Final Environmental Impact Statement for the

Proposed Kalaeloa Desalination Facility

Kalaeloa, Ewa, Oahu, Hawaii

TMK: **9-1-031 Portion 01**
9-1-031 Portion 28



September 2008

HONOLULU BOARD OF WATER SUPPLY

City and County of Honolulu
State of Hawaii

Final Environmental Impact Statement

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I indicate that the statement and all ancillary documents were prepared under my direction or supervision and that the information submitted, to the best of my knowledge fully addresses the document content requirements as set forth in section 11-200-18. Hawaii Administrative Rules.

Very truly yours,

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This document contains the Final Environmental Impact Statement, or FEIS, in accordance with Chapter 343 of the Hawaii Revised Statutes. Pursuant to EIS requirements, EIS changes based on responses to DEIS public comments are tracked throughout this FEIS. Added text is double underlined.

Project Summary

Project Location:	Kalaeloa, Ewa, Oahu
Tax Map Key:	9-1-031: Portion 028 and 9-1-031: Portion 001
Property Owner:	Desalination Parcel -Board of Water Supply, City and County of Honolulu Hawaiian Electric Company substation site- State of Hawaii
Land Area:	Desalination Plant – a portion of a 20 acre parcel Electrical Substation – a 1-acre parcel
Existing Land Use:	Undeveloped with exploratory wells; formerly part of the Barbers Point Naval Air Station and state-owned land
State Land Use:	Urban
Zoning:	F-1 Military and I-2 Industrial

Proposed Action

The City and County of Honolulu, Board of Water Supply (BWS) proposes to build a seawater reverse osmosis desalination facility in Kalaeloa, Ewa, Oahu. The proposed desalination facility will produce 5 million gallons per day (MGD) of potable water with provisions, as needed, to expand up to 15 mgd, that will add to Oahu's potable water supply. The desalination facility will occupy a portion of the 20-acre parcel. An electrical transformer substation will be constructed on an adjacent one-acre parcel mauka (towards the mountains) of the proposed desalination facility. This substation will provide a dedicated source of power to the desalination plant. To serve this substation, a 46kV sub-transmission line extension from the existing power system will be required.

The desalination property is undeveloped and was previously part of the Barbers Point Naval Air Station (BPNAS). The location of the project site is shown in Figure A (next page). Exploratory wells have been constructed on the property, as described in the *Honolulu Desalination Study Final Environmental Assessment and Finding of No Significant Impact, April 2001*.

The proposed desalination facility will include an administration/visitor center and control building, a chemical storage building, source water wells, pretreatment facilities, reverse osmosis facilities, post-treatment facilities, a transmission main, potential emergency brine pond, reject water disposal facilities (injection wells), domestic waste package system and an electrical transformer substation.

Source water for the desalination will be provided through a network of three basalt aquifer (BA) wells located on the 20-acre parcel. Pretreatment will consist of chemical addition and filtration. Pretreated water (filtrate) from filtration will then undergo reverse osmosis desalination. Product water (permeate) from reverse osmosis will be conditioned before finally being pumped into the BWS distribution system. Up to 12 MGD of source water will be pumped from the source water well network to produce 5 MGD of potable water. Waste cleaning solution and brine (7 MGD) from pretreatment and reverse

osmosis operations will be disposed of through injection wells in the Lower Caprock Aquifer 250-300 below mean sea level. The exact depth and location of the wells has yet to be determined.

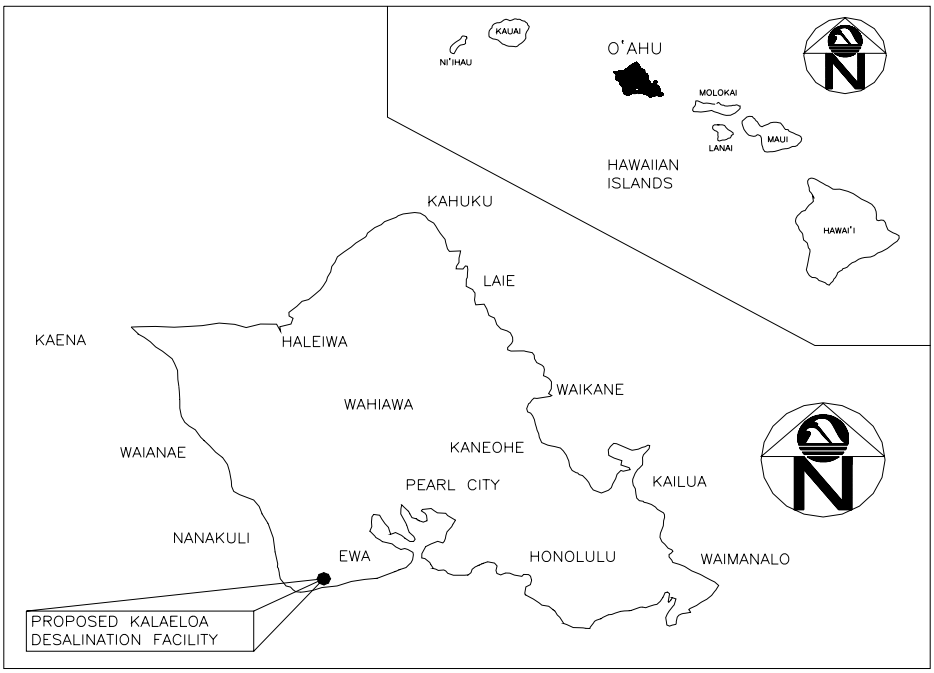


Figure A - Proposed Location of Facility

Potential Beneficial Impacts

- Considering present patterns of potable water use, projected demands from the City's population projections to 2030 and available potable groundwater sources, it is estimated that the sustainable yield of Oahu's natural freshwater sources may be reached within 20 years. The need to ensure the long-term availability of an alternate and reliable potable water source has prompted BWS to place a greater emphasis on developing alternative water resources. This project, when considered with other water management alternatives such as recycled water, ocean thermal energy conversion (OTEC) and conservation, will assist in providing additional, alternative and reliable sources of drinking water for the Island of Oahu.
- Utilizing desalination as a potable water resource will assist in slowing the rate of water draw on the limited groundwater resources of Oahu, allowing more natural recharge patterns, aquifer replenishment and less ecological strain on natural water patterns.
- Construction of the desalination plant will allow the utilization of free land given to the BWS for a "public benefit" use by the federal government.
- Groundwater resources are becoming more expensive and regulated, as well as difficult to access, store and transport. The cost of desalination facilities continues to

drop as the industry expands and the technology improves. The proposed facility will utilize the most current technology available. Over the years, the cost of desalination facilities and treatment has decreased. These savings are now part of the proposed facility. As technology improves, innovations may be incorporated into the facility if they are cost-effective and increase the efficiency of the facility. For example, improved membranes could be incorporated into existing vessels when they reach their life expectancy and require replacement. Any future phases would benefit from the latest technological advances.

- The BWS' mandate is to provide potable water to its service area. The proposed facility will impact public facilities by initially providing five million gallons a day of additional water to the BWS potable water supply system.

Potential Adverse Impacts

- This site is currently vacant. Construction of the facility will involve grading, filling, removal of vegetation and the actual construction of the facility itself. Noise, odor and dust will be associated with the construction.

- Disposal wells will inject backflush water, brine and membrane cleaning solution into the Lower Caprock Aquifer (LCA).

- The project may contain volatile and/or toxic chemicals on-site. These chemicals are needed for the operation and maintenance of the plant.

- Birds may be attracted to the emergency brine storage pond when it is filled with water. These birds may interfere with small craft landings at the nearby landing facility at BPNAS.

- Construction and operation of this facility may impact known archaeological sites in the area.

Proposed Mitigation Measures and Conditions

1) Best Management Practices for dust control, shall be applied to the project during construction. Dust control measures will include watering of the work area, use of windscreens, cleaning adjacent roadways, and covering open-bodied trucks.

2) A recommendation is made to install a monitoring well to determine the hydraulic gradient, whether the density gradient (injectant) is behaving as theorized, and to monitor for any contamination of the source water. The monitor well should be drilled midway between the source and injection wells and open to the aquifer from the elevation of the bottom of the production well(s) and a point midway to the top of the open portion of the injection wells (Mink and Yuen, 2002). A single monitor well placed midway between the pumping and injection wells, will be

adequate to keep track of the changes in potential (head) caused by pumping and injection and changes in salinity that may arise from injection.

3) During construction, Best Management Practices shall be implemented to prevent erosion and runoff into the channel. These may include a 15 foot wide berm built on site and extending the mauka - makai (towards the sea) length of the site and designed to prevent silt runoff from the site. Other acceptable BMP's may be utilized in place of, or conjunction with, the berm wall.

4) In compliance with the BWS standards, all structures at the site shall be constructed to Seismic Zone 3 Construction Standards. As to the structures themselves, they would be built to meet or exceed all current Uniform Building Code standards pertaining to tsunami inundation zones.

5) Proper storage of chemicals will help reduce the risk of environmental damage in the event of a flood or tsunami. All unused chemicals will be stored in fireproof buildings that conform to the UBC and to Department of Health standards as to labeling, storage and use. Any liquid storage tanks will be surrounded by berms to contain any accidental spills.

6) Whenever the emergency brine pond is filled, streamers, a bladder cover or other bird dispersing implements may be utilized, if recommended by the U.S Fish and Wildlife Service. These implements shall remain as long as water remains in the pond. Consultation with the U.S. Fish and Wildlife Service is recommended prior to installation.

7) Interim protection measures are recommended for archaeological Site 6374 and a previously identified human burial, Site 4209, located on the western edge of the drainage channel (TMK 9-1-31:46). The two sites will be well-marked and afforded temporary protection during upcoming construction phases so that heavy equipment will not inadvertently disturb or destroy the sinkhole features. In the event that construction occurs near the numbered burial adjoining the channel, the State Historic Preservation Division and the Burial Council shall be contacted to provide appropriate action strategies. An archaeological monitoring and mitigation plan may be submitted to SHPD prior to construction for their review and approval.

8) The landscape plan shall be implemented as shown on the Master Plan but may include recommended species from the flora study irrigated through drip lines. A condition is recommended that *maiapilo* and *Myoporum stellatum* as well as other native lowland species be used for landscaping the facility. The City and County of Honolulu Botanical Garden should be contacted to propagate these species on the project site.

9) The architectural features and earthtone colors shall be the same or similar to those used and described in the Master Plan.

10) All facilities and parking will be designed to all applicable building code standards including Americans with Disabilities Act standards.

11) Construction activities will be scheduled during weekdays between 8:30 am and 3:30 pm or as required by BWS, and will not be scheduled during weekends, Federal or State holidays. Any work outside these periods will obtain necessary approvals or permits. This schedule will help limit any traffic impacts from construction.

12) In order to reduce noise generated by construction equipment, mufflers will be used on construction equipment, and all equipment will be kept in good working order. Pump and drilling equipment will be regulated for noise generation by State Department of Health rules. If noise levels from construction activities are expected to exceed allowable levels, the contractor will obtain a noise permit. Drills and pumps will have sound attenuation devices including mutes or structural enclosures.

13) A Fire Department access road will be established within 150 feet of the first floor of the most remote structure. It will have a minimum vertical clearance of 13 feet 6 inches, be constructed of an all-weather driving surface complying with Department of Transportation Services (DTS) standards, be capable of supporting the minimum 60,000 pound weight of fire apparatus, and have a gradient not exceeding 20 percent. The unobstructed width of the fire apparatus access road shall meet the requirement of the appropriate county jurisdiction. All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround having a radius complying with DTS standards.

14) A new waterline where all appurtenances, fire hydrants, and fire flow requirements meet Board of Water Supply standards will be provided.

Alternatives Considered

Alternatives reviewed for the project include the Delayed Action, No Action, Alternative Desalination Technologies, Disposal Methods and Locations, and Water Conservation. Alternatives for wastewater disposal were also analyzed. The three disposal methods reviewed include injection wells, ocean outfall, and brine ponds. Three project locations were considered for this project: Kalaeloa, Sand Island Wastewater Treatment Plant, and Keehi Lagoon Beach Park.

Unresolved Issues

The exact composition of the source water and the desalination product water has not been determined. These issues will be addressed as part of the source water permit application through the State Department of Health. In addition, the exact depth and location of the injection well(s) either in the LCA, has not been resolved. The final determination will be made by the Board of Water Supply based on hydrological studies

and requirements of the Department of Health and the Environmental Protection Agency (EPA).

Compatibility with Land Use Plans and Policies
The construction of this facility is not likely to bring about unanticipated development to the surrounding area. A five MGD facility will provide only a small amount of total water for the island of Oahu. While large-scale desalination in general may have growth-inducing impacts, a 5 MGD facility is unlikely to impact growth or growth pressures. The Board of Water Supply currently provides 150 MGD to the island. The 5 MGD facility represents approximately 3 percent of this water supply.

This project is being proposed by the Board of Water Supply to help meet water demands in the approved Ewa Development Plan projected growth area and throughout Oahu. This project is compatible with State Land Use Plans and Policies related to industrial uses in the I-2 zone and the State Land Use Designation of "Urban". This project is also consistent with the Ewa Development Plan and the Kalaeloa Redevelopment Plan policies related to development and design of the desalination project at this location.

Permits and Approvals Required
Prior to construction, the following permits will need to be secured by the BWS

City and County of Honolulu Permits

- Department of Planning and Permitting (DPP) - Building Permit
- DPP - Grubbing, Grading, and Stockpiling Permit
- DPP – Permit for transmission line at Kalaeloa Boulevard
- DTS – Road construction permits

State of Hawaii Permits

- Department of Land and Natural Resources (DLNR), Commission on Water Resource Management – Well construction permit, pump installation permit, and water use permit
- Department of Health, Noise, Radiation, and Indoor Air Quality Branch – Community Noise Permit (May be required if the noise levels from construction activities are expected to exceed allowable levels as defined in Hawaii Administrative Rules 11-46-4.)
- Department of Health, Safe Drinking Water Branch – Injection well permit, and Source Water Use Approval
- Department of Transportation-Airports Division – Aviation Easement 540 and 541.
- Department of Health, Clean Water Branch – National Pollutant Discharge Elimination System (NPDES), Stormwater and Hydrotesting Testing

Federal Permits

U.S. Department of Transportation – Notice of Proposed Construction or Alteration, FAA Form 7460-1

List of Abbreviations

AAQS	Ambient Air Quality Standards
ADA	Americans with Disabilities Act
BA	Basalt Aquifer
BMP	Best Management Practice
BPNAS	Barbers Point Naval Air Station
BRAC	Base Relocation and Closure Committee
BWS	Board of Water Supply
C&C	City and County of Honolulu
CEQ	Center for Environmental Quality
CO	Carbon Monoxide
DDC	Department of Design and Construction
DEIS	Draft Environmental Impact Statement
DLNR	Department of Land and Natural Resources
DP	Development Plan
DPP	Department of Planning and Permitting
DTS	Department of Transportation Services
EA	Environmental Assessment
EJ	Environmental Justice
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EPA	Environmental Protection Agency
FEIS	Final Environmental Impact Statement
HAR	Hawaii Administrative Rules
HECo	Hawaiian Electric Company
HHS	U.S. Department of Health and Human Services
JACIP	James A. Campbell Industrial Park
kw	kilowatts
LCA	Lower Caprock Aquifer
MCL	Maximum Contaminant Levels
MCS	Membrane Cleaning Solution
MED	Multi-Effect Distillation
mg/l	milligrams per liter
MGD	Million Gallons per Day
MSDS	Material Safety Data Sheet
MSF	Multi-Stage Flash Distillation
mw	megawatts
NAAQS	National Ambient Air Quality Standards
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
OEQC	Office of Environmental Quality Control
OTEC	Ocean Thermal Energy Conversion

PCBs	Polychlorinated Biphenyls
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PM_{10}	Particulate Matter less than 10 microns
psi	pounds per square inch
O_3	Ozone
RCRA	Resource Conservation Recovery Act
RO	Reverse Osmosis
SAP	Special Area Plan
SHPD	State Historic Preservation Division
SO_2	Sulfur Dioxide
SO_X	Sulfur Oxides
TDS	Total Dissolved Solids
UBC	Uniform Building Code
UCA	Upper Caprock Aquifer
UF	Ultrafiltration
USEPA	U.S. Environmental Protection Agency
WMCS	Wasted Membrane Cleaning Solution
WWTP	Wastewater Treatment Plant

Glossary

Ambient Air – The general outdoor atmosphere, external to buildings, to which the general public has access

Aquifer – an underground area of rock or another geologic feature that contains economically significant quantities of groundwater to supply wells and springs

Basal – a major body of groundwater that floats on and is in equilibrium with a body of salt water

Brine – sea water that is unusually high in salt content because of evaporation, freezing, or filtration

Carbon Monoxide – a colorless, odorless, tasteless gas under atmospheric conditions; produced by the incomplete combustion of carbon fuels with the majority of emissions coming from transportation feeds

Desalination – the removal of dissolved salts from seawater or brackish water

Dissolved Solids – any minerals, salts, metals, cations or anions dissolved in water, including anything present in water other than the water (H_20) molecule and suspended solids

Distillation – a separation process in which a liquid is evaporated and the vapor is condensed to a liquid, usually for the purpose of purification

Endemic species – a species that is found only in one region, i.e. species endemic to Hawaii are found only in Hawaii

Indigenous species – a species that is native to one or more region, i.e. indigenous species in Hawaii are considered native species but may be found in other areas

Membrane – material that regulates the flow of substances. In reverse osmosis, membranes prohibit the flow of salts

NAAQS – National Ambient Air Quality Standards; these are pollutant standards that the EPA has established to protect public health and welfare.

Nitrogen Dioxide – a brownish, highly corrosive gas with a pungent odor; formed in the atmosphere from emissions of nitrogen oxides, feeds of nitrogen oxides include electric utilities, industrial boilers, motor vehicle exhaust and combustion of fossil fuels; is also a component in the atmospheric reaction that produces ground-level ozone

Osmotic pressure – the force exerted on a semi-permeable membrane that is between a pure solvent and a solution, or between two solutions of differing concentration, caused by the tendency of solvent molecules to pass through the membrane into the more dilute solution

Particulate Matter – any dispersed matter, solid or liquid, in which the individual aggregates are larger than the single molecules in diameter, but smaller than 500 micron; includes dust, soot, smoke, and liquid droplets from feeds such as factories, power plants, motor vehicles, construction activities, agricultural activities, and fires

Potable Water – water that is safe and suitable to drink; drinking water

Scaling – the precipitation of magnesium and calcium; this can cause clogs on membranes and pipes and reduce the efficiency of the facility

Spores – A reproductive cell produced by plants (fungi, moss, ferns) and some protozoa and bacteria; spores have thick walls, and are able to withstand varying temperatures, humidity, and other unfavorable conditions

Sulfur Oxides – colorless gases which include sulfur dioxide (SO_2), sulfur trioxide, their acids, and the salts of their acids; emissions of sulfur oxides are largely from feeds that burn fossil fuels such as coal and oil, and locally from the eruption of Kilauea Volcano

Suspended Solids – any particles that are neither dissolved nor settled in the water, such as very fine clay minerals

Sustainable yields – the maximum rate at which water may be withdrawn from a water feed without impairing the utility or quality of the water feed as determined by the Water Commission

Chapter 1

Chapter 1: Purpose and Project Description

1.1 Introduction and Historical Perspective

The City and County of Honolulu (C&C) Board of Water Supply (BWS) is responsible for the management, control and operation of Oahu's municipal water supply system. As part of this responsibility, the BWS is investigating alternative methods to obtain potable water. In the 1980s, it was estimated that the sustainable yield of Oahu's freshwater resources would be reached by the year 2000. However, because of the closure of the water-intensive sugar industry, combined with a modest economy, upcoming, new groundwater sources and successful conservation measures, the estimate has been pushed back to beyond the year 2020. Prudent planning means planning for uncertainty and increased reliability for public health and safety purposes. In 1983 and again in 1995, BWS has had to close major well stations when pesticides detected in the water rose beyond maximum contaminant levels. Development moratoriums were imposed in 1983 until treatment systems were built. Recently, the Hawaii Supreme Court decision on Waiahole Ditch emphasized water resource management of streams. The uncertainty of these judicial and administrative decisions on natural resource planning places a greater emphasis on developing alternative resources. Taking advantage of new technologies in alternative water source development will reduce the need for new groundwater sources and allow more efficient use of all resources by matching use with water quality. Reclamation and desalination plants for the arid Ewa district add multiple water supplies and associated reliability and flexibility to continue to best serve our customers and sustain the precious potable (drinking) groundwater resource. Use of alternative sources may be based on feasibility based on economics of location relative to area of use, operation and maintenance of sources, and cost of money.

A seawater desalination feasibility study titled Honolulu Desalination Study was completed in June 2000. The study evaluated different facility locations and technologies available for desalination. The recommended alternative was construction of a reverse osmosis (RO) desalination facility at the former Barbers Point Naval Air Station (BPNAS) site.

In April 2001, BWS published *Honolulu Desalination Study Final Environmental Assessment and Finding of No Significant Impact (FONSI)* for the two exploratory wells constructed on the proposed project site.

BWS then published the *Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility* in December 2001.

In compliance with Hawaii's Environmental Review law (HRS 343), *the Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility was* prepared for circulation and public review.

1.2 The Purpose of Desalination

Water on Earth is abundant. However, not all of this water is available for drinking water. As shown in the Figure 1.1 below, 97 percent of the Earth's water is saltwater located in the oceans and seas. Two percent of the remaining water is frozen in ice and glaciers, and 0.3 percent is in the atmosphere. That leaves only 0.7 percent of the Earth's water supply as available freshwater. Of this amount, most is ground water stored in the aquifers and is heavily used for irrigation, industry, and municipalities of the world. Unfortunately, not all is suitable for drinking or has been impacted by human activities and is not suitable as drinking water. All aquifers have a limited sustainability and the size of the aquifer determines available water quantity so that areas of heavy demand and limited supply are challenged to solve the problem of sustainable water delivery. Oahu being an island in the middle of the Pacific Ocean is one of those areas.

Desalination of seawater occurs naturally in the water cycle. As shown in Figure 1.2, water evaporates from the oceans. When the water evaporates, it leaves behind salts and creates fresh water vapor in the atmosphere. This water vapor eventually turns to rain and falls to the ground. Rainwater then flows across the land, and moves back towards the ocean in aquifers, streams and rivers. As it flows across the Earth, minerals and other materials dissolve in the water, increasing its salinity. This water flows into the oceans, and the water cycle continues (Buros, 2000).

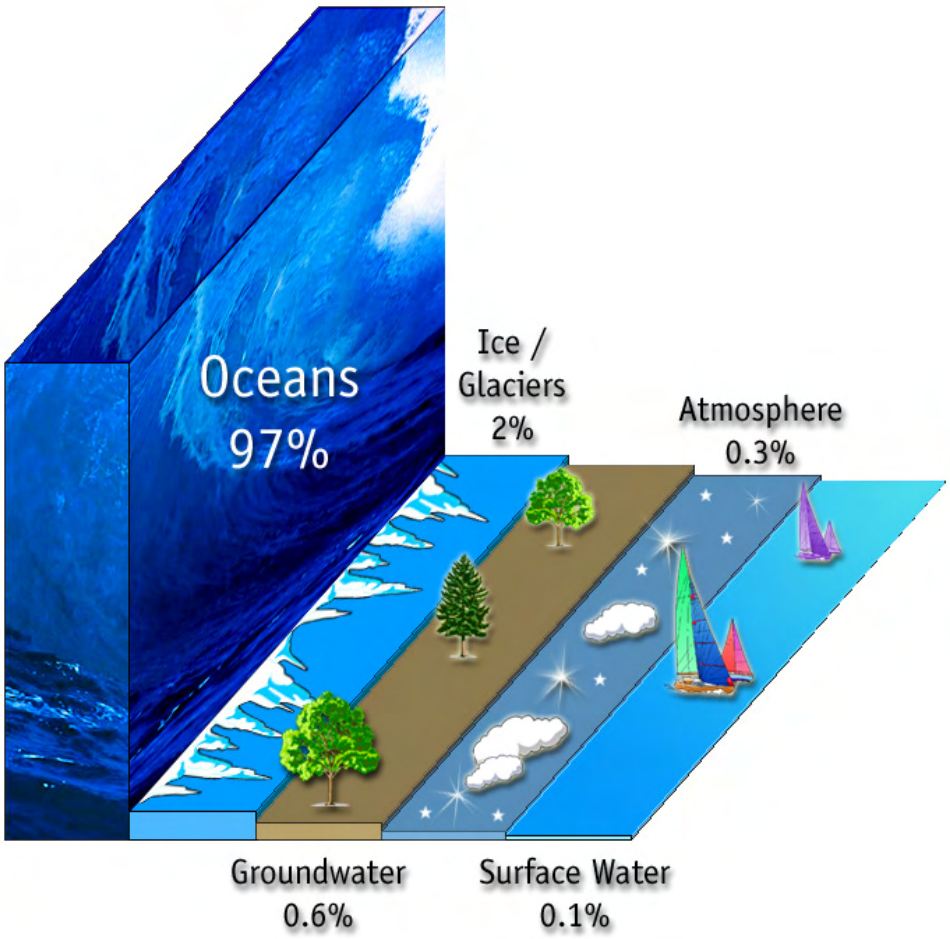


Figure 1.1: Distribution of the world's water supply (AWWA, 1996)

"Sustainable Yield" means the maximum rate at which water may be withdrawn from a water source without impairing the utility or quality of the water source. Alternative water sources can provide potable water without impacting fresh groundwater supplies. The proposed desalination facility will lessen the impact on the fresh groundwater supplies in the area, increase the general drinking water supply, and reduce the likelihood that demand will exceed sustainable yields.

1.3 Desalination Technologies

In many areas around the world, desalinated water is used as the main source of drinking water. Areas including the Caribbean, Mediterranean, and the Middle East rely heavily on desalinated water. The source water for desalination ranges from brackish to seawater. Desalinated water can provide an economically feasible and reliable source of freshwater in areas where it is not readily available. Desalination is also being utilized in Florida where freshwater resources cannot meet demand.

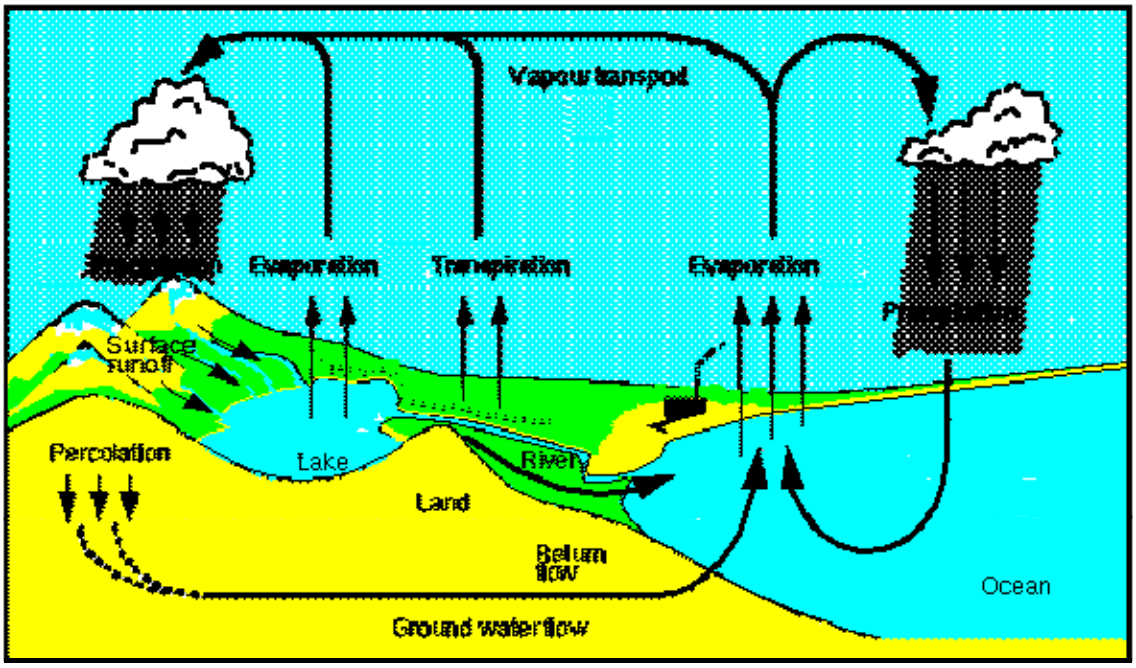


Figure 1.2: Water Cycle (MITC 2002)

Desalination is currently used in over 100 countries, with most of this capacity used in the Middle East and North Africa. Saudi Arabia has the largest desalination capacity, followed by the United States. In 1998, the total worldwide capacity of desalination plants was 6 billion gallons per day, which was an increase of about 70 percent from 1990 (Buros 2000).

There are several commercially available desalination processes, including:

- Thermal
  - Multi-Stage Flash Distillation (MSF)
  - Multi-Effect Distillation (MED)
  - Vapor Compression (VC)
- Membrane
  - Electrodialysis (ED)
  - Reverse Osmosis (RO)
- Freezing
- Membrane Distillation (MD)
- Solar Humidification (SH)

Of the current worldwide desalination capacity, approximately 42 percent uses reverse osmosis (See Figure 1.3). Reverse osmosis is a widely accepted technology for removing dissolved solids from a liquid. It can be used in an industrial setting to clean process water, and also in a municipal setting to purify drinking water.

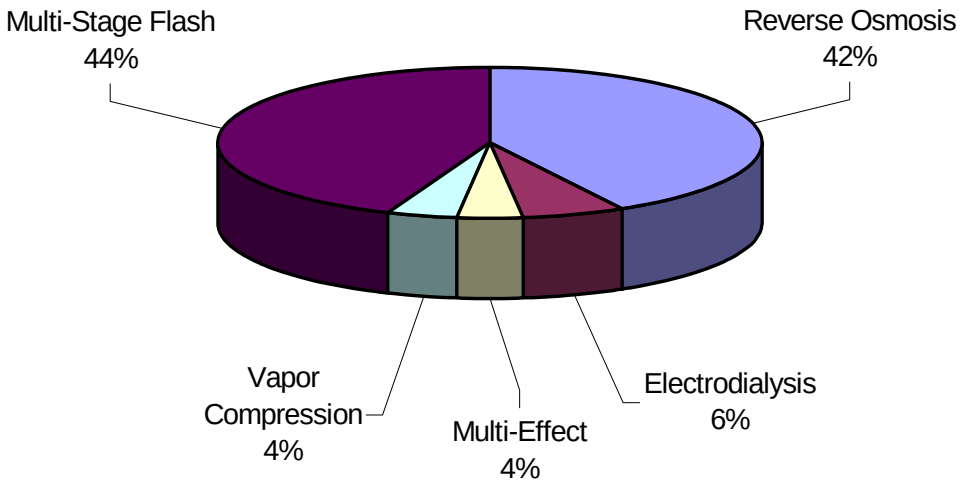


Figure 1.3: Percentage of Capacity by Process (Buros, 2000)

Over the past 50 years, desalination technology has been actively developed and has become a reliable source of fresh water. Advances in technology and expansion of the industry have greatly lowered the cost of desalination, and increased efficiencies.

1.4 The Theory behind Reverse Osmosis

Osmosis is a diffusion process through a semi-permeable membrane between two liquids of different concentrations. The weaker solute moves through cell walls to the stronger solute. It is a natural process that sustains plant and animal growth and life. Reverse osmosis is the opposite process, one where energy is supplied on the more concentrated solute to force pure water through a semi-permeable membrane, leaving behind the salts. Reverse osmosis (RO) is the proposed desalination technology. Alternative technologies that were considered for this project will be discussed in subsequent sections. RO is a membrane process that is conceptually similar to filtration in that a barrier permits only certain constituents of a solution to pass through. However, as opposed to filtration, when an RO system is operating properly, there is no build up on the membrane. During RO, pressurized seawater is desalted by passing through a membrane. The major energy requirement for RO is for pressurizing the source water. The diagrams below will help explain the two processes.

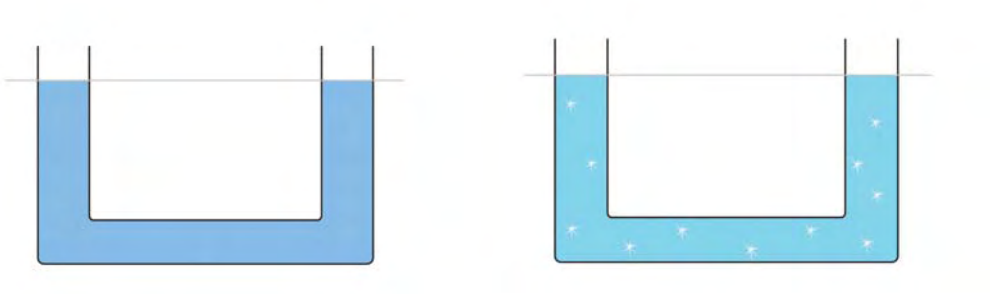


Figure 1.4a: Normal Osmosis Procedure

The figure on the left above shows fresh water in a tube; the figure on the right shows saltwater in a tube. The stars in the saltwater represent dissolved salts. As you would expect, the water in each tube has equilibrated and is at the same height on each end of the tube.

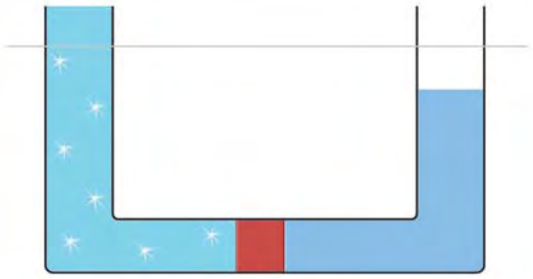


Figure 1.4b: Normal Osmosis Procedure

In the figure above, a semi-permeable membrane has separated the freshwater and saltwater. A semi-permeable membrane is a membrane that will allow some atoms or molecules to pass through but not others. Initially, the level of the fresh water and saltwater in the tube is equal. But, over time, the water level on the saltwater side rises. This is due to normal osmotic pressure.

The membrane allows water molecules to pass through, but not salt molecules. Water molecules on both sides of the membrane are in constant motion; a natural phenomenon called Brownian motion. On the saltwater side of the membrane, the membrane selectively prevents the passage of certain ions. The pores on the freshwater side of the membrane do not become clogged. Therefore, more water molecules can pass through to the saltwater side than can pass through to the freshwater side. The water level on the saltwater side will rise until the water pressure on the saltwater side is equal to the osmotic pressure.

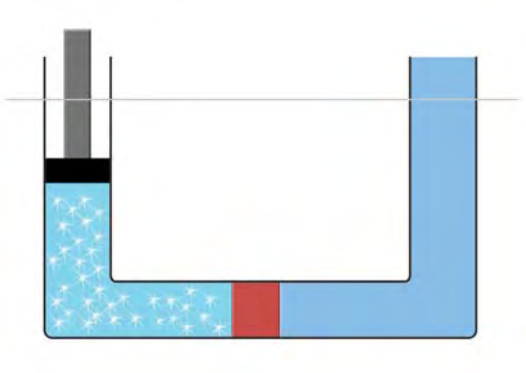


Figure 1.4c: Reverse Osmosis Procedure

In RO, pressure is used to reverse the normal osmotic process. The figure above demonstrates reverse osmosis. Saltwater is placed on one side of a semi-permeable membrane. When pressure is applied to the saltwater, osmosis is reversed. Freshwater is pushed through the membrane and the salt molecules remain on the other side. RO will remove dissolved solids, salts and any bacteria present in the saltwater.

1.5 Statement of Objectives

The main purpose of BWS is to provide a municipal water supply capable of meeting domestic and fire protection needs for the island of Oahu. The BWS is responsible for providing a safe and reliable water distribution system for Oahu residents at the most affordable cost possible. The BWS has assumed a leadership role in the environmental stewardship of Oahu's precious natural resources by forming community partnerships to protect our watersheds and are working with the City and County of Honolulu and the State of Hawaii to effectively manage our water resources.

About 92 percent of Oahu's water comes from underground aquifers fed by rainfall along the Koolau and Waianae mountain ranges. High-level dike tunnels – such as Waihee and Luluku – provide about 8 percent of the island's water supply. Closure of major wells because of pesticide contamination, judicial and administrative decisions on stream water management, increasing population, industrial water demands and adverse climactic conditions, place a greater emphasis on the importance of long term planning and developing alternate water resources. Oahu's increasing population and resulting water demands are shown in Figure 1.5 and Figure 1.6. The BWS goals include moving towards alternative water sources, emphasizing reuse and desalination, leveraging new technology, and conservation which is further discussed in Section 2.6 of this report.

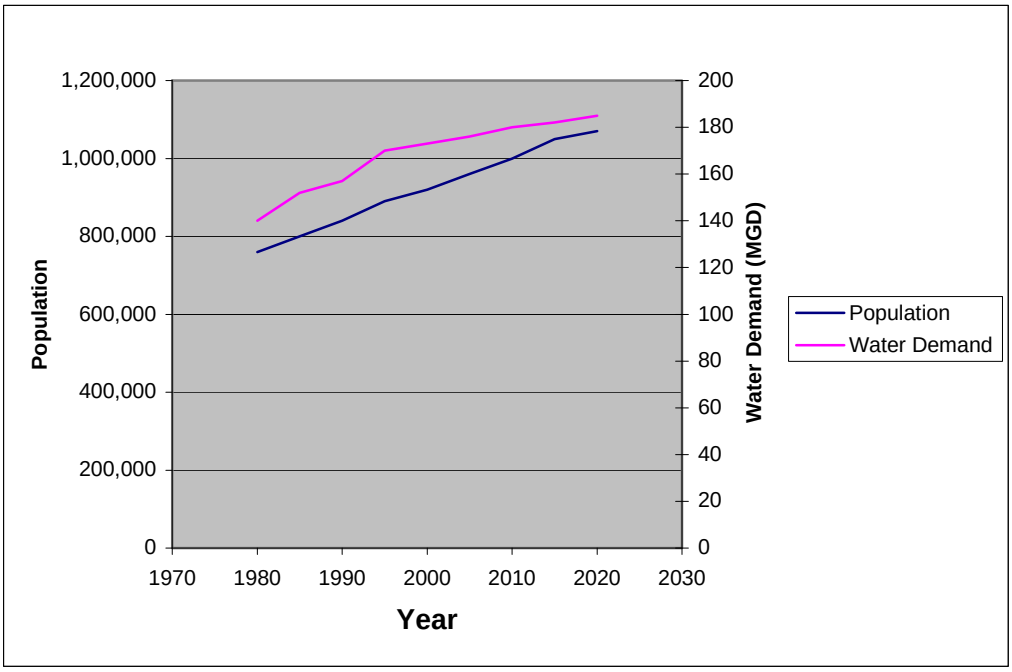


Figure 1.5: Projections of Oahu Population and Water Demand Growth (GMP, 2000)

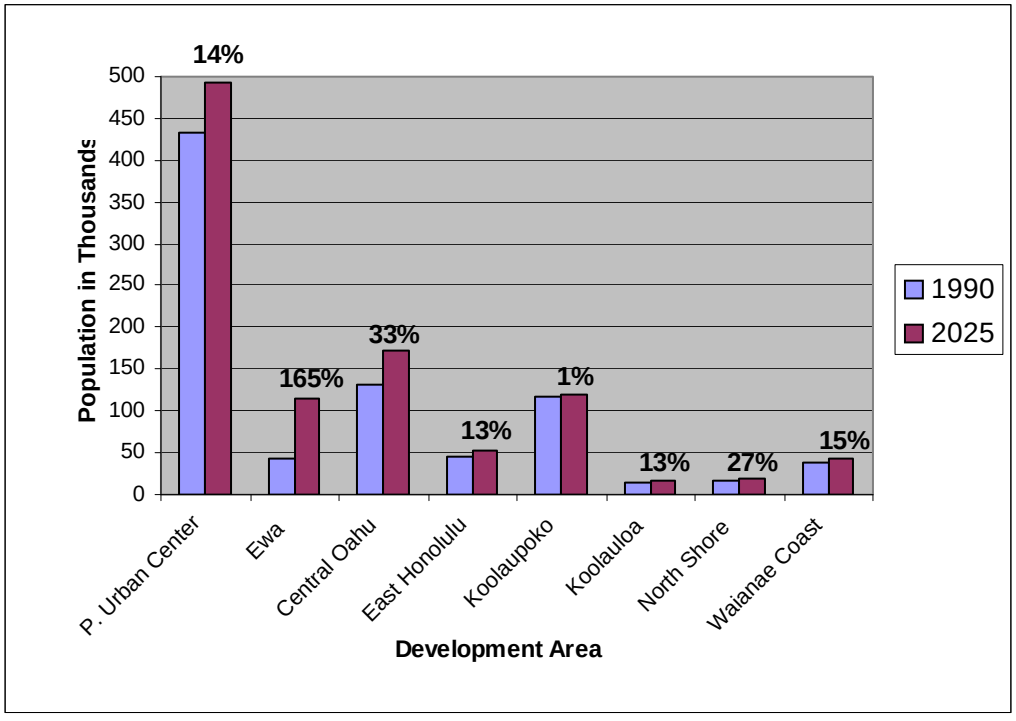


Figure 1.6: Projected Population Growth by Development Area on Oahu and Percentage Change between 1990 and 2025 (DPP, 2000)

	2000	2025
Resident Population	67,156	113,081
Demand (MGD)	13.62	37.2
Per Capita Demand (GPCD)	225.85	225.85

Table 1.1: Projected Populations and Water Demands 1990 for the Ewa Water District (BWS)

Watershed Planning

There has been a long-held BWS water transfer plan to move surplus water from areas of supply to areas of demand. While certain transfers between districts will still need to occur to dry areas such as Waianae and Hawaii Kai districts, district transfers will decrease. This is because of water rights issues, environmental concerns and economic costs. As districts grow and need more water, BWS is looking at alternative supplies rather than moving water around the island. Watershed planning parallels the sustainable Hawaiian concept of ahupuaa. This is the unit of land in which Hawaiians protected and conserved resources in an area from mauka to makai. The goal is to try to live within each watershed's means first, before sharing resources from other watersheds. The BWS is committed to creating a sustainable future on Oahu, one in which there is enough water for many generations to come.

1.6 Purpose and Need for the DEIS

Hawaii's Environmental Review law (HRS 343) requires the preparation of environmental assessments (EAs) and environmental impact statements (EISs) for many development projects. HRS 343-6 is applicable if a project proposes to use, "state or county lands or the use of state or county funds, other than funds to be used for feasibility or planning studies for possible future programs or projects which the agency has not approved, adopted, or funded, or funds to be used for the acquisition of unimproved real property; provided that the agency shall consider environmental factors and available alternatives in its feasibility or planning studies" (HI 2002).

Under this law, the government must give systematic consideration to environmental, social, and economic consequences of proposed development projects before granting permits. The public is also given the opportunity to participate in planning projects that fall under this law. There are eight types of actions that are covered under the environmental review law. This project triggered the environmental review process because of the use of county land and county funds.

BWS prepared an EA (April 2001) for the drilling of test wells at the Kalaeloa site and preliminary planning for the desalination facility. These wells were drilled to help determine hydrogeological features of the site and to obtain needed data for the design of the desalination facility. BWS also published an Environmental Impact Statement Preparation Notice (EISPN) in December 2001 to notify the public and governmental agencies that BWS was preparing an EIS for the design and construction of a proposed desalination facility.

The draft EIS disclosed the project design and any potential impacts of the proposed facility. The draft EIS was available to the public for a 45-day review period which concluded on April 22, 2003.

This Final EIS incorporates the changes proposed by various reviewing agencies in response to the Draft EIS notification. For ease of review, the changes are shown throughout this document. Finally, the comment letters received from the Draft EIS circulation and BWS responses are included as an attachment to this Final EIS so that comparisons can be made as to the changes.

1.7 Proposed Action

In order to develop an independent water source to supplement the limited potable groundwater resources of Oahu, the Honolulu BWS proposes to build a seawater desalination facility at Kalaeloa, formerly the Barbers Point Naval Air Station. The proposed facility will produce 5 MGD of potable water. In conjunction with this project, a new Hawaiian Electric Company (HECO) substation will be constructed to serve the power needs of the desalination facility. A transmission main will be constructed to Kalaeloa Boulevard to transport the water to the water supply system.

1.7.1 Proposed Site

The site in the Kalaeloa area was chosen as the preferred site after comparison with Sand Island and Keehi Lagoon sites. The proposed Kalaeloa desalination facility is located within the Ewa Development Plan Boundaries. The site is bordered by a storm drainage channel on the east, the James A. Campbell Industrial Park on the north and west, and additional undeveloped land to the south. A portion of the 20-acre site TMK 9-1-031: Portion 028, will be used for the proposed desalination plant while a contiguous 1.39 acre parcel, TMK 9-1-031: Portion 001, located mauka of the plant, will be used for the substation facility.

Access to the site will be from the east end of Olai Street (private), through an access easement (Easement 1373). This easement runs across the parcel immediately north of the site. The water transmission line will be constructed from the plant to Kalaeloa Boulevard.

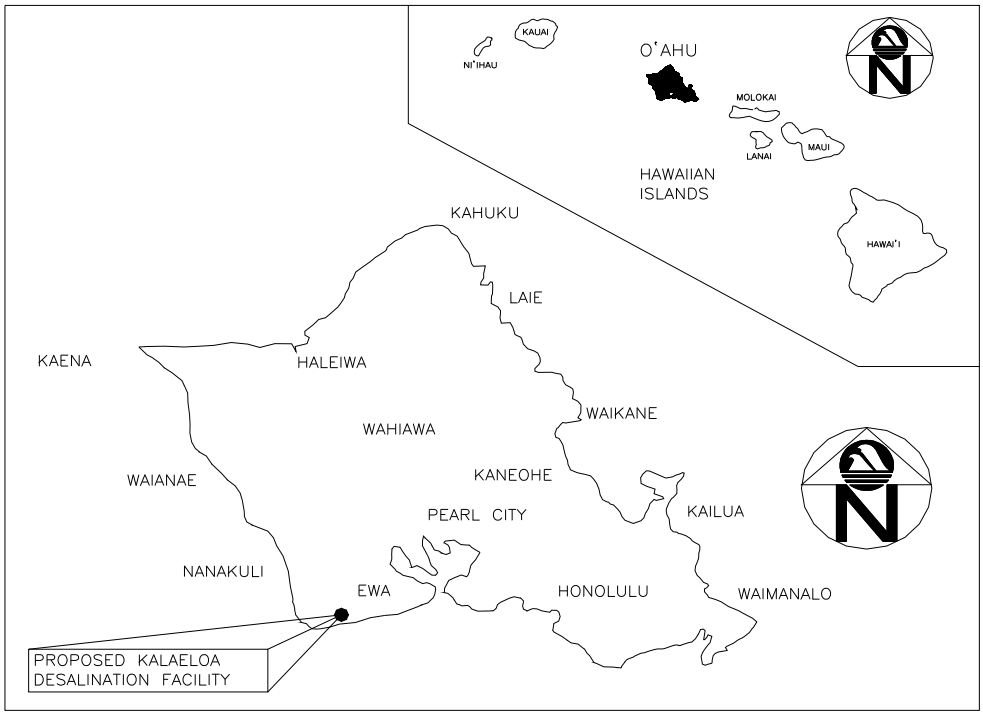


Figure 1.7: General Location of Proposed Kalaeloa Desalination Facility

1.7.2 Proposed Facilities

See Master Plan Appendix D, for details of plans.

Structures

The facility will consist of an electric substation, administration/visitor center, parking, temporary brine pond, a chemical storage building, and a reverse osmosis building. The RO building will contain areas for: pretreatment and reverse osmosis equipment. The administration/visitor center will contain a total of 6605 square feet of space while the RO building will contain 28,440 square feet. The structures will be designed with materials such as masonry split face, pip rough concrete, and a monier tile roof. The reverse osmosis building will have a metal roof deck with skylights. The specific design for the electrical substation and a 46kV line extension has not been determined but will be consistent with other substations within the HECO service network.

The structures are to be laid out to meet the code requirements for separation, accessibility and means of egress and ingress, and accommodations of the existing topographic conditions. The intent is to create a "campus" character. A six-foot high chain link fence shall be located around the site. All structures will

constructed to comply with flood zone, earthquake and tsunami zone building code requirements.

Avigation Easement
The buildings will be located in a flight easement that limits structure height on the site, to between 45 feet on the east and 65 feet on the west. The desalination structures proposed are designed for a maximum height not to exceed 32 feet anywhere on the property, in compliance with applicable codes and other local requirements (See Appendix D).

Landscaping
The theme of the landscaping for the area is a tropical shoreline environment. The plants selected are designed to be drought-tolerant, hardy, wind-resistant, and low maintenance. Emphasis is placed on utilization of native, Hawaiian shoreline zone plants appropriate to the Kalaeloa site. Visually framing the Administration/Visitor Center, and providing a focal point, is a dry streambed constructed of river rock and indigenous coral builders accentuated to reinforce the xeriscape theme of the landscape. To minimize initial cost, long-term maintenance and irrigation requirements, the landscape is focused on the Administration/Visitor Center including flowering canopy trees for cooling and shade. The landscaping of the facility perimeter will be limited to providing necessary drought and wind tolerant visual screening and grass for low maintenance erosion control. Irrigation will be accomplished with a combination of low flow spray heads or pop-up rotors for lawn areas; bubblers or drip emitters for trees and palms; and drip emitters for shrubs and groundcovers (See Appendix D).

Access
New roads and driveways will be constructed for easy access to the proposed facilities. Roadways will be WB-60 truck accessible. Olai Street (private) will be crowned and travel lanes will be 12-feet wide or as coordinated with owner(s). Paved shoulders will be 4-feet wide turnaround and/or reversing lanes will be provided for the convenience of maintenance vehicles servicing the new structures. Twenty-two parking stalls (three of which are bus parking), and seven handicapped accessible stalls, will be provided adjacent to the Administration/Visitor Center in compliance with all applicable County parking standards and provisions of the Americans with Disabilities Act (ADA) (See Appendix D). Pavement areas on site will have standard concrete curbs.

A Fire Department access road will be established within 150 feet of the first floor of the most remote structure. It will have a minimum vertical clearance of 13 feet 6 inches, be constructed of an all-weather driving surface complying with Department of Transportation Services (DTS) standards, be capable of supporting the minimum 60,000 pound weight of fire apparatus, and have a gradient not exceeding 20 percent. The unobstructed width of the fire apparatus access road shall meet the requirement of the appropriate county jurisdiction. All dead-end

fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround having a radius complying with DTS standards.

Utilities

The facility will be connected to telephone service via overhead line pole located makai of Olai Street. All water mains and laterals shall be designed in accordance with the *Water System Standards, BWS, City and County of Honolulu, 2002*. Domestic water should be provided to all buildings. There are currently no sewer facilities at the proposed site. Therefore, wastewater will be collected and conveyed to an on-site package system for treatment. A new pipeline will be installed to provide fire protection, as necessary, where all appurtenances, fire hydrants, and fire flow requirements meet Board of Water Supply standards.

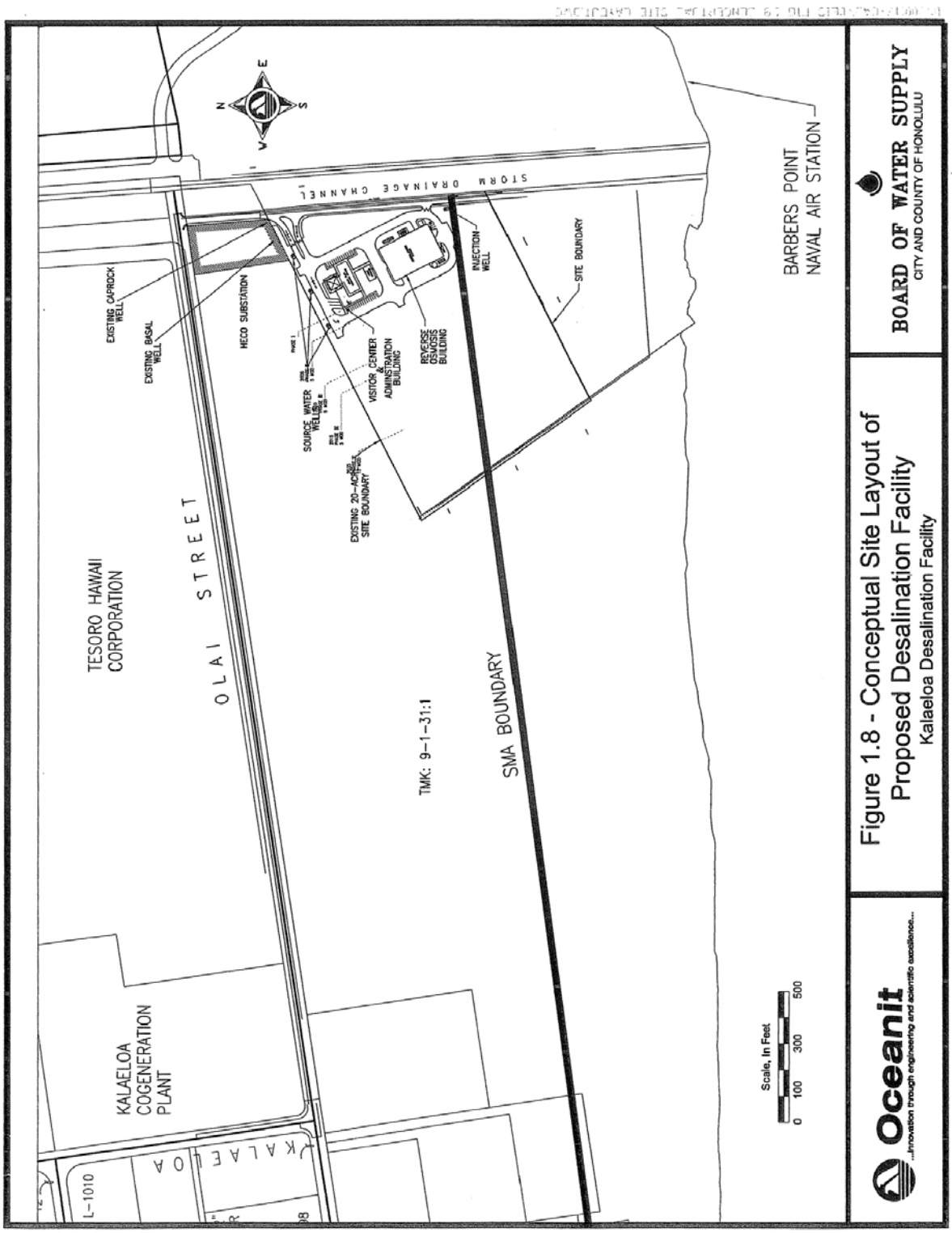
In order to run the desalting equipment at the proposed facility, a large amount of power will be needed. Electricity will also be needed to provide power to office equipment and lighting. The 5 MGD seawater desalination facility will need an estimated 5 megawatts (Mw) of power. Five megawatts is enough to serve approximately 1,000 homes as each standard home uses an average of 4,000 watts. Hawaiian Electric Company (HECO) will construct a dedicated substation within the adjacent State property, mauka of the desalination parcel, to serve the desalination plant, and will extend a 46kV line from its existing system to serve the substation. A standby generator system will be provided for emergency operational maintenance power to the desalination plant. The specific design for the electrical substation and a 46k V line extension have not been determined but will be consistent with other substations and 46k V lines within the HECO service network.

Drainage

The site is slightly sloping southeasterly and will be graded to allow overland flow in that general direction. Both on-site and off-site runoff will be handled by on-site dry wells. During construction, the brine pond may be excavated to provide the fill material for elevating and flood proofing the structures. The pond will also serve as temporary sedimentation basins to minimize erosion and sediment transport into the existing drainage canal. Upon installation of the new drainage system, a temporary brine pond may be used as emergency storage for processed brine.

Running parallel on the west side of the access road, a temporary 15 foot-wide low earthen berm will be constructed to separate the construction site from the drainage canal and limit sheet flow and sediment into the canal.

Figure 1.8 Conceptual Site Layout of Proposed Desalination Facility
(See following page)


BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
Figure 1.8 - Conceptual Site Layout of Proposed Desalination Facility
Kalaeloa Desalination Facility
Oceanit
...innovation through engineering and scientific excellence...
BARBERS POINT NAVAL AIR STATION
STORM DRAINAGE CHANNEL
EXISTING CAPROCK WELL
EXISTING BASAL WELL
HECO SUBSTATION
SOURCE WATER WELLS
VISITOR CENTER & ADMINISTRATION BUILDING
REVERSE OSMOSIS BUILDING
INJECTION WELL
SITE BOUNDARY
EXISTING 20-ACRE SITE BOUNDARY
OLAI STREET
TESORO HAWAII CORPORATION
TMK: 9-1-31:1
SMA BOUNDARY
KALAELOA COGENERATION PLANT
KALAELOA
L-1010
Scale, In Feet
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1.7.3 Proposed Process

In order to determine the quality of source water for the desalination facility, two exploratory wells were drilled on the Kalaeloa project site as discussed in the *Honolulu Desalination Study Final Environmental Assessment* (BWS 2001). Tests were conducted at these wells to determine the quality and quantity of water that can be produced from the Basalt Aquifer (BA). Quantity testing included yield drawdown and sustained pumping tests. The results state that water from the BA could be drawn at a rate of 5 MGD per well without negative impacts to the geology or water resources at the site (Mink and Yuen 2002). A total of 3 source wells are proposed, resulting in the potential to draw 15 MGD.

Various injection well scenarios were investigated. A combination of caprock/basal wells were reviewed and considered by the BWS. The porosity of the caprock layer was determined to not interfere with mixing and migration between the source Lower Caprock Aquifer (LCA) and injection wells (BA). Therefore, the injection wells will be located accordingly.

Figure 1.9 shows the drill rig during installation of one of the test wells at the Kalaeloa project site.



Figure 1.9: Exploratory Well Being Drilled at the Kalaeloa Site

Up to 12 MGD of saline source water will be pumped from the BA aquifer and pretreated, prior to RO. Source water will be treated to reduce the potential of membrane fouling. The amount of treatment will be adjusted depending on source water quality and the properties of the selected RO membranes. Chemically-conditioned source water will be sent through a bank of pretreatment filtration modules to remove particulates, natural organic matter, colloids and other components before feeding into the RO modules. Certain filtration processes will produce reject water and a relatively small amount of wastewater from backwash and membrane cleaning processes. This wastewater will be disposed of through injection wells.

The RO process will reduce the chloride content of seawater from approximately 18,000 mg/l, which will match the water quality of the existing system. There is a thin layer of brackish water at the top surface of the upper caprock aquifer thick enough to support salt-tolerant vegetation at the site. A shallow well tapping this thin brackish layer is not feasible because it cannot sustain needed pumping rates.

The layer of brackish water thickens toward inland areas, but not sufficiently to sustain the needed pumping rates to support a 5 MGD facility.

The RO modules are expected to have a recovery rate of 43 percent from a two-pass system. Filtered water (filtrate) from the pretreatment units will be fed into the RO modules under high pressure in order to recover 5 MGD of fresh water. The 7 MGD of waste brine will be disposed of through injection wells. An energy recovery device will recover energy from the brine discharge for use by the RO pumps.

The permeate (product water) from the RO membrane system will be post-conditioned to improve palatability and reduce corrodibility before pumping into the BWS water distribution system.

The facility will contain a product water pump station. A 24-inch transmission (force) main will convey the product water from the pump station to the BWS potable water distribution system located up Kalaeloa Boulevard. The transmission main will follow Olai Street to the west. The connection point for the transmission main will be an existing water main approximately 400 feet north of Olai Street on Kalaeloa Boulevard, near the Kalaeloa Cogeneration Plant. Figure 1.10 shows the basic flow path through the desalination plant.

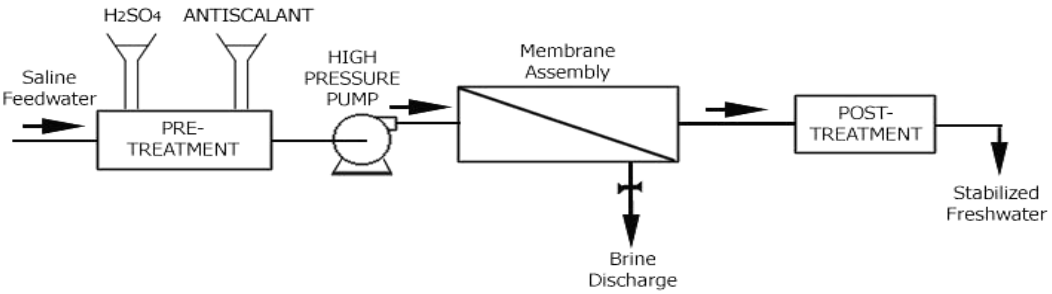


Figure 1.10: Basic Process Flow Diagram

Source Water System

The desalination source wells will draw from a salt water source approximately equivalent to seawater salinity. The three source wells will draw source water from the BA at a depth of approximately 1,600 feet. The caprock aquifer has been dismissed as a viable source because the water quality analysis indicates higher levels of constituents that would be too costly to remove. There is no freshwater lens at the location of the source and injection wells and therefore, brine injection will not affect any freshwater lens aquifer. Water quality monitoring of the source water will be conducted as part of the Department of Health (DOH) permitting procedures and as an ongoing monitoring of the desalination operation.



Figure 1.11: Existing Test Wells at Proposed Project Site (2002)

Source Water Pretreatment

Prior to RO, the source water will undergo pretreatment. The pretreatment process improves the RO process by removing particles and compounds that can negatively impact RO membranes. During pretreatment, the source water is chemically conditioned and filtered. Chemical conditioning disinfects the source water and hinders scale formation on the RO membranes. Chemical conditioning will maximize the performance and lengthen the life of the RO membranes.

A combination of filtration technologies are currently planned for pretreatment. Cartridge filters will be used to remove particulate material. Ultra-filtration (UF) may be used after the cartridge filters to remove colloidal material and microbes. However, UF will not remove any dissolved solids in the source water. The recovery rate of the UF process is approximately 93%, therefore it will take a little over 12 MGD of source water to produce about 11 MGD of water for the RO processes. The UF units will be cleaned by backflushing with water to remove trapped particles. A pilot study to further evaluate the need for UF, and to optimize the proposed pretreatment design was conducted.

Reverse Osmosis Process

After pretreatment, the source water (now called filtrate) will be sent through the RO membranes at a pressure of 800 to 1,200 psi. During the RO process total dissolved solids (TDS) in the filtrate will be reduced from approximately 6000 mg/l to 100 mg/l. A second pass may be necessary to reduce salinity to acceptable levels for drinking water.

The proposed RO process has a recovery rate of about 43 percent. This means that a little over 11 MGD of filtrate will be needed to produce 5 MGD of potable water. The salinity of the brine from the RO process will be about twice that of the source water.

Energy Recovery

Energy recovery can have a significant impact on the economics of operating large plants. It is common now to use energy recovery devices connected to the brine stream as it leaves the pressure vessel at about 15 to 60 psi less than the applied pressure from the high-pressure pump. These energy recovery devices are mechanical and generally consist of work or pressure exchangers, turbines, or pumps of some type that can convert the pressure difference to rotating or other types of energy that can be used to reduce the energy needs in the overall process. These devices can have a significant impact on the economics of operating large plants. They increase in value as the cost of energy increases. Energy usage in the range of 11.4 kWh/1000 gallons for seawater RO (with energy recovery) plants has been reported (Buros 2000). Energy recovery is being analyzed currently to see about its applicability to this project. This project will use an innovative and efficient energy recovery system using pressure vessels to recover energy.

Final Treatment, Final Product and Distribution

The RO product water (called permeate) will be conditioned by chemical addition. Sodium bicarbonate will be added for pH and alkalinity adjustment. Alternately, calcium hydroxide could be used to adjust the pH of the permeate. The chemical addition will have no impacts on the safety of the water for human consumption. Sodium hypochlorite will also be added in small quantities at this point for disinfection. The Board of Water Supply is still considering subjecting the product water to a "second pass" through the reverse osmosis procedure. This will ensure that the water exceeds the water quality currently available through the Makakilo distribution system. Regardless, the water product will meet or exceed all applicable water quality standards for drinking water. To ensure quality and safety of the product, water will be tested and monitored by the BWS prior to introduction into the general water system, and further post-conditioning may be implemented to ensure compatibility with distribution system waters.

This final product water will be piped into the existing BWS municipal potable distribution water system. The system serving this western area of Oahu is known as the Makakilo distribution system. While the product water will be pumped directly into the distribution system at large, the principals of water flow and water pressure dictate that the most likely recipient of the 5 MGD will be the areas geographically closest to the desalination facility. These areas include the Campbell Industrial Park, BPNAS, and to a lesser extent, the residential and commercial developments in the southern portion of Kapolei. The water will mix

with the existing water supplies and distributed through the BWS service area. The product water will not be directed specifically to any one area.

The BWS estimates that the average home uses 400 gallons of water per day (GPD). The 5 MGD facility could potentially serve up to 12,500 homes. This figure would vary based on the mix of residential, commercial and industrial water users.

Waste Stream Generation and Disposal

The proposed desalination facility will produce five waste streams:

- Reject water from the UF process
- Backflush water from the UF membrane cleaning process
- Reject water from the RO process (brine solution)
- Spent membrane cleaning solution (MCS)
- Domestic wastewater from offices and facility

Reject water from the UF process will contain chemicals used for pretreatment. This waste stream will also include material rejected by the filter. Backflush water from the UF membrane cleaning process will be similar to the UF reject water. Reject water from the RO process will be a brine solution containing about twice the concentration of salts as that of seawater.

Occasionally, the UF and RO membranes will need to be cleaned. The cleaning frequency can be minimized by proper operation of pretreatment. Membrane cleaning solution (MCS), which will contain citric acid, will be used to remove biological and precipitated inorganic buildup on the membranes. Most of the MCS will be recirculated; however, a part of the solution will be discarded after its cleaning ability is diminished (See Figure 1.12) The RO membrane cleaning process is anticipated to occur once a year.

Injection Wells

Injection wells will be used for the disposal of brine concentrate rather than an ocean outfall. Two injection well options evaluated, were discharges into either the basalt formation below the source wells or into the caprock formation that is situated above the source wells. The injection wells will have at least 500 feet of horizontal separation from the source wells. The basal injection option would rely on about 300 feet of vertical separation between the 1,600 foot source well and the 1,900 foot injection well and the density of the brine will cause it to sink. The caprock injection option utilized the sedimentary geologic formation to dissipate the brine. The sedimentary formation provides an adequate barrier between the source and injection wells. Within the caprock formation, the brine will tend to sink to the lower permeable layer approximately 300 feet below MSL, and be dispersed below the near shore environment. The multiple coral and clay rich layers would prevent the brine from reaching the basalt. The interbedded

clay would consume the driving head of the brine and the brine would be leaked off within the permeable layers. Injection well capacity and injectant quality will also be monitored as part of the DOH Underground Injection Control permit process.

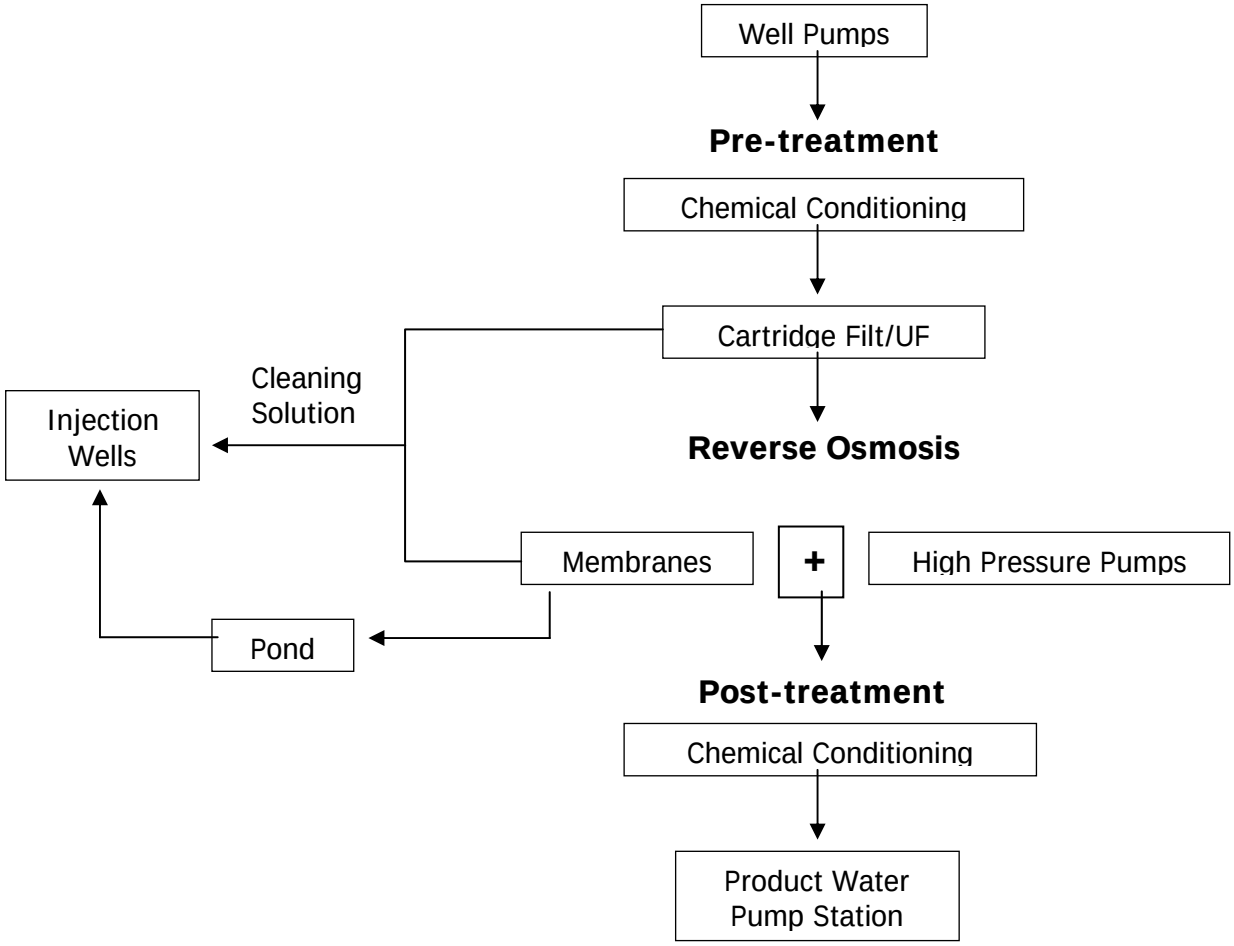


Figure 1.12: Detailed Flow Chart of Proposed Seawater Desalination Facility

Chemical Usage

Chemicals are added to make the product water compatible with the pH and alkalinity levels of the potable water in the existing system. The amount of chemical treatment is the minimum required to have the product water meet regulatory standards. Calcium hydroxide, carbon dioxide and calcium hypochlorite will added. The project will be located in the 3 Seismic Zone, the Zone D flood zone and within the tsunami inundation zone. Structures will be built and chemicals stored to comply with applicable Uniform Building Codes

standards, OSHA standards and any regulations associated with the chemical storage. Safety plans for chemical handling will be required.

Chemical	*Classification*	*Process*	*Dose (ppm)*	*Monthly Estimated Usage*	*On-site Storage*	
					Amount	*Location*
Sodium Hypochlorite 0.8%	*Corrosive, DOT Class 8*	*PT*	*0-5*	*31,800 gal*	*80,000 gal*	*ROB*
		IT	*0-5*	*31,800 gal*		
		PST	*0-3*	*14,300 gal*		
		CS	*N/A*	*330 gal*		
Sulfuric Acid 20%	*Corrosive DOT Class 8*	*PT*	*0-30*	*1,800 gal*	*18,000 gal*	*ROB*
Silica Antiscalant		*PT*	*0-10*	*tba*	*tba*	*CSB/ROB*
Sodium Bisulfite 39%	*Corrosive DOT Class 8*	*IT*	*0-30*	*tba*	*tba*	*CSB/ROB*
Sodium Hydroxide 50%	*Corrosive DOT Class 8*	*PST*	*0-75*	*tba*	*tba*	*CSB/ROB*
		CS	*N/A*	*tba*		
Citric Acid 0.5%	*Not regulated*	*CS*	*N/A*	*tba*	*tba*	*CSB/ROB*

PT = pretreatment *CS = Cleaning system*
IT = interim treatment *CSB = Chemical storage building*
PST = post-treatment *ROB=RO building*
tba- exact figures to be determined as part of the final EIS.

Table 1.2: Chemical Usage Information for the Proposed Desalination Facility

To ensure safe working conditions, all chemicals will be properly labeled. Material Safety Data Sheets (MSDSs) that provide information on the chemicals used at the facility will be easily accessible to all employees. MSDSs will provide the following information for each chemical:

- Identification of chemical composition, formula, common name, and scientific name
- Physical data (melting point, boiling point, flash point, specific gravity, solubility, vapor pressure, etc.)
- Chemical reactivity and decomposition products
- Toxicity and other health hazards
- First aid procedures
- Environmental impacts
- Safe handling, storage, disposal, protective equipment, and spill/leak procedures

Chemicals will be stored as recommended by the manufacturer and in accordance with regulations. The chemical storage area will be fireproof and kept clean, dry, and disinfected. Liquid chemical storage tanks will have berms or earthen banks surrounding them to contain any accidental spills. Facility operators will be trained in first aid and chemical cleanup procedures.

Facility Employees

Construction employment is expected to average about 110 jobs during the construction period. In addition, employment supported by indirect sales is expected to average about 170 jobs. Thus, direct-plus-indirect employment supported by the 1.5 years of construction activity is expected to average about 280 jobs. Total payroll for both construction workers and indirect jobs emanating from the construction activity during the 1.5-year construction period is estimated at $11.7 million per year.

Operating employment at the desalination plant is expected to number about 12 jobs. In addition, the purchase of electricity, other utilities, chemicals and other supplies is expected to support an estimated 17 jobs at these supply companies. Finally, the purchase of goods and services by workers at the plant and by supply companies and their workers will support about 29 more jobs. In total, the operation of the desalination plant is expected to support an estimated 58 direct and indirect jobs. Total payroll for direct and indirect jobs is estimated at $2.4 million per year. The estimated number of direct and indirect jobs will support about 113 residents and 38 households

1.7.4 Use of Public Funds and/or Lands

In July 1993, the Base Relocation and Closure Committee (BRAC) recommended closure of the Barbers Point Naval Air Station. The installation was closed in 1999. This land was acquired by the U.S. Department of Health and Human Services (HHS) as a no-cost public benefit conveyance from the U.S. Navy. HHS has subsequently transferred this property to the BWS. As part of the public conveyance, the BWS was given three years from the date of transfer to develop the desalination facility. BWS would use the land for public benefit by April 4, 2004 or the land will revert back to Health and Human Services. However, this reversion has been extended as the BWS has deferred construction of the desalination plant. When construction is programmed, the BWS intends to pursue applicable Federal grant(s) to reduce the capital costs of the desalination plant.

1.7.5 Phasing, Timing and Water Rates

The project timeline will be adjusted, as design issues are determined and permitting proceeds. At this time, it is expected that the project will proceed as follows:

Facility Design – Begun in Summer 2001 (Deferred until 2016)
Permitting and Regulatory Issues – Begun in Fall/Winter 2001

Construction – Tentatively scheduled around 2018
Water Production – Tentatively scheduled around 2020.

Applicable Federal grant(s) and incremental phasing of the desalination facilities capability will help to mitigate cost impacts. The deep source wells and reverse osmosis filters are modular, such that huge over-sizing of major components are avoided. New and more efficient technologies will reduce operating costs in the long run.

The BWS has held water rates steady over the last ten years. Operational costs have been managed in part, because of the favorable economic situation of the late 1990's, water conservation measures, operational savings from on-going re-engineering and the application of new technologies and work processes. However, the economic situation has recently changed with dramatic rises in power, gas, labor and construction material costs. A water rate increase was approved by the Board of Directors of the Board of Water Supply on May 15, 2006.

Project Costs

The cost to build and fully equip the proposed 5 MGD plant is estimated in the range of $40 to $45 million or about $8 million per 1 MGD. This capital cost is within an acceptable range of groundwater source development costs. The annual operating and maintenance cost (O and M) is projected to be $5.5-6 million per year. This cost is significantly higher than the current average per-unit cost of supplying water. However, when the cost of supplying desalinated water is averaged in with water supplied by the BWS island-wide, the effect on BWS operating and management (O and M) costs will be comparable. The project should have little or no impact on water rates. Water rates will not be raised as a result of this project. The capital cost of the desalination plant on a cost per gallon of capacity basis, is comparable to constructing a well in rural Oahu and transporting that water to urban Oahu. The desalination plant will be funded with an impact fee and by floating municipal bonds. New developments will be required to pay our Water System Facilities Charges (WSFC) or impact fees that will recover some of the capital costs and the existing and future water users will pay the debt service. Water rates recover the system operating costs and are uniformly distributed throughout Oahu's existing and future water rate payers. These funding mechanisms place the capital cost on future water users and the operating costs on existing and future water rate payers.

The initial amount of desalination capacity developed will be limited to where the Operating and Management (O and M) do not require an increase in the water rates. The BWS is considering the creation of "lifeline rates" for low income families that have difficulty paying for their water services.

Desalination may become a more cost effective alternative as costs and environmental and regulatory constraints on fresh groundwater development

increase. The cost of RO has decreased significantly in the last decade. There are two major reasons for this: increases in membrane efficiencies, and the use of energy recovery devices. Desalination has also become more economically feasible as costs for conventional water development have increased because of increased levels of treatment required by strict water quality standards (Buros, 2000). It is important to note that the first phase construction cost involves some oversizing and allowances for future expansions.

Chapter 2

Chapter 2: Proposed Alternatives

In preparation for this project a study was conducted that identified several possible project locations and compared desalination technologies. This section explains the alternatives to the preferred reverse osmosis facility at the Kalaeloa site.

Alternatives include:

- No Action Alternative
- Delayed Action Alternative
- Alternative Technologies
- Alternative Disposal Methods
- Alternative Locations
- Water Conservation

2.1 No Action Alternative

In 2001, the Honolulu Desalination Study and a Final Environmental Assessment was completed. This study looked at various alternative technologies for desalination and various locations to locate the facility. As noted in the EA, the BWS is legally required to provide potable water to the residents of the City and County of Honolulu. The no action alternative would prevent the BWS from doing so beyond Oahu's finite groundwater supply. The no action alternative would also result in the lost opportunity to diversify water supplies, conserve Oahu's existing potable resources and leverage new, cost effective technology such as desalination.

2.2 Delayed Action Alternative

The delayed action alternative would postpone plans for an alternate water supply for the City and County of Honolulu. An important aspect of the proposed desalination facility is that the BWS is looking ahead to future water demands and planning on meeting these needs with alternate water sources. The current water sources will not be able to meet the growing water demands.

Delaying the proposed project will have no impact on any potential environmental impacts generated from the project. Delaying the project, however, will result in higher costs because of inflation.

As part of the public benefit conveyance, the BWS was given three years from the date of transfer to construct the desalination facility. If the land has not been used in a way beneficial to the public, the land may revert back to the United States Department of Health and Human Services at some future date.

2.3 Alternative Desalination Technologies

Twelve specific desalination technologies were reviewed in preparation for this project and are described in more detail in the "Honolulu Desalination Study" of June 2000:

- Multistage flash distillation

- Multi-effect distillation
- Vapor compression
- Solar distillation
- Reverse osmosis
- Electrodialysis
- Electrodialysis reversal
- Vacuum freezing vapor compression
- Secondary refrigerant freezing
- Eutectic freezing
- Hydrate formation
- Ion exchange

In the April 2001 Final EA, all alternatives desalination technologies were reviewed in detail. These processes were evaluated for source water requirements, product water quality, energy consumption, performance, operation and maintenance, general advantages and disadvantages, and principal applications. After they were analyzed it was determined that the use of the Multi-Stage Flash Distillation and Reverse Osmosis (RO) processes are the most clearly dominant in the inventory of plants larger than 1 MGD.

In distillation processes, such as multi-stage flash distillation (MSF), thermal energy is used to heat a saline solution. Steam is created and fresh water evaporates. The salt is left in a brine solution. The fresh water vapor (steam) is then condensed to form product water. MSF performance is limited by the maximum temperature difference between the first stage and the last stage. The temperature of the last stage is limited to ambient temperatures, so there is higher efficiency when the highest possible temperature is used in the first stage. However, an increase in process temperatures can cause an increase of scaling and corrosion. Scaling can be controlled through chemical additions. A major factor that must be considered for distillation is the availability of steam. For this project, three general categories of steam sources were considered:

- Surplus steam from a nearby source
- Cogeneration from low cost alternate fuels
- Steam generation through a dedicated boiler

The best option is to find a surplus steam source as it is the cheapest option, and may also allow for the generation of electrical power. Cogeneration is a viable option if there is a favorable fuel price, and can also generate electrical power. The last option is the use of a dedicated boiler. Other desalination technologies not requiring a steam source would be cheaper than distillation with a dedicated boiler.

Although two potential hosts for distillation steam were identified, the estimated cost of the steam was found to be uneconomical in comparison to electrical costs for a reverse osmosis plant. Consequently, reverse osmosis was found to be more cost effective than distillation due to the lack of an economical source of steam and the expense of providing a steam generator to serve the facility.

Use of Brackish Source Water

Brackish water was an option discounted early in the feasibility stage because it is very limited and not available in sufficient quantity to produce 5 MGD of freshwater. Brackish composition varies with pumpage and its removal will affect the transition zone. The proposed desalination facility requires a consistent composition of water because variances in the source water will result in higher costs.

	Reverse Osmosis	Multistage Flash Distillation
Advantages	• Reverse osmosis processes require only a fraction of the energy required for the distillation of seawater. • In addition to removing salts, RO processes remove other contaminants such as organic molecules, viruses, bacteria, and silica. • Reverse osmosis has a higher water recovery than distillation, which reduces the volume of concentrate disposal. • RO plants are modular which allows for easier and faster expansion than with distillation technologies. • RO plant automation is a feasible option.	• MSF produces water with good water quality. Product water will have between 5 and 50 ppm total dissolved solids. • MSF has been used for 40 years and there is a considerable amount of experience in this technology; MSF is the leading technology for large-scale desalination, especially for seawater. • MSF is less susceptible to scaling than other distillation processes because boiling does not occur at the heat transfer surfaces. • There is experience in building MSF facilities with very large capacities.
Disadvantages	• The RO process is sensitive to source water quality and proper source water treatment is essential to avoid scaling or biofouling of the membranes. In some cases, membrane fouling is irreversible and may require membrane replacement sooner than the normal 3 to 5 year membrane life cycle. • Source water pretreatment may be more complicated than for distillation processes.	• MSF requires a large energy input. • There are high maintenance requirements for MSF facilities. • MSF facilities require more space than other desalination technologies. • Most of the experience with using MSF for seawater desalination is from the Middle East where energy costs are less of a concern. • Process control can be difficult with MSF; start up is difficult and the process cannot be run at less than 60% of design capacity. • A large amount of seawater is necessary for water production and cooling. • Brine is discharged at an elevated temperature. • High re-circulation rates are often used which necessitates high pumping costs and slow reaction to sudden input changes.

Table 2.1: Desalination Technology Comparison

Knowledge Transfer from Demonstration Desalting Plant

The State's desalting project was closed in 1995 and was only partially tested because of limited state funds. Three processing methods selected for the demonstration were RO, Electro-dialysis and Electro-dialysis Reversal. Source wells were drilled into brackish portion of the Basalt (BA) and the Lower Caprock Aquifer (LCA). The BA source was tested at rates less than 1.0 million gallons per day (MGD) and the facility only produced about 250,000 MGD of drinking water. The pumping of brackish water sources proved to be insufficient and of an inconsistent quality to produce drinking water at higher quantities. The brackish caprock aquifer has decreased significantly from the cessation of agricultural return irrigation from the close of the Oahu Sugar Company. Based on current pumping data from the adjacent non-potable irrigation wells, the brackish caprock aquifer can only sustain small levels of pumping at about 100,000 gallons per day.

2.4 Alternative Disposal Methods

Three types of disposal methods were investigated for this project:

- Ocean Outfall
- Disposal Ponds
- Injection Wells

Ocean Outfall

An ocean outfall is a long pipe that is laid along the seafloor. At a design depth and distance from shore, the pipe is perforated to allow a waste stream to diffuse through the pipe into the ocean. Due to concerns with environmental impacts and cost, the ocean outfall disposal method was ranked low as an option and is not being pursued or analyzed further for this phase of the project. If ocean outfall disposal is pursued with future phases of the project, those impacts will be analyzed through future environmental reviews

Disposal Ponds

Disposal ponds can be used as a method for disposing of brine. The brine is pumped into the ponds where it evaporates, leaving behind salts and other dissolved solids. Brine ponds can also be used to hold the brine solution until it can be disposed of in another way. For the project's primary brine disposal, this option is not viable.

The quantity of brine generated is estimated to be 7 MGD. A brine pond would have to accommodate this flow on a continuing basis even with slow evaporation rates during humid or cold meteorological conditions. Even if an evaporation pond for primary brine disposal were considered, its massive size would require purchasing additional proximate acreage to accommodate it.

An emergency-only brine disposal pond is proposed at the site as shown on the plans (Appendix D). This brine pond will be designed for a volume of 3.6 acre-feet per day. This converts to 1.17 MGD. The quantity of brine water produced each day is estimated to be 7 MGD. The pond would therefore fill in 3.8 hours. The negligible average evaporation rate of 0.225 inches per day would have little impact on this quantity.

Therefore, the brine pond will be utilized only for emergency situations and only for a few hours at a time.

$$\frac{1.17 \text{ MGD} = 16\% \text{ of } 7 \text{ MGD}}{16 \% \text{ of } 24 \text{ hours} = 3.8 \text{ hours}}$$

Injection Wells

The injection well method was chosen as the preferred disposal method for the project. This method will convey inject waste streams to deep injection wells within the LCA. These wells will inject the wastewater into the LCA eliminating the potential of waste brine seeping into the offshore coastal waters.

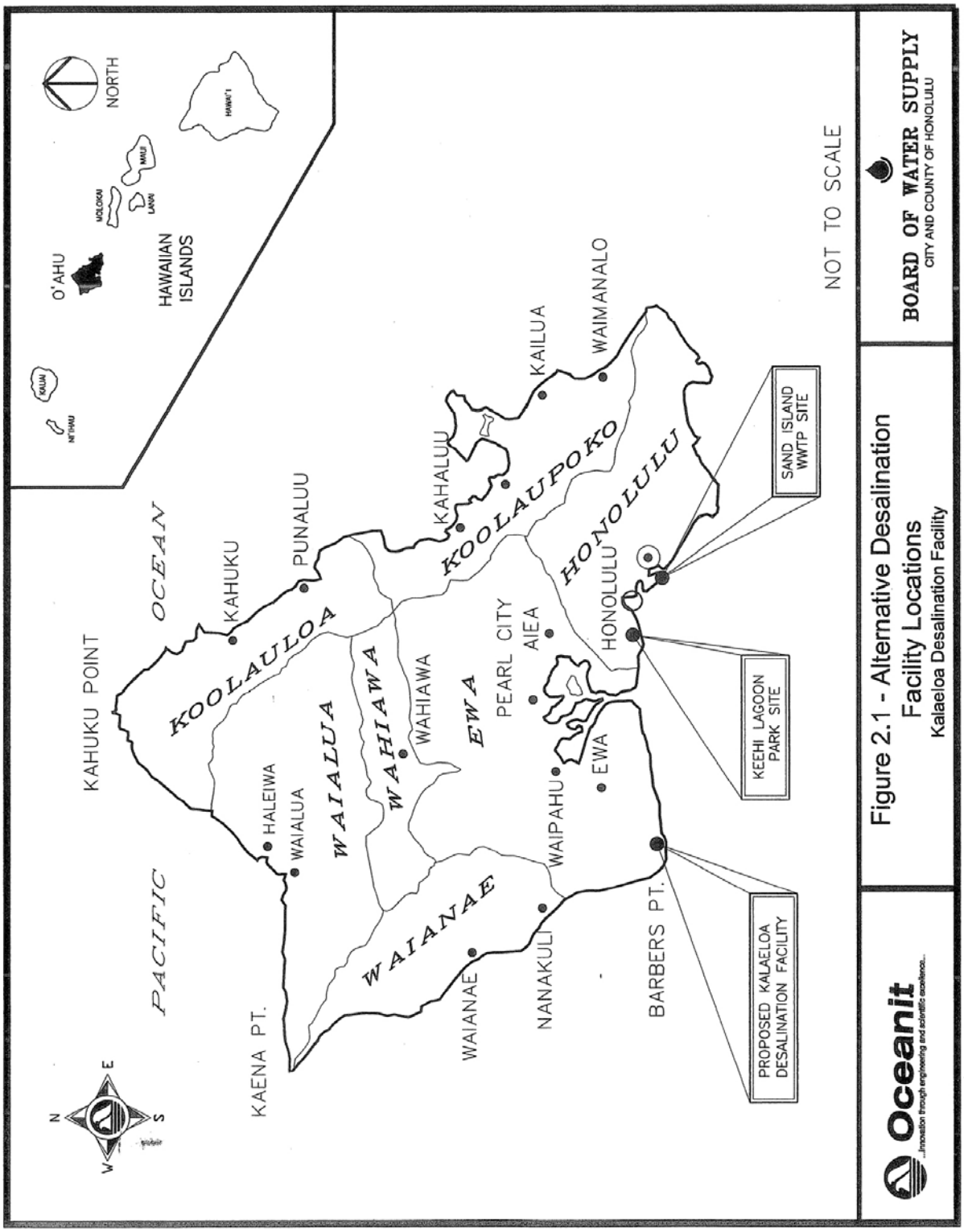
2.5 Alternative Project Locations

Twelve sites were initially reviewed as potential sites for the proposed desalination facility. The initial sites were rated according the following characteristics:

- existing land use
- hydrogeology (i.e., quality of water present)
- available utilities such as electric power, sewers and water system integration
- environmental impacts such as air and water quality, noise impacts and visual aesthetics
- options available for brine disposal
- the proximity of steam suppliers

After this initial review, three sites were selected for further evaluation: the Kalaeloa site, the Sand Island Wastewater Treatment Plant, and a site within Keehi Lagoon Beach Park (See Figure 2.1).

Figure 2.1: Alternative Desalination Facility Locations *(See following page)*


NORTH
O'AHU
HAWAIIAN ISLANDS
KAUAI
NI'IHAU
MOLOKAI
MAUI
LANAI
HAWAI'I
NOT TO SCALE
KAHUKU POINT
OCEAN
PACIFIC
KAHUKU
PUNALUU
KAHALUU
KAILUA
WAIMANALO
KOOLAULOA
KOOLAUPOKO
HONOLULU
WAIALUA
WAHIAWA
EWA
PEARL CITY
AIEA
HONOLULU
HALEIWA
WAIALUA
WAHIAWA
WAIPAHU
EWA
WAIANAE
NANAKULI
BARBERS PT.
KAENA PT.
SAND ISLAND WWTP SITE
KEEHI LAGOON PARK SITE
PROPOSED KALAELOA DESALINATION FACILITY
Oceanit
Innovation through engineering and scientific excellence
Figure 2.1 - Alternative Desalination Facility Locations
Kalaeloa Desalination Facility
BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

The Sand Island Wastewater Treatment Plant (WWTP) is located south of downtown Honolulu as shown in Figure 2.2. The Keehi Lagoon Beach Park site is shown in Figure 2.3. This site is located on the northern end of Keehi Lagoon, the Honolulu International Airport is located to the west, and downtown Honolulu is to the east. Table 2.2 compares the preferred site location (Kalaeloa) with the alternative project locations (Sand Island and Keehi Lagoon).

	Kalaeloa	Sand Island	Keehi Lagoon
Advantages	• The Kalaeloa site was formerly part of the Barbers Point Naval Air Station, which closed on July 1, 1999. The BWS received this land at no cost as part of a public benefit conveyance from the Navy. • The site is located in relative proximity to both the primary and secondary urban centers, which will allow for easy drinking water distributions to these areas.	• Hydrogeological characteristics of the site and surrounding areas are known relatively well and water quality data from existing wells is available. • Brine from the plant processes could be disposed of through injection wells or added to the existing wastewater treatment plant effluent outfall.	• The ultimate target production capacity could be met at the site through the construction of direct ocean intake or feed wells.
Disadvantages	• Hydrogeological characteristics of the area are extremely variable over relatively short distances. • The site is located within a runway easement and therefore limits any buildings on the site to be 45-65 feet.	• There is a possibility that the City and County of Honolulu would want to expand the treatment plant located at the site; expansion of the desalination facility could be limited by expansion of the treatment facility. • There is a sufficient supply of groundwater at the site for a 10 MGD desalination plant. If future expansion were desired, a direct ocean intake or feed wells would have to be built in the adjacent Sand Island Recreational Beach Park.	• The BWS would need to purchase or lease land from the State to construct the proposed facility at the Keehi site. • Stagnant ocean water conditions in the area would require long and costly pipelines for ocean intake or brine disposal. • Keehi Lagoon Beach Park is used for a variety of recreational uses and the proposed facility would reduce open park area and may adversely impact park users.

Table 2.2: Site Location Comparison

Figure 2.2: Sand Island WWTP Alternative Project Location

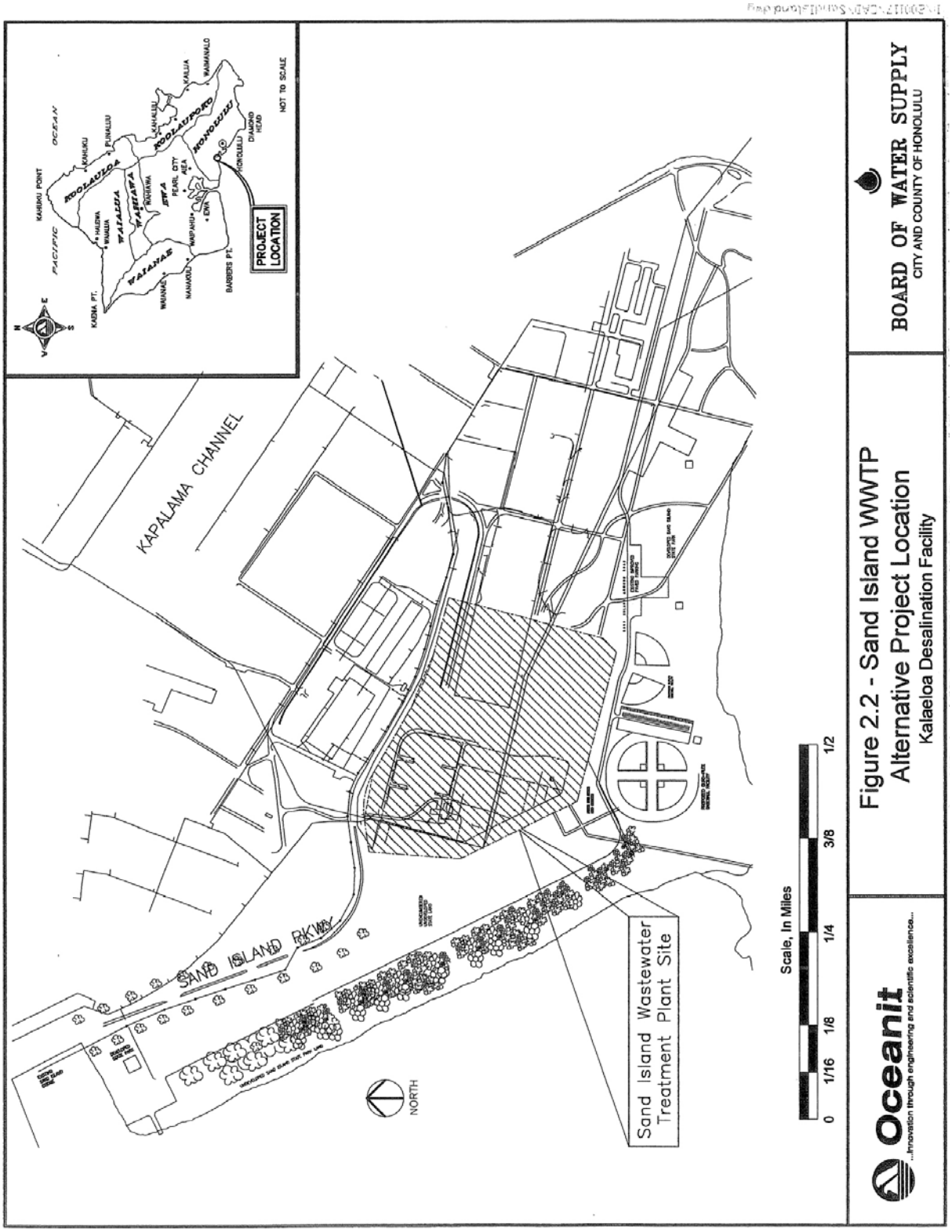
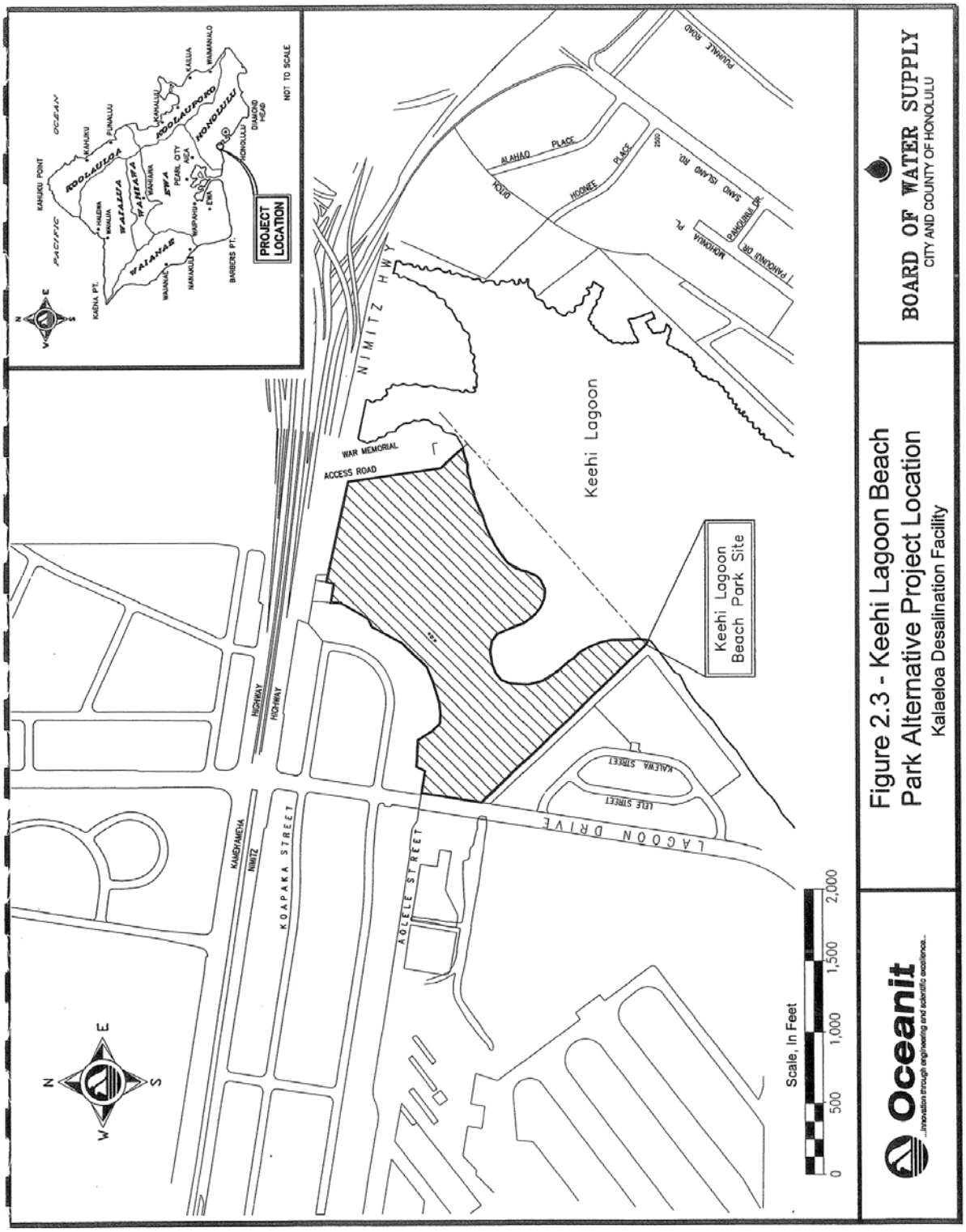


Figure 2.3: Keehi Lagoon Beach Park Alternative Project Location



2.6 Water Conservation Measures

The BWS has several demand side management program projects such as: Low Flow Toilet Rebate, HalawXeriscape Garden, Water Conservation Poster Contest and summer water use campaign. All of the projects promote water conservation. The toilet rebate program is estimated to have saved about 1.8 million gallons per day of water, which equates to about $3.8 million dollars, after rebates. BWS internal conservation/leak detection identified and repaired numerous leaks in the Windward water system saving about 1.5 MGD.

Water conservation measures are an integral part of the BWS program and encourages water savings and use reduction. While the costs of conservation programs are low, they alone are not adequate to meet the increased demand for water. Additional conservation programs are being evaluated following industry best practices.

Conservation may be viewed as a supplemental or even an alternative technology for meeting safe drinking water needs. Conservation should be implemented as part of a long-term strategy for providing safe and reliable drinking water. Efficiency standards for plumbing fixtures and other conservation measures have long-lasting implications for water demand. Conservation planning can help water systems and the states recognize these effects and accelerate the pace of efficiency improvements (EPA 2002).

Conservation activities may alter the timing and sizing of new water system facilities, including source-of-supply, transmission, treatment, and storage facilities. Conservation can save water resources and financial resources used to support the cost of the water delivery system. In no case should the planning and implementation of a water conservation program be allowed to delay a project needed immediately to achieve compliance or public health goals (EPA 2002).

The BWS has advocated conservation and efficient use of our island's water supply since its establishment in 1929. For years, planning of new resources to meet increasing demand for water included provisions for making the use of water as efficient as possible. Integrated resource planning--now a buzzword in government planning circles--has always been an integral part of the water works planning process. This includes identifying potential non-potable source of water: surface water springs, lakes or ponds; brackish water; and treated effluent (wastewater). (BWS 2002)

The BWS Water Conservation Program includes, among other things, the following matrix of activities that support water conservation on

Oahu:

- Public Outreach and Education
- Leak Detection, Repair and Maintenance
- Regulation
- Alternate Source Development, Recycling and Conservation Alternatives
- Large Water User Programs (audits/education)

These programs are consistent with water conservation recommendations below of the U.S. Environmental Protection Agency (USEPA).

- Ensure the utility rate structure encourages water efficiency, or at least does not encourage water waste.

- Offer incentive programs (rebates/tax credit) to homeowners and businesses to encourage replacement of plumbing fixtures and appliances with water-efficient models.

- Make retrofit kits for residences and businesses available free or at cost. Kits may contain low flow faucet aerators, high efficiency showerheads, leak detection toilets, and replacement valves.

- Promote water-efficient landscape practices to homeowners and businesses, especially those with large, irrigated properties. Practices include use of native plants, landscape innovation to reduce water use, and more efficient irrigation. (EPA 2002)

Conservation is used in conjunction with the pursuit of additional water resources and technologies in conformance with the BWS mandate to supply fresh, safe drinking water and to secure additional sources of water for the island of Oahu.

Chapter 3

Chapter 3: Environmental Setting

This section describes the environmental setting of the proposed project site in Kalaeloa. Chapter 4 describes the possible impacts of the proposed project on the local environment.

3.1 Location and Topography

The project site is located within the Ewa Development Plan area, on the southwest shore of Oahu near Barbers Point. The Ewa region contains Oahu's fastest growing residential communities. Figure 3.1 is an aerial photo of the Kalaeloa area. The former BPNAS runway is visible on the right side of the photo and a storm drainage canal bisects the photo.

Figure 3.2 shows the project location within Campbell Industrial Park at the intersection of Kalaeloa & Olai Street. The approximate latitude and longitude of the project site is 21° 18' 6"N and 158° 5' 25"W. The maximum elevation at the site is about 11 feet above mean sea level. Neighboring facilities in Campbell Industrial Park have elevations of less than 20 feet above sea level.



Figure 3.1. Aerial Photo of Kalaeloa Area.

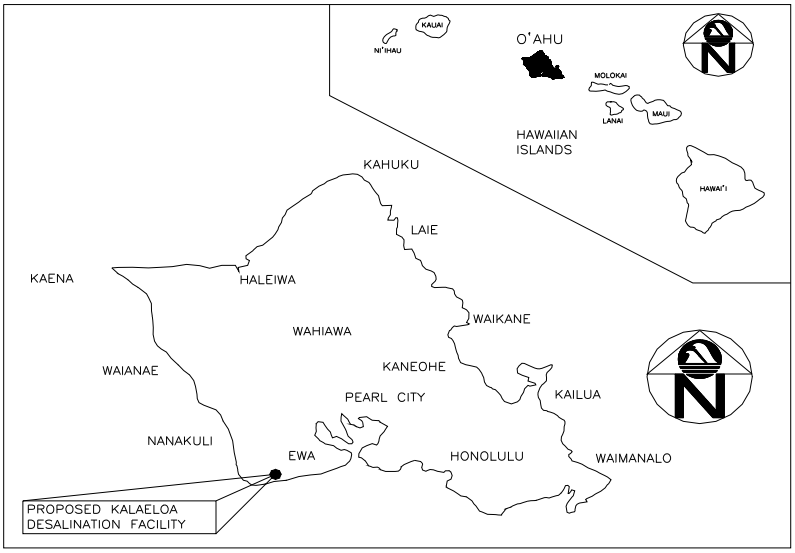


Figure 3.2: Proposed Kalaeloa Desalination Facility Location

3.2 Land Use

The Kalaeloa Community Development District, formerly called Barbers Point Naval Air Station, is approximately three miles long and two miles wide, covering about 3,700 acres. A portion of the area is used for airport services including runways, taxiways, aprons, and aircraft tie-down areas. North and northeast of the Kalaeloa Community Development District is an urban area with residential, commercial and supporting services, and an industrial support area with maintenance shops, warehouses, and paved areas. The proposed project site is located on the southwestern portion of the Kalaeloa Community Development District and is undeveloped with overgrown natural vegetation.

There are several different land uses bordering the proposed Kalaeloa location. East of the project site is the Kalaeloa Community Development District. Mauka of the project site is the Tesoro Plant (See Figure 3.3). The Tesoro facility provides jet and marine fuels, and gasoline to the Hawaiian Islands. West of the plant is state-owned property and currently undeveloped. Makai of the site is former BPNAS land that BWS would like to obtain for future use.



Figure 3.3: Tesoro Plant Bordering the Proposed Kalaeloa Project Site (Tesoro, 2001) *(See previous page)*

3.3 Geology

Two shield volcanoes called the Koolau and Waianae Volcanoes created the island of Oahu. These volcanoes were active during the Pliocene and Pleistocene epochs. The volcanoes have eroded greatly and now form two mountain ranges, with the highest point being Mt. Kaala of the Waianae Range. Between the two ranges, a large plain called the Ewa Plain was formed as the lava from the two volcanoes merged. The coastal areas of the Ewa Plain consist of sediments from the erosion of the volcanoes and the remains of coral growth. The project area is on a portion of the Ewa Plain that consists of calcareous substrata and sedimentary deposits (UH, 1983).

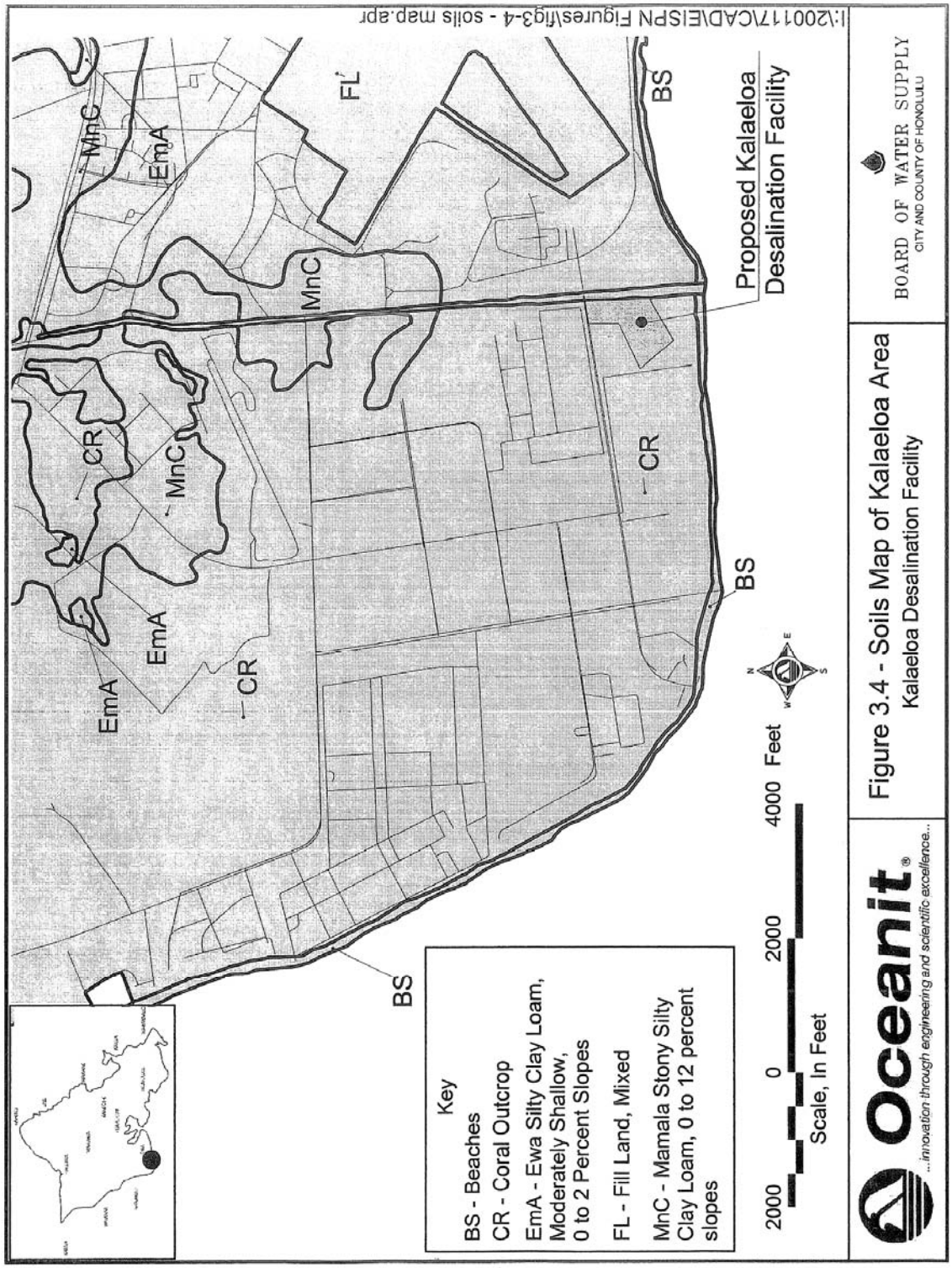
The Ewa Coastal Plain comprises an area of approximately 28 square miles and is composed of an exposed emergent reef. The caprock has sequences of relatively flat Pleistocene marine sedimentary deposits and terrestrial alluvium deposits. The marine sedimentary deposits consist of calcareous silts, sands and gravels and reef limestone layers. The terrestrial alluvium deposits consist of silts and clays derived from upslope volcanic material (UH, 1983).

3.4 Soils

In the broad area containing the Kalaeloa site, the soil is classified as part of the Lualualei – Fill Land – Ewa soil association. This association is characterized as being deep; nearly level to moderately sloping, well-drained soil that has fine textured or moderately fine textured subsoil. Soils in this association are also characterized as fill land (US SCS, 1971).

The area directly fronting the ocean is beach sand, and the remaining area is coral outcrop (See Figure 3.4). The soil classified as coral outcrop consists of coral and cemented calcareous sand. Coral reefs were formed in shallow ocean water at a previous time when the ocean level was higher. Coral outcrop can be found exposed at the ocean shore, on the coastal plains, and at the foot of the uplands. 80 to 90 percent of the coral outcrop is made from coral reef. The remaining 10 to 20 percent consists of a thin layer of red soil in cracks, crevices, and depressions within the coral outcrop. Vegetation on this type of soil consists of kiawe, koa haole, and fingergrass (US SCS, 1971). A geotechnical investigation was conducted by PSC Consultants, LLC, April 2002. The subsurface conditions as a result of the field exploration indicate that the project site generally underlain by competent coral-algal reef formation and dense to very dense, silty and sandy coral gravel with occasional clayey silt and organic clay pockets within the top 20 to 25 feet below the ground surface.

Figure 3.4: Soils map of Kalaeloa area *(See following page)*


I:\200117\CAD\EISPN Figures\fig3-4 - soils map.apr
EmA
EmA
CR
MnC
MnC
CR
MnC
EmA
FL
CR
BS
BS
BS
Proposed Kalaeloa
Desalination Facility
Key
BS - Beaches
CR - Coral Outcrop
EmA - Ewa Silty Clay Loam, Moderately Shallow, 0 to 2 Percent Slopes
FL - Fill Land, Mixed
MnC - Mamala Stony Silty Clay Loam, 0 to 12 percent slopes
2000 0 2000 4000 Feet
Scale, In Feet
Oceanit
...innovation through engineering and scientific excellence...
Figure 3.4 - Soils Map of Kalaeloa Area
Kalaeloa Desalination Facility
BOARD OF WATER SUPPLY
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3.5 Climate

Hawaii's climate is influenced by its subtropical location, topography, and the surrounding Pacific Ocean. Temperature varies with elevation, distance from shore, and exposure to winds. Higher elevations have cooler temperatures. There is less temperature variation in areas exposed to the consistent trade winds, and more temperature variation in areas farther from shore (DOA and DOT, 2000). On the Ewa Plain, low temperatures range from about 60°F in the winter to near 70°F in the summer and high temperatures range from 80°F in the winter to almost 90°F in the summer (UH, 1983).

The island of Oahu experiences trade wind conditions the majority of the time, with winds out of the northeast at speeds of 5-25 mph (UH, 1983). Long-term wind data gathered at the BPNAS shows that the northeasterly trade winds prevail throughout the year. Southerly winds occur only a few days a year and are associated with Kona storms. Winds speeds at BPNAS average 12 mph (DOA and DOT, 2000).

Rainfall is highly dependent on elevations and location. Areas at higher elevations and on the windward side of the mountain ranges receive the most rainfall, as moisture-laden trade winds rise over the mountain range and lose their moisture. The average annual rainfall in the Barbers Point area is 20 inches. Rainfall is the heaviest during winter months. Monthly rainfall may vary from a trace to 15 inches or more (DOA and DOT, 2000). Mean annual average evaporation is 91 inches (Palama, 1999).

3.6 Air Quality

The USEPA established National Ambient Air Quality Standards (NAAQS) as required by the Clean Air Act. These standards cover seven major air pollutants: carbon monoxide (CO), nitrogen oxides (NO_X), ozone (O_3), particulate matter smaller than 10 microns (PM_{10}), particulate matter smaller than 2.5 microns ($PM_{2.5}$), sulfur oxides (SO_X), and lead. The State of Hawaii has also established standards for six of these air pollutants. In 1999, the State of Hawaii met all federal ambient air quality standards.

Air Pollutant	Averaging Time	Standards		
		Hawaii State Standard[a] ($\mu g/m^3$)	Federal Primary Standard[b] ($\mu g/m^3$)	Federal Secondary Standard[c] ($\mu g/m^3$)
Carbon Monoxide	1-hour 8-hour	10,000 5,000	40,000 10,000	40,000 10,000
Nitrogen Dioxide	Annual (arithmetic)	70	100	100
PM10	24-hour Annual (arithmetic)	150 50	150 50	150 50
Ozone	1-hour	100	235	235
Sulfur Dioxide	3-hour 24-hour Annual (arithmetic)	1,300 365 80	-- 365 80	1,300 -- --
Lead	Calendar Quarter (arithmetic)	1.5	1.5	1.5

Table 3.1: State and Federal Ambient Air Quality Standards

There are nine air quality monitoring stations on the island of Oahu; three of which are in the general vicinity of the project site as shown in Figure 3.5. The first site is at Makaiwa and is located at 92-670 Farrington Highway. This site is in a residential and agricultural area and is down wind of an electrical power plant. The Makaiwa station monitors for SO_2. The second site is at West Beach and is located within the Ko Olina Golf Course. This station monitors NO_2, PM_{10}, CO, and SO_2. The last air quality monitoring station in the project area is the Kapolei station and is located at 91-591 Kalaeloa Boulevard at the entrance to Campbell Industrial Park. This site is in a commercial, industrial, and residential area with nearby agricultural lands. The Kapolei station measures NO_2, PM_{10}, CO, and SO_2.

[a] Designated to protect public health and welfare and to prevent significant deterioration of air quality. Feed: HAR § 11-59-1.
[b] Designated to prevent against adverse effects on public health. Feed 40 CFR Part 50.
[c] Designated to prevent against adverse effects on public welfare, including effects on comfort, visibility, vegetation, animals, aesthetic values, and soiling and deterioration of materials. Feed 40 CFR Part 50.

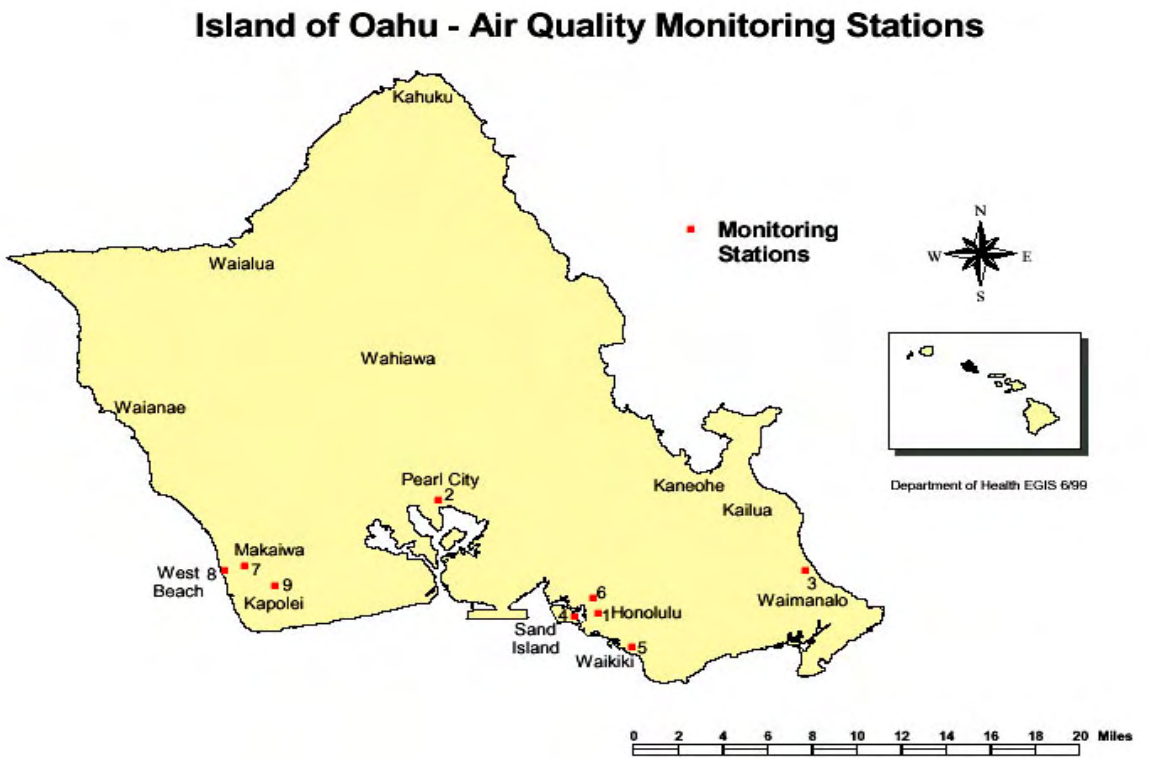


Figure 3.5: Air Quality Monitoring Stations on the Island of Oahu (DOH, 2001)

Information from the three stations gives a good picture of the air quality at the proposed Kalaeloa project site because of the close proximity to the stations, and also the mixture of land uses that the stations are near. The following figures show the data from the air quality monitoring stations in the project area for the year 1999 and the relevant state and federal standards. This data shows that all three monitoring stations are well below both federal and state standards (DOH, 1999).

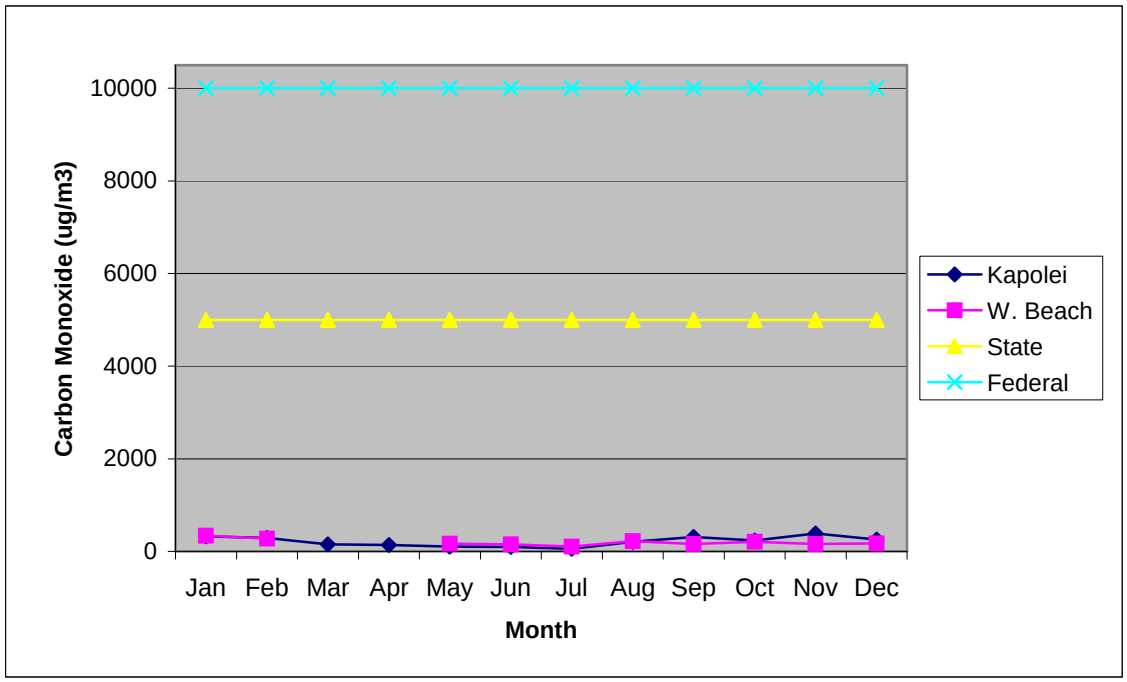


Figure 3.6: 1999 Average Monthly 8-hour Carbon Monoxide Values and Standards (DOH, 1999)

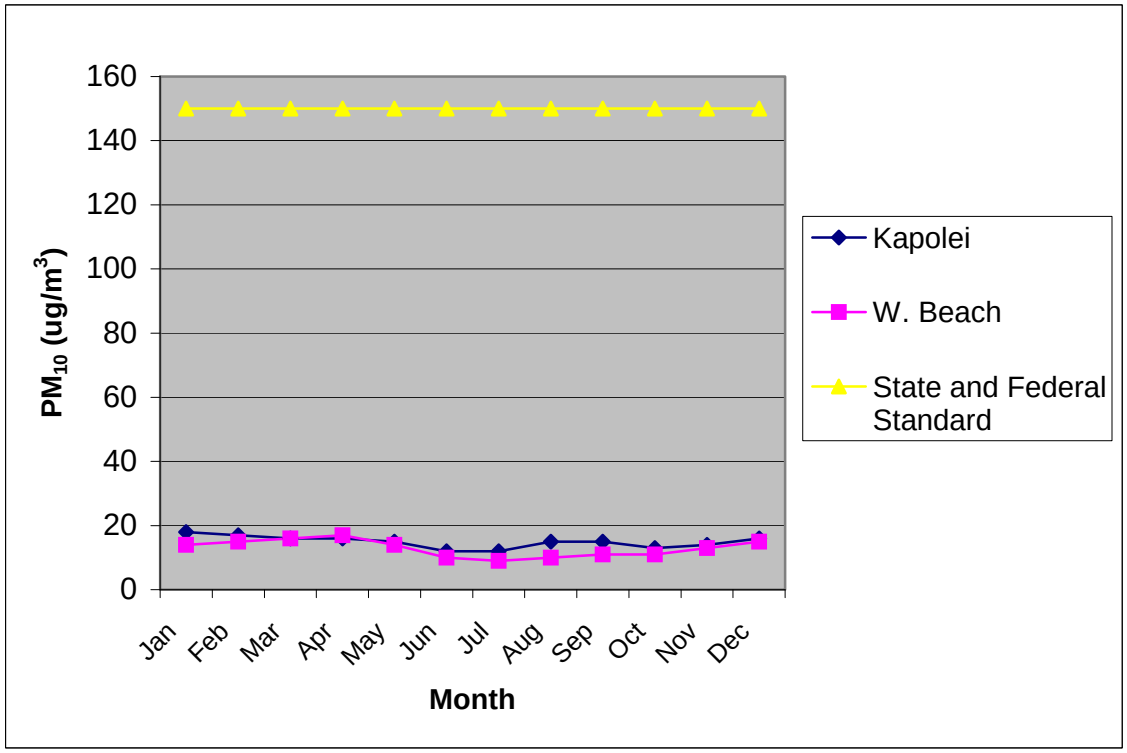


Figure 3.7: 1999 Average Monthly 24-hour PM_{10} Values and Standards (DOH, 1999)

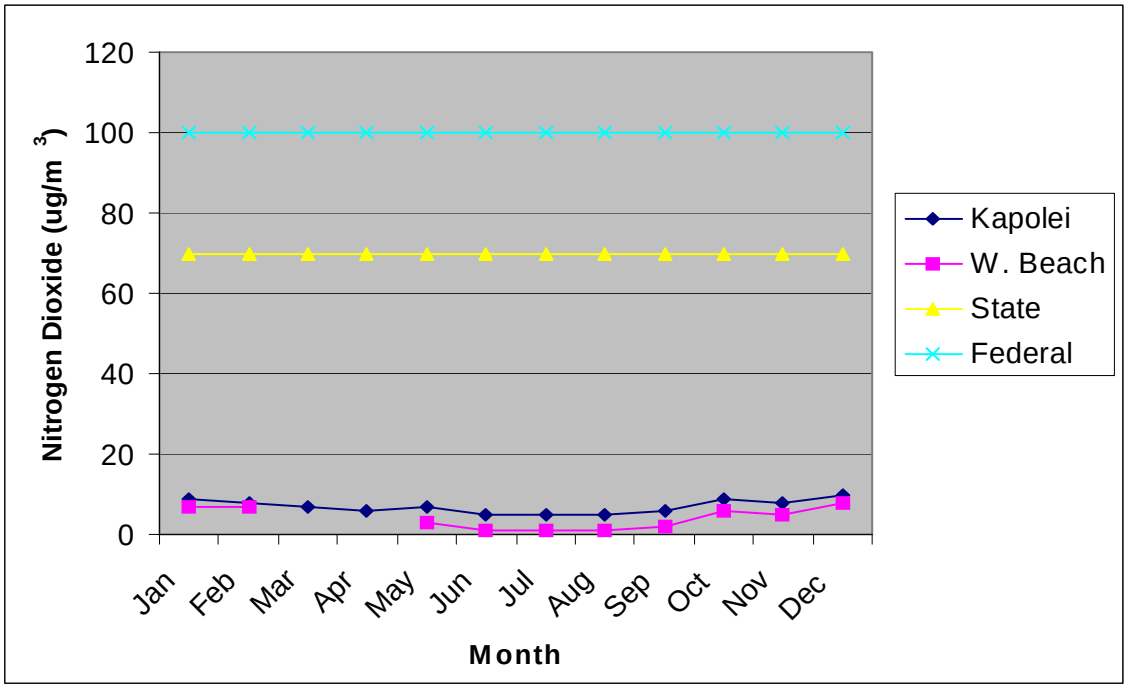


Figure 3.8: 1999 Average Monthly 24-hour Nitrogen Dioxide Values and Standards (DOH, 1999)

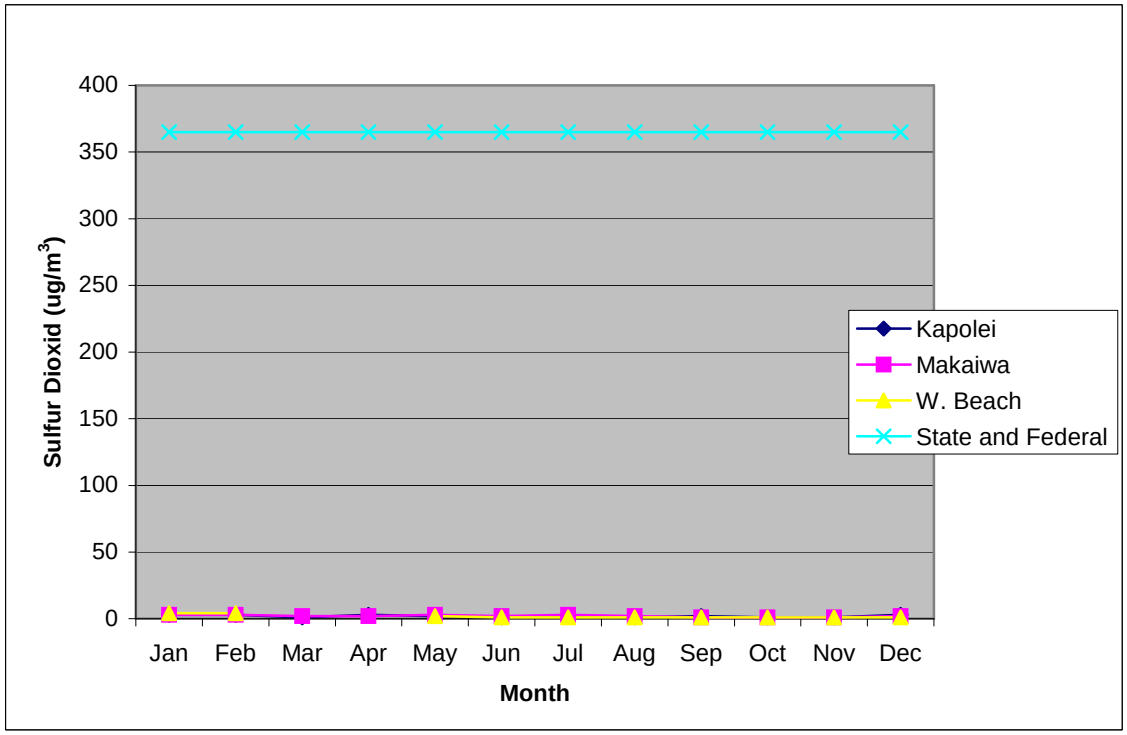


Figure 3.9: 1999 Average Monthly 24-hour Sulfur Dioxide Values and Standards (DOH, 1999)

3.7 Water Resources

There are several hydrologic systems in the vicinity of the proposed project area. This section outlines the hydrologic properties of the area.

3.7.1 Groundwater

Mink and Lau have generally classified groundwater on the island of Oahu according to aquifer and status codes. In the vicinity of the project area, there are two aquifers, one above the other. The top aquifer (upper caprock aquifer) is listed as part of the Ewa aquifer system, basal (freshwater in contact with seawater), unconfined, and occurring in sedimentary or non-volcanic geologic area. The status code of the top aquifer identifies it as being currently used, having moderate salinity (1000-5000 mg/l Cl), replaceable, and having a high vulnerability to contamination.

The lower aquifer (lower caprock aquifer) is listed as part of the Ewa aquifer system, basal, confined, and occurring in flank or horizontally extensive lavas. The status of the lower aquifer is defined as being currently used, with low salinity of (250-1000 mg/l Cl^-), irreplaceable, and having a low vulnerability to contamination (Mink and Lau, 1987). The lower caprock has been used for industrial purposes and for disposal of used water, and the quality of the groundwater has suffered as a result.

Beneath the caprock aquifers is the Waianae Basalt aquifer (BA). The BA is contained in the volcanic formations of the area and is saturated with seawater. At the coastline, the BA is about 1,100 feet deep and rises at a 3 to 5 percent grade in the inland direction. The Waianae Basalt (basal) is the basement rock on which the caprock sediments rest. The caprock and basal formations are separated by an unconformity consisting of a layer tens of feet thick of saprolite and terrestrial alluvium.

The chemistry of the basalt groundwater so nearly resembles that of the caprock water that it is probable that it originates as seawater that passes through the caprock and enters the basalt aquifer under the stress of pumping (Mink and Yuen, 2002). The caprock is assumed to have substantial porosity exceeding 10 percent. The estimated porosity of the Waianae Basalt is 5-10 percent.

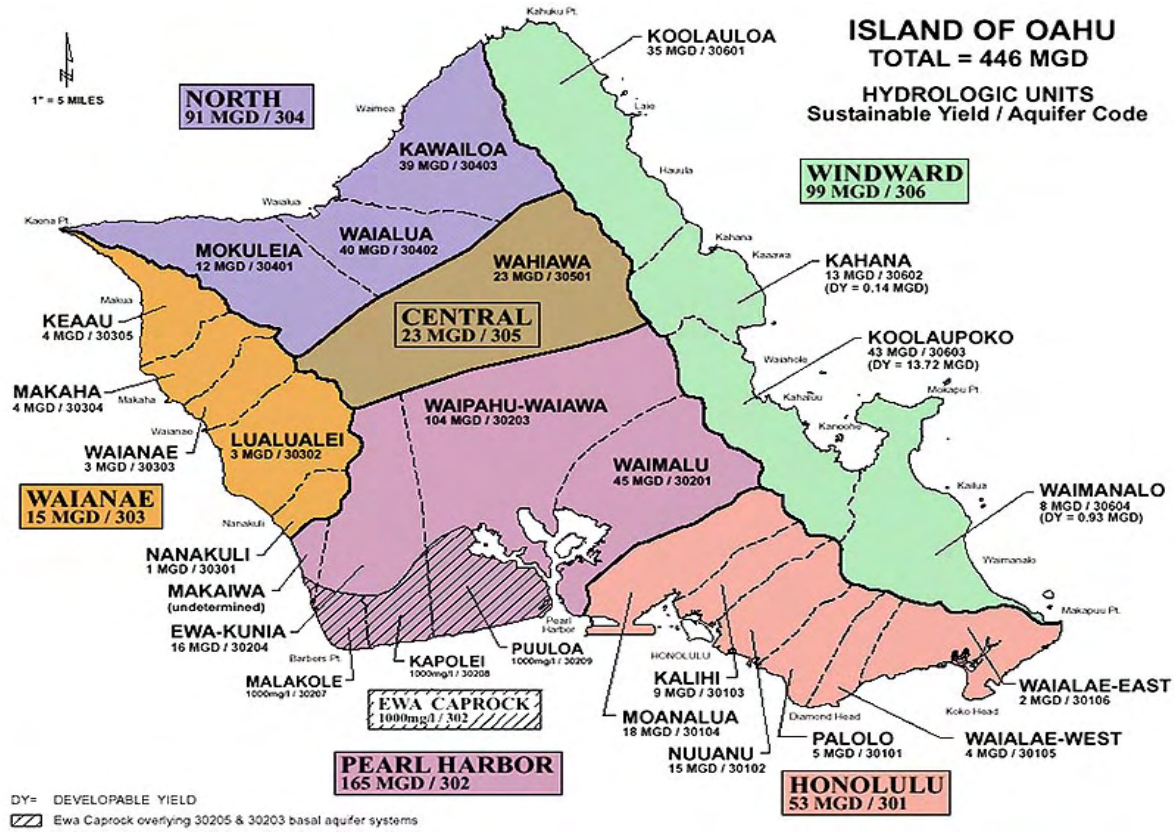


Figure 3.10: Hydrologic Units and Sustainable Yields

Groundwater Contamination

As part of this project, sources of information related to contaminated sites, were reviewed. In addition, the Draft EIS was referred to various agencies for comments on potential impacts to groundwater in the area. The 1998 Groundwater Contamination Maps for the State of Hawaii were reviewed. The maps do not denote any designated groundwater contamination sites or contiguous to, the proposed site.

The proposed Kalaeloa desalination facility is located makai of the Department of Health (DOH) underground injection control (UIC) line (See Figure 3.11). The boundary between non-drinking water aquifers and underground sources of drinking water is generally referred to as the "UIC Line". Restrictions on injection wells differ, depending on whether the area is inland (mauka) or seaward (makai) of the UIC line. Locations below the UIC line are not considered drinking water sources and injection wells are allowed with a permit. The proposed well is located in an area not considered for drinking water. Injection wells are allowed in this area with a permit. As part of this project the BWS will be required to secure an UIC permit from the DOH.

The State's Underground Injection Control Program has fourteen injection well facilities currently registered at Campbell Industrial Park. The injection wells

closest to the desalination project appear to be Tesoro Hawaii Refinery's two injection wells approximately 2000 feet northwest of the project site. Tesoro's Injection wells are approximately 235 feet deep. The Tesoro site is also currently undergoing Resource Conservation and Recovery Act (RCRA) corrective action to address petroleum contamination at its site. In addition, there is a layer of free product under the facility that Tesoro plans to recover. At the present time, the plume sits directly below the facility and has not been found off-site.

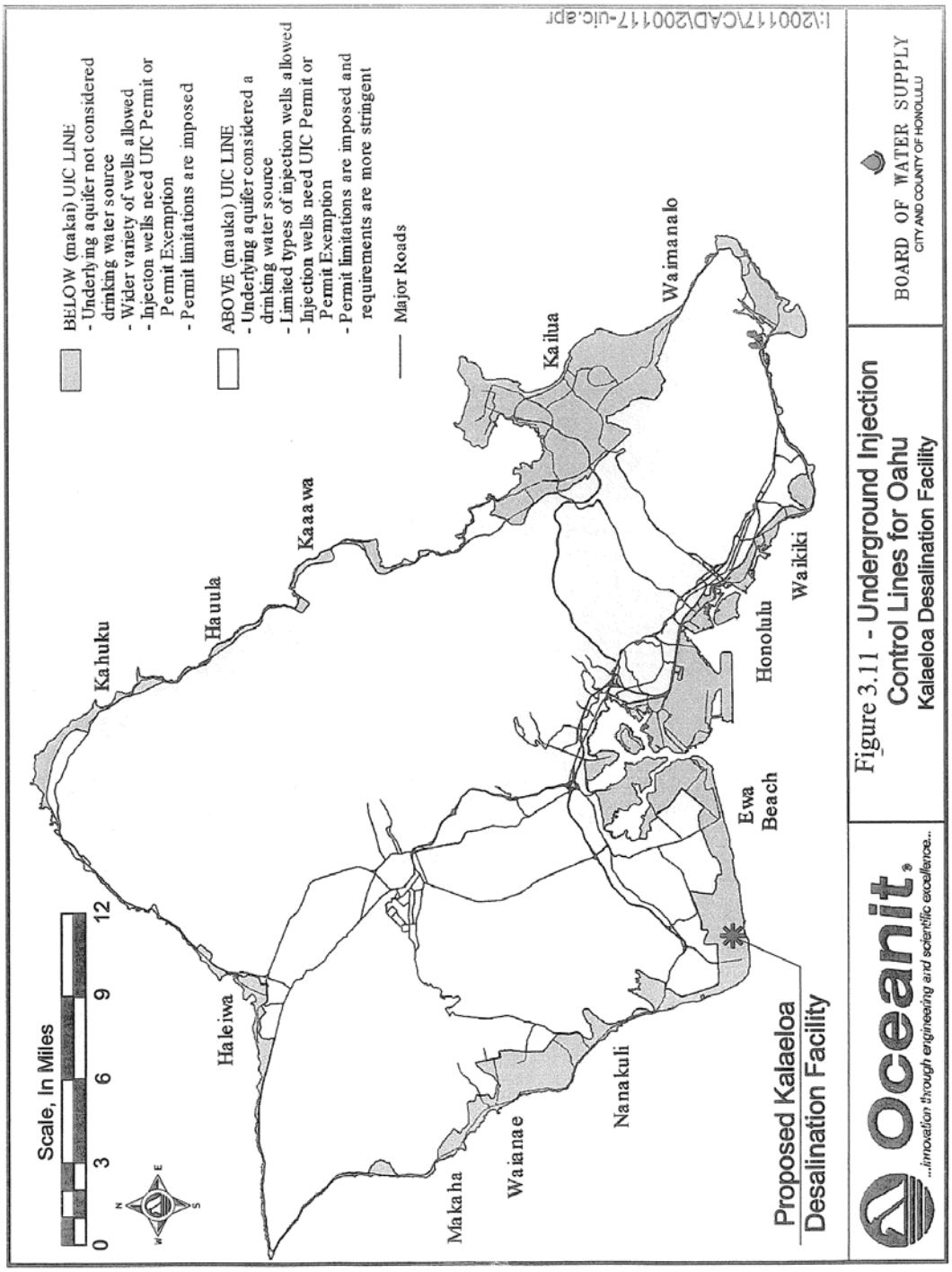
The City and County of Honolulu (City) owns and operates the Honouliuli Wastewater Treatment Plant (WWTP), which is the regional wastewater treatment facility for the Ewa district. The Honouliuli WWTP is located along Geiger Road directly east of the former BPNAS. The service area of the plant encompasses a total area of approximately 76,000 acres and ranges from Red Hill along its eastern boundary up to Mililani on its northern boundary, and extends to Makakilo City, Honokai Hale, and Ko Olina on its western boundary.

All residential, commercial, industrial and agricultural areas within these boundaries are included in the service area except for Pearl Harbor, Campbell Industrial Park and several small pockets that are served by cesspools or septic tanks. Wastewater treated at the Honouliuli WWTP is discharged into West Mamala Bay through a deep ocean outfall (WWTP 2002). The proposed desalination project will not be associated with the operation at the Honouliuli waste treatment facility and will not be involved in any processing or treatment of effluent for off-site use. In addition, the desalination project will not utilize ocean outfall as a means of brine disposal.

3.7.2 Surface Water

There are no natural lakes, reservoirs, ponds, rivers, streams, or wetlands in the vicinity of the proposed project area. A man made drainage canal runs along the eastern boundary of the site. The canal contains seawater during normal conditions. Figure 3.12 shows the drainage channel located on the eastern edge of the proposed Kalaeloa project site.

Figure 3.11: Underground Injection Control Lines for Oahu *(See following page)*


BELOW (makai) UIC LINE
- Underlying aquifer not considered drinking water source
- Wider variety of wells allowed
- Injection wells need UIC Permit or Permit Exemption
- Permit limitations are imposed
ABOVE (mauka) UIC LINE
- Underlying aquifer considered a drinking water source
- Limited types of injection wells allowed
- Injection wells need UIC Permit or Permit Exemption
- Permit limitations are imposed and requirements are more stringent
Major Roads
Scale, In Miles
0 3 6 9 12
Kahuku
Hauula
Kaaawa
Kailua
Waimanalo
Haleiwa
Honolulu
Waikiki
Ewa Beach
Waianae
Nanakuli
Makaha
Proposed Kalaeloa Desalination Facility
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Oceanit
...innovation through engineering and scientific excellence...
Figure 3.11 - Underground Injection Control Lines for Oahu
Kalaeloa Desalination Facility
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Figure 3.12: Photograph of Drainage Canal on Edge of Proposed Kalaeloa Project Site

3.7.3 Coastal Waters

The State of Hawaii Department of Health (DOH) has classified the near shore waters of the Ewa area as Class A Open Coastal Waters (See Figure 3.13). Class A waters are designated to be protected for recreational use and aesthetic enjoyment. Uses other than recreational are allowed as long as they are not in conflict with the protection and propagation of fish, shellfish, and wildlife, and with ocean-related recreational activities. DOH regulations state that Class A waters should not receive any discharges that have not undergone the best degree of treatment.

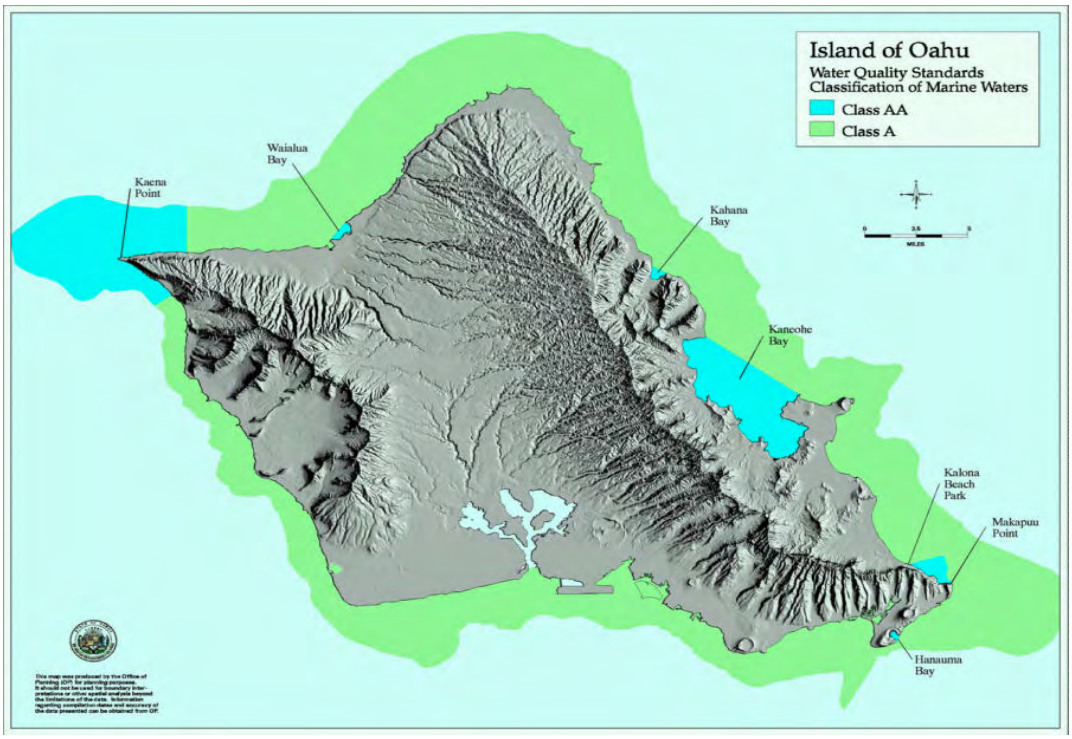


Figure 3.13: Water Quality Classifications for the Island of Oahu (DOH, 2001)

3.8 Natural Hazards

There are two categories of natural hazards that are of concern at the project site: seismic and flood/tsunami hazard.

3.8.1 Seismic

The Uniform Building Code (UBC) seismic provisions contain six seismic zones, ranging from 0 (no chance of severe ground shaking) to 4 (10 percent chance of severe shaking in a 50-year interval). Oahu has a low probability for seismic disturbances and has been designated as a Zone 2A under the Uniform Building Code in its 1997 assignment (Figure 3.15). Most recent seismic activity in the State of Hawaii has occurred on the Big Island and Maui.

Jurisdiction	Island	1988 Zone	1997 Zone
County of Hawaii	Hawaii	3	4
County of Maui	Maui	2B	2B
	Kahoolawe	2B	2B
	Lanai	2B	2B
	Molokai	2B	2B
City & County of Honolulu	Oahu	1	2A
County of Kauai	Kauai	1	1
	Niihau	1	1

Figure 3.14: Hawaii Seismic Zone Assignments, 1988 and 1997 (USGS 2002)

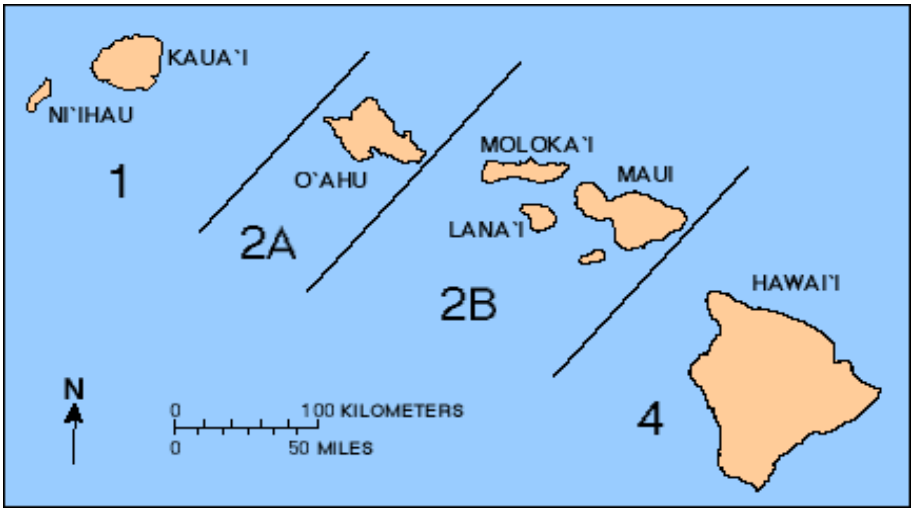


Figure 3.15: Map of the 1997 Hawaii Seismic Zone Assignments (USGS 2002)

3.8.2 Flood and Tsunami Hazard

Flood Insurance Rate Maps (FIRM) dated November 20, 2000 show that the project site is located in Zone D. This zone is a defined as an area in which flood hazards are undetermined (See Figure 3.16). Coastal areas to the south and west of the project site are designated Zone AE and have base flood elevations ranging from 6 feet to 9 feet above mean sea level. These coastal areas are defined as "Special Flood Hazard Areas Inundated by 100-year Flood" and are concentrated along the shoreline.

The project area is within the tsunami evacuation area as defined by the Oahu Civil Defense Agency Map #17-Kahe Point to Ewa Beach. The evacuation zone extends from the shoreline mauka to Olai Street. Since none of the proposed buildings would be "steel and/or concrete six or more stories in height" due to the height limit in the area, they would not provide adequate protection from a

tsunami. Therefore, the evacuation would be necessary to the nearest public shelter or designated refuge area at Makakilo Elementary School. (PDC, 2002)

Figure 3.16: Flood Zone Map *(See following page)*

Civil Defense Tsunami Evacuation Map

Evacuate all shaded areas

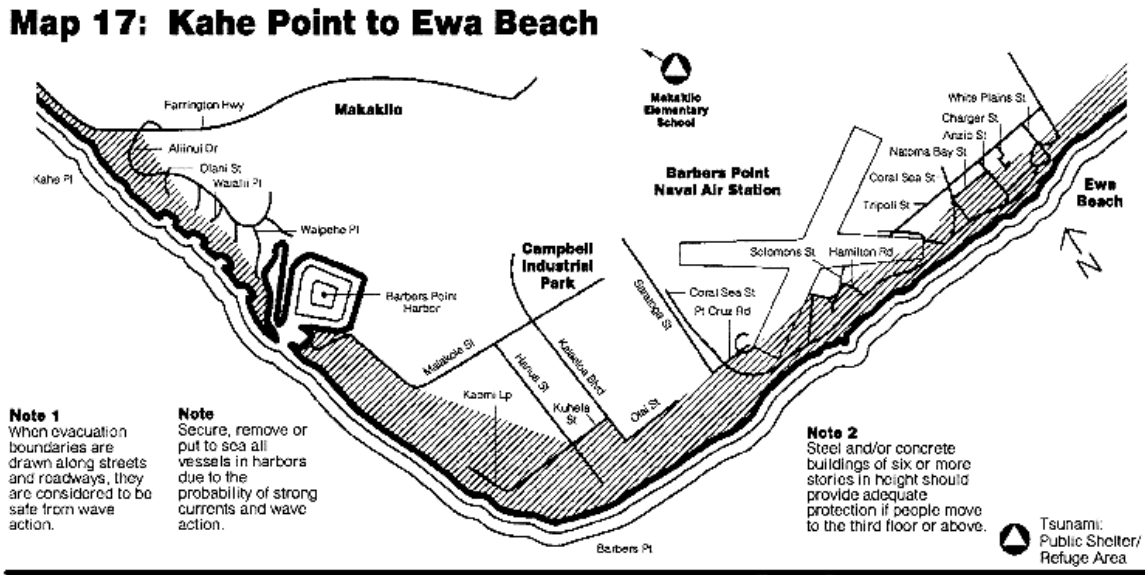
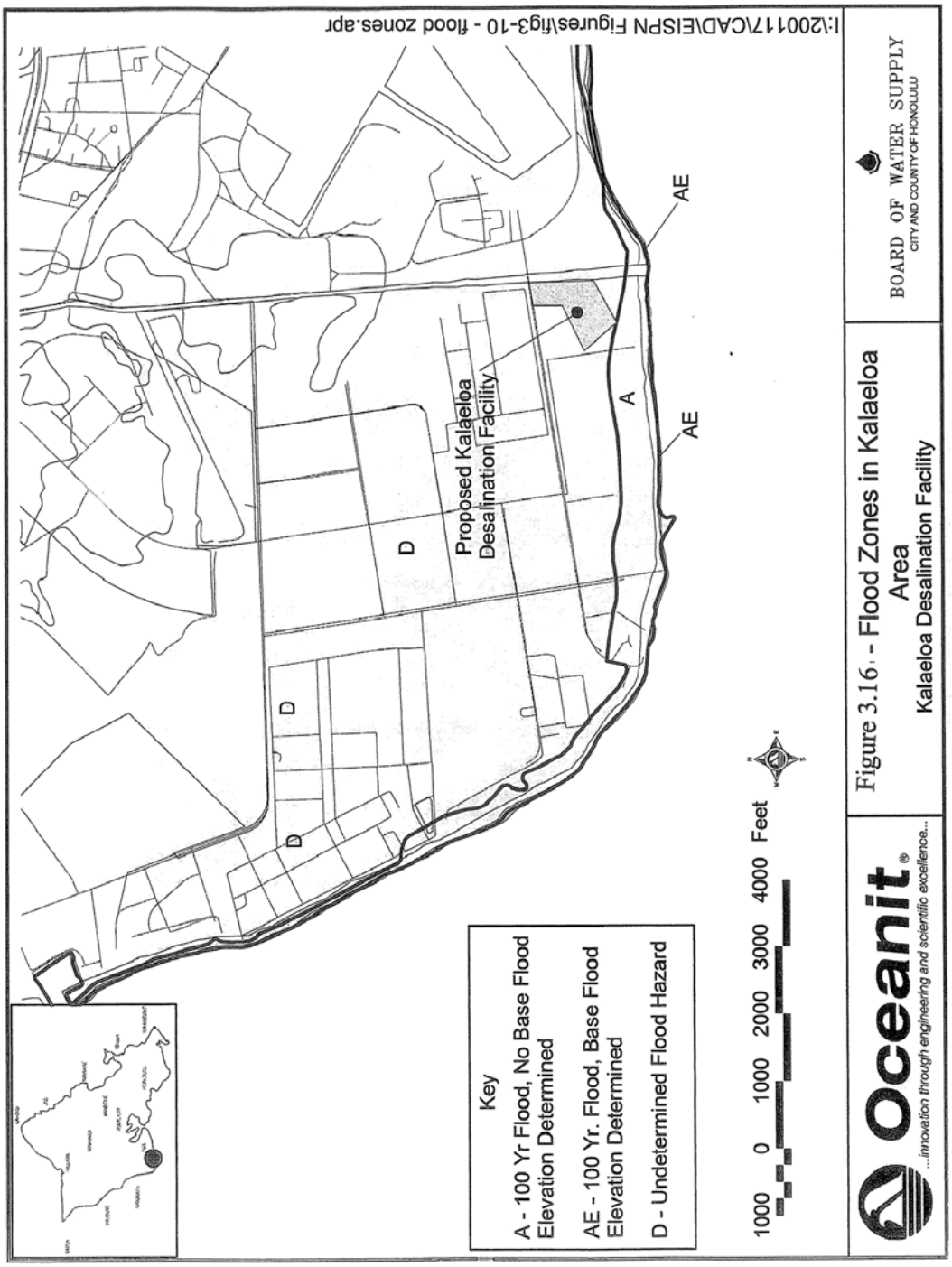


Figure 3.17: Tsunami Evacuation Zones in Kalaeloa Area (PDC, 2002)

3.9 Biological Resources

Both floral and faunal studies were completed for this project site. The subject site is significantly disturbed with ground scraping, introduced vegetation and limited if any undisturbed area. This is mostly due to its urban location contiguous to intense industrial uses and a former military airfield.


I:\2001170\CAD\EISPN Figures\fig3-10 - flood zones.apr
Proposed Kalaeloa Desalination Facility
D
D
D
A
AE
AE
Key
A - 100 Yr Flood, No Base Flood Elevation Determined
AE - 100 Yr. Flood, Base Flood Elevation Determined
D - Undetermined Flood Hazard
1000 0 1000 2000 3000 4000 Feet
Oceanit
...innovation through engineering and scientific excellence...
Figure 3.16 - Flood Zones in Kalaeloa Area
Kalaeloa Desalination Facility
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CITY AND COUNTY OF HONOLULU

3.9.1 Flora

Char and Associates, Botanical Consultants, Honolulu, Hawaii conducted a floral survey of the project area in February 2002. The objectives of the survey were to provide a general description of the vegetation on the site, inventory the flora, search for threatened and endangered species as well as species of concern, and identify areas of potential environmental problems or concerns and propose mitigation measures. (See Appendix B for the complete survey report.) A records and literature search was completed prior to a walk-through survey of the site.

Two vegetation types were identified on the project site: kiawe forest, and open scrub. Portions of the site are covered by kiawe forest on karst, and more recently disturbed areas support open scrub vegetation. The majority of plants inventoried on the project site are introduced or alien species. The three endemic species (native only to Hawaii) are the kupala (*Sicyos pachycarpus*), maiapilo (*Capparis sandwichiana*), and naio (*Myoporum stellatum*).

Kiawe Forest

The substrate underlying the kiawe forest area is weathered coralline reef which was formed when sea level was higher. Portions of the forest may have been cleared in the past for BPNAS operations and also by people harvesting kiawe wood.

Kiawe trees (*Prosopis pallida*) in the forest area average 20 to 30 feet tall and form a closed canopy forest, with 60 percent of the tree branches interlocking. Understory vegetation in the kiawe forest area is sparse and consists of scattered patches of plants where the canopy is not dense. Plants found in these areas include a few shrubs of koa haole (*Leucaena leucocephala*) and maiapilo or native caper (*Capparis sandwichiana*); herbaceous species such as ‘aheahea (*Chenopodium murale*), *Achyranthes aspera*, cheese weed (*Malva parviflora*), and Australian saltbush (*Atriplex semibaccata*); and bristly foxtail grass (*Setaria verticillata*) and buffelgrass (*Cenchrus ciliaris*) which are locally abundant. In addition to the maiapilo, other native species include the kupala vine (*Sicyos pachycarpus*), the naio or false sandalwood (*Myoporum stellatum*), and kauna’oa pehu (*Cassytha filiformis*).

Open Scrub

The open scrub vegetation type occurs on areas which have been disturbed, such as along the drainage canal, adjacent to the perimeter fence line, and along the bulldozed road that runs down the middle of the property. The substrate in these areas is crushed coral with a thin layer of soil or organic material. In some areas, including the area along the drainage canal, the substrate is sandy. There are also large piles of sand, which are probably dredge material or side cast from the canal.

In the open scrub area, there are open patches of grasses and weeds with scattered young kiawe trees. Plant cover is very dense on areas where there is a thin layer

of soil. Bristly foxtail, buffelgrass, and swollen fingergrass (*Chloris barbata*) are co-dominant and form extensive mats. Patches of ʻaheahea and golden crown-beard (*Verbesina encelioides*) are locally common in some areas. In areas where there is sandy substrate, there are large patches of Australian saltbush, saltbush (*Atriplex suberecta*), kipukai (*Heliotropium curassavicum*), and succulent mats of ʻakulikuli (*Sesuvium portulacastrum*). There are fewer shrubs in the open scrub area, but include sourbush (*Pluchea carolinensis*), koa haole, and tree tobacco (*Nicotiana glauca*).

Rare, Threatened or Endangered Species

No threatened or endangered species were found on the project area. Two species of concern, as defined by the U.S. Fish and Wildlife Service (USFWS), are found on the project site: the maiapilo or native caper (*Capparis sandwichiana*) and the naio or false sandalwood (*Myoporum stellatum*). Species of concern do not receive legal protection under Federal and State endangered species laws, but are monitored by USFWS. If the species begins to decline dramatically, then conservation actions may be initiated.

The maiapilo can be found in coastal lowlands throughout the Hawaiian Islands, while the naio is restricted to the Ewa Plains. Because of its restricted distribution and development in the Ewa area, the naio is considered a high priority species of concern.



Figure 3.18: Vegetation on proposed Kalaeloa project site

The two general vegetation types (kiawe forest and open scrub) are dominated by introduced or alien species. Of the 50 species observed on the site, 78 percent are introduced and 22 percent are native. It is recommended that native lowland species be used for landscaping the facility including the maiapilo and Myoporum. The City and County of Honolulu should be contacted to propagate the maiapilo and Myoporum from the project site.

3.9.2 Fauna

Wildlife on the Ewa Plain includes birds, feral dogs and cats, rodents, and mongoose. Birds are the most common form of wildlife in the area. There are 17 introduced species and five indigenous species. The five most common introduced species are the zebra dove, Japanese white-eye, Northern cardinal, red-crested cardinal, and the red-vented bulbul. The five indigenous species are the black-crowned night heron, great frigate bird, Pacific golden plover, sanderling, wandering tattler, and the ruddy turnstone. There are no federally endangered, threatened, or candidate species, or wetlands within the proposed Kalaeloa site.

A two-day field survey of the project site was conducted in May 2002. There were no native land or waterbirds observed during the field survey. It is possible that the Short-Eared Owl or Pueo (*Asio flammeus sandwichensis*) might be present on rare occasions in this area. The Pueo is listed as endangered on Oahu by the State of Hawaii. The Black-crowned Night-Heron (*Nycticorax nycticorax*) may occasionally forage along the nearby shoreline or canal. This species is not listed as endangered or threatened (Bruner, 2002).

During the field survey, two species of migratory shorebirds were noted. One Pacific Golden-Plover (*Pluvialis fulva*) was observed on the northern end of the canal. Plover winter in Hawaii and migrate to Alaska for breeding in April. Therefore, more plover will likely be seen in this area between August and April when the majority of the birds return to winter in Hawaii. Also during the field survey, three Wandering Tattler (*Heteroscelus incanus*) were seen foraging along the edge of the canal and shoreline. Neither the Pacific Golden-Plover nor the Wandering Tattler are listed as endangered or threatened (Bruner, 2002).

There were no seabirds observed during the field survey. These birds can be observed in offshore areas, but there is not suitable nesting habitat within the project site (Bruner, 2002).

A variety of alien or introduced birds were observed during the field survey. None of the noted species are listed as endangered or threatened. Table 3.2 lists the alien or introduced bird species observed on the project site (Bruner, 2002).

Common Name	Scientific Name
Ring-necked Pheasant	*Phasianus colchicus*
Spotted Dove	*Streptopelia chinensis*
Zebra Dove	*Geopelia striata*
Red-vented Bulbul	*Pycnonotus cafer*
Northern Mockingbird	*Mimus polyglottos*
Common Myna	*Acridotheres tristis*
Japanese White-eye	*Zosterops japonicus*
Northern Cardinal	*Cardinalis cardinalis*
Red-crested Cardinal	*Paroaria coronata*
House Finch	*Carpodacus mexicanus*
House Sparrow	*Passer domesticus*
Common Waxbill	*Estrilda astrild*
Warbling Silverbill (African Silverbill)	*Lonchura malabarica (Lonchura catans)*
Java Sparrow	*Padda oryzivora*

Table 3.2: Alien or Introduced Birds Observed During Field Survey (Bruner, 2002)

Two types of feral mammals were observed on the project site, the Small Indian Mongoose (*Herpestes auropunctatus*) and a feral cat (*Felis catus*). While no dogs, rats, or mice were observed, they are likely to occur in the area. The endangered native Hawaiian Hoary Bat was not seen during the field survey and is unlikely to occur in this area (Bruner, 2002).

Bruner state in his conclusions of the field survey:

This field survey recorded the usual mix of birds and mammals typical of this type of habitat in this region of Oahu. No unusual or unexpected species were recorded. No endangered or threatened species were observed. The habitats at this location are those commonly found in coastal West Oahu. No unusual or particularly important natural resources were noted. The canal and nearby rocky shoreline are used by migratory shorebirds and would likely still be used to the same degree even if the land in this area were developed. These birds have learned to forage in many areas disturbed by human activity as well as undisturbed sites.

3.9.3 Aquatic Ecosystems

Coastal waters of the Ewa Plain receive nutrient rich water from springs below sea level. The nutrients in this water comes from upland agricultural fertilization, leach from cesspools and septic tanks, domestic waste injection wells, and urban application of fertilizers. These extra nutrients promote the growth of benthic algae (limu). The Ewa area is a popular seaweed harvesting area on Oahu.

Organisms offshore of Ewa include reef-building corals, several species of sea cucumber, sea urchins, and colonial soft corals. A few species of reef fish are also present in low numbers. Macroalgae (seaweed) is very abundant in the offshore areas.

3.10 Cultural Resources

In compliance with Hawaii Revised Statutes, a Cultural Impact Assessment was completed for the project site and the surrounding area of Ewa. Aki Sinoto Consulting completed this report. The study area is within the Neighborhood Board District of Makakilo/Kapolei/Honokai Hale (DBEDT, 1999).

Formerly called Barbers Point, Kalealoa ('the long point') lies at the southwest end of the island of Oahu. The surrounding Ewa plain is extensive and very fertile and has traditionally been used for intensive cultivation by native Hawaiians. Many artesian wells are located in this seemingly resource-poor area of the island. Ancient Hawaiians developed a system for managing the water resources based on the ahupuaa, a land division that stretched from the mountain to the sea and extended beyond the reefs. Streams did not always flow above the ground. Water bubbled up from beneath the ground both on land and off the coastline, coming up through the seabed.

The Campbell Industrial Park surrounds the proposed site. In 1877, James Campbell known as "the Sugar Baron" purchased 41,000 acres at Honouliuli in the Ewa Plain. James Dillingham partnered with James Campbell to develop a railroad between the sugar plantations of the Ewa Plain and Honolulu. One of these plantations was managed by George Renton, Jr. This plantation eventually became the town of Ewa with a residential section named Renton Village. The Renton Plantation closed in the late 1970's, but many of the buildings are being restored to preserve this link to Hawaii's plantation era. The Campbell Estate currently manages the Industrial Park along with numerous real estate ventures in the surrounding area and throughout Hawaii.

Occupying an area known by *kupuna* as Kanahili, the Barbers Point Naval Air Station opened on the Ewa Plain in during World War II. The base was officially closed and the personnel transferred to the Marine Corps Base Hawaii at Kaneohe Bay, in 2001. The State is currently establishing the Kalaeloa Community Development District at the former base. This development district's goal is to diversify the economy and revitalize the Ewa Plain area.

Today, the beach fronting the site is used for diving, shell collecting, pole fishing, swimming, and throw-netting. Since the areas immediately inland of the coast have restricted access, shoreline access is primarily pedestrian along the shore from the public park to the lighthouse

3.11 Archaeological Resources

The Department of Land and Natural Resources (DLNR) Historic Preservation Division lists five sites on its National and State Register of Historic Places within the Ewa Region. The Ewa Region sites include a beach midden site, Oneula Archaeological

District, Barbers Point Harbor Archaeological District, Oahu Railway and Land Company Right-of-Way, and Ewa Plantation Villages. None of these sites are specifically identified as occurring on or adjacent to the project site.

The State Historic Preservation Division (SHPD) records show a human burial; numbered SIHP 50-80-12-4209, on the edge of the drainage channel (See Figure 3.19). This record does not list any previous archaeological surveys at the site. A field inspection in October 2000 showed that portions of the proposed facility had been extensively cleared and base coral had been exposed. However, there are some undisturbed areas at the Kalaeloa site and SHPD recommends a full archaeological inventory.

On April 13-15, 2002, an archaeological inventory assessment, cultural impact assessment and monitoring was completed by Aki Sinoto Consulting of Honolulu. Inventory survey procedures were conducted between November 30, 2001 and January 23, 2002. The inventory was completed for the project site as well as the 10-acre parcel (TMK 9-1-31:47) that adjoins the project area to the south. In the course of the current undertaking, three sites, two cultural and one paleontological, were recorded.

Archaeological Survey	Brief Description
Site 6373	Small, three feature complex consisting of deteriorated, circular enclosure, a capped sinkhole, and an unusual structure made of several leaning, limestone slabs that formed a cyst-like surface structure
Site 6374	Two large adjoining sinkholes that were concluded to be "a late-historic period, lime kiln where coralline limestone was burned"
Site 6375	Complex of eight paleontological sinkhole features selected from thirteen accessible sinkholes identified during the initial surface survey

Table 3.3: Archaeological Site Descriptions

Figure 3.19 Burial Sites for Kalaeloa Project Site *(See following page)*

3.12 Visual Resources

The design guidelines of the Kalaeloa Redevelopment Plan specify that:

- The existing architectural styles at the former BPNAS are intended to influence future development and redevelopment.

- Industrial buildings may use the design precedence of Building 19. Other industrial-based design precedence such as the hangers, may be used if appropriate due to the functional requirements of the structure.

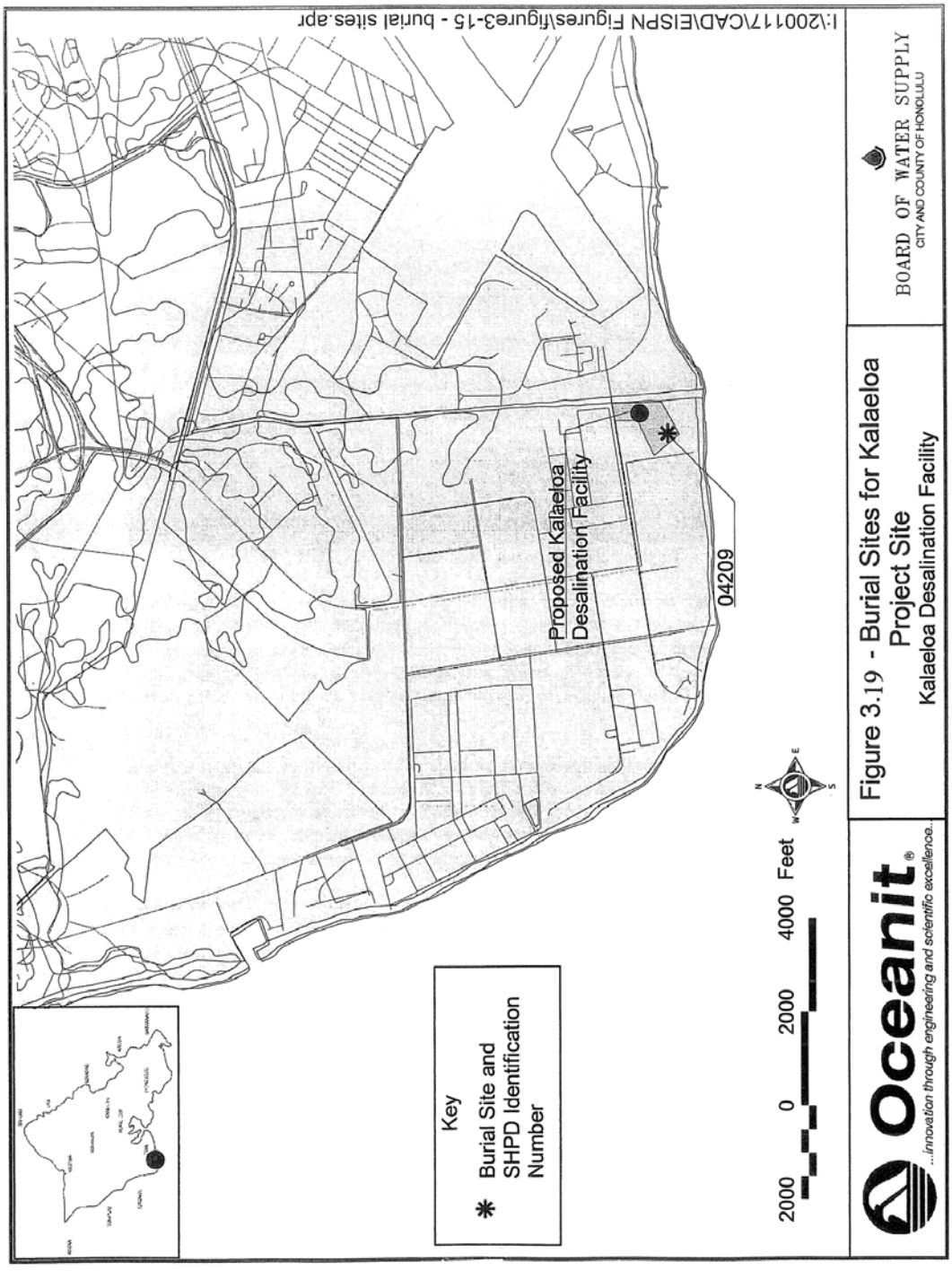

I:\2001170\CAD\EISPN Figures\figure3-15 - burial sites.apr
Proposed Kalaeloa Desalination Facility
04209
Key
* Burial Site and SHPD Identification Number
2000 0 2000 4000 Feet
Figure 3.19 - Burial Sites for Kalaeloa Project Site
Kalaeloa Desalination Facility
Oceanit
...innovation through engineering and scientific excellence...
BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU



Figure 3.20: Building 19 of the BPNAS (DPP, 2002)

The mechanical requirements of this facility require a number of large building enclosures to shelter the processing equipment from dirt, rain, ultraviolet and other radiation. Operational and maintenance requirements dictate a minimum clear height for this shelter as well as access doors for service, skylights for daytime lighting, large air vents located both high and low to provide a gravity-type air flow within the sheltering buildings.

"*While these requirements will mean large scale and boxy buildings, the process is a clean one, and the business of making clean, pure water can be 'imaged' in these buildings by the introduction of color - the rainbow of blue/green colors incorporated in the building materials will identify these buildings as being the ones where the water is 'made'. This identification will make an appropriate statement as to the use and purpose of this project."*

The entry area is occupied by the Administration and Visitor Center. This portion of the facility is designed with a "campus" character, which is depicted by the 12-foot wide covered walkways linking the buildings. The Visitor Center of approximately 1600 square feet, is the high roofed Hawaiian structure used as a meeting and educational place for the Board of Water Supply to meet and inform the public about this facility and its processes. This public area is interconnected with the Administration functions office, control room and lab. A central receptionist location has oversight of both areas.

The covered walkway links the Administration/Visitor Center to the Workshop, Chemical Storage building and links to the "site alley" connecting all of the RO

buildings. Working with the landscape design, this central area contains all of the administration and public functions of the site.

The Ewa Development Plan identifies several visual landmarks and significant vistas in the Ewa area, including:

- Distant views of the shoreline from the H-1 Freeway above the Ewa Plain
- Views of the ocean from Farrington Highway between Kahe Point and the boundary of the Waianae Development Plan area
- Views of the Waianae Range from H-1 Freeway between Kunia Road and Kalaoi Gulch and from Kunia Road
- Views of na puu (hills) at Kapolei, Palailai, and Makakilo
- Mauka and makai views, and views of central Honolulu and Diamond Head



Figure 3.21: View of Shoreline Near Project Site



Figure 3.22: View Diamond Head Across Canal from Project Site



Figure 3.23: Mauka View from Project Site



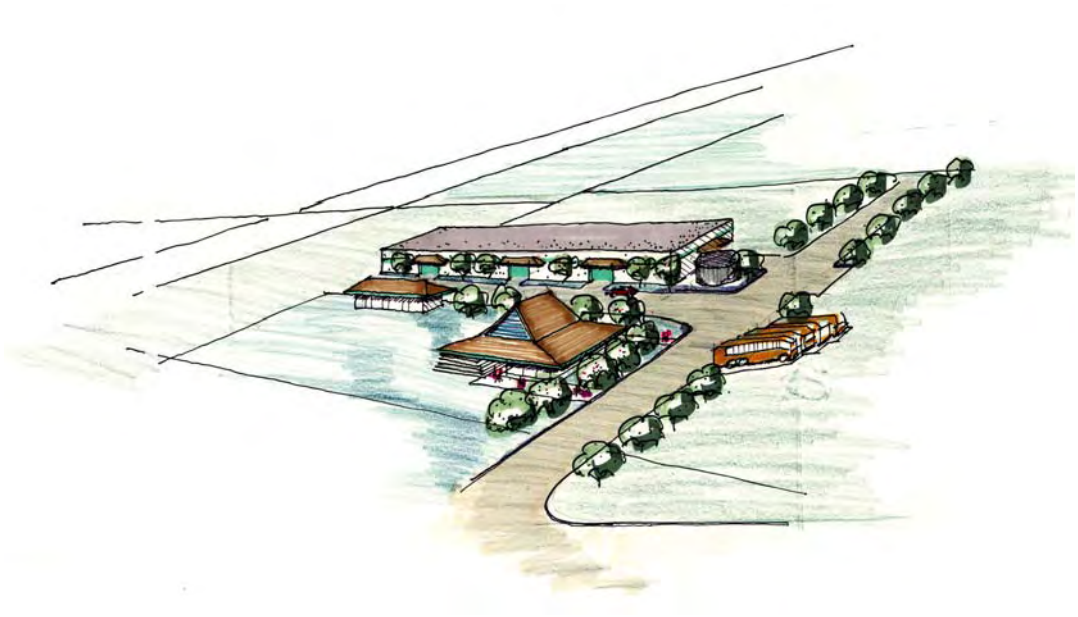
Figure 3.24: View of 40+ foot Storage Tanks
Blocking View of Project Site from H-1 Freeway Corridor

One applicable significant vista is the **"Distant views of the shoreline from the H-1 Freeway above the Ewa Plain"**(See Figure 3.24). Between the H-1 Freeway and the proposed project, there is a Tesoro Refinery and Oil Storage Facility. The numerous oil storage tanks on this site exceed the proposed 32-foot height of the desalination buildings. Therefore the proposed buildings would not be visible from the H-1 Freeway.



Figure 3.25: Makai View from H-1 Freeway Area-Project Not Visible





Figures 3.26: Artist Renderings of the General Design of the Facility (Typical)
Scaled Design and Placement of Buildings are shown in Appendix D

3.13 Socioeconomic Environment

By developing several types of water supplies, such as seawater desalination, recycled wastewater and deep ocean water/Ocean Thermal Energy Conversion (OTEC) technologies, in addition to surface and groundwater supplies, the BWS can provide the flexibility to adapt to future uncertainty, to continue to meet consumer demand with enhanced water resource stewardship.

The capital development cost of the desalination plant on a cost per gallon of capacity basis, is comparable to the cost of constructing a well in rural Oahu and transporting that water to urban Oahu. By developing an alternative source within the growth areas, we avoid the impacts on rural watersheds and water rights. In this respect, the entire island benefits from desalination and, therefore, the cost can be distributed across the entire island. The desalination plant will be funded with BWS impact fees and by floating municipal bonds. These financial mechanisms place the capital costs on future water users. The initial amount of desalination capacity developed will be limited to where the Operating and Maintenance costs do not require an increase in the water rates. The BWS is evaluating the creation of "lifeline rates" for low-income families that have difficulty paying for their water service.

In the year 2000, the population of the State of Hawaii was approximately 1.2 million and receives nearly 7 million visitors a year. Most of this population resides in the City and County of Honolulu, with 876,156 living in the county in 2000. The area surrounding the project site encompasses several census tracts including 84, 85, 86.98, and 86.04. Table 3.4 below gives census values for year 2000 in these tracts.

Census Tract	Population
Ewa (84)	22,326
Barbers Point (85)	1,311
Makakilo, East Kapolei/Ewa Villages, Villages of Kapolei, Ko Olina Expansion, and the Ko Olina – Campbell Industrial Park (86.98 and 86.04)	23,218

Table 3.4: Census Tracts and 2000 Data for Kalaeloa and Surrounding Areas (DBEDT, 1999)

According to the Ewa Development Plan (DP) population of the Ewa DP area will grow from 43,000 in 1990 to 125,000 in 2020. Jobs will have risen from 17,000 in 1990 to 64,000 in 2020. The Ewa area will attract residents and visitors with a new university campus, the Ko Olina Resort, ocean and waterfront activities at Ewa Marina, a major super regional park, and the City of Kapolei with retail and commercial establishment and private and governmental offices.

3.14 Traffic

Olai Street is the access to the proposed Kalaeloa Desalination Facility Site. There are currently no Levels of Service (LOS) studies that have been completed for this section of roadway. Olai Street is a private access road that currently ends at the proposed facility site and is only accessed through a locked gate. There is currently minimal, if any, traffic along Olai Street proximate to the proposed facility.

3.15 Noise

The State of Hawaii regulates noise levels in residential areas through the Department of Health regulations HAR Title 11, Chapter 46, Community Noise Control. Under these regulations, the proposed facility is a Class C Zoning District. The Class C Zoning District includes all areas “equivalent to lands zoned agriculture, country, industrial or similar type”. The maximum permissible limits given are for stationary noise sources, and equipment related to agricultural, construction, and industrial activities. Class C Districts cannot exceed noise levels of 70 dbA (DOH, 2002).

The predominant source of noise near the site is aircraft performing takeoff and landing operations at the nearby airfield. A 1989 Compatible Use Zones Noise Contours and Supporting Data evaluated noise impacts associated with 1987 aircraft operations and the BPNAS (Kalaeloa). At the time, the noise levels in the vicinity of the proposed site ranged from 65 to 75 dBA. Aircraft operations were reduced 24 percent between the years 1987 and 1993 (US DON, 1999).

The main source of noise at the time was due to airfield operations. While the noise impacts are not only a function of the number of aircraft, a decline of this magnitude would be expected to cause a decrease in noise levels (US DON, 1999). Other than the

use of emergency generators, the project is not anticipated to increase noise levels at the site.

3.16 Utilities

In order to operate the desalting equipment at the proposed facility, a large power requirement will be needed. Electricity will also be needed to provide power to office equipment and lighting. The initial 5 million gallons per day MGD seawater desalination facility will need an estimated 5 megawatts (Mw) of power, or 1 watt per gallon.

This power requirement is not currently available at the Kalaeloa site. A new substation will need to be installed in order to provide the needed electricity. HECO has suggested that multiple 10 MVA transformers be used. A location for the substation has already been proposed mauka of the desalination site. The 1-acre parcel will contain the dedicated HECO substation that will provide the additional electrical power to the site. The existing 46kV sub-transmission infrastructure will require upgrades as well as a line extension to the new substation, but no new electrical plants will need to be built for this project. Renewable energy sources, such as photovoltaics and solar panels, will be considered to reduce electricity needs.

Water will initially be brought to the site until a water transmission line is constructed. Then, the proposed facility will be connected to the BWS water supply system to provide potable water for employees during the start up phase of construction. When the facility is fully operational, the potable water generated will be added to the C&C water supply for distribution.

There are currently no sewer facilities at the proposed Kalaeloa site. Therefore, a package treatment system will need to be installed to deal with domestic wastewater generated at the plant facilities.

The facility will be connected to telephone service at the overhead telephone cable line pole lead located on the makai side of Olai Street.

Chapter 4

Chapter 4: Potential Impacts and Mitigation Measures

This section gives some of the potential impacts and mitigation measures for the proposed seawater desalination facility in Kalaeloa.

4.1 Topography

The local topography is relatively flat and will require minimal grading during construction of the proposed facility. Olai Street (private) will be crowned and travel lanes will be 12-feet wide. Paved shoulders will be 4-feet wide or as coordinated with owner(s). Around the Administration/Visitor Center Building and providing a focal point, is a dry streambed constructed of river rock and indigenous coral builders accentuated to reinforce the xeriscape theme of the landscape. A temporary low earth berm along the eastern boundary of the site will prevent off-site sheet flow to enter the property during construction. The site will be graded such that the surface flow will be directed off-site towards the access roadway. Swales along the western edge of the access roadway will divert the runoff into drainage inlets and dry wells.

During construction, the brine pond will be excavated to provide the fill material for elevating and flood proofing the structures. The pond also temporarily serves as a ponding basin to minimize erosion and transport into the existing drainage ditch. Upon installation of the new drainage piping, ditches, box culverts, and landscaping, the brine pond may be used to temporarily store process brine.

There will be little impact on topography of the project site. The contractor is required to obtain a grubbing and grading permit prior to any land disturbances. Conditions will be set with this permit for the implementation of erosion control measures and Best Management Practices.

4.2 Land Use

Currently the proposed project site is unused and undeveloped. Although the site is currently unused, there has been grading and dumping, and the land could not be called undisturbed. North and northeast of the BPNAS is an urban area with residential, commercial zones and an industrial support area with maintenance shops, warehouses, and paved areas.

The project will change the land use to a light industrial use for the production of potable water. This new land use will be consistent with the neighboring areas that are also used for industrial purposes. This use is also consistent with the proposed underlying zoning designation of I-2 and the State Land Use Designation of “Urban”. The C&C Department of Planning and Permitting approved an amendment to the Ewa Public Infrastructure Map. This map change incorporated the desalination plant at the proposed Kalaeloa location. (See additional information in Chapter 5 of this report).

The zoning of BPNAS was F-1 (Federal) prior to base closure. A designation change to the Special Area Plan is currently being processed at the C&C DPP. The zoning designation would change to I-2 (Intensive Industrial District) in conformity with the surrounding parcels in the area. The substation parcel is already zoned I-2.

This site is subject to a Federal Aviation Administration Easements 540 and 541. These easements are applicable to the subject properties due to their proximity to the airstrips of the former Barbers Point Naval Air Station, just to the east. Since the site is within the BPNAS easement, buildings cannot exceed 45 feet on the east side and 65 feet on the west side of the project site. A Federal Aviation Administration (FAA) Form 7470-1, Notice of Proposed Construction or Alteration form will be submitted to the FAA so that an airspace evaluation can be conducted.

The Kalaeloa Redevelopment Plan requires that no building exceed 60 feet. At 32 feet, the proposed structures comply with provisions for height limits in addition to requirements for setbacks, access, parking and other applicable zoning parameters. This parcel is consistent with the surrounding zoning, in compliance with State Plans, the Ewa Plan and County zoning. The desalination land use is consistent with the existing heavy industrial uses in the area. It is not anticipated that the construction of the facility will trigger unanticipated land use changes in the area.

Growth Issues

The BWS is mandated by the City Charter to ensure a reliable water supply to meet the community's current and future needs. The construction of desalination plant is a response to, rather than a basis for more, development and urbanization. Development is fueled by a healthy economy, whereby there is a related increase in employment opportunities and spending power. These elements attract new people to an area, thereby causing an increase in population and housing demand. Planning policies and land use regulations determine and enable the level and location of growth and development. Land use planners and decision-makers must consider and address all of the environmental and growth related impacts before approving more development. Once the development and growth projections area determined, public and private agencies fulfill their responsibilities by planning for the infrastructure and services necessary. Infrastructure includes roadways circulation systems, water availability and transmission facilities, wastewater treatment facilities and utilities. Services include police and fire protection, education and medical services.

4.3 Geology

There are no expected impacts on the local geology resulting from the construction or operation of the proposed desalination facility. Brine will be injected into a geological form that is close to the ocean and has a significant amount of mixing and dissolution with seawater. The removal of water and the injection of brine within the aquifer, will not impact the geological structure of the area.

Petroleum will detrimentally impact the acetate-based reverse osmosis membranes. Since the caprock aquifer in this area is approved for underground injection of industrial waste products, the brine concentrate disposal and membrane cleaning wash is being permitted for discharge into the caprock. The seawater basal aquifer existing 1,000 feet below the caprock through samples show no evidence of contamination or hydraulic connection between the two geologic formations.

The reverse osmosis filters are expected to last up to ten years. The used filters will contain chlorides and are not classified as hazardous waste and can be disposed of through regular means.

4.4 Soils

Impacts on the soils of the project are expected to be minimal during the construction of the proposed desalination facility. As the project site is relatively flat, it is expected that there will be little grading or fill needed. Blasting will not be allowed. The soil of the area does not appear to be susceptible to erosion because the topography is relatively flat and the soils are shallow and highly permeable. Rainfall in the area is also limited which will reduce the possibility of erosion. Standard erosion control measures and Best Management Practices will be implemented throughout the construction process. Around the Administration/Visitor Center and providing a focal point, is a dry streambed constructed of river rock and indigenous coral limestone boulders to reinforce the xeriscape theme of the landscape. A low foot wide temporary earth berm along the western boundary of the site will prevent off-site sheet flow from entering the property. This berm will also prevent construction materials and waste from flowing into the drainage canal. Other runoff/erosion techniques may be incorporated instead of the berm, depending on construction practices and recommended BMP's from the DPP.

4.5 Climate

There are no potential impacts from the construction and operation of the proposed desalination facility on the local climate.

4.6 Air Quality

State of Hawaii Department of Health Administrative Rules regarding atmospheric emissions will be followed during the construction and operation of the proposed desalination facility. Emissions from construction vehicles and equipment will be of short-term duration, lasting only during the construction phase of the project. Emissions from standby generators may also occur (exempt from emission standards by HAR Chapter 60). Proper maintenance of equipment and vehicles will help reduce combustion emissions. Dust emissions will also only last during the construction phase, and will be minimized by following best management practices to control dust. Dust control measures will include watering of the work area, use of windscreens, cleaning adjacent roadways, and covering open-bodied trucks.

The Barbers Point Elementary School is approximately 2 ½ miles from the proposed desalination facility and transformer substation. There will be no emissions generated from the type of proposed transformer substation for the desalination facility. There will also be no energy production at the actual desalination facility so no emissions will be generated.

4.7 Water Resources

The proposed desalination facility has a direct benefit by avoiding additional potable groundwater development in remote regions. This section explains any potential impacts of the proposed facility on the water resources of the local area. Permits for effluent

disposal and drainage, will be coordinated during the design phase of the project. The required permits are listed in chapter five of this report.

4.7.1 Groundwater

All of the existing permitted injection wells in the Campbell Industrial Park terminate in the caprock. Total permitted injection rates for these wells are 15 MGD. Within the Industrial Park the volume of injection has caused degradation of the pre-existing thin Ghyben-Herzberg lens. This thin lens never held the promise of yielding fresh water nor of usable irrigation water. (Mink and Yuen, 2002)

From the basalt aquifer, the source wells will extract virtual sea water having zero potential relative to mean sea level. The drawdown of the test well indicates that the local hydraulic conductivity of the BA is approximately 4,000 gallons per minute. This is adequate to guarantee five MGD per well. Up to three source wells on the site may produce around 15 MGD, which is more than the 12 MGD which may ultimately be used for the plant. At this stage, the plant is anticipated to use only 5 MGD.

Brine from the injection wells will be pumped into lower caprock (LCA) and will infuse waste brine into the lower caprock aquifer. How much injectant the formation will accept depends on its transmissivity. Based on calculations, the rate of injection the formation can take (23 MGD) per well is far in excess of any anticipated to be produced (a maximum of 7 MGD). Because of its density the brine will sink once it is injected.

Numerous reports were reviewed during preparation of the Draft EIS to determine that there is no freshwater lens at the site of the source and injection wells. Two of these reports include Mink and Lau's *Aquifer Classification and Identification for Oahu, 1987* and Mink and Yuen's *Hydrological Considerations, Board of Water Supply, Kalaeloa, Ewa Plain, Oahu, 2002*.

There is no freshwater lens at the location of the source and injection wells and therefore brine injection will not affect any freshwater lens. The density of the brine causes it to sink and dispersion in the much larger saltwater flow of the aquifers will ensure that salinity concentrations will be diluted. The estimated hydraulic conductivity of the caprock is 2,500 feet per day. Based on transmissivity calculations, it has been determined that the caprock aquifer can accommodate 20 MGD per well under a driving head of 5 feet. One well will handle the brine disposal while a second will be for backup and maintenance. The desalination project is anticipated to produce up to 7 MGD of waste brine. The aquifer should easily accommodate the daily injectant.

A monitoring program to determine the hydraulic gradient and whether the density gradient (injectant) is behaving as theorized, is a requirement of the Department of Health permit. The monitor well should be drilled midway between the production and injection wells and open to the aquifer from the

elevation of the bottom of the production well(s) and a point midway to the top of the open portion of the injection wells A single monitor well placed midway between the pumping and injection wells will be adequate to keep track of the changes in potential (head) caused by pumping and injection and changes in salinity that may arise from injection. (Mink and Yuen, 2002)

The Tesoro facility is located mauka of the project site and is known to contain some contamination from petroleum contamination. It is unlikely that the Tesoro petroleum contamination would affect the desalination water sources because of the lateral distance to the site (2000 feet) and the depth of the source water wells (1300 feet average) within the BA and below the LCA (Mink and Yuen, 2002). The source water wells will be tested as part of the source water permit procedure with the Department of Health. Two exploratory wells were dug as part of the pilot plant operation of this project. One well is located in the upper limestone layer caprock (LCA) at a depth of 300 feet while the other was located in the deeper basalt aquifer (BA) at a depth of 1,600 feet. While petroleum products were found in the LCA, there was no petroleum found in the BA. The source water will be drawn from the BA.

The proposed project is being coordinated with the City and County of Honolulu to incorporate it into the County's Water Use and Development Plan. BWS acknowledges that a Well Construction, Pump Installation and Water Use Permit will be required from the Commission on Water Resources Management before groundwater is developed as a source of supply for the project.

There is a level of uncertainty on the remaining untapped water supplies. Some estimates indicate the sustainable yield may be reached by 2025. The "Petition for Amendment to the State Land Use District Boundaries" for the Koa Ridge project was referred to the BWS in 2001. At that time, the BWS indicated that it cannot be determined if there is adequate groundwater supply in the Waipahu-Waiawa water management area to accommodate the vacant Urban designated lands of Central Oahu, Ewa and Honolulu in addition to Koa Ridge. There are several factors that add to the uncertainty of groundwater supply, including decisions on water rights and public trust resources, the State's adoption of a lower sustainable yield for the Waipahu-Waiawa and Ewa-Kunia aquifer systems and the allocation and pumpage milestone framework, the lack of a validated 3-dimensional groundwater model to accurately assess the sustainable yield, the uncertain availability of the Waiahole Ditch water and an incomplete State Agricultural Water Use Development Plan. Developing various types of water supplies, such as conservation, recycled water, desalination, deep ocean water/Ocean Thermal Energy Conservation (OTEC) technologies in addition to surface and groundwater supplies will allow the flexibility needed to adapt to future uncertainty, severe drought and enable BWS to meet consumer demand with enhanced water resource stewardship.

Less expensive groundwater is being developed from several new water sources in the Waipahu-Waiawa groundwater management area. Remaining groundwater

supplies within this water management area are uncertain as explained above. Water is available in other water management areas, such as Waialua, but connecting infrastructure does not exist. The cost of permitting, developing, treating and transporting groundwater is becoming increasingly expensive. Regulatory, environmental, social and cultural issues are adding layers of complexity which will be addressed in the BWS watershed management plans. The cost of seawater desalination is therefore comparable to regional groundwater development and transmission. The seawater desalination and recycled water facilities will allow drought proof, high quality potable and non-potable water for Ewa's sustainable growth and reduce imports and associated environmental and cultural impacts in Oahu's rural areas.

4.7.2 Surface Water

Watershed protection and management are specific water resource management objective realizing the importance of enhancing sustainable supplies. To this end, BWS has created a watershed protection grant program to complement our watershed protection efforts. From a water supply perspective, watershed management programs are implemented to protect and manage prime forest recharge areas to increase recharge and control polluted runoff.

There are no anticipated impacts on the drainage channel bordering the project site from the construction or operation of the proposed facility. The drainage canal which is excavated into the upper stratum of the LCA, will be unaffected (Mink and Yuen, 2002). During construction, Best Management Practices will be implemented to prevent erosion and runoff into the channel.

4.7.3 Coastal Waters

The ocean outfall brine disposal option will not be pursued at this time. Therefore, there are no anticipated impacts on the local coastal waters from the proposed desalination plant. Any brine injectant passing to the sea through the aquifer will be diluted and dispersed through mixing.

4.8 Natural Hazards

The presence of the proposed facility will not impact the occurrence of earthquakes or tsunamis. Paved areas could increase the potential flooding from rainfall in the project area because of the decreased area for rainfall infiltration. However, the project site is designed with stormwater drainage controls to minimize any potential impacts on flooding. The negligible grade of the property and presence of a large drainage canal across the street from the property make the possibility of flooding unlikely.

Because the seismic risk is low at the site, there is little risk that the facility will be damaged by such an occurrence. However, in order to prevent facility damage that could cause negative environmental impacts, the facility will be designed to withstand a certain amount of seismic activity. The UBC sets design criteria for buildings that may be subject to seismic disturbances. Oahu has been designated as within Seismic Zone 2A, having a low potential for seismic induced ground movement. However, the BWS has

adopted a higher level of standards (Zone 3) for all its structures. All structures at the proposed facility will be built in accordance with these standards.

This facility will be located in a tsunami inundation zone. The evacuation zone extends from the shoreline mauka to Olai Street. None of the proposed buildings will be "steel and/or concrete six or more stories in height" and because of the height limit in the area, they would not provide adequate protection from a tsunami. Therefore, the evacuation would be necessary to the nearest public shelter or designated refuge area at Makakilo Elementary School. (PDC, 2002) As to the structures themselves, they will be built to meet or exceed all current UBC standards pertaining to tsunami inundation zones.

Proper storage of chemicals will help reduce the risk of environmental damage in the event of a flood or tsunami. All unused chemicals will be stored in fireproof buildings that conform to the UBC. Liquid storage tanks will be surrounded by berms to contain any accidental spills.

For fire protection, this project was referred to the Honolulu Fire Department for review and it has stated that the BWS is required to provide:

1. A private water system where all appurtenances, hydrant spacing and fire flow requirements meet Board of Water Supply standards.

2. A fire department access road within 150 feet of the first floor of the most remote structure. Such access shall have a minimum vertical clearance of 13 feet six inches, be constructed of an all-weather driving surface complying with Department of Transportation Services standards, capable of supporting the minimum 60,000 pound weight of our fire apparatus, and with a gradient not to exceed 20%. The unobstructed width of the fire apparatus access road shall meet the requirements of the appropriate county jurisdiction. All dead end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround having a radius complying with DTS standards. As part of the building permit review process, the civil drawings for the facility will be submitted to HFD for review.

4.9 Biological Resources

Both floral and faunal studies were completed for this project site. The subject site is significantly disturbed with ground scraping, introduced vegetation and limited if any undisturbed area. This is mostly due to its urban location contiguous to intense industrial uses and a former military airfield.

4.9.1 Flora

The proposed desalination facility is not expected to have a significant negative impact on the botanical resources as the majority of the vegetation is composed of introduced or alien species. As noted in the flora study completed for this project no threatened or endangered species were found on this site. In addition, an Environmental Data Resources, Inc. NEPACheck® report confirmed the lack of threatened or endangered habitats or species. No plants of the endangered Ewa

Plain akoko, which were transplanted to the site in 1979 by Campbell Estate and Kawahara Nursery, were found during this survey. Two species of concern occur on the site, the maiapilo and Myoporum stellatum. Both candidates are excellent candidates for landscaping. A condition is recommended that these two species as well as other native lowland species, be used for landscaping the facility. The City and County's Honolulu Botanical Garden should be contacted to propagate these species on the project site.

4.9.2 Fauna

The field study recorded the usual mix of birds and mammals typical of this type of habitat in this region of Oahu. No unusual or unexpected species were recorded. No endangered or threatened species were observed. No unusual or particularly important natural resources were noted. The canal and nearby rocky shoreline are used by migratory shorebirds and would likely still be used to the same degree even if the land in the area was developed.

The U.S. Fish and Wildlife Service expressed concerns with the possibility of any brine disposal pond on the site being used by endangered and/or migratory waterbirds. As noted in Section 2.4 of this report, any proposed brine pond will only be used in emergencies and then, only for a few hours, due to its capacity. The use of the brine pond will at most be intermittent, non-regular and for emergencies only. The pond will have the ability to accommodate 1.17 MGD within the 3.6 acre-foot volume of the pond. The pond would fill in approximately 3.8 hours based on the estimated 7 MGD of waste brine per day. As discussed with Jay Nelson of the USFWS on August 26, 2002, if the water were to remain in the pond weeks or months, it may attract stilts or waterbirds that will try to nest in the area. It is anticipated that the water would evaporate and dissipate into the ground prior to the formation of waterbird nesting locations. It is not anticipated that the emergency use of this 3.6-acre brine pond will impact migratory or endangered waterbirds. However, as mitigation, it is recommended that whenever the pond is filled during emergencies, streamers, a bladder cover or other bird dispersing implements be placed around the edge of the pond. While various measures would be adequate, netting stretched across the pond would most likely be the best way to eliminate birds at the pond. The U.S. Fish and Wildlife Service will be consulted prior to the BWS choosing mitigation measures for the emergency brine pond.

4.9.3 Aquatic Ecosystems

No impacts to the local aquatic ecosystems are expected from the construction of the proposed facility. Erosion control measures and best management practices will be followed to ensure that runoff from the site will not exceed predevelopment runoff rates. The canal proximate to the construction site frequently contains sea turtles and care will be taken to avoid impacting the canal area during the construction and operation of this project.

4.10 Cultural Resources

None of the people interviewed for the cultural resources report or who shared information in personal conversation expressed distress or concern about the construction of the desalination plant. The massive degradation of the area where the plant will be located is likely a primary factor for the community's low level of concern. The fact that extensive damage has already been done with dredging and changing of the landscape over the last hundred years, coupled with the changing political climate, contributed to a feeling that the BWS would be open to instituting conservation measures. It was noted by another interviewee that his concern was to help the land heal itself after so many decades of degradation and contamination. Based on observations made during the current study, the most frequent use of the area consisted of recreational fishing along the shoreline. Since the areas immediately inland of the coast have restricted access, shoreline access is mostly from the public park at the lighthouse. The proposed project would not impact shoreline access or current public uses near the site.

4.11 Archaeological Resources

The archaeological survey recommends interim protection measures for two sites near the project site. Future data recovery and consultation of the adjoining 10-acre area is recommended when development becomes imminent. A monitoring plan and mitigation is recommended if resources are found on the project site.

Interim protection measures are recommended for Site 6374 and a previously identified human burial, Site 4209, located on the western edge of the drainage channel (TMK 9-1-31:46). The two sites will be well-marked and afforded temporary protection during upcoming construction phases so that heavy equipment will not inadvertently disturb or destroy the sinkhole features. The survey concludes that a long-term preservation plan should be prepared for approval by the State Historic Preservation Division and the Oahu Island Burial Council after the presence of the burial site is confirmed. In the event that construction occurs near the numbered burial adjoining the channel, the State Historic Preservation Division and the Burial Council will be contacted to provide appropriate action strategies (Appendix A).

This survey will be submitted to the State Historic Preservation Division (SHPD) for review prior to any construction activities. If any significant historic sites or human remains are found during the archaeological survey, an archaeological monitoring and mitigation plan may be submitted to SHPD prior to construction for their review and approval.

4.12 Visual Resources

The Ewa Development Plan identifies several visual landmarks and significant vistas in the Ewa area. As discussed in Section 3.12 this project complies with the Ewa Development Plan and this project will not impact any significant vistas. This project will also comply with the landscaping requirements of the Kalaeloa Redevelopment Plan.

The architectural feature and theme of the proposed project will be consistent with the architectural cues of Building 19 of the Kalaeloa Development Plan.

4.13 Socioeconomic Environment

The proposed desalination facility will have no direct impacts on the population or demographics of the Ewa and Honolulu areas. The facility will not likely have indirect impacts on population growth. This development will increase the water supply in the BWS system by only 3 percent and will contribute to an adequate water supply for planned and approved development of Ewa and other leeward areas.

Land use planning relies heavily on proper water resources planning. As natural water resources have become polluted and are reaching sustainable yields, it is important to provide alternate sources to account for future uncertainties in water demand.

This project has the added benefit of providing a water source in the area of need. An alternate method for providing water to the Ewa area would be to construct a well in rural Oahu and transport the water to the urban area. By developing an alternative water source within the growth area, impacts to rural Oahu are avoided. The capital development cost of the desalination facility on a cost per gallon basis is comparable to the cost of constructing a well in rural Oahu and transporting the water to urban areas.

The project will result in the creation of temporary construction jobs and permanent facility operation jobs. The purchasing of supplies and materials will also positively impact the local economy.

4.13.1 Environmental Justice

Environmental Justice is the fair treatment of people of all races, cultures and income with respect to the development, implementation and enforcement of environmental laws, regulations, programs, and policies. Fair treatment means that no racial, ethnic or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from the operation of industrial, municipal, and commercial enterprises and from the execution of Federal, state and local, and tribal programs and policies (EJ 2002).

Environmental Justice is a provision of the National Environmental Policy Act (NEPA) that ensures that the lead agency preparing NEPA analyses and documents has appropriately analyzed environmental effects on minority populations, low-income populations, or Indian tribes, including human health, social and economic effects. (CEQ, 2002) While the Federal government is not the lead agency for this desalination project, the parcel is currently under Federal ownership. Therefore an analysis of Environmental Justice is appropriate.

Six principles should be addressed in the course of environmental review to ensure consideration of Environmental Justice (EJ), which can be paraphrased as follows:

- Consider the human composition of the affected area - that is, its population and how human communities use it, and determine whether any such communities are characterized by low-income levels or high-minority

composition. If so, determine whether there may be disproportionately high and adverse effects on such populations.

Response: This area is formally designated for industrial use in land use plans. The area therefore has many intensive industrial uses such as an oil processing/storing facility, other energy facilities, utility service operations and manufacturing. There are no residential neighborhoods of any economic level, located within a 2-mile radius of the project site. The only known public uses in the area are diving, shell collecting, pole fishing, swimming, and throw-netting along the shoreline. Public access is gained from a public park on the former BPNAS. There is no access to the beach from the desalination area as the access road from the shore is fenced and locked. The desalination plant or its operation will not impact public access or fishing along the shoreline.

- Consider not only direct impacts on the health and environmental quality of EJ communities, but indirect, multiple, and cumulative effects as well.

- In the case of new construction, the EIS should consider impacts on EJ communities that are not adjacent to the project site but whose residents use the vicinity of the project site for business, social, or cultural purposes.

  Response to previous 2 questions: After construction, there will be no emissions, noise, odors, pollutants, or visually obtrusive structures resulting from the desalination operation. The site will be cleaned, graded, and landscaped. It will consist of aesthetically and visually consistent structures. Parking and improved access will be provided on the site.

- Recognize that the cultural, social, occupational, historical, and economic characteristics of an EJ community may amplify the environmental effects of an action. Such a population may be more sensitive to such effects, and less resilient in adapting to them, than another community.

  Response: As part of this EIS, cultural and historical/archaeological assessments were completed. These are attached to this report as Appendices A and C. No EJ issues or mitigations were identified in these reports, which involved site reconnaissance, records research and interviews with area historians and residents.

- Implement effective public participation strategies that seek to overcome linguistic, cultural, institutional, geographic and other barriers to meaningful participation, including active outreach.

- Assure early and meaningful community representation in the process of NEPA analysis and review, recognizing that there may be diverse constituencies within a given community and seeking complete representation.

Response to previous 2 questions: Subsequent to the completion and publication of the DEIS, representatives of the BWS attended two Neighborhood Board meetings to explain the reason for the project and solicit input from the neighborhood and stakeholders**.**

The project was presented to the Makakilo/Kapolei/Honokai Hale Neighborhood Board on December 19, 2001. During that meeting concerns were raised about:

- The cost to the City and the consumer
- The Health and Safety of the Water
- Impacts on groundwater from brine injection/intrusion
- Level of employment
- Potential accidents
- Impact on cultural resources
- Impact on shoreline and ocean

A subsequent article about the EISPN was published in the January 7, 2002 Honolulu Advertiser. (HA 2002)

The BWS desalination project was presented to the Waianae Coast Neighborhood Board at the July 2, 2002 meeting. Concerns were raised at this community meeting as to:

- The cost to the City and the consumer
- The Health and Safety of the Water
- Who would be the recipient of the desalinated water
- Why the plant is proposed at this particular location
- Why island-serving facilities seem to frequently be located on the west side of Oahu

In addition, concerns were raised as to the impacts to ocean ecosystems. At that time, the project was proposing an "an ocean outfall" for a disposal system for the brine/waste water. At this time, the ocean outfall is no longer being considered as an option. As part of the project outreach program, the Ewa Neighborhood Board was contacted for placement of our project on a November 8, 2001 meeting agenda. The Ewa Board declined our offer for a presentation.

Satisfying Environmental Justice requirements primarily involves inviting the participation of affected Federal, State and local agencies, any affected native people, Indian tribe, the proponent of the action, and other interested persons including those who might not be in accord with the action on environmental grounds. Public participation is especially well established for EIS's because of the clear public involvement procedures outlined in the regulations of Section 343 of Hawaii State Statutes. This project complies with public noticing, input, and review timeframes as required by law.

4.14 Traffic

There may be a temporary increase in traffic in the area of the proposed desalination facility because of the presence of construction related vehicles. In addition, there will be temporary impacts to Kalaeloa Boulevard by the trenching/boring and construction of the transmission main from the proposed facility. New roads and driveways will be constructed for easy access to the proposed facilities. *All facilities and parking will be designed to all applicable building code standards including Americans with Disabilities Act standards.*

While evaluating the actual traffic generated during construction and operation of the facility for the DEIS, it was determined that a full-scale traffic impact analysis is not warranted given the relatively low level of traffic anticipated from the project. Approximately 12 trip ends will be generated during the post construction operation. The addition of 12 trip ends will not significantly impact the traffic on Kalaeloa Boulevard. Olai Street is currently a private street with limited access and minimal traffic. As noted on page 109 of the Honolulu Desalination Study Final Environmental Assessment and FONSI on April 2001 "…any temporary increase in traffic congestion that could result from the movement of construction related vehicles is unlikely to inconvenience motorists in the immediate vicinity of the project site due to the lack of business and residences".

Construction activities will be scheduled during weekdays between 8:30 am and 3:30 pm or as required by BWS, and will not be scheduled during weekends or Federal and State holidays. Any work outside these periods will obtain necessary approvals or permits. This schedule will help limit any traffic impacts from construction.

4.15 Noise

During construction of the proposed facility, noise will be generated from site preparation activities, installation of wells and equipment, and construction of facility buildings. Noise will also be generated from construction related vehicles entering and leaving the project site. These impacts will be limited to the construction phase of the project. The contractor will be required to comply with all applicable noise regulations of Chapter 11-46 HAR, "Community Noise Control." In order to reduce noise generated by construction equipment, mufflers will be used on construction equipment, and all equipment will be kept in good working order. Pump and drilling equipment will be regulated for noise generation by State Department of Health rules. If noise levels from construction activities are expected to exceed allowable levels, the contractor will obtain a noise variance permit. Drills and pumps will have sound attenuation devices including mutes or structural enclosures.

4.16 Utilities

Sewer

There are currently no sewer facilities at the proposed site. While an on-site septic system was initially considered, it now appears the State DOH will most likely require a package treatment system for the domestic waste produced at the desalination facility based on the estimated quantity of domestic wastewater produced on-site. This waste treatment system will be designed to accommodate on-site peak domestic flows and will comply with Department of Health regulations. Disinfection will be utilized if required by applicable DOH regulations.

Communications

The facility will be connected to telephone service via overhead line pole located makai of Olai Street. A standby generator system will most likely be provided for emergency operational maintenance power to the desalination plant.

Power

The desalination facility will utilize approximately 1,000 kilowatts per one million gallons of processed water. A dedicated substation will be constructed to serve the power needs of the proposed facility. The capital cost of the construction of the dedicated substation and the 46kV line extension will be borne by HECO and recovered by the expected 60-month revenues of this desalination facility. If BWS elects to have a redundant electrical service, the cost will be paid fully by BWS. BWS will pay the same cost per kWh as the market rate charged by the Hawaiian Electric Company for other facilities in the service area, but will receive rate discounts for efficiencies. HECO's power rates will apply as they do to all BWS pumping facilities. The desalination process is energy intensive because of the high pressure pumps, but energy efficient because it is recovered. Additional efficiencies and alternative renewable energy options are being evaluated, such as load shifting conservation measures, natural and photovoltaic lighting, seawater district cooling from the facility's deep wells and diesel generators to reduce peak hour demand.

There will be a high power demand for the desalination facility. However, implementation of the desalination facility is measured against the environmental impacts of new groundwater wells in the windward and the north shore and their use of electricity to pump and transport water many miles to the population centers of south Oahu. According to HECO, there is sufficient electrical generation capacity in their system. HECO is planning to construct a dedicated substation within the adjacent State property, north of the desalination parcel, to serve the desalination plant, and will extend a 46kV line from its existing system to serve the substation. The proposed facility will use 13 percent of the capacity of the 46vK capacity of the line. The impact from the new substation will not significantly affect the energy supply and demand on the island of Oahu.

Renewable energy sources, such as photovoltaics and solar panels, will be considered to reduce electricity needs.

Domestic Water

Domestic water for use at the proposed facility and fire flow protection will be provided by extending a water line and connecting to the Board of Water Supply system.

Solar Energy

Solar energy is one option that was considered to provide electricity to the desalination operation. Solar cells convert sunlight directly into electricity. They are made of semi-conducting materials similar to those used in computer chips. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity. This process of converting light (photons) to electricity (voltage) is called the *photovoltaic (PV) effect.* The performance of a solar cell is measured in terms of its efficiency at turning sunlight into electricity. Only sunlight of certain energies will work efficiently to create electricity, and much of it is reflected or absorbed by the material that make up the cell. Because of this, a typical commercial solar cell has an efficiency of 15 percent—about one-sixth of the sunlight striking the cell generates electricity (NREL 2003).

The solar energy option was considered less reliable as a source of electricity for various reasons. First, the plant intends to operate on a 24-hour basis. Solar energy is produced only during daylight hours and the energy cannot be stored efficiently for use during nighttime hours. Therefore, an alternate energy source would be required for the plant's nighttime operation. Second, the quantities of energy needed by the plant are estimated to be about 5 mw a day. Solar energy standards have established that seven acres of solar panels are needed to produce one megawatt of power. Therefore, a thirty-five acre parcel would be needed to produce the needed energy for the first phase of the desalination plant. The entire desalination parcel is only 20 acres in size. This, combined with the inability to produce power at night, would still result in an energy shortfall for the operation of the plant.

Ocean Thermal Energy Conversion (OTEC)

OTEC is an energy technology that converts solar radiation to electric power. OTEC systems use the ocean's natural thermal gradient—the fact that the ocean's layers of water

have different temperatures—to drive a power-producing cycle. As long as the temperature between the warm surface water and the cold deep water differs by about 20°C (36°F), an OTEC system can produce a significant amount of power. The cold, deep seawater used in the OTEC process is also rich in nutrients, and it can be used to culture both marine organisms and plant life near the shore or on land. In small island nations, the benefits of OTEC include self-sufficiency, minimal environmental impacts, and improved sanitation and nutrition, which result from the greater availability of desalinated water and mariculture products (OTEC, 2003). OTEC is a portion of the proposed Deep Ocean Water Application Facility (DOWAF) project. This energy option is currently being explored by BWS for its utility and applicability as the primary or secondary energy source for the desalination plant.

4.17 Short and Long Term Impacts

This EIS includes a description of the relationship between local short-term uses of humanity's environment and the maintenance and enhancement of long-term productivity. The extent to which the proposed action involves trade-offs among short-term and long-term gains and losses are discussed below (HI 2002).

Short and long term impacts include the removal of water from and injection into, the aquifer, on a regular basis. If the LCA is used for the injection well, the impacts from the proposed pumpage rates are not anticipated to have significant detrimental impacts on the salinity, biological health or structure of the aquifer, geology or seawater in the area due to the structure and porosity of the LCA and BA. The water will be taken from the aquifer and rapidly recharge. The brine will be injected into the aquifer and because of its density, will sink downward and be diluted with the existing saline aquifer waters and dispersed by the permeability of the aquifer.

Short-term impacts will include:

- the grading, filling and vegetation removal on the project site
- presence of traffic and construction personnel
- noise, odor and dust associated with construction
- the actual construction itself
- use of resources at the BWS, including personnel, to implement this project

Long-term impacts include:

- the presence of a new facility on a currently vacant parcel
- associated personnel and traffic associated with the day-to-day operation of the facility
- the introduction of additional water quantities into the supply of Oahu
- demand for electricity, telephone service, waste disposal, fire protection and other city services, where no demand currently exist at the site.
- possible increased growth pressures. Water constraints currently act to temper growth pressures. Growth pressures may increase with the introduction of a new non-finite source of potable water.

- a decreased reliance on current sources may result is a reduced draw on the existing finite water resources of the island. This would allow natural aquifer replenishment and historical surface water flows.
- the commitment of BWS resources, including personnel, for the long-term operation of this facility.

4.18 Irreversible and Irretrievable Losses

This project will result in the long-term commitment of BWS time, money and resources. Implementation of this project will result in this vacant site being committed to a particular use.

4.19 Unavoidable Impacts

This project will result in the removal, alteration, injection and distribution of water resources of the island of Oahu.

Chapter 5

Chapter 5: Relationship to Governmental Plans and Policies

5.1 Plans

This section on plans relates the proposed project to various governmental planning documents. These plans are separated into State of Hawaii and City and County of Honolulu documents.

5.1.1 State

The State of Hawaii has several plans that provide long term and short term goals for the State. These plans include the Hawaii State Plan, State Functional Plans, and the State Water Plan. The relevance of these plans to the proposed project is described below.

Hawaii State Plan

The Hawaii State Plan (HRS 226) was created to improve planning processes, increase government effectiveness, improve coordination among government agencies, and guide the future development of the State. The State has three main goals to create through this plan:

- A strong viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations.
- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
- Physical, social, and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, caring, and participation in community life.

Two sections of the Plan relate directly to the proposed desalination facility.

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

(b)(2) Promote the proper management of Hawaii's land and water resources.

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

(a) Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.

(b)(1) Coordinate development of land use activities with existing and potential water supply.

(b)(2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.

(b)(4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

(b)(5) Support water supply services to areas experiencing critical water problems.

Comments: The proposed project is in accordance with these objectives. The desalination facility encourages proper management of water resources by lessening dependence on groundwater sources that are already reaching sustainable yields. The facility also provides for the research and development of alternative methods for providing potable water. The Kalaeloa facility will be the first large-scale desalination facility in the State of Hawaii.

5.1.2 City and County of Honolulu

The City and County of Honolulu (C&C) uses a series of planning documents to guide community and economic development. Four plans can be related to the proposed desalination facility: the C&C General Plan, the Oahu Water Management Plan, the Ewa Development Plan, and the Kalaeloa Redevelopment Plan.

General Plan

The City and County of Honolulu (C&C) General Plan (1992) has two major functions. First, it gives long-range objectives for the island of Oahu. Second, it gives broad policies to help achieve these objectives. The Plan is divided into eleven subject areas with general objectives and policies for each subject area. Objectives and policies of the General plan that relate to the proposed facility and how the facility will impact these objectives are given below.

Subject Area: **Population**

Objective B: To plan for future population growth

Policy 1: Allocate efficiently the money and resources of the City and County in order to meet the needs of Oahu's anticipated future population.

Policy 2: Provide adequate support facilities to accommodate future growth in the number of visitors to Oahu.

Objective C: To establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony.

Policy 2: Encourage development within the secondary urban center at Kapolei and the Ewa and Central Oahu urban-fringe and rural areas and to meet housing needs not readily provided in the primary urban center.

Policy 3: Manage physical growth and development in the urban-fringe and rural areas so that:

a. An undesirable spreading of development is prevented; and
b. Their population densities are consistent with the character of development and environmental qualities desired for such areas.

Policy 4: Seek a year 2025 distribution of Oahu's residential population, which would be in accord with the following:

Location:	% of year 2025 Island wide population
Primary Urban Center	46%
Ewa	13 %

Comments: The proposed desalination facility is a vital part of the BWS' long-range plans. This facility will efficiently use C&C resources to provide a reliable water supply for projected future populations. By providing a water resource that, through its distribution nature, will primarily serve the Ewa region, growth can be concentrated in the Secondary Urban Center to prevent undesirable growth in other areas of the island.

Subject Area: **Economic Activity**

Objective G: To bring about orderly economic growth on Oahu

Policy 1: Direct major economic activity and government services to the primary urban center and the secondary urban center at Kapolei.

Comments: Providing reliable water supply to the Secondary Urban Center in Kapolei will allow for additional economic activity and government services to be provided in this area.

Subject Area: **Transportation and Utilities**

Objective B: To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal.

Policy 1: Develop and maintain an adequate supply of water for both residents and visitors.

Policy 2: Develop and maintain an adequate supply of water for agricultural and industrial needs.

Comments: The proposed Kalaeloa desalination facility will provide a long-term reliable source of potable water for residents and visitors, as well as for agricultural and industrial uses.

Subject Area: **Physical Development and Urban Design**

Objective C: To develop a secondary urban center in Ewa with its nucleus in the Kapolei area.

Policy 1: Allocate funds from the City and County's capital improvement program for public projects that are needed to facilitate development of the secondary urban center at Kapolei.

Policy 2: Encourage the development of major residential, commercial, and employment center within the secondary urban center at Kapolei.

Policy 3: Encourage the continuing development of Barbers Point as a major industrial center.

Comments: By providing a water supply for the Kapolei and Barbers Point areas, the proposed desalination facility is responding to development of residential, commercial, and industrial development in these areas.

Oahu Water Management Plan
Section 30-2.2 of the Revised Ordinances of Honolulu outlines the policies for water use and development within each development plan area. The Oahu Water Management Plan is intended to ensure:

(a) The optimum utilization of the existing water supply in order to minimize the need for the development of additional potable groundwater sources;

(b) The preservation of the aquifers for the benefit of future generations, in perpetuity, by proper management of Oahu's groundwater sources;

(c) The timely development of additional potable groundwater sources and alternative sources to provide for additional consumer demand;

(d) That growth in consumer demand will be compatible with available water supply.

(Added by Ord. 90-62)

There are seven policies guiding water resources on Oahu. The policy applicable to the desalination project is Policy 7: *Alternate water sources shall be developed*

wherever feasible to ensure an adequate supply of water for planned uses on Oahu.



Figure 5.1: Oahu Development Plan Areas (C&C, 2001)

By providing an additional water source in the Ewa area, the desalination facility will be providing a new alternative reliable source of water as the area of West Oahu continues to develop as the designated Secondary Urban Center.

Watershed Management Plans

The Board of Water Supply's Integrated Resources Plan (IRP) has been replaced with watershed management plans for each of the 8 sustainable community and development plan areas established in the County General Plan. The revised planning approach is community-based and environmentally-holistic encompassing the entire watershed. This holistic approach centers on sustainability including watershed protection, management, conservation, restoration as well as water use and development.

The stakeholder involvement process will utilize the watershed partnerships that have been established. Waianae and Koolauloa are the initial watershed management plans being formulated and have been on-going for about 1.5 years. The State Commission on Water Resources Management approved the BWS watershed management plan approach and scope on March 17 2004.

Ewa Development Plan

The C&C of Honolulu updated the Development Plan for Ewa by Ordinance 97-49 on August 22, 1997. The C&C Development plans give a more detailed framework for implementing the objectives and policies of the General Plan. The proposed Kalaeloa desalination facility is located within the Ewa area as defined in the 1997 Ewa Development Plan (DP) by the C&C Planning and Permitting Department (See Figure 5.1).

Resolution No. 01-223, CD1, adopted by the City Council on October 17, 2001, revised the Public Infrastructure Map for the Ewa Development Plan area to include a desalination facility symbol for the proposed project.

There are four general policies given in the Ewa DP that should be followed when developing Ewa potable and non-potable water systems to meet projected demands.

- Adequacy of Water Supply – *prior to zoning approval for new residential or commercial development in Ewa, the BWS should either indicate that adequate potable and non-potable water is available or recommend conditions that should be included as part of the zone change approval in order to assure adequacy.*

- Dual Transmission Lines – *where required, developments should have dual water lines to allow conservation of potable water and use of non-potable water for irrigation and other appropriate uses. Such requirements shall be determined during review of project master plans for new developments and approval of zoning applications*.

- Development and Allocation of Potable Water – *The State Commission on Water Resource Management has final authority in all matters regarding administration of the State Water Code. Under that authority, the BWS should coordinate development of potable water sources and allocation of all potable water intended for urban use on Oahu. State and private well development projects could then be integrated into and made consistent with City water source development plans.*

- Use of Non-potable Water – *An adequate supply of non-potable water should be developed for irrigation and other suitable uses on the Ewa Plain in order to conserve the supply of potable water and to take advantage of dual water systems constructed by Ewa developers*.

The proposed desalination facility supports these four policies by providing a new source of potable water for residential, commercial and possibly agricultural development in the Ewa area. The proposed desalination facility will also help allocate potable water by creating a freshwater supply in an area lacking sufficient supply.

As to the location of the desalination plant, the Ewa DP designates Barbers Point Industrial Area including Campbell Industrial Park, Barbers Point Deep Draft Harbor, Kenai Industrial Park, and Kapolei Business Park, as industrial areas for the region. It should continue to grow as one of Oahu and the State's most important industrial areas. It is the site of the State's largest heavy industrial area (Campbell Industrial Park) and an important industrial harbor and fuel transfer point.

The Barbers Point Redevelopment Commission will determine the future industrial and transportation uses of Barbers Point Naval Air Station (BPNAS). The northern parts of Kapolei Business Park and any BPNAS lands designated for industrial use should provide for light industrial uses as a transition between heavy industry at Campbell Industrial Park and the City of Kapolei (DPP, 2002).

The desalination project is consistent with the Ewa DP and its relation to industrial uses.

Kalaeloa Redevelopment Plan

In June of 1993, the Base Realignment and Closure (BRAC) Commission recommended the closure of Barbers Point Naval Air Station (BPNAS). This was accepted in September 1993, and BPNAS was disestablished on July 1, 1999. In 1994, the Barbers Point Naval Air Station Redevelopment Commission was formalized to assist in the planning and implementation of the transition of uses at BPNAS. The Redevelopment Commission was instrumental in preparing the Kalaeloa Redevelopment Plan.

The Kalaeloa Redevelopment Plan is a Special Area Plan (SAP) of the Ewa Development Plan, and is more specific than the Ewa DP. The Honolulu City Council adopted the Kalaeloa SAP in April 2001. It is consistent with the Ewa DP.

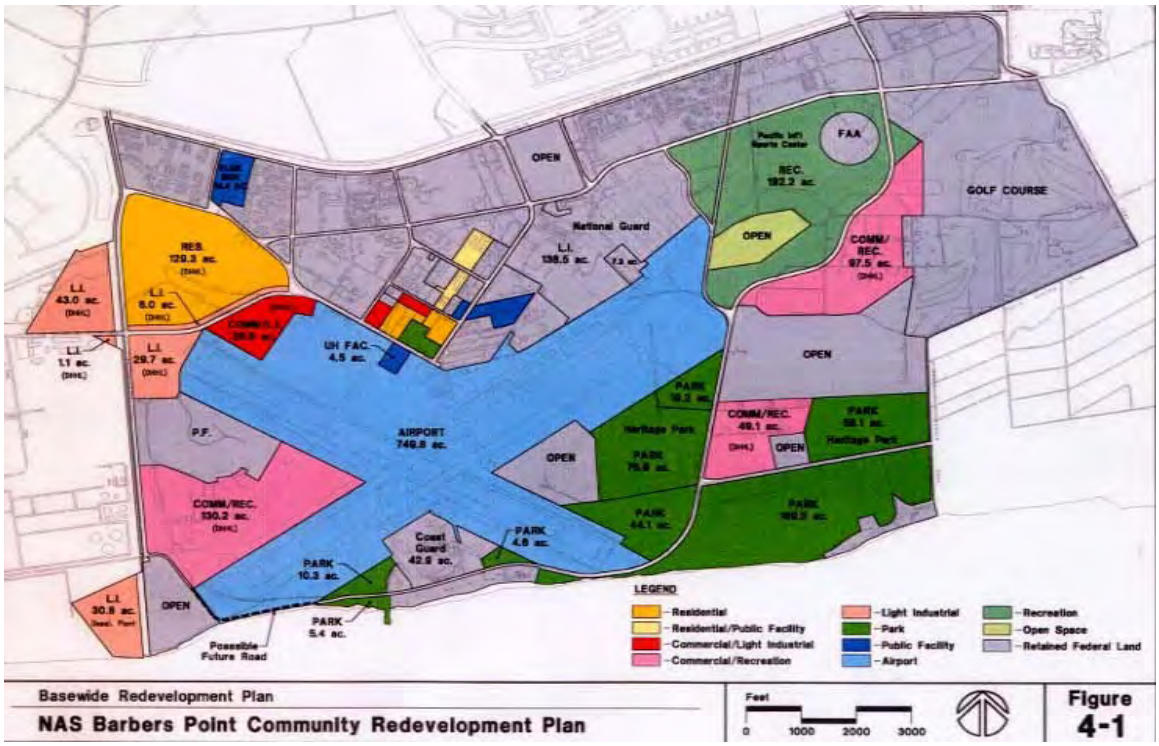


Figure 5.2: Kalaeloa Redevelopment Plan

In addition to compliance with design criteria for industrial development as discussed in Section 3.12 of this report, the proposed desalination facility is consistent with the Kalaeloa Redevelopment Plan goals and objectives including:

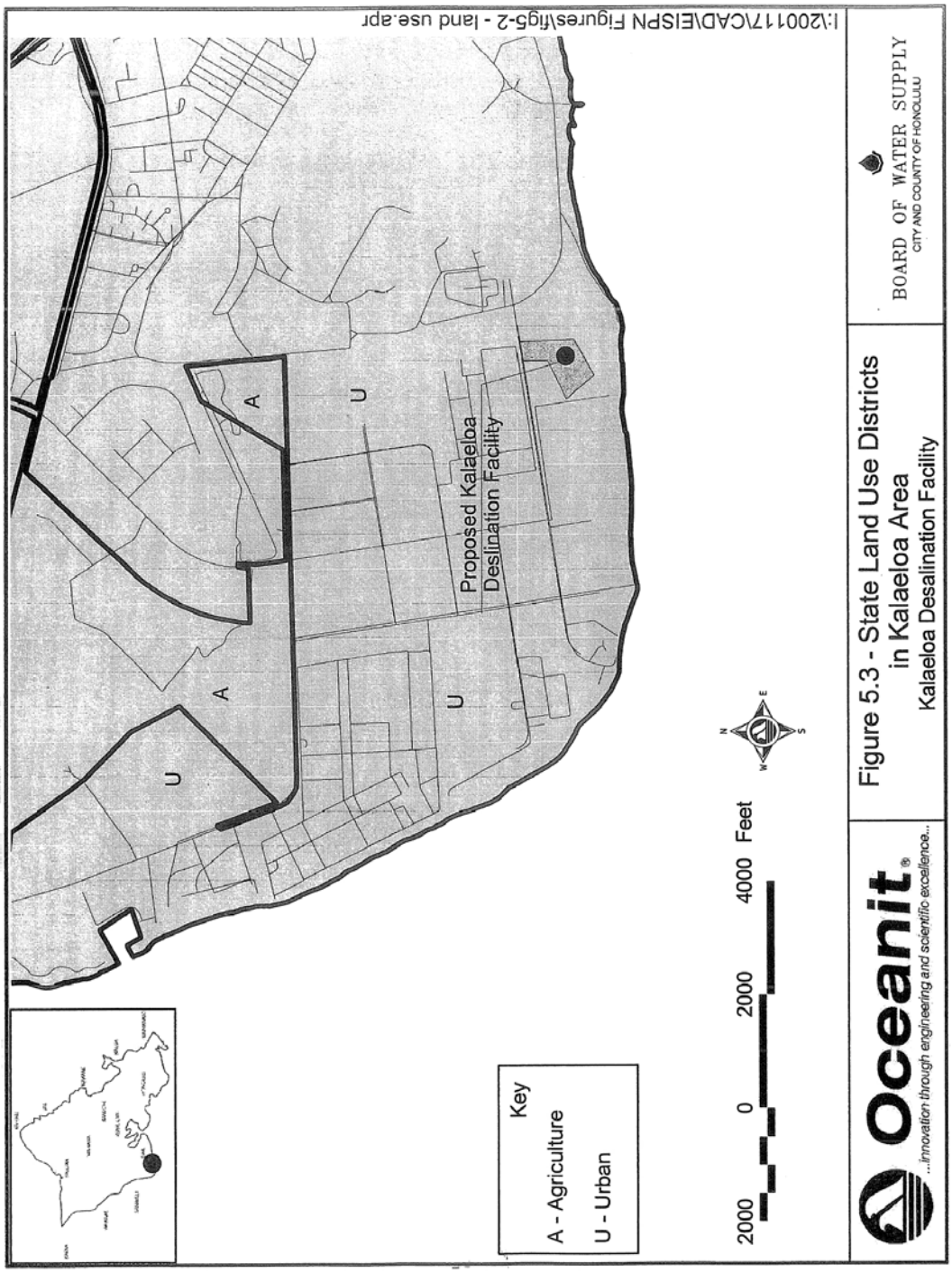
- Creation of new job opportunities
- Providing sites for existing, new or expanded Federal, State and City and County public facilities.
- Integration of the Barbers Point Naval Air Station site with land uses and infrastructure within the West Oahu area. (DPP, 2000)

5.2 Land Use and Zoning

5.2.1 State Land Use

Land use districts are established by the state to determine broad scale land use patterns. The four districts used are Urban, Rural, Agricultural, and Conservation. The Kalaeloa area is located in the Urban district boundary (See Figure 5.3). The proposed facility is consistent with the objectives and policies of the State land use law.

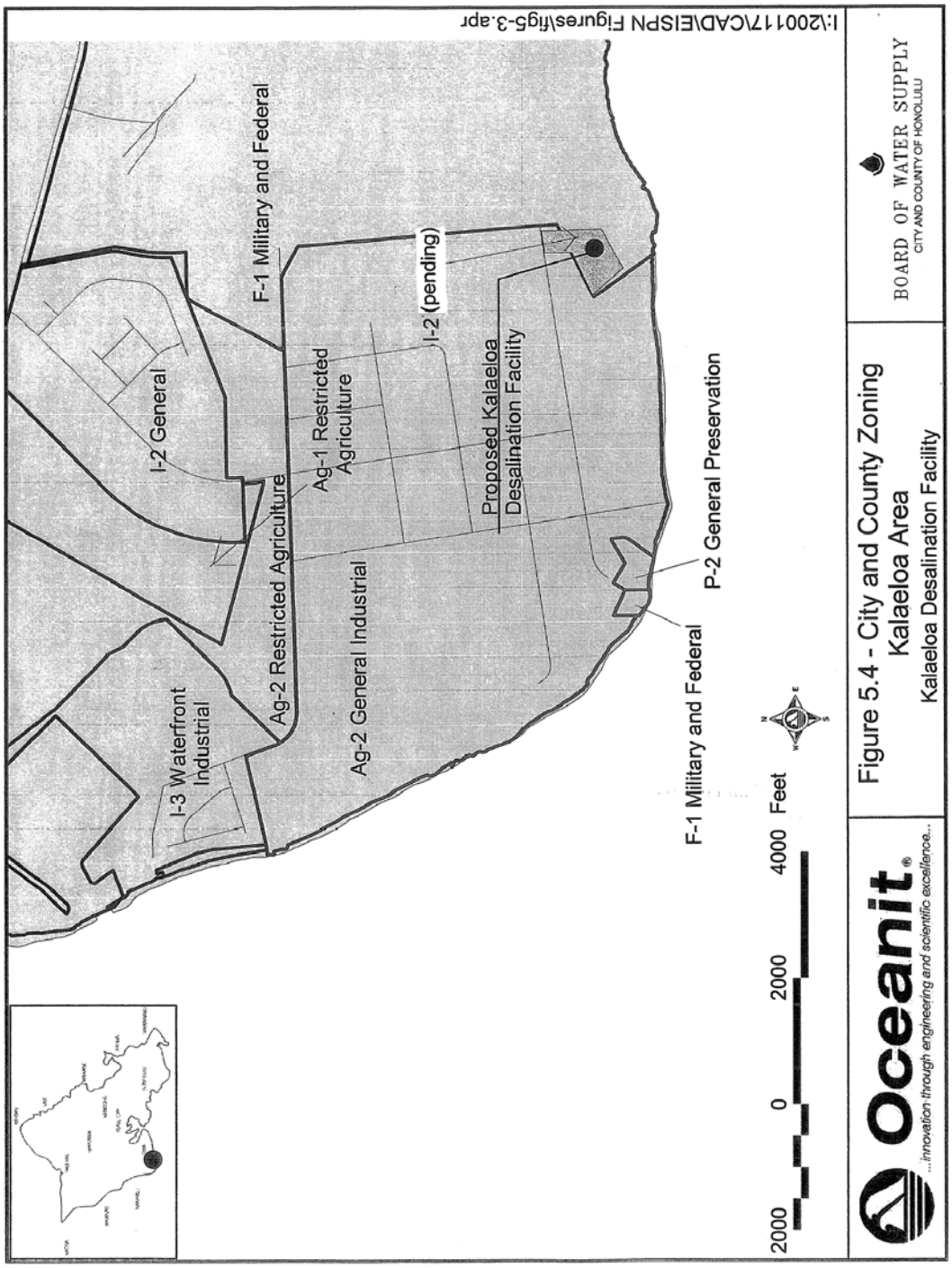
Figure 5.3. State Land Use Districts in Kalaeloa Area (DPP, 2002)
(See following page)


I:\200117\CAD\EISPN Figures\fig5-2 - land use.apr
Proposed Kalaeloa
Deslination Facility
U
A
U
A
U
Key
A - Agriculture
U - Urban
2000
0
2000
4000 Feet
N
E
S
W
Oceanit
...innovation through engineering and scientific excellence...
Figure 5.3 - State Land Use Districts
in Kalaeloa Area
Kalaeloa Desalination Facility
BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

5.2.2 City and County Zoning

The project site was previously a portion of the Barbers Point Naval Air Station. This land was zoned F-1, for Military and Federal land. After the land was conveyed to the BWS, P-2 General Preservation standards were applied. In July 2001, Resolution 01-166 was passed by the City Council to recommend a zone change to I-2 General Industrial. The Department of Planning and Permitting is currently processing this zone change request. Figure 5.4 shows zoning codes for the Kalaeloa area.

Figure 5.4: City and County Zoning Kalaeloa Area (DPP, 2002) *(See following page)*



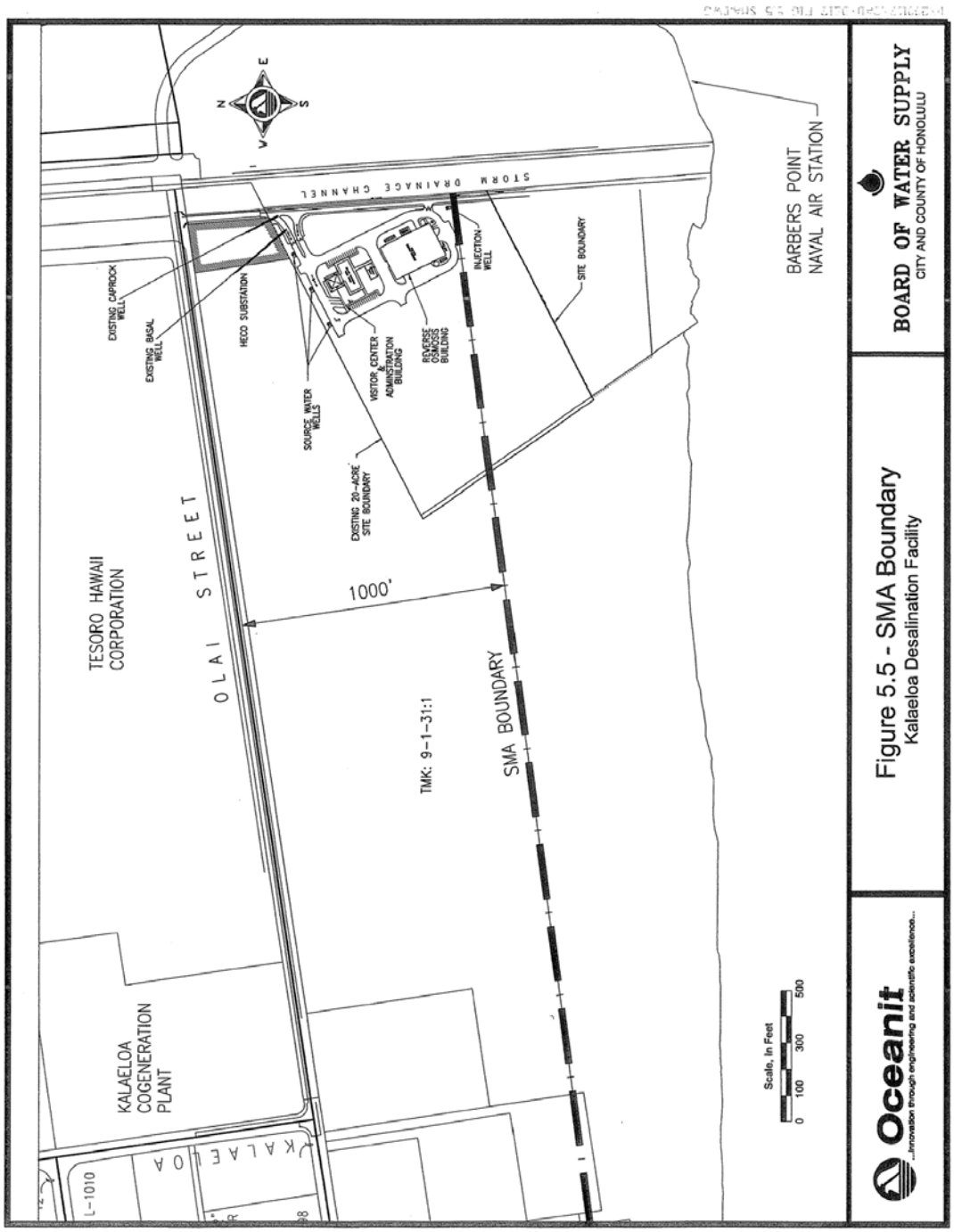
5.2.3 Special Management Area

The Special Management Area (SMA) and Shoreline Setback Area are designated for more intensive management by the four counties. The SMA originally encompassed all lands extending not less than 100 yards inland from the shoreline. The shoreline is defined as the upper reaches of the wash of the waves (other than storm or seismic waves) at high tide during the season of the year in which the highest wash of the waves occurs. The shoreline is usually evidenced

by vegetation growth, or the upper limit of debris left by the wash of waves (DBEDT, 2002).

Figure 5.5 shows the SMA boundary in the project area. The SMA line runs parallel to Olai Street, 1000 feet south of the street. In the current project design, there is no construction within the SMA; therefore no SMA permit is required.

Figure 5.5: Special Management Area Boundary *(See following page)*



5.3 Permits Required for Project

The permits required for the construction of the proposed desalination facility will depend on the final design chosen. The following is a preliminary list of permits that will likely be needed for the project.

City and County of Honolulu Permits

- Department of Planning and Permitting (DPP) - Building Permit
- DPP - Grubbing, Grading, and Stockpiling Permit

- Department of Planning and Permitting (DPP)-Permit for transmission line along Kalaeloa Boulevard
- DTS – Road construction permits

State of Hawaii Permits

- Department of Transportation, Airport Division – Avigation Easement 540 and 541
- Department of Health, Clean Water Branch – National Pollutant Discharge Elimination System (NPDES), Stormwater and Hydrogeological Testing
- Department of Land and Natural Resources (DLNR), Commission on Water Resource Management – Well construction permit, pump installation permit, and water use permit
- Department of Health, Noise, Radiation, and Indoor Air Quality Branch – Community Noise Permit (May be required if the noise levels from construction activities are expected to exceed allowable levels as defined in Hawaii Administrative Rules 11-46-4.)
- Department of Health, Safe Drinking Water Branch – Injection well permit, and Source Water Use Approval

Federal Permits

- U.S. Department of Transportation – Notice of Proposed Construction or Alteration, FAA Form 7460-1

Chapter 6

Chapter 6: Supporting Documentation

Oceanit Project Team

Patrick K. Sullivan, Ph.D., P.E., President. Dr. Sullivan is a registered civil engineer in Hawaii and holds a doctoral degree in Ocean Engineering. As the president of Oceanit, Dr. Sullivan has the primary responsibility for Oceanit's internal quality control and quality assurance programs. Dr. Sullivan has final oversight and responsibility for all Oceanit projects. Dr. Sullivan has over 20 years of experience in conducting environmental investigations and studies.

Dayananda H. Vithanage, Ph.D., P.E., Technical Director. Dr. Vithanage is a registered civil engineer in Hawaii and holds a doctoral degree in Ocean Engineering. Dr. Vithanage has over 30 years of experience in conducting environmental investigations and studies. Dr. Vithanage acted as the technical reviewer for submittals.

Derrick C. Elfalan, P.E., Senior Projects Engineer. Mr. Elfalan is a civil engineer and has bachelor's degrees in Civil Engineering and Geology-Geophysics. Mr. Elfalan has over 23 years experience on various civil engineering projects primarily dealing with planning, infrastructure, wastewater, water distribution and drainage. Mr. Elfalan was the Project Leader for the Desalination project for Oceanit and its sub-consultants.

Jay M. K. Stone, P.E., Project Manager. Mr. Stone is a registered civil engineer in Hawaii and holds bachelor's degrees in civil engineering and English. Mr. Stone has over nine years of experience in conducting environmental investigations and studies. Mr. Stone has received confined space entry and CPR training.

Travis W. Hylton, P.E., R.E.M., Project Leader. Mr. Hylton is a registered civil engineer in Hawaii and California and a Registered Environmental Manager. Mr. Hylton holds bachelor's degrees in civil engineering and economics and has over seven years of experience in conducting environmental investigations and studies. Mr. Hylton was a licensed water treatment plant operator in California and has received HAZWOPER and confined space entry training.

Jeffrey D. Merz, AICP, Senior Planner. Mr. Merz is a senior planner and holds a Bachelor's degree in Urban and Regional Planning-Geography. Jeff has over ten years experience as a planner working for both municipal governments and performing land use and public hearing functions for private telecommunications firms.

Robert E. Bourke, M.S., Project Scientist. Mr. Bourke holds a master's degree in Animal Science and has over 25 years of experience in conducting environmental investigations and studies. Mr. Bourke has received HAZWOPER training and is a certified diver.

Christopher G. Goody, M.S., Project Engineer. Mr. Goody holds a master's degree in Ocean and Resource Engineering and has over ten years of experience in working in the ocean environment. Mr. Goody has extensive experience in surveying, computer modeling, and the use of geographic information systems. Mr. Goody has received training in CPR, first aid, and oxygen administration.

Andrea M. Perry, Project Administrator. Ms. Perry's main responsibilities were collection of pertinent documents, graphic design, and clerical support.

Colleen C.L. Tom, Project Administrator. Ms. Tom holds a bachelor's degree in Teaching English as a Second Language and has had over 7 years of word processing and clerical experience. Ms. Tom's main responsibilities were collection of pertinent documents and clerical support. Ms. Tom has received training in Adult and Child CPR as well as First Aid.

Sub-Consultants

Phil Bruner, Environmental Consultant – Avifaunal and Feral Mammal Survey

Char & Associates, Botanical Consultants – Botanical Survey and Archaeological Site Assessment

Aki Sinoto Consulting – Cultural Impact Assessment

Earthplan, Berna Cabacungan – Community Outreach and Public Input

List of Consulted Groups

The following is a list of agencies, organizations, and individuals that are being consulted during the environmental review process.

Federal

Army Corps of Engineers
U.S. Fish and Wildlife
National Marine Fisheries, Pacific Islands Area Office
Federal Aviation Administration, Western Pacific Regional Office
Department of the Navy, Navy Region Hawaii

State

Office of Environmental Quality Control
UH Manoa Environmental Center
UH Water Resources Research Center
Hawaii Community Development Authority
Department of Land and Natural Resources – State Historic Preservation Division; Land Division
Department of Business and Economic Development and Tourism – Office of Planning; Coastal Zone Management; Energy, Resources, and Technology Division
Department of Transportation
Department of Transportation, Airport Administration
Department of Education
Office of Hawaiian Affairs
Department of Health – Clean Water Branch and Safe Drinking Water Branch
Department of Hawaiian Home Lands
Senator Colleen Hanabusa, District 21
Representative Michael PuamamoKahikina, District 43
Council member John DeSoto, District 9
Ewa Beach Public and School Library
Barber's Point Naval Air Station Redevelopment Commission

City and County

Environmental Services
Planning and Permitting
Transportation Services
Honolulu Police Department
Honolulu Fire Department
Design and Construction
Facility Maintenance
Parks and Recreation

Private Citizens / Organizations

Ewa Neighborhood Board #23
Waianae Neighborhood Board #24
Makakilo / Kapolei / Honokai Hale Neighborhood Board #34
Oceanic Cable
The Gas Company
Verizon Hawaii
Hawaiian Electric Company
Estate of James Campbell
Tesoro Hawaii – Refinery
Sierra Club, Oahu Group
West Oahu Soil and Water Conservation District
Joseph N. A. Ryan
Hawaii Livestock Co-op

List of EISPN Comments and Responses

Comment	BWS Response/Action
BPNAS Redevelopment Commission – Change name and placement of BPNAS RC in Chapter 7.0.	Formal BWS signed response mailed 2/1/02.
Office of Hawaiian Affairs – No comments.	Formal BWS signed response mailed 1/16/02.
DBEDT Office of Planning – No comments.	Formal BWS signed response mailed 2/5/02.
DLNR Historic Preservation Div – Recommended archaeological inventory survey.	Comments addressed in DEIS & DEIS response letter.
Federal Aviation Administration – Stated that a Notice of Proposed Construction or Alteration, FAA form 7460-1 must be submitted. Suggested coordination with State Airports Division.	Formal BWS signed response mailed 2/4/02.
Police Department – No comments.	Formal BWS signed response mailed 2/5/02.
Department of Transportation – No comments until they review the traffic impact study.	Formal BWS signed response mailed 2/8/02.
DLNR Department of Forestry and Wildlife – No comments until they review the biological survey.	Formal BWS signed response mailed 2/27/02.
DLNR Oahu District Land Office – Gave some info on surrounding parcels and noted a mistaken reference to James A. Campbell Industrial Park.	Formal BWS signed response mailed 2/27/02.
DLNR Commission on Water Resource Management – Recommended coordination with county government to incorporate project into county's Water Use and Development Plan. Noted that pump installation permits and water use permits will be required.	Formal BWS signed response mailed 3/5/02.
DLNR Engineering Branch – Affirmed that project site is within Flood Zone D (undetermined) and that if this changes, we will have to comply with flood ordinances.	Formal BWS signed response mailed 2/27/02.
Department of the Army – Clarified that the project will not need a DA permit.	Formal BWS signed response mailed 2/8/02.
Fire Department – Requested that a private water system meeting BWS standards be provided. Also listed requirements for fire department access road and requested civil drawings.	Formal BWS signed response mailed 4/2/02.
DOT Airports Division – Requested an avigation easement and noted that the project area is within the 55-60 DNL noise contour for the Kalaeloa Airport.	Formal BWS signed response mailed 3/4/02.
Department of Design and Construction – No comments.	Formal BWS signed response mailed 2/19/02.
Department of Health – Gave twelve comments about groundwater, injection wells, figures, etc.	Formal BWS signed response mailed 6/12/02.
Department of Parks and Recreation – No comments.	Formal BWS signed response mailed 2/19/02.
Fish and Wildlife Service – Sent long letter	Formal BWS signed response mailed 3/4/02.

covering possible groundwater, nearshore, and endangered species impacts.	
Office of Environmental Quality Control – Sent letter with 6 comments.	Formal BWS signed response mailed 4/8/02.
Sierra Club – Commented on urbanization, cost equity, and energy use.	Comments addressed in DEIS & DEIS response letter.
Covanta Energy – wants EIS to comment on impacts of proposed facility on expansion of current tenants of Campbell Industrial Park.	Formal BWS signed response mailed 2/19/02.
DLNR Division of Aquatic Resources – wants EIS to discuss disposal of reject water and its impact on the aquatic environment	Comments addressed in DEIS.
DOH – second lengthy letter outlining several issues with the EISPN	Formal BWS signed response mailed 6/18/02.
Department of Planning and Permitting – asked for clarification on infrastructure map and zoning, minor comments, and comments on wastewater disposal, population projections, air quality, biological surveys.	Formal BWS signed response mailed 4/5/02.

List of Draft EIS Comments and Responses as of 2/17/06 Comment Period Ended – April 22, 2003

Comment and Agency	BWS Response/Action
Department of Agriculture Received 3/24/03 No comments	Formal BWS signed response mailed 5/9/03.
Federal Aviation Administration Reviewed 4/14/03 Simple comments/permit needed.	Formal BWS signed response mailed 5/9/03.
Hawaii Department of Transportation Received 4/10/03 Simple comments/permit needed.	Formal BWS signed response mailed 5/9/03.
Honolulu DDC Received 4/11/03 No comments.	Formal BWS signed response mailed 4/11/03.
Honolulu Police Department Received 4/11/03 No comments.	Formal BWS signed response mailed 5/9/03.
Hawaii Department of Accounting and General Services Received 3/19/03 No comments.	Formal BWS signed response mailed 5/9/03.
State Office of Hawaiian Affairs Received 3/24/03 No comments	Formal BWS signed response mailed 5/9/03.
Honolulu Facility Maintenance Received 3/21/03 No comments.	Formal BWS signed response mailed 5/9/03.
Gas Company Received 3/25/03 No comments	Formal BWS signed response mailed 5/9/03.
DLNR - Forestry Received 3/13/03 Concurrence with flora study.	Formal BWS signed response mailed 6/4/03.
Honolulu Parks and Recreation Received 3/21/03 No comments.	Formal BWS signed response mailed 5/9/03.
Honolulu Fire Department. Received 3/25/03 Standard conditions.	Formal BWS signed response mailed 5/9/03.
DLNR –Historic Preservation Received 4/23/03 Recommended mitigation plan for both –4209 and –6374 sites. Should note sea turtles in canal.	Formal BWS signed response mailed 6/19/03.

DLNR –5 Divisions Received 3/31/03 **State Parks** No comments. **Engineering** No comments. **Aquatic Resources** No comments **Oahu District Land Office** Received 3/17/03 **Commission On Water Resource** Received 3/17/03	Formal BWS signed response mailed 6/6/03.
Honolulu Dept of Transportation Received 4/28/03 Concern expressed over a lack of completion of a traffic study as suggested in the EISPN	Formal BWS signed response mailed 7/16/03
Hawaii Dept of Education. Received 4/17/03 Concern raised about the emissions from the substation and proximity to Barber's Point Elementary School	Formal BWS signed response mailed 7/11/03.
Honolulu DPP Received 4/29/03 Recommended to revised to included an updated population policy.	Formal BWS signed response mailed 6/19/03.
U.S. Fish and Wildlife Service Received 5/2/03 Concerns with temp. holding pond and the effect of hypersaline brine on end. Species of birds. Also, effect on groundwater from septic systems and groundwater with injection wells.	Formal BWS signed response mailed 10/31/03.
UH Water Resources Center Received 4/23/03 Concerns with 1. groundwater and clarification/review needed on which aquifer. 2. Energy and the substation's impact and demand on Oahu H service, and 3. Alt. Technologies and using brackish water instead of sea water-less energy.	Formal BWS signed response mailed 9/2/03.
Sierra Club – Received 4/23/03 Commented on justification for desal, growth inducement, why desal if less expensive options are available, energy use and needs, HECO impact on Oahu water rates, climate change, further discussion on desal capital costs, Tesoro contamination, waste streams into aquifer, public opinion survey, endangered species.	Formal BWS signed response mailed 12/30/05.

UH Environmental Center Received 4/22/03 Need to clarify basal or caprock, depth of wells, separation, costs of desal vs. current water use, dimensions of pond, need to elaborate on "No Action" and alternatives. Contamination of near shore environment. Secondary treatment with disinfection facilities should be used for septic.	Formal BWS signed response mailed 7/16/03.
Hawaiian Homelands Received 4/21/03 Confusion over brackish water vs. potable water source location. Analysis of separation of wells and contamination of source. Would salinity be less with shallower wells? What is knowledge transfer from the demo desal plant mauka? Discuss need for so much chemical treatment and energy use. Cost differential from regular water sources and desal –capital O&M?	Formal BWS signed response mailed 8/31/04.
Hawaiian Electric Company Received 4/15/03 The letter from HECO specified verbiage changes and slight modifications to the description of its facility.	Formal BWS signed response mailed 6/20/03.

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Appendix A

Archaeological Study

ASC0211-1

AN ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED DESALINATION FACILITY BARBERS POINT, HONOULIULI, `EWA, O`AHU (TMK 9-1-31:28)

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ABSTRACT

At the request of Oceanit Laboratories Inc. of Honolulu, Aki Sinoto Consulting of Honolulu, conducted an inventory survey and completed monitoring on a parcel of land proposed for the development of a desalination facility by the Honolulu Board of Water Supply. The 20-acre parcel (TMK 9-1-31:28) is located in the southeastern coastal portion of Campbell Industrial Park in Honouliuli *ahupua`a*, `Ewa District, O`ahu Island. This area was formerly a portion of the Naval Reservation associated with the Naval Air Station Barbers Point as a flight easement for one of the aircraft runways. Inventory survey procedures were also completed for a 10-acre parcel (TMK 9-1-31:47) that adjoins the project area to the south.

In the course of the current undertaking, three sites, two cultural and one paleontological, were recorded. Site 6373 was a small, three-feature complex consisting of a deteriorated, circular enclosure, a capped sinkhole, and an unusual structure made of several leaning, limestone slabs that formed a cyst-like surface structure. Intensive data recovery of this feature recovered limited midden remains primarily consisting of marine mollusks and one traditional bone, toggle artifact. Site 6374 was two large adjoining sinkholes, each measuring about 4 meters in diameter and 1 meter deep. Results of subsurface testing and the fire-altered appearance of the westernmost sinkhole feature led to the conclusion that the site represented a late-historic period, lime kiln where coralline limestone was burned. This site is the only such recorded example, to date, from the vast inventory of previously investigated sinkholes in the `Ewa Plain region. Site 6375 was a complex of eight paleontological sinkhole features selected from thirteen accessible sinkholes with various attributes that were identified during the initial surface survey. Subsurface testing in seven of these sinkholes recovered a vast array of skeletal avi-faunal remains. Faunal analyses identified thirteen species, including some prehistorically extinct ones, and thirteen indeterminate, but sortable categories of birds within the recovered assemblage.

No further work, including monitoring of construction, is recommended in the 20-acre project area based on the results of the current undertaking. However, future data recovery for Site 6374, which is located within the adjoining 10-acre area, is recommended when development becomes imminent. The implementation of interim protection measures are recommended for Site 6374 and a previously identified human burial, Site 4209, located at the western edge of the drainage channel (TMK 9-1-31: 46) that parallels the eastern boundary of the project area. A long-term preservation plan should be prepared for approval by the State Historic Preservation Division and the O`ahu Island Burial Council after the presence of the burial has been re-confirmed.

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INTRODUCTION

At the request of Oceanit Laboratories, Inc. of Honolulu, Aki Sinoto Consulting of Honolulu conducted an archaeological inventory survey, cultural impact assessment, and monitoring during geo-technical borings in a parcel of land located in Campbell Industrial Park at Barbers Point, O`ahu Island. The subject parcel is being proposed for the development of a desalination plant by the Honolulu Board of Water Supply. Inventory survey procedures were conducted between November 30, 2001 and January 23, 2002. Locations for geo-technical bore holes and access were assessed on February 27, 2002 and finalized on March 4, 2002. Archaeological monitoring and field inspections were conducted during clearing for foundation borings during April 13-15, 2002. The cultural impact assessment report has been submitted under separate cover. The monitoring report is presented as Appendix B of this report.

PROJECT LOCATION

The project area is located on a coastal portion of Honouliuli *ahupua`a*, `Ewa district, O`ahu Island (Fig. 1). Situated at the southeastern corner of Campbell Industrial Park, the 20-acre parcel (TMK 9-1-31:28), together with the 10-acre parcel adjoining to the south (TMK 9-1-31:47), comprises a portion of the former flight easement for one of the runways of the Barbers Point Naval Air Station (BPNAS). The trapezoidal-shaped parcel is bounded on the north by a strip of State land paralleling the *makai* side of Olai Road and a barbed-wire fence, east by a large drainage channel that separates the industrial park area from the former air station, south by the adjoining 10-acre parcel, and west by a fence-line paralleling an unpaved road which comprises the eastern boundary of the former Oahu Meat Packers cattle feed-lot (Figs. 2-4). On the *mauka* side of Olai Road is the petroleum storage tank yard for Tesoro, Inc., formerly Hawaiian Independent Refineries, Inc.

At the time of the survey, roughly half of the project area consisted of open grassland with the other half under *kiawe* and *koa-haole* cover. The open area has undergone extensive surface alteration including the filling of sinkholes and the overlay of a shallow cover of imported topsoil. Within the *kiawe* area, piles of cut *kiawe* and some bulldozer cuts and tailings are still evident. Although, some of the sinkholes in the peripheral areas have been filled, many in the interior of the tree cover are still open and accessible. Signs of a brushfire in the recent past are evident in the eastern portions of the tree-covered area. The project parcel is currently unused other than the 1-acre area at the northeast corner where two pilot wells are being drilled (see Fig. 3). Vehicular access to the shoreline is restricted by locked gates and chain-link fencing along the *makai* periphery of Olai Road, although pedestrian access is possible through breaches in the fences and along the shoreline from Barbers Point Beach Park, located roughly a mile to the west.

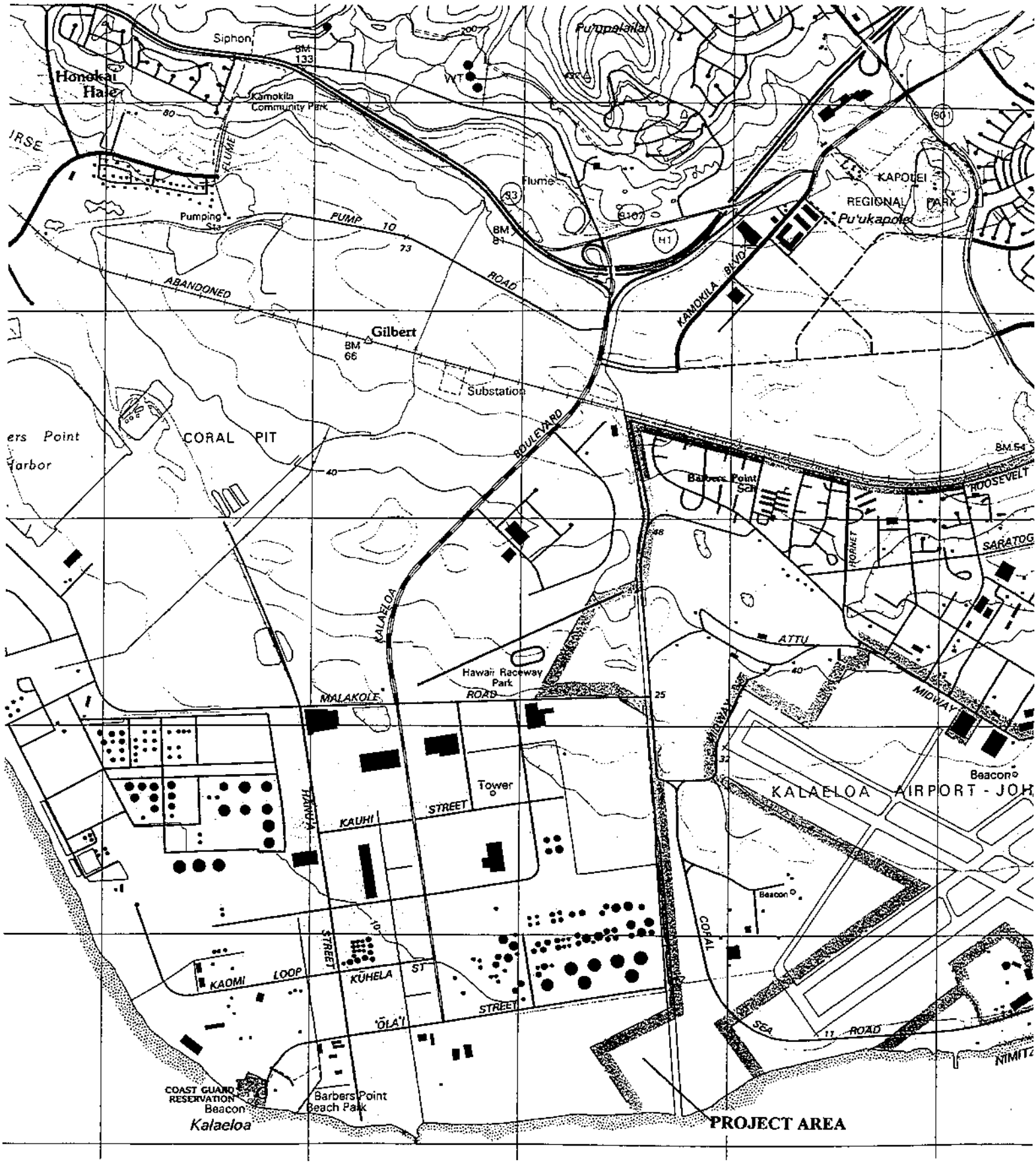
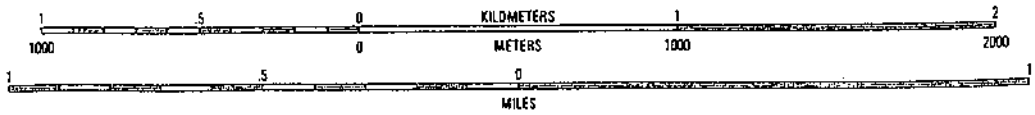


Figure 1. Location of Project Area on the 1998 USGS Ewa Quadrangle



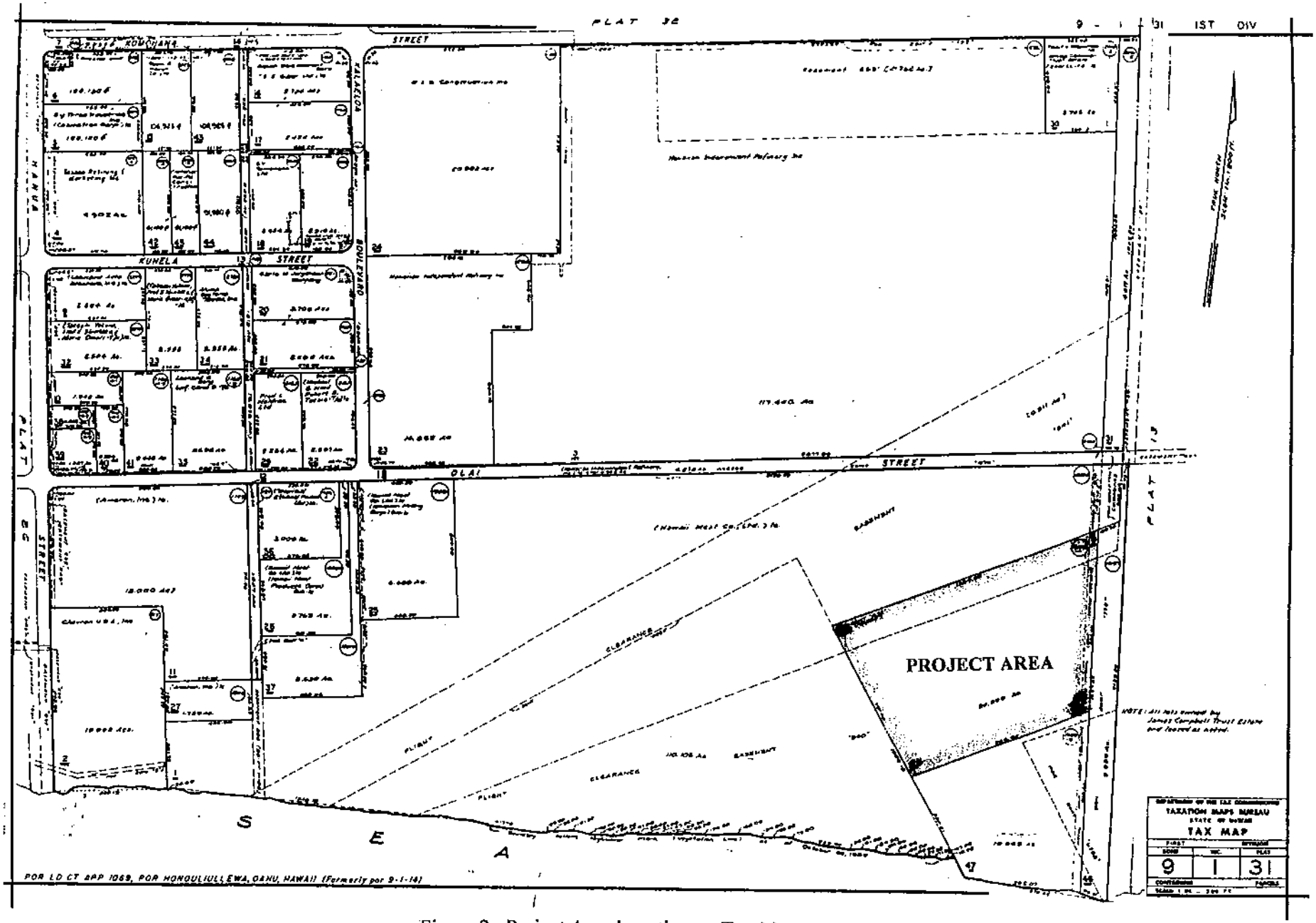


Figure 2. Project Area Location on Tax Map

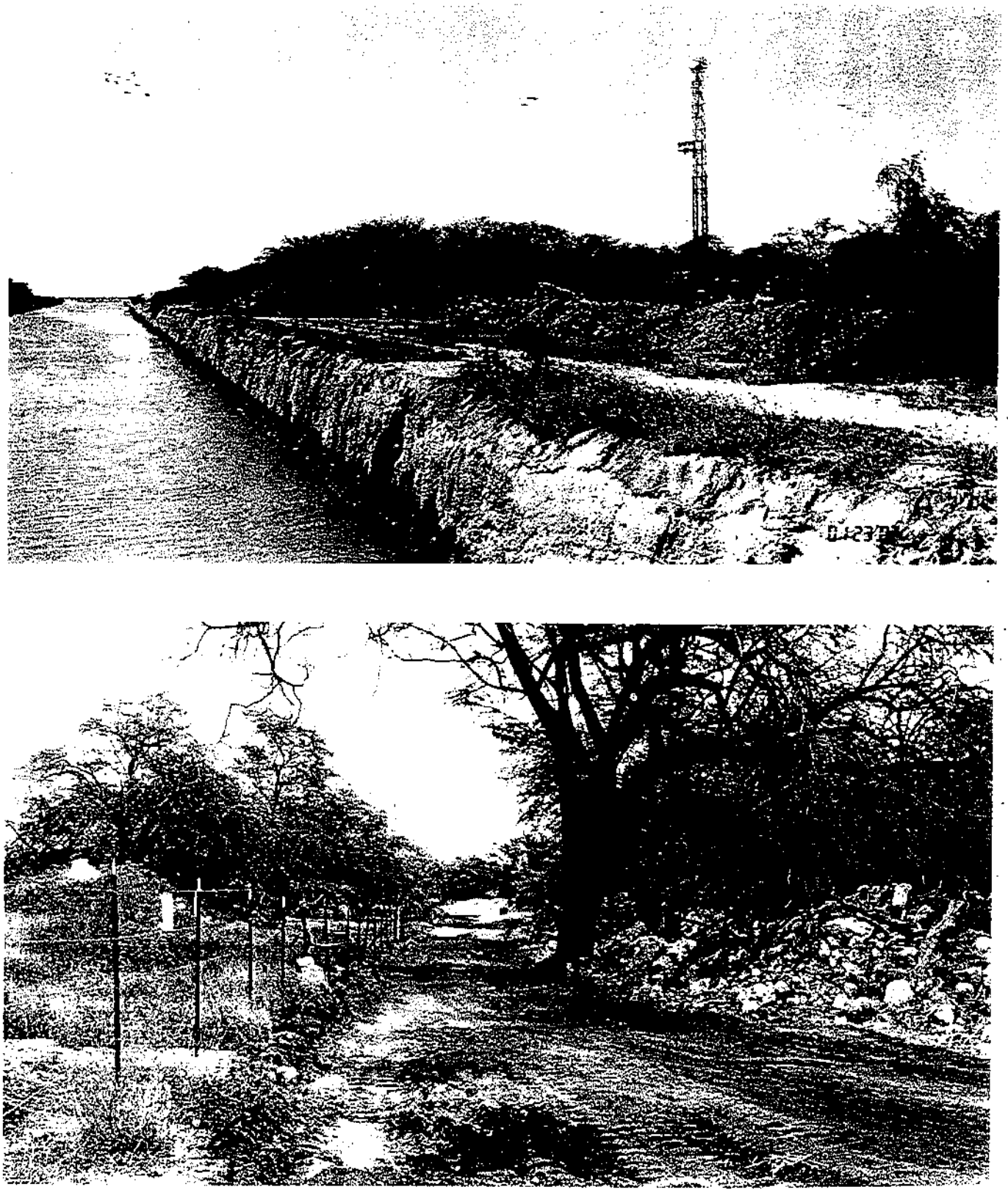


Figure 3. Project Area Overviews: (top) View Along East Boundary Drainage Channel to South Note Drill Rig Tower for Pilot Well, (bottom) View of North Boundary Fenceline to East

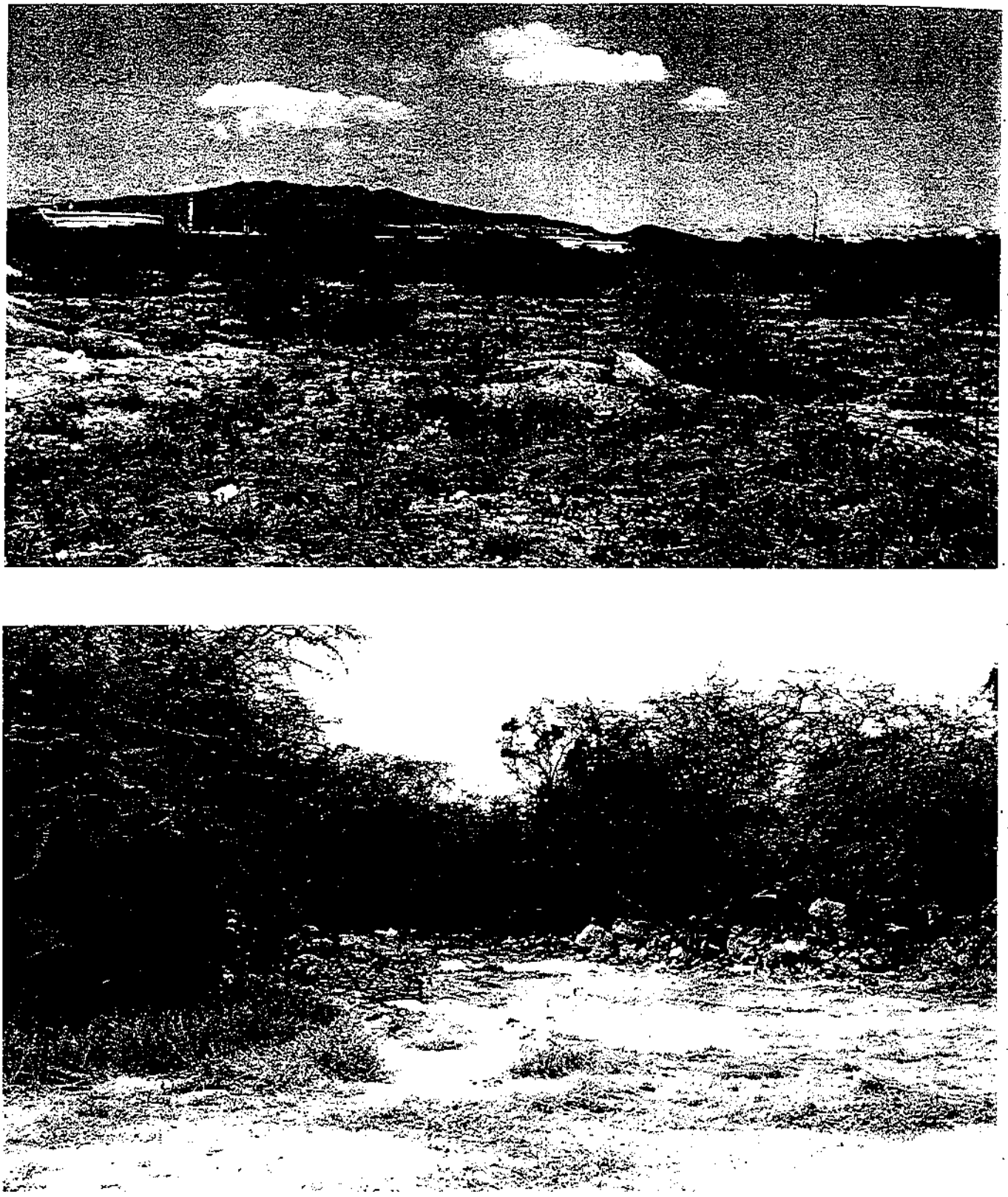


Figure 4. Overviews: (top) West Boundary Fenceline, View to Northeast
(bottom) View of Central *kiawe*-covered Area to South

ENVIRONMENT

In previous discussions, the `Ewa Plain has been subdivided into three zones based on surface characteristics and the availability of water; the lowland limestone exposure, the upland alluvial terrain, and a locale of floodplain and alluvial fans (Tuggle and Tuggle 1997:9). The current project area occurs within the lowland limestone exposure, an area of flat karst topography with minimal to no soil cover. Sinkholes of varying diameters and depths are ubiquitous features of this zone. Within the immediate shoreline areas, including the subject area, the landscape has undergone episodes of compounded alteration. The existing landscape within the project area is the result of past clearing and grading, along with signs of recent vegetation clearing. Stockpiles of cut *kiawe* trees and bulldozer tailings of large coralline limestone boulders are interspersed in the landscape. Large portions of the parcel consist of flat, open areas that attest to the clearing and grading (fill) activities that took place, possibly in conjunction with historic period agriculture, during its use as a flight easement, and the more recent use of portions of the subject and immediately neighboring areas as a feedlot for beef cattle. Surface scatters of cow bones occur throughout the western portion of the project area.

The elevation ranges from 0 to about 10 feet above mean sea level. Annual rainfall is below 20 inches with January having the highest and June and July having the lowest monthly averages (Armstrong 1973:56). The soil in the area is classified "CR" or coral outcrop (Foote et al. 1972:29) and consists of coral or cemented calcareous sand. The coral limestone is the remains of coral reefs that grew in shallow water during the higher stand of the sea. Small pockets of thin, friable, red soil material (Mamala stony silty clay loam) occur in cracks, crevices, and depressions in the karst substrate (Foote et al. 1972:29).

Vegetation consists of *kiawe* (*Prosopis pallida*) as the dominant high cover with *koa haole* (*Leucaena glauca*) and occasional *noni* (*Morinda citrifolia*) within the thickets. Along the periphery are stands of Indian fleabane (*Pulchea indica*), wild basil (*Ocimum gratissimum*), beggar's tick (*Bidens pilosa*), and other exotic shrubs and weeds. Notable native plants within the *kiawe* thickets consist of *maiapilo* (*Capparis sandwichiana*), *naio* (*Myoporum sandwicense*), and *kauna`oa-uka* (*Cassytha filiformis*). Natal grass (*Tricholaena rosea*) dominates the open areas with occasional bushes of Castor bean (*Ricinus communis*) along with other exotic weeds (Neal 1965).

HISTORICAL BACKGROUND

The environmental and cultural histories of O`ahu Island and the `Ewa Plain have previously been treated in detail in other reports (Haun and Kelly 1991, Tuggle and Tomonari-Tuggle 1997, Athens et al. 1999). The cultural impact assessment report, produced as an adjunct to the current archaeological report, also includes

information regarding the traditional history of `Ewa and Honouliuli (Cruz 2002). This section presents a brief historical summary of the subject region.

A generalized review of the results of radiocarbon dating from previous archaeological research suggests limited occupation in the `Ewa Plains region prior to A.D. 1000, with scattered clusters of occupation from A.D. 1000 to 1400, and more substantial settlement occurring during A.D. 1400 to 1800 (Tuggle and Tomonari-Tuggle 1997:18). Recurrent seasonal occupation for the exploitation of resources has been suggested for many of the site complexes in southwestern Honouliuli (Sinoto 1978).

The colonialization history of O`ahu has been propounded by two schools of thought; the "long" and "short" chronologies. The former argues for early settlement (c. A.D. 100) and the latter for late settlement (c. A.D. 900), with as much as 800 years of discrepancy between the two. Results of recently undertaken paleo-environmental research appear to support the short chronology (Athens et al. 1999:20).

Two different interpretations of the early political history and eventual unification of the Island of O`ahu are suggested by Johnson (1994) and Cordy (1996). Johnson postulates that by the latter A.D. 700s, districts and *ahupua`a* had been established with a "stratified chiefly heirarchy" in place. The sons of Maweke controlled much of O`ahu by the 11th to 12th Century A.D. Around that time, 'Ewa was under the control of Keaunui. Political unification of O`ahu is not attributed to La`akona, but to Kakuhihewa, several generations later during the 17th century. Cordy suggests that in the early A.D. 1300s, `Ewa, together with Wai`anae and Waialua, was politically dominant under Keaunui, son of Maweke and belonging to the Maweke-Kumuhonua lineage. Under La`akona, also associated with `Ewa, O`ahu was unified by A.D. 1400. One royal center for `Ewa is suggested by Cordy at Lihue, in the upland area of Honouliuli. The period from the 1500s into the beginning of the 1700s was marked by warfare and several changes of political power until Kuali`i took control. His son, Peleioholani, took control of O`ahu in 1740 until 1778, when succeeded by Kahahana (belonging to the `Ewa line of chiefs, but raised on Maui in Kahekili's court).

During the latter 1700s, a turbulent period marked by warfare, O`ahu was conquered by Kahekili in 1783. Following Kahahana's death, the 'Ewa chiefs plotted the overthrow of Kahekili and the other Maui chiefs. Discovering the conspiracy, Kahekili attacked Kona and `Ewa, resulting in a massacre in which "streams...in Kona and Kahoa`ai`ai (Ho`ae`ae) in `Ewa were choked with the bodies of the dead...(Kamakau 1961:138)." Following Kamehameha's conquest of O`ahu, Kalanimoku was given Honouliuli *ahupua`a* and subsequently passed it on to his sister, Wahinepi`o (Tuggle and Tomonari-Tuggle 1997:31). At the time of the *Mahele*, this land was awarded to her daughter, Kekauonohi.

The early accounts of 'Ewa, made by outsiders shortly after contact, generally characterize the region as barren and unpopulated (Vancouver 1798:361-363 and Ellis 1969:11), using such adjectives as "destitute" and "desolate" in their descriptions (Athens et al. 1999:16). These accounts may have focused on the arid, western coastal areas of the `Ewa Plain, and missed the fact that Honouliuli was the largest *ahupua`a* on O`ahu at the time. Significantly, it also had the highest population in the first census taken in 1831-32 (Schmitt 1973:13). The population probably concentrated along the productive inland margin of Pearl Harbor on the eastern portions of the *ahupua`a*.

Honuliuli *ahupua`a* encompassed 43,250 acres, but only about 150 acres comprising 72 awards, mostly in the vicinity of Honouliuli Village, went to commoners as *kuleana* parcels (Tuggle and Tomonari-Tuggle 1997:23). During the first half of the 19th century, wild cattle proliferated across O`ahu and cattle hunting on the `Ewa Plain evolved into formal ranching. In 1877, the *ahupua`a* was purchased by James Campbell, who used much of the land for cattle grazing at the Honouliuli Ranch, devoted 10,000 acres for agriculture, and drilled artesian wells. He also leased land to Chinese rice farmers, controlled fishing rights to Pearl Harbor, and supported a lime quarry operation. In 1890, B.F. Dillingham, Campbell's partner in an unsuccessful venture to market `Ewa, subleased all the land below the 200ft. elevation for sugar cultivation to the Ewa Plantation Company. Dillingham's Oahu Railway and Land Company's rail line eventually traversed the Ewa Plain (Fig. 5). The Hawaiian Fibre Company, established in 1898, cultivated sisal (*Agave sisalana*) which was imported from Florida (Tuggle and Tomonari-Tuggle 1997:37). The railroad separated the sugar cane in the *mauka* area from the sisal fields and remnant cattle ranching in the *makai* areas (Athens et al. 1999:17). Commercial *kiawe* cutting for charcoal and the harvesting of *kiawe* pods for cattle feed were some of the other enterprises in the region.

In the early 20th century, the Ewa Plantation Company purposely induced erosion along the lower slopes of the Wai`anae range in an effort to introduce arable soils to the coral plain. About 373 acres are purported to have been reclaimed over a span of a few years (Frierson 1973:17). In the 1920s, land-use in Honouliuli consisted primarily of sugar cane cultivation and ranching. Honouliuli Ranch encompassed 20,000 acres; Ewa Plantation held 12,000 in sugar cane fields, a mill, residential areas, a sisal plantation, a wood lot, and a limestone quarry; and Oahu Sugar Company occupied 3,000 acres in inland Honouliuli. Pu`uloa had 2,300 acres in private homes, salt works, and fishponds along the shoreline of Pearl Harbor; and the remaining 6,000 acres consisted of pineapple fields, inland forest, and wasteland. Most of the major communities were located along the northeastern portion of the `Ewa Plain, including Honouliuli and `Ewa (Fig. 6).

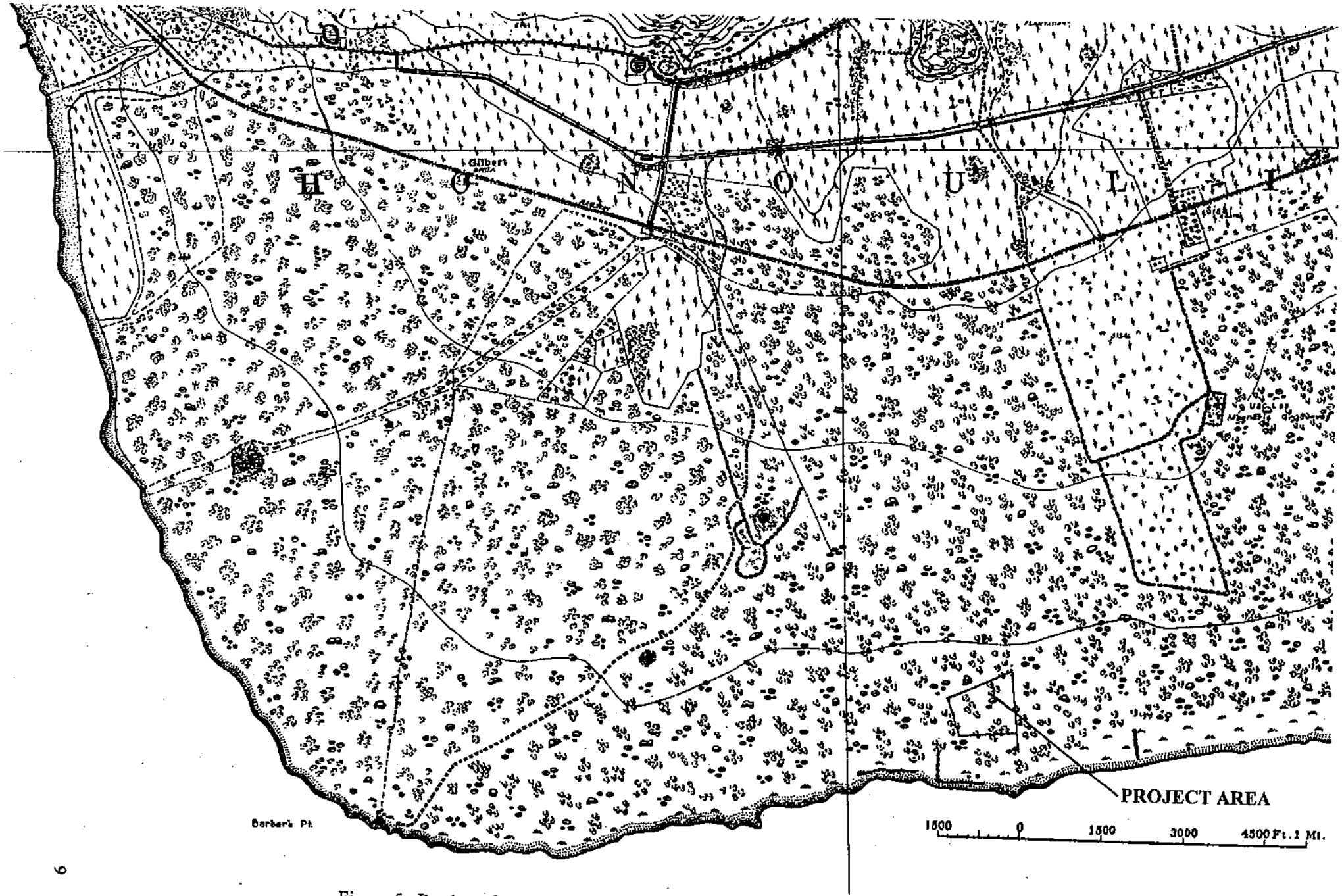


Figure 5. Portion of a Territorial Map of Oahu Based on Military Surveys of 1908-1913
Note Railroad, Sisal Fields, and Cattle Walls

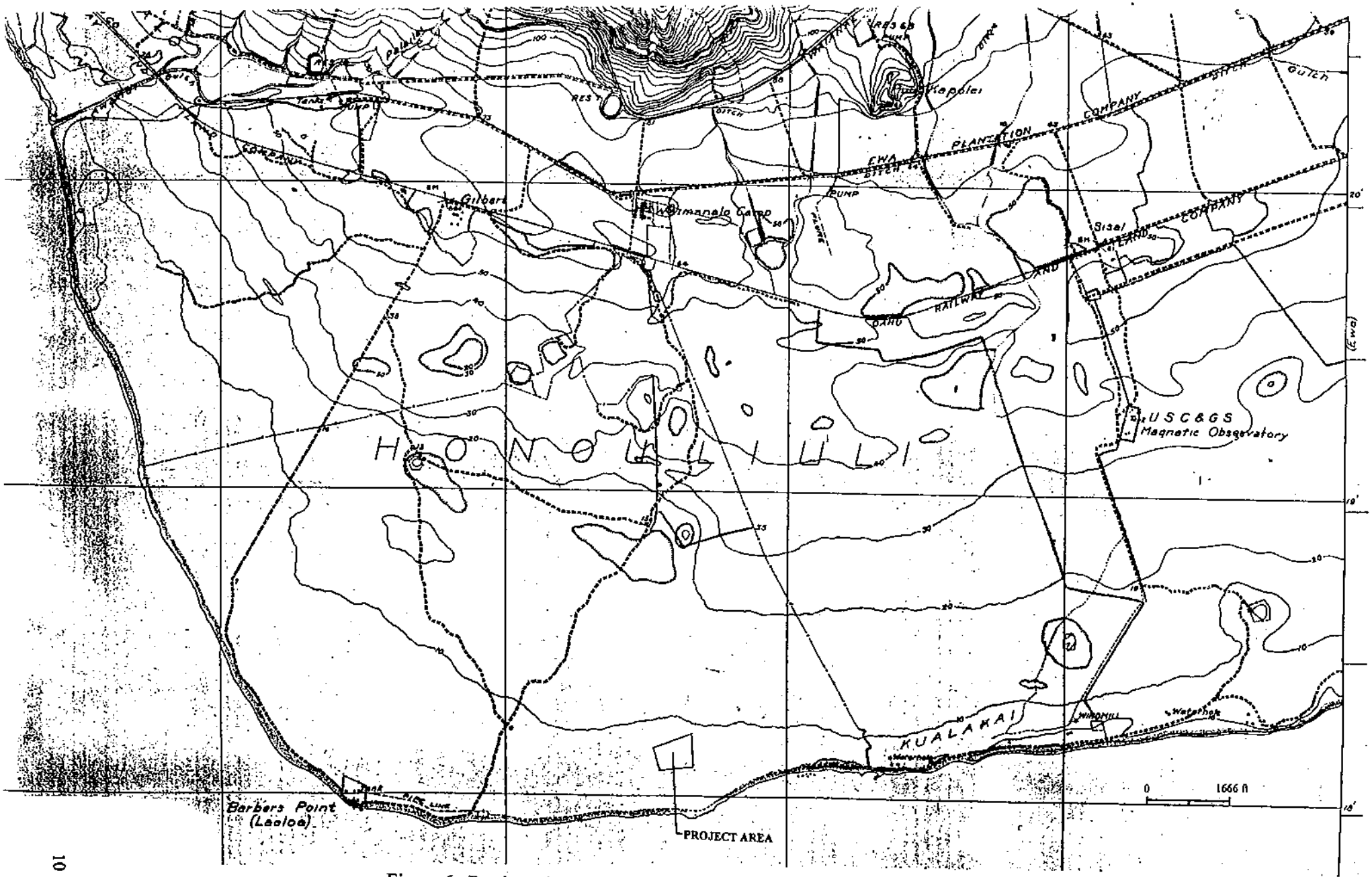


Figure 6. Portion of 1927-28 USGS Barbers Point Quadrangle (Advance Sheet)
Note Pipeline from Barbers Point to Kualakai (1:20,000)

Major changes in land-use occurred during the 1930s and 40s with the U.S. Military developments in the region (Figs. 7-10). The largest and longest lasting was NAS Barbers Point. Sugar cultivation continued in the inland areas from West Loch to Kahe Point. The use of the railroad was discontinued by the plantation in 1947. Extensive bulldozing in the form of parallel cuts, most likely for survey transects or sight-lines, took place during the late 1950s to early 1960s in the current industrial park area west of NAS Barbers Point (Fig. 11). By the early 1960s, the oil refinery and portions of Campbell Industrial Park had been developed, The feedlot appears to have been constructed during the mid-1960s according to aerial photographs (Figs. 12-13). From 1974 on, surplus Federal lands have been turned over to both the City and County of Honolulu and the State of Hawaii. Major portions of NAS Barbers Point is currently under State jurisdiction. The subject project area has also been included in the recently excessed lands.

PREVIOUS ARCHAEOLOGY

Most of the archaeological research undertaken during the past 30 years in the 'Ewa Plain has predominantly been focused in three major localities; West Beach or the Ko'olina Resort area immediately south of Kahe Point, the Barbers Point Deep Draft Harbor project area to the north of Campbell Industrial Park, and within the boundaries of the Naval Air Station Barbers Point. Other areas include Ewa Marina, Puuloa Golf Course, and West Loch. The results of the various phases of work completed in these areas have been comprehensively summarized in a previous synthesis (Tuggle and Tomonari-Tuggle 1997). A brief overview will be presented here.

The earliest archaeological information, gathered by Thrum and Stokes in the early 1900s and by McAllister in the 1930s, mainly focused on the surface remains of prominent sites such as *heiau* and fishponds. McAllister's description diminished the significance of pre-contact Hawaiian occupation in the region:

> Site 146. Ewa coral plains, throughout which are remains of many sites. The great extent of old stone walls, particularly near the Puuloa Salt Works, belongs to the ranching period of about 75 year ago. It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population there. (in Sterling and Summers 1978:36)

The perception that the region was a marginal area not favored for occupation appears to have been influential since, between that time and 1970, only about a half-dozen or so field procedures were undertaken. Since the first modern, formal survey in the region in 1970 (Lewis 1970), there have been a myriad of extensive and intensive archaeological research completed in conjunction with large-scale resort, residential, industrial, or government-sponsored developments together with construction activities within military holdings. These studies have generally focused on the pre-contact Hawaiian period and addressed

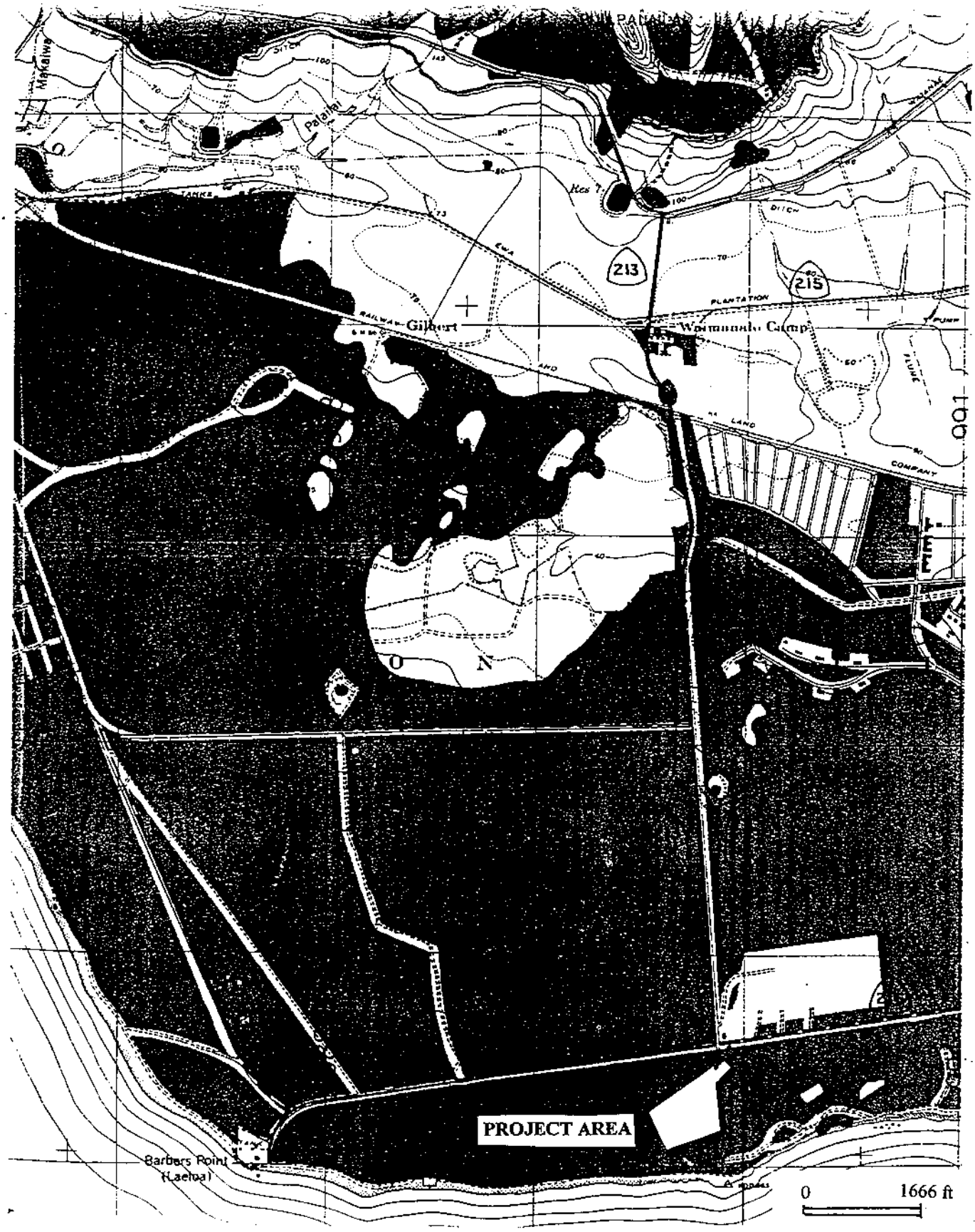


Figure 7. Portion of 1943 U.S. Army Corps of Engineers Terrain Map, Barbers Point Quadrangle
Note NAS Barbers Point Not Depicted (1:20,000)



Figure 8. Portion of December 1944 Aerial, Hawaiian Islands Photo Map (1000 yd. Grid)



Figure 9. Portion of 1953 USGS Ewa Quadrangle (1:24,000), Note NAS Barbers Point

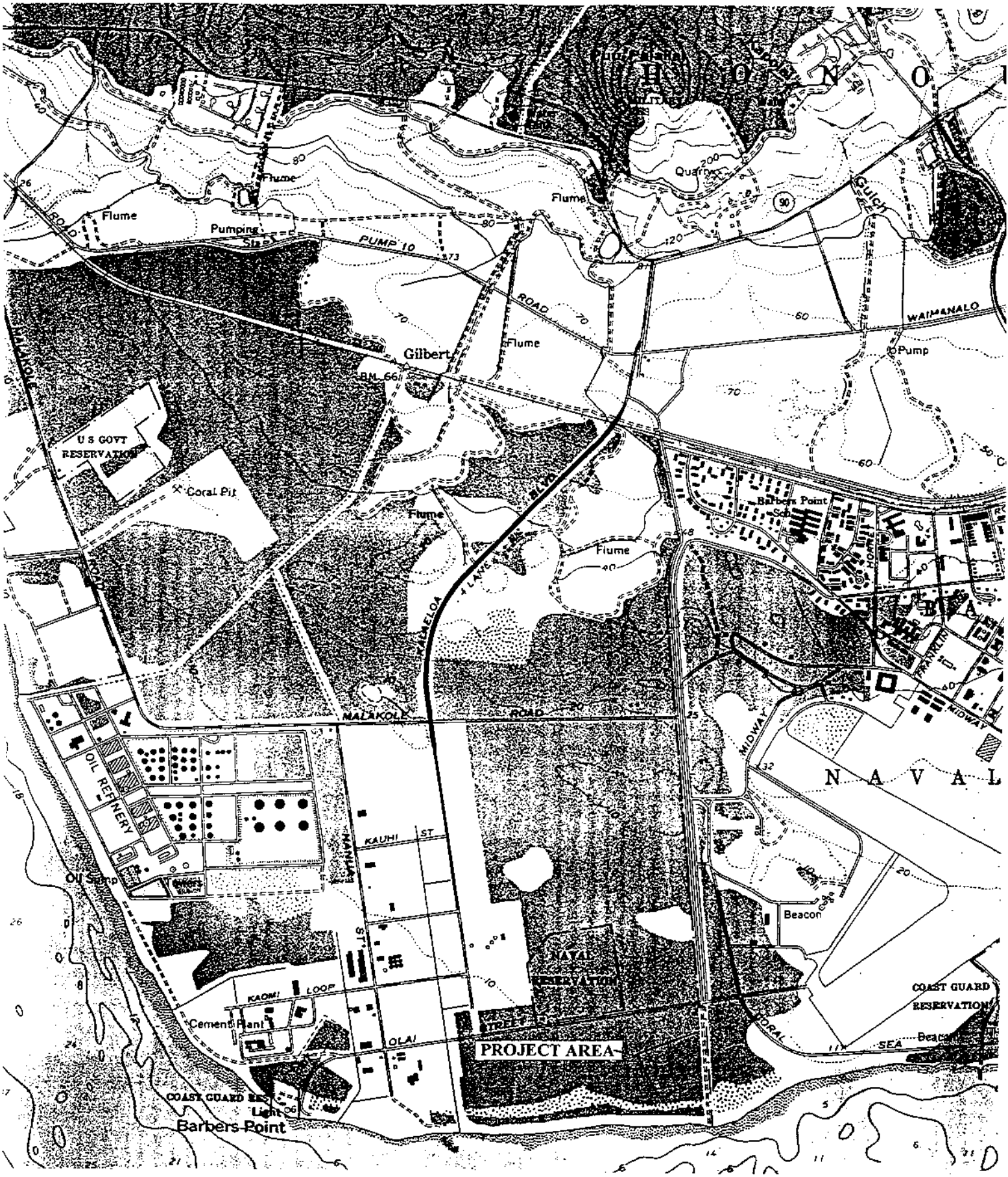


Figure 10. Portion of 1962 USGS Ewa Quadrangle (1:24,000), Note Refinery and Industrial Park Area

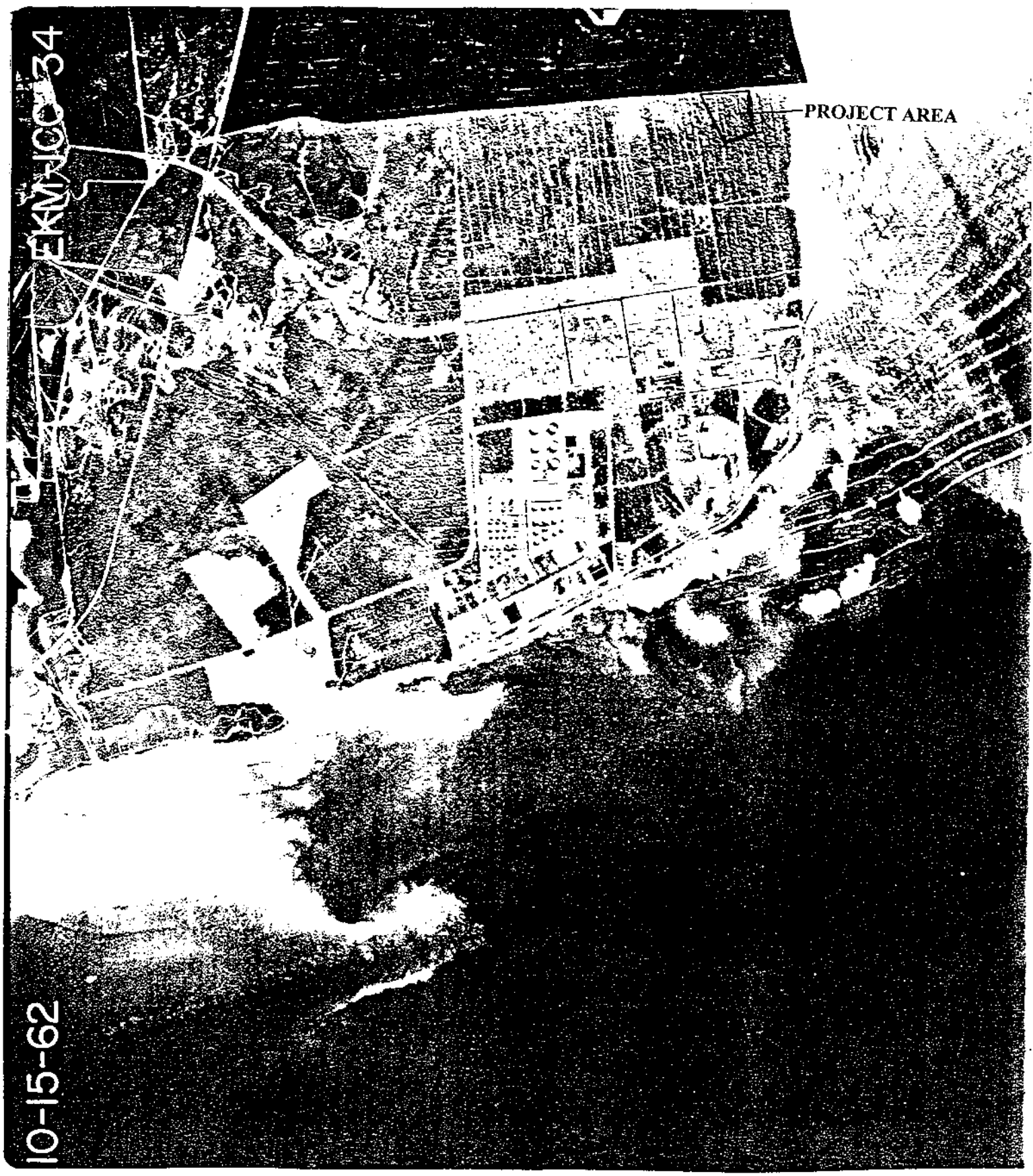


Figure 11. Portion of 1962 Military Aerial Showing Bulldozed Transects in Industrial Park Area and in Current Project Area (coastal area to the left of the blacked out area)

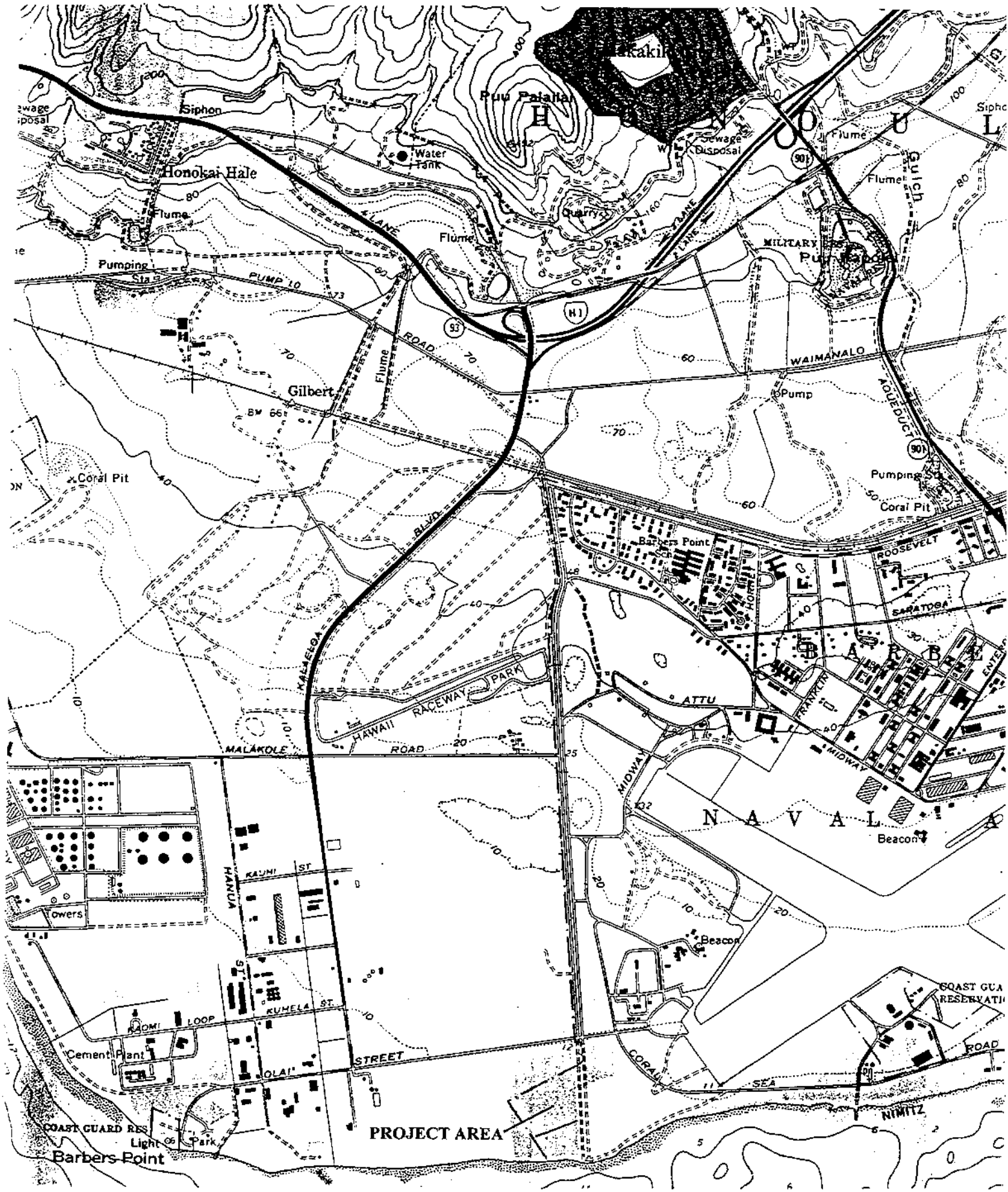


Figure 12. Portion of 1968 USGS Ewa Quadrangle (1:24,000), Showing Boundary of Flight Easement Area



Figure 13. Portion of February 1968 Aerial Showing Project Area and Feed Lot

three major research issues; site inventory, traditional settlement and adaptational history, and the role of human activities in environmental change (Tuggle and Tomonari-Tuggle 1997:43). Also, the majority of these studies have taken place in the coastal and mid-elevation zones of the 'Ewa Plain. Fieldwork in the inland, upper elevation zones of Honouliuli *ahupua'a* have been limited.

A total of 142 radiocarbon dates have been generated for the region by past studies. Of these, only 10 dates calibrate to a range earlier than A.D. 1000. Of these, five are probably from non-cultural contexts, one is from a questionable cultural provenience. Of the four remaining, three occur from complex talus deposits with multiple lensing and one from a beach deposit. None of the 10 dates are considered to represent an early occupational period and two conclusions are suggested regarding early occupation; 1) the sites excavated probably do not pre-date A.D. 900-1100, and 2) the earliest sites have yet to be discovered from this region (Tuggle and Tomonari-Tuggle 1997:78-80).

Of the remaining 132 dates, only seven span the A.D. 1000-1400 period and the rest span the A.D. 1400-1800 range. Concentration of cultural activity during this latter period is suggested. There is a paucity of data related to early post-contact Hawaiian occupation of the region. Thus, the determination of whether specific sites were continuously occupied from pre-contact into the contact period have been problematic and have not yet been elucidated based on the available information.

The recent research has also served to assign the ubiquitous sinkholes with significance not related to cultural activities, when the presence of the skeletal remains of numerous extinct avian species were discovered in the interior floor deposits of these natural features (Sinoto 1976). Since the period of initial discovery, the skeletal remains of a few hundred new species of birds, ranging from small finches to large flightless geese, have been recovered by subsequent research efforts.

Three previous projects were undertaken within the immediate vicinity of the current project area. The earliest, in 1975, was an archaeological reconnaissance survey of a proposed drainage channel (Oshima 1975). An 18,000-foot by 200-feet wide corridor was examined through a walk-through survey. The coastal segment of this channel, *makai* of Olai Street, comprises the eastern boundary of the current project area. One area of surface remains was recorded along an inland segment between Hawaii Raceway Park and Malakole Road. The area appeared to have been chain-dragged or cleared at one time, but surface remains consisting of wall segments; a crudely constructed, small enclosed circular platform; and a low-walled enclosure were encountered. No further work was recommended, due to the marginal nature and poor condition of the remains.

In 1985, the current project area was included in an archaeological survey of the Naval Air Station Barbers Point (Haun 1991). Based on a criterion of previous disturbance, a low intensity survey was conducted in the flight easement area and no remains were recorded. Subsequent archaeological procedures for NAS Barbers Point undertook no further fieldwork within the current project area.

In 1990, human remains which were inadvertently discovered in a sinkhole that was originally exposed during the excavation of the drainage channel was re-exposed when a section of the surficial cement lining of the channel wall broke off (Kawachi 1990). The skeletal remains, designated Site 50-890-12-4209, were located within a limestone cavity that was exposed along the western bank of the channel, immediately adjacent to the eastern boundary of the current project area. A large limestone slab was used to cover the top opening of the hole and since removal of the remains was not feasible, it was left *in situ*.

SETTLEMENT PATTERN

Pre-contact Hawaiian settlement in the `Ewa Plain probably consisted of small clusters of habitation complexes or hamlets, representing marine exploitation and small-scale agricultural activities, dispersed along the coastal and immediate inland areas. More substantial communities were most likely concentrated along the shores of Pearl Harbor and the mouth of Honouliuli or Makali`i Gulch where wetland taro cultivation took place. Formalized dry land agriculture, along with permanent habitation, may have taken place along the lower slopes of the Wai`anae range with exploitation of inland forest resources in the upper elevations. During construction of the Honokai Hale subdivision, a large complex of archaeological features were impacted and destroyed without documentation (McCoy pers. comm.). Significantly, this complex occurred in the transition zone or interface between the *makai* coralline substratum and the *mauka* volcanic soils and may have represented a mid-elevation settlement.

During the early post-contact era, much of the pre-contact settlement pattern most likely continued. Some of the named coastal hamlets; such as Waimanalo, Ko`olina, Kalaeloa, Kualaka`i, and Onelua represented the continuation of traditional occupational patterns. With large-scale land-use changes that occurred during the later historic period, the pattern of human occupation also changed. Communities in Honouliuli and `Ewa towns probably grew as expansive areas of the plain were taken up by cattle ranching and commercial agriculture involving sugar cane and sisal. Later, more changes took place with the advent of military development during the 1930s and 40s. Following WWII, the `Ewa Plains region has undergone agricultural, industrial, residential, and resort/recreational development. This trend continues today with the purposeful shift of the urban center towards west O`ahu as a governmental initiative.

SITE EXPECTABILITY

Based on the results of previous archaeological investigation in the Barbers Point region, numerous unmodified sinkholes of varying sizes and depths along with a few small structural features such as C and U-shapes, wall segments, and modified sinkholes maybe expected. Also the remains of historic period activities in the form of fences, walls, wooden and concrete structures may also be present. Due to the use of the area as a flight easement, associated infrastructure and materials, such as the remains of concrete structures and lighting may also be present.

However, with the wide-ranging effects of compounded previous disturbances in the form of vegetation clearing and grading, the best probability for remains will be within the remaining *kiawe* thickets. The floor deposits of the sinkholes are expected to contain skeletal remains of a variety of avi-fauna.

METHODS

The project parcel was traversed on foot during the initial surface assessment to gain an overview of the whole project area. Roughly, half of the 20-acre project area was found to be extensively modified through vegetation clearing and filling. The remaining area was under high cover of *kiawe* trees with some understory of *koa haole* and other shrubs and bushes. Previous disturbances in the form of bulldozer cuts, berms of tailings, stockpiles of large cut *kiawe* trees, and small surface concentrations of construction materials and 55 gallon drums occurred around the periphery and within the interior of the vegetated area. Additionally, the adjoining ten-acres on the seaward side was observed to be totally cleared and filled with the exception of a narrow strip of *kiawe* paralleling the drainage channel. Due to the fact that the southern boundary of the 20-acre project area was not clearly marked, coupled with the minimal size of the vegetated area in the adjoining 10-acre seaward parcel, archaeological inventory procedures were completed for both areas during the current undertaking.

Based on the observations made during the initial surface assessment, survey efforts were concentrated within the *kiawe*- covered area. Utilizing the sight-line corridors cut by surveyors at base-lines, systematic transects were walked through the vegetated area. The visibility through the vegetation allowed for a ten meter interval between survey personnel throughout the *kiawe* area. Open sinkholes, accessible for testing were marked with flagging tape. All other potential features were closely inspected. From the marked sinkholes, eight representing a variety of criteria including depth, size of opening, and shape of the cavity were selected for testing.

In addition to the sinkholes, two cultural sites were discovered. One was small complex consisting of a deteriorated circular enclosure, a capped sinkhole, and a constructed cyst or cupboard; and the other was a double sinkhole with one exhibiting evidence of use as a lime kiln. Both sites were located within the eastern side of the project area and the lime kiln site most likely occurred within the adjoining seaward, 10-acre parcel. The interior floor of the enclosure was subdivided into quadrants and completely excavated. The associated features also underwent testing. The interior deposit of the lime-kiln sinkhole was subdivided into quadrants and one quadrant was excavated.

Recording entailed locational mapping utilizing a Trimble GPS on loan from the State Historic Preservation Division, drawing plan maps and profiles of sinkholes and cultural features. Narrative and photographic documentation of the sites and features were undertaken. Subsurface testing was conducted by manual excavation using trowels, shovels, and small mattocks. All excavated matrix was screened through ¼" and 1/8" sieves. Rough sorting of sample categories were done in the field as the samples were bagged.

Laboratory procedures included the cleaning and processing of the recovered artifactual and sample material. The recovered materials were washed, either manually or using an ultrasonic cleaner, and air dried. Then the materials were separated into gross faunal categories, re-bagged, and sent for faunal analyses. Following completion of analyses, the sorted categories were weighed and the results tabulated. Artifacts and representative sampling of the avi-faunal material were photographed.

Following the laboratory procedures, the resulting data was synthesized and a review draft of the report was written and produced for regulatory agency review. Discrete State site numbers, obtained from SHPD, were assigned to the cultural sites and one site number with eight numeric feature designations were assigned to the sinkholes. Concurrent to the archaeological survey, an independent sub-consultant conducted informant interviews and archival searches for the cultural impact assessment procedure. The assessment report draft was prepared and after undergoing internal review, produced for regulatory agency review.

Literature and documents searches were conducted at the State Historic Preservation Division library in Kapolei, the Bishop Museum Library and Archives in Kalihi, the Hawaii and Pacific Collections at the main State Library in downtown Honolulu, the Kaimuki Public Library, the Survey Office of the State Department of Accounting and General Services in downtown Honolulu, and the Hamilton Library Map Collection at the University of Hawaii in Manoa.

During the current undertaking, all standard and accepted archaeological techniques and practices were followed for all recording and other data gathering procedures. Aki Sinoto was project coordinator, Paul Titchenal, M.A. acted as the Principal Investigator, and Neal Oshima assisted during the GPS survey. The recovered artifact and sample materials as well as maps, notes, and other documentation generated during the course of this undertaking are being curated by Aki Sinoto Consulting in Honolulu. Mr. Eric Komori from SHPD, undertook post-processing of the GPS data and produced a GIS generated map that located the sites. Dr. Alan Ziegler performed the faunal analyses.

During the fieldwork phase, field inspections were undertaken by Dr. Sara Collins, O'ahu Island archaeologist from the State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources along with Ms. Elaine Jourdane and Mr. Eric Komori, both staff members of SHPD. Field visitation was also made by Mr. Shad Kane, one of the oral informants interviewed for the cultural impact assessment.

Following completion of the field procedures, archaeological consultation and monitoring were undertaken in conjunction with placement and implementation of geo-technical borings required for the proposed development. A brief monitoring plan in letter form was prepared and approved by SHPD for archaeological monitoring during limited vegetation clearing and ground surface preparation within pre-selected access corridors for the geo-technical boring equipment. Clearing of the longer access corridors was monitored full-time during the initial stages and later spot-checked. The boring using truck mounted coring equipment was also monitored during the first ten feet of depth at two locales. No cultural remains were encountered during the monitoring procedures.

RESULTS OF FIELDWORK

The results of the initial surface assessment determined that the potential for extant surface remains would be limited to the area under *kiawe* cover. Systematic walk-through survey within the vegetated area encountered a total of eighteen features, consisting of two structural features, two modified sinkholes, and fourteen unmodified sinkholes. Eight of the unmodified sinkholes were selected for data recovery. Two cultural sites with five constituent features and a paleontological site with eight unmodified sinkhole features were ultimately recorded and underwent areal excavations or subsurface testing (Fig. 14).

CULTURAL SITES

The surface survey recorded two cultural sites consisting of two structural features and three sinkholes. One of the sites appears to be located within the adjoining 10-acre parcel beyond the southern boundary of the project area.

Site 50-80-12-6373

This site is a small complex of three features located on the southern boundary of the project area, near the middle of the *kiawe* area in the southeastern quadrant of the project area (Fig. 15). The complex occurs in an area of exposed limestone bedrock with little soil. No cultural materials were observed on the surface.

Feature 1

This is a small circular enclosure measuring 3.2 meters along a northwest/southeast axis and 3.0 meters along a southwest/northeast axis. The enclosure wall ranges in height from 0.43 meters on the northern side to 0.26 meters on the south. The wall has previously been disturbed with its stones displaced and in most places only one to two courses remain stacked. The wall width varies from .80 to 1.0 meters depending on the extent of the tumble. On the northwestern side is a 1.00 meter wide opening, consisting of a .40m gap and a .60m flat slab, that may have been a doorway. An interior earthen floor was exposed after removing the overburden (Fig. 16).

Excavation

The interior floor of Feature 1 was subdivided into equal quadrants for excavation. Starting with the West Quadrant and proceeding clockwise, the matrix of all of the quadrants were manually excavated by natural layers. All excavated soil was screened and recovered materials bagged by provenience and sample categories. Within the first 3 cm below the initial 2 to 3 cm of overburden, a dark stained soil with flecks of charcoal and ash was exposed, continuing to a maximum depth of 16 cm. The interior floor and fill was

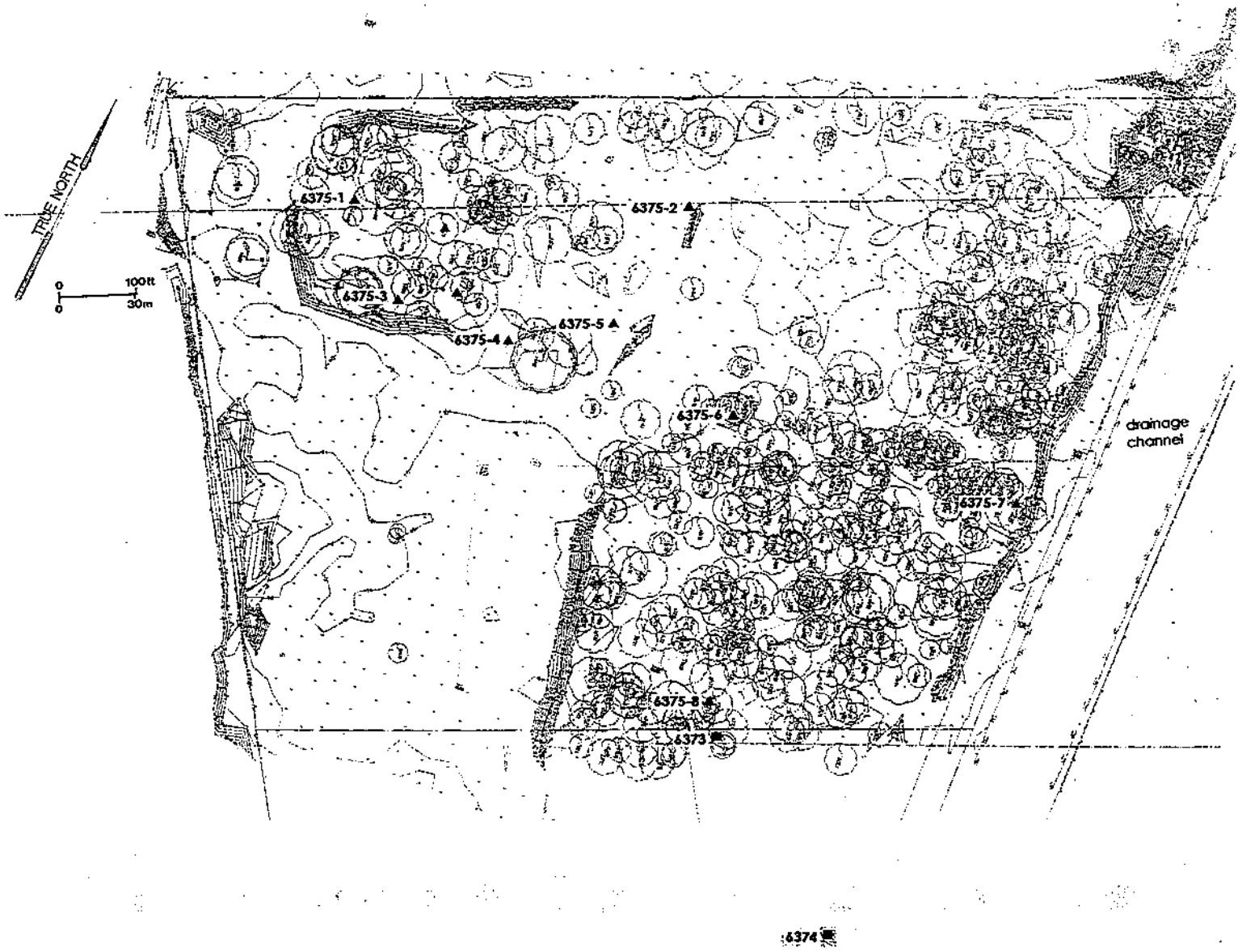


Figure 14. Reduced Topographic Map of Project Area with Site Locations
(Base Map Produced by Park Engineering)

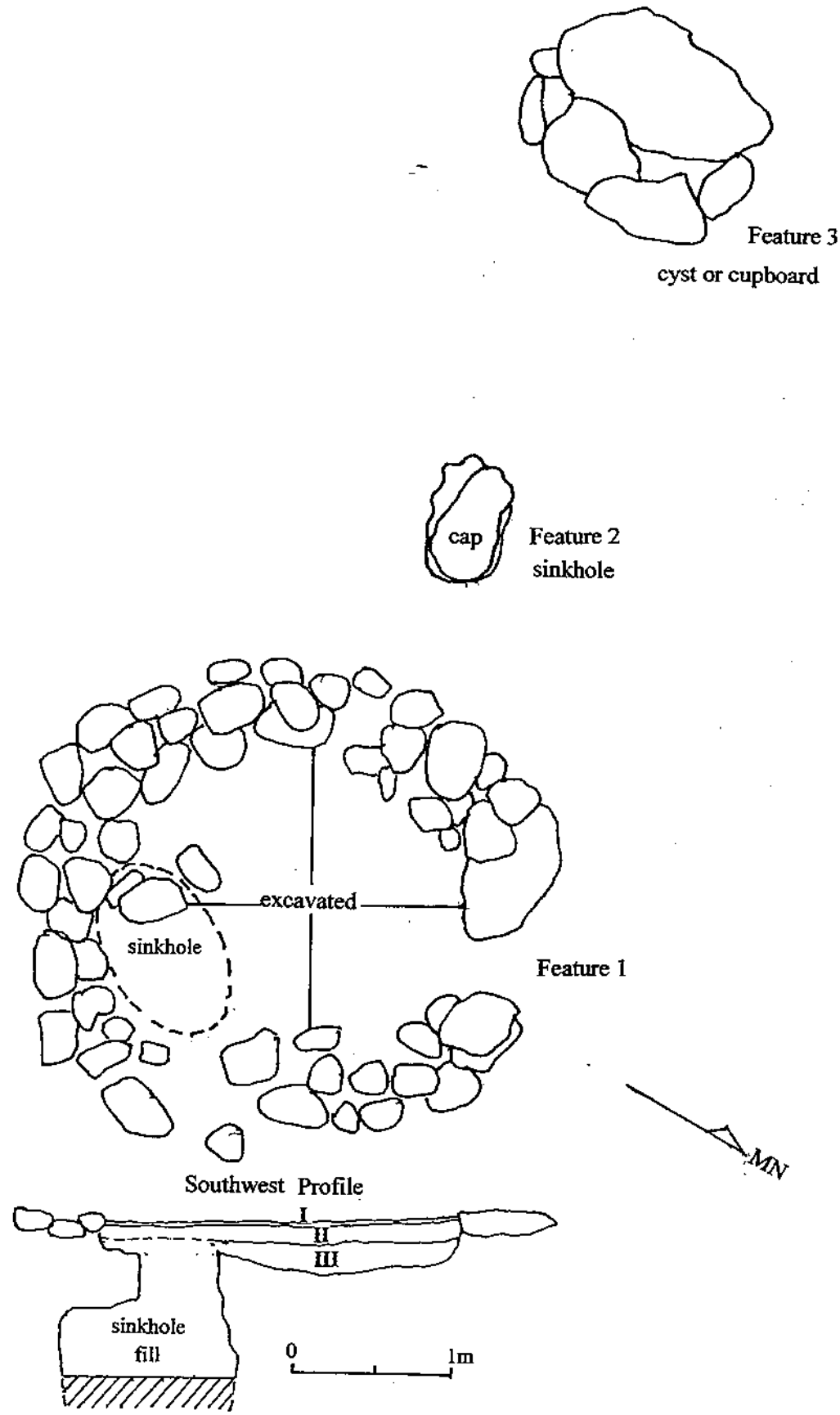


Figure 15. Plan of Site 50-80-12-6373 Features 1 –3, Showing Feature 1 NW/SW Profile

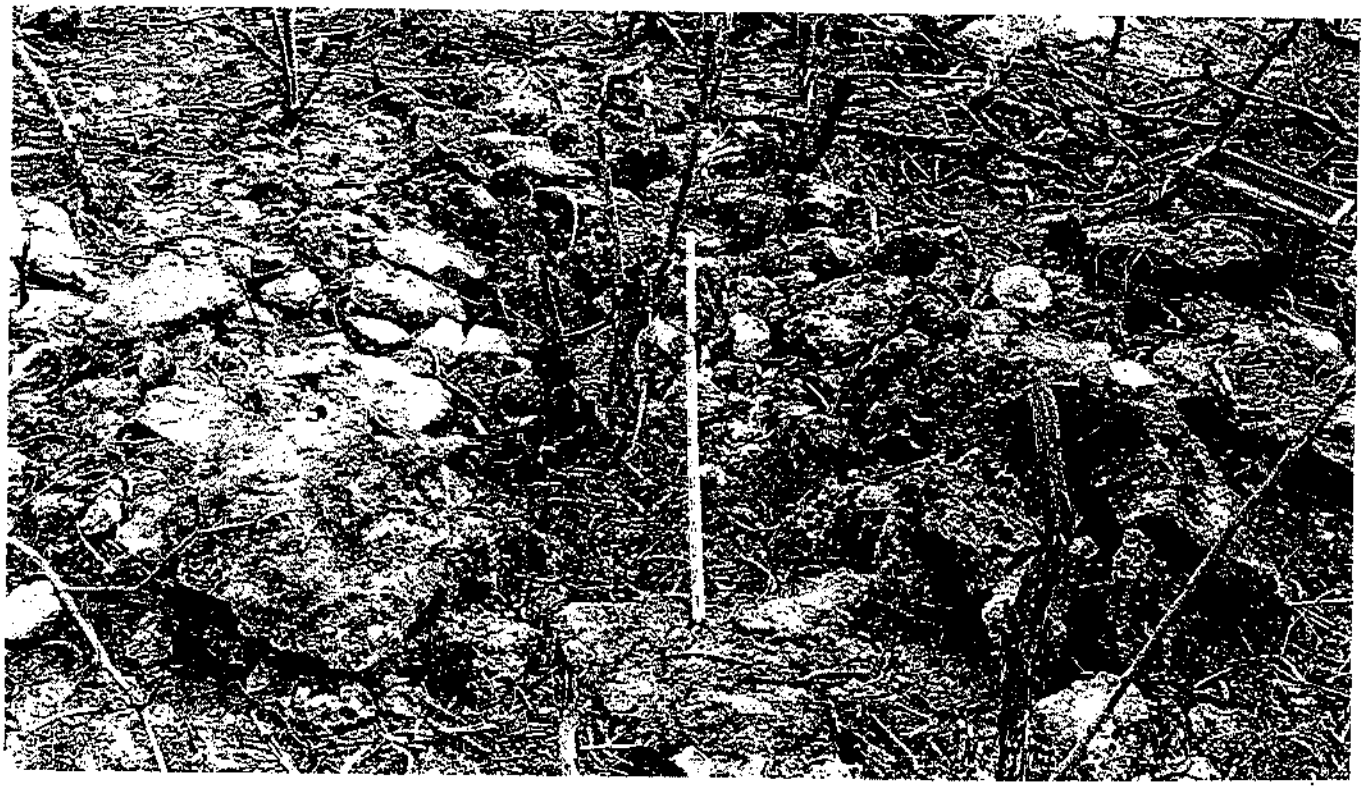


Figure 16. View of Site 6373 Feature 1 after Clearing to Southeast

found to be slightly deeper towards the center of the feature, indicating that the substratum was concave. Underlying the darkly stained layer, from 16 –27 cm in thickness, was a tan/brown silty soil with pockets of uniform-sized gravel along the base of the layer. This tan layer overlies a concave, solid limestone substratum 10 cm below surface along its periphery and sloping to 27 cm below surface at its center. The bedrock in the East Quadrant dips lower and measures 40cm below surface. The bottom layer of soil and gravel appear to be fill, used to level the interior floor of this feature.

A solitary bone artifact, probably a toggle made of human bone, was found in the screened matrix from Layer II in the East Quadrant. No other artifact was encountered and the quantity of avian and other faunal remains were minimal from all layers of the interior floor. The three stratigraphic layers encountered in the floor deposit were:

Layer I, 0-3cm, very dark brown (7.5YR 2.5/2) overburden-organic litter, humus, and charcoal,
Layer II, 3-16cm, very dark brown (10YR 2/2) friable silty-loam with small limestone cobbles,
Layer III, 16-27cm, tan/brown (7.5YR 4/4) friable silty-loam with limestone gravel, and

An interesting discovery was a buried sinkhole located mostly within the East Quadrant with a small portion encroaching into the South Quadrant (Fig. 17). This small sinkhole with a ovoid opening measuring .50 meters east/west and .70m north/south was filled with a dark matrix similar in color and texture to the Layer II floor deposit above. Due to the small size of the opening which limited access, excavation of the sink fill was halted at a depth of 1 meter below the surface of the bedrock. A larger quantity of marine shell midden and avi-faunal remains were recovered from the fill of this sinkhole. The matrix is described as:

Sink Fill, 40-140cm, very dusky red (7.5YR 2.5/3) friable silty-loam with midden and bird bone.

Feature 2

Located 1.8 meters southwest of the Feature 1 opening is a small sinkhole, 1.5 meters deep, with an opening that measures .90 (east/west) by .70 meters (north/south). A .25 meter thick limestone slab, with roughly the same dimensions as the opening, caps the opening. The interior of the sinkhole decreases in diameter, roughly .40 meters below the surface, to around .60 meters and to about .50 meters at around 1.0 meter in depth. The interior of this sinkhole has a chimney configuration that tapers or narrows as it increases in depth (Fig. 18). No faunal remains were visible on the surface of the floor deposit.

Subsurface Testing

After the removal of the cap stone, subsurface testing of the floor deposit of this small sinkhole was undertaken with difficulty since access was prohibited by the narrowing of the interior. A shallow circular

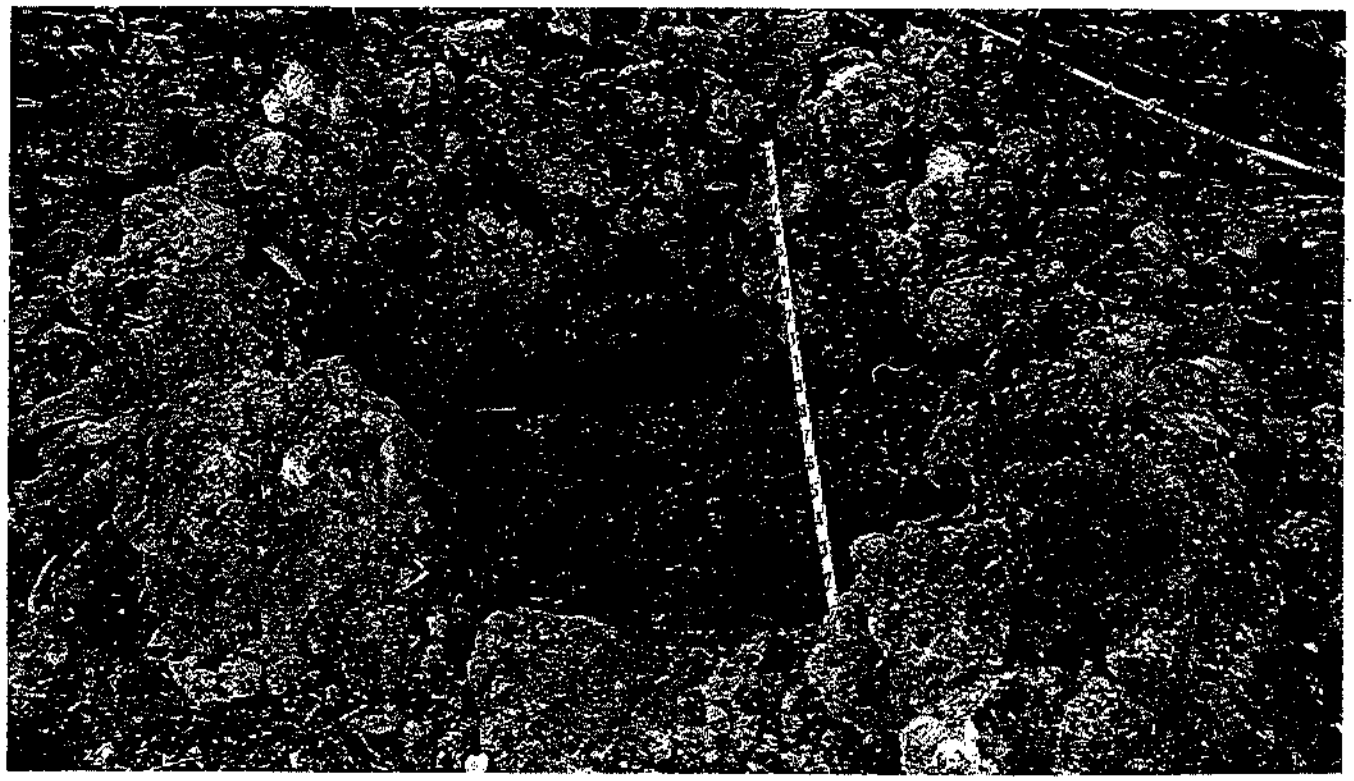


Figure 17. View of Sinkhole in East Quadrant of Site 6373 Feature 1 to Southeast



Figure 18. View into Site 6373 Feature 2 with Cap Slab Lifted

probe, roughly .30m in diameter and .05-.10 m deep, was dug into the central portions of the floor deposit. Further excavation was prevented by the inclusions of limestone rubble and cobbles, and possibly shallow bedrock. Overburden and a portion of the next layer, the only material recoverable by reaching from the surface, were retrieved. Only three fragments, amounting to less than a gram, of *pipipi shell* (*Nerita picea*) were recovered. No other faunal remains, including bird bones were obtained. The observed layers were identical in color and texture to the overburden and Layer II of Feature 1. The extent of Layer II and the presence of absence of Layer III could not be determined.

Feature 3

Located 4.5 meters west of the Feature 1 opening, is a cyst or cupboard constructed of large slabs of limestone propped up against one another. This unusual structure measures 1.42 meters long along a north/south axis, 1.22 meters wide, and .73 meters high (Fig. 19). The largest slab, measuring 1.10 by .78 meters, is placed on edge on the west side and leaning to the east. Two smaller slabs, both about half the size of the large slab, are placed on edge along the east side leaning westward into the large slab, with the southern smaller slab supporting the large slab. The northern slab leans against both slabs, sealing the opening into the created hollow beneath the leaning slabs. Three to four smaller slabs are arranged around the eastern margin, covering other openings on the side. The interior below the leaning slabs is a hollow space with a shallow deposit of dirt on the floor. The structure sits upon a large slab of exposed limestone bedrock. No midden or other remains are visible on the surface of the interior floor.

Subsurface Testing

The northern slab, covering the largest opening, was removed to facilitate access to the interior floor (Fig. 20). About 13 cm of soil was present within a shallow concavity in the bedrock primarily beneath the largest slab. All of the soil deposit was removed and screened. The soils consisted of about 3 cm of overburden and 10cm of Layer II in a .50 by .30m area. The texture and color of the soils were again identical to that of Feature 1. No bird bones were present, but less than a gram each of *Nerita picea* and *Turbo operandum* with 5 grams of *Cypraea* sp. fragments were recovered.

Summary of Site 6373

Feature 1 was most likely a short-term habitation site used in conjunction with marine exploitation, fairly common in the region in morphology and size. The buried and filled sinkhole was probably used as a refuse pit during the occupation of Feature 1. The location was most likely chosen for economy of construction, since the bedrock was raised above the surrounding ground surface while the interior floor was concave. The surrounding wall needed only to be stacked two to three courses high to afford reasonable shelter, especially with some sort of superstructure. Unfortunately, no carbon samples with clear context was

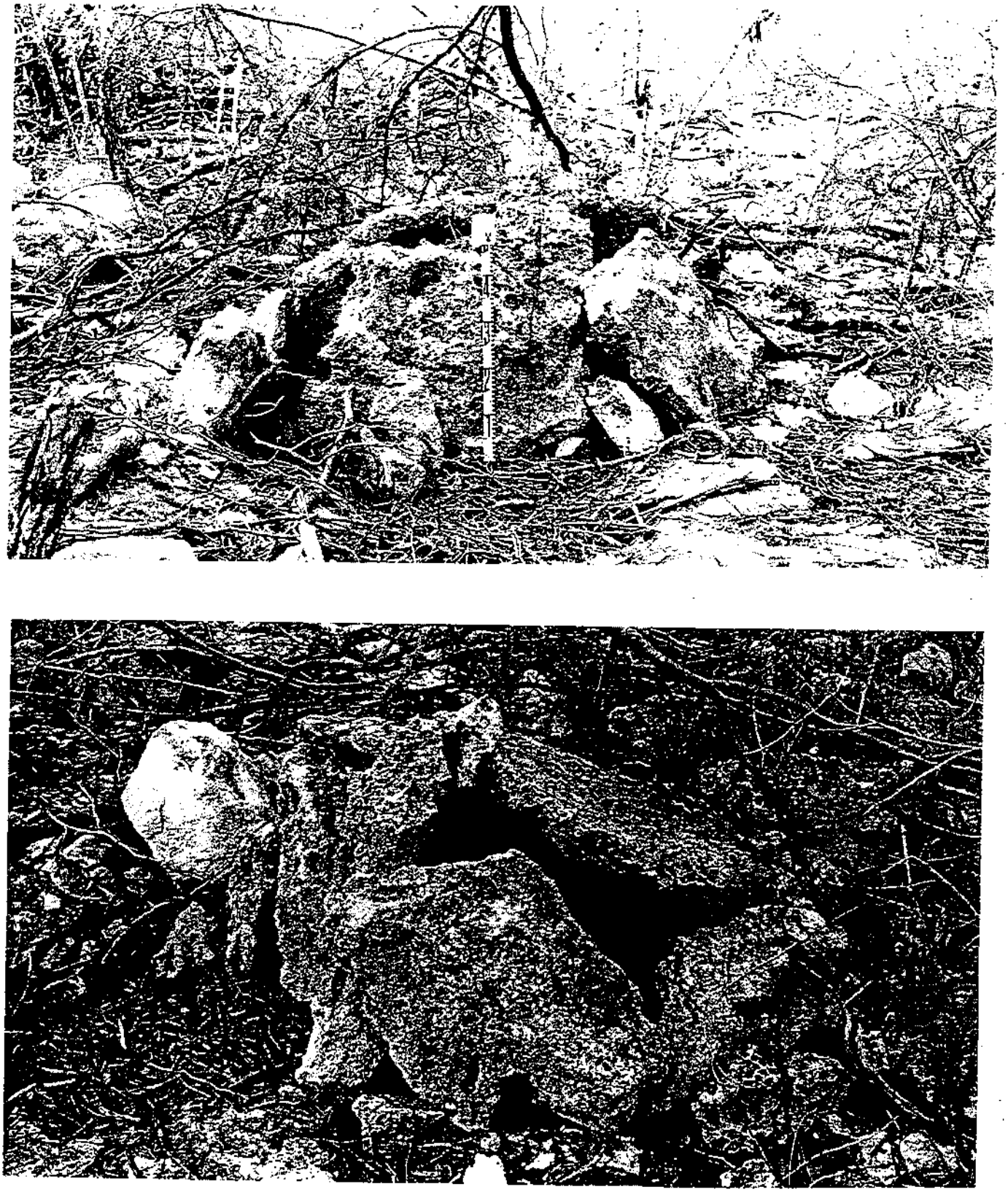


Figure 19. Two Views of Site 6373 Feature 3 to West

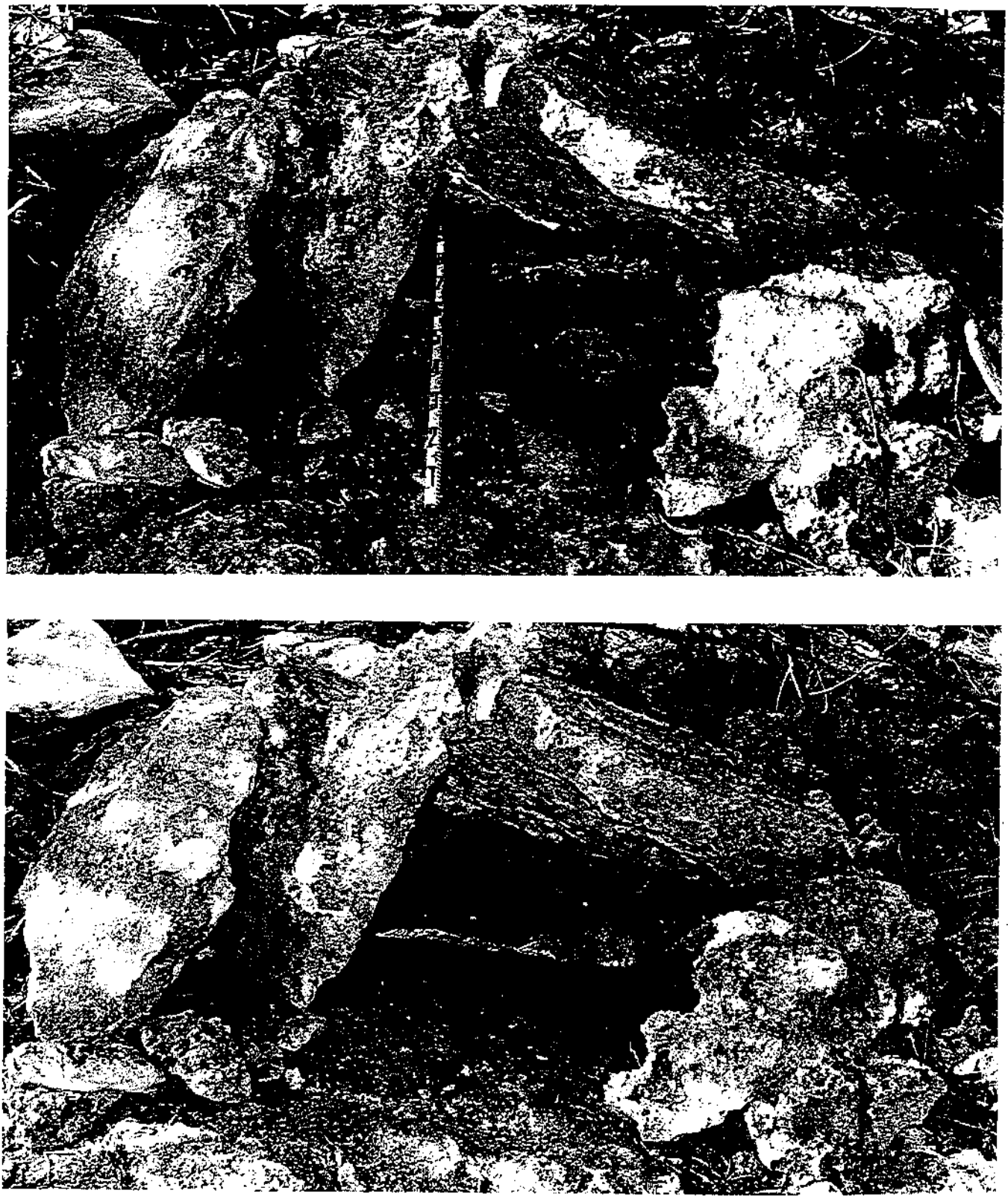


Figure 20. (top) View of Site 6373 Feature 3 with One Slab Removed, to West
(bottom) View of Site 6373 Feature 3 after Testing, to West

present in this site. The effects of the recent fire rendered the flecking in the matrix problematic for use in aging the site. However, the presence of the bone artifact and the absence of any historic materials suggest pre-contact origins for this feature and complex.

Following the pattern observed at other sites, Feature 2 was also thought to have served as a refuse pit for the occupation of Feature 1. However, the test probe established a paucity of midden and other remains, at least in the upper portions of the sink deposit. The sink may have been capped, simply to prevent accidentally stepping into the opening. Based on its proximity, Feature 3 was most likely also associated with the occupation of Feature 1, but its function is unclear. Perhaps it was used as a storage or a pen for small animals or birds. The crude nature of construction would not suggest any religious or ceremonial function outright, but could the presence of marine shell midden represent offerings?

Site 50-80-12-6374

This site, located south of Site 6373 within the vegetated strip, along the eastern portion of the 10-acre parcel adjoining the project area to the south, consists of two adjoining, shallow, circular sinkholes with large diameter openings (Figs. 21 and 22). The long axis of this site is oriented east/west. The normally rough interior of one of the sinkholes, apparently altered by fire, exhibits a smooth surface. With the exception of a stockpile of small *kiawe* logs, no other cultural remains were observed on the surface.

Feature 1

This western-most feature measures 4.0 meters in diameter and ranges in depth from .80 to .90 meters. The surface of the interior wall of this feature has been fire-scoured and its smooth appearance contrasts sharply with that of the adjoining sinkhole. Two logs of *kiawe* wood, about .12-.15 meters in diameter, and burnt on the end on the ground, were propped up against the eastern edge of this sinkhole.

Feature 2

This feature adjoining Feature 1 to the east, is slightly smaller and deeper and measures 4.2 meters east/west, 3.8 meters north/south, and ranges in depth from 1.0 meter on the southwest side to 1.21 meters on the southeast. When the site was first discovered, eight *kiawe* logs ranging in diameter from .12 to .25 meters and of varying lengths of about a meter, were found stockpiled inside of this feature.

Subsurface Testing

Both sinkholes were cleared of vegetation and overburden with the objective of conducting subsurface testing to retrieve possible cultural remains, since these features were both large enough to be used for

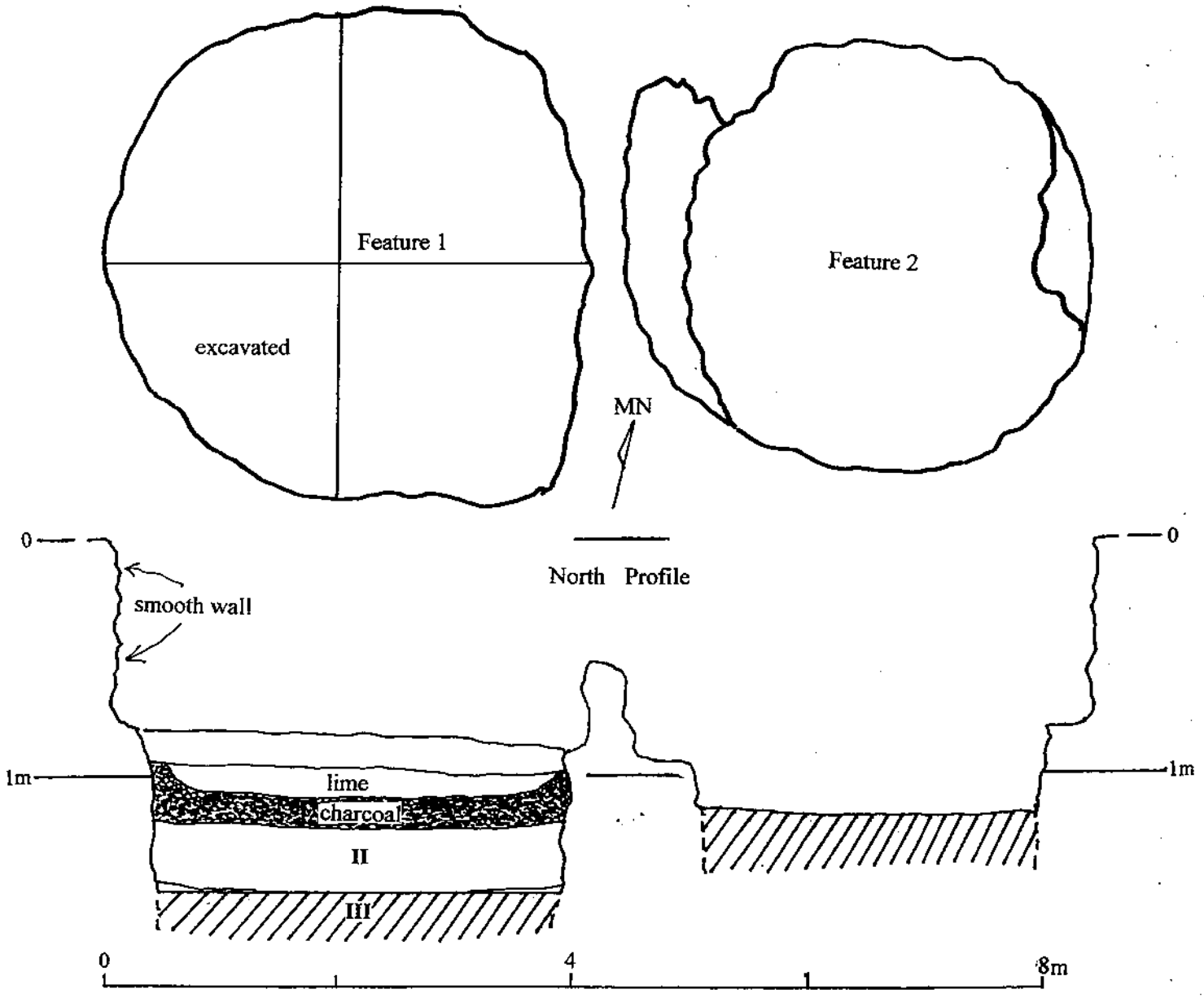


Figure 21. Plan of Site 6374 Features 1 and 2, Showing Feature 1 North Profile



Figure 22. View of Site 6374 Features 1 and 2 to West. Note Logs in Feature 2

habitation. Feature I was selected for testing to confirm the fire-scouring theory and to determine its function. The interior floor area was equally subdivided into four quadrants and the Southwest Quadrant was excavated. The floor deposit is concave, depressed in the center and sloping up towards the periphery.

Layer I consisted of limestone gravel, cobbles, and chunks of charcoal within a dark brown, silty matrix. Underlying Layer I was a whitish layer of consolidated powder (lime) composed of burnt coralline limestone (Fig. 23). Surrounding this white layer 30 cm around its periphery and also underlying it, was a very black layer of almost pure charcoal (Fig. 24). Underlying the charcoal layer was a yellowish red silty loam with the skeletal remains of avifauna. Layer II from the Southwest Quadrant yielded more than 15 grams of bird bone. Underlying Layer II was Layer III consisting of moist, weathered limestone with a pinkish tan color. The stratigraphic descriptions are as follows:

Layer I, 0-17cm, very dark brown (7.5YR 2.5/2) overburden-organic litter, humus, limestone gravel and cobble, and charcoal,

White Lens, 17-27cm, very pale brown (10YR 7/3) consolidated powdery burnt limestone,

Charcoal Lens, 27-42cm, black (N2.5) homogenous charcoal,

Layer II, 42-70cm, yellowish red (5YR 4/6) friable silty-loam with avi-faunal remains, and

Layer III, 70+cm, pink (7.5YR 7/4) moist, weathered limestone with some limestone gravel.

No midden or other evidence of traditional Hawaiian cultural activity pre-dating the burning of coralline limestone was encountered during the excavation of Feature 1.

Summary of Site 6374

Although both sinkholes of this site were large enough to be utilized as habitation features, no evidence of indigenous or historic use for habitation purposes was recovered through the subsurface testing. Rather, historic period manufacture of lime powder by burning coralline limestone in the Feature 1 sinkhole was established. Also the smoothing of the sinkhole wall by the scouring action of fire was confirmed. Based on the size of the feature and the amount of lime produced, most likely, this site did not represent a commercial venture, but a limited operation, perhaps to produce lime for domestic use to make cement.

Stratigraphic analysis revealed that only minimal preparation or removal of the floor deposit in Feature 1 was undertaken prior to burning the limestone. When comparing the depths below surface of the floor deposits of Features 1 and 2, the top of Layer II in Feature 1 is only about 6-10 cm below the top of Layer I in Feature 2. This indicates that prior to burning the limestone, the overburden may have been removed from Feature 2. The 12-20cm of overburden overlying the lime lens indicates the rapidity of accumulation



Figure 23. View of Southwest Quadrant with Exposure of White Lens of Lime Beneath Layer I

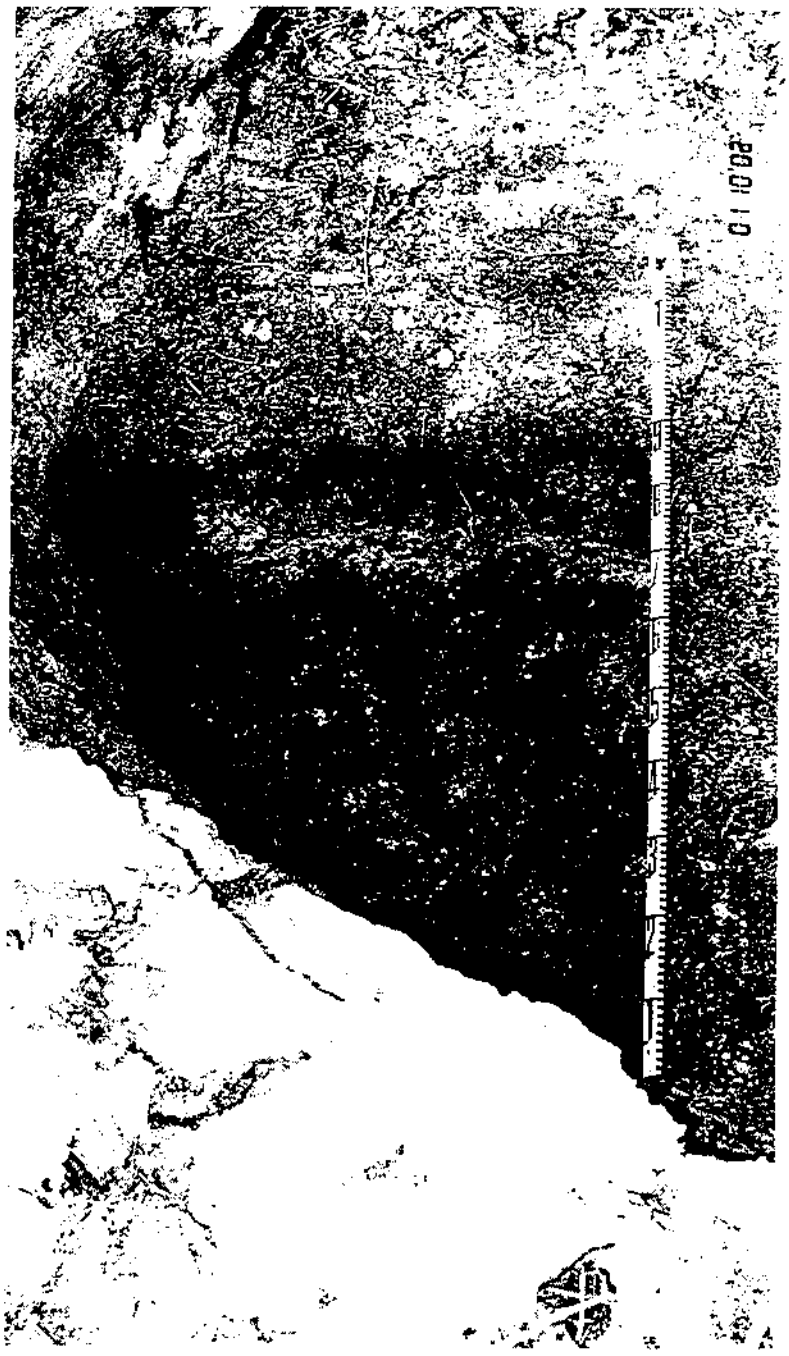


Figure 24. View of Southwest Quadrant with Exposure of Black Charcoal Lens Beneath the Lime Lens

of this top layer from the time of abandonment of the burning activity, probably during the late historic period, to the present.

PALEONTOLOGICAL SITE 50-80-12-6375

Thirteen unmodified sinkholes were initially marked during the surface survey and eight of these were selected to undertake recording and subsurface testing for the recovery of avi-faunal remains. The complex was assigned State Site Number 6375 and the sinkholes were designated Features 1 – 8. The criteria used to select the representative sinkholes included; the size of the opening, the depth of the sinkhole, the interior shape, and the presence of water. Basically, sinkholes representing two variables within each of the categories were chosen. For example, a large opening (6375-1) and a small opening (6375-3), deep (6375-7) and shallow (6375-8), bell-shaped (6375-4) and chimney-shaped (6375-6), or wet (6375-2 & 5) and dry (6375-1,3,4,6-8). In six of the features (6375-1,3,4,6-8), roughly half of the floor deposit was excavated and screened. In one of the features (6375-5) with standing ground water, testing was not conducted. In the other wet feature (6375-2), a smaller test unit was excavated.

The excavated volume represents an adequate sample from each of the six features in which roughly half of the floor deposit was examined for avian and other faunal remains. Table 1 presents the dimensions of each feature, the interior shape, the layers represented, the total weight of recovered avi-faunal remains, and whether the feature was wet or dry. Figures 25 to 40 are plan/profile drawings and photographs of each unmodified sinkhole feature.

No cultural remains or other evidence of cultural activities were encountered during the testing of these features with paleontological significance, with the possible exception of Feature 8 which exhibited fire-scoured smoothing of its interior wall, similar to Feature 1 of Site 6374.

Table 1. Pertinent Data for Site 6375 Features 1 - 8

Site 6375	Long	Axis	Wide	Deep	Shape	Layers	Avifauna	Wet
Fe. 1	3.70	270	1.46	1.49	chimney	I/II/IIa/III	154g	No
Fe. 2	1.50	330	0.80	3.00	bell	I/II/?	40g	Yes
Fe. 3	1.57	210	1.10	1.43	chimney	I/II/III	146g	No
Fe. 4	1.50	180	1.50	1.90	bell	"	208g	"
Fe. 5	2.37	296	1.50	2.20	chimney	I/II/?	-	Yes
Fe. 6	1.40	280	1.30	1.24	"	I/II/III	25g	No
Fe. 7	1.50	310	1.00	2.20	"	"	204g	"
Fe. 8	1.40	250	0.90	1.00	"	I/II/?	27g	"

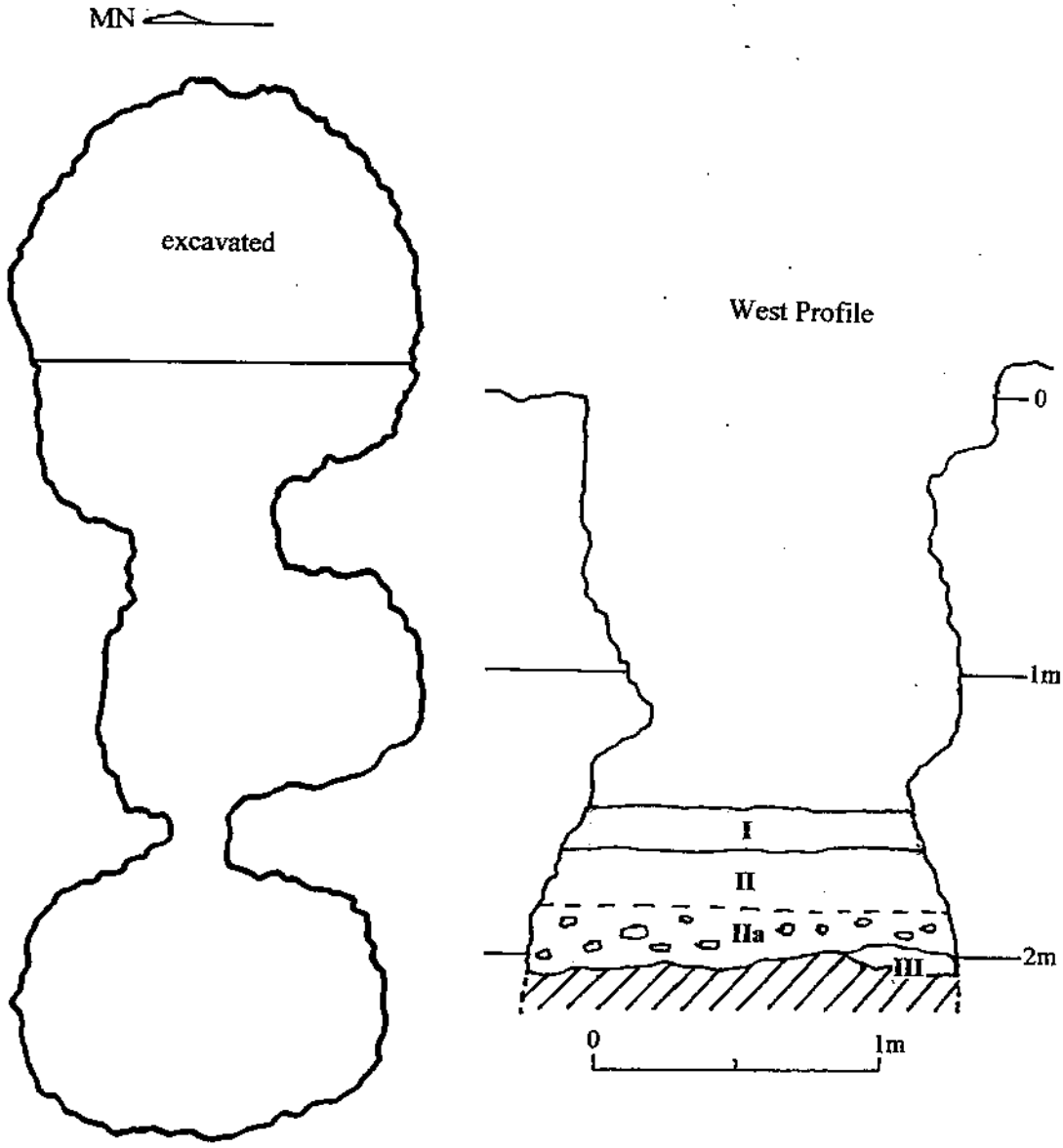
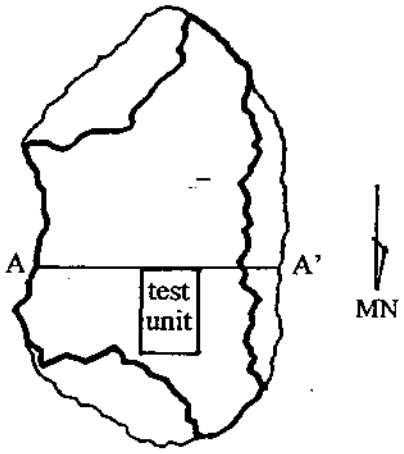


Figure 25. Plan and West Profile of Site 6375-1



Figure 26. View of Site 6375-1 to West



South Profile

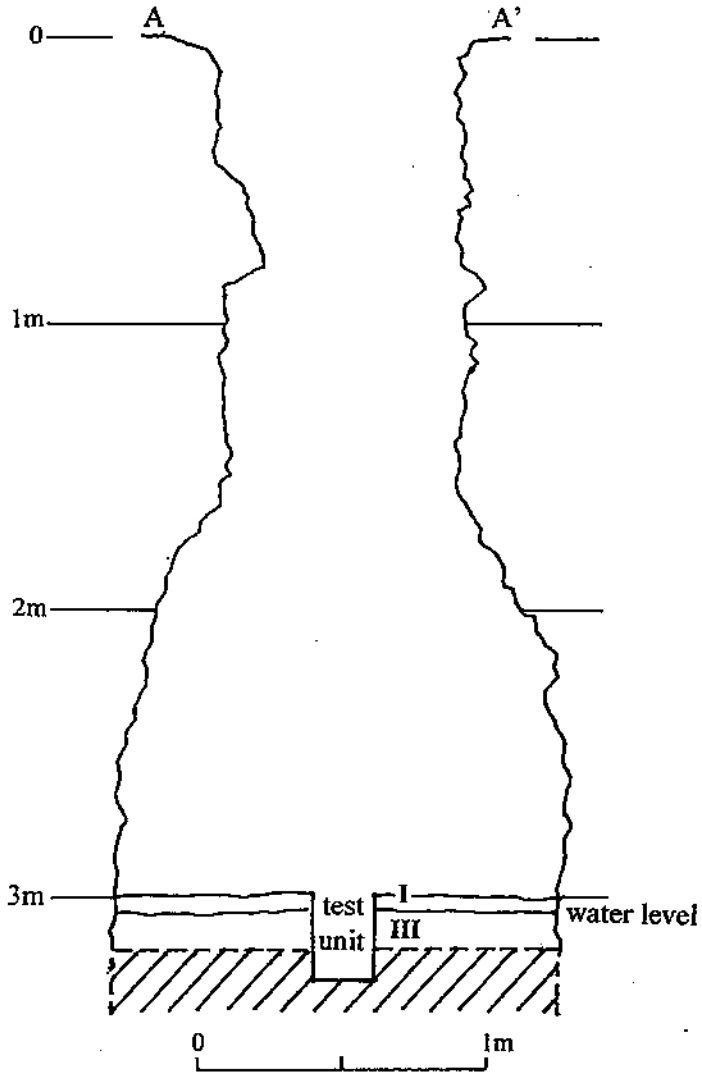
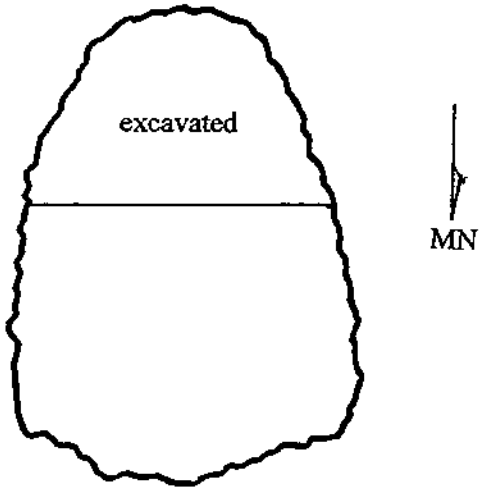


Figure 27. Plan and South Profile of Site 6375-2



Figure 28. View of Site 6375-2 to South



North Profile

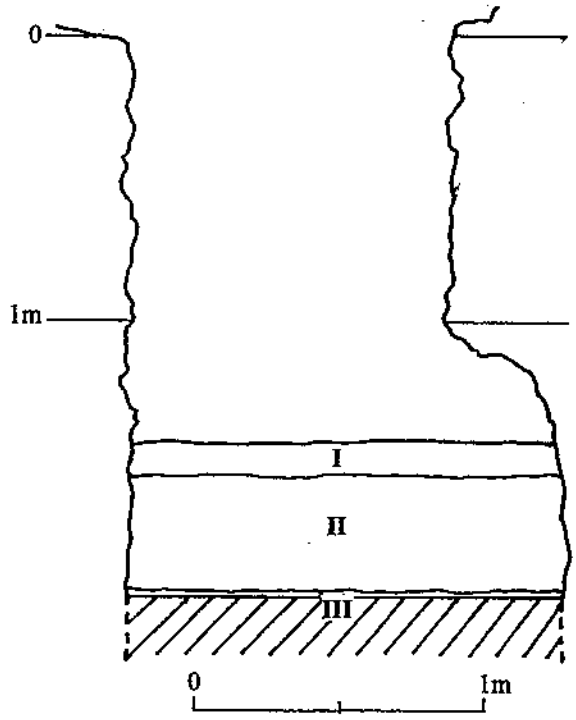
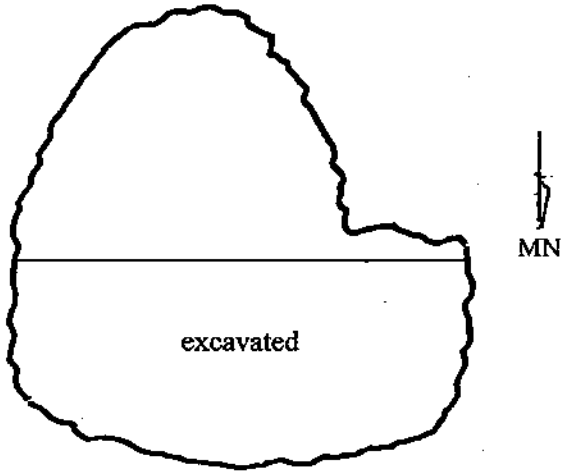


Figure 29. Plan and North Profile of Site 6375-3



Figure 30. View of Site 6375-3 to South



South Profile

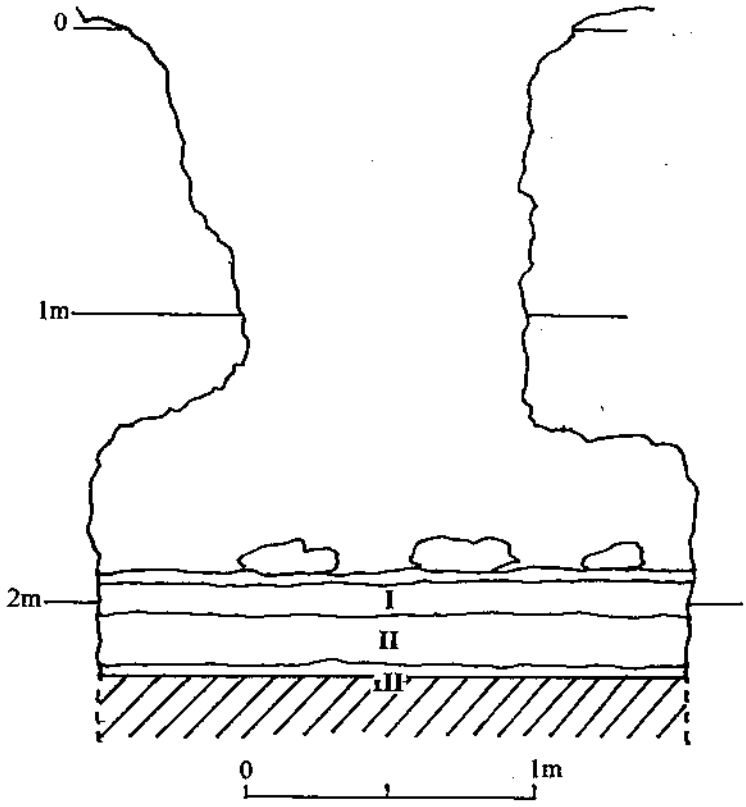


Figure 31. Plan and South Profile of Site 6375-4

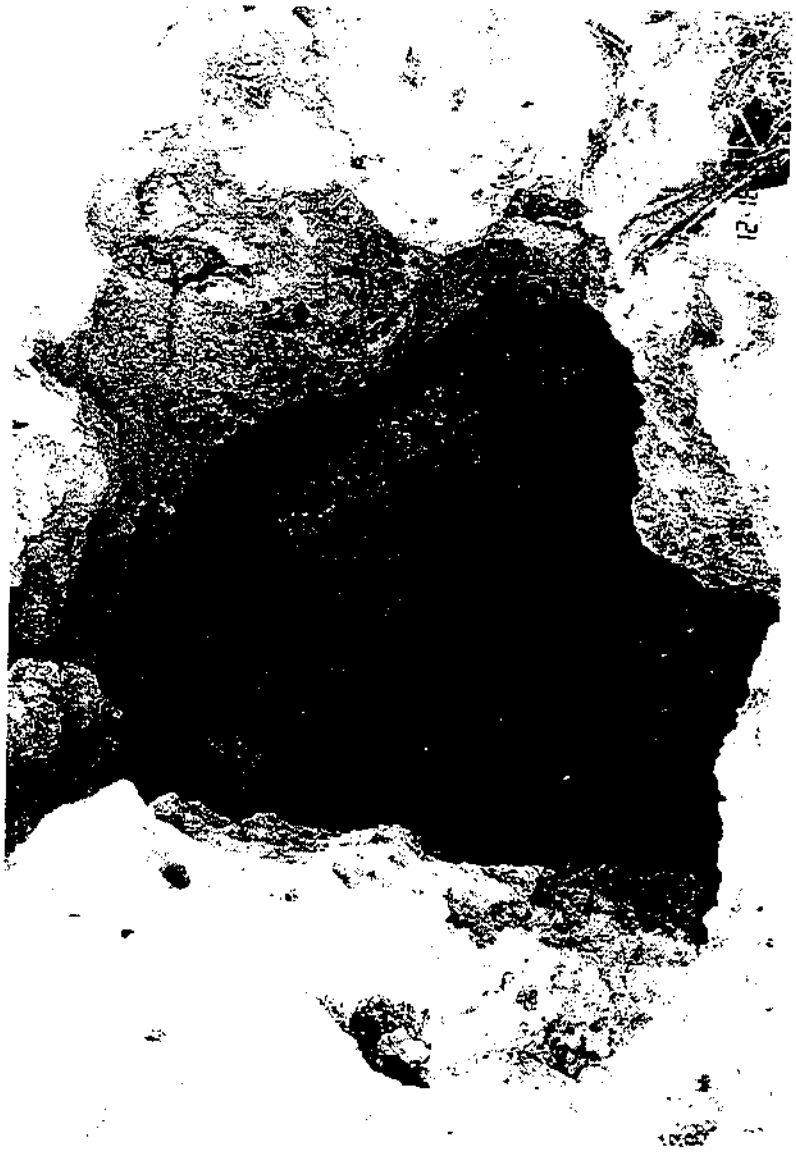
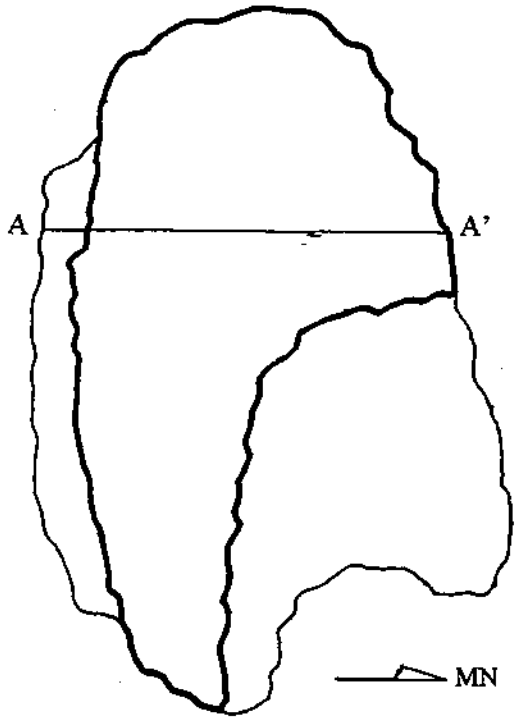


Figure 32. View into Site 6375-4



West Profile

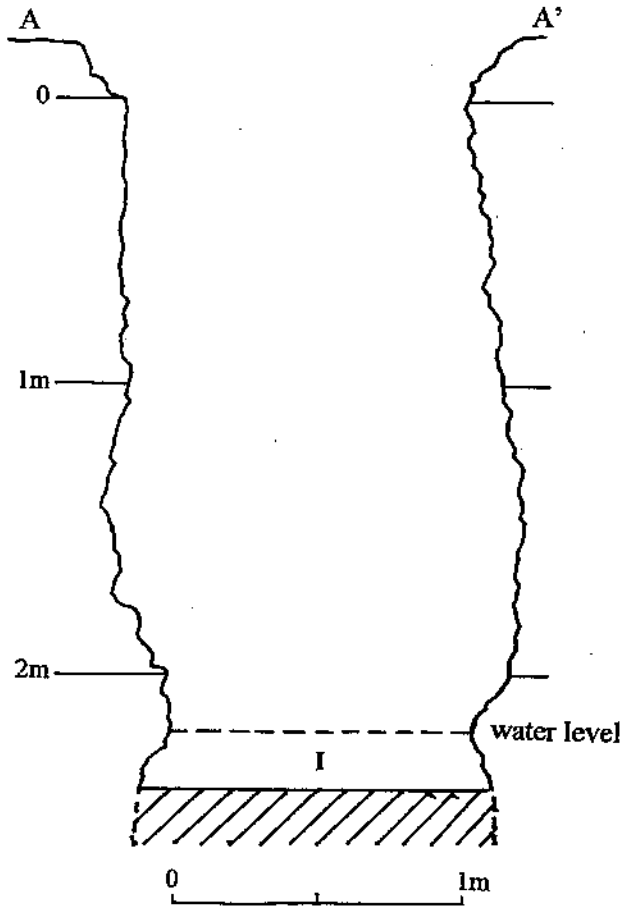


Figure 33. Plan and West Profile of Site 6375-5



Figure 34. View of Site 6375-5 to West

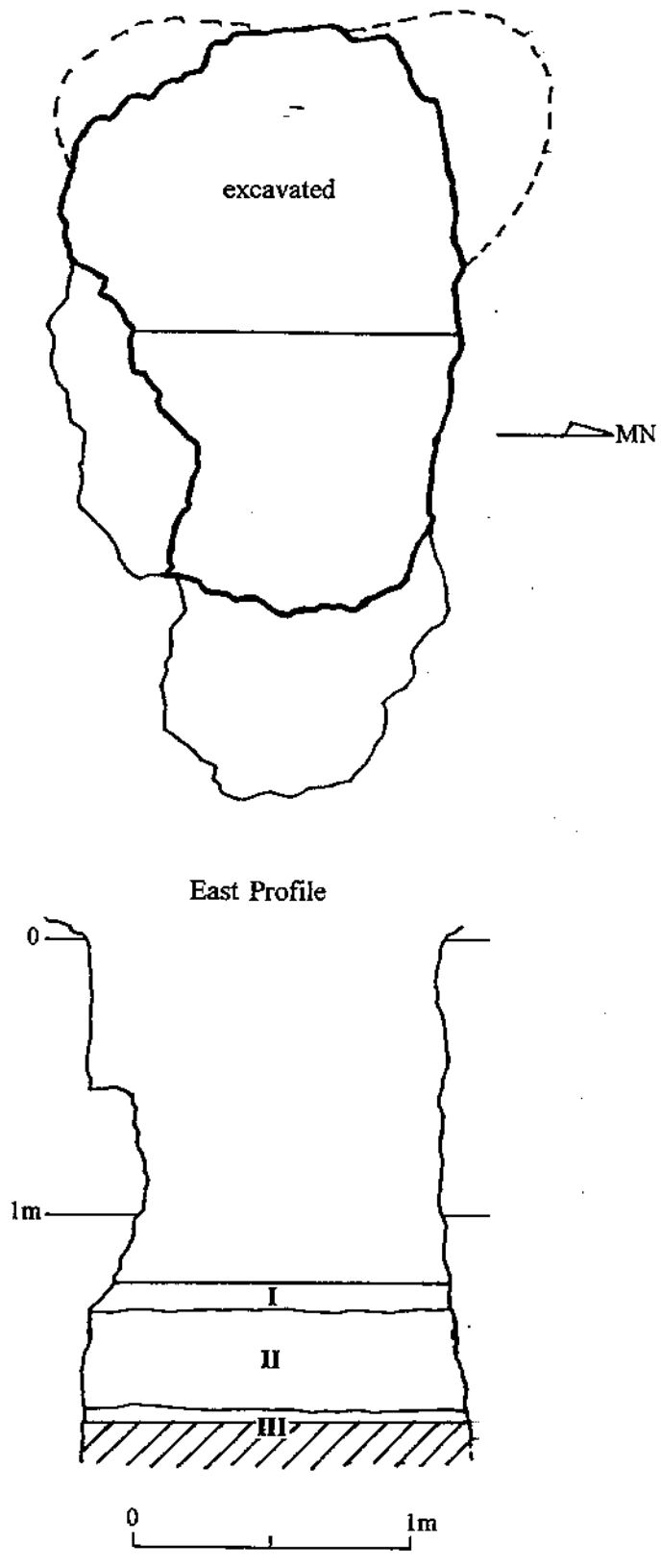


Figure 35. Plan and East Profile of Site 6375-6



Figure 36. View of Site 6375-6 to West

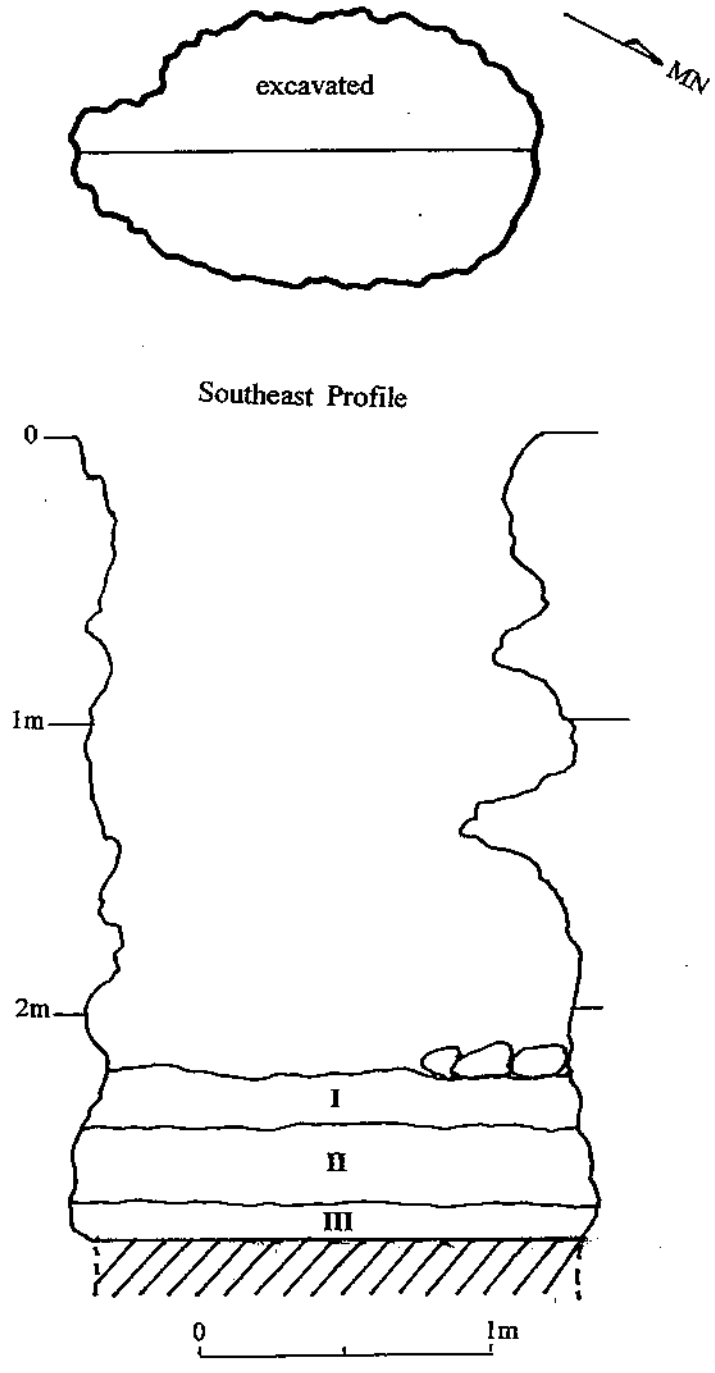


Figure 37. Plan and Southeast Profile of Site 6375-7



Figure 38. View of Site 6375-7 to Northwest

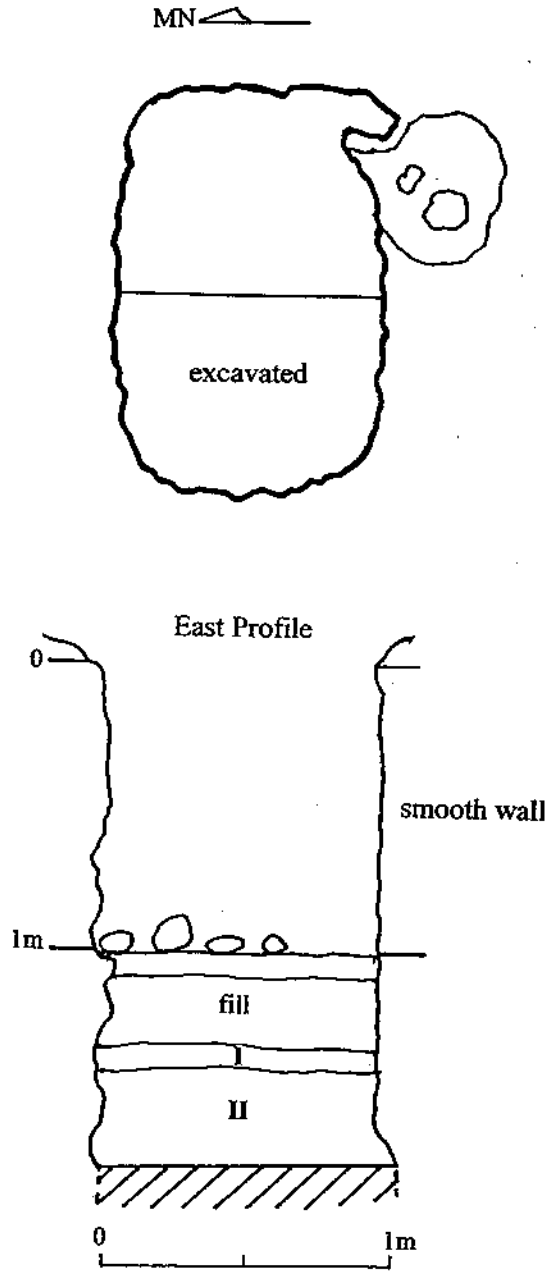


Figure 39. Plan and East Profile of Site 6375-8



Figure 40. View of Site 6375-8 to West

Generally, the stratigraphy within the sinkholes were identical or very similar and consisted of three layers: Layer I, an overburden layer with organic debris and humus; Layer II, a silty-loam matrix with limestone cobbles and the primary source for the skeletal remains of avifauna; and Layer III, and moist silty-loam matrix with more weathered limestone and often immediately overlying bedrock. Local variations in soil color, frequency of limestone gravel and cobble inclusions, moisture, and the presence of ground water were encountered. Corresponding layer designations are maintained for the paleontological sinkholes throughout the project area.

The stratigraphic descriptions for the layers and variants encountered within the sinkhole deposits are presented below:

Layer I, 0 to 7-20cm, very dark brown (7.5YR 2.5/2) overburden-organic litter, humus, cobbles
Variants: very dark brown (10YR 2/2) in Site 6375 Features 4, 7, & 8

Layer II, 7-20 to 28-53cm, brown (7.5YR 4/4) friable silty-loam with avi-faunal remains
Variants: white (2.5Y 8/1) in Site 6375 Feature 2 (wet sink)
reddish yellow (7.5YR 6/6) in Site 6375 Feature 7

Layer IIa occurs only in Site 6375 Feature 1, same matrix as II, but markedly dense occurrence of limestone cobbles in lower half of layer

Layer III, 30-53 to 49-93cm or bedrock, pink (7.5YR 7/4) moist, weathered limestone and gravel
Variants: very pale brown (10YR 8/2) in Site 6375 Features 4 & 7

Three features exhibited anomalous stratigraphy; Site 6375 Features 2, 5, and 8. For Features 2 and 5, the color and texture variations are most likely due to the saturated condition of the layers, since ground water can be seen regularly rising above the interior floor level in relation to tidal fluctuations of sea level. For Feature 8, however, the anomaly can be attributed to human activity related to ranching or the feedlot operation that was taking place in the vicinity. When the sinkhole was initially being cleared, some skeletal remains of a juvenile cow was observed on the surface. Upon commencement of testing and screening, it became obvious that the whole animal was in the sinkhole. It appears that a calf had either fallen into the feature and died or it was buried there after it died. In either case, it appears that an attempt to cover the carcass with soil was made. This is apparent from the stratigraphy, since this feature contains a lot more overburden, almost 30cm thick, than any of the other features investigated. Also, Layers I and II are still intact beneath this upper deposit. An additional point of interest, is that the interior sides of this sinkhole has been fire-scoured and smoothed similar to the condition of Site 6374 Feature 1. Layer I is heavily laden with charcoal, but no evidence of any lime or burnt limestone was observed. Although the possibility exists that the cattle carcass was burned, the recovered bones did not show any signs of charring or discoloration.

ARTIFACTS

Only one artifact was recovered during the course of the current inventory survey. A traditional Hawaiian bone toggle was retrieved from the screen during the excavation of Site 6373 Feature 1, from Layer II in the East Quadrant. This artifact is made of large mammal long bone, probably human, based on its thickness, curvature, and density (Fig. 41). It is oblong and tapered in shape with rounded ends, abraded sides, and measures 25mm in length, tapers from 8 to 6 mm in width, and 4.5mm in maximum thickness. The artifact weighs 1.31 grams. A longitudinal cut mark is visible along one edge on the dorsal side along with several shallow scratch marks across the center of the dorsal side. Two shallow V-shaped notches occur, one each, on opposing edges near the mid-length of the artifact.

This artifact is interpreted to be a toggle lashing device used for the assembly of an octopus lure. The toggle is used to lash the cowrie shell lure to the main shank. The size and design of the artifact, with the central notches on opposing sides, coincide with other known specimens. The rough appearance and poor finish of the artifact, suggest that it may still be in the latter stages of manufacture and not yet completed. However, a variety of finishes, from crude to elaborate, are evident in previously collected specimens.

MIDDEN ANALYSIS

The non-artifactual remains of human occupation in the form of food refuse were collected from the excavations at Site 6373. Relatively small amounts of marine shell accompanied by minimal amounts of fish and crustacean remains were recovered. No medium or large mammal bones were represented in the assemblage recovered from the cultural site. No bird bones with evidence of butchering were recovered. Also, debitage from the manufacture or repair of tools and implements were markedly lacking. The results of midden analysis are presented in Table 2.

As expectable and indicated by the tabulated data, Feature 1 produced the highest quantities of midden. Interestingly, similar quantities were recovered from Layer II and the fill of the sinkhole located within the floor of the enclosure. This suggests that refuse was deposited into the sinkhole. However, a few more varieties of marine shell were represented from the Layer II assemblage.

Feature 2, the capped sinkhole adjacent to the Feature 1 enclosure yielded only 3 *pipipi* shells, indicating that this feature was not utilized for refuse disposal. One each of *pipipi*, cowrie, and an operculum from a turbo were recovered from the shallow floor deposit of Feature 3, the cupboard or cyst constructed of limestone slabs. The significance and context of the presence of these marine shells are unclear along with the function of the structure itself.

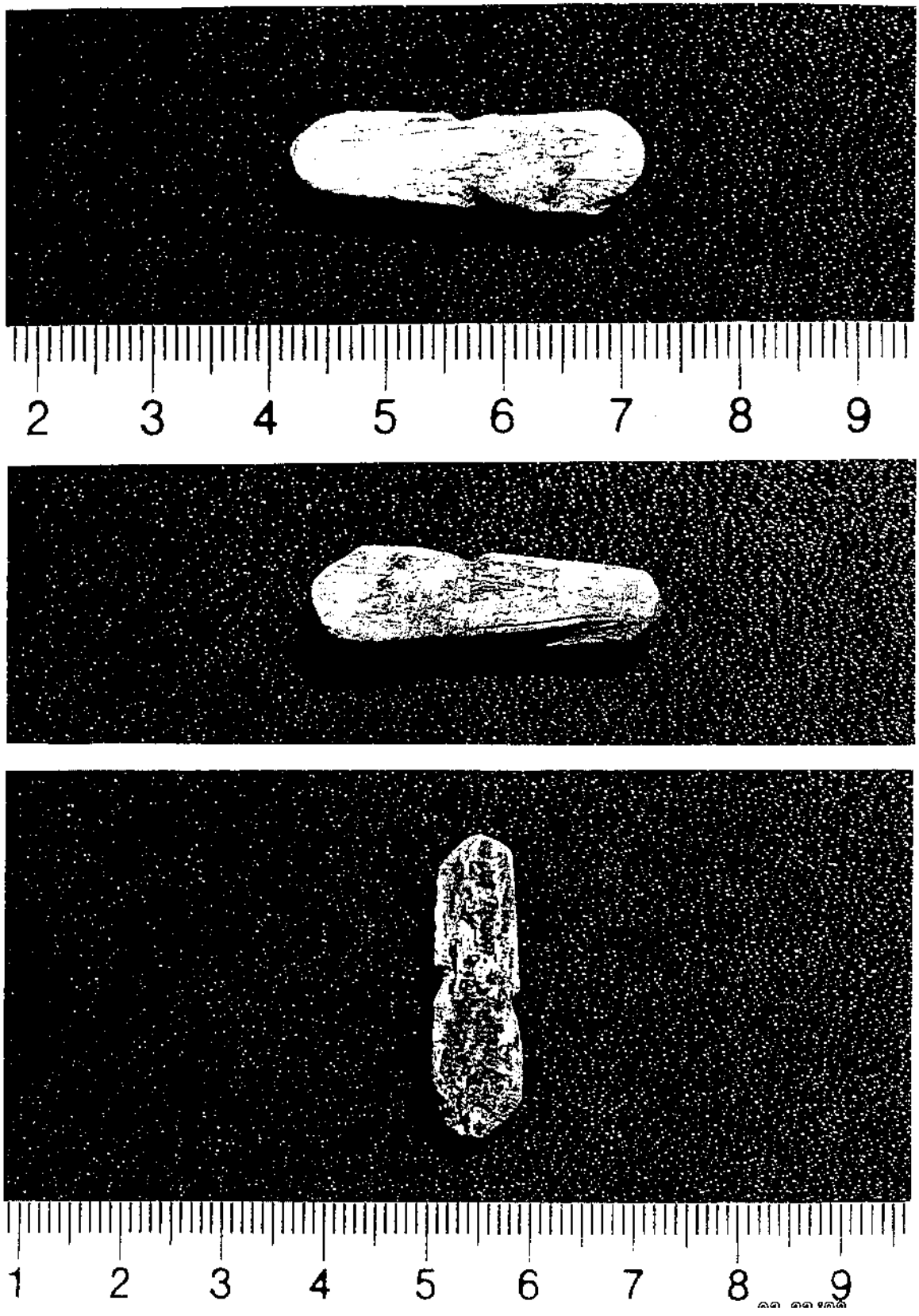


Figure 41. Bone Toggle Artifact from Site 6373 Feature 1, E Quadrant, Layer II, from Screen
(top) Dorsal Surface Showing Notches and Scratches
(center) Dorsal Surface Showing Longitudinal Cut Mark Along Bottom Edge
(bottom) Ventral Surface

Table 2. Weights and Counts of Marine Midden from Site 6373

Site 6373		Feature 1			Feat.	Feat.	
Provenience	I	II	III	fill	2	3	Totals
INVERTEBRATES							
Mollusca (weights in grams / #)							
Gastropoda							
Nerita picea		15.54/46	2.30/5	22.92/61	0.70/3	0.24/1	**41.70/116**
Strombus sp.		2.36/2					**2.36/2**
Cypraea sp.	0.65/1	1.48/2	1.52/1	8.34/4		5.20/1	**17.19/9**
Conus sp.		11.75/2					**11.75/2**
Turbo sp.		6.16/13		0.17/1			**6.33/14**
operculum		5.44/3				0.94/1	**6.38/4**
Bivalvia							
Brachidontes crebristriatus		1.48/8		3.07/15			**4.55/23**
unidentified		2.45/5	1.12/2				**3.57/7**
Crustacea				2.87/14			**2.87/14**
VERTEBRATES							
Osteichthyes							
unidentified fish		0.91/3					**0.91/3**
Totals	**0.65/1**	**47.57/84**	**4.94/8**	**37.37/95**	**0.70/3**	**6.38/3**	**97.61/194**

The minimal quantities of midden is a fairly common pattern for sites in the region. Similar findings have been reported from other studies in the surrounding areas and have been attributed in part to limited occupation (Tuggle and Tomonari-Tuggle 1997:89). The absence of any historic materials, such as glass, porcelain, or metal fragments, suggests traditional Hawaiian occupation, possibly during the late pre-contact or early post-contact era.

FAUNAL ANALYSIS

The recovered faunal material from the non-cultural features have undergone identification and the total assemblage has been tabulated in two categories, avi-fauna and other vertebrates and invertebrates. Table 3 presents the results from the analysis of non-avian fauna by weight and provenience and Table 4 presents the results of avi-faunal identification by provenience and weight. The notes and comments provided by Dr. Alan Ziegler, who undertook the identifications, are included as Appendix A of this report.

Non-avian Faunal Remains

A very small quantity of this category, comprising a total weight of 17.22 grams, was recovered from six features of Site 6375 and one feature each from Sites 6373 and 6374. Layer II was the most productive

Table 3. Results of Non-avian Faunal Analysis

Site 6375		Fe.1			Fe. 3		Fe.4		Fe. 6		Fe. 7		Fe. 8	6374-1	6373-1		
Provenience	**I**	**II**	**IIb**	**I**	**II**	**II/III**	**II**	**III**	**II**	**I**	**II**	**III**	**III**	**II**	**II**	**fill**	**Totals**
INVERTEBRATES																	
Mollusk (weights in grams)		0.01	<0.01											2.17			**2.18**
Crustacean			1.13		0.13	0.33	0.89	0.23	0.13		1.05	0.32	0.39			0.57	**5.17**
VERTEBRATES																	
Osteichthyes																	
Monocanthid																	
Pervagor sp.						0.06											**0.06**
Fish															0.12	1.33	**1.45**
Reptilia																	
small lizard					<0.01												
Aves (see separate table)																	
Mammalia																	
Rattus exulans	0.20	3.06	<0.01	0.05	0.88	0.01	0.12		0.9	0.28	0.8				0.15	0.79	**7.24**
Rattus norvegicus/rattus		0.04															**0.04**
Mus musculus	<0.01																
Felis cattus				0.68													**0.68**
undescribed bat					<0.01												
small/medium mammal				0.06			0.17										**0.23**
medium vertebrate				<0.01									0.17				**0.17**
Totals	**0.20**	**3.11**	**1.13**	**0.79**	**1.01**	**0.4**	**1.18**	**0.23**	**1.03**	**0.28**	**1.85**	**0.32**	**0.56**	**2.17**	**0.27**	**2.69**	**17.22**

Table 4. Results of Avi-faunal Analysis by Site, Feature, and Provenience

Site 6375		Fe.1		Fe.2		Fe. 3		Fe.4		Fe.6			Fe. 7		Fe. 8	6374-1	6373-1		
Provenience	I	II	IIb	II	I	II	II/III	II	III	II	III	I	II	III	II	II	II	III	Totals
AVES (weights in grams)																			
Procellariiformes																			
Procellariidae																			
Puffinus newelli						0.91		0.31								1.38			2.29
Puffinus sp.		0.40		0.25				0.56					0.64						1.85
Bulweria bulwerii		1.39	0.25	0.84	1.29	3.35	0.53	0.98	0.42	0.64		0.28	1.22	0.29	1.09	1.79		0.02	14.38
Pterodroma fugabilis							0.12	0.17					0.18						0.47
Pterodroma phaeopygia		8.73	5.73	1.41	0.08	7.45	0.46	15.43	1.63	0.80		0.85	29.60	0.86	2.19			0.36	75.58
small procellariid		9.64	4.89			9.94	0.56	1.83	0.28	0.36		0.32	2.13		0.21		0.63	0.34	31.13
small/medium procellariid									0.14				0.57						0.71
medium procellariid		61.39	16.11	17.94	0.13	55.59	2.40	114.36	13.19	10.90		7.27	103.64	0.26	14.19	4.44	0.29	1.87	423.97
Hydrobatidae																			
Oceanodroma castro		0.10	<0.01		<0.01	0.38	0.17	0.26	0.09				0.36	0.04	0.26				1.66
Anseriformes																			
Anatidae																			
Branta sp.								4.87					3.91						8.78
Thambetichen xanion				12.64		0.92	4.55						0.99						19.10
Gruiformes																			
Rallidae																			
Porzana ziegleri		0.02											0.10		0.17				0.29
medium Rallid								0.49					0.42						0.91
Charadriformes																			
Charadriidae																			
Pluvialis fulva																		0.06	0.06
Columbiformes																			
Columbridae																			
Geopelia striata	0.51	0.02															0.10		0.63
Strigiformes																			
Strigidae																			
medium Strigid		0.10						0.39					0.59						1.08
Passeriformes																			
Corvidae																			
Corvus sp.								2.58					3.47						6.05
Meliphagidae																			
Chaetoptila spp.						<0.01	0.58								0.15				0.73
Family indeterminate																			
small Passeriform	0.03	1.25	0.04	0.20	<0.01	1.20	0.65	2.13		0.16			1.41		0.21				7.28
Order & Family indeterminate																			
medium raptorial bird			<0.01																
small bird	<0.01	0.03	0.01							0.05			0.23						0.32
small/medium bird		1.03	0.45	3.60	0.63	41.44	8.79	1.13		11.60	0.29	0.12	0.90		8.14	7.60		0.76	85.46
medium bird	0.32	26.48	13.28					41.12	0.57			3.14	35.70	0.77			0.18		121.56
medium/large bird				0.50			0.45	4.56					3.85						9.36
large bird		1.54	0.58	2.20		2.14	1.37	0.89					0.71						9.43
egg shell fragment?															0.12				0.12
Totals	0.86	112.12	41.34	39.58	2.13	123.32	20.63	191.75	16.32	24.51	0.29	11.86	189.72	2.22	26.73	15.21	1.20	3.41	823.20

provenience, in almost all instances, except for the fill from the incorporated sinkhole of Feature 1 of Site 6373. The best represented faunal categories include crustacean and the rat, followed by marine mollusks and unidentified fish. Less than one gram of cat, small/medium mammal, and medium vertebrate were also represented. Trace (<0.01 gram) weights of small lizard, mouse, and undescribed bat were also recovered.

Avi-faunal Remains

Based on the results of previous investigations in the 'Ewa Plain, sinkhole deposits have been known to yield large quantities of bird bone, including those of numerous extinct or undescribed taxa. The majority have been recovered from non-cultural contexts in the natural deposits within the floors of unmodified sinkholes, the ubiquitous natural features of this karstic region. During the current investigation too, the more prolific recovery of bird remains occurred from the non-cultural, sinkhole features (Figs. 42 and 43).

A total of 823.08 grams of avi-faunal skeletal remains were recovered from seven of the eight sinkhole features of Site 6375 and one feature each from Sites 6373 and 6374. Features 4 and 7 produced the highest yields, followed by Features 1 and 3. According to these results, the selection criteria of size, depth, configuration, and wet/dry applied to the sinkholes, do not appear to have much influence on the total quantity of remains.

In terms of the recovered taxa; the Procellariids, or Shearwaters, Petrels, and Fulmars, ie. seabirds; were by far the most well-represented, totaling over 500 grams or 60% of all recovered bird bone. Next highest identified family were the Anatidae or the Swans, Geese, and Ducks amounting to only about 28 grams or only 3.4% of the total bones. The order Passeriformes, represented by crows and jays, as well as honeyeaters, and the smaller perching and songbirds, was next with about 14 grams or 1.7%. In the indeterminate category, small/medium and medium bird were the most represented with 85 grams and 122 grams respectively. The remaining categories all weighed-in under 10 grams. Here again, not much correlation can be made between the morphological characteristics of the sinkhole and the recovered categories.

Stratigraphically, the majority of the bones appeared to be deposited in Layer II and the proportionately smaller quantities recovered from Layers I and II can probably be attributable to the effects of bioturbation and natural migration in most cases. At this time, within the currently recovered assemblage, no chronological patterning was apparent from the depositional data. According to Ziegler, the current avi-faunal assemblage is quite typical of Barbers Point sinkholes in general (Appendix B, Memo page 3).

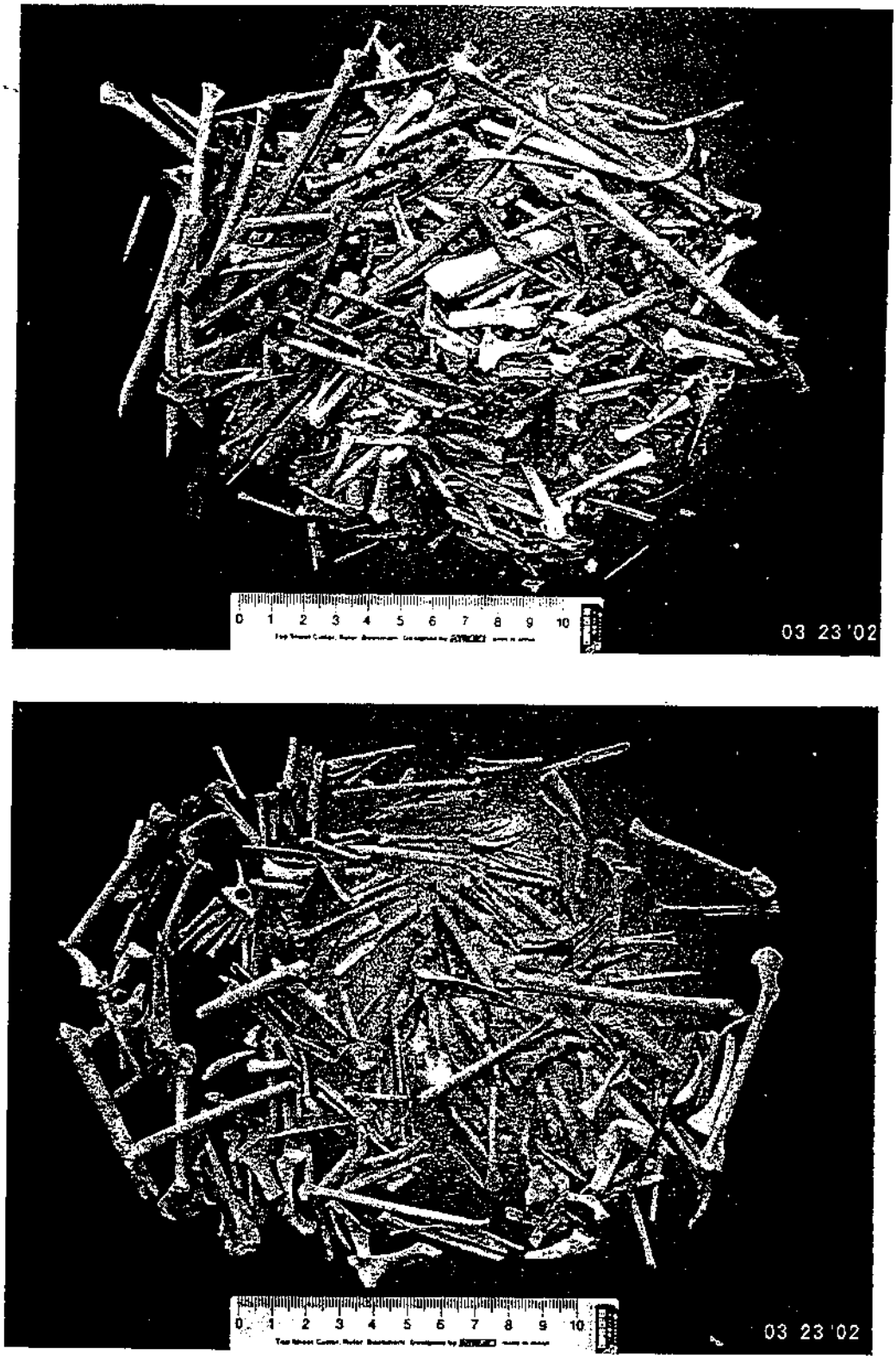


Figure 42. A Typical Assortment of Bird Bones from Site 6375 Feature 1
(top) from Layer II
(bottom) from Layer IIb

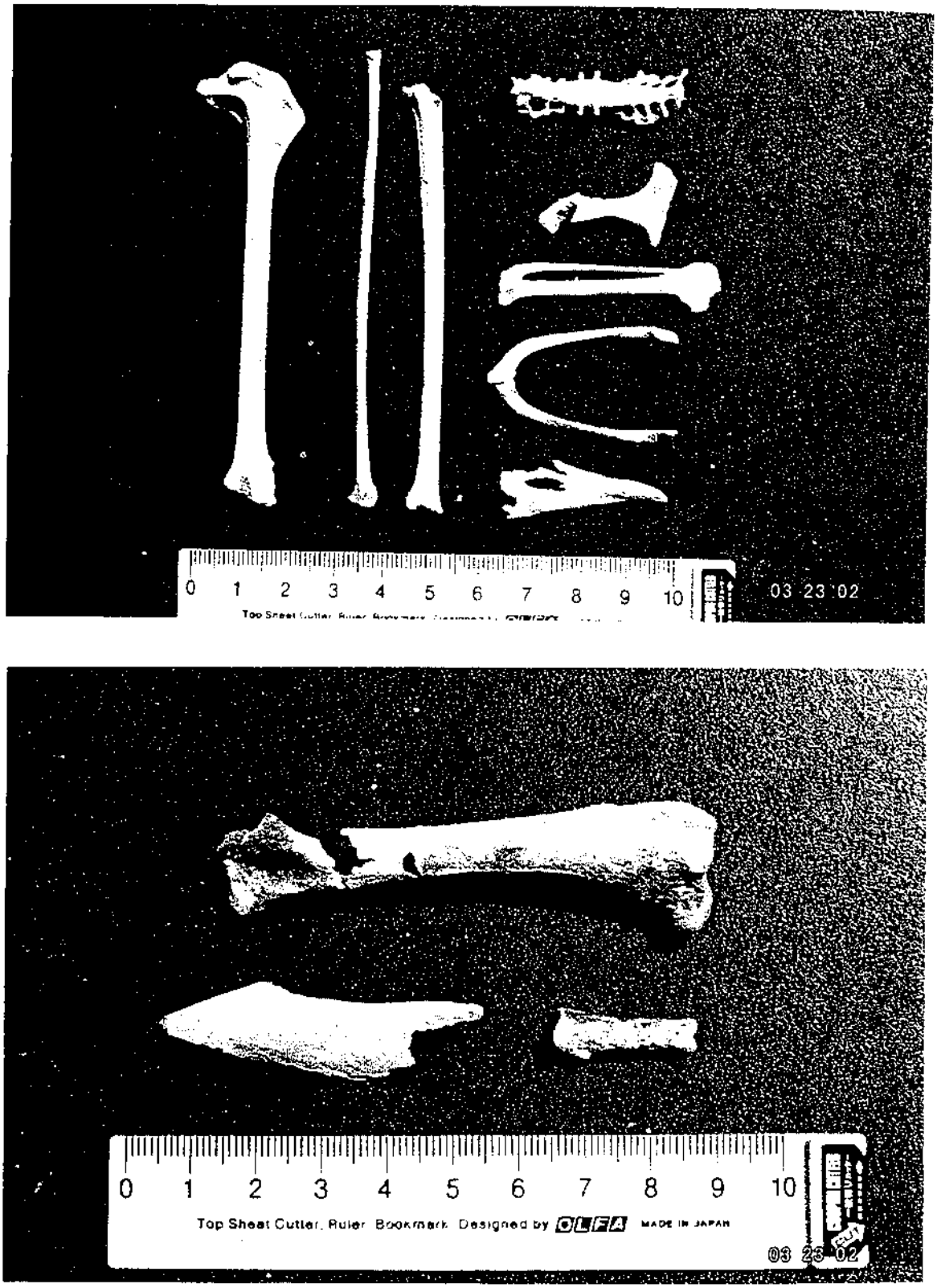


Figure 43. Avi-faunal Remains from Site 6375-7, Layer II
(top) Typical Procellariid Skeletal Parts
(bottom) Long Bone from *Branta* and Bill of *Corvus* sp.

DISCUSSION

The current archaeological inventory survey resulted in the recording of two cultural sites and eight sinkhole features of a paleontological site complex. The current procedures also completed intensive data recovery of Site 6373, a small, traditional Hawaiian habitation complex. Based on the recovery of a traditional Hawaiian artifact, a bone toggle, together with the absence of any historic period artifacts or samples, Site 6373 is interpreted to be a short-term habitation site that was occupied by indigenous Hawaiians who were exploiting marine resources of the region. The site is estimated to have been occupied during the late pre-contact to early contact periods.

Controlled partial excavation of Feature 1 of Site 6374 determined that this site was used for the burning of coralline limestone in the manufacturing of lime. To date, this is the first recorded example of a sinkhole being utilized for a lime kiln. Late historic period origins and use, late 1800s to early 1900s, are estimated for this site.

The bird bones collected from the eight (seven) sinkhole features of Site 6375 were analyzed and assessed to represent a quite typical assemblage from sinkholes in the Barbers Point region in general. Seabirds were the most well-represented category. Several species of prehistorically extinct birds were also represented. Although, some researchers have argued that the bird bones are secondarily depositedfrom the ground surface above the sinkholes through natural forces, such as erosion; firm evidence is lacking. Sinkholes acting as traps for some of the larger birds and functioning as nests for others, appear to provide a more plausible explanation for the quantity and variety of bird remains.

INITIAL SIGNIFICANCE ASSESSMENTS

Initial significance has been assessed for the archaeological sites recorded in the project area. These assessments are based on the Hawaii Register of Historic Places significance evaluation criteria. The five criteria are:

Criterion A: This specifies association with events or broad patterns important to the history of a region, island, or Hawaii in general;

Criterion B: This reflects association with persons important to the history of a region,island, or Hawaii in general;

Criterion C: This applies to sites that reflect architectural achievements or are excellent examples of a specific type of site;

Criterion D: This specifies that the site has yielded or has the potential to yield information significant for our understanding of traditional culture, history, prehistory, and/or foreign influences on traditional culture and history of a region, island, or Hawaii in general; and

Criterion E: This applies to sites perceived by the contemporary community as having traditional cultural value.

Sites 6374 is considered significant under multiple criteria, Criterion C and D. The utilization of a sinkhole as a lime kiln is so far unique to this site and the adjoining Feature 2 can be considered to have the potential to yield more information. Sites 6373 and 6375 have realized their significance through the procedures completed during the current inventory survey. Thus, these sites are no longer considered to be significant.

RECOMMENDATIONS

Site 6374 is recommended for data recovery when development in the neighboring 10-acre parcel becomes imminent. Until such time, the site should be well marked and afforded temporary protection during upcoming construction phases so that heavy equipment will not inadvertently disturb or destroy the sinkhole features. This should be feasible since the phase of work currently being proposed for the near future will not be implemented in the vicinity of this site.

Also, the burial, Site 50-80-12-4209, mentioned in Kawachi's memorandum (1990), is supposedly still located on the side of the canal, adjoining the project area. The location of this site should be re-confirmed and protected to prevent disturbance by construction activities.

An interim preservation plan should be prepared for review by the State Historic Preservation Division (SHPD). This plan shall establish a buffer zone around Sites 4209 and 6374 and include recommendations for temporary protection measures to be implemented during any development activities in the surrounding areas.

Based on the results of the current inventory survey and the monitoring during access clearing and geo-technical boring activities, no further work, including archaeological monitoring during construction, is recommended. However, should inadvertent discoveries, such as human burials, be encountered during construction, an archaeologist shall be contacted to assess the finding and carry out necessary mitigation measures in coordination with the State Historic Preservation Division of the Department of Land and Natural Resources and other pertinent agencies, such as the O`ahu Island Burial Council.

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APPENDIX A:

Faunal Analysis Memorandum
Alan C. Ziegler

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Telephone:
(808) 247-5318

M E M O R A N D U M

DATE: 31 August 2002

TO: Aki Sinoto, Archaeologist

FROM: Alan C. Ziegler, Zoological Consultant

SUBJECT: Identification of vertebrate faunal material from Kalaeloa, 'Eva, O'ahu, (various lots from Sites 6373, 6374, and 6375), received 15 March and 28 August 2002.

I have identified this faunal material to the lowest taxonomic level possible for me, and am now returning it to you along with this MEMO in one box. An INVOICE covering the total of 27 hours spent on the identifications and write-up is also included here.

Each of the labeled plastic bags I received contained (primarily) the vertebrate faunal remains from a discrete excavation unit (i.e., from a particular Site, Feature or Sink Hole, Layer, etc.). For each of these excavation units I have identified and separated the material into various faunal categories, and placed the remains of each category in an individual stapled plastic bag along with a yellow paper slip giving the name of the particular category represented and sometimes a pertinent comment on the material (--but, note, to keep the identification time to a minimum, not the provenience, which appears only on the original labeled plastic container bag[s] still accompanying the corresponding identified material).

All of these lots of stapled bags from each excavation unit have then been put either back into your original labeled container bag, or into a larger ziploc bag with the original container bag. These various stapled bags with yellow paper identification slips are arranged within each container or ziploc bag in the same order as the category names appear on the Faunal Category List described below.

The transparency of the stapled faunal-category bags, of course, allows counting of the contained skeletal items of at least the less-well-represented categories without the time and trouble of removing the material. Even in the case of possible future weighing of the material, I might note that this could also be done without opening the bag because each of these stapled bags is of the same weight as all of the others, bears one staple, and contains a single yellow-paper label of uniform weight; thus you should be able to deduct an identical tare weight throughout any in-bag weighing procedure.

If any artifacts were found, these have similarly been placed in individual stapled bags, with an identification of the animal category or nonfaunal substance apparently represented by the original raw material. Additionally, I segregated and saved in individual stapled plastic bags any invertebrate and nonfaunal items encountered, although you may well not need most--or any--of them.

To explain the faunal categories used for the present material, I have included with this MEMO a Faunal Category List dated 31 August 2002, which contains all of the faunal categories identified in the present material, or otherwise mentioned by me.

It should be noted in this List that when I mention the common or scientific name of genera or species in explanations of the more-generalized faunal categories--as, for example, in "Medium Bird" or "Small-to-Medium Mammal"--unless it is obviously indicated otherwise, I intend these names to convey only an idea of the general size of the animal represented rather than to definitely indicate that any specific taxon mentioned is necessarily present in the material.

For some identifications on the yellow paper slips, I have prefixed the name of a family, genus, or species with "cf.". This means that the material seems extremely close osteologically to the taxon named and quite likely belongs to it, but I cannot entirely rule out the possibility that an extinct, accidental, or extremely rare, morphologically similar form--although, usually of the same order, family, or genus--is represented instead. For most later compilation purposes, however, I would advise simply omitting the "cf." whenever you see it in my identifications (--I guess the main reason I use it at all is to let any possible future identifiers examining the bones know that I did realize that in some cases there was an alternative, although unlikely, identification possible).

In regard to minimum number of individuals, if it was obvious that more than one individual was represented by the material in the stapled bag, I have noted on the yellow-paper identification slip the number indicated (written as "MNI = ...").

In the case of any fish recovered, other than sharks, rays, and (usually) eels, whenever vertebrae were present, I have given approximate total lengths of the particular individuals involved (written as "Len's. = ..."), based on comparison of vertebra size with that of prepared skeletal specimens of known length. These estimates could well be off by perhaps 20-30% (depending on species represented and position of the vertebrae in the spinal column) but they will serve to give you at least a general idea of the size of many of the fish present.

I have not attempted to chronologically age any bird individuals whose bones are present in the faunal material, except to note on the yellow paper slips any obviously immature bones (usually meaning nestlings in species other than chicken and other precocial ground-living birds), lack of any such notation meaning that the bird bones are apparently of adult individuals.

For mammals other than bats and rodents, whenever possible I have endeavored to give a general idea of age at death (in the case of appropriate material often estimating the probable minimum and/or maximum chronological age at death by reference to published tables--when available--of dental replacement sequence or stage of long-bone epiphyseal union).

You may already routinely present the following in each of your archaeological excavation reports but, in case you do not, I hope you will consider including a minimal faunal-data table in each such final paper. That is, a simple table (similar to the sample included as an ATTACHMENT to this MEMO) including each excavation unit, giving at least the actual numbers and/or weights of the bones/fragments per level assigned to each faunal category that occurs in the unit. This is so possible future investigators will always have available these raw faunal data, along with other information such as midden volumes contained in your report, for use in faunal analysis calculations (for example, Concentration Indices) that, for one reason or another, you may not have carried out.

As I think you already know, I usually do not write up a formal faunal analysis report per se (--having found that, in terms of the amount that would have to be paid for my time, this is much more expeditiously done by personnel who either actually participated in the field work or, at least, have more ready access to the complete original excavation data than I do--) but, instead, I provide a series of general and specific, largely subjective, Comments (as I have done below) regarding the identified faunal material. These Comments can then be quoted or paraphrased, or the information contained in them otherwise utilized in the manner most suitable to the style of the final overall project report.

COMMENTS ON KALAELOA, 'EWA, O'AHU, FAUNAL MATERIAL

GENERAL. I will not give here a complete listing of the types and numbers of vertebrates from all the various excavation units, because you will have these same data available from any tabulation you may make of the identified material.

Instead, I will offer some more generalized observations that may be of use to you.

TYPE OF SITE USAGE. When we spoke on Wednesday, 28 August 2002, you informed me that Sites 6373 and 6374 were culturally related, while all excavation units of Site 6375 apparently contained only material deposited other than by human means. The vertebrate material from the first two of these Sites, however, gives little evidence of even moderate human use. This material is essentially all of bird, other than of an occasional "*Rattus exulans*" (Polynesian Rat) individual. True, other than a single bone of "Monacanthid" (Filefishes) in Site 6375, Area B, Sink 2, "Fish" material appears only in Site 6373, and this could possibly represent human food midden. But it could equally well have been derived from stomach contents of seabirds dying in the Sink, or have been beach-derived carrion carried to the Sink by, for instance, a species of "*Corvus sp.*" (Crow).

I presume most remains of medium and large birds recovered are derived from individuals somehow becoming trapped after entering the sink holes. "*Bulweria bulwerii*" (Bulwer's Petrel) and "*Oceanodroma castro*" (Band-rumped Storm-Petrel), however, seem small enough that they may have been able to enter and exit the sink holes at will, and thus may have nested there.

TIME OF SITE USAGE. Essentially all of the bird material from all three of the Sites examined is quite typical of that from the Barber's Point sink holes in general. The birds identified that represent species (apparently) prehistorically extinct on at least O'ahu are "*Pterodroma jugabilis*" (Gracile Petrel), "*Pterodroma phaeopygia*" (Hawaiian Petrel), "*Oceanodroma castro,*" "*Branta* sp." (True Goose), "*Thambetochen xanion*" (O'ahu Lowland *Moa nalo*), "*Porzana ziegleri*" (Small O'ahu Rail), "*Corvus* sp." (Crow), "*Chaetoptila* sp." (*Kioea*), and "Undescribed Vespertilionid Bat." Certain species of at least "*Puffinus sp.*" (Shearwater), "Small Procellariid," "Medium Strigid," "Small Passeriform," and "Medium Raptorial Bird" could also possibly be similarly prehistorically extinct species.

A little deposition, however, also occurred in the post-Contact period, as evidenced by the very occasional presence of "*Geopelia striata*" (Zebra Dove), (possibly) "*Mus musculus*" (House Mouse), "*Rattus norvegicus* and/or *Rattus rattus*" (Norway Rat and/or Roof Rat), and "*Felis catus*" (House Cat). The latter species--or another nonhuman mammalian predator such as mongoose, could have taken these Historic Period species (as well as species of the probably Polynesian introduced "Small Lizard") as prey. Also, the one or more avian raptors represented by "Medium Strigid" and/or "Medium Raptorial Bird" may similarly have taken any of these as well as some or all of the individuals of the small "*Oceanodroma castro,* "*Porzana ziegleri,*" and "Small Passeriform."

I hope this information will be of interest and use to you. Many thanks for the chance to see this material. Please be sure to let me know if there are any questions on any of my procedures, identifications or comments. Continued best in everything !!

* * *

CATEGORIES USED FOR AKI SINOTO FAUNAL IDENTIFICATIONS

Alan C. Ziegler
31 August 2002

NONVERTEBRATE-

Vegetable.....all uncharred or otherwise unmodified vegetal material.

Coral Reef Rubble.....including fragments of mollusk, echinoderm, etc., that seem obviously to have weathered out of the reef or to be quite beachworn, and thus probably not human food midden.

Mollusk.....nonfossil material of marine, freshwater, and/or terrestrial forms that seems to have entered the deposit in a relatively fresh condition, most of the nonterrestrial material probably being human food midden.

Crustacean.....usually, exoskeleton remains of crab or lobster, with an occasional barnacle plate, much--but not all--probably being human food midden.

VERTEBRATE

CLASS CHONDRICHTHYES (Sharks and Rays) AND/OR CLASS OSTEICHTHYES (Bony Fishes)
[Arrangement and nomenclature follow Gosline, W.A., and V.E. Brock, 1960 (reprinted 1965), *Handbook of Hawaiian Fishes*, University of Hawaii Press, Honolulu.]

Monacanthid.....member(s) of the family Monacanthidae (Filefishes), of which the small *Pervagor spilosoma* (Fantail Filefish), reaching only about 15 cm in length and sometimes washing up on beaches dead in great numbers, is by far the most abundant of the 8 species to be expected in near-shore Hawaiian waters; the genus *Alutera* contains the largest species, reaching about 60 cm in length.

Fish.....material of indeterminate class and family, although essentially always a bony fish rather than shark or ray.

CLASS REPTILIA

Order Squamata
Family Indeterminate

Small Lizard.....lizard(s) with a head-and-body length (i.e., excluding tail) of less than about 10 or 15 cm; usually not identified to any lower taxonomic level although, in Hawai'i, most or all of the material probably represents the Polynesian-introduced(?) families Gekkonidae (geckos) and/or Scincidae (skinks) rather than any of the smaller members of historically introduced families.

CLASS AVES [Arrangement and nomenclature--unless modified by the various Olson and James' references listed below--of historically known forms follow Pratt, H.D., P.L. Bruner, and D.G. Berrett, 1987, *The Birds of Hawaii and the Tropical Pacific*, Princeton University Press, Princeton, New Jersey; while information on prehistorically extinct forms is drawn from Olson, S.L., and H.F. James, 1982, Prodromus of the fossil avifauna of the Hawaiian Islands, *Smithsonian Contributions to Zoology*, No. 365; Olson, S.L., and H.F. James, 1991, Descriptions of thirty-two new species of birds from the Hawaiian Islands: Part I. Non-Passeriformes, *Ornithological Monographs* No. 45; and James, H.F., and S.L. Olson, 1991, Part II. Passeriformes, *ibid.* No. 46.]

Order Procellariiformes
Family Procellariidae: (Shearwaters, Petrels, and Fulmars)

Puffinus nevelli (Newell's Shearwater)

Puffinus sp. (Shearwater).....member(s) of this genus that in Hawai'i most likely include the relatively small species *Puffinus nativitatis* (Christmas Shearwater) and, possibly, *Puffinus lherminieri* (Audubon's Shearwater; see Olson and James 1982:33), as well as the medium-sized species *Puffinus pacificus* (Wedge-tailed Shearwater) and *Puffinus nevelli* (Newell's Shearwater).

Bulweria bulwerii (Bulwer's Petrel)

Pterodroma jugabilis (Gracile Petrel).....an extinct (apparently prehistorically) species known only from the Hawaiian Islands (see Olson and James 1991:17-22).

Pterodroma phaeopygia (Hawaiian Petrel)

Small Procellariid.....smaller member(s) of the family Procellariidae, in the general size range of *Puffinus nativitatis* (Christmas Shearwater), *Bulweria bulwerii* (Bulwer's Petrel), *Pterodroma hypoleuca* (Bonin Petrel), as well as, possibly, *Puffinus lherminieri* (Audubon's Shearwater; see Olson and James 1982:33) and the prehistorically extinct *Pterodroma jugabilis* (Gracile Petrel) of Olson and James 1991:17-22.

Medium Procellariid.....medium-sized member(s) of the family Procellariidae, in the general size range of *Puffinus pacificus* (Wedge-tailed Shearwater), *Puffinus newelli* (Newell's Shearwater), and *Pterodroma phaeopygia* (Hawaiian Petrel).

Family Hydrobatidae (Family Oceanitidae of Olson and James 1982:33): (Storm-Petrels)

Oceanodroma castro (Band-rumped Storm-Petrel)....material of a very small member of this family, presumably this species but I have not been able to obtain comparative skeletal material of it either locally or from the Smithsonian Institution, although I have satisfactory material of the larger *Oceanodroma tristrami* (Tristram's Storm-Petrel).

Order Anseriformes
Family Anatidae: (Swans, Geese, and Ducks)

Branta sp. (True Goose).....comprises both *Branta sandvicensis* (Hawaiian Goose) and the 1 or more prehistorically extinct, apparently semiflightless--or possibly even flightless--medium-sized forms morphologically similar to, but evidently specifically distinct from, the present-day *Branta sandvicensis*; (see Olson and James 1991:42-47 for the various species potentially represented on the different Hawaiian Islands).

Thambetochen xanion (O'ahu Lowland *Moa nalo*)

Order Gruiformes
Family Rallidae: (Rails, Moorhens or Gallinules, Coots, etc.)

Porzana ziegleri (Small O'ahu Rail).....the smaller of 2 prehistorically extinct flightless rails known from O'ahu.

Medium Rallid.....member(s) of the family Rallidae in the general size range of *Gallinula chloropus* (Common Moorhen) and *Fulica* spp. (coots); most of the material probably consists of certain bones of 1 or both of the 2 Hawaiian species of these types of rallids that I cannot satisfactorily distinguish, especially when the material is fragmentary.

Order Charadriiformes
Family Charadriidae: (Plovers and Dotterels)

Pluvialis fulva (Pacific Golden-Plover).....this relatively common migratory species is most abundant--and thus most readily available for capture--in the Hawaiian Islands from August through April, although a few individuals may occasionally be found here all year.

Order Columbiformes
Family Columbidae: (Pigeons and Doves)

Geopelia striata (Zebra Dove).....introduced to the Hawaiian Islands in 1922. (There are no native Hawaiian columbiforms, and of the 20 or so species of the order [all family Columbidae except for 1 sandgrouse of the family Pteroclidae] historically introduced to the State only 4 managed to establish widespread, long-surviving, populations: *Columba livia* [Rock Dove or "Domestic Pigeon"], *Streptopelia chinensis* [Spotted Dove], *Geopelia striata* [Zebra Dove], and *Zenaidura macroura* [Mourning Dove--apparently only in the Pu'uwa'awa'a area in the North Kona District of Hawai'i Island]. Thus, I presume most or all bones of columbids found will represent only these 4 forms

although in a few cases osteologically similar species--introduced but now extirpated--could conceivably be represented.)

Order Strigiformes
Family Strigidae: (Typical Owls)

Medium Strigid.....comprises owl material that does not appear to be the sole Hawaiian representative of the family Tytonidae *Tyto alba* (Common Barn-Owl, introduced to the Hawaiian Islands in 1958), but very likely represents either or both the native *Asio flammeus* (Short-eared Owl) and the prehistorically extinct owl genus *Grallistrix* (Stilt-Owls) of Olson and James 1991:67-81 (both family Strigidae), many of whose bones I cannot yet satisfactorily distinguish, especially when fragmentary.

Order Passeriformes
Family Corvidae: (Ravens, Crows, Magpies, and Jays)

Corvus sp. (Crow).....comprises material presumably representing this genus but that could not be certainly assigned to any of the 3 Hawaiian species: the extant *Corvus hawaiiensis* (Hawaiian Crow) or the prehistorically extinct *Corvus impluviatus* (Arch-billed Crow) and *C. viriosus* (Long-billed Crow) of James and Olson 1991:11-22.

Family Meliphagidae: (Honeyeaters)

Chaetoptila spp. (Kioea).....historically or prehistorically extinct member(s) of this genus; (see Olson and James 1982:39 and, for Maui records, James and Olson 1991:80.)

Family Indeterminate

Small Passeriform.....member(s) of 1 or more families of this order ("Perching Birds" or "Songbirds"), up to the general size of cardinals or smaller thrushes; most of the extinct and extant endemic Hawaiian passeriform species--as well as a number of the historically introduced ones--would be of this size.

Order and Family Indeterminate

Medium Raptorial Bird.....member(s) of either the order Falconiformes (eagles, hawks, falcons, etc.) or Strigiformes (owls), in the general size range of *Buteo solitarius* (Hawaiian Hawk), *Tyto alba* (Common Barn-Owl), *Asio flammeus* (Short-eared Owl), and the prehistorically extinct owls of the genus *Grallistrix* (Stilt-Owls) as well as the similarly extinct hawk *Circus dossenus* (Wood Harrier) of Olson and James 1991:64-81.

Small Bird.....member(s) of indeterminate order and family up through the general size of storm-petrel, quail, plover, sparrow, myna, and thrush; probably a large amount of the material represents passeriforms but smaller native or historically introduced species of 3 or 4 other orders could well be included, also.

Medium Bird.....member(s) of indeterminate order and family in the general size range of shearwater and petrel, tropicbird, night-heron, duck, hawk, junglefowl (= chicken), moorhen and coot, curlew, gull, owl, crow, and so on; in Hawai'i, probably no passeriforms other than Hawaiian species of the genus *Corvus* would be included, but a number of native or historically introduced species of up to a half-dozen other orders could potentially be.

Large Bird.....member(s) of indeterminate order and family in the general size range of albatross, booby, frigatebird, goose, eagle, turkey, raven, and so on; in Hawai'i, a number of native or historically introduced species of up to a half-dozen orders could potentially be included.

CLASS MAMMALIA [Insofar as possible, arrangement and nomenclature follow Tomich, P.Q., 1986, *Mammals in Hawai'i, Second Edition*, Bishop Museum Press, Honolulu; except that the more generally accepted name *Mus musculus* is used here instead of *Mus domesticus*.]

Order Chiroptera
Family Vespertilionidae: (Common Bats)

Undescribed Vespertilionid Bat.....a prehistorically extinct, apparently endemic, species smaller than the Hoary Bat (*Lasiurus cinereus*), and thus far known from 5 main Hawaiian Islands.

Order Rodentia
Family Muridae: (Old World Rats and Mice)

Rattus exulans (Polynesian Rat).....comprises all material of this Polynesian-introduced species that, because of its relatively small size, could be distinguished with some degree of certainty from corresponding material of the larger *Rattus norvegicus* (Norway Rat) and *R. rattus* (Roof Rat), both historically introduced to the Hawaiian Islands.

Rattus norvegicus and/or *Rattus rattus* (Norway Rat and/or Roof Rat)...comprises all material that, because of its relatively large size, could be distinguished with some degree of certainty from that of the smaller *Rattus exulans*; although, except for essentially intact crania, I doubt that isolated skeletal elements of these 2 larger, post-Contact, species can safely be distinguished from each other.

Mus musculus (House Mouse).....introduced to the Hawaiian Islands sometime after 1778.

Order Carnivora
Family Felidae: (Lions, Tigers, Cats, etc.)

Felis catus (House Cat).....introduced to the Hawaiian Islands sometime after 1778.

Order and Family Indeterminate

Small-to-Medium Mammal.....member(s) of indeterminate order and family in the general size range of wallaby, rabbit, dog, and cat; in Hawai'i, Polynesian- or historically introduced species of at least 3 orders could potentially be included.

Medium Mammal.....member(s) of indeterminate order and family in the general size range of human, porpoise, seal, pig, deer, and goat/sheep; in Hawai'i, native or introduced species of at least 4 orders could potentially be included.

CLASS INDETERMINATE

Order and Family Indeterminate

Small Vertebrate.....comprises highly fragmented bone material representing member(s) of indeterminate class, order, and family, but with an estimated head-and-body length less than about 0.3 m.

Medium Vertebrate.....comprises highly fragmented bone material representing member(s) of indeterminate class, order, and family but with an estimated head-and-body length of from about 0.3 m to, roughly, 2.0 m.

* * *

APPENDIX B:

Archaeological Monitoring Report

ASC025-1

ARCHAEOLOGICAL MONITORING DURING CLEARING OF ACCESS CORRIDORS FOR GEOTECHNICAL BORING PROCEDURE AT THE PROPOSED DESALINATION FACILITY BARBERS POINT, HONOULIULI, `EWA, O`AHU (TMK 9-1-31:28)

for:
Oceanit Laboratories, Inc.
1001 Bishop Street
Pacific Tower Suite 2970
Honolulu, Hawaii 96813

May 2002

by:

Aki Sinoto
and
Paul Titchenal, M.A.

Aki Sinoto Consulting
2333 Kapiolani Blvd., No. 2704
Honolulu, Hawai`i 96826

INTRODUCTION

Archaeological monitoring, during vegetation clearing within access corridors, was undertaken by Aki Sinoto Consulting of Honolulu for Oceanit Laboratories, Inc. of Honolulu. This task was conducted in conjunction with the implementation of foundation study-related geotechnical borings for the proposed desalination facility in a coastal portion of Campbell Industrial Park at Barbers Point, O`ahu. The monitoring procedures were guided by a Monitoring Plan letter, dated 29 January 2002, that was approved by the State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources.

PROJECT LOCATION

The project area is located on a coastal portion of Honouliuli *ahupua`a*, `Ewa district, O`ahu Island (Fig. 1). Situated at the southeastern corner of Campbell Industrial Park, the 20-acre parcel (TMK 9-1-31:28), together with the 10-acre parcel adjoining to the south (TMK 9-1-31:47), comprises a portion of the former flight easement for one of the runways of the Barbers Point Naval Air Station (BPNAS). The trapezoidal- shaped parcel is bounded on the north by a strip of State land paralleling the *makai* side of Olai Road and a barbed-wire fence, on the east by a large drainage channel that separates the industrial park area from the former air station, on the south by the adjoining 10-acre parcel, and on the west by a fence-line paralleling an unpaved road which comprises the eastern boundary of the former Oahu Meat Packers cattle feed-lot. On the *mauka* side of Olai Road is the petroleum storage tank yard for Tesoro, Inc., formerly Hawaiian Independent Refineries, Inc.

MONITORING PLAN OBJECTIVES

The current monitoring procedures were undertaken in accordance to the conditions and protocols as set forth in the plan and as mandated by the State Historic Preservation Regulations contained in Chapter 6E of the Hawaii Revised Statutes. These conditions can be briefly summarized as follows:

1. To conduct a pre-construction coordinating meeting in which pertinent parties can be advised of the authority of the archaeological monitor to halt work in the immediate vicinity of an inadvertent discovery and be familiarized with the types of remains expected, appropriate mitigation measures, and possible ramifications to the project;

2. To initially implement full-time monitoring of all construction-related, ground disturbing activities until the nature of the subsurface conditions can be confirmed and the appropriate scope and methods can be applied;

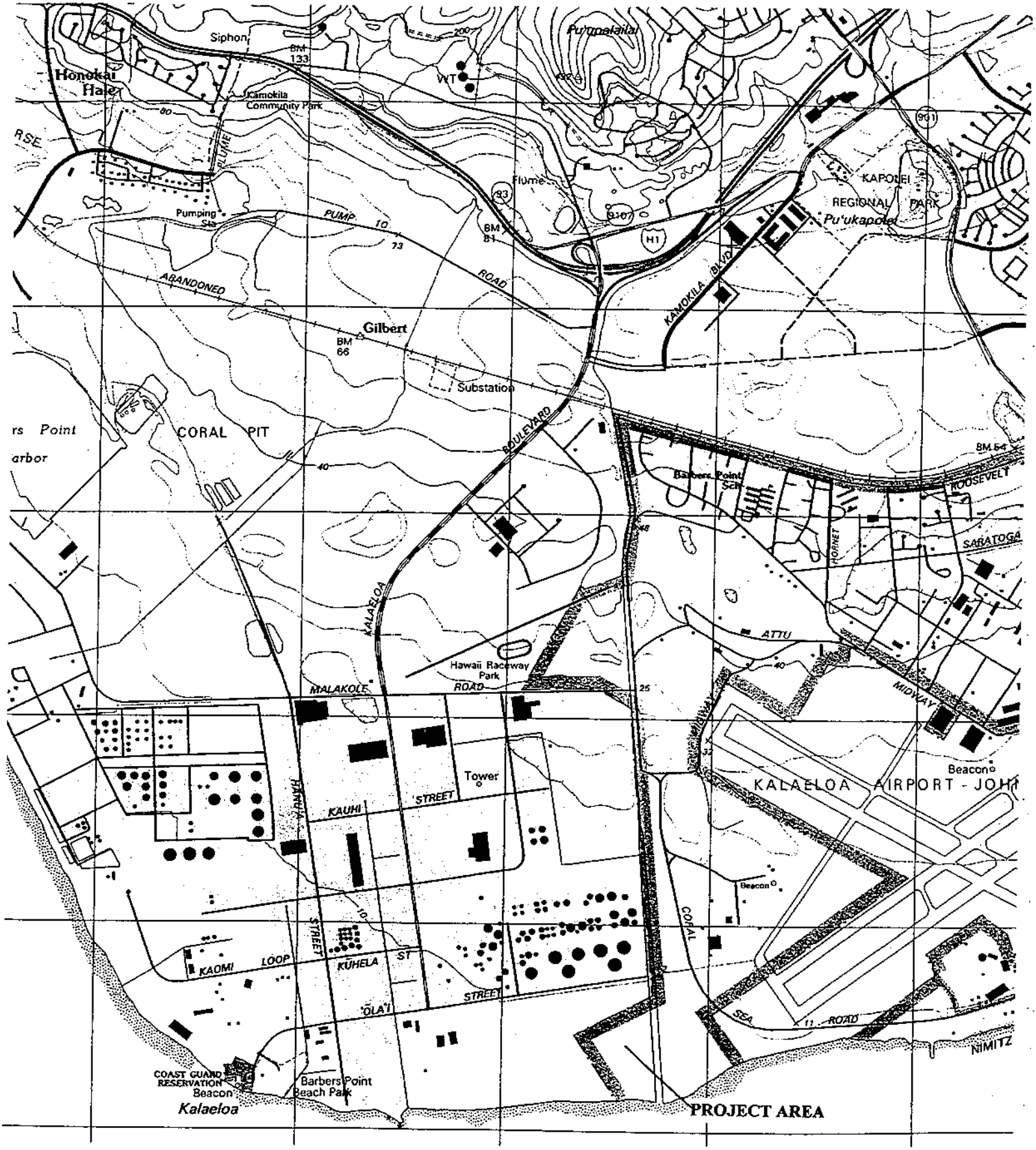

Figure 1. Location of Project Area on the 1998 USGS Ewa Quadrangle

3. To ensure that all standard practices and appropriate protocols are implemented, along with the proper notifications, when significant inadvertent remains are encountered during the course of monitoring;

4. To ensure that all procedures are followed upon the inadvertent discovery of human skeletal remains including the implementation of adequate interim protection measures;

5. To conduct all necessary post-field and laboratory procedures including the preparation and submission of a final report; and

6. To properly archive all records, notes, photographs, maps, and other documentation generated in the course of this undertaking at the facilities of Aki Sinoto Consulting in Honolulu.

METHODS

On several occasions prior to the commencement of clearing activities, representatives of the prime contractor and sub-contractors together with the archaeologist toured the project area to become familiarized with the area and the archaeological site locations. Bore site locations were determined in the field to ensure proper coverage as well as the protection of archaeological sites. Final locations of the bore sites were determined in March 2002 (Fig.2). To facilitate the scheduling and implementation of the clearing activities, initial access was planned from the road paralleling the drainage canal.

All of the recorded sites were clearly marked with perimeter flagging consisting of wide, yellow caution tape. The sites have also been tagged with numbers written with black marker on yellow and black striped surveyor's flagging tape. Clearing of access corridors in areas close to existing sites shall be closely monitored to prevent any disturbance to the sites. Whenever possible, the shortest access route shall be used. The initial segments, within the first 10 feet, of boring activities in selected localities may also be monitored at the discretion of the archaeologist if the opportunity to gain insight regarding conditions of the substratum or subsurface geology of the area should arise. The boring is not anticipated to impact any culturally sensitive remains.

During the course of the current undertaking, all procedures were implemented in accordance to standard and accepted archaeological procedures and techniques. Aki Sinoto was the primary monitor and Paul Titchenal, M.A. acted as the principal investigator. The monitoring procedures, including pre-commencement consultations, were conducted on separate occasions between February and April 2002.

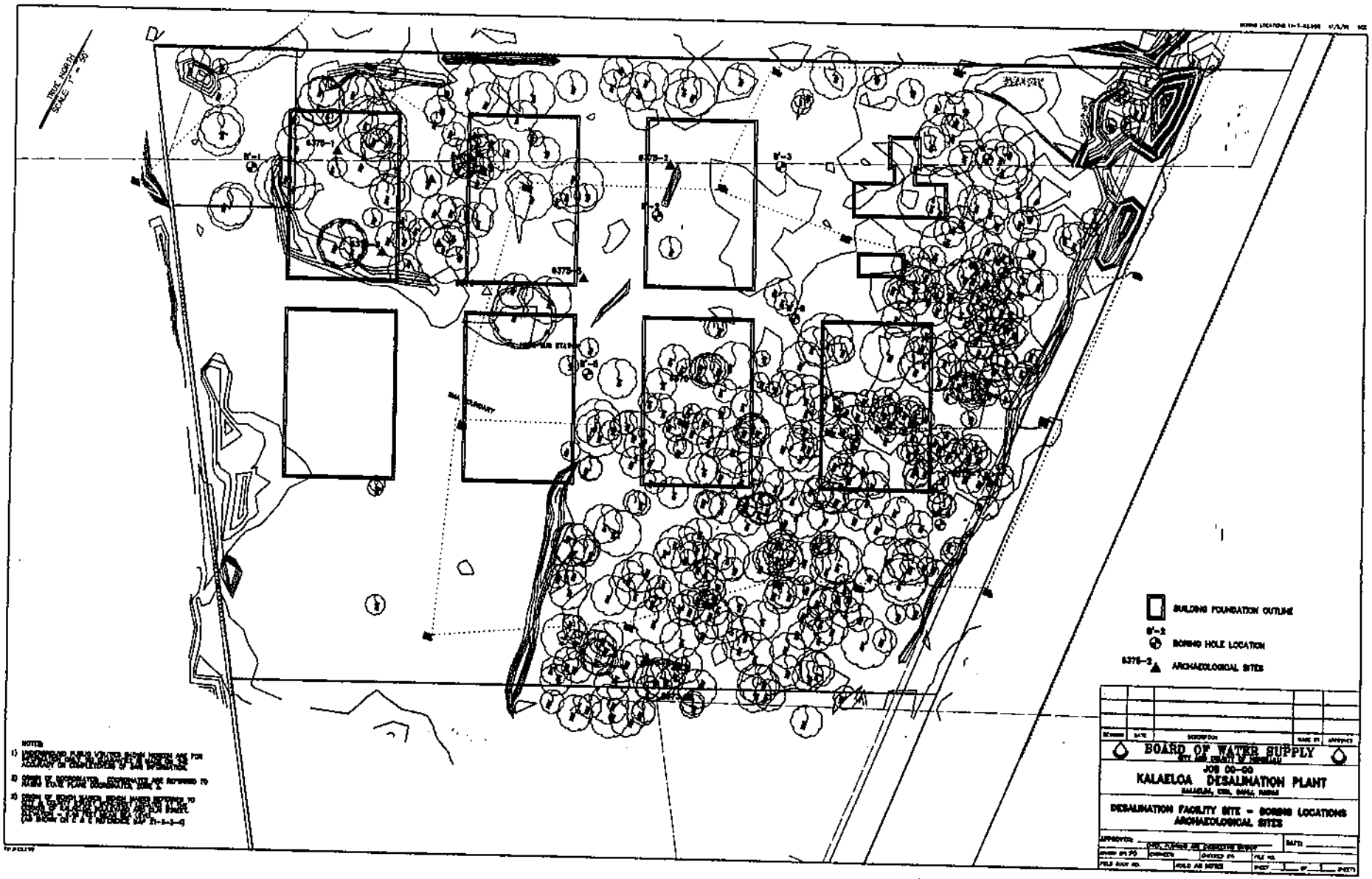

Figure 2. Locations of Bore Sites and Archaeological Sites
(base map prepared by Oceanit Laboratories, Inc.)

RESULTS OF MONITORING

The clearing activities commenced on Saturday, April 13, 2002. Using a Komatsu WA-380 loader with large rubber tires, access roads were initially cleared into the *kiawe* covered area south of the existing pilot well site located at the northeast corner of the project area (Fig.3 top). Access to bore hole locations B-4, 7, & 8 along the eastern periphery of the project area adjacent to the drainage channel were cleared. Following that, a road paralleling the northern boundary fenceline was cleared to gain access to the central portions of the project area for bore hole locations B-2, 3, 5, & 6. A corridor to access bore hole location B-1 near the northwest corner of the project area was cleared from the B-5 area, passing along the southern periphery of the *kiawe* covered area. Access to B-6 was cleared on Monday, April 15, 2002, when the clearing procedure was completed.

The construction activity consisted of vegetation clearing using the loader and also the filling of sinkholes and other cavities to facilitate access for the truck mounted drilling rig. Some sand from existing stockpile from material previously dredged from the channel was used to fill selected segments of the access corridors and roads. The clearing or surface preparation activity did not disturb any of the existing archaeological sites. The impact to sinkholes were minimal since most of the bore hole locations were in the peripheral areas of the vegetated zone, the majority of the existing sinkholes were previously filled. Also, no inadvertent discoveries were made during the course of the clearing activities.

The coring operation began on Monday at B-3 using a truck mounted rig (Fig.3 bottom). The initial stages of the coring was monitored. However, monitoring was discontinued due to the small size of the sampler and the sampling locality being almost always on solid limestone bedrock.

No culturally significant discoveries were made and no existing remains were impacted during the course of the monitored construction-related activities.

RECOMMENDATIONS

Based on the negative results of the current monitoring procedure, no further archaeological procedures are recommended. The potential for inadvertent discoveries being made during the upcoming phase of construction for the desalination facility appears to be minimal.

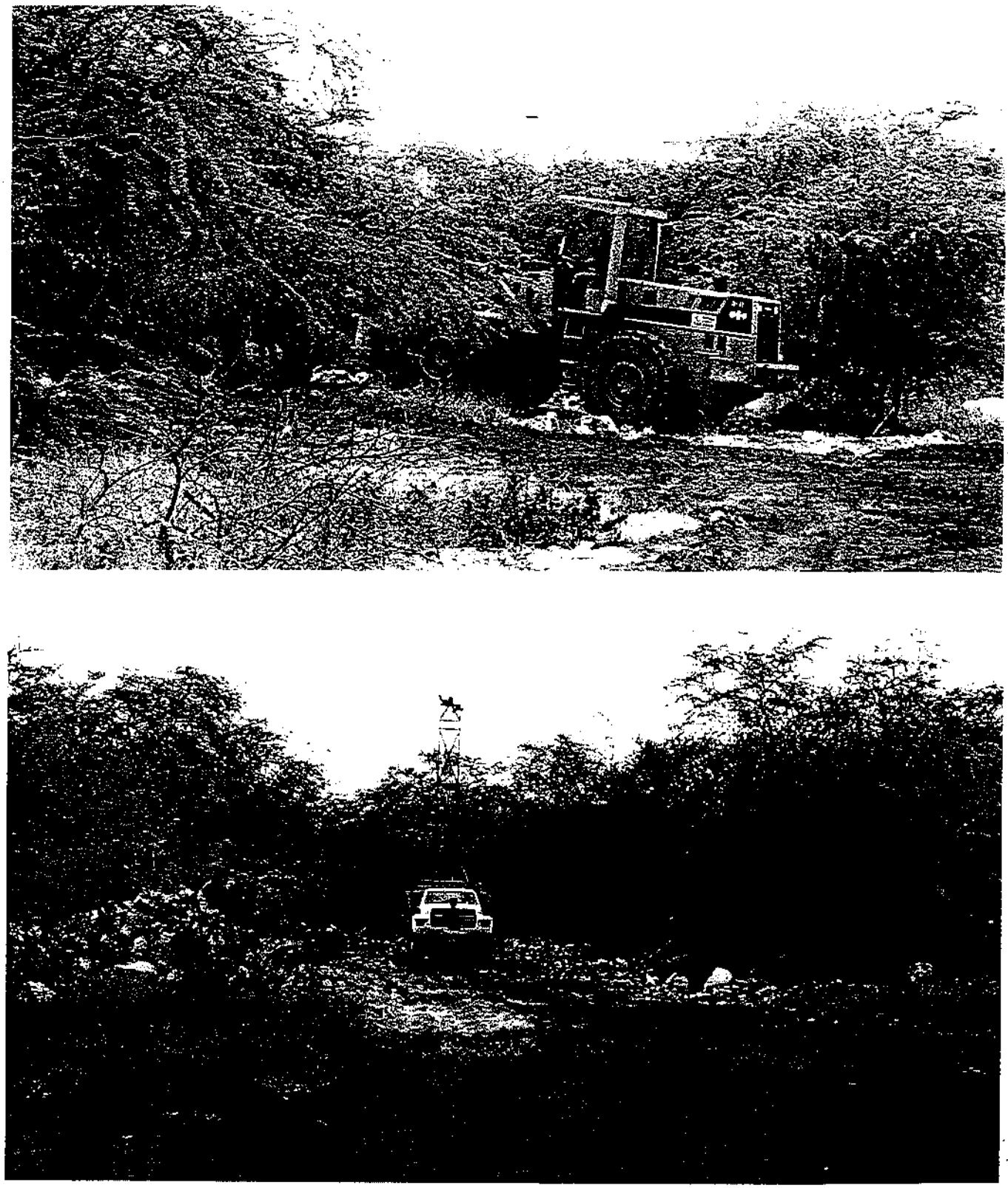

Figure 3. (top) View of Komatsu Loader Clearing Access to B-6, to Southeast
(bottom) View of Truck Mounted Drill Rig at B-3, to East

Aki Sinoto Consulting – Cultural Resource Management
2333 Kapiolani Blvd. No. 2704, Honolulu, Hawai`i 96826 Tel: (808)941-9538 Fax: (808)942-1096

January 29, 2002

Dr. Sara Collins
O`ahu Island Archaeologist
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawai`I 96707

Dear Dr. Collins:

Subject: Post-field Summary and Interim Monitoring Plan for Foundation Borings
Proposed Desalination Plant, Kalaeloa, Honouliuli, O`ahu (TMK 9-1-31:28)

The field portion of the inventory survey has been completed for the above referenced project area, for which yourself, Ms. Elaine Jourdane, and Mr. Eric Komori from your office have made field inspections. The project area is located in a portion of the former Naval Reservation associated with the Barbers Point Naval Air Station as a flight easement for one of the runways. It is located at the eastern terminus of Olai Street adjoining the former Oahu Meat Packers feedlot. A barbed-wire fenceline defines the northern and western boundaries. The eastern boundary runs parallel to the existing drainage channel that separates the Campbell Industrial area with the former Naval Air Station. The southern boundary is currently marked by surveyor's flagging. Much of the area has evidently undergone compounded previous disturbance. Large bulldozed debris piles, fallen *kiawe* trees, and flat clearings comprise much of the area. Roughly one-half of the area is currently still under *kiawe* cover, although signs of former disturbances are evident within these areas as well. Several native plants are present within the *kiawe* area. These consist of *maiapilo* (*Capparis sandwichiana*), *naio* (*Myoporum sandwicense*), and *kauna`oa* (*Cuscuta sandwichiana*). A botanical survey is slated to be completed soon.

A total of eight sinkholes and one cultural feature were investigated during the survey. Although several other sinkholes were located, only those that underwent subsurface testing were assigned a permanent State Site Number. **Site 50-80-12-6373** is a deteriorated, small circular enclosure (3m diameter) with an associated feature consisting of a small, ovoid, cyst-like structure (1.4m long, 1.2 m wide, and .73m high) constructed from leaning upright slabs of karst material. **Site 50-80-12-6375 Features 1-8** are sinkholes that were test excavated. **Site 50-80-12-6374** is an unique historic lime-kiln utilizing a sinkhole; however, it is located within the adjoining 10-acre area *makai* of the current 20 acre project area. Evidence of traditional Hawaiian cultural activities was encountered only at Site 6373 in the form of marine shell midden, sparse fish bones, and one bone artifact, a probable toggle for an octopus lure. Excavations at all of the sinkhole features of Site 6375 produced only the skeletal remains of extinct, extirpated, and possibly extant avifauna. Currently the identifications of the avifaunal materials are pending and will be delayed due to the unavailability of Dr. Alan Ziegler at this time. Currently, other avenues for preliminary identifications are being explored with personnel at the Bishop Museum.

The locations of the investigated sites (square) and sink features (triangles) have been plotted on the attached map along with the proposed ideal bore locations (circles). The client has indicated that the bore locations are flexible and avoidance of sites and features can easily be accomplished.

Completion of the botanical survey prior to the commencement of boring activities has been recommended. Most of the bore locations are in the previously cleared areas and in the periphery of the *kiawe* cover, thus facilitating access. Where access for the truck-mounted equipment needs to be cleared, a small backhoe will be used to clear the vegetation.

All of the sites have been perimeter flagged with wide, yellow caution tape so that the locations are highly visible. The sites have also been numbered with felt marker on yellow and black striped surveyor's tape.

Prior to commencement of the boring activities, the archaeologist shall accompany the contractor and determine each bore location on the ground. For the bore locations requiring clearing; such as B-2, 4, 6, 8, 11, 12, 15, & 16; the archaeologist shall flag the route and also monitor the clearing. Bore locations 11 and 15 will require the most clearing. Three of the bore locations are located close to sites; B-6 near Site 6375-5, B-12 near Site 6375-7, and B-15 near Sites 6373 and Site 6375-8. Access to these areas will be closely monitored to prevent any disturbance to the sites. Whenever feasible, the shortest access route shall be used.

The actual boring may be spot monitored based on the specific bore locality to gain insight regarding ground water levels and the formative geology of the area. However, no culturally sensitive remains are anticipated since all of the boring will be on the solid karst substratum. However, should any inadvertent discovery be made, all standard procedures and protocols shall be followed in the implementation of interim protection and mitigation measures and notification of SHPD as well as other appropriate regulatory agencies.

Currently, we are in the process of completing the preliminary laboratory procedures on the recovered materials, preparation for review draft report production, and finalizing the cultural impact assessment for this project. We request concurrence to this interim monitoring plan to permit the timely implementation of the preliminary foundation investigations so further planning can proceed. As you know, the Board of Water and its consultants are on a very tight timeline and your assistance in expediting the response will be greatly appreciated.

If the representatives from Oceanit or myself can be of any assistance, please do not hesitate to contact us. The contacts at Oceanit are Mr. Travis Hylton and Dr. Dayan Vithanage at 531-3017.

Sincerely,

Aki Sinoto
Consulting Archaeologist

Attachment: map of site and bore locations


TRUE NORTH
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-10
B-11
B-12
B-13
B-14
B-15
B-16
6375-1
6375-2
6375-3
6375-4
6375-5
6375-6
6375-7
6375-8
6373
drainage channel
ADVANCE COF
Subject to Change

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

DEPUTIES
ERIC T. HIRANO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

HAWAI'I HISTORIC PRESERVATION DIVISION REVIEW

Log #: 30934
Doc #: 0210EJ09

Applicant/Agency:	Barry Cheung Oahu District Office
Address:	DLNR/Land Division
SUBJECT:	Request for HECO Offsite Substation to Power BWS Kalaeloa Desalination Plant
Ahupua'a:	Honouliuli
District, Island:	'Ewa, O'ahu
TMK:	(1) 9-1-003:por. 001

1. We believe there are no historic properties present, because:

____ a) intensive cultivation has altered the land
____ b) residential development/urbanization has altered the land
__✓__ c) previous grubbing/grading has altered the land
____ d) an acceptable archaeological assessment or inventory survey found no historic properties
____ e) other:

2. This project has already gone through the historic preservation review process, and mitigation has been completed ___.

__✓__ Thus, we believe that "no historic properties will be affected" by this undertaking

Staff: Elaine Jourdane Date: 10/14/02

Title: Elaine Jourdane-Assistant Archaeologist – O'ahu (Phone: 808-692-8027)

Appendix B

Flora and Fauna Study

BOTANICAL SURVEY
KALAELOA DESALINATION FACILITY
'EWA DISTRICT, O'AHU

by

Winona P. Char

CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: **OCEANIT**

February 2002

BOTANICAL SURVEY
KALAELOA DESALINATION FACILITY
'EWA DISTRICT, O'AHU

INTRODUCTION

The City and County of Honolulu, Board of Water Supply proposes to build a seawater reverse osmosis desalination facility at Kalaeloa, 'Ewa, O'ahu. The proposed desalination facility will include administration and control buildings, a chemical storage building, source water wells, pretreatment facilities, reverse osmosis facilities, a transmission main, brine pond, and reject water disposal facilities. Source water for the desalination will be provided through a network of caprock and basal aquifer wells. Approximately 12 million gallons per day (MGD) of source water will be pumped from the source water well network to produce 5 MGD of potable water.

The facility will occupy about 20 acres of land on the mauka portion of TMK: 9-1-31: 28. The land is undeveloped and was previously part of the Barbers Point Naval Air Station. The project site is bounded to the west and north by lands acquired by the State of Hawaii in 1991 for an Agricultural Park site, on the east by a large drainage canal, and on the south by the undeveloped makai portion of TMK: 9-1-31: 28 which borders the ocean.

Field studies to assess the botanical resources on the project site were conducted on 13 and 15 February 2002. The primary objectives of the survey were to:

1) provide a general description of the vegetation on the site;
2) inventory the flora;

3) search for threatened and endangered species as well as species of concern; and
4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. The survey engineers had flagged the project site prior to our field studies. A reconnaissance site visit was made with the project's archaeologist, Aki Sinoto, to examine access, boundaries, and reference points.

A walk-through survey method was used. Notes were made on plant associations and distribution, disturbances, substrate, drainage, topography, exposure, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium, and for comparison with the recent taxonomic literature. An intensive search was made of the open scrub and kiawe forest alongside the drainage canal as this was the site of an earlier transplantation experiment for the endangered 'Ewa Plains 'akoko (Chamaesyce skottsbergii var. kalaeloana) -- see "Rare Plants" section of this report.

DESCRIPTION OF THE VEGETATION

Two vegetation types are recognized on the project site. Much of site is covered by kiawe forest on karst. More recently disturbed areas such as along the perimeter of the property support open scrub vegetation. An inventory of the plants found in these two vegetation types is presented in the checklist at the end of the report.

Kiawe Forest

In most places, the 20 to 30 ft. tall kiawe trees (Prosopis pallida) form a closed canopy forest, that is, canopy cover is greater than 60% and the branches of the trees interlock. Understory vegetation is sparse and consists of scattered patches of plants where the canopy cover is not dense. Plants found here include a few shrubs of koa haole (Leucaena leucocephala) and maiapilo or native caper (Capparis sandwichiana); herbaceous species such as 'aheahea (Chenopodium murale), Achyranthes aspera, cheese weed (Malva parviflora), and Australian saltbush (Atriplex semibaccata); and bristly foxtail grass (Setaria verticillata) and buffelgrass (Cenchrus ciliaris) which are locally abundant. Besides the maiapilo, other native species observed here include the kupala vine (Sicyos pachycarpus) -- a member of the gourd or squash family (Cucurbitaceae), the naio or false sandalwood (Myoporum stellatum), and kauna'oa pehu (Cassytha filiformis) -- an orange-colored, parastic vine which twines over trees and shrubs.

The substrate is weathered coralline reef which was formed when sea level was higher. The topography is interrupted by numerous sinkholes, and small jagged ridges and limestone masses. Scattered throughout the kiawe forest are jumbled piles of kiawe branches. Portions of the forest may have been cleared in the past for the Naval Air Station operations and also by kiawe cutters harvesting the wood.

Open Scrub

This vegetation type occurs on those areas which have been more or less recently disturbed such as along the drainage canal and adjacent to the perimeter fence line. A bulldozed road also runs down the middle of the property. The substrate is crushed coral

with a thin layer of soil or organic material. In some places such as along the drainage canal the substrate is sandy and there are large piles of sand; these probably represent dredge material or side cast from the canal.

The general physiognomy is open patches of grasses and weeds with scattered young kiawe trees, 5 to 12 ft. tall. On those areas with a layer of thin soil, plant cover is very dense. Bristly foxtail, buffelgrass, and swollen fingergrass (Chloris barbata) are co-dominant and form extensive mats. In places, patches of 'aheahea and golden crown-beard (Verbesina encelioides) are locally common. Areas with sandy substrate support large patches of Australian saltbush, saltbush (Atriplex suberecta), kipukai (Heliotropium curassavicum), and succulent mats of 'akulikuli (Sesuvium portulacastrum). Shrubs found here occur in smaller numbers and include sourbush (Pluchea carolinensis), koa haole, and tree tobacco (Nicotiana glauca).

These disturbed open scrub areas support a large number of weedy species besides those already mentioned above. Other species observed here occasionally include Bermuda grass (Cynodon dactylon), Flaveria trinervia, lion's ear (Leonotis nepetifolia), Chinese violet (Asystasia gangetica), cheese weed, and Achyranthes aspera.

RARE PLANTS

In February 1979, Campbell Estate and Kawahara Nursery transplanted roughly 218 plants of the 'Ewa Plains 'akoko (Chamaesyce [syn. Euphorbia] skottsbergii var. kalaeloana) to the western banks of the drainage canal separating Campbell Industrial Park from the Barbers Point Naval Air Station; this is on TMK: 9-1-31: 28. The survival rate was poor with only about a dozen plants

still alive on May 1980. The lack of continued watering was cited as the single most critical deficiency in the experimental transplantation project. Other factors included salt spray from Kona winds and trampling of the plants from persons collecting kiawe firewood. In March 1981, only two plants were alive (Aecos 1981). Subsequent site visits found that all the plants had died and no seedlings were present. The 'akoko was officially listed as endangered by the U.S. Fish and Wildlife Service in 1982; plants on the Services' list are automatically included on the State's list of threatened and endangered species.

During this field study, an intensive search was made for the 'akoko along the entire length of the property bordering the drainage canal, but no plants or seedlings were found.

Two species of concern (U.S. Fish and Wildlife Service 1999a) are found on the project site; these are the maiapilo or native caper (Capparis sandwichiana) and the naio or false sandalwood (Myoporum stellatum). Species of concern do not receive legal protection under Federal and State endangered species laws. Species of concern are monitered by the U.S. Fish and Wildlife Service for more biological and/or taxonomic information, changes in population numbers, threats, etc. If the species begins to decline dramatically, then conservation actions may be initiated including listing as a threatened or endangered species.

The maiapilo can be found in coastal lowlands throughout the Hawaiian Islands, while Myoporum stellatum is restricted to the 'Ewa Plains. Because of its restricted distribution and development in the 'Ewa area, the Myoporum is considered a high priority species of concern (U.S. Fish and Wildlife Service 1999a; Wagner et al. 1999).

DISCUSSION AND RECOMMENDATIONS

Two general vegetation types dominated by introduced species occur on the project site. Closed canopy kiawe forest occupies those areas with eroded and pitted coralline substrate. Open scrub vegetation composed almost exclusively of a mixture of grasses and weedy annuals with scattered young kiawe trees is found on the more recently disturbed areas with crushed coral and thin soils or sand.

The majority of the plants inventoried on the project site are introduced or alien species. Introduced species are all those plants which were brought to the Hawai'i by humans, intentionally or accidentally, after Western contact, that is, Cook's arrival in the islands in 1778. Of a total of 50 species observed on the site, 39 (78%) are introduced and 11 (22%) are native. Of the native species, eight are indigenous, that is, they are native to Hawai'i and elsewhere, and three are endemic, that is, they are native only to Hawai'i. The endemic species are the kupala (Sicyos pachycarpus), maiapilo (Capparis sandwichiana), and naio (Myoporum stellatum).

No threatened and endangered species (U.S. Fish and Wildlife Service 1999a, 1999b) were found on the site. No plants of the endangered 'Ewa Plains 'akoko which were transplanted to the site in 1979 by Campbell Estate and Kawahara Nursey (Aecos 1981) were found during this survey. Two species of concern, the maiapilo and Myoporum stellatum, occur on the property. Both species are excellent candidates for landscaping as they are of ornamental value and are adapted to the local growing conditions. They would require little soil and water. The maiapilo has large, attractive, fragrant, white flowers, while the Myoporum has attractive foliage and fragrant flowers.

In summary, the proposed desalination facility is not expected to have a significant negative impact on the botanical resources as the majority of the vegetation is composed of introduced or alien species. It is recommended that native lowland species be used for landscaping the facility, including the maiapilo and Myoporum. The City and County's Honolulu Botanic Gardens should be contacted to propagate the maiapilo and Myoporum from the project site.

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PLANT SPECIES LIST -- Kalaeloa Desalination Facility

The following checklist is an inventory of all the plants observed on the project site during the field studies. The plant names are arranged alphabetically by family within each of two groups: Dicots and Monocots. The taxonomy and nomeclature of the flowering plants, Dicots and Monocots, follow Wagner et al. (1990), and Wagner and Herbst (1999). The few recent name changes are in accordance with those reported in the Hawaii Biological Survey series (Evenhuis and Eldredge, editors, 1999-2000).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
   - E = endemic = native only to the Hawaiian Islands.
   - I = indigenous = native to the Hawaiian Islands and elsewhere.
   - I? = questionably indigenous = data not clear if dispersal to the islands by natural or human-related mechanisms, but weight of evidence suggests probably indigenous/natural.
   - X = introduced or alien = all those plants brought to the islands by humans, intentionally or accidentally, after Western contact, that is, Cook's arrival in the Hawaiian Islands in 1778.
   - X? = questionably introduced = date of introduction unclear or very soon after Western contact; may possibly be indigenous or of Polynesian introduction.
4. Presence (+) or absence(-) of a particular species within each of two vegetation types recognized on the project site (see text for discussion):
   - k = Kiawe Forest
   - s = Open Scrub

AVIFAUNAL AND FERAL MAMMAL SURVEY OF PROPOSED BWS KALAELOA DESALINATION FACILITY, KALAELOA, EWA, OAHU, HAWAII

Prepared for: Oceanit

Prepared by:

Phillip L. Bruner
Environmental Consultant
Faunal (Bird & mammal) Surveys

3 June 2002

INTRODUCTION

The purpose of this report is to provide the findings of a two day (2, 9 May 2002) field survey of the proposed Kalaeloa Desalination Facility site (Fig. 1). In addition, references to other studies and pertinent literature are also noted in the report. These sources are included to give a broader perspective to the results of the field work. The primary objectives of the field work were to:

1- Document the species of birds and mammals currently seen on or near the site.

2- Focus attention on any native or migratory species encountered on the survey.

3- Note any unusual resources important to native or migratory species.

METHODS OF SURVEY

The site was examined on two separate visits. The entire area was covered on foot. Lands to the west and along the shoreline were also walked for a distance of approximately 200 meters. The drainage canal to the east was not crossed. Observations were made during the early morning hours when birds are most active. Some data were also obtained later in the day. All birds seen or heard were identified and tallied.

Scientific and common names of birds used in this report follow Pyle (1997). Mammal names follow Honacki et al. (1982). Weather during the survey was generally

clear with light easterly winds. Several people were seen fishing along the shoreline to the south and west of the site on both days of the survey.

GENERAL SITE DESCRIPTION

A wide drainage canal filled with seawater forms the east boundary of the area surveyed. Industrial facilities lie to the north. Abandoned cattle feed lots and open brush covered habitat form the western and southern boundaries. A rocky shoreline occurs nearby but not on the property. Kiawe trees and an understory of grass and weeds dominate the vegetation on this site.

RESULTS

NATIVE LAND BIRDS:

No native species were observed on the survey. The only species in this category that might occur on rare occasions in this area is the Short-eared Owl or Pueo (*Asio*

flammeus sandwichensis). This species is listed as endangered on Oahu by the State of Hawaii. Pueo forage over fields as well as forests. They nest on the ground and are therefore subject to ground predators such as dogs, cats and the Small Indian Mongoose (*Herpestes auropunctatus*) (Pratt et al. 1987, Hawaii Audubon Society 1993). Pueo have been recorded on lands in this region of Oahu. Bruner (1989a, 1989b, 1990, 1991, 1994, 1997, 2001) provide further information on both native and introduced birds in this area of Oahu.

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No native waterbirds were noted on the survey. The only species that might occasionally forage along the nearby shoreline and the canal would be the Black-crowned Night-Heron (*Nycticorax nycticorax*). This species is not listed as endangered or threatened. They utilize a wide variety of wetland habitats including coastal wetlands and rocky shorelines. No habitat suitable for waterbirds was found on the property proposed for the development of the Desalination facility. However, a drainage canal borders the site.

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Two species of migratory shorebirds were tallied on the survey. One Pacific Golden-Plover (*Pluvialis fulva*) was seen foraging on a small beach at the north end of

the canal. This species is the most abundant migratory shorebird that winters in Hawaii. They have been extensively studied in both Hawaii and on their breeding grounds in western Alaska (Johnson et al. 1981, 1989, 1993, 2001). Plover depart Hawaii for Alaska around the 25 April each year. A few birds "over-summer" in Hawaii and do not migrate to the Arctic. These are usually young birds that did not obtain sufficient fat to migrate or older birds that might be injured. The plover seen on this survey was not in breeding plumage and was probably a young bird. During the months of August through April many more plover would be seen in this area. These would be wintering birds. Most of these individuals establish foraging territories that they actively defend. Three Wandering Tattler (*Heteroscelus incanus*) were observed foraging along the edge of the canal and shoreline on day two of the survey. They were in breeding plumage so were probably not "over-summering" birds. Tattler may depart for their arctic grounds a little later than plover (pers. observations). Both Pacific Golden-Plover and Wandering Tattler are not listed as endangered or threatened. Their occurrence at this site was expected.

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No seabirds were seen on the survey. They can be observed offshore but no habitat suitable for nesting occurs in this area. Mammalian predators and human disturbance limit seabird nesting on the main Hawaiian Islands to only a few protected localities (Pratt et al. 1987, Hawaii Audubon Society 1993).

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CONCLUSIONS

This field survey recorded the usual mix of birds and mammals typical of this type of habitat in this region of Oahu. No unusual or unexpected species were recorded. No endangered or threatened species were observed. The habitats at this location are those commonly found in coastal West Oahu. No unusual or particularly important natural resources were noted. The canal and nearby rocky shoreline are used by migratory shorebirds and would likely still be used to the same degree even if the land in this area were developed. These birds have learned to forage in many areas disturbed by human activity as well as in undisturbed sites.

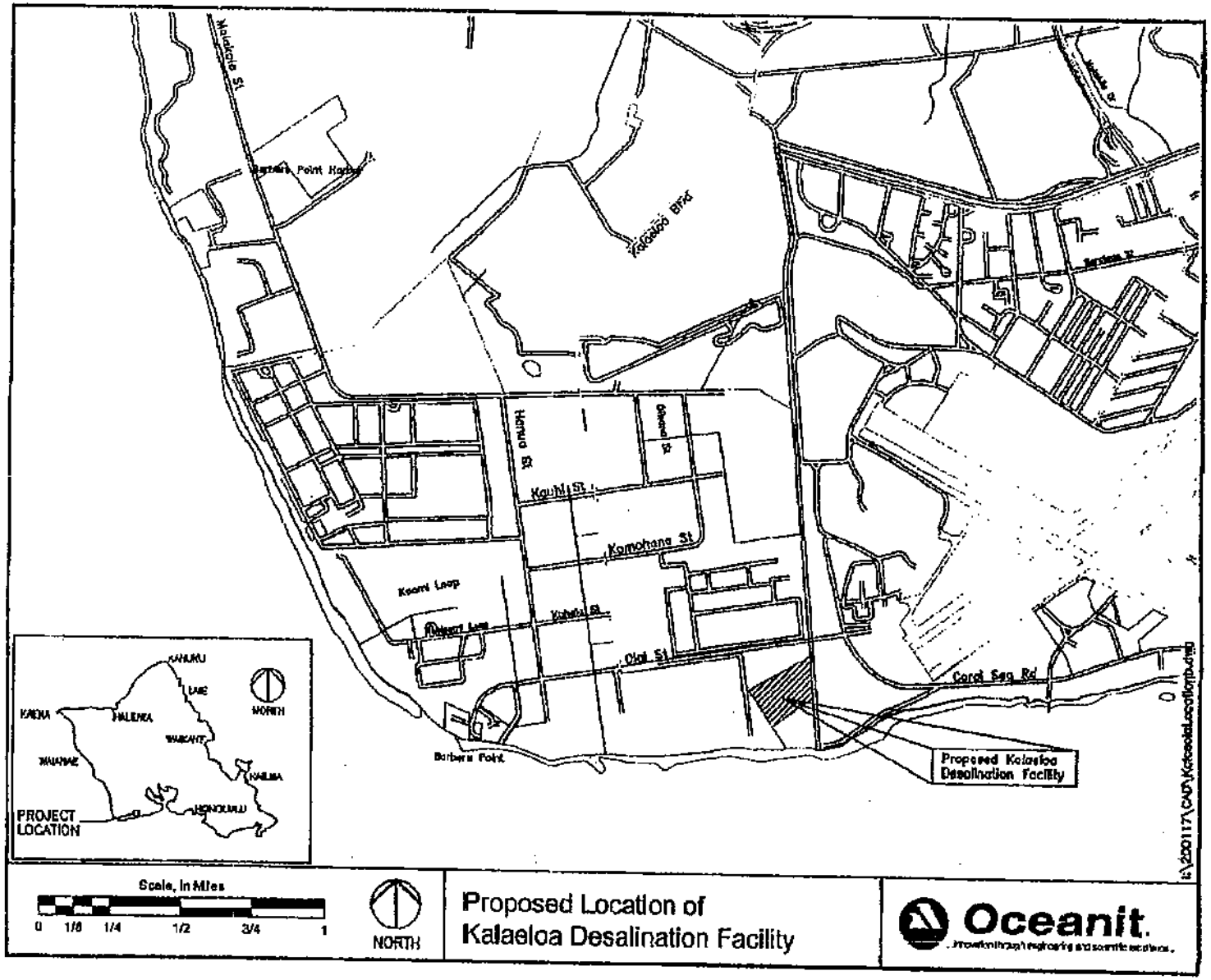

Fig. 1. Location of faunal survey.

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Introduced birds recorded at Kalaeloa, Ewa, Oahu. Relative abundance estimated by tallies of birds made over the two days of the survey. Abundant (A) = 20+/day, Common (B)= 10-19/day, Uncommon (U) = 5-9/day, Rare (R) = total for survey less than 4.

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Zebra Dove	*Geopelia striata*	A
Red-vented Bulbul	*Pycnonotus cafer*	C
Northern Mockingbird	*Mimus polyglottos*	R = 2
Common Myna	*Acridotheres tristis*	U
Japanese White-eye	*Zosterops japonicus*	C
Northern Cardinal	*Cardinalis cardinalis*	C
Red-crested Cardinal	*Paroaria coronata*	A
House Finch	*Carpodacus mexicanus*	A
House Sparrow	*Passer domesticus*	U
Common Waxbill	*Estrilda astrild*	A
Warbling Silverbill*	*Lonchura malabarica**	C
Java Sparrow	*Padda oryzivora*	U

* The Warbling Silverbill has recently had a name change to African Silverbill (*Lonchura catans*) (AOU 2000).

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CHAR & ASSOCIATES
Botanical / Environmental Consultants
4471 Puu Panini Ave.
Honolulu, Hawaii 96816
(808) 734-7828

15 January 2003

OCEANIT
1001 Bishop Street
Pacific Tower, Suite 2970
Honolulu, Hawaii 96813

Attention: Derrick Elfalan

SUBJECT Review of Botanical Resources
Proposed Electrical Substation
Kalaeloa Desalination Facility

Dear Mr. Elfalan:

A botanical survey report for the Board of Water Supply's (BWS) seawater reverse osmosis desalination facility at Kalaeloa, 'Ewa, O'ahu, was prepared in February 2002 by Char & Associates. The study covered the mauka portion of TMK: 9-1-31: 28, roughly 20 acres. The BWS is proposing to acquire an additional 1.39 acres (a portion of TMK: 9-1-31: 01) for a proposed HECO substation. The 1.39-acre parcel is located between Olai Street and the desalination facility parcel.

A review of the botanical resources on the 1.39-acre site was made; no field studies were conducted. The earlier field studies conducted for the desalination facility, conducted on 13 and 15 February 2002, covered a portion of the 1.39-acre parcel; the field notes from this earlier study were reviewed. Recent colored photographs of the site taken by Oceanit and a topographic map of the site were also examined.

The topography on the 1.39-acre parcel is relatively level except for the portion facing the existing drainage canal. In this area, there is a berm of boulders, soil, and sand. Kiawe trees (Prosopis pallida) form a narrow band in this area. The rest of the parcel has been bulldozed and disturbed and the vegetation occurs as scattered patches; there are large areas with barren soil or a mix of soil and coral rubble. Among the most frequently observed plants are buffelgrass (Cenchrus ciliaris), saltbush (Atriplex suberecta), swollen fingergrass (Chloris barbata), Australian saltbush (Atriplex semibaccata), aheahea (Chenopodium murale), and golden crown-beard (Verbesina encelioides). A few young kiawe saplings and shrubs of koa haole (Leucaena leucocephala) and sourbush (Pluchea carolinensis) can also be found here.

No threatened and endangered species or species of concern (U.S. Fish and Wildlife Service 1999; Wagner et al. 1999) were noted from this parcel during the earlier botanical survey. The majority of the site has been disturbed and leveled and supports patches of weedy, scrub vegetation.

Given these findings, the proposed use of the 1.39-acre site for an electrical substation is not expected to have a significant negative impact on the botanical resources. All of the plants can be found in similar disturbed, lowland, leeward habitats throughout the Hawaiian Islands.

If you have any questions regarding this letter report, please do not hesitate to contact me.

Sincerely,

Winona P. Char

Winona P. Char

References

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Prepared for: Oceanit

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Environmental Consultant
Faunal (Bird & mammal) Surveys

3 June 2002

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The purpose of this report is to provide the findings of a two day (2, 9 May 2002) field survey of the proposed Kalaeloa Desalination Facility site (Fig. 1). In addition, references to other studies and pertinent literature are also noted in the report. These sources are included to give a broader perspective to the results of the field work. The primary objectives of the field work were to:

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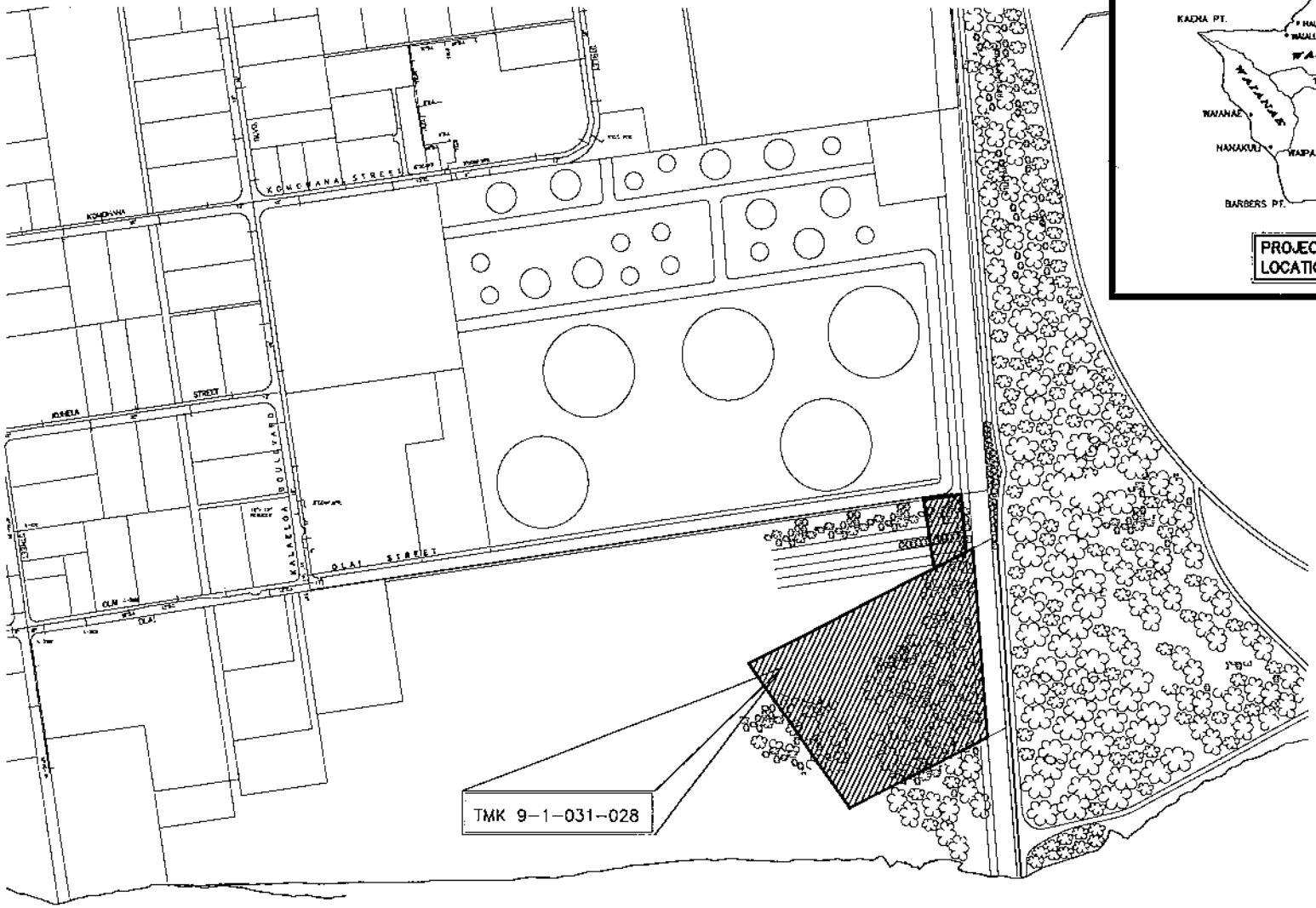

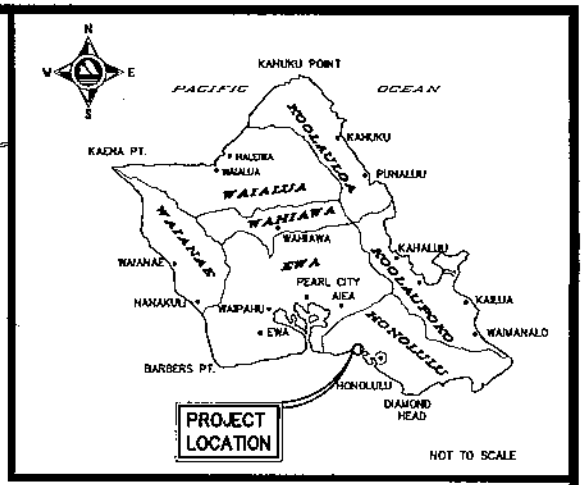

Scale, In Feet

0 500 1000 2000

Phillip L. Bruner
Environmental Consultant
Faunal (Bird & Mammal) Surveys

Figure I - Location of Faunal Survey

Kalaeloa Desalination Facility

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

TABLE ONE

Introduced birds recorded at Kalaeloa, Ewa, Oahu. Relative abundance estimated by tallies of birds made over the two days of the survey. Abundant (A) = 20+/day, Common (B)= 10-19/day, Uncommon (U) = 5-9/day, Rare (R) = total for survey less than 4.

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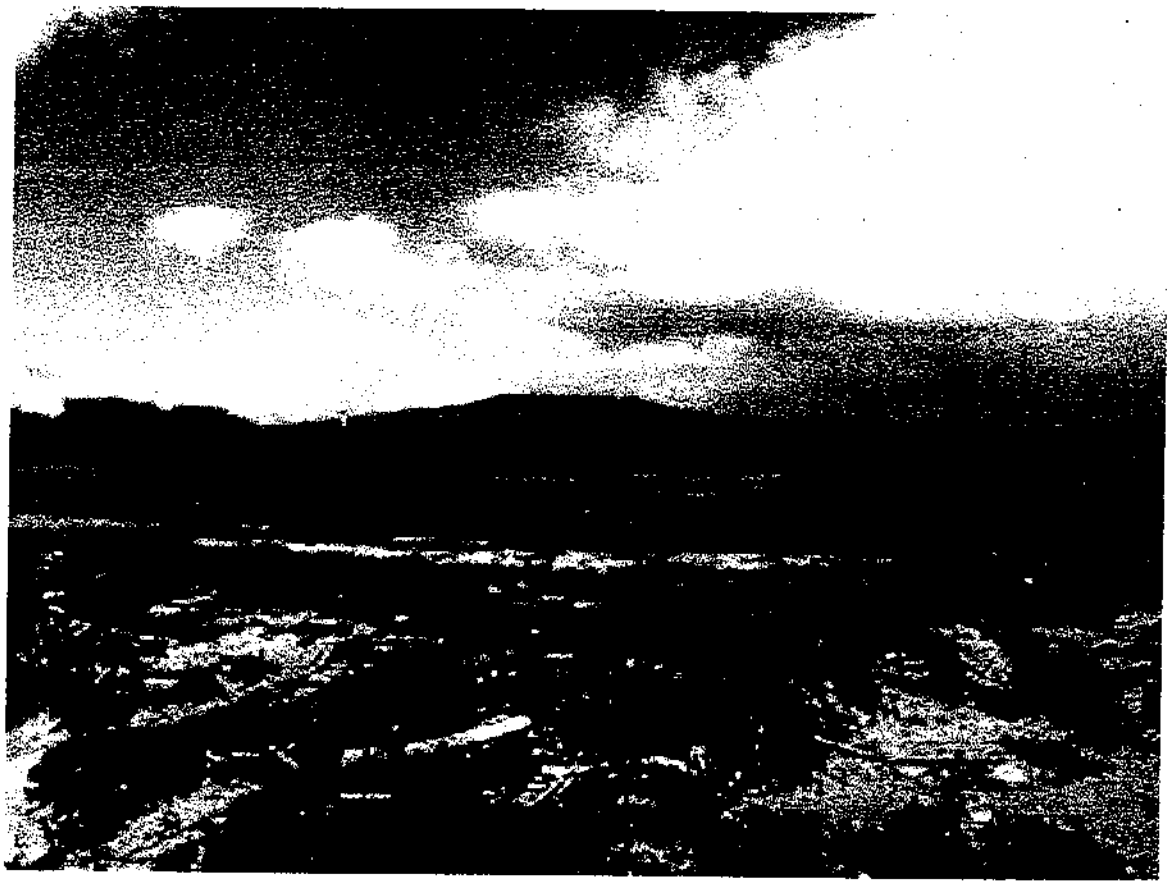
Appendix C

Cultural Impact Study

Kalaeloa:
*Ahupua`a* of Honouliuli, `Ewa *Moku*
A Cultural Impact Assessment



Aki Sinoto Consulting
2333 Kapiolani Blvd. No. 2704
Honolulu, Hawaii 96826

INTRODUCTION

The current cultural impact assessment was prepared in conjunction with an archaeological inventory survey undertaken by Aki Sinoto Consulting of Honolulu, under contract to Oceanit Laboratories, Inc. at the site of a desalination plant being proposed by the Honolulu Board of Water Supply. The project area consists of a c. 20-acre area (TMK 9-1-31:28) located at the seaward southeastern terminus of the Campbell Industrial Park complex at Kalaeloa, Honouliuli, `Ewa, O`ahu Island (Fig. 1).

MANDATE AND METHODS

This cultural impact assessment follows the methodology and protocol as set forth by the OEQC's *Guidelines for Assessing Cultural Impacts* (November 19, 1997) in meeting Section 343-2 (recently amended by Act 50) of the Hawaii Revised Statutes. This and other statutes, regulations, and laws stipulate the promotion and preservation of cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups. Information obtained through the conduct of informant interviews and other pertinent research was initially used to gauge the levels of current cultural use of the subject area and subsequently applied towards assessing the potential impact of the proposed development to existing cultural practices and beliefs. The tasks undertaken included:

1) identifying individuals with expertise regarding the cultural practices and beliefs of the area,
2) conducting informal interviews with identified individuals,
3) conducting documentary research,
4) identifying the resources, practices, and beliefs within the project area,
5) evaluating the impact of the proposed development, and
6) recommending appropriate mitigation measures, as warranted.

Literature and historic documents review were conducted in conjunction with this study and the inventory survey. Materials available at the State Historic Preservation Division library in Kapolei; the Department of Accounting and General Services Survey Office, The Department of Land and Natural Resources Bureau of Conveyances, the Hawaii State Library, and the Hamilton Library at UH Manoa, all in Honolulu

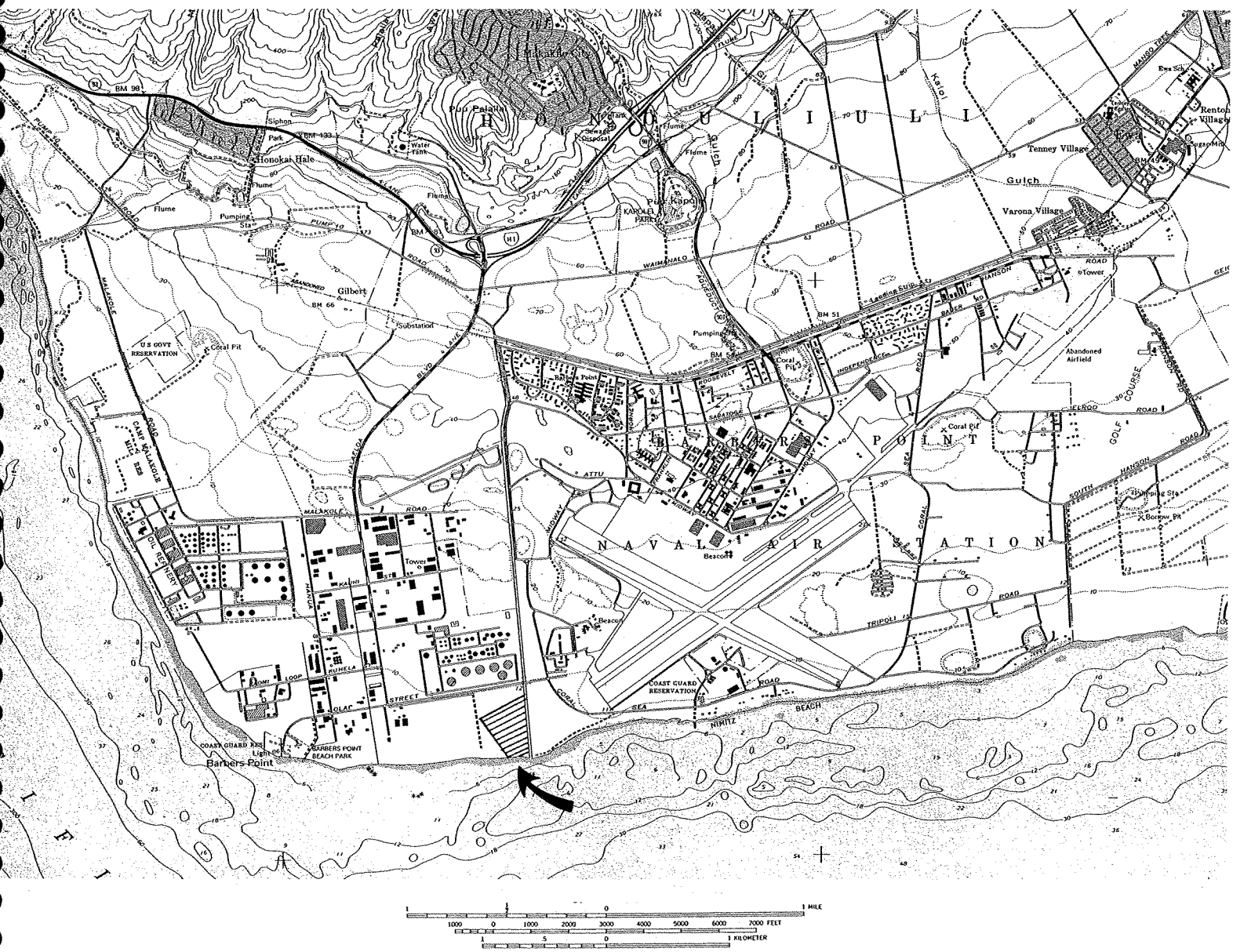


Figure 1. Location of Project Area on USGS Ewa Quadrangle

`EWA MOKU

Kamakau tells us that in the old days the lands were not divided. But when the population grew, the lands were divided and given names so the people could identify what those lands were called and where they were located. Sometimes names changed, depending on a chief or famous person who lived in an area, or because an important event like a battle or a famous occurrence took place. In this way both large and small areas of all islands were named.

Regarding the naming of `Ewa *moku*, Kamakau further notes that:

> Wailuanuiahoano was born at `Ewa and his descendants went to Kaua`i and to Maui, and wherever they settled they called the land after the name of their ancestor. Wailua was a descendant of La`akona, the father of `Ewa and of Kaho`anookalani. His name, Wailuanuiahoano, came by adding the name of his mother, and thus he became Wailua-(the)-great-son of Ho`ano. Thus, some names were derived from those of ancestors (1976:7).

Sometimes people in old days gave names from the resemblance to a man, a house, a pig, a bird, and various other things, and thus names were attached to the divisions of land . The name `Ewa was derived in this way.

Land in ancient times was more than just the earth that was used for farming, traveling upon, or for building one's *hale*. Land had the status of kin and was an integral part of the lives of the people. Land was what nurtured the people. The people in turn nurtured the land.

Native Hawaiian culture recognizes a familial relationship between the *`aina* (land), the *kalo* plant (taro, the staple food), the *ali`i nui* (high chiefs), and the Hawaiian people. This relationship is the foundation for what Kame`eleihiwa describes as duty, or *kuleana*:

> In traditional Hawaiian society, as in the rest of Polynesia, it is the duty of the younger siblings and junior lineages to love, honor, and serve their elders. This is the pattern that defines the Hawaiian relationship to the *`aina* and the *kalo* that together feed *ka lahui Hawaii* (the nation). Thus, the modern concepts of *aloha `aina*, or love of the land, and *malama `aina*, or serving and caring for the land, stem from the traditional model established at the time of *Wakea*. The Hawaiian does not desire to conquer his elder female sibling, the *`aina*, but to take care of her, to cultivate her properly, and to make her beautiful with neat gardens and careful husbandry." (1992:25)

Gutmanis further notes, "all the elements of the heavens, the earth, and the seas, including the various classes of men and their gods, are interdependent. Nowhere is this interdependence more visible than in the relationships of the chiefs, the people, and the land." (1983:104)

And so it was in ancient times on all the islands of Hawaii, in each *moku* and each *ahupua`a*. This interdependence was evident in the numbers of people who lived and were sustained in their lifestyle in the `Ewa *moku*. The size of this district, largest on the island of O`ahu, and the relatively dry character of the land seem to imply, today, that it was always desolate and resource-poor, lacking streams to give it life. But ancient stories indicate otherwise.

KALAELOA

Located in the `Ewa *moku* is the *ahupua`a* of Honouliuli. And within Honouliuli *ahupua`a* is the area that is today called Kalaeloa. The State of Hawai`i included in its 1963 *Land Use Districts for the State of Hawai`i* a description of `Ewa district that reflected the ancient understandings of chiefly boundaries. Thus `Ewa district, then and now, included all of the Pearl Harbor basin area, the entire Barbers Point peninsula, stretching from the West Loch of Pearl Harbor to Nanakuli in the Wai`anae Mountain range. The importance of Kalaeloa, formerly Barber's Point, can only be understood in the context of the surrounding area. That special placement makes its history and character unique, and affirms that the ancient thriving community of *Kanaka Maoli* who lived there was connected to and interdependent with the heavens and earth, the seas and rains, and the multitude of the gods in a very place-specific way. Kalaeloa, within Honouliuli, within `Ewa *moku*, fed the people and the people fed the land, and both thrived.

AHUPUA`A

Ancient Hawaiians developed a system for managing the resources of each island based on the *ahupua`a*, a land division that stretched from the mountain to the sea and extended beyond the reefs. In this way, they managed water that flowed downward (from *mauka* to *makai*) for farming, fishing, and everyday use. The people made sure that the water that reached the shore was free of

sediment and suitable for nourishing the sometimes numerous fishponds and reefs that lined the shores and provided them with marine resources, food and medicine, and clean water for swimming and bathing. Around this system developed a series of *kapu*, or restrictions, to ensure proper use of all resources, land and water, ocean and wind, people and gods. The water sources in the mountains were in the province of the gods, the *wao akua*. Man's place was in the *wao kanaka* and extended *makai* to the *kula* lands, the reefs and beyond.

Protocols were developed and maintained to protect the water flowing from the upland streams, out of which a system of laws called *Kanawai* arose, determining usage rights and responsibilities. Streams did not always flow above the ground. Water bubbled up from beneath the ground in various places, both on land and off the coastline. Ancient Hawaiians knew this, and when at sea for a long time, they carefully gathered fresh water to drink from the sea bottom, diving down with empty gourds to harvest fresh water coming up through the seabed. The water that was held in the mountains, as if in very large thermos bottles, found its way to the ocean in many ways and fed the people [Kubota 1997].

*Ahupua`a* were part of larger political regions called *moku*, ruled by greater and lesser chiefs, and these districts in turn were part of the four *mokupuni* (larger islands) of Kaua`i, O`ahu, Maui and Hawai`i, ruled by *ali`i nui*, the great chiefs. The smaller islands of Kaho`olawe, Lana`i and Moloka`i became *moku* of Maui, and Ni`ihau became a *moku* of Kaua`i. On the *mokupuni* of O`ahu, the six *moku* were `Ewa, Wai`anae, Wai`alua, Ko`olauloa, Ko`olaupoko and Kona. These *moku* designations, as well as the *ahupua`a* within each *moku*, are identified on present-day maps of O`ahu, and are part of our current system of land identification using tax map keys.

Ahupua`a* were often entire valleys, affording those who lived in them access to resources from *mauka* to *makai*, and in some instances, allowing gathering across an *ahupua`a boundary. The *ahu*, a stone altar, marked the division between one *ahupua`a* and another. The pig (*pua`a*) or an image of a pig, carved of wood and sometimes dyed red, was placed on the *ahu* as *ho`okupu* (a

ceremonial gift) during the *makahiki* season; as priests carrying the god Lono (in the form of an image) made their way on trails around each island to collect tribute.

Ahupua`a* boundaries were identified by stone markers, and as the god traveled along the trail, priests made note of which *ahupua`a had been blessed with bountiful harvests, and which had not. *Ahupua`a* names were important. Years later, at the time of the *Mahele* and the redistribution of lands by Kamehameha III, it was clearly evident that everyone had common knowledge of *ahupua`a* names and locations. Thus, the King's distribution of land by name of the area was understood by the chiefs. The 245 chiefs who received lands affixed their signatures to a paper that signified their understanding of which lands they were acquiring and where those lands were located.

Each *ahupua`a* is unique. Mountain ridges generally define the upper borders of each *ahupua`a*. Other markers are used to define the boundaries at lower elevations. While all *ahupua`a* vary in shape and size on each of the islands, the majority are connected to the shoreline, allowing accessibility to ocean resources for the people living there. Some *ahupua`a* did not go all the way to the mountains, such as Ho`ae`ae in the `Ewa *moku*. On O`ahu island, Honouliuli *ahupua`a* has the longest coastline, but lacks in rain. According to the *Sites of O`ahu* map (*Ka Mokupuni `O O`ahu*), the `Ewa *moku* includes 13 *ahupua`a*, the largest of which is Honouliuli. East of Honouliuli are Pu`uloa, Ho`ae`ae, Waikele, Waipi`o, Waiawa, Manana, Waimano, Waiau, Waimalu, Kalauao, Aiea, and Halawa (Fig. 2). Their combined coastline is extremely long, and access to ocean resources in `Ewa *moku*, especially in ancient times, contributed to the wealth of those lands.

The area called Kalaeloa has a rich and interesting cultural and spiritual history not commonly known and seldom talked about. Formerly called Barbers Point, Kalaeloa lies at the southwest end of O`ahu Island, in the *ahupua`a* of Honouliuli, `Ewa *moku*. A local historian from the `Ewa district notes that Kalaeloa ('the long point') refers to the cape that was known, originally, as Kanahili. He cites an 1825 map by C.R. Malden, cartographer on

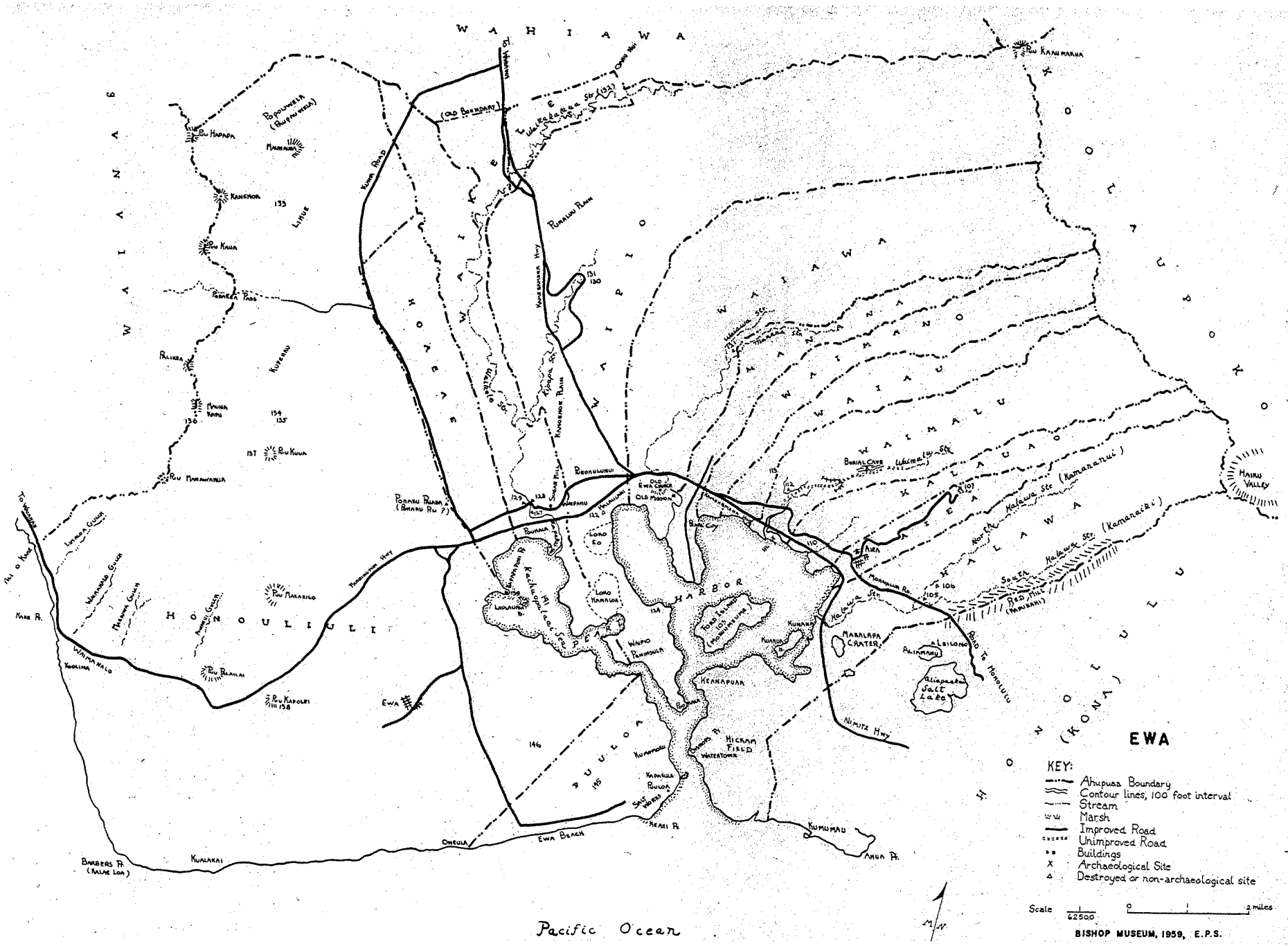


Figure 2. Map of `Ewa *Moku* (from Sterling and Summers 1978)

one of Vancouver's visits to O`ahu (Fig. 3), in which the name Kanahili appears as the ancient name for the Kalaeloa area. The name Kanahili apparently fell into disuse over time, as aboriginal residents of the area were relocated (or displaced) after Western settlers introduced diseases and began to acquire and develop lands in the `Ewa plain for different, non-traditional purposes. Ogden (1999) mentions an earlier name of Kalaeloa as 'Point Banks', so named in 1786 by Captain Nathaniel Portlock in honor of Joseph Banks, from Cook's first voyage to the Pacific. Captain Portlock was a British explorer who commanded the British vessels *King George* and *Queen Charlotte*, that anchored off the coast of O`ahu in 1786. Ogden further notes that ten years later, in October 1796, Captain Henry Barber of the ship *Arthur* went aground on the coral shoal. The area was then renamed Barber's Point, after Captain Barber.

For Hawaiians, understanding of a geographic feature or area is always dependent on context, including geographic, hydrologic and historical settings. As mentioned earlier, understanding concepts of connection and interconnectedness are important to grasp how and why ancient Hawaiians came to live in particular areas and the kind of interactions that took place between people and their environment for sustainable living over long periods of time. Ancient Hawaiians were practitioners, for the most part common people. As *maka`ainana*, they were, indeed, the 'people who attended the land,' consciously making decisions about how to manage the resources upon which their lives depended.

Western settlers who desired to cut land into parcels for easy fencing, sale, and development established arbitrary boundaries. This occurred in the area now called Kalaeloa. However, they failed to take into account traditional knowledge of the natural relationship between the Wai`anae mountain range, the rain, and the ocean; or the flow of water under the land and its ability to surface in seemingly dry areas on or near the coastline. While from a strictly geographic perspective those early planners found the `Ewa district a dry area, void of natural resources; in more ancient times the whole coastline was populated, with people moving to and from the higher and lower elevations as weather and the changing seasons dictated. Kalaeloa, in the `Ewa plain, was the site of

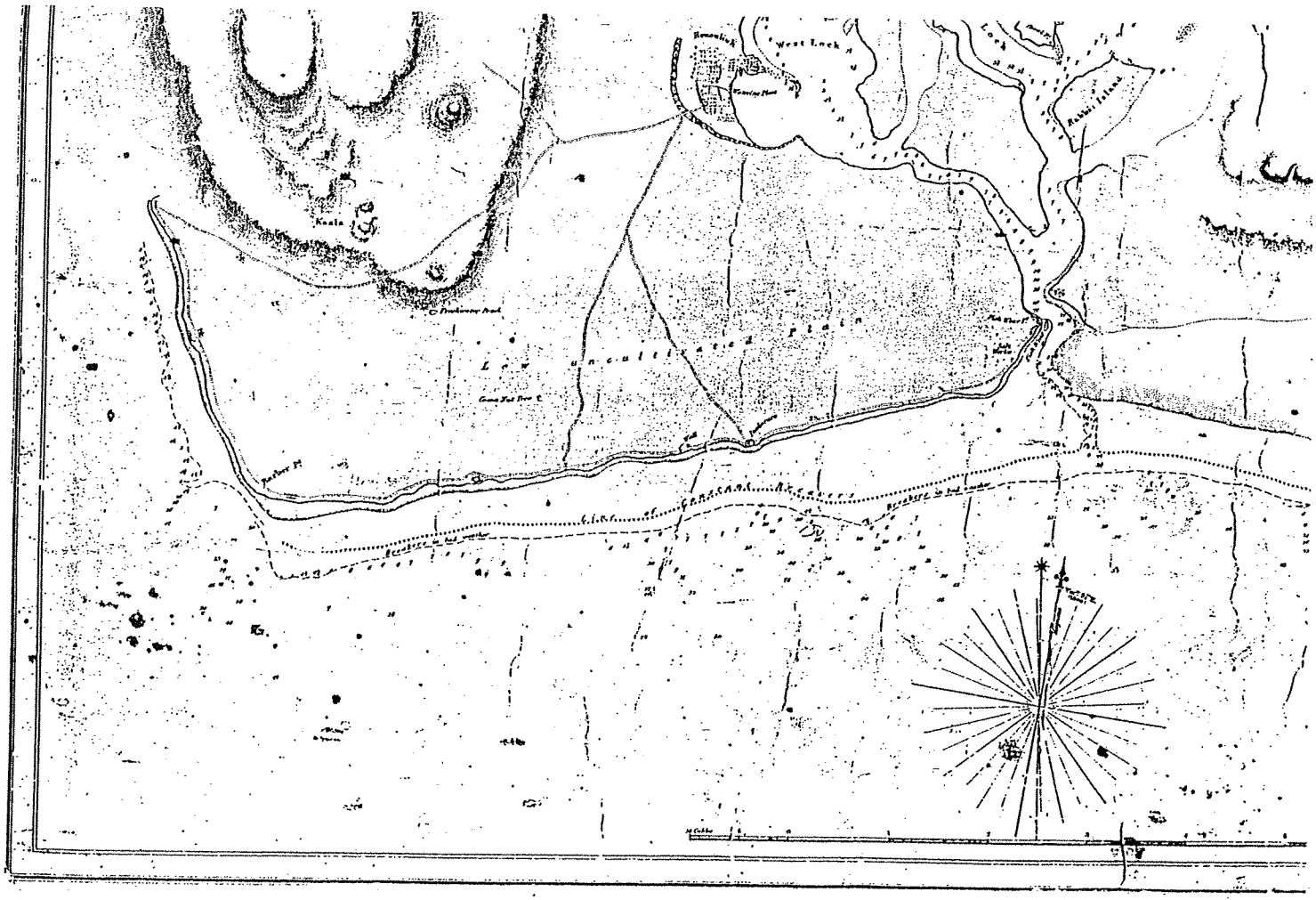


Figure 3. Portion of 1825 Map by Lt. R.C. Malden Showing the Ewa Plain and Pearl Harbor

habitation and innovation, of industry and intrigue. Battles were fought here, while the *maka`ainana* continued their lives, fishing and farming, using dry land techniques developed over centuries, and trying to steer clear of *ali`i* warriors battling for control over those resources. Native plants thrived in `Ewa. Food resources were plentiful, making these lands desirable.

THE ORAL HISTORY OF OUR KUPUNA

`Ewa is included in many of the oral traditions of O`ahu Island attesting to the importance of this *moku* in times of old.

MEANING OF `EWA

Sterling and Summers note, in *Sites of O`ahu*, possible meanings of `Ewa. One story tells of Kane and Kanaloa surveying O`ahu and coming across the broad `Ewa plains. The land they saw spread out before them was so beautiful they decided to mark boundaries by hurling stones. Where the stones landed would be a boundary. One stone went as far as the Wai`anae range, and landed somewhere in the Waimanalo section, but when they went to look they couldn't find it. So they named the area `Ewa, which means 'strayed,' and the place became known by that name: 'the stone that strayed.'

But eventually the stone was found at Pili o Kahe, the spot where two small hills of the Wai`anae range form the boundary between Honouliuli and Nanakuli (of `Ewa and Wai`anae). Ancient Hawaiians said the hill on the `Ewa side was male, and the hill on the Wai`anae side was female. The stone was found on the Wai`anae side hill and the place is known as Pili o Kahe, meaning to 'cling to the place called Kahe'. This story was shared with Sterling and Summers by Simeon Nawa`a in 1954. In ancient times this area was favored by O`ahu kings.

`EWA TRAILS

John I`i talks about the various trails leading from Kikihale, in Honolulu, to `Ewa where, as a boy, he met with his attendants who brought with them the god Ka`ili, and together they proceeded to Ho`ae`ae. Past Waiawa was a stream called Kukehi, and I`i remembered the names of the trails leading to `Ewa. Near Kukehi the trail branched into three separate trails to Pu`u-o-kapolei, Pohakea and Kolekole, all within the `Ewa district (Fig. 4). Remnants of these trails exist today.



Figure 4. Trails Described by Ī`i (Map by Paul Rockwood from Ī`i 1959:96)

SWEET WATER

Archibald Campbell mentions, in his 1809 treatise, passing through ʻEwa and seeing the "extensive and fertile plain in the highest state of cultivation, with auwai that provided water for wetland kalo, and where there was less water available, numerous crops of yams and sweet potatoes. The mountains were forested with tall trees and there were many trails and roads, and houses shaded by coconut palms." In addition, the newspaper "The Friend", May 1901, notes the "copious springs of most delicious water abounded throughout the district of ʻEwa," in reference to a statement made about ʻEwa in 1836.

KANE AND KANALOA

A tale is told of Kane and Kanaloa and their responding to the young man, Maihea, who through his actions honored the two gods. Maihea, a farmer, lived at Waimalu at a place called Punanalo. He also grew *awa*, and devised a ceremony in the preparing and drinking of *awa* that honored Kane and Kanaloa, although these names he did not know. For a long time Maihea did this. And because of his devotion, he received *mana* and knowledge from Kane and Kanaloa. One day the two gods sent a whale to fetch Maihea's son, Ulu-a-Maihea. The whale came to the sea of Waimalu and into the shallow water where it settled, waiting with its back protruded out of the water. Children came to the whale and climbed on its back and swam around it as a plaything. After two weeks had passed, Maihea's son heard the commotion and asked his father about it, but the father would not say. On the fourth week the son went down to the beach, saw the children playing and followed them onto the back of the whale. But when the whale felt him climb on, it began to move, slowly at first so that the other children would have time to jump off safely in shallow water. Thus it swam slowly away with Ulu-a-Maihea on its back until all the other children had left. Then it swam swiftly out to sea and on to Kahiki. There, Ulu-a-Maihea was trained in the priestly lore and all its arts under the instruction of Kane and Kanaloa. The parents of the child were grief-stricken.

One night, in a dream, they were told to stop grieving. The boy had been taken to Kahiki because of what Maihea had asked in his prayer—that he and his family might receive *mana* and knowledge. Time passed, and one evening two

strangers appeared. Maihea invited them in. Maihea had not seen them before, but was hospitable to them and asked them to join him in his *awa* ceremony. When the *awa* was ready, Maihea began to pray to his unknown gods. When he was finished, and uttered the "amama, let the kapu be lifted", the men identified themselves as Kane and Kanaloa, admonishing him to, thereafter, call them by their names. This was the beginning of the travels of Kane and Kanaloa on earth, and the time when the boundaries of the `Ewa district were made. Kane and Kanaloa divided the land. From the top of Haupu`u, where the Kahikuonalani Church at Waiawa now stands, they stood and looked `Ewa toward the fishponds at Wai`awa. They decreed that the fishponds would be full of mullet and fine limu, with productive salt ponds and many coconut trees, and especially sweet water to remove the bitterness of the *awa*. Maihea, as a result of his interaction with these gods, obtained the knowledge of the priesthood and oratory. (Sterling and Summers 1978:5-6).

BATTLE OF KUKI`IAHU

Between the naming of Point Banks in 1786 and renaming it as Barber's Point in 1796, both Fornander and Kamakau note that Captain Vancouver, seeking new lands for Great Britain, played a role in some of the action at Barber's Point. Vancouver traveled in 1793 back to Hawai`i from America, making his way throughout the islands. Records indicate he tried to promote peace among the warring chiefs, and since this time was still prior to unification, Vancouver "was the friend of every chief and every government". Chief Kalanikupule, son of Kahekili of Maui, and Ka`eo-ku-lani, chief of Kaua`i, were preparing to do battle against each other on O`ahu. Kaeo won easy victories in the first skirmishes. In the meantime, two foreign ships entered the harbor at Kou (Pearl Harbor). These ships were on an exploring expedition, but were equipped like men-of-war. Kalanikupule engaged Captain Brown, of the two ships, *Jackal* and *Prince Leboo,* to help him against Ka`eo in exchange for 400 hogs. Ka`eo's forces advanced from Waikiki, while Kalanikupule's men scrambled to stop them. By November 1794, Ka`eo and his men marched on `Ewa. Near Punahawele in `Ewa the troops met. In this first battle, Ka`eo was victorious. The fighting continued into `Aiea where the tide turned, and Ka`eo was finally compelled to flee. The guns and cannons and swords and spears had killed his

men. This battle came to be known as the "Battle of Kuki`iahu", on the `Ewa plains, and Ka`eo was venerated, thereafter, as the ideal of the Hawaiian chieftain, much admired by his contemporaries. Kalanikupule, following the battle, proclaimed amnesty (Sterling and Summers 1978:12-13).

HA`O, CHIEF OF `EWA AND WAI`ANAE

Fornander describes the O`ahu line of kings from the time of Kukaniloko to the death of Kahahana, with regard to the autonomy of this island. Kukaniloko was *mo`i* of O`ahu. Her daughter, Kalaimanuia, succeeded her. During the reign of Kalaimanuia, there was peace and tranquility. Kalaimanuia was born at Kukaniloko but lived most of the time at Kalauao in the `Ewa district. The foundations of her house may still be evident at Kuki`iahu, where the great battle took place. Kalaimanuia built the great fishponds at Kapa`akea, Opu, and Pa`aiau. Kalaimanuia married a kind man named Lupekapu, and together they had four children, each one raised by a *kahu* or guardian of rank who was a chiefly relative. Ha`o, their third son, was brought up and educated at Waikele, `Ewa.

Before Kalaimanuia died, she gave certain lands to her children to oversee and maintain. To Ha`o she gave the districts of `Ewa and Wai`anae, subject to the authority of his elder brother, Ku-a-manuia. After he died, the second son, Kahikapu-a-manuia became *mo`i* of O`ahu. Kahikapu-a-manuia was a good person, and devout. He supervised good works, like repairing and building heiau and encouraging religious practice. However, while visiting his younger brother Ha`o one day, he was surprised and disturbed at his brother's wealth and popularity. He became apprehensive about the potential for revolt by his brother and his brother's followers.

With his high priest, Kahikapu-a-manuia devised a plan to rid himself of this threat. He counseled with his high priest, Luamea, and together they devised a strategy to overcome Ha`o by surprise. Kahikapu-a-manuia caught an enormous shark off Waikiki and sent it as a present to his brother. While dedicating the shark to the gods, Ha`o, his priest and attendant chiefs were killed by armed men who jumped out of the shark and surprised them.

KANEKUA`ANA, A ROYAL *MO`O*

The royal *mo`o*, Kanekua`ana, lived in the lochs of `Ewa. It is said that she brought the pearl oyster to `Ewa. She was the guardian of the district of `Ewa and all the people honored her and depended upon her as their protector. The people erected waihau *heiau* for Kanekua`ana (*heiau* for sacrifice of hogs, bananas and coconuts, but not human beings) from Halawa to Honouliuli when the fish was scarce, and lighted fires to bring blessings upon the people. The *mo`o*, because the people honored her, brought oysters, which over a very short time was found in abundance in all of `Ewa. In addition, shrimp, *nehu* (very small fish) and other shellfish began to fill the lochs and the people were fed (Sterling and Summers 1978:50-51).

KA`AHUPAHAU, THE SHARK GODDESS

In addition to the protector *mo`o*, `Ewa also has the distinction of having a protector shark. Ka`ahupahau's mother was a chiefess. One day while gathering *limu* in the waters of Pearl Harbor, the chiefess had a miscarriage. Thinking that the baby was dead she left it in the water to be washed away. Later she went again to gather *limu* and was bitten by a shark. She went to a *kahuna* who told her that the shark was her own daughter, Ka`ahupahau, and that the baby she had did not die. The *kahuna* told her to build an *ahu* of *hau* at the place where the baby had been left. From there she could feed and care for her shark baby. Since that time Ka`ahupahau became the protector of the people of `Ewa.

Time passed, and one day Papio, a pretty young chiefess who used to go surfing at Keahi, between Pu`uloa and Kalaeloa, met Koihala, Ka`ahupahau's mother, who was making flower leis for her grandchildren, the children of Ka`ahupahau. Papio asked for a lei, a very rude request on her part, and was refused. She begged and was refused again. Then Papio left to go surfing. On her way back, she took one of the leis from Koihala and ran off laughing. Koihala, angry because of the rudeness to her, took the leis to the beach and told Ka`ahupahau what had happened. Ka`ahupahau also became angry. Papio had gone across the channel and lay down on a large rock to rest, her long hair trailing in the water. Ka`ahupahau then sent a shark to kill her. The shark

approached and dragged her into the water by her hair, his bites causing her blood to spurt on the shore not far away. To this day the soil there is stained red from Papio's blood. Later, Ka`ahupahau became sorry for the incident and promised henceforth to keep her promise to protect the people in that area. And because the flower lei was the reason for the trouble, she ruled that no flowers were to be carried or worn on the waters of Pu`uloa. Since that time, the sharks and people have become friends (Sterling and Summers 1978:54).

AFTER THE COMING OF WESTERNERS

Changes in the ʻEwa district came about primarily because of several individuals in Hawaiian contemporary history. These people, among others, played a large part in shaping ʻEwa, including Kalaeloa.

JAMES CAMPBELL

Perhaps most prominent among them was James Campbell who founded the Honouliuli Ranch and opened the first Artesian well in the islands. Among other things, Campbell was a carpenter with experience in boat repairs and home construction. He married a young woman in Lahaina at age 24 and, after her untimely death, married Abigail Kuaihelani Maipinepine, the daughter of a long-time friend, in 1887. The couple had seven children, four of whom died in infancy. Their eldest daughter, Alice Kamokila Campbell, became one of the first women in Hawaiʻi to be elected to public office. In her adult years she kept a beachfront estate in ʻEwa that was used for USO shows during World War II.

Mrs. Abigail Kuʻaihelani Campbell later became a confidante of Queen Liliʻuokalani, and during the time of the overthrow in 1893 and afterward, Mrs. Campbell and a number of influential Hawaiian women became the primary movers in resisting annexation of Hawaiʻi to the United States. Mrs. Campbell was an active member of the Women's Auxiliary of Hui Aloha ʻAina, the Hawaiian Patriotic League. In her letters to the Queen, Mrs. Campbell addressed her as 'Ka Maile Aliʻi', a term of endearment and respect, and one that hinted at the trust between these two women and those others who supported the Queen during those difficult times. It was Mrs. Campbell who spearheaded the gathering of signatures on the neighbor islands for the Great Petition of 1897.

James Campbell started several businesses, in addition to carpentry. Along with two others, he founded the Pioneer Mill Co. on Maui in 1860, which built his fortune. In 1876 he started Kahuku Ranch, and the next year purchased 41,000 acres at Honouliuli in the ʻEwa Plain. Campbell started drilling for water and opened the first Artesian well in 1879 in Honouliuli. Almost overnight he became known as the "Sugar Baron."

Campbell became politically and financially even more powerful, serving in the House of Nobles representing Maui, Moloka`i and Lana`i, and being recognized by both Kalakaua and the Royal Hawaiian Agricultural Society for his service to the community. Campbell died at age 74 in 1900, leaving an estate valued at over $3 million. His lands and assets are held in trust. Campbell Estate presently manages a number of agricultural and real estate ventures in Hawai`i and abroad, including Campbell Industrial Park at Kalaeloa. Campbell High School and Campbell Avenue in Kapahulu are named in his honor.

BENJAMIN FRANKLIN DILLINGHAM

Dillingham arrived in Hawai`i in 1864. He married Emma Smith, daughter of the Rev. Lowell Smith. The Dillinghams lived in Honolulu and Ben worked with Alfred Castle to purchase the Dimond Hardware Store. In 1888 Dillingham partnered with James Campbell to develop a railroad system to transport sugar cane from the cane fields in rural O`ahu to Honolulu. Originally track was to be laid from Honolulu to `Ewa, but eventually tracks were laid all around the Leeward coast, around Ka`ena Point, all the way to Kahuku.

Campbell leased the land for the railroad to Dillingham and supplied the first load of goods from his `Ewa Plantation. The railway company, which became O`ahu Railway and Land Co. (OR&L), was successful and very quickly opened the islands to sugar production. Dillingham went on to develop plantations on Maui and Hawai`i, as well as on O`ahu, and founded a railway system on the Big Island. By 1899 Dillingham was ready for tourism and big development. He opened the Haleiwa Hotel in 1899 and began developing Pearl City, adjacent to Pearl Harbor. Dillingham died at age 64, leaving his wife and four children to run the business. Emma, his wife, helped to found the YWCA and the Daughters of Hawai`i. She was superintendent of the Kaumakapili Sunday School. Emma spoke fluent Hawaiian.

GEORGE RENTON, JR.

George Renton, Sr. was manager of `Ewa Plantation. After George Jr. graduated from Yale he went to work for his father and eventually became manager. Much of his time as manager was spent trying to improve workers'

living conditions: building homes, improving water and sewer systems, building a park, community center and theater. In later years this area made up the town of ʻEwa, with one of the residential sections named Renton Village.

In the late 1970s ʻEwa Plantation closed. Some of the original structures remain. Restoration began in the 1990s to restore these buildings because of their link to Hawaiʻi's plantation era.

BARBER'S POINT BASE CLOSURE

Gregg Kakesako provided the following report in the Honolulu Star-Bulletin, July 2001:

> In July 1944 it cost Navy Machinist Mate Stanley Donelson just 50 cents for the 30-mile train ride from Barbers Point Naval Air Station to the terminal at Aʻala Park. "There was nothing between here and there then," said Donelson, 76, who moved to Kaneohe after he retired from the Navy in 1965 with 23 years of service. "I was gone when Hawaii became a state and when I returned everything had changed ... at the base and all over the island." Today there will be more changes taking place on the Ewa plain as Barbers Point Naval Air Station, a fixture in the community for the past 57 years, will be closed. When the flag is lowered at base headquarters this morning, it will be one of the last military installations to be closed this century. In its place the state hopes to establish the Kalaeloa Community Development District designed to revitalize the economy of the Ewa plain. That land will be used to maintain the Navy's 1,090 housing units, a clinic, military commissary and exchange, and a golf course. Four hundred fifty acres will be used by other federal agencies, and the state will use 750 acres and three runways as its new general aviation facility. Perhaps one of the biggest benefactors will be the general public, which gained the use of 2 miles of white, sandy beaches, surfing and bodyboarding spots, and camping and picnic areas. Nearly 2,300 Navy personnel were transferred to Marine Corps Base Hawaii at Kaneohe Bay to accompany the 29 P-3 Orion anti-submarine warfare aircraft and nine SH-60 Seahawk helicopters that were moved there. The move made Kaneohe Bay the first fully integrated Navy-Marine installation in the military, according to Brig. Gen. Arnold Fields, Kaneohe Bay commander. Keeping the four P-3 Orion and one Seahawk helicopter anti-submarine warfare squadrons in Hawaii meant that $84 million won't be lost from the island's economy, said Rear Adm. Michael Holmes, commander of the U.S. Pacific Fleet's Patrol and Reconnaissance Force. Holmes will oversee the Navy's operations from the newest building at Kaneohe Bay -- the $9.7 million Finn building named after Pearl Harbor attack Medal of Honor recipient Lt. John Finn. Fields said for the first time Marines and sailors have been integrated into two units to conduct airfield operations and provide logistical and maintenance support for all the aircraft assigned to the Windward Oahu base.

INTERVIEWS WITH CONTEMPORARY *KUPUNA*

A series of interview were conducted with elders from the area who have first-hand knowledge of ʻEwa *moku* and the Kalaeloa area.

MR. SHAD KANE

A resident of 'only' 29 years, Shad Kane is a recent retiree of the Honolulu Police Dept., after 29 years of service (Fig. 5). He is active in the Hawaiian Civic Club and other community organizations. Because of his research and interaction with Hawaiian *kupuna* over time, his knowledge is broad as well as detailed. Shad participated in a walk-through visit to the proposed desalination plant site and identified two native plants, *maiapilo* (*Capparis sandwichiana*) and *naio* (*Myoporum sandwicense*), growing in the area. He also had opportunity to view the sinkholes and cultural sites recorded during the current archaeological inventory survey.

The interview took place at the Kapolei Police Department Conference Room on January 8, 2002. The following is an informal transcript:

> Dr. Alan Ziegler, a biologist, was instrumental in finding evidence in the area where Koʻolina is, the golf course and hotel, of cultural resources, evidence of human habitation and related areas. He found lots of bird bones, extinct bird bones, a giant goose, and a Hawaiian eagle, which he referred to, but which people don't even talk about. He's still sharp, and enthusiastic, but not in the best of shape. He was in the hospital. A good guy to talk to for a scientific approach on sinkholes and the work that has been done. But he was not successful in getting legislation passed. But as a result of his efforts, he was able to get a lot of respect from Campbell Estate people. He pointed out that there were some 300 sinkholes and in the sinkholes were a lot of bird bones. He does tours. I went to one, but he doesn't access all sinkholes, just selected ones. Only a small amount of work was done, just to satisfy requirements. So he's only identified 4 or 5 sinkholes where people can pan for bird bones, actually using screens to sift through the dirt for bones. There's *opaeʻula* in sinkholes with fresh water. I saw it with my own eyes, had fresh water *opaeʻula*. This was in October, last year. If you want to see a whole lot more *opaeʻula*, better to go to Waiʻanae boat harbor. Get plenty there today. People don't know. And maybe there's a reason why people don't want people to know that these things are there. I don't know why. Dr. Ziegler doesn't allow anybody to take anything. It's just educational and everything goes back. It felt so awesome. A lot of the stuff I know I learned from Alan, and from Dr. Sinoto (Aki's dad). He was one of the first guys to research this area, right where the harbor is. A lot of stuff came out of there. For example, there was a large sinkhole with huge stalactites. Nowhere else in the Hawaiian Islands will you find sinkholes or caves or caverns with stalactites. But it's gone now; they blew them



Figure 5. Mr. Shad Kane Examining a *maiapilo* Plant in the Project Area

up, blew them to pieces and filled in the whole thing with water for the harbor. There are documents that Dr. Sinoto and others have identified of existing sites.

In the area of the deep draft harbor, Ko`olina, burials were discovered. It's all documented. My *ohana*'s bones were found there, seven individuals, but not complete sets—long bones, fragments of skulls—with seven different incidences when they were discovered. We can only speculate on those seven different individuals. They came from primarily Kualaka`i, the area of Nimitz Beach, around that area. They were dug up as a result of all the Navy projects. One was when they built the Navy sewage treatment plant, which is just adjacent to Nimitz Beach by the coast guard station. The actual facility is about a hundred yards inland from the beach, but they had to build an outfall. So they dug up a trench from the facility, in a line out to the beach. I don't know how far the line actually goes out into the ocean, but when they crossed and cut through the sand area, that's when they found a number of *`iwi*. So that's some of the *`iwi* that I have responsibility for. I went out there to take a look at the place, to get some kind of feeling for the location, because that's a whole part of the protocol for reinterment. Kumu hula John Kaimikaua is our *kahu*, the one establishing our protocol. Because we cannot put the *`iwi* back in that same place, we're putting them somewhere else. But they must go back in sand, cause they came from sand. This whole effort is for us to try to do it the way it's supposed to be done. That area is right across the street from the coast guard station.

We try to research Kualaka`i as much as we can, and the oldest reference to Kualaka`i is on an 1825 map by Lt. Malden, cartographer on one of Vancouver's ships. He made numerous visits but on one of them, I think in 1825, he made a map with Kualaka`i on it. He was pretty much instrumental in charting these islands. So on the earliest map I could find, his map of 1825, he identifies on documents several names, and one is Kualaka`i. The most recent map is an 1873 map. There are ancient stories in regards to Kualaka`i. As far as its location, it's right across the street to the entrance to the coast guard station. When you go out to Kalaeloa, the main intersection, turn left going out to Coral Sea road. Then make a right. Coral sea is the only road that takes you all the way across the base, to the *makai* side. It actually goes all the way around and loops, but people don't know that. Most people know it goes as far as the coast guard station. The problem, the difficulty we have is not knowing how big an area Kualaka`i encompasses. You read some of the stories, some of the oral traditions, it seems like a much larger area than for a small community. Especially when you look at the work of others, and this is not just my opinion. David Tuggle did the inventory of the archaeological sites for Kalaeloa to satisfy the EIS requirements. When the bases were closed, in 1994, one of the first things we did was take an inventory of all the sites we knew about at Barber's Point. The Navy was aware at the time that a lot of archaeological work had been previously done, in the 70s and the 80s, in all the base facilities for all different projects. So Tuggle's part in this whole thing was to inventory all the archaeological work that had been done in the past. Some of the key people were Rosendahl and Haun. These are the two primary archaeologists who did the work.

Dave Tuggle did some. His job was basically to satisfy the requirements of the EIS. And he worked with Aunty Rubellite Johnson in regards to the historical portion. He approached it from a scientific perspective. So he needed someone who could understand the whole history of what he was looking at. And one of the conclusions that he drew from his work in inventorying sites and previous works done, was that Kualaka`i may have been actually much larger area than just this small little community. Between 1855 and 1888, after the Mahele, there were a number of places in and around this area where communities were actually paying taxes, and Kualaka`i was one of those places. So through that period of time there was a community of people established. It may have been much larger prior to that. In Tuggle's opinion, based on his research, it may have been a much larger area because of the extent of human habitation in and around that area. Much of the `Ewa plains, including Kalaeloa, had evidence of human habitation. From Kalaeloa, Barber's Point, the Navy has records identifying how the bulldozing was done. It looked like a checkerboard, how they bulldozed everything. But the significance of this, in the words of Tuggle, is that if you look at the way they bulldozed, you see little pockets that were not touched. In almost every pocket you find evidence of habitation. What does it tell you? What that tells you, he said, is that there was human habitation all the way across that whole area. If you look at the bulldozing records, you can see that it may have been one continuous community that extended all the way across, actually from One`ula, from Haseko's property, where `Ewa Marina is. It may have been a coastal community of Hawaiians that extended all the way across this area.

This brings us to the importance of all the sites here. In the closing statement of his report Tuggle says that these are the last sites that may well be representative of everything that existed throughout the whole `Ewa plains, which leads to why we need to preserve what is left. The only work and research done there was just to satisfy government requirements. They did what they needed to do to satisfy the Navy. Then they put everything on a shelf and that was it. Dave Tuggle and Aunty Rubellite Johnson said no one has the money to do that kind of work now. There's no resources to do the work.

This area is mostly Navy property. So we're not talking about One`ula or Campbell Industrial Park. This is within the boundaries of the fence line, where most of the bulldozing was done, especially the runway. There's a number of quarries that they actually dug out to build the foundation for the runway. There's a number of big, huge quarries in and around the base, and also outside the base. The Navy ground up the coral, so rather than rock or basalt, what they used was coral for the foundation of the runway, and all that coral came from quarries in and around Kalaeloa. That's the interesting thing. If we take a look at all these sites, with respect to the work that's been done there, the first thing that comes to mind is that these communities extended all the way across the coastline. That's Kualaka`i. Although documented records show that Kualaka`i existed in 1825, the stories tell us that it's been around a long time. For example, I think Kahahana lived in the middle of the 1700s, or around the middle and latter part of the 1700s. His wife, Popoki, was not of *ali`i* lineage, but from my understanding of the readings, she was such a beautiful person that the *ali`i* all had relationships with her. One, of course, was Kahahana. He was the last O`ahu chief. Anyway, there's

a whole story behind this about what happened subsequent to his death, but in terms of Kualaka`i, Kahahana's wife, Hopoe, wrote a *kanikau* (a mourning chant). In that *kanikau*, she mentions several things of significance. The significance of Kualaka`i and other places in and around this region is their association with each other, especially Pu`u o Kapolei.

Pu`u o Kapolei is known today as Fort Barrett. It seems that Pu`u o Kapolei is the *piko* of this whole region, the umbilical cord with respect to our ancestors. So when we read all these things and listen to the stories, there appears to be a strong relationship between Pu`u o Kapolei and all the ancient places around here, one of which is Kualaka`i. In her *kanikau*, she makes reference to this area. She makes references to Pu`u Kapolei as the place where her husband's spirit or soul went to Hilo. My understanding is that it's an afterworld. I don't know if it's a good world, or bad world, or what. Anyhow, it's another world where the spirit goes through. In the *kanikau* she says that her husband's spirit actually entered the Hilo by way of Pu`u Kapolei. She makes reference to Kapo as being associated with this *pu`u*. She also makes reference to Pu`u o Kapolei, Kualaka`i and Kanahili.

In the opinion of Dave Tuggle and Rubellite Johnson, who drafted a map where they identified the whole area of the former Naval Air Station, the area is called *Kanahili*, not Kalaeloa. There are stories about Kanahili. The Pele-Hi`iaka legends is one source that makes references. In the Pele-Hi`iaka legends there is a reference to traveling downhill from Pu`u o Kapolei to Kualaka`i. Hi`iaka traveled downhill from Pu`u o Kapolei to Kualaka`i and she passed through Kaupea, and passed through Kanahili. In Aunty Rubellite's opinion Kanahili is all of the area that today is occupied by the former Naval Air Station. In Tuggle's report he draws a map with Kanahili in it, but he overlays that with everything else. So we got worried about that. In the opinion of Tuggle and Rubellite Johnson, Kalaeloa, in ancient times, is not the name. Kalaeloa is just the descriptive definition of the coastline. If you read oral traditions, Kanahili is the proper name of all of Kalaeloa.

Kanahili shows up in the Pele-Hi`iaka legends. In the travels of Kane and Kanaloa, this is one of the places where they visited. With his staff, Kane brings forth water from the sinkholes. That leads us to see significance in the sinkholes. I mention all these things because of the association to Kualaka`i and Pu`u Kapolei is their distance to the desalination plant. It's really a short distance away. I've talked to a number of *kupunas* who have confirmed the stories I've heard in regards to the relationship of Kualaka`i and this area near the lighthouse, by the proposed desalination plant. There are stories of people who lived in the early 1900s, and who are still alive and members of the Hawaiian Civic Club. They talk of their travels from town by train all the way out here. One *kupuna* was 5 or 6 years old at the time, and she recalled traveling from Iwilei by train to here, getting off from the train in an area where the enlisted homes are that were destroyed and bulldozed. There was no train station. You just tell the train guy where you're going to get off and he slows the train down and you jump off. No train stop.

She said as far as she could recall it was in the area right at the border of the Naval Station and Campbell Industrial Park, that corner. And the

reason why she and her mom came out was they knew people who lived at Kualaka`i. She knows the name Kualaka`i. This was pretty consistent with stories I had heard in regards to people traveling by train in the early 1900s. She and her mom traveled to get lobsters, limu and fish. They walked from the train to Kualaka`i. There was one house on the way to the beach. There were lots of people there. And *kiawe* trees were there, but not as heavy as today. And you could see the beach. You could see long distances. She recalled the walk from the train to Kualaka`i, the house and the lighthouse. Now you cannot see any of this. When you looked in the Wai`anae direction, the only real structure you could see in the 1920s was the lighthouse. There was nothing else there. The lighthouse is actually beyond the area of the proposed desalination plant. Really, there was nothing else in the area at that time, as she recalls. It confirms other stories I have heard about the area. The role Kualaka`i played in the latter 1800s and early 1900s was as a place where ocean resources could be gathered. Other records with respect to the ancient history of this area could be found in some of Ross Cordy's work. He put together a model of early settlement, although he cannot say where the area of first settlement might be. On this island, Ross says there were several possibilities. West Loch-Honouliuli, in the first channel on the west side as you come in from the ocean, might have been one of the earliest settlements, right in the area of St. Francis West, near the golf course. Another was in Waikiki. And another was in Kane`ohe, between Mokapu and Kailua. Another one may have been in Makaha. He couldn't say which was first, but he did say that Honouliuli with all the archaeological works in and around the `Ewa plain, shows clear evidence of habitation. While the evidence is not specific, he believes there may be habitation as early as 450 A.D. And over a period of years, people moved along the coastline and simultaneously moved mauka. The `Ewa plains seemed always to be a barren area, so movement was likely west along the area toward today's `Ewa beach, One`ula, Kalaeloa, Makaha. Much of this information is in other works, like Dave Tuggle's reports. Dave and Rubellite Johnson tried to explain early migrations, habitations and ancient history. See Dave Tuggle's inventory of archaeological sites.

Kaiho o pala`ai*, as explained by Aunty Rubellite Johnson, is the ancient Hawaiian name for West Loch. Pearl Harbor is *Keawalau o Pu`uloa, the many harbors of Pu`uloa. People today think that Pu`uloa is just an area of `Ewa beach, however Pu`uloa actually extended all the way across in the Honolulu direction into the area of ...where Watertown used to be, Mapunapuna, the airport. That whole area is part of Pu`uloa. Pearl harbor has retained the name Pu`uloa. So the name that Aunty Rubellite uses is Keawalau o Pu`uloa. Farrington highway is actually where the old Hawaiian trail was. Some of the names associated with these areas, as you travel from Honouliuli, as you travel inland where there's the golf course and Kahi Mohala, still remain. The area of Kahi Mohala was Po`ohilo. That's the first significant name and all of these names have special meanings. The way this name came about was that through the time of *Ma`ilikukahi*, historically these islands were full of resources, especially in the area of Honouliuli—oysters, fish, fertile soil. Before rice there was *kalo* in this area. Historically the other islands always wanted to take control of O`ahu. So at the time of Ma`ilikukahi, there were several political capitals on the island of O`ahu, one of which was Waikiki and the other was Lihu`e (not Kaua`i). Lihu`e on Kaua`i got

its name from our Lihu`e on O`ahu. Lihu`e is where Schofield Barracks is, by Kolekole Pass, extending both on the Waialua side and on the Kunia slopes—that whole area. During the 1500s, when Ma`ilikukahi was the ruling chief, this is where his army spent most of its time, in Lihu`e. A chief by the name of Hilo from the big island, attempted to invade O`ahu. His army went to Waikiki first and then they came up to Pearl Harbor channel. Then they went to Kaiho o Pala`ai. According to the stories there were thousands of canoes that came up to Kaiho o Pala`ai and they entered the area where the golf courses are now. They went in search of Ma`ilikukahi's army, which was in Lihu`e. They followed the trail that is now Kunia, an ancient Hawaiian trail. There were a series of skirmishes. The first one appears to have been in the area of Waikakalaua, which is just Honolulu of Wahiawa, where the townhouses are in the valley. That was where one of the first battles took place. Then it went all the way down to the area of where Waiau and Waimanu are. There were several more skirmishes in the area where Mililani is. The names of these places today make reference to these battles. Mililani, for example, was really called the plains of Punalu`u, the name of a chief from the Big Island who died in this area. The battle continued *makai* of this area and one battle was fought at a place now called Kipapa, the name of a Big Island chief—paved with the bodies of Big Island chiefs. Ultimately the battle in and around today's Pearl City and Pearl City peninsula was fought, a decisive victory for Ma`ilikukahi and his army. But it served as a lesson for others attempting to conquer this island.

One of the most vulnerable places was Kaiho o Pala`ai, coming in by way of Pearl Harbor. The people there decapitated a Big Island chief named Hilo. They took his head and stuck it on a pole in the area in or around where Kahi Mohala is today. And that's how this community got its name back in the 1500s—Po`ohilo, the head of Hilo. It was to serve as a lesson to anybody else trying to come by way of Kaiho o Pala`ai and invade O`ahu to take control of the resources in the harbor.

As you travel around the *mauka* trail in the Wai`anae direction, before you get to Makakilo, another place is Keone`ai, which is right in the area where Kalo`i gulch passes the trail, that is, passes Farrington Highway. If you follow Kalo`i gulch, most of it can't be seen because it's mostly bulldozed over by sugar companies, but if you follow that alignment of Kalo`i gulch, it takes you right to One`ula, what folks call 'Hau Bush'. There may be a relationship between the names of Keone`ai and Keone`ula. And of course as you travel further along on Farrington Highway, or the ancient trail, you come to Pu`u o Kapolei. And the significance of Pu`u o Kapolei, the first documented significance, is in McAllister's report in the 1930s. The thing to remember about McAllister's report is that part of what he had done to satisfy the requirements of his work was to identify Hawaiian informants. He talked to kupunas from this area who had been living in the latter part of the 1930s. He also referenced the work of Kamakau. McAllister had been talking to *kupunas* who lived in the early 1800s but McAllister accessed Kamakau's documents and Kamakau made references to Pu`u o Kapolei. Kamakau's informants lived in the period just around contact; they lived just around the middle and latter part of the 1700s. The information of McAllister and Kamakau comes from these people who lived in and around the `Ewa plains around the middle and latter part of the 1700s. I

think we can say with some confidence that some of this information came right around contact, and some of the stuff they said with respect to Pu`u o Kapolei was that first of all, there was a heiau there. No one is certain what the heiau was used for.

Aunty Rubellite Johnson shed some light. And Emma Metcalf Nakuina who did a lot of work in the early 1900s also shared a little bit more with respect to the significance of that heiau, and what they are basically saying is that the significance may be that it was a place associated with the sun. One of the first important things to note was that it was a heiau.

In 1930 when McAllister did his archaeological work, he said that there was a stone crusher that crushed stones to use in the irrigation ditch for sugar. The roads accessed that area for the sugar fields. That was the first quarry in this area. Today that quarry is Pu`u o Makakilo. Not the same stone crusher but the processing quarry. Sugar came in the latter part of the 1800s, when they started to bulldoze and clear this whole region. They needed roads. Campbell punched a number of wells. What he needed was a series of viaducts to bring water from where he was storing it up *mauka* down to the fields. He needed concrete and he needed roads. He wanted a quarry in the area, rather than bringing stones from far away. So he looked at places that were cheap, affordable, and easier logistics-wise. He looked at a number of regions between here and the `Ewa plains because the sugar fields needed a quarry and stones. The first place he found was Pu`u o Kapolei. We're speculating that the reason for that was because of the enormous amounts of stone there. That's where the heiau was. The heiau and the stones were all in place. The roads—that was the heiau.

The next thing is that according to McAllister and Kamakau, from the informants they spoke to, this was also the residence of Ka-mau-no-a-niho-kekele-ai-ko. Kamaunoaniho was the grandmother of Kamapua`a. Kekeleaiko was the older brother of Kamapua`a. There's a little difficulty here—people have a hard time drawing the line between what is legend and what is reality. But the thing to keep in mind is the fact that when you have people who become almost greater than life, it's not unusual to speak of them in terms of the supernatural. For example, we kind of elevate Davy Crockett to bigger-than-life. These are the stories that Hawaiians told. So a lot of people have a hard time defining reality. When Kamapua`a killed Olopana and united the whole island of O`ahu, in order assert his authority over the *`aina*, like today, you put your loyal people in different places and you assert your authority in the region. Kamapua`a did this. The *kupuna* that Kamakau had talked to said Kamapua`a placed his grandmother and older brother at Kapolei, and they became the *konohiki*s of this period. This was the residence of Kamaunoaniho. Evidence of the foundations for her home and her burial could still be seen in 1930. It was on the *makai* side of Pu`u o Kapolei. Subsequent to this they converted the area *makai* of the *pu`u*, and it became a sisal plantation. When they built it, they bulldozed this whole area where her grave and the foundation for her home existed.

This heiau was used as a landmark in ancient times for travelers, and this is what our *kupuna* said in the latter part of the 1700s. This is how we got to Waianae. When we speak of traveling from Honolulu to

Waianae we speak in terms of different trails. There were several trails. One was by way of Kolekole pass. Another way was Pohakea, another ancient Hawaiian trail. The third way to Waianae was by way of Pu`u o Kapolei. This place was identified as a way to get to Waianae. The last significance was the use of Pu`u o Kapolei for solar observation.

There is a lineal association between our ancient places—they're all related to and associated with each other. We find this on the `Ewa plains, but we just don't know where the markers are because of the bulldozing and disturbance in the area. Since all markers of the different ahupua`a have literally been destroyed, we're relying a whole lot on language, on names and places. The same type of technology that ancient Hawaiians used to live here, we use also. We did what they did. For example, Hawaiians never had a written language or a written calendar. But what's a calendar? Hawaiians knew the geographical features well enough to build an *ahu*, for example—to build something you can see for a distance. Being able to visually line up different *pu`u* and other sites was one way they gave names to different places. They recognized the lineal relationship between different places at different times—sun, moon, stars and geographical features. This is the significance of Pu`u o Kapolei, why it is important.

As a matter of fact, Nakuina refers to Pu`u o Kapolei as the calendar. It was used to determine the seasons. Hawaiians needed to know what day it was, what time of the month, what month. The *pu`u* was used as a place of solar observation. One of the things that McAllister references in Kamakau is what he says about the significance of the *pu`u*. Ancient Hawaiians had two seasons, one when the sun was in the north, the other when the sun was in the south. This time of the year, when you go outside and watch the stars, the sun is way in the south. The shadows in the yard this time of year are long. Hawaiians knew this. Two seasons, one is the season of the Makali`i, when the sun is in the north, high up. The other season is the season of Ho`oilo, when the sun is in the south. When the sun is in the north it's the dry season, not the season to plant. Not much water. Time to conserve. The time of the Ho`oilo, when the sun is in the south, is when you have a lot of rainfall, you have a lot of water. That's when you plant *kalo*. Kamakau said that when the sun set over Pu`u o Kapolei and sets in the Mahina Ona, that is the division between the Ho`oilo and the Makali`i. He's comparing that to our summer solstice, in June. Hawaiians never knew when June was. No calendar. For Hawaiians, the position between the two seasons is actually May. So May 1 on a western calendar would actually be when the sun stops and turns—that's how Hawaiians explained. The *kupuna* is telling Kamakau this. The reason Kamakau became an important man is because Kamehameha III realized that in the short time between when Cook came in 1778 and the time of Kamehameha I, so much had been lost. In his ship's logs Cook documented that there were about 300,000 Hawaiians. Wherever he went he could literally walk on the backs of the people. When Vancouver came, 14 years later in 1792, he had Cook's logs with him. He could not confirm that many people. He went to all the places that Cook went to confirm what Cook wrote, but he could not. In that time plenty had died. The relationships of the sailors with the women on that first visit wiped the people out. By 1890, the first census, only 43,000 Hawaiians were left. So Kamehameha III realized that people were dying like crazy. That's the reason why he

needed to recover what had been lost, to save the traditions. Kamakau himself did not know all these things. He had lost it all, too. He's talking to *kupuna* and getting this information.

The significance of the sun at Pu`u o Kapolei at this time of the year is that when the sun set over Pu`u o Kapolei, the Mahina Ona happened, the division between the seasons, between the Makali`i and Ho`oilo, May 1. The issue was, where was the Mahina Ona? There needs to be a reference so you can make a lineal association. So where would the observer have to stand to place the sun over Pu`u o Kapolei to keep the Mahina Ona? We don't know what Mahina Ona is, but that's what our *kupuna* said. The *kupuna* said this geographical feature is the setting of the Mahina Ona. There's been some research by Rubellite Johnson in regards to what they meant. What the *kupuna* seem to have meant is that there has to be a 'v' in the mountain or it's something like a 'crown' or a 'crater'. I even asked my cousin, a Hawaiian language teacher, about what 'Mahina Ona' means to her. She couldn't really explain it, but it may reference a valley, a ridge, the shape of a mountain range, a cloud, or a crater. Emma Nakuina, who lived around the turn of the century, was trying to get an understanding of what *kupuna* were saying. She says the 'Mahina Ona' may be a *pu`u*, crater, in the shape of a crown. So we tried to look at *pu`us* that might be shaped like a crown, and there are only two on this whole island in the shape of a crown, and they both have a lineal relationship to the cross of Pu`u o Kapolei. If you were to stand anywhere along the `Ewa coastline looking toward Honolulu you can see a crown, low on the *mauka* side, high in the front. If you go to Waikiki, to Diamond Head, and look in this direction, there's a small cliff, Pu`u o Palaelae. If you draw a line from Pu`u o Lahilahi, on the Wai`anae coast, to Diamond Head, right in the middle is Pu`u o Kapolei. What it seems the *kupuna* were saying is that the division of the seasons is when the sun sets over Pu`u o Kapolei in the crater, Pu`u o Palaelae.

Today, on May 1, if you come into this *pu`u* right here, you can see the sun set right in the crater and disappear. May 1, the celebration of lei day, is an ancient holiday. It's not new. People think it's something we put together recently. It's an ancient celebration. The division between those two seasons was a day the Hawaiians celebrated, the changing of the seasons from the Ho`oilo to the Makali`i. They celebrated the coming of the season of abundance, of water, of rainfall, of food, of *kalo*. May 1 is not a superficial celebration of wearing leis; it was in ancient times when they celebrated the sun setting over Pu`u o Kapolei, of Mahina Ona, the division of the seasons. So that, perhaps, is the single most significant thing of that *pu`u*. And it leads to the significance of all the other places in and around this area.

Kaupea is another place associated with this region. We don't know where Kaupea is. We guess based on stories. For example, the Pele-Hi`iaka legend tells of traveling *makai* of Pu`u o Kapolei and whatever place Hi`iaka passes through as Kaupea. There are references to the *wiliwili* groves of Kaupea in different *mo`olelo* (stories). The significance of Kaupea is found in the old traditions that referred to *Ao Kuewa*, a place of wandering spirits. Every island has an *Ao Kuewa*. Every island has a *leina ka`uhane*. Kaupea is referred to as our *Ao Kuewa* on this island.

The ancient Hawaiians believed that life, death, and sleep all overlap each other. They also believed we all had two energies within us. One is referred to, in English terms, as soul or dream spirit. The other energy in all of us, as Hawaiians explained it, not in scientific measures, but in terms of what is physical. Energy that sustained our lives, the blood that kept your heart pumping. Two energies: spiritual and the one that kept you physically alive. Ancient Hawaiians, our *kupuna*, believed that when you go to sleep, your dream spirit would be allowed to wander, and that's how they explained dreams. When you wake up in the morning and you think about your grandmother that passed away, you actually visited her. That's how Hawaiians explained it. In other words, if you're a pregnant female and you wake up in the morning and you think of a name that your grandmother shared with you while you were sleeping, you took that seriously because you actually visited with her and she shared that name with you, which means you should give your new child that name. So you took these things seriously. However, in order for you to wake up, your dream spirit has to come back to the body. When you read some of the early reports of early visitors, the writers witnessed Hawaiians chanting over a body, someone who was dead. But they were trying to call the spirit back to the body, to wake the person up. But the *haoles* couldn't understand the singing and chanting and talking to a body. That dream spirit had to come back to the body in order for you to wake up. If the dream spirit didn't come back, Hawaiians defined that as *'make loa'*—dead. When you die—and here I'm trying to explain Ao Kuewa—if you were a good person, respectful of your *`aumakua*, of your parents, etc.—when you die your *`aumakua* will carry your spirit to a place that is referred to as a *leina ka`uhane*, a place that led to the next world, a jumping off place. `Aumakua would take you there to help you get to the next realm. If you were not respectful of your *`aumakua*, if you were not a good Hawaiian, you would not have the benefit of getting to the next realm. In that case, our *kupuna* told Kamakau, if you were not a good Hawaiian, if you did not respect your *`aumakua*, you would be banished to desolate, barren places. You would be banned to Ao Kuewa. Ao Kuewa on this island is Kaupea. Another way to explain it, to help understand, is in the Christian sense— heaven, hell, and purgatory, the in-between place. I hate comparing Hawaiian understandings to Christianity. Hawaiians think in very spiritual terms, but it helps to look at a Christian perspective to explain. Notice the difference—this is what Hawaiians are telling Kamakau. Kamakau has already lost much of his understanding. He's trying to learn about his Hawaiianess from his *kupuna*. Christians believe that purgatory is somewhere else; it's a place that they go to. They're telling him that this in-between place is real, not some magical place somewhere else. They understand that he is Christian. Kaupea, Pu`u o Kapolei, Leina Ka`uhane at Ka`ena Point—if you draw a line across the peaks, from the *leina* stone at Ka`ena Point on the other side of the Wai`anae mountain range, it crosses Pu`u o Kapolei. There was a lineal relationship between the *leina* stone, Ao Kuewa, the Waianae mountain ranges. Your *`aumakua* would help you if you were good to the next realm. If you were not good, your *`aumakua* would bring you right across the mountain ranges to Ao Kuewa. That's a lineal relationship. Hawaiians believed Ao Kuewa was the place of wandering spirits.

I will share a little more, but normally I don't share this with anybody. I just retired from the Police Department about a year ago. And I've seen a

lot of police reports. In this particular region there's a lot of reports in regards to things that cannot be explained. I have a feeling it's the Ao Kuewa. Get plenty accidents over here, coming around Kahe Point, where no alcohol is involved, but the guy for some reason just decides to turn off the road and crashes. Plenty unexplained accidents out here. More recently, when they closed the base at Kalaeloa, formerly they used to have military searches at the gate. Since then they've had private contractors. Right now I don't think they have anybody there. They had private contractors provide security for the place. They had hard time keeping them because the security guards were chasing shadows around buildings. For example, when the Navy moved out and shut down all those enlisted homes on the far Wai'anae side, security guys checking the place out would see kids in there fooling around, running around. The guards would chase them; cannot find them. There were shadows in the bushes; they would look in the bushes, cannot explain it. They were so bothered about it they made police reports. So we get reports of that. Why would somebody bother to make a police report unless it was a serious situation in their minds? By Kapolei Middle School there were two [ancient] hula mounds. When the school first opened they were having all kinds of problems there. The school has an audio/video monitoring system. The security company's main office is on Sand Island. On one particular night, around 1 o'clock in the morning, a lady monitoring the alarm system sees a red light come on—the monitoring system comes on, and audio. She's looking at Kapolei Middle School and she's looking at video equipment, at a video screen, and monitoring a classroom at Kapolei Middle School. She hears children on the audio and the picture is not that good, but she sees kids in a classroom, having a good time. And she hears children yelling and screaming and laughing in the classroom. So the first thing that comes to her mind is that these kids are burglarizing this class. So she calls up the Principal, she calls the janitor, she calls the Police Dispatch. Anyhow, we all converge at the Middle School and we end up going to the classroom. The principal and the police open the door to the classroom—nothing. The lady monitoring the classroom swears there was something going on, and that she got it all on tape. So we all go to Sand Island to check the video (tape) and check the audio—nothing. They made a police report documenting that whole incident. The lady that was monitoring for the company swears that all this was taking place. She was bothered by the fact that she called everybody up in the middle of the night to come and check this out and there was nothing there. These kinds of stuff—they're not unique to this area. They're typical of all Ao Kuewa on all islands. Each island has police reports, police documents, of things of significance that we cannot explain.

Now, what's the significance of Kaupea? Kaupea means Southern Cross. Hawaiians refer to the Southern Cross as a bat's perch. It's a constellation that Hawaiians used in the ancient Polynesian voyages to tell them what direction they were going. For example, here in the islands, the Southern Cross is low on the horizon. It never goes up high. Looking from this direction, for example right here, in the summer sky if you're looking in the direction of Ko`olina, you will see maybe two of the stars of the southern cross. You won't see the whole thing. But if you travel south you'll see it move to higher latitudes. It will appear higher. So the higher up you see it as you travel south, it tells you you're going in a southerly direction. It doesn't tell you exactly, but at least you know

you're going in the right direction. You gotta pick up other constellations to tell you exactly where you are. The other significance of Kaupea, and a good portion of this has been lost because we don't know what the boundaries of Kaupea might have been, but we suspect that those boundaries, and this is the significance, might have been pointing in the direction of the southern cross, in the summer sky, pointing in the direction of the southern islands.

Another reason why that thought is sort of toyed with is simply because of the Tahitian associations in this particular region—they're all aligned. First of all, Kamaunoaniho is referred to as one of our Tahitian ancestors. Another one is that a lot of the archaeological structures at Kalaeloa you can still see today. Hawaiians had their own way of dry stacking stones, their own way of interlocking stones. Tahitians are a little bit different. Tahitians took tall, upright stones and stand them up and fill them. That's how Tahitians make their walls. At Kalaeloa, this very thing we talked about at Kualaka`i, what you see in there is an integration of Hawaiian stone masonry and Tahitian stone masonry. There are a lot of structures in this area. One example, a heiau in Kalaeloa in an area we refer to as Kanahili (which is today Kalaeloa), is a one-acre area closed by a rock wall, all coral, and it's partitioned into different levels. When you look at it, you see a perfect example of Tahitian and Hawaiian stone masonry integrated. You see one wall built in a Hawaiian stone fashion. And up against it is a Tahitian rock wall. If you owned a house today, and you move out, then another person moves in and builds on it, makes an addition—that's what you see at Kalaeloa. You see basic Hawaiian walls and these Tahitian rock walls built onto it. That tells us there were subsequent generations that were living and working in this particular area—a prime example where you see integration of two different styles of rock walls here in these islands.

These things confirm our belief that this would have been an area of departure for Tahiti: the Southern Cross, Kaupea, the Tahitian drywall stacking, Kamaunoaniho, the very name of Kualaka`i. Of course this is just speculation. It is referenced in Kamakau's work, and even he speculates on it. Those references to the name Kualaka`i may have come from a Tahitian chief named Kaha`i. You will hear stories of Kaha`i, not on just this side of the island, but also the Windward side. Kaha`i is credited for bringing the first breadfruit tree to the island of Oahu, so there's a story that Kaha`i, who had gone to Tahiti and came back to Oahu and planting a breadfruit tree at Kualaka`i. The feeling is that the name Kualaka`i may actually be a corruption from generations of using, that it may actually be a corruption of Kauluokaha`i—the ulu of Kaha`i. It's because of these many Tahitian associations that we are saddened by the reality that we've lost so much because of the bulldozing, and we don't have all the boundary markers that were in place at one time. So many associations are there for all of the ancient places. And the history of this area tells us these different places are all somewhat related. When we go through the oral traditions we recognize the Pele-Hi`iaka legends, because that's when the connections show up. Kane and Kanaloa in Fornander's work, and Kamakau, for example—it gives you a better appreciation for this area.

Regarding the sites in Kalaeloa, in addition to habitation structures, there are also a lot of sinkholes associated with habitation structures

and a lot of stone mounds. Some of these mounds have been identified as *ahus*, and shrines associated with *ahus*. In Kalaeloa today some of the stone mounds are being interpreted as agricultural mounds. What ancient Hawaiians did in areas where there was limited rainfall was to take advantage of the cycles of the seasons. These stone mounds are defined as agricultural sweet potato mounds in Kalaeloa. When you see these mounds it's hard to explain—all these mounds were obviously made by somebody, patches of them. Today you could go there to see it. You can see acres of little stone mounds all over the place.

It's important to get an understanding of the water situation, since it's so difficult for people to understand that this was a dry place. It appears that what the Hawaiians did was to take advantage of the cycle of the seasons and they used that knowledge in their growing of sweet potatoes. For example, they took coral and organic matter, what little soil was there, remember this area had not too much soil, and dried up composted leaves and put them in little mounds with stones all around. When it rained—like for example for the last month or so it's been raining a lot around here and it's very green—Hawaiians understood this, so what they did was prepare these mounds in anticipation of the coming rainy season. They would just leave it like that. When the rains came, the Ho`oilo season came, sun in the south, cooler season, first rainfall comes—that's when they planted. What we do know is that there used to be more water here, in the sinkholes. That's our understanding, our feeling. When Campbell first purchased the lands in this area, he purchased it for several reasons. Initially he tried to raise cattle. Subsequent to that, he decided to cultivate sugar. He drilled 77 wells looking for water. He wanted to get the water to a higher elevation so he could gravity-feed and control irrigation. So he drilled sufficient wells to establish reservoirs up *mauka*. What that did was reduce the amount of water flow to the lower levels.

What we do know is that in ancient Hawai`i in this particular region there was a lot more water in our streams. What we also know is that in ancient times there was a lot of *lipoa*, which is a *limu*. What we need to understand about *lipoa* is that it cannot survive with just salt water. *Lipoa* has to have fresh water. So at one time this whole region, if you read the different stories, there's reference to the `Ewa plain as an area rich in *lipoa*, up until the turn of the century. Today there's no *lipoa*, nothing. This is attributed to the fact that we no longer have fresh water leaching on top of the cap-rock out into the coastline. That's all gone. We suspect that because of the leaching of water in ancient times, all the sinkholes along the coastal region had water. That's confirmed by the fact that today, if you go to these areas of Kalaeloa, the formal Naval Air Station, again, you'll find a lot of sinkholes today. If you go down to the bottom, there's no water, but they're damp. They're all damp at the bottom. You'll also find a lot of sinkholes where there's banana, in Kalaeloa, growing in the bottom of the sinkholes. There is also *ti* leaves today, growing inside the sinkholes.

In every area of Kalaeloa where you find evidence of ancient human habitation and sinkholes, you will find native plants growing, today. But you can't see them because they're buried under the *kiawe* brush. And this is great, because nobody knows that they're there, and this is the reason why we want to preserve them. This substantiates the belief that

there may have been a lot of water. And there are Kane-Kanaloa references to Kane bringing forth water from the sinkholes for *awa*. And that's why we believe there was fresh water in the sinkholes. Another example that lends support for this understanding is that a number of sinkholes had rock walls built around them. There's a feeling that the rocks walls were built around the sinkholes to prevent debris from falling into the water resource. A lot of sinkholes that I could show you today, in Kalaeloa, have walls around them and have steps that go down into the lower levels of the sinkholes. We suspect that the water varied in the sinkholes. The steps allowed people to go down to the lower levels when the water level varied to get water. Those very sinkholes with paving, when you get down to the lower levels, the lower portions, are discolored with green algae at the bottom. That's evidence. We suspect that this was the water source.

MR. TONY BISE

Tony Bise's ancestors came from Okinawa. He has lived in ʻEwa Beach for 81 years (Fig. 6). This interview took place at his home in ʻEwa Beach on January 8, 2002.

Had four villages in this area—Tenney Village, Lower Village, Filipino-Korean Camp and Spanish Camp, which was down by the Mill. I lived in the Lower Village, across from the Family Center. My dad came from Okinawa in 1907. My family moved here in 1915. My father worked for plantation. Dad was also a fisherman and fished at Barber's Point. Those days had all *kiawe* except for the lighthouse. Lots of cows. Kahua Ranch went all the way down to the ocean, from mountain to sea. No houses. We used to swim in the storm drain, in the ditch. I remember one Hawaiian family in early 1930s; the father was custodian for ʻEwa school. Before the war, in the 1930s, used to have farms in this area where people grew tomatoes. Had pig farms, too. Only had sugar cane fields here before. No houses, except for one or two, down by the beach side. I used to go pick *limu* all the time, but now no more. We used to dive for the *limu*, but now others come and take all the *limu*. Nothing is left. Used to go fishing a lot, too. Had plenty mullet and *moi*. Dad was a fisherman but worked on the plantation. He used to catch the train and ride on the flat car to go to Kahe.

This place is very dry; no more rain. I used to live where a Chinese family made rock salt. They were selling it. They would pump the water up from the sea, then dry it out. The water was very clean, no pollution. Had plenty crabs, too. And all kinds of fish. This was back in the mid-1930s. West side had plenty fish. I worked for ʻEwa Plantation first, then Oʻahu Sugar Co. In 1970 they closed down. Then I worked until 1986 for Oʻahu Sugar. I do gardening in my yard now that I'm retired.

In the old days, before my time, they used to grow sisal down at Barber's Point, by the base. That was during my father's time. Oahu railway put a railroad there and the train used to go to Kahuku. We would ride in the boxcar all the way to Waiʻanae and to Haleiwa. My dad used to work on the track.

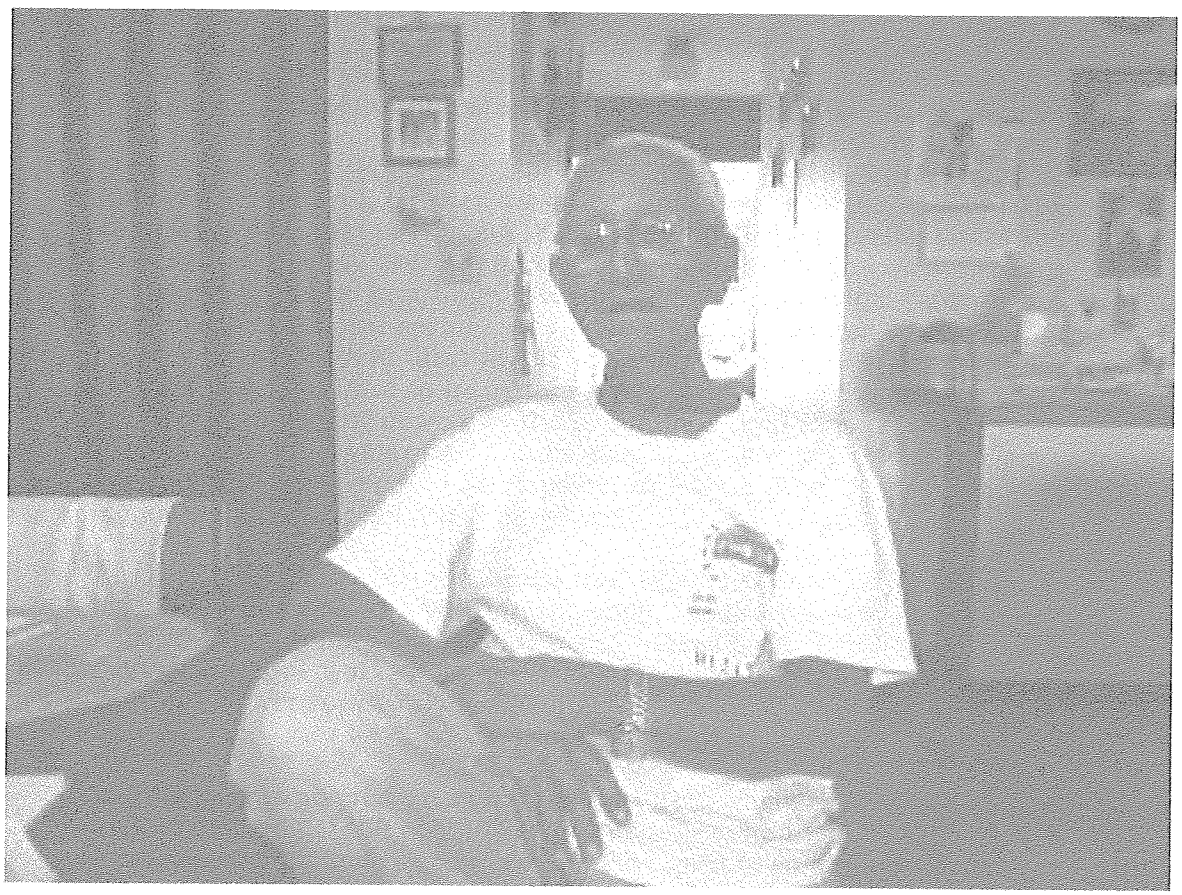


Figure 6. Mr. Tony Bise at his Home during the Interview

Used to have a Spanish village here, by the Mill. It was all Spanish people. They didn't speak English too well.

I think it's a good idea to have a plant here to make fresh water from salt water. Not enough water coming out of the ground, from the wells. The best water came out of the area where the farm is now, by the freeway. It had the best fresh water. I heard that long time ago had fresh water coming out in the sea, under the sea. Lots of coral here and water coming out of the coral. ʻEwa beach side got plenty.

Kahua Ranch had a lot of cowboys and I knew some of them when I was growing up. The Mokulehua family was living there and still live there, and the Aina family, too. They know a lot about this area. When I was a kid I used to go up there, to the Ranch.

Campbell estate used to crush coral and that's how they built the foundation for most of this area. But under this subdivision, there isn't any crushed coral. The walls are cracking. I thought there was water down below. But when they started to drill, they went down about 50 feet with a test drill, all over the place, and they never hit water. This area is too dry. But in Honouliuli, used to have water coming out of the ground, fresh water. But not on this side. We used to go swimming over at the ranch house in a huge fresh water pool. The water came out of the ground, a natural spring. It was about 5 feet deep or more. It was covered over later and filled in. It was right by the nursery, the Kahua Nursery. All that used to be fresh water, coming up in the rocks. There was a stream coming down and the plantations used that. A water pump used to pump the water out. That's what they used to grow rice. I don't know if had taro before. But upside, at Kahua, had fresh water, and Honouliuli, too, but not much over here.

At Oʻahu Sugar I was a machinist and when I worked for Campbell at around 14 years old; I worked in the shop. Later I became a blacksmith helper. Used to have lots of mules and horses back then. They ate the sugar cane and worked in the field. Donkeys carried the bundles of cane. They were owned by the plantation. There was a stable by the big banyan tree.

The stable was about a quarter mile away from where the swimming pool was, *makai* side of the pool. Now there's a freeway there. The pool was about 50 ' by 40' and 5' deep. All the kids used to go swimming there. I don't think that water was used for irrigation. In the same area, by Honouliuli, had plenty *opaeʻula*. Had small little eels, too. They used to be in the fresh water. The Japanese people eat that. We used to call them *dojo*. Also had catfish, from the rice fields. Catfish live in fresh water and used to swim around in the rice fields. We never used to eat that. Had only one pond with *opaeʻula*, and the rest we used to find at the shore. Had crayfish in the reservoir, too. I think the plantation brought that. They brought tilapia, too, the ʻEwa Plantation. This was all owned by Campbell Estate. Had plenty *papio*.

Another thing, after the rain all the mud from the fields went into the ocean, back in the '50s. That's when the fish and *limu* all died. That area was all ruined. ʻEwa plantation had lots of recreation for the workers, all kinds of activities and games for the families.

I volunteer a lot so I know lots of the families. Campbell estate honored me for my contributions to the community. Last year I won an award called the Kapolei Outstanding Achievement Award. I was one of twelve people honored for lifetime service.

MS. JEAN KUBOTA

Jean Miyoko Shimizu Kubota wrote a series of little stories to share with friends and family on the occasion of her 75th birthday celebration held on June 8, 1996 in Honolulu, Hawai`i. Mrs. Kubota offered to share these stories about her life in Ho`ae`ae in the `Ewa district.

I was born in the sticks of Kapa`a, Kaua`i on June 9, 1921. My faintest recollection of my early years is growing up in Ho`ae`ae, along West Loch. I remember an old house under a common mango tree. The train passed right in front of our house. Across the tracks was the muddy sea. The houses were far apart. Each house had a 1" x 12" plank pier with kiawe stilts. Can you imagine me running on this pier and diving in the water at the end?

We caught many red Hawaiian crabs and white haole crabs. These were kept in a box at the end of the pier. After a few days my father would put them in a burlap bag and send it on the train, which conveniently stopped right in front of our house, to Ohtani Fish Market, near River Street in Honolulu. The train station in Honolulu was at Iwilei Road. It went as far as Wai`anae.

September was clam season. We dug clams and sent them to market the same way the crabs were sent. We ate clams (free) to our hearts content. People from all over came to dig their one-gallon limit.

My father was a fisherman. He had a 14-foot sailboat. On calm days it took forever to reach the fishing grounds. On windy days it went fast and the boat tipped on one side. I would dip my hand in the swift water and my father would say, "The shark will bite your hand off."

When the fish were biting my father would take my brothers. On one of those not so good days he took me to fish for papio. Some of the papio came up half eaten by sharks. I was so scared when I saw the dark shadows swimming under the boat. Fishing for omaka was fun. My father made a special gadget so you could catch two at a time.

Mom burned firewood to heat the water for the furo bath. When the bath was ready we would go swimming in our birthday suits. When the train passed by we would dunk ourselves up to the neck and wave at the passengers. The hot furo was so good after the swim.

Mom would roast sweet potatoes in the hot ashes and burnt firewood. So ono! Also, grilled dried hammerhead sharks. I could almost hear my grandchildren say "Ugh! Hammerhead shark?!"

On a calm day the baby sharks would come swimming near the shore looking for food. We could see the fins sticking out of the water. My brother would just catch them by the tail. I held the bag. Mom used the head and tail for crab bait. The flesh was cut in strips, salted and dried. When grilled, it was smelly but good, like takuwan and kim chee.

We walked about three miles to `Ewa Elementary School. First, on the O`ahu Railway tracks to Honouliuli, then on the road. We passed a slaughterhouse. Some women were there cleaning the intestines in a stream nearby. I didn't know why they were doing this. We passed a Buddhist temple that was also my Japanese language school. We went through the Filipino camp and past a Chinese store. I tasted my first black bean manapua which cost only a nickel. My big sister Mitsuko took me to my class and introduced me to a girl. Since I did not go to kindergarten, I was assigned to the "B" class.

I was moved up to the "A" class in a month. Miss Eldrich was my teacher for three years. She moved up with us each year. She took the whole class to her cottage and treated us to all kinds of candies and cookies every holiday—Halloween, Thanksgiving, Christmas, Valentines and Easter. This was a real treat for me because we hardly had any of those things.

The children hovered over me for the mangoes I used to bring. Besides the common, there was apple, small, round, sweet and ono; Chinese, very tart and good for pickles; Indian, red and tasty; Filipino, which the Filipinos liked. And there was Kaki mango my mom named because it had the texture of persimmon and tasted very good.

The plantation nurse came to check up on us. The plantation kids were given a tablespoon of cod liver oil and a slice of orange. I didn't get any because my folks didn't work for the plantation. But because I was so skinny, I was required to buy poi and milk every day: 1 cent for poi and 5 cents for milk. Some of us took salted cod fish to eat with poi or we added sugar and milk.

My home lunch was musubi with ume inside. One haole boy loved ume so I exchanged it for his tapioca pudding. It was so delicious the first time I tasted it. I couldn't eat olives, never tasted one before until I got it on my lunch plate. I gave it away and got the seed back before the teacher came to inspect my plate.

My uncle was a carpenter. Our home was built with his help. All the lumber and other construction supplies were delivered by train, so conveniently stopping right in front of our yard. They built two bedrooms with a doorway in between, a living room and kitchen. The bathroom was separate and also an outhouse.

I remember my brother Mutsuo being born with the help of a mid-wife right in the same room where we slept.

Every family had a little pond. Water from this pond was used for laundry, bath and for the garden. I remember beautiful hyacinths, real frogs, not toads, and some fresh water fish.

We had a well for drinking water. A bucket was lowered to get the water that was carried to the house.

One day the train stopped in front of the house. Parts of a windmill were unloaded. My father, with the help of my uncle and others, built the windmill. Water was pumped up into a tank. We were so happy to get running water at last! This water was very brackish and salty, being so close to the sea. But, thank god, we never got sick. It must have been full of trace minerals.

There was no electricity. We used kerosene lamps and lanterns. One of my chores was to clean the soot off the lamps and fill them with kerosene. W had kerosene stove for cooking, but mom cooked rice with a special rice cooker called the *kama*, burning firewood beneath it. The burnt rice tasted so good!

We didn't even have a radio. My brother Toichi was very mechanical minded so he built a crystal set with earphones. I was able to listen to some music while I did my homework. My father used to say, "How can you listen to the radio and do your homework?" Anything is possible if you have a super mind, ha ha.

On the way to school one day, we crossed over to the other side of the road on to the sugar train tracks. We picked up sugar cane that had fallen off the cars being hauled to the sugar mill. We peeled the tough outer skin with a knife or our teeth and chewed the fibers loaded with sweet juice. That's real sugar. Sweet can turn sour. The tracks were off limits. "The Principal!". We all dropped our cane. Too late, caught red-handed. We were ordered to report to her office. Scared and nervous, we listened to her lecture. We promised never to do it again, so we were excused. Oh, I forgot to say that this sugar cane had a special burnt sugar flavor because the leaves were burned for easier harvesting. Uuuum... good!

As I was playing in the yard I accidentally broke off a branch of mom's pepper plant. She was so angry she chased after me, yelling her head off. I ran on the tracks and hid in the *haole koa* bushes. After a long while, she came looking for me to tell me supper was ready. I guess that was her way of saying I was forgiven. After that I was careful not to damage any of her plants. My love for plants and flowers was instilled in me by her.

"Shimizu-san, you have a kidney infection. Sorry, but you have to drink milk instead of sake," said Dr. Shirota. There was no store nearby. I remember walking with my brother to Ho`ae`ae Ranch and Dairy through the California grass, over streams, up and down the hill, walking on the narrow path between rice fields and taro patches. It was about three miles going and coming home. We didn't have even an icebox so we had to go every day for milk. I don't remember how long this continued, but one day he got well. This was a trying time for him because he loved his sake.

My cousin Shigeru and I went swimming. We went out on a raft. After swimming for quite a while, I decided to swim back. I swam and swam but I couldn't touch bottom. I panicked. I was out of breath. I called,

"Shigeru, help!" If it wasn't for him, I would not be here today. You see, we went out when it was low tide. We didn't realize the tide had come up.

During summer vacation we took turns staying over a couple of weeks at our house, then at my cousin's. My aunty was a very smart woman. She ran a General Merchandise and Grocery Store on Waiakamilo Road. While waiting for customers, she sewed all the clothes for her seven boys and husband and her two girls. She would say, "Miyoko, you #1 button hole maker." Those days undershorts were called BVDs, even though home made. I learned to embroider from my cousins. I remember a lavender dress with pretty embroidery, a hand-me-down from my cousin Kiyoko. I loved it very much.

"My-yo-ko Shi-mit-zu," my teacher would call. She struggled with all the Japanese names. So she gave everyone an English name. I was named "Jean" and was very happy with it. When I was seventeen, a senior at Farrington High School, I was asked to bring my birth certificate. They looked at it and I was told it was fake. Mr. Sumida had swindled my mom and many others. He said he'll take care of it for a fee. He was arrested for swindling. Since I had to get a new certificate made, my sister Mitsuko suggested adding "Jean", but it would cost $50 to do it so we didn't. Although it's not legal, most people know me as Jean. Recently, when I started research on the meanings of names, I learned that Jean means "God's gracious gift."

After graduating from the 8th grade at `Ewa Elementary School, I rode the train which stopped right in front of the house to go to Kalakaua Intermediate School. After many, many stops along the way, the main depots were at Waipahu, Pearl City, Aiea and Honolulu. Those who went to Kalakaua got off at Kalihi Street. Others who went to McKinley rode to the end of the line in Honolulu. Then they rode the streetcar.

It was fun riding the train. I remember looking out at the rice fields and taro patches, farmers working in their fields. I saw Pearl Harbor and the ships going out and coming in. I saw windmills just like ours. I enjoyed the train ride very much. Some mornings, when we were late, we called out to the train conductors to stop the train. As long as someone was out there, they would stop the train.

We had a Victorola. Every time mom went into Honolulu, she spent time with her sister in Kalihi on Waiakamilo Road. She always came home with some records to play on the Victorola. She got songs for herself in Japanese, but she always got some children's songs for us. We learned many songs even before we went to school. This is how the love of music was instilled in us.

My mom loved to sing. She had a beautiful voice and she always sang at parties. My sister Hideko took after her. She loves to sing popular Japanese songs. She also sings for the Lord at Kalihi Union Church with the Japanese group. At 108 years of age, my mother can still sing.

During my senior year at Farrington High, I lived with a family friend who ran a sweet shop and soda fountain in front of Toyo Theater on College Walk. So I worked there after school, making root beer floats,

strawberry sundaes, banana splits and Cokes. This was about the time Coke was introduced to Hawai`i. They didn't come in cans. I squirted a little syrup in the fancy Coke glass, some ice and fizzed in the carbonated water. It cost only a nickel. People stopped by before going to the movies. I also packed cracked seed, li hing mui, etc. in small paper bats. These were only a nickel, too.

After Kalakaua Intermediate School, we started as freshmen at Farrington High. Then sophomores, juniors and seniors. We were the first graduates in 1939. Our school was the old Kamehameha Boys' School on King and Kalihi Streets. It was an old termite-eaten building. After graduation I wanted to go to commercial school, but my father said, "Girls no need go school. Mo betta go Bride School." So being an obedient daughter, I went and learned to sew, do flower-arranging, and tea ceremony. Sewing was my favorite. I bought materials for 10 or 15 cents a yard at Kress Store on Fort Street.

I dated several boys, going to the movies, dancing, even roller-skating. Skating was a flop. I was so scared and kept falling. I never learned to skate. I loved dancing but no one took me seriously. They only wanted a good dancing partner. One guy invited me to his apartment after the movie. Of course, I refused and never went out with him again.

My friend Terry, from Honouliuli, came to the soda fountain one night. He said, "I like you meet one guy, handsome bugga. We work together. We all go out together, the three of us." So I said, "OK." It was Friday, my night off. He came on a pick-up truck. Terry got off and when I got in he introduced me to Harry and slammed the door. I said, "Wait! You not coming?" Harry just drove off. He gave me a vanda orchid lei. We rode the crazy car at the E.K. Fernandez carnival. It was scary but exciting being knocked around with someone I met for the first time. Waffle hot dog was most delicious at KC Drive-Inn. When he took me home he said, "See you next Friday."

After Bride School I went to work as a waitress in a restaurant in the A`ala Park district. The owner was a family friend. Next I became a live-in maid. Here I learned to cook and bake. I tasted my first fruitcake. Being a salesclerk at the Fair Department Store on the corner of Fort and Beretania Streets was rather enjoyable. I made many friends. Stores closed on Sundays so Harry and I with friends went on picnics, ginger picking, crabbing and fishing in Ho`ae`ae. Mullet were jumping left and right but not many got caught in the net.

My father bought a 1929 Ford Model "T" pick-up truck to sell his fish. Once a month we all jumped in the back and went to Waipahu to see free Japanese movies. He also took us to school programs that we would not have been able to attend if not for this truck. One day, after visiting my uncle, aunt and cousins, we (my brothers and sisters and I) found ourselves upside down in the truck. My father must have had one too many drinks of sake. Thank god we didn't even have a scratch. Later we got a Ford Touring sedan, which was much nicer and more comfortable.

I remember standing in line at Hawaii Theater and Princess Theater to go to the movies. Harry and I enjoyed playing wee golf in Waikiki. We had great times together. When the war broke out in December 1941, our

nighttime dates came to an end. Civilians were not allowed to drive around at night. We got engaged on Christmas and got married the following year on July 20, 1942, and lived happily ever after.

CONCLUSION: Impact of the Board of Water Supply's Desalination Plant

None of the people whose interviews appear in this report, or who shared information in personal conversation, expressed distress or concern about the construction of the BWS Desalination Plant. One interviewee noted that he favored its construction because he understood the need to have more fresh water available for use. One unsolicited comment raised the issue of cost to the consumer for desalinating water.

The existing massive degradation of the area where the plant will be located is likely a primary factor for the community's low level of concern. The fact that extensive damage had already been done with dredging and changing of the landscape over the last hundred years, coupled with the changing political climate, contributed to feelings that the Board of Water Supply would be open to instituting conservation measures in and around the area of development and perhaps participate in helping to restore damaged areas. It was also noted by another interviewee that his concern was to help the land to heal itself after so many decades of degradation and contamination.

Based on observations made during the current study, the most frequent use of the area consisted of recreational fishing along the shoreline. Since the areas immediately inland of the coast have restricted access, shoreline access is primarily pedestrian, along the shore from the public park at the lighthouse. The proposed project would not pose a major negative impact to shoreline access.

Appendix D

Master Plan

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

JOB NO. 00-00

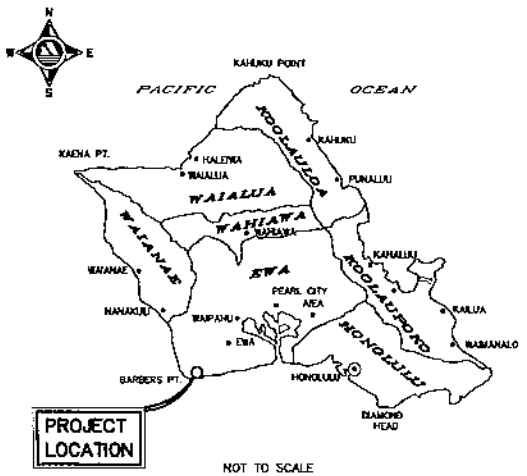
KALAELOA DESALINATION PLANT
MASTER PLAN

KALAELOA, EWA, OAHU, HAWAII

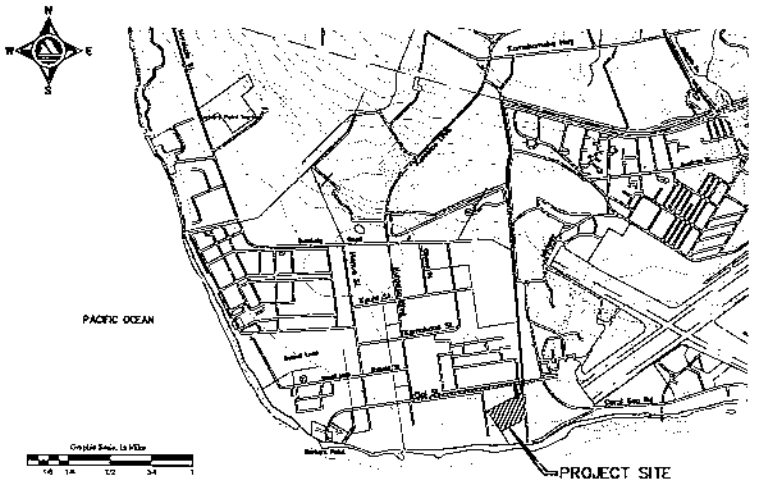
TMK: 9-1-31:028

PREPARED BY:
Oceanit
...innovation through engineering and scientific excellence...
HONOLULU, HAWAII

VICINITY MAP



LOCATION MAP



CONSULTANTS

OCEANIT
CIVIL, ENVIRONMENTAL & PROCESS ENGINEERS

MARC S. SIAH ASSOCIATES, INC.
CIVIL & STRUCTURAL ENGINEERS

JOSEPH LANCOR ARCHITECTS, INC.
ARCHITECT

RONALD N. S. HO & ASSOCIATES, INC.
ELECTRICAL ENGINEERS

OKAHARA & ASSOCIATES
MECHANICAL ENGINEERS

BROWNLIE & LEE
LANDSCAPE ARCHITECTS

PAREN INC. DBA PARK ENGINEERING
SURVEYORS

PSC CONSULTANTS, LLC
SOILS, FOUNDATION AND GEOTECHNICAL ENGINEERS

SAM DANNAWAY ASSOCIATES
FIRE PROTECTION ENGINEERS

KALAELOA DESALINATION PLANT – MASTER PLAN

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CIVIL ABBREVIATIONS

A

@	AT
ABND	ABANDONED
AC	ASPHALTIC CONCRETE
ARV	AIR RELIEF VALVE
AT&T	AMERICAN TELEPHONE & TELEGRAPH

B

B	BOTTOM, BACK
BC	BOTTOM OF CURB
℄	BASE LINE
BLDG	BUILDING
BLK	BLOCK
BM	BENCH MARK
BV	BOTTOM VERTICAL
BW	BACK OF WALL, BOTTOM OF WALL
BWS	BOARD OF WATER SUPPLY
B&S	BELL & SPIGOT

C

℄	CENTERLINE
C&C	CITY & COUNTY
CATV	CABLE TELEVISION
CB	CATCH BASIN
CI	CAST IRON
CLR	CLEAR, CLEARANCE
CM	CEMENT MORTAR
CO	CLEAN OUT
CONC.	CONCRETE
CONT	CONTINUOUS
COTG	CLEANOUT TO GRADE
CR	CRUSHED
CU	COPPER
CY	CUBIC YARD

D

DET	DETAIL
DHHL	DEPARTMENT OF HAWAIIAN HOMELANDS
DI	DUCTILE IRON, DRAIN INLET
DIA	DIAMETER
DIAG	DIAGONAL
DL, D	DRAINLINE
DMH	DRAIN MANHOLE
DPP	DEPARTMENT OF PLANNING AND PERMITTING
DPW	DEPARTMENT OF PUBLIC WORKS
DRWG, DWGS	DRAWING(S)

E

E	ELECTRIC LINE, EAST, EXISTING
EF	EACH FACE
ELEC	ELECTRICAL
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
EXIST. (E)	EXISTING

F

F	FRONT, FUEL
F.B.	FLAT BAR
FE	FLANGED END
FF	FINISHED FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FIN	FINISH
FLG	FLANGE
FM	FORCE MAIN
FT	FEET
FW	FRONT OF WALL, FRESH WATER

G

G	GAS
GAL, GA	GALLON
GALV	GALVANIZED
GRND.	GROUND
GV	GATE VALVE

H

H	HORIZONTAL
HB	HOSE BIBB
HECO	HAWAIIAN ELECTRIC COMPANY
HORIZ	HORIZONTAL
HT	HAWAIIAN TELEPHONE, HEIGHT
HTCO	HAWAIIAN TELEPHONE COMPANY

I

ID.	INSIDE DIAMETER, IDENTIFICATION
I.E.	EXAMPLE
INV.	INVERT
IPT	INTERNAL PIPE THREAD
IRRIG	IRRIGATION

L

L	LEFT
LF	LINEAR FOOT

M

MAX.	MAXIMUM
MJ	MECHANICAL JOINT
MH	MANHOLE
MIL	MILLION
MIN	MINIMUM

N

N	NORTH
NO.	NUMBER
NTS	NOT TO SCALE

O

OC	ON CENTER
OD	OUTSIDE DIAMETER

P

℗	PROPERTY LINE, PLATE
PAVT	PAVEMENT
PC	POINT ON CURVE
PE	POLYETHYLENE
PSI	POUNDS PER SQUARE INCH
PT	POINT, POINT ON TANGENT
PVC	POLYVINYL CHLORIDE

R

R	RADIUS OF CURVE, RIGHT
RCJ	REINFORCED CONCRETE JACKET
RD	ROAD
REINF	REINFORCEMENT
REQ'D	REQUIRED
RPM	RAISED PAVEMENT MARKER
RT	RIGHT
R/W	RIGHT-OF-WAY

S

S	SOUTH, SEWER, SLOPE
SC	SIGNAL CORPS CABLE
SF	SQUARE FOOT
SHT	SHEET
SMH	SEWER MANHOLE
SQ.	SQUARE
SS	STAINLESS STEEL
SSMH	SANITARY SEWER MANHOLE
ST	STREET
STA	STATION
STD	STANDARD

T

T	TOP
TC	TOP OF CURB
TEL	TELEPHONE
TEMP	TEMPORARY
THK	THICK
TP	TOP OF PIPE
TS	TRAFFIC SIGNAL
TUG	TELEPHONE UNDERGROUND
TV	TOP VERTICAL
TW	TOP OF WALL
TYP.	TYPICAL

U

UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE

V

VAR	VARIES
VB	VALVE BOX
VERT	VERTICAL
VIF	VERIFY IN FIELD

W

W	POTABLE WATER, WEST
W/	WITH
W, (W/A)	WATER LINE
WM	WATER METER
WMH	WATER MANHOLE
WS	WATER SERVICE LATERAL
WV	WATER VALVE
WVHH	WATER VALVE HAND HOLE

REVISION	DATE	DESCRIPTION	WAS BY	APPROVED

Oceanit

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

JOB NO. 00-00

KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII

INDEX TO DRAWINGS

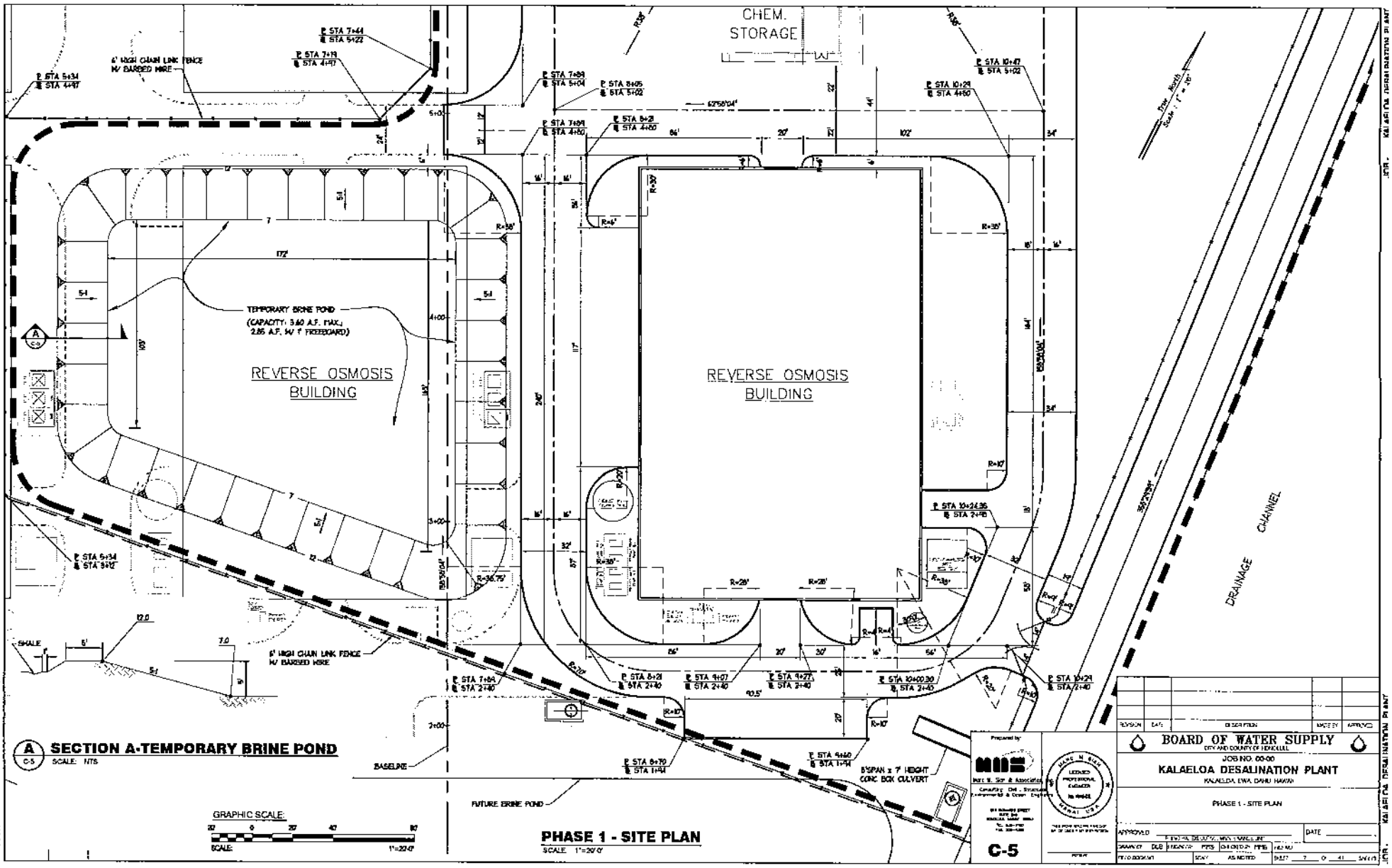
APPROVED: _____ DATE: _____
FOR BWS, DEPUTY MANAGER AND CHIEF ENGINEER

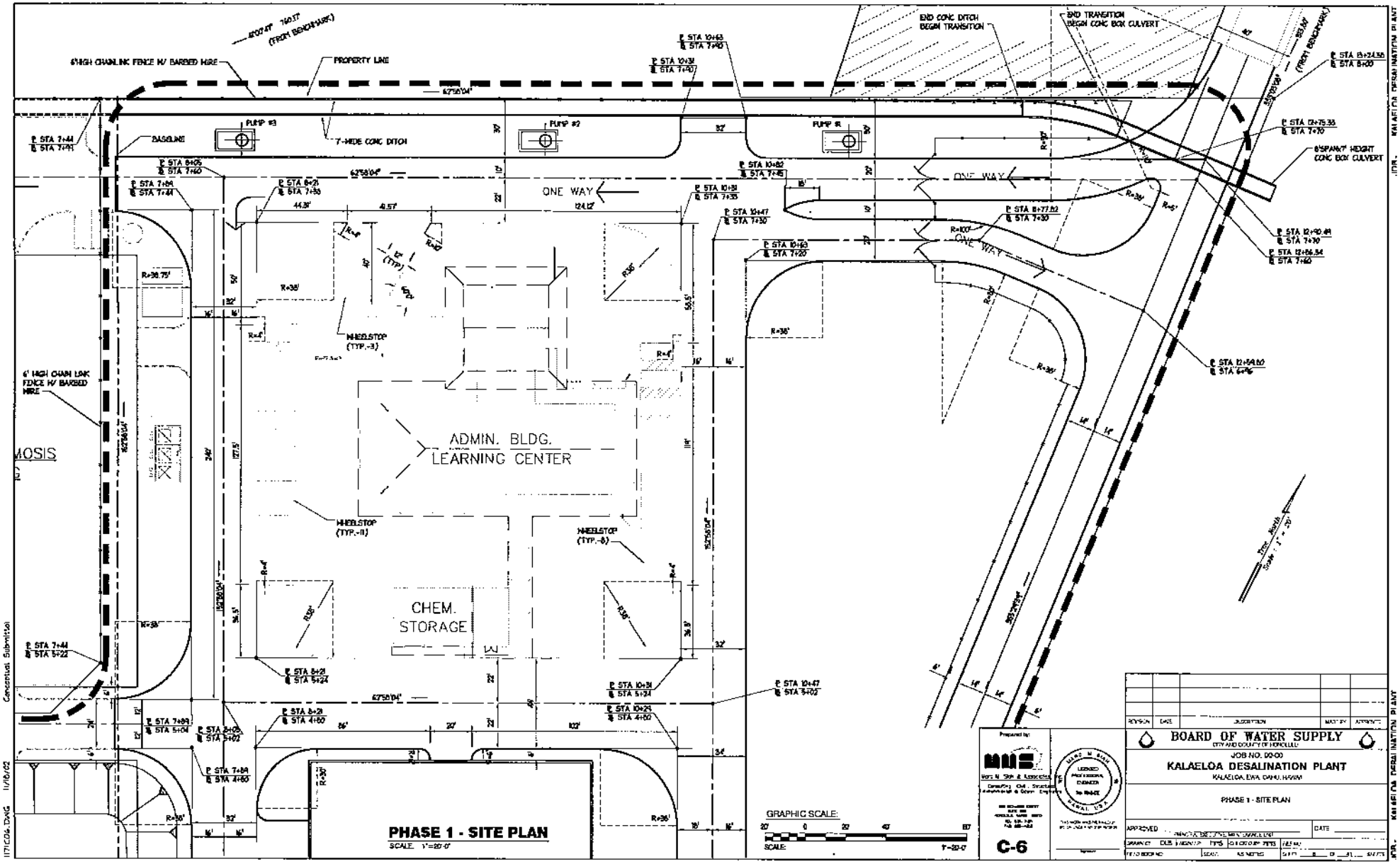
DRAWN BY: DCZ | ENGINEER: DCZ | CHECKED BY: | FILE NO.

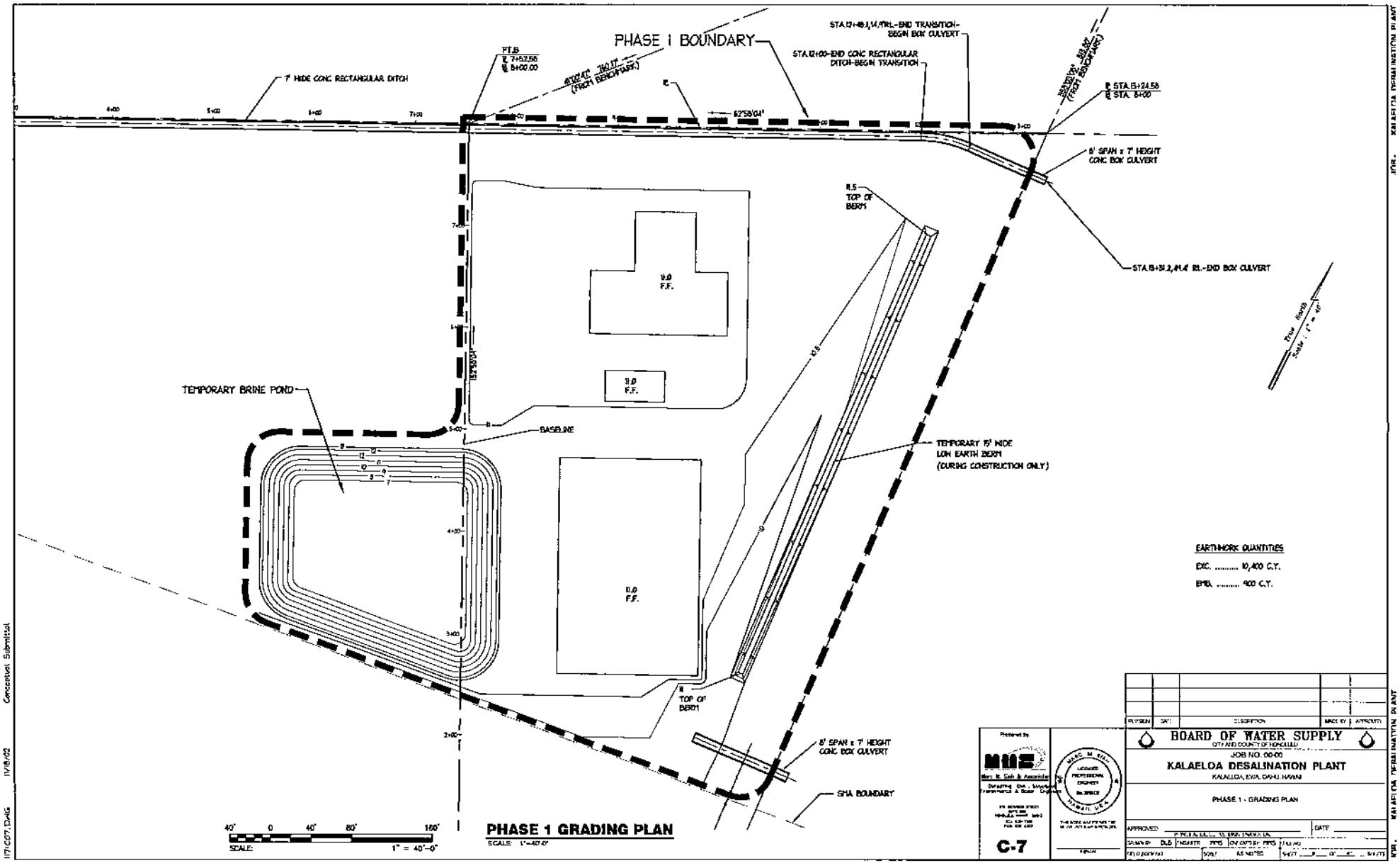
FIELD BOOK NO.: | SCALE: AS NOTED | SHEET 2 OF 33 SHEETS

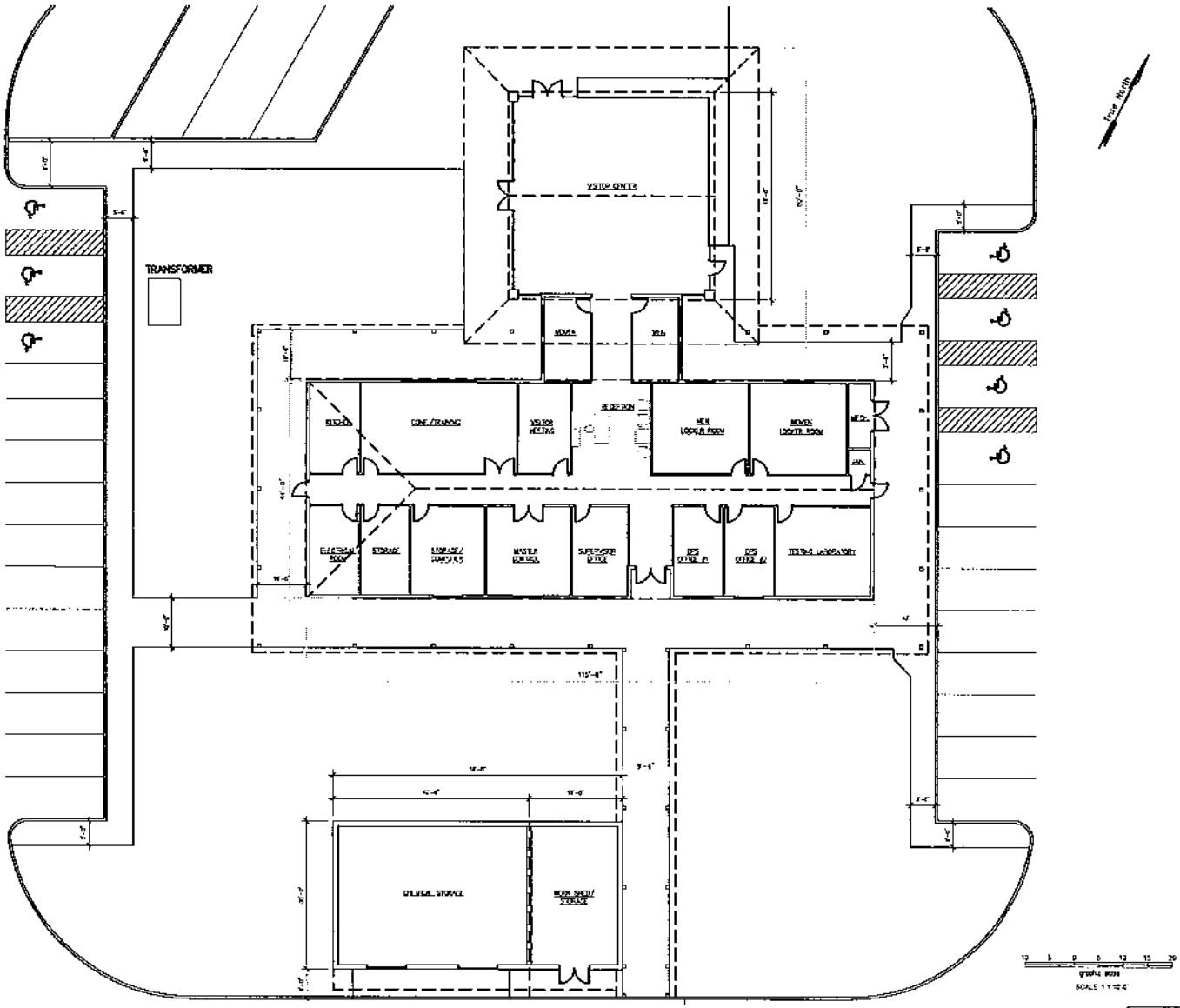
T-2

JOB 00-00 KALAELOA DESALINATION PLANT


CHEM. STORAGE
REVERSE OSMOSIS BUILDING
REVERSE OSMOSIS BUILDING
TEMPORARY BRINE POND
(CAPACITY: 340 A.F. MAX.; 285 A.F. W/ 1' FREEBOARD)
6' HIGH CHAIN LINK FENCE W/ BARBED WIRE
6' HIGH CHAIN LINK FENCE W/ BARBED WIRE
DRAINAGE CHANNEL
BASELINE
FUTURE BRINE POND
8'SPAN x 7' HEIGHT CONC BOX CULVERT
SHALE
GRAPHIC SCALE:
SCALE: 1"=20'-0"
A C-5 SECTION A-TEMPORARY BRINE POND
SCALE: NTS
PHASE 1 - SITE PLAN
SCALE 1"=20'-0"
C-5
BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
JOB NO. 00-00
KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII
PHASE 1 - SITE PLAN
Conceptual Submittal
11/16/02


6' HIGH CHAINLINK FENCE W/ BARBED WIRE
PROPERTY LINE
BASELINE
7'-WIDE CONC DITCH
PUMP #3
PUMP #2
PUMP #1
ONE WAY
ADMIN. BLDG.
LEARNING CENTER
CHEM.
STORAGE
WHEELSTOP (TYP.-3)
WHEELSTOP (TYP.-11)
WHEELSTOP (TYP.-6)
6' HIGH CHAIN LINK FENCE W/ BARBED WIRE
END CONC DITCH BEGIN TRANSITION
END TRANSITION BEGIN CONC BOX CULVERT
8'SPAN/7' HEIGHT CONC BOX CULVERT
MOSIS
PHASE 1 - SITE PLAN
SCALE: 1"=20'-0"
GRAPHIC SCALE:
SCALE: 1"=20'-0"
C-6
BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
JOB NO. 00-00
KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII
PHASE 1 - SITE PLAN


PHASE I BOUNDARY
7' WIDE CONC RECTANGULAR DITCH
PT.B
℄ 7+52.58
℄ 8+00.00
STA.12+48.1,14.9'RT.-END TRANSITION-BEGIN BOX CULVERT
STA.12+00-END CONC RECTANGULAR DITCH-BEGIN TRANSITION
℄ STA.13+24.58
℄ STA. 8+00
8' SPAN x 7' HEIGHT CONC BOX CULVERT
STA.13+31.2,41.4' RT.-END BOX CULVERT
11.5 TOP OF BERM
11.0 F.F.
11.0 F.F.
11.0 F.F.
TEMPORARY BRINE POND
BASELINE
TEMPORARY 15' WIDE LOW EARTH BERM (DURING CONSTRUCTION ONLY)
11 TOP OF BERM
8' SPAN x 7' HEIGHT CONC BOX CULVERT
SMA BOUNDARY
True North
Scale: 1" = 40'
EARTHWORK QUANTITIES
EXC. ..... 10,400 C.Y.
EMB. ..... 900 C.Y.
40' 0 40' 80' 160'
SCALE: 1" = 40'-0"
PHASE 1 GRADING PLAN
SCALE: 1"=40'-0"
C-7
BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
JOB NO. 00-00
KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII
PHASE 1 - GRADING PLAN
APPROVED
DATE
DRAWN BY DLS
SCALE AS NOTED
Conceptual Submittal
11/18/02
11/18/02



ADMINISTRATION BUILDING / VISITOR CENTER SPACE REQUIREMENTS

SPACE NAME	APPROXIMATE AREA (SQ. FT.)
VISITOR CENTER	1573
MEN'S RESTROOM (VC)	195
WOMEN'S RESTROOM (VC)	195
RECEPTION (VC)	217
KITCHEN	186
CONF. / TRAINING	580
VISITOR / MEETING	195
STORAGE	177
STORAGE COMPUTER	270
MASTER CONTROL	309
SUPERVISOR OFFICE	204
OPS OFFICE NO. 1	180
OPS OFFICE NO. 2	180
LAB	351
MECHANICAL ROOM	60
JANITORIAL ROOM	23
WOMEN'S LOCKER ROOM	360
MEN'S LOCKER ROOM	360
HALLWAYS	990
TOTAL	6605
CHEMICAL STORAGE	1078
WORKSHED / STORAGE	490
PARKING (STD STALLS)	19
BUS	3
HANDICAP STALLS	7

REVISION	DATE	DESCRIPTION	MADE BY	APPROVED

Oceanit

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

JOB NO. 00-00
KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII

ADMINISTRATION BUILDING PLAN

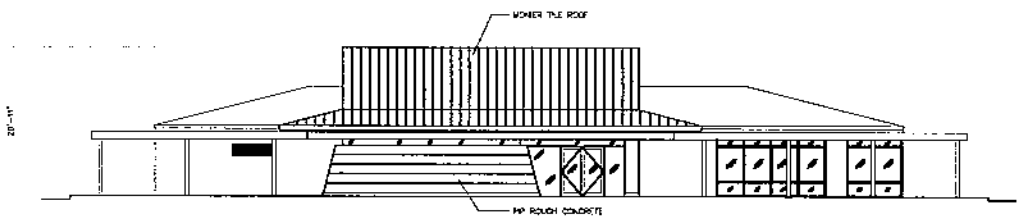
APPROVED: _____ PRINCIPAL ENGINEER, MAINTENANCE UNIT DATE: _____

DRAWN BY: PCS | ARCHITECT: JL | CHECKED BY: JL | FILE NO.: XXX

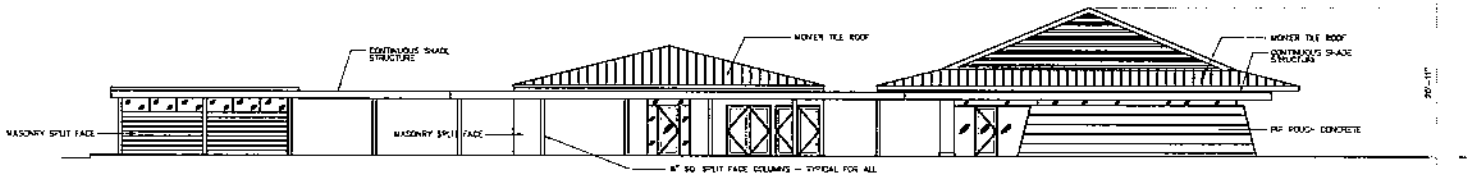
FIELD BOOK NO.: | SCALE: AS NOTED | SHEET 19 OF 41 SHEETS

A-1

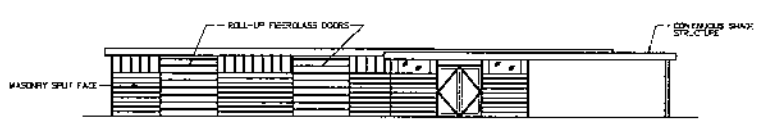
JOB 00-00 KALAELOA DESALINATION PLANT



ADMINISTRATION BUILDING NORTH ELEVATION
SCALE: 1/8" = 1'-0"



ADMINISTRATION BUILDING EAST ELEVATION
SCALE: 1/8" = 1'-0"



ADMINISTRATION BUILDING SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

REVISION	DATE	DESCRIPTION	MADE BY	APPROVED

Oceanit

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

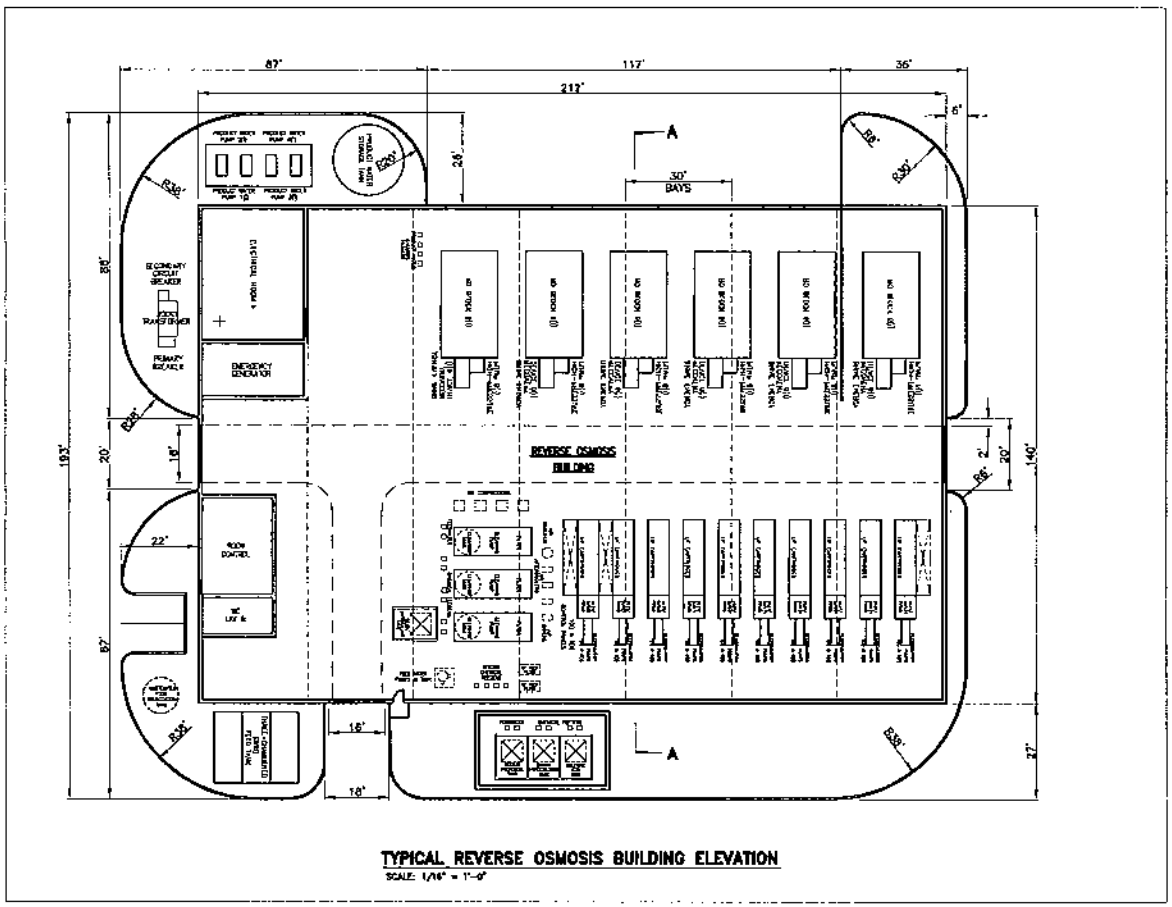
JOB NO. 00-00
KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII

ADMINSTRATION BUILDING ELEVATIONS

APPROVED: _____ PRINCIPAL, EXECUTIVE, MAINTENANCE UNIT | DATE: _____
DRAWN BY: PCS | ARCHITECT: JL | CHECKED BY: JL | FILE NO. XXX
FILE BOOK NO.: | SCALE: AS NOTED | SHEET 21 OF 41 SHEETS

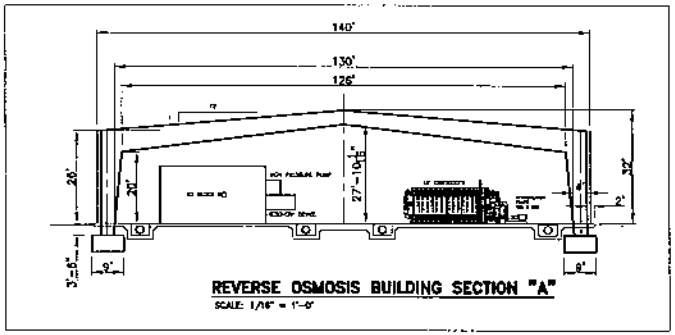
A-2

JOB 00-00 KALAELOA DESALINATION PLANT



TYPICAL REVERSE OSMOSIS BUILDING ELEVATION

SCALE: 1/16" = 1'-0"



REVERSE OSMOSIS BUILDING SECTION "A"

SCALE: 1/16" = 1'-0"

REVERSE OSMOSIS BUILDING SPACE REQUIREMENTS

SPACE NAME	APPROXIMATE AREA (SQ. FT.)
PROCESS AREA	26,628 SF
ELECTRICAL ROOM	1,072 SF
CONTROL ROOM	540 SF
WC & LAV	200 SF

REVISION	DATE	DESCRIPTION	MADE BY	APPROVED

Oceanit

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

JOB NO. 00-00
KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII

REVERSE OSMOSIS BUILDING PLAN

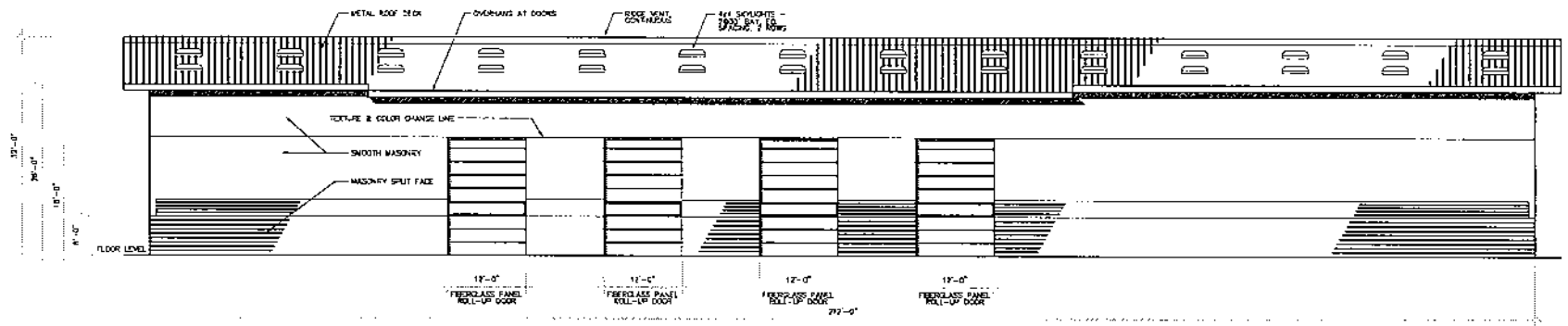
APPROVED: _____ PRINCIPAL EXECUTIVE, MAINTENANCE DIV. DATE: _____

DRAWN BY: DCE | ENGINEER: DCE | CHECKED BY: | FILE NO.

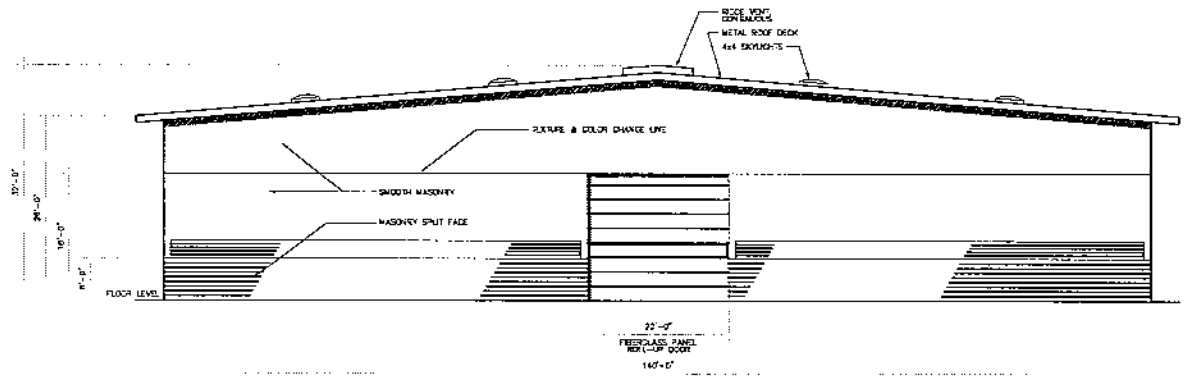
FIELD BOOK NO.: | SCALE: AS NOTED | SHEET 21 OF 41 SHEETS

A-3

JOB 00-00 KALAELOA DESALINATION PLANT



TYPICAL RO BUILDING BUILDING ELEVATION
SCALE: 1/8" = 1'-0"



TYPICAL RO BUILDING BUILDING ELEVATION
SCALE: 1/8" = 1'-0"

REVISION	DATE	DESCRIPTION	MADE BY	APPROVED

Oceanit

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

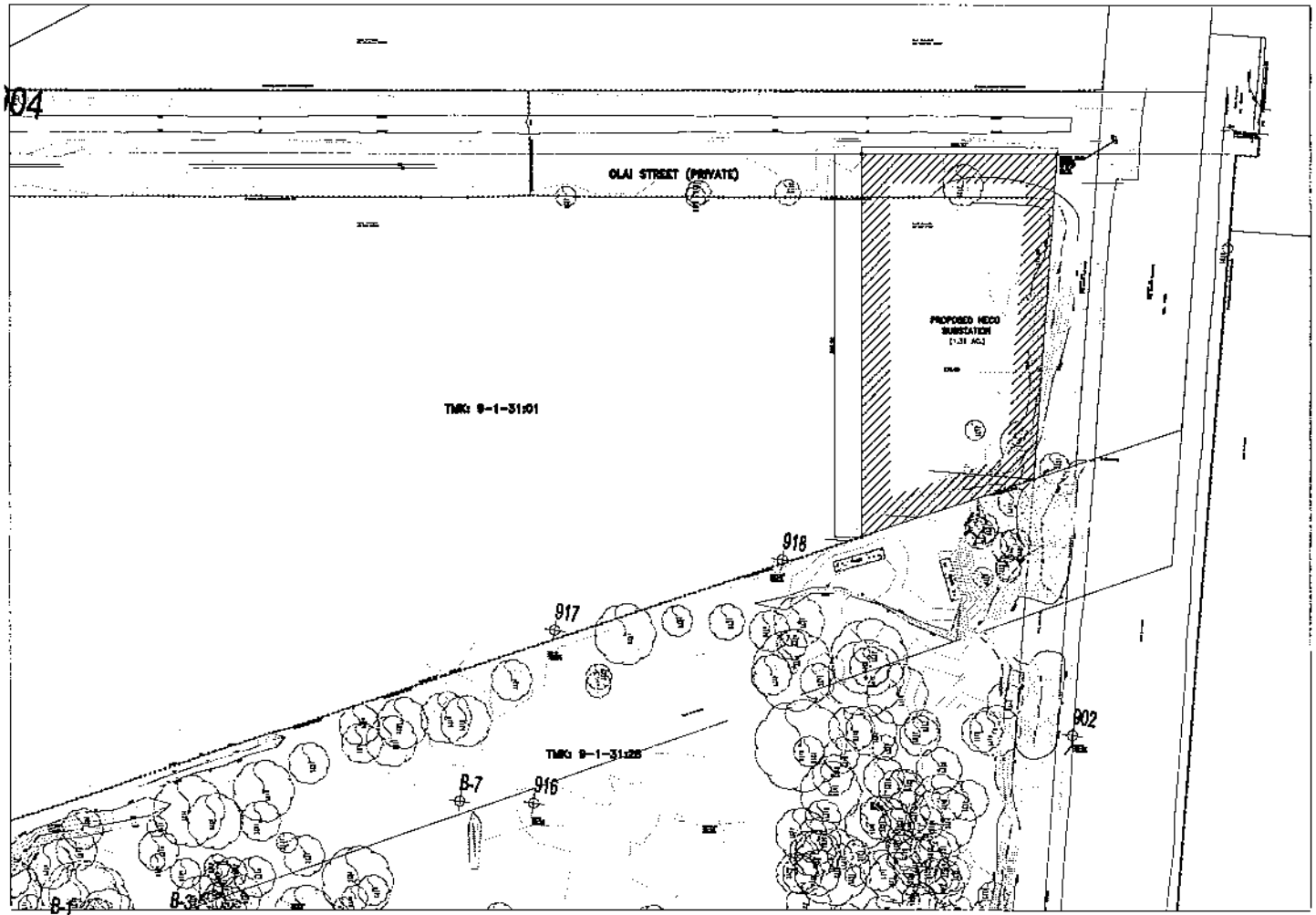
JOB NO. 00-00
KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII

TYPICAL RO BUILDING ELEVATIONS

APPROVED: _____ DATE: _____
PRINCIPAL EXECUTIVE, MAINTENANCE UNIT
DRAWN BY: PCS | ARCHITECT: JL | CHECKED BY: JL | FILE NO. A-5.DWG
FIELD BOOK NO.: | SCALE: AS NOTED | SHEET 22 OF 41 SHEETS

A-4

JOB 00-00 KALAELOA DESALINATION PLANT



PROPOSED HECO SUBSTATION LOCATION

Scale : 1" = 50'-0"

REVISION	DATE	DESCRIPTION	MADE BY	APPROVED

Oceanit

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

JOB NO. 00-00
KALAELOA DESALINATION PLANT
KALAELOA, EWA, OAHU, HAWAII

PROPOSED HECO SUBSTATION LOCATION

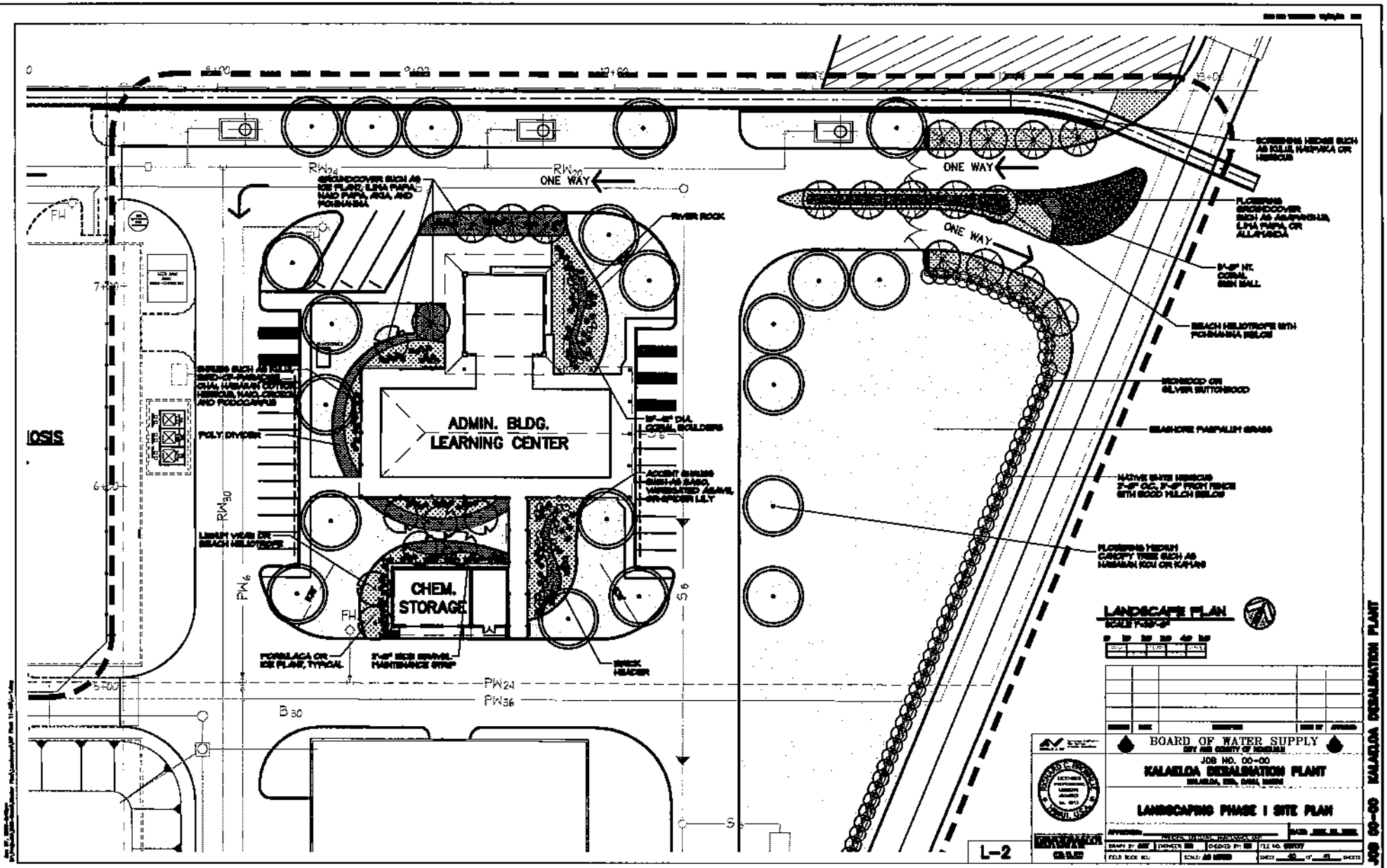
APPROVED: _____ PRINCIPAL, EXECUTIVE, MAINTENANCE UNIT DATE: _____

DRAWN BY: DCE | ENGINEER: RICE | CHECKED BY: XXX | FILE NO. XXX

FIELD BOOK NO.: | SCALE: AS NOTED | SHEET 23 OF 48 SHEETS

EA-1

JOB 00-00 KALAELOA DESALINATION PLANT



ONE WAY
ONE WAY
ONE WAY
RW24
RW20
RW30
PW6
PW24
PW36
B30
S6
FH
ADMIN. BLDG.
LEARNING CENTER
CHEM.
STORAGE
RIVER ROCK
POLY DIVIDER
LANDSCAPE PLAN
BOARD OF WATER SUPPLY
JOB NO. 00-00
KALAELOA DESALINATION PLANT
LANDSCAPING PHASE I SITE PLAN
L-2
JOB 00-00 KALAELOA DESALINATION PLANT

Appendix E

NEPACheck

Environmental Data Resources, Inc.

EDR NEPACheck®

Kaleloa Desalination Plant
Kaleloa Desalination Plant
Ewa Beach, HI 96706

Inquiry Number: 892272.1s

December 04, 2002

The Source For Environmental Risk Management Data

3530 Post Road
Southport, Connecticut 06890

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

FORM-ACP

TABLE OF CONTENTS

SECTION	PAGE
EDR NEPACheck® Description	1
Map Findings Summary	2
Natural Areas	3
Historic Sites	5
Flood Plain	8
Wetlands	10
Wetlands Classification System	12
FCC & FAA Sites	16
Key Contacts and Government Records Searched	24

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EDR NEPACheck® DESCRIPTION

The National Environmental Policy Act of 1969 (NEPA) requires that Federal agencies include in their decision-making processes appropriate and careful consideration of all environmental effects and actions, analyze potential environmental effects of proposed actions and their alternatives for public understanding and scrutiny, avoid or minimize adverse effects of proposed actions, and restore and enhance environmental quality as much as possible.

The EDR NEPACheck provides information which may be used, in conjunction with additional research, to determine whether a proposed site or action will have significant environmental effect.

The report provides maps and data for the following items (where available). Search results are provided in the Map Findings Summary on page 2 of this report.

Section	Regulation
Natural Areas Map	
• Federal Lands Data:	
- Officially designated wilderness areas	47 CFR 1.1307(1)
- Officially designated wildlife preserves, sanctuaries and refuges	47 CFR 1.1307(2)
- Wild and scenic rivers	40 CFR 6.302(e)
- Fish and Wildlife	40 CFR 6.302
• Threatened or Endangered Species, Fish and Wildlife, Critical Habitat Data (where available)	47 CFR 1.1307(3); 40 CFR 6.302
Historic Sites Map	
• National Register of Historic Places	47 CFR 1.1307(4); 40 CFR 6.302
• State Historic Places (where available)	
Flood Plain Map	
• National Flood Plain Data (where available)	47 CFR 1.1307(6); 40 CFR 6.302
Wetlands Map	
• National Wetlands Inventory Data (where available)	47 CFR 1.1307(7); 40 CFR 6.302
FCC & FAA Map	
• FCC antenna/tower sites, AM Radio Towers, FAA Markings and Obstructions, AM Radio Interference Zones, Airports, Topographic gradient	47 CFR 1.1307(8)
Key Contacts and Government Records Searched	

MAP FINDINGS SUMMARY

The databases searched in this report are listed below. Database descriptions and other agency contact information is contained in the Key Contacts and Government Records Searched section on page 24 of this report.

TARGET PROPERTY ADDRESS

KALELOA DESALINATION PLANT
KALELOA DESALINATION PLANT
EWA BEACH, HI 96706

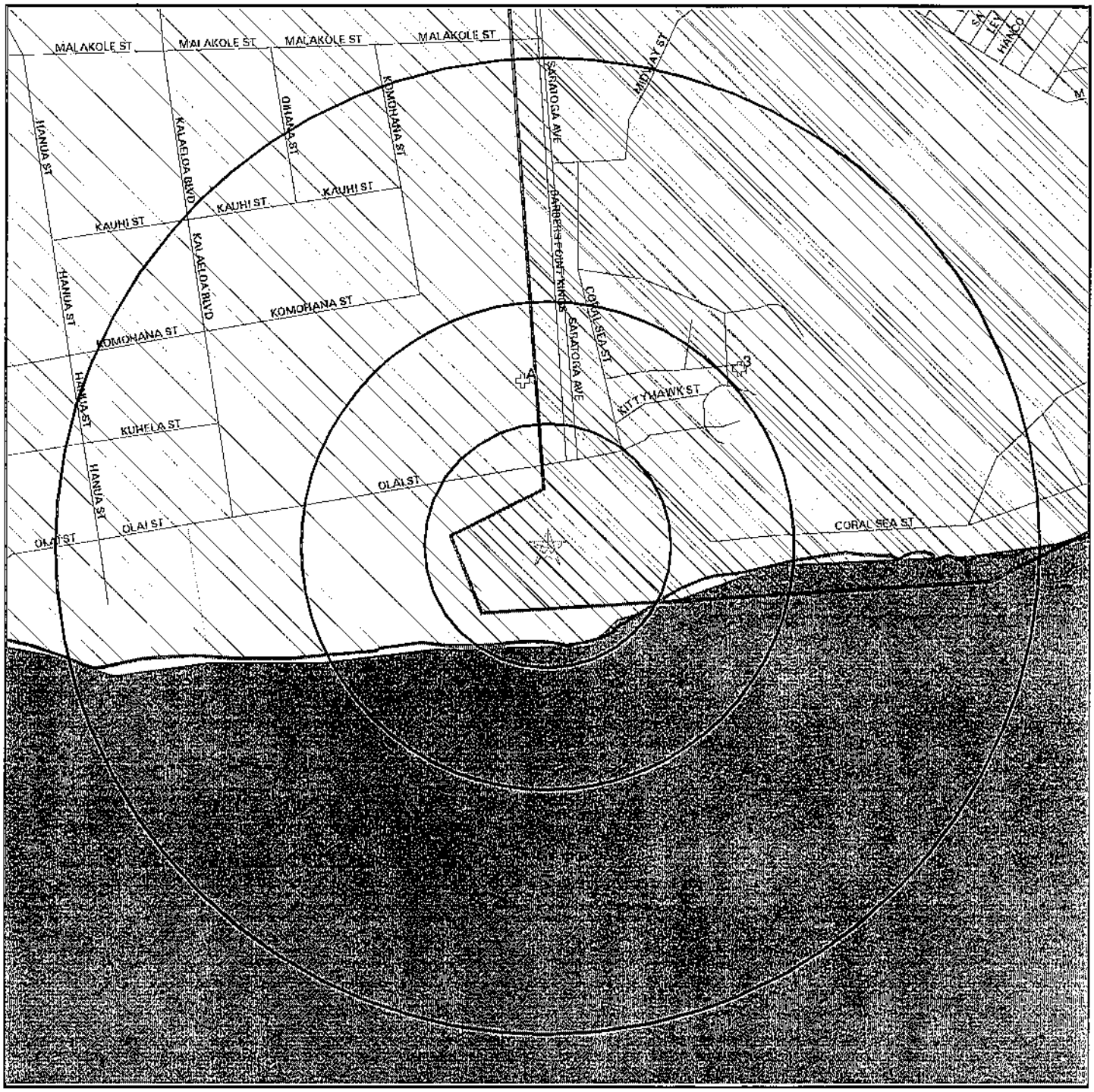
Inquiry #: 892272.1s
Date: 12/4/2

TARGET PROPERTY COORDINATES

Latitude (North):	21.298599 - 21° 17' 55.0"
Longitude (West):	158.086899 - 158° 5' 12.8"
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	594711.9
UTM Y (Meters):	2355330.5

Applicable Regulation from 47 CFR/FCC Checklist	Database	Search Distance (Miles)	Within Search	Within 1/8 Mile
NATURAL AREAS MAP				
1.1307a (1) Officially Designated Wilderness Area	US Federal Lands	1.00	YES	YES
1.1307a (2) Officially Designated Wildlife Preserve	US Federal Lands	1.00	YES	YES
1.1307a (2) Officially Designated Wildlife Preserve	HI Managed Areas	1.00	YES	YES
1.1307a (2) Officially Designated Wildlife Preserve	HI Game Management	1.00	YES	YES
HISTORIC SITES MAP				
1.1307a (4) Listed or eligible for National Register	National Register Hist. Places	1.00	NO	NO
FLOODPLAIN MAP				
1.1307 (6) Located in a Flood Plain	FLOODPLAIN	1.00	YES	YES
WETLANDS MAP				
1.1307 (7) Change in surface features (wetland fill)	NWI	1.00	YES	NO
HI COASTAL ZONE	20.00		YES	YES
FCC & FAA SITES MAP				
	FCC Cellular	1.00	NO	NO
	FCC Antenna	1.00	YES	NO
	FCC Tower	1.00	YES	NO
	FCC AM Tower	1.00	NO	NO
	FAA DOF	1.00	YES	NO

Natural Areas Map



0 1/4 1/2 1 Miles

- Target Property
- Roads
- County Boundary
- Waterways
- Water
- Locations
- Federal Areas
- Federal Linear Features
- State Areas
- State Linear Features

TARGET PROPERTY:	Kaleloa Desalination Plant	CUSTOMER:	Oceanit
ADDRESS:	Kaleloa Desalination Plant	CONTACT:	Jeff Merz
CITY/STATE/ZIP:	Ewa Beach HI 96706	INQUIRY #:	892272.1s
LAT/LONG:	21.2986 / 158.0869	DATE:	December 04, 2002

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NATURAL AREAS MAP FINDINGS

Map ID Direction Distance Distance (ft.)			EDR ID Database
A1 North 0-1/8 mi 0	Unit:	Not reported	HI10000022 HI Game Management
A2 North 0-1/8 mi 0	Reserve Type: Reserve Name: Managed Area: Reserve Sub-section:	Undefined (code 1) Not reported 0 Not reported	HI20000030 HI Managed Areas
3 North 0-1/8 mi 0	Name: ID: State FIPS: Feature:	'Barbers Point Naval Air Station' 98817 15 Navy DOD	US0050034 US Federal Lands

Historic Sites Map



Target Property
Streets
County Boundary
Waterways
Water
Historic Sites
Federal Historic Areas
State Historic Areas
Scenic Trail

0 1/4 1/2 1 Miles

N

TARGET PROPERTY:	Kaleloa Desalination Plant	CUSTOMER:	Oceanit
ADDRESS:	Kaleloa Desalination Plant	CONTACT:	Jeff Merz
CITY/STATE/ZIP:	Ewa Beach HI 96706	INQUIRY #:	892272.1s
LAT/LONG:	21.2986 / 158.0869	DATE:	December 04, 2002

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HISTORIC SITES MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)

EDR ID
Database

No mapped sites were found in EDR's search of available government records within the search radius around the target property.

UNMAPPABLE HISTORIC SITES

Due to poor or inadequate address information, the following sites were not mapped:

Status EDR ID Database

No unmapped sites were found in EDR's search of available government records.

Flood Plain Map



Major Roads
Contour Lines
Waterways
County Boundary
Power Lines
Pipe Lines
Fault Lines
Water
100-year flood zone
500-year flood zone
Electronic FEMA data available
Electronic FEMA data not available

0 1/4 1/2 1 Miles

TARGET PROPERTY:	Kaleloa Desalination Plant	CUSTOMER:	Oceanit
ADDRESS:	Kaleloa Desalination Plant	CONTACT:	Jeff Merz
CITY/STATE/ZIP:	Ewa Beach HI 96706	INQUIRY #:	892272.1s
LAT/LONG:	21.2986 / 158.0869	DATE:	December 04, 2002

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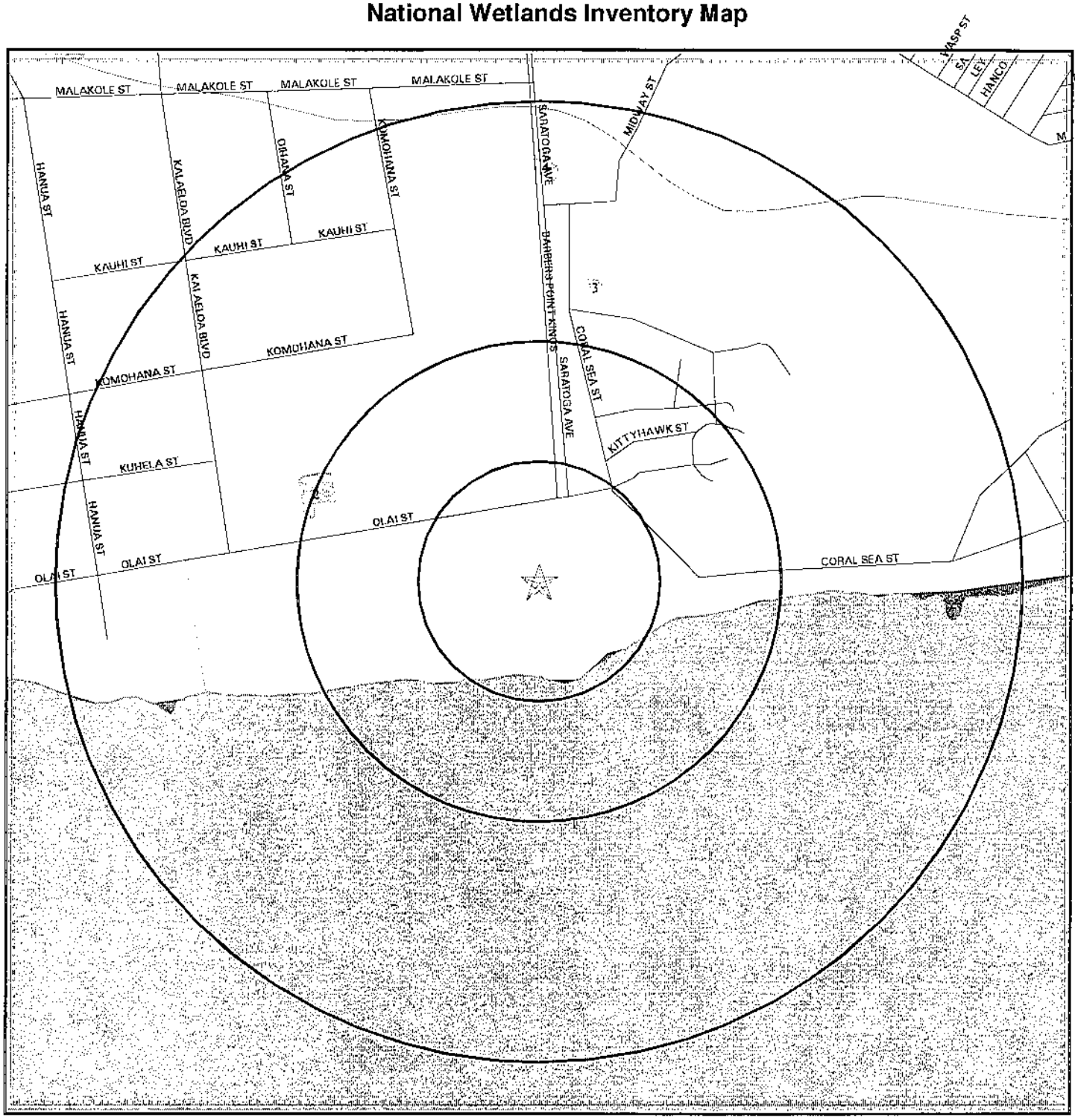
FLOOD PLAIN MAP FINDINGS

Source: FEMA Q3 Flood Data

County	FEMA flood data electronic coverage
HONOLULU, HI	YES
Flood Plain panel at target property:	1500010130C
Additional Flood Plain panel(s) in search area:	None Reported

National Wetlands Inventory Map



Major Roads
Contour Lines
Waterways
County Boundary
Power Lines
Pipe Lines
Fault Lines
Water
Wetlands
Electronic NWI data available
Electronic NWI data not available

0 1/4 1/2 1 Miles

N

TARGET PROPERTY:	Kaleloa Desalination Plant	CUSTOMER:	Oceanit
ADDRESS:	Kaleloa Desalination Plant	CONTACT:	Jeff Merz
CITY/STATE/ZIP:	Ewa Beach HI 96706	INQUIRY #:	892272.1s
LAT/LONG:	21.2986 / 158.0869	DATE:	December 04, 2002

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WETLANDS MAP FINDINGS

Source: Fish and Wildlife Service NWI data

NWI hardcopy map at target property: Ewa
Additional NWI hardcopy map(s) in search area:
Not reported in source data

Map ID Direction Distance Distance (ft.)	Code and Description*	Database
1 South 1/8-1/4 mi 1037	M1OWL [M] Marine, [1] Subtidal, [OW] Open Water/Unknown Bottom (obs), [L] Subtidal	NWI
2 WNW 1/4-1/2 mi 2383	POWHh [P] Palustrine, [OW] Open Water/Unknown Bottom (obs), [H] Permanently Flooded, [h] Diked/Impounded	NWI
3 North 1/2-1 mi 3234	POWHx [P] Palustrine, [OW] Open Water/Unknown Bottom (obs), [H] Permanently Flooded, [x] Excavated	NWI
4 North 1/2-1 mi 4397	PSS1/EM1C [P] Palustrine, [SS] Scrub-Shrub, [1] Broad-Leaved Deciduous / , [EM] Emergent, [1] Persistent, [C] Seasonally Flooded	NWI

*See Wetland Classification System for additional information.

WETLANDS CLASSIFICATION SYSTEM

National Wetland Inventory Maps are produced by the U.S. Fish and Wildlife Service, a sub-department of the U.S. Department of the Interior. In 1974, the U.S. Fish and Wildlife Service developed a criteria for wetland classification with four long range objectives:

- to describe ecological units that have certain homogeneous natural attributes,
- to arrange these units in a system that will aid decisions about resource management,
- to furnish units for inventory and mapping, and
- to provide uniformity in concepts and terminology throughout the U.S.

High altitude infrared photographs, soil maps, topographic maps and site visits are the methods used to gather data for the productions of these maps. In the infrared photos, wetlands appear as different colors and these wetlands are then classified by type. Using a hierarchical classification, the maps identify wetland and deepwater habitats according to:

- system
- subsystem
- class
- subclass
- modifiers

(as defined by Cowardin, et al. U.S. Fish and Wildlife Service FWS/OBS 79/31. 1979.)

The classification system consists of five systems:

1. marine
2. estuarine
3. riverine
4. lacustrine
5. palustrine

The marine system consists of deep water tidal habitats and adjacent tidal wetlands. The riverine system consists of all wetlands contained within a channel. The lacustrine systems includes all nontidal wetlands related to swamps, bogs & marshes. The estuarine system consists of deepwater tidal habitats and where ocean water is diluted by fresh water. The palustrine system includes nontidal wetlands dominated by trees and shrubs and where salinity is below .5% in tidal areas. All of these systems are divided in subsystems and then further divided into class.

National Wetland Inventory Maps are produced by transferring gathered data on a standard 7.5 minute U.S.G.S. topographic map. Approximately 52 square miles are covered on a National Wetland Inventory map at a scale of 1:24,000. Electronic data is compiled by digitizing these National Wetland Inventory Maps.

SYSTEM — **MARINE**

SUBSYSTEM — **1 - SUBTIDAL** | **2 - INTERTIDAL**

CLASS	1 - SUBTIDAL					2 - INTERTIDAL			
	RB-ROCK BOTTOM	UB-UNCONSOLIDATED BOTTOM	AB-AQUATIC BED	RF-REEF	OW-OPEN WATER / Unknown Bottom	AB-AQUATIC BED	RF-REEF	RS-ROCKY SHORE	US-UNCONSOLIDATED SHORE
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 3 Rooted Vascular 5 Unknown Submergent	1 Coral 3 Worm		1 Algal 3 Rooted Vascular 5 Unknown Submergent	1 Coral 3 Worm	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic

SYSTEM — **E - ESTUARINE**

SUBSYSTEM — **1 - SUBTIDAL**

CLASS	RB-ROCK BOTTOM	UB-UNCONSOLIDATED BOTTOM	AB-AQUATIC BED	RF-REEF	OW-OPEN WATER / Unknown Bottom
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface	2 Mollusk 3 Worm	

SUBSYSTEM — **2 - INTERTIDAL**

CLASS	AB-AQUATIC BED	RF-REEF	SB - STREAMBED	RS-ROCKY SHORE	US-UNCONSOLIDATED SHORE	EM-EMERGENT	SS-SCRUB SHRUB	FO-FORESTED
Subclass	1 Algal 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface	2 Mollusk 3 Worm	1 Cobble- Gravel 2 Sand 3 Mud 4 Organic	1 Bedrock 2 Rubble	1 Cobble- Gravel 2 Sand 3 Mud 4 Organic	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 Deciduous 7 Evergreen	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 Deciduous 7 Evergreen

SYSTEM — **R - RIVERINE**

SUBSYSTEM	1 - TIDAL	2 - LOWER PERENNIAL	3 - UPPER PERENNIAL	4 - INTERMITTENT	5 - UNKNOWN PERENNIAL
CLASS	RB-ROCK BOTTOM; UB-UNCONSOLIDATED BOTTOM		*SB-STREAMBED	AB-AQUATIC BED	RS-ROCKY SHORE; US-UNCONSOLIDATED SHORE; **EM-EMERGENT; OW-OPEN WATER/ Unknown Bottom
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Bedrock 2 Rubble 3 Cobble-Gravel 4 Sand 5 Mud 6 Organic 7 Vegetated	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface	1 Bedrock 2 Rubble 1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated 2 Nonpersistent

* STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM.
**EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

SYSTEM — **L - LACUSTRINE**

SUBSYSTEM	1 - LIMNETIC	2 - LITTORAL
CLASS	RB-ROCK BOTTOM; UB-UNCONSOLIDATED BOTTOM; AB-AQUATIC BED; OW-OPEN WATER/ Unknown Bottom	RB-ROCK BOTTOM; UB-UNCONSOLIDATED BOTTOM; AB-AQUATIC BED; RS-ROCKY SHORE; US-UNCONSOLIDATED SHORE; EM-EMERGENT; OW-OPEN WATER/ Unknown Bottom
Subclass	1 Bedrock 2 Rubble 1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface	1 Bedrock 2 Rubble 1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface 1 Bedrock 2 Rubble 1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated 2 Nonpersistent

SUBSYSTEM — **P - PALUSTRINE**

CLASS	RB–ROCK BOTTOM	UB–UNCONSOLIDATED BOTTOM	AB-AQUATIC BED	US–UNCONSOLIDATED SHORE	ML–MOSS-LICHEN	EM–EMERGENT	SS–SCRUB-SHRUB	FO–FORESTED	OW-OPEN WATER/ Unknown
Bottom									
Subclass	1 Bedrock 2 Rubble 3 Mud 4 Organic	1 Cobble-Gravel 2 Sand	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Moss 2 Lichen	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 Deciduous 7 Evergreen	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6Deciduous 7 Evergreen	

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME

Non-Tidal

- A Temporarily Flooded
- B Saturated
- C Seasonally Flooded
- D Seasonally Flooded/ Well Drained
- E Seasonally Flooded/ Saturated
- F Semipermanently Flooded
- G Intermittently Exposed
- H Permanently Flooded
- J Intermittently Flooded
- K Artificially Flooded
- W Intermittently Flooded/Temporary
- Y Saturated/Semipermanent/ Seasonal
- Z Intermittently Exposed/Permanent
- U Unknown

Tidal

- K Artificially Flooded
- L Subtidal
- M Irregularly Exposed
- N Regularly Flooded
- P Irregularly Flooded

Coastal Halinity Inland Salinity pH Modifiers for

- *S Temporary-Tidal
- *R Seasonal-Tidal
- *T Semipermanent -Tidal
- V Permanent -Tidal
- U Unknown

*These water regimes are only used in tidally influenced, freshwater systems.

WATER CHEMISTRY

- 1 Hyperhaline
- 2 Euhaline
- 3 Mixohaline (Brackish)
- 4 Polyhaline
- 5 Mesohaline
- 6 Oligohaline
- 0 Fresh
- 7 Hypersaline
- 8 Eusaline
- 9 Mixosaline
- 0 Fresh

all Fresh Water

- a Acid
- t Circumneutral
- i Alkaline

SOIL

- g Organic
- n Mineral

SPECIAL MODIFIERS

- b Beaver
- d Partially Drained/Ditched
- f Farmed
- h Diked/Impounded
- r Artificial Substrate
- s Spoil
- x Excavated

Source: U.S. Department of the Interior
Fish and Wildlife Service
National Wetlands Inventory

FCC & FAA Sites Map



Streets
Contour Lines
County Boundary
Waterways
Water

Sites
Omni Directional AM Interference
Directional AM Interference

0 1/4 1/2 1 Miles

TARGET PROPERTY:	Kaleloa Desalination Plant	CUSTOMER:	Oceanit
ADDRESS:	Kaleloa Desalination Plant	CONTACT:	Jeff Merz
CITY/STATE/ZIP:	Ewa Beach HI 96706	INQUIRY #:	892272.1s
LAT/LONG:	21.2986 / 158.0869	DATE:	December 04, 2002

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FCC & FAA SITES MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)

EDR ID
Database

1
WNW
1/8-1/4 mi
736

DOF000000023880
FAA DOF

Unique ID:	120053	Obstruction #:	0053
City:	BARBERS POINT	State:	Hawaii
Verification Status:	verified	Obstruction Type:	PLANT
Latitude:	21 18 09N	Longitude:	158 05 30W
Frequency:	Not Reported	Type of Lighting:	Not Reported
Above Ground Level Height (Ft.):		0165	
Above Mean Sea Level Height (Ft.):		00184	
Horizontal Accuracy:	Not Reported	Vertical Accuracy:	Not Reported
Painted/Marked:	Not Reported	FAA Study #:	69PC0046

2
NW
1/4-1/2 mi
2138

TOW100000063160
TOWER

Tower ID:	501		
Tower Owner Name:			
BARBERS POINT, HONOLULU, HI			
Latitude:	21 18' 76700"	Latitude (in seconds):	76700
Longitude:	158 5' 40"	Longitude (in seconds):	569140
Transmitter Latitude:	211820	Transmitter Longitude	1580540
Construction Date:	99/99/1999	Activation Date:	Jan 20 1972
FAA Date:	Dec 13 1971	FCC Date:	
File Number:	665-M-ML-121	FAA ID:	71-PC-65-OE
Antenna Height:	0.0000	Antenna Height (M):	0.0000
Beacon Height:	0.0000	Beacon Height (M):	0.0000
Elevation:	104.0000	Elevation FAA:	104.0000
Elevation FAA (M):	31.7000	Elevation (M):	31.7000
Structure Height:	90.0000	Structure Height (M):	27.4000
Structure Height FAA:	90.0000	Structure Height FAA (M):	27.4000
Supporting Struct Hgt:	0.0000	Supporting Struct Hgt (M):	0.0000
Tower Height:	0.0000	Tower Height (M):	0.0000
Structure Type:	TOW	Tower Type:	E
Key Remarks:		Date:	
Key Site:	601	Record Action:	OLD
ID Exam:		ID_ASB_ACC:	W
Paint and Lighting Specs:			
Special Conditions/Remarks:			

This record is for a license, and it may or may not indicate a site which has been built.

FCC & FAA SITES MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)

EDR ID
Database

3
West
1/4-1/2 mi
2294

DOF000000024146
FAA DOF

Unique ID:	120328	Obstruction #:	0328
City:	EWA	State:	Hawaii
Verification Status:	verified	Obstruction Type:	STACKS 2
Latitude:	21 18 07N	Longitude:	158 05 47W
Frequency:	Not Reported	Type of Lighting:	Not Reported
Above Ground Level Height (Ft.):		0212	
Above Mean Sea Level Height (Ft.):		00223	
Horizontal Accuracy:	+-100'	Vertical Accuracy:	+-20'
Painted/Marked:	Not Reported	FAA Study #:	Stereoplot

4
WSW
1/4-1/2 mi
2434

DOF000000023870
FAA DOF

Unique ID:	120042	Obstruction #:	0042
City:	EWA BEACH OAHU	State:	Hawaii
Verification Status:	verified	Obstruction Type:	PLANT
Latitude:	21 17 56N	Longitude:	158 05 46W
Frequency:	Not Reported	Type of Lighting:	Not Reported
Above Ground Level Height (Ft.):		0112	
Above Mean Sea Level Height (Ft.):		00122	
Horizontal Accuracy:	Not Reported	Vertical Accuracy:	Not Reported
Painted/Marked:	Not Reported	FAA Study #:	68PC0005

FCC & FAA SITES MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)

EDR ID
Database

5
West
1/2-1 mi
2956

TOW100000062908
TOWER

Tower ID:	498		
Tower Owner Name:			
91-319 OLAI ST., EWA BEACH, HI			
Latitude:	21 18' 76686"	Latitude (in seconds):	76686
Longitude:	158 5' 54"	Longitude (in seconds):	569154
Transmitter Latitude:	211806	Transmitter Longitude	1580554
Construction Date:	99/99/1999	Activation Date:	Dec 14 1977
FAA Date:	Jul 15 1977	FCC Date:	Nov 21 1977
File Number:	10869-IB-118	FAA ID:	77-APC-23-OE
Antenna Height:	0.0000	Antenna Height (M):	0.0000
Beacon Height:	0.0000	Beacon Height (M):	0.0000
Elevation:	121.0000	Elevation FAA:	121.0000
Elevation FAA (M):	36.9000	Elevation (M):	36.9000
Structure Height:	112.0000	Structure Height (M):	34.1000
Structure Height FAA:	112.0000	Structure Height FAA (M):	34.1000
Supporting Struct Hgt:	0.0000	Supporting Struct Hgt (M):	0.0000
Tower Height:	0.0000	Tower Height (M):	0.0000
Structure Type:	TOW	Tower Type:	E
Key Remarks:		Date:	
Key Site:	597	Record Action:	OLD
ID Exam:		ID_ASB_ACC:	C
Paint and Lighting Specs:			
Special Conditions/Remarks:			

This record is for a license, and it may or may not indicate a site which has been built.

FCC & FAA SITES MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)

EDR ID
Database

6
NW
1/2-1 mi
3169

TOW100000084733
TOWER

Tower ID:	87543		
Tower Owner Name:	DELTA CONSTRUCTION CORP.		
91-255 OIHANA STREET, EWA BEACH, HI			
Latitude:	21 18' 76707"	Latitude (in seconds):	76707
Longitude:	158 5' 48"	Longitude (in seconds):	569148
Transmitter Latitude:	211827	Transmitter Longitude	1580548
Construction Date:	99/99/1999	Activation Date:	Sep 21 1988
FAA Date:	Apr 6 1988	FCC Date:	Jul 13 1988
File Number:	303168	FAA ID:	88-AWP-119-OE
Antenna Height:	19.0000	Antenna Height (M):	5.8000
Beacon Height:	0.0000	Beacon Height (M):	0.0000
Elevation:	89.0000	Elevation FAA:	89.0000
Elevation FAA (M):	27.1000	Elevation (M):	27.1000
Structure Height:	79.0000	Structure Height (M):	24.1000
Structure Height FAA:	79.0000	Structure Height FAA (M):	24.1000
Supporting Struct Hgt:	0.0000	Supporting Struct Hgt (M):	0.0000
Tower Height:	60.0000	Tower Height (M):	18.3000
Structure Type:	POL	Tower Type:	E
Key Remarks:		Date:	
Key Site:	603	Record Action:	ADD
ID Exam:	ASB3	ID_ASB_ACC:	C
Paint and Lighting Specs:			
Special Conditions/Remarks:			

This record is for a license, and it may or may not indicate a site which has been built.

FCC & FAA SITES MAP FINDINGS

Map ID Direction Distance Distance (ft.)		EDR ID Database
7 NNW 1/2-1 mi 4812		ANT100000025902 ANTREG

Tower ID:	1026420		
Address:	ON KAUHI ST 2 BLKS W OF KALAELOA BLVD, MAKAKILO CITY, HI		
Lat (NAD 27):	211846	Lon (NAD 27):	1580551
Lat (NAD 83):	211835	Lon (NAD 83):	1580541
Construction Date:	Mar 25 1997	Dismantled Date:	
Nepa Flag:	N	FAA ID:	97-AWP-1393-OE
Structure Type:	TOWER	Elevation (M):	5.00
Structure Hgt (M):	34.00	Hgt Above Ground:	40.00
Hgt Above Ground (M):	40.1426467	Hgt Above Mean Sea Level (M):	45.2633476
Date Activated:	Dec 8 1998	License Issue Date:	Jul 28 1997
Date Keyed:	Jul 28 1997	Date Printed:	Dec 9 1998
Date Processed:	Jul 28 1997	Date Received:	Jul 24 1997
Licensee Signature	A W CIAMPAGLIA		
Nature of Modification:		Purpose:	U
Company (DBA) Name:			
Owner Name:	MOTOROLA INC		
Attention:	A W CIAMPAGLIA		
Owner Address:	1270 FAIRFIELD RD STE 5, GETTYSBURG, PA 17325		
Owner PO Box:		Phone Number:	7173341114
E-Mail Address:	CAC038@EMAIL.MOT.COM		
Internet Domain:	EMAIL.MOT.COM		
Painting & Lighting Specs:		Date of Last Remarks:	
Special Conditions #1:			
Special Conditions #2:			
Key Remarks:			

This record is for a license, and it may or may not indicate a site which has been built.

FCC & FAA SITES MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)

EDR ID
Database

8
NW
1/2-1 mi
4978

TOW100000063626
TOWER

Tower ID:	507		
Tower Owner Name:			
91-326 KAUHI ST, EWA BEACH, HI			
Latitude:	21 18' 76723"	Latitude (in seconds):	76723
Longitude:	158 5' 58"	Longitude (in seconds):	569158
Transmitter Latitude:	211843	Transmitter Longitude	1580558
Construction Date:	99/99/1999	Activation Date:	Feb 22 1977
FAA Date:	Nov 26 1976	FCC Date:	Jan 6 1977
File Number:	14593-IB-17	FAA ID:	76-APC-53-OE
Antenna Height:	0.0000	Antenna Height (M):	0.0000
Beacon Height:	0.0000	Beacon Height (M):	0.0000
Elevation:	130.0000	Elevation FAA:	140.0000
Elevation FAA (M):	42.7000	Elevation (M):	39.6000
Structure Height:	120.0000	Structure Height (M):	36.6000
Structure Height FAA:	130.0000	Structure Height FAA (M):	36.6000
Supporting Struct Hgt:	0.0000	Supporting Struct Hgt (M):	0.0000
Tower Height:	0.0000	Tower Height (M):	0.0000
Structure Type:	TOW	Tower Type:	E
Key Remarks:		Date:	
Key Site:	610	Record Action:	OLD
ID Exam:		ID_ASB_ACC:	C
Paint and Lighting Specs:			
Special Conditions/Remarks:			

This record is for a license, and it may or may not indicate a site which has been built.

FCC & FAA SITES MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)

EDR ID
Database

9
WNW
1/2-1 mi
5242

TOW100000063397
TOWER

Tower ID:	504		
Tower Owner Name:			
91-326 KAUHI ST, EWA BEACH, HI			
Latitude:	21 18' 76715"	Latitude (in seconds):	76715
Longitude:	158 6' 9"	Longitude (in seconds):	569169
Transmitter Latitude:	211835	Transmitter Longitude	1580609
Construction Date:		Activation Date:	Jan 10 1975
FAA Date:	Dec 5 1974	FCC Date:	May 15 1974
File Number:	9903-IS-15	FAA ID:	74-PC-84-OE
Antenna Height:	0.0000	Antenna Height (M):	0.0000
Beacon Height:	0.0000	Beacon Height (M):	0.0000
Elevation:	140.0000	Elevation FAA:	140.0000
Elevation FAA (M):	42.7000	Elevation (M):	42.7000
Structure Height:	130.0000	Structure Height (M):	39.6000
Structure Height FAA:	130.0000	Structure Height FAA (M):	39.6000
Supporting Struct Hgt:	0.0000	Supporting Struct Hgt (M):	0.0000
Tower Height:	0.0000	Tower Height (M):	0.0000
Structure Type:	TOW	Tower Type:	E
Key Remarks:		Date:	
Key Site:	605	Record Action:	OLD
ID Exam:		ID_ASB_ACC:	C
Paint and Lighting Specs:			
Special Conditions/Remarks:			

This record is for a license, and it may or may not indicate a site which has been built.

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

Various Federal laws and executive orders address specific environmental concerns. NEPA requires the responsible offices to integrate to the greatest practical extent the applicable procedures required by these laws and executive orders. EDR provides key contacts at agencies charged with implementing these laws and executive orders to supplement the information contained in this report.

NATURAL AREAS
Officially designated wilderness areas
Government Records Searched in This Report

FED_LAND: Federal Lands
Source: USGS
Telephone: 703-648-5094
Federal data from Bureau of Land Management, National Park Service, Forest Service, Fish and Wildlife Service, and Bureau of Indian Affairs.
- National Parks
- Forests
- Monuments
- Wildlife Sanctuaries, Preserves, Refuges
- Federal Wilderness Areas.
- Indian Reservations
Date of Government Version: 09/01/1997

Federal Contacts for Additional Information

National Park Service, Pacific West Region
600 Harrison Street, Suite 600
San Francisco, CA 94107
415-427-1300

USDA Forest Service, Pacific Southwest
630 Sansome Street
San Francisco, CA 94111
415-705-2557

Fish & Wildlife Service, Region 1
Eastside Federal Complex 911 NE 11th Avenue
Portland, OR 97232-4181
503-231-6188

Officially designated wildlife preserves, sanctuaries and refuges
Government Records Searched in This Report

FED_LAND: Federal Lands
Source: USGS
Telephone: 703-648-5094
Federal data from Bureau of Land Management, National Park Service, Forest Service, Fish and Wildlife Service, and Bureau of Indian Affairs.
- National Parks
- Forests
- Monuments
- Wildlife Sanctuaries, Preserves, Refuges
- Federal Wilderness Areas.
- Indian Reservations
Date of Government Version: 09/01/1997

HI Game Management: Game Management Areas
State Game Management areas for islands of Kauai, Oahu, Molokai, Lanai, Maui and Hawaii
Source: Dept. of Land and Natural Resources.
Telephone: 808-587-0166

HI Managed Areas: Managed Areas
Managed areas (e.g. refuges, preserves, etc.) for islands Kauai, Oahu, Maui, Molokai, Lanai and Hawaii. Such areas include, but are not limited to, private and public wildlife refuges, preserves, sanctuaries and reserves. Also includes state forest reserves and some state parks
Source: Dept. of Land and Natural Resources.
Telephone: 808-587-0166

Federal Contacts for Additional Information
Fish & Wildlife Service, Region 1
Eastside Federal Complex 911 NE 11th Avenue
Portland, OR 97232-4181
503-231-6188

State Contacts for Additional Information
Dept. of Land & Natural Resources 808-587-0100

Wild and scenic rivers
Government Records Searched in This Report
FED_LAND: Federal Lands
Source: USGS
Telephone: 703-648-5094
Federal data from Bureau of Land Management, National Park Service, Forest Service, Fish and Wildlife Service, and Bureau of Indian Affairs.
- National Parks
- Forests
- Monuments
- Wildlife Sanctuaries, Preserves, Refuges
- Federal Wilderness Areas.
- Indian Reservations
Date of Government Version: 09/01/1997

Federal Contacts for Additional Information
Fish & Wildlife Service, Region 1
Eastside Federal Complex 911 NE 11th Avenue
Portland, OR 97232-4181
503-231-6188

Endangered Species

Federal Contacts for Additional Information
Fish & Wildlife Service, Region 1
Eastside Federal Complex 911 NE 11th Avenue
Portland, OR 97232-4181
503-231-6188

State Contacts for Additional Information
Natural Heritage Program, The Nature Conservancy of Hawaii 808-537-4508

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

LANDMARKS, HISTORICAL, AND ARCHEOLOGICAL SITES
Historic Places
Government Records Searched in This Report

National Register of Historic Places:
The National Register of Historic Places is the official federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture. These contribute to an understanding of the historical and cultural foundations of the nation. The National Register includes:
- All prehistoric and historic units of the National Park System;
- National Historic Landmarks, which are properties recognized by the Secretary of the Interior as possessing national significance; and
- Properties significant in American, state, or local prehistory and history that have been nominated by State Historic Preservation Officers, federal agencies, and others, and have been approved for listing by the National Park Service.

Date of Government Version: 03/15/2000

Federal Contacts for Additional Information

Park Service; Advisory Council on Historic Preservation
1849 C Street NW
Washington, DC 20240
Phone: (202) 208-6843

State Contacts for Additional Information

Dept. of Land & Natural Resources 808-587-0401

Indian Religious Sites
Federal Contacts for Additional Information

Department of the Interior- Bureau of Indian Affairs
Office of Public Affairs
1849 C Street, NW
Washington, DC 20240-0001
Office: 202-208-3711
Fax: 202-501-1516

National Association of Tribal Historic Preservation Officers
1411 K Street NW, Suite 700
Washington, DC 20005
Phone: 202-628-8476
Fax: 202-628-2241

State Contacts for Additional Information

A listing of local Tribal Leaders and Bureau of Indian Affairs Representatives can be found at:
http://www.doi.gov/bia/areas/agency.html

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

FLOOD PLAIN, WETLANDS AND COASTAL ZONE

Flood Plain Management
Government Records Searched in This Report
Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

Federal Contacts for Additional Information
Federal Emergency Management Agency 877-3362-627

State Contacts for Additional Information
Department of Defense, Emergency Mgmt. 808-733-4300

Wetlands Protection
Government Records Searched in This Report
NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

Federal Contacts for Additional Information
Fish & Wildlife Service 813-570-5412

State Contacts for Additional Information
Dept. of Land & Natural Resources 808-587-0100

Coastal Zone Management
Government Records Searched in This Report
CAMA Management Areas
Dept. of Env., Health & Natural Resources
919-733-2293

Federal Contacts for Additional Information
Office of Ocean and Coastal Resource Management
N/ORM, SSMC4
1305 East-West Highway
Silver Spring, Maryland 20910
301-713-3102

State Contacts for Additional Information
Office of Planning, Coastal Zone Management Program 808-587-2875

FCC & FAA SITES MAP
For NEPA actions that come under the authority of the FCC, the FCC requires evaluation of Antenna towers and/or supporting structures that are to be equipped with high intensity white lights which are to be located in residential neighborhoods, as defined by the applicable zoning law.

Government Records Searched in This Report
Cellular
Federal Communications Commission
Mass Media Bureau
2nd Floor - 445 12th Street SW
Washington DC 20554 USA
Telephone (202) 418-2700
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KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

Tower
Federal Communications Commission
Mass Media Bureau
2nd Floor - 445 12th Street SW
Washington DC 20554 USA
Telephone (202) 418-2700
Portions copyright (C) 1999 Percon Corporation. All rights reserved.

Antenna Registration
Federal Communications Commission
Mass Media Bureau
2nd Floor - 445 12th Street SW
Washington DC 20554 USA
Telephone (202) 418-2700
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AM Tower
Federal Communications Commission
Mass Media Bureau
2nd Floor - 445 12th Street SW
Washington DC 20554 USA
Telephone (202) 418-2700

FAA Digital Obstacle File
National Oceanic and Atmospheric Administration
Telephone: 301-436-8301
Describes known obstacles of interest to aviation users in the US. Used by the Federal Aviation Administration (FAA) and the National Oceanic and Atmospheric Administration to manage the National Airspace System.

Excessive Radio Frequency Emission
For NEPA actions that come under the authority of the FCC, Commission actions granting construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities, require the determination of whether the particular facility, operation or transmitter would cause human exposure to levels of radio frequency in excess of certain limits.

Federal Contacts for Additional Information
Office of Engineering and Technology
Federal Communications Commission
445 12th Street SW
Washington, DC 20554
Phone: 202-418-2470

OTHER CONTACT SOURCES

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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Appendix F

Groundwater Contamination Information and Oahu Aquifer Sectors Map

Oahu - Aquifer Sector 02

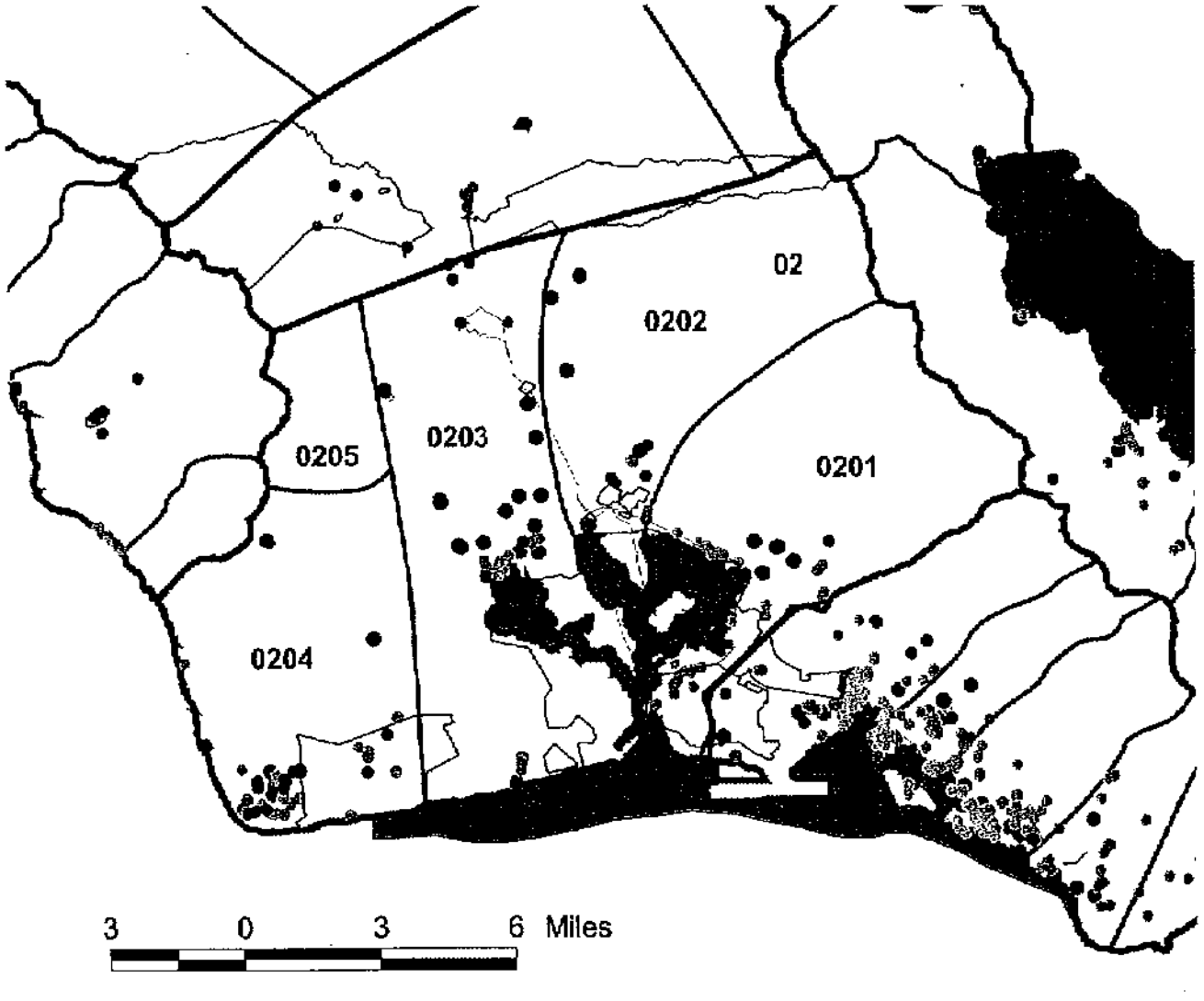

Table 5-3.93 Ground Water Contamination Summary

Hydrogeologic Setting [1] Island of Oahu - 0201 Pearl Harbor Aquifer Sector, Waimalu Aquifer System
Spatial Description (optional) [2]
Map Available (optional) [3] Map available
Data Reporting Period [4] April 1998 - April 2000

Source Type [5]	Number of sites [6]	Number of sites with confirmed ground water contamination [6]	Number of sites that are listed and/or have confirmed releases [6]	Contaminants [7]	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL	1	0	1	uncertain			1		
CERCLIS (non-NPL)	2	0	2	various			2		
DOD/DOE	2	0	2	various			2		
LUST	153	0	153	various			39		
RCRA Corrective Action	0	0	0						
Underground Injection	0	0	0						
State Sites	2	0	2				2		
Non-point source	1	0	1				1		
Other (specify)	4	4	22	2,5	6				

NPL - National Priority List
CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOE - Department of Energy
DOD - Department of Defense
LUST - Leaking Underground Storage Tanks
RCRA - Resource Conservation and Recovery Act

Contaminant List
(1) Atrazine (2) Chlordane
(3) DCP (4) DBCP (5) Dieldrin (6) EDB
(7) Ethylene (8) Nitrate (9) O-xylene
(10) TCB (11) TCE (12) TCP

Table 5-3.94 Ground Water Contamination Summary

Hydrogeologic Setting [1] Island of Oahu - 0202 Pearl Harbor Aquifer Sector, Waiawa Aquifer System
Spatial Description (optional) [2]
Map Available (optional) [3] Map available
Data Reporting Period [4] April 1998 - April 2000

Source Type [5]	Number of sites [6]	Number of sites with confirmed ground water contamination [6]	Number of sites that are listed and/or have confirmed releases [6]	Contaminants [7]	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL	3	0	3	uncertain			3		
CERCLIS (non-NPL)	3	0	3	various			3		
DOD/DOE	1	0	1	various			1		
LUST	6	0	6	various			6		
RCRA Corrective Action	0	0	0						
Underground Injection	0	0	0						
State Sites	3	0	3	various			3		
Non-point source	1	0	1	various			1		
Other (specify)	8	8	8	3,4,6,7,9,10 12	91				

NPL - National Priority List
CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOE - Department of Energy
DOD - Department of Defense
LUST - Leaking Underground Storage Tanks
RCRA - Resource Conservation and Recovery Act

Contaminant List
(1) Atrazine (2) Chlordane
(3) DCP (4) DBCP (5) Dieldrin (6) EDB
(7) Ethylene (8) Nitrate (9) O-xylene
(10) TCB (11) TCE (12) TCP

Table 5-3.95 Ground Water Contamination Summary

Hydrogeologic Setting [1] Island of Oahu - 0203 Pearl Harbor Aquifer Sector, Waipahu Aquifer System
Spatial Description (optional) [2]
Map Available (optional) [3] Map available
Data Reporting Period [4] April 1998 - April 2000

Source Type [5]	Number of sites [6]	Number of sites with confirmed ground water contamination [6]	Number of sites that are listed and/or have confirmed releases [6]	Contaminants [7]	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL	1	0	1	uncertain			1		
CERCLIS (non-NPL)	5	0	5	various			5		
DOD/DOE	4	0	4	various			4		
LUST	29	0	29	various			29		
RCRA Corrective Action	0	0	0						
Underground Injection	0	0	0						
State Sites	3	0	3	various			3		
Non-point source	1	0	1	various			1		
Other (specify)	22	22	22	1,4,6,7,8, 10,11,12	257				

NPL - National Priority List
CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOE - Department of Energy
DOD - Department of Defense
LUST - Leaking Underground Storage Tanks
RCRA - Resource Conservation and Recovery Act

Contaminant List
(1) Atrazine (2) Chlordane
(3) DCP (4) DBCP (5) Dieldrin (6) EDB
(7) Ethylene (8) Nitrate (9) O-xylene
(10) TCB (11) TCE (12) TCP

Table 5-3.96 Ground Water Contamination Summary

Hydrogeologic Setting [1] Island of Oahu - 0204 Pearl Harbor Aquifer Sector, Ewa Aquifer System
Spatial Description (optional) [2]
Map Available (optional) [3] Map available
Data Reporting Period [4] April 1998 - April 2000

Source Type [5]	Number of sites [6]	Number of sites with confirmed ground water contamination [6]	Number of sites that are listed and/or have confirmed releases [6]	Contaminants [7]	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL	0	0	0						
CERCLIS (non-NPL)	8	0	8	various			8		
DOD/DOE	1	0	1	various			1		
LUST	42	0	42	various			42		
RCRA Corrective Action	2	0	2	uncertain			2		
Underground Injection	16	0	0						
State Sites	0	0	0						
Non-point source	1	0	1	various			1		
Other (specify)	1	1	1	1	6				

NPL - National Priority List
CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOE - Department of Energy
DOD - Department of Defense
LUST - Leaking Underground Storage Tanks
RCRA - Resource Conservation and Recovery Act

Contaminant List
(1) Atrazine (2) Chlordane
(3) DCP (4) DBCP (5) Dieldrin (6) EDB
(7) Ethylene (8) Nitrate (9) O-xylene
(10) TCB (11) TCE (12) TCP

Table 5-3.97 Ground Water Contamination Summary

Hydrogeologic Setting [1] Island of Oahu - 0205 Pearl Harbor Aquifer Sector, Kunia Aquifer System
Spatial Description (optional) [2]
Map Available (optional) [3] Map available
Data Reporting Period [4] April 1998 - April 2000

Source Type [5]	Number of sites [6]	Number of sites with confirmed ground water contamination [6]	Number of sites that are listed and/or have confirmed releases [6]	Contaminants [7]	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL	0	0	0						
CERCLIS (non-NPL)	0	0	0						
DOD/DOE	0	0	0						
LUST	0	0	0						
RCRA Corrective Action	0	0	0						
Underground Injection	0	0	0						
State Sites	0	0	0						
Non-point source	0	0	0						
Other (specify)									

NPL - National Priority List
CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOE - Department of Energy
DOD - Department of Defense
LUST - Leaking Underground Storage Tanks
RCRA - Resource Conservation and Recovery Act

Contaminant List
(1) Atrazine (2) Chlordane
(3) DCP (4) DBCP (5) Dieldrin (6) EDB
(7) Ethylene (8) Nitrate (9) O-xylene
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Notes from Underground Injection Control Files

Safe Drinking Water Branch, Department of Health
September 26 and 27, 2001

File #1. UO-1319 Tesoro Hawaii Corp. Refinery

- 91-325 Komohana St., Campbell Industrial Park, Kapolei, HI 96707
- wells are on south side of property
- discharge – treated oil refinery industrial wastewater
- two 8" diameter wells, 230' deep
- 864,000 gpd – avg
- 900,000 gpd – max
- 625 gpm – avg
- Injectant characteristics – wastewater from refining, stormwater runoff from tank sites, fire water runoff, tank condensate, other off site Tesoro wastewater

File #2. UO-1376 Honolulu Resource Recovery Venture (H-Power)

- 91-174 Hanua Street, Campbell Industrial Park, Kapolei, HI
- discharge – industrial cooling water
- well #1 has 16" diameter to 256' depth
- well #2 has 16" diameter to 426'
- 1,129,000 gpd (max)
- 784 gpm (max)
- Injectant characteristics – non-contact cooling water containing dispersants, biodispersants, corrosion inhibitors, biocides, and pH control agents

File #3. UO-1991 – Coca-Cola USA, Honolulu, Syrup Plant, Well No. 1

- 91-233 Kalaeloa Blvd., Kapolei, HI 96707
- discharge – syrup manufacturing industrial wastewater
- one well, 8' diameter, 16.5' depth
- 20,000 gpd (avg)
- 40,000 gpd (max)
- Injectant characteristics – potable water treatment process wastewater from a dechlorinization and RO filtration, process washing, and facility cleaning wastewater

File #4. UO-1224 – Ball Metal Beverage Container Corp. Hawaii Can Plant

- 91-320 Komohana Street, Ewa Beach, HI 96707
- discharge – treated industrial process wastewater
- three wells, 8" diameter, 259' deep into the Ewa Plain Pleistocene sedimentary caprock formations
- 44,000 gpd (avg)
- 59,000 gpd (max)
- Injectant characteristics – treated industrial wastewater from can washing, equipment washdown, etc.

File #5. UO-1321 The Gas Co. SNG Plant Storm Drainage, Industrial Well

- 91-390 Kauhi Street, Campbell Industrial Park, Kapolei, HI
- one well, 8" diameter, 125' deep into caprock
- Stormwater 232,658 gpd (max)
- Industrial wastewater 43,500 gpd (avg)
- Injectant characteristics – storm water from facility area adjacent to injection well; industrial wastewater is steam trap condensate, deaerator and degasifier overflow, etc.

File #6. UO-2087 Honolulu Wood Treatment Co. Drainage Well

- 91-291 Hanua Street, Campbell Industrial Park, Kapolei, HI
- discharge – untreated rainfall runoff water
- one well, 8' diameter, 22.1' deep into Ewa caprock limestone
- intermittent and variable flow up to approximately 6330 gpm at peak flow
- injectant characteristics – rainfall runoff water from the facilities paved treated wood product storage area

File #7. UO-1520 Germaine's Luau / Zippy's

- 91-121 Olai Street, Campbell Industrial Park, Kapolei, HI
- discharge – secondary treated sewage effluent
- two wells, 4" diameter, 60' deep into Pleistocene limestone (caprock)
- 12,000 gpd design avg flow
- 10 psi pressure
- injectant characteristics – secondary treated domestic wastewater effluent from Germaine's Luau private wastewater treatment facility

File #8. UO-2057 BOC Gases / Gaspro Ewa Beach Facility

- 91-102 Kaomi Loop, Campbell Industrial Park, Kapolei, HI 96707
- discharge – non-contact cooling water
- one injection well, 10" diameter, 29' deep into marine and terrigenous sedimentary deposits of Ewa Coastal Plain (caprock)
- average disposal for one calendar week not to exceed 4400 gpd
- maximum disposal for every day shall not be exceeded
- injectant characteristics – non-contact cooling water from cooling towers, makeup water to cooling tower is from City and County supply. Cooling water additives are used for corrosion and scale inhibition, and biofouling control.

File #9. UO-2090 Air Liquide America Corporation

- 91-163 Hanua Street, Kapolei, HI
- discharge – industrial process wastewater
- one well, 6" diameter, 300' deep into Ewa caprock limestone
- 12,000 gpd avg
- 50,000 gpd max
- injectant characteristics – industrial wastewater related to production and distribution of industrial gases: cooling tower blowdown from air separation unit treated with scale inhibitor and biocide, rainfall runoff, hydrostatic test water, etc.

File #10. UO-1496 Kalaeloa Partners, L.P., Kalaeloa Cogen Power Plant

- 91-111 Kalaeloa Blvd., Kapolei, HI 96701
- wastewater discharges from cooling tower blowdown, boiler blowdown, boiler drains, neutralization tank, floor drains, treated boiler wash water
- two wells, 12" diameter, 303' deep into lower aquifer, corraline limestone
- 951,290 gpd (ave)
- 1,008,000 gpd (max)
- 700 gpm (max)

Facility	Location	Distance from Desal Site (mi)	Depth of Well (ft)	Volume Injected (gpd)	General Characteristics	Salinity (Cl mg/l)	Temperature (c)
Tesoro	91-325 Komohana St.						
Well #1		0.63	230	864,000 avg	Wastewater from refining,	158	
Well #2			230	864,000 avg	runoff, and condensate		
H-Power	91-174 Hanua St.				industrial cooling water,		
Well #1		0.98	256	1,129,000 max	containing dispersants,	30,000	27
Well #2			426	1,129,000 max	biocides, etc.		
Coke Plant	91-233 Kalaeloa Blvd.	0.97	16.5	20,000 avg	process wastewater from RO filtration	170	26
Can Plant	91-320 Komohana St.						
Well #1		0.65	259	44,000 avg		154	
Well #2			259	44,000 avg	treated industrial wastewater		
Well #3			259	44,000 avg	from can washing, etc.		
Gas Co. SNG Plant	91-390 Kauhi St.		125		stormwater from facility	59 in neutralizing pit	
Industrial WW		0.86		43,500 avg	area; industrial wastewater		
Stormwater				232,658 max	is condensate, etc.		
Wood Treatment	91-291 Hanua St.	1.2	22.1	9,115,200 max - intermittent	rainfall runoff from paved treated wood storage area	freshwater	
Germaine's Luau	91-121 Olai St.						
Well #1		1.1	60	12,000 avg	secondary treated domestic	freshwater	
Well #2			60	12,000 avg	wastewater effluent		
BOC Gases	91-102 Kaomi Loop	1.5	29	4400 avg	non-contact cooling water	250	24
Air Liquide	91-163 Hanua St.	0.97	300	12,000 avg	industrial wastewater from production and distribution of industrial gases	200	
Cogen Plant	91-111 Kalaeloa Blvd.				industrial wastewater from		
Well #1		0.64	303	951,290 avg	blowdown, drains, and wash	14,000	33
Well #2			303	951,290 avg	water		
		Avg. Distance	Avg. Depth	Total Injected		Wt. Avg. Sal.	
		0.95	196.1	10,167,500		7380	

LUST

Facility ID	Release ID	Facility name	Facility address	Status
9-101056	980163	PALEHUA OBSERVATORY	PALEHUA RD / BLDG 210	Case Transferred to HEEF
9-200211	900038	WALDRON FEED MILL	91-254 OLAI ST	Site Cleanup Completed
9-200221	960095	MAKAKILO QUARRY	91-920 FARRINGTON HWY	Site Cleanup Completed
9-200231	930035	HAWAII CAN PLANT	91-320 KOMOHANA ST	LUST Cleanup Initiated: P
9-200304	970010	ROBERT McMULLAN AND SON, INC.	91-430 KOMOHANA ST	Site Cleanup Completed
9-200515	940062	MAKAKILO CENTRAL OFFICE	92-815 NOHOHALE ST	Site Cleanup Completed
9-200822	980244	HONSADOR	91-151 MALAKOLE RD	Confirmed Release
9-200825	900082	HAWAII INTERNATIONAL MOVERS INC.	91-120 HANUA ST	Site Cleanup Completed
9-200949	010041	FOUNDATION INTERNATIONAL	91-227 HANUA ST	LUST Cleanup Initiated: P
9-201152	990163	OAHU CONSTRUCTION CO., LTD.	91-202 KALAELOA BLVD	Confirmed Release
9-201157	890037	AMERON H C & D LTD	91-059 HANUA ST	Site Cleanup Completed
9-201366	900112	TEXACO BARBERS POINT SALES TERMINAL	91-119 HANUA ST	Disconfirmed Release
9-201366	970085	TEXACO BARBERS POINT SALES TERMINAL	91-119 HANUA ST	LUST Cleanup Initiated: P
9-201428	000049	DELTA CONSTRUCTION CORPORATION	91-255 OIHANA ST	Site Cleanup Completed
9-201760	920091	AMFAC LUMBER & CONSTRUCTION	91-445 KOMOHANA ST	Site Cleanup Completed
9-201763	900001	HAWAIIAN CEMENT (CEMENT DIVISION)	91-055 KAOMI LP	Site Cleanup Completed
9-201763	990201	HAWAIIAN CEMENT (CEMENT DIVISION)	91-055 KAOMI LP	Site Cleanup Completed
9-201811	900010	PACIFIC FABRICATIONS, INC.	91-110 HANUA ST	Site Cleanup Completed
9-201986	920011	VALLEY DETROIT DIESEL	91-265 KALAELOA BLVD	Case Transferred to HEEF
9-202159	000014	HAWAIIAN DREDGING & CONSTRUCTION	91-063 MALAKOLE ST	Site Cleanup Completed
9-202159	010027	HAWAIIAN DREDGING & CONSTRUCTION	91-063 MALAKOLE ST	Confirmed Release
9-202159	890023	HAWAIIAN DREDGING & CONSTRUCTION	91-063 MALAKOLE ST	Site Cleanup Completed
9-202165	900003	CHEVRON REFINERY	CAMPBELL INDUSTRIAL PARK	Case Transferred to HEEF
9-202210	990095	WASTE MANAGEMENT OF HAWAII, INC.	91-310 HANUA ST	Confirmed Release
9-202562	980239	PALAILAI LANDFILL	91-402 FARRINGTON HWY	Confirmed Release
9-202895	960035	E.E. BLACK LTD.	91-252 KUHELA ST	Site Cleanup Completed
9-203406	990146	FAA - MAUNA KAPU TRANSMITTER RECEIVER	Top of Mauna Kapu - QMKA RTR	Confirmed Release

Appendix G

Comment Letters and Responses as Part of the Public Notice of the EISPN

BPNAS
Barbers Point
Naval Air Station
Redevelopment Commission
Developing the Community at Kalaeloa

RECEIVED
JAN 14 2002
By LOH

Benjamin J. Cayetano
Governor

Rick Egged
Chairman

William M. Bass
Executive Director

Ref. No.: BP-1024

January 11, 2002

Oceanit
1001 Bishop Street
Pacific Tower, Suite 2970
Honolulu, Hawaii 96813
Attn: Ms. Lara Hutto

Subject: EISPN for the Proposed Kalaeloa Desalination Facility

Dear Ms. Hutto,

Thank you for providing the BPNAS Redevelopment Commission a copy of subject EISPN. The document has been reviewed and found to be thorough and complete.

With regard to Chapter 7.0 List of Groups to be Consulted, on page 68 "Barbers Point Community Redevelopment Commission" is listed under Private Citizens/ Organizations. This is incorrect. The Barbers Point Naval Air Station (BPNAS) Redevelopment Commission is the State agency that developed the Barbers Point Naval Air Station Community Redevelopment Plan. We are not aware of the existence of a "Barbers Point Community Redevelopment Commission" and believe the BPNAS Redevelopment Commission is the organization with which you intend to consult. It should be listed under "State" organizations.

Please do not hesitate to contact me should you require further clarification.

Sincerely,

William M. Bass
Executive Director

P.O. Box 75268 • Kapolei, Hawaii 96707-0268

COPY

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD02/434

January 3, 2002

Mr. Scot Muraoka
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

SUBJECT: PROPOSED KALAELOA DESALINATION FACILITY – EIS PREPARATION NOTICE

Dear Mr. Muraoka:

Thank you for the opportunity to review the EIS Preparation Notice for the proposed Kalaeloa Desalination Facility to be located at the former Barbers Point Naval Air Station.

The Office of Hawaiian Affairs (OHA) has no comments at this point in time and looks forward to receiving the Draft EIS for the project.

If you have any questions, please contact Jerry B. Norris at 594-1847 or email him at jerryn@oha.org.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator
Hawaiian Rights Division

cc: OHA Trustees
Clyde W. Namu'o, OHA Administrator

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

COPY

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
JAN M.L.Y. AMII
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

January 16, 2002

Mr. Colin C. Kippen, Jr.
Deputy Administrator
Hawaiian Rights Division
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Kippen:

Subject: Your Letter of January 3, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kalaeloa Desalination Facility

Thank you for reviewing the Environmental Impact Statement (EIS) Preparation Notice for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We acknowledge that the Office of Hawaiian Affairs has no comments at this time. The Draft EIS will be forwarded for your review upon completion.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: ✓ Dayan Vithanage, Oceanit

Pure Water . . . our greatest need – use it wisely

COPY

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

BENJAMIN J. CAYETANO
GOVERNOR
SEIJI F. NAYA, Ph.D.
DIRECTOR
SHARON S. NARIMATSU
DEPUTY DIRECTOR
DAVID W. BLANE
DIRECTOR, OFFICE OF PLANNING

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

RECEIVED
JAN 29 2002
By

Ref. No. P-9349

January 25, 2002

Mr. Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Subject: Kalaeloa Desalination Facility, Ewa, Oahu, TMK: 9-1-013-028

Dear Mr. Muraoka:

The Office of Planning, Department of Business Economic Development and Tourism, has reviewed the Environmental Impact Statement Preparation Notice (EISPN) for the Kalaeloa Desalination Facility proposed by the Board of Water Supply of the City and County of Honolulu. The facility would be located on a 20-acre parcel of land that is located in the southwest corner of the Campbell Industrial Park. The parcel is in the State Urban Land Use District and is zoned I-2 General Industrial.

We have no comments at this time concerning the proposed project.

Thank you for the opportunity to comment. Should you have any questions, please call Heidi Meeker at 587-2802.

Sincerely,

David W. Blane
Director
Office of Planning

c: Genevieve Salmonson, Office of Environmental Quality Control
✓ Lara Hutto, Oceanit

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
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BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

February 5, 2002

Mr. David W. Blane
Director, Office of Planning
Department of Business, Economic
Development and Tourism
235 South Beretania Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Blane:

Subject: Your Letter of January 25, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kalaeloa Desalination Facility

Thank you for reviewing the Environmental Impact Statement Preparation Notice for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We acknowledge that you have no comments at this time concerning the proposed project.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
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BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

February 1, 2002

FEB 13 2002

Mr. William M. Bass, Executive Director
Barbers Point Naval Air Station
Redevelopment Commission
State of Hawaii
P. O. Box 75268
Kapolei, Hawaii 96707-0268

Dear Mr. Bass:

Subject: Your Letter of January 11, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility

Thank you for your letter regarding the Environmental Impact Statement Preparation Notice for the proposed Kalaeloa Desalination Facility.

We acknowledge the correct organization name and placement in the List of Groups to be Consulted (Chapter 7.0). Your organization will be listed as the Barbers Point Naval Air Station Redevelopment Commission under State organizations in the Draft Environmental Impact Statement.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Lara Hutto, Oceanit

Pure Water . . . our greatest need – use it wisely

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

COPY

RECEIVED
JAN 29 2002
By

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

January 17, 2002

Scott Muraoka
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813

LOG NO: 28946
DOC NO: 0201EJ08

Dear Mr. Muraoka:

SUBJECT: Chapter 6E-8 Historic Preservation Review –Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Honolulu Desalination Facility at Kalaeloa, `Ewa, O`ahu
Honouliuli, `Ewa, O`ahu
TMK: 9-1-031:028

Thank you for the opportunity to comment on the EISPN for the proposed Kalaeloa Desalination Facility. We provided comments during the earlier phases of this project.

The EISPN summarizes in Section 3.15 our earlier comments regarding known historic sites in the general area and the results of a field inspection conducted of the Kalaeloa test location, which showed that the test location had been extensively altered. As recommended, the EISPN commits to an archaeological inventory survey of those areas to be used for the facility which have not been modified. We understand that an archaeological inventory survey is currently being undertaken. Sara Collins and Elaine Jourdane conducted a field inspection of the inventory survey area with the consulting archaeologist and representatives of Oceanit on December 18, 2001. We look forward to reviewing the results of the survey. If significant historic sites are found during the survey, and if they will be adversely affected by the proposed facility, then an acceptable mitigation plan will need to be prepared and approved prior to any ground disturbance.

Should you have any questions, please feel free to call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

EJ:jk

c: Laura Hutto, Oceanit, 1001 Bishop Street, Suite 2970, Honolulu, HI 96813

U.S Department of Transportation
Federal Aviation Administration

Western-Pacific Region
Airports District Office

300 Ala Moana Blvd., Room 7-128
Honolulu, Hawaii 96813
MAIL: Box 50244
Honolulu, Hawaii 96850-0001
Phone: (808) 541-1232
FAX: (808) 541-3566

January 22, 2002

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843
Attn: Mr. Scot Muraoka

Dear Mr. Muraoka:

We have reviewed the Environmental Impact Statement Preparation Notice (EISPN) for the Proposed Kalaeloa Desalination Facility dated December 2001.

We have no comments on the EISPN; however, we note that a Notice of Proposed Construction or Alteration, FAA Form 7460-1, must be submitted for any construction to assess the impacts on Kalaeloa Airport. Based upon this EISPN, the proposed facilty will be located within the notice criteria of Federal Aviation Regulations Part 77.13 (a)2 requiring the submittal of a 7460-1 Form. We also suggest coordination with the State Airports Division.

If you have any questions, please call us.

Sincerely,

David J. Welhouse
Project Engineer

Ronnie V. Simpson
Manager, Airports District Office

cc: Ben Schlapak, DOTA

Post-it® Fax Note 7671	Date	# of pages ▶
To Lara	From Iris	
Co./Dept.	Co. BWS	
Phone #	Phone # 527 5245	
Fax #	Fax #	

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

February 4, 2002

Mr. Ronnie V. Simpson, Manager
Airports District Office
U.S. Department of Transportation
Federal Aviation Administration
300 Ala Moana Boulevard, Room 7-128
MAIL: Box 50244
Honolulu, Hawaii 96850-0001

Attention: David J. Welhouse

Dear Mr. Simpson:

Subject: Your Letter of January 22, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kalaeloa Desalination Facility

Thank you for reviewing the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We acknowledge that you have no comments on the EISPN and note that a Notice of Proposed Construction or Alteration, FAA Form 7460-1, must be submitted for any construction to assess the impacts on Kalaeloa Airport. The proposed project will be coordinated with the Airports Administration of the State Department of Transportation.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: ✓Dayan Vithanage, Oceanit

Pure Water . . . our greatest need – use it wisely

RECEIVED
JAN 28 2002
By SH

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org
www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

LEE D. DONOHUE
CHIEF

MICHAEL CARVALHO
ROBERT AU
DEPUTY CHIEFS

OUR REFERENCE CS-KP

January 23, 2002

TO: CLIFFORD JAMILE, DIRECTOR
BOARD OF WATER SUPPLY

ATTENTION: SCOT MURAOKA, ENVIRONMENTAL UNIT HEAD

FROM: LEE D. DONOHUE, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA DESALINATION FACILITY

Thank you for the opportunity to review and comment on the subject project.

We have no comment to offer at this time.

If there are any questions, please call Ms. Carol Sodetani of the Support Services Bureau at 529-3658.

LEE D. DONOHUE
Chief of Police

By Karl Godsey
KARL GODSEY
Acting Assistant Chief of Police
Support Services Bureau

cc: OEQC
✓Ms. Lara Hutto, Oceanit

Serving and Protecting with Aloha

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

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JAN M.L.Y. AMI
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

February 5, 2002

TO: LEE D. DONOHUE, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

FROM: BY for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF JANUARY 23, 2002 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA DESALINATION FACILITY

Thank you for reviewing the Environmental Impact Statement Preparation Notice for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We acknowledge that you have no comments to offer at this time concerning the proposed project.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Dayan Vithanage, Oceanit

Pure Water . . . our greatest need – use it wisely

BENJAMIN J. CAYETANO
GOVERNOR

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
JEAN L. OSHITA
JADINE Y. URASAKI

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

IN REPLY REFER TO:

HWY-PS
2.5507

JAN 31 2002

Mr. Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Muraoka:

Subject: Environmental Impact Statement Preparation Notice, Kalaeloa Desalination Facility, Ewa, TMK: 9-1-31: 028

We reserve our comments until we have reviewed the project's Traffic Impact Study that is currently being prepared.

If you have any questions, please contact Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

Brian K. Minaai
BRIAN K. MINAAI
Director of Transportation

c: OEQC, Oceanit (Attn: Ms. Lara Hutto)

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor
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EDDIE FLORES, JR., Chairman
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HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

February 8, 2002

Mr. Brian K. Minaai, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Minaai:

Subject: Your Letter of January 31, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kalaeloa Desalination Facility

Thank you for reviewing the Environmental Impact Statement (EIS) Preparation Notice for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We acknowledge that you reserve comments until the Traffic Impact Study is completed. The study will be included in the Draft EIS which will be forwarded for your review upon completion.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa
for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit

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RECEIVED
LAND DIVISION
2002 JAN 16 P 4:23
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 11, 2002

LD/NAV LOG135
BWSKALAELOADESAL.RCM

Suspense Date: 2/25/02

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Oahu District Land Office

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN)
Applicant: Board of Water Supply (BWS)
Authority: City and County of Honolulu BWS
Proposed: Kalaeloa Desalination Facility
Location: Kalaeloa, Ewa, Oahu, Hawaii
TMK: 1st/ 9-1-031: 028

Please review the EISPN covering the proposed project and submit your comment (if any) to us on division letterhead signed and dated on or before the suspense date. If we do not receive a response by the suspense date, we will assume there are no comments. Should you need more time to review this matter, please contact Nicholas A. Vaccaro at 587-0438

NOTE: One (1) complete DEA document is available in the Land Office, room 220.

No Comment At This Time

Date 1/14/02

Signed
Administrator, DOFAW

Comment Attached

We will provide comments when a detailed biological survey is completed for the draft EIS.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STEN, Vice-Chairman
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HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

February 27, 2002

Mr. Michael Buck, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 325
Honolulu, Hawaii 96813

Dear Mr. Buck:

Subject: Your Letter of January 14, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility (Ref: BWSKALAELOAEDESAL.RCM)

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility.

We acknowledge that the Division of Forestry and Wildlife will provide comments when the detailed biological survey is completed for the Draft Environmental Impact Statement.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit
Harry Yada, Department of Land and Natural Resources

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 11, 2002

LD/NAV LOG135
BWSKALAELOADESAL.RCM Suspense Date: 2/25/02

MEMORANDUM:

TO: XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Oahu District Land Office

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN)
Applicant: Board of Water Supply (BWS)
Authority: City and County of Honolulu BWS
Proposed: Kalaeloa Desalination Facility
Location: Kalaeloa, Ewa, Oahu, Hawaii
TMK: 1st/ 9-1-031: 028

Please review the EISPN covering the proposed project and submit your comment (if any) to us on division letterhead signed and dated on or before the suspense date. If we do not receive a response by the suspense date, we will assume there are no comments. Should you need more time to review this matter, please contact Nicholas A. Vaccaro at 587-0438

NOTE: One (1) complete DEA document is available in the Land Office, room 220.

No Comment_____ **Comment Attached** ✓

Date 1/16/02

Signed Barry Cheung

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

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

RECEIVED
2002 JAN 17 A 8:18
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII
LAND DIVISION

January 16, 2002

Ref.: LD-BC

MEMORANDUM

TO: Harry M. Yada, Acting Administrator, Land Division

ATTN: Nicholas A. Vaccaro

FROM: Barry Cheung, Oahu District Land Office Barry Cheung

SUBJECT: EISPN – C&C of Honolulu BWS, Kalaeloa Desalination Plant, Ewa, Oahu (1) 9-1-031:028

Please note that the parcel to the west of the proposed site (identified by TMK (1) 9-1-031:001) is owned by the State, not "James A. Campbell Industrial Park' as appeared on some drawings of the document. The consultant may wish to correct, if appropriate, the reference to Campbell Industrial Park in the document.

Please take note of the following recent disposition:

1. This office is processing a revocable permit over portion of parcel 001 for storage yard, parking and office purposes. The proposed permittee is Quality Precast Products, Inc (Tel: 668-1553).

2. The Department of Agriculture (DOA) is managing parcels 025 & 026 for the operation of slaughterhouses. DOA also obtained approval from the Board of Land and Natural Resources over portion of parcel 001 for the disbursement of the treated wastewater effluent. They will be hiring a consultant to prepare an environmental assessment for the facility.

A copy of map showing the relevant location is attached for reference. The consultant may need to address the concerns, if any, due to the occupation of the above parties in the proximity

Enclosure

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

COPY

EDDIE FLORES, JR., Chairman
CHARLES A. STEED, Vice-Chairman
JAN M.L.Y. AMII
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

February 27, 2002

Mr. Barry Cheung
Oahu District Land Office
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Cheung:

Subject: Your Letter of January 16, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility (Ref: BWSKALAELOAEDESAL.RCM)

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility

We will correct the reference to Campbell Industrial Park in the Draft Environmental Impact Statement. We note the information regarding Parcels 001, 025, and 026; and appreciate the update on these parcels. We did not receive your enclosure noting the locations of these parcels, but have reviewed a TMK map from 2001.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit
Harry Yada, Department of Land and Natural Resources

Pure Water . . . our greatest need – use it wisely

COPY

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 11, 2002

LD/NAV LOG135
BWSKALAELOADESAL.RCM

Suspense Date: 2/25/02

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Oahu District Land Office

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN)
Applicant: Board of Water Supply (BWS)
Authority: City and County of Honolulu BWS
Proposed: Kalaeloa Desalination Facility
Location: Kalaeloa, Ewa, Oahu, Hawaii
TMK: 1st/ 9-1-031: 028

Please review the EISPN covering the proposed project and submit your comment (if any) to us on division letterhead signed and dated on or before the suspense date. If we do not receive a response by the suspense date, we will assume there are no comments. Should you need more time to review this matter, please contact Nicholas A. Vaccaro at 587-0438

NOTE: One (1) complete DEA document is available in the Land Office, room 220.

No Comment_____ **Comment Attached** ✓

Date 1-17-02

Signed

COPY

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON

BRUCE S. ANDERSON
MEREDITH J. CHING
CLAYTON W. DELA CRUZ
BRIAN C. NISHIDA
HERBERT M. RICHARDS, JR.

LINNEL T. NISHIOKA
DEPUTY DIRECTOR

RECEIVED
LAND DIVISION

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

January 17, 2002

DEPT. LAND & NATURAL RESOURCES STATE OF HAWAII

Ref:BWSKALAELOADESAL.RCM

TO: Mr. Harry Yada, Acting Administrator
Land Division

FROM: Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Environmental Impact Statement Preparation Notice, Board of Water Supply, Kalaeloa Desalination Facility, Kalaeloa, Ewa, Oahu

FILE NO.: BWSKALAELOADESAL.COM

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[X] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[ ] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[X] OTHER:

Permits to construct two exploratory wells, one caprock well (Well No. 1805-14) and one basalt Well (Well No. 1805-13), were issued on May 24, 2001. Pump installation permits and water use permits would be required prior to withdrawal and use of the well water.

If there are any questions, please contact Lenore Nakama at 587-0218.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
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HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

March 5, 2002

Ms. Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Ms. Nishioka:

Subject: Your Letter of January 17, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility (Ref:BWSKALAELOAEDESAL.RCM)

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility.

The proposed project will be coordinated with the City and County of Honolulu to incorporate this project into the County's Water Use and Development Plan. Pump installation permits and water use permits will be obtained prior to withdrawal and use of the well water.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit
Harry Yada, Department of Land and Natural Resources

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

AQUACULTURE DEVELOPMENT PROGRAM
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CONSERVATION AND RESOURCES ENFORCEMENT
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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

January 30, 2002

LOG500and135
LD-NAV
Ref.: BWSKAKAELOADESAL.RCM2

Oceanic
Dayananda Vithanage, Project Manager
1001 Bishop Street, Suite 2970
Honolulu, Hawaii 96813

Dear Ms. Vithanage:

SUBJECT: Environmental Impact Statement Preparation Notice
Applicant: Board of Water Supply
Project: Kalaeloa Desalination Facility
Authority: City and County of Honolulu
Location: Kalaeloa, Ewa, Oahu, Hawaii
TMK: 1st/ 9-1-031: 028

This is a follow-up to our letter (Ref: BWSKAKAELOADSAL.RCM) to you dated January 25, 2002, pertaining to the subject matter

Attached herewith is a recently received comment from the Land Division Engineering Branch.

The Department has no other comment to offer.

Should you have any questions, please feel free to contact Nicholas Vaccaro of the Land Division Support Services Branch at 808-587-0438.

Very truly yours,

HARRY M. YADA
Acting Administrator

C: Oahu District Land Office
Land Division Engineering Branch

LNR-LAND DIVISION
ENGINEERING BRANCH

LD/NAV LOG135
BWSKALAELOADESAL.RCM

COMMENTS

The project site, according to FEMA Community Panel Number 15003C 0315 E, is located in Zone D. This is an area in which flood hazards are undetermined.

However, if further studies determined that the project site is within the flood zone, the project must comply with rules and regulations of the National Flood Insurance Program (NFIP) and all applicable County Flood Ordinances. If there are questions regarding the NFIP, please contact the State Coordinator, Sterling Yong, of the Department of Land and Natural Resources at 587-0248. If there are questions regarding flood ordinances, please contact applicable County representative.

M:\WLD\MAKAI\SUZIE\OAHU\Ewa.desalt.O.144.DOC

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

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CHARLES R. STEED, Vice-Chairman
JAN M.L.Y. KIM
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

February 27, 2002

Mr. Sterling Yong
Land Division, Engineering Branch
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Yong:

Subject: Your Letter Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility (Ref:BWSKALAELOAEDESAL.RCM)

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility.

We acknowledge that if further studies determine that the project site is within the flood zone, the project must comply with rules and regulations of the National Flood Insurance Program and all applicable County Flood Ordinances.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: ✓Dayan Vithanage, Oceanit
Harry Yada, Department of Land and Natural Resources

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

REPLY TO
ATTENTION OF

January 29, 2002

Civil Works Technical Branch

Mr. Scot Muraoka
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Muraoka:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice (EISPN) for the Proposed Kalaeloa Desalination Facility, Ewa, Oahu (TMK 9-1-31: 28). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, development within the project parcel will not involve any work in wetlands or other waters of the U.S. and will not require a DA permit. However, any work in the bordering drainage canal would involve a water of the U.S. and may require a DA permit. For further information, please call Mr. Peter Galloway of our Regulatory Branch at (808) 438-8416 and refer to file number 200200173.

b. The flood hazard information provided on page 36 of the EISPN is correct.

A copy of this letter has also been furnished to Ms. Lara Hutto, Oceanit, 1001 Bishop Street, Suite 2970, Honolulu, Hawaii 96813.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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EDDIE FLORES, JR., Chairman
CHARLES A. STEELE, Vice-Chairman
JAN M.L.Y. AMI
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

February 8, 2002

Mr. James Pennaz, P.E.
Chief, Civil Works Technical Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Pennaz:

Subject: Your Letter of January 29, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kalaeloa Desalination Facility

Thank you for reviewing the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We have the following response to your comments:

1. We do not anticipate the need for a Department of the Army permit since this phase of the project will not involve any work in wetlands or waters of the U.S., including the bordering drainage canal.

2. We note that the flood hazard information provided in the EISPN is correct.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit

Pure Water . . . our greatest need – use it wisely

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425 • HONOLULU, HAWAII 96819-1869
TELEPHONE: (808) 831-7761 • FAX: (808) 831-7750 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

February 5, 2002

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: SCOT MURAOKA

FROM: ATTILIO K. LEONARDI, FIRE CHIEF

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA SEAWATER DESALINATION FACILITY
TAX MAP KEY: 9-1-031: 028

We received a letter from Dayananda Vithanage, Project Manager with Oceanit, dated January 9, 2002, requesting our comments for the proposed Kalaeloa Seawater Desalination Facility.

The Honolulu Fire Department (HFD) requests that the following be complied with:

1. Provide a private water system where all appurtenances, hydrant spacing, and tire flow requirements meet Board of Water Supply standards.

2. Provide a fire department access road within 150 feet of the first floor of the most remote structure. Such access shall have a minimum vertical clearance of 13 feet 6 inches, be constructed of an all-weather driving surface complying with Department of Transportation Services (DTS) standards, capable of supporting the minimum 60,000 pound weight of our tire apparatus, and with a gradient not to exceed 20%. The unobstructed width of the fire apparatus access road shall meet the requirements of the appropriate county jurisdiction. All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround having a radius complying with DTS standards.

3. Submit civil drawings to the HFD for review and approval.

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

Attilio K. Leonardi

ATTILIO K. LEONARDI
Fire Chief

AKL/SK:bh

cc: Lara Hutto, Oceanit
Office of Environmental Quality Control

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
JAN M.L.Y. AMI
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

April 2, 2002

COPY

TO: ATTILIO K. LEONARDI, FIRE CHIEF
FIRE DEPARTMENT

FROM: BH for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF FEBRUARY 5, 2002 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA DESALINATION FACILITY

Thank you for reviewing the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We have the following response to your comments:

1. The proposed water system will be designed in accordance with Board of Water Supply standards.

2. The access road to the proposed facility will be designed in accordance with the specifications discussed in Item No. 2 of your letter.

3. Civil drawings will be submitted for your review and approval upon completion.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Dayan Vithanage, Oceanit

Pure Water . . . our greatest need – use it wisely

BENJAMIN J. CAYETANO
GOVERNOR

COPY

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
JEAN L. OSHITA
JADINE Y. URASAKI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION
400 RODGERS BOULEVARD, SUITE 700
HONOLULU, HAWAII 96819-1880

IN REPLY REFER TO:
AIR-P
02.0054

February 1, 2002

RECEIVED
FEB 6 - 2002
By LBH

Mr. Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Muraoka:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Proposed Kalaeloa Desalination Facility

We have reviewed the EISPN for the Proposed Kalaeloa Desalination Facility and have the following comments:

1) The proposed site of the facility is located within the Runway Protection Zone for Runway 4R at Kalaeloa Airport. We concur that building heights are restricted to 45 feet mean sea level (MSL) at the eastern boundary and 65 feet MSL at the western boundary of the proposed site. However, we request that the Department of Transportation, Airports Division be granted an avigation easement on the property to ensure that all structures do not become obstructions to air navigation. An avigation easement is a grant of property interest in land over which a right of unobstructed flight in the airspace with potential for noise, fumes, smoke, vibrations and other substances and phenomena from aircraft is established.

2) The proposed facility is also located within the 55 – 60 DNL noise contour for the Kalaeloa Airport. Please be aware that the property may be impacted by noise from aircraft approaching and departing Kalaeloa Airport.

Thank you for the opportunity to comment. Please contact Ms. Lynette Kawaoka, Planner, at 838-8812 to clarify any questions you may have.

Sincerely,

ROY K. SAKATA
Acting Airports Administrator

c: Office of Environmental Quality Control (OEQC)
✓Ms. Lara Hutto, Oceanit

Hana Like No Ke Ala Aloha
Working Together to Provide Gateways of Aloha

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ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

March 4, 2002

Mr. Roy K. Sakata
Acting Airports Administrator
Airports Division
Department of Transportation
State of Hawaii
400 Rodgers Boulevard, Suite 700
Honolulu, Hawaii 96819-1880

Dear Mr. Sakata:

Subject: Your Letter of February 1, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility (REF: AIR-P 02.0054)

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility.

We have the following responses to your comments:

1. The Board of Water Supply (BWS) will provide an avigation easement for the property to the Department of Transportation, Airports Division. This avigation easement will ensure that all structures on the property do not become obstructions to air navigation. Our BWS Land Section will coordinate the easement document for execution.

2. We acknowledge that the proposed facility may be impacted by noise from aircraft approaching and departing Kalaeloa Airport.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit

Pure Water . . . our greatest need – use it wisely

DEPARTMENT OF DESIGN AND CONSTRUCTION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 523-4564 • Fax: (808) 523-4567
Web site: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

RAE M. LOUI, P.E.
DIRECTOR

ERIC G. CRISPIN, AIA
DEPUTY DIRECTOR

GEORGE T. TAMASHIRO, P.E.
ASSISTANT DIRECTOR

WW.P 02-053

February 7, 2002

MEMORANDUM

TO: MR. CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: MR. SCOT MURAOKA

FROM: RAE M. LOUI, P.E., DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN) FOR THE PROPOSED KALAELOA DESALINATION FACILITY

We have reviewed the subject EISPN and have no comments to offer at this time. We look forward to receiving a copy of the Draft Environmental Impact Statement for our review and comments.

Should you have any questions, please contact Bill Liu of the Wastewater Division at 527-6871.

cc: Office of Environmental Quality Control
Oceanit

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

February 19, 2002

TO: RAE M. LOUI, P.E., DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: BU for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF FEBRUARY 7, 2002 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA DESALINATION FACILITY

Thank you for reviewing the Environmental Impact Statement (EIS) Preparation Notice for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We acknowledge that you have no comments to offer at this time. The Draft EIS will be submitted for your review and comments upon completion.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Dayan Vithanage, Oceanit

Pure Water . . . our greatest need – use it wisely

3. Campbell Industrial Park is not served by a municipal sewage collection system. This means that sanitary wastewater from most properties is disposed of via an on-site wastewater system, typically consisting of a cesspool or a septic tank and leach field. These sanitary wastewater systems discharge wastewater into the ground at shallow depths;

4. Source water wells for desalination should seek source water from depths that would preclude the influence of injection well and sanitary wastewater disposal practices;

5. Source water from deep depths will likely contain a high total dissolved solids concentration. The reverse osmosis system should be compatible with this condition;

6. Injection wells, if used for the disposal of desalination wastewater, require Underground Injection Control registration. A UIC permit application must be submitted prior to the construction of an injection well, and construction can occur only after an approval-to-construct is granted by the Department of Health. An approval to construct an injection well is not an approval to operate the injection well. Depending on the technical information obtained during construction and the results of the injection test, a UIC permit to operate the injection well may or may not be issued. A UIC permit application is open to public review and a public comment period of 30 days may be offered;

7. Chemical storage areas should be designed to completely retain and recover a total materials release. Impervious concrete floors or the equivalent should be used for the storage area. The storage area should be sheltered to prevent the accumulation of rain water or runoff;

8. Please describe how the permeate water quality will be monitored for meeting drinking water standards;

9. Please describe how the effluent from the facility's proposed septic tank will be discharged;

10. The Department of Health's Wastewater Branch should be consulted for sanitary wastewater disposal; and

11. Please accordingly adjust the scale of the map for the following Figures: 1.1, 2.5, 2.8, 2.9, 3.4, 3.10, 3.15, 5.2, and 5.3;

12. Please provide the scale of the map for the following Figures: 2.6, 3.2, and 5.4.

Thank you for this document review opportunity. If you have any questions about the comments, please call Chauncey Hew of the Safe Drinking Water Branch at 586-4258.

Sincerely,

GARY GILL, DEPUTY DIRECTOR
Environmental Health Administration

CH:chl

c: 1. Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street
Leiopapa A Kamehameha, Suite 702
Honolulu, HI 96813

2. Ms. Lara Hutto
Oceanit
1001 Bishop Street, Suite 2970
Honolulu, HI 96813

3. Mr. Burt Kuioka
Water Resources Unit
Board of Water Supply
630 S. Beretania Street
Honolulu, HI 96843

BOARD OF WATER SUPPLY

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BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

June 12, 2002

Mr. Gary Gill, Deputy Director
Environmental Health Administration
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801-3378

Dear Mr. Gill:

Subject: Your Letter of January 25, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility (REF:01007UCH.02)

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility.

Your comments will be addressed in the Draft Environmental Impact Statement (EIS) and we acknowledge that you may have more comments during the document review period. We have the following response to your comments:

1. The project site is located below the State's Underground Injection Control (UIC) line as shown in Figure 3.11 of the Environmental Impact Statement Preparation Notice.

2. Injection well activity occurs in the Kalaeloa area and we have obtained documentation of these wells from the Safe Drinking Water Branch. The Draft EIS will assess the potential impacts of these injection wells.

3. Ground disposal of sanitary waste from the proposed facility will be further addressed in the Draft EIS.

4. We anticipate utilizing source water from the deep basal aquifer to preclude the influence of injection well and sanitary wastewater disposal practices. Basal wells, although higher in construction costs, will provide a more secure and consistent quality feedwater source for the project than caprock wells.

5. Water quality results from test wells will be used to design an appropriate pretreatment process for the reverse osmosis system.

6. If injection wells are used for the proposed facility, proper permitting procedures will be followed. Approval to construct and UIC permits to operate will be obtained from the Department of Health (DOH).

7. Chemical storage areas will be designed to retain and recover any possible materials release. Impervious floors will be used for the storage area, and the storage area will be sheltered to prevent the accumulation of rain or runoff.

8. A discussion on monitoring permeate water quality to ensure compliance with drinking water standards will be included in the Draft EIS.

9. Septic systems will probably be constructed at the facility. A discussion on the disposal method of the sanitary waste will be included in the Draft EIS.

10. The DOH's Wastewater Branch will be consulted in regards to sanitary wastewater disposal.

11. Map scales will be adjusted for figures 1.1, 2.5, 2.8, 2.9, 3.4, 3.10, 3.15, 5.2, and 5.3 in the Draft EIS.

12. Map scales will be provided for figures 2.6, 3.2, and 5.4 in the Draft EIS.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EMD/SDWB

January 25, 2002

01007UCH.02

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawai'i 96843

RECEIVED
FEB 5 - 2002
By LBH

ATTENTION: Mr. Scot Muraoka

Dear Mr. Jamile:

SUBJECT: PROPOSED KALAELOA DESALINATION FACILITY
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
DECEMBER 2001

Listed below are our comments for the subject document. We understand that our comments will be addressed in the Draft Environmental Impact Statement. We may subsequently have more comments to submit during that document review period.

1. The project site is located below (makai) the State's Underground Injection Control (UIC) line. Land areas below the UIC line are generally considered areas that (1) do not contain underground sources of drinking water, that is, aquifers that do not contain potable water, and (2) are known for having subsurface wastewater disposal activity via injection wells;

2. Injection well activity occurs at Campbell Industrial Park (Kalaeloa) consisting mostly of industrial wastewater discharges. Injection well depths range from relatively shallow depths, 10 to 20 feet deep, to depths up to about 430 feet. The State's Underground Injection Control program has fourteen injection well facilities currently registered at Campbell Industrial Park. The injection wells closest to the desalination project appear to be Tesoro Hawai'i Refinery's two injection wells, approximately 2000 feet northwest of the project site. Tesoro's injection wells are approximately 235 feet deep;

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 10TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4182 • FAX: 527-5725 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

EDWARD T. "SKIPPA" DIAZ
DEPUTY DIRECTOR

RECEIVED
FEB 11 2002
BY:

February 4, 2002

MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: WILLIAM D. BALFOUR, JR., DIRECTOR

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA DESALINATION FACILITY

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Kalaeloa Desalination Facility.

The Department of Parks and Recreation has no comments relating to the EISPN at this time.

Should you have any questions, please contact Mr. John Reid, Planner, at 547-7396.

W. D. Balfour

WILLIAM D. BALFOUR, JR.
Director

WDB:cu (7236)

cc: Office of Environmental Quality Control
✓Ms. Lara Hutto, Oceanit

Oceanit®
...innovation through engineering and scientific excellence...

January 9, 2002

Mr. William D. Balfour, Jr.
City and County of Honolulu
Department of Recreation
650 South King Street
Honolulu, Hawaii 96813

'02 JAN 14 A9:28
DEPT. OF PARKS & RECREATION C & C OF HONOLULU

Subject: Kalaeloa Desalination Facility

An Environmental Impact Statement Preparation Notice (EISPN) has been prepared pursuant to the EIS law (Hawaii Revised Statutes, Chapter 343) and the EIS rules (Administrative Rules, Title 11, Chapter 200) for the proposed Seawater Desalination Facility in the Kalaeloa area. This EISPN is available for your review on the internet at www.oceanit.com/desalination.

TITLE OF REPORT: Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility

LOCATION: ISLAND Oahu DISTRICT Ewa

TAX MAP KEY: 9-1-03:1-028

There is a 30-day review period for this EISPN. Any comments you have on this report must be received or postmarked by February 7, 2002.

Please send original comments to:

Applicant: Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843
Attn: Mr. Scot Muraoka

Copies of the comments should be sent to the Office of Environmental Quality Control (OEQC) and:

Consultant: Oceanit
1001 Bishop Street, Suite 2970
Honolulu, Hawaii 96813
Attn: Ms. Lara Hutto

Thank you for your participation in the EIS process.

Sincerely,

FOR LB Hutto

Dayananda Vithanage, Project Manager

1001 BISHOP STREET • PACIFIC TOWER • SUITE 2970 • HONOLULU, HAWAII 96813
Tel: (808) 531-3017 • Fax: (808) 531-3177 • Email: oceanit@oceanit.com • URL: http://www.oceanit.com

2/7

BOARD OF WATER SUPPLY
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ROSS S. SASAMURA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

February 19, 2002

TO: WILLIAM D. BALFOUR, JR., DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: BU for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF FEBRUARY 4, 2002 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA DESALINATION FACILITY

Thank you for reviewing the Environmental Impact Statement Preparation Notice for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

We acknowledge that you have no comments to offer at this time.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Dayan Vithanage, Oceanit

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

RECEIVED
FEB 11 2002
BY:

In Reply Refer to: PI-02-35

FEB 7 2002

Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Re: Environmental Impact Statement Preparation Notice (EISPN) for the proposed Seawater Desalination Facility in the Kalaeloa area, Oahu, Hawaii.

Dear Mr. Muraoka,

The US Fish and Wildlife Service (Service) received the above referenced EISPN on January 10, 2002. The comments below are provided per your request for input on the proposed project. If a federal permit, such as a Department of the Army permit under section 404 of the Clean Water Act is required, the Service will provide comments and recommendations to the U.S. Army Corp of Engineers pursuant to our various federal authorities.

As stated in the EISPN, the proposed desalination plant will require approximately 11 million gallons per day (MGD) of saline feed water, which will be pumped from the lower caprock aquifer (LCA) or the basal aquifer (BA). This water will be treated to adjust pH and reduce membrane fouling. The recovery rate is expected to be 45 percent, which means that approximately 5 MGD of fresh water and 6 MGD of brine will be produced. As stated in the EISPN, the preferred method of disposing brine and additional wastewater is the use of injection wells. The wastewater will be comprised of ultrafiltration reject water, backflushwater, membrane cleaning solution, and brine. The wastewater will be injected through the wells and into the upper caprock aquifer (UCA).

The EISPN identifies the UCA as part of the Ewa aquifer system, which is a mix of freshwater in contact with seawater and is unconfined and occurring in a sedimentary or nonvolcanic area. The EISPN also identifies the status for the UCA as currently being used, of moderate salinity, replaceable, and having a high vulnerability to contamination. It is unclear from these descriptions whether the wastewater would affect the UCA and whether the adjacent coral reef ecosystem would be impacted. The Service recommends that the draft EIS assess whether the UCA will have enough capacity to contain the wastewater. Since the UCA is permeable and wastewater will be injected, we recommend that the draft EIS assess whether this positive pressure will cause the UCA water/wastewater mixture to flow out and whether this mixture is expected to flow into the marine environment, LCA or BA. The EISPN indicates that the wastewater will contain high salinity and water treatment chemicals, which may include sodium hypochlorite, sulfuric acid, silica antiscalant, sodium bisulfite, sodium hydroxide and citric acid. We recommend that the draft EIS address the affect of these chemicals on the nearby coral reef ecosystem. Since the desalination facility derives its source water from the LCA or BA, the Service recommends the draft EIS address the possibility of contamination from the UCA water/wastewater mixture in relation to the life span of the facility or additional costs associated with purifying the source water.

As stated in the EISPN, an alternative to the use of injection wells is the use of brine ponds for disposal of wastewater. Since brine ponds can attract endangered waterbirds (see list below) and migratory birds, the Service recommends that the draft EIS address possible impacts and seek technical assistance from our office if necessary. Another alternative is the installation of an ocean outfall pipe to carry the wastewater to the ocean for offshore disposal. The Service recommends that the draft EIS examine the least environmentally damaging alignment. A nearby disturbed channel may exist that would provide a least damaging environmental alternative.

In general, the Service reviews project proposals for potential impacts to fish and wildlife resources, primarily federal trust resources such as threatened and endangered species, migratory birds, wetlands, and coral reefs. From a preliminary review of the EISPN, the Service foresees the potential for project-related impacts to the coral reef ecosystem and four endangered waterbirds (Hawaiian duck, koloa, *Anas wyvilliana*; Hawaiian coot, alae ke'oke'o, *Fulica alai*; Hawaiian moorhen, 'alae 'ula, *Gallinula chloropus sandvicensis*; and Hawaiian stilt, ae'o, *Himantopus mexicanus knudseni*). If project-related impacts to endangered species are anticipated, further assistance from our office may be required to ensure compliance with the Endangered Species Act. When reviewing alternatives in an EIS, the Service first examines whether unnecessary impacts to fish and wildlife resources have been avoided. If unavoidable impacts to fish and wildlife resources are anticipated, impacts should be minimized through the use of Best Management Practices. When impacts to fish and wildlife resources are unavoidable and significant, compensatory mitigation to offset those impacts should be outlined in the draft EIS.

These comments are provided to the Board of Water Supply, as requested, to assist in the preparation of a the draft EIS. The Service looks forward to formal review of upcoming documents and working with involved parties. If you have any questions regarding this letter please contact Marine Specialist Antonio Bentivoglio at 541-3441.

Sincerely,

for Paul Henson, PhD
Field Supervisor
Ecological Service

cc:

OEQC, Honolulu
Oceanit, Honolulu
EPA, Region IX, Honolulu
NMFS-PIAO, Honolulu
ACOE, Honolulu Engineer District, Fort Shafter

BOARD OF WATER SUPPLY

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BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

March 4, 2002

Paul Henson, Ph.D.
Field Supervisor
Fish and Wildlife Service
U.S. Department of the Interior
P. O. Box 50088
Honolulu, Hawaii 96850

Dear Dr. Henson:

Subject: Your Letter of February 7, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility (REF: PI-02-35)

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility.

We have the following responses to your comments:

1. We acknowledge that if a federal permit, such as a Department of the Army permit is required, the Fish and Wildlife Service (FWS) will provide comments and recommendations to the U.S. Army Corps of Engineers.

2. The Draft Environmental Impact Statement (DEIS) will include an assessment of hydrogeological impacts including possible physical and biological impacts from the proposed injection wells on the local aquifer and nearshore waters.

3. If brine ponds are chosen as a disposal method, the DEIS will assess impacts to water birds and migratory birds. The Board of Water Supply (BWS) will seek assistance from FWS in assessing these impacts. The DEIS will assess all alternative wastewater and brine disposal methods.

4. The DEIS will assess any potential impacts to fish and wildlife resources, including threatened and endangered species, migratory birds, wetlands, and coral reefs. In addition, Best Management Practices and mitigative measures will be developed to minimize construction related and any unavoidable impacts. If any project-related impacts to endangered species are anticipated, BWS will contact FWS for assistance to ensure compliance with the Endangered Species Act.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Nagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

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

February 7, 2002

Mr. Clifford Jamile, Manager
Board of Water Supply, City and County of Honolulu
630 South Beretania Street
Honolulu, Hawai'i 96843

Dr. Dayananda Vithanage
Oceanit
1001 Bishop Street, Pacific Tower, Suite 2970
Honolulu, Hawai'i 96813

Dear Messrs. Jamile and Vithanage:

Thank you for your submittal of a final environmental assessment and environmental impact statement preparation notice for the proposed Kalaeloa Desalination Facility, TMK: 9-1-031-028 in the 'Ewa District. We have reviewed the document and submit the following comments for your consideration and response in the draft environmental impact statement.

1. PERMITTING FOR BRINE PONDS (page 21): Please discuss in the draft EIS who would be the authority (if any) to regulate disposal in a brine pond (surface impoundment). Please consult with the solid and hazardous waste branch of the Department of Health.
2. WATER: Please discuss in section whether approval from the Commission for Water Resources Management may be required in the future for water use.
3. WATER RESOURCES (pages 38-40): In addition to natural surface water bodies, please describe artificial surface water bodies in the region (i.e., ponds, surface impoundments, etc.) as they may impact local hydrogeology. Also, per our discussion earlier, please include a schematic diagram (cross section) outlining the relative locations of the basal and caprock aquifers, indicating where water is to be drawn from as well as where water is proposed for disposal.
4. HAZARDOUS WASTE SITES UNDERGOING CORRECTIVE ACTION IN THE REGION: Please consult with the solid and hazardous waste branch of the Department of Health and describe all interim status and permitted hazardous waste treatment, storage and/or disposal units in the region, as well as those sites undergoing corrective action under the leaking underground storage tank program, the RCRA corrective action program, or the Superfund program. For example, the two petroleum refineries have surface impoundments, injection wells and a hazardous waste land treatment unit. The Campbell Industrial Park Region contains the former Chemwood Hazardous Waste Treatment Site, the Hawaiian Western Steel Landfill, as well as others.
5. CULTURAL IMPACT ASSESSMENT: Pursuant to Act 50, Session Laws of Hawai'i, please include a cultural impact assessment that describes cultural resources and practices based on interviews with cultural practicioners in the region , and the impact that the proposed action will have (if any) on these resources and practices.
6. CUMULATIVE AND SECONDARY IMPACT ANALYSIS: Using the information on planned projects in the region, as well as projects undergoing corrective action, discuss the cumulative and indirect effects the proposed project will have on these other projects and the environment in general. In particular, please discuss costs of producing RO desalinated water. Also, please impacts from and how the proposed project will dovetail with the RO project to use secondary sewage treated effluent from the Honouliuli Wasterwater Treatment Plant for irrigation.

Thank you for the opportunity to comment. If there are any questions, please call Leslie Segundo, Environmental Health Specialist, at (808) 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

Enclosures

State of Hawaii
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
Guidelines for Assessing Cultural Impacts

Adopted by the Environmental Council, State of Hawaii
November 19, 1997

I. INTRODUCTION

It is the policy of the State of Hawaii under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

II. CULTURAL IMPACT ASSESSMENT METHODOLOGY

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants, including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access

to gathering areas would be included in the assessment. An ahupua'a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices.

The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

If the subject area is in a developed urban setting, cultural impacts must still be assessed. Many incorrectly assume that the presence of urban infrastructure effectively precludes consideration of current cultural factors. For example, persons are known to gather kauna''oa, ''ilima, ''uhaloa, noni or ki on the grassy slopes and ramps of the H-1 freeway and some state highways on the neighbor islands. Certain landmarks and physical features are used by Hawaiian navigators for sailing, and the lines of sight from landmarks to the coast by fisherman to locate certain fishing spots. Blocking these features by the construction of buildings or tanks may constitute an adverse cultural impact.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

(1) identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua`a;

(2) identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;

(3) receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;

(4) conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;

(5) identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and

(6) assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the precise location of human burials are likely to be withheld from a cultural impact assessment, but it is important that the document identify the impact a project would have on the burials. At times an informant may provide information only on the condition that it remain in confidence. The wishes of the informant should be respected.

Primary source materials reviewed and analyzed may include, as appropriate: Mahele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

III. CULTURAL IMPACT ASSESSMENT CONTENTS

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§§§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

1. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.

2. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

3. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

4. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

5. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.

6. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the

proposed action is located, as well as their direct or indirect significance or connection to the project site.

7. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.

8. An explanation of confidential information that has been withheld from public disclosure in the assessment.

9. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

10. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

11. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call 586-4185.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
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BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

April 8, 2002

COPY

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Your Letter of October 5, 2001 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kalaeloa Desalination Facility

Thank you for your letter regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Kalaeloa Desalination Facility.

We have the following response to your comments:

1. Permitting for Brine Ponds

   The Draft Environmental Impact Statement (EIS) will indicate that the Department of Health is the regulatory authority for brine pond disposal. The area is within the underground injection control area.

2. Water

   A pump installation and water use permit will be required for the seawater wells.

3. Water Resources

   Additional hydro-geological information will be provided in the Draft EIS, including descriptions of any artificial surface water bodies that may impact local hydro-geology. In addition, a schematic diagram will be included outlining the relative locations of the basal and caprock aquifers where water is to be withdrawn and disposed of.

4. Hazardous Waste Sites Undergoing Corrective Action in the Region

   The Draft EIS will include a discussion of hazardous waste treatment, storage and disposal units in the region, and those sites undergoing corrective action under the leaking underground storage tank program, RCRA or the Superfund program that may impact the water source.

5. Cultural Impact Assessment

   A cultural impact assessment will be included in the Draft EIS pursuant to Act 50, Session Laws of Hawaii.

6. Cumulative and Secondary Impact Analysis

   The Draft EIS will include a discussion on the proposed project's potential cumulative and secondary impacts on other projects and the environment, including the Honouliuli Recycled Water Facility. A discussion on the costs of producing reverse osmosis desalinated water will also be included.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit

SIERRA CLUB
HAWAI'I CHAPTER
P.O. Box 2577, Honolulu, HI 96803
tel: 808.538.6616 fax: 808.537.9019

7 February 2002

Board of Water Supply, City and County of Honolulu
Attn: Mr. Scot Muraoka and Mr. Clifford Jamile
630 S. Beretania St.
Honolulu, HI 96843

RE: Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility

The Sierra Club, Hawai`i Chapter, has a number of concerns regarding the proposed desalination facility. We are most concerned that desalinization is a radical departure from conventional methods of providing potable water. This is a significant shift in regards to cost and equity and should be examined in a very circumspect, public dialog.

URBANIZATION

While we recognize that utilizing brackish water sources could *potentially* decrease pressure on potable groundwater resources as well as reduce pressure to divert natural streams, the Sierra Club is concerned that availing more freshwater will only enable more development and urbanization of O`ahu. Increasing development and population only exacerbates existing environmental problems. Increasing population results in additional non-point source pollution, air pollution, solid waste, sewage, energy use, traffic, and open space and habitat loss. While some may believe that desalinated water will be used to *offset* use of groundwater resources, thereby extending the length of time before the aquifer sustainable yields are reached, there is nothing preventing desalinated water from providing for *new* water demands coming online. Water is a contributing attribute in understanding the carrying capacity of O`ahu. By increasing availability of freshwater, carrying capacity may be exceeded in other environmental attributes.

In fact, a large residential development proposed by Castle & Cooke Homes Hawaii, Inc. in central Oahu (Koa Ridge) is currently going through the State Land Use Commission reclassification process. The 7500 house and hospital development will likely use some 3.8 million gallons of water per day. The developer is claiming that there is ample water available for the project, even at full build-out around 2020. The EISPN for this project claims that the sustainable yield may be reached by 2020. Who is correct?

Please discuss the relationship between constructing desalination plants and inducing development on O`ahu in the EIS.

Sierra Club

COST EQUITY

Page 6 of the EISPN states:

> "A capital cost of $54 million and an annual operations and maintenance (O&M) cost of $6.80 per 1,000 gallons were estimated for the 5 MGD facility. This capital cost is within the upper limits of comparable ground water source development costs. However, the O&M cost is higher than for groundwater production. The cost of the production of 5 MGD is not expected to affect water rates."

How can this increase in water cost not have an impact on water rates? Are water rates currently artificially high? At what production level will the O&M costs start to impact existing water rates?

This cost will be spread across all Board of Water Supply ratepayers, yet the water will be used to support new development. Why should existing water users have to foot the bill for new development? Is it fair that low-income residents in Waianae will have to pay more for their water because more water users want to come online?

These new costs could be avoided if Oahu would live within its means in regards to potable water. New water demand is coming from new development. Wouldn't it be more equitable to have new development foot the bill if it is ***their*** development that is pushing demand over the sustainable yield?

ENERGY USE

Although it was stated that the 5 million gallons per day production would require 5 megawatts of electricity, the overall amount of energy (both electrical and/or petroleum) needed to produce desalinated water through the microfiltration and reverse osmosis system was not adequately discussed in the EISPN. Will the turbines, compressors, pumps, auxiliaries, and other equipment be powered by electricity from the Hawaiian Electric Company grid? Does HECO have the existing generating capacity to meet the electricity needs at full plant capacity? If not, will new fossil fuel plants be built—with the cost spread across existing electricity ratepayers? How would a rate increase impact the cost of desalinated water? What are the other petroleum needs for the plant?

We appreciate the opportunity to comment on this draft environmental assessment and look forward to your response.

Sincerely,

Jeff Mikulina

cc. Office of Environmental Quality Control
Oceanit Laboratories, Inc.

Honolulu Resource Recovery Venture
A Covanta Energy Company
91-174 Hanua Street
Kapolei, HI 96707
Tel 808 682 2099
Fax 808 682 5203

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COVANTA ENERGY

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February 6, 2002

FEB 6 2 21 PM '02

Mr. Clifford Jamile
Manager and Chief Engineer
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

Subject: Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalinization Plant

Dear Mr. Jamile,

Covanta Energy was pleased to hear of the Mayor's plan to expand HPOWER during his recent state of the city speech. Should the expansion of HPOWER proceed with a larger municipal waste combustor, there may be the need for another injection well on the property as well as in increased caprock withdrawal rate. We currently utilize two caprock wells and two injection wells for our cooling system. Our allowable caprock withdrawal rate is 2,260,000 gallons per day and the allowable injection rate is 1,129,000 gallons per day.

The proposed desalinization plant will also utilize caprock and basal aquifer wells as source water as well as injection wells for disposal. We request that the environmental impact statement address the impacts (if any) the proposed desalinization facility will have on future expansion of current tenants in the Campbell Industrial Park.

If you need additional information, please feel to call our Chief Engineer, Mr. Todd Kanja at 682-0202. Thank you for the opportunity to comment on the EISPN for the proposed desalinization plant.

Very truly yours,

Robert A. Webster
Facility Manager

GKK/mrk
0202009raw

cc: T. Kanja
G. Kashiwabara

Printed on recycled paper

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

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BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

February 19, 2002

Mr. Robert A. Webster, Facility Manager
Covanta Energy
A Covanta Energy Company
91-174 Hanua Street
Kapolei, Hawaii 96707

Dear Mr. Webster:

Subject: Your Letter of February 6, 2002 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kalaeloa Desalination Facility

Thank you for reviewing the Environmental Impact Statement (EIS) Preparation Notice for the proposed Kalaeloa Desalination Facility at the former Barbers Point Naval Air Station.

The Draft EIS will discuss any impacts the proposed desalination facility will have on future expansion of current tenants in the Campbell Industrial Park. The Draft EIS will be forwarded for your review upon completion.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa
for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayan Vithanage, Oceanit

Pure Water . . . our greatest need – use it wisely

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

RECEIVED
MAR - 5 2002
By

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

February 28, 2002

LOG1091
LD-NAV
Ref.: BWSKAKAELOADESAL.RCM3

Oceanic
Dayananda Vithanage, Project Manager
1001 Bishop Street, Suite 2970
Honolulu, Hawaii 96813

Dear Ms. Vithanage:

SUBJECT: Environmental Impact Statement Preparation Notice
Applicant: Board of Water Supply
Project: Kalaeloa Desalination Facility
Authority: City and County of Honolulu
Location: Kalaeloa, Ewa, Oahu, Hawaii
TMK: 1st/ 9-1-031: 028

This is a follow-up to our letter to you dated January 30, 2002, pertaining to the subject matter

Attached herewith is a recently received comment from the Division of Aquatic Resources.

The Department has no other comment to offer at this time.

Should you have any questions, please feel free to contact Nicholas Vaccaro of the Land Division Support Services Branch at 808-587-0438.

Very truly yours,

HARRY M. YADA
Acting Administrator

C: Oahu District Land Office

STATE OF HAWAII
Department of Land and Natural Resources
Division of Aquatic Resources

SUSPENSE DATE: February 25, 2002

MEMORANDUM

To: William Devick, Administrator

From: Richard Sixberry, Aquatic Biologist RS

Subject: Comments on Environmental Impatct Statement Preparation Notice

Comments Requested By: Harry Yada, Land Division

Date of Request: 1/11/02 Date Received: 1/14/02

Summary of Project

Title: Kalaeloa Desalination Facility

Proj. By: C&C - Board of Water Supply

Location: Kalaeloa, Oahu

Brief Description:

The applicant proposes to construct a seawater reverse osmosis desalination facility in Kalaeloa, Ewa, Oahu. The facility would produce 5 million gallons per day of fresh water that will add to Oahu's potable water supply. The facility will occupy a portion of a 20-acre parcel of undeveloped land that was previously part of the Barbers Point Naval Air Station.

Comments:

We will review the DEIS when it is completed and comment on any significant impacts adverse to aquatic resource values at a later date.

Although the early consultation describes the proposed project, it does not discuss the potential effects on the environment, especially the disposition of reject water.. We suggest the forthcoming DEIS discuss in detail potential short term impacts and propose specific means for averting or minimizing adverse effects, and provide possible mitigation for unavoidable damage to natural resources and the aquatic environment in the vicinity of Kalaeloa, Ewa, Oahu.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:
02-006/cpo

RECEIVED
MAR - 5 2002
By

February 27, 2002

Mr. Dayananda Vithanage, Project Manager
1001 Bishop Street, Pacific Tower, Suite 2970
Honolulu, Hawaii 96813

Dear Mr. Vithanage:

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Seawater Desalination Facility, Kalaeloa, Hawaii
Tax Map Key: (1) 9-1-031: 028

Thank you for the opportunity to review and comment on the subject proposal. The EISPN was routed to the various branches of the Environmental Health Administration. We have the following comments.

Clean Water Branch

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. A Section 401 Water Quality Certification is required for "Any applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters…", pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act").

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following discharges to waters of the State:

   a. Discharge of storm water runoff associated with industrial activities, as define in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi);

   b. Discharge of storm water runoff associated with construction activities that involve the disturbance of five (5) acres or greater, including clearing, grading, and excavation;

c. Discharge of treated effluent from leaking underground storage tank remedial activities;

d. Discharge of once through cooling water less than one million gallons per day;

e. Discharge of hydro-testing water;

f. Discharge of construction dewatering effluent;

g. Discharge of treated effluent from petroleum bulk stations and terminals; and

h. Discharge of treated effluent from well drilling activities.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department of Health, Clean Water Branch (CWB) at least thirty (30) days prior to commencement of any discharges to State waters;

3. If construction activities involve the disturbance of one acre or greater, including clearing, grading, and excavation, and will take place or extend after March 10, 2003, an NPDES general permit coverage is required for discharges of storm water runoff into State waters; and

4. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters.

If you have any questions, please contact the Clean Water Branch at (808) 586-4309.

Safe Drinking Water Branch (SDWB)

Drinking Water:

1. The EISPN indicates that the project will include the development of new sources of potable water. Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems, Section 11-20-29, requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report of which addresses the requirements set in Section 11-20-29.

2. The engineering report must identify all potential sources of contamination and evaluate alternative control measures, which could be implemented to reduce or eliminate the potential for contamination, including treatment of water sources. In addition, water quality analyses (for both raw and finish water), performed by a laboratory certified in the State of Hawaii, must be submitted as part of the report to

demonstrate compliance with all drinking water standards. Additional water quality tests may be required by the Director upon his review of the information submitted.

3. A major concern is the possible utilization of water from the caprock aquifer. There are many potential sources of aquifer contamination in the vicinity of the project, including but not limited to, abandoned landfills, cattle feedlot, proposed slaughterhouse, sludge composting operations, petroleum storage tanks, various industrial activities, injection wells, cesspools, and septic tanks. In addition, there is a strong possibility that water taken from the caprock may be considered to be a groundwater under the direct influence of surface water 9GWUDI). If this were to happen, Public Water System No. 335, BWS Waipahu-Ewa-Waianae, would be reclassified as a large surface water system and become subject to additional disinfections, monitoring, and reporting requirements. Due to these factors, it would be advantageous to preclude the use of caprock aquifer water as source water.

4. The EISPN also mentions that the permeate from the reverse osmosis units will be conditioned with chemicals. Please note that Section 11-20-37 requires that all such additives be certified as meeting the American National Standards Institute/National Sanitation Foundation Standard 60, Drinking Water Treatment Chemicals – Health Effects.

5. The Draft Environmental Impact Statement (DEIS) should examine all reasonable alternative sites to this project including, but not limited to, expanded wells(s) source development and water conservation programs.

6. The DEIS should better identify the proposed source water and brine disposal aquifers. We are not familiar with the specific terms "Upper Caprock Aquifer (ACA)", and "Lower Caprock Aquifer (LCA)". Please reference your sources for these terms. Data or modeling studies should be presented which prove that the aquifers are not connected to each other, and that source water pumping (12+ MGD) from the LCA and the disposal of brine and other facility waste streams (6+ MGD) into the UCA will not degrade the quality of the source water or that of other wells in the area.

7. The EISPN states that the UCA is 100 to 200 feet thick, yet the LCA ranges from 50 feet to 800 feet below the ground surface. Please clarify.

8. The EISPN indicates on page 4 that tests will be conducted to determine the quality and quantity of water that can be produced from the LCA. However, the well construction permit application for the caprock exploratory well (State Well No. 3-1805-14) indicates that the well will be taking in water from the UCA since it will have only 50 feet of solid casing and 35 feet of cement grouting. Please not that this 300-foot deep well is at the same depth of existing injection wells in the Campbell Industrial Park area.

9. The long-term capacity of this facility (35 MGD) does not correlate to the acknowledged limited capacity of the two source aquifers being investigated (LCA: 10 MGD and BA: 5 MGD). Where will this future capacity (est. 84 MGD) come from?

10. The DEIS should provide a more detailed project cost breakdown and comparison (including data and assumptions) regarding project capital, offsite utilities (HECO, etc.) upgrades and O&M costs. In addition, if project costs are going to be compared to groundwater development programs (EISPN, page 6), shouldn't this be one of the alternatives to the proposed action?

11. The Alternative to Proposed Action should not include "alternative technologies", "disposal methods" and "alternative locations", since they are all parts of the same proposed action. The applicant needs to do a more thorough job at exploring viable alternatives to this project in the DEIS. Also, the No Action Alternative logic does not eliminate this option convincingly.

12. If the site selection process is addressed in the DEIS, it should include the development of the original twelve sites and ultimate selection process from the original twelve to the final three (GMP study?). The final site selection process should include a weighted, multiple-parameter matrix that evaluates the critical parameters of each site on a relative basis.

13. The proposed and ultimate capacity of this plant merits a more thorough discussion of the safeguards being put in place in the event of a tsunami, or more likely, a large hurricane surge. The EISPN virtually ignores this possibility.

14. The last sentence on page 6 of the EISPN, section titled, "Project Costs", makes an incorrect statement by assuming that the proposed desalination facility will be subject to less environmental and regulatory constraints than a groundwater project. This project will be subject to either groundwater or surface water (GWUDI) regulations, both of which are expected to be further revised in the near future. Desalination of seawater wells provides no relief from this inevitability.

15. The report mentions disposal of the waste stream from the desalination facility will be by injection wells. However, other options were discussed. Should an ocean outfall be considered, an NPDES permit will be required.

Underground Injection Control:

1. Comments were forwarded directly to Mr. Clifford Jamile, Manager and Chief Engineer, Honolulu Board of Water Supply. A copy of this January 25th, 2002 letter is attached for your reference.

2. Please note that if the Honolulu Board of Water Supply wishes to convert an exploratory source water well into an underground injection well (as indicated on the well construction permit application for State Well No. 3-1805-14), they must comply with the requirements contained in Hawaii Administrative Rules, Title 11, Chapter 23, Underground Injection Control. Furthermore, the construction and operation of an injection well must first be authorized by the Department of Health through an application and permit issuance process.

If you have any questions, please contact the Safe Drinking Water Branch at (808) 586-4258.

Wastewater Branch (WWB)

The project is located in the Pass Zone, below the Underground Injection Control Line and in the critical wastewater disposal area. New cesspools are not allowed in the area. As the area is not served by the City's sewer system, wastewater in the Campbell Industrial Park is either disposed of by subsurface disposal or ocean outfalls, with the majority of business using subsurface disposal means. Our records indicate that not all wastewater disposal is domestic in nature or being disposed of in shallow wells and cesspools. We believe that there are non-

domestic wastes being disposed of with minimal or no treatment. For example, adjacent to the property is an old Navy unlined landfill. Biosolids from the Navy, Army, and the City and County of Honolulu, continue to be processed at this site. Also sharing this site will be the new Hawaii Livestock Coop's slaughterhouse. All wastewater from this operation will be disposed of on site. The area also has known contamination sites (contact the Solid and Hazardous Waste Branch, Underground Injection Control program, for further information on injection well disposal and contaminated sites).

Due to the varied business in the area as well as the many non-domestic components being disposed of, testing the source water for the standard list of contaminants under the Safe Drinking Water Act may be insufficient. We recommend that the Board of Water Supply take extreme care in trying to determine the presence of contaminants in the source water for this project. One way this may be accomplished is to inventory all of the various businesses in the area, in order to test for the various contaminants thought to be disposed of from these industries and businesses.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules.

If you have any questions, please contact the Wastewater Branch at (808) 586-4294.

Solid & Hazardous Waste Branch (SHWB)

SHWB is concerned with the location of the project site as it is directly south of the Tesoro Refinery. Tesoro has been at Campbell Industrial Park since 1972. Among other activities,

Tesoro brings in crude oil and refines it into different grades of heavy and light oils and gasoline. Due to the nature of their operation and the tank farms used on its property, Tesoro is currently undergoing RCRA corrective action to address petroleum contamination.

In addition, there is a layer of free product under the facility that Tesoro plans to recover. At the present time, the plume sits directly below the facility and has not been found off-site. There is however, potential for migration of the petroleum that may impact the proposed desalination facility.

If you have any questions, please contact the Solid & Hazardous Waste Branch at (808) 586-4226.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

Attachment

c: CWB
SDWB
WWB
SHWB

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
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HERBERT S.K. KAOPUA, SR.

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

June 18, 2002

Mr. Gary Gill, Deputy Director
Environmental Health Administration
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801-3378

Dear Mr. Gill:

Subject: Your Letter of February 27, 2002 to Mr. Dayananda Vithanage of Oceanit Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kalaeloa Desalination Facility (REF: 02-006/epo)

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility.

We have the following response to your comments:

Clean Water Branch

1. We do not anticipate the need for a Department of the Army permit since this phase of the project will not involve any work in wetlands or waters of the U.S., including the bordering drainage canal.

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for various discharges to waters of the State. We note that a Notice of Intent should be filed with the Department of Health, Clean Water Branch (CWB) at least thirty (30) days prior to commencement of any discharges to State waters.

3. Construction activities involving the disturbance of one acre or greater after March 10, 2003, will require NPDES general permit coverage for storm water runoff into State waters.

4. An individual NPDES permit may be required if there is any type of activity in which wastewater is discharged from the project into State waters.

Safe Drinking Water Branch

1. We understand that Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems, Section 11-20-29, requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to its use. An engineering report addressing the requirements set forth in Section 11-20-29 will be submitted to the Director of Health for approval.

2. The engineering report will identify all potential sources of contamination and evaluate alternative control measures. In addition, the report will include water quality analyses (for both raw and finished water), performed by a laboratory certified in the State of Hawaii, to demonstrate compliance with all drinking water standards.

3. We acknowledge that there may be potential sources of contamination to the caprock aquifer. The water quality data suggest that the caprock well may be subject to influence from adjacent land uses and the recirculation of brine, if not sufficiently separated. We anticipate utilizing source water exclusively from the deep basal aquifer. Basal wells, although higher in construction costs, will provide a more secure and consistent quality feed water source for the project than caprock wells. We do not agree that source water from the caprock is under the influence of surface water. However, we intend to utilize the deep basal seawater well as the exclusive source, which addresses your concern on surface water influence.

4. We note that all chemicals used for water conditioning will need to be certified as meeting the American National Standards Institute/National Sanitation Foundation Standard 60, Drinking Water Treatment Chemicals – Health Effects.

5. The Draft Environmental Impact Statement (EIS) will examine all reasonable alternatives to the proposed facility, including expanded wells source development and water conservation programs. The desalination plant provides for drought mitigation and addresses the uncertainty surrounding groundwater supply estimates. Our conservation and recycled water programs ensure continued potable supply reliability.

6. The Draft EIS will identify the source and disposal aquifers, and include a complete discussion of the local aquifers, including definitions of terms and references. Information will be provided to clarify hydrogeological concerns between source wells and injection wells, and impacts of pumping and injection on other wells within the area.

7. The depths and locations of aquifers at the project site will be further clarified in the Draft EIS. Well logging information will be provided.

8. The Draft EIS will include details of the test well construction and the water quality test results. We acknowledge that the caprock well is 300-feet deep. The location, depth and proximity of existing injection wells in the Campbell Industrial Park Area and any influence to the caprock well has yet to be determined.

9. As stated in the Environmental Impact Statement Preparation Notice (EISPN), the lower caprock aquifer has a capacity of 2 million gallons per day (MGD) per well. We can develop 40 mgd/well because the basal aquifer has an unlimited capacity of ocean fed saltwater. In the event that the Board of Water Supply pursues expansion of the facility to 35 MGD, the necessary source water could be obtained from additional basal wells.

10. The Draft EIS will include additional information on the project cost breakdown and comparisons.

11. The Draft EIS will explore in more detail viable alternative actions to this project, which are those that can provide other sources of potable water to the island of Oahu. These alternatives include options other than desalination. However, desalination provides system reliability and resource benefits that provide reasonable alternatives to groundwater sources. While alternative desalination technologies, disposal methods, and locations are related to desalination facilities and are not completely separate alternatives, they will be discussed as options since these decisions will determine environmental impacts. Alternative locations will be addressed in the Draft EIS as per your comment #12.

12. The summary of the site selection process will be included in the Draft EIS. The Honolulu Desalination Site and technology selection report will be included in the Draft EIS for reference.

13. The Draft EIS will include an expanded discussion of the impacts of a tsunami or hurricane surge on the facility. Design features, such as berms and elevated foundations, will mitigate inundation potential.

14. The last sentence on page 6 of the EISPN will be revised in the Draft EIS to indicate that the proposed project will be subject to either groundwater or surface water regulations, both of which are expected to be further revised in the near future.

15. We acknowledge that if an ocean outfall is constructed for the proposed facility, an NPDES permit will be required.

Underground Injection Control

1. We received your comment letter dated January 25, 2002 and will respond in a separate letter.

2. We acknowledge that the conversion of an exploratory well to an injection well, or the construction and operation of a new injection well will require the authorization of the Department of Health (DOH) in compliance with the Hawaii Administrative Rules, Title 11, Chapter 23, Underground Injection Control (UIC) and through an application and permit issuance process.

Wastewater Branch

1. We acknowledge that the project site is located below the State's UIC line, as shown in Figure 3.11 of the EISPN. We reviewed UIC files for wells within one mile of the project site and are aware that there are both domestic and non-domestic waste discharges into aquifers in the area. Source water will be tested for all potential contaminants.

2. We acknowledge that all wastewater plans must conform to applicable provisions of DOH's Administrative Rules, Chapter 11-62, "Wastewater Systems." All wastewater plans will be made available to the Wastewater Branch for review.

Solid and Hazardous Waste Branch

1. We acknowledge that the Tesoro facility north of the proposed project site is currently undergoing RCRA corrective action to address petroleum contamination at their facility. We will investigate the potential for off-site migration and may seek assistance from the Solid and Hazardous Waste Branch in this area.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dayananda Vithanage, Oceanit

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4414 • FAX: (808) 527-6743 • INTERNET: www.honolulu.gov

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

2002/ELOG-160(RY)

March 4, 2002

TO: SCOT MURAOKA
BOARD OF WATER SUPPLY

FROM: RANDALL K. FUJIKI, AIA, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR KALAELOA DESALINATION FACILITY, EWA, OAHU
TAX MAP KEY: 9-1-31: 28

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

1. Ewa Development Plan Public Infrastructure Map

   Page 60. The discussion on Section 5.2.2. Ewa Public Infrastructure Map should be amended to read as follows:

   Resolution No. 01-223, CD1, adopted by Council on October 17, 2001, revised the Public Infrastructure Map for the Ewa Development Plan area to include a desalination plant symbol for the BWS' proposed project.

2. Zoning

   The property is zoned F-1 Federal and Military Preservation District. Since it is being transferred to the City and County of Honolulu, the property falls under the P-2 General Preservation District development standards. The zoning has not been changed to I-2 Intensive Industrial District as stated on Page 60. We are unaware of any zone changes approved for this site or any other sites in the Kalaeloa District.

   The proposed use is deemed a "Public Use and Structure" which is a permitted use under the transition zoning. However, a waiver of P-2 development standards may be necessary for portions of the project. If so, Page 63 should be revised to include the Waiver as a possible City permit required for the project.

3. Minor Comments

   a. Table of Contents: add 5.2.4 Special Management Area (Page 60).

   b. List of Figures: add Figure 5.4 Special Site Layout of Proposed Desalination Facility (Page 62).

   c. The TMK listed on the cover of the report should be corrected to TMK: 9-1-031: Portion 28.

   d. The DEIS should discuss the potential impacts that might affect the operation of the facility:

      i. Ground water contamination from nearby sources such as the Tesoro facility.

      ii. Flood and tsunami hazard from the nearby coastline and storm drainage channel.

      iii. Aviation accident potential from the Kalaeloa Airport.

4. Specific Comments on the EISPN as follows:

   a. Pages 5, 6, 8, 10 to 12, 21, 38 and 49. Disposition of the wastewater and waste brine.

      An analysis and discussion of the anticipated impacts (both indirect and cumulative) of disposing wastewater into injection wells should be included in the DEIS. In particular, the DEIS should discuss why the preferred disposal method for the disposal of the Ultrafiltration (UF) reject water, backflush water, membrane cleaning solution and brine, into the upper caprock aquifer (UCA) will not affect the source water aquifer and offshore water quality and habitats.

   b. Pages 6 and 7 (Section 1.2).

      Population projections to year 2025 are available. Please call Steve Young, Planning Research Branch Chief at 527-6080. The DEIS should discuss the statement made that the sustainable yield maybe reached as soon as the year 2020 (or 2025).

c. Pages 32 to 36. Air Quality.

The numbers for the relevant state and federal standards should be included in the narrative at the top of page 34 to give more meaning to their conclusion that "This data shows that all three monitoring stations are well below both federal and state standards (DOH, 1999).

The first line on page 34 states "Information from the **three** stations gives a good picture of the air quality at the proposed Kalaeloa project site ...". However, Makaiwa air quality monitoring station's data are omitted from figures 3.6, 3.7 and 3.8 (finally shows up on Figure 3.9). Although the Federal standard is listed in the legend of Figures 3.6 and 3.8, their data is not plotted on both figures. Finally, for consistency, the same symbols for the air quality stations should be used in all figures in this chapter (e.g. West Beach's symbol changed in Figure 3-9).

5. Page 65. Section 6.1 - The list of possible impacts to be discussed in the draft environmental impact statement.

The conclusion in item number nine (9) should be verified by the flora and fauna survey to be conducted as stated in Section 4.9. Attached for your information is a letter dated April 25, 2000, from the United States Department of the Interior's Fish and Wildlife Service regarding endangered species in the vicinity.

Thank you for the opportunity to comment. If you have any questions, please contact Raymond Young 527-5839.

RKF:lh

Attachment
Doc 141352

2000/CLOG-2722

'00 MAY 3 AM 9 07

DEPT OF PLANNING and PERMITTING CITY & COUNTY OF HONOLULU

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

APR 25 2000

In reply refer to: IAK

Randall K. Fujiki
Acting Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Re: Proposed Revision to the Ewa Public Infrastructure Map - Kalaeloa Desalination Plant, Ewa, Oahu, Hawaii, 1999/PIM-01

Dear Mr. Fujiki:

The U.S. Fish and Wildlife Service (Service) received your March 3, 2000, letter requesting our review of the proposed revision to the Ewa Public Infrastructure Map to include the Kalaeloa Desalination Plant, Ewa, Oahu, Hawaii. The proposed project includes a 15 million gallon per day (mgd) desalination plant, administration building, non-potable wells and pumps, a brine pond, security fencing, parking, landscaping, and other related improvements. The purpose of the project is to provide an additional water source to meet future water demands for the city of Kapolei. The Service offers the following comments for your consideration.

Based on our review of the proposed map revisions, information in our files including maps prepared by the Hawaiian Heritage Program of the Nature Conservancy and the Service's National Wetland Inventory Program, there are no federally endangered, threatened, or candidate species, wetlands or other Federal trust resources known to occur directly within the proposed project site. However, the federally endangered plant, *Achyranthes splendens* var. *rotundata*, is known to occur on land adjacent to the proposed project site at the former Barbers Point Naval Air Station. In addition, the presence of open water associated with brine ponds and shallow water in discharge channels may attract the following federally endangered waterbirds and federally protected migratory birds:

a. Ae`o or Hawaiian stilt (*Himantopus mexicanus knudseni*), federally listed as endangered;
b. `Alae`ula or Hawaiian moorhen (*Gallinula chloropus sandvicensus*), federally listed as endangered;
c. `Alae ke`oke`o or Hawaiian coot (*Fulica americana alai*), federally listed as endangered;
d. Koloa or Hawaiian duck (*Anas wyvilliana*), federally listed as endangered;

e. `Auku`u or Black-crowned night heron (*Nycticorax nycticorax hoactli*), federally protected as migratory;
f. Kolea or Pacific golden plover (*Pluvialis fulva*), federally protected as migratory;
g. `Ulili or Wandering Tattler (*Heteroscelus incanus*), federally protected as migratory;
h. `Akekeke or Ruddy turnstone (*Arenaria interpes*), federally protected as migratory;
i. Hunakai or Sanderling (*Calidris alba*), federally protected as migratory; and the
j. Kioea or Bristle-thighed curlew (*Numenius tahitiensis*), federally protected as migratory.

In general, we recommend that the project be designed to avoid unnecessary adverse impacts and minimize unavoidable impacts to native resources. Other considerations should include: (1) surveys for the endangered *Achyranthes splendens* var. *rotundata* within the proposed project site; (2) control of sedimentation and avoidance of unnecessary discharges into areas that support nearby coral reef communities. We also recommend that you contact the Pacific Islands Area Office with the National Marine Fisheries Service (NMFS) for information on federally listed species under NMFS jurisdiction.

The Service appreciates the opportunity to comment and we look forward to working with your office during the planning process. If you have any questions or comments, please contact Fish and Wildlife Biologist James Kwon by telephone at (808) 541-3441 or by facsimile transmission at (808) 541-3470.

Sincerely,

Donald Palanski
for Paul Henson
Field Supervisor
Ecological Services

cc: DLNR, Hawaii
DAR, Hawaii
CZMP, Hawaii
NMFS-PAO, Honolulu
USFWS Refuges, Oahu

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
JAN M.L.Y. AMII
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

April 5, 2002

COPY

TO: RANDALL K. FUJIKI, AIA, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: BCJ for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR LETTER OF MARCH 4, 2002 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA DESALINATION FACILITY

Thank you for your letter regarding the proposed Kalaeloa Desalination Facility.

We have the following response to your comments:

1. Ewa Development Plan Public Infrastructure Map:

   Section 5.2.2 of the Draft Environmental Impact Statement (EIS) will be amended to indicate that Resolution No. 01-223, CD1, adopted by the City Council on October 17, 2001, revised the Public Infrastructure Map for the Ewa Development Plan area to include a desalination plant symbol for the proposed facility.

2. Zoning:

   We acknowledge that the zoning changed from F-1 Federal and Military Preservation District to P-2 General Preservation District when the project's property was transferred from the Navy to the City and County of Honolulu. Resolution 01-166, which was passed on July 11, 2001, changed the zoning of the Kalaeloa project site from P-2 General Preservation District to I-2 Intensive Industrial District. Copies of the resolution and updated zoning map are attached for your reference.

3. Minor Comments:

   a. The Table of Contents will be amended to include Section 5.2.4, Special Management Area in the Draft EIS.

   b. The List of Figures will be amended to include Figure 5.4, Special Site Layout of Proposed Desalination Facility in the Draft EIS.

   c. The TMK number will be revised in the Draft EIS to read TMK: 9-1-031: Portion 28.

d. The Draft EIS will discuss the potential impacts of groundwater contamination from nearby sources, flood and tsunami hazard, and aviation accident potential from the Kalaeloa Airport on the proposed facility.

4. Specific Comments on the EISPN:

a. The Draft EIS will discuss the potential impacts of disposing of wastewater into injection wells, including indirect and cumulative impacts, interaction between injection wells and source wells, and impacts on offshore water quality and habitats.

b. Steve Young, Planning Research Branch Chief, will be contacted to obtain population projections up to the year 2025. The Draft EIS will include these projections and a discussion of sustainable yield in relation to these population projections.

c. The state and federal standards for air quality will be stated in Section 3.6 of the Draft EIS to more clearly show that data from the three monitoring stations within the area are well below these standards.

The Makaiwa monitoring station was only included on Figure 3.9 because it collects data for sulfur dioxide, but not for carbon monoxide, PM_{10}, and nitrogen dioxide. Section 3.6 of the Draft EIS will be edited to clarify this information.

Federal and state standards were plotted on both Figure 3.6 and 3.8 of the Environmental Impact Statement Preparation Notice. Symbols on Figures 3.6 - 3.9 will be edited in the Draft EIS for consistency.

5. Page 65 Section 6.1:

Preliminary information showed that there were no rare, threatened, or endangered species on the project site. Detailed flora and fauna surveys will be conducted and the results included in the Draft EIS. We will respond directly to the United States Department of the Interior's Fish and Wildlife Service in a separate letter.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Dayan Vithanage, Oceanit

Appendix H

Comment Letters and Responses to the Draft Environmental Impact Statement

LINDA LINGLE
Governor

SANDRA LEE KUNIMOTO
Chairperson, Board of Agriculture

DIANE LEY
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9600 Fax: (808) 973-9613

March 13, 2003

RECEIVED
MAR 24 2003
BY

Mr. Scott Muraoka
Board of Water Supply
630 South Beretania St.
Honolulu, Hawaii 96843

Dear Mr. Muraoka:

RE: DEIS for Kalaeloa Desalination Facility

Thank you for the opportunity to review and comment on the above draft EIS. The Department of Agriculture supports an agricultural park approximately two thirds of a mile west of your proposed facility. This ag park contains an aggregate storage lot and a new slaughterhouse. Currently, we have no requests for additional water above what is currently available. We appreciate the introduction of a new potable water source into the vicinity as this allows for future expansion of the ag park.

Sincerely,

Sandra Lee Kunimoto
Chairperson, Board of Agriculture

C:\Docs\wordfiles\L031203sm.bws.doc

LINDA LINGLE
GOVERNOR

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

ERNEST LAU
DEPUTY DIRECTOR

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

P.O. Box 621
HONOLULU, HAWAII 96809

March 6, 2003

LD/NAV
BWSKALAELOADESADEIS.RCM

Suspense Date: 3/18/03

RECEIVED
MAR 31 2003
BY

MEMORANDUM:

TO:
XXX Division of Aquatic Resources (DD)
**XXX Division of Forestry & Wildlife
**XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Engineering Division (DD)
**XXX Commission on Water Resource Management
**XXX Land-Planning and Technical Services
**XXX Land-Oahu District Land Office

FROM: Charlene E. Unoki, Acting Assistant Administrator
Land Division

SUBJECT: Draft Environmental Impact Statement (DEIS)
Applicant: Board of Water Supply (BWS)
Authority: City and County of Honolulu BWS
Consultant: Oceanit (Jeff D. Merz at 531-3017)
Proposed: Kalaeloa Desalination Facility
Location: Kalaeloa, Ewa, Oahu, Hawaii
TMK: 1st/ 9-1-031: portion 001 and 028

Please review the DEIS covering the proposed project and submit your comment (if any) to us on division letterhead signed and dated by the suspense date. If we do not receive a response by the suspense date, we will assume there are no comments.

Should you need more time to review this matter, please contact Nicholas A. Vaccaro at 587-0384.

**NOTE: One (1) copy of the DEIS is available for your review in the Land Division Office, Room 220.

No Comments. ✓ Comments Attached.

Date. 3/12/03 Signed.

LINDA LINGLE
GOVERNOR

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

ERNEST LAU
DEPUTY DIRECTOR

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR THE COMMISSION ON WATER RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
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LAND
STATE PARKS

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

March 6, 2003

LD/NAV
BWSKALAELOADESADEIS.RCM

Suspense Date: 3/18/03

MEMORANDUM:

TO: XXX Division of Aquatic Resources (DD)
**XXX Division of Forestry & Wildlife
**XXX Division of State Parks
Division of Boating and Ocean Recreation
✓ XXX Engineering Division (DD)
**XXX Commission on Water Resource Management
**XXX Land-Planning and Technical Services
**XXX Land-Oahu District Land Office

RECEIVED
MAR 31 2003
By

FROM: Charlene E. Unoki, Acting Assistant Administrator
Land Division

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Authority: City and County of Honolulu BWS
Consultant: Oceanit (Jeff D. Merz at 531-3017)
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**NOTE: One (1) copy of the DEIS is available for your review in the Land Division Office, Room 220.

No Comments. X

Comments Attached. _____

Date. 3/11/03

Signed. [signature]

LINDA LINGLE
GOVERNOR

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

ERNEST LAU
DEPUTY DIRECTOR

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR THE COMMISSION ON WATER RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

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

March 6, 2003

LD/NAV
BWSKALAELOADESADEIS.RCM

Suspense Date: 3/18/03

MEMORANDUM:

TO: XXX Division of Aquatic Resources (DD)
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**XXX Division of State Parks
Division of Boating and Ocean Recreation
✓ XXX Engineering Division (DD)
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**XXX Land-Oahu District Land Office

RECEIVED
MAR 31 2003
By

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Land Division

SUBJECT: Draft Environmental Impact Statement (DEIS)
Applicant: Board of Water Supply (BWS)
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Should you need more time to review this matter, please contact Nicholas A. Vaccaro at 587-0384.

**NOTE: One (1) copy of the DEIS is available for your review in the Land Division Office, Room 220.

No Comments. _____

Comments Attached. X

Date. _____

Signed. [signature]

LINDA LINGLE
GOVERNOR

DIVISION OF AQUATIC RESOURCES

DIRECTOR	✓	Suspense Date:
COMMISSIONER		Draft Reply ☐
ADMINISTRATOR		Reply Direct ☐
ADVISOR	✓	Comments ☐
STAFF SVCS		Information ☐
FISH DIV		Comp Act & File ☐
STATISTICS		Return to:
AFRC		Copies to:
EDUCATION		Remarks:
SECRETARY		
OFFICE SVCS		
FED AID		06-19
RS	X	

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

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

ERNEST LAU
DEPUTY DIRECTOR

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ACTING DEPUTY DIRECTOR FOR THE COMMISSION ON WATER RESOURCE MANAGEMENT

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LAND
STATE PARKS

March 6, 2003

LD/NAV
BWSKALAELOADESADEIS.RCM

Suspense Date: 3/18/03

MEMORANDUM:

RECEIVED MAR 7 2003 AQUATIC RESOURCES

RECEIVED MAR 31 2003 By

✓XXX Division of Aquatic Resources (DD)
**XXX Division of Forestry & Wildlife
**XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Engineering Division (DD)
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Please review the DEIS covering the proposed project and submit your comment (if any) to us on division letterhead signed and dated by the suspense date. If we do not receive a response by the suspense date, we will assume there are no comments.

Should you need more time to review this matter, please contact Nicholas A. Vaccaro at 587-0384.

**NOTE: One (1) copy of the DEIS is available for your review in the Land Division Office, Room 220.

No Comments. _____

Comments Attached. X

Date. 3/13/03

Signed. [signature]
William S. Devick
Administrator

LINDA LINGLE
GOVERNOR

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

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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STATE PARKS

March 6, 2003

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MEMORANDUM:

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TO: XXX Division of Aquatic Resources (DD)
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Division of Boating and Ocean Recreation
XXX Engineering Division (DD)
**XXX Commission on Water Resource Management
**XXX Land-Planning and Technical Services
✓**XXX Land-Oahu District Land Office

FROM: Charlene E. Unoki, Acting Assistant Administrator
Land Division

SUBJECT: Draft Environmental Impact Statement (DEIS)
Applicant: Board of Water Supply (BWS)
Authority: City and County of Honolulu BWS
Consultant: Oceanit (Jeff D. Merz at 531-3017)
Proposed: Kalaeloa Desalination Facility
Location: Kalaeloa, Ewa, Oahu, Hawaii
TMK: 1st/ 9-1-031: portion 001 and 028

Please review the DEIS covering the proposed project and submit your comment (if any) to us on division letterhead signed and dated by the suspense date. If we do not receive a response by the suspense date, we will assume there are no comments.

Should you need more time to review this matter, please contact Nicholas A. Vaccaro at 587-0384.

**NOTE: One (1) copy of the DEIS is available for your review in the Land Division Office, Room 220.

No Comments. _____

Comments Attached. X

Date. 3/12/03

Signed. [signature]

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

ERNEST Y.W. LAU
DEPUTY DIRECTOR

ERNEST Y.W. LAU
DEPUTY DIRECTOR FOR
THE COMMISSION ON
WATER RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND MANAGEMENT
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

RECEIVED
MAR 13 2003
By

March 7, 2003

Mr. Scot Muraoka
Board of Water Supply
530 S. Beretania St.
Honolulu, Hawaii 96843

Dear Mr. Muraoka:

Subject: Draft EIS for the Proposed Kalaeloa Desalination Facility, Ewa, Island of Oahu.

The Division of Forestry and Wildlife (DOFAW) has reviewed the proposed Kalaeloa Desalination Facility and provide the following comments for your consideration. The botanical survey completed by Winona Char and Associates reports no threatened and endangered species on the site. Since the dominant vegetation is composed of introduced species, the proposed facility will not have a significant impact on the botanical resources. Furthermore, we agree with the recommendations of Winona Char and Associates that native lowland species be considered for landscaping the facility, including the maiapilo and Myoporum. Thank you for the opportunity to comment on this project.

Sincerely,

Michael G. Buck
Administrator

C: Vickie Caraway, State Botanist
Nick Vaccaro, DLNR, Land Division
Jeff Merz, Oceanit

LINDA LINGLE
GOVERNOR

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

ERNEST LAU
DEPUTY DIRECTOR

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

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

RECEIVED
MAR 31 2003
By

March 12, 2003

MEMORANDUM

TO: Charlene E. Unoki, Acting Assistant Administrator
Land Division

FROM: Barry Cheung, Oahu District Land Office Barry Cheung

SUBJECT: Draft EIS for Kalaeloa Desalination Plant TMK (1) 9-1-31:01 & 28

The proposed HECO off-site substation is within the parcel identified by TMK (1) 9-1-31:01 which is owned by the State. Currently, we are processing a request for land disposition from BWS for the substation. We have no other comments. Thank you.

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, SUITE 215 • KAPOLEI, HAWAII 96707
Phone: (808) 692-5054 • Fax: (808) 692-5857

JEREMY HARRIS
MAYOR

LARRY J. LEOPARDI
DIRECTOR AND CHIEF ENGINEER

ALVIN K.C. AU
DEPUTY DIRECTOR

IN REPLY REFER TO:

PRO 03-019

RECEIVED
MAR 21 2003
By

March 13, 2003

MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: SCOT MURAOKA

FROM: LARRY J. LEOPARDI, P.E.
DIRECTOR AND CHIEF ENGINEER

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE PORPOSED DESALINATION FACILITY
EWA, OAHU, HAWAII, TMK: 29-1-3:portion 1 and portion 28

The Department of Facility Maintenance does not have any comments.

If you have any questions, please call Laverne Higa at 692-5111.

LJL:lh
cc: OEQC (fax no. 586-4186)
Oceanit, Jeff D. Merz

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON

MEREDITH J. CHING
CLAYTON W. DELA CRUZ
CHIYOME L. FUKINO, M.D.
BRIAN C. NISHIDA
HERBERT M. RICHARDS, JR.

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

RECEIVED
MAR 31 2003
By
Re: Kalaeloa Desalt DEIS.dr

March 13, 2003

TO: Ms. Dede Mamiya, Administrator
Land Division

FROM: Dean A. Nakano, Acting Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility
Ewa, Oahu

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[X] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[X] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[X] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[X] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[X] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[X] OTHER:

The report correctly notes that well construction, pump installation, and water use permits are required. Two exploratory well construction permits have been granted for Well Nos. 1805-13 & 14. Our records indicate that the exploratory wells were completed in 2001 and 2002. Pump installation permits and water use permits must still be applied for and obtained.

If there are any questions, please contact Lenore Y. Nakama at 587-0218.

c: Scot Muraoka, City and County of Honolulu, Board of Water Supply
Jeff D. Merz, Oceanit

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
1000 ULUOHIA STREET, SUITE 309 • KAPOLEI, HAWAII 96707
TELEPHONE: (808) 692-5561 • FAX: (808) 692-5131 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

EDWARD T. "SKIPPA" DIAZ
DEPUTY DIRECTOR

RECEIVED
MAR 21 2003
By

March 17, 2003

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: SCOTT MURAOKA

FROM: WILLIAM D. BALFOUR, JR., DIRECTOR

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED KALAELOA DESALINATION FACILITY

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement relating to the proposed Kalaeloa Desalination Facility.

The Department of Parks and Recreation has no comment on this project.

Should you have any questions, please contact Mr. John Reid, Planner, at 692-5454

W. D. Balfour Jr.

WILLIAM D. BALFOUR JR.
Director

WDB:mk (J. Reid, EOS)
(22810)

cc: Mr. Don Griffin, Department of Design and Construction
Office of Environmental Quality Control
✓Oceanit

bcc: Mr. Edward T. "Skippa" Diaz, Deputy Director
Mr. Jerome Marr, Departmental Staff Executive Assistant

STATE OF HAWAII
Department of Land and Natural Resources
Division of Aquatic Resources

SUSPENSE DATE:March 18, 2003

RECEIVED
MAR 31 2003
By

MEMORANDUM

To: William Devick, Administrator

From: Richard Sixberry, Aquatic Biologist

Subject: Comments on Environmental Impatct Statement Preparation Notice

Comments Requested By: Charlene Unoki, Land Division

Date of Request: 3/6/03 Date Received: 3/7/03

Summary of Project

Title: Kalaeloa Desalination Facility

Proj. By: C&C - Board of Water Supply

Location: Kalaeloa, Oahu

Brief Description:

The applicant proposes to construct a seawater reverse osmosis desalination facility in Kalaeloa, Ewa, Oahu. The facility would produce 5 million gallons per day of fresh water that will add to Oahu's potable water supply. The facility will occupy a portion of a 20-acre parcel of undeveloped land that was previously part of the Barbers Point Naval Air Station.

Comments:

Our review of the DEIS and the mitigation measures proposed indicate that no significant adverse impacts to aquatic resource values is expected. Erosion control measures and best management practices will be followed and the earlier ocean outfall brine disposal option will not be pursued. A monitoring program will be established for brine pumped into onsite injection wells.

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

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

RECEIVED
MAR 24 2003
BY

March 17, 2003

Mr. Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

SUBJECT: PROPOSED KALAELOA DESALINATION FACILITY – DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Muraoka:

Thank you for the opportunity to comment on the above referenced proposal to build a desalination facility that will produce 5 million gallons per day (MGD) of freshwater.

The Office of Hawaiian Affairs has no comments at this point in time. If you have any questions, please contact Jerry B. Norris at 594-1847 or email him at jerryn@oha.org.

Sincerely,

Peter L. Yee
Nationhood and Native Rights

cc: Mr. Jeff D. Merz, Oceanit

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
COMPTROLLER

KATHERINE H. THOMASON
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

(P)1088.3

MAR 18 2003

RECEIVED
MAR 19 2003
BY

Mr. Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Muraoka:

Subject: Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility, TMK 9-1-031:portion 028; portion 031

Thank you for the opportunity to review the subject project's Draft Environmental Impact Statement. The project does not directly impact any of the Department of Accounting and General Services' projects or existing facilities. Therefore, we have no comments to offer.

If there are any questions regarding the above, please have your staff call Mr. Bruce Bennett of the Planning Branch at 586-0491.

Sincerely,

TADASHI YOSHIZAWA
Acting Public Works Administrator

BB:jo
c: Ms. Genevieve Salmonson, OEQC
Mr. Jeff D. Merz, Oceanit

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425 • HONOLULU, HAWAII 96819-1869
TELEPHONE: (808) 831-7761 • FAX: (808) 831-7750 • INTERNET: www.honolulufire.org

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

INTERNATIONALLY ACCREDITED AGENCY
2000-2005

RECEIVED
MAR 25 2003
By

March 20, 2003

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: SCOT MURAOKA, CIVIL ENGINEER V
WATER RESOURCES OPERATING UNIT

FROM: ATTILIO K. LEONARDI, FIRE CHIEF

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE PROPOSED KALAELOA DESALINATION FACILITY
ISLAND OF OAHU, EWA
TAX MAP KEY: 9-1-031: PORTIONS 028 AND 001

We received a letter from Jeff D. Merz of Oceanit, dated March 5, 2003, requesting our comments on the Draft Environmental Impact Statement for the above-mentioned project.

The Honolulu Fire Department (HFD) requires that the following be complied with:

1. Provide a private water system where all appurtenances, hydrant spacing, and fire flow requirements meet Board of Water Supply standards.

2. Provide a fire department access road within 150 feet of the first floor of the most remote structure. Such access shall have a minimum vertical clearance of 13 feet 6 inches, be constructed of an all-weather driving surface complying with Department of Transportation Services (DTS) standards, capable of supporting the minimum 60,000-pound weight of our fire apparatus, and with a gradient not to exceed 20%. The unobstructed width of the fire apparatus access road shall meet the requirements of the appropriate county jurisdiction. All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround having a radius complying with DTS standards.

3. Submit civil drawings to the HFD for review and approval.

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

Attilio K. Leonardi

ATTILIO K. LEONARDI
Fire Chief

AKL/SK:bh

cc: Office of Environmental Quality Control
Jeff D. Merz, Oceanit

515 Kamakee Street Honolulu, Hawaii 96814
P.O. Box 3000 Honolulu, Hawaii 96802-3000
Telephone 808.535.5900 Facsimile 808.594.5630 Sales

THE GAS COMPANY
Citizens Energy Services

RECEIVED
MAR 25 2003
By

March 21, 2003

Board of Water Supply
630 south Beretania Street
Honolulu, Hawaii 96843

Attention: Mr. Scot Muraoka

Gentlemen:

Subject: Draft Environmental Impact Statement for the
Proposed Kalaeloa Desalination Facility

Please be advised that The Gas Company maintains underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area and is interconnected with the utility network in Ewa. We would appreciate your consideration during the project planning and design process to minimize any potential conflicts with the existing gas facilities in the project area.

Thank you for the opportunity to comment on the Draft Environmental Impact Statement. Should there be any questions, or if additional information is desired, please call Chris Anderson at 594-5564.

Sincerely,

Charles E. Calvet, P.E.
Manager, Engineering

CEC:krs
03-121

cc: Ms. Genevieve Salmonson, Office of Environmental Quality Control
Mr. Jeff D. Merz, Oceanit

LINDA LINGLE
GOVERNOR

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DAN DAVIDSON
DEPUTY DIRECTOR FOR LAND

ERNEST Y.W. LAU
DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. Box 621
HONOLULU, HAWAII 96809
March 28, 2003

RECEIVED
MAR 31 2003
By

LD-NAV

BWSKALAELOADESADEIS.RCM
L-1272/1314/1209/1294/1228

Oceanit
Jeff D. Merz, Senior Planner
1101 Bishop Street, Suite 2970
Honolulu, Hawaii 968134

Dear Mr. Merz:

SUBJECT: Draft Environmental Impact Statement (DEIS)
Applicant: Board of Water Supply (BWS)
Authority City and County of Honolulu BWS
Project: Kalaeloa Desalination Facility
Consultant: Oceanit
Location: Kalaeloa, Ewa, Island of Oahu, Hawaii
TMK: 1st/ 9-1-031: portion 001 and 028

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of the DEIS to the following DLNR Divisions for their review and comment:

X Division of Aquatic Resources
- Division of Forestry and Wildlife
- Engineering Division
X Commission on Water Resource Management
- Land-Planning and Technical Services
X Land-Oahu District Land Office

Attached herewith is a copy of the Division of Aquatic Resources, Commission on Water Resource Management and Oahu District Land Office comments.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer on the subject matter.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 587-0384.

Very truly yours,

Charlene E. Unoki
for DIERDRE S. MAMIYA
Administrator

C: ODLO

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Acting Deputy Director
GLENN M. OKIMOTO

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

IN REPLY REFER TO:

STP 8.0718

April 7, 2003

RECEIVED
APR 10 2003
By

Mr. Scot Muraoka
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Muraoka:

Subject: Kalaeloa Desalination Facility
Draft Environmental Impact Statement (DEIS)
TMK: 9-1-031 portion 028, 9-1-031 portion 001

We are responding to the March 5, 2003, request by Oceanit for our review of the subject DEIS.

Earlier comments on traffic and aviation issues related to the environmental preparation notice had been submitted by our Highways and Airport Divisions. The following represents our current response and supercedes prior comments:

1. The proposed desalination facility itself will not adversely impact our State highway facilities.

2. It is our understanding that the Board of Water Supply (BWS) will provide the Department of Transportation through and for our Airports Division, an avigation easement for the property and, further, the BWS has acknowledged that the facility may be impacted by noise from aviation activity at Kalaeloa Airport.

3. The BWS will submit a Federal Aviation Administration (FAA) Form 7470-1, Notice of Proposed Construction or Alteration, to the FAA for their review. We would appreciate that BWS notify our Airports Division's Planning Office when BWS transmits the form to the FAA.

We appreciate the opportunity to provide comments.

Very truly yours,

RODNEY K. HARAGA
Director of Transportation

c: Genevieve K. Y. Salmonson, Office of Environmental Quality Control
Jeff D. Merz, Oceanit

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org
www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

LEE D. DONOHUE
CHIEF

GLEN R. KAJIYAMA
PAUL D. PUTZULU
DEPUTY CHIEFS

OUR REFERENCE GL-DL

April 9, 2003

RECEIVED
APR 11 2003
BY

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: SCOT MURAOKA

FROM: LEE D. DONOHUE, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KALAELOA DESALINATION FACILITY
TMK: 9-1-031 - PORTION 028, 9-1-031 - PORTION 001

Thank you for the opportunity to review and comment on the subject project.

This project should have no significant impact on the services and facilities of the Honolulu Police Department.

If there are any questions, please call Acting Major Gregory Lefcourt of District 8 (Kapolei) at 692-4253.

LEE D. DONOHUE
Chief of Police

By
KARL GODSEY
Assistant Chief of Police
Support Services Bureau

cc: Ms. Genevieve Salmonson, OEQC
Mr. Jeff D. Merz, Oceanit

Serving and Protecting with Aloha

U.S. Department
of Transportation
Federal Aviation Administration

Western-Pacific Region
Real Estate and Utilities Section, AHNL-548

P. O. Box 50109
Honolulu, Hawaii 96850-5000

April 10, 2003

RECEIVED
APR 14 2003
BY

Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843
Attn: Mr. Scot Muraoka

Dear Mr. Muraoka:

Your letter of March 5, 2003, requested our review and comment of the Draft Environmental Impact Statement (DEIS) for the Proposed Kalaeloa Desalination Facility, Ewa District, Island of Oahu, State of Hawaii; Tax Map Key: 9-1-031-portion 028, 9-1-031-portion 001.

The Federal Aviation Administration (FAA) requests that the proponents of this project submit a "Notice of Construction or Alteration" FAA Form 7460-1 so that an airspace evaluation may be conducted.

We appreciate this opportunity to comment on your project. Please contact me at 541-1236, if there are any questions.

Sincerely,

Darice B. N. Young
Realty Contracting Officer

cc:
State of Hawaii
Office of Environmental Quality Control
236 South Beretania Street, Suite 702
Honolulu, HI 96813

Oceanit
1001 Bishop Street, Suite 2970
Honolulu, HI 96813
Attn: Mr. Jeff D. Merz

DEPARTMENT OF DESIGN AND CONSTRUCTION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 523-4564 • Fax: (808) 523-4567
Web site: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

TIMOTHY E. STEINBERGER, P.E.
ACTING DIRECTOR

GEORGE T. TAMASHIRO, P.E.
ASSISTANT DIRECTOR

WW.P 03-126

April 11, 2003

RECEIVED
APR 2003
Ke

MEMORANDUM

TO: MR. CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: MR. SCOT MURAOKA

FROM: For TIMOTHY E. STEINBERGER, P.E., ACTING DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
FOR THE PROPOSED KALAELOA DESALINATION FACILITY

We have reviewed the subject DEIS and have no comments to offer. We understand that a copy of the DEIS was submitted to the Department of Environmental for their comments on wastewater.

Should you have any questions, please contact Bill Liu of the Wastewater Division at 527-5388.

cc: Office of Environmental Quality Control
Oceanit (Attn: Mr. Jeff D. Merz)

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOME LANDS COMMISSION

JOBIE HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

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

April 15, 2003

RECEIVED
APR 21 2003
BY

Mr. Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Muraoka:

Subject: Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility

The Department of Hawaiian Home Lands has major landholdings in adjacent Kalaeloa, the Kapolei Village 6 residential community, and 200 acres of unimproved property at East Kapolei. We offer the following comments with a view toward improving the informational content of the subject report:

1. Proposed Action (Page 9)

The proposal seeks "to develop an independent water source to supplement the limited fresh groundwater resources of Oahu, . . .". However, the planned seawater desalination facility at Kalaeloa would draw brackish water from the same basal aquifer (BA) as potable well operations. More importantly, the chemically treated brine wastewater will be injected back into the basal aquifer. Please discuss in more detail the composition of the brine wastewater and possible impacts of its disposal into the basal aquifer.

2. Proposed Process (Page 13) and Source Water (Page 16)

The project proposes to draw source water from the basal aquifer (BA) from 3 wells at a rate of 5 MGD each, for a total draw of 15 MGD. The wells ". . . would extract virtual seawater from a depth of 1086-1586 feet and the injection wells would infuse waste brine into the aquifer at a depth of 1000-1600 feet." (Source Water System, page 16) To assure that the

heavier waste brine will not descend into the source wells, adequate horizontal and vertical separation should be provided; i.e., the injection wells should be separated from and deeper than the source wells.

3. Reverse Osmosis Process (Pages 17-19)

The efficiency of the process should be more clearly described. What will be the salinity of the source water? Given the proposed reverse osmosis recovery rate of 43%, and based on the statement that the reject water will contain about twice the concentration of salts as that of the source water, the source water salinity should be no more than 2.5% to achieve the current drinking water salinity standard of 250 mg/liter. We understand that the chloride content of seawater may be as high as 19,500 mg/liter. Would the salinity of the source water be less if the wells were drilled to a lesser depth or placed further inland? What has been the knowledge transfer from the demonstration desalting plant project that was undertaken on Tax Map Key 9-1-75:38 about 1.5 miles mauka during the early 1990s?

4. Chemical Usage (Pages 20-21)

Why the need for so much chemical treatment? Will the storage tanks (80,000 gallons of Sodium Hypochlorite 0.8% and 18,000 gallons of Sulfuric Acid 20%) be able to withstand tsunami impacts or other disturbances? The report should discuss the impacts, if any, on adjacent urban areas due to possible levels of releases of chemicals under different wind/climatic conditions.

5. Utilities (Page 12)

The energy requirement for the project is stated as 5 megawatts, to be provided by a dedicated substation on an adjacent parcel. Are there any other means to obtain the potable water using less electricity, or energy from alternative sources? Five megawatts is enough to serve the needs of how many typical households?

6. Project Costs (Pages 22-23)

Estimated costs should be fully disclosed, including the comparability with other current costs. More specifically, what

is this specific cost amount that "is significantly higher than the current average per-unit cost of supplying water"? What are the actual differences in anticipated costs between this plant and the most proximate regular plant, in terms of both capital and operating and maintenance costs?

Thank you for the opportunity to comment. If you have any questions regarding this matter, please call Joe Chu of our Planning Office at 587-6421.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

c: Oceanit
OEQC

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF ADMINISTRATIVE SERVICES

RECEIVED
APR 17 2003
BY

April 15, 2003

Mr. Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, Hawai`i 96843

Dear Mr. Muraoka:

Subject: Seawater Desalination Facility
Draft Environmental Impact Statement (DEIS)
Kalaeloa, Ewa, Oahu, TMK: 9-1-031: por. 28

The Department of Education (DOE) has reviewed the DEIS for the Kalaeloa Desalination Facility proposed for 20 acres in the Campbell Industrial Park. The plant would produce five million gallons of potable water per day.

The DEIS failed to include a regional map that could easily indicate the distance from the plan to various centers of public habitation such as the Barbers Point Elementary School. It is estimated that the school is slightly more than a mile and a half from the plant.

The DEIS states in Chapter 4 that, "After construction, there will be no emissions, noise, odors, pollutants, or visually obtrusive structures resulting from the desalination operation." The DEIS was unclear if that statement also applies to the electrical substation adjacent to the desalination plant which will be used to transmit the water.

The DOE is concerned by the possibility of any harmful emissions affecting the air quality at Barbers Point Elementary School. A regional map, a full discussion of all emissions from the entire desalination operation, and a brief description of the pattern of prevailing winds would enhance our efforts to gauge whether there would be impacts to the school.

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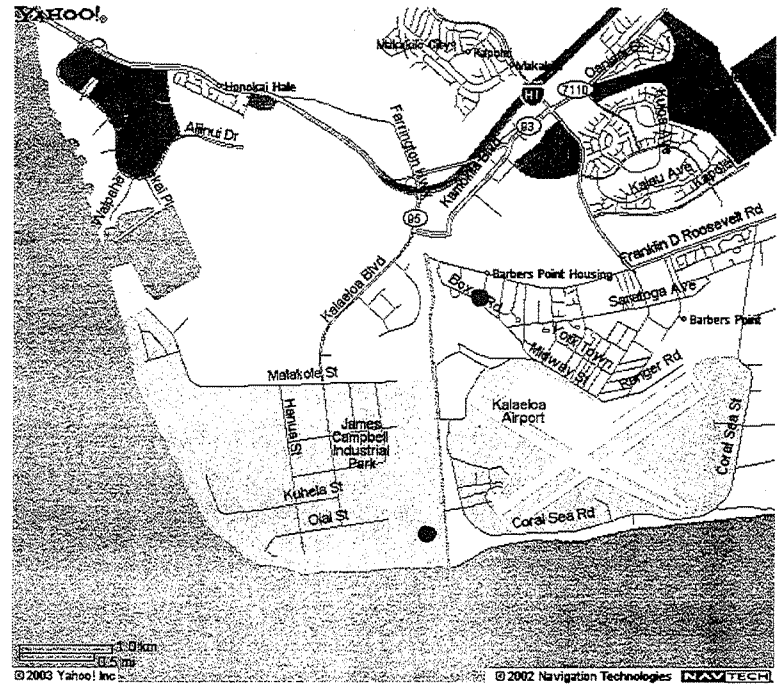
Back to Map

★ **3001 boxer, Honolulu, HI**



When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

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LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

ERNEST Y.W. LAU
DEPUTY DIRECTOR - WATER
COMMISSION ON WATER RESOURCE MANAGEMENT

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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

April 17, 2003

Mr. Cliff Jamile, Director
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843
[ATTN: Scot Muraoka]

RECEIVED
APR 23 2003
By

LOG NO: 2003.0299
DOC NO: 0304SC19

Dear Mr. Jamile:

SUBJECT: **Chapter 6E-8 Historic Preservation Review of a Draft Environmental Impact Statement (DEIS) for the Proposed Kalaeloa Desalination Facility**
Honoluliuli, `Ewa, O`ahu, TMK: (1)-9-1-031: portion 028, portion 001

Thank you for the opportunity to review and comment on the DEIS prepared for the proposed desalination facility at Kalaeloa, on the former Naval Air Station, Barbers Point (NASBP) in `Ewa, O`ahu. Our review is based on historic maps, aerial photographs, records, and reports maintained at the State Historic Preservation Division. In addition, Sara Collins and Elaine Jourdane of our staff conducted brief field inspections of parts of the subject parcels in December 2001 and January 2002. We received the subject DEIS on March 6, 2003, and provide the following comments.

The DEIS includes data from an archaeological inventory survey conducted in support of the proposed desalination plant (Sinoto & Titchenal. 2002. *An Archaeological Inventory Survey of the Proposed Desalination Facility Barbers Point, Honouliuli, `Ewa, O`ahu [TMK 9-1-31:28]*). A total of three significant historic sites were found within the proposed project area: Site 50-80-12-6373 (a complex of an enclosure, a sinkhole, and a cyst or cupboard); Site -6374 (a complex of two sinkholes modified and used for the historic manufacture of lime powder); Site -6375 (a complex of 13 unmodified sinkholes of which eight were tested and found to contain avian palaeontological deposits and a small amount of cultural deposits). All three sites were deemed significant under one or more criteria, but no further work is recommended for Sites -6373 and -6375. Site -6374 is recommended for data recovery, with appropriate preservation measures taken until data recovery work occurs.

While we have not completed our review of the subject survey report, we generally concur with its findings. We anticipate requesting some minor revisions to the survey report before accepting it as final. In addition, a mitigation plan, including both preservation and data recovery components, will need to be prepared for Site -6374 prior to beginning any construction for the

proposed desalination plant. Finally, we concur with the recommendation to prepare a mitigation plan for Site -4209, the previously identified burial site said to be near the project area, in order to protect it from any inadvertent damage during construction activities. If these mitigation measures are taken, then we believe any "adverse effect" on significant historic sites caused by the proposed desalination plant will be mitigated.

Finally, we note for your information that our staff who conducted field inspections in December 2001 and January 2002 noticed sea turtles swimming in the drainage canal along the eastern boundary of the subject parcels. Oceanit representatives present on those days commented on the apparently permanent or regular presence of these reptiles in the waters of the drainage canal. While the proposed desalination plant may not affect this area, the presence of these endangered animals in the canal immediately adjacent to the construction areas should probably be noted in any revision of the DEIS.

Should you have any questions about archaeology, please feel free to contact Sara Collins at 692-8026. Should you have any questions about burial matters, please feel free to contact Kamana`o Mills at 587-0010.

Aloha,

P. Holly McEldowney

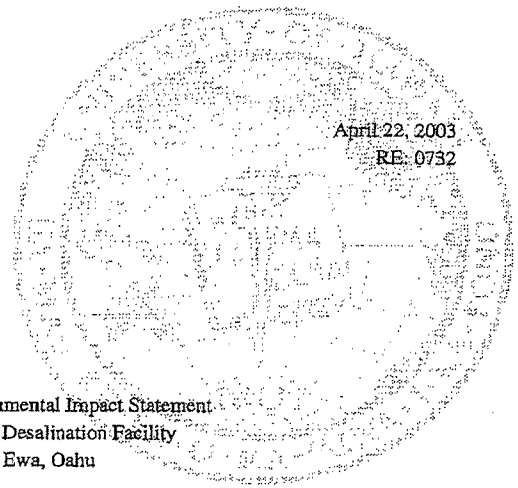
P. Holly McEldowney, Acting Administrator
State Historic Preservation Division

c. Mr. A. Van Horn Diamond, Chair, O`ahu Island Burial Council
Mr. Jeff D. Merz, Oceanit, 1001 Bishop Street, Suite 2970, Honolulu, HI 96813
Mr. Kamana`o Mills, Burial Sites Program

SC:ak

UNIVERSITY OF HAWAI'I AT MANOA
Environmental Center

April 22, 2003



Scot Muraoka
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Muraoka:

Draft Environmental Impact Statement
Kalaeloa Desalination Facility
Ewa, Oahu

The City and County of Honolulu, Board of Water Supply (BWS) proposes to build a seawater reverse osmosis desalination facility on land previously part of the Barbers Point Naval Air Station (BPNAS). The proposed desalination facility will produce freshwater that will be added to Oahu's potable water distribution system. The proposed desalination facility will include: an administration/visitor center and control building; a chemical storage building; source water wells; pretreatment facilities; post-treatment facilities; reverse osmosis facilities; a transmission main; brine pond; reject water disposal facilities (injection wells); and a domestic septic system. Also an electrical transformer substation to be constructed on an adjacent parcel. Source water will be provided through a network of up to three aquifer wells located on the 20-acre site. Pretreatment will consist of chemical addition and filtration. Approximately 12 million gallons per day (MGD) of source water will be pumped from the source water well network to produce 5 MGD of potable water. Waste cleaning solution and brine (7 MGD) from pretreatment and reverse osmosis operations will be disposed of via injection wells.

This review was conducted with the assistance of Roger Babcock, Civil Engineering and Dave Sims, Environmental Center.

2500 Dole Street, Krauss Annex 19, Honolulu, Hawai'i 96822-2313
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General Comments

1. In several places early in the document, a brine disposal pond is discussed and described, but it does not appear in Figures 1.8 or 3.26. Also, the dimensions and depth of the pond are not given (volume seems to be 1.17 million gallons). It does appear in Appendix D (Fig. C-7). Either refer to that figure or add it into earlier figures.
2. On page vii, the DEIS refers to the cost of reverse osmosis going down as technology improves and implies that the proposed facility will benefit from this and in essence become cheaper. This is highly questionable, since in general the system will be designed with today's technology and usually will not be compatible with future innovations without costly redesign/construction.
3. The depth of wells to be used on the project are reported differently in different places (see pp vi and 16). On page vi, the brine disposal will be below the raw water intake and on page 16 it will be above – page 16 must be incorrect.
4. The DEIS states that the source water may be from either the BA or the LCA on several pages (13, 16, 19, 27, 70). However, page 1 states that the BA will be used. Is this issue decided or not?
5. On page 24, the no action alternative is dismissed. However, no valid basis for this is given. There are other methods to increase water supplies, so why was desalination chosen? Was a study done?
6. On pp 24-25, 12 choices were narrowed down to 2. How was this done? Why were all the others ruled out?
7. Figure 3.1 does not indicate the outline of the property. Add this.

Given that these remarks are offered on Earth Day, 2003, it is appropriate to note that desalination by reverse osmosis is enormously energy-intensive. Ideally, we would prefer a design scheme incorporating, renewable energy sources. We note that, cost considerations notwithstanding, energy sustainability and energy security concerns strongly motivate planning and policy directions that will displace rather than increase fossil energy imports.

Domestic wastewater aspects

Domestic wastewater will be produced by the 12 employees as well as visitors (note, 30 parking spaces and bus parking is anticipated). Potentially, the wastewater volume will be significant. The proposal is to use a septic tank for partial treatment and a shallow injection

well for disposal. This is allowable by law. However, it is not the environmentally responsible course of action. The DEIS points out the fact that the LCA and the upper caprock aquifer have been impacted by land use and by contamination due to injection (pp 44-46). The DEIS also points out that leachate from septic tanks and cesspools impacts the nearshore aquatic ecosystems (pp 56). It should be noted that the contamination of both caprock groundwater and nearshore waters is not limited to nutrients and does include elevated fecal indicator bacteria, which can mean the presence of human pathogens. Given that septic tanks (especially without a properly-designed leach field) provide only partial treatment at best and do not include high pathogen reduction, that great efforts have been made to properly dispose of waste brines and cleaning fluids from the RO process, that compact state-approved secondary treatment facilities including disinfection are readily available and reasonably priced, and that BWS is a leading environmental steward, why would BWS propose to add more pollutants to the already impacted caprock aquifers and nearshore areas? An actual treatment system (preferably with disinfection) for the domestic wastewater should be included.

Thank you for the opportunity to comment on this Draft EIS.

Sincerely,

John T. Harrison, Ph.D.
Environmental Coordinator

cc: OEQC
Office of the Mayor, City and County of Honolulu
Jeff Merz, Oceanit
James Moncur
Dave Sims

FAX TRANSMITTAL SHEET

University of Hawaii, Environmental Center
2500 Dole St., Kruass Annex 19
Honolulu, Hawaii 96822
FAX: (808) 956-3980
TELEPHONE: (808) 956-7361

DATE: April 22, 2003

FROM: John Harrison

TO: Scot Muraoka 550-5550

CC: OEQC 586-4186

Office of the Mayor, Honolulu 527-5552

Jeff Merz, Oceanit 531-3177

SUBJECT: **Kalaeloa Desalination Facility Draft EIS**

Comments:

NUMBER OF PAGES including this cover sheet: 4

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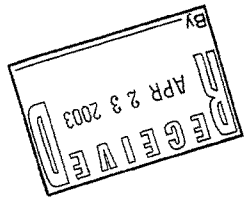
O`AHU GROUP
P.O. Box 2577, Honolulu, HI 96803
808.538.6616 / hawaii.chapter@sierraclub.org



22 April 2003

Board of Water Supply, City and County of Honolulu
Attn: Mr. Scot Muraoka
630 S. Beretania St.
Honolulu, HI 96843

RE: Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility

The Sierra Club, O`ahu Group, has a number of concerns regarding the proposed Kalaeloa desalination facility. Producing potable water through desalination, we believe, is a radical departure from conventional methods of providing freshwater. We are concerned that the following issues have not been adequately addressed: 1) the need of a desalination facility, considering the lack of important water planning studies for O`ahu; 2) urbanization pressure; 3) the impact of the desalination facility on the demand for new power generation on O`ahu; 4) the cost impacts on future water users; 5) the likelihood that five million gallons per day of water *savings* could be found through demand side management at a lesser cost than additional supply through desalination; 6) the possibility that the estimated $45 million capital and $6 million annual operating investments would be better spent on watershed management or other natural means to strengthen groundwater supply; 7) existing contamination problems; and 8) the lack of a study of public perception toward the use of desalinated drinking water.

NEED FOR DESALINATION FACILITY

The DEIS does not present a clear need for the desalination facility

1) What is the current status of the Water Integrated Resource Plan for O`ahu and the and O`ahu Water Management Plan?

Water resources expert Tom Nance testified before the State Land Use Commission regarding Castle & Cooke's Koa Ridge reclassification that at current usage rates, the sustainable yield for water on O`ahu will not be reached for another 20 to 40 years. The developer has claimed that there will be ample water available to meet the 3.8 mgd needs of the 7500-unit and hospital development, even at full build-out around 2020. Specifically, Nance testified on November 15th, 2001 before the Commission that "there is still on the order of a little more than 40, maybe 41 to 44 mgd of water that's potential supply to other projects outside of Ewa in Central O`ahu and in Honolulu."

2) Is Nance correct in his assessment, or did he provide misleading information to the Land Use Commission?
3) If Nance is correct, why would an, 5 mgd desalination facility be necessary if less expensive water can be developed upgradient?

4) Will the desalination facility be designed with an eye toward future expansion? What are those expansion plans?

URBANIZATION PRESSURE

While we recognize that utilizing brackish water sources could potentially decrease pressure on potable groundwater resources as well as reduce pressure to divert natural streams, the Sierra Club is concerned that availing more freshwater will only enable more development and urbanization of O`ahu. Increasing development and population only exacerbates existing environmental problems. Increasing urban development on O`ahu contributes to additional non-point source pollution, air pollution, solid waste, sewage, energy use, traffic, and open space and habitat loss. While some may believe that desalinated water will be used to offset use of groundwater resources, thereby extending the length of time before the aquifer sustainable yields are reached, there is nothing preventing desalinated water from providing for new water demands coming online. In fact, on page 3 of the DEIS, it is stated that "The proposed desalination facility will...reduce the likelihood that demand will exceed sustainable yield." Clearly it is envisioned that the facility will enable further urban development; without the facility, water would not be available to serve the additional need. Water is a contributing attribute in understanding the carrying capacity of O`ahu. By increasing availability of freshwater, carrying capacity may be exceeded in other environmental attributes.

In the response to the Sierra Club's EISPN comment letter, it was stated "providing an alternative water supply to our natural groundwater supply does not necessarily enable more development and urbanization." Page 19 of the DEIS, however, states "The 5 (MGD) facility could potentially serve up to 12,500 homes."

5) Please discuss the relationship between constructing desalination plants and providing for more development on O`ahu in the EIS. How do you resolve the statement "serve up to 12,500 homes" and "not necessarily enable more development and urbanization" if water is increasingly a limiting factor in development?

ENERGY USE

Although it was stated that the 5 million gallons per day production would require 5 megawatts of electricity, the overall amount of power needed to produce desalinated water through the microfiltration and reverse osmosis system was not adequately discussed in the DEIS. Energy use requirements for desalination plants are high. For example, an estimated 50 million kWh/yr would be required for full-time operation of the City of Santa Barbara's desalination plant to produce 7,500 AF/yr of water. For example, the Santa Barbara RO desalination plant was using about 6,600 kWh of electricity per acre-foot of water produced before the plant shut down operations. These energy requirements may be compared to the energy use of a small- to medium-sized industrial facility (such as a large refinery, small steel mill, or large computer center) which uses 75,000 to 100,000 kWh/yr (Source: California Coastal Commission, "SEAWATER DESALINATION IN CALIFORNIA," October 1993, *www.coastal.ca.gov/desalrpt/dtitle.html#TOCDesalination.*) Using the power needs for the Santa Barbara facility (which is no longer in operation), and considering that 1 acre-foot of water is equivalent to 326,000 gallons, then the proposed Kalaeloa 5 mgd facility would use 101,227 kWh per day, or roughly 37 megawatt-hours annually. The reference amount given in the DEIS was 11.4 kWh per 1000 gallons, or 57,000 kWh per day.

6) How much power will the facility use on a daily basis?
7) What will be the cost per kWh paid to HECO for the electricity?

8) Will a long-term contract be signed with HECO or will the price per kWh be subject to fluctuation (depending on the price of a barrel of oil)?

Currently, Hawaiian Electric Company plans to construct a $200 million, 318-megawatt oil-fired powerplant at Campbell Industrial Park in 2009.

9) Will the Kalaeloa facility increase the need for a new O`ahu powerplant?

Using the numbers from the Santa Barbara facility, it is possible to calculate the emissions of carbon dioxide that the Kalaeloa facility will induce. Using HECO's 1.96 pounds of CO_2 per kWh average, the desalination facility will contribute 36,209 tons of CO_2 to the atmosphere annually.

10) Please include a discussion of indirect environmental impacts—particularly climate change—from the desalination facility.

DESALINATION COSTS

The DEIS states that the capital costs for the facility will be $45 million and the operating costs will be $6 million per year. The DEIS states on pages 22 and 23: "This cost is significantly higher than the average per-unit cost of supplying water." On page 23 of the DEIS, it is stated: "The desalination plant will be funded with an impact fee and by floating municipal bonds. These financial mechanisms place the capital costs on future water users." Yet page 23 of the DEIS also states: "Water rates will not be raised as a result of this project."

11) How do you resolve this inconsistency? Who will be paying the $45 million capital cost and the $6 million operating cost?
12) How can this increase in water cost not have an impact on water rates? Are water rates currently artificially high? At what production level will the O&M costs start to impact existing water rates?

This cost will be spread across all Board of Water Supply ratepayers, yet the water will be used to support new development.

13) Why should existing water users have to foot the bill for new development? Is it fair that low-income residents in Waianae will have to pay more for their water because more water users want to come online?

These new costs could be avoided if Oahu would live within its means in regards to potable water. New water demand is coming from new development.

14) Wouldn't it be more equitable to have new development foot the bill if it is their development that is pushing demand over the sustainable yield?
15) What are the cost and water savings estimates of the City and County of Honolulu's demand side management programs?

ALTERNATIVE ANALYSIS

16) Is it possible that 5 mgd per day of water *savings* could be found at a lower cost than the proposed desalination facility?
17) Has the potential groundwater benefit of investing $45 million in watershed protection programs on O`ahu been analyzed?

18) Is it possible that such watershed programs—maintained at $6 million annually—could increase the sustainable yield of Oahu's main aquifer? Please compare this alternative—in terms of additional environmental and ecosystem benefit, job creation, and water availability—with the proposed desalination facility.

EXISTING CONTAMINATION

As noted in EISPN and comment letter from Department of Health, the nearby Tesoro Refinery has been undergoing RCRA corrective action to address petroleum contamination. A free layer of petroleum product exists under the Tesoro facility.

19) Has a study been conducted to analyze the migration pattern of this petroleum contamination?
20) The EISPN states that the source water wells will be tested as part of the source water permit procedure with the Department of Health. Is this a continuous monitoring procedure or only a periodic sampling?
21) Do the RO membranes work as effectively in the presence of petroleum?

WASTESTREAMS

Desalination plants produce liquid wastes that may contain all or some of the following constituents: high salt concentrations, chemicals used during defouling of plant equipment and pretreatment, and toxic metals (which are most likely to be present if the discharge water was in contact with metallic materials used in construction of the plant facilities). The Kalaeloa facility will use sodium hypochlorite, sulfuric acid, sodium bisulfate, and sodium hydroxide. These products will be present in the wastestream that will be injected into the basal aquifer or the lower caprock aquifer

22) What is the ultimate fate of these materials?
23) How often do the filters need to be replaced? Where will they be disposed?

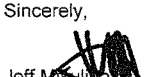
OTHER CONCERNS

Freshwater has always been integral to life in Hawai`i.

24) Have any public attitude surveys been conducted to gauge public sentiment toward drinking desalinated water?
25) In a letter dated April 25th, 2000, from the US Fish and Wildlife Service to the City and County Planning and Permitting Director, the presence of Achyranthes splendens on land adjacent to the project site was mentioned and a recommendation was made that a survey for the plant be completed. Was a specific survey for Achyranthes conducted?

We appreciate the opportunity to comment on this draft environmental impact statement and look forward to your response.

Sincerely,



Jeff Mikulina
Director, Sierra Club, Hawai`i Chapter
cc. Oceanit
Office of Environmental Quality Control

UNIVERSITY OF HAWAI'I AT MĀNOA
Water Resources Research Center

April 22, 2003



Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Muraoka:

Thank you for the opportunity to review the DEIS for the proposed Kalaeloa Desalination Facility. My colleague Dr Clark Liu, who has considerable background in the field of desalination, offers the following comments:

1. Groundwater

In order to produce 5 MGD freshwater, approximately 12 MGD of saline source water will be pumped from basal aquifer (BA). Brine from RO process and other wastewater will be disposed by a deep injection well. The exact depth and location of the injection well(s) has not been resolved at this time.

The DEIS stated that the desalination source and injection wells will not further impact the thin freshwater lens in the caprock since they will most likely be drilled into the Waianae Basalt below the caprock layer (page 70). However, this conclusion was derived on the basis of hydraulic properties of the basal aquifer (BA) or lower caprock aquifer (LCA). The mixing and dispersion of effluent plume in the BA was not carefully studied. The injection of 12 MGD or more of brine at a density twice that of seawater into the basal aquifer would induce significant salinity dispersion, which in turn would alter the existing pattern of seawater-freshwater transition zone and would impact the existing thin freshwater lens in the caprock.

As stated in the DEIS, a monitoring program to determine the hydraulic and density gradients is recommended (page 71). We suggest that the recommended monitoring program is undertaken to allow a careful evaluation of the possible impact of brine injection on the transition zone.

Holmes Hall 283, 2540 Dole Street, Honolulu, HI 96822
Telephone (808) 956-7847, Facsimile (808) 956-5044, Web site: www2.hawaii.edu/~wrrc/WRRC.html
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2. Energy Consumption

The reverse osmosis process produces freshwater by applying pressure in excess of the natural osmotic pressure to the salt solution. It is energy-intensive and the energy consumption increases as the source water salinity increases. A new Hawaiian Electric Company (HECo) substation will be constructed to serve the power needs of the proposed Kalaeloa desalination facility (page 9). The potential impact of this proposed facility on the future energy supply and demand on the island of Oahu was not addressed by this DEIS.

3. Alternative Technologies

Relative merits of the two alternative desalination technologies, reverse osmosis (RO) and multistage flush distillation (MFD), were studied by this DEIS. However, no discussion was made on the use of brackish water rather than seawater as the feed water for RO process. Brackish water RO desalination would require smaller applied pressure than seawater desalination and thus would be more energy efficient. The brine produced by the brackish RO process would have a salinity that is compatible to natural seawater and thus would have much smaller environmental impact.

Thank you for providing us with the opportunity to review this DEIS. Please let me know if any further information is needed.

Sincerely,

James Moncur
Director

cc: Jeff D. Merz
Clark Liu

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR • HONOLULU, HAWAII 96813
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JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

GEORGE "KEOKI" MIYAMOTO
DEPUTY DIRECTOR

April 22, 2003

RECEIVED APR 28 2003

TP5/03-22787

MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: SCOT MURAOKA

FROM: CHERYL D. SOON, DIRECTOR

SUBJECT: KALAELOA DESALINATION FACILITY

In response to the March 5, 2003 letter from Oceanit, we reviewed the draft environmental impact statement (EIS) for the subject project. The following comments are the result of this review:

1. The EIS Preparation Notice stated that a traffic study would be completed and included in the Draft EIS. The Draft EIS reviewed did not include a traffic study that addresses the project's impact on traffic during construction as well as its impact on the surrounding roadway system (including Olai Street and Kalaeloa Boulevard), once the facility is constructed and becomes operational.

2. All parking required for the project should be provided on-site, so as not to impact the surrounding area roadways.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at Local 6976.

Cheryl D. Soon

CHERYL D. SOON

cc: Ms. Genevieve Salmonson, Office of
Environmental Quality Control
✓Mr. Jeff D. Merz, Oceanit

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
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JEREMY HARRIS
MAYOR

ERIC G. CRISPIN, AIA
DIRECTOR

BARBARA KIM STANTON
DEPUTY DIRECTOR

April 28, 2003

RECEIVED APR 29 2003 By

MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: SCOT MURAOKA

FROM: ERIC G. CRISPIN, AIA, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: KALAELOA DESALINATION FACILITY DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS), EWA, OAHU, TAX MAP KEY: 9-1-031: PORTION OF PARCELS 001 AND 028

This is response to your March 5, 2003 memorandum requesting comments on the proposed Kalaeloa Desalination Facility DEIS. We have reviewed the DEIS and recommend that the "Utilities" section of the document be revised to include discussion on the Deep Ocean Water Application Facility (DOWAF). It is our understanding that your department is currently exploring the feasibility of using DOWAF to provide electricity to power the desalination plant in addition to providing additional desalinated water.

Section 5.1 of the DEIS provides discussion on how the proposed project is consistent with City and County of Honolulu General Plan 2010 distribution of residential policy. City Council Resolution 02-205, CD1 revised the General Plan distribution policy to 2025. The General Plan discussion should be revised to reflect the 2025 policy.

We have no other comments to offer at this time. Should you have any questions, please feel free to contact Eugene Takahashi of my staff at 527-6022.

EGC:et
216719
cc: ✓Oceanit
Attn: Jeff D. Mertz
OEQC

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

'02 OCT No. 02-205, CD1

RESOLUTION

CITY & COUNTY OF HONOLULU

AMENDING THE POPULATION DISTRIBUTION POLICIES OF THE GENERAL PLAN OF THE CITY AND COUNTY OF HONOLULU.

WHEREAS, the General Plan of the City and County of Honolulu states in Population Objective C that it is a desirable and attainable long-range objective to establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony; and

WHEREAS, Population Objective C sets forth three population policies describing the elements of the City's directed growth policy and a policy describing the desired population share for each development plan area; and

WHEREAS, Oahu's growth since adoption of the General Plan is following a pattern consistent with the City's directed growth policy as described in Population Objective C Policies 1, 2, and 3 with:

a. The primary urban center moving toward full development;

b. A secondary urban center emerging at Kapolei with the surrounding Ewa and Central Oahu urban fringe areas providing significant suburban residential housing to meet needs that cannot be readily met in the primary urban center; and

c. The remaining urban fringe and rural areas being maintained to sustain their low-rise, low-density suburban character, scenic open space, and small-town, country atmosphere;

and

WHEREAS, Policy 4 complements Policies 1, 2, and 3 by indicating what share of Oahu's population each development plan area should have at the planning horizon year if Policies 1, 2, and 3 are successfully implemented; and

Post-it® Fax Note 7671	Date 4/29/03	# of pages ▶ 9
To Jeff Merta	From Eugene Takahashi	
Co./Dept. Oceanit	Co. City of Hon.	
Phone # 531-3017 ext 126	Phone # 527-6022	
Fax # 531-3177	Fax #	

OCS00469.R02

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

No. 02-205, CD1

RESOLUTION

WHEREAS, the General Plan calls for a reevaluation of the objectives and policies of the General Plan and an amendment to maintain a planning horizon of approximately 20 years whenever the State Department of Business, Economic Development, and Tourism revises its population projections for Oahu to an extended time horizon; and

WHEREAS, the State Department of Business, Economic Development, and Tourism has issued revised projections to the year 2025 for Oahu as of February 2000; and

WHEREAS, the Department of Planning and Permitting has conducted a review of the General Plan, with special attention to the Population Objective C policies; and found that:

a. A policy on population distribution identifying a directed growth policy for Oahu is desirable; and

b. The current General Plan policies are desirable and attainable and should be continued; and

c. The appropriate use of the Population Objective C policies needs to be clarified to reduce misunderstanding and misinterpretations; and

d. The General Plan planning horizon needs to be extended to reflect the time horizons being used in current land use and infrastructure planning;

now, therefore,

BE IT RESOLVED by the Council of the City and County of Honolulu that Population Objective C of the General Plan be amended as follows (material to be deleted is bracketed; new material is underscored):

"**Objective C**
To establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony.

RESOLUTION

Policy 1
Facilitate the full development of the primary urban center.

Policy 2
Encourage development within the secondary urban center at Kapolei and the Ewa and Central Oahu urban-fringe areas to relieve development pressures in the remaining urban-fringe and rural areas and to meet housing needs not readily provided in the primary urban center.

Policy 3
Manage physical growth and development in the urban-fringe and rural areas so that:

a. An undesirable spreading of development is prevented; and

b. Their population densities are consistent with the character of development and environmental qualities desired for such areas.

Policy 4
[Seek a year 2010 distribution of Oahu's residential population which would be in accord with the following table:

Distribution of Residential Population

LOCATION	% OF YEAR 2010 ISLANDWIDE POPULATION
Primary Urban Center	45.1% - 49.8%
Ewa	12.0% - 13.3%
Central Oahu	14.9% - 16.5%
East Honolulu	5.3% - 5.8%
Koolaupoko	11.0% - 12.2%
Koolauloa	1.3% - 1.4%
North Shore	1.6% - 1.8%
Waianae	3.8% - 4.2%
	95.0% - 105.0%]

RESOLUTION

Direct growth according to Policies 1, 2, and 3 above by providing land development capacity and needed infrastructure to seek a 2025 distribution of Oahu's residential population as follows:

Distribution of Residential Population

LOCATION	% SHARE OF 2025 ISLANDWIDE POPULATION
Primary Urban Center	46.0 %
Ewa	13.0 %
Central Oahu	17.0 %
East Honolulu	5.3 %
Koolaupoko	11.6 %
Koolauloa	1.4 %
North Shore	1.7 %
Waianae	4.0 %
	100.0 %"

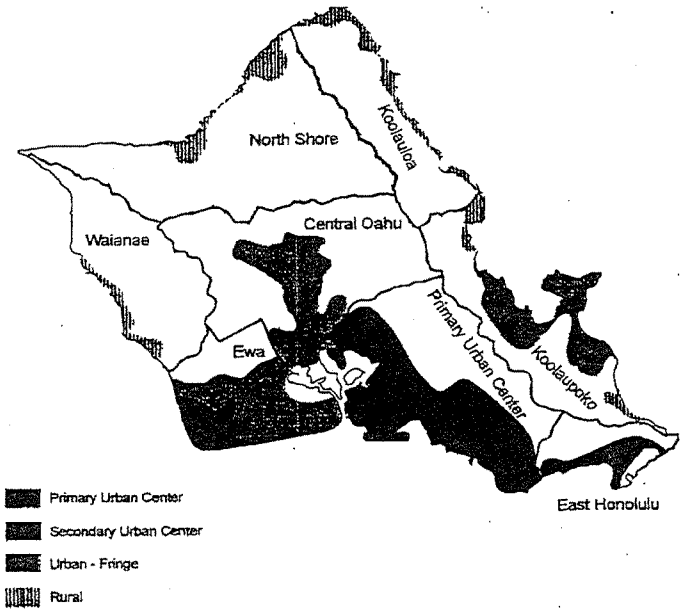
BE IT FURTHER RESOLVED that the following conceptual map shall be added to Population Objective C to illustrate the pattern of development described in Policies 1, 2, and 3 and that the current informational Appendix shall be deleted in its entirety; and

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

No. 02-205, CD1

RESOLUTION

General Plan Development Pattern



BE IT FURTHER RESOLVED that the appropriate use of Policy 4 is to help evaluate how well the existing and proposed Development Plans and Sustainable Communities Plans are implementing the General Plan directed growth policy expressed in Policies 1, 2, and 3; and

BE IT FURTHER RESOLVED that this Resolution shall take effect upon its approval pursuant to Section 6-1511 of the Revised Charter; and

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

No. 02-205, CD1

RESOLUTION

BE IT FINALLY RESOLVED by the Council of the City and County of Honolulu that the Clerk transmit, and is hereby directed to transmit, a certified copy of this Resolution to the Mayor, the Managing Director, and the Director of Planning and Permitting.

INTRODUCED BY:

John DeSoto (BR)

DATE OF INTRODUCTION:

June 26, 2002
Honolulu, Hawaii

Councilmembers

APPROVED this 3rd day of October, 2002.

JEREMY HARRIS, Mayor
City and County of Honolulu

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

I hereby certify that the foregoing RESOLUTION was adopted by the COUNCIL OF THE CITY AND COUNTY OF HONOLULU on the date and by the vote indicated to the right.

ATTEST:

GENEVIEVE G. WONG
CITY CLERK

JOHN DeSOTO
CHAIR AND PRESIDING OFFICER

Dated 9/25/02

ADOPTED MEETING HELD 9/25/02	AYE	NO	A/E
BAINUM	X		
BUNDA	X		
CACHOLA	X		
DeSOTO	X		
FELIX	X		
HOLMES		X	
KOBAYASHI	X		
OKINO	X		
YOSHIMURA	X		
	8	1	0

Reference:

Report No. P-371

Resolution No.

02-205, CD1

CITY COUNCIL OF THE CITY AND COUNTY OF HONOLULU

STATE OF HAWAII

ADOPTION OF AN AMENDMENT TO THE GENERAL PLAN	GENERAL PLAN AMENDMENT RESOLUTION NO. 02-205, CD1

FINDINGS OF FACT

The Council of the City and County of Honolulu ("Council"), having considered the proposal to amend the General Plan of Honolulu 1992, in accordance with the requirements of Section 6-1512(2) of the Revised Charter of the City and County of Honolulu, 1973, as amended ("Charter"), and concurrent with its passage of Resolution No. 02-205, CD1, hereby makes the following Findings of Fact:

FINDINGS

1. The purpose of the proposal is to amend the General Plan of the City and County of Honolulu (GP) to amend the General Plan Objectives and Policies by: updating Population Objective C, Policy 4, relating to the distribution of residential population, clarifying the purpose of the population distribution projections, adding a conceptual map that illustrates the GP development pattern, and deleting the informational appendix.

2. This amendment was proposed by the Director of Planning and Permitting. The Director of Planning and Permitting, in a report dated April 29, 2002, and transmitted to the Planning Commission ("Commission"), recommended that the amendment be approved.

3. In accordance with Sections 6-1512(1) and 6-1512(3) of the Charter, the Planning Commission considered the amendment to the General Plan, held a public hearing on the proposal on May 1, 2002, and in a letter dated May 17, 2002, transmitted its findings and recommendation for approval through the Mayor to the Council.

4. On June 24, 2002, the Council received the Commission's recommendations.

5. On July 2, 2002, the Council's Committee on Planning recommended that Resolution No. 02-205 entitled "RESOLUTION RELATING TO AMENDING THE POPULATION DISTRIBUTION POLICIES OF THE GENERAL PLAN OF THE CITY AND COUNTY OF HONOLULU" be reported out and scheduled for a public hearing.

6. On July 17, 2002, the Council held a public hearing on the proposal as required by Section 6-1512(2) of the Charter and on that same day referred Resolution No. 02-205 to the Committee on Planning.

7. On July 24, 2002, the Council's Committee on Planning recommended that Resolution No. 02-205 be reported out in CD1 form to reflect a commitment to continued development of the Ewa area, that the Resolution be laid over for two weeks and be advertised once in a daily newspaper of general circulation at least ten days before adoption, and that it be formally adopted along with the Findings of Fact consistent therewith.

CONCLUSION

Based on the foregoing findings, and having considered the recommendations of the Director of Planning and Permitting and the Planning Commission, the Council finds that the amendment is consistent with and complies in form and content with the applicable requirements of the Charter.

By _____
GARY OKINO, Chair
Committee on Planning

WR-56/03

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

Pls. log
thx.
S
5/5

In Reply Refer to:
PI-03-66

APR 30 2003

Letter being drafted by Oceanit

Scot Muraoka
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Re: Draft Environmental Impact Statement (DEIS) for the proposed Seawater Desalination Facility in the Kalaeloa area, Oahu, Hawaii.

Dear Mr. Muraoka:

The U.S. Fish and Wildlife Service (Service) received the DEIS on March 6, 2003, for the above referenced project. The project sponsor is the Hawaii Board of Water Supply (BWS). If a Department of the Army permit under section 404 of the Clean Water Act is required, the Service will provide further comments and recommendations to the U.S. Army Corp of Engineers pursuant to our various federal authorities.

As stated in the DEIS, the proposed desalination plant will require approximately 11 million gallons per day (MGD) of saline feed water, which will be pumped from the lower caprock aquifer or the basal aquifer. This water will be treated to adjust pH and reduce membrane fouling. The recovery rate is expected to be 45 percent, which means that approximately 5 MGD of fresh water and 6 MGD of hypersaline brine will be produced. As stated in the DEIS, the preferred method of disposing brine and additional wastewater is the use of injection wells. The wastewater will be comprised of ultrafiltration reject water, backflushwater, membrane cleaning solution, and brine. The wastewater will be injected through the wells and into the upper caprock aquifer. A holding pond will be built to hold the wastewater when the rate of injection is less than the rate of production or during emergencies.

The size of the proposed holding pond is not clearly identified in the DEIS, but its target volume is estimated to be 3.6 acre-feet (p. 27). The contents will be waste brine from the desalination process, with a total dissolved solids concentration about twice that of seawater. Suspended solids (like salts) and bacteria will not pass the ultra filtration or reverse osmosis membranes, so they will be present in the brine, along with traces of pretreatment solutions and cleaning solutions used to remove "biofouling" substances from the membrane. The facility wastes will be collected in an on-site septic system, and periodically pumped into the deep well injection system for ultimate disposal. It is unclear if these facility wastes will be mixed with the desalination waste brine prior to possible temporary storage in the holding pond, or if they can be

directly pumped to the deep well injection system. The holding pond is intended to be used by BWS as an "emergency-only brine disposal pond" designed to temporarily hold approximately 1 million gallons (p. 27). However, the holding pond can be used as a reservoir to temporarily hold liquid wastes that will then be injected into deep disposal wells. It is unclear how frequently waste brine will be present in the holding pond and at what volumes. Unless waste injection rates exactly match brine production the holding pond will retain waste water. If for any reason, deep well injection is halted while desalination continues operating (producing waste brine at 6 MGD), the pond would fill quickly and reach its capacity in roughly 3 to 4 hours (p. 27). Please clarify these items in the Final EIS.

The DEIS acknowledges that birds may be attracted to the emergency brine storage pond when it is filled with water (p. viii). Since the water will be hypersaline, and may contain other contaminants and potential pathogens, the Service is concerned that the pond may at times be an attractive nuisance to water birds. Although the DEIS notes that no threatened or endangered species were observed during a two-day site survey (p. 55), any coastal surface water has the potential to attract federally endangered birds such as the Hawaiian coot, alae ke'oke'o (*Fulica americana alai*), Hawaiian duck, koloa (*Anas wyvilliana*), Hawaiian moorhen,'alae 'ula (*Gallinula chloropus sandvicensis*) or Hawaiian stilt, ae'o (*Himantopus mexicanus knudseni*). The Pacific golden plover (*Pluvialis fulva*) and wandering tattler (*Heteroscelus incanus*) were observed along or foraging near the drainage canal running parallel to the site's access road (p. 55). These species are protected under the under the Migratory Bird Treaty Act. The use of a hypersaline, contaminated pond could adversely affect federally protected water birds. Risks include potential toxicity by ingesting pond water, exposure to disease-causing microorganisms, and impaired insulating and buoyancy properties of feathers from dermal exposure.

In general, the Service reviews project proposals for potential impacts to fish and wildlife resources, primarily federal trust resources such as threatened and endangered species, migratory birds, wetlands, and coral reefs. From a preliminary review of the DEIS, the Service foresees the potential for project-related impacts to the above mentioned endangered waterbirds. If project-related impacts to endangered species are anticipated, further assistance from our office may be required to ensure compliance with the Endangered Species Act. If a Federal Aviation Administration permit is required for the proposed project, we recommend that the US Department of Transportation contact our office regarding the potential for the proposed project to affect listed species.

Thank you for your consideration of these comments on the DEIS. If you have any questions regarding this letter please contact Marine Specialist Antonio Bentivoglio at 541-3441.

Sincerely,

for Paul Henson, PhD
Field Supervisor

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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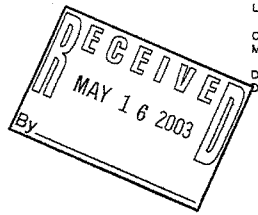
CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

May 9, 2003



Ms. Sandra Lee Kunimoto
Chairperson, Board of Agriculture
Department of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814-2512

Dear Ms. Kunimoto:

Subject: Your Letter of March 13, 2003 Regarding the Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility Ewa, Oahu, Hawaii, TMK: 9-1-031: Portion 028, and Portion 01

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We acknowledge that there are no requests for additional water for the agricultural park located approximately two-thirds of a mile west of our proposed facility.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

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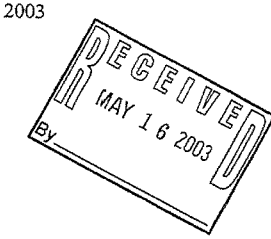
Deputy Manager and Chief Engineer

May 9, 2003



Ms. Darice B.N. Young
Realty Contracting Officer
U.S. Department of Transportation
Federal Aviation Administration
P. O. Box 50109
Honolulu, Hawaii 96850-5000

Dear Ms. Young:

Subject: Your Letter of April 10, 2003 Regarding the Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portion 28 and Portion 01

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

A "Notice of Construction or Alteration", Federal Aviation Administration Form 7460-1, will be submitted to your office so that an airspace evaluation can be conducted.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

Pure Water . . . our greatest need – use it wisely

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
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LARRY J. LEOPARDI, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

May 9, 2003

RECEIVED
MAY 12 2003
By

Mr. Rodney Haraga, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Haraga:

Subject: Your Letter of April 7, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portion 28, 9-1-031: Portion 01

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

1. We acknowledge that the proposed project will not adversely impact any State highway facilities.

2. We are in the process of acquiring the federal surplus 10-acre parcel adjacent to the project site. Following the deed transfer, we will prepare the grant document for avigation easements 540 and 541, which affects both parcels.

3. A Federal Aviation Administration (FAA) Form 7470-1, Notice of Proposed Construction or Alteration, will be submitted to the FAA for their review. The Airports Division Planning Office will be notified when the form is transmitted to the FAA.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa
for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY
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CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

May 9, 2003

RECEIVED
MAY 16 2003
By

TO: TIMOTHY E. STEINBERGER, P.E., ACTING DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

ATTN: BILL LIU

FROM: BU for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF APRIL 11, 2003 REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED KALAELOA DESALINATION FACILITY, EWA, OAHU, HAWAII, TMK: 9-1-031: PORTION 28 AND PORTION 01

Thank you for your memorandum regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility.

We acknowledge that you have no comments to offer. A copy of the Draft EIS was submitted to the Department of Environmental Services for their review and comments.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Jeff Merz, Oceanit

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CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

May 9, 2003

RECEIVED
MAY 16 2003

TO: LEE D. DONOHUE, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

ATTN: MAJOR GREGORY LEFCOURT

FROM: BH for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF APRIL 9, 2003 REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED KALAELOA DESALINATION FACILITY, EWA, OAHU, HAWAII, TMK: 9-1-031: PORTION 28 AND PORTION 01

Thank you for your memorandum regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We acknowledge that the proposed project will have no significant impact on the services and facilities of the Honolulu Police Department.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

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CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

May 9, 2003

RECEIVED
MAY 16 2003
By

Mr. Tadashi Yoshizawa
Department of Accounting and General Services
State of Hawaii
P. O. Box 119
Honolulu, Hawaii 96810

Attention: Bruce Bennett

Dear Mr. Yoshizawa:

Subject: Your Letter of March 18, 2003 Regarding the Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portion 28 and Portion 01

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We acknowledge that you have no comments to offer.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
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CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

May 9, 2003

RECEIVED
MAY 16 2003
By

TO: LARRY J. LEOPARDI, P.E., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF FACILITY MAINTENANCE

ATTN: LAVERNE HIGA

FROM: BH for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF MARCH 13, 2003 REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED KALAELOA DESALINATION FACILITY , EWA, OAHU, HAWAII, TMK: 9-1-031: PORTION 28 AND PORTION 01

Thank you for your memorandum regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We acknowledge that you have no comments on the proposed project.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
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CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

May 9, 2003

RECEIVED
MAY 16 2003
By

Mr. Peter L. Yee
Nationhood and Native Rights Division
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

Attention: Jerry B. Norris

Dear Mr. Yee:

Subject: Your Letter of March 17, 2003 Regarding the Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portion 028 and Portion 01

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We acknowledge that you have no comments at this time.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

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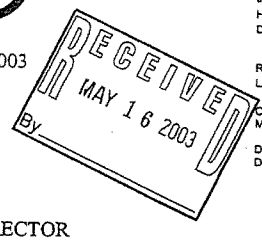
RODNEY K. HARAGA, Ex-Officio
LARRY J. LEOPARDI, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

May 9, 2003



TO: WILLIAM D. BALFOUR, JR., DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

ATTN: JOHN REID

FROM: BY for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF MARCH 17, 2003 REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED KALAELOA DESALINATION FACILITY, EWA, OAHU, HAWAII, TMK: 9-1-031: PORTION 28 AND PORTION 01

Thank you for your memorandum regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We acknowledge that you have no comments on the proposed project.

If you have any questions, please contact Scot Muraoka at 527-5221.

c: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

JEREMY HARRIS, Mayor

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CLIFFORD S. JAMILE
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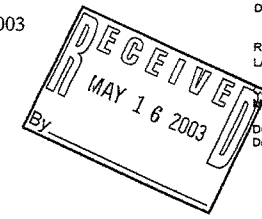
Deputy Manager and Chief Engineer

May 9, 2003



Mr. Charles E. Calvet, P.E.
Manager, Engineering
The Gas Company
P. O. Box 3000
Honolulu, Hawaii 96802

Dear Mr. Calvet:

Subject: Your Letter of March 21, 2003 Regarding the Draft Environmental Impact Statement for the Proposed Kalaeloa Desalination Facility, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portion 28 and Portion 01

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

The construction drawings will be submitted for your review and approval to minimize any potential conflicts with the existing gas facilities in the project area.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

Barry Nagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

c: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
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May 9 2003

RECEIVED
MAY 16 2003
By

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CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

TO: ATTILIO K. LEONARDI, FIRE CHIEF
HONOLULU FIRE DEPARTMENT

FROM: BU for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF MARCH 20, 2003 REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED KALAELOA DESALINATION FACILITY, EWA, OAHU, HAWAII, TMK: 9-1-031: PORTION 28 AND PORTION 01

Thank you for your memorandum regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

1. The project will have a private water system where all appurtenances, hydrant spacing, and fire flow requirements meet Board of Water Supply (BWS) standards.

2. The BWS will comply with all fire department access roads listed in comment #2 of your memorandum.

3. The BWS will submit civil drawings to the Honolulu Fire Department for review and approval upon availability.

If you have any questions, please contact Scot Muraoka at 527-5221.

cc: Jeff Merz, Oceanit

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00

May 14, 2003

Mr. Scot Muraoka
Board of Water Supply
630 South Beretania St.
Honolulu, HI 96843

Subject: Kalaeloa Desalination Facility

Dear Mr. Muraoka,

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the proposed Kalaeloa Desalination Facility. The following are our comments regarding the electrical power requirements for this project:

1. Pg. vi: Please add the following sentence to the end of first Paragraph: *"To serve this substation, a 46kV subtransmission line extension from the existing power system will be required."*
2. Pg. 11: Sentence in first paragraph should be modified to read: "The specific design for the electrical substation *and a 46kV line extension have* not been determined but will be consistent with other substations *and 46kV lines* within the HECO service network."
3. Pg. 12: Second to last sentence under Utilities should be modified to read: "Hawaiian Electric Company (HECO) will construct a dedicated substation within the adjacent State property, mauka of the desalination parcel, to serve the desalination plant, *and will extend a 46kV line from its existing system to serve the substation."*
4. Pg. 67: Modify last sentence in second paragraph under Utilities to read: *"The existing 46kV subtransmission* infrastructure will require upgrades as well *as a line extension to the new substation, but* no new electrical plants will need to be built for this project."
5. Pg. 79: Modify second sentence of the first paragraph to read: "*The cost of construction of the dedicated substation and the 46kV line extension will be borne by HECO and covered by the expected 60-month revenues of this desalination facility. If BWS elects to have a redundant electrical service, the cost will be paid fully by BWS."*

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

As noted, no new power plant will be built for this project. Therefore, this substation will not have any emissions. If you have any questions, please call me at 543-7281.

Sincerely,

Enrique Che, Director
Planning and Design Division

xc: Francis Hirakami
Lori Hoo
Kirk Tomita
Jeff D. Merz, Oceanit

BOARD OF WATER SUPPLY

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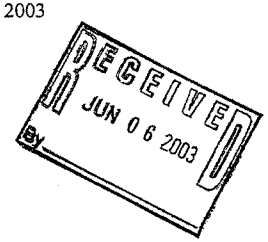
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

June 4, 2003



Mr. Michael Buck, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 325
Honolulu, Hawaii 96813

Dear Mr. Buck:

Subject: Your Letter of March 7, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We acknowledge that since the dominant vegetation is composed of introduced species, the proposed facility will not have a significant impact on the botanical resources. Also, native lowland species will be considered for landscaping the facility, including maiapilo and myoporum, as recommended in the report by Winona Char and Associates.

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

Division of Aquatic Resources

1. We acknowledge that no significant adverse impacts to aquatic resource values is expected.

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

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630 SOUTH BERETANIA STREET
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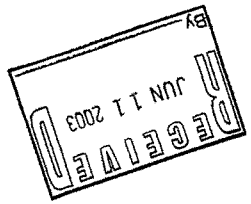
CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

June 6, 2003



Ms. Dierdre S. Mamiya, Administrator
Land Division
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Ms. Mamiya:

Subject: Your Letter of March 28, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement
Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

Land - Oahu District Land Office

We acknowledge that the Board of Water Supply's (BWS) request for land disposition for the proposed HECO off-site substation is presently being processed.

Commission on Water Resource Management

1. The proposed project is being coordinated with the City and County of Honolulu to incorporate it into the County's Water Use and Development Plan.

2. We acknowledge that a Well Construction, Pump Installation and Water Use Permit will be required from the Commission before groundwater is developed as a source of supply for the project.

3. We do not anticipate altering the bed and banks of any stream channel.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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JUN 24 2003
By

June 19, 2003

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LARRY J. LEOPARDI, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

P. Holly McEldowney, Acting Administrator
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Dear Ms. McEldowney:

Subject: Your Letter of April 17, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28 (REF: PI-03-66)

Thank you for your letter regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

1. We acknowledge that no further work is recommended for Sites –6373 and –6375.

2. A mitigation plan, including both preservation and data recovery components will be prepared for Sites –6374 and –4209 prior to construction. The two sites will be well-marked and afforded temporary protection during upcoming construction phases so that heavy equipment will not inadvertently disturb or destroy the sinkhole features.

3. The Final EIS shall be revised to include an acknowledgement that the canal proximate to the construction site, frequently contains sea turtles and that care should be taken to avoid impacting the canal area during the construction and operation phase of this project.

Should inadvertent discoveries, such as human burials, be encountered during construction, an archaeologist shall be contacted to assess the finding and carry out necessary mitigation measures in coordination with the State Historic Preservation Division of the Department of Land and Natural Resources and other pertinent agencies, such as the Oahu Island Burial Council.

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

Pure Water . . . our greatest need – use it wisely

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CITY AND COUNTY OF HONOLULU
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HONOLULU, HI 96843

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June 19, 2003

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RODNEY K. HARAGA, Ex-Officio
LARRY J. LEOPARDI, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

TO: ERIC G. CRISPIN, AIA, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

ATTN: EUGENE TAKAHASHI

FROM: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF APRIL 28, 2003 REGARDING THE PROPOSED KALAELOA DESALINATION FACILITY DRAFT ENVIRONMENTAL IMPACT STATEMENT, EWA, OAHU, HAWAII, TMK: 9-1-031: PORTIONS 01 AND 28

Thank you for your memorandum regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility.

Section 4.16 "Utilities" on Page 78 of the Draft EIS discusses both solar energy and Ocean Thermal Energy Conversion (OTEC). OTEC is a portion of the proposed Deep Ocean Water Application Facility (DOWAF) project. The EIS will be revised to indicate a proposed DOWAF/OTEC project, which is currently in the feasibility study phase. As noted on Page 79 of the Draft EIS, the OTEC option is currently being explored for its utility and applicability as the primary or secondary energy source for the desalination plant.

Section 5.1 Policy #4 on Page 84 of the Draft EIS will be revised in the Final EIS to reflect the 2025 distribution of residential population consistent with the policy revised under City Council Resolution 02-205. These changes shall include replacing the existing chart below:

Location	% of year 2010 Island wide population
Primary Urban Center	45.1 – 48.8%
Ewa	12 – 13.3%

With the following chart:

Location	% share of 2025 Island wide population
Primary Urban Center	46%
Ewa	13%

If you have any questions, please contact Scot Muraoka at 748-5942.

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
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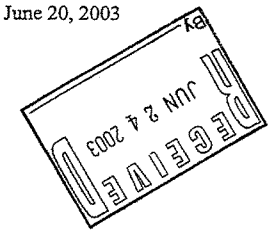
CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

June 20, 2003



Mr. Enrique Che, Director
Planning and Design Division
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Che:

Subject: Your Letter of May 14, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28

Thank you for your letter regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

1. Page vi: The end of the first paragraph shall read, *"To serve this substation, a 46k V subtransmission line extension from the existing power system will be required"*.

2. Page 11: The sentence in the first paragraph will be modified to read, *"The specific design for the electrical substation and a 46k V line extension have not been determined but will be consistent with other substations and 46k V lines within the HECO service network"*.

3. Page 12: Second to the last sentence under Utilities will be modified to read, *"HECO will construct a dedicated substation within the adjacent State property, mauka of the desalination parcel, to serve the desalination plant, and will extend a 46k V line from its existing system to serve the substation"*.

4. Page 67: The last sentence in the second paragraph will be modified to read, *"The existing 46k V subtransmission infrastructure will require upgrades as well as a line extension to the new substation, but no new electrical plants will need to be built for this project"*.

5. Page 79: The second sentence of the first paragraph will be modified to read, *"The cost of construction of the dedicated substation and the 46k V line extension will be borne by HECO and covered by the expected 60-month revenues of this desalination facility. If BWS elects to have a redundant electrical service, the cost will be paid fully by BWS"*.

6. We note that no new power plant will be built for this project; therefore, the substation will not have any emissions.

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

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CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

July 11, 2003

RECEIVED
JUL 16 2003

Mr. Raynor M. Minami, Director
Facilities and Support Services Branch
Department of Education
State of Hawaii
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Minami:

Subject: Your Letter of April 15, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

A regional map showing the location of the Barbers Point Elementary School is enclosed. The school is approximately two and one-half (2½) miles from the proposed desalination and transformer substation facilities. We understand that there will be no emissions generated from the type of proposed transformer substation for the desalination facility. There will also be no energy production at the desalination facility so no emissions will be generated. Therefore, there will be no impact on the Barbers Point Elementary School.

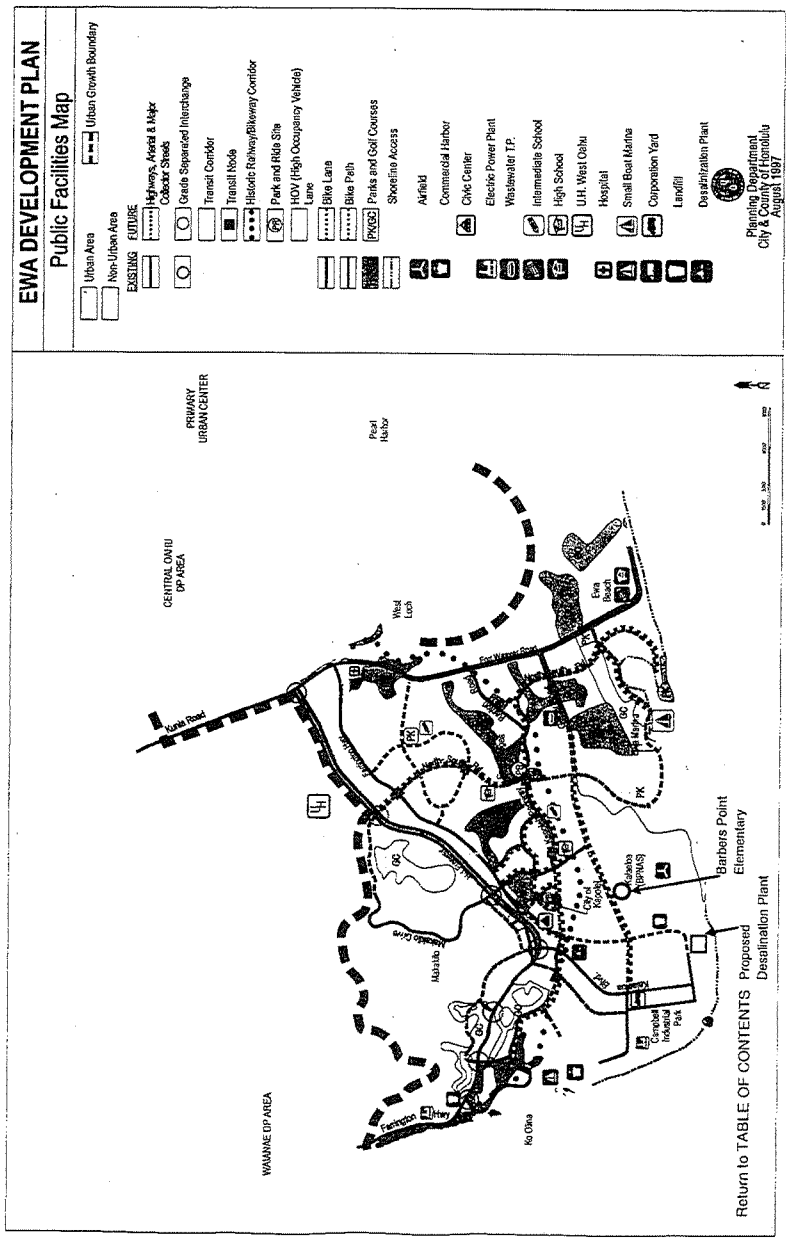
If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

for CLIFFORD S. JAMILE
Manager and Chief Engineer

Enclosure

cc: Jeff Merz, Oceanit



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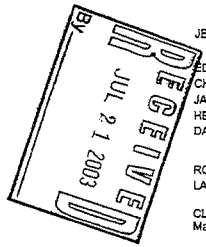
HONOLULU, HI 96843

July 16, 2003



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CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

TO: CHERYL D. SOON, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

FROM: BY for CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF APRIL 22, 2003 REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED KALAELOA DESALINATION FACILITY, EWA, OAHU, HAWAII, TMK: 9-1-031: PORTION 28 AND PORTION 01

Thank you for your memorandum regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

1. We acknowledge that the EIS Preparation Notice stated that a traffic study would be conducted as part of the EIS process.

   However, while evaluating the actual traffic generated during construction and operation of the facility for the Draft EIS, we determined that a full-scale traffic impact analysis is not warranted given the relatively low level of traffic anticipated from the project. Approximately 12 trip ends will be generated during the post-construction operation. The addition of 12 trip ends will not significantly impact the traffic on Kalaeloa Boulevard. Olai Street is currently a private street with limited access and minimal traffic. As noted on page 109 of the Honolulu Desalination Study Final Environmental Assessment and FONSI of April 2001, "...any temporary increase in traffic congestion that could result from the movement of construction related vehicles is unlikely to inconvenience motorist in the immediate vicinity of the project site due to the lack of business and residences."

   We also understand that there are no Levels of Service studies completed for either Kalaeloa Boulevard or Olai Street (private). There is no baseline data by which to measure project impacts.

   If necessary to mitigate potential traffic congestion, the movement of construction vehicles may be restricted during the morning and afternoon peak traffic hours or through an approved traffic plan.

2. All parking required for the project will be provided on-site so as not to impact the surrounding roadway. The parking will be designed to comply with all applicable County parking standards including provisions for the Americans with Disabilities Act .

If you have any questions, please contact Scot Muraoka at 748-5942.

cc: Jeff Merz, Oceanit

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

July 16, 2003

RECEIVED
JUL 21 2003
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LARRY J. LEOPARDI, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

John T. Harrison, PhD, Environmental Coordinator
Environmental Center
University of Hawaii at Manoa
State of Hawaii
2500 Dole Street, Krauss Annex 19
Honolulu, Hawaii 96822-2313

Dear Dr. Harrison:

Subject: Your Letter of April 22, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28

Thank you for your letter regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

1. **In several places early in the document, a brine disposal pond is discussed and described, but it does not appear in Figures 1.8 or 3.26. Also, the dimensions and depth of the pond are not given.**

   Figures 1.8 and 3.26 do not show the brine disposal pond. The brine disposal pond is shown in Appendix D as C-5. The dimensions are shown as roughly 172 feet by 163 feet and the capacity is listed as 3.60 acre feet. Reference to Appendix D will be included in Section 2.4, Alternative Disposal Methods, of the Final EIS.

2. **On page vii, the Draft EIS refers to the cost of reverse osmosis going down as technology improves and implies that the proposed facility will benefit from this and in essence become cheaper. This is highly questionable, since in general the system will be designed with today's technology and usually will not be compatible with future innovations without costly redesign/construction.**

   The proposed facility will utilize the most current technology available today. Over the years, the cost of desalination facilities and treatment has decreased. These savings are now part of the proposed facility. As technology improves, innovations may be incorporated into the facility if they are cost-effective and increase efficiency at the facility. For example, improved membranes could be incorporated into existing vessels when they reach their life expectancy and require replacement. Any future phases would benefit from the latest technological advances.

3. **The depth of wells to be used on the project is reported differently in different places. (see pp vi and 16). On page vi, the brine disposal will be below the raw water intake and on page 16, it will be above-page 16 must be incorrect.**

   The source water for the desalination will be provided through a network of three basal aquifer (BA) wells located on the 20-acre parcel. Approximately 12 million gallons per day of source water will be pumped from the source water network at an estimated depth of approximately 1,600 feet below the surface in the BA.

   The location of the injection wells are currently being reviewed based on hydrogeological studies. The injection well will either be located in the Lower Caprock Aquifer (LCA) or the BA. The description on page vi is correct and the last paragraph on page 16 will be revised in the Final EIS.

4. **The Draft EIS states that the source water may be from either the BA or LCA on several pages (13, 16, 19, 27, 70). However, page 1 states that the BA will be used. Is this issue decided or not?**

   The three source wells will draw source water from the BA at a depth of approximately 1,600 feet. The caprock aquifer has been dismissed as a viable source because the water quality analysis indicates higher levels of constituents that would be too costly to remove.

   However, the issue of the injection well location has not been determined pending the review of the hydrogeological studies associated with various aspects of the injection process and requirements from both the State Department of Health (DOH) and the Environmental Protection Agency. The injection well will be located in either the BA or the LCA.

5. **On page 24, the "no action" alternative is dismissed. However, no valid basis for this is given. There are other methods to increase water supplies, so why was desalination chosen? Was a study done?**

   In 2001, the Honolulu Desalination Study and a Final Environmental Assessment (EA) was completed. This study looked at various alternative technologies for desalination and various locations to locate the facility. As noted in the EA, the Board of Water Supply (BWS) has a legal requirement to provide potable water to the residents of the City and County of Honolulu. The proposed project would help meet this requirement beyond Oahu's finite groundwater supply, while the no action alternative would prevent the BWS from doing so. The no action alternative would also result in the lost opportunity to diversify water supplies, conserve Oahu's existing potable resources and leverage new, cost effective technology, such as desalination.

6. **On pp 24-25, 12 choices were narrowed down to 2. How was that done? Why were all the others ruled out?**

   In the April 2001 Final EA, all alternative desalination technologies were reviewed in detail. After they were analyzed it was determined that the use of the Multi Stage Flash Distillation and Reverse Osmosis (RO) processes are most clearly dominant in the inventory of plants larger than 1 mgd. It was then determined that the RO process would be the most economical. Although two potential hosts for distillation steam were identified, the estimated cost of the steam was found to be uneconomical in comparison to electrical costs for a reverse osmosis plant. The EA elaborates on the methodology and details the findings of how the choices were narrowed down to two.

7. **Figure 3.1 does not indicate the outline of the property. Add this.**

   Detailed maps of the project and its boundaries are located in Appendix D and a description of the property is found in Section 1.7.1 of the Draft EIS. Figure 3.1 will be revised in the Final EIS to reflect the outline of the project area.

8. **It should be noted that the contamination of both caprock groundwater and near shore waters is not limited to nutrients and does include elevated fecal indicator bacteria, which can mean the presence of human pathogens. An actual treatment system (preferably with disinfection) for the domestic wastewater should be included.**

   The State DOH will most likely require a package treatment system for the domestic waste produced at the desalination facility based on the estimated quantity of domestic wastewater produced on-site. This system will be designed to comply with all provisions of DOH. Disinfection will be utilized if required by applicable DOH code.

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

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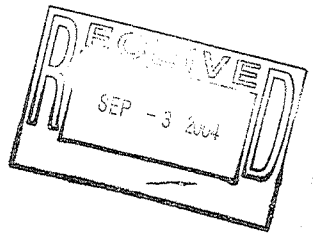
Deputy Manager and Chief Engineer

August 31, 2004



Mr. Micah Kane, Chairman
Hawaiian Homes Commission
Department of Hawaiian Home Lands
State of Hawaii
P. O. Box 1879
Honolulu, Hawaii 96805

Dear Mr. Kane:

Subject: Your Letter of April 15, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28

Thank you for your letter regarding the Draft Environmental Impact Statement for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

1. **Comment:**

   Proposed Action (page 9) – The chemically treated brine wastewater will be injected back into the basal aquifer. Please discuss in more detail the composition of the brine wastewater and possible impacts of its disposal in the basal aquifer.

   Response:

   The waste stream from the reverse osmosis (RO) process consists of brine concentrate and membrane cleaning solutions (MCS). The composition of the reject water from the RO process is essentially a seawater composition with a concentration of dissolved solids including chlorides from the source water that is rejected by the RO filter. The concentration of chlorides is approximately twice that of seawater.

   Occasionally, the RO membranes will need to be cleaned with MCS. The MCS will contain citric acid to remove scaling buildup on the membranes. The MCS will be re-circulated during the cleaning process and then discarded after use. The RO membrane cleaning process is anticipated to occur once a year.

Injection wells will be used for the disposal of brine concentrate rather than an ocean outfall. Two injection well options evaluated were discharges into either the basalt formation below the source wells or into the caprock formation that is situated above the basalt. The injections wells will have at least 500 feet of horizontal separation from the source wells. The basal injection option will rely on about 300 feet of vertical separation between the 1,600-foot source well and 1,900-foot injection well and the density of the brine will cause it to sink. The caprock injection option utilizes the sedimentary geologic formation to dissipate the brine. We have recently decided to inject the brine concentrate into the caprock formation.

The desalination source wells will draw from a seawater source, not brackish water mixing zone. There is no freshwater lens at the location of the source and injection wells, and therefore, brine injection will not affect any freshwater lens aquifer. Water quality monitoring of the source water will be conducted as part of the Department of Health (DOH) permitting procedures and as an ongoing monitoring of the desalination operation. Injection well capacity and injectant quality will also be monitored as part of the DOH Underground Injection Control permit process.

Domestic wastewater from offices and facility will be treated and disposed of through a septic system/leach field.

2. **Comment:**

   Proposed Process (page 13) and Source Water (page 16) – To assure that the heavier waste brine will not descend into the source wells, adequate horizontal and vertical separation should be provided (i.e., the injection wells should be separated from and deeper than the source wells).

   Response:

   The injection wells will discharge concentrate into the caprock formation that is situated above the basalt. The caprock injection option will rely on about 1,300-feet of vertical separation between the 1,600-foot deep source well and 300-foot deep injection well. The basal source wells will be horizontally separated from the injection wells at a minimum distance of 500-feet, which is deemed adequate horizontal and vertical separation to avoid migration that could mix the source wells with the brine from the injection wells. The sedimentary geologic formation provides an adequate barrier between the source and injection wells. Within the caprock formation, the brine will tend to sink to the lower permeable layer approximately 300 feet below MSL, and be dispersed below the near shore environment. The multiple coral and thick clay layers would prevent the brine from reaching the basalt. The interbedded clay would consume the driving head of the brine and the brine would be leaked off within the corals layers.

3. **Comment:**

RO Process (pages 17-19) – The efficiency of the process should be more clearly described. What will be the salinity of the source water? The source water should be no more than 2.5 percent to achieve the current drinking water salinity standard of 250 million gallons per liter (mg/l). Would the salinity of the seawater be less if the wells were drilled to a lesser depth or placed further inland? What has been the knowledge transfer from the demonstration desalting plant project that was undertaken about 1.5 miles mauka during the early 1990's?

Response:

The RO process will reduce the chloride content of seawater from approximately 18,000 mg/l to 100 mg/l, which will match the water quality of the existing system. There is a thin layer of brackish water at the top surface of the upper caprock aquifer thick enough to support salt-tolerant vegetation at the site. A shallow well tapping this thin brackish layer is not feasible because it cannot sustain needed pumping rates. The layer of brackish water thickens toward inland areas, but not sufficiently to sustain the needed pumping rates to support a 5 mgd facility.

The State's desalting project was closed in 1995 and was only partially tested because of limited State funding. Three processing methods selected for the demonstration were RO, Electro-dialysis and Electro-dialysis Reversal. Source wells were drilled into brackish portion of the Basalt (BA) and the Lower Caprock Aquifer (LCA). The BA source was tested at rates less than 1.0 million gallons per day (mgd) and the facility only produced about 250,000 gallons per day (GPD) of drinking water. The pumping of the brackish water source proved to be insufficient and of an inconsistent quality to produce drinking water at higher quantities. The brackish caprock aquifer has shrunk significantly from the cessation of agricultural irrigation from the close of the Oahu Sugar Company. Based on current pumping data from the adjacent nonpotable irrigation wells, the brackish caprock aquifer can only sustain levels at about 100,000 GPD.

4. **Comment:**

Why the need for so much chemical treatment? Will the storage tanks be able to withstand tsunami impacts or other disturbances? The report should discuss the impacts, if any, on adjacent urban areas due to possible levels of release of chemicals under different wind/climatic conditions.

Response:

Chemicals are added to make the product water compatible with the pH and alkalinity levels of the potable water in the existing system. The amount of chemical treatment is the minimum required to have the product water meet regulatory standards. Calcium hydroxide, carbon dioxide and calcium hypochlorite will be added. The project will be located in the 2A Seismic Zone, the Zone D flood zone and within the tsunami inundation zone. All structures will be built and chemicals stored to comply with applicable Uniform Building Codes standards, OSHA standards and any regulations associated with the chemical storage. Safety plans for chemical handling will be required.

5. **Comment:**

Are there any other means to obtain the potable water using less electricity, or energy from alternative sources? Five megawatts is enough to serve the needs of how many typical households?

Response:

This project will use an innovative and efficient energy recovery system using pressure vessels to recover energy. Energy recovery can have a significant impact on the economics of operating large plants.

Alternative renewable energy is also being considered to provide power to the desalination project. The Board of Water Supply (BWS) has a Deep Ocean Water Application Facility (DOWAF)/Ocean Thermal Energy Conversion (OTEC) project, which is currently in the feasibility study phase. The DOWAF/OTEC option is currently being explored for its utility and applicability as the primary or supplementary energy source for the desalination facility. Solar energy was considered but deemed infeasible due to the large land requirements and its proximity to the Barber's Point airport.

Five megawatts is enough to serve about 1,000 homes as each home uses an average about 4,000 watts.

6. **Comment:**

Estimated costs should be fully disclosed, including the comparability with other current costs. More specifically, what is the amount that is "significantly higher than the current average per-unit cost of supplying water"? What are the actual differences in anticipated costs between this plant and the most proximate regular plant, in terms of both capital and Operation and Maintenance (O&M) costs?

Response:

The cost to build and fully equip the proposed 5 mgd desalination facility is estimated at $40 million, or about $8 million per 1 mgd. This capital cost is within an acceptable range of groundwater source development costs. It is important to note that the first phase construction cost involves some oversizing and allowances for future phases. Capital costs of the future phases of expansion will therefore be less. In addition, 5 mgd constitutes only about three percent of Oahu's total water production. The estimated operation and maintenance cost for seawater reverse osmosis desalination is approximately $3.20 per kgal.

The Kalaeloa desalination plant is comparable to the cost of constructing, for example, 5 mgd of wells in Waialua, installing 17 miles of pipeline through Wahiawa, four booster pump stations and reservoirs and operating and maintaining that immense water system for Ewa.

The cost of securing, treating and transporting groundwater is becoming increasingly expensive. In addition, regulatory and legislative requirements are making it more difficult to develop groundwater in rural areas. The desalination plant will allow drought proof, high quality water within and for the Ewa area, an area that imports water from Pearl Harbor. When all of the above factors are taken into consideration, the desalination alternative is cost-comparative and preferable to regional water transport.

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

Barry Usagawa

BARRY USAGAWA
Principal Executive
Water Resources Operating Unit

cc: Jeff Merz, Oceanit

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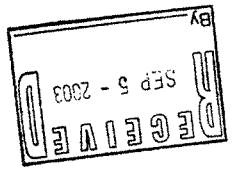
September 2, 2003



Mr. James Moncur, Director
University of Hawaii at Manoa
Water Resources Research Center
2540 Dole Street, Holmes Hall 283
Honolulu, Hawaii 96822

Dear Mr. Moncur:

Subject: Your Letter of April 22, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28

Thank you for your letter regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility.

We have the following response to your comments:

1. COMMENT:

Groundwater: The Draft EIS stated that the desalination source and injection wells will not further impact the thin freshwater lens in the caprock since they will most likely be drilled in the Waianae Basalt below the caprock layer (page 70). However, this conclusion was derived on the basis of hydraulic properties of the Basalt Aquifer (BA) or Lower Caprock Aquifer. The mixing and dispersion of effluent plume in the BA was not carefully studied. The injection of 12 million gallons per day (mgd) or more of brine at a density twice that of seawater into the BA would induce significant salinity dispersion, which in turn would alter the existing pattern of seawater-freshwater transition zone and would impact the existing thin freshwater lens in the caprock.

RESPONSE:

The desalination source and injection wells will be located below the transition zone, not in the transition zone, and will not impact the brackish water lens. Numerous reports were reviewed during preparation of the Draft EIS to determine that there is no freshwater lens at the site of the source and injection wells. Two of these reports include Mink and Lau's *Aquifer Classification and Identification for Oahu, 1987* and Mink and Yuen's *Hydogeological Considerations, Board of Water Supply, Kalaeloa, Ewa Plain, Oahu 2002*.

The source wells will be drilled into the Waianae Basalt below the caprock layer. Approximately 6 mgd of brine, not 12 mgd, will be disposed of into an injection well located in either the Basalt or the Lower Caprock Aquifer. The injection well location has not been determined pending the review of the hydrogeological studies associated with various aspects of the injection process and requirements from both the State Department of Health (DOH) and the Environmental Protection Agency.

There is no freshwater lens at the location of the source and injection wells and therefore brine injection will not affect any freshwater lens. The density of the brine causes it to sink and dispersion in the much larger saltwater flow of the aquifers will ensure that salinity concentrations will be diluted.

2. COMMENT:

Groundwater: As stated in the Draft EIS, a monitoring program to determine the hydraulic and density gradients is recommended (page 71). We suggest that the recommended monitoring program is undertaken to allow a careful evaluation of the possible impact of brine injection on the transition zone.

RESPONSE:

The desalination source and injection wells will be located below the transition zone, not in the transition zone and will not impact the brackish lens. However, water quality monitoring of both source water and injection well brine will be completed as part of the DOH permitting procedures and as an ongoing monitoring of the operation of the desalination operation.

3. COMMENT:

Energy Consumption: A new Hawaiian Electric Company (HECo) substation will be constructed to serve the power needs of the proposed facility (page 9). The potential impact of this proposed facility on the future energy supply and demand of the island of Oahu was not addressed by this Draft EIS.

RESPONSE:

We acknowledge the higher power demand for the desalination facility. However, desalination will reduce the environmental impact of new groundwater wells in rural areas like Windward and North Shore, which also use electricity to pump and transport the water many miles to the population centers of South Oahu.

According to HECo, there is sufficient electrical generation capacity in their system. HECo is planning to construct a dedicated substation within the adjacent State property, north of the desalination parcel, to serve the desalination plant, and will extend a 46kV line from its existing system to serve the substation. The proposed facility will use 13 percent of the capacity of the 46kV capacity of the line. The impact from the new substation will not be significant. The construction and operation of the dedicated substation will not significantly affect the future energy supply and demand on the island of Oahu.

Alternative renewable energy is also being considered to provide power to the desalination project. The Board of Water Supply has a Deep Ocean Water Application Facility (DOWAF) / Ocean Thermal Energy Conversion (OTEC) project which is currently in the feasibility study phase. The DOWAF/OTEC option is currently being explored for its utility and applicability as the primary or supplementary energy source for the desalination facility.

4. COMMENT:

Alternative Technologies: No discussion was made of the use of brackish water rather than seawater as a feed water for the Reverse Osmosis (RO) process. Brackish water RO desalination would require smaller applied pressure than seawater desalination and thus would be more energy efficient. The brine produced by the brackish RO process would have a salinity that is comparable to natural seawater and thus would have much smaller environmental impacts.

RESPONSE:

Brackish water was an option discounted early in the feasibility stage because it is very limited and insufficient to produce 5 mgd of freshwater. Brackish composition varies with pumpage and its removal will affect the transition zone. The proposed desalination facility requires a consistent composition of water because variances in the source water will result in higher costs.

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

Barry Usagawa

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

IO/SM:js
cc: MNE
C. Lao
S. Muraoka

WR-46/03

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Deputy Manager and Chief Engineer

October 31, 2003

Paul Henson, Ph.D., Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

RECEIVED
NOV - 4 2003
By

Dear Dr. Henson:

Subject: Your Letter of April 30, 2003 Regarding the Proposed Kalaeloa Desalination Facility Draft Environmental Impact Statement, Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28 (REF:PI-03-66)

Thank you for your letter regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility.

We have the following response to your concerns:

1. We acknowledge that the Service will provide further comments and recommendations to the U.S. Army Corp of Engineers, if a Department of Army Permit is required.

2. There is no sewerage connection at the proposed site; personal waste will be collected in an on-site septic system. As noted on Page 78 of the Draft EIS, the septic system product will then be injected into a separate caprock injection well. This well will be completely separate from the operation of the desalination injection facilities. The septic system and injection well will be required to comply with all State of Hawaii Department of Health provisions for personal waste facilities.

3. The brine pond is proposed only as a temporary, emergency measure to be used only in situations where the normal injection of the brine product is interrupted and the production of desalination water continues. The use of the brine pond will at most be intermittent, non-regular and for emergencies only and will have the ability to accommodate 1.17 MGD within the 3.6 acre-foot volume of the pond. The pond would fill in

approximately 3.8 hours based on an estimated 7 MGD of waste brine per day. Page 71 of the Draft EIS discusses the quantities of brine generated and the ability of the aquifer to accept those quantities. The estimated hydraulic conductivity of the caprock is 2,500 feet per day, while the basal aquifer has an estimated hydraulic conductivity of 4,000 feet per day. Based on transmissivity calculations, it has been determined that the caprock aquifer can accommodate two to three MGD per well. The desalination project is anticipated to produce only 7 MGD of waste brine. The aquifer should easily accommodate the daily injectant.

4. The condition to ensure that no waterbirds and migratory birds are impacted during times that the brine pond is full is proposed on Page 73 of the Draft EIS as follows:

   Bird dispersing measures shall be installed at the pond site to reduce/eliminate the congregation of waterfowl at times when the emergency brine pond is full. While various measures would be adequate, netting stretched across the pond would most likely be the best way to eliminate birds at the pond. This type of mitigation has been incorporated at the Cyanotech facility north of Kona on the Island of Hawaii. Like the desalination location, the Cyanotech facility is located near the sea and near an airport. Other mitigation options may be a bladder cover or a combination of various measures. The Fish and Wildlife Service as well as the Federal Aviation Administration will be consulted prior to the Board of Water Supply (BWS) choosing mitigation measures for the emergency brine pond.

5. If any project-related impacts to endangered species are anticipated, further assistance will be sought from your office to ensure compliance with the Endangered Species Act.

6. If a Federal Aviation permit is required, we will inform the U.S. Department of Transportation to contact your office regarding the potential for the proposed project to affect listed species.

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

Barry Usagawa
for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jeff Merz, Oceanit

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Deputy Manager and Chief Engineer

December 30, 2005

Mr. Jeff Mikulina, Director
Sierra Club, Hawaii Chapter
P. O. Box 2577
Honolulu, Hawaii 96803

Dear Mr. Mikulina:

Subject: Your Letter Regarding the Proposed Kalaeloa Desalination Facility
Draft Environmental Impact Statement,
Ewa, Oahu, Hawaii, TMK: 9-1-031: Portions 01 and 28

Thank you for your letter regarding the Draft Environmental Impact Statement (EIS) for the proposed Kalaeloa desalination facility. We apologize for the inconvenience of our delayed response.

We have the following response to your comments:

1. **Comment:**
What is the current status of the Water Integrated Resource Plan for Oahu and the Oahu Water Management Plan?

Response:
The Board of Water Supply's (BWS) Integrated Resources Plan (IRP) has been replaced with watershed management plans for each of the 8 sustainable community and development plan areas established in the county general plan. The revised planning approach is community-based and environmentally holistic encompassing the entire watershed. This holistic approach centers on sustainability including watershed protection, management, conservation, restoration as well as water use and development.

The stakeholder involvement process will utilize the watershed partnerships that we have created. Waianae and Ko`olauloa are the initial plans and have been on going for about 1.5 years. A public review draft will be issued shortly. The North Shore and Ko`olaupoko areas are planned for FY 2007 and Ewa, Central Oahu, Primary Urban Center and East Honolulu are planned for FY 2008. The State Commission on Water Resource Management (CWRM) approved our watershed management plan approach and scope on March 17, 2004.

2. **Comment:**
(Concerning the Koa Ridge hearings) Is Nance correct in his assessment that sustainable yields will not be reached for 20-40 years?

Response:
There is a level of uncertainty on the remaining untapped water supplies. Some estimates indicate the sustainable yield may be reached by year 2025. The "Petition for Amendment to the State Land Use District Boundaries" for the Koa Ridge project was referred to the BWS in 2001. At that time, the BWS indicated that it cannot be determined if there is adequate groundwater supply in the Waipahu-Waiawa water management area to accommodate the vacant Urban designated lands of Central Oahu, Ewa and Honolulu in addition to Koa Ridge. There are several factors that add to the uncertainty of groundwater supply, including recent decisions on water rights and public trust resources, the State's adoption of a lower sustainable yield for the Waipahu-Waiawa and Ewa-Kunia aquifer systems and the allocation and pumpage milestone framework, the lack of a validated 3-dimensional groundwater model to accurately assess sustainable yield, the uncertain availability of the Waiahole Ditch water and an incomplete State Agricultural Water Use Development Plan.

Developing various types of water supplies, such as conservation, recycled water, desalination, deep ocean water/Ocean Thermal Energy Conversion (OTEC) technologies in addition to surface and groundwater supplies will allow the flexibility needed to adapt to future uncertainty, severe droughts and enable BWS to meet consumer demand with enhanced water resource stewardship.

3. **Comment:**
Why would a 5 mgd desalination facility be necessary if less expensive water can be developed upgradient?

Response:
Less expensive groundwater is being developed from several new water sources in the Waipahu-Waiawa groundwater management area. Remaining groundwater supplies within this water management area are uncertain as explained above. Water is available in other water management areas, such as Waialua, but connecting infrastructure does not exist. The cost of permitting, developing, treating and transporting groundwater from other remote regions is becoming increasingly expensive. Regulatory, environmental, social and cultural issues are adding many layers of complexity, which will be addressed in the BWS watershed management plans. The cost of seawater desalination is therefore

comparable to regional groundwater development and transmission. The seawater desalination and recycled water facilities will allow drought proof, high quality potable and nonpotable water for Ewa's sustainable growth and reduce imports and associated environmental and cultural impacts in Oahu's rural areas.

4. **Comment:**
Will the desalination facility be designed with an eye toward future expansion? What are those expansion plans?

Response:
The Kalaeloa Desalination Facility project is a phased project. The first phase is currently 5 million gallons per day (mgd) of capacity. There is ample room for future phases of additional capacity. The project is being phased to manage capital and operating costs and will be expanded accordingly as the Ewa area grows over the next several decades.

5. **Comment:**
Please discuss the relationship between constructing desalination plants and providing for more development on Oahu in the EIS. How do you resolve the statement "serve up to 12,500 homes" and "not necessarily enable more development and urbanization" if water is increasingly a limiting factor in development?

Response:
The construction of desalination plant is a response to, rather than the basis for more development and urbanization. Development is fueled by a healthy economy, whereby there is a related increase in employment opportunities and spending power. These elements attract new people to an area, thereby causing an increase in population and housing demand. Planning policies and land use regulation determines and enables the level and location of growth and development. Land use planners and decision-makers must consider and address all of the environmental and growth related impacts before approving new development. Once the development and growth projections are determined, public and private agencies fulfill their responsibilities by planning for the infrastructure and services necessary. Infrastructure includes roadways and circulation systems, water availability and transmission facilities, wastewater treatment facilities and utilities. Services include police and fire protection, education, and medical services.

The BWS is mandated by the City Charter to ensure a reliable water supply to meet the community's current and future needs. The proposed desalination plant will help ensure that there is an adequate supply of potable water for future generations.

6. **Comment:**
How much power will the facility use on a daily basis?

Response:
The desalination plant will use approximately 1,000 kilowatts per one million gallon of processed water.

7. **Comment:**
What will be the cost per kWh paid to HECO for the electricity?

Response:
The cost will be the same as the market-rate charged by the Hawaiian Electric Company (HECO) for other facilities in its service area, but will receive rate discounts for efficiencies. The desalination process is energy intensive because of the high pressure pumps, but energy efficient because the high pressure is recovered. Additional efficiencies and alternative renewable energy options are being evaluated, such as load shifting conservation measures, natural and photovoltaic lighting, and seawater district cooling from the facilities deep wells and diesel generators to reduce peak hour demand.

8. **Comment:**
Will a long-term contract be signed with HECO or will the price of kWh be subject to fluctuation?

Response:
HECO's power rate schedules will apply as they do to all BWS pumping facilities.

9. **Comment:**
Will the Kalaeloa facility increase the need for a new Oahu power plant?

Response:
HECO is planning to construct an additional power plant to meet future power needs of the island. A 46kV line from HECO's existing system will be extended to the dedicated substation, which will serve the desalination plant. The closest existing HECO power source is at the Kahe power plant.

Alternative renewable energy is also being considered to provide power to the desalination project. The Board of Water Supply is conducting a Deep Ocean Water Application Facility (DOWAF)/Ocean Thermal Energy Conversion (OTEC) feasibility study to investigate ocean resources development toward a sustainable water and energy future for Oahu.

10. **Comment:**
Please include a discussion of indirect environmental impacts-particularly climate change-from the desalination facility.

Response:
There is no anticipated climate change environmental impact from the desalination facility.

11. **Comment:**
How do you resolve the inconsistency (bonds/water rate increase)? Who will be paying the $45 million capital cost and the $6 million operating cost?

Response:
BWS is pursuing a Federal grant to reduce the capital costs of the Kalaeloa Desalination facility. Congressional Senate Bill S.960 authorizes a 25% Federal match for this project and if appropriated, will significantly reduce the project's capital cost. The remaining balance will be funded by a combination of water rates, impact fees and bond funds. The project will improve system reliability for existing users and provide new water for future users. Therefore, both the existing and future users should pay the capital and operational costs. BWS is currently conducting a water rate and capital needs assessment study.

12. **Comment:**
How can this increase in water cost not have an impact on water rates? Are water rates currently artificially high? At what production level will the O&M costs start to impact existing water rates?

Response:
The Federal grant and the incremental phasing of the desalination facilities capacity will help to mitigate cost impacts. The deep source wells and reverse osmosis filters are modular, such that huge over-sizing of major components are avoided. New and more efficient technologies will reduce operating costs in the long run.

The Board of Water Supply has held scheduled water rate increases for the last 10 years. Operational costs have been managed in part, because of the favorable economic situation of the late 1990's, water conservation measures and operational savings from on-going re-engineering and the application of new technologies and work processes. However, the economic situation has recently changed with dramatic rises in power and construction materials costs. A water rate and capital needs assessment study is currently being conducted.

13. **Comment:**
Why should existing water users have to foot the bill for new development? Is it fair that low-income residents in Waianae will have to pay more for their water because more water users want to come on-line? Wouldn't it be more equitable to have new development foot the bill if it is their development that is pushing demand over the sustainable yield?

Response:
This project will benefit both existing and future users by improving system reliability, especially in times of extended drought, and by providing water for future users. The remaining balance, after the grant offset, will be funded by a combination of water rates, impact fees and bond funds.

New developments will be required to pay our Water System Facilities Charges (WSFC) or impact fees that will recover some of the capital costs of the project. Bonds will finance the remaining capital costs and the existing and future water rates payers will pay the debt service. Water rates recover the system operating costs and are uniformly distributed throughout Oahu existing and future water rate payers. These funding mechanisms place the capital cost on future water users and the operating costs on existing and future water rate payers.

14. **Comment:**
What are the cost and water savings estimates of the City and County of Honolulu's demand-side management programs?

Response:
The BWS has several demand side management program projects such as: Low flow Toilet Rebate, Halawa Xeriscape Garden, Water Conservation Poster Contest, Summer Conservation Radio Campaign, exhibits at various events, Detect-A-Leak week and Large water user campaign. All of the projects promote water conservation. The toilet rebate program is estimated to have saved about 1.8 million gallons per day (mgd) of water, which equates to about $3.8 million dollars, after rebates. BWS internal conservation/leak detection identified and repaired numerous leaks in the Windward water system saving about 1.5 mgd. Additional conservation programs are being evaluated following industry best practices.

15. **Comment:**
Is it possible that 5 MGD of water savings could be found at a lower cost than the proposed desalination facility?

Response:
Water conservation is an integral part of the BWS program and encourages water savings and use reduction. While the costs of conservation programs are low, they alone are not adequate to meet the increased demand for water.

Conservation, such as low flush toilets, could possibly yield significant water savings if every toilet on the island were changed to low flush toilets and every household ensured the leaks were repaired promptly. However, since it is not possible to control how people actually use and maintain their water fixtures, we cannot fully depend on these conservation measures to meet varying levels of water demands.

16. **Comment:**
Has the potential groundwater benefit of investing $45 million in watershed protection programs on Oahu been analyzed?

Response:
Watershed protection and management is a specific water resource management objective realizing the importance of enhancing sustainable supplies. To this end, BWS has created a watershed protection grant program to complement our watershed protection efforts. While additional investment is needed and expected, our watershed management plans need to be completed first so a directed course of action can be identified and programmed.

17. **Comment:**
Is it possible that such watershed programs-maintained at $6 million annually-could increase the sustainable yield of Oahu's main aquifer? Please compare this alternative-in terms of additional environmental and ecosystem benefit, job creation, and water availability-with the proposed desalination facility?

Response:
From a water supply perspective, watershed management programs are implemented to protect and manage prime forest recharge areas to increase recharge and control polluted runoff. However, in our recent experience, we do well to maintain current watershed health and avoid further regulatory reduction of sustainable yield amounts due to land use and climatic changes.

The proposed desalination facility has a direct benefit in avoiding additional potable groundwater development in remote regions. The additional sustainable water supply help to support Oahu's growing economy and its people.

18. **Comment:**
Has a study been conducted to analyze the migration pattern of petroleum contamination?

Response:
A study has not been conducted to analyze the migration pattern of petroleum contamination. Two test wells were dug as part of the pilot plant operation of this project. One well is located in the upper limestone layer of the caprock at a depth of 300 feet, and the other well is located in the deeper Waianae basalt aquifer (BA) at a depth of 1,600 feet. The testing results of source water did indicate any petroleum contamination. The proposed 1,600-foot deep source well will draw seawater from the BA. The injection wells will be located in the caprock.

19. **Comment:**
The EISPN states that the source water wells will be tested as part of the source water permit procedure with the Department of Health. Is this a continuous monitoring procedure or only a periodic sampling?

Response:
All of the source wells at the site will be required to meet Department of Health Safe Drinking Water Act requirements. Compliance will require initial and periodic testing. Regular monitoring will be performed to ensure the source and product meet standards and specifications.

20. **Comment:**
Do the RO membranes work as effectively in the presence of petroleum?

Response:
Petroleum will detrimentally impact the acetate-based reverse osmosis membranes. Since the caprock aquifer in this area is approved for underground injection of industrial waste products, the brine concentrate disposal is being permitted for discharge into the caprock. The seawater basal aquifer exists 1,000 feet below the caprock and samples show no evidence of contamination or hydraulic connection between the two geologic formations.

21. Comment:
What is the ultimate fate of these materials (waste streams)?

Response:
The brine concentrate and membrane backwash effluent will be disposed of in caprock injection wells.

22. Comment:
How often do the filters need to be replaced? Where will they be disposed?

Response:
The reverse osmosis filters are expected to last up to ten years. The used acetate filters will contain chlorides and are not classified as hazardous waste and can be disposed of through regular means.

23. Comment:
Have any public attitude surveys been conducted to gauge public sentiment toward drinking desalinated water?

Response:
There are two main desalination projects in the United States that have come on-line in the recent past. Tampa Bay in Florida recently activated its desalination plant. The Tampa Bay Estuary Guardian held a symposium and found the following public perception of desalination in general.

The question was, "To what extent did the participants support desalination as an alternative water source?"

55% said Very Much
28% said Yes, but with Reservations
13% said As The Last Resort
5% said Not At All

The other facility of recent construction is the desalination facility in Santa Barbara, California. In June 1991, City voters supported both the State Water Project and desalination as permanent water supplies and the City has included the combined State Water Project/ desalination option in its Long-Term Water Supply Program (LTWSP). Since the plant never became operational, due to the demise of the drought, little public perception information is available.

We conducted a community outreach program, which informed leeward community organizations about the desalination project. Section 4.13 of the Draft EIS summarizes the community comments. The acceptability of drinking desalinated water was not a major issue. Seawater desalination is prevalent and acceptable in many areas of the world.

24. Comment:
In a letter dated April 25, 2000 from the U.S. Fish and Wildlife Service to the City and County Planning and Permitting Director, the presence of Achyranthes splendens on land adjacent to the project site was mentioned and a recommendation was made that a survey for the plant be conducted. Was a specific survey for Achyranthes conducted?

Response:
A complete fauna reconnaissance was completed as part of the EIS process. No native species were observed in the survey. No survey for Achyranthes splendens was completed, as none were observed.

We appreciate your thorough comments. If you have any questions, please contact Barry Usagawa at 748-5900.

Very truly yours,

Barry Usagawa

BARRY USAGAWA, PE
Water Resources Principal Executive

cc: Oceanit