BENJAMIN J. CAYETANO
GOVERNOR

BULLETIN
9/23

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
JADINE Y. URASAKI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 SO. NIMITZ HWY. • HONOLULU, HAWAII 96813-4898

IN REPLY REFER TO:
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QUALITY CONTROL

September 4, 2002

Mr. Thomas C. Simmons, Vice President
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Simmons:

Subject: Acceptance of the Final Environmental Impact Statement
Waiau Fuel Pipeline Project, State of Hawaii Energy Corridor, Oahu

This letter is to inform you that the Department of Transportation, Harbors Division, accepts the *Final Environmental Impact Statement for the Waiau Fuel Pipeline Project* within the State of Hawaii's Energy Corridor as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes and Title 11, Chapter 200 of the Hawaii Administrative Rules. The document adequately describes the environmental, social, and economic impacts, which are likely to occur should this project be implemented. The analysis, together with the comments made by reviewers and your responses to them, provide useful information to policymakers and the public.

We find that the mitigation measures proposed in the *Final Environmental Impact Statement* will minimize the adverse impacts of the project. Therefore, if this project is implemented, the Hawaiian Electric Company, Inc. (HECO) and/or its agents should perform these or alternative, but at least equally effective, mitigation measures, at the discretion of the permitting agencies. Should there be any questions, please call Mr. Derrick Lining, Property Manager, at 587-1944.

Very truly yours,

GLENN M. OKIMOTO
Harbors Administrator

c: Office of Environmental Quality Control

2002 - Oahu - FEIS -
Waiau Fuel

AUG 23 2002
FILE COPY

Final Environmental Impact Statement

WAIAU FUEL PIPELINE PROJECT

PREPARED FOR:
Hawaiian Electric Company, Inc.

PREPARED BY:
PLANNING SOLUTIONS

JULY 2002

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

July 23, 2002

Subject: Waiau Fuel Line Project
Final Environmental Impact Statement (FEIS)

Dear Participant:

Today Hawaiian Electric Company, Inc. (HECO) submitted the *Final Environmental Impact (FEIS)* for its proposed Waiau Fuel Pipeline Project to the Harbors Division of the State Department of Transportation. The document was prepared pursuant to Hawai'i's EIS law (Chapter 343, Hawai'i Revised Statutes) and implementing regulations (Hawai'i Administrative Rules, Title 11, Chapter 200). HECO also submitted copies of the *FEIS* to the State Office of Environmental Quality Control (OEQC) and expects that OEQC will announce this in the August 8, 2002 edition of *The Environmental Notice.*

I have enclosed a copy of the *FEIS* for your records. If you have any questions or would like additional information, please call me at 543-7746 or the project consultant, Mr. Perry White, at 593-1288.

Sincerely,

Ken Fong,
Project Manager

Enclosure: FEIS

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

Final Environmental Impact Statement

WAIAU FUEL PIPELINE PROJECT

SIGNATORY CERTIFICATION:

This Final Environmental Impact Statement and all ancillary documents were prepared under my direction or supervision, and, to the best of my knowledge, the information submitted fully addresses the document content requirements as set forth in HAR §11-200-18.

Perry J. White 7/23/02

Perry J. White Date

PREPARED FOR:
Hawaiian Electric Company, Inc.

PREPARED BY:
PLANNING SOLUTIONS

JULY 2002

PROPOSED ACTION

Project:	WAIAU FUEL PIPELINE PROJECT
Applicant:	Hawaiian Electric Company, Inc. P.O. Box 2750 Honolulu, Hawaii 96840-0001 Contact: Ken Fong (543-7746)
Approving Agency:	State Department of Transportation Ali'iaimoku Building, Room 509 869 Punchbowl Street, Honolulu, HI 96813
Location:	State Energy Corridor, between Campbell Industrial Park (CIP) and Waiau, Existing HECO easements and property in CIP, and HECO property at CIP, Waiau, and Iwilei.
Proposed Action:	Construction and operation of a new fuel oil pipeline from Barbers Point Tank Farm to Waiau Power Plant and ancillary facilities
Associated Actions Requiring Environmental Assessment:	• Long-term commitment of State-owned land through a lease in the State Energy Corridor and through granting of an easement in the former Oahu Rail & Land Company Right-of-Way (OR&L ROW) near Pouhala Marsh. • Crossing under former OR&L ROW designated Historic Site at Kalaeloa Blvd. • Possible Use of Lands within the State Conservation District at Pouhala Marsh if OR&L ROW easement is not granted.
Tax Map Keys:	Zone 9, Parcels in Sections 1, 3, 4, 6, 7, and 8
State Land Use Districts:	Mostly Urban with some Agriculture. Conservation District through Pouhala Marsh only if easement in OR&L ROW past Marsh is not granted.
Consultant:	Planning Solutions, Inc. 1210 Auahi Street, Suite 221 Honolulu, HI 96814 Contact: Perry White (593-1288)

NOTES ON FORMAT USED TO DEPICT REVISIONS

The following notation has been used to depict substantive differences between this document and the *Draft Environmental Impact Statement*:

- **Insertions are noted by a double underline;**
- **Deletions are noted with a ~~strike-through~~.**

All changes, whether insertions or deletions are indicated by a vertical line in the outside margin of the changed page.

SUMMARY

Hawaiian Electric Company, Inc. (HECO) is proposing to construct a new, 13-mile-long pipeline between its Barbers Point Tank Farm (BPTF) in Campbell Industrial Park and its Waiau Generating Station in Pearl City. HECO is seeking a lease from the State Department of Transportation that will allow it to use space in the State Energy Corridor (SEC) for this purpose. The proposed new pipeline will allow HECO to transport fuel to Waiau more efficiently, with lower environmental risk, and at a lower cost than the present system. Over the long term, customers would pay significantly less if HECO uses the new pipeline.

Known as the "Waiau Fuel Pipeline Project", the 8-inch insulated pipeline and ancillary facilities would allow HECO to continue supplying low-sulfur fuel oil (LSFO) to Waiau after its current contract with Chevron expires at the end of 2004. Waiau's nearly 400 megawatts of installed LSFO-fired generating units represent nearly a quarter of O'ahu's total generating capacity, and their continued availability is critical to insuring a reliable supply of electricity to HECO's customers. This Environmental Impact Statement describes HECO's proposal and two alternatives and analyzes the anticipated environmental impacts that would result from their implementation. It also discusses the impacts of "no action".

S-1.0 HECO FUEL DELIVERY OPTIONS FOR WAIAU

S-1.1 OBJECTIVES OF THE PROPOSED ACTION

HECO's objectives for the proposed action are to provide an improved means of continuing to supply fuel to its Waiau Generating Station over the long term while maintaining environmental quality and maintaining costs to its customers at a reasonable level. These costs include those that could result from a leak or other failure in the system as well as operating and capital costs.

S-1.2 ACTION ALTERNATIVES EVALUATED IN DETAIL

This document evaluates the following three "Action Alternatives".

- Waiau Fuel Pipeline Project (Preferred Alternative): HECO's proposed action is to construct a new 8-inch insulated pipeline between its BPTF and Waiau Generating Station, combined with trucking fuel from the BPTF to the Iwilei Tank Farm for use in the Honolulu Generating Station. Most of the route is within the existing State Energy Corridor.
- Continue to Use the Chevron Pipeline: This alternative consists of a long-term extension of the existing fuel supply agreement with Chevron and continued use of the existing Chevron pipeline to supply the Waiau Generating Station and the Iwilei Tank Farm.
- Trucking: This alternative involves the use of tanker trucks to transport LSFO from the BPTF both to Waiau and to the Iwilei Tank Farm.

S-1.3 THE "NO ACTION ALTERNATIVE"

The "No Action" Alternative consists of failing to arrange for delivery of LSFO to Waiau beyond the end of HECO's current contract with Chevron. This would result in the loss of nearly a quarter of O'ahu's electrical generating capacity and would likely force HECO to implement rolling blackouts. It cannot be emphasized too strongly that this alternative would not meet the objectives of the proposed action.

S-1.4 COMMUNITY INPUT IN PLAN DEVELOPMENT

HECO made its public consultation efforts an integral part of the planning and design process for the Waiau Fuel Pipeline project. It undertook a community outreach program designed to help it understand and address the concerns of those who would be directly affected by the proposed project.

HECO's program was aimed at residents, businesses, and other stakeholders along the proposed fuel line corridor. Program objectives included:

- Incorporating the knowledge and input of community leaders in understanding and approaching the affected communities;
- Informing community associations and regional organizations of the purpose of and need for the new fuel line and providing forums for discussion of the project; and
- Contacting groups and individuals affected by the preferred alternative in ways that were conducive to fully informing them of the project, eliciting their comments, and providing avenues for future communication. This included going door-to-door to speak individually with residents and businesses along the proposed pipeline route.

The feedback HECO received from the community played an important role in shaping its "preferred alternative". Specific examples of the design elements that have been added or modified in response to the information it has obtained through its public outreach efforts include the following:

- Initially, HECO planned to use conventional trenching techniques to install most of the pipe. In response to concerns that were expressed about potential interference with businesses and vehicle traffic on busy roads, it has substantially increased the amount of pipe installed using advanced directional drilling techniques. For example, HECO's early plans to cross in front of the Kapolei Shopping Center called for a combination of open trenching and directional drilling. However, because of the traffic impact concerns raised and as a result of further investigation of the situation, HECO is now planning to cross the entire shopping center complex frontage using two or three directional drilling operations as the primary construction technique.
- To avoid construction in the proposed Pouhala Marsh Wildlife Sanctuary, HECO is seeking an easement from the State Department of Transportation that will allow it to route its pipeline outside the portion of the State Energy Corridor that passes through Pouhala Marsh.
- In response to concerns raised by proponents of the bike and railroad improvements around Pearl Harbor that are part of the Pearl Harbor Historic Trail initiative, HECO changed the proposed location of several pipeline block valves and is planning to install the valves underground.

S-2.0 PROPOSED ACTION AND ALTERNATIVES

S-2.1 PROPOSED WAIAU FUEL PIPELINE

HECO's Proposed Action includes the construction of a new pipeline from HECO's Barbers Point Tank Farm (BPTF) to the Waiau Generating Station. The insulated pipeline would be approximately 13 miles in length, would be located largely alongside two existing pipelines owned by Tesoro and The Gas Company within the State Energy Corridor, and would transport heated LSFO. In addition to the BPTF-to-Waiau pipeline, the overall project would require some modifications to the BPTF, Waiau, and Iwilei facilities to accommodate the transport system. It would also include trucking of fuel from the BPTF to HECO's Iwilei Tank Farm; this would replace fuel that would no longer be transported by Chevron. HECO estimates that construction would begin in the summer of 2003 and that the total capital costs would be about $27 million.

S-2.1.1 PROPOSED PIPELINE ROUTE

HECO's proposed Waiau Fuel Pipeline would run 13 miles from a pumping station located within the BPTF to existing fuel storage tanks at the Waiau Generating Station. A second, much shorter (0.6 mile), pipeline would be installed adjacent to this pipeline over the first portion of the route to connect the BPTF with the existing HECO pipeline that supplies the Kahe Generating Station. The proposed Waiau Fuel Pipeline route enters the State Energy Corridor (SEC) at the intersection of the former Oahu Rail and Land Co. (OR&L) right-of-way (ROW) and Kalaeloa Boulevard. The SEC

route passes through the 'Ewa Plain, mostly along the *mauka* side of Farrington Highway and then, after crossing beneath the Fort Weaver Road interchange, continues to join the former OR&L railroad ROW near the shoreline of Pearl Harbor's West Loch.

The proposed pipeline route continues within the SEC as it proceeds eastward, leaving the corridor only to detour around the portion of the SEC that lies within Pouhala Marsh. It makes this detour to avoid the wetland and endangered waterbird sanctuary that is being established there. The pipeline would remain underground for the entire route until it enters HECO property at Waiau, where the pipeline would be supported on low, above-ground concrete piers until it crosses over the Navy Utility Corridor on an existing overpass into the large LSFO storage tanks at the Waiau Generating Station.

S-2.1.2 MAJOR PIPELINE COMPONENTS

The pipe that would be used for the proposed Waiau fuel pipeline would be a high grade steel pipe with a wall thickness of 0.322 to 0.5 inches, depending on the specific location of the pipe section. The pipe would be insulated to minimize heat loss and keep the highly viscous LSFO warm enough to flow freely. The pipe would also be coated completely with a fusion-bonded epoxy to protect against corrosion. The proposed design includes six remotely actuated valves that allow operators to isolate one part of the pipeline from another, thereby limiting the size of potential spills. The valve locations were selected to protect high population areas and water bodies in the event of an accidental pipeline leak. The proposed valves are located adjacent to existing easements, roads, and streets and would be accessed by existing public and private roads.

The pipeline operating system that is part of the proposed design permits the pipeline operators, located either at the Waiau Station or the BPTF, to monitor the flow of fuel through the system in real time and to obtain immediate notification of any unusual conditions along the route. This monitoring system includes a fiber-optic cable that links the Waiau and Barbers Point terminations of the pipeline and makes connections to sensors at the in-line valve locations along the pipeline.

HECO would install several new pieces of equipment at the BPTF. These include heaters, pumps, valves, inspection equipment, and meters. It would also install a storage tank for diesel fuel: this is required for system inspection and maintenance and for an emergency generator. Finally, HECO would construct a small, fuel-truck loading facility that it would use to fill fuel tanker trucks destined for the Iwilei Tank Farm. All facilities would be located well within the existing property boundaries.

HECO would make several small additions to the Waiau Generating Station to accommodate the new pipeline. These include installing the metering, inspection and valve assemblies needed to receive the LSFO and to maintain and monitor the system. It would also modify an existing fuel line support structure to accommodate the additional pipe. Finally, HECO would establish a Pipeline Operations Control Center within existing buildings to oversee all pipeline operations. Proposed modifications to the Iwilei Tank Farm include installation of a truck unloading station, relocation of existing aboveground piping, and installation of a new entrance and driveway paving.

S-2.1.3 GENERAL PIPELINE CONSTRUCTION TECHNIQUES

Construction of the proposed pipeline would involve several types of activities. Pre-construction activities would include detailed field surveying of the route, various engineering and geotechnical studies, and development of traffic management plans for areas where construction activities have the potential to interfere with normal traffic flow.

HECO would work with local police and traffic engineers to assure that adequate access is maintained where temporary street closures may occur. Businesses along the pipeline route would be informed in advance of planned construction dates. Existing access to businesses near the proposed route would be maintained throughout the construction, consistent with safe construction practices. HECO would notify service providers of intended construction to avoid conflict with existing utilities and

disruptions of service to utility customers. All areas affected by pipeline construction would be restored to their pre-construction condition. Where practical, HECO would identify alternate bikepath routes to be used during the construction period.

Pipeline construction involves clearing and grading, trenching, pipe installation, backfilling, cleanup and restoration. Pipe-stringing trucks would be used to transport the pipe in 40- to 80-foot lengths from the shipment point or storage yards to the pipeline ROW. HECO intends to bore or directionally drill under all major paved road crossings. Preliminary interactions with community leaders, landowners, the Neighborhood Boards, and many members of potentially affected communities have helped to identify the most likely crossings where boring and directional drilling would be employed. HECO's present plans call for construction of the pipeline to commence in the third quarter of 2003 and to be completed around the middle of 2004.

S-2.1.4 PIPELINE OPERATION

Once construction is completed and the pipeline tested, heated LSFO would be introduced to the pipeline and normal continuous operation could commence. On the rare occasions when HECO would shut down the system for inspection and maintenance, diesel oil would be pumped into the line, "displacing" the LSFO from the line into existing heated storage tanks at Waiau Generating Station. Fuel trucks (approximately 5 truck-loads per day) would carry fuel from the BPTF to the Iwilei Tank Farm for eventual use in the Honolulu Generating Station. The operational life of the pipeline would depend on the needs of the Waiau Generating Station over time. HECO has projected the economic life of the pipeline to be 30 years but there is no reason why, if needed, the pipeline cannot operate for 50 years or longer with proper maintenance. Once the operational lifespan of the pipeline is reached, HECO would, consistent with its easement lease with the State of Hawai'i be responsible for the costs either of abandoning or removing the pipeline system. Commonly, pipelines are abandoned in place after being purged and cleaned of fuel. HECO estimates that the 30-year levelized annual revenue requirement for the proposed Waiau Fuel Pipeline project would be approximately $6.4 million per year.

S-2.2 NEW CHEVRON CONTRACT

As noted above, the LSFO used at the Waiau Generating Station is now delivered through Chevron's 8-inch black-oil pipeline that runs from Campbell Industrial Park to Waiau and then to the Honolulu Marine Terminal at Pier 30. This Alternative involves continuing to use this pipeline and assumes that a new contract with Chevron can be negotiated.

Because the line is not insulated, Chevron must heat the fuel to a relatively high temperature (about 190 degrees F) and pump it at a high rate (~1,000 barrels per hour) to ensure that it reaches Waiau before it cools to the point where it becomes too viscous to flow. Because this pumping rate exceeds the needs of the power plant, Chevron cannot operate the line continuously. Instead, Chevron batch-ships LSFO to Waiau by pumping at approximately 1,000 barrels per hour for three days. When not in operation, a light, less viscous fuel is placed in the pipeline. This lighter oil, typically No. 5 fuel oil, remains in the line for approximately one to two weeks until the line is needed for the next LSFO shipment to Waiau or Iwilei. The Chevron pipeline is within easements from property owners along the route.

Chevron has an active pipeline maintenance program. The program includes regular inspections of the pipeline, with annual maintenance work based on the results of the most recent inspections. This alternative assumes that these activities would continue at levels needed to meet applicable pipeline regulations but that no major upgrade would be undertaken. The maintenance activities may eventually result in all of the original pipe in the Chevron system between the BPTF and Iwilei being replaced with new pipe.

Negotiating a new contract with Chevron does not require the initial capital investment needed for the proposed Waiau Fuel Pipeline, but it has substantially higher operating costs. HECO estimates that

the 30-year levelized annual revenue requirement for this alternative would be approximately $8.5 million per year. This would make it approximately $2.1 million per year more costly than the proposed Waiau Fuel Pipeline project on a levelized annual revenue requirement basis.

S-2.3 TRUCK DELIVERY

This alternative involves the use of trucks to transport fuel from the BPTF to both Waiau and Iwilei. Fuel trucks would use existing public highways. Much of the route would be on the H-1 Freeway, but this alternative would also place a substantial number of tanker trucks on Kamehameha Highway and other surface streets near the Waiau Generating Station. Construction of truck loading facilities at the BPTF and truck unloading facilities at Waiau and Iwilei would be required.

Fuel truck fleet requirements would be between 6 and 14 trucks for the 51 to 81 daily Waiau fuel deliveries and 2 to 3 trucks for the Iwilei Tank Farm fuel deliveries. HECO estimates that the 30-year levelized annual revenue requirement for this alternative would be approximately $8.0 million per year. This would make it over $1.6 million per year more costly than HECO's proposed Waiau Fuel Pipeline project on a levelized annual revenue requirement basis.

S-2.4 NO ACTION ALTERNATIVE

In the case of HECO's proposed Waiau Fuel Pipeline project, "No Action" consists of failing to arrange for continued delivery of LSFO to Waiau beyond the end of the current contract between HECO and Chevron. This would prevent the operation of nearly a quarter of the installed electrical generating capacity on O'ahu. It cannot be emphasized too strongly that this alternative would not meet the objectives of the proposed action. "No Action" is included only because it is needed to fulfill the requirements of State law.

S-3.0 OVERVIEW OF THE EXISTING ENVIRONMENT

S-3.1 TOPOGRAPHY, SURFACE WATER, AND GROUNDWATER

All project components are situated on O'ahu's southern coastal plain on lands that are relatively level, with slopes of a few percent or less. Over the 13-mile-long route from HECO's Barbers Point Tank Farm to its Waiau power plant, the proposed Waiau Fuel Pipeline crosses six normally dry gulches and eight streams or man-made channels which are perennial and/or tidal. The Chevron pipeline crosses the 'Ewa Plain at locations further *makai* than the proposed Waiau Fuel Pipeline and is closely aligned with the proposed Waiau pipeline route around the shoreline areas of Pearl Harbor. The Chevron route also continues past the Waiau Generating Station to the Iwilei Tank Farm very near to Honolulu Harbor. Truck transport of the fuel from the BPTF to Waiau and Iwilei involves crossing all of the same waterways as the pipelines using major existing thoroughfares. The proposed pipeline route passes over four groundwater aquifers; the Chevron pipeline route crosses the 'Ewa Caprock Aquifer before arriving at the shoreline of Pearl Harbor and passes through several groundwater aquifers after passing the Waiau Generating Station. No aboveground structures that are part of the Action Alternatives are in Special Flood Hazard Areas.

S-3.2 NATURAL ECOSYSTEMS

The 'Ewa Plain ecosystems through which both pipeline routes pass consist of introduced plant and animal species typical of roadside habitats. In the Pearl Harbor shoreline areas, the pipeline routes are close to several wetlands that are used by endangered waterbirds. No substantial natural flora or fauna communities exist at or near the Iwilei Tank Farm.

S-3.3 HISTORIC AND ARCHAEOLOGICAL RESOURCES

Portions of the State Energy Corridor route that HECO proposes to use between West Loch Estates and Waipi'o Point Access road are located within the former O'ahu Railroad and Land Company

(OR&L) railroad system right-of-way. The majority of the Chevron pipeline is located within the former OR&L railroad system right-of-way; the railroad tracks between the communities of 'Ewa and Nānākuli are listed on the Hawai'i Register of Historic Places and on the National Register of Historic Places. No traditional native Hawaiian cultural practices, beliefs, and/or properties of any kind are known to exist within the pipeline corridors.

S-3.4 LAND USE AND LAND OWNERSHIP

The BPTF and the western ends of the pipeline routes are in the Campbell Industrial Park. The routes then pass through several residential developments and agricultural lands until reaching the shoreline along West Loch of Pearl Harbor. Except for the wetlands on the Pearl Harbor shoreline (including Pouhala Marsh), all of the areas near which the fuel pipelines pass are in either the Urban or Agricultural State Land Use Districts. The Iwilei Tank Farm is located in the industrial area adjacent to Honolulu Harbor.

HECO owns the parcels that contain the BPTF, the Waiau Generating Station, and the Iwilei Tank Farm. The proposed pipeline route lies within HECO rights-of-way, the State Energy Corridor, and the OR&L right-of-way. The Chevron route lies within several easements established for the pipeline within the former OR&L right-of-way. The easements for both pipelines are generally non-exclusive, and land ownership is by various private and government interests.

S-3.5 EXISTING INFRASTRUCTURE

The facilities that would be constructed or modified by the action alternatives are all accessible from existing public or private roads. The pipeline corridors are generally located along roadway corridors. A major concern in the installation, maintenance, or replacement of the fuel pipeline would be the existence of buried electrical and communication lines, water pipelines, and sewer and stormwater lines along the routes.

S-4.0 PROBABLE IMPACTS OF THE ACTION ALTERNATIVES

Continuing to provide the fuel needed to operate the Waiau Generating Station involves the transport of large quantities of LSFO from the BPTF to Waiau. This section describes and compares the anticipated environmental impacts associated with each of the three "Action Alternatives" described above. The comparison of the Action Alternatives is presented in two tables. Table S-1 outlines the predicted impacts for construction, maintenance, and decommissioning activities. Table S-2 summarizes impacts associated with operation of the systems that are included in each Alternative.

The design and operational plans for the proposed Waiau Fuel Pipeline project incorporate many provisions designed to avoid leaks. These include:

- the use of a high quality pipe and coating system selected for its resistance to corrosion;
- the use of a state-of-the-art cathodic protection system;
- the provision of multiple remotely operated valves that allow segments of the pipeline to be isolated from the remainder of the pipeline, thereby minimizing the volume of oil that could be released at any one point along the route; and
- the real time system used to detect a leak and establish its location.

While HECO's plans provide many redundant design features and operational safeguards to avoid a release, there is a remote possibility that a combination of equipment failure, human error, or some outside force (whether from a deliberate act, heavy construction equipment working in areas where it should not, or other source) could result in the release of oil. The proposed Waiau Fuel Pipeline would contain LSFO at least 99.8 percent of the time. Because LSFO is solid at temperatures below 120 degrees F, the effects of an accidental release during the time it is in normal use would be limited

to the area immediately around the leak or break. Only if a release occurred during the 0.2 percent of the time that the pipeline contained the lighter oil used during periodic inspections could it travel further. As evidenced by field studies of previous pipeline accidents of a similar nature, even in the unlikely event a release occurred during such infrequent inspections the effects, while locally significant, are not expected to persist in the environment for more than two or three years, given the response and remediation actions that would be taken.

S-5.0 IMPACTS OF THE NO ACTION ALTERNATIVE

The "No Action" Alternative consists of failing to arrange for the continued delivery of LSFO to the Waiau Generating Station beyond the end of the current fuel delivery contract between HECO and Chevron. This would make it impossible for HECO to operate the LSFO-fired generating units that are located there. It cannot be emphasized too strongly that this alternative would not meet the objectives of the proposed action (i.e., of continuing to provide fuel to its existing facilities). "No Action" is included only because it is needed to fulfill the requirements of State law.

The LSFO-fired units at Waiau have a rated capacity of 397 megawatts, nearly a quarter of HECO's system total. Without these units, HECO would not be able to satisfy its Public Utility Commission-accepted capacity planning criteria. This would inevitably lead to shortfalls in generating capacity. When those occur, they could only be made up by load-shedding, i.e., the purposeful suspension of service to customers (blackouts). Residential customers are likely to bear a disproportionately large share of this down-time. Service interruptions of the magnitude that could occur in the "No Action" scenario are likely to be severe enough to result in substantial and debilitating disruptions to the O'ahu and the State of Hawai'i economies.

S-6.0 CONSISTENCY WITH EXISTING POLICIES, CONTROLS, AND LAND USE PLANS

HECO's Proposed Waiau Fuel Pipeline project is consistent with the applicable policies, controls, and plans. These include Federal Controls such as the Oil Pollution Act of 1990, the Hazardous Liquid Pipeline Safety Act of 1979, and the Clean Water Act; State of Hawai'i Policies, Controls, and Plans such as the Hawai'i State Plan, the State Model Energy Code, the designation of the State Energy Corridor, and the Coastal Zone Management Program; County plans such as the O'ahu General Plan, the 'Ewa Development Plan, the Central O'ahu Sustainable Communities Plan, and the Pearl Harbor Historic Trail Master Plan; and the City and County of Honolulu Land Use Ordinance and Special Management Area regulations.

S-7.0 OTHER CHAPTER 343 TOPICS

S-7.1 SECONDARY AND CUMULATIVE EFFECTS

The proposed Waiau Fuel Pipeline project is designed to provide a stable, long-term means of supplying the Waiau Generating Station with fuel. It does not affect the capacity of the Station to supply electricity to its customers, lead to any substantial changes in the existing supply system, or involve the provision of services not previously available to HECO's customers. The proposed action is not expected to substantially affect the Island or region's population. No indirect changes in land use or value in these areas or nearby areas would be expected.

S-7.2 SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY

HECO believes that there are substantial advantages to the construction of a new pipeline to supply fuel for the Waiau Generating Station. It has chosen this approach over a continuation of the existing

situation because it believes that its preferred alternative is likely to lead to lower long-term costs to HECO customers and higher system reliability.

S-7.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

The construction of the proposed pipeline does not commit HECO to the continued use of fossil fuels for power generation. Continued operation of the Waiau Generating Station will have no bearing on HECO's efforts to pursue meeting future energy needs with additional generation utilizing new technologies, including renewable energy and other developing technologies. The Company would continue all prudent efforts to achieve the targets established in the State's renewable portfolio standards. It does require the consumption of non-renewable resource (in this case petroleum and building materials) and the emission of air pollutants during construction.

S-7.4 REQUIRED PERMITS AND UNRESOLVED ISSUES

The permits and other approvals that HECO will need for the proposed project are summarized in Table 2-7. HECO's extensive public and agency consultations have allowed it to resolve most issues that have come to light. The one issue that remains is whether the State Department of Transportation will grant an easement within the former OR&L right-of-way that will allow HECO to bypass the portion of the SEC that is within Pouhala Marsh.

S-7.5 RATIONALE FOR PROCEEDING

HECO is committed to avoiding or mitigating adverse effects to the greatest extent practical within the limits of its other responsibilities. As O'ahu's chartered public utility, the company is obligated to meet the electrical power needs of the Island's residents and businesses. HECO has made fundamental design choices that it believes will improve the efficiency with which fuel is delivered to the Waiau Generating Station and reduce the potential for accidental damage to the environment. It does not believe that there are alternatives, including those considered in this report and others, that would achieve the same goals with fewer environmental effects.

S-8.0 PARTIES CONSULTED

HECO consulted with numerous State, County, and Federal agencies in formulating its plans for maintaining an uninterrupted supply of LSFO to Waiau. It also undertook a comprehensive community outreach program designed to help it understand and address the concerns of those who would be directly affected by the proposed Waiau Fuel Line project. The program was aimed at residents, businesses, and other stakeholders along the proposed fuel line corridor. Results from these efforts led to design changes that are incorporated into the current project proposal.

Table S-1 Comparison of Impacts: Construction, Maintenance, and Pipeline Decommissioning

EIS Section	*Impact Topic*	*Proposed Action (Alt. 1) Waiau Fuel Pipeline Construction and Decommissioning*	*Alternative 2 Chevron Pipeline Maintenance and Decommissioning*	*Alternative 3 Trucking Construction*
4.1	**Topography, Geology, and Soils**	Minor, temporary disturbances due to trenching, stockpiling, and filling. Removal and off-site disposal of material from trench.	Minor, temporary disturbances due to trenching and filling associated with pipeline maintenance.	Very minor, temporary disturbances due to facility construction within HECO property.
4.2	**Climate and Air Quality**	Minor, temporary dust and vehicle exhaust from construction and decommissioning; no exceedance of Air Quality Standards.	Minor, temporary dust and vehicle exhaust from maintenance and decommissioning; no exceedance of Air Quality Standards.	Very minor, temporary dust and vehicle exhaust from construction and maintenance of fuel truck loading & unloading facilities; no exceedance of Air Quality Standards.
4.3	**Surface Water**	Minor increase in construction stormwater runoff from BPTF; construction stormwater runoff minimized using Best Management Practices (BMPs); temporary partial coffer dam during trenching across Waiawa Stream. Effects on other water bodies avoided by directional drilling.	Potential minor temporary increases in stormwater turbidity minimized or eliminated through construction BMPs.	Very minor temporary increases in stormwater runoff due to facility construction; minimized or eliminated through BMPs
4.4	**Groundwater**	No substantial use of water; trenching would not intercept water table; no effect on groundwater quality.	No substantial use of water; trenching intercepts water table in some areas, necessitating de-watering; no effect on groundwater quality.	No substantial use of water; construction would not intercept water table; no effect on groundwater quality.
4.5	**Aquatic Communities**	Minor, temporary effect from open trenching of Waiawa Stream; some temporary disruption of wetland communities if OR&L ROW easement not granted around Pouhala Marsh; no permanent loss of wetlands.	Minor, temporary disruptions possible during maintenance or replacement of stream crossings; some temporary disruption of wetland communities if sections in wetland areas need maintenance.	No impacts.
4.6	**Terrestrial Flora**	Minor temporary impacts from trenching, grading and stockpiling; mitigated by replanting; no rare or endangered flora present.	Minor temporary impacts from trenching, grading and stockpiling; mitigated by replanting.	Replacement of scrubby growth of koa haole, sourbush, and Natal redtop grass at Waiau Generating Station with truck unloading facility; no substantial impacts.

EIS Section	*Impact Topic*	*Proposed Action (Alt. 1) Waiau Fuel Pipeline Construction and Decommissioning*	*Alternative 2 Chevron Pipeline Maintenance and Decommissioning*	*Alternative 3 Trucking Construction*
4.7	**Terrestrial and Avian Fauna**	Possible temporary displacement of waterbirds and other animals during construction; proposed routing outside SEC at Pouhala Marsh avoids adverse effect on restoration area; no loss of threatened or endangered species or their habitats.	Temporary displacement of waterbirds and other animals during maintenance; no loss of threatened or endangered species or their habitats.	No substantial impacts.
4.8	**Historic, Cultural, & Archaeological Resources**	Impacts to historic and archaeological resources unlikely due to disturbed nature of pipeline route. Potential impacts to fishponds mitigated by testing program if necessary; potential impacts to OR&L railway mitigated by drilling under railway bed; potential impacts to unknown burial sites mitigated by monitoring in sensitive areas; no substantial cultural impacts.	Impacts to historic and archaeological resources unlikely due to disturbed nature of pipeline route. Potential impacts to fishponds mitigated by testing program if necessary; potential impacts to OR&L railway mitigated by replacing any disturbed associated structures; potential impacts to unknown burial sites mitigated by responding to unexpected finds; no substantial cultural impacts.	Only active facilities, disturbed industrial lands and roadways affected; no substantial cultural impacts.
4.9	**Visual Resources**	Aboveground structures all in existing industrial facilities; no significant interference with sight lines; minor temporary impacts in some areas during pipeline construction.	No visible new construction except possible reconstruction of pipe crossing bridges and drainageways; no loss of sight lines; minor temporary impacts in some areas during pipeline maintenance requiring pipe replacement.	New structures <20' high in existing industrial facilities; fuel truck unloading facilities at Waiau slightly visible from Kamehameha Highway; no substantial adverse impacts.
4.10	**Transportation and Traffic**	No impacts due to construction at the BPTF, Waiau, or Iwilei; potential impacts at crossings of busy roadways eliminated by drilling in lieu of open trenching; brief lane closures possible over <2 mi. along route; construction during off-peak hours would mitigate potential impacts to traffic; no substantial impacts to roadways' levels of service.	Potential temporary traffic disruptions due to maintenance activities; assuming roadway crossing made using same techniques as for the proposed Waiau Fuel Pipeline, no substantial impacts expected.	No substantial impacts due to new facility construction; construction of fuel truck entrance and exit at Waiau could require temporary lane closure.

EIS Section	*Impact Topic*	*Proposed Action (Alt. 1) Waiau Fuel Pipeline Construction and Decommissioning*	*Alternative 2 Chevron Pipeline Maintenance and Decommissioning*	*Alternative 3 Trucking Construction*
4.11	**Noise**	Construction noise apparent in residential areas close to pipeline route; construction noise permit needed; limiting noisy construction work to daytime hours combined with short duration of incompatible noise levels avoids substantial adverse effect.	Construction noise apparent in residential areas close to pipeline route; construction noise permit needed; limiting noisy construction work to daytime hours combined with short duration of incompatible noise levels avoids substantial adverse effect.	Only construction noise limited to areas close to BPTF, Waiau, and Iwilei; isolation from noise-sensitive areas avoids substantial adverse effect.
4.12	**Land Use and Economic Resources**	Pipeline is adjacent to existing pipelines within designated SEC and within existing industrial areas; construction activities would add about $15 million total in direct spending in Hawai'i.	No immediate new construction; however, requires continuation of aggressive maintenance and pipe replacement program; further discussion under operations, below.	Construction activities would add about $1.8 million total in direct spending in Hawai'i.
4.13	**Natural Hazards**	Except for Waiawa Stream crossing, construction activities outside areas affected by known natural hazards (e.g., flooding, earthquakes, etc.); above-ground facilities designed to withstand Zone 2A earthquake and high winds.	Pipeline has several exposed stream crossings: pipe replacement exposed to possible flood hazard.	None known.
4.14	**Public Infrastructure and Services**	Minor, temporary delays or modification in some facility access; potential for utility line breakage, impacts mitigated or avoided by proper construction planning and in-place response procedures.	Minor, temporary delays or modification in some facility access; potential for utility line breakage, impacts mitigated or avoided by proper construction planning and in-place response procedures.	No substantial impacts.

Source: Compiled by Planning Solutions, Inc.

Table S-2 Comparison of Impacts: Normal Operations

EIS Section	*Impact Topic*	*Proposed Action (Alt. 1) Waiau Fuel Pipeline Operation*	*Alternative 2 Chevron Pipeline Operation*	*Alternative 3 Trucking Operation*
4.1	**Topography, Geology, and Soils**	No impacts	No impacts	No impacts
4.2	**Climate and Air Quality**	No substantial impacts; no exceedance of air quality standards	No substantial impacts; no exceedance of air quality standards	No substantial impacts; fuel truck operations increase pollutants on roadways; no exceedance of air quality standards
4.3	**Surface Water**	No impacts	No impacts	No impacts
4.4	**Groundwater**	No impacts	No impacts	No impacts
4.5	**Aquatic Communities**	No impacts	No impacts	No impacts
4.6	**Terrestrial Flora**	No impacts	No impacts	No impacts
4.7	**Terrestrial and Avian Fauna**	No impacts	No impacts	No impacts
4.8	**Historic, Cultural, and Archaeological Resources**	No impacts	No impacts	No impacts
4.9	**Visual Resources**	No substantial impacts	No substantial impacts	No substantial impacts
4.10	**Transportation and Traffic**	5 fuel-truck trips per day between the BPTF and Iwilei Tank Farm; No substantial impacts	No substantial impacts	Increase in truck traffic
4.11	**Noise**	Minor increases in noise from fuel truck operations at BPTF and Iwilei facilities	No changes to existing noise levels	Some increases in noise levels along trucking routes, no substantial increases during daylight hours; potentially noticeable in early morning or evening hours

EIS Section	*Impact Topic*	*Proposed Action (Alt. 1) Waiau Fuel Pipeline Operation*	*Alternative 2 Chevron Pipeline Operation*	*Alternative 3 Trucking Operation*
4.12	**Land Use and Economic Resources**	Annualized revenue requirement is approximately $6.4 million/year makes this the most cost-effective for HECO customers; would not change land use; no potential for altering land values; addition of 5-6 permanent HECO jobs for pipeline operation and maintenance .	Annualized revenue requirement is approximately $8.5 million/year makes this the most expensive for HECO customers; No change in land use; no potential for altering land values; ongoing support for existing jobs.	Annualized revenue requirement is approximately $8.0 million/year $1.6 million/year more than preferred alternative; No change in land use; no potential for altering land values; addition of 100 permanent jobs in the community
4.13	**Natural Hazards**	No substantial exposure.	No substantial exposure.	No substantial exposure
4.14	**Public Infrastructure and Services**	No substantial impacts	No substantial impacts	Increases in fuel-truck traffic along delivery routes

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1.0 PURPOSE AND NEED

Hawaiian Electric Company, Inc. (HECO) is proposing to construct a fuel pipeline and ancillary facilities to supply fuel to its Waiau Generating Station. Referred to as the Waiau Fuel Pipeline project in this report, HECO has identified it as its "preferred alternative". The pipeline would be located mostly in the State Energy Corridor (SEC) and would extend from HECO's Barbers Point Tank Farm in Campbell Industrial Park (CIP) to the Company's Waiau Generating Station in Pearl City. HECO is seeking to obtain a lease from the State Department of Transportation to use the SEC to construct the pipeline. This Environmental Impact Statement describes the proposed project and alternatives and analyzes the environmental impacts that may result.

HECO has undertaken a number of scientific, engineering, and environmental studies in the development of this proposal. At the same time, the company has met with members of the communities through which the SEC passes, including neighborhood boards, individual residents, and others. Recommendations from these groups have influenced the design of the project, as described in the following sections. Detailed engineering is still in progress, and the project will be modified accordingly as further information becomes available.

At present, HECO obtains the low sulfur fuel oil[1] (LSFO) that it uses at its Waiau and Honolulu Generating Stations through a Chevron-owned pipeline. Chevron provides the pipeline and related facilities and services under contract to HECO. The pipeline originates at HECO's Barbers Point Tank Farm (BPTF) adjacent to the Chevron Refinery in Campbell Industrial Park (CIP). It connects the refinery and BPTF with Chevron fuel storage facilities adjacent to Honolulu Harbor. Spurs off the main Chevron pipeline feed the Waiau Generating Station and HECO's Iwilei Tank Farm.

HECO's contract with Chevron provides for Chevron to:

- Operate and maintain HECO's Barbers Point Tank Farm.
- Transport LSFO from HECO's BPTF to its Waiau Generating Station through Chevron's 8" black-oil[2] pipeline.
- Transport LSFO through Chevron's 8" black-oil pipeline from HECO's BPTF to the Company's Iwilei Tank Farm for further shipment to the Honolulu Generating Station via HECO's own 6" Iwilei pipeline.
- Operate pumping facilities located at Chevron's refinery in CIP. These facilities are used to move fuel through the 8" black-oil pipeline from the BPTF to HECO's Waiau and Kahe Generating Stations and to its Iwilei Tank Farm.
- Operate and maintain HECO's Kahe pipeline.

Historically, Chevron used only a portion of the capacity of its Barbers Point-to-Honolulu Harbor black-oil pipeline to transport HECO-owned products.[3] When not being used to serve HECO, Chevron has historically used the pipeline to move fuel from its CIP refinery to barge-loading facilities in Honolulu Harbor. From there, the barges have carried the fuel to the Neighbor Islands for use in generating stations owned by Kauai Electric, Maui Electric Company (MECO), and Hawai'i Electric Light Company (HELCO). Beginning in December 2001, Chevron switched its interisland shipments to Kalaeloa-Barbers Point Harbor. Consequently, the pipeline is used primarily for HECO-owned product.

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[1] "Low sulfur" in this context means that the fuel oil contains less than 0.5% sulfur by weight.

[2] Black oil is a class of highly viscous by-products of petroleum refining that can flow freely only when heated above normal temperatures. It is defined by the Environmental Protection Agency [Federal Register: June 17, 1999 (Volume 64, Number 116)] as a hydrocarbon liquid with an initial gas-to-oil ratio (GOR) less than 0.31 cubic meters per liter (m3/liter) and an American Petroleum Institute (API) gravity less than 40 degrees.

[3] In December 2001, this situation changed when Chevron transferred inter-island barge shipments from Pier 30 in Honolulu Harbor to the Kalaeloa-Barbers Point Deep Draft Harbor. Today, the pipeline is used primarily for HECO-owned product.

HECO's contract with Chevron expires on December 31, 2004. Because of this, HECO must make new arrangements for the continued delivery of LSFO to Waiau and Iwilei beyond that time. In the case of deliveries to Waiau, this fuel is needed for the continued operation of the existing LSFO-fired units at the Waiau Generating Station, which provides nearly 400 megawatts, or about one-quarter, of O'ahu's generating capacity. Continued operation of the Waiau and Honolulu Generating Stations will have no bearing on HECO's efforts to pursue meeting future energy needs with additional generation utilizing new technologies, including renewable energy and other developing technologies.

The remainder of this Chapter describes the alternative means available to HECO for continuing to supply fuel to Waiau and Iwilei.

- Section 1.1 briefly describes the existing fuel supply system for the Waiau and Honolulu Generating Stations.
- Section 1.2 summarizes the forecast fuel use at the relevant generating stations.
- Section 1.3 outlines the options available to HECO for continuing to supply that fuel and describes the possible alternatives that were eliminated from further consideration.
- Section 1.4 identifies the alternatives, including HECO's proposed Waiau Fuel Pipeline, that were selected for detailed impact assessment.
- Section 1.5 describes the community's input into the formulation of HECO's plans.

1.1 EXISTING WAIAU FUEL OIL SUPPLY SYSTEM

The Waiau Generating Station is one of three HECO-owned electrical generating stations on the Island of O'ahu. All of them are fired with liquid petroleum fuels originating off-island.

Table 1-1 summarizes their fuel-related characteristics. The routes of the pipelines that carry oil from the refineries and storage facilities in Campbell Industrial Park to HECO's Waiau and Kahe Generating Stations are shown in Figure 1-2.

HECO obtains fuel oil for the generating stations from Chevron U.S.A., Incorporated (Chevron) and from Tesoro, Inc. Both companies operate fuel unloading, refining, and storage facilities in CIP. Ocean-going tankers carry crude or fuel oil to the Chevron or Tesoro offshore mooring and fuel off-loading facilities. Pipelines along the ocean bottom carry the oil from these offshore moorings to the respective refineries. Both the Chevron and Tesoro undersea pipelines arrive onshore close to one another at the southwestern tip of Barbers Point.

Once at the refineries, crude oil is refined to produce gasoline, jet fuels, propane, and other light fuels. The remaining oil or "residual oil" is either stored temporarily in tanks located at the refineries or delivered immediately by pipeline directly to HECO's Barbers Point Tank Farm. In some cases, the refineries import fuel oil that has already been processed elsewhere. Whether it is delivered directly or is first processed or stored at the refineries, all of the LSFO that is consumed at HECO's generating stations eventually passes through the Barbers Point Tank Farm. Figure 1-1 indicates the existing pathways through which LSFO is transported to the three generating stations.

The LSFO stored in HECO's Barbers Point Tank Farm is quite viscous; in fact, it is nearly solid at ambient temperatures. Because of this, HECO uses steam from the adjacent Chevron Refinery to heat the oil so that it will flow. Pumps located at the Refinery are used to pressurize the pipelines that carry the oil from the Tank Farm to HECO's generating stations. Chevron maintains and operates the Tank Farm, pumps, and other equipment under contract to HECO.

Several black-oil storage tanks are situated at the Waiau Generating Station. These tanks, and their respective nominal capacities, are: Tank No. 1 (70,000 barrels), Tank No. 3 (30,000 barrels), Tank No. 4 (80,000 barrels), and Tank No. 5 (100,000 barrels). These tanks generally contain enough oil to operate the Waiau Generating Station for about 20 to 30 days at the rate that it consumed LSFO in 2000.

Table 1-1. Fuel-Related Characteristics of HECO Generating Stations

Characteristic	*Kahe*	*Waiau*	*Honolulu/ Iwilei*
Generating Capacity in MW by Type of Fuel Used			
Low Sulfur Fuel Oil	651	397	113
No. 2 (Diesel) Fuel Oil	0	102	0
Consumption (bbl/year in CY2000)	5,397,221	1,890,560	161,944
On-Site Storage (nominal bbl)			
Low Sulfur Fuel Oil	498,000	280,000	108,000
No. 2 (Diesel) Fuel Oil	430*	48,155	0
Current Method of Delivery	HECO Pipeline	Chevron Pipeline	Chevron & HECO Pipelines

*Diesel storage is for "black-start" diesel engines only.

Source: HECO.

Several of the facilities that are used to deliver fuel to the Waiau Generating Station are part of the larger system that serves all of HECO's generating stations. Parts of HECO's fuel oil supply system that are not directly related to operation of the Waiau Generating Station but which have some bearing on fuel transport to Waiau include:

- The HECO-owned pipeline that delivers fuel from its Barbers Point Tank Farm to the Kahe Generating Station. Pumps at the Chevron Refinery are used for that purpose under contract to HECO.
- HECO's Iwilei Tank Farm (mentioned above), which serves the company's Honolulu Generating Station. Three storage tanks are located at this facility. The principal one (Tank No. 2) is an 80,000-barrel capacity steel tank that is used to store oil destined for the Honolulu Generating Station. The other two are 450-barrel capacity tanks that hold light displacement oil[4] used in the Iwilei-to-Honolulu Generating Station fuel supply line.
- The HECO-owned pipeline connecting its Iwilei Tank Farm to the Honolulu Generating Station.
- Fuel storage tanks at the Honolulu Generating Station.
- Tesoro's fuel storage tanks at the Tesoro Refinery.
- A 20-inch Tesoro-owned LSFO pipeline that connects its Campbell Industrial Park Refinery with barge loading facilities at the Kalaeloa-Barbers Point Deep Draft Harbor. A 10-inch pipeline interconnects this pipeline with HECO's Barbers Point Tank Farm.

[4] The term "displacement oil" refers to the light oil (typically diesel oil) that is pumped into the line when it is not being used to transport LSFO. The "displacement oil", which remains fluid at ambient temperatures, forces the LSFO out of the line. If LSFO were left in the pipeline, it would cool and solidify. If that were to happen, the line would have to be taken out of service and cleaned before it could be used again.

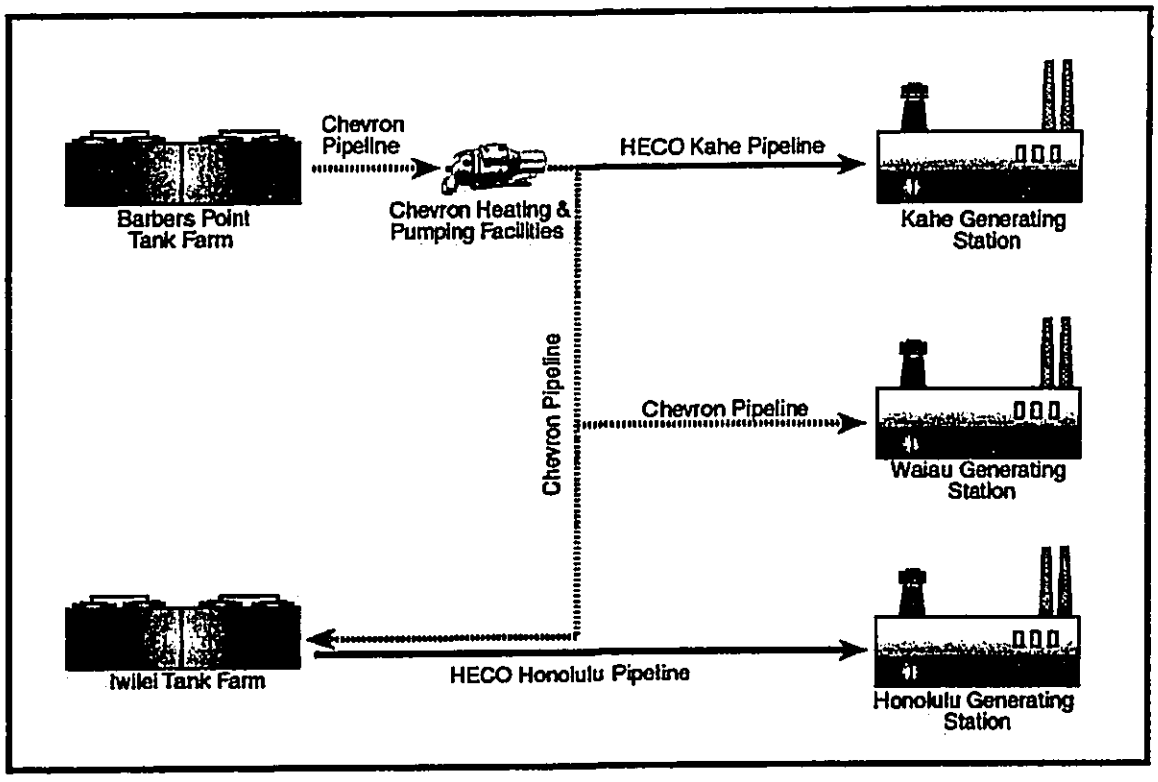

Figure 1-1 Existing Fuel Oil Supply Pathways

- Piers P-5 and P-6 at the State Department of Transportation's Kalaeloa-Barbers Point Deep Draft Harbor. This includes under-deck piping and manifolds owned and operated by Tesoro to accommodate a variety of petroleum products, including diesel and LSFO.
- The "Waiau Reheat Station" adjacent to the Waiau power plant. This station boosts the temperature of the oil that is destined for HECO's Iwilei Tank Farm.

1.2 FORECAST FUEL DELIVERY REQUIREMENTS

The best means of supplying oil to the Waiau Generating Station depends in part on the volume of fuel that will be needed. Because the present fuel delivery is done using a pipeline that also serves the Iwilei Tank Farm and other Chevron uses, an understanding of those other uses is needed as well.

1.2.1 FORECAST FUEL NEEDS

During the year 2000, HECO used 1,890,560 Barrels of LSFO in the Waiau Generating Station and 161,944 Barrels in the Honolulu Station. HECO's forecast assumes that it will dispatch power from the various generating units that are available to it in accordance with a formula that will result in the lowest cost to its customers consistent with the desired reliability. The factors that affect forecasts include data on the economic outlook, customer load information, projected future development, population growth, weather, energy efficiency standards, and estimates of existing and planned demand-side management measures. Changes in these forecasting considerations could affect the fuel forecasts. HECO's forecasts indicate that the fuel consumption over the next 15 years at its Waiau Generating Station will range between 1.8 and 3.0 million barrels per year.

1.2.2 FUEL USE BY HONOLULU GENERATING STATION

Under the present arrangements, all of the LSFO that HECO uses at both its Waiau and Honolulu Generating Stations flows through Chevron's black-oil pipeline as far as Waiau. Only the fraction

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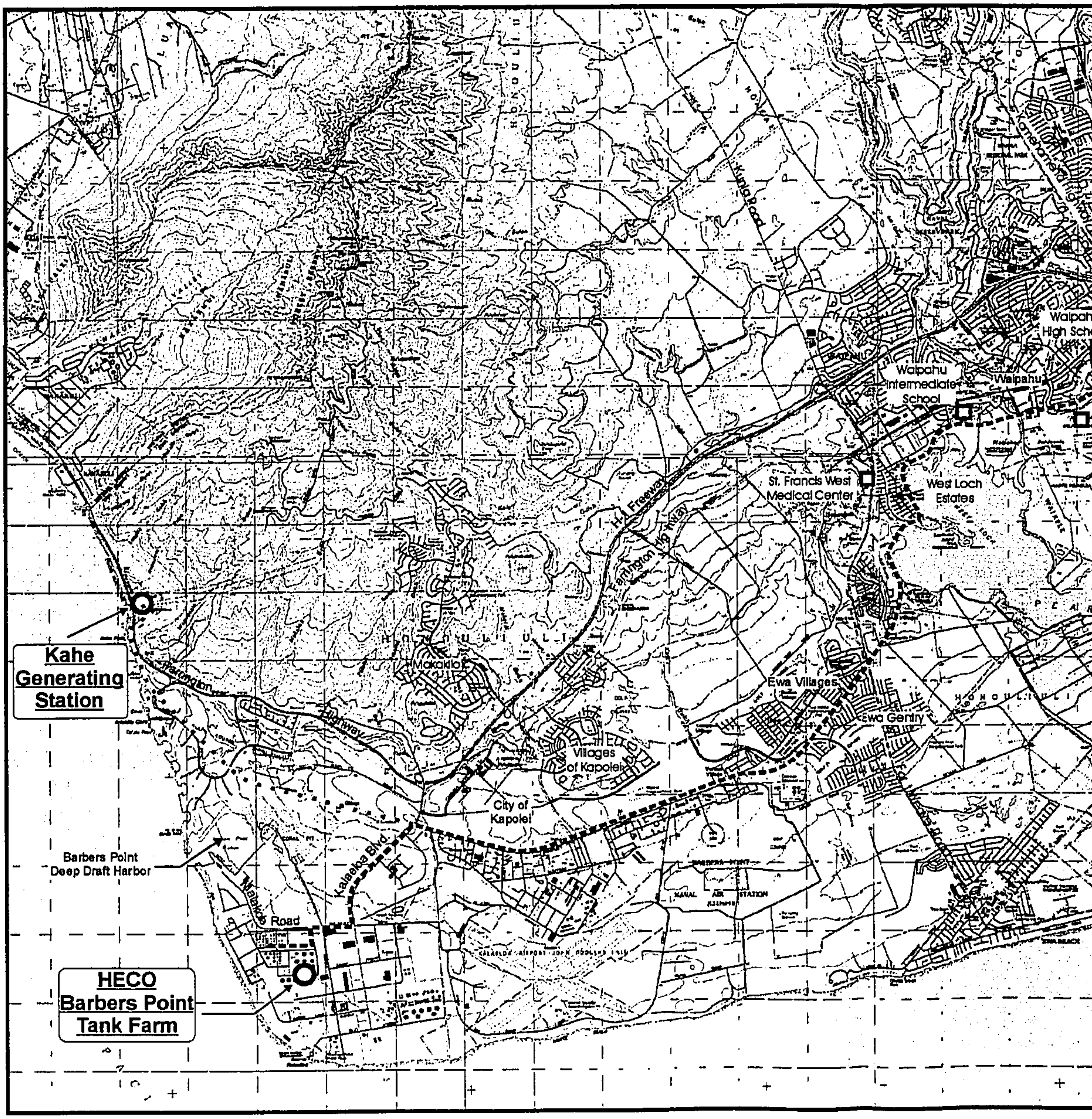

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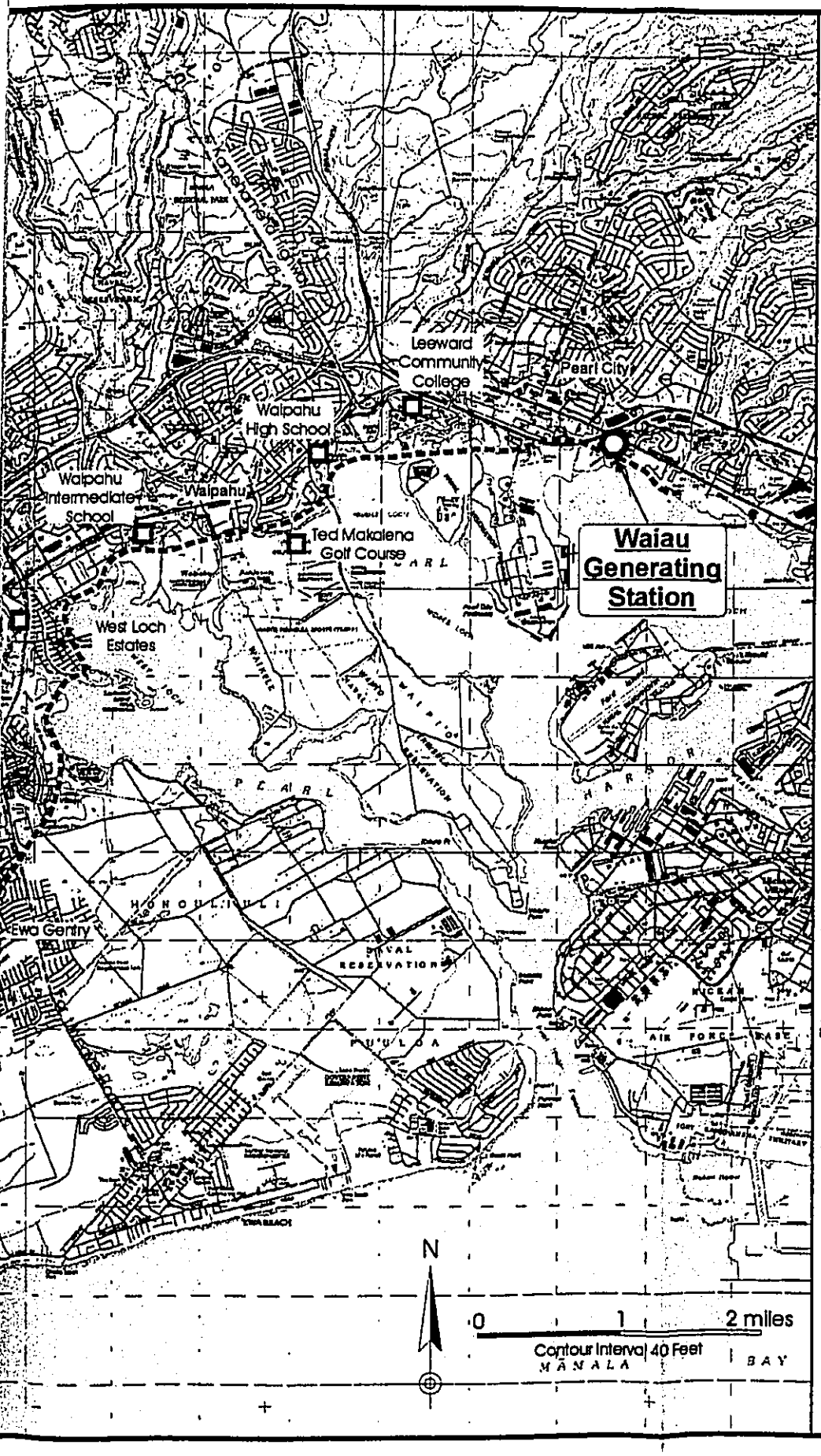

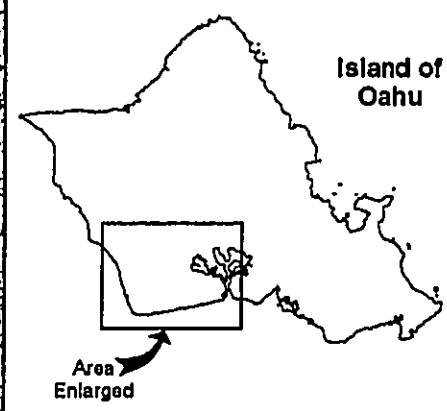

Legend::

- HECO Kahe Pipeline
- Chevron Pipeline
- HECO Facility
- Other Facility Near Existing Route

Prepared For:

Hawaiian Electric Company, Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

BHP/Gasco.
Williams Brothers Engineering Company.
USGS Quadrangle Maps: Ewa, Schofield Barracks, Waipahu, Pearl Harbor; 2000 editions

Figure 1-2:

Existing Fuel Oil Supply Pipelines

Waiau Fuel Pipeline Project

that is needed for the Iwilei Tank Farm/Honolulu Generating Station (about 8 percent of the total in 2000) remains in the Chevron line past Waiau.

Historically, HECO has not been the only user of the portion of Chevron's pipeline that extends past Waiau. Chevron has also used its black-oil line to transport fuel to its Honolulu Products Terminal at Pier 30 in Honolulu Harbor. From there the fuel was loaded onto inter-island barges that transported some of the fuel used at the Kauai Electric Port Allen Generating Station, the MECO Kahului Generating Station, and the HELCO Shipman/Waiākea, Hill/Kanoelehua, and Puna power plants. Since Chevron has switched its barge shipments to the Kalaeloa-Barbers Point Deep Draft Harbor, that use of the Chevron pipeline has ceased. Consequently, the Chevron line is now used only to carry HECO-owned LSFO intended for use at the Waiau and Honolulu Generating Stations.

1.3 HECO FUEL DELIVERY OPTIONS FOR WAIAU

While there are many possible variations, conceptually there are only five different ways that HECO can supply the Waiau Generating Station with needed fuel.[5]

- Extension of the existing contract with Chevron: Under the existing contract, LSFO is delivered to the Waiau Generating Station through the 'Ewa portion of Chevron's 8-inch Campbell Industrial Park to Honolulu Products Terminal (Pier 30) pipeline. In this alternative, fuel delivery to the Iwilei Tank Farm would continue to be made using the eastern portion of the Chevron Pipeline.
- HECO's purchase and operation of Chevron's 8-inch pipeline and right-of-way (ROW): There are two principal variants of this. They are: (a) operating and maintaining the existing pipeline, and (b) replacing the entire pipeline with a new line of equal capacity. Each of these could be done either *along the entire pipeline route* (so that HECO could continue to supply both Waiau and the Iwilei Tank Farm through the pipeline) or, alternately, only for the BPTF-to-Waiau portion of the route. In the case of the latter, HECO would need to provide an alternate means of supplying fuel to the Iwilei Tank Farm, with truck transport directly from the Barbers Point Tank Farm to the Iwilei Tank Farm being the most likely.
- Construction of a new fuel oil pipeline along a different corridor: While many routings are theoretically possible, the difficulty of assembling the property rights (lease, ownership, easements, or other) for a long linear facility such as a pipeline limits the number of alternatives that are practical to existing road and pipeline rights-of-way. The State Energy Corridor (SEC) was created expressly to accommodate fuel movement along the Campbell Industrial Park to Honolulu Harbor corridor. Hence, it is the logical route to use for this alternative.
- Truck transport of the LSFO from Barbers Point to the Waiau Generating Station and Iwilei Tank Farm: This would require the construction of new fuel truck loading and unloading facilities at the Barbers Point Tank Farm and at the Waiau Generating Station, as well as the acquisition/charter and operation of the fuel trucks.
- Vessel delivery of LSFO to the Waiau Generating Station:[6] This would entail construction of a barge unloading facility approximately 1,600 feet offshore in the East Loch of Pearl Harbor; the installation would include submarine pipelines to transport LSFO and diesel fuel directly to the storage tanks at the Waiau power plant. Barge delivery would require improvements to the pipelines linking HECO's Barbers Point Tank Farm with the State Department of Transportation's Kalaeloa/Barbers Point Deep Draft Harbor. This would probably be required in any event because

[5] Note that this analysis assumes that HECO would not attempt to assume responsibility for the offshore portions of the crude oil delivery system to the Kalaeloa/Barbers Point Harbor. This possibility has been discussed in the past, but is not currently under consideration in any way.

[6] In theory, tankers could be used instead of barges. However, this would be practical only if the fuel were delivered from directly overseas. Tanker delivery would require the construction or lease of substantially more oil storage tank capacity at or near Waiau. Limited space on the ground for larger fuel storage tanks, tanker logistics, and other factors make direct delivery by tanker infeasible. Hence, only barge-delivery was considered.

of HECO's need to continue to transport fuel from its Barbers Point Tank Farm to the Iwilei Tank Farm.

Other options were considered briefly but eliminated as impractical. These include:

- Use of the currently unused pipeline owned by the U.S. Navy: This pipeline ends at the former Barbers Point Naval Air Station (BPNAS). It was not considered for use for several reasons. It was not designed to transport heated LSFO; the current condition of the pipeline is uncertain; the route it follows under West Loch in Pearl Harbor poses uncertain environmental liabilities and makes maintenance difficult; and the pipeline ends at the former BPNAS and does not extend to HECO's tank farm in Campbell Industrial Park.
- Use of the existing 10-inch "white oil" pipeline owned by Tesoro: This pipeline is already in the State Energy Corridor. It is used exclusively for "white oil" products (e.g., jet fuel and gasoline) and it is not possible to transport LSFO in this line without adversely affecting the quality of those transportation grade fuels. Conversion of the Waiau Station to make use of these other fuels would require extensive and costly changes to the existing generating units and the cost of these fuels is approximately 50% higher than the cost of LSFO. Consequently, this is not a practical alternative.

1.4 IDENTIFICATION OF ALTERNATIVES FOR FURTHER ANALYSIS

1.4.1 FRAMEWORK FOR CONSIDERATION OF ALTERNATIVES

Hawai'i Administrative Rules HAR, §11-200-17 (the Department of Health's Environmental Impact Statement Rules) addresses the content requirements of draft and final environmental impact statements (EIS). Subsection §11-200-17(f) states:

> *(f) The draft EIS shall describe in a separate and distinct section alternatives which could attain the objectives of the action, regardless of cost, in sufficient detail to explain why they were rejected. The section shall include a rigorous exploration of the environmental impacts of all such alternative actions. Particular attention shall be given to alternatives that might enhance environmental quality or avoid, reduce, or minimize some or all of the adverse environmental effects, costs, or risks. Examples of alternatives include:*
>
> *(1) The alternative of no action;*
>
> *(2) Alternatives requiring actions of a significantly different nature which could provide similar benefits with different environmental impacts;*
>
> *(3) Alternatives related to different designs or details of the proposed action which would present different environmental impacts;*
>
> *(4) The alternative of postponing action pending further study; and*
>
> *(5) Alternative locations for the proposed project.*
>
> *In each case the analysis shall be sufficiently detailed to allow a comparative evaluation of the environmental benefits, costs, and risks of the proposed action and each reasonable alternative.*

1.4.2 OBJECTIVES OF THE PROPOSED ACTION

Determining the objectives of a proposed action is the first, and in many ways the most critical, step in identifying alternatives. In the case of the proposed Waiau Fuel Pipeline Project, HECO's objective can be succinctly stated as follows:

> To provide an assured means of continuing to supply fuel to its Waiau Generating Station over the long term while maintaining environmental quality and maintaining costs to its customers at a reasonable level. These costs include those that could result from a leak or other failure in the system as well as operating and capital costs.

1.4.3 ALTERNATIVES TO BE EVALUATED IN THE EIS

1.4.3.1 Action Alternatives Evaluated in Detail[7]

This document evaluates three "Action Alternatives". These are drawn from the options outlined in Section 1.3.

- Proposed Action (Alternative 1) – Pipeline in the State Energy Corridor: This alternative (described in detail in Section 2.1) is an implementation of Option 3, construction of a new pipeline between HECO's BPTF and Waiau Generating Station, combined with trucking fuel from BPTF to the Iwilei Tank Farm.[8] It incorporates design elements that stem from HECO's extensive consultation with the communities through which fuel for the Waiau Generating Station must pass and is presently HECO's "preferred alternative." The design elements that can be attributed to the public input received through this consultation are listed in the last section of this chapter, and Chapter 9 contains a full discussion of the public consultation process. Finally, readers should note that information developed through the EIS process may change this preference or lead to changes in the details of the improvements that would be constructed and/or mitigation measures used.
- Alternative 2 – Continue to Use the Chevron Pipeline: This alternative (described in detail in Section 2.2) is drawn from Options 1 and 2, both of which involve a pipeline within Chevron's existing pipeline easement. Because of the need to continue using the existing pipeline in the interim, the analysis assumes that the pipe would be repaired or replaced incrementally during periods when the line is out of service for its scheduled annual maintenance. This is essentially a continuation of the existing contract arrangement.
- Alternative 3 – Trucking: This alternative (described in detail in Section 2.3) involves the use of tanker trucks to transport fuel from BPTF both to Waiau and the Iwilei Tank Farm.

1.4.3.2 Action Alternative Eliminated From Detailed Consideration

Barging. Barging was evaluated as a means of transporting fuel from Barbers Point to Waiau. Two principal factors have led HECO to eliminate it from the alternatives being considered.

- First, the Navy has historically been very reluctant to guarantee that civilian vessels (including tugs and barges) delivering non-military cargo would be allowed to enter Pearl Harbor under all security conditions. Because of this, HECO could not rely on this as a means of supplying fuel to its generating units at Waiau.
- Second, barging of the LSFO from the Deep Draft Harbor to Pearl Harbor would entail additional risks of damage to coastal and marine resources in the event of oil spills or other accidents.

These operational and environmental factors have led HECO to eliminate the barging alternative from further consideration.[9]

1.4.3.3 Consideration of Other Alternatives

HAR 11-200 requires "consideration of Alternatives related to different designs or details of the proposed action which would present different environmental impacts." It also requires the consideration of "reduced-scale" or delayed action. Finally, it requires consideration of "No Action". This document addresses these requirements in the following ways.

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[7] The term "Action Alternative" is intended to distinguish them from the "no action" and "delayed action" alternatives that must also be considered to comply with HAR §11-200.

[8] The existing Chevron pipeline extends past Waiau all the way to Honolulu Harbor and the Iwilei Tank Farm. However, for reasons discussed elsewhere in this report, it is unlikely that HECO's use of this segment of the line will continue to be possible over the long term.

[9] While cost was not a factor in deciding to eliminate barging from further consideration, it is worth noting that barging would be more expensive. The barging alternative would cost about $4.3 million per year more (i.e. approximately 80% more) than constructing and operating a pipeline within the proposed SEC corridor. This estimate is based on a calculated 30-year levelized annual revenue requirement of $10.7 million for barging, compared to a similarly calculated requirement of $6.4 million per year for a new pipeline within the SEC plus trucking from BPTF to the Iwilei Tank Farm.

- Installing and operating a smaller (i.e., reduced capacity) pipeline is possible but it would not be capable of meeting the fuel needs of the Waiau Generating Station under all of the operating conditions the proposed pipeline is intended to serve. Moreover, construction impacts of a smaller pipeline would be essentially identical to those of the full-scale version. Hence, while it might be possible to reduce a few of the potential operating impacts of the proposed pipeline by reducing the design throughput, the reduction of impacts would be very small. Hence, this document does not treat it as an alternative.
- This report discusses the environmental implications of different designs or details of the proposed action where the differences are substantial. To facilitate ease of understanding, this is done within the context of the specific Action Alternatives described above rather than as discrete (i.e., separate) alternatives.
- The "No Action Alternative" is outlined in Section 2.4 and discussed in more detail in Chapter 5. In the case of HECO's proposed Waiau Pipeline Project, "No Action" consists of failing to arrange for continued fuel delivery to Waiau beyond the end of the current contract between HECO and Chevron. This would result in the loss of nearly a quarter of the electrical generating capacity for O'ahu, and it cannot be emphasized too strongly that this alternative would not meet the objectives of the proposed action. Instead, "No Action" is included only because it is needed to fulfill the requirements of Chapter 343.

1.5 COMMUNITY INPUT IN PLAN DEVELOPMENT

1.5.1 FRAMEWORK FOR COMMUNITY OUTREACH

HECO made its public consultation efforts an integral part of the planning and design process for the Waiau Fuel Pipeline project. It undertook a community outreach program designed to help it understand and address the concerns of those who would be directly affected by the project. The program was aimed at residents, businesses, and other stakeholders along the proposed fuel line corridor. Program objectives included:

- Incorporating the knowledge and input of community leaders in understanding and approaching the affected communities;
- Informing community associations and regional organizations of the purpose of and need for the new fuel line, and provide forums for discussion of the project;
- Contacting groups and individuals affected by the preferred alternative in ways that were conducive to fully informing them of the project, eliciting their comments, and providing avenues for future communication.

To achieve these objectives, the design and implementation of the community outreach program followed two key guidelines:

(1) Those who will be directly affected should be among the first to know about the project and their concerns should be addressed in plans as much as possible.

(2) Consultation should begin early in the planning process so that meaningful design and mitigation measures can be incorporated into the proposal from the outset, rather than as afterthoughts or retrofits.

Discussion. Often, proposed projects are discussed in forums made up wholly or largely of individuals representing statewide, islandwide, and regional entities. While these forums are valuable and necessary, they often fail to reach the majority of the people in local neighborhoods that are most likely to be affected. This occurs because a large percentage of the population is either unfamiliar or unaware of such processes or is too busy with their daily lives to pay close attention to issues which they do not perceive as being of immediate consequence to them. As a consequence of this, many

people do not find out about projects that may affect them until after major design decisions are made.

Such a late start has two important, and negative, by-products. On the one hand, it tends to make communities feel as though project proponents have attempted to bypass them. On the other, project proponents who may already have invested substantial time and financial resources in a particular design may resist suggestions that they would have welcomed had they come earlier in the decision-making process.

The 13-mile-long route of the proposed Waiau Fuel Pipeline passes many individual residences, businesses, and other uses. HECO felt it was important that the people who live and work in the project area hear about the project firsthand from company representatives so that they could express any concerns they might have about the proposed action directly to HECO. It did this in the belief that direct, early contact would help the company obtain community feedback at a time in the design process when it was most able to modify its plans. Contacting people who live and work near the pipeline route first ensured that those who would be potentially most affected by the project would have the most influence over the design and management of the project.

1.5.2 SUMMARY OF COMMUNITY ACTIVITY

The community outreach program that HECO developed and implemented in accordance with these precepts included the following components.

Interviews with Community Leaders. Several community leaders, including chairs of Neighborhood Boards, elected officials, and organizational leaders were interviewed. The purpose of the interviews was to:

- Understand the overall region in terms of its strength, problems, and plans.
- Ensure that community leaders are aware of the State Energy Corridor and the operational pipelines that are already in it.
- Identify other key community leaders and organizations that HECO should consider contacting.

Individual Meetings and Discussions. The project team conducted a thorough inventory of those residents, businesses, and other entities near the proposed Waiau Fuel Pipeline route using Tax Map Key data bases and other sources. The project team then conducted two simultaneous activities:

- Four teams of HECO personnel canvassed residential neighborhoods in the proximity of the Waiau Fuel Pipeline route. One of the primary objectives of the canvassing effort was to make personal contact with each resident. In some areas, this required canvassers had to make multiple visits. The canvassers distributed brochures and described the project to residents, asked for their input, and provided information for future contacts. Information packets were left at every home that was canvassed including residences where no personal contact was possible. Approximately 250 residents were contacted in this effort.
- Project team members contacted farmers, business operators, elected officials and other users in proximity to the SEC corridor to provide project information and ask for input.
- In all, HECO made approximately 350 contacts in this manner.

Community Meetings. The project team made multiple presentations to 5 groups to provide information about the project and identify issues and concerns. The names of the groups, and the dates on which HECO representatives made presentations are shown in Table 1-2.

1.5.3 SUMMARY OF REACTIONS AND COMMENTS

Those contacted during the community outreach effort often expressed appreciation for the opportunity to learn about and comment on the proposed project so early in the planning and EIS preparation stage. A frequent comment from those contacted was that they were accustomed to

hearing about proposed actions only after a *Draft EIS* was issued, and some expressed frustration that this more common practice did not allow them time for meaningful participation or for changes to be made in the proposals in response to their concerns. Individual residents particularly expressed surprise, and in some cases, gratitude, that they were contacted well before construction activities would occur.

Table 1-2. Community Presentations Made by HECO Representatives.

Name of Organization	*Meeting/Presentation Date*
Pearl City Neighborhood Board No. 21	Aug 30, 2001, Sep 27, 2001, Jan 31, 2002
Waipahu Neighborhood Board No. 22	Jul 19, 2001, Sep 20, 2001, Jan 12, 2002
Makakilo / Kapolei / Honokai Hale Neighborhood Board No.34	Aug 15, 2001, Oct 24, 2001, Jan 30, 2002
Makibaka Community Association	Jul 10, 2001, Oct 30, 2001
West Loch Estates Community Association Board of Directors	Aug 14, 2001
Waipahu Community Association	Jan 14, 2002
Source: HECO	

In terms of awareness of the presence of and activities in the State Energy Corridor, those who live or operate businesses in the vicinity of the corridor were generally aware of its existence because they had some previous contact with representatives of the two existing SEC tenants (Tesoro and ~~GASCO~~GasCO). Regional leaders were generally aware of the corridor, though they sometimes did not know its exact location.

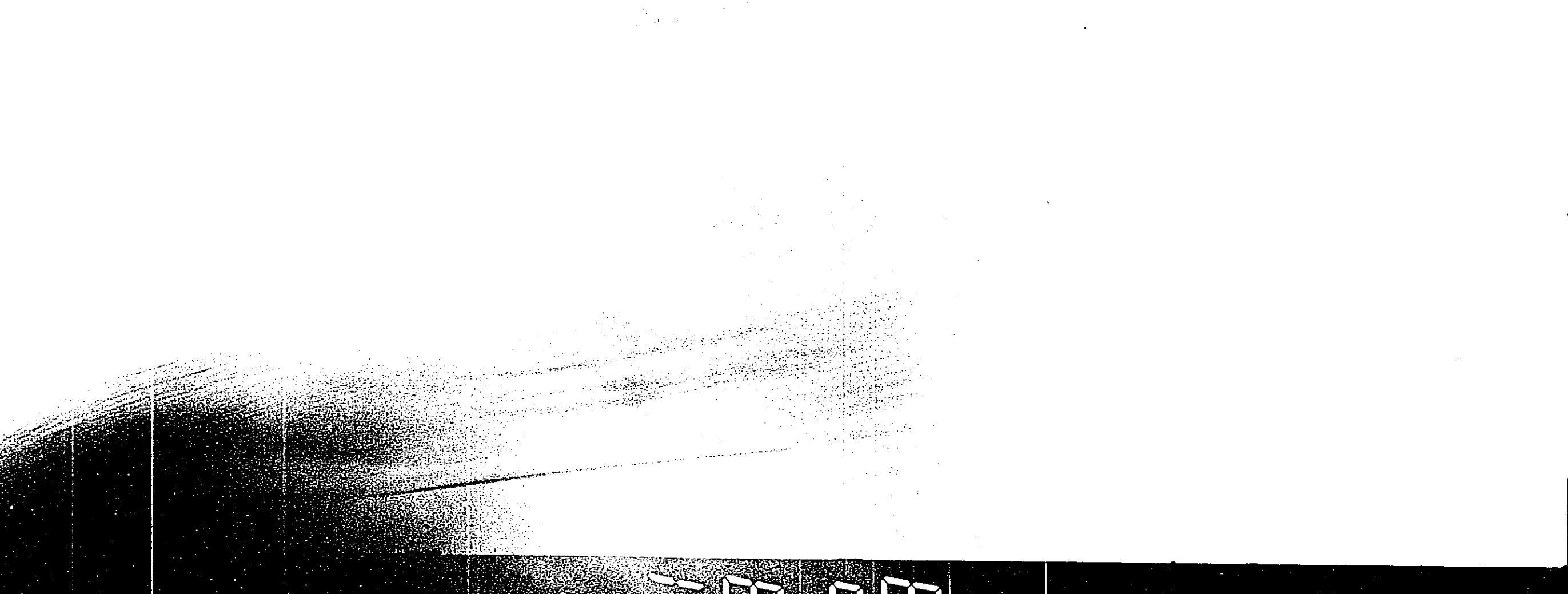
Table 1-3 summarizes comments made by those contacted during the consultation process. The table also summarizes HECO's responses and, where applicable, notes the section in the EIS where the topic is discussed.

Table 1-3. Summary of Comments Received in the Community Outreach Program and HECO's Responses

Issue	Nature of Issue	HECO Response
Traffic and Access	• The leading concern expressed by those contacted was how construction may affect access to their property. • Businesses were concerned that construction activities may impede access by their customers. • Residents questioned if the project would affect access to their homes. • Regional leaders wanted to make sure that construction activities would not add to or cause traffic congestion.	• At the Kapolei Shopping Center and major road crossings, the pipeline will be installed using directional drilling. (2.1.10.3) • Construction across driveways and accesses will be coordinated with residents and other users to ensure that ingress and egress are not impeded. • Coordination includes advance notification and schedule management.
Noise and Dust	• Nearby users wanted to make sure that they would not be subjected to significant noise and dust impacts resulting from construction activities. They asked that measures be taken to minimize such impacts. This was particularly a concern in areas in which development is occurring. • One person did not approve of night construction because he worked during the day.	• Construction noise and dust impacts will be mitigated through use of Best Management Practices in accordance with City and State regulations. Further, HECO will require its contractors to practice responsible construction management, including establishing procedures for receiving and responding to on-site community concerns that are presented to them directly. • Limits on the time of construction will reflect a balance between minimizing traffic and noise impacts and will be designed to benefit the greatest number of people.
Safety	• There were concerns about the safety of the fuel line in the SEC corridor. Those contacted asked if the technology and manner in which the line is installed will be safe for the nearby uses as well as the natural environment. • Businesses expressed concerns about security during construction as vandalism and theft has been a problem in several areas along the SEC route. • One residential neighborhood was concerned about security due to temporary removal of a fence that separated it from another neighborhood.	• Safety is HECO's highest priority. The proposed design incorporates state-of-the-art materials, technology, monitoring and controls. The LSFO that would be transported is non-flammable. • By burying all components of the system, HECO has eliminated the vulnerability associated with above-ground fuel transport. • Most segments of the pipeline can be constructed without affecting existing fences. In the few locations where this is not true, the contractor would install temporary fencing or provide security during the construction period. .

Issue	Nature of Issue	HECO Response
Uses in and Adjacent to the SEC	• The SEC traverses through Pouhala Marsh, an important habitat for endangered waterbirds • Several uses, including driveways, landscaping, berms, fences, temporary structures and a parking lot, have been constructed over the SEC corridor since its placement in the 1970s. Those responsible for these changes are concerned that any work in the SEC corridor may affect their activities and uses.	• HECO's preferred route would bypass the Pouhala Marsh by installation of the pipeline in the OR&L right-of-way through the portion of the route that would allow the pipeline to pass *mauka* of the marsh. • To minimize disruption, HECO will avoid existing features as much as feasible. Where this is unavoidable, it will do its utmost to see that existing uses remain fully functional. Where some disruption cannot be avoided, HECO will seek to minimize the duration of the construction impact. • HECO will repair or restore any improvements and landscaping, as nearly as reasonably practicable, to the conditions existing prior to constructing the pipeline.
Agricultural Concerns	• Farmers were concerned that the installation of the new pipeline might affect irrigation lines and damage crops. • Farmers were concerned with security of their crops during construction when berms are removed.	• To minimize disruption, HECO will avoid agricultural fields as much as feasible. • HECO will coordinate construction to avoid irrigation lines. Irrigation lines damaged will be repaired. • Farmers have agreed to coordinate planting to minimize crop damage and losses. Crop damage compensation will be arranged. • HECO will require contractor to provide security during construction and coordinate efforts with the farmers.
Relationship with Existing and Planned Leeward Bike Path and the Proposed OR&L Railroad Improvements	• Residents and regional leaders were aware that SEC corridor is adjacent to the existing and planned improvements for the bike path and OR&L right-of-way. They were concerned about possible disruptions and problems due to the installation of a new fuel pipeline.	• HECO will manage construction to minimize the activity period. Further, measures will be taken to provide convenient alternate routes, if possible, while segments are under construction and advance notification of bikepath closures. • Proposed improvements in the other projects are in early planning stages; the new fuel pipeline will be installed well before those improvements are implemented. At that time, HECO will coordinate with the appropriate entities to ensure compatibility.
Technical Questions	• Regional leaders and a resident who are aware of pipeline technology asked questions regarding alternative pipeline technology and the alternative of building a new power plant at Campbell Industrial Park. • There were also general questions about how the proposed technology works.	• HECO provided information that illustrated that the proposed pipeline is considered state-of-the-art and preferable to other types of pipelines currently in existence. Further, a new power plant was not considered a feasible option because it did not meet the objective of the project which is to deliver fuel to the Waiau Generating Station.

Issue	Nature of Issue	HECO Response
Continued Use of Chevron Pipeline	• Regional leaders asked if HECO still had the option to use the existing pipeline, and inquired about the future of that pipeline if HECO moves to the SEC corridor.	• HECO representatives explained that the preferred alternative was selected over the Chevron pipeline for economic, technological and reliability reasons.
Source: Compiled by Earthplan		



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IMMEDIATELY FOLLOWING

Issue	Nature of Issue	HECO Response
Continued Use of Chevron Pipeline	• Regional leaders asked if HECO still had the option to use the existing pipeline, and inquired about the future of that pipeline if HECO moves to the SEC corridor.	• HECO representatives explained that the preferred alternative was selected over the Chevron pipeline for economic, technological and reliability reasons.
Source: Compiled by Earthplan		

2.0 ALTERNATIVES CONSIDERED

This chapter contains detailed descriptions of the three "Action Alternatives" that HECO considered, including the proposed Waiau Fuel Pipeline. It describes the facilities that would be built, the construction activities needed to put them in place, the manner in which HECO would operate the facilities, the anticipated cost and construction schedule, and the permits that would be sought. The discussion begins with HECO's proposed Waiau Fuel Pipeline, which is its "Preferred Alternative". Section 2.2 covers "Alternative 2", a new long-term contract with Chevron that extends the existing fuel delivery contract between the two companies. Section 2.3 describes "Alternative 3", which entails trucking fuel from the BPTF to Waiau and Iwilei over existing streets and highways.

2.1 THE PROPOSED ACTION (ALTERNATIVE 1)

The proposed action (Alternative 1) includes the construction of a new pipeline from HECO's Barbers Point Tank Farm (BPTF) to the Waiau Generating Station. The insulated pipeline would be approximately 13 miles in length, would be located largely alongside two existing pipelines within the State Energy Corridor, and would transport heated LSFO. In addition to the BPTF-to-Waiau pipeline, the overall project would include construction and operation of:

- A pumping and heating station at the Barbers Point Tank Farm;
- A new connection to HECO's existing Kahe pipeline;
- Equipment at the Waiau Station and BPTF;
- Truck loading facilities at BPTF; and
- Truck unloading facilities at the Iwilei Tank Farm.

The major components and transport methods of this system are indicated schematically in Figure 2-1; they are described in more detail in the following sections. Figure 2-2 shows the proposed route for the Waiau Fuel Pipeline.

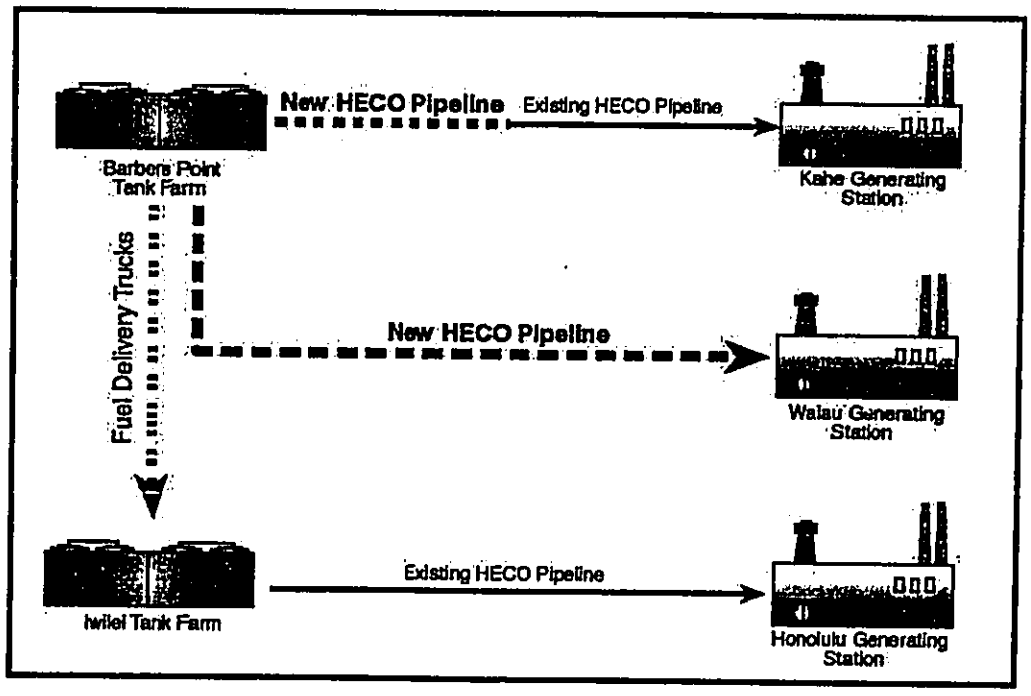

Figure 2-1 Proposed Fuel Oil Supply Pathways.

HECO estimates that about 15 to 18 months will be required to obtain the necessary permits. Construction would begin in the summer of 2003, overlapping the final phase of permitting for the project. Construction work would be completed by the summer of 2004. The remainder of this section describes the key features of the proposed system.

2.1.1 PROPOSED PIPELINE ROUTE

HECO's proposed BPTF-to-Waiau pipeline would run approximately 13 miles from a pumping station located within BPTF to existing fuel storage tanks at the Waiau Generating Station. It would install a second, much shorter (0.6 miles), line to connect the BPTF station with the existing HECO pipeline that supplies the Kahe Generating Station.

The BPTF-to-Waiau pipeline route starts at an elevation of about 10 feet above mean sea level (MSL) at the BPTF, gradually ascends to its maximum elevation of about 180 feet above MSL along Farrington Highway (at about 6.5 miles or half way along the route), and then descends gradually to 10-feet above sea level again near the Waiau Generating Station. The short segment of new pipeline that would connect the BPTF with HECO's existing Kahe pipeline remains below 20 feet MSL for its entire length.

Initially, both the Waiau and Kahe pipelines follow the same route; for the most part, both also remain within existing HECO easements. From the BPTF, the proposed route heads eastward within HECO's property initially and then turns north, following an existing easement that lies just within the eastern boundary of the Chevron Refinery.

The route continues northward, exiting Chevron property and crossing to the northern side of Malakole Street. At that point, the new segment of Kahe-bound pipe would connect to HECO's existing Kahe pipeline. HECO's proposed new Waiau line would then follow the route of its existing Kahe pipeline eastward on the north side of Malakole Street and then generally northward along the western side of Kalaeloa Boulevard. The proposed Waiau Fuel Pipeline route separates from the existing Kahe pipeline route where the former O'ahu Rail and Land Co. (OR&L) right-of-way (ROW) crosses Kalaeloa Boulevard. The proposed Waiau pipeline route crosses Kalaeloa Boulevard at that point and joins the State Energy Corridor (SEC); the existing Kahe pipeline turning westward to parallel the OR&L ROW. HECO will need a new easement to cross Kalaeloa Boulevard.

The proposed Waiau pipeline route continues eastward from Kalaeloa Boulevard once it enters the SEC (see Figure 2-3 for general configuration). In general, it parallels Farrington Highway (primarily on the *mauka* side of the right-of-way rather than in the roadway itself) to the intersection of Fort Weaver Road. After crossing under the Fort Weaver Road overpass, the route turns south along Kaihuopa'alai Street in West Loch Estates to join the former OR&L railroad ROW adjacent to the West Loch of Pearl Harbor. From that point heading north and east, the OR&L ROW and the SEC have the same boundaries until they cross Waikele Stream.

After crossing Waikele Stream, the SEC and the OR&L ROW separate, with the SEC passing through the wetlands of the Pouhala Marsh and the OR&L ROW passing *mauka* on higher ground above the wetlands. HECO's proposed Waiau pipeline route leaves the SEC at this point, remaining in the OR&L ROW until it crosses Waipahu Depot Road. It rejoins the SEC at that point and continues east. HECO has proposed use of the OR&L alignment in this area to eliminate the potential for impact to the Pouhala Marsh from pipeline construction. However, because use of the OR&L alignment requires an easement from the State Department of Transportation that HECO has not yet obtained, the SEC route must remain as a fallback alternative at present.

After crossing Waipahu Depot Road, the SEC and the OR&L boundaries overlap to a point just east of Waipi'o Point Access Road. There the SEC turns north, while the OR&L ROW continues to the east. The proposed HECO pipeline alignment stays within the SEC and out of the OR&L ROW until reaching the U. S. Navy property.

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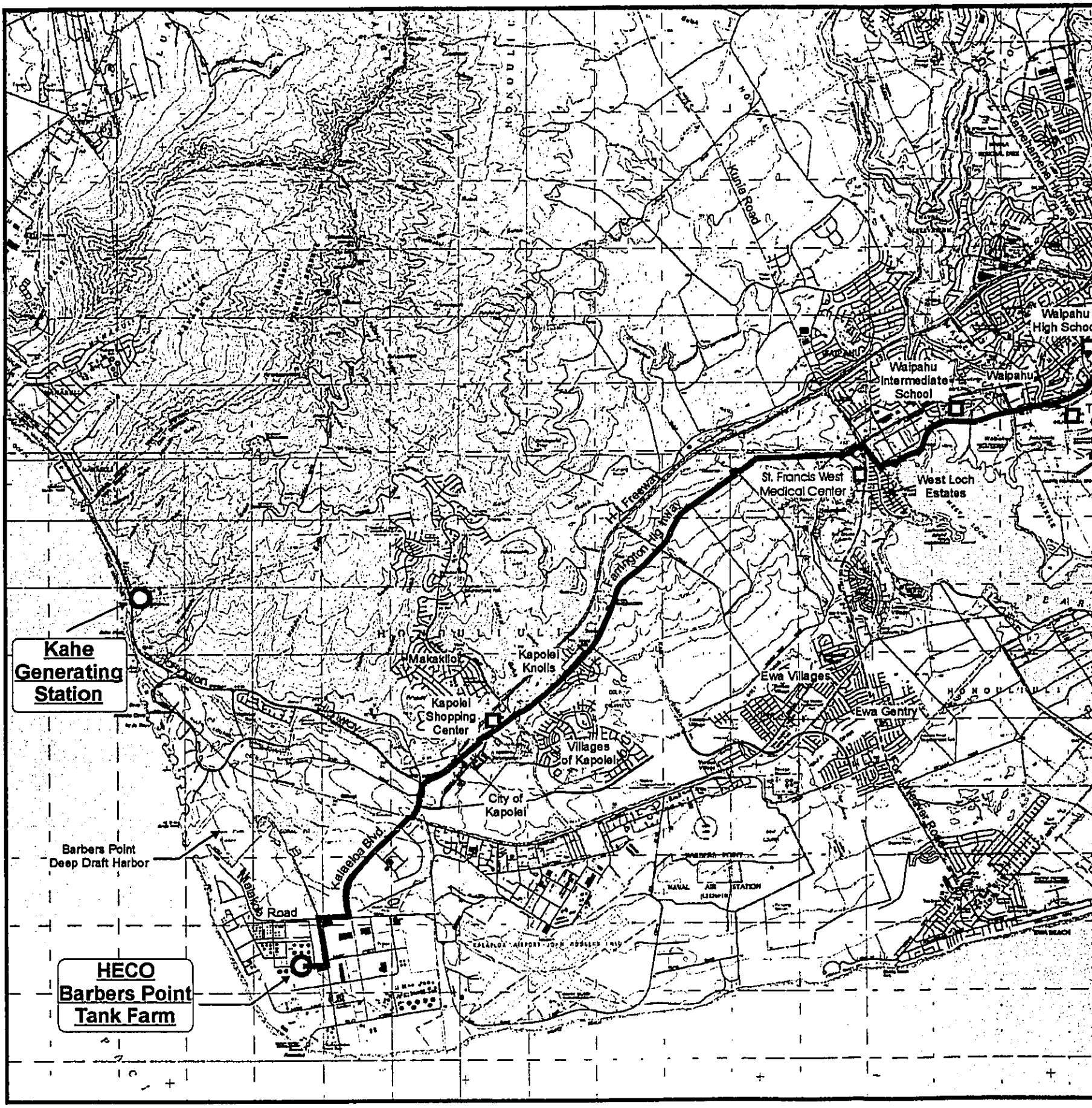

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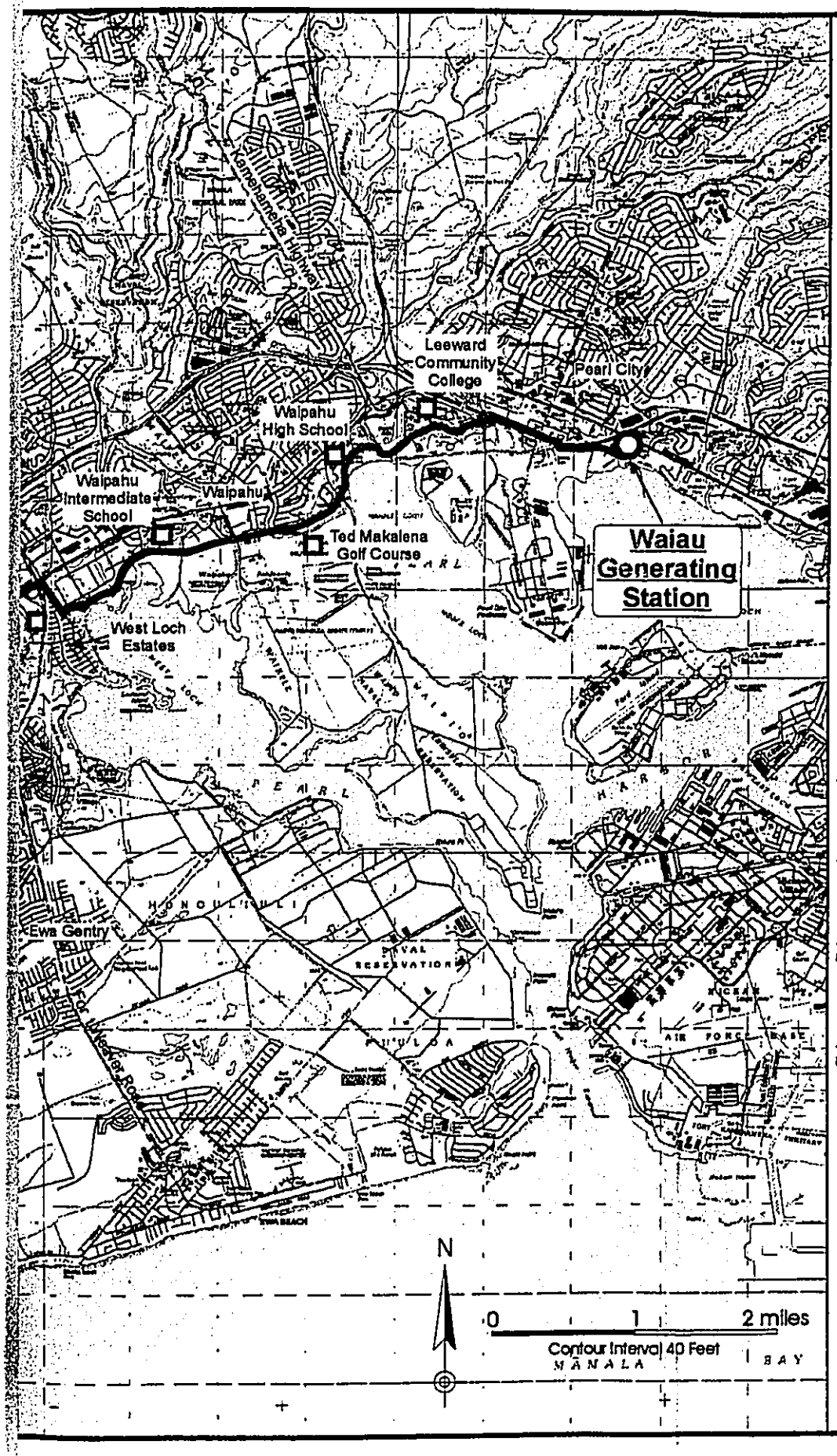
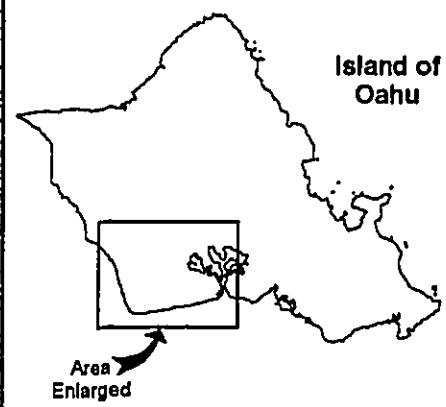




LEGEND:

- Proposed Pipeline Route
- HECO Facility
- Other Facility Near Proposed Route

PREPARED FOR:

Hawaiian Electric Company, Inc.

PREPARED BY:

PLANNING SOLUTIONS

SOURCES:

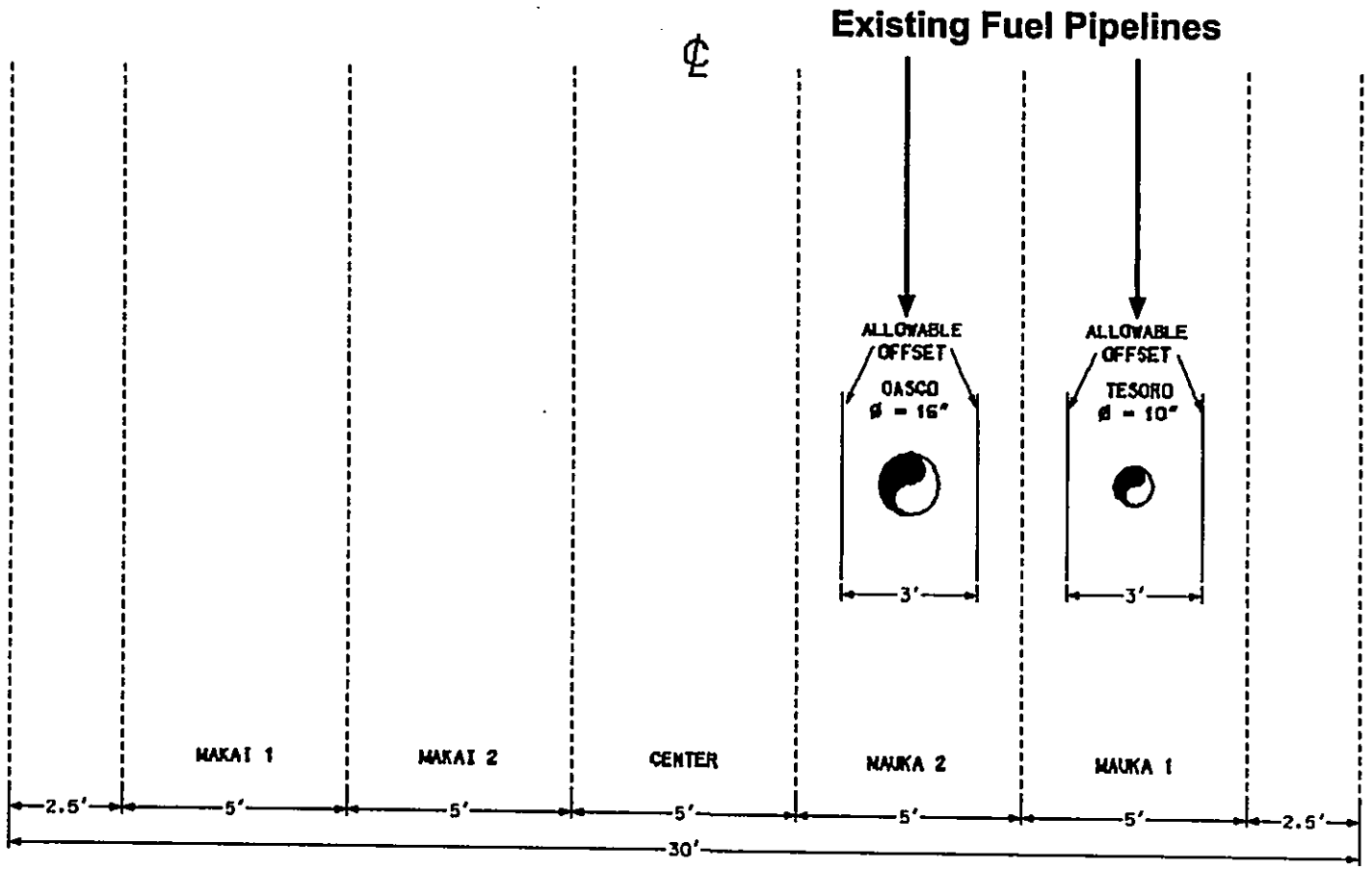
Hawaiian Electric Co., Inc.
USGS Quadrangle Maps: Ewa, Schofield Barracks, Waipahu, Pearl Harbor; 2000 editions

FIGURE 2-2:

Proposed Waiau Fuel Oil Pipeline Route

Waiau Fuel Pipeline Project

ENERGY CORRIDOR UTILITY SPACING



Prepared For:
Hawaiian Electric Company, Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Rooney Engineering, Inc. (2000)

NOT TO SCALE

Figure 2-3:

General Configuration of the State Energy Corridor

Waiau Fuel Pipeline Project

The proposed pipeline route continues within the SEC along the southern boundary of the U. S. Navy property and crosses into the property of the Leeward Community College. The pipeline alignment continues in the SEC to and across Waiawa Stream and under an elevated portion of the H-1 freeway. The width of the SEC decreases from 30 feet to 26 feet as it emerges from under the freeway.

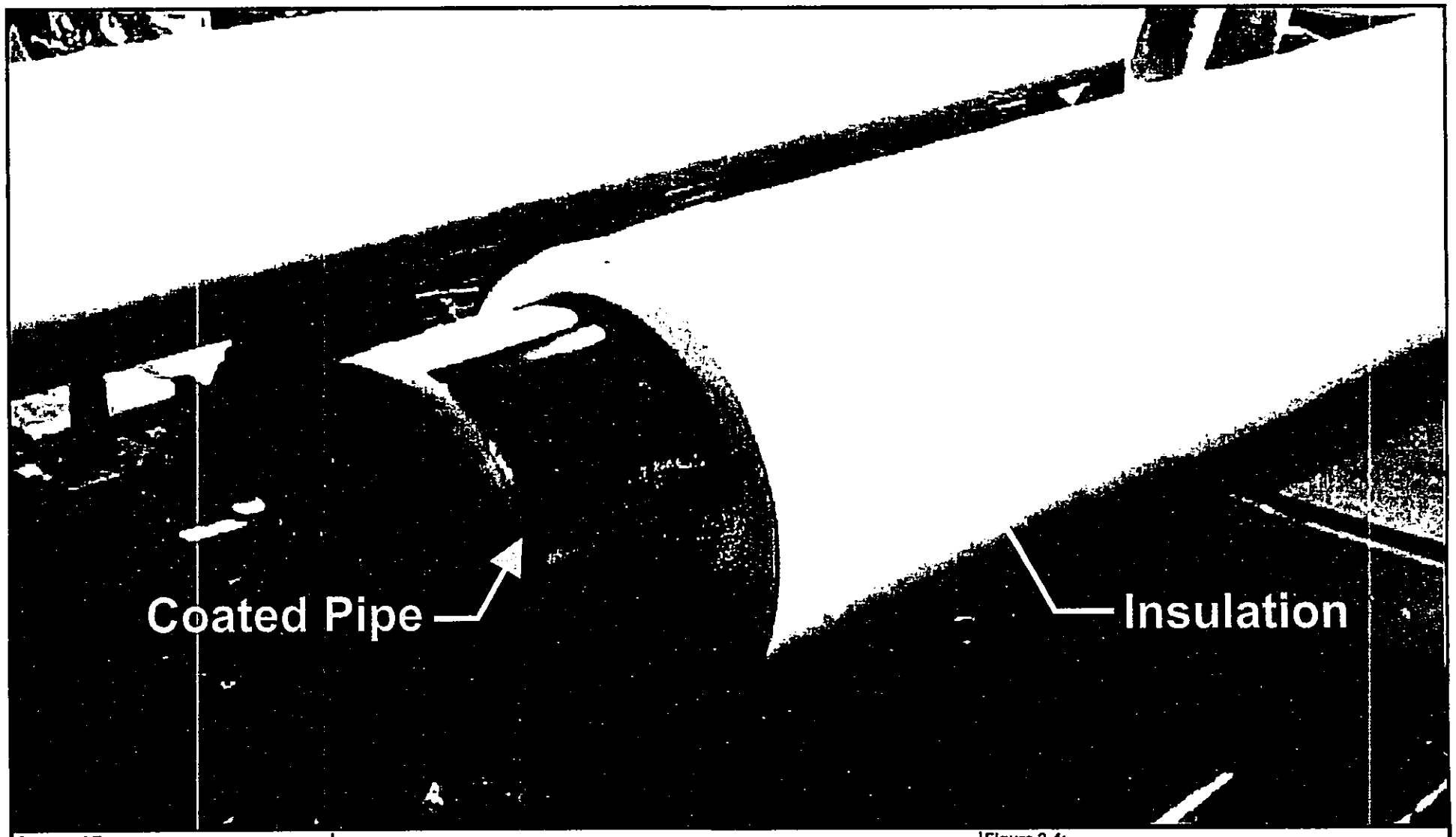
The proposed route continues in the SEC parallel to 2nd Street across Lehua Avenue. At that point it turns south and again crosses under the elevated H-1 freeway. Once back on the makai side of H-1, the route turns east and then southeast, parallel to the existing bikeway and Navy Utility Corridor and onto HECO property. The route stays makai of the Waiau Generating Station until reaching the tie-in point to the existing fuel delivery system. HECO would construct new receiving facilities alongside the existing utility corridor at this location. The last six hundred feet of the proposed Waiau Fuel Pipeline would be constructed on pylons extending a few feet above ground in the portion of the Waiau Generating Station property that is used by watercress farmers (see Figure 2-12). It is expected that it will be on 22 driven pile supports spaced 30 feet apart. These would extend about two feet above ground, and the pipe would rest atop them. In all cases the overall height would be less than 4 feet and the top of the pipe would be below the level of the bikeway. ~~The proposed route continues in the SEC parallel to 2nd Street across Lehua Avenue. At that point it turns south and again crosses under the elevated H-1 freeway. Once back on the *makai* side of H-1, the route turns east and then southeast, parallel to the existing bikeway and Navy Utility Corridor and onto HECO property. The route stays *makai* of the Waiau Generating Station until reaching the tie-in point to the existing fuel delivery system. HECO would construct new receiving facilities alongside the existing utility corridor at this location.~~

2.1.2 PIPE TO BE USED

The pipe that would be used for the proposed Waiau fuel pipeline would be a high grade steel pipe with a wall thickness of 0.3 to 0.5 inches, depending on the specific location of the pipe section. It would be coated with a high-temperature, fusion-bonded epoxy to protect against corrosion. It would also be insulated to minimize heat loss. Insulation is very desirable, because the LSFO fuels used in the Waiau Generating Station must be heated up to about 165° F before they will flow easily through the pipeline to Waiau at the planned pumping rate. Table 2-1 presents some of the key design characteristics for this pipe. Figure 2-4 is a photograph of the pipe, illustrating its coating and insulation. The procedures used in the installation of this pipe are outlined in Section 2.1.8.5.

Table 2-1 Key Design Characteristics of the Fuel Pipe

Characteristic	*Specification*
American Petroleum Institute Specification	A. 5L Grade B steel, ERW B. 5LX– 65, ERW
Minimum Yield Strength	A. 35,000 pounds per square inch (35 KSI) B. 65,000 pounds per square inch (65 KSI)
Maximum Operating Pressure	1,350 pounds per square inch above atmospheric pressure (1,350 psig)
Total Outside Diameter, finished pipe	8.625 inches
Wall Thickness	0.322 – 0.5 inches, depending on location
Cathodic Protection	Fusion Bonded Epoxy Coating (0.024" min.), Impressed DC Current, Sacrificial Anodes
Insulation	Urethane foam (2 inches thick)
External Coating	0.075" high density extruded or sprayed polyethylene jacket
Source: Rooney Engineering, Inc. (2002)	



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Rooney Engineering, Inc. (2000)

Figure 2-4:

Coated and Insulated Pipe

Waiau Fuel Pipeline Project

2.1.3 VALVES

The design of the proposed project calls for three types of valves to be used~~The design of the proposed pipeline calls for two types of valves to be used~~. Block valves can stop oil moving in either direction. Check valves prevent flow in only one direction and are installed on the up-slope at selected locations to prevent the backflow of oil when pumping is interrupted. Valves provide pipeline operators the ability to isolate one part of the pipeline from another, allowing them to limit the quantity of potential spills or leaks. The design for the project includes six block valves and one check valve along the pipeline route. Isolation valves, which are very similar to block valves, would also be located at each station facility, making nine control points in all.~~Isolation valves would also be located at each station facility making nine control points in all.~~

These valves are located at strategic points along the proposed pipeline. Generally, they have been placed to protect areas where a release of oil could pose a substantial environmental threat, such as near drainageways where released oil could gain access to waterways. Table 2-2 lists the preliminary plans for valve locations. Preliminary discussions with individuals representing communities adjacent to the proposed pipeline route have identified possible alternate locations that will also be considered for inclusion in the final plan.

Table 2-2 Preliminary Locations and Characteristics of Valves Used in the Pipeline

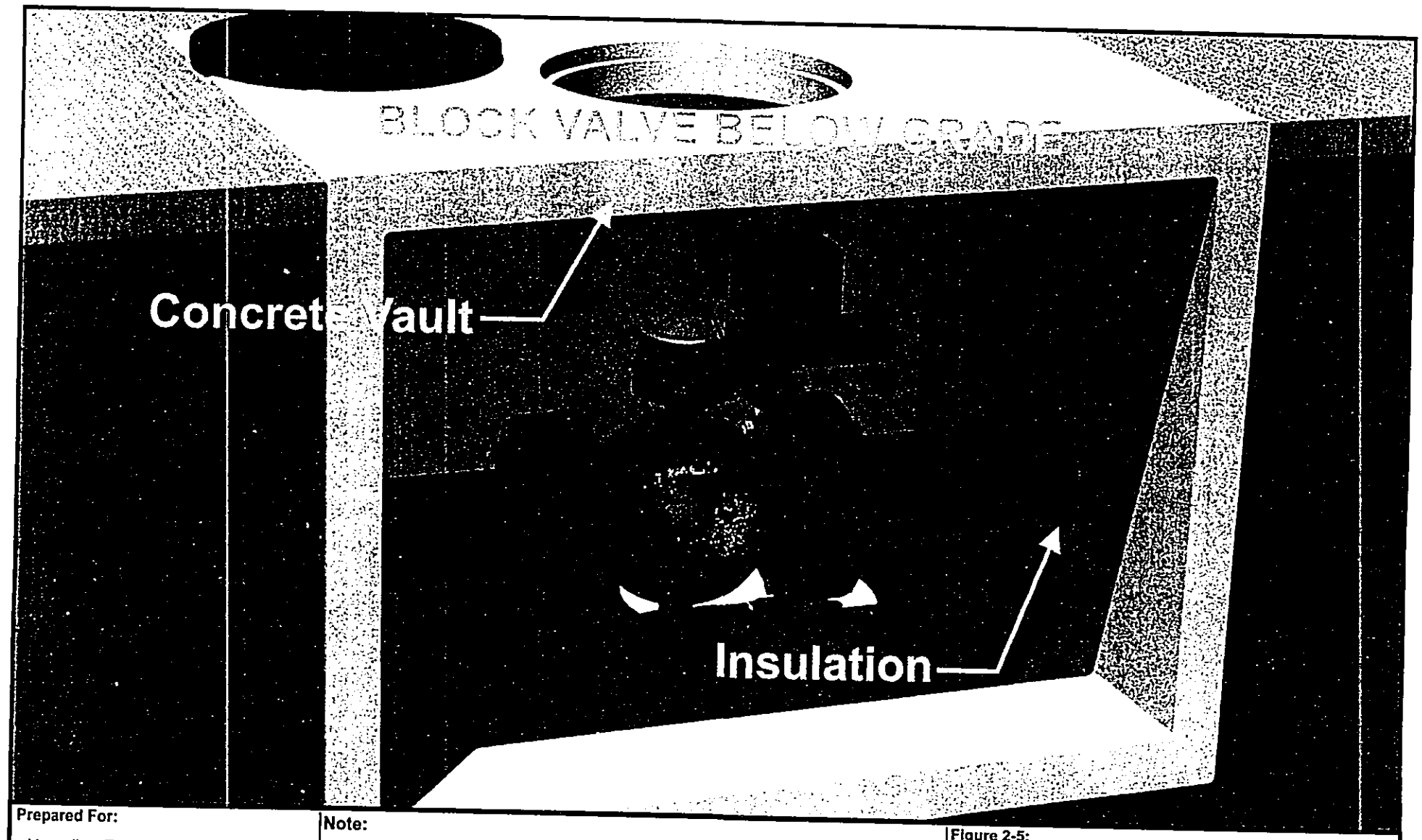
Valve No. (Figure 2-6)	*Station*	*Valve Location*	*Elevation (ft.)*	*Valve Type*
1	0+00	BP Tank Farm	10	Isolation
2	162+15	Kapolei Storm Channel	90	Block
3	370+46	West of Honouliuli Gulch	155	Block
4	389+00	Honouliuli Gulch	75	Check
5	438+80	West Loch	30	Block
6	507+36	Kapakahi Stream	8	Block
7	555+67	Middle Loch	12	Block
8	616+72	Waiawa Stream	52	Block
9	676+51	Receiver at Waiau	18	Isolation

Source: Rooney Engineering, Inc., Tabulation dated February 27, 2002.

Figure 2-5 illustrates the general features of the block valves; Figure 2-6 shows preliminary plans for valve locations. The proposed valves are located adjacent to existing easements, roads, and streets and would be accessed by existing public and private roads. No new maintained roads would be required. Each block valve would require a permanent 10-foot by 5-foot area and a 20-foot by 10-foot excavation area for installation.

2.1.4 PIPELINE COMMUNICATIONS SYSTEM

A data collection system would be installed to permit the pipeline operators, located either at the Waiau Station or BPTF, to monitor and control the flow of fuel through the pipe in real time and to obtain immediate notification of any unusual conditions along the route of pipeline. The system



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PLANNING SOLUTIONS

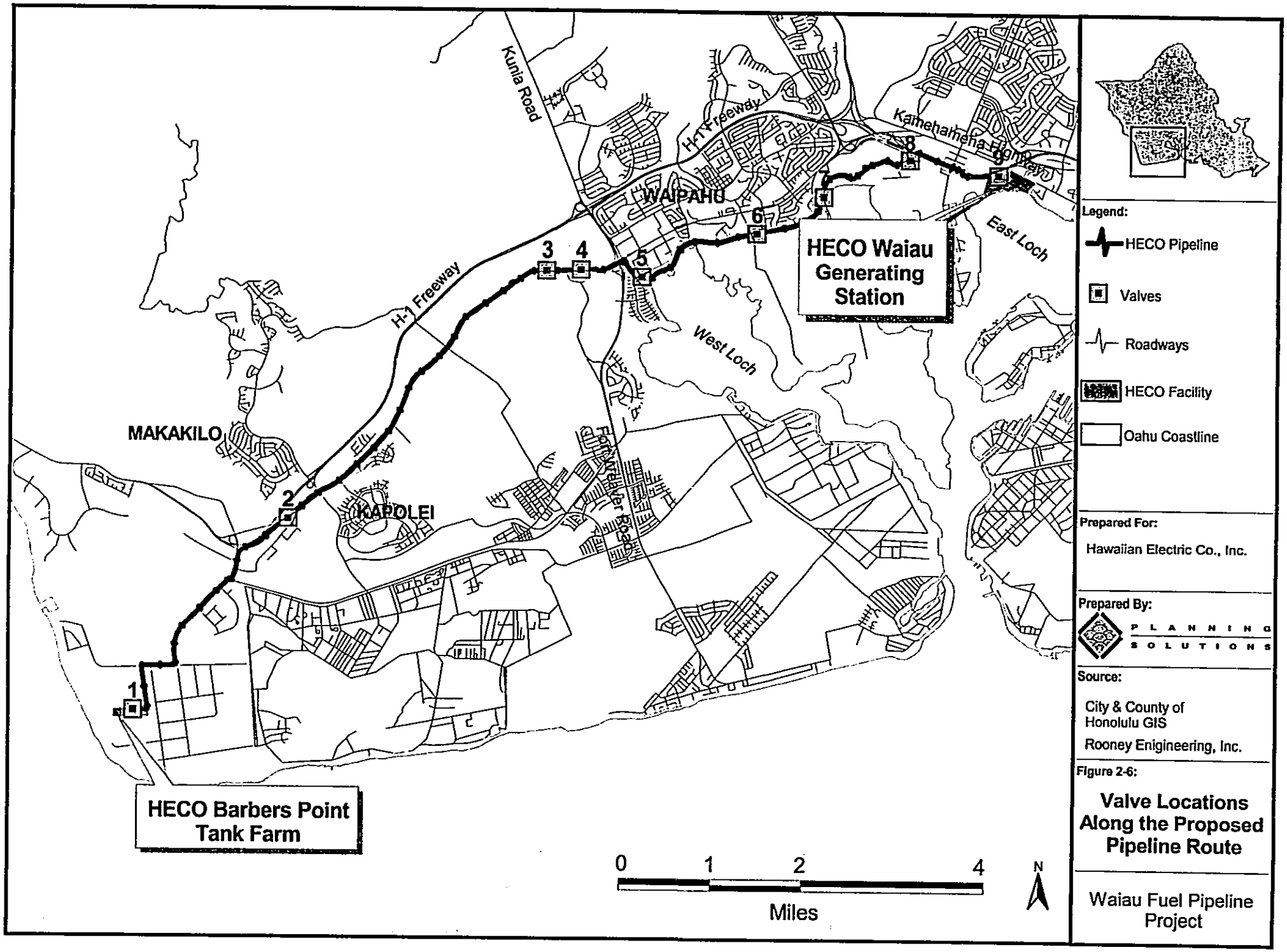
Source:
Rooney Engineering, Inc. (2000)

Note:
The valves would be insulated also. For clarity in this figure, the insulation is not shown.

Figure 2-5:

Typical Block Valve Design

Waiau Fuel Pipeline Project


Kunia Road
H-1 Freeway
WAIPAHU
Kamehameha Highway
East Loch
West Loch
HECO Waiau Generating Station
MAKAKILO
KAPOLEI
Fort Weaver Road
H-1 Freeway
1
2
3
4
5
6
7
8
9
HECO Barbers Point Tank Farm
0 1 2 4
Miles
N
Legend:
HECO Pipeline
Valves
Roadways
HECO Facility
Oahu Coastline
Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
PLANNING SOLUTIONS
Source:
City & County of Honolulu GIS
Rooney Enigineering, Inc.
Figure 2-6:
Valve Locations Along the Proposed Pipeline Route
Waiau Fuel Pipeline Project

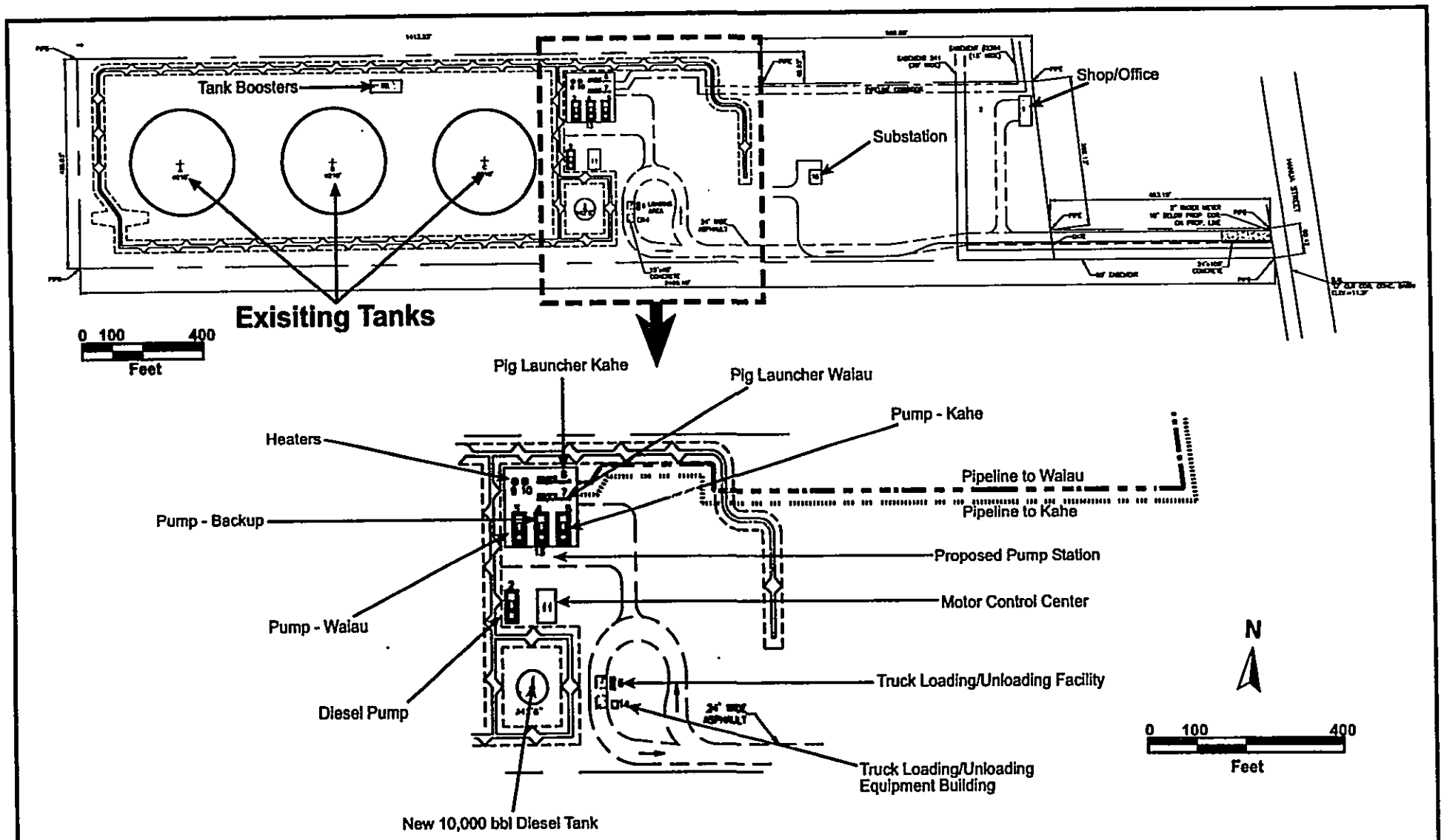
would include a fiber-optic cable that links the Waiau and Barbers Point terminations of the pipeline and makes connections to sensors at the in-line valves along the pipeline. Programmable logic controllers would be installed at the terminations and valves to transmit data to a host computer at Waiau. Backup communication would be provided by a combination of radio and microwave systems that would automatically become operational should the fiber-optic system be damaged.

2.1.5 MODIFICATIONS TO THE BARBERS POINT TANK FARM

The new facilities that would be constructed at BPTF as part of the proposed new pipeline system include:

Main Line Pump Station. HECO would construct a main line pump station serving both the existing Kahe pipeline and the new Waiau pipeline. It would house: (a) a new tank booster pump, (b) a mainline pumping unit for the Kahe line, (c) multiple pumping units for the Waiau line, and (d) a backup unit capable of pumping fuel oil to either location. The general layout for these facilities and the proposed changes that would be made to them are shown in Figure 2-7. A schematic layout of a typical pump station is shown in Figure 2-8. The backup pumping unit would be capable of delivering fuel either to Kahe or Waiau in the event that the regular pump unit for that pipeline is out of service. The manifold configuration would also allow the Waiau mainline pump to be used to deliver fuel to Kahe in the unlikely event that both the Kahe and standby units are out of service.

- Metering Facilities: HECO would install metering facilities (Figure 2-9) and inspection tool launchers (Figure 2-10) for both the Kahe and Waiau pipelines. The metering facilities would be used to monitor flow rates, pressure, and other key variables in the pipelines to provide immediate notification of any anomalies, such as would be caused by a pipeline leak or other failure. The inspection system would launch tools through the pipeline. Such devices, generally called "pigs," ensure optimal performance of the pipeline and provide early warning of potential problems.
- Booster Pump and Tank Piping: Modifications to the existing storage tank piping and additional booster pumps would be added to accommodate the new functions that would be assumed at BPTF.
- Diesel Fuel Storage Tank: A 10,000 Barrel diesel fuel storage tank would be installed to provide diesel fuel for displacement of the LSFO for system maintenance and shut-down operations.
- Programmable Logic Controller: A Programmable Logic Controller would collect and pre-process data from the pipeline metering systems and other data inputs at Barbers Point. The data would then be forwarded to the control center at the Waiau Generating Station for further processing and display to the pipeline operator.
- Electrical Tank and Pipe Heating Equipment: Electrical tank and pipe heating equipment would replace the existing steam system where required.
- Emergency Generating Equipment: Emergency generating equipment would be installed to maintain heat and electrical power to the facility in the event of a major power outage.
- Closed Circuit Video: HECO would install a closed circuit video link from BPTF to the Control Center at the Waiau Generating Station; this would use the fiber-optic communications system. Cameras would be equipped with remotely controlled pan, tilt, and focus controls accessible to Control Center staff.
- Maintenance and Storage Building: A single-story maintenance and storage building, approximately 30' wide x 60' long x 14' tall, would contain a backup pipeline control center, which could be activated in the case of a failure or evacuation of the Control Center at the Waiau Generating Station.



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Source:
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Figure 2-7:

Proposed Modifications to Barbers Point Tank Farm

Waiau Fuel Pipeline Project

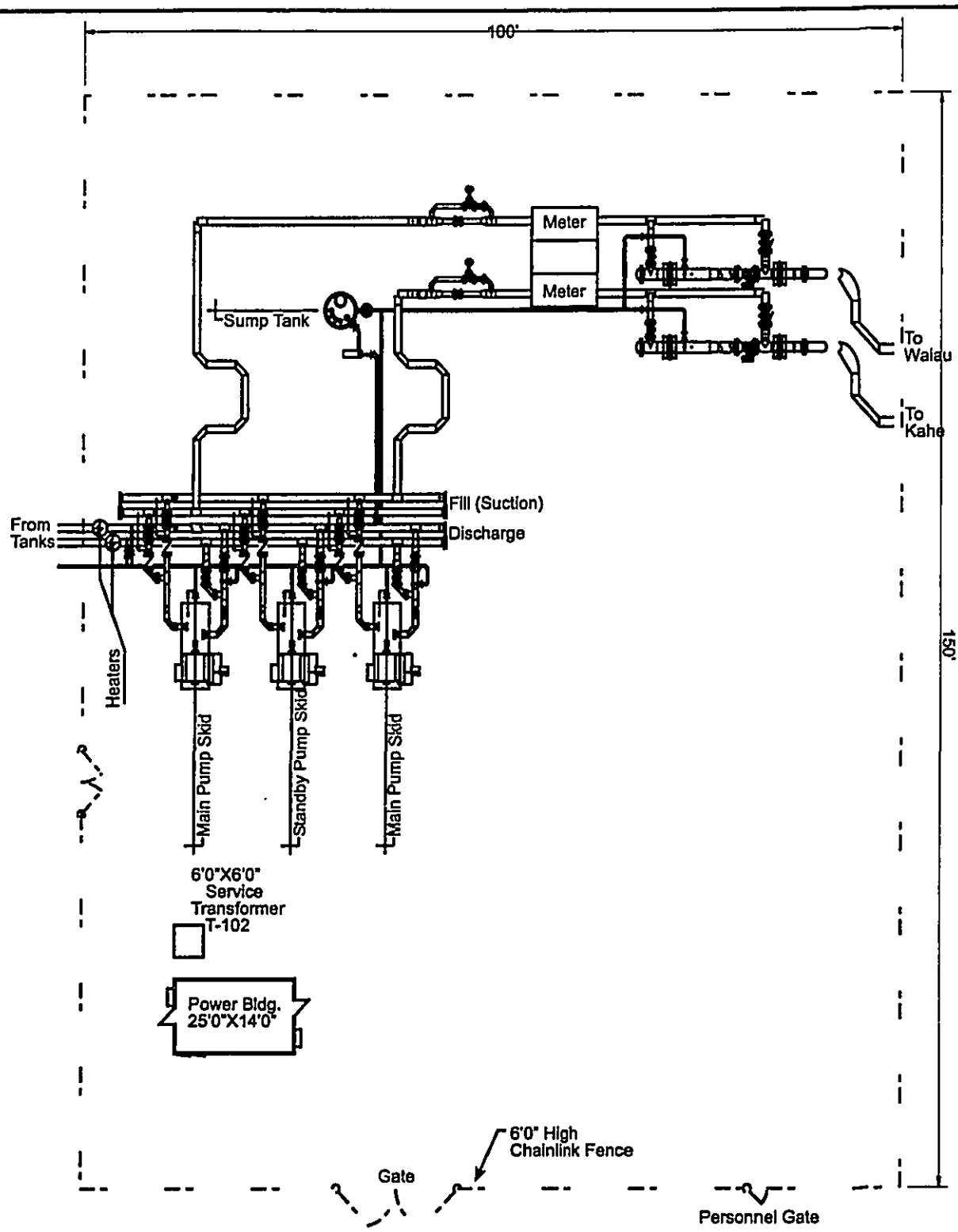

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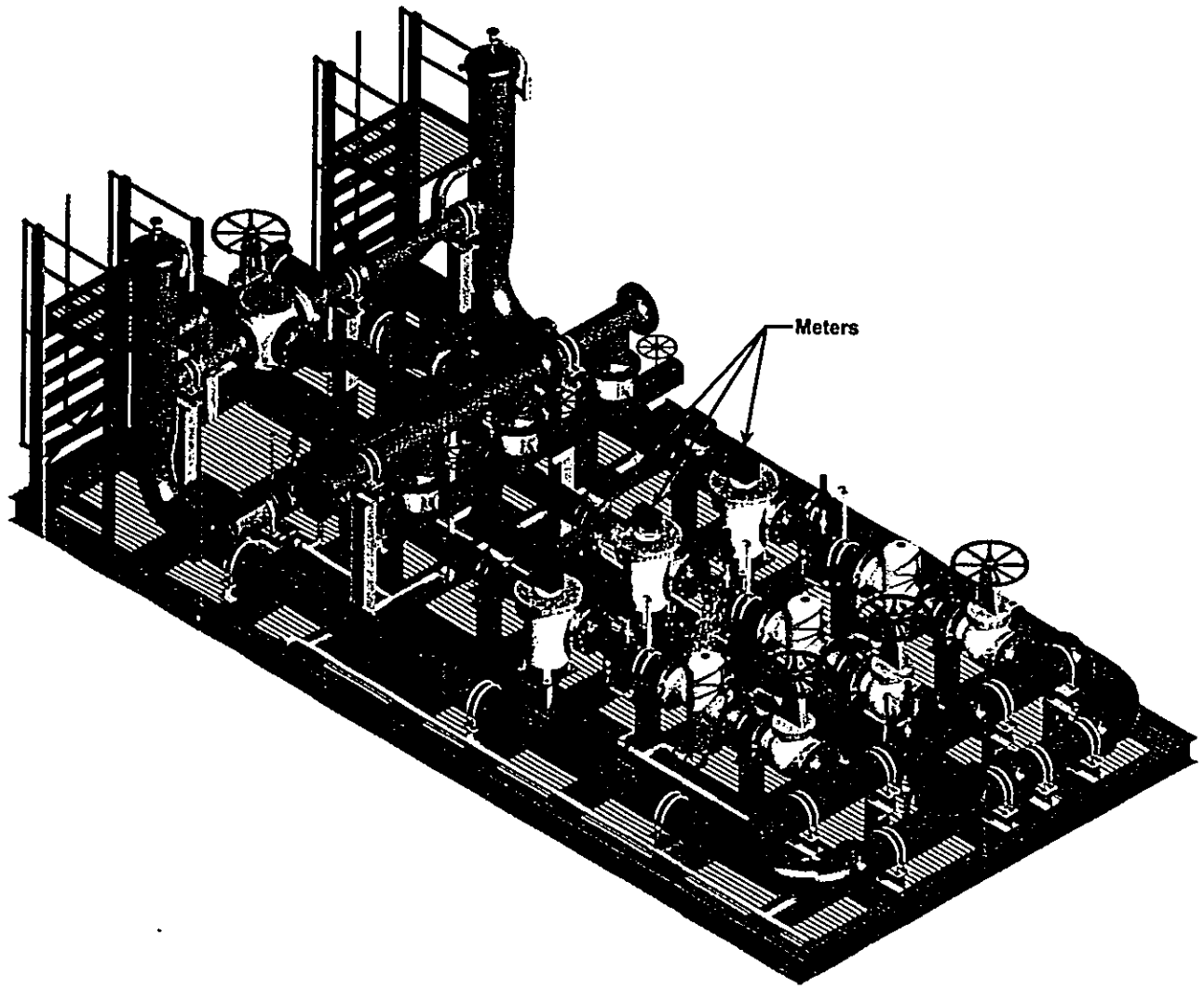
Figure 2-8:

TYPICAL PUMP STATION

Waiau Fuel Pipeline Project



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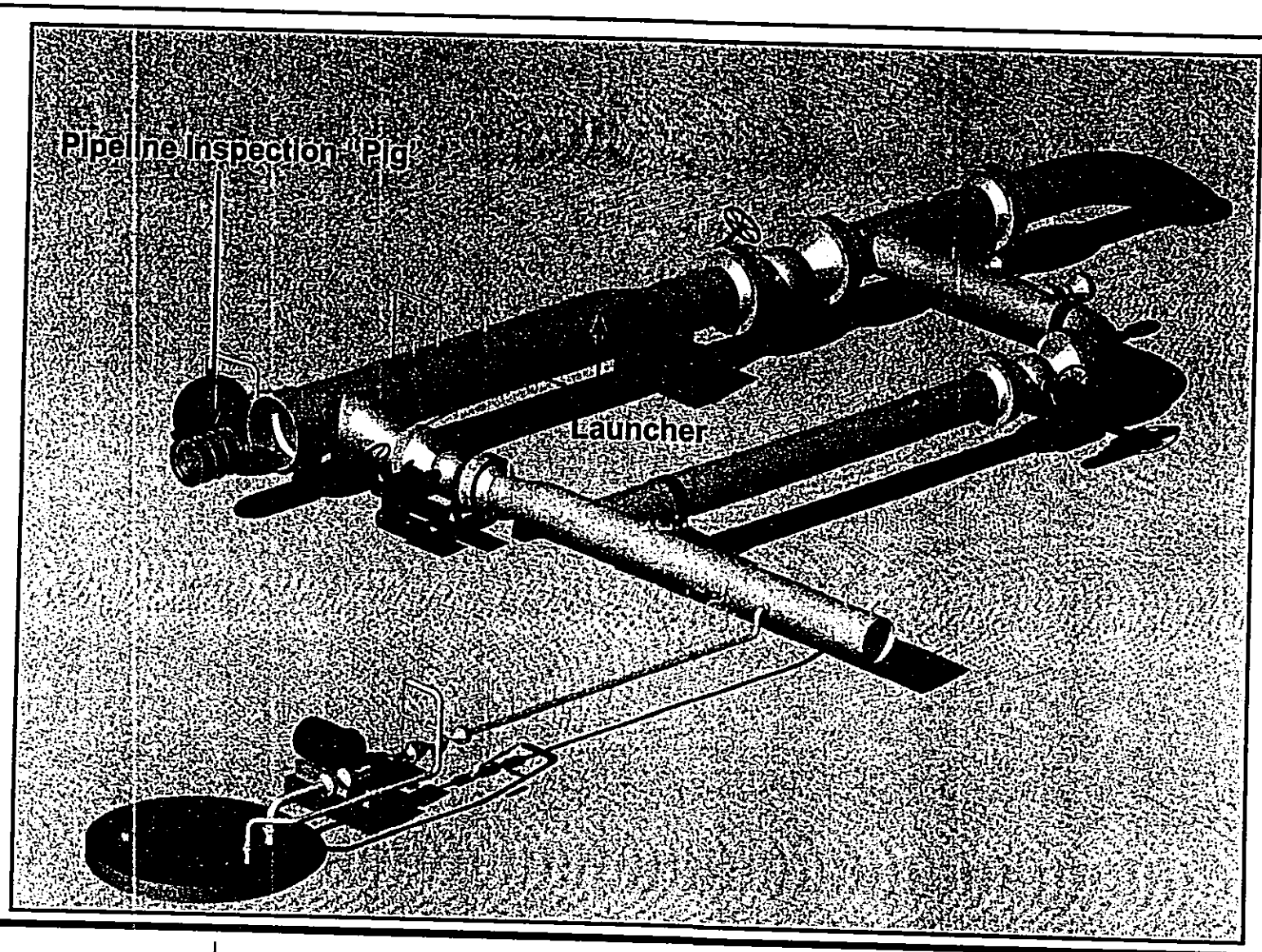
SOURCE:
Rooney Engineering, Inc.

Figure 2-9:

Typical Metering Equipment For Oil Pipelines

Waiau Fuel Pipeline Project



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Source:
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Figure 2-10:

Typical "Pig"-Launcher/ Reciever for System

HECO Fuel Delivery Project

- Fuel Truck Loading Facility: A truck-loading facility would be installed to fill fuel trucks destined for the Iwilei Tank Farm.[10] Computer programming, accessed by a card-lock security system would control truck loading. The same facility would be able to receive and pump No. 2 fuel oil (diesel grade) from trucks into a newly constructed 40-foot high storage tank with a capacity of 10,000 barrels. No. 2 oil would be used to displace the LSFO in the pipelines, if necessary. Using the diesel fuel, the pipelines can either be cooled for the running of internal inspection tools or heated after the inspection tool run before running LSFO.
- Access Control. Access to the facilities at BPTF would be controlled by a magnetic card or keypad actuated electronic gate at the entrance to the tank farm. An electronic card reader would actuate the truck loading system.

2.1.6 MODIFICATIONS TO THE WAIAU GENERATING STATION

HECO would make several modifications to the Waiau Generating Station to accommodate the new pipeline.

- It would establish an Operations Control Center (OCC) for all pipeline operations in an existing room at the Waiau Generating Station (probably one of the Control Rooms). The OCC would house the Supervisory Control and Data Acquisition (SCADA) system master. The proposed SCADA system design, which is based on high-speed desktop computers, would utilize state-of-the-art pipeline operating software combined with a dynamic leak-detection model. The system would process all data received from the remote terminal sites at BPTF and at sensors along the length of the pipeline and would present this information to the pipeline operator in graphical form. The system would provide closed-circuit video monitoring of the BPTF and Waiau facilities.
- It would install a metering facility and pig retriever system. This would be a near twin of the pig launcher system proposed for BPTF (see Figure 2-10).
- It would modify the existing structure that supports the fuel-line overhead crossing of the Navy fuel-line ROW and bikeway. The existing structure and proposed modifications, with attached pipelines, are illustrated in Figure 2-11. Site plan showing the location of the metering facility, pig launcher, and other facilities that would be installed at the Waiau Generating Station is presented in Figure 2-12.

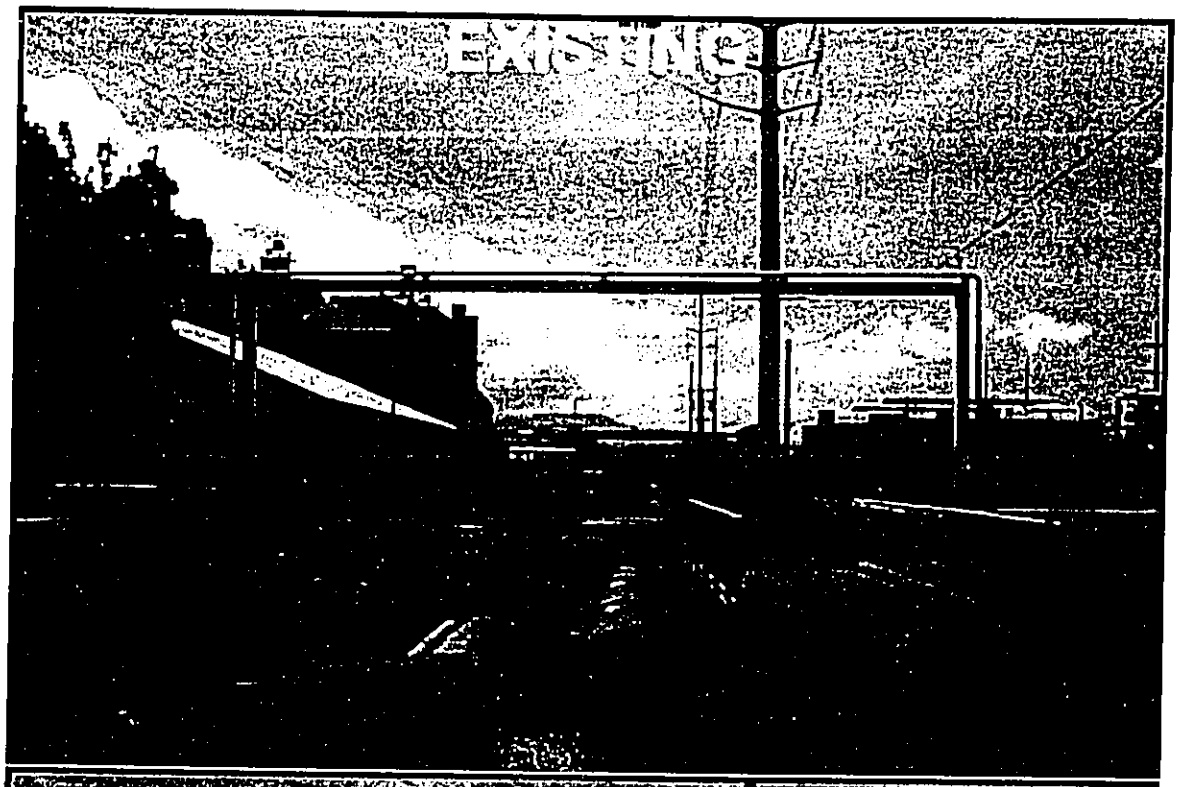
2.1.7 IWILEI TRUCK UNLOADING FACILITY

LSFO would be loaded onto trucks at the BPTF using the proposed new loading facilities and would be off-loaded at the existing Iwilei Tank Farm. Proposed modifications to the existing facilities (see Figure 2-13) include:

- Installation of electrically operated gates on the east side of the facility;
- Installation of the truck unloading connections, valves, pumping equipment, and metering;
- Relocation of existing aboveground piping to improve truck access to the facility;
- Construction of a small (approximately six feet square) shed to house the computer and ticket printer and bill of lading depository; and
- Installation of a new entrance and driveway paving.

Approximately 5 truck trips per day would be required to provide the amount of fuel presently consumed at the Honolulu Generating Station. The route followed by the trucks is shown in Figure 2-14 and discussed in more detail below in Section 2.3.2.2.

[10] From Iwilei the fuel would travel by the existing HECO pipeline to the Honolulu Generating Station.



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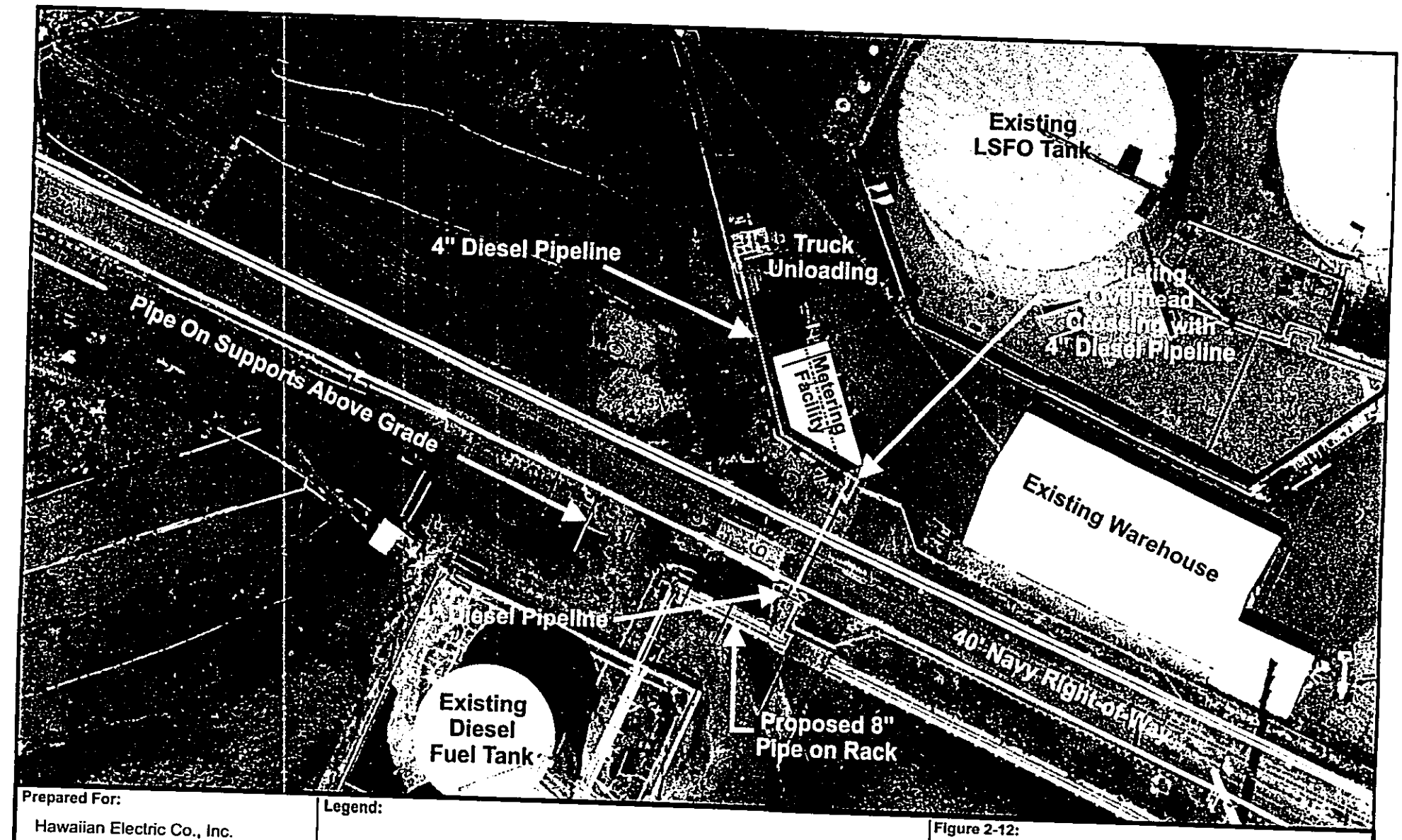
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Rooney Engineering, Inc. (2001)

Figure 2-11:
Existing and Proposed Fuel Line Overpass at Waiau Generating Station

Waiau Fuel Line Project



Prepared For:
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PLANNING SOLUTIONS

Source:
Rooney Engineering, Inc.

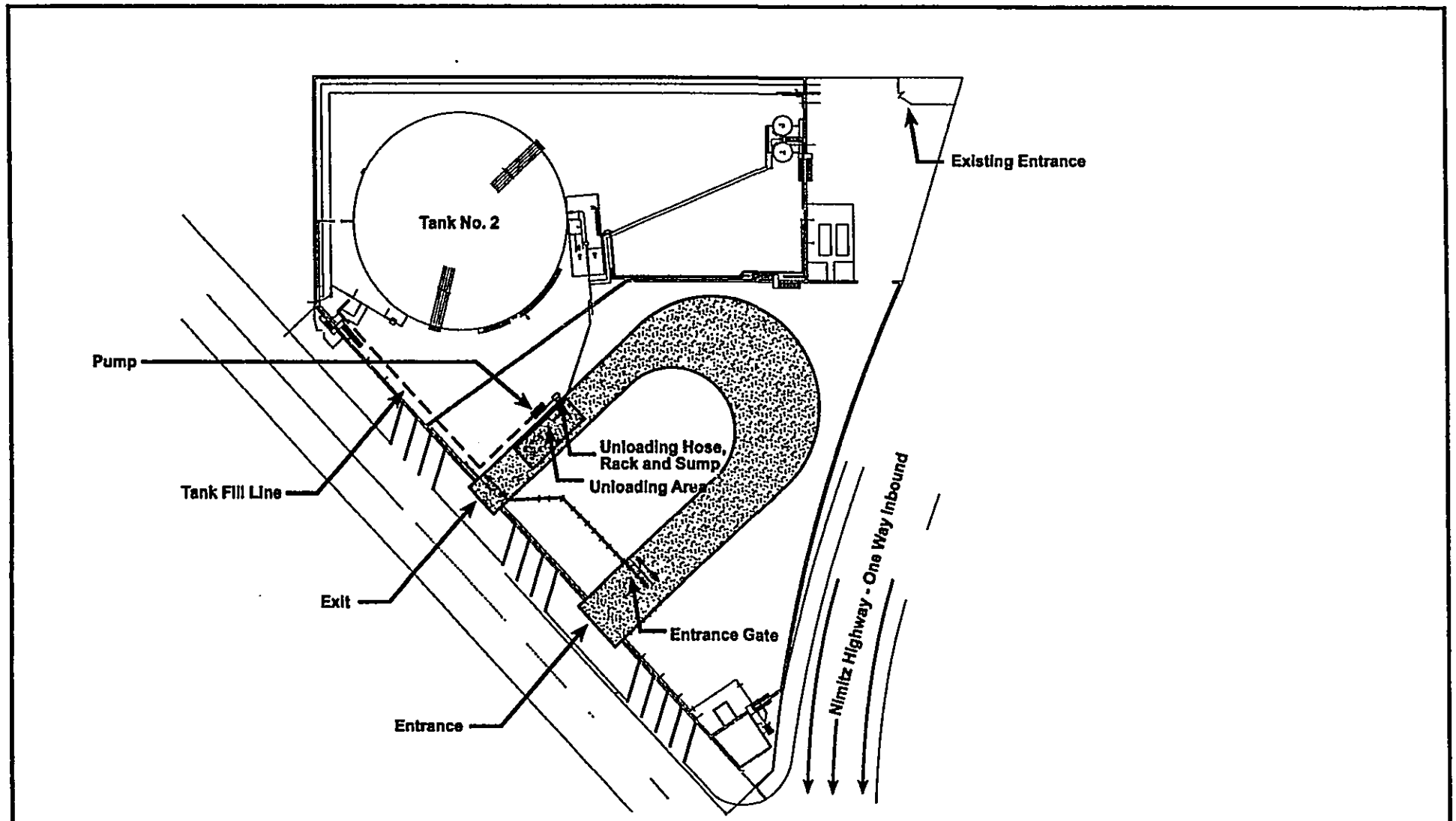
Legend:

N

Figure 2-12:

Site Plan for Proposed Modifications to Waiau Generating Station

Waiau Fuel Pipeline Project



Prepared For:
Hawaiian Electric Company, Inc.

Prepared By:
PLANNING SOLUTIONS

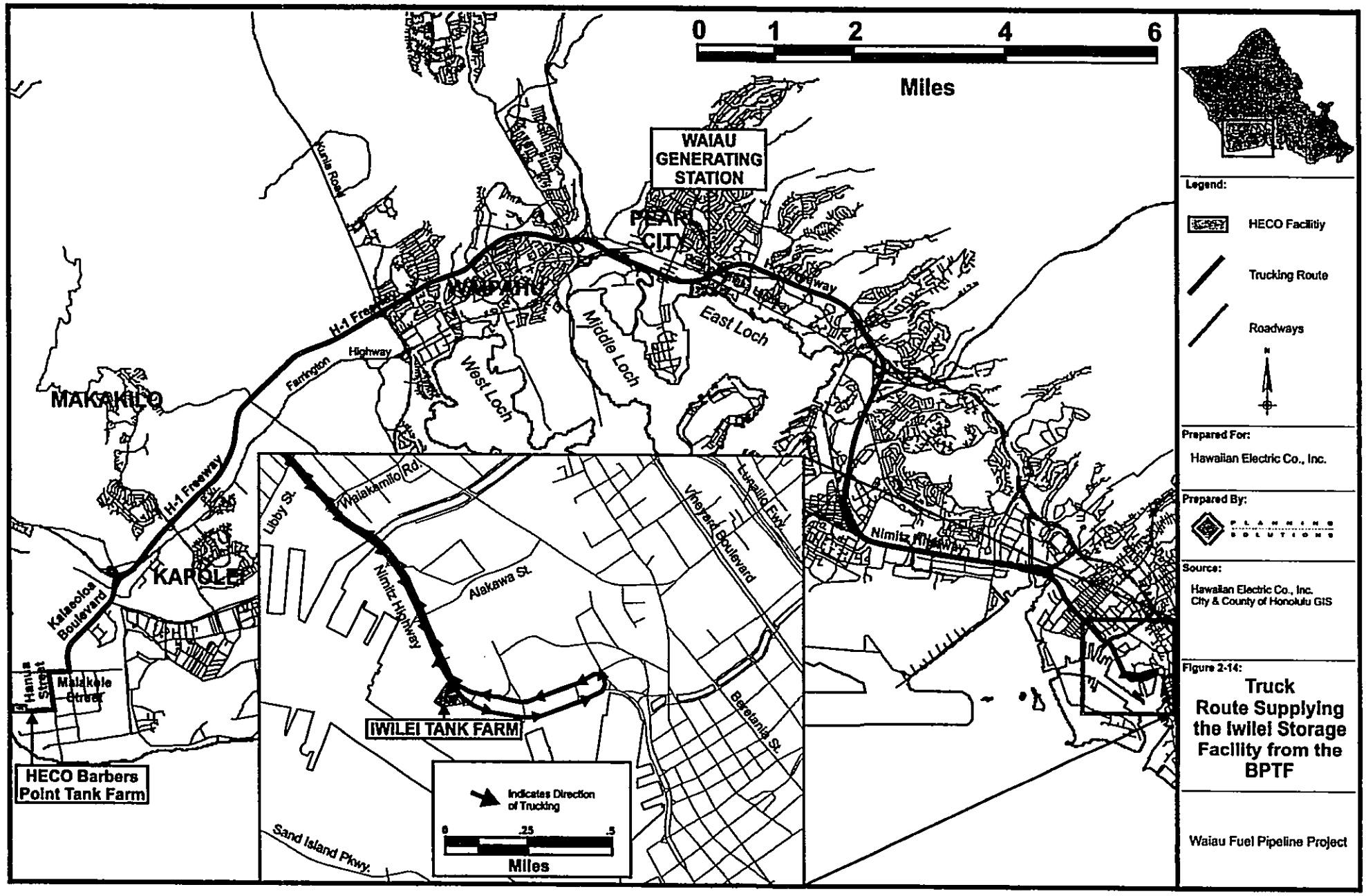
Source:
Rooney Enginnering, Inc.
Drawing# 480F0402
Rev. C, 01-29-01

Legend:
Proposed Facilities
Existing Facilities
Pavement

Figure 2-13:

Iwilei Storage and Truck Unloading Facility

Waiau Fuel Pipeline Project


0 1 2 4 6
Miles
WAIAU GENERATING STATION
PEARL CITY
WAIPAHU
MAKAKILO
KAPOLEI
H-1 Freeway
Farrington Highway
Kunia Road
West Loch
Middle Loch
East Loch
Kamehameha Highway
Nimitz Highway
Kalaeloa Boulevard
Malakole Street
Hanua Street
HECO Barbers Point Tank Farm
Waiakamilo Rd.
Libby St.
Alakawa St.
Nimitz Highway
Vineyard Boulevard
Ewa Mill Ewl
IWILEI TANK FARM
Bagalanta St.
Sand Island Pkwy.
Indicates Direction of Trucking
0 .25 .5
Miles
Legend:
HECO Facility
Trucking Route
Roadways
N
Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
PLANNING SOLUTIONS
Source:
Hawaiian Electric Co., Inc.
City & County of Honolulu GIS
Figure 2-14:
Truck Route Supplying the Iwilei Storage Facility from the BPTF
Waiau Fuel Pipeline Project

2.1.8 GENERAL CONSTRUCTION TECHNIQUES

Construction of the proposed pipeline would involve several types of activities. These include: pre-construction surveying; clearing and grading; ditching; hauling and stringing the line pipe; pipe bending, line-up and welding; inspecting welds; coating and insulation of pipe welds; lowering and tying in pipe sections; backfilling; hydrostatic testing; and cleaning up and restoring the construction areas. These activities are described in the following sections.

2.1.8.1 Pre-Construction Activities

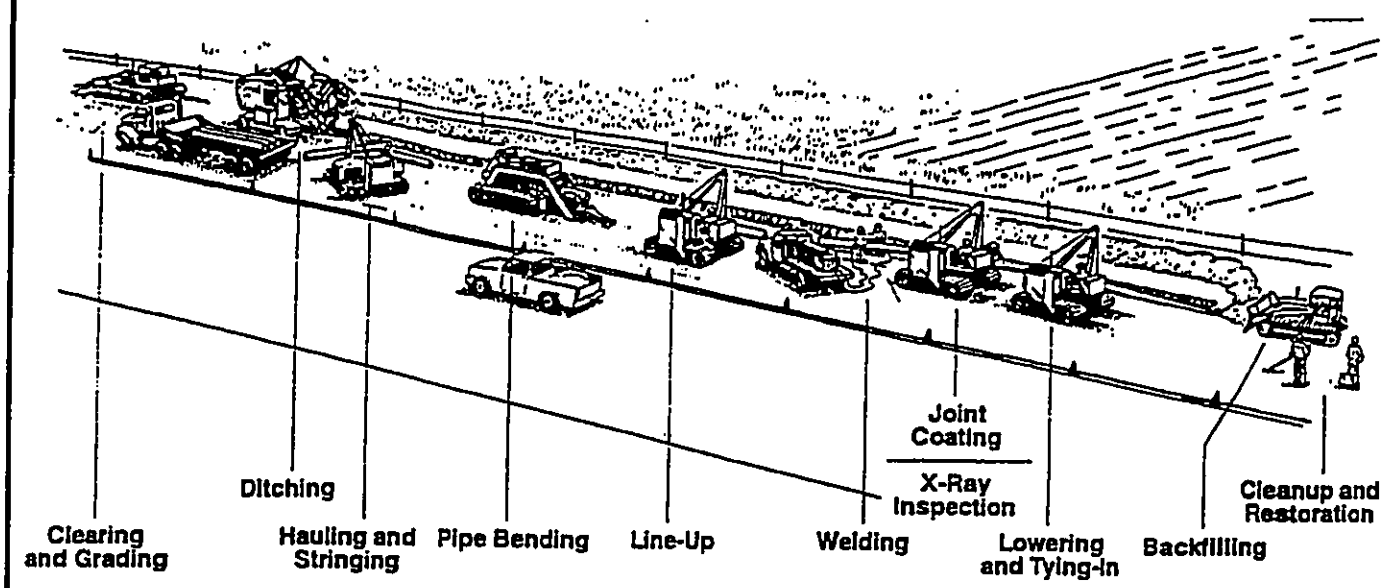
The major field operation before construction is detailed field surveying of the proposed route. HECO would prepare several pre-construction technical and engineering studies and surveys. These activities, which include geotechnical studies of soils and geohazards, would help engineers to refine pipeline design parameters, such as corrosion control measures and pipe strength requirements, and also to develop erosion control measures for pipeline construction and operation. Detailed construction traffic management plans would be developed for areas where construction activities have the potential to interfere with normal traffic flow. In most areas, construction activities would be completed within a few weeks of their start.

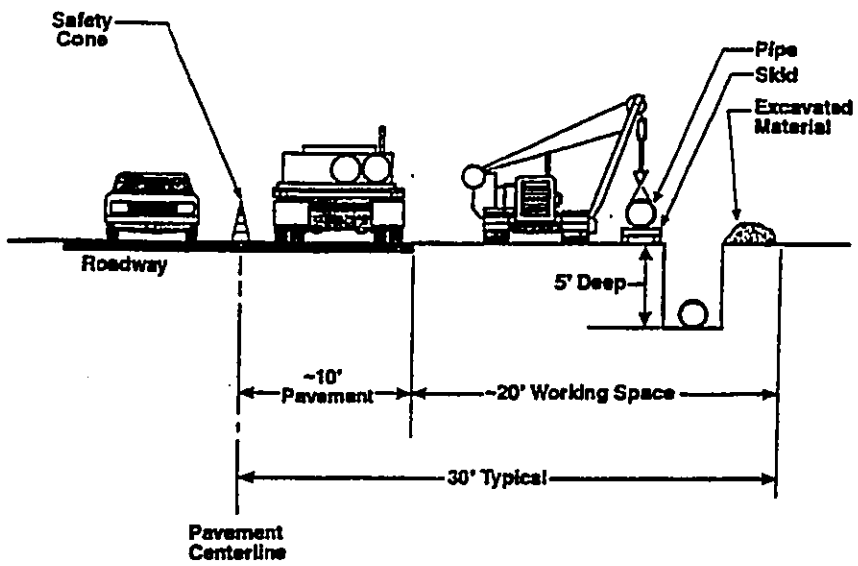
If HECO is successful in obtaining approvals for the proposed project, it will finalize its construction plans and let a construction contract for the work. It will also finalize its agreement with the State Department of Transportation for lease of a slot within the SEC. HECO and/or the construction contractor that is awarded the contract would notify landowners, permittees, and regular users of public lands along the ROW in advance of construction activities that could affect their business or operations. Notification to landowners would normally be by mail. *Tenants would be notified in* person prior to construction. Other notification would be made by various means, including placing signs at road crossings in advance of construction. Farmers would be advised of any fence openings, disturbances to range improvement, or farm-related structures in advance of construction. HECO will provide the Neighborhood Boards along the route with regular updates on the status of the project.

Where construction activities might adversely affect pedestrian access to transit stops, transit providers would be contacted to develop temporary alternatives with appropriate signs and public notification. Businesses along the pipeline route would be informed in advance of planned construction dates. Temporary signs would be installed and alternate vehicular and pedestrian access established. Existing access to businesses near the proposed route would be maintained throughout the construction period to the degree possible consistent with safe and efficient construction practices. Where such access must be temporarily disrupted, HECO would provide advance notice and would work with business operators to minimize disruptions. HECO would notify service providers of intended construction to avoid conflict with existing utilities and disruptions of service to utility customers.

In many areas the SEC shares rights-of-way with the proposed Pearl Harbor Historic Trail, planned and existing bicycle paths, and the former OR&L ROW (City & County of Honolulu 2000). Detailed plans for the bicycle paths and railway line that are part of the Historic Trail concept have not yet been developed. However, preliminary engineering studies for the pipeline suggest that access to the railway ROW and to the planned and existing bicycle, walking, and jogging paths may need to be modified or interrupted for short periods during pipeline construction to ensure public safety. No such potential exists during normal pipeline operation.

Input that HECO has received at public meetings, during meetings with community leaders and elected officials, and in private conversations with residents of potentially affected communities, has emphasized the value of these existing and planned corridors. HECO and its contractor would work with City and State agencies, including the City's bicycle coordinator, to ensure that adequate notification is provided of any temporary closures that are needed. All areas affected by pipeline construction activities would be restored to their pre-construction condition. Where practical, HECO would identify alternate routes to be used during the construction period.





Prepared For:
Hawaiian Electric Company, Inc.

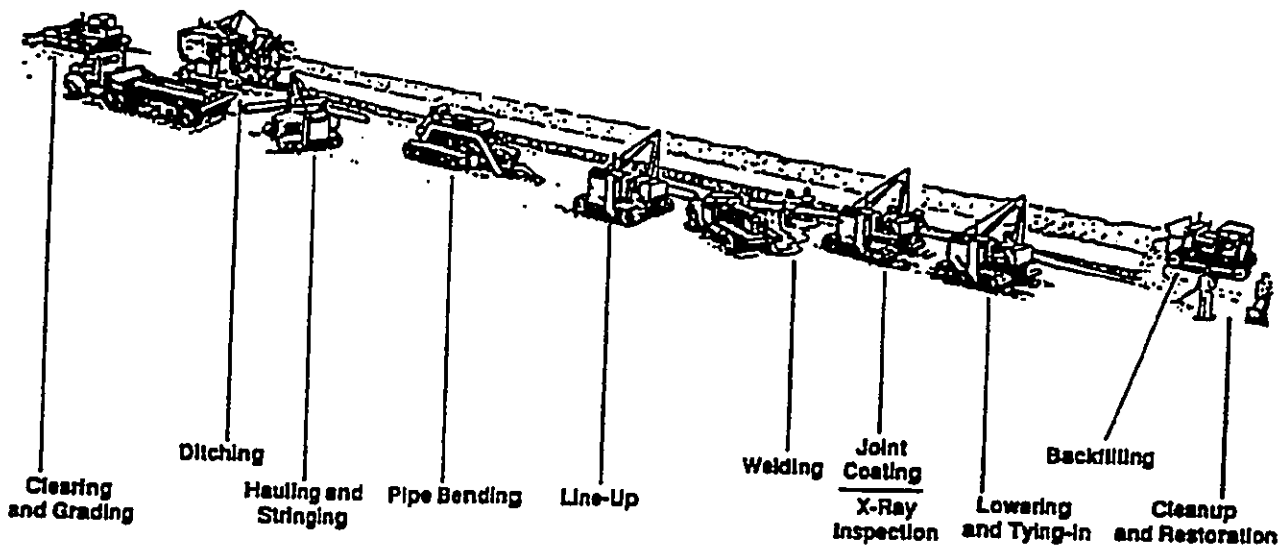
Prepared By:
PLANNING SOLUTIONS

Source:
Rooney Engineering, Inc. (2000)

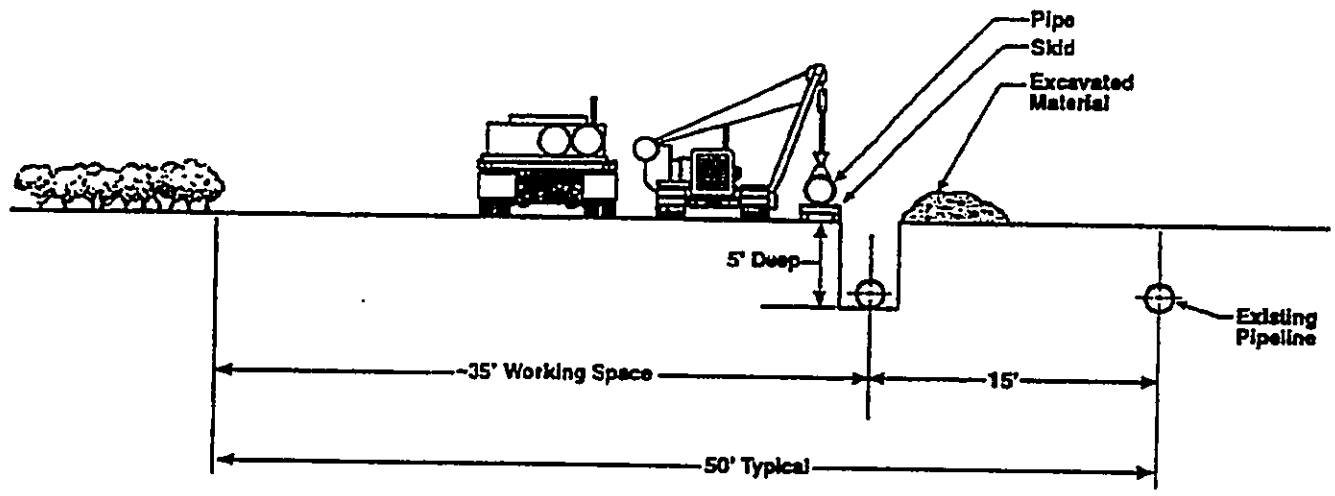
Figure 2-15:

Example of Pipeline Construction Along Existing Roads

Waiau Fuel Pipeline Project



TYPICAL CONSTRUCTION SPREAD
OPEN COUNTRY



CROSS-SECTION OF PIPELINE CONSTRUCTION RIGHT OF WAY - OPEN COUNTRY

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Prepared By:
PLANNING SOLUTIONS

Source:
Rooney Engineering, Inc. (2000)

Figure 2-16:

Example of Pipeline Construction In Open Country

Waiau Fuel Pipeline Project

2.1.8.2 Clearing and Grading

Pipeline construction involves clearing and grading, ditching, pipe handling, backfilling, cleanup and restoration. These tasks are illustrated diagrammatically in Figure 2-15 for construction along road shoulders and in Figure 2-16 for construction in open country. Clearing and grading activities are described in the remainder of this section. Ditching, pipe handling, backfilling, and cleanup and restoration are described in Sections 2.1.8.3 through 2.1.8.6.

Some clearing is always required. This includes removal of aboveground obstacles to construction, such as trees, brush, crops, and boulders. Sensitive trees or vegetation areas along the ROW would be marked or flagged to prevent accidental clearing.

Temporary construction fencing would be erected as needed to protect these trees and other sensitive areas. Tree stumps and roots within the ditch line would also be removed. As appropriate, vegetation would be chipped for use as mulch in re-vegetation efforts along the ROW. Materials unsuitable for use as backfill would be transported to a landfill permitted to receive the material or to individual parties permitted to receive clean fill. No vegetation debris would be buried along the ROW.

Any small drainageways or gullies that need to be frequently crossed by construction traffic would be protected by temporary access installations. These would consist of culverts or temporary access fords. In addition, the streets adjacent to frequently used construction entrances would be swept regularly, if expected to be in use for more than a week. Temporary culverts would be small concrete or corrugated metal pipes topped with well-graded earth fill. Culvert openings would be of an adequate size for the conveyance; more than one section may be necessary. These installations would help prevent further drainageway degradation from traffic crossings. Culverts would be removed and the fill would be spread on nearby ground and seeded when pipeline construction traffic ceases. Temporary construction entrances would be removed and the areas returned to their original condition.

Grading would include leveling the ground surfaces as required to permit transit and operation of vehicles and equipment and to allow placement of the pipeline at the desired elevation. Cuts and fills to maintain grade would be minimized. Where necessary, cut and fill would be blended with existing terrain to maintain drainage and slope stability.

Construction of roads and bridges and various other kinds of work may also be needed within the ROW. In paved areas, surface preparation would include breaking and removing pavement with concrete saws, pavement breakers, and where necessary, jack hammers. The broken debris would be hauled off to approved landfill sites or a crusher plant via trucks.

2.1.8.3 Ditching

Once the ROW has been prepared, ditching operations would begin. Most of the proposed pipeline route is believed to consist of unconsolidated fill materials, since pipelines are already in place. Plans call for the ditch to be excavated through such material using tracked excavators and backhoes. An exception to the mechanical excavation would be hand digging to locate buried utilities, such as other fuel pipelines, cables, water mains, and sewers. If bedrock is encountered during ditching, the area would be trenched using excavation equipment.

The depth of the ditch may vary if special conditions are encountered. Such special conditions include the presence of other pipelines or utilities, the presence of bedrock, or other factors. The trench would typically be 24-30 inches wide. At road and railway crossings, the depth of the ditch would conform to appropriate regulations.

Spoils from cuts would typically be used as backfill materials at the site of origin. Paving materials would be recycled or disposed of in the appropriate manner. Excess materials would not be placed in drainageways or on steep, unstable slopes. The contractor would attempt to minimize the amount of excess material. Where excess backfill materials are generated, they would be spread on nearby

project areas for reseeding, or used in other excavation areas along the ROW. Materials unsuitable for backfill use and economically not usable for other purposes would be disposed in accordance with county guidelines in available landfills. Vegetation or other debris would not be mixed with backfill or topsoil.

Generally, de-watering techniques are not expected for open trenches. However, de-watering will probably be needed in some low-lying locations along West Loch. As indicated below in Table 2-7, a de-watering permit would be needed for this. At open-cut stream crossings, a trench would be excavated to a depth four feet below the estimated 100-year scour depths or 1.3 times the scour depth.[11] Spoils would not be stored in the streambed but would be transferred to the bank. The open trench would likely fill with groundwater. Since de-watering is not proposed, the pipeline would have to be sunk into the trench. Several different means of accomplishing this could be used.

HECO intends to bore or directionally drill under all major paved road crossings wherever possible. Preliminary interactions with community leaders, landowners, the Neighborhood Boards, and many members of potentially affected communities have helped to identify the most likely crossings where boring and directional drilling would be employed (see Table 2-3). For example, early plans to cross the Kapolei Shopping Center called for a combination of open trenching and directional drilling. Currently, HECO is exploring the technical feasibility of crossing the entire shopping center complex using one or two directional drilling operations.

Trenching, rather than boring, would be used for pipeline segments crossing all unpaved minor roads and some minor paved roads. If a minor paved road should require trenching, the trench would be filled with cement slurry in order to prevent settlement. Steel plates would be used to cover any open trench left at the end of each workday. Fencing may be used in some areas where plating is not practical and/or access across the trench is not necessary.

2.1.8.4 Pipe Transport and Handling

The pipe needed for this project would be manufactured on the Mainland and transported to Hawai'i by ship or barge. Once on O'ahu, it would be trucked to one or more construction staging areas located along the route. The exact locations of these staging areas have not yet been identified. It is expected that the delivery would be done using tractors and trailers.

Pipe handling would be kept to a minimum to prevent damage to the coating systems and the pipe itself. On blacktop roadways, it is expected that one to two truckloads of pipe would be required per day. Pipe-stringing trucks would be used to transport the pipe in 40- to 80-foot lengths from the shipment point or storage yards to the pipeline ROW.

2.1.8.5 Pipe Installation

Once the pipe is delivered to the construction area, the contractor would generally adhere to the following construction sequence:

- Trucks would carry the pipe to the point along the ROW where it is needed.
- Once in the correct location, tractors would unload the joints of pipe from the stringing trucks and lay them end-to-end beside the ditch line for future line-up and welding.
- Laying the pipe would involve use of line-up clamps to hold the pipe sections in position until the first welding pass (bead) is completed. The welders would make a second welding pass, the "hot pass".
- Following the bead and "hot pass" crew, the "fill and cap welding" crew would apply the remaining weld passes to bring the thickness of the weld to more than the thickness of the pipe by

[11] Scour depth is the maximum predicted depth that a 100-year storm would create. At present, Honouliuli Stream is the only location at which scour appears to be a possibility. This will be confirmed as engineering studies progress.

approximately 1/16 inch. All pipeline welds would be inspected radiographically to ensure the integrity and durability of the weld.

- The main pipeline corrosion coating would be applied at the mill before delivery to the construction site. However, field coating is necessary on all field weld joints to provide a continuous corrosion coating along the pipeline. After the pipe has been welded and inspected radiographically, fusion-bonded epoxy (FBE) coating would be applied to all field joints and fittings. Following the FBE coating of the welds, insulation would be installed around the field joint and secured with shrink sleeves.
- Once this work has been completed (but before the pipe is lowered into the excavated ditch), the pipe would be tested to locate any coating discontinuities that could permit moisture to reach the pipe.[12] All coated pipe including all field joints, fittings, and bends would be tested and repaired as necessary after the pipe is in place and before backfilling.
- The pipe would then be lifted and lowered into the ditch by two or more tractors. Cradles with rubber rollers or padded slings would be used so the tractors could lower the pipe without damage as they travel along the ditch line.[13]
- Backfill material would primarily be obtained from the ditch spoils. Spoils would be placed in windrows as delivered off the back of the ditching machine/backhoe. Where native top soils are disturbed in agricultural areas, topsoil would be salvaged before trenching and would be windrowed or stock piled within the ROW. This material would be replaced as the top layer of backfill.
- Spoils would be screened if necessary as the material is returned to the ditch using standard construction screening equipment. The pipe would be covered along the sides with fill free of rocks larger than 1 inch (1-inch minus), and then covered on top with a minimum of 12-inches of 1-inch minus fill. This zone is referred to as the "pipeline shading."[14]
- The fiber-optic duct would be installed within the trench at some distance from the pipeline itself. The backfilling would then be completed. The backfill in the remainder of the trench above the shading would be native material, free of vegetation.
- Where necessary, the backfilled earth would be compacted using a roller or hydraulic tamper. Cover would be slightly crowned to allow for settlement of the fill and to discourage drainage along the pipeline. Re-grading operations would restore the approximate original contour to the ROW, except in areas where slope stabilization requires contour modification.
- At the time of backfilling, a colored warning tape would be buried approximately 12 inches below the ground surface to indicate the presence of a buried pipeline and fiber-optic cable to third-party excavators.
- After the backfill is complete, crews would install the fiber-optic cable in the buried duct. The cable would be installed by pulling cable from reels through the duct from hand hole to hand hole. Once the cable is pulled along the entire length of the pipeline, the fiber can be tested and the connections made to the valves and the originating and receiving locations.

[12] The testing device (a holiday detector) develops an electrical potential between the pipe and an electrode in contact with the outside of the coating or ground. Pinholes in the coating of microscopic size can be located using the holiday detector.

[13] Tie-ins would be required whenever a break occurred in the continuous operation of the main-line pipe crews. This would be the case at road crossings, water crossings, block valves, and other special locations. Tie-in welds would usually be made in the ditch at the final elevation, and each weld would require pipe handling for line-up, cutting to exact length, and coating, and backfilling, in addition to normal welding and weld inspection. All welders would meet training and experience standards set by API 1104, and all welds would be inspected by a third party contractor. The radiographic records would be preserved for the life of the pipeline.

[14] In certain areas where damage might occur to the pipe coating, e.g. rocky, (other than the existing spoil from the excavation process) material, clean sand, or earth backfill would be used to pad the pipeline. Any required padding material would be obtained from local commercial sources or private landowners.

- Before the start of operation, the pipeline would be hydrostatically pressure tested to 125% of its maximum operating pressure in accordance with federal and state rules.

2.1.8.6 Cleanup and Restoration

Cleanup and restoration would involve several steps. These include: ROW cleanup; fence, road, driveway, and trail repair; and erosion control, re-vegetation, and landscape restoration. Disturbed areas would be restored as closely as practical to the way they were before the start of construction. HECO would plant disturbed areas and implement and erosion-control measures, in accordance with detailed plans approved by the Clean Water Branch of the State Department of Health and by the City & County of Honolulu. A maintenance program would be implemented where necessary to ensure restoration of sensitive resources.

The restoration process would typically include removal of construction debris, temporary construction signs, surplus material and equipment; water control structures; cultivation, mulching, application of soil amendments; and, where applicable, replanting. In all land types, restoration would follow pipeline construction specifications, beginning with the disposal of debris and the restoration of normal contour and surface soils. Surface contouring and water control structures would be used as diversions to concentrate and/or channel surface-water flow and prevent soil erosion.

Discs and other types of equipment would be used to break up clods and to smooth the land surface where required. Tillable land would be restored so that normal cultivation could be resumed. Temporary openings in fences would be repaired, necessary gates installed, and fences restored to their original condition. Driveways and access roads would be repaired to original condition. Markers showing the location of the pipeline would be installed at road and fence crossings; these markers would identify the owner of the pipeline and other pertinent information such as type of material transported and the telephone number to call in case of emergency.

Disturbed areas would be re-vegetated or seeded. Re-vegetation would utilize plant species that conform to adjacent land use/vegetative cover type. Seed mixtures would contain no noxious weeds, and the project-related preferred seeding methods would be specified. Where appropriate, topsoil would be returned to cover the trench backfill material. Some areas would require that the soil not be turned over and that the topsoil be preserved separately for use in preparing seedbeds and to control erosion. Fertilizers would be applied where appropriate. Re-vegetation programs would be based on conditions of project approval, agency guidelines, or industry standards, as appropriate. Restoration of agricultural land would be based on pre-construction agreements with each landowner or tenant. Many of these measures would be as specified in the NPDES Construction Permit that will be needed.

Restoration of the ROW where it crosses open cuts of a stream would emphasize stream-bank stabilization. This stabilization could involve mulches, seeding of seedlings, runoff diversion structures, and/or riprap in conformance with applicable permits and other requirements.

Temporary access roads, staging and assembly areas, and other temporary installation support areas would be restored in a manner similar to the ROW. Upon abandonment, such areas would be stabilized without undue delay, and the area would be returned to the owner or land manager.

2.1.9 VALVE INSTALLATION

As previously noted, HECO proposes to install six mainline block valves and one check valve on the pipeline as well as station isolation valves at the origin and terminus of the line (see Table 2-2). Crews not assigned to the regular pipeline installation activities would install the vaults and structural enclosures for these valves. A pit large enough to install the valve vault would be excavated prior to installation of each vault. Each valve assembly would be aligned and connected to the main pipe using flanged fittings or by welding directly to the pipe. The pit would be backfilled, compacted, and re-graded in the same manner as the rest of the pipeline trench.

2.1.10 PIPELINE CROSSINGS OF ROADS AND DRAINAGEWAYS

Three methods of crossing roads and drainageways are under study and outlined in the following sections. One of the three methods would probably be applicable to any particular crossing. It is anticipated that all three would be utilized during the course of construction. Table 2-3 lists pertinent information about each planned road crossing. Table 2-4 describes the key features of the necessary drainageway crossings on the route. Figure 2-17 and Figure 2-18 show the locations of these crossings.

2.1.10.1 Open Trenching

This method is applicable to crossings of roads with low traffic volume. It can also be used for most drainageway crossings, particularly if they are dry or in a state of low flow.

2.1.10.2 Conventional or Jacked Bores

For conventional boring, a bore and receiving pit are excavated on their respective sides of the crossing. An auguring machine is then lowered into the bore pit, a tunnel or casing is then augured beneath the road into the receiving pit, and the carrier pipe is inserted into the tunnel or casing. This method is depicted in Figure 2-19. It is effective where the groundwater level is below the bottom of the drilling pit.

2.1.10.3 Horizontal Directional Drilling

Horizontal Directional Drilling (HDD) is accomplished by setting up a drilling machine on the side of the road or on the bank of the stream at a predetermined angle. The attitude of the drill bit can be changed during the drilling process to target a predetermined exit point on the opposite side of the stream (see Figure 2-20). This method can be extremely useful at busy roadways, wide stream crossings and crossings where the banks would be difficult to stabilize if they were to be trenched and at crossings where stream alteration agreements demand extensive restoration efforts.

2.1.11 OPERATIONAL CHARACTERISTICS FOR THE PROPOSED ACTION

2.1.11.1 Fuel Flow Characteristics and Pipeline Startup

LSFO must be kept heated (to above 165° F in the current design) to flow through a pipeline with acceptably low friction. As the temperature drops below that point, the oil becomes increasingly viscous, requiring more energy to pump. If its temperature drops below approximately 120° F, the fuel oil becomes so viscous that it cannot be pumped at all. Fuel that has congealed to the point where it cannot be pumped forms what is referred to as a "cold plug."

Normal Startup and Shutdown Procedures. When the proposed pipeline is first being put into service, it would be filled with heated diesel oil to bring the pipe up to its normal operating temperature. Heated LSFO would then be introduced to the pipeline and normal continuous operation could commence. This startup procedure would be followed after each period when the pipeline is out of service for more than a short time. The steps in the startup procedure would be followed in reverse order each time the pipeline is taken out of service for more than a few hours. The shutdown steps involve pumping diesel oil into the line, "displacing" the LSFO from the line into existing heated storage tanks at Waiau Generating Station.

Displacement of the LSFO in pipelines by lighter oil is necessary when the pipeline must be shut down for an extended period of time and when certain inspection and maintenance tools or "pigs" are used in the pipeline. All diesel oil used for displacement and pigging would be disposed of by blending it into the LSFO tanks. The time it takes for displacement is a function of the flow rate and pipeline distance. The design rate for the proposed dedicated emergency pump is 390 barrels per hour. At this rate, it would take 11 hours to displace all of the LSFO from the proposed Waiau pipeline.

Table 2-3 Road Crossings along the Proposed Pipeline Route

Location Key (Figure 2-17)	Street Name	Ownership	Crossing Type	Constr. Timing	Approx. Width (ft.)[1]
R1	Malakole St.	State	Bore/HDD	Day	60
R2	Kalaeloa Blvd.	Private	Bore/HDD	Day	160
R3	Kapolei Pkwy.	County	Bore/HDD	Day	133
R4	Farrington Hwy.-1	State	HDD/Open Cut	Day/Night	88
R5[2]	Kapolei Shopping Center Entrance-1	County/Private	HDD/ Open Cut	Day/Night	93
R6[2]	Kapolei Shopping Center Entrance-2	County/Private	HDD/ Open Cut	Day/Night	90
R7[2]	Kapolei Shopping Center Entrance-3	County/Private	HDD/ Open Cut	Day/Night	53
R8[2]	Makakilo Dr.	County	HDD	Day	140
R9	Noulu Rd.	County	Open Cut	Day	89
R10	Pālehua Rd.	County	Open Cut	Day	40
R11	Farrington Hwy.-2	State	Bore/HDD	Day	170
R12	Fort Weaver Rd.-1	State	Bore/HDD[3]	Day	47
R13	Fort Weaver Rd.-2	State	Bore/HDD[3]	Day	24
R14	Fort Weaver Rd.-3	State	Bore/HDD[3]	Day	75
R15	Fort Weaver Rd.-4	State	Bore/HDD	Day	31
R16	Waipahu Depot Rd.	County	HDD[4]	Day	57
R17	Waiawa Rd.	County	Open Cut	Day	57
R18	H-1 Freeway-1	Federal/State	Open Cut[5]	Day	215
R19	Lehua Ave.	County	Open Cut/HDD	Day	80
R20	H-1 Freeway-2	Federal/State	Open Cut[5]	Day	250
R21	Navy Utility ROW-1	State	Open Cut	Day	40
R22	Navy Utility ROW-2	State	Aerial	Day	40

Notes: All crossing types shown are preliminary and subject to change pending detailed engineering.
[1]These distances represent the approximate length of pipe installed in the road right of way.
[2] These four crossings might be made using either one or two directional drills.
[3]Might be completed in single directional drilling, approx. 650 feet in length.
[4]Kapakahi Stream and Waipahu Road might be crossed in a single directional drill
[5]Open cut crossings under elevated freeway

Source: Rooney Engineering, Inc. (2000)

Fuel Flow Characteristics. The rate at which fuel in a pipeline cools is a function of its initial temperature, the distance traveled, the flow rate, and the insulating properties of the pipe. Table 2-5 shows the predicted cooling at different flow rates for the Waiau pipeline. It shows that flow rates will range between 125 barrels/hour and 667 barrels/hour. HECO anticipates that it will pump fuel at the close to the "normal flow" rate (333 barrels/hour) the majority of the time.

As described above, HECO plans to install a short (about 0.6 mile) segment of insulated pipeline that will connect BPTF with the Company's existing Kahe Pipeline beginning on Kalaeloa Boulevard. This will allow it to transport fuel from BPTF to the Kahe Generating Station without using Chevron facilities.

Table 2-4 Drainageway Crossings along the Proposed Waiau Pipeline Route

Key[1]	*Drainageway*	*Type*[2]	*Crossing Length*[3] *(ft.)*	*Distance*[4] *from BPTF (ft.)*
1	Makakilo Gulch	Open Cut	36	19,630
2	Unnamed #1	Open Cut	70	24,735
3	Unnamed #2	Open Cut	20	25,945
4	Hunehune Gulch	HDD	139	27,076
5	Kalo'i Gulch	HDD	301	30,040
6	Honouliuli Stream	Open cut	50	38,800
7	Hō'ae'ae Storm Canal	HDD	200	45,134
8	Storm Drain	HDD	162	47,030
9	Waikele Stream	HDD	521	48,520
10	Kapakahi Stream	HDD	368	50,520
11	Waipahu Canal	HDD	222	51,940
12	Waiawa Stream	Open Cut	80	62,240
13	Waimano Stream	HDD	314	66,765
14	Kaluao'opu Spring[5]	Above Grade	600	66,904

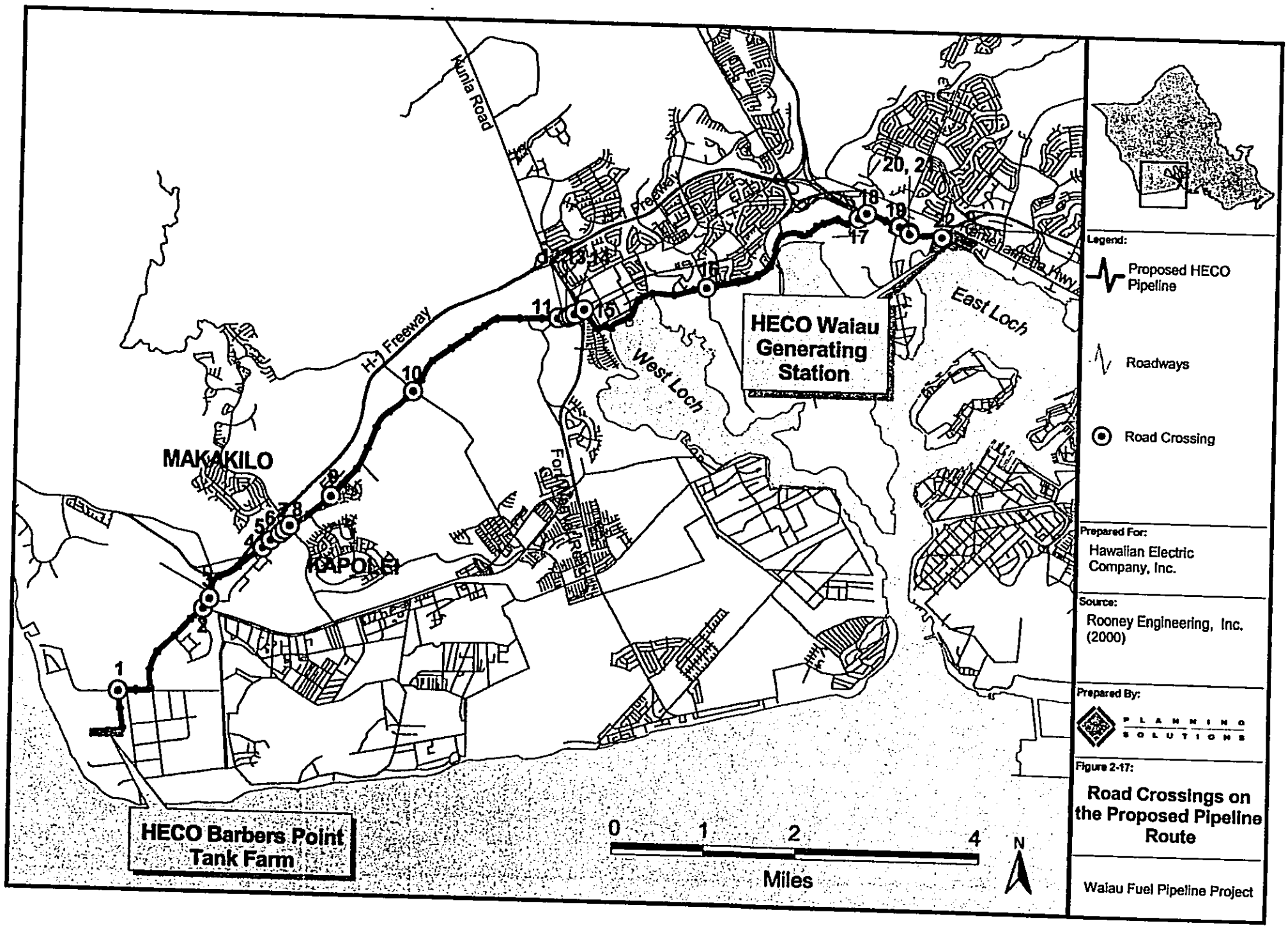
[1] See Figure 2-18
[2] All crossing types shown are preliminary and subject to change pending detailed engineering.
[3] HDD pipe length or crossing length
[4] Distance along pipeline route, starting at the BPTF
[5] Sometimes also called Waiau Stream

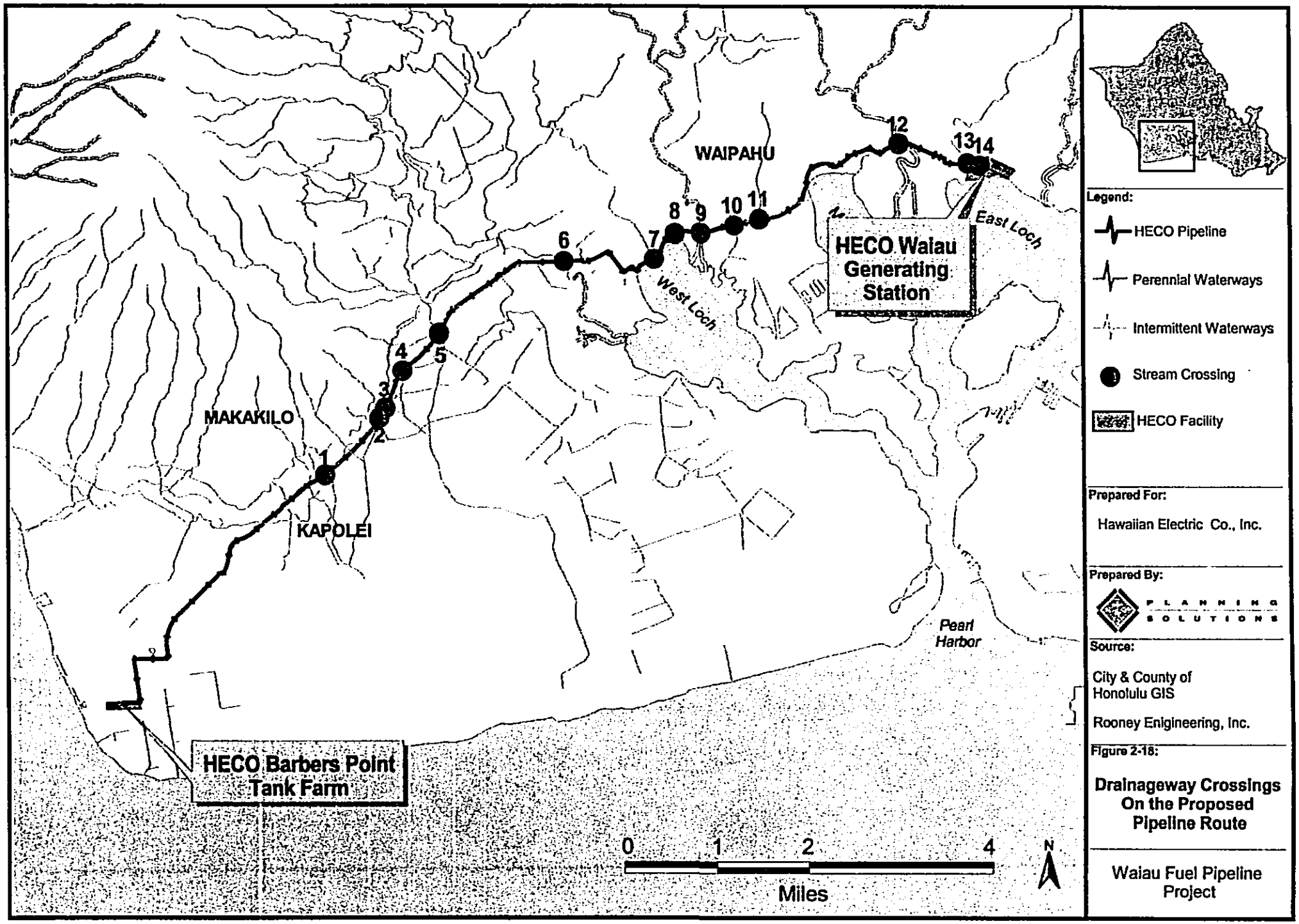
Source: Rooney Engineering, Inc. (2002)

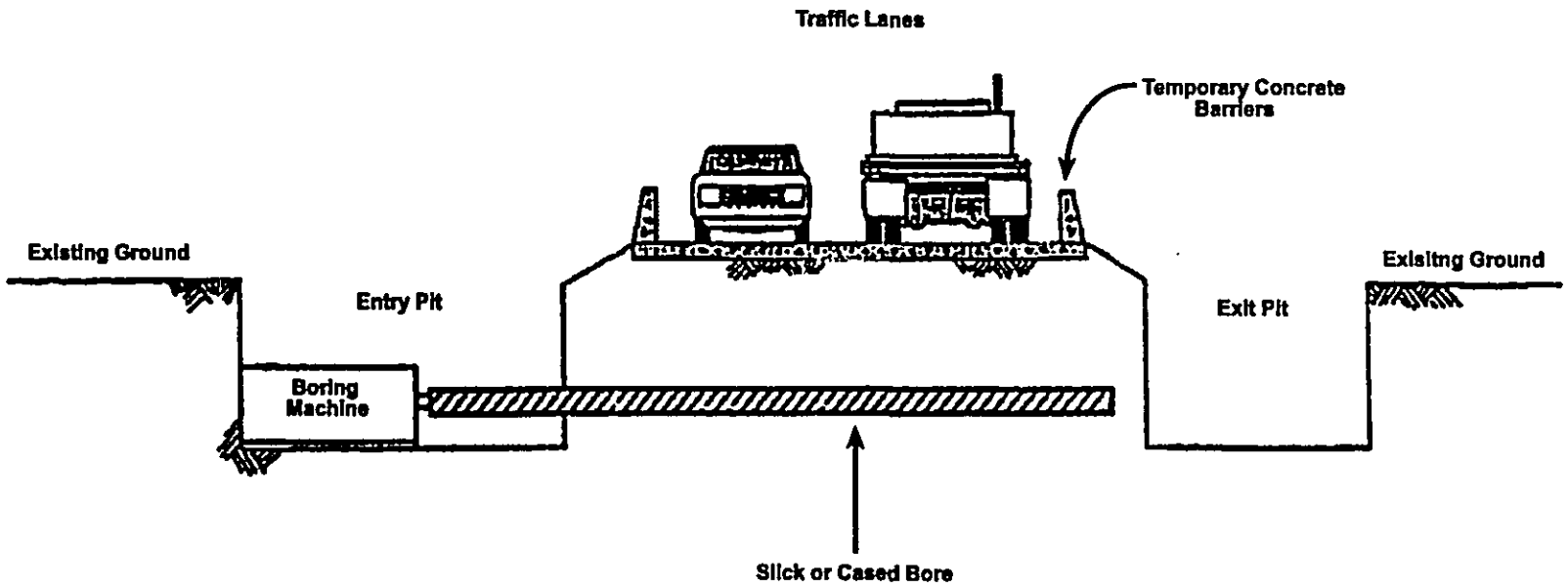
2.1.11.2 Pipeline Control and Leak Detection

The proposed BPTF-to-Waiau system would employ a computer-based leak-detection system. This system would be an integrated part of the SCADA system. Temperature and pressure transmitters installed at each remotely operated block valve (see Table 2-2) would transmit data through a fiber-optic cable installed in the same ditch as the pipeline.[15] The system would compare actual operating conditions measured at the sensors to a sophisticated hydraulic model and display accurate, real-time estimates of flow within the pipeline. The system can detect flow anomalies indicative of incipient leakage and immediately warn the pipeline operator.

[15] As outlined in Section 2.1.4, redundant communications would be provided by a combination of radio and microwave systems following separate paths from the pipeline and with connections both to Barbers Point and Waiau. In the event that the primary communications system becomes inoperable or damaged, the backup system would automatically assume the primary role and would be capable of relaying data to the Operations Control Center from both sides of the interruption.


Kunia Road
H-1 Freeway
MAKAKILO
KAPOLEI
Fort Weaver Road
West Loch
East Loch
HECO Waiau Generating Station
HECO Barbers Point Tank Farm
1
2
3
4
5
6
7
8
10
11
15
16
17
18
19
20, 21
0
1
2
4
Miles
N
Legend:
Proposed HECO Pipeline
Roadways
Road Crossing
Prepared For:
Hawaiian Electric Company, Inc.
Source:
Rooney Engineering, Inc. (2000)
Prepared By:
PLANNING SOLUTIONS
Figure 2-17:
Road Crossings on the Proposed Pipeline Route
Waiau Fuel Pipeline Project


WAIPAHU
MAKAKILO
KAPOLEI
HECO Waiau Generating Station
HECO Barbers Point Tank Farm
West Loch
East Loch
Pearl Harbor
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0
1
2
4
Miles
N
Legend:
HECO Pipeline
Perennial Waterways
Intermittent Waterways
Stream Crossing
HECO Facility
Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
PLANNING SOLUTIONS
Source:
City & County of Honolulu GIS
Rooney Enigineering, Inc.
Figure 2-18:
Drainageway Crossings On the Proposed Pipeline Route
Waiau Fuel Pipeline Project



Prepared For:
Hawaiian Electric Company, Inc.

Prepared By:
PLANNING SOLUTIONS

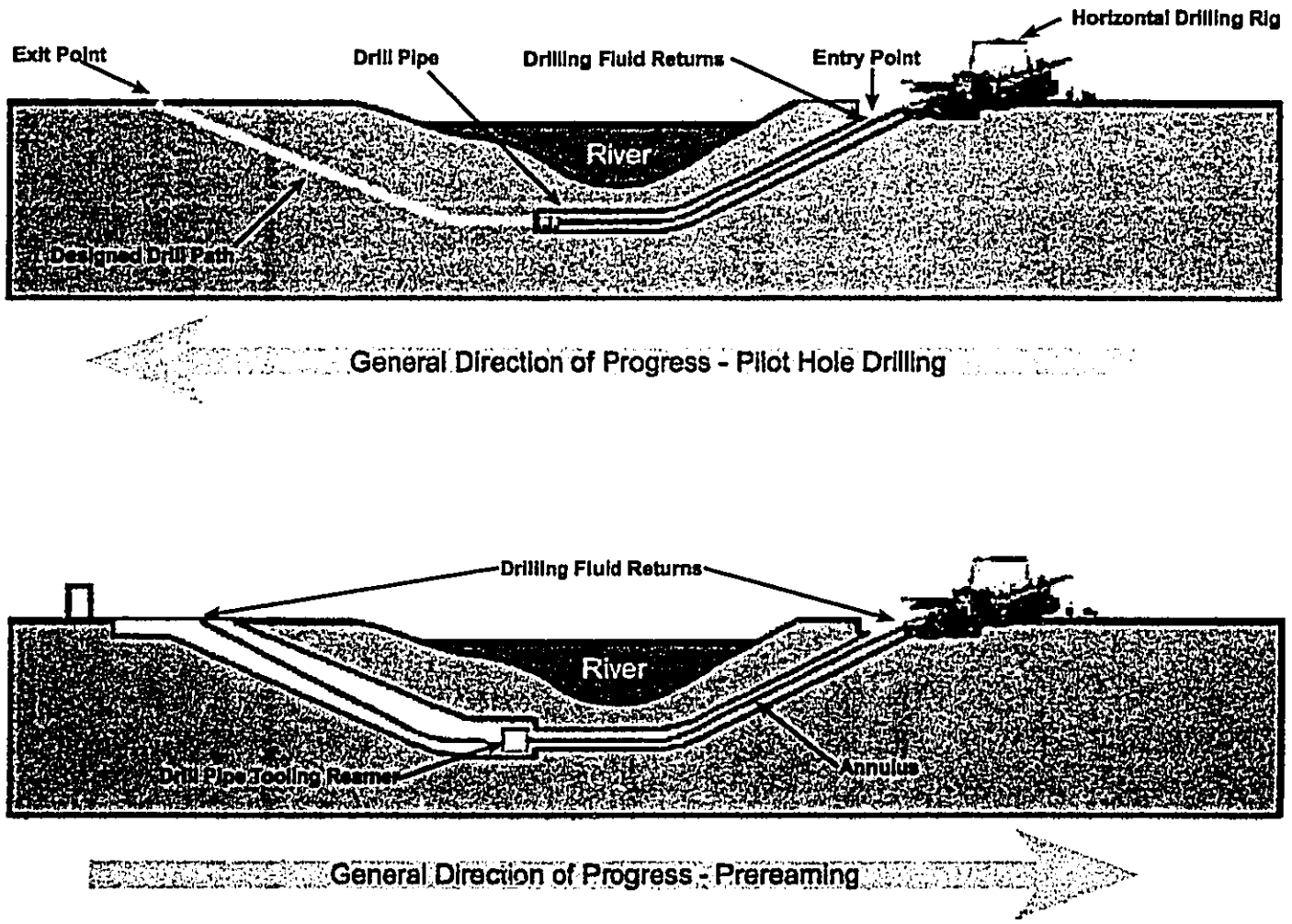
Source:
Rooney Engineering, Inc.

Note:
The same kind of construction technique may be used to pass beneath streams.

Figure 2-19:

Conventional Boring For Road Crossings

Waiau Fuel Pipeline Project



Prepared For:
Hawaiian Electric Company, Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
A & L Underground, Inc.
Planning Solutions, Inc. (2001)

Note:
The same kind of construction technique would be used to pass beneath roads.

Figure 2-20:

Horizontal Directional Drilling (HDD) for Stream Crossings

Waiau Fuel Pipeline Project

Table 2-5 Expected Fuel Flow Conditions for the Proposed New Waiau Fuel Line

Flow Regime / *Variable*	*Low Flow*	*Normal Flow*	*Maximum Flow*
Flow Rate (barrels/hr)	125	333	667
Initial Temp. (F°)	195	165	165
Receiving Temp. (F°)	142	151	163
Maximum Idle Time (hr)	8.5	18.8	30

Definition of Terms:
"Low Flow Rate" and "Normal Flow Rate" are based on the existing low and average flow rates.
"Maximum flow rate" is based on the maximum burn rate if all the generating units at Waiau are operating at 100 percent of their capacity.
"Initial Temperature" is the temperature of fuel when it is pumped into the pipeline.
"Receiving temperature" is the estimated temperature of fuel when it arrives at the Waiau Generating Station.
"Maximum Idle Time" is the estimated time that the pipeline can be idle after the specified flow rate before the LSFO must be displaced by lower viscosity oil such as diesel fuel to avoid a cold plug within the pipeline.

Source: Rooney Engineering, Inc. (2000)

2.1.12 ESTIMATED CAPITAL AND OPERATING COSTS FOR THE PROPOSED ACTION

HECO estimates the total Project cost to be approximately $27 million. It estimates the 30-year levelized annual revenue requirements to be approximately $6.4 million per year. The "annual revenue requirement" is the amount of money that the utility must charge its customers in order to recover the capital, operating, and maintenance cost of a facility. This is a significantly lower cost than that estimated for a continuation of the existing contract with Chevron (see Section 2.2.6).

2.1.13 PRELIMINARY CONSTRUCTION SCHEDULE: THE PROPOSED ACTION

HECO's present plans call for construction of the pipeline to commence in the third quarter of 2003. The system would be in operation within a year of the start of construction.

2.1.14 REQUIRED PERMITS AND APPROVALS: PROPOSED ACTION (ALTERNATIVE 1)

Table 2-7 lists the likely permits that will be required for the proposed action. The list has been assembled through preliminary consultation with the various agencies that would be involved, based on early conceptual descriptions of the alternative. Modifications and additions to this list are possible if the design process leads to construction details not presently contemplated.

2.1.15 SURRENDER OF PIPELINE EASEMENT

2.1.15.1 Project Lifespan

The operational life of the pipeline would depend on the needs of the Waiau Generating Station over time. For budgeting purposes, HECO has projected the economic life of the pipeline to be 30 years. However, an evaluation of existing oil pipelines indicates that, on average, they remain in service for a much longer period of time. For example, the Chevron pipeline currently used to supply the Waiau Generating Station has been in service for more than 40 years. Because there is likelihood that the proposed pipeline could operate for 50 years, and in order to develop reasonably conservative assumptions for impact analysis, this document considers a 50-year project lifespan. It must be noted,

however, that future development of new technologies may obviate the need for the pipeline before this lifespan is reached. HECO is actively pursuing such developments.

Table 2-6 Expected Fuel Flow Conditions for the Proposed Modified Kahe Fuel Line

Flow Regime / *Variable*	*Low Flow*	*Normal Flow*	*Maximum Flow*
Flow Rate (barrels/hr)	290	750	1,000
~~Discharge~~ Initial Temp. (F°)	190	190	190
Receiving Temp. (F°)	149	173	178
Maximum Idle Time (hr)	0.67	4.6	5.3

Definition of Terms:
"Low Flow Rate" and "Normal Flow Rate" are based on the existing low and average flow rates.
"Maximum flow rate" is based on the maximum burn rate if all the generating units at Kahe are operating at 100 percent of their capacity.
"Initial Temperature" is the temperature of fuel when it is pumped into the pipeline.
"Receiving temperature" is the estimated temperature of fuel when it arrives at the Kahe Generating Station.
"Maximum Idle Time" is the estimated time that the pipeline can be idle after the specified flow rate before the LSFO must be displaced by lower viscosity oil such as diesel fuel to avoid a cold plug within the pipeline.

Source: Rooney Engineering, Inc. (2000)

2.1.15.2 Options for Surrender of the Easement

The proposed pipeline would be removed from service at the end of the project lifespan. The procedures for abandonment are described in this section. They would be subject to the lease terms under which HECO would construct and operate the pipeline. These terms have not yet been finalized. However, Section XV of the current draft lease reads as follows:

> *Surrender of Easement. Lessee shall surrender peaceably to Lessor the Easement on the date of the cessation of this Lease, whether such cessation be by termination, expiration or otherwise, promptly and in same condition as at the commencement of this Lease, reasonable wear arising from the use of said Easement to the extent permitted elsewhere in this Lease and damage resulting from causes over which Lessee has no control excepted; provided, that, Lessee shall have the right, when not in breach of any provision of this Lease, within ninety (90) days after the expiration of this Lease, to remove its improvements, pipelines, fixtures, equipment and personal property from the Easement in such a manner as to cause no damage thereto, and in the event of any such damage, Lessee shall, at its own cost and expense, repair or otherwise remedy the same and provided further that, in the event Lessee fails or neglects to so remove all or any portion of its improvements, equipment, personal property or trade fixtures within the ninety (90) days after the expiration or termination of this Lease, Lessor may either remove and dispose of the same and charge the cost of such removal and disposal to Lessee, or consider the same to be abandoned and take title thereto.*

Two options for the surrender of the lease are discussed below. The first is that the pipeline would be cleaned and abandoned in place, possibly to be used for some purpose other than transport of fuel to the Waiau Generating Station. The second is that the pipeline would be removed. A third possibility

should also be noted; HECO requests, and the State grants, an extension of the easement. This would delay, but not eliminate eventual abandonment, and so this possibility is not treated separately.

2.1.15.2.1 Abandonment of the Pipeline

Once the operational lifespan of the pipeline is reached, HECO would, consistent with its easement lease with the State of Hawai'i be responsible for the costs either of abandoning or removing the pipeline system. Commonly, pipelines are abandoned in place. The decommissioning process would be subject to appropriate local, State, and Federal regulations enforced at the time of abandonment. As required by Federal, State and/or County regulation, HECO would be liable for clean up and remediation of any potential contamination that could have resulted from the operation of pipeline. In the decommissioning process, the pipeline would be purged of LSFO by displacement with diesel fuel and then drained.

The drained pipeline would be purged by sending cleaning pigs through the line with a small volume of cutter stock. The cutter stock would be followed by squeegee pigs driven by inert gas. After purging the remaining oil, additional cleaning pigs and batches of cutting stock would be run through the line to remove most of the oil from the pipe wall; however, some petroleum residue would remain after purging. Purged oil and cutting stock would be removed and disposed of using appropriate procedures. The tie-in valves at the Waiau receiving station would be sealed off. The pipeline would be sealed and filled with pressurized inert nitrogen gas or filled with grout. Intermediate block valves and the check valve would be removed, and all other aboveground piping and equipment would be removed and/or salvaged. Utility services would be disconnected, and all surface facilities within the easement would be removed. Pumps and motors would be disconnected and removed, and all residual oil would be removed and disposed of using appropriate methods. All equipment and materials that could not be sold or salvaged would be taken to an appropriate disposal site. The surface would be re-graded and re-vegetated to its original condition or to conform to future land uses.

2.1.15.2.2 Removal of the Pipeline

Removal of the pipeline would entail the same pipe deactivation work as required for abandonment of the pipeline in place (see Section 2.1.15.2.1) and most of the same activities needed for pipeline installation (see Section 2.1.8). Removal would consist of pipe cleaning as described above, the removal of all above ground equipment and appurtenances, block valves and vaults and eventually the pipe. Some sections of the pipeline that were installed using horizontal direction drilling would have to remain in place as they are virtually impossible to pull once installed and have been put in operation. The pipe could be pumped full of grout if there was a possibility of contaminates leaking from it, but a thorough cleaning should obviate that need.

2.2 ALTERNATIVE 2: NEW CHEVRON CONTRACT

2.2.1 INTRODUCTION

As described in Section 1.1 the fuel used to power the Waiau Generating Station is now delivered through Chevron's 8-inch black-oil pipeline that runs from Campbell Industrial Park to Waiau and then to the Honolulu Marine Terminal at Pier 30. Chevron performs this service under contract to HECO. Alternative 2 involves continuing to use this pipeline. Outright purchase of the facilities or construction of new facilities in this easement would be very difficult because it would require the acquisition of new HECO easements (permission to install and operate the pipeline) throughout the entire route. Hence, this alternative involves renegotiation of a long-term contract between Chevron and HECO. It also assumes that Chevron would continue to provide the other services covered by the existing agreement. Thus, Alternative 2 is fundamentally different than Alternatives 1 and 3 because it is not within HECO's power to implement this alternative without the willing agreement of another party (Chevron). The remainder of this section describes the facilities, construction activities, and related work that HECO believes would be required for this alternative.

Table 2-7 Permit/Approvals Requirements for ~~T~~the Pro~~posed Action~~ject

Permit	*Project Component*					
			Fuel Line			
	Iwilei Tank Farm	*BPTF*	*Buried Pipe*	*Above-Ground Facilities*	*Stream & Road Crossings*	*Waiau Power Plant*
C&C of Honolulu Department of Planning and Permitting						
Special Management Area Permit	N	N	N	N	N	Overpass only
Development Applications in Flood Hazard Districts	N	N	N	N	N	N
Flood Determination in General Flood Plain District	N	N	N	N	N	N
Flood Hazard Variance	N	N	N	N	N	N
Grubbing, Grading, & Stockpiling Permit	N	N	Y	N	TBD	N
Building Permits	Y	Y	Y	Y	Y	Y
Permit to Discharge to Storm Sewer	N	N	N	N	N	N
C&C of Honolulu Department of Design and Construction						
~~Grubbing, Grading, & Stockpiling Permit~~	~~N~~	~~N~~	~~Y~~	~~N~~	~~TBD~~	~~N~~
~~Building Permits~~	~~Y~~	~~Y~~	~~Y~~	~~Y~~	~~Y~~	~~Y~~
~~Construction Dewatering Permit~~	~~N~~	~~P~~	~~Y~~	~~N~~	~~P~~	~~P~~
Permit to Excavate Public Rights-of-Way	N	N	Y	P	Y	N
~~Permit to Discharge to Storm Sewer~~	~~N~~	~~N~~	~~N~~	~~N~~	~~N~~	~~N~~
C & C of Honolulu Dept. of Transportation						
Street Usage Permit	N	N	Y	P	Y	N
C & C of Honolulu Department of Environmental Services						
Permit to Discharge Effluent	N	N	Y	Y	Y	N
Honolulu Fire Department						
Flammable/Combustible Tank Installation	Y	Y	N	N	N	N
U.S. Army Corps of Engineers						
Department of the Army Permit	N	N	N	N	Yes	N
U.S. Navy Pacific Facilities Engineering Command						
Lease Amendment for Waiau Overpass	N	N	N	Y	N	Y
State of Hawai'i Department of Health Clean Water Branch						
Section 401 Water Quality Certification	N	N	N	N	Y	N
NPDES Construction Stormwater Permit	N	Y	Y	Y	Y	Y
NPDES Dewatering Permit	N	N	Y	N	Y	P
NPDES Hydrotest Water Disposal Permit	N	N	Y	N	N	N

Permit	*Project Component*					
			Fuel Line			
	Iwilei Tank Farm	*BPTF*	*Buried Pipe*	*Above-Ground Facilities*	*Stream & Road Crossings*	*Waiau Power Plant*
State Dept. of Health, Noise & Radiation Branch						
Noise Permit	N	N	Y	N	N	N
State Commission on Water Resource Management						
Stream Channel Alteration Permit	N	N	N	N	Waiawa	N
State of Hawai'i Department of Land & Natural Resources						
Historic Site Review	N	N	Y	N	Y	N
Conservation District Use Permit	N	N	N*	N	N	N
Revocable Permit for Use of State Lands	N	N	P	N	P	N
State of Hawai'i Department of Transportation, Harbors Division						
Lease of Slot in State Energy Corridor	N	N	Y	Y	Y	N
Chapter 343/HAR 11-200 EIS	Y	Y	Y	Y	Y	Y
Construction in State Energy Corridor	N	N	Y	Y	Y	N
State Dept. of Transportation, Highways						
Permit for Work Upon a State Highway	P	N	Y	P	P	N
State Coastal Zone Management Office						
CZM Consistency Certification	N	N	N	N	Y	N

Key:
Y: Required ~~Permit~~
P: Probably Required, depends on final design
N: Not Required
TBD: To Be Determined
*If DLNR grants permission to use OR&L Right-of-Way to bypass Pouhala Marsh is granted.

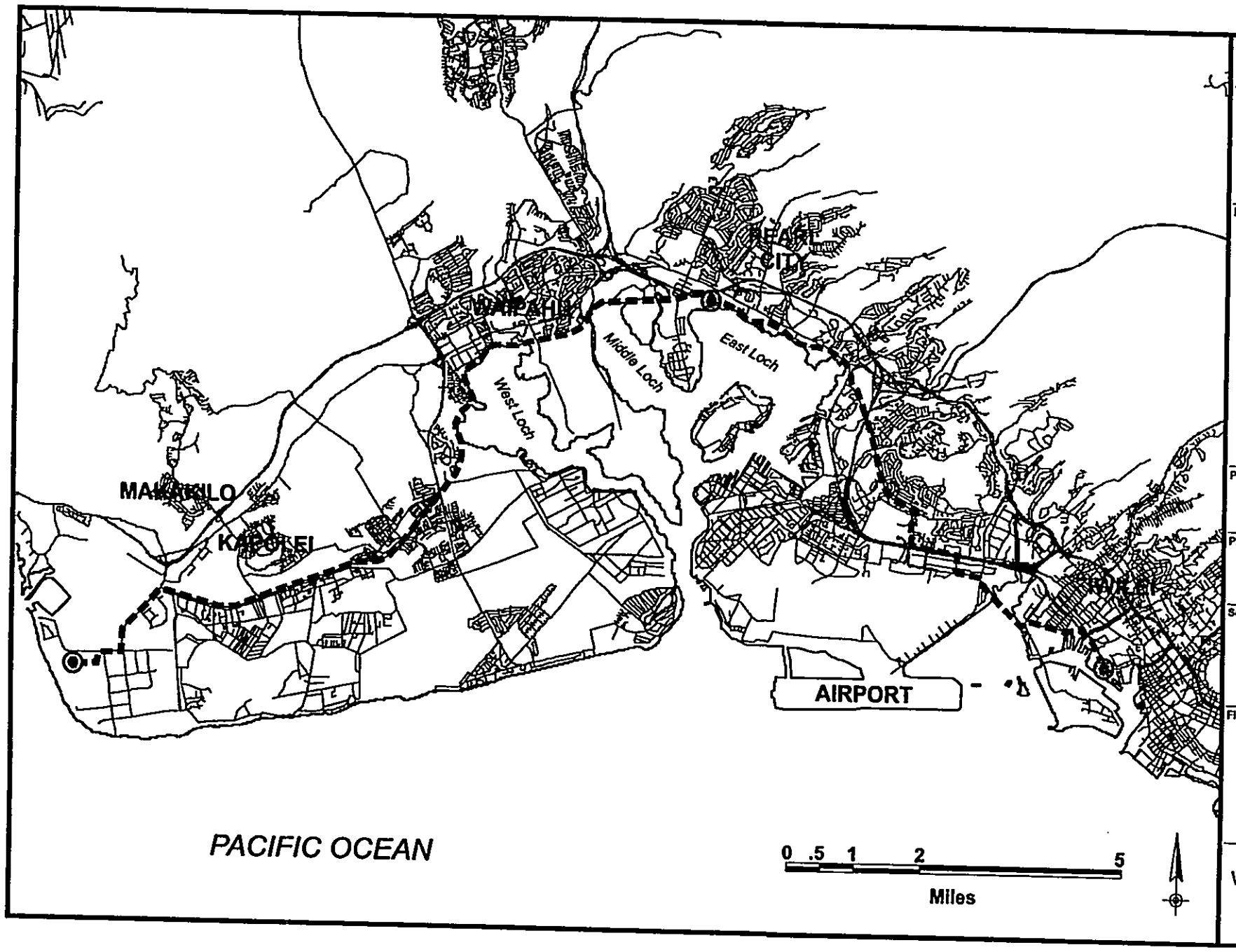
Source: Compiled by Planning Solutions, Inc.

2.2.2 EXISTING CHEVRON PIPELINE AND ANCILLARY FACILITIES

2.2.2.1 Chevron Black-Oil Pipeline Overview

Chevron owns and operates an 8-inch pipeline that extends from its Campbell Industrial Park refinery to its Honolulu Products Terminal (Pier 30). The pipeline is within easements that Chevron obtained from the owners of the property that the pipeline crosses. These owners include private individuals and corporations as well as Federal, State, and County entities.

Figure 1-2 shows the approximate location of the portion of the pipeline between the refinery and the Waiau Generating Station. The easement width varies generally between 10 feet and 40 feet. Chevron has constructed two pipelines within the easement. One is the 8-inch black-oil pipeline that supplies LSFO to the Waiau Generating Station and the Iwilei Tank Farm. The other is an 8-inch pipeline that Chevron uses to transport lighter refined products. Block valves are located along Chevron's 8-inch black-oil pipeline at milepost 7.0 (Fort Weaver Road) and milepost 13.1 (Waiau Generating Station).



Legend:

- Chevron Pipeline
- Roadways
- HECO Facilities

Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
City & County of Honolulu GIS
Rooney Engineering, Inc.

Figure 2-21:

Chevron Pipeline Route, BPTF to Iwilei

Waiau Fuel Pipeline Project

Chevron has historically used the portion of the pipeline that extends past Waiau to deliver petroleum products to HECO's Iwilei Tank Farm and to its own Honolulu Products Terminal near Pier 30 (see Figure 2-21). HECO uses the Iwilei Tank Farm to store fuel that is eventually consumed at its Honolulu Generating Station (see Section 2.1.7). Chevron stopped using the line to deliver fuel to Pier 30 at the end of 2001 when it relocated its inter-island barge shipments to the Kalaeloa-Barbers

Point Deep Draft Harbor. Now that the only use of the Waiau-to-Honolulu Harbor portion of Chevron's line is for delivering LSFO to the Iwilei Tank Farm, HECO is responsible for all of the line's operating and maintenance costs.

2.2.2.2 Chevron Pipe Characteristics

Portions of the pipe have been replaced over the years during the course of normal maintenance operations.[16] As a result of this work, the Chevron pipeline between its Barbers Point Refinery and the Waiau Generating Station now generally consists of various lengths of Schedule 40 steel pipe (wall thickness = 0.322"), Schedule 20 pipe (wall thickness = 0.250"), and less-than-Schedule 20 pipe (wall thickness = 0.219"). All sections meet or exceed the minimum required thickness as specified by the Department of Transportation Regulation 49 CFR Part 195 for the pipeline's operating pressures. Unlike the new pipeline described for the Proposed Action, the existing 8-inch black-oil line is not insulated.

To prevent corrosion, external pipeline coatings are used as a barrier between the metal pipe and the soil. Chevron inspects its line periodically to monitor the integrity of the pipe and its coating system. Chevron's maintenance program targets appropriate areas for repair or replacement.

2.2.2.3 Operational Requirements/Constraints on Pipeline Use

Chevron designed its pipeline to serve multiple purposes, rather than dedicating it to the transportation of LSFO. Initially, major customers in addition to HECO included ~~GASCO~~GasCo, whose synthetic natural gas plant was located in Iwilei, ship-refueling activities (bunkering) in Honolulu Harbor, and inter-island fuel shipments out of Honolulu Harbor. Of these, only the Waiau Generating Station and the Iwilei Tank Farm require heated product. The remainder can be shipped at ambient temperature, but are normally heated to facilitate pumping efficiency.

Because of HECO's special requirements, Chevron must take the following special measures to operate the line.

- Because the line is not insulated, Chevron must heat the fuel to a relatively high temperature (approximately 190 degrees F) and pump it at a high rate to ensure that it reaches Waiau before it cools to the point where it becomes too viscous to flow.
- Because this pumping rate exceeds the needs of the power plant, Chevron cannot operate the line continuously. Instead, it typically pumps at approximately 1,000 barrels per hour for three days. When not in operation, a lighter, less viscous fuel is placed in the pipeline. This lighter oil remains in the line for approximately a week until the line is needed for the next LSFO shipment to Waiau/Iwilei.

2.2.3 CHEVRON PIPELINE MAINTENANCE AND REPAIR ACTIVITIES

Chevron has an active pipeline maintenance program. The program includes regular inspections of the pipeline, with annual maintenance work based on the results of the most recent inspections. Alternative 2 assumes that these activities would continue at levels needed to meet applicable pipeline regulations but that no major upgrade would be undertaken. The maintenance activities may eventually result in all original pipe in the Chevron system between BPTF and Iwilei being replaced with new pipe. The work will be similar to that conducted in the past. Because this alternative

[16] In some cases, the replacement pipe has had virtually the same specifications as the original; in other instances, the replacement pipe has had a higher strength rating than the original.

requires that the Chevron pipeline continue to be available to deliver fuel to the Waiau Generating Station and the Iwilei Tank farm, the work would necessarily occur on an incremental basis over a period of years rather than as part of a single construction effort.

2.2.4 OTHER RELATED SERVICES AND FACILITIES

In assessing the potential effects of Alternative 2, the environmental impact analyses assume that Chevron would continue to provide (under contract to HECO) the same support facilities and services it presently does. These include the provision of steam heaters to warm the oil before it is placed in the line and pumping facilities to pressurize the BPTF-to-Waiau line.

2.2.5 OTHER CHARACTERISTICS: ALTERNATIVE 2

Alternative 2 involves replacement of pipe that has been in use for many years. Because the Chevron line would need to remain in service for all but brief periods, the work that would be required to implement it differs from that of The Proposed Action in other ways as well. Some of the more notable of these differences include the following:

- Scheduling Pipeline Replacement More Difficult Than New Construction. The Chevron Pipeline must remain in service. This means that replacement pipe can be installed only when the line is not in service for fuel shipment. Though Chevron has demonstrated that this coordination can be effectively and successfully managed, the operational nature of the existing pipeline may introduce additional logistical complexities not associated with HECO's proposed new pipeline.
- Possibility of Encountering Existing Contamination. The existing Chevron pipeline and other adjacent fuel transportation infrastructures have over time experienced leaks. If existing contamination is encountered, it would be handled in accordance with the provisions of the *Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan* (Hawai'i Department of Health. 1996). Dealing with such contamination could increase both the cost and time needed for the work.
- Negotiating Contract Terms. This Alternative involves negotiating terms with Chevron. In HECO's view, previous negotiations have been complicated and lengthy, and there is no guarantee of a successful outcome.

2.2.6 ESTIMATED COSTS: ALTERNATIVE 2

Ultimately the cost of Alternative 2 will depend upon the outcome of negotiations between HECO and Chevron that have not yet taken place. However, if the terms of a renegotiated (extended) contract are similar to those in the present agreement, HECO estimates that the 30-year levelized annual revenue requirement for Alternative 2 would be approximately $8.5 million per year. This would make Alternative 2 approximately $2.1 million per year more costly than the proposed Waiau Fuel Pipeline project on a levelized annual revenue requirement basis.

2.2.7 PRELIMINARY CONSTRUCTION SCHEDULE: ALTERNATIVE 2

This alternative does not involve construction of an entirely new pipeline. Instead, it entails continuing repair and incremental replacement of segments of the line when required. This work would need to be accomplished during periods when the line is not otherwise needed. Based on historical experience and discussions with Chevron representatives, it is anticipated that this will continue to be done during one four-week period each year.

2.2.8 REQUIRED PERMITS AND APPROVALS: ALTERNATIVE 2

In general, maintenance and repair of existing facilities are allowed without any permits or approvals other than those specifically related to the maintenance and repair activities (e.g., de-watering permits, construction access permits, etc.). This is reflected in the tabulation of probable permit requirements presented in Table 2-8.

Table 2-8 Likely Permit/Approval Requirements: Alternative 2

Permit	*Project Component*				
	Tank Farm	*Fuel Line*			*Waiau Power Plant*
		Buried Pipe	*Above-Ground Facilities*	*Stream & Road Crossings*	
C&C of Honolulu Department of ~~Design and Construction~~Planning and Permitting					
Building Permits	~~No~~N	~~No~~N	~~No~~N	~~No~~N	~~No~~N
~~Construction Dewatering Permit~~	~~No~~	~~Y~~	~~No~~	~~No~~	~~No~~
~~Permit to Excavate Public Rights-of-Way~~	~~No~~	~~Y~~	~~P~~	~~Y~~	~~No~~
Permit to Discharge to Storm Sewer	~~No~~N	TBD	~~No~~N	~~No~~N	TBD
C&C of Honolulu Department of Design and Construction					
Permit to Excavate Public Rights-of-Way	N	Y	P	Y	N
Department of Environmental Services					
Permit to Discharge Effluent	N	Y	N	Y	N
C&C of Honolulu Dept. of Transportation Services					
Street Usage Permit	~~No~~N	Y	P	Y	~~No~~N
U.S. Army Corps of Engineers					
Department of the Army Permit	~~No~~N	Y	~~No~~N	Y	~~No~~N
State of Hawai'i Department of Health Clean Water Branch					
Section 401 Water Quality Certification	~~No~~N	Y	~~No~~N	Y	~~No~~N
NPDES Construction Stormwater Permit	~~No~~N	Y	Y	Y	Y
NPDES Dewatering Permit	~~No~~N	Y	~~No~~N	Y	P
NPDES Hydrotest Water Disposal Permit	~~No~~N	Y	~~No~~N	Y	~~No~~N
State Dept. of Health, Noise & Radiation Branch					
Noise Permit	~~No~~N	P	TBD	P	~~No~~N
State Commission on Water Resource Management					
Stream Channel Alteration Permit	~~No~~N	~~No~~N	~~No~~N	~~No~~N	~~No~~N
State Dept. of Transportation, Highways					
Permit for Work Upon a State Highway	~~No~~N	Y	~~No~~N	P	~~No~~N
State Coastal Zone Management Office					
CZM Consistency Certification	~~No~~N	~~No~~N	~~No~~N	P	~~No~~N

Key:
Y: Required Permit
P: Probably Required, depends on final design
~~No~~N: Not Required
TBD: To Be Determined

Source: Compiled by Planning Solutions, Inc.

2.3 ALTERNATIVE 3: TRUCK DELIVERY

2.3.1 INTRODUCTION

Alternative 3 involves the use of trucks to transport fuel from BPTF to both Waiau and Iwilei. It assumes that HECO would continue to use existing Chevron facilities to transport fuel oil from BPTF to the existing Kahe pipeline. Section 2.3.2 describes the routes that tanker trucks would follow while traveling between BPTF and the respective generating stations. Section 2.3.3 describes the equipment and facilities that would be needed. Sections 2.3.4, 2.3.5, and 0 summarize the cost, construction schedule, and permits and approvals needed for this alternative.

2.3.2 ROUTING OF FUEL DELIVERY TRIPS

2.3.2.1 Barbers Point Tank Farm to Waiau

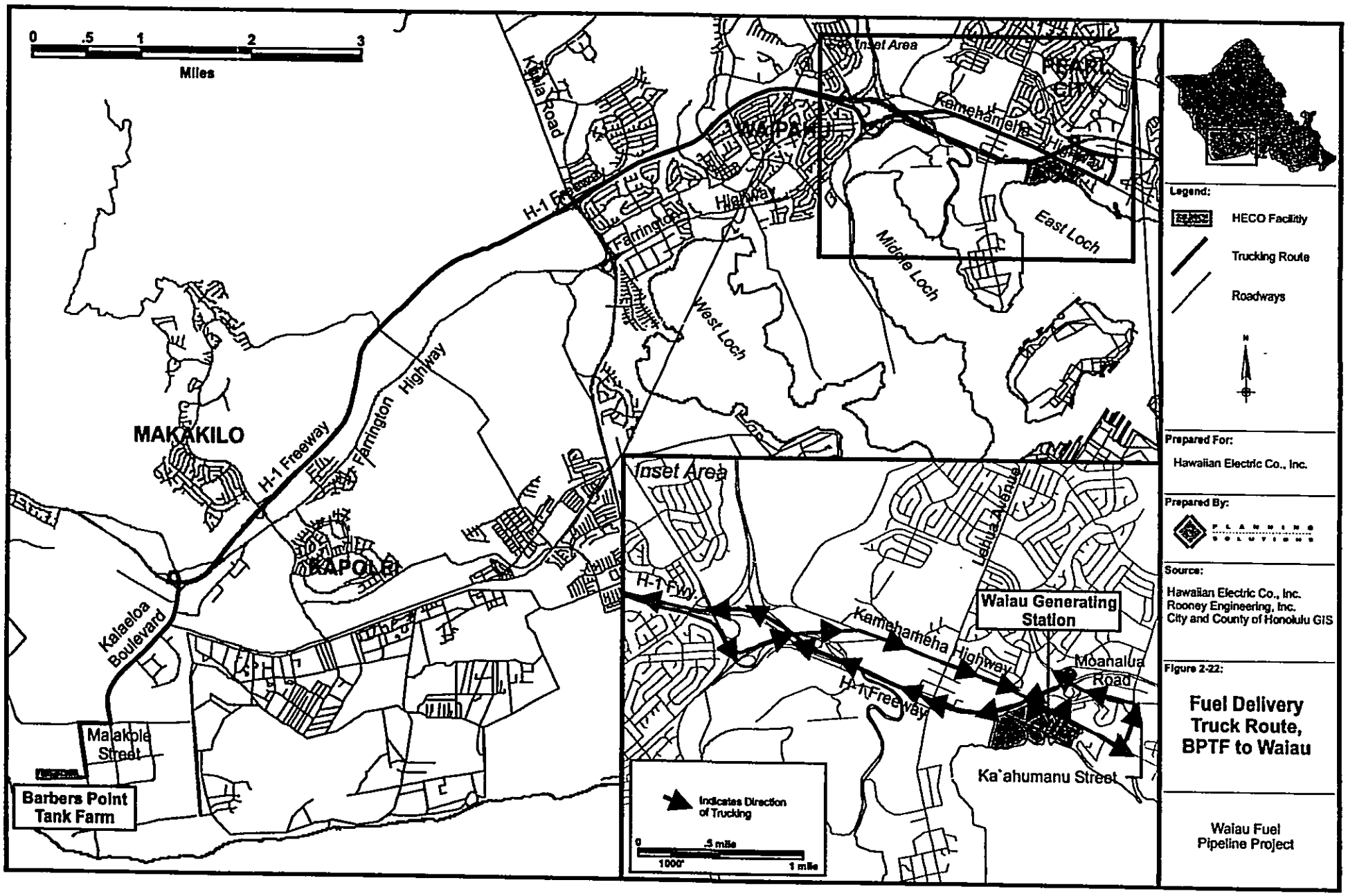
Trucks carrying fuel from the Barbers point Tank Farm to the Waiau Generating Station would turn left out of the BPTF and follow either Hanua Street/Malakole Street or Hanua Street/Kauhi Street to Kalaeloa Boulevard (Figure 2-22). They would proceed out Kalaeloa Boulevard to the H-1 Freeway, turning eastbound onto the freeway. The trucks would stay on the freeway for nearly 10 miles, before taking the Kamehameha Highway exit just past Waipahu. They would turn right into the Waiau Generating Station just after passing under the H-1 Freeway viaduct.

Trucks returning to the BPTF would turn right out of the Waiau Generating Station on to Kamehameha Highway, turn left onto Ka'ahumanu Street northbound, turn left again onto Moanalua Road westbound, and finally use the Waiawa Interchange to access the H-1 Freeway westbound. Once on H-1, they would return to the BPTF by re-tracing the route they followed on the outbound leg.

2.3.2.2 Barbers Point Tank Farm to Iwilei Tank Farm

Trucks carrying fuel from the Barbers Point Tank Farm to the Iwilei Tank Farm (see Figure 2-14) would follow the same route as those destined for Waiau until they reach the Kamehameha Highway eastbound off-ramp. At that point they would remain on the H-1 Freeway past Pearl Harbor and Honolulu International Airport, exiting H-1 onto Nimitz Highway just before Sand Island Road. They would remain on Nimitz Highway until they are just past the Iwilei Tank Farm, turning right into an internal roadway owned and maintained by the Harbors Division of the State Department of Transportation (see Figure 2-13). That road would take them to the *makai* side of the facility, where they would enter through a security gate. HECO already has BLNR approval for the easement to use the road.

Empty trucks returning to the BPTF would exit to Nimitz Highway eastbound using the same road they used to enter. They would then take advantage of breaks in traffic created by the traffic light at the intersection of Nimitz Highway and Pacific Street to cross from the *makai* to the *mauka* eastbound lanes and use the one-way connecting road to circle back onto the Nimitz Highway westbound lanes. Once headed west, the trucks would re-trace their route to the BPTF.


0 .5 1 2 3
Miles
Kalaeloa Road
H-1 Freeway
Farrington Highway
WAIPAHU
See Inset Area
PEARL
Kamehameha Highway
East Loch
Middle Loch
West Loch
MAKAKILO
H-1 Freeway
Farrington Highway
KAPOLEI
Kalaeloa Boulevard
Malakole Street
Barbers Point Tank Farm
Inset Area
Lehua Avenue
H-1 Fwy.
Kamehameha Highway
Waiau Generating Station
Moanalua Road
H-1 Freeway
Ka'ahumanu Street
Indicates Direction of Trucking
0 .5 mile
1000'
1 mile
Legend:
HECO Facility
Trucking Route
Roadways
N
Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
PLANNING SOLUTIONS
Source:
Hawaiian Electric Co., Inc.
Rooney Engineering, Inc.
City and County of Honolulu GIS
Figure 2-22:
Fuel Delivery Truck Route, BPTF to Waiau
Waiau Fuel Pipeline Project

2.3.3 EQUIPMENT AND OPERATION

2.3.3.1 New Facilities Needed

The BPTF and the Waiau Generating Station do not presently have provisions for fuel truck loading. The Waiau Generating Station has an emergency truck unloading rack designed only for low-volume/short-term operations. It is not adequate to accommodate the volume of fuel truck traffic that would be needed to implement this alternative. Consequently, while this alternative does not involve pipeline construction activities that are part of both Alternatives 1 and 2, it would require the construction of new loading and unloading facilities that would not be needed for those alternatives.

Preliminary site plans have been prepared laying out the loading facilities at BPTF and the Waiau Generating Station (see Figure 2-23 and Figure 2-24). Because the number of truck loading and unloading stations that would be required for the scenarios that would limit trucking to either 12 hours per day or to 8 hours per day is so high, these facility estimates are based 18-hour/day operations, 5 days per week.

2.3.3.2 Operation

Table 2-9 derives the number of fuel-truck trips, the number of fuel trucks, and the number of fuel-truck loading/unloading stations needed for each alternative. The table illustrates three different trip-timing scenarios: (1) Fuel transported during a maximum-length 18-hour day; (2) Fuel transported over 12 hours of daylight; no transport at night; and (3) Fuel transported only during the hours of lowest traffic (8:00 p.m. to 6:00 a.m.).

Several things are apparent from the estimates in Table 2-9.

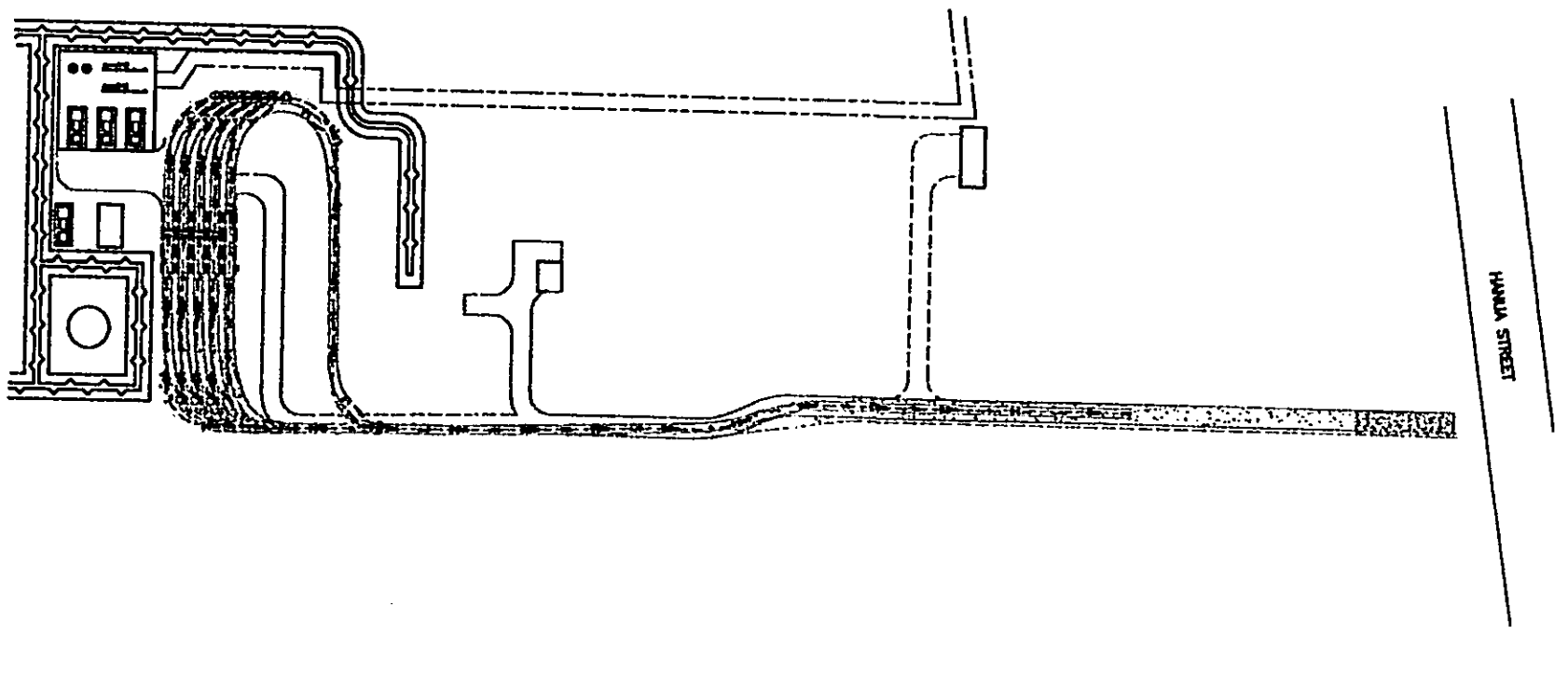
- Spreading the trips over the maximum 18-hour period has a substantial effect on the peak number of truck trips per hour. It also reduces the loading/unloading station requirements. At the same time, it places trucks on the road during some periods when other vehicle traffic is high.
- The number of truck trips is not high compared to other traffic that presently uses the affected roadways.
- Supplying the Honolulu Generating Station using trucks operating from either Barbers Point or Waiau would require only a modest fleet of trucks. There is no difference in the number of vehicles that would be needed regardless of whether the fuel is trucked all of the way from Barbers Point to Iwilei or is piped first to Waiau and then transshipped from Waiau to Iwilei.
- The number of truck-loading stations needed at Barbers Point is directly proportional to the number of hours over which fuel shipments are spread. Trying to concentrate the shipments during either the night time (to avoid placing the trucks on the road when substantial numbers of other vehicles are present) or only during a regular 8-hour work day (to reduce overtime) increases the number of trucks and truck loading stations that would be required.

2.3.4 ESTIMATED COSTS: ALTERNATIVE 3

HECO would contract out for fuel delivery services. Hence, the only capital costs it would incur are for improvements to loading and unloading facilities at BPTF, Waiau, and Iwilei. HECO estimates that the 30-year levelized annual revenue requirement for this Alternative would be approximately $8.0 million per year. This would make Alternative 3 over $1.6 million per year more costly than The Proposed Action on a levelized annual revenue requirement basis.

2.3.5 PRELIMINARY CONSTRUCTION SCHEDULE: ALTERNATIVE 3

This alternative eliminates the need for pipeline construction. It also eliminates the need for the pumping and pig handling facilities that would be needed for Waiau. However, it significantly increases the facilities that would need to be constructed at the BPTF and at the Waiau Generating Station to accommodate the large volume of trucks that would be needed. HECO estimates that these



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Rooney Engineering, Inc.

Legend:

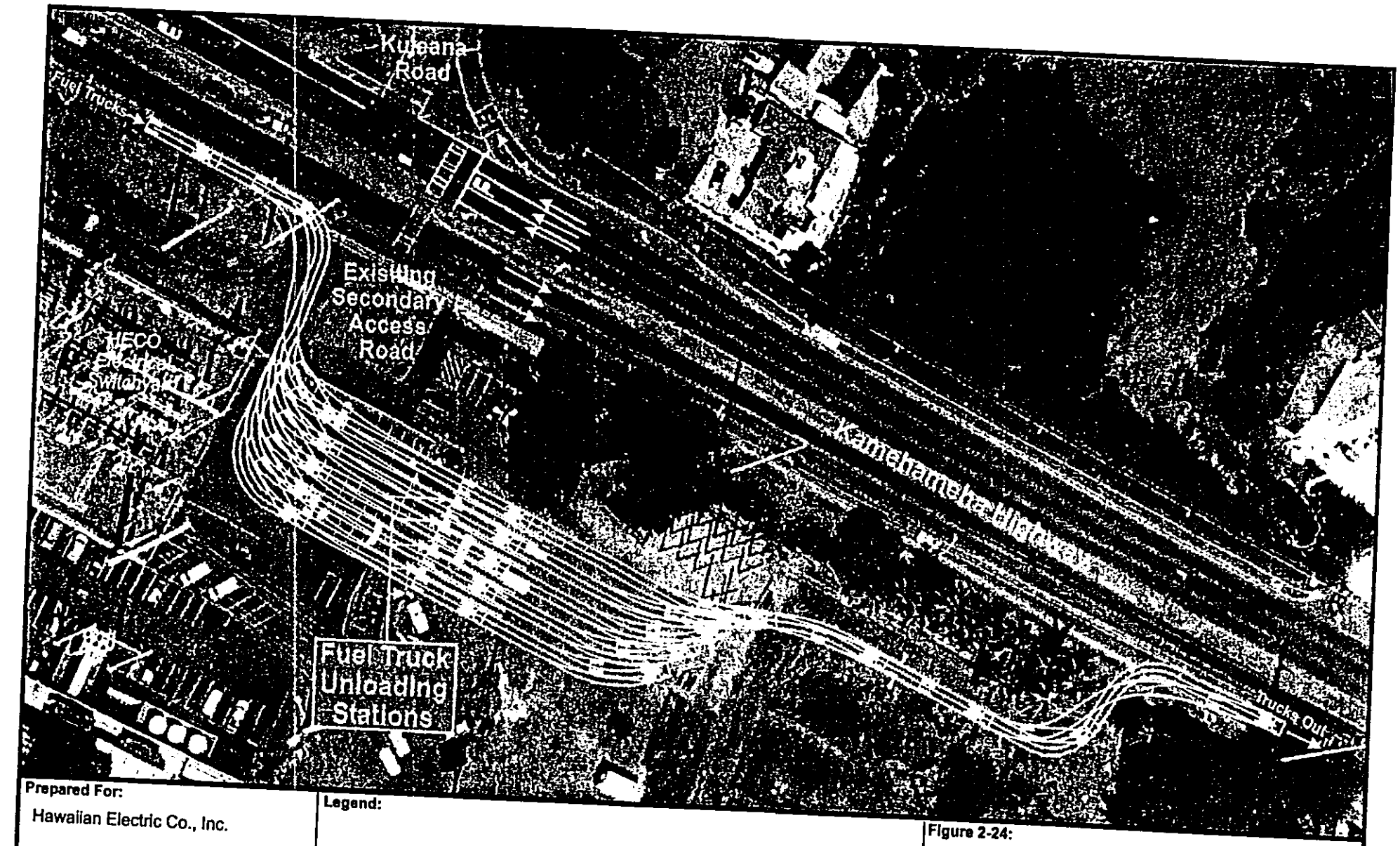
0 100 200 400
Feet

N

Figure 2-23 :

Barbers Point Tank Farm Truck Loading Facility

Waiau Fuel Pipeline Project



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Rooney Engineering, Inc.

Legend:

0 25 50 100 200
SCALE IN FEET

N

Figure 2-24:

Waiau Generating Station Truck Unloading Facility

Waiau Fuel Pipeline Project

Table 2-9. Fuel-Truck Trip Generation and Fleet Requirements.

Parameter Expected Range	*Waiau*[1]	*Iwilei*[2]	*Total/BPTF*
Annual LSFO Use (1,000's of barrels)	1,891–3,002	162–445	2,053–3,447
Truck Deliveries/day[3]	51 - 81	5 - 12	56 - 93
One-Way Truck-Trips/day[4]	101 - 162	10 - 24	111 - 186
One-Way Truck-Trips/Hour[5]:			
- 18-hour Operation	5.6-9.0	0.6-1.3	6.2-10.3
- 12-hour Operation	8.4-13.5	0.8-2.0	9.2-15.5
- 10-hour Operation	10.1-16.2	1.0-2.4	11.1-18.6
Maximum Loading/Unloading Stations Needed[6]			
- 18-hour Operation	4 - 6	1	5 - 7
- 12-hour Operation	5 - 8	1 - 2	6 - 10
- 10-hour Operation	6 - 10	1 - 2	7 - 12
Fuel Truck Fleet Requirements[7]			
- 18-hour Operation	6 - 8	2	8 - 10
- 12-hour Operation	7 - 11	2 - 3	9 - 14
- 10-hour Operation	8 - 14	2 - 3	10 - 17

Table Notes:

(1) Minimum rates from Year 2000 actual usage at the Waiau Generating Station; maximum rates from HECO April 1999 5-yr sales and peak forecast for Year 2016.

(2) Minimum rates from Year 2000 actual usage at the Honolulu Generating Station; maximum rates based on average of recent historical fuel consumption.

(3) Assumes use of trucks having a capacity of 6,000 gallons, or 143 barrels, operating 5 days per week, 52 weeks per year (260 days).

(4) Each fuel delivery generates 2 vehicle-trips, 1 inbound vehicle-trip, and one outbound vehicle-trip. Hence, the number of fuel deliveries is half the number shown.

(5) 18-hour operation assumes that deliveries are made during two 9-hour driving shifts; 12-hour operation assumes that deliveries are during the day; 10-hour operation assumes that deliveries are only during the 10 consecutive hours having the lowest traffic volumes.

(6) Estimates assume 1-hour truck cycling time. Fuel loading station estimates at Waiau are rounded upward to nearest whole number and assume 1 backup station. No backup stations are assumed for Iwilei

(7) Fuel truck fleet requirements assumes 75% utilization rate.

(8) One barrel is equivalent to 42 gallons.

Source: Compiled by Planning Solutions, Inc. and Rooney Engineering, Inc.

facilities would require only slightly less time to construct than it would take to construct the proposed Waiau Fuel Pipeline (Alternative 1).

2.3.6 REQUIRED PERMITS AND APPROVALS: ALTERNATIVE 3

Table 2-10 identifies the permits and approvals that would probably be required for this alternative. Because trucking does not involve any fuel line construction, the number of approvals required is far smaller than the number needed for The Proposed Action. The most significant addition to the required approvals is the need for a major Special Management Area permit at the Waiau Generating Station. This requirement is triggered by the need to construct additional truck unloading facilities there.

Table 2-10. Required Permits and Approvals: Alternative 3: Trucking.

Permit	*Project Component*				
		Fuel Line			
	Tank Farm	*Buried Pipe*	*Above-Ground Facilities*	*Stream & Road Crossings*	*Waiau Power Plant*
C&C of Honolulu Department of Planning and Permitting					
Special Management Area Permit	~~No~~N				Y
Chapter 343/HAR 11-200 EA/EIS	~~No~~N				Yes
Development Applications in Flood Hazard Districts	~~No~~N				~~No~~N
Grubbing, Grading, & Stockpiling Permit	N				TBD
Building Permits	N				Y
Construction Dewatering Permit	N				TBD
Permit to Discharge to Storm Sewer	TBD				TBD
Flood Hazard Variance	~~No~~N				TBD
~~**C&C of Honolulu Department of Design and Construction**~~					
~~Grubbing, Grading, & Stockpiling Permit~~	~~No~~				~~TBD~~
~~Building Permits~~	~~No~~				~~Yes~~
~~Construction Dewatering Permit~~	~~No~~				~~TBD~~
~~Permit to Discharge to Storm Sewer~~	~~TBD~~				~~TBD~~
State of Hawai'i Department of Health Clean Water Branch					
NPDES Construction Stormwater Permit	P				Y
NPDES Dewatering Permit for	~~No~~N				~~No~~N
State of Hawai'i Department of Health, Noise & Radiation Branch					
Noise Permit (HAR §11-46-7)	TBD				TBD
Key: Yes: Required ~~Permit~~; P: Probably Required, depends on final design; No: Not Required TBD: To Be Determined					
Source: Compiled by Planning Solutions, Inc.					

2.4 NO ACTION ALTERNATIVE

In the case of HECO's proposed pipeline project, "No Action" consists of failing to arrange for continued fuel delivery to Waiau beyond the end of the current contract between HECO and Chevron. This would result in the loss of nearly a quarter of the installed electrical generating capacity for O'ahu. It cannot be emphasized too strongly that this alternative would not meet the objectives of the proposed action. Instead, "No Action" is included only because it is needed to fulfill the requirements of Chapter 343.

Implementation of the "No Action" alternative would require HECO to make a number of changes in the way it operates.

- First, it would have to drastically increase the utilization of the generating units that would remain in service. This, in turn, would entail increased fuel deliveries to those facilities, greater emissions from them, longer operating hours, and other changes.
- Second, HECO would have to violate the generating reserve criteria stipulated in its filings with the PUC. This would greatly increase the fragility of the electrical power supply. It could also to lead to transmission bottlenecks as the grid struggles to move power from the remaining generating units to users.
- Third, HECO would have to institute drastic measures to restrict demand. While some of these would involve voluntary conservation, such measures would fall far short of the drastic cut in demand that would be needed for HECO to serve all of its customers without the capacity at Waiau. Inevitably, this means that the company would have to institute rolling blackouts. These would be of the sort occasionally needed during natural disasters and large-scale equipment failures in the past. But they would be far more widespread and prolonged. As a result, they would be much more costly to its customers and disruptive to the life and economy of the island.

As noted above, HECO's contract with Chevron expires on December 31, 2004. Because of this, HECO must make new arrangements for the continued delivery of fuel to Waiau and Iwilei beyond that time. In the case of deliveries to Waiau, this fuel is needed for the continued operation of the existing LSFO-fired units at the Waiau Generating Station, which constitute about a quarter of O'ahu's generating capacity. Continued operation of the Waiau Generating Station will have no bearing on HECO's efforts to pursue meeting future energy needs with additional generation utilizing new technologies, including renewable energy and other developing technologies.

3.0 OVERVIEW OF THE EXISTING ENVIRONMENT

This chapter briefly describes the existing environment of the areas that would be affected by the alternatives described above. These include the BPTF, existing HECO and Chevron easements within Campbell Industrial Park, the State Energy Corridor and Chevron pipeline corridor between Campbell Industrial Park and Waiau, the Waiau Generating Station, and the Iwilei Tank Farm.

The discussion is organized by topic (e.g., topography, hydrology, sound levels, etc.). Within each topic, the descriptions are broken down into general, i.e., information that is applicable to all areas and information that is applicable to only one of the alternatives. The information is intended primarily as a means of orienting readers to the general characteristics of the areas. More detailed information is provided in Chapter 4 where it is needed to identify and evaluate potential impacts.

3.1 PHYSIOGRAPHY AND TOPOGRAPHY

The BPTF, the Waiau Generating Station, and the Iwilei Tank Farm are all situated on O'ahu's southern coastal plain. These sites are relatively level, with slopes of a few percent or less. The pipeline routes are more varied in elevation, but they also transit relatively gently sloping terrain.

The BPTF is approximately 10 feet above mean sea level (msl). The average slope across it is approximately 2 percent, just enough to maintain adequate drainage.

The existing pipeline easements between the BPTF and the western end of the State Energy Corridor (SEC) also traverse relatively flat land. Ground elevations range from approximately 10 feet msl where the pipeline leaves the BPTF to approximately 60 feet above MSL where it joins with the western end of the SEC. The average slope over this segment of the route is less than 1 percent. The short segment of new pipeline connecting the BPTF directly with HECO's existing Kahe supply line parallels this segment of the proposed Waiau Fuel Pipeline and has the same elevations.

Once the proposed Waiau Fuel Pipeline enters the SEC it generally remains below 100 feet above MSL. The exception occurs between mileposts 3.75 and 7.0. In that area the Waiau Fuel Pipeline alignment runs along Farrington Highway across the lower slopes of the Waianae range. The highest ground elevation along that part of the route reaches approximately 180 feet above MSL. Ground slopes throughout this stretch of the corridor are a few percent or less.

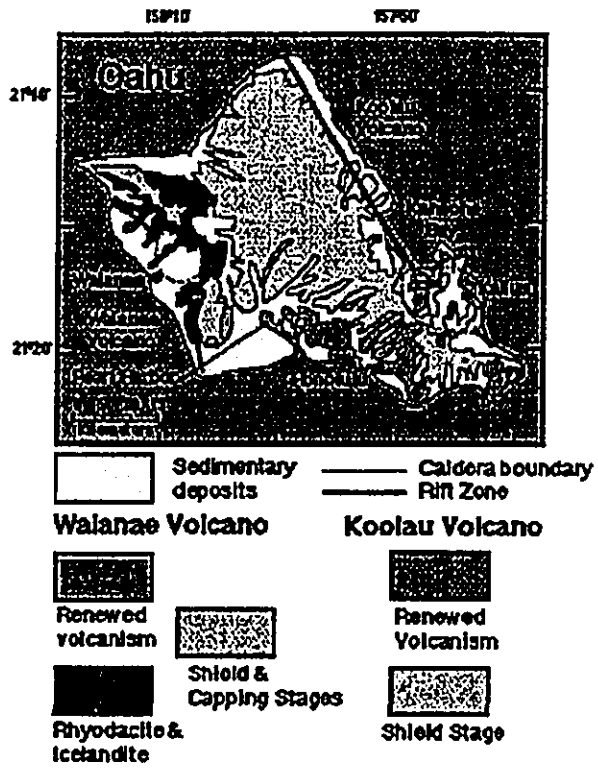
The Chevron pipeline (Alternative 2) also remains entirely within the coastal plain in the west, and skirts the edge of Pearl Harbor near the SEC. At its high point, which occurs in Campbell Industrial Park near where it diverges from Kalaeloa Boulevard, the Chevron pipeline is approximately 60 feet above MSL. The gradient remains less than one percent along its entire route.

Ground elevations at the Waiau Generating Station range from approximately 40 feet MSL along Kamehameha Highway to just a few feet above MSL along the *makai* side of the facility. Slopes range from a maximum of less than 5 percent on the upper portion of the site to less than 0.5 percent on the *makai* side of the power plant.

The Iwilei Tank Farm is nearly level. The ground elevation is less than 10 feet above MSL.

3.2 GEOLOGY AND SOILS

Figure 3-1 Geological Setting



O'ahu is the eroded remnant of the Waianae and Ko'olau volcanoes. Lava flows from the western flank of the Ko'olau Volcano banked against the eastern flanks of the older Waianae Volcano to form the gently sloping surface of the Schofield Plateau between the two (see Figure 3-1, from Langenheim and Clague 1987). The 'Ewa Plain, on which most of the new facilities would be constructed, is formed from emerged coral reefs and alluvial deposits that developed along the southern side of the island. The coralline reef deposits include carbonate sinkholes and solution channels; the surface expressions of these karst-like structures have been mostly filled by subsequent sedimentation. The 'Ewa Plain and Pearl Harbor receive the bulk of the sediments eroded from the Schofield Plateau as well as erosional products from the Southern Waianae and Ko'olau Ranges; sedimentary inputs from the Ko'olau Range dominate the inputs to the coastal areas around the eastern part of the Harbor.

Pearl Harbor is essentially a series of drowned river valleys and has a complex history reflecting a balance among the processes of sea-level change, uplift and subsidence of the island itself, and inputs of material from erosion of the island and the development of coral reefs (see Macdonald, Abbott and Peterson 1983; p. 424–426). The result is a complicated series of discontinuous layers of sedimentary and coralline-reef deposits in the lowlands, lapping into hard-rock outcrops of volcanic basalt deposits in the elevated areas.

The soils in the area are all classed as the Lualualei-Fill-Land-'Ewa association (Foote 1972, General Soil Map, O'ahu Island, Hawai'i). These range in type from coral-reef outcrops at the BPTF, into clays and silty clays in the flatter areas of the 'Ewa Plain through which the Chevron and proposed pipeline routes pass (e.g. Honouliuli and 'Ewa clay and silty clay), into stony, steep lands in the steepest areas of the proposed pipeline route near the Makalapa Gulch, and through the Pearl Harbor clay around the coastal fringe of the Harbor to the Waiau Generating Station.

3.3 CLIMATE AND AIR QUALITY

The Hawaiian Island chain is situated south of the large Eastern Pacific semi-permanent high-pressure cell, the dominant feature affecting air circulation in the region. Over the Hawaiian Islands, this high-pressure cell produces very persistent winds called the northeast trade winds. During the winter months, cold fronts sweep across the north central Pacific Ocean, bringing rain to the Hawaiian Islands and intermittently modifying the trade wind regime. Thunderstorms, which are rare but most frequent in the mountains, also contribute to annual precipitation.

3.3.1 TEMPERATURE

Due to the tempering influence of the Pacific Ocean and their low-latitude location, the Hawaiian Islands experience extremely small diurnal and seasonal variations in ambient temperature. Average temperatures in the coolest and warmest months at Honolulu International Airport are 72.9° (January)

and 81.4° (July), respectively. These temperature variations are quite modest compared to those that occur at inland continental locations. Temperature data from Honolulu International Airport are summarized in Table 3-1.

3.3.2 RAINFALL AND HUMIDITY

The terrain on O'ahu is influential in determining the amount of rainfall. Near the top of the Ko'olau Range on the windward side of O'ahu, rainfall averages nearly 250 inches per year. On the leeward side of the island, where the pipeline would be constructed, the annual average rainfall is much lower (see Table 3-1). Annual average rainfall at the Waiau Generating Station is less than 30 inches per year. Average annual rainfall decreases from that point southward and westward along the pipeline routes, averaging less than 20 inches per year at BPTF. Although the project area is on the leeward side of the island, the humidity is still moderately high, ranging from the mid-60s to the mid-70s.

Table 3-1. Average Temperature, Rainfall, and Humidity, by Month.

	Ambient Temperature, °Fahrenheit			
Month	*Minimum*	*Maximum*	*Average Monthly Rainfall (inches)*	*Average Relative Humidity (%)*
January	66	80	3.3	77.2
February	66	80	2.4	74.5
March	67	81	2.7	69.0
April	69	82	1.3	67.8
May	70	84	1.0	66.0
June	72	86	0.4	64.8
July	74	87	0.6	65.0
August	74	88	0.6	66.0
September	74	88	0.7	65.5
October	73	86	2.0	67.0
November	70	84	2.8	71.0
December	67	81	3.4	73.5

Source: National Weather Service, Honolulu International Airport Station.

3.3.3 WIND PATTERNS

The northeast trade winds predominate in the project area. Data from the Honolulu International Airport show that they are strongest and most persistent in the summer. During July, for example, winds from the northeast through east are present over 85 percent of the time and winds average 12.8 miles per hour. The trade winds become weaker and less persistent in the winter. During January, for example, they are much less persistent. In winter, winds from the northeast through east are present only 35 percent of the time and the average wind speed drops to 10.5 miles per hour. The island is also influenced by occasional *kona* storms, which are intense low-pressure centers that pass near the island, bringing moderate to strong southerly winds and rain. When the trade winds or storms do not dominate the wind flows, the winds are typified by land/sea breezes and *kona* winds.

3.3.4 APPLICABLE AIR QUALITY STANDARDS

The U.S. Environmental Protection Agency has set national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, 10-micron particulate matter (PM_{10}), and airborne lead. These ambient air quality standards establish the maximum concentrations of pollution considered acceptable, with an adequate margin of safety, to protect the public health and welfare. The State of Hawai'i has also adopted ambient air quality standards for some pollutants. In

some cases, these are more stringent than the federal standards. At present, the State has set standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, lead, and hydrogen sulfide.

Both state and national air quality standards consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is to be measured. The allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops, and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposure to a high concentration for a short time (one hour, for instance), or to a lower average concentration over a longer period (8 hours, 24 hours, or one month). For some pollutants there is more than one air quality standard, reflecting both its short-term and long-term effects. Table 3-2 presents the state and national ambient air quality standards for selected pollutants.

3.3.5 EXISTING AIR QUALITY

Generally, air quality in the area is excellent. The State of Hawai'i Department of Health monitors ambient air quality on O'ahu using a system of 9 monitoring sites. The primary purpose of the monitoring network is to measure ambient air concentrations of the six criteria pollutants that the United States Environmental Protection Agency (EPA) has promulgated as National Ambient Air Quality Standards (NAAQS). The four monitoring sites that are most relevant to the proposed project are listed in Table 3-3, and the air quality at these locations during the year 2000 is summarized in Table 3-4. As shown by these data, air quality in the area never exceeded the short-term or long-term State or National standards during the period of measurement for particulate matter (PM_{10}), sulfur dioxide (SO_2), and carbon monoxide.

3.4 SURFACE WATER

3.4.1 PROPOSED WAIAU FUEL PIPELINE (ALTERNATIVE 1)

Over the 13-mile-long route from HECO's Barbers Point tank farm to its Waiau power plant, the proposed pipeline crosses six normally dry gulches and eight streams or man-made channels which are perennial and/or tidal. The SEC also passes through the upper end of Pouhala Marsh; while HECO has proposed to install its pipeline outside this part of the SEC to avoid the wetland, it is not assured of permission to do so from the State Department of Land and Natural Resources. Hence, the Pouhala Marsh portion of the SEC remains a possibility. These crossings are identified below. Section 4.3.2 provides greater detail as part of its discussion of potential impacts.

3.4.1.1 Proposed Pipeline Crossings of Six Dry Gulches

The six dry gulch crossings are toward the western end of the pipeline route. Moving from west to east, they begin at Makakilo Gulch and end at Honouliuli Gulch. All of these crossings are along the *mauka* side of the Farrington Highway corridor. Their locations are identified as DG-1 to DG-6 on Figure 3-2. Data on tributary watersheds, dimensions of the crossings, and type of pipeline installation to be used are summarized on Table 3-5.

The tributary areas of these gulches vary from 0.03 square miles (the unnamed drainageway between the Grace Pacific Quarry and Navy's Barbers Point Shaft) to 11.2 square miles (Honouliuli Gulch). Except for the Honouliuli Gulch, none of these dry gulches persist downstream to the ocean. Instead, they lose all topographic expression on the 'Ewa Plain, either through burial in alluvium or through existing artificial modification of the landscape.

Table 3-2. State and National Ambient Air Quality Standards.

Pollutant/Averaging Period	*Standard, µg/m³*	
	State Standard	*Federal Standard*
Nitrogen Dioxide Annual	70	100
Sulfur Dioxide 3-hour	1300	1300
24-hour	365	365
Annual	80	80
Carbon Monoxide (CO) 1-hour	10,000	40,000
8-hour	5,000	10,000
Particulate Matter (PM_{10}) 24-hour	150	150
Annual	50	50
Ozone 1-hour	100	235
8-hour	n/a	156
Hydrogen Sulfide (H_2S) 1-hour	35	n/a
Lead 3 months	1.5	1.5

Source: State of Hawai'i Department of Health

Table 3-3. Air Quality Monitoring Stations.

Station	*Site Name/Type*	*Description*	*Station Type*			
			PM_{10}	*CO*	*SO_2*	*NO_2*
1	Honolulu	City Center/ Comm.	N	N	S	
2	Pearl City	Suburban/ Residential	N			
8	West Beach	Rural/ Industrial	S, C	S	S	
9	Kapolei	Rural/Industrial	S	S	S	S

N= National Air Monitoring Station (NAMS)
C= Co-located Site
S= State and Local Air Monitoring Stations

Source: State of Hawai'i Department of Health, Annual Summary Air Quality Data 2000

Table 3-4. Air Quality at Selected Locations: 2000.

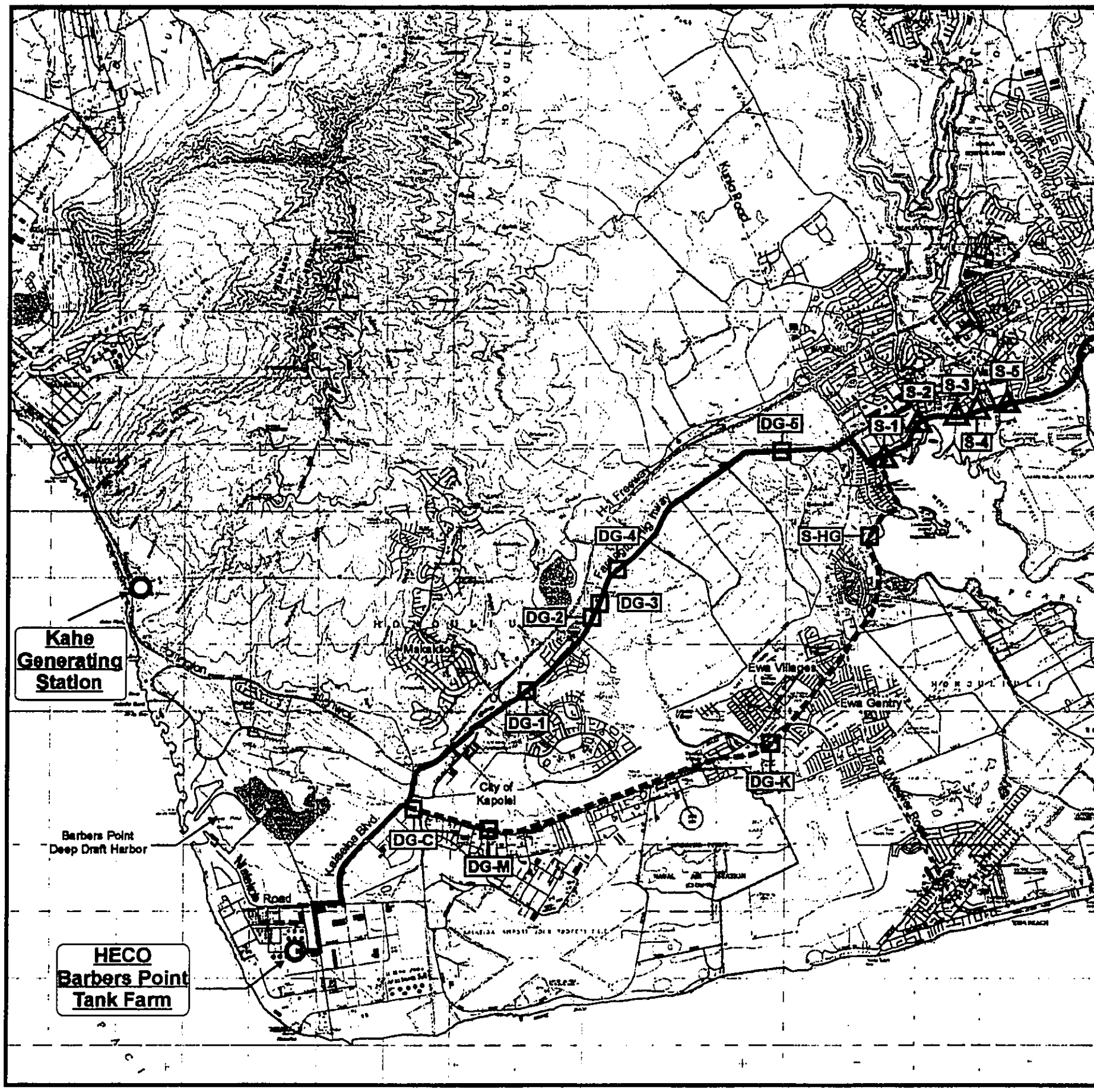
Sampling Station	*PM_{10}*			*Nitrogen dioxide*		
	Highest Values		*Annual Mean*	*Annual range*		*Annual Mean*
	Highest	*2nd Highest*		*Minimum*	*Maximum*	
Downtown Honolulu	83	31	14	-	-	-
Pearl City	164	154	16	...	...	...
Kapolei	148	129	17	-	-	9
West Beach[1]	41	40	14	-	-	7
	1-Hour Carbon Monoxide			*8-Hour Carbon Monoxide*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Downtown Honolulu	3,990	3,762	774	1,753	1,724	774
Pearl City	—	—	—	—	—	—
Kapolei	2,508	1,596	336	1,055	827	336
West Beach	1,596	1,596	197	1,012	627	197
	3-Hour SO_2			*24-Hour SO_2*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Downtown Honolulu	65	18	1	9	7	1
Pearl City	—	—	—	—	—	—
Kapolei	23	18	1	6	5	1
West Beach	11	9	1	4	4	1

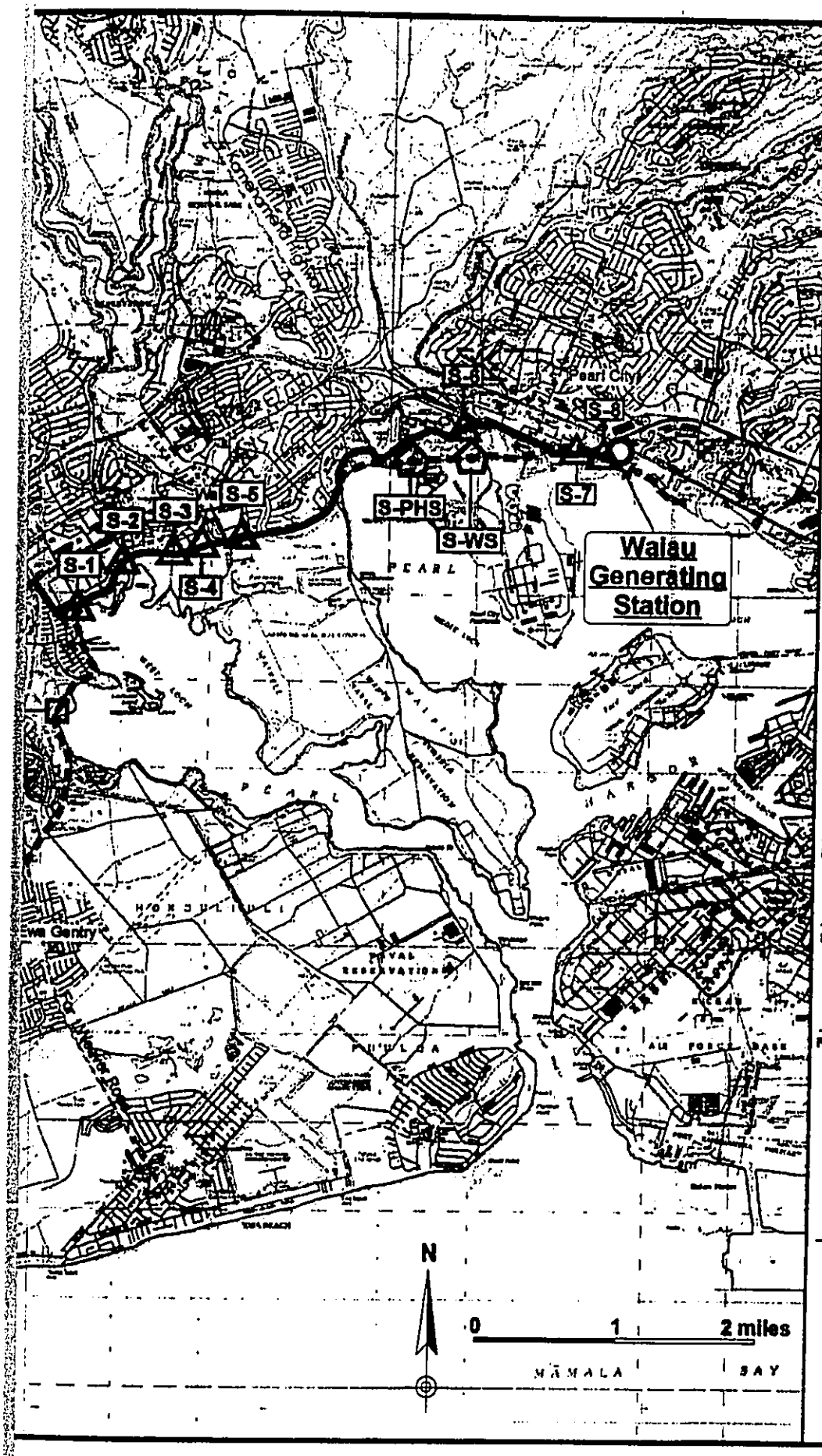
Note: PM_{10} samplers operated for 24 hours once every 6 days in accordance with EPA guidelines.

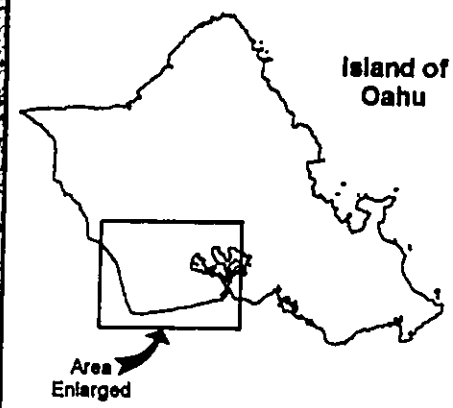
Note: Based on 24-hour sampling, in micrograms per cubic meter

Note: As shown by these data, air quality in the area never exceeded the short-term or long-term State or National standards during the period of measurement for particulate matter (PM_{10}), sulfur dioxide (SO_2), and carbon monoxide.

Source: State Department of Health, Annual Summary Air Quality Data 2000


Kahe Generating Station
HECO Barbers Point Tank Farm
DG-1
DG-2
DG-3
DG-4
DG-5
DG-C
DG-M
DG-K
S-1
S-2
S-3
S-4
S-5
S-HG
Kahe Road
Makakilo
City of Kapolei
Ewa Villages
Ewa Gentry
Barbers Point Deep Draft Harbor
Kalaeloa Blvd
North-South Road
Farrington Hwy
Kamokila Blvd
Fort Weaver Rd





Legend:

- Proposed HECO Pipeline
- Chevron Pipeline
- Dry Gulch
- Perennial Stream or Tidal Channel
- Emergent Spring
- HECO Facility

Prepared For:

Hawaiian Electric Company, Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Tom Nance Water Resource Engineering, Inc.
USGS Quadrangle Maps: Ewa, Schofield Barracks, Waipahu, Pearl Harbor; 2000 editions

Figure 3-2:

Crossings of Drainageways, Both Pipeline Routes

Waiau Fuel Pipeline Project

Table 3-5 Dry Gulches Crossed by the Pipeline Routes

Route	*ID*	*Name*	*Tributary Area (mi^2)*	*Adjacent Structure*	*Channel Width (ft.)*	*Crossing Type*
Alt-1	DG-1	Makakilo	1	Two 16' x 5' Box Culverts	35	Open Cut Above Structure
	DG-2	Unnamed #1	0.24	One 15' x 4' Box Culvert	40	Open cut across drainageway
	DG-3	Unnamed #2	0.03	One 6' x 2' Box Culvert	12	Open cut across drainageway
	DG-4	Hunehune	0.4	One 17' x 8' Box Culvert	25	Drill Under Drainageway
	DG-5	Kalo'i	4.61	24' x 12' Bridge Opening	50	Drill Under Drainageway
	DG-6	Honouliuli	11.2	40' x 24' Bridge Opening	60	Open cut across drainageway
Alt-2	DG-C	Kapolei City	0.78	Two 16' x 9' Box Culverts	32	In a trench over the top of the box culverts
	DG-M	Makakilo	1.86	30' x 4' Bridge Opening	25	Pipe span of the channel
	DG-K	Kalo'i	6.71	135' x 15' Bridge Opening	138	Mounted underneath bridge girders

Note: The Chevron pipeline crossings listed above include only those which are not coincident with the proposed pipeline route

Source: *Rooney Engineering, Inc. and Tom Nance Water Resource Engineering*

3.4.1.2 Eight Crossings of Perennial Streams and Tidal Channels

As noted in Section 3.1, Pearl Harbor is a natural estuary formed by successive flooding during glacial epochs (Stearns 1985). Six perennial, two intermittent streams, and several small dry gulches draining an estimated 109 square mile area of central O'ahu, discharge into the harbor. Numerous perennial springs fed by groundwater emerge near an elevation of 20 feet above sea level (Visher and Mink 1964). Nance (1988) noted that spring discharges have increased in recent years due to the cessation of pumping groundwater for sugarcane irrigation.

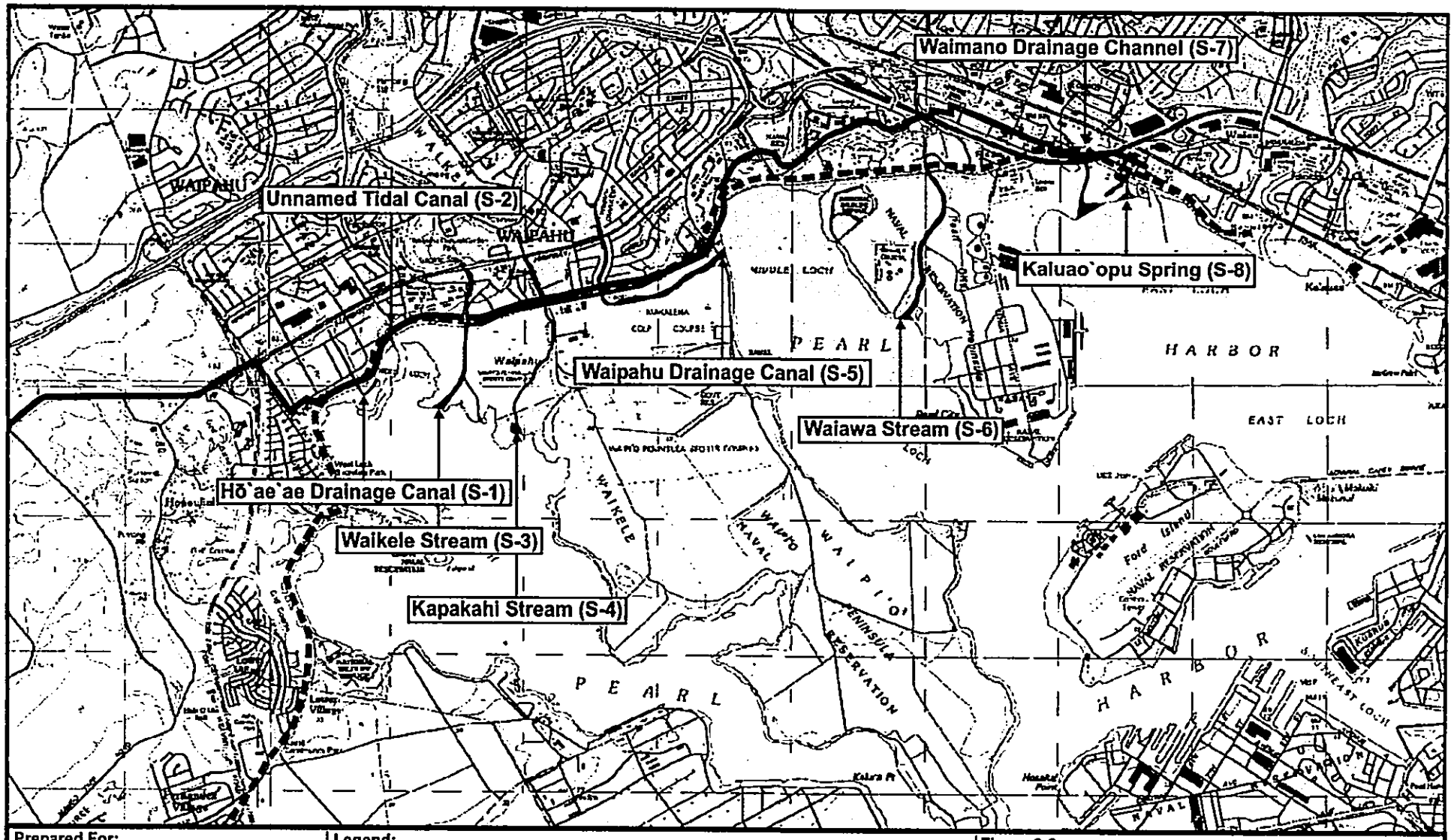
Streams draining into Pearl Harbor from the Waianae Mountains are intermittent, discharging only during freshets. Flows in streams draining the Ko'olau Mountains are relatively low above the emergent Pearl Harbor springs, often disappearing completely into the channel alluvium during droughts (~~Coles~~Englund, et al. ~~1999~~2000). Stream flows are perennial and chemically more characteristic of groundwater below the Pearl Harbor springs. Figure 3-3 illustrates the perennial drainages and springs within the Pearl Harbor watershed. Table 3-6 provides information about them.

3.4.1.3 Crossing Along the Mauka End of Pouhala Marsh

Pouhala Marsh is a saline wetland which sits on the delta deposits between Waikele and Kapakahi Streams. HECO's proposed routing would avoid the marsh by using an easement from the State Department of Transportation within the former OR&L right-of-way. However, if this easement is not granted, the pipeline would have to use the SEC alignment, which passes through the marsh near its *mauka* boundary. The portion of the marsh within the SEC corridor is normally dry.

3.4.2 ALTERNATIVE 2: CHEVRON PIPELINE

The route of the Chevron pipeline (Alternative 2) is also shown on Figure 3-2. Some of the route is essentially coincident with the proposed pipeline route. The following paragraphs describe the portions of the route which are not within or parallel to the proposed pipeline route. Greater detail is provided in the discussion of potential impacts.



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Tom Nance Water Resource Engineers, Inc.
USGS Pearl Quad
Rooney Engineering, Inc.

Legend:

- Proposed HECO Pipeline
- SEC Diverges from the Proposed Pipeline Route
- Chevron Pipeline
- Stream, Channel or Spring

0 5000 10000
2500 20000
Feet

N

Figure 3-3:

Perennial Streams, Tidal Channels, and Springs

Waiau Fuel Pipeline Project

Table 3-6 Perennial Streams and Tidal Waterways Crossed by the Pipeline Routes

Route	*ID*	*Name*	*Tributary Area (mi^2)*	*Channel Width (ft.)*	*Crossing Type*
Proposed	S-1	Hō'ae'ae Canal	2.7	47	Drill Under Drainageway
	S-2	Storm Drain	0.03	9	Drill Under Drainageway
	S-3	Waikele Stream	45.7	65	Drill Under Drainageway
	S-4	Kapakahi Stream	0.15	60	Drill Under Drainageway
	S-5	Waipahu Canal	2.27	55	Drill Under Drainageway
	S-6	Waiawa Stream	26.7	80	Open cut across the stream channel
	S-7	Waimano Drainage Canal	2.7	50	Drill Under Drainageway
	S-8	Kaluao'opu Spring	0.01	30	New above-grade span just *makai* of the bikeway bridge
Chevron (Portions)	S-HG	Honouliuli Gulch	11.9	52	Pipeline mounted on the bridge piers
	S-PHS	Pearl Harbor Springs	0.27	25	Pipeline mounted on the bridge piers
	S-WS	Waiawa Stream	27.1	75	Pipeline mounted on the bridge piers
Note: The Chevron pipeline crossings listed above include only those which are not coincident with the proposed route.					
Sources: Rooney Engineering, Tom Nance Water Resource Engineering					

3.4.2.1 Chevron Pipeline Crossings of Dry Gulches

The Chevron pipeline crosses three dry gulches across the 'Ewa Plain at locations further *makai* than the proposed pipeline. These three are identified at the bottom of Table 3-5. As with the proposed pipeline crossings of these gulches further inland, all three are dry except during and immediately following major rainstorms.

3.4.2.2 Chevron Pipeline Crossings of Perennial Streams and Tidal Waterways

Three of Alternative 2's crossings of perennial streams or tidal waterways differ from those of The Proposed Action. These are identified on Figure 3-2 as S-HG, S-PHS, and S-WS; information on them is provided at the bottom of Table 3-6. It is interesting to note that the more *makai* route of the Chevron pipeline takes it across Honouliuli Gulch at a point where it has transitioned from a dry gulch to a tidal estuary along the West Loch shoreline.

Because the Chevron pipeline that would be used for Alternative 2 continues past the Waiau Generating Station to the Iwilei Tank Farm, it crosses many more stream channels than does the BPTF-to-Waiau pipeline that HECO has proposed (Alternative 1). These include Kalauao, 'Aiea, Halawa, Moanalua, and Kapālama Streams. These watercourses were not investigated as part of this study.

3.4.3 ALTERNATIVE 3: TRUCKING

Truck transport of the fuel from the BPTF to Waiau and Iwilei involves crossing all of the same waterways as Alternatives 1 and 2.

3.5 GROUNDWATER

3.5.1 PROPOSED WAIAU FUEL PIPELINE (ALTERNATIVE 1)

The 13-mile-long route to HECO's Waiau power plant passes over four groundwater aquifers. For the first two miles, from HECO's Barbers Point tank farm to the upper end of Kalaeloa Boulevard, the

pipeline route is over the Malakole Sector of the 'Ewa (Limestone) Caprock Aquifer. Following along Farrington Highway for the next four miles, the route crosses the 'Ewa-Kunia Aquifer. The next segment (just under seven miles) traverses the entire width of the Waipahu-Waiawa Aquifer. The final 0.3 miles into the Waiau Generating Station is over the southwest corner of the Waimalu Aquifer. Figure 3-4 shows these aquifer boundaries in relation to the pipeline route. Trucks carrying fuel to the Iwilei Tank Farm would also cross the Waimalu, Moanalua, and Kalihi aquifers. Greater detail is provided in Chapter 4 in the discussion of potential impacts.

3.5.2 ALTERNATIVE 2: CHEVRON PIPELINE

The route of the Chevron pipeline across the 'Ewa Plain, being further *makai* than the proposed pipeline, crosses all three sectors of the 'Ewa Caprock Aquifer (Malakole, Kapolei, and Pu'uloa). Along this *makai* route, the Chevron pipeline does not run across any portion of the 'Ewa-Kunia Aquifer. These differences are depicted on Figure 3-4. Greater detail is provided in Chapter 4. The route also passes beyond the Waiau Generating Station through the lower reaches of the Waimalu, Moanalua, and Kalihi aquifers to its terminus in Iwilei.

3.5.3 ALTERNATIVE 3: TRUCKING

This alternative involves fuel transport across the same aquifers as The Proposed Action.

3.6 FLOODING

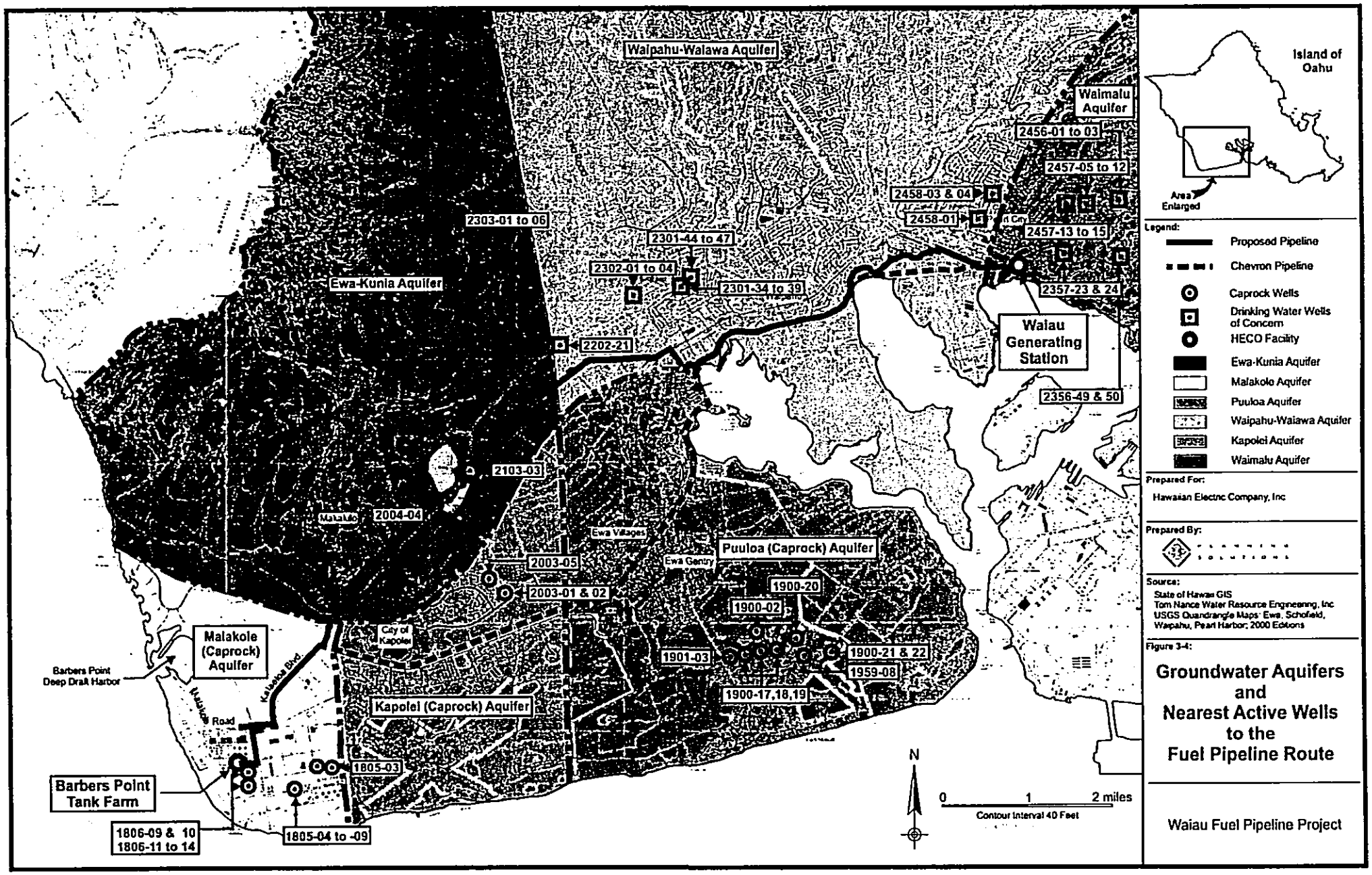
The BPTF is the area relevant to the proposed action that is closest to the ocean coastline. It is outside the coastal high hazard area identified in the FIRM map for the area. Pearl Harbor itself is a protected area. Thus, pipeline routes that skirt the harbor are not exposed to significant wave action. The Flood Insurance Rate Maps for the region identify several drainageways along the pipeline route. Flood hazards have been identified for several of the streams and other drainageways listed in Table 2-4. Both pipeline routes pass through Special Flood Hazard Areas (SFHAs) along the shoreline of Pearl Harbor. The proposed pipeline route also crosses through an SFHA in the Honouliuli Gulch, while the Chevron pipeline route crosses an SFHA at the Kalo'i Gulch crossing in the community of 'Ewa.

3.6.1 AQUATIC COMMUNITIES

All of the aquatic communities that could be affected by the project are within the Pearl Harbor drainage area. Pearl Harbor is the largest landlocked estuarine body of water in Hawai'i and has a surface area of 8 square miles, a mean depth of 30 feet, and about 36 miles of shoreline. Approximately 100 square miles (about one-sixth of O'ahu's total surface area) drain into Pearl Harbor. The harbors four lochs are joined by a main channel connecting the harbor with the ocean. Grovhoug (1992) notes that Pearl Harbor is relatively isolated from oceanic circulation and that water exchange is slow. He estimated that the mean water residence time in the harbor is about 6 days for bottom waters and one to three days for surface waters. Surface water circulation is primarily offshore and driven by the northeast trade winds, while weak tidal flows of 0.15 to 0.3 m/sec control the movement of bottom water in and out of the harbor.

3.6.1.1 Freshwater and Estuarine Aquatic Communities

From a biological perspective, Timbol and Maciolek (1978) concluded that none of the streams draining into Pearl Harbor could be considered as pristine. Englund, et al. (2000) discovered that introduced species comprise 47% of the aquatic biota found in Pearl Harbor estuarine and riparian habitats, while only 33% were confirmed to be native species (the balance being undetermined). Hawaiian aquatic ecologists generally consider relatively high numbers of introduced species in a given stream or wetland to be indicative of severe ecological disturbance. Introduced species are known to eliminate native biota through competition for food and shelter, predation, habitat and food chain alteration, and introduction of parasites and disease.


Waipahu-Waiawa Aquifer
Waimalu Aquifer
2456-01 to 03
2457-05 to 12
2458-03 & 04
2458-01
2457-13 to 15
2303-01 to 06
2301-44 to 47
2302-01 to 04
2301-34 to 39
Ewa-Kunia Aquifer
2357-23 & 24
Waiau Generating Station
2202-21
2356-49 & 50
2103-03
2004-04
Ewa Villages
Ewa Gentry
Puuloa (Caprock) Aquifer
2003-05
2003-01 & 02
1900-20
1900-02
Malakole (Caprock) Aquifer
City of Kapolei
1901-03
1900-21 & 22
1959-08
Barbers Point Deep Draft Harbor
Kalaeloa Blvd
1900-17,18,19
Kapolei (Caprock) Aquifer
Malakole Road
1805-03
Barbers Point Tank Farm
1806-09 & 10
1806-11 to 14
1805-04 to -09
N
0 1 2 miles
Contour Interval 40 Feet
Island of Oahu
Area Enlarged
Legend:
Proposed Pipeline
Chevron Pipeline
Caprock Wells
Drinking Water Wells of Concern
HECO Facility
Ewa-Kunia Aquifer
Malakolo Aquifer
Puuloa Aquifer
Waipahu-Waiawa Aquifer
Kapolei Aquifer
Waimalu Aquifer
Prepared For:
Hawaiian Electric Company, Inc
Prepared By:
Source:
State of Hawaii GIS
Tom Nance Water Resource Engineering, Inc
USGS Quandrangle Maps: Ewa, Schofield, Waipahu, Pearl Harbor; 2000 Editions
Figure 3-4:
Groundwater Aquifers and Nearest Active Wells to the Fuel Pipeline Route
Waiau Fuel Pipeline Project

The most recent comprehensive stream surveys conducted within the HECO pipeline alignment are those of Englund (1993) and Englund, et al. (2000). Previous studies include those of Ford (1985), Timbol and Maciolek (1978), and US Fish and Wildlife Service (1975). Higashi (2001) knew of no recent studies within the project area conducted by the State of Hawaii Division of Aquatic Resources.

A comprehensive list of aquatic macrofauna found within the lower reaches of influent streams to West Loch Pearl Harbor appears in *Appendix C: Stream and Wetland Records for Invertebrates and Fishes Collected or Observed in Pearl Harbor, Legacy Project Surveys of Freshwater and Estuarine Habitats* by Englund, et al. (2000). These investigators recorded a total of 329 species in 14 phyla from the "estuarine and riparian habitats of Pearl Harbor", of which 21% were native to Hawaii and 60% were introduced species. Of these, 192 species were aquatic macrofauna other than insects. As Timbol and Maciolek (1978) reported finding these Pearl Harbor streams to be dominated by introduced aquatic species, so too did Englund, et al. (2000) find similar results within area wetlands, streams, and estuaries. They estimated that about 47% of the aquatic species found within the area were introduced, while only 33% of aquatic species found within the area were endemic and indigenous to Hawaii (the origin of the remaining 19% could not be determined).

The most predominant group of aquatic animals found within the area was insect species, of which 79% were aquatic flies, followed by dragonflies and damselflies (8%), aquatic beetles (6.6%), and the true bugs (5.5%). Insects ranged from a low count of two species at the Waiawa Unit of the Pearl Harbor National Wildlife Refuge (due to limited sampling time) to a high count of nearly 30 species within the terminal reaches of Honouliuli, Waiawa and Waimalu Streams, and the Waiau and Waiawa Springs (Englund, et al. 2000). ~~As discussed in Section 3.4, several perennial and intermittent streams and several small dry gulches discharge into the harbor. The lower reaches of Pearl Harbor streams, springs, and wetlands overlay oyster beds, reefs, and mud deposits eroded from the Ko'olau and Wai'anae Mountain ranges (Coles, et al. 1999). Coles, et al. (1999) contains a comprehensive list of aquatic macrofauna found within the lower reaches of influent streams to West Loch Pearl Harbor. These investigators recorded a total of 329 species in 14 phyla from the "estuarine and riparian habitats of Pearl Harbor". Nearly three fifths of the species listed in Coles were aquatic macrofauna other than insects.~~

~~Coles, et al. (1999) reported that just over 20 percent of the aquatic species identified are native to Hawai'i and 60 percent are introduced species (the origin of 20 percent is unknown). These findings are similar to the results reported two decades earlier by Timbol and Maciolek (1978), who also reported finding these Pearl Harbor streams to be dominated by introduced aquatic species. Timbol and Maciolek estimated that at the time of their survey about 47% of the aquatic species found within the area were introduced, while only 33% of aquatic species found within the area were endemic and indigenous to Hawai'i (the origin of the remaining 19% could not be determined).~~

3.6.1.2 Saltwater Aquatic Communities

There are reports that Pearl Harbor had great abundance of fish and shellfish prior to the Twentieth Century. The area was clearly important to Hawaiian culture, as evidenced by the numerous fishponds formerly present along its shores (Coles et al. 1997). Handy and Handy (1972) state that the harbor "*...offered the most favorable locality in all the Hawaiian Islands for the building of fish ponds and fish traps into which deep sea fish came on the inflow of tidal water...*". They further note that the harbor's many bays "*...provided a greater variety and abundance of edible shellfish, and were the summer home of mullet.*"

Biological collections from Pearl Harbor commenced at the turn of the century, but it was not until the work by Evans (1974) and the more recent efforts by Coles et al. (1997) that representative collections have been adequately documented. Coles et al. (1997) listed 434 taxa (36 algae, 1 spermatophyte, 338 invertebrates and 59 fish) collected from 15 stations in the harbor. In total, 394 of these taxa were from fouling communities (i.e., communities present on hard surfaces), sediment

samples, or fish observations; the remaining 40 taxa were exclusively from sediment samples. Evans (1974) listed 388 taxa (23 algae, 278 invertebrate and 87 fish) collected or seen in the 1971-73 period. Grovhoug (1992) reported 130 taxa (79 invertebrate and 51 fish) from the harbor. Brock (1994, 1999) found 96 and 99 taxa from six stations sampled in East Loch.

3.6.2 TERRESTRIAL AND AVIAN BIOTA

Before modern developments transformed this dry, leeward area, it consisted of a wide-open savanna, where large expanses of native grasses, such as *pili (Heteropogon contortus)* and *emoloa (Erogrostit paupera)* were punctuated by stands of shrubs and trees. These included *ko'ola (Abutilon incanum), 'akoko (Euphorbia skottsbergii), wiliwili (Erythrina sandwicensis)*, and *aulu (Sapindus oahuensis)* along the intermittent streambeds and other low-lying areas. Animal life included the Polynesian rat *(Rattus exulans)*, feral pigs, and a few native bird species.

Currently, the landscape is dominated by suburban developments and fallow fields left over from sugarcane production (City & County of Honolulu 2000). Plant communities in the 'Ewa Plain are dominated by introduced species such as *kiawe (Prosopis pallida), koa haole (Leucaena leucocephala),* and *swollen-finger grass (Chloris inflata).* Animal life consists primarily of non-native pests, pets, and introduced bird species.

The Pearl Harbor estuary ecosystem is a low-energy system generally protected from ocean waves. Except during major storm events, it is characterized by slow moving stream-water inputs and gentle tidal mixing of fresh and ocean waters. The flora includes mostly introduced species, such as pickleweed *(Basis maritima),* Indian pluchea *(Pluchea indica),* and American mangroves *(Rhizophora mangle).*

Rare, isolated patches of endangered Hawaiian plants such as *ko'oloa'ula (Abutilon menziesii)* and *'ihi'ihilaukea (Marsilea villosa)* have been documented in the region (Hawai'i Natural Heritage Program 1999). However, the results of the botanical survey that was conducted as part of this assessment indicate that none are present within the area that would be affected by pipeline construction and maintenance (see Section 4.6.2).

Though the natural habitats in the area have been seriously compromised due to the agricultural, industrial, and suburban development of O'ahu during the Nineteenth and Twentieth centuries, viable estuarine animal communities are still present and host native Hawaiian waterbirds, such as the Hawaiian Duck, or ~~Kōloa~~ koloa maoli *(Anas wyvilliana),* the Hawaiian Coot, or 'alae ke'oke'o *(Fulica alai),* the ~~Hawaiian Stilt~~Black-Necked Stilt, or ae'o *(Himantopus mexicanus knudsenind),* and the ~~Hawaiian~~ Common Moorhen, or 'alae'ula *(Gallinula chloropus sandvicensis).* The proposed and Chevron pipeline routes are close to several areas that are used by these waterbirds. The State of Hawai'i endangered Hawaiian owl, the pueo *(Asio flammeus sandwichensis),* may also occur in this region, although none were seen during the field survey that was conducted. Endemic Hawaiian fish, such as the Hawaiian goby, or *o'opu nakea (Awaous stamineus)* and the Hawaiian anchovy *(Encrasicholina purpurea)* may occur in the area.

3.6.3 URBAN HONOLULU

The Iwilei Tank Farm is near the waterfront of Honolulu Harbor in a completely industrialized area. No substantial natural flora and fauna communities exist at or near the facility.

3.7 NOISE

Existing ambient noise levels vary greatly from place to place along the pipeline corridors and the roadways that would be used by fuel trucks that are part of Alternatives 1 and 3. Almost all of the variation in the areas of concern here is related to differences in traffic noise, with the primary determinant being proximity to heavily traveled roadways and the traffic load. Other identifiable

noise sources that cause localized differences in ambient noise levels include industrial machinery, traffic on local roads, aircraft, birds, and wind in the foliage.

Similarly, the resources that could potentially be affected by noise vary significantly in these areas, from busy industrial sites and thoroughfares that would be relatively insensitive to new sources of noise to relatively quiet residential neighborhoods and shoreline areas along Pearl Harbor where new sources would be clearly noticeable.

The three Action Alternatives have the potential for adding to the levels of noise in their surrounding environments, chiefly through the construction and maintenance activities associated with the pipeline alternatives and the construction and operations phases of the trucking alternative. Section 4.11 presents a comparison of the types of noise that would be generated by these activities and the existing levels along the pipeline and truck routes and examines their potential for impacts on neighboring communities and habitats.

3.8 ARCHAEOLOGICAL, HISTORIC, AND CULTURAL RESOURCES

With one exception, all of the facilities that would be constructed or modified during implementation of the Action Alternatives are located in eight of the *ahupua'a* of the 'Ewa District.[17] The 'Ewa District has hosted native Hawaiian populations for at least 1,000 years; for the most part their activities were concentrated near the shoreline. Portions of the proposed pipeline and the Chevron pipeline are located within the former O'ahu Railroad and Land Company (OR&L) railroad system ROW; the railroad tracks between the communities of 'Ewa and Nānākuli are listed on the Hawai'i Register of Historic Places and on the National Register of Historic Places. A number of prehistoric fishponds buried around the fringes of Pearl Harbor contain materials of archaeological interest, but these are generally at least 8-10 feet below the existing ground surface. A few burials have been encountered during previous excavations along the eastern part of the pipeline route near Leeward Community College. These were unexpected and inadvertent finds and are probably sparse in the area. However, their presence points to the possibility that additional remains might be encountered during pipeline construction. Further information on these historic and archaeological remains is presented as part of the discussion of potential impacts contained in Section 4.8. No traditional native Hawaiian cultural practices, beliefs, and/or properties of any kind were known to exist within the pipeline corridors. Nonetheless, a cultural impact assessment was undertaken as part of the planning effort for the Waiau Pipeline project. The results of this investigation indicated that there is no current or recent use of the project area by native Hawaiian cultural practitioners exercising traditional and customary access and use rights for any purposes. The results also showed that those contacted did not have any direct knowledge of any specific traditional cultural properties located within the project area. The bases for this conclusion are discussed in Section 4.8.

3.9 SCENIC AND AESTHETIC RESOURCES

Generally, the land through which the pipeline routes pass is relatively flat and undistinguished. According to the City and County of Honolulu's island-wide study of coastal views (City & County of Honolulu 1987), the most significant views are of the Waianae Mountains, coastal views of the ocean, and, from the higher elevations, the view across the Malama Bay to Diamond Head. ~~*"'Ewa has never been acclaimed for its scenic qualities and not a single scenic lookout or provision for roadside viewing can be found today within the district."*~~ The City's coastal view study did not identify any significant views near the Iwilei Tank Farm.

[17] The exception is the truck unloading station at Iwilei; it is limited to equipment installation in an existing facility.

3.10 EXISTING LAND USE

3.10.1 GENERAL

Industrial, agricultural, residential, and military uses predominate in the area. Generally, the agricultural uses are being converted to residential uses. The following sections discuss the existing land uses in each area through which fuel transported by one or more of the alternatives would pass. A fuller discussion of the communities may be found in the discussion of community issues presented on Section 4.14 of Chapter 4.

3.10.2 CAMPBELL INDUSTRIAL PARK PIPELINE EASEMENTS

The BPTF and the nearby pipeline routes are in the Campbell Industrial Park (CIP). The CIP contains by far the largest concentration of heavy industrial activities in the State. These include Hawai'i's two petroleum refineries, two large electrical generating plants, the "H-Power" waste-to-energy facility, a cement plant, and many warehousing and baseyard facilities.

3.10.3 STATE ENERGY CORRIDOR

After leaving the Campbell Industrial Park and the Kapolei Business Park, the proposed pipeline route passes through areas used for various commercial activities, such as the Kapolei Shopping Center. It is also near buildings occupied by several government agencies. The route then passes through several residential developments and agricultural lands until it reaches the shoreline along West Loch of Pearl Harbor. The area to the north, *mauka* from Pearl Harbor around West Loch, is presently used for mixed industrial and residential uses. Across the western portion of Waipi'o Peninsula, the SEC passes through Pouhala Marsh, while the alternate OR&L bypass route that HECO has proposed is closer to low-density residential lots. The eastern portion of the route across the Waipi'o Peninsula is just inland of the Ted Makalena Golf Course. As the proposed pipeline route passes to the north of the Middle Loch, it skirts a variety of commercial, residential, and public properties. Notable properties near the route in this area include Waipahu High School, Leeward Community College, and the University of Hawai'i Tropical Agriculture facility.

3.10.4 CHEVRON PIPELINE CORRIDOR

From the intersection of Kalaeloa Boulevard and the former OR&L railroad ROW, the Chevron route follows the rail line eastward. It passes between the communities of Kapolei and 'Ewa Villages on the north and the Barbers Point Naval Air Station to the south. The Kapolei and 'Ewa communities are expanding rapidly onto land that was formerly in agricultural use (primarily for cultivation of sugar cane). The portion of the Barbers Point Naval Air Station that is closest to the Chevron line is used for military housing.

After passing to the south of 'Ewa Village, the route turns north through residential and community business properties on its way to Pearl Harbor. It passes through almost the same properties as the proposed pipeline route around West Loch and the Waipi'o Peninsula, but stays closer to Pearl Harbor and passes through several wetlands areas, including the Pearl Harbor National Wildlife Reserve. It passes next to the Naval Reservation and agricultural lands on the Pearl Harbor Peninsula and then continues through residential and agricultural lands until it reaches the Waiau Generating Station.

The route continues near the shoreline around East Loch until it reaches 'Aiea Bay. It then follows a southerly and then southeastern direction adjacent to Salt Lake Boulevard until the intersection with Radford Drive. The route then passes south and then turns east to parallel Nimitz Highway. It continues parallel to Nimitz Highway for about 3,800 feet and then turns south again, crossing under Nimitz Highway, Koapaka St., Ualena St, and Aolele St. It then turns eastward, continuing parallel to Aolele St. until the intersection with Lagoon Drive. The route crosses under Lagoon Drive, turns south and then southeast to cross under Ke'ehi Lagoon. After the pipeline crosses the lagoon and

comes ashore on the lagoon's eastern side, it turns east and crosses under Sand Island Access Road. It then runs on the south side and parallel to Auiki Street, cuts through the Kapālama Military Reservation and then runs parallel to Nimitz Highway to the pipeline terminus at Iwilei.

3.10.5 WAIAU GENERATING STATION

The *makai* side of the Waiau Generating Station, where fuel receiving facilities needed for The Proposed Action would be constructed, is bordered by agricultural fields and existing HECO fuel storage and generating facilities. The portion of the Waiau Generating Station property that would be used for the fuel truck unloading facilities needed for Alternative 3 adjoins Kamehameha Highway. Mixed residential and commercial uses are present on either side of that roadway and on the other surface streets that would be used by fuel trucks returning to the BPTF.

3.10.6 IWILEI TANK FARM

The Iwilei Tank Farm is located in the industrial area adjacent to Honolulu Harbor. Major uses in the area include other fuel storage and handling facilities, shipping operations associated with the Harbor operations, warehousing, retail business, and other commercial uses. The Nimitz Highway corridor that would be used by trucks traveling to and from the facility contains a mix of commercial uses.

3.11 LAND USE CONTROLS

Except for the wetlands on the Pearl Harbor shoreline (including Pouhala Marsh), all of the areas through which the fuel pipelines pass are in either the Urban or Agricultural State Land Use Districts (see Figure 3-5). The County Zoning designations reflect the general patterns of usage described above for planned communities, ranging from the heavy industrial area of the Campbell Industrial Park to the conservation wetlands around Pearl Harbor (see Figure 3-6).

3.12 LAND OWNERSHIP

3.12.1 BARBERS POINT TANK FARM AND CAMPBELL INDUSTRIAL PARK EASEMENTS

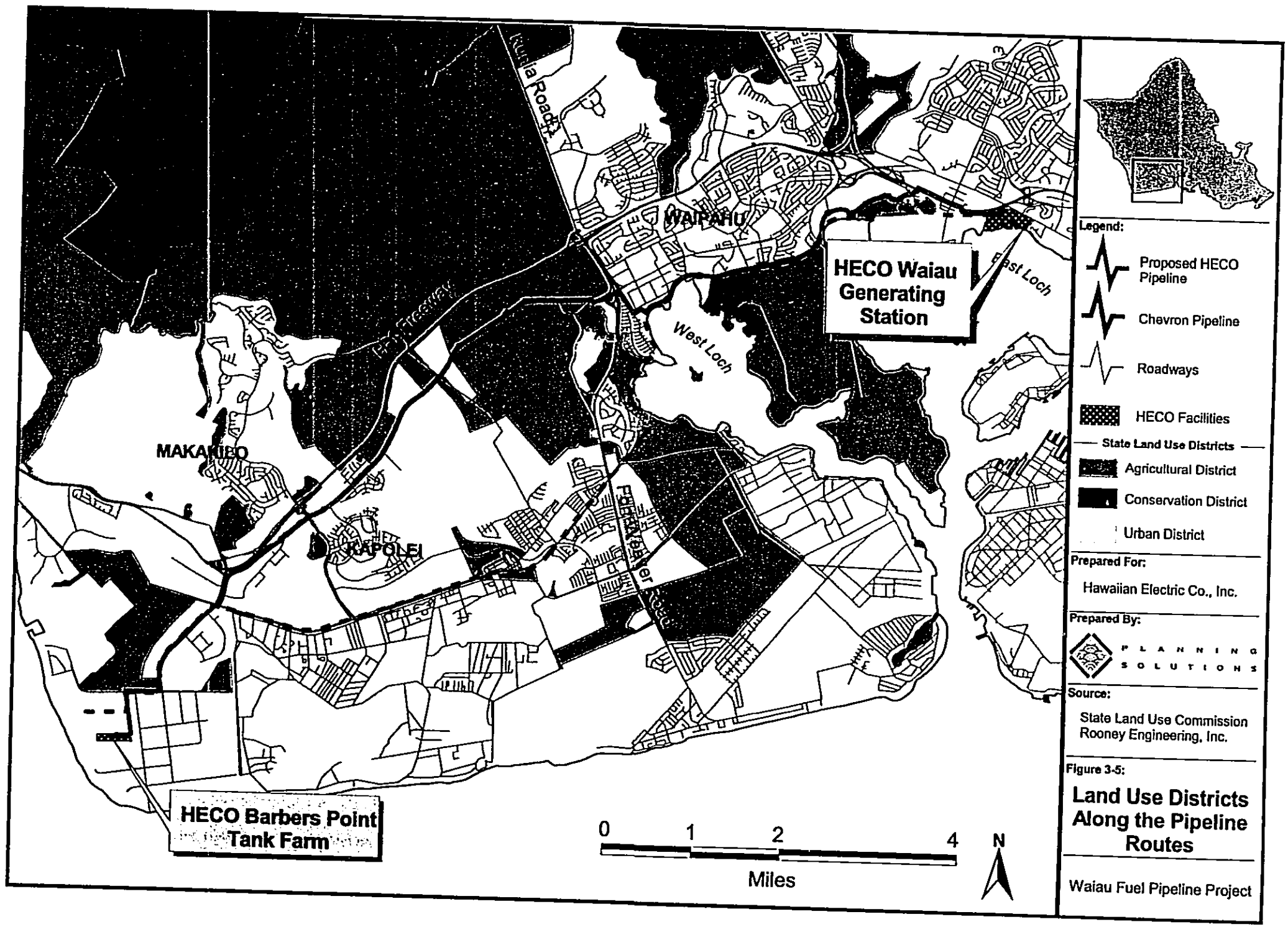
HECO owns the BPTF parcel. The portion of HECO's proposed pipeline route between the BPTF and Malakole Street is within an existing HECO easement across Chevron property. The land on which the first part of the Chevron pipeline is located south of Malakole Street is owned by Chevron USA, Inc. The rest of the pipeline routes along Malakole Street and Kalaeloa Blvd. to the OR&L ROW are within HECO and/or Chevron easements across properties owned by the James Campbell Estate.

3.12.2 STATE ENERGY CORRIDOR

Most of the proposed pipeline corridor through the 'Ewa Plain is adjacent to James Campbell Estate lands and within existing roadways. Along the Pearl Harbor shoreline, the proposed pipeline corridor is mostly in government lands, including parcels owned by the City and County of Honolulu, the State of Hawai'i, and the U.S. government.

3.12.3 CHEVRON PIPELINE CORRIDOR

After the Chevron pipeline route diverges from the proposed pipeline route, it follows the OR&L ROW through the 'Ewa Plain to Pearl Harbor. The parcels along this route are all owned by the State of Hawai'i except for one parcel (TMK 9-10-17-008) near the Harbor that is owned by the United States of America. Just before converging with the proposed pipeline corridor route along the West Loch shoreline, the Chevron route passes through one privately owned parcel (TMK 9-40-48-001). Beyond the Waiau Generating Station the corridor passes through areas that are used for a wide variety of purposes. This report does not include a detailed examination of these sections of the pipeline.


Kunia Road
H-1 Freeway
WAIPAHU
HECO Waiau Generating Station
West Loch
West Loch
MAKAKILO
KAPOLEI
Fort Weaver Road
HECO Barbers Point Tank Farm
0 1 2 4
Miles
N
Legend:
Proposed HECO Pipeline
Chevron Pipeline
Roadways
HECO Facilities
State Land Use Districts
Agricultural District
Conservation District
Urban District
Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
PLANNING SOLUTIONS
Source:
State Land Use Commission
Rooney Engineering, Inc.
Figure 3-5:
Land Use Districts Along the Pipeline Routes
Waiau Fuel Pipeline Project

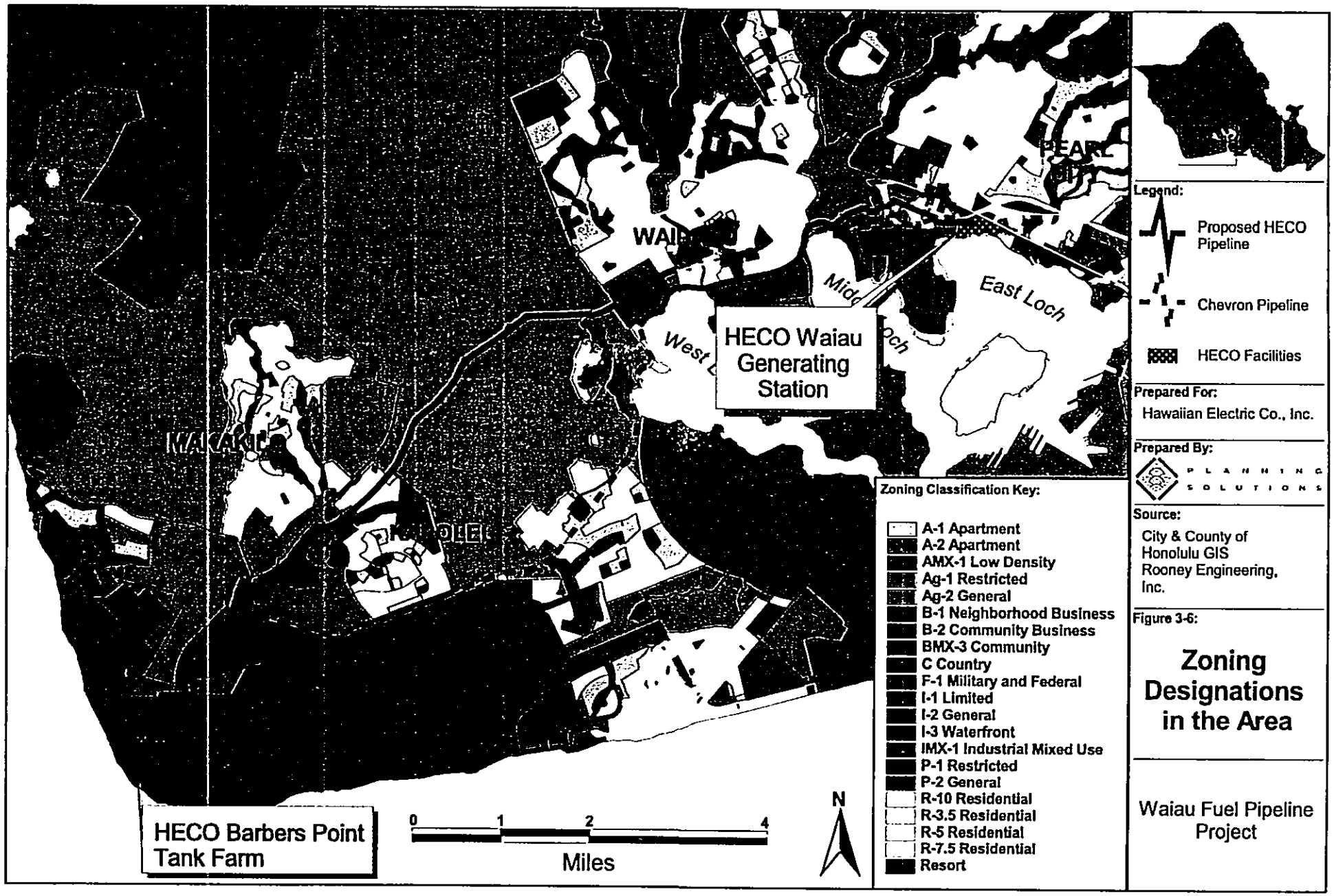


Figure 3-6:

Zoning Designations in the Area

Waiau Fuel Pipeline Project

3.12.4 WAIAU GENERATING STATION AND IWILEI TANK FARM

These properties are owned by HECO.

3.13 INFRASTRUCTURE

3.13.1 TRANSPORTATION CORRIDORS

The facilities that would be constructed or modified by the Action Alternatives are all accessible from existing public or private roads. The major facilities, including the BPTF, the Waiau Generating Station, and the Iwilei Tank Farm, have established access roads. As discussed above, access to the pipeline and to pipeline support facilities (e.g., valves) along the pipeline routes would be accomplished using existing roadways.

The pipeline corridors are generally located along roadway corridors. Exceptions occur along the shoreline area of Pearl Harbor and where the Chevron pipeline route crosses the 'Ewa Plain along the former OR&L ROW. Major roads that could be affected by construction activities associated with the Action Alternatives include Kalaeloa Boulevard, access roads to the H-1 Freeway (particularly the on-ramp from Kalaeloa Boulevard), Farrington Highway, and Fort Weaver Road. Roadways that would be affected by construction of pipeline crossings along the proposed pipeline route are shown in Figure 2-17. Maintenance or replacement of portions of the Chevron pipeline could affect these major roads (except for the H-1 Freeway) and potentially other roads along the pipeline route.

3.13.2 ELECTRICAL, COMMUNICATION, WATER, SEWER & STORMWATER SYSTEMS

A major concern in the installation, maintenance, or replacement of the fuel pipeline would be the existence of buried electrical and communication lines, water pipelines, and sewer and stormwater lines along the routes. This would be particularly important in the newer residential and community business districts where most of the utilities are underground. Close coordination with appropriate utilities will be necessary to ensure the accurate location of such buried utilities and efficient management of potential service interruptions.

4.0 POTENTIAL IMPACTS

Continuing to provide the fuel needed to operate the Waiau Generating Station involves the transport of large quantities of Low Sulfur Fuel Oil (LSFO) from HECO's Barbers Point Tank Farm (BPTF) to the Pearl City Peninsula. This chapter describes the anticipated environmental impacts associated with each of the three "Action Alternatives" described in Chapter 2. Chapter 5 discusses the impacts of the "No Action" Alternative. The most salient aspects of the three Action Alternatives examined in this chapter are as follows:

Proposed Action (Alternative 1) includes construction of a new pipeline and related facilities; most of the pipeline would be located within the SEC. Pipeline installation involves excavation, pipe-laying, as well as other construction work, equipment installation, and testing. As with the existing Chevron pipeline, operation of the new pipeline system would involve ongoing inspection, maintenance, and the movement of petroleum products over long distances. Alternative 1 also includes the truck transport of fuel from the Barbers Point Tank Farm to the existing Iwilei storage facility (see Section 2.1.7) to replace the existing fuel transport by the Chevron pipeline.

Alternative 2 consists of HECO continuing to contract with Chevron for the continued use of its 8-inch black oil line and related facilities beyond December 2004. It involves less initial construction, but more ongoing pipe repair and replacement, than the proposed Waiau Fuel Pipeline. The two alternatives involve essentially the same kinds of activities, albeit in differing locations along some portions of the corridor (see Figure 3-2). HECO and Chevron have not negotiated a new contract that would allow HECO to implement Alternative 2. This report's treatment of this as a potentially viable alternative is based on informal discussions between the two companies. It is possible that the contract could not be consummated to both parties' satisfaction.

Alternative 3 consists of the use of trucks, rather than a pipeline, to carry fuel from the BPTF to the Waiau Generating Station. The Iwilei Tank Farm would be supplied using the same truck transport system as would be used for Alternative 1. Alternative 3 would limit new construction to existing HECO properties (the BPTF, Waiau Generating Station, and Iwilei Tank Farm). However, it would require much more fuel-truck traffic on public roadways than the other alternatives.

This chapter is divided into fourteen major sections, each dealing with a particular aspect of the environment e.g., air quality, surface water quality, flora, etc. Each of the alternatives is addressed separately within these sections, facilitating comparison of their potential effects.

4.1 IMPACTS ON TOPOGRAPHY, GEOLOGY, AND SOILS

4.1.1 PROPOSED ACTION (ALTERNATIVE 1)

4.1.1.1 Barbers Point Tank Farm

4.1.1.1.1 Construction

As described in Section 0, HECO would have to modify the BPTF to accommodate the new pipeline. Required changes include installation of new pumping, heating, control, storage and truck-loading systems and installation of a 10,000 Barrels diesel fuel storage tank. All of these improvements would be made within the existing HECO property (see Figure 2-7) and on land that has already been extensively disturbed and graded. No substantial impacts to the existing topography, geology, or soils would be anticipated from construction of these improvements.

4.1.1.1.2 Operation

Normal operations at the BPTF do not involve activities that have the potential to adversely affect topography, geology, or soils.[18]

[18] If oil were spilled onto the ground, it would be dealt with in accordance with the *Oil Spill Contingency Plan* for the facility (HECO 2002) as well as the existing *Spill Prevention Control and Countermeasure Plans* (SPCC Plans), pursuant

4.1.1.2 Waiau Generating Station

4.1.1.2.1 Construction

As described in Section 0, HECO would install an Operations Control Center and metering and pig-receiving system and would modify the existing aboveground fuel line to accommodate the new pipeline. All of these improvements would be made within the existing boundaries of the Generating Station. The land is already graded and extensively disturbed, and no modification to the existing topography, geology, or soils would be anticipated.

4.1.1.2.2 Operation

Normal operations at the Waiau Facility would not impact the area topography, geology, or soils. The provisions response in the event of a spill are the same as those at the Barbers Point Tank Farm.

4.1.1.3 Iwilei Tank Farm and Trucking Fuel from BPTF to Iwilei

4.1.1.3.1 Construction

As described in Section 2.1.7, the existing Iwilei Fuel Storage Facility would have to be modified to accommodate loading and unloading of fuel trucks that would provide the fuel supply for the Honolulu Generating Station. Because these modifications would not include the alteration of any unimproved land, no substantial impacts to the topography, geology, or soils would be anticipated. Similarly, normal trucking operations would not impact these resources, since they would take place exclusively on existing paved roadways.

4.1.1.3.2 Operation

Normal operations at the Iwilei Facility would not impact the area topography, geology, or soils. The provisions for response in the event of a spill are the same as those at the Barbers Point Tank Farm.

4.1.1.4 Waiau Fuel Pipeline

4.1.1.4.1 Construction

As discussed in Sections 2.1.8, 2.1.9, and 2.1.10 construction of the pipeline and its in-line valves involves clearing and grading, ditching, pipe handling, and backfilling. HECO estimates that, approximately 3,000 – 5,000 cubic yards of excavated material would not be returned to the place from which it is taken. In agricultural and other open areas where it is feasible, this excess material would be spread as a thin layer on nearby vacant land. Where it is not possible to return the material to adjacent areas the contractor would arrange with other land owners for permission to deposit the material on their property and would truck it from its point of origin to those locations. If potentially contaminated material is encountered during the course of excavation, the contractor would cease work in the area and respond in accordance with Federal and State regulations (e.g., HAR §11-451-5).

In all areas, restoration would follow pipeline construction, beginning with the disposal of debris and the restoration of normal contour and surface soils. Surface contouring and water control structures would be used as diversions to concentrate and/or channel surface-water flow and prevent soil erosion. Disturbed areas would be re-vegetated or seeded. Re-vegetation would utilize plant species that conform to adjacent land use/vegetative cover type. Restoration of the pipeline route where it crosses open cuts of a stream would emphasize stream-bank stabilization. This stabilization could involve mulches, seeding of seedlings, runoff diversion structures, and/or riprap in conformance with applicable permits and other requirements. Temporary access roads, staging and assembly areas, and other temporary installation support areas would be restored in a manner similar to the pipeline route itself. These mitigation measures would prevent substantial construction impacts to topography, geology, or soils.

to Federal regulations (specifically, 40 CFR 112 and 49 CFR 195). The response and remediation procedures included in these plans provide for the removal and proper disposition of contaminated soil. The same guidance would be followed when and if oil were spilled onto the ground elsewhere in the system.

4.1.1.4.2 Operation

Normal operation of the pipeline would have no impacts on the topography, geology, or soils of the area. The provisions for response in the event of a spill are the same as those at the Barbers Point Tank Farm.

4.1.1.5 Pipeline Decommissioning

As discussed in Section 2.1.15.2, when the useful life of the pipeline is completed, the system would be drained and cleaned and then either abandoned in place or removed. Abandonment in place would completely avoid impacts to topography, geology or soils. Removal involves the same types of construction and restoration activities as the initial pipeline construction. These do not have the potential to cause substantial impacts to topography, geology or soils.

4.1.2 ALTERNATIVE 2: CHEVRON PIPELINE

4.1.2.1 Chevron Pipeline Maintenance

As discussed in Section 2.2.3, Chevron has an active pipeline maintenance program. Alternative 2 assumes that these activities will continue at levels needed to meet applicable pipeline regulations. The maintenance activities may eventually result in all original pipe in the Chevron system between the BPTF and the Iwilei Tank Farm being replaced with new pipe, but this would occur only if Chevron deemed it appropriate. When replacing sections of the pipeline, Chevron is required to use proper in-place support and backfill, consistent with Federal regulations (49 CFR 195). Chevron also restores and replants backfilled sections, as required by the terms of its easements. No substantial impacts to the topography, geology or soils would be anticipated from the continuation of these maintenance activities.

4.1.2.2 Chevron Pipeline Operation

Normal operation of the pipeline would have no impacts on the topography, geology, or soils of the area. Chevron has an in-place response plan, which is consistent with applicable Federal regulations (49 CFR 195). If an oil spill were to occur, Chevron plans to mitigate the effects on these resources by rapid response to the spill in accordance with State and Federal regulations. For these reasons, no substantial impacts on topography, geology, or soils would be anticipated.

4.1.2.3 Chevron Pipeline Decommissioning

Chevron is required to take adequate precautions when the pipeline is taken out of service to mitigate or eliminate potential impacts. The line would be purged of oil and displaced with water and then either abandoned in place or removed. Regulations require that any spilled oil or soil that is contaminated by the operation be cleaned up or removed and disposed of properly [49 CFR 195.402(c) (10)]. No substantial impacts on topography, geology, or soils are anticipated.

4.1.3 ALTERNATIVE 3: TRUCKING

4.1.3.1 Construction

Installation of the truck loading and unloading facilities at the BPTF, the Waiau Generating Station, and the Iwilei Tank Farm would involve minor modification of the existing surfaces (see Figure 2-23 and Figure 2-24). This alternative would also include the modifications to the Iwilei Storage Facility, discussed in Section 4.1.1.3. This work would take place on areas that have already been graded and extensively disturbed in the past. It would not have a substantial impact on topography, geology, or soils.

4.1.3.2 Operation

No impacts to these resources would take place during normal trucking operations, which would be confined to existing roads and paved access driveways. The response to an oil spill, should one occur as a result of a trucking accident, would be handled in accordance with applicable State and Federal

guidelines and regulations. The volume of the spill would be limited to the truck capacity, which is equal to or less than the capacity of tanker trucks now used on island roadways to transport gasoline, diesel oil, and other petroleum products. For these reasons, no substantial impacts on topography, geology, or soils would be anticipated.

4.2 IMPACTS ON AIR QUALITY

Operation of a sealed pipeline moving viscous, low-volatility LSFO or trucking of the quantities of LSFO required to supply the Waiau and Iwilei Generating Stations are not significant, long-term sources of air emissions. Consequently, the principal air quality impacts associated with the proposed project are temporary and short-term and include: (i) emissions resulting from pipeline construction activities and (ii) emissions arising from the release of fuel oil as a result of a pipeline rupture or an in-transit truck accident.

The existing air quality and ambient air quality standards relevant to the consideration of potential air quality effects are summarized in Section 3.3. The remainder of this section builds on that material to address the potential air quality implications of each of the three "Action Alternatives" under consideration. The discussion is divided into three parts:

- Section 4.2.1 discuses relevant meteorological factors.
- Section 4.2.2 addresses the effects that pipeline construction could have on ambient air quality.
- Section 4.2.3 discusses the air quality implications of a pipeline accident leading to a spill.

4.2.1 RELEVANT METEOROLOGICAL FACTORS

As noted in Section 3.3, the northeast trade winds predominate in the project area. Climatic norms, means and extremes for Honolulu are shown in Table 4-1. These data are *reasonably representative* of the project area with only rainfall demonstrating a wider range (<20 - 30+ inches per year) as one moves inland from the leeward coast. Analysis of the monthly temperature and rainfall data from the National Weather Service station at Honolulu International Airport in accordance with Thornwaite's scheme for climatic classification yields a precipitation/evaporation (P/E) index of 26.6; this places it in the "semi-arid" category.

Meteorological data from the Honolulu International Airport and Hickam Air Force Base show the annual prevalence of northeast trade winds; they also show that wind velocities of less than 10 miles per hour occur frequently and that the normal northeasterly trade winds are frequently replaced by light, variable wind conditions through during the winter and early spring. Honolulu generally experiences its highest pollutant levels during these times. The stability wind roses prepared for Hickam Air Force Base are of particular interest from an air pollution standpoint. These data indicate that stable conditions, i.e., Pasquill-Gifford stability categories E and F, occur about 28 percent of the time on an annual basis and 36 percent of the time during the peak winter month (January). It is under such conditions that the greatest potential for air pollutant buildup from ground level sources exists.

Table 4-1. Climatic Norms, Means and Extremes: Honolulu International Airport

Parameter	Descriptor	Value
Temperature (deg F)	Daily maximum	84.4
	Daily minimum	70.0
	Annual mean	77.2
Precipitation (inches)	Maximum monthly	20.91
	Minimum monthly	trace
	Annual mean	22.02
Humidity (%)	Normal	68
Wind Speed (mph)	Mean	11.4
Sunshine	Percent of possible	71
Sky cover (mean # days)	Clear	90.0
	Partly cloudy	179.8
	Cloudy	92.0
Sources: National Climatic Data Center (NCDC); Western Regional Climatic Center		

4.2.2 POTENTIAL CONSTRUCTION IMPACTS: PIPELINE ALTERNATIVES (1 AND 2)

The principal source of short-term air quality impact will be construction activity. Emissions would be generated by the various construction equipment engines as they operate during the various phases of site preparation, pipe installation, and site cleanup and restoration. The same kinds of construction equipment are expected to be used for pipeline construction and pipeline maintenance/pipe replacement (i.e., for Alternatives 1 and 2). Items include loaders, excavators, bulldozers, graders, backhoes, drill rigs, trucks, welding units, etc. Based on the expected construction period to complete the 13-mile pipeline, estimates of regulated pollutant emissions were generated and are presented in Table 4-2. For comparative purposes, the table includes the estimated emissions from one day of traffic along a 1-mile segment of the H-1 Freeway.

Potential ambient air quality impacts were analyzed using the U.S. Environmental Protection Agency's (EPA) guideline dispersion model ISC-3 and one year of National Weather Service data from the Honolulu International Airport preprocessed for the model's input. Because the equipment would not remain at a single site for an extended period of time but rather would continue to move to new locations as pipe segments are installed, only short-term, i.e., 1, 3, 8, and 24-hour ambient air quality standards were considered.

The site clearing, trenching and backfilling activities would generate particulate matter (PM) emissions as would construction vehicle movement on unpaved on-site areas. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and a precipitation/ evaporation (P/E) index of 50. EPA also estimates that 50 percent control of fugitive dust can be achieved by twice daily watering of the construction area. Using this PM generation rate and assuming a minimum of 50 percent dust control, the previously cited ISC-3 model was used to estimate ambient particulate matter concentrations.

The results of these analyses are presented in Table 4-3. They indicate that the work would not cause an exceedance of ambient air quality standards.

Table 4-2. Pipeline Construction Emissions vs. H-1 Freeway Emissions

Pollutant	*Pipeline Construction Equipment (T/day)*	*1 Mile Segment H-1 Freeway (Tons/day)*
NOx	0.2	181
CO	0.09	2,432
SO_2	0.02	n/a
HC	0.02	5.2
Source: J.W. Morrow, March 2002		

Table 4-3. Estimates of Ambient Air Quality Impacts of Pipeline Construction

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Ambient Air Quality Standard ($\mu g/m^3$)
CO	1-hr	8,800	10,000
	8-hr	1,100	5,000
SO_2	3-hr	702	1,300
	24-hr	104	365
PM_{10}	24-hr	71	150
Source: J.W. Morrow, March 2002			

4.2.3 AIR QUALITY IMPACTS: PIPELINE OR FUEL TRUCK ACCIDENT

As noted in the introduction to this section, there is no potential for significant emissions or long-term air quality impact from normal operation of the fuel pipeline, and fuel truck emissions constitute a tiny percent of total emissions by vehicles using the roads that these trucks would use. Consequently, normal fuel delivery operations do not have the potential to significantly affect air quality.

In the event of an accidental rupture of the pipeline or collision involving a fully loaded tank truck, there would be a release of oil and potential air quality impacts due to the evaporation or burning of gasoline from another vehicle involved in an accident with the fuel delivery truck. For the purpose of this air quality impact analysis, three accident scenarios were identified and evaluated.

- Pipeline rupture during routine operation resulting in release of 718 barrels of low sulfur fuel oil (LSFO).
- Pipeline rupture during periodic inspection of the pipeline resulting in the release of 718 barrels of No. 2 fuel oil (diesel).
- A tanker truck accident resulting in release of 140 barrels of LSFO, 60 gallons of diesel fuel, and a small amount of gasoline.

4.2.3.1 Estimated Release into the Atmosphere

4.2.3.1.1 Release of LSFO from Pipeline

LSFO is a very viscous residual oil. It would be heated to approximately 165° F at the BPTF in order to arrive at the Waiau Generating Station while still relatively fluid. Because it is a residual

petroleum product, most volatile organic compounds (VOC) have been distilled off in the refining process; only an extremely small percentage of volatiles is left behind. Upon the accidental release of 718 bbl of LSFO, the oil would immediately start to cool and solidify.[19] Equally important, clean-up crews would recover a substantial portion of the spilled oil into tanker trucks before it has a chance to volatilize and escape into the atmosphere. After all factors are considered, it is expected that approximately 550 gallons would evaporate and that this would occur over a period of 24 hours.

4.2.3.1.2 Release of Diesel (No. 2 Fuel Oil) from Pipeline

No. 2 Fuel Oil is not considered a highly volatile petroleum product. However, it does contain substantially more volatile components than does LSFO. Because of this, the same size release (718 barrels) of diesel would result in substantially more evaporation (nearly 9,000 gallons evaporated in the first 24 hours).

4.2.3.1.3 Release of LSFO from Fuel Truck Accident

The amount of LSFO that could evaporate in the event of a truck accident is too small to be of consequence from an air quality standpoint. LSFO and No. 2 diesel oil are very difficult to ignite, and this is not a reasonable possibility with a pipeline spill. However, in the case of a fuel truck, it is conceivable, but unlikely, that an accident with another vehicle could lead to the ignition of the other vehicle's gasoline and that this in turn could ignite the diesel and LSFO in the tank truck. Emissions generated by the fire were estimated based on EPA factors for external combustion of residual and distillate fuels. The estimates assumed that the fire would continue for one hour before being brought under control by fire fighters and that ten percent of the LSFO (600 gallons) and 60 gallons of diesel fuel would be completely burned during that hour.

4.2.3.2 Ambient Air Quality Impacts

The ISC-3 model was used along with one year of airport weather data to evaluate ambient VOC concentrations in the area surrounding the hypothetical spills. The results of the analysis are summarized below. The extensive tables and graphical plots on which the conclusions are based are reproduced in Appendix A.

- The estimated VOC concentrations for the LSFO spill all were well below the "no observable adverse effect level" (NOAEL) reported by the U. S. Department of Health and Human Services for fuel oil vapors. The reported NOAELs ranged from 65 to 1,500 mg/m^3. Other studies determined "lowest observable adverse effect level" (LOAEL) in virtually this same concentration range, but it is important to note that these animal studies involved exposures ranging from 5 to 90 days, a situation which would not occur with a pipeline rupture incident. In the case of a spill, it is also probable that some individuals at downwind locations may notice hydrocarbon odors particularly during the first few hours after the spill.
- In the case of the diesel oil spill, the estimated VOC concentrations were somewhat higher but still well below the reported NOAELs and LOAELs except in the immediate vicinity of the spill during the maximum 1- and 8-hour exposure scenarios. This suggests that the risk of adverse health effects would be greatest for the workers involved in cleaning up the spill. The National Institutes of Occupational Safety and Health (NIOSH) recommendation for petroleum distillates is 350 mg/m^3 as an 8-hour time-weighted average (TWA) and only at the spill itself might VOC concentrations approach such a level and then only as a 1-hour maximum. The Occupational Safety and Health Administration (OSHA) has a substantially less stringent 8-hour standard of

[19] The spill volume at any point along the pipeline depends on the topography and distance to the nearest block valves. The maximum occurs at a topographic depression between the first and second block valves (see Figure 2-6). 718 barrels represents the maximum volume of petroleum product that HECO estimates could escape from the pipe if a catastrophic break were to occur. This volume is used as the reasonable worst case (RWC) for impact analysis in terrestrial environments. However, a spill from this section of the pipeline would not reach aquatic resources in Pearl Harbor or streams. Consequently, the RWC volume used for the aquatic impact analysis is 137 barrels. This is the amount at the location that has the greatest potential for discharging oil into streams or Pearl Harbor. It would occur as the result of a release between the sixth block valve and the Waiau Generating Station.

2,000 mg/m^3 which is an order of magnitude greater than any of the maximum concentrations predicted in this analysis. Due to its greater volatility and resulting higher ambient concentrations, a diesel oil spill might result in noticeable hydrocarbon odors at greater distances than in the case of the LSFO spill. All of these numbers should be considered in the context of the extremely low probability that they might occur. Diesel fuel would be present in the pipeline only during pipeline inspections that would be conducted once a 3-year period; thus, assuming that such an accident occurred at all, the probability of the worst case 1-hour concentrations occurring is 1 in 26,280 or 0.0038%.

- The tank truck accident presents a somewhat different situation in terms of potential air quality and health effects in that it deals with products of combustion rather than simply evaporating hydrocarbons. SO_2, NO_2, and PM_{10} concentrations would be high in the smoke plume from the burning fuel oils; since they are all pulmonary irritants, some irritation may be experienced by individuals in the path of the plume for a considerable distance from the accident scene. People downwind of the fire would detect it odor as well. CO levels do not appear high enough to suggest any adverse health effects. VOC's would be a mix of unburned fuel vapors and a variety of hydrocarbons generated by partial combustion of the fuel oils. The concentrations of hazardous air pollutants, such as benzene, and ethylbenzene, are sufficiently low and short-lived so as not to present a significant health risk.

4.3 IMPACTS ON SURFACE WATER

4.3.1 APPLICABLE WATER QUALITY STANDARDS

4.3.1.1 Classification of State Waters

Hawai'i Administrative Rules, Title 11, Chapter 54 (HAR 11-54) establishes water quality standards for the State. The regulations categorize all State waters as either marine or inland. All waters that could be affected by the Action Alternatives being considered are classified as "Inland Waters" (HAR §11-54-02(b)(1); none are "Marine Waters".

The regulations make distinctions between different categories of Inland Waters and, based on those distinctions, establish "uses to be protected" and specific water quality criteria. The latter include both "basic water quality criteria" that are applicable to all waters and "specific criteria" that are applicable to each different category of water depending upon the use that is to be protected in a given circumstance. The Inland Waters between the BPTF and Waiau Generating Station that have the potential for being impacted by Alternative 1 or Alternative 2 are listed Table 4-4.

Existing Classification of Area Streams. All except two of the stream segments crossed by the proposed HECO or existing Chevron pipeline are designated Class 2. The objective of the standards for Class 2 waters is to protect their use for recreational purposes, for the support and propagation of aquatic life, as a source of agricultural and industrial water supply, and for shipping and navigation. The uses to be protected in Class 2 waters are "*all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters.*" HAR §11-54 require that discharges into Class 2 waters receive the best degree of treatment or control compatible with the criteria established for this class. It also bans most new industrial discharges within estuaries.

The only two stream segments crossed by the pipelines that comprise Alternatives 1 and 2 that are not Class 2 are the lower reaches of Kapakahi Stream and the lower reaches of Waikele Stream. Both of these are designated Class 1b. The uses to be protected in class 1b waters are: "*domestic water supplies, food processing, protection of native breeding stock, the support and propagation of aquatic life, baseline references from which human-caused changes can be measured, scientific and educational purposes, compatible recreation, and aesthetic enjoyment.*"

Table 4-4. Inland Waters between BPTF and Waiau Potentially Impacted by Alternative 1 or Alternative 2

Category	*HAR Section*	*Water Body to which Applicable**
Fresh water, Flowing Waters (Stream, Perennial and intermittent):	§11-54-02(b)(1)(A)(i)	Honouliuli Stream (2) Waikele Stream (2) Kapakahi Stream (2) Waiawa Stream (1, 2)
Fresh water, Flowing Waters Flowing springs and seeps	§11-54-02(b)(1)(A)(ii)	Kaluao'opu Spring (1,2)
Fresh water, Wetlands Low wetlands	§11-54-02(b)(1)(C)(ii)	Watercress farms at Waiau (1,2)
Brackish or saline water Coastal wetland	§11-54-02(b)(2)(B)(ii)	Pouhala Marsh (1,2)
Brackish or saline water Natural estuaries	§11-54-02(b)(2)(C)(i)	Pearl Harbor (1,2)
Brackish or saline water Developed estuaries	§11-54-02(b)(2)(C)(ii)	Hō'ae'ae Storm Canal (2) Unnamed Storm Drain (2) Waipahu Canal (2)
*Note: Number in parentheses indicates the Alternative(s) to which item is applicable.		
Source: HAR 11-54-02: compiled by Planning Solutions, Inc.		

Water Quality Standard Revision Program. The State of Hawai'i Department of Health (DOH) has just completed its triennial review of HAR §11-54 and is proposing to revise portions of it to insure full compliance with federal and state law. The Department expects the revisions to include changes to the classification of streams that will help it implement the Total Maximum Daily Load (TMDL) program, which will assist in the restoration of impaired water bodies. DOH's present schedule calls for the proposed changes to be taken to public hearing by the end of the second quarter of 2002 and to be adopted by the end of 2002. Assuming this schedule is followed, the revisions are to be in effect by the time construction on the Waiau Fuel Line project begins.

If adopted, the revisions would modify the orientation of the classification system so that it distinguishes more clearly those stream segments where water quality standards are not being met. It would combine the uses in existing Class 1a and 1b streams (i.e., there would be no difference between the two). All streams in the new Class 1 where water quality standards are being met (or presumed to be met would be designated Class 1a. If monitoring results show that a stream that has been classified as Class 1a does not meet the water quality standards, it would be classified as 1b (impaired). Similarly, Class 2 (which presently has no sub-categories) would be split into Class 2a and 2b. The uses to be protected in both classes are the same as for the existing Class 2. Where monitoring results show that a stream segment does not meet the water quality standards for Class 2a, the segment would be classified as Class 2b.

Streams classified as 1b or 2b under this system would be subject to listing on the Federal Clean Water Act 303(d) list of Impaired Waters. TMDL Reports on pollution loads would have to be prepared for all listed streams, and load reductions would have to be successfully implemented before the stream could be returned to Class 1a status. Class 1b is intended to make sure that users know where the quality of a stream has been impaired and to insure that applications for work in class 1b streams are carefully reviewed for possible impacts that may further degrade the quality of the stream waters.

The five perennial streams that pass through the project area (Honouliuli Stream, Waikele Stream, Kapakahi Stream, Waiawa Stream, and Waiau Stream) would have a "b" classification. Most of these would be classified as 2b, but the lowest reaches of Waikele and Kapakahi Streams (i.e., the segments that pass on either side of Pouhala Marsh) would be classified as 1b.

4.3.1.2 Basic Water Quality Criteria

HAR §11-54-04 establishes "basic water quality criteria". These require that all waters be free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including:

- Materials that will settle to form objectionable sludge or bottom deposits;
- Floating debris, oil, grease, scum, or other floating materials;
- Substances in amounts sufficient to produce taste in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to produce objectionable color, turbidity or other conditions in the receiving waters;
- High or low temperatures; biocides; pathogenic organisms; toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water;
- Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life;
- Soil particles resulting from erosion on land involved in earthwork, such as the construction of public works; highways; subdivisions; recreational, commercial, or industrial developments; or the cultivation and management of agricultural lands.

4.3.1.3 Water Quality Criteria for Inland Waters

HAR §11-54-05.2 sets water quality criteria for inland waters. The criteria applicable to the inland water types relevant to the Action Alternatives being considered are summarized below.

4.3.1.3.1 Fresh Water, Flowing Waters, Streams: Perennial and Intermittent.
This classification is applicable to the crossing of Waiawa Stream. Water in the stream must meet the criteria shown in Table 4-5. In addition, the following bottom criteria are applicable to the stream.

- Episodic deposits of flood-borne soil sediment may not occur in quantities exceeding an equivalent thickness of five millimeters (0.20 inch) over hard bottoms twenty-four hours after a heavy rainstorm.
- Episodic deposits of flood-borne soil sediment shall not occur in quantities exceeding an equivalent thickness of ten millimeters (0.40 inch) over soft bottoms twenty-four hours after a heavy rainstorm.
- In soft bottom material in pool sections of streams, oxidation-reduction potential (eH) in the top ten centimeters (four inches) shall not be less than +100 millivolts.
- In soft bottom material in pool sections of streams, no more than fifty per cent of the grain size distribution of sediment shall be smaller than 0.125 millimeter (0.005 inch) in diameter.
- Parameters specified by the Director of Health are to be used for monitoring stream bottom biological communities including their habitat, which may be affected by proposed actions. The water quality criteria for this subsection shall be deemed to be met if time series surveys of benchmark stations indicate no relative changes in the relevant biological communities, as noted by biological community indicators or by indicator organisms which may be applicable to the specific site. Fresh water, Flowing Waters, Flowing Springs and Seeps.

This criteria is applicable to Kaluao'opu Spring, which discharges into a low wetlands (the watercress farms at Waiau). These must meet only the "basic criteria" set forth in section 11-54-04.

Table 4-5. Specific Criteria for Streams.

Parameter	*Season*	*Geometric mean not to Exceed the Given Value*	*Not to Exceed the Given Value More Than 10% of the Time*	*Not to Exceed the Given Value More Than 2% of Time*
Total Nitrogen (µg N/L[1])	Wet[2]	250.0	520.0	800.0[1]
	Dry[3]	180.0	380.0	600.0[2]
Nitrate + Nitrite Nitrogen (µg NO_3 +NO_2]-N/L)	Wet	70.0	180.0	300.0
	Dry	30.0	90.0	170.0
Total Phosphorus (µg P/L)	Wet	50.0	100.0	150.0
	Dry	30.0	60.0	80.0
Total Suspended Solids (mg/L)	Wet	20.0	50.0	80.0
	Dry	10.0	30.0	55.0
Turbidity (NTU)[4]	Wet	5.0	15.0	25.0
	Dry	2.0	5.5	10.0

[1] *µg* = microgram or 0.000001 grams; *L* = liter

[2] *Wet season* - November 1 through April 30.

[3] *Dry season* - May 1 through October 31.

[4] *NTU* = Nephelometric Turbidity Units. A comparison of the intensity of light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. The higher the intensity of scattered light, the higher the turbidity.

Additional Criteria:

pH Units - shall not deviate more than 0.5 units from ambient conditions and shall not be lower than 5.5 nor higher than 8.0

Dissolved Oxygen - Not less than eighty per cent saturation, determined as a function of ambient water temperature.

Temperature - Shall not vary more than one degree Celsius from ambient conditions.

Specific Conductance - Not more than three hundred µS/centimeter.

Source: HAR §11-54-05.2

4.3.1.3.2 Fresh Water, Wetlands, Low Wetlands

These standards apply to Watercress farms at Waiau. These must meet only the "basic criteria" set forth in section §11-54-04.

4.3.1.3.3 Brackish or Saline Water Coastal Wetland

These standards apply to Pouhala Marsh. They require only that the water meet the "basic criteria" set forth in section §11-54-04.

4.3.1.3.4 Brackish or Saline Water, Natural Estuaries

The specific criteria shown in Table 4-6 are applicable to the Pearl Harbor estuary.

Table 4-6. Specific Criteria for Pearl Harbor Estuary.

Parameter	*Geometric Mean not to Exceed the Given Value*	*Not to Exceed the Given Value More Than 10 % of the Time*	*Not to Exceed the Given Value More Than 2% of Time*
Total Nitrogen (µg N/L)[1]	300.0	550.0	750.0
Ammonia Nitrogen (µg NH_4-N/L)	10.0	20.0	30.0
Nitrate + Nitrite Nitrogen (µg [NO_3 +NO_2]-N/L) 3 2	15.00	40.0	70.0
Total Phosphorus (µg P/L)	60.0	130.0	200.0
Chlorophyll a (µg/L)	3.50	10.00	20.00
Turbidity (NTU[2])	4.0	8.0	15.0

[1]µg = microgram or 0.000001 grams ; L = liter

[2]NTU = Nephelometric Turbidity Units. A comparison of the intensity of light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. The higher the intensity of scattered light, the higher the turbidity.

Additional Criteria:

pH Units - shall not deviate more than 0.5 units from ambient conditions and shall not be lower than 6.8 nor higher than 8.8.

Dissolved Oxygen - Not less than sixty per cent saturation, determined as a function of ambient water temperature.

Temperature - Shall not vary more than one degree Celsius from ambient conditions.

Salinity - Shall not vary more than ten per cent from ambient conditions.

Oxidation - Reduction potential (eH) - Shall not be less than -100 millivolts in the uppermost ten centimeters (four inches) of sediment.

Source: HAR §11-54-05.2

4.3.2 PROPOSED ACTION (ALTERNATIVE 1)

4.3.2.1 Barbers Point Tank Farm, Waiau Generating Station, and Iwilei Tank Farm

4.3.2.1.1 Construction Period

As described in Sections 0, 2.1.6, and 2.1.7, the Barbers Point Tank Farm, Waiau Generating Station, and Iwilei Tank Farm would have to be modified to accommodate the new pipeline. Detailed construction and erosion-control plans have not yet been prepared. However, they will incorporate the following principles. First, and most importantly, only those areas which must be cleared to permit efficient construction and construction staging would be cleared. Second, construction would be sequenced to minimize the exposure time of the cleared surface area. Third, stormwater run-on to the construction sites from adjacent areas would be controlled as necessary using appropriate preventive measures. Finally, temporary soil stabilization with appropriate vegetation would be applied on areas that are scheduled to remain unfinished for more than thirty calendar days, and permanent soil stabilization with perennial vegetation would be applied as soon as practical after final grading. Through application of these and perhaps other best management practices, erosion from

construction areas would be kept to a minimum, thereby preventing substantial impacts to surface water resources.

4.3.2.1.2 Operational Period

Normal operation of these facilities does not have the potential to impact surface water resources. Areas where fuel is stored and handled are surrounded by berms and other containment facilities that would prevent material from leaving the sites. These and other features, as well as the operational procedures that complement them, would be spelled out in the Spill Prevention Control and Countermeasures (SPCC) plans for each facility, consistent with Federal Regulations administered by the EPA (40 CFR 112) and in the *Draft Oil Spill Contingency Plan* (OSCP)[20] for the fuel transportation systems, including pipelines and trucking operations (HECO 2002). Similarly, measures outlined in an oil spill contingency plan that would be developed for the truck delivery operations would allow HECO to minimize the spread of any product that might be released from the fuel delivery trucks needed to serve the Iwilei Tank Farm; the OSCP would also mandate procedures to clean up and properly dispose of any contaminated soil and water. By eliminating and mitigating releases, the system avoids substantial impacts to surface water resources.

4.3.2.2 Pipeline Construction Across Six Dry Gulches

Section 3.4.1 notes that the pipeline route crosses six dry gulches. Except during and immediately following severe rainfall events, all six gulches are normally dry. The only available data on the frequency and magnitude of storm runoff events are provided by two USGS crest-stage gauging stations, No. 2124.5 on a branch of Kalo'i Gulch inland of the route and No. 2125 on Honouliuli Gulch next to the proposed pipeline crossing. There are 33 and 45 years of record for these stations, respectively. Based on these data and numerous field observations over several decades, the following characterizations of events when water actually flows in the gulches can be made:

- At least once a year and sometimes as often as three or four times a year, stormwater runoff is conveyed in the gulches.
- The runoff events, even for infrequent, large-scale storms, are short in duration. Surface runoff ends soon after the storm rainfall ceases.
- Overtopping and flooding of Farrington Highway during major storms, such as last occurred in November 1996 on Kalo'i Gulch, is due to limited conveyance capacity in the gulches leading to the highway rather than due to the capacity of highway culvert or bridge structures.
- Because all of these gulches are normally dry and none provide a *mauka-makai* migration route for aquatic biota, the Commission on Water Resource Management (CWRM) has determined that stream channel alteration permits (SCAPs) for the pipeline crossings would not be necessary.
- With reasonably prudent scheduling of the pipeline's installation, all six of these normally dry gulch crossings can be made in completely dry conditions. As such, the pipeline installation would not impact surface water in these gulches.

4.3.2.3 Pipeline Construction Across Perennial Streams/Tidal Channels & Pouhala Marsh

The eight pipeline crossings of perennial streams and tidal canals were previously identified as S-1 through S-8 on Figure 3-2. Table 3-6 also provides a capsule summary of each of these crossings. Potential impacts during the pipeline installation at each crossing are described in the following sub-sections.

4.3.2.3.1 Hō'ae'ae Drainage Canal (Crossing S-1 on Figure 3-2)

Hō'ae'ae Drainage Canal has a rectangular concrete cross section which is 47 feet wide and 8 feet deep at the point where it crosses the proposed pipeline. The canal provides an outlet to the West Loch of Pearl Harbor for runoff from 2.70 square miles of industrial, residential, and agricultural land uses. There are a bridge and bridge piers at the point of the pipeline crossing. The canal is tidal at

[20] Oil Spill Contingency Plans are administered by the U.S. Department of Transportation.

this location, with water depths of several inches to a couple of feet depending on the phase of the tide. As indicated by the data in Table 4-7, the water in the canal is normally quite saline (73 to 84 percent of open-ocean water salinity).

Table 4-7 Specific Conductance, Hō'ae'ae Channel (10/11/01, high tide)

Sample Location in Water Column	*Specific Conductance (µS/cm)*	*Salinity (ppt)*	*Temperature (F°)*
Upper 6 inches	40,200	25.7	77.7
Canal Bottom	45,200	29.2	78.0
Note: Measurements with a HACH sensION™ 5 Meter			
Source: Tom Nance Water Resource Engineering			

The Waiau Fuel Pipeline would be installed by drilling beneath the Hō'ae'ae drainage canal. The boring would pass beneath the existing structure, including the three concrete piers that support the five pipelines that presently cross this point above ground. Hence, construction related to this crossing would not impact waterway conveyance capacity or water quality. The CWRM has also determined that a SCAP would not be necessary for the crossing.

4.3.2.3.2 Unnamed Tidal Canal (Crossing S-2 on Figure 3-2)

The unnamed tidal channel designated S-2 on Figure 3-2 provides an outlet to West Loch for a 42-inch pipeline which drains a portion of the lower Waipahu Industrial area. There is a 9' x 5' box culvert which spans the channel immediately downstream of the pipeline crossing. The culvert's concrete headwalls provide support for four pipes which now cross the canal. The HECO pipeline would be installed by drilling beneath the bottom of the canal. Because the construction would not disturb the stream channel, and it does not have the potential to affect stream flow, the CWRM has determined that a SCAP would not be necessary.

4.3.2.3.3 Waikele Stream (Crossing S-3 on Figure 3-2)

The 45.7-square mile area tributary to Waikele Stream is O'ahu's largest watershed. Flow in the lower reach of the stream is sustained by a number of discrete springs, all of which emerge on the stream's east bank between the H-1 Freeway and Farrington Highway. The dominance of groundwater in the stream's dry period flow can be demonstrated in several ways.

- First, as shown in Table 4-8, the four sets of USGS measurements above and below the input of groundwater show a gain of stream flow of 9.4 to 10.4 MGD in the 0.85-mile section between H-1 freeway and Farrington Highway.
- Second, as shown in Figure 4-1 and Table 4-9, the USGS measurements also show a distinct increase in the stream water's conductivity and a decrease in temperature in the transition from predominately surface runoff upstream at H-1 freeway to predominately groundwater downstream near Farrington Highway.
- Finally, the duration-discharge characteristics of stream flow at Gauge 2130 just above Farrington Highway illustrate the sustained level of stream flow even during dry periods (Figure 4-1).

Table 4-8 Stream-flow Measurements Along Waikele Stream

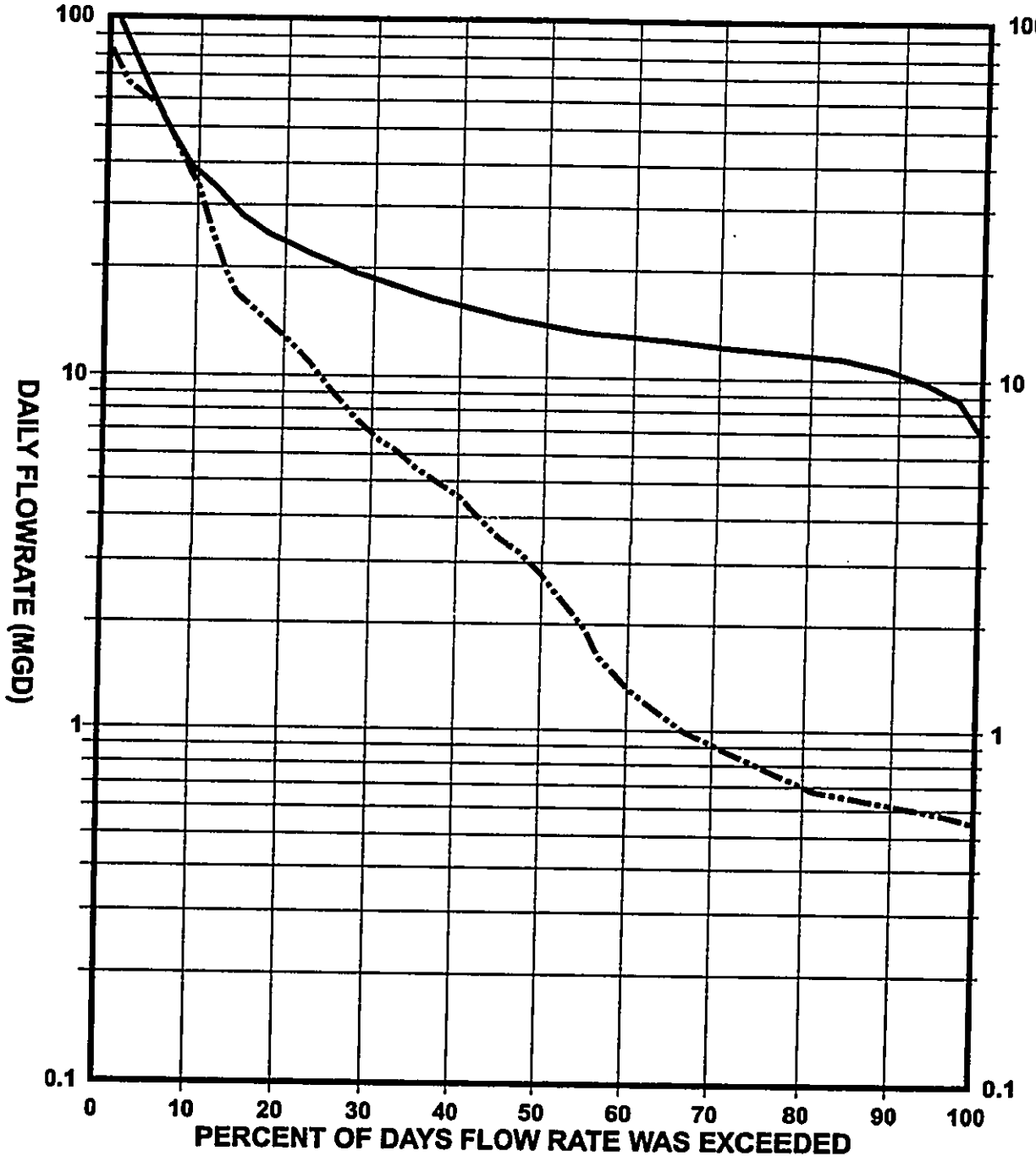
Date of Measurement	*Measured Flow Rate Millions of Gallons per Day (MGD)*		*Gain in Flow (MGD)*
	At Site 2129.5, At H-1 Freeway	*At Gauge 2130, Above Farrington Highway*	
5/14/99	2.85	13.25	10.40
7/12/99	7.24	16.93	9.69
4/06/00	8.37	18.55	10.08
6/30/00	0.68	10.08	9.40
Source: U.S. Geological Survey (USGS) records			

Table 4-9 Specific Conductance and Temperature along Waikele Stream

Date	*Specific Conductance, (µS/cm)*		*Temperature (F°)*	
	Site 2129.5, Beneath H-1	*Gauge 2130, Above Farrington Highway*	*Site 2129.5, Beneath H-1*	*Gauge 2130, Above Farrington Highway*
5/14/1999	121	454	75.2	71.6
7/12/1999	236	415	75.2	72.5
4/6/2000	92	347	68(?)	70.7
6/30/2000	118	536	81.5	71.6
Source: U.S. Geological Survey (USGS) records				

The Waiau Fuel Pipeline would cross Waikele Stream close to the old railroad bridge which is approximately 1,400 feet downstream of Farrington Highway. At this location, the stream is a tidal estuary, with fresh water moving downstream over a saltwater wedge at the channel bottom. The salinity profile through the stream's water column at the location of the pipeline crossing illustrates this (refer to Figure 2-3). At the time this profile was made, the fresh water surface layer was about 1.0 to 1.5 feet thick. The sharp transition from fresh to saltwater over the 1.5 feet immediately below this is indicative of a relatively fast freshwater flow with only a nominal amount of mixing with saltwater below.

The old railroad bridge across Waikele Stream is 21 feet wide and spans a width of 62 feet. While it supports six pipelines at present, this structure would not be used for the HECO pipeline. Instead, the pipeline would be installed beneath the stream utilizing horizontal directional drilling (HDD). The use of this technique avoids the kinds of water quality and other effects that would occur if conventional trenching were used. Because neither the bed nor the banks of the stream would be altered, no SCAP would be needed from the CWRM.



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Tom Nance Water Resource Engineering, Inc.

Legend:
Waikele Stream
Waiawa Stream

Figure 4-1:

Discharge Characteristics of Waikele and Waiawa Streams

Waiau Fuel Pipeline Project

4.3.2.3.4 Kapakahi Stream (Crossing S-4 on Figure 3-2)

Kapakahi Stream originates as a spring located a short distance *mauka* of Farrington Highway. The discharge from the spring passes beneath Farrington Highway in a box culvert and then flows in a man-made channel along the west side of Waipahu Depot Road before discharging into the mangroves at the upper end of West Loch. Four USGS measurements made in 1999-2000 indicate that the spring's discharge is relatively consistent over time and on the order of 0.90 to 0.97 MGD (refer to Table 4-10).

The proposed pipeline crossing is 1,400 feet *makai* of Farrington Highway. Although the water level in the stream is influenced by the tide at this location, the depth of water is relatively shallow and saltwater does not intrude this far inland (a specific conductance of 560 µS/cm was measured at both the top and bottom of the stream's water column at high tide on October 11, 2001). Similar to the crossing of Waikele Stream, an old railroad bridge provides support for a number of pipes laid on and anchored to its beams. By using HDD techniques to carry the pipeline underneath the stream, HECO has eliminated the potential for construction impacts on it. No SCAP would be required.

4.3.2.3.5 Waipahu Drainage Canal (Crossing S-5 on Figure 3-2)

There is a consistent spring discharge into the Waipahu Drainage Canal above Pā'iwa Street (from 1.32 to 1.44 MGD as shown on Table 4-10). This location is about 0.57 miles inland of the proposed pipeline crossing of the canal. At this point, the concrete canal is 55 feet wide and rectangular-shaped and the water in the canal is tidal. As the salinity profile on

Figure 4-2 shows, the upstream discharge of freshwater by the spring does create a distinct *stratification of flow over saltwater at the bottom, although the fresh water is substantially mixed to a* salinity of 25 parts per thousand (ppt) in the upper layer.

On the *mauka* side of the bikeway bridge across the canal, there are two pipes which are supported by reinforced concrete beams which span the entire 55-foot canal width. Rather than follow this lead, HECO proposes to install its pipeline using horizontal directional drilling beneath the channel bottom, thereby avoiding all water quality effects and habitat disruption. Because no alteration of the channel banks or bottom would occur, a SCAP would not be required.

4.3.2.3.6 Waiawa Stream (Crossing S-6 on Figure 3-2)

The proposed pipeline crosses Waiawa Stream just *makai* of H-1 freeway. At this point, the stream's tributary watershed is approximately 26.7 square miles, second in size only to Waikele Stream's watershed on the Island of O'ahu. In the reach of the stream at the pipeline crossing, the dry weather flow is sustained by discharge from springs along the banks. However, as the comparison of duration-discharge characteristics of Figure 4-1 illustrates, the discharge rate of the Waiawa Stream springs is about an order of magnitude less than those along Waikele Stream. The series of measurements by the USGS along the lower reach of the Waiawa Stream quantify the spring flow over specific reaches (refer to Table 4-11~~Table 4-10~~). On the four days of measurements, spring inflow averaged 1.2 MGD over the 2,000-foot section from the Pearl City Industrial area to Kamehameha Highway and another 1.1 MGD over the next 1,200 feet below Kamehameha Highway to the near vicinity of the proposed pipeline crossing.

At the location of the proposed pipeline crossing, H-1 is a viaduct and there are no other structures across the stream in the near vicinity. Due to the constraints of access and available space on the south side of the stream, HDD has been ruled out for the pipeline's installation at this location. Consequently, the pipeline must be installed using open trenching techniques. Engineers expect that it would require a few weeks of work to complete the crossing. While the design details have not been worked out as yet, HECO anticipates that the crossing would be made using either by doing half of the installation at a time, using a temporary cofferdam to seal off the work area and allowing the stream flow to bypass it in the remaining channel or installing a temporary flume so that the stream's flow bypasses the open portion of the pipeline's trench. In either case a Stream Channel Alteration Permit (SCAP) would be required for this work.

Table 4-10 Discharge Rate, Specific Conductance and Temperature at Selected Springs

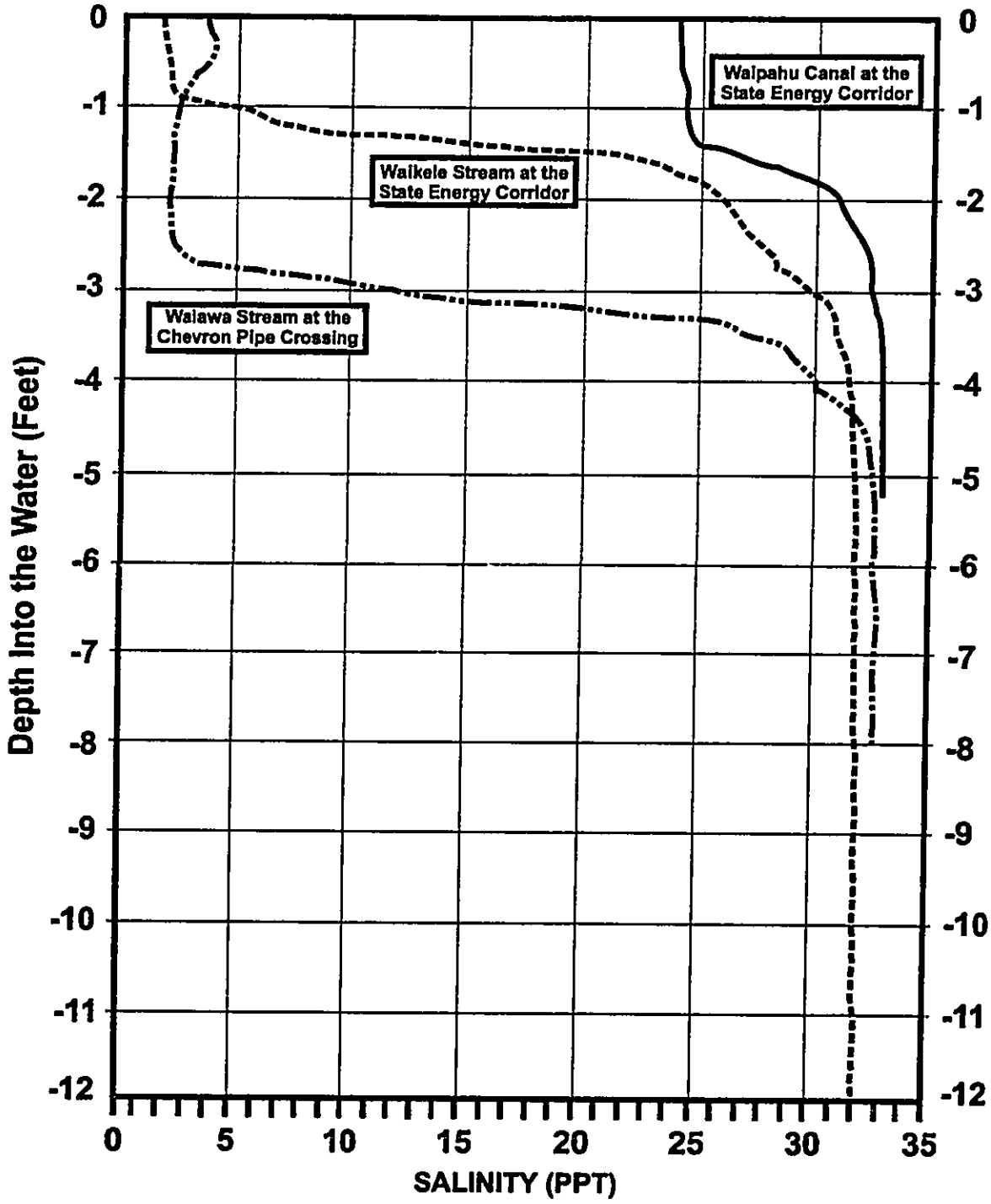
Location	*Date of Measurement*	*Discharge Rate (MGD)*	*Specific Conductance (µS/cm)*	*Temperature (F°)*
Kapakahi Stream Above Farrington Highway	5/12/1999	0.9	567	74.3
	7/12/1999	0.97	564	74.3
	4/6/2000	0.97	563	73.4
	6/29/2000	0.92	550	75.2
Waipahu Drainage Canal Above Pā'iwa Street	5/12/1999	1.32	607	76.1
	7/12/1999	1.35	626	76.1
	4/6/2000	1.44	605	n.a.
	6/30/2000	1.34	598	73.4
Waimano Drainage Canal Below H-1 in Pearl City	5/13/1999	0.34	392	75.2
	7/12/1999	0.61	471	75.2
	4/6/1999	0.48	696	69.8
	6/29/2000	0.38	390	72.5
Kaluao'opu Spring Next to HECO Waiau Plant	5/13/1999	5.09	918	71.6
	7/13/1999	4.91	970	71.6
	4/7/2000	4.69	811	71.6
	6/30/2000	4.51	945	70.7
Source: U.S. Geological Survey 1999b and 2000				

4.3.2.3.7 Waimano Drainage Channel (Crossing S-7 on Figure 3-2)

The Waimano Drainage Channel provides a stormwater outlet for 2.7 square miles of the Pearl City and Waimano areas. As with the other perennial features along the pipeline route, its lower reach is spring-fed. Measurements of this flow by the USGS, which were made within 100 feet of the proposed pipeline crossing, range from 0.34 to 0.61 MGD (see Table 4-10). HECO's plans call for HDD to be used to carry the pipeline beneath this channel. Because of this, there is no potential for construction to disturb the stream channel or adversely affect water quality. No Stream Channel Alteration Permit would be needed.

4.3.2.3.8 Kaluao'opu Spring (Crossing S-8 on Figure 3-2)

The last perennial waterway crossing along the pipeline route is the outlet for Kaluao'opu Spring. It is located adjacent to the western boundary of the Waiau Generating Station property. The spring discharge is substantial, being on the order of 4.5 to 5.1 MGD (refer to the USGS measurements in Table 4-10). A bikeway culvert spans the 30-foot wide channel immediately *mauka* of the proposed pipeline crossing. An above-grade support structure would be installed to span the channel with the new pipeline. This work could be done without altering the stream channel. Hence, there is no potential for construction work to impact surface water; no SCAP would be required.



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Prepared By:
PLANNING SOLUTIONS

Source:
Tom Nance Water Resource Engineering, Inc.

Legend:
- Waipahu Canal
- Waikele Stream
- Waiawa Stream

Figure 4-2:

Salinity Profile at Stream Crossings

Waiau Fuel Pipeline Project

Table 4-11 Groundwater Discharge Above and Below Waiawa Stream Crossing

Location Along Waiawa Stream		*Date of Measurement*	*Discharge Rate (MGD)*	*Specific Conductance (µS/cm)*	*Temp. (in F°)*
Station No.	*Description*				
2158	2,000 Feet *Mauka* of Kamehameha Highway in the Pearl City Industrial Area	5/13/99	0.00	--	--
		7/12/99	2.48	153	76.1
		4/06/00	3.61	156	70.7
		6/27/00	0.00	--	--
2160	At Continuous Record Station Just *Mauka* of Kamehameha Highway	5/13/99	1.23	--	--
		7/12/99	4.01	--	--
		4/06/00	4.33	--	--
		6/27/00	1.36	--	--
2161	1,200 Feet *Makai* of Station 2160, Near proposed pipeline Crossing	5/13/99	2.49	708	74.3
		7/12/99	5.27	420	74.3
		4/06/00	7.37	380	73.4
		6/27/00	2.28	--	--

Source: U.S. Geological Survey (2000)

4.3.2.3.9 Crossing of the *Mauka* End of Pouhala Marsh

Pouhala Marsh is a saline wetland which sits on the delta deposits of Waikele and Kapakahi Streams. The channels of these two streams delineate the western and eastern boundaries of the marsh. Both stream channels have distinct earthen berms which prevent overtopping of fresh water into the marsh except during extreme flood events. The SEC passes through the marsh near its *mauka* boundary. The former OR&L right-of-way is just a short distance inland from the marsh, and HECO has asked the State Department of Transportation for permission to place the pipeline within it so that it would not have to work within the marsh, and the Department has indicated its tentative approval of the request. If the request is ultimately granted, construction of the proposed pipeline would have no effect on the marsh. If HECO's request is not granted, then it would be necessary to work within the wetland boundary. The portion of the marsh within the SEC corridor is frequently dry, and it is anticipated that the work would be done during such periods.

The *mauka*-eastern corner of the marsh contains permanent pools of water which are several inches to no more than two feet deep. The upper ends of these pools are 50 to 150 feet *makai* of the SEC. All of the water in these pools is hypersaline[21], with conductivities almost four times higher than seawater. The temperatures are also elevated due to the shallowness of the pools and their lack of circulation (see Table 4-12). The surface of the mud flats surrounding these hypersaline pools is comprised of a thin crust of salt crystals.

[21] All salinity measurements were greater than 80 ppt, the extreme value that can be measured by the HACH sensION™ 5 meter used for the study. Typical seawater has a salinity of about 35 ppm.

Table 4-12 Hypersaline *Mauka* Pools in Pouhala Marsh (10/13/01)

Site No.	Specific Conductance (µS/cm)	Temperature (F°)
1	193,700	93.2
2	193,600	90.8
3	209,000	93.7
4	195,100	90.6
5	193,700	90.4
Note: Typical Seawater Specific Conductance: ~50,000		
Source: Tom Nance Water Resource Engineering		

Based on pipeline trench excavations observed in October 2001, the mud at the *mauka* end of the marsh is poorly permeable and essentially dry to a depth of at least five feet.[22] If done during dry weather, installation of the pipeline in the SEC, although requiring removal of some of the marsh's vegetation, would not require dewatering. If the alignment is moved further inland to the OR&L right-of-way, clearing would only involve the removal of scrub grass.

4.3.2.4 Normal Operation

Normal pipeline operations would have no impact on surface water resources. Regular inspections of the line would be conducted from existing roadways and paths without disturbing drainageways, stream banks, wetlands, or nearby fast land. Regular inspections would be conducted using equipment that runs along the inside of the pipeline; the land surface would not be disturbed. Consequently, there is no mechanism through which normal operation could adversely affect surface waters. In view of this, the only way that the proposed project might adversely affect these communities is in the event of an accidental release.

Truck loading and unloading operations would take place at facilities that are isolated by berms and other containment structures from natural habitats that would be threatened by spilled oil. Trucking of fuel between the BPTF and the Iwilei Tank Farm would be confined to existing roadways and would normally have no impacts on surface waters.

As discussed earlier in this report, the design and operational plans for the proposed Waiau Fuel Pipeline project incorporate many provisions designed to avoid leaks and, should one occur, minimize its possible magnitude. These include:

- the use of high quality pipe and coating system, selected for resistance to corrosion and impacts (see Section 2.1.2);
- the use of a state-of-the-art cathodic protection system (see Table 2-1);
- the provision of multiple block valves and a check valve that make it possible for segments of the pipeline where a leak occurs to be isolated from the remainder of the pipeline, thereby minimizing the volume that could be released at any one point along the route (see Section 2.1.3); and
- the redundant, multi-location flow monitoring system to be used to pinpoint leaks immediately (see Section 2.1.4).

[22] This is due to the fact that the area has been filled with poorly permeable material to a depth greater than that of the trenching.

4.3.2.5 Accidents: Approach to Assessing Oil Spill Impact

4.3.2.5.1 Introduction

While HECO is attempting to provide all of the design and operational measures needed to avoid a release, there is a remote possibility that equipment failure, human error, or some outside force (whether from a terrorist, heavy construction equipment working in areas where it should not, or other source) could cause a leak The magnitude of impact from an oil spill to surface water and other resources is directly related to the volume of oil spilled, the nature of the petroleum product, the area over which it spreads, the kinds of surface water in the affected area, and the length of time that the contamination persists. The remainder of this section discusses the effects that an oil spill from the proposed Waiau Fuel Pipeline could have on surface water quality. Subsequent sections examine the impacts of potential spills on aquatic communities (Section 4.4) and the terrestrial flora and fauna that inhabit the wetlands around Pearl Harbor (Sections 4.6 and 4.7).

Investigators can use two fundamentally different approaches to assess the water quality and biological effects likely to result from a spill. The first is computer modeling. The second consists of using inferences from field data collected during similar previous events. Often the data needed to use the second approach are unavailable; in those instances computer modeling is the only alternative. The drawback to this approach is that it involves many assumptions and analytical complexity. In the present instance, the availability of data from an historical spill resulting from a rupture in the existing Chevron line while Chevron was using it to transport oil to Honolulu Harbor provides the information needed to use the second approach. Because these studies include investigations that link biological response to the physical and chemical changes in water quality that resulted from the spill, this approach provides a more integrated framework for assessing impacts.

4.3.2.5.2 1996 Chevron Oil Spill and HECO Reasonable Worst Case Oil Spill

1996 Chevron Oil Spill. At approximately 1:30 a.m. on May 14, 1996, the 8-inch Chevron pipeline that runs from Barbers Point to Honolulu Harbor ruptured at a spot thinned by external corrosion and began discharging No. 6 bunker fuel oil.[23] The break occurred near the Waiau Generating Station where the pipe crosses a small spring-fed stream (Kaluao'opu Spring; see Section 4.3.2.3.8). Because of the location of the break, the oil flowed immediately down the stream and directly into Pearl Harbor. The break occurred in the middle of the night, the line did not have the kind of real-time monitoring system that is included in HECO's proposed design, and there is only one valve on this line between Barbers Point and Waiau (at the pipeline crossing of Fort Weaver Road). Before the release was controlled, an estimated 982 barrels of oil had escaped. Because it involved a product similar to the most mobile one that would be carried in the proposed Waiau Fuel Pipeline, the 1996 Chevron oil spill into the Middle Loch of Pearl Harbor provides a real-world example that can be used through comparison to help gauge the potential environmental impacts of a release from the Waiau Fuel Pipeline project.

Reasonable Worst Case Waiau Fuel Pipeline Spill. HECO estimated a "reasonable worst case" (RWC)[24] oil spill to assist in these impact assessments. It used the site of the 1996 Chevron oil spill as the presumed location of the RWC spill. It did this because that location has one of the most direct pathways to aquatic habitat. The following assessments use the RWC estimates to provide general guidelines regarding the magnitudes and persistence of impacts that would potentially occur from an accidental spill.

[23] No. 6 fuel oil is a heavy oil produced by blending heavy residual oils, like the LSFO used in the Waiau Station, with a light oil (often No. 2, diesel-grade fuel oil) to allow it to flow at lower temperatures than LSFO.

[24] "Reasonable worst case" is defined here to be consistent with the U.S. Department of Transportation (49CFR194.105) definition: "*Worst case discharge means the largest foreseeable discharge of oil, including a discharge from fire or explosion, in adverse weather conditions.*" The discharge characteristics of the scenario are calculated using the procedures defined in this regulation.

4.3.2.5.3 Comparison of the Characteristics of the Waiau Fuel Pipeline RWC & 1996 Chevron Spill

The RWC spill from the proposed Waiau Fuel Pipeline resembles, and differs from, the 1996 Chevron spill in the following ways:

- *Spill Volume*. The RWC accidental spill from the proposed Waiau Fuel Line at the site of the Chevron spill has a total spill volume of 137 barrels[25]. This is only 14 percent of the 982 barrels that were lost during the 1996 Chevron incident. This much lower volume is due primarily to the block valves that would prevent much of the oil in the line from leaking by automatically sealing off the section where the leak occurs. The size of the largest RWC accidental spill from the proposed Waiau Fuel Line is estimated at approximately 718 barrels, but this could only occur at a location where there are no direct pathways to Pearl Harbor or other sensitive areas. Consequently, the volume of oil with the potential to actually reach sensitive aquatic habitats in the area is less than that of the 1996 Chevron spill.
- *Nature of the Petroleum Product*. The proposed Waiau Fuel Pipeline would carry LSFO more than 99 percent of the time. LSFO is more viscous and less volatile than the No. 6 oil that was involved in the Chevron spill. Unlike the No. 6 oil, LSFO would solidify as soon as it is cooled by contact with water. It would be generally inert and would travel downstream on the water surface. Less of the product would escape into the atmosphere. The pipeline would contain No. 2 (diesel grade) fuel oil ~~for a few days each year~~approximately once every three years. This is a lighter product that allows passage of the testing equipment used to check the integrity of the pipeline (see Section 2.1.11.2). It is more volatile than the No. 6 fuel oil leaked from the Chevron pipeline; it would spread somewhat faster and more of it would evaporate in the process. However, in other respects the dispersal would be similar.
- *Accessibility to the Aquatic Environment*. The 1996 spill occurred from an above-ground portion of the pipeline in a location where it could directly enter into a flowing stream. Because of that, virtually all of the oil that was released found its way into the aquatic environment. In contrast, the Waiau Fuel Line would be buried (nominally 5 feet deep and much deeper under segments such as stream crossings that are installed by drilling under the streambeds) throughout almost its entire length in virtually all areas where it would be in the vicinity of aquatic environments. The sole exception is the segment of pipeline within HECO's Waiau Generating Station property where, for technical reasons, HECO has proposed installing it above ground on a pipe support structure where the total height will be less than 48" above ground.
- *Dispersal in the Aquatic Environment: Western Portion of Route*. The drainageways crossed by the western portion of the pipeline route consist of dry gulches; normally there is no water in them to contaminate. Moreover, all of the Waiau Fuel Pipeline in this area is underground. Consequently, even if third party were to dig up the pipeline (breaking it open in the process), and even if this occurred during a storm, the pipeline route in this area is so much farther inland than the point at which the 1996 spill occurred that far more of the oil would be removed from the water before reaching Pearl Harbor than was the case with the 1996 Chevron spill.
- *Dispersal in the Aquatic Environment: Eastern Portion of Route*. The eastern portion of the Waiau Pipeline crosses beneath several perennial streams. None are closer to the harbor or have other characteristics that make them more sensitive to oil spills than the Kaluao'opu Spring, where the Chevron release occurred. Hence, from a geographic standpoint, a spill from the proposed Waiau

[25] The spill volume at any point along the pipeline depends on the topography and distance to the nearest block valves. The maximum occurs at a topographic depression between the first and second block valves (see Figure 2-6). 718 barrels represents the maximum volume of petroleum product that HECO estimates could escape from the pipe if a catastrophic break were to occur. This volume is used as the reasonable worst case (RWC) for impact analysis in terrestrial environments. However, a spill from this section of the pipeline would not reach aquatic resources in Pearl Harbor or streams. Consequently, the RWC volume used for the aquatic impact analysis is 137 barrels. This is the amount at the location that has the greatest potential for discharging oil into streams or Pearl Harbor. It would occur as the result of a release between the sixth block valve and the Waiau Generating Station.

Fuel line that resulted in oil entering one of these is not likely to disperse farther, or in a fundamentally different way than occurred as a result of the 1996 spill.

4.3.2.6 Impact of an Oil Spill on Surface Waters: Proposed Waiau Fuel Line

HECO's entire approach to the project has been aimed at developing plans that maintain the highest practical level of environmental protection. Where design choices have had to be made between greater environmental protection and lower cost, the more protective alternative has been selected. The use of high quality, coated pipe (selected for its toughness and resistance to corrosion (see Section 2.1.2), the inclusion of multiple remotely-operated block valves to reduce the amount that could be spilled at any one site along the route (see Section 2.1.3), and the redundant, multi-station flow-monitoring system for pinpointing leaks immediately (see Section 2.1.4) are examples of these basic design measures. In addition, HECO is preparing a comprehensive *Draft Oil Spill Contingency Plan* (HECO 2002) for the proposed Waiau Fuel Pipeline which clearly defines the steps that would be taken and chain of authority assigned to assure rapid and efficient response to any spill from the pipeline. Because of these precautions: (i) the probability of an oil spill from pipeline operations is believed to be extremely low and (ii) the possible effects of a spill on surface water resources would be mitigated significantly by the in-place response and remediation measures included in the draft plan.

If, despite all of these precautions, a third party were to accidentally break the pipe, the calculated maximum spill volume in the vicinity of Pearl Harbor is 137 barrels.[26] Observations of the 1996 Chevron oil spill reported in the *Final Restoration Plan and Environmental Assessment* for the spill (Section 3.1.3 in Trustees 1999, Table 3) documented through direct observations that the sheen that resulted from that oil spill covered approximately 1,700 acres, with the coverage ranging from a fine sheen to an opaque cover. The study estimated that another 700 acres of the harbor were probably also affected to some degree, though not directly observed. Table 4-13 reproduces the oil coverage summary in the final restoration plan and assessment for the spill.

During the period most affected by the 1996 Chevron spill, water quality in affected portions of Pearl Harbor, and probably in the tidal areas at the mouths of some tributary streams, would not have met the Basic State Water Quality Standards. Although no site-specific data are available that allow it to be quantified, it is possible that concentrations of some trace constituents found in petroleum also briefly exceeded the State Water Quality standards described in Section 4.3.1.

With the information that is available from studies of the Chevron spill, it is possible to estimate the likely water quality consequences of a RWC release from the proposed Waiau Fuel Line project.

- The rapid leak detection capability provided by the Supervisory Control and Data Acquisition (SCADA) system (see Section 2.1.11.2) and the rapid response afforded by the *Draft Contingency Plan*, would allow emergency response crews to react immediately.
- Based on the response measures that are planned, oil spill specialists estimate that 72 barrels of the RWC spill volume (i.e., just over half) would be contained within the 3-acre wetland area that receives the water from the Kaluao'opu Spring and that about four-fifths of this (60 barrels) would be recovered by clean-up operations within the wetland.
- Despite the measures included in the *Draft Contingency Plan*, about 50 barrels of oil might reach Pearl Harbor. Oil spill specialists estimate that about 90 percent of this would be recovered by containment booms, skimming operations, and shoreline clean-up.

[26] As noted earlier in this document, the spill volume at any point along the pipeline depends on the topography and distance to the nearest block valves. 137 barrels is the maximum amount that could be released at the point with the greatest potential for discharging into the aquatic environment. That point is located ~~near the Waiau bIt but would occur as the result of a release~~ between the sixth block valve and the Waiau Generating Station.

Table 4-13. Areal Extent of Oil Sheen from Chevron Spill.

Date (1996)	*Photo of Video Data Source*	*Estimated Areal Extent (in acres) of Oil Coverage in Pearl Harbor*			
		Sheen[1]	*Probable Sheen*[2]	*Heavier*[3]	*Probable Heavier*[4]
May 14	Vertical multispectral images from TerraSystems	Not calculated	—	16.4	—
May 14	TerraSystems high-altitude video over-flight, 1700-1730 hours	259.6	—	18.3	—
May 15	Unnamed video over-flight taken 1234-1252 hours	Not calculated	—	18.3 acres	5.6 acres
May 15	Chevron video over-flight taken 1722-1744 hours	Not calculated	Not calculated	Not calculated	—
May 16	Chevron low-altitude video over-flight taken in late afternoon	1,091.3	Not calculated	Not calculated	—
May 17	Chevron video over-flight, time of day not specified	393.6	33.8	3.9	—
May 19	Chevron video over-flight, time of day not specified	371.4	39.1	0.3	—
May 14 thru 19th	*Summary of all video over-flights*	1,598.9	55.2	64.1	5.7 acres

[1]Characterized as rainbow or silver in color.
[2]Assumed sheen coverage into/from the out-of-view portion of frame.
[3]Characterized by darker color.
[4]Assumed heavier coverage into/from the out-of-view portion of frame.

Source: Final Restoration Plan and Environmental Assessment for the May 14, 1996 Chevron Pipeline Oil Spill into Waiau Stream and Pearl Harbor, Oahu, Hawaii, Table 3.

Within three hours of the incident, crews would be working both on land, in the wetland, and in the harbor to remove as much of the spilled oil as possible as quickly as possible. During approximately two weeks after the spill, clean-up activities would continue. Affected foliage on the shoreline areas would be cut and removed to eliminate the trapped oil from availability to the ecosystem. After two weeks, HECO estimates that less than 12 barrels of spilled oil that could not be cleaned up would remain in the environment.

Because LSFO is chemically inert in most aquatic environments, most of this oil would be incorporated into the sediments and be diluted with time and weathering processes. Components (e.g., phenol) of the diesel fuel that would be in the line during testing are soluble and do, therefore, have the potential to change water quality. In both cases the much smaller spill volume and increased response measures that would be in place mean that changes in water quality would be much lower in magnitude, more geographically localized, and less persistent than were experienced in the 1996 Chevron release.

In view of the foregoing, the principal issue with respect to the potential effects of an oil spill relate to the extent to which it might harm the aquatic ecosystem. This topic is discussed in Section 4.4.

4.3.2.7 Pipeline Decommissioning

HECO would be responsible for draining and cleaning of the pipeline, and possibly for the removal of much the pipeline itself, when it terminates pipeline operation of and returns the easement to the State of Hawai'i. Commonly, pipelines are abandoned in place. If abandoned, the pipeline would be sealed and filled with pressurized inert nitrogen gas or filled with grout. If portions of the pipe are removed, HECO would employ best management practices to ensure that the removal operations do not cause excessive erosion or sediment runoff. Also, HECO would return the surface to its original condition by compacting and replanting the trenched area, as appropriate. These measures would eliminate or minimize the potential for adverse water quality effects.

4.3.3 ALTERNATIVE 2: CHEVRON PIPELINE

4.3.3.1 Impacts of Normal Pipeline Operation and Maintenance

The alternative of continuing to use the existing Chevron pipeline would not involve any new pipeline installation. However, maintenance activities, including the replacement of pipeline sections, would have similar impacts on surface waters as original construction. These are considered in the following paragraphs for each drainageway between the BPTF and the Waiau Generating Station.

4.3.3.1.1 Dry Gulch Crossings

The locations of the Chevron pipeline crossings of three dry gulches are identified as DG-KC, DG-M, and DG-K on Figure 3-2. Dimensions of the channels are provided in Table 3-5. Similar to the crossings by the proposed pipeline route a short distance further inland, stormwater runoff events are infrequent and short in duration. Repair or replacement of these sections of the Chevron pipeline, if and when necessary, could be made in completely dry conditions with no impact on surface water resources.

4.3.3.1.2 Perennial Water Bodies Also Crossed by the Proposed Waiau Pipeline Route

As it passes around the shoreline of Pearl Harbor to Waiau the Chevron line crosses many drainageways quite close to where they would be crossed by the proposed Waiau Pipeline. These include, from west to east, the Hō'ae'ae Storm Canal, an unnamed storm drain, Waikele and Kapakahi Streams, the Waipahu Canal, Waiawa Stream, Waimano Stream, and the channel that drains the Kaluao'opu Springs (see Table 3-6 and Figure 3-3).

At all of these locations the Chevron pipeline crossing is via an overpass structure. While performing maintenance activities at these crossings, no trenching or other impacts to the drainageways are necessary to replace the pipe. In addition, Chevron conducts its maintenance activities in accordance with Federal regulations (49 CFR 195), which minimize or eliminate the potential for adverse impacts from these maintenance activities. No substantial effects on surface waters would be anticipated from these normal maintenance activities.

4.3.3.1.3 Other Crossings of Drainageways

Honouliuli Gulch: The Chevron pipeline also crosses Honouliuli Gulch immediately inland of its discharge point into West Loch. At this location, and in contrast to the proposed Waiau Pipeline crossing 7,300 feet further inland, Honouliuli Gulch is a tidal estuary. Water in the estuary is predominately seawater, although a small amount of slightly brackish spring discharge does occur in the channel reach between Fort Weaver Road and the West Loch shoreline. This modest spring discharge is reflected in the salinity of top and bottom samples of the water at the Chevron pipeline crossing (Table 4-14).

Pearl Harbor Springs at Waiawa (Crossing S-PHS on Figure 3-2): The Pearl Harbor Springs at Waiawa emerge at the foot of the embankment directly *makai* of Leeward Community College. Due to the relatively narrow (25-foot) opening in the berm which was originally constructed for the OR&L right-of-way, the springs sustain a wetlands of 20 to 25 acres, some of which is used for watercress cultivation. The USGS periodically measures the combined flow of the springs as it exits the wetland through the opening in the OR&L berm (see Table 4-15). The discharge is quite large, on the order of

7 to 10 MGD, and the water is slightly brackish[27]. Spring flow discharged through this opening passes through mangroves into Middle Loch of Pearl Harbor.

Table 4-14 Specific Conductance, Temperature and Salinity of Honouliuli Gulch

Location in Water Column	Specific Conductance (µS/cm)	Salinity (ppt)	Temperature (F°)
Upper 6 inches	35,400	22.6	82.0
Bottom (2 ft. depth)	41,500	26.5	80.4
Source: Tom Nance Water Resource Engineering			

Table 4-15 Characteristics of Pearl Harbor Springs, Waiawa (USGS Station #2140)

Date of Measurement	Flow Rate (MGD)	Specific Conductance (µS/cm)	Temperature (F°)
5/12/1999	7.82	3,600	73.4
7/12/1999	8.21	3,530	71.6
4/6/2000	10.4	3,860	75.2
6/29/2000	9.24	3,650	71.6
Source: Tom Nance Water Resource Engineering			

The Chevron pipeline crosses the opening of the berm on the piers of what is now a relatively new bikeway bridge. However, the piers themselves appear to be part of an original bridge upon which the bikeway bridge has been constructed. The bottom of the pipeline is several feet above the water surface. Maintenance activities would not substantially affect these surface waters.

Crossings Between Waiau and Iwilei: Potential impacts to surface waters are also possible from maintenance of the Chevron pipeline's crossings of drainageways between the Waiau Generating Station and the Iwilei Tank Farm (see Figure 2-21 for crossings). These are all Class 2b intertidal or subtidal, brackish or saline estuaries [HAR §11-54-02(b)(2)(C)] and include, from west to east, the mouths of the Waimalu, Kalauao, 'Aiea and Hālawa Streams, Ke'ehi Lagoon, and the Kapālama Drainage Canal. The possible impacts of regular maintenance activities on these crossings were not analyzed for this report, but observations of similar crossings in the Barbers Point to Waiau portion of the Chevron pipeline indicate that they are normally small.

4.3.3.2 Impact of an Oil Spill on Surface Waters

Since 1996, Chevron has increased the intensity of its inspection and maintenance program and upgraded its leak detection system. For the purposes of this analysis, we have assumed that a future oil spill from the Chevron pipeline could be of the same volume and could lead to similar effects on surface waters as were experienced as a result of the 1996 spill. Hence, the size of the potential spill from the Chevron pipeline is assumed to be equal to the 982 barrels that were released during the May 14, 1996 incident. The potential biological effects of such a spill are discussed later in this chapter.

[27] Specific conductance values are in excess of 3,000 µS/cm whereas fresh water is less than 1,000 µS/cm

4.3.3.3 Chevron Pipeline Decommissioning

Existing State and Federal regulations make Chevron responsible for taking precautions to avoid adverse effect when its pipeline is taken out of service. Chevron would be responsible for draining and cleaning of the pipeline, and possibly for the removal of portions of the pipeline itself, when it terminates pipeline operation of and returns the easement to the State of Hawai'i. Commonly, pipelines are abandoned in place. If abandoned, the pipeline would be sealed and filled with pressurized inert nitrogen gas or filled with grout. If portions of the pipe are removed, Chevron is required to use best management practices to ensure that the removal operations do not cause excessive erosion or sediment runoff. These measures would minimize the potential for adverse water quality effects. Any spilled oil or soil that is contaminated by the operation must be cleaned up or removed and disposed of properly [49 CFR 195.402(c) (10)].

4.3.4 ALTERNATIVE 3: TRUCKING

As described in Section 2.3, Alternative 3 involves the use of trucks to transport fuel from BPTF to both Waiau and Iwilei. Potential impacts from construction of the facilities necessary to support this alternative, normal operations, and oil spills are examined in the following sections.

4.3.4.1 Construction

Installation of the fuel truck loading/unloading facilities at the BPTF and the Waiau Generating Station would involve some minor modification of the existing surfaces (see Figure 2-23 and Figure 2-24). This alternative would also include the modifications to the Iwilei Storage Facility, examined in Section 4.1.1.3. These developments would all take place on areas that have already been graded and extensively disturbed in the past. Best management practices would be used to ensure minimal stormwater runoff for these activities. Consequently the construction would comply with applicable water quality standards.

4.3.4.2 Normal Operation

Trucks would operate on existing roads and paved access driveways. They would be well-maintained and would represent a very small percentage of total traffic on the roadway. Consequently, there are no mechanisms through which normal operation of the trucks and related facilities could adversely affect water quality.

4.3.4.3 Impact of an Oil Spill on Surface Waters

If an oil spill were to occur from a trucking accident, a maximum of 140 barrels of LSFO could be released into the environment.[28] If a spill were to occur, the oil would begin to cool immediately and rapidly, greatly restricting its ability to migrate away from the scene of the accident and enter a water body. An appropriate oil spill contingency plan[29] would be implemented to contain and remove the spilled material, thereby mitigating possible adverse effects. Oil would be removed from areas contaminated by the spilled oil and the areas would be remediated. For these reasons, no substantial impacts on surface waters are anticipated.

4.4 GROUNDWATER IMPACTS

4.4.1 ACTIVITIES WITH THE POTENTIAL TO IMPACT GROUNDWATER

None of the three Action Alternatives would change the amount of groundwater used or alter the amount of groundwater recharge. Consequently, the only kinds of potential effects are related to groundwater quality.

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[28] The diesel fuel that used at Waiau would continue to be supplied through other pipelines.

[29] A specific Oil Spill Contingency Plan would be drafted, pursuant to the U.S. Department of Transportation regulations (49 CFR 195) for this Alternative should it be selected.

Potential construction effects on groundwater quality are very limited. Construction of the pipeline does not involve the use of substantial amounts of chemicals or other potential contaminants. The water that would be used to hydrotest the pipeline as segments are completed would be of a quality equal to or better than the quality of the groundwater underlying the areas onto which it would be disposed.

In view of the foregoing, the only real concern is the possibility that a leak of LSFO or diesel oil could adversely affect groundwater quality in an area that is used as a potable water source. The remainder of this section discusses the risk of this that is associated with each of the three Action Alternatives.

Both pipeline routes pass within a few thousand feet or less from various potable water and brackish irrigation wells. LSFO is so viscous at ambient temperature that it does not have the potential to migrate far from the point of release before it cools and hardens, stopping further movement. Furthermore, LSFO contains only very low concentrations of compounds that are significantly soluble in water. Consequently, a release that occurs while either the Waiau Fuel Pipeline or the existing Chevron pipeline is filled with LSFO does not have the potential to affect groundwater quality in any significant way.

Lighter grades of oil are liquid at normal ambient temperatures and can disperse beyond the immediate vicinity of a pipeline leak or break. They also contain compounds that are water soluble and capable of being entrained into groundwater flows.

The exact composition of diesel oil can vary significantly, depending upon the specific chemistry of the original feedstock. Research efforts by Fleischer, et al. (1986) examined the potential environmental fate of selected components of this and other oil types using a computer simulation model called SESOIL (Seasonal Soil Compartment Model) developed for the U.S. EPA Office of Toxic Substances. Results of the SESOIL simulation modeling indicate that several specific compounds, including benzene, ethyl-benzene, naphthalene, phenol, and ortho-xylene can dissolve in groundwater and thus present the potential for impacts to groundwater. Potential impacts related to the contamination of groundwater by these types of compounds are discussed in Section 4.4.2.5 for the Proposed Waiau Fuel Pipeline and in Section 4.4.3.4 for the Chevron Pipeline.

4.4.2 PROPOSED ACTION (ALTERNATIVE 1)

The proposed Waiau Fuel Pipeline crosses over four groundwater aquifers. For the first 2.0 miles from HECO's Barbers Point Tank Farm to the upper end of Kalaeloa Boulevard, the proposed pipeline route is over the Malakole Sector of the 'Ewa (Limestone) Caprock Aquifer. From that point and following along Farrington Highway for the next 3.8 miles, the route crosses the 'Ewa-Kunia Aquifer. The next 6.7 miles traverses the entire width of the Waipahu-Waiawa Aquifer, and the final 0.3 miles next to the Waiau power plant is over the southwest corner of the Waimalu Aquifer. Figure 3-4 shows these aquifer boundaries in relation to the pipeline route. Potential effects on the four aquifers from construction and normal operation of the proposed pipeline are discussed in Sections 4.4.2.1 through 4.4.2.4. The implications of an accidental oil spill are discussed in Section 4.4.2.5.

4.4.2.1 Malakole Sector of the 'Ewa (Limestone) Aquifer

The 'Ewa limestone aquifer is a brackish to saline groundwater body which exists as a thin basal lens in the permeable coralline reef deposits which create the 'Ewa Plain. Water levels are on the order of 0.5 to 1.5 feet above sea level. Although there are no internal hydrologic boundaries across the nine-mile width of the 'Ewa Plain, the Commission on Water Resource Management (CWRM) has divided the aquifer into three sectors for management purposes. The two-mile width on the west side of the 'Ewa Plain was designated the Malakole Sector. This is the aquifer sector that would be traversed by the first two miles of the proposed pipeline.

Water in the Malakole Sector, unlike the two sectors of the caprock aquifer to the east, is too saline for irrigation supply. However, it is used extensively for industrial cooling. The typical pattern of

this use is to draw water from wells in the shallow aquifer and return residual amounts not lost to evaporative cooling to the underlying (and hydrologically separate) second limestone layer of the 'Ewa Plain. The most significant such users are Kalaeloa Partners cogeneration plant (Well Nos. 1805-04 to 09), the HPOWER plant (Well Nos. 1806-09 and 10), and the AES cogeneration plant (Well Nos. 1806-11 to 14). Salinity of the water pumped by these wells varies from 30 to 98 percent of the salinity of seawater. The locations of these wells are shown on Figure 3-2.

Trench excavation and installation of the fuel pipeline across the Malakole Sector of the 'Ewa Limestone Aquifer would not intercept groundwater. There would typically be five to more than 30 feet vertical separation from the bottom of the pipeline trench to the top of groundwater. As such, the pipe's installation should have no direct impact on the underlying groundwater body.

4.4.2.2 'Ewa-Kunia Aquifer

The 'Ewa-Kunia Aquifer is the CWRM's name for the groundwater body that exists in the Waianae volcanic formation. Water levels in the portion of the aquifer traversed by the pipeline route are 14 to 15 feet above sea level and the groundwater gradients are very flat. Ground elevations along the proposed pipeline route across this aquifer vary from 80 to 160 feet above sea level. Based on the drillers' logs of the nearest wells, the first 50 to 100 feet below ground is comprised of soil and saprolite. This means that there would be substantial vertical separation between the bottom of the pipeline trench and the underlying groundwater and that much of this intervening material is of low permeability.~~80 to 160 feet above sea level, providing a substantial vertical separation from the bottom of the pipeline trench to the underlying groundwater. This means there should be no direct impact to groundwater due to the pipeline's installation.~~

There are three locations in this aquifer where water is extracted for drinking water supply (all locations shown on Figure 3-4):

- The six BWS wells in upper Honouliuli (Nos. 2303-01 to 06) which typically pump 7.5 MGD;
- The Navy's Barbers Point Shaft (No. 2103-03) which produces about 2.3 MGD; and
- The BWS Makakilo Well (No. 2004-04) which has averaged 0.65 MGD in recent years.

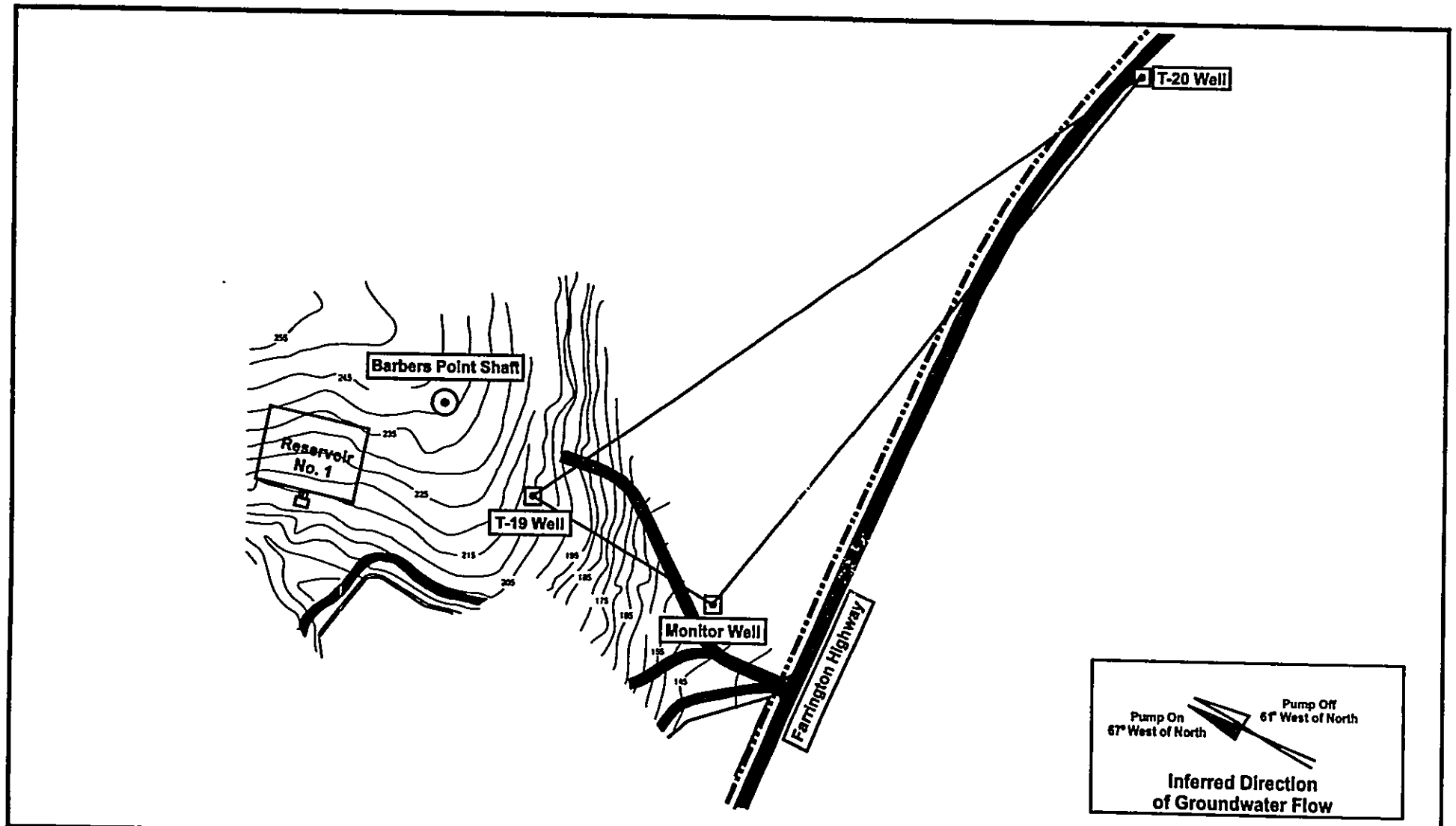
The BWS wells in upper Honouliuli are more than 1.1 miles away and are hydrologically up-gradient of the pipeline route. The other two drinking water wells are closer, being 400 to 800 feet from the route of the proposed Waiau Fuel Pipeline at its nearest points.

Groundwater gradients in the 'Ewa-Kunia Aquifer in the vicinity of the Navy's Barbers Point Shaft are shown on Figure 4-3. The local gradient is to the northwest with a minor variation in direction depending on whether the shaft's pumps are on or off. The general groundwater gradient in the vicinity of the BWS Makakilo well is generally west-southwest and it is approximately 0.5 feet per mile (Tom Nance Water Resource Engineering 1998). Construction of the proposed pipeline does not involve activities with the potential to affect any of these wells.

4.4.2.3 Waipahu-Waiawa Aquifer

The Waipahu-Waiawa Aquifer is a major source of the island's drinking water supply for areas from Honolulu to Nānākuli and in Central O'ahu. The CWRM has set the aquifer's sustainable yield at 104 MGD. At present, authorized pumpage totals 82.5 MGD, of which 54.8 MGD has been allocated to the Honolulu BWS. Actual pumpage is about 30 MGD less than the authorized use. About 24 MGD of this authorized (but as yet unused) allocation has been assigned to the BWS.

BWS has 20 active (or about to become active) well and well battery locations in the aquifer. There are 61 individual wells at these 20 sites. The locations of the well and well batteries which are



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Tom Nance Water Resource Engineering, Inc.
City & County of Honolulu GIS
Rooney Engineering, Inc.

Legend:

- Groundwater Level Measurement Station
- Shaft Well
- Roadway
- Proposed HECO Pipeline Route

N

0 100 200 300 400

SCALE IN FEET

Figure 4-3:

Directions of Groundwater Flow in the Vicinity of the Barbers Point Well Shaft

Waiau Fuel Pipeline Project

nearest to the pipeline route are identified on Figure 3-2, and information on their authorized and actual use is presented in Table 4-16. All other BWS facilities are located further inland and farther away from the pipeline route.

Table 4-16 Municipal Water Wells in the Waipahu-Waiawa Aquifer Nearest to the Proposed Pipeline Route

Well Facility		*Authorized Use (MGD)*	*Current Use (MGD)*	*Mauka Distance From Pipeline (ft.)*
Name	*State Well No.*			
'Ewa Shaft (EP 15 & 16)	2202-21	12.154	Not Yet in Use	1,600
Kunia I	2302-01 to 04	4.357	4.114	3,900
Hō'ae'ae	2301-34 to 39	6.61	9.132	3,800
Waipahu IV	2301-44 to 47	1	Not Yet in Use	4,700
Pearl City Shaft	2458-01	1.32	0.677	2,800
Pearl City I	2458-03 & 04	0.7	0.618	4,000
Pearl City II	2457-01 to 03	1.80	1.58	6,400

1. Authorized use amounts from the CWRM Island Water Use Permit Index dated October 18, 2001.
2. Current use rates are the average pumpage for the four-year period through May 2001.
3. A number of private wells are located near Leeward College and the Preferred and Chevron pipeline routes. The status of these wells (in use, abandoned, or sealed) is not known.

Source: Tom Nance Water Resource Engineering

Groundwater gradients, based on data from wells and as defined by numerical simulations in Oki (1998), are generally oriented toward the aquifer's natural discharge points at springs along the West, Middle, and East Loch shorelines of Pearl Harbor. That means that the directions of groundwater flow are generally away from the BWS well facilities and toward the HECO pipeline route. Measured and simulated gradients are on the order of one foot per 1,800 feet on the west side of the aquifer near the 'Ewa Shaft, Kunia I, and Hō'ae'ae pumping centers. On the east side near BWS' Pearl City Shaft and Pearl City I facilities, gradients are slightly flatter at one foot per 2,800 feet.

The proposed Waiau Fuel Pipeline route crosses the *makai* end of the aquifer. In the vicinity of streams and marshes, the lower reaches of some streams and the springs *makai* of Leeward Community College are points of natural discharge from this aquifer. This discharge is moving upward through the sapprolite and alluvium which overlie permeable lavas at depth. Based on logs of drilled wells, the thickness of sapprolite and alluvium is several tens to more than 100 feet. This means that although extensive sections of the pipeline trench would be at lower elevations than the 14- to 18-foot piezometric head of the underlying aquifer, the trench excavation would not intercept the aquifer itself. With the possibility of some localized exceptions, trench excavations would be dry. Dewatering, if required at some locations, would involve minimal water volumes due to the nominal permeability of the silt and clay soils.

4.4.2.4 Waimalu Aquifer

The last 0.3 miles of the pipeline route crosses the southwest corner of the Waimalu Aquifer. This aquifer also provides substantial drinking water supply, including drafts by 33 BWS wells at 12 facilities throughout the aquifer. The nearest of these pumping centers are listed in Table 4-17 and located on Figure 3-2. Except for the two Ka'ahumanu wells, all of the BWS wells are more than a mile up-gradient of the pipeline. The Ka'ahumanu wells are across gradient from the end of the pipeline route. As with the adjacent Waipahu-Waiawa Aquifer, the direction of flow is toward discharge along the Pearl Harbor shoreline. Gradients in this corner of the aquifer are on the order of one foot per 3,000 feet. Trench excavation for the pipeline across this corner of the aquifer, for the same reasons given above for the Waipahu-Waiawa Aquifer, would not intercept the underlying groundwater body.

Table 4-17 Municipal Water Wells in the Waimalu Aquifer Nearest to the Proposed Pipeline Route

Well Facility		*Authorized Use (MGD)*	*Current Use (MGD)*	*Mauka Distance From Pipeline (ft.)*
Name	*State Well No.*			
Waiau	2457-13 to 15	1.89	1.647	5,100
Punamani	2457-05 to 12	11.97	12.276	6,400
Newtown	2456-01 to 03	1.50	0.917	7,700
Waimalu	2356-49 & 50	0.08	0.000	6,600
Ka'ahumanu	2357-23 & 24	1.11	1.094	3,500

Note 1: Authorized use amounts from the CWRM Island Water Use Permit Index dated October 18, 2001.
Note 2: Current use rates are the average pumpage for the four-year period through May 2001.
Source: Compiled by Tom Nance Water Resource Engineering

4.4.2.5 Impact of an Accidental Oil Spill on Groundwater: Waiau Fuel Pipeline

At least every five years, and more frequently if necessary, the proposed pipeline would be subjected to integrity tests using internal inspection tools, "smart pigs," that are inserted into the pipeline.[30] These devices use a variety of techniques to provide detailed information concerning the physical properties of the pipe, but they do not function properly in LSFO at the high temperatures necessary for its efficient flow. Consequently, the LSFO in the line must be replaced with less viscous oil, such as diesel, for the test. This impact analysis conservatively assumes that diesel oil would be present in the Waiau Fuel Pipeline once every three years. Typically, about 2 days would suffice for the test, meaning that diesel would be present less than 0.2 percent of the time. It is only during the periods when the pipeline is carrying diesel oil that there is any potential for groundwater contamination from a leak or break in the pipe.

Despite the extremely low probability of a leak of diesel fuel, HECO completed a first order screening evaluation to determine if releases of diesel fuel from the pipeline would have any potential to impact any of the drinking water wells described above.

Most of the wells listed are far removed from the proposed pipeline route and/or tap groundwater that is hydrologically upgradient from it. There is no potential for the proposed project to affect these

[30] The term "smart pig" refers to an instrumented inspection device or internal inspection pig. These pigs can detect certain corrosion and deformation anomalies in the pipe wall. This type of pig records the existence, location, and relative severity of the anomalies through use of recording equipment carried on board the pig.

wells. However, the five well facilities listed in Table 4-18 cannot be dismissed from consideration immediately using these criteria. The following paragraphs discuss each well facility separately.

Barbers Pt. Shaft: This shaft is located approximately 660 feet from the pipeline at the nearest point along its route. The ground surface at the shaft is approximately 242 feet (above mean sea level, MSL). Development tunnels which deliver water to the vertical shaft are parallel to the pipeline alignment and lead away from it. The development tunnels have an invert elevation of -4 feet MSL, and the groundwater level within the shaft is +14 feet MSL. The pipeline alignment has an approximate elevation of 130 to 135 feet MSL as it passes south and east of the shaft. As shown in Figure 4-3, the direction of groundwater flow beneath this segment of the pipeline route is generally from the pipeline toward the well battery. Thus, preliminary screening of this situation cannot completely eliminate the possibility that a leak of diesel oil from the proposed pipeline could result in some contamination of the well by the soluble components of the diesel oil. The probability of this occurring (which requires the rare presence of light fuel in the pipeline combined with the complete fracture of the pipe by an unauthorized contractor working in an area that is marked for pipelines) is very low. Fortunately, the risk can be further reduced by intensifying visual inspection along the portion of the pipeline near these wells during the two days every several years when lighter oil is in the line.

Table 4-18 Drinking Water Wells of Concern near Proposed Pipeline Route

Well Facility		*Horizontal Distance to Pipeline (ft.)*	*Vertical Elevation of Well Above Groundwater Table (ft.)*
Name	*State Well No.*		
Barbers Point Shaft	2103-03	660	116-121
Makakilo Well	2004-04	850	86-91
'Ewa Shaft, EP 15/16	2202-21	1,750	138-143
Hō'ae'ae Wells	2301-34 to 39	3,500	28
Kunia I	2302-01 to 04	4,000	33

Source: Compiled by Planning Solutions, Inc. and Tom Nance Water Resource Engineering

Makakilo Well: This well is located approximately 850 feet north of the pipeline at the nearest point along its route. The ground surface at the well is approximately +141 feet MSL. The groundwater level within the well is +14 feet. The well is located upslope of the pipeline alignment, which has an approximate elevation of +100 to +105 feet MSL. Because the general direction of groundwater flow beneath the pipeline at this location is from the well, screening indicates that there is no substantial potential for contamination of this well from a pipeline leak or break.

Ewa Shaft EP 15/16: This shaft is located approximately 1,750 feet northwest of the pipeline at the nearest point. The ground surface at the shaft is approximately +150 feet MSL. A single 1,050-foot-long development tunnel heads north away from the shaft and away from the pipeline. The development tunnel has invert elevations ranging from +3 to -4 feet MSL, and the groundwater level within the shaft is +17 feet MSL.

At this location, the direction of groundwater flow is from the northwest to the southeast, ultimately discharging into the West Loch of Pearl Harbor. However, when the BWS begins to use the shaft for potable supply, it will pump on the order of 10 to 15 MGD, and this will reverse the gradient downstream of the shaft for some distance. Using simplifying assumptions, the stagnation point downstream of the shaft (i.e., the point at which the flow reversal will not occur) is likely to be on the

order of 800 to 1,200 feet. Since the nearest point for a possible fuel release from the pipeline is 1,750 feet, it does not appear that the soluble component of such an accidental release could ultimately reach the shaft.

Hō'ae'ae Wells: This well facility is located approximately 3,500 feet northeast of the pipeline at the nearest point. The ground surface at the well battery is approximately +130 feet. The groundwater level within the wells is +17 feet MSL. The wells are located upslope of the pipeline alignment, which has an approximate elevation of +45 feet MSL. At this location also, groundwater would carry oil from a leak in the proposed pipeline away from the wells, and so the preliminary screening indicates that there is no potential for contamination of these well from a pipeline leak. This conclusion is consistent with the estimate of the wellhead protection area for these wells developed by the State of Hawai'i Department of Health and the U.S. EPA (Hageman and Fukunaga 1995). The boundary of the wellhead protection area determined by this study is more than 1,800 feet from the closest point on the proposed pipeline route.

Kunia I Wells: These wells are located approximately 4,000 feet northwest of the pipeline at the nearest point. The ground surface at the well battery is approximately +205 feet MSL. The groundwater level within the wells is +17 feet MSL. The well is located upslope of the pipeline alignment, which has an approximate elevation of +45 feet MSL. The pipeline would be constructed at approximately 5 feet below the ground surface. At this location also, groundwater would carry oil from a leak in the proposed pipeline away from the wells; thus, the preliminary screening indicates that there is no potential for contamination of these well from a pipeline leak. This conclusion is consistent with the demonstration project estimate of the wellhead protection area for these wells developed by the State of Hawai'i Department of Health and the U.S. EPA (Hageman and Fukunaga 1995). The boundary of the wellhead protection area determined by that study was more than 1,800 feet from the closest point on the proposed pipeline route.

In summary, the proposed Waiau Fuel Pipeline would, in general, have no potential for impacting groundwater resources during the 99.8% of the time that LSFO would be present in it. However, during the integrity tests that would be conducted every few years (i.e. less than 0.2% of the time), the pipeline would be filled with diesel oil. It is not possible to eliminate the possibility that a pipeline leak or break at the closest point to the Barbers Point Shaft could introduce small amounts of the water-soluble components of the oil into the groundwater tapped by this potable water drinking source.

It is important to note that installation of the new HECO pipeline does not significantly increase the probability of this occurring compared to the existing situation where the Tesoro pipeline, also in the State Energy Corridor, is filled with light petroleum products almost all of the time. To mitigate this potential impact, HECO would take special precautions at this location to ensure that unauthorized excavation activities would not occur during the brief periods when diesel fuel would be in the line.

4.4.3 ALTERNATIVE 2: CHEVRON PIPELINE

The more *makai* route of the Chevron pipeline (relative to the proposed Waiau Fuel Pipeline) avoids the portion of the 'Ewa-Kunia Aquifer traversed by Alternative 1. Instead, the Chevron pipeline crosses the width of the 'Ewa Plain, remaining over the 'Ewa Limestone Aquifer for the entire distance from the BPTF to the southern shore of West Loch. Once it reaches West Loch, the Chevron pipeline follows essentially the same route as HECO's proposed Waiau Fuel Line. The route also passes beyond the Waiau Generating Station through the lower reaches of the Waimalu, Moanalua, and Kalihi aquifers to its terminus in Iwilei. The potential effects on groundwater of the ongoing operation and maintenance that would be needed for this alternative are discussed in Sections 4.4.3.1 and 4.4.3.2. Accidental spills and leaks are discussed in Section 4.4.3.4.

4.4.3.1 'Ewa (Limestone) Aquifer

The Chevron pipeline traverses all three sectors of the caprock aquifer (Malakole, Kapolei, and Pu'uloa). The Kapolei and Pu'uloa sectors are utilized for landscape irrigation. By far the greatest such use is by the four golf courses listed below in Table 4-19. Just recently, however, wastewater from the Honouliuli treatment plant, polished to R-1 quality, has replaced brackish groundwater as the primary source of irrigation supply for the Kapolei, Coral Creek, and Hawai'i Prince golf courses.

The Chevron pipeline typically does not directly intercept groundwater in the Kapolei and Pu'uloa sectors of the caprock aquifer. The bottom of the pipeline trench is typically 20 to 40 feet above the underlying groundwater. Hence, the continuation of normal operations and maintenance activities does not have the potential to substantially affect these aquifers.

4.4.3.2 Waipahu-Waiawa and Waimalu Aquifers

The Chevron pipeline follows essentially the same route across these aquifers as the one followed by the proposed Waiau Fuel Line discussed in 4.4.2. Hence, its potential effects in this area are identical to those for that alternative.

Table 4-19 Golf Course Irrigation Usage

Golf Course	*Aquifer Sector*	*State Well No.*	*Authorized Use (MGD)*
Kapolei	Kapolei	2003-01, 2003-02, and 2003-05	1
Hawai'i Prince	Pu'uloa	1900-02, 1900-17 to 20, and 1901-03	1.201
New 'Ewa Beach	Pu'uloa	1900-21 & 22, and 1959-08	0.7
Coral Creek	Pu'uloa	2001-14 and 2002-15, 17, & 19	0.892
Source: Compiled by Tom Nance Water Resource Engineering			

4.4.3.3 Waimalu, Moanalua and Kalihi Aquifers

The Chevron pipeline continues beyond the Waiau Generating Station through the lower reaches of the Waimalu, Moanalua, and Kalihi aquifers to its terminus in Iwilei. Detailed consideration of the impacts of maintenance activities on these aquifers is not included in this report. However, the pipeline is generally well removed and down-slope from sources of potable water along this portion of the route.

4.4.3.4 Impact of an Accidental Oil Spill on Groundwater: Chevron Pipeline

The Chevron pipeline is well *makai* and hydrologically separated from the groundwater aquifers tapped by the important potable water well sources discussed above in Section 4.4.2.5. An accidental release from the Chevron line could enter the underlying brackish caprock aquifer, but it could never reach potable groundwater.

The situation is slightly different with respect to water quality in the caprock aquifer. This stems from differences in the way in which the two lines would be operated. As discussed earlier in this report, because the Chevron line is not insulated, LSFO must be pumped through it at a high rate (approximately 1,000 barrels per hour versus the 333 barrels per hour that would be used for the Waiau Fuel Line) to insure that it reaches Waiau without congealing in the pipe. Because the Waiau Generating Station uses fuel at only one-third this rate, Chevron must pump LSFO for a few days, then lay the line up for several days by introducing lighter oil (generally No. 5 fuel oil) into the pipe to displace the LSFO. Unlike LSFO, this lighter oil has a higher concentration of constituents that are soluble in water. If small leaks do develop in buried portions of the line, oil would escape and could

potentially reach the underlying brackish groundwater. Thus, there is a greater potential for Alternative 2 to introduce oil into the groundwater than there is for the proposed Waiau Fuel Pipeline project, but the groundwater reached would not be part of a present or possible future drinking water source.

4.4.4 ALTERNATIVE 3: TRUCKING

Construction and normal operations of this alternative do not have the potential to adversely affect groundwater resources. Accidents are possible anywhere along the truck delivery route, much of which is over aquifers that are used as sources of potable water. However, because only LSFO would be transported and would not spread far in the event of an accident, there is little chance for adverse effects from this source.

4.5 IMPACTS ON AQUATIC COMMUNITIES

As noted in Section 3.6.1, all of the aquatic communities that could be affected by the project are within the Pearl Harbor drainage area. This section identifies the potential adverse effects associated with each alternative: More information relevant to aquatic communities is presented in Appendix B and Appendix C.

- Section 4.5.1 describes the distinct aquatic communities within the Harbor basin that could be affected by the Action Alternatives.[31]
- Section 4.5.2 discusses the present conditions in these systems, including water quality, existing contamination, and existing physical alterations of the natural habitats. Because of its relevance to this project, the 1996 oil spill from the Chevron pipeline is given specific attention in 4.5.2.2.
- Sections 4.5.3, 4.5.4 and 4.5.5 consider the potential impacts that each of the three Action Alternatives could have on these aquatic communities.

The discussion includes a review of potential effects during construction, normal operations, and in the event of an accidental release.

4.5.1 KEY AQUATIC COMMUNITIES OF INTEREST

4.5.1.1 Pearl Harbor

Pearl Harbor is Hawaii's largest natural estuary and possesses a rich diversity of salt-tolerant aquatic species, many of which are of significance to recreational and subsistence fisheries. In recent years, however, populations of numerous introduced non-native species have become established within the harbor. ~~Coles~~Englund, et al. (~~1999~~2000) indicate that new introductions of non-native species into Hawaiian streams and estuaries appear to be continuing at an estimated rate of 6.4 species per decade. Appendix B summarizes the primary aquatic communities found in the harbor and its subtidal and intertidal margins.

Pearl Harbor has been the hub for the U.S. Naval operations in the Pacific since the early 1900's. It contains berthing and maintenance facilities for hundreds of ships, and most of the harbor's shoreline (outside of West Loch) has been heavily modified over the years. Most of the harbor bottom has been dredged to accommodate shipping, with major channels kept at a depth of approximately 40 feet. The benthos within the dredged areas is highly disturbed.

Freshwater flow into Pearl Harbor has been estimated to be about 187,500 m^3/day (or 50 MGD) during dry periods and more than twice that during wet periods (Cox and Gordon 1970). The high volume of freshwater entering the harbor has a significant effect on the distribution of biota, especially on the shallow reef flats and inner portions of the harbor.

[31] More detailed characterizations of the aquatic communities found in the harbor and its inflowing drainages are presented, respectively, in Appendix A and Appendix B.

4.5.1.2 Perennial Streams and Tidal Channels

As discussed in Section 4.3.2.3, the influent streams to Pearl Harbor include one of O'ahu's largest perennial stream (Waikele). However, the ecological significance of these streams and those of O'ahu have been severely degraded over the past century (Timbol and Maciolek 1978; Maciolek 1984; Devick 1991; Polhemus 1996). Timbol and Maciolek (1978) inventoried O'ahu streams and classified their biological importance relative to the extent of their physical alteration. All streams draining into Pearl Harbor demonstrated a high degree of artificial channelization along a significant portion of their lower reaches. Most have been dewatered to some degree by surface diversion and groundwater pumping, and portions of many have been dammed, realigned, and/or channelized. Timbol and Maciolek (1978) classified the ecological value of most Pearl Harbor streams as Class III (exploitive-consumptive). Within the Waikele Stream watershed alone, they counted a total of 14 surface diversions and 65 road crossings.

4.5.1.3 Wetlands in the Vicinity of the Project Alternatives

The Waiau Fuel Pipeline and Chevron pipeline routes, as well as the Waiau Generating Station, are near a number of wetlands, as designated on the U.S. Fish and Wildlife Service Wetlands Inventory Maps of 1978. An artificial wetland is located at the Chevron Refinery in Campbell Industrial Park immediately adjacent to the Barbers Point Tank Farm. The other facilities that would be constructed or modified are not near wetlands.

Wetland habitats fed by groundwater seepage, springs, and streams are found along the shoreline and terminal reaches of streams within Pearl Harbor. The National Wetlands Inventory (NWI) classifications for the wetlands around Pearl Harbor and near the two pipeline routes are depicted on Figure 4-4. As indicated by that map, both pipelines pass close to several types of wetlands. Those classified as E2FO3, "Estuarine, intertidal, forested, broad-leaved evergreen wetlands (i.e., mangrove forests)" are the most common. They line the shore of the West and East Lochs of Pearl Harbor and are immediately adjacent to the pipeline alignments where they pass *makai* of the Waipahu Industrial Park. The Chevron line also passes near a number of freshwater, palustrine wetlands (marshes) as it skirts the western edge of West Loch. In addition, other marshy areas are located near the pipeline routes on the Pearl City Peninsula and immediately *makai* of the pipelines' termini at the Waiau Generating Station.

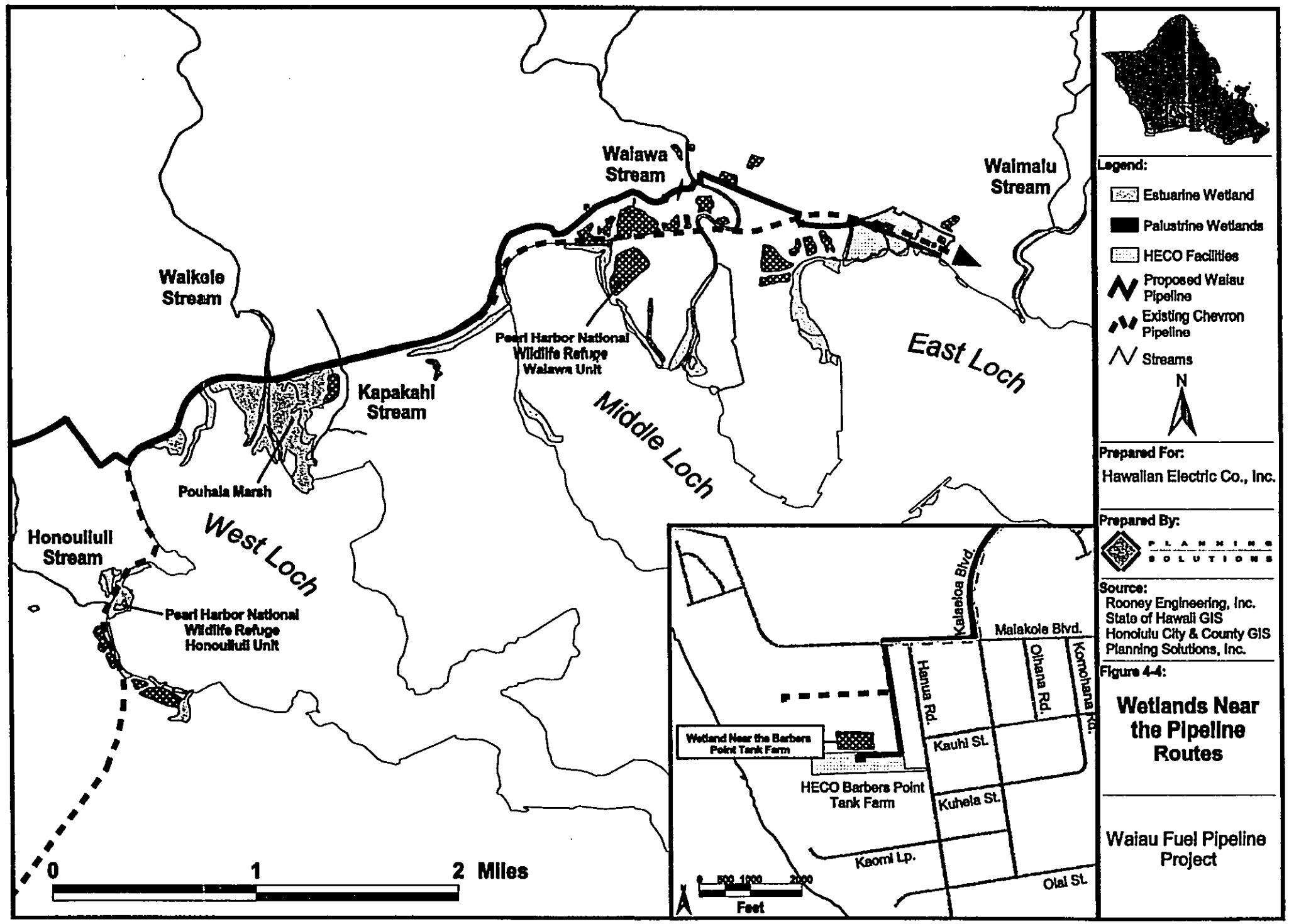
The Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit, 1990) identifies the Waimalu, Waiawa, Waikele, and Honouliuli estuarine areas as "special areas" primarily due to the significance of their riparian wetlands to endangered waterbirds. The US Fish and Wildlife Service (1990) listed Pouhala Marsh as a priority wetland acquisition site due to its importance for endangered species habitat, migratory waterbirds and waterfowl, and flood control. In addition to the Honouliuli and Waiawa units of the Pearl Harbor National Wildlife Refuge, Miller, et al. (1989) list riparian wetlands within the terminal reach of Waikele Stream, Waipahu Landfill, Pouhala Marsh, and the Waipi'o Peninsula as important, ecologically sensitive wetland habitats.

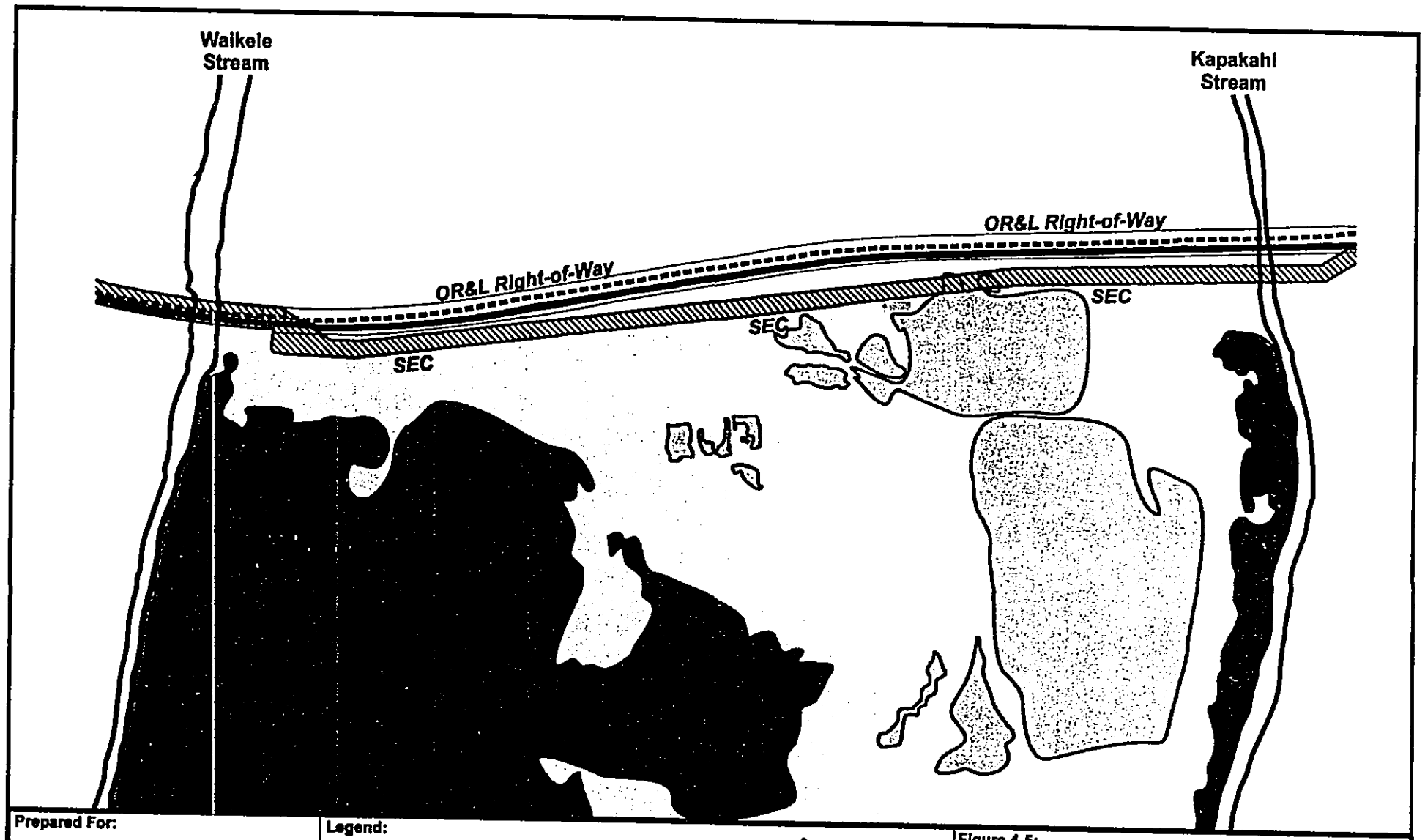
The largest and most biologically significant of the Pearl Harbor wetlands is the 70-acre Pouhala Marsh (Ducks Unlimited, 1998), which lies between the terminal reaches of Waikele and Kapakahi Streams. Pouhala is considered to be a Hawaiian playa wetland, and its salinity is influenced by seasonal changes in groundwater seepage, high stream flows, and tidal waters. As discussed in Section 4.3.2.3.9, portions of it may become hypersaline during dry periods. Figure 4-5 illustrates the distribution of wetland vegetation within Pouhala Marsh; it also shows the relationship of wetland areas to the boundaries of the State Energy Corridor and to the former OR&L right-of-way that HECO has proposed using as a means of avoiding work in the wetland.

Because of its significance as habitat for endangered Hawaiian waterbirds, Pouhala Marsh has become the focus of extensive habitat restoration efforts by Ducks Unlimited (1998), the U.S. Fish and Wildlife Service (1999), the State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife, and the City and County of Honolulu. HECO consulted

extensively with representatives of these organizations as it developed plans for the Waiau Fuel Pipeline. Its proposal to take its pipeline outside the SEC in this area is a direct result of the consultation and of HECO's desire to adhere to the management recommendations that those agencies provided. To date, no restoration construction has been initiated.

Two other notable wetland habitats are near the Chevron pipeline alignment. The first is the 36.5-acre Honouliuli Unit of the Pearl Harbor National Wildlife Refuge located on the western shore of West Loch. The second is the Refuge's 24.5-acre Waiawa Unit. The location of both these areas is shown on Figure 4-4. The U.S. Fish and Wildlife Service manages these areas under a use agreement with the U.S. Navy. Water is pumped into the two impoundments that make up the Honouliuli Unit from an on-site freshwater well. Water for the Waiawa Unit, which is also composed of two impoundments, is pumped into these impoundments from the ~~adjacent streamoutlet that drains the~~ adjacent Pearl Harbor Springs (also called the Waiawa Spring). ~~;t~~The Waiawa Unit has man-made islands for bird nesting. ~~The Waiawa Unit appears to be hydrologically linked to the 25-acre Waiawa Springs that feeds a broad area of cultivated watercress and taro fields below the Leeward Community College (Coles, et al. 1999).~~ Together, these two refuge units provide feeding, foraging, loafing, and nesting habitat for all four species of endangered Hawaiian waterbirds found on O'ahu and more than 25 species of migratory birds.


Waiawa Stream
Waimalu Stream
Waikele Stream
Kapakahi Stream
Pearl Harbor National Wildlife Refuge Waiawa Unit
East Loch
Middle Loch
West Loch
Pouhala Marsh
Honouliuli Stream
Pearl Harbor National Wildlife Refuge Honouliuli Unit
0
1
2 Miles
Wetland Near the Barbers Point Tank Farm
HECO Barbers Point Tank Farm
Kaloloa Blvd.
Malakole Blvd.
Hanua Rd.
Olhana Rd.
Komohana Rd.
Kauhi St.
Kuhela St.
Kaomi Lp.
Olai St.
0 500 1000 2000
Feet
Legend:
Estuarine Wetland
Palustrine Wetlands
HECO Facilities
Proposed Waiau Pipeline
Existing Chevron Pipeline
Streams
N
Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
PLANNING SOLUTIONS
Source:
Rooney Engineering, Inc.
State of Hawaii GIS
Honolulu City & County GIS
Planning Solutions, Inc.
Figure 4-4:
Wetlands Near the Pipeline Routes
Waiau Fuel Pipeline Project



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Ducks Unlimited, Inc.
Rooney Engineering, Inc.
Planning Solutions, Inc.

Legend:

Wetland Areas:
- Pickleweed
- Water
- Mangrove

- Proposed HECO Pipeline
- OR&L Right-of-Way
- State Energy Corridor (SEC)
- Chevron 8-Inch Pipeline

0 200 400 600
Feet

N

Figure 4-5:

Pouhala Marsh

Waiau Fuel Pipeline Project

4.5.2 EXISTING HABITAT CONTAMINATION AND ALTERATION

4.5.2.1 Historical Sources of Habitat Contamination and Alteration

Numerous pollution sources are known to affect Pearl Harbor. Cox and Gordon (1970) summarized the situation, noting that the primary sources of pollution in the harbor at that time included the sanitary sewer outfalls of the City and County of Honolulu and the U.S. Navy, sugar mill wastewater discharges, ships using the harbor, storm-sewer discharges, cesspool seepage and the discharge from the Hawaiian Electric Company power plant.

Streams are an important mechanism for carrying pollutants from the hinterland to the harbor. Studies determining the presence and concentration of pollutants in stream organisms and associated muds have demonstrated that some streams flowing into Pearl Harbor have considerable pollutant loads. These contaminants are the result of long-term agricultural and urban activities in upland areas and have been documented in many prior studies [see, for example, Schmidt, et al. (1990); Schmidt and Brumbaugh (1990); Krabbenhoft, et al. (1999); Del Monte Corporation (1998); (Brasher and Anthony, 2000); and Aoyama and Young (1974)].

Operations at the U.S. Naval Shipyard are also known to have contributed pollutants to the harbor. These include heavy metals from vessel maintenance activities and heat from the operation of the naval power plant (Evans 1974). The Pearl Harbor Naval Complex was placed on the National Priorities List of the nation's most contaminated hazardous waste sites (EPA 1992). In 1998, The State of Hawai'i Department of Health issued a health notice warning against the consumption of marine life taken from Pearl Harbor. The bottom within much of Pearl Harbor is physically disturbed on a regular basis by maintenance dredging of about 9 million cubic yards on four to five year cycles (Nystedt 1977 *in* Grovhoug 1992). Numerous fish and invertebrate kills have been reported in Pearl Harbor (see, for example, Peeling *et al.* (1972) and McCain (1977). Toxicity tests using standard marine bioassay organisms have pointed out the presence of a wide range of contaminants, including metals, organic tin compounds, polynuclear aromatic hydrocarbons, semi-volatile organic compounds, chlorinated pesticides, polychlorinated biphenyls, polychlorinated dioxins and furans, chlorinated herbicides, and ordnance compounds. Sources of these compounds are unknown but locations of occurrence suggest both civilian and military origins (Anon. February 1998).

In summary, biological communities in Pearl Harbor and the streams that are tributary to it have been subjected to numerous impacts due to human activities for close to 100 years. The species that survive there are for the most part hardy, non-native species.

4.5.2.2 May 1996 Oil Spill

While environmental scientists agree that the pollutants associated with these extensive, long-term agricultural, military, and urban uses of the Pearl Harbor watershed have been by far the most influential factor in shaping the basin's existing aquatic communities, a single event, the May 1996 Chevron oil spill into Waiau Stream is probably better known to the general public. More importantly, as discussed in Section 4.3.2.5, the results of studies that were conducted of that spill's effects constitute an extremely useful means of understanding the potential effects of a catastrophic failure of the proposed Waiau Fuel Line. In their report on the biological effects of the spill, the Trustees (1999, page 3) noted:

failure of the proposed Waiau Fuel Line. In their report on the biological effects of the spill, the Trustees (1999, page 3) noted:

> *"Oiling of shorelines and intertidal areas affected freshwater and saltwater wetlands, mangroves, mudflats, rocky shorelines, sandy beaches, riprap, seawalls and piers. These oiled habitats contribute to many recreationally and commercially valuable fish and wildlife species and the prey and forage items for these species. The contamination of the water column and sediments of Waiau Marsh and Pearl Harbor by this oil may have caused impacts to egg, larval, juvenile and adult stages of recreationally and commercially valuable finfish and invertebrates which utilize the Pearl Harbor estuary.*
>
> *Immediate cleanup measures following the incident were undertaken at the direction of a Unified Command which included the USCG, the USN, the State of Hawaii Department of Health and Chevron. Cleanup measures employed during the response included: high-pressure steam cleaning of affected shorelines, boom placements to exclude, contain and recover oil; skimming the surface waters of Pearl Harbor to remove the oil; passive collection technologies such as pompoms and sorbent pads and chemical cleaning agents to remove oil from USN piers."*

Clean-up efforts began immediately, with most of the oil removed within a week or so, but the clean-up operations continued through 22 July 1996 at specific "hot spot" locations. The Trustees (1999) attributed the deaths of one tilapia, one spiny pufferfish and four smooth pufferfish to the direct impacts of the spill.

4.5.2.2.1 Initial Assessment of Impacts

The Trustees (1999) estimated that 25 acres of intertidal habitat (3.3 acres of industrial shoreline, 8.6 acres of mangrove shoreline, 7.3 acres of rocky shoreline, and 5.8 acres of mixed sediment shoreline) was affected in East Loch by the oil spill. Because almost all of the spilled oil remained floating on top of the water column, the shallow intertidal habitats in Pearl Harbor were most affected. The movement of the tides exposed intertidal organisms directly to floating oil, coating them as the tides rose and fell. They assumed an 80% loss of services in the affected area and a ten-year period of recovery. They noted that a possible reason for the small number of dead animals that could be attributed to the oil spill may have been due to the speed with which predators consumed dead and dying individuals.

To assess the impact of the oil spill on water column species, scientists carried out a laboratory study of oil toxicity to mysid shrimp. The results of this study showed *"...a low acute toxicity, and therefore, adverse effects resulting from exposure to the spilled oil were not likely to have produced immediate mass mortality of most species"* (Trustees 1999). For reasons not explained in their report, the Trustees largely discounted the findings of this laboratory study. Instead, based on reports of the general effects of contained in the scientific literature, they noted:

> *"Inferred injury to water column biota includes reduced primary production, reduced secondary production and adverse effects of oil on fish reproduction and early fish development (as reviewed and described in Weiss and Weiss 1989). The oil may have had other adverse effects on fish, for example, by impairing avoidance of predators and reducing rates of feeding, growth and long-term survival. Oil has been reported to reduce plankton populations (NRC 1985)."*

The Trustees (1999) did not directly assess the damage the oil spill may have done to subtidal benthic communities of Pearl Harbor. Instead, they inferred probable effects, based on published field and laboratory studies of the effects of other spills. Their report states:

> *"Scientists from the Bernice P. Bishop Museum made some incidental observations in a few partially oiled locations as part of another study and reported that nothing seemed to be injured some weeks after the spill (Coles et al. 1997). However, the Bishop Museum*

observations, at best, would have only detected obvious injury that would have persisted from the time of the spill to the time the Museum investigators visited their sites (e.g., lasting discoloration or necrosis of sessile organisms such as sponges and ascidians). The Bishop Museum observations were not designed to specifically investigate effects of this spill and did not include the following: sites of heaviest oiling; biota that would have decomposed, washed away, sank, been scavenged or otherwise disappeared if killed by oil; systematic observations for effects of oil; and sub-lethal effects that would not have been obvious to the casual observer, such as long-term decreased survivorship or reduced reproduction.

All evidence of injury to subtidal benthic biota is inferred from preliminary estimates of oil exposure and its potential adverse effects as determined from published field and laboratory studies demonstrating adverse effects relative to the estimated exposure to same or similar oil. The UCSC studies (UCSC 1996) of toxicity of the Chevron oil do not apply here for the same reasons explained in the prior section on water column habitat.

Injury to subtidal biota is inferred from exposure of the biota through probable direct contact with and ingestion of oil. Adverse effects of such exposure on subtidal biota would include decreased rates of growth, reduced long-term survivorship and decreased rates of reproduction. For example, these effects could be the consequences of oil causing reduced feeding, reduced avoidance of predators, and interference with endocrine functions."

The Trustees (1999) noted that injury to subtidal biota is measured in terms of spatial extent, severity, and duration of the injury. They estimated that 5 acres of subtidal habitat suffered a 30% loss of services. Recovery was assumed to follow a linear function. There was no indication that any federally protected threatened or endangered species in Pearl Harbor was impacted by the 1996 Chevron oil spill.

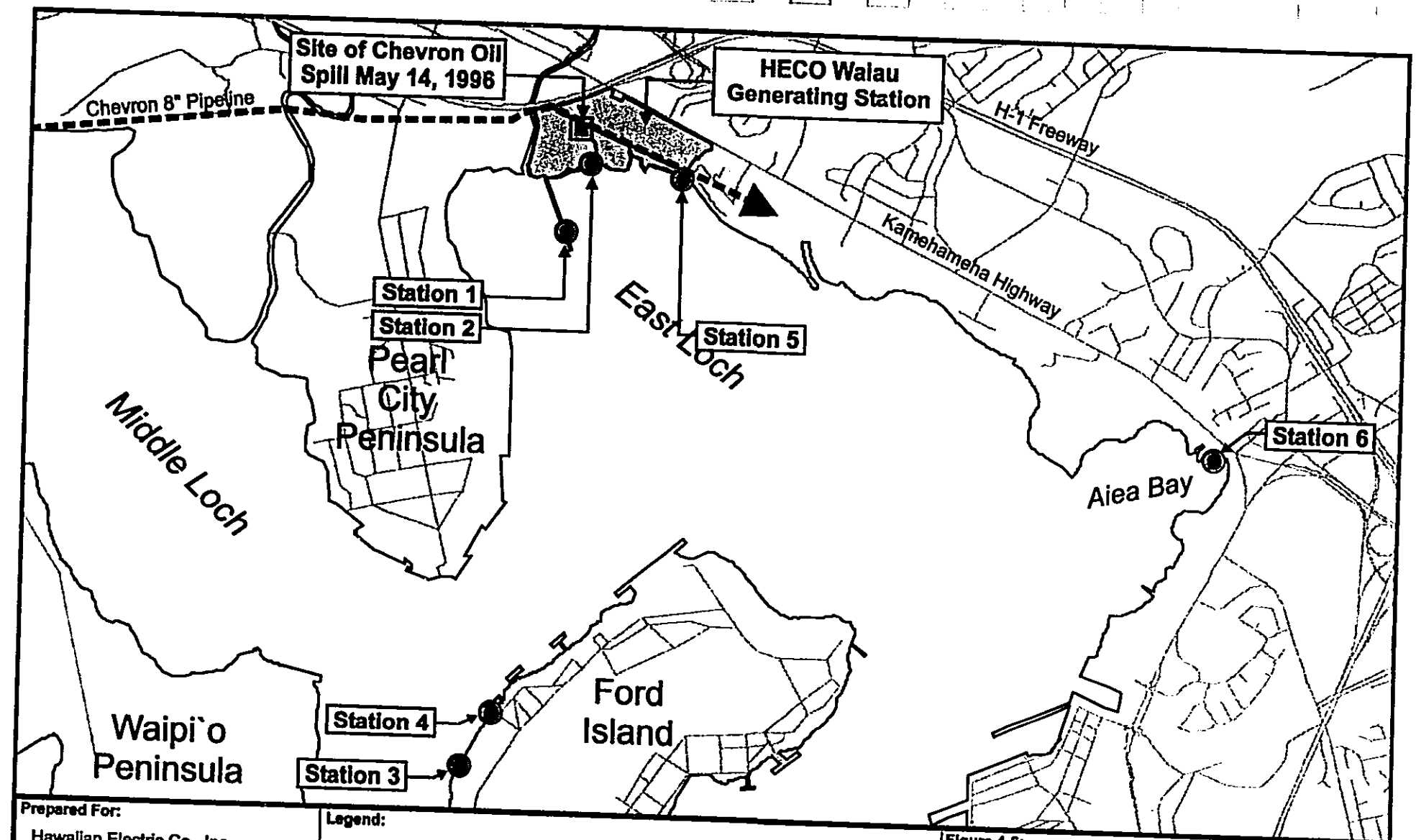
4.5.2.2.2 Subsequent Assessment of Impacts

The Trustees' initial documentation of impact to marine aquatic biota in the Chevron 1996 spill was largely qualitative. The limited field studies that were done indicated that the oil from the spill did have a direct impact to those organisms exposed to it, but they did not provide sufficient data to quantify these effects or to allow the trustees to conclude that the effects were less than those that have sometimes resulted from larger spills into more sensitive environments.

Fortunately, data from other studies in the Harbor are now available that make it possible to trace the rate at which aquatic communities in Pearl Harbor have recovered from the effects of the 1996 spill. Since 1993, Brock (1994, 1999) has conducted annual surveys of marine and intertidal communities in the vicinity of the HECO Waiau Generating facility. This has been done as part of the zone of mixing monitoring program required by US EPA and the Hawai'i State Department of Health for the operation of that facility and has, therefore, been subject to official review and acceptance.

Brock's surveys assess change in intertidal and subtidal benthic and fish communities. They utilize permanently marked stations (Figure 4-6) where quantitative survey methods are used to determine the abundances and/or coverage by the organisms present in the sampled communities. Two sampling stations (Stations 1 and 2) are located adjacent to and just east of the Waiau Generating Station; control stations are located on the western side of Ford Island (Stations 3 and 4), more than 3.2 km seaward of the Waiau Generating Station. Each survey examines intertidal communities on steel bulkheads (Waiau and Ford Island stations) and on mangrove prop roots at Waiau (Station 5) and Aiea Bay (Station 6). Subtidal communities are sampled at the Waiau and Ford Island stations.

Table 4-20 and Table 4-21 summarize the findings for the biological parameters measured at each of the six stations from 1993 through 1999. The 1996 survey was carried out on 30 July 1996, just 77 days following the Chevron oil spill. The other surveys were generally carried out in December. As noted in Table 4-20 and illustrated in Figure 4-7, the summary data suggest apparent declines in the



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Brock 1999

Legend:

- Biological Sampling Station
- Site of May 14, 1996 Chevron Oil Spill

N

0 .5 1
Miles

Figure 4-6:

Intertidal and Subtidal Biological Sampling Stations

Waiau Fuel Pipeline Project

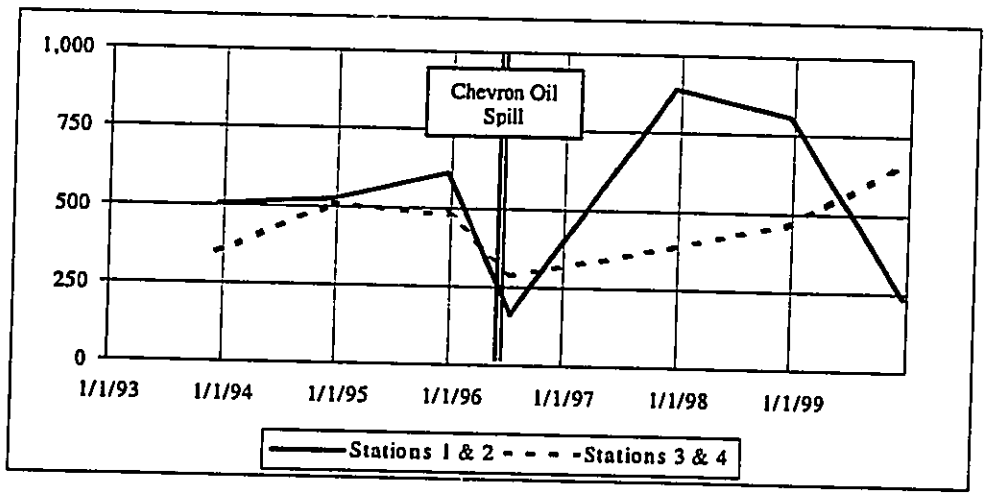
Table 4-20 Macrobiota Quadrat Survey Time Series (1993 – 1999)

Station 1, in Zone of Mixing for the Waiau Generating Station Thermal Plume							
FAUNAL GROUP	***1993***	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***
Sponges	4(2.5)*	7(6.2)	9(53.4)	11(31.2)	11(11.9)	11(14.5)	12(13.4)
Polychaetes	1(23.5)	1(53.5)	1(10.8)	1(12.4)	1(17.2)	1(17.2)	1(10.7)
Tunicates	3(1.9)	3(0.3)	3(1.8)	4(0.8)	3(0.2)	3(0.1)	3(0.4)
Total Benthic Species	15	20	25	30	29	28	31
Total Fish Species	3	5	5	5	4	4	4
No. Fish Individuals	92	68	70	41	31	22	21
Fish Biomass (g/m^2)	1	2	1	0.7	0.5	3	1.5
Station 2, in Zone of Mixing for the Waiau Generating Station Thermal Plume							
FAUNAL GROUP	***1993***	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***
Sponges	7(50.1)	9(42.5)	8(55.1)	11(63.1)	6(52.0)	8(44.5)	9(25.8)
Polychaetes	1(0.02)	1(0.02)	1(0.2)	1(0.2)	0(0)	0(0)	1(0.07)
Tunicates	3(0.3)	2(0.4)	3(1.0)	3(0.4)	2(0.03)	2(0.03)	2(0.5)
Total Benthic Species	18	20	21	24	19	19	21
Total Fish Species	10	8	8	7	6	8	8
No. Fish Individuals	411	454	539	119	860	785	211
Fish Biomass (g/m^2)	292	261	710	81	51	373	537
Station 3, West Side of Ford Island							
FAUNAL GROUP	***1993***	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***
Sponges	12(39.2)	11(20.1)	10(67.0)	10(91.4)	9(89.8)	9(29.7)	12(75.7)
Polychaetes	3(56.5)	2(77.7)	2(32.2)	2(8.5)	2(11.3)	2(69.8)	2(23.3)
Tunicates	4(3.1)	4(2.2)	4(0.4)	4(0.2)	3(0.5)	4(0.3)	4(0.4)
Total Benthic Species	24	25	24	23	24	24	26
Total Fish Species	5	3	4	4	4	6	3
No. Fish Individuals	152	90	63	67	46	68	182
Fish Biomass (g/m^2)	2	1	3	3	3	4	8
Station 4, West Side of Ford Island							
FAUNAL GROUP	***1993***	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***
Sponges	10(6.1)	8(11.7)	8(8.2)	6(10.7)	8(6.9)	9(8.0)	9(5.9)
Polychaetes	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Tunicates	1(0.07)	1(0.07)	1(0.02)	1(0.02)	0(0)	0(0)	0(0)
Total Benthic Species	20	23	18	18	17	21	22
Total Fish Species	4	10	11	7	6	7	10
No. Fish Individuals	193	417	414	216	337	394	486
Fish Biomass (g/m^2)	2	13	25	16	17	24	14
*The first number is the number of species in the faunal group. The second number, in parentheses, is the percentage of seabed area occupied by the faunal group.							
Source: Brock (1994, 1999)							

Table 4-21 Mangrove Prop Root Survey Time Series (1993 – 1999)

Station 5, Near East Boundary of Waiau Station Property							
	1993	1994	1995	1996	1997	1998	1999
Total No. Species	14	16	16	12	13	14	13
No. Sponge Species	3	5	5	3	4	5	4
No. Mollusk Species	4	4	4	4	4	4	4
No. Polychaete Species	2	2	2	2	2	2	2
No. Arthropod Species	4	4	4	2	2	2	2
Station 6, Aiea Bay							
	1993	1994	1995	1996	1997	1998	1999
Total No. Species	11	10	10	5	11	9	9
No. Sponge Species	4	3	3	1	3	2	2
No. Mollusk Species	3	3	3	3	3	3	3
No. Polychaete Species	0	0	0	0	2	1	1
No. Arthropod Species	3	3	3	1	2	2	2
Source: Brock (1994, 1999)							

Figure 4-7 Numbers of Individual Fish Observed



number of individual fish counted at Stations 1 and 2, which are relatively close to the origin of the spill, and less obvious declines at Stations 3 and 4[32], which are relatively remote. These changes could well have been caused, in whole or in part, by the spill, although this cannot be proven conclusively. The counts of fish in the following year suggest rapid recovery to levels similar to or exceeding the pre-spill values.

[32] Station 3 actually shows a slight increase after the spill, which is overwhelmed by the higher counts at Station 4 when the two are summed together in the figure.

The median value for the estimated biomass of fish (Figure 4-8) and for the number of intertidal species found on mangrove prop roots (Figure 4-9) show a similar pattern. The data suggest decreases immediately after the spill, followed by recoveries to pre-spill levels within one or two years.

Figure 4-8 Median Estimate of Fish Biomass (g/m^2; Stations 1 – 4)

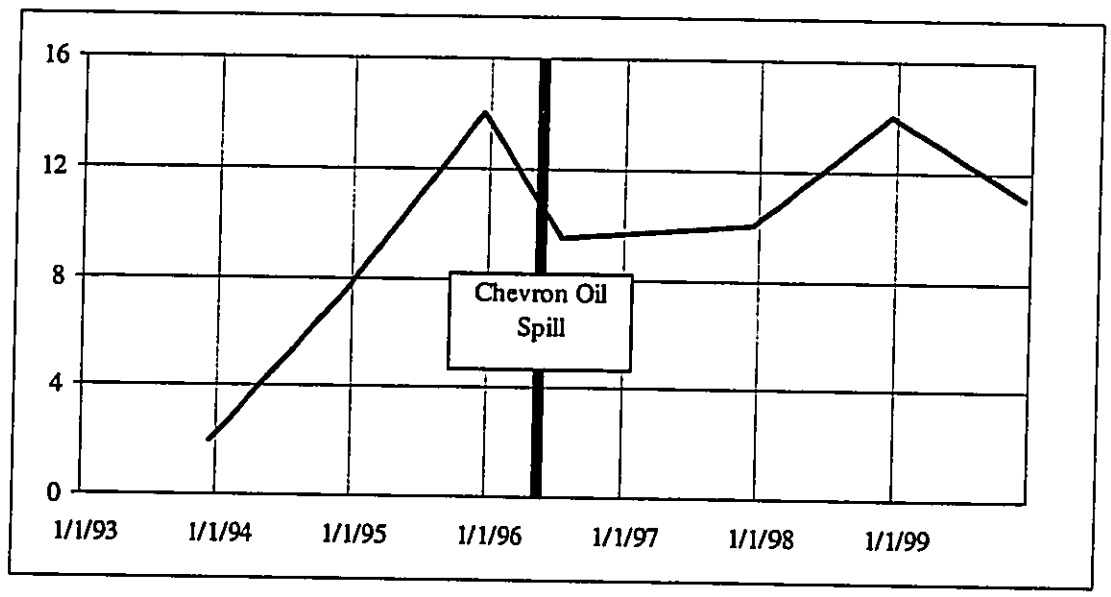
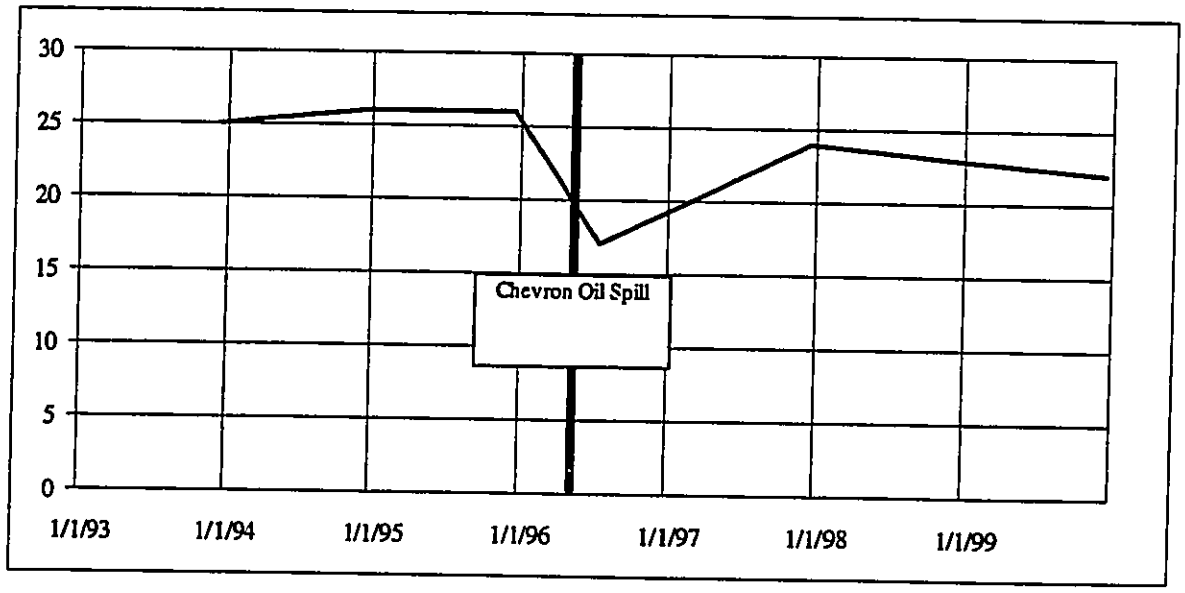


Figure 4-9 Median Number of Species on Mangrove Prop Roots (Stations 5 and 6)



The most apparent change on the steel bulkhead (Station 1) immediately following the 1996 oil spill was the decline in the snail, *Littorina scabra*, which decreased from 120 individuals/1,000 cm^2 in 1995 to 1 individual/1,000 cm^2 in 1996. The declines in abundance at Station 3 (mangrove prop roots) from the 1995 to the 1996 surveys suggest that the oil spill also had an impact in this environment. Examples of these declines include *Littorina scabra* (from 1 shell/15 prop roots to 1 shell/65 prop roots), the native oyster *Ostrea sandvicensis* (from 1 shell/20 prop roots to 1 shell/70 prop roots), the oyster *Crassostrea virginica* (from 1 shell/20 prop roots to 1 shell/70 prop roots), the intertidal shell *Siphonaria normalis* (from "common" to "present"), the polychaetes *Pomatoleios kraussii* (from "abundant" to "present"), *Neodexiospira foraminosa* (from "common" to "present"), and the rock crab *Metapograpsus thukuhar* (from 1 crab/23 prop roots to 1 crab/70 prop roots). The barnacles *Balanus amphitrite amphitrite* and *Chthamalus proteus* were completely absent in the 1996 survey. An examination of the prop roots at station 3 revealed a persistent band of thick oil, usually covered by silt and detritus. This oil appeared as an approximately 7-cm wide band, located about 30 cm above the area where most of the attached intertidal fauna occur.

Besides the declines in biota on the prop roots at station 3 next to the Waiau station, the intertidal fauna on the prop roots at station 6, about 2.7 km east of the Waiau plant, also declined between 1995 and 1996. There was no evidence of any oil on the prop roots at station 6. Examples of these declines include three sponge subtidal species in 1995 and only one in 1996. Change in the intertidal fauna was less consistent:

- *Littorina scabra* increased from 1 shell/46 prop roots in 1995 to 1 shell/3 prop roots in 1996,
- *Ostrea sandvicensis* increased from 1 shell/17 prop roots in 1995 to 1 shell/12 prop roots in 1996,
- *Crassostrea virginica* decreased from 1 shell/35 prop roots in 1995 to one shell/40 prop roots in 1996,
- *Metapograpsus thukuhar* doubled from 1 crab/26 prop roots in 1995 to 1 crab/12 prop roots in 1996, but the two barnacles (*Balanus amphitrite amphitrite* and *Chthamalus proteus*) were absent in the 1996 survey.

The causes for the changes at station 6 are not clear since oil from the Chevron spill probably did not reach this corner of East Loch (i.e., the northeast reach along the 'Aiea shoreline as per Trustees 1999, page 25).

These results show that, despite the apparent decline in some species abundances between 1995 and 1996, by 1997 most of these declines had reversed themselves. Overall, Brock (1999) found no statistically significant differences when comparing faunal abundance measured before the spill to faunal abundance measured more than one year after the spill.

In summary, several important points can be drawn from the experience with the 1996 Chevron spill:

- Oil from the 1996 Chevron spill did adversely affect some biota in the vicinity of the release.
- These impacts appeared to have been short-lived, largely disappearing by the end of 1997.

The rapid and concerted response by governmental agencies and Chevron to the spill was probably an important reason why the impacts were not greater. Other factors that may have contributed to the relatively rapid recovery may be the relative hardiness of the species in the inner reaches of Pearl Harbor that have the greatest exposure in the event of an oil spill. The resilience of the shoreline habitats most exposed to contamination from a spill may stem in part from the fact that the aquatic communities in these areas are already adapted to relatively high levels of pollutants, being areas of mud substratum adjacent to streams.

4.5.3 PROPOSED ACTION (ALTERNATIVE 1)

4.5.3.1 Waiau Fuel Pipeline Construction

The construction of the proposed Waiau Fuel Pipeline would entail trenching or drilling and emplacement of the pipeline below grade over nearly the entire route. If work of this sort is not properly conducted, the vegetation removal and stockpiling of excavated material that occurs during the construction process can increase the potential for erosion and increased sediment loads in runoff. The kinds of best management practices (BMPs) that HECO would employ during construction of the proposed pipeline are shown in Table 4-22; these are intended to minimize this potential. Site specific BMPs for each pipeline segment and for the other facilities that are needed at the BPTF and at the Iwilei Tank Farm would be developed during the final design process. These would be submitted to the State Department of Health as part of the application for an NPDES Construction Permit that is needed for the pipeline. These measures would minimize the possibility of runoff and sediment from ongoing construction reaching the waters of Pearl Harbor via overland flow or the streams that drain into it.

4.5.3.1.1 Potential Impacts on Intertidal and Marine Communities

Since the entire pipeline route is inland, construction of the Waiau Fuel Pipeline does not have the potential to directly disturb intertidal and marine communities. Hence, the only way in which project-related construction activities could affect these biological resources is by increasing pollutant loads in the storm runoff that enters the harbor.

Currently, periods of heavy rainfall cause large volumes of sediment-laden storm runoff in the streams and drainageways that cross the pipeline route to enter the harbor. For example, biological sampling in the waters fronting the Waiau station and other sites in East Loch had to be rescheduled from 27 September 2001 to a later date, because the water clarity was nil through much of East Loch due to the heavy rainfall and runoff occurring in the previous 24 hours (1.9 inches recorded at the Waiau plant for the 26 September 2001). Nearly all of the runoff and sediment originates from areas inland of the proposed pipeline.

As previously discussed, under present conditions (pre-pipeline development), the marine communities of Pearl Harbor are regularly exposed to occasional high sediment and freshwater input especially in the more landward (*mauka*) portions of the harbor following heavy rainfall. These disturbances have resulted in community structures (i.e. species composition, abundance and distribution) favoring species that are reasonably tolerant to occasional reduced salinities and high sediment loading. The construction BMPs that would be used during installation of the Waiau Fuel Pipeline would prevent construction activities from adding measurably to the sediment load entering the harbor. This, and the fact that the biological communities in the harbor are already resilient to these perturbations, indicates that the sediment from pipeline construction would not have a substantial impact on the aquatic communities within the harbor.

4.5.3.1.2 Potential Impacts on Stream Communities

The relatively level nature of the terrain through which the pipeline passes and the use of the construction BMPs outlined in Table 4-22 would limit the potential for sediment and other pollutants from overland pipeline construction to reach drainageways. Consequently, construction of the main components of the proposed project would not adversely affect stream communities.

With one exception, direct effects on stream communities has been avoided by using directional drilling for all stream crossings, thereby preventing disturbance to the banks and beds of these waterbodies. Because of this, the proposed project would conform to the State Water Quality Standards contained in HAR §11-54 (see Section 4.3.1).

Table 4-22. Pipeline Construction Best Management Practices

Activity	Best Management Practices
General	Use silt fences, sediment retaining barriers, and retention basins and/or sediment traps to prevent sediment from being carried offsite and into drainageways. Use naturally level areas for parking and construction base yards.
	Use matting or other slope stabilization techniques on short, steep slopes where the erosion hazard is high and the vegetation may be slow to establish itself.
	Locate stockpiles away from waterways and low spots; provide barriers that prevent material eroded from the piles from easily reaching drainageways.
	Mulch and/or re-grass exposed areas immediately after construction is completed and maintain ground cover until it is well-established.
	Maintain construction equipment in good working condition and inspect daily for fluid leaks. Clean any spills from construction equipment immediately. Store all construction-related materials and chemicals appropriately; keep chemicals in area where spills can be contained.
	To the extent practical, fuel, maintain, and wash construction equipment off-site or in areas where runoff can be controlled.
	Dispose of construction garbage and debris regularly.
	Sweep areas where construction equipment regularly enters or leaves paved roadways frequently.
	Provide adequate sanitation facilities for construction workers.
	Conduct detailed field investigation of other subsurface pipeline and utility locations before starting work. Notify owners of all such facilities at least one week prior to start of construction.
Drainageway Crossings	Use directional drilling, horizontal boring, or similar techniques wherever possible to install pipeline beneath drainageways.
	Where work in stream channel is necessary, schedule work for periods where no or low flow can be reasonably assured.
Wetland Crossings	Avoid work in wetlands wherever possible. Use alternate routes, directional drilling, or horizontal boring techniques for this purpose.
	If work must be conducted in Pouhala Marsh, avoid stockpiling within marsh.

Source: Compiled by Planning Solutions, Inc.

For technical reasons, it is not possible to drill under Waiawa Stream (Crossing S-6 in Figure 3-2) because of the configuration of the SEC easement. Consequently, this stream crossing would have to be completed using open trenching. As discussed in Section 4.3.2.3.6, a cofferdam would be constructed to divert the stream temporarily to one side of its usual path. A trench would be excavated, and spoils would be transferred to the bank. The finished pipe would be coated with concrete and submerged in the crossing. The submerged pipe would be backfilled with spoils stored on the stream banks. The cofferdam would then be moved to the other side of the stream and the process would be repeated to complete the crossing. The entire process would take a few weeks.

These construction activities would temporarily displace the aquatic fauna from a small portion of the streambed; they would also temporarily increase turbidity in the stream. Installation of the cofferdam would smother any infauna that is present. For reasons outlined below, it is believed that these changes would not cause a significant or lasting harm to the aquatic communities in the stream.

The construction activity would affect water quality by increasing turbidity. It would also disturb the stream bottom. The change would be limited principally to the period when the cofferdam is being installed and removed, but during those periods turbidity would increase slightly. This activity would almost certainly result in total suspended solids concentrations and turbidity above the limits shown

in Table 4-5. The increase would persist for only a short period of time, probably for no more than a few days at a time, and it would be limited relative to the increases that commonly occur during storm events.

Native Hawaiian stream macrofauna characteristic of estuarine environments are found in the vicinity of the pipeline crossing in Waiawa Stream. However, the overall diversity of aquatic life at this location is considerably lower than that found in other Pearl Harbor drainages, including Waikele and Waimalu Streams. Because a portion of the stream channel would be left open at all times and because the changes in turbidity and suspended solids concentrations would be within naturally occurring ranges and would persist for only short periods, installation of the pipeline does not have the potential to substantially interfere with the natural migration of amphidromous species. Neither would there be a long-term change to the benthic habitats as a result of temporary dewaterment within cofferdams at Waiawa. No threatened or endangered species are present to be affected by pipeline construction at Waiawa.

4.5.3.1.3 Potential Impacts on Wetland Communities

HECO has purposely proposed routing its Waiau Fuel Pipeline outside the portion of the State Energy Corridor that passes through Pouhala Marsh. Its ability to implement this proposal is dependent upon the State Department of Transportation granting an easement for this purpose. If the easement is granted, construction would be limited to areas outside the marsh.

If the DOT does not grant the easement that HECO has requested, HECO would construct the pipeline within the limits of the existing SEC easement through Pouhala Marsh. In this case, wetland communities would be disturbed. As discussed in Section 4.3.1, the State's Basic Water Quality Standards are applicable to the marsh. Construction activities can be carried out in such a way as to comply with most of these standards, but some soil excavated from the trench would inevitably enter the wetland.[33] By scheduling the construction work for a dry period, there is a good chance that it can be completed while no water is present. However, because there is always a small possibility of unseasonable rains, it is not possible to guarantee that this would be the case. The wetland would be restored to its pre-construction condition immediately after the pipeline is in place, and the total period of disturbance is likely to be less than a month. No permanent loss of wetland would occur.

Pipeline construction would also temporarily disturb a small portion of the cultivated wetlands within HECO's Waiau Generating Station property. In order to minimize this disturbance, the proposed design calls for this segment of the pipeline to be installed above ground on small support structures spaced every 20 feet, thereby avoiding the need to excavate a trench through the wetland. The support structures would have small cross-sections, would require minimal construction activity within the wetland, and would result in a pipe height of less than 48 inches above ground. The area occupied by the pipeline supports would total no more than 50 square feet, limiting permanent loss of wetland habitat to that amount. Depending upon the exact construction techniques used, this work could probably be completed without violating the basic water quality standards that are applicable to these lowland wetlands.

In summary, construction impacts to the aquatic stream communities near the proposed pipeline route would be limited to temporary, localized displacement of some individual organisms, particularly in the Waiawa Stream, but no substantial impacts to these communities would be expected, and no impacts to endangered or threatened aquatic species would occur.

4.5.3.2 Normal Operations

Regular visual inspections of the line would be conducted from existing roadways and paths without disturbing drainageways, stream banks, wetlands, or nearby fast land. Inspections would be

[33] Directional drilling was evaluated as a means of passing entirely beneath the marsh. However, the distance is too great for this to be practical in a single run. Consequently, intermediate stations within the marsh would be required. Since the need to establish such work stations would obviate most of the advantages that directional drilling might otherwise provide, HECO does not believe this is a practical alternative in this situation.

conducted using equipment that runs along the inside of the pipeline; the land surface would not be disturbed. Consequently, there is no mechanism through which normal operation could adversely affect aquatic communities. In view of this, the only way that the proposed project might adversely affect these communities is in the event of an accidental release, as discussed in Section 4.5.3.3.

Truck loading and unloading operations would take place at facilities that are isolated by berms and other containment structures from natural habitats that would be threatened by spilled oil. Trucking of fuel between the BPTF and the Iwilei Tank Farm would be confined to existing roadways and would normally have no impacts on aquatic communities.

4.5.3.3 Accidental Oil Spills from the Waiau Fuel Pipeline[34]

As discussed in Section 4.3.2.4, the design and operational plans for the proposed Waiau Fuel Pipeline project incorporate many provisions designed to avoid leaks and, in the remote chance that one should occur, to minimize its possible magnitude. However, no matter how well designed, constructed, and operated, it is impossible to totally eliminate the risk that a combination of equipment, human, and systems failure could result in a release of oil.

Section 4.3.2.5 describes the "Reasonable Worst Case" spill from the proposed Waiau pipeline. It involves the release of 137 barrels of oil directly into the inlet fed by Kaluao'opu Spring. Of that amount, HECO estimates that 72 barrels would be retained within the wetland area (with 60 barrels eventually being recovered). Approximately 50 barrels could reach Pearl Harbor, where most would be caught and recovered from the protective boom system. The remainder (just over 5 barrels), would disperse beyond that point and have the potential to affect other areas.

Oil, depending upon its form and chemistry, causes a range of physiological and toxic effects. For example, the low molecular weight aliphatics of oil can have anaesthetic properties and aromatic components such as benzene are known carcinogens and are toxic to wildlife. Some polynuclear aromatics are also carcinogenic and toxic and can be concentrated in the food chain. Benzene, toluene and other light hydrocarbons of oil and fuels, if inhaled, are transferred to the bloodstream from the lungs and can damage red blood cells, suppress immune systems, strain the liver, spleen and kidneys and even interfere with the reproductive system of animals. In general, heavier fuels such as the LSFO that would be transported in the Waiau Fuel Line tend to be less toxic to organisms than the lighter petroleum products. The low volatility of LSFO means that it is more persistent and more likely to have physical impacts on wildlife e.g., by coating feather, fur and skin. This compositional variation of oil also governs its behavior, weathering and fate after being spilt in the marine environment. Factors at work include the volatility of the hydrocarbons into the air from the oil, the solubility of toxic components into seawater from the slick and dispersed oil, the formation and stability of emulsions that form, the "stickiness" of the product (i.e., the extent to which it adheres to surfaces) and the rate of natural biodegradation.

Because LSFO is chemically almost inert in most aquatic environments, most of the residual oil that is not recovered would be incorporated into the sediments and be diluted with time and weathering processes. Components (e.g., phenol) of the diesel fuel that would be in the line during testing are soluble and do, therefore, have the potential to change water quality. In both cases the much smaller maximum spill volume resulting from HECO's use of multiple block valves and the faster response that would be possible because of the improved monitoring and control systems that are part of the proposed Waiau Fuel Pipeline project mean that changes in water quality, and therefore, potential impacts on aquatic communities, would be much lower in magnitude, more geographically localized and less persistent than the changes that were experienced in the 1996 Chevron spill.

[34] An accident by one of the tanker trucks that would be used to transport oil from the BPTF to the Iwilei Tank Farm could cause some LSFO to spill into habitats along the roadways; however the high viscosity of the LSFO and emergency response actions by HECO and public agencies means that such effects are unlikely to be substantial.

The kinds of adverse effects documented following the 1996 Chevron oil spill showed that such an accidental release has the potential to harm stream, intertidal, and wetland habitats. Examples of the mechanisms capable of producing these effects include the following:

- Organisms can be exposed to oil through direct contact and/or ingestion. Animals that come in direct contact with petroleum products can become fouled or smothered.
- Organisms can absorb the volatile compounds in petroleum, and these can also injure and kill.
- Organisms can be exposed indirectly to petrochemicals by eating contaminated prey, and wildlife can ingest it through preening.
- Spilled petroleum can smother vegetation, destroying food sources and habitats; this subsequently lowers the value of wetland vegetation for aquatic communities and wildlife. Oil can smother eggs by sealing pores in the eggs and preventing gas exchange.

The *Final Restoration Plan and Environmental Assessment* (Trustees 1999) prepared for the 1996 Chevron Waiau Oil Spill, concluded that all of the freshwater marsh's ecological functions were lost as a result of the spill. Based upon their literature review, its authors estimated that it might take as many as 15 to 20 years before the marsh fully recovered. No field data were presented in this report to support or refute this conclusion. As discussed in Section 4.5.2.2.2, the results of field research carried out in the aftermath of that spill indicate that subtidal and intertidal marine fauna exposed to the spill recovered more rapidly than the Trustees anticipated, showing no measurable effects less than two years after the spill occurred.

As discussed above with reference to surface water impacts (Section 4.3.2.6), the volume of the 1996 Chevron oil spill was significantly greater than the projected RWC for the proposed HECO pipeline. Moreover, because it did not have as sensitive a monitoring system, Chevron was able to recover a far smaller percentage of the oil that did escape before it reached sensitive aquatic habitats where it could cause more damage than would be the case for the proposed project. If a RWC spill were to occur from the Waiau Fuel Pipeline:

- The amount of oil reaching the waters of Pearl Harbor would be more than an order of magnitude less than the volume that resulted from the 1996 event.
- At little more than 5 barrels, the volume of oil spreading beyond the protective booms as the result of a RWC spill from the Waiau Fuel Pipeline would be only about 0.5 percent the volume that resulted from the Chevron Spill.
- The much lower volume, together with the fact that the oil that would escape would be LSFO rather than the less viscous No. 6 fuel oil that was released in 1996 mean that the potential for adverse impact to marine and estuarine species is far less than occurred with the Chevron spill.
- HECO estimates that a RWC spill from the proposed pipeline has the potential to affect approximately 3 acres of intertidal habitat, almost all of concentrated in the area immediately adjacent to the Waiau Generating Station. This is approximately 10 percent of the area that was affected by the 1996 event. Some loss of aquatic life would occur, particularly in the intertidal areas. No threatened or endangered aquatic species would be affected. Within these areas, the abundance of fish and numbers of aquatic species could be reduced substantially (see Table 4-21, Table 4-24, and Figure 4-7 to Figure 4-9.
- As shown in Section 4.5.2.2.2, the 1996 Chevron spill had little, if any, impact on aquatic species beyond two years after the release. Consequently, it is reasonable to assume that the potential for adverse effect due to the smaller RWC spill from the proposed Waiau Fuel Line would be limited and short-term. Appropriate spill response and remediation measures, which are being documented in HECO's *Draft Oil Spill Contingency Plan* (HECO 2002), would further limit the potential for adverse impact.

4.5.3.4 Decommissioning of the Waiau Fuel Pipeline

As previously discussed, HECO would be responsible for draining and cleaning the pipe when it terminates pipeline operation and the term of the easement ends. In certain cases it might actually remove portions of the pipe.[35] Commonly, pipelines are abandoned in place. If abandoned, the pipeline would be sealed and filled with pressurized inert nitrogen gas or filled with grout. If pipe is removed, HECO would employ best management practices to ensure that the removal operations do not cause excessive erosion and sediment runoff into the harbor. Also, HECO would return the surface to its original condition, by compacting and replanting the trenched area, as appropriate. No work would be done in streams or other drainageways. The work that would be required for pipeline decommissioning does not have the potential to adversely affect aquatic communities.

4.5.4 ALTERNATIVE 2: CHEVRON PIPELINE

4.5.4.1 Maintenance and Replacement Activities

As discussed above in Section 2.2.3, Chevron has an active pipeline maintenance program that includes annual inspections. Its maintenance program incorporates a range of BMPs designed to limit potential adverse effects. Over time, this maintenance work is expected to result in the replacement of most, or all, of the pipe in the line (including the segment that continues past Waiau to the Iwilei Tank Farm). The impacts of carrying out such activities between the BPTF and the Waiau Generating Station are much the same as those that would result from constructing HECO's proposed Waiau Fuel Line; maintenance and replacement work beyond that point would require additional work. Possible differences stem from the fact that the replacement activities would be phased over a much longer period of time and would, in some cases, involve other locations. Nonetheless, all things considered it is reasonable to assume that the maintenance and pipe replacement work that would occur if Alternative 2 were implemented would affect aquatic resources to at least the same extent as the maintenance activities needed for HECO's proposed Waiau Fuel Pipeline project.

4.5.4.2 Continued Pipeline Operation

Normal pipeline operations do not have the potential to impact aquatic communities.

4.5.4.3 Pipeline Decommissioning

Under the terms of its easements, Chevron is responsible for the decommissioning its pipeline when it is no longer needed. It is likely that Chevron would accomplish this by using measures similar to those anticipated for the decommissioning of the proposed pipeline. In general, this activity carries with it little potential to adversely impact aquatic habitats.

4.5.4.4 Accidental Oil Spills from the Chevron Pipeline

As discussed in Section 4.3.3, since 1996 Chevron has increased the intensity of its inspection and maintenance program and has upgraded its leak detection system. Other things being equal this is sure to have lowered the probability of a future spill. Its work has not increased the number of valves or otherwise changed the volume of oil or rate of pumping in its pipeline. Consequently, for the purposes of this analysis, we have assumed that a future oil spill from the Chevron pipeline could be of the same volume (982 barrels) and could lead to similar effects on surface waters as were experienced as a result of the May 14, 1996 incident.

In general, any future spills from the Chevron pipeline would be expected to have similar or fewer impacts than those described above for the 1996 event. The ongoing Chevron pipeline inspection and maintenance program is designed to minimize the probability of future events such as the 1996 spill, and the pipe size is similar to the pipe selected for the proposed pipeline. However, the Chevron

[35] Portions of the pipe that are installed using horizontal drilling or directional drilling cannot be removed.

pipeline differs from the proposed Waiau Fuel Pipeline in the following respects that have implications for potential oil spills:

- All crossings of drainageways planned for the proposed Waiau Pipeline route are buried, while many of the Chevron crossings are elevated above the drainageways. Because of this the proposed Waiau Pipeline is far less susceptible to deliberate or accidental damage that could breach the pipe and cause a spill directly into these drainageways. Equally important, the fact that the Waiau Fuel Line crossings are beneath, rather than over drainageways, eliminates the direct pathways into the aquatic environment that are present in Alternative 2.
- Because the Chevron pipe is not insulated, LSFO must be delivered to the Waiau Station at a higher pumping rate than would be used for the new pipe. This means that the Chevron pipe would be under relatively higher pressure than the new pipe during delivery of LSFO. Thus, with all other factors being the same, a spill of LSFO from the Chevron pipe would escape at a relatively higher rate than one from the new pipe.
- The delivery of LSFO in the Chevron pipeline is not continuous since the required pumping rate that must be used is higher than the station's rate of consumption (see Section 2.2.2.3). This means that there would be recurring periods between fuel deliveries when the Chevron pipeline would be idle; during these periods it would contain displacement oil, normally No. 5 fuel oil that is used to displace the LSFO.
- The Chevron pipeline has only one, manually operated in-line valve (located at the pipeline's intersection with Fort Weaver Road) between the Chevron refinery and the Waiau Generating Station. In comparison, the proposed pipeline includes 6 remotely activated and monitored block valves and an automatic check valve along the route (see Table 2-2). The system of valves and monitoring devices incorporated in the design of the proposed Waiau Fuel Line permits more rapid response to any significant compromise of the pipe integrity than is possible with the Chevron pipeline. This, in turn, helps to minimize the potential size of a spill. Thus, if a release from the Chevron pipeline were to occur, it is likely to be larger than a spill under comparable circumstances from the Waiau Fuel Pipeline.

In summary, because the Chevron pipeline alignment is close to the Waiau Fuel Pipeline alignment within the area that could affect aquatic resources, and because the volumes of oil potentially spilled from the Chevron pipeline are larger than the volumes that could be released in the event of a failure of HECO's proposed Waiau Fuel Line, impacts to aquatic resources from a spill are potentially much greater. These impacts would include destruction of intertidal and subtidal organisms, but no threatened or endangered aquatic populations would be affected and recovery of the intertidal and subtidal communities would be expected within one or two years.

4.5.5 ALTERNATIVE 3: TRUCKING

Construction of the facilities needed for this alternative involves only a small amount of site disturbance required to install truck loading and unloading facilities at the Barbers Point Tank Farm, the Waiau Generating Station, and the Iwilei Tank Farm. Oil spills at the loading and unloading facilities would be handled in accordance with the facility SPCCs. Such spills do not have the potential to affect aquatic habitats or communities. Similarly, there are no pathways through which normal operation of the trucks and other facilities could affect water quality or aquatic habitats.

Truck transport of fuel does involve the risk of a highway accident. Trucks would each be carrying 6,000 gallons of LSFO. Because LSFO is not normally flammable and because it solidifies fairly rapidly at normal ambient temperatures, spills would be confined to the immediate vicinity of the accident and would be very unlikely to pose a threat to adjacent areas or to Pearl Harbor. As discussed in the *Draft Oil Spill Contingency Plan* (HECO 2002), the impacts caused by any spill related to truck transport operation would be mitigated and remediated by the rapid response of the designated emergency personnel. No substantial impacts to aquatic communities would be expected.

4.6 IMPACTS ON TERRESTRIAL FLORA

Char & Associates (2001) has examined the extent to which the three Action Alternatives could affect the terrestrial flora found in the area through which they pass. The full report is reproduced in Appendix D. The remainder of this section summarizes its most important findings.

- Section 4.6.1 describes the vegetation communities that are present along the routes associated with each of the alternatives.
- Section 4.6.2 describes the effect that construction and operation of the two pipeline alternatives (1 and 2) could have on these communities. It covers construction, normal operations, and most importantly, the potential effects of an accidental release.
- Section 4.6.3 briefly discusses the potential effects of Alternative 3.

4.6.1 VEGETATION COMMUNITIES PRESENT

Char & Associates identified four vegetation communities along one or more of the routes. These are: Ruderal/Roadside Vegetation Community; Koa Haole/Kiawe Scrub Community; Wetland Vegetation; and Landscaped Areas. The makeup of these communities and the location in which they are found are described below.

4.6.1.1 Ruderal/Roadside Vegetation

This vegetation type covers the greatest area of the four vegetation communities. It is found adjacent to roadsides and to the paved bikeway which runs along a portion of the former O'ahu Railway & Land Co. (OR&L) Right-of-Way (ROW) and the proposed pipeline route. The vegetation along Farrington Highway and the roads that service the James Campbell Industrial Park is mowed or bladed; in some places it shows indications of treatment with herbicides (Char 1999).

This vegetation type consists of a mixture of grasses and weedy, mostly annual, herbaceous species. It is adapted to frequent mowing and to vehicular traffic; the plants tend to form low, compact mats. Most abundant in these areas are buffelgrass *(Cenchrus ciliaris),* swollen fingergrass *(Chloris barbata),* Bermuda grass *(Cynodon dactylon),* and Natal redtop *(Melinis repens).* Among the more frequently observed herbaceous species and smaller shrubs are creeping indigo *(Indigofera hendecaphylla), Sida ciliaris,* false mallow *(Malvastrum coromadelianum),* Australian saltbush *(Atriplex semibaccata),* hairy spurge *(Chamaesyce hirta),* and *Boerhavia coccinea.* Scattered patches of barren, thin soils are also common, especially during the drier summer months.

In some places behind the mowed grassy strips, there may be a thin line of open, scrubby koa haole *(Leucaena leucocephala)* shrubs, 3 to 10 feet tall. Clumps of Guinea grass *(Panicum maximum)* and buffelgrass, 2 to 3 ft. tall, usually form a dense cover between the shrubs. Other woody components which may be found here include Christmas berry *(Schinus terebinthifolius),* castor bean *(Ricinus communis),* sourbush *(Pluchea carolinensis),* and young trees of kiawe *(Prosopis pallida)* and 'opiuma *(Pithecellobium dulce).*

4.6.1.2 Koa Haole/Kiawe Scrub

This vegetation type occurs on those areas that have not been recently disturbed. It is found abutting the Chevron pipeline where it follows along the fence line just outside (*mauka*) of the former Naval Air Station, and covers a large section where the proposed Waiau Fuel Pipeline route passes on the *makai* side of Waipahu High School and Leeward Community College. It is characterized by koa haole shrubs, which form a somewhat dense cover that is 7 to 15 feet tall, and scattered taller kiawe trees, 20 to 35 feet high. Large trees of 'opiuma are scattered through this area. On the 'Ewa Plain, where thin soils overlay coralline substrate, the ground cover consists of patchy clumps of buffelgrass, 1 to 2 feet tall. On the deeper soils by Pearl City, the ground cover consists of a more dense cover of Guinea grass, 2 to 3 feet tall. Other plants associated with this vegetation type include false mallow, klu *(Acacia farnesiana),* lion's ear *(Leonotis nepetifolia),* Chinese violet *(Asystasia gangetica),* sourbush, hairy abutilon *(Abutilon grandifolium),* wild bittermelon *(Momordica*

charantia), and virgate mimosa *(Desmanthus virgatus).* Native species which can be found in the koa haole/kiawe scrub are 'ilima *(Sida fallax),* 'uhaloa *(Waltheria indica),* ma'o or hoary abutilon *(Abutilon incanum),* and popolo *(Solanum americanum).*

4.6.1.3 Wetland Vegetation

American or red mangrove *(Rhizophora mangle)* is the dominant plant cover along the undeveloped areas of the Pearl Harbor shoreline with estuarine, intertidal habitats. The plants often form impenetrable thickets, 20 to 40 ft. tall; in some of the more sheltered, inland areas the trees may reach 50 to 60 ft. in height. Under the mangroves, there is only a dense carpet of leaf litter and propagules, and exposed substrate, usually mud or coral and shell rubble. Mangrove is native to Florida, the West Indies, and South America. The American Sugar Company introduced it to Hawai'i in 1902 to hold soil in mudflats on southwestern Moloka'i, and the species has spread from there. Mangroves have been found in Pearl Harbor since 1917, but the original steep-sided shoreline provided little suitable habitat. Mechanical harvesting of sugar cane beginning in the mid-1940s led to increased sediment outputs and the formation of deltas at the mouth of Pearl Harbor streams. These mudflats now provide large areas suitable for mangrove colonization. Mangroves have also been successful because there are few native species which colonize mudflats and there are no mangrove predators (herbivores and insects) and diseases in Hawai'i (Bishop Museum 2000; Char 2000a).

Mudflats and shallow brackish water habitats also support dense patches of pickleweed *(Batis maritima),* a native of tropical and subtropical America and the Galapagos Islands. Pickleweed was first observed in 1859 in the salt flats around Honolulu Harbor (Wagner *et al.* 1990). It spread quickly. In the 1930s, thick patches of pickleweed were described from along the West Loch shoreline. Pickleweed is a woody, much-branched shrub with succulent, cylindrical leaves, and forms thick mats 3 ft. high. Like the mangrove community, there are few other plants found within the solid mats of pickleweed.

Around the inland peripheries of the mangrove and pickleweed communities, Indian pluchea *(Pluchea indica)* shrubs often form dense thickets. In some places along the margins of these plant communities, there are open areas with exposed, often mineral encrusted soils. These areas support scattered clumps of Australian saltbush, *Leptochloa fusca,* swollen fingergrass, and *Trianthema portulacastrum.*

Undeveloped areas adjacent to a fresh water source such as streams, springs and watercress farms support dense, thick mats of California grass *(Brachiaria mutica),* 3 to 5 feet tall. Shrubs of koa haole, castor bean and sourbush are scattered along the periphery of these areas.

4.6.1.4 Landscaped Areas

These are actively maintained areas usually consisting of open, grassy lawns and plantings of various landscape species. Bermuda grass and Bermuda grass hybrids are the most commonly planted turf species. Various colored bougainvillea cultivars *(Bougainvillea spectabilis,* B. *glabra),* cultivars of oleander *(Nerium oleander)* and plumeria *(Plumeria rubra),* be-still tree *(Thevetia peruviana),* ice flower *(Lampranthus glomerata),* and rainbow shower *(Cassia fistula* X *javanica)* are popular ornamentals; these species tend to be drought-tolerant. Many of the weedy, annual plants associated with the ruderal or roadside vegetation pop up occasionally in areas where there is exposed soil or disturbance. Some of the more frequently encountered weeds in lawn areas include wiregrass *(Eleusine indica),* swollen fingergrass, nutgrass *(Cyperus rotundus),* sowthistle or milkweed *(Sonchus oleraceus), Calyptocarpus vialis,* and prostrate spurge *(Chamaesyce prostrata).* No detailed survey or inventory was made for these landscaped areas as no naturally occurring rare plants are associated with these highly maintained surroundings.

The following sections examine the potential impacts that the three Action Alternatives could have on these botanical communities.

4.6.2 POTENTIAL IMPACTS OF PROPOSED ACTION AND ALTERNATIVE 2

The vegetation on and adjacent to both pipeline routes is dominated by introduced species. Introduced or alien species are those plants which were brought to Hawai'i by humans, intentionally or accidentally, after 1778. Char & Associates (2001) inventoried a total of 135 species in the study area. Of these, 121 (90%) are introduced species, 3 (2%) are originally of Polynesian introduction, and 11 (8%) are native. Ten of the native plants are indigenous, that is, they are native to Hawai'i and elsewhere; these are the 'akulikuli *(Sesuvium portulacastrum),* kipukai *(Heliotropium curassavicum),* alena *(Boerhavia repens),* milo *(Thespesia populnea),* hau *(Hibiscus tiliaceus),* 'ilima *(Sida fallax),* hoary abutilon *(Abutilon incanum),* 'uhaloa *(Waltheria indica),* popolo *(Solanum americanum),* and kukaepua'a *(Digitaria setigera).* One endemic species, i.e., a species native only to Hawai'i., occurs on the study area; it is pa'uohi'iaka *(Jacquemontia ovalifolia* ssp. *Sandwicensis).*

None of the plants found during the field studies is a threatened or endangered species or a species of concern (U.S. Fish and Wildlife Service 1999; Wagner *et al.* 1999). There have been a number of botanical studies conducted by the principal investigator (Char 1980, 1999, 2000b, 2000c; Char and Balakrishnan 1979) and by others (Traverse Group, Inc. 1988, 1991) for various projects on or adjacent to the pipeline routes. No threatened and endangered species were identified along the pipeline routes in these earlier studies. Char & Associates (2001) note that this is not surprising as the routes are located primarily on an existing ROW which has been disturbed for a long time.

4.6.2.1 Construction and Maintenance Activities

Construction of the proposed pipeline and associated facilities at the BPTF, the Waiau Generating Station and the Iwilei Storage facility, as well as the maintenance activities that involve replacement of segments of the Chevron pipeline, would involve some grading, trenching and other disruptions of the flora within and immediately adjacent to the project areas. The best management practices that HECO would employ and that we have assumed Chevron would use in conducting these activities would ensure that the disruptions are confined to the immediate vicinity of the activities and also that the areas would be appropriately re-vegetated after the work is completed (see, for example, Section 2.1.8.6). The field surveys of the potentially affected areas that were conducted during preparation of this report (see Appendix D) indicate that no threatened or endangered plant species are present in these areas. For these reasons, no substantial effects on terrestrial flora would be expected from construction or maintenance of either of the two pipeline alternatives.

4.6.2.2 Normal Operations

Normal operations of the pipelines and associated facilities would not affect terrestrial flora. No substantial effluents or emissions are anticipated from these activities that could stress botanical communities, and no re-direction of irrigation waters or stormwater runoff would occur.

Truck loading and unloading operations would take place at facilities that are isolated by berms and other containment structures from natural habitats that would be threatened by spilled oil. Trucking of fuel between the BPTF and the Iwilei Tank Farm would be confined to existing roadways and would normally have no impacts on surface waters.

4.6.2.3 Potential Impacts of Accidents (Oil Spills) on Flora

As noted throughout this document, the design and operational plans for the proposed Waiau Fuel Pipeline project incorporate many provisions designed to avoid leaks and, should one occur, minimize its possible magnitude. Similarly, the ongoing Chevron pipeline inspection and maintenance program is designed to minimize the probability of future events such as the 1996 spill. This section discusses the potential effects on terrestrial vegetation if, despite all efforts, a release were to occur. It parallels the discussion of the potential for spill-related effects on water quality and aquatic biota presented previously.

The following sub-sections consider the potential effects of oil spills on terrestrial flora from both pipeline alternatives (i.e., Alternatives 1 and 2). Section 4.6.2.3.1 discusses the potential effects on

the flora that are not characteristic of wetland areas (i.e. Types 1, 2, and 4), while Section 4.6.2.3.2 discusses the predicted effects on the wetland flora (Type 4). Vehicle accidents from Alternatives 1 and 3 could cause some LSFO to spill into habitats along the roadways; however the high viscosity of the LSFO and emergency response actions by HECO and public agencies means that such effects are unlikely to be substantial.

4.6.2.3.1 Potential Spill Impacts on Non-Wetland Botanical Communities

Oil toxicity to terrestrial botanical communities (Types 1, 2, and 4) is closely linked to the composition of the oil spilled and to the specific types of plants that are affected. A number of researchers (e.g. Gustafson 1998 and Scholten 1998) note the importance of differentiation based on different oil fractions. Lighter oils, such as diesel fuel and No. 5 fuel oil, are in general more toxic than the heavier oils, such as LSFO. This is important because LSFO would be in the proposed Waiau Fuel Pipeline more than 99.8 percent of the time compared to less than half of the time in the existing Chevron pipeline.

Different types of terrestrial plants also respond very differently to the presence of oil. For example, Chaîneau et al. (1997) found that the LC_{50}[36] values for a sunflower (*Helianthus annuus*) were 70,000 mg/kg, while the same oil produced an LC_{50} of only 3,000 mg/kg in the case of the most sensitive species, lettuce (*Lactuca sativa*). Because the volatile components of oil are the primary contributors to toxicity in general,[37] fresh oil is generally more toxic to plants than weathered oil, and the influence of weathered oil in the soil on the key microbial processes is expected to be minor.

Analyses conducted during preparation of this report indicate that if the break in the proposed Waiau Fuel Line were to occur in the location that would cause the greatest release, about 720 barrels of oil could escape.[38] Because the proposed pipeline is buried along virtually its entire length, this volume could only be released onto the surface where it could adversely affect vegetation if a contractor excavating along the pipeline route were to strike the pipe and break it open.

The situation with respect to the Chevron pipeline is different for several reasons. These include its use of numerous above-ground crossings of dry gulches, the much higher pumping rate that is used when sending LSFO through it, the flatter terrain to which the Chevron pipeline is confined, and the lower number of valves that are present on it. Consequently, the impacts of a spill from the two pipelines are considered separately.

Proposed Waiau Fuel Pipeline: If the break were to occur with the normal LSFO in the pipeline, the oil would flow down hill away from the break, solidifying in place as it cools. Because of the measures that would be employed through implementation of the HECO *Draft Oil Spill Contingency Plan,* most of this oil would be recovered before migrating far from the initial pipeline rupture. Response crews would use sand bags, bales of hay, filter fences, absorbent and viscous oil sweeps, and excavation equipment (including shovels) to channel and isolate the flow, remove as much oil as possible, and minimize the affected area. Depending upon the exact conditions of the spill, as many as 260 barrels might actually reach the ground and spread outside the immediate vicinity of the break. In dry weather, when construction crews are most likely to be working, rapidly cooling LSFO would cover no more than an acre, and its direct effect on vegetation would be limited to that area. If it were to occur during a rain storm, a larger area (possibly amounting to several acres) could be affected, although the immiscible nature of LSFO would tend to restrict the spread.

In order to continue flowing, LSFO must be at a temperature of approximately 120 degrees F or higher. Because of this, it would immediately kill any plants it contacts. Remediation of the spill would involve excavation and removal of the entire soil surface, and associated vegetation, from the

[36] LC_{50} is the concentration of the pollutant that causes mortality in 50% of the test population.

[37] The greater concentrations of volatile components in the lighter oils such as diesel fuel are the primary factors that distinguish them from the residual oils, such as LSFO.

[38] To place this in perspective, 720 barrels is roughly equivalent to the amount carried by five of the kinds of gasoline tanker trucks that carry fuel to neighborhood gas stations.

area that was covered. New topsoil and vegetation would be placed in the area once the removal phase of the clean-up is complete.

If the incident occurred during the rare occasions when diesel fuel is in the pipeline, then the oil could flow farther since diesel fuel would remain liquid and would flow much more freely than would the LSFO. Because of this, it has the potential to cover a greater land area and affect more vegetation. Again, the exact area that could be affected depends upon the specific circumstances of the spill, but it could amount to several times the area that would be affected by LSFO. While the diesel is less likely to kill vegetation on contact, the cleanup operations would require removal of the soil from affected areas, and virtually all of the vegetation would be destroyed in the process.

Both kinds of spills are most likely to affect solely or primarily Type 1 roadside vegetation. If the incident happened during a rainstorm or if diesel fuel were spilled and flows away from the initial spill site, other types of vegetation could be affected as well. The most problematic of situation would occur if the State did not grant HECO the easement needed to route its pipeline outside the portion of the SEC that passes through Pouhala Marsh and the break were to occur in that segment of the line. If that were to occur during a period when there is water in the wetland, the oil could disperse widely through the marsh, harming a substantial amount of wetland vegetation and habitat in the process.

No threatened or endangered plant species are present that could be affected by the kind of accident evaluated here. Though the plants in the immediate vicinity of the spill would be substantially affected, these effects would be mitigated by subsequent remediation efforts, and no long-term, persistent effects on these communities are anticipated.

Chevron Pipeline: A break in the Chevron pipeline would produce the same types of effects as those described above for the proposed Waiau Fuel Pipeline. However, because the Chevron pipeline differs from the proposed Waiau Fuel Line in the following respects, the likelihood and magnitude of the effects could be greater:

- The Chevron line crosses many gulches aboveground; this makes it more likely that oil could spill directly onto the surface.
- The Chevron pipeline is much more likely to contain No. 5 fuel oil fuel than the proposed Waiau Fuel Pipeline. Because No. 5 fuel oil flows more readily than LSFO, a spill from Alternative 2 is, on average, likely to contaminate a larger area and require more vegetation removal.
- The smaller number of control valves present on the Chevron pipeline limit the ability to stop oil from escaping from the pipe if a catastrophic failure occurs. While this is partially offset by the fact that the flatter terrain across which the western portion of the Chevron pipeline passes reduces the pressure driving a leak once the pumps are shut down, a spill from the Chevron line is likely to be larger than one from the proposed Waiau Fuel Pipeline.

The differences noted above mean that Alternative 2 has a slightly greater potential to affect dryland vegetation communities than does the proposed Waiau Fuel Pipeline. This is particularly true in view of the fact that Alternative 2 includes use of a pipeline over the Waiau-to-Iwilei portion of the route, whereas Alternative 1 does not. However, the differences between the two alternatives are relatively small and the vegetation at risk is primarily common exotics. Consequently, the difference is not substantial. As discussed above for the proposed Waiau pipeline, the effects from such spills would be greatly mitigated through re-planting in affected areas with appropriate vegetation. No threatened or endangered plant species would be affected, and no substantial persistent or long-term effects on terrestrial plants is likely.

4.6.2.3.2 Impacts on Wetland Botanical Communities

If the oil can find a suitable pathway, spills from the portions of the pipelines that are located near the shoreline of Pearl Harbor (about 35% of the length of both pipelines) could affect wetland plants (primarily Type 3, wetland botanical communities, mostly dominated by mangrove forests). As

discussed above for terrestrial communities, the impact of the LSFO stems largely from its physical properties (heat and viscosity/stickiness), while No. 5 fuel oil or diesel fuel have greater potential for plant toxicity.

For mangrove wetland communities, several long-term field studies of the effects of real spills and laboratory experiments with various species of mangroves provide guidance regarding the potential effects of a spill.

- In 1986 approximately 240,000 barrels of medium weight crude oil were released from a storage tank on the Caribbean coast of Panama. Oil spread along the coast and washed across fringing reefs and into mangrove forests and small estuaries within 10 km of the spill. A total of 82 km of coastline was oiled to varying degrees. Approximately 165 acres of mangroves, primarily the red mangrove *Rhizophora mangle*, were killed by the discharge. Studies of affected mangrove habitats conducted between 1986 and 1992 evaluated primary production, various parameters of seedling demography, tree growth and recruitment, and seedling growth. Keller and Jackson (1991) reported that, after three years, there were no statistically significant differences in rates of leaf production and net canopy production in oiled and non-oiled habitats.
- Getter et al. (1983) performed experimental studies to examine the effects of oil on seedlings of red and black mangroves. No. 4 fuel oil (somewhat less viscous and with more volatile components than the No. 6 oil released in the 1996 Chevron spill), No. 2 fuel oil (diesel grade), and light Arabian crude oil were tested. Consistent with most other comparisons of different oil toxicity levels, the lighter petroleum products (Arabian crude oil, No. 2 fuel oil) were the most toxic, while No. 4 fuel oil was the least toxic of the oils tested. Red mangroves collected from chronically oiled areas showed significant resistance to oiling with Arabian crude oil.

In summary, these studies support the following general conclusions about the potential for oil-spill effects on mangrove communities:

- Consistent with other biological communities, mangrove forests are more severely affected initially by lighter oils containing more volatile components (like diesel fuel or No. 5 fuel oil) than by heavier, residual oils (like LSFO).
- Mangrove communities can be severely affected by oil spills, but seem able to recover to close to pre-spill levels of community health within less than five years of the initial exposure. This is consistent with the recovery patterns observed in intertidal and subtidal aquatic communities after the Chevron oil spill (see Section 4.5.2.2.2).
- The red mangroves that comprise the dominant species in most of the wetland areas adjacent to both pipeline routes are a very resilient species and able to withstand relatively high levels of contamination compared to other plant species.

The following discussion applies these general findings in evaluating each of the two pipeline alternatives.

Proposed Waiau Fuel Pipeline: The RWC oil spill from the proposed Waiau Fuel Pipeline has the potential to affect the wetlands near the Waiau Generating Station. As discussed in Section 4.3.2.6, about 3 acres of wetland area could be affected, including approximately 3,000 linear feet of wetland foliage along the shoreline. Because spills in other areas would not have as direct a pathway into wetlands, they would affect smaller amounts of wetland vegetation.

The immediate effects on botanical communities would include physical smothering of the lower level flora such as swollen fingergrass, pickleweed and mangrove saplings and prop roots that occupy nearby shoreline areas. If the incident were to occur when diesel fuel is in the pipeline (less than 0.2 percent of the time) then these communities could also suffer some toxic effects. Response and remediation efforts would be conducted to minimize these effects (see Section 4.3.2.6), but groundcover plants, seedlings and mature mangroves would be killed in the most affected areas, principally due to physical injury and the effects of remediation efforts. Based on the available

research results, including the observed recovery of the wetlands affected by the Chevron spill, these communities would be expected to recover to pre-spill rates of leaf production and net canopy production within about five years of the spill. No threatened or endangered plants would be affected.

Chevron Pipeline: In general, an accidental release from the Chevron pipeline has the same potential to affect wetland botanical communities as discussed above for the proposed Waiau Fuel Pipeline. However, as discussed above, the Chevron pipeline differs from the proposed pipeline in the following respects that have implications for potential oil spills:

- All but one of the crossings of drainageways planned for the proposed Waiau Fuel Pipeline route are buried, while many of the Chevron crossings are elevated above the drainageways. This means that there is a greater potential with the Chevron alternative than with the proposed Waiau Fuel Pipeline that an accidental discharge from an exposed portion of pipe could reach wetland vegetation.
- Because of the way the uninsulated Chevron pipeline must be operated, it contains light oil a much greater portion of the time than would the proposed Waiau Fuel Pipeline. Its lower viscosity makes such oil more likely than LSFO to reach and disperse through wetlands if it is spilled.
- The Chevron pipeline has only one manual in-line valve and less sensitive monitoring systems than are incorporated in the design of the proposed Waiau Fuel Pipeline. Consequently, the volume of oil spilled could be higher for this alternative than for the proposed action.
- The portion of the Chevron pipeline past Pouhala Marsh is located within the former OR&L right-of-way that HECO has proposed using as an alternative to the SEC easement through this area. If HECO's request for an easement within the former OR&L right-of-way is granted, then the two pipelines will be similar with respect to their potential to affect wetland vegetation within the marsh. If, on the other hand, HECO's application for an easement is denied, then the Chevron alignment would be better in this regard.

In summary, the two pipeline alignments are similar with respect to the potential for a spill to reach wetland communities, but a spill from the Chevron pipeline is more likely to involve a larger release. On balance, the proposed Waiau Fuel Pipeline is slightly superior from the viewpoint of protecting wetland botanical communities. Nonetheless, based on the available research results, including the observed recovery of the wetlands affected by the 1996 Chevron spill, wetland vegetation would probably recover relatively quickly following an RWC spill from either pipeline.

4.6.2.4 Pipeline Decommissioning

As discussed in Section 2.1.15, HECO would be responsible for draining and cleaning of the pipeline, and possibly for the removal of the pipeline itself, when it terminates pipeline operation of and returns the easement to the State of Hawai'i. If portions or all of the pipe is removed, HECO would employ best management practices to ensure that the removal operations do not cause excessive erosion and sediment runoff into the harbor. Also, HECO would return the surface to its original condition, by compacting and replanting the trenched area, as appropriate. No substantial impacts to wetland botanical communities are anticipated.

HECO would not be responsible for the decommissioning of the Chevron pipeline, but, because the activities are covered by Federal regulations, it is likely that decommissioning of the Chevron pipeline would involve measures that are similar to those that would be used to decommission the proposed Waiau Fuel Pipeline. Chevron would be responsible for draining and cleaning the pipeline, and possibly for the removal of the pipeline itself, when it terminates pipeline operation and abandons the easement. If portions of or all the pipe were to be removed, Chevron would be required to employ best management practices to ensure that the removal operations do not cause excessive erosion and sediment runoff into the harbor. Assuming this is done, no substantial impacts to wetland botanical communities are anticipated.

4.6.3 ALTERNATIVE 3: TRUCKING

The trucking alternative would require the construction of new unloading facilities at the Waiau Generating Station. The proposed unloading site is adjacent to Kamehameha Highway. A portion of the site is bermed and was used for wastewater storage; it supports a scrubby growth of koa haole, sourbush, and Natal redtop grass. The rest of the site is paved or graveled with low, clumps of weedy, ruderal vegetation. Construction of the unloading facilities and operation of the truck transport of oil would not have a substantial effect on the botanical resources of the area.

The fuel truck loading and unloading facilities would be operated in accordance with the facility's SPCC plan. Spills would be confined to the immediate vicinity and would not pose a threat to adjacent wetland areas or to wetlands along the shoreline of Pearl Harbor. Possible impacts to botanical resources caused by any spill related to truck transport operation would be mitigated and remediated by the rapid response of the designated emergency personnel.

4.7 IMPACTS ON TERRESTRIAL AND AVIAN FAUNA

Rana Productions, Ltd. (2002) studied the potential impacts of the two pipeline alternatives on terrestrial and avian fauna. This study included a field survey of the pipeline routes and an evaluation of relevant literature on the subject. It is reproduced here as Appendix E. The principle conclusions from this study are summarized below for Alternative 1 and Alternative 2. Because the facilities required for Alternative 3 are located on developed land that would be affected by aspects of the other alternatives, it was not included in the field survey.

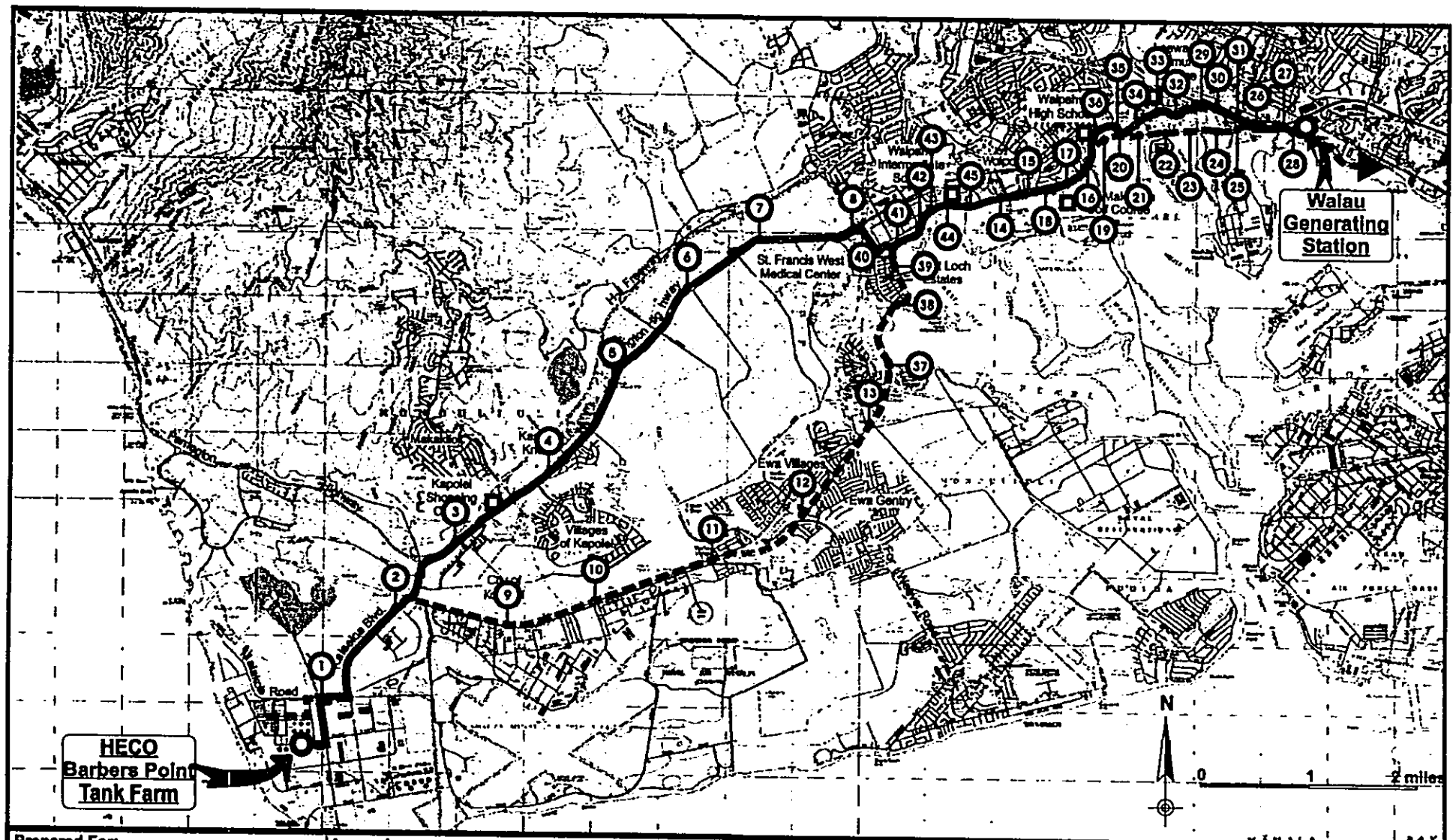
The remainder of this section is divided into seven parts:

- Section 4.7.1 describes the survey methodology that was followed.
- Sections 4.7.2 and 4.7.3 summarize the results of the mammalian survey and avian surveys.
- Section 4.7.4 describes the potential construction-related effects that pipeline construction, operation, and maintenance could have on terrestrial and avian fauna.
- Section 4.7.5 discusses the impacts that an accidental spill could have on terrestrial and avian fauna.
- Section 4.7.6 briefly reviews pipeline decommissioning activities.
- Section 4.7.7 assesses the potential effects of Alternative 3, trucking to both Iwilei and Waiau.

4.7.1 SURVEY METHODOLOGY

Biologists conducted a four-day ornithological and mammalian survey along the two pipeline routes. Fieldwork was conducted on September 28th and from October 9th through October 11th 2001. The primary purpose of the survey was to determine if there were any federally listed endangered, threatened, proposed, or candidate avian or mammalian species on, or in the immediate vicinity of either pipeline route.

Forty-five avian count stations were established along the two pipeline corridors; their locations are shown on Figure 4-10. Six-minute unlimited distance variable circular plot counts were made at each station. The stations within the 'Ewa plains were spaced approximately one mile apart; those along the West Loch shoreline and the immediate surrounding area were spaced approximately 440 feet apart. One count was conducted at each station. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated in the morning hours, the time of day when bird activity is typically at its peak. Four waterbird counts were made from locations adjacent to wetland features at stations 4, 14, 20 and 28. An additional two hours were spent during the evenings of October 9th and 10th and on the mornings of the October 10th and 11th, 2001, in an attempt to detect nocturnally flying seabirds and owls over-flying the area. Time not spent counting was used to search the two corridors and the surrounding area for species and habitats not detected during count sessions.



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Rana Productions, Ltd.
Rooney Engineering, Inc.
USGS Quadrangle Maps: Ewa, Schofield Barracks, Waipahu, Pearl Harbor; 2000 editions

Legend:

- Proposed HECO Pipeline
- Chevron Pipeline
- Observation Station
- HECO Facility
- Other Facility Near Existing Route

Figure 4-10:

Terrestrial Fauna Observation Stations

Waiau Fuel Pipeline Project

All observations of mammalian species were of an incidental nature. With the exception of the endemic (native and unique to Hawai'i), endangered Hawaiian hoary bat *(Lasiurus cinereus semotus)*, or *'ope'ape'a*, as it is known in Hawaiian, all terrestrial mammals currently found on the island of O'ahu are alien species. Most are ubiquitous; no trapping program was proposed or undertaken to quantify the use of the study site by alien mammalian species. The survey of mammals was limited to visual and auditory detection, coupled with observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species observed and heard within the project sites. Additionally, four crepuscular (twilight) surveys were conducted close to stations 2, 11, 28, and 39 (as shown Figure 4-10) to determine if bats are over-flying either of the two pipeline corridors.

A one-time survey cannot provide a total picture of the wildlife using any given area. Certain species will not be detected for one reason or another. Seasonal variations in populations, coupled with seasonal availability and use of resources, will cause different use patterns throughout a year and, in fact, over a number of years. For this reason, the survey results have been augmented significantly with a comprehensive literature review to support the conclusions reached for the study.

4.7.2 MAMMALIAN SURVEY RESULTS

Three mammalian species – domestic dog (*Canis f. familiaris*), cat (*Felis catus*), and small Indian mongoose (*Herpestes a. auropunctatus*) – were detected within the study corridors. All of these introduced mammalian species are deleterious to native species. The endangered Hawaiian hoary bat was not detected during the course of this survey.

Although no rodents were detected during the course of this survey, it is likely that roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), European house mice (*Mus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use various resources present within the two pipeline corridors. Without conducting a trapping program, it is difficult to assess the population densities of these often hard-to-see mammals. All of these introduced rodents are deleterious to native avian and floral species.

The mammalian field survey results are consistent with the results of other recent surveys conducted within the lowland areas of O'ahu (David, 1997a, 1997b, 1998, 1999, 2000a; David and Guinther 2000; Guinther and David 2001). Hence, they are believed to accurately represent the species that are present.

4.7.3 AVIAN SURVEY RESULTS

4.7.3.1 General Conclusions

A total of 1,866 individual birds, representing 26 avian species, from 16 separate families, were recorded during station counts (Table 4-23). Of the 26 species detected, three species – Hawaiian Duck (*Anas wyvilliana*), or *koloa ~~mapu~~maoli*, as it is known in Hawaiian, Common Moorhen (*Gallinula chloropus sandvicensis*), or *'alea'ula* and Black-~~necked~~ Necked Stilt (*Himantopus mexicanus knudseni*), or *ae'o* – are listed as endangered species under the Federal Endangered Species Act of 1973, as amended (ESA), and by the State of Hawai'i under it's endangered species program (*Federal Register* 1999a, DLNR 1998). The stations at which these were observed are shown in Table 4-24.

Of the remaining 23 species detected, only the Black-crowned Night-Heron (*Nycticorax nyticorax hoactli*), or *'auku'u*, is indigenous (i.e., native to Hawai'i but also found elsewhere naturally). Three species – Pacific Golden-Plover (*Pluvialis fulva*), or *kolea*, Wandering Tattler (*~~Heteroscelus~~ Heteroscelus incanus*), or *'ulili*, Ruddy Turnstone (*Arenaria interpres*), or 'akekeka, and Sanderling (*Calidris alba*), or *hunakai* – are regularly occurring indigenous migrants. The remaining 19 species are alien to the Hawaiian Islands.

Table 4-23. Avian Species Detected During Station Counts

Common Name	*Scientific Name*	*ST*	*RA*
HERONS - Ardeidae.			
Cattle Egret	*Bubulcus ibis.*	A	1.22
Black-crowned Night-Heron.	*Nycticorax nycticorax hoactli.*	I	0.78
DUCKS, GEESE & ALLIES - Anatidae			
Muscovy	*Cairina moschata*	AD	0.02
Hawaiian Duck X Mallard Hybrid	*Anas wyvilliana X platyrhynchos*	EE	0.22
PHEASANTS & ALLIES – Phasianidae			
Red Junglefowl	*Gallus gallus.*	A	0.58
RAILS & ALLIES - Rallidae			
Common Moorhen (Hawaiian)	*Gallinula chloropus sandvicensis*	EE	0.04
PLOVERS & LAPWINGS - Charadriidae			
Pacific Golden-Plover.	*Pluvialis fulva.*	IM	1.80
STILTS & AVOCETS - Recurvirostridae			
Black-~~necked~~ Necked Stilt ~~(Hawaiian)~~	*Himantopus mexicanus knudseni*	EE	2.07
SANDPIPERS & ALLIES - Scolopacidae			
Wandering Tattler	*~~Heteroscelus~~ Heteroscelus incanus*	IM	0.31
Ruddy Turnstone	*Arenaria interpres*	IM	1.16
Sanderling	*Calidris alba*	IM	0.16
PIGEONS & DOVES - Columbidae			
Rock Dove	*Columbia livia*	A	0.89
Spotted Dove.	*Streptopelia chinensis.*	A	3.82
Zebra Dove.	*Geopelia striata.*	A	7.24
BULBULS – Pycnonotidae			
Red-vented Bulbul	*Pycnonotus cafer.*	A	4.78
THRUSHES - Turdidae			
White-rumped Shama.	*Copsychus malabaricus indicus*	A	0.04
SILVEREYES - Zosteropidae			
Japanese White-Eye.	*Zosterops japonicus*	A	2.44
STARLINGS - Sturnidae			
Common Myna.	*Acridotheres tristis.*	A	3.58
SALTATORS & ALLIES - Cardinalidae			
Red-crested Cardinal.	*Paroaria coronata.*	A	0.73
Northern Cardinal.	*Cardinalis cardinalis.*	A	0.80
CARDULINE FINCHES & ALLIES - Fringillidae			
House Finch.	*Carpodacus mexicanus frontalis*	A	1.93
OLD WORLD SPARROWS - Passeridae			
House Sparrow	*Passer d. domesticus*	A	0.98
WAXBILLS & ALLIES - Estrildidae			
Common Waxbill.	*Estrilda A. astrild*	A	2.20
Nutmeg Manikin	*Lonchura punctulata topela*	A	0.38
Chestnut Munia	*Lonchura atricapilla*	A	0.40
Java Sparrow.	*Padda oryzivora*	A	2.93

Notes: ST=Status; I=Indigenous, resident species, A=Alien species – established in the wild in Hawai'i; AD=Alien domestic species – not established in the wild in Hawai'i; EE=Endangered, endemic species; IM=Indigenous, migratory species; RA=Relative Abundance: Number of birds detected divided by the number of count stations (45)

Source: Rana Productions, Ltd., 2002.

Table 4-24 Endangered Avian Species Observed Along the Pipeline Routes

Station No.	Hawaiian Duck	Common Moorhen	Black-~~necked~~ Necked Stilt
14			69
20	2		
22	2		6
23	1		
33	2		6
35		2	
45	3		12
TOTAL	**10**	**2**	**93**
Note: Station locations shown on Figure 4-10.			
Source: Rana Productions, 2002.			

The results of the survey showed that avian diversity along both pipeline routes is relatively low. Four species; Spotted Dove (*Streptopelia chinensis*), Zebra Dove (*Geopelia striata*), Red-vented Bulbul (*Pycnonotus cafer*) and Common Myna (*Acridotheres tristis*) accounted for 47 percent of the total number of birds recorded during station counts. The most common avian species detected was the Zebra Dove, which accounted for 17 percent of the total individual birds recorded. An average of 41 birds was recorded per station-count.

The findings of the avian survey are consistent with the findings of other recent surveys conducted within the lowland areas of O'ahu (David, 1995a, 1995b, 1995c, 1995d, 1997a, 1997b, 1997c, 1998, 1999, 2000a, 2000b; David and Guinther 2000; Guinther and David 2001). There have been monumental changes in the avian species makeup of the areas around West Lock and the 'Ewa plains following the closure of Castle & Cooke's 'Ewa Plantation in the early 1970's and O'ahu Sugar Co.'s operations in 1994. Consequently, the results of surveys conducted before 1990 are no longer directly applicable.

4.7.3.2 Wetland Areas

From an ornithological perspective, the most interesting sections of the two pipeline corridors surveyed were those running along, or close to, the West Loch of Pearl Harbor. The various natural and man-made wetland features and the loch waters support all four extant endangered Hawaiian waterbird species found on O'ahu; Hawaiian Duck, Hawaiian Coot (*Fulica alai*), or 'alae ke'oke'o , which are endemic at the species level, and the Common Moorhen and Black-~~necked~~ Necked Stilt which are endemic at the sub-species level (American Ornithological Union 1998; Clements 2000). All four species are listed as endangered under both the ESA and the State of Hawai'i endangered species statutes (DLNR 1998; Federal Register 1999a).

Between the turn of the century and 1995-96 the numerous man made wetlands associated with sugar cane production supported large numbers of waterbirds. The area also was a major migratory shorebird and waterbird stopping-off point between September and April each year. Many of the more than 80 species of migratory and extralimital[39] avian species which have been recorded from Hawai'i have been recorded from the area (Engilis 1988, Pyle et al. 1988, David 1991, Pyle 1992, Pyle 1997). Between 1995 (when the last sugar operations ceased) and the present, the sugar cane settling ponds have dried up and become overgrown with a mix of alien weedy species or have been

[39] Not generally present in the specific area.

leveled for development. The shoreline along West Loch is heavily vegetated with red mangrove which all but obscures the beach mudflats. This dense vegetation all but precludes the current utilization of the intertidal zone by shorebirds.

The area along both routes adjacent to West Loch supports numerous wetland habitats including, saltwater swamp, saltwater marsh, freshwater marsh, freshwater swamp, cultivated wetlands, and ruderal wetlands (see Figure 4-4). There are several significant wetlands located along the pipeline routes. Pouhala Marsh is located just north-northwest of Kapakahi Stream on the Waipi'o peninsula. Managed under a cooperative agreement with the U.S. Navy, Pearl Harbor National Wildlife Refuge (NWR) was established in 1976. This refuge is composed of two units, the 37-acre Honouliuli Unit, which borders West Loch, and the 25-acre Waiawa Unit bordering Middle Loch. ~~The area along both routes adjacent to West Loch supports numerous wetland habitats including, saltwater swamp, saltwater marsh, freshwater marsh, freshwater swamp, cultivated wetlands, and ruderal wetlands. There are several significant wetlands located along the pipeline routes. Pouhala Marsh is located just north-northwest of Kapakahi Stream on the Waipi'o peninsula. There is a unit of the Pearl Harbor National Wildlife Refuge (PHNWR) located on the 'Ewa side of West Loch immediately adjacent to the West Loch Golf Course. Additionally there are two units of the PHNWR located on the southwest shore of the Pearl City Peninsula.~~

During the course of this survey 10 Hawaiian Duck X Mallard hybrids, 2 Common Moorhen and 93 Black ~~necked~~ Necked Stilts were detected during station counts (Table 4-24). Additionally, four ~~Hawaiian~~ Black-Necked Stilts were seen flying over Malakole Road from the BPTF to the fertilizer processing operation located just west of station number 1 as an incidental observation. Numerous stilt were heard but not seen from within the BPTF while inspecting the proposed pumping station site; the vocalizations came from the artificial wetland that is located just north of the BPTF within the boundaries of the Chevron Refinery.

- Ten Hawaiian Duck X Mallard hybrids were flushed from wetland areas around West Loch. Two birds were seen flying off the fenced wetland close to station #20, located to the north of the existing Chevron pipeline, three birds from the cultivated wetlands located adjacent to station #22, and #23, and two birds from the northern side of the same wetland adjacent to station #33. An additional three birds were flushed from the northern end of the pickleweed (*Batis maritima*) salt marsh just to the southwest of the two pipeline corridors at station #45.
- Hawaiian Ducks, once extirpated from the Island of O'ahu, were successfully re-introduced to the Island by the State Department of Land and Natural Resources (DLNR) during the 1970's. The O'ahu population is currently estimated at approximately 300 birds (Engilis and Pratt 1993; USFWS 1999). In the intervening years the genetic pool of this endemic endangered species has all but been swamped by the introduced Mallard (*Anas platyrhynchos*), and few if any birds remaining on O'ahu are pure Hawaiian Ducks, but rather Hawaiian Duck X Mallard hybrids.
- Two Common Moorhen were detected within the fenced wetland located to the north of station #20, and south of station #35. This endangered endemic sub-species is an extremely secretive bird. Moorhens are widely but sparsely distributed on O'ahu, with a small population known in the Pearl Harbor area (Engilis and Pratt 1993; USFWS 1999). Current population estimates are suspect due to the difficulty in counting this secretive species.
- As previously mentioned, a total of 93 Black ~~necked~~ Necked Stilts were recorded during station counts, with numerous others recorded as incidental observations in and around the BPTF. Sixty-nine Black ~~necked~~ Necked Stilts were seen within the playa that is part of Pouhala Marsh (station #14). An additional six each were recorded at stations #22 and #23; these birds were in the cultivated wetlands on the Pearl City Peninsula between the proposed Waiau Fuel Pipeline and the existing Chevron pipeline. It is currently estimated that the Black ~~necked~~ Necked Stilt has a State-wide population of between 1,200 and 1,600 birds (USFWS 1999) and that O'ahu supports a population of between 500 and 750 birds (Engilis and Pratt 1993).

- There is little if any suitable habitat, either in the existing or the proposed pipeline corridors or within the playa, that is suitable for stilt nesting. Stilts generally nest on, or adjacent to low relief islands within bodies of water.[40] Stilts generally forage and nest in separate wetland sites, moving between them on a daily basis (USFWS 1999). The stilts currently use the playa as a loafing area.
- Although not detected during this survey, it is probable that Hawaiian Coots use resources within the various wetlands located between the existing and proposed pipelines in which the above three species were detected. Currently these wetland habitats do not favor Hawaiian Coots, which prefer more open water than is currently available within both the cultivated and fenced wetlands. Numbers of this species and the other three listed waterbird species regularly use resources within the two units of the PHNWR located on the southwest shore of the Pearl Harbor Peninsula and the third unit located on the West Loch shoreline.
- Although also not detected during this survey, the threatened Newell's Shearwater (*Puffinus newelli*) may occasionally fly over sections of the pipeline routes. No nesting colonies have to date been detected on O'ahu; but small numbers of this species have been recovered on the island following "downing" incidents. The majority of these birds were found on the Honolulu side of the Ko'olau Mountains (Banko 1980; R. L. Pyle, personal communication; B. Flint, personal comm.; D. Smith, personal comm.).

4.7.4 POTENTIAL CONSTRUCTION AND MAINTENANCE IMPACTS

This sub-section discusses potential impacts to listed waterbirds and their habitats from construction and maintenance of both the proposed Waiau Fuel Pipeline and the Chevron pipeline. It also discusses the potential effects of an accidental oil spill.

4.7.4.1 Construction and Maintenance Impacts

During the course of construction of the proposed Waiau Fuel Pipeline project (Alternative 1) and during maintenance activities that require replacement of sections of the existing Chevron pipeline (Alternative 2), it is likely that individual listed birds and other animals would be displaced briefly by the noise and human activity associated with excavation and installation of new and/or replacement pipe in areas that are close to their habitat. At the BPTF, new construction would be more than 200 feet away from the Chevron wastewater pond that is known to host populations of stilts. Observations of the stilts' behavior in the presence of activity on the BPTF site indicate that this is sufficient buffer to keep construction activity from having a significant adverse effect on them.

HECO's proposed route within the former OR&L right-of-way past Pouhala Marsh provides several hundred feet of separation, some of it with intervening screening vegetation, between pipeline construction and the portions of the marsh that are presently most used by waterbirds. This is sufficient to minimize or avoid disturbance to them. Should the State Department of Transportation refuse HECO the permission it needs to route the proposed Waiau Fuel Pipeline outside the portion of the State Energy Corridor that passes through Pouhala Marsh, then the potential for temporary displacement in this area would be substantially greater. Because the distance across the marsh is too great for directional drilling techniques to be used to construct the pipeline beneath the marsh without intermediate drilling stations in it, this is true even if the most advanced construction techniques are used.

There is adequate similar habitat relatively close to the three main areas in which listed waterbirds were recorded to accommodate the temporary displacement. It is likely that any stilts, moorhen, and ducks that might be displaced would find suitable loafing and foraging sites close to the ones from which they may be displaced. It is unlikely that these construction and maintenance activities would have any impacts, positive or negative on the Newell's Shearwater, which is not currently known to occupy the project area and for which there is no suitable nesting habitat within or close to the

[40] Such islands are one of the features that are expected to be developed in Pouhala Marsh as part of the restoration plan for the area.

proposed pipeline route. If there is no further mechanical and/or human disturbance of the loafing area located south of station #14 and #45, during the course of construction or maintenance, the ~~Hawaiian~~ Black-Necked stilts may become acclimated to the construction activity. Following the completion of the construction or maintenance activities and the restoration of the disturbed area, it is unlikely that there would be any lingering effects to the endangered birds or other animals that are displaced.

Because it lies near and above wetlands, construction of the portion of the proposed Waiau Fuel Pipeline between Waipi'o Point Access Road and the Waiau Generating Station poses a small additional risk of siltation of these wetlands from excavated materials which have the potential to be carried down-slope by rains. Such impacts would be avoided by the use of best management practices during construction or maintenance activities (see Table 4-22).

4.7.4.2 Operation

Normal operation of the two pipeline alternatives (the proposed Waiau Fuel Pipeline and the Chevron pipeline) would have no effect on any of the fauna that are present. The truck loading and unloading operations that are part of the proposed action would take place at facilities that are isolated by berms and other containment structures from natural habitats that would be threatened by spilled oil. Trucking of fuel between the BPTF and the Iwilei Tank Farm would be confined to existing roadways and would normally have no impacts on fauna.

4.7.5 IMPACTS OF ACCIDENTAL OIL SPILLS ON TERRESTRIAL AND AVIAN FAUNA

4.7.5.1 Introduction

The threat of a break or leak in either the proposed Waiau Fuel Pipeline or the existing Chevron pipeline poses a risk to avian fauna as well as to the terrestrial and marine habitats on which they depend. The kinds of effects that can result from wildlife exposure to oil spills are well documented, although the most careful studies have been of spills from vessels that are far larger than those that could result from a failure in either of the pipeline alternatives discussed in this report. In accordance with the Memorandum of Agreement between Chevron and the Trustees responsible for clean-up and recovery efforts following the 1996 Chevron spill, efforts were focused on restoration rather than documentation. Consequently, detailed field studies of injury to wildlife habitat were not undertaken. However, the following discussion included in the *Final Restoration Plan and Environmental Assessment* (Trustees 1999:30) summarizes the kinds of effects that can occur.

> *Typically, wildlife is exposed to oil through either direct surface contact, ingestion, absorption or indirect ingestion. Direct contact with oil can foul feathers, matt hair, irritate mucous membranes, and smother animals. Oil droplets on the feathers of adult federally-listed and state-listed endangered waterbirds (i.e., ~~Hawaiian~~ Black-Necked stilts, Hawaiian ducks, Hawaiian coots, or ~~Hawaiian~~ Common moorhens) may have been transmitted to chicks or eggs. Embryos in the early stage of incubation are especially vulnerable to contact with oil and small quantities ranging from 1 microliter to 20 microliter may be sufficient to cause death (Parnell et al. 1984, Hoffman 1990, Albers 1991).*
>
> *Inhalation or dermal absorption of the volatile components of oil can injure airways and cause internal toxicity. Organisms can also ingest oil by preening or cleaning their body surface or through direct consumption (e.g., filter feeding or swallowing oil particles). In addition, indirect exposure can occur when oil-contaminated prey is consumed. Waterbirds can be adversely affected from residual surface sheen and oil or indirectly through bioaccumulation processes whereby they ingest tainted invertebrates or vegetation during forage activities (Albers 1995b, Baca et al. 1985, Vandermeulen 1984). The extent to which endangered Hawaiian waterbirds were exposed to spilled oil in Pearl Harbor remains uncertain.*

The following discussion of potential effects is based on the estimated reasonable worst case (RWC) spill volumes, the kinds of pathways and effect mechanisms noted above, and the characteristics of the potentially affected communities presented in Section 4.7.3. Section 4.7.5.2 discusses the Waiau Fuel Pipeline. Section 4.7.5.3 discusses potential effects associated with Alternative 2, continued use of the Chevron pipeline. Vehicle accidents could cause some LSFO to spill into habitats along the roadways; however the high viscosity of the LSFO and emergency response actions by HECO and public agencies means that such effects are unlikely to be substantial.

4.7.5.2 Alternative 1: Proposed Waiau Fuel Pipeline

The RWC oil spill from the proposed pipeline into the wetland near the Waiau Generating Station is estimated at 137 barrels, 14 percent of the amount that was released by the Chevron spill. Moreover, the response plan that HECO is developing as part of its planning for the Waiau Fuel Pipeline project would allow the majority of the oil to be contained before reaching Pearl Harbor and spreading more widely across it as happened in 1996. Nonetheless, such a spill has the potential to affect directly about 3 acres of wetland area, including approximately 3,000 linear feet of wetland foliage along the shoreline. The immediate threat would be to waterbirds and to birds using shoreline areas. These would include the same species found along the pipeline route and reported in Table 4-23.

It is not possible to quantify the damage that could be done to wildlife by such a spill. However, it is possible to draw a number of qualitative conclusions. First, because of its substantially smaller size and the response provisions that HECO would have in place, it is clear that the effects of a RWC spill from the proposed Waiau Fuel Pipeline would be substantially less than occurred in 1996. Secondly, some loss of life could occur, including loss of endangered waterbirds. Finally, temporary degradation of habitat could affect the health and population size of other species using the shoreline areas, but evidence from studies conducted following oil spills elsewhere indicates that recovery would probably be complete or largely compiete within five years.

The possibility that a spill occurring at a location other than Waiau Stream might have worse effects on the faunal community was considered. However, with one possible exception the pathways are not present that would allow the spill to reach as much sensitive habitat. That exception occurs along the Pouhala Marsh segment of the route.

HECO has proposed routing the Waiau Fuel Pipeline outside the portion of the SEC that passes through Pouhala Marsh. If the State Department of Transportation grants its request, there will be no direct flow path between the pipeline and the sensitive wetland habitat in the marsh. Moreover, the low gradient of the pipe through this essentially flat area means that if a leak were to occur from a pipe located within the easement that HECO has requested, the flow rate of release would drop to a low level as soon as the leak is reported and the pumps are shut down. The location is accessible by land, and the equipment needed to contain and remediate the spill could go to work quickly. In all likelihood the spill could be contained before reaching water in the marsh.

If HECO's request for an easement within the former OR&L right-of-way is denied and it must use the existing SEC easement, the pipeline would be placed adjacent to the Tesoro and ~~Gasco~~ GasCo pipelines that are already located within the Pouhala Marsh portion of the SEC. A pipeline rupture in this location has the potential to release fuel into the wetland.[41] If the break occurred during a relatively wet period when water ponds extensively throughout the marsh (a condition that will be more frequent if present plans for marsh restoration are implemented), then the spilled oil could spread widely throughout the 70-acre marsh. In view of its importance as a habitat for endangered Hawaiian waterbirds, the potentially lethal effects of this oil constitute a potentially significant adverse effect.

[41] As noted elsewhere, the kind of failure that would lead to a substantial release could occur only if the pipeline were damaged by excavation equipment. This kind of activity is extremely unlikely to occur in the marsh today, and it will be even less probable after the USF&WS erects fencing around the marsh as is presently planned.

As discussed above, HECO is preparing a comprehensive *Draft Oil Spill Contingency Plan* (HECO 2002), which clearly defines the steps that would be taken and chain of authority assigned to assure rapid and efficient response to any spill from the pipeline. Implementation of the measures called for in the plan would mitigate possible effects on avian and other terrestrial fauna. As HECO engineers develop final plans for this section of the proposed pipeline, they would continue to work with State and Federal resource agencies and with other stakeholders to refine these response measures.

4.7.5.3 Alternative 2: Chevron Pipeline

In general, any future spills from the Chevron pipeline would be expected to have the same kinds of effects on avian fauna as those described above for the proposed Waiau Fuel Pipeline. The ongoing Chevron pipeline inspection and maintenance program is designed to minimize the probability of future events such as the 1996 spill. However, as discussed above in Section 4.6.2.3 and elsewhere, in the unlikely event that a spill were to occur, there are a number of design aspects of the Chevron Pipeline that make it likely to affect substantially more habitat than would a spill from the proposed Waiau Fuel Pipeline. These include such things as its greater number of above-ground drainageway crossings, the much higher percentage of the time that the Chevron line would contain No. 5 fuel oil fuel (rather than LSFO), the use of the existing pipeline past Waiau, and the fact that the fewer shutoff valves in the Chevron system would tend to allow a greater amount of oil to be discharged before the leak is completely stopped.

4.7.6 PIPELINE DECOMMISSIONING

As discussed in 2.1.15.2, once the operational lifespan of the pipeline has been reached, the pipeline operator would be responsible for the costs either of abandoning or removing the pipeline system. The pipeline would be drained and purged of petroleum. In certain cases it might actually remove portions of the pipe. Commonly, pipelines are abandoned in place. If abandoned, the pipeline would be sealed and filled with pressurized inert nitrogen gas or filled with grout. If removed, impacts on terrestrial and avian fauna would be similar to those caused by construction. Implementation of best management practices during the pipeline removal would minimize or eliminate the potential for introduction of sediments into wetland areas. No substantial impacts on terrestrial and avian communities would be anticipated for either pipeline alternative.

4.7.7 ALTERNATIVE 3: TRUCKING

This alternative would require the construction of larger (than for Alternative 1) truck loading facilities at the BPTF and new truck unloading facilities at the Waiau Generating Station. The proposed unloading site at the Waiau Generating Station is along the Kamehameha Highway side of the existing facilities. A portion of the site is bermed and was once used for wastewater storage; it supports a scrubby growth of koa haole, sourbush, and Natal redtop grass. The rest of the site is paved or graveled with low, clumps of weedy, ruderal vegetation. No endangered or threatened animal species have been found in the potentially affected area. Construction of the unloading facilities and operation of the truck transport of oil would not have a substantial effect on the terrestrial fauna of the area.

Oil spills at the unloading facilities would be handled in accordance with the facility's SPCC plan. The maximum potential spill volume is equivalent to the capacity of a fuel tanker truck (just under 140 barrels), and facilities are in place to insure that the oil is contained within the fuel handling area. Spills would be confined to the immediate vicinity and would not pose a threat to adjacent areas or to Pearl Harbor. The impacts to terrestrial fauna caused any spill related to the truck transport operation would be mitigated and remediated by the rapid response of the designated emergency personnel.

If an accident were to occur while a fuel truck were in transit, the same 140 barrels could be released at any point along the route. If spilled, the oil (which would be at a temperature of between 140 and 160 degrees F in the insulated tanker truck) would flow away from the accident site at a rate dependent upon the exact topography where the spill occurred. As it spreads, it would cool and

become more viscous, limiting the area that would be covered. The roadways that would be used are not near to areas that include sensitive habitats. Thus, such an accident has relatively little potential to cause substantial adverse effects to terrestrial and avian fauna.

4.8 IMPACTS ON HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

International Archaeological Research Institute, Inc. ~~(IARII)~~ assessed the effect that the proposed Waiau Fuel Pipeline project (Alternative 1) and Alternative 2 might have on historical/archaeological resources.[42] Paul H. Rosendahl, Inc. (PHRI) evaluated their potential effects on cultural resources. Both assessments were conducted in accordance with applicable State and Federal guidance and are reproduced in Appendix F and Appendix G. Because the trucks that would be used for Alternatives 1 and 3 would use existing roadways and the necessary truck loading and unloading facilities would be constructed on previously disturbed areas within the BPTF and the Waiau Generating Station, truck transport of the LSFO was not assessed separately.

The primary conclusions from these studies are summarized below. The discussion is organized as follows:

- Section 4.8.1 describes the general environmental setting and provides a narrative overview of what is known about past human activities in the region.
- Section 4.8.2 outlines the results from the various archaeological studies conducted in the region.
- Sections 4.8.3 and 4.8.4 examine the potential impacts to these resources from the proposed Waiau Fuel Pipeline project and the Chevron Alternative (Alternatives 1 and 2), respectively. Proposed mitigation measures to minimize these impacts are also included in these sections.
- Section 4.8.5 discusses the results of the investigations that were conducted to determine if there is any potential for effects on cultural practices.

4.8.1 OVERVIEW

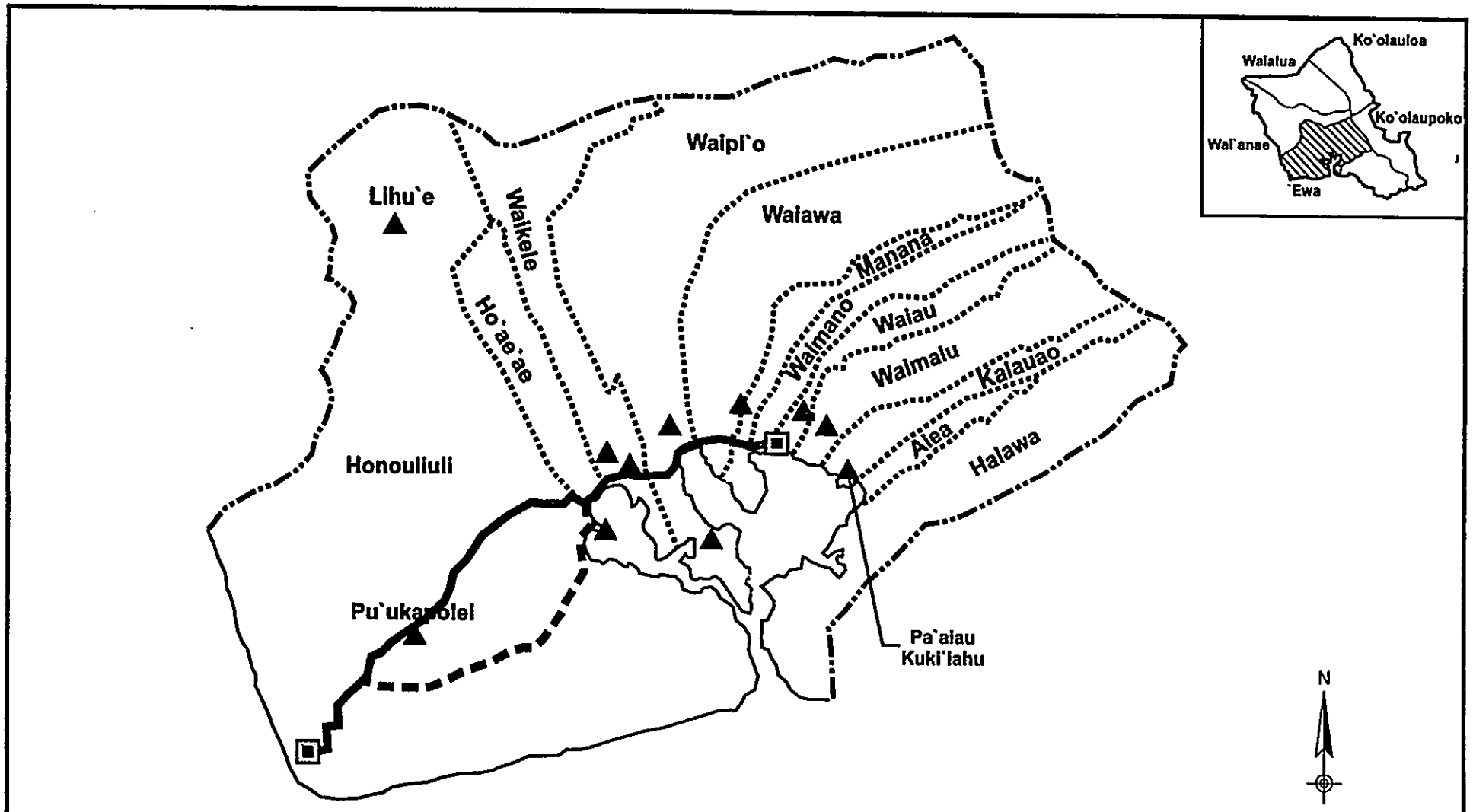
4.8.1.1 The Traditional District of 'Ewa

The alternative fuel line routes cross the *ahupua'a* of Honouliuli, Hō'ae'ae, Waikele, Waipi'o, Waiawa, Mānana, Waimano, and Waiau in the traditional Hawaiian district of 'Ewa (see Figure 4-11). The 'Ewa District occupies the southwestern quadrant of the island of O'ahu, encompassing the dry 'Ewa Plain, all of Pearl Harbor (traditionally called Pu'uloa lagoon), the southern half of the central plateau of the island, and portions of the Wai'anae and Ko'olau ranges. In ancient times, 'Ewa District was a center of island power for Hawaiian ruling chiefs (Cordy 1996). It is important to note that it extended far beyond the area that is commonly referred to today as 'Ewa; hence, care must be taken when interpreting references to the area in tradition and earlier work.

The legendary origin of 'Ewa District comes from the land division created by the gods Kāne and Kanaloa (Sterling and Summers 1978:1, with a reinterpretation by Maly 1992:9). While playing a game of 'ulu maika at Kapūkakī (the present Red Hill), Kāne threw the game stone, but it went so far and across such a crooked course that it was lost. As Nawa'a (1953, quoted in Sterling and Summers 1978:1) says: "*So Ewa (strayed) became known by that name. The stone that strayed.*"

The 'Ewa District figures early in the pre-contact history of O'ahu. According to Cordy (1996), by the A.D. 1200s, 'Ewa was one of three major competing districts that had developed out of earlier small, independent political units. Called Greater 'Ewa, it consisted of the later districts of 'Ewa,

[42] The analysis for Alternative 2 was restricted to the Campbell Industrial Park-to-Waiau portion of the Chevron pipeline. Continued use of the Waiau to Honolulu Harbor portion of the Chevron pipeline would entail the same kinds of maintenance, repair, and replacement activities as those needed for the part of the existing line that was evaluated. Those activities would be confined to urban areas that are already highly disturbed, however.



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
International Archaeological Research Institute, Inc.
Planning Solutions, Inc.

Legend:

- HECO Facilities
- Approximate Area of Temple or Chiefly Residence
- Proposed HECO Pipeline
- Chevron Pipeline

Figure 4-11:

Traditional Districts of `Ewa Including Cultural Places and Temples

Waiau Fuel Pipeline Project

Wai'anae, and Waialua (see Cordy 1996). In the early A.D. 1400s, the king La'akona, considered "the great progenitor of the Ewa chiefs" (Fornander 1969:II-48-49), ruled O'ahu. During this time, 'Ewa was the center of power of the O'ahu Kingdom, with the ruling center at Līhu'e on the upland plateau (Cordy 1996; see Figure 4-11 for approximate location). Subsequent generations saw periods of unification and peace alternating with periods of conflict. Although the royal center moved from Līhu'e to Waikīkī, 'Ewa continued to be an important chiefly locality.

By the second half of the 18th century, all of the districts of O'ahu had been united under a single ruler. At the time of Cook's arrival in 1778, Peleiōhōlani sat on the throne of a kingdom that included Moloka'i and Kaua'i. Shortly after his death, however, O'ahu was conquered by the Maui king Kahekili. Kahekili's rule was short-lived, however, for in a few years all of his lands were absorbed into the domain of Kamehameha from Hawai'i.

4.8.1.2 Hawaiian Settlement and Land Use at the Time of Contact

The district of 'Ewa is traditionally known for its abundance of food sources. The deep bays of Pearl Harbor produced a large variety of shellfish and fish, including an abundance of pearl oysters (pipi). Hawaiians constructed fishponds and fish traps, enabling them to catch deep-sea fish from the inflow of tidal waters. At the time of contact, population and land use in 'Ewa centered around Pu'uloa Lagoon (Pearl Harbor), particularly its inner shore where complex irrigation systems were developed along numerous streams, springs, and floodplains. Fishponds and fishtraps lined the deeply indented shoreline (Cordy 1996). Although currently dry, streams in gulches in the southern Wai'anae Mountains may have had water at some time in the past; at the very least springs brought water to the surface.

Numerous temples are recorded for 'Ewa, including many scattered along the slopes and ridgelines above Pu'uloa lagoon (see McAllister 1933: Figure 19; Sterling and Summers 1978:56) (see Figure 4-11). The only traditionally recognized religious site on the 'Ewa Plain is at Pu'ukapolei, described as "*...the home of the family of Kamapua'a and also the location of a temple*" (Tuggle and Tomonari-Tuggle 1997). Recorded temples in the coastal areas of the lagoon include one in Honouliuli, two in Waikele, and one each in Waipi'o, Waiawa, Waiau, and Waimalu (McAllister 1933:103-106). In addition, there were probably numerous fishing shrines, given the importance of fishing and the population density of the interior region.

4.8.1.3 The Nineteenth Century

The two conquests of O'ahu by Kahekili and Kamehameha in the early post-contact period greatly reduced the power of the island's ali'i. Communities shrank and sometimes disappeared due to population decline from disease and out-migration. 'Ewa was transformed in the early 19th century from a center of Ali'i power to a rural backwater, far from the political, social, and economic center of Honolulu. On the 'Ewa Plain, communities contracted from scattered residential localities on the plain to the well-watered Honouliuli Gulch and places along the lagoon shoreline. For a brief decade of intensive sandalwood collection in the 1820s, Pu'uloa lagoon was a transitory center for the collection and out-shipment of this commodity. A Christian mission station was established at Waiawa in 1834.

At mid-century, ownership of lands in the islands was codified in a system of fee-simple ownership. The Māhele of 1848 divided lands among the king, the high chiefs, and the government, not including commoners' rights to land they lived on and used. Land Commission records of awards to commoners indicate that the irrigation fields and fishponds were still maintained. Dense clusters of award parcels, usually coterminous with taro fields and house lots, occurred along the inland shore, particularly along the banks of the major permanent streams and around springs. Fishponds such as Kukona (just west of the Waiau Generating Station) were also awarded as Land Commission awards.

The second half of the 19th century saw a transformation of the 'Ewa landscape. Irrigation agriculture was still practiced but it was now carried out by Chinese rice farmers who also took over

operations of many of the fishponds. The spring at Waiau became the locality of a rice mill (Bennington 1897).

Ranching also developed during this period. Ranchers James Dowsett and John Meek made the initial efforts on the 'Ewa Plain in 1871. But shortly after, most of the plain was bought by James Campbell, who began improving his property by running all the wild cattle off the land, fencing a section for grazing, and converting the remainder to agriculture. Smaller ranches were located inland of West Loch and Waipi'o Peninsula (Monsarrat 1913).

In 1889, Benjamin F. Dillingham acquired a 50-year lease on most of Campbell's Honouliuli lands; a year later he subleased a major portion of this to the Ewa Plantation Company for sugarcane cultivation. Dillingham's main interest was the Oahu Railway and Land Company (OR&L). The company's system linked Honolulu with rural O'ahu and brought urban development to the inner shoreline of Pu'uloa. The OR&L began rail service in 1889. This was followed a year later with the development of Pearl City, O'ahu's first planned community. Railway stations serviced the line; these included stations at Pearl City, Waiawa (just west of Loko Kuhialoko), Waipi'o, Waipahu, Hō'ae'ae, Honouliuli, and Ewa Mill.

By the end of the century, the landscape of coastal 'Ewa and the 'Ewa Plain reflected commercial agricultural development, budding urbanization, and scattered remnants of earlier small-scale farms and communities. Ewa Plantation Company had transformed the 'Ewa Plain into vast fields of sugar cane irrigated by 72 artesian wells. On the southern slopes of the central plateau, the Oahu Sugar Company, formed in 1897, was undertaking a similar transformation of the island landscape. Along the Pu'uloa shoreline, Chinese rice fields were extensive and Chinese managers continued to harvest fish from converted Hawaiian ponds (although many of the smaller fishponds had been filled or were no longer in use). The OR&L rail line was a conspicuous feature of the coastline, cutting across and along side the ponds and fields.

4.8.1.4 The Modern History of 'Ewa

The modern history of 'Ewa is linked to commercial agriculture and to the U.S. military. The early 20th century saw commercial agriculture in southern O'ahu at his height. In the 1920s, 'Ewa Plantation covered 12,000 acres, and included sugarcane fields, a mill, residential areas for several thousand people, a sisal plantation, a large wood lot on the western shore, and a limestone quarry. Ewa Plantation lands extended east to abut the similarly developed lands of Oahu Sugar Company, which had cane growing from the expansive central plateau slopes to the lowlands bordering the OR&L line, and even onto the Waipi'o Peninsula (Monsarrat 1913). The main communities in 'Ewa clustered around sugarcane operations, with smaller communities still linked to older origins. On the 'Ewa Plain, the plantation mill and villages straddled both sides of the OR&L line. The Oahu Sugar Company headquarters at Waipahu and the newly created town of Pearl City were community focal points along the inland shore. Older communities included Honouliuli on the bluffs west of Honouliuli Gulch, as well as smaller residential clusters along the inland shore of Pearl Harbor.

During this same period, the military was a major shaper of the Pu'uloa landscape. Following the overthrow of the monarchy in 1893 and annexation of the islands by the U.S. in 1898, the development of Pearl Harbor as a naval base had begun. The first decade of the new century saw sand dredging of the lagoon, condemnation of private lands along the lagoon edge, and massive channelization of the harbor entrance. The major facilities of the naval base and submarine base were constructed between 1910 and 1918.[43]

In the 1930s the military acquired more lands as part of a general build-up of facilities on O'ahu to alleviate overcrowding at Pearl Harbor. A major section of Campbell Estate in Honouliuli was developed for naval magazine facilities, an Army coastal defense battery at Pu'ukapolei, Army and

[43] Fort Weaver, after which Fort Weaver Road is named, was constructed at the western mouth of Pearl Harbor in 1921-22 (Dorrance 1993:76).

Marine training facilities, and a Marine Corps airfield. Just prior to and at the start of World War II, other Pearl Harbor facilities underwent major expansion, including acquisition of most of the Waipi'o and Pearl City Peninsulas. Just one month before the December 7 attack, the U.S. Navy began construction of Naval Air Station, Barbers Point on the 'Ewa Plain adjacent to the Marine Corps airfield.

The war brought changes to 'Ewa, not the least of which was the intensification of land use along the perimeter of Pearl Harbor and military control over railroad operations. After the war, the Navy retained much of the lands over which it had assumed control, and the railroad lost its primacy in island transportation. The Ewa Plantation Company ended its use of railroads (Condé and Best 1973), but continued to use rail easements for automotive vehicles. At the end of 1947, the Oahu Railway and Land Company ran its last train. Although sugar cane cultivation continued to flourish for several decades after the war, by the 1970s, evolving world economies made commercial sugar agriculture in Hawai'i less competitive, and both 'Ewa Plantation and Oahu Sugar Company closed their doors. In recent times, urban development has been the main driver of landscape change in 'Ewa.

4.8.2 PREVIOUS ARCHAEOLOGICAL RESEARCH

Hawaiian settlement and land use of the 'Ewa region left a material record of overlapping events, but the last 100 years of large-scale land modifications from sugar cultivation, military construction, and recent development, has destroyed much of this record. Archaeological research in recent years, however, has revealed and preserved some of the information.

Early in the 20th century, archaeological avocationists and researchers recorded sites on the island, primarily monumental structures such as temples and fishponds (Thrum 1907; Stokes 1909). In 1930, McAllister (1933) carried out a systematic survey of O'ahu using information from nine months of fieldwork, literary sources, and informants; in particular, Thrum's earlier work on temples, in which he identified 108 on the island, was a major source for McAllister's study.

It was not until the 1970s, however, that archaeological research became common. In order to comply with federal and state laws and regulations, extensive work on the 'Ewa Plain was carried out in anticipation of harbor construction, residential and commercial development, and as part of planning for military closure of the Naval Air Station at Barbers Point. Less work has been conducted along the northern shoreline of the harbor, primarily because this area had already been urbanized before the adoption of stringent Federal and State historic preservation laws.

Table 4-25 lists the archaeological research projects that have been conducted in areas that include or are close to the proposed and/or the Chevron pipeline routes. These sites include several fishponds along the north shore of Pearl Harbor, various middens, burials and other sites of early occupation, the OR&L right-of way, and the 'Ewa Plantation Villages. Figure 4-12 and Table 4-26 summarize locations and principal findings of these studies. Appendix F provides additional descriptive and interpretive information.

4.8.3 POTENTIAL IMPACTS OF THE PROPOSED ACTION (ALTERNATIVE 1)

Based on previous archaeological surveys and archival research, 13 archaeological and historical sites have been identified along the two pipeline routes. The results of the archaeological and historical research indicate the potential for: (i) adverse impacts to known sites and (ii) encountering additional remains during construction and operation of the proposed Waiau Fuel Pipeline (Alternative 1) and continuing maintenance and repair of the Chevron pipeline (Alternative 2). Figure 4-13 identifies the archaeological sites and areas that might require site preservation measures.

Table 4-25. Previous Archaeological Projects Near the Pipeline Routes

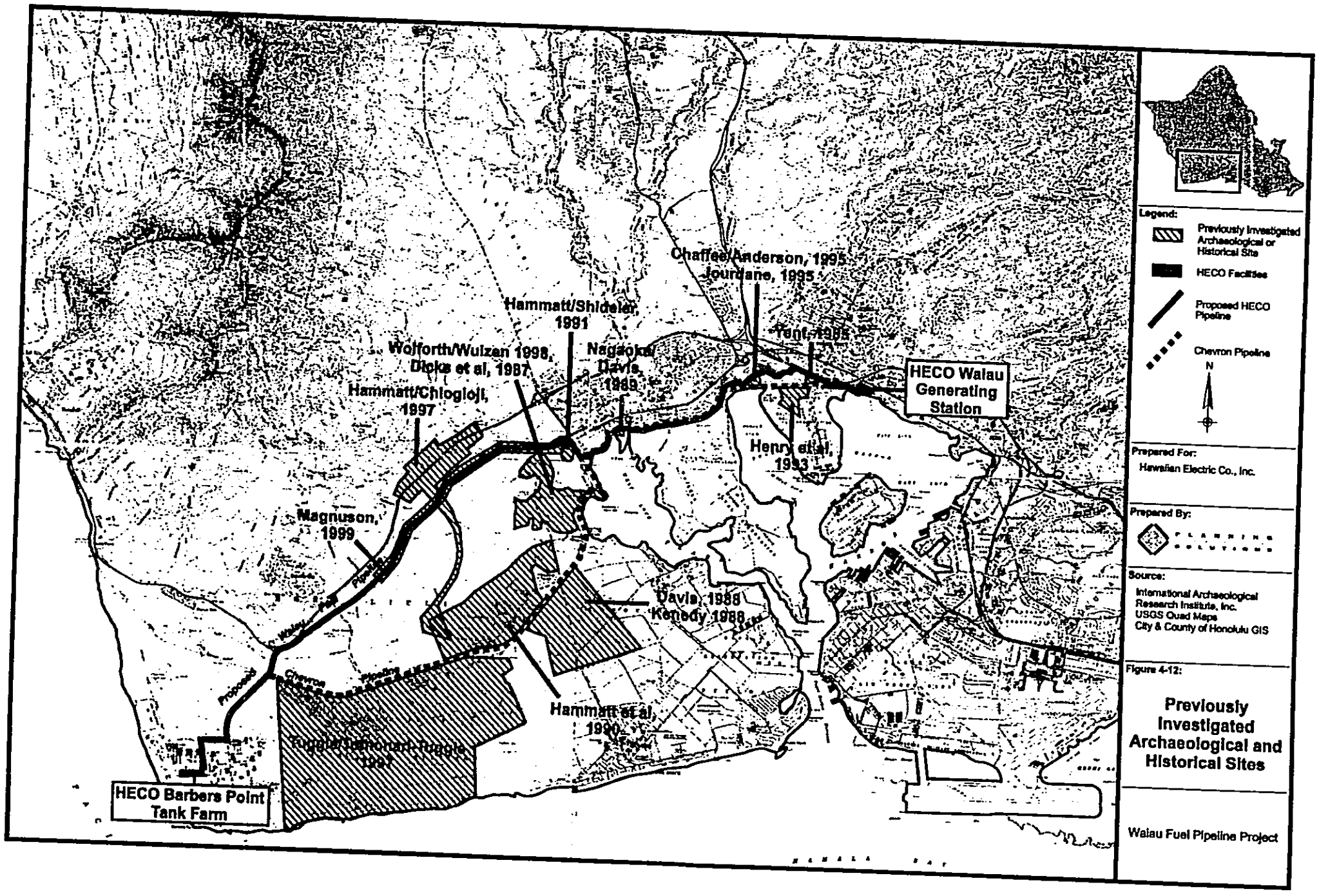
Reference	Level of Work	Location	Archaeological Sites	Alternatives
Yent 1985	Reconnaissance and testing	Hale Mohalu, ca. 1 mile west of Waiau Generating Station between Alternative 1 and 2 routes, Waiawa *ahupua'a*	none; but prior uses of area include traditional Hawaiian agriculture; WWII Air Force mess hall, dormitory, etc.; health center for treatment of Hansen's disease; buildings knocked down in 1983	1 and 2
Rosendahl 1987	Reconnaissance survey	West Loch Estates, Honouliuli *ahupua'a*	3314 (midden site)	1 and 2
Dicks et al. 1987	Reconnaissance survey	West Loch Estates, Honouliuli *ahupua'a*	3323 (unnamed fishpond) 9714 (OR&L)	1 and 2
Kennedy 1988	Reconnaissance survey	Ewa Gentry, Honouliuli *ahupua'a*	9714 (OR&L)	2
Davis 1988	Subsurface survey	Ewa Gentry, Honouliuli *ahupua'a*	9714 (OR&L) 5334 (disturbed charcoal)also late 19th, early 20th century bottle glass along OR&L tracks	2
Nagaoka and Davis 1989	Survey and monitoring	Pupu'ole Mini Park, Waikele *ahupua'a*	9714 (OR&L)	1 and 2
Hammatt et al. 1990	Reconnaissance survey	'Ewa Villages, Honouliuli *ahupua'a*	9714 (OR&L)	2
Hammatt and Shideler 1991	Inventory survey	Saint Francis Medical Center West, Honouliuli *ahupua'a*	9786 (Ewa Villages)	none 1
Henry et al. 1993	Inventory survey	Waiawa Floodplain, Mānana *ahupua'a*	none; but possible irrigation pondfield deposits underlying modern fill	1 and 2

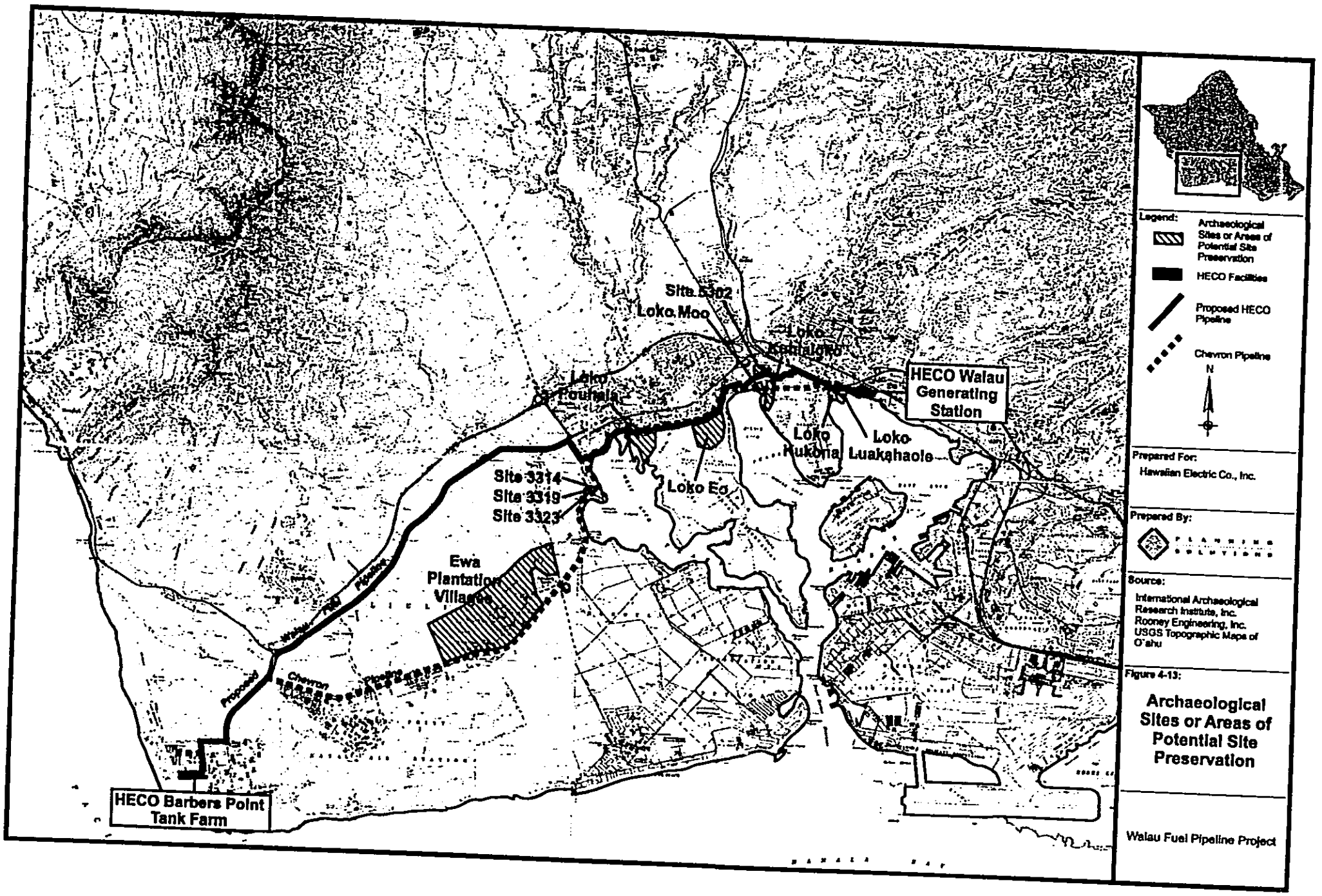
Source: Coral M. Magnuson, M.A. and M.J. Tomonari-Tuggle, January 2002, page 18.

Table 4-26. Summary of Archaeological and Historical Sites along the Alternative Pipeline Routes.

Site Number	Site Description	Project Alternatives	Location	Comment/Status	Reference
09-114	Loko Kukona	south of 1 and 2	west of Waiau Generating Station	Once possibly 30 acres in size; by 1930, very little was left	McAllister 1933
09-115	Loko Luakahaole	south of 1 and 2	west of Waiau Generating Station	Filled by 1930.	McAllister 1933
09-119	Loko Kuhialoko	2	NW corner of Pearl City Peninsula	By 1930, was only a few acres. Upper 10 fee show major historic disturbances.	McAllister 1933; Athens 2000
09-120	Loko Moo	between 1 and 2	NW corner of Pearl City	Once approximately 13 acres, by 1930 it was "a very small pond".	McAllister 1933
09-123	Loko Eo	north of 1 and 2	NE corner Waipi'o Penin.	Once 137 acres, it was filled in the mid-20th century; it now forms the Ted Makalena Golf Course,	McAllister 1933; Athens 2000
09-126	Loko Pouhala	1 and 2	NW corner of Waipi'o Penin	In 1930, this covered approximately 22 acres, but portion inland of the OR&L right-of-way was filled.	McAllister 1933
13-3314	possible midden deposit	2	inland of Hō'ae'ae Point, north of the mouth of Honouliuli Gulch	Surrounding area has been extensively disturbed; ambiguous as to whether it was a cultural feature.	Rosendahl 1987
13-3319	habitation deposit, possible cemetery	2	nose of a 20 foot high ridge south of Hō'ae'ae Point		Dicks et al. 1987
12-3323	unnamed historic period fishpond	2	mouth of Honouliuli Gulch	Created by construction of OR&L line across the mouth of Honouliuli Gulch. The southwest wall of the pond separates it from another fishpond (site 3322).	Dicks et al. 1987
09-5302	historic house site, burial	1	seaward of Leeward Community College	These are historic period burials uncovered during sewer line construction along Waiawa Road. The remains include one post-1917 coffin burial and disturbed remains of at least 5 individuals.	Chaffee and Anderson 1995; Jourdane 1995
12-5334	buried charcoal	2	S. side of OR&L alignment, east of Fort Weaver		Davis 1988
12-9714	OR&L Alignment	1 and 2	across 'Ewa Plain and along inland shore of Pearl Harbor		multiple
12-9786	'Ewa Plantation Villages	2	north side of OR&L alignment, west of West Loch	A complex of historic buildings and remains; consists of three extant plantation villages (Renton, Tenney, and Varona).	multiple

Source: International Archaeological Research Institute, Inc., January 2002. Note: All site numbers are preceded by the prefix "50-80." "50" stands for the State of Hawaii; "80" stands for the island of O'ahu.


Chaffee/Anderson, 1995
Jourdane, 1995
Hammatt/Shideler, 1991
Wolforth/Wulzen 1998, Dicks et al, 1987
Nagaoka/ Davis, 1989
Tent, 1995
HECO Waiau Generating Station
Hammatt/Chiogioji, 1997
Henry et al, 1993
Magnuson, 1999
Davis, 1988
Kennedy 1988
Hammatt et al, 1990
Tuggle/Tomonari/Tuggle 1997
HECO Barbers Point Tank Farm
Legend:
Previously Investigated Archaeological or Historical Site
HECO Facilities
Proposed HECO Pipeline
Chevron Pipeline
N
Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
Source:
International Archaeological Research Institute, Inc.
USGS Quad Maps
City & County of Honolulu GIS
Figure 4-12:
Previously Investigated Archaeological and Historical Sites
Walau Fuel Pipeline Project


Site 5302
Loko Moo
Loko Kapitalowo
Loko Pouhala
HECO Walau Generating Station
Loko Hukona
Loko Luakahaole
Site 3314
Site 3319
Site 3323
Loko Ea
Ewa Plantation Villages
Waiau Fuel Pipeline
Proposed
Chevron Pipeline
HECO Barbers Point Tank Farm
Legend:
Archaeological Sites or Areas of Potential Site Preservation
HECO Facilities
Proposed HECO Pipeline
Chevron Pipeline
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Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
Source:
International Archaeological Research Institute, Inc.
Rooney Engineering, Inc.
USGS Topographic Maps of O'ahu
Figure 4-13:
Archaeological Sites or Areas of Potential Site Preservation
Walau Fuel Pipeline Project

4.8.3.1 Impacts on Known Sites

OR&L Right-of-Way (Site 9714). The easement that makes up the SEC overlaps portions of the former OR&L right-of-way. The location of the overlap is shown on Figure 4-13. Other underground pipelines (including the Chevron pipeline that constitutes Alternative 2) are co-located with the railroad right-of-way as well. There is nothing inherent in the proposed Waiau Fuel Pipeline project that conflicts with the historic values that the railroad right-of-way's registration on the State and National Registers of Historic Places seeks to preserve so long as the new construction is done in such a way as to: (i) minimize disturbance of the former rail bed and (ii) allow for the maintenance of both the pipelines and the rail bed as needed to allow future operation of trains. Concern about rail preservation is related to disturbance to the existing tracks, ballast, and underlying bed; if such disturbance occurs, the tracks, ballast, and rail bed need to be returned to operating order as stipulated in Federal standards for the reinstallation of tracks (N. Napoka, personal comm.).

Site 5302 Site: Remains of Historic Period Burials. This site is situated close to the Waiau Fuel Pipeline alignment. Another burial, Site 3761, was found on the south bank of Waiawa Stream. Neither would be disturbed by the construction or operation of the proposed pipeline.

Named Hawaiian Fishponds. The proposed route passes through Pouhala Marsh, which occupies the inland margin of the Waipi'o Peninsula. Two former Hawaiian Fishponds were located within its present boundaries. They are Loko Pouhala on the northwest west and Loko Eo on the northeast. The proposed route passes just inland of Loko Moo and Loko Kuhialoko on the northwestern corner of the Pearl City Peninsula. Paleoenvironmental coring in two of these ponds, Loko Kuhialoko and Loko Eo, suggest that there has been considerable historic and modern dredging and filling (from 3 to 7 m thick) of these former pond areas. This activity has disturbed what were once intact fishpond sedimentary deposits, thereby destroying their integrity (Athens 2000).

4.8.3.2 Potential for Encountering New Remains

For reasons discussed below, unidentified surface remains are not expected within areas that would be affected by construction and operation of the proposed Waiau Fuel Pipeline. Subsurface remains are unlikely to be encountered during construction of the portion of the pipeline that crosses the 'Ewa Plain. However, it is possible that some may be present along the northern shore of Pearl Harbor.

4.8.3.2.1 The 'Ewa Plain

In an overview of the prehistory and archaeology of the 'Ewa Plain, Tuggle and Tomonari-Tuggle (1997:45) estimate that about 45 percent of the 'Ewa Plain has been covered by modern archaeological surveys. Of the area that has been archaeologically surveyed, roughly 85 percent has been completely modified by modern activities, primarily sugarcane cultivation. Surface investigations and backhoe tests have shown that there is virtually no pre-sugar site preservation in any of these areas. The Farrington Highway leg of the proposed Waiau Fuel Pipeline route was not evaluated by Tuggle and Tomonari-Tuggle (1997) as it falls inland of their 'Ewa Plain study area. However, other archaeological research along and near this roadway (Magnuson 1999; Hammatt and Chiogioji 1997) found no sites, and the areas studied were observed to be very disturbed by sugar cane cultivation (as with the most of the 'Ewa Plain). In view of these findings, the probability that as yet unknown sites have been preserved that could be affected by construction or operation of the 'Ewa Plain portion of the proposed Waiau Pipeline is low.

4.8.3.2.2 Northern Shore of Pearl Harbor

Traditional and archival sources show that the northern shore of Pearl Harbor was intensively occupied and used in pre-contact times and throughout the 19th century. Previous archaeological research indicates that some remains of this occupation may be extant. Possible subsurface sites include fishpond and irrigation pondfield deposits and isolated remains of pre-contact and historic period residences related to this agricultural and aquacultural activity. As suggested by the burials previously found in this area (e.g., Site 5302), human remains may exist within areas that would be impacted by the proposed Waiau Fuel Pipeline project. Figure 4-13 shows the areas with the highest probability of subsurface site preservation

along the inland shore of Pearl Harbor. This assessment is based on historical records (primarily Land Commission awards), results of previous archaeological studies, and the extent of modern development.

4.8.3.3 Mitigation Measures

4.8.3.3.1 Mitigation near Known Fishponds

As discussed above, the proposed Waiau Fuel Pipeline project passes near several former fishponds. Where projects have involved work in areas that have not been previously excavated and for which, therefore, there was no available information, the State Historic Preservation Division of the Department of Land and Natural Resources has commonly recommended testing in areas of known fishponds to determine the presence or absence of intact fishpond deposits. With the exceptions discussed in the following paragraph, construction of the proposed Waiau fuel pipeline involves work only in areas that have already been disturbed by previous construction. No further archaeological testing is planned for these areas.

Previous research in areas along the Pearl Harbor margin (Henry et al. 1993; Athens 2000) has shown that buried deposits indicative of fishponds and irrigation agriculture are generally confined to depths of at least 6.5 ft (2 m) below the present ground surface. Since typical excavation for the proposed pipeline would be shallower than this (approximately 5 feet), no preconstruction archaeological testing for intact cultural deposits is planned in former fishpond areas. Current plans for HDD drilling under the Waikele and Kapakahi Streams, which require deeper installations, do not appear to overlap with the known sites for fishponds (see Athens 2000). However, should the final design for the Waiau fuel pipeline call for excavation deeper than 5 feet through former fishpond areas, the need for further investigation would be evaluated on a case-by-case basis to determine whether testing for possible fishpond deposits in these areas is warranted. The need for additional work would also be reassessed in the event that HECO is unable to obtain permission from the State Department of Transportation to use the former OR&L right-of-way to bypass Pouhala Marsh. Should this occur, a fishpond deposit sampling and testing plan would be developed and implemented for this segment of the route.

4.8.3.3.2 Mitigation Near the OR&L Line

The Hawaiian Railway Society currently operates trains over the segment of the OR&L line between Fort Weaver Road and Kalaeloa Boulevard. The proposed Waiau Fuel Pipeline project intersects this part of the OR&L alignment in only one location, the point in Campbell Industrial Park where both cross Kalaeloa Boulevard. Because that crossing would be accomplished through horizontal boring beneath the right-of-way, pipeline construction would not interfere with the Hawaiian Railway Society's operations.

As discussed in Section 6.1.3, detailed plans for additions to the railway line that may overlap with the proposed Waiau Fuel Pipeline route are being considered by government and public interest organizations consulted by HECO in the development of the project. Current discussions strongly suggest that pipelines (including those within the OR&L ROW), bikeways, and the historic railway can continue to share the same right-of-way. HECO will continue to work together with all interested parties as the concepts for the uses of these areas are further developed.

4.8.3.3.3 Mitigation Near Site 5302 and Other Potentially Sensitive Areas

Figure 4-13 identifies areas where there is a potential for encountering previously unidentified archaeological remains and/or burials. These include portions of the proposed Waiau Fuel Pipeline route from the western side of the Waipi'o Peninsula to the Waiau Generating Station. In order to avoid or mitigate potential adverse impacts, HECO would adhere to the following recommendations contained in the archaeological report for the project:

- Contract with a qualified professional archaeologist to monitor construction in the vicinity of Site 5302.
- Prepare a monitoring plan pursuant to the stipulations of Hawaii Administrative Rules Title 13, Section 13-279, regarding rules for archaeological monitoring studies and reports.

- Brief project managers, construction supervisors, and crews prior to ground alteration activities concerning the kinds of subsurface deposits that may be encountered and the procedures that should be followed in the event that buried deposits or artifacts are exposed, or if human remains are uncovered.
- Suspend work on the affected portion of the line in the event that archaeological deposits are uncovered during trenching and investigate and document the deposits as prescribed in the monitoring plan.
- Cease work on that portion of the project if human remains are uncovered during construction, and follow the requirements of State law and regulations regarding burials (see HAR, §13-300). Should human remains be uncovered in an area where no archaeological monitor is present, HECO's contractor would cease all work in the immediate area and notify the State Historic Preservation Division, the Medical Examiner, and the Police Department, pursuant to HAR §13-300-40.
- Have the archaeological monitor prepare and submit a monitoring report to the SHPD following the completion of the work. The monitoring report would be prepared in accordance with HAR §13-279.

4.8.4 POTENTIAL IMPACTS: ALTERNATIVE 2

4.8.4.1 Impacts on Known Sites

OR&L Right-of-Way (Site 9714). As discussed above, the Chevron pipeline runs within the former OR&L right-of-way from Kalaeloa Boulevard in Campbell Industrial Park to the Waiau Generating Station (and beyond). The location of this overlap is shown on Figure 4-13 and is much greater than that for the proposed Waiau Fuel Pipeline project. HECO is not aware of conflicts between the two since the Chevron pipeline was first installed in 1958. As was true for the proposed action (Alternative 1), there is nothing inherent in the continued operation of the Chevron pipeline that conflicts with the historic values that the railroad right-of-way's registration on the State and National Registers of Historic Places seeks to preserve. This is true so long as the maintenance, repair, and periodic replacement work is done in such a way as to: *(i) minimize disturbance* of the former rail bed and (ii) allow for the maintenance of both the pipelines and the rail bed as needed to allow future operation of trains. As was true for the proposed action, concern about rail preservation is related to disturbance to the existing tracks, ballast, and underlying bed; if such disturbance occurs, the tracks, ballast, and rail bed need to be returned to operating order as stipulated in Federal standards for the reinstallation of tracks (N. Napoka, personal comm.).

Site 5302 Site: Remains of Historic Period Burials. While no remains are known to have been encountered during past maintenance in this location, the fact that previous occupation and burials have been identified in the area suggests that additional burials and/or residential remains may be present.

Site 3314: Midden Deposit. Because the midden deposit that constitutes this site has been extensively disturbed by sugarcane cultivation, it is unlikely that activities associated with operation and maintenance of the Chevron pipeline would affect the remains.

Site 3319: Habitation Deposit/Possible Cemetery. The Chevron pipeline passes near the habitation deposit and possible historic period cemetery that comprise this site. Thus, it is possible that remains could be encountered during repair and maintenance of the line in this area.

Named Hawaiian Fishponds. The Chevron line follows the OR&L right-of-way past Pouhala Marsh, the same route that HECO has proposed. Consequently, its potential effect on the remnants of the two fishponds that were once located in that area (Loko Pouhala and Loko Eo) is the same as that described for the proposed action. The Chevron pipeline is generally *makai* of the proposed Waiau Fuel Pipeline once the former passes Middle Loch; consequently, the Chevron pipeline comes close to two other former named fishponds as well; they are Loko Moo and Loko Kuhialoko on the northwestern corner of the Pearl City Peninsula. The subsurface around the Chevron pipeline has already been extensively disturbed, and it is unlikely that maintenance and repair activities required for Alternate 2 would adversely affect intact remains.

Unnamed Pond (Site 3323). The Chevron line is located within the seaward berm of a fishpond that was created by construction of the roadbed for the former OR&L railway. The subsurface has already been extensively disturbed, and it is unlikely that repair and maintenance activities would adversely affect this feature.

4.8.4.2 Potential for Encountering New Remains

The likelihood that activities associated with Alternative 2 would encounter previously unidentified subsurface remains is generally equal to or less than the probability of such an effect from Alternative 1. There are two principal reasons for this. First, the portion of the Chevron line that diverges most from the route followed by the proposed Waiau Fuel Line project is on the 'Ewa Plain, where few intact remains are present. Second, the work needed to maintain and repair the Chevron line is generally more limited than that needed to install an entirely new pipeline; even when complete replacement is needed, most of the work is confined to areas that have previously been trenched.

4.8.4.3 Mitigation Measures

4.8.4.3.1 Mitigation Near Known Fishponds

As discussed above, the Chevron pipeline passes near the same former fishponds as the proposed Waiau Fuel Pipeline, as well as a few more. Repair and maintenance of the line generally involves activities only in areas that have already been disturbed by previous construction, and it is unlikely to require excavation of sufficient depth to encounter buried fishpond deposits. Assuming this to be the case, mitigation measures for this alternative would be the same as those described for Alternative 1.

4.8.4.3.2 Mitigation Near the OR&L Line

The majority of the Chevron pipeline between Campbell Industrial Park and Waiau is located within the former OR&L right-of-way that is on the State and National Register of Historic Places. Because the Navy was still operating trains over the portion of the rail line between Lualualei and West Loch at the time the Chevron pipeline was constructed, this portion of the Chevron pipeline does not lie beneath the tracks. Consequently, continuing maintenance and operation of this segment of the Chevron pipeline would not directly affect existing or planned operations of the Railway Society. Use of the rail line beyond West Loch, i.e., at the point where the proposed route and the Chevron alignments begin to substantially overlap, ceased earlier; hence, it is possible that the Chevron pipeline was installed beneath the former rail bed in this area. If so, continuing maintenance and operation of the Chevron pipeline would have the same effect, and impose the same constraints on, possible future train operations as the proposed Waiau Fuel Pipeline project.

4.8.4.3.3 Mitigation Near Site ~~3502~~ 5302 and Other Potentially Sensitive Areas

Figure 4-13 identifies areas where there is a potential for encountering previously unidentified archaeological remains and/or burials. These include portions of the Chevron pipeline route from the head of West Loch to the Waiau Generating Station. The number of feet of pipeline route that the archaeologist has designated as being "potentially sensitive" is greater for Alternative 2 than for the proposed Waiau Fuel Pipeline, but the difference is at least partially offset by the fact that the Chevron route through this area has already been disturbed by construction of the existing pipeline. The same kinds of mitigation measures that HECO has proposed are probably appropriate for the Chevron alternative, but the maintenance nature of the activities that Chevron undertakes may not subject it to the same kinds of historic preservation requirements. It would, however, have to respond in the same fashion as HECO if burials were encountered during work on the pipeline.

4.8.5 POTENTIAL IMPACTS ON CULTURAL PRACTICES: PIPELINE ALTERNATIVES

4.8.5.1 Approach and Methodology

A cultural impact assessment study was conducted for the proposed action by Paul H. Rosendahl, Inc. (PHRI). The purpose of that study was to identify and assess the potential effects that the Action

Alternatives might have upon the cultural practices of the community and State. In particular, the analysis was designed to address the issue of potential project impacts upon traditional native Hawaiian cultural uses and practices in accordance with the "Guidelines for Assessing Cultural Impacts" adopted by State Office of Environmental Quality Control (OEQC) in November 1997.

The overall rationale that guided the analysis was that the level of study effort should be commensurate with the potential of the proposed project to adversely impact any native Hawaiian cultural practices currently conducted by cultural practitioners. As documented elsewhere in this report, the project area and immediately adjacent lands have been extensively modified and disturbed by over a century of historic period sugarcane cultivation and U.S. military activity and by more recent commercial, residential, and industrial development and uses.

Consideration of these factors within the specific nature and context of HECO's proposed Waiau Fuel Pipeline project, as well as consultation with professional staff in the State Historic Preservation Division–History and Culture Branch, indicated an identification study would be the most appropriate level of analysis, with more intensive work warranted only if the results of the identification study indicated that it is needed.

The distinctive characteristics of an identification study are that it is limited to: (a) the identification of native Hawaiian or other ethnic group cultural practices, beliefs, properties, features, or exploitable natural resources associated with and/or present within or related to the specific project area that are currently being conducted by and/or known to individual cultural practitioners or groups and (b) the collection of information reasonably sufficient to define the general nature, location, and likely authenticity of identified cultural claims. An identification study does not involve the considerably greater level of study effort needed for a full documentation study.

The specific purpose of the cultural impact assessment study was to assess the potential impacts of HECO's proposed Waiau Fuel Pipeline Project upon the cultural resources (the practices, features and/or beliefs) of native Hawaiians or any other ethnic group, that are associated with project area. Several specific objectives were established for the work:

- Identify any native Hawaiian or other ethnic group cultural practices currently being conducted by individual cultural practitioners or groups;
- Collect sufficient information so as to define the general nature, location, and authenticity of any identified cultural practices;
- Assess the potential impacts of the proposed project upon identified cultural practices; and
- Recommend appropriate mitigation measures for any potentially adverse impacts upon identified cultural practices.

The identification study project team consisted of two individuals: PHRI Cultural Specialist Wanda Hoke Pua-Kaipo, and PHRI Principal Paul H. Rosendahl. Initial potential contact lists were formulated, compared, and finalized, and project team members were assigned primary responsibility for attempting to contact specified potential informants. The list was continually revised and expanded, as potential informants were contacted, information was obtained, and the contacted individual in turn suggested additional referrals to be contacted. The list eventually stabilized as contact referrals became largely repeated and new names became rare. The majority of the contacts were made, and information obtained, by Mrs. Pua-Kaipo. PHRI was ultimately successful in consulting with all but two of these individuals. The names and affiliations of tie individuals are shown in Table 4-27.

The informants had diverse backgrounds and came from native Hawaiian and other ethnic groups. Six of these individuals stated that they did not have any useful information, five provided limited general and cultural information, and five provided useful information specific to the project area. Of the two potential informants not successfully contacted, neither was reported by other informants as having good interview potential and neither is recommended for any follow-up interviews. Additional sources of information consulted were prior archaeological reports and maps of the general project area. *Sites of*

Oahu (Sterling and Summers 1978) was also consulted. Of particular use were two recent studies completed by International Archaeological Research Institute, Inc. ~~(IARII)~~ of Honolulu. The first was a native Hawaiian traditional cultural property identification study of lands in Hawai'i owned or controlled by the U.S. Navy (Tuggle and Tomonari-Tuggle 2001). The second was an historical and archaeological assessment study of the 'Ewa Plain and the inland shore of Pearl Harbor (Magnuson and Tomonari-Tuggle 2002). A draft final report for the former study, which was done for the Department of the Navy (Pacific Division-Naval Facilities Engineering Command), was provided for inspection and review by study collaborator Kepā Maly of Kumu Pono Associates of Hilo, while an advance draft of the latter, which was done for the present Waiau Fuel Pipeline Project, was kindly provided for use by co-author Myra Tomonari-Tuggle. No new or additional historical documentary work was carried out by PHRI.

The methodology used was designed to test the hypothesis that the project was unlikely to have significant cultural impacts through consultation with those individuals and organizations identified as most likely to possess knowledge of current cultural practices and beliefs relating to the project area. The number and variety of individuals and groups contacted and consulted demonstrate an adequate, appropriate, and reasonable good-faith effort to identify any traditional native Hawaiian or other ethnic group cultural practices, beliefs, or properties that might be relevant to HECO's proposed Waiau Fuel Pipeline project. It is unlikely that any significant cultural practices, beliefs, and/or properties currently associated with the project area were overlooked.

4.8.5.2 Findings

4.8.5.2.1 Traditional and Customary Cultural Practices and Beliefs

In the course of the informant contacts and informal interviews, no cultural practices or beliefs of any kind that would likely be considered to be representative of traditional and customary native Hawaiian cultural practices and beliefs were identified as currently occurring within and/or immediately adjacent to HECO's Waiau Fuel Pipeline Project area.

4.8.5.2.2 Identification of Traditional Cultural Properties

While attempting to identify any cultural practices and beliefs associated with HECO's proposed Waiau Fuel Pipeline project area, considerable effort was also expended toward the identification of any potential traditional cultural properties. No potential traditional cultural properties of any kind were identified in the course of the informant contacts and informal interviews as being present within and/or immediately adjacent to the project area by any of the informants contacted in the course of the assessment study.

4.8.5.2.3 Contemporary Cultural Practices and Beliefs

No cultural practices or beliefs of any type that would seem to be contemporary rather than traditional and customary cultural ones were identified by any of the informants contacted during the assessment study.

4.8.5.2.4 Current Cultural Concerns

In the course of the informant contacts and informal interviews, several informants mentioned a number of issues and concerns related to HECO's proposed Waiau Fuel Pipeline project. One informant (A. Eaton) indicated a preference that the area generally referred to today as Barbers Point should be called by its true name, which is Kalaeloa (literally, "the long point" [Pukui, Elbert and Mookini 1974:72]). A second informant (S. Kane) stated three areas of concern: (a) project construction activities should avoid any adverse impacts to an existing 8-acre sinkhole preservation area situated north of Malakole Road and just outside of Campbell Industrial Park (exact location and ownership/responsibility uncertain); (b) the possible presence of human burials in the general area of the Waipi'o Peninsula between West Loch of Pearl Harbor and the Ted Makalena Golf Course; and (c) oral traditions mention local settlements named Poohilo and Guanaco, which linked the *makai* (seaward) lands of Honouliuli with *mauka* (inland) lands, and were said to have been situated in the general area where Farrington Highway crosses Kalo'i Gulch. Two other informants (R. Lum, T.H. Young) felt that the pipeline should avoid Pouhala Marsh at the head of the West Loch of Pearl Harbor because of potential adverse impacts to the marsh and adjacent lagoon waters from possible fuel leakage from the pipeline. Finally, one informant (R. Lum) was concerned that

Table 4-27. List of Potential Informants

No.	Name	Contact: None	Contact: WPK	Contact: PHR	Expertise	Potential	Affiliation	Additional Comments
1	Dolores "Dolly" Bright	-	+	-	NH	0/R	EPHCC	Former PHCC member
2	Roger Bright	-	+	-	NH	0	EPHCC	Former PHCC member
3	Sara Collins	-	-	+	HPS	0/R	SHPD	Staff Archaeologist
4	Arline Eaton	-	+	-	NH	1/R	EPHCC,LR	Pu'uloa kūpuna
5	Melissa Guerriero	+	-	-	NH	0	ASK	ASK, President
6	Arthur Hoke, Jr.	-	+	-	NH	0/R	HM	HM, President
7	Ruth Holt	+	-	-	NH	0	EPHCC	EPHCC, President
8	Shad Kane	-	+	-	NH	3/R	ASK,MNHB, TNC, IA, LR	
9	Jalna Keala	-	+	-	NH,CR	1/R	ASK, OHA	OHA Community Resource Officer
10	Antoinette Lee	-	+	-	NH	1R	PHHCC,LR	
11	Ruth Lum	-	+	-	NH	1	WNHB,LR	Waipahu NHB
12	Kepa Maly	-	-	+	CRS,HDR	0	KPA	
13	Holly McEldowney	-	-	+	CRS,HDR,HPS	0/R	SHPD	Historical/Cultural Staff
14	Nathan Napoka	-	+	-	NH,HPS	1/R	SHPD	Historical/Cultural /Cult. Branch Chief
15	Bob Paoa	-	+	-	NH,HDR	2	HRS,BPBM	Historian
16	Ben Schlapak	-	+	-	ENG	2/R	HRS	Airport Engineer
17	Helen Young	-	+	-	NH	2	RO,LR	
18	Tin Hu Young	-	+	-	NH	2	RO,LR	

Expertise				
	C/P	Cultural Practitioner	HDR	Historical Documentary Researcher
	CR	Community Relations	HPS	Historic Preservation Specialist
	CRS	Cultural Resources Specialist	NH	Native Hawaiian
	ENG	Engineer	PLN	Planner

Potential	
0	None
1	Limited information; possible follow-up contact
2	Useful information; probable follow-up contact
3	Good information; definite follow-up; potential formal interview informant
R	Provided referral(s) to other potential informants and/or information sources

Affiliation					
ASK	'Ahahui Siwila o Kapolei Hawaiian Civic Club	OHA	Office of Hawaiian Affairs	KPA	Kumu Pono Associates
BPBM	Bernice Pauahi Bishop Museum	PHCC	Pu'uloa Hawaiian Civic Club	LR	Local Resident
EPHCC	Ewa/Pu'uloa Hawaiian Civic Club	PS	Planning Solutions	MNHB	Makakilo Neighborhood Board
HM	Hawai'i Maoli	RO	Royal Order of Kamehameha I	WNHB	Waipahu Neighborhood Board
HRS	Hawaii Railway Society	SHPD	St.Hist.Pres.Div (DLNR)	PHR	Paul H. Rosendahl (PHRI)
IA	'Ike Aina	TNC	The Nature Conservancy	PHRI	Paul H. Rosendahl, Ph.D., Inc.

Source: Compiled by Planning Solutions, Inc. after Paul H. Rosendahl, Inc. (2002)

the proposed project might have potential adverse impacts upon the existing bike trail that extends along the shoreline at the head of the East Loch of Pearl Harbor between 'Aiea and Pearl City.

4.8.5.2.5 Conclusion

The findings of the study led to the following specific conclusions:

- No traditional native Hawaiian cultural practices, beliefs, and/or properties of any kind were identified by informants as being associated with the proposed Waiau Fuel Pipeline project area.
- No cultural practices, beliefs, or properties of any other, non-native Hawaiian cultural or ethnic groups were identified by any of the informants.
- None of the informants consulted as part of the cultural impact assessment had any direct knowledge of any current or recent use of the project area by native Hawaiian cultural practitioners exercising traditional and customary access and use rights for any purposes.
- None of the informants had any direct knowledge of any specific traditional cultural properties located within the project area.

Based on the entirely negative results of the cultural impact assessment informant interviews, it can be concluded that the project area is not being accessed by native Hawaiian or other ethnic group cultural practitioners for any traditional and customary cultural uses, that the proposed project would thus have no adverse cultural impacts of any kind upon the exercise of any native Hawaiian traditional and customary access and use rights, or the cultural practices, beliefs, or properties of native Hawaiian or any other ethnic group. Consequently, no mitigation measures of any kind are needed as they pertain to these issues.

4.9 VISUAL IMPACTS

Except for a short segment at its eastern end that is within the boundaries of the Waiau Generating Station, all of the proposed Waiau Fuel Pipeline (Alternative 1) would be below ground. The proposed action differs from the existing Chevron pipeline (Alternative 2) in this respect in that numerous short segments of the Chevron pipeline are above ground where it crosses streams. All of the Action Alternatives also involve a few above-ground structures at the beginning and end of the routes. The following sections identify these new structures and assess the effect that have on views from public vantage points.

- Section 4.9.1 deals with the proposed Waiau Fuel Pipeline project.
- Section 4.9.2 addresses Alternative 2, continued use existing Chevron facilities.
- Section 4.9.3 discusses effects related to Alternative 3, using trucks rather than pipelines, to supply the Waiau Generating Station.

4.9.1 ALTERNATIVE 1: PROPOSED WAIAU FUEL PIPELINE

4.9.1.1 Modifications to the Barbers Point Tank Farm

As described in Section 0, HECO would construct a main line pump station within its existing BPTF; this would serve both the existing Kahe pipeline and the proposed Waiau Fuel Pipeline. In addition to the pumps, HECO would also construct a small diesel oil storage tank, a control building, and ancillary equipment and piping. At approximately 40 feet, the storage tank would be by far the tallest of these. The other items would be less than 20 feet above ground.

As shown in Figure 2-7, the proposed developments would be almost 1,400 feet away from the nearest public street, Hanua Street. They would be consistent with the height limit (< 60 feet) and setback restrictions in this I-2 Zoning District. None of these structures would be easily visible from any location to which the public has general access; moreover, they would be dwarfed by other development already in the area (including existing fuel storage tanks, HPOWER, the AES

Generating Station, and industrial buildings along Hanua Street). Their erection would not alter any significant sight-lines.

4.9.1.2 Modifications to the Waiau Generating Station

As described in Section 2.1.6, HECO would make several small modifications to the Waiau Generating Station to accommodate the proposed Waiau Fuel Pipeline. These include construction of a metering facility and pig launcher/retriever system and modifications to the existing structure that supports the overhead fuel-line crossing of the Navy fuel-line ROW and bikeway (see Figure 2-11). The last few hundred feet of the proposed Waiau Fuel Pipeline would be constructed on pylons extending a few feet above ground in the portion of the Waiau Generating Station property that is used by watercress farmers. The proposed pipeline ~~operations~~ Operations and ~~control~~ Control ~~center~~ Center (OCC) would be housed in an existing room at the Waiau Generating Station and would not alter the external appearance of the facility.

The pig launcher and retriever system (see Figure 2-10) would be less than 4-feet high and would be located behind fencing within the existing Waiau Generating Station complex. The modifications to the existing overhead crossing and the pipe through the watercress farms would be visible to individuals using the bikeway and walking path, but the changes would occur in a location where the bikeway is already bounded by the industrial buildings, equipment, and activities associated with the Generating Station. Consequently, the addition of these would not substantially modify the existing views in the area.

4.9.1.3 Modifications to the Iwilei Tank Farm

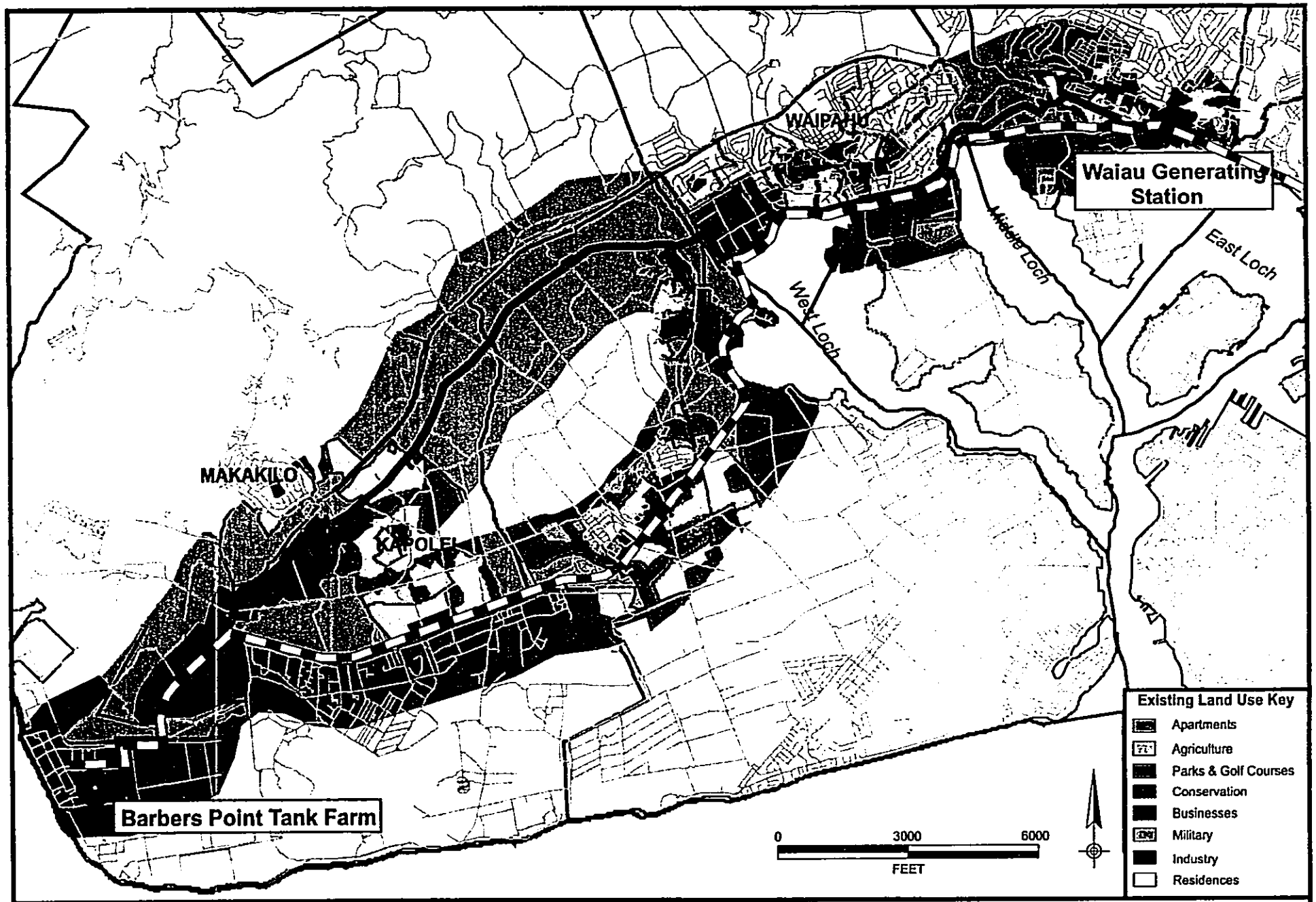
As described in Section 2.1.7, proposed modifications to the existing facilities include installation of gates on the east side of the facility; installation of the fuel truck unloading system, relocation of existing aboveground piping to improve truck access to the facility, construction of a small shed, and installation of a new entrance and driveway paving along the back (*makai*) side of the facility. The top of the highest piece of equipment (the truck unloading rack) is less than 20 feet above ground; the rack is about the same in height and appearance as the facilities that are located in the Shell Oil Company fuel truck loading station immediately to the east of the Iwilei Tank Farm. All of the other changes are less than 10 feet high. These improvements would all be well below the 60-foot height limit that exists within this I-3 (Waterfront) Zoning District and would be compatible with the industrial uses in the area. In summary, few, only the top of the truck unloading facilities would be visible from outside the Iwilei Tank Farm, and none would impinge upon identified views.

4.9.1.4 Pipeline Construction

Construction of the proposed Waiau Fuel Pipeline would entail trenching, stockpiling, equipment parking, materials storage, and other activities that would be visible from adjacent areas. The nature and duration of these temporary changes, the areas from which they would be visible, and their relationship to other activities in the area are discussed below. Figure 4-14, which shows the existing uses within the region, helps to illustrate the points being made.

As shown in this figure and discussed in Section 4.12.1, the western end of the proposed route from the BPTF to the beginning of the State Energy Corridor (SEC), is located completely within an industrial area. Facilities near the route include the Chevron Refinery, Amerigas Propane, Dietrich Industries, and other medium to heavy industrial concerns. The area also includes several vacant lots within the Campbell Industrial Park. Construction through these areas would proceed quickly, would not disrupt existing facilities or uses, and would substantially alter the appearance of the area.

Between the beginning of the SEC and the Kapolei Shopping Center (just to the east of the intersection of Farrington Highway and Kamokila Boulevard), the route passes through currently vacant land adjacent to Kalaeloa Boulevard and then parallels freeway on- and off-ramps and a storm drainage channel, passing behind the Kapolei 16 movie theaters, Zippy's restaurant, and other commercial properties that lie between the H-1 Freeway and Kamokila Boulevard. The open lands in



Prepared For:
Hawaiian Electric Company, Inc.

Prepared By:
Planning Solutions, Inc.

Source:
City and County of Honolulu GIS

Legend:

- Proposed HECO Pipeline
- Chevron Pipeline
- Barbers Point Tank Farm
- HECO Waiau Generating Station
- Neighborhood Board Sub-Districts

Figure 4-14:

Existing Land Use

HECO Waiau Fuel Line

this area are slated for commercial use. Presently, numerous commercial building projects are ongoing along this route. Pipeline construction through this area would take no more than a few weeks, and the land would quickly be returned to its present appearance.

The next segment of the pipeline passes the Kapolei Shopping Center. The initial plan was to use open-trenching construction techniques in this area. However, after listening to concerns about appearance, interference with access to shops, and investigating the technical alternatives, HECO concluded that construction of the pipeline through the Kapolei Shopping Center could be better-accomplished by using Horizontal Directional Drilling (see Section 2.1.10.3). This technique would involve work stations on either side of the segment being drilled, but no activity between the two stations. As a consequence of this decision, above-ground construction equipment and work would be very limited and would not disturb landscaping. Some material stockpiling and would occur, and this would be visible for a period of up to 8 weeks.

The portion of the pipeline east of Makakilo Boulevard to Fort Weaver Road would be constructed using open-trenching techniques. This would involve short-term degradation of the appearance of the roadside as the work proceeds through the grassed area fronting Kapolei Knolls. Here again, the area is open, however, the construction work itself can be completed in a matter of a few weeks, and the roadside landscaping should return to its original condition within two to three months. The remainder of this segment of line is along the roadway bordering agricultural fields. The trenching and pipe installation can be completed quickly, and the area returned to its present appearance within a short time.

The crossing beneath the Farrington Highway/Fort Weaver Road interchange would be done using directional drilling. Equipment and material staging areas would be positioned on either side of the crossing and, perhaps, at one intermediate point. These would be visible above-ground for a period of several weeks, but would not require significant land disturbance or other activities with the potential to significantly affect views or the appearance of the area. The activity would be similar to other past construction activity that has taken place in the same general area.

The segment of the pipeline along Kaihuopa'alai Street and through Ota Camp can be constructed quickly, with no more than a few weeks required from the time ground is first broken until all of the pipe is in place. However, during that time the work area would be disturbed and the equipment visible. The work would not disturb large trees or other slow-growing vegetation; hence, the appearance of the area would return to its present state within a few months following the end of construction.

Once the route reaches the area along the shore of West Loch, it is largely within the right-of-way of the former OR&L railroad. This corridor is, or will be, shared with walkways and bike paths, as well as with other utility lines. Construction through this area would proceed quickly, but the appearance would be temporarily affected by the trench, temporary excavation stockpiles, construction equipment, pipe, and other material while the work is underway. These would be visible to people walking and bicycling through the area. The activities would also be directly visible from the windows of residential units on the *makai* side of the apartment buildings that are located along the former railroad right-of-way just west of Waipahu Intermediate School. In most other areas existing vegetation would screen the work from view from adjoining residences and from the Ted Makalena Golf Course.

The portion of the pipeline past the Waipahu High School and Leeward Community College (LCC) is generally located away from areas where people gather. There are a few exceptions, however, e.g., the segment past the *makai* side of the baseball diamond at Waipahu High School and the tennis courts at LCC. Construction through these areas would not, with some exceptions (e.g. at LCC), require disturbing landscaping or other improvements. From a visual standpoint, the area would return to its original appearance within 2-3 months following the completion of construction.

Pipeline construction from LCC would be largely along open areas to the side of roads or in open fields. It would not require the removal of substantial landscaping, could be completed quickly, and would return to its original appearance shortly after construction work is completed. Hence, ~~It~~ it does not have the potential to have a substantial visual impact.

The last segment of the proposed pipeline that is not on HECO property (i.e., beginning at the point at which it returns to the *makai* side of the H-1 Freeway) is immediately *makai* of the existing bikeway. However, the proposed pipeline location is largely hidden from view from the bikeway by existing vegetation and a fence, making the construction work relatively difficult to see. The screening ends on the eastern side of Waimano Stream. Hence, construction work from that point to the pipeline's terminus at the Fuel storage tanks at the Waiau Generating Station would be visible to bikeway users.

4.9.1.5 Operation

Operation of the proposed Waiau Fuel Pipeline would not involve activities that are visible from public vantage points. The fuel tanker trucks that would be used to supply LSFO to the Iwilei Tank Farm would be visible, however. These trucks resemble regular gasoline tanker trucks, and there are too few of them to be noticeable on the heavily traveled routes they would use. Hence, the proposed Waiau Fuel Pipeline project does not have the potential to cause substantial visual effects once the facilities are in operation.

4.9.2 ALTERNATIVE 2: CHEVRON PIPELINE

The Chevron pipeline is already in place. However, based on current practices, it is likely that Chevron would continue to replace portions of the old pipe as part of its ongoing maintenance efforts. This involves the same kinds of construction activities as those described above for the Waiau Fuel Pipeline. However, the work would probably be spread over a longer period of time.

With respect to location, the construction work associated with these likely maintenance activities would avoid the Kapolei civic center. However, they would pass close to many recently developed residential areas in 'Ewa and West Loch Estates. This alternative also involves more potential work that could be visible by users of the Pearl Harbor bikeway and trail system across the Pearl City Peninsula. Maintenance activities performed on portions of the pipeline beyond the Waiau Generating Station would also result in temporary views of the requisite trucks, excavation equipment, and stockpiled materials through urban sections of Honolulu.

4.9.3 ALTERNATIVE 3: TRUCKING

4.9.3.1 Modifications to the Barbers Point Tank Farm

Alternative 3 involves construction of substantially larger fuel truck loading facilities at the Barbers Point Tank Farm than do the other alternatives. However, the low height and bulk of these facilities and their distance from any public viewpoint eliminates any potential for adverse visual effects from their presence.

4.9.3.2 Modifications to the Waiau Generating Station

HECO would need to construct many fuel truck unloading stations at the Waiau Generating Station in order to implement Alternative 3. It would also need to modify the entrance and exit to the facility to accommodate movement of the fuel trucks. These facilities would be less than 20 feet high, and only the tops would be visible from outside the plant fence. These would not have substantial adverse visual impacts.

4.9.3.3 Modifications to the Iwilei Tank Farm

This alternative involves the same changes to the existing Iwilei Tank Farm as would Alternative 1. As discussed in Section 4.9.1.3, these do not have the potential to cause substantial visual impacts.

4.9.3.4 Fuel Truck Activity

Using trucks instead of a fuel pipeline to supply the Waiau Generating Station requires a substantial number of truck trips. In view of the relatively heavy truck traffic that is already present on the roadways that these would follow, they are unlikely to have a significant visual effect when judged by qualitative criteria. However, the number of trips may be sufficient to be noticeable to regular users of the roadway, particularly as many would occur during periods of the day when large truck traffic is relatively low. Hence, some other drivers or residents near the Waiau Generating Station could react to seeing the fuel trucks, particularly as they are not presently used in the operation of the power plant.

4.10 IMPACTS ON TRANSPORTATION AND TRAFFIC

Normal operation and regular maintenance of the proposed Waiau Fuel Pipeline do not involve activities with the potential to affect transportation facilities. The project does have the potential to affect some transportation facilities during the construction phase. Specifically, construction of new pipeline facilities would:

- Require excavation, pipe laying and other work within existing road (and in a few instances railroad) rights-of-way.
- Involve the transport of substantial volumes of construction material. This would include material excavated from the trench, select fill, and the pipe itself. Only the latter is likely to involve the importation of substantial quantities of material and, therefore, to affect harbor facilities.
- Generate some vehicular traffic as work crews travel on area roadways while commuting to and from work.

Because HECO would use trucks rather than the Chevron pipeline to transport fuel past Waiau to the Iwilei Tank Farm for use in its Honolulu Generating Station, Alternative 1 would add several truck trips per day into and out of the BPTF and the Iwilei Tank Farm. These same BPTF-to-Iwilei truck trips would be made in Alternative 3. In addition to these, Alternative 3 would require a substantial number of fuel truck-trips between the BPTF and the Waiau Generating Station.

None of the normal operational activities included in these alternatives would increase the number of vehicle-trips on area roadways sufficiently to cause capacity problems. Consequently, the discussion focuses on the extent to which construction activities might require temporary lane closures or other effects that might reduce the level of service on area roadways or otherwise affect transportation facilities.

The remainder of Section 4.9 is organized as follows:

- Section 4.10.1 characterizes project-related traffic volumes for each of the three action-alternatives. The estimates are based on the volumes of fuel to be transported, anticipated delivery schedules, the approximate location of construction staging areas and construction base yards, the methods that the contractor is likely to use to deliver materials to the work sites, the time of day during which various activities would occur, and the approximate duration of these construction activities. It also estimates project-related air and ocean transportation usage.
- Section 4.10.2 combines this information with information on the nature of the existing facilities and their use to identify locations at which project-related activities might affect the level of service on arterial roadways. It does this by comparing the anticipated traffic volumes and/or roadway restrictions (as in temporary lane closures) with information on existing traffic volume and capacity obtained from the State Department of Transportation and the City & County of Honolulu Department of Transportation Services (DTS).

- Sections 4.10.3, 4.10.4, and Section 4.10.5 discuss the effect that each of the three Action Alternatives would have on transportation facilities. Where relevant, they outline prototypical traffic management procedures that would be used during pipeline construction.

4.10.1 VEHICLE-TRIP GENERATION

4.10.1.1 Construction-Phase Trip Generation

4.10.1.1.1 Construction-Phase Vehicle-Trips: Proposed Waiau Fuel Pipeline Project

Construction of HECO's proposed Waiau Fuel Line would generate a small number of vehicle-trips on area roadways. Most of these would be associated with the delivery of pipe and other construction materials to staging areas and with employee commute trips to and from working areas.

Employee Work Trips. In view of the relatively small size of the individual work crews (estimated at no more than 20 persons each), construction workers are expected to make about 20 vehicle-trips in the morning and 20 in the afternoon. Assuming typical work schedules, most of the to-work trips would be between 6:30 and 7:00 a.m.; most of the "from-work" trips would be between 3:30 and 4:00 p.m.

Pumping, Tank, Monitoring and Miscellaneous Equipment Delivery Trips. Alternative 1 requires the construction of new pumps, a small diesel fuel storage tank, monitoring and control devices, and other mechanical equipment at the BPTF, the Waiau Generating Station, and the Iwilei Tank Farm. The amount of such equipment is small compared to that used for other nearby industrial projects and its delivery to the construction sites would generate few vehicle-trips, probably no more than 5-10 on even the busiest day.

Pipe Delivery Trips. The pipe itself would arrive from the Mainland in container loads. Assuming the use of standard 40-foot containers and the use of typical internal racks designed to protect the insulation during transport, each container would hold approximately 20 pieces of 40-foot-long pipe (i.e., approximately 800 linear feet of pipe per container). Dividing the total pipeline length (13.1 miles, or 68,640 linear feet) by the capacity of one container (800 linear feet), indicates that approximately 86 container loads of pipe would be required. Allowing for some extra pieces and for the transport of some irregularly shaped pieces of pipe that require more space in the containers, 100 container loads of materials is a reasonable estimate of the amount that would need to be delivered to the staging areas.

The contractor is expected to establish one or perhaps more staging areas along the pipeline corridor. If these deliveries were relatively concentrated, i.e., deliveries were made within 2-3 days of the arrival of the pipe in the harbor, the number of vehicle-trips from this source would not exceed 20 per day. It is probable that much of the pipe would be delivered in sections that are significantly longer (60 to 80 ft.) than could be delivered in container traffic. These pipe sections would be staged at the BPTF and moved along the pipeline route directly to the installation site. This would lower the consequent roadway traffic required below this estimate.

Excavated Material and Select Fill. Most of the material excavated during trenching for the pipeline would be used to cover the pipe once it is in place. However, because the pipe would fill some of the trench volume and because select fill (rather than native material) would be used where needed (e.g., through rocky areas) to protect the pipe and pipe coating, some surplus material would be generated that would need to be hauled away. HECO estimates that approximately 3,000 to 5,000 cubic yards of material would be involved. Preliminary engineering review indicates that at least half this could be spread over fields immediately adjacent to the construction area, eliminating the need for trucks to carry it away. If 20-cubic-yard capacity trucks are used for this material, this would entail a total of, at most, 125 truck loads. Since the excavation would be spread over many weeks, this activity would generate at most a six or so truck-trips per day.

4.10.1.1.2 Construction-Phase Vehicle-Trips: Alternative 2

Alternative 2 does not involve new construction. Consequently, there would be no additional vehicle-trips on island roadways from this source. Note, however, that Chevron would continue to maintain its line during this period (including replacing old sections), and that this activity would generate more vehicle-trips than would maintenance and repair of the new line that is used for Alternative 1.

4.10.1.1.3 Construction-Phase Vehicle-Trips: Alternative 3

Alternative 3 does not involve the construction of new pipeline, thereby avoiding the construction traffic associated with Alternative 1. It does require the construction of substantial truck loading and unloading facilities at the BPTF and Waiau Generating Station that are not needed for Alternative 1 or 2. This would require delivery of various pieces of mechanical equipment, but the number of such truck-trips would not exceed 20, and these would be spread over a number of days. This Alternative would require the same limited mechanical equipment and installation at the Iwilei Tank Farm as Alternative 1.

4.10.1.2 Operational Phase Vehicle-Trip Generation

4.10.1.2.1 Operational-Phase Vehicle-Trips: Alternative 1

Employee Trips. The proposed Waiau Fuel Line project would generate very few vehicle-trips once it is operational. The system would be controlled from the Waiau Generating Station and would require no more than one additional person per shift at that location. One additional person would be used for regular inspection along the pipeline route. Finally, periodic maintenance activities, as when the pipeline is taken off-line for inspection, would bring a few additional contract personnel to the BPTF and Waiau Generating Station for at most a few days each year. These might increase the number of employee commute trips by 10-20 per day for up to a week. No employees would be based at the Iwilei Tank Farm, but employees might visit it once or twice per day, on average, during normal operations.

Fuel Truck Trips. This alternative involves the use of trucks to deliver fuel from the BPTF to the Iwilei Tank Farm. As discussed in Chapter 2, it is anticipated that this would require approximately 5 fuel truck trips per day to provide the volume of fuel presently consumed at the Honolulu Generating Station. If fuel use at that facility increases to the highest amount now forecast (which is projected to be in 2016), the number of tanker truck deliveries could be more than double that.

4.10.1.2.2 Operational-Phase Vehicle-Trips: Alternative 2

Alternative 2 involves continuing to contract with Chevron to carry fuel to both the Waiau Generating Station and the Iwilei Tank Farm. It involves very few vehicle-trips during normal operation, with those typically being limited to inspection of the facilities. A few additional vehicle-trips are generated several days each year during the annual inspection, most of these into and out of the Chevron refinery at Barbers Point.

Chevron has been conducting an aggressive maintenance program that includes replacement of segments of pipe on an as-needed basis. This type of work involves the same sorts of activities and vehicle trips as construction of a new pipeline.

4.10.1.2.3 Operational-Phase Vehicle-Trips: Alternative 3

Alternative 3 involves the use of trucks to transport fuel from the BPTF to both Waiau and Iwilei. Table 4-28 derives the number of fuel-truck-trips that would occur at all three facilities. On average, it is expected that a few employee and maintenance vehicles might visit the BPTF and Waiau fuel handling facilities each day; since fewer than 10 such vehicle-trips are expected each day, with no more than a couple occurring during peak traffic times, the following analysis focuses on the fuel trucks.

Table 4-28. Fuel Truck Trip Generation and Fleet Requirements: Alternative 3.

Parameter	Waiau[1]		Iwilei[2]		Total/BPTF	
	2005	Max.	2005	Max.	2005	Max.
Annual Fuel Use (1,000's of barrels)	1,891	3,002	162	445	2,053	3,447
Truck Deliveries/day[3]	51	81	5	12	56	93
One-Way Truck-Trips/day[4]	102	162	10	24	111	186
Average One-Way Truck-Trips/Hour	5.6	9.0	0.6	1.3	6.2	10.3
Maximum Loading/Unloading Stations Needed[5]	4	6	1	1	5	7
Fuel Truck Fleet Requirements[6]	6	8	2	2	8	10

Table Notes:

[1] One barrel is equivalent to 42 gallons. Minimum rates from Year 2000 actual usage; maximum rates from HECO April 1999 5-yr sales and peak forecast for Year 2016.

[2] Minimum rates from Year 2000 actual usage; maximum rates based on average of recent historical fuel consumption.

[3] Assumes use of trucks having a capacity of 6,000 gallons, or 143 barrels. These would operate during two 9-hour driving shifts, 5 days per week, 52 weeks per year (260 days).

[4] Each fuel delivery generates 2 vehicle-trips, 1 inbound vehicle-trip, and one outbound vehicle-trip. Hence, the number of fuel deliveries is half the number shown.

[5] Estimates assume 1-hour truck cycling time. Fuel loading station estimates at Waiau are rounded upward to nearest whole number and assume 1 backup station. No backup stations are assumed for Iwilei.

[6] Fuel truck fleet requirements assumes 75% utilization rate.

[7] One barrel is equivalent to 42 gallons.

Source: Compiled by Planning Solutions, Inc. and Rooney Engineering, Inc.

Alternative 3 involves the same number of fuel truck deliveries to Iwilei as Alternative 1. This ranges from 5 per day when the Waiau Pipeline is first put in service to as many as a dozen in 2016 if fuel use at the Honolulu Generating Station increases to the extent now forecast. Fuel use at the Honolulu Generating Station (and fuel truck trips to the Iwilei Tank Farm) are forecast to decrease after that year. As shown in the table, this would result in the an average of less than one fuel truck trip (either in or out) per hour in 2005 and slightly over one per hour in 2016.

Forecast fuel use at the Waiau Generating Station would also increase over time. An estimated 51 truck deliveries per weekday would be needed in 2005; this would rise to 81 truck loads per day in later years. These numbers assume that no trucking would occur on Saturday or Sunday. This rate would result in from 6 to 9 fuel truck trips per hour.

4.10.1.3 Routing of Fuel Delivery Trips

4.10.1.3.1 Barbers Point Tank Farm – Iwilei Tank Farm

Trucks carrying fuel from the Barbers Point Tank Farm to the Iwilei Tank Farm would turn left out of the BPTF and follow either Hanua Street/Malakole Street or Hanua Street/Kauhi Street to Kalaeloa Boulevard. They would proceed northbound on Kalaeloa Boulevard to the H-1 Freeway, turning eastbound onto the freeway. They would remain on the H-1 Freeway past Pearl Harbor and Honolulu International Airport, exiting H-1 onto Nimitz Highway just before Sand Island Road. They would remain on Nimitz Highway until they are just past the Iwilei Tank Farm, turning right into an internal roadway owned and maintained by the Harbors Division of the State Department of Transportation

(see Figure 2-14). That road would take them to the *makai* side of the facility, where they would enter through a security gate. HECO is obtaining an easement for the use of this road.

Empty trucks returning to BPTF would exit to Nimitz Highway eastbound on the same private road they used to enter. They would then take advantage of breaks in traffic created by the traffic light at the intersection of Nimitz Highway and Pacific Street to cross from the *makai* to the *mauka* eastbound lanes and use the one-way connecting roads to circle back onto the Nimitz Highway westbound lanes. Once headed west, the trucks would re-trace their route to the BPTF.

4.10.1.3.2 Barbers Point Tank Farm – Waiau Generating Station

Trucks carrying fuel from the Barbers point Tank Farm to the Waiau Generating Station would follow the same route as those destined for the Iwilei Tank Farm until reaching the Kamehameha Highway eastbound exit just past Waipahu (see Figure 2-14). They would descend to Kamehameha Highway at that point for approximately one mile before making a right turn into the Waiau Generating Station just after passing under the H-1 Freeway viaduct.

There are two possible return routes. One involves a left turn out of Waiau onto Kamehameha Highway westbound, then onto the H-1 Freeway westbound at Pearl City. Once on the freeway, the trucks would reverse their outbound route while returning to the BPTF. This route involves crossing the eastbound lanes of Kamehameha Highway without benefit of a traffic signal. While the platooning of vehicles caused by traffic signals located on Kamehameha Highway to the west of the power plant is significant, the movement would require care. The second possibility is for trucks to turn right out of the power plant onto Kamehameha Highway eastbound, slowly moving from the *makai* to the *mauka* lanes in order to turn left onto Ka'ahumanu Street northbound. After traveling approximately one quarter mile on Ka'ahumanu Street, the vehicles would turn left again, this time onto Moanalua Road westbound. They would then use the Waiawa Interchange to access the H-1 Freeway westbound and then back to the BPTF. At the beginning and end of each shift, the fuel trucks would return to their base yard. While the location of that is as yet undetermined, it is almost certain to be either at or very near the BPTF. Hence, this would generate little additional traffic.

4.10.1.4 Air and Ocean Transportation Facilities[44]

None of the alternatives under consideration would have a substantial effect on air transportation facilities. Nearly all of the work force would be locally based, and most of the pipe, mechanical equipment (including fuel trucks and other equipment needed for Alternative 3), and other materials would either be imported by sea or come from local sources. The ocean shipments that would enter Hawai'i amount to approximately 100 container loads and would arrive over a period of several months. None of it is oversized to the point where it would require special or unusual provisions. Existing harbor facilities can easily handle these shipments. Consequently, this analysis is focused on the effect that the alternatives might have on road transportation facilities.

4.10.2 AREAS OF CONCERN WITH RESPECT TO POTENTIAL TRANSPORTATION IMPACTS

The activities associated with construction and operation of the three Action Alternatives covered in this report were evaluated with respect to their potential to affect transportation facilities and operations. A wide variety of effects was considered, including the extent to which these alternatives might:

- Increase the number of vehicle-trips to the point where they lower the level of service on existing roadways.

[44] Note: As noted throughout this report, the SEC overlaps the former OR&L railroad right-of-way in a number of areas. While the Hawaiian Railroad Society still operates some trains on this line, they are for historic preservation and for recreational activities, rather than passenger or goods transportation. Because of this, the effects that the various alternatives might have on this line are discussed in Section 4.8 rather than in this section.

- Generate vehicle turning movements that interfere with the free movement of other vehicles, again to the point where they reduce the level of service or cause hazards.
- Cause substantial numbers of over-size vehicles to use roadways during periods when they are heavily used by other vehicles, thereby interfering with the free flow of traffic and reducing the level of service provided.
- Encourage drivers to make unsafe turning movements in an effort to avoid delays or take the most direct route to their destinations.
- Require the temporary narrowing or closure of traffic lanes to the point it reduces ability of those roads to accommodate the number of vehicles attempting to use the roadways.

The results of this review led to the identification of areas of particular concern for each of the three Action Alternatives. These areas of concern are discussed in the following subsections.

The discussion addresses both the period during which the facilities associated with each alternative are being constructed and the period during which they are operating. If the pipeline and other facilities are left in place when they are decommissioned, decommissioning would have no effect on transportation facilities. If on the other hand, substantial sections are removed, the effect would be essentially the same as those described for the construction period. Because of this, no separate discussion of decommissioning is presented.

4.10.2.1 Identified Concerns for Waiau Fuel Line Project

Construction Period. As discussed in Section 4.10.1.1.1, the construction phase of the Waiau Fuel Line Project would generate only a small number of vehicle-trips. These would be spread over considerable space and time. Consequently, the number of additional vehicle-trips that would be generated during construction is too small to substantially affect the level of service on area roadways. An issue of greater concern with respect to construction-period impacts is temporary lane closures or narrowing needed to provide space for the construction activity. The potential for this to adversely affect the level of service is discussed in Section 4.10.3.1.

Operational Period. As discussed in Section 4.10.1.2.1, operation of the completed pipeline would involve very few vehicle-trips. The small number that would occur does not have the potential to significantly affect the level of service. This alternative would use trucks to carry fuel from the BPTF to the Iwilei Tank Farm; these would replace use of the Chevron pipeline. The forecast number of fuel truck vehicle-trips is small (five truck loads per day, five days per week when the fuel line is first placed in service). The addition of these vehicles to roadways entering and leaving the BPTF, traveling on the streets and highways between the BPTF and the Iwilei Tank Farm is far too small to affect the level of service on them. The private roadway that would be used to access the Iwilei Tank Farm off of Nimitz Highway already services fuel trucks entering and leaving the Shell Oil truck loading facilities located there. However, because of certain limitations in the configuration of the intersection between the existing access road and Nimitz Highway, small improvements are called for at this location. These are discussed in Section 4.10.3.2.

4.10.2.2 Identified Concerns for Alternative 2: Continuing Chevron Contract

Construction. As discussed in Section 4.10.1.1.2 continuing to use the existing Chevron black oil line to transport fuel to the Waiau Generating Station and Iwilei Tank Farm would entail extension of the existing repair and replacement activities as well. These activities are limited to a few weeks each year and generate too few vehicle-trips to substantially increase traffic volume. Between the BPTF and the Waiau Generating Station, it is located largely within the OR&L right-of-way, and these activities do not require lane closures or other construction activities with the potential to increase congestion on area roadways, except at the crossings of Kalaeloa Boulevard and Fort Weaver Road.

Beyond the Waiau Generating Station, the pipeline crosses or runs very near and parallel to several major roadways (see Figure 2-21).[45] Replacement of existing pipe segments in these areas has the potential to cause substantial disruptions in traffic flow. It is likely that such work would either be scheduled for periods when the traffic volumes could be accommodated with lane closures, or the pipe would be replaced using the kinds of horizontal boring or directional drilling techniques that HECO is proposing. If this is not possible and if the contemplated replacement schedule involved extensive disruptions of one or more of the potentially affected roadways, it is possible that the Waiau-Iwilei segment of the pipeline would be decommissioned and that other options, such as the trucking option described for Alternative 1, would be implemented by Chevron instead of commitment to possibly costly, time-consuming, and disruptive pipeline maintenance through this urban area.

Operational Period. As discussed in Section 4.10.1.2.2, operation of the Chevron pipeline involves very few vehicle-trips. The small number that would occur does not have the potential to significantly affect the level of service on area roadways. Because this alternative continues use of the Chevron pipeline to deliver fuel to the Iwilei Tank Farm, it would not affect traffic volumes on roadways.

4.10.2.3 Identified Concerns for Alternative 3: Truck Delivery

Construction. As discussed in Section 4.10.1.1.3 using trucks instead of a pipeline to deliver fuel to the Waiau Generating Station would require the construction of new fuel loading and unloading facilities at the Barbers Point Tank Farm and the Waiau Generating Station. These would be in addition to the similar (but much smaller) facilities needed at the Iwilei Tank Farm that are discussed under Alternative 1. The activities needed to construct these facilities are too limited to adversely affect transportation facilities.

Operational Period. As discussed in Section 4.10.1.2.3, trucking fuel to the Waiau Generating Station would require a substantial number of truck trips. The volume is still modest relative to traffic on the roadways that the tank trucks would use, but the size of the vehicles and the nature of the cargo dictate careful consideration.

4.10.3 POTENTIAL IMPACTS: PROPOSED ACTION

4.10.3.1 Temporary Lane Closures and Narrowing During Construction

4.10.3.1.1 Barbers Point Tank Farm, Waiau Generating Station, and Iwilei Tank Farm

None of the construction that would be needed for this alternative at the Barbers Point Tank Farm or the Waiau Generating Station would require lane closures or other work that would constrain the capacity of existing roadways.

The minor improvements that HECO has proposed for the access road easement to the Iwilei Tank Farm (see discussion in Section 4.10.3.2) involve a small amount of work within the easement that could require restricting the use of a portion of the roadway for a few hours at a time. At least one lane would be left open at all times, however, and flagmen or other traffic controls would be used to insure safety. Access to the harbor facilities and to the fuel truck loading facilities used by Shell and Tesoro would be maintained at all times.

4.10.3.1.2 Pipeline Route

There are two situations in which pipeline construction requires lane closures on streets and roadways:

[45] Specifically, these include Kamehameha Highway, Salt Lake Boulevard, Bougainville Drive, Radford Drive, Nimitz Highway, Ualena Street, Lagoon Drive, and Sand Island Access Road.

- The first is when plans call for the pipeline to be within the travel way. This can occur where: (*i*) plans call for the pipeline to actually cross a roadway using trenching or other techniques that disturb the pavement and (*ii*) the pipeline runs along parallel to and within the roadway.
- The second is where the pipeline does not require disturbance of the roadway proper but the need to position materials or construction equipment used in the work requires the temporary closure or narrowing of lanes.

With respect to the first, HECO's proposed design calls for pipeline crossings of heavily traveled roadways to be installed using directional drilling, horizontal boring, and other techniques that avoid the need for lengthy lane closures[46]. Segments of the pipeline that run along the rights-of-way of heavily traveled roads are designed to be outside the paved area. There is no need for closures of the first type in these areas. A few segments of the pipeline route are located within the rights-of-way of lightly traveled streets and roads. Construction in these areas would require brief lane closures, but the traffic volumes are so light that these restrictions would not significantly affect the level of service provided. Table 4-29 lists the locations where pipeline construction has the potential to affect area roadways.

As can be seen from the table, construction work is likely to require brief lane closures along approximately 1.1 miles (slightly less than 9 percent) of the route. There is a possibility that temporary lane closures may be needed along another 0.85 miles (6.5%) of the route, but the probability of this being needed is relatively low. The lane closures would be scheduled for off-peak hours. The more heavily traveled of the affected roadways have at least two lanes in the direction that would be affected by the temporary lane closures; no more than one of these would be closed.

The Highway Capacity Software[47] *that implements analytical procedures in the Highway Capacity Manual* was used to evaluate the effect that lane narrowing and closures might have on affected segments of roadway. The analysis indicates that, in all cases, the remaining unobstructed lanes have more than adequate capacity to carry the existing traffic volumes.[48]

Detailed traffic control plans would be developed and submitted to State Department of Transportation and to the City and County of Honolulu Department of Transportation Services for review and approval before the start of construction that affects roads under their respective jurisdictions. These plans would be based on construction contract documents that bind the contractor to implementation of the agreed-upon measures.

4.10.3.2 Fuel Truck Deliveries to the Iwilei Tank Farm During Operations

4.10.3.2.1 Background

As shown in Figure 2-14, the Iwilei Tank Farm is located on the *makai* side of Nimitz Highway between Ala Kawa Street and Pacific Street. The tank farm is bounded by Nimitz Highway on the *mauka* side, by a 60-foot wide access easement (roadway) on the Diamond Head side, and the former Oahu Lumber site on the Ewa side. A Shell Oil Company gasoline truck loading facility is located on the Diamond Head side of the road. HECO plans to modify the Iwilei Tank Farm to accommodate oil deliveries by tractor-trailer combination tanker trucks in lieu of Chevron's fuel pipeline. The tanker trucks would enter the tank farm site from Nimitz Highway through the existing 60-foot wide access

[46] Individual traffic lanes will be closed for a few hours at a time to prepare for and perform HDD operations. Typical preparation activities involve exploratory digging to locate existing underground structures and confirm that the HECO pipeline alignment clears those structures.

[47] The Highway Capacity Software (HCS) is developed and maintained by McTrans as part of its user-supported software maintenance as a faithful implementation of the Highway Capacity Manual (HCM) procedures. Version HCS2000 was used for this analysis. The modules that were used include HCS Two-Lane Highways Version 4.1b and HCS Multi-Lane Highways Version 4.1b,

[48] The Highway Capacity Software was used to evaluate the roadway adequacy along Farrington Highway east of Makakilo Road during construction.

easement that currently provides access to Piers 31 to 33 and to the Shell Oil Company facility. The proposed configuration is shown in Figure 2-14.

This access road is already used by Shell Oil Company and Tesoro tanker trucks very similar to those that HECO proposes to use to supply the Iwilei Tank Farm. However, the radius of the turn from Nimitz Highway onto the access road is such that the kinds of semi-tractor-trailer trucks presently used (and that HECO would use to supply the Iwilei Tank Farm under this and Alternative 3) cannot execute the right turn movement from Nimitz onto the access road without encroaching onto the Nimitz-bound lane of the access road.

Table 4-29 Temporary Lane Closures and Roadway Pavement Disturbance.

Pipeline Segment		Length of Temporary Lane Closure (in feet)		Comments
Starting No.	Ending No.	Likely	Possible	
170.0	187.0		1,700	Proposed route is within the landscaped and parking areas of the Kapolei Shopping Center. No construction within paved roadway areas except in the unlikely event that soil conditions prevent the use of directional drilling. Lane closures unlikely unless unexpected soil conditions force the use of open trenching.
187.0	214.0		2,700	Proposed route fronts undeveloped land *mauka* of Farrington Highway. No construction within paved area. No lane closures required unless the frontage is developed before pipeline is constructed.
214.0	232.0	1,800		Proposed route is within the landscaped setback area along the *mauka* side of the road right-of-way. No construction needed within paved area of Farrington Highway. Curb lane of 4-lane portion could be closed periodically during construction to permit access and safe equipment operations.
418.0	431.0	1,300		The proposed route is within the road right of way of Kaihuopa'alai St., a dead-end, two-lane, residential street within West Loch Estates. One lane would be closed to allow the work, and it would be necessary to trench through the pavement. Traffic volume is low and flagmen would provide adequate control.
431.0	434.0	300		Proposed route is within the right-of-way of a small, unnamed dead-end street. One lane would be closed to allow the work, and it would be necessary to trench through the pavement. Traffic volume is low and flagmen would provide adequate control.
507.5	515.5	800		The proposed route overlaps the paved access road to the Honolulu Fire Department maintenance facility. It would be necessary to work within the paved area, necessitating special traffic controls to allow continued safe access.
635.0	652.0	1,700		The proposed route overlaps the right-of-way for Second Street. Installation of the pipeline would require temporary closure of portions of the *makai* lane of Second Street. It would also require some trenching through pavement. Traffic volume is low and flagmen would provide adequate control.
Total (in feet)		**5,900**	**4,400**	
Total (in % of Length)		***8.74%***	***6.52%***	

Source: Compiled by Planning Solutions, Inc. from estimates by Rooney Engineering, Inc.

Nimitz Highway, in the vicinity of the Iwilei Tank Farm, is a divided, east-west principal arterial roadway providing access to downtown Honolulu from the airport area. The posted speed limit on Nimitz Highway is 35 miles per hour. Traffic signal systems are provided on Nimitz Highway at its major intersections.

The 60-foot wide access easement from Nimitz Highway provides access to Shell Oil Company's Honolulu Plant and to Piers 31 to 33. Right turns into and out-of the access easement are permitted at its intersection with the inbound lanes of Nimitz. Left turns into the access easement from the outbound lanes of Nimitz Highway are permitted (via a dedicated turn lane) while left turns out are prohibited. The left-turn traffic entering and right-turn traffic exiting are controlled by stop signs at Nimitz Highway. There are twenty-four perpendicular on-street permit-parking stalls on the west side of the access easement, adjacent to the HECO Tank Farm parcel.

4.10.3.2.2 Existing Traffic Conditions

Traffic engineers from Austin Tsutsumi & Associates, Inc., observed traffic conditions and collected traffic volume data at the Nimitz Highway and access easement intersection. Twenty-four-hour machine counts on the access easement roadway were obtained for five days between Monday, April 9, 2001 and Friday, April 13, 2001. Traffic volumes on Nimitz Highway were obtained from the State of Hawaii, Department of Transportation, Highways Division (SDOT) Traffic Count Station SL-20 located at Kapālama Drainage Canal (Table 4-30). From the SDOT counts the peak hours of traffic for Nimitz Highway were determined to be from 7:00 to 8:00 during the morning and 3:15 to 4:15 during the afternoon. The vehicular turning movements at the Nimitz Highway and access easement intersection were determined from the machine counts.

Table 4-30 Traffic Volumes, Nimitz Hwy at Kapālama Drainage Canal

Movement	*AM Peak Hour*	*PM Peak Hour*
Eastbound Approach to Nimitz Highway	3,103	3,513
Right Turn from Nimitz Highway into Access Road	20	10
Right Turn out of Access Road onto Nimitz Highway Eastbound	38	17
Source: State of Hawai'i Dept. of Transportation (July 9, 2001)		

According to Shell Oil Company, approximately 5 Tesoro tanker trucks (maximum 1 per hour) now use the access road each day that did not use it at the time the traffic counts were taken. However, Shell representatives indicate that these trucks usually arrive before the AM peak period of traffic and/or after the PM peak period of traffic. Hence, this change does not alter the peak-hour tabulation shown above.

4.10.3.2.3 Adequacy of Nimitz Highway and Access Easement Intersection Design

Field observations indicate that the inbound traffic on Nimitz Highway flows smoothly at the access easement intersection. The upstream traffic signal at the Nimitz Highway and Ala Kawa Street intersection creates gaps in the flow of traffic on the inbound lanes of Nimitz Highway allowing motorists the ability to execute the right turn out of the access easement.

"Level of Service" (LOS) is a measure of the inconvenience a driver must endure either along roadways or at intersections. LOS for intersections without signal lights (unsignalized) is based on the delay, i.e., the average time a vehicle must wait before crossing or turning at an intersection. LOS

designations range from a rating of "A," denoting no delay at the intersection, to "F", which indicates an unacceptable delay that would lead to substantial traffic disruption.[49]

The traffic at the unsignalized Nimitz Highway/access easement intersection operates at LOS A during the morning and afternoon peak hours of traffic. However, the right turning traffic from the access easement operates at LOS E during the morning peak hour of traffic and operates at LOS D during the afternoon peak hour of traffic, due to the delay between the gaps in the traffic flow created by the Ala Kawa Street signalized intersection. It is not uncommon for a low volume side street such as the access easement to experience long delays when trying to enter or cross a major regional facility such as Nimitz Highway. This is not considered to be a substantial impact on traffic.

"Sight Distance" is the length of the roadway a driver can see ahead at any particular time. When applied to intersections, having adequate sight distance means that motorists traveling at the highway's design speed have adequate time to see an object in the intersection and to make the necessary evasive maneuvers (e.g., slowing, stopping, changing lanes, etc.) without colliding with the object. There is adequate intersection stopping sight distance for the exiting right turns from the access easement at its intersection with Nimitz Highway.

4.10.3.2.4 Effect of Waiau Fuel Line Traffic and Intersection Changes

Based upon current fuel usage at the Honolulu Generating Station, HECO estimates that 5 tanker truck deliveries per weekday (maximum 1 per hour) would be required from the BPTF for Alternatives 1 and 3 beginning in late 2004. If fuel use at the Honolulu Generating Station in 2016 as presently forecast, as many as 12 truck loads per day would be needed (assuming a 5-day per week/18-hour per day operation). Because the existing entrance to the Iwilei Tank Farm was not designed to accommodate fuel truck movements into and out of the facility, HECO's proposed design calls for the tanker trucks to access the site via the access easement roadway after turning off Nimitz Highway. Once on the access easement roadway, they would enter and exit the tank farm site via new driveway connections on the access easement roadway. This connection is shown on Figure 2-13.

The Nimitz Highway/access easement intersection would continue to operate at LOS A even with the additional tanker trucks. The right turning traffic from the access easement would also continue to operate at its current levels of service, LOS E during the morning peak hour of traffic and LOS D during the afternoon peak hour of traffic. In summary, the additional truck-trips that would result from using tanker trucks rather than the Chevron black oil line to deliver fuel to the Iwilei Tank Farm would not change the level of service at this intersection. However, without the improvements included in the proposed project, the existing turning radius limitation that causes semi-tractor-trailer trucks to encroach on the opposing traffic lane on the access easement road would continue to exist.

The proposed design involves use of the access easement roadway from Nimitz Highway, with ingress and egress driveways to the tank farm site on the access easement driveway. It relocates the *mauka*-bound lane of the access easement roadway approximately 7 feet in the Diamond Head direction within the existing 60-foot wide easement. This would allow the tanker trucks to execute the right turn movement from Nimitz Highway without encroaching into the opposing traffic lane on the access road. The relocation of the *mauka*-bound lane requires the relocation of an existing wooden utility pole.

Before deciding on its proposed design, HECO considered the following alternatives:

- Alternative A is similar to the proposed design, but requires the reconstruction of the curb return (corner) of Nimitz Highway and the access easement roadway to increase the radius of the curb return to better accommodate the turning path of the tanker truck without encroaching into the

[49] When applied to unsignalized intersection delays, the following conventions, in seconds of delay, apply to the LOS designations: LOS A is ≤10; LOS B is >10 and ≤ 15; LOS C is >15 and ≤ 25; LOS D is >25 and ≤ 35; LOS E is >35 and ≤ 50; LOS F is >50.

existing opposing traffic lane. However, this alternative requires the relocation of a wooden utility pole, a fire hydrant, a guard rail, a street light pull box, a telephone pull box, and a fence and wall. New curb, gutter, sidewalk and pavement structure would also have to be constructed.

- Alternative B entails a direct ingress access to the Iwilei Tank Farm site from Nimitz Highway. A 35-foot wide gated opening would be needed on Nimitz Highway approximately 250 feet Ewa of the Nimitz Highway/access easement intersection. Egress from the tank farm site would be via a driveway connection to the access easement roadway. This alternative would require the relocation of a fire hydrant and relocation of the guardrail on Nimitz Highway. Since it is not practical to construct a right-turn deceleration lane on Nimitz Highway, Alternative B would also increase the potential for rear-end collisions occurring whenever the right turning truck comes to a near stop when executing the right-turn movement from the right traffic lane of Nimitz Highway. This design would require the approval of the State Highways Division and would be subject to an enhancement fee due the access restriction along the Nimitz Highway frontage.
- Alternative C also involves a direct access to the Iwilei Tank Farm site from Nimitz Highway by widening the existing tank farm access on Nimitz Highway. Egress from the tank farm is via a driveway on to the access easement roadway. This alternative requires the removal of guardrail at the ingress location. This alternative also has similar potential traffic problems as Alternative B. It would also require the approval of the State Highways Division and might be subject to payment of an enhancement fee.

Its proposed access design is more costly than the direct-access alternatives. HECO selected this approach principally because it:

- Limits changes to the access easement where the volume of traffic is lowest.
- Routes tanker trucks onto the same easement now used by Shell and Tesoro fuel trucks.

4.10.4 POTENTIAL IMPACTS: ALTERNATIVE 2

Alternative 2 does not involve the construction of new facilities. Hence, there is no "construction phase" to this alternative in the sense that there is for Alternative 1.

However, as noted above, continuing to use the existing Chevron black oil line to transport fuel to the Waiau Generating Station and Iwilei Tank Farm would entail extension of Chevron's existing maintenance, repair, and replacement activities. These activities entail (on a smaller scale) the kinds of material-delivery, employee-commute, and other miscellaneous vehicle trips that are needed for Alternative 1. However, these would be limited to a few weeks each year and would generate too few vehicle-trips in any one location to substantially increase traffic volume.[50]

As discussed above, replacement of existing pipe segments in several locations along the pipeline between the Waiau Generating Station and Iwilei has the potential to cause substantial disruptions in traffic flow. It is likely that such work would either be scheduled for periods when the traffic volumes could be accommodated with lane closures, or the pipe would be replaced using the kinds of horizontal boring or directional drilling techniques that HECO is proposing. Also, if the contemplated replacement schedule involved extensive disruptions of one or more of the potentially affected roadways, it is quite possible that Chevron would stop using the Waiau-Iwilei segment of the pipeline substitute other options, such as the trucking option described for Alternative 1.

[50] Because the Chevron line would remain the only means of supplying fuel to the Waiau Generating Station in this alternative, repairs, maintenance, and replacement of existing facilities pipe and other facilities must be accomplished while it remains in operation. This means that the line can be taken out of service for only a short period (perhaps two weeks), after which it must be reactivated so that additional fuel can be pumped to Waiau. Hence the limitation noted here.

4.10.5 ALTERNATIVE 3: TRUCKING

Alternative 3 involves the use of tanker trucks to transport fuel to the Iwilei Waiau Generating Station and the same use of these trucks to carry fuel to the Iwilei Tank Farm as Alternative 1. The ability of the street and highway system to accommodate these trips while maintaining an adequate level of service is discussed below. Sections 4.10.5.1, 4.10.5.3, and 4.10.5.4 discuss the ingress and egress to the Barbers Point Tank Farm, the Waiau Generating Station, and the Iwilei Tank Farm, respectively. Section 4.10.5.2 covers effects on roadways within Campbell Industrial Park. Section 4.10.5.3 also discusses the ability of the surface streets in Pearl City to accommodate the forecast traffic to and from the Waiau Generating Station, and Section 4.10.5.4 also briefly reviews the use of the H-1 Freeway and Nimitz Highway

4.10.5.1 Barbers Point Tank Farm Ingress and Egress

Table 4-28 derived estimates of total daily fuel truck trips into and out of each of the three facilities (the BPTF, Waiau, and Iwilei) from which they would operate. Table 4-31derives estimates of peak-hour fuel truck trips for each of the three facilities.

The estimates of fuel truck trips were used together with estimates of non-project peak-hour vehicle-trips on Hanua Street fronting the BPTF that allow for at least a 50 percent increase over present levels to assess potential effects. Hanua Street is a 44-foot wide all-weather roadway designed and constructed to accommodate heavy vehicles. The results of this analysis indicate that:

- Hanua Street presently operates at LOS A even during peak traffic hours and would continue to do so with the few additional trips that fuel transport would generate.
- Fuel trucks turning left out of the Tank Farm would experience LOS B when through Traffic on Hanua Street is heaviest. The remainder of the time they would experience LOS A.
- Even during periods of peak traffic there are sufficient gaps between vehicles on Hanua Street to accommodate vehicles turning left out of the Tank Farm without the addition of turning lanes.

4.10.5.2 Campbell Industrial Park Roadways

In addition to Hanua Street, fuel trucks traveling to and from the BPTF would use Malakole Street and Kalaeloa Boulevard. Malakole Street at its intersection with Hanua Street is 40 feet wide, slightly less than Hanua Street's 44 feet.

Hanua Street presently ends at the intersection; a private driveway on its northern side provides access to the Grace Pacific quarry, Milo Nursery, and undeveloped land around the Kalaeloa Harbor. The Campbell Estate's master plan for the area calls for the eventual extension of Hanua Street into this area to provide access to future industrial and commercial development. No parking is allowed along either street near the intersection. Sight distance is good in all directions. The picture shown to the right looks across Hanua Street at a light truck that has just turned right from Hanua Street onto Malakole Road.

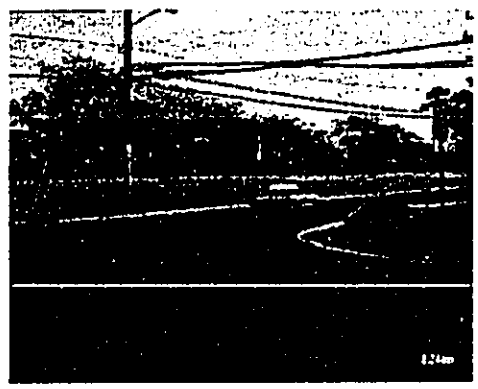


Table 4-31. Alternative 3 Forecast Average and Peak-Hour Fuel Truck Trips

Parameter	Waiau	Iwilei	Total/BPTF
Tank Truck Deliveries/day[1]	81	12	93
One-Way Tank Truck-Trips/day[1]	162	24	186
Average One-Way Tank Truck-Trips/Hour[1]	9.0	1.3	10.3
Peak Hour Factor[2]	0.75	0.75	0.75
Directional (in/out) Split (%)[3]	50/50	50/50	50/50
In-Bound Tank Truck Trips in Peak Hour	6	2	8
Out-Bound Tank Truck Trips in Peak Hour	6	2	8

Table Notes:

[1] Maximum based on highest forecast year. Assumes use of trucks having a capacity of 6,000 gallons, or 143 barrels. These would operate during two 9-hour driving shifts, 5 days per week, 52 weeks per year (260 days).

[2] Ratio of average number of trips to number of trips in the busiest hour.

[3] Each fuel delivery generates 2 vehicle-trips, 1 inbound vehicle-trip, and one outbound vehicle-trip. Hence, the number of fuel deliveries is half the number shown.

[4] No personnel are based at the BPTF or at Iwilei, and the number of miscellaneous trips that would be made that are related to the pumping and other facilities. Because the number of non-fuel truck trips would be very small, it is not accounted for in this table.

Source: Estimated by Planning Solutions, Inc.

The intersection of Malakole Street and Hanua Street is signalized and its approaches have the following configuration:

Approach	*Pavement Width*	*Lane 1 (width/ direction)*	*Lane 2 (width/ direction)*	*Lane 3 (width/ direction)*	*Lane 4 (width/ direction)*
Malakole Street Eastbound	32 feet	11ft/	10 ft	11ft	—
Malakole Street Westbound	24 feet	12 ft/R	LT	—	—
Kalaeloa Boulevard Southbound	48 feet	12 ft/L	12 ft/T	12 ft/T	12 ft/R
Kalaeloa Boulevard Northbound	40 feet	12 ft/LT	12 ft T	12 ft TR	—

The photograph to the right shows the southbound approach to Kalaeloa Boulevard's intersection with Malakole Road. Kalaeloa Boulevard has a landscaped median; Malakole Street does not. No parking is allowed near any of the approaches. The signal is traffic actuated. During the peak hour in the morning the cycle length typically ranges between 70 and 100 seconds. There are three phases to the signal: (a) left turn movements from Kalaeloa Boulevard onto Malakole Road, (b) all movements from Malakole Road, and (c) through and right-turn movements on Kalaeloa Boulevard. A button is present that pedestrians can use to extend the green time

allowed to cross Kalaeloa Boulevard, but it was inoperative at the time of the field observations in January 2002. No pedestrians were seen at the intersection during the peak-hour on the count day. All legs of the intersection cleared fully on each cycle.

The State Department of Transportation traffic count station 10-H is located at the intersection. Data from the traffic count that were taken at that location on May 15-16, 2000, are summarized in Figure 4-15. The graph illustrates two important points:

- Traffic volumes show very distinct directional peaks, in-bound in the morning and outbound in the afternoon.
- There are only a few hours each day when the volumes exceed 600 vehicles per hour in either direction.

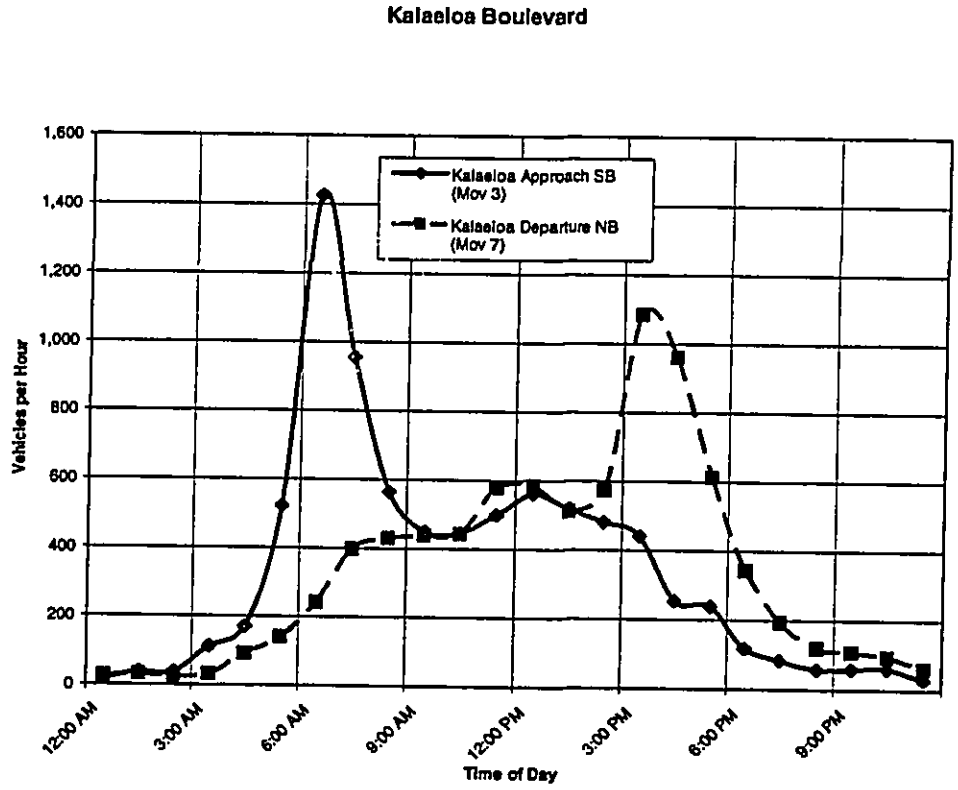


Figure 4-15. Existing Traffic on Kalaeloa Boulevard by Hour.

As one would expect from its location, trucks make up a substantial proportion of total vehicles at this intersection. The State Department of Transportation vehicle classification count performed in May 2000 found that trucks and buses accounted for 18.4 percent of the total vehicle-trips at this location. Trucks accounted for an even higher percentage of trips during the morning and afternoon peak hours (34 percent of the total outbound trips during the morning peak hour and 32 percent of the incoming trips during the afternoon peak hours). However, the high percentages are more attributable to fluctuations in the volume of passenger cars than they are to changes in the truck volumes (which are more constant).

The performance of the Kalaeloa Boulevard/Malakole Street intersection was analyzed using the signals module of the Highway Capacity Software Program (version 4.1b). The results of the analysis showed that:

- The present overall LOS at the intersection during the morning rush hour is C, with most legs operating at LOS B.
- Because of the more intense peak in the afternoon, the LOS is poorer, with the Eastbound leg on Malakole and northbound leg on Kalaeloa operating close to capacity for a short period of time.
- The congestion in the afternoon resolves itself after about an hour.
- The addition of eight additional vehicle-trips in each direction during the morning and afternoon peak hours would have little effect on the LOS at this intersection. The morning peak hour would continue to be busy, but the intersection would clear during each cycle. Congestion during a brief period in the afternoon would be very slightly worsened. However, with less than a 1 percent change in traffic volume during either the morning or evening peak, any change is likely to be imperceptible.

4.10.5.3 Waiau Generating Station Ingress and Egress

As shown in Table 4-31, the use of fuel trucks to transport fuel from the BPTF to the Waiau Generating Station would necessitate an average of 4.5 fuel truck deliveries per hour to the facility over the 18 hours when fuel would be trucked. These would arrive via Kamehameha Highway, a 3-lane divided arterial street.

The State Department of Transportation's Station No. 7 is located at the Kamehameha Highway/Waimano Home Road/Lehua Avenue intersection approximately 1 mile west of the entrance to the Waiau Generating Station. Results of a traffic count taken at that location on August 24/25, 2000, showed a total of 74,786 vehicles entering the intersection over a 24-hour period. The 24-hour eastbound volume on Kamehameha Highway just east of the intersection (Leg 5 of the traffic count station), was 19,253.

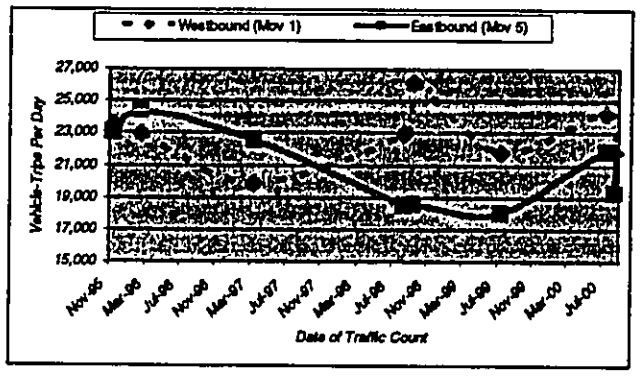
Figure 4-16 depicts the Westbound and Eastbound traffic volumes at this location over the course of the 24-hour period.

The eastbound peak in the morning is later than at Campbell Industrial Park, occurring about 8:00 AM when the volume is nearly 1,900 vehicles per hour. The volume drops noticeably after that and remains below 1,500 vehicles per hour (vph) for the remainder of the day.

Westbound traffic is highest in the afternoon; hourly volumes in that direction remain above 1,800 vph for all but one of the hours from noon to 8:00 PM.

Eastbound traffic, i.e., the vehicles that are headed in the same direction as fuel trucks delivering fuel to the Waiau Generating Station, is spread relatively evenly through the day. This means that it would not be possible to schedule fuel deliveries at "off-peak hours".

While not evident from the single day's count portrayed in Figure 4-16, the plot to the right shows that traffic on Kamehameha Highway fronting the Waiau Generating Station was actually lower in 2000 than it had been 5 years earlier. This indicates that, despite the new construction that had occurred in the area, there was no increase in traffic volumes that needs to be taken into consideration in the analysis.



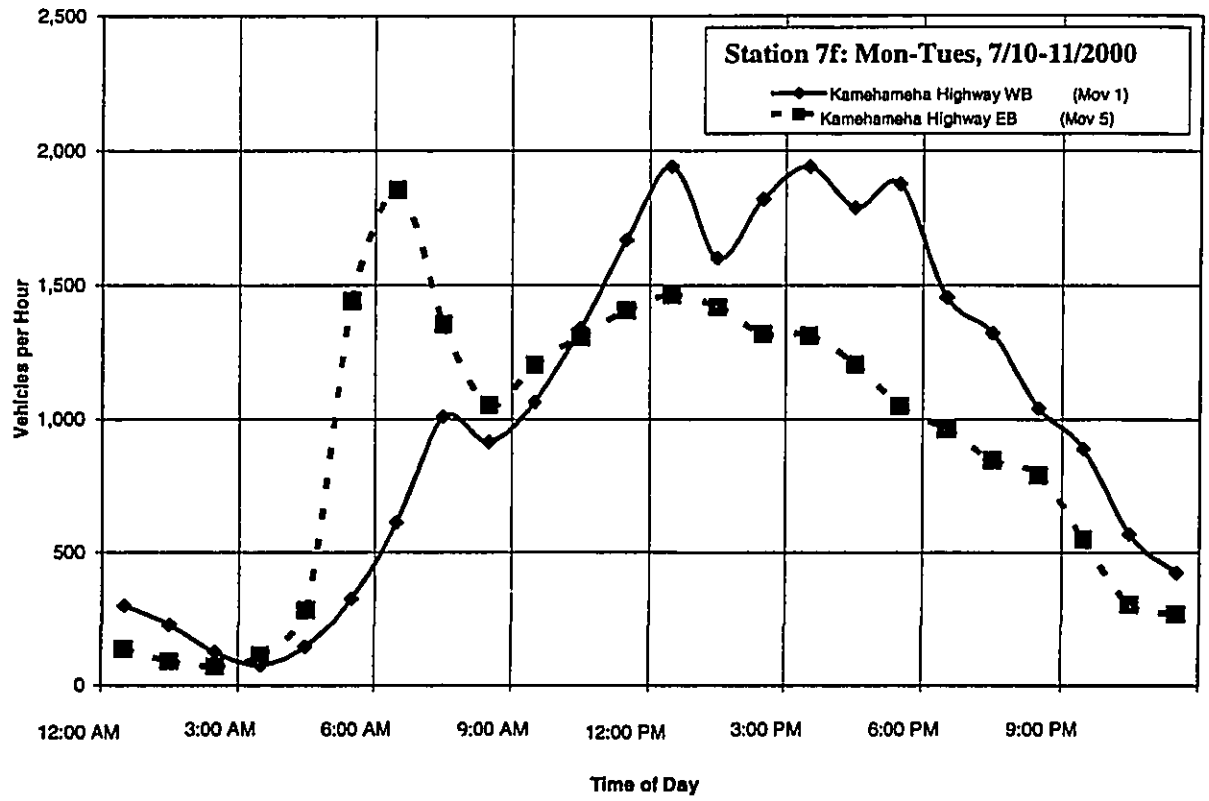


Figure 4-16. 24-Hour Traffic Volume on Kamehameha Highway Near Waiau.

There is no reserved turn lane for eastbound trucks turning right into the Waiau Generating Station. However, the sight-distance is good and the availability of two additional through-lanes means that eastbound trucks slowing to make the turn would not interfere unduly with other traffic. Trucks exiting the Generating Station would make a right turn onto the eastbound curb lane of Kamehameha Highway. They would take advantage of gaps in traffic produced by upstream traffic lights to cross from the *makai* to the *mauka* eastbound lanes and turn left onto Ka'ahumanu Street northbound. They would turn left again onto Moanalua Road westbound, and use the Waiawa Interchange to access the H-1 Freeway westbound. Once on the Freeway they would retrace their route to the BPTF.

Traffic on Kamehameha Highway, Ka'ahumanu Street, Moanalua Road, and the H-1 Freeway is already very heavy during peak hours. The results of traffic counts at the Kamehameha Highway/Ka'ahumanu Street and Moanalua Road/Ka'ahumanu Street intersections are shown in Figure 4-17 and Figure 4-18. A traffic impact assessment that was conducted for the City and County of Honolulu's Moanalua Spine Road project evaluated a number of intersections in the area (Pacific Planning & Engineering, December 28, 1998). It found a LOS of "E" at the Kamehameha Highway-Waimano Home Road intersection and the Waimano Home Road/Moanalua Road intersection. We did not conduct formal operational level-of-service analyses at other intersections that would be transited by fuel trucks carrying fuel to the Waiau Generating Station, but observations during peak traffic hours suggested that at least some intersections on the Kamehameha Highway approach to the Waiau Generating Station are also operating at or near capacity and have relatively poor LOSs. All of the intersections through which the fuel trucks would pass are signalized, and all of the

intersections have roadway geometries designed to accommodate the kinds of vehicles that would be used to haul the fuel.

The number of vehicle-trips that the fuel hauling would generate at the busiest intersections (maximum of 6 per hour past any single point) represents less than 0.1 percent of total existing traffic volumes. Such a small change would not reduce the calculated peak-hour LOS (which is already poor). However, any increase in traffic at already congested locations is undesirable, and the fact that the vehicle count increases are being made by fuel trucks may make them more noticeable than would be the case for other types of vehicles. Forecast increases in regional traffic at the intersections that would be used by fuel trucks would also tend to exacerbate traffic conditions unless they are offset by roadway and traffic control improvements.

Aside from roadway improvements to the entrance and exits at the Waiau Generating Station that are already part of Alternative 3, the fact that the congestion is almost entirely a function of other local and regional traffic means that there is there is virtually no direct action that HECO could take to mitigate the effect of the additional truck trips except to schedule them for off-peak hours. Because non-project-related traffic volumes are high at various locations during many other time periods, scheduling fuel deliveries during off-peak hours would not be particularly effective unless the deliveries were confined to nighttime hours (8:00 pm to 5:00 am). Aside from the operational difficulties that this would present, the noise that such a truck delivery schedule might cause in homes along the route during noise-sensitive periods may make such a mitigation strategy inadvisable, however. ~~Traffic volumes on Ka'ahumanu Street, Moanalua Road, and the H-1 Freeway can be heavy during peak hours. The results of traffic counts at the Kamehameha Highway selected locations along which the fuel trucks would travel are shown in Figure 4-17 and Figure 4-18.~~

~~All of the intersections through which the fuel trucks would pass are signalized, however, and all have roadway geometry designed to accommodate the kinds of vehicles that would be used to haul the fuel. The number of vehicle trips that the fuel hauling would generate at these intersections (maximum of 6 per hour) is a tiny fraction of present volumes on these roadways, and their addition would not measurably affect the level of service the roadways would provide.~~

4.10.5.4 H-1 Freeway, Nimitz Highway, and Iwilei Tank Farm Ingress and Egress

This alternative would have the same effect on traffic at the entrance to the Iwilei Tank Farm as Alternative 1. These are discussed in Section 4.10.3.2.

4.11 NOISE IMPACTS

Installation of pipe and the new equipment that would be needed at the BPTF, the Waiau Generating Station, and the Iwilei Tank Farm would involve the use of excavators, trucks, and other heavy equipment. Some of the equipment and activities are inherently noisy. Fuel trucks that would be used for the trucking alternative (and to a much lesser extent in HECO's proposed Waiau Fuel Pipeline project as well) also generate noise. This section discusses the nature and magnitude of those effects. It is divided into the following parts:

- Section 4.11.1 presents an overview of the fundamentals of environmental noise.
- Section 4.11.2 discusses the way that sound levels are measured and reported; it includes a discussion of relevant descriptors and terms.
- Section 4.11.3 summarizes relevant noise standards and impact assessment guidelines; these are used later in the section to help determine the significance of potential noise impacts.
- Section 4.11.4.1 briefly discusses the sound levels that are typical of different environments and presents the results of a survey of the ambient noise levels that were measured in the different areas potentially affected by the Action Alternatives.

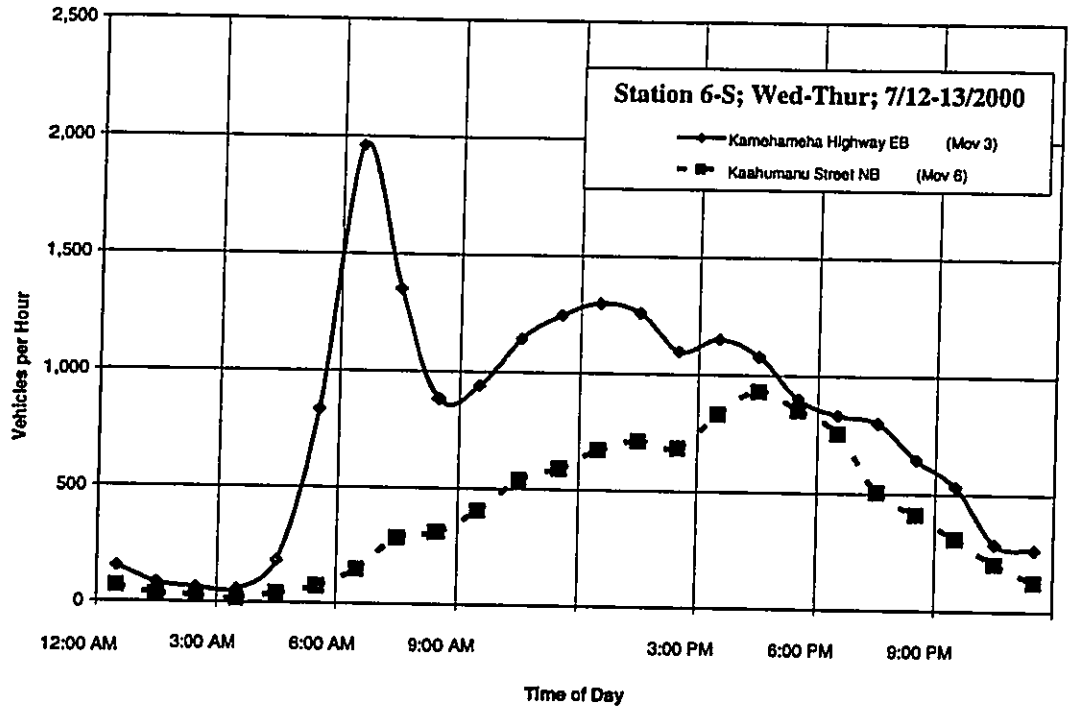


Figure 4-17. Existing Traffic: Kamehameha Highway/Ka'ahumanu St. Intersection.

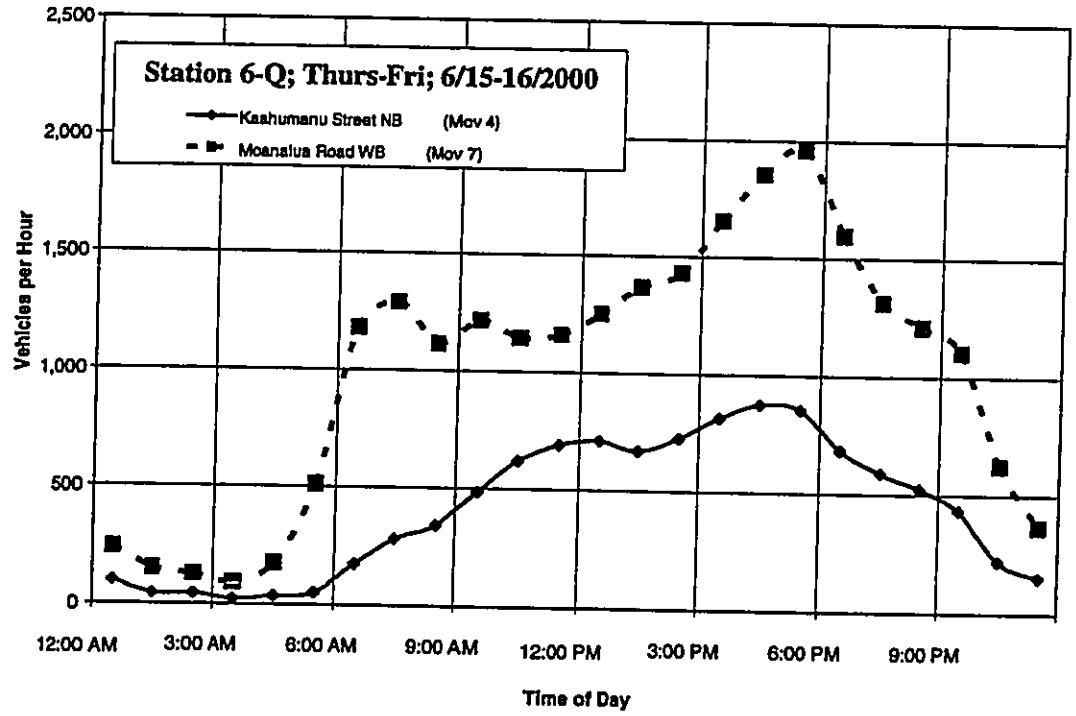


Figure 4-18. Existing Traffic: Moanalua Road/Ka'ahumanu St. Intersection.

- Section 4.11.5 discusses project-related noise, i.e., noise that would be produced by the construction, operation, and maintenance of the various alternatives.
- Sections 4.11.6, 4.11.7, and 4.11.8 discuss potential noise impacts of each of the three Action Alternatives. The discussion notes the permits that would be required and the mitigation measures that would be implemented.

4.11.1 FUNDAMENTALS OF NOISE

The sound people hear is the result of a sound source causing vibration in the air. A good example of this can be seen by watching someone play a large musical instrument such as a bass viola or a kettle drum. In these cases, one can actually watch the strings move back and forth or the drum membrane moving up and down after it is hit by the drum stick. The movement produces alternating bands of relatively dense and less dense volumes of air. These fluctuations in the normal atmospheric pressure spread outward from the source in the same way as ripples do in water after a stone is thrown into it, and so they are referred to as sound waves. Sound waves radiate in all directions from the source and may be reflected, refracted, and scattered; like the waves we see in water, they can turn corners. When the source stops vibrating, the sound waves disappear almost instantly, and the sound ceases.

Sound is usually characterized in terms of three variables: (1) amplitude (equivalent to loudness); (2) frequency (equivalent to pitch); and (3) time pattern (or how the sound varies over time with respect to amplitude or frequency). The combination of these three variables, as well as factors relating to the situation and attitude of the person hearing the sound, determine the extent to which sound is intrusive (bothersome) or does not interfere with other activities. The following sub-sections describe each of these variables in more detail.

4.11.1.1 Amplitude or Loudness

Amplitude is the measure of the ratio between atmospheric pressure (with no sound present) and the total atmospheric pressure with sound present. The "decibel" (dB) is the basic unit of sound pressure; thus it is said that a sound pressure level is a certain number of decibels. The decibel scale is a logarithmic scale, not a linear one such as the scale of length. A logarithmic scale is used because the range of sound intensities is so great that it is convenient to compress the scale to encompass all the sounds that need to be measured.

The human ear can hear an extremely wide range of sound amplitude. A sound that seems very loud to us (even painful) is 10 million times greater in sound pressure than the least audible sound. In decibels, this 10 million to 1 ratio is simplified logarithmically to 140 dB. In general, people barely notice changes in sound levels of 3 dBA or less; an increase or decrease of 5 dBA is clearly apparent; and an increase or decrease of 10 dBA is perceived as a doubling or halving of loudness. However, because the ear is quite nonlinear in its response, a quartering or quadrupling of loudness more closely corresponds to a change of 15 dB, not 20 dB as the rule of thumb might suggest.

Another unusual property of the decibel scale is that the sound pressure levels of two separate sounds are not directly (that is, arithmetically) additive. For example, if a sound of 70 dB is added to another sound of 70 dB, the total is only a 3-decibel increase (to 73 dB), not a doubling to 140 dB. Furthermore, if two sounds are of different levels, the lower level adds less to the higher as this difference increases. Once the difference reaches 10 dB, the lower level adds almost nothing to the higher level. In other words, adding a 60 decibel sound to a 70 decibel sound increases the total sound pressure level less than one-half decibel.

4.11.1.2 Frequency

The rate at which a sound source vibrates, or makes the air vibrate, determines frequency. The unit of time used in reporting the rate is usually one second and the term "Hertz" (after an early investigator of the physics of sound) is used to designate the number of cycles per second. The human ear and the ears of most animals are able to hear over a wide range of frequencies. Humans, for example, can

identify sounds with frequencies from about 16 Hz (Hertz) to 20,000 Hz. Because pure tones (i.e., sounds that are composed of only one frequency) are relatively rare in real-life situations, most sounds we hear are a mixture of many frequencies.

4.11.1.3 Time Pattern

The temporal nature of sound may be described in terms of its pattern of time and level: continuity, fluctuation, impulsiveness, intermittency. Continuous sounds are those produced for relatively long periods at a constant level, such as the noise of a waterfall. Intermittent sounds are those which are produced for short periods, such as the ringing of a telephone or aircraft take-offs and landings. Impulse noises are sounds which are produced in an extremely short span of time, such as a pistol shot or a hand clap. Fluctuating sounds vary in level over time, such as the loudness of traffic sounds at a busy intersection.

4.11.2 MEASUREMENT OF ENVIRONMENTAL NOISE: SOUND DESCRIPTORS

Because environmental sound and the way people perceive it are so complex, analysts have developed many different ways of describing it. The U.S. Environmental Protection Agency (EPA) has adopted a system of "sound descriptors" for use in characterizing the way people hear sound and determining the impact of environmental noise on public health and welfare. They are related but each is most useful for a particular type of measurement. Three of the descriptors and some examples of their uses are as follows:

- A-weighted Sound Level. A person's ability to hear a sound depends greatly on its frequency. Young, healthy people can hear frequencies as low as about 20 Hz (cycles per second) and as high as about 20,000 Hz. People hear sounds best when the predominant sound energy is between 1,000 and 6,000 Hertz (cycles per second). Sounds at frequencies above 10,000 Hertz (such as high-pitched hissing) are much more difficult to hear, as are sounds at frequencies below about 100 Hz (such as a low rumble). To measure sound on a scale that approximates the way it is heard by people, more weight must be given to the frequencies that people hear more easily. While there are a number of different ways to weigh the frequency spectrum so that it matches what our ears actually hear, the U.S. EPA recommends the A-weighting scale for environmental noise because it is convenient to use, accurate for most purposes, and is used extensively throughout the world. When used by itself, an A-weighted decibel value denotes either a sound level at a given instant, a maximum level, or a steady-state level. The A-weighting of frequency also is used in the two descriptors discussed below.
- Equivalent Sound Level (Leq). This is the hypothetical steady-state sound which has the same A-weighted sound energy as that is contained in the time-varying sound that is actually measured over a specified time interval. The Equivalent Sound Level is a single value of sound level for any desired duration which includes all of the time-varying sound energy in the measurement period.[51] Leq correlates reasonably well with the effects of noise on people, even for wide variations in environmental sound levels and time patterns. It is very useful for noise that occurs during normal daytime hours. Sounds that occur round-the-clock are better characterized using the Ldn descriptor described next.
- Day-Night Sound Level (Ldn). People generally find a sound occurring at night more annoying than the same sound during the daytime. The Ldn descriptor incorporates this bias against nighttime noise. It does this by adding a 10 dBA "penalty" to the sound levels occurring between 10 P.M. and 7 A.M. when calculating the equivalent sound leve l (Leq).

Because of the nature of the activities that are the subject of this report, Leq is the most useful metric. Two other parameters that are useful in characterizing noise are "Lmax", the maximum sound

[51] The duration of be observation period must always be stated or implied when using Leq; for example, the equivalent sound level over a ten-minute interval is symbolized as the Leq(10min).

pressure level recorded during a measurement period, and "Lmin", the lowest sound pressure level recorded during a measurement period. All three are reported in the characterization of existing sound levels, but the discussion of impacts focuses on Leq.

4.11.3 ENVIRONMENTAL NOISE GUIDELINES, STANDARDS, AND CRITERIA

The State of Hawai'i has adopted regulations that govern noise from a number of sources. These are described in 4.11.3.1. The City and County of Honolulu Land Use Ordinance (LUO) also contains one noise limitation (see (Section 4.11.3.2). In addition to these enforceable limits, State and federal agencies have established goals and guidelines that can be used to assess environmental noise impacts and to relate land use compatibility to varying levels of environmental noise. A few that are most relevant are discussed in Section 4.11.3.3.

4.11.3.1 State Department of Health (DOH), HAR §11-46, Community Noise Control

Hawaii Administrative Rules (HAR) §11-46 defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to (i) stationary noise sources and (ii) equipment related to agricultural, construction, and industrial activities. Those limits, applicable at the property boundary of the parcels containing the affected land use, are shown in Table 4-32.

These limits apply to the fixed facilities that are part of each of the alternative. Examples include the pumps at the BPTF and the Chevron Refinery that are part of Alternatives 1 and 2, respectively, and the truck unloading facilities at the Iwilei Tank Farm and the Waiau Generating Station that are part of Alternatives 1 and 3. They also apply to construction noise.

HAR §11-46-7 gives the Director of Health the authority to issue permits that allow the limits shown in the table to be exceeded so long as:

- the best available control technology is used;
- the granting of the permit is found to be in the public interest;
- the services or activities for which the permit is sought are temporary and cannot be delayed, postponed, or rescheduled to a time period in which such services are permitted;
- the applicant requires additional time to alter or modify the applicant's activity or operation to comply with this chapter;
- the applicant has disclosed any possible impact from noises created by any proposed nighttime activity which may affect the immediate surrounding; and The applicant plans to notify the people in the surrounding area of planned nighttime activity.

The regulations contain the specific limitations on the Director's ability to issue permits for construction activity. Those limits, measured at the property boundary, are:

- No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels for the hours before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday;
- No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels for hours before 9:00 a.m. and after 6:00 p.m. on Saturday; and
- No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays.
- HAR §11-46-8 also provides for variances in situations where it is not possible to meet all of the conditions required for permits. At present it s anticipate that construction of the proposed pipeline would qualify for a noise permit; hence, it is not anticipated that a variance will be needed.

Table 4-32. Maximum Permissible Sounds Levels in dBA (HAR §11-46).

Zoning Districts	*Daytime (7 a.m. to 10 p.m.)*	*Nighttime (10 p.m. to 7a.m.)*
Class A	55	45
Class B	60	50
Class C	70	70

Notes:

(a) The maximum permissible sound levels apply to any excessive noise source emanating within the specified zoning district, and at any point at or beyond (past) the property line.

(b) Noise levels may not exceed the maximum permissible sound levels for more than ten per cent of the time within any twenty minute period, except by permit or variance issued under sections 11-46-7 and 11-46-8.

(c) For mixed zoning districts, the primary land use designation shall be used to determine the applicable zoning district class and the maximum permissible sound level.

(d) Measurements values are for "A" weighting network and "slow" meter response unless otherwise stated. Sound level meters and calibrators must conform to American National Standard, ANSI S1.4-1983, specifications. The maximum permissible sound level for impulsive noise is ten dBA above the maximum permissible sound levels shown and is measured using the "Fast" meter response.

(e) The limits do not apply to the operation of emergency generators, provided the best available control technology is implemented.

(f) For the purpose of the regulations, the following definitions apply:

"*Construction activities*" means any or all activities, including but not limited to those activities necessary or incidental to the erection, demolition, assembling, renovating, installing, or equipping of buildings, public or private highways, roadways, premises, and parks.

"*Construction equipment*" means any device designed and intended for use in construction, including but not limited to any air compressor, pile driver, bulldozer, pneumatic hammer, steam shovel, derrick, crane, tractor, grader, loader, power saw, pump, pneumatic drill, compactor, on-site vehicle, and power hand tool.

"*Construction site*" means any or all areas, necessary or incidental for the purpose of conducting construction activities.

(g) Class A zoning districts include all areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type.

Class B zoning districts include all areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.

Class C zoning districts include all areas equivalent to lands zoned agriculture, country, industrial, or similar type.

Source: Hawaii Administrative Rules, Title 11, Department Of Health, Chapter 46, Community Noise Control

4.11.3.2 City and County of Honolulu Land Use Ordinance

Section 21-4.80 of the City & County of Honolulu's Land Use Ordinance (LUO) prohibits commercial or industrial development from having a public address or other sound amplifying device on the outside of a structure on any lot that is adjacent to a lot that is in a country, residential, apartment, apartment mixed use, or resort zoning district. This does not apply to any of the structures that would be needed for the proposed Waiau Fuel Pipeline project because they are located well within industrially zoned districts.

4.11.3.3 Noise Guidelines

4.11.3.3.1 Federal Highway Administration Design Goals

The Federal Highway Administration (FHWA) has established non-regulatory design goals for traffic noise exposure (see Table 4-33). The FHWA uses these for evaluating the potential effect of noise from vehicle traffic that would result from FHWA projects. Hence, they are not directly applicable to the present situation. However, even if they were applicable, the fact that the change in vehicular traffic that would result from the proposed project is too small to increase the Leq(1 hr) by the 1 point required to be considered significant means that the proposed Waiau Fuel Pipeline project is consistent with the design goal. Alternative 2 would not have a long-term effect on traffic volumes or noise; hence, it would be consistent with the guideline as well. The trucking alternative has a greater effect on traffic volume than the the proposed Waiau Fuel Pipeline project or Alternative 2. The design-level analysis of vehicle noise needed to confirm Alternative 3's consistency with these guidelines was not conducted as part of this study.

4.11.3.3.2 State Department of Transportation, Highways Division Guidelines

The State Department of Transportation, Highways Division (June 1977) has adopted the FHWA's design goals for traffic noise exposure. According to the policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's design goals or when the predicted traffic noise levels "substantially exceed the existing noise levels." The policy also states that "approach" means at least 1 dB less than FHWA's design goals and "substantially exceed the existing noise levels" means an increase of at least 15 dB. Noise from project-related traffic is sufficiently low to be consistent with this guideline.

4.11.3.3.3 U.S. Environmental Protection Agency Goals

The U.S. Environmental Protection Agency (EPA) (April 1977) has identified a range of yearly day-night equivalent sound levels (Ldn) sufficient to protect public health and welfare from the effects of environmental noise. Its immediate goal is to reduce exterior environmental noise to an Ldn not exceeding 65 dBA. The EPA has a long-term goal of further reducing exterior environmental noise to an Ldn not exceeding 55 dBA. The EPA states that these goals are not intended as regulations, as it has no authority to regulate noise levels. Instead, it states that they are intended to be viewed as levels below which the general population will not be at risk from any of the identified effects of noise. These goals are applicable to permanent installations that have a long-term effect on the noise environment rather than to temporary construction noise. The proposed Waiau Fuel Pipeline project is consistent with this guideline, as is Alternative 2. The detailed analysis needed to confirm that Alternative 3 (trucking) is also consistent with the guideline has not yet been conducted.

4.11.4 AMBIENT SOUND LEVELS

4.11.4.1 Sound Emissions by Typical Sources

Table 4-34 shows noise levels from common household devices; for comparison purpose, it includes sound levels in a few natural environments as well. These examples cover the full range of human hearing, from below the threshold of detection at 20 dBA up to levels of over 100 dBA.

Table 4-33.FHWA Recommended Equivalent Hourly Sound Levels

Activity Category	Leq(1 hr) in dBA	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	---	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Federal-Aid Policy Guide, October 16, 1997, Transmittal 19 23 CFR 772, Subchapter H - Right-of-Way And Environment, Part 772 - Procedures For Abatement of Highway Traffic Noise and Construction Noise

4.11.4.2 Ambient Sound Levels in the Areas Relevant to the Action Alternatives

Existing noise levels along the routes followed by the three alternatives vary widely. The differences are both geographic (spatial) and temporal (i.e., over time). The locations were selected because they are in areas close to the most noise-sensitive uses along the routes. Ten-minute measurements were taken at the locations shown on Figure 4-19 in March, 2002. The recorded Leq, Lmax, and Lmin measurements are listed in Table 4-35.

Comparing the recorded noise levels in Table 4-35 with the "typical" levels shown in Table 4-34, it can be seen that existing sound levels in the areas near the fuel delivery routes are very much as one would expect given the nature of the surrounding land use. Traffic noise is the dominant noise source at almost all stations. The quietest stations, based on Leq values (e.g. 2-4, 1-14, and 1-10) were distinguished by their distance from active roadways, while the noisiest stations (e.g. 3-1, 3-2, and 2-1) were the closest to busy streets. The source of the peak noise levels recorded at each measurement location varies. In most cases they, too, were from passing vehicles, usually trucks. However, in the case of 1-7 (St. Francis Hospice) a weed whacker and air-conditioning compressor provided the highest levels of sound, while behind Waipahu High School (Station 1-12) the generators that operate the U.S. Navy's maintenance system for the Middle Loch mothballed ships were the dominant source of sound.

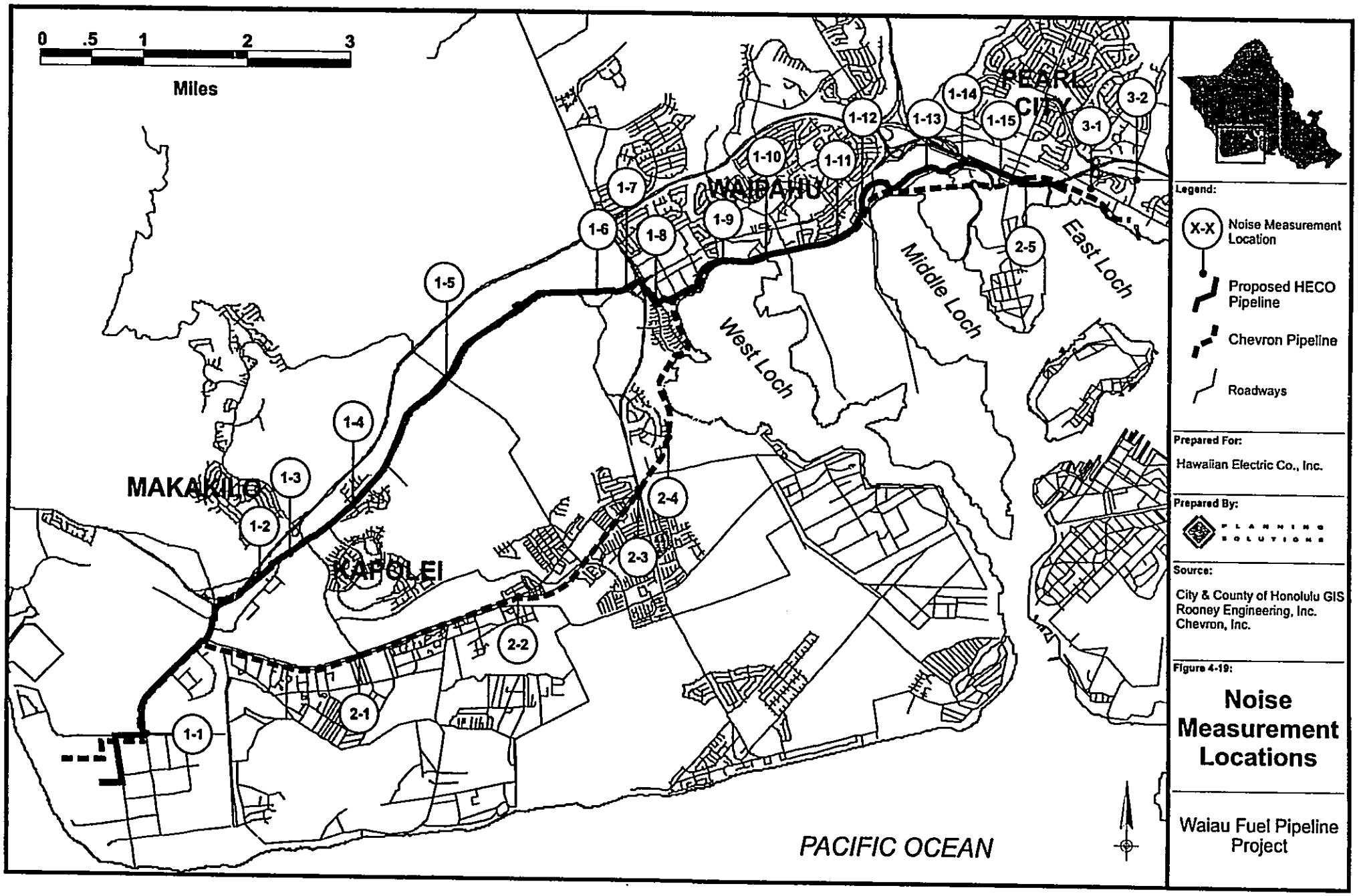
4.11.5 PROJECT-RELATED NOISE GENERATION

4.11.5.1 Construction Noise

Construction, including pipeline replacement, of the facilities needed for the proposed Waiau Fuel Pipeline and Alternative 2 would generate noise along much of or the entire pipeline route. In the case of the proposed action, this would affect all segments of the corridor, as well as the BPTF, the Waiau Generating Station, and the Iwilei Tank Farm. In the case of Alternative 2, construction noise will affect only those areas near areas where the existing pipe is replaced.

Table 4-34 Noise Levels from Common Devices and Environments

Device	dBA
Grand Canyon at Night (no roads, birds, wind)	10
Quiet basement w/o mechanical equipment	20
Quiet Room	28-33
Computer	37-45
Refrigerator	40-43
Typical Living Room	40
Forced Hot Air Heating System	42-52
Radio Playing in Background	45-50
Background Music	50
Bathroom Exhaust Fan	54-55
Microwave Oven	55-59
Normal Conversation	55-65
Clothes Dryer	56-58
Printer	58-65
Window Fan on High	60-66
Alarm Clock	60-80
Dishwasher	63-66
Clothes Washer	65-70
Telephone	66-75
Push Reel Mower	68-72
Inside Car, Windows Closed, 30 MPH	68-73
Handheld Electronic Games	68-76
Kitchen Exhaust Fan, High	69-71
Inside Car, Windows Open, 30 MPH	72-76
Garbage Disposal	76-83
Air Popcorn Popper	78-85
Hairdryer	80-95
Electric Can Opener	81-83
Vacuum Cleaner	84-89
Coffee Grinder	84-95
Handheld Electric Mixer	86-91
Lawn Mower	88-94
Air Compressor	90-93
1/4" Drill	92-95
Food Processor	93-100
Weed Whacker	94-96
Leaf Blower	95-105
Circular Saw	100-104
Maximum Output of Stereo	100-110
Note: All sounds are measured at the distance that a person would typically be from the source.	
Source: Noise Pollution Control Clearinghouse	


0 .5 1 2 3
Miles
WAIPAHU
PEARL CITY
MAKAKILO
KAPOLEI
West Loch
Middle Loch
East Loch
1-1
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1-5
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1-11
1-12
1-13
1-14
1-15
2-1
2-2
2-3
2-4
2-5
3-1
3-2
PACIFIC OCEAN
Legend:
X-X Noise Measurement Location
Proposed HECO Pipeline
Chevron Pipeline
Roadways
Prepared For:
Hawaiian Electric Co., Inc.
Prepared By:
PLANNING SOLUTIONS
Source:
City & County of Honolulu GIS
Rooney Engineering, Inc.
Chevron, Inc.
Figure 4-19:
Noise Measurement Locations
Waiau Fuel Pipeline Project

Table 4-35 Ambient Noise Levels at Selected Locations

No.	*Closest Station*	*Location*	*Recorded Sound Level*		
			Leq (10 min.)	*Lmax*	*Lmin*
1-1	8+00	Hanua St. fronting BPTF	65.6	81.5	54.7
1-2	151+00	*Mauka* of Kapolei Multiplex Theaters	60.5	69.5	53.3
1-3	171+00	Kapolei Shopping Center (@Tesoro Station.)	67.4	76.5	55.1
1-4	220+00	Farrington Highway NE of Papaiaulu Ave.	66.5	81.3	40.8
1-5	295+00	Farrington Highway @ Palehua Road	67.8	87.5	36.7
1-6	385+00	Farrington Highway Near Kahi Mohala	69.8	86.3	44.3
1-7	403+00	St. Francis Hospice	63.6	72.4	52.7
1-8	430+00	Kaihuopala'ai Street at Ota Camp	57.1	81.4	33.2
1-9	473+00	Near Waipahu Intermediate School	52.7	69.9	42.2
1-10	492+00	OR&L ROW Near Pouhala Marsh	48.4	64.5	41.3
1-11	547+00	Ted Makalena G.C. @ Waipi'o Pt. Access Rd	51.0	62.2	42.5
1-12	557+00	Waipahu High School	51.4	63.4	44.3
1-13	595+00	Leeward Community College Observatory	49.9	58.8	43.5
1-14	617+00	College Garden Apartments, *makai* side	46.5	65.2	32.3
1-15	642+00	2nd Street Near Lehua	57.8	67.1	51.5
2-1		Pipeline Crossing at Fort Barrette Road	70.1	84.6	51.5
2-2		'Ewa Villages	63.2	83.5	42.0
2-3		Pipeline West of Fort Weaver Road	59.1	71.4	46.9
2-4		Near West Loch Estates	43.1	62.6	<30.0
2-5		Hale Mohalu Long-Term Care Facility	61.0	67.2	54.7
3-1		N. Side of Kamehameha Hwy. Near Waiau	73.9	88.3	56.5
3-2		Ka'ahumanu Ave. Below Moanalua Rd.	73.6	96.6	56.2
Note: Measurements taken using B&K Type 2239 Noise Meter, slow response., March 28, 2002					
Source: Planning Solutions, Inc.					

Table 4-36 lists the kinds of equipment typically used in the construction of oil pipelines that have significant noise emissions. The table indicates both the typical range of noise emissions as reported in the literature and the level that was assumed for this analysis. The upper portion of the table indicates the equipment that is the principal source of noise from the pipe-laying spread. The bottom portion of the table provides noise source information for the other equipment most likely to be used.

The distance over which the pipe-laying equipment listed in Table 4-36 is spread while it works and the rate of pipe-laying progress (expressed in terms of number of feet per day) are important determinants of the intensity and duration of noise from the construction operations. As indicated by the following examples, these can vary greatly depending upon specific circumstances.

Table 4-36. Noise Emission Characteristics of Equipment in Construction Spread.

	Equipment	*Reported Range of Noise Emissions*	*Value Assumed for Analysis*
Pipe-laying Construction Spread	Backhoe, 1.25 Cubic Yard Diesel	80-92	85
	Diesel Motor Crane	78-87	80
	Engine-Powered Welding Rigs	72-82	75
	Sideboom	78-92	80
	Front End Loader	80-90	85
Other Construction Equipment	Backfiller	82-95	80
	Bulldozer	82-95	80
	Trucks With Lowboy	82-92	80
	Air Compressor	85-91	81
	Ditching Machine	80-90	85
	Dragline 1.25 Yard	80-90	85
	Truck Leaving Construction Site	72-80	75
	Pickups	70-85	70
	Jack Hammer and Drills	75-98	88

Notes:
(1) "Typical range" is based on data in U.S. Environmental Protection Agency (NTID 300.1, 1972, pp2-108) and other sources, as adapted by Aspen Environmental Group, April 1995.
(2)Values are in dBA at 50-foot reference disiance.

Source: Compiled by Planning Solutions, Inc.

- In open, undeveloped areas with level terrain the pipe-laying equipment may be spread over as much as 1,500 feet. A backhoe at the front of the construction spread would clear ground and dig the trench for the pipe. A diesel motor crane would follow up to 400 feet behind; it would support pipe stringing, bending, and lineup. A welding rig would trail about 200 feet behind that and would join together sections of the pipe. Next would come two diesel sidebooms, whose job it is to lower the pipe into the trench. A front-end loader at the rear of the pipe-laying string would backfill the trench. In such circumstances, a spread may be able to lay more than 1,500 feet of pipe in a single day, moving past noise receptors very quickly and limiting the duration of potential impact.
- At the other extreme, when the pipe is being laid through urban areas with many underground utilities and paved surfaces, the pipe-laying spread can lay fewer feet of pipe in a day and the noise-producing construction equipment is clustered closer together. The shortest "blacktop" spread is about 100 feet in length, and forward progress may be as slow as 300 feet per day. Under these circumstances, sensitive receptors that are close to the route are exposed to noise for a longer period of time.

The maximum noise level that would be experienced by any noise-sensitive receptors immediately adjacent to the pipeline route is between 80 and 85 dBA. This is controlled by the noisiest piece of equipment. The length of time that a given sensitive receptor would be exposed to construction noise at or above a certain level can be calculated from the spread of construction equipment, the rate at

which the pipe-laying progresses, and the receptor's distance from the construction work.[52] Table 4-37 summarizes this for two distances from the pipeline (immediately adjacent to the right-of-way and 300 feet from the pipeline) under four different combinations of the length of the "construction spread" and rates of pipeline construction progress. From this table it can be seen that the duration of the exposure is relatively short, even for the receptors that are immediately adjacent to the pipeline.

Table 4-37. Construction Noise Impact Durations.

Days Sensitive Receptor Fronting Right-of-Way Would Experience Noise Increase >5dB				
Existing Ambient Level	*Blacktop Spread of 100 Feet @300 feet/day*	*Urban Spread of 100 feet @400 feet/day*	*Rural Spread of 600 feet @600 feet/day*	*Open Spread of 1,000 Feet @1,500 feet/day*
75	1.1			1.1
70	1.9			1.3
65	3.4	0.9	1.2	1.6
60	5.9	1.7	1.5	2.2
55	10.2	2.9	2.0	3.4
50	17.5	5.0	2.7	5.5
Days Sensitive Receptor 300 feet from Right-of-Way Would Experience Noise Increase >15dB				
Existing Ambient Level	*Blacktop Spread of 100 Feet @300 feet/day*	*Urban Spread of 100 feet @400 feet/day*	*Rural Spread of 600 feet @600 feet/day*	*Open Spread of 1,000 Feet @1,500 feet/day*
75				
70				
65	0.9			1.2
60	1.7			1.5
55	2.9	1.6	1.4	2.0
50	5.0	3.5	2.6	2.7

Notes:
(1) The first column represents existing ambient noise levels against which the project-related increase was measured to determine the amount of increase above ambient.
(2) Shaded areas represent combinations where the value is zero.
(3) Spreads are as discussed in narrative.

Source: Compiled by Planning Solutions, Inc. after Table C.9-6 in Aspen Environmental Group, April 1995.

4.11.5.2 Noise Generation During Operations

Pumps such as those that would be installed and operated at the BPTF as part of the Waiau Fuel Pipeline project are the only significant noise sources associated with the fuel supply system. The pipeline, meters, receiving stations, and other components of the system do not produce substantial sound emissions. The mainline pumps typically produce noise levels of approximately 60 dBA or

[52] Because of the generally level ground through which the pipeline and fuel trucks would pass, attenuation by intervening terrain or structures is not a significant factor and can be ignored in this analysis.

less at a distance of 50 feet. The pumps that would be used to load fuel trucks are even quieter than the mainline pumps for the pipeline.

The diesel-powered tanker trucks that would be used to transport fuel from the Barbers Point Tank Farm to the Iwilei Tank Farm in the proposed project and to both Iwilei and Waiau in Alternative 3 also generate noise. Because of the relatively low volume of truck traffic required for the proposed Waiau Fuel Pipeline project, the noise does not have a significant effect on Leq. Single-event truck noise can be relatively high, however,[53] and can be disturbing if the trucks pass close to noise sensitive uses (such as residences) during noise-sensitive time periods (i.e., between 10:00 pm and 7:00 a.m.). This is particularly so if the areas are presently relatively quiet.

4.11.6 ALTERNATIVE 1: PROPOSED WAIAU FUEL PIPELINE

The proposed Waiau Fuel Pipeline is relatively well-situated with respect to potential construction noise impacts. This is because the majority of the route is near or along heavily-traveled roadways that pass through industrial, commercial, and agricultural land uses. Nonetheless, certain parts of the route do pass close to noise-sensitive residential uses. The most notable of these are the residences along Farrington Highway east of Makakilo Drive, the St. Francis Hospice, and residences in parts of West Loch Estates, Ota Camp, and the extreme *makai* side of Waipahu.

Referring back to Section 4.11.5.1, it can be seen that construction equipment is sufficiently noisy and portions of the route sufficiently close to noise-sensitive land uses, that it will not be possible to keep noise levels below the maximum permissible sounds levels stipulated by the State Department of Health (see Table 4-32). Because of this, a construction noise permit will be needed as provided for in HAR §11-46-7. In view of the short period during which noise levels would exceed the limits and the fact that activities would be limited to daytime hours, it appears that the project qualifies for a permit. This assumes that HECO will require the contractor to employ the best available control technology, and to limit activity to daytime hours.

4.11.6.1 Noise from Operation

For reasons discussed below, the proposed Waiau Fuel Pipeline project does not have the potential to generate substantial amounts of noise during operations.

- Pumps such as those that would be installed and operated at the BPTF as part of the Waiau Fuel Pipeline project are the only significant noise sources associated with the fuel supply system. The pipeline, meters, receiving stations, and other components of the system do not produce measurable sound emissions.
- The mainline pumps typically produce noise levels of approximately 60 dBA at a distance of 50 feet. These pumps, which would be installed approximately 100 feet from the property line of the BPTF, would produce sound levels of approximately 55 dBA at the boundary between the HECO and Chevron properties. This is far below the 70 dBA that the State Department of Health noise regulations allow in the I-2 zoning district.
- The pumps that would be used to load fuel trucks are even quieter than the mainline pumps for the pipeline; hence, they would also comply with the standards.
- The estimated number of trucks that would be used to transport fuel from the BPTF to the Iwilei Tank Farm, is very small (5 trips per day in 2005) and would be made along established truck routes during normal working hours.

[53] The now-repealed HAR §11-42 Vehicular Noise Limits for Heavy contained a limit of 73 dBA at 50 feet during night time hours (i.e., between 10:00 pm and 7:00 a.m.). Federal regulations on newly constructed trucks are 80 dBA at 50 feet, and higher for older trucks (Noise Analysis and Abatement Policy, Department of Transportation, Highways Division, State of Hawaii, June 1997).

- Finally, none of the alternatives involve the use of public address or sound-amplifying devices that are regulated by Section 21-4.80 of the City & County of Honolulu's Land Use Ordinance (LUO).

4.11.7 ALTERNATIVE 2: CHEVRON PIPELINE

4.11.7.1 Noise from Construction

The Chevron pipeline passes through the same kinds of areas as the proposed Waiau Fuel Pipeline. Less of this route is on heavily traveled roadways that provide masking background noise, but this is partially offset by the fact that work would not need to be conducted along the entire route since only certain segments of pipe would need to be replaced.

As with the proposed action, it will not be possible to keep noise levels below the maximum permissible sounds levels stipulated by the State Department of Health when pipe is being replaced in areas that are close to noise-sensitive land uses. Because of this, a construction noise permit would be needed as provided for in HAR §11-46-7. In view of the short period during which noise levels would exceed the limits and the fact that activities would be limited to daytime hours, the work that Chevron would need to undertake appears to qualify for a permit so long as the contractor uses the best available control technology and limits work to daytime hours.

4.11.7.2 Noise from Operation

Because all of the facilities are already in place and operating, Alternative 2 would not increase noise from operations above its current low level. This alternative does not involve trucking, eliminating the potential for substantial vehicular noise.

4.11.8 ALTERNATIVE 3: TRUCKING

4.11.8.1 *Noise from Construction*

The facilities need to implement Alternative 3 are all located well within existing industrial complexes. It would not increase noise sufficiently to exceed the State Department of Health noise limits and would not require a noise variance.

4.11.8.2 Noise from Operation of Alternative 3

The fixed facilities needed for Alternative 3 (truck loading and unloading facilities at the BPTF, Waiau Generating Station, and Iwilei Tank Farm) are quiet. They would not increase noise levels above those now present.

Truck noise in the vicinity of the Iwilei Tank Farm would be the same as for Alternative 1. Because the number of trips needed to serve that facility is small, would be limited to daytime hours, and would follow along an existing truck route, there is no potential for significant adverse noise effect in that area.

A far larger number of truck trips would be needed to deliver fuel by truck to the Waiau Generating Station. Moreover, the trucks would approach and depart the facility using roadways that pass noise-sensitive uses and the plan to operate the truck supply system to Waiau using two 9-hour shifts means that there is a potential for adverse noise effect along roadways near the Waiau Generating Station. The ambient levels near the Waiau Station are already quite high during the day (note Stations 3-1 and 3-2 in Table 4-35); the additional noise generated by these trucks may not substantially change existing levels during daytime hours. A potentially more noticeable change could occur at night, with the exact nature of the impact depending upon the trucks used and the hours during which the trucks operate.

4.12 LAND USE AND ECONOMIC IMPACTS

The Action Alternatives involve construction along roadways and bikeways, modifications to existing industrial facilities, operation of fuel pipelines, and, in the case of the two pipeline alternatives,

ultimately decommissioning of the pipelines. Both the proposed Waiau Fuel Pipeline and the Chevron pipeline routes pass through a number of existing and developing communities. The following subsections provide an overview of these existing land uses and the implications that construction (including maintenance activities) and continued operation fuel supply system has for them. All three Action Alternatives involve continuing to move fuel through corridors along which petroleum products already travel (i.e., the do not constitute a truly new use), and the discussion is presented in that context.

The discussion is divided into four parts:

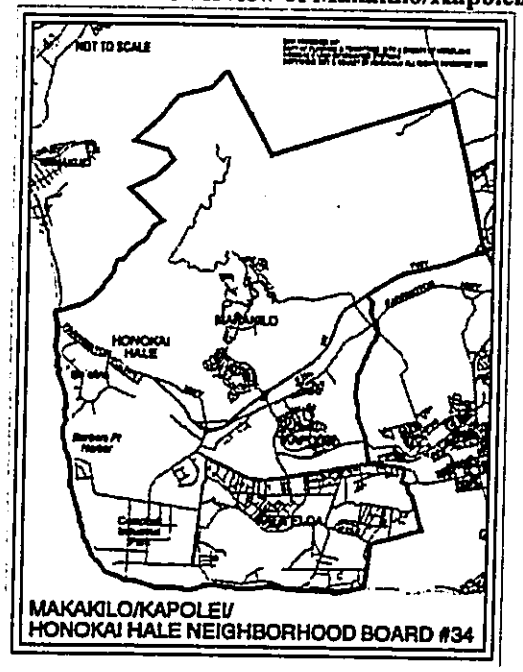
- Section 4.12.1 presents an overview of the communities through which the two pipeline alternatives (the proposed Waiau Fuel Pipeine and the Chevron pipeline) pass.
- Section 4.12.2 discusses the extent to which the Waiau Fuel Pipeline project could affect existing and planned land uses; it also summarizes the likely direct economic effects of implementing HECO's proposal.
- Section 4.12.3and Section 4.12.4 provide the same information for Alternative 2 and 3.

4.12.1 OVERVIEW OF THE AFFECTED COMMUNITIES

This section provides an overview of the communities through which the proposed Waiau Fuel Pipeline would pass in terms of the overall regions and identifies major uses close to the alignment of the proposed Waiau Fuel Pipeline within the State Energy Corridor (SEC). The communities are described in terms of four sub-areas: Kapolei, West Loch, Waipahu *Makai* and Pearl City *Makai*. Each sub-area is part of a Neighborhood Board area designated by the City and County of Honolulu, and is described in terms of the Neighborhood Board area characteristics and population trends. Figure 4-14 shows the sub-areas and Neighborhood Board boundaries as they relate to the two pipeline routes.

4.12.1.1 Kapolei Sub-Area

4.12.1.1.1 Overview of Makakilo/Kapolei/Honokai Hale Neighborhood Board Area No. 34



Kapolei is a master-planned urban center that includes the state's largest industrial park, one of the two civilian harbors on O'ahu capable of accommodating ocean-going vessels, a new business park, a vacation resort area (Ko 'Olina), residential developments, and commercial areas. The Makakilo/Kapolei/Honokai Hale Neighborhood Board Area No. 34, commonly referred to as Kapolei, initially comprised the western part of the original 'Ewa Neighborhood Board Area No. 23, which extended from Kahe Point to West Loch, and included the *mauka* region of Makakilo, the 'Ewa plains, 'Ewa Beach and Iroquois Point. When the City designated Kapolei as O'ahu's "Second City", the original 'Ewa Neighborhood Board Area was split into two parts.

Encompassing 1,367 acres, the James Campbell Industrial Park is Hawai'i's largest industrial park and Kapolei's largest job center. Over 300 businesses are located there and employ about 4,500 people. The Kapolei Business Park is located just south of the City of Kapolei and adjacent to James Campbell Industrial Park and Kalaeloa/Barbers Point Harbor. The infrastructure and landscaping for the first phase of the Kapolei Business Park are complete and ready for immediate occupancy. However, only a few structures have been constructed thus far.

The City of Kapolei contains uses typical of a full-service urban environment. The Kapolei Shopping Center is the largest commercial complex. Its 30-plus tenants include anchors Safeway and Longs Drugs, banks, various retail shops, and numerous restaurants. Public facilities include the Kapolei Judiciary complex, State and City and County offices, a regional library, and the Kapolei Regional Park. Kapolei Park Plaza provides an array of commercial opportunities. Recreational facilities range from public parks to a water amusement park and theater complex.

Both the Honokai Gardens/Nanakai Gardens (developed in the late 1960s and early 1970s) and Makakilo (begun in the early 1960s and still expanding) communities were established before the creation of the "Second City" concept. Dominated by single family homes, Makakilo also offers townhouses and neighborhood amenities.

The newer residential communities in this Neighborhood Board area contain a wide variety of housing options, ranging from affordable townhouses to full-sized single-family homes and custom lots for owner-built homes. The Coconut Plantation, a luxury residential community, is located in the Ko 'Olina Resort, a 640-acre resort with a hotel, golf course and oceanfront parks. The Villages of Kapolei is a cooperative housing development between government and private developers. Covering 890 acres, the overall project is envisioned to include eight villages, a golf course, neighborhood parks, a recreation center and three schools. Kapolei Knolls offers semi-custom single-family homes.

State and City and County governments have established public services and facilities to meet the needs of this growing community. They have established satellite offices and built police and fire stations. New elementary and high schools now serve the region, and public and private recreational facilities help to diversify the support service environment.

Because this Neighborhood Board area was formed after the 1990 U.S. census, no comparative statistics are available that show how it has changed over the past decade. The growth trends are clearly evident, however, in the population counts for the 'Ewa Development Plan, which generally comprises both the 'Ewa and Makakilo/Kapolei/Honokai Hale Neighborhood Board areas. Between 1980 and 1990, the 'Ewa Development Plan Area population grew by 45 percent (38,324 to 42,983). Between 1990 and 2000, the increase was a significant 60 percent (42,983 to 68,718).

4.12.1.1.2 Area Near the Proposed Fuel Line

In the Kapolei Sub-Area, the SEC corridor passes through areas that reflect the region's diverse and transitional character. From west to east, the corridor is adjacent to major uses as follows:

- Adjacent to industrial uses along Kalaeloa Boulevard in Campbell Industrial Park.
- Immediately *mauka* of a multiplex theater complex, but away from the site ingress and egress.
- Immediately *mauka* of the parking lot of the Kapolei Police Station, but away from site ingress and egress.
- Immediately *makai* of the Kapolei Shopping Center and across ingresses and egresses.
- Across Farrington Highway from neighborhoods that are part of Kapolei Knolls.
- Immediately *makai* of Kapolei Knolls, a residential subdivision and across its ingress and egress.
- Immediately *makai* of the PC&R quarry operated by Ameron and across its ingress and egress.
- Immediately *makai* of agricultural lands cultivated by Aloun Farms and across its access roads.
- Immediately *makai* of a HECO Electrical Substation.

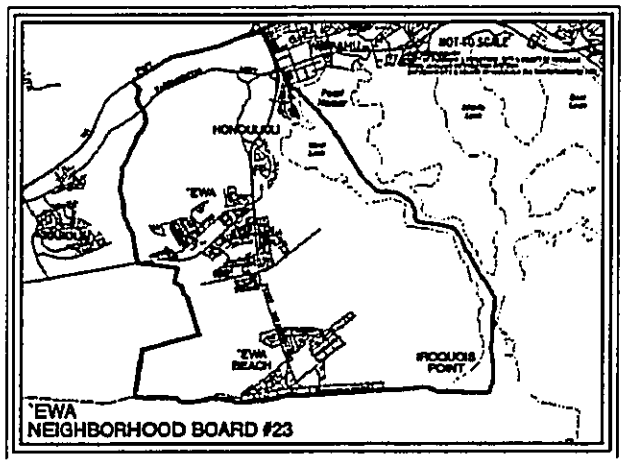
4.12.1.1.3 Area Near the Chevron Pipeline

The initial (starting at the BPTF) portion of the Chevron pipeline is within the Kapolei Sub-Area. It follows the same route and is adjacent to the same uses as the proposed Waiau Fuel Pipeline as far as its intersection with the former OR&L right-of-way. At that point, the Chevron line turns east, passing along the northern side of the largely unoccupied Kapolei Business Park. After leaving the Business Park, the right-of-way continues eastward between the Barbers Point Naval Air Station on the south and the developing area of Kapolei on the north. It passes various residential and open

space uses located on the northern side of the Air Station, but these uses are set back from the fence line and are on the *makai* side of Franklin D. Roosevelt Avenue, the roadway that runs along the entire inland side of the base.

4.12.1.2 West Loch Sub-area

4.12.1.2.1 Overview of 'Ewa Neighborhood Board Area



The 'Ewa Neighborhood Board Area No. 23 includes the communities of 'Ewa Beach, 'Ewa Villages, West Loch Estates, West Loch Fairways Subdivision, and 'Ewa by Gentry.

These communities represent a diverse history and origin. In the 1940s, 'Ewa Beach was the site of seafront summer homes with approximately 200 people living in the area. Today, the 'Ewa Beach community contains residential subdivisions, shopping areas, schools, churches, and all the public and private amenities associated with small towns that exist throughout the island.

'Ewa Villages was at one time home to `Ewa Plantation sugar workers and their families. Today, many of the historic structures and houses have been restored through the City and County of Honolulu's Revitalization Program, and a golf course and commercial spaces are community amenities.

The newer communities are "'Ewa by Gentry" and "West Loch Estates." Both are master-planned residential communities that include housing targeting a range of incomes and community support facilities. This Neighborhood Board area has experienced major growth particularly in the last decade.

4.12.1.2.2 Area Near the Proposed Fuel Line

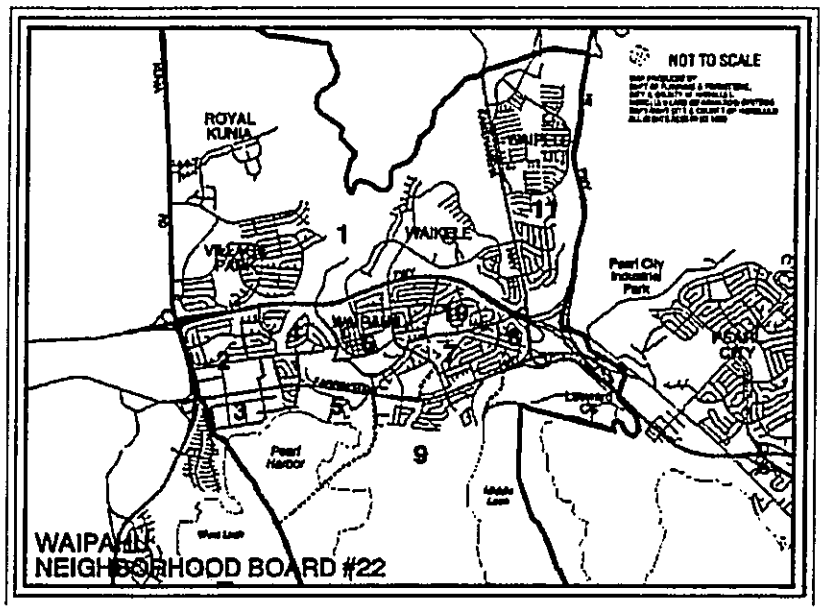
In the West Loch Sub-area, the SEC corridor is in the northernmost portion of the `Ewa Neighborhood Board Area. From west to east, its relationship to major uses is as follows:

- Across Farrington Highway from the Kahi Mohala Behavioral Health Care Center.
- Adjacent and immediately *mauka* of the St. Francis Hospice.
- Across several homes in West Loch Estates along Kaihuopa'alai Street.

4.12.1.2.3 Area Near the Chevron Pipeline

The Chevron pipeline continues eastward and northeastward as it passes through the 'Ewa Neighborhood Board Area No. 23. It passes close to existing residential, apartment, and related uses in 'Ewa Villages as it does this. After crossing Fort Weaver Road, the Chevron pipeline swings northward and passes along the eastern side of the West Loch Golf Course, West Loch Fairways Subdivision, and West Loch Estates. It remains within the former OR&L right-of-way through this area.

4.12.1.3 Waipahu *Makai* Sub-area



The older areas of the Waipahu Neighborhood Board Area developed around the Oahu Sugar Company's mill site and headquarters. A plantation town took form around the mill, but changed as the sugar industry declined. Today the portion below the freeway is considered Waipahu Town, an urban community that contains a full complement of uses. Pockets of housing, ranging from single family homes to low- and mid-rise apartment buildings, are situated throughout this community. Many of the homes were built in the 1970s when home ownership was made possible for Oahu Sugar employees by the company. Publicly-sponsored and market subdivisions were developed as the plantation cut back on its workforce and production lands to cope with the economic difficulties of the sugar industry.

Commercial, office and light industrial uses are situated along Farrington Highway. Shopping malls, restaurants and office buildings are interspersed with mom-and-pop retail and light industrial businesses. *Makai* of the highway are mostly industrial uses, with scattered pockets of single-family homes and apartment buildings.

In the Waipahu *Makai* Sub-area, the SEC corridor is mostly coterminous with the existing alignment of HECO's fuel pipeline. It passes through a residential area and is mostly separated from other uses by an existing buffer. From west to east, the relationship of the SEC corridor to major uses is as follows:

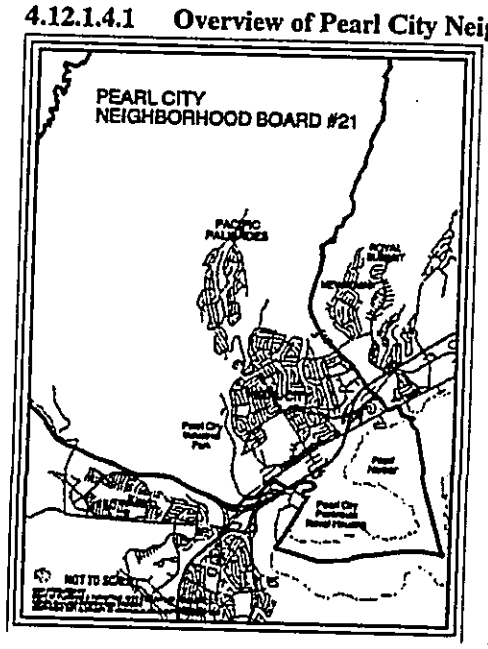
- Passes through and along the northern boundary of Ota Camp, a small residential community of single family homes.
- *Makai* of industrial structures, and at lower elevation and separated by a fence and landscaping.
- *Makai* of apartment buildings in the Pu'upu'u Street area, and at a lower elevation and separated by a fence and landscaping.
- *Makai* of fields of Waipahu Intermediate School, and separated by a fence and landscaping.
- *Mauka* and adjacent to the northernmost edge of the Pouhala Marsh, the largest remaining wetland habitat in Pearl Harbor's West Loch that was recently purchased by the State of Hawaii and serves as a bird sanctuary.
- *Makai* of single family homes, and separated by a fence and landscaping.
- *Mauka* of the Honolulu Fire Department Maintenance Facility.
- *Makai* of single family homes and separated by a canal and fence.
- *Mauka* of the Ted Makalena Golf Course.
- *Makai* of single family homes.
- *Makai* of the Waipahu Aloha Clubhouse and at a lower grade and separated by a fence.
- *Makai* of the grounds and athletic fields of Waipahu High School.

- *Makai* of the Leeward Community College.
- *Mauka* and across the road from single family homes and small farms.
- *Makai* of College Gardens, a complex of low-rise apartment buildings, and a lower elevation and separated by a fence.
- Through a small farm operated by an independent farmer.

The Chevron pipeline route through this area is essentially the same as that followed by the proposed Waiau Fuel Pipeline for nearly the entire distance. Hence, it is adjacent to the same uses. The only notable difference occurs at the eastern end of this segment. Here the Chevron pipeline is located *makai* of the route that would be followed by the proposed Waiau Fuel Pipeline. This places it further away from LCC and closer to small farms.

4.12.1.4 Pearl City Sub-area

4.12.1.4.1 Overview of Pearl City Neighborhood Board Area



From a planning perspective, the Pearl City Neighborhood Board Area differs from other Board areas discussed in this study in two basic ways. First, it is part of the Primary Urban Center Development Plan Area; this means that there are fundamental differences between the plans and policies which govern this area and those that govern Kapolei and 'Ewa (which are part of the 'Ewa Development Plan Area) and Waipahu (which is part of the Central O'ahu Sustainable Communities Plan Area). Second, the area is already built out. Population growth has been modest in the last two decades and no major development changes are expected.

Pearl City began as a new town site in 1890, when the Oahu Railway and Land (OR&L) Company announced a new destination along the railroad line. Pearl City had been laid out with streets and 350 lots. At the turn of the century, the region contained small farms, a railroad depot, a dance pavilion, a yacht club and several *kama'aina* homes on the peninsula.

After World War II, as the demand for single-family homes grew, Pearl City offered a residential alternative to the urban core. Pearl City Heights was the first subdivision to be developed, followed by Pearl City Highlands in 1955, Momilani in 1959, and Pacific Palisades and Manana in 1965.

For the most part, housing areas remained *mauka* of Kamehameha Highway, and those areas along the highway became increasingly commercial and business in nature. The regional Pearlridge Shopping Center, several smaller shopping complexes and industrial establishments are situated along Kamehameha Highway. The Waiau Power plant operated by HECO is also located on this highway. Today, development tends to occur in the *mauka* lands or consist of infill efforts. Non-residential facilities are supportive of residential or military uses.

4.12.1.4.2 Area Near the Proposed Fuel Line

The SEC corridor in the Pearl City Sub-area is *mauka* of the H-1 Freeway and occasionally runs under the freeway structure. From east to west, the relationship of the corridor to major uses is as follows:

- *Makai* and across a road from the Urban Garden Center, which is operated by the University of Hawaii Cooperative Extension Service
- *Makai* of single family homes and separated by a road.
- Adjacent to a construction company operation.

- Through the parking lot of a church facility.
- Through a construction production yard.
- *Makai* and across the road from single family homes.
- *Makai* and across the road from a temple.
- *Mauka* and through of portion of the grounds of a lu'au caterer.
- *Mauka* of a small farm and at higher elevation.

4.12.1.4.3 Area Near the Chevron Pipeline

The former OR&L route followed by the Chevron pipeline is well remains well *makai* of the proposed Waiau Fuel Pipeline until the latter crosses back to the *makai* side of the H-1 Freeway a short distance east of Lehua Avenue. The two lines pass one another beneath the freeway (the Waiau Fuel Pipeline headed *mauka* and the Chevron Line headed *mauka*. The Chevron line remains inland of the freeway for a short distance, passing along the *makai* side of the Hale Mohalu Senior Apartments, and then re-crosses beneath the H-1 Freeway. When it emerges on the *makai* side of the freeway the Waiau Generating Station is on either side of the right-of-way.

4.12.2 ALTERNATIVE 1: PROPOSED WAIAU FUEL PIPELINE

4.12.2.1 Potential Land Use/Land Value Impacts

All of the pumping, fuel storage, monitoring, and other ancillary facilities that are part of the proposed Waiau Fuel Pipeline project would be located within existing industrial facilities. They do not represent a change in use, would not be visible from adjacent public areas, and are not otherwise of a sort that has the potential to interfere with the activities that are located on adjacent property.

Installation of the pipe would entail construction activities that, if not properly conducted, have the potential to interfere with some commercial activities and/or disturb area residents. HECO has deliberately chosen construction techniques designed to minimize such effects (e.g., using directional drilling and horizontal boring rather than open trenching to pass beneath busy thoroughfares). Its plans call for the work to be conducted with all economical speed, for it to be limited to times of day when it would cause the least disruption to adjacent uses, and for the disturbed area to be returned to its pre-existing (or better) condition immediately after the pipeline is installed. All of these are designed to limit adverse effects on neighboring land uses.

Active fuel pipelines already exist in all portions of the proposed Waiau Fuel Pipeline route. The LSFO that HECO would transport through the proposed pipeline is nonflammable and more viscous than the other fuels (e.g., kerosene, gasoline, natural gas, etc.) that flow through the existing pipelines along this route. Moreover, the project would not increase the total volume of fuel being supplied to Waiau, since the amount pumped through the proposed new line would be offset by an equivalent decrease in the amount of the same fuel pumped through the Chevron line. Finally, nearly all of the development that is present along the pipeline route occurred after the SEC was created, and the prices that present owners of the land and improvements near the corridor paid for their property reflect whatever effect the presence of the fuel line easement may have had. In view of the foregoing, installation of a new pipeline within the SEC does not have the potential to alter land values.

4.12.2.2 Potential Economic Impacts of the Waiau Fuel Pipeline

4.12.2.2.1 Construction

Construction of the pipeline and associated facilities would require local labor, materials, and services. HECO's expenditures for the required capital improvements constitute direct inputs into the economy. These direct expenditures would lead to further, indirect, effects as the funds spent on the purchase of labor and supplies for the pipeline are re-used locally for consumer goods and services.

The State of Hawai'i Department of Business, Economic Development and Tourism (DBEDT) has developed an economic, input-output model, based on historical economic data in Hawai'i, to

estimate the extent to which the direct economic inputs from various activities lead to these indirect economic effects (DBEDT 1998). HECO estimates that the costs for the new pipeline and associated facilities that would be expended in Hawai'i for new industrial construction of support facilities, pipeline construction, and other services, would total about $14.77 million. Assuming that these numbers represent final-demand local investments, the DBEDT model predicts that these investments would result in a total of 227 person-years of employment for the local community. Table 4-38 lists the predicted overall (direct, indirect and induced) economic impacts of the construction effort; it uses the HECO's construction-related cost estimates as final demand inputs to the algorithms developed by DBEDT.

Table 4-38 Economic Impacts of Waiau Fuel Pipeline Construction.

Cost Category	*Direct Spending in Hawai'i*[1] *(in millions)*	*Direct, Indirect & Induced Impacts in Hawai'i (in millions)*	*Total Person-Years of Employment in Hawai'i*
New Industrial Construction	$2.55	$5.35	67
Pipeline Construction	$8.74	$19.58	239
Services[2]	$3.48	$7.85	115
Totals	**$14.77**	**$32.78**	**421**

[1] HECO estimates the total project cost to be approximately $26.9 million. An estimated $14.77 million of this would be directly spent in Hawai'i. All of these costs are in 2004 dollars.

[2]These include engineering, architectural, legal and other service categories.

Source: Planning Solutions, Inc.

4.12.2.2.2 Operation

The Waiau Fuel Pipeline would be operated by personnel based at the Waiau Generating Station. Pipeline operators in the control room there would monitor the pipeline using the installed SCADA system. These observations would be complemented by visual inspections and reports from maintenance personnel and drivers of the trucks that would carry fuel from the BPTF to the Iwilei Tank Farm. HECO expects to add approximately six people to its staff to handle these activities and estimates that this will add about $350,000 per year to it unburdened expenditures on direct labor.[54]

In addition to a labor force, operational expenditures would also generate business activity and jobs in the trucking company with which HECO contracts for fuel delivery from the BPTF to the Iwilei Tank Farm. In 2005, the first full year of operation, HECO anticipates that the total cost of trucking would be between $700,000 and $800,000. These costs would vary over time as a function of the amount of fuel used at the Honolulu Generating Station. A portion would go towards the capital costs of the trucks; the remainder represents labor costs. Based on typical staffing, it is estimated that these expenditures for trucking to Iwilei would generate approximately 5 to 6 person-years of employment (drivers, maintenance personnel, and office staff) in 2005.

4.12.2.2.3 Pipeline Decommissioning

HECO estimates that it will cost approximately $2 million (in 2004 dollars) to decommission the pipeline at the end of its service life. The majority of this would be spent on labor in the construction industry, but the need for extensive testing during the closure phase would lead to jobs in other industries as well. Based on experience with other pipelines, HECO engineers estimate that this would generate approximately 10 to 15 person-years of direct employment.

[54] This does not include indirect labor costs such as fringe benefits.

4.12.3 ALTERNATIVE 2: CHEVRON PIPELINE

4.12.3.1 Potential Land Use/Land Value Impacts

Alternative 2 involves the continued use of existing facilities rather than new construction. Hence, just as the proposed Waiau Fuel Line project does not represent a new land use, this alternative simply continues an existing practice.

While this alternative does not involve new construction, keeping the Chevron pipeline safe does require ongoing maintenance, including replacement of pipe that shows sign of wear. In the long run, this means that over the decades-long service life that HECO is planning on for the Waiau Fuel Pipeline, Chevron would probably replace most of its existing pipeline, one segment at a time. Installation of this pipe would entail the same kinds of construction activities needed for the Waiau Fuel Pipeline; they would simply be spread over many more years.

HECO cannot control the kinds of construction techniques that Chevron would use as it replaces pipe. However, assuming it were to make the same kinds of choices that HECO has made in order to minimize adverse effects on the community (e.g., using directional drilling and horizontal boring rather than open trenching to pass beneath busy thoroughfares), the fact that the two alternatives pass through similar kinds of land uses indicate that the conclusions that were reached with respect to potential effects of the Waiau Fuel Line should also be true for this alternative.

Finally, as was true of HECO's proposed pipeline within the SEC, nearly all of the development that is present along the portion of the Chevron pipeline route between the BPTF and the Waiau Generating Station occurred after the Chevron pipeline was installed, and the prices that present owners of the land and improvements near that pipeline paid for their property reflect whatever effect the presence of the fuel line easement may have had. In view of the foregoing, continued use of the Chevron pipeline does not have the potential to alter land values.

4.12.3.2 Potential Economic Impacts

4.12.3.2.1 Ongoing Operation and Maintenance

Continued operation and maintenance (including replacement of old pipe as needed) of the Chevron pipeline and associated facilities would require local labor, materials, and services. Chevron's expenditures for these items constitute direct inputs into the economy. These direct expenditures would lead to further, indirect, effects as the funds spent on the purchase of wages and supplies for the pipeline are re-used locally for consumer goods and services.

The Chevron pipeline would be operated by personnel based at the Chevron Refinery. Maintenance personnel regularly inspect the pipeline and major maintenance is accomplished by a Chevron contractor. HECO estimates that a contract with Chevron in 2005 would be between $5 to 6 million for the year. This contract includes payments for Chevron labor, facility use fees, Chevron profit, and maintenance costs of the pipeline and ancillary equipment. A portion of these contractual payments generate jobs in Hawai'i related to the maintenance of the pipeline and supporting facilities. While a specific count of the number is not available, HECO estimates that the number of jobs is between 5 and 15.

4.12.3.2.2 Pipeline Decommissioning

HECO does not have the data needed to precisely estimate the cost of decommissioning the Chevron pipeline. Neither has Chevron indicated that it would decommission the pipeline once it is no longer used to supply the Waiau Generating Station. However, assuming that Chevron did decide to decommission the pipeline when it is taken out of Waiau service, the fact that it is nearly nine miles longer than the proposed Waiau Fuel Pipeline suggests that the costs would be about double that reported above for HECO's proposed project. The majority of this would be spent on labor in the construction industry, but the need for extensive testing during the closure phase would lead to jobs in other industries as well.

4.12.4 ALTERNATIVE 3: TRUCKING

4.12.4.1 Potential Land Use/Land Value Impacts

All facility modifications that are needed to implement Alternative 3 are located within existing, HECO-owned industrial facilities and within industrial zoning districts. The modifications to the BPTF and the Iwilei Tank Farm would be virtually invisible from off-site. Those at the Waiau Generating Station would be more visible, as would the increase in fuel tanker truck activity at the entrance to the generating station and on the roads leading to and from it. However, these changes would be relatively small, and it is unlikely that they would be perceived as a substantial intensification of industrial activity. Hence, it is unlikely that they would have a substantial effect on land values in the area.

4.12.4.2 Potential Economic Impacts

4.12.4.2.1 Modification of the BPTF, Waiau Generating Station, and Iwilei Tank Farm

HECO estimates that it would cost approximately $1.8 million to construct the facilities needed for the trucking alternative. This expenditure would imply a total input to the community of about (direct, indirect and induced inputs) of about $3.85 million and a total addition of 48 person-years of employment.

4.12.4.2.2 Operation

HECO estimates the direct costs for the operation of the fuel trucks between the BPTF and the Waiau and Iwilei facilities to be approximately $5.3 million during the first year of operation. Assuming that this represents a final-demand investment into the community (see DBEDT 1998), this would represent an addition of up to 100 total jobs to the community. Its cost in real dollars would increase after that in response to higher fuel use at Waiau. Using the multiplier factors discussed above indicates that the total input to the community (direct, indirect and induced inputs) of approximately would be about $12 million per year and that this would generate approximately 180 jobs.

4.13 NATURAL HAZARDS

4.13.1 ISSUES OF CONCERN

Each of the three Action Alternatives was assessed to determine what, if any, special hazards might be associated with it. Existing facilities, such as the fuel storage tanks at the Barbers Point Tank Farm, which would continue to be used in their present manner, were not investigated since the proposed action would not alter the way in which they are operated.

4.13.1.1 Seismicity

Hawai'i experiences literally thousands of earthquakes each year. The vast majority of them are too small to be felt by anything but the most sensitive instruments. Most of the larger earthquakes during recorded history have been centered on the Big Island, where numerous quakes larger than magnitude 5.0 have been felt over the last two centuries.

While O'ahu is not in a high risk area, neither is it earthquake-free, however. According to the 1986 catalog "*Earthquakes felt on Oahu, Hawaii, and their intensities*," 113 felt and reported earthquakes were documented on O'ahu from 1859 to 1986. The O'ahu Earthquake of 1948, had a measured magnitude between 4.8 and 5.0 on the Richter Scale; it resulted in broken store windows, plaster cracks, ruptures in building walls, and a broken underground water main. The Lanai earthquake of 1871, which had a magnitude of 7.0 or greater caused some structural damage to a few buildings on O'ahu. Activity within the Molokai Fracture Zone is probably the largest risk, and it was

consideration of that possibility that led the City and County of Honolulu to upgrade its Uniform Building Code seismic risk zone ranking from a 1 to a 2A.[55]

Waiau Fuel Pipeline Project. The proposed Waiau Fuel Pipeline project would be designed so that it would withstand the movements that could accompany this design earthquake without substantial damage.

Chevron Pipeline. The existing Chevron line was designed and constructed before the seismic risk rating for O'ahu was upgraded. The buried portions of the line are unlikely to be affected by the kind of forces that can be anticipated. However, a few segments of the line are hung on old bridges. These were designed and constructed to lower structural standards, and no analysis has been conducted to determine their susceptibility to damage as the result of the kind of forces that could occur in Risk Zone 2A.

Alternative 3. The trucking alternative, which would rely on ground-level and elevated highways, is also unlikely to be adversely affected by the kinds of seismic events that are believed possible on O'ahu. The roadways and roadway structures, as well as the fuel handling facilities at the BPTF, Waiau Generating Station, and Iwilei Tank Farm would be designed in accordance with current Building Code requirements, which take the higher risk zone rating into account.

4.13.1.2 Tsunami

Tsunami, while posing risks to many coastal area on the O'ahu, do not pose substantial risks for any of the Action Alternatives. No sections of the pipeline routes or pipeline facilities, and no portions of the truck delivery routes are located on the City & County of Honolulu Tsunami Evacuation Map evacuation zones (State of Hawai'i 2002). It is very unlikely that the facilities described in the Action Alternatives could be substantially impacted by tsunami.

4.13.1.3 Hurricanes

Hurricanes are tropical cyclones in which winds reach sustained speeds of 74 miles per hour or more, and blow around a relatively calm center, or "eye." Near the center, hurricane winds may gust to more than 200 miles per hour, although storms reaching Hawai'i have been less powerful than this. Hurricanes are categorized 1 through 5, by the Saffir/Simpson Scale, according to the amount of potential damage and wind speed.

Category	*Description of Damage*	*Wind Speeds (mph)*	*Storm Surge (feet)*	*Examples*
1	Minimal	74 - 95	4 - 5	Iwa, 92 MPH, Nov. 1982
2	Moderate	96 - 110	6 - 8	None
3	Extensive	111 - 130	9 - 12	Uleki, 128 MPH, Sep. 1992
4	Extreme	131 - 155	13 - 18	Iniki, 145 MPH, Sep. 1992
5	Catastrophic	> - 155	>18	Emilia & Gilma, 161 MPH, Jul 94, John, 173 MPH Aug. 1994
Source: Federal Emergency Management Agency and Hawaii State Civil Defense				

Hurricane season begins in June and lasts through November in the Hawaiian Islands. During the last 50 years many hurricanes and tropical storms have come close to the Hawaiian Islands, but only three have had direct impact. In all three cases, Kaua'i was the hardest hit, although O'ahu suffered

[55] The UBC contain six seismic zones, ranging from 0 (no chance of severe ground shaking) to 4 (10% chance of severe shaking in a 50-year interval).

significant damages as well. Hurricane Iniki was by far the most destructive storm to strike Hawaii in recorded history, with widespread wind and water damage exceeding 2.2 billion dollars. Losses in Hurricane Dot, August of 1959 were about 6 million dollars. Hurricane Iwa, in November of 1982 caused over $250 million in damages.

The proposed Waiau Fuel Pipeline and the Chevron pipeline are buried and are not, therefore, susceptible to damage by hurricane winds. Hence, only the above-ground facilities located at the BPTF, the Waiau Generating Station, and the Iwilei Tank Farm have any exposure. They would be designed and constructed to withstand wind loadings specified in the Uniform Building Code and would, therefore, be expected to escape major damage from hurricane winds.

4.13.1.4 Flooding

All of the transportation routes cross areas that have been designated as flood hazard areas. Plans for the proposed Waiau Fuel Pipeline have been developed with the flood hazard areas in mind. All of the facilities at the BPTF, the Waiau Generating Station, and the Iwilei Tank Farm are outside identified flood hazard areas. Thus, only the pipeline and truck routes connecting the various facilities are of concern. These are discussed below in Section 4.13.2.

4.13.2 RISK OF FLOODING

4.13.2.1 Alternative 1: Proposed Waiau Fuel Pipeline

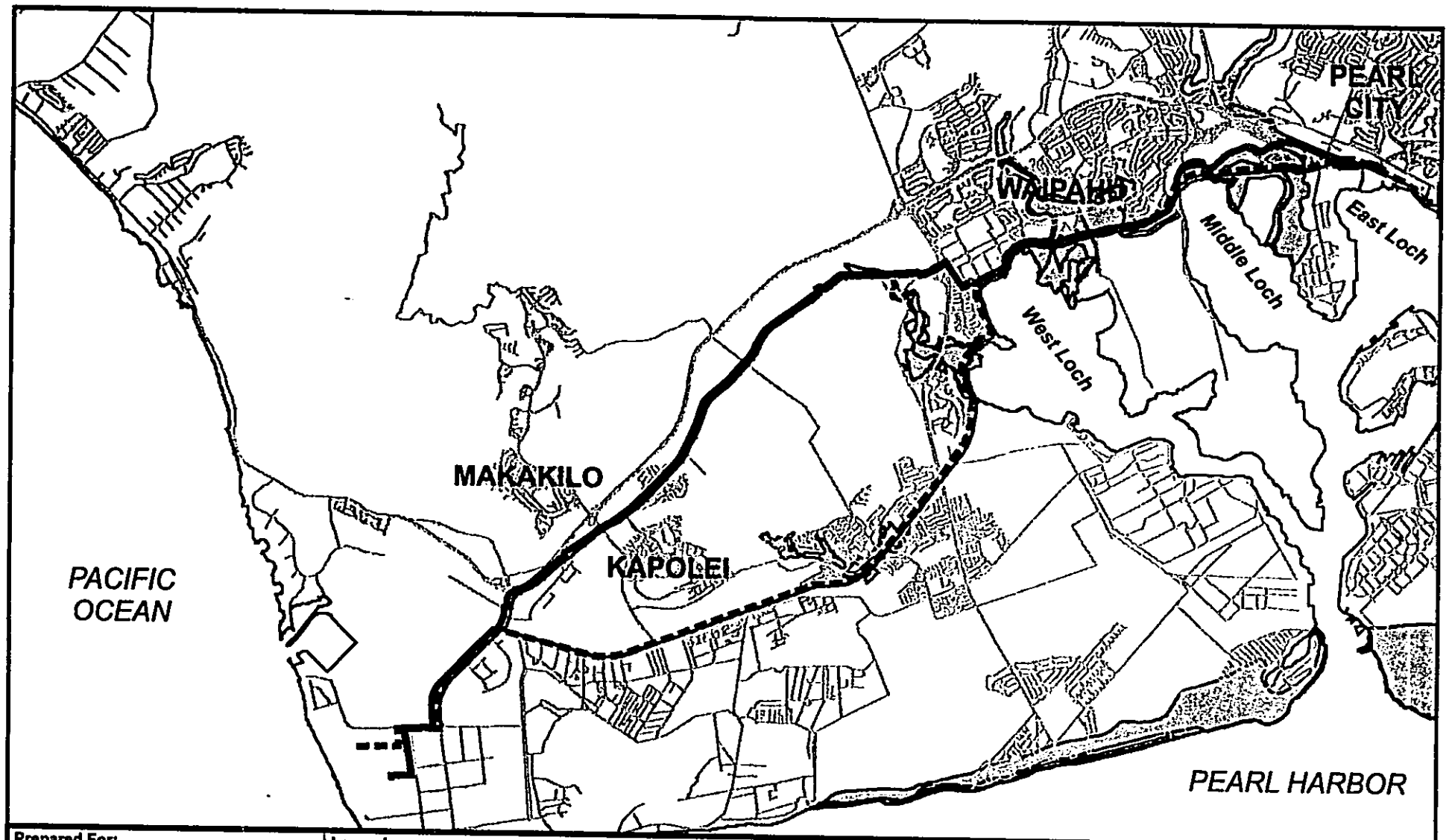
Figure 4-20 shows the Special Flood Hazard Areas (SFHAs), designated by the U.S. Federal Emergency Management Agency (FEMA) as areas of particular concern for flooding and subject to specific FEMA controls for construction of new structures and repairs of existing structures. As shown in the figure, the proposed Waiau Pipeline route crosses SFHAs at the Honouliuli Gulch, across the Waipahu Peninsula, and near the Waiawa Stream. In all of these areas, the pipeline would be buried and not subject to damage from flooding.

Only one of the planned stream crossings (Waiawa Stream) would be constructed using open-trenching techniques. The crossing is short (about 30 feet across the normal stream channel and less than 100 feet top-of-bank to top-of-bank), the work needed to complete it can be completed within two weeks, and long-range weather forecasts would be consulted to see that it is not scheduled for a period when storms are expected. Despite best efforts, it is possible that an unanticipated rainstorm could produce flows sufficiently high to damage the construction area. The effect would be limited to physical property damage to the crossing itself, however. No damage would result to adjacent or downstream properties.

4.13.3 ALTERNATIVE 2: CHEVRON PIPELINE

As shown in Figure 4-20, the Chevron pipeline crosses the same SFHAs as the proposed Waiau Fuel Pipeline. In addition, it also crosses an SFHA in the lower reaches of the Kalo'i Gulch. In addition, between the Waiau Generating Station and the Iwilei Tank Farm, the Chevron pipeline crosses SFHAs at the mouths of the Kalauao and 'Aiea Streams. Through most of these areas the pipeline is buried and not susceptible to damage during flooding events. However, the pipeline is exposed in several sites where it passes over drainageways. The overpass structures are believed to be well-designed and sturdily built, but their structural integrity and ability to withstand flood forces has not been studied as part of this assessment.

As noted elsewhere in this report, Chevron's maintenance program includes pipe replacement where needed. If stream-crossings are included in this and Chevron retains the elevated design, there would be no change in the present level of exposure. If it decides to increase the security of the pipeline by burying it, then in-channel work could be needed in areas where directional drilling or horizontal boring are not economically or technically feasible. Such area would be subject to the same kinds of



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Rooney Engineering, Inc.
City & County of Honolulu GIS
Planning Solutions, Inc.

Legend:
- Special Flood Hazard Zone
- Proposed HECO Pipeline
- Chevron Pipeline

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Figure 4-20:

Special Flood Hazard Zones Along the Pipeline Routes

Waiau Fuel Pipeline Project

flood hazard issues that accompany the single such crossing that is part of the proposed Waiau Fuel Line project.

4.13.4 ALTERNATIVE 3: TRUCKING

As noted above, the facilities that would house the truck loading and unloading facilities at the BPTF, Waiau Generating Station and Iwilei Tank Farm are not in SFHAs and would not be at risk during flooding events. Though sections of the roadways used in the trucking pass over various SFHAs, the roadways themselves are elevated in these areas to accommodate flooding events. If extreme flooding during a major storm event (such as a hurricane) were to present a real threat to the safety of these roadways, then the trucking operation would be suspended temporarily until the operation could safely resume. No substantial threat to the trucking operation would be expected from flooding.

4.14 IMPACTS ON PUBLIC INFRASTRUCTURE AND SERVICES

None of the pipeline alternatives involves activities that have the potential to place a significant additional burden on public infrastructure or services. Neither Alternative 1 nor Alternative 2 would increase the volume of flow moving through the existing pipeline corridors. Except for during the short construction period they would not create new jobs that have the potential to have secondary effects or to induce growth that would require new public services or infrastructure development.

In view of this, there are only two ways in which they might impact the provision of public infrastructure and services. The first is by inadvertently damaging existing underground utility lines during installation of new pipe. The second is if an accident were to occur either during construction or operation that were to require emergency services or to through the accidental interference with existing facilities during construction.

4.14.1 ALTERNATIVE 1: PROPOSED WAIAU FUEL PIPELINE

4.14.1.1 Potential for Damage During Construction

Construction of the modifications to the BPTF, Waiau Generating Station, and the Iwilei Tank farm would all take place within existing HECO facilities. HECO maintains accurate plans for these areas, and the possibility of accidentally damaging buried utility lines that service others is very small. However, construction of the pipeline itself involves work in a much broader area that has many underground utility lines and passes other public facilities. Because of this, there is some potential for damage or interference with these facilities during pipeline construction.

4.14.1.2 Construction Impacts to Public Facilities

The principal public facilities located near to the proposed Waiau Fuel Pipeline route are shown in Figure 4-21. Table 4-39 summarizes the potential that construction of the pipeline would have for affecting these facilities, starting on the western end of the route. A specific examination of impacts to roadway traffic is presented in Section 1.1. In this table, "Minimal" impacts mean impacts that might be noticeable but that would not impair the functioning of the facility. A "Small" impact is one that could cause some delays in access to the facility or that might require some minor and temporary adjustments to the way some aspects of the facility are operated (e.g., temporary relocation of parking or access).

Impacts to the Pearl Harbor Historic Trail (PHHT) would depend on the details of the design and development schedule of the planned bikeway and train track in the areas of the pipeline route around Pearl Harbor where the pipeline would share the OR&L corridor with these developments. HECO has met with the Friends of the PHHT, elected officials, City planners, and the Hawaiian Railway Society to understand their concerns and learn about their plans for the Pearl Harbor Historic Trail development.

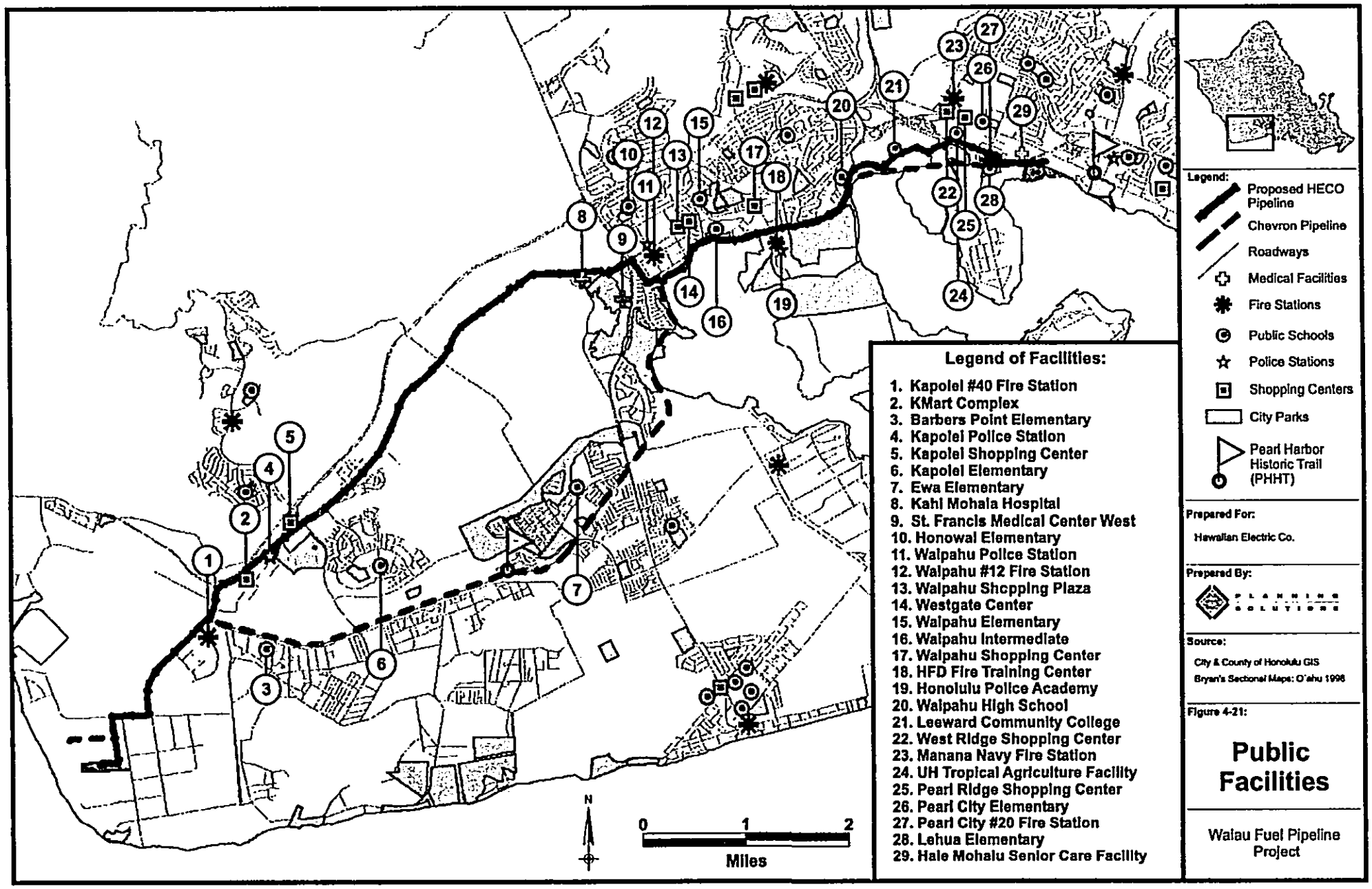

Legend of Facilities:
1. Kapolei #40 Fire Station
2. KMart Complex
3. Barbers Point Elementary
4. Kapolei Police Station
5. Kapolei Shopping Center
6. Kapolei Elementary
7. Ewa Elementary
8. Kahi Mohala Hospital
9. St. Francis Medical Center West
10. Honowai Elementary
11. Waipahu Police Station
12. Waipahu #12 Fire Station
13. Waipahu Shopping Plaza
14. Westgate Center
15. Waipahu Elementary
16. Waipahu Intermediate
17. Waipahu Shopping Center
18. HFD Fire Training Center
19. Honolulu Police Academy
20. Waipahu High School
21. Leeward Community College
22. West Ridge Shopping Center
23. Manana Navy Fire Station
24. UH Tropical Agriculture Facility
25. Pearl Ridge Shopping Center
26. Pearl City Elementary
27. Pearl City #20 Fire Station
28. Lehua Elementary
29. Hale Mohalu Senior Care Facility
N
0
1
2
Miles
Legend:
Proposed HECO Pipeline
Chevron Pipeline
Roadways
Medical Facilities
Fire Stations
Public Schools
Police Stations
Shopping Centers
City Parks
Pearl Harbor Historic Trail (PHHT)
Prepared For:
Hawaiian Electric Co.
Prepared By:
PLANNING SOLUTIONS
Source:
City & County of Honolulu GIS
Bryan's Sectional Maps: O'ahu 1998
Figure 4-21:
Public Facilities
Waiau Fuel Pipeline Project

Table 4-39 Potential Temporary Impacts to Public Facilities due to Proposed Waiau Fuel Pipeline Construction

Facility	Potential Impact Level	Explanation
Kapolei #40 Fire Station	No Impact	Construction only on opposite side of Kalaeloa Blvd.
Kmart Complex	Small Impact	Some trenching at Kamokila Blvd possible
Kapolei Police Station	Small Impact	Some trenching at Kamokila Blvd possible
Kapolei Shopping Center	Small Impact	HDD; 2 drill stations minimum
Kahi Mohala Hospital	No Impact	Opposite Side of Farrington Hwy
St. Francis Hospice	Small Impact	Impacts to back parking lot due to trenching
Honowai Elementary	No Impact	Farrington & Ft. Weaver crossings all drilled
Waipahu Police Station	No Impact	Farrington & Ft. Weaver crossings all drilled
Waipahu #12 Fire Station	No Impact	Farrington & Ft. Weaver crossings all drilled
PHHT	Minimal Impact	See discussion in Section 6.1.4
Waipahu Shopping Plaza	No Impact	Farrington & Ft. Weaver crossings all drilled
Westgate Center	No Impact	Farrington & Ft. Weaver crossings all drilled
Waipahu Elem. School	No Impact	Farrington & Ft. Weaver crossings all drilled
Waipahu Intermediate School	Minimal Impact	Construction noise ~400 ft. from classrooms
Waipahu Shopping Center	No Impact	Farrington & Ft. Weaver crossings all drilled
HFD Fire Training Center.	Small Impact	Assumes open cut trenching; none if drilled
Honolulu Police Academy	No Impact	Small effect if Waipahu Depot Rd. is open cut crossing
Waipahu High School	Minimal impact	Construction ~300 ft. from classrooms
Leeward Community College	Minimal Impact	Construction across back of campus property
West Ridge Shopping Center	No Impact	No crossings of access roads
Manana Navy Fire Station	No Impact	No crossings of access roads
Pearl Ridge Center	No Impact	No crossings of access roads
Pearl City Elem. School	No Impact	No crossings of access roads
U.H. Tropical Agric.Facility	Small Impact	Some noise & traffic delays within facility
Lehua Elementary School	Small Impact	Construction within ~200 ft. from classrooms and open-trench crossing of Lehua Rd.
Hale Mohalu Care Facility	No Impact	500-foot separation at closest point

Source: Compiled by Planning Solutions, Inc.

While the proponents have not yet developed detailed plans for the bicycle paths and railway line that are part of the Historic Trail concept, the discussions strongly suggest that pipelines (including those within the proposed route), bikeways, and the historic railway can continue to share the same right-of-way. HECO will continue to work together with all interested parties as the concepts for the PHHT are further developed. Minimal impacts to the PHHT, including some temporary closures or detours of the bikeway during trenching, would occur if it improvements are in place before the proposed Waiau Fuel Pipeline is constructed.

Inaccurate or incorrect documentation of the location of existing utilities can lead to accidental breakage of lines during pipeline construction. Because the proposed Waiau Fuel Pipeline would be in the SEC during most of its length, it is likely that most electrical, water, fuel and other lines that cross the corridor or run within it are relatively well documented. However, such documentation is rarely sufficiently accurate for design purposes and may not depict "As Built" conditions. In addition, vertical location information is almost never available. Because of this, HECO would use the following procedures to minimize and avoid accidental encounters with utility lines:

- Utility Records Search: This is the most basic level of information. It comes solely from existing utility records. It is a primary input to the project design, but is generally not accurate enough for the construction operations.
- On-Site Delineation: Immediately before beginning excavation, HECO's construction contractor would contact the relevant representatives of the utilities that might have lines present at the excavation site. The normal practice is for the utility representatives to mark the ground surface with paint immediately above the known (or estimated) line position. Surface expressions of the lines, such as manholes, valve boxes, posts, etc., are also used to improve the delineation. Additionally, the contractor would conduct controlled exploratory digging to verify and locate underground structures.
- Hand Excavation: When the trench is within a few feet of a delineated utility line, the rest of the excavation is done by hand until the utility line is exposed. Construction can then proceed after adjusting the new line route to avoid the existing line.

A number of other remote detection survey tools (e.g., electromagnetic, radar, and acoustic instruments) are available for use in areas where the existence of utilities is suspected but not documented and would be used if appropriate to complement the methods listed above. In addition, HECO contractors would maintain on the construction site the necessary materials and expertise to repair relatively small utility lines that may be severed during the construction process. The operators would also have at all times available on site the proper notification instructions to permit rapid notification to the appropriate utility when necessary.

4.14.1.3 Operation

Normal pipeline operations would have no adverse impacts on public infrastructure and services. The need for public agencies (e.g., police, fire, Coast Guard, etc.) to respond in the event of an accident is an exception to this general rule. However, because the fuel that would be transported through the line is already present in existing pipelines, the proposed Waiau Fuel Pipeline project would not increase this requirement. HECO is preparing a *Draft Oil Spill Contingency Plan* (HECO 2002) to provide direct and immediate response to such accidents that would help to minimize the burdens on public agencies in the event of a spill.

4.14.1.4 Decommissioning

The decommissioning and abandonment of the pipeline would have similar impacts to those of construction, and would include potential disruptions of access and potential for breakage of utility lines that are constructed after the pipeline.

4.14.2 ALTERNATIVE 2: CHEVRON PIPELINE

4.14.2.1 Pipeline Maintenance

Pipeline maintenance and replacement activities required for Alternative 2 have essentially the same potential for impacting public infrastructure and services as the construction of the Waiau Fuel Pipeline. The only significant exception to this is the fact that they would exist over a larger area, since the Chevron pipeline extends past Waiau to the Iwilei Tank Farm. These impacts include the potential to impair access to public facilities and to disrupt utilities by accidental breakage of utility of fuel lines within the area excavated. Also, the Chevron pipeline overlaps almost completely with the Pearl Harbor Historic Trail (PHHT); hence, its presence must also be taken into consideration in development of the Trail.

4.14.2.2 Operation

As with the proposed Waiau Fuel Pipeline, normal operation of the Chevron pipeline would have no adverse impacts on public infrastructure and services beyond the need for public agencies (e.g., police, fire, Coast Guard, etc.) to respond in the event of an accident.

4.14.2.3 Decommissioning

The decommissioning and abandonment of the Chevron pipeline would have similar impacts to those of construction and would include potential disruptions of access and potential for breakage of utility lines that are constructed after the pipeline.

4.14.3 ALTERNATIVE 3: TRUCKING

4.14.3.1 Facility Construction

Installation of the improvements needed for truck loading and unloading operations at the BPTF, Waiau Generating Station, and Iwilei Tank Farm would be completed within the existing bounds of these facilities. Transport of materials and workers to the sites would not disrupt access to any public facilities, and the construction would not involve unusual usage of power, water or other public infrastructure. Thus, these activities would not cause substantial impacts to these resources.

4.14.3.2 Operation

Normal operations would not impact public infrastructure and services, except for some additional traffic on the public roadways. These impacts are specifically considered in Section 4.10.5. Accidents at the loading and unloading facilities and on the roadways would not add substantial additional burdens to existing public emergency response services. HECO would develop an Oil Spill Contingency Plan for the transport operation and would augment the existing facility Spill Prevention Control and Countermeasure Plans Contingency plans to minimize the impact of such accidents on public agencies.

5.0 NO ACTION ALTERNATIVE

5.1 INTRODUCTION

Section 1.4 of this report sets the framework for the consideration of Alternatives. It distinguishes between three categories of alternatives: (i) "Action Alternatives Evaluated in Detail", (ii) "Action Alternatives Eliminated from Detailed Consideration", and (iii) "No Action". Alternatives in the first category form the basis for this report and are described in detail in Chapter 2. Alternatives in the second category are discussed in Section 1.4.3.2. This Chapter discusses the implications of "No Action."

"No Action" consists of failing to arrange for continued fuel delivery to Waiau beyond the end of the current contract between HECO and Chevron. This would result in the loss of a sizeable portion of Oahu's electrical generating capacity. It cannot be emphasized too strongly that this alternative would not meet the objectives of the proposed action (i.e., of supplying fuel to its generating stations). Instead, "No Action" is included only because it is needed to fulfill the requirements of Chapter 343.

If none of the Action Alternatives described in this report is implemented, HECO would be unable to continue delivering LSFO to its Waiau Generating Station for more than a few weeks after the December 31, 2004, when the existing contract with Chevron expires. This would prevent it from running all but two of the generating units that are located there. The two diesel-fuel-fired combustion turbines (Waiau Units 9 and 10) that HECO has at Waiau obtain fuel through another Chevron-owned pipeline. The other pipeline supplying diesel fuel would continue to be available, and this discussion assumes that it would remain in use.

In order to understand the implications of losing the generating capacity at Waiau, HECO:

- Quantified the extent to which the loss of this generating capacity at Waiau would reduce the generating capacity of its system.
- Estimated the extent to which the remaining shortfall in generating capacity could only be made up by load-shedding, i.e., the purposeful suspension of service to customers (blackouts).
- Assessed the implications that this would have for the reliability of electrical supply to its customers.

Note that both the proposed Waiau Fuel Pipeline project (HECO's Preferred Alternative) and Alternative 3 include using trucks, instead of the Chevron black oil line, to deliver fuel to the Iwilei Tank Farm, which serves the Honolulu Generating Station. Because it would be possible, albeit not ideal, to supply Iwilei (and, therefore, the Honolulu Generating Station) without making the small improvements described in this report, we have assumed that "No Action" would not affect operations at the Honolulu Generating Station. Were this not to be the case, the adverse effect on the Island's electrical supply would be even more serious than depicted here.

The remainder of this Chapter discusses these topics in more detail. Section 5.2 quantifies the reduction in generating capacity that would occur. Section 5.3 forecasts the amount of forced load reduction that HECO would still need to make after implementing all other measures, discusses the factors that control how this reduction would need to be made, and reviews some of the implications that the shortage of supply would have for the utility's ability to meet its customers needs.

5.2 EXTENT OF REDUCTION IN GENERATING CAPACITY

5.2.1 OVERVIEW OF EXISTING GENERATING CAPABILITIES

Table 5-1 lists the firm capacity of the generating units that are now available to HECO's system.[56] The table illustrates the effect that the loss of the LSFO-fired units at Waiau would have on the installed generating capacity available to its customers. It shows that the net loss represents a total of 379 MW. This is nearly a quarter of HECO's system total (see Figure 5-3).

Table 5-1. Capacity of Existing Generating Units.

Generating Station/ Fuel Type	Unit Minimum Rating (in MW)		Unit Normal Top Load Rating (in MW)		Unit Normal Top Load Rating as % of System
	Gross	Net	Gross	Net	
Waiau LSFO	*152.0*	*140.7*	*397.0*	*379.0*	*23.47*
Waiau Diesel	*10.0*	*9.8*	*102.0*	*101.8*	*6.31*
WAIAU	162.0	150.5	499.0	480.8	29.78
HONOLULU	48.0	44.8	103.0	~~107.3~~113.0	6.65
KAHE	238.0	219.7	651.0	620.5	38.43
OTHER SOURCES				406.0	25.15
SYSTEM GRAND TOTAL				***1,614.6***	***100.0***

Source: HECO

5.2.2 HECO CAPACITY PLANNING CRITERIA

HECO provides, and has an obligation to provide, electric service on the island of O'ahu under its franchise from the State of Hawai'i. Under its franchise and state statutory law, HECO's service is regulated by the Hawai'i Public Utilities Commission (PUC). The PUC's rules require that an electric utility's plant be installed, maintained, and operated in accordance with accepted good engineering practice in the electric industry to assure, as far as reasonably possible, continuity of service. Its charter requires it to "*...exercise reasonable diligence and care to furnish and deliver a continuous sufficient supply of electrical energy to the customer, and to avoid any interruption of delivery of same.*" In order to ensure that an electric utility can furnish and deliver sufficient electrical energy, the PUC's rules require that the generating capacity of the utility's plant, "*...supplemented by electric power available from other sources, must be sufficiently large to meet all reasonably expectable demands for service and provide a reasonable reserve for emergencies.*" Accordingly, the company has filed, and the PUC has accepted, a number of "generation capacity planning criteria". These capacity criteria, which are summarized in Table 5-2, recognize the fact that HECO is an isolated island utility without the interconnections to other electrical power sources that are available to most utility companies on the Mainland. They establish "reserve margins" and

[56] "Firm capacity" refers to generating capacity available on a scheduled basis, which the utility owns, or which is provided to the utility under a power purchase agreement.

"quick load pick up capacity" sufficient to keep the frequency and duration of outages resulting from a shortfall of generating capacity at very low levels. HECO's compliance with these capacity planning criteria is critical to meeting its obligation to provide electrical service and to ensure the reliable flow of electricity to its customers.

5.2.3 CURRENT ELECTRICAL POWER GENERATION AT WAIAU

O'ahu's electrical power generation system includes several different types of generating units. Each type has specific characteristics with respect to such things as:

- fuel efficiency (i.e., the number of kilowatt-hours produced for each unit of fuel input),
- the length of time it takes to start the unit and warm it up to the point where it can be brought on line,
- operating efficiency at different levels of output, and
- location in relationship to both electrical demand (i.e., where the users of the power are located) and to the transmission and distribution networks.

HECO dispatches (i.e., schedules the use of) these generating units in a way that is intended to best meet the needs of its customers with due regard for reliability and cost-effectiveness. Typically, it attempts to use the most economical units available. As a result, the amount of power that each unit produces over the course of a year is not in exact proportion to its percentage of the capacity (see Figure 5-3). Because the LSFO-fired units at Waiau make up the majority of the cycling units[57] on the island, they have historically been used to produce less of the electrical energy that HECO's customers use than the units nameplate capacity rating would indicate. On the other hand, they are particularly important during peak demand periods, when they provide nearly one-quarter of the total system capacity.

5.2.4 ABILITY TO SATISFY DEMAND WITHOUT WAIAU LSFO UNITS

Figure 5-1 compares the generation capacity that would be available without the Waiau LSFO-fired units with the capacity that HECO must have available in order to meet its customers' needs. The derivation of the "Load Service Capability Without Waiau LSFO Units Contribution to Supply" shown in that comparison was calculated by taking the sum of all firm capacity generating resources on O'ahu and subtracting out: (i) the capacity of the Waiau LSFO units, (ii) the capacity of other units that were out of service on maintenance during the period, and (iii) the capacity of the largest remaining unit (to account for an unanticipated outage of the most heavily loaded unit in accordance with Rule 1 as shown in the figure).

As Figure 5-1 shows, if the Waiau LSFO units had been unavailable the week of October 22-26, 2001, HECO would not have been able to meet its Load Service Capability criterion from roughly 7:00 in the morning through 10:00 at night. At 7:00 PM, the time of greatest electrical demand, the shortfall would have been over 160 MW, which represents approximately 40,000 residential customers. Between 2001 and 2005, the load is expected to increase approximately 10%; this would further exacerbate the Load Service Capability criterion violation that would occur if the Waiau LSFO units were unavailable.

[57] The term "cycling unit" is used to denote units that operate with rapid load changes and daily shutdowns and startups. The output of these units "follows the load" by increasing and decreasing in response to minute-to-minute changes in demand. These units are particularly important during peak demand periods, when the demand for electricity is at its highest.

Table 5-2. HECO Capacity Planning Criteria Rules

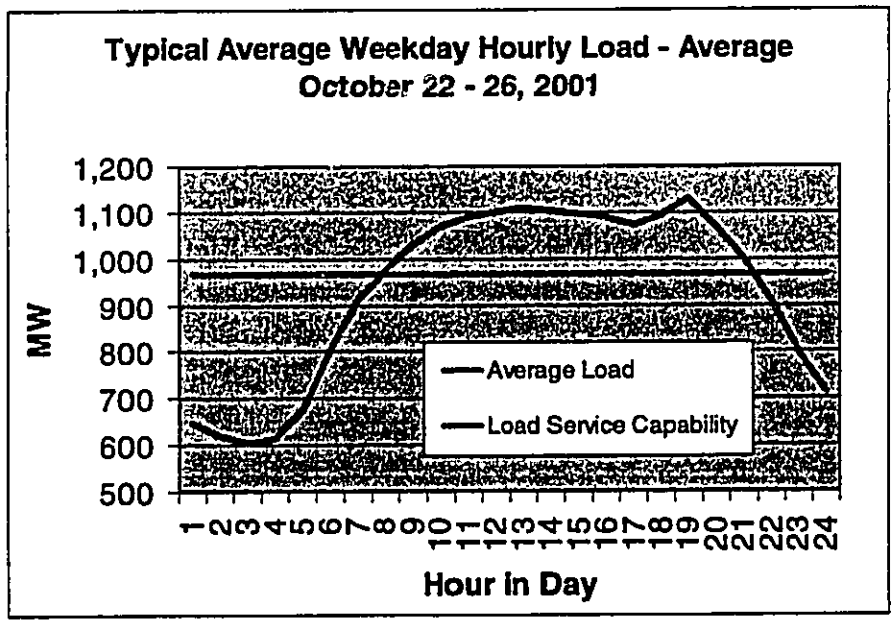
Capability Rule	Description
Rule 1 **Load Service Capability**	This criterion states that the utility must have sufficient reserve capacity to serve the peak load even in the event of the sudden loss of the largest unit in service with a unit or units on planned outage. More specifically, the total capability of the system plus the total amount of interruptible loads must at all times be equal to or greater than the sum of the following: a. the capacity needed to serve the estimated system peak load; b. the capacity of the unit scheduled for maintenance; and c. the capacity that would be lost by the forced outage of the largest unit in service.
Rule 2 **Quick Load Pickup**	The quick load pickup criterion is designed to reduce the likelihood of a service interruption in the event of a forced outage of a unit by providing for enough reserve capacity in operation to make up for the sudden outage of the largest-loaded unit. This criterion states that: There must be enough net generation running in economic dispatch so that the sum of the three-second quick load pickup power available from all running units, not including the most heavily loaded unit, plus the net loads of all other running units must equal or exceed 95 percent of the hourly system net load (which excludes power plant auxiliary loads but *includes T&D losses). This is based on a minimum allowable system* frequency of 58.5 Hz and assumes a 2 percent reduction in load for each 1 percent reduction in frequency.
Reliability Rule	HECO's capacity planning criteria also specify a predetermined reliability threshold. The rule states that capacity planning analysis should include a calculation of risk (probability of power outage) in years between days of outage. Development plans are usually designed to exceed a generating system reliability threshold of 4.5 years per day of outage, equivalent to a reliability of 99.94%.
Definitions: (1) "Interruptible loads" loads are loads that the utility is able to disconnect quickly without prior warning to the customer. (2) "Quick load pickup" is the reserve generation in operation (spinning) at all times to make up for the unexpected loss of the most heavily loaded unit. Quick load pickup is designed to ensure that the system frequency does not drop below 58.5 cycles/second for more than 3 seconds after the loss of the largest generating unit.	
Source: HECO	

Table 5-3. Energy Produced by Existing Generating Units: Year 2000.

Generating Station/ Fuel Type	Energy Produced in 2000	
	MW-Hours	Percent of Total
Waiau LSFO	*1,065,106*	*14.0*
Waiau Diesel	*3,878*	*0.1*
TOTAL WAIAU	1,137,908	14.1
OTHER SOURCES	6,451,501	85.9
SYSTEM GRAND TOTAL	**7,589,409**	**100.0**

Source: HECO

Figure 5-1. System Shortfall (by hour) without Waiau LSFO Units Contribution to Supply: October 2001.



In summary, the foregoing comparison shows how critical the LSFO-fired units at Waiau are to HECO's ability to continue serving its customers. They also show the magnitude of the gap between supply and demand that would occur if the company was unable to continue operating those units. The following section discusses the implications of the deficiency.

5.3 IMPLEMENTING FORCED LOAD REDUCTION

Based on all available information, HECO would not be able to satisfy its capacity planning criteria without the use of the LSFO-fired generating units at Waiau. When shortfalls in generating capacity occur they could only be made up by load-shedding, i.e., the purposeful suspension of service to customers (blackouts). Section 5.3.1 discusses the magnitude of the forecast electrical energy shortfall in 2005 during months of low and high demand. It also discusses the way in which the load

reduction would probably be accomplished. Section 5.3.2 assesses the implications that this would have for HECO's customers.

5.3.1 SPECIFIC ELECTRICAL ENERGY SHORTFALL

Figure 5-2 and Figure 5-3 show the system shortfall (by hour) in 2005 without the Waiau LSFO units' contribution to supply during periods of relatively low and relatively high demand. May and October were selected because they represent the months with the lowest and highest monthly peaks, respectively. The remaining 10 months of the year have peaks that fall between these values.

Figure 5-2. System Shortfall (by hour) without Waiau LSFO Units: May 2005.

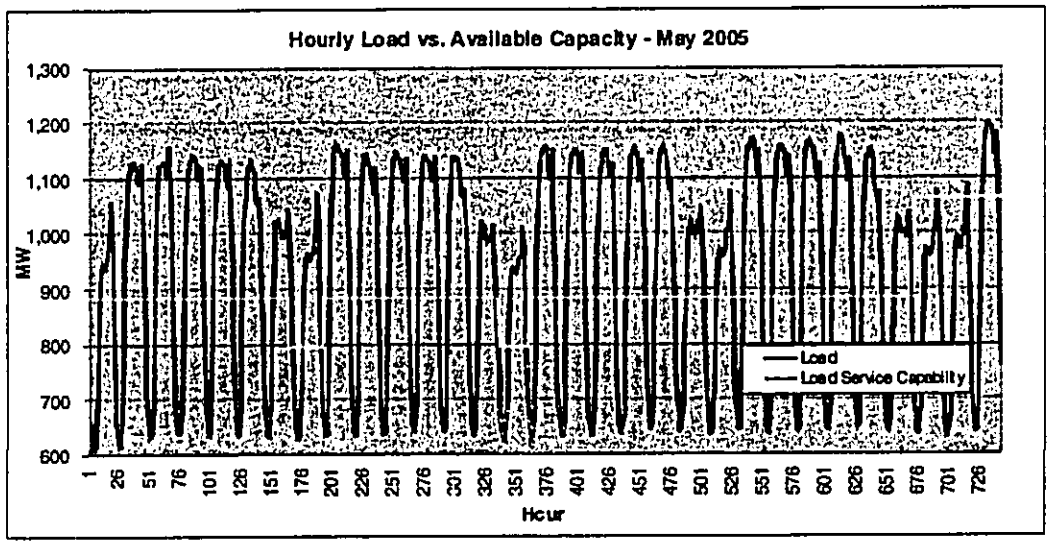
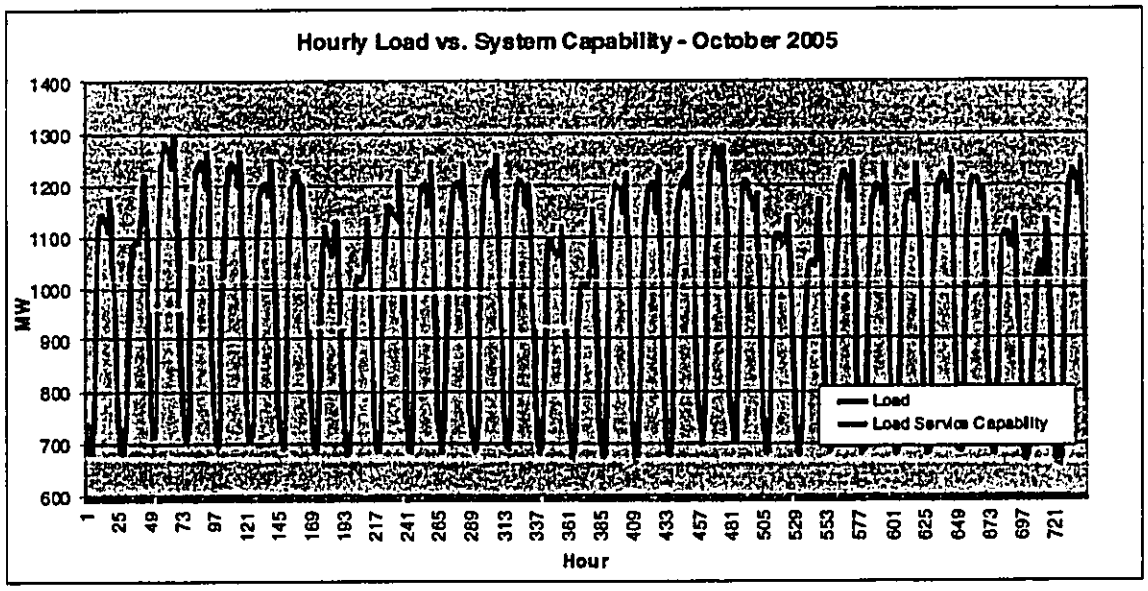


Figure 5-3. System Shortfall (by hour) without Waiau LSFO Units: October 2005.



Several points can be drawn from the graphs:

- First, there are some low-demand periods when the available capacity is expected to be sufficient to meet the entire demand. These include the nighttime hours of 9:00 PM to 7:00 AM when the

majority of people are asleep and air-conditioning, industrial equipment, and other loads are at their lowest levels.

- During the rest of the time (i.e., from about 7:00 AM each morning until about 9:00 PM each night) however, the available supply of electricity would be insufficient to meet the entire demand. In order to keep supply and demand in balance at all times, various users would have to be disconnected from the electrical grid whenever available supply is insufficient to meet demand. This would probably be done using rolling blackouts (i.e., sequentially disconnecting customers for periods of time ranging from a few minutes to an hour and then returning service to them while halting service to other areas).
- The period of greatest deficiency would occur between 5:00 PM and 9:00 PM. This period is the most critical because the air-conditioning loads on buildings are still substantial, street lighting is required, and residential loads (such as for water heating and cooking) are at their peak.
- During the evening peak in the high-demand period that is illustrated in these figures, it would probably be necessary to withdraw service to residential customers in order to keep the system running. The number of customers that would be affected is dependent upon the specific shortfall for that evening and is discussed below.
- The combination of violating the planning criteria and running the system at its capacity would greatly reduce HECO's ability to isolate its customers from the effects of unanticipated generating equipment failures. The resulting unplanned outages could adversely affect many customers; they have the potential to disrupt service throughout the entire grid.

Residential customers are likely to bear a disproportionately large share of the down-time. The primary reason is that suspension of service to densely populated areas (e.g., Waikiki, downtown Honolulu, and areas with concentrations of high-rise buildings) or to critical facilities (e.g., military bases and hospitals) carries with it a greater public safety risk and disruption than it does for other areas.

5.3.2 IMPLICATIONS OF INSUFFICIENT ELECTRICAL SUPPLY

Immediately following the unavailability of power from the LSFO-fired units at the Waiau Generating station, HECO would be forced to implement rolling blackouts in various areas throughout the island. Scheduling and planning of the blackouts would be coordinated with various federal, state and county agencies. Additionally, HECO would ask the public through various media for voluntary reductions in their electric consumption. The frequency, duration, and the number of customers affected by scheduled blackouts would depend upon the particular load profile and capacity shortages for each day.

Reliable Electric Supply to Critical Facilities. In addition to supplying a significant portion of the total amount of energy used by HECO's customers, the Waiau Generating Station plays a critical role in providing emergency backup electrical service to key public facilities. Presently, in the event of a system upset that causes load shedding, HECO's operating plan is to isolate the electric circuit serving certain key facilities from the remainder of the electrical grid and to furnish energy to this isolated circuit using the Waiau Generating Station. Without the ability to operate most of the units at Waiau, it would lose this ability. Instead, it would have to supply these key public facilities from the Kahe Generating Station over long runs of transmission lines. This would increase the risk of service interruption to these critical loads.

Economic Loss to the Community. Service interruptions of the magnitude that could occur in the "No Action" scenario are likely to be severe enough to result in substantial and debilitating disruptions in the O'ahu and the State of Hawai'i economies. A determination of the extent of the disruptions would require a macroeconomic analysis of the state economy that is far beyond the scope of this analysis.

6.0 CONSISTENCY WITH EXISTING POLICIES, CONTROLS, AND LAND USE PLANS

In accordance with the requirements of HAR §11-200-17 (h), this chapter discusses the relationship of the proposed action to land use plans, policies, and controls for the area that would be affected by the proposed Waiau Fuel Pipeline project. It identifies the extent to which the proposed action would conform or conflict with objectives and specific terms of approved or proposed land use plans, policies, and controls. The discussion is organized first by the jurisdiction (County, State, or Federal) and then by specific ordinance, regulation, or law.

6.1 CITY & COUNTY OF HONOLULU

6.1.1 O'AHU GENERAL PLAN

With regard to utilities in general, the *O'ahu General Plan* declares as a general objective (Section V, Objective C) *"To maintain a high level of service for all utilities."* Specifically with regard to energy production and usage, Section VI of the Plan (Objective A) calls for providers *"To maintain an adequate, dependable, and economical supply of energy for Oahu residents."* Objective B urges providers *"To conserve energy through the more efficient management of its use."*

The proposed Waiau pipeline project is consistent with these objectives. As stated in Section 1.4.2, HECO's primary purpose for the project is:

> *"To provide an assured means of continuing to supply fuel to its Waiau Generating Station over the long term while maintaining environmental quality and maintaining costs to its customers at a reasonable level."*

HECO must secure a means of continuing to provide fuel to its LSFO-fired electrical generating units at Waiau if it is to maintain a dependable supply of electricity to O'ahu's residents, businesses, and public institutions. Moreover, as discussed in Section 2.2.2.3, under HECO's preferred alternative the new pipe would be insulated, reducing the amount of heat that is lost from during the oil's transit from the BPTF to Waiau. This, in turn, reduces the temperature to which the LSFO must be heated, substantially reducing energy use.

6.1.2 'EWA DEVELOPMENT PLAN

The sections of the *'Ewa Development Plan* reproduced in italics below, are the most directly relevant to the proposed pipeline. Its consistency with the provisions of these sections is discussed separately after each.

§2.2.9 PRESERVATION AND ENHANCEMENT OF HISTORIC AND CULTURAL RESOURCES

Ewe's Historic and Cultural Resources will be preserved and enhanced by: Preserving significant historic features from the plantation era and earlier periods, including:

- *The Ewa Villages and other remnants of the plantation era,*
- *The OR&L right-of-way,*
- *Lanikuhonua, and*
- *Native Hawaiian cultural and archaeological sites.*

Discussion: The proposed pipeline does not require disturbing the OR&L ROW within the 'Ewa District. Neither is it near to Lanikuhonua (which is adjacent to the Ko 'Olina Resort) or to the 'Ewa Villages (which are well south of the proposed route, along the OR&L ROW). No potential activities or accidents related to the pipeline construction or operation would be expected to affect these historic and cultural resources. As discussed is ~~4.8~~Sections 3.8, Section 4.8.2, Section 4.8.3.2, and Section 4.8.3.2.1, there are no known archaeological sites in this area that could be potentially disturbed by

the construction of the pipeline, and the probability of subsurface remains being present is generally low throughout the 'Ewa Development Plan Area. Procedures are in place to deal with inadvertent finds if any subsurface remains are encountered.

§3.1.2 PLANNING PRINCIPLES

The general policies listed above provide the basis for the following planning principles:

Dual Use of Drainageways and Utility Corridors. *To create the regional open space network, drainageways and utility corridors should be viewed as opportunities to link major open spaces with pedestrian and bike paths along open corridors. To accommodate such uses, where possible, drainageways should be retained as natural or man-made vegetated channels rather than be replaced by concrete channels.*

Discussion: The proposed Waiau Fuel Pipeline would be installed underground within the existing SEC and other existing pipeline and utility corridors. All but one of the drainageway crossings would be completed using directional drilling techniques. The sole exception (Waiawa Stream) would be done using conventional trenching, but the work would be completed in less than three weeks. Once completed, the project would have no effect on open space values or interfere with bikeways or pedestrian paths. None of the crossings along the route would impede water flow or access to the drainageways when in place, nor would they involve any major construction of concrete channels.

§3.7.3.3 Guidelines [for Industrial Centers]

Based on the above planning principles, the following are guidelines for development of each of the industrial areas.

Barbers Point Industrial Area

Coastal Environment

- *There should be a minimum building setback of 60 feet and 150 feet where possible. A lateral public access easement should be provided along the entire shoreline from the Barbers Point Deep Draft Harbor to Barbers Point Naval Air Station.*
- *The major entry point to the shoreline easement should continue to be at the Barbers Point beach park and lighthouse area, but at least one additional minor access, similar to the one at Kenai Industrial Park, should be provided at the drainage channel next to Barbers Point Naval Air Station and other points where public parking on the street is available.*

Discussion: The BPTF is more than 1,200 feet from the shoreline at its closest point, and it would not be expanded for the proposed modifications (see Section 0). The project would not impact the public access to the shoreline.

Building Height and Mass

- *Building heights should generally not exceed 60 feet when they consist of large mass.*

Discussion: All of the modifications proposed for the BPTF are less than 60 feet high.

Landscape Treatment

- *The visibility of parking, storage, industrial equipment, and operations areas from the street should be minimized through the planting of a landscape screen, consisting of trees and hedges, along street frontages.*
- *Streets leading to the shoreline access points should receive special landscape treatment.*

Discussion: The proposed improvements are more than 900 feet from the nearest public roadway and almost completely obscured by intervening buildings and storage tanks. No impacts to streets with shoreline access would be included in the developments.

§4.1.4.2 Planned Rapid Transit Corridor

As shown on the Public Facilities Map in Appendix A, a rapid transit corridor is planned to connect the City of Kapolei with Waipahu and onward to the Primary Urban Center. The corridor could provide for both an Ewa shuttle service, which could travel back and forth on the transit corridor between Ko Olina, the City of Kapolei, the UH West Oahu campus and Waipahu, and a commuter service, which could provide peak-hour express bus service to and from the Primary Urban Center. In peak-hour commuting, the corridor could carry express bus service, or even higher-speed dedicated transit service.

By connecting to the Primary Urban Center via Waipahu, the corridor could provide for a future high-speed connection between the Kapolei campus of the University of Hawaii at West Oahu and Leeward Community College, Honolulu Community College, and the University of Hawaii at Manoa.

Discussion: Along Farrington Highway in Kapolei, where the proposed pipeline would be near the planned rapid transit corridor, the pipeline would be entirely within the existing State Energy Corridor, where two other pipelines are already installed. Any plans for development of the rapid transit corridor would have to accommodate these existing pipelines and the State Energy Corridor. Therefore, we anticipate no conflicts between the development of the rapid transit corridor and the proposed pipeline.

6.1.3 CENTRAL O'AHU SUSTAINABLE COMMUNITIES PLAN

The final review draft of the *Central Oahu Sustainable Communities Plan* (DPP 2001, page 2-2) describes the current vision for the region along West and Middle Lochs through which the proposed pipeline route passes:

> *"A **Shoreline Park and Preservation Area** developed along the entire shoreline in Pearl Harbor's West Loch and Middle Loch will restore the shoreline in Waipahu to public use, provide active and passive recreation facilities, and help create a pedestrian and bikeway system running from Rainbow Marina near Aloha Stadium to the Ko Olina Resort in 'Ewa."*

The *Central O'ahu Sustainable Communities Plan* also calls for the preservation of significant historic and pre-historic features, including the OR&L right-of-way and non-specified Native Hawaiian cultural and archaeological sites (p. 2-19). The Plan further recommends that the OR&L railroad line be restored between Waipahu to Ko 'Olina, with a terminus at the Waipahu Cultural Garden. The proposed pipeline route is within the OR&L right-of-way around West Loch and where the proposed pipeline route diverges from the SEC around the Pouhala Marsh (see Figure 2-2).

HECO has met with public interest groups such as the Friends of the Pearl Harbor Historic Trail (PHHT), elected officials, City planners, and the Hawaiian Railway Society to understand their plans for the areas around the shoreline of Pearl Harbor where the SEC shares land with other uses. While the proponents have not yet developed detailed plans for the bicycle paths and railway line that are part of the Historic Trail concept, results of discussions held to date strongly suggest that pipelines (including those such as the proposed Waiau Fuel Pipeline and other fuel pipelines that occupy the SEC), bikeways, and the historic railway can continue to share the same right-of-way. HECO will continue to work together with all interested parties as the concepts for the uses of these areas are further developed to avoid and/or mitigate potential conflicts.

6.1.4 PEARL HARBOR HISTORIC TRAIL MASTER PLAN

The proposed pipeline route coincides with the planned route for the Pearl Harbor Historic Trail along the shoreline of West Loch, across the base of the Waipi'o Peninsula, and near the Waiau Generating Station (see Figure 4-21). HECO has met with the Friends of the PHHT, elected officials, City planners, and the Hawaiian Railway Society to understand their concerns and learn about their plans for the Pearl Harbor Historic Trail development. While the proponents have not yet developed detailed plans for the bicycle paths and railway line that are part of the Pearl Harbor Historic Trail concept, the results of the discussions that HECO has had to-date strongly suggest that pipelines (including those within the SEC), bikeways, and the historic railway can continue to share the same right-of-way. HECO will continue to work together with all interested parties as the concepts for the PHHT are further developed.

6.1.5 CITY AND COUNTY OF HONOLULU LAND USE ORDINANCE (LUO)

The purpose of the LUO is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies. It does this by establishing zoning districts and specifying the kinds of development and development standards that must be adhered to within each zoning district. The following subsections discuss the proposed Waiau Fuel Pipeline project's consistency with applicable provisions of the LUO.

6.1.5.1 Improvements on the BPTF, Waiau Generating Station, and Iwilei Tank Farm Sites

The BPTF and the Waiau Generating Station are located the I-2, or General Industrial Zoning District. The Iwilei Tank Farm is located in the I-3, Waterfront Industrial District. Fuel storage and handling is an approved use in both Districts, and the proposed facilities are all consistent with the applicable height limitations, setback requirements, and other design standards of these zoning districts (LUO §21-3.130).

6.1.5.2 Proposed Waiau Fuel Pipeline Route

Except for the initial pipeline section within the Campbell Industrial Park and the short section proposed in the OR&L right-of-way to avoid Pouhala Marsh, the entire pipeline route is within the State Energy Corridor. That corridor was established for the specific purpose of containing fuel pipelines and already hosts two other pipelines. Figure 3-6 depicts the general zoning designations in the areas that would contain the proposed Waiau Fuel Pipeline developments. As shown in the figure, the proposed pipeline route passes through agricultural, industrial, business, and residential zoning districts. However, through virtually all of its extent, it is located within or adjacent to existing road and other utility rights-of-way and would not alter existing uses of these lands. Installation of the pipeline would involve short-term disruptions of traffic in a few areas, but it would have no long-term effect on the use of adjoining areas. Because the proposed Waiau Fuel Pipeline is within a long-established fuel pipeline easement that already contains two existing pipelines, adjoining development has taken place in a way that is compatible with this continuing use. The proposed action would not impair these ongoing uses.

6.1.6 SPECIAL MANAGEMENT AREA REVIEW

The entire BPTF, all of the Iwilei Tank Farm, and over three-quarters of the proposed Waiau Fuel Pipeline route lie outside the Special Management Area (SMA). Consequently, they do not require permitting under City & County of Honolulu the SMA Review Guidelines found in the *Revised Ordinances of Honolulu 1990* (ROH), Chapter 25 (Shoreline Management). With one exception, all of the facilities that are located within the SMA (including the pipeline itself, the associated metering and inspection tool handling equipment to be installed at the Waiau Generating Station, and all of the in-line valves) would be buried or less than four feet above grade. The City Department of Planning

and Permitting has determined[58] that, consistent with Section 25-1.3(2)(M) of the ROH, these facilities would not require Special Management Area Permits (SMPs).

The only component of the project that would require an SMP is the modification to the existing pipeline overpass into the main part of the Waiau Generating Station (described above in Section 2.1.6). The following subsections discuss the overpass's consistency with the SMA Review Guidelines found in the *Revised Ordinances of Honolulu 1990* (ROH), Chapter 25 (Shoreline Management). Each subsection addresses one of the guidelines listed in this ordinance. For convenience, the guidelines are reproduced in italics.

6.1.6.1 Impacts on Public Access

All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:

§25-3.2a(1) Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas and natural reserves is provided to the extent consistent with sound conservation principles;

Discussion: The modified overpass would not affect the shoreline and would not impair public access. Passage of pedestrians and bicycles along the existing bikeway would not be impaired (see Figure 2-11). HECO has purposely designed the pipeline crossing to take advantage of an existing structure so that it would not increase the number of crossings of the existing bikeway.

6.1.6.2 Impacts on Recreation Areas and Wildlife Reserves

All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:

§25-3.2a(2): Adequate and properly located public recreation areas and wildlife preserves are reserved;

Discussion: With the possible exception of a few days during construction, adding a second pipeline to the existing pipeline overpass would not compromise or impair use of the bikeway or access to any public recreation areas. The fuel that would be delivered through the proposed Waiau Fuel Pipeline is presently being pumped through the adjacent Chevron pipeline. It would not affect government's ability to reserve adequate and property located public recreation areas and wildlife preserves.

6.1.6.3 Impacts on Solid and Liquid Waste Treatment Facilities

All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:

§25-3.2a(3): Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources;...

Construction of the proposed overpass would not result in the generation of significant quantities of solid or liquid waste. Any packing or shipping material that is used in the transport of the proposed facilities would be disposed of properly. The overpass would have no impact on these resources.

6.1.6.4 Impacts on Land Forms, Vegetation, and Water Resources

All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:

§25-3.2a(4) Alterations to existing land forms and vegetation; except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational

[58] This determination is documented in two letters from the DPP Director, Randall Fujiki, to the project consultant Perry J. White, on November 20, 2000 and July 9, 2001 (DPP reference for both letters: 2000/CLOG-5475[ask]).

amenities and minimum danger of floods, landslides, erosion, siltation or failure in the event of earthquake.

Discussion: The modified overpass would not affect landforms or vegetation.

6.1.6.5 Cumulative Impacts and Impacts on Planning Options

No development shall be approved unless the council has first found that:

§25-3.2b(1) The development will not have any substantial, adverse environmental or ecological effect except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health and safety, or compelling public interest. Such adverse effect shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect and the elimination of planning options;

Discussion: The proposed overpass would replace an existing pipeline crossing that is located a few hundred feet further to the east. Because it would be hung on an existing structure, it would not physically or visually intrude on other uses. Neither would it increase the amount of fuel that is pumped by pipeline into the Waiau Generating Station.

6.1.6.6 Consistency With CZMP Objectives and Policies and With the State SMA Guidelines

No development shall be approved unless the council has first found that:

§25-3.2b (2)The development is consistent with the objectives and policies set forth in Section 25-3.1 and area guidelines contained in HRS Section 205A-26;

Discussion: As discussed below in Section 6.2.5, the modified overpass construction is consistent with the Coastal Zone Management Program Objectives. The City and County of Honolulu SMA Review Guidelines, discussed in this Section, are based upon and consistent with the State of Hawai'i SMA Guidelines.

6.1.6.7 Consistency with County General Plan, Development Plans, and Zoning

No development shall be approved unless the council has first found that:

§25-3.2b(3) The development is consistent with the county general plan, development plans and zoning. Such a finding of consistency does not preclude concurrent processing where a development plan amendment or zone change may also be required.

Discussion: Sections 6.1.1 - 6.1.5 document the consistency of the entire project with the appropriate County plans and zoning requirements. As a small component of the project, the overpass would also be consistent with these plans and requirements.

6.1.6.8 Impacts on Bays, Salt Marshes, River Mouths, Sloughs, or Lagoons

The council shall seek to minimize, where reasonable:

§25-3.2c(1) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;

Discussion: Construction and operation of the overpass would not include any dredging, filling or other modifications to these natural resources.

6.1.6.9 Impacts on Beaches and Public Recreation

The council shall seek to minimize, where reasonable:

§25-3.2c(2) Any development which would reduce the size of any beach or other area usable for public recreation;

Discussion: The proposed modification of the overpass would have no impact on any beach or other area within the SMA that is usable for public recreation.

6.1.6.10 Impacts on Other Coastal Resources Within the Special Management Area

The council shall seek to minimize, where reasonable:

§25-3.2c(3) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management area and the mean high tide line where there is no beach;

Discussion: The proposed modification to the overpass would not restrict access to any coastal resource in the area.

6.1.6.11 Impacts on Lines of Sight Toward the Sea

The council shall seek to minimize, where reasonable:

§25-3.2c(4) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast;...

Discussion: As shown in Figure 2-11, the proposed modification to the overpass would not lead to substantial modifications to the existing lines of sight toward the sea, since it would consist only of adding an additional pipe on an existing structure.

6.1.6.12 Impacts on Water Quality, Open Water, Fisheries, Fishing Grounds, Wildlife Habitats & Agricultural Land Use

The council shall seek to minimize, where reasonable:

§25-3.2c(5) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

Discussion: Construction and operation of the fuel pipeline overpass would not affect these resources.

6.2 STATE OF HAWAI'I

6.2.1 HAWAI'I STATE PLAN

The *Hawaii State Plan* is intended to guide the long-range development of the State of Hawai'i by:

- Identifying goals, objectives, and policies for the State and its residents;
- Establishing a basis for determining priorities and allocating resources; and
- Providing a unifying vision to enable coordination between the various counties' plans, programs, policies, projects and regulatory activities to assist them in developing their county plans, programs, and projects and the State's long-range development objectives.

The *Hawai'i State Plan* is a policy document. It depends upon implementing laws and regulations to achieve its goals. The sections of the *State Plan* that are most relevant to the Waiau Fuel Pipeline project are Sections 226-18(a) and (b), which establish objectives and policies for energy facility systems. These sections are reproduced in italics below, and the proposed action's consistency with them is discussed.

§226-18 (a) *Planning for the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:*

(1) *Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;*

Discussion: The objective of the proposed action, which is to provide an assured means of continuing to supply fuel to the Waiau Generating Station while maintaining environmental quality and

maintaining costs to HECO customers at a reasonable level is consistent with this provision of the State Plan. Because of its insulation, the proposed Waiau Fuel Pipeline would reduce the amount of energy needed to transport LSFO to the Waiau Generating Station. As a result, the proposed action would increase the net energy efficiency of O'ahu's electrical energy system relative to continuation of the existing fuel supply system (Alternative 2). Fuel delivery via the proposed pipeline also consumes less energy than if it were trucked (Alternative 3).

(2) *Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased;*

Discussion: HECO's proposed Waiau Fuel Pipeline project would not alter the ratio of indigenous to imported energy use.

(3) *Greater energy security in the face of threats to Hawaii's energy supplies and systems; and*

Discussion: The proposed new pipeline is entirely buried except where it is on HECO property. Because of this, it would increase the security of Oahu's electrical energy system.

(4) *Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use.*

Discussion: Because the new pipeline would be more energy-efficient than the existing fuel delivery system or the trucking alternative, it would help in a small way to reduce the overall production of greenhouse gas emissions required for electrical energy generation in the State. The proposed project would not impede the development of renewable, indigenous energy sources that are not based on fossil fuels. The Waiau Fuel Pipeline project would allow HECO to transport fuel more efficiently, with lower environmental risk, and at a lower cost, to existing generating units at the Waiau Generating Station. HECO's forecasts indicate a need to run the generating units at the Waiau Generating Station for the foreseeable future and must continue to provide fuel to it after the existing Facilities and Operating contract with Chevron expires at the end of 2004. The proposed pipeline is HECO's preferred alternative for supplying fuel to Waiau. It would not affect HECO's ongoing efforts to achieve the renewable energy portfolio standard goals established in HRS §269-92.

From an operational perspective, continued operation of the Waiau Generating Station would help to accommodate additional renewable energy that is not dependent upon fossil fuels. This is because, on the HECO system, the units at Waiau make up the majority of the cycling units on O'ahu. Compared to base-loaded units, the Waiau cycling units start up and shut down daily, and they are used to respond to frequent changes in load demand. Since most renewable energy resources provide "as-available" energy, the availability of cycling units on the system is desirable to operationally accommodate renewable energy.

§226-18 (b) *To achieve the energy objectives, it shall be the policy of this State to ensure the provision of adequate, reasonably priced, and dependable energy services to accommodate demand.*

Discussion: The new pipeline would enhance the dependability of the fuel supply for the Waiau Station and would be less costly than the other alternatives that are being considered.

6.2.2 STATE MODEL ENERGY CODE

The Department of Business, Economic Development, and Tourism maintains the State's Model Energy Code, *Energy Efficient Standard for Buildings*. The code's goal is to reduce Hawaii's consumption of oil, reduce the amount of fossil fuel being utilized and ultimately bring about significant savings in utility costs throughout the State. The code is intended for residential and commercial structures; it does cover industrial processes. HECO intends to adhere to the precepts of the model code to the extent practicable.

6.2.3 CHAPTER 205, HAWAI'I REVISED STATUTES - LAND USE LAW

Chapter 205, Hawai'i Revised Statutes (HRS), establishes the State Land Use Commission (SLUC) and gives this body the authority to designate all lands in the State as Urban, Rural, Agricultural, or Conservation District lands. The Counties make all land use decisions within the Urban Districts in accordance with their respective County general plans, development plans, and zoning ordinances. The Counties also regulate land use in the State Rural and Agricultural Districts, but within the limits allowed by Chapter 205.

The existing State Land Use District boundaries along the proposed Waiau Fuel Pipeline route are shown in Figure 3-5. As indicated in this figure, the proposed route is located only in Urban and Agriculture District. Pipelines are permitted uses in these districts. If HECO is unable to obtain an easement that allows it to use the former OR&L right-of-way to bypass Pouhala Marsh, the pipeline would need to be constructed in a portion of the SEC that passes through the State Conservation District. In that event, a Conservation District Use Permit would be needed.

The BPTF, the Waiau Generating Station, and the Iwilei Tank Farm are all in the State Urban District. The consistency of the proposed modification in these areas with applicable land use controls is discussed in Section 6.1.5.

Pipelines are permitted uses within the State Agricultural District. The portions of the proposed Waiau Fuel Pipeline that would be constructed through agricultural fields would be buried below soil depths required for most agricultural uses. Moreover, they would be located within a corridor that already contains existing fuel lines. The addition of a third pipeline to the two that are already within the SEC would reduce the fields' usability for agricultural purposes.

6.2.4 STATE ENERGY CORRIDOR (SEC)

The State Department of Transportation is authorized (HRS§277-2) to maintain, operate, manage and control energy corridors throughout the State for the purpose of maximizing the utilization of lands available for use in connection with transporting oil by pipeline; provided that the utilization of such energy corridors shall be permissive and not mandatory. HECO is currently negotiating with the Department of Transportation, Harbors Division to acquire a lease for the construction and operation of the proposed pipeline within the SEC.

6.2.5 COASTAL ZONE MANAGEMENT PROGRAM

The objectives of the Hawai'i Coastal Zone Management (CZM) Program are set forth in Chapter 205A, Hawaii Revised Statutes. The program is intended to promote the protection and maintenance of valuable coastal resources. All lands in Hawai'i are classified as valuable coastal resources. The State Office of Planning administers Hawai'i's CZM program. Because HECO must obtain an individual Department of the Army permit for construction of several of the drainageway crossings along the pipeline route, a CZM Consistency certification is required for the project. A general discussion of the project's consistency with the objectives and policies of Hawai'i's CZM Program follows.

6.2.5.1 Recreational Resources

Objective: *Provide coastal recreational opportunities accessible to the public.*

Policies:

1. *Improve coordination and funding of coastal recreational planning and management; and*
2. *Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:*
    a. *Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*
    b. *Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;*
    c. *Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*
    d. *Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*
    e. *Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;*
    f. *Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;*
    g. *Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and*
    h. *Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of section 46-6.*

Discussion: Generally, the proposed project would have no effects on coastal recreational resources. However, as discussed in Section 4.12.2, construction activity would cause some localized disruptions of portions of the Pearl Harbor Historic Trail and its associated bikeway. Sections of the bikeway would have to be trenched to install the pipe sections and temporarily closed to public access. These impacts would be short-term and localized and HECO would restore all disturbed portions of the bikeway to their original condition.

6.2.5.2 Historic Resources

Objective: *Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.*

Policies:

1. *Identify and analyze significant archaeological resources;*
2. *Maximize information retention through preservation of remains and artifacts or salvage operations; and*
3. *Support state goals for protection, restoration, interpretation, and display of historic resources.*

Discussion: The proposed Waiau Pipeline and associated facilities would be located predominately in areas that have already been extensively disturbed by the installation of other pipelines and industrial facilities. Section 4.8 describes the known locations of historic and prehistoric resources in the region and the proposed plan for monitoring construction activities in specific areas that have might contain presently unknown resources; it also discusses the steps that HECO would take to preserve any resources discovered during construction. Because of the generally disturbed nature of the project area and the monitoring and preservation measures that would be implemented, the project would be consistent with this objective.

6.2.5.3 Scenic and Open Space Resources

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

Policies:

1. *Identify valued scenic resources in the coastal zone management area;*
2. *Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;*
3. *Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and*
4. *Encourage those developments that are not coastal dependent to locate in inland areas.*

Discussion: In general, coastal open space and scenic resources would not be affected by the proposed pipeline. The pipeline itself would be buried in almost all locations on the route, and the associated facilities at the BPTF, Waiau Generating Station, and Iwilei Tank Farm would include only modest additions to existing industrial facilities.

6.2.5.4 Coastal Ecosystems

Objective: *Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.*

Policies:

1. *Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;*
2. *Improve the technical basis for natural resource management;*
3. *Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;*
4. *Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and*
5. *Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.*

Discussion: Sections 4.4, 4.6, and 4.7 discuss the predicted impacts of the proposed project on coastal ecosystems. In general, construction activities would lead to minor and localized impacts, while normal operations of the system would have no impacts. The design and operational procedures that are incorporated in HECO's plans for the proposed pipeline make an oil spill highly unlikely. They cannot completely eliminate it as a possibility. If one should occur, there is the

potential for substantial localized adverse effects. Oil spills, caused by unauthorized disruptions of the system, have the potential for substantial impacts to localized areas.

HECO would use best management practices to eliminate potential impacts from construction, and the basic design of the pipeline system has included the best available design features to minimize the probability of a spill and the size of potential spill volumes. In addition, a *Draft Oil Spill Contingency Plan* (HECO 2002) is being drafted and would be implemented to provide rapid response and remediation measures should a spill occur despite these measures.

6.2.5.5 Economic Uses

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

Policies:

1. *Concentrate coastal dependent development in appropriate areas;*
2. *Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and*
3. *Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:*
    a. *Use of presently designated locations is not feasible;*
    b. *Adverse environmental effects are minimized; and*
    c. *The development is important to the State's economy.*

Discussion: The proposed Waiau Pipeline would not lead to any changes in the concentration or location of coastal developments. The pipeline itself would be constructed mostly within the existing SEC next to currently operational pipeline systems, and the supporting facilities at the BPTF, Waiau Generating Station, and the Iwilei Tank Farm would not substantially change the character or normal uses of those facilities.

6.2.5.6 Coastal Hazards

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

Policies:

1. *Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;*
2. *Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;*
3. *Ensure that developments comply with requirements of the Federal Flood Insurance Program; and*
4. *Prevent coastal flooding from inland projects.*

Discussion: Generally, the proposed project would lead to somewhat reduced coastal hazards and would thus be consistent with this objective. None of the facility modifications planned for the project would be in Special Flood Hazard Areas (SFHAs), and all sections of the pipeline that traverse through SFHAs, including all the stream crossings, would be buried (see Figure 4-19).

6.2.5.7 Managing Development

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

Policies:

1. *Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;*
2. *Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and*
3. *Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.*

Discussion: HECO has initiated and continues to work on close cooperation with all government agencies with oversight responsibilities to facilitate efficient processing of permits and informed decision-making by the responsible parties.

6.2.5.8 Public Participation

Objective: *Stimulate public awareness, education, and participation in coastal management.*

Policies:

1. *Promote public involvement in coastal zone management processes;*
2. *Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and*
3. *Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.*

Discussion: HECO has included an extensive public outreach program as part of this proposed development. As discussed in Section 9.0 HECO drafted an extensive and detailed project description that was distributed publicly in the Preparation Notice for this EIS. HECO will continue these activities the project design becomes better defined to facilitate public inputs into the development process and the efficient processing of all permits.

6.2.5.9 Beach Protection

Objective: *Protect beaches for public use and recreation.*

Policies:

1. *Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;*
2. *Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and*
3. *Minimize the construction of public erosion-protection structures seaward of the shoreline.*

Discussion: The project poses no risks to beaches. No structures are planned seaward of the shoreline, and no interactions with littoral processes would be included.

6.2.5.10 Marine Resources

Objective: *Promote the protection, use, and development of marine and coastal resources to assure their sustainability.*

Policies:

1. *Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;*
2. *Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;*
3. *Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;*
4. *Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and*
5. *Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.*

Discussion: HECO would use best management practices to minimize potential impacts from construction, and the basic design of the pipeline system has included the best available design features to minimize the probability of a spill and the size of potential spill volumes. In addition, a *Draft Oil Spill Contingency Plan* (HECO 2002) is being drafted and would be implemented to provide rapid response and remediation measures should a spill occur despite these measures. These measures represent the application of the best available techniques for the protection and preservation of marine and coastal resources, consistent with this CZM objective.

6.3 FEDERAL

6.3.1 OIL POLLUTION ACT OF 1990 (OPA)

The Oil Pollution Act of 1990, together with the Oil Pollution Liability and Compensation Act of 1989, builds upon Section 311 of the Clean Water Act (CWA) to create a single Federal law providing cleanup authority, penalties, and liability for oil pollution. OPA establishes a liability regime for oil spills which injure or are likely to injure natural resources and/or the services that those resources provide to the ecosystem or humans. Its implementing regulations also provide specified procedures and guidelines for the prediction of oil spill volumes and dispersal (e.g. 40 CFR Part 112, Appendix C). HECO applies the appropriate procedures and guidelines, consistent with this law and its implementing regulations, in all oil spill prediction, response, and remediation efforts. The measures adopted by HECO to prevent oil spills are documented in this report (see, for example, Sections 2.1.2, 2.1.3, and 2.1.4). The measures adopted for oil spill response and remediation are being prepared in HECO's *Draft Oil Spill Contingency Plan* (HECO 2002).

Other important Federal requirements are contained in 40 CFR Parts 109, 110, 112, 113, and 114, which pertain to the need for "Oil Spill Prevention Control & Countermeasures (SPCC) Plans" and which implement in part the Oil Pollution Act (OPA) of 1990. HECO has in place active and regularly updated SPCC plans for the BPTF, Waiau Generating Station, and the Iwilei Tank farm. These plans would be modified appropriately to accommodate the changes required to support the planned Waiau Fuel Pipeline.

6.3.2 HAZARDOUS LIQUID PIPELINE SAFETY ACT OF 1979 (49 U.S.C. 2004)

Under this law, fuel oil pipelines also are under the jurisdiction of the U.S. Department of Transportation (US DOT) and must follow the regulations in 49 CFR Part 195, "Transportation of

Hazardous Liquids by Pipeline." These rules cover general requirements, accident reporting, design requirements, construction, hydrostatic testing, and operation and maintenance. HECO has consistently applied the appropriate procedures and guidelines provided in these regulations in all design efforts for the proposed pipeline system.

6.3.3 CLEAN WATER ACT (CWA)

The CWA (Federal Water Pollution Control Act, 33 USC 1251, et seq.) is the principal law governing pollution control and water quality of the nation's waterways. Section 404 of the law authorizes a permit program for the disposal of dredged or fill material into navigable waters. The U.S. Army Corps of Engineers (Corps) administers the program.

Under Section 401 of the CWA, projects that involve discharge or fill to wetlands or navigable waters must obtain certification of compliance with state water quality standards. The Hawaii Department of Health implements the Section 401 certification program. HECO will apply to the State Department of Health for Water Quality Certifications for all applicable components of the proposed pipeline project.

7.0 OTHER CHAPTER 343 TOPICS

Hawaii Administrative Rules §11-200-17 establishes the content requirements for draft environmental impact statements. Most of these topics have been dealt with in the preceding sections of this report. This chapter addresses the few that do not fit neatly into any of the previously defined categories.

7.1 SECONDARY AND CUMULATIVE IMPACTS

The proposed Waiau Fuel Pipeline project is designed to provide a stable, long-term means of supplying the Waiau Generating Station with fuel. It does not affect the capacity of the Station to supply electricity to its customers. The project is not directly related to other possible actions by HECO except as discussed in this report. As is presently the case, HECO would continue to purchase fuel, certain maintenance services, and other items from independent suppliers. No changes in the amounts or types of fuel would be anticipated, so the project is not likely to lead to any substantial changes in the existing supply system.

The construction and operation of the pipeline do not involve the extension of electrical power service into new areas. Neither do they involve the provision of services not previously available to HECO's customers. The proposed action is not expected to substantially affect the Island or region's population.

The proposed Waiau Fuel Pipeline route and associated facilities are located on land that is presently designated for fuel pipelines and/or industrial use. Moreover, the corridor in which it is located is already used for other fuel pipelines. Thus, no indirect changes in land use or value in these areas or nearby areas would be expected.

7.2 SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY

As discussed in Chapter 1 of this report, HECO believes that there are substantial advantages to the construction of a new pipeline to supply fuel for the Waiau Generating Station. It has chosen this approach over a continuation of the existing situation because it believes that construction of a new pipeline lead to lower long-term costs to HECO customers and higher system reliability.

HECO's plans for the proposed facilities do not foreclose any options. Continued operation of the Waiau Generating Station will have no bearing on HECO's efforts to pursue meeting future energy needs with additional generation utilizing new technologies, including renewable energy and other developing technologies.

7.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

The construction of the proposed pipeline does not commit HECO to the continued use of fossil fuels for power generation. It does require the consumption of non-renewable resource (in this case petroleum and building materials) and the emission of air pollutants during construction.

The technology to be used is proven to be highly reliable. The probability of an oil spill or other accident would lower if the new pipeline is constructed than if it is not. However, some risk will remain. HECO is designing its pipeline and associated facilities to meet the most stringent applicable construction and operating codes. There is little risk of earthquake at the sites, and the facilities with surface structures are outside flood hazard areas. Concerns related to fuel spills and leaks, the release of dangerous air pollutants, and other hazards are discussed in Chapter 4.

7.4 UNRESOLVED ISSUES

At present, only one item is known to remain unresolved, relating to the Pouhala Marsh. As discussed throughout this document, the State Energy Corridor (SEC) runs through Pouhala Marsh.

HECO's consultation with the State of Hawai'i Department of Land and Natural Resources, U.S. Fish and Wildlife Service, and others indicated that, the presence of two existing fuel lines notwithstanding, these resource management agencies would prefer an alternate route if it were available. As a result, HECO has formally asked the State Department of Transportation for an easement within the former OR&L right-of-way so that it could bypass the portion of the SEC that is within the marsh. If the Department of Transportation grants the request, no further action on this topic will be required. If, on the other hand, the request is not granted, HECO will need to obtain a Conservation District Use Permit from the State Department of Land and Natural Resources and must complete consultation with both the U.S. Fish & Wildlife Service and the State Department of Land and Natural Resources concerning potential effects on the endangered waterbirds that use the marsh. HECO expects that such consultation could lead to the incorporation of specific design or construction measures for the portion if pipeline that would pass through the marsh.

7.5 RATIONALE FOR PROCEEDING

Chapter 4 describes the environmental effects that could result from construction and operation of the proposed pipeline. HECO is committed to avoiding or mitigating adverse effects to the greatest extent practical within the limits of its other responsibilities. As O'ahu's chartered public utility, the company is obligated to meet the electrical power needs of the Island's residents and businesses. HECO does not believe that there are alternatives, including those considered in this report, which would achieve the same goals with fewer environmental effects.

7.6 PERSONS PREPARING THE ENVIRONMENTAL IMPACT STATEMENT

Table 7-1 lists the persons, firms, and organizations who helped prepare the Draft EIS.

Table 7- 1. List of Persons Preparing the Environmental Impact Statement.

Name of Person	*Organization*	*Qualifications*	*Responsibility*
Perry J. White	Planning Solutions, Inc.	MA Regional Planning	EIS Project Manager & Principal Author
Charles L. Morgan	Planning Solutions, Inc.	PhD. Limnology & Oceanography	Environmental Planner & Author
Makena White	Planning Solutions, Inc.	2 years experience	GIS and Graphics
Ken Fong	Hawaiian Electric	BS Engineering	HECO Project Manager
Bill Decker	Rooney Engineering, Inc.	BS Engineering	Pipeline Design
Thomas Nance	Tom Nance Water Resource Engineering	MS Engineering	Hydrology
John Ford	GeoInsight, International, Inc.	PhD Zoology	Aquatic Biology
Richard Brock	University of Hawai'i	PhD Oceanography	Marine Biology
Winona Char	Winona Char & Associates	BA Botany, MS Botanical Sciences	Botany
Reginald David	Pacific Biological Survey	19 years experience	Wildlife Biology
Coral Magnuson	International Archaeological Research Institute, Inc.	M.A. Archaeology	Archaeology
Paul Rosendahl	Explorations Associates Ltd.	MA Archaeology	Cultural Impacts
Jim Morrow	~~Sierra Researeh~~L.W. Morrow Environmental Management Consultants	~~BA BS Physical Sciences~~Chemistry, PhD Public Health	Air Quality Impacts
Masa Fujioka	Masa Fujioka & Associates	BS Engineering	Groundwater Analysis
Berna Cabacungan	Earthplan	BA English	Community Outreach

8.0 GLOSSARY AND LIST OF ACRONYMS

AC	Alternating current
Ahupua'a	A traditional unit of land in ancient Hawai'i that usually includes a region between two bounding ridges, from the ocean to the mountain peaks
API	American Petroleum Institute
Barrel	42 gallons
Black oil	A class of highly viscous by-products of petroleum refining that can flow freely only when heated above normal ambient temperatures. It is defined by the Environmental Protection Agency [*Federal Register* June 17, 1999 (Volume 64, Number 116)] as a hydrocarbon liquid with an initial gas-to-oil ratio less than 0.31 cubic meters per liter (m^3/liter) and an American Petroleum Institute (API) gravity less than 40 degrees.
BMP	Best Management Practice
BPNAS	Barbers Point Naval Air Station
BPTF	Barbers Point Tank Farm
BWS	Board of Water Supply, City & County of Honolulu
CFR	Code of Federal Regulations
CIP	Campbell Industrial Park
Cold plug	A situation in a pipeline where black oil has cooled below the point where it can flow freely in the pipe
CWRM	Commission on Water Resource Management, State of Hawai'i
CZM	Coastal Zone Management
CZMP	Coastal Zone Management Program
dB	Decibel, the basic, logarithmic unit of sound level measurement
dBA	Sound level measurement weighted to be most sensitive to the frequencies audible to the human ear
DBEDT	Department of Business, Economic Development and Tourism, State of Hawai'i
DC	Direct current
Displacement	The process of replacing black oil with lighter oil in a pipeline such as diesel fuel; used for inspection or in an emergency situation to prevent a cold plug.
DLNR	Department of Land and Natural Resources, State of Hawai'i
DOH	Department of Health, State of Hawai'i
DPP	Department of Planning and Permitting, City & County of Honolulu
DTS	Department of Transportation Services, City & County of Honolulu
EA	Environmental Assessment
eH	Oxidation/reduction potential
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice

EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended
F	Fahrenheit degrees
FBE	Fusion-bonded epoxy, used to coat the pipe and prevent corrosion
FEMA	Federal Emergency Management Agency, U.S. Federal Government
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
GasCo	The Gas Company
GIS	Geographic Information System
HAR	Hawai'i Administrative Rules
HCSM	Highway Capacity Manual
HDD	Horizontal Directional Drilling, used to construct pipeline crossings of streams, roadways and other facilities without open trenching
HECO	Hawaiian Electric Company, Inc.
HELCO	Hawai'i Electric Light Company
HRS	Hawai'i Revised Statutes
Hz	Hertz, the basic unit of frequency, cycles per second
ISC	Industrial Source Complex computer model; used for estimation of air quality impacts from potential emissions
KSI	Unit of pressure, thousands of pounds per square inch
LC_{50}	The concentration of the pollutant that causes mortality in 50% of the test population.
LCC	Leeward Community College
LOAEL	Lowest Observable Adverse Effect Level; used for air quality impact analysis
LOS	Level of Service; a measure of the inconvenience a driver must endure either along roadways or at intersections
LSFO	Low Sulfur Fuel Oil; This is a residual fuel oil that contains less than 0.5% sulfur by weight.
LUO	Land Use Ordinance, City & County of Honolulu
makai	Downhill, towards the ocean
mauka	Inland; towards the mountains
MECO	Maui Electric Company
MGD	Millions of Gallons per Day flow
MPH	Miles Per Hour
MSL	Mean sea level
NAAQS	National Ambient Air Quality Standards
NCDC	National Climatic Data Center
NE	Northeast

NGDC	National Geophysical Data Center, Department of Commerce, National Oceanic and Atmospheric Administration, U.S. Federal Government
NIOSH	National Institutes of Occupational Safety and Health
No. 6 fuel oil	A heavy oil produced by blending heavy residual oils, like the LSFO used in the Waiau Generating Station, with a light oil (often No. 2, diesel-grade fuel oil) to allow it to flow at lower temperatures than LSFO.
NOAA	National Oceanic and Atmospheric Administration, Department of Commerce, U.S. Federal Government
NOAEL	No Observable Adverse Effect Level; used for air quality impact analysis
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service, Department of the Interior, U.S. Federal Government
NRC	National Research Council
NTU	Nephelometric Turbidity Units
NW	Northwest
NWI	National Wetlands Inventory
OCC	Operations Control Center, which controls and monitors all pipeline functions
OEQC	Office of Environmental Quality Control, Department of Health, State of Hawai'i
OR&L	O'ahu Rail and Land Co
OSCP	Oil Spill Contingency Plan
OSHA	Occupational Safety and Health Administration
pH	Measure of acidity; the negative logarithm (Base 10) of the effective molal concentration of hydronium ions in water
PHHT	Pearl Harbor Historic Trail
PHNWR	Pearl Harbor National Wildlife Refuge
PHRI	Paul H. Rosendahl, Inc.
Pig	An in-line inspection tool for examining pipelines from the inside
PM_{10}	Concentration of airborne Particulate Matter that will pass through a 10 micrometer filter
ppt	parts per thousand, by weight unless otherwise specified
Psig	Unit of pressure, pounds per square inch above ambient atmospheric pressure
PUC	Public Utilities Commission
ROH	Revised Ordinances of Honolulu of 1990
ROW	Right–of–Way
RWC	Reasonable Worst Case
S	South
SCADA	Supervisory Control and Data Acquisition system. A set of computers, monitoring systems and software that monitors pipeline functions, actuates automated controls, and reports to pipeline operators

SCAP	Stream Channel Alteration Permit
SDOT	State Department of Transportation, Highways Division, State of Hawai'i
SEC	State Energy Corridor, State of Hawai'i
SESOIL	Seasonal Soil Compartment Model; a computer program used to model dispersion of oil products in soils
SFHA	Special Flood Hazard Area
SHPD	State Historical Preservation Division, Department of Land and Natural Resources, State of Hawai'i
SLUC	State Land Use Commission, State of Hawai'i
SMA	Special Management Area
SMP	Special Management Area Permit
SPCC	Spill Prevention Control and Countermeasures
T&D	Transmission and Delivery (of electrical energy)
TMDL	Total Maximum Daily Load
TMK	Tax Map Key
TWA	Time-Weighted Average
UBC	Uniform Building Code
UCSC	University of California at Santa Cruz
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USN	United States Navy
VOC	Volatile Organic Compounds
White Oil	Relatively volatile refined petroleum products, including jet fuel, gasoline, diesel fuel, and other products
WWII	World War II
µS/cm	Micro-Siemens per centimeter, the standard unit for measuring specific conductance (which is generally directly proportional to salinity in natural waters)

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10.0 PARTIES CONSULTED

10.1 EA/EIS PREPARATION NOTICE

The Hawaiian Electric Company, Inc. (HECO) prepared an *Environmental Assessment* (*EA*) for the proposed Waiau Fuel Pipeline Project in the summer of 2001. During the course of preparing that document, HECO consulted with a number of agencies concerning its proposal, incorporating the information that it obtained into the *EA*. On the basis of the information contained in the *EA*, the State Department of Transportation determined that an *Environmental Impact Statement* (*EIS*) should be prepared and filed an Environmental *Impact Statement Preparation Notice* (*EISPN*) for the project with the State Office of Environmental Quality Control (OEQC) in August, 2001. OEQC published an announcement of the determination in the September 8, 2001 edition of *The Environmental Notice*. The individuals and organizations included in this initial round of contacts are listed in Table 10-1.

Table 10-1. Initial Consultation.

Organization	*Individuals*
State Agencies	
Office of Environmental Quality Control	Genevieve Salmonson
Dept. of Health, Hazard Evaluation & Emergency Response	Liz Galvez, Bryce Hataoka, Calvin Sunada
Dept. of Health, Clean Water Branch	Alec Wong, Ed Chen
Dept. of Land & Natural Resources, Historic Preservation Division	Sara Collins, Elaine Jourdane
Dept. of Land & Natural Resources, Commission on Water Resource Management	David Higa
Department of Land & Natural Resources, Division of Forestry and Wildlife	Paul Conry
Department of Transportation, Harbors Division	Derrick Lining, James M. Smith, Napoleon Agraan, John Dooley
Department of Transportation, Highways Division	Ken Tatsuguchi, Jonathan Winn, Milton Oka
Federal Agencies	
U.S. Fish and Wildlife Service	Kevin Foster, Don Palawski
U.S. Army Engineer Division, Operations Branch	Lolly Silva, Farley Watanabe, Bill Lennan
U.S. Navy, Pacific Division Naval Facilities Engineering Command	Cheryl Connett, J.M. Kilian
City and County of Honolulu	
Department of Planning & Permitting	Barbara Moon, Ardis Kim-Shaw, Eileen Mark, Bonnie Arakawa
Local Utilities	
GasCo, Ltd.	Tom Young, Steve Golden, Keith Yamamoto
Other Parties	
Hawaiian Railway Society	Ben Schlapak, Bob Yatchmenoff
Ducks Unlimited, Inc.	Kim Uyehara, Jack Palmer
Friends of Pearl Harbor Historic Trails	Robyn Blanpied
Tesoro Corp.	Alan Knox, Andy Nomura, Mike Turina, Susan Kusunoki
Source: Compiled by Planning Solutions, Inc.	

HECO, Inc. sent copies of the EA/EISPN, together with a written request for comments, to the organizations and individuals listed in Table 10-2. Grayed areas indicate that no response was received. Written comments on the EA/EISPN led HECO to investigate possible plan changes. Copies of the written comments received and the responses to them are reproduced in Section 10.4.

Table 10-2. Parties Sent Copies of the EISPN and Asked to Comment.

Organizations and Individuals Sent Copy of EA/EISPN	*Comment Letter Received*	*Response Letter Number*	*Date Response Letter Sent*
City and County of Honolulu			
Board of Water Supply	10-26-01	3	12-14-01
Department of Design and Construction	10-26-01	4	12-14-01
Department of Environmental Services			
Department of Facility Maintenance			
Department of Parks and Recreation	11-06-01	12	12-14-01
Department of Planning & Permitting	11-07-01	18	12-14-01
Department of Transportation Services	12-13-01	23	01-07-02
Fire Department	11-01-01	9	12-14-01
Police Department	10-30-01	8	12-14-01
City & County Civil Defense			
State Agencies			
Commission on Water Resource Management	10-30-01	6	12-14-01
Department of Defense			
Department of Hawaiian Home Lands	11-07-01	10	12-14-01
Hawai'i State Civil Defense	01-24-01	25	02-08-02
Office of Environmental Quality Control	11-07-01	17	12-14-01
Office of Hawaiian Affairs	11-07-01	15	12-14-01
State Department of Accounting and General Services	10-23-01	2	12-14-01
State Department of Agriculture			
State Department of Business, Economic Development, and Tourism			
State Department of Education	10-31-01	7	12-14-01
State Department of Health, Environmental Planning Office			
State Department of Land and Natural Resources, Land Division	10-29-01	5	12-14-01
State Department of Transportation	11-15-01	16	12-14-01
State Department of Transportation	01-07-01	24	01-28-01
State DLNR Historic Preservation Division	11-08-01	14	12-14-01
Federal Agencies			
U.S. Environmental Protection Agency			
National Marine Fisheries Service			
US Army Corps of Engineers	10-22-01	1	12-14-01
US Fish and Wildlife Service			
US Natural Resources Conservation Service			
US Navy, Pac. Div. Naval Facilities Engineering Command (PACDIV)	06-11-01	11	12-14-01
Elected Officials			
Senator Daniel K. Inouye			
Senator Daniel Akaka			
US Representative Patsy T. Mink			
US Representative Neil Abercrombie			

Organizations and Individuals Sent Copy of EA/EISPN	*Comment Letter Received*	*Response Letter Number*	*Date Response Letter Sent*
State Senator Rod Tam			
State Senator David Ige			
State Senator Cal Kawamoto			
State Senator Brian Kanno			
State Senator Colleen Hanabusa			
State Representative Ben Cabreros			
State Representative Nestor Garcia			
State Representative Michael Kahikina			
State Representative Mark Moses			
State Representative Roy Takumi			
State Representative William Espero			
County Councilmember Jon Yoshimura			
County Councilmember Gary Okino			
County Councilmember John DeSoto			
Neighborhood Board No. 15 Chair, Bernadette Young			
Neighborhood Board No. 21 Chair, Albert Fukushima			
Neighborhood Board No. 22 Chair, Annette Yamaguchi			
Neighborhood Board No. 23 Chair, Jeff R. Alexander			
Neighborhood Board No. 34 Chair, George Yamamoto			
~~Neighborhood Board No. 38, Dr. Kioni Dudley~~	~~11-03-01~~	~~20~~	~~12-14-01~~
Local Utilities			
Verizon			
GasCo	11-14-01	13	12-14-01
Other Parties			
Ducks Unlimited, Inc.			
Ewa Beach Community Association			
Ewa By Gentry Community Association			
Hawaiian Railway Society			
Chevron			
West Loch Estates Community Association			
Makibaka Community Association			
James Campbell Estate	11-05-01	22	12-14-01
Friends of Pearl Harbor Historic Trail			
Tesoro			
The Sierra Club	11-06-01	19	12-14-01
Dr. Kioni Dudley	11-03-01	20	12-14-01
The Outdoor Circle	11-03-01	21	12-14-01

Libraries and Depositories			
DBEDT Library			
Ewa Beach Public & School Library			
Hawaii State Library Hawaii Documents Center			
Honolulu Municipal Reference and Records Center			
Legislative Reference Bureau			
Pearl City Regional Library			
UH Hamilton Library			
Waipahu Public Library			

Note: All entities listed were sent a copy of the EA/EISPN and asked to comment. The "Letter Number" is the number assigned to each comment letter received. Those comment letters, and HECO's responses, are reproduced at the end of this chapter.

10.2 COMMUNITY OUTREACH

As discussed in detail in Section 1.5, HECO made its public consultation efforts an integral part of the planning and design process for the Waiau Fuel Pipeline project. It undertook a community outreach program designed to help it understand and address the concerns of those who would be directly affected by the proposed Waiau Fuel Line project.

10.3 DISTRIBUTION OF THE DRAFT EIS

HECO ~~is providing~~has provided copies of the DEIS to all of the individuals and organizations listed in Table 10-3. The distribution includes multiple copies to libraries that are located near the route of the proposed Waiau Fuel Pipeline.

10.4 COMMENTS AND RESPONSES

HECO received comments from 26 individuals and organizations (a total of 28 letters). Those comment letters, as well as HECO's responses, are indexed in Table 10-4.

Table 10-3. Parties Sent Copies of the Draft EIS

State Agencies	Libraries and Depositories
Commission on Water Resource Management	DBEDT Library
Department of Defense	'Ewa Beach Public & School Library
Department of Hawaiian Home Lands	Hawaii State Library Hawaii Documents Center
Hawai'i State Civil Defense	Honolulu Municipal Reference and Records Center
Office of Environmental Quality Control (5)	Legislative Reference Bureau
Office of Hawaiian Affairs	Pearl City Regional Library
State Department of Accounting and General Services	UH Hamilton Library
State Department of Agriculture	Waipahu Public Library
State Department of Business, Economic Development, and Tourism	**Elected Officials**
State Department of Education	Senator Daniel K. Inouye
State Dept. of Health, Environ. Planning Office (3)	Senator Daniel Akaka
State Department of Land and Natural Resources (4)	US Representative Patsy T. Mink
State Department of Transportation (5)	US Representative Neil Abercrombie
State DLNR Historic Preservation Division	State Senator Rod Tam
UH Environmental Center (3)	State Senator David Ige
Federal Agencies	State Senator Cal Kawamoto
Environmental Protection Agency	State Senator Brian Kanno
National Marine Fisheries Service	State Senator Colleen Hanabusa
US Army Corps of Engineers	State Representative Ben Cabreros
US Fish and Wildlife Service	State Representative Nestor Garcia
US Natural Resources Conservation Service	State Representative Michael Kahikina
US Navy, Pacific Division Naval Facilities Engineering Command (PACDIV)	State Representative Mark Moses
US Navy, Hawaii Regional Environmental Department	State Representative Roy Takumi
City and County of Honolulu	State Representative William Espero
Board of Water Supply	County Councilmember Jon Yoshimura
Department of Design and Construction	County Councilmember Gary Okino
Department of Environmental Services	County Councilmember John DeSoto
Department of Facility Maintenance	Neighborhood Board No. 15 Chair, Bernadette Young
Department of Parks and Recreation	Neighborhood Board No. 21 Chair, Albert Fukushima
Department of Planning & Permitting (4)	Neighborhood Board No. 22 Chair, Annette Yamaguchi
Department of Transportation Services	Neighborhood Board No. 23 Chair, Jeff R. Alexander
Fire Department	Neighborhood Board No. 34 Chair, George Yamamoto
Police Department	
City & County Civil Defense	
Local Utilities	
Verizon	The Gas Company
Other Parties	
Ducks Unlimited, Inc.	West Loch Estates Community Association
Ewa Beach Community Association	Makibaka Community Association
Ewa By Gentry Community Association	James Campbell Estate
Hawaiian Railway Society	Friends of Pearl Harbor Historic Trail
Chevron	Tesoro
Sierra Club, Hawai'i Chapter	Dr. Kioni Dudley
The Outdoor Circle	

Table 10-4. Parties Commenting on the Draft EIS

Organizations and Individuals Commenting	*Comment Letter Date*	*Response Letter Number*
Board of Water Supply	5/14/02	7
Department of Facility Maintenance	6/17/02	25
Department of Parks and Recreation	5/17/02	11
Department of Planning & Permitting	6/10/02	23
Department of Transportation Services	6/6/02	21
Fire Department	5/6/02	4
Police Department	6/3/02	16
Commission on Water Resource Management	5/2 & 5/10/02	2, 6
Office of Environmental Quality Control	6/7/02	22
State Department of Accounting and General Services	5/6/02	3
State Department of Education	5/16/02	8
State Department of Health, Environmental Planning Office	6/4/02	17
State Department of Land and Natural Resources	5/22 & 6/14/02	12, 24
State Department of Transportation, Harbors Division	5/17/02	10
State Department of Transportation, Airports Division	5/14/02	9
State DLNR Historic Preservation Division	6/25/02	27
US Army Corps of Engineers	5/2/02	1
US Fish and Wildlife Service	6/5/02	26
Natural Resources Conservation Service, U.S. Dept. of Agriculture	5/21/02	13
US Navy, Pac. Div. Naval Facilities Engineering Command	5/31/02	15
Office of Hawaiian Affairs	6/18/02	28
Elected Officials		
State Senator Colleen Hanabusa	5/2/02	5
Local Utilities		
Verizon	5/24/02	14
Other Parties		
Friends of Pearl Harbor Historic Trail	6/6/02	20
University of Hawaii Environmental Center	6/7/02	18
Life of the Land	6/7/02	19
Note: All entities listed were sent a copy of the *Final EIS*.		

10.5 EISPN COMMENT LETTERS AND RESPONSES

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

REPLY TO ATTENTION OF

October 22, 2001

Civil Works Technical Branch

Mr. Perry White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Thank you for the opportunity to review and comment on the Environmental Assessment (EA) and Environmental Impact Statement Preparation Notice (EISPN) for the HECO Waiau Fuel Line Project, Barbers Point, Oahu (TMKs 9-1, 3, 4, and 6-8). 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, a DA permit will be required for some of the alternatives being considered. Early coordination with our Regulatory Branch is suggested. For further information, please call Mr. William Lennan at (808) 438-6986 and refer to file number 200200030.

b. The flood hazard information provided on page 3-10 of the EA is correct.

Should you require additional information, please contact Ms. Jessie Dobinchick of my staff at (808) 438-8876.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/O

December 14, 2001

Mr. James Pennaz, P.E., Chief
Civil Works Technical Branch
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawai'i 96850-5440

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Mr. Pennaz:

Thank you for your October 22, 2001 letter concerning Hawaiian Electric Company's (HECO) proposed Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing your written comments concerning flood hazard information and the need for Department of the Army permits. Item-by-item responses to your comments are provided below. To simplify your examination, we have reproduced the text of your comments in *italics* before each response.

a. Based on the information provided, a DA permit will be required for some of the alternatives being considered. Early coordination with our regulatory branch is suggested. For further information, please call Mr. William Lennan at (808) 438-6986 and refer to file number 200200030.

RESPONSE: Thank you for the notice concerning the need for a Department of the Army Permit for some of the alternatives being considered. We have contacted Mr. Lennan and other staff during our early planning for the project, and they have been very helpful in explaining the permit requirements for the different alternatives. We will have further discussions with them over the next few months as we refine the engineering plans for the project and will submit applications for any Department of the Army permits that may be needed at the earliest possible date.

b. The flood hazard information provided on page 3-10 of the EA is correct.

RESPONSE: Thank you for confirming that the flood hazard information is correct.

Our present schedule calls for us to publish the Draft Environmental Impact Statement in March 2002. We will send you a copy of the document at that time for your review and comment. In the meantime, if you have any questions concerning the project, please call our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288 or me at (808) 543-7746.

Sincerely,

Ken Fong, P.E.
Project Manger

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(2)

BENJAMIN J. CAYETANO
GOVERNOR

WAYNE H. KIMURA
COMPTROLLER

MARY ALICE EVANS
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1666.1

OCT 23 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: HECO Waiawa Fuel Line Project
Environmental Assessment/Environmental
Impact Statement Preparation Notice (EA/EISPN)

Thank you for the opportunity to review the EA/EISPN for the subject project.

This project does not impact any Department of Accounting and General Services projects or existing facilities. Therefore, we have no comments to offer.

Should you have any questions, please have your staff call Mr. Allen Yamanoha of the Planning Branch at 586-0488.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

AY:mo
c: Office of Environmental Quality Control

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Gordon Matsuoka
Public Works Administrator
Department of Accounting and General Services
State of Hawai'i
P.O. Box 119
Honolulu, Hawai'i 96810

Subject: **Environmental Assessment/Environmental Impact Statement:**
Waiau Fuel Pipeline Project

Dear Mr. Matsuoka:

Thank you for your October 23, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and preparing your letter. We are glad to know that the project would not impact any Department of Accounting and General Services projects or existing facilities.

Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. In accordance with the instructions of Mr. Yamanoha of your office, we will not forward a copy of that document unless you specifically request one. In the meantime, if you have any questions concerning the project, please call our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288 or me at (808) 543-7746.

Sincerely,

Ken Fong, P.E.
Project Manger

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(3)

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. AMI
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

BRIAN K. MINAI, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

October 26, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: Your Transmittal of October 5, 2001 on the Environmental Impact Statement Preparation Notice for the HECO Waiau Fuel Pipeline Project, Ewa, TMK: Vicinity of 9-1, 3, 4, 6, 7, 8

Thank you for the opportunity to review the subject document for the proposed fuel pipeline project.

The construction plans should be submitted for our review and approval to minimize any potential impacts to our water system facilities in the area. We reserve further comment until the Draft Environmental Impact Statement is submitted for our review.

If you have any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

for CLIFFORD S. JAMILE
Manager and Chief Engineer

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Clifford Jamile
Manager and Chief Engineer
Board of Water Supply
City & County of Honolulu
630 South Beretania Street
Honolulu, Hawai'i 96843

Subject: **Environmental Assessment/Environmental Impact Statement: Walau Fuel Pipeline Project**

Dear Mr. Jamile:

Thank you for your October 26, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Line project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and preparing your letter. We understand that you have no project-specific comments at this time.

We appreciate the Board of Water Supply's desire to minimize potential impacts on water system facilities in the area. Towards that end, we have tasked our engineering consultants with incorporating all practical pipeline safeguards into the design.

Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. In accordance with your request, we will send you a copy of the document at that time for your review and comment.

In the meantime, if you have any questions concerning the project, please call our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288 or me at (808) 543-7746.

Sincerely,

Ken Fong, P.E.
Project Manger

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

4

DEPARTMENT OF DESIGN AND CONSTRUCTION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4544 • FAX: (808) 523-4567
WEB SITE ADDRESS: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

RAE M. LOUI, P.E.
DIRECTOR

GEORGE T. TAMASHIRO, P.E.
DEPUTY DIRECTOR

ERIC O. CRISPIN, AIA
ASSISTANT DIRECTOR

October 26, 2001

MEDE

Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Attention: Perry J. White

Gentlemen:

Subject: HECO Waiau Fuel Line Project
Environmental Assessment/Environmental Impact Statement Preparation Notice

We have reviewed the subject project for its impact on the existing City owned street lighting system and have no comments at this time.

If you have any questions, please contact Robert Yee at 523-4705.

Sincerely,

GERALD N. HAMADA
Chief
Mechanical/Electrical Design and Engineering Division

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-000

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Gerald N. Hamada, Chief
Mechanical/Electrical Design & Engineering Division
Department of Design and Construction
City & County of Honolulu
650 South Beretania Street
Honolulu, Hawai'i 96843

Subject: **Environmental Assessment/Environmental Impact Statement:**
Waiau Fuel Pipeline Project

Dear Mr. Hamada:

Thank you for your October 26, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Line project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and preparing your letter.

We understand that you have reviewed the project for its impact on the City-owned street lighting system and have no comments at this time. Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. We will send a copy of that document to your office for review and comment as soon as it is available.

In the meantime, if you have any questions concerning the project, please call our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288 or me at (808) 543-7746.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

5

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

October 29, 2001

Ref: LD-BC

Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Attn.: Mr. Perry J. White

Dear Mr. White

HECO Waiau Fuel Line Project - EA/EISPN

Thank you for the opportunity of reviewing the subject report. We have no comment on the proposed project. However, please be advised that subject to the availability of the finalized route of the pipeline, a grant of easement is required from the Board of Land and Natural Resources on the lands managed by this office.

Please call us at 587-0430 if you have other questions.

Sincerely,

Barry Cheung
Barry Cheung

cc Land Board Member

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Barry Cheung
Land Division
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Mr. Cheung:

Thank you for your October 29, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter.

We understand that you have reviewed the report and have no comments at this time. We acknowledge that a grant of easement is required from the Board of Land and Natural Resources for the lands managed by your office. As indicated by the discussion beginning at the bottom of page 2-2 of the *EA/EISPN*, we understand that use of the OR&L alignment will require a grant of easement from the Department of Transportation.

Our present schedule calls for us to publish the Draft *Environmental Impact Statement* in March 2002. We will send a copy of that document to your office for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call our consultant Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288 or me at (808) 543-7746.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(6)

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON

BOARD OF LAND AND NATURAL RESOURCES
BRUCE E. ANDERSON
ROBERT G. GIRALD
BRIAN C. NISHIDA
DAVID A. NOBRIGA
HERBERT M. RICHARDS, JR.

LINNEL T. NISHIOKA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

OCT 30 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu Hawaii 96814

Dear Mr. White:

Environmental Assessment and Environmental Impact Statement Preparation Notice
HECO, Waiau Fuel Pipeline Project

Thank you for allowing us to comment on the subject document. The proposed fuel line crosses thirteen watercourses listed in Table 2-4.

Hawaii Revised Statutes §174C-71 requires stream channel alteration permits for projects which alter the bed or banks of streams.

The following watercourses listed in table 2-4 are considered streams at the location of the proposed crossing:

Waikele Stream	S8
Kapakahi Stream	S9
Waipahu Canal	S10
Waiawa Stream	S11
Waimano Stream	S12
Unnamed Creek	S13

If the fuel line crossings alter the bed or banks of these streams, HECO will have to obtain a stream channel alteration permit for the crossing. If the bed or banks are not altered through the use of overhead crossings or horizontal directional drilling, stream channel alteration permits will not be required.

We will offer additional comments regarding our permit requirements as more specific plans are proposed.

If you have any questions regarding this letter please, call David Higa at 587-0249.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

DH:sd
c. OEQC

G:\WORK\REGULATE\FINAL\HIGA\HECOFUEL.DOC.doc

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Ms. Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Environmental Assessment/Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Ms. Nishioka:

Thank you for your October 30, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Line project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter.

Hawaiian Electric Company understands the need to obtain stream channel alteration permits for work that alters the bed or banks of streams. As indicated in the *EA/EISPN*, we are reviewing the methods that will be used to cross the streams along the proposed route. Further information is needed to determine the specific construction methods (e.g., directional drilling, open trenching, etc.) that are practical. This will be available in the first quarter of 2002, and we will refine the plans for the stream crossings at that time. We will contact the Commission's staff as soon as those plans are available to discuss the crossings in more detail.

Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. We will send a copy of that document to your office for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(7)

(7)

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

[redacted]
PATRICIA HAMAMOTO
INTERIM SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

October 31, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawai'i 96814

Dear Mr. White:

Subject: HECO Waiau Fuel Line Project EISPN

The Department of Education has no comment on the subject project at this time.

Thank you for the opportunity to respond.

Very truly yours,

Patricia Hamamoto
Interim Superintendent

PH:hy

cc: A. Suga, DAS

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00(

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Ms. Patricia Hamamoto, Interim Superintendent
Department of Education
State of Hawai'i
P.O. Box 2360
Honolulu, Hawai'i 96804

Subject: **Environmental Assessment/Environmental Impact Statement:**
Waiau Fuel Pipeline Project

Dear Ms. Hamamoto:

Thank for your October 31, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter.

We understand that the Department of Education has no comments at this time.

Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. We will send a copy of that document to your office for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

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

October 30, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Thank you for the opportunity to review and comment on the Environmental Assessment/Environmental Impact Statement Preparation Notice for the HECO Waiau Fuel Line Project.

During the installation phase of the project, there may be calls for police service for construction-related dust, noise, and traffic problems, especially when work is being conducted in heavily populated and trafficked areas such as around the Kapolei Shopping Center.

If there are any questions, please call Ms. Carol Sodetani of the Support Services Bureau at 529-3658.

Sincerely,

LEE D. DONOHUE
Chief of Police

By
EUGENE UEMURA
Assistant Chief of Police
Support Services Bureau

Serving and Protecting our Ohana

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00

CONSTPR P0000064
GENPP I0-16
YA/G

December 14, 2001

Chief Lee Donohue
Police Department
City & County of Honolulu
801 South Beretania Street
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Chief Donohue:

Thank you for your October 30, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you, Mr. Eugene Uemura, and others on your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter.

We understand that construction work on a project such as this can increase the workload on the Police Department and lead to calls for police service. Hawaiian Electric Company is working to include in the design measures that will minimize such impacts. These include using construction techniques that avoid or minimize work in public rights-of-way and incorporating dust-control measures in the construction contract specifications. The *Draft Environmental Impact Statement* will discuss these measures as well as the impacts that cannot be fully mitigated.

Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. We will send a copy of that document to your Department for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425 • HONOLULU, HAWAII 96819-1869
TELEPHONE: (808) 831-7781 • FAX: (808) 831-7799 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

November 1, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: HECO Waiau Fuel Line Project
Environmental Assessment/Environmental Impact
Statement Preparation Notice

We received your letter dated October 5, 2001, regarding the above-mentioned project.

The Honolulu Fire Department requests that the following be complied with:

1. Maintain fire apparatus access throughout the construction site for the duration of the project.

2. Notify the Fire Communication Center at 523-4411 regarding any interruption in the existing fire hydrant system during the project.

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

Sincerely,

Attilio K. Leonardi

ATTILIO K. LEONARDI
Fire Chief

AKL/SK:ms

9

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Chief Attilio K. Leonardi
Fire Department
City & County of Honolulu
3375 Koapaka Street, Suite H425
Honolulu, Hawai'i 96819-1869

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Chief Leonardi:

Thank you for your November 1, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter.

We will require the construction contractor for the pipeline to comply with your requests. Specifically, the contractor will be required to:

- Maintain fire apparatus access throughout the construction site for the duration of the project.
- Notify the Fire Communication Center if there is any interruption in the existing fire hydrant system during the project.

Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. We will send a copy of that document to your Department for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or our consultant Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288

Sincerely,

Ken Ego, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(10)

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 7, 2001

Mr. Perry J. White
Planning Solutions, Inc.
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: HECO Waiau Fuel Line Project

Thank you for providing a copy of the Environmental Assessment/Environmental Impact Preparation Notice (EA/EISPN) report for the subject project.

We note that the preferred alternative of constructing a new pipeline to supply fuel to the HECO generating stations at Waiau and Honolulu would be environmentally safer and less expensive than the other alternatives. Further, construction would occur within the existing State Energy Corridor, except for a portion which will be routed around the Pouhala Marsh wetlands.

Please be advised that the Department of Hawaiian Home Lands will be acquiring land parcels at East Kapolei, near Farrington Highway and North Road, and next to the Leeward Community College campus. Since these parcels will be close to the proposed route for the new pipeline, please continue to keep us informed of the status of this project.

If you have any questions, please call Darrell Yagodich of our Planning Office at 586-3836.

Aloha,

Darrell Yagodich for

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Raynard C. Soon, Chairman
Hawaiian Homes Commission
P.O. Box 1879
Honolulu, HI 96805

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Chairman Soon:

Thank for your November 7, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you and members of your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter. A major purpose of the *EISPN* is to identify issues that should be addressed in the *Draft Environmental Impact Statement (DEIS)*, and your letter helps us determine the scope of the studies we will undertake.

In accordance with your suggestion, I have asked Mr. Perry White of Planning Solutions, Inc., our environmental planning consultant, to contact Mr. Yagodich of your staff. He will request information concerning the exact location of the land parcels you indicated the Department of Hawaiian Home Lands expects to acquire in East Kapolei, near Farrington Highway and North Road, and next to the Leeward Community College Campus.

Our present schedule calls for us to publish the *DEIS* in March 2002. We will send a copy to the Hawaiian Homes Commission for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project or the items discussed above, I encourage you to call me at (808) 543-7746 or Mr. Perry White at (808) 593-1288.

Sincerely,

Ken Pong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
517 RUSSELL AVENUE, SUITE 110
PEARL HARBOR, HAWAII 96860-4884

5090
Ser N465/13054
06 NOV 2001

Mr. Perry White
Planning Solutions, Inc.
1210 Auahi Street, Suite 221
Honolulu, HI 96814

Dear Mr. White:

Subj: HAWAIIAN ELECTRIC COMPANY (HECO) WAIAU FUEL LINE PROJECT
ENVIRONMENTAL ASSESSMENT/ENVIRONMENTAL IMPACT STATEMENT
PRERPARATION NOTICE (EA/EISPN)

Thank you for your letter of October 5, 2001 soliciting the Navy's comment on the proposed EA/EISN for HECO's Waiau Fuel Line project.

We have no review comments at this time. We appreciate the opportunity to participate in your review process and look forward to reviewing the Draft EIS.

Please direct future correspondence to:

Commander
Navy Region Hawaii
Regional Environmental Department (N465)
517 Russell Avenue, Suite 110
Pearl Harbor, HI 96860-4884

The Navy's point of contact is Ms. Lisa Chan at 471-1171, extension 229.

Sincerely,

J. T. SOMMER
Commander, CEC, U. S. Navy
Director
Regional Environmental Department
By direction of
Commander, Navy Region Hawaii

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00(

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Commander J.T. Sommer
Director, Regional Environmental Department (N465)
517 Russell Avenue, Suite 110
Pearl Harbor, Hawai'i 96860-4884

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Waiau Fuel Pipeline Project

Dear Commander Sommer:

Thank you for your November 6, 2001 letter (your reference #5090, Ser N465/13054) concerning the *Environmental Assessment/Environmental Impact Statement Preparation Notice* for Hawaiian Electric Company's Waiau Fuel Pipeline Project. We appreciate the time that you and your staff spent reviewing the document and preparing your letter.

We understand that the Navy has no comments at this time. Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. We will send a copy of that document to your office for review and comment as soon as it is available.

In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(12)

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

November 6, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: HECO Waiau Fuel Line Project
Environmental Assessment/Environmental Impact Statement
Preparation Notice (EA/EISPN)

Thank you for the opportunity to review the Environmental Assessment/Environmental Impact Statement Preparation Notice relating to the HECO Waiau Fuel Line Project.

The Department of Parks and Recreation has no comments at this time.

Should you have any questions, please contact Mr. John Reid, Planner, at 547-7396.

Sincerely,

W.D. Balfour, Jr.

WILLIAM D. BALFOUR, JR.
Director

WDB:cu (4547)

cc: Mr. Don Griffin, Department of Design and Construction

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0C

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. William D. Balfour, Jr., Director
Department of Parks and Recreation
City & County of Honolulu
650 South King Street
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Waiau Fuel Pipeline Project

Dear Mr. Balfour:

Thank you for your November 6, 2001 letter concerning the *Environmental Assessment/ Environmental Impact Statement Preparation Notice* for Hawaiian Electric Company's Waiau Fuel Pipeline Project. We appreciate the time that you and your staff spent reviewing the document and preparing your letter.

We understand that the Department of Parks and Recreation has no comments at this time. Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. We will send a copy of that document to your office for review and comment as soon as it is available.

In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Mr. Don Griffen, Department of Design & Construction
Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(13)

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

November 14, 2001

Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Attention: Mr. Perry J. White

Gentlemen:

Subject: EA/EISP Notice
For Proposed HECO Waiau Fuel Line Project

Please be advised that The Gas Company maintains a 16"gas transmission pipeline and underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area. 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 EA/EISP Notice. Should there be any questions, or if additional information is desired, please call me at 594-5570.

Very truly yours,

Charles Calvet
Manager, Engineering

CEC:krs
01-216

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00

CONSTPR P0000364
GENPP 10-16
YA/G

December 14, 2001

Mr. Charles Calvet, Manager of Engineering
The Gas Company
515 Kamake'e Street
Honolulu, Hawai'i 96813

Subject: **Environmental Assessment/Environmental Impact Statement Preparation Notice: Waiau Fuel Pipeline Project**

Dear Mr. Calvet:

Thank you for your November 14, 2001 letter concerning the *Environmental Assessment/ Environmental Impact Statement Preparation Notice* for Hawaiian Electric Company's Waiau Fuel Pipeline Project. We appreciate the time that you and your staff spent reviewing the document and preparing your letter.

We understand that The Gas Company maintains a 16-inch gas transmission pipeline and underground utility gas mains in the project vicinity. We have taken the presence of these facilities into consideration in developing the conceptual design for the Waiau Fuel Pipeline Project and have met with and discussed our plans with representatives of The Gas Company.

We will continue to work with The Gas Company to insure that we do not adversely affect your operations in this area. Our present schedule calls for us to publish the *Draft Environmental Impact Statement* in March 2002. We will send a copy of that document to you for review and comment as soon as it is available.

In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at (808) 593-1288.

Sincerely,

Ken Foag, P.E.
Project Manger

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

14

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

DEPUTIES
JANET E. KAWELO
LINNE ISHIOKA

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

November 8, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

LOG NO: 28362 ✓
DOC NO: 0110SC19

Dear Mr. White:

SUBJECT: Chapter 6E-42 Historic Preservation Review of the Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN) for the Proposed Hawaiian Electric Company Inc. (HECO) Waiau Fuel Line
`Ewa, O`ahu
TMK: 9

Thank you for the opportunity to comment on the EA/EISPN prepared for the proposed Waiau Fuel Line, to be constructed by HECO from its Barbers Point Tank Farm in Honouliuli to the Waiau Generating Station in Pearl City, O`ahu. Your client plans to construct a fuel line and ancillary facilities, and nearly all construction will take place within the State Energy Corridor (SEC). Our review is based on historic maps, aerial photographs, records, and reports maintained at the State Historic Preservation Division; no field inspection was made of the proposed project corridor.

The EA/EISPN correctly summarizes the available information concerning historic, cultural, and archaeological resources. We will await publication of the Draft EIS before commenting on the effects, if any, that the proposed actions may have on significant historic sites.

Should you have any questions on archaeology, please feel free to contact Sara Collins at 692-8026. Should you have any questions about the OR & L Railway, please feel free to contact Nathan Napoka at 587-0040.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

SC:jk

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawai'i
601 Kamokila Boulevard, Room 555
Kapolei, Hawai'i 96707

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Waiau Fuel Pipeline Project

Dear Mr. Hibbard:

Thank you for your November 8, 2001 letter (your reference Log No: 28362/Doc No: 0110SC19) concerning the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* for Hawaiian Electric Company's Waiau Fuel Pipeline Project. We appreciate the time that you and your staff spent reviewing the document and preparing your letter.

We appreciate your confirmation that the EA/EISPN correctly summarizes the available information concerning historic, cultural, and archaeological resources. We will address the project's potential impacts on these in the *Draft Environmental Impact Statement (DEIS)*.

Our present schedule calls for us to publish the *DEIS* in March 2002. We will send you a copy of that document for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manger

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

November 7, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, HI 96814

HRD01/326

Subject: Hawai'i Electric Company, Inc. (HECO) Waiau Fuel Line Project
Environmental Assessment/Environmental Impact Statement
Preparation Notice (EA/EISPN)
TMK's: Zone 9, Parcels in Sections 1, 3, 4, 6, 7, and 8

Dear Mr. White:

Thank you for the opportunity to comment on the above referenced project. According to the EA/EISPN, HECO proposes to construct a new fuel oil pipeline, which would be located mostly in the State Energy Corridor (SEC), from Barber's Point Tank Farm in Campbell Industrial Park (CIP) to the Waiau Generating Station in Pearl City, for a total of 13 miles of insulated pipeline. The Office of Hawaiian Affairs (OHA) offers the following comments.

Burials, Historical and Cultural Sites

In the event human burials, cultural or historical sites are discovered during clearing, grading, ditching, piping, or construction activities at the proposed project site, the State's Historic Preservation Division (SHPD) should be contacted immediately. In the event of any inadvertent discoveries of human burials or remains, OHA requests that a mitigation plan be developed in conjunction with SHPD, O'ahu Island Burial Council, and Native Hawaiian individuals or organizations familiar with the proposed project area.

Environmental Affects

As with any project involving ground-disturbing activities, OHA has concerns with the impacts to the natural and human environment such activities may cause. In addition, the pipeline route of the proposed project crosses the Waikele and Waiawa Streams, and near to a number of wetland areas.

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OHA urges that HECO adhere with State and Federal environmental protection laws and use best management practices to minimize any potential impacts that the proposed project may cause.

We anticipate the EIS for this proposed project and will further comment upon our review. If you have any questions, please contact Mark A. Mararagan, policy analyst at 594-1756, or e-mail him at markm@oha.org.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

cc: Board of Trustees
Administrator

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00(

15

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Colin C. Kippen, Jr., Deputy Administrator
Office of Hawaiian Affairs
711 Kapi'olani Boulevard
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Waiau Fuel Pipeline Project

Dear Mr. Kippen:

Thank you for your November 7, 2001 letter (your reference HRD01/326) concerning the *Environmental Assessment/Environmental Impact Statement Preparation Notice* for Hawaiian Electric Company's Waiau Fuel Pipeline Project. We appreciate the time that you and other members of your staff spent reviewing the document and preparing your letter.

Burials, Historic, and Cultural Sites. While most of the land that is within the State Energy Corridor (SEC) has already been extensively disturbed, HECO recognizes that construction of the proposed pipeline involves subsurface work that could lead to the discovery of previously unknown features and remains. Project planners and engineers have been in close contact with staff at the State Historic Preservation Division during preparation of conceptual plans for a new pipeline. The *Draft Environmental Impact Statement (DEIS)* will discuss this possibility. It will also outline the measures we will take to ensure that we deal appropriately with such inadvertent finds should they occur. In the case of burials, these measures would typically include preparation of a mitigation plan.

Environmental Effects. HECO will adhere to State and Federal environmental protection laws and use best management practices to limit the potential impacts of the proposed project.

Our present schedule calls for the *DEIS* to be published in March 2002, and we will send you a copy of that document for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 593-1288.

Sincerely,

Ken Fong
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 SO. NIMITZ HWY. • HONOLULU, HAWAII 96813-4898

November 15, 2001

BRIAN K. MIKUNI
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
JADINE Y. URASAKI

IN REPLY REFER TO:
HAR-PM
1453.02

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: Environmental Assessment and Environmental Impact Statement Preparation Notice for Hawaiian Electric Company's Proposed Barbers Point to Waiau Pipeline Project within the State's Energy Corridor

Thank you for your October 5, 2001 letter and September 2001 subject assessment and notice. This notice describes the Hawaiian Electric Company's (HECO) proposal and various alternatives for the construction of the subject pipeline project.

HECO or their assigns will perform site/soil assessments before and during excavation. Hazardous materials will be removed or neutralized if encountered during construction activities. Cost responsibilities will be determined in paragraph 7.20, Environmental Provisions, of HECO's Energy Corridor Lease Agreement. Environmental insurance naming the State as additional insured may be required.

In addition, we understand that Planning Solutions and/or HECO will respond directly to The Outdoor Circle's November 3, 2001 letter, the Sierra Club's November 6, 2001 letter and the State of Hawaii Office of Environmental Quality Control comments dated November 7, 2001.

If we may provide further assistance in facilitating your entrance into the State's Energy Corridor, please call Mr. James Smith, Property Manager, at 587-1942.

Very truly yours,

GLENN M. OKIMOTO
Acting Harbors Administrator

c: HECO- Mr. Ken Fong

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00C

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Ms. Jadine Urasaki, Acting Administrator
Harbors Division
Department of Transportation
State of Hawai'i
79 South Nimitz Highway
Honolulu, Hawai'i 96813-4898

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Waiau Fuel Pipeline Project

Dear Ms. Urasaki:

Thank you for your November 7, 2001 letter (your reference HAR-PM/1453.02) concerning the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* for Hawaiian Electric Company, Inc.'s (HECO) Waiau Fuel Pipeline Project. We appreciate the time that you and other members of your staff spent reviewing the document and preparing your letter. Responses to the points contained in your letter follow.

HECO or their assigns will perform site/soil assessments before and during excavation. Hazardous materials will be removed or neutralized if encountered during construction activities. Cost responsibilities will be determined in Paragraph 7.20, Environmental Provisions, of HECO's Energy Corridor Lease Agreement. Environmental insurance naming the State as additional insured may be required.

RESPONSE. HECO is aware that hazardous materials may be encountered during construction. HECO's consultant has already performed a Phase I Environmental Site Assessment ("ESA") to identify areas where hazardous materials are most likely to be encountered, and we will take special precautions in these areas. These precautions will include soil testing. In particular, HECO plans to have a Phase II ESA performed concurrent with construction. If contamination is encountered, it is our understanding that clean up responsibility and any associated costs should be governed by the provisions of the Energy Corridor Lease Agreement that is now being finalized.

We understand that Planning Solutions and/or HECO will respond directly to The Outdoor Circle's November 3, 2001 letter, the Sierra Club's November 6, 2001 letter and the State of Hawaii Office of Environmental Quality Control comments dated November 7, 2001.

RESPONSE. HECO is responding directly to these three organizations. We will send copies of these responses to your office.

Our present schedule calls for the *DEIS* to be published in March 2002, and we will send you a copy of that document for review and comment as soon as it is available. In the meantime, if you have any

(16)

questions concerning the project, please call me at 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 593-1288.

Sincerely,

Ken Fang, P.E.
Project Manger

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

(17)

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

November 7, 2001

Mr. Ken Fong
Hawaiian Electric Company, Inc.
P.O. Box 750
820 Ward Avenue
Honolulu, Hawai'i 96813

Mr. James Smith
Department of Transportation, State of Hawai'i
869 Punchbowl Street
Honolulu, Hawai'i 96813-5097

Mr. Perry White
Planning Solutions, Inc.
1210 Auahi Street
Honolulu, Hawai'i 96814

Dear Messrs. Fong, Smith and White:

We have reviewed your final environmental assessment (FEA) for the Department of Transportation's environmental impact statement preparation notice (EISPN) determination for theWaiau Fuel Pipeline Project in the State Energy Corridor, Tax Map Keys: Zone 9, various parcels in sections 1,3,4,6,7 and 8, in the 'Ewa and Honolulu districts on the island of O'ahu. We offer the following comments for your consideration, response, and incorporation into the draft environmental impact statement for the project..

(1) **BIOLOGICAL RESOURCES AND ECOSYSTEM IMPACT ANALYSIS.** In the environmental setting, please discuss the biological resources in the vicinity of the pipeline that may be affected by discharges from the pipeline. A copy of the Environmental Council's guidance for biological surveys, ecosystem impact analysis and mitigation measures.

(2) **PAST DISCHARGES AND DISCUSSION OF IMPACTS (DIRECT, INDIRECT AND CUMULATIVE) AND MITIGATION ON SURFACE WATER, GROUND WATER, AIR QUALITY AND AQUATIC RESOURCES:** Please consult with the Office of Hazard Evaluation and Emergency Response of the Department of Health and include a discussion of past leaks from the pipelines, effects on sensitive environments such as the national wildlife refuge and past and proposed mitigative measures. Please include also a discussion of air quality impacts, surface water quality impacts, ground water impacts and mitigation measures.

(3) **CULTURAL IMPACTS.** Please include in the DEIS an assessment of impacts to cultural resources and cultural practices based on interviews with community members and cultural practicioners (gatherers, etc.) in the Honolulu and 'Ewa regions. What impacts (if any) will the proposed action have on cultural practices and resources in the area? Chapter 343, Hawai'i Revised Statutes now requires that cultural impacts be assessed (see enclosed copy of Act 50, SLH 2000). A copy of the Environmental Council's guidelines for assessing cultural impacts is enclosed for your use.

If there are any questions, please call Leslie Segundo of my staff at (808) 586-4185. Thank you for the opportunity to comment.

Sincerely,

GENEVIEVE SALMONSON
Director

Enclosures

CONTENT GUIDELINES FOR
BIOLOGICAL SURVEYS, ECOSYSTEM IMPACT ANALYSIS
AND MITIGATION MEASURES

Introduction:

Hawaii State law calls for efforts to prevent or eliminate damage to the environment and biosphere and the protection of endangered species and indigenous plants and animals. To meet this goal, special care must be taken to assess a proposed project's impact on biological resources.

The purpose of the state's environmental review law is to encourage full, accurate and complete analysis of proposed actions, promote public participation and support enlightened decision making by public officials. To assist agencies and applicants in meeting this legal purpose, the Office of Environmental Quality Control offers the following guidelines for preparers of environmental reviews under the authority of HRS 343.

These guidelines do not constitute rules or law. They have been refined by staff, student interns and peer review to provide a helpful checklist of items that will assist planners in preparing an adequate biological survey.

An Environmental Assessment or Impact Statement for a project that may affect biological resources should contain a biological survey that considers the items and issues described below.

Part I. Biological Surveys: Methods and Content

1. Survey Method

Timing

Surveyors should take into account the activities of nocturnal, migratory and seasonal species and conduct surveys accordingly. (e.g. a survey of wetland flora should take place during the rainy season to observe otherwise dormant species.)

Route and Coverage

A thorough flora/fauna survey, should provide the following:

* a map containing the survey routes
* a minimum of 50% coverage of the study area (although smaller areas may merit a larger percentage of study coverage)
* the areas covered must include a composite of all terrain present (i.e., ridge tops, wetland, slope, riparian habitat etc.)
* accounting for native invertebrate populations may be accomplished by estimating the coverage of host flora.

Adjacent Streams

Stream conditions both up and down-stream from a survey site should be assessed. The Hawaiian Stream Bio-assessment Protocol (HSBP) developed by the Environmental Planning Office of the Department of Health may be utilized in studying habitat and biotic quality of streams.
The Hawaii Stream Assessment produced by the Commission on Water Resource Management (CWRM) should also be consulted to identify waterways that qualify as a "heritage" streams. Investigators should also consider CWRM's Stream Protection and Management (SPAM) system administrative rules and consult with DLNR's Division of Aquatic Resources.

Literature Search

Literature and database sources should be searched for historical sightings of significant biological resources. Consult sources such as the Manual of the Flowering Plants of Hawaii, the Bishop Museum, The Nature Conservancy's Hawaii Heritage Program Database listings, the U.S. Fish and Wildlife Service, the National Biological Service, the State Department of Land and Natural Resources Division of Forestry and Wildlife and Natural Area Reserve Commission, the University of Hawaii botany, zoology and geography departments and the Audubon Society.

On-island experts should be contacted for information on historical sightings of significant species which may not be present during the survey (e.g., migratory water birds, ephemeral plants).

2. Ecosystem Characterization

Description
A description of the ecosystem should include the following:

* an analysis of principal community types including both native and non-native organisms and the biological values of these community types
* note the presence and condition of plant and animal communities based on elevation, moisture, substrate, topography and physiography (examples include: coastal dry shrublands; montane wet forests; seasonal or perennial wetlands and streams; anchialine pools; aeolian lava flow systems; and subterranean cave ecosystems)
* a description of any obligate species (those requiring specific niches)
* a list any applicable global ranks (established by the Nature Conservancy), describe species density (frequency of sightings or rate of occurrences), historical and current ranges and the location of notable species

Native Intactness

Analyze habitat intactness based on species composition. Assess the native bio-diversity of the project site based on alien-to-native species proportions and distributions and the presence of indicator species for a given ecosystem. Indicator species should be considered to identify potentially high quality ecosystems. For example, the presence of 'o'opu, or native goby species, (Lentipes concolor, Awaous stamineus, Sicyopterus stimpsoni), as well as hihiwai (Neritina granosa) in streams indicate unaltered stream conditions necessary for their survival.

Listed Species

Any rare, threatened and endangered species and their habitats should be listed and described. Indicate the presence and distribution of the following taxonomic groups:

* species listed as either endangered or threatened by the state or federal government or both
* species that are proposed or candidates to be listed as either endangered or threatened by the state or federal government or both
* species of concern as determined by the U.S. Fish and Wildlife Service (those which appear or are suspected to be declining and may eventually fall under one of the categories listed above)
* those species noted as rare or vulnerable by authorities on the specific taxa and not necessarily recognized by the State or Federal Endangered Species Act (such as insects)

In addition, note whether the habitat type is part of critical or essential habitat for the taxa listed above and restricted to the project area.

Resource Values

Note any historical and/or cultural importance related to the species or habitat. Also describe any economic, scientific, medicinal or recreational value related to the species or habitat. Non-governmental organizations, local community associations, oral histories, Hawaiian language texts, kupuna and recreational users can be consulted to obtain this information. The book, **Valued Economic Ecosystem Components** by Gorden Orian, identifies various resource economic indices that may be of assistance in this analysis.

3. Shelf life of biological surveys

If the biological survey for a given site is older than 5 years it should be updated. A new "walk through" of the site should be performed at a minimum. Project proponents should also consult with area experts to determine if any changes have occurred since the area was last surveyed.

Part II. Ecosystem Impact Analysis

1. Consistency with existing land use policy

The EA should include a full discussion of how the proposed action corresponds to existing county and state land use requirements, goals and objectives related to conservation. The analysis should relate to the following:

* State and county zoning
* County General Plans
* State Plan
* State Environmental Policy (HRS 344)

2. Habitat fragmentation and encroachment assessment

Determine whether the proposed action reduces the principal community types which are located on the given site and are part of the larger ecological community outside the project area.

For example, if the project alters native forest that occupies 10% of the project area, but represents 50% of that forest type remaining in the district, then the impact analysis should cover both the reduction of vegetation in the immediate project area and in the district as a whole.

Identify and assess areas that are generally intolerant to change such as wetland habitat, dryland forests and coral reefs. Analyze potential impacts resulting from catastrophic events (e.g. hurricanes, fires and landslides) in addition to the project impacts. Consider this cumulative impact on the survival of any species.

Noise impacts on the area should also be considered.

3. Alien species importation

Indicate whether and how the proposed action increases the potential for alien species dispersal that may affect native species. For example, if temporary access roads/corridors are to be built through pristine forest for construction in a disturbed area, discuss how the construction of access roads could increase

alien plant dispersal. Encroachment of exotic grasses that increase the area's fire hazard can also be a concern.

4. Cultural impact analysis

Discuss potential impacts to the cultural use of biological resources. The analysis should relate to native gathering and other traditional subsistence practices (e.g., fishing, aquaculture) as well as current cultural activities (e.g., commercial, scientific, recreational, educational).

5. Impacts on Streams and Coastal Waters

A project's impact on streams, rivers and coastal waters should be assessed. A project that alters streams could impact upon the following:

* wetlands, estuaries and fisheries
* native species, food sources, water quality, temperature and nutrient load
* reduction in flow leading to increased predation or competition from alien species
* siltation or contamination of habitat from run-off
* ground water resources or agricultural uses

Part III. Proposed mitigation measures

1. Vegetation alteration

If the proposed action reduces and/or alters existing vegetation, mitigation measures may include the following:

* incremental clearing of project site to reduce erosion and siltation
* concurrent application of geotextiles or other proven techniques in erosion-prone areas
* revegetation with native species

2. Alien species introduction and establishment

If the project is shown to increase the potential for alien species importation, then mitigation should include the cleaning of gear, equipment and clothing before, during and after the project is completed.

3. Ecosystem-wide and species-specific management of significant biological resources

If the project potentially impacts significant biological resources, mitigation of impacts should go beyond mere avoidance of the resources. The EA should consider direct management

and/or protection of sensitive species and their supporting ecosystems, to include the following:

* ecosystem protection planning: designation of heavy impact activities to areas within the project that can sustain them (e.g., previously degraded areas)
* habitat enhancement: selective weeding, native species outplanting
* subsequent monitoring: engage foresters and/or biologists to monitor effects of actions over time and direct additional management actions as needed

4. Project design

To reduce or mitigate a project's impacts, it may be appropriate to integrate the following components into its design:

* buffer zones to protect fragile areas
* walkways or boardwalks to protect sensitive areas
* native landscaping appropriate to the area
* detention and retention basins to control run-off
* vegetated rather than channelized stream banks

5. Alternative analysis

To direct harmful development away from sensitive native ecosystems, the project proponent should consider employing conservation techniques such as land exchanges, conservation easements, and management agreements with non-profit organizations. The Trust for Public Land and the Nature Conservancy, among other organizations, may provide technical assistance with developing these options.

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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.

(17)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Ms. Genevieve Salmonsen, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Waiau Fuel Pipeline Project

Dear Ms. Salmonsen:

Thank you for your November 7, 2001 letter concerning the *Environmental Assessment/Environmental Impact Statement Preparation Notice* for Hawaiian Electric Company's Waiau Fuel Pipeline Project. We appreciate the time that you and your staff spent reviewing the document and preparing your comments. Brief responses to your comments and suggestions follow below. We have reproduced your comments verbatim in italics immediately before each response.

(1) BIOLOGICAL RESOURCES AND ECOSYSTEM IMPACT ANALYSIS. In the environmental setting, please discuss the biological resources in the vicinity of the pipeline that may be affected by discharges from the pipeline. A copy of the Environmental Council's guidance for biological surveys, ecosystem impact analysis and mitigation measures.

RESPONSE: We appreciate the copy of Environmental Council's guidance concerning biological surveys. We will use it in preparing the *Draft Environmental Impact Statement (DEIS)*.

(2) PAST DISCHARGES AND DISCUSSION OF IMPACTS (DIRECT, INDIRECT AND CUMULATIVE) AND MITIGATION ON SURFACE WATER, GROUND WATER, AIR QUALITY AND AQUATIC RESOURCES. Please consult with the Office of Hazard Evaluation and Emergency Response of the Department of Health and include a discussion of past leaks from the pipelines, effects on sensitive environments such as the national wildlife refuge and past and proposed mitigative measures. Please include also a discussion of air quality impacts, surface water impacts, ground water impacts and mitigation measures.

RESPONSE: The *DEIS* will include a discussion of previous contamination within the State Energy Corridor and other areas where construction activities have the potential to disturb existing material. It will also discuss the extent to which the various alternatives have the potential to affect sensitive habitats, including National Wildlife Refuges. Finally, the *DEIS* will discuss potential impacts on air quality, surface water, and ground water, and summarize the mitigation measures that will be taken to avoid or minimize these.

(3) CULTURAL IMPACTS. Please include in the DEIS an assessment of impacts to cultural resources and cultural practices based on interviews with community members

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and cultural practitioners (gatherers, etc.) in the Honolulu and 'Ewa regions. What impacts (if any) will the proposed action have on cultural practices and resources in this area? Chapter 343, Hawai'i Revised Statutes now requires that cultural impacts be assesses (see enclosed copy of Act 50, SLH 2000). A copy of the Environmental Council's guidelines for assessing cultural impact is enclosed for your use.

RESPONSE: The *DEIS* will include an assessment of impacts on cultural resources and practices.

Our present schedule calls for us to publish the Draft Environmental Impact Statement in March 2002. We will send a copy of that document to your office for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or our planning consultant, Mr. Perry White of Planning Solutions, Inc., at (808) 593-1288.

Sincerely,

Ken Feng, P.E.
Project Manger

cc: Perry White, Planning Solutions, Inc.
James Smith, Harbors Division, State DOT

(18)

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.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

2001/ELOG-4095(RY)

November 7, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: HECO Waiau Fuel Line Project Environmental Assessment/
Environmental Impact Statement Preparation Notice (EISPN)

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

A. General Plan and Development Plans

The project is located in the Ewa Development Plan and the Central Oahu Development Plan areas. The EISPN should address the project's consistency with applicable policies and provisions of said Development Plans (DP). The EISPN should address in particular how the project relates to the DP's establishment of a rapid transit corridor along portions of Farrington Highway, integration of the project with other modes of transportation such as bikeways, and the use of utility corridors as future greenways. For your information, the Central Oahu Development Plan is under a major plan revision as the Central Oahu Sustainable Communities Plan and the EISPN should compare the project with proposed changes to the existing Central Oahu DP.

B. Pearl Harbor Historic Trail Master Plan (PHHT)

The EISPN should address the following with respect to the PHHT:

1. Location of the pipeline alignment in relation to the OR&L right-of-way including proposed crossings and overlaps;

2. Locations where the pipeline and/or block and check valves will be above grade and associated visual impacts mitigation measures; and,

3. Other potential impacts of the project such as sensitivity to community desires for pedestrian/bicycle-friendly goals of the PHHT. For example, how will exposed portions of the pipeline and warning signs be sensitive to the goals of the PHHT?

The EISPN should also address other possible conflicts such as sensitivity to planned extensions of train operations within the PHHT right-of-way.

C. Zoning

1. Portions of the project are within the Special Management Area. The portion of the proposed fuel line within the State Energy Corridor (SEC) is exempt from obtaining a Special Management Area Permit (SMP) under Section 25-1.3(2)(M) of the Revised Ordinances of Honolulu. However, the fuel line must be less than four feet high to qualify for this exemption.

Any SMA portion of the proposed fuel line that is not within the SEC and not within any existing easement or corridor will require a SMP. Areas of the project that are subject to an SMP should be described in the Draft Environmental Impact Statement (DEIS), and requirements requiring an environmental assessment under Chapter 25, ROH, should be addressed to avoid another supplemental assessment.

2. A new maintenance and storage building, truck loading facility, diesel storage fuel tank, metering facilities, and other exterior improvements are proposed at the Barbers Point Tank Farm (BPTF). We were unable to determine from the size and scale of the map in the EISPN whether the BPTF is within the Special Management Area (SMA). An SMP will be required if the BPTF is within the SMA.

3. Section 2.1.6 of the EISPN states that a metering facility and pig launcher and retriever system would be installed at the Waiau Generating Station. A site plan of the Waiau Generating Station should be included in the DEIS showing the location of the pig launcher and other improvements.

D. Civil Engineering

Tables 2-7, 2-8, and 2-10 should be revised to indicate that Grubbing, Grading & Stockpiling Permits, Building Permits, Construction Dewatering Permits, Permits to Excavate Public Rights-of-Way, and Permits to Discharge to Storm Sewer are issued by the Department of Planning and Permitting and not the Department of Design and Construction.

The Permit to Discharge Effluent (during the hydrotesting activity) which is issued by the Department of Environmental Services should also be included in the above tables.

Thank you for the opportunity to comment. If you have any questions, please contact Raymond Young of our staff at 527-5839.

Sincerely yours,

RANDALL K. FUJIKI, AIA
Director of Planning and Permitting

RKF:lh
Doc 123680

(18)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Randall K. Fujiki, AIA
Director of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Mr. Fujiki:

Thank you for your November 7, 2001 letter (your reference 2001/ELOG-4095(RY) concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you and members of your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter. A major purpose of the EISPN is to identify issues that should be addressed in the *Draft Environmental Impact Statement (DEIS)*, and your letter helps us determine the scope of the studies we will undertake.

Brief responses to your comments follow below. Your comments have been reproduced in italics immediately before each response.

A. General Plan and Development Plans

Comment. The project is located in the Ewa Development Plan and the Central Oahu Development Plan areas. The EISPN should address the project's consistency with applicable policies and provisions of said Development Plans (DP). The EISPN should address in particular how the project relates to the DP's establishment of a rapid transit corridor along portions of Farrington Highway, integration of the project with other modes of transportation such as bikeways, and the use of utility corridors as future greenways. For your information, the Central Oahu Development Plan is under a major plan revision as the Central Oahu Sustainable Communities Plan and the EISPN should compare the project with proposed changes to the existing Central Oahu DP.

RESPONSE: We appreciate your guidance concerning relevant O'ahu General Plan and Development Plan topics that should be discussed in the *Draft Environmental Impact Statement*. We will include the information you have requested in it.

B. Pearl Harbor Historic Trail Master Plan (PHHT)

The EISPN should address the following with respect to the PHHT:

1. *Location of the pipeline alignment in relation to the OR&L right-of-way including proposed crossings and overlaps;*
2. *Locations where the pipeline and/or block and check valves will be above grade and associated visual impacts mitigation measures; and,*

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3. Other potential impacts of the project such as sensitivity to community desires for pedestrian/bicycle-friendly goals of the PHHT. For example, how will exposed portions of the pipeline and warning signs be sensitive to the goals of the PHHT?

The EISPN should also address other possible conflicts such as sensitivity to planned extensions of train operations within the PHHT right-of-way.

RESPONSE: Input that HECO has received during meetings with public officials, community leaders, and private citizens has emphasized the value of these existing and planned corridors. The *DEIS* will discuss the relationship of the various alternatives to the *PHHT*. The discussion will include a description of locations where the pipeline and related valves would be above grade, as well as measures that will be used to avoid or mitigate their visual impacts.

We have met with the Friends of the PHHT, elected officials, City planners, and the Hawaiian Railway Society to understand their concerns and learn about their plans for the Pearl Harbor Historic Trail development. While the proponents have not yet developed detailed plans for the bicycle paths and railway line that are part of the Historic Trail concept, our discussions strongly suggest that pipelines (including those within the SEC), bikeways, and the historic railway can continue to share the same right-of-way. HECO will continue to work together with all interested parties as the concepts for the PHHT are further developed.

Our preliminary engineering studies for the two pipeline alternatives suggest that access to the existing railway ROW and to existing bicycle, walking, and jogging paths may need to be modified or interrupted for short periods during pipeline construction to ensure public safety. HECO and its contractor would work with City and State agencies, including the City's bicycle coordinator, to ensure that adequate notification is provided of any temporary closures that are needed. All areas affected by pipeline construction activities would be restored to their pre-construction condition. Where practical, HECO would identify alternate routes that trail users may follow during the brief periods when construction activities may interrupt normal use.

I have asked Planning Solutions, Inc., our consultant preparing the *DEIS*, to contact Mr. Raymond Young of your staff to discuss this issue. In particular, he will be seeking information concerning the ways in which planners for the PHHT have taken into account interactions between the train and the existing Chevron and other pipelines within the portions of the PHHT right-of-way that are outside the SEC.

C. Zoning

C.1. Portions of the project are within the Special Management Area. The portion of the proposed fuel line within the State Energy Corridor (SEC) is exempt from obtaining a Special Management Area Permit (SMP) under Section 25-1.3(2)(M) of the Revised Ordinances of Honolulu. However, the fuel line must be less than four feet high to qualify for this exemption.

Any SMA portion of the proposed fuel line that is not within the SEC and not within any existing easement or corridor will require a SMP. Areas of the project that are subject to an SMP should be described in the Draft Environmental Impact Statement (DEIS), and requirements requiring an environmental assessment under Chapter 25, ROH, should be addressed to avoid another supplemental assessment.

RESPONSE: The proposed utility pipeline will be installed underground along an existing corridor and its appurtenant aboveground structures will be less than four feet in height. Based on previous

consultation with your Department[1], we confirmed that the pipeline and its appurtenant facilities are exempt from the SMA requirements. The only component of the project that will require a Special Management Area Permit is the modification to the existing pipeline overpass into the main part of the Waiau Generating Station. The next response provides additional information concerning this coordination.

C.2. A new maintenance and storage building, truck loading facility, diesel storage fuel tank, metering facilities, and other exterior improvements are proposed at the – Barbers Point Tank Farm (BPTF). We were unable to determine from the size and scale of the map in the EISPN whether the BPTF is within the Special Management Area (SMA). An SMP will be required if the BPTF is within the SMA.

RESPONSE: The proposed facilities at the BPTF are outside of the SMA. This was also confirmed in DPP's November 20, 2000 letter to Mr. White of Planning Solutions, Inc. [DPP Reference 2000/CLOG-5475 (ask)] states: "*We confirm that... the Barbers Point and Iwilei Tank Farms are not within the SMA.*" DPP's determination was based on a review of location drawings containing more detail than those we included in the *EA/EISPN*.

C.3. Section 2.1.6 of the EISPN states that a metering facility and pig launcher and retriever system would be installed at the Waiau Generating Station. A site plan of the Waiau Generating Station should be included in the DEIS showing the location of the pig launcher and other improvements.

RESPONSE: The *DEIS* will include a site plan showing the location of the metering facility, pig launcher, and other facilities that would be installed at the Waiau Generating Station.

D. Civil Engineering

Tables 2-7, 2-8, and 2-10 should be revised to indicate that Grubbing, Grading & Stockpiling Permits, Building Permits, Construction Dewatering Permits, Permits to Excavate Public Rights-of-Way, and Permits to Discharge to Storm Sewer are issued by the Department of Planning and Permitting and not the Department of Design and Construction.

The Permit to Discharge Effluent (during the hydrotesting activity) which is issued by the Department of Environmental Services should also be included in the above tables.

RESPONSE: The tables in the *DEIS* will incorporate the changes you suggested.

Our present schedule calls for us to publish the *DEIS* in March 2002. We will send copies to the Department of Planning and Permitting for review and comment as soon as the document is available. In the meantime, if you have any questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

[1] Reference: DPP letters 2000/CLOG-5475 (ask) dated Nov 20, 2000 and 2000/CLOG-5475 (ask) dated July 9, 2001.

19

SIERRA CLUB
HAWAI'I CHAPTER
P.O. Box 2777, Honolulu, HI 96803
tel: 808.538.6616 fax: 808.537.5019

6 November 2001

State Department of Transportation
Attn: James Smith
869 Punchbowl St.
Honolulu, HI 96813

Hawaiian Electric Company, Inc.
Attn: Ken Fong
820 Ward Ave
Honolulu, HI 96813

RE: Waiau Fuel Pipeline Project Environmental Impact Statement Preparation Notice

The Sierra Club, Hawai'i Chapter, would like the following issues address more thoroughly in the Environmental Impact Statement for the Waiau Fuel Pipeline Project.

1. ALTERNATIVES

- The EISPN states that the HECO's Waiau facility will be burning low sulfur fuel oil, particularly "black oil," or oil that is so viscous it needs to be heated to over 165 degrees F in order to flow freely. Does HECO plan to change the fuel composition for the Waiau or downtown facilities? How will this change impact the Clean Air Act permits that are currently in place for the facilities?

- The Ewa region has developed considerable since the Waiau facility was constructed. The region—primarily downwind from the Waiau facility—is now highly populated. What are the impacts on the Ewa population of the emissions from the burning of the forecasted 1.8 to 3.0 million barrels of LSFO annually at the Waiau facility?

- Hawaii Administrative Rules 11-200-17(f)(2) states that alternatives that should be examined include: "Alternatives requiring actions of a significantly different nature which could provide similar benefits with different environmental impacts." Has HECO examined alternatives such as replacing the existing Waiau or downtown facilities through demand side management and renewable energy projects? Other municipalities have successfully made this switch. Sacramento Municipal, for instance, shut down an 800 MW nuclear reactor and replaced it with 400 MW of demand side management ("conservation

Jeff Mikulina, Director mikulina@aya.net

powerplant") and 400 of alternative energy. They did it by installing photovoltaics (PV) on 450 homes, at utility expense, and then developed a buy-down program to yield another 1500 PV roofs. Sacramento is spending about 3% of its revenue for energy alternatives, 0.7% going to support their massive PV installation program, and the utility is not increasing its rates. HECO's Waiau facility is smaller—approximately 500 MW. Has HECO examined such an alternative for the Waiau facility?

- The Waiau facility is an oil-fired steam boiler. Has HECO considered converting the Waiau facility to a gas turbine or a more efficient power generation facility? What are the impacts (economically, on the pipeline need, on the environment) of such a conversion?

- On page 1-2 of the EISPN it is noted that "Continued operation of the Waiau Generating Station does not, and will not, preclude HECO's efforts to pursue meeting future energy needs with additional generation utilizing new technologies, including renewable energy and other developing technologies." What efforts to pursue meeting future energy needs with additional generation utilizing new technologies, including renewable energy and other developing technologies is HECO currently undertaking? What is HECO's progress in complying with Act 272, Session Laws 2001, where HECO must provide renewable energy for eight per cent of its net electricity sales by December 31, 2005, and nine per cent of its net electricity sales by December 31, 2010?

- While the EISPN claims that the heavy fuel oil pipeline will not preclude efforts at alternative generation, the investment in the pipeline is nearly $30 million. It is clear that this investment will "lock-in" the Waiau facility to burning the heavy oil for some time. What will be the opportunity cost of the alternatives foregone to complete this pipeline project?

2. PIPELINE CORRIDOR

- What efforts will be made to avoid the Puohala Marsh and other sensitive wetlands near Pearl Harbor?

- Will HECO co-locate a bikeway along the pipeline corridor?

- Will HECO underground its high-voltage powerlines along the corridor as long as they are already doing construction?

3. OTHER CONCERNS

- It is disturbing to see that one of the reasons not to purchase or use the existing Chevron pipeline is because of the potential presence of contamination from previous leaks along

the pipeline. What is currently being done to detect and decontaminate the soils or waters that have been contaminated with HECO fuel flowing through Chevron's pipeline?

- If Chevron is moving operations to the Barber's Point Deep Draft Harbor, will they abandon the existing pipeline?
- Will ratepayers by paying the estimated $6.2 million annual cost for 30 years of constructing this pipeline? How much will the average ratepayer's bill rise because of this development?

We appreciate the opportunity to offer these comments and look forward to your response.

Sincerely,

Jeff Mikulina
Director, Sierra Club, Hawai'i Chapter

cc: Office of Environmental Quality Control

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Jeff Mikulina, Director
Sierra Club Hawai'i Chapter
P.O. Box 2577
Honolulu, HI 96803

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Mr. Mikulina:

Thank you for your November 6, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Line project. HECO appreciates the time you and other members of the Hawai'i Chapter spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter. A major purpose of the *EISPN* is to identify issues that should be addressed in the *Draft Environmental Impact Statement (DEIS)* and your letter helps us in determining the scope of our studies.

Responses to your comments follow below. We have reproduced your comments in italics immediately before each response.

Comments Relating to Alternatives

I. ALTERNATIVES

Comment 1.1 The EISPN states that the HECO's Waiau facility will be burning low sulfur fuel oil, particularly "black oil, " or oil that is so viscous it needs to be heated to over 165 degrees F in order to flow freely. Does HECO plan to change the fuel composition for the Waiau or downtown facilities? How will this change impact the Clean Air Act permits that are currently in place for the facilities?

RESPONSE: HECO does not plan to change the fuel composition for the Waiau or Honolulu Generating Stations. Use of a HECO-owned pipeline will have no effect on emissions from the two facilities, nor would it require changes to current air permits. This issue will not be addressed in the *DEIS*.

Comment 1.2. The Ewa region has developed considerable (sic) *since the Waiau facility was constructed. The region – primarily downwind from the Waiau facility – is now highly populated. What are the impacts on the Ewa population of the emissions from the burning of the forecasted 1.8 to 3.0 million barrels of LSFO annually at the Waiau facility?*

RESPONSE: The proposed Waiau Fuel Line Project represents an alternative means of delivering fuel to an existing facility. It will not alter the way in which the generating units at Waiau are operated or change other factors that would affect air emissions from the facility. Because of this, the Environmental Impact Statement will not include a discussion of the generating units' emissions. Those generating units operate under the terms of an air quality permit approved by the Environmental Protection Agency and issued by the State of Hawai'i Department of Health in April 2001. Issuance of the permit, which

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authorizes burning of 6 million barrels of LSFO annually, confirms that under maximum operating conditions Waiau complies with the health-based State and Federal ambient air quality standards. Additionally, air quality monitoring data collected by the Department of Health in the Ewa and Barber's Point areas consistently show compliance with these health-based standards by wide margins.

Comment 1.3. Hawaii Administrative Rules 11-200-17 (f)(2) states that alternatives that should be examined include: "Alternatives requiring actions of a significantly different nature which could provide similar benefits with different environmental impacts." Has HECO examined alternatives such as replacing the existing Waiau or downtown facilities through demand side management and renewable energy projects? Other municipalities have successfully made this switch. Sacramento Municipal, for instance, shut down an 800 MW nuclear reactor and replaced it with 400MW of demand side management ("conservation powerplant") and 400 of alternative energy. They did it by installing photovoltaics (PV) on 450 homes, at utility expense, and then developed a buy-down program to yield another 1500 PV roofs. Sacramento is spending about 3% of its revenue for energy alternatives, 0.7% going to support their massive PV installation program, and the utility is not increasing its rates. HECO's Waiau facility is smaller – approximately 500 MW. Has HECO examined such an alternative for the Waiau facility?

RESPONSE: You cited one of five examples cited in Hawaii Administrative Rules HAR, §11-200-17 (the Department of Health's Environmental Impact Statement Rules). Section 1.4 of the EA/EISPN describes the manner in which HECO identified the alternatives that would be evaluated in detail in the EIS and addresses the content requirements of draft and final environmental impact statements (EIS). It presents the full text from HAR §11-200-17(f). That section states:

"(f) The draft EIS shall describe in a separate and distinct section alternatives which could attain the objectives of the action [emphasis added], regardless of cost, in sufficient detail to explain why they were rejected. The section shall include a rigorous exploration of the environmental impacts of all such alternative actions. Particular attention shall be given to alternatives that might enhance environmental quality or avoid, reduce, or minimize some or all of the adverse environmental effects, costs, or risks. Examples of alternatives include:

(1) The alternative of no action;

(2) Alternatives requiring actions of a significantly different nature which could provide similar benefits with different environmental impacts;

(3) Alternatives related to different designs or details of the proposed action which would present different environmental impacts;

(4) The alternative of postponing action pending further study; and

(5) Alternative locations for the proposed project.

In each case the analysis shall be sufficiently detailed to allow a comparative evaluation of the environmental benefits, costs, and risks of the proposed action and each reasonable alternative."

In its full context, HAR §11-200-17(f) makes it clear that the "alternatives" that must be addressed are those that "could attain the objectives of the proposed action". Section 1.4.2 of the EISPN notes the critical importance of this in defining alternatives for analysis and explains:

"In the case of the Waiau Fuel Pipeline Project, HECO's objective can be succinctly stated as follows:

> To provide an assured means of continuing to supply fuel to its Waiau Generating Station over the long term while maintaining environmental quality and maintaining costs to its customers at a reasonable level. These costs include those that could result from a leak or other failure in the system as well as operating and capital costs."

Replacing the existing Waiau or downtown facilities through demand side management ("DSM") and renewable energy projects would not achieve the objectives of the proposed action, which is to provide an assured means of continuing to supply fuel to the Waiau Generating Station while maintaining environmental quality and maintaining costs to our customers at a reasonable level. Consequently, the types of actions you cited are not "alternatives" as the term is used in Chapter 343 or HAR §11-200 and will not be included as alternatives in the *DEIS*.

The ~500 MW Waiau Generating Station provides about a third of the electricity needed for O'ahu. Because it is one of the island's principal sources of electricity, it is neither feasible nor cost-effective to attempt to replace the plant with DSM or alternative energy sources now or in the near future.

HECO's intent to improve fuel delivery to its existing generating station at Waiau is not a choice between fossil fuel and alternate energy for the future. Construction of the fuel pipeline will not preclude or lessen our support for the development of renewable energy technologies. Instead, it will simply allow us to transport fuel more efficiently, at a lower cost, to existing generating units at the Waiau Generating Station.

We will be contacting you shortly to provide you with additional information concerning the experience of Sacramento Municipal District.

Comment 1.4. The Waiau facility is an oil-fired steam boiler. Has HECO considered converting the Waiau facility to a gas turbine or a more efficient power generation facility? What are the impacts (economically, on the pipeline need, on the environment) of such a conversion?

RESPONSE: In HECO's two previous Integrated Resource Plans (IRPs), repowering the Waiau Power Plant and retirement of existing Waiau units were reviewed. Both IRPs found that the continued operation of the existing generating units at the Waiau Generating Station would best meet the island's near and long-term energy needs in an efficient and reliable manner at the lowest reasonable cost. HECO's current plans call for the continued operation of the Waiau Generating station for the foreseeable future. Because replacing the existing LSFO-fired units at Waiau would not meet the objectives of the proposed action, the *DEIS* will not treat this as an alternative.

Comment 1.5. On page 1-2 of the EISPN it is noted that "Continued operation of the Waiau Generating Station does not, and will not, preclude HECO's efforts to pursue meeting future energy needs with additional generation utilizing new technologies, including renewable energy and other developing technologies." What efforts to pursue meeting future energy needs with additional generation utilizing new technologies, including renewable energy and other developing technologies is HECO currently undertaking? What is HECO's progress in complying with Act 272, Session Laws 2001, where HECO must provide renewable energy for eight per cent of its net electricity sales by December 31, 2005, and nine per cent of its net electricity sales by December 31, 2010?

RESPONSE: HECO is committed to reducing Hawai'i's use of oil by supporting renewable energy and energy efficiency programs. Our support has made Hawai'i one of the nation's leaders in both areas and we intend to continue and increase that support in the years to come. We appreciate the Sierra Club's interest in learning more about our alternate energy efforts. However, a complete discussion of HECO's renewable and alternative energy activities falls outside of the scope of the EIS process for the Waiau Fuel Pipeline project since these are not alternatives as defined by Chapter 343 or HAR §11-200. Hence, such a discussion will not be included in the *DEIS*.

We will be contacting you shortly to provide additional information concerning our continuing renewable and alternate energy efforts as well as our progress in meeting the goals of Act 272.

Comment 1.6. While the EISPN claims that the heavy fuel oil pipeline will not preclude efforts at alternative generation, the investment in the pipeline is nearly $30 million. It is clear that this investment will "lock-in" the Waiau facility to burning the heavy oil for some time. What will be the opportunity cost of the alternatives foregone to complete this pipeline project?

RESPONSE: HECO's investment in the new fuel pipeline will not "lock in" the Waiau Generating Station to burning heavy fuel oil. HECO's completion of the Waiau Fuel Pipeline Project will not preclude or lessen our support for the development of renewable energy or alternate energy technologies. This project to improve fuel delivery to an existing plant is by no means a choice between fossil fuel and alternate energy for the future. Instead, it will simply allow us to transport fuel more efficiently, at a lower cost, to the Waiau Generating Station. This issue will not be discussed further in the *DEIS*.

2. PIPELINE CORRIDOR

Comment 2.1. What efforts will be made to avoid the Puohala [sic] Marsh and other sensitive wetlands near Pearl Harbor?

RESPONSE: HECO intends to avoid the Pouhala Marsh by deviating from the SEC in the sensitive areas. As stated in the last paragraph on page 2-2 of the *EA/EISPN*, HECO's proposed pipeline route leaves the SEC after crossing Waikele Stream. Instead, the proposed route follows the former OR&L right-of-way in order to avoid the marsh. This deviation is the direct result of early consultation with resource management agencies and of our determination to minimize the potential for environmental harm through wise design choices.

The portion of the SEC that is within Pouhala Marsh would be used only if the State will not grant HECO the easement within the former OR&L right-of-way that the company needs to bypass the marsh and if the State Department of Land and Natural Resources were to grant the Conservation District Use Permit needed to route the line through Pouhala Marsh. The remainder of the SEC is outside wetland areas, as is the portion of the proposed route within Campbell Industrial Park.

Portions of HECO's Waiau Generating Station property are leased to watercress farmers and do qualify as wetlands. Preliminary engineering plans for this area call for the pipeline to be suspended above ground in this area, thereby avoiding fill or other substantial disturbance to the wetland.

Comment 2.2. Will HECO co-locate a bikeway along the pipeline corridor?

RESPONSE: HECO's project involves the construction of a utility pipeline. Hence, while portions of the proposed pipeline and other pipelines within the SEC are collocated with the bikeway, it is not within the scope of our project to construct a bikeway.

Concerning plans for future bikeways, we met with the Friends of the Pearl Harbor Historic Trail (PHHT), elected officials, City planners, and the Hawaiian Railway Society to understand their concerns

relative to pipeline construction and maintenance in areas where the SEC and OR&L right-of-way overlap and to learn about their plans for the PHHT development. While the proponents have not yet developed detailed plans for the bicycle paths and railway line that are part of the Historic Trail concept, our discussions strongly suggest that pipelines (including those within the SEC), bikeways, and the historic railway are mutually compatible and can continue to share the same right-of-way. Additionally, we have been working with the Department of Transportation to coordinate construction of the new pipeline and the proposed Leeward Bikeway project. We will continue to work together with all interested parties as the concepts for the PHHT are further developed.

Regarding the existing bikeways in general, our preliminary engineering studies for the two pipeline alternatives suggest that access to the existing railway ROW and to existing bicycle, walking, and jogging paths may need to be modified or interrupted for brief periods during pipeline construction to ensure public safety. HECO and its contractor will work with City and State agencies, including the City's bicycle coordinator, to ensure that adequate notification is provided of any temporary closures that are needed. All areas affected by pipeline construction activities will be restored to their pre-construction condition. Where practical, HECO will identify alternate routes that trail users may follow during the brief periods when construction activities may interrupt normal use.

Comment 2.3. Will HECO underground its high-voltage powerlines along the corridor as long as they are already doing construction?

RESPONSE: HECO will not relocate any electrical transmission lines as part of the Waiau Fuel Pipeline project. Issues related to relocation of existing or future electric transmission lines are beyond the scope of our fuel pipeline project and will not be addressed in the *DEIS*.

For your information, cost issues aside, there are several reasons why it is not possible to relocate the 138 kV transmission facilities from their overhead location to an underground facility sharing a slot in the State Energy Corridor (SEC).

- Some of the easements that the State obtained from landowners when it established the SEC limit the use of the corridor to pipelines. They do not give the State the right to allow the corridor to be used for the transmission of electricity.
- The existing SEC right-of-way is not large enough to accommodate the new underground 138 kV circuits. Replacing the two existing overhead 138 kV circuits would require a right-of-way width of approximately 18 to 22 feet to accommodate the new underground duct banks. This is far more space than is available within the State Energy Corridor.
- Safety issues associated with co-locating fuel and electric transmission lines in close proximity to one another are a concern. The SEC and railway ROW are non-exclusive easements, sharing portions of the land with numerous other utility lines (water, sewer, etc.) as well as with other fuel lines (owned by Chevron, the U.S. Navy, and others). Protection against induced and fault currents from the buried electric transmission lines onto these buried pipelines is a serious concern; further study of this issue would be needed to confirm that the lines can be safely co-located.

3. OTHER CONCERNS

Comment 3.1. It is disturbing to see that one of the reasons not to purchase or use the existing Chevron pipeline is because of the potential presence of contamination from previous leaks along the pipeline. What is currently being done to detect and decontaminate the soils or waters that have been contaminated with HECO fuel flowing through Chevron's pipeline?

RESPONSE: It appears that this comment is related to the discussion in the second bullet item of Section 2.2.5 of the EA/EISPN. That section correctly notes that over its 40-plus years the existing Chevron pipeline has experienced leaks. To the best of our knowledge, none of the leaks have involved oil owned by HECO.

We are aware that hazardous materials may be encountered during construction. HECO has already performed a Phase I Environmental Site Assessment ("ESA") to identify areas where hazardous materials are most likely to be encountered and will take special precautions in these areas. These precautions will include soil testing. In particular, we plan to have a Phase II ESA performed concurrent with construction. If contamination is encountered, it will be handled in accordance with the provisions of the *Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan* (Hawai'i State Department of Health, 1996). This issue will be included in the *DEIS*.

> *Comment 3.2. If Chevron is moving operations to the Barber's Point Deep Draft Harbor, will they abandon the existing pipeline?*

RESPONSE: Chevron has notified HECO that it intends to transfer interisland barge shipments of fuel from Pier 30 in Honolulu Harbor to the Kalaeloa-Barbers Point Deep Draft Harbor by January 2002. Additionally, Chevron has indicated to us that it intends to use its existing black oil pipeline for transportation fuels should HECO construct its own pipeline. We hope to include summary information concerning Chevron's position on this matter in the *DEIS*, but you will need to contact Chevron directly if you would like detailed information or need to have it before the *DEIS* is published.

> *Comment 3.3. Will ratepayers by [sic] paying the estimated $6.2 million annual cost for 30 years of constructing this pipeline? How much will the average ratepayer's bill rise because of this development?*

RESPONSE: Our customers will pay less with the proposed new fuel pipeline project than continuing with the current contract arrangement. However, because utility ratemaking involves a comprehensive examination of all of the company's costs, expenses and potential revenues to determine how much, if any, rate increase is appropriate, the potential effect on an individual ratepayer's bill of a specific project like the proposed Waiau Fuel Pipeline cannot be accurately stated and thus not be included in the *DEIS*.

Our present schedule calls for us to publish the *DEIS* in March 2002. We will send a copy to the Sierra Club for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project or the items discussed above, you can call me at 543-7746 or Mr. Perry White of Planning Solutions Inc., our environmental planning consultant, at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manger

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
James Smith, Harbors Division, State DOT

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Comments on the Environmental Impact Statement Preparation Notice for the proposed HECO pipeline from Campbell Industrial Park to Waiau.

The following requests/questions arose at the Environment and Zoning committee of the Makakilo-Kapolei-Honokai Hale Neighborhood Board:

I

The EIS should discuss in great detail the *economic ramifications of building the pipeline for the island of O'ahu*. People are part of the environment. HECO says that it will save $35 million dollars over the next ten years by having its own pipeline. This savings is over and above the costs of laying the new line. One of our concerns is what Chevron will do when it no longer has this income for its line. Will it pass that $35 million on to the consumer, as can be expected from their past treatment of our state? If HECO saves $35 million, will they pass that savings on to the electricity consumers in the state? The people of Hawaii have been educated by experience to expect to be taken advantage of in all situations by all of our monopolistic or near monopolistic corporations. What are the guarantees that this will be a financial wash for the consumer? If there are no guarantees, what kind of guarantees can be built into the deal?

II

The people of West O'ahu are deeply grieved by the construction of the gargantuan ugly utility poles which HECO has stretched across our plain. Many of us cannot avoid seeing them everyday, which causes the pain and anguish to grow. Although HECO could not afford to put these gross looking power lines underground, HECO can afford to put a new pipeline underground. While this pipeline is being put underground, what can be done about the present power lines on the ugly stanchions stretching across the plain? Can a companion pipe be laid into which these and future power lines can be put underground? Is there another place—the railroad right-away for instance—where the two pipes can be laid together, or in relatively close proximity to each other. Representing the citizens of the Leeward area we formally ask those doing the EIS to use this study to find a way to put all present and future above ground lines below ground, and to do so as cheaply as possible while laying this proposed pipe.

These questions and requests were submitted by Dr. Kioni Dudley, 92-1218 Hulukoa Place Makakilo, Hawaii 96707 Phone: (808) 672-8888. Dr. Dudley is member of the Committee on Environment and Zoning, and a member of the Neighborhood Board No. 38.

Dr. Kioni Dudley
Signature

Nov. 3 2001
Date

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-00(

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December 14, 2001

Dr. Kioni Dudley
92-1218 Hulukoa Place
Makakilo, Hawai'i 96707

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Dr. Dudley:

Thank you for your November 3, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you spent reviewing the Environmental Assessment/Environmental Impact Statement Preparation Notice *(EA/EISPN)* and preparing your comments. A major purpose of the EISPN is to identify issues that should be addressed in the *Draft Environmental Impact Statement (DEIS)*, and your comment letter helps us to determine the scope of our studies.

Information concerning the two topics addressed in your letter is provided below. We have reproduced your comments in italics immediately before each response.

I

The EIS should discuss in great detail the economic ramifications of building the pipeline for the island of O'ahu. People are part of the environment. HECO says that it will save $35 million dollars over the next ten years by having its own pipeline. This savings is over and above the costs of laying the new line. One of our concerns is what Chevron will do when it no longer has this income for its line. Will it pass that $35 million on to the consumer, as can be expected from their past treatment of our state? If HECO saves $35 million, will they pass that savings on to the electricity consumers in the state? The people of Hawaii have been educated by experience to expect to be taken advantage of in all situations by all of our monopolistic or near monopolistic corporations. What are the guarantees that this will be a financial wash for the consumer? If there are no guarantees, what kind of guarantees can be built into the deal?

RESPONSE: We understand your concern for the net benefit of the pipeline. The *DEIS* will discuss the economic implications of the various alternatives in terms of their revenue requirements from HECO's perspective. These revenue requirements form the basis of the Public Utility Commission's determination of the rates that HECO charges its customers. Alternatives with lower net revenue requirements will result in lower costs to HECO's customers.

The second part of your question asks HECO to speculate on how Chevron would deal with the effect that the loss of the income that Chevron now receives from its contract with HECO might have on the prices of Chevron's other products. We are not in a position to speak for Chevron and this issue will not be addressed in the *DEIS*.

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II

The people of West O'ahu are deeply grieved by the construction of the gargantuan ugly utility poles which HECO has stretched across our plain. Many of us cannot avoid seeing them everyday, which causes the pain and anguish to grow. Although HECO could not afford to put these gross looking power lines underground HECO can afford to put a new pipeline underground. While this pipeline is being put underground, what can be done about the present power lines on the ugly stanchions stretching across the plain? Can a companion pipe be laid into which these and future power lines can be put underground? Is there another place-the railroad right-of-way for instance-where the two pipes can be laid together, or in relatively close proximity to each other? Representing the citizens of the Leeward area we formally ask those doing the EIS to use this study to find a way to put all present and future above ground lines below ground, and to do so as cheaply as possible while laying this proposed pipe.

RESPONSE: We appreciate your feelings concerning the existing electric transmission lines. However, issues related to relocation of existing or future electric transmission lines are beyond the scope of our fuel pipeline project and will not be addressed in the *DEIS*.

There are several reasons, cost issues aside why relocating the 138 kV transmission facilities from their overhead location to an underground facility sharing a slot in the State Energy Corridor (SEC) is not possible.

- Some of the easements that the State obtained from landowners when it established the SEC limit the corridor to pipelines. They do not give the State the right to use the corridor for the transmission of electricity.
- The existing SEC right-of-way is not be large enough to accommodate the new underground 138 kV circuits. Replacing the two existing overhead 138 kV circuits would require a right-of-way width of approximately 18 to 22 feet to accommodate the new underground duct banks. This is far more space than is available within the State Energy Corridor.
- Safety issues associated with co-locating fuel and electric transmission lines in close proximity to one another are a concern. The SEC and railway ROW are non-exclusive easements, sharing portions of the land with numerous other utility lines (water, sewer, etc.) as well as with other fuel lines (owned by Chevron, the U.S. Navy, and others). Protection against induced and fault currents from the buried electric transmission lines onto these buried pipelines is a serious concern; further study of this issue would be needed to confirm that the lines can be safely co-located.

Our present schedule calls for us to publish the Draft Environmental Impact Statement in March 2002. We will send a copy of that document to you for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at (808) 543-7746 or our consultant Mr. Perry White of Planning Solutions, Inc., at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

THE OUTDOOR CIRCLE
1314 South King St., Suite 306 • Honolulu, HI 96814
Phone: 808-593-0300 Fax: 808-593-0525

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A Non-profit Organization
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North Shore
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HAWAI'I
Hilo
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Kona
Waikoloa Village
Waimea
KAUA'I
MAUI
GARDEN CIRCLE
Lani-Kai

November 3, 2001

Mr. Ken Fong
Hawaiian Electric Company, Inc.
820 Ward Avenue
Honolulu, HI 96813

RE: Environmental Impact Statement Preparation Notice (EISPN) – Waiau Fuel Pipeline Project

Dear Mr. Fong:

On behalf of The Outdoor Circle, I am writing to request that my organization be considered a contested party in the preparation of the above referenced Environmental Impact Statement. Our members have many interests in the project including its historical impacts, the need for the pipeline and the expansion of our State's dependence on fossil fuels. We strongly believe that we should be looking toward developing alternative energy sources whenever possible.

I look forward to hearing from you. Thank you for your consideration.

Sincerely,

Mary Steiner
CEO

Cc: James Smith, State Department of Transportation
✓Mr. Perry White, Planning Solutions, Inc.
Office of Environmental Quality Control

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

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December 14, 2001

Ms. Mary Steiner
Chief Executive Officer
The Outdoor Circle
1314 South King Street, Suite 306
Honolulu, Hawai'i 96814

Subject: Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Ms. Steiner:

Thank you for your November 3, 2001 letter concerning the *Environmental Assessment/ Environmental Impact Statement Preparation Notice (EA/EISPN)* for Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you spent reviewing the *EA/EISPN* and preparing your letter. A major purpose of the EISPN is to identify issues that should be addressed in the *Draft Environmental Impact Statement (DEIS)*, and your comment letter helps us to determine the scope of our studies.

Your letter states "*...members [*of the Outdoor Circle*] have many interests in the project including its historical impacts, the need for the pipeline and the expansion of our State's dependence upon fossil fuels. We strongly believe that we should be looking toward developing alternative energy sources whenever possible.*" We assume that you are suggesting that these issues be addressed in the DEIS. The following indicates how we will address the four issues.

Historical resources: The DEIS will address project impacts on historical resources. The only resource that is on the National Register of Historic Sites in the vicinity of the project is the portion of the former Oahu Railroad and Land Company (OR&L) right-of-way that begins just west of Ft. Weaver Road and runs to Nānākuli. The preferred pipeline alternative will cross under the right-of-way at Kalaeloa Boulevard. We intend to construct this using an advanced directional drilling construction method that will not disturb the railway roadbed or rails.

The need for the pipeline: Chapter 1 of the EISPN contains a discussion of the need for the proposed pipeline. This discussion provides the rationale for the project and will be included in the DEIS.

Expansion of State's dependence on fossil fuel: HECO's investment in a new fuel pipeline will not expand the State's dependence on fossil fuel. Instead, it will simply allow us to transport fuel more efficiently, at a lower cost, to existing generating units at the Waiau Generating Station.

Development of alternative energy sources whenever possible: The ~500 MW Waiau Generating Station provides about a third of the electricity needed for O'ahu. Because it is one of the island's principal sources of electricity, it is neither feasible nor cost-effective to attempt to totally replace the plant with alternative energy sources now or in the near future. Development of alternative energy

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sources would not achieve the objectives of the proposed action, which is to provide an assured means of continuing to supply fuel to the Waiau Generating Station while maintaining environmental quality and maintaining costs to our customers at a reasonable level. Consequently, alternative energy sources are not "alternatives" as the term is used in Chapter 343 or HAR §11-200.

This project, which improves fuel delivery to an existing power plant, is not a choice between fossil fuel and alternate energy for the future. Construction of the fuel pipeline will not preclude or lessen our support for the development of renewable energy technologies, which play an important role in meeting our state's future energy needs. Hawaiian Electric is committed to reducing Hawaii's use of oil by supporting renewable energy and energy efficiency programs. Our support has made Hawaii one of the nation's leaders in both areas and we intend to continue that support in the years to come.

Finally, your letter "*...requests that my organization be considered a contested party in the preparation of the above referenced Environmental Impact Statement.*" Chapter 343 of the Hawaii Revised Statutes does not provide for "contested parties," but does call for consulted parties that are specifically included in the process to evaluate and comment on environmental assessments and environmental impact statements. I assume you intended to ask to be consulted party and therefore, we will include the Outdoor Circle in the distribution of future EIS documents.

Our present schedule calls for publication of the *DEIS* in March 2002. We will send a copy to the Outdoor Circle for review and comment as soon as it is available. In the meantime, if you have questions on the proposed project or this letter, please call me at (808) 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
James Smith, Harbors Division, State DOT
Perry White, Planning Solutions Inc.

THE ESTATE OF JAMES CAMPBELL

November 5, 2001

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, HI 96813

Dear Perry:

HECO/Waiau Fuel Line Project, Environmental Assessment/
Environmental Impact Statement Preparation Notice (EA/EISPN)

Thank you for allowing us to review and comment on the subject EA/EISPN. Based on our review, we provide the following comments.

1. The report indicates that HECO has considered underground directional drilling in the area of Kapolei Shopping Center but will construct the fuel line using the open trenching technique. We feel open trenching will have a negative impact on traffic congestion in and around the Kapolei Shopping Center. This will be very detrimental to area businesses and assurance is needed that there will be sufficient traffic control to mitigate traffic congestion and ingress and egress to the shopping center.

2. In Alternative 1, the fuel line goes from the HECO Barbers Point tank farm to the Waiau power plant. Further, the Honolulu power plant will be supplied by truck traffic, about five trucks a day, running between the Barbers Point tank farm and the Iwilei tank farm. It is unclear why it is more advantageous, in terms of traffic congestion, to run trucks between Barbers Point and Iwilei versus running trucks between the Waiau pipeline terminus and Iwilei.

3. Following installation, clean up will include restoration. We would like to see how the restoration will be done in more detail in terms of replacement of appropriate landscape materials and ongoing maintenance for a year or more after the landscaping plantings are in place.

4. There is no indication regarding the status of the existing Chevron pipeline in the old railroad right-of-way should the first option or alignment be followed. Will Chevron abandon its existing pipeline in favor of using the Kalaeloa/Barbers Point Harbor for shipping fuel oil to the neighbor islands?

If you have any questions regarding our comments, please call me at 674-3284.

Very truly yours,

Charles A. Ehrhorn
Land Planning Coordinator

db.01002900\K11322

cc: George Hiu
Susan Graham

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-000

CONSTPR P0000064
GENPP 10-16
YA/G

December 14, 2001

Mr. Charles A. Ehrhorn
Land Planning Coordinator
The Estate of James Campbell
1001 Kamokila Boulevard
Kapolei, Hawai'i 96707

Subject: **Environmental Assessment/Environmental Impact Statement: Waiau Fuel Pipeline Project**

Dear Mr. Ehrhorn:

Thank you for your November 5, 2001 letter concerning Hawaiian Electric Company's proposed Waiau Fuel Pipeline project. We appreciate the time you and other staff at the Estate spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* and preparing your letter. A major purpose of the *EISPN* is to identify issues that should be addressed in the *Draft Environmental Impact Statement (DEIS)*, and your letter helps us determine the scope of the studies we will undertake. Brief responses to your comments follow below.

> *Comment 1. The report indicates that HECO has considered underground directional drilling in the area of Kapolei Shopping Center but will construct the fuel line using the open trenching technique. We feel open trenching will have a negative impact on traffic congestion in and around the Kapolei Shopping Center. This will be very detrimental to area businesses and assurance is needed that there will be sufficient traffic control to mitigate traffic congestion and ingress and egress to the shopping center.*

Response. We understand the concerns you expressed relative to the need to minimize adverse effects on traffic flow into and out of the Kapolei Shopping Center. These concerns were also expressed to us in previous meetings with other Campbell Estate representatives, community leaders, elected officials, and Neighborhood Board members. Section 2.1.8.3 of the *EISPN* addresses about the issues related to ditching and also outlines our intent to bore or directionally drill under all major paved road-crossings wherever possible.

Our early plans to cross the Kapolei Shopping Center called for a combination of open trenching and directional drilling. However, because of the traffic impact concerns raised and our observations of the situation, we are exploring the technical feasibility of crossing the entire shopping center complex using one or two directional drilling operations as the primary construction technique. Additional geotechnical information is needed to be sure that directional drilling is a feasible alternative in this area, and we expect to obtain and review that information as our planning and engineering work proceeds.

Although directional drilling would be less disturbing than open trenching, the related construction activities could still cause some temporary disruption. Regardless of the final decision that is made with respect to construction techniques, we understand the need to provide adequate traffic control

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and to insure unrestricted ingress and egress to the shopping center and we will work with Campbell Estate to address these traffic concerns.

Comment 2. In Alternative 1, the fuel line goes from the HECO Barbers Point tank farm to the Waiau power plant. Further, the Honolulu power plant will be supplied by truck traffic, about five trucks a day, running between the Barbers Point tank farm and the Iwilei tank farm. It is unclear why it is more advantageous, in terms of traffic congestion, to run trucks between Barbers Point and Iwilei versus running trucks between the Waiau pipeline terminus and Iwilei.

Response. There are several reasons why HECO believes it would be better for trucks carrying fuel to the Iwilei Tank Farm to operate directly from the Barbers Point Tank Farm rather than pumping oil first to the Waiau Generating Station and then transshipping it from there to Iwilei.

- The roads that would be used within Campbell Industrial Park (Hanua Street and Kalaeloa Boulevard) were designed to accommodate a large volume of heavy truck traffic, and existing traffic volumes on them are far below their design capacity. Thus, the addition of a few tanker trucks will not cause a noticeable change in existing conditions. The remainder of the fuel transportation route between Campbell Industrial Park and the Iwilei Tank Farm is on the H-1 freeway and Nimitz Highway, roadways that are designed for, and presently handle, vehicles of the sort that would be used to supply the Iwilei Tank Farm.
- The proposed fuel transfer operations at Campbell Industrial Park are consistent with current land uses and fuel transfer operations conducted by the oil companies located there. Trucking from the Waiau Generating Station would involve establishing a new use at that facility, the erection of additional fuel storage and truck loading facilities within the Special Management Area, and other changes that are not needed if we truck the fuel directly from the Barbers Point Tank Farm.

In summary, while trucking from Waiau to Iwilei is possible, it involves the use of surface roadways near residential areas that are far more congested and less compatible with fuel trucks than are the roadway links to Campbell Industrial Park. This issue will be discussed in the *DEIS*.

Comment 3. Following installation, clean up will include restoration. We would like to see how the restoration will be done in more detail in terms of replacement of appropriate landscape materials and ongoing maintenance for a year or more after the landscaping plantings are in place.

Response. In accordance with the SEC easement provisions, HECO will work with Campbell Estate, and all landowners, to restore any improvements and landscaping, as nearly as practicable, to the conditions existing prior to constructing the pipeline. The *DEIS* will include a general discussion on restoration.

Comment 4. There is no indication regarding the status of the existing Chevron pipeline in the old railroad right- of-way should the first option or alignment be followed. Will Chevron abandon its existing pipeline in favor of using the Kalaeloa/Barbers Point Harbor for shipping fuel oil to the neighbor islands?

Response. Chevron has notified HECO that it intends to transfer interisland barge shipments from Pier 30 in Honolulu Harbor to the Kalaeloa-Barbers Point Deep Draft Harbor by January 2002. Additionally, Chevron has indicated to us that it intends to use its existing black oil pipeline for transportation fuels should HECO construct its own pipeline. We hope to include summary

information concerning Chevron's position on this matter in the *DEIS*, but you will need to contact Chevron directly if you would like detailed information or need to have it before the *DEIS* is published.

Our present schedule calls for us to publish the *DEIS* in March 2002. We will send a copy to the Estate for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project or the items discussed above, I encourage you to call me at (808) 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
PACIFIC PARK PLAZA • 711 KAPIOLANI BOULEVARD, SUITE 1200 • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4529 • FAX: (808) 523-4730 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

GEORGE "KEOKI" MIYAMOTO
DEPUTY DIRECTOR

(3)

(23)

December 13, 2001

TPD10/01-04486R

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: HECO Waiau Fuel Line Project

In response to your October 5, 2001 letter, the Environmental Assessment/Environmental Impact Statement Preparation Notice for the subject project was reviewed. The following comments are the result of this review:

1. It appears that there will be minimal long-term impact on traffic operations on City streets once the project is completed. However, short-term traffic impact on City-jurisdiction streets will likely occur as the proposed pipeline route crosses these streets.

2. The Draft Environmental Impact Statement (DEIS) should include proposed measures to mitigate construction impacts, such as the mitigation of the decrease in capacity along a major arterial in Kapolei and the restoration of damaged roadways back to reconstructed/repaved condition.

   Detailed plans for any pipeline construction project should be developed with the idea of effecting minimal traffic impact on the City's roadway system. All roadways should be kept open to the public to the greatest extent possible. Roadway closures should be avoided, unless such closure is absolutely necessary. In addition to notifying area residents and businesses of planned construction roadwork, the support of the area neighborhood board should also be solicited regarding any planned roadwork of significance.

   Should closure of any roadway be required, appropriate alternate route(s)/detour plans need to be provided to guide motorists around the work area to facilitate traffic flow. All affected parties (area neighborhood board, businesses, residents, emergency service providers, TheBus, etc.) should be informed of the reason(s) for and duration of such roadway closure.

We look forward to reviewing the DEIS. In order to facilitate our review, please send us two copies of the document.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

CHERYL D. SOON
Director

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-000

CONSTPR P0000064
GENPP 10-16
YA/G

23

January 7, 2002

Ms. Cheryl Soon
Department of Transportation Services
711 Kapi'olani Boulevard, Suite 1200
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Waiau Fuel Pipeline Project

Dear Ms. Soon:

Thank you for your December 13, 2001 letter (your reference TPD10/01-04486R) concerning the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* for Hawaiian Electric Company, Inc.'s (HECO) Waiau Fuel Pipeline Project. We appreciate the time that you and other members of your staff spent reviewing the document and preparing your letter. Responses to the points contained in your letter follow.

1. *It appears that there will be minimal Long-term impact on traffic operations on City streets once the project is completed. However, short-term traffic impact on City-jurisdiction streets will likely occur as the proposed pipeline route crosses these streets.*

RESPONSE. Thank you for confirming that there is unlikely to be any long-term impact on traffic operations on City streets once the project is completed. HECO is aware of the potential for construction-period effects, and the *Draft Environmental Impact Statement (DEIS)* will address these as discussed under Item 2, below.

2. *The Draft Environmental Impact Statement (DEIS) should include proposed measures to mitigate construction impacts, such as the mitigation of the decrease in capacity along a major arterial in Kapolei and the restoration of damaged roadways back to reconstructed/repaved condition.*

RESPONSE. HECO is working hard to minimize the effect that construction activities would have on City streets and roads. Our efforts include the use of directional drilling and/or horizontal drilling for pipeline segments that are beneath busy arterials. Similarly, the construction specifications will require the pipeline construction contractor to restore roadways to their pre-construction condition. Should any temporary roadway or lane closures be needed, we will develop appropriate traffic control plans that will allow motorists to bypass the affected area. HECO will also notify affected parties, including neighborhood boards, businesses, residents, emergency service providers, and TheBus, of the location and duration of closures.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

Our present schedule calls for the *DEIS* to be published in March 2002, and we will send you a copy of that document for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

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

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
JEAN L. OSHITA
JADINE Y. URASAKI

IN REPLY REFER TO:

HWY-PS
2.5370

JAN 17 2002

Mr. Perry J. White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Subject: Environmental Impact Statement Preparation Notice/Environmental Assessment, HECO Waiau Fuel Line Project, Ewa

Thank you for requesting our review of the proposed fuel line project.

The preferred new pipeline alternative is not expected to significantly impact our State highway facilities. The construction details regarding pipeline placement, including typical sections and road crossings, within our right-of-way must be coordinated with the Highways Division.

We will reserve further comment until we have been able to review the Environmental Impact Statement.

If there are any questions, please contact Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

BRIAN K. MINAAI
Director of Transportation

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-000

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GENPP 10-16
YA/G

January 28, 2002

Mr. Brian Minaai, Director
Department of Transportation
State of Hawai'i
869 Punchbowl Street
Honolulu, Hawai'i 96813-5097

Subject: **Environmental Assessment/Environmental Impact Statement Preparation Notice: HECO Waiau Fuel Pipeline Project**

Dear Mr. Minaai:

Thank you for your January 17, 2002 letter (your reference HWY-PS/2.5370) concerning the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* for Hawaiian Electric Company, Inc.'s (HECO) Waiau Fuel Pipeline Project. We appreciate the time that you and other members of your staff spent reviewing the document and preparing your letter.

We appreciate being informed that you do not expect our proposed new fuel pipeline within the State Energy Corridor to significantly impact State Highway facilities. We further understand that you may have further comments after you review the *Draft Environmental Impact Statement*.

We have met with staff of the Highways Division on a number of occasions beginning early in the planning of the proposed new pipeline, and they have been very helpful. We are currently developing the construction details regarding pipeline placement you requested, including typical sections and road crossing plans, and we will continue to coordinate this work with the Highways Division.

Our present schedule calls for the *DEIS* to be published in March 2002, and we will send you a copy of that document for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

BENJAMIN J. CAYETANO
GOVERNOR

MAJOR GENERAL EDWARD L. CORREA, JR.
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

January 24, 2002

Mr. Perry White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

HECO Waiau Fuel Line Project Environmental Assessment/
Environmental Impact Statement Preparation Notice (EA/EISPN)

Dear Mr. White:

Thank you for the opportunity to comment on the EA/EISPN for the HECO Waiau Fuel Line Project.

We do not have any comments or recommendations on the EA/EISPN.

State Civil Defense (SCD) technicians and planners are available to assist and answer any questions you may have. Please contact Mr. Norman Ogasawara, SCD, at 733-4300, if you need assistance.

Sincerely,

EDWARD T. TEIXEIRA
Vice Director of Civil Defense

c: State Department of Transportation

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-000

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GENPP 10-16
YA/G

February 8, 2002

Mr. Edward T. Teixeira, Vice-Director of Civil Defense
Department of Defense
Office of the Director of Civil Defense
State of Hawai'i
3949 Diamond Head Road
Honolulu, Hawai'i 96816-4495

Subject: **Environmental Assessment/Environmental Impact Statement Preparation Notice: HECO Waiau Fuel Pipeline Project**

Dear Mr. Teixeira:

Thank you for your January 24, 2002 letter concerning the *Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)* for Hawaiian Electric Company, Inc.'s (HECO) Waiau Fuel Pipeline Project. We appreciate the time that you and other members of your staff spent reviewing the document and preparing your letter.

We appreciate being informed that you do not have any comments or recommendations concerning the *EA/EISPN*.

Our present schedule calls for the *DEIS* to be published in March 2002, and we will send you a copy of that document for review and comment as soon as it is available. In the meantime, if you have any questions concerning the project, please call me at 543-7746 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Jim Smith, Harbors Division, State Department of Transportation
Perry White, Planning Solutions, Inc.

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10.6 DRAFT EIS COMMENT LETTERS AND RESPONSES

(1)

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

REPLY TO ATTENTION OF

May 2, 2002

Civil Works Technical Branch

Mr. Ken Fong, Project Manager
Hawaiian Electric Company
PO Box 2750
Honolulu, Hawaii 96840

Dear Mr. Pong:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the Waiau Fuel Pipeline Project, Oahu. 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. A DA permit will be required for this project and is currently being coordinated with our Regulatory Branch. For further information, please contact Mr. William Lennan at (808) 438-6986 and refer to file number 200200030.

b. The flood hazard information provided on page 3-12 of the DEIS is correct.

Should you require additional information, please contact Ms. Jessie Dobinchick of my staff at (808) 438-8876.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

1

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/0

July 23, 2002

Mr. James Pennaz, P.E., Chief
Civil Works Technical Branch
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawai'i 96850-5440

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Mr. Pennaz:

Thank you for your May 2, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing written comments. Item-by-item responses to your comments are provided below.

a. A DA permit will be required for this project and is currently being coordinated with our Regulatory Branch. For further information, please contact Mr. William Lennan at (808) 436-6986 and refer to file number 200200030.

RESPONSE: We will continue to work with Mr. Lennan and will reference file number 200200030 in our correspondence.

b. The flood hazard information provided on page 3-12 of the DEIS is correct.

RESPONSE: Thank you for confirming that the flood hazard information we presented is correct.

If you have any further questions concerning the project, please call me at (808) 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
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(2)

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON

BRUCE B. ANDERSON
MEREDITH J. CHING
CLAYTON W. DELA CRUZ
BRIAN C. NISHIDA
HERBERT M. RICHARDS, JR.

LINNEL T. NISHIOKA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

May 2, 2002

Hawaiian Electric Company, Inc.
Attn: K. Fong (WA3-YJ)
P.O. Box 2750
Honolulu, HI 96840-0001

Ref:Waiau Pipeline.dr

SUBJECT: Waiau Fuel Pipeline Project
Draft Environmental Impact Statement

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.

[ ] 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.

[ ] 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).

[X] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[ ] OTHER:

If there are any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

LN:ss

c: DLNR, Land Division

(2)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

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GENPP 10-16
YA/G

July 23, 2002

Ms. Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
State Of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Ms. Nishioka:

Thank you for your May 2, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing written comments. Item-by-item responses to your comments are provided below.

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.

RESPONSE: HECO is committed to minimizing adverse water quality effects wherever it conducts its activities. The *DEIS* contains a detailed discussion of this topic. As indicated in that document, we will require numerous permits and will work with the Department of Health to incorporate all water quality related requirements into our plans.

If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

RESPONSE: The pipeline crossing of Waiawa Stream must be constructed using an open cut and will, therefore, require alteration of the stream channel. We have discussed this with David Higa of your staff and are presently preparing a stream channel alteration permit application. As confirmed by your May 10, 2002, the other drainageways crossed by the pipeline will not require stream channel alteration permits.

If you have any further questions concerning the project, please call me at (808) 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(3)

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

GLENN M. OKIMOTO
COMPTROLLER

MARY ALICE EVANS
DEPUTY COMPTROLLER

LETTER NO. PWD02.P266

MAY 6 2002

Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Attention: Mr. Ken Fong (WA3-YJ)

Dear Gentlemen:

Subject: HECO Waiau Fuel Line Project
Draft Environmental Impact Statement

Thank you for the opportunity to review the Draft Environmental Impact Statement for the subject project.

This project does not impact any of the Department of Accounting and General Services projects or existing facilities. Therefore, we have no comments to offer.

Should you have any questions, please have your staff call Mr. Allen Yamanoha of the Public Works Division at 586-0488.

Very truly yours,

GLENN M. OKIMOTO
State Comptroller

c: Ms. Jadine Urasaki, DOT Harbors Division
Office of Environmental Quality Control

(3)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/O

July 23, 2002

Mr. Glenn M. Okimoto, State Comptroller
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawaii 96810

Subject: **Draft Environmental Impact Statement:**
Waiau Fuel Pipeline Project

Dear Mr. Okimoto:

Thank you for your May 6, 2002 letter (your reference No. Letter No. PWD02.P266) commenting on Hawaiian Electric Company's *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Thank you for confirming that the project would not impact any of the Department of Accounting and General Services projects or existing facilities.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

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(4)

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1969

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

May 6, 2002

Mr. Ken Fong (WA3-YJ)
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Subject: Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (DEIS)

We received your letter dated April 23, 2002, regarding the above-mentioned project. The Honolulu Fire Department requests that the following be complied with:

1. Maintain fire apparatus access throughout the construction site for the duration of the project.

2. Notify the Fire Communication Center at 523-4411 regarding any interruption in the existing fire hydrant system during the project.

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

Sincerely,

ATTILIO K. LEONARDI
Fire Chief

AKL/SK:bh

cc: Jadine Urasaki, Acting Harbors Administrator
Harbors Division, State Department of Transportation

(4)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YAG

July 23, 2002

Mr. Attilio K. Leonardi, Fire Chief
City & County of Honolulu Fire Department
3375 Koapaka Street
Honolulu, Hawai'i 96819

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Chief Leonardi:

Thank you for your May 6, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing written comments. Our responses to your two requests follow:

Honolulu Fire Department requests that the following be complied with:

1. Maintain fire apparatus access throughout the construction site for the duration of the project.

RESPONSE: HECO will require the contractor to maintain emergency access to adjacent properties throughout the construction period.

2. Notify the Fire Communication Center at 523-4411 regarding any interruption in the existing fire hydrant system during the project.

RESPONSE: HECO will include a requirement that the contractor notify the Fire Communication Center of all planned and unanticipated interruptions in the existing fire hydrant system during the project. At present, we do not believe that such an interruption will be necessary.

If you or Chief Kenneth Silva of your Fire Prevention Bureau have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Chief Kenneth Silva, Fire Prevention Bureau
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

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FOR DISTINGUISHED INDUSTRY LEADERSHIP

5

ROBERT BUNDA
PRESIDENT
COLLEEN HANABUSA
VICE PRESIDENT
JONATHAN CHUN
CAL KAWAMOTO
MAJORITY LEADER
J. KALANI ENGLISH
MAJORITY FLOOR LEADER
SAM SLOM
MINORITY LEADER
FRED HEMMINGS
MINORITY FLOOR LEADER
BOB HOGLE
MINORITY POLICY LEADER

FIRST DISTRICT
LORRAINE R. INOUYE
SECOND DISTRICT
DAVID M. MATSUURA
THIRD DISTRICT
RUSSELL E. HORIBUCHI
FOURTH DISTRICT
JAN YAGI BUEN
FIFTH DISTRICT
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SIXTH DISTRICT
ANTHY B. CHUMBLEY
SEVENTH DISTRICT
JONATHAN CHUN
EIGHTH DISTRICT
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ELEVENTH DISTRICT
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TWELFTH DISTRICT
CAROL FUKUNAGA
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ROD TAM
FOURTEENTH DISTRICT
SUZANNE CHUN OAKLAND
FIFTEENTH DISTRICT
DONNA MERCADO KIM
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DAVID ICHI
EIGHTEENTH DISTRICT
RON MENOR
NINETEENTH DISTRICT
CAL KAWAMOTO
TWENTIETH DISTRICT
BRIAN KANNO
TWENTY-FIRST DISTRICT
COLLEEN HANABUSA
TWENTY-SECOND DISTRICT
ROBERT BUNDA
TWENTY-THIRD DISTRICT
BOB HOGLE
TWENTY-FOURTH DISTRICT
BOB HOGLE
TWENTY-FIFTH DISTRICT
FRED HEMMINGS
CHIEF CLERK
PAUL T. KANNO/JOY

The Senate
The Twenty-First Legislature
of the
State of Hawaii

STATE CAPITOL
HONOLULU, HAWAII 96813

May 2, 2002

Mr. Ken Fong, Project Manager
Hawaiian Electric Company, Inc.
PO Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

RE: Waiau Fuel Pipeline Project Draft Environmental Impact Statement (DEIS)

Thank you for the opportunity to review and comment on the Waiau Fuel Pipeline Project Draft Environmental Impact Statement. I have reviewed the document and am providing the following questions and comments:

1). Regarding transporting fuel via trucks to the Honolulu Generating Station in alternative 1.
Why not load the truck at the Waiau Generating Station instead of at the Barbers Point Tank Farm?

2). Regarding restarting the flow of oil after it has cooled and become more viscous.
Page 2-28, paragraph 2.1.11.1 – This paragraph states that the oil needs to be heated in order to be pumped, and that, "If its temperature drops below approximately 120 F, the fuel oil becomes so viscous that it cannot be pumped at all."

If a break occurred in the pipeline and the valves around the break were closed in order to stop the flow of the oil, wouldn't the oil remaining in the pipeline eventually cool off and solidify? How long would this take to occur? How would the flow of oil be restarted? This appears to be problematic since most of the installation will be underground.

Page 2-9, figure 2-5; The valve and the section of pipe immediately before and after the valve don't appear to be insulated. Will the oil in the immediate vicinity of the valve cool faster than the oil in the rest of the pipe if the flow is stopped? If sufficient cooling occurred to form a "cold plug", would the valve actuator be able to reopen the valve?

Even if the fuel did not did not solidify before the break was repaired and the valves were reopened, are the pumps capable of pumping the cooled and more viscous oil?

Sincerely,

COLLEEN HANABUSA
Senator, Twenty-First District

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

5

CONSTPR P0000064
GENPP 10-16
YA/O

July 23, 2002

Senator Colleen Hanabusa
Twenty-First Senatorial District
State Capitol
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Senator Hanabusa:

Thank you for your May 2, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate your review of the document and your written comments. Item-by-item responses to your comments are provided below.

(1) Regarding transporting fuel via trucks to the Honolulu Generating Station in Alternative 1.

Why not load the truck at the Waiau Generating Station instead of at the Barbers Point Tank Farm?

RESPONSE: There are several reasons for loading the trucks with fuel at Barbers Point Tank Farm for transshipping to the Iwilei Tank Farm:

- The proposed fuel transfer operations at Campbell Industrial Park are consistent with current land uses and fuel transfer operations conducted by the oil companies located there. Trucking from the Waiau Generating Station would involve establishing a new use at that facility, the erection of additional fuel storage and truck loading facilities within the Special Management Area, and other changes that are not needed if we truck the fuel directly from the Barbers Point Tank Farm.
- The roadways that would be used within Campbell Industrial Park (Hanua Street and Kalaeloa Boulevard) were designed to accommodate a large volume of heavy truck traffic, and existing traffic volumes on these roadways are far below their design capacity. Thus, the addition of a few tanker trucks will not cause a noticeable change in existing conditions. The remainder of the fuel transportation route between Campbell Industrial Park and the Iwilei Tank Farm is on the H-1 freeway and Nimitz Highway, which are designed for, and presently handle, the type of vehicles of the sort that would be used to supply the Iwilei Tank Farm.

  Furthermore, trucking from Waiau to Iwilei involves the use of surface roadways (Kamehameha Highway and Nimitz Highway) near residential and retail commercial areas that are far more congested and less compatible with fuel trucks than are the roadway links to Campbell Industrial Park.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

2) Regarding restarting the flow of oil after it has cooled and become more viscous.

Page 2-28, paragraph 2.1.11.1 – "This paragraph states that the oil needs to be heated in order to be pumped, and that, "If its temperature drops below approximately 120 F, the fuel oil becomes so viscous that it cannot be pumped at all."

If a break occurred in the pipeline and the valves around the break were closed in order to stop the flow of the oil, wouldn't the oil remaining in the pipeline eventually cool off and solidify? How long would this take to occur? How would the flow of oil be restarted? This appears to be problematic since most of the installation will be underground.

Page 2-9, figure 2-5: The valve and the section of pipe immediately before and after the valve don't appear to be insulated. Will the oil in the immediate vicinity of the valve cool faster than the oil in the rest of the pipe if the flow is stopped? If sufficient cooling occurred to form a "cold plug", would the valve actuator be able to reopen the valve?

RESPONSE: The fact that LSFO solidifies at normal ambient temperatures means that we must take special care in the design and operation of the pipeline to insure that the LSFO temperature remains above 120 degrees F. The following are answers to your specific questions:

- *If a break occurred in the pipeline and the valves around the break were closed in order to stop the flow of the oil, wouldn't the oil remaining in the pipeline eventually cool off and solidify?*

  Yes, the oil would eventually cool and solidify. However, the insulation on the proposed Waiau Fuel Pipeline allows HECO a good deal of time to repair any problem and re-start the pipeline before a cold plug can occur. Hence, with our proposed insulated pipeline, we will be better able to avoid a cold plug compared to the current use of uninsulated pipe.

- *How long would this take to occur?*

  Operating at the lowest flow rate, pipeline engineers estimate that HECO could shut down the pumps for at least 20 hours before cold plugging would begin to occur. If the pipeline were operating at a higher flow rate at the time a problem occurred, the number of hours before cold plugging would occur would be higher. It should be possible to resolve most problems within 20 hours. In cases where it might not be possible to complete repairs within this time, the LSFO would be displaced with diesel, thereby avoiding a cold plug.

- *How would the flow of oil be restarted?*

  The process for restarting the flow of oil if a cold plug does occur is as follows. The pipeline will have six isolation block valves between Barbers Point and the Waiau power plant. Each of these valves will have two bypass connections, one on each side of the valve, whereby heated diesel fuel can be injected into the pipeline to clear the cold plug. Once the LSFO has been displaced with less viscous oil, the cleared pipeline can be placed back into normal service.

- *Will the oil in the immediate vicinity of the valve cool faster than the oil in the rest of the pipe if the flow is stopped? If sufficient cooling occurred to form a "cold plug", would the valve actuator be able to reopen the valve?*

(5)

Your observation concerning the valve shown in Figure 2-5 is correct; the valve and section of adjoining pipe shown in the drawing are not insulated. The valve that we would actually use has an insulation blanket around it. We did not depict that in the *Draft EIS* because the blanket would have hidden the valve detail. For the *Final EIS*, we will add a note to Figure 2-5 stating that, for clarity, the insulation is not shown. Additionally, the valve will be heated with an electric heating system to keep the valve hot. With this insulation, the oil close to the valve would cool at about the same rate as the oil in the rest of the pipe.

I hope this letter adequately answers your concerns. If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
BOARD OF LAND AND NATURAL RESOURCES

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MEREDITH J. CHING
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LINNEL T. NISHIOKA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

MAY 10 2002

Mr. Ken Fong, Project Manager
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong,

Thank you for allowing us to review and comment on the Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project.

Of the watercourses listed on Table 2-4, only Waiawa Stream will require a stream channel alteration permit for the pipeline crossing. This crossing is proposed to be trenched with an open cut in a stream reach which supports instream uses. The other crossings which will have open cut trenches, including Makakilo Gulch, Unnamed #1 and #2 and Honouliuli Stream, are not considered to be streams at the location of the proposed crossings. Therefore they will not require stream channel alteration permits.

If you have any questions regarding this letter, please call David Higa at 587-0249.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

DH:sd
c. Land Division (Ref. WAIAUFUELPIPELINE.COM)
DOT, Harbors Division

G:\WORK\REGULATE\TEMP\HECOWaiauFuel docrev.doc

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Ms. Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management
Department of Land And Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Ms. Nishioka:

Thank you for your May 10, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Your letter notes the following with respect to the proposed project:

> *Of the watercourses listed on Table 2-4, only Waiawa Stream will require a stream channel alteration permit for the pipeline crossing. This crossing is proposed to be trenched with an open cut in a stream reach which supports instream uses. The other crossings which will have open cut trenches, including Makakilo Gulch, Unnamed #1 and #2 and Honouliuli Stream, are not considered to be streams at the location of the proposed crossings. Therefore they will not require stream channel alteration permits.*

RESPONSE: Thank you for informing us that we will need a stream channel alteration permit only for the crossing of Waiawa Stream. We are now preparing an application for that permit and expect to submit it shortly.

Mr. David Higa of your staff has been particularly helpful to us as we researched the permit requirements for this project, and I want to thank him for his effort. If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

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

May 14, 2002

Mr. Ken Fong
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Subject: Your Letter of April 23, 2002 on the Waiau Fuel Pipeline Project, Draft Environmental Impact Statement

Thank you for the opportunity to review the subject document for the proposed fuel pipeline project.

We have the following comments to offer:

1. The Draft Environmental Impact Statement should mention the caprock thickness separating the basil aquifer, its composition, and the protection offered for the Ewa-Kunia and Waipahu-Waiawa aquifers.

2. The Pearl City Wells II and some private domestic wells near Leeward Community College are near the pipeline alignment and should be added to Table 4-16.

3. The construction schedule for all projects in the area should be coordinated to minimize impacts to the community and our water system. In conjunction with the project scheduling, the construction plans for the pipeline project should be submitted for our review.

If you have any questions, please contact Joseph Kaaua at 527-6123.

Very truly yours,

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Jadine Urasaki, Department of Transportation, Harbors Division

Pure Water . . . our greatest need – our greatest resource

7

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

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

Subject: Your Letter of May 14, 2002 on the Draft Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Mr. Jamile:

Thank you for your May 14, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project.* We appreciate the time you and your staff spent reviewing the document and providing written comments. Item-by-item responses to your comments are provided below.

1. *The Draft Environmental Impact Statement should mention the caprock thickness separating the basil (sic) aquifer, its composition, and the protection offered for the Ewa-Kunia and Waipahu-Waiawa aquifers.*

RESPONSE: In response to your request, we have revised the first paragraph in Section 4.4.2.2 'Ewa-Kunia Aquifer to include additional information concerning the caprock. In the *Final EIS* the last part of the paragraph will read: "*...80 to 160 feet above sea level. Based on the drillers' logs of the nearest wells, the first 50 to 100 feet below ground is comprised of soil and sapprolite. This means that there would be substantial vertical separation between the bottom of the pipeline trench and the underlying groundwater and that much of this intervening material is of low permeability.*"

The thickness of the caprock protecting the Waipahu-Waiawa Aquifer is reported in the last paragraph in Section 4.4.2.3 of the *Draft EIS*, which states, in part:

> *The proposed Waiau Fuel Pipeline route crosses the makai end of the aquifer. In the vicinity of streams and marshes, the lower reaches of some streams and the springs makai of Leeward Community College are points of natural discharge from this aquifer. This discharge is moving upward through the sapprolite and alluvium which overlie permeable lavas at depth. Based on logs of drilled wells, the thickness of sapprolite and alluvium is several tens to more than 100 feet. This means that although extensive sections of the pipeline trench would be at lower elevations than the 14- to 18-foot piezometric head of the underlying aquifer, the trench excavation would not intercept the aquifer itself.*

2. *The Pearl City Wells II and some private domestic wells near Leeward Community College are near the pipeline alignment and should be added to Table 4-16.*

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FOR DISTINGUISHED INDUSTRY LEADERSHIP

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RESPONSE: We have revised Table 4-16 to include the Pearl City Wells II and the private domestic wells. The latter are identified through the addition of the following as note 3 in Table 4-16:

A number of private wells are located near Leeward College and the Preferred and Chevron pipeline routes. The status of these wells (in use, abandoned, or sealed) is not known.

Thank you for calling this omission to our attention.

3. *The construction schedule for all projects in the area should be coordinated to minimize impacts to the community and our water system. In conjunction with the project scheduling, the construction plans for the pipeline project should be submitted for our review*

RESPONSE: We understand the importance of coordinating construction of the Waiau Fuel Pipeline with other projects in order to minimize impacts to the community and the BWS water system. We are making that coordination a priority in our contracting process. We will submit construction plans for your review when they are available.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

(8)

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

PATRICIA HAMAMOTO
SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

May 16, 2002

Mr. Ken Fong, Project Manager (WA3-YJ)
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawai'i 96840-0001

Dear Mr. Fong:

Subject: Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (DEIS)

The Department of Education has no comment on the DEIS.

Thank you for the opportunity to respond.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:hy

cc: A. Suga, OBS
J. Urasaki, Harbors Division, DOT

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

(8)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Ms. Patricia Hamamoto, Superintendent
Department of Education
State of Hawai'i
P.O. Box 2360
Honolulu, Hawai'i 96805

Subject: **Draft Environmental Impact Statement:**
Waiau Fuel Pipeline Project

Dear Ms. Hamamoto:

Thank you for your May 16, 2002 letter concerning Hawaiian Electric Company's *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Thank you for confirming that the Department of Education has no comment on the *DEIS*.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(9)

BENJAMIN J. CAYETANO
GOVERNOR

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
JEAN L. OSHITA
JADINE V. URASAKI

IN REPLY REFER TO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION
400 RODGERS BOULEVARD, SUITE 700
HONOLULU, HAWAII 96819-1880

AIR-P
02.0173

May 14, 2002

Mr. Ken Fong
Project Manager
Hawaiian Electric Company
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Subject: Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (DEIS)

Thank you for the opportunity to review and comment on the Waiau Fuel Pipeline Project DEIS. We do not see any impact on either Kalaeloa Airport or Honolulu International Airport. We concur with the preferred Alternative 1, the proposed Waiau Fuel Pipeline, rather than Alternative 3, trucking fuel from Barbers Point to Waiau and Iwilei. This would result in additional traffic and maintenance costs to our highways system.

Please contact Mr. Stephen Takashima, Senior Planner, at 838-8810, to clarify any questions you may have.

Sincerely,

ROY K. SAKATA
Acting Airports Administrator

Hana Like No Ke Ala Aloha
Working Together to Provide Gateways of Aloha

(9)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Mr. Roy K. Sakata, Acting Airports Administrator
Department of Transportation
Airports Division
State of Hawai'i
400 Rodgers Boulevard, Suite 700
Honolulu, Hawai'i 96819-1880

Subject: **Draft Environmental Impact Statement:**
Waiau Fuel Pipeline Project

Dear Mr. Sakata:

Thank you for your May 14, 2002 letter (your Reference No. AIR-P:02.0173) commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Your letter noted:

> *We do not see any impact on either Kalaeloa Airport or Honolulu International Airport. We concur with the preferred Alternative 1, the proposed Waiau Fuel Pipeline, rather than Alternative 3, trucking fuel from Barbers Point to Waiau and Iwilei. This would result in additional traffic and maintenance costs to our highways system.*

RESPONSE: Thank you for confirming that the proposed Waiau Fuel Pipeline Project would not adversely affect operations or facilities at Honolulu International Airport or Kalaeloa Airport. We also appreciate your concurrence that our proposed pipeline (Alternative 1) is superior to trucking (Alternative 3).

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

10

BENJAMIN J. CAYETANO
GOVERNOR

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
JEAN L. OSHITA
JADINE Y. URASAKI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 SO. NIMITZ HWY. • HONOLULU, HAWAII 96813-4898

IN REPLY REFER TO:
HAR-PM
1879.02

May 17, 2002

Hawaiian Electric Company, Inc.
Attention: K. Fong (WA3-YI)
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Gentlemen:

Subject: Draft Environmental Impact Statement for Hawaiian Electric Company, Inc.'s Proposed Barbers Point to Waiau Fuel Pipeline Project within the State's Energy Corridor

Thank you for your April 23, 2002 letter and accompanying April 2002 Draft Environmental Impact Statement for the subject proposed project.

HECO or its assigns will perform site/soil assessments before and during excavation. Hazardous material will be removed or neutralized if encountered during construction activities. Cost responsibilities will be determined in accordance with Article X, entitled " Construction or Installation of Leasehold Improvements; Environmental Assessment and Requirements " of HECO's Proposed Energy Corridor Lease Agreement. Environmental insurance naming the State as additional insured shall be required.

If we may be of further assistance in facilitating your entrance into the State's Energy Corridor, please call James Smith, Property Manager, at 587-1942.

Very truly yours,

JADINE Y. URASAKI, P.E.
Acting Harbors Administrator

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Ms. Jadine Urasaki, Acting Harbors Administrator
Harbors Division
Department of Transportation
State of Hawai'i
79 South Nimitz Highway
Honolulu, Hawai'i 96813-4898

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Ms. Urasaki:

Thank you for your May 17, 2002 letter (your reference HAR-PM 1879.02) commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing written comments.

You noted that HECO must fulfill the following requirements:

> *HECO or its assigns will perform site/soil assessments before and during excavation. Hazardous material will be removed or neutralized if encountered during construction activities. Cost responsibilities will be determined in accordance with Article X, entitled "Construction or Installation of Leasehold Improvements; Environmental Assessment and Requirements" of HECO's Proposed Energy Corridor Lease Agreement. Environmental insurance naming the State as additional insured shall be required.*

RESPONSE: Thank you for noting these requirements in the draft lease for use of the State Energy Corridor. HECO will comply with the provisions of the final State Energy Corridor Lease Agreement.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

11

DEPARTMENT OF PARKS AND RECREATION

CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, SUITE 309 • KAPOLEI, HAWAII 96707
Phone: (808) 692-5581 • FAX: 692-5131 • Internet: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

EDWARD Y. "SKIPPA" DIAZ
DEPUTY DIRECTOR

May 17, 2002

Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Attention: K. Fong (WA3-YJ)

Gentlemen:

Subject: Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (DEIS)

Thank you for the opportunity to review and comment on the DEIS relating to the Waiau Fuel Pipeline Project.

The Department of Parks and Recreation has no comment on the proposed project.

Should you have any questions, please contact Mr. John Reid, Planner, at 692-5454.

Sincerely,

W. D. Balfour

WILLIAM D. BALFOUR, JR.
Director

WDB:cu (10865)

cc: MS. Jadine Urasaki, Acting Harbors Administrator
Don Griffin, Department of Design and Construction

11

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENTP 10-16
YA/D

July 23, 2002

Ms. William D. Balfour, Jr., Director
Department of Parks and Recreation
City and County of Honolulu
1000 Liluohia Street, Suite 309
Kapolei, Hawai'i 96707

Subject: **Draft Environmental Impact Statement:**
Waiau Fuel Pipeline Project

Dear Mr. Balfour:

Thank you for your May 17, 2002 letter commenting on Hawaiian Electric Company's *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and confirming that the Department has no comments.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Jadine Urasaki, Acting Harbors Administrator, State DOT
Don Griffin, Department of Design and Construction
Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(12)

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

May 22, 2002

LD-NAV
L2292/2972/2842/2406/2564/2623/2327
Ref.: WAIAUFUELPIPELINE.RCM

Hawaiian Electric Company, Inc.
Attention Ken Fong, Project Manager (WA3-Y)
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Subject: Hawaiian Electric Waiau Fuel Pipeline Project Draft Environmental Impact Statement (April 2002), Oahu, Hawaii

Thank you for the opportunity to review and comment on the subject matter.

A copy of the document covering the proposed project was distributed to the following Department of Land and Natural Resources' Divisions for their review and comment:

- Division of Aquatic Resources – Division of Forestry and Wildlife – Division of State Parks – Division of Boating and Ocean Recreation – Historic Preservation Division – Commission on Water Resource Management – Land Division Planning and Technical Services – Land Division Engineering Branch – Oahu District Land Office

Attached herewith is a copy of the Commission on Water Resource Management and Oahu District Land Office comment.

The Department of Land and Natural Resources has no other comment to offer on the subject matter based on the attached responses. Should additional comments be received, they will be forwarded to you at that time

Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 587-0438.

Very truly yours,

Charlene E. Unoki
for DIERDRE S. MAMIYA
Administrator

C: Oahu District Land Office

579
Duplicate.

ST... .S
Apr 26 10 13 AM '02

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

April 25, 2002

LD-NAV/LOG2292
Ref.: WAIAUFUELPIPELINE.COM

Suspense Date: 5/17/02

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks ←
XXX Division of Boating and Ocean Recreation
XXX 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: for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Hawaiian Electric Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (April 2002)

Please review the subject Draft Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

NOTE: One (1) document covering the Waiau Fuel Pipeline Project Draft Environmental Impact Statement is available for review in the Land Division Office, room 220

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments. ( ) Comments attached.

Date:_____ Signed:_____

12

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

April 26, 2002

LD-NAV/LOG2292
Ref.: WAIAUFUELPIPELINE.COM

Suspense Date: 5/17/02

MEMORANDUM:

TO:
* Division of Aquatic Resources
XXX Division of Forestry & Wildlife (Distributed Doc)
XXX Division of State Parks (Distributed Doc)
Division of Boating and Ocean Recreation
XXX Historic Preservation (Distributed Doc)
* Commission on Water Resource Management
Land Division Branches of:
* Planning and Technical Services
* Engineering Branch*
* Oahu District Land Office

FROM: for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Hawaiian Electric Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (April 2002)

Please review the subject Draft Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

*NOTE: One (1) document covering the Waiau Fuel Pipeline Project Draft Environmental Impact Statement is available for your review in the Land Division Office, room 220

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If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments. ( ) Comments attached.

Date:_____ Signed:_____

RECEIVED
LAND DIVISION
2002 MAY -2 P 3:05
DEPT. OF NATURAL RESOURCES
STATE OF HAWAII

ADMINISTRATOR
ASST ADMIN
DEV BR
PLAN BR
RES MGT BR
CLERICAL
ADMIN ASST
INTERP BR
CHRON/POST/STAFF MTG
COMMENTS & REC
DRAFT REPLY
FILE
FOLLOW UP
INFO
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OTHER
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3 96

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

April 26, 2002

LD-NAV/LOG2292
Ref.: WAIAUFUELPIPELINE.COM

Suspense Date: 5/17/02

MEMORANDUM:

~~TO:~~ From:
* Division of Aquatic Resources
XXX Division of Forestry & Wildlife (Distributed Doc)
XXX Division of State Parks (Distributed Doc)
Division of Boating and Ocean Recreation
XXX Historic Preservation (Distributed Doc)
* Commission on Water Resource Management
Land Division Branches of:
* Planning and Technical Services
* Engineering Branch*
* Oahu District Land Office

To:
~~FROM:~~ for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Hawaiian Electric Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (April 2002)

Please review the subject Draft Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

*NOTE: One (1) document covering the Waiau Fuel Pipeline Project Draft Environmental Impact Statement is available for your review in the Land Division Office, room 220

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(✓) We have no comments. ( ) Comments attached.

Date: 4/30/02 Signed:

12

BOR - D

RECEIVED
LAND DIVISION
2002 MAY -1 A 8:27
DEPT. OF NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

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

April 25, 2002

LD-NAV/LOG2292
Ref.: WAIAUFUELPIPELINE.COM

Suspense Date: 5/17/02

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
XXX Division of Boating and Ocean Recreation ←
XXX 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: for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Hawaiian Electric Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (April 2002)

Please review the subject Draft Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

NOTE: One (1) document covering the Waiau Fuel Pipeline Project Draft Environmental Impact Statement is available for review in the Land Division Office, room 220

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(✓) We have no comments. ( ) Comments attached.

Date: 4/30/02

Signed:

APR26'02AM10:21BOR BIV

RECEIVED
LAND DIVISION
2002 MAY 10 A 10:41
DEPT. OF NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

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

April 26, 2002

LD-NAV/LOG2292
Ref.: WAIAUFUELPIPELINE.COM

Suspense Date: 5/17/02

MEMORANDUM:

TO:
* Division of Aquatic Resources
XXX Division of Forestry & Wildlife (Distributed Doc)
XXX Division of State Parks (Distributed Doc)
Division of Boating and Ocean Recreation
XXX Historic Preservation (Distributed Doc)
* Commission on Water Resource Management ←
Land Division Branches of:
* Planning and Technical Services
* Engineering Branch*
* Oahu District Land Office

FROM: for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Hawaiian Electric Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (April 2002)

Please review the subject Draft Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

*NOTE: One (1) document covering the Waiau Fuel Pipeline Project Draft Environmental Impact Statement is available for your review in the Land Division Office, room 220

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments. (✓) Comments attached.

Date: 5/6/02

Signed:

(12)

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON

BRUCE B. ANDERSON
MEREDITH J. CHING
CLAYTON W. DELA CRUZ
BRIAN C. MINAKA
HERBERT M. RICHARDS, JR.

LINNEL T. NISHIOKA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

MAY 10 2002

Mr. Ken Fong, Project Manager
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong,

Thank you for allowing us to review and comment on the Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project.

Of the watercourses listed on Table 2-4, only Waiawa Stream will require a stream channel alteration permit for the pipeline crossing. This crossing is proposed to be trenched with an open cut in a stream reach which supports instream uses. The other crossings which will have open cut trenches, including Makakilo Gulch, Unnamed #1 and #2 and Honouliuli Stream, are not considered to be streams at the location of the proposed crossings. Therefore they will not require stream channel alteration permits.

If you have any questions regarding this letter, please call David Higa at 587-0249.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

DH:sd
c. √Land Division (Ref. WAIAUFUELPIPELINE.COM)
DOT, Harbors Division

G:\WORK\REGULATE\TEMP\HECOWaiauFuel.docrev.doc

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

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

02 APR 26 P3:26

April 25, 2002

LD-NAV/LOG2292
Ref.: WAIAUFUELPIPELINE.COM Suspense Date: 5/17/02

MEMORANDUM:

TO: XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
XXX Division of Boating and Ocean Recreation
XXX 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: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Hawaiian Electric Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (April 2002)

Please review the subject Draft Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

NOTE: One (1) document covering the Waiau Fuel Pipeline Project Draft Environmental Impact Statement is available for review in the Land Division Office, room 220

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments. (X) Comments attached.

Date:_____ Signed:

(12)

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON

BRUCE S. ANDERSON
MEREDITH J. CHING
CLAYTON W. DELA CRUZ
BRIAN C. MINAKA
HERBERT M. RICHARDS, JR.

LINNEL T. NISHIOKA
DEPUTY DIRECTOR

RECEIVED
LAND DIVISION
2002 MAY -8 P 2:28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

May 2, 2002

Hawaiian Electric Company, Inc.
Attn: K. Fong (WA3-YJ)
P.O. Box 2750
Honolulu, HI 96840-0001

Ref.: Waiau Pipeline.ltr

RECEIVED
LAND DIVISION
2002 MAY -9 P 12:52

SUBJECT: Waiau Fuel Pipeline Project
Draft Environmental Impact Statement

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.

[ ] 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.

[ ] 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).

[X] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[ ] OTHER:

If there are any questions, please contact Lenore Nakama at 587-0216.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

LN:ss

c: DLNR, Land Division

RECEIVED
LAND DIVISION
2002 MAY 17 A 8:56

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

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

April 25, 2002

LD-NAV/LOG2292
Ref.: WAIAUFUELPIPELINE.COM

Suspense Date: 5/17/02

MEMORANDUM:

FROM: ~~TO:~~

XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
XXX Division of Boating and Ocean Recreation
XXX 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

TO: ~~FROM:~~ for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Hawaiian Electric Waiau Fuel Pipeline Project
Draft Environmental Impact Statement (April 2002)

Please review the subject Draft Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

NOTE: One (1) document covering the Waiau Fuel Pipeline Project Draft Environmental Impact Statement is available for review in the Land Division Office, room 220

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Date: 5/9/02

Signed:

BC

MAY 17 2002

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

ADMIN RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

MEMORANDUM

To: Dierdre Mamiya
Land Administrator

Attn: Nick Vaccaro

From: Steve Lau
Land Agent

Subject: Hawaiian Electric Waiau Fuel Pipeline Project
Draft Environmental Impact Statement

We have no comment on the proposed project. However, please be advised that subject to the availability of the finalized route of the pipeline, a grant of easement is required from the Board of Land and Natural Resources on the State lands which are managed by this office.

(12)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Ms. Dierdre S. Mamiya, Administrator
Land Division
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Draft Environmental Impact Statement (DEIS): Waiau Fuel Pipeline Project
LD-NAV L2292I2972128421240612 5f41262312327
Ref.: WAIAUFUELPIPELINE.RCM

Dear Ms. Mamiya:

Thank you for your May 22, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project* and for distributing the document to the various DLNR Divisions for their review and comment. We appreciate the time you and others at DLNR spent reviewing the document and providing written comments. Responses to the various Divisions' comments follow.

Division of State Parks and Division of Boating and Ocean Recreation

Based on your letter and attachments, it is our understanding that the Division of State Parks and the Division of Boating and Ocean Recreation have no comments.

Commission on Water Resource Management

The Commission on Water Resource Management (CWRM) noted that a Stream Channel Alternation Permit will be needed only for the crossing of Waiawa Stream. We were aware of this through our prior coordination with CWRM staff and are preparing the application at this time. Our responses to the Commission's two comment letters are attached.

Land Division

Some DLNR Divisions did respond separately, and we have included copies of their letters and our responses in the *Final EIS*.

Other Divisions

We understand that other DLNR Divisions had not responded by the date of your letter but may submit comments separately before the June 7, 2002 deadline.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(12)

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Ecng, P.E.
Project Manager

Enclosures: Copies of the two Response Letters to CWRM

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

(12)

United States Department of Agriculture

NRCS Natural Resources Conservation Service

P.O. Box 50004
Honolulu, HI 96850
Phone: 808-541-2600
FAX: 808-541-1335

Our People...Our Islands...In Harmony

May 21, 2002

Hawaiian Electric Company, Inc.
Attn: Mr. Kan Fong (WA3-YJ)
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Subject: Draft Environmental Impact Statement (DEIS) – Waiau Fuel Pipeline Project, Oahu

We have reviewed the above mentioned document and have no comments to offer at this time.

Thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

Ms. Jadine Urasaki, Acting Harbors Administrator, Harbors Division, State Department of Transportation, 79 South Nimitz Highway, Honolulu, Hawaii 96813

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER

(13)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Mr. Kenneth M. Kaneshiro, State Conservationist
National Resources Conservation Service
P.O. Box 50004
Honolulu, Hawai'i 96850

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Mr. Kaneshiro:

Thank you for your May 21, 2002 letter concerning Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing a written response.

Thank you for confirming that the National Resources Conservation Service has no comments to offer at this time.

If in the future you should have any questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(14)

GTE Hawaiian Tel

Beyond the call

3[illegible]
P.O. Box 2200 • [illegible], HI 96841 • 808 546-4511

May 24, 2002

Ken Fong (WA3-YJ)
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, HI 96840-0001

Dear Ken,

I have reviewed the "Waiau Fuel Pipeline Project, Draft Environmental Impact Statement" prepared by Planning Solutions.

Section 4.14, Impacts on Public Infrastructure and Services, discusses accidental breakage of lines during pipeline construction. Please contact our buried cable group at 840-1444 to identify underground telephone lines in the vicinity. Your consideration will eliminate accidental damage to our extensive network and avoid inconvenience to our customers.

I appreciate the opportunity to communicate my concern.

Very truly yours,

Harlan Hashimoto
Verizon Hawaii
Environmental Affairs
546-2562

c: J. Urasaki – Harbors Division

(14)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YAG

July 23, 2002

Mr. Harlan Hashimoto
Environmental Affairs
Verizon Hawaii
P.O. Box 2200
Honolulu Hawai'i 96841

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Mr. Hashimoto:

Thank you for your May 24, 2002 letter commenting on Hawaiian Electric Company's (HECO). *Draft Environmental Impact Statement* for the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing written comments.

As indicated in Section 4.14 of the *Draft Environmental Impact Statement*, HECO is aware of, and takes very seriously, the potential for construction activity to disrupt underground utility lines. Accordingly, we will contact your buried cable group to obtain information on the location of Verizon's buried cable facilities in the vicinity of our proposed pipeline installation. Once construction begins, our Contractor will be in continuous contact with the buried cable group and will request cable location and marking a minimum of 48 hours prior to excavating in the area..

In the meantime, if you or members of the buried cable group have any questions or would like additional information, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc., at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Jadine Urasaki, Acting Harbors Administrator, State DOT
Perry White, Planning Solutions Inc.

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(15)

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
517 RUSSELL AVENUE, SUITE 110
PEARL HARBOR, HAWAII 96860-4884

IN REPLY REFER TO:
5090
Ser N465/ 00169
31 MAY 2002

Mr. Ken Fong
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu HI 96840-0001

Dear Mr. Fong:

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) WAIAU FUEL PIPELINE PROJECT

Thank you for your letter of April 23, 2002 soliciting the Navy's comment on the DEIS for HECO's Waiau Fuel Pipeline Project

We have reviewed the document and our comments are enclosed. We appreciate the opportunity to participate in your review process and look forward to receiving the final environmental impact statement.

The Navy's point of contact is Mr. Randy Miyashiro at 471-1171, extension 233.

Sincerely,

R. M. WAKUMOTO
Director (Acting)
Regional Environmental Department
By direction of
Commander, Navy Region Hawaii

Enclosure: 1. DEIS Comments

Copy to: Harbors Division, State Department of Transportation

(15)

COMMENTS ON WAIAU FUEL PIPELINE PROJECT DEIS

No.	Page	Section/ Para. No.	Comment	Action
1.	2-29	Table 2-3	HECO is working with the Navy to amend its easement for the aerial crossing over the Navy right-of-way (ROW) location key R22. Please clarify the location of the ROW crossing at location key R21. What impacts are associated with the Navy ROW at this site for the open trenching activities?	
2.	2-38	Table 2-7	Title should be changed to Permits/Approvals Requirements for the Project. Not all of the requirements specified are actually permits. Should also mention the required amendment to lease for the aerial bypass over the Navy ROW.	
3.	2-35	2.2.12	Does the 30-year levelized annual revenue requirement of $6.4 million per year include the operation and maintenance of the HECO BPTF, maintenance and operation of HECO's Kahe pipeline that are included in the current HECO contract with Chevron? In Section 2.1 and 4.0 the proposed action only mentions the new construction required at the facilities and maintenance of the new pipeline and transport of fuel from the BPTF to Iwilei but does not elaborate on the cost to replace the services provided under the existing contract by Chevron.	
4.	2-36	Table 2-6	Discharge Temp heading should be Initial Temperature to be consistent with previous tables and definition of terms provided.	
5.	3-12	3.6.1.1	Our copy of the *Biodiversity of Freshwater and Estuarine Communities in Lower Pearl Harbor, Oahu, Hawaii with Observations on Introduced Species* by Cole, et al is dated February 2000. The study also cited 329 species in 8 phyla. Table 3 (Page 28 of report) lists that 33% of aquatic species are native, 47% introduced and 19% undetermined. The totals quoted in the DEIS represent all species collected (terrestrial and aquatic).	
6.	3-14	3.6.2	Correct spelling for scientific name for pickleweed is *Batis maritima*.	
7.	3-15	3.6.2	To be consistent with the terminology used in Section 4.7.3 the following should be revised: Hawaiian stilt to black-necked stilt Hawaiian hoorhen to Hawaiian, Common moorhen Correct spelling of scientific name for black-necked stilt to *Himantopus mexicanus knudseni*.	
8.	4-65	4.7.1	Insert scientific name of the Hawaiian hoary bat (*Lasiurus cinereu semotus*).	
9.	4-65	4.7.3.1	The Hawaiian duck is also known as the koloa or koloa maoli. koloa mapu is the Hawaiian name for ;the Northern Pintail (*Anas acuta*)	

ENCLOSURE(1)

No.	Page	Section/ Para. No.	Comment	Action
			Correct the following spelling : Genus name for Wandering Tattler is *Heteroscelus vice Heterosceles*. (Correction needed also in Table 4-23) Hawaiian name for the Ruddy Turnstone is 'akekeke vice akekeka.	
10.	4-69	4.7.3.2	Last sentence of the first full paragraph. There is only a single unit (Waiawa Unit) of the PHNWR on Pearl City Peninsula.	
11.	4-85	4.8.4.3.3	Site number is 5302 vice 3502.	

15

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Mr. R. M. Wakumoto, Acting Director
Regional Environmental Department
Navy Region Hawai'i
577 Russell Avenue, Suite 770
Pearl Harbor, Hawai'i 96860-0884

Subject: Draft Environmental Impact Statement: Waiau Fuel Pipeline Project

Dear Mr. Wakumoto:

Thank you for your 31 May 2002 letter (Your Reference 5090: Ser N4651 00169) commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and your staff spent reviewing the document and providing written comments. Item-by-item responses to your comments are provided below.

1. Page 2-29, Table 2-3 HECO is working with the Navy to amend its easement for the aerial crossing over the Navy right-of-way (ROW) location key R22.

Please clarify the location of the ROW crossing at location key R21. What impacts are associated with the Navy ROW at this site for the open trenching activities?

RESPONSE: The Navy Utility ROW-1 indicated in this table of road crossings is within the State Energy Corridor and will not require a new easement. An easement modification is needed for the Navy ROW-2 crossing listed in Table 2-3. As discussed in Section 4.14.1.2 of the *Draft EIS*, impacts of the construction of this crossing could include some minor, temporary disruptions in the use of the bikeway.

2. Page 2-38, Table 2-7. Title should be changed to Permits/Approvals Requirements for the Project. Not all of the requirements specified are actually permits. Should also mention the required amendment to lease for the aerial bypass over the Navy ROW.

RESPONSE: Thank you for these suggestions. We have revised the table titles in the *Final EIS* as you recommended; we have also added the amendment to the lease for the aerial bypass. For your information, the Navy approved the CATEX for the lease amendment on May 19, 2002.

3. Page 2-35, Section 2.2.12. Does the 30-year levelized annual revenue requirement of $6.4 million per year include the operation and maintenance of the HECO BPTF, maintenance and operation of HECO's Kahe pipeline that are included in the current HECO contract with Chevron? In Section 2.1 and 4.0 the proposed action only mentions the new construction required at the facilities and maintenance of the new pipeline and transport of fuel from the BPTF to Iwilei but does not elaborate on the cost to replace the services provided under the existing contract by Chevron.

RESPONSE: The costs to operate and maintain the BPTF and the cost to replace the services provided by Chevron under the existing contract are accounted for in the economic analysis.

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FOR DISTINGUISHED INDUSTRY LEADERSHIP

4. 2-36, Table 2-6. Discharge Temp heading should be Initial Temperature to be consistent with previous tables and definition of terms provided.

RESPONSE: Thank you for noting this inconsistency. This table heading will be changed to "Initial Temperature" as you have suggested.

5. Page 3-12, Section 3.6.1.1. Our copy of the Biodiversity of Freshwater and Estuarine Communities in Lower Pearl Harbor, Oahu, Hawaii with Observations on Introduced Species by Cole, et al is dated February 2000. The study also cited 329 species in 8 phyla. Table 3 (Page 28 of report) lists that 33% of aquatic species are native, 47% introduced and 19% undetermined. The totals quoted in the DEIS represent all species collected (terrestrial and aquatic).

RESPONSE: Thank you for noting the confusing way in which this was stated. We have modified and expanded section of the *Final EIS* to clarify the discussion of these species classifications and also to provide the most appropriate citation, which is to:

Englund, R.A., D.J. Preston, R. Wolff, S.L. Coles, L.G. Eldredge & K. Arakaki. 2000. Biodiversity of freshwater and estuarine communities in lower Pearl Harbor, Oahu, Hawaii with observations on introduced species. Final Report prepared for the U.S. Navy.Bishop Museum Technical Report 16: x + 167 pp.

Section 3.6.1.1 of the *Final EIS* reads as follows:

From a biological perspective, Timbol and Maciolek (1978) concluded that none of the streams draining into Pearl Harbor could be considered as pristine. Englund, et al. (2000) discovered that introduced species comprise 47% of the aquatic biota found in Pearl Harbor estuarine and riparian habitats, while only 33% were confirmed to be native species (the balance being undetermined). Hawaiian aquatic ecologists generally consider relatively high numbers of introduced species in a given stream or wetland to be indicative of severe ecological disturbance. Introduced species are known to eliminate native biota through competition for food and shelter, predation, habitat and food chain alteration, and introduction of parasites and disease.

The most recent comprehensive stream surveys conducted within the HECO pipeline alignment are those of Englund (1993) and Englund, et al. (2000). Previous studies include those of Ford (1985), Timbol and Maciolek (1978), and US Fish and Wildlife Service (1975). Higashi (2001) knew of no recent studies within the project area conducted by the State of Hawaii Division of Aquatic Resources.

A comprehensive list of aquatic macrofauna found within the lower reaches of influent streams to West Loch Pearl Harbor appears in Appendix C: Stream and Wetland Records for Invertebrates and Fishes Collected or Observed in Pearl Harbor, Legacy Project Surveys of Freshwater and Estuarine Habitats by Englund, et al. (2000). These investigators recorded a total of 329 species in 14 phyla from the "estuarine and riparian habitats of Pearl Harbor", of which 21% were native to Hawaii and 60% were introduced species. Of these, 192 species were aquatic macrofauna other than insects. As Timbol and Maciolek (1978) reported finding these Pearl Harbor streams to be dominated by introduced aquatic species, so too did Englund, et al. (2000) find similar results within area wetlands, streams, and estuaries. They estimated that about 47% of the aquatic species found within the area were introduced, while only 33% of

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aquatic species found within the area were endemic and indigenous to Hawaii (the origin of the remaining 19% could not be determined).

The most predominant group of aquatic animals found within the area was insect species, of which 79% were aquatic flies, followed by dragonflies and damselflies (8%), aquatic beetles (6.6%), and the true bugs (5.5%). Insects ranged from a low count of two species at the Waiawa Unit of the Pearl Harbor National Wildlife Refuge (due to limited sampling time) to a high count of nearly 30 species within the terminal reaches of Honouliuli, Waiawa and Waimalu Streams, and the Waiau and Waiawa Springs (Englund, et al. 2000).

6. Page 3-14, Section 3.6.2. Correct spelling for scientific name for pickleweed is Batis maritime.

RESPONSE: The spelling used in the *Draft EIS* (*Batis maritima*), is consistent with that in, W.L. Wagner, D.R. Herbst, and S.H. Sohmer, 1999. Manual of the flowering plants of Hawai'i, revised edition. 2 vols. University of Hawai'i Press and Bishop Museum Press, Honolulu. We retained this spelling in the *Final EIS*.

7. Page 3-15, Section 3.6.2. To be consistent with the terminology used in Section 4.7.3 the following should be revised:

Hawaiian stilt to black-necked stilt

Hawaiian moorhen to Hawaiian, Common moorhen

Correct spelling of scientific name for black-necked stilt to Himantopus mexicanus knudseni.

RESPONSE: Thank you for noting these inconsistencies. The references in the Final EIS to the stilt will be changed to "Black-Necked Stilt"; the references to the moorhen will be changed to "Common Moorhen"; and the spelling for the Latin name for the stilt will be changed to "*Himantopus mexicanus knudseni.*"

8. Page 4-65, Section 4.7.1. Insert scientific name of the Hawaiian hoary bat (Lasiurus cinereus semotus).

We will insert the scientific name of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the *Final EIS*.

9. Page 4-65, Section 4.7.3.1. The Hawaiian duck is also known as the koloa or koloa maoli. koloa mapu is the Hawaiian name for the Northern Pintail (Anas acute)

Correct the following spelling:

Genus name for Wandering Tattler is Heteroscelus vice Heterosceles. (Correction needed also in Table 4-23)

Hawaiian name for the Ruddy Turnstone is `akekeka vice akekeka.

RESPONSE: Thank you for noting these points. The references to the Hawaiian duck will be changed in the *Final EIS* to "koloa maoli". We will also incorporate your suggestions related to the names of he Wandering Tattler and the Ruddy Turnstone into the *Final EIS*.

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10. Page 4-68, Section 4.7.3.2, Last sentence of the first full paragraph. There is only a single unit (Waiawa Unit) of the PHNWR on Pearl City Peninsula.

RESPONSE:

Thank you for bringing this matter to our attention. We have rewritten the first complete paragraph on this page to clarify the locations of the two units of the PHNWR. It will read as follows in the *Final EIS*:

> *"The area along both routes adjacent to West Loch supports numerous wetland habitats including, saltwater swamp, saltwater marsh, freshwater marsh, freshwater swamp, cultivated wetlands, and ruderal wetlands (see Figure 4-4). There are several significant wetlands located along the pipeline routes. Pouhala Marsh is located just north-northwest of Kapakahi Stream on the Waipi'o peninsula. Managed under a cooperative agreement with the U.S. Navy, Pearl Harbor National Wildlife Refuge (NWR) was established in 1976. This refuge is composed of two units, the 37-acre Honouliuli Unit which borders West Loch and the 25-acre Waiawa Unit bordering Middle Loch."*

11. Page 4-85, Section 4.8.4.3.3. Site number is 5302 vice 3502.

RESPONSE: Thank you for noting this typographical error. It has been corrected in the Final EIS.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

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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

ROBERT AN
GLEN KAJIYAMA
DEPUTY CHIEFS

OUR REFERENCE CS-KP

June 3, 2002

Mr. Ken Fong
(WA3-YJ), Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the Waiau Fuel Pipeline Project.

Based on the information provided in the DEIS, this project should have minimal impact on the services and facilities of this department.

If there are any questions, please call Ms. Carol Sodetani of the Support Services Bureau at 529-3658.

Sincerely,

LEE D. DONOHUE
Chief of Police

By
KARL GODSEY
Assistant Chief of Police
Support Services Bureau

cc: Ms. Jadine Urasaki
Department of Transportation

OEQC

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CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Chief Lee D. Donohue
Police Department
City and County of Honolulu
801 South Beretania Street
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Chief Donahue:

Thank you for your June 3, 2002 letter (Reference Cs-K) commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and your staff spent reviewing the document and providing written comments.

We are pleased that the Department has concluded that the proposed project should have minimal impact on the Police Department's services and facilities.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

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:
02-105/epo

June 4, 2002

Mr. Ken Fong, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Subject: Draft Environmental Impact Statement (DEIS)
Waiau Fuel Pipeline Project
From HECO's Barbers Point Tank Farm, Campbell Industrial Park, to
Waiau Generating Station, Pearl City.

Thank you for the opportunity to review and comment on the subject proposal. The DEIS was routed to the various branches of the Environmental Health Administration. We have the following comments.

Environmental Planning Office (EPO)

This project is located in the Pearl Harbor watershed and would possibly cross several of its streams. Of these streams, Kapakahi, Waikele, Waimano, and Waiawa, as well as Pearl Harbor itself, are currently listed under section 303(d) of the Clean Water Act as impaired waters. The pollutants of concern in each water body are shown below:

Listed Water Body	Pollutants
Pearl Harbor	Nutrients, turbidity, suspended solids
Waiawa Stream	Nutrients, turbidity, trash
Waimano Stream	Turbidity
Waikele Stream	Nutrients, turbidity
Kapakahi Stream	Nutrients, turbidity, trash

The impaired status of these waters requires that the Department of Health establish Total Maximum Daily Loads (TMDLs) suggesting how much the existing pollutant loads should be reduced in order to attain water quality standards in the stream and coastal waters. Although

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these TMDLs are yet to be established and implemented, a first step in achieving TMDL objectives would be to prevent any project-related increases in pollutant loads.

The DEIS summarizes water pollution control permit requirements for the proposed action (Table 2-7). A TMDL technical study of water quality in the Pearl Harbor watershed, including the streams listed above, will begin this year, and the TMDLs may be established by June 2003. We therefore encourage Hawaiian Electric Company, Inc. to participate in the TMDL process and suggest that they consult with the Department of Health Clean Water Branch (Engineering Section) to discuss how water pollution control permitting may be linked with TMDL implementation.

If you have any questions about the Total Maximum Daily Load program, please contact David Penn, Environmental Planning Office, at (808) 586-4337.

Clean Air Branch (CAB)

Control of Fugitive Dust

There is a significant potential for fugitive dust emissions during the construction activities. Implementation of adequate dust control measures during all phases of development and construction activities is warranted.

Construction activities must comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and

f. Controlling of dust from debris being hauled away from project site.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at (808) 586-4200.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: EPO
CAB

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CONSTPR P0000064
GENPP 10-16
YA/O

July 23, 2002

Dr. Bruce S. Anderson, Ph.D., Director
Department Of Health
State Of Hawai'i
P.O. Box 3378
Honolulu, Hawai'i 96801

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Dr. Anderson:

Thank you for your June 4, 2002 letter (your file reference 02-1051epo) commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. Thank you for routing the document to the various branches of the Environmental Health Administration. We appreciate the time you and members of those branches spent reviewing the report and providing written comments. Item-by-item responses to your comments are provided below.

Environmental Planning Office (EPO)

This project is located in the Pearl Harbor watershed and would possibly cross several of its streams. Of these streams, Kapakahi, Waikele, Waimano, and Waiawa, as well as Pearl Harbor itself, are currently listed under section 303(d) of the Clean Water Act as impaired waters. The pollutants of concern in each water body are shown below:

Listed Water Body	*Pollutants*
Pearl Harbor	*Nutrients, turbidity, suspended solids*
Waiawa Stream	*Nutrients, turbidity, trash*
Waimano Stream	*Turbidity*
Waikele Stream	*Nutrients, turbidity*
Kapakahi Stream	*Nutrients, turbidity, trash*

The impaired status of these waters requires that the Department of Health establish Total Maximum Daily Loads (TMDLs) suggesting how much the existing pollutant loads should be reduced in order to attain water quality standards in the stream and coastal waters. Although these TMDLs are yet to be established and implemented, a first step in achieving TMDL objectives would be to prevent any project-related increases in pollutant loads.

The DEIS summarizes water pollution control permit requirements for the proposed action (Table 2-7). A TMDL technical study of water quality in the Pearl Harbor watershed, including the streams listed above, will begin this year, and the TMDLs may be established

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by June 2003. We therefore encourage Hawaiian Electric Company, Inc. to participate in the TMDL process and suggest that they consult with the Department of Health Clean Water Branch (Engineering Section) to discuss how water pollution control permitting may be linked with TMDL implementation.

If you have any questions about the Total Maximum Daily Load program, please contact David Penn, Environmental Planning Office, at (808) 586-4337.

RESPONSE: We appreciate the information you provided concerning the pollutants of concern in the listed streams. We are aware of the Department's planned TMDL technical study, and members of our Environmental Department have discussed the manner in which HECO might link its various facilities with the Department's implementation of the TMDL program.

As indicated in the *DEIS* for the Waiau Fuel Pipeline project, we have purposely selected construction techniques for the proposed project which will allow us to limit our work to Waiawa Stream. We will not need to disturb the other water bodies you listed. In accordance with your suggestion, we contacted Mr. David Penn of the Environmental Planning Office. He indicated that no further consultation with the TMDL program is needed at this time. We are continuing to coordinate with the Engineering Section of the Clean Water Branch.

Clean Air Branch (CAB)

Control of Fugitive Dust

There is a significant potential for fugitive dust emissions during the construction activities. Implementation of adequate dust control measures during all phases of development and construction activities is warranted.

Construction activities must comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and

f. Controlling of dust from debris being hauled away from project site.

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RESPONSE: As indicated in the *Draft EIS*, HECO will require the contractor to contractor to provide adequate measures to control dust from the road areas and during the various phases of construction using measures such as those included in your letter.

If you have any further questions concerning the project, please call me at (808) 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at (808) 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

UNIVERSITY OF HAWAI'I
ENVIRONMENTAL CENTER

A UNIT OF THE WATER RESOURCES RESEARCH CENTER

June 7, 2002
RE: 726

Ken Fong
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawai'i 96840

Dear Mr. Fong:

HECO Waiau Fuel Pipeline Project
Draft Environmental Impact Statement
Honolulu, Hawai'i

Hawaiian Electric Company, Inc. (HECO) proposes to construct a new, 13-mile-long insulated pipeline between the HECO Barbers Point Tank Farm in Campbell Industrial Park and the Waiau Generating Station in Pearl City. The project will permit HECO to continue supplying low-sulfur fuel oil (LSFO) to the Waiau Station after 2004, when the current contract agreement to use the Chevron pipeline expires.

HECO is seeking a lease from the State Department of Transportation to utilize the existing State Energy Corridor for most of the pipeline's route. From the Barbers Point Tank Farm, the pipeline would be placed along Kalaeloa Boulevard to Farrington Highway, then proceeding along the mauka side of Farrington Highway. The final stage of the proposed route would follow the former Oahu Rail and Land Company right-of-way near the northern shoreline of Pearl Harbor to the Waiau Station. HECO suggests that the new pipeline will supply fuel to Waiau more efficiently, with enhanced environmental protection, and at a lower cost than the present system.

Peter Fischbart, Urban and Regional Planning; Stephen Masutani, Hawai'i Natural Energy Institute; and Kevin Polloi of the Environmental Center assisted in the review of this document.

GENERAL COMMENTS

The draft EIS is well written, nicely illustrated, and easy to read and comprehend. It appears to address the major relevant impacts of the three alternatives in a systematic fashion.

The proposed project addresses the need to provide an uninterrupted supply of low-sulfur fuel oil (LSFO) to the HECO Waiau power station, which contributes nearly one-quarter of the electrical generating capacity on the island of Oahu. Interruption of this supply would certainly result in

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significant hardship and economic losses to consumers of electricity and might also jeopardize the health and safety of the community.

The existing Chevron pipeline currently transporting LSFO from the Barbers Point Tank Farm to the Waiau power station is aging. It requires constant maintenance, and in addition it has a limited number of isolation valves and rudimentary monitoring systems to detect, prevent, or minimize spill events. A pipeline failure in 1996 due to corrosion resulted in release of almost 1,000 barrels of No. 6 fuel oil, which had significant negative impacts on the environment. The new pipeline proposed by HECO represents a major technical upgrade that should reduce the risks of oil spills. However, our reviewers have noted the following concerns.

SPECIFIC COMMENTS

Section 2.0 – Alternatives Considered

While our reviewers find the concept of constructing a new, upgraded pipeline is generally favorable, they suggest that additional information should be included in the final EIS to provide a data set sufficient to properly evaluate the project and to determine if adequate safeguards will be implemented. Specifically:

1. Include any data on the effectiveness of the epoxy coating in preventing material loss due to corrosion. In this regard, any information on previous buried pipe applications (histories) using the same pipe and coating would be particularly useful.

2. Corrosive failure at weld joints due to galvanic effects arising from local gradients in steel structure (i.e., changes in material composition and structure at the welds) is well known. Please provide a short discussion on whether this may pose a problem over the expected lifetime of the pipeline and describe any quality control steps during the field installation that will be taken to minimize this problem.

3. Although the Draft EIS speaks highly of the monitoring system intended to detect leakage or other aberrant behavior, very few details are provided about this monitoring system. Of particular interest is the level of redundancy of sensors, the error bands of the sensors (i.e., what is the minimum detectable leakage threshold), and the general "control" logic that will be applied to detect a problem and respond to it.

Section 4.0 – Potential Impacts

1. While the Draft EIS states the basis (procedures described in 49CFR194.105) for the estimate of the reasonable worst case oil spill scenario being considered, it would be helpful if a few more details on the rationale and assumptions were provided to allow the reviewer to evaluate the scenario's realism.

2. The Draft EIS frequently mentions the Oil Spill Contingency Plan that is being prepared by HECO. Some of the information presumably included in this Plan should be provided in the final EIS for the Waiau pipeline project. Specifically, a summary of site-specific general steps that will be taken to respond to an oil spill resulting from a failure in the buried pipeline should be included, including a review of the major steps and procedures from the point in the monitoring that a problem is detected through clean up and remediation (if required).

Section 4.1 – Impacts on Transportation and Traffic

1. Table 2-9 (p. 2-49) shows that trucking operations will add from 5.6 to 16.2 one-way trips per hour depending on the total hours of trucking operations, which range from 10 to 18 hours per day. Based on the information in Table 2-9, the EIS concludes, "The number of truck trips is not high compared to other traffic that presently uses the affected roadways." (p. 2-46) Section 4.10 provides more details on traffic impacts and its primary purpose is to present evidence to support this conclusion. Section 4.10.2 identifies areas of concern with respect to potential transportation impacts and itemizes five types of effects (e.g., "Increase the number of vehicle-trips to the point where they lower the level of service on existing roadways". (p. 4-98)

It's clear from this last statement that the EIS acknowledges that the level of service (LOS) of affected roadways is necessary baseline information and a relevant criterion for evaluating certain traffic impacts. Indeed, Section 4.10.5.1 and Section 4.10.5.2 indicate that the Barbers Point Tank Farm Ingress and Egress and the Campbell Industrial Park Roadways currently have adequate LOS (i.e., A, B, or C depending on location and time of day). However, the existing levels of service of roadways and intersections used to access the Waiau plant are noticeably absent. Instead, the EIS presents existing 24-hour traffic volumes on Kamehameha Highway (Figure 4-16) and two intersections (Figures 4-17 and 4-18) from single-day counts and acknowledges that "Traffic volumes on Ka'ahumanu Street, Moanalua Road, and the H-1 Freeway can be heavy during peak hours" (p. 4-110). It concludes, however, that the maximum of 6 truck trips to the Waiau plant "would not measurably affect the level of service the roadways would provide" (p. 4-110). Our reviewers suggest that the EIS should state the present LOS of these roadways and intersections and consider effects of these 6 truck trips on the various LOS's during peak hours. If the LOS is already D or E at these locations, then even 6 truck trips could make congested traffic at these locations even worse.

2. Section 4.10.5.3 does not discuss the existing LOS of Kamehameha Highway and major intersections or the expected changes in the LOS due to projected population growth in the area. Instead the EIS shows in an unnumbered figure that traffic did not grow in this area between November 1995 and July 2000 (p. 4-109). Based on data in this figure, the EIS assumes "... despite the new construction that had occurred in the area, there was no increase in traffic volumes that needs to be taken into consideration in the analysis" (p. 4-109). Their apparent argument is that even though they have only one-day's worth of traffic data, these data are considered representative of traffic trends for the years spanning 1995 and 2000. At best this seems ingenuous and counterintuitive.

3. The EIS does not discuss future traffic conditions on affected roadways and intersections at anytime during the estimated 30 to 50 year economic life span of the pipeline. More so than in the present, truck trips to the Waiau plant will likely have a greater impact on traffic, if population growth occurs in this area. Rather than relying on current and past traffic data, it might help if the document included projected traffic growth. The Oahu Metropolitan Planning Organization recently published a report called the "Transportation for Oahu Plan TOP 2025" which shows such traffic projections.

Table 7.6 – Persons Preparing the Environmental Impact Statement

The table indicates that Jim Morrow, who prepared Appendix A on air quality impacts, is affiliated with Sierra Research and has a B.A. in the physical sciences. However, the name of his firm is J.W. Morrow Environmental Management Consultants, and he has a B.S. in chemistry and a doctorate in public health from the University of Hawai'i at Manoa.

Thank you for the opportunity to review this draft Environmental Impact Assessment.

Sincerely,

John T. Harrison, Ph.D.
Environmental Coordinator

Cc: OEQC
Jadine Urasaki, DOT
James Moncur
Kevin Polloi

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YA/CI

July 23, 2002

Dr. John T. Harrison, Ph.D.
Environmental Center
University of Hawai'i
Krauss Annex 18
2500 Dole Street
Honolulu, Hawai'i 96822

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Dr. Harrison:

Thank you for your June 7, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time that Dr. Flachsbart, Dr. Masutani, Mr. Polloi, and you spent reviewing the document and preparing written comments. In particular, I want to thank you for the complimentary remarks concerning the document's writing, illustrations, and comprehensive coverage of potential environmental effects.

Your letter did identify a few areas where the reviewers felt that additional information could be provided. Our item-by-item responses to their suggestions follow below. These include an explanation of the changes we will incorporate into the *Final Environmental Impact Statement*. To facilitate understanding, we have reproduced the comments in the body of this letter immediately before each response.

Section 2.0 – Alternatives Considered

While our reviewers find the concept of constructing a new, upgraded pipeline is generally favorable, they suggest that additional information should be included in the final EIS to provide a data set sufficient to properly evaluate the project and to determine if adequate safeguards will be implemented. Specifically:

1. Include any data on the effectiveness of the epoxy coating in preventing material loss due to corrosion. In this regard, any information on previous buried pipe applications (histories) using the same pipe and coating would be particularly useful.

2. Corrosive failure of weld joints due to galvanic effects arising from local gradients in steel structure (i.e., changes in material composition and structure at the welds) is well known. Please provide a short discussion on whether this may pose a problem over the expected lifetime of the pipeline and describe any quality control steps during the field installation that will be taken to minimize this problem.

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FOR DISTINGUISHED INDUSTRY LEADERSHIP

RESPONSE: Our response to these two items is grouped together because both the epoxy coating and galvanic protection measures work together to insure the integrity of the pipe over the life of the system. Publications describing corrosion prevention systems similar to the ones that would be used for the proposed Waiau Fuel Pipeline have been sent to Dr. Masutani of the University of Hawai'i. We believe that the data indicate that the coatings and welding techniques that we propose to use will resist material loss and changes in material structure and composition at the welds. Dr. Masutani has stated that the information he received addressed well the technical issues of concern and satisfies your request.

3. Although the Draft EIS speaks highly of the monitoring system intended to detect leakage or other aberrant behavior, very few details are provided about this monitoring system. Of particular interest is the level of redundancy of sensors, the error bands of the sensors (i.e., what is the minimum detectable leakage threshold), and the general "control" logic that will be applied to detect a problem and respond to it.

RESPONSE: In preparing the *DEIS*, we tried to strike a balance between comprehensiveness and readability. In doing so, we did not include all of the detailed technical information we have developed for the monitoring system. Publications that describe the details of the monitoring system we will use have been sent to Dr. Masutani. These include information on the level of redundancy of sensors, the minimum detectable leakage threshold, and the general "control" logic that will be applied to detect a problem and respond to it. Dr. Masutani has stated that the information he received addressed well the technical issues of concern and satisfies your request.

Section 4.0 — Potential Impacts

1. While the Draft EIS states the basis (procedures described in 49CFR194.105) for the estimate of the reasonable worst case oil spill scenario being considered, it would be helpful if a few more details on the rationale and assumptions were provided to allow the reviewer to evaluate the scenario's realism.

RESPONSE: The reasonable worst case (RWC) scenario varies at different points along the pipeline and according to the type of fuel. The worst case discharge (WCD) is calculated by assuming that all of the oil that can be released will be released, first by the decompression of the pipeline, second by oil released prior to the pumps being shut off and lastly by gravity flow after the pumps are shut off.

The location with the potential of generating the greatest spill volume is at Makakilo Gulch. The pertinent characteristics of RWC spills of LSFO and diesel oil at this location are as follows:

RWC for LSFO at Makakilo Gulch
WCD: 718 bbl
Total Recovered from pipe: 450 bbl
Total Recovered From Golf Course Pond: 165 bbl
Total Manual / Sorbent Recovery: 45 bbl
Estimated Evaporative Loss (5%): 13 bbl
Unaccounted for: 21 bbl

RWC for Diesel Oil at Makakilo Gulch
WCD: 718 bbl.
Total Recovered from pipe: 180 bbl
Total Recovered From Pond: 237 bbl
Total Manual Recovery (oily soil): 10 bbl
Sorbent Recovery: 15 bbl
Unaccounted for (Evaporation, 45%): 242 bbl
Unaccounted for (Other): 34 bbl

While this is the point along the pipeline where the total volume of a spill could be greatest, its inland location means that this oil would not reach sensitive habitats in and around Pearl Harbor. Because of this, we also identified a RWC LSFO Spill near the Waiau Generating Station where the product escaping from a pipeline break would enter aquatic environments. The characteristics of that spill are as follows:

RWC for LSFO at Waiau Generating Station
Total Volume Released: 137 bbl
Total Recovered From Pipeline: 15 bbl
Discharged to Wetland / Interior areas: 72bbl
Recovered (Interior Areas): 60 bbl
Evaporative loss (5%, Interior Areas): 3.5 bbl
Unaccounted for (Interior Areas): 8.5 bbl
Discharged to Pearl Harbor: 50 bbl
Recovered from Pearl Harbor (Containment booms and skimming operations): 42.5 bbl
Recovered from Ford Island / Other shorelines: 2 bbl
Evaporative Loss (5%, Pearl Harbor): 2.5 bbl
Unaccounted for (Pearl Harbor): 3 bbl

2. The Draft EIS frequently mentions the Oil Spill Contingency Plan that is being prepared by HECO. Some of the information presumably included in this Plan should be provided in the final EIS for the Waiau pipeline project. Specifically, a summary of site-specific general steps that will be taken to respond to an oil spill resulting from a failure in the buried pipeline should be included, including a review of the major steps and procedures from the point in the monitoring that a problem is detected through clean up and remediation (if required).

RESPONSE: The Oil Spill Contingency Plan (OSCP) cannot be finalized until the actual pipeline is in place and all as-built conditions documented. The final plan is then reviewed annually for accuracy and completeness. However, the general steps that would be taken to detect, respond to and remediate a spill are well known and summarized in the following paragraphs. This information will be included in the *Final EIS* in the form of a copy of this letter:

- Initial 15 minutes: SCADA System detects an abnormal condition indicating a leak. Pipeline operator initiates immediate system shutdown, closes valves, and identifies approximate location of leak. The pipeline depressurizes immediately following the break in the pipe, releasing oil at a relatively rapid rate. The discharge rate decreases quickly as the pressure in the pipeline stabilizes

and gravity drainage of the pipeline begins. The pipeline operator implements the oil spill contingency plan (OSCP). The contractor who caused the break reports the incident accident to the responsible party who calls the HECO emergency number which is on an adjacent pipeline marker. Police and Fire Department personnel arrive on scene and setup traffic control. If the break is in an area close to the Waiau Generating Station, the pipeline operator notifies on-duty plant personnel to implement the flow diversion plan for the Waiau Units 1&2 intake/discharge system and check deployment of permanent boom off the discharge canal.

- Remainder of Hour 1: Crews are dispatched to the break with initial response equipment. These may include a Personal Protective Equipment site package, portable pumps, a 2,400 gallon Fast Tank, sorbent and viscous oil sweeps, double diaphragm pumps, an oil mop skimmer, and an additional Fast Tank. Sorbent is applied to product. If the spill is LSFO, it will have congealed by the end of the hour, stopping most movement. Snare sweeps or other devices will have been deployed to keep the oil from migrating further from the source of the leak. If the release is into Pearl Harbor near the Waiau Generating Station, the pipeline operator would notify on-duty plant personnel to implement the flow diversion plan for the Waiau Units 1&2 intake/discharge system and to check deployment of the permanent boom off the discharge canal.
- Hours 2 through 5: Additional sorbent would be deployed; vacuum trucks would arrive and collect spilled oil, capturing most of the oil that continues to escape from the pipe. Some oil would escape during switchover from one truck to the next. Pipeline repair crews would arrive and begin preparing the break point for repair operations. If the leak is near Waiau where it could reach Pearl Harbor, a crew would deploy the containment boom in the area between the Waiau discharge canal and Ford Island. Temporary pipeline repairs would be initiated as soon as the excavation can be safely entered.
- Rest of Day 1: Recovery of oil draining from pipe would continue until flow ceases; vacuum recovery would continue as well. Repairs crews would begin temporary repair of pipeline. In instances where small amounts of oil reach Pearl Harbor, the skimmer boat would begin recovery of oil contained by booms and uncontrolled oil approaching Ford Island.
- Day 2 thru end of week: In the case of the RWC LSFO spill at Waiau, a few tar balls would be observable on the water surface in Pearl Harbor. Manual recovery would be carried out. Beach cleanup would continue on the shoreline of the Mainland and Ford Island. Manual cleanup of tar balls on Ford Island would continue and workers would monitor conditions along other shorelines. Response teams would be dispatched to conduct cleanup where necessary. Recovery of oil in the interior areas would continue. Minimal mobile oil would be present by the end of this period, and recovery in wetland would consist mostly of manual recovery and recovery using snare. Pipeline repair would be completed.

Section 4.1 - Impacts on Transportation and Traffic

1. Table 2-9 (p.2-49) shows that trucking operations will add from 5.6 to 16.2 one-way trips per hour depending on the total hours of trucking operations, which range from 10 to 18 hours per day. Based on the information in Table 2-9, the EIS concludes, "The number of truck trips is not high compared to other traffic that presently uses the affected roadways." (p. 2-46) Section 4.10 provides more details on traffic impacts and its primary purpose is to present evidence to support this conclusion. Section 4.10.2 identifies areas of concern with respect to

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potential transportation impacts and itemizes five types of effects (e.g., "Increase the number of vehicle-trips to the point where they lower the level of service on existing roadways". (p. 4-98)

It's clear from this last statement that the EIS acknowledges that the level of service (LOS) of affected roadways is necessary baseline information and a relevant criterion for evaluating certain traffic impacts. Indeed, Section 4.10.5.1 and Section 4.10.5.2 indicate that the Barbers Point Tank Farm Ingress and Egress and the Campbell Industrial Park Roadways currently have adequate LOS (i.e., A, B, or C depending on location and time of day). However, the existing levels of service of roadway s and intersections used to access the Waiau plant are noticeably absent. Instead, the EIS presents existing 24-hour traffic volumes on Kamehameha Highway (Figure 4-16) and two intersections (Figures 4-17 and 4-18) from single-day counts and acknowledges that "traffic volumes on Ka'ahumanu Street, Moanalua Road, and the H-1 Freeway can be heavy during peak hours" (p. 4-110). It concludes, however, that the maximum of 6 truck-trips to the Waiau plant "would not measurably affect the level of service the roadways would provide" (p.4-110). Our reviewers suggest that the EIS should state the present LOS of these roadways and intersections and consider effects of these 6 truck-trips on the various LOSs during peak hours. If the LOS is already D or E at these locations, then even 6 truck trips could make congested traffic at these locations even worse.

2. Section 4.10.5.3 does not discuss the existing LOS of Kamehameha Highway and major intersections or the expected changes in the LOS due to projected population growth in the area. Instead the EIS shows in an unnumbered figure that traffic did not grow in this area between November 1995 and July 2000 (p. 4-109). Based on data in this figure, the EIS assumes "... despite the new construction that had occurred in the area, there was no increase in traffic volumes that needs to he taken into consideration in the analysis" (p. 4-109). Their apparent argument is that even though they have only one-day's worth of traffic data, these data are considered representative of traffic trends for the years spanning 1995 and 2000. At best this seems ingenuous and counterintuitive.

The EIS does not discuss future traffic conditions on affected roadways and intersections at anytime during the estimated 30 to 50 year economic life span of the pipeline. More so than in the present, truck trips to the Waiau plant will likely have a greater impact on traffic, if population growth occurs in this area. Rather than relying on current and past traffic data, it might help it the document included projected traffic growth. The Oahu Metropolitan Planning Organization recently published a report called the "Transportation for Oahu Plan TOP 2025" which shows such traffic projections.

RESPONSE: Thank you for your detailed comments and for the conversations that Environmental Center reviewers subsequently had with our consultant. We share your reviewers' belief that trucking (i.e., Alternative 3 as described in the *Draft EIS*) is not the best alternative from a traffic standpoint. We would also like to reiterate the fact that it is not HECO's Preferred Alternative.

The traffic situations, both existing and future, along the non-freeway route that fuel trucks would use traveling through Pearl City to and from the Waiau Generating Station are complicated. There are numerous signalized intersections, and during peak hours existing traffic volumes are high. As explained in the *Draft EIS*, the incremental change that the proposed project would cause (approximately six

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vehicle-trips per hour past any given point) is very small relative to the existing and forecast volumes of at least 2,000 vehicle-trips per hour. It is also quite small relative to the changes in traffic likely to result from other traffic generators in the area. Finally, and, equally important, the potential that project-related traffic has to alter vehicle-capacity (*v/c*) ratios and Level of Service (LOS) is small compared to the effect of changes (e.g., capital improvements to roadways, signal timing adjustments, etc.) that the State and City and County plan to make.

Because these other factors (traffic from other generators, changes/improvements to the road network, etc.) overwhelm the potential effect that trucking fuel to Waiau would have on traditional measures of traffic impact, we concluded that detailed intersection and roadway network studies would not contribute meaningfully to an understanding of the situation and were not necessary for an adequate assessment of potential effects of Alternative 3.

As a small footnote to the above, the *Draft EIS* did not, as the comment suggested it did, consider only one-day's worth of traffic data. The graph at the bottom of page 4-109 of the *Draft EIS* presented data from six years (late-1995, early-1996, mid-1997, late-1998, mid-1999, and late 2000). These data show considerable year-to-year fluctuation in traffic, which I believe is the point your reviewer was trying to make, but they do not show a discernible trend. The point that the *Draft EIS* was trying to make in presenting these traffic counts was that the data that we had used in preparing Figures 4-16 and Figure 4-17 were reasonably representative of the present situation, not a one-day aberration.

Having said all of that, the concerns expressed in your letter indicated to us that it would be useful to revise the discussion of potential traffic effects presented in the *Draft EIS* to include some of the additional information and clarifications that you had requested. Hence, following receipt of your letter, we contacted the Oahu Metropolitan Planning Organization (OMPO) and obtained from them information concerning forecast traffic volumes on the roads in the vicinity of the Waiau Generating Station. The information includes AM peak-hour, PM peak-hour, and off-peak maximum traffic volumes for the year 2025. OMPO made its forecasts using a 2025 roadway network that included all the projects listed in the *Transportation Plan for O'ahu (TOP) 2025* plan. OMPO's response to our consultant is reproduced as Attachment A.

It is important to note that the OMPO forecasts are for 4-hour periods in the morning and afternoon rather than for the more familiar AM and PM peak-hours. Because of that, they are not directly comparable to the existing traffic volumes presented in the *Draft EIS*. Dr. Flachsbart, who was kind enough to speak to our consultant at some length, asked that we provide 4-hour totals of existing traffic that could be compared to the OMPO forecast numbers, and we have included that comparison as an attachment to this letter, a presentation that Dr. Flachsbart indicated would be satisfactory. However, it is important to note that the street network on which OMPO has based its 2025 forecast included all of the projects listed in the *Transportation for Oahu Plan (TOP) 2025 Plan*. Consequently, it would be misleading to compare numbers from the two years and assume that the differences are growth-related. OMPO has also noted that the facilities and improvements listed in the TOP 2025 were defined in general terms. Equally important, identification of a project in the plan does not guarantee its construction. Limitations of funding, changes in design, planning constraints, and environmental issues may also change the descriptions and timing of the projects. These changes would, in turn, impact the resulting volumes.

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Based on the concerns expressed in your letter and our exchanges with Mr. Polloi and Dr. Flachsbart, we have replaced the last two paragraphs in Section 4.10.5.3 of the *Draft EIS* with the following.

> *Traffic on Kamehameha Highway, Ka'ahumanu Street, Moanalua Road, and the H-1 Freeway is already very heavy during peak hours. The results of traffic counts at the Kamehameha Highway/Ka'ahumanu Street and Moanalua Road/Ka'ahumanu Street intersections are shown in Figure 4-17 and Figure 4-18. A traffic impact assessment that was conducted for the City and County of Honolulu's Moanalua Spine Road project evaluated a number of intersections in the area (Pacific Planning & Engineering, December 28, 1998). It found a LOS of "E" at the Kamehameha Highway-Waimano Home Road intersection and the Waimano Home Road/Moanalua Road intersection. We did not conduct formal operational level-of-service analyses at other intersections that would be transited by fuel trucks carrying fuel to the Waiau Generating Station, but observations during peak traffic hours suggested that at least some intersections on the Kamehameha Highway approach to the Waiau Generating Station are also operating at or near capacity and have relatively poor LOSs. All of the intersections through which the fuel trucks would pass are signalized, and all of the intersections have roadway geometries designed to accommodate the kinds of vehicles that would be used to haul the fuel.*
>
> *The number of vehicle-trips that the fuel hauling would generate at the busiest intersections (maximum of 6 per hour past any single point) represents less than 0.1 percent of total existing traffic volumes. Such a small change would not reduce the calculated peak-hour LOS (which is already poor). However, any increase in traffic at already congested locations is undesirable, and the fact that the vehicle count increases are being made by fuel trucks may make them more noticeable than would be the case for other types of vehicles. Forecast increases in regional traffic at the intersections that would be used by fuel trucks would also tend to exacerbate traffic conditions unless they are offset by roadway and traffic control improvements.*
>
> *Aside from roadway improvements to the entrance and exits at the Waiau Generating Station that are already part of Alternative 3, the fact that the congestion is almost entirely a function of other local and regional traffic means that there is there is virtually no direct action that HECO could take to mitigate the effect of the additional truck trips except to schedule them for off-peak hours. Because non-project-related traffic volumes are high at various locations during many other time periods, scheduling fuel deliveries during off-peak hours would not be particularly effective unless the deliveries were confined to nighttime hours (8:00 pm to 5:00 am). Aside from the operational difficulties that this would present, the noise that such a truck delivery schedule might cause in homes along the route during noise-sensitive periods may make such a mitigation strategy inadvisable, however.*

In the event that HECO were forced to rely on trucking to maintain the fuel supply to Waiau, it would undertake an operational analysis of the traffic situation as part of its design effort. Because this alternative would require changes to Kamehameha Highway at the entrance to the Waiau Generating Station, it could not implement this alternative until the roadway changes and fuel truck operations are reviewed and approved by the State Department of Transportation.

Table 7.6 - Persons Preparing the Environmental Impact Statement

The table indicates that Jim Morrow, who prepared Appendix A on air quality impacts, is affiliated with Sierra Research and has a B.A. in the physical sciences. However, the name of his firm is J.W. Morrow Environmental Management Consultants, and he has a B.S. in chemistry and a doctorate in public health from the University of Hawaii at Manoa.

RESPONSE: Perry White of Planning Solutions, Inc. has asked me to extend his regrets to both you and to Jim Morrow, whom he knows well, for the incorrect listing. The correction will be made in the *Final EIS.*.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

Attachment:

Attachment A - June 21, 2002 Letter from OMPO

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

OMPO

Oahu Metropolitan Planning Organization

Ocean View Center, Suite 200
707 Richards Street
Honolulu, Hawaii 96813-4623

(808) 587-2015
(808) 523-4178
FAX (808) 587-2018

June 21, 2002

Mr. Perry White
Planning Solutions
1210 Auahi Street, Suite 221
Honolulu, Hawaii 96814

Dear Mr. White:

Attached are the forecasted AM Peak, PM Peak, and Off-Peak maximum traffic volumes for the Year 2025 you requested of the Waiawa area. The AM Peak period is defined as 5:00 a.m. to 9:00 a.m., and the PM Peak period is defined as 2:00 p.m. to 6:00 p.m.

These numbers are based on our forecast of vehicle trips using the 2025 network that included all of the projects listed in the Transportation for Oahu Plan (TOP) 2025 plan. They were generated for planning purposes only.

The facilities and improvements listed in the TOP 2025 were defined in general terms. It should be understood that identification of a project in the plan does not guarantee its construction. Limitations of funding, changes in design, planning constraints, and environmental issues may also change the descriptions and timing of the projects. These changes would impact the resulting volumes.

If you have any questions, please contact either Lori Arakaki or myself at 587-2015.

Sincerely,

Laureen Brennan
Transportation Planner

C:\OMPO PROJECTS\Letters from the PUBs\Laureen letter to Perry White Planning solutions doc
6/21/02

Comparison of OMPO 2025 Peak-Period Traffic Forecast with Existing Traffic

Facility	*Time Period*	
	5:00 am - 9:00 am	2:00 pm - 6:00 pm
Kamehameha Highway Eastbound Approach to Waimano Home Road (Stn 7, Mov. 3)		
Existing (Year 2000)	7,498	6,841
OMPO Forecast Year 2025	8,500	5,500
Difference (vehicle-trips)	1,002	-1,341
Difference (percent)	13%	-20%
Kamehameha Highway Eastbound Approach to Kaahumanu Street (Stn 6-S, Mov 3)		
Existing (Year 2000)	5,031	3,130
OMPO Forecast Year 2025	8,500	4,227
Difference (vehicle-trips)	3,469	4,500
Difference (percent)	69%	273
		6%

Note 1: Station 7 counts were taken July 10-11, 2000. Station 6-S counts were taken July 12-13, 1999.
Note 2: Existing volumes do not account for changes in traffic patterns resulting from the recent completion of the Manana Spine

OAHU METROPOLITAN PLANNING ORGANIZATION

TRANSPORTATION FOR OAHU PLAN 2025 (TOP 2025)

FORECASTED TRAFFIC VOLUMES IN THE WAIAWA/PEARL CITY AREA*

YEAR 2025

Facility	A	B	All Peak		PM Peak		Off Peak	
			A-B	B-A	A-B	B-A	A-B	B-A
H-1 Eastbound Off-Ramp	H-1 Freeway, Eastbound	Farrington Highway	12,000	N/A	9,800	N/A	14,500	N/A
Kamehameha Highway	Farrington Highway	Waiawa Home Road	8,800	10,000	6,800	14,500	8,500	14,000
Waimano Home Road	Kamehameha Highway	Waiawa Home Road	2,000	8,000	3,000	4,800	3,000	3,800
Moanalua Road	Waimano Home Road	Waiawa Street	1,500	4,000	4,800	2,500	2,500	3,000
Waiawa Street	Moanalua Road	H-1 Westbound On-Ramp	1,800	3,800	3,800	2,500	2,000	3,000

N/A = Not Applicable

* The highest link volumes on each facility between points A and B were selected.

(19)

LIFE OF THE LAND

76 North King Street Suite 203 * Honolulu, Hawai'i 96817
Phone: 533-3454 * Fax: 533-0993 * E-mail: life_of_the_land@hotmail.com
Website: www.lifeoftheland.org

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Jerry White
Planning Solutions, Inc.
1210 Auahi Street, Suite 221
Honolulu, HI 96814

Aloha Mr. White,

Life of the Land hereby submits questions for HECO's Waiau Fuel Pipeline Project Draft EIS.

Copies of the Documents

The Sierra Club and The Outdoor Circle were sent copies of the EISPN and were asked to comment. (Table 9-2, page 9-2). Both commented. Neither were sent a copy of the Draft EIS. (Table 9-3, page 9-5)

(1) Is it common not to send documents to those who responded?

Life of the Land, in our 33 year as an environmental and energy watchdog group, were sent neither. Life of the Land would like a copy of all Draft and Final EAs, and EISPNs, and all Draft and Final EISs prepared by your company for all proposed projects.

(2) Will you put us on your mailing list for all of these documents?

The Waiau Generation Station

(A) Table 5.1 Capacity of electric generation units (Unit normal top load rate as % of system): Waiau = 29.78%.

(B) Table 5.3 Energy produced by Existing Generation Units: Year 2000. Waiau = 14.1%

(C) "Because the LSFO-fired units at Waiau make up the majority of the cycling units on the island, they have historically been used to produce less of the electric energy that HECO's customers use than the units nameplate capacity would indicate. On the other hand, they are particularly important during peak demand periods, when they provide nearly one-quarter of the total system capacity." (page 5-3)

(D) "The ~500 MW Waiau Generation Station provides about a third of the electricity needed for Oahu." (Ken Fong, HECO, response to Sierra Club's comments for the EISPN. page 3)

(3) Which of the above statements are correct and which are incorrect?
(4) How much power does Waiau produce?

Security vs. Vulnerability

(A) "The proposed new pipeline is entirely buried except where it is on HECO property. Because of this, it would increase the security of Oahu's electric energy system." (6-7)

(B) Paul Luersen's testimony at HECO's Waahila Ridge 138kV Transmission Line contested case hearing before the BLNR: "Q. So you would think that the overhead line on Wa'ahila Ridge would be no more vulnerable than an underground electric line? A. That's right, they are equally vulnerable." (page 317, lines 11-14)

(5) In light of the foregoing statements, does HECO believe that underground systems are less vulnerable to terrorism?
(6) In light of the foregoing statements, is vulnerability decided on a case-by-case basis?
(7) How secure is it having oil come from one source only via only one pipe?
(8) Is the pipeline trench lined?

Hawai'i State Plan

Section 226-18(a)(2) Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased; Discussion: HECO's proposed Waiau Fuel Pipeline project would not alter the ration of indigenous to imported energy use." (page 6-7)

(9) Is maintaining the ratio in compliance with the goal of increasing the ratio?

Honolulu Generation Station

"In HECO's two previous Integrated Resource Plans (IRPs), repowering the Waiau power Plant and retirement of existing Waiau units were reviewed. Both IRPs found that the continued operation of the existing generation units at the Waiau Generation Station would best be meet the island's near and long-term energy needs." (Ken Fong, HECO, response to Sierra Club's comments for the EISPN. page 3)

The Draft EIS goes into great lengths about the benefits of keeping Waiau on-line, including that Waiau's cycling units work well with intermittent renewable energy resources. However, there is no discussion about the benefit of keeping the Honolulu Generation Station on-line. This power plant produces about 1.2% of the electricity for the island, will require continual truck shipments to the Iwilei Tank Farm, and is occupying space that would offer great economic benefit to the public (parking for Aloha Tower; harbor-front for pedestrians; open space; and a promenade to connect Kakaako to Aloha Tower.

(10) Please elaborate on all of the benefits and risks associated with this phase of the project.
(11) Does the risks associated with trucking oil outweigh the loss of 1.2% of the average load for Oahu?
(12) What is the cost-benefit analysis for maintaining the Honolulu Power Plant?
(13) How close are the Iwilei/Honolulu Harbor underground oil plumes to the Iwilei Tank Farm?
(14) What precautions is HECO taking to make sure that their liability is not increased due to more illicit spills?

Reasonable Worst Case (RWC)

4.4.2.5 Impact of an Accidental Oil Spill on Groundwater: Waiau Fuel Line. At least every five years, and more frequently if necessary, the proposed pipeline must be subjected to integrity tests ... Consequently, the LSFO in the line must be replaced with less viscous oil, such as diesel, for the test. ... Typically ... diesel would be present less than 0.2 percent of the time. It is only during the periods when the pipeline is carrying diesel oil that there are any potential for groundwater contamination from a leak or break in the pipe." (4-33)

4.2.2.6 Impact of an Oil Spill on Surface Waters: Proposed Waiau Fuel Line ... Components (e.g., phenol) of the diesel fuel that would be in the line during tests are soluble and do, therefore, have the potential to change water quality. (4-25)

(15) Can you elaborate on the potential damage cause by a spill while diesel is in the pipeline?
(16) Can you elaborate on the potential damage cause by a spill while there is a conversion between LSFO and diesel (and vice versa) in the pipeline?
(17) What is the RWC for surface water contamination due to a diesel spill?
(18) What is the RWC for groundwater contamination due to a diesel spill?

(19) If a power failure occurs, would the pipeline shut down?
(20) If a power failure occurs, does the pipeline control room have emergency power? If so, what kind?
(21) How is the control room powered, and to what contingency level?
(22) If a power failure occurs, would the pipeline valves operate?
(23) If a power failure occurs, would the oil harden in the pipelines?
(24) If a power failure occurs, would leaks be detectable?

Pearl Harbor

"Numerous pollution sources are known to affect Pearl Harbor" (page 4-41)

(25) NPDES discharges from the Waiau Generation Plant into Pearl Harbor raises the average temperature of Pearl Harbor by how many degrees?

Management

(26) What specific computer software program will be used in connection with SCADA to manage the pipeline?

Horizontal Directional Drilling (HDD)

The use of Horizontal Directional Drilling (HDD) can increase or decrease the disruption to residential, commercial, environmental and cultural interests. In areas where (1) there are known or suspected underground cultural, archeological and/or burial issues at hand; and (2) and the HDD is done fairly close to the surface; then (3) the use of HDD will place these objects at risk, that is, the tunneling devise will rip through objects (such as bones) without the knowledge of the HDD operator.

(27) How will these issues be dealt with?
(28) Please identify specific ways the location of 'iwi will be searched for prior to the drilling operation.
(29) At what depth are burials found at?
(30) At what range of depths are 90% of the burials found at?
(31) At what depth will the HDD occur at?
(32) Please provide a map of the location of 'iwi discovered within the vicinity of the pipeline.
(33) Will there be a cultural monitor present during the HDD?
(34) How can a cultural monitor determine if the HDD is going through a skeleton?

Integrated Resource Planning (IRP)

The PUC considers all of the physical infrastructure (generation stations, transmission and distribution lines, fuel lines) to be part of the utilities 'plants'. The Integrated Resource Planning (IRP) process is designed to allow the public and the regulatory community to learn of the utilities short-term (3 years) and long-term (20 years) plans for all new and modified plants owned by the utility.

(35) How has HECO addressed the pipeline issue in their most recent IRP Preferred Plan?
(36) Please detail all cross-references between this EIS and the current HECO IRP Preferred Plan.
(37) Has HECO ever sought to supplement the IRP and/or to alert community participants to the most recent IRP about this proposed project?

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Community Involvement

> "HECO made its public consultant efforts an integral part of the planning and design process for the Waiau Fuel Pipeline project. It undertook a community outreach program designed to help it understand and address the concerns of those who would be directly affected by the proposed project. (S-1) The feedback HECO received from the community played an important role in shaping its 'preferred alternative'". (S-2) ... many people do not find out about projects that may affect them until after major project designs are made. Such a late start has two important, and negative, by-products. On the one hand, it tends to make communities feel as though project opponents have attempted to bypass them. On the other hand, project proponents who may already have invested substantial time and financial resources in a particular design may resist suggestions that they would have welcomed had they come earlier in the decision-making process." (1-10, 1-11)

1999	HECO starts the planning process through internal discussions. Ken Fong, Makakilo/Kapolei/Honokai Hale Neighborhood Board. August 15, 2001. (www.co.honolulu.hi.us/nco/nb34/01/34augmin.htm)
July	Makabaka Community Association (July 10, 2001) Waipahu Neighborhood Board (July 19, 2001)
August	West Loch Estates Community Association Board of Directors (August 14, 2001) Makakilo/Kapolei/Honokai Hale Neighborhood Board (August 15, 2001) Pearl City Neighborhood Board (August 30, 2001)
September	Waipahu Neighborhood Board (September 20, 2001) Pearl City Neighborhood Board (September 27, 2001)
October	OEQC Bulletin: Availability of EISPN (October 8, 2001) Makakilo/Kapolei/Honokai Hale Neighborhood Board (October 24, 2001) Makabaka Community Association (October 30, 2002)
November	Deadline for public comment on EISPN (November 7, 2001) HECO opens PUC docket 01-0444 before Draft EIS is published (November)
December January	Deadline for public participation in PUC Docket (December) Waipahu Neighborhood Board (January 12, 2002) Waipahu Community Association (January 14, 2002) Makakilo/Kapolei/Honokai Hale Neighborhood Board (January 30, 2002) Pearl City Neighborhood Board (January 31, 2002)
April	Draft EIS (April 2002)

(38) HECO crammed all public knowledge, reaction, and comment into a small time cage. The PUC did not wait to see whether the EIS would be accepted before opening a docket. Does the statement "communities feel as though project opponents have attempted to bypass them" apply in the case?

Renewable Energy

> "It must be noted, however, that future development of new technologies may obviate the need for the pipeline before the lifespan is reached. HECO is actively pursuing such developments." (2-35, 2-36)

(39) Wouldn't investing $Millions in fossil fuel equipment today, prevent the company from moving towards the new paradigm of renewable energy resources and fuel cells in the near future?

The Honolulu Generation Station is 21% efficient. The Pohai Nani Retirement Home in Kaneohe is 91% efficient. The difference is centralized power generation versus cogeneration (highly efficient combined heat and power units).

(40) Has HECO failed to aggressively move into cogeneration BECAUSE of its massive capital expenditures that must still be paid off on its old inefficient centralized facilities?

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(41) Doesn't HECO have to use ratepayer income to cover depreciation costs of these old facilities for another 2 decades?

> HECO is committed to reducing Hawaii's use of oil by supporting renewable energy and energy efficiency programs. Our support has made Hawaii one of the nations leaders in both areas" (Ken Fong, HECO, response to Sierra Club's comments for the EISPN. page 4)

The United States Energy Information Agency (EIA) and the Hawai'i Department of Business, Economic Development & Tourism (DBEDT) both publish data on renewable energy.

(42) Isn't Hawaii blessed with some of the finest renewable energy resources in the world?
(43) Doesn't Hawai'i have a greater variety of renewable energy resources than any other country in the world?
(44) Doesn't Hawai'i have the highest kWhr costs in the nation, making it the ideal place to test renewables?
(45) Among states, does Hawai'i rank number 1 in the use of oil?
(46) Among states, isn't Hawaii below the national average in the use of renewable energy?
(47) Aren't HECO owned generators based on Oahu fueled 100.00% by oil?
(48) Doesn't Hawai'i trail Europe in the use of renewable energy?
(49) Among all places in the world with (a) our abundant supply of renewables; (b) our variety of renewables; and (c) our high costs of electricity; doesn't (d) HECO use less renewables to produce electricity than anyone else?

Oil

"Once at refineries, crude oil is refined to produce gasoline, jet fuels, propane, and other lighter fuels. The remaining oil or 'residual fuels' is ... delivered ... by pipeline to HECO" (EISPN page 1-2)

(50) Can the refinery use the same quantity of oil and make different amounts of residual oil, dependent upon the utility demand for that product?
(51) Isn't 'residual oil' simple one product of refining, and is no more of a residual than any other refined product?
(52) Please define black oil, white oil, black oil pipeline, white oil pipeline.
(53) What experience does HECO have with pipelines?
(54) How many people does HECO employ for its existing pipelines?
(55) How many additional pipeline people will need to be hired?
(56) Who is head of the pipeline program at HECO?
(57) How many leaks have occurred on HECO pipelines?
(58) For HECO pipeline leaks over the past 10 years please name the dates, amount and type leaked, the agency(s) the leaks were reported to, the environmental impacts and any mitigation's employed.
(59) How is the oil acquired?
(60) Since operating your own pipeline is more cost-effective, would bypassing the refineries and buying residual oil on the open market be more effective?
(61) If Chevron does not renew the HECO-Chevron residual oil contract, what would happen?
(62) Is it reasonable to assume that a snag might develop in the Chevron-HECO pipeline contract, but that no snag will develop in the Chevron-HECO oil contract?
(63) How does HECO purchase oil?
(64) Does HECO buy oil by the tanker full?
(65) What is the capacity of oil tankers arriving in Hawaii?
(66) What is the oil capacity of the pipeline?
(67) How much oil will flow through the pipeline per year?
(68) Does HECO have experience in heating oil for use in pipelines?
(69) What are the specific characteristics of residual oil used by HECO?

Rates

(70) It was reported that this capital expenditure will not raise rates. Is this true?
(71) If so, could rates be lowered if it were not built?
(72) What other large capital expenditure items are planned?

PUC

(73) Did HECO open a docket with the PUC before the DEIS was released?
(74) Are there other dockets which were opened by HECO BEFORE the DEIS was released?

Soil Sampling

(75) Was a Phase II analysis completed along the proposed route of the pipeline?

Unintended Consequences

(76) The HECO proposal will leave the Chevron pipeline without customers. Common sense indicates that there is a probable likelihood that the Chevron pipeline would need to be plugged. As a secondary impact resulting from this project, wouldn't the environmental impacts associated with removing or plugging the Chevron pipeline be a direct consequence of this proposal?
(77) What are the probable impacts associated with discontinuing the Chevron pipeline?

No Action

""'No Action' consists of failing to arrange for continued fuel delivery to Waiau beyond the end of the current contract. ... It cannot be emphasized too strongly that this alternative would <u>not</u> meet the objectives of the proposed action. Instead, 'No Action' is included only because it is needed to fulfill the requirements of Chapter 343." [EISPN page 2-46]

Council on Environmental Quality (CEQ), oversees the National Environmental Policy Act (NEPA) for the United States Government. The CEQ analysis of the 'No Action' alternative is found below:

> 3. No-Action Alternative. What does the "no action" alternative include? If an agency is under a court order or legislative command to act, must the EIS address the "no action" alternative?
>
> A. Section 1502.14(d) requires the alternatives analysis in the EIS to "include the alternative of no action." There are two distinct interpretations of "no action" that must be considered, depending on the nature of the proposal being evaluated. The first situation might involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed. In these cases "no action" is "no change" from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise. Therefore, the "no action" alternative may be thought of in terms of continuing with the present course of action until that action is changed. Consequently, projected impacts of alternative management schemes would be compared in the EIS to those impacts projected for the existing plan. In this case, alternatives would include management plans of both greater and lesser intensity, especially greater and lesser levels of resource development.
>
> The second interpretation of "no action" is illustrated in instances involving federal decisions on proposals for projects. "No action" in such cases would mean the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward.

> Where a choice of "no action" by the agency would result in predictable actions by others, this consequence of the "no action" alternative should be included in the analysis. For example, if denial of permission to build a railroad to a facility would lead to construction of a road and increased truck traffic, the EIS should analyze this consequence of the "no action" alternative.
>
> In light of the above, it is difficult to think of a situation where it would not be appropriate to address a "no action" alternative. Accordingly, the regulations require the analysis of the no action alternative even if the agency is under a court order or legislative command to act. This analysis provides a benchmark, enabling decisionmakers to compare the magnitude of environmental effects of the action alternatives. It is also an example of a reasonable alternative outside the jurisdiction of the agency which must be analyzed. Section 1502.14(c). See Question 2 above. Inclusion of such an analysis in the EIS is necessary to inform the Congress, the public, and the President as intended by NEPA. Section 1500.1(a).

(78) In light of this definition of 'No Action', what action would HECO take if the three proposed actions fail to materialize?

Global Warming

(79) The pipeline is expected to operate for 30 years supplying oil to create electricity at the Waiau Generation Station. The oil passing through the pipeline/WGS will result in how many tons of CO2 being released into the environment?

Flora and Fauna

(80) How close are endangered/threatened species to the proposed pipeline?

Aesthetics

"Virtually all of the proposed facilities are located below ground. The only exceptions are minor structures (including pipelines attached to existing bridges and other structures crossing streams) without the potential to cause significant visual effects." [EISPN 4-5]

(81) How could a pipeline cause a significant visual effect?
(82) How could a pipeline cause a visual effect but not a significant visual effect?
(83) Is another name for "visual effect" an "aesthetic impact"? Is not, please elaborate?
(84) What is a minor structure?
(85) What does the term potential mean? Please elaborate.

Economic Impact

"Over the short term, the proposed project will generate construction employment and capital expenditures that ... will have positive ripple effects on the other sectors of the economy as well." [EISPN 4-7]

(86) How does the magnitude of the construction impact compare with the magnitude of the oil impact (each $100M of imported oil for the pipeline bleeds $150-175M from the economy)?

(87) Wouldn't demand-side management, energy efficiency, and renewable energy systems, all of which are far more labor-intensive than the oil-importing/refining/electricity-generating approach, and all of which are based on import-substitution, have a far greater positive impact on the state economy?

"The electric power generated at Waiau is vital to maintaining today's material standard of living." [EISPN 4-7]

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(88) Does this mean that if the plant were located somewhere else, that "today's material standard of living" would falter?
(89) Does it mean that the power must be produced by HECO to maintain "today's material standard of living"?
(90) Wouldn't highly efficiently-produced electricity generated by Independent Power Producers (rather than HECO ratepayers) maintain "today's material standard of living"?
(91) Doesn't military generators and co-generators located on Oahu decrease the need for HECO electricity?
(92) Doesn't HECO need the Waiau facility to please their stockholders?

Mahalo,
Henry Curtis
Executive Director

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/CI

July 23, 2002

Mr. Henry Curtis, Executive Director
Life of the Land
76 North King Street, Suite 203
Honolulu, Hawai'i 96817

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Mr. Curtis:

Thank you for your June 7, 2002 letter to Mr. Perry White concerning Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. I appreciate the time that you and other Life of the Land members spent reviewing the document and preparing written comments.

This response to your questions uses the same subject heading and numbering system contained in your letter. For your convenience, I have included the questions immediately before each set of responses.

Copies of the Documents

> *The Sierra Club and The Outdoor Circle were sent copies of the EISPN and were asked to comment. (Table 9-2, page 9-2). Both commented. Neither were sent a copy of the Draft EIS. (Table 9-3, page 9-5)*
>
> *(1) Is it common not to send documents to those who responded?*

RESPONSE: The Sierra Club and the Outdoor Circle were sent copies of the *Draft EIS* even though Table 9-2 in the *Draft EIS* inadvertently omitted listing them. We will include a corrected table in the *Final EIS* showing the parties to whom HECO sent copies of the *Draft EIS*.

> *Life of the Land, in our 33 year<s> as an environmental and energy watchdog group, were sent neither. Life of the Land would like a copy of all Draft and Final EAs, and EISPNs, and all Draft and Final EISs prepared by your company for all proposed projects.*
>
> *(2) Will you put us on your mailing list for all of these documents?*

RESPONSE: Notices for the *EIS Preparation Notice* and *Draft EIS* were published by the Office of Environmental Quality Control on October 8, 2001 and April 23, 2002 respectively. During the review periods, Life of the Land did not request information about the proposed project. Had a copy of either the *EIS Preparation Notice* or the *Draft EIS* been requested, we would have provided a copy. You will receive a copy of the *Final EIS* when it is available.

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With regard to your request relating to future projects, HECO uses the lists maintained by the Office of Environmental Quality Control in preparing distribution lists for proposed projects. If you are interested in projects in the future, please contact us at that time.

The Waiau Generating Station

> *(A) Table 5.1 Capacity of electric generation units (Unit normal top load rate as % of system): Waiau = 29.78%*
>
> *(B) Table 5.3 Energy produced by Existing Generation Units: Year 2000. Waiau = 14.1%*
>
> *(C) "Because the LSFO-fired units at Waiau make up the majority of the cycling units on the island, they have historically been used to produce less of the electric energy that HECO's customers use than the units nameplate capacity would indicate. On the other hand, they are particularly important during peak demand periods, when they provide nearly one-quarter of the total system capacity." (page 5-3)*
>
> *(D) "The ~500 MW Waiau Generation Station provides about a third of the electricity needed for Oahu." (Ken Fong, HECO, response to Sierra Club's comments for the EISPN. page 3).*
>
> *(3) Which of the above statements are correct and which are incorrect?*

RESPONSE: A, B, C and D are correct. The reference to "about a third of the electricity" for Statement "D" is from a letter concerning the *EIS Preparation Notice* and was based on the fact that the generating units at Waiau represent approximately 30 percent of HECO's total generating capacity. The *Draft EIS* makes this distinction more clearly than the letter that you quoted.

> *(4) How much power does Waiau produce?*

RESPONSE: As shown in Table 5-1 of the *Draft EIS*, generating units at the Waiau Generating Station are capable of producing 499 MW-gross of electrical power and produced 1,137,908 megawatt-hours of electricity in 2000.

Security vs. Vulnerability

> *(A) "The proposed new pipeline is entirely buried except where it is on HECO property. Because of this, it would increase the security of Oahu's electric energy system." (6-7)*
>
> *(B) Paul Luersen's testimony at HECO's Waahila Ridge 138kV Transmission Line contested case hearing before the BLNR: "Q. So you would think that the overhead line on Wa'ahila Ridge would be no more vulnerable than an underground electric line? A. That's right, they are equally vulnerable." (page 317, lines 11-14)*
>
> *(5) In light of the foregoing statements, does HECO believe that underground systems are less vulnerable to terrorism?*

RESPONSE: HECO as a policy does not provide details on the security or vulnerability of its facilities. It is not appropriate to lump electrical transmission lines and fuel pipelines into a single "underground" category. In general, because buried pipelines (the subject of the *Draft EIS*) are more difficult to access than pipelines that are above ground, they are less susceptible to terrorist attacks as well as vandalism in general.

(6) In light of the foregoing statements, is vulnerability decided on a case-by-case basis?

RESPONSE: The vulnerability of pipelines is decided on a case-by-case basis, but this does not mean that one cannot reach general conclusions concerning above-ground and buried pipelines. As noted above, other things being equal, buried pipelines are less susceptible to terrorist attack and vandalism than are above-ground pipelines.

(7) How secure is it having oil come from one source only via only one pipe?

RESPONSE: HECO does not have oil coming from one source via one pipeline. If the question is meant to suggest that the Waiau Generating Station has only one source of fuel, it is incorrect. HECO has more than one source of fuel oil; see answer to No. 59. In addition to the LSFO line, Waiau is also served by a second Chevron-owned pipeline that provides diesel oil for use in the two combustion turbines that are located there. Moreover, the Chevron pipeline that is presently used to supply LSFO to Waiau could serve as a backup since Chevron has indicated that it does not intend to remove the pipeline even if HECO constructs the Waiau Fuel Pipeline. Finally, the Waiau Generating Station currently has the capability of receiving some fuel by truck to cover delivery emergencies. None of these fuel supply alternatives is as good as the proposed Waiau Fuel Pipeline. However, they are sufficient to ensure that the Waiau Generating Station would not be overly compromised by an interruption in the supply from a single source.

(8) Is the pipeline trench lined?

RESPONSE: No, it is not lined. The LSFO that would be transported in the proposed pipeline becomes a solid at ambient temperatures. Consequently, a lining would have little, if any, benefit.

Hawai'i State Plan

Section 226-18(a)(2) Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased; Discussion: HECO's proposed Waiau Fuel Pipeline project would not alter the ration <sic> of indigenous to imported energy use." (Page 6-7)

(9) Is maintaining the ratio in compliance with the goal of increasing the ratio?

RESPONSE: The complete citation of HRS 226-18 (a) is:

Planning the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:

(1) Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;

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(2) Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased;

(3) Greater energy security in the face of threats to Hawaii's energy supplies and systems; and

(4) Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use.

HECO's proposed Waiau Fuel Pipeline project is consistent with the cited Section 226-18(a)(2) goal when due consideration is given to all four stated objectives. A reasonable and logical application of the *Hawai'i State Plan* provision would not require that every action that is taken in Hawai'i must increase energy self-sufficiency.

"In HECO's two previous Integrated Resource Plans (IRPs), repowering the Waiau power Plant and retirement of existing Waiau units were reviewed. Both IRPs found that the continued operation of the existing generation units at the Waiau Generation Station would best be <sic> meet the island's near and long-term energy needs." (Ken Fong, HECO, response to Sierra Club's comments for the EISPN, page 3)

The Draft EIS goes into great lengths about the benefits of keeping Waiau on-line, including that Waiau's cycling units work well with intermittent renewable energy resources. However, there is no discussion about the benefit of keeping the Honolulu Generation Station on-line. This power plant produces about 1.2% of the electricity for the island, will require continual truck shipments to the Iwilei Tank Farm, and is occupying space that would offer great economic benefit to the public (parking for Aloha Tower; harbor-front for pedestrians; open space; and a promenade to connect Kaka'ako to Aloha Tower.

(10) Please elaborate on all of the benefits and risks associated with this phase of the project.

RESPONSE: As stated in the Summary (Section S-1.1) and first chapter (Section 1.0) of the *Draft EIS*, the primary objective of this project is to provide fuel for the Waiau Generating Station. Trucking of fuel to Iwilei is a consequence of choosing this alternative. The Waiau Fuel pipeline is needed whether or not the Honolulu Station continues to operate. Thus, an evaluation of its continued operation is beyond the scope of the EIS.

However, for your information, the 107.3 MW of generating capacity at the Honolulu Generating Station provides substantial benefits to 'Oahu's power supply system. It represents 6.65% of the island's generating capacity and provides additional reliability and voltage support to the downtown community. The cost to replace ~100 MW of firm capacity would be around $100 million if combustion turbines were constructed.

The trucking of fuel to Iwilei will allow HECO to continue using the generating units located at the Honolulu Generating Station. Because of the low number of fuel truck-trips needed to supply the Iwilei Tank Farm, the short distance covered by the underground pipeline connecting the Iwilei Tank Farm to the Honolulu Generating Station, and the nature of the LSFO that would be transported, the trucking operation does not involve substantial risks.

(11) Does <sic> the risks associated with trucking oil outweigh the loss of 1.2% of the average load for Oahu?

RESPONSE: The risks associated with trucking LSFO to the Iwilei Tank Farm are very low and do not outweigh the current benefit of continuing operation of the Honolulu Generating Station.

(12) What is the cost-benefit analysis for maintaining the Honolulu Power Plant?

RESPONSE: This question is not within the scope of the environmental impact statement for the Waiau Fuel Pipeline project. HECO assesses the costs and benefits of maintaining units at all of its generating stations as part of the separate ongoing Integrated Resource Plan process.

(13) How close are the Iwilei/Honolulu Harbor underground oil plumes to the Iwilei Tank Farm?

RESPONSE: The Iwilei District Participating Parties (the voluntary group working in cooperation with DOH on the Iwilei investigation) are still investigating the extent of subsurface contamination in the Iwilei area of study. While some contamination is known to exist proximal to the tank farm, recent studies indicate that the Iwilei Tank Farm is not contaminated and has not contributed to any offsite contamination.

(14) What precautions is HECO taking to make sure that their liability is not increased due to more illicit spills?

RESPONSE: Safety of the community and the environment is a top priority for HECO, and it will never be compromised in the operation and maintenance of our facilities. HECO will continue to operate and maintain all of its fuel facilities to minimize the risk of releases and follow all State and Federal regulations in operating its pipelines. The additional safety measures that are built into the proposed Waiau Fuel Pipeline project are the result of the latest pipeline technology and are described in the *Draft EIS. These measures* include the use of modern coatings, remotely operated block isolation valves and a state-of-the-art leak detection system.

Reasonable Worst Case (RWC)

4.4.2.5 Impact of Accidental Oil Spill on Groundwater: Waiau Fuel Line. At least every five years, and more frequently if necessary, the proposed pipeline must be subjected to integrity tests ... Consequently, the LSFO in the line must be replaced with less viscous oil, such as diesel, for the test. ... Typically ... diesel would be present less than 0.2 percent of the time. It is only during the periods when the pipeline is carrying diesel oil that there are any potential for groundwater contamination from a leak or break in the pipe." (4-33)

4.2.2.6 Impact of an Oil Spill on Surface Waters: Proposed Waiau Fuel Line ... Components (e.g., phenol) of the diesel fuel that would be in the line during tests are soluble and do, therefore, have the potential to change water quality. (4-25)

(15) Can you elaborate on the potential damage cause <sic> by a spill while diesel is in the pipeline?

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RESPONSE: The *Draft EIS* contains an extensive discussion of the potential effects of both the LSFO that would be in the pipeline the vast majority of the time and the diesel that would be in it during short periods of testing. See sections 4.3.2.5, 4.3.2.6, as well as the section you cited with respect to groundwater (4.4.2.5). Generally, this analysis concludes that a spill of diesel fuel would have short-term, localized effects on the environment that would be mitigated by HECO's response and remediation actions.

(16) Can you elaborate on the potential damage cause <sic> by a spill while there is a conversion between LSFO and diesel (and vice versa) in the pipeline?

RESPONSE: The potential spill impacts when both diesel and LSFO are in the pipeline will be the same as the impacts discussed in the DEIS for either LSFO or diesel. The interface or transition between LSFO and diesel oil is very distinct, with only a narrow zone of mixing between the two. The effects of a spill that might occur during such a transition would be the same as those associated with non-transitional periods.

(17) What is the RWC for surface water contamination due to a diesel spill?

RESPONSE: The RWC scenario for diesel is the same as for LSFO. Under the RWC, of the 137 bbl that could be released at a point where it could directly enter surface water, the majority of the fuel would be recovered from interior areas or evaporate. Less than a third of the fuel could reach Pearl Harbor, and skimming and evaporation would remove most of this before it spread beyond the containment booms.

(18) What is the RWC for groundwater contamination due to a diesel spill?

RESPONSE: No substantial impacts on groundwater resources would be expected as discussed in Section 4.4.2.5 of the *Draft EIS.*

(19) If a power failure occurs, would the pipeline shut down?

RESPONSE: No. The pumping station that would be constructed at the Barbers Point Tank Farm would have an emergency generator. It would be started if there were a power failure, allowing the pipeline to remain in operation. Immediately following start-up, operators would assess the nature of the power failure to determine its cause, seriousness, and likely duration. If their assessment indicates a likelihood that problems could spread to the point where they might adversely affect pipeline operations, the operator would initiate an orderly, safe shutdown of the pipeline.

(20) If a power failure occurs, does the pipeline control room have emergency power? If so, what kind?

RESPONSE: Yes. The pipeline control system will have an emergency back up Uninterruptible Power Supply system to allow for continued operation in the event of a general power failure.

(21) How is the control room powered, and to what contingency level?

RESPONSE: See previous answer to question (20).

(22) If a power failure occurs, would the pipeline valves operate?

RESPONSE: Yes. In the event of a power failure at the Barbers Point Tank Farm, the emergency generator will provide power for operation of the valves located at the pumping station. The block valves along the 13 mile long pipeline will be electrically powered and can be manually operated in the event of a local power outage.

(23) If a power failure occurs, would the oil harden in the pipelines?

RESPONSE: No. As indicated above, the pumps have backup power that would allow them to continue operation. Additionally, the pumping station will have the capability to displace LSFO from the pipeline using a pump that is driven by a diesel engine. This would allow HECO to remove the LSFO from the line before it hardens under the worst power-related scenario.

(24) If a power failure occurs, would leaks be detectable?

RESPONSE: Yes. The monitoring system also has a backup power supply system.

Pearl Harbor

"Numerous pollution sources are known to affect Pearl Harbor" (page 4-41)

(25) NPDES discharges from the Waiau Generation Plant into Pearl Harbor raises the average temperature of Pearl Harbor by how many degrees?

RESPONSE: This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following information concerning the operation of the Waiau Generating Station and the physical processes that affect water temperatures in Pearl Harbor:

- The plant discharges water that is about 3-4 degrees C higher than ambient temperature.
- The volume of the discharge is very small compared to the total volume of Pearl Harbor. Hence, it has no measurable effect on the average water temperature of that water body.
- The warm water dissipates quickly and is undetectable within a few hundred yards of the plant, which is well within the Zone of Mixing established in the Department of Health permit for the facility. NPDES discharges from the Waiau Generating Station are fully compliant with all NPDES permit requirements for temperature.

Management

(26) What specific computer software program will be used in connection with SCADA to manage the pipeline?

RESPONSE: The specific pipeline control system vendor has not been selected. HECO will use industry-standard software for this purpose that is provided by companies such as Metso Automation.

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Horizontal Directional Drilling (HDD)

The use of Horizontal Directional Drilling (HDD) can increase or decrease the disruption to residential, commercial, environmental and cultural interests. In areas where (1) there are known or suspected underground cultural, archeological and/or burial issues at hand; and (2) and the HDD is done fairly close to the surface; then (3) the use of HDD will place these objects at risk, that is, the tunneling devise will rip through objects (such as bones) without the knowledge of the HDD operator.

(27) How will these issues be dealt with?

RESPONSE: While there may be a few exceptions, in almost all instances the use of directional drilling decreases the likelihood of disruption to residential, commercial, and cultural interests. However, as you correctly note, the blind use of this technique is not without risk. Because of this, HECO has incorporated into its plans various mitigation measures (such as monitoring of the HDD operations by a qualified archaeologist), which are further discussed in Section 4.8.3.3 of the *Draft EIS*. As indicated in the second bullet item in Section 4.8.3.3.3, additional details will be provided in the monitoring plan prepared in accordance with HAR §13-279.

(28) Please identify specific ways the location of 'iwi will be searched for prior to the drilling operation.

RESPONSE: See preceding response to question (27) and subsequent response to question (34).

(29) At what depth are burials found at?

RESPONSE: Burials are typically found within a few feet of the surface.

(30) At what range of depths are 90% of the burials found at?

RESPONSE: Insufficient data are available to answer this question. The uncertainty will be dealt with in the monitoring plan.

(31) At what depth will the HDD occur at?

RESPONSE: Directional drilling depths will range from 0 to 30 feet.

(32) Please provide a map of the location of 'iwi discovered within the vicinity of the pipeline.

RESPONSE: No such map is available. Because of the sensitivity of burial information, such maps are generally not widely distributed even when they are available.

(33) Will there be a cultural monitor present during the HDD?

RESPONSE: Yes. Monitoring and other mitigation measures, such as possible testing for artifacts from ancient fishponds, are discussed in Section 4.8.3.3 of the *Draft EIS*.

(34) How can a cultural monitor determine if the HDD is going through a skeleton?

RESPONSE: The cultural monitor would be present when the contractor is setting up for HDD work in areas where there is a potential for burials to be present. These are identified in Figure 4-13 of the *DEIS*. Burials, if present, would be relatively close to the surface. The cultural monitor would have the contractor use a backhoe or other excavator to carefully clear the upper few feet of material before the HDD operation begins. This will allow the cultural monitor to visually inspect for the presence of burials and, if one were found, to take appropriate measures before allowing the drilling to begin.

Integrated Resource Planning (IRP)

The PUC considers all of the physical infrastructure (generation stations, transmission and distribution lines, fuel lines) to be part of the utilities 'plants'. The Integrated Resource Planning (IRP) process is designed to allow the public and the regulatory community to learn of the utilities short-term (3 years) and long-term (20 years) plans for all new and modified plants owned by the utility.

(35) How has HECO addressed the pipeline issue in their most recent IRP Preferred Plan?

RESPONSE: HECO's most recent IRP ("HECO 1997 IRP") was published in January 1998 before HECO began working on the Waiau Fuel Pipeline Project. Therefore, the proposed pipeline project is not addressed in it.

(36) Please detail all cross-references between this EIS and the current HECO IRP Preferred Plan.

RESPONSE: Not applicable. See preceding response to (35).

(37) Has HECO ever sought to supplement the IRP and/or to alert community participants to the most recent IRP about this proposed project?

RESPONSE: The Waiau Fuel Pipeline project is consistent with and would not alter the current HECO IRP plan. Thus, there was no need to revise the HECO IRP or notify the IRP Advisory Group.

Community Involvement

"HECO made its public consultant efforts an integral part of the planning and design process for the Waiau Fuel Pipeline project. It undertook a community outreach program designed to help it understand and address the concerns of those who would be directly affected by the proposed project. (S-1) The feedback HECO received from the community played an important role in shaping its 'preferred alternative'". (S-2) ... many people do not find out about projects that may affect them until after major project designs are made. Such a late start has two important, and negative, by-products. On the one hand, it tends to make communities feel as though project opponents <sic> have attempted to bypass them. On the other hand, project proponents who may already have invested substantial time and financial resources in a particular design may resist suggestions that they would have welcomed had they come earlier in the decision-making process." (1-10, 1-11)

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1999 HECO starts the planning process through internal discussions. Ken Fong, Makakilo/Kapolei/Honokai Hale Neighborhood Board. August 15, 2001. (www.co.honolulu.hi.us/nco/nb34/01/34augmin.htm)

July Makabaka Community Association (July 10, 2001) Waipahu Neighborhood Board (July 19, 2001)

August West Loch Estates Community Association Board of Directors (August 14, 2001) Makakilo/Kapolei/Honokai Hale Neighborhood Board (August 15, 2001) Pearl City Neighborhood Board (August 30, 2001)

September Waipahu Neighborhood Board (September 20, 2001) Pearl City Neighborhood Board (September 27, 2001)

October OEQC Bulletin: Availability of EISPN (October 8, 2001) Makakilo/Kapolei/Honokai Hale Neighborhood Board (October 24, 2001) Makabaka Community Association (October 30, 2002)

November Deadline for public comment on EISPN (November 7, 2001) HECO opens PUC docket 01-0444 before Draft EIS is published (November)

December Deadline for public participation in PUC Docket (December)

January Waipahu Neighborhood Board (January 12, 2002) Waipahu Community Association (January 14, 2002) Makakilo/Kapolei/Honokai Hale Neighborhood Board (January 30, 2002) Pearl City Neighborhood Board (January 31, 2002)

April Draft EIS (April 2002)

(38) HECO crammed all public knowledge, reaction, and comment into a small time cage. The PUC did not wait to see whether the EIS would be accepted before opening a docket. Does the statement "communities feel as though project opponents <sic> have attempted to bypass them" apply in the case?

RESPONSE: HECO conducted the public participation process described in Section 1.5 in the *Draft EIS* over many months and will continue to work with affected neighborhoods as we move forward.

With respect to opening the PUC docket before the EIS was accepted, the timing of the PUC filing for this project was based on the need to build in enough PUC review time to fit within a project schedule that has a specific deadline (i.e., the expiration of the Chevron contract).

Finally, note that the citation of a statement made in the *Draft EIS* is incorrect. It mistakenly refers to "project opponents". The correct statement from Section 1.5.1 in the *Draft EIS* is that when an effective community outreach program is not conducted, *"communities feel as though project proponents (emphasis added) have attempted to bypass them"*. HECO's community outreach program has helped the company obtain community feedback early in the design process. As discussed in Section 1.5 of the

Draft EIS, this early community involvement in the process has helped to shape a project that is responsive to the concerns of the potentially affected communities on O'ahu.

Renewable Energy

> *"It must be noted, however, that future development of new technologies may obviate the need for the pipeline before the lifespan is reached. HECO is actively pursuing such developments." (2-35, 2-36)*

> *(39) Wouldn't investing $Millions in fossil fuel equipment today, prevent the company from moving towards the new paradigm of renewable energy resources and fuel cells in the near future?*

RESPONSE: No. Building a state-of-the-art pipeline will not prevent the Company from pursuing renewables or fuel cells.

> *The Honolulu Generation Station is 21% efficient. The Pohai Nani Retirement Home in Kaneohe is 91% efficient. The difference is centralized power generation versus cogeneration (highly efficient combined heat and power units).*

> *(40) Has HECO failed to aggressively move into cogeneration BECAUSE of its massive capital expenditures that must still be paid off on its old inefficient centralized facilities?*

RESPONSE: No. Your statements regarding relative fuel efficiencies are misleading and concern a topic that is beyond the scope of the Waiau Fuel Pipeline project. Discussion of additional types of generation does not pertain to the subject of this DEIS, i.e., the proposed Waiau Fuel pipeline project which would allow HECO to transport fuel more efficiently, at a lower cost, to existing generating units at the Waiau Generating Station. Note though that HECO does support cogeneration as an option for customers when it meets their specific situation and needs

> *(41) Doesn't HECO have to use ratepayer income to cover depreciation costs of these old facilities for another 2 decades?*

RESPONSE: This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following for your information. HECO receives income from its customers to cover depreciation expenses for all of its facilities that have not been retired or fully depreciated. The depreciation periods for our facilities vary greatly depending on the depreciation schedule for the specific plant in service.

> *HECO is committed to reducing Hawai'i's use of oil by supporting renewable energy and energy efficiency programs. Our support has made Hawai'i one of the nations leaders in both areas" (Ken Fong, HECO, response to Sierra Club's comments for the EISPN, page 4)*

> *The United States Energy Information Agency (EIA) and the Hawaii Department of Business, Economic Development & Tourism (DBEDT) both publish data on renewable energy.*

> *(42) Isn't Hawai'i blessed with some of the finest renewable energy resources in the world?*

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RESPONSE: This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following comment. While we agree that Hawai'i has a wide variety of renewable energy resources, the quality and quantity of the resources vary greatly between islands.

> *(43) Doesn't Hawai'i have a greater variety of renewable energy resources than any other country in the world?*

RESPONSE: This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following comments. Hawaii does have a variety of renewable energy resources. However, to say that our resources are greater than "any other country in the world" is questionable. We do not have the data to make specific comparisons with all other countries in the world.

> *(44) Doesn't Hawai'i have the highest kWhr costs in the nation, making it the ideal place to test renewables?*

RESPONSE: This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following for your information. The area HECO serves does not have the highest kilowatt-hour rates in the nation.

> *(45) Among states, does Hawai'i rank number 1 in the use of oil?*

RESPONSE: This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following comments. Many states use far more oil than Hawai'i. They also use larger amounts of other fossil fuels, such as coal and natural gas. However, it is true that Hawai'i is a heavy user of oil. This oil use is not only for electricity generation but also for transportation purposes.

> *(46) Among states, isn't Hawaii below the national average in the use of renewable energy?*

RESPONSE: No. This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following for your information. Counting sun, wind, biomass, geothermal and other resources, Hawai'i is a leader in the use of renewable energy. About 7% of the electricity sold to customers of HECO and its subsidiaries, HELCO and MECO, comes from renewable energy resources. Compare this with the nationwide average of only 2%. These percentages exclude large hydroelectric resources, which are not available in Hawai'i and which many people feel have such extensive environmental effects that they should be viewed differently than sources such as solar.

> *(47) Aren't HECO owned generators based on Oahu fueled 100.00% by oil?*

RESPONSE: Yes. HECO also provides its customers with energy produced by renewable energy and coal sources.

> *(48) Doesn't Hawai'i trail Europe in the use of renewable energy?*

RESPONSE: This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following for your information. Approximately 7% of the electricity produced in Hawaii is from renewables. We do not have data to make specific comparisons to Europe.

(49) Among all places in the world with (a) our abundant supply of renewables; (b) our variety of renewables; and (c) our high costs of electricity; doesn't (d) HECO use less renewables to produce electricity than anyone else?

RESPONSE: This question does not pertain to the potential effects of the Waiau Fuel Pipeline project. However, we offer the following for your information. We do not have the data to make specific comparisons with all places in the world. As discussed above, Hawai'i has a wide variety of renewable energy resources, but the quality and quantity of the resources vary greatly among islands. Hawai'i is a leader in the use of renewable energy in the United States.

Oil

"Once at refineries, crude oil is refined to produce gasoline, jet fuels, propane, and other lighter fuels. The remaining oil or 'residual fuels' is ... delivered ... by pipeline to HECO" (EISPN page 1-2)

(50) Can the refinery use the same quantity of oil and make different amounts of residual oil, dependent upon the utility demand for that product?

RESPONSE: No. The yield of residual fuel oil from a given volume of crude oil is almost entirely dependent on the physical property of the crude oil being processed. Please note that the quote references the EIS Preparation notice, not the *Draft EIS*.

(51) Isn't 'residual oil' simple <sic> one product of refining, and is no more of a residual than any other refined product?

RESPONSE: No. Residual fuel oil is a term commonly used in industry and government to refer to the residuum of the crude oil after the more highly valued fractions, including naphtha, kerosene and distillate fuel oil have been removed. It is a function of the physical properties of the crude oil being processed.

(52) Please define black oil, white oil, black oil pipeline, white oil pipeline.

RESPONSE: "Black oil" is defined in footnote 2 on page 1-1 of the *DEIS* and refers to oil that is black in color like LSFO and No. 6 fuel oil. A "black oil pipeline" is a pipeline that carries that oil. "White oil" is defined in the last bullet item of Section 1.3 of the *DEIS* and is oil that is not black in color. Jet fuel, diesel, and gasoline are examples of "white oil" products. A "white oil pipeline" is a pipeline that carries that type of product.

(53) What experience does HECO have with pipelines?

RESPONSE: HECO has owned and operated pipelines for many years. These include the pipeline that connects the Iwilei Tank Farm with the Honolulu Generating Station and a great portion of the pipe that connects the Barbers Point Tank Farm with the Kahe Generating Station. In addition to these fuel transmission lines, it owns and operates many smaller lines within its electrical generating stations.

(54) How many people does HECO employ for its existing pipelines?

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RESPONSE: Currently our existing pipelines are managed and operated by people with responsibilities that extend beyond pipelines alone. In other words, no employee is currently employed solely to manage or operate the pipelines. Thus, although it is difficult to give a precise answer, approximately 10 to 20 employees do work that includes responsibility relating to the pipelines.

(55) How many additional pipeline people will need to be hired?

RESPONSE: HECO expects to add approximately six people to its staff to operate and maintain the new Waiau Fuel Pipeline.

(56) Who is head of the pipeline program at HECO?

RESPONSE: HECO's pipelines fall under the responsibility of the Vice President of Power Supply.

(57) How many leaks have occurred on HECO pipelines?

RESPONSE: Our records indicate 2 small leaks in the last 10 years.

(58) For HECO pipeline leaks over the past 10 years please name the dates, amount and type leaked, the agency(s) the leaks were reported to, the environmental impacts and any mitigation's employed.

RESPONSE: The following information is provided for the two small leaks that occurred on the Iwilei-Honolulu power plant pipeline during the period:

Date	Location	Media Affected	Release Information	Cleanup Information
08/01/94	Nimitz Hwy @ Sumner St.	sidewalk, roadway and subsurface soil	Release of LSFO/diesel mixture resulting from a pinhole corrosion leak surfaced between the sidewalk and roadside curbing. Amount released was less than 100 gallons. USCG, DOH HEER, Honolulu Police Dept. and Honolulu Fire Dept. (HFD) responded.	HFD provided initial spill containment using absorbent material. HECO crews conducted cleanup. Sidewalk and roadway were cleaned with sorbents and detergent. Concrete Coring and Mega Construction were contracted to excavate the site. Approximately 25 cubic yards of soil were removed and tested for total petroleum hydrocarbon (TPH, in soil), polynuclear aromatic hydrocarbons (PAH), and total metals. The contaminated soil was thermally treated by Pacific Thermal Services, Inc.. Sorbent material was sent to H-Power for energy recovery.

01/04/95	Nimitz Hwy @ Sumner St.	sidewalk, roadway and subsurface soil	Release site was about 50 ft west (Ewa) of 08/01/94 release site at Sumner St. USCG was contacted, but did not file report. LSFO/diesel mixture was released from corroded section of pipe. Exact volume of oil released is unknown, but believed to be between 25-50 gallons.	HECO crews conducted cleanup and pipe repairs. Sidewalk and roadway were cleaned with sorbents and detergent. Less than 10 yds of contaminated soil were removed and tested for BTEX, PAH, metals and TPH. The contaminated soil was thermally treated by Pacific Thermal Services, Inc..

(59) How is the oil acquired?

RESPONSE: HECO presently purchases oil under various petroleum supply contracts with Tesoro Hawaii and Chevron Products Company. These contracts have been reviewed by the State's Consumer Advocate and the Hawaii Public Utilities Commission (PUC).

(60) Since operating your own pipeline is more cost-effective, would bypassing the refineries and buying residual oil on the open market be more effective?

RESPONSE: This question is not relevant to the Waiau Fuel Pipeline project. However, we offer the following information. The Waiau Fuel Pipeline would allow HECO to transport oil from its Barbers Point Tank Farm (which acts as a central repository for fuel shipments delivered to HECO under fuel supply contracts) to storage facilities at HECO's Waiau generating station. The need to efficiently and safely transfer fuel from HECO's central storage facility at Barbers Point to its Waiau generating station is independent of the manner in which HECO acquires its fuel oil supplies. .

(61) If Chevron does not renew the HECO-Chevron residual oil contract, what would happen?

RESPONSE: HECO would obtain the fuel previously supplied by Chevron from Tesoro or another alternate supplier.

(62) Is it reasonable to assume that a snag might develop in the Chevron-HECO pipeline contract, but that no snag will develop in the Chevron-HECO oil contract?

RESPONSE: HECO has successfully negotiated contracts for fuel supplies and for the services of petroleum pipelines, petroleum terminal facilities and for petroleum transportation with a number of different vendors for decades. We do not expect to encounter any irresolvable issues in future negotiations of this nature.

(63) How does HECO purchase oil?

RESPONSE: See response to question (59).

(64) Does HECO buy oil by the tanker full?

RESPONSE: No.

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(65) What is the capacity of oil tankers arriving in Hawaii?

RESPONSE: Not applicable. See response to question (64).

(66) What is the oil capacity of the pipeline?

RESPONSE: As stated in Section 2.1.11.1 of the *Draft EIS*, HECO expects that it will normally pump oil through the pipeline at a rate of approximately 333 barrels per hour. The maximum pumping rate will be about twice that.

(67) How much oil will flow through the pipeline per year?

RESPONSE: Section 1.2.1 of the *Draft EIS* describes the forecast fuel flow through the proposed pipeline. HECO's forecasts indicate that the fuel consumption over the next 15 years at its Waiau Generating Station will range between 1.8 and 3.0 million barrels per year.

(68) Does HECO have experience in heating oil for use in pipelines?

RESPONSE: Yes. As the type of residual fuel oil purchased by HECO, Low Sulfur Fuel Oil solidifies at ambient temperature and below, it is routinely heated during storage and shipment. HECO presently heats oil for storage and movement through pipelines at all of its generating stations and at the Iwilei Tank Farm.

(69) What are the specific characteristics of residual oil used by HECO?

RESPONSE: HECO's current specifications for LSFO are:

API gravity Deg: 12-24

Viscosity: SSU @ 210 F: 100 – 450

Sulfur %: 0.5% max

Gross Heating Value: 6.0 Million-Btu/Bbl minimum

Rates

(70) It was reported that this capital expenditure will not raise rates. Is this true?

RESPONSE: HECO does not intend to request a rate increase from the PUC based solely on this project. Rates are established by the PUC in rate cases which look at estimates of total company costs and revenues. Rates are determined based on the net effect of some costs going up, savings in other areas, and the revenues HECO estimates it will receive. In general, with respect to this project, customers' rates won't increase as fast with this new pipeline as compared to continuing to use the Chevron pipeline. That is because the new pipeline system will cost less in the long-term than staying with the existing contract.

(71) If so, could rates be lowered if it were not built?

RESPONSE: See the response to Item #70.

(72) What other large capital expenditure items are planned?

RESPONSE: If you are referring to the proposed project, HECO has identified the relevant expenditures for the project. If you are referring to projects other than the subject project, all HECO capital projects over $500,000 are submitted to the Public Utilities Commission for approval.

PUC

(73) Did HECO open a docket with the PUC before the DEIS was released?

RESPONSE: Yes. HECO submitted an application pursuant to General Order No. 7, paragraph 2.3(g)(2) on November 6, 2001, requesting PUC approval of capital expenditures in excess of $500,000. The draft EIS for the Waiau Fuel Pipeline project was published on April 23, 2002.

(74) Are there other dockets which were opened by HECO BEFORE the DEIS was released?

RESPONSE: Yes. Please note that most capital expenditure applications submitted to the PUC do not require a Draft EIS.

Soil Sampling

(75) Was a Phase II analysis completed along the proposed route of the pipeline?

RESPONSE: A Phase I environmental site assessment analysis has been conducted. A Phase II analysis has not been conducted.

Unintended Consequences

(76) The HECO proposal will leave the Chevron pipeline without customers. Common sense indicates that there is a probable likelihood that the Chevron pipeline would need to be plugged. As a secondary impact resulting from this project, wouldn't the environmental impacts associated with removing or plugging the Chevron pipeline be a direct consequence of this proposal?

RESPONSE: As stated in the *Draft EIS*, Chevron has indicated that they do not intend to remove or plug the pipeline if the contract with HECO is not renewed. Instead Chevron would use the pipeline for other purposes such as for moving transportation fuels.

(77) What are the probable impacts associated with discontinuing the Chevron pipeline?

RESPONSE: As noted above, the proposed Waiau Fuel Pipeline project is not expected to lead Chevron to discontinue use of its existing pipeline. Consequently, it is not an anticipated consequence of the proposed project and we have not evaluated its potential environmental effects.

No Action

""'No Action' consists of failing to arrange for continued fuel delivery to Waiau beyond the end of the current contract. ... It cannot be emphasized too strongly that this alternative would not

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meet the objectives of the proposed action. Instead, 'No Action' is included only because it is needed to fulfill the requirements of Chapter 343." [EISPN page 2-46]

Council on Environmental Quality (CEQ), oversees the National Environmental Policy Act (NEPA) for the United States Government. The CEQ analysis of the 'No Action' alternative is found below:

3. No-Action Alternative. What does the "no action" alternative include? If an agency is under a court order or legislative command to act, must the EIS address the "no action" alternative?

A. Section 1502.14(d) requires the alternatives analysis in the EIS to "include the alternative of no action." There are two distinct interpretations of "no action" that must be considered, depending on the nature of the proposal being evaluated. The first situation might involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed. In these cases "no action" is "no change" from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise. Therefore, the "no action" alternative may be thought of in terms of continuing with the present course of action until that action is changed. Consequently, projected impacts of alternative management schemes would be compared in the EIS to those impacts projected for the existing plan. In this case, alternatives would include management plans of both greater and lesser intensity, especially greater and lesser levels of resource development.

The second interpretation of "no action" is illustrated in instances involving federal decisions on proposals for projects. "No action" in such cases would mean the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward.

Where a choice of "no action" by the agency would result in predictable actions by others, this consequence of the "no action" alternative should be included in the analysis. For example, if denial of permission to build a railroad to a facility would lead to construction of a road and increased truck traffic, the EIS should analyze this consequence of the "no action" alternative.

In light of the above, it is difficult to think of a situation where it would not be appropriate to address a "no action" alternative. Accordingly, the regulations require the analysis of the no action alternative even if the agency is under a court order or legislative command to act. This analysis provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of the action alternatives. It is also an example of a reasonable alternative outside the jurisdiction of the agency which must be analyzed. Section 1502.14(c). See Question 2 above. Inclusion of such an analysis in the EIS is necessary to inform the Congress, the public, and the President as intended by NEPA. Section 1500.1(a).

(78) In light of this definition of 'No Action', what action would HECO take if the three proposed actions fail to materialize?

RESPONSE: The reference to the *EIS Preparation Notice* appears to be a mistake. It is presumed that the reference was intended to be to Section 2.4 of the *Draft EIS*.

With respect to your specific question concerning the actions that HECO would take if it were unable to take one of the three action alternatives discussed in the *Draft EIS*, the "No Action" discussion in Section 5 of the Draft EIS addresses that point. HECO has identified and evaluated the various means that are available to it to continue supplying fuel to the Waiau Generating Station. The *Draft EIS* describes and evaluates the three that appear viable.

Global Warming

(79) The pipeline is expected to operate for 30 years supplying oil to create electricity at the Waiau Generation Station. The oil passing through the pipeline/WGS will result in how many tons of CO_2 being released into the environment?

RESPONSE: The pipeline is a sealed system that does not emit CO_2. The air quality impacts associated with the proposed project are discussed in Section 4.2 of the *Draft EIS* and include emissions resulting from pipeline construction and from an accidental release of fuel oil. Any discussion of emissions from the ongoing operation of the Waiau Generating Station is beyond the scope of this EIS.

Flora and Fauna

(80) How close are endangered /threatened species to the proposed pipeline?

RESPONSE: As discussed in Section 4.6.2 of the *Draft EIS* (potential effects on flora) and Section 4.7 (potential effects on fauna) of the *Draft EIS* there are no endangered plants close to the proposed Waiau Fuel Pipeline. HECO's proposed pipeline route passes within 100 feet of the boundary of Pouhala Marsh. Portions of the marsh serve as habitat for endangered Hawaiian waterbirds.

Aesthetics

"Virtually all of the proposed facilities are located below ground. The only exceptions are minor structures (including pipelines attached to existing bridges and other structures crossing streams) without the potential to cause significant visual effects." [EISPN 4-5]

(81) How could a pipeline cause a significant visual effect?

RESPONSE: The reference to the *EIS Preparation Notice* is misplaced. We presume your intention was to reference the discussion in Section 4.9 of the *Draft EIS*. Assuming that to be the case, pipelines that run above ground can have a notable effect if they are large, are in areas where pipelines do not already exist, and run for extensive distances through areas where people's aesthetic experience would be seriously degraded by the sight of the pipeline.

(82) How could a pipeline cause a visual effect but not a significant visual effect?

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RESPONSE: There are many circumstances where a pipeline can be visible without having a significant visual effect. Examples include, but are not limited to, situations where a pipeline is visible over relatively short distances, is only one of several pipelines running along a corridor, appears in the context of other industrial development, and does not interfere with important views.

(83) Is another name for "visual effect" an "aesthetic impact"? Is <sic> not, please elaborate?

RESPONSE: The two are closely related.

(84) What is a minor structure?

RESPONSE: The reference to "minor structures" appeared in the *EIS Preparation Notice* and was defined as pipelines attached to existing bridges and other structures crossing streams without the potential to cause significant visual effects. The Draft EIS did not refer to "minor structures" and discussed the visual impacts of all structures in Section 4.9.

(85) What does the term potential mean? Please elaborate.

RESPONSE: We intended to use the commonly understood meaning of that word. The *American Heritage Dictionary* defines "potential" as meaning "*possible, but not yet realized; capable of being*".

Economic Impact

"Over the short term, the proposed project will generate construction employment and capital expenditures that ... will have positive ripple effects on the other sectors of the economy as well." [EISPN 4-7]

(86) How does the magnitude of the construction impact compare with the magnitude of the oil impact (each $100M of imported oil for the pipeline bleeds $150-175M from the economy)?

RESPONSE: The reference to the *EISPN* in your letter commenting on the *Draft EIS* is misplaced. The potential economic impacts of the Waiau Fuel Pipeline project are discussed in section 4.12.2.2 of the *Draft EIS*. Because it is insulated, the Waiau Fuel Pipeline project will reduce the amount of imported oil needed.

(87) Wouldn't demand-side management, energy efficiency, and renewable energy systems, all of which are far more labor-intensive than the oil-importing/refining/electricity-generating approach, and all of which are based on import-substitution, have a far greater positive impact on the state economy?

RESPONSE: Demand-side management, energy efficiency, and use of renewable energy systems are important but are not substitutes for the proposed project as discussed in Section 1.4 of the Draft EIS.

"The electric power generated at Waiau is vital to maintaining today's material standard of living." [EISPN 4-7]

(88) Does this mean that if the plant were located somewhere else, that "today's material standard of living" would falter?

RESPONSE: No. However, the reference to the EISPN in your letter commenting on the Draft EIS is misplaced. The *Draft EIS* did not include such a statement.

(89) Does it mean that the power must be produced by HECO to maintain "today's material standard of living"?

RESPONSE: This question is not relevant to the Waiau Fuel Pipeline project. However, we offer the following comments. Without question, electricity has improved the quality of life and plays an important role in maintaining our standard of living. These benefits are not a function of the entity that produces the power.

(90) Wouldn't highly efficiently-produced electricity generated by Independent Power Producers (rather. than HECO ratepayers <sic>) maintain "today's material standard of living"?

RESPONSE: See previous response to comment 89.

(91) Doesn't <sic> military generators and co-generators located on Oahu decrease the need for HECO electricity?

RESPONSE: This question is not relevant to the Waiau Fuel Pipeline project. However, we offer the following information. Some of HECO's customers do generate some of their own electricity. However, these customers still remain connected to the HECO system, obtain the majority of their electricity from HECO, and depend upon HECO for backup. Because of this, HECO must maintain sufficient generating capacity to meet their needs when they call upon us to do so.

(92) Doesn't HECO need the Waiau facility to please their stockholders?

RESPONSE: This question is not relevant to the Waiau Fuel Pipeline project. However, we offer the following comments. The Waiau Generating Station is needed to provide reliable and cost-effective electricity to the residents of Oahu.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

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Friends of Pearl Harbor Historic Trail
P.O. Box 2693 'Aiea HI 96701 Phone: (808) 487-9160

Subject: Waiau Fuel Pipeline Project

Hawaiian Electric Company, Inc. 6 June 2002
ATT: K. Fong (WA3-YJ)
P.O. Box 2750
Honolulu HI 96840
Dear Mr. Fong:

We have reviewed the *Draft Environmental Impact Statement (DEIS)* for your proposed Waiau Fuel Pipeline Project.

As you are aware from the *Pearl Harbor Historic Trail (PHHT) Master Plan* and your attendance at Friends of PHHT meetings, at this time we do not see any insurmountable conflicts between your proposed pipeline and the development of the OR&L right-of-way for a multi-use community resource.

In fact, we believe that by working together, there are benefits for both HECO and the community at large in terms of developing a unified landscaping and maintenance program, decreasing unauthorized dumping, increasing security along the corridor and regulating encroachment into the area.

There are areas where we will need to work together to resolve conflicts, specifically the proposed fuel line overpass at Waiau generating station (2.1.6 Modifications to the Waiau Generating Station, and Figure 2-11). Expansion and upgrade of the PHHT and re-establishment of the train on the OR&L right-of-way may pose a threat to any overhead pipe, and possibly represent an unacceptable liability risk for HECO. You may wish to re-look the proposed pipeline construction at that point.

Although your plan suggests that pipeline construction and maintenance will have a minimal impact on trail operations, (4.14.1.2 Construction Impacts to Public Facilities) we would like to have provisions made for temporary bike and pedestrian detours around construction areas.

3.9 Scenic and Aesthetic Resources cites the 1987 City & County of Honolulu study of coastal views. You quote: *Ewa has never been acclaimed for its scenic qualities and not a single lookout or provision for roadside viewing can be found today within the district.* (italics yours). This study was conducted 15 years ago, and much has changed in the use and appreciation of the 'Ewa Plain ecosystem. Additionally, the quote makes no reference to the fact that many of the locations for potential coastal viewpoints are under Navy control, and were not available for developing lookouts. The usefulness of the study is doubtful and should not be cited as justification for intrusive development.

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Although aesthetic considerations have not figured into past HECO projects, the economic potential for the PHHT demands special consideration be given to any proposed actions which might degrade the area's revenue producing capabilities.

We appreciate the effort made to include the Pearl Harbor Historic Trail in the Environmental Impact Statement. We look forward to continuing to work with you, and encourage your continued involvement in Friends of PHHT planning actions. We firmly believe that this is an opportunity for HECO and the PHHT to build a strong, mutually beneficial partnership.

Best Regards,

Bobby B. Blanpied
Executive Director
Friends of Pearl Harbor Historic Trail

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Mr. Robyn B. Blanpied, Director
Friends of Pearl Harbor Historic Trail
P.O. Box 3593
Honolulu, HI 96701

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Ms. Blanpied:

Thank you for your June 6, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and other members of your organization spent reviewing the document and providing written comments.

I have included your comments and provided item-by-item responses below.

There are areas where we will need to work together to resolve conflicts, specifically the proposed fuel line overpass at Waiau generating station (2.1.6 Modifications to the Waiau Generating Station, and Figure 2-11. Expansion and upgrade of the PHHT and reestablishment of the train on the OR&L right-of-way may pose a threat to any overhead pipe, and possibly represent an unacceptable liability risk for HECO. You may wish to re-look the proposed pipeline construction at that point.

RESPONSE: I appreciate your concern that liability issues might arise if rail use of the portion of the PHHT you refer to were to be reestablished. We share your desire to maintain safe operations in this area.

As you are probably aware, our proposal is to place the new pipeline on an existing overhead structure that already supports a fuel pipeline. This overpass has a clearance of 15 feet above the bikeway, and the addition of the proposed Waiau Fuel pipeline would not change that. There are also other overhead pipeline crossings of the right-of-way in the area of the Waiau Generating Station that have similar clearance. It is possible, but not certain, that trains operating within the PHHT could require clearance in excess of the 15 feet that is presently available. Should this occur, the existing crossings, including the one that would be used for the proposed Waiau Fuel Pipeline project, would have to be raised. In view of this, we do not believe the new pipeline would impose any additional liability risk to HECO.

During our review of the situation, we have identified a number of technical issues that could only be resolved during the actual design of the railway in that area. One is the height of the train as discussed above; another is the final grade of the track and trail. Engineering work would be needed since there are several bridges in the area that would require reconstruction.

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It is our understanding that reestablishment of train operations on the segment of the PHHT that passes under the existing overpass may not occur in the near future as it is dependent upon uncertain funding sources. Because of the uncertainty, we believe that it would be prudent to delay engineering and design of the necessary changes to the overpass until there are relatively firm commitments for funding. This is particularly so since the proposed fuel line crossing is within an easement that we have obtained from the Navy and would require Navy review and approval before it could be implemented.

While HECO believes it would not be necessary to modify the existing structure at this time, I want to assure you that we will work with the Friends of PHHT to accommodate future train operations.

Although your plan suggests that pipeline construction and maintenance will have a minimal impact on trail operations (4.14.1.2 Construction Impacts to Public Facilities) we would like to have provisions made for temporary bike and pedestrian detours around construction areas.

RESPONSE: HECO plans to minimize the extent to which construction of the proposed pipeline interferes with all existing activities, including trail operations. Temporary bike and pedestrian detours are one of the techniques we will use to accomplish that goal. While we will do everything possible to maintain uninterrupted use of the trail network, safety of the trail users is our top priority. Therefore, there may be brief periods during construction when short segments of the trail will be closed as a matter of safety to pedestrians and bicyclists. In cases where that is necessary, we will require the contractor to post advance notification of the location, time, and duration of the interruption and we will work with the City's Bike Coordinator. We will not request such closures simply as a matter of our convenience, but only where safety issues are involved.

3.9 Scenic and Aesthetic Resources cites the 1987 City & County of Honolulu study of coastal views. You quote: "'Ewa has never been acclaimed for its scenic qualities and not a single lookout or provision for roadside viewing can be found today within the district. (italics yours)." This study was conducted 15 years ago, and much has changed in the use and appreciation of the 'Ewa Plain ecosystem. Additionally, the quote makes no reference to the fact that many of the locations for potential coastal viewpoints are under Navy control, and were not available for developing lookouts. The usefulness of the study is doubtful and should not be cited as justification for intrusive development.

Although aesthetic considerations have not figured into past HECO projects, the economic potential for the PHHT demands special consideration given to any proposed actions which might degrade the area's revenue producing capabilities.

RESPONSE: The quote from the 1987 coastal view study was not in any way intended to justify "intrusive development". It was included because it was part of an official planning document for the area. The quote is not a vital part of the analysis, and we have eliminated it from the *Final EIS*. As discussed in Section 4.9.1 of the Draft EIS, all of the structures included in the pipeline design would either be completely buried or would constitute minor and not intrusive additions to existing industrial facilities.

As an adjoining property owner to the trail, HECO can contribute to the fulfillment of the PHHT vision by working together with your organization to ensure that this area is suitably landscaped and maintained, reduce unauthorized dumping, maintain security, and regulate encroachments.

Thank you for sharing your plans with us and for allowing us to be active participants in the Friends of PHHT planning meetings. If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

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JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

GEORGE "KEOKI" MIYAMOTO
DEPUTY DIRECTOR

June 6, 2002

TPD4/02-01587R
(TPD4/02-01661)

Mr. Ken Fong
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Subject: Draft Environmental Impact Statement - Waiau Fuel Pipeline Project

This responds to your April 23, 2002 letter and the Draft Environmental Impact Statement (DEIS, April 2002):

1. Where existing sidewalks, accessible paths, etc., are affected in construction and are rebuilt, the project must incorporate ADA accessibility requirements.

2. P 2-6; 2.1.3. Describe/define 'isolation' valve (third type?). Clarify the reference to nine isolation valve/stations-control points as Table 2-2 indicates two only (Fig 2-6 maps valve location).

3. P 2-8; Table 2-2/Fig 2-6. Consider the use of additional valves along the long stretch of pipeline between the HECO BP tank farm/Kapolei and Old Fort Weaver Road (Valve #3). Any leaks at Kapolei City and along Farrington Highway may have serious impacts to the adjacent agricultural land.

4. P 2-21; 2.1.8.1. Traffic control plans/permits are required for construction on City streets.

5. P 2-21; 2.1.8.1, para. 2. The respective neighborhood boards should be included in the list of organizations to be notified.

6. P 2-21; 2.1.8.1, para. 4. Rights-of-way need to be identified together with required temporary and permanent easements.

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7. Fig. 2-15; 2-16. Rights-of-way, easements, and provisions for traffic controls should be identified.

8. Fig. 2-19. This figure should be identified for a road crossing only.

9. Fig. 2-20. This figure should be identified for a stream crossing only.

10. P 2-27; 2.1.10. Roadway closures, unless absolutely necessary, should be avoided. Should such closure be warranted, traffic control plans must be submitted for City approval; also, all affected parties should be notified.

11. Appendix D-1. It should be noted that several colonies of *ko'oloa'ula (Abutilon menziesii)*, an endangered plant, have been identified in Kaloi Gulch, between Farrington Highway and Renton Road in Ewa.

Thank you for this opportunity to review and comment on the fuel line project DEIS.

Sincerely,

CHERYL D. SOON
Director

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Ms. Cheryl D. Soon, Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Ms. Soon:

Thank you for your June 6, 2002 letter (Your Reference TPD4/02-01587R; TPD4/02-01661) commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and your staff spent reviewing the document and providing written comments. Item-by-item responses to your comments are provided below.

1. Where existing sidewalks, accessible paths, etc., are affected in construction and are rebuilt, the project must incorporate ADA accessibility requirements.

RESPONSE: HECO understands and will comply with the need to incorporate ADA accessibility requirements into all sidewalks, accessible paths, and other facilities affected by construction of the proposed Waiau Fuel Pipeline.

2. P 2-6; 2.1.3. Describe/Define 'isolation' valve (third type?). Clarify the reference to nine isolation valve/stations-control points as Table 2-2 indicates two only (Fig 2-6 maps valve location).

RESPONSE: Thank you for calling our attention to the ambiguity here. It is confusing to state that there are two types of valves and then refer to three types. The lack of clarity stems from the fact that the "isolation valves" mentioned in the last sentence of this paragraph are actually a type of block valve used at either terminus of the pipeline. We have revised the first sentence in the *Final EIS* Section 2.1.3 to read: "*The design of the proposed project calls for three types of valves to be used*". We have also revised the last sentence of the paragraph to read: "*Isolation valves, which are very similar to block valves, would also be located at each station facility, making nine control points in all.*"

3. P 2-8; Table 2-2/Fig 2-6. Consider the use of additional valves along the long stretch of pipeline between the HECO BP tank farm/Kapolei and Old Fort Weaver Road (Valve #3). Any leaks at Kapolei City and along Farrington Highway may have serious impacts to the adjacent agricultural land.

WINNER OF THE EDISON AWARD
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RESPONSE: We certainly understand the your concerns about safety and impacts to agricultural lands as well as protecting communities and environmentally sensitive areas. Please be assured you that safety is a priority for this project. When we chose the locations for the block valves we looked at the likelihood of a pipeline release occurring and how a release could affect the public or environment. That's why we plan to install six remotely operated block valves to protect the public and the environment. We think it's also important to note that HECO's proposed design has several times as many remotely operated block valves as any other pipeline on Oahu.

As a result of your comment we have reviewed the need to add an additional valve to protect the agricultural area. Considering the likelihood of a pipeline rupture in this area and how a release in this area would affect public safety and the agricultural lands, we concluded that an additional valve would not do much to increase the community's safety or environmental protection. The following are the among the most important factors we considered:

- The low sulfur fuel oil that will be transported in this thick, insulated steel pipeline is non-flammable and not explosive.
- LSFO is so thick or solid at ambient temperatures that we have to warm it above 120 deg F in order for it to flow through the pipeline. If it was released, it would begin to cool and rapidly thicken, hardening into a solid tar-like substance which would limit the distance it would travel.
- If in the remote instance, despite all of the built-in protections (high speed leak detection system and block valves) and the fact that the pipeline will be monitored 24 hours a day, a spill does occur, any release of oil can be rapidly contained.
- The likelihood of an accidental release caused by some other party digging into the pipeline is low because very little construction work occurs in State Energy Corridor along the agricultural lands.

4. P-21; 2.1.8.1. Traffic control plans/permits are required for construction on City streets.

RESPONSE: I appreciate the information concerning the need for traffic control plans and permits for construction on City Streets. Table 2-7 on page 2-38 of the *Draft EIS* notes the need for a permit from the City and County of Honolulu to excavate public rights-of-way. HECO contractors will develop and submit detailed traffic control plans for review and approval as part of our application for those permits.

5. P-21; 2.1.8.1, para.2. The respective neighborhood boards should be included in the list of organizations to be notified.

RESPONSE: HECO has met regularly with the Neighborhood Boards along the proposed route to inform them of the project status and to solicit and respond to their concerns. We will continue to do this throughout the construction period. Your suggestion that we specifically reference the Neighborhood Boards in this discussion is a good one. We will add the following sentence at the end of this paragraph: "*HECO will provide the Neighborhood Boards along the route with regular updates on the status of the project.*"

6. P 2-21; 2.1.8.1, para. 4. Rights-of-way need to be identified together with required temporary and permanent easements.

RESPONSE: HECO would acquire the easements needed for the proposed pipeline as part of its lease of a slot in the State Energy Corridor (supplemented by lease of an easement within the former OR&L right-of-way for the by-pass of Pouhala Marsh). Other rights-of-way that need to be respected during construction will be shown on the construction plans for the proposed project. This will be done as part of our compliance with Item (4), above.

7. Fig. 2-15; 2-16. Rights-of-way, easements, and provisions for traffic controls should be identified.

RESPONSE: These figures are schematic representations of the equipment strings that would be used in constructing the proposed pipeline. It is not possible to depict the detailed, site specific information you have requested on them. As indicated in preceding responses, that information will be placed on construction plans, traffic control plans, and other construction documents that are prepared prior to construction.

8. Fig. 2-19. This figure should be identified for a road crossing only.

RESPONSE: The figure title used in the *Draft EIS* reflects the fact that the same construction technique could be used for segments that pass beneath both roads and streams, and we did not think it necessary to show both applications. However, I understand the confusion that this may engender when only a road crossing is actually drawn. Consequently, the title in the *Final EIS* will omit the words "and Stream". We will add a note to the figure that states: "*Note: The same kind of construction technique may be used to pass beneath streams.*"

9. Fig. 2-20. This figure should be identified for a stream crossing only.

RESPONSE: This is essentially the same situation as Figure 2-19. To avoid confusion, the title of Figure 2-20 will omit the reference to roads and will include the following: "*Note: The same kind of construction technique would be used to pass beneath roads.*"

10. P-27; 2.1.10. Roadway closures, unless absolutely necessary, should be avoided. Should such closure be warranted, traffic control plans must be submitted for City approval; also, all affected parties should be notified.

RESPONSE: HECO plans to avoid unnecessary roadway closures on City streets. If we believe that temporary closures are warranted and necessary, we or our contractor will submit traffic control plans to the City for City approval. We would also notify all affected parties.

11. Appendix D-1. It should be noted that several colonies of ko'oloa'ula (Abutilon menziesii), an endangered plant, have been identified in Kaloi Gulch, between Farrington Highway and Renton Road in 'Ewa.

RESPONSE: Thank you for the information concerning the discovery of ko'oloa'ula (*Abutilon menziesii*), an endangered plant, in Kalo'i Gulch, between Farrington Highway and Renton Road in 'Ewa. We have conducted biological surveys of the pipeline route and have not found those species to be present in the portion of Kalo'i Gulch that we would affect. The project botanical consultant, Ms. Winona Char, has located for the State of Hawai'i the sites within the gulch area where this plant

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can be found. Ms. Char has confirmed that all of these sites are *makai* from the pipeline route and that they will not be threatened by the pipeline construction. Please call Ms. Char directly at 734-7828 with any further questions that you may have on this matter.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

3

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

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

June 7, 2002

Mr. K. Fong
Hawaiian Electric Company, Inc.
P.O. Boxz 2750
Honolulu, Hawai'i 96840-0001

Ms. Jadine Urasaki
State of Hawai'i Department of Transportation, Harbors Division
869 Punchbowl Street
Honolulu, Hawai'i 96813-5097

Mr. Perry White
Planning Solutions, Inc.
1210 Auahi Street, Suite 221
Honolulu, Hawai'i 96814

Dear Ms. Urasaki, and Messrs. Fong and White:

The Office of Environmental Quality Control has reviewed the draft environmental impact statement (DEIS) entitled: "Waiau Fuel Pipeline Project" dated April 2002, for various TMKs in the 'Ewa and Honolulu districts. We offer the following comments for your consideration and response.

1. **SIGNATORY CERTIFICATION:** On the coversheet of the EIS, please include a signature to the language described in Section 11-200-20(d), Hawai'i Administrative Rules.
2. **IMPACTS TO RECREATIONAL ACTIVITIES ALONG THE CORRIDOR ROUTE:** The project appears to traverse recreational areas. Please discuss direct, indirect and cumulative impacts of the project on recreational activities (fishing, boating, picnicking, gathering, etc.) along the corridor route.

If there are any questions, please call Leslie Segundo of my staff at (808) 586-4185. Thank you for the opportunity to comment.

Sincerely,

GENEVIEVE SALMONSON
Director

Enclosures

22.

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Ms. Genevieve Salmonson, Director
Office of Environment Quality Control
235 South Beretania Street, Suite 742
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Ms. Salmonsen:

Thank you for your June 7, 2002 letter commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for* the Waiau Fuel Pipeline Project. We appreciate the time you and members of your staff spent reviewing the report and providing written comments. Item-by-item responses to your comments are provided below.

1. SIGNATORY CERTIFICATION: On the coversheet of the EIS, please include a signature to the language described in Section 11-200-200(d), Hawaii Administrative Rules.

RESPONSE: The coversheet will contain the following language:

This Final Environmental Impact Statement and all ancillary documents were prepared under my direction or supervision and, to the best of my knowledge, the information submitted fully addresses the document content requirements as set forth in HAR §11-200-18.

The coversheet will be signed and dated by Perry White, President of Planning Solutions, Inc. Planning Solutions prepared both the draft and final environmental impact statements.

2. IMPACTS TO RECREATIONAL ACTIVITIES ALONG THE CORRIDOR ROUTE. The project appears to traverse recreational areas. Please discuss direct, indirect and cumulative impacts of the project on recreational activities (fishing, boating, picnicking, gathering, etc.) along the corridor route.

RESPONSE: Potential effects on natural resources that are used for recreation are discussed in numerous locations throughout the *Draft EIS* (see, for example, the discussions of water quality effects, effects on aquatic biota, noise effects, etc.). Other sections of the *Draft EIS* report potential effects on recreational activities and facilities. In addition to Section 4.14.1.2's discussion of impacts to public facilities, including the Pearl Harbor Historic Trail (PHHT), these include:

- The discussion of compliance with the *O'ahu Sustainable Communities Plan* found in Section 6.1.3 of the *Draft EIS*.

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- The discussion of potential effects on public access to recreational facilities presented in Section 6.1.6.1 of the *Draft EIS*.
- The discussion of potential Impacts on recreation areas and wildlife reserves found in Section 6.1.6.2 of the *Draft EIS*.
- The point-by-point review of potential effects on beaches and public recreation contained in Section 6.2.5.1 of the *Draft EIS*.

Based on our consultant's June 20, 2002 discussion of these points with Mr. Leslie Segundo of your staff, it is my understanding that he now believes the information contained in those sections adequately addresses the recreational impacts issue.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

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DEPARTMENT OF PLANNING AND PERMITTING
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JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

2002/ELOG-1087 (RS)

June 10, 2002

Hawaiian Electric Company, Inc.
Attention: K. Fong (WA3-YJ)
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Gentlemen:

DEIS for the 13-mile long Waiau Fuel Pipeline Project between the Barbers Point Tank Farm in Campbell Industrial Park and Pearl City, Oahu, Hawaii, TMK: 9, Parcels in Sections 1, 3, 4, 6, 7 and 8

This is in response to your request dated April 23, 2002, for comments on the April 2002 Draft Environmental Impact Statement (DEIS) for Hawaiian Electric Company, Inc.'s (HECO) proposed new Waiau Fuel Pipeline Project.

We offer the following comments for your review and consideration:

1. A glossary listing the abbreviations/acronyms and the definitions/items/entities represented would be helpful.

2. **Page 1-9. Section 1.4.3.1 Action Alternatives Evaluated in Detail.**

   According to the DEIS report, beginning in December 2001, the Chevron line is currently used only to carry HECO-owned low-sulfur fuel oil (LSFO) to the Waiau and Honolulu Generating Stations. Therefore, purchase of this "black-oil" pipeline and continuation of Chevron's current practice of batch-shipping "the LSFO to Waiau by pumping at approximately 1,000 barrels per hour for three days" may be another viable option (pages S-4, 1-1 and 1-7), which should be added to the EIS report.

   If this option was broached with Chevron and/or the owners of the property (private individuals, corporations, Federal, State and County entities) that the pipeline crosses, their replies should be added to this section to support this conclusion.

3. **Pages 2-38, 2-43 and 2-50. Tables 2-7 (Permit Requirements for the Proposed Action); 2-8 (Likely Permit Requirements: Alternative 2), and 2-10 (Required Permits and Approvals: Alternative 3: Trucking).**

   The following changes acknowledged in HECO's December 14, 2001 letter to DPP were not incorporated in said three tables of the DEIS report:

   The following permits are issued by the Department of Planning and Permitting, rather than the Department of Design and Construction: Grubbing, Grading, and Stockpiling; Building; Construction Dewatering; and Permit to Discharge to the Storm Sewer.

   The Permit to Discharge Effluent (during the hydrotesting activity), which is issued by the Department of Environmental Services should also be included in the above tables.

4. **Page 4-127. Section 4.12.1.2.1 Overview of Ewa Neighborhood Board Area and Section 4.12.1.2.3 Area Near the Chevron Pipeline.**

   Please add the West Loch Fairways Subdivision (the Chevron pipeline and the SEC are both within the OR&L ROW; the ROW is located between the eastern edge of the West Loch Fairways Subdivision, the West Loch Golf Course and the West Loch Estates Subdivision).

5. **Pages 6-1 and 6-2. Section 6.1.2. Ewa Development Plan.**

   In the "Discussion" paragraph of Section 2.2.9, reference to "Section Q" should be replaced by Sections 3.3 Historic and Archeological Resources; Section 4.8.2 Previous Archeological Research; Section 4.8.3.2 Potential for Encountering New Remains; and Section 4.8.3.2.1 The 'Ewa Plain.

   Add discussion of how the project relates to the Ewa DP's establishment of a rapid transit corridor along portions of Farrington Highway for the Department of Transportation Services' planned Ewa rapid transit corridor from Waipahu along the Farrington Highway ROW (see Section 4.1.4.2 Planned Rapid Transit Corridor on page 4-10 and the Ewa DPPFM in Appendix A-7 of the Ewa DP).

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6. **Page 6-3. Section 6.1.3 Central Oahu *Sustainable* Communities Plan.**

The following update on the adoption of the CO SCP (2002 version) is forwarded solely for information. The plan, Bill 26 (2002), passed first reading at the City Council on March 13, 2002, and was referred to the Committee on Planning. You may call the Council Assistance office at 523-4480 for the date of the anticipated Planning Committee meeting, or log into the City Council's web-site address at www.co.honolulu.hi.us/council. Questions about the plan may be directed to DPP's project manager, Robert Stanfield at 527-6094.

7. **Page 6-4. Section 6.1.6 Special Management Area Review.**

The section number is missing in the second sentence of the second paragraph "(described above in Section □)." Should it be Section 2.1.6 on page 2-16?

The following additional comments are also forwarded for your review and consideration:

1. **Special Management Area (SMA)**

Neither the Barbers Point nor the Iwilei Tank Farm are within the SMA.

Although portions of the fuel pipeline are within the SMA, they appear to be along an existing corridor. Provided the appurtenant aboveground fixtures are less than four feet in height, the fuel line would qualify for an exemption under Section 25-1.3(2)(M) of the ROH.

The Waiau Generating Station is within the SMA. In our July 9, 2001 letter, we determined that the proposed metering facility and "pig-handling equipment" were exempt from SMA permits.

2. **Land Use Ordinance**

<u>Pipeline</u>

If the pipeline qualifies as a Utility Installation, Type A, it would be a permitted use within all zoning districts subject to compliance with development standards.

<u>Barbers Point Tank Farm</u>

The HECO facility at Barbers Point is located in the I-2 Intensive Industrial District and was approved as a Utility Installation Type B, under a Conditional Use Permit (DPP file number 89/CUP1-17). Proposed structures at the Barbers Point Tank Farm include a maintenance and storage building, truck loading facility, pump station and other equipment. The applicant must obtain approval of modifications to 89/CUP1-17 prior to construction of the proposed improvements.

<u>Waiau Generating Station</u>

The Waiau Generating Station was granted an Existing Use Permit for a Utility Installation, Type B in 1989 (89/CUP1-47). In addition to the underground fuel line, improvements include a metering facility and other equipment. These would qualify as a minor modification to the existing facility. Approval of the modification must be obtained prior to construction.

<u>Iwilei Truck Unloading Facility</u>

This facility appears to qualify as a storage yard. Storage yards are permitted in the I-3 Waterfront Industrial District subject to the standards in Article 5 of the LUO.

3. **Pearl Harbor Historic Trail (PHHT) Master Plan**

The DEIS does not adequately address some of the concerns raised in our November 7, 2001 comment letter on the EISPN report. Except for the portion of the fuel line located within the HECO Waiau Power Plant, the proposed fuel line will be installed underground. The DEIS fails to clearly indicate the location of the above-ground sections of the pipeline, relative to the proposed PHHT. A description of the above-ground sections of the pipeline should be included in Section 2.1.1 of the DEIS.

Our letter also cited the need for discussion about the visual impacts of the pipeline above grade, impacts of pipeline signage on the PHHT, and impacts on planned extension of train operations.

- Will above ground installation of the pipeline within HECO property affect the PHHT's future plans for extension of locomotive service to this area?

2

- Will this portion of the pipeline adversely affect the PHHT's future plans for expansion?

- Surface mounting requires mounting blocks. What is the width of the pipeline easement required for the portion that is surface mounted? Why does the portion of the fuel line located on HECO property and adjacent to the OR&L right-of-way need to be surface mounted instead of being installed underground?

- The final EIS report should discuss mitigative measures for any adverse impacts on the PHHT.

4. **State Land Use Districts**

The State Land Use Districts shown on Figure 3-5 is erroneous in the area east of Kapolei Villages. Most of those areas shown as Urban is in the State Land Use Agricultural District.

If you have any questions, please call staff planner Ray Sakai at 523-4047.

Sincerely yours,

for RANDALL K. FUJIKI, AIA
Director of Planning and Permitting

RKF:mo
cc: Ms. Jadine Urasaki, Acting Harbors Administrator
Harbors Division, State Department of Transportation
Perry White, Project Consultant
Planning Solutions, Inc.

g:planning\div function\ea-eis\2002\waiaufuelinedeis.doc

23

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/G

July 23, 2002

Mr. Randall K. Fujiki, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawai'i 96813

**Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project**

Dear Mr. Fujiki:

Thank you for your June 10, 2002 letter [Your Reference 2002/ELOG-1087 (RS)] commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and your staff spent reviewing the document and providing written comments. Item-by-item responses to your comments are provided below.

General

1. A glossary listing the abbreviations/acronyms and the definitions/items/entities represented would be helpful.

RESPONSE: We will include a glossary in the *Final EIS* in accordance with your request. This will include most of the entities represented.

2. Page 1-9. Section 1.4.3.1 Action Alternatives Evaluated in Detail.

According to the DEIS report, beginning in December 2001, the Chevron line is currently used only to carry HECO-owned low-sulfur fuel oil (LSFO) to the Waiau and Honolulu Generating Stations. Therefore, purchase of this "black-oil" pipeline and continuation of Chevron's current practice of batch-shipping "the LSFO to Waiau by pumping at approximately 1,000 barrels per hour for three days" may be another viable option (pages S-4, 1-1 and 1-7), which should be added to the EIS report.

If this option was broached with Chevron and/or the owners of the property (private individuals, corporations, Federal, State and County entities) that the pipeline crosses, their replies should be added to this section to support this conclusion.

RESPONSE: HECO did consider the purchase option early in the planning phase of the project. This would involve either (a) operating and maintaining the existing Chevron pipeline or (b) replacing the entire Chevron pipeline with a new line of equal capacity. Each of these could be done either along the entire pipeline route (so that HECO could continue to supply both Waiau and the Iwilei Tank Farm/Honolulu Generating Station through the pipeline) or, alternately, only for the BPTF-to-Waiau portion of the route. However, outright purchase of the facilities or construction of

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FOR DISTINGUISHED INDUSTRY LEADERSHIP

new facilities in this easement was eliminated as a feasible alternative because it would require HECO to acquire numerous new easements (as not all of the Chevron easements can be assigned to HECO). Additionally, the purchase of existing Chevron facilities would need to be negotiated and such negotiations could be complicated and lengthy. Issues such as who would be responsible for any existing contamination would also need to be resolved. Because of this situation, we concluded that the alternative you suggested (i.e., *"...purchase of this "black-oil" pipeline and continuation of Chevron's current practice of batch-shipping "the LSFO to Waiau by pumping at approximately 1,000 barrels per hour for three days"* is not a viable option.

3. Pages 2-38, 2-43 and 2-50. Tables 2-7 (Permit Requirements for the Proposed Action); 2-8 (Likely Permit Requirements: Alternative 2), and 2-10 (Required Permits and Approvals: Alternative 3: Trucking).

The following changes acknowledged in HECO's December 14, 2001 letter to DPP were not incorporated in said three tables of the DEIS report:

The following permits are issued by the Department of Planning and Permitting, rather than the Department of Design and Construction: Grubbing, Grading, and Stockpiling; Building; Construction Dewatering; and Permit to Discharge to the Storm Sewer.

The Permit to Discharge Effluent (during the hydrotesting activity), which is issued by the Department of Environmental Services should also be included in the above tables.

RESPONSE: We apologize to the Department for the incorrect listing in these tables. The *Final EIS* will contain the corrected tables.

4. Page 4-127. Section 4.12.1.2.1 Overview of 'Ewa Neighborhood Board Area and Section 4.12.1.2.3 Area Near the Chevron Pipeline.

Please add the West Loch Fairways Subdivision (the Chevron pipeline and the SEC are both within the OR&L ROW; the ROW is located between the eastern edge of the West Loch Fairways Subdivision, the West Loch Golf Course and the West Loch Estates Subdivision).

RESPONSE: Thank you for pointing out this omission. We have added a reference to the West Loch Fairways Subdivision to both sections.

5. Pages 6-1 and 6-2. Section 6.1.2. Ewa Development Plan.

In the "Discussion" paragraph of Section 2.2.9, reference to "Section 0" should be replaced by Sections 3.8 Historic and Archeological Resources; Section 4.8.2 Previous Archeological Research; Section 4.8.3.2 Potential for Encountering New Remains; and Section 4.8.3.2.1 The 'Ewa Plain.

Add discussion of how the project relates to the Ewa DP's establishment of a rapid transit corridor along portions of Farrington Highway for the Department of Transportation Services' planned Ewa rapid transit corridor from Waipahu along the Farrington Highway ROW (see Section 4.1.4.2 Planned Rapid Transit Corridor on page 4-10 and the Ewa DPPFM in Appendix A-7 of the Ewa DP).

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RESPONSE: The erroneous cross-reference in the "Discussion" paragraph of Section 2.2.9 will be corrected. We will include references to Section 3.3, Historic and Archeological Resources; Section 4.8.2, Previous Archeological Research; Section 4.8.3.2, Potential for Encountering New Remains; and Section 4.8.3.2.1, The 'Ewa Plain, in the *Final EIS* in accordance with your request.

To address the potential relationships between the project and the planned Rapid Transit Corridor, we will include the following paragraphs at the end of Section 6.1.2 of the *Final EIS*.

§4.1.4.2 Planned Rapid Transit Corridor

As shown on the Public Facilities Map in Appendix A-7 of the 'Ewa Development Plan, a rapid transit corridor is planned to connect the City of Kapolei with Waipahu and onward to the Primary Urban Center. The corridor could provide for both an Ewa shuttle service, which could travel back and forth on the transit corridor between Ko Olina, the City of Kapolei, the UH West Oahu campus and Waipahu, and a commuter service, which could provide peak-hour express bus service to and from the Primary Urban Center. In peak-hour commuting, the corridor could carry express bus service, or even higher-speed dedicated transit service.

By connecting to the Primary Urban Center via Waipahu, the corridor could provide for a future high-speed connection between the Kapolei campus of the University of Hawaii at West Oahu and Leeward Community College, Honolulu Community College, and the University of Hawaii at Manoa.

Discussion: Along Farrington Highway in Kapolei, where the proposed pipeline would be near the planned rapid transit corridor, the pipeline would be entirely within the existing State Energy Corridor, where two other pipelines are already installed. Any plans for development of the rapid transit corridor would have to accommodate these existing pipelines and the State Energy Corridor. Therefore, we anticipate no conflicts between the development of the rapid transit corridor and the proposed pipeline.

6. Page 6-3. Section 6.1.3 Central Oahu Sustainable Communities Plan.

The following update on the adoption of the CO SCP (2002 version) is forwarded solely for information. The plan, Bill 26 (2002), passed first reading at :he City Council on March 13, 2002, and was referred to the Committee on Planning. You may call the Council Assistance office at 523-4480 for the date of the anticipated Planning Committee meeting, or log into the City Council's web-site address at www.co.honolulu.hi.usleotuncil. Questions about the plan may be directed to DPP's project manager, Robert Stanfield at 527-6094.

RESPONSE: Thank you for the update on the status of the Central O'ahu Sustainable Communities Plan Ordinance. As of June 20, Bill 26 was still in committee.

7. Page 6-4. Section 6.1.6 Special Management Area Review.

The section number is missing in the second sentence of the second paragraph "(described above in Section u)." Should it be Section 2.1.6 on page 2-16?

4

RESPONSE: Yes, the correct cross-reference is to Section 2.1.6. The *Final EIS* will contain the correct cross-reference.

Additional Comments

1. Special Management Area (SMA)

Neither the Barbers Point nor the Iwilei Tank Farm are within the SMA.

Although portions of the fuel pipeline are within the SMA, they appear to be along an existing corridor. Provided the appurtenant aboveground fixtures are less than four feet in height, the fuel line would qualify for an exemption under Section 25-1.3(2)(M) of the ROH.

The Waiau Generating Station is within the SMA. In our July 9, 2001 letter, we determined that the proposed metering facility and "pig-handling equipment" were exempt from SMA permits.

RESPONSE: Thank you for confirming the SMA status of the various improvements.

2. Land Use Ordinance

Pipeline

If the pipeline qualifies as a Utility Installation, Type A, it would be a permitted use within all zoning districts subject to compliance with development standards.

Barbers Point Tank Farm

The HECO facility at Barbers Paint is located in the I-2 Intensive Industrial District and was approved as a Utility Installation Type B, under a Conditional Use Permit (DPP file number 89ICUP1-17). Proposed structures at the Barbers Point Tank Farm include a maintenance and storage building, truck loading facility, pump station and other equipment. The applicant must obtain approval of modifications to 89/CUP 1-17 prior to construction of the proposed improvements.

Waiau Generating Station

The Waiau Generating Station was granted an Existing Use Permit for a Utility Installation, Type B in 1989 (89ICLTP1-47). In addition to the underground fuel line, improvements include a metering facility and other equipment. These would qualify as a minor modification to the existing facility. Approval of the modification must be obtained prior to construction.

Iwilei Truck Unloading Facility

This facility appears to qualify as a storage yard. Storage yards are permitted in the I-3 Waterfront Industrial District subject to the standards in Article 5 of the LUO.

RESPONSE: Thank you for confirming the need for minor modifications to the existing use permits at the Waiau Generating Station and the Barbers Point Tank Farm.

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3. Pearl Harbor Historic Trail (PHHT) Master Plan

The DEIS does not adequately address some of the concerns raised in our November 7, 2001 comment letter on the EISPN report. Except for the portion of the fuel line located within the HECO Waiau Power Plant, the proposed fuel line will be installed underground. The DEIS fails to clearly indicate the location of the above-ground sections of the pipeline, relative to the proposed PHHT. A description of the above-ground sections of the pipeline should be included in Section 2.1.1 of the DEIS.

Our letter also cited the need for discussion about the visual impacts of the pipeline above grade, impacts of pipeline signage on the PHHT, and impacts on planned extension of train operations.

- *Will above ground installation of the pipeline within HECO Property affect the PHHT's future plans for extension of locomotive service to this area?*
- *Will this portion of the pipeline adversely affect the PHHT's future plans for expansion?*
- *Surface mounting requires mounting blocks. What is the width of the pipeline easement required for the portion that is surface mounted? Why does the portion of the fuel line located on HECC property and adjacent to the QR&L right-of-way need to be surface mounted instead of being installed underground?*

The final EIS report should discuss mitigative measures for any adverse impacts on the PHHT.

RESPONSE: The location of the above-ground portion of the proposed Waiau Fuel Pipeline is described in Section 4.9.1.2 of the *Draft EIS*, which states:

> *As described in Section 2.1.6, HECO would make several small modifications to the Waiau Generating Station to accommodate the proposed Waiau Fuel Pipeline. These include construction of a metering facility and pig launcher/retriever system and modifications to the existing structure that supports the overhead fuel-line crossing of the Navy fuel-line ROW and bikeway (see Figure 2-11). The last few hundred feet of the proposed Waiau Fuel Pipeline would be constructed on pylons extending a few feet above ground in the portion of the Waiau Generating Station property that is used by watercress farmers.*

Approximately two-thirds of the 600-foot-long segment of the route that is above ground is shown more clearly in Figure 2-12, where it is identified by the label "Pipe on Supports Above Grade". The PHHT is not labeled on that drawing. However, because the PHHT is within the "40-foot Navy Right-of-Way" that is labeled, its location is easy to see. We did not include a drawing depicting the design of this segment because that has not yet been settled. However, present thinking is that that it would be on 22 driven pile supports spaced 30 feet apart. These would extend about two feet above ground, and the pipe would rest atop them. In all cases the overall height would be less than 4 feet and the top of the pipe would be below the level of the bikeway. These relationships are shown in Attachment A.

In response to your request that we include more information about the above-ground portion of the pipeline in the *Final* EIS, we have revised the last paragraph in Section 2.1.1 to read as follows:

The proposed route continues in the SEC parallel to 2nd Street across Lehua Avenue. At that point it turns south and again crosses under the elevated H-1 freeway. Once back on the makai side of H-1, the route turns east and then southeast, parallel to the existing bikeway and Navy Utility Corridor and onto HECO property. The route stays makai of the Waiau Generating Station until reaching the tie-in point to the existing fuel delivery system. HECO would construct new receiving facilities alongside the existing utility corridor at this location. The last six hundred feet of the proposed Waiau Fuel Pipeline would be constructed on pylons extending a few feet above ground in the portion of the Waiau Generating Station property that is used by watercress farmers (see Figure 2-12). It is expected that it will be on 22 driven pile supports spaced 30 feet apart. These would extend about two feet above ground, and the pipe would rest atop them. In all cases the overall height would be less than 4 feet and the top of the pipe would be below the level of the bikeway.

Based on the design of the above-ground portion of the pipeline described above, we do not believe there is a potential for it to adversely affect the PHHT's future plans for extension of locomotive service to this area. The top of the pipe would be below the existing grade, eliminating possible concerns about clearance. The proposed pipeline is no closer to the right-of-way than the several existing fuel lines that have above-ground expressions in the area, and we are unaware of any additional safety issues that it would raise. The information provided above includes the additional design detail you requested. Because the above-ground portion of the pipeline is entirely within HECO property rather than within an easement, there is no easement width information.

HECO would have preferred to keep the entire pipeline underground. It would have been less expensive and remained consistent with the design approach used over the remainder of the route. However, the soil conditions and numerous other pipelines within this portion of the corridor present numerous barriers to undergrounding. Consequently, HECO has proposed mounting it above-ground instead. By keeping the top of the pipe below the level of the former OR&L right-of-way, the design avoids physical constraints on the use of the adjacent area. However, in response to a request by a member of the Friends of PHHT, HECO will landscape this area to provide additional visual mitigation if feasible.

4. State Land Use Districts

The State Land Use Districts shown on Figure 3-5 is erroneous in the area east of Kapolei Villages. Most of those areas shown as Urban is (sic) in the State Land Use Agricultural District.

RESPONSE: The State Land Use District boundaries shown in Figure 3-5 of the *Draft EIS* were obtained from the State GIS database. This seemed appropriate in view of the fact that the boundaries are administered by the State Land Use Commission. In preparing that document we did not check to insure that the City GIS database showed the same boundaries.

Following receipt of your letter, we found that the two electronic databases contain conflicting information in the area to the east of Kapolei Villages. In order to resolve the conflict we contacted the State Land Use Commission office and found that the map in the *Draft EIS* accurately reflects the official State Land Use District boundaries. It appears that the City GIS layer containing the State Land Use District boundaries may not have been updated to reflect the most recent boundary change.

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Attachment B is a copy of the map we obtained from the State Land Use Commission confirming this. While the boundaries shown on the map are correct, in reviewing Figure 3-5 as we answered your question we discovered it is not error-free. It gives the City GIS database as its source. As explained above, this is not the case. We have corrected Figure 3-5 in the *Final* EIS to show the source as the State Land Use Commission.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

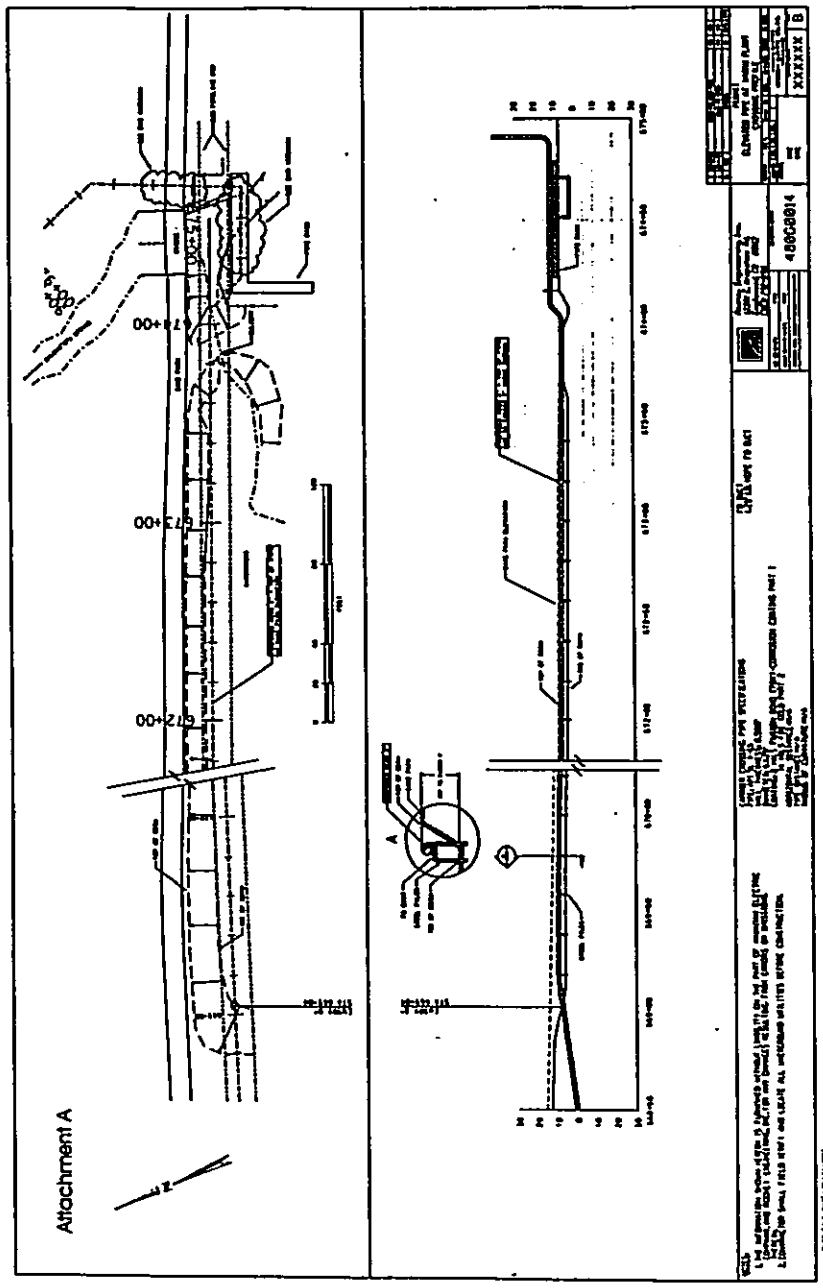
Sincerely,

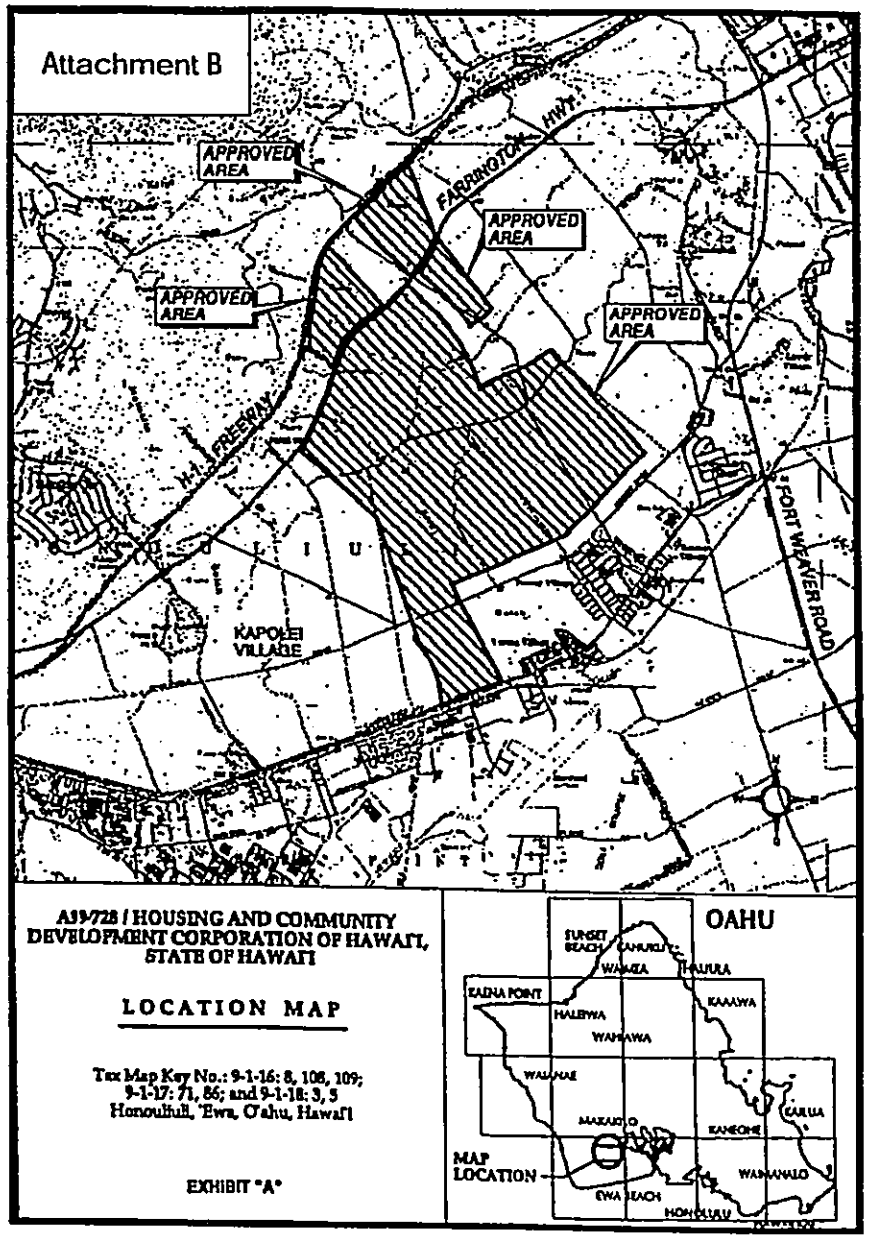
Ken Fong, P.E.
Project Manager

Attachments:
Attachment A – Elevated Pipe at Waiau Generating Station
Attachment B – State Land Use District Boundary Map

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

6


Attachment A


Attachment B
APPROVED AREA
APPROVED AREA
APPROVED AREA
APPROVED AREA
FARRINGTON HWY.
H-1 FREEWAY
FORT WEAVER ROAD
KAPOLEI VILLAGE
A39-728 / HOUSING AND COMMUNITY DEVELOPMENT CORPORATION OF HAWAII, STATE OF HAWAII
LOCATION MAP
Tax Map Key No.: 9-1-16: 8, 108, 109; 9-1-17: 71, 86; and 9-1-18: 3, 5
Honouliuli, 'Ewa, O'ahu, Hawai'i
EXHIBIT "A"
OAHU
SUNSET BEACH
KAHUKU
WAIMEA
HAUULA
KAENA POINT
HALEIWA
KAAAWA
WAHIAWA
WAIANAE
MAKUA
KANEOHE
KAILUA
MAP LOCATION
EWA BEACH
WAIMANALO
HONOLULU

24

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

ACUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

June 14, 2002

LD-NAV
L-3375
Ref.: WAIAUFUELPIPELINE.RCM2

Hawaiian Electric Company, Inc.
Attention Ken Fong, Project Manager (WAS-Y)
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Fong:

Subject: Hawaiian Electric Waiau Fuel Pipeline Project Draft Environmental Impact Statement (April 2002), Island of Oahu, Hawaii

This is a follow-up to our letter (Ref.: WAIAUFUELPIPELINE.RCM) to you dated May 22, 2002, pertaining to the subject matter.

Attached herewith is a copy of the Division of Forestry and Wildlife comment.

The Department of Land and Natural Resources has no other comment to offer on the subject matter.

Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 587-0438.

Very truly yours,

for DIERDRE S. MAMIYA
Administrator

C: Oahu District Land Office

Division of Forestry & Wildlife

1151 Punchbowl Street, Rm. 325 • Honolulu, HI 96813 • (808) 587-0166 • Fax: (808) 587-0160

RECEIVED
LAND DIVISION
2002 JUN -7 A 11:23

June 5, 2002

MEMORANDUM

TO: Nick Vaccaro, Land Agent
Land Division

THRU: Dierdre S. Mamiya, Administrator
Land Division

FROM: Michael G. Buck, Administrator
Division of Forestry and Wildlife

SUBJECT: Hawaiian Electric Waiau Fuel Pipeline Project Draft EIS (April 2002).

We have reviewed the above subject document and provide the following comments for your considerations. DOFAW supports and encourages the State Department of Transportation to grant an easement through the former OR&L right-of-way which will allow HECO to bypass the State Energy Corridor that crosses through Pouhala marsh. It will simplify the management of our property and help mitigate any potential spills which might occur in the future. Please call Patrick Costales, Oahu Branch Manager at 973-9787 if you have questions to DOFAW's review of the subject draft EIS. Thank you for allowing us the opportunity to comment on the draft EIS.

C: Patrick Costales, DOFAW Oahu Branch
Paul Conry, DOFAW Administration

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24

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GENPP 10-16
YA/G

July 23, 2002

Ms. Dierdre S. Mamiya, Administrator
Land Division
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Draft Environmental Impact Statement (DEIS): Waiau Fuel Pipeline Project
LD-NAV L3375
Ref.: WAIAUFUELPIPELINE.RCM

Dear Ms. Mamiya:

Thank you for your June 14, 2002 letter providing the Division of Forestry and Wildlife's (DOFAW) comments on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and Division of Forestry & Wildlife staff spent reviewing the *Draft EIS* and providing written comments.

We are pleased that DOFAW supports and encourages the State Department of Transportation to grant an easement through the former OR&L right-of-way, thereby allowing HECO to bypass the State Energy Corridor where it passes through Pouhala marsh. On the basis of our discussions with them to date, we are optimistic that we will be able to obtain such an easement.

As you probably know, the State has recently determined that a portion of the easement that will be required to bypass Pouhala Marsh is still under the control of DLNR, having never been administratively transferred to DOT. We assume that your support for obtaining the easement applies even if part of the easement may be granted by DLNR.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Jadine Urasaki, Acting Harbors Administrator, State DOT
Paul Conry, DOFAW Administration
Patrick Costales, DOFAW O'ahu Branch
Thomas Toyama, Manger Rights-of-Way, Highways Division, State DOT
Perry White, Planning Solutions, Inc.
Steve Sekiya, HECO Lands & ROW

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DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, KAPOLEI HALE, SUITE 215, KAPOLEI, HAWAII 96707
TELEPHONE: (808) 692-3654 FAX: (808) 692-3657

JEREMY HARRIS
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

ALVIN K. C. AU
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 02-469

June 17, 2002

Hawaiian Electric Company
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Attention: Mr. Ken Fong (WA3-YJ)

Dear Mr. Fong:

Subject: **Waiau Fuel Pipeline Project**
Draft Environmental Impact Statement (DEIS)

Thank you for the opportunity to review the DEIS for the subject proposed fuel pipeline project.

We support the alternative pipeline installation methods of jacking and horizontal directional drilling in lieu of open trenching where the pipeline will cross City-owned streams and major roadways.

It appears the pipeline installation will have minimal impact on City facilities. However, we request the opportunity to review and provide comments on the construction plans for those locations where the pipeline will cross or affect our facilities.

Should you have any questions, please call Mr. Charles Pignataro of our Division of Road Maintenance, at 527-6282.

Very truly yours,

ROSS S. SASAMURA, P.E.
Director and Chief Engineer

cc: State Department of Transportation
(Harbors Division)

(25)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

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GENPP 10-16
YA/CI

July 23, 2002

Mr. Ross S. Sasamura, P.E.
Director and Chief Engineer
Department of Facility Maintenance
City and County of Honolulu
Kapolei Hale
1000 Uluohia Street, Suite 215
Kapolei, Hawai'i 96707

Subject: **Draft Environmental Impact Statement:**
Waiau Fuel Pipeline Project

Dear Mr. Sasamura:

Thank you for your June 17, 2002 letter [Your Reference DRM 02-469] commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

We are pleased by your positive reaction to our decision to use directional drilling in lieu of open trenching where the proposed pipeline crosses major roadways and most streams. Our selection of this technique is intended to minimize adverse effects on communities, other facilities and adjacent landowners, as well as to minimize other types of environmental effects. Your support reinforces our belief that we have made the correct design decision.

We also appreciate your confirmation that the proposed pipeline will have minimal impact on City facilities. We will, of course, provide the City an opportunity to review and provide comments on the construction plans for those locations where the pipeline would cross or potentially affect City facilities.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(26)

U.S. FISH AND WILDLIFE SERVICE

FACSIMILE TRANSMITTAL SHEET

TO: Perry White — FROM: Kevin Foster

FAX NUMBER: — DATE: 6/15/02

COMPANY: — TOTAL NO. OF PAGES INCLUDING COVER:

PHONE NUMBER: 808/541-3441

RE: DEIS Waiau Fuel Pipeline Project

☑ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Perry
We reccomend BMPs for all stream crossings. Otherwise no comment on the EIS
Thank
Roger

300 ALA MOANA BLVD., RM 3-122
P.O. BOX 50088 • HONOLULU, HI 96850
PHONE: (808) 541-3441 • FAX: (808) 541-2756

26

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YAG

July 23, 2002

Mr. Kevin Foster
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement:
Waiau Fuel Pipeline Project

Dear Mr. Foster:

Thank you for your June 15, 2002 fax to Perry White commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and other staff at the Service spent reviewing the document and responding.

Your fax indicated that you had no comments on the *Environmental Impact Statement*. We are pleased that the document adequately addressed the Service's concerns.

You also recommended that Best Management Practices be used for all stream crossings. This is to confirm that the use of directional drilling will allow us to avoid open trenching across all but one of the streams along the 13-mile pipeline route. We consider this to be the best possible BMP. The sole exception is at Waiawa Stream, where the twisting configuration of the State Energy Corridor easement within we must work forces us to trench.

We are applying for Department of the Army and NPDES permit for the Waiawa Stream crossing, and we will prepare BMPs as part of that process. We will also use BMPs for regular pipeline construction.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.
Jadine Urasaki, Acting Harbors Administrator, State DOT

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

(27)

PHONE (808) 594-1888

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STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

June 18, 2002

Hawaiian Electric Company, Inc.
Attention: K. Fong (WA3-YJ)
P.O. Box 2750
Honolulu, HI 96840-0001

(HRD 02-326)

Subject: Hawai'i Electric Company, Inc. (HECO) Waiau Fuel Line Project
Draft Environmental Impact Statement (DEIS)
TMK's: Zone 9, Parcels in Sections 1, 3, 4, 6, 7, and 8

Dear Mr. Fong:

Thank you for the opportunity to comment on the above referenced project. The Office of Hawaiian Affairs reiterates our concerns as stated in our November 7, 2001 to Mr. Perry White of Planning Solutions, in response to the Environmental Assessment/Environmental Impact Statement Preparation Notice. If you have any questions, please contact Mark A. Mararagan, policy analyst at 594-1756, or e-mail him at markm@oha.org.

Sincerely,

Ina Keala

Ina Keala
Acting Hawaiian Rights Division Director

cc: Board of Trustees
Administrator Clyde W. Namu'o
Ms. Jadine Urasaki, Acting Harbors Administrator-Harbors Division,
State Dept. of Transortation

(27)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CONSTPR P0000064
GENPP 10-16
YA/D

July 23, 2002

Ms. Ina Keala, Acting Hawaiian Rights Division Director
Office of Hawaiian Affairs
711 Kapi'olani Boulevard, Suite 500
Honolulu, Hawai'i 96813

Subject: **Hawai'i Electric Company, Inc. (HECO) Waiau Fuel Line Project Draft Environmental Impact Statement (DEIS)**

Dear Ms. Keala:

Thank you for your June 18, 2002 letter (your reference HRD 02-326) commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project.* We appreciate the time you and other staff at the Office of Hawaiian Affairs (OHA) spent reviewing the document and responding.

Your letter stated:

> *The Office of Hawaiian Affairs reiterates our concerns as stated in our November 7, 2001 to Mr. Perry White of Planning Solutions, in response to the Environmental Assessment/ Environmental Impact Statement Preparation Notice.*

The November 7, 2001, letter you reference contained the following comments:

> *Burials, Historical and Cultural Sites*
>
> *In the event human burials, cultural, or historic sites are discovered during clearing, grading, ditching, piping, or construction activities at the proposed project site, the State's Historic Preservation Division should be contacted immediately. In the event of any inadvertent discoveries of human burials or remains, OHA requests that a mitigation plan be developed in conjunction with the SHPD, O'ahu Island Burial Council, and Native Hawaiian individuals or organizations familiar with the proposed project area.*
>
> *Environmental Affects*
>
> *As with any project involving ground-disturbing activities, OHA has concerns with the impacts to the natural and human environment such activities may cause. In addition, the pipeline route of the proposed project crosses the Waikele and Waiawa Streams, and near to a number of wetland areas.*
>
> *OHA urges that HECO adhere with State and Federal environmental protection laws and use best management practices to minimize potential impacts that the proposed project may cause.*

RESPONSE: In preparing the *Draft EIS* we paid very close attention to the concerns expressed in OHA's November 7, 2001 letter commenting on the *Environmental Impact Statement Preparation Notice*. OHA did a good job of outlining them in that document, and that made it possible to ensure that the *Draft EIS* could address the issues you identified.

WINNER OF THE EDISON AWARD
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With respect to burials, historic and cultural sites, the discussion of these begins with a brief overview presented in Section 3.8, entitled Archaeological, Historic, and Cultural Resources. A much fuller discussion of potential impacts on historic, cultural, and archaeological resources is included in Section 4.8 of the *Draft EIS*. Section 4.8.3.3.3 discusses mitigation measures. Among other things, it commits HECO to the following actions concerning burials and inadvertent finds:

- Contract with a qualified professional archaeologist to monitor construction in the vicinity of Site 5302.
- Prepare a monitoring plan pursuant to the stipulations of Hawaii Administrative Rules Title 13, Section 13-279, regarding rules for archaeological monitoring studies and reports.
- Brief project managers, construction supervisors, and crews prior to ground alteration activities concerning the kinds of subsurface deposits that may be encountered and the procedures that should be followed in the event that buried deposits or artifacts are exposed, or if human remains are uncovered.
- Suspend work on the affected portion of the line in the event that archaeological deposits are uncovered during trenching and investigate and document the deposits as prescribed in the monitoring plan.
- Cease work on that portion of the project if human remains are uncovered during construction, and follow the requirements of State law and regulations regarding burials (see HAR, §13-300). Should human remains be uncovered in an area where no archaeological monitor is present, HECO's contractor would cease all work in the immediate area and notify the State Historic Preservation Division, the Medical Examiner, and the Police Department, pursuant to HAR §13-300-40.
- Have the archaeological monitor prepare and submit a monitoring report to the SHPD following the completion of the work. The monitoring report would be prepared in accordance with HAR §13-279.

These steps were developed with your earlier comments in mind, and are responsive to your concerns.

We approached this project determined to minimize adverse effects on the environment. Our preferred alternative incorporates a number of design elements that stemmed largely from the environmental investigations we undertook during preparation of the *Draft EIS*, and we believe it achieves that objective. As discussed throughout the *Draft* EIS, the proposed project adheres to State and Federal environmental protection laws and uses best management practices to minimize potential impacts.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Jadine Urasaki, Acting Harbors Administrator, State DOT
Perry White, Planning Solutions, Inc.

BENJAMIN J. CAYETANO
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

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
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DEPUTIES
ERIC T. HIRANO
LINNEL NISHIOKA

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

June 25, 2002

Ken Fong
Project Manager
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

LOG NO: 30157
DOC NO: 0206EJ28

Dear Mr. Fong:

SUBJECT Chapter 6E-42 Draft Environmental Impact Statement for the Waiau Fuel Pipeline
`Ewa
TMK: (1) 9-1, -3, -4, -6, -7and -8

Thank you for the opportunity to provide comment on the DEIS for the Waiau Fuel Line. HECO is proposing to construct a new, 13-mile long pipeline, extending from HECOs tank farm at Barbers Point Campbell Industrial Park to the Waiau Generating Station in Pearl City. The pipeline is mostly located within the State Energy Corridor. We received the DEIS on April 23, 2002 and apologize for the delay in our review.

The proposed pipeline will allow the fuel to be transported from Barbers Point to Waiau more efficiently. The DEIS includes an historical and archaeological assessment for the proposed project which identifies the historic sites within or near the pipeline route. Thirteen previously identified historic and archeological sites are listed within the report including buried fishponds, habitation sites, human burials, the historic OR&L alignment and the Ewa Plantation Villages. The report identifies that two of the previously known sites may be adversely affected by one or both of the two pipeline alternatives (The OR&L alignment and the area along the south bank of Waiawa stream that was historically occupied and where human remains and habitation sites have been previously identified). The report also makes recommendations for mitigating the potential adverse effect the pipeline would have on these known sites and also for the discovery of new sites in areas that where there is a potential for encountering previously unidentified historic sites. The DEIS adequately summarizes the archeological assessment and recommendations and we believe that if the mitigation measures are followed as stipulated in the DEIS the project will result in a "no adverse effect" on significant historic sites.

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Should you have any questions about archaeology, please feel free to call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027. Should you have any questions about burial matters, please feel free to contact Kai Markell at 587-0008. Should you have any questions about cultural matters, please feel free to contact Nathan Napoka at 587-0040.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

EJ:jk

c Ms. Jadine Urasaki, Acting Harbors Administrator, Harbors Division, State Department of Transportation, 79 S. Nimitz Highway, Honolulu, HI 96813
√ Perry White, Planning Solutions, Inc., 1210 Auahi Street, Suite 221, Honolulu, HI 96814
Nick Vaccaro, Land Division, DLNR

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

28

CONSTPR P0000064
GENPP 10-16
YA/0

July 23, 2002

Mr. Don Hibbard, Administrator
Historic Preservation Division
Department of Land and Natural Resources
State of Hawai'i
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawai'i 96707

Subject: Hawai'i Electric Company, Inc. (HECO) Waiau Fuel Line Project Draft Environmental Impact Statement (DEIS)

Dear Mr. Hibbard:

Thank you for your June 25, 2002 letter (your reference Log No. 30157/Doc.No. 0206EJ28) commenting on Hawaiian Electric Company's (HECO) *Draft Environmental Impact Statement for the Waiau Fuel Pipeline Project*. We appreciate the time you and other staff at the State Historic Preservation Division (SHPD) spent reviewing the document and responding.

I appreciate your confirmation that the *Draft EIS* adequately assesses project-related archeological issues and recommendations, including planned mitigation measures. We understand that your issuance of a "no adverse effect" opinion is predicated upon our implementation of the mitigation measures stipulated in that document.

If you have any further questions concerning the project, please call me at 543-7746 or our consultant, Mr. Perry White of Planning Solutions, Inc. at 593-1288.

Sincerely,

Ken Fong, P.E.
Project Manager

cc: Office of Environmental Quality Control
Jadine Urasaki, Acting Harbors Administrator, State DOT
Perry White, Planning Solutions, Inc.

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APPENDIX A AIR QUALITY IMPACT REPORT

J. W. MORROW
Environmental Management Consultant
1481 South King Street, Suite 548
Honolulu, Hawaii 96814

AIR QUALITY IMPACT REPORT (AQIR)

WAIAU FUEL PIPELINE PROJECT

18 March 2002

PREPARED FOR:

Planning Solutions, Inc.

and

Hawaiian Electric Company, Inc.

PREPARED BY:

J. W. MORROW
Environmental Management Consultant
1481 South King Street, Suite 548
Honolulu, Hawaii 96814

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J. W. MORROW

1. INTRODUCTION

Hawaiian Electric Company, Inc. (HECO) is proposing to construct a new pipeline and related support facilities to supply fuel oil to its Waiau Generating Station on the island of Oahu.[1] Fuel is currently delivered to Waiau through a portion of a Chevron-owned 8-inch black-oil pipeline running from Chevron's Barbers Point Refinery to its Honolulu Products terminal at Pier 30 in Honolulu Harbor. A portion of this oil is also moved through HECO-owned connections to HECO's storage tanks at the Iwilei Tank Farm. HECO's contract with Chevron expires at the end of 2004 and must either be re-negotiated or an alternative delivery means developed. After thorough analysis and evaluation of a number of alternatives, HECO concluded that the following alternatives were the most practical and economically feasible:

- Construct a new, HECO-owned pipeline in the State Energy Corridor from Barbers Point to Waiau, and truck fuel from Barbers Point to HECO's tanks at Iwilei.
- Continue to use the Chevron pipeline.
- Use tanker trucks to transport fuel from Barbers Point.

The purpose of this report is to assess the potential impacts of the proposed project on air quality. Because operation of a sealed pipeline moving viscous, low volatility fuel oil is inherently not a significant long-term source of air emissions, the principal air quality impacts associated with the proposed project appear to be (1) emissions resulting from pipeline construction activities which can be considered temporary and short-term and (2) emissions arising from the release of fuel oil as a result of

a pipeline rupture or an in-transit truck accident. Much of the focus of this analysis, therefore, is on these potential events and their impact on air quality.

2. AIR QUALITY STANDARDS

A summary of State of Hawaii and national ambient air quality standards (NAAQS) is presented in Table 1.[2,3,4] Note that Hawaii's standards are not divided into primary and secondary standards as are the federal standards.

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values [3]. Note that in the case of the principal automotive pollutants [CO, NO_2, and O_3], the primary and secondary standards are identical.

Some of Hawaii's standards (CO, NO_2, and O_3) are clearly more stringent than their federal counterparts and like their federal counterparts in the case of short-term standards, they may be exceeded once per year.

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities [4]. There simply can be no visible emissions from fugitive dust sources.

TABLE 1

SUMMARY OF STATE OF HAWAII AND FEDERAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING PERIOD	NAAQS PRIMARY	NAAQS SECONDARY	STATE STANDARDS
PM_{10}	Annual 24-hr	50 150	50 150	50 150
$PM_{2.5}$	Annual 24-hr	15 65	15 65	— —
SO_2	Annual 24-hr 3-hr	80 365 —	— — 1,300	80 365 1,300
NO_2	Annual	100	100	70
CO	8-hr 1-hr	10,000 40,000	— —	5,000 10,000
O_3	1-hr 8-hr	235 156	235 156	100 —
H_2S	1-hr	—	—	35
Pb	Calendar Quarter	1.5	1.5	1.5

KEY: PM_{10} - particulate matter ≤ 10 microns
$PM_{2.5}$ - particulate matter ≤ 2.5 microns
SO_2 - sulfur dioxide
NO_2 - nitrogen dioxide
CO - carbon monoxide
O_3 - ozone
H_2S - hydrogen sulfide
Pb - lead

All concentrations in micrograms per cubic meter ($\mu g/m^3$).

3. EXISTING AIR QUALITY

3.1 General. The state Department of Health (DOH) maintains a network of air monitoring stations around the state to gather data on the following regulated pollutants:

- particulate matter ≤ 10 microns (PM_{10})
- sulfur dioxide (SO_2)
- nitrogen dioxide (NO_2)
- carbon monoxide (CO)
- ozone (O_3)

In the case of PM_{10} , measurements are made on a 24-hour basis to correspond with the averaging period specified in state and federal standards. Depending on the sampling equipment and site, samples are collected either continuously or once every six days in accordance with U. S. Environmental Protection Agency (EPA) guidelines. Carbon monoxide, sulfur dioxide, and ozone, however, are measured on a continuous basis due to their short-term (1- and 3-, and 8-hour) standards. Nitrogen dioxide is also measured with continuous instruments and averaged over a full year to correspond to its annual standards. Lead sampling was discontinued in October 1997 with EPA approval. This was largely due to the elimination of lead in gasoline and the resulting reduction of ambient lead levels to essentially zero in Hawaii.

3.2 Department of Health Monitoring. There are a number of DOH monitoring stations in the project area. A summary of the most recent published air quality data [7] from those sites, is presented in Table 2. These data are indicative of the generally good air quality in Honolulu County and compliance with State and Federal ambient standards. It should be noted that the two high 24-hour PM_{10} values at the Pearl City site that exceed the applicable standard were believed to be the result of New Year's fireworks use, a phenomenon unique to Hawaii.[7]

4. CLIMATE AND METEOROLOGY

4.1 Climate. Climatic norms, means and extremes for Honolulu [8] are presented in Table 3. These data are reasonably representative of the project area with only rainfall demonstrating a wider range (<20 - 30+ inches per year) as one moves inland from the leeward coast. Analysis of the monthly temperature and rainfall data from the National Weather Service station at Honolulu International Airport in accordance with Thornwaite's scheme for climatic classification, yields a precipitation/evaporation (P/E) index of 26.6 which classifies the area as "semi-arid".[9,10]

4.2 Surface Winds. Meteorological data records were reviewed from the Honolulu International Airport and Hickam Air Force Base. The annual prevalence of northeast trade winds is clearly shown in Table 4. A closer examination of the data, however, indicates that low velocities (less than 10 mph) occur frequently and that the normal northeasterly trade winds tend to break down in the Fall giving

TABLE 2

DEPARTMENT OF HEALTH MONITORING DATA
YEAR 2000

Pollutant	Averaging Period	Concentration (ug/m³) Downtown Honolulu	Sand Island	Pearl City	Kapolei	West Beach
SO_2	3-hr	65	--	--	23	11
	24-hr	9	--	--	6	4
	Annual	1	--	--	1	1
NO_2	Annual	--	--	--	9	7
PM_{10}	24-hr	83	--	164	148	41
	Annual	14	--	16	17	14
CO	1-hr	3,990	--	--	2,508	1,596
	8-hr	1,753	--	--	1,055	1,012
O_3	1-hr	--	98	--	--	--

Notes:
1. All concentrations in micrograms per cubic meter (ug/m³)
2. Source: Reference 7

TABLE 3

CLIMATIC NORMS, MEANS AND EXTREMES
HONOLULU INTERNATIONAL AIRPORT (HIA)

Parameter	Descriptor	HIA
Temperature (deg F)	Daily maximum	84.4
	Daily minimum	70.0
	Annual mean	77.2
Precipitation (inches)	Maximum monthly	20.91
	Minimum monthly	trace
	Annual mean	22.02
Humidity (%)	Normal	68
Wind Speed (mph)	Mean	11.4
Sunshine	Percent of possible	71
Sky cover (mean # days)	Clear	90.0
	Partly cloudy	179.8
	Cloudy	92.0

Sources: National Climatic Data Center (NCDC) (Reference 8)
Western Regional Climatic Center (Reference 9)

way to more light, variable wind conditions through the Winter and on into early Spring. It is during these times that Honolulu generally experiences elevated pollutant levels. This seasonal difference in wind conditions can be easily contrasted by comparing August and January wind roses (Figures 1 and 2). Of particular interest from an air pollution standpoint were the stability wind roses prepared for Hickam Air Force Base [11]. These data indicated that stable conditions, i.e., Pasquill-Gifford stability categories E and F [12], occur about 28% of the time on an annual basis and 36% of the time during the peak winter month (January). It is under such conditions that the greatest potential for air pollutant buildup from groundlevel sources exists.

5. CONSTRUCTION IMPACTS

The principal source of short-term air quality impact will be construction activity. Emissions will be generated by the various construction equipment engines as they operate during the various phases of site preparation, pipe installation, and site cleanup and restoration. These include loader, excavators, bulldozers, graders, backhoes, drill rigs, trucks, welding units, etc. Based on the expected 1-year construction period to complete the 13-mile pipeline, estimates of regulated pollutant emissions were generated and are presented in Table 5. For comparative purposes, the table includes the estimated emissions from one day of traffic along a 1-mile segment of the H-1 Freeway. [13,14]

An ambient impact analysis was also conducted using EPA's guideline [15] dispersion model ISC-3,[16] one year of National Weather Service data from the Honolulu International Airport[17] preprocessed for

TABLE 4

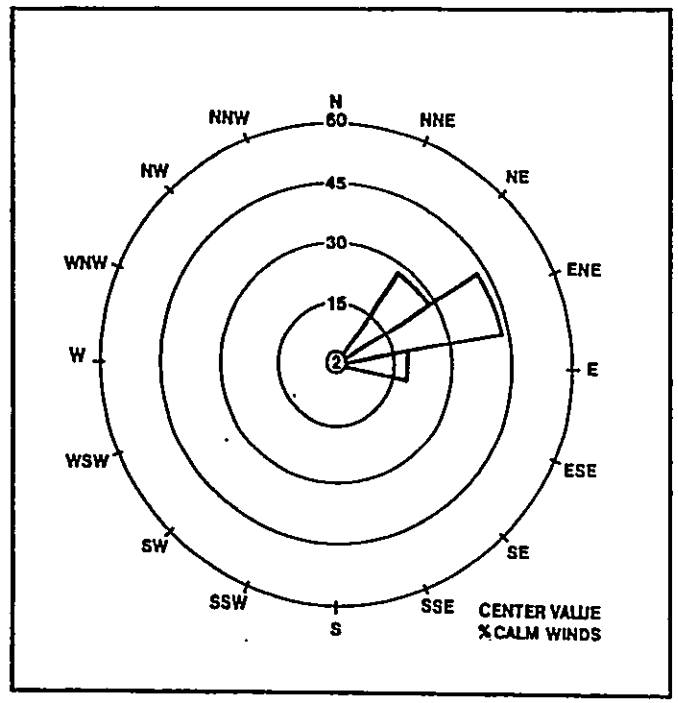
ANNUAL JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION HONOLULU INTERNATIONAL AIRPORT

	Wind Speed (mph)						
Dir (deg)	<7	7<13	13<19	19<25	<19	>=19	All
10	0.0065	0.0038	0.0023	0.0016	0.0009	0.0001	0.0151
20	0.0082	0.0041	0.0025	0.0023	0.0011	0.0001	0.0183
30	0.0100	0.0061	0.0051	0.0038	0.0028	0.0007	0.0288
40	0.0188	0.0157	0.0258	0.0222	0.0174	0.0040	0.1039
50	0.0268	0.0290	0.0449	0.0385	0.0307	0.0054	0.1752
60	0.0344	0.0289	0.0436	0.0273	0.0238	0.0041	0.1621
70	0.0250	0.0181	0.0197	0.0122	0.0096	0.0009	0.0855
80	0.0113	0.0081	0.0065	0.0039	0.0009	0.0003	0.0310
90	0.0073	0.0049	0.0040	0.0009	0.0008	0.0000	0.0179
100	0.0031	0.0016	0.0014	0.0006	0.0002	0.0000	0.0068
110	0.0027	0.0019	0.0010	0.0007	0.0005	0.0001	0.0069
120	0.0027	0.0013	0.0019	0.0009	0.0003	0.0003	0.0075
130	0.0022	0.0032	0.0018	0.0015	0.0007	0.0002	0.0096
140	0.0034	0.0033	0.0039	0.0018	0.0011	0.0006	0.0141
150	0.0022	0.0030	0.0019	0.0003	0.0002	0.0005	0.0081
160	0.0024	0.0033	0.0023	0.0010	0.0005	0.0000	0.0094
170	0.0031	0.0048	0.0023	0.0007	0.0003	0.0000	0.0109
180	0.0055	0.0042	0.0018	0.0008	0.0005	0.0000	0.0128
190	0.0065	0.0038	0.0013	0.0002	0.0000	0.0000	0.0117
200	0.0057	0.0032	0.0011	0.0001	0.0000	0.0000	0.0101
210	0.0076	0.0038	0.0016	0.0001	0.0000	0.0000	0.0131
220	0.0083	0.0077	0.0016	0.0001	0.0001	0.0000	0.0179
230	0.0078	0.0049	0.0014	0.0001	0.0001	0.0000	0.0141
240	0.0042	0.0016	0.0013	0.0000	0.0000	0.0000	0.0071
250	0.0040	0.0010	0.0003	0.0000	0.0000	0.0000	0.0054
260	0.0064	0.0023	0.0005	0.0000	0.0000	0.0000	0.0091
270	0.0065	0.0010	0.0005	0.0002	0.0000	0.0000	0.0082
280	0.0099	0.0005	0.0002	0.0000	0.0000	0.0000	0.0106
290	0.0123	0.0003	0.0002	0.0001	0.0000	0.0000	0.0130
300	0.0167	0.0018	0.0011	0.0000	0.0000	0.0000	0.0197
310	0.0235	0.0022	0.0015	0.0001	0.0000	0.0000	0.0272
320	0.0200	0.0022	0.0013	0.0006	0.0001	0.0000	0.0241
330	0.0121	0.0023	0.0011	0.0005	0.0000	0.0000	0.0159
340	0.0094	0.0010	0.0003	0.0001	0.0000	0.0000	0.0109
350	0.0082	0.0025	0.0018	0.0002	0.0000	0.0000	0.0125
360	0.0093	0.0027	0.0022	0.0006	0.0005	0.0001	0.0154
All	0.3537	0.1898	0.1917	0.1240	0.0932	0.0174	0.9698
						Calms:	0.0302

SOURCE: National Weather Service, 1992

FIGURE 1

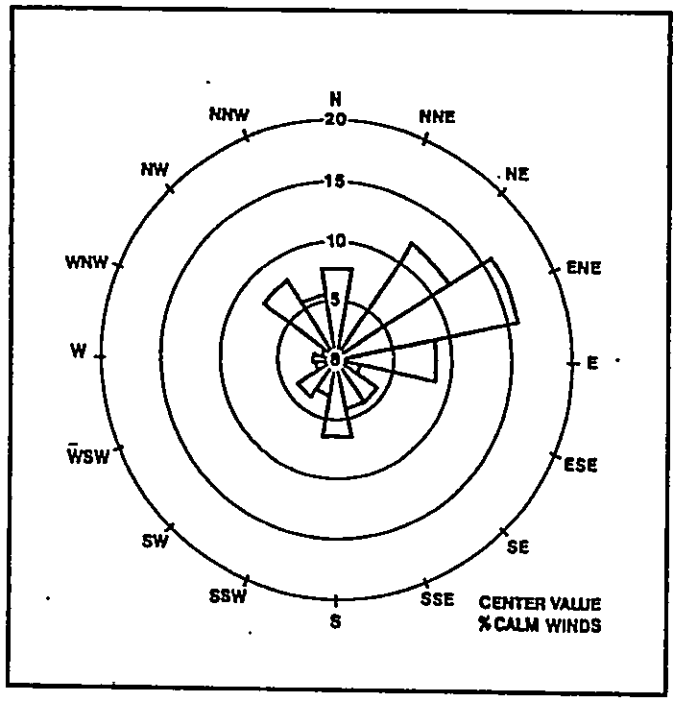
AUGUST WIND ROSE HONOLULU INTENATIONAL AIRPORT



SOURCE: National Weather Service
Historical Records, 1940-57

FIGURE 2

JANUARY WIND ROSE
HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service
Historical Records, 1940-57

TABLE 5

COMPARISON OF ESTIMATED
PIPELINE CONSTRUCTION EQUIPMENT EMISSIONS
WITH H-1 FREEWAY EMISSIONS

Pollutant	Pipeline Construction Equipment (T/yr)	1-Mile Segment H-1 Freeway (T/da)
NOx	75	181
CO	32	2,432
SO_2	7.6	n/a
HC	7.8	5.2

remain at a single site but rather continues to move to new sites as the pipeline is installed, only short-term, i.e., 1, 3, 8, and 24-hour standards were addressed. The results of this analysis, which indicate compliance with ambient air quality standards, are presented in Table 6.

The site clearing, trenching and backfilling activities will generate particulate matter (PM) emissions as will construction vehicle movement on unpaved on-site areas. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and a precipitation/ evaporation (P/E) index of 50. [10, 19] EPA also estimates that 50% control of fugitive dust can be achieved by twice daily watering of the construction area.[19] Using this PM generation rate and assuming a minimum of 50% dust control, the previously cited ISC-3 model [12] was used to conduct an ambient impact analysis of particulate matter with the results also included in Table 6.

TABLE 6

ESTIMATES OF AMBIENT IMPACTS OF
PIPELINE CONSTRUCTION

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Ambient Air Quality Standard ($\mu g/m^3$)
CO	1-hr	8,800	10,000
	8-hr	1,100	5,000
SO_2	3-hr	702	1,300
	24-hr	104	365
PM_{10}	24-hr	71	150

6. ACCIDENT IMPACTS

6.1 Accident Scenarios. As noted in Section 1, no significant long-term air quality impact would be expected from normal operation of the fuel pipeline. In the event of an accidental rupture of the pipeline or collision involving a fully loaded tank truck, there would be a release of oil and potential air quality impacts due to the evaporation or burning of that oil. The following three accident scenarios have therefore been identified and will be analyzed herein for their potential air quality impacts.

- Pipeline rupture during routine operation resulting in release of 718 barrels of low sulfur fuel oil (LSFO)[20]

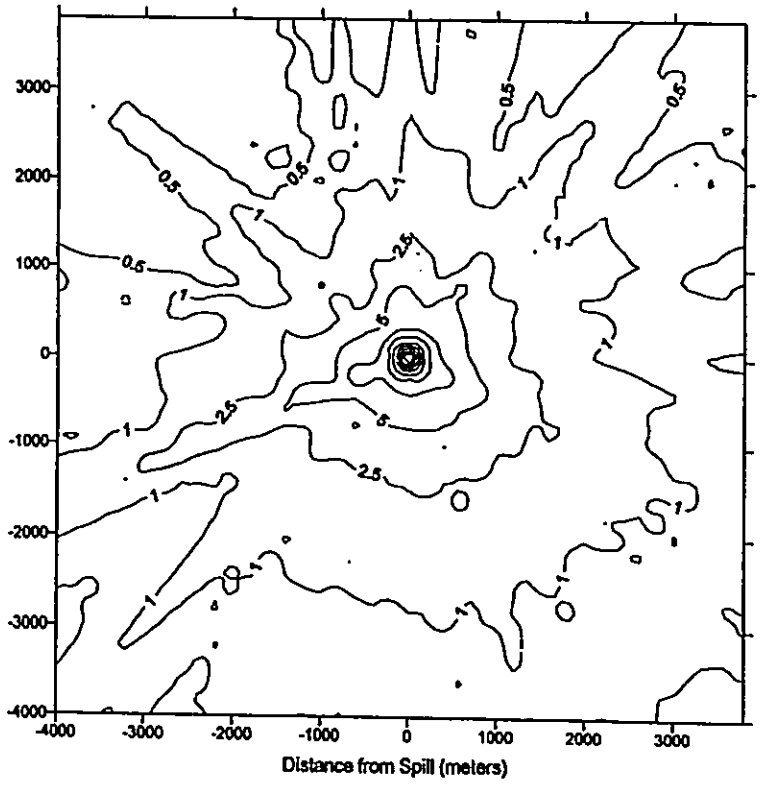
- Pipeline rupture during pipeline testing resulting in release of 718 barrels of fuel oil No. 2 (FO2)[20]
- Tank truck accident resulting in release of 6,000 gallons of LSFO and 60 gallons of FO2[21]

6.2 Scenario 1. LSFO is a very viscous residual oil which must be heated to 165 °F or higher in order to flow through a pipe. As a residual petroleum product, most volatile organic compounds (VOC) have been distilled off in the refining process leaving only a small percentage of volatiles behind. Upon accidental release of 718 bbl (30,156 gallons) of LSFO from a ruptured pipeline, the oil would immediately start to cool and solidify. The quantity evaporated from such a spill at ambient temperatures is estimated to be 546 gallons. With the assumption that this quantity evaporates within the first 24 hours after the spill occurs, the ISC3 model was used along with one year of airport weather data to evaluate ambient VOC concentrations in the area surrounding the spill. Figures 3, 4, and 5 depict the spatial distributions of the 1-, 8- and 24-hour data. They provide an indication of the maximum expected VOC concentration at any location for the specified averaging time.

6.3 Scenario 2. Fuel Oil No. 2 is not normally considered a highly volatile petroleum product, but compared to LSFO, it does contain substantially more volatile components. Thus, a spill of 718 barrels (30,156 gallons) is estimated to result in approximately 8,946 gallons evaporated in the first 24 hours. The ISC3 modeling results of this incident are depicted graphically in Figures 6, 7, and 8.

FIGURE 3

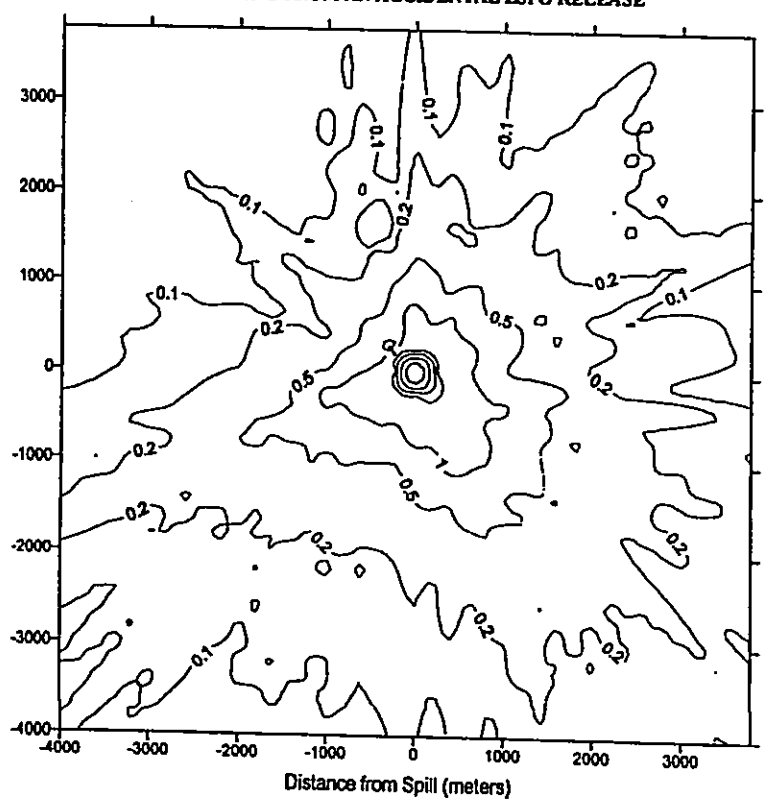
SPATIAL DISTRIBUTION OF
MAXIMUM 1-HOUR VOC CONCENTRATIONS
RESULTING FROM AN ACCIDENTAL LSFO RELEASE



Note: Concentration isopleths in milligrams per cubic meter (mg/m^3)

FIGURE 4

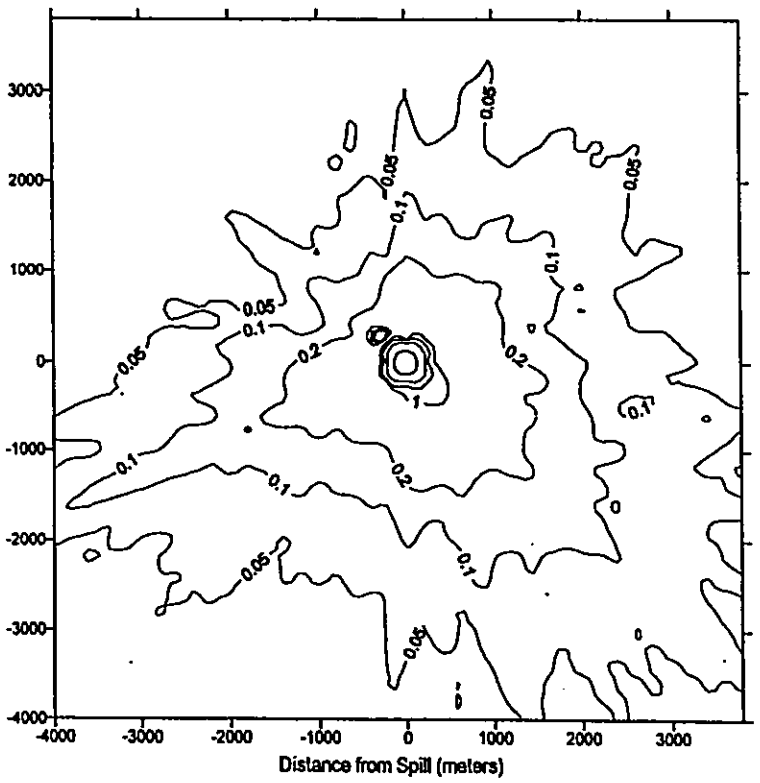
SPATIAL DISTRIBUTION OF
MAXIMUM 8-HOUR VOC CONCENTRATIONS
RESULTING FROM AN ACCIDENTAL LSFO RELEASE



Note: Concentration isopleths in milligrams per cubic meter (mg/m^3)

FIGURE 5

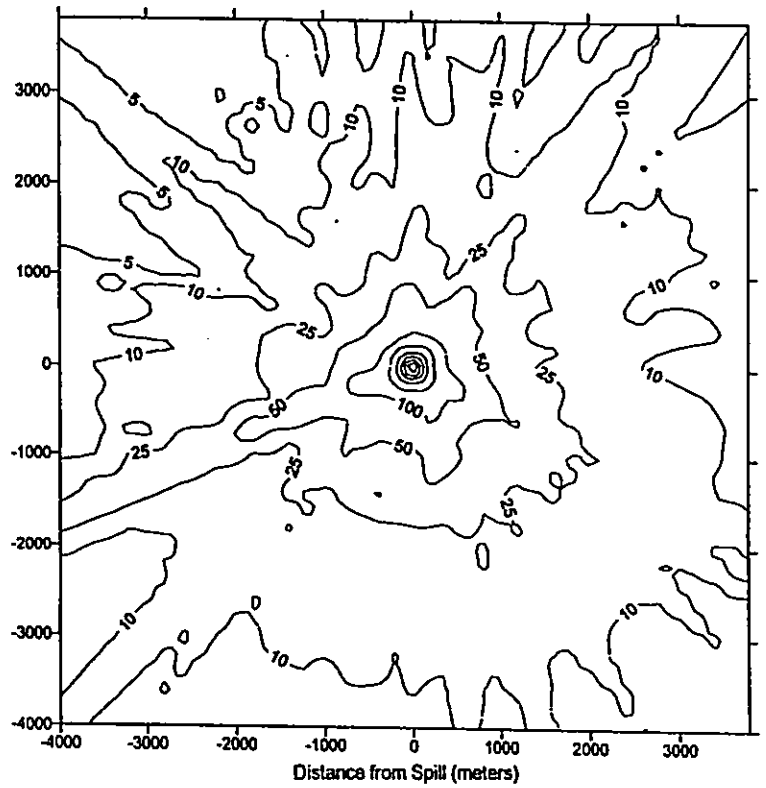
SPATIAL DISTRIBUTION OF
MAXIMUM 24-HOUR VOC CONCENTRATIONS
RESULTING FROM AN ACCIDENTAL LSFO RELEASE



Note: Concentration isopleths in milligrams per cubic meter (mg/m³)

FIGURE 6

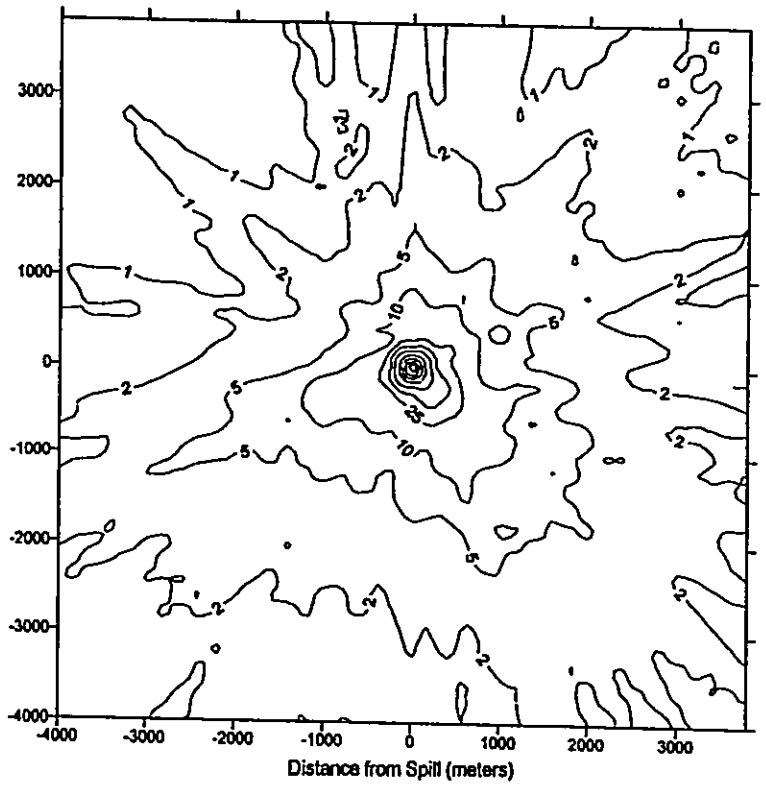
SPATIAL DISTRIBUTION OF
MAXIMUM 1-HOUR VOC CONCENTRATIONS
RESULTING FROM AN ACCIDENTAL FUEL OIL NO. 2 RELEASE



Note: Concentration isopleths in milligrams per cubic meter (mg/m³)

FIGURE 7

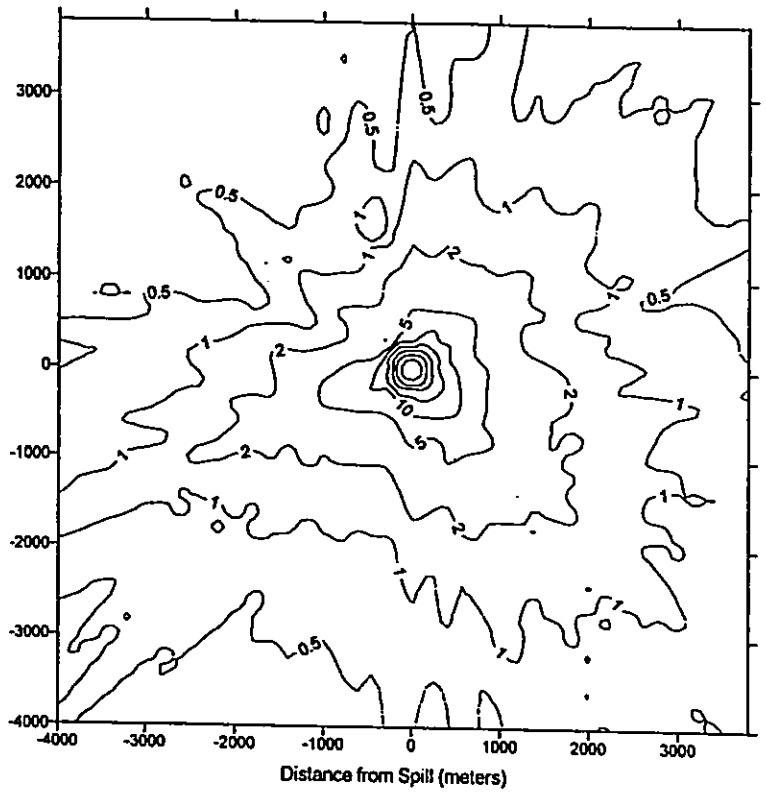
SPATIAL DISTRIBUTION OF
MAXIMUM 8-HOUR VOC CONCENTRATIONS
RESULTING FROM AN ACCIDENTAL FUEL OIL NO. 2 RELEASE



Note: Concentration isopleths in milligrams per cubic meter (mg/m^3)

FIGURE 8

SPATIAL DISTRIBUTION OF
MAXIMUM 24-HOUR VOC CONCENTRATIONS
RESULTING FROM AN ACCIDENTAL FUEL OIL NO. 2 RELEASE



Note: Concentration isopleths in milligrams per cubic meter (mg/m^3)

6.4 Scenario 3. LSFO is not easily ignited, but in this scenario it is assumed that the truck accident results in release and ignition of the vehicle's diesel fuel which in turn ignites the spilled LSFO. It is further assumed that the fire continues for one hour before being brought under control by fire fighters. Ten percent of the LSFO (600 gallons) and 60 gallons of diesel fuel are assumed to be completely burned during that hour. Emissions generated by the fire were estimate based on EPA factors for external combustion of residual and distillate fuels.[19] The ISC3 modeling results of this accident are summarized in Table 7 and may be correlated with the spatial distribution of pollutant concentrations depicted in Figure 9. The isopleths presented in Figure 9 represent the distribution of maximum 1-hour concentrations based on analysis of the 8,760 hours in a recent year of Honolulu meteorology.

6.5 Discussion. The estimated VOC concentrations for the LSFO spill all appeared to be well below the "no observable adverse effect level" (NOAEL) reported by the U. S. Department of Health and Human Services for fuel oil vapors.[22] The reported NOAEL's ranged from 65 to 1,500 mg/m^3. Other studies determined "lowest observable adverse effect level" (LOAEL) in virtually this same concentration range,[22] but it is important to note that these animal studies involved exposures ranging from 5 to 90 days, a situation which would not occur with a pipeline rupture incident. In the case of a spill, it is also possible that some individuals at downwind locations may notice hydrocarbon odors particularly during the first few hours after the spill.

In the case of the FO2 spill, the estimated VOC concentrations were, as expected, somewhat higher but still well below the reported NOAEL's and LOAEL's except in the immediate vicinity of the spill during the maximum 1- and 8-hour exposure scenarios. This suggests that the risk of adverse health

TABLE 7

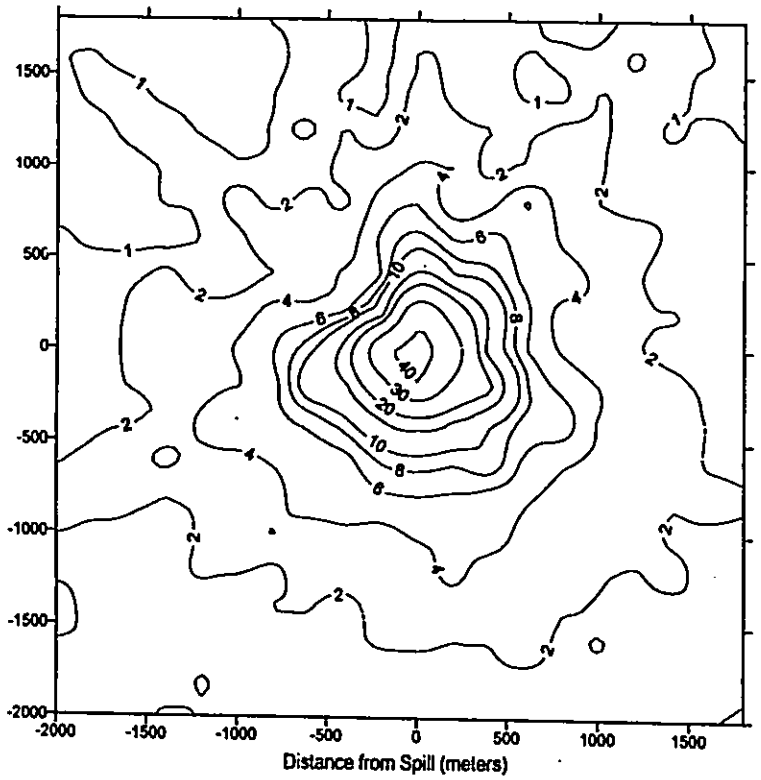
ESTIMATES OF MAXIMUM 1-HOUR POLLUTANT CONCENTRATIONS RESULTING FROM A TANK TRUCK ACCIDENT

Isopleth Value:	1	2	4	6	8	10	20	40
	Maximum 1-Hour Concentrations (mg/m^3)							
Pollutant								
SO_2	6.5	13	26	39	52	65	129	259
NOx	4.3	8.6	17	26	34	43	86	172
PM_{10}	0.37	0.74	1.5	2.2	3.0	3.7	7.4	15
CO	0.42	0.83	1.7	2.5	3.3	4.2	8.3	17
VOC	0.13	0.25	0.50	0.75	1.0	1.3	2.5	5.0
Benzene	1.62E-05	3.24E-05	6.47E-05	9.71E-05	1.29E-04	1.62E-04	3.24E-04	6.47E-04
Ethylbenzene	4.81E-06	9.62E-06	1.92E-05	2.88E-05	3.85E-05	4.81E-05	9.62E-05	1.92E-04
Formaldehyde	5.07E-03	1.01E-02	2.03E-02	3.04E-02	4.06E-02	5.07E-02	1.01E-01	2.03E-01
Naphthalene	8.54E-05	1.71E-04	3.42E-04	5.13E-04	6.83E-04	8.54E-04	1.71E-03	3.42E-03
Toluene	4.69E-04	9.37E-04	1.87E-03	2.81E-03	3.75E-03	4.69E-03	9.37E-03	1.87E-02
o-Xylene	8.24E-06	1.65E-05	3.30E-05	4.94E-05	6.59E-05	8.24E-05	1.65E-04	3.30E-04

Note: See Figure 9 to relate "isopleth value" with pollutant concentrations presented in this table.

FIGURE 9

SPATIAL DISTRIBUTION OF MAXIMUM RELATIVE 1-HOUR POLLUTANT CONCENTRATIONS RESULTING FROM A TANK TRUCK ACCIDENT



Note: See Table 9 for correlation of isopleth values with estimates of individual pollutant concentrations.

effects would be greatest for the workers involved in cleaning up the spill. The National Institutes of Occupational Safety and Health (NIOSH) recommendation for petroleum distillates is 350 mg/m^3 as an 8-hour time weighted average (TWA) and only at the spill itself might VOC concentrations approach such a level and then only as a 1-hour maximum (see Figure 6). The Occupational Safety and Health Administration (OSHA) has a substantially less stringent 8-hour standard of 2,000 mg/m^3 which is an order of magnitude greater than any of the maximum concentrations predicted in this analysis.

Nevertheless, due to its greater volatility and resulting higher ambient concentrations, an FO2 spill might result in noticeable hydrocarbon odors at greater distances than in the case of the LSFO spill. Perhaps, the most important point to make with this scenario is the fact that FO2 is used for pipeline testing only once in a 3-year period; thus, assuming that such an accident occurred at all, the probability of the worst case 1-hour concentrations occurring is 1 in 26,280 or 0.0038%.

The tank truck accident presents a somewhat different situation in terms of potential air quality and health effects in that one is now dealing with products of combustion rather than simply evaporating hydrocarbons. Table 7 includes the regulated criteria pollutants (SO_2, NO_2, PM_{10}, and CO) for which there are ambient standards, but only one (CO) has a 1-hour standard which would be applicable in this case. It also includes the regulated hazardous air pollutants (HAP), e.g., benzene, ethylbenzene, etc., for which there are no ambient standards.

SO_2, NO_2, and PM_{10} concentrations, not surprisingly, are high in the smoke plume from the burning fuel oils and since they are all pulmonary irritants, some irritation may be experienced by individuals in

the path of the plume out to one to two kilometers from the accident scene. CO levels do not appear high enough to suggest any adverse health effects. VOC's would be a mix of unburned fuel vapors and a variety of hydrocarbons generated by partial combustion of the fuel oils. They would contribute to the odor of the smoke plume which would also be noticeable out to 1 - 2 kilometers. The HAP's all appear to be low enough in concentration, not to mention the short duration of exposure, so as to not present a significant health risk.

7. CONCLUSIONS AND MITIGATION

7.1 Construction Impacts. The foregoing analysis concluded that ambient air quality standards can be met during the construction phase of this project; however, a few additional comments concerning fugitive dust are appropriate. Since, as noted in Section 4, the project area is considered to be "semi-arid" by Thornwaite's climatic classification system with a P/E index lower than that associated with the EPA fugitive dust emission factor, there appears to be a somewhat greater potential for fugitive dust. The silty clays that are common in Hawaii and have a silt content greater than the 30% upon which the EPA emission factor is based also suggests a somewhat greater dust potential. It will therefore be important to employ adequate dust control measures during the pipeline construction, particularly during the drier summer months. Dust control could be accomplished through frequent watering of stockpiles and areas of exposed soil. As noted earlier, the EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50% [19]. The soonest possible restoration of vegetation in the trenched areas will also help.

7.2 Accident Impacts. Since there are no ambient air quality standards for the volatile organic compounds (VOC) evaporating from a fuel oil spill, standards compliance is not an issue. However, potential adverse health effects are. Based on the foregoing analysis, it is concluded that should an LSFO or FO2 spill of the magnitude described occur due to a pipeline rupture, the resulting VOC levels are not likely to reach concentrations high enough nor persist long enough to cause observable adverse health effects outside the immediate area of the spill. Workers cleaning up the spill and repairing the pipeline will have to take appropriate precautions to minimize their exposure to the vapors and comply with the OSHA standard although this analysis indicated worst case concentrations well below that standard. Fuel odor will certainly be present in the immediate spill area and may extend one to two kilometers downwind (possbily farther in the case of FO2) and result in citizen complaints.

A tank truck accident involving a spill and burning of LSFO and FO2 will result in high short-term concentrations of a number of regulated pollutants, but violations of ambient air quality standards are not likely. With expected rapid response to extinguish the fire within one hour of the accident, downwind exposure of citizens will be minimized. Some complaints of odor or mild respiratory irritation may occur within one to two kilometers downwind if citizens are exposed to the smoke plume. Firefighters and other responders to the accident will have to take normal safety precautions to minimize their inhalation of toxic pollutants and comply with occupational health standards.

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APPENDIX B AQUATIC COMMUNITIES IN PEARL HARBOR

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AQUATIC COMMUNITIES IN PEARL HARBOR

This appendix summarizes the types of biological communities found in the harbor. Section B-1 discusses the fishery resources in the harbor itself. Section B-2 outlines the subtidal and intertidal communities that persist at the margins of the harbor. Section B-3 describes the documented occurrences of threatened and endangered species in the harbor. Appendix B discusses the aquatic communities in the freshwater and brackish streams and tidal channels that drain into the harbor.

B-1 SYNOPSIS OF FISHERY RESOURCES OF PEARL HARBOR

There are reports that Pearl Harbor had great abundance of fish and shellfish and the area was important to Hawaiian culture as evidenced by the numerous fishponds formerly present along its shores (Coles *et al.* 1997). Handy and Handy (1972) state that the harbor "...offered the most favorable locality in all the Hawaiian Islands for the building of fish ponds and fish traps into which deep sea fish came on the inflow of tidal water...". These authors further note that the harbor's many bays "...provided a greater variety and abundance of edible shellfish, and were the summer home of mullet".

Biological collections from Pearl Harbor commenced at the turn of the century but none were very extensive or in-depth in their efforts. It was not until the work by Evans (1974) and the more recent efforts by Coles *et al.* (1997) have the biological collections been more systematic and representative of the harbor. Coles *et al.* (1997) listed 434 taxa (36 algae, 1 spermatophyte, 338 invertebrate and 59 fish) species and high taxa collected from 15 stations in the harbor. In total, 394 of these taxa were from fouling communities, sediment samples or fish observations and the remaining 40 taxa were exclusively from sediment samples. Evans (1974) listed 388 taxa (23 algae, 278 invertebrate and 87 fish) collected or seen in the 1971-73 period. Grovhoug (1992) reported 130 taxa (79 invertebrate and 51 fish) from the harbor. Brock (1994, 1999) found 96 and 99 taxa from six stations sampled in East Loch. All other studies carried out in the harbor previous to those above have reported ten or fewer taxa. Not surprisingly, most taxa reported from Pearl Harbor are not directly part of Hawaii's inshore fisheries. Some of the species that are, are discussed below.

As noted above, it is evident that in the period from 1900 through the 1970's many changes occurred to the habitats and consequently to the biota of the harbor due to human activities both in the harbor and surrounding hinterland. Thus some commercially important species appearing in the earlier collections are now very rare or absent. Among these are the kona crab (*Ranina ranina*) listed in B.P. Bishop collections from 1902 as well as the striped mantis shrimp or aloalo (*Lysiosquilla maculatus*) which was recorded in the B.P. Bishop Museum collection in 1923 (see Coles *et al.* 1997).

It is recognized that many motile species (such as fish and crabs, etc.) may move in and out of the harbor as adults, or larvae of some may recruit to the harbor having originated from areas outside of the harbor. Sampling biological communities seaward of the harbor will result in a much longer species list (as given in Coles *et al.* 1997) simply because the conditions are more marine and less estuarine in a seaward direction. Additionally, there are many species that have been recorded as being present in Pearl Harbor and are edible, but are small in size, and today are not a significant part of Hawaii's fisheries.

A number of algal species favored for consumption have been found in Pearl Harbor including sea lettuce or limu pahala (*Ulva lactuca* and *Ulva fasciata*, Evans 1974) and Brock (1994) noted limu wawae'iole (*Codium edule*). Although not consumed, the most common algae encountered in Pearl Harbor are the aliens *Acanthophora spicifera* and *Gracilaria salicornis* (Brock 2000a). *Gracilaria salicornis* occurs as a near-continuous blanket in areas up to several hundred square meters in size at depths from 0.6 to 5 m at a number of locations in Pearl Harbor (Brock 2000a).

There are a number of commercially important crab species present in Pearl Harbor; among these are the swimming crabs (*Thalamita crenata* and *T. integra*) which are seen in the shallows of many parts of the harbor. The Hawaiian crab (*Podophthalmus vigil*) and the haole crab (*Portunus sanguinolentus*) are usually seen below depths of 3 m on the mud or sand bottom. Brock (2000) using line transects recorded densities of these two crab species as great as one individual per 8 m^2, however mean densities are much lower (1 crab/120 m^2). In Pearl Harbor the mud or Samoan crab is seen in waters from 0.2 m and deeper on mud or sand bottoms. These crabs are frequently found in the middle of mangrove thickets making density estimates very difficult. Other arthropods found in Pearl Harbor include the slipper lobster or ula'papa (*Scyllarides squamosus*) which is occasionally encountered in caves and ledges at depths below 4 to 5 m (Evans 1974, Brock 1994). Less frequently seen is the spiny lobster or 'ula (*Panulirus penicillatus*) which Evans *et al.* 1974) recorded in the harbor. Some sea urchin species are collected for their gonads or "uni" when they are ripe. One of these species, the black sea urchin or hawa'e (*Tripneustes gratilla*) is occasionally encountered in more seaward portions of the harbor usually below depths of 2 m.

Clams are well-known in Pearl Harbor. Probably the best known is the introduced "Japanese" or "oriental" clam, *Venerupis philipinarum*. Brock (1960) notes that ten barrels of Japanese clams were released at three localities: Pearl Harbor, Kaneohe Bay and Waialae (Maunalua) Bay in 1920. Prior to this time, *V. phillipinarum* was available live in Honolulu markets. Coles *et al.* (1997) record this species in Pearl Harbor. Kay (1979) states that after an initial spread by this species following its introduction, abundance declined such that it was only exploited in Kaneohe Bay by 1965. Another clam found in the harbor is the olepe or *Tellina palatam*. Bryan (1915) notes at that time the olepe is "...the most important shell-bearing food mollusk of the group." Both *Tellina* and *Venerupis* are found in the shallow flats in the mud and sand of Pearl Harbor. Densities of *Tellina palatum* may be quite high, locally as many as 7 individuals per 0.1 m^2 where the substratum has a greater percentage of sand rather than fine mud (Brock 2000a).

At one time Pearl Harbor provided a habitat appropriate for pearl oysters. There are two common species in Hawaii including the black-lipped pearl oyster (*Pinctada margaritifera*) which is used the pearl aquaculture industry in Tahiti and elsewhere in the South Pacific, and the smaller *Pinctada radiata* which was the most abundant species in Pearl Harbor many years ago (Kay 1979). Both of these species is near-absent in the harbor today (Evans 1974, Coles *et al.* 1997, Brock 2000a). The question arises as to why these species are near-absent today in the harbor. Changes in water quality and/or habitat destruction may have all played a role in the near demise of these *Pinctada* species in the waters of the harbor. Other possible factors related to the decline in pearl oysters in the harbor may be (1) the arrival of a parasite or disease specific to these oysters from another locality in the Pacific transported by vessel traffic or (2) similarly, due to another sessile species non-native to Hawaiian waters becoming established and simply outcompeting the native oysters. However, no single species appears to have come to dominate subtidal hard substratum in the harbor which is required by the adult oysters but rather, an assemblage of sessile species including many species of sponges, polychaete worms, mollusks (vermetids and bivalves), arthropods (barnacles), and urochordates (tunicates). Many of these are known or suspected alien species in Pearl Harbor are among the most abundant sessile forms.

Besides pearl oysters, there are three other oyster species commonly seen in Pearl Harbor. The first of these is the small native oyster (*Ostrea sandvicensis*) and the two introduced commercially important species of *Crassostrea*. The eastern oyster, *Crassostrea virginica* was imported from the west coast of the US and was successfully established by 1895 (Brock 1960). *Crassostrea gigas* was also imported from Japan and was successfully planted in Pearl Harbor and Kaneohe Bay by the late 1930's. Both species are found in the harbor today but *C. virginica* is by far the most abundant (Brock 2000a).

The beds of commercially desirable *Crassostrea virginica* in West Loch are well-known. Sparks (1963) provides details on the estimated sizes of the West Loch beds with more than 35.6 million (or 55,630 bushels) of eastern oysters present. Despite the potential commercial importance of these oyster beds, coliform bacteria levels measured the time of the study were high precluding any commercial development. It was this population of oysters that was almost completely decimated in

1974 by a parasitic fungus (McCain 1977). Brock (2000a) found that the beds of West Loch appeared to have recovered. However, as with other shellfish resources (i.e., clams), the possibility of bioaccumulation of heavy metals and pesticides in the tissues of the oysters as well as probable continuing high levels of coliform bacteria, preclude any consideration of consumptive exploitation of this resource at the present time. Source of coliform bacteria include sewage, soils, and domesticated animal wastes, the latter entering via the streams that flow into the harbor.

In their detailed study of the ecosystems of Pearl Harbor, Evans (1974) found 90 species of fishes among 46 families in the harbor. Many of these species are commercially important insofar as Hawaii's inshore fishery resources are concerned. Among the commercially important species found in Pearl Harbor are the grey mullet or ama'ama (*Mugil cephalus*), milkfish or awa (*Chanos chanos*), bonefish or o'io (*Albula vulpes*), awa'awa (*Elops hawaiiensis*), threadfin or moi (*Polydactylus sexifilis*), barracuda or kaku (*Sphyraena barracuda*), flagtail or aholehole (*Kuhlia sandvicensis*), chub or nenue (*Kyphosus biggibus*), soldierfish or menpachi (*Myripristes berndti*), bigeye or aweoweo (*Priacanthus cruentatus*), baitfishes - nehu (*Encrasicholina purpureas*) and i'ao (*Pranesus insularum*), introduced snapper or to'au (*Lutjanus fulvus*), goatfishes such as the weke (*Mulloides flavolineatus*), weke'ula (*Mulloides vanicolensis*), kumu (*Parupeneus porphyreus*), moano (*Parupeneus multifasciatus*), malu (*Parupeneus pleurostigma*), weke pueo (*Upeneus taeniopterus*), jacks or papios (*Carangoides gymnostethoides, Caranx ignobilis, Caranx sexfasciatus*), pao'pao (*Gnathanodon speciosus*), omilu (*Caranx melampygus*), 'omaka (*Caranx mate*), la'i (*Scomberoides lysan*), flatfish or paki'i *Bothus pantherinus*), parrotfish or ponuhunuhu (*Calatomus carolinus*), bulletnose parrotfish or uhu (*Scarus sordidus*), cigar wrasse or kupoupou (*Cheilio inermis*), sargeant major or mamo (*Abudefduf abdominalis*), eye-stripe surgeonfish or palani (*Acanthurus dussumieri*), convict surgeonfish or manini (*Acanthurus triostegus*), ringtail surgeonfish or pualo (*Acanthurus blochii*), yellowfin surgeonfish or pualo (*Acanthurus xanthopterus*), orangebar surgeonfish or na'ena'e (*Acanthurus olivaceus*), goldring surgeonfish or kole (*Ctenochaetus strigosus*), bluespine unicornfish or kala (*Naso unicornis*) and the spotted unicornifish or kala lolo (*Naso breviorstris*).

Perhaps the fish species of greatest importance through time to humans in Pearl Harbor has been the grey mullet or ama'ama (*Mugil cephalus*) which attains sizes up to about 60 cm in length. The mullet was the mainstay of the fishponds that ringed much of the shoreline of the harbor prior to the Navy's occupation of the area. The wild populations of this species utilized the harbor then and now and were fished as a major source of protein before such activity was curtailed by the Navy's tenure of the harbor. A hundred years of human activity in the harbor and hinterland draining into the harbor has taken its toll on the abundance of mullet. In 1902 it was reported that the waters were teeming with shoals of mullet (Anon. 1902). Today, schools of this species are present but their abundance is greatly reduced due to numerous factors including the loss of appropriate juvenile habitat (the brackish stream mouths draining into the harbor) which is not polluted and habitat without competing alien species. Brock (2000a) estimated the abundance of mullet and milkfish in the upper reaches of the lochs of Pearl Harbor using visual census techniques and noted that the abundance of these species remains relatively high relative to elsewhere around the high Hawaiian Islands.

For many years the most important commercial fishery in the Hawaiian Islands was the pole-and-line, live-bait fishery for skipjack tuna or aku (*Katsuwonus pelamis*). Aku are high-seas species and are seasonally abundant around the Hawaiian Islands especially during the summer months. The fishery annually landed more than 2,500 metric tons of skipjack tuna at its height from 1937 through the 1960's. The fishery began in the early 1900's with technology originating from Japan utilizing live bait captured in bays around the islands used to hold the aku school close to the vessel, where lures are dipped into the water catching the fish. The landed fish were used to satisfy the fresh raw fish (sashimi) market with the remainder going to the local cannery based in Honolulu (built in 1917). A sustained drop in the catch per unit of effort (CPUE) of large skipjack occurred in the early 1970's which was related to environmental changes which affected local fish availability (Boggs 1988). Combined with increased fishing costs, partially due to chronic shortages of baitfish, market competition from other tuna products and later to the closure of Hawaiian Tuna Packers cannery in

1984, the fishery went into a decline (Boggs and Pooley 1987) from which it never recovered. By 1991 only four vessels were active on a full-time basis in this fishery (Boggs and Kikkawa 1993).

The primary bait species used in the aku fishery was the nehu (*Encrasicholina purpureas*) and to a lesser extent, the silverside or i'ao (*Pranesus insularum*). Baitfish were harvested from wild populations. The quiet waters of Pearl Harbor and Kaneohe Bay were important sources of baitfish contributing more than 70% of the total state harvest. Commercial fishermen entered Pearl Harbor under permits taking an average of 33% of all bait captured in the state. Pearl Harbor showed wide fluctuations in bait catch and effort in the 1960-81 period, but no trends in the catch/effort data are apparent (Shomura and Sakuda 1983). The statewide capture of baitfish from 1946-72 ran from 22,849 buckets in 1960 to 49,712 buckets in 1955 with an average of 35,528 buckets with a bucket holding 3.2 kg of nehu (Yoshida *et al.* 1977, Uchida 1977). Therefore, in this period about 37,500 kg were annually captured in Pearl Harbor. Somerton *et al.* (1993) estimated that the spawning biomass of nehu in Pearl Harbor ranged from 0.5 to 5.0 metric tons over a two-year study period (1986-88) with the fluctuation in response to continuing intensive fishery and seasonal cyclicity in spawning. The reported baitfish catch from Pearl Harbor was 7,664 kg or a little less than 2,400 buckets, reflecting the decline in the pole-and-line, live bait aku fishery in Hawaii.

Fishermen pointed out that there was a gradual increase in the catch of "marquesan sardine" which comprised 10% in 1977 and made up 21% of the baitfish catch in 1981. The species involved is actually the gold-spot herring (*Herklotsichthys quadrimaculatus*) common to the waters of the Marshall Islands and not the "Marquesan sardine" (*Sardinella marquesensis*) that was originally introduced from the Marquesas Islands in the late 1950's. The sardine is established in Hawaii, but is not abundant (Randall 1987). In contrast, the gold-spot herring populations have mushroomed and it is a dominant baitfish in most bays and harbors today (Baldwin 1984). Fishermen strongly believe that this alien gold-spot herring preys on the eggs and larvae of the nehu giving the alien a competitive edge over the native nehu (Shomura and Sakuda 1983). Brock (2000a) noted the presence and estimated school size of baitfish schools encountered in his surveys of Pearl Harbor. Large schools of nehu were not seen and the biggest schools seen were comprised of the introduced gold-spot herring. Brock (2000a) notes that there are few fishermen or vessels capturing and using live bait for the capture of aku and the fishery for bait in Pearl Harbor is either no longer existent or only occurs at a very reduced scale.

B-2 INTERTIDAL AND SUBTIDAL BIOTA NEAR PEARL HARBOR'S STREAM MOUTHS

Much of the shoreline at the point where streams enter Pearl Harbor is dominated by the red mangrove (*Rhizophora mangle*). This an other mangrove species were introduced to Hawaii in the early 1900's to prevent erosion of shorelines. Mangroves are found along much of the undeveloped shorelines of all lochs of Pearl Harbor and where they occur are the dominant vegetation.

Mangroves in Hawaii are an introduced alien species. A number of native species in Hawaii that utilize mangroves in other locations where their ranges overlap (e.g., the snail *Littorina scabra*, the goby *Oxyurichthys lonchotus*, juvenile mullet or pua (*Mugil cephalus*) and others) mangroves are an important habitat as they are for some introduced aquatic species such as the mud or Samoan crab (*Scylla serrata*). In Pearl Harbor mangroves occupy an area of about 1.3 km^2. Species that utilize mangroves are found also on man-made surfaces (sheet piling, concrete, or rock walls) with the point of commonality being a vertical or near-vertical hard surface on which to settle and grow. Species of the upper intertidal on these surfaces include the black crab (*Metapograpsus thukuhar*), the snail (*Littorina scabra*) and the alien barnacle (*Chthamalus proteus*). Slightly further down in the intertidal on these surfaces are the native oyster (*Ostrea sandvicensis*), alien oysters (*Crassostrea virginica* and *Crassostrea gigas*) and unidentified amphipods. Subtidally, the alien alga (*Acanthophora spicifera*) is seen as are the sponges (*Halichondria coerulea, Zygomycale parishii, Mycale armata* and other species) as are the mud or Samoan crab (*Scylla serrata*), the blue pincher

crab (*Thalamita integra*), alien tilapia (*Tilapia melanotheron*), juvenile mullet (*Mugil cephalus*), introduced guppies and topminnows (family Poecilidae), barracuda or kaku (*Sphyraena barracuda*) as well as many other species. The species composition of this "epifauna" on mangrove prop roots or anthopogenic vertical surfaces is strongly influenced by the proximity and volume of freshwater inputs as well as sedimentation. The more marine the local setting, the more marine and diverse the fauna will be.

While Pearl Harbor is a large estuarine feature, diversity of the underwater physical zonation is relatively low. Overall there are three major zones within the harbor. The first are the vertical surfaces whether they be anthropogenic in origin (concrete piles, sheet piling, rock walls) or natural (as mangrove prop roots and underwater vertical limestone as occurs along channel cuts). The second rings the shoreline of most of the harbor and consists of a shallow limestone platform of fossil reef origin. The shallow platform is divided into two subzones: sediment covered and bared hard bottom. The distinction between the two subzones is gradual with a gradient of highest sediment cover on the mud flats that predominate the *mauka* heads of the lochs where streams enter the estuary, and the lowest near the juncture of the entrance channel with the open ocean. The inner harbor mud flats that extend over most of the *mauka* heads of the three lochs comprise about 5.6 km^2 (or 27% of the harbor's area) while the hard bottom reef flat comprise about 0.5 km^2 (Brock 2000a).

The shallow platform terminates in either a dredged vertical face, or slopes gradually to the third major zone, which consists of the sand/mud channel floor. The structure and composition of the channel floor is similar throughout the harbor, the main difference being a higher percentage of calcareous sands and lower percentage of terrigenous mud with proximity to the ocean. Surface area of the channel floor comprises about 60% of the total harbor area.

Coles *et al.* (1997) list 59 taxa in two phyletic groups (Mollusca and Arthropoda) that as adults are found in the soft substratum of the harbor. However their list does not have any of the polychaetes which are usually the most specious and abundant of the infaunal groups. Most species found on soft sediments are infaunal, or living in the sediment and most are very small. There are a number of larger species found in the soft sediment communities of Pearl Harbor. Among these are crustaceans such as ghost shrimps (family Callianassidae), mantis shrimps (family Squillidae), burrowing shrimps (particularly family Alpheidae), the blue pincher crab (*Thalamita integra*), Samoan crab (*Scylla serrata*), Hawaiian crab (*Podophthalmus vigil*), haole crab (*Portunus sanguinolentus*) and clams such as *Tellina rugosa*. Fishes that feed on the soft bottom communities include the nightmare goatfish or weke pueo (*Upeneus arge*), the eagle ray or hihimanu (*Aetobatus narinari*), flatfish or paki'i (*Bothus pantherhinus*) as well as a number of other species that opportunistically forage across soft bottom communities at night for crustaceans and polychaetes that may emerge from the sand/mud substratum. Species in this category include most of the goatfishes, some squirrelfish, the introduced snapper or to'au (*Lutjanus fulvus*), bonefish or o'io (*Abula vulpes*) cardinalfishes, gobies and juvenile hammerhead sharks (*Sphyrna lewini*).

Communities of the water column are dominated by minute phytoplankton and zooplankton and large pelagic jellyfish (e.g., *Aurelia aurita* and *Mastigias* sp.). Almost every aquatic species found in Pearl Harbor utilizes the water column during some part of their lifecycle (such as larval phases). If a fuel oil spill were to occur and enter Pearl Harbor, most of the material would float and water column communities would probably not receive the level of impact that intertidal/shallow subtidal communities might due to the floating nature of the oil and its movement across the intertidal/shallow subtidal interface due to the tides.

Vertical substratum in Pearl Harbor occurs in primarily four categories: 1) the *makai* portions of the natural reef flat that borders the shoreline that are not covered by a layer of terrigenous sediment; 2) near vertical dredge-cut limestone surfaces that comprise channel walls; 3) solid surfaces that are the result of human activities (i.e., pier pilings, sheet pilings/bulkheads, submerged and/or derelict materials) and 4) mangrove prop roots as previously discussed. Because of the high sediment loads benthic communities have historically been better developed on vertical surfaces than on horizontal

ones where sediment accumulation may result in smothering. As a result, benthic communities on horizontal limestone surfaces are best developed in areas removed form the proximity of freshwater and/or terrigenous input (i.e., away from the heads of bays, stream mouths or *mauka* areas). Thus, benthic community development is usually greater on vertical over horizontal surfaces and diversity in these communities is greater with distance from sources of sediment and freshwater.

Brock (1994, 1999) has noted that many of the intertidal and shallow subtidal aquatic species found in the vicinity of the Waiau Generating Facility are probably alien and that few native species are common to the study areas which include reef flat, subtidal and intertidal vertical surfaces including mangroves. Species lists are similar when comparing data from the inner portions of West , Middle or East Lochs (Brock 1994, 1999, 2000a) and as noted above, important forcing functions in these communities are the local sediment and freshwater loads. Coles *et al.* (1997) note that introduced or alien species comprise 47% of the aquatic biota in the more estuarine habitats of the harbor and native species make up 33% of the total with the remainder being undetermined. Generally, habitats with greater numbers of alien species are considered to be more disturbed or stressed due to the competitively superior alien forms reducing or eliminating native species. Thus, in summary, the Pearl Harbor aquatic communities in the vicinity of the stream discharges are not particularly diverse and are dominated by non-native species.

B-3 THREATENED AND ENDANGERED SPECIES

The Hawaiian green sea turtle (*Chelonia mydas*) is federally protected as a threatened species. Two green sea turtles have been sighted in Pearl Harbor in the past; one individual near the *USS Arizona* Memorial and a second individual along Waipi'o Peninsula well into the middle part of the harbor. Review of the author's data from HECO's Waiau discharge showed one small green sea turtle was sighted in 1998 in the vicinity of the discharge (Brock 2000b). On 21 March 1998, federally-listed endangered humpback whales (one adult with calf; *Megaptera novaeangliae*) entered Pearl Harbor but evidently soon left the harbor; this visitation was considered to be an unusual event (Trustees 1999). In summary threatened and endangered marine species are not particularly common in Pearl Harbor.

APPENDIX C DESCRIPTION OF AQUATIC RESOURCES AND ENVIRONMENTAL IMPACT ASSESSMENT FOR THE HECO WAIAU PIPELINE PROJECT, PEARL HARBOR, HAWAII

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1.0 SETTING

Pearl Harbor is a natural estuary formed by successive flooding during glacial epochs (Stearns 1985). Six perennial, two intermittent streams, and several small dry gulches draining an estimated 109 square mile area of central Oahu, discharge into the harbor. The lower reaches of Pearl Harbor streams, springs, and wetlands overlay oyster beds, reefs, and mud deposits eroded from the Koolau and Waianae Mountain ranges (Coles, et al. 1999). Numerous perennial springs fed by groundwater emerge near an elevation of 20 ft above sea level (Visher and Mink 1964). Nichols, et al. (1997) estimated a combined discharge of 80 mgd (million gallons per day) from Pearl Harbor springs in 1983. Nance (1988) noted that spring discharges have increased in recent years due to the cessation of pumping groundwater for sugarcane irrigation.

Discharge of streams draining the Koolau Mountains is relatively low above the emergent Pearl Harbor springs, and often disappears completely into the channel alluvium during droughts (Coles, et al. 1999). Streams draining into Pearl Harbor from the Waianae Mountains are intermittent and discharge only during freshets. High flood peaks and low base flows characterize all Pearl Harbor streams (Nichols et al. 1997). Stream flows are perennial and chemically more characteristic of groundwater below the Pearl Harbor springs. Figure 3-3 illustrates the principal drainages and springs within the Pearl Harbor watershed.

The terminal reaches of perennial streams entering Pearl Harbor are tidal. A saltwater wedge is commonly found underlying fresh surface waters several hundred feet upstream. The upstream limit of saltwater intrusion is usually demarcated by a weir or elevated culvert. Wetland habitats fed by groundwater seepage, springs, and streams are found along the shoreline and terminal reaches of streams within Pearl Harbor. The National Wetlands Inventory (NWI) classifies most of the Pearl Harbor wetlands into the following categories:

E1OW – Estuarine, subtidal, open water (lower reaches of influent streams)

E2EM1 – Estuarine, intertidal, emergent, persistent (riparian vegetation along terminal reaches)

E2FO3 – Estuarine, intertidal, forested, broad-leaved evergreen (mangrove forests)

E2SS3 – Estuarine, intertidal, scrub-shrub, broad-leaved evergreen (lower stature forested areas)

POW – Palustrine, open-water (refuge ponds)

PSS1- Palustrine, scrub-shrub, broad-leaved evergreen (refuge areas)

The largest and most biologically significant of the Pearl Harbor wetlands is the 70-acre Pouhala Marsh (Ducks Unlimited, 1998), which lies between the terminal reaches of Waikele and Kapakahi Streams. Pouhala is considered to be a Hawaiian playa wetland and its salinity is influenced by seasonal changes in groundwater seepage, high stream flows, and tidal waters, and may become hypersaline during periods of drought. Figure 4-5 illustrates the distribution of wetland vegetation within the marsh. Because of its significance as habitat for endangered Hawaiian waterbirds, the marsh has become the focus of extensive habitat restoration efforts by Ducks Unlimited (1998), the U.S. Fish and Wildlife Service (1998), the State of Hawaii Department of Forestry and Wildlife, and the City and County of Honolulu.

The NWI classified riparian vegetation within the middle reaches of Waikele and Kipapa streams as PFO3C (palustrine, forested, broad-leaved, evergreen, seasonal) and PFO3A (palustrine, forested, broad-leaved, evergreen, temporary), reflecting their ecosystem classification as "artificially interrupted" (Polhemus, et al. 1992).

Additional significant wetland habitats within the area affected by the proposed HECO pipeline alignment include the 36.5-acre Honouliuli Unit and the 24.5-acre Waiawa Unit of the Pearl Harbor National Wildlife Refuge. The U.S. Fish and Wildlife Service manage these refuge units under a use

agreement with the U.S. Navy. The Waiawa Unit is composed of two impoundments with man-made islands for bird nesting. Waters are pumped into the impoundments from the adjacent stream. It appears to be hydrologically linked with the 25-acre Waiawa Springs that feeds a broad area of cultivated watercress and taro fields below the Leeward Community College in Waipahu (Coles, et al. 1999). Water is pumped into the two impoundments at the Honouliuli Unit from an on-site freshwater well. These two refuge units provide feeding, foraging, loafing, and nesting habitat for all four species of endangered Hawaiian waterbirds and 25 species of migratory birds.

2.0 WATER QUALITY, CONTAMINANTS, AND HABITAT ALTERATION

Pearl Harbor is classified as a Class 1 protected estuarine Inland Water in the State of Hawaii Department of Health Water Quality Standards. In accordance with US Environmental Protection Agency (EPA) requirements, the State of Hawaii is currently proposing revisions to water quality standards. Under the proposed changes, Waimalu and Waiawa Streams will have Class 1a, 1b, and 2b reaches; Waikele will have Class 1b and 2b reaches; and Honouliuli will be Class 2b. All other streams not named will be Class 2a. The new standards recognize that even though some streams may flow through highly degraded industrial or urban areas, they may feed ecologically significant wetlands and waters and must therefore be protected from further degradation, and to the extent possible, enhanced. The new standards also state, "Water quality shall be maintained and protected within National Parks, wildlife refuges, other protected lands remote from developed areas, and within State reference streams." This will affect Honouliuli, Waikele, and Kapakahi Streams in particular which terminate within or immediately adjacent to National Wildlife Refuges or ecologically significant wetlands. Information about the State of Hawaii water quality standards for the influent streams may be found at: http://mano.icsd.hawaii.gov/doh/eh/cwb/wqmaps/wqstand.htm.

Temporal and geographic trends in concentrations of persistent environmental contaminants observed in central Oahu streams may threaten fish and wildlife. The U.S. Fish and Wildlife Service periodically determined concentrations of potentially toxic elements and selected organochlorine chemicals in samples of fish and wildlife collected from nationwide networks of stations. Schmidt, et al (1990) reported that mean dieldrin concentrations from fish tissues collected from central Oahu stream were higher than from any other samples collected nationwide. DDT metabolites were also found in Manoa and Waikele Streams, and suggested to investigators direct inputs of DDD primarily for control of insects on fruit and vegetables.

Schmidt, et al (1990a) reported that samples containing the highest concentrations of copper nationwide in 1984 were in Tilapia (*Sarotherodon sp.*) collected from Waikele Stream. Waikele has historically yielded fish containing relatively high concentrations of copper. These persistent chemicals, now banned were once commonly used to control insects such termites and crop pests, are found in the mud at the bottom of streams and also in creatures that live there. The pesticide DDT was widely used in urban areas for control of pest insects, and was sometimes broadcast through the neighborhood streets by spray trucks to control mosquitoes. DDT also was used in agricultural insect control before being banned in 1972. It breaks down into products known as DDE and DDD, both of which are toxic and slow to break down. Chlordane was Hawaii's termite ground treatment chemical of choice until it was banned for commercial use in 1988. Another termite pesticide used in Hawaii, aldrin, breaks down readily into toxic dieldrin.

Krabbenhoft, et al. sampled water, sediments, and fish tissues of Waikele Stream during the National Mercury Pilot Study conducted in conjunction with the National Water Quality Assessment (NAWQA) program of the US Geological Survey. The relatively high concentrations of Hg found in Waikele led them to suggest that there existed a significant source other than atmospheric deposition from the Kilauea Volcano on Hawaii Island.

Del Monte Corporation (1998) reported contamination of soils from a 1977 spill of ethylene dibromide (EDB) and 1,2-dibromo-3- chloropropane (DBCP) used in fumigants to combat nematode infestation in pineapple fields at a site adjacent near Poliwai Gulch, a tributary of Waikele Stream. Although groundwater contamination from the spill was observed, the downstream extent of surface water or stream sediment contamination was not determined.

Water quality studies and soils samples collected within Pouhala Marsh for Ducks Unlimited (1998) were found to be free of hazardous concentrations of substances known to be toxic to waterbirds and aquatic life. Despite recent use restrictions, however, some toxic compounds continue to be detected in stream sediment and fish tissue samples (Brasher and Anthony, 2000).

The Pearl Harbor Naval Complex was listed on the National Priorities List of the nation's most contaminated hazardous waste sites (EPA 1992). In 1998, The State of Hawaii Department of Health issued a health notice warning against the consumption of marine life taken from Pearl Harbor.

Aoyama and Young (1974) assessed the water quality changes in Waiawa and Waimano Streams caused by chlorinated effluent from the Pacific Palisades Sewage Treatment Plant. Some changes were very apparent, especially those of an aesthetic nature, the visible change in the color and turbidity of the water and the sulfurous odor of septic sewage. Phosphate levels in the surface layer are high in samples collected by the University of Hawaii in Waikele Stream than in other Pearl Harbor streams, averaging 8.6 µgm-at/l. This may be an artifact of effluent discharged from the Mililani sewage treatment plant.

3.0 METHODS

Common sampling methods used to collect aquatic life in tropical insular streams include the use of insect aspirators, insect and dip nets, electro-shockers, drift and seine nets, direct visual examination through snorkeling, and the use of chemicals such as rotenone (the latter is rarely permitted in Hawaii). These devices and methods are listed in order of their relative selectivity, from high to low.

Definitive biological inventories of streams require extensive sampling along the entire stream course over the period of at least a year and are beyond the scope of this study. This study draws from the significant volume of recent scientific literature covering Pearl Harbor streams and estuaries. Sampling was limited to brief observations at the streams and wetlands bisected by the proposed HECO pipeline crossing, including direct visual examination and the use of dip nets.

4.0 OBSERVATIONS

4.1 Dry Gulches and Honouliuli Gulch

None of the six dry channels bisected by the proposed HECO pipeline corridor carried standing or flowing water during field studies conducted for this project. USGS crest-stage records for Kaloʻi and Honouliuli Gulches (Section 3.4.1) indicate that stormwater runoff is periodically conveyed during spates. However, there is no evidence that these intermittent streams support endemic or native migratory aquatic species above the stream mouths. The mouth of Honouliuli Stream is estuarine and supports aquatic species year round (see Section3.4.2).

4.2 Hōʻaeʻae Storm Canal

The Hōʻaeʻae Storm Canal drains a portion of the industrial district in Waipahu. The lower reaches of the canal below Farrington Highway are fully channelized within a rectangular concrete culvert. Tidal waters filled the terminal reach of the canal from several inches up to a foot in depth during field studies. The concrete invert of the terminal reach was littered with wood, concrete, and metal debris, and a few car batteries.

The channel below the pipeline crossing is not lined with concrete though it has been realigned and flows straight from roughly 50 yards before meandering to the east into a larger intertidal, open-water area lined by mangroves and wetland scrub-shrub vegetation.

4.3 Waikele Stream and Springs

The 17.5 mile-long Waikele Stream drains Oahu's largest watershed. The USGS estimates that the upper 28 percent of this 45.7 square mile drainage basin is largely forested conservation land; while the lower 72 percent of the drainage is split between agricultural (55 percent) and urban (45 percent) land. Perennial discharge in the lower reaches is spring fed; however, the middle and upper reaches of the stream are interrupted (Polhemus, et al. 1992). Stream discharge was measured at USGS gaging station 2130 beginning in 1951, and has been continuously recorded since 1960. Average discharge at the station was calculated to be 40.4 cubic feet per second (cfs), with a maximum-recorded discharge of 13,600 cfs in November 1954, and no flow recorded on February 25, 1978. Nance (1998) estimated that Waikele Springs located in the lower reaches of Waikele Stream accounted for nearly 80% of the base flow of the stream.

The stream is not channelized at the proposed HECO pipeline crossing. It is perennial at the point owing a significant contribution from ground waters. Tidal waters reach this point within the stream channel. The stream bottom consists of fine silt at this location. Downstream from the proposed pipeline crossing, the stream channel narrows as it flows through dense mangrove thickets. A broad expanse of tidal mud flats covered with alternate patches of hard silt and soft, deep muck lies at the mouth of the stream. The area is littered with urban debris.

The stream becomes channelized roughly 400 feet above the proposed pipeline crossing. A concrete weir ponds the stream at the USGS gaging station 2130. Perennial flows spill across the lip of the weir into a concrete channel at Farrington Highway Bridge. A series of pools ranging in depth from roughly two to five feet and connected by deep runs extends upstream from the weir toward Waipahu Road. The substrate consisted of cobbles and gravel within the runs, and gravel and silt in the pools. Riparian vegetation in this area was primarily California grass (*Brachiaria mutica*). For several years beginning in 1975, the U.S. Fish and Wildlife Service's Hawaii Cooperative Fishery Unit collected fishes in the run just above Waipahu Road for tissue analysis of environmental contaminants subsequently summarized by Schmidt (1990, 1990a).

Waikele Springs emerge as cool and clear waters on the east bank of Waikele Stream about 600 feet downstream of the H-1 freeway and substantially augment the flow of the stream at this point. California grass (*Brachiaria mutica*), taro (*Colocasia esculenta*), and an introduced aquarium plant reported by Coles, et al. (1999) to be *Vallisneria americana* were found in abundance where the springs debouch into the stream channel.

4.4 Kapakahi Stream

Nance (1998) identified the origin of Kapakahi Stream as a 0.5 million gallon per day (mgd) spring that emerges just north of Farrington Highway. The stream flows approximately one mile through an unlined, channelized course along the west side of Waipahu Depot Road, and enters Pearl Harbor through a dense mangrove thicket. The east side of the channel is an industrial area, while the west side is housing. The lower reach of the stream flows along the eastern margin of Pouhala Marsh below the old railroad trestle where the Chevron fuel pipeline and the proposed HECO pipeline corridor cross the channel (Ducks Unlimited, 1998).

The stream appears to be tidal only up to the landward edge of the mangrove thicket, roughly 100 yards downstream from the railroad trestle. Trash and urban debris litter the channel below Farrington Highway, and the stream itself is quite turbid within this reach.

3.5 Waipahu Canal

Waipahu Canal, referred to as E'o Stream by Coles, et al. (1999), is fed by perennial spring discharge above Paiwa Street, about a half mile above the proposed HECO pipeline crossing (Nance, this report). The stream course above the pipeline crossing is channelized and drains a housing area, while the lower reaches flow along the north side of the Ted Makalena Golf Course and enters Middle Loch Pearl Harbor under the Waipi'o Point Access Road bridge. The stream below the pipeline corridor opens into a broader channel lined by mangroves. The stream course is tidal up to the proposed HECO pipeline crossing. It is likely that the canal receives trace amounts of dissolved nutrients and contaminants in irrigation runoff from the Ted Makalena Golf Course.

4.6 Waiawa Springs

A broad band of scattered watercress farms seaward of the bluffs below the Leeward Community College campus is fed by flow from the slightly brackish Waiawa Springs, the smallest of the springs entering Pearl Harbor (Nichols et al. 1997). Classified as a rheocrene by Polhemus, et al. (1992), Waiawa Springs emanates from multiple sites along the base of the bluffs. A checkerboard of irrigation ditches, dirt roads and paths, homes, storage sheds, vehicles, fill, and related urban debris crisscrosses the watercress farms in this area.

3.7 Waiawa Stream

The lower reach of Waiawa Stream is perennial where it crosses under the H-1 freeway just west of the Urban Garden Center. Here it forms an oxbow through an un-lined, heavily vegetated channel and drains south in Pearl Harbor across the Waipio Peninsula. The Waiawa Unit of the Pearl Harbor National Wildlife Refuge lies along the eastern margin of the stream mouth. The stream mouth is presently choked with mangrove forests. The stream is tidal beyond H-1 highway up to the USGS gage station below Kamehameha Highway. Scattered dwellings line the west bank of the stream at the proposed HECO pipeline crossing. The east bank at the proposed crossing site is heavily vegetated.

3.8 Pearl Harbor National Wildlife Refuge (Honouliuli and Waiawa Units)

These two refuge units provide wetland habitat for all four species of endangered Hawaiian waterbirds as well as secure habitat for other resident waterbirds, and migratory shorebirds and waterfowl. Their locations are illustrated in Figure 4-4. Management activities include maintenance of marsh and open water habitats, predator control, and reduction of human disturbance. The U.S. Fish and Wildlife Service conducts a seasonal schedule of water level draw-downs. Low dikes retain shallow water impoundments that are maintained by pumps. Maintenance of nesting islands in combination with seasonal habitat manipulation provides suitable habitat for nesting, feeding, and resting of native and migrant waterbirds at different times of the year. Noxious vegetation and animal pests (such as California grass and mongoose, respectively, are controlled to help ensure a secure habitat for endangered waterbirds, migratory waterfowl, and shorebirds.

4.9 Waimano Stream

Also referred to as Long's Stream and the Waimano Drainage Canal, Waimano Stream is an intermittent stormwater outlet that drains a portion of Waimano and Pearl City. The stream channel is heavily vegetated at the proposed HECO pipeline crossing, located just below the bikeway south of the H-1 freeway. It flows into Pearl Harbor from this point through uninhabited ruderal land. The reach above H-1 flows through a concrete-lined channel.

4.10 Kaluao'opu Spring

This spring, also referred to as Waimano Spring by Coles, et al. (1999), has a substantial perennial discharge that emanates from cracks in the base of the Koolau Basalt. The springs have no detectable

salinity at the point where the proposed HECO pipeline will cross, and are used to irrigate watercress farms along the western bank of the springs. Water from the springs is also diverted into a storage tank at the HECO Waiau Power Plant.

5.0 HAWAIIAN STREAM AND WETLAND HABITATS

The Hawaiian Islands, located nearly 3,000 miles from the nearest continent, are considered to be the most isolated archipelago on earth. As a result, Hawaii's native freshwater fauna is small and disharmonic in comparison to continental aquatic fauna (Kinzie 1988). The prominent families of native stream animals are comprised largely of marine species. These characteristic stream animals possess an amphidromous life cycle: larvae that hatch from eggs laid by adults within the streams are carried into nearshore marine waters where they develop as zooplankton before re-entering freshwater streams as post-larvae, and migrating upstream to grow and reproduce as adults (Maciolek, 1977; Kinzie and Ford, 1979; Ford and Kinzie, 1982; Radtke, et al. 1988; Radtke and Kinzie, 1991; Hodges 1997; Nishimoto and Kuamo'o, 1997.).

The characteristic native macrofauna of pristine Hawaii stream ecosystems include five species of endemic fishes (the gobiids *Awaous guamensis*, *Sicyopterus stimpsoni*, and *Lentipes concolor*; and the eleotrids *Eleotris sandwicensis* and *Stenogobius hawaiiensis*). Two gastropods, *Neritina granosa* (hihiwai) and the estuarine *Neritina vespertina* (hapawai), are endemic to Hawaii and are common in pristine stream ecosystems. The decapod crustacean *Atyoida bisulcata* ('opae-kalaole) inhabits the middle reaches of pristine mountain streams and is locally abundant in plunge pools. The endemic Hawaiian prawn (*Macrobrachium grandimanus* - 'opae-'oeha'a) inhabits estuaries and the terminal reaches of streams. The presence of all these native species within a stream is commonly considered to be an indicator of outstanding environmental quality. Conversely, their absence is considered an indicator of environmental degradation (Hawaii Cooperative Park Service Unit, 1990).

Community structure in Hawaiian streams appears to change continuously due to random processes affecting reproduction, recruitment of post-larvae, and distribution (Kinzie and Ford, 1982; Kinzie 1988). The synergistic effects of habitat destruction (channelization and dewaterment), point- and non-point source pollution (sedimentation, waste water, environmental contaminants), hydropower development, and the introduction of non-native species have dramatically reduced populations of native stream organisms (Maciolek, 1977 and 1984; Timbol and Maciolek, 1978; and Devick, 1991). Recent reductions in water use by plantation agriculture on Oahu, together with new legislative and administrative mandates for water management, offers some hope of protecting and/or restoring many damaged or threatened stream habitats. However, enhanced stream flow alone is not likely to result in an increase in native species abundance or diversity (Englund, 1993).

5.1 Aquatic Resources of Pearl Harbor Streams and Estuaries

Pearl Harbor is recognized as Hawaii's largest natural estuary and possesses a rich diversity of salt-tolerant aquatic species, many of which are of significance to recreational and subsistence fisheries. In recent years, however, populations of numerous introduced non-native species are becoming established within the harbor. Coles, et al. (1999) indicate that new introductions of non-native species into Hawaiian streams and estuaries appear to be continuing at an estimated rate of 6.4 species per decade. The influent streams to Pearl Harbor include Oahu's largest perennial interrupted stream (Waikele); however, the ecological significance of these streams and those of Oahu have been severely degraded over the past four decades (Timbol and Maciolek 1978; Maciolek 1984; Devick 1991; Polhemus 1996). Timbol and Maciolek (1978) inventoried Oahu streams and classified their biological importance relative to the extent of their physical alteration. All streams draining into Pearl Harbor demonstrated a high degree of artificial channelization along a significant portion of their lower reaches. Most have been dewatered to some degree by surface diversion and groundwater pumping, and dammed, realigned, and/or channelized. Timbol and Maciolek (1978) classified the

ecological value of most Pearl Harbor streams as Class III (exploitive-consumptive). Within the Waikele Stream watershed alone, they counted a total of 14 surface diversions and 65 road crossings.

From a biological perspective, Timbol and Maciolek (1978) concluded that none of the streams draining into Pearl Harbor could be considered as pristine. Coles, et al. (1999) discovered that introduced species comprise 47% of the aquatic biota found in Pearl Harbor estuarine and riparian habitats, while only 33% were confirmed to be native species (the balance being undetermined). Hawaiian aquatic ecologists generally consider relatively high numbers of introduced species in a given stream or wetland to be indicative of severe ecological disturbance. Introduced species are known to eliminate native biota through competition for food and shelter, predation, habitat and food chain alteration, and introduction of parasites and disease.

The most recent comprehensive stream surveys conducted within the HECO pipeline alignment are those of Englund (1993) and Coles, et al. (1999). Previous studies include those of Ford (1985), Timbol and Maciolek (1978), and US Fish and Wildlife Service (1975). Higashi (2001) knew of no recent studies within the project area conducted by the State of Hawaii Division of Aquatic Resources.

A comprehensive list of aquatic macrofauna found within the lower reaches of influent streams to West Loch Pearl Harbor appears in *Appendix C: Stream and Wetland Records for Invertebrates and Fishes Collected or Observed in Pearl Harbor, Legacy Project Surveys of Freshwater and Estuarine Habitats* by Coles, et al. (1999). These investigators recorded a total of 329 species in 14 phyla from the "estuarine and riparian habitats of Pearl Harbor", of which 21% were native to Hawaii and 60% were introduced species. Of these, 192 species were aquatic macrofauna other than insects. As Timbol and Maciolek (1978) reported finding these Pearl Harbor streams to be dominated by introduced aquatic species, so too did Coles, et al. (1999) find similar results within area wetlands, streams, and estuaries. They estimated that about 47% of the aquatic species found within the area were introduced, while only 33% of aquatic species found within the area were endemic and indigenous to Hawaii (the origin of the remaining 19% could not be determined).

The most predominant group of aquatic animals found within the area was insect species, of which 79% were aquatic flies, followed by dragonflies and damselflies (8%), aquatic beetles (6.6%), and the true bugs (5.5%). Insects ranged from a low count of two species at the Waiawa Unit of the Pearl Harbor National Wildlife Refuge (due to limited sampling time) to a high count of nearly 30 species within the terminal reaches of Honouliuli, Waiawa and Waimalu Streams, Waiau and Waiawa Springs (Coles, et al. 1999).

Ford (1985), Englund (1993), and Coles, et al. (1999) observed only non-native mollusks in freshwater and estuarine environments within the area affected by the proposed HECO pipeline. Coles recorded two new freshwater mollusk introductions in 1999 including the Apple snail (*Pomacea canaliculata*) and a hydobiid snail (*Pygrophorus* cf. *coronatus*). None of the native Hawaiian mollusks characteristic of healthy stream or estuarine habitats were observed during this study.

Estuarine crustaceans within the proposed HECO pipeline alignment include an abundance of native species including *Periclimenes* cf. *grandis*, *Palaemon debilis*, *Thalamita crenata*, and *Ligia hawaiiensis*. Toward the head of the estuaries near the upstream limit of tidal influence, the native prawn *Macrobrachium grandimanus* appears to be relatively common. *Neocaridina denticulata sinensis*, an newly introduced species of freshwater shrimp from China and Taiwan as also abundant within Pearl Harbor streams (Devick 1991; Coles, et al. 1999). *Neocaridina* is in the same family of shrimp as the native Hawaiian "mountain opae" *Atyoida bisulcata*; however, the latter species has not been found in Pearl Harbor streams. The introduced Louisiana crayfish *Procambarus clarkii* and the Tahitian prawn *Macrobrachium lar* are common in freshwater habitats in of Pearl Harbor.

Introduced poeciliid fishes (particularly mosquito fish and guppies), tilapia (*Sarotherodon melanotheron*), the native o'opu akupa (*Eleotris sandwicensis*) and the native 'aholehole (*Kuhlia*

sandvicensis) were the most common fishes observed in the lower reaches of Pearl Harbor streams during this study, and generally the most common found by previous investigators. Introduced swordtails, platyfish, and armored catfishes (*Ancistris* sp., *Hypostomus* sp.) are also locally common within the terminal and lower reaches of Pearl Harbor streams. Coles, et al. (1990) found the introduced Chinese catfish (*Clarias fuscus*) only in Waiawa Spring. This species was abundant in Pearl Harbor streams some 25 years ago (Shima 1961; Timbol and Maciolek 1978). The 'dojo' or Oriental loach (*Misgurnus anguillicaudatus*), also common in Pearl Harbor streams two decades ago, has not been found in recent years. Shima (1961) and Ford (1985) found small populations of the Hawaiian amphidromous o'opu *Awoous guamensis* present in the middle reaches of Waikele Stream, within the Waikele Branch of the Lualualei Naval Magazine. Coles, et al (1999) reported the species from Waikele Stream and Waimalu Stream. Table 1, provided at the end of this report, lists estuarine and aquatic species found within the six perennial and two intermittent streams affected by the proposed HECO pipeline project.

5.2 Wetlands

The Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit, 1990) identifies the Waimalu, Waiawa, Waikele, and Honouliuli estuarine areas as "special areas" primarily due to the significance of their riparian wetlands to endangered waterbirds. The US Fish and Wildlife Service (1990) listed Pouhala Marsh as a priority wetland acquisition site due to its importance for endangered species habitat, migratory waterbirds and waterfowl, and flood control. In addition to the Honouliuli and Waiawa units of the Pearl Harbor National Wildlife Refuge, Miller, et al. (1989) list riparian wetlands within the terminal reach of Waikele Stream, Waipahu Landfill, Pouhala Marsh, and the Waipio Peninsula as important, ecologically sensitive wetland habitats.

Pearl Harbor wetlands provide important loafing, feeding, and nesting habitat for migratory shorebirds and waterbirds, and for the four species of endangered Hawaiian waterbirds (US Fish and Wildlife Service, 1990; Ducks Unlimited 1998; US Fish and Wildlife Service 1998). Previous biological surveys revealed that these wetlands represent disturbed habitats with a high percentage of introduced plant species (>87%) and arthropods (nearly 90%).

6.0 IMPACTS OF THE PROJECT UPON AQUATIC ECOSYSTEMS

6.1 Introduction

The dramatic expansion of the Aiea-Pearl City-Waipahu-Wahiawa metropolis over the past 40 years has resulted in substantial modification of the natural watercourses draining central Oahu. Ecologically detrimental alternations have resulted primarily from stream channelization, dewaterment, point-and non-point source pollution, and introduction of non-native aquatic species. Maciolek (1977) observed that the primary threat to native Hawaiian stream life statewide was the loss and degradation of available stream habitats. Norton, et al. (1978) and Hathaway (1978) evaluated the effects of urbanization upon native Hawaiian stream fauna, including an assessment of lethal tolerances to variation in basic physicochemical parameters. Largely because of these insults, the altered streams of urban Oahu, and particularly in south central Oahu, were found to have severely depleted populations of native Hawaiian aquatic insects, fishes, mollusks, and crustaceans.

The potential for alternation of freshwater stream and marshland habitats due to accidental petroleum spills exists following the new pipeline construction, but is highly unlikely. Impacts of oil spills in the Pearl Harbor estuary are well documented (Natural Resource Trustees, et al 1996), and are addressed below.

6.2 Impacts of Pipeline Construction on Stream and Wetland Resources

Historic stream habitat degradation within the Pearl Harbor area has dramatically reduced populations of native stream organisms (Maciolek, 1977 and 1984; Timbol and Maciolek, 1978; and Devick, 1991). No rare, threatened, or endangered stream fauna will be affected by the proposed project. Migratory pathways for native amphidromous species that may persist within Pearl Harbor perennial streams will not be affected by project construction.

Neither installation of the new pipeline across existing trestles nor Horizontal Directional Drilling under stream channels should affect stream water quality, aquatic habitats or fauna. No disturbance to the stream banks, riparian vegetation, or benthic habitat is anticipated to occur as a result of pursuing either alternative construction method.

Impacts to aquatic resources of other Pearl Harbor streams where disturbance of the stream banks, substratum, and stream flow may be ancillary to pipeline construction are likely to be short-term and ecologically insignificant. Mobilization of heavy equipment and construction materials adjacent to streams may result in disturbance of ground cover and riparian vegetation, and may result in temporary increases in sedimentation from cleared areas. In instances where pipeline construction will require temporary diversions and cofferdams within stream channels, the disturbance of soils and riparian vegetation will result in short-term increases in turbidity and sedimentation of benthic habitats immediately downstream. This impact is anticipated to be negligible when compared to the volume of sediments that wash downstream from disturbed upland forests, fallow agricultural lands, and urbanized streets and parking lots within the central Oahu watersheds. It is also possible that petroleum product (e.g. motor, Diesel, and lubricating oil) sheens may be found downstream of heavy construction equipment, particularly during heavy rains. All of these impacts can be mitigated through best management practices and careful site preparation.

In case(s) where construction of temporary cofferdams must be constructed, complete stream dewaterment is not anticipated and no significant or long-term alterations of stream physicochemical parameters or migratory pathways are anticipated. Streambeds in the terminal reaches of Pearl Harbor streams where the pipeline crossings are proposed are characteristically muddy. Although a temporary increase in sedimentation is anticipated downstream of cofferdam construction, no long term detrimental impacts are anticipated once the cofferdams are removed upon project completion.

The Waiawa Unit of the Pearl Harbor National Wildlife Refuge is intensively managed to support threatened and endangered waterbirds, waterfowl, and migratory shorebirds. Pipeline construction (e.g. road grading, clearing, snagging, trenching, and related heavy equipment mobilization) may create temporary disturbances to ruderal wetland soils and vegetation within the northern margins of Pouhala Marsh; adjacent to the terminal reaches of some Pearl Harbor perennial streams, and to the cultivated wetlands immediately south of Leeward Community College. Pearl Harbor wetlands provide loafing, feeding, and nesting habitat for migratory shorebirds and waterbirds, and for the four species of endangered Hawaiian waterbirds. However, previous biological surveys revealed that these wetlands represent disturbed habitats with a high percentage of introduced species. These construction-related impacts are likely to be localized in their effect. Construction is planned to avoid sensitive waterbird and waterfowl habitats altogether.

In past years, there has been uncontrolled dumping of soils, construction debris, and other undocumented materials in and adjacent to the landfill area at Pouhala and at other landfills within Pearl Harbor. Ducks Unlimited (19) found little or no toxic substances in Pouhala Marsh soils; however, leachate samples collected from monitoring wells and soils within the landfill at Pearl City Peninsula were found to possess an substances characteristic of municipal solid waste (Natural Resource Trustees, et al 1996). Detectable concentrations of fuel products found in wetland soils near the Waiawa Unit of the Pearl Harbor National Wildlife Refuge sediments may be from both a 1987 fuel spill and the 1996 Chevron oil spill. Hydrologic evidence indicates that leachate mixed with ground water may enter the refuge; however, recent surface water and sediment sampling analyses indicated that there are no detectable impacts due to hazardous chemicals. Relatively high concentrations of certain heavy metals observed in Pearl Harbor wetland sediments may be due in part to the behavior of wetlands as contaminant sinks.

No construction will occur within or immediately adjacent to any units of the Pearl Harbor National Wildlife Refuge System. No net loss of wetland or stream habitat, and no net degradation of water quality is anticipated to occur as a result of any construction method under consideration. Disturbance of wetland soils for construction of the proposed pipeline, however, is not expected to result in detrimental effects to wetland ecology. Results of limited sampling by the US Fish and Wildlife Service suggest that the relative potential impact of contaminated ground water/leachate flowing into the northern portion of the Waiawa Unit is low under existing conditions. Construction activities associated with the proposed HECO pipeline is not expected to increase the risk of soil or water contamination within or adjacent to the Waiawa Unit.

6.3 Impacts of Potential Oil Spills on Pearl Harbor Streams and Wetlands

Historic contamination of stream and estuarine waters and sediments in Pearl Harbor is well documented, and has led the Hawaii State Health Department to issue warnings about the consumption of fishes and shellfishes from harbor waters. Two petroleum product spills in Pearl Harbor, in 1987 and 1996, were known to have detrimental impacts to area stream, wetlands, and aquatic life. Should the proposed HECO pipeline leak at or adjacent to a stream crossing, the warm petroleum products would likely flow downstream where they may enter riparian wetlands and permeate emergent vegetation. As the oil cools, it would likely sink and pool in marshes and subsequently become incorporated into sediments. It is reasonable to assume that leaking petroleum that infiltrates downstream marsh habitat may negatively impact all flora and fauna found within this habitat through. Typically, wildlife is exposed to oil through direct contact and ingestion. Animals that come in direct contact with petroleum products can become fouled or smothered. Absorption of the volatile compounds in petroleum can also injure and kill. Indirect exposure to petrochemicals through consumption of contaminated prey and/or preening is also possible. Spilled petroleum affects vegetation through smothering, which subsequently lowers the value of wetland vegetation for wildlife. In the 1996 Chevron Waiawa Oil Spill, the Natural Resource Trustees, et al (1996) concluded that all of the freshwater marsh's ecological functions were lost as a result of the spill. Based upon their literature review, they estimated that it might take as many as 15 to 20 years before the marsh is fully recovered.

While natural weathering will help restore wetlands following a spill, the effectiveness of weathering may be reduced in the relatively low energy wetland environments of Pearl Harbor. As residual oil sheens continue to become mobilized after a spill, plants and aquatic life will continue to be exposed to petroleum byproducts. This would increase and prolong the detrimental affects of contamination upon wetland wildlife, possibly including endangered waterbirds in the Pearl Harbor area. Careful construction techniques and management of wetland habitats at Pouhala Marsh and the Pearl Harbor National Wildlife Refuge Units can help to avoid these impacts altogether. The proposed HECO pipeline is made of new materials designed and assembled to maintain physical integrity and prevent leakage, making the possibility of a spill from this source very rare. Wise spill contingency planning and appropriate design of wetland habitat enhancements by resource management agencies can help to mitigate the impacts of yet another Pearl Harbor oil spill.

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Table 1: Pearl Harbor Stream, Wetland, and Estuarine Species List

Class Taxon and Author	Habitat: F=Freshwater; E=Estuarine; R=Riparian	Status: End=Endemic; Ind=Indigenous; Exo=Exotic, intentionally or accidentally introduced; ?=Undetermined	Honouliuli Stream	Kapakahi Stream	Pouhala Marsh	Waiau Spring	Walawa Springs	Walawa Stream	Walawa NWR Unit	Waikele Springs	Waikele Stream	Waimalu Stream
Anthozoa												
Epiphellia humilis (Verill 1928)	E	Ind		X								
Secernentea												
Camallanus cotti Fujita 1927	F	Exo		X			X				X	
Sipuncula												
Undetermined sipunculid?												X
Hirudinea												
Aestabdella abditovesiculata (Moore 1952)	F	Exo						X			X	X
Myzobdella lugubris Leidy 1851	F	Exo					X				X	
Oligochaeta												
Undetermined oligochaete	F	?						X				
Polychaeta												
Neanthes sp.	F,E	Ind									X	
Capitella capitata (Fabricius 1780)	F,E	Ind	X								X	
Armandia intermedia Fauvel 1902	F,E	Ind		X							X	
Undetermined amphinomid	F,E	?	X								X	
Minuspio sp.	F,E	?		X							X	
Streblospio benedicti Webster 1879	F,E	Ind	X									
Undetermined spionid	E	?	X									
Gastropoda												
Physa sp.	F,E	Exo		X								
Planorbella duryi (Wetherby 1879)	F	Exo		X			X					
Pomacea sp.	F	Exo		X						X		
Pyrgophorus cf. *coronatus* Pfeiffer 1840	F	Exo			X		X		X			
Melanoides tuberculata (Muller 1774)	F	Exo		X	X		X				X	
Tarebia granifera (Lamarck 1816)	F	Exo								X		
Thiara cf. *indefinata* (Lea & Lea 1851)	E	Exo	X									
Undetermined thiarid	E	?	X									
Pelecypoda												
Corbicula fluminea Muller 1774	F,E	Exo		X			X		X	X	X	
Arthropoda												
Undetermined ascid	F	?			X							

Class Taxon and Author	Habitat: F=Freshwater; E=Estuarine; R=Riparian	Status: End=Endemic; Ind=Indigenous; Exo=Exotic, intentionally or accidentally introduced; ?=Undetermined	Honouliuli Stream	Kapakahi Stream	Pouhala Marsh	Waiau Spring	Walawa Springs	Walawa Stream	Walawa NWR Unit	Waikele Springs	Waikele Stream	Waimalu Stream
Lasioseius sp.	F	Exo			X							
Bdella distincta Baker and Balock 1944	F	Exo			X							
Eupodes n. sp.	F	New?			X							
Amblyseius sp. nr. *oahuensis/coniferus*	F	?			X							
Tetragnatha mandibulata Walckennaer 1841	R	Exo	X	X			X					X
Insecta												
Araeocerus sp.	R	Exo	X	X		X	X				X	X
Stator limbatus (horn 1873)	R	Exo					X					
Prosoplus bankii (Fabricius 1775)	R	Exo	X									
Sybra alernans (Wiedemann 1825)	R	Exo										X
Chaetocnema confinis Crotch 1873	R	Exo		X		X		X				
Brumoides suturalis (Fabricius 1798)	R	Exo			X		X					
Curinus coeruleus (Mulsant 1850)	R	Exo					X	X			X	
Diomus notescens (Blackburn 1889)	R	Exo						X				
Scymnus loewii Mulsant 1850	R	Exo				X		X			X	
Sticholotis ruficeps Weise 1902	R	Exo						X				
Cryptamorpha desjardinsi (Guerin-Meneville 1844)	R	Exo						X				
Enochrus sayi Gundersen 1977	F,E	Exo		X	X		X	X				X
Tropistemus cf. *salsamentus* Fall 1901	F,E	Exo		X			X					
T. lateralis humeralis Motschulsky 1859	F,E	Exo						X			X	
T. salsamentus Fall 1901	F	Exo		X	X		X					
Parathroscinus cf. *murphyi* Woodridge 1990	F,E	Exo	X	X		X	X				X	X
Undetermined nitidulid	R	Exo			X							
Amauromyza maculosa (Malloch 1913)	R	Exo						X				
Liriomyza sp. Prob. *Sativae* Blanchard 1938	R	Exo										X
Liriomyza sp.	R	Exo						X				
Melanagromyza splendida Frick 1953	R	Exo	X	X		X						X
Siguloessa sp?	R	Exo					X	X				

Class Taxon and Author	Habitat: F=Freshwater; E=Estuarine; R=Riparian	Status: End=Endemic; Ind=Indigenous; Exo=Exotic, intentionally or accidentally introduced; ?=Undetermined	Honouliuli Stream	Kapakahi Stream	Pouhala Marsh	Walau Spring	Walawa Springs	Walawa Stream	Walawa NWR Unit	Waikele Springs	Waikele Stream	Waimalu Stream
Chrysomya megachepala (Fabricius 1794)	R	Exo	X									
Melinda pusilla (Villeneuve 1927)	R	Exo						X				
Procanoce williamsi Wirth 1951	F,E	Exo	X			X	X				X	X
Undetermined cecidomyiid	R	?										X
Atrichopogon jacobsoni (Meijere 1907)	F,E	Exo										X
Atrichopogon sp.	F	Exo						X				
Dasyhelea calvescens Macfie 1938	F,E	Ind?					X	X				X
Dasyhelea digna Borkent 1996	F	End	X									X
Dasyhelea hawaiiensis? Macfie 1934	F	End					X	X				X
Dasyhelea spp.	F	?		X		X		X				X
Forcipomyia sp.	E	?	X			X						
Chironomus crassiforceps (Keiffer 1916)	F	Exo		X	X							
Chironomus hawaiiensis Grimshaw 1901	E	End?	X									X
Cricotopus bicinctus (Meigen 1818)	F	Exo		X		X		X			X	
Goeldichironomus holoprasinus (Goeldi 1905)	F	Exo		X		X	X					
Orthocladius spp.	F,E	?	X	X		X						X
Cadrema pallida (Loew 1865)	R	Exo	X			X						X
Liohippelates collusor (Townsend 1895)	R	Exo	X			X						
Monochaetoscinella ananyma (Williston 1896)	R	Exo		X							X	X
Rhodesiella scutellata (Meijere 1908)	R	Exo						X			X	X
Rhodesiella sp.	R	?				X						
Semaranga dorsocentralis Becker 1911	R	Exo										X
Undetermined chyromyid	R	?	X									
Nannodastia hooi Hendel 1930	R	Exo					X					
Chrysotus longipalpus Aldrich 1896	F,E	Exo				X					X	
Chrysotus sp.	F	Exo						X				
Condylostylus longicornis (Fabricius 1775)	F,E	Exo	X	X				X				
Undetermined dolichopodid	F	?					X					

Class Taxon and Author	Habitat: F=Freshwater; E=Estuarine; R=Riparian	Status: End=Endemic; Ind=Indigenous; Exo=Exotic, intentionally or accidentally introduced; ?=Undetermined	Honouliuli Stream	Kapakahi Stream	Pouhala Marsh	Walau Spring	Walawa Springs	Walawa Stream	Walawa NWR Unit	Waikele Springs	Waikele Stream	Waimalu Stream
Hydrophorus pacificus van Duzee 1933	F	End?					X					
Syntormon flexible Becker 1922	F,E	Exo	X		X	X	X				X	
Tachytrechus angustipennis Loew 1862	F	Exo						X				X
Thinophilus hardyi Grootaert & Evenhuis 1996	F,E	Exo	X		X	X	X					X
Hemerodromia prob. *stellaris* Melander 1947	F	Exo									X	
Atissa oahuensis Cresson 1948	F,E	End	X		X	X	X					X
Brachydeutera ibari Ninomiya 1930	F	Exo									X	
Ceropsilopa coquilletti Cresson 1922	F,E	Exo	X		X							X
Clasiopella uncinata Hendel 1914	F,E	Exo	X									X
Discocerina mera Cresson 1939	F,E	Exo	X				X	X				X
Donaceus nigronotatus Cresson 1943	F,E	Exo		X		X	X				X	
Ephydra milbrae Jones 1906	F,E	Exo	X		X		X					
Hydrellia williamsi Cresson 1936	F	Exo				X						
Lytogaster gravida (Loew 1863)	F	Exo				X						
Notiphila insularis Grimshaw 1901	F	End									X	
Ochthera prob. *circularis* Cresson 1926	F,E	Exo			X						X	
Paratissa pollinosa (Williston 1896)	F,E	Exo									X	
Placopsidella marquesana (Malloch 1933)	F,E	Exp				X	X					
Psilopa girschneri Von Roeder 1889	F,E	Exo	X		X		X					X
Scatella bryani (Cresson 1926)	F	End?				X						
Scatella sexnotata Cresson 1926	F	Ind	X		X	X	X			X		X
Scatella spp.	F	End?	X								X	
Scatella stagnalis (Fallen 1813)	F,E	Exo	X	X	X	X	X	X			X	X
Homoneura unguiculata (Kertesz 1913)	R	Exo										X
Lonchaea sp.	R	?						X				
Desomometopa sp.	R	?	X									
Leptometopa sp.	R	?			X							
Atherigona reversura Villeneuve 1936	R	Exo									X	

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Hydroteaea chalcogaster (Wiedemann 1824)	R	Exo	X									
Teleostylinus lineolatus (Wiedemann 1830)	R	Exo						X				
Notogramma cimiciforme Loew 1867	R	Exo		X								
Psychoda sp.	E	?	X									
Gressittomyia gressitti (Hall & Bohart 1948)	R	Exo	X									
Tricharaea occidua (Fabricius 1794)	R	Exo				X						
Undetermined sciarid	R	?		X								X
Coproica hirtula (Rondani 188)	R	Exo										X
Leptocera abdominiseta (Duda 1925)	R	Exo						X				X
Leptocera fuscipennis (Haliday 1933)	R	Exo	X		X							X
Pterogramma brevivenosum (Tenorio 1968)	R	End									X	
Evaza javanensis Meijere 1911	R	Exo						X				
Hermetia illucens (Linnaeus 1758)	R	Exo		X								
Allograpta exotica (Weidemann 1830)	R	Exo				X	X					
A. obliqua (Say 1823)	R	Exo	X									
Omidia obesa (Fabricius 1775)	R	Exo	X	X		X	X				X	X
Toxomerus marginatus (Say 1823)	R	Exo				X	X					
Trichopoda pilipes (Fabricius 1805)	R	Exo									X	
Acinia picturata (Snow 1894)	R	Exo										X
Ensina sonchi (Linnaeus 1767)	R	Exo				X						
Neotephritis sp.	R	End	X									
Dasyrhinconessa insularis (Aldrich 1931)	F,E	Ind?	X		X	X	X					X
Dasyrhinconessa sp.	F,E	?	X			X						
Dasyrhinconessa vockerothi Hardy & Delfinado 1980	F,E	Ind?			X							
Tethina variseta (Melander 1951)	F,E	Exo										X
Limonia advena (Alexander 1954)	F	End?								X		
Limonia swezeyi (Alexander 1919)	F,E	End	X									
Stringomyia didyma Grimshaw 1901	F	Exo				X						

Class Taxon and Author	Habitat: F=Freshwater; E=Estuarine; R=Riparian	Status: End=Endemic; Ind=Indigenous; Exo=Exotic, intentionally or accidentally introduced; ?=Undetermined	Honouliuli Stream	Kapakahi Stream	Pouhala Marsh	Waiau Spring	Waiawa Springs	Waiawa Stream	Waiawa NWR Unit	Waikele Springs	Waikele Stream	Waimalu Stream
Symplecta pilipes (Fabricius 1787)	F	Exo			X							
Xenasteia sabroskyi? Hardy 1980	E	?										X
Paratriphleps laeviusculus Champion 1901	R	Exo					X					X
Undetermined coreid	R	?				X						
Trichcorixa reticulata (Guerin-Meneville 1857)	F	Exo			X		X					
Halobates hawaiiensis Usinger 1938	E	Ind						X	X			X
Nysius caledoniae Distant 1920	R	Exo		X		X						
Nysius sp.	R	?	X	X	X	X						X
Mesovelia amoena Uhler 1894	F,E	Exo		X	X			X				
Mesovelia mulsanti White 1879	F,E	Exo		X	X	X	X	X			X	
Trigonotylus sp.	R	?				X						
Liorhyssus hyalinus (Fabricius 1794)	R	Exo		X		X						
Micracanthia humilis (Say 1832)	F	Exo					X	X				
Corythucha morrilli Osborn & Drake 1917	R	Exo						X				
Leptodictya tabida (Herrich-Schaeffer 1840)	R	Exo									X	
Balcutha sp.	R	?		X								
Draeculacephala sp.	R	Exo		X			X					
Empoasca sp.	R	Exo		X	X							
Clastoptera xanthocephala Germar 1839	R	Exo			X		X					
Melormenis basalis (Walker 1851)	R	Exo	X	X	X							
Undetermined tropiduchid	R	Exo	X		X	X						
Philotrypesis sp.	R	Exo?										X
Pithitis smaragdula (Fabricius 1787)	R	Exo					X					
Xylocopa sonorina Smith 1874	R	Exo	X	X		X	X				X	X
Coccophagus ceroplastae? (Howard 1895)	R	Exo	X									
Apis mellifera Linnaeus 1758	R	Exo	X	X		X	X				X	X
Brachymeria sp.	R	?	X									
Elasmus sp.	R	?	X									
Anastatus koebelei Ashmead 1901	R	End						X				
Evannia appendigaster (Linnaeus 1758)	R	Exo									X	

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Undetermined formicid	R	Exo	X	X		X	X					
Undetermined pteromalid	R	?									X	X
Togmus sp.	R	?										
Delia curvata Saussure 1854	R	Exo	X									
D. pryeriana philippinensis (Bequaert 1928)	R	Exo	X									
Pachodynerus nasidens (Latreille 1832)	R	Exo	X	X		X	X				X	X
Polistes carnifex Saussure 1853	R	Exo	X	X		X	X				X	X
P. exclamans Viereck 1906	R	Exo			X							
P. olivaceus (DeGeer 1773)	R	Exo	X	X		X	X				X	X
Herpetogramma licarsisalis (Walker 1859)	R	Exo	X	X		X	X				X	X
Macaria abdotaa Guenee 1857	R	Exo	X	X		X	X				X	X
Brephidium exilis (Bolsduval 1852)	R	Exo	X	X		X	X				X	X
Agraulis vanillae (Linnaeus 1758)	R	Exo	X	X		X	X				X	X
Danaus plexippus (Linnaeus 1758)	R	Exo	X	X		X	X				X	X
Popillo stultus (Linnaeus 1767)	R	Exo	X									
Pieris rapae (Linnaeus 1758)	R	Exo	X	X		X	X				X	X
Conocompsa zimmermani Klimmins 1953	R	Exo	X									
Micromus timidus Hagen 1853	R	Exo						X			X	
Anax junius (Drury 1770)	F,E	Ind	X	X		X	X				X	X
Erolloxena civile (Hagen 1862)	F	Exo	X								X	
Ischnura posita (Hagen 1862)	F,E	Exo		X				X				
I. ramburii (Selys-Longchamps 1850)	F,E	Exo	X	X		X			X	X	X	X
Crocothemis servilia (Drury 1770)	F,E	Exo	X	X	X	X	X	X			X	X
Orthemis ferruginea (Fabricius 1775)	F	Exo	X			X						
Pantala flavescens (Fabricius 1798)	F,E	Ind	X			X	X					
Oedaleus abruptus (Thunberg 1815)	R	Exo						X				
Schistocerca nitens (Thunberg 1815)	R	Exo						X				
Atractomorpha sinensis Bolivar 1905	R	Exo		X		X						
Paratettix mexicanus (Saussure 1861)	R	Exo		X		X						

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Conocephalus solitator (Saussure 1859)	R	Exo	X	X		X	X					
Elimoea portifera (Walker 1869)	R	Exo	X	X		X	X					X
Excoconcephalus nasutus (Thunberg 1815)	R	Exo									X	
Xyphidiopsis ilia Hebard 1922	R	Exo	X	X		X	X					X
Cheumatopsyche petitii (Banks 1908)	R	Exo								X		
Crustacea												
Undetermined ostracod	F	?			X			X				
Undetermined amphipod	F,E	?	X	X	X						X	
Hyalella azteca (Saussure 1858)	F	End								X		
Undetermined talitrid	F,E	?	X	X		X	X				X	X
Caligus rogoce Edwards 1840	F	Ind									X	
Alpheus mackayi Banner 1959	E	Ind								X		
Neocaridina denticulata sinensis (de Haan 1844)	F	Exo								X	X	X
Procambarus clarkii (Girard 1852)	F	Exo		X		X	X			X	X	
M. lar (Fabricius 1798)	F	Exo										
Macrobrachium grandimanus (Randall 1840)	F,E	Ind	X									
Palaemon debilis? (Dana 1852)	F,E	Ind	X									
Periclimenes cf. *grandis* (Stimpson 1860)	F,E	Ind	X									
Metapograpsus messor Forskal 1900	F	Ind										
Podophthalmus vigil Weber 1795	E	Ind		X								
Pseudohalmus pustulosus (Edmondson 1954)	F	End				X						
Thalamita crenata Latreille 1900	F,E	Ind	X	X	X		X					
Undetermined isopod	F	?					X	X				
Undetermined armadillid	F,E	?	X	X			X					
Ligia hawaiiensis (Dana 1853)	R	End										
Porcellio laevis Latreille 1804	R	Exo										
Undetermined mysid	E	?	X									
Chondrichthyes												
Sphyrna lewini Griffith & Smith 1834	E	Ind										
Osteichthyes												
Saurida gracilis Quoy & Gaimard 1824	F,E	Ind	X	X								
Awaous guamensis (Valenciennes 1837)	F,E	Ind	X	X								
Eleotris sandwicensis Vaillant & Sauvage 1875	F,E	Ind	X	X								
Gobiomorus dormitor Lacepede 1800	F,E	Ind	X	X								
Lentipes concolor (Gill 1860)	F	End										
Sicyopterus stimpsoni (Gill 1860)	F	End										
Stenogobius hawaiiensis Watson & Pezold 1995	F	End										
Poecilia latipinna (Lesueur 1821)	F,E	Exo	X	X								
Poecilia reticulata Peters 1859	F,E	Exo	X	X								
Xiphophorus hellerii Heckel 1848	F	Exo										
Xiphophorus maculatus (Gunther 1866)	F	Exo										
Oreochromis mossambicus (Peters 1852)	F,E	Exo	X	X								
Tilapia mariae Boulenger 1899	F	Exo										
Tilapia zillii (Gervais 1848)	F	Exo										
Mugil cephalus Linnaeus 1758	E	Ind	X	X								
Rhinogobius brunneus (Temminck & Schlegel 1845)	F	Exo										
Kuhlia sandvicensis (Steindachner 1876)	F,E	Ind	X	X								
Lutjanus kasmira (Forsskal 1775)	E	Ind	X	X								
Mugil cephalus Linnaeus 1758	E	Ind	X	X								
Sicyopterus stimpsoni (Gill 1860)	F	End										
Stenogobius hawaiiensis Watson & Pezold 1995	F	End										
Poecilia latipinna (Lesueur 1821)	F,E	Exo	X	X								
Poecilia reticulata Peters 1859	F,E	Exo	X	X								
Xiphophorus hellerii Heckel 1848	F	Exo										
Xiphophorus maculatus (Gunther 1866)	F	Exo										
Oreochromis mossambicus (Peters 1852)	F,E	Exo	X	X								
Tilapia mariae Boulenger 1899	F	Exo										
Tilapia zillii (Gervais 1848)	F	Exo										
Mugil cephalus Linnaeus 1758	E	Ind	X	X								
Rhinogobius brunneus (Temminck & Schlegel 1845)	F	Exo										
Kuhlia sandvicensis (Steindachner 1876)	F,E	Ind	X	X								
Lutjanus kasmira (Forsskal 1775)	E	Ind	X	X								
Mugil cephalus Linnaeus 1758	E	Ind	X	X								

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Colossoma macropomum (Cuvier 1818)	F	Exo					X					
Undetermined dussumieriid	F	?	X									
Encrasicholina purpurea Fowler 1900	F	Ind	X									
Undetermined engraulid	F	Ind					X					
Gambusia affinis Baird & Girard 1853	F,E	Exo	X	X	X	X	X	X	X	X	X	X
Limia cf. *vittata* Guichénot 1853	F,E	Exo		X	X		X		X		X	
Poecilia latipinna LeSeur 1821	F,E	Exo			X				X			
P. mexicana Steindachner 1863	F,E	Exo	X	X	X	X	X	X	X	X	X	X
P. reticulata Peters 1859	F	Exo		X			X	X		X	X	X
Xiphophorus helleri Heckel 1848	F	Exo				X				X	X	X
X. maculatus (Gunther 1866)	F	Exo		X	X							
Chanos chanos Forsskal 1775	E	Ind							X			X
Scomberoides lysan Forsskal 1775	F,E	Ind	X					X				
Hemichromis elongatus Guichenot in Dumeril 1861	F	Exo						X				
Sarotherodon melanotheron Ruppell 1852	F,E	Exo	X	X	X	X	X	X	X	X	X	X
Eleotris sandwicensis Vaillant & Sauvage 1875	F,E	End	X	X	X			X			X	X
Awaous guamensis Valenciennes 1837	F	End									X	X
Mugilogobius cavifrons Weber 1909	F,E	Exo		X			X				X	X
Oxyurichthys lonchotus Jenkins 1903	F,E	Ind					X					X
Stenogobius hawaiiensis Watson 1991	F	Ind	X				X	X			X	X
Kuhlia sandvicensis Steindachner 1876	F,E	End	X				X	X	X		X	
Moolgarda engeli Bleeker 1858	F,E	Exo	X						X		X	
Mugil cephalus Linnaeus 1758	F,E	Ind	X				X		X		X	X
Neomyxus leuciscus Gunther 1871	F	Ind							X			
Sphyraena barracuda Walbaum 1792	F,E	Ind						X	X		X	X
Clarias fuscus (Lacepede 1803)	F	Exo					X					
Ancistrus temminckii Valenciennes 1840	F	Exo								X	X	
Hypostomus cf. *watwata* Hancock 1828	F	Exo						X			X	

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Monopterus albus Zuiew 1793	F	Exo						X				
Amphibia												
Bufo marinus (Linnaeus 1758)	F	Exo		X		X		X		X	X	X
Rana catesbiana Shaw 1802	F	Exo		X		X		X				
R. rugosa Schlegel 1838	F	Exo								X		

Adapted from Coles, S.L., R.C. DeFelice, L.G. Eldredge, and J.T. Carlton. 1999. *Biodiversity of freshwater and estuarine communities in Lower Pearl Harbor, Oahu, Hawaii with observations on introduced species.* Bishop Museum, Hawaii Biological Survey, Honolulu, Hawaii. 68pp + Appendicies.

APPENDIX D BOTANICAL SURVEY, WAIAU FUEL PIPELINE PROJECT

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BOTANICAL SURVEY
WAIAU FUEL PIPELINE PROJECT

INTRODUCTION

Hawaiian Electric Company, Inc. (HECO) is proposing to construct a fuel pipeline and ancillary facilities to supply fuel for its Waiau Generating Station. The pipeline would be located mostly within the State Energy Corridor (SEC) and would extend from HECO's Barbers Point Tank Farm in Campbell Industrial Park to the Waiau Generating Station in Pearl City. The following action alternatives are being evaluated for the Environmental Impact Statement (ETS) to be prepared for the proposed project (Planning Solutions 2001).

Alternative 1 - Pipeline in the State Energy Corridor: This alternative would involve construction of a new pipeline along the SEC, from HECO's Barbers Point Tank Farm to the Waiau Generating Station. The insulated pipeline would be approximately 13 miles in length and would transport heated low sulfur fuel oil (LSFO).

Alternative 2 - Continue to use the Chevron Pipeline: The fuel that is presently being used to power the Waiau Generating Station is delivered through Chevron's 8-inch black oil pipeline, which runs from Campbell Industrial Park to Waiau and then to the Honolulu Marine Terminal at Pier 30. Chevron performs this service under contract to HECO. This alternative involves the renegotiation of a long-term

contract between Chevron and HECO. This alternative does not involve construction of an entirely new pipeline, but continuing repair and incremental replacement of segments of the aging line when required.

Alternative 3 - Trucking: This alternative involves the use of tanker trucks to transport fuel from the Barbers Point Tank Farm to Waiau and the Iwilei Tank Farm.

Two listed endangered species which are protected by Federal and State endangered species laws are known from the Campbell Industrial Park and the former Barbers Point Naval Air Station: these are the 'Ewa Plains 'akoko *(Chamaesyce skottsbergii)* and *Achyranthes splendens* var. *rotundata* (U.S. Fish and Wildlife Service 1982, 1986). Two species of concern (U.S. Fish and Wildlife Service 1999), the native caper or maiapilo *(Capparis sandwichiana)* and naio *(Myoporum stellatum)*, also occur on the 'Ewa Plains area. These plants may be present on or near the SEC and Chevron routes.

Field studies were conducted to assess the botanical resources on both the SEC and Chevron pipeline routes, and the areas within the Barbers Point Tank Farm and the Waiau Generating Station that would be affected by project-related construction. The field studies were conducted on 10 to 13 October 2001 for the corridors and Barbers Point Tank Farm, and 21 November 2001 for the Waiau site. The primary objectives of the survey were to:

1) provide a general description of the vegetation on the project area;
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. Aerial photographs (1"=200') with the corridors identified and the project map were examined to determine vegetation cover patterns, terrain characteristics, access, boundaries and refererice points.

A walk-through survey method was used. Notes were made on plant associations and distribution, disturbances, substrate types, drainage, exposure, topography, 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. The less disturbed koa haole/kiawe scrub-covered areas on the Campbell Industrial Park and adjacent to the former Naval Air Station were surveyed more intensively as these areas were more likely to harbor native and, perhaps, rare species.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. A survey taken at a different time

of the year and under varying environmental conditions would no doubt yield slight variations in the species list, especially of the weedy, annual plants.

DESCRIPTION OF THE VEGETATION

A description of the four vegetation types found on the pipeline routes and the Waiau truck unloading facilities follows. An inventory of all the plants found in these vegetation types within the study area is presented in the checklist at the end of the report. The distribution of these four vegetation types along the SEC and Chevron pipeline routes and the truck unloading site is presented in the next section.

Ruderal/Roadside Vegetation

This vegetation type covers the most area on the project site. It is found adjacent to roadsides and the City and County's paved bikeway which runs along a portion of the O'ahu Rail and Land Co. (OR&L) Right-of-Way (ROW) and the SEC route. It is periodically maintained.

Along Farrington Highway and the roads which service the industrial park, the vegetation is mowed or bladed and, in some places, may be treated with herbicides (Char 1999). The vegetation consists of a mixture of grasses and weedy, mostly annual, herbaceous species. The plants which occur in this vegetation type are adapted to frequent mowing and vehicular traffic; they tend to form low, compact mats. The grasses which are abundant to common in these areas include buffelgrass *(Cenchrus ciliaris)*, swollen fingergrass *(Chloris barbata)*, Bermuda grass

(Cynodon dactylon), and Natal redtop *(Melinis repens)*. Among the more frequently observed herbaceous species and smaller shrubs are creeping indigo *(Indigofera hendecaphylla)*, *Sida ciliaris*, false mallow *(Malvastrum coromadelianum)*, Australian saltbush *(Atriplex semibaccata)*, hairy spurge *(Chamaesyce hirta)*, and *Boerhavia coccinea*. Scattered patches of barren, thin soils are also common, especially during the drier summer months.

In some places behind the mowed grassy strips, there may be a thin line of open, scrubby koa haole *(Leucaena leucocephala)* shrubs, 3 to 10 ft. tall. Clumps of Guinea grass *(Panicum maximum)* and buffelgrass, 2 to 3 ft. tall, usually form a dense cover between the shrubs. Other woody components which may be found here include Christmas berry *(Schinus terebinthifolius)*, castor bean *(Ricinus communis)*, sourbush *(Pluchea carolinensis)*, and young trees of kiawe *(Prosopis pallida)* and 'opiuma *(Pithecellobium dulce)*.

The asphalt-paved bikeway is lined by dirt shoulders with scattered patches of weedy plants. *Sida ciliaris*, which forms low, much-branched mats, is abundant along the bikeway, especially in areas with crushed coral fill. Other more commonly observed plants are Bermuda grass, buffelgrass, Guinea grass, pitted beardgrass *(Bothriochloa pertusa)*, *Trianthema portulacastrum*, swollen fingergrass, and *Calyptocarpus vialis*.

Koa Haole/Kiawe Scrub

This vegetation type occurs on those areas which have not been recently disturbed. It is found abutting the Chevron pipeline where it follows along the fenceline just

outside (mauka) of the former Naval Air Station, and also covers a large section where the SEC follows behind Waipahu High School and Leeward Community College.

It is characterized by koa haole shrubs which form a somewhat dense cover, 7 to 15 ft. tall, and scattered taller kiawe trees, 20 to 35 ft. high. Large trees of 'opiuma are occasional. On the 'Ewa Plains section, where thin soils overlay coralline substrate, the ground cover consists of patchy clumps of buffelgrass, 1 to 2 ft. tall. On the deeper soils by Pearl City, the ground cover consists of a more dense cover of Guinea grass, 2 to 3 ft. tall. Other plants associated with this vegetation type include false mallow, klu *(Acacia farnesiana)*, lion's ear *(Leonotis nepetifolia)*, Chinese violet *(Asystasia gangetica)*, sourbush, hairy abutilon *(Abutilon grandifolium)*, wild bittermelon *(Momordica charantia)*, and virgate mimosa *(Desmanthus virgatus)*. Native species which can be found in the koa haole/kiawe scrub are 'ilima *(Sida fallax)*, 'uhaloa *(Waltheria indica)*, ma'o or hoary abutilon *(Abutilon incanum)*, and popolo *(Solanum americanum)*.

Wetland Vegetation

Along the undeveloped areas of the Pearl Harbor shoreline with estuarine, intertidal habitats, American or red mangrove *(Rhizophora mangle)* is the dominant plant cover. The plants often form impenetrable thickets, 20 to 40 ft. tall; in some of the more sheltered, inland areas the trees may reach 50 to 60 ft. in height. Under the mangroves, there is only a dense carpet of leaf litter and propagules, and exposed substrate, usually mud or coral and shell rubble.

Mangrove is native to Florida, the West Indies, and South America. It was introduced by the American Sugar Company in 1902 to hold soil in mudflats on southwestern Moloka'i. Mangroves have been found in Pearl Harbor since 1917, but the steep-sided shoreline provided little suitable habitat. Mechanical harvesting of sugar cane in the mid-1940s led to increased sediment outputs causing the formation of deltas at the mouth of Pearl Harbor streams. These mudflats provided large areas suitable for mangrove colonization. Mangroves have also been successful because there are few native species which colonize mudflats and there are no mangrove predators (herbivores and insects) and diseases in Hawai'i (Bishop Museum 2000; Char 2000a).

Mudflats and shallow brackish water habitats also support dense patches of pickleweed *(Batis maritima)*, a native of tropical and subtropical America and the Galapagos Islands. Pickleweed was first observed in 1859 in the salt flats around Honolulu Harbor (Wagner *et al.* 1990). It spread quickly. In the 1930s, thick patches of pickleweed were described from along the West Loch shoreline. Pickleweed is a woody, much-branched shrub with succulent, cylindrical leaves, and forms thick mats 3 ft. high. Like the mangrove community, there are few other plants found within the solid mats of pickleweed.

Around the inland peripheries of the mangrove and pickleweed communities, Indian pluchea *(Pluchea indica)* shrubs often form dense thickets. In some places along the margins of these plant communities, there are open areas with exposed, often

mineral encrusted soils. These areas support scattered clumps of Australian saltbush, *Leptochloa fusca*, swollen fingergrass, and *Trianthema portulacastrum*.

Undeveloped areas adjacent to a fresh water source such as streams, springs and watercress farms support dense, thick mats of California grass *(Brachiaria mutica)*, 3 to 5 ft. tall. Scattered along the periphery of these areas are shrubs of koa haole, castor bean and sourbush.

Landscaped Areas

These are actively maintained areas usually consisting of open, grassy lawns and plantings of various landscape species. Bermuda grass and Bermuda grass hybrids are the most commonly planted turf species. Various colored bougainvillea cultivars *(Bougainvillea spectabilis*, B. *glabra)*, cultivars of oleander *(Nerium oleander)* and plumeria *(Plumeria rubra)*, be-still tree *(Thevetia peruviana)*, ice flower *(Lampranthus glomerata)*, and rainbow shower *(Cassia fistula* X *javanica)* are popular ornamentals; these species tend to be drought-tolerant. Many of the weedy, annual plants associated with the ruderal or roadside vegetation pop up occasionally in areas where there is exposed soil or disturbance. Some of the more frequently encountered weeds in lawn areas include wiregrass *(Eleusine indica)*, swollen fingergrass, nutgrass *(Cyperus rotundus)*, sowthistle or milkweed *(Sonchus oleraceus)*, *Calyptocarpus vialis*, and prostrate spurge *(Chamaesyce prostrata)*.

No detailed survey or inventory was made for these landscaped areas as no naturally occurring rare plants are associated with these highly maintained surroundings.

DISTRIBUTION OF VEGETATION TYPES

The distribution of the four major vegetation types along the pipeline routes and the truck unloading facilities at the Waiau Generating Station is discussed below. The reader is referred to the preceding section for a detailed description of the vegetation types.

Proposed Pipeline Route

A few clumps of ruderal vegetation are found on the HECO Barbers Point Tank Farm; most of the substrate is asphalt pavement or crushed coral. From the tank farm, the proposed Waiau pipeline follows along an existing easement and fence line that lies within the eastern boundary of the Chevron refinery. This easement supports only a few patches of ruderal vegetation; substrate is crushed coral.

The route leaves the Chevron property and follows the north side of Malakole Street where it crosses grassy lawns and various landscape plantings which front a plant nursery and landscaping operation It turns northward at Kalaeloa Boulevard and follows along the west side. Patches of weedy, ruderal vegetation are found on the pipeline route; substrate is coralline material with thin soils. Where the O'ahu Rail & Land Co. (OR&L) Right-of-Way (ROW) crosses Kalaeloa Boulevard, the proposed Waiau pipeline turns, crosses Kalaeloa Boulevard, and joins the State Energy Corridor (SEC). From here to the Kapolei Shopping Center, the ruderal vegetation

consists of buffelgrass with scattered clumps of koa haole, Christmas berry, sourbush, and a few kiawe saplings; the substrate changes to reddish-brown soil. A concrete-lined drainage channel is also found in this area.

Landscaped areas are found on the Kapolei Town portions of the pipeline route. Where the proposed route crosses in front of the PC&R Quarry, there is a band of koa haole/kiawe scrub. Past the quarry and continuing parallel to Farrington Highway, the proposed pipeline passes through ruderal or roadside vegetation. Koa haole shrubs and Guinea grass line the sides of the dry streambeds which cross Farrington Highway.

The proposed pipeline then crosses the Fort Weaver overpass and turns south along Kaihuopa'alai Street in West Loch Estates; this section is landscaped. Where the proposed pipeline leaves Kaihuopa'alai Street to join the OR&L ROW, the vegetation is somewhat dense koa haole/kiawe scrub. The ROW is an elevated, old railroad bed. It is periodically maintained and supports ruderal vegetation as well as large areas of bare soil, gravel, and coral fill. In many places, dense thickets of mangrove are found adjacent to the ROW.

After crossing Waikele Stream, the SEC and the OR&L ROW separate, with the SEC passing through the wetlands of Pouhala Marsh and the OR&L ROW passing mauka on higher ground above the wetlands. The wetlands in this area consist primarily of dense mats of pickleweed. HECO's proposed Waiau pipeline leaves the

SEC and remains within the OR&L ROW, thus avoiding the wetlands. The proposed pipeline rejoins the SEC after it crosses Waipahu Depot Road.

After crossing Waipahu Depot Road, the SEC and OR&L Row boundaries overlap. The City and County's paved bikeway follows along the ROW; again, the vegetation consists of a patchwork of weedy plants along the the dirt shoulders of the bikeway.

After crossing Waipio Point Access Road, the proposed Waiau pipeline route continues within the SEC and turns north below Waipahu High School; the OR&L ROW continues east along the coastline of the Middle Loch. From the high school to the U.S. Navy property, the proposed route follows along a dirt road lined with koa haole/kiawe scrub. This vegetation type also forms a band along the paved road behind the Leeward Community College; the proposed pipeline will be located between the road and the campus grounds. From the college, the proposed pipeline crosses maintained landscaped areas, California grass-dominated wetlands along Waiawa Stream, and ruderal vegetation under the elevated portion of the H-l freeway.

The proposed route then follows along 2nd Street by the Urban Gardens project, crosses Lehua Avenue, and crosses under the elevated freeway. The proposed pipeline then parallels the bikeway to the HECO property. The vegetation consists of a patchwork of landscaped areas and ruderal vegetation. A watercress farm is found near the HECO property.

Chevron Pipeline

The existing Chevron pipeline follows the same route as the Waiau pipeline where it leaves the Barbers Point Tank Farm and proceeds up Kalaeloa Bouleverd. But instead of heading north toward Farrington Highway, it turns east and follows along the OR&L ROW alongside the former Naval Air Station fenceline. The vegetation in this area consists of koa haole/kiawe scrub with scattered, large rosettes of sisal *(Agave sisalana)*. The railroad track is intact in this area and the railway society's train yard is located near Varona Village. The Chevron pipeline then passes through 'Ewa Villages, crosses Fort Weaver Road, and heads toward West Loch. A mosaic of weedy ruderal vegetation is found on the infrequently maintained areas and former cane fields, and landscape plantings occur on the actively maintained sites.

The Chevron pipeline continues along the shoreline adjacent to the West Loch Golf Course where it passes through mangrove-dominated wetlands. In the West Loch Estates portion, it crosses through the West Loch Shoreline Park. Grassy, open lawns, primarily St. Augustine grass *(Stenotaphrum secundatum)* and Bermuda grass, and plantings of coconut *(Cocos nucifera)*, milo *(Thespesia populnea)*, bougainvillea, etc., line the Chevron route.

After leaving West Loch Estates, the Chevron pipeline joins the OR&L ROW; the OR&L ROW and the SEC have the same boundaries until they cross Waikele Stream. After crossing Waikele Stream, the Chevron pipeline continues along the OR&L Row, while the SEC crosses Pouhala Marsh. The Chevron pipeline continues

following the OR&L ROW to the Waiau Generating Station. Patches of weedy vegetation cover the ROW and shoulders of the bikeway.

Truck Delivery

This alternative would require the construction of new unloading facilities at the Waiau Generating Station. The proposed unloading site is located adjacent to Kamehameha Highway. A portion of the site is bermed and was used for wastewater storage; it supports a scrubby growth of koa haole, sourbush, and Natal redtop grass. The rest of the site is paved or graveled with low, clumps of weedy, ruderal vegetation.

DISCUSSION

The vegetation on and adjacent to both pipeline routes and the Waiau Generating Station is dominated by introduced species. Introduced or alien species are all those plants which were brought to Hawai'i by humans, intentionally or accidentally, after Western contact, that is, Cook's discovery of the Islands in 1778. A total of 135 species were inventoried on the study area. Of these, 121 (90%) are introduced species, 3 (2%) are originally of Polynesian introduction, and 11 (8%) are native. Ten of the native plants are indigenous, that is, they are native to Hawai'i and elsewhere; these are the 'akulikuli *(Sesuvium portulacastrum)*, kipukai *(Heliotropium curassavicum)*, alena *(Boerhavia repens)*, milo *(Thespesia populnea)*, hau *(Hibiscus tiliaceus)*, 'ilima *(Sida fallax)*, hoary abutilon *(Abutilon incanum)*, 'uhaloa *(Waltheria indica)*, popolo *(Solanum americanum)*, and kukaepua'a *(Digitaria setigera)*. One

endemic species, pa'uohi'iaka *(Jacquemontia ovalifolia* ssp. *sandwicensis)*, occurs on the study area; an endemic species is native only to Hawai' i.

None of the plants found during the field studies is a threatened and endangered species or a species of concern (U.S. Fish and Wildlife Service 1999; Wagner *et al.* 1999). There have been a number of botanical studies conducted by the principal investigator (Char 1980, 1999, 2000b, 2000c; Char and Balakrishnan 1979) and by others (Traverse Group, Inc. 1988, 1991) for various projects on or adjacent to the pipeline routes. No threatened and endangered species were identified along the pipeline routes in these earlier studies. This is not surprising as the routes are located primarily on an existing ROW which has been disturbed for a long time.

Wetlands are of concern as they provide habitat for endangered waterbirds. The proposed Waiau pipeline avoids wetlands by following more mauka along portions of the SEC. Where the SEC crosses Pouhala Marsh, HECO has proposed the use of the OR&L alignment which avoids the marsh. Use of this portion of the OR&L alignment will require an easement from the State Department of Transportation.

The existing Chevron pipeline crosses five distinct wetland areas along the shoreline of the southwest lobe of West Loch (Planning Solutions, Inc. 2001). Portions of the aging pipeline need to be repaired or replaced periodically to remain in service.

In summary, the proposed Waiau pipeline is not expected to have a significant negative impact on the botanical resources. If the pipeline is allowed to bypass that

portion of the SEC which passes through Pouhala Marsh, then adverse effects to wetlands would be avoided or reduced.

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PLANT SPECIES LIST —Waiau Fuel Pipeline Project

The following checklist is an inventory of the plant species observed on the project site The plant names are arranged alphabetically by family and then by species into each of two groups: Dicots, and Monocots. The taxonomy and nomenclature of the lowering plants follow Wagner *et al.* (1990) and Wagner and Herbst (1999). The few recent name changes are those recorded 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 information is provided:
   - 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 natural.
   - P = Polynesian introduction = plants brought to the islands by the Polynesian settlers prior to Western contact, that is, Cook's arrival in the Islands in 1778.
   - P? = questionably a Polynesian introduction = may have been introduced by the Polynesians, or possibly introduced soon after Western contact.
   - X = introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, 1778.
   - X? = questionably introduced = date of introduction unclear or very soon after Western contact; may possibly be indigenous or of Polynesian introduction.
4. Vegetation type. Four vegetation types are recognized along the corridors and on the truck unloading facilities (see text for discussion):
   - r = Ruderal/Roadside Vegetation
   - k = Koa Haole /Kiawe Scrub
   - w = Wetland Vegetation
   - l = Landscaped Areas

Scientific name	Common name	Status	Vegetation Type r	k	w	l
FLOWERING PLANTS						
DICOTS						
ACANTHACEAE (Acanthus family)						
Asystasia gangetica (L.) T. Anderson	Chinese violet, coromandel	X	+	+	-	-
AIZOACEAE (Fir-marigold family)						
Lampranthus glomerata (L.) N.E. Br.	ice flower, 'akulkuli-lei	X	-	-	-	+
Sesuvium portulacastrum (L.) L.	'akulikuli	I	-	-	+	-
Trianthema portulacastrum L.		X	+	+	-	-
AMARANTHACEAE (Amaranth family)						
Achryanthes aspera L.		X	+	-	-	-
Alternanthera pungens Kunth	khaki weed	X	+	-	-	+
Amaranthus spinosus L.	spiny amaranth, pakai kuku	X	+	+	-	-
Amaranthus viridus L.	slender amaranth, pakai	X	+	+	-	-
ANACARDIACEAE (Mango family)						
Mangifera indica L.	mango, manako	X	-	+	-	-
Schinus terebinthifolius Raddi	Christmas berry	X	+	+	-	-
APOCYNACEAE (Dogbane family)						
Nerium oleander L.	oleander, 'oleana	X	-	-	-	+
Plumeria rubra L.	plumeria, frangipani	X	-	-	-	+
Thevetia peruviana (Pers.) K. Schum.	be-still tree	X	-	-	-	+
ASTERACEAE (Daisy family)						
Bidens pilosa L.	Spanish needle, ki, ki nehe	X	+	+	-	-
Calyptocarpus vialis Less.		X	+	-	-	+
Conyza bonariensis (L.) Cronq.	hairy horseweed, ilioha	X	-	-	-	+
Cotula australis (Sieber ex Spreng.) J. D. Hook.	Australian brass buttons	X	-	-	-	+

APPENDIX E SURVEY OF AVIAN AND TERRESTRIAL MAMMALIAN SPECIES FOR THE HECO FUEL PIPELINE: BARBERS POINT TO WAIAU PROJECT, O'AHU, HAWAI'I

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A Survey of Avian and Terrestrial Mammalian Species for the HECO Fuel Pipeline: Barbers Point to Waiau Project, O'ahu, Hawai'i.

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INTRODUCTION

This report summarizes the findings of a four day ornithological and mammalian survey conducted along the Hawaiian Electric Company, Inc.'s (HECO) proposed Waiau Fuel Pipeline route, and a portion of the existing Chevron-owned and operated Barbers Point-to-Honolulu black oil pipeline. HECO is proposing to construct a fuel pipeline and ancillary facilities to supply fuel from the Barbers Point Tank Farm (BPTF), for its existing Waiau Generating Station. Fieldwork was conducted on September 28th and from October 9th through October 11th 2001.

The primary purpose of the survey was to determine if there were any federally listed endangered, threatened, proposed, or candidate avian or mammalian species on, or in the immediate vicinity of either pipeline route. In addition to the study we assessed the probability of any usage of the corridors by listed avian and mammalian species given the habitat currently found along the routes. Federal and State of Hawai'i listed species are those that are published in the following documents (DLNR, 1998; Federal Register, 1999a, 1999b, 2001).

Avian phylogenetic order and nomenclature follows The American Ornithologists' Union Checklist of North American Birds 7th Edition (American Ornithologist's Union 1998), and the 42nd supplement to Check-list of North American Birds (American Ornithologist's Union 2000). Mammal scientific names follow Mammals in Hawai'i (Tomich 1986). Plant names follow Manual of the Flowering Plants of Hawai'i (Wagner et al. 1990). Place names follow Place names of Hawaii (Pukui et al. 1974).

GENERAL SITE DESCRIPTION

The proposed BPTF-to-Waiau pipeline would run approximately 13 miles from a pumping station located within the BPTF to existing fuel storage tanks at the Waiau Generating Station. The proposed pipeline route starts at an elevation of 5-feet above mean sea level (msl), at the BPTF, gradually ascending to a maximum elevation of ±180 msl at a point along Farrington Highway approximately half way along the route, and then descends gradually to ± 10-feet msl, adjacent to the Waiau Generating Station (Figure1).

Initially, both the Waiau and the existing Chevron Barbers Point-to-Honolulu black oil pipeline follow the same route; for the most part, both also remain within the existing HECO easements. From the BPTF, the proposed route heads eastward within HECO's property initially and then turns north, following an existing easement that lies just within the eastern boundary of the Chevron Refinery.

The current habitat present along both pipeline routes can be grossly separated into the former sugar cane (*Saccharum officinarum*) lands, and those areas adjacent to Pearl Harbor and other wetland features associated with the nearshore areas of West Loch. The vegetation within the former Castle & Cooke's, 'Ewa Plantation and O'ahu Sugar Co.'s plantation is dominated by alien (introduced to Hawai'i by humans) weedy species, virtually the entire area has been repeatedly and extensively disturbed by human activity.

The area along both routes adjacent to West Loch supports numerous wetland habitats including, saltwater swamp, saltwater marsh, freshwater marsh, freshwater swamp, cultivated wetlands and ruderal wetlands. There are several significant wetlands located along the pipeline routes. Pouhala Marsh located just north-northwest of Kapakahi Stream on the Waipi'o peninsula. There is a unit of the Pearl Harbor National Wildlife Refuge (PHNWR) located on the 'Ewa side of West Loch immediately adjacent to the West Loch Golf Course. Additionally there are two units of the PHNWR located on the southwest shore of Pearl City Peninsula.

MAMMALIAN SURVEY METHODS

All observations of mammalian species were of an incidental nature. With the exception of the endemic (native and unique to Hawai'i), endangered Hawaiian hoary bat, or 'ope'ape'a, as it is known in Hawaiian, all terrestrial mammals currently found on the island of O'ahu are alien species. Most are ubiquitous; no trapping program was proposed or undertaken to quantify the use of the study site by alien mammalian species. The survey of mammals was limited to visual and auditory detection, coupled with observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species observed and heard within the project sites. Additionally, four crepuscular (twilight) surveys were conducted close to stations 2, 11, 28 and 39, in an attempt to detect bats over-flying the two pipeline corridors.

AVIAN SURVEY METHODS

Forty-five avian count stations were established along the two pipeline corridors. Six-minute unlimited distance variable circular plot counts were made at each station (Reynolds et al., 1980). The stations within the 'Ewa plains were spaced approximately one mile apart; those along the West Loch shoreline and the immediate surrounding area were spaced approximately 440 feet apart. Each station was counted once. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated in the morning hours, the time of day that bird activity is typically at its peak. Four, 30 minute, time-dependant, waterbird counts were made from locations adjacent to wetland features at stations 4, 14, 20 and 28. An additional two hours were spent along the pipeline route during the evenings of the 9th and 10th and the mornings of the 10th and 11th of October, 2001, in an attempt to detect nocturnally flying seabirds and owls over-flying the area. Time not spent counting was used to search the two corridors and the surrounding area for species and habitats not detected during count sessions.

MAMMALIAN SURVEY RESULTS

Three mammalian species; domestic dog (*Canis f. familiaris*), cat (*Felis catus*), and small Indian mongoose (*Herpestes a. auropunctatus*) were detected within the study corridors. All of these introduced mammalian species are deleterious to native species . The endangered Hawaiian hoary bat was not detected during the course of this survey.

AVIAN SURVEY RESULTS

A total of 1,866 individual birds, representing 26 avian species, from 16 separate families, were recorded during station counts (Table 1). Of the 26 species detected three species; Hawaiian Duck (*Anas wyvilliana*), or *koloa mapu*, as it is known in Hawaiian, Common Moorhen (*Gallinula chloropus sandvicensis*), or *'alea'ula* and Black-necked Stilt (*Himantopus mexicanus knudseni*), or *ae'o* - are listed as endangered species under the Federal Endangered Species Act of 1973, as amended (ESA), and by the State of Hawai'i under it's endangered species program (Federal Register 1999a, DLNR 1998).

Of the remaining 23 species detected, only the Black-crowned Night-Heron (*Nycticorax nyticorax hoactli*), or *'auku'u*, is indigenous (i.e., native to Hawai'i but also found elsewhere naturally). Three species - Pacific Golden-Plover (*Pluvialis fulva*), or *kolea*, Wandering Tattler (*Heterasceles incanus*), or *'ulili*, Ruddy Turnstone (*Arenaria interpres*), or *'akekeka*, and Sanderling (*Calidris alba*), or *hunakai*, are regularly occurring indigenous migrants. The remaining 19 species are alien to the Hawaiian Islands (Table 1).

Avian diversity was relatively low. Four species; Spotted Dove (*Streptopelia chinensis*), Zebra Dove (*Geopelia striata*), Red-vented Bulbul (*Pycnonotus cafer*) and Common Myna (*Acridotheres tristis*)

Table 1.

Avian Species Detected During Station Counts: HECO Waiau Fuel Pipeline Project

Common Name	Scientific Name	*ST*	*RA*
HERONS - Ardeidae.			
Cattle Egret	*Bubulcus ibis.*	A	1.22
Black-crowned Night-Heron.	*Nycticorax nycticorax hoactli.*	I	0.78
DUCKS, GEESE & ALLIES - Anatidae			
Muscovy	*Cairina moschata*	AD	0.02
Hawaiian Duck X Mallard Hybrid	*Anas wyvilliana X platyrhynchos*	EE	0.22
PHEASANTS & ALLIES – *Phasianidae*			
Red Junglefowl	*Gallus gallus.*	A	0.58
RAILS & ALLIES - Rallidae			
Common Moorhen (Hawaiian)	*Gallinula chloropus sandvicensis*	EE	0.04
PLOVERS & LAPWINGS - Charadriidae			
Pacific Golden-Plover.	*Pluvialis fulva.*	IM	1.80
STILTS & AVOCETS - Recurvirostridae			
Black-necked Stilt (Hawaiian)	*Himantopus mexicanus knudseni*	EE	2.07
SANDPIPERS & ALLIES - Scolopacidae			
Wandering Tattler	*Heterosceles incanus*	IM	0.31
Ruddy Turnstone	*Arenaria interpres*	IM	1.16
Sanderling	*Calidris alba*	IM	0.16
PIGEONS & DOVES - Columbidae			
Rock Dove	*Columbia livia*	A	0.89
Spotted Dove.	*Streptopelia chinensis.*	A	3.82
Zebra Dove.	*Geopelia striata.*	A	7.24
BULBULS – Pycnonotidae			
Red-vented Bulbul	*Pycnonotus cafer.*	A	4.78
THRUSHES - Turdidae			
White-rumped Shama.	*Copsychus malabaricus indicus*	A	0.04
SILVEREYES - Zosteropidae			
Japanese White-Eye.	*Zosterops japonicus*	A	2.44
STARLINGS - Sturnidae			
Common Myna.	*Acridotheres tristis.*	A	3.58
SALTATORS & ALLIES - Cardinalidae			
Red-crested Cardinal.	*Paroaria coronata.*	A	0.73
Northern Cardinal.	*Cardinalis cardinalis.*	A	0.80
CARDULINE FINCHES & ALLIES - Fringillidae			
House Finch.	*Carpodacus mexicanus frontalis*	A	1.93

OLD WORLD SPARROWS - Passeridae			
House Sparrow	*Passer d. domesticus*	A	0.98
WAXBILLS & ALLIES - Estrildidae			
Common Waxbill.	*ESTRILDA A. ASTRILD*	A	2.20
Nutmeg Manikin	*LONCHURA PUNCTULATA TOPELA*	A	0.38
Chestnut Munia	*Lonchura atricapilla*	A	0.40
Java Sparrow.	*Padda oryzivora*	A	2.93

Key to Table 1:.

Status (ST)

I	Indigenous, resident species
A	Alien species – established in the wild in Hawai'i
AD	Alien domestic species – not established in the wild in Hawai'i
EE	Endangered, endemic species
IM	Indigenous, migratory species
RA	Relative Abundance: Number of birds detected divided by the number of count stations (45)

accounted for 47% of the total number of birds recorded during station counts. The most common avian species detected was the Zebra Dove, which accounted for 17% of the total individual birds recorded. An average of 41 birds was recorded per station-count.

DISCUSSION

A one-time survey cannot provide a total picture of the wildlife using any given area. Certain species will not be detected for one reason or another. Seasonal variations in populations, coupled with seasonal availability and use of resources, will cause different use patterns throughout a year and, in fact, over a number of years. Coupling the results of a one time survey with the results of previous surveys conducted in similar habitats and locations, greatly expands the value of the information gathered.

The findings of the mammalian survey are consistent with the results of other recent surveys conducted within the lowland areas of O'ahu (David, 1997a, 1997b, 1998, 1999, 2000a; David and Guinther 2000; Guinther and David 2001). Although no rodents were

detected during the course of this survey, it is likely that roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), European house mice (*Mus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use various resources present within the two pipeline corridors. Without conducting a trapping program, it is difficult to assess the population densities of these often hard-to-see mammals. All of these introduced rodents are deleterious to native avian and floral species.

The findings of the avian survey are consistent with the findings of other recent surveys conducted within the lowland areas of O'ahu (David, 1995a, 1995b, 1995c, 1995d, 1997a, 1997b, 1997c, 1998, 1999, 2000a, 2000b; David and Guinther 2000; Guinther and David 2001). There have been monumental changes in the avian species makeup of the areas around West Lock and the 'Ewa plains following the closure of Castle & Cooke's, 'Ewa Plantation in the early 1970's and O'ahu Sugar Co.'s operations in 1994. Between the turn of the century and 1995-96 the numerous man made wetlands associated with sugar cane production supported large numbers of waterbirds. The area also

was a major migratory shorebird and waterbird stopping off point between September and April each year. Many of the more than 80 species of migratory and extralimital avian species which have been recorded from Hawai'i have been recorded from the area (Engilis 1988, Pyle et al. 1988, David 1991, Pyle 1992, Pyle 1997). Between 1995 and the present, the sugar cane settling ponds have dried up and become overgrown with a mix of alien weedy species or have been leveled for development. The shoreline along West Loch is heavily vegetated with red mangrove which all but obscures the beach mudflats. This dense vegetation all but precludes the current utilization of the intertidal zone by shorebirds.

Not surprisingly the vast majority of the birds recorded during this survey were alien species. From an ornithological perspective the most interesting sections of the two pipeline corridors surveyed were those running along, or close to the West Loch of Pearl Harbor. The various natural and man-made wetland features and the loch waters support all four extant endangered Hawaiian waterbird species found on O'ahu; Hawaiian Duck, Hawaiian Coot (*Fulica alai*), or *'alae ke'oke'o* , which are endemic at the species level, and the Common Moorhen and Black-necked Stilt which are endemic at the sub-species level (American Ornithological Union 1998; Clements 2000). All four species are listed as endangered under both the ESA and the State of Hawai'i endangered species statutes (DLNR 1998; Federal Register 1999a). During the course of this survey 10 Hawaiian Duck X Mallard hybrids, 2 Common Moorhen and 93 Black-necked Stilts were detected during station counts (Table 2). Additionally, four Hawaiian Stilts were seen flying over Malakole Road from the BPTF to the fertilizer processing operation located just west of station number 1 as an incidental observation. Numerous stilt were heard but not seen within the BPTF while inspecting the proposed pumping station site which is located to the south of the tank farm, and the Chevron wetlands.

Table 2
Endangered Avian Species Detected by Station #

Station #	Hawaiian Duck	Common Moorhen	Black-necked Stilt
14			69
20	2		
22	2		6
23	1		
33	2		6
35		2	
45	3		12
TOTAL	10	2	93

Please see Figure 4-10 for station locations.

Ten Hawaiian Duck X Mallard hybrids were flushed from wetland areas around West Loch (Table 2). Two birds were seen flying off the fenced wetland close to station #20, located to the north of the existing Chevron pipeline, three birds from the cultivated wetlands located adjacent to station #22, and #23, and two birds from the northern side of the same wetland adjacent to station #33 (Table 2). An additional three birds were flushed from the northern end of the pickleweed (*Batis maritima*) salt marsh just to the southwest of the two pipeline corridors at station #45 (Table 2).

Hawaiian Ducks once extirpated from the Island of O'ahu were successfully re-introduced to the Island by the State Department of Land and Natural Resources (DLNR) during the 1970's. The O'ahu population is currently estimated at approximately 300 birds (Engilis and Pratt 1993; USFWS 1999). While the population upswing is positive, in the intervening years the genetic pool of this endemic

endangered species has all but been swamped by the introduced Mallard (*Anas platyrhynchos*). Consequently, few if any birds remaining on O'ahu are pure Hawaiian Ducks; but rather Hawaiian Duck X Mallard hybrids.

Two Common Moorhen were detected within the fenced wetland located to the north of station #20, and south of station # 35 (Table 2). This endangered endemic sub-species is an extremely secretive bird. Moorhens are widely but sparsely distributed on O'ahu, with a small population known from the Pearl Harbor area (Engilis and Pratt 1993; USFWS 1999). Current population estimates for this species are suspect due to the difficulty in censusing the species.

A previously mentioned a total of 93 Black-necked Stilts were recorded during station counts, with numerous others recorded as incidental observations in and around the BPTF. Sixty-nine Black-necked Stilts were seen within the playa, located to the west of Kapakahi Stream adjacent to the pickleweed salt marsh just to the southwest of the two pipeline routes at station number 14 (Table 2). An additional 6 each were recorded in the cultivated wetlands located between the existing and proposed pipelines (Table 2) at station #22 and #23 respectively,

There is little if any suitable habitat within either the existing or the proposed corridors, or within the playa suitable for stilt nesting. Stilts generally nest on, or adjacent to low relief islands within bodies of water. Stilts generally forage and nest in separate wetland sites, moving between them on a daily basis (USFWS 1999). The stilts currently use the playa as a loafing area. Loafing is a term used by shorebird scientists to describe the resting and social activity that shorebirds perform when not feeding, nesting or migrating. Loafing areas are usually open, with good sight lines so that resting shorebirds can easily see approaching predators. Shorebirds usually gather in loafing areas in mixed flocks. In the case of this playa there was a mixed flock of 69 stilts 9 Pacific Golden Plover, 2 Wandering Tattler and 2 Ruddy Turnstone, the three most commonly encountered migratory shorebird species found annually throughout the state between the months of July and April.

It is currently estimated that the Black-necked Stilt has a State-wide population of between 1,200 and 1,600 birds (USFWS 1999). O'ahu supports a population of between 500 and 750 birds (Engilis and Pratt 1993).

Although not detected during this survey it is probable that Hawaiian Coots use resources within the various wetlands located between the existing and proposed pipelines in which the above three species were detected. Currently these wetland habitats do not favor Hawaiian Coots, which prefer more open water than is currently available within both the cultivated and fenced wetlands. Numbers of this species and the other three listed waterbird species regularly use resources within the two units of the PHNWR located on the southwest shore of the Pearl Harbor peninsula and the third unit located on the West Loch shoreline.

Although not detected during this survey the threatened Newell's Shearwater (*Puffinus newelli*) may occasionally overfly sections of both the existing and proposed pipeline corridors. No nesting colonies have to date been detected on the Island; however, small numbers of this species have been recovered on the Island following "downing" incidents. The majority of these birds were found on the Honolulu side of the Ko'olau Mountains (Banko 1980; R. L. Pyle, personal communication.; B. Flint, personal communication; D. Smith, personal communication).

Newell's Shearwaters, especially fledging birds, can become disoriented by exterior lighting on their way to sea in the fall. When disoriented, seabirds often collide with manmade structures and, if not killed outright, the dazed or injured birds become easy targets of opportunity for feral mammals. Collision with utility structures is considered to be the second most significant cause of mortality of this species in Hawai'i (Telfer et al. 1987; Ainley et al. 1995, 1997, 1998, 2001; Cooper and Day 1995. 1998; Day and Cooper 1995). The primary cause of mortality is thought to be predation by alien mammalian species at the nesting colonies (Ainley et al. 2001; Day and Cooper, 1998; Cooper and Day 1995). There are no known nesting colonies, nor appropriate nesting habitat for this listed seabird species within or close to either of the corridors addressed in this report.

Potential impacts to listed waterbirds and the habitats on which they depend can be roughly separated into those that may arise during construction of the proposed pipeline, and those that may result from accidental discharges of petroleum based products from either the existing Chevron pipeline or potentially may occur from the new line once it has been constructed and placed into service.

During the course of construction it is likely that individual listed birds will be temporally displaced by the noise and activity associated with excavation and installation of the new pipeline.

There is adequate like habitat close to the three main areas in which listed waterbirds were recorded (Table 2). It is likely that temporarily displaced stilts, moorhen and ducks will find suitable loafing and foraging sites close to the ones from which they may be displaced from. If there is no further mechanical and or human disturbance of the loafing area located south of station # 14 and # 45, during the course of construction the stilts may become acclimated to the construction activity. It is logical to assume that following the completion of the construction phase, and the restoration of the disturbed area, that there will be no lingering impact to Black-necked Stilts resulting from the construction of the pipeline.

Construction of the portion of the pipeline between the Waiau Generating Station and the intersection with Waipi'o Point Access Road poses an additional risk to the cultivated wetlands and the one fenced wetland located down-slope from this portion of the proposed route, namely siltation of these wetlands and Middle Loch from excavated materials which have the potential to be carried down-slope by rains.

It is unlikely that the construction of the new pipeline will have any impacts, positive or negative on the Newell's Shearwater, which are not currently known from the project area, and for which there is no suitable nesting habitat within or close to the new pipeline route.

In the greater scheme of things the threat of a break or leak in either the existing Chevron pipeline or in the new pipeline while either contains petroleum based products poses a very real risk to both endangered species as well as the terrestrial and marine habitats on which they are dependant. Such a failure in the existing Chevron pipeline occurred in 1996 while the pipeline was full of No. 6 bunker fuel. The resulting spill entered the Waiau Stream (termed the Kaluao'opu Springs channel in this report) and from there emptied into East Loch. An estimated 41,244 gallons of No. 6 fuel oil was released into Waiau Stream, the resulting spill covered approximately 2,290 acres of open water during the first week following the incident (Pearl Harbor Natural Resource Trustees 1999). This one spill had a significant impact to natural resources in the Pearl Harbor area, and ultimately ended up costing over 25 million dollars to remediate (Pearl Harbor Natural Resource Trustees 1999).

The proposed new pipeline will be built further inland than the existing Chevron pipeline along the bulk of its length and will also be much further away from the Honouliuli unit of the PHNWR than the existing pipeline. This combined with the plan to install a total of 11 check and block valves along the new pipeline will markedly reduce the chance that a spill will be either as large or will as easily migrate into Pearl Harbor as happened in the case of the 1996 spill.

Assuming that the new pipeline is constructed, the portion of the pipeline between the Waiau Generating Station and the intersection with Waipi'o Point Access Road will pose a potential threat to the cultivated wetlands and the one fenced wetland located down-slope from this portion of the proposed route. However, it should be note that the increased distance from the Pearl Harbor shoreline of the proposed pipeline in this section will greatly reduce the risk, that should a break occur in the pipeline in this section, that the risk that the oil will reach the Harbor will be greatly reduced (for a more detailed discussion on the cooling of, and decreased migration rates of spilled fuels over land, see Pearl Harbor Natural Resource Trustees 1999).

RECOMMENDATIONS

Design and implement adequate Best Management Practices (BMP's) to ensure that any excavated materials and or construction materials are restricted to the construction corridor, and are not allowed to migrate down-slope.

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APPENDIX F HISTORICAL AND ARCHAEOLOGICAL ASSESSMENT FOR THE PROPOSED WAIAU FUEL PIPELINE, 'EWA DISTRICT, ISLAND OF O'AHU

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HISTORICAL AND ARCHAEOLOGICAL ASSESSMENT FOR THE PROPOSED WAIAU FUEL PIPELINE, 'EWA DISTRICT, ISLAND OF O'AHU

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I. INTRODUCTION

At the request of Planning Solutions, Inc., International Archaeological Research Institute, Inc. (IARII), has conducted an historical/archaeological assessment for a fuel pipeline project in southwest O'ahu. The project covers alternative pipeline alignments from the Hawaiian Electric Company, Inc. (HECO) Barbers Point Tank Farm (BPTF) in Campbell Industrial Park to the Waiau Generating Station east of Pearl City Peninsula (Fig. 1). The assessment was conducted to provide information appropriate to and sufficient for preparation of an Environmental Impact Statement (EIS) for the proposed development of the fuel line.

Three alternatives are proposed for providing fuel to the Waiau Generating Station. Alternative 1 proposes construction of a new pipeline that will run primarily through the existing State Energy Corridor (SEC); modifications to the BPTF (pumping, metering, loading, storage, and maintenance facilities and related equipment) and the Waiau Generating Station (receiving and metering facilities) are also proposed. Alternative 2 is to renew a contract with Chevron to provide fuel through an existing Chevron pipeline that diverges from the SEC along some segments between the BPTF and Waiau Generating Station; this alternative will entail periodic maintenance and repair, including pipe replacement (in the same location as the existing pipeline). Alternative 3 involves the use of tanker trucks to transport fuel along existing roadways; because it does not have the potential to affect historical or archaeological resources, it is not discussed further in this report.

PROJECT AREA DESCRIPTION

The proposed Waiau fuel pipeline project crosses approximately 13 miles of the 'Ewa Plain and the northern shore of the West and Middle Lochs of Pearl Harbor. Alternatives 1 and 2 follow two different routes across the plain but generally lie along the same alignment where they follow the inner edge of the harbor.

Figure 1. Proposed alternatives for the Waiau Fuel Pipeline.

Alternative 1 generally follows the State Energy Corridor (SEC), a 30 ft. wide, non-exclusive easement that extends for the most part within road rights-of-way and the right-of-way of the Oahu Railway and Land (OR&L) alignment. The SEC runs along the inland side of the 'Ewa Plain adjacent to Farrington Highway from Kapolei to Fort Weaver Road, at which point it extends through West Loch Estates and connects to the OR&L alignment. The SEC then runs along the inland edge of Pearl Harbor to the Waiau Generating Station. An approximate half-mile segment of new pipeline connecting the BPTF to the existing Kahe Generating Station pipeline is also proposed under Alternative 1. This segment of pipeline will parallel the proposed fuel line from the BPTF to Malakole Road, at which point it will connect to HECO's existing Kahe Point line.

The SEC contains two existing fuel pipelines, one owned and operated by Tesoro and the other owned and operated by GASCO. Other fuel pipelines owned and operated by the U.S. Navy and by Chevron, as well as various water, sewer, and drainage lines, also run within or cross portions of the SEC easement.

Alternative 2 consists of continuing to contract with Chevron for the use of its existing 8-inch black oil pipeline and related pumping, metering, fuel heating, and other facilities. The Chevron pipeline follows the same route as the Alternative 1 route from the BPTF to its intersection with the OR&L right-of-way at Kalaeloa Boulevard (west of Kapolei). From this point, it follows the rail alignment across the middle of the 'Ewa Plain to the west side of Pearl Harbor and then runs on the ocean side of the SEC to the Waiau Generating Station.

Both the SEC route and the Chevron pipeline follow alignments that have been heavily disturbed by historic sugarcane cultivation, World War II military activities, and modern commercial, residential, industrial, and infrastructure development.

DESCRIPTION OF PROJECT ACTIVITIES

Construction activities related to Alternative 1 that could potentially affect cultural resources include clearing and grading to prepare the right-of-way, ditching, pipe handling, pipe installation, backfilling, and cleanup and restoration (Planning Solutions 2001:2-20—2-26). Construction is anticipated to involve a 30 foot wide working corridor in areas along existing roads and a 50 foot wide working corridor in open country. Pipeline trenches are typically 24 to 30 inches wide with depths dependent on specific situations (typically 5 feet deep). Directional drilling is planned for major paved road crossings and possibly for other large expanses of pavement such as Kapolei Shopping Center (Planning Solutions 2001:2-23). Pipe handling will include preparation of staging areas for pipe storage in not-yet-determined areas outside of the immediate corridor.

Alternative 2 actions are limited to maintenance, repair, and possible replacement of the existing Chevron 8-inch pipeline. Maintenance is not anticipated to be a source of adverse impact on cultural resources. Repair and replacement of the pipeline have low potential to adversely affect cultural resources, since it will involve digging an existing pipeline trench.

However, there is still a possibility, albeit low, that new digging could expose subsurface cultural deposits.

PROJECT AREA ENVIRONMENT

As noted above, the alternative routes cross the 'Ewa Plain and the northern shore of the West and Middle Lochs of Pearl Harbor.

The 'Ewa Plain

The 'Ewa Plain constitutes the lowlands of southwestern O'ahu (Photo 1). It is an emerged limestone reef formation that was exposed following the last interglacial sea-level high stand between about 131,000 and 114,000 years ago (Szabo et al. 1994). A layer of alluvium from the southern end of the Wai'anae Mountains covers the more landward areas of the reef limestone. The 'Ewa Plain can be divided into three sub-units based on surface characteristics and water availability: lowland limestone exposure; floodplain and alluvial fans; and upland alluvial terrain.

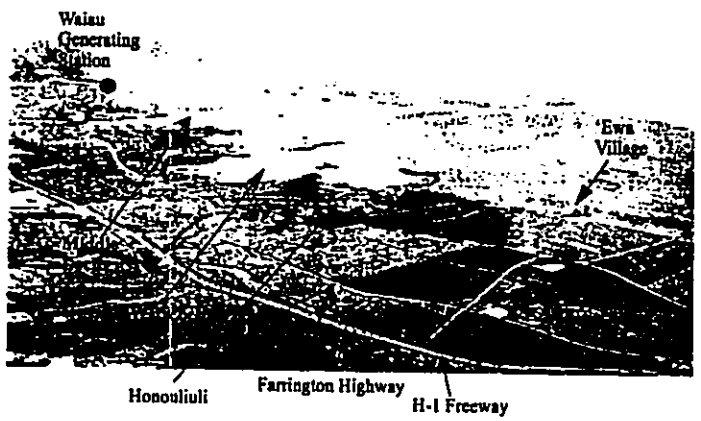

Photo 1. Eastern part of the 'Ewa Plain and Pearl Harbor, ca. 1970.

The portion of the proposed SEC pipeline route that runs along Farrington Highway (Alternative 1) lies primarily in the zone of upland alluvial terrain, which covers the inland one-third of the 'Ewa Plain. The rest of the route runs along the *mauka* margin (inland shore) of Pearl Harbor. The upland terrain is characterized by an alluvial mantle that overlies limestone bedrock or basalt. The primary soil is Mamala stony silty clay loam, which is shallow and well-drained, and is dark reddish brown with coral fragments (Foote et al. 1972:93). A much thinner Mamala alluvium extends in patches below the upper alluvium, some of which may have been artificially spread during sugarcane cultivation.

The western end of Alternative 1 and most of the Alternative 2 Chevron pipeline route cross the center of the plain, which is a lowland limestone exposure with little or no soil cover. This portion of the 'Ewa Plain generally lies below the 40 ft (12.2 m) contour (approximately two-thirds of the plain). Prior to historic and modern development on the plain, sinkholes were common across the surface.

The east end of Alternative 2 crosses the mouth of Honouliuli Gulch, which is the only permanent stream on the 'Ewa Plain. It flows out of the southeast Wai'anae Mountains and drains into the head of the West Loch of Pearl Harbor.

Annual rainfall on the 'Ewa Plain averages about 18 to 25 inches (45.7 to 63.5 cm) from the coast inland, with most rainfall occurring in the late fall and winter. There is great variability on a year-to-year basis, with ranges as great as 67 inches (170.2 cm) for the year 1982 and only 5 inches (12.7 cm) for the following year.

Very little native vegetation remains on the 'Ewa Plain. Cattle grazing, sugarcane and rice cultivation, military use, and modern development, have drastically altered the vegetation landscape of the plain. Currently, much of the undeveloped area is dominated by wild grasses, kiawe (*Prosopis pallida*), and haole koa (*Leucaena glauca*).

Recent paleoenvironmental research shows that prior to the advent of humans on O'ahu, a somewhat open diverse dryland forest probably covered the plain (Athens et al. 1999). This was quickly replaced by an "open savanna-like grassland" where "trees such as Pritchardia, wiliwili, noni, and kou, formed small groves in favorable locations..." (Davis 1990:342). Food plants that were probably traditionally collected or cultivated on 'Ewa Plain include coconut palm (*Cocos nucifera*), *noni* (*Morinda citrifolia*), banana (*Musa* sp.), *ki* (*Cordyline fruticosa*), *pōhuehue* (*Ipomoea brasilensis*), *koali'al* (*Ipomoea cairica*), sugarcane (*Saccharum officinarum*), and *'āheahea* (*Chenopodium oahuense*).

The Inland Shore of Pearl Harbor

The eastern portions of Alternatives 1 and 2 follow the northern shore of Pearl Harbor between the head of West Loch and just east of Pearl City Peninsula.

Pearl Harbor is a deeply indented and multi-lobed embayment on the south shore of the island. It has a narrow entrance and extends inland for about 4.8 miles (8 km) into three

lochs formed by two peninsulas, Waipi'o and Pearl City. The harbor is geologically a series of drowned river valleys. It has a complex depositional history resulting from creation of the valleys by erosion, sea-level change, island subsidence, and subsequent erosion of upland sediments. The Pearl Harbor coastal plain consists predominantly of alluvium overlying limestone from old reef formations (Macdonald and Abbott 1970:356-7). The soils of the coastal plain up to approximately 0.6 miles (1 km) inland of Pearl Harbor are deep, nearly level to moderately sloping, fine-textured, and well-drained. The present Pearl Harbor shoreline shows evidence of accretion and sedimentation over the last century (Athens 2000:B-Figure 3).

The alternative routes are crossed by two streams that emanate from the Schofield Plateau. Waikele Stream feeds into the head of West Loch, west of Waipi'o Peninsula. Waiawa Stream flows into Middle Loch along the west side of Pearl City Peninsula. Historical records document the presence of numerous springs close to the shoreline.

The landscape along the northern Pearl Harbor shoreline reflects the intensity of 20th century development of urban O'ahu. Vegetation consists primarily of introduced species, including pickleweed (*Batis maritima*), Indian pluchea (*Pluchea indica*), and American mangrove (*Rhizophora mangle*) (Planning Solutions 2001:3-11).

II. BACKGROUND

This chapter of the report summarizes the cultural, historical, and archaeological setting of the project area. The opening section discusses the traditional district of 'Ewa, in which the alternative pipeline routes fall; this section is intended to provide background for subsequent sections on the cultural resources of the project area.

THE TRADITIONAL DISTRICT OF 'EWA

The alternative fuel line routes cross the *ahupua'a* of Honouliuli, Hō'ae'ae, Waikele, Waipi'o, Waiawa, Mānana, Waimano, and Waiau in the traditional Hawaiian district of 'Ewa (Fig. 2). This district occupies the southwestern quadrant of the island of O'ahu, encompassing the dry 'Ewa Plain, all of Pearl Harbor (traditionally called Pu'uloa lagoon), the southern half of the central plateau of the island, and portions of the Wai'anae and Ko'olau ranges. In ancient times, 'Ewa District was a center of island power for Hawaiian ruling chiefs (Cordy 1996).

Legendary Origins and Pre-Contact History

The legendary origin of 'Ewa District comes from the land division created by the gods Kāne and Kanaloa (Sterling and Summers 1978:1, with a reinterpretation by Maly 1992:9). While playing a game of *'ulu maika* at Kapūkaki (the present Red Hill), Kāne threw the game stone, but it went so far and across such a crooked course that it was lost. As Nawa'a (1953, quoted in Sterling and Summers 1978:1) says: "So Ewa (strayed) became known by that name. The stone that strayed."

Another tradition connects Honouliuli in 'Ewa with Kahiki, the mythical homeland of the Hawaiian people. There are several versions of the story of the legendary character Kaha'i who traveled from Kalaeloa (on the 'Ewa Plain) to Kahiki to bring back breadfruit to 'Ewa (e.g. Kamakau 1991:110). Symbolically, these stories relate to life and renewal. Kamakau (1964:84) refers to 'Ewa as the "celebrated land of the ancestors," possibly in reference to the fact that the grandmother of the pig-god Kamapua'a lived in 'Ewa, and that she was one of the three migrants from Kahiki who were the "ancestors for the people of Oahu" (Kamakau 1964:64). The grandmother made her home on Pu'ukapolei (Sterling and Summers 1978:33), the volcanic cone that lies at the inland edge of the 'Ewa Plain just seaward of the SEC and west of Fort Barrette Road in the present city of Kapolei.

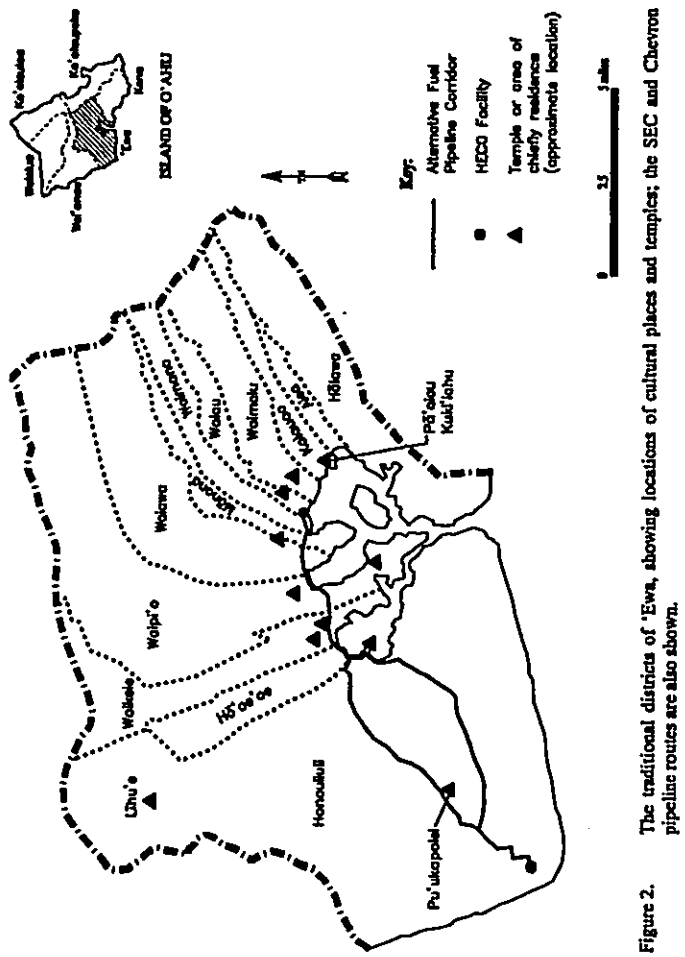

Figure 2. The traditional districts of 'Ewa, showing locations of cultural places and temples; the SEC and Chevron pipeline routes are also shown.

'Ewa District figures early in the pre-contact history of O'ahu. By the A.D. 1200s, 'Ewa was one of three major competing districts that had developed out of earlier small, independent political units. Called Greater 'Ewa (consisting of the later districts of 'Ewa, Wai'anae, and Waialua; see Cordy 1996), 'Ewa stood alongside the other two districts of Kona and Ko'olau. The dominant *ali'i* line of 'Ewa was that of the Māwcke-Kumuhonua genealogy. Māweke is one of the main figures in the voyaging era of Hawaiian traditions, and from his time, the lineage of ancient Polynesia transformed into a distinctly Hawaiian lineage (Fornander 1919:243).

In the early A.D. 1400s, the king La'akona, considered "the great progenitor of the Ewa chiefs" (Fornander 1969:II-48-49), ruled O'ahu. During this time, 'Ewa was the center of power of the O'ahu Kingdom, with the ruling center at Lihu'e on the upland plateau (Cordy 1996; see Fig. 2 for approximate location). The lords of this place (as well as Wahiawā and Halemano) also became known as the Lō Ali'i (Kamakau 1991:40).

Subsequent generations saw periods of unification and peace alternating with periods of conflict. Although the royal center moved from Lihu'e to Waikiki, 'Ewa continued to be an important chiefly locality. For example, the ruling chief Kala'imanuia spent most of her time in 'Ewa, particularly at Kuki'iahu and Pā'aiau (at the east end of East Loch; Kamakau 1991:57-58). One of her sons, Ha'o, maintained an opulent residence at Waikele (at the head of West Loch; Kamakau 1991:64). A succeeding ruling chief, Kākuhihewa, was raised in Waipi'o, Waiawa, and Mānana (in the western half of Pu'uloa; Kamakau 1991:68). His brother, Kaihikapu-a-Kākuhihewa "...kept his gay and brilliant court sometimes at Ewa, sometimes at Waikiki" (Fornander 1969:275).

The high chief Kuali'i, estimated to have ruled in the early A.D. 1700s, decided to "bring the Oahu chiefs to their proper status as feudatories of the Moi of Oahu" (Fornander 1969:280). He directed successful campaigns against the chiefs of Kona, 'Ewa, and Waialua. Although the 'Ewa chiefs attempted several revolts, Kuali'i "routed them effectively with great slaughter" (Fornander 1969:281).

At the time of Cook's arrival in 1778, the king of O'ahu was Peleiōhōlani, who ruled a kingdom that included Moloka'i and Kaua'i. Shortly after his death, however, the O'ahu Kingdom came to an end when it was conquered by the Maui king Kahekili. Kahekili's conquests were shortly thereafter absorbed into the domain of Kamehameha from Hawai'i.

Hawaiian Settlement and Land Use at the Time of Contact

The district of 'Ewa is traditionally known for its abundance of food sources. The deep bays of Pearl Harbor produced a large variety of shellfish and fish, including an abundance of pearl oysters (*pipi*). Hawaiians constructed fishponds and fish traps, enabling them to catch deep-sea fish from the inflow of tidal waters. 'Ewa was also famous for its *kai* taro, which was cultivated in the lowlands; this type of taro sends up many shoots and often lasts 10 years with a single planting (Handy and Handy 1972:471). The deep valleys cutting through the southern half of the central plateau provided a number of natural resources: along

the lower sections of these valleys, yams and bananas were cultivated; *'awa* (*Piper methysticum*) grew further inland; and an extensive upland jungle (*wao*) stretched beyond the *'awa*. Many birds lived in the *wao*, including those with feathers that were prized for use in feather capes, helmets, and *lei* making. Plants such as *wauke* and *māmaki* that grew in the *wao* supplied bast for making *tapa* (bark cloth).

Hawaiian legend tells of the wealth of 'Ewa, as illustrated in this story related by Kamakau (1991:83, brackets added):

> Kaneku'ana was the kia'i [guard or watchman[1]] of 'Ewa, and the kama'aina [native-born] from Halawa to Honouliuli relied upon her. Not all of the people of 'Ewa were her descendants, but the blessing that came to her descendants were shared by all. When pilikia [trouble] came to the i'a [marine animals] at 'Ewa, and their children were in distress because of the scarcity of i'a, the descendants of Kanekua'ana erected waihau heiaus [a heiau where hogs, bananas, and coconuts were sacrificed] for Kanekua'ana, and lighted the fires [for the cooking of offerings] to bring blessings upon the whole people. What blessing did they obtain? I'a. What kinds of i'a? The pipi (pearl oysters)—strung along from Namakaohalawa to the cliffs of Honouliuli from the kuapa [wall built in reef] fishponds of inland 'Ewa clear out to Kapakule.

At the time of contact, population and land use in 'Ewa centered around Pu'uloa lagoon, particularly its inner shore where complex irrigation systems were developed along numerous streams, springs, and floodplains. Fishponds and fishtraps lined the deeply indented shoreline. Cordy (1996:5) describes settlement along the inner shore:

> Each community around Pearl Harbor had its focus on ... a fertile floodplain. ... Halawa, Aiea, Kalauao, and Waimalu each had their own small floodplain, and Waiau and Waimano essentially shared a floodplain ... Manana and Waiawa shared one larger plain fed by the joined Panakauahi, Waiawa, and Manana streams. Waipi'o had a spring-fed floodplain ... Waikele, Ho'ae'ae, and Honouliuli each had their own plains. These floodplains were the irrigated taro lands for which 'Ewa was renowned.

The main trail around O'ahu passed through the densely populated 'Ewa coast and further west along the base of the southern Wai'anae mountains (Ii 1959:96). An early 19th century traveler along this trail describes the coastal plain in 1816 (Campbell 1969:145):

> We passed by foot-paths winding through an extensive and fertile plain, the whole of which is in the highest state of cultivation. Every stream was carefully embanked, to supply water for the taro beds. Where there was no water, the land was under crops of yams and sweet potatoes. The roads and numerous houses are shaded by cocoa-nut trees, and the sides of the mountains covered with wood to a great height.

1. Definitions are from Pukui and Elbert (1986).

As the trail extended along the inland 'Ewa Plain, however, the landscape is described as a "barren desolate plain" (Hall 1839, quoted in Kelly 1991:150), where there "were no houses there, only a plain" (Ii 1959:95). In contrast to the densely populated and agriculturally developed inner shoreline of Pu'uloa, the arid lands of the 'Ewa Plain had only smaller or more scattered communities, including small fishing camps along the open ocean coast.

Although currently dry, streams in gulches in the southern Wai'anae Mountains may have had water at some time in the past. There were certainly springs that bubbled to the surface. One such water source was observed in Kalo'i (a gulch draining from the southeast side of the Wai'anae Mountains) in the 1890s, when a search for ranch water resulted in finding a paved well (von Holt 1953:116, in Sterling and Summers 1978:35):

> ...On their return to the ranch house at Honouliuli that evening, it was soon spread around that "Hale" had found a new spring with much water. After supper, when he and Lui Warren, the foreman, were sitting on the lanai, two old Hawaiians who lived in the village and who were great friends of Harry's came up... Finally he got them to explain the spring, called "Waihuna" (Hidden Spring) had been one of the principle sources of water for all that country, which was quite heavily populated before the smallpox epidemic of 1840.

Numerous temples are recorded for 'Ewa, including many scattered along the slopes and ridgelines above Pu'uloa lagoon (see McAllister 1933:Figure 19; Sterling and Summers 1978:56) (see Fig. 2). The only traditionally recognized religious site on the 'Ewa Plain is at Pu'ukapolei, described as "the home of the family of Kamapua'a and also the location of a temple" (Tuggle and Tomonari-Tuggle 1997). Recorded temples in the coastal areas of the lagoon include one in Honouliuli, two in Waikele, and one each in Waipi'o, Waiawa, Waiau, and Waimalu (McAllister 1933:103-106). In addition, there were probably numerous fishing shrines, given the importance of fishing and the population density of the interior region.

The Nineteenth Century

The two succeeding conquests of O'ahu by Kahekili and Kamehameha in the early post-contact period severely damaged the *ali'i* families of the island. After the island was conquered by Kahekili, the 'Ewa chiefs plotted the death of the Maui chief, but the plot fell apart. As revenge, Kahekili attacked 'Ewa and Kona and "men, women, and children were massacred, until... streams in Kona and Kahoa'ai'ai [Hō'ae'ae] in 'Ewa were choked with the bodies of the dead..." (Kamakau 1961:138, brackets added). The aftermath of Kamehameha's victory was the placement of Hawai'i island chiefs in controlling positions throughout the island. This disruption and turmoil was then compounded by the effects of European contact in the ensuing decades.

In the early 19th century, 'Ewa was transformed from a center of *ali'i* power to a rural backwater, far from the political, social, and economic center of Honolulu. Communities shrank and sometimes disappeared due to population decline from disease and out-migration. On the 'Ewa Plain, communities contracted from scattered residential localities on the plain to the well-watered Honouliuli Gulch and places along the lagoon shoreline. For a brief decade of intensive sandalwood collection in the 1820s, Pu'uloa lagoon was a transitory center for the collection and out-shipment of this commodity. A Christian mission station was established at Waiawa in 1834.

At mid-century, ownership of lands in the islands was codified in a system of fee simple ownership. The Māhele of 1848 divided lands among the king, the high chiefs, and the government, not including commoners' rights to land they lived on and used. Land Commission records of awards to commoners indicate that the irrigation fields and fishponds were still maintained. Dense clusters of award parcels, usually coterminous with taro fields and house lots, occurred along the inland shore, particularly along the banks of the major permanent streams and around springs. Fishponds such as Kukona (just west of the Waiau Generating Station) were also awarded as Land Commission awards.

The second half of the 19th century saw a transformation of the 'Ewa landscape. Irrigation agriculture was still practiced but it was now carried out by Chinese rice farmers who also took over operations of many of the fishponds. The spring at Waiau became the locality of a rice mill (Bennington 1897). Frank Damon (1882:37) describes the rice farmers at Honouliuli Gulch in 1882:

> Towards evening we reached Honouliuli, where the whole valley is leased to rice planters... This was one of the largest rice plantations we visited. Sometimes two or three men only, have a few fields which they cultivate for themselves, and we often too came upon houses where there were eight or ten men working their own land. But the larger plantations are owned by merchants in Honolulu, who have a manager acting for them.

Ranching also developed during this period. On the 'Ewa Plain, initial efforts were started by ranchers James Dowsett and John Meek in 1871. But shortly after, most of the plain was bought by James Campbell, who began improving his property by running all the wild cattle off the land, fencing a section for grazing, and converting the remainder to agriculture. Smaller ranches were located inland of West Loch and Waipi'o Peninsula (Monsarrat 1913).

In 1889, Benjamin F. Dillingham acquired a 50-year lease on most of Campbell's Honouliuli lands and then a year later subleased a major portion to Ewa Plantation Company for sugarcane cultivation. Dillingham's main interest was the Oahu Railway and Land Company (OR&L), a transportation marvel of the time that linked Honolulu with rural O'ahu and brought urban development to the inner shoreline of Pu'uloa. The OR&L began rail service in 1889. This was followed a year later with the development of Pearl City, O'ahu's first planned community. Railway stations serviced the line; within the project corridor,

stations were located at Pearl City, Waiawa (just west of Loko Kuhialoko), Waipi'o, Waipahu, Hō'ae'ae, Honouliuli, and Ewa Mill.

By the end of the century, the landscape of coastal 'Ewa and the 'Ewa Plain reflected commercial agricultural development, budding urbanization, and scattered remnants of earlier small-scale farms and communities. Ewa Plantation Company had transformed the 'Ewa Plain into vast fields of sugar cane irrigated by 72 artesian wells. On the southern slopes of the central plateau, the Oahu Sugar Company, formed in 1897, was undertaking a similar transformation of the island landscape. Along the Pu'uloa shoreline, Chinese rice fields were extensive and Chinese managers continued to harvest fish from converted Hawaiian ponds (although many of the smaller fishponds had been filled or were no longer in use). The OR&L rail line was a conspicuous feature of the coastline, cutting across and along side the ponds and fields.

The Modern History of 'Ewa

The modern history of 'Ewa is linked to commercial agriculture and the U.S. military. The early 20th century saw commercial agriculture in southern O'ahu at its height. In the 1920s, Ewa Plantation covered 12,000 acres, and included sugarcane fields, a mill, residential areas for several thousand people, a sisal plantation, a large wood lot on the western shore, and a limestone quarry. Ewa Plantation lands extended east to abut the similarly developed lands of Oahu Sugar Company, which had cane growing from the expansive central plateau slopes to the lowlands bordering the OR&L line, and even onto the Waipi'o Peninsula (Monsarrat 1913). The main communities in 'Ewa clustered around sugarcane operations, with smaller communities still linked to older origins. On the 'Ewa Plain, the plantation mill and villages straddled both sides of the OR&L line. Oahu Sugar Company headquarters at Waipahu and the newly created town of Pearl City were community focal points along the inland shore. Older communities included Honouliuli on the bluffs west of Honouliuli Gulch, as well as smaller residential clusters along the inland shore of Pearl Harbor.

During this same period, the military was a major shaper of the Pu'uloa landscape. Under terms of the 1887 Reciprocity Treaty with the United States, the Hawaiian government leased Pearl Harbor to the United States. Following the overthrow of the monarchy in 1893 and annexation of the islands by the U.S. in 1898, the development of Pearl Harbor as a naval base had begun. The first decade of the new century saw sand dredging of the lagoon, condemnation of private lands along the lagoon edge, and massive channelization of the harbor entrance. The major facilities of the naval base and submarine base were constructed between 1910 and 1918.[2]

In the 1930s, the military acquired more lands as part of a general build-up of facilities on O'ahu to alleviate overcrowding at Pearl Harbor. A major section of Campbell Estate in Honouliuli was developed for naval magazine facilities, an Army coastal defense

2. Fort Weaver, after which Fort Weaver Road is named, was constructed at the western mouth of Pearl Harbor in 1921-22 (Dorrance 1993:76). It was part of a system of coastal defenses along the southern shoreline of O'ahu.

battery at Pu'ukapolei, Army and Marine training facilities, and a Marine Corps airfield. Just prior to and at the start of World War II, other Pearl Harbor facilities underwent major expansion, including acquisition of most of the Waipi'o and Pearl City Peninsulas. Just one month before the December 7 attack, the U.S. Navy began construction of Naval Air Station, Barbers Point on the 'Ewa Plain adjacent to the Marine Corps airfield.

The war brought changes to 'Ewa, not the least of which was the intensification of land use along the perimeter of Pearl Harbor and military control over railroad operations. After the war, the Navy retained much of the lands over which it had assumed control, and the railroad lost its primacy in island transportation. The Ewa Plantation Company ended its use of railroads (Condé and Best 1973), but continued to use rail easements for automotive vehicles. At the end of 1947, the Oahu Railway and Land Company ran its last train.

Although sugar cane cultivation continued to flourish for several decades after the war, by the 1970s, evolving world economies made commercial sugar agriculture in Hawai'i less competitive, and both 'Ewa Plantation and Oahu Sugar Company closed their doors. In recent times, urban development has been the main driver of landscape change in 'Ewa.

PREVIOUS ARCHAEOLOGICAL RESEARCH

Hawaiian settlement and land use of the 'Ewa region left a material record of overlapping events, but the last 100 years of large-scale land modifications from sugar cultivation, military construction, and recent development, has destroyed much of this record. Archaeological research in recent years, however, has revealed and preserved some of the information.

Early in the 20th century, archaeological avocationists and researchers recorded sites on the island, primarily monumental structures such as temples and fishponds (Thrum 1907; Stokes 1909). At the beginning of the century, Nakuina (1904:50, brackets added) described remains attributed to the grandmother of the pig-god Kamapua'a:

> A very short time ago the foundations of Kamaxuaniho's house could still be seen at Puuokapolei; also the remains of stone wall surrounding her home. It has even been said that her grave could be identified, but since the extension of the cane and sisal planting at the base of Puuokapolei, it is possible that the stones may have been removed for wall-making.

In 1930, McAllister (1933) carried out a systematic survey of O'ahu using information from nine months of fieldwork, literary sources, and informants; in particular, Thrum's earlier work on temples, in which he identified 108 on the island, was a major source for McAllister's study.

It was not until the 1970s, however, that archaeological research became common. Mostly related to compliance with federal and state laws and regulations, extensive work on

the 'Ewa Plain was carried out in anticipation of harbor construction, residential and commercial development, and as part of planning for military closure of the Naval Air Station at Barbers Point. More limited work was conducted along the northern shoreline of the harbor, primarily because this area was already urbanized.

Table 1 lists the archaeological projects that have been conducted in areas that include or are close to the SEC and the Chevron pipeline routes. Figure 3 shows their locations. Five projects have been carried out along the SEC (Rosendahl 1987; Hammatt and Shideler 1991; Chaffee and Anderson 1995; Jourdane 1995; Magnuson 1999). Four archaeological projects have been conducted within or near the Chevron pipeline route (Kennedy 1988; Davis 1988; Hammatt et al. 1990; Wolforth and Wulzen 1998). In addition, numerous archaeological investigations of Naval Air Station Barbers Point (along the southern side of the route followed by the Chevron pipeline) have also been carried out (see Tuggle and Tomonari-Tuggle 1997 for synthesis of NAS Barbers Point and 'Ewa Plain research). Six projects cover areas crossed by both Alternatives 1 and 2 (Yent 1985; Dicks et al. 1987; Nagaoka and Davis 1989; Henry et al. 1993; Hammatt and Chiogioji 1997; Athens 2000).

ARCHAEOLOGICAL SITES NEAR THE PIPELINE ROUTES

There are 13 previously identified historic and archaeological sites in or adjacent to the routes followed by Alternatives 1 and 2. Table 2 summarizes these sites; Figure 4 shows their locations.

FISHPONDS

Both pipeline routes pass over or near the locations of six Hawaiian fishponds: Loko Kukona (Site 50-80-09-114); Loko Luakahaole (Site 50-80-09-115); Loko Kuhialoko (Site 50-80-09-119); Loko Moo (Site 50-80-09-120); Loko Eo (Site 50-80-09-123); and Loko Pouhala (Site 50-80-09-126). The Chevron pipeline also passes an unnamed historic period fishpond at Honouliuli (Site 50-80-12-3323).

Loko Kukona. Loko Kukona was located to the east of Pearl City Peninsula in the *ahupua'a* of Waimano. Maps dating to the last two decades of the 19th century (Bishop 1887; Bennington 1897) show the pond on the west side of a small unnamed stream, probably emanating from a spring. The surrounding area is shown as "rushes" and "banana swamp" on the Bishop (1887) map. By the time of McAllister's 1930 survey, very little of Loko Kukona was left (McAllister 1933:105). It is described as having "formerly covered 27 acres. The wall was of coral and basalt, to 5 feet wide but only 2 feet high, without makaha" (McAllister 1933:105). It is estimated that the Alternatives 1 and 2 routes cross through or just inland of the former pond.

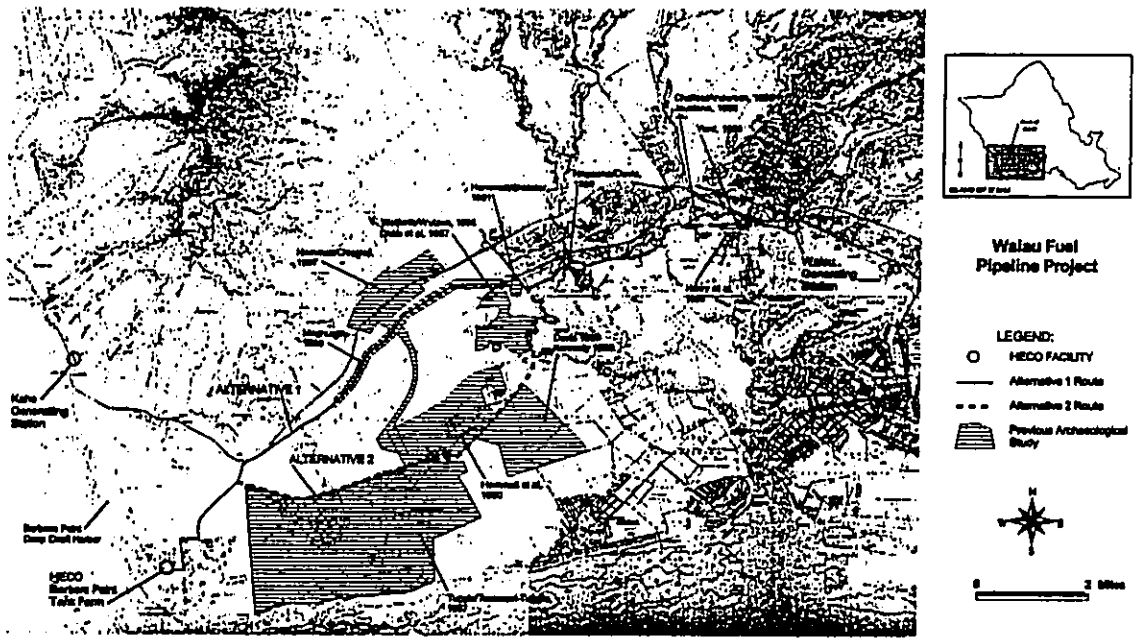

Figure 3. Locations of previous archaeological studies within or near the SEC and Chevron pipeline routes.

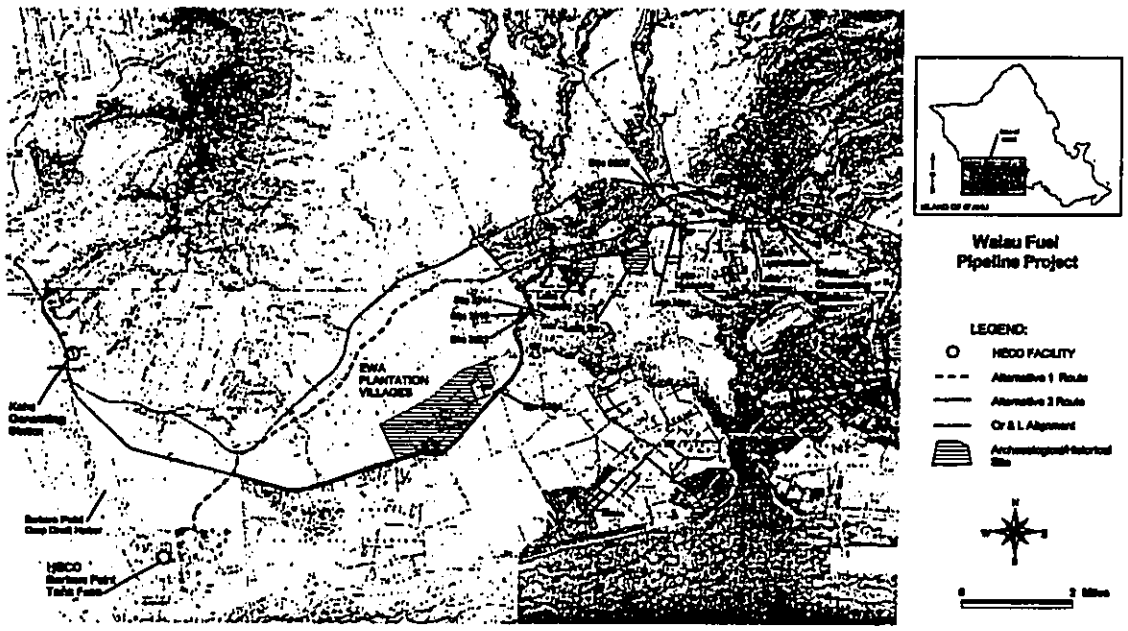

Figure 4. Locations of previously identified archaeological and historical sites within or adjacent to the SEC and Chevron pipeline routes.

Table 1. Previous Archaeological Projects Near the SEC (Alternative 1) and Chevron Pipeline (Alternative 2) Routes

Reference	Level of Work	Location	Archaeological Sites	Alternative
Yent 1985	Reconnaissance and testing	Hale Mohalu, ca. 1 mile west of Waiau Generting Station, between Alternative 1 and 2 routes, Waiawa *ahupua'a*	none; but prior uses of area include traditional Hawaiian agriculture; WWII Air Force mess hall, dormitory, etc.; health center for treatment of Hansen's disease; buildings knocked down in 1983	1 and 2
Rosendahl 1987	Reconnaissance survey	West Loch Estates, Honouliuli *ahupua'a*	3314 (midden site)	1 and 2
Dicks et al. 1987	Reconnaissance survey	West Loch Estates, Honouliuli *ahupua'a*	3323 (unnamed fishpond) 9714 (OR&L)	1 and 2
Kennedy 1988	Reconnaissance survey	Ewa Gentry, Honouliuli *ahupua'a*	9714 (OR&L)	2
Davis 1988	Subsurface survey	Ewa Gentry, Honouliuli *ahupua'a*	9714 (OR&L) 5334 (disturbed charcoal) also late 19th, early 20th century bottle glass along OR&L tracks	2
Nagaoka and Davis 1989	Survey and monitoring	Pupu'ole Mini Park, Waikele *ahupua'a*	9714 (OR&L)	1 and 2
Hammatt et al. 1990	Reconnaissance survey	'Ewa Villages, Honouliuli *ahupua'a*	9714 (OR&L) 9786 (Ewa Villages)	2
Hammatt and Shideler 1991	Inventory survey	Saint Francis Medical Center West, Honouliuli *ahupua'a*	none	1
Henry et al. 1993	Inventory survey	Waiawa Floodplain, M_nana *ahupua'a*	none; but possible irrigation pondfield deposits underlying modern fill	1 and 2

Table 1. Previous Archaeological Projects Near the SEC (Alternative 1) and Chevron Pipeline (Alternative 2) Routes (cont.)

Reference	Level of Work	Location	Archaeological Sites	Alternative
Chaffee and Anderson 1995	Burial excavation	*makai* side of Leeward Community College, Waiawa *ahupua'a*	5302 (burial associated w/ historic house site)	1
Jourdane 1995	Burial excavation	*makai* side of Leeward Community College, Waiawa *ahupua'a*	5302 (burial associated w/ historic house site)	1
Hammatt and Chiogioji 1997	Reconnaissance survey	north-south road corridor, Honouliuli *ahupua'a*	9714 (OR&L) 9786 (Ewa Villages)	1 and 2
Tuggle and Tomonari-Tuggle 1997	Synthesis	NAS Barbers Point	multiple	2
Wolforth and Walzen 1998	Data recovery	West Loch Estates, Honouliuli *ahupua'a*	none	2
Magnuson 1999	Reconnaissance survey	Farrington Highway, Honouliuli *ahupua'a*	9714 (OR&L)	1
Athens 2000	Paleoenvironmental coring	Pearl Harbor, multiple *ahupua'a* in 'Ewa District	119 (Kuhialoko fishpond) 123 (Eo fishpond)	1 and 2

Table 2. Summary of Archaeological and Historical Sites Along the Alternative Pipeline Routes.

Site No. •	Site Description	Location	Project Alternatives	Reference
09-114	Loko Kukona	west of Waiau Generating Station	south of 1 and 2	McAllister 1933
09-115	Loko Lualuahaole	west of Waiau Generating Station	south of 1 and 2	McAllister 1933
09-119	Loko Kuhialoko	NW corner of Pearl City Peninsula	2	McAllister 1933; Athens 2000
09-120	Loko Moo	NW corner of Pearl City Peninsula	between 1 and 2	McAllister 1933
09-123	Loko Eo	NE corner of Waipi'o Peninsula	north of 1 and 2	McAllister 1933; Athens 2000
09-126	Loko Pouhala	NW corner of Waipi'o Peninsula	1 and 2	McAllister 1933
13-3314	possible midden deposit	inland of H_'ae'ae Point, north of the mouth of Honouliuli Gulch	2	Rosendahl 1987
13-3319	habitation deposit, possible cemetery	nose of a 20 foot high ridge south of H_'ae'ae Point	2	Dicks et al. 1987
12-3323	unnamed historic period fishpond	mouth of Honouliuli Gulch	2	Dicks et al. 1987
09-5302	historic house site, burial	seaward of Leeward Community College	1	Chaffee and Anderson 1995; Jourdane 1995
12-5334	buried charcoal	south side of OR&L alignment, east of Fort Weaver Road	2	Davis 1988
12-9714	OR&L Alignment	across 'Ewa Plain and along inland shore of Pearl Harbor	1 and 2	multiple
12-9786	'Ewa Plantation Villages	north side of OR&L alignment, west of West Loch	2	multiple

• All site numbers are preceded by the prefix "50-80-." "50" stands for the State of Hawaii; "80" stands for the island of O'ahu.

Loko Luakahaole. Loko Luakahaole was situated on the east side of the unnamed stream that flowed past Loko Kukona (Bishop 1887). McAllister (1933:105) describes it as once covering only 1 acre; by 1930, it had been filled in. It is estimated that the SEC and Chevron pipeline routes are just north of or cross through the former pond.

Loko Kuhialoko. Loko Kuhialoko is located south of Leeward Community College in the *ahupua'a* of Waiawa. The pond at the time of McAllister's 1930 survey was only "a few acres in size" and lay on the seaward side of the OR&L line (McAllister 1933:105). The U.S.S. Bennington map of 1897 shows the rail line crossing the center of the pond; it is apparent that by McAllister's time, the inland half of the pond had filled in. Paleoenvironmental coring in the vicinity of the pond suggests that the upper 318 cm of strata reflect major historic disturbances (Athens 2000:B-52). It is estimated that the Alternative 1 route passes inland of the former pond; the Alternative 2 route crosses the pond.

Loko Moo. Loko Moo was adjacent and to the north of Loko Kuhialoko in the *ahupua'a* of Waiawa. McAllister (1933:105) reports that the pond "formerly covered 13 acres, but is now a very small pond." It lay on the inland side of the OR&L track. It is estimated that the former pond lies between the SEC and Chevron pipeline routes.

Loko Eo. Loko Eo is located in the northeastern section of Waipi'o Peninsula in the *ahupua'a* of Waipi'o. It once covered 137 acres but was filled in the mid-20th century and is now the site of the Ted Makalena Golf Course. McAllister (1933:106) notes that the pond wall "was about 6 feet wide of coral stone and about 4 feet high, with six *makaha*. The wall has been greatly widened now, forming a railroad track bed for the plantation train." Coring results in the Loko Eo area suggest lagoonal sediments indicative of a very low energy environment (Athens 2000:B-56). The upper layers of the fishpond, possibly to 7.17 m below surface, have been disturbed and may be fill. This pond is located in an area that is separated from the former OR&L right-of-way used by the SEC and the Chevron pipeline by a modern canal.

Loko Pouhala. Loko Pouhala covered 22 acres in the northwestern portion of Waipi'o Peninsula (McAllister 1933:106) at the head of West Loch, in the *ahupua'a* of Waikele. Pukui (1939) describes it as "an important fishpond in olden days. ... The railroad crosses the pond, cutting it in two." The portion of the former pond seaward of the OR&L alignment is presently referred to as Pouhala Marsh and is a federally designated critical habitat for endangered Hawaiian waterbirds (Planning Solutions 2001:3-7). The proposed Alternative 1 route and the Alternative 2 Chevron pipeline are within the former OR&L right-of-way, which is not part of the Pouhala Marsh preserve.

Unnamed Pond. The Site 3323 fishpond was identified during archaeological survey for the West Loch Estates development (Dicks et al. 1987). It is a roughly triangular-shaped body of water that was created by the construction of the OR&L berm across the mouth of Honouliuli Gulch. The 275 m long east wall of the pond is the railroad grade (Dicks et al. 1987:55). The southwest wall separates this pond from Site 3322, a fishpond that dates to at least the 1870s (Dicks et al. 1987:53, referencing Monsarrat 1878); Site 3322 is not within or

immediately adjacent to the project corridor. The OR&L right-of-way that is followed by the Chevron pipeline is located within the seaward berm of the fishpond.

Site 3314: Midden Deposit

Site 50-80-13-3314 consists of a possible midden deposit located inland of Hō'ae'ae Point and north of the mouth of Honouliuli Gulch (Rosendahl 1987). This site lies on the high ground above and west of the Chevron pipeline route. Dicks et al. (1987) state that it "was ambiguous as to whether or not it was a cultural feature;" the area surrounding the midden deposit was described as extensively disturbed by sugarcane cultivation.

Site 3319: Habitation Deposit/Possible Cemetery

Site 50-80-13-3319 is a habitation deposit and possible historic period cemetery located at the nose of a 20 foot high ridge south of Hō'ae'ae Point (Dicks et al. 1987:42-43). The Chevron pipeline crosses the low-lying ground at the base of the ridge nose.

Site 5302: Historic House Site and Burial

Site 50-80-09-5302 consists of the remains of historic period burials uncovered during sewer line excavation along seaward side of Waiawa Road *makai* of Leeward Community College (Jourdane 1995; Chaffee and Anderson 1995). The remains include one coffin burial that post-dates 1917 (based on the presence of a 1917 buffalo head nickel) and disturbed remnants of at least five individuals. The burial remnants may be a secondary deposit resulting from disturbance during the interment of the coffin burial.

Another burial was uncovered in 1988 on the south bank of Waiawa Stream. This site was assigned the number 50-80-09-3761 (Bath 1988).

Site 5334: Buried Charcoal

Site 50-80-12-5334 consists of fragmented charcoal collected from a backhoe trench located on the south side of the former OR&L right-of-way followed by the Chevron pipeline and east of Fort Weaver Road. Although the sample produced a C12/C13 corrected age of 1,580±70 years BP, it was not likely to be from a cultural context (Davis 1988). Historic bottle glass associated with the OR&L was found near the surface.

Site 9714: OR&L Alignment

Site 50-80-12-9714 consists of the remains of the OR&L alignment that runs along the inland shore of Pearl Harbor and extends west across the 'Ewa Plain to Nānākuli. The

OR&L was established in 1889 by Benjamin F. Dillingham. It provided rail transportation from a base in Honolulu around the southern, western, and northern shores of the island. An inland leg built at the turn-of-the-century connected the main line at Waipahu to the pineapple fields at Wahiawā and the military base at Schofield Barracks on the central plateau. It played an important role during World War II, carrying troops and munitions. Following the war, there was a decrease in passenger travel, and the OR&L ran its train in 1947 (Hungerford 1963:37).

The railroad track was 1.04 m wide, and the distance between ties (crib) was between 38 and 43 cm. The railroad bed was often formed by laying crushed basalt or coral gravel over soil (McDermott and Hammatt 2000; Magnuson 2001). The section from 'Ewa to Kahe Point has been restored and is being used by the Hawaiian Railway Society for scenic train rides. Major portions of the alignment along the shore of Pearl Harbor from Fort Weaver Road to the Arizona Memorial have been paved as a pedestrian/bicycle trail. Other unimproved sections remain as dirt/gravel rail beds.

The section of the rail line between the towns of 'Ewa and Nānākuli was listed on the Hawai'i and National Registers of Historic Places in 1975. This section runs from approximately Fort Weaver Road at the east end to Lualualei Home Road at the west end. A short segment on Navy land near Waipahu Depot Road has also been designated as eligible for inclusion on the National Register. The Hawaiian Railway Society is interested in placing the connecting segment between Fort Weaver Road and the Navy area on the National Register, although there is no current effort to do so (N. Napoka, pers. comm.).

The OR&L alignment from the east side of Pearl Harbor to Nānākuli is presently being planned as part of an outdoor recreation and transportation network (the Pearl Harbor Historic Trail; see BCH 2001).

The proposed Waiau fuel pipeline crosses or overlies the OR&L alignment in four places: at its intersection with Kalaeloa Boulevard; from West Loch Estates to Waikele Stream; inland of Pouhala Marsh to Waipahu Depot Road (under consideration but requires an easement within the former OR&L right-of-way from the State Department of Transportation that has not yet been acquired); and from Waipahu Depot Road to Waipio Point Access Road. The Alternative 2 route roughly follows the rail line alignment the entire distance from Kalaeloa Boulevard in the west to the east end at Waiau Generating Station.

Site 9786: 'Ewa Plantation Villages

Site 50-80-12-9786 consists of the complex of historic buildings and remains called 'Ewa Plantation Villages. It is located on the north side of the OR&L alignment (i.e., the route followed by the Chevron pipeline that comprises Alternative 2) and west of West Loch. It consists of three extant plantation villages (Renton Village, Tenney Village, and Varona Village) and three former plantation villages (C Village, Mill Village, and Middle Village). Hammatt et al. (1990) identify 'Ewa Depot along the railroad, between Renton Village and Mill Village. Additional unnamed features also occur along the rail alignment.

III. ASSESSMENT ANALYSIS AND RECOMMENDATIONS

This section of the report uses the archival and archaeological data presented in Section II to assess the extent to which activities associated with each of the pipeline alternatives have the potential to adversely affect known cultural resources and/or to encounter previously unidentified remains. The section concludes with recommendations for testing of fishpond deposits and monitoring during construction.

ASSESSMENT ANALYSIS

Based on previous archaeological surveys and archival research, 13 archaeological and historical sites have been identified along the two pipeline routes. The results of the archaeological and historical research give an indication of the potential for adverse impacts to known sites and for encountering additional remains during construction and operation of the proposed Waiau pipeline (Alternative 1) and continuing maintenance and repair of the Chevron pipeline (Alternative 2). Figure 5 illustrates the archaeological sites and areas of potential site preservation that may be adversely impacted by Alternatives 1 or 2 activities.

Effects on Known Sites

Two of the previously identified sites, the OR&L line and Site 5302, may be adversely affected by one or both of the two pipeline alternatives.

The OR&L rail line is the site that has the most possibility of being adversely affected by the fuel pipeline alternatives. The portion between Fort Weaver Road and Kalaeloa Boulevard, which contains the Chevron pipeline that would be used for Alternative 2, and a short segment on Navy lands near Waipahu Depot Road, are on the State and National Registers of Historic Places. The entire length of the rail line through the 'Ewa Plain and the inland shore of Pearl Harbor remains in place, although paved along most sections. SHPD staff "responsible for historic period remains indicated that, so long as the pipeline does not compromise the integrity of the historic OR&L rail line," the proposed alternatives are not problematic (Planning Solutions 2001:4-4). Concern about rail preservation is related to disturbance to the existing tracks, ballast, and underlying bed; if such disturbance occurs, the tracks, ballast, and rail bed need to be returned to operating order as stipulated in Federal standards for the reinstallation of tracks (N. Napoka, pers. comm.).

Figure 5. Archaeological sites or areas of potential site preservation.

Site 5302 is situated close to the Alternative 1 alignment. Another burial, Site 3761, was found on the south bank of Waiawa Stream. This is an area that was historically occupied by Hawaiians in the early to middle 19th century and later by Chinese rice farmers. There is therefore a possibility for additional burials as well as residential remains in this area.

For most of the sites along the northern coast of Pearl Harbor, the potential for adverse effect from fuel line project-related activities is moderate. Both the SEC and the Chevron pipeline pass over or near six named Hawaiian fishponds. However, paleoenvironmental coring in two of these ponds, Loko Kuhialoko and Loko Eo, suggest considerable historic and modern dredging and filling (from 3 to 7 m thick), destroying what were once intact fishpond sedimentary deposits and thereby destroying their integrity (Athens 2000). It is unknown whether similar extensive dredging and filling have occurred at the other fishponds. Loko Kukona, Loko Luakahaole, and the northern half of Loko Kuhialoko were filled sometime in the early 20th century (filling alone only buries but does not destroy intact deposits). The southern half of Kuhialoko, a portion of the smaller Loko Moo, Loko Eo, and Loko Pouhala were still open at the time of McAllister's site survey in 1930, but have since been badly degraded as cultural features. Loko Moo and Loko Eo no longer exist. The southern half of Loko Kuhialoko and most of Loko Pouhala are presently preserved as estuarine wetland habitats for Hawaiian waterbirds. Subsurface testing in an area of known irrigation pondfields at the head of Pearl City Peninsula indicate possibly intact deposits underlying layers of modern disturbance (Henry et al. 1993). In general, the SHPD requires the testing of fishpond locations to determine the presence or absence of pond deposits prior to any construction activity.

For sites from Honouliuli Gulch west across the 'Ewa Plain, the potential for adverse impacts from project activities is low.

Sites 3314 and 3319 are in physiographical areas that preclude adverse impact from construction activities associated with either of the project alternatives.

The unnamed Site 3323 pond was created by construction of the OR&L rail line. Alternative 2 activities next to this pond should not adversely affect the site. The SEC pipeline route (Alternative 1) does not come near this site and would not affect it.

Site 5334 marks a location of collected charcoal from a non-cultural context south of the Alternative 2 alignment. Alternative 2 activities are evaluated to have minimal potential for adverse impact. The SEC pipeline route (Alternative 1) does not come near this site and would not affect it.

Ewa Plantation Villages (Site 9786) as well as other plantation-era features are located along the Alternative 2 alignment. However, it is unlikely that subsurface remains related to plantation activities will be impacted by the proposed project. The OR&L was constructed before the major development of the plantation complex. Therefore, there should not be any remains from this period underlying the rail line. The SEC pipeline route (Alternative 1) does not come near this site and would not affect it.

Potential for Encountering New Remains

For reasons discussed below, previously unidentified surface remains are not expected within areas that would be affected by either of the pipeline alternatives, since sugarcane cultivation and modern development have extensively impacted the project alternative routes and surrounding areas. Subsurface remains are unlikely on the 'Ewa Plain, and are moderately possible along the inland shore of Pearl Harbor.

The 'Ewa Plain

In the 'Ewa Plain portion of both pipeline alternatives, the likelihood that as yet unknown sites have been preserved is low. In an overview of the prehistory and archaeology of the 'Ewa Plain, Tuggle and Tomonari-Tuggle (1997:45) estimate that about 45 percent of the 'Ewa Plain has been covered by modern archaeological survey:

> Of the area that has been archaeologically surveyed, roughly 85 percent has been completely modified by modern activities, primarily sugarcane cultivation. Surface investigations and backhoe tests have shown that there is virtually no pre-sugar site preservation in any of these areas.

The Farrington Highway leg of the Alternative 1 route was not evaluated by Tuggle and Tomonari-Tuggle (1997) as it falls inland of their 'Ewa Plain study area. However, other archaeological research along and near this roadway (Magnuson 1999; Hammatt and Chiogioji 1997) found no sites, and the areas studied were observed to be very disturbed by sugar cane cultivation (as with the most of the 'Ewa Plain).

The Honouliuli Gulch portion of the Alternative 2 alignment was evaluated by Tuggle and Tomonari-Tuggle (1997) to have once been developed in irrigated agricultural fields, of which some buried remains were extant at the time of archaeological investigations (e.g., Dick et al. 1987). However, this area has since been developed into residential and golf course uses. Hence, it is anticipated that no remains are now present.

Northern Shore of Pearl Harbor

Traditional and archival sources show that the inland shore was intensively occupied and used in pre-contact times and throughout the 19th century. Previous archaeological research indicates that some remains of this occupation may be extant. Possible subsurface sites include fishpond and irrigation poondfield deposits and isolated remains of pre-contact and historic period residences related to this agricultural and aquacultural activity. As suggested by the burials in Sites 5302 and 3761, human remains may exist within areas that will be impacted by the fuel pipeline project.

Figure 5 (above) shows the areas with the highest probability of subsurface site preservation along the inland shore of Pearl Harbor. This assessment is based on historical

records (primarily Land Commission awards), results of previous archaeological studies, and the extent of modern development.

RECOMMENDATIONS

Recommendations are provided for dealing with known sites and for anticipating discovery of new remains.

Recommendations for Known Sites

Fishponds. The SHPD has commonly recommended testing in areas of known fishponds to determine the presence or absence of intact fishpond deposits. It has made this recommendation for work in areas that have not been previously excavated and for which, therefore, there was no available information. With the exceptions discussed in the following paragraph, construction of the proposed Waiau fuel pipeline within the SEC (Alternative 1) and continued operation and maintenance of the Chevron black oil line (Alternative 2) involve work in areas that have already been disturbed by previous construction. No further archaeological testing is called for in these areas.

Previous research in areas along the Pearl Harbor margin (Henry et al. 1993; Athens 2000) has shown that buried deposits indicative of fishponds and irrigation agriculture are generally confined to depths of at least 6.5 ft (2 m) below the present ground surface. Since typical excavation for the proposed pipeline would be shallower than this (5 ft), no pre-construction archaeological testing for intact cultural deposits is recommended in former fishpond areas. This includes virtually all of the areas shown in Figure 5. However, should the final design for the Waiau fuel pipeline call for excavation deeper than 5 ft through former fishpond areas, the situation should be evaluated on a case-by-case basis to determine whether testing for possible fishpond deposits in these areas is warranted.

Also, in the event that HECO is unable to obtain permission from the State Department of Transportation to use the former OR&L right-of-way to bypass Pouhala Marsh, a fishpond deposit sampling and testing plan should be developed and implemented for this segment of the route.

The OR&L Line. The following recommendations are made for the segment of the OR&L line that presently has working tracks; this applies to the project section between Fort Weaver Road and Kalaeloa Boulevard. Prior to any construction activity that will require removal of tracks, the State Historic Preservation Division and the Hawaiian Railway Society (P.O. Box 60369, Ewa Station, Ewa Beach, HI 96706; phone 681-5461) should be consulted about appropriate methods for removal and reinstallation of tracks, ballast, and rail bed. Following construction, the tracks, ballast, and rail bed need to be returned to operating order as stipulated in Federal standards for the reinstallation of tracks (N. Napoka, pers. comm.). In addition, the materials used in reinstalling the tracks should be consistent with the existing appearance of the operating sections of the OR&L.

It is recommended that, where either alternative crosses the OR&L line, directional drilling rather than trenching be used for installation of pipes.

Site 3502. Any construction activity in the vicinity of Site 3502 should be monitored by a professional archaeologist. This recommendation is presented in more detail below.

Recommendations for Potential New Sites

In the vicinity of Site 5302 and in areas where there is potential for encountering previously unidentified archaeological remains (see Fig. 5), the following recommendations should be followed during any construction activity related to Alternatives 1 or 2.

Prior to Construction. Prior to construction, a monitoring plan should be prepared, pursuant to the stipulations of Hawaii Administrative Rules Title 13, Section 13-279, regarding rules for archaeological monitoring studies and reports.

A briefing for project managers, construction supervisors, and crews should be held prior to ground alteration activities. The briefing should include: [1] information on the kinds of subsurface deposits that may be encountered during construction and [2] the procedures that should be followed in the event that buried deposits or artifacts are exposed, or if human remains are uncovered. The construction personnel should be apprised of the fact that an archaeological monitor will be present in the above areas and that the monitor will have the authority to halt construction in the immediate area of the find or to conduct further investigation of an area of interest as may be needed.

During Construction. During construction, the archaeological monitor should be present in the above noted portions of the fuel pipeline alignments. In the event that archaeological deposits are uncovered during trenching, work in that portion of the project will cease and the monitor will document the deposits as prescribed in the monitoring plan.

If human remains are uncovered during construction, work in that portion of the project will cease and the requirements of State law and regulations regarding burials will be followed (see Hawaii Administrative Rules, Title 13, and Section 13-300). Should human remains be uncovered in an area where no archaeological monitor is present, all work should stop in the immediate area and the State Historic Preservation Division, the Medical Examiner, and the Police Department should be notified, pursuant to Hawaii Administrative Rules, Title 13, Section 13-300-40.

Following Construction. Following completion of required monitoring of construction activities, the archaeological monitor should prepare a monitoring report that complies with Hawaii Administrative Rule Title 13, Section 13-279.

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APPENDIX G CULTURAL IMPACT ASSESSMENT STUDY, HECO WAIAU FUEL PIPELINE PROJECT

Paul H. Rosendahl, Ph.D., Inc.

Archaeological • Historical • Cultural Resource Management Studies & Services
224 Waianueanue Avenue, Hilo, HI 96720

Cultural Impact Assessment Study
HECO Waiau Fuel Pipeline Project

State Energy Corridor: Campbell Industrial Park to HECO's Waiau Power Plant

'Ewa District, Island of O'ahu
(TMK:2-9-1,3,4,6,7,8:Var.)

Technical Report for Environmental Impact Statement

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EXECUTIVE SUMMARY

This cultural impact assessment study was prepared as a technical report in support of a Chapter 343 Environmental Impact Statement (EIS). The EIS is intended for use in support of Hawaiian Electric Company, Inc.'s (HECO) proposed Waiau Fuel Pipeline Project. The proposed pipeline, which is approximately 15 miles long, would be constructed largely within the existing State Energy Corridor (SEC), and would connect HECO's existing Barbers Point Tank Farm (BPTF) in Campbell Industrial Park to HECO's existing Waiau Power Plant in Pearl City in the 'Ewa District, Island of O'ahu.

The general purpose of this study is to comply with the requirements of *Chapter 343 (Hawai'i Revised Statutes)*, which among other things requires that environmental assessments (EA) and impact statements (EIS) identify and assess the potential effects of any proposed project upon the "...cultural practices of the community and State...." More specifically, EA and EIS should address the issue of potential project impacts upon traditional native Hawaiian cultural uses and practices, in accordance with the "Guidelines for Assessing Cultural Impacts" adopted by State Office of Environmental Quality Control (OEQC) in November 1997.

The specific purpose of the present study is to assess the potential impacts of the proposed project upon the cultural resources–the practices, features and/or beliefs–of native Hawaiians or any other ethnic group, that are currently associated with the proposed Waiau Fuel Pipeline Project area. The basic study methodology involved contacting and consulting with potentially knowledgeable individuals and group representatives. A final revised "List of Potential Informants" included some 21 potential information sources. Of the 21 individuals, some 19 individuals, representing many different groups and organizations, were contacted and consulted. Nine stated they were unable to provide any useful information, five provided limited general and cultural information, and five provided useful information specific to the project area and have potential for follow-up and/or possible interviews concerning cultural information relating to the general area of the project. Of the two potential informants not successfully contacted, neither was reported by other informants as having good interview potential and neither is recommended for any follow-up interviews. The number and variety of individuals and groups contacted and consulted during the present identification study demonstrate an adequate, appropriate, and reasonable good-faith effort to identify any traditional native Hawaiian or other ethnic group cultural practices, beliefs, or properties that might currently be associated with HECO's proposed Waiau Fuel Pipeline Project area. In the course of the identification study, informants representing diverse backgrounds and community groups were contacted and consulted, including individuals of ethnicities other than native Hawaiian. This documented effort indicates it likely that any cultural practices, beliefs, and/or properties currently associated with the project area should have been identified, even if only the general nature of any such these practices, beliefs, and/or properties were determined but not recorded in any detail.

No traditional native Hawaiian cultural practices, beliefs, and/or properties of any kind were identified by informants as being associated with the proposed Waiau Fuel Pipeline Project area. Neither were any cultural practices, beliefs, or properties of any other, non-native Hawaiian cultural or ethnic groups specifically mentioned by any of the informants. None of the informants consulted of any current or recent use of the project area by native Hawaiian cultural practitioners exercising traditional and customary access and use rights for any purposes. Additionally, none of the informants had any direct knowledge of any specific traditional cultural properties located within the project area. Based on the entirely negative results of the informant interviews, it can be concluded that the project area is not being accessed by native Hawaiian or other ethnic group cultural practitioners for any traditional and customary cultural uses, that the proposed project would thus have no effects, much less any adverse cultural impacts, and therefore no mitigation measures of any kind are needed. Therefore, it is recommended that full "cultural impact clearance" for the proposed Waiau Fuel Pipeline Project area be given, as there will be no impact of any kind–much less any adverse impacts–upon the exercise of any native Hawaiian traditional and customary access and use rights, or the cultural practices, beliefs, or properties of native Hawaiians or any other ethnic group

PREFACE

The present study, which is the result of work done by PHRI over a two-month period beginning in mid-December 2001, is based largely on contacts and consultations made with potentially knowledgeable individuals and group representatives, with additional information obtained from other readily available documentary sources and previously prepared reports. The general purpose of the study is to comply with the requirements of *Chapter 343 (Haw.Rev.Stat.)*, as amended and approved in 2000. Among other things, Chapter 343 requires that environmental assessments (EA) and impact statements (EIS) identify and assess the potential effects of any proposed project upon the "...cultural practices of the community and State...." More specifically, this study addresses the issue of potential project impacts upon current native Hawaiian cultural uses and practices within the area through which the proposed pipeline would pass in general accordance with the OEQC "Guidelines for Assessing Cultural Impacts".

The overall rationale that has guided the present study was that the level of study effort should be commensurate with the potential of the proposed project for making any adverse impacts upon any native Hawaiian cultural practices currently conducted by cultural practitioners within the Hanamā'ulu project area. Thus the present identification study is believed to comprise a reasonable approach for the assessment of potential cultural impacts within this specific project area. The project area and immediately adjacent lands have been extensively modified and disturbed by (a) over a century of historic period sugarcane cultivation and U.S. military activity, and (b) more recent commercial, residential, and industrial development and uses. Because of this, an initial review of project plans suggested that the potential for the project to result in significant or adverse effects upon any current native Hawaiian cultural practices, beliefs, or features is likely to be minimal or indeterminate. The methodology that has been used was designed to test this assumption through consultation with those individuals and organizations identified most likely to possess knowledge of current cultural practices and beliefs relating to the project area. Because the informants contacted have indicated that there are no current practices, beliefs, or features that would in any way be constrained, restricted, prohibited, or eliminated by construction of the proposed pipeline, no further investigation is believed to be warranted

I would like to acknowledge the efforts made by those who have helped achieve the successful completion of the present study. First, I would like to thank the many individuals and group representatives who were contacted by and consulted with our study project team -- especially those *kumu'āina* and cultural practitioners who shared aspects of their specific knowledge of the Waiau Fuel Pipeline project area. Second, I would like to acknowledge the efforts of the other member of our study project team. As a native Hawaiian and a graduate of the Kamehameha Schools, PHRI Cultural Specialist Wanda Pua-Kaipo has taken positive advantage of this opportunity to bring together two of her many interests – native Hawaiian culture and the management of traditional Hawaiian archaeological resources – and explore how the two elements interact and operate in the everyday world; I believe she has accomplished much in that direction.

Paul H. Rosendahl
Hilo, Hawai'i

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INTRODUCTION

Paul H. Rosendahl, Ph.D., Inc. (PHRI) has prepared this cultural impact assessment study at the request of Mr. Perry J. White of Planning Solutions and on behalf of their client, Hawaiian Electric Company, Inc. (HECO). It is intended as a technical report for an Environmental Impact Statement (EIS) to be submitted in support of regulatory applications for HECO's proposed Waiau Fuel Pipeline Project. The proposed pipeline extends for approximately 13 miles from HECO's Barbers Point Tank Farm (BPTF) in Campbell Industrial Park to HECO's existing Waiau Power Plant in Pearl City in the 'Ewa District, Island of O'ahu.

The present study report consists of six principal sections:

- Introduction–which provides general project background including project identification, statement of general and specific study purposes, discussion of cultural impact assessment issues, summary of present study scope of work and discussion of level of study effort and rationale for study approach, summary of project personnel and roles, and summary of study methodology;
- HECO Waiau Fuel Pipeline Project–which presents a short general descriptions of both the project itself and the physical setting of the project area;
- Summary of Historical Documentary Research–which presents a short summary of archival, historical documentary, and previous archaeological research relevant to the project area;
- Findings–which presents the results of the study;
- Conclusion–which summarizes and evaluates study findings, assesses potential effects of the proposed Waiau Fuel Pipeline Project, and makes recommendations for limited discretionary further work; and
- References Cited.

STUDY PURPOSE

General Purpose

The general purpose of this cultural impact assessment is to assess the potential impacts of HECO's proposed Waiau Fuel Pipeline Project on any identified cultural resources in compliance with the requirements of *Chapter 343 (Haw.Rev.Stat.)*, as amended by H.B. No.2895, H.D.1 of the Hawai'i State Legislature (2000) and approved by the Governor as *Act 50* on April 26, 2000. *Chapter 343 (Haw.Rev.Stat.)* was amended by the State legislature because of the perceived need to assure that the environmental review process explicitly addressed the potential effects of any proposed project–i.e., "cultural impacts"–upon the cultural resources of the different groups comprising the multi-ethnic community of Hawaii.

Cultural resources include a broad range of often overlapping categories of cultural items –places, behaviors, values, beliefs, objects, records, stories, and so on. A traditional cultural property ("TCP") is one specific type of cultural resource that falls within the purview of the historic preservation review process. A "TCP" is a historic property or place that is important because it possesses "traditional cultural significance":

> "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices....
>
> A traditional cultural property, then, can be defined generally as one that is...[important/significant]...because of its association with cultural practices or beliefs

> of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community (Parker and King 1990:1).

In addition, it is important to realize that sometimes a traditional cultural property may not have a visible physical manifestation:

> Although many traditional cultural properties have physical manifestations that anyone walking across the surface of the earth can see, others do not have this kind of visibility, and more important, the meaning, the historical importance of most traditional cultural properties can only be evaluated in terms of the oral history of the community (Sebastian 1993:22).

There are at least two significant differences that distinguish traditional cultural properties as a subset within the larger sphere of cultural resources. First, while cultural resources such as practices and beliefs may be spatially associated with general types of geographical areas, such as the coastal shoreline and inshore area of Pearl Harbor, a traditional cultural property is a specific physical entity or feature with a definable boundary, such as a specific location on a point on the Pearl Harbor shoreline. Second, while cultural resources such as practices and beliefs can include general cultural behaviors such as the gathering of shoreline marine resources for general subsistence or ceremonial uses, a traditional cultural property is a specific place or feature directly associated with specific behaviors, the continuity of which over time–in either actual practice or remembrance–can be demonstrated.

Based on these two significant distinctions, it is possible to suggest three types of practitioner claims relating to cultural practices, beliefs, and features that are likely to be encountered in the course of conducting a cultural impact assessment study. These claims, which are characterized below, would be (a) traditional cultural property claims, (b) traditional and customary cultural practice claims, and (c) contemporary or neo-traditional cultural practice claims.

Traditional cultural property claims would be those that lie within the purview of the current historic preservation review process (DLNR 2001a,b). That is, they are claims involving the traditional practices and beliefs of a local ethnic community or members of that community that (a) are associated with a definable physical property (an entity such as a site, building, structure, object, or district); (b) are founded in the history of the local community; (c) contribute to the maintenance of the cultural identity of the community; and (d) demonstrate a historical continuity of practice or belief up to the present–through either actual practice or historical documentation. Furthermore, to qualify as a legitimate traditional cultural property within the historic preservation context, a potential traditional cultural property must be able to demonstrate its historical significance in terms of established evaluation criteria, such as those of the National Register of Historic Places and/or the Hawai'i Register of Historic Places.

Traditional and customary cultural practice claims would be those native Hawaiian claims which lie within the purview of Article XII, Section 7, of the Hawai'i State Constitution ("Traditional and Customary Rights"), and various other state laws and court rulings, particularly as reaffirmed in 1995 by the Hawai'i State Supreme Court in the decision commonly referred to as the "PASH decision," and as further clarified more recently in its 1998 decision in State of Hawai'i v. Alapa'i Hanapi and its 2000 decision in Ka Pa'akai o Ka 'Aina et al. v. Land Use Commission, State of Hawai'i et al. The notable points of the decisions in PASH and in Hanapi can be summarized as follows: (a) the reasonable exercise of ancient Hawaiian usage is entitled to protection under Article XII, Section 7 of the Hawai'i State Constitution; and (b) those persons claiming their conduct is constitutionally protected must prove that they are a native Hawaiian as defined in PASH, that the claimed right is constitutionally protected as a traditional or customary native Hawaiian practice, and that the exercise of the right is occurring on undeveloped or less than fully developed property. Ka Pa'akai generally reaffirms the same points as in the PASH and Hanapi decisions and, in addition, (a) indicates the explicit responsibility of the regulatory agency involved in any application review to arrive at affirmative and substantive conclusions regarding potential impacts upon traditional and customary native Hawaiian cultural practices and resources, and (b) suggests an "analytical framework" for the identification of and potential impacts upon any such cultural practices and resources.

Traditional native Hawaiian cultural practices can be categorized as two general types: (a) practices with active behaviors involving both observable activities with material results and their inherent values or beliefs; and (b) practices with more passive behaviors that seek to produce nonmaterial results. The former type of behaviors – practices with active behaviors, for example, would involve practices like the

gathering and collecting of different animal and plant resources for various purposes, such as subsistence, medicinal, adornment, social, and ceremonial possibly other uses. Uses such as these usually have associated beliefs and values (both explicit and implicit) relating to a pervasive general theme that flows throughout traditional native Hawaiian culture and binds it together. To native Hawaiians, the natural elements of the physical environment – the land, sea, water, winds, rains, plants, and animals, and their various embodied spiritual aspects – comprise the very foundation of all cultural life and activity – subsistence, social, and ceremonial; to native Hawaiians, the relationship with these natural elements is one of family and kinship. The latter type of behaviors – practices with more passive behaviors – involves more experiential activities focused on "communing with nature"; that is, behaviors relating to spiritual communication and interaction that reaffirm and reinforce familial and kinship relationships with the natural environment.

While traditional cultural property claims, as defined above, would certainly fall within the general domain of traditional and customary cultural practice claims, not all traditional and customary cultural practice claims would necessarily qualify as traditional cultural property claims. Traditional and customary cultural practice claims subsume a broad range of cultural practices and beliefs associated with a general geographical area or region, rather than a clearly definable property or site. For example, they might involve the gathering of marine resources from along a section of shoreline for traditional subsistence or for ceremonial purposes. This is in contrast to the gathering of a specific marine resource species for a specific use by current generation members of a family that had obtained the same resource from the same recognized site for several generations.

Contemporary, or "neo-traditional", cultural practice claims overlap with neither traditional property claims nor traditional and customary practice claims. Contemporary cultural practice claims would be those made by cultural practitioners relating to current practices or beliefs for which no clear specific historical basis in traditional culture can be clearly established or demonstrated. For example, the conducting of ritual ceremonies of uncertain authenticity at sites or features for which no such prior use can be demonstrated.

Specific Purpose and Objectives

The specific purpose of the present cultural impact assessment study is to assess the potential impacts of HECO's proposed Waiau Fuel Pipeline Project upon the cultural resources–the practices, features and/or beliefs–of native Hawaiians or any other ethnic group, that are associated with project area. To accomplish this purpose, several specific objectives were established:

1. Identify any native Hawaiian or other ethnic group cultural practices currently being conducted by individual cultural practitioners or groups;
2. Collect sufficient information so as to define the general nature, location, and authenticity of any identified cultural practices;
3. Assess the potential impacts of the proposed project upon identified cultural practices; and
4. Recommend appropriate mitigation measures for any potentially adverse impacts upon identified cultural practices.

Thus, the overall goal or objective of the present cultural impact assessment study is to identify any native Hawaiian or other cultural practices currently being conducted within or immediately adjacent to HECO's proposed Waiau Fuel Pipeline Project area that might potentially be in some manner constrained, restricted, prohibited, or eliminated if the proposed project were to be constructed. Claims for all three types of practices–traditional cultural property, traditional and customary cultural practices, and contemporary cultural practices–are identified and considered.

CULTURAL IMPACT ASSESSMENT AND OEQC GUIDELINES

As indicated previously, the general purpose of this cultural impact assessment is to assess the potential impacts of HECO's proposed Waiau Fuel Pipeline Project on any identified cultural resources in compliance with the requirements of *Chapter 343 (Hrs.Rev.Stat.)*, as amended by H.B. No 2895, H.D.1 of the Hawai'i State Legislature (2000) and approved by the Governor as *Act 50* on April 26, 2000. Among

other things, this amendment requires that environmental assessments (EA) and impact statements (EIS) identify and assess the potential effects of any proposed project upon the "...cultural practices of the community and State...." Guidelines previously prepared and adopted by the State Office of Environmental Quality Control (OEQC 1997) provide compliance guidance. Both *Act 50* and the OEQC *Guidelines for Assessing Cultural Impacts* mandate consideration of potential cultural impacts upon all the different groups comprising the multi-ethnic community of Hawaii. This inclusiveness, however, is generally understated, and the emphasis–as indicated by a background review of the cultural impact assessment issue–and the intent and evolution of both the legislative action and the guidelines–is clearly meant to be primarily upon aspects of Native Hawaiian culture–particularly traditional and customary access and use rights.

Background

To understand the cultural impact assessment issue, particularly as it is addressed in the present study, a summary review of the intent and evolution of the OEQC guidelines is necessary. The guidelines evolved out of what are commonly referred to as "PASH/Kohanaiki" issues – issues relating to native Hawaiian traditional and customary access and land use rights as they were reasserted by a State Supreme Court decision in August 1995 and further clarified in its 1998 decision in State v. Hanapi – and the need for appropriate means to address these issues within the State environmental impact review process. For a good discussion of the issues and options involved, the "Report on Native Hawaiian Traditional and Customary Practices Following the Opinion of the Supreme Court of the State of Hawai'i in Public Access Shoreline Hawai'i v. Hawai'i County Planning Commission" prepared by the PASH/Kohanaiki Study Group (1998) should be consulted.

Initial attempts to address various issues relating to native Hawaiian traditional and customary access and land use rights within the framework of the State environmental impact review process were made in the form of proposed changes to the State EIS law as contained in Chapter 343 (HRS). These attempts to require a formal cultural impact assessment failed to pass the State legislature in 1996 and 1997.

A subsequent, second attempt to address various issues relating to native Hawaiian traditional and customary access and land use rights was made in the form of proposed changes in the "Administrative Rules" for compliance with Chapter 343 (DOH Title 11, Chapter 200). This attempt to require an explicitly defined cultural impact assessment also failed, as the governor declined to approve the proposed amendments.

The third attempt to address various issues relating to native Hawaiian traditional and customary access and land use rights within the State environmental impact review process resulted in the current OEQC "Guidelines for Assessing Cultural Impacts" (OEQC 1997b). Draft guidelines were initially issued for public review and comment on September 8, 1997. The Environmental Council formally adopted the guidelines in their final form on November 19, 1997.

The relationship of the OEQC guidelines to the State Supreme Court "PASH decision" was clearly stated on the front page of the September 8, 1997 issue of the OEQC bulletin, *"The Environmental Notice,"* when the draft guidelines were first issued for public review and comment:

> For years, a controversy has simmered over developer's responsibility to perform a "Cultural Impact Study" prior to building a project. The recent Supreme Court "PASH" decision reaffirmed the state's duty to protect the gathering rights of native Hawaiians. In light of these events, the Environmental Council has drafted a guidance document to provide clarity on when and how to assess a project's impacts on the cultural practices of host communities.

It should be noted that the guidelines for cultural impact assessment are meant to include consideration of all the different groups comprising the multi-ethnic community of Hawai'i; however, this inclusiveness is generally understated, and the clear emphasis is meant to be upon aspects of native Hawaiian culture.

More than 20 letters were received by OEQC in response to the publication of the draft guidelines, and relevant comments were said to have been incorporated into a final version of the guidelines (OEQC n.d.). The final guidelines (OEQC 1997b) were formally adopted by the Environmental Council on November 19, 1997. The final guidelines are virtually identical to the draft guidelines initially published on

September 8, 1997, and the degree to which any of the received comments on the draft guidelines were considered prior to issuance of the final guidelines is uncertain. In fact, the overall process through which the guidelines were prepared and adopted brings out several important questions relating to such topics as (a) the source or basis utilized for the content of the guidelines, (b) the background and qualifications of the preparer(s) of the guidelines, (c) the criteria to be used for the adequacy of cultural impact assessment studies prepared in response to the guidelines, and (d) the legal question of how compliance can be required when the standards are guidelines.

According to the Chair's Report contained in *The 1997 Annual Report of the Environmental Council*, the guidelines were drafted by the Cultural Impacts Committee:

> The Committee drafted guidelines recommending a methodology to assess the impact of proposed actions on cultural resources, including Native Hawaiian cultural resources, values, and beliefs. The guidelines also specify the contents of a cultural impact assessment.
>
> To prepare the Guidelines, the Committee reviewed public testimony and solicited input from interested parties. Expertise from the DLNR's Historic Preservation Division as well as Federal regulations governing the "Protection of Historic Properties" were used to model the draft guidelines.
>
> The draft cultural impact guidelines were published for review and comment in the Sept. 8 *Environmental Notice*, and over 20 letters were received. Relevant comments were incorporated into a final draft version of the guidelines, which were adopted as a policy document by the Environmental Council on November 19, 1997 (OEQC n.d.:5).

Direct inquiries to OEQC (Gary Gill, Director) and SHPD (Dr. Holly McEldowney, Staff Specialist in the History and Culture Branch) provided additional background information relating to the formulation of the cultural impact assessment guidelines. The principal author or compiler of the guidelines was Arnold Lum, Esq., a member of the Environmental Council's Cultural Impacts Committee. Mr. Lum was also a staff attorney at the Native Hawaiian Legal Corporation. OEQC staff also assisted in the preparation of the guidelines. Several internal drafts were prepared, reviewed, and revised. Preparation of the guidelines relied to some degree upon National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1990) for basic content information. Other sources, including the SHPD draft rules for conducting ethnographic surveys and dealing with traditional cultural properties (DLNR n.d.), were consulted; in fact, a copy of the SHPD draft rules was provided to OEQC and the Cultural Impacts Committee by SHPD Administrator, Dr. Don Hibbard. Professional staff in the SHPD-History and Culture Branch took part in the preparation and review of the guidelines. Certainly the inclusion of such professional anthropological and historical expertise in the preparation of the guidelines was appropriate; however, much of the professional advice on the extent to which detailed expectations–regarding study scope, content, methodology, documentation, and impact assessment–should be explicitly addressed in the guidelines was apparently discounted.

The most recent attempt to address various issues relating to native Hawaiian traditional and customary access and land use rights within the State environmental impact review process has resulted in the recent amendment to *Chapter 343 (Haw.Rev.Stat.)*, as amended by H.B. No.2895, H.D.1 of the Hawai'i State Legislature (2000) and approved by the Governor as *Act 50* on April 26, 2000. While no specific administrative rules for the implementation of this amendment have been adopted, it is generally accepted that the *Guidelines* previously prepared and adopted by the State Office of Environmental Quality Control (OEQC 1997) are meant to provide compliance guidance.

Discussion

The OEQC *Guidelines* consist of three basic sections. The first section is an introduction which notes the various statutory and other bases for addressing potential impacts upon cultural resources within the context of the environmental assessment review process, and "...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" (OEQC 1997:1). The second section of the guidelines discusses methodological considerations for conducting cultural impact assessments, and presents a recommended six-step protocol to be followed by the assessment preparers. The third section

of the guidelines outlines eleven topics or "matters" that a cultural assessment should address; these topics basically represent the desired content and organization of a cultural impact assessment report.

As "guidelines," the OEQC *Guidelines* would seem to have neither the specific statutory authority of law, nor the regulatory authority of administrative rules. As guidelines, they can be regarded as providing general guidance; that is, they represent general suggestions and recommendations as to how to approach the assessment of potential cultural impacts. The guidelines provide little or no guidance relative to many important questions, perhaps the most significant of which would be the following:

1. How would project-specific determinations be made as to whether or not a cultural impact assessment study might even be necessary or appropriate–given the specific nature and location of a proposed project;
2. If a cultural impact assessment study is to be conducted, how does one determine what constitutes an appropriate project-specific level of effort – that is, the general scope of work or objectives for the study, and the specific tasks or activities required to accomplish successfully the scope of work or objectives;
3. What criteria are to be used for determining the credibility and reliability of potential cultural information sources (generally referred to as "informants" or "knowledge-able individuals");
4. If specific cultural practices, beliefs, or features are definitely identified as being associated with a project area, what criteria are to be applied for evaluating (a) the descriptive adequacy and (b) the cultural authenticity of the identified practices, beliefs, or features;
5. If specific culturally authentic practices, beliefs, or features are definitely identified as being associated with a project area, what criteria are to be used for assessing the nature and extent of potential impacts of a proposed project on the identified practices, beliefs, or features–that is, "no effect," "no adverse effect," or "adverse effect;"
6. If a project is determined to have potentially adverse impacts upon specific identified culturally authentic practices, beliefs, or features, what criteria are to be used for evaluating the adequacy and appropriateness of alternative potential mitigation actions;
7. Within the purview of what regulatory office or agency would the review and acceptance or rejection of a completed cultural impact assessment study legitimately fall; and
8. What standards or criteria are to be used to evaluate the overall adequacy or acceptability of a completed cultural impact assessment study?

Consideration of these questions, and their implicit implications, has direct relevance to the present cultural impact assessment study. These implications relate most importantly to (a) the level of study effort believed appropriate for the project-specific context, and (b) the rationale adopted for both the study overall, as well as for the identification and evaluation of identified cultural practice claims, the assessment of potential project-specific impacts, and the formulation of any specific recommendations for further study or other mitigation actions.

PRESENT STUDY SCOPE

Level of Study Effort and Rationale for Study Approach

The scope of work and methodology utilized for the present cultural impact assessment are based on the general assumption that the level of study effort appropriate in any project-specific context should involve the consideration of several factors, the most relevant of which are the following: (a) the probable number and significance of known or suspected cultural properties, features, exploitable natural resources, practices, or beliefs within or associated with the specific project area; (b) the potential number of individuals (potential informants) with cultural knowledge of the specific project area; (c) the

availability of historical and cultural information for the specific project area or immediately adjacent lands; (d) the physical size, configuration, and natural and human modification history of the specific project area; (e) the present or recent modern land use of the specific project area; and (f) the potential effects of the project on known or expected cultural properties, features, practices, exploitable natural resources, or beliefs within or related to the specific project area.

Consideration of these factors within the specific nature and context of HECO's proposed Waiau Fuel Pipeline Project, as well as consultation with professional staff in the State Historic Preservation Division-History and Culture Branch, indicated that the appropriate level of study for an adequate assessment of potential cultural impacts would be a relatively lesser level of study effort that could be characterized as an identification study. The distinctive characteristics of an identification study are that it is limited to (a) the identification of native Hawaiian or other ethnic group cultural practices, beliefs, properties, features, or exploitable natural resources associated with and/or present within or related to the specific project area that are currently being conducted by and/or known to individual cultural practitioners or groups, and (b) the collection of information reasonably sufficient to define the general nature, location, and likely authenticity of identified cultural claims.

An identification study does not involve the considerably greater level of study effort-both calendar months and hours of labor-needed to carry out what could be characterized as a full documentation study. The distinctive characteristics of the latter, which would commonly be referred to as a full ethnographic or oral history study, would be (a) the collection of detailed information regarding identified native Hawaiian or other ethnic group cultural practices by means of formal oral history interviews which are usually tape recorded and transcribed, and (b) the analysis and synthesis of all collected data-from interviews, as well as relevant historical documentary and archival research-within the general cultural-historical context of traditional native Hawaiian or other ethnic group culture and the defined specific geographical area of a specific project.

An identification study could be the first of what might become a two-part study. For example, consider whether an identification study seems adequate and sufficient; if so, then conduct it; if not, do a more extensive full documentation study. If results of an identification study are basically negative-i.e., indicate the absence of any adverse impacts, then the cultural impact assessment requirement has been satisfied. On the other hand, if results of the identification study indicate that there potentially are adverse impacts and/or there is substantially more relevant information available, then a more extensive full documentation study might be undertaken.

The overall rationale guiding the present identification study was that the level of study effort should be commensurate with the potential of the proposed project for making any adverse impacts upon any native Hawaiian or other ethnic group cultural practices currently conducted by cultural practitioners within the project area. The identification study presented here is believed to comprise a reasonable approach for the assessment of potential cultural impacts within this specific project area. After a preliminary review of available information about (a) the nature of the project and the area through which it passes, and (b) the cultural, historical, and archaeological resources of the general project area, it was concluded that the potential for the project to result in adverse impacts upon any current native Hawaiian or other ethnic group cultural practices, beliefs, or features was likely to be minimal; that is, given the past land use history of the project area and the general nature of the proposed project, it was believed very unlikely that the continued exercise of any current practices would be in any way constrained, restricted, prohibited, or eliminated.

Because the project was believed unlikely to have any determinable adverse impacts on any current native Hawaiian or other ethnic group cultural practices associated with the project, the level of study effort comprising the present identification study is believed sufficient. Adequate evaluation and documentation of such practices for the present study do not require intensive ethnographic studies that would document the specific details of any identified cultural practice. Neither are exhaustive efforts needed to evaluate the authenticity of any identified cultural practices, or to determine whether such practices represent traditional and customary cultural practices or more recently established contemporary cultural practices. Whatever the nature of any current native Hawaiian or other ethnic group cultural practices that might be associated with HECO's proposed Waiau Fuel Pipeline Project area, the proposed project, as currently conceived, should not be likely to significantly affect the continuation of such practices.

Study Scope and Tasks

An action plan was initially prepared for providing overall direction to the conduct of the cultural impact assessment identification study. This action plan included the following tasks:

1. Project team members assemble preliminary working lists of potential contacts, informants, and information sources (groups and individuals);
2. Compare preliminary lists and assemble prioritized final list of potential contacts, informants, and information sources;
3. Review final list with client and client representatives;
4. Conduct limited background review of readily available historical and cultural documents and reports;
5. Make initial contacts with potentially knowledgeable informants;
6. Conduct initial communications, meetings, and/or informal interviews with potentially knowledgeable informants;
7. Review and evaluate initial findings, and develop revised list of principal knowledgeable informants and cultural practice associations;
8. Select principal knowledgeable informants with whom subsequent formal oral history interviews would be appropriate for documentation purposes;
9. Develop outline of general informant oral history interview topic areas for subsequent formal oral history interviews; and
10. Prepare cultural impact assessment identification study report.

Project Personnel and Roles

The identification study project team consisted of two individuals: PHRI Cultural Specialist Wanda Hoke Pua-Kaipo, and PHRI Principal Paul H. Rosendahl. Initial potential contact lists were formulated, compared, and finalized, and project team members were assigned primary responsibility for attempting to contact specified potential informants. The list was continually revised and expanded, as potential informants were contacted, information was obtained, and the contacted individual in turn suggested additional referrals to be contacted. The list eventually stabilized as contact referrals became largely repeated and new names became rare. The majority of the contacts were made, and information obtained, by Mrs. Pua-Kaipo. While repeated attempts were made to contact all individuals placed on the revised list of potential informants, a few did not respond to the repeated attempts (i.e., did not return calls) or could not be contacted at all.

The present identification study report was prepared by Dr. Rosendahl, with the assistance of Mrs. Pua-Kaipo. Mrs. Pua-Kaipo was primarily responsible for preparing the sections dealing with (a) study methodology-particularly that portion dealing with potential informants contacted, (b) identification of any cultural practices, beliefs, or properties associated with the Waiau Fuel Pipeline Project area, and (c) the broader issues and concerns of the local Hawaiian community, while Dr. Rosendahl assumed primary responsibility for preparation of most of the other sections of the report, including (a) the introduction, background, and study approach and rationale, and (b) the conclusions. The sections that summarize the background and nature of the proposed project overall, and the historical background for the project area were largely adapted from existing sources as indicated.

STUDY METHODOLOGY

Guidance Documents

Several references were utilized as basic guidance documents for the conduct of the present cultural impact assessment identification study. The principal sources were the following:

1. The OEQC *Guidelines for Assessing Cultural Impacts* (OEQC 1997);
2. The *Native Hawaiian Rights Handbook* (MacKenzie 1991), and more specifically the discussions of traditional and customary rights contained in the two chapters on access rights (Lucas 1991a) and gathering rights (Lucas 1991b);
3. The *Report on Native Hawaiian Traditional and Customary Practices Following the Opinion of the Supreme Court of the State of Hawai'i in Public Access Shoreline Hawaii v. Hawai'i County Planning Commission* prepared by the PASH/Kohanaiki Study Group (1998);
4. The text of several relevant decisions of the Hawai'i Supreme Court, including the decision commonly referred to as the "PASH decision" (1995), and the decisions in State of Hawai'i v. Alapa'i Hanapi (1998) and Ka Pa'akai o Ka 'Aina et al. v. Land Use Commission, State of Hawai'i et al. (2000);
5. The federal regulations of the Advisory Council on Historic Preservation for the *National Register of Historic Places* (CFR 1981) and the *Protection of Historic Properties* (CFR 1986);
6. National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1990); and
7. Recent versions of the State Historic Preservation Division (SHPD) draft administrative rules, including Chapter 275: *Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS* (DLNR 2001a), Chapter 284: *Rules Governing Procedures for Historic Preservation Review to Comment on Chapter 6E-42, HRS, Projects* (2001b), and Chapter 284—*Rules Governing Procedures for Ethnographic Inventory Surveys, Treatment of Traditional Cultural Properties, and Historical Data Recovery* (DLNR n.d.).

While the general nature and content of the first four referenced sources are self-explanatory, further comment should be made regarding the final three items. In the absence of any formally adopted administrative rules, SHPD currently utilizes National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1990), as its principal source of guidance for reviewing and evaluating the adequacy and acceptability of traditional cultural property study reports prepared in connection with various permit applications for which SHPD regulatory review is required. Bulletin No. 38 provides detailed guidance for the assessment of traditional cultural properties within the framework of the National Register significance criteria evaluation process (NPS 1990).

The SHPD draft administrative rules relating to ethnographic surveys and traditional cultural properties (DLNR n.d.) have existed in finalized draft version since at least early 1997; however, they have never been circulated openly, much less formally provided for public review, comment, and eventual adoption by the Department of Land and Natural Resources. This situation is unfortunate because the draft rules go well beyond National Register Bulletin No. 38 in providing detailed guidance for conducting traditional cultural property studies, and more specifically for dealing with the identification, evaluation, and documentation of native Hawaiian traditional cultural properties and their associated cultural practices and beliefs.

In the absence of any formally adopted administrative rules, SHPD can also be said to basically follow the federal regulations of the Advisory Council on Historic Preservation for guidance in the evaluation of significance–as contained in Section 60.4 ("Criteria for evaluation") of the "National Register of Historic Places" (CFR 1981), and for guidance in the assessment of potential effects–as contained in Section 800.9 ("Criteria of effect and adverse effect") of the "Protection of Historic Properties" (CFR 1986).

Information Sources

The principal sources of information utilized for this study were various individuals identified in the List of Potential Informants *(Table 1)*. An effort was made to identify and contact individuals potentially knowledgeable of the project area with regard to traditional cultural properties, traditional and customary cultural practices, and/or contemporary ("neo-traditional") cultural practices. Potentially knowledgeable

individuals were evaluated by means of an initial contact and preliminary interview to determine which–if any–individuals had site-specific knowledge and might be candidates for formal ethnographic interviews.

The Project Team formulated an initial list of potential informants. An attempt was made to identify as many potential informants as possible. This list consists of individuals associated with State agencies, associations, community groups, Hawaiian Civic Clubs, and as well as individuals from a wide number of backgrounds and expertise. Individuals contacted were asked to provide referrals and, based on this networking; the initial contact list was expanded to include 21 individuals. Given the limited time frame, a conscious effort was made to contact as many people as possible within the Hawaiian community on southwestern O'ahu. A special effort was made to contact *kūpuna* (elders), other knowledgeable individuals, and cultural practitioners, cultural specialists, teachers, and crafts people.

Additional sources of information consulted were prior archaeological reports and maps of the general project area. *Sites of Oahu* (Sterling and Summers 1978) was also consulted. Of particular use were two recent studies completed by International Archaeological Research Institute, Inc. (IARII) of Honolulu; a native Hawaiian traditional cultural property identification study of lands in Hawai'i owned or controlled by the U.S. Navy (Tuggle and Tomonari-Tuggle 2001), and an historical and archaeological assessment study of the 'Ewa Plain and the inland shore of Pearl Harbor (Magnuson and Tomonari-Tuggle 2002). A draft final report for the former study–which was done for the Department of the Navy (Pacific Division-Naval Facilities Engineering Command), was provided for inspection and review by study collaborator Kepā Maly of Kumu Pono Associates of Hilo, while an advance draft of the latter–which was done for the present Waiau Fuel Pipeline Project, was kindly provided for use by co-author Myra Tomonari-Tuggle. No new or additional historical documentary work was carried out by PHRI.

Summary of Potential Informants Contacted

A final List of Potential Informants contacted for the present study is contained in *Table 1*. Numerous attempts were made to contact everyone on the Potential Informant List. Repeated attempts were made either by phone or through intermediaries. Attempts were made to follow up on all leads that were given. Those people not successfully contacted are indicated as such and these names remain on the list to show the broad spectrum of people for whom contacts were attempted. All informant interviews were done informally by telephone, and written notes were kept. A previously prepared outline of general informant interview topics was utilized for general interview guidance (see *Appendix A*, at end). For the present study, all informants were contacted by phone; no formal taped interviews were done for this identification study. "Potential informant" means anyone identified by another individual as potentially having cultural information. The list of "Potential Informants" is meant to indicate–among other things–the range and extent of effort made to identify individuals who might have any relevant cultural information.

The informants have diverse backgrounds, represent community groups, and include native Hawaiians and those of other ethnicities. Their expertise included, but was not limited to, cultural resource specialists, historians, researchers, engineers, and *kūpuna*. Any potential informant who might have used the area or have specific knowledge of the area was also included in the study. Of the 21 informants included in the final revised "List of Potential Informants," a total of 19 informants were contacted. Nine were unable to provide any useful information, five provided limited general and cultural information, and five provided useful information specific to the project area and have potential for follow-up and/or possible interviews. Of the two potential informants not successfully contacted, neither was reported by other informants as having good interview potential and neither is recommended for any follow-up interviews.

Following are brief profiles of informants identified and evaluated as knowledgeable individuals and who are recommended as potential candidates for discretionary more detailed formal oral history interviews that would record cultural information relating to the general area of the project–i.e., information not essential to reaching conclusions for the present specific project, but useful if one were interested in a broader area. These individuals were selected because of their area specific knowledge and family ties to the general area of the project.

Shad Kane- Retired as a Lieutenant with 29 years in the Honolulu City and County Police Department, Shad currently resides in Makakilo. He is an active member of 'Ahahui Siwila Hawai'i o Kapolei Hawaiian Civic Club, the Nature Conservancy, 'Ike 'Āina and the Makakilo/Kapolei/Honokaihale

Neighborhood Board. Shad was born in Pearl City and is the Association of Hawaiian Civic Clubs resource person for Kalaeloa.

Robert Paoa– Robert is a retired civil servant, having served 42 years with the Army National Guard. He is currently Historian for the Hawaiian Railway Society and is a part-time volunteer archivist at the Bishop Museum.

Ben Schlapak – A member of and resource person for Hawaiian Railway Society, Ben became interested in railroads from his days in the military. He is a professional engineer currently employed by the Airports Division of the State Department of Transportation at the Honolulu International Airport.

Helen Young – Helen is a long time area resident and member of the Royal Order of Kamehameha I. She is also a descendant of Don Francisco DePaul Marin, once confidant of Kamehameha I and good friend to Kalanimoku who owned all of Honouliuli. Helen is married to Tin Hu Young.

Tin Hu Young – Born and raised in Pearl City Peninsula, Waiawa area, Tin Hu's grandfather was a rice grower in Pearl City. The Pearl Harbor area was notably rich with springs. He is a member of the Royal Order of Kamehameha I, and retired from Hawaiian Air as a flight scheduler for pilots and attendants.

HECO'S WAIAU FUEL PIPELINE PROJECT

[Note: The following summaries of project description and setting have been adapted largely from Magnuson and Tomonari-Tuggle 2001 and Planning Solutions 2001.]

PROJECT DESCRIPTION

HECO proposes to construct a fuel pipeline and associated support facilities to transfer fuel from its existing Barbers Point Tank Farm (BPTF) in Campbell Industrial Park (CIP) to its Waiau Generating Station in Pearl City. Situated in the 'Ewa District on the Island of O'ahu, the project area of HECO's proposed Waiau Fuel Pipeline Project extends for approximately 15 miles from Campbell Industrial Park at Barbers Point, across the 'Ewa Plain and the northern shoreline of the West and Middle Lochs of Pearl Harbor, to HECO's existing Waiau Power Plant in Pearl City (*Figure 1, at end*). The proposed pipeline would be mostly located within the existing State Energy Corridor (SEC). Use of one of the five "slots" within the SEC and, if it is granted, a supplemental easement that would allow the pipeline to avoid the portion of the SEC that is within Pouhala Marsh, would require a lease from the State.

HECO has proposed three alternatives for providing fuel to the Waiau Generating Station. Alternative 1 involves (a) construction of a new pipeline running mostly within the existing SEC, (b) modifications at the BPTF to pumping, metering, loading, storage, and maintenance facilities and related equipment, and (c) modifications at the Waiau Generating Station to receiving and metering facilities. Alternative 2 involves renewal of the existing contract with Chevron to provide fuel through an existing Chevron pipeline that diverges from the SEC along some segments between the BPTF and Waiau Generating Station, and would entail periodic maintenance–including pipe replacement–within the same location as the existing pipeline. Alternative 3 involves the use of tanker trucks to transport fuel along existing roadways. As this last alternative would not have the potential to impact cultural resources, it is not mentioned further in this study.

Construction activities related to Alternative 1 that could potentially impact any identified cultural resources include clearing and grading to prepare the right-of-way, ditching, pipe handling, pipe installation, backfilling, and cleanup and restoration.

Alternative 2 construction actions would be limited to maintenance, repair, and possible replacement of the existing Chevron 8-inch pipeline. While maintenance activities would not likely result in any adverse impacts to any identified cultural resources, pipeline repair and replacement activities might have limited potential to adversely impact any identified cultural resources as such activities would involve excavation within an existing pipeline alignment. There is always the possibility–however improbable–that new excavation could expose potentially significant subsurface cultural deposits.

PROJECT SETTING

Situated in the 'Ewa District on the Island of O'ahu, the project area of HECO's proposed Waiau Fuel Pipeline Project extends for approximately 15 miles from Campbell Industrial Park at Barbers Point, across the 'Ewa Plain and the northern shoreline of the West and Middle Lochs of Pearl Harbor, to HECO's existing Waiau Power Plant in Pearl City (*Figure 1, at end*). The project area extends throught a number of the traditional local land units, or *ahupua'a*, of the traditional district of 'Ewa, including the lands of Honouliuli, Hō'ae'ae, Waikele, Waipi'o, Waiawa, Waimano, and Waiau.

Comprising the lowlands of southwestern O'ahu, the 'Ewa Plain is an emerged limestone reef formation that was exposed following the last interglacial sea-level high stand between about 131,000 and 114,000 years ago (Szabo et al. 1994). A layer of alluvium from the southern end of the Wai'anae Mountains covers the more landward areas of the reef formation. The 'Ewa Plain can be divided into three subunits on the basis of surface characteristics and water availability–lowland limestone exposure, floodplain and alluvial fans, and upland alluvial terrain.

The portion of the proposed pipeline route that runs along Farrington Highway within the SEC (Alternative 1) lies primarily in the upland alluvial terrain zone which covers the inland one-third of the 'Ewa Plain. The remainder of the route runs along the *mauka* margin (inland shoreline) of Pearl Harbor.

An alluvial mantle that overlies limestone bedrock or basalt characterizes the upland terrain. The primary soil is Mamala stony silty clay loam, which is shallow and well drained, and dark reddish brown with coral fragments (Foote et al. 1972:93). A much thinner Mamala alluvium extends in patches below the upper alluvium, some of which may have been artificially spread during sugarcane cultivation. The western end of Alternative 1 and most of the Alternative 2–Chevron pipeline route cross the center of the plain, which is exposed lowland limestone with little or no soil cover. This portion of the 'Ewa Plain generally lies below the 40 ft. (12.2 m) elevation contour. Prior to historic and modern development on the plain, sinkholes in the limestone reef were common. The east end of Alternative 2 crosses the mouth of Honouliuli Gulch, the only permanent stream on the 'Ewa Plain and which flows out of the southwest Wai'anae Mountains and drains into the head of the West Loch of Pearl Harbor.

Annual rainfall on the 'Ewa Plain averages about 18 to 25 inches (45.7 to 63.5 cm) from the coast inland, with most rainfall occurring in the late fall and winter. There is great annual variability, with extremes as great as 67 inches (170.2 cm) for the year 1982 and only 5 inches (12.7 cm) for the following year.

Very little native vegetation remains on the 'Ewa Plain, as historic period activities such as cattle grazing, sugarcane and rice cultivation, military use, and modern development have extensively altered the vegetation cover of the plain. Introduced grasses, kiawe (*Prosopis pallida*), and haole-koa (*Leucaena glauca*) currently dominate much of the remaining undeveloped area. Recent paleoenvironmental research (Athens et al. 1999) has indicated that prior to the advent of humans on O'ahu, a somewhat open diverse dryland forest likely covered the plain. This was quickly replaced by an "open savanna-like grassland" where "trees such as Pritchardia, wiliwili, noni, and kou, formed small groves in favorable locations..." (Davis 1990:342).

The eastern portions of Alternatives 1 and 2 follow the northern shore of Pearl Harbor between the head of West Loch and just east of Pearl City Peninsula. Pearl Harbor is a deeply indented and multi-lobed embayment with a narrow entrance and three lochs–formed by two peninsulas, Waipi'o and Pearl City–extending inland for about 8 km. The harbor is a series of drowned river valleys, and has a complex depositional history resulting from creation of the valleys by erosion, sea-level change, island subsidence, and subsequent erosion of upland sediments.

The Pearl Harbor coastal plain is the result of the formation and evolution of Pearl Harbor and consists predominantly of alluvium overlying limestone from old reef formations (Macdonald and Abbott 1970:356-7). The soils of the coastal plain up to approximately 1.0 km (0.6 miles) inland of Pearl Harbor are deep, nearly level to moderately sloping, fine-textured, and well drained, and the present shoreline within the project corridor shows evidence of accretion and sedimentation over the last century (Athens 2000).

Two streams that flow from the Schofield Plateau cross the project area. Waikele Stream feeds into the head of West Loch, west of Waipi'o Peninsula, while Waiawa Stream flows into Middle Loch along the west side of Pearl City Peninsula. The landscape along the northern Pearl Harbor shoreline reflects primarily the intensity of 20th century development of urban O'ahu. Vegetation consists primarily of introduced species, including pickleweed (*Batis maritima*), Indian pluchea (*Pluchea indica*), and American mangrove (*Rhizophora mangle*) (Planning Solutions 2001:5-11).

SUMMARY OF HISTORICAL DOCUMENTARY RESEARCH

[Note: The following summary has been adapted from Magnuson and Tomonari-Tuggle 2001.]

According to legend, the 'Ewa District originated from the land division created by the gods Kāne and Kanaloa. While playing *'ulu maika* at Kapūkakī (the present Red Hill), Kāne threw the game stone, but it went so far and crookedly that it was lost, so Ewa ("strayed") became known by that name.

'Ewa District figures early in the pre-contact history of O'ahu. By AD 1200s, 'Ewa was one of three major districts on O'ahu, the other two being Kona and Ko'olau. The dominant *ali'i* line of 'Ewa was that of the Māweke-Kumuhonua genealogy. In the early AD 1400s, the king La'akona, considered the progenitor of the 'Ewa chiefs, ruled O'ahu. 'Ewa was the center of power of O'ahu, with the ruling center at Līhu'e on the upland plateau. Subsequent generations saw periods of unification and peace alternating with periods of conflict; through this, 'Ewa continued to be an important chiefly locality.

At the time of contact, land use in 'Ewa concentrated around Pu'uloa lagoon (Pearl Harbor), where complex irrigation systems were developed along numerous streams, springs, and floodplains. Numerous temples are recorded for 'Ewa, including many scattered along the slopes and ridgelines above Pu'uloa lagoon.

In the early 19th century, 'Ewa was transformed from a center of *ali'i* power to a rural backwater, far from the political, social, and economic center of Honolulu. Communities shrank and even disappeared due to population decline from disease and out-migration. In 1848, the Great Māhele divided lands among the king, the high chiefs, and the government, not including commoners' rights to land they lived on and used. Land Commission records of awards to commoners indicate that the irrigation fields and fishponds were still maintained. Dense clusters of award parcels, usually coterminous with taro fields and house lots, were present along the inland shore.

The second half of the 19th century saw a transformation of the 'Ewa landscape. Irrigation agriculture was still practiced; ranching developed during this period, as did sugarcane production. In 1890, Benjamin F. Dillingham's Oahu Railway and Land Company (OR&L) linked Honolulu with the rural O'ahu and brought urban development to the inner shoreline of Pu'uloa lagoon. By the end of the century, 'Ewa had vast fields of sugar cane. Along the Pu'uloa shoreline were rice fields and converted Hawaiian fishponds.

The early 20th century saw commercial agriculture in southern O'ahu at its height. In the 1920s, Ewa Plantation covered 12,000 acres, and included sugarcane fields, a mill, residential areas for several thousand people, a sisal plantation, a large wood lot on the western shore, and a limestone quarry. Oahu Sugar Company headquarters at Waipahu and the newly created town of Pearl City were focal points along the inland shore. The military was another major shaper of the Pu'uloa lagoon and surrounding landscape during this period. Under terms of the 1887 Reciprocity Treaty with the United States, the Hawaiian government leased Pearl Harbor to the United States. Following the overthrow of the monarchy in 1893 and annexation of the islands by the U.S. in 1898, the development of Pearl Harbor as a naval base began. The first decade of the new century saw sand dredging of the lagoon, condemnation of private lands along the lagoon edge, and massive channelization of the harbor entrance. The major facilities of the naval base and submarine base were constructed between 1910 and 1918.

World War II brought changes to 'Ewa, not the least of which was the intensification of land use along the perimeter of Pearl Harbor and military control over railroad operations. After the war, the Navy retained much of the lands over which it had assumed control, and the railroad lost its primacy in island transportation. The Ewa Plantation Company ended its use of railroads but continued to use rail easements for automotive vehicles. At the end of 1947, the Oahu Railway and Land Company ran its last train. Although sugarcane cultivation continued to flourish for several decades after the war, by the 1970s evolving world economies made commercial sugar agriculture in Hawai'i less competitive, and both Ewa Plantation and Oahu Sugar Company closed their doors. In recent times, urban development has been the main driver of landscape change in 'Ewa.

The last 100 years of land modifications in Ewa have destroyed much of the archaeological record, but research in recent years has revealed and preserved some of the information. Early in the 20th century,

archaeological avocationists, and archaeologists Thrum and Stokes recorded sites within the general vicinity of the project area), including monumental structures such as temples and fishponds. It was not until the 1970s, however, that archaeological research intensified. Mostly related to compliance with federal and state laws and regulations, extensive work on the 'Ewa Plain was carried out in anticipation of harbor construction, residential and commercial development, and as part of planning for military closure of the naval air station at Barbers Point.

A number of archaeological projects have been conducted in areas that include or are close to the SEC and the Chevron pipeline routes. Five projects have been carried out along the SEC, and five have been conducted within or near the Chevron pipeline route. In addition, numerous archaeological investigations of Naval Air Station Barbers Point (along the southern side of the route followed by the Chevron pipeline) have also been carried out. Six projects have covered areas crossed by both proposed pipeline Alternatives 1 and 2. (See Tuggle and Tomonari-Tuggle 1997 for a synthesis of NAS Barbers Point and 'Ewa Plain research.)

Thirteen previously identified historic and archaeological sites have been within or adjacent to the routes followed by proposed pipeline Alternatives 1 and 2. Both pipeline routes pass over or near the locations of six Hawaiian fishponds that were once part of Pu'uloa lagoon: Loko Kukona (Site 50-80-09-114); Loko Luakahaole (Site 50-80-09-115); Loko Kuhialoko (Site 50-80-09-119); Loko Moo (Site 50-80-09-120); Loko Eo (Site 50-80-09-123); and Loko Pouhala (Site 50-80-09-126). The Chevron pipeline also passes an unnamed historic period fishpond at Honouliuli (Site 50-80-12-5323).

Site 50-80-15-5314 consists of a possible midden deposit located inland of Hō'ae'ae Point and north of the mouth of Honouliuli Gulch. This site lies on the high ground above and west of the Chevron pipeline route. Site 50-80-15-5319 is a habitation deposit and possible historic period cemetery located at the nose of a 20-foot-high ridge south of Hō'ae'ae Point. Site 5302 is a historic house site and burial. Site 50-80-12-5354 consists of fragmented charcoal collected from a backhoe trench located on the south side of the former OR&L right-of-way.

Site 50-80-12-9714 consists of the remains of the Oahu Rail & Land Company alignment that runs along the inland shore of Pearl Harbor and extends west across the 'Ewa Plain to Nānākuli. The OR&L provided rail transportation from a base in Honolulu around the southern, western, and northern shores of O'ahu. An inland leg connected the main line at Waipahu to the pineapple fields at Wahiawā and the military base at Schofield Barracks on the central plateau. It played an important role during World War II, carrying troops and munitions. Following the war, there was a decrease in passenger travel. The section from 'Ewa to Kahe Point has been recently restored and is being used by the Hawaiian Railway Society for scenic train rides. Major portions of the alignment along the shore of Pearl Harbor from Fort Weaver Road to the Arizona Memorial have been paved as a pedestrian/bicycle trail, while other unimproved sections remain as dirt/gravel rail beds. The section of the rail line between the towns of 'Ewa and Nānākuli was listed on the Hawai'i and National Registers of Historic Places in 1975. The OR&L alignment from the east side of Pearl Harbor to Nānākuli is presently being planned as part of an outdoor recreation and transportation network.

Located on the north side of the OR&L alignment and west of West Loch, Site 50-80-12-9786 is a complex of historic buildings and remains called 'Ewa Plantation Villages. It consists of three extant plantation villages (Renton Village, Tenney Village, and Varona Village) and three former plantation villages (C Village, Mill Village, and Middle Village).

FINDINGS

TRADITIONAL AND CUSTOMARY CULTURAL PRACTICES AND BELIEFS

In the course of the informant contacts and informal interviews, no cultural practices or beliefs of any kind that would likely be considered to be representative of traditional and customary native Hawaiian cultural practices and beliefs were identified as currently occurring within and/or immediately adjacent to HECO's Waiau Fuel Pipeline Project area.

IDENTIFICATION OF TRADITIONAL CULTURAL PROPERTIES

While attempting to identify any cultural practices and beliefs associated with HECO's proposed Waiau Fuel Pipeline Project area, considerable effort was also expended toward the identification of any potential traditional cultural properties. No potential traditional cultural properties of any kind were identified in the course of the informant contacts and informal interviews as being present within and/or immediately adjacent to the project area by any of the informants contacted in the course of the assessment study.

CONTEMPORARY CULTURAL PRACTICES AND BELIEFS

No cultural practices or beliefs of any type that would seem to be contemporary rather than traditional and customary cultural ones were identified by any of the informants contacted during the assessment study.

CURRENT CULTURAL CONCERNS

In the course of the informant contacts and informal interviews, several informants mentioned a number of issues and concerns related to HECO's proposed Waiau Fuel Pipeline Project. One informant (A. Eaton) indicated a preference that the area generally referred to today as Barbers Point should be called by its' true name, which is Kalaeloa (literally, "the long point" [Pukui, Elbert and Mookini 1974:72]). A second informant (S. Kane) stated three areas of concern: (a) project construction activities should avoid any adverse impacts to an existing 8-acre sinkhole preservation area situated north of Malakole Road and just outside of Campbell Industrial Park (exact location and ownership/responsibility uncertain); (b) the possible presence of human burials in the general area of the Waipi'o Peninsula between West Loch of Pearl Harbor and the Ted Makalena Golf Course; and (c) oral traditions mention local settlements named Poohilo and Puainako, which linked the *makai* (seaward) lands of Honouliuli with *mauka* (inland) lands, and were said to have been situated in the general area where Farrington Highway crosses Kaloʻi Gulch. Two other informants (R. Lum, T.H. Young) felt that the pipeline should avoid Pouhala Marsh at the head of the West Loch of Pearl Harbor because of potential adverse impacts to the marsh and adjacent lagoon waters from possible fuel leakage from the pipeline. Finally, one informant (R. Lum) was concerned that the proposed project might have potential adverse impacts upon the existing bike trail that extends along the shoreline at the head of the East Loch of Pearl Harbor between 'Aiea and Pearl City.

CONCLUSION

The basic purpose of the present cultural impact assessment study was to determine if any traditional native Hawaiian or other ethnic group cultural practices, beliefs, or features might be adversely affected by HECO's proposed Waiau Fuel Pipeline Project. The basic methodology followed was to review available documentary information and to identify and interview appropriate individuals who might have relevant knowledge of any such cultural practices, beliefs, or features. The number and variety of individuals and groups contacted and consulted during the present identification study, as evidenced by the individuals named in the "List of Potential Informants" *(Table 1)*, demonstrate an adequate, appropriate, and reasonable good-faith effort to identify any traditional native Hawaiian or other ethnic group cultural practices, beliefs, or properties that might currently be associated with HECO's proposed Waiau Fuel Pipeline Project area. Of the 21 individuals that were included in the final revised "List of Potential Informants," some 19 individuals, representing many different groups and organizations, were contacted and consulted. This documented effort indicates it likely that any cultural practices, beliefs, and/or properties currently associated with the project area should have been identified, even if only the general nature of any such these practices, beliefs, and/or properties were determined but not documented in any detail. In the course of the identification study, informants representing diverse backgrounds and community groups were contacted and consulted, including individuals of ethnicities other than native Hawaiian.

The findings of the study have resulted in the following specific conclusions:

- No traditional native Hawaiian cultural practices, beliefs, and/or properties of any kind were identified by informants as being associated with the proposed Waiau Fuel Pipeline Project area;
- No cultural practices, beliefs, or properties of any other, non-native Hawaiian cultural or ethnic groups were identified by any of the informants;
- None of the informants consulted as part of the cultural impact assessment had any direct knowledge of any current or recent use of the project area by native Hawaiian cultural practitioners exercising traditional and customary access and use rights for any purposes; and
- Additionally, none of the informants had any direct knowledge of any specific traditional cultural properties located within the project area.

Based on the entirely negative results of the cultural impact assessment informant interviews, it can be concluded that the project area is not being accessed by native Hawaiian or other ethnic group cultural practitioners for any traditional and customary cultural uses, that the proposed project would thus have no effects–much less any adverse cultural impacts–of any kind upon the exercise of any native Hawaiian traditional and customary access and use rights, or the cultural practices, beliefs, or properties of native Hawaiian or any other ethnic group. Consequently, no mitigation measures of any kind are needed as they pertain to these issues, and it is recommended that full "cultural impact clearance" for the proposed Waiau Fuel Pipeline Project area be given, and that any permit applications for the construction pipeline be approved, as there will be no impact of any kind upon the exercise of any native Hawaiian traditional and customary access and use rights, or the cultural practices, beliefs, or properties of native Hawaiians or any other ethnic group.

In response, however, to the opportunity offered by the identification of several individual informants with cultural knowledge of the general project area–including knowledge of local place names and folklore and family ties to the area, certain limited further work is recommended for consideration. The scope of this work goes beyond the level of study effort appropriate to and necessary for compliance with the OEQC guidelines for the assessment of potential cultural impacts by the proposed Waiau Fuel Pipeline Project. The recommended work would focus on the formal recordation of the native Hawaiian cultural practices and knowledge and potential traditional cultural properties identified as being associated with general area of the Waiau Fuel Pipeline Project, but not directly impacted by the project. A work plan to guide the conduct of this recommended further work, and a proposed content outline for an appropriate report, can be prepared and submitted to the State Historic Preservation Division for review and comment.

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APPENDIX A

OUTLINE OF GENERAL INFORMANT INTERVIEW CONTENT

Cultural Impact Assessment Study
HECO Waiau Fuel Pipeline Project
State Energy Corridor: Campbell Industrial Park
to HECO's Waiau Power Plant
'Ewa District, Island of O'ahu
(TMK:) 9-9-1,3,4,6,7,8:Var.)

General Information

- Full name
- Telephone number
- Current residence and address
- Interview date, time, location
- Other participants

Biographical Information

- Age, birthdate, birthplace
- Immediate family composition
- Education
- Occupation
- Family background: parents, grandparents, residential ties
- Previous residences: childhood to present
- Any additional family background pertinent to informant knowledge

General Sources of Informant Knowledge

Knowledge of Specific Historic/Cultural Properties, Practices, and/or Beliefs

- Name(s) of property/place or area
- Description of property/place or area
    - Present physical characteristics, setting, location, uses
    - Original/prior physical characteristics, setting, location, uses
- Practices or beliefs associated with property/place or area
- Specific sources of informant knowledge
- Individuals, families, and/or groups associated with property/place or area
    - Specific nature of association
    - Time frame/depth and intensity of association

Perceived Impact(s) of Proposed Uses on Any Properties/Places/Areas, Practices, and/or Beliefs

Possible Mitigation Measures

Any Additional Information to Provide

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Table 1: List of Potential Informants

No.	Name	Contact: None	Contact: WPK	Contact: PHR	Expertise	Affiliation	Potential	Additional Comments
1	Dolores "Dolly" Bright	-	+	-	NH	EPHCC	0/R	Former PHCC member
2	Roger Bright	-	+	-	NH	EPHCC	0	Former PHCC member
3	Sara Collins	-	-	+	HPS	SHPD	0/R	Staff Archaeologist
4	Arline Eaton	-	+	-	NH	EPHCC,LR	1/R	Pu'uloa kūpuna
5	Ken Fong	-	-	+	-	HECO	-	
6	Melissa Guerriero	+	-	-	NH	ASK	0	ASK, President
7	Arthur Hoke, Jr.	-	-	-	NH	HM	0/R	HM, President
8	Ruth Holt	+	-	-	NH	EPHCC	0	EPHCC, President
9	Lori Hoo	-	-	+	-	HECO	-	
10	Shad Kane	-	+	-	NH	ASK,MNHB, TNC, IA, LR	3/R	
11	Jalna Keala	-	+	-	NH,CR	ASK, OHA	1/R	ASK Community Resource Officer
12	Antoinette Lee	-	+	-	NH	PHHCC,LR	1R	
13	Ruth Lum	-	+	-	NH	WNHB,LR	1	Waipahu NHB
14	Kepa Maly	-	-	+	CRS,HDR	KPA	0	
15	Holly McElDowney	-	-	+	CRS,HDR,HPS	SHPD	0/R	Historical/Cultural Staff
16	Nathan Napoka	-	+	-	NH,HPS	SHPD	1/R	Historical/Cultural /Oahu Branch Chief
17	Bob Pena	-	+	-	NH,HDR	HRS,BPBM	2	Historian
18	Ben Schlapak	-	+	-	ENG	HRS	2/R	Airport Engineer
19	Perry White	-	-	+	PLN	PS	0/R	
20	Helen Young	-	+	-	NH	RO,LR	2	
21	Tin Hla Young	-	+	-	NH	RO,LR	2	

Expertise: C/P Cultural Practitioner; CR Community Relations; CRS Cultural Resources Specialist; ENG Engineer; HDR Historical Documentary Researcher; HPS Historic Preservation Specialist; NH Native Hawaiian; PLN Planner

Affiliation: ASK 'Ahahui Siwila o Kapiolani Hawaiian Civic Club; BPBM Bernice Pauahi Bishop Museum; EPHCC 'Ewa/Pu'uloa Hawaiian Civic Club; HM Hawai'i Maoli; HRS Hawaii Railway Society; IA 'Ike Aina; OHA Office of Hawaiian Affairs; PHCC Pu'uloa Hawaiian Civic Club; PS Planning Solutions; RO Royal Order of Kamehameha I; SHPD SLHist.Pres.Div (DLNR); TNC The Nature Conservancy; KPA Kamu Pono Associates; LR Local Resident; MNHB Makakilo Neighborhood Board; WNHB Waipahu Neighborhood Board; PHR Paul H. Rosendahl (PHRI); PHRI Paul H. Rosendahl, Ph.D., Inc.

Potential: 0 None; 1 Limited information; possible follow-up contact; 2 Useful information; probable follow-up contact; 3 Good information; definite follow-up; potential formal interview informant; R Provided referral(s) to other potential informants and/or information sources

Any Additional Thoughts or Concerns