DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

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2006/ELOC-1794 (MH)

August 10, 2006

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
Leiopapa A Kamehameha Building
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813-2437

Dear Ms. Salmonson:

Re: Final Environmental Impact Statement (FEIS) for Campbell Industrial Park Generating Station & Transmission Additions, Tax Map Keys: 9-1-015:002; 9-1-015:016; 9-1-015:020; 9-1-014:033; 9-1-014:034; 9-1-014:035; 9-1-014:010; 9-1-014:014; 9-1-026:018; 9-1-026:039; 9-1-014:029; 9-1-026:038; 9-2-003:027 and 9-2-003:011
Ewa District, Oahu, Hawaii

The Department of Planning and Permitting is notifying you of our acceptance of the FEIS for Campbell Industrial Park Generating Station & Transmission Additions project, as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. Enclosed is our Acceptance Report for the subject FEIS.

Pursuant to Section 11-200-23, Title 11, Chapter 200 ("Environmental Impact Statement Rules") of the Administrative Rules, our department's determination of the subject FEIS should be published in the next issue of The Environmental Notice by the Office of Environmental Quality Control. The following items are also enclosed:

- Four (4) copies of the FEIS
- Completed Publication Form
- Completed FEIS Distribution List
- Project Summary

Should you have any questions, please contact Matt Higashida of our staff at 527-6056.

Very truly yours,

Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:js
Enclosures

cc: Robert Isler, Hawaiian Electric Company, Inc.
Perry White, Planning Solutions, Inc.

Final Environmental Impact Statement

CAMPBELL INDUSTRIAL PARK GENERATING STATION & TRANSMISSION ADDITIONS

PREPARED FOR:

Hawaiian Electric Company, Inc. (HECO)

PREPARED BY:

PLANNING SOLUTIONS

JULY 21, 2006

Final Environmental Impact Statement

CAMPBELL INDUSTRIAL PARK GENERATING STATION & TRANSMISSION ADDITIONS

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 July 21, 2006

Robert Isler July 21, 2006

PREPARED FOR:

Hawaiian Electric Company, Inc. (HECO)

PREPARED BY:

PLANNING SOLUTIONS

JULY 21, 2006

PROJECT SUMMARY

Project:	**CIP Generating Station and Transmission Additions Project**
Applicant	Hawaiian Electric Company, Inc. P.O. Box 2750 Honolulu, HI 96840 Contact: Robert Isler (808) 543-7206
Approving Agency	Department of Planning and Permitting City and County of Honolulu 650 South King Street Honolulu, HI 96813 Contact: Matthew Higashida (808) 527-6056
Location	Campbell Industrial Park (CIP) and the future expansion area of the Kapolei Business Park (KBP), Barbers Point, ‘Ewa District, Island of O‘ahu
Tax Map Keys	9-1-015:002; 9-1-015:016; 9-1-015:020; 9-1-014:033; 9-1-014:034; 9-1-014:035; 9-1-014:010; 9-1-014:014; 9-1-026:018; 9-1-026:039; 9-1-014:029; 9-1-026:038; 9-2-003:027; 9-2-003:011
State Land Use District	Mostly Urban with some Agriculture.
Ewa DP Land Use Designation	Industrial
County Zoning	I-2 Intensive Industrial, Ag-1 Restricted Agriculture, Ag-2 General Agriculture
Proposed Action	Construction of a new fossil-fueled electrical generating station, a new 138kV overhead transmission line, and associated improvements at two electrical substations in and around Campbell Industrial Park, ‘Ewa, Hawai‘i.
Associated Actions Requiring Environmental Assessment	Electrical power generating facility, electrical substation improvements, and 138 kV electrical transmission line.
Required Permits & Approvals	Conditional Use Permit, NPDES Construction Permit, NPDES Industrial Storm Water Permit, PUC Approval, Well Construction ~~and Well Operation~~ Permit~~s~~, Pump Installation Permit, Water Use Permit, Initial Covered Source/Prevention of Significant Deterioration Permits, Wastewater Treatment Permit, Fuel Tank Construction Permit, FAA Clearance, Grading Permit, Building Permit, Construction Noise Permit
Agencies Consulted	~~City & County of Honolulu Department of Planning and Permitting, State of Hawai‘i Department of Health, Public Utilities Commission, DOH, EPA, FAA, PUC, DPP~~Numerous Federal, State, County, and private organizations as listed in Chapter 10.
Consultant	Planning Solutions, Inc. 210 Ward Ave, Suite 330 Honolulu, HI 96814 Contact: Perry White (808) 550-4483

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. In order to maintain legibility, formatting changes (such as revised headers and footers), updates to the table of contents with new page numbers and cross-references, changes to the publication date, revisions to the title page to reflect the fact that the document is a "Final" EIS, rather than a "Draft" EIS, and other non-substantive changes are not marked.

SUMMARY

S-1.0 PROJECT DESCRIPTION

S-1.1. PROPOSED ACTION (ALTERNATIVE 1)

Hawaiian Electric Company, Inc. (HECO) is proposing to improve the electrical generation and transmission infrastructure on O‘ahu. If the required land use approvals and environmental permits are granted, HECO will:

- Construct a 110 MW simple-cycle combustion turbine on its Barbers Point Tank Farm (BPTF) site in Campbell Industrial Park (CIP) by mid-2009. The unit will burn clean fuels with low air emissions, like naphtha or diesel, and will include provisions to allow burning of biofuels, such as ethanol, when they become commercially viable. This unit is primarily intended to supplement existing capacity during periods of peak use; however, it would also be operated during non-peak hours if other units are not reasonably able to serve system needs. By providing this type of unit and continuing its efforts to limit electricity demand, HECO hopes to delay the need for the 180 MW coal unit identified in IRP-3.~~meet the peak energy demands, but may be needed during emergency conditions when other units are not available.~~
- Install new electrical equipment (e.g., relays, circuit breakers, and related support equipment) within the AES Substation, which is adjacent to the BPTF site.
- Acquire the 44-foot wide strip of property between the Tank Farm parcel and the adjoining AES Substation and the parcel between the AES Substation and Hanua Street to provide additional space for the proposed generating and substation equipment.
- Acquire easements for and construct an additional, two mile-long, 138 kV overhead transmission circuit linking the expanded AES Substation with the existing Campbell Estate Industrial Park (CEIP) Substation.
- Install new electrical equipment (e.g., relays, circuit breakers, and related support equipment) within the existing CEIP Substation.
- Install a new underground water pipeline to transport recycled wastewater (RO water) from the City and County of Honolulu’s Honouliuli Wastewater Treatment Plant (WWTP) to HECO’s Kahe Generating station in accordance with HECO’s proposed community benefits program.
- Plan for, and be prepared to construct, a second 110 MW simple-cycle combustion turbine on the BPTF site if demand-side management (DSM), conservation, renewable energy and combined heat and power (CHP) programs cannot provide the demand reduction and/or additional firm generating capacity needed to meet peak demand.

The project is needed to meet the existing and forecasted future system load growth on the island of O‘ahu and is an integral part of HECO’s continuous commitment to providing safe, adequate, and reliable electric service to its customers. The proposed improvements are designed to improve system reliability, minimize adverse effects on the environment, and maintain costs to HECO’s customers at a reasonable level.

S-1.2 ACTION ALTERNATIVES EVALUATED IN DETAIL

The following alternatives to the proposed action are evaluated in this environmental impact statement:

Alternative 2: Transmission Circuit & Single Combustion Turbine. This “reduced scale” alternative is nearly the same as Alternative 1 except that it does not include the option of installing a second CT. Thus, the maximum generating capacity provided by this alternative would be the 110 MW provided by the first combustion turbine and may not be sufficient to meet the peak demand on the system.

Alternative 3: Single Combustion Turbine Only. The generation part of this alternative is identical to that in Alternative 2. However, this alternative does not provide additional transmission capacity.

As a result, the electrical transmission system serving the area would not have sufficient capacity to accommodate the total output from all of the electrical generating units at CIP.

Alternative 4: Additional Transmission Circuit Only. This alternative consists solely of the transmission-related improvements in Alternative 1. It would improve the reliability of the transmission facilities that connect the three major CIP generating complexes (Kalaeloa, AES, and HPOWER) to the grid, but it would not supply additional generating capacity to the system.

No Action Alternative. "No Action" consists of failing to install or arrange for the installation of the additional generating capacity and transmission capacity needed to bring electrical energy supply and demand into balance. This alternative would not meet any of the objectives of the proposed action, but is included to comply with regulatory requirements.

S-2.0 SIGNIFICANT BENEFICIAL & ADVERSE IMPACTS

S-2.1 PROBABLE IMPACTS OF THE ACTION ALTERNATIVES

The effects that construction of each alternative would have are summarized in Table S-1 below. Table S-2 summarizes the effects that would result from operation of the facilities in each alternative.

As can be seen from the tables, none of the alternatives entail significant adverse effects on the physical or human environment. Because Alternatives 2, 3, and 4 are reduced-scale subsets of the proposed action, they entail similar impacts but on a smaller scale. Eliminating the generation portion of the project reduces potential effects to a much greater extent than elimination of the transmission elements. However, eliminating project components also has serious implications for the reliability of electrical service on O‘ahu, and therefore also for its economic health and quality of life, as described below.

S-2.2 PROBABLE IMPACTS OF THE NO ACTION ALTERNATIVE

At the very least, failure to construct the 110 MW combustion turbine that HECO proposes to place in service in mid-2009 could force HECO to suspend service temporarily to selected areas through rolling blackouts. At worst, it has the potential to disrupt service throughout the entire grid. The frequency and duration of the service interruptions and the number of customers affected will depend upon the particular circumstances of the outage and cannot be accurately predicted. However, analyses show that even small outages have substantial economic effects on customers, as well as potential health and safety impacts.

Failure to add a third transmission line to serve the CIP area will increase the probability that the transmission system would be unable to reliably connect the substantial generating capacity at Campbell Industrial Park to HECO's islandwide electrical grid. This, in turn, would increase the likelihood that rolling blackouts might be needed and the potential for a system-wide blackout.

Whether caused by shortfalls in generating or transmission capacity, even brief power outages that affect only a small fraction of HECO's customers impose considerable costs on the community. Outages that affect all of HECO's customers for even a few hours are even more expensive, and could have other serious health and safety consequences. Neither type of outage is consistent with HECO's obligation to serve its customers.

S-3.0 CONSISTENCY WITH LAND USE POLICIES AND PLANS

HECO's Proposed CIP Generating Station and Transmission Additions project is located in an area set aside for heavy industrial uses and is consistent with State and County land use plans and controls. It would be constructed and operated in accordance with applicable environmental regulations. Table 6.1 lists the permits and other approvals that HECO will need.

S-4.0 OTHER CHAPTER 343 TOPICS

The proposed improvements are not directly related to other possible actions by HECO and would not lead to growth or changes in the character of economic activity (e.g., the opening of new industries not previously practical) that might have secondary impacts. They would, however, avoid projected shortfalls in electrical power, thereby ensuring that HECO's customers continue to receive reliable and affordable electrical service. Fuel to power the generating unit will be naphtha or other light fuels that are already produced at the two refineries located in Campbell Industrial Park. The construction and operation of the proposed transmission line does not involve the extension of electrical power service into new service areas or the provision of services not previously available to HECO's customers. Hence, it does not have the ability to cause secondary impacts except insofar as it helps forestall unintended power outages that might otherwise encourage businesses to locate their activities elsewhere.

Constructing and operating the proposed peaking units at the BPTF and installing a second transmission line between the AES and CEIP Substations will allow HECO to maintain reliable electrical service to its customers. It would not prevent other uses of the property that might be more productive over the long term.

HECO's plans for the proposed facilities do not foreclose any energy supply options. Because the proposed CTs are designed primarily as peaking units to be used only when needed to meet peak demand, they involve the minimum capital investment required to maintain service reliability. If demand should be lower than anticipated, HECO will operate the units for fewer hours. The availability of the firm capacity will allow HECO to continue its alternate energy efforts with the confidence that a shortfall from those sources can be made up by operating the peaking units during those periods when the alternate energy sources are not available.

The construction of the proposed generating units, substation additions, and transmission improvements does not irrevocably commit HECO to the continued use of fossil fuels for power generation. As mentioned, both proposed generating units can utilize biofuels should they become commercially available and economical for use in Hawai‘i.

At present, ~~there are no known unresolved issues.~~ the only known unresolved issue that is not directly a function of the Public Utility Commission's final decision on HECO's pending application is the extent to which the *mauka* portion of the transmission line may be constructed underground in response to the landowner's request. However, numerous permits and approvals must still be obtained, and it is possible that issues may arise as applications for these are prepared and processed.

S-5.0 PARTIES CONSULTED

HECO distributed the EIS Preparation Notice (EISPN) to the individuals and organizations listed in Table 10.1 and requested their comments on the proposed scope of the analysis and on the completeness of the alternatives that HECO proposed to evaluate. It also conducted extensive community outreach through meetings with representatives of the West O‘ahu/Wai‘anae Coast communities. The public ~~will have~~had an opportunity to review and comment on th~~is~~e DEIS for the project in accordance with HRS Chapter 343. Their comments are reproduced in Chapter 10 of this FEIS.

Table S-1 Comparison of Impacts: Construction Period

EIS Section	*Impact Topic*	*Proposed Action (Alternative 1) Combustion Turbine (CT) + Overhead Transmission Circuit + Possible Second CT*	*Alternative 2 Transmission Circuit + Single CT*	*Alternative 3 Single CT Only*	*Alternative 4 Additional Transmission Circuit Only*
4.1	**Physiography &Topography**	*Power Generation and Substation Facilities*. The project will involve minor excavation for foundations and small volumes of fill for protective berms and pads suitable for the emplacement of large equipment. Trenches will be excavated for the proposed RO water line but will later be backfilled. No significant lasting changes to topography will occur. *Power Transmission Facilities*. The only earthwork needed is borings for the pole foundations. If the underground alternative is selected, substantial trenching will be required. Neither option results in permanent changes to topography.	*Power Generation and Substation Facilities*. Same as impacts for Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.2	**Geology & Soils**	*Power Generation and Substation Facilities*. Disturbance of approximately 9 acres on the BPTF site. A few thousand cubic yards of structural fill will be needed. The BPTF is underlain by coral outcrop, which is not valued for agriculture. The new RO line will require trenching along the proposed route; a distance of about 4 miles, but the trenches will be backfilled and they are along existing roadway and utility corridors. *Power Transmission Facilities*. Very little ground disturbance if the lines are suspended on overhead poles as proposed. If the transmission lines are installed underground, the work would require trenching along the entire length of the transmission corridor. Disturbance would be limited to areas along existing and/or planned roadways or storm drains.	*Power Generation and Substation Facilities*. Disturbance of slightly less area on the BPTF site and the use of slightly less fill; otherwise impacts are same as described for Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.3	**Air Quality & Climate**	*Power Generation and Substation Facilities*. Minor, temporary dust and vehicle exhaust from construction of the proposed generating station and substation improvements. *Power Transmission Facilities*. Overhead transmission line entails very limited ground disturbance and does not, therefore, have the potential to produce significant fugitive dust emissions. The underground variant would involve greater ground disturbance.	*Power Generation and Substation Facilities*. Largely the same as Alternative 1. However, internal combustion engine emissions associated with construction activities related to the installation of the second generating unit would be eliminated. *Power Transmission Facilities*. Same as described for Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.4	**Hydrology & Water Resources**	*Power Generation and Substation Facilities*. Construction will not substantially alter the overall drainage pattern or significantly alter runoff volumes across the BPTF site or the water line route. *Power Transmission Facilities*. The proposed changes along the transmission line route will have minimal to no effect on drainage patterns or water quality.	*Power Generation and Substation Facilities*. Largely the same as Alternative 1. Possible slight reduction in stormwater runoff. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.5	**Exposure to Natural Hazards**	*All Facilities*. All construction will take place outside defined hazard areas and will not exacerbate existing hazards in the project area.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.6	**Biota**	*Power Generation and Substation Facilities*. No sensitive or endangered species inhabit the areas to be directly affected by construction. *Power Transmission Facilities*. No endangered, threatened, or candidate species are known to exist along the proposed transmission corridor. The area is heavily disturbed and is slated for extensive development.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.

Table S-1 Comparison of Impacts: Construction Period

EIS Section	*Impact Topic*	*Proposed Action (Alternative 1) Combustion Turbine (CT) + Overhead Transmission Circuit + Possible Second CT*	*Alternative 2 Transmission Circuit + Single CT*	*Alternative 3 Single CT Only*	*Alternative 4 Additional Transmission Circuit Only*
4.7	**Noise**	*Power Generation and Substation Facilities*. Construction noise from excavators, trucks, and other heavy equipment will occur at the BPTF and along the route of the new RO water line to Kahe Generating Station. A construction noise permit may be required. *Power Transmission Facilities*. Temporary increase in noise along transmission corridor as a result of construction activities.	*Power Generation and Substation Facilities*. Intensity will be the same as Alternative 1, but the duration of construction noise will be shortened by elimination of work required to install the second CT. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.8	**Archaeological, Historic, & Cultural Resources**	*Power Generation and Substation Facilities*. The BPTF site is heavily disturbed and developed, and no historic or archaeological resources have been found there. The RO water line to Kahe will be within the historic OR&L Railroad right-of-way. HECO will minimize disruptions to the railroad's use to the greatest extent possible. An SHPD-approved archaeological monitoring plan will be in place during construction of the proposed water line. If any archaeological deposits or human burials are encountered, the contractor will halt work and contact the State Historic Preservation Division (SHPD). *Power Transmission Facilities*. The surface inspection carried out along the transmission corridor did not reveal any archaeological materials in primary (in situ) or secondary (disturbed) context. If any archaeological deposits or human burials are encountered, the contractor will halt work and contact the State Historic Preservation Division (SHPD).	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.9	**Visual Resources**	*Power Generation and Substation Facilities*. Minor grading, equipment parking, materials storage, the erection of structures and placement of equipment, and other aboveground activities will take place at the BPTF site, mostly in areas that are not readily seen from Hanua Street or other public areas. Work on the AES Substation site and the RO water line route will be more visible, but will be temporary and will not substantially alter the appearance of the area. *Power Transmission Facilities*. Most transmission elements are located in areas (e.g., Chevron refinery, undeveloped areas, etc.) not readily visible to the public. The construction activities associated with the ~~T~~transmission lines would be visible from some locations within CIP, but would be distant from ~~more sensitive~~existing residential areas.	*Power Generation and Substation Facilities*. Largely the same as Alternative 1. One fewer exhaust stacks will be visible in CIP. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.10	**Transportation Facilities**	*Power Generation and Substation Facilities*. Construction would generate a small number of vehicle-trips on area roadways for the delivery of construction materials and employee trips. Would not significantly affect the level-of-service. No work is planned in existing road rights-of-ways. Delivery of oversized equipment could slow local traffic for very short periods of time. *Power Transmission Facilities*. Installing the overhead lines would generate a small number of construction vehicle-trips; it would not affect the Level of Service on area roadways. The underground variant would occur partially within existing road rights-of-ways and would require traffic controls and re-routing.	*Power Generation and Substation Facilities*. The number of construction-related vehicle-trips would be reduced by the absence of work needed to construct a second CT and to expand the AES Substation. *Power Transmission Facilities*. Same as described for Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.

Table S-1 Comparison of Impacts: Construction Period

EIS Section	*Impact Topic*	*Proposed Action (Alternative 1) Combustion Turbine (CT) + Overhead Transmission Circuit + Possible Second CT*	*Alternative 2 Transmission Circuit + Single CT*	*Alternative 3 Single CT Only*	*Alternative 4 Additional Transmission Circuit Only*
4.11	**Public Infrastructure & Services**	*Power Generation and Substation Facilities*. Construction would require small (less than 1,000 gallons per day) amounts of water from the existing BWS system. BWS has adequate source and transmission capacity to meet the expected need. All construction waste would be trucked away and properly disposed of. Construction would not substantially affect police, fire, emergency medical services, or recreational areas. *Power Transmission Facilities*. Construction of the transmission facilities would have no significant effect on public infrastructure and services.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.12	**Land Use & Socioeconomic Resources**	*Power Generation and Substation Facilities*. HECO will acquire the 44-foot right of way parcel and the parcel between AES Substation and Hanua Street prior to commencing construction, both of which are vacant. Construction will not interfere with use of or access to existing facilities. Construction-generated expenditures and employment could total approximately $200 million ($6 million of which is for community benefit activities). *Power Transmission Facilities*. HECO will acquire easements for construction of the transmission line. The corridor traverses land that is either already in industrial use or is currently vacant and slated for industrial use in the future. Construction will not interfere with the use of these areas.	*Power Generation and Substation Facilities*. Same land use effects as Alternative 1. Construction employment, business activity, and construction cost are reduced by elimination of second unit. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.13	**Electric & Magnetic Fields (EMF)**	*Power Generation and Substation Facilities*. These will not emit EMF until they are placed in operation. *Power Transmission Facilities*. These will not emit EMF until they are placed in operation.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Source: Compiled by Planning Solutions, Inc.					

Table S-2 Comparison of Impacts: Normal Operations.

EIS Section	*Impact Topic*	*Proposed Action (Alternative 1) Combustion Turbine (CT) + Overhead Transmission Circuit + Possible Second CT*	*Alternative 2 Transmission Circuit + Single CT*	*Alternative 3 Single CT Only*	*Alternative 4 Additional Transmission Circuit Only*
4.1	**Physiography & Topography**	*Power Generation and Substation Facilities*. No operational impacts. *Power Transmission Facilities*. No operational impacts.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.2	**Geology & Soils**	*Power Generation and Substation Facilities*. No operational impacts. *Power Transmission Facilities*. No operational impacts.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.3	**Air Quality & Climate**	*Power Generation and Substation Facilities*. HECO is employing Best Available Control Technology (BACT) to minimize emissions. Worst-case scenarios were modeled with both units operating at 100% of their rated capacity. The results showed that 3-hour and 24-hour SO_2 was the only pollutant averaging periods above the modeling significant impact levels and that SO_2 is therefore the only pollutant which required a full impact analysis. Additional modeling (including non-HECO sources) for SO_2 showed that the operation of the generating station will not cause or contribute to an exceedance of National or State Ambient Air Quality Standards. *Power Transmission Facilities*. The transmission line will not have a measurable effect on climate or air quality.	*Power Generation and Substation Facilities*. Worst-case operating scenarios for one CT and one BSG were compared with the PSD modeling significant impact levels. As for Alternative 1, 3-hour and 24-hour SO_2 was the only pollutant averaging periods above the modeling significant impact levels. The subsequent analysis showed that no exceedance of National or State Air Quality Standards would occur due to operation, and BACT would be in place. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 2.
4.4	**Hydrology & Water Resources**	*Power Generation and Substation Facilities*. The proposed facility would require less than 1,000 gallons per day of water from the Board of Water Supply's potable water system. Most of the water used at the facility will be recycled water from the City's Honouliuli Wastewater Treatment Plant or saline water from on-site wells tapping a non-potable aquifer. Estimated water use for the CTs (under a heavy use scenario) would be 106,000 gallons per day (GPD) of RO water or 252,000 GPD of saline groundwater. Wastewater would be disposed of in two on-site disposal wells. Estimated wastewater volumes for both CTs would be 19,000 GPD of RO water or 162,000 GPD of saline groundwater. The very small volume of sanitary wastewater generated would be treated in an individual wastewater treatment system and disposed of into the on-site injection wells. No surface water features are located nearby, and none will be affected by the proposed generating station. Storm water runoff would be collected in swales, inlets, and subsurface conduits and routed to a detention basin. *Power Transmission Facilities*. No impacts once operational.	*Power Generation and Substation Facilities*. The types of effects are the same as for Alternative 1, but volumes are lower. Estimated water use is as follows: 53,000 GPD of RO water or 126,000 GPD of saline groundwater from on site well. Process wastewater volumes are projected as 9,000 and 81,000 for RO and saline groundwater, respectively. Potable water use and sanitary wastewater volumes are the same as for Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.5	**Exposure to Natural Hazards**	*Power Generation and Substation Facilities*. Same as construction period. *Power Transmission Facilities*. Same as construction period.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.

Table S-2 Comparison of Impacts: Normal Operations.

EIS Section	*Impact Topic*	*Proposed Action (Alternative 1) Combustion Turbine (CT) + Overhead Transmission Circuit + Possible Second CT*	*Alternative 2 Transmission Circuit + Single CT*	*Alternative 3 Single CT Only*	*Alternative 4 Additional Transmission Circuit Only*
4.6	**Biota**	*Power Generation and Substation Facilities*. No operational impacts. *Power Transmission Facilities*. No operational impacts.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. None included.
4.7	**Noise**	*Power Generation and Substation Facilities*. Noise levels have the potential to exceed 70 dBA along both the north and future south boundary lines, in part because noise emitted by neighbors already exceeds that level. The adjoining land areas where the noise levels could exceed 70 dBA are not considered to be noise sensitive, or areas where noise levels of 70 to 75 dBA would interfere with current activities. *Power Transmission Facilities*. No impacts once operational.	*Power Generation and Substation Facilities*. For a single CT, it was concluded that noise levels from the generating station could exceed 70 dBA along the future south boundary line, an area where this is already the case. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.8	**Archaeological, Historic, and Cultural Resources**	*Power Generation and Substation Facilities*. No impacts once operational. *Power Transmission Facilities*. No impacts once operational.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. None included.
4.9	**Visual Resources**	*Power Generation and Substation Facilities*. The proposed generating facilities at the BPTF are set back approximately 600 feet from Hanua Street, limiting close up views. Moreover, they would all be behind perimeter fencing and located in an industrialized zone. The facilities would largely blend in to the surrounding industrial landscape when seen from near and far vantage points. Improvements to the substations are minor and would not significantly impact the appearance of the existing facilities. *Power Transmission Facilities*. The transmission line would run through a heavy industrial facility, across Malakole Road, and through a large extent of vacant land that is planned for eventual commercial and industrial development. A few hundred feet of the route passes the eastern end of a future golf course. With the possible exception of the golf course crossing, none of these uses are particularly sensitive to the visual and aesthetic effects that would result from an additional transmission line passing nearby. Once the area is developed as planned, the transmission lines would be barely visible from far vantage points.	*Power Generation and Substation Facilities*. The effect would be nearly the same Alternative 1, with the most notable difference being the elimination of one of the two tall exhaust stacks and slightly less equipment at the site. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.10	**Transportation Facilities**	*Power Generation and Substation Facilities*. Operation of the generating facilities would contribute little traffic to the roadways in and around Campbell Industrial Park. Only 5 employees maximum would be on site at one time, in addition to the occasional maintenance worker, inspector, or visitor. None of these (with the possible exception of some maintenance vehicles) would consist of oversize vehicles. Fuel would arrive via pipeline. Preliminary analyses indicate that the 210-foot exhaust stacks do not constitute a hazard to air navigation. *Power Transmission Facilities*. No impacts once operational.	*Power Generation and Substation Facilities*. Largely the same as Alternative 1. Maintenance and overhaul-related traffic would be slightly lower and/or present during 2-4 fewer weeks each year. However, the difference is so small it would not affect the level-of-service on area roadways. *Power Transmission Facilities*. No impacts once operational.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.

Table S-2 Comparison of Impacts: Normal Operations.

EIS Section	*Impact Topic*	*Proposed Action (Alternative 1) Combustion Turbine (CT) + Overhead Transmission Circuit + Possible Second CT*	*Alternative 2 Transmission Circuit + Single CT*	*Alternative 3 Single CT Only*	*Alternative 4 Additional Transmission Circuit Only*
4.11	**Public Infrastructure & Services**	*Power Generation and Substation Facilities*. Potable water use from the existing BWS system is less than 1,000 gallons per day. The facility will treat and dispose of its own wastewater. The water line that HECO will install to its Kahe Generating Station will allow it to substitute recycled water from the Honouliuli Wastewater Treatment Plant for potable water that is now used for process purposes at Kahe. The facility would have its own security system. It would not place substantial additional demands upon existing police service. Similarly, the facility includes fire water storage and other fire protection facilities required by all applicable ordinances and regulations, thus reducing the potential for additional burden on the Fire Department. It would not place additional demands on area schools, recreational facilities, or health care facilities. *Power Transmission Facilities*. No impacts once operational.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. None included.
4.12	**Land Use & Socioeconomic Resources**	*Power Generation and Substation Facilities*. The proposed generating and substation facilities are located in the midst of an area devoted to heavy industrial uses. They are consistent with the existing zoning, and their construction and operation will not alter the existing land use pattern. The facility would utilize the 44-foot right of way and the parcel between AES Substation and Hanua Street, both of which are currently vacant. A total of 12 workers will man the generating station over a typical 24 hour period. HECO estimates that most of these would be drawn from its existing pool of employees, and thus operation will not generate significant employment. Ongoing expenditures for materials and outside services will also occur. These benefits are relatively small compared to the economic and social costs associated with not providing needed generating capacity. *Power Transmission Facilities*. No impacts once operational.	*Power Generation and Substation Facilities*. Same as for Alternative 1, because the generating station would require the same number of employees with one CT as with two. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.
4.13	**Electric & Magnetic Fields (EMF)**	*Power Generation and Substation Facilities*. EMF from these facilities are very low. *Power Transmission Facilities*. EMF from these facilities would be far below levels at which adverse effects can occur.	*Power Generation and Substation Facilities*. Same as Alternative 1. *Power Transmission Facilities*. Same as Alternative 1.	*Power Generation and Substation Facilities*. Same as Alternative 2. *Power Transmission Facilities*. None included.	*Power Generation and Substation Facilities*. None included. *Power Transmission Facilities*. Same as Alternative 1.

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1.0 PURPOSE AND NEED

1.1 INTRODUCTION AND OVERVIEW

Hawaiian Electric Company, Inc. (HECO) is the franchised public utility responsible for the production, purchase, transmission, distribution, and sale of electricity on the Island of O‘ahu, Hawai‘i. In carrying out its responsibilities, HECO regularly prepares forecasts of anticipated future energy demand, evaluates its ability to meet that demand with its existing resources, and identifies measures that are needed to assure that it can maintain reliable service to its customers.

This chapter summarizes the reasons HECO is seeking approval to construct and operate additional electrical generation and transmission facilities within Campbell Industrial Park (CIP). It is divided into the following major parts:

- Section 1.2 presents an overview of HECO’s existing electrical generation and transmission facilities and use patterns.
- Section 1.3 discusses the need for new electrical generation facilities. The section provides information on electrical energy use patterns on the island, forecasted growth in energy use, and the extent to which conservation efforts, demand side measures, independent power producers, and alternate energy sources can defer the need for HECO to construct new generation capacity. The section concludes with a summary of the reasons why HECO must construct an additional fossil fuel fired generating facility in Campbell Industrial Park.
- Section 1.4 discusses the need for additional electrical transmission facilities in CIP. The need is predicated upon existing transmission limitations and on the generation additions described in the preceding section.

1.2 EXISTING GENERATION AND TRANSMISSION FACILITIES AND USE

HECO provides nearly all of the electricity for an estimated population of 900,000 on the island of O‘ahu. At the end of 2004, it served 288,456 customers through its generation, transmission, and distribution systems (see Table 1.1). The following subsections provide an overview of the most important characteristics of those systems.

1.2.1 EXISTING POWER GENERATION FACILITIES

The total net electrical generating capacity installed at Oahu’s existing generating facilities is 1642.6 megawatts (Net MW). These facilities include 1,208.6 Net MW from HECO oil-fired units, which include the Kahe Generating Station (620.5 Net MW), the Waiau Generating Station (480.8 Net MW), and the Honolulu Generating Station (107.3 Net MW). Figure 1-1 shows the location of these generating facilities and Table 1.2 provides specific information concerning each of the generating units at these facilities. In addition to its own generating units, HECO has firm-capacity contracts with three independent power producers (IPPs) that have a total generating capacity of 434 Net MW.[1] Table 1.3 summarizes the generating capacity installed at each of these facilities, the amount of energy each IPP sold to HECO during 2004, and the date the contract between the IPP and HECO expires.

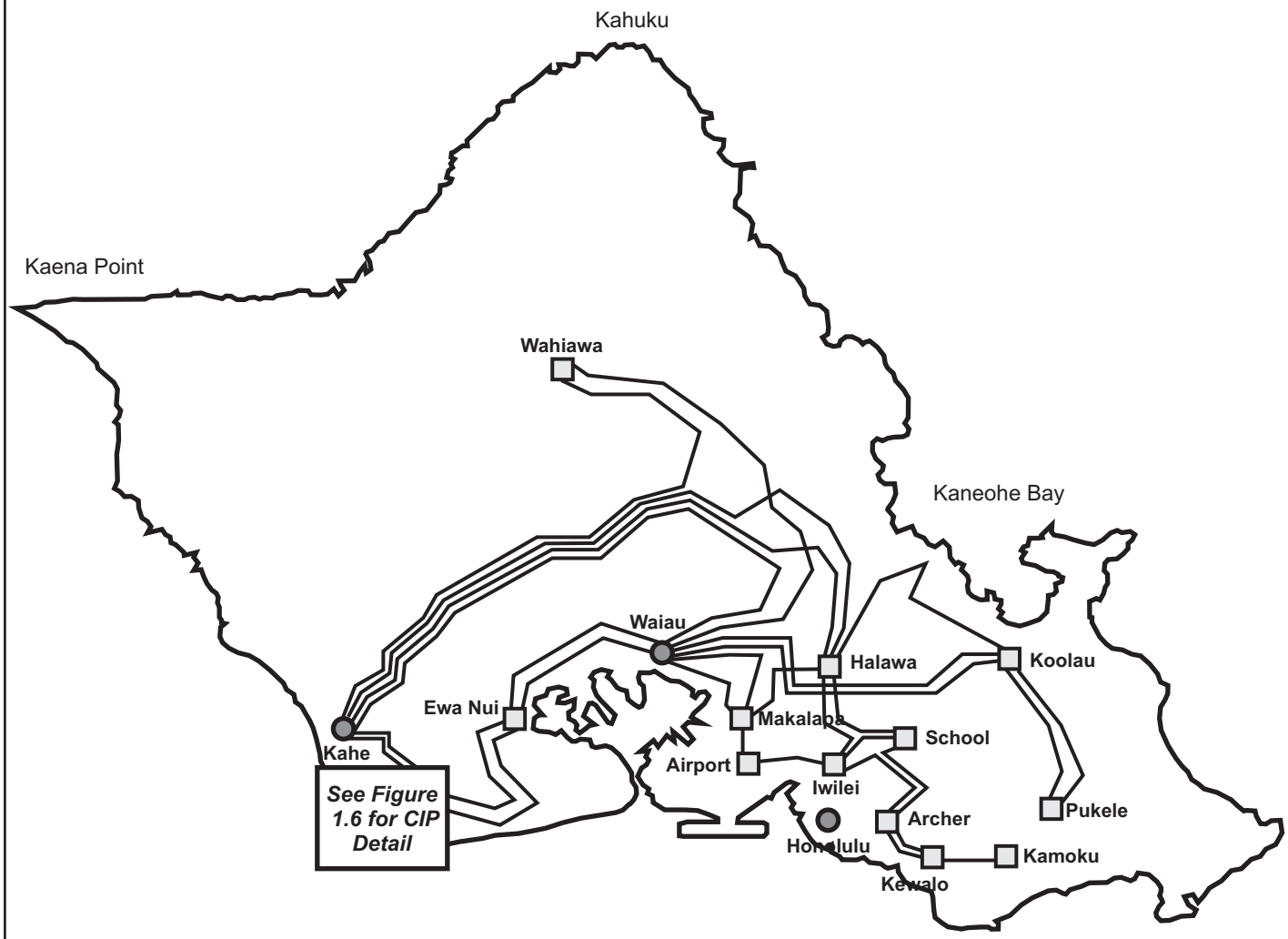
[1] “Firm Capacity” is the electric power (expressed in megawatts) that a supplier guarantees to be available for dispatch at all times except when uncontrollable forces produce outages.

Table 1.1. Selected Information Concerning Customers and Energy Sales: 2000 – 2004

	Customers as of December 31			Gross System Peak[2]	
Year	***Total***	***Residential[1]***	***Other***	***(MW)***	
2000	278,260	245,027	33,233	1,203	
2001	280,911	247,672	33,239	1,233	
2002	283,161	249,896	33,265	1,250	
2003	286,677	253,033	33,644	1,284	
2004	288,456	254,797	33,659	1,327	
Year	***Power sold (1,000 kWh)***			***Average annual use (kWh)[3]***	
	Total	***Residential[1]***	***Other***	***Residential[1]***	***Other***
2000	7,211,760	1,897,691	5,314,069	7,745	159,903
2001	7,276,681	1,924,443	5,352,238	7,770	161,023
2002	7,390,367	2,002,655	5,387,711	8,014	161,963
2003	7,522,230	2,066,522	5,455,707	8,167	162,160
2004	7,732,834	2,151,329	5,581,505	8,443	165,825

[1] "Residential" refers to single-metered residential customers, which may include condominiums for visitor use but excludes master-metered apartment and condominium buildings used by residents, which are classified as commercial customers.
[2] Gross System peak is the maximum amount of energy required by the electrical system at a point in time.
[3] Based on number of customers at end of year.

Source: Hawai'i State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy records as reported in the State of Hawai'i Data Books for the respective years.



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Hawaiian Electric Co., Inc.

Legend:

- Power Plant
- Substation
- 138 kV Transmission Line

Figure 1.1:

Existing Electrical Generating Facilities & Transmission Lines

CIP Generating Station & Transmission Additions Project

Figure 1-1 Existing Electrical Generating Facilities & Transmission Lines 2005-11-02.cdr

Table 1.2. Capacities and Type of Existing HECO Generating Units.

		Unit Minimum Rating (MW)		*Unit Normal Top Load Rating (MW)*		
Unit	***Fuel Type***	***Gross***	***Net***	***Gross***	***Net***	***Year Built***
Honolulu 8	LSFO	24.0	22.3	56.0	52.9	1954
Honolulu 9	LSFO	24.0	22.5	57.0	54.4	1957
Waiau 3	LSFO	24.0	22.1	49.0	46.2	1947
Waiau 4	LSFO	24.0	22.3	49.0	46.4	1950
Waiau 5	LSFO	24.0	22.6	57.0	54.6	1959
Waiau 6	LSFO	24.0	22.5	58.0	55.6	1961
Waiau 7	LSFO	35.0	32.7	92.0	88.1	1966
Waiau 8	LSFO	35.0	32.7	92.0	88.1	1968
Waiau 9	Diesel	15.0	14.9	52.0	51.9	1973
Waiau 10	Diesel	15.0	14.9	50.0	49.9	1973
Kahe 1	LSFO	30.0	27.7	92.0	88.2	1963
Kahe 2	LSFO	30.0	27.9	90.0	86.3	1964
Kahe 3	LSFO	30.0	27.8	92.0	88.2	1970
Kahe 4	LSFO	30.0	27.8	93.0	89.2	1972
Kahe 5	LSFO	55.0	50.4	142.0	134.7	1974
Kahe 6	LSFO	45.0	40.1	142.0	133.9	1981
TOTAL		464.0	431.2	1,263.0	1,208.6	

Note 1: Unit Minimum Ratings are the lowest rate at which it is practical to operate the unit.

Note 2: LSFO is low sulfur fuel oil.

Note 3: Gross numbers represent the nameplate rating of the units. Net numbers represent the power that the unit can deliver to the system after subtracting the power used by all ancillary equipment (e.g., pumps, blowers, etc.)

Note 4: All units are electric utility steam boilers except for Waiau 9 and Waiau 10, which are simple cycle combustion turbines.

Source: Hawaiian Electric Company, Inc.

Table 1.3. Firm Capacity and 2004 Energy Sales of Major Independent Power Producers.

Name	***Firm Generating Capacity (net MW)***	***2004 Energy Sales (in kilowatt-hours)***	***Contract Expires***
HPOWER (HRRV)	46	325,591,187	2015
Kalaeloa Partners, L.P.	208[2]	1,337,348,274	2016
AES-Hawai‘i	180	1,541,607,697	2022

Note: Firm generating capacity is the amount of electric power available for production guaranteed to be available for dispatch at all times except when uncontrollable forces produce outages.

Source: Hawaiian Electric Company, Inc.

[2] Amendments No. 5 and No. 6 to Kalaeloa's Purchase Power Agreement became effective on September 28, 2005, increasing Kalaeloa's firm capacity from 180 MW to 208 MW.

1.2.2 ELECTRICAL ENERGY USE PATTERNS AND DEMAND

Table 1.1 shows peak energy use and energy sales by HECO for calendar years 2000 through 2004, the latest year for which complete information is available. As indicated by the data in the table, both the instantaneous system peak and average energy use per customer have increased each year from 2000 through 2004. In 2004, the Gross System Peak reached 1,327 MW, over 3 percent higher than the 1,284 MW peak recorded just one year earlier.

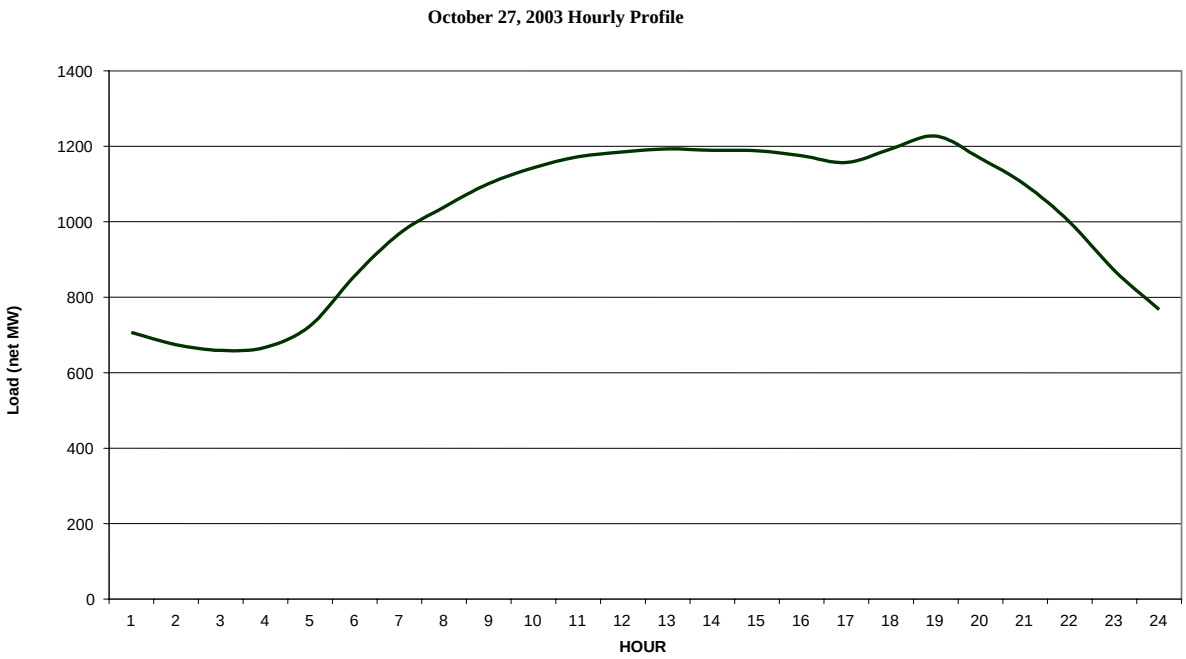
In addition to year-to-year changes, energy use varies greatly over the course of a day, over the course of the week, and seasonally. The highest daily usage typically occurs between 5:00 pm and 9:00 pm. Energy use also tends to be highest on weekdays when more businesses are open, and in September and October, when warm temperatures lead many customers to increase their use of air-conditioning units and other energy-consuming devices. The graphs shown in Figure 1.2 through Figure 1.4 illustrate this variability.[3]

- Figure 1.2 shows the variation in energy use over a 24-hour period in October 2003, a high-use month. It shows that usage at the time of greatest demand (between 5:00 pm and 9:00 pm) is approximately twice that at the point of lowest demand (which occurs in the early morning hours). Because it is inefficient (and therefore costly) to keep all units operating just to meet the peak demand for a few hours, HECO brings generators on and off line over the course of the day to follow the load.
- Peak energy use also varies over the course of a week. As illustrated in Figure 1.3, peak use (demand) is generally highest on weekdays, tapering off on the weekend when many businesses are closed. The magnitude of weekly variation is less than the daily variation, with peak usage on the day with the greatest peak demand being only about 20 percent higher than the day with the lowest peak demand.
- Finally, peak electrical energy use also varies seasonally. As shown in Figure 1.4, the highest demand on HECO's system usually occurs in September and October. During those months, peak energy use is typically at least ten percent higher than the peak energy use in February, March, and April.

Generating electricity to meet the daily, weekly, and seasonal changes in electricity demand in a reliable and economic manner requires HECO to constantly vary the mix of generating units that it has in operation and the level of output from these units. Figure 1.5 illustrates the way HECO brought generating units on- and off-line over the course of a 24-hour period on the day in 2003 with the highest peak energy use. The graph shows that some generating units (typically the most efficient) are in service nearly all of the time. These are often referred to as being "baseloaded"; the large oil-fired units at Kahe and the coal-fired AES generating unit in CIP are good examples. Other generators run most of the time during the day (but at fluctuating percentages of their capacity) to meet the load demand, but are usually shut down at night. These are often referred to as "cycling units." The mid-size oil-fired steam units at Waiau are examples of the units that perform this function. Finally, some units run only during periods of very high demand or during emergency conditions when other units are not available; these are often referred to as "peaking units." Waiau Units 9 and 10, which are relatively small diesel oil fired combustion turbines, are examples of engines that HECO operates as peaking units. There are no hard and fast boundaries between categories, but some generalizations can be made about the kinds of machines most suitable for base-loading, cycling, and peaking.

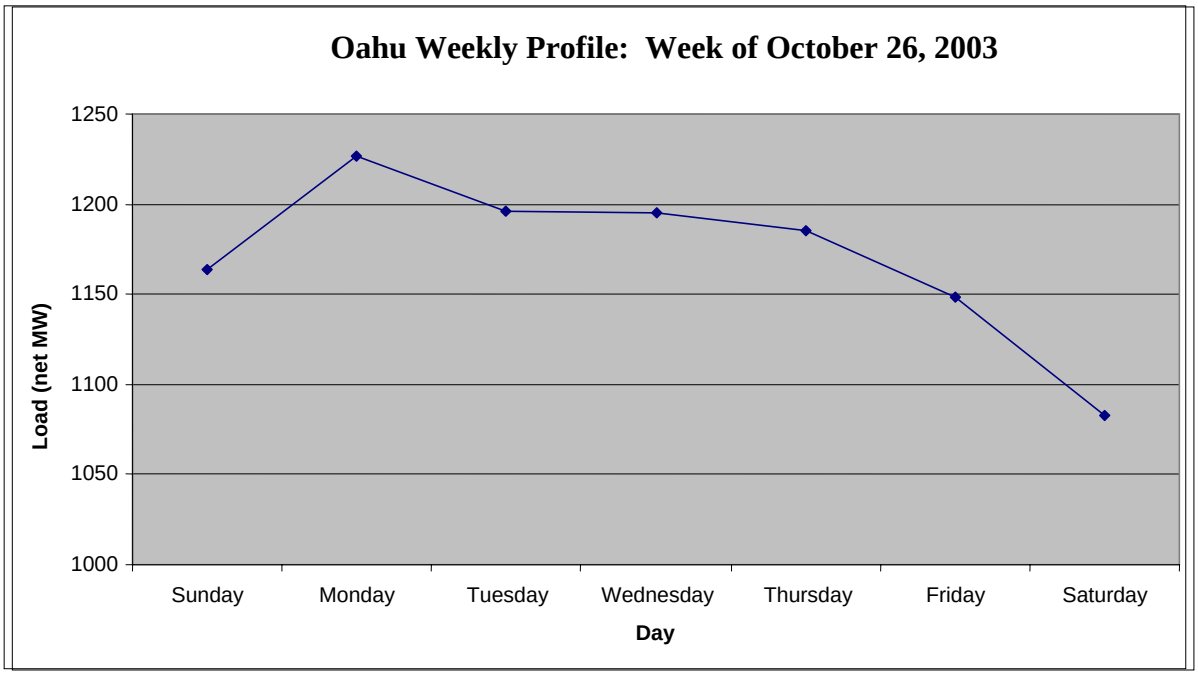
[3] The graphs focus on peak energy use because HECO must ensure that it is always capable of meeting the instantaneous peak in order to serve its customers fully. Total energy use affects the amount of fuel needed and is relevant to other generation planning considerations, but is not discussed further here.

Figure 1.2. Variation in Energy Use Over a Typical 24-Hour Period.



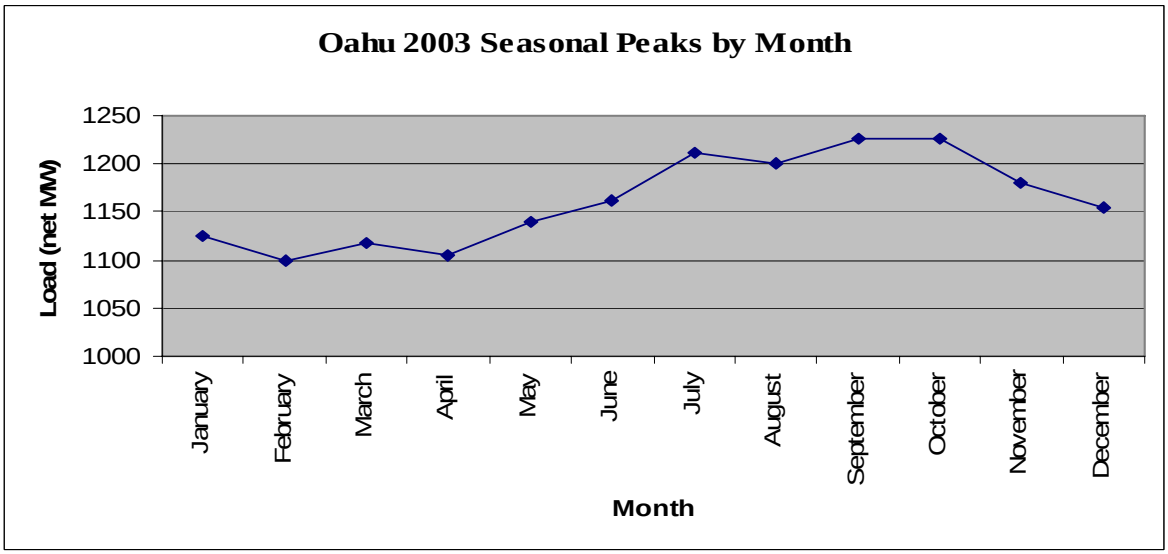
Source: HECO

Figure 1.3. Variation in Peak Energy Use over a Typical Week.



Source: HECO

Figure 1.4. Seasonal Variation in Peak Energy Use.

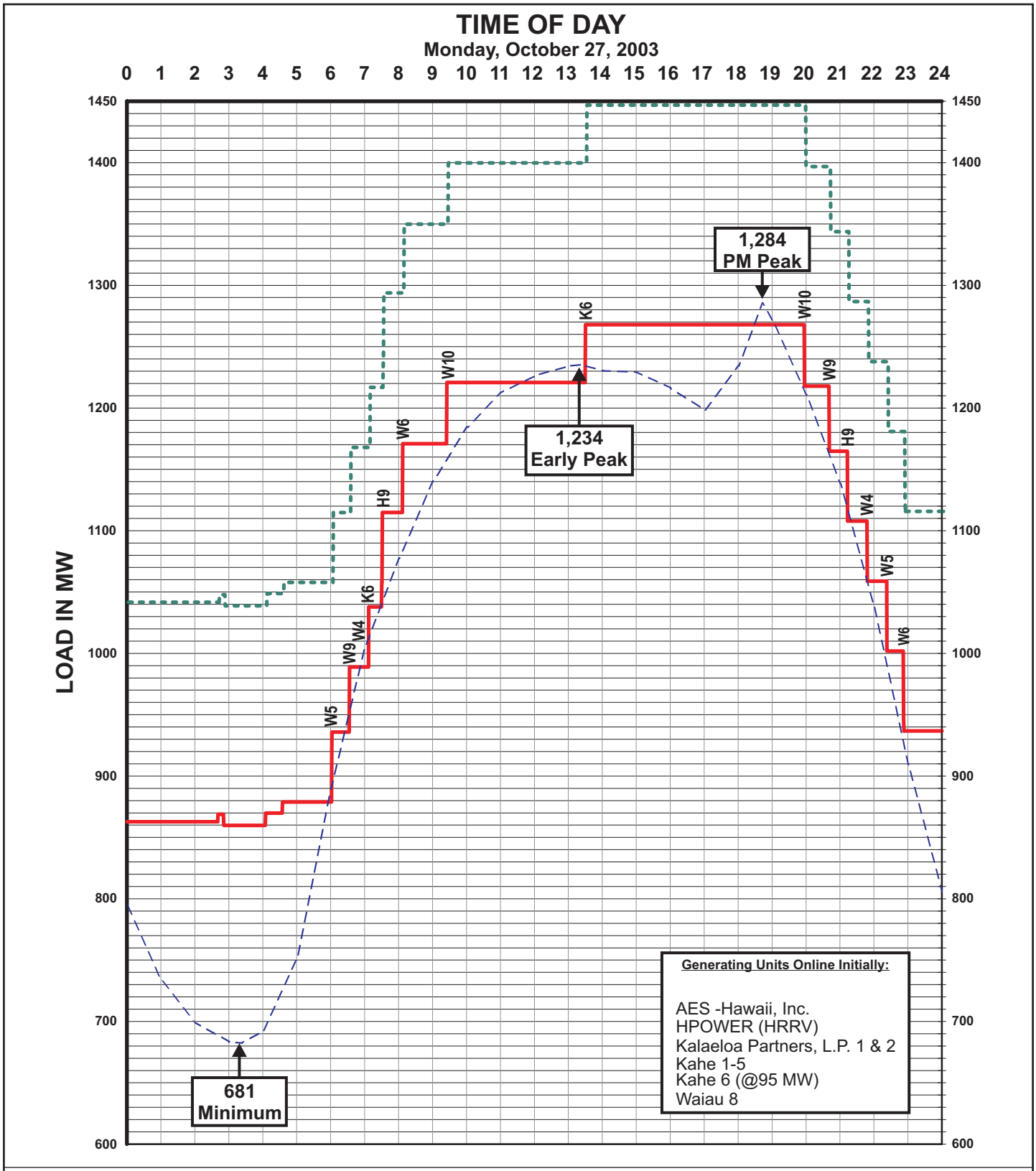


Source: HECO

- *Base-Load Units*. Certain types of generating units are best-suited for situations in which they are operated at full or near-full capacity 24 hours a day, 7 days a week. A fluidized-bed coal-burning unit is a good example of such a unit. Such units often take a relatively long time to start up and shut down, experience the most wear during the start-up and shut-down process, are least thermally efficient during such transitions and/or when operated at relatively low levels of output, and do not respond quickly to changes in demand.
- *Cycling Units*. Generating units used for this purpose are typically started up before the morning peak and shut down daily after the evening peak. These units are similar in design to the baseload units.[4] Operators bring them on and off line as needed and vary their output over a wide range to ensure that there is just the right amount of capacity available to meet demand.
- *Peaking Units*. Generating units best-suited for use as peaking units are designed to start up and shut down very quickly, often in as little as a few minutes. Moreover, once they are running they can respond very quickly to fluctuations in demand. Peaking units provide the utility with the ability to respond quickly to the sharp rise and fall of electricity demand typically experienced daily by HECO during the 5:00 pm to 9:00 pm evening period. However, seasonal and daily variations of customer electricity use sometimes results in "peak periods" at other times of the day. In addition, peaking units provide near immediate increases in capacity in the event of a system disturbance or system emergency.
- *Non-Firm Renewable Energy Units*. This final category of generating unit (which includes power that is generated by wind turbines and photovoltaic systems) is fundamentally different from the other three in that it is not always available. However, because the fuel cost is essentially zero, HECO actually uses energy from these sources first (i.e., before using electricity generated using non-renewable resources).

The variability in demand and the operational characteristics of the different types of resources that can be used to meet that demand strongly influence the way in which HECO must operate its system both now and in the future.

[4] All of the HECO units that are operated as cycling units were originally designed and operated as baseloaded units. However, to operate the electric generating system in the most economical manner, current system conditions dictate that these units be cycled. Potential unit outages, both planned and unplanned, and possible future increases in electricity demand may result in these units being temporarily or permanently operated as baseload units.



Prepared For:
Hawaiian Electric Co., Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Hawaiian Electric Co., Inc.

Legend:

- Units Online Less Largest Unit
- Units Available
- Actual System Load

H Honolulu Power Plant
K Kahe Power Plant
W Waiau Power Plant

Figure 1.5:

Generating Unit Use Pattern On Peak Day in 2003

CIP Generating Station & Transmission Additions Project

Figure 1-5 Unit Use Pattern On Peak Day in 2003 2005-11-02.cdr

1.2.3 EXISTING HECO TRANSMISSION SYSTEM

1.2.3.1 138 kV Islandwide Transmission Grid

The 138 kilovolt (kV) transmission grid consists of approximately 219 miles of overhead and underground transmission lines and 17 transmission substations.[5] The overhead system is designed to withstand most environmental hazards and remain in continuous service. HECO's 138 kV underground transmission system consists of 8 circuit-miles, most of which is in the Hawai'i Capital Special District and the Punchbowl Special District. A sophisticated system of protective relays and circuit breakers can sense and isolate faults in both the overhead and underground transmission systems without interruption of service.

1.2.3.2 138 kV Connections to Existing Campbell Industrial Park Generators

As shown in Figure 1.1, most of HECO's transmission system originates at individual, HECO-owned generating stations (e.g., Kahe and Waiau). The situation in CIP is different. Figure 1.6 shows the three existing generating stations located in the Campbell Industrial Park area (AES, Kalaeloa, and HPOWER) as well as the interconnecting 138kV transmission system in more detail. IPPs own these generating units, which have electrical busses connecting them to the two HECO substations located within the industrial area. The AES and HPOWER generating stations connect to the AES Substation, while the Kalaeloa plant connects to the Kalaeloa Substation. Three 138kV transmission lines (AES-CEIP, AES-Kalaeloa, and Kalaeloa-Ewa Nui) interconnect the substations.[6] The AES-Kalaeloa transmission line interconnects the AES Substation and the Kalaeloa Substation and the AES-CEIP and Kalaeloa-Ewa Nui lines interconnect the two substations to the remainder of the HECO system.

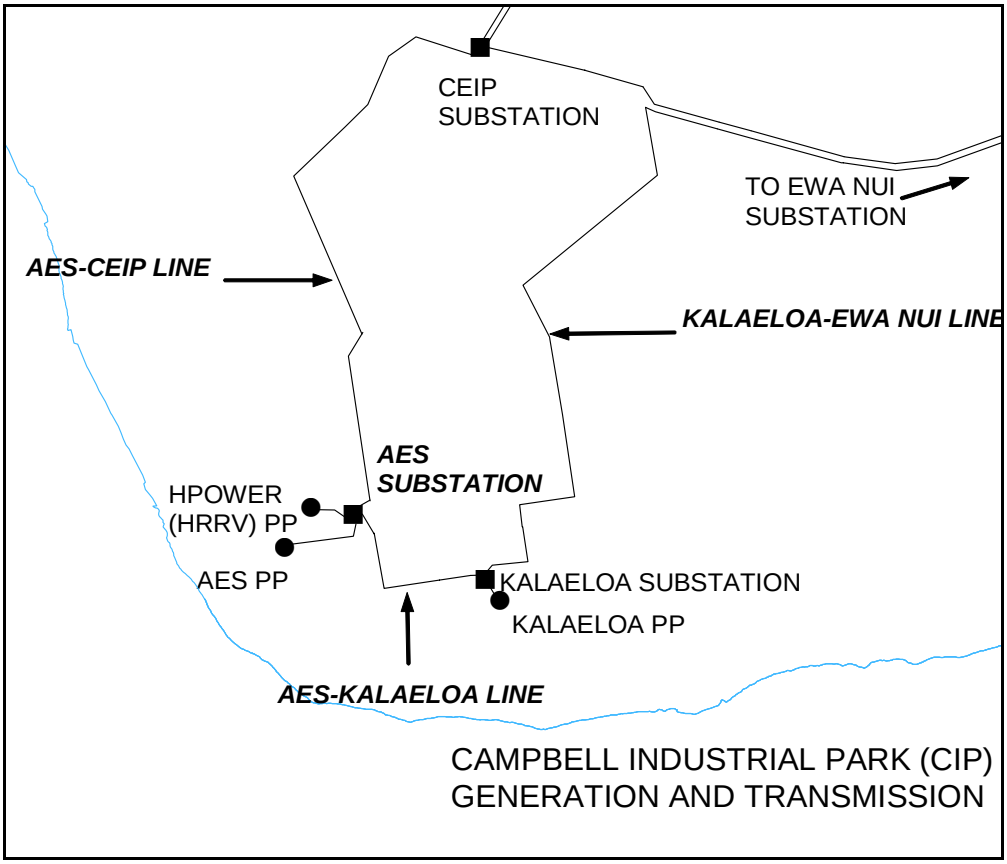
The portion of the existing AES-CEIP 138kV transmission line along Hanua Street to Malakole Road consists of 3,300 feet of 138 kV line attached to steel poles. The remaining 8,500 feet of this 138kV transmission line from Malakole Road to the CEIP Substation line is constructed on wooden poles. The entire existing AES-Kalaeloa 138 kV transmission line is constructed on steel poles.

As discussed in more detail in Section 1.4, the AES-CEIP and Kalaeloa-Ewa Nui 138kV transmission lines are responsible for exporting the collective power generated in CIP (which typically represents a substantial fraction of all of the power being consumed by HECO's customers at any given moment). Simultaneous outages of these two lines would result in the loss of all the power generated in CIP.

[5] Most of these are shown on Figure 1.1; because it would have made it overly difficult to read, that drawing does not show the AES, Kalaeloa, Kahe or Waiau substations. The AES and Kalaeloa facilities are shown on Figure 1.6.

[6] The official name for HECO's substation on the inland side of Campbell Industrial Park is the Campbell Estates Industrial Park Substation, or CEIP Substation.

Figure 1.6. Transmission System - Campbell Industrial Park Area



Source: Hawaiian Electric Company, Inc.

1.3 NEED FOR ADDITIONAL GENERATING CAPACITY

The following subsections explain why HECO needs to add conventional fossil fuel-fired generating capacity to its system even after it implements all reasonable efforts to limit growth in the demand for electrical energy from its system and takes advantage of available renewable resources. The discussion, which is drawn from HECO's Integrated Resource Plan (IRP-3), filed with the Hawaii Public Utilities Commission on October 28, 2005, consists of two main parts:

- Section 1.3.1 describes the Integrated Resource Planning (IRP) process prescribed by the Hawai'i Public Utilities Commission (PUC). This is the framework within which HECO conducts its system planning and determines the proper technologies to meet future demand for electricity.
- Section 1.3.2 summarizes relevant portions of HECO's Integrated Resource Plan (IRP-3). The discussion includes an overview of the process it has followed; the import of the renewable portfolio standards; assessments of demand-side, distributed generation, combined heat and power, and supply side resources; the considerations and assumptions used to integrate the various factors into six Finalist Plans; the identification of a Draft Preferred Plan, and the selection of a Final Preferred Plan, including a Proposed Five-Year Action Plan, and Risk Mitigation Measures.

The information in these sections provides the long-term planning context within which the need for the CT in 2009 was established.

1.3.1 INTEGRATED RESOURCE PLANNING (IRP) PROCESS

HECO conducts its system planning within the context of the PUC's framework for Integrated Resource Planning (IRP).[7] Integrated Resource Planning is the planning process required of each energy utility in the State of Hawai‘i to systematically and thoroughly develop long-range plans for meeting future energy needs. IRP evaluates and integrates both resources that supply electricity and resources that reduce or better manage the demand for electricity. The purpose of achieving this balance is to ensure reliability and affordability of electric power for residential and business customers, to support the State's growing economy, and to protect the environment. Because the planning process must proceed in a context of uncertainty, the balance of resources needs to be diverse and flexible, and to reflect community preferences. The overall objective of the IRP process is to identify the mix of resources needed to meet the near and long-term energy needs of the utility's customers in an efficient and reliable manner at the lowest reasonable cost.[8] The IRP plan and program implementation schedule approved by the PUC govern all utility expenditures for capital projects, purchased power, and demand-side management programs.[9]

The IRP framework establishes a number of governing principles. It makes energy utilities regulated by the PUC responsible for developing integrated resource plans. It requires that the plans be consistent with state and county environmental, health, and safety laws and with formally adopted state and county plans. The framework requires the plans to consider the costs, effectiveness, and benefits of all appropriate, available, and feasible supply-side and demand-side options. It also requires the plans to take into consideration the utility's financial integrity, size, and physical capability. The PUC's policies governing the IRP process stipulate that the process be an open one and that the public and governmental agencies be encouraged to participate in the development and review of plans. In addition, the framework calls for the removal of disincentives and the establishment of incentives so that demand-side management (DSM) programs are on an even footing with supply-side options.

- Demand-side measures include those intended to influence utility customers to lower their uses of energy, thereby reducing the electrical demand that customers place on HECO's system. They include conservation, load management, and efficiency improvement measures. DSM measures include installing more energy-efficient lighting, cooling, heating and other equipment; substituting solar for electric water heating; allowing HECO to control residential water heaters; and allowing customers to designate a portion of their energy use as "interruptible".
- Supply-side measures are those that increase the amount of electricity that HECO is able to provide. They include installing conventional fossil-fuel-fired generation and renewable resource generation (e.g., wind, municipal solid waste, photovoltaic, biomass, etc.).

The IRP framework establishes responsibilities for the PUC and the Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs. The PUC's responsibilities include (i) determining whether the utility's plan represents a reasonable course for meeting the energy needs of the utility's customers, is in the public interest and is consistent with the goals and objectives of integrated resource planning; and (ii) monitoring the utility's implementation of its plan. The Consumer Advocate's responsibilities include representing, protecting, and advancing the interest of consumers of utility services. In carrying out these responsibilities, the Consumer Advocate serves as a party to each utility's integrated resource planning docket and is a member of all advisory groups that the utility establishes to assist in the development of its integrated resource plan.

[7] The PUC established the IRP framework by Decision and Order No. 11524 in Docket No. 6617 and subsequently revised by Decision and Order No.11630.

[8] In the context of the IRP, long-term is defined as a 20-year time horizon.

[9] Notwithstanding approval of an IRP plan, expenditures for any capital project in excess of $2,500,000 and specific demand-side management program elements included in an integrated resource plan or a program implementation schedule must be submitted to the PUC for review and approval.

1.3.2 HECO'S PROPOSED INTEGRATED RESOURCE PLAN (IRP-3)

The IRP process is on-going. HECO filed its first IRP review report with a preferred plan in 1993 (IRP-1). It filed its second plan, IRP-2, in 1998, and filed an evaluation of the IRP-2 in December 2002 to update the IRP-2 resource plan. HECO recently completed its third IRP report and preferred plan (IRP-3); it filed these with the Hawaii Public Utilities Commission on October 28, 2005.[10] The remainder of this section describes the process through which IRP-3 was developed and summarizes its most important components, including those that led to the proposed action that is covered by this document.

1.3.2.1 IRP-3 Process Overview

HECO began work on the most recent round of the IRP process, IRP-3, for its third cycle IRP plan in the summer of 2003, when it convened an ad hoc community advisory group with distinguished members of the broad community to provide recommendations on how to structure a stronger and more open IRP process. Following the community advisory group's recommendations, in September 2003 HECO invited key representatives from government agencies, the business community, and environmental and cultural interest groups to participate as part of an official Advisory Group for the IRP-3 process. The Advisory Group helped guide the direction of the IRP planning process and provided policy input at a policy level. In addition to the Advisory Group, five technical committees were formed for specific IRP process elements: (1) Load Forecasting, (2) Demand-Side Management, (3) Supply-Side Resources, (4) Distributed Generation/Combined Heat and Power Resources and (5) Integration Analysis. The general workflow for IRP-3 is shown in Figure 1.7.

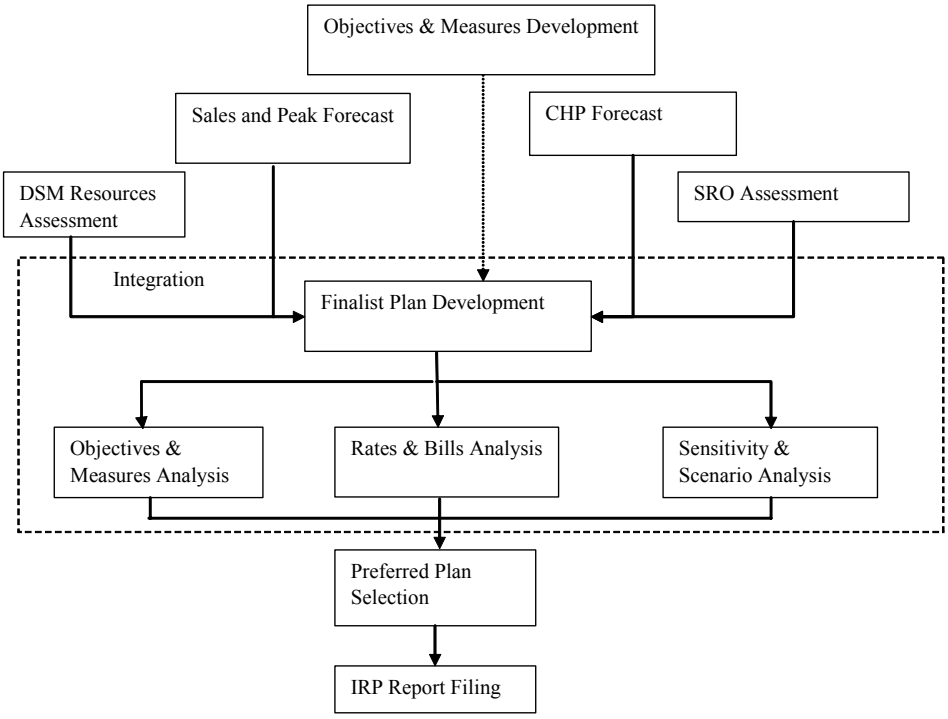
In accordance with the PUC's directives, HECO has made a strenuous effort to ensure that the IRP process was an open one. All meetings were open to the public. Notices, reference materials, and minutes of meetings were posted on HECO's Website. The initial orientation sessions for the Advisory Group were publicized and broadcast on 'Olelo public television, to build understanding and encourage involvement by the public. Two public meetings were held during the IRP-3 process to invite comments and to respond to questions. One of the meetings was held while the IRP-3 Objectives were being formulated. The second meeting was used to share the proposed Finalist Plans. Comments from both meetings were integrated back into the process and helped to shape the objectives and the final preferred plan. Full-page advertisements were placed in newspapers explaining the IRP process, announcing the public meetings, describing the plans and the attributes of each option, identifying sources of additional information, and inviting the public to provide comments. HECO shared all of the public comments it received with the Advisory Group. After receiving additional input from the Advisory Group, HECO prepared a draft of its "Preferred 20-Year Plan," which included a proposed five-year action plan. It provided the draft preferred plan to the IRP-3 Advisory Group on June 7, 2005, and met with the Advisory Group on July 13, 2005 to present the draft preferred plan and request their feedback on the plan. HECO considered the feedback provided to develop its IRP-3 Final Preferred Plan which it submitted to the PUC on October 28, 2005.

The IRP-3 process began with HECO and the Advisory Group developing seven objectives and assessment measures that guided the formation of the integration plans that were analyzed. They were very similar to the objectives that were identified in IRP-2, and they include: protecting the environment, providing economical electricity, maintaining power quality and reliability, promoting energy security and sustainability in the future, minimizing potential negative societal and cultural impacts, building flexibility into the plan, and promoting the financial integrity and competitiveness of the company. While some of these objectives are mutually supporting, others (e.g., economy and reliability) are not. Hence, IRP recommendations necessarily involve tradeoffs between different objectives. Long-term planning assumptions for IRP-3 were based on forecasts of energy use

[10] IRP-3 was prepared in compliance with PUC Order No. 20430, filed on September 11, 2003, in Docket No. 03-0253.

reduction obtainable through DSM measures, supply-side resource cost and performance, existing unit performance and maintenance, unit retirements, and CHP market size. The planning process also used forecasts of electricity sales and peak demand (February 2004 forecasts); fuel prices (July 2002 forecast); financial assumptions (cost of capital, inflation rate, tax rates etc.); and externality costs.

Figure 1.7. IRP-3 Process Elements and Flow



1.3.2.2 Renewable Portfolio Standards

Hawai‘i’s Renewable Portfolio Standards (RPS) Law played an important role in the development of IRP-3. First established in 2001 by Act 272, the Hawai‘i State Legislature set standards for the share of electricity generated from renewable sources, thereby encouraging the establishment of a market for renewable energy.[11] The law defined renewable energy to include any electrical energy produced by:

> *“wind, solar energy, hydropower, landfill gas, waste to energy, geothermal resources, ocean thermal energy conversion, wave energy, biomass including municipal solid waste, biofuels or fuels derived entirely from organic sources, hydrogen fuels derived entirely from renewable energy, or fuel cells where the fuel is derived entirely from renewable sources. ‘Renewable energy’ also means electrical energy savings brought about by the use of solar and heat pump water heating.”*[12]

[11] Section 269-93 of this Act provides that an electric utility company and its electric utility affiliates (e.g., Hawaiian Electric Company, Maui Electric Company, and Hawaii Electric Light Company) may aggregate their renewable portfolios in order to achieve the renewable portfolio standard.

[12] A bill for an Act: Relating to renewable energy resources. Act 272 (2001).

Act 95 of the 2004 Hawai‘i State Legislature amended the RPS for Hawai‘i by revising the definition of renewable energy and increasing the 2010 RPS level (see Table 1.4) to guide utilities in incorporating renewable resources into their resource portfolios and to reduce the use of imported oil.[13]

Table 1.4. Renewable Portfolio Standards under Act 272 and Act 95.

Legislation	*% of Electricity from Renewable Sources*				
	2003	***2005***	***2010***	***2015***	***2020***
Act 272 (2001)	7%	8%	9%	N/A	N/A
Act 95 (2004)	7%	8%	10%	15%	20%

Section 269-94, as amended, provides that any electric utility company not meeting the renewable portfolio standard must explain to the PUC the reasons for not meeting the RPS. The PUC has the option to either grant a waiver from the renewable portfolio standard or to extend the deadline for meeting the prescribed standard. The PUC also may provide incentives to encourage electric utility companies to exceed their renewable portfolio standards and/or to meet their renewable portfolio standards ahead of time. The PUC has a legislative mandate to formulate an electric utility rate design by December 31, 2006 that (1) enables the achievement of renewable portfolio standards (RPS) requiring that renewable energy resources are to have a specific share in the power generation mix by a particular period of time, (2) encourages investments in renewable energy facilities, (3) conforms to the existing regulatory regime, which is cost-of-service regulation, or to alternative regulatory regimes, such as performance based ratemaking, and (4) provides utilities an opportunity to earn a reasonable rate of return. HECO, as well as the other energy utilities in the State, is currently involved in the PUC process involving three sets of workshops that will lead to the creation of a document for rulemaking.

1.3.2.3 Assessment of Demand-Side Resources

The DSM resource portfolio presented in IRP-3 is the result of a comprehensive and wide-ranging assessment of DSM potential conducted by HECO over the past two years. To assist in the development of this assessment, HECO retained Global Energy Partners (Global) in July 2003. Global developed two studies that assessed Hawaii’s energy efficiency and demand response potential. As a result of this assessment, with PUC approval, HECO plans to expand its five existing energy and efficiency programs, continue its two load management programs, and propose two new DSM programs. Table 1.5 provides a description of these programs.

HECO had previously proposed a third DSM program, the Residential Customer Energy Awareness (RCEA) program. In response to a PUC decision on this program, HECO has proposed in its 2005 rate case to include in base rates the cost of similar consumer conservation and energy efficiency awareness informational advertising with the objective of helping to achieve energy savings, reduction of peak load and additional reductions during emergencies.

[13] Act 95, codified as sections 269-91 to 269-94, Hawaii Revised Statutes.

Table 1.5. Proposed Energy Efficiency and Load Management Programs.

Name	*Description*
EXISTING ENERGY EFFICIENCY PROGRAMS	
Commercial & Industrial Energy Efficiency	This program offers cash rebates to non-residential customers who purchase high-efficiency electric equipment, and provides incentives to dealers who sell high-efficiency electric equipment.
Commercial & Industrial New Construction	This program offers design assistance and customer rebates that cover both new buildings/facilities and buildings/facilities undergoing major renovation.
Commercial and Industrial Customized Rebate	This program provides targeted customers with a full range of products and services within their facilities that will be aimed at achieving total efficiency improvements rather than individual measure efficiency.
Residential Efficient Water Heating	This program promotes solar water heating and high-efficiency electric water heaters to customers in existing residential dwellings.
Residential New Construction	This program promotes solar water heating, high-efficiency electric water heaters, and packages of other energy efficiency measures (such as wall and ceiling insulation, high performance windows, high-efficiency cooling equipment and EnergyStar® appliances) to customers in new residential dwellings.
EXISTING LOAD MANAGEMENT PROGRAMS	
Residential Direct Load Control	This program provides ongoing incentives to participating customers in return for allowing HECO to control their electric water heaters and/or air conditioning equipment during system peak hours through the use of load control devices attached to the customers' equipment.
Commercial and Industrial Direct Load Control	This program provides ongoing incentives to participating commercial and industrial customers in return for HECO being allowed to interrupt some or all of their electrical service during peak hours.
PROPOSED NEW DSM PROGRAMS	
Energy Solutions for the Home	This program provides a comprehensive range of energy efficiency options suitable for several major end-use applications.
Residential Low Income	This program enables qualified low-income customers to receive high-efficiency equipment (i.e., compact fluorescent lamps and low-cost water heating measures, such as faucet aerators and low-flow showerheads) for little or no cost.
Source: HECO IRP-3 report.	

1.3.2.4 IRP-3 Assessment of Distributed Generation, and Combined Heat and Power Resources

Distributed generation (DG) involves the use of small-scale electric generating technologies installed on or near the end-user's property. Combined heat and power (CHP) is a type of DG in which heat energy from a conventional electric generating unit is captured for use in a heat exchanger or absorption chiller to provide hot water for domestic hot water uses or chilled water for air-conditioning. In October 2003, HECO, together with MECO and HELCO, filed an application for approval of a utility-owned CHP Program and Schedule CHP tariff under which they would provide CHP services to eligible commercial customers.

The PUC opened an investigative docket to determine the potential benefits and impact of DG on Hawai'i's electric distribution systems and markets and to develop policies and a framework for DG projects deployed in Hawai'i. The PUC also suspended HECO, MECO, and HELCO's application for their CHP program until, at a minimum, it concludes its generic DG docket. HELCO and HECO filed proposed individual CHP Agreements with the Commission in accordance with Rule 4 of the Companies' tariffs pending approval of the generic CHP program, but on January 21, 2005, the PUC suspended these applications, noting that such a program would more appropriately be evaluated after its separate generic DG docket had been concluded. With the continued suspension of HECO's CHP Program application and subsequent suspension of applications for individual CHP projects, there is considerable uncertainty as to when or if the benefits of utility CHP can begin to be realized. HECO is currently waiting for a decision in generic DG docket and will proceed on the basis of the PUC decision. HECO has also installed six of nine planned 1.67 MW portable, leased DG units at utility-controlled substations or other utility sites as a short-term mitigation measure to bolster HECO's reserve capacity. Installation of the next three DG units is scheduled for completion during the fourth quarter of 2005.

1.3.2.5 Assessment of Supply-Side Resources

HECO evaluated a broad range of energy supply-side resources as part of IRP-3. The list of candidate resources considered was based on the lists of technologies previously developed, updated by HECO and the consulting firm of Black & Veatch, with input from the Supply-Side Technical Committee. The candidate resources were evaluated and screened using criteria developed and used in previous IRPs. Table 1.6 provides the resource options that were selected and used in the IRP-3 analysis.

Table 1.6. Supply-Side Resources Evaluated in IRP-3.

RENEWABLE RESOURCES	
	Wind energy – 10, 15, 20, 25, and 50 MW wind farms
	Biomass combustion – 25 MW
	Municipal waste mass burn – 16 MW
	Central-station photovoltaics • 100 kW (Fixed) • 100 kW (Single-axis tracking)
	Distributed (residential) photovoltaics • 2 kW (Fixed) • 2 kW (Fixed with battery storage and back-up charging system)
FOSSIL FUEL RESOURCES	
	Simple-Cycle Combustion Turbine – 76 MW (Naphtha/No. 2 Fuel Oil)
	Steam Injected Gas Turbine (STIG) – 81 MW (Naphtha/No. 2 Fuel Oil)
	1-on-1 Combined-Cycle Combustion Turbine – 120 MW (Naphtha/No. 2 Fuel Oil) • Phase 1 of 2 Simple-Cycle (1 x 76.3 MW) • Phase 2 of 2 Thermal-Cycle (120.2 MW)
	2-on-1 Combined-Cycle Combustion Turbine – 242 MW (Naphtha/No. 2 Fuel Oil) • Phase 1 of 3 Simple-Cycle (1 x 76 MW) • Phase 2 of 3 Simple-Cycle (2 x 76.3 MW) • Phase 3 of 3 Thermal-Cycle (242.1 MW)
	Atmospheric Fluidized Bed Combustion (AFBC) • 180 MW (Sub-bituminous coal) • HECO/AES AFBC – 180 MW (Sub-bituminous coal).
Note: Unit information forms were developed for each of these resource options. The specifics of each of these options were used for the IRP-3 analysis. Each of the above resource options represents a class of resources. For example, a simple-cycle combustion turbine from GE that generates 76.3 MW is considered a member of the 100 MW class of generators, as is a 110 MW generator from Siemens-Westinghouse.	
Source: HECO IRP-3 Report.	

1.3.2.6 Integration Considerations and Assumptions

The Strategist optimization model was used to perform the integration of demand-side and supply-side resources, in combination with plan concepts developed by HECO and the Advisory Group. A range of candidate integrated resource plans were developed. HECO anticipate~~s~~d reserve capacity shortfalls to begin in 2005 and project~~s~~ed these shortfalls to continue until 2009, which is the earliest that HECO expects to be able to permit, acquire, and place into commercial operation its next central-station generating unit. The reserve capacity shortfalls are due to a number of factors, including (1) the continued strong economic outlook and resulting peak load growth, (2) a decrease in the availability of HECO generating units, and (3) the continued delay in the start of HECO's proposed CHP program. HECO is taking a number of interim mitigation measures to reduce the amount of the anticipated shortfall, including the addition of nine 1.67 MW portable leased DG units at three HECO substations by the end of 2005. At the same time, this shortfall could increase significantly if DSM program participation is lower than originally anticipated, if HECO is not able to achieve the CHP penetration forecasted due to delays in starting the CHP program, or if electricity sales are higher than forecasted. The degree to which these measures can address the reserve capacity shortfall in the

2006-2010 period will depend on (1) the time required to obtain the permits and/or approvals that may be necessary to obtain, install and implement the measures, (2) the cost to install, operate and maintain the measures, and (3) the extent to which the customers agree to participate in the demand-side measures. Thus HECO projects that there will continue to be some reserve capacity shortfall, even after implementation of mitigation measures, at least until 2009.

Because the power generated by resources considered in the IRP analysis must be delivered by the transmission system, the potential impacts of transmission system capital improvements and energy losses were calculated for each of the finalist plans. The transmission analyses include estimates of the cost and timing of load driven transmission additions and the cost and timing of generation related interconnection requirements. The capital costs for all transmission additions were then incorporated into each finalist plan's capital cost. The transmission analyses also included a calculation of system energy losses in each year of the 20-year planning period for each of the finalist plans. These losses were inputs to the generation model to incorporate system loss impact upon generation energy costs. The impact of alternative resource plans on the State's economy was provided by macroeconomic analysis performed by the University of Hawai'i Economic Research Organization (UHERO).

1.3.2.7 Finalist Plan Development and Integration Analysis

The considerations and assumptions described above were used to perform an integration analysis on a variety of finalist plan concepts developed by HECO and the Advisory Group. The finalist plan concepts were based on the objectives and measures defined earlier in the process. This analysis first helped provide a set of finalist plans through a process illustrated in Figure 1.8.

The timing of generating unit additions was determined by the Proview module of the computer production simulation program based on HECO's capacity planning criteria, which consists of HECO's load service capability criterion[14] and HECO's reliability guideline (i.e. loss of load probability[15]).

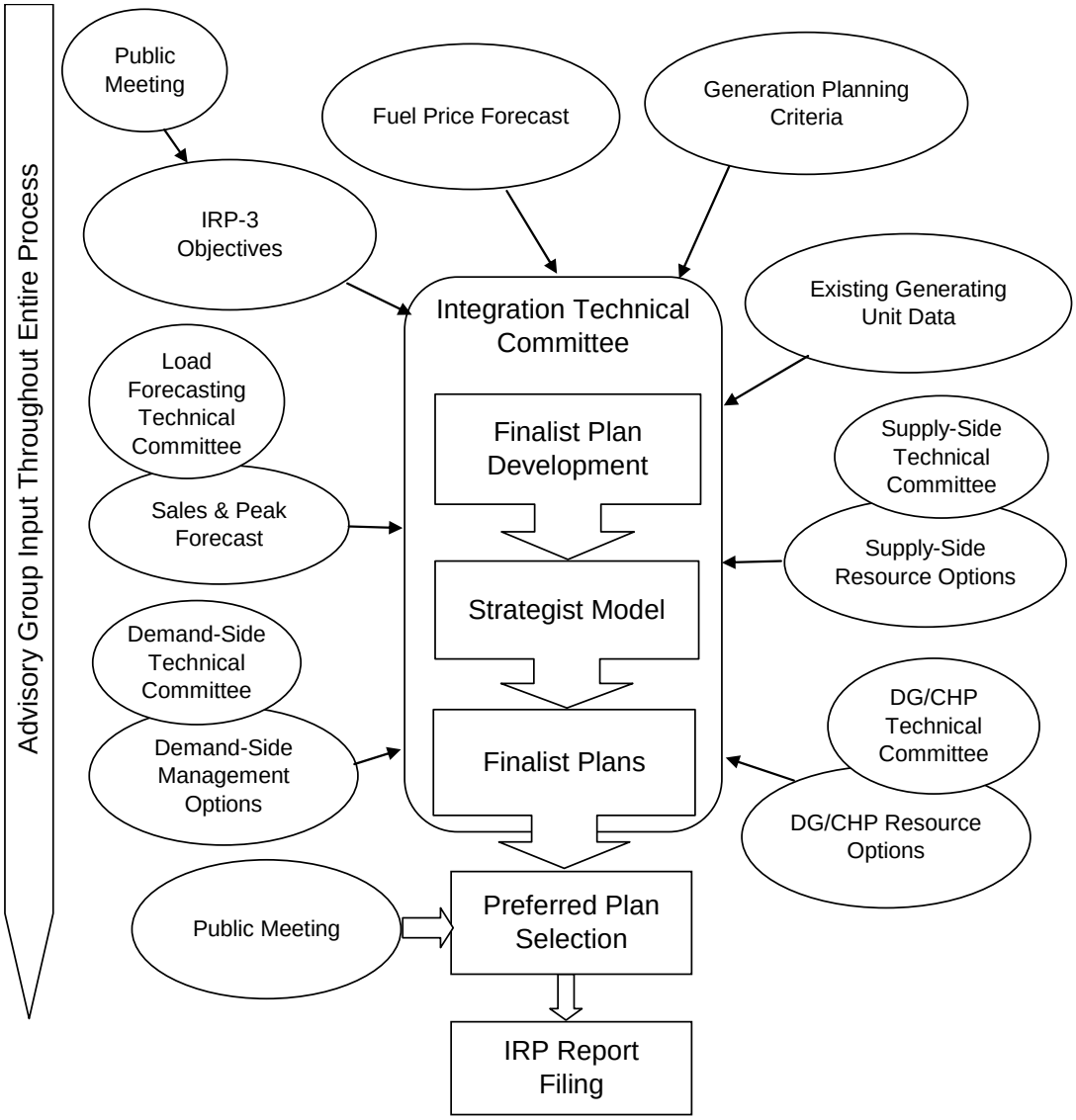
The integration analysis considered each resource plan's ability to fulfill the IRP-3 objectives described in Section 1.3.2.1. The process resulted in the six Finalist Plans listed below.

- ***Least-cost Finalist Plan*** – provides lowest total resource cost without requirement to meet RPS;
- ***Meet 20% RPS on O'ahu Finalist Plan*** – enables HECO to meet the RPS requirements as mandated by Act 95 of 2004 (Senate Bill 2474) without contributions from its subsidiary utilities;
- ***Maximize Renewable Energy Finalist Plan*** – adds as much energy from renewable resources as would be feasible;
- ***Meet State RPS Law Finalist Plan*** enables HECO to meet the RPS requirements as mandated by Act 95 of 2004 (Senate Bill 2474) with contributions from its subsidiary utilities;
- ***Maximize Fuel Diversity Finalist Plan*** – diversifies the source of fuel to minimize the consumption of petroleum fuel with the intent of reducing Hawai'i's dependence on imported oil; and
- ***Combination Finalist Plan*** – represents a hybrid of the other plans, developed to incorporate some of the best features from several plan concepts.

[14] The load service capability criterion ensures that an adequate amount of reserve capacity will be available in the event of the sudden loss of the largest unit in service. The criterion states that the total capability of the system plus the total amount of interruptible loads must at all times be equal to or greater than the summation of: 1) the capacity needed to serve the estimated system peak load; 2) the capacity of the unit scheduled for maintenance; and 3) the capacity that would be lost by the forced outage of the largest unit in service.

[15] HECO's reliability guideline is set at a Loss of Load Probability (LOLP) of 4.5 years per day. This means that the estimated probability of an outage due to generation shortfall should be no more than once every 4.5 years. Because Strategist estimates Loss of Load Hours (LOLH) and does not estimate LOLP, a measure of LOLH for HECO's 4.5 years per day loss of load probability (LOLP) guideline was used.

Figure 1.8 Resource Integration Process



Source: IRP-3.

These Finalist Plans result from tradeoffs made by the integration analysis among often competing objectives. They demonstrate the lowest total resource cost while best meeting the applicable objectives and satisfying HECO's generation criteria and reliability guideline.

Despite the different aims of the plans, they share some common elements. In particular, under all plans, integration modeling determined that a 100 MW class CT is the preferred generation unit type for installation in 2009 in order to best meet the forecasted electricity demand. A General Electric MS7001EA combustion turbine, with rating of approximately 76 MW, was used as a proxy for the 100 MW class of simple cycle combustion turbines in developing the HECO IRP-3 finalist plans because performance, cost, and emission data provided by the vendor were considered the most complete at the time needed for the integrated resource planning work to proceed. Subsequently, through a competitive bidding process, HECO selected a 110 MW capacity CT model from Siemens-

Westinghouse as the preferred model. More detailed information concerning the plans is in Sections 1.3.2.7.1 through 1.3.2.7.6.

1.3.2.7.1 Plan 1 – Least-Cost Plan

The least-cost plan was model-derived, meaning the resource type and timing were determined by the Strategist model. When firm capacity was required by the system, Strategist had all supply-side resource options available to add for development of a plan. Under the assumptions of enhanced level of energy efficiency DSM, the load management DSM programs, and a large CHP market, Strategist added, in addition to the CT in 2009, a 76 MW simple-cycle combustion turbine in 2022. This plan was not constrained to comply with the state RPS law; and hence because of the higher costs of generation from renewable energy, as opposed to central station generation using fossil fuels, it did not meet the law's 2020 target.

1.3.2.7.2 Plan 2 – Meets 20% RPS on O'ahu Plan

This Plan was developed by first calculating how many renewable energy resources must be included in the plan to cover 20% of HECO's sales by 2020. As with all the plans under consideration, this one assumes the 110 MW CT will be in place in 2009 and has factored that into the total sales. Firm capacity would be provided by the MSW and biomass units. As-available resources would be added based on economics and quantity required to meet the RPS law targets in 2010, 2015, and 2020. As-available resources included in this plan were wind, residential rooftop PV systems, commercial PV systems, and PV energy park systems. Under the assumptions of the enhanced level of energy efficiency DSM and large CHP market, along with the existing renewable energy resources, HECO meets the RPS law in 2010. In order to meet the 2015 target, a 16 MW mass solid waste unit and 50 MW wind unit are added in 2015. A 25 MW biomass unit, 20 MW and 15 MW wind resources, and PV resources are added in 2020 to meet the RPS target (4 MW of commercial PV systems were added each year from 2011 to 2020, 2 MW of PV energy park systems were added each year from 2016 to 2020, and 4 MW of residential rooftop PV systems were added each year from 2016 to 2020).

1.3.2.7.3 Plan 3 – Maximize Renewable Energy Plan

This Plan was developed to capture the maximum potential of renewable energy resources that could be added to the HECO system. This plan is similar to Plan 2 in Section 1.3.2.7.2 except that the renewable energy resources are added to the system as early as feasibly possible before firm capacity is required. This plan exceeds the mandated RPS target. The assumptions for the maximum amount of residential rooftop PV systems, commercial PV systems, and PV energy park systems that can be installed in one year are the same as in Plan 2. The cumulative maximum amount of commercial PV systems and PV energy park systems that can be installed is 400 units (40 MW) and 200 units (20 MW), respectively, based on the amount of area required for these installations. Plan 3 includes the enhanced level of energy efficiency DSM, the load management DSM programs, a large CHP market, a simple-cycle combustion turbine added in 2009, 4 MW of commercial PV systems in each year from 2008-2017, 2 MW of PV energy park systems in each year from 2010-2019, 4 MW of residential rooftop PV systems in each year from 2010-2025, and the installation of mass solid waste and biomass units in 2015.

1.3.2.7.4 Plan 4 – Meets the State RPS Law Plan

The state RPS law requirements are based on corporate-wide sales of HECO, HELCO, and MECO to meet the 2010, 2015, and 2020 targets. Plan 4 was developed by first calculating what portion of the RPS goals must be met by HECO. Plan 4 was also "model-derived" (i.e., the Strategist computer model determined the resource type and timing without the use of any non-economic constraints). When firm capacity was required by the system, Strategist had all supply-side resource options available to add for development of the plan. The renewable energy resources that needed to be added into the plan to meet the RPS law were also based on least-cost. With the enhanced level of energy efficiency DSM, the load management DSM programs, and a large market of for CHP, a simple-cycle combustion turbine is added in 2009 as with the other plans, a 25 MW wind unit is added in 2020, and a second 76 MW simple-cycle combustion turbine is added in 2022.

1.3.2.7.5 Plan 5 – Maximize Fuel Diversity Plan

The Maximize Fuel Diversity Plan was derived by minimizing oil-fired generating resources. When firm capacity was required by the system, the Strategist model was allowed to choose from all available supply-side resource options except oil-fired generating resources. The only oil-fired generating resource included in the plan is the simple-cycle combustion turbine in 2009, which had to be used in all of the plans in order to balance supply and demand. To minimize oil consumption, the small market for CHP was assumed in this plan in lieu of the large market, and renewable energy resources were added sooner than required to meet the state RPS goals. With the enhanced level of energy efficiency DSM, the load management DSM programs, and a small market of CHP, a simple-cycle combustion turbine is added in 2009, a 50 MW wind unit is added in 2009 and a 180 MW coal unit is added in 2016. This plan meets the state RPS goals.

1.3.2.7.6 Plan 6 – Combination Plan

The Combination Plan was developed after the previous five plans were derived. The combination plan tried to mix the resources in the different plans to develop a plan that balances the various attributes of Plans 1 through 5. Along with the enhanced level of energy efficiency DSM, the load management DSM programs, a large market of CHP, and a simple-cycle combustion turbine to be added in 2009, a 50 MW wind unit is added in 2009, 300 kW (3 units) of commercial PV systems are added in 2015, 300 kW (3 units) of commercial PV systems are added in 2020, a 180 MW coal unit is added in 2022, and 300 kW (3 units) of commercial PV systems are added in 2025. The coal unit was selected for its fuel diversity which relates to the objective "Energy Security & Sustainable Future." The renewable energy resources exceed the amount required to meet the state RPS goals with consideration to the objective of "Economical Electricity."

1.3.2.8 Scenario Analysis

After input from a public meeting and much discussion with the Advisory Group on potential impacts, key factors and uncertainties, HECO subjected the Finalist Plans to scenario analysis to determine their sensitivity to real-world conditions different from those assumed in the original model runs. Specifically, HECO evaluated how the outcome would differ if the following were to occur:

- No future energy efficiency DSM impacts – assumes DSM is no longer pursued by the utility;
- Only moderate level of energy efficiency DSM and CHP market;
- Higher and lower sales and peak demand – reflects changing economic conditions;
- Honolulu Power Plant retirement – considers the possibility of plant retirement due to the state's interest in redevelopment of the waterfront;
- Alternate combustion turbine size – from 76MW to 100+ MW; and
- Fuel prices higher and lower than that forecast.

A major conclusion of the scenario analysis was that additional firm capacity, beyond that contemplated in the finalist plans, may be needed between 2009 and 2013 under certain conditions.

1.3.2.9 Draft Preferred Plan Selection

After evaluating the six Finalist Plans listed in Section 1.3.2.7 on the basis of their attributes and response to the different scenarios, and on comments from the public and Advisory Group that tended to favor more DSM, more renewable energy (especially photovoltaics), more CHP and quicker implementation of renewable energy resources, HECO selected the Combination Plan as a foundation for its IRP-3 Draft Preferred Plan. The resulting Draft Preferred Plan is a modification of the Combination Plan. The modifications to the Combination Plan included the addition of PV in 2007 and the acceleration of the wind farm installation from 2009 to 2007.[16] In making this choice, HECO

[16] As part of the IRP Framework, HECO analyzed the macroeconomic impacts of all plans on the Hawaiian economy. This analysis revealed that there was little difference among the plans: The projections of Hawai'i's Gross State Product and

took note of the unanticipated conclusion that firm capacity in addition to the combustion turbine already envisioned for mid-2009 may be needed between 2009 and 2013 under certain conditions. That finding is discussed further in Section 1.3.2.10 below. The components and timing of that plan are shown in Figure 1.9.

HECO then examined a variety of risks and uncertainties that might affect implementation of its IRP-3 Draft Preferred Plan. These included:

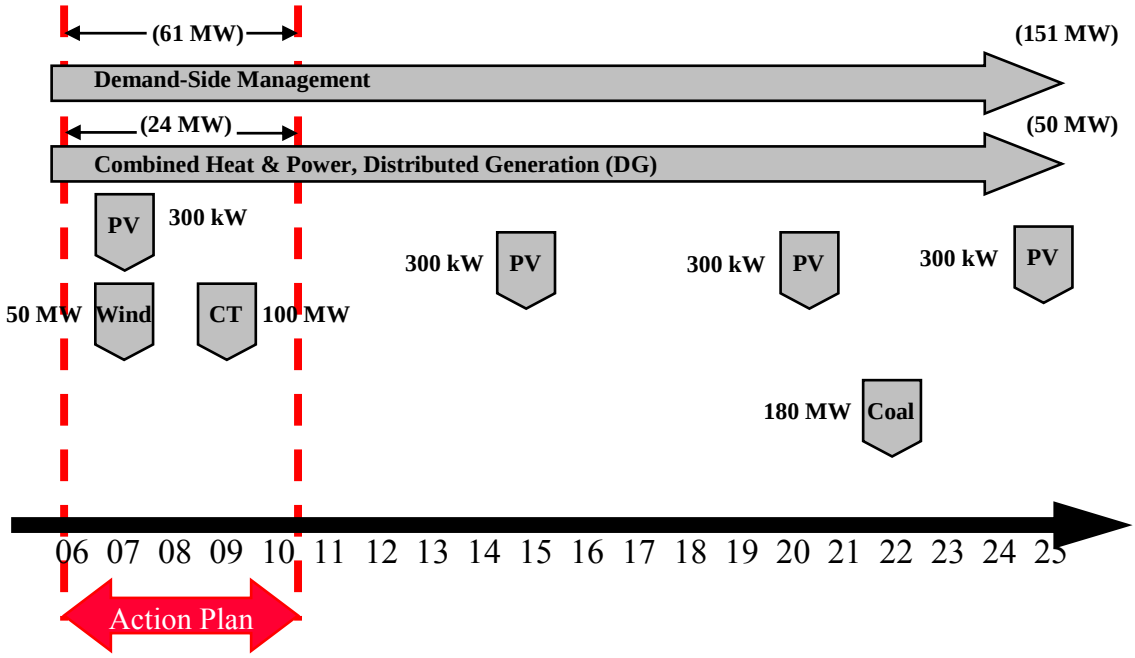
- Changing economic conditions that could affect electricity sales and peak demand;
- Federal or state legislation, such as changes in the Renewable Portfolio Standards, tax credits for renewables, or environmental restrictions;
- Regulatory uncertainties related to DSM, CHP, competitive bidding, etc.;
- Technological advances in renewables, such as use of an electronic shock absorber to increase wind energy on the system;
- Independent power producer projects, such as expansion of HPOWER (Honolulu's municipal solid waste facility); and
- Determination of the actual capacity of the 100 MW class combustion turbine scheduled for installation in 2009.

Since the time the original data for IRP-3 was collected and the base analysis was performed, updated information became available in the following areas:

- *Sales and peak forecasts* – modestly lower in near-term years because of delays in large construction projects;
- *Load management DSM programs* – reduced impact on load through 2007 because of later-than-forecast program approval;
- *Energy efficiency DSM programs* – HECO anticipates that the benefits of its energy efficiency program on load reduction will not be experienced as soon as hoped for because of delays in program approval.
- *Proposed CHP projects* – HECO's proposed CHP projects will not yield benefits as rapidly as expected because of the delay in receiving program approval.
- *Equivalent forced outage rates (EFORs)* – HECO is experiencing somewhat higher than anticipated forced outage rates for its existing units. This is due partially to their increasing age, but much of the increase is attributable to the need to run them longer and harder in order to meet the high ongoing demand for electrical power.
- *Challenging maintenance schedule issues for generating units* – greater negative impact because, as reserve capacity decreases, the flexibility to adjust maintenance schedules also decreases, which can adversely affect system reliability.
- *Kahe wind farm project -* termination of the 50 MW Kahe wind farm project due to community and governmental concerns.
- *Fuel price forecasts –* higher fuel price forecast in 2005 than 2002 Fuel Price Forecast.

average household income differed only by about 0.2% across the plans. Consequently, this factor did not play a role in the selection of the Preferred Plan.

Figure 1.9. Draft Preferred Plan



DSM Programs Include:		Supply-Side Resources Include:
REWH - Residential Efficient Water Heating	CICR - Commercial & Industrial Custom Rebate	Coal - Atmospheric Fluidized Bed Combustion
RNC - Residential New Construction	CFL - Interim Compact Flourescent Light	CT - Simple-Cycle Combustion Turbine
CIEE - Commercial & Industrial Energy Efficiency	RDLC - Residential Direct Load Control	PV - Photovoltaic
CINC - Commercial & Industrial New Construction	CIDLC - Commercial & Industrial Direct Load Control	Wind - Wind Farm
Note: Actual size of supply-side resources will depend on project development activities and siting considerations.		

These recent developments do not alter the major conclusions of the integration analysis. In particular, the proposed mix of generation units remains the same. However, they highlight the urgency of bringing the planned combustion turbine on line in 2009 and pursuing other risk mitigation measures. HECO's draft proposed five-year action Plan and mitigation measures are outlined in Section 1.3.2.10 of this report.

1.3.2.10 Draft Proposed Five-Year Action Plan and Risk Mitigation Measures

HECO's Draft Proposed Five-Year Action Plan outlined several major actions that needed to be undertaken over the short term in order for the objectives of IRP-3 to be achieved over the Preferred Plan's 20-year time horizon. It identified specific tasks in three major areas:

- DSM Action Plan. Continue the five existing energy efficiency programs and two new load management programs, with modifications, and add an interim Compact Fluorescent Lamp program. Pursue approval of the Energy Solutions for the Home and Residential Low Income programs in the Energy Efficiency Docket.
- Supply-Side Action Plan. Three of the supply-side measures that HECO is pursuing are already well-defined. They are: (i) Continuing exploration (including seeking community input) of development options for installation of a wind farm in 2007; the actual size of the wind farm will depend upon wind resource and siting considerations. (ii) Initiation of preliminary activities to support installation of three 100 KW photovoltaic systems in 2007. (iii) Preliminary activities to support installation of a 100 MW class simple-cycle combustion turbine generating unit in 2009.

HECO has also undertaken preliminary activities to support possible installation of a future 180 MW AFBC coal unit. In addition, HECO and its subsidiary Renewable Hawai'i, Inc., are actively pursuing other renewable energy projects.

- CHP Action Plan. HECO will continue to pursue PUC approval of the proposed Utility CHP Program, in addition to individual CHP projects under Rule 4 of HECO's tariff.

As discussed at the end of Section 1.3.3, however, application of HECO's capacity planning criteria and its reliability guideline reveal an expected reserve capacity shortfall, beginning within the Action Plan period. In response to this changed situation, particularly the reserve margin shortfall, HECO is proposing efforts in three major areas:

- DSM Risk Mitigation Measures. HECO will ask the PUC for permission to modify its existing DSM programs and request a decision from the PUC to proceed with the modified DSM programs. The utility will also develop and implement programs to expand the use of direct load control.
- DG/CHP Risk Mitigation Measures. HECO will have installed nine 1.67 MW portable, leased DG units at utility-controlled substations or other utility sites by the end of 2005. Initial evaluation has identified the potential for installing an order-of-magnitude 20-40 MW capacity, using portable diesel generators. HECO is also evaluating mainland utility models for dispatchable standby generation.
- Supply-Side Risk Mitigation Measures. HECO is considering ways to accelerate the installation of the next combustion turbine generating unit, currently scheduled for 2009. In addition, it is taking the engineering and permitting steps needed to preserve the option of installing additional firm capacity (such as a second combustion-turbine generating unit like that planned for 2009) should such a unit be needed. HECO will also continue to work with the City and County of Honolulu to facilitate municipal solid waste generating units.

Finally, in addition to these measures, HECO is also considering three short-term mitigation measures that could help reduce the potential impact of a reserve margin shortfall. These include: (i) improving the availability of HECO generating units; (ii) maintaining or improving the availability of independent power producer generating units; and (iii) further refining a public notification program that allows it to inform customers of potential generation-related outages and request voluntary conservation.

1.3.2.11 Final Preferred Plan Selection

To promote transparency and understanding of the key issues in the IRP-3 planning process, HECO invited members of the IRP Advisory Group to submit written statements of position or comments on the IRP process, Draft Preferred Plan and Action Plan. The submitted comments were considered in selecting the Final Preferred Plan, which was included in the Final IRP-3 Report that HECO submitted to the PUC on October 28, 2005. Out of this comment process emerged a review of several key issues, notably forecasted fuel prices and the potential application of Sea Water Air Conditioning (SWAC) technology. In response to these issues, HECO provided additional analysis and developed additional scenarios for the Final Preferred Plan. [17, 18]

With these additional scenarios completed, assumptions updated, Advisory Group comments considered, and risk mitigation measures identified, HECO then reviewed its Draft Preferred Plan to

[17] The SWAC technology continued to evolve subsequent to the conclusion of the Demand-Side Technical Committee work on the potential demand-side options for IRP-3. Should it become commercially available, HECO's existing DSM CICR program has the flexibility to provide incentives for customers to install systems using the SWAC technology.

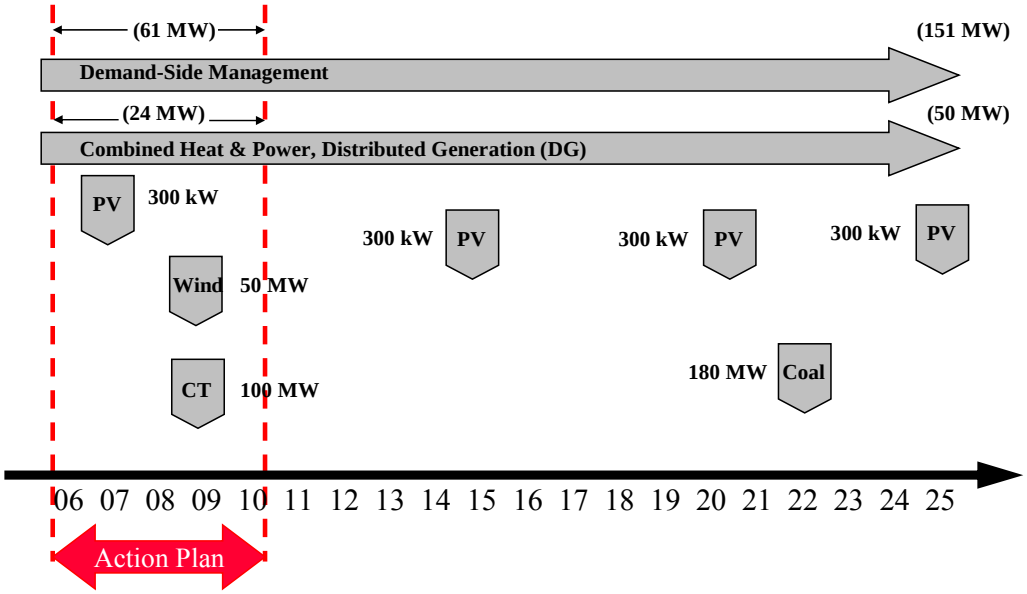
[18] An "Additional High Fuel Price" forecast was developed as a scenario to illuminate possible options and impacts under higher fuel price conditions. It was intended to provide additional information and ensure that the plan is responsive to fuel prices at the high end of the possible range.

determine its Final Preferred Plan. HECO revised its Draft Preferred Plan by replacing the 50 MW Kahe wind farm in 2007 with a 50 MW wind farm in 2009 at an unspecified site.[19]

The Final Preferred Plan contains a strong commitment to increase the use of indigenous renewable resources, to use distillate fuels like naphtha and biofuels when commercially available, and to decrease the use of imported oil. It is responsive to the near-term need for generation brought about by the strong economy, and it reduces near-term risks of reserve capacity shortfalls by implementing mitigation measures such as expanding load management programs and installing distributed generation at selected HECO substations.

The Final Preferred Plan (graphically depicted on Figure 1.10) includes approximately 151MW of energy efficiency, conservation, and other DSM programs, 50MW of CHP and DG resources, 1.2MW of solar photovoltaic resources of which 300kW is to be accelerated into the 5-year action plan period, and 50MW of wind power. Fuel diversity is further enhanced with the possible installation of a coal unit later in the planning period.

Figure 1.10. Final Preferred Plan.



DSM Programs Include:		Supply-Side Resources Include:
REWH - Residential Efficient Water Heating	CICR - Commercial & Industrial Custom Rebate	Coal - Atmospheric Fluidized Bed Combustion
RNC - Residential New Construction	CFL - Interim Compact Flourescent Light	CT - Simple-Cycle Combustion Turbine
CIEE - Commercial & Industrial Energy Efficiency	RDLC - Residential Direct Load Control	PV - Photovoltaic
CINC - Commercial & Industrial New Construction	CIDLC - Commercial & Industrial Direct Load Control	Wind - Wind Farm
Note: Actual size of supply-side resources will depend on project development activities and siting considerations.		

Source: Figure 13.3-1 in Final Preferred Plan in HECO IRP-3.

[19] In its Draft Preferred Plan HECO included a wind farm in 2007, located on the ridges above the HECO Kahe Generating Facility. Although the City Administration expressed general support for wind energy as a resource, on September 19, 2005, it announced that it would not issue related government permits for the Kahe wind site based on community concerns. In light of this opposition, HECO has determined that it is not practical to proceed with this project and is exploring other alternatives. The Final Preferred Plan instead includes a provision for a 50 MW wind farm two years later (i.e., in 2009) at a site to be selected later.

HECO believes that its Final Preferred Plan is the best plan to fulfill the IRP Framework's goal of identifying a mix of energy resources that will meet both near- and long-term customer needs in an efficient, reliable manner at the lowest reasonable cost. Given the uncertainties facing the electric utility industry, HECO's Final Preferred Plan provides a high degree of flexibility and robustness that will allow HECO to modify its plan in response to changing market conditions. It is intended as a planning strategy rather than as a fixed course of action.

1.3.3 NEED FOR ADDITIONAL FOSSIL FUEL-FIRED GENERATING CAPACITY

1.3.3.1 IRP Process/Draft EIS

The analysis in HECO's IRP-3 report indicates that even if all of the potential demand-side and DG/CHP technologies are deployed on the HECO system (including third-party CHP), the available resources will not be able to meet the forecast demand in the near term. The assessment of renewable energy in HECO's IRP-3 indicates that wind and photovoltaics technologies can be deployed by 2009, and these are part of the utility's proposed Five-Year Action Plan. However, because these technologies depend upon natural resources (wind and solar radiation) that are not always present, and do not provide the firm dispatchable power needed to ensure the integrity of O'ahu's electrical system.[20]

HECO's IRP-2, filed in January 1998, indicated that HECO had a need for capacity in 2009. Consistent with its Action Plan from the IRP-2 Evaluation Report filed in 2002, HECO pursued long-lead time activities, such as processing air, water and land use permits to obtain the necessary government approvals to construct the power plant.

The IRP-3 planning process recognized the need for additional firm capacity as early as 2005. This need for capacity was based on the reserve capacity shortfalls projected in the 2004 and 2005 Adequacy of Supply Reports. Installing a 100 MW combustion turbine has a lead time of approximately seven years. Given that (1) HECO had made substantial progress on the permitting and engineering efforts; (2) a site was available to install the unit; and (3) other firm capacity resources of sufficient size would have similar or longer lead times than the simple cycle combustion turbine work, the simple-cycle combustion turbine is the only large increment of firm capacity that can be realistically installed by 2009. Therefore, the IRP-3 preferred plan contains a nominal 100 MW simple cycle combustion turbine installed in 2009 as one element.

As discussed in Section 1.3.2.10, HECO hopes that its efforts to limit demand and meet customers' needs using existing resources and the first CT proposed by this project will eliminate the need to add even more firm capacity in the 2009 to 2013 time period and delay the need for the 180 MW coal unit. The DEIS, which was prepared in the second half of 2005, noted that if HECO determined that additional capacity is needed that cannot be satisfied through the measures included in its IRP-3 Plan, it would seek a separate PUC approval for that capacity. The DEIS further stated that if additional capacity were determined to be necessary to meet immediate demand in excess of the amount that could be satisfied by the first CT, HECO would probably request permission to provide that capacity with a second combustion turbine constructed on the same site as the first CT. To accommodate this approach, the air pollution control permit application was amended to include the second CT and it is included in HECO's application for a Public Infrastructure Map Amendment for the facilities covered by this EIS. It should be emphasized that inclusion in this EIS does not commit HECO to actually install a second unit. It does allow full consideration of potential cumulative impacts and provides a sound factual basis for the City Administration and City Council's review of the proposed actions.

[20] To utilize wind and photovoltaics as firm dispatchable power requires significantly large energy storage so that power will be available when sufficient wind or solar resources are not present. Energy storage technology that would be required to utilize wind and photovoltaics is such that the size required is not commercially available or an approvable site (in the case of pumped storage hydroelectric) has not been identified.

1.3.3.2 March 2006 Adequacy of Supply

On March 6, 2006, HECO submitted its required annual "Adequacy of Supply" (AOS) report to the PUC. The report, which had not been prepared at the time the DEIS was written, strongly reinforces the conclusion that additional firm generating capacity is required immediately to permit HECO to continue to provide reliable electrical service to O'ahu. As discussed below, the 2006 AOS report confirms the urgent need for additional firm generating capacity in HECO's system.

1.3.3.2.1 Reserve Capacity Shortfalls

HECO's 2005 AOS report concluded that its generation capacity for O'ahu was sufficiently large to meet all reasonably expected demands for service at that time, but that it expected a reserve capacity shortfall of 50 to 70 MW in the 2006-2009 period.[21] HECO's March 6, 2006 AOS report places the reserve capacity shortfall between 170 to 200 MW in the 2006-2009 period. As discussed in more detail below, this increase in projected shortfalls is primarily due to lower estimates for DSM program effects and lower levels of availability of existing generating units.

HECO's policy is to maintain a "spinning reserve[22]" equivalent to the output of its largest operating generating unit, typically 180 MW. The effect of the existing reserve capacity shortfall is evident in the following tabulation of the number of occurences when HECO was unable to provide sufficient spinning reserve to cover for the loss of the largest operating unit.

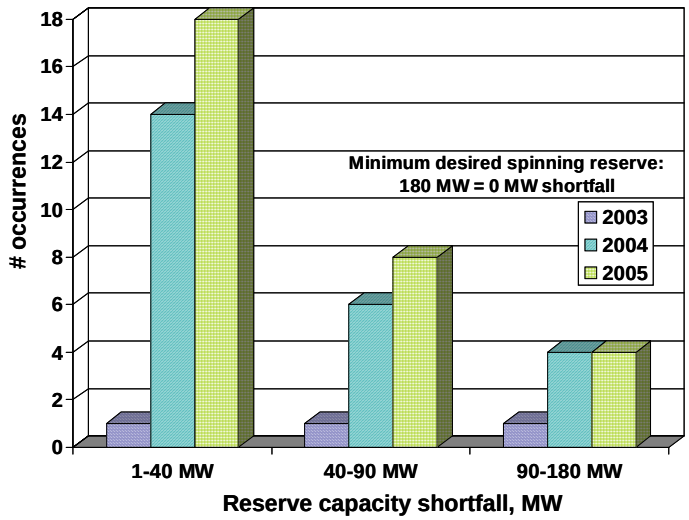
Year	***Number of Occurences When Spinning Reserve Criteria was not Met***
2003	3
2004	24
2005	30

The deficiency increased from 3 occurrences in 2003 to 30 occurrences in 2005, a ten-fold increase. In addition to an increasing number of occurrences when a reserve capacity shortfall was experienced, the magnitude of the shortfalls has increased as well (Figure 1.11).

[21] The 50-70 MW shortfall was based on HECO being able to obtain timely approval of the two load management DSM program applications and the utility CHP program application ~~that it had~~pending before the PUC at the time of the 2005 AOS filing.

[22] "Spinning reserve" is the difference between the capacity of the running generating units (excluding the largest unit on line) and the amount of electricity being generated by these units.

Figure 1.11. Reserve Capacity Shortfalls: 2003-2005.



HECO narrowly avoided the need to resort to rolling outages during several of these occurrences. On two recent occasions (November 7-10, 2005 and January 10-12, 2006), HECO notified its customers of its spinning reserve shortfall situation and asked for help through energy conservation. The spinning reserve shortfalls during these periods were 123 MW-gross and 174 MW-gross, respectively. On both occasions, HECO used two of the tools approved by the PUC to help mitigate the impact of the shortfall. These included the operation of its recently installed distributed generators and the activation of the residential direct load control program, "EnergyScout", where the power to approximately 5,000 residential water heaters was shut off for 1-2 hours. HECO's 2006 AOS report forecasts that the number of reserve capacity shortfalls and requests for conservation will continue to increase in both frequency and duration until reserve capacity margins have returned to desirable levels.

HECO has been mitigating the effects of the reserve capacity shortfalls by increasing generating capacity, fostering reduced demand, and increasing unit availability where possible. For example:

- In 2005, HECO received Commission approval and has been using the additional 28 MW of firm capacity from Kalaeloa Partners.
- HECO has installed approximately 15 MW of distributed generation at three HECO-owned facilities: the Ewa Nui substation, the Helemano substation, and the Iwilei Tank Farm, and is evaluating further installations for 2006 and beyond.
- HECO's Demand-Side Management (DSM) programs have contributed 46 MW of peak reduction benefits in 2005, up from 36 MW in 2004.
- Approximately 5,000 customers have signed up for the residential direct load control program, EnergyScout, which saves HECO approximately 3 to 4 MW in the event of a system emergency. HECO continues to sign up more customers and is on target to meet its goal of 25,000 participants by 2008.
- During the last quarter of 2005 HECO started its "See the Light, Make the Change" campaign, partnering with GE and the local GE distributor Webco Hawaii to encourage residents to buy and install 100,000 compact fluorescent light bulbs (CFL) by December 31, 2005. The promotion increased statewide sales of CFLs to over 100,000.

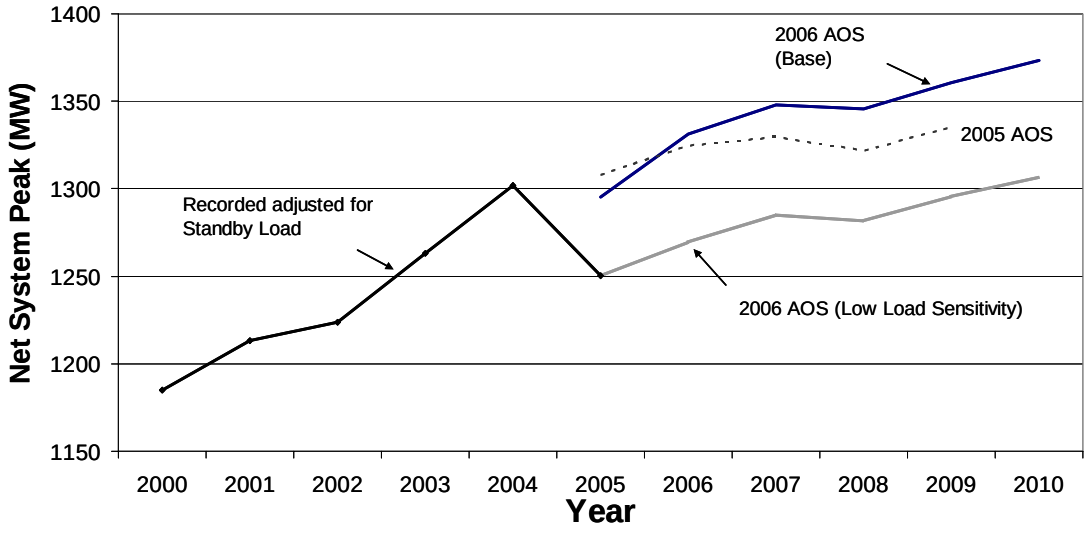
- HECO has stepped up the assistance it gives to its IPP partners to help them maintain or improve the availability of their generating units.
- HECO has increased operational staff to allow for full-time (24/7) operations of all generating units, is continuing to increase maintenance staff to provide a night-shift maintenance crew for its Kahe and Waiau power plants, and is expanding the role of its consultants involved with HECO's current continuous improvement efforts to include assessing the generating unit availability situation.

Despite all these efforts, HECO forecasts show that a reserve capacity shortfall will remain until at least the first CT is operational.

1.3.3.2.2 Load Forecast Update

HECO's 2005 system peak was 54 MW-gross (51 MW-net) lower than the system record peak set the previous year (on October 12, 2004). The lower 2005 system peak appears attributable to a combination of factors. 2005 was less humid and slightly cooler overall than 2004 and this may have lowered air conditioning loads. Consumers also appear to have been generally more price-conscious and to have conserved electricity. This voluntary response may be due in part to HECO's energy conservation messages and calls for voluntary reductions in use. Although welcome, HECO's experience shows that in the past customers have not sustained these conservation efforts over the long term. While the 2005 peak did not achieve the level of 2004's record peak, HECO expects the peak to continue its long-term upward trend with the robust local economy and as new construction projects are completed. The most recent peak forecast is shown in Figure 1.12.

Figure 1.12. Adjusted Peak Forecast Comparisons (with Future DSM, Load Management, CHP, and Rider I).



1.3.3.2.3 Demand-Side Management, Load Management, and CHP Systems Updates

HECO's existing energy efficiency DSM and load management DSM programs in 2005 reduced the demand for electricity by 8 MW. This impact was 3 MW less than the 11 MW projected in the 2005 AOS. The 2005 AOS projected that combined impacts from load management DSM, energy efficiency DSM, and CHP would be approximately 98 MW by 2009. The 2006 AOS projects that the combined impacts will be reduced to approximately 79 MW, as shown in Table 1.7, below.

Table 1.7 Previous and Current Projections of Load Management DSM, Rider I, Energy Efficiency DSM, and CHP (MW).

	Load Management (in MW)		*Rider I (in MW)*		*Energy Efficiency DSM (in MW)*		*CHP (in MW)*		**Total Load Reduction** (in MW)		
Year	*2005 AOS*	*2006 AOS*	*2005 AOS*	*2006 AOS*	*2005 AOS*	*2006 AOS*	*2005 AOS*	*2006 AOS*	***2005 AOS***	***2006 AOS***	***Diff***
2005	6	5	5	5	5	4	0	0	**17**	**14**	**-3**
2006	17	15	5	5	15	9	5	0	**41**	**29**	**-12**
2007	26	22	5	5	24	18	10	1	**65**	**46**	**-19**
2008	34	31	5	5	33	27	15	4	**87**	**67**	**-20**
2009	35	37	5	5	43	36	20	5	**103**	**84**	**-19**
2010	35	42	5	5	52	45	24	7	**116**	**100**	**-16**

Source: Table ES-1. 2006 *Adequacy of Supply* Report.

The reductions in MW impact from the March 2005 to the March 2006 AOS report are due to a combination of factors. These include:

- HECO's 2005 AOS report assumed a higher level of commercial and industrial load management DSM program participation in 2005 than has actually occurred.
- The 2005 AOS report assumed that the five existing energy efficiency programs with enhancements and three additional programs would be approved quickly so that the peak reduction benefits from the eight programs would begin in July 2005. The 2006 AOS takes into account the fact that the three additional programs have not yet been approved so that HECO will be able to implement only its five existing energy efficiency DSM programs until the additional programs are approved.
- CHP has had a smaller impact than assumed in the 2005 AOS, which has forced HECO to provide more power from other sources than it had hoped would be necessary. HECO is re-evaluating its CHP impact estimates, taking into account the higher prices for diesel and/or synthetic natural gas used by CHP systems, relative to the cost of electricity, which is based on the lower cost of LSFO, as well as HECO's ability to implement CHP projects since a comprehensive CHP program has not been approved.

The lower-than-projected reductions from DSM and load management programs and lower estimated CHP impacts increase the effective load that must be served or backed up by firm capacity generating units. This has reduced reserve margins and increased reserve capacity shortfalls. As noted above, the shortfall persists in spite of HECO having installed nine distributed generation units totaling approximately 15 MW at three HECO sites in the fourth quarter of 2005.[23]

[23] HECO is looking into installing additional distributed generation at its substations in 2006.

1.3.3.2.4 Existing Firm Capacity Update

While the shortfalls noted above account for some of the challenges that HECO presently faces in meeting its customers needs, declining generating unit availability rates account for the greater part of the reserve capacity shortfall.[24]

In the 2005 AOS report, HECO expected that generating unit availability would improve in 2005 and beyond because of the substantial amount of major maintenance work performed in 2004. Unfortunately, information obtained during the course of that maintenance work has proven this expectation wrong. As a result, HECO now believes that planned maintenance outages will continue to be more numerous and of longer duration than in the past. The increasing age of the units is also contributing to the need for more frequent and longer maintenance periods.

When generation margins are adequate, planned maintenance can be scheduled without difficulty and time overruns in the work, if they occur, can be handled without risking reserve capacity shortfalls. Conversely, when the generation margins do not meet reserve capacity criteria, as is presently the case, maintenance scheduling becomes more difficult. Moreover, when unanticipated repair needs are identified during the course of the maintenance work it becomes more difficult to continue to meet system needs during the extended unit downtime. The situation with emergency repairs is similar. When an operating generating unit suffers a breakdown, maintenance resources must be shifted away from planned maintenance work to repair the unit that has experienced the problem. Consequently, planned maintenance projects from which resources have been drawn to make emergency repairs take longer to complete, which leads to delays in undertaking planned maintenance to other units.

Another factor contributing to increased maintenance requirements is the high operating levels of the existing units. As the demand for electricity has increased and more units have been out of service for maintenance, the generating units that remain in service at any given time must operate at higher average load levels for longer periods of time. The greater stress this imposes on them increases the likelihood of unscheduled (forced) outages and the frequency or duration of periods during which units must be operated at less than their rated capacities (this is referred to as "de-rating).[25] In addition, because of the high demand, generating units operating in a de-rated capacity cannot be afforded the luxury of a full maintenance shutdown to restore them to full-power operations. As a result, some units are operated for longer periods in a de-rated state.

One measure of the situation is known as the "equivalent forced outage rate" (EFOR). HECO's EFOR, after remaining low for many years, is climbing. This is becoming a driver in the capacity planning criteria and reserve capacity shortfall calculations. Based on HECO's maintenance experience in 2004 and 2005, lower generating unit availabilities and higher EFOR estimates are expected to continue in the near future, and have been incorporated into HECO's planning assumptions.

[24] HECO operates sixteen firm generating units at three power plants. HECO purchases firm power from three independent power producers, including the additional 28 MW of power from Kalaeloa Partners.

[25] Often an equipment problem does not require a generating unit to be shut down completely. Instead, the problem affects only one subsystem and the unit can continue to operate at reduced output until the repair is completed. This is comparable to the situation with an automobile that has a flat tire and must be driven at reduced speeds with a limited service spare tire until it can be taken to a repair station and the flat is fixed or the tire is replaced.

Table 1.8 Historical and Forward-Looking EFOR.

	2000	2001	2002	2003	2004	2005	Forward-Looking EFOR	4 Year Avg EFOR 2002 - 2005	AOS 2005 EFOR
H8	7.2%	10.4%	3.6%	13.0%	23.7%	1.7%	12.8%	10.5%	5.7%
H9	1.4%	3.0%	3.1%	20.0%	1.0%	12.0%	12.8%	9.0%	5.7%
W3	2.0%	1.9%	6.5%	10.9%	24.7%	42.2%	33.5%	21.1%	9.2%
W4	3.0%	14.8%	5.1%	3.4%	13.4%	5.0%	12.8%	6.7%	7.9%
W5	3.6%	0.8%	2.2%	4.1%	1.0%	1.0%	2.9%	2.1%	2.3%
W6	3.8%	3.9%	0.6%	2.8%	0.3%	2.6%	2.9%	1.6%	2.3%
W7	0.7%	1.6%	1.8%	0.7%	1.2%	0.6%	7.7%	1.1%	1.2%
W8	5.3%	1.5%	0.1%	0.0%	7.7%	23.5%	7.7%	7.8%	2.9%
W9	65.7%	4.1%	49.9%	6.9%	63.2%	69.2%	10.0%	47.3%	10.0%
W10	13.4%	5.0%	13.6%	36.0%	4.4%	7.4%	10.0%	15.3%	10.0%
K1	1.2%	0.7%	2.3%	1.2%	2.6%	5.4%	4.3%	2.9%	2.6%
K2	1.7%	3.1%	1.0%	2.2%	2.9%	2.0%	4.3%	2.0%	2.9%
K3	0.3%	3.9%	0.1%	3.5%	8.8%	8.3%	7.7%	5.2%	3.3%
K4	5.7%	0.9%	3.6%	1.3%	1.4%	4.9%	7.7%	2.8%	2.6%
K5	1.7%	0.4%	1.0%	1.1%	7.6%	3.1%	5.5%	3.2%	2.4%
K6	0.9%	0.4%	0.5%	1.9%	3.3%	5.9%	4.9%	2.9%	2.4%
HECO	**2.45%**	**1.6%**	**1.8%**	**2.4%**	**6.2%**	**9.25%**	**6.8%**	**4.0%**	**2.9%**
H-POWER							10.0%	10.0%	10.0%
Kalaeloa							1.0%	1.0%	1.0%
AES							1.0%	1.0%	1.0%

Source: Table ES-2. HECO *2006 Adequacy of Supply Report*.

1.3.3.2.5 Summary of 2006 AOS Analysis

In summary, HECO's 2006 Adequacy of Supply Report to the PUC found the following:

- Reserve capacity shortfalls will reach between 170 and 200 MW in the 2006-2009 period. This is substantially larger than the 50 to 70MW shortfalls projected in the 2005 AOS.
- Even with the lower forecast EFORs used in the analysis, the reserve capacity shortfalls will be 120 to 160MW.
- Even with the lower forecast peak loads used in the analysis, reserve capacity shortfalls will be 110 to 140MW.
- Lower-than-expected benefits from DSM could lead to reserve capacity shortfalls of 180 to 240MW.

The magnitude of the reserve capacity shortfalls are large – about the size of the largest generating unit on O'ahu. This strongly suggests that there will be an ever-increasing number of calls for public conservation and that the potential for generation-shortage-related outages will increase until new firm generation is added to the system. The 2006 analysis confirmed that the combustion turbine that HECO has proposed is needed now and will be critically needed by the planned mid-2009 in-service date.

~~The analysis in HECO's IRP-3 report indicates that even if all of the potential demand-side and DG/CHP technologies are deployed on the HECO system (including third-party CHP), the available resources will not be able to meet the forecast demand. The assessment of renewable energy in HECO's IRP-3 indicates that wind and photovoltaics technologies can be deployed by 2009, and these are part of the utility's proposed Five-Year Action Plan. However, because these technologies~~

~~depend upon natural resources (wind and solar radiation) that are not always present, they do not provide the firm dispatchable power needed to ensure the integrity of O'ahu's electrical system.[26] IRP-3 concludes that new central-station fossil-fuel-fired generating capacity is needed immediately and that there will be a reserve shortfall until the additional firm capacity is on-line. It also found that a combustion turbine in the 100 MW class is the most appropriate type of facility to satisfy this need. Finally, it is worth noting that all of the Finalist Plans that emerged from the IRP process, even the ones that maximize the use of renewables and energy conservation, require the immediate installation of additional fossil fuel-fired generating capacity designed to provide firm power during peak periods.~~

~~As discussed in Section 1.3.2.10, HECO hopes that its efforts to limit demand and meet customers' needs using existing resources and the first CT will eliminate the need to add even more firm capacity in the 2009 to 2013 time period and delay the need for the 180 MW coal unit. If HECO determines that additional capacity is needed that cannot be satisfied through the measures included in its IRP-3 Plan, it will seek a separate PUC approval for that capacity. In all likelihood HECO would request permission to provide that capacity with a second combustion turbine constructed on the same site as the 2009 unit. Because of this, the air pollution control permit application was amended to include the second CT and it will be included in HECO's application for a Public Infrastructure Map Amendment for the 2009 unit and is covered by this EIS. It should be emphasized that inclusion in this EIS does not commit HECO to actually install a second unit. It does allow full consideration of potential cumulative impacts and provides a sound factual basis for the City Administration and City Council's review of the proposed actions.~~

1.4 NEED FOR ELECTRICAL TRANSMISSION SYSTEM ADDITIONS

1.4.1 INTRODUCTION

As previously noted, the generating units located in CIP connect to the main HECO transmission grid via the AES-CEIP and Kalaeloa-Ewa Nui 138 kV transmission lines. These two lines are responsible for carrying all of the power generated at CIP and are essential to ensuring that power is available to customers throughout HECO's islandwide system. As illustrated in Figure 1.13, the CIP generating complex is served by far fewer transmission lines (two) when compared to HECO's other major generating stations (Kahe and Waiau).

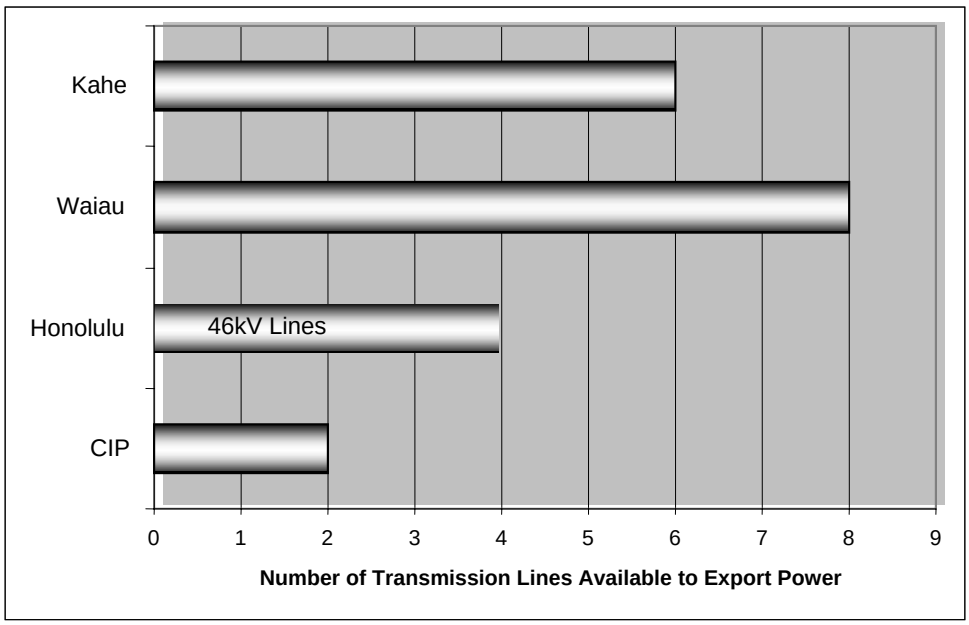
1.4.2 TRANSMISSION SYSTEM'S ABILITY TO SUPPORT ADDITIONAL GENERATION

The potential addition of 110 MW of additional generating capacity as discussed above led HECO to conduct a comprehensive review of the existing transmission system. The review considered the desirability of improvements to serve the existing generating facilities as well as those improvements that would be needed to serve the generating additions that HECO is considering.[27] HECO used computer load flow simulations to identify potential line overload conditions and to verify the effectiveness of proposed solutions. In evaluating potential transmission system improvements, HECO relied on its approved transmission planning criteria (see Table 1.9 for relevant criteria).

[26] Energy storage technology that would be required to utilize wind and photovoltaics is such that the size required is not commercially available or an approvable site (in the case of pumped storage hydroelectric) has not been identified.

[27] The assessment considered both "load driven" and "generation driven" factors. Load driven problems occur due to an increase in demand (i.e., use) on the system or in a specific area. As load grows, power flow must increase to meet the higher load demands, and eventually, existing power facilities become taxed beyond their capability, resulting in overloads and/or low voltage conditions. In addition to conventional remedies such as new lines, capacitors, and reconductoring, load driven problems may sometimes be ameliorated by installing distributed generation (DG) and implementing DSM programs in the areas served by the transmission lines. Generation driven problems occur when generation capacity exceeds the capability of the surrounding power lines to carry the output of the generating units under certain circumstances. Unlike load driven problems, remedies such as DG and DSM programs are not effective when dealing with generation driven problems.

Figure 1.13. Number of Lines Available to Export Power at Each Generating Station.



Source: Hawaiian Electric Company, Inc.

The study concluded that a substantial increase in the amount of generating capacity located in CIP would raise one system reliability concern and cause two planning criteria violations. These, in turn, would trigger the need for an additional transmission line. It also pointed to the desirability of adding a third line to address reliability concerns with exporting a significant amount of generation from one area with only two 138kV transmission lines. The concerns and violations are discussed in Sections 1.4.2.1 and 1.4.2.2.

1.4.2.1 CIP Reliability Concern

The HECO system is currently vulnerable to loss of the entire CIP generation since there are only two transmission paths available to export power from CIP. Having only two lines to export power makes the CIP generation the least robust of HECO's major generating nodes.[28] Figure 1.14 shows the importance of CIP generating capacity relative to the total system capacity now and in the future if the proposed generating additions are made.

As shown, generating capacity in CIP is similar to that of HECO's Kahe and Waiau power plants, but with many fewer lines available to export power. If one of the two available CIP connecting lines is out of service and a fault or failure should occur on the remaining line, all CIP generation would become disconnected from the HECO system. Depending on the amount of generation being exported out of the CIP area at the moment this occurs, the fault or failure in the line could lead to underfrequency load shedding. The term "load shedding" refers to the automated or manual process of disconnecting customers from the system, thereby decreasing demand (i.e., shedding load), in order to protect against a system-wide blackout. HECO utilizes the underfrequency load shedding scheme to maintain the overall system stability following the loss of generation. When a generating unit trips off-line, the system frequency (which normally remains near 60 Hz)[29] decreases, creating an

[28] Although the three generating facilities currently located at CIP are in separate locations and owned by parties other than HECO, because each facility is contractually bound to supply firm power to HECO and due to the geographical proximity of facilities, they are considered a single major generating station for analytical and planning purposes.

[29] Hz is the abbreviation of "Hertz". It is a standard unit of frequency used for alternating current (the kind used in homes) and is equal to one cycle per second. 60 hertz electricity means 60 cycles per second of electricity which is the United States standard.

"underfrequency" condition. HECO utilizes the underfrequency load-shedding scheme to maintain the overall system stability following the loss of generation. Relays which monitor the system frequency are used to shed (i.e., disconnect) customers when frequency levels drop substantially below 60 Hz in order to prevent the system from becoming unstable which could lead to an island-wide blackout.

Taking one of the two transmission lines serving CIP (either the AES-CEIP line or the Kalaeloa-Ewa Nui line) out of service for maintenance leaves only a single transmission line to transport all of the power produced by the generators located there. If that single transmission line then tripped unexpectedly, all of the power generated in the CIP area would need to be replaced almost instantaneously by the spinning reserve from the other O'ahu generating stations. Since the spinning reserve on the system is typically maintained at 180 MW (the capacity of the largest unit on the HECO system), CIP generation is presently limited to a maximum of 180 MW whenever either of the two lines is out of service.

Until recently, this 180 MW CIP generation restriction has not been critical because HECO has coordinated maintenance of the transmission line with the maintenance of AES, Kalaeloa and/or HPOWER (which reduces the generation from the area and reduces the amount of generation lost) or had sufficient generation capacity elsewhere in its system to address the shortfall. Because of the substantial growth in energy use over the past few years, it is no longer viable to continue that practice. The construction of a third transmission line to serve the CIP area is needed to ensure that line maintenance can be accomplished without placing all of the CIP generation at risk.

1.4.2.2 AES-CEIP and Kalaeloa-Ewa Nui Line Overloads

Transmission lines are designed to carry up to a rated level of current under specified environmental conditions (e.g., wind speed, ambient air temperature, etc). They are given normal and emergency capacity ratings, which specify the amount of current the lines are able to carry safely without overheating. Normal conductor ratings provide the maximum amount of current that lines are capable of carrying on a continuous basis without damaging or weakening the conductor. Emergency conductor ratings provide the maximum amount of current that lines are capable of carrying on a limited basis. Exceeding a line's emergency rating will cause the temperature of the conductor to exceed its thermal capability, and may result in permanent conductor damage. As the conductor temperature rises, the potential for a line failure or fault also rises due to increased conductor sag, which increases the likelihood of contact with trees or obstacles, or failure of line splices and termination points. A line failure or fault could result in a prolonged outage until repairs are made. The length of the outage would be dependent on the severity of the line failure.

The CIP transmission lines will be at risk for overload conditions upon installation and full-load operation of the first combustion turbine that is one of the elements of the IRP-3 Final Preferred Plan and thus the entire HECO system will be at risk. Specifically, it would not meet the transmission planning criteria shown in Table 1.9. The risk for overload conditions would significantly worsen if a second combustion turbine in the 76 to 130 MW range were installed at the site without increasing the transmission capacity.

AES-CEIP Transmission Line. The existing AES-CEIP line is one of two lines available for exporting the power generated in CIP. Removal of the other line (the Kalaeloa-Ewa Nui line) from service requires that the AES-CEIP line export all of the power that is generated in CIP. Generally, the AES-CEIP line will begin to overload when CIP generation output exceeds about 435 MW, which is only about 30 MW above the capacity of the existing three generating facilities in CIP. There are presently no overload conditions and no criteria violations on the AES-CEIP line. However, the proposed generation additions and upgrades will increase CIP generation significantly above 435 MW and result in possible overload conditions.

Table 1.9. Relevant Transmission Planning Criteria

Transmission Planning Criteria 1: With any generating unit off for overhaul, no transmission system component loading will exceed its NORMAL rating, nor will voltage levels violate their upper or lower limits for any of the following outages:

a. Any other generating unit.
b. Any transmission circuit.
c. Any transmission transformer.
d. Any transmission bus.

Transmission Planning Criteria 3: With any generating unit off for overhaul, and any transmission line out of service for maintenance, no transmission system component will exceed its EMERGENCY rating, nor will voltage levels violate their upper or lower limits for any of the following outages:

a. Any other generating unit.
b. Any other transmission circuit.
c. Any multiple transmission circuit outages caused by a line down at a crossing point.
d. Any transmission transformer.
e. Any transmission bus.

Transmission Planning Criteria 4: Each single generating station should be able to export power equal to the sum of the individual generating unit NORMAL capability ratings in MW at 105 percent of rated generator field current with no transmission system component loading exceeding its EMERGENCY rating, nor will voltage levels violate their upper or lower limits for any of the following outages:

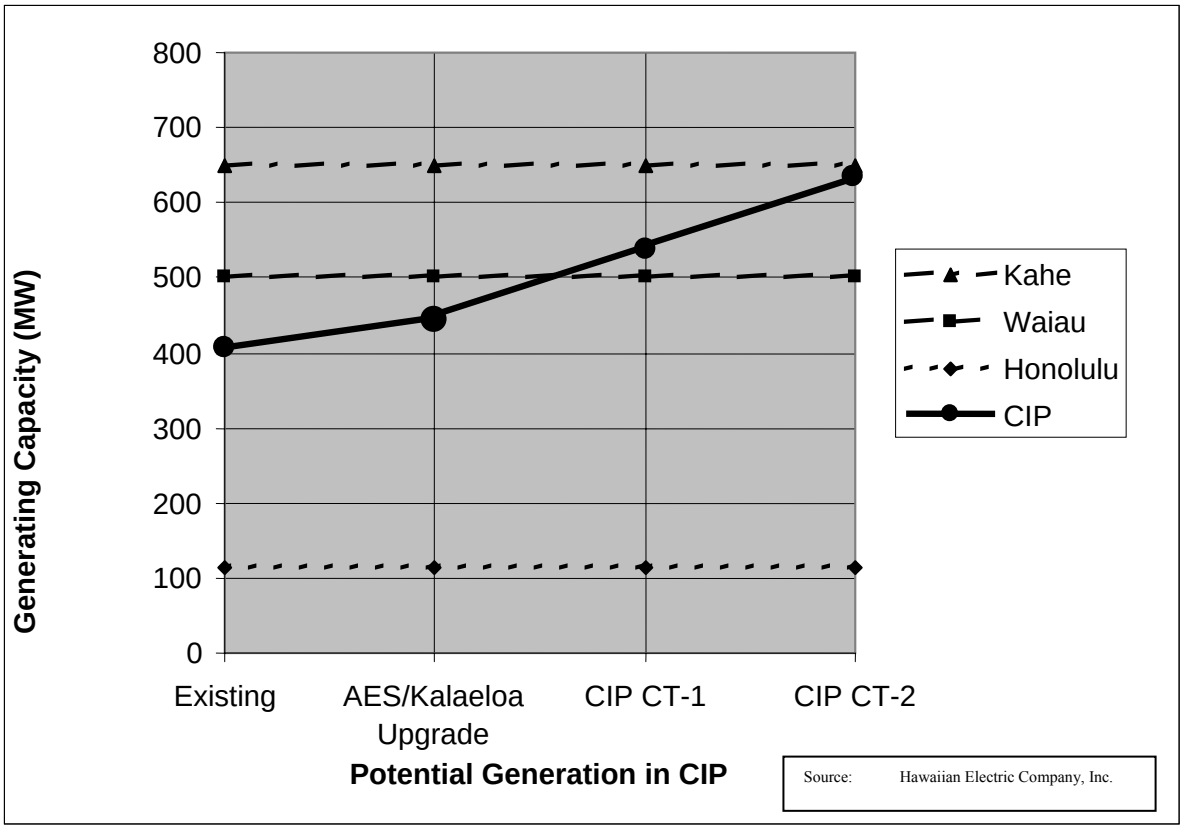
a. Any transmission circuit.
b. Any multiple transmission circuit outages caused by a line down at a crossing point.
c. Any transmission transformer.
d. Any transmission bus.

Notes: Criterion #1 is a check against normal conductor ratings for single contingency conditions to ensure that the transmission lines are capable of handling the power flow for prolonged periods of time whenever a single transmission line undergoes repair following a fault or failure.

- Criterion #3 is a check against emergency ratings for double contingency conditions to ensure that the transmission system is capable of handling the power flow for those limited duration instances that two transmission lines are out of service; one due to scheduled maintenance and the other due to fault or failure. It is assumed that the line that is out for maintenance can be returned to service within a short period of time. The purpose of criterion 3 is to help assure that the system, as opposed to a particular circuit, will survive. Under this criterion, all loads may not continue to be served, but those that continue to be served should not cause any transmission system component to exceed its EMERGENCY rating, or any voltage level to violate its upper or lower limits. Manual intervention will not be required to meet these conditions.
- Criterion #4 is a check against emergency conductor ratings during single contingency conditions to ensure that the total generating capacity at each generating station can be exported.
- HECO has seven (7) criteria used to plan for installation of new transmission lines. Criteria #2, #5, #6, and #7 are not included in this table as they are not relevant to the need for the planned second AES-CEIP transmission line.

Source: Hawaiian Electric Company, Inc., *Engineering Standard Practice Manual*, January 28, 1997.

Figure 1.14. Generating Capacity at Each Generating Station



Source: Hawaiian Electric Company, Inc.

Kalaeloa-Ewa Nui Transmission Line. The Kalaeloa-Ewa Nui line is the other line available for exporting the power generated in CIP. Removal of the AES-CEIP line from service requires that this line export all of the power generated in CIP. As with the existing AES-CEIP line, the Kalaeloa-Ewa Nui line will begin to overload when CIP generation output exceeds about 435MW. There are presently no overload conditions on the Kalaeloa-Ewa Nui line.[30] However, as is true for the AES-CEIP line, the proposed generating capacity upgrades and additions that are contemplated will increase CIP generation significantly above 435MW and result in possible overload conditions.

If the overloads are not prevented, permanent conductor damage could occur and result in possible prolonged line outages.

1.4.3 PROPOSED ACTION TO MEET THE TRANSMISSION REQUIREMENTS

HECO's analyses have determined that the installation of a new AES-CEIP #2 138kV line is the most effective option for increasing CIP generation reliability and preventing overloads on the AES-CEIP and Kalaeloa-Ewa Nui lines. Installation of the new line will increase the robustness of the CIP generation and address the CIP reliability concern by providing an additional path for exporting power. It would also alleviate the identified line overload problems associated with the installation of the first combustion turbine at CIP.

[30] The maximum line loading for the Kalaeloa-Ewa Nui line is 93% of normal for single contingency conditions and 87% of emergency for double contingency conditions.

1.5 OVERALL OBJECTIVES OF THE PROPOSED ACTION

Based on the identified needs of its system described above, HECO has identified the following as the objectives for the proposed actions (the construction and operation of new generating capacity and the construction and operation of an additional 138 kV transmission line between generating capacity in Campbell Industrial Park and the CEIP Substation).

(1) Bring on-line at the earliest possible date and in no case later than 2009, a new generating unit that can provide the additional firm peaking generating capacity needed to allow HECO to meet the peak period energy demand.

(2) Install at the earliest possible date and in no case later than 2009, additional electrical transmission capacity from the Campbell Industrial Park Generating Facilities sufficient to provide a level of service reliability consistent with HECO's PUC mandate.

(3) Ensure that the size and operating characteristics of the new generating unit(s) are compatible with HECO's overall system requirements to facilitate their integration into the company's grid.

(4) Locate the additional generating capacity in such a way as to minimize the need for additional fuel delivery infrastructure, thereby avoiding unnecessary risks inherent in fuel transport.

(5) Provide the option of constructing a second, similar generating unit at the same location with a minimum of delay and uncertainty if load reduction measures such as Demand-Side Management (DSM), Conservation, Renewable Energy, and Combined Heat and Power (CHP) programs are unable to provide the additional firm peaking generating capacity needed to allow HECO to meet the peak period energy demand.

(6) Locate the additional generating capacity in an area with suitable surrounding land use and appropriate land use designation (i.e., zoning).

(7) Maintain environmental quality and provide compensating benefits to the communities most affected by the proposed action.

(8) Maintain costs to customers at a reasonable level.

(9) Ensure that the additional generating capacity is consistent with HECO's Integrated Resource Plan goals related to DSM, CHP, and the use of Renewable Resources.

2.0 ALTERNATIVES CONSIDERED

2.1 INTRODUCTION

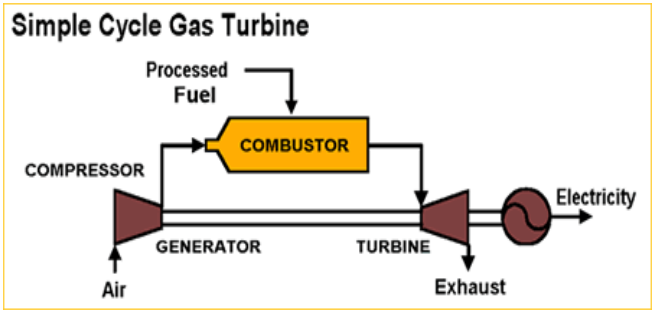
As described in Chapter 1 of this report, Hawaiian Electric Company (HECO) plans to construct new electrical generation and transmission facilities in Campbell Industrial Park (CIP). This chapter provides detailed information about the physical and operational characteristics of those facilities. It also describes the alternative means of achieving HECO's objectives for the proposed action that it has considered. The description is divided into five major parts.

- Section 2.2 describes the facilities that HECO would construct as part of the proposed generating unit additions. It includes conceptual site plans for the two different site arrangements being considered.
- Section 2.3 describes the electrical transmission system additions that HECO has proposed for the area. The discussion is divided into two parts. The first focuses on the changes to substations that would be made. The second addresses the 138 kV transmission line that HECO proposes to install between the AES Substation and the CEIP Substation.
- Section 2.4 discusses the anticipated schedule for the work.
- Sections 2.5 and 2.6 provide the anticipated schedule and preliminary cost estimates for each of the major project components, respectively.
- Finally, Section 2.7 discusses the alternatives to the proposed actions.

2.2 TECHNICAL DESCRIPTION OF THE PROPOSED GENERATION ADDITION

2.2.1 OVERVIEW

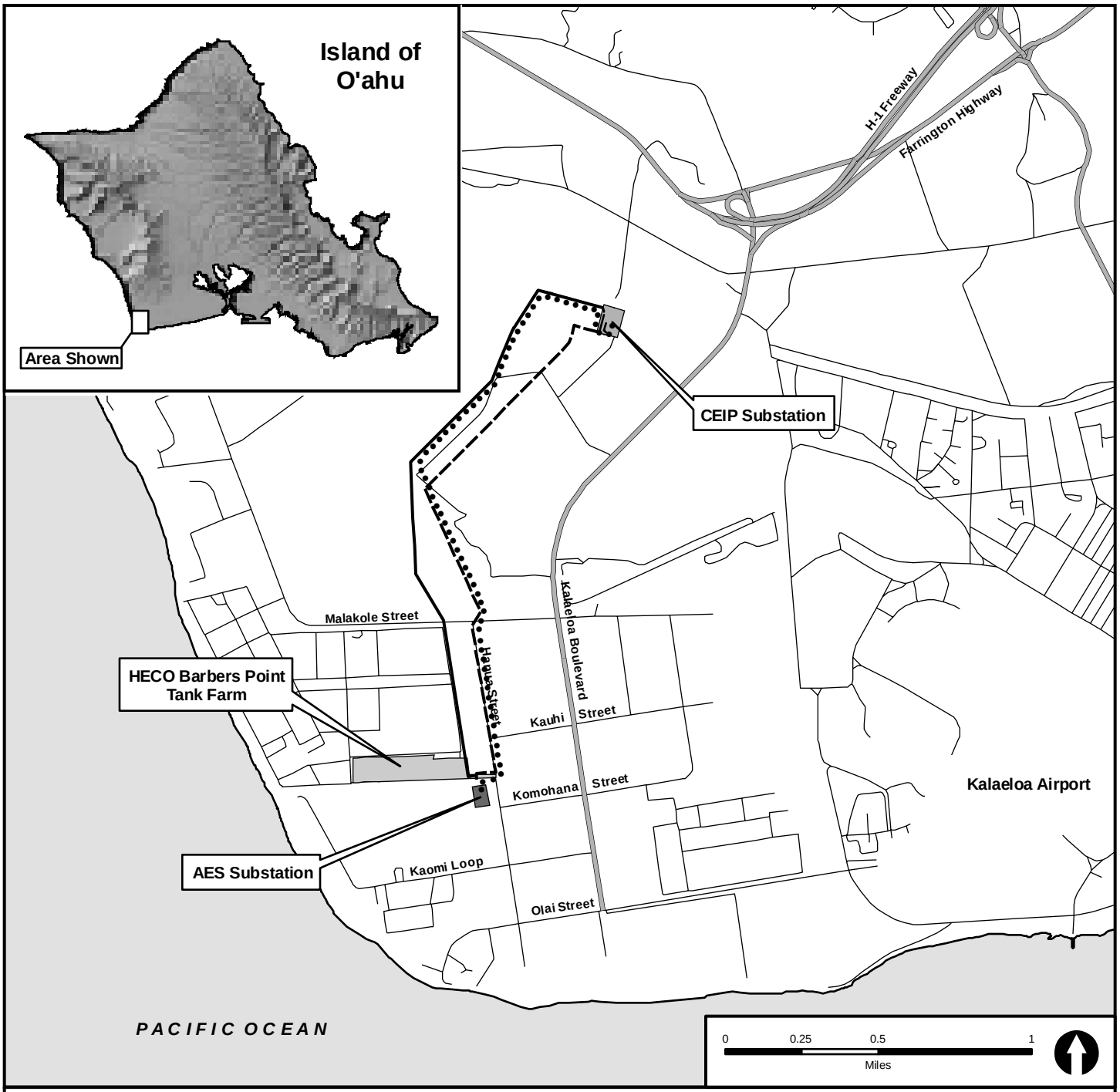
HECO proposes to construct a new generating station on vacant portions of its existing Barbers Point Tank Farm (BPTF) in CIP on the island of O'ahu (see Figure 2.1). Figure 2.2 shows the parcel tax map keys (TMKs) in the project area and Figure 2.3 contains an aerial photograph showing existing conditions on and immediately around the site.



The proposed generating station would consist of a single 110 MW Siemens-Westinghouse 501D5A combustion turbine (CT) and a single, 4 MW capacity "black-start" diesel engine generator.[31] The combustion turbine (CT) is much like a large, heavy-duty version of the jet engines used on commercial aircraft. The sketch to the right shows the main features of a combustion turbine engine (which is also referred to as a "gas turbine"). Figure 2.4, Figure 2.5, and Figure 2.6 provide photographs of the unit and a conceptual layout for the facility using this model engine.[32] If needed, a second, identical combustion turbine could eventually be installed.

[31] Large generating equipment such as the proposed CTs or HECO's steam boiler units require significant amounts of electricity to start up – much more than could be reasonably stored in batteries, for example. The purpose of a "black-start" generator (which itself is capable of starting using a battery) is to provide the electricity to start the large units in the event of an island-wide blackout.

[32] Note that Siemens-Westinghouse offers options to augment the power output of their combustion turbines by strategically injecting water into the inlet air stream, thereby adding more mass throughput and intercooling the turbine compressor.



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Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

--Hawaiian Electric Co., Inc.
--City & County of Honolulu GIS
--State of Hawaii GIS

Legend:

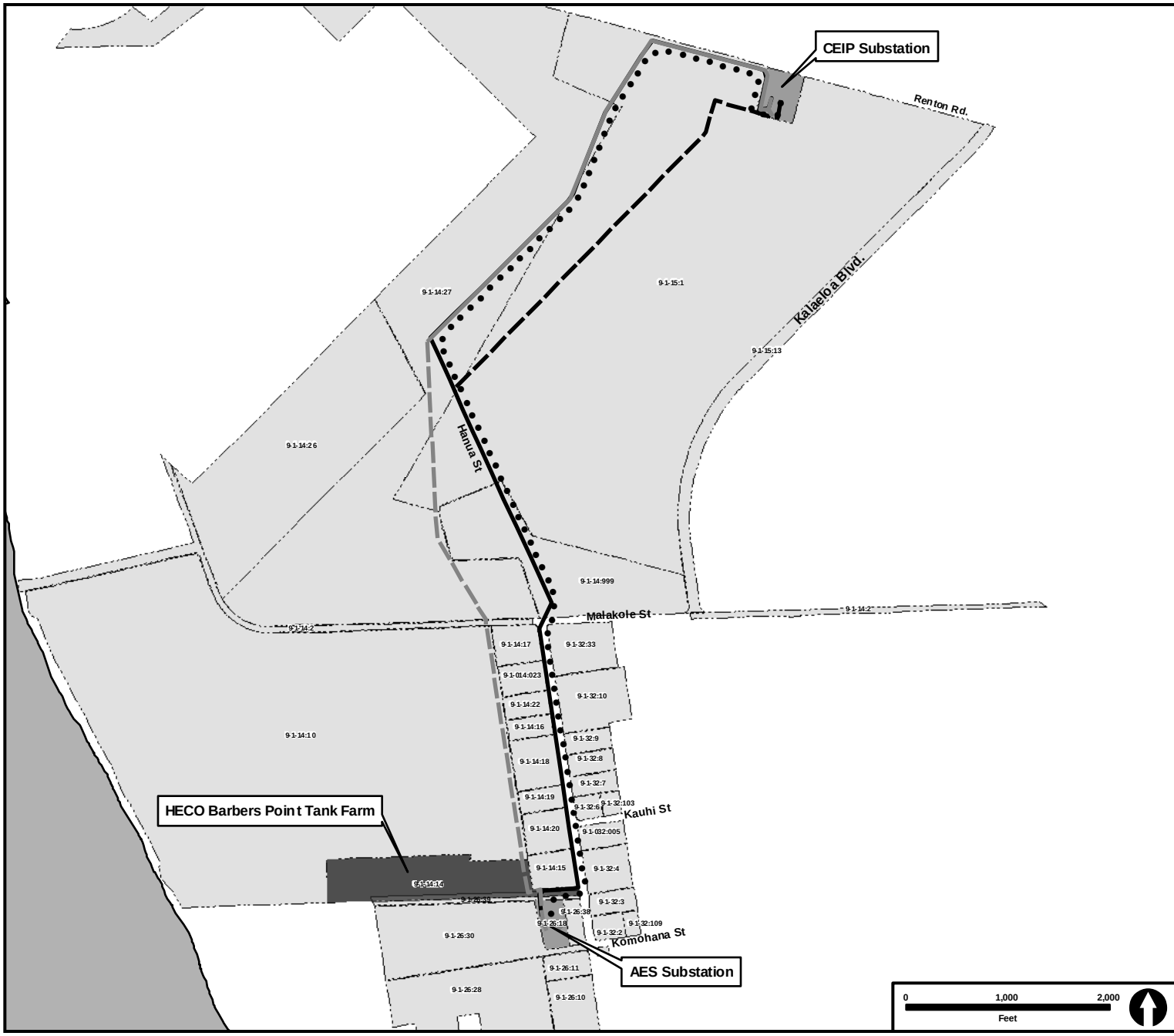
- AES CEIP #1
- AES CEIP #2
- AES CEIP #2 Underground Alternative
- Highways
- Roadways

Figure 2.1:

Location Map

CIP Generating Station & Transmission Additions Project

Figure 2-1 Location Map 2005-11-02.mxd



Legend:

- AES CEIP 1 Existing
- AES CEIP 1 New
- AES CEIP 2 Existing
- AES CEIP 2 New
- AES CEIP #2 Underground Alternative
- Parcels Near Tank Farm

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Sources:

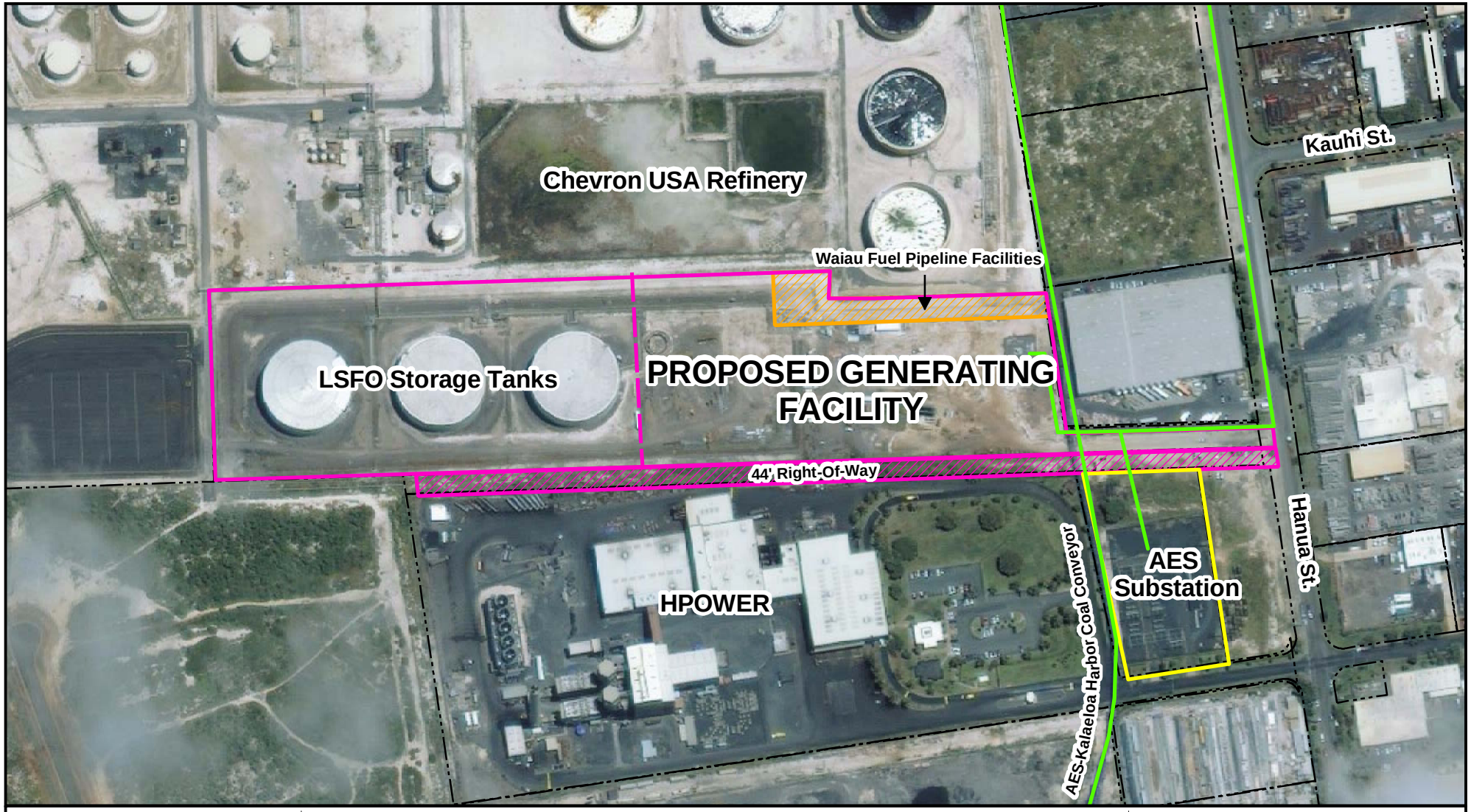
–City & County of Honolulu GIS
–Hawaiian Electric Co., Inc.

Figure 2-2:

TMKs In the Project Area

CIP Generating Station & Transmission Additions Project

Figure 2-2 TMKs In the Project Area 2005-12-20.mxd



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Sources:

--Hawaiian Electric Co., Inc.
--Space Imaging, Inc. (2004-08-24)

Legend:

138 kV Transmission Line

Barbers Point Tank Farm Parcel Boundary

0 125 250 500
Feet

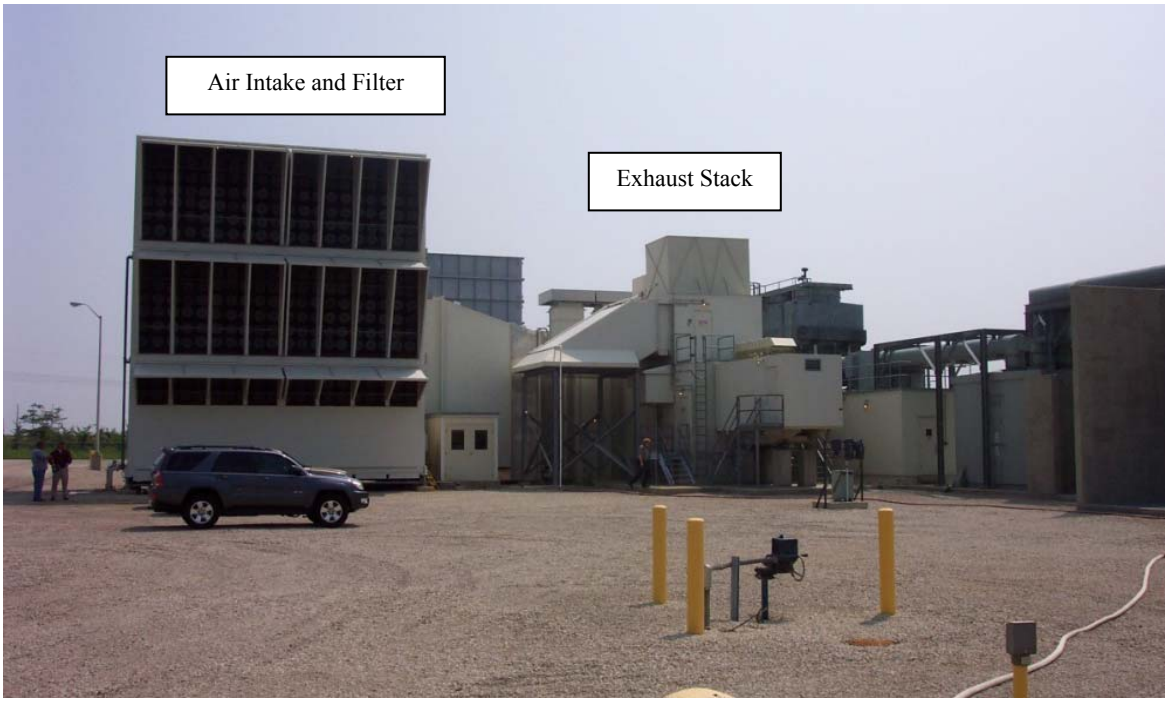
Figure 2.3:

Existing Facilities

CIP Generating Station & Transmission Additions Project

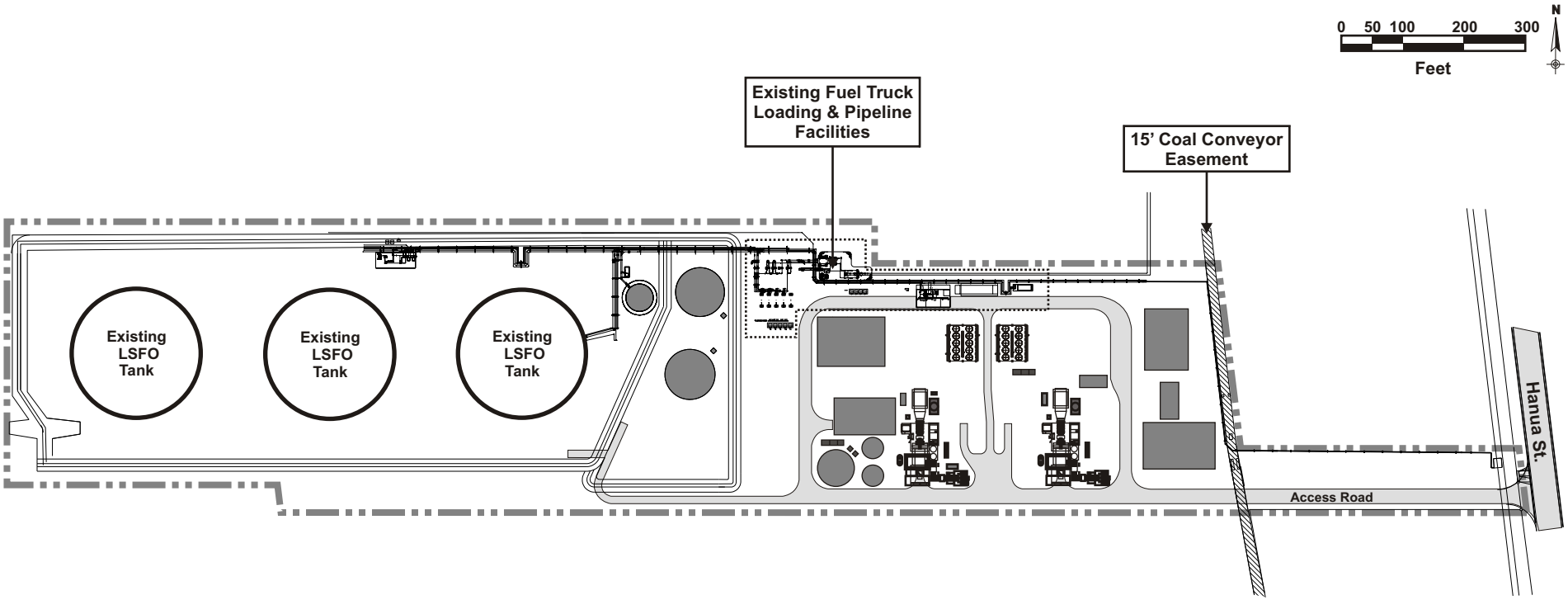
Figure 2-3 Existing Facilities 2005-11-02.mxd

Figure 2.4. Photographs of Typical Siemens 501D5A Combustion Turbine



Note: There are two significant differences in the unit proposed for the BPTF and the one shown above. The first is that the air inlet filter will be above the unit instead of next to it as shown in these photos. The second is that the exhaust stack will be 210 feet high rather than the much shorter exhaust stack shown on the right hand side of the upper photograph.

Source: Hawaiian Electric Company, Inc. (2005).



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Source:

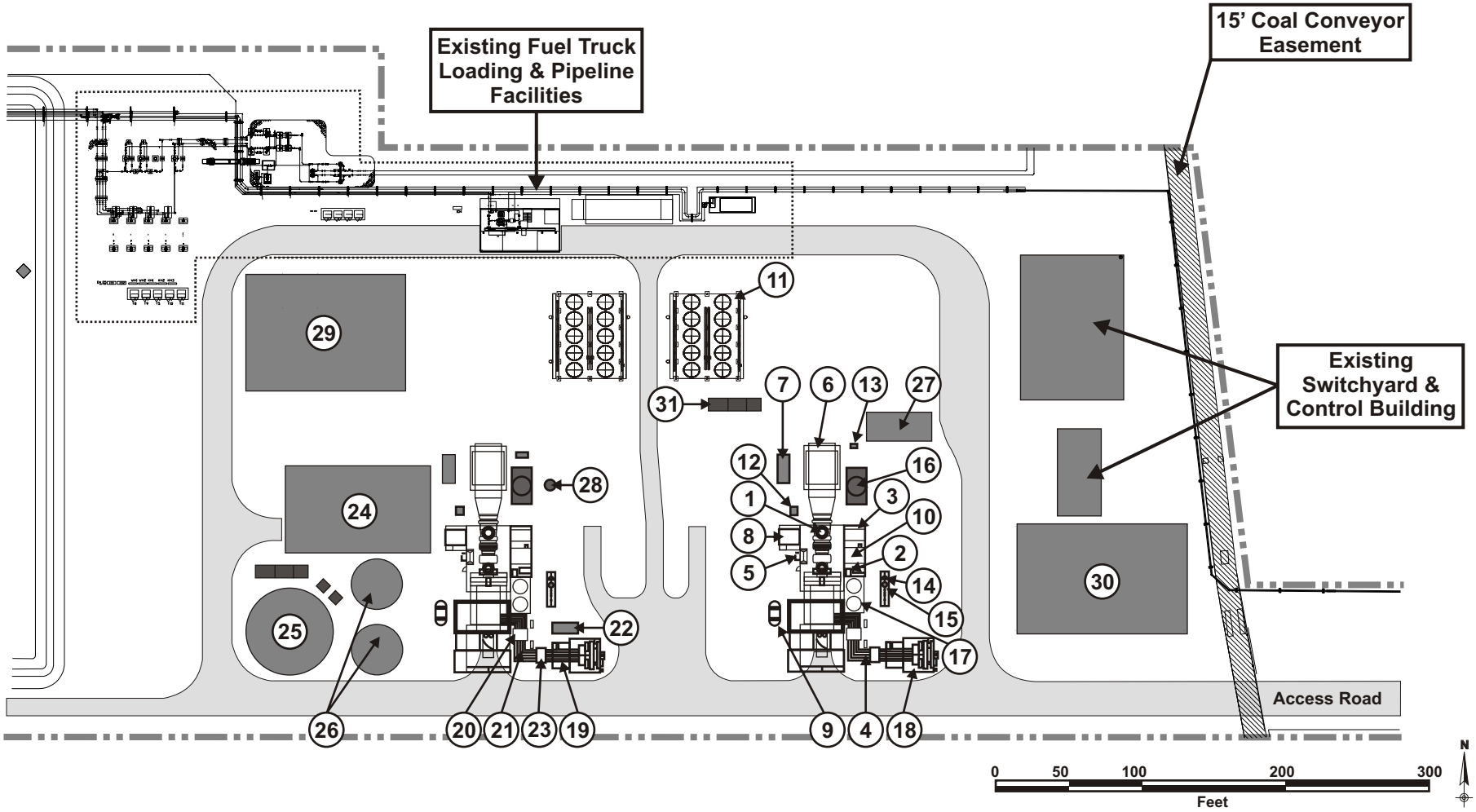
Sargent & Lundy

Figure 2.5:

Conceptual Layout for the Facility With Siemens 501D5A CTs

CIP Generating Station & Transmission Additions Project

Figure 2-5 Conceptual Layout for Facility With Siemens 501D5A 2005-12-01.cdr



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Source:

Sargent & Lundy

Number Key:

1. Combustion Turbine
2. Water Wash Skid
3. Water Injection Skid
4. Electrical Package
5. Fuel Oil/Water Injection Skid
6. CT Stack
7. Fire Protection Skid
8. Naptha Pump Skid
9. CO Bottle Tank
10. Fuel Oil Pump Skid
11. Fin Fan Cooler
12. Hydraulic Control Oil Skid
13. CT CEMS Building
14. Water Wash Drains Tank
15. False Start Drains Tank
16. Rotor Air Cooler
17. Mechanical Package
18. Set-Up Transformer
19. Unit Auxiliary Transformer
20. Line Side Cubicle
21. Bus Duct
22. 4160V Switchgear
23. Generator Circuit Breaker
24. Water Treatment Building
25. Fire Water Tank & Pumps
26. Demineralized Water Tanks & Pumps
27. Diesel Generator
28. Diesel Start-Up Tank
29. Waste Water Treatment & Settling Pond
30. Control/Administration Building
31. BOP 480V Switchgear

Figure 2.6:

Conceptual Layout Detail for the Facility With Siemens 501D5A

CIP Generating Station & Transmission Additions Project

Figure 2-6 Conceptual Layout Detail for Facility With Siemens 501D5A 2005-12-01.cdr

Initially, HECO would burn naphtha[33] or #2 fuel oil (diesel) in the unit. The selected unit is also capable of using biofuels (e.g., biodiesel, ethanol, and biofuel blends) or other alternate fuels (e.g., hydrogen) to meet some or all of the needs of the facility. However, such alternative fuels are not currently available in Hawai‘i in sufficient quantities to be the sole fuel source for new generation and are costly. Until the technological and fuel supply barriers can be overcome, the primary energy source for the next generating unit will likely be petroleum-based fuels.

The planned operational date for the first generator covered by this EIS is no later than July 1, 2009. A second generator would be constructed only if and when it is needed to meet system requirements.

The support facilities and equipment required for the two proposed combustion turbines include:

- **Water Treatment and Storage Facilities** that would occupy approximately one-half acre of the site. These facilities treat non-potable well water or recycled water purchased from the Honolulu Board of Water Supply to produce water for fire protection, general use and the demineralized water needed for NOx control. If, during detailed design, the existing Chevron firewater loop is determined to be adequate to serve the added generation, the water treatment and storage would be decreased in capacity accordingly.
- **Fuel Storage** that would occupy approximately one acre of the site. HECO has selected a CT capable of burning both naphtha and diesel, and the tanks would be capable of storing either fuel. Both fuels would be delivered by pipeline from the neighboring Chevron and/or Tesoro refineries.
- **Maintenance, Support, and Administrative Facilities** that would be combined in one warehouse type building on site.

Additional information concerning the various components of the proposed generating addition is provided in Section 2.2.2.

2.2.2 COMBUSTION TURBINE

As noted above, HECO has selected a Siemens-Westinghouse 501D5A combustion turbine for the project. It would be fired on naphtha and/or No. 2 diesel fuel with maximum sulfur contents of 0.050% and 0.35%, respectively. HECO will have the ability to switch from one type of fuel to another in order to achieve the lowest possible operating costs while meeting air permit limits.

Table 2.1 shows selected characteristics and operating parameters for the selected CT model. HECO expects that it would normally start and shut down the engine at least once each day that it is needed (estimated at approximately 200 days per year) in order to help meet peak loads on the system; these peak loads normally occur between 5:00 pm and 9:00 pm on weekdays. Additional startup/shutdown sequences would be required periodically for maintenance and testing purposes, or to meet unusual system load requirements (as when another generating unit trips off line or is out of service for unscheduled maintenance or repair).[34]

The height of the combustion turbine air intake, the highest part of the generating unit itself, is approximately 60 feet. The CT would have its own 210-foot high, 17-foot diameter exhaust stack.[35] A room for a continuous emission monitoring system would be located near the base of the stack. The engine would be enclosed in a sound-attenuating package provided by the supplier. The exhaust from the black start-diesel generator would discharge through a pipe alongside and supported by one of the CT stacks. These dimensions would also apply to a second CT, if one is later needed.

[33] Naphtha is a light petroleum fuel intermediate between diesel oil and gasoline.

[34] While HECO fully expects that the units will be used to meet peak demand and will normally operate for only a few hours each day, there may be times when one or both of them must be run continuously for extended periods of time. Thus, the air permit application does not propose any annual operating limits (i.e., it would allow each unit to be run 8,760 hours per year).

[35] The stack height is based on the results of air quality modeling conducted as part of the State Department of Health air permitting process.

The CT will utilize water injection in the combustion process to limit the amount of nitrogen oxides (NOx) being emitted to 42 parts per million (ppm). The water is ultra-pure demineralized water produced by the on-site water treatment facilities to protect the equipment from erosion and corrosion damage. The water mixes with the fuel and air in the combustors.

Table 2.1. Selected Characteristics of the Siemens W501D5A Combustion Turbine

Parameter	*Siemens W501D5A Engine*
Nominal Unit Base Load (Net MW)[1]	110
Emergency Unit Rating (Net MW)[2]	130
Duty Cycle	Peak
Exhaust Stack Height (feet)	210
Onsite Fuel Storage (in gallons)	4,400,000
Potable Water Use (gal/day)	575
Note 1: All numbers assume that naphtha is being fired. The engine is capable of firing other fuels as well, each of which would result in slightly different outputs and requirements. Estimate assumes the following ambient conditions: Dry Bulb Temperature = 86º F.; Relative Humidity = 70º; Inlet Air Temperature = 86º F.	
Note 2: Operation above the base load rating for emergency purposes is limited due to increased unit degradation when operating at that level. Therefore, only the base load rating is used for planning purposes.	
Source: Hawaiian Electric Company, Inc.	

2.2.3 CONTROL /ADMINISTRATION BUILDING

The proposed generating station includes a control/administration building. The structure would be approximately 120 feet long, 75 feet wide, and 30 to 40 feet high. This building would contain a control room for the CTs that would house combustion turbine control panels, the control system operator console, and relay panels. The control building also would contain rooms housing electrical equipment (uninterruptible power supply, batteries, and electronic system cabinets), a maintenance shop, offices, locker rooms, and a reception area.

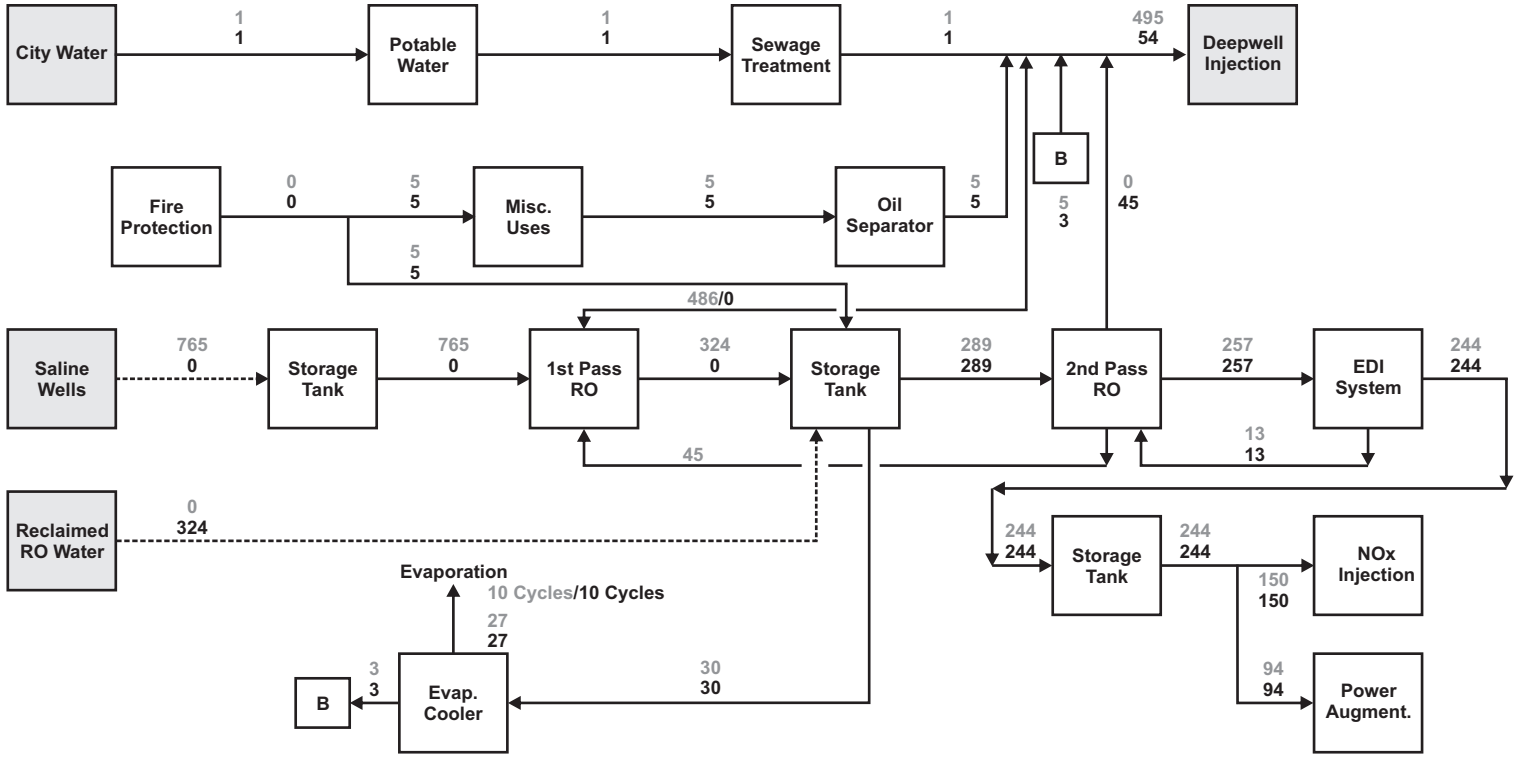
2.2.4 WATER SUPPLY/WASTEWATER DISPOSAL

2.2.4.1 Forecast Water Use

As shown in Figure 2.7, non-potable water use for the selected unit would be approximately 600 gallons per minute (gpm). Because the CTs would be operated as peaking units (see Section 2.1), they would usually operate for only a few hours each day. If there were two units and both operated together for a full 24 hours, they would consume approximately 1.7 million gallons of non-potable water per day.[36]

[36] This estimate assumes the use of an air-cooled closed cooling water system. The cooling water is heated as it cools systems in the plant such as the generators and the CTs' hydraulic and lubricating oil. The heat is then rejected by the air-cooled heat exchangers.

Water Use in Gallons Per Minute



Prepared For:

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Prepared By:

PLANNING SOLUTIONS

Source:

TNWRE

Legend:

N Reverse-Osmosis (RO) Water from Hono'uli'uli Waste Water Treatment Plant

N Saline Water From On-Site Wells

Figure 2.7:

Water Use In Gallons Per Minute

CIP Generating Station & Transmission Additions Project

Figure 2-7 Water balance 2005-11-02.cdr

As indicated by the water balance diagram, the non-potable water would be used for a variety of purposes. The most significant would be water injection into the CT for air pollution control.

2.2.4.2 Water Supply: Source, Treatment, and On-Site Water Storage

Water Source. HECO expects to use Honolulu Board of Water Supply RO (reverse osmosis) water from the Honouliuli Wastewater Treatment plant or saline water from wells located on the Tank Farm property to provide process water for the proposed facility. This follows the pattern set by other major energy producers located nearby (e.g., AES-Hawai‘i and Kalaeloa Power Partners). The saline water (likely to have salinity close to that of seawater) that on-site wells can supply would be drawn from the uppermost layer of the caprock aquifer beneath the site. Well yields in the area are highly variable and depend upon both localized geology and on the design and construction of the wells. The wells that supply the AES-Hawai‘i facility, for example, have yielded 4,000 to 6,000 gpm, while those at the HPOWER and Kalaeloa facilities have yielded only half that amount. The technical feasibility of relying on these wells must be confirmed through test borings and pump testing. The small amount (approximately 575 gallons per day) of potable water that is needed for drinking and other quality-sensitive uses would be obtained from an existing Honolulu Board of Water Supply waterline in Hanua Street.

Water Treatment and On-Site Storage. Whether the source of process water is saline well water or RO water, it would require treatment before it can be used. The water treatment process would consist of the following components: (1) filtration; (2) reverse osmosis treatment; and (3) electro-deionization [EDI - ion exchange]. As depicted in Figure 2.7, HECO proposes to use a multi-stage water treatment process. The first stage uses pressure filters to remove (10-20 micron range) particulate matter. The second stage is a reverse osmosis process that would convert the saline water, if used as the source, into potable-quality water. This stage will not be required if RO water is used as the source.

The treated water from this initial treatment or the incoming RO water, if used, would be stored in a service water/fire water tank. This storage would function as a buffer between the different rates of incoming supply and the rate of use within the site. This tank would be approximately 60 feet in diameter and 60 feet high. It would have a capacity of approximately 1,270,000 gallons, but only a portion of this would be used for operational purposes; the remainder would be reserved for firefighting (see Section 2.2.4.3 below).

A portion of the service water would be used to meet the general service water needs of the facility, but most of it would be used as feed water for the reverse osmosis/EDI system. The quantity of service water stored would be equivalent to 24 hours’ of water use assuming continuous operation. Because the units would typically operate for just a few hours each day, the storage would be sufficient for more than one day under normal operating conditions.

Water produced by the reverse osmosis/EDI treatment process, which would be very pure, would be stored in two demineralized water storage tanks until it is used. Each of the demineralized water storage tanks would be approximately 35 feet in diameter and 60 feet high and would have a capacity of approximately 434,000 gallons. They would hold enough water for 25 to 30 hours of continuous operation, i.e., for several days under most circumstances. This storage capacity would allow the generating units to continue to function for a limited period in the event that the water treatment system becomes inoperative.

2.2.4.3 Fire-Fighting Facilities

In addition to the filtered and demineralized water storage capacities described above, a reserve of filtered water is held back in the service water/fire water tank for fire-fighting purposes. A fire pump would be located adjacent to the tank on the site’s main loop road, a position that the fire department

can easily access.[37] The site would have a 2,500 gallon per minute (GPM) electric motor-driven fire pump, a 2,500 GPM diesel engine-driven fire pump, a jockey pump to keep the fire loop pressurized, and controllers. All facilities would comply with the National Fire Protection Association's (NFPA) recommendations, local codes, and other applicable fire protection regulations.

2.2.4.4 Wastewater Disposal

Types of Wastewater Streams. Approximately 30 percent of the total process water supplied to the facility would be discharged to the atmosphere in the exhaust from the CTs. The remainder would require an acceptable means of disposal. The wastewater would be of four types:

- Process waters, generally comprising water treatment plant reject and wash waters;
- Site runoff from rainfall;
- Domestic and sanitary wastes; and
- Infrequent wash waters which would require a special means of disposal.

The quantities in each stream are shown in Figure 2.7 and are described briefly below.

Disposal of Process Wastewater. The largest component of the process wastewater stream consists of "reject" from the water treatment process. This water would have several-times higher concentrations of the constituents naturally found in the raw water supply. In addition, it would contain very low concentrations of standard anti-fouling compounds that are added to prevent biological growth in the water systems. Wash water, which could pick up oil and other hydrocarbons, would be passed through an oil-water separator before being combined with the bulk of the process wastewater stream.

Since the site is *makai* of the State of Hawai'i, Department of Health's Underground Injection Control (UIC) line, permitted injection wells are an allowable means of disposal. The number of disposal wells necessary would be determined by field testing, but HECO expects that two or three wells (with one of these providing standby capacity) would suffice. Because supply wells would also be located on or near the site, the spacing between these two types of wells would be set to minimize recirculation. The disposal wells would be located hydraulically down-gradient and would discharge wastewater to a portion of the caprock aquifer below the shallow zone tapped by the HECO supply wells.

Site Runoff. On-site stormwater collection facilities would be designed to regulate storm runoff quantities for flood control as well as water quality. They would be designed to conform to "*Rules Relating to Storm Drainage Standards*" (January 2000) published by the Department of Planning and Permitting of the City and County of Honolulu. Stormwater management will also comply with applicable State of Hawai'i Department of Health Regulations. On-site runoff would be collected by swales, inlets, and subsurface conduits and routed to an on-site detention basin. The ultimate disposal point (on-site infiltration wells or an off-site system) has not been decided. The basin would slow the rain water runoff to allow entrained particles to settle out. The basin is sized to include a 1-foot depth of sediment accumulation before dredging/cleanup is required.

Treatment and Disposal of Domestic and Sanitary Wastewater. This system has not yet been designed. However, HECO anticipates that it would collect the small amount of sanitary waste that would be generated at the facility; provide treatment in an approved individual wastewater treatment system; and dispose of it in the injection well that it will construct.

Disposal of Infrequent Wash Water. Depending upon regulatory requirements, treated wash water would either be disposed of into the sanitary system or held in tanks and periodically trucked away for disposal at an approved site.

[37] The existing Chevron fire loop will be evaluated during detailed design. If it has sufficient capacity, the fire fighting equipment would be fed directly from the Chevron loop instead. In this event, the fire water pumps would be eliminated and the filtered water tank capacity decreased accordingly.

2.2.5 FUEL DELIVERY AND STORAGE

The CT is designed to run on either naphtha or diesel oil. Both fuels would be stored on site after being delivered by pipeline from the nearby Chevron and/or Tesoro facilities. The fuel from the Tesoro refinery would be delivered via two existing pipelines connecting the refinery with the Barbers Point-Kalaeloa Deep Draft Harbor. Those pipelines run along Hanua Street, and the connections would be made at the intersection of Hanua Street and the entrance road to the facility (see Figure 2.8). Fuel from Chevron would be transported to the generating station site via a new pipeline that would cross directly onto the property from the adjacent refinery.

The proposed design provides two floating-roof fuel storage tanks.[38] This allows one tank to be off-line for cleaning and refilling. Each tank would be 80-feet in diameter and 60 feet high and would have a capacity of approximately 2.2 million gallons (52,380 barrels). They could be used to store either of the two fuels used by the CT. Together, the two tanks provide sufficient storage to operate the generating units continuously at full capacity for approximately six days. A start-up diesel tank would also be provided for the black-start generators and for the CT, as needed.

The proposed design would have numerous elements intended to prevent fuel from escaping into the surrounding environment. Among these are (*i*) berms with impermeable membranes, *(ii)* containment walls around the fuel storage tanks, or (*iii*) double-wall tanks. An oil-water separator would be at the downstream end of that portion of the storm sewer system that receives rainwater runoff and wash-down water from the fuel handling areas.

2.3 TECHNICAL DESCRIPTION OF ELECTRICAL TRANSMISSION SYSTEM ADDITIONS

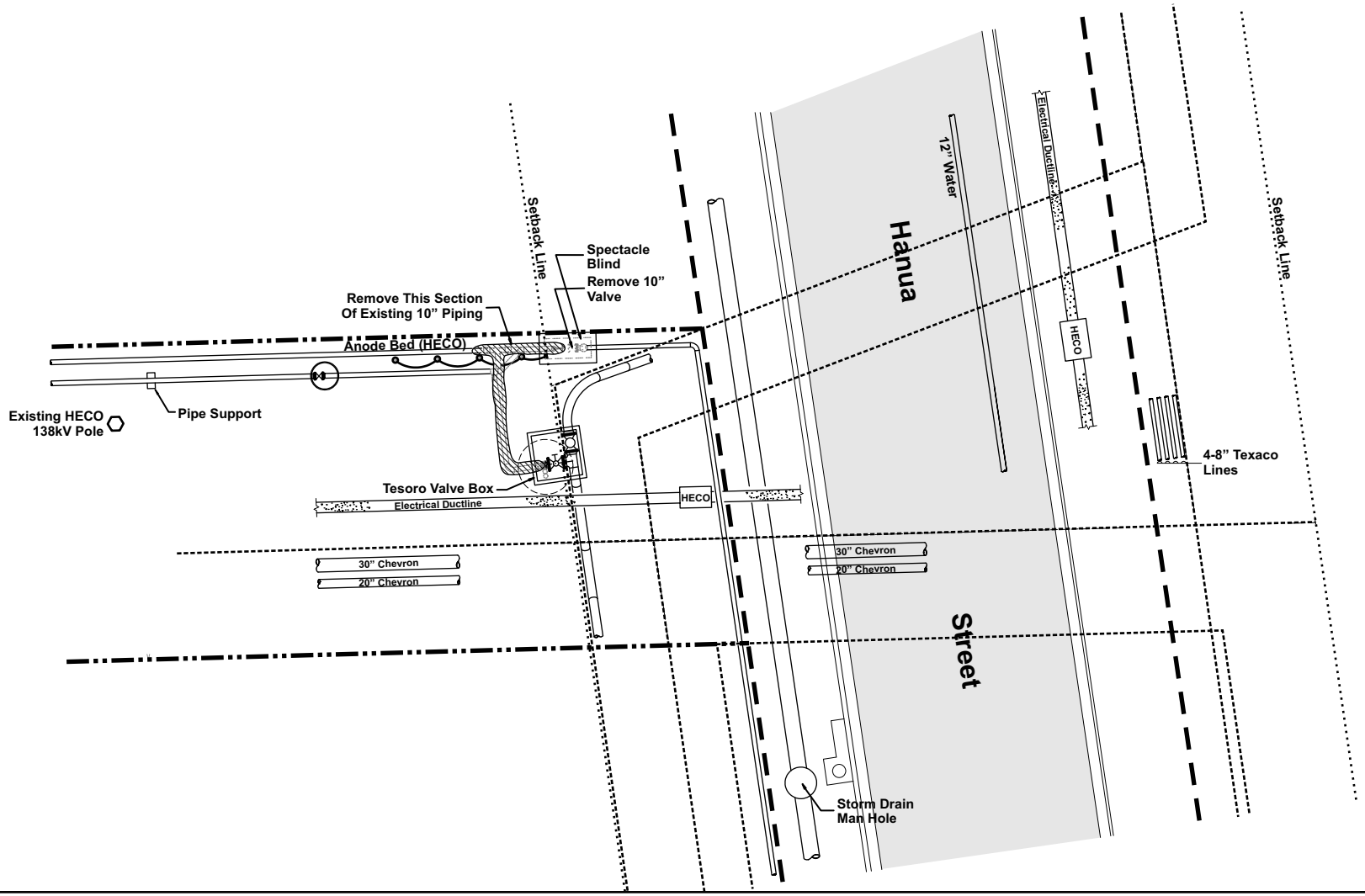
This subsection is divided into two main parts. Section 2.3.1 describes the changes that HECO proposes making to the AES and CEIP Substations. Section 2.3.2 discusses the new electrical transmission line that HECO proposes to construct between the two substations.

2.3.1 ELECTRICAL STEP-UP TRANSFORMERS AND SUBSTATIONS

2.3.1.1 Generating Station Site

The combustion turbine generator step-up transformers would be located on the southern side of the plant property immediately adjacent to the air intake filters for the CTs. These transformers would boost the voltage of the power produced by the generators from 13.8 to 138 kV. Underground cables would carry the high-voltage energy from the generator step-up transformers to the AES Substation (see Figure 2.5 for example).

[38] Using naphtha as a potential fuel imposes certain requirements on fuel storage facilities that would not be present if only diesel oil were used. For example, the tanks must have floating roofs and the electrical gear near the storage tanks must be explosion-proof.



Prepared For:

Hawaiian Electric Co.. Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Hawaiian Electric Co.. Inc.

Legend:

- Property Boundary
- Right-Of-Way
- Easement Boundary
- Setback Line

0 10 20 30 40
Feet

Figure 2.8:

Fuel Delivery From Tesoro Pipeline

CIP Generating Station & Transmission Additions Project

Figure 2-9 Tesoro Tie In 2005-11-02.cdr

2.3.1.2 AES Substation

The AES Substation presently consists of six breakers arranged in a breaker-and-a-half scheme with 138 kV outgoing transmission line. The design uses a 33-foot breaker-bay spacing. The proposed action calls for the substation to be expanded to the east, and possibly to the north, to accommodate installation of the new overhead transmission line and the underground lines between the step-up transformers on the power plant site and the switchyard. The design provides one transformer tie to the substation for each of the proposed combustion turbine generators; two bays of six circuit breakers would also be added to the substation. The proposed substation expansion includes a substation control house containing protective relay panels, control panels, batteries, and other equipment related to the substation.

2.3.1.3 CEIP Substation Modifications

Installation of a second 138 kV transmission line between the expanded AES Substation and the existing CEIP Substation would require only minor changes at the CEIP Substation. These would be limited to the installation of new terminations, relays and one breaker arranged in a breaker-and-a-half scheme.

2.3.2 138 kV AES TO CEIP SUBSTATION TRANSMISSION LINE

2.3.2.1 Transmission Line Route

HECO proposes to construct a second, two mile long, overhead 138 kV transmission circuit between the AES and CEIP substations. Each of the two circuits (which would be named AES-CEIP #1 and AES-CEIP #2) would consist partly of a portion of the existing AES-CEIP circuit and partly of new construction.[39]

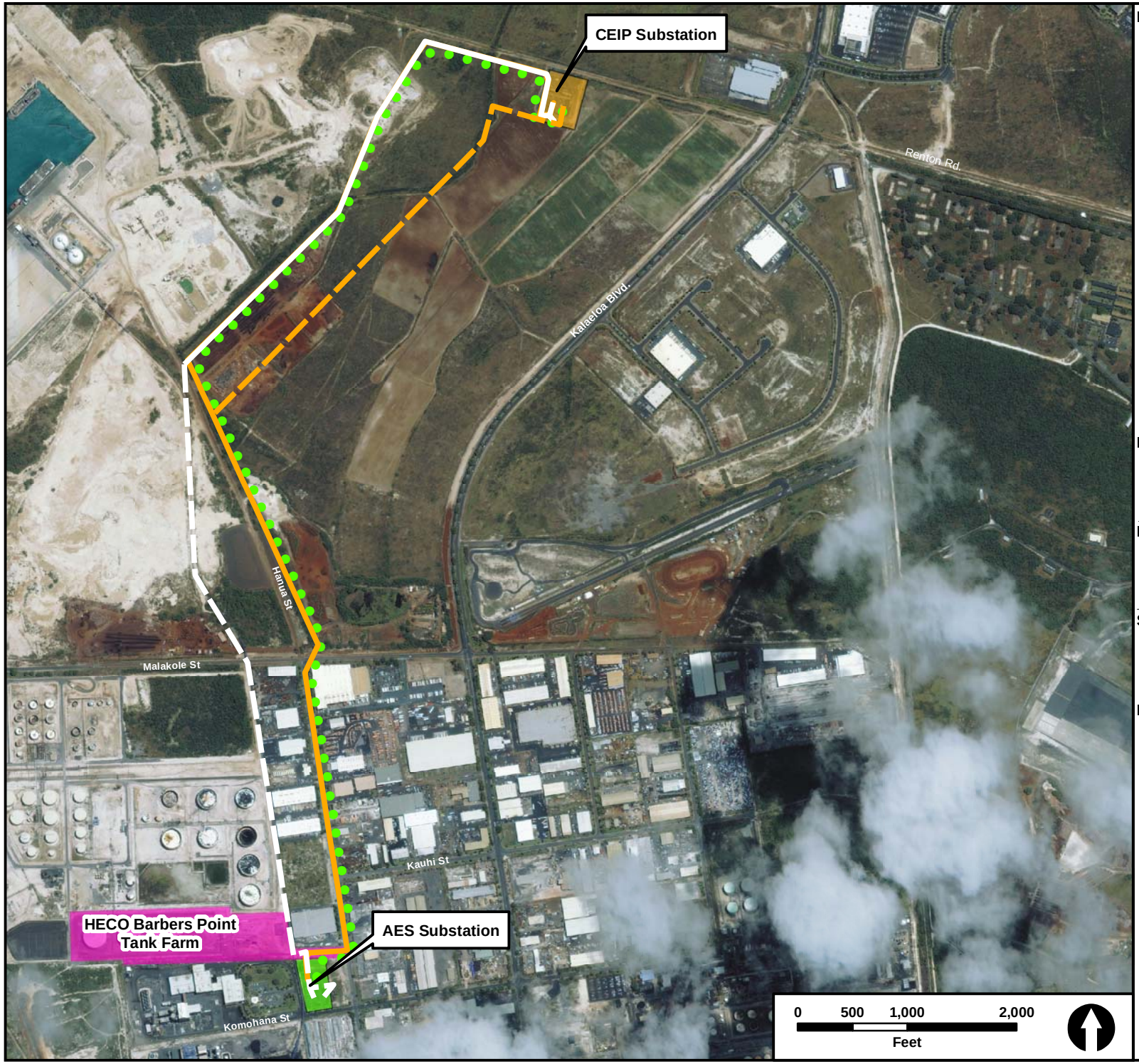
- The first part of AES-CEIP #1 (see Figure 2.9) would be new and would begin by following the right-of-way used by the coal conveyor between the AES-Hawai‘i generating station and Barbers Point-Kalaeloa Harbor. This new transmission line would eventually turn northeast to connect with the existing AES-CEIP transmission line, which would carry the power the remaining distance to the CEIP Substation.
- The first part of AES-CEIP #2 would consist of the existing AES-CEIP line along Hanua Street. The second part would consist of new line; this would roughly parallel the existing AES-CEIP line but would be about 500 feet to the east.

The proposed reconfiguration prevents the two circuits from crossing one another, an undesirable situation.

2.3.2.2 Transmission Pole Design

Approximately 23 tubular steel poles would be used for the overhead alternative. Depending on where each pole is located, it may be one of three types. Figure 2.10 provides a key showing where the different pole types would be located, and Figure 2.11 and Figure 2.12 provide detailed diagrams of the various poles. The average pole height is 120 feet. In general, the poles would be supported on drilled concrete caisson foundations, approximately 6-8 ft in diameter with an estimated depth of 20 to 30 feet. One sub-transmission circuit (46 kV) would be under-built (i.e., supported lower on the same structures) in a section of the line. For the underground transmission line alternatives, the lines would be placed in an underground duct bank such as the one diagrammed in Figure 2.13.

[39] The Figure also shows the approximate alignment that would be followed if the line were to be placed underground, a design variation that HECO is considering.



Legend:

- AES CEIP 1 New
- AES CEIP 1 Existing
- AES CEIP 2 New
- AES CEIP 2 Existing
- AES CEIP Underground Alternative

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Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

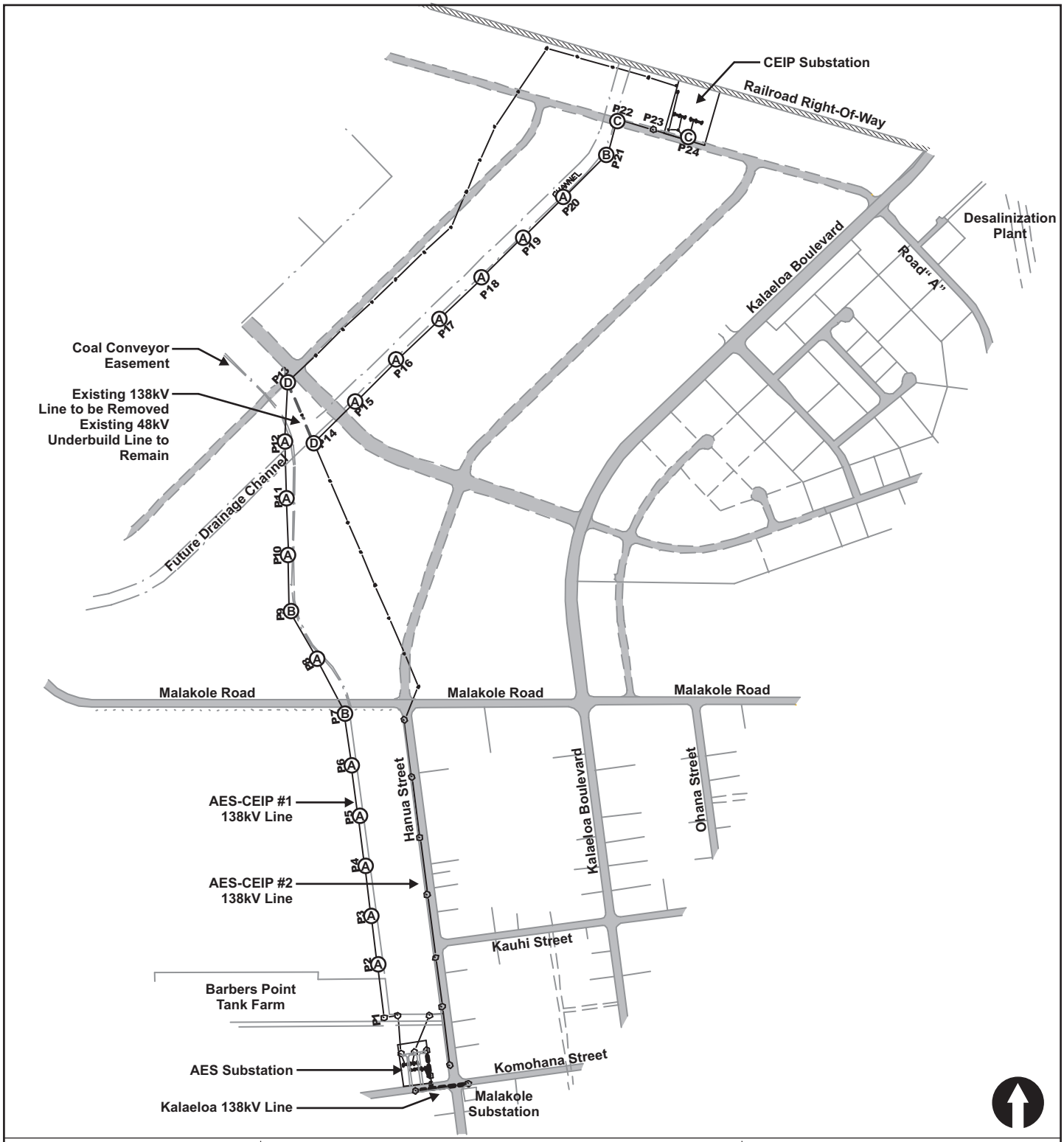
Hawaiian Electric Co., Inc.
Space Imaging, Inc. (2004)

Figure 2.9:

Transmission Line Routes

CIP Generating Station & Transmission Additions Project

Figure 2-9 Transmission Line Routes 2005-11-02.mxd



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Source:

Hawaiian Electric Co., Inc.

Legend:

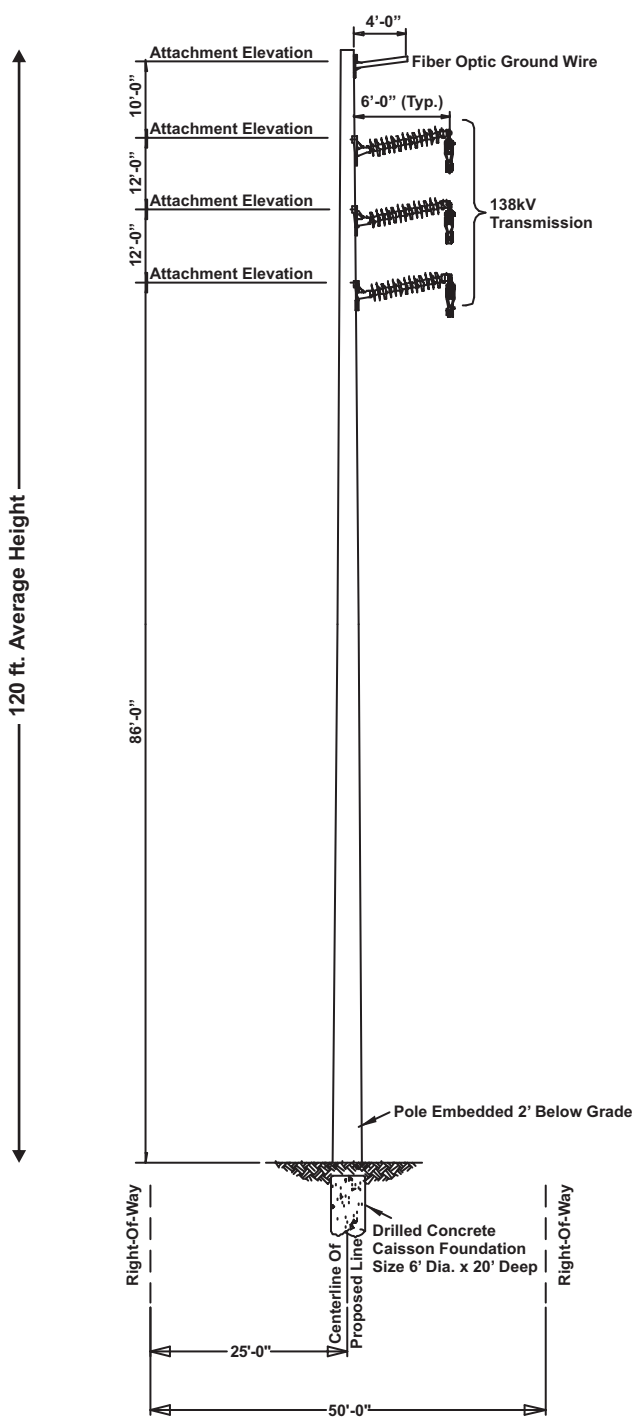
- Ⓐ Tangent Poles (see Figure 2.11)
- Ⓑ Running Angle Poles (see Figure 2.11)
- Ⓒ Dead End Poles (see Figure 2.12)
- Ⓓ Dead End Poles with 46kV Sub Transmission Lines (see Figure 2.12)

Figure 2.10:

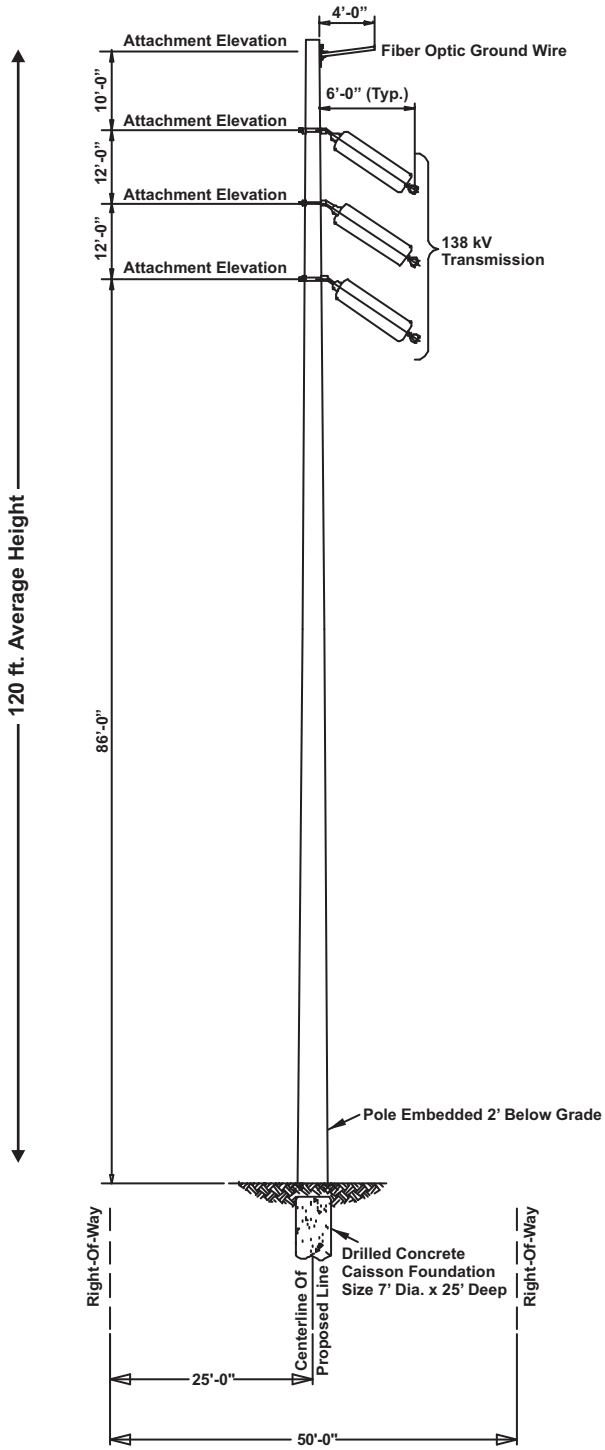
Key to Transmission Pole Types

CIP Generating Station & Transmission Additions Project

Figure 2.10 Key to Transmission Pole Types 2005-11-02.cdr



Ⓐ TANGENT POLES AVERAGE



Ⓑ RUNNING ANGLE POLES AVERAGE

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Source:

Hawaiian Electric Co., Inc.

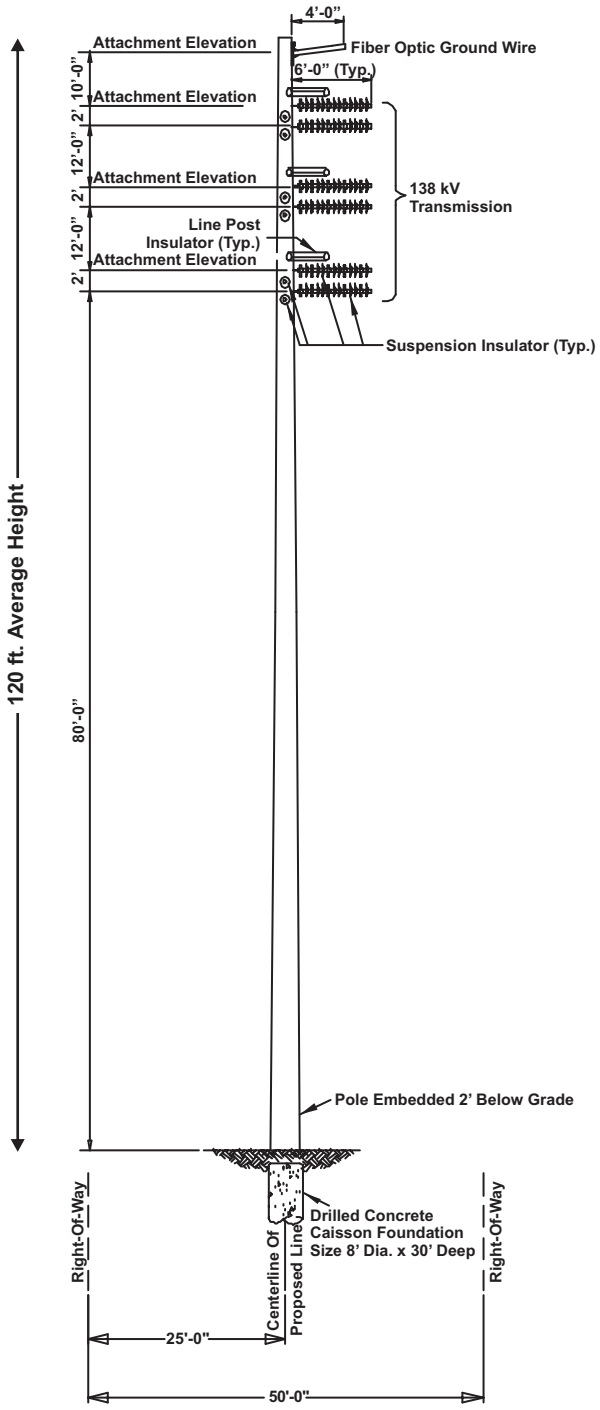
Note: See Figure 2.10 for the pole locations.

Figure 2.11:

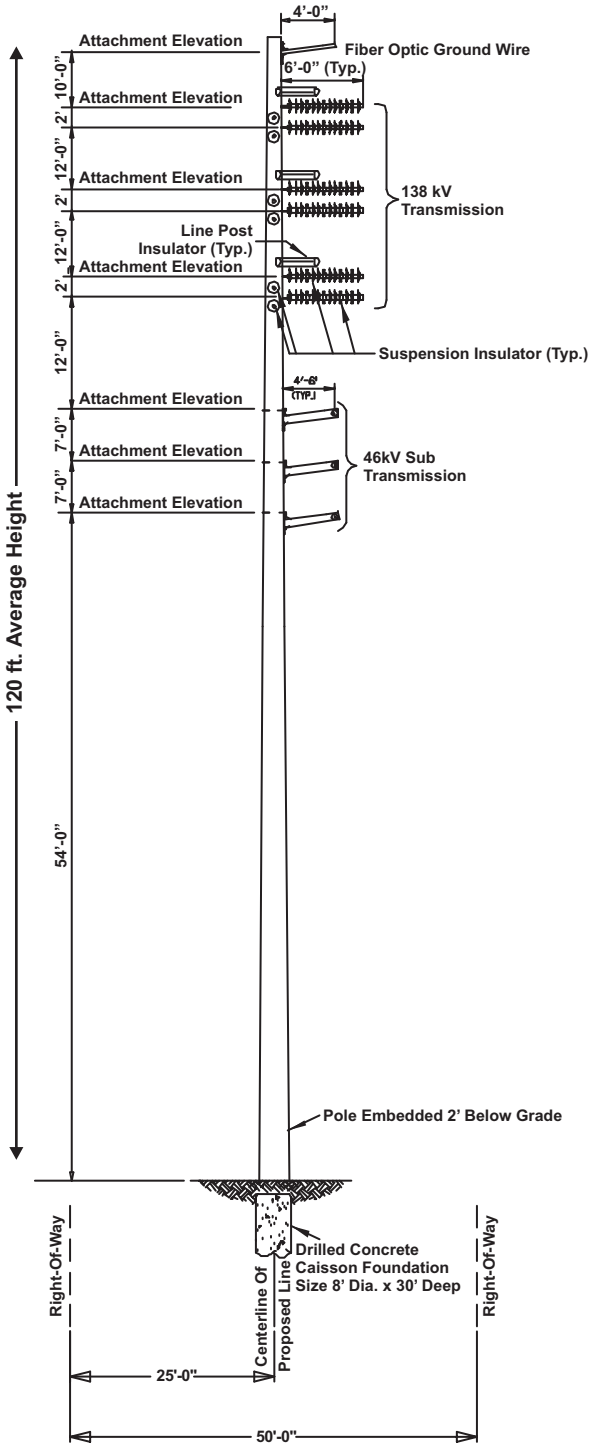
Tangent & Running Angle Transmission Pole Types

CIP Generating Station & Transmission Additions Project

Figure 2-11 Tangent & Running Angle Transmission Poles 2005-11-02.cdr



Ⓒ DEAD END POLES



Ⓓ DEAD END POLES WITH 46kV SUB TRANSMISSION LINES

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Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Hawaiian Electric Co., Inc.

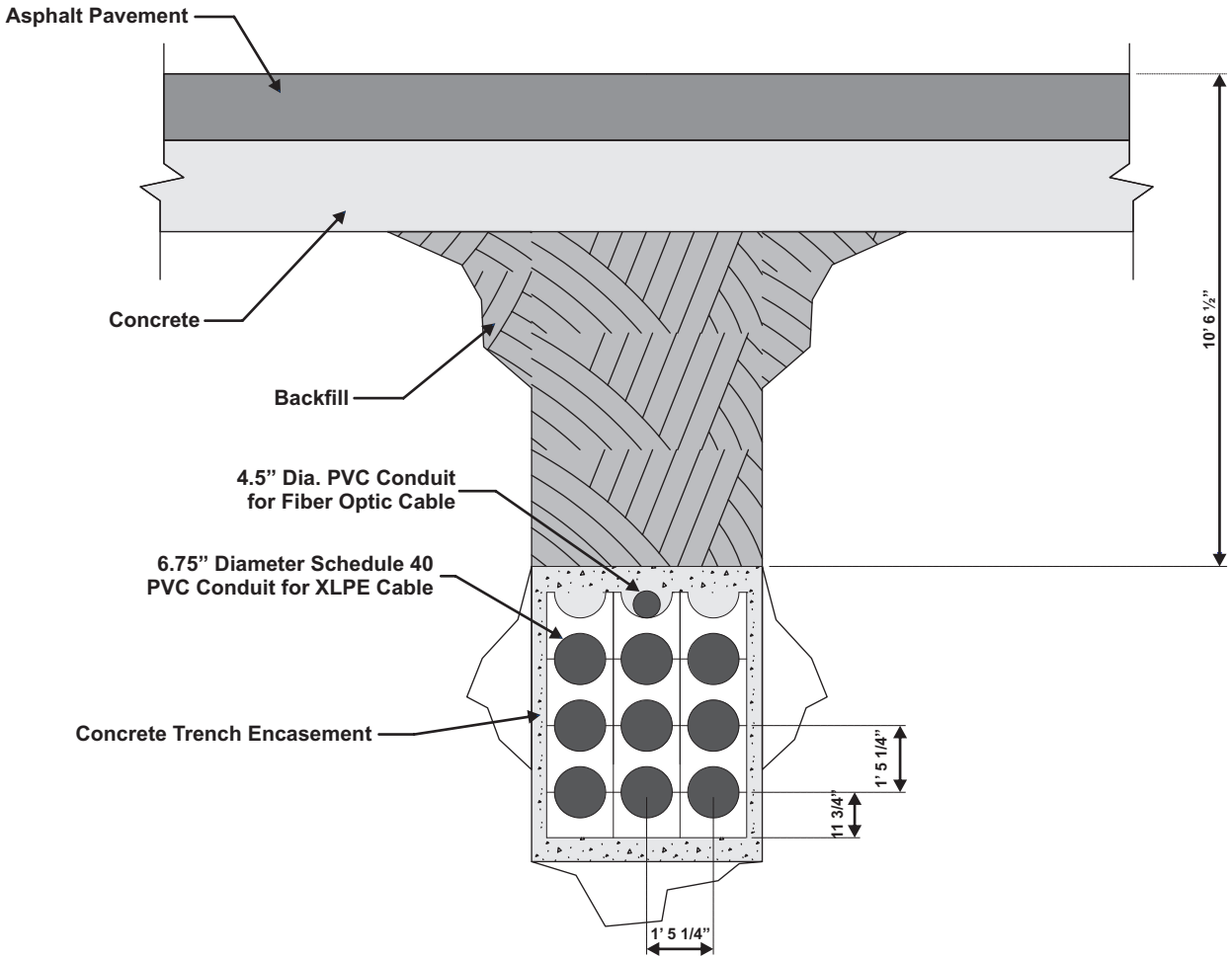
Note: See Figure 2.10 for pole locations.

Figure 2.12:

Dead End Transmission Pole Types

CIP Generating Station & Transmission Additions Project

Figure 2.12 Dead End Transmission Pole Types 2005-11-02.cdr



Typical Duct Bank Section

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Prepared By:

PLANNING SOLUTIONS

Source:

Hawaiian Electric Co.. Inc.

Figure 2.13:

Typical Underground Duct Bank

CIP Generating Station &
Transmission Additions Project

Figure 2-13 Typical Underground Duct Bank 2005-11-02.cdr

2.4 OFF-SITE COMMUNITY BENEFIT ACTIVITIES

Over the past several years there has been increased discussion about the extent to which communities are disproportionately burdened by the placement of community infrastructure in their areas. More recently, in late 2003 and early 2004, the University of Hawai‘i at Mānoa Energy Policy Forum through a sub-group called the Community Impacts Group sought to identify, understand and address the issues related to the impact of locating major infrastructure facilities in communities. The group concluded that the decision-making process for these projects should include input from the impacted communities and that the community consultation process should give the most weight to the communities directly impacted by the projects. A set of protocols for community consultation was recommended.

In accordance with these protocols, HECO began meeting with representatives of residents of West O‘ahu/Wai‘anae Coast communities in 2004 to discuss its plans for energy-related facilities in the region and possible ways of recognizing the burdens being imposed by major infrastructure facilities. The early meetings combined discussions on conventional generating capacity (such as the combustion turbine described in previous sections) with energy efficiency and conservation, distributed generation, and renewable energy (the latter including a possible wind energy project on the ridges above the Kahe Generating Station). Subsequent meetings separated discussions on the proposed unit addition at Barbers Point from those concerning the wind energy project to allow HECO to gather further information on the nature of the wind resource before making decisions concerning the viability and appropriateness of wind energy development in this area.

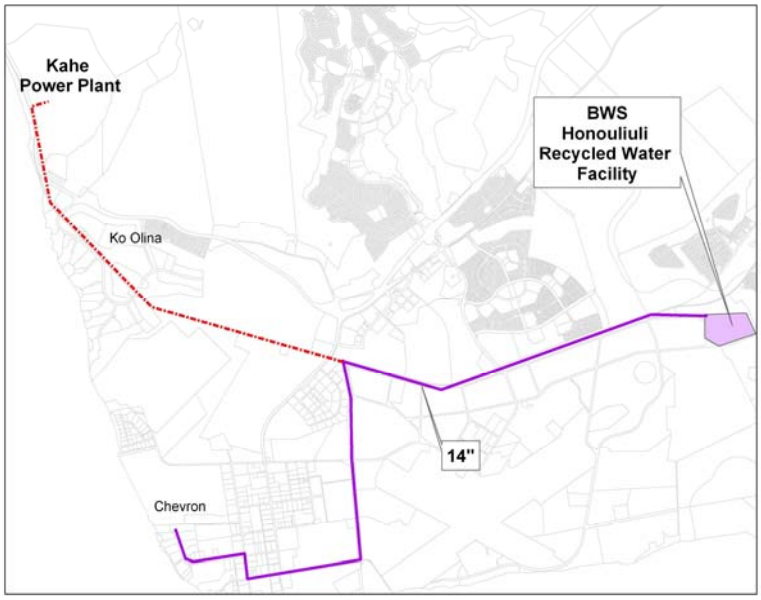
The discussions that HECO held with community representatives concerning the proposed CIP Generating Station project were open, far-ranging, and productive. Based on a set of principles that HECO and the community developed, HECO made the commitments summarized below. The first three are included in a filing with the Public Utilities Commission made at the same time as the filing for the new generating unit, and their implementation is contingent upon PUC approval. The second three are commitments made by HECO that do not require PUC approval.

(1) The company will seek permission to provide a rate discount for the residents in the area immediately proximate to the new unit (i.e., zip code 96707, which includes Makakilo, Kapolei, Honokai Hale, and Ko Olina).[40] More specifically, the request will be to discount the energy charge (but not the fuel charge) for residential ratepayers by 7% for a period of ten years. In order to discourage energy waste, the discount will apply only to the first 786 kilowatt-hours of individual use per month (which is the current average use amount in this area); energy use over that amount will not be discounted. HECO estimates that the value of the discount will amount to approximately $5.0 million over its life.

(2) In conjunction with the Board of Water Supply, Hawaiian Electric Company will construct the facilities and infrastructure necessary for the Kahe Power Plant to use reclaimed wastewater instead of potable water for its power generating equipment at that location. HECO will reduce its potable water consumption by supplying the Kahe demineralizer with RO (Reverse Osmosis) reclaimed water processed by the Board of Water Supply (BWS) from sewage waste water processed at the Honouliuli Wastewater Treatment Plant. Use of RO water will reduce Kahe’s industrial water use of BWS supplied potable water by approximately 140,000 gallons per day. The project will involve construction new Kahe RO water pipeline that will be approximately 4 miles long and will connect to an existing 14-inch BWS RO water pipeline that starts from the Honouliuli Waste Water Treatment Plant and runs along the *mauka* side of Roosevelt Ave. to Campbell Industrial Park. HECO estimates that the new pipeline will cost approximately $6 million.

[40] This area is currently part of the C.L.E.A.N. process that deals with emissions and other impacts from activities in the Campbell Industrial Park.

Generally, the new Kahe RO Water Pipeline will be constructed along existing roadway, utility, and pipeline corridors. It will be in the former Oahu Rail and Land Company (OR&L) Right-of-Way ("ROW") from the west end of Roosevelt Avenue to the Kahe Power Plant area. The new RO water pipeline will tap into the existing 14-inch BWS RO water pipeline at the west end of Roosevelt Avenue. From Roosevelt Avenue, the new RO pipeline will be routed to the former OR&L ROW. Following the former OR&L ROW, the pipeline will run west and will cross Kalaeloa Boulevard, Alinui Drive on the east end of Ko Olina, Olani, and Alinui Drive again at the western entrance to Ko Olina. Upon reaching the Kahe Power Plant, the RO pipeline will cross under Farrington Highway and be routed in the Kahe Power Plant and connect to the piping that feeds the demineralizer. HECO expects that a combination of conventional trenching and directional drilling construction will be used to install the new RO water pipeline.



(3) HECO will establish three additional air quality monitoring stations in the region. One will be located *makai* of the proposed new generating unit, one in Nānākuli, and one in the Waiʻanae area (see left and right for pictures of outside and inside of typical stations.) Each station will be configured to collect background air quality data measuring nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, and particulate matter (PM-10).[41] The instruments operate on a continuous basis and can be controlled remotely from HECO's Environmental Laboratory at Waiau. Each air quality monitoring station consists of an 8' x 14' x 8' enclosed shelter. Meteorological instrumentation is attached to a 10-meter aluminum crank-up tower. The station will require an area of approximately 20' x 30' (600 square feet) and will be secured by perimeter fencing. In addition, Hawaiian Electric will resume the fish monitoring studies it formerly conducted on the Waiʻanae Coast in conjunction with the operation of its Kahe Generating Station. HECO estimates that it will cost approximately $570,000 to set up the new air quality monitoring stations and that together they will cost about $360,000 per year to operate ($120,000 per station). The three air quality monitoring stations will begin collecting data approximately one year prior to the start-up of the new combustion turbine generator at the CIP station. The three stations are expected to continue to operate and collect data after the construction of the new unit until otherwise determined. HECO proposes to work with representatives from the West Oahu/Waiʻanae Coast communities to determine an acceptable format and interval for reporting the data being collected from the three air quality monitoring stations.

[41] The station in the CIP area would also be outfitted with a meteorological monitoring station including SODAR to collect approximately 12 months of confirmatory weather type data such as wind speed, wind direction, vertical wind speed, temperature, precipitation, and standard deviation of wind speed and direction.

In addition to the items that require PUC approval, Hawaiian Electric has committed to several activities that do not require PUC approval. These include:

- A commitment to provide $100,000 a year for ten years to support a resource conservation education program spearheaded by community leaders. In September of 2005, community leaders from the Leeward Coast organized and established *Ka Papa o Kakuhihewa*—a nonprofit organization led by a council of community members that would serve to promote resource conservation practices through education programs. In October of 2005, HECO made a formal commitment to support this community effort by making an initial contribution of $50,000 to *Ka Papa o Kakuhihewa*.
- A promise to create and deliver, on an ongoing basis, a "report card" on company activities in areas such as energy efficiency/demand side management, renewable energy, and electrical use by categories such as residential use. The company will also provide copies of the C.L.E.A.N. (Campbell Local Emergency Action Network) reports to communities in the area.[42]
- Reaffirmation of its commitment to provide strong support for community activities and charitable causes in the West O'ahu/Wai'anae Coast area.

2.5 SCHEDULE

Major schedule milestones for the proposed project are as follows:

- Complete Chapter 343 EIS Process – ~~April~~ August 2006.
- HECO issues notice-to-proceed to construction contractor for transmission line – No Later Than (NLT) June 2008.
- HECO issues notice-to-proceed to construction contractor for generating unit – NLT April 2008.
- Transmission line enters service – NLT December 2008.
- Combustion turbine enters service – NLT July 2009.
- Possible second combustion turbine enters service – if needed, date to be determined

2.6 ANTICIPATED COSTS

The exact capital cost of the proposed generation and transmission additions will depend upon the particular alignment and configuration of the overhead transmission line that is eventually approved, and the construction bidding environment that exists at the time that contracts are awarded. With that caveat, Table 2.2 summarizes HECO's estimates of the anticipated costs. These are preliminary numbers and assume that permit conditions would allow HECO to select the least-cost alternative. Additional costs could be incurred if special features must be incorporated into the design or if the transmission line must be placed underground.

[42] C.L.E.A.N. grew out of safety concerns Campbell Industrial Park tenants had for their staff and community members after a facility accidentally emitted sulfur dioxide, sending several people with nausea to the hospital. C.L.E.A.N. members are AES Barbers Point, BHP Hawaii Inc., Brewer Environmental, Chevron, The Estate of James Campbell, Hawaiian Cement, Hawaiian Electric Co., Marisco Ltd. and Oahu Gas Service Inc. The reference is from www.bizjournals.com/pacific/stories/1997/06/30/focus2.html.

Table 2.2. Estimated ~~Construction~~ Capital Costs.

Item	*Order-of-Magnitude Cost (in million 2004$)*
First Combustion Turbine	$115
AES-CEIP #2 138 kV Transmission Line (Overhead)	$19
Second Combustion Turbine, if needed	$60-90
Community Benefit Capital Costs	$6
Note: In addition to the community benefit capital cost, the rate discount that is part of the community benefits package is expected to have a capitalized cost of approximately $5 million over its life.	
Source: Hawaiian Electric Company, Inc., PUC application, Docket No. 05-0145 and PUC application, docket no. 05-0145 (for community benefits).	

2.7 ALTERNATIVES

2.7.1 FRAMEWORK FOR CONSIDERATION OF ALTERNATIVES

Hawai‘i Administrative Rules (HAR), §11-200-17 (a section in the Office of Environmental Quality Control'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.*

The objectives listed in Section 1.5 of this report were used in identifying the alternatives described below for inclusion in this evaluation. Section 2.7.2 presents the alternatives to the proposed action that HECO has included in this impact analysis. The following two sections (Sections 2.7.3 and 2.7.4) list alternatives that were considered and eliminated from further analysis and discuss HECO's reasons for doing so.

2.7.2 ALTERNATIVES EVALUATED IN THE EIS

This section introduces the alternatives that HECO is including in the impact analysis portion of this EIS. Alternative 1 is the proposed action, which is the focus of the impacts analysis included as Chapter 4. Alternatives 2, 3, and 4 represent various reduced scale action alternatives as required by Chapter 343. The No Action alternative, which would not meet the objectives of the proposed action but which is included in accordance with Chapter 343 and HAR §11-200, is analyzed separately in Chapter 5.0. The potential effects of possible design variations which do not rise to the level of full alternatives are discussed in appropriate sections of Chapter 4 within the context of the relevant action alternatives.

2.7.2.1 Alternative 1: Proposed Action (Combustion Turbine + Overhead Transmission Circuit + With Possibility of Future Second Combustion Turbine)

Alternative 1 consists of HECO's proposed action as described above in Sections 2.2 and 2.3. Implementation of this alternative would ensure that HECO has sufficient electrical generation capacity available in its system to meet the forecast needs of its customers for a number of years, after which further system capacity additions might be needed. In summary, this alternative involves:

- Construction of a single 110 MW simple-cycle combustion turbine peaking unit, including fuel storage, water treatment and storage, and wastewater disposal facilities, on HECO's BPTF site with an in-service-date as early as possible and no later than mid-2009.
- Installation of new electrical equipment (e.g., relays, circuit breakers, and related support equipment) within the AES Substation.
- Acquisition of the 44-foot wide strip of property between the Tank Farm parcel and the adjoining AES Substation to facilitate installation of a 138 kVA underground power feed between the generating unit and the main breaker in the Substation.
- Acquisition of the parcel between the AES Substation and Hanua Street to allow for installation of the additional electrical equipment needed to service CIP generating facilities.
- Construction of an additional 138 kV overhead transmission circuit linking the existing AES Substation with the CEIP Substation.
- Acquisition of easements from Campbell Estate and Chevron for construction of the new 138 kV overhead transmission circuit.
- Installation of new electrical equipment (e.g., relays, circuit breakers, and related support equipment) within the existing CEIP Substation.
- Construction of a second 110 MW simple-cycle combustion turbine peaking unit if needed on HECO's BPTF site. A second unit would only be pursued if HECO's DSM and CHP programs and renewable energy efforts cannot provide the demand reduction and/or additional firm peaking generating capacity needed to allow HECO to meet the peak period energy demand.

This alternative would meet all the project objectives listed in Section 1.5.

2.7.2.2 Alternative 2: Transmission Circuit & Single Combustion Turbine

This "reduced scale" alternative is nearly the same as Alternative 1 except that it forecloses the option of installing a second CT if HECO's DSM programs, CHP programs and renewable energy efforts cannot provide the demand reduction and/or additional firm peaking generating capacity needed to allow HECO to meet customers' peak period energy demand. Thus, the maximum generating capacity provided by this alternative would be the 110 MW provided by the single planned combustion turbine. Alternative 2 would not meet Objective 5.

2.7.2.3 Alternative 3: Single Combustion Turbine Only

The generation portion of this alternative is identical to that in Alternative 2. However, this alternative does not provide additional transmission capacity. As a result, the electrical transmission system serving the area would not have sufficient capacity to accommodate the total output from all of the electrical generating units at CIP. This alternative would not meet Objectives 2 and 5.

2.7.2.4 Alternative 4: Additional Transmission Circuit Only

This alternative consists solely of the transmission-related improvements in Alternative 1. It would improve the reliability of the transmission facilities that connect the three major CIP generating complexes (Kalaeloa, AES, and HPOWER) to the grid, but it would not supply additional generating capacity to the system. Consequently, it would achieve only three of the nine objectives (Objectives 2, 7, and 8).

2.7.3 POWER SUPPLY ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

2.7.3.1 Use DSM, CHP, and Renewable Energy to Meet All Capacity Requirements

As previously discussed, HECO is actively pursuing measures through DSM, CHP, and renewable energy efforts intended to limit the increase in the amount of electrical power supply to its customers from central-station generation. However, the analyses carried out as part of the IRP-3 process show that these alone do not have the potential to provide sufficient firm capacity to eliminate the immediate need for at least the first generating unit. Consequently, all of the IRP Finalist Plans included the first CT, as did the Draft Preferred Plan that the IRP Advisory Group reviewed and the Final Preferred Plan proposed by the Company.

Over the long run, HECO expects DSM to moderate increases in the peak loads on its system. It also believes that CHP projects can provide reliable firm capacity as projects are developed over the next decade. While it is theoretically possible that some renewable sources (e.g., wind power combined with pumped-storage hydropower[43]) may eventually be able to provide some firm capacity, actual realization of this potential is dependent upon resolution of numerous key technical, cost, and permitting issues. Consequently, this report does not treat them as alternatives. While they are often overlooked, particularly when they are being discussed conceptually, construction and operation of the facilities needed to take advantage of renewable resources generally involve their own environmental effects. Thus, a wind power/stored hydropower combination that might provide firm power has the potential to disturb natural areas, disturb stream courses, affect views from sensitive areas, raise safety concerns (in the event of a failure of the storage reservoir), affect sensitive habitat, and have a variety of other potentially serious effects that can only be identified by site-specific analyses.

2.7.3.2 Develop Fossil Fuel-Fired Generating Units on Another Site

Relatively few areas on the island of O‘ahu have the land use, zoning, fuel supply infrastructure, and other qualities that facilitate development of the proposed generating units. The alternate locations that HECO considered but eliminated from detailed consideration follow below.

Other Existing HECO Property (I-2 Zoned): A combination of the urban development that has grown up around HECO’s existing Honolulu Generating Station and Waiau Generating Station and air emission/air quality limitations make it difficult to add new fossil fuel-fired generating units at those

[43] Pumped storage hydroelectricity is a method of storing energy that is produced by a variable resource (such as wind) for use during periods when the variable resource is not available. In this approach, water is pumped up into a reservoir (where it has potential energy) and released through a penstock and turbine located below the reservoir to produce electricity when it is needed. Due to evaporation losses from the exposed water surface and mechanical efficiency losses during conversion, only 70% to 85% of the electrical energy used to pump the water into the elevated reservoir can be regained when it is released, but this efficiency may be when viewed in the context of the efficiency of other storage systems (e.g., about 90% for lead-acid batteries and 40-70% for hydrogen/fuel cell combinations.

locations. The same factors apply to replacing older units with newer ones with greater generating capacities. The Kahe Generating Station is more remote and its environs less developed, but air shed limitations stemming from its location close to surrounding ridges restrict the ability to add generating capacity at that location.

Other I-2 Zoned Property: The City and County of Honolulu Geographic Information System (GIS) database shows 2,430 parcels with I-2 zoning. However, nearly all of them are already developed, are too small to accommodate the required facilities, or have other characteristics that make them unsuitable for the proposed project. Of the few that do have these qualities, nearly all are within CIP and, therefore, do not differ significantly from the proposed site with respect to regional land use issues. Moreover, with the following exceptions, all are inferior to the site that HECO has proposed with respect to their ability to tie into existing electrical substations, electrical transmission facilities, and fuel storage and delivery facilities. The exceptions are vacant land on the Diamond Head side (east) of the AES Barbers Point Generating Unit, the undeveloped shoreline parcels *makai* (south) of the AES, HPOWER, and Tank Farm parcels, and a parcel near the Tesoro Refinery. Use of these areas in lieu of the proposed site offers no discernible advantages, would require HECO to acquire land that it does not presently own, and would necessitate the construction of new fuel pipelines within Campbell Industrial Park. Because these other locations do not provide measurable environmental advantages to the Tank Farm site, HECO is not considering them.

Other Areas Where Re-Zoning Would Be Required: Obtaining the I-2 zoning needed to develop a new generating station is a very time-consuming process. Experience on O‘ahu and on other islands shows that it typically takes a minimum of seven to ten years to obtain the approvals needed to start construction and several more years before a generating unit can begin delivering power to the grid. This is much longer than the two to three years needed for a site (such as the one that HECO has proposed) that already has the appropriate zoning. Equally important, while it is by no means certain that approval would eventually be obtained if the proposed facility is located on a site that already has the appropriate zoning, the likelihood of success has proven to be much greater than it is for “green fields” sites. In view of the foregoing, HECO believes that areas that do not already have the required zoning are not feasible alternatives for the proposed action and is not considering them.

2.7.4 TRANSMISSION ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

HECO evaluated alternative means of avoiding transmission criteria violations on the basis of their effectiveness, reliability, feasibility of implementation, and cost. The reasons that they were judged unacceptable are as follows.

2.7.4.1 Relying on System Operator Action

This option relies on the system operator intervening immediately to correct any transmission line overload conditions after the fact. HECO does not consider this a viable alternative for two reasons. First, the alternative does not address the CIP Reliability Concern, i.e., it does not provide additional paths for power to flow from CIP into the HECO transmission and distribution grid. CIP generation would still have only two available paths to export power. Second, it would not address the AES-CEIP and Kalaeloa-Ewa Nui line overloads.

Those overloads could still occur and would require immediate corrective system operator response after the fact. Calculations performed using Electric Power Research Institute’s (EPRI’s) Dynamp software show that the AES-CEIP line could reach its thermal limit in about 12 minutes with one new CT running should the Kalaeloa-Ewa Nui line trip out of service due to failure or fault. Similarly, the Kalaeloa-Ewa Nui line could reach its thermal limit in about 15 minutes with one CIP CT running and about 6 minutes with both CTs running, should the AES-CEIP line trip out of service due to failure or fault. If total CIP generation were not reduced to below 435 MW within the appropriate time, the overloaded line could fail and result in the loss of all CIP generation and subsequent load shedding. Additionally, permanent damage to the conductors of the overloaded line could require prolonged outages to facilitate repair work.

2.7.4.2 Re-Rating Existing Lines

The amount of current that a transmission line can safely carry is limited mainly by conductor temperature. A conductor's temperature is influenced by 1) the physical and electrical properties of the conductor (e.g., its size, stranding, resistance, and material), 2) the amount of current flowing in the conductor, and 3) weather conditions such as air temperature, solar radiation, and wind speed and direction. When lines are first installed, they are generally given a rating that allows them to safely operate under the most extreme conditions (e.g., high temperature, high solar radiation, and wind blowing parallel to the direction of the lines). As a utility gains experience with the environmental conditions and operation of the lines or if it is able to conduct studies that demonstrate the actual environmental conditions are such that it is prudent to consider a higher current carrying capacity rating, the lines can sometimes be re-rated. In order to consider changing the rating for the AES-CEIP and Kalaeloa-Ewa Nui line, accurate and sustained data along various points for each of the lines, which is presently not available, is needed.

Based on current industry experience with this alternative, re-rating the lines can allow an increase in current carrying capacity of 0 to 30 percent. In a hypothetical case where the existing lines serving the CIP generators could be re-rated to the extreme upper end of this range (30 percent), it would theoretically be possible for a single line to carry all of the electrical power produced by the existing generators at CIP plus one of the proposed new generating units. Anything less than the maximum possible increase would still leave a single circuit that would be unable to carry the entire system load; in that case the need to provide an additional circuit in order to assure the availability of the full CIP generating capacity in the event of a single line failure would remain.

There are two further points that must be made about re-rating as a means of avoiding the need for an additional transmission line to serve the existing and proposed CIP generators. First, re-rating would increase the risk of overloading the lines by loading them closer to their physical limitations, thereby reducing safety margins during unanticipated changes in weather. In addition, even if additional data and analysis were to suggest that re-rating the lines to a higher capacity is justifiable, HECO would still have to undertake major upgrade work at the AES, CEIP, Kalaeloa, and Ewa Nui substations — work which would necessitate daily outages and purchase of additional land at the CEIP Substation.

After considering all factors, HECO concluded that line re-rating: (i) is unlikely to provide sufficient transmission capacity for even a single additional combustion turbine, (ii) would not provide highly desirable backup for the two existing lines, and (iii) would certainly provide inadequate electrical transmission capacity to accommodate two additional combustion turbines. This, together with the fact that re-rating would entail very difficult and costly substation upgrades to accommodate the increased power flow on the AES-CEIP and Kalaeloa-Ewa Nui lines, led HECO to conclude that re-rating is not a viable alternative.

2.7.4.3 Replacing the Conductors on Existing Lines

HECO also considered the possibility of replacing the existing wires on the two electrical transmission circuits, the AES-CEIP and Kalaeloa-Ewa Nui lines, to provide sufficient current-carrying capability. It evaluated 3M's state-of-the-art 795 kcmil high-temperature, low-sag conductor for both lines. The analysis assumed re-use of as many of the existing poles as possible to minimize cost.

This conductor would provide the required normal and emergency current-carrying capacities of 2,400 amps and 3,000 amps, respectively. Even if two combustion turbines of the size range HECO is considering are eventually needed at the proposed new generation site, this is sufficient to accommodate their addition to the electrical power produced by the generators already present in CIP.

Despite the fact that re-conductored lines would have sufficient capacity once they are in place, the reduced transmission capacity that would exist while the re-conductoring is being done makes this alternative infeasible. During the line replacement work, the line being re-conductored must be

removed from service on a daily basis for the safety of the work crews. As discussed previously, this would require that CIP generation be limited to 180 MW whenever such work is performed. This limitation would force HECO to use less efficient generating units to meet its customers' needs than would otherwise be the case. More importantly, it would reduce the generating capacity available to the system. Additionally, the same substation upgrades and issues previously discussed in the "Re-Rating" option would occur.

HECO's analysis concluded that this would not improve the reliability of service to the CIP area, would be costly, and would be difficult to implement (particularly the substation upgrades needed to accommodate the increased power flow on the AES-CEIP and Kalaeloa-Ewa Nui lines).

2.7.4.4 Installing Additional 138 kV Kalaeloa-CEIP Line

Installing a new 138kV line between the Kalaeloa and CEIP Substations would alleviate the CIP Reliability Concern and the AES-CEIP and Kalaeloa-Ewa Nui line overloads by providing another path for power to flow. In this regard it is very similar to HECO's proposal to construct a new transmission line between the AES and CEIP Substations. Results of load-flow analysis indicate that both new-line alternatives are effective in alleviating overload conditions on the existing AES-CEIP and Kalaeloa-Ewa Nui lines. However, HECO's analysis indicates that an AES-CEIP line could support more CIP generation than a new Kalaeloa-CEIP line and would provide better longevity. Because an additional 138 kV Kalaeloa-CEIP line does not provide any apparent environmental advantages over the AES-CEIP line that HECO has proposed and is inferior from an operational viewpoint, HECO is no longer considering this as an alternative to the proposed action.

2.7.4.5 Double-Circuit Existing Line

A number of the transmission lines in HECO's system are double-circuited, i.e., each pole carries two lines. This is an appropriate and economical design approach in situations where there are numerous alternate transmission routes that are capable of carrying the load if a single event affects operation of both 138 kV lines on the double-circuited poles. Because this is not true at CIP, adding an additional circuit to one of the existing transmission line's poles would not address the CIP reliability problem. If all of the CIP generation was operating, the one remaining transmission line would trip on overload, cutting customers off from the generating capacity at CIP. Like reconductoring, double-circuiting the AES-CEIP transmission line would provide the required additional current-carrying capacity without providing the desired redundancy.

2.7.5 CONSIDERATION OF DESIGN 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. This EIS will address these requirements in the following ways.

2.7.5.1 Smaller Generating Unit

Installing and operating a single, smaller (i.e., less-than 110 MW capacity) combustion turbine generating unit is possible, but a smaller unit would be incapable of providing HECO the additional generating capacity it needs to meet the forecast 2009 peak demand. Follow-on construction would be needed immediately. Moreover, because the construction impacts of a smaller generating unit would be substantially identical to those of the proposed version and the operating emissions would be comparable on a unit-output basis (i.e., emissions per kilowatt-hour), including a detailed discussion of such an alternative would not add substantially to readers' understanding of potential effects. Consequently, HECO is not considering generating units of less than 110-megawatt capacity.

2.7.5.2 Design Variations

Alternate CT Models. HECO considered three combustion turbine models from different manufacturers before selecting the Siemens-Westinghouse 501 D5A. The other two were the General

Electric 7EA and the Alstom CT11N2 models. All three models had similar characteristics. The Siemens-Westinghouse model was selected based on cost (the manufacturers placed competitive bids) as well as on environmental factors such as water use and efficiency (including the potential for enhanced capacity through water injection).

Underground Transmission Lines. Another design variation HECO is considering is placing the proposed transmission lines underground, rather than stringing them on overhead poles as in the preferred alternative. This would involve leaving the existing line as is and placing the new line underground along the route depicted on Figure 2.9. Alternatively, it could involve undergrounding only a portion of the proposed circuit in order to minimize visual impacts to various public vantage points and sensitive uses identified in Section 4.9. Discussions of the environmental and economic impacts of underground versus overhead lines are included in relevant sections of Chapter 4.

2.7.6 NO ACTION

HAR §11-200-17(f)(1) requires an evaluation of "no action". In the case of HECO's proposed CIP Generating Station and Transmission Additions Project, "No Action" consists of failing to install or arrange for the installation of the additional generating capacity and transmission capacity needed to bring electrical energy supply and demand into balance. Failure to provide that balance would lead to systematic load shedding (i.e. curtailing the supply of electricity to some customers), or, if the load shedding were insufficient or could not be implemented in time, would lead to unplanned power outages of indeterminate geographic extent and duration. In either case, the adverse effect on its customers would be substantial and would prevent HECO from meeting its PUC mandate to provide reliable power to its customers. This alternative and its implications are discussed in further detail in Chapter 5.0

3.0 OVERVIEW OF THE EXISTING ENVIRONMENT

This chapter provides an orientation to the environmental, cultural, and social characteristics of the areas that would be affected by the alternatives described above. The proposed action could directly affect the following geographical areas: 1) the Barbers Point Tank Farm (BPTF) and adjacent 44-foot wide parcel that HECO plans to acquire from HRPT Properties Trust, a successor of Campbell Estate; 2) the Campbell Estate Industrial Park (CEIP) substation; 3) the AES Substation and adjacent land that HECO plans to acquire, and 4) the existing and planned overhead transmission line corridors connecting the CEIP and AES substations (see Figure 2.9). If the new transmission connection is underground, HECO expects that it would follow the alignment shown on Figure 2.9.[44] The underground alignment follows existing and/or future planned road and/or drainage rights-of-ways rather than the current transmission corridor.

The discussion is organized by topic (e.g., topography, hydrology, sound levels, etc.). The information is intended primarily as a means of orienting readers to the general characteristics of the project area and to outline the general kinds of resources that will be examined in further detail in the impact analysis included in Chapter 4.

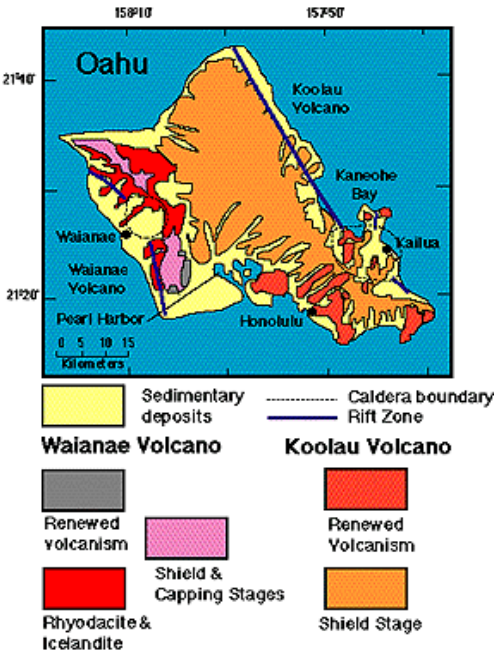
3.1 PHYSIOGRAPHY AND TOPOGRAPHY

The area affected by the proposed project is on O‘ahu’s southern coastal plain. The terrain at the BPTF, AES Substation, and CEIP Substation sites is relatively flat, with slopes of a few percent or less. The BPTF is approximately 10 feet above mean sea level (msl). From there, the terrain slopes gradually upward along the transmission corridor, reaching 70 feet above msl at the CEIP Substation site, which is located approximately 1.5 miles north by northeast of the BPTF. The Wai‘anae Mountains are located approximately 5 miles to the north of the BPTF.

3.2 GEOLOGY AND SOILS

O‘ahu is the eroded remnant of the Wai‘anae and Ko‘olau volcanoes. Lava flows from the western flank of the Ko‘olau Volcano banked against the eastern flanks of the older Wai‘anae 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 the new facilities would be constructed, is formed from a seaward thickening wedge of 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. These interbedded marine and non-marine sediments, which are hundreds of feet thick near the site, are collectively referred to as caprock. The caprock is underlain by fractured basalt from the Wai‘anae volcano.

Figure 3.1. Geological Setting



[44] If the underground alternative is selected, the existing transmission line would remain in place and the new line would be placed underground.

Table 3.1 Characteristics of Soil Types Within the Project Area.

Soil Type	*Slope %*	*Depth to Coral Limestone (in)*	*Permeability*	*Runoff*	*Erosion Hazard*	*Land Uses*
Coral Outcrop	--	--	High	Very Slow	Slight	Military installations, quarries, urban development
Mamala stony silty clay loam	0-12	8-20	Moderate	Very Slow-Medium	Slight to Moderate	Sugarcane, truck crops, and pasture
‘Ewa silty clay loam	0-2	20-50	Moderate	Very Slow	Slight	Sugarcane, truck crops, and pasture
Source: General Soil Survey of Hawai‘i, Foote et al. 1972 (U.S. Soil Conservation Service).						

The majority of the industrial facilities at the CIP, including the BPTF, are underlain by coral outcrop and recently placed fill. The *mauka* portions of the project area have received erosional products from the southern portions of the Wai‘anae Range. The soil at the CEIP Substation site is Mamala stony silty clay loam (Foote 1972, General Soil Map, O‘ahu Island, Hawai‘i). In addition, there are two small patches (< 20,000 square feet combined) of ‘Ewa silty clay loam along the transmission corridor. Table 3.1 lists selected characteristics of the soil types in the project area. According to the Agricultural Lands of Importance to the State of Hawai‘i (ALISH) map shown on Figure 3.2, the two patches of ‘Ewa silty clay loam along the transmission corridor are considered Prime agricultural land. The remainder of the project area is either unclassified or defined as "Other Agricultural Lands" by the ALISH map.

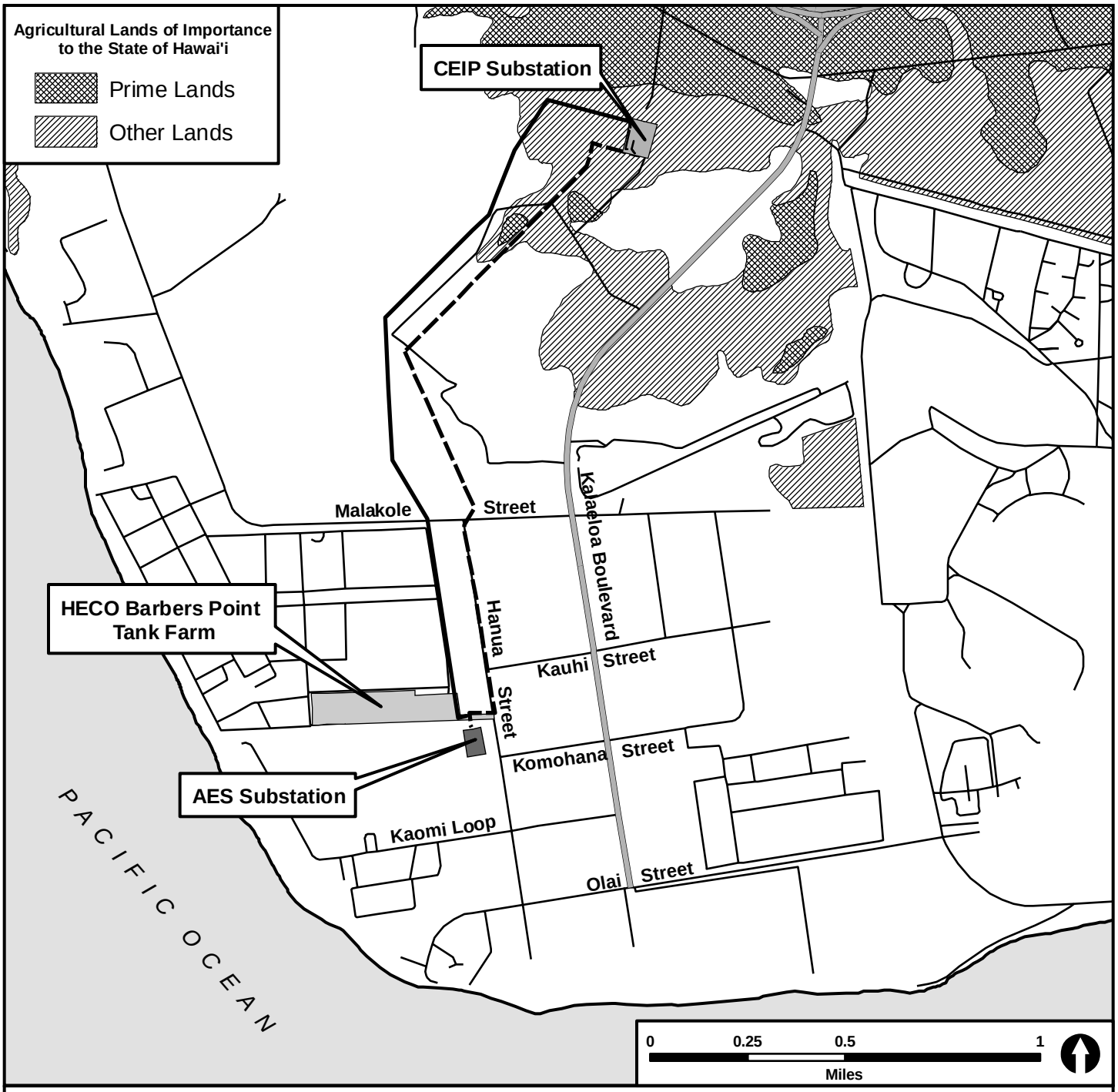
3.3 CLIMATE AND EXISTING AIR QUALITY

3.3.1 CLIMATOLOGY

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 much more frequent in the mountains, also contribute to annual precipitation.

3.3.1.1 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˚ Fahrenheit (F) (January) and 81.4˚F (July), respectively. These temperature variations are quite modest compared to those that occur at inland continental locations. Additional temperature data from Honolulu International Airport are summarized in Table 3.2.



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

--Hawaiian Electric Co., Inc.
--City & County of Honolulu GIS
--State of Hawaii GIS

Legend:

- AES-CEIP #1
- AES CEIP #2
- Major Roadways
- Other Roadways

Figure 3.2:

Agricultural Lands of Importance to the State of Hawai'i (ALISH)

CIP Generating Station & Transmission Additions Project

Figure 3-2 Agricultural Lands of Importance 2005-11-03.mxd

Table 3.2. Average Monthly Temperature, Rainfall, and Humidity

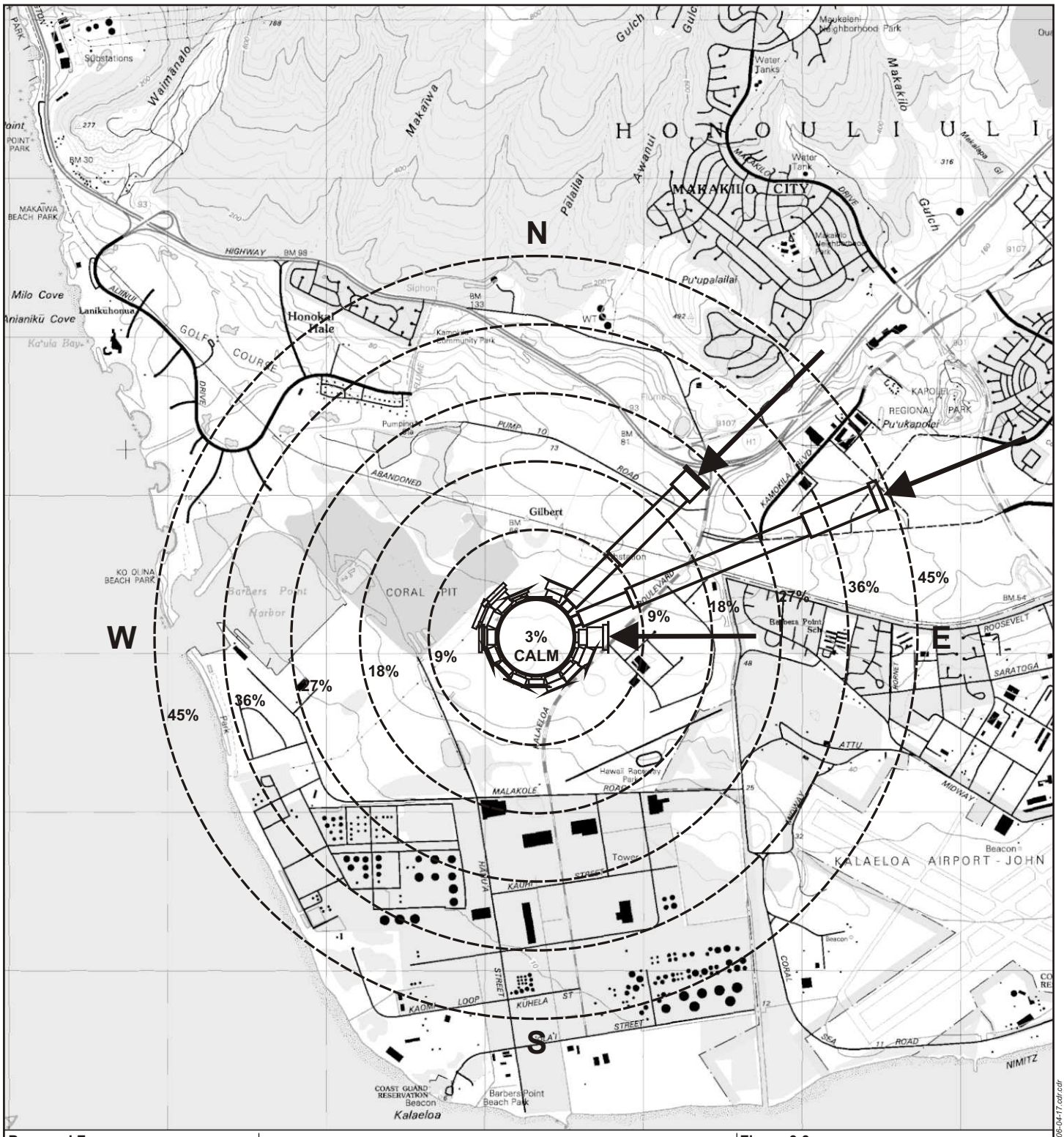
	Normal Ambient Temperature, °Fahrenheit		*Average Monthly Rainfall (inches)*		
Month	***Daily Minimum***	***Daily Maximum***	***Monthly Minimum***	***Monthly Maximum***	***Average Relative Humidity (%)***
January	65.7	80.4	0.18	14.74	71
February	65.4	80.7	0.06	13.68	69
March	66.9	81.7	0.01	20.79	65
April	68.2	83.1	0.01	8.92	62.5
May	69.6	84.9	0.03	7.23	60.5
June	72.1	86.9	T	2.46	59
July	73.8	87.8	0.03	2.33	60
August	74.7	88.9	T	3.08	60
September	74.2	88.9	0.05	2.74	61.5
October	73.2	87.2	0.07	11.15	63.5
November	71.1	84.3	0.03	18.79	67
December	67.8	81.7	0.04	17.29	74.75
Note: "T" signifies a trace amount of rainfall (i.e., less than 0.01 inch).					
Source: State of Hawai'i Data Book 2003 (Data from Honolulu International Airport).					

3.3.1.2 Rainfall and Humidity

Topography and the dominant northeast trade winds are the two primary factors that influence the amount of rainfall that falls on any given location on O'ahu. On the island's windward side near the top of the Ko'olau Range, which is fully exposed to the trade winds, rainfall averages nearly 250 inches per year. On the leeward side of the island, where the project is located, the annual average rainfall is much lower (see Table 3.2). Average annual rainfall in the area is less than 20 inches per year. Although the project area is on the leeward side of the island, the humidity is still moderately high, ranging from the mid-60 to the mid-70 percent.

3.3.1.3 Wind Patterns

The northeasterly trade winds predominate in the project area (see annual wind rose in Figure 3.3). 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 wind speed averages 12.8 miles per hour. The trade winds become weaker and less persistent in the winter. During that season, 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.



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

--Hawaiian Electric Co., Inc.
--USGS 7.5' Quad Map *'Ewa*

Figure 3.3:

Annual Wind Rose for Campbell Industrial Park

CIP Generating Station & Transmission Additions Project

Figure 3-3 Annual Wind Rose for Campbell Industrial Park 2006-04-17.cdr.cdr

3.3.2 AIR QUALITY

3.3.2.1 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, 2.5-micron and 10-micron particulate matter ($PM_{2.5}$ and 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 five of the six criteria pollutants (excluding $PM_{2.5}$) in addition to hydrogen sulfide (DOH 2003).

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 measured. The allowable concentrations are based on 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 3.3 presents the state and national ambient air quality standards for selected pollutants.

Table 3.3. State and National Ambient Air Quality Standards

Pollutant/Averaging Period	*Standard, $\mu g/m^3$*		
	State Standard	*Federal Primary[1]*	*Federal Secondary[2]*
Nitrogen Dioxide (NO_2): Annual	70	100	100
Sulfur Dioxide (SO_2): 3-hour	1300	---	1300
Sulfur Dioxide (SO_2): 24-hour	365	365	---
Sulfur Dioxide (SO_2): Annual	80	80	---
Carbon Monoxide (CO): 1-hour	10,000	40,000	40,000
Carbon Monoxide (CO): 8-hour	5,000	10,000	10,000
2.5-micron Particulate Matter ($PM_{2.5}$): 24-hour	---	65	65
2.5-micron Particulate Matter ($PM_{2.5}$): Annual	---	15	15
10-micron Particulate Matter (PM_{10}): 24-hour	150	150	150
10-micron Particulate Matter (PM_{10}): Annual	50	50	50
Ozone: 1-hour	---	235	235
Ozone: 8-hour	157	157	157
Hydrogen Sulfide (H_2S): 1-hour	35	---	---
Lead: 3 months	1.5	1.5	1.5

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

Source: DOH (2003)

3.3.2.2 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 nine monitoring sites. The primary purpose of the monitoring network is to measure ambient air concentrations of the six criteria NAAQS pollutants. The three monitoring sites closest to the proposed project are listed in Table 3.4, and the air quality at these locations during the year 2003 is summarized in Table 3.5. As shown by these data, air quality in the area during that year never exceeded the short-term or long-term State or National ambient air quality standards for the six pollutants measured [particulate matter ($PM_{2.5}$ and PM_{10}), nitrogen dioxide (NO_2) sulfur dioxide (SO_2), carbon monoxide, and hydrogen sulfide]. The Department of Health’s only ozone monitoring station on O‘ahu is located on Sand Island. Existing ozone concentrations at that location also meet State and Federal ambient air quality standards. Brief descriptions of the regulated pollutants follow below.

Ozone. Ozone (O_3) is an end-product of complex reactions between reactive organic gases (ROG) or non-methane hydrocarbons (NMHC) and oxides of nitrogen (NOx) in the presence of intense ultraviolet radiation. ROG and NOx emissions from vehicles and stationary sources, in combination with daytime wind flow patterns, mountain barriers, a persistent temperature inversion, and intense sunlight, contribute to high ozone concentrations.

Nitrogen Dioxide. Nitrogen dioxide (NO_2) is formed primarily in the atmosphere from a reaction between nitric oxide (NO) and oxygen or ozone. Nitric oxide is formed during high-temperature combustion processes when the nitrogen and oxygen in the combustion air combine. Although NO is much less harmful than NO_2, it can be converted to NO_2 in the atmosphere within a matter of hours, or even minutes under certain conditions.

Carbon Monoxide. Carbon monoxide (CO) is a product of incomplete combustion, principally from automobiles and other mobile sources of pollution. Industrial sources typically contribute less than 10 percent of ambient CO levels.

Sulfur Dioxide. Sulfur dioxide (SO_2) is produced when any sulfur-containing fuel is burned. Because of the complexity of the chemical reactions that convert SO_2 to other compounds (such as sulfates), peak concentrations of SO_2 occur at different times of the year in different areas, depending on fuel characteristics and local weather and topography.

Fine Particulate (PM_{10}). Particulate matter in the air is caused by a combination of wind-blown fugitive dust; particles emitted from combustion sources (usually carbon particles); and organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons (sulfur oxides and oxides of nitrogen). In 1987, EPA adopted standards for fine particulate (PM_{10} - particulate matter less than 10 microns in size) and phased out the prior total suspended particulate (TSP) standards. PM_{10} standards were substituted for TSP standards because PM_{10} corresponds to the size range of inhalable particulate related to human health.

Table 3.4. Nearby Air Quality Monitoring Stations.

Station	*Site Name/Type*	*Description*	*Station Type*			
			PM_{10}	*CO*	*SO_2*	*NO_2*
7	Makaiwa	Rural/Industrial			S	
8	West Beach	Rural/ Industrial	S, C		S	
9	Kapolei	Rural/Industrial	S	S	S	S
C= Co-located Site S= State and Local Air Monitoring Stations						
Source: DOH (2003)						

Table 3.5. Air Quality at Nearby Locations: 2003.

Sampling Station	*PM_{10}*			*$PM_{2.5}$*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Makaiwa	--	--	--	--	--	--
Kapolei	72	29	14	11	9	4
West Beach	33	29	16	--	--	--
	1-Hour Carbon Monoxide			*8-Hour Carbon Monoxide*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Makaiwa	--	--	--	--	--	--
Kapolei	2166	1596	413	841	770	413
West Beach	--	--	--	--	--	--
	3-Hour SO_2			*24-Hour SO_2*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Makaiwa	91	71	3	18	16	3
Kapolei	26	19	1	9	9	1
West Beach	16	10	0.2	4	3	0.2
	Nitrogen dioxide			*1-hour Hydrogen Sulfide*		
	Annual range		*Annual Mean*	*Highest Values*		*Annual Mean*
	Minimum	*Minimum*		*Highest*	*2nd Highest*	
Makaiwa	--	--	--	--	--	--
Kapolei	--	--	9	--	--	--
West Beach	--	--	8	--	--	--

Note 1: PM10 samplers operated for 24 hours once every 6 days in accordance with EPA guidelines.
Note 2: PM2.5 samplers operated for 24 hours once every 3 days in accordance with EPA guidelines.
Note 3: Based on 24-hour sampling, in micrograms per cubic meter.
Note 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 (PM10), sulfur dioxide (SO2), and carbon monoxide.

Source: DOH (2003).

3.3.2.3 Other Air Quality Issues

3.3.2.3.1 Hazardous Air Pollutants

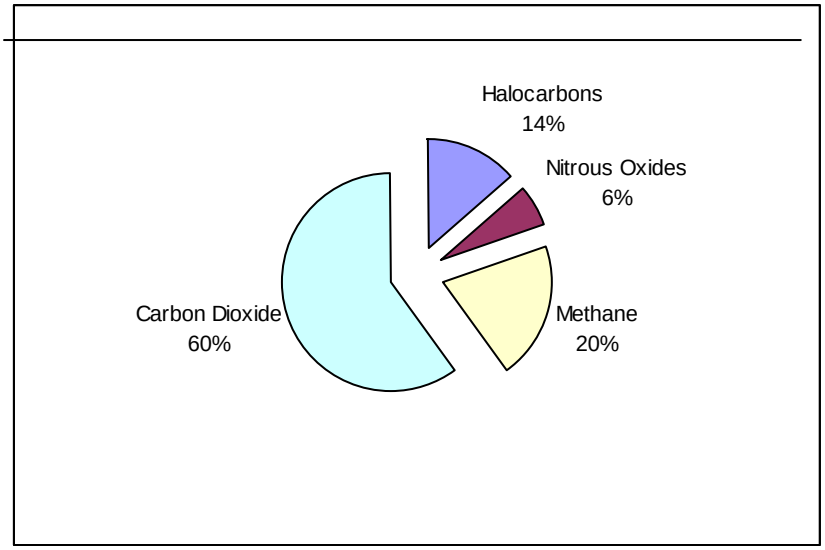
Hazardous air pollutants are substances that have the potential to cause or contribute to an increase in mortality or an increase in serious illness, or that may pose a present or potential hazard to human

health. Sources of hazardous air pollutants are regulated under Section 112 of the Clean Air Act.. Additionally, the federal fuel standards, including the gasoline standards that became effective in 1996 and the diesel fuel standards that become effective in 2006, are expected to result in significant reductions in hazardous air pollutants from motor vehicles. Motor vehicles, as a category, are the sources of toxic air contaminants that contribute most significantly to health risks in urban areas.

3.3.2.3.2 Global Warming

Global warming is the name given to the projected increase in worldwide average temperatures as a result of the "greenhouse effect." The greenhouse effect is due to the increased concentration of carbon dioxide (CO_2) and several other gases in the atmosphere (see Figure 3.4). Like the glass in a greenhouse, these gases are transparent to visible light, but absorb energy in the infrared spectrum. Visible light from the sun is thus transmitted through to the earth's surface, but infrared radiation from the earth's surface is absorbed near the atmosphere, rather than radiating back to space. As a result, higher CO_2 concentrations cause more heat buildup within the atmosphere than would otherwise be the case. Table 3.6 shows greenhouse gas emissions from the United States in 2004, the most recent year for which complete data are available.[45] Table 3.7 shows U.S. emissions of CO_2 from fossil fuel combustion as attributed to a range of economic sectors. A full discussion of greenhouse gases as they relate to global warming and the proposed project is presented in Section 4.3.11.

Figure 3.4. Relative Contribution of Human-Caused Greenhouse Gases to Climate Change.



Source: Planning Solutions, Inc. after State of Hawai'i Department of Business and Economic Development, March 29, 2006.

[45] Emissions data are reported in metric tons (2,205 pounds, or about 10 percent heavier than the 2,000 pound English short ton). Table 3.6 shows emissions of greenhouse gases in terms of the full molecular weights of the native gases. Most other statistics concerning emissions of carbon dioxide and other greenhouse gases are given in "carbon dioxide equivalents". In the case of carbon dioxide, emissions denominated in the molecular weight of the gas or in carbon dioxide equivalents are the same. Carbon dioxide equivalent data can be converted to carbon equivalents by multiplying by 12/44 (0.272727).

Emissions of other greenhouse gases (such as methane) can also be measured in carbon dioxide equivalent units by multiplying their emissions (in metric tons) by their global warming potentials (GWPs). Carbon dioxide equivalents are the amount of carbon dioxide by weight emitted into the atmosphere that would produce the same estimated radiative forcing as a given weight of another radiatively active gas. Carbon dioxide equivalents are computed by multiplying the weight of the gas being measured (for example, methane) by its estimated GWP (which is 23 for methane). See "Units for Measuring Greenhouse Gases" on page xi, and Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis* (Cambridge, UK: Cambridge University Press, 2001).

Table 3.6. Estimated U.S. Emissions of Greenhouse Gases from Energy Sources, 1990 and 1996-2004.

Gas	*Estimated Emissions in Million Metric Tons of Gas*									
	1990	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*P2004*
United States										
Carbon Dioxide	5,002.3	5,499.7	5,563.0	5,598.1	5,677.9	5,845.5	5,785.5	5,808.5	5,871.8	5,973.0
Methane	31.4	29.4	29.4	28.4	27.9	27.8	27.2	27.2	27.6	27.8
Nitrous Oxide	1.1	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.2
HFCs, PFCs, and SF6	M	M	M	M	M	M	M	M	M	M
Hawai'i										
Carbon Dioxide	8.58	8.35	8.23	8.13	8.14	8.29	8.27	9.13	8.55	8.91
CO_2 as % of U.S.	0.17%	0.15%	0.15%	0.15%	0.14%	0.14%	0.14%	0.16%	0.15%	0.15%

Notes: M = mixture of gases. These gases cannot be summed in native units. P = preliminary data.

Source: Energy Information Administration, Office of Integrated Analysis and Forecasting, U.S. Department of Energy (December 2005). Table ES1 in *Emissions of Greenhouse Gases in the United States 2004*.

United States Department of Energy (Release Date: December 2005). *Emissions of Greenhouse Gases in the United States 2004*. "Table B2 - Energy-Related Carbon Dioxide Emissions from the Industrial and Transportation Sectors, by Fuel Type, 1949-2004." Report DOE/EIA-0573(2004).

Table 3.7. All U.S. CO_2 Emissions from Fossil Fuel Combustion by End-Use Sector (Tg CO_2 Eq.)

End-Use Sector	*1990*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
Transportation	**1,464.4**	**1,663.4**	**1,725.6**	**1,770.3**	**1,757.0**	**1,802.2**	**1,805.4**	**1,860.2**
Combustion	1,461.4	1,660.3	1,722.4	1,766.9	1,753.6	1,798.8	1,801.0	1,855.5
Electricity	3.0	3.1	3.2	3.4	3.5	3.4	4.3	4.7
Industrial	**1,528.3**	**1,634.5**	**1,613.5**	**1,642.8**	**1,574.9**	**1,542.8**	**1,572.4**	**1,595.0**
Combustion	851.1	871.9	849.0	862.6	861.2	842.1	844.6	863.5
Electricity	677.2	762.6	764.5	780.3	713.7	700.7	727.7	731.5
Residential	**922.8**	**1,044.5**	**1,064.0**	**1,123.2**	**1,123.2**	**1,139.8**	**1,166.6**	**1,166.8**
Combustion	338.0	333.5	352.3	369.9	361.5	360.0	378.8	369.6
Electricity	584.8	711.0	711.7	753.3	761.7	779.8	787.9	797.2
Commercial	**753.1**	**895.9**	**904.8**	**961.6**	**983.3**	**973.9**	**978.1**	**983.1**
Combustion	222.6	217.7	218.6	229.3	224.9	224.3	235.8	226.0
Electricity	530.5	678.2	686.2	732.4	758.4	749.6	742.2	757.2
U.S. Territories	**28.0**	**33.5**	**34.5**	**35.8**	**48.5**	**43.1**	**48.7**	**51.4**
Total	**4,696.6**	**5,271.8**	**5,342.4**	**5,533.7**	**5,486.9**	**5,501.8**	**5,571.1**	**5,656.6**
Electricity Generation	**1,795.5**	**2,154.9**	**2,165.6**	**2,269.3**	**2,237.3**	**2,233.5**	**2,262.2**	**2,290.6**

Note: Totals may not sum due to independent rounding. Combustion-related emissions from electricity generation are allocated based on aggregate national electricity consumption by each end-use sector.

Source: *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2004*, Table ES-3: "CO2 Emissions from Fossil Fuel Combustion by End-Use Sector (Tg CO2 Eq.)

~~**3.3.2.4Global Warming**~~

~~Global warming is the name given to the projected increase in worldwide average temperatures as a result of the "greenhouse effect." The greenhouse effect is due to the increased concentration of carbon dioxide (CO_2) and several other gases in the atmosphere (see Figure 3.4). Like the glass in a greenhouse, these gases are transparent to visible light, but absorb energy in the infrared spectrum. Visible light from the sun is thus transmitted through to the earth's surface, but infrared radiation from the earth's surface is absorbed near the atmosphere, rather than radiating back to space. As a result, higher CO_2 concentrations cause more heat buildup within the atmosphere than would otherwise be the case~~

~~**Figure 3.4. Relative Contribution of Human-Caused Greenhouse Gases to Climate Change.**~~

~~Source: Environment Canada, Yukon Region; www.taiga.net/ yourYukon/col082.html~~

3.4 HYDROLOGY AND WATER RESOURCES

3.4.1 SURFACE WATER

There are no perennial streams in the project area. Rainfall on all of the areas where the project would be developed first ponds and then infiltrates into the porous ground. The nearest tidally influenced waters are the Pacific Ocean, which lies over ¼ mile west of the proposed generating unit site, and the Barbers Point-Kalaeloa Harbor, which is more than twice that far to the north. A small man-made wetland (Rowland's Pond) is located within the Chevron refinery immediately north of the BPTF site. Also, a small, excavated wetland is located just to the north of Malakole Street and to the east of the planned AES-CEIP #2 transmission line alignment.

3.4.2 GROUNDWATER

The project site is located over the Malakole Sector of the ‘Ewa (Limestone) Caprock Aquifer (Aquifer Code 30207 as designated by the State of Hawai‘i Water Use Commission). This aquifer is recharged through local rainfall and infiltration from surface water drainage. It is not potable and is used primarily as irrigation water. It is within a designated groundwater management area regulated by the State Commission on Water Resource Management (CWRM).

In cross section, the ‘Ewa limestone formation is wedged shaped. On the order of 1,000 feet thick along its southern shoreline, it tapers to an inland edge interbedded with alluvium and generally following the alignment of Farrington Highway. There is a distinctive upper layer of limestone which covers the entire ‘Ewa Plain. It is typically 100 to 120 feet thick (from 10 to 20 feet above sea level to 90 or 110 feet below it). This upper limestone layer contains brackish to saline groundwater. On the eastern side of the ‘Ewa Plain, the brackish groundwater is suitable for some irrigation uses. On the western side, including all of the CIP area, the groundwater is too saline for irrigation use. The permeability of the formation is quite variable but generally very high. This has enabled wells of high capacity to be developed. The active production wells nearest to the BPTF and AES substation (i.e., the two facilities where exterior changes are proposed) are shown on Figure 3.5.

Beneath the upper limestone layer is a stratum of dry calcareous silt and siltstone. This layer, which is about 40 feet thick, forms an essentially impervious basement to the aquifer in the upper limestone layer and a confining member of the aquifer in the second or lower limestone layer. Extensive pump and injection testing conducted by TNWRE has shown that this stratum of silt and siltstone effectively separates the aquifers in the upper and second limestone layers from one another.

The second or lower limestone layer is typically about 200 feet thick where deep holes have been drilled *makai* of the proposed power plant site. This layer may be somewhat thinner at the more inland location of the proposed site. Groundwater confined in this second, lower, layer is entirely of seawater salinity. As with the upper limestone layer, the formation has exceptionally high permeability which has enabled large capacity wells to be developed in it.

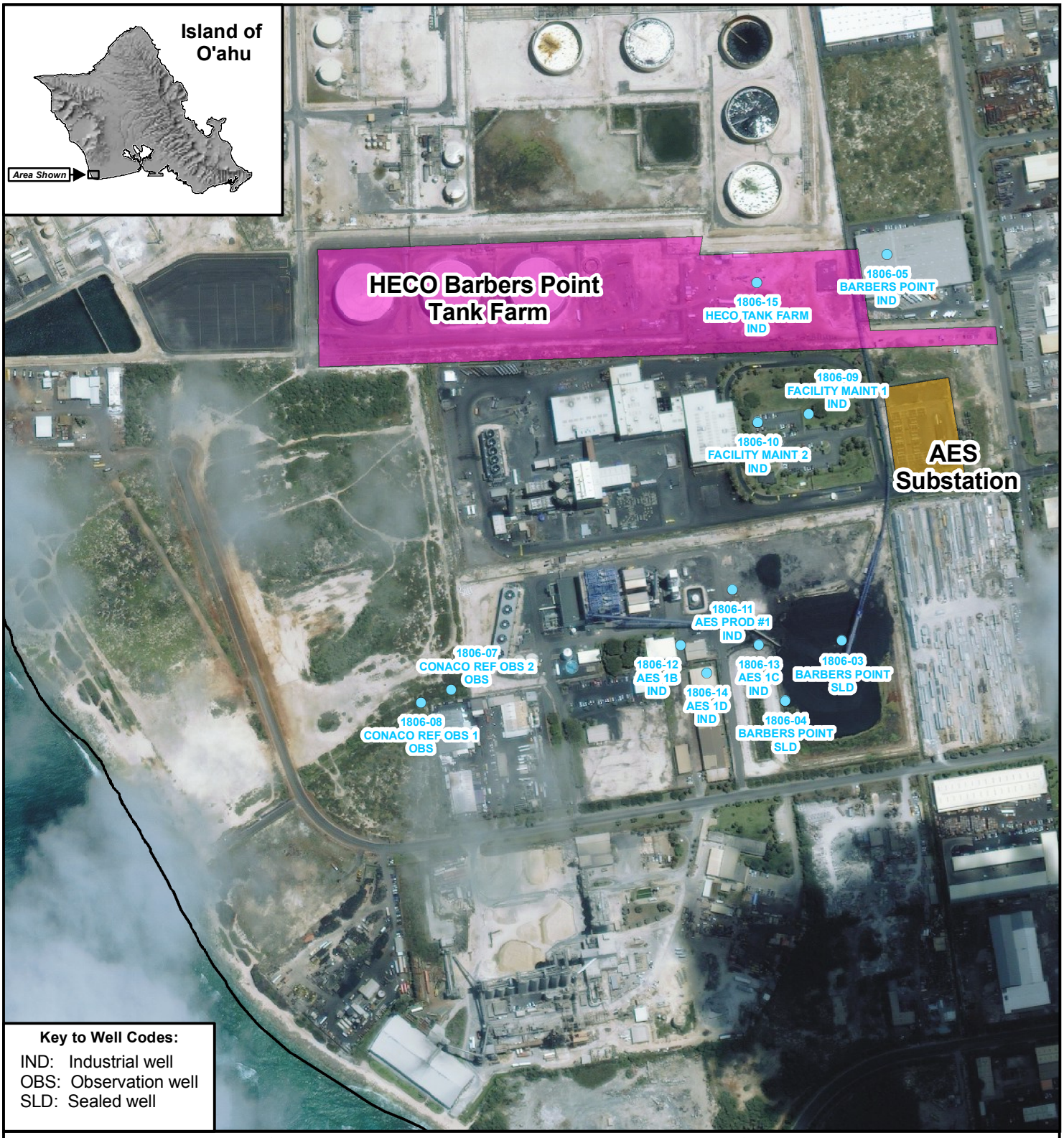
3.5 NATURAL HAZARD DESIGNATIONS

3.5.1 FLOODING & TSUNAMI

Flood hazards for the BPTF and AES Substation properties are depicted on Flood Insurance Rate Map (FIRM) Flood Sheet 0315; those for the CEIP Substation site and the AES-CEIP transmission corridor are depicted on FIRM Flood Sheet 0305. All areas are outside the coastal high hazard area identified in the FIRM maps and none are within the Special Flood Hazard Area (see Figure 3.6). The flood zone designation of the entire project area is D, signifying an area of undetermined flood hazards.

3.5.2 SEISMIC HAZARDS

The Uniform Building Code (UBC) establishes minimum design criteria for structures to address the potential for damages due to seismic disturbances. The scale is from Seismic Zone 0 through Zone 4, with 0 the lowest level for potential seismic induced ground movement. Like all of O‘ahu, the project area is designated Seismic Zone 2a (U. S. Geological Survey, 1997).



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

-City & County of Honolulu GIS (2001)
-Ikonos Satellite Photo (May 28, 2004)

Legend:

Well Locations

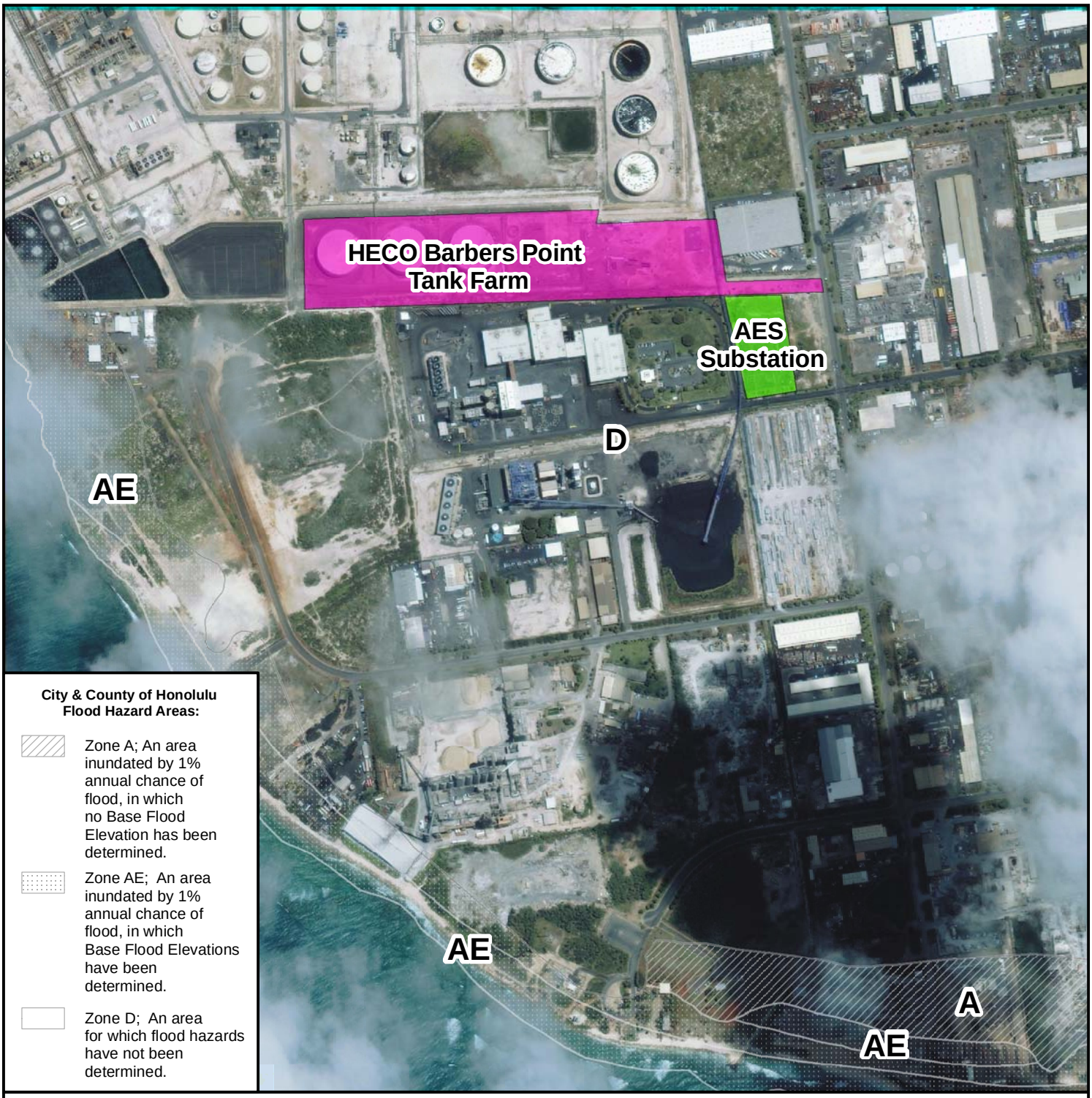
0 250 500 1,000
Feet

Figure 3.5:

Wells in the Project Area

CIP Generating Station & Transmission Additions Project

Figure 3-5 Active Wells in the Project Area 2005-11-03.mxd



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

--Hawaiian Electric Co., Inc.
--City & County of Honolulu
--Space Imaging, Inc. (08/17/04)

Legend:

0 250 500 1,000
Feet

Figure 3.6:

Flood Hazard Areas

CIP Generating Station &
Transmission Additions Project

Figure 3-6 Flood Hazard Areas 2005-11-03.mxd

3.6 TERRESTRIAL BIOTA

3.6.1 VEGETATION

3.6.1.1 Botanical Survey Methods

A botanical survey was conducted of the proposed generating station site and transmission corridor on August 23rd, 24th, and 29th, 2005, to determine if any federal or State of Hawai'i listed endangered, threatened, proposed, or candidate avian, mammalian or botanical resources were present (David & Guinther 2005).[46] Wandering transects were used to cover nearly all of the area through which the existing and proposed transmission line routes run north of Malakole Street. The route of the proposed underground alternative that runs south from Malakole Street to the proposed expansion area of the AES Substation along Hanua Street was also surveyed, but in a more cursory manner since the vegetation along Hanua Street is limited to landscape plantings with some patches of weeds. Additionally, the survey along the section of the proposed transmission line corridor within the Chevron refinery was brief, since this is an area where most vegetation is removed or kept low (or regularly sprayed with herbicide) in order to reduce fire hazard. This is also true for the fenced portion of the HECO Barbers Point Tank Farm parcel.

3.6.1.2 Botanical Survey Results

The vegetation in the project area ranges from highly disturbed "vacant lot" weeds (TMKs 9-1-026:018, 9-1-026:038, & 9-1-026:039), to ruderal species regenerating in places of highly controlled growth (grounds maintenance; TMKs 9-1-0014:014 and 9-1-0014:010), to planted and maintained vegetation along Hanua Street, to lands disturbed by grading, quarrying, and agriculture along much of the transmission corridor. A green waste recycling site is also present. Less frequently disturbed lands are characterized by extensive *Kiawe* (*Prosopis pallida*) growth and or *Koa haole* (*Leucaena leucocephala*) scrub. In these areas, the typical understory is dominated by a ground-cover of buffelgrass (*Cenchrus ciliaris*). The survey found that vegetation in the project area is comprised of flowering plants and overwhelmingly dominated by alien (non-native) plant species. A total of 79 species of plants were noted (see Table 3.8). The proposed new transmission line would pass through the existing Chevron Tank Farm along a firebreak that is virtually devoid of vegetation.

Eight of these plant species are known from the Hawaiian Islands before the arrival of James Cook. Two of these are considered to be introductions made by the earlier Polynesian settlers, leaving 6 species (7.6%) as true native plants. Of these six, only one is endemic; the remaining five are indigenous species commonly found throughout the Pacific Islands and in similar habitats elsewhere on O'ahu. All but one of these six species, ('*Ilima* or *Sida fallax*) are rare or uncommon in the survey area. Thus, in terms of biomass as well as number of species, native plants are a minor component of the vegetation.

The most significant find within the survey area is a rare endemic *Naio* (*Myoporum sandwicense var. stellatum*), three specimens of which were seen along the southern boundary of the 44-foot right-of-way parcel (TMK: 9-1-026:039), opposite the middle of the three large oil storage tanks on the *makai* end of the Barbers Point Tank Farm. This variety of *Naio* is potentially a separate species from the common *Naio* (*M. sandwicense var sandwicense*) or bastard sandalwood which is widespread in the islands; it occurs as a shrub or small tree from dry coastal areas, through mesic forest, and up into subalpine forest (Wagner et a. 1990). A cursory look about the northeast corner of the adjacent, undeveloped parcel to the south (TMK: 9-1-026:035) revealed several more plants present there. While this variety is found only in coastal areas of the 'Ewa Plain, it has not been officially proposed for listing by the U.S. Fish & Wildlife Service.

[46] Federal and State of Hawai'i listed species status are identified in the following documents (DLNR, 1998, Federal Register, 1999a, 1999b, 2001, 2002, 2004).

Table 3.8. Plant Species Identified Within the Project Area (August 2005).

FLOWERING PLANTS **DICOTYLEDONES**							
Species listed by family		***Common name***	***Status***	***Abundance***			***Nts***
				TF	Pa	Rt	
ACANTHACEAE							
	Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat.	U	O	U2	
AIZOACEAE							
	Sesuvium portulacastrum (L.) L.	*`akulikuli*	**Ind.**	--	R	U	
	Trianthema portulacastrum L.	---	Nat.	R	U	R	
AMARANTHACEAE							
	Achyranthes aspera L.	---	Nat.	--	U2	U	
	Alternanthera pungens Kunth	khaki weed	Nat.	R	R	R	
	Amaranthus spinosus L.	spiny amaranth	Nat.	R	R	O3	(1)
	Amaranthus virdis L.	slender amaranth	Nat.	--	--	R	
ARALIACEAE							
	Schefflera actinophylla (Endl.) Harms.	octopus tree	Nat.	--	R	--	
ASTERACEAE (COMPOSITAE)							
	Bidens pilosa L.	*ki*	Nat.	--	--	U	(1)
	Conyza sp.	horseweed	Nat.	--	--	R	
	Emilia fosbergii Nicolson	*pualele*	Nat.	--	--	R	
	Flaveria trinerva (Spreng.) C. Mohr	---	Nat.	C	A	U	
	Lactuca serriola L.	prickly lettuce	Nat.	R	R	O2	(1)
	Pluchia carolinensis (Jacq.) G. Don	sourbush	Nat.	U	C	A	
	Pluchia x *fosbergii* Cooperr. & Galang	---	Nat.	--	C	C	
	Pluchea indica (L.) Less.	Indian fleabane	Nat.	--	O	O	
	Sonchus oleraceus L.	sow thistle	Nat.	--	--	O	(1)
	Tridax procumbens L.	coat buttons	Nat.	C	C	U	
	Verbesina enceliodes (Cav.) Benth. & Hook.	golden crown-beard	Nat.	C	A	O2	
	Xanthium strumarium L.	*kikiana,* cockleburr	Nat.	--	--	U1	
BORAGINACEAE							
	Cordia subcordata Lam.	*kou*	**Ind.**	--	R	--	
	Heliotropum procumbens Mill.	---	Nat.	O	C	O	

Table 3-6 (continued)

Species listed by family		***Common name***	***Status***	***Abundance***			***Nts***
				TF	Pa	Rt	
CAPPARACEAE							
	Cleome gynandra L.	wild spider flower	Nat.	R	--	--	(1)
CARICACEAE							
	Carica papaya L.	papaya	Nat.	--	R	R	
CHENOPODIACEAE							
	Atriplex semibaccata R. Br.	Australian saltbush	Nat.	--	--	O2	
	Atriplex suberecta Verd.	---	Nat.	A	A	A	
CHENOPODIACEAE (continued)							
	Chenopodium cf. *murale* L.	*`aheahea*	Nat.	--	--	U	(1)
	Salsola tragus L.	tumbleweed	Nat.	--	--	R	
CONVOLVULACEAE							
	Convolvulus arvense L.	field bindweed	Nat.	--	--	U	
	Ipomoea cairica (L.) Sweet	*koali `ai*	**Ind.**	--	R	--	
	Ipomoea obscura (L.) Ker-Gawl.	---	Nat.	O	O	U	
	Merremia aegyptia (L.) Urb.	hairy merremia	Nat.	--	R	U	
COMBRETACEAE							
	Conocarpus erectus L.	button mangrove	Nat.	--	U	--	(2)
CUCURBITACEAE							
	Cucumis dipsaceus Ehrenb. Ex. Spach	teasel gourd	Nat.	--	--	U	
	Momordica charantia L.	balsam pear	Nat.	--	R	R	
EUPHORBIACEAE							
	Chamaesyce hirta (L.) Millsp.	garden spurge	Nat.	C	O	O	
	Chamaesyce hyssopifolia (L.) Small	---	Nat.	--	U	O2	
	Chamaesyce prostrate (Aiton) Small	prostrate spurge	Nat.	--	--	R	
	Ricinus communis L.	castor bean	Nat.	--	--	C	
FABACEAE							
	Acacia farnesiana (L.) Willd.	*klu*	Nat.	--	--	U1	
	Crotalaria incana L.	fuzzy rattlepod	Nat.	--	--	U	
	Desmanthus virgatus (L.) Willd.	virgate mimosa	Nat.	R	O	C	
	Leucaena leucocephala (Lam.) deWit	*koa haole*	Nat.	R	O	AA	
	Erythrina cf. *crista-galli* L.	coral tree	Orn.	--	U	--	(2)
	Indigofera spicata Forssk.	creeping indigo	Nat.	C	O	R	
	Macroptilium lathyroides (L.) Urb.	cow pea	Nat.	U	U	U	
	Mimosa pudica L.	sensitive plant	Nat.	R	R	--	
	Pithecelobium dulce (Roxb.) Benth.	*`opiuma*	Nat.	--	--	R	
	Prosopis pallida (Humb. & Bonpl.) Kunth	*kiawe*	Nat.	R	O	C3	
	Senna occidentalis (L.) Link	coffee senna	Nat.	--	--	U1	

Table 3-6 (continued)

Species listed by family		***Common name***	***Status***	***Abundance by Survey Area***			***Nts***
				TF	Pa	Rt	
LAMIACEAE							
	Leonotis nepetifolia (L.) R. Br.	lion's ear	Nat.	--	--	O2	
MALVACEAE							
	Abutilon grandifolium (Willd.) Sweet	hairy abutilon	Nat.	U	O	O	
	Malvastrum coromandelianum (L.) Garck	false mallow	Nat.	R	U	U	
	Sida ciliaris L.	---	Nat.	--	U	U2	
	Sida fallax Walp.	*`ilima*	**Ind.**	R	O	U	
	Sida rhombifolia L.	Cuba jute	Nat.	--	R	U	(1)
MALVACEAE (continued)							
	Sida spinosa L.	prickly sida	Nat.	R	O2	O2	
MENISPERMACEAE							
	Cocculus trilobus (Thunb.) DC	*huehue*	**Ind.**	--	--	R2	
MYOPORACEAE							
	Myoporum sandwicense var. *stellatum* G.L. Webster	*naio*	**End.**	--	R	--	(3)
PASSIFLORACEAE							
	Passiflora foetida L.	running pop	Nat.	--	U	O	
POLYGONACEAE							
	Antigonon leptopus Hook. & Arnott	Mexican creeper	Nat.	--	--	U	
PORTULACACEAE							
	Portulaca oleracea L.	pigweed	Nat.	--	U	R	
SOLANACEAE							
	Nicandra physalodes (L.) Gaertn.	apple of Peru	Nat.	--	--	U	(1)
	Nicotiana glauca R.C. Graham	tree tobacco	Nat.	--	--	C3	
STERCULIACEAE							
	Waltheria indica L.	*`uhaloa*	Nat..	U	C	C	
ZYGOPHYLLACEAE							
	Tribulus terrestris L.	puncture vine	Nat.	R	--	U	

MONOCOTYLEDONES

AGAVACEAE							
	Cordyline fruticosa L.	*ti*	**Pol.**	--	--	R	
MUSACEAE							
	Musa X *paradisiaca* L.	banana	**Pol.**	--	--	R	
POACEAE							
	Cenchrus ciliaris L.	buffelgrass	Nat.	A	AA	AA	
	Chloris barbata (L.) Sw.	swollen fingergrass	Nat.	C	AA	C3	

Table 3-6 (continued)

Species listed by family		***Common name***	***Status***	***Abundance***			***Nts***
				TF	Pa	Rt	
POACEAE (CONTINUED)							
	Eleusine indica (L.) Gaertn.	beach wiregrass	Nat.	--	--	U3	
	Eragrostis cf. *tenella* (L.) R & S	lovegrass	Nat.	O	O	R	
	Leptochloa uninerva (K Presl.) Hitchc. & Chase	sprangletop	Nat.	--	U	--	
	Melinus repens (Willd.) Zizka	Natal redtop	Nat.	--	--	U2	
	Panicum maximum Jacq.	Guinea grass	Nat.	--	U	U	
	Setaria verticillata (L.) P. Beauv.	bristly foxtail	Nat.	R	--	U3	
	Sporobolus sp.	---	Nat.	O	O	--	
	Unidentified grass	large w/ hairy culms	Nat.	--	--	R	

STATUS = distributional status for the Hawaiian Islands:

end. = endemic; native to Hawaii and found naturally nowhere else.
ind. = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.
nat. = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
orn. = exotic, ornamental or cultivated; plant not naturalized (not well-established outside of cultivation).
pol. = Polynesian introduction before 1778.

ABUNDANCE = occurrence ratings for plants by area:

R – Rare seen in only one or perhaps two locations.
U - Uncommon- seen at most in several locations
O - Occasional seen with some regularity
C - Common observed numerous times during the survey
A - Abundant found in large numbers; may be locally dominant.
AA - Very abundant abundant and dominant; defining vegetation type.

Numbers following an occurrence rating indicate clusters within the survey area. The ratings above provide an estimate of the likelihood of encountering a species within the specified survey area; numbers modify this where abundance, where encountered, tends to be greater than the occurrence rating:

1 – several plants present
2 - many plants present
3 – locally abundant

AREAS: Survey areas for this report.

TF – HECO tank farm parcel.
Pa – Property acquisition area around AES Substation and 44-foot r-o-w.
Rt – Transmission line routes (excl. developed portion of Hanua Street; see text)

NOTES:
(1) - Identified from dried, dead material.
(2) - In this setting, planted as an ornamental.
(3) - A rare variety found only in vicinity of Barbers Point; not a listed species.

Source: David & Guinther (2005).

3.6.2 MAMMALS

3.6.2.1 Mammalian Survey Methods

All observations of mammalian species were of an incidental nature. With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or *'Ope'ape'a* as it is known locally, all terrestrial mammals currently found on the Island of O'ahu are alien species, and most are ubiquitous. Two hours were spent within the project area on the evenings of the 23rd and 24th of August and again in the early morning hours of the 24th of August 2005 in an attempt to detect Hawaiian hoary bats. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal signs. A running tally was kept of all vertebrate species observed and heard within the study area.

3.6.2.2 Mammalian Survey Results

Three mammalian species were detected while on the site: domestic dog (*Canis f. familiaris*), small Indian mongoose (*Herpestes a. auropunctatus*), and cat (*Felis catus*). The survey team observed one dog and one mongoose, as well as tracks and sign of cats, at several locations north of Malakole Street. All three of these are introduced species that are considered deleterious to native avian species and Hawaiian ecosystems. No Hawaiian hoary bats were observed during the survey.

3.6.3 AVIAN FAUNA

3.6.3.1 Avian Survey Methods

Fourteen avian count stations were sited at approximately 300-meter intervals along the existing transmission line corridor as well as along the overhead and underground transmission line routes under consideration. Additionally, one count station was sited within the proposed extension portion of the AES Substation and two others within the 44-foot wide right-of-way separating the HECO Tank Farm from the City and County HPOWER plant. One six-minute point count was conducted at each station. Field observations were made using Leitz 10 X 42 binoculars to sight birds and by listening for vocalizations. Counts took place between 6:30 a.m. and 10:30 a.m., the peak of daily bird activity. An additional two hours was spent within the project area on the evenings of the 23rd and 24th of August and again in the early morning hours of the 24th of August 2005 in an attempt to detect crepuscular and/or nocturnally flying seabirds and owls. Time not spent conducting station counts was used to search the area for species and habitats not detected during count sessions.

3.6.3.2 Avian Survey Results

A total of 607 individual birds of 17 different avian species, representing 13 separate families were recorded during station counts (see Table 3.9). Two additional species representing two more families were recorded as incidental observations while traveling between count stations. The field biologist recorded an average of 36 birds per station count. Avian diversity was relatively low, though densities of several species were relatively high. Three species: Common Myna (*Acridotheres tristis*), Spotted Dove (*Streptopelia chinensis*) and Zebra Doves (*Geopilia striata*), accounted for a little more than half of the total number of individual birds recorded. Common Myna was the most frequently recorded species, accounting for approximately one-fifth of the individual birds recorded during station counts.

Only five of the species recorded are native to the Hawaiian Islands. They are: Hawaiian Duck (*Anas wyvilliana*), Black-crowned Night-Heron (*Nycticorax nycticorax hoactli*), Pacific Golden-Plover (*Pluvialis fulva*), Black-necked Stilt (*Himantopus mexicanus knudseni*), and Ruddy Turnstone (*Arenaria interpres*). The Hawaiian Duck and the Black-necked Stilt are resident endangered endemic species. The Black-crowned Night-Heron is an indigenous resident species, and the Pacific Golden-Plover and Ruddy Turnstone are indigenous migratory waterbirds. The remaining twelve species detected during the course of this survey are considered to be alien to the Hawaiian Islands.

Table 3.9. Avian Species Detected in the Project Area (August 2005)

Common Name	*Scientific Name*	*ST*	*RA*
	ANSERIFORMES		
	ANATIDAE - Ducks, Geese & Swans		
	Anserinae - Ducks		
Hawaiian Duck x Mallard hybrid	*Anas wyvilliana* x *A. platyrhynchos*	**EH**	**I-2**
	GALLIFORMES		
	PHASIANIDAE - Pheasants & Partridges		
	Phasianinae - Pheasants & Allies		
Gray Francolin	*Francolinus pondicerianus*	A	0.353
Black Francolin	*Francolinus francolinus*	A	**I-1**
	CICONIIFORMES		
	ARDEIDAE - Herons, Bitterns & Allies		
Black-crowned Night-Heron	*Nycticorax nycticorax hoactli*	IR	0.59
	CHARADRIIFORMES		
	CHARADRIIDAE - Lapwings & Plovers		
	Charadriinae - Plovers		
Pacific Golden-Plover	*Pluvialis fulva*	IM	0.412
	RECURVIROSTRIDAE - Stilts & Avocets		
Black-necked Stilt	*Himantopus mexicanus knudseni*	**ER**	0.412
	SCOLOPACIDAE - Sandpipers, Phalaropes & Allies		
	Scolopacinae - Sandpipers & Allies		
Ruddy Turnstone	*Arenaria interpres*	IM	0.294
	COLUMBIFORMES		
	COLUMBIDAE - Pigeons & Doves		
Spotted Dove	*Streptopelia chinensis*	A	5.941
Zebra Dove	*Geopelia striata*	A	5.941
	PASSERIFORMES		
	PYCNONOTIDAE - Bulbuls		
Red-vented Bulbul	*Pycnonotus cafer*	A	2.471
	ZOSTEROPIDAE - White-Eyes		
Japanese White-eye	*Zosterops japonicus*	A	1.647
	MIMIDAE - Mockingbirds & Thrushes		
Northern Mockingbird	*Mimus polyglottos*	A	0.117

Table 3.7 (continued)

Common Name	*Scientific Name*	*ST*	*RA*
	STURNIDAE - Starlings		
Common Myna	*Acridotheres tristis*	A	7.471
	EMBERIZIDAE - Emberizids		
Red-crested Cardinal	*Paroaria coronata*	A	0.235
	CARDINALIDAE - Cardinals Saltators & Allies		
Northern Cardinal	*Cardinalis cardinalis*	A	0.5706
	FRINGILLIDAE - Fringilline And Cardueline Finches & Allies		
	Carduelinae - Carduline Finches		
House Finch	*Carpodacus mexicanus*	A	2.353
	ESTRILDIDAE - Estrildid Finches		
	Estrildinae - Estrildine Finches		
Common Waxbill	*Estrilda astrild*	A	5.706
Red Avadavat	*Amandava amandava*	A	0.647
Chestnut Munia	*Lonchura atricapilla*	A	1.059

KEY TO TABLE

ST	Status
EH	Endangered Endemic Hybrid Species
ER	Endangered Resident Species
IM	Indigenous Migrant – a native migratory species that winters in Hawai‘i but breeds elsewhere
IR	Indigenous Resident Species
A	Alien – introduced to the Hawaiian Islands by humans
RA	Relative Abundance – Number of birds detected divided by the number of count stations (17)

Source: David & Guinther (2005).

3.7 AQUATIC BIOTA

Year-round aquatic habitats in the project area are limited to manmade pond features, including Rowland's Pond within the Chevron facility, which is managed as habitat for the endangered Black-Necked Stilt. No sensitive or unique aquatic habitats are located nearby. The Pacific Ocean is approximately 0.5 miles from the site.

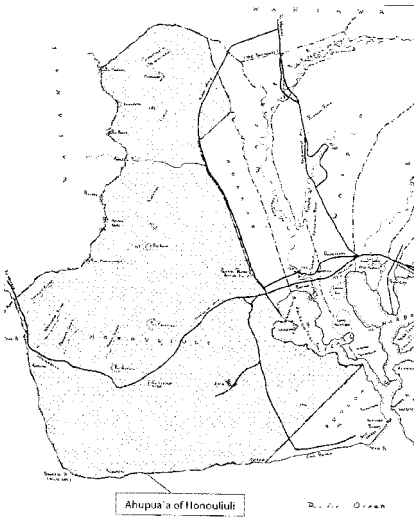
3.8 NOISE

Existing ambient noise levels vary greatly from place to place within the project area. 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. For example, noise from the adjacent HPOWER facility and AES coal conveyor are generally the predominant noise sources at the BPTF, whereas the dominant existing source of noise on the CEIP Substation site is traffic on nearby roadways and the tourist trains that occasionally pass on the adjacent O'ahu Railroad and Land Company (OR&L) railroad tracks.

A survey conducted in September 2005 measured existing background noise measurements at the BPTF (Ebisu & Associates 2005). It found that the State Department of Health (DOH) noise limit of 70 dBA (for lands zoned for industrial use) was periodically exceeded along the southern project site boundaries during operation of the coal conveyor serving the AES plant and the metal crusher at the HPOWER facility, and along the northern site boundary during operation of an emergency diesel generator on the BPTF site.

3.9 ARCHAEOLOGICAL, HISTORIC, AND CULTURAL RESOURCES

All of the facilities that are included in the alternatives are within the *ahupua'a* of Honouliuli, in the *moku* (district) of 'Ewa on the southwest coast of O'ahu. The *ahupua'a* of Honouliuli is the largest traditional land unit on the island of O'ahu. It includes all the land from the western boundary of Pearl Harbor (West Loch) westward to the 'Ewa/Wai'anae District Boundary, with the exception of the west side of the harbor entrance which is in the *ahupua'a* of Pu'uloa (the 'Ewa Beach/Iroquois Point area). Honouliuli has both a long (12 mile) open coastline along the normally calm waters of leeward O'ahu and four miles of waterfront running along the west side of the West Loch of Pearl Harbor. The generating site and transmission line route are inland of a small traditional settlement area at Kalaeloa, which occupies a portion of the Plain of Kaupe'a, now commonly known as the 'Ewa Plain. The eastern portion of the water line that HECO proposes to construct to allow RO water from the Honouliuli Wastewater Treatment Plant to be used in lieu of potable water for industrial purposes at the Kahe Generating Station also passes through this previously disturbed area (see photos in Figure 4.14). Several detailed overviews are available for archaeological investigations in the 'Ewa Plain (Athens et al. 1999; Cleghorn and Davis 1990; Davis 1990; McDermott et al. 2000; Tuggle 1997a, 1997b; Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997).



The summary presented below is drawn largely from work that International Archaeological Research Institute prepared for the generating and transmission elements of the project and from previous work by Cultural Surveys Hawai'i (Cordy and Hammatt, November 2003; Mitchell and Hammatt, December 2004; Hammatt, *et al*., 2001) that assessed the archaeological resources within

the proposed Kapolei West Project site and other nearby areas. The investigations covered areas on either side of the former OR&L railroad right-of-way within which the proposed water line would run.[47] In addition to surface features, the studies investigated filled limestone sinkholes to determine whether they contained burials, other cultural finds, and/or evidence of extinct species. Tulchin and Hammatt (January 2005) provided information on the area closest to the Kahe Generating Station end of the proposed water pipeline.

3.9.1 CULTURAL LANDSCAPE AND HISTORICAL LAND USE PATTERNS

Tuggle (1997b:21) summarizes the cultural significance of the ʻEwa Plain for both commoners and elites in traditional Hawaiian society:

> *For the common people who struggled for survival in this land, the ʻEwa Plain was a place of small villages, Oneʻula and Kualakaʻi and Kalaeloa, and their deities were Kūulakai and Lono. For the royalty of ʻEwa, their priests and priest-astronomers, this was the plain of Kaupeʻa and of Puʻuokapolei; this was the plain of the sun, and their gods were Kāne and Kapoʻulakīnaʻu.*

In the ʻEwa Plain, Tuggle (1997b) identifies three major features in the cultural landscape: a) Puʻuokapolei; b) the Plain of Kaupeʻa; and c) Kualakaʻi. The project area is situated in the western portion of the Plain of Kaupeʻa.

Pre-Contact Period. Puʻuokapolei is a small cinder cone, probably the most visually distinctive landform in the ʻEwa Plain and served as the primary landmark for travelers between Pearl Harbor and the west Oʻahu coast.

Tuggle (1997b:20) describes Puʻuokapolei as "the spiritual vortex of the ʻEwa Plain," associated with astronomers and solar movements. McAllister (1933:108) mentions that a temple was once on this hill, yet it was destroyed when the stones were passed through a rock-crusher. Tuggle (1997b:20-21) proposes that the former temple was dedicated to Kapo or Kapoʻulakīnaʻu, a female element of the sun and counterpart of Kāne (Barrère et al. 1980:8; Emerson 1978:41, 45). According to Kamakau (1961:47, 49), the Plain of Kaupeʻa was the *ao kuewa* of Oʻahu, a place for homeless souls with no other rightful place. Tuggle (1997b:20) notes that the "*sparsely settled and harsh region of Kaupeʻa seems an appropriate setting for this spiritual realm*."

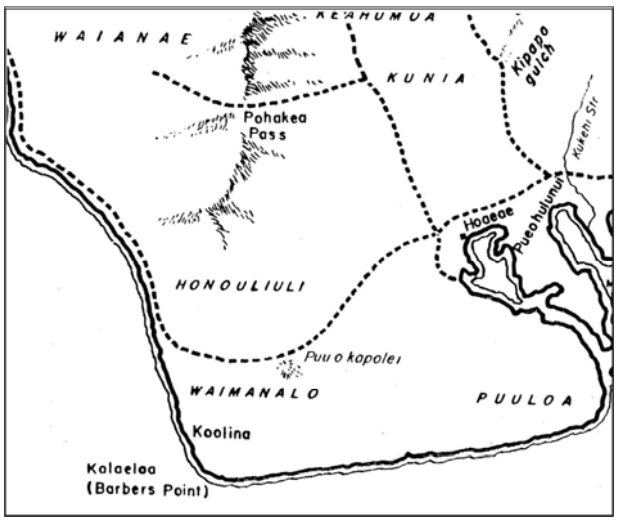
Kualakaʻi is mentioned in some oral traditions as the place where a chief or god (named Kaulua-Kahaʻi) from a foreign land (Kahiki) left royal garments for his son, beneath a breadfruit tree (Fornander 1916-20, Vol. 4: 224-227). Beckwith (1970:479) refers to this breadfruit tree as "the standing breadfruit of Kahaʻi," a spiritual manifestation of Kaulua-Kahaʻi. Moreover, Tuggle (1997b:20) mentions a former spring at Kualakaʻi, perhaps symbolic of "life/genealogy, expressed in the spirit of Kaulua-Kahaʻi, godly royalty, a tree of life, and a being from Kahiki." (See Section 3.9.3 for a fuller description of such accounts.)

Various legends and early historical accounts indicate that in pre-contact times the Honouliuli *ahupuaʻa* was heavily populated. This substantial settlement is attributable for the most part to the plentiful marine and estuarine resources available at the coast and to the presence of lowlands suitable for wetland taro cultivation. The lower mountain slopes would have provided the inhabitants of the lowland with a variety of forest goods; the forest resources along the slopes of the Waiʻanae Range may also have acted as a viable subsistence alternative during times of famine and/or low rainfall. Hammatt et al. 1991 report at least one probable quarrying site (50-80-12-4322) is present in

[47] State site 50-80-12-9714 is a portion of railroad tracks that represents the former OR&L Railroad line. Near the Kahe Generating Station it runs immediately *makai* of Farrington Highway. Elsewhere it is further *makai* of the highway. The railroad right-of-way is listed on the National Register of Historic Places.

Makaʻiwa Gulch at an elevation of approximately 500 feet and so the upper valley slopes may have also been a resource for sporadic quarrying of basalt for the manufacturing of stone tools.

Early Post-Contact. Barbers Point is named after Captain Henry Barber who ran aground on October 31, 1796. Early historical accounts of the general region typically refer to the more populated areas of the ʻEwa district, where missions and schools were established and subsistence resources were perceived to be greater. However, the presence of archaeological sites along the barren coral plains and coast of southwest Honouliuli *ahupuaʻa* indicate that pre-contact and early post-contact populations also adapted to less inviting areas, despite the environmental hardships.



John Papa ʻĪʻī describes a network of Leeward Oʻahu trails (see sketch of trail at right after ʻĪʻī 1959) which in later historic times encircled and crossed the Waiʻanae Range, allowing passage from West Loch to the Honouliuli lowlands, past Puʻuokapolei and Waimānalo Gulch to the Waiʻanae coast and onward). Following ʻĪʻī's description, a portion of this trail network would have passed close to the presently existing Farrington Highway. This would place it near the western portion of the water pipeline route and the Kahe Generating Station.

Early Nineteenth Century. During the late eighteenth and early nineteenth centuries the landscape of the ʻEwa plains and Waiʻanae slopes was substantially altered by the removal of the sandalwood forest and the introduction of domesticated animals and exotic plant species. Domesticated animals including goats, sheep, and cattle were brought to the Hawaiian Islands by Capt. George Vancouver in the early 1790s, and allowed to graze freely about the land for some time after. L.A. Henke reports the existence of a longhorn cattle ranch in Waiʻanae by at least 1840 (in Frierson 1972:10). During this same period, exotic vegetation species were introduced to and flourished in the area. Prickly pear (cactus, *Opuntia tuna*; Haole koa, *Leucaena glauca*; and guava were among the earliest (c. 1790). Bermuda grass (*Cynodon dactylon*) and wire grass (*Eleusine indica*), arrived between 1835 and 1840, and the *kiawe* tree was introduced about the same time (either in 1828 or 1837).

Mid to late 19th Century. Following the *Mahele* of 1848, 99 individual land claims were registered in the *ahupuaʻa* of Honouliuli and awarded by King Kamehameha III. The present study area appears to have been included in the largest award (Royal Patent 6071, LCA 11216, ʻApana 8) granted in Honouliuli *ahupuaʻa* to Miriam Keʻahi-Kuni Kekauʻonohi in January 1848 (Native Register). Kekauʻonohi acquired a deed to all unclaimed land within the *ahupuaʻa*, totaling 43,250 acres. In 1877 James Campbell purchased most of Honouliuli *ahupuaʻa* for less than $100,000, removed the more than 30,000 head of cattle that were being grazed there, and fenced the property (Bordner and Silva, 1983: C-12). By 1881 Campbell's Honouliuli property was prospering as a cattle ranch. In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oʻahu Railway and Land Company (0.R.&L) in 1890. Dillingham subleased all land below 200 feet to William Castle who in turn sublet the area to the ʻEwa Plantation Company for sugar cane cultivation (Frierson, 1972:15). To increase the extent and quality of arable land on the coral plain, the ʻEwa Plantation Co. dug ditches running from the lower slopes of the mountain range to the lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972:17).

Modern Land Use. Much of the area along the northern portion of the transmission line route and the eastern portion of the proposed pipeline to Kahe was under sugar cane cultivation by the first half of the twentieth century. By 1920, the lands of Honouliuli were used primarily for sugar cultivation and ranching. In the 1930s, the U.S. Military began development in the area. Army, Navy, and Marine

facilities were constructed there in the 1930s and early 1940s; the largest and most lasting of these was Naval Air Station (NAS) Barbers Point. Tuggle and Tomonari-Tuggle (1997:23-47) reviewed the historic and modern land use changes in detail.

Historic and modern activities have greatly altered most of the land on and adjacent to the areas on which project-related facilities would be constructed. A 1939 map of the ‘Ewa Plantation fields (see right) indicates sugarcane fields at the north end of the project area, but recent aerial photographs of the area reveal much more extensive abandoned agricultural plots (presumably once used for sugarcane) that have begun to be overtaken by modern industrial developments. At present, virtually all of the project area appears to have been disturbed by historic or modern land use.

A 9-acre barge harbor was constructed on Campbell Estate lands at Barbers Point in 1961, enabling neighboring industries to ship their products by barge to the other islands. Because of its size and surge problems, however, the harbor realized only limited barge use and was more popular for recreational fishing. It was not until the 1980s that a joint Federal-State dredging project created a 387-acre harbor with a 450-foot-wide, 4,280 foot-long, and 42 foot-deep entrance channel, a 114-acre harbor basin, and landside support facilities. Despite the construction of the harbor, Campbell Industrial Park was slow to develop, with much of the land that had been laid out for heavy industrial uses remaining vacant.

3.9.2 ARCHAEOLOGICAL CONTEXT: SETTLEMENT CHRONOLOGY AND SITE TYPES

The history of archaeological investigations in and around the Barbers Point area has been reviewed in detail elsewhere (Tuggle and Tomonari-Tuggle 1997:49-55), and numerous resource identification and data recovery projects have been completed in this part of the ‘Ewa Plain.[48] A robust model of the chronology of human settlement and human-environment relations on the ‘Ewa Plain has emerged from this work (Athens et al. 2002). While this synthesis places the first settlements and human-induced environmental changes in O‘ahu around AD 900 to 1000, the earliest occupation of the ‘Ewa Plain probably did not occur until after AD 1250, and more substantial settlement there occurred after ca. AD 1350.

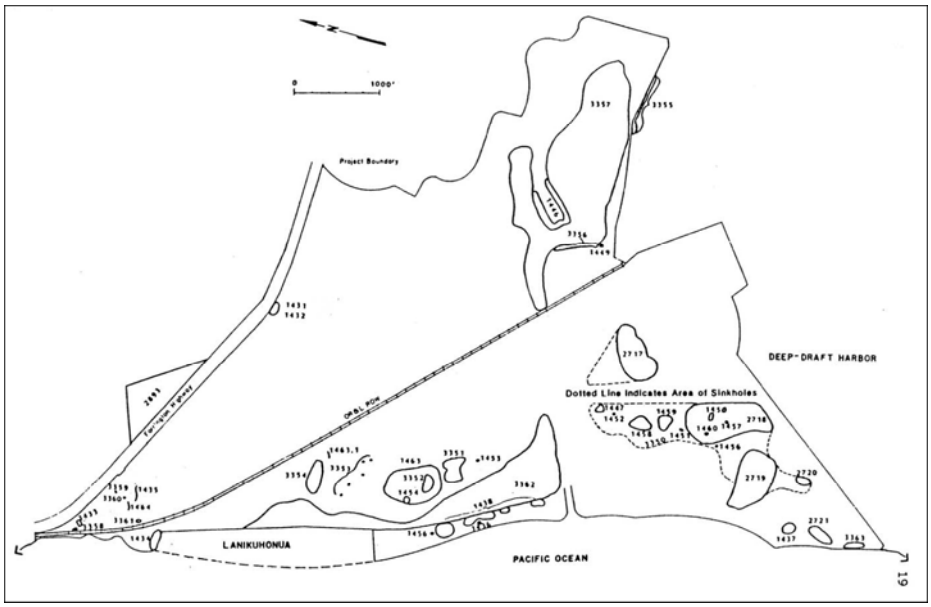
The land immediately inland of the coastline consists of a flat Karstic raised limestone reef forming a level, nearly featureless plain covered in pre-contact times by a thin or non-existent soil mantle. Chemical weathering of the limestone has produced numerous sinkholes in some areas. The extended limestone plain would have been used for bird catching (until the hunters’ success led to the extinction of the most readily exploited species), and would include the temporary habitation features associated with this activity. Planters could have also used the natural limestone sinks for agriculture, though it would have been seasonal and on a small scale. Proceeding inland, this plain is overlain by alluvium deposited through a series of gulches draining the Wai‘anae Mountains. The major gulches have a high gradient and steep sides in the uplands; once they reach the flat ‘Ewa plain, they are broad and relatively level. They have deposited alluvium in delta fashion over the inland portions of the plain. These gulches do not provide a reliable water source and do not have valleys suitable for extensive irrigated agriculture.

[48] See, for example, Athens et al. 1999; Burgett and Rosendahl 1992; Cleghorn and Davis 1990; Davis 1990; Hammatt and Folk 1981; Haun 1991; Hommon 1989; Landrum and Schilz 1993; McDermott et al. 2000; Miller 1993; O’Hare et al. 1996; Schilz and Landrum 1994; Sinoto 1976, 1978, 1979; Tuggle 1997a, 1997b; Tuggle and Tomonari-Tuggle 1997; Welch 1987; Wickler and Tuggle 1997; Wulzen and Rosendahl 1996; Yoklavich et al. 1995.

There appear to have been three main areas of settlement within the *ahupua'a*: (i) the coastal zone including Kalaeloa (Barbers Point), Ko'Ōlina (West Beach), and One'ula; (ii) the Honouliuli Taro Lands; and the inland area of Pu'u Ku'ua. Documented archaeological remains in these settlement areas include: 1) sinkholes used for cultivation, temporary shelters, or burials; 2) C-shaped structures; 3) thick-walled, rectangular house ruins; 4) platform or terrace foundations; 5) low walls or alignments; 6) mounds or piles of cobbles; and 7) piles of fire-cracked limestone (Tuggle 1997b). The structural remains are "universally made of limestone slabs and cobbles" (Tuggle 1997b:15). Most of the structural remains are found near sinkholes; perhaps because the sinkhole areas were untouched by historic and modern land alterations that obliterated structural features elsewhere in the 'Ewa Plain. A summary of archaeological findings for each settlement area is presented below.

Kalaeloa (Barbers Point). Archaeological research at Kalaeloa/Barbers Point has focused on the areas in and around the Harbor. A series of small clustered shelters, enclosures and platforms show limited but recurrent use at the shoreline zone for marine oriented exploitation. This settlement covers much of the shoreline, with more concentrated features around small marshes and wet sinks. Immediately behind the shoreline under a linear dune deposit is a buried cultural layer believed to contain some of the earliest habitation evidence in the area. The archaeological content of the sites indicates a major focus on marine resources. Considering rainfall, agriculture would have been constrained by accessibility to water and was probably concentrated on tree crops and roots (sweet potatoes). There is some indication of agriculture in mulched sinkholes and soil areas. The plentiful and easily exploited bird population was an important food source. Heavy exploitation of nesting seabirds and other species, in conjunction with habitat destruction, appears to have led to their early extinction. The proposed generating station and transmission additions are inland of this previous settlement area. There is no indication that any permanent settlements existed there, but it is likely that the area was frequently traversed and used for the gathering of resources. This is discussed further in Section 4.8.2.

Ko'Ōlina (West Beach) to Kahe.



Studies associated with the Ko'Ōlina area document around 200 component features at approximately 50 sites and site complexes. The features consist of habitation sites, gardening areas, and human burials. Chronologically the occupation covers the entire span of Hawaiian settlement, in what Davis and Haun (1987:37) describe as "one of the longest local sequences in Hawaiian prehistory." The earliest part of the sequence relates to the discovery of an inland marsh but early dates were also obtained for a beachfront site and an inland rock shelter. As shown in the map at right, only at the western end of the survey area are the sites close to the OR&L right-of-way within which the waterline would be buried. All of the burials discussed in Davis and Haun lie further to the south and east, outside of the current project area.

McAllister (1933) and Sterling and Summers (1978) did not report any sites near the Kahe end of the proposed pipeline route. Hammatt and Shideler (1989:5) reported one agricultural terrace (State site 50-80-07-4221) *mauka* of the Kahe Point Power Plant, and one prehistoric burial (State site 50-80-12-4061) found at the high-water mark approximately 183 meters northwest of Kahe Beach Park. Site -1433 (Barrera 1979), located about 200 meters south of Kahe Beach Park, is thought to be a fishing shrine (*ko'a*) (Hammatt and Shideler 1989).

Honouliuli Taro Lands. The rich irrigated lands of Honouliuli centered around the west side of Pearl Harbor at Honouliuli Stream and its broad outlet into the West Loch which give the *ahupua'a* its name are far from the proposed project site. This area bordering West Loch was clearly a major focus of population within the Hawaiian Islands. Its importance stemmed from the abundance of fish and shellfish resources in close proximity to a wide expanse of well-irrigated bottomland suitable for wetland taro cultivation.

Inland Settlement. The absence of archaeological studies and other sources of information make it difficult to accurately characterize inland settlement in Honouliuli *ahupua'a*. Mitchell and Hammatt (December 2004) speculate that the area around Pu'uku'ua, on the east side of the Wai'anae Ridge seven miles inland of the coast, was a Hawaiian place of some importance. In 1899 Hawaiian Newspaper *Ka Loea Kālai 'Āina* describes the area as "*…a place where chiefs lived in ancient times*" and a "battle field," "thickly populated." Archaeological work near Ko'Ōlina suggests a thinly scattered, but widespread zone of settlement generally above the 800-foot elevation stretching eastward and northeast along the east Wai'anae Range slopes; possibly increasing in intensity along the more watered lands forming the *mauka* western boundary of Honouliuli.

3.9.3 MYTHOLOGICAL AND TRADITIONAL ACCOUNTS

Mitchell and Hammatt (December 2004) summarize mythological and traditional accounts relating to Honouliuli. Many of the mythological accounts relate to the actions of gods or demi-gods such as Kāne, Kanaloa, Maui, Kamapua'a, the reptile deity Maunauna, the shark deity Ka'ahupāhau, and the demi-god hero Palila. While they report several references to chiefly lineages and references to the ruling chiefs Hilo a Lakapu and Kūali'i, there is no clear reference to powerful chiefs living permanently in Honouliuli.

Some of the themes of these traditions include connections with Kahiki (the traditional homeland of Hawaiians) and the special character and relationship of the places known as Pu'uokapolei and Kualaka'i. There are several versions of Kaha'i leaving from Kalaeloa for a trip to Kahiki to bring breadfruit back to 'Ewa (Kamakau 1991:110). There are several stories that associate places in the region with Kamapua'a and the Hina family, as well as with Pele's sisters, all of whom have strong connections with Kahiki (cf. Kamakau 1991:111; Pukui et al. 1974:200).

Pu'uokapolei, located northeast of the current project area was perhaps one of the most sacred places in Honouliuli (cf Sterling and Summers 1978:33). Pu'uokapolei's connections with Kahiki are emphasized when it is noted that the hill was the home of Kamapua'a grandmother, Kamaunuaniho, the Kahiki ancestor to the people of O'ahu (Fornander 1916-20, V: 318; Kahiolo 1978:81, 107; Chariot 1987:62). By name, Kapolei is associated with the goddess Kapo, another connection with the Pele and Kamapua'a stories (Kamakau 1976:14). McAllister (1933:108) records that a *heiau* or temple was located on Pu'uokapolei, but was destroyed before his survey of the early 1930s. The *heiau* may have been associated with the sun (Fornander 1916-20, III: 292), and the hill was used as a point of solar reference or as a place where such observations were made.

Mitchell and Hammatt (December 2004) record a number of traditional and legendary accounts relating to the area. They are summarized below, starting with those pertaining to Pōhākea Pass.

- *The Pele Family at Honouliuli*. Kapolei (beloved Kapo), is believed to have been named in reference to the volcano goddess Pele's sister Kapo (Pukui et al, 1974:89). Pōhākea Pass is

understood as one of the resting places of Pele's sister Hiʻiaka as she was returning from Kauaʻi with Pele's lover Lohiau (Fornander 1919 Vol. V: 188 note 6).

- *Kahalaopuna at Pōhākea Pass*. One of the most popular legends of Oʻahu is that of Kahalaopuna (or Kaha) a young woman of Mānoa who is slandered by others and then killed by her betrothed, Kauhi, a chief from Koʻolau. Her spirit (*ʻuhane*) flies up into a *lehua* tree and chants for someone to go notify her parents. Upon hearing the news her parents fetch Kahalaopuna back to Mānoa and she is restored.
- *Keahumoa, Residence of Maui's Grandfather.* In the Legend of Maui's Flying Expedition (Thrum 1923:252-259) Maui-kupua looks toward Pōhākea Pass and sees his wife, Kumulama, being carried away by chief Peapeamakawalu. With the help of his mother, Hina, and grandfather, Kuolokele, Maui gathers *ki* leaves, *ʻieʻie* vines, and bird feathers from which Kuolokele fabricates a "bird-ship" (*moku-manu*) which Maui uses to defeat Peapeamakawalu and recover his wife.
- *Kane and Kanaloa and the Boundaries of 'Ewa.* It seems likely the boundaries between ʻEwa and Waiʻanae were often contested. The ʻEwa people claimed that when Kāne and Kanaloa were surveying the islands they came to Oʻahu they hurled the stone as far as the Waiʻanae Range and it landed at Pili o Kahe, a spot where two small hills of the Waiʻanae Range come down parallel on the boundary between Honouliuli and Nānākuli. The ancient Hawaiians said the hill on the ʻEwa side was the male and the hill on the Waiʻanae side was female… (Simeon Nawaa In Sterling and Summers 1978:1).
- *Kamapuaʻa at Honouliuli*. Kamapuaʻa the pig god is associated with Honouliuli. After conquering most of Oʻahu, he installed his grandmother [Kamaunuaniho] as queen, took her to Puʻuokapolei, and made her establish her court there. This was to compel the people who were to pay tribute to bring all the necessities of life from a distance, to show his absolute power.
- *Moʻo at Maunauna*. Moses Manu in recounting the Legend of Keaomelemele makes a reference to a bad *moʻo* (fabulous lizard, dragon, serpent) named Maunauna, who lived in extreme northern Honouliuli.
- *Home of the Shark-Goddess Kaʻahupāhau*. The legend of Kaʻehuikimanōo Puʻuloa is that the Big Island shark god, Kaʻehuiki, travels to visit the famous shark deity Kaʻahupāhau "…reaching Honouliuli, the royal residence." Kaʻahupāhau is said to have lived in a royal cave at Honouliuli.
- *The Frightened Populace of Honouliuli (He Kaʻao no Palila)*. In the Legend of Palila, the *kupua* or demigod hero of Kauaʻi lands at Kaʻena Point with his *lāʻau pālau*, a fabulous war club that took 80 men to carry it. He carried it from there through Pōhākea Pass and into Honouliuli. After he descended to the plain of Keahumoa, he stood and looked at the dust caused by the people who had gathered there as it ascended to the sky; he then pushed his war club toward Honouliuli. When the people heard something roar like an earthquake they were afraid and they all ran to Waikele.
- *Two Old Women who Turned to Stone*. The Hawaiian language newspaper *Ka Loea Kālai ʻĀina* (January 13, 1900) relates that near Puʻuokapolei, on the plain of Pukaua, on the *mauka* side of the road, there was a large rock. The legend is that it is the remains of two peculiar women with strange powers. After fishing at Kualakaʻi [near Barbers Point], they were returning to the plain from the shore and met a one-eyed person [bad omen]. They became frightened and began to run, dropping the *ʻaʻama* crabs and seaweeds that they had gathered on the way. As it became light, one woman said to the other, "Let us hide lest people see us," and they did. Their bodies turned into stone and that is one of the famous things on this plain to this day, the stone body.
- *The Naming of Honouliuli*. In the Legend of Lepeamoa, the chicken-girl of Pālama, Honouliuli is the name of the husband of the chiefess Kapālama and grandfather of Lepeamoa.
- *The Story of Kaihuopalaʻai Pond*. In the Legend of Maikohā, Kaihuopalaʻai, a sister of Maikohā (a deified hairy man who became the god of *tapa* makers) traveled to Oʻahu where she saw and fell in

love with a goodly man by the name of Kapapaapuhi who was living at Honouliuli. Kaihuopala‘ai was changed into that fishpond in which mullet are kept and fattened, and has remained in ‘Ewa to this day.

- *Honouliuli and the Head of Hilo-a-Lakapu*. In the Legend of the Sacred Spear-point, following his unsuccessful raid against O‘ahu the Hawai‘i Island chief Hilo-a-Lakapu was slain at Waimano and his head was placed upon a pole near Honouliuli for the birds to feed up on.
- *The Strife at Honouliuli from which Kūali‘i unites Hawai‘i nei*. Fornander reports that the celebrated chief Kūali‘i, is said to have lead an army of twelve thousand against an army of twelve hundred representing the chiefs of Ko‘olauloa upon the plains of Keahumoa. The battle was called off and the *ali‘i* of Ko‘olau ceded the districts of Ko‘olauloa, Ko‘olaupoko, Waialua and Wai‘anae to Kūali‘i.
- *The Vacationing Place of Kākuhihewa*. One historical account refers to an *ali‘i* residing in Ko ‘Ōlina in Waimānalo near the boundary of ‘Ewa and Wai‘anae. This was a vacationing place for chief Kākuhihewa.
- *The Last Days of Kahahana and Honouliuli*. One story relates that in the tradition of the prophecy of the *kahuna* Kaopulupulu, the deposed O‘ahu chief Kahahana fled for his life with his wife Kekuapoi and friend Alapa‘i and hid in the hills. They went to many places, eventually stopping at Honouliuli, where they showed themselves to the people and submitted themselves to their care. Through treachery, Kahahana was induced to leave Honouliuli and was killed on the plains of Hō‘ae‘ae.
- *Pu‘uokapolei and the Reckoning of the Seasons*. Samuel Kamakau relates that the people of O‘ahu reckoned from the time when the sun set over Pu‘uokapolei until it set in the hollow of Mahinaona and called this period *Kau* [summer], and when it moved south again from Pu'uokapolei and it grew cold and the time came when young sprouts started, the season was called from their germination (*‘ōilo*) the season of *ho‘ōilo* [winter, rainy, season].
- *Winds of Honouliuli*. Moses K. Nakuina recounts the following names for the winds of the region: Moa‘e-kū is of ‘Ewaloa; Kēhau is of Waiopua; Waikōloa is of Līhu‘e; and Kona is of Pu‘uokapolei.

3.9.4 CONSULTATIONS

Numerous studies conducted for previous projects in the area include information obtained through consultations with Hawaiian cultural organizations, government agencies, and individuals who might have knowledge of and/or concerns about traditional cultural practices. The contacts provided information concerning (i) the general history and present and past land use of the study area; (ii) knowledge of cultural sites which may be impacted by the project, e.g., historic sites, archaeological sites, burials, etc.; (iii) knowledge of traditional gathering practices in the study area-both past and present; (iv) cultural associations with the study area through legends, traditional use or otherwise; (v) referrals of *kupuna* who might be willing to share their cultural knowledge of the study area in general; and (vii) other cultural concerns the community might have related to Hawaiian or other cultural practices in this area.

Two additional individuals with knowledge of the project area were interviewed for this project in order to assess potential impacts to traditional cultural practices in accordance with guidance related to Chapter 343 HRS, Articles IX and XII, and to Act 50. They are Mr. Shad Kane and Ms. Nettie Tiffany. Both individuals have been recognized as knowledgeable about the cultural history of the area in previous studies of the region, and the Office of Hawaiian Affairs identified both as excellent sources of information for this project. Because the results of the interviews provided more information relevant to the potential adverse effects of the proposed action and alternatives, they are presented in Chapter 4 of this report (see Section 4.8).

3.10 EXISTING LAND USE/SOCIOECONOMIC & CULTURAL ENVIRONMENT

Campbell Industrial Park and its environs are characterized by diverse industrial and commercial uses. Figure 3.7, which is based on the Campbell Estate's January 2003 records, shows the businesses and landowners within CIP. The area north of the industrial park where the CEIP Substation and most of the transmission corridor is located is designated for future expansion of the Kapolei Business Park (KBP).

CIP represents the largest heavy industrial area on O‘ahu. In addition to the generating facilities that are discussed throughout this report, users include the state's two oil refineries, a large cement factory, many construction yards, and large warehouses. The CEIP Substation and transmission corridor abut and traverse, respectively, areas within the future KBP which are currently undeveloped land previously used for agricultural purposes. The land north of the CEIP Substation is now vacant, but is planned for future urban development.

The residential communities closest to the generation site are Makakilo (2.5 miles away), Honokai Hale/Nanakai Gardens (2.3 miles), Ko Olina (1.7 miles), and Kalaeloa (2.2 miles). The AES Substation adjacent to the proposed generating site is also in the midst of the heavy industrial area. The CEIP Substation is presently in the midst of vacant land, but the proposed development of Kapolei West, a residential project centered on a new golf course, would bring urban development closer to that facility.

3.11 SCENIC AND AESTHETIC RESOURCES

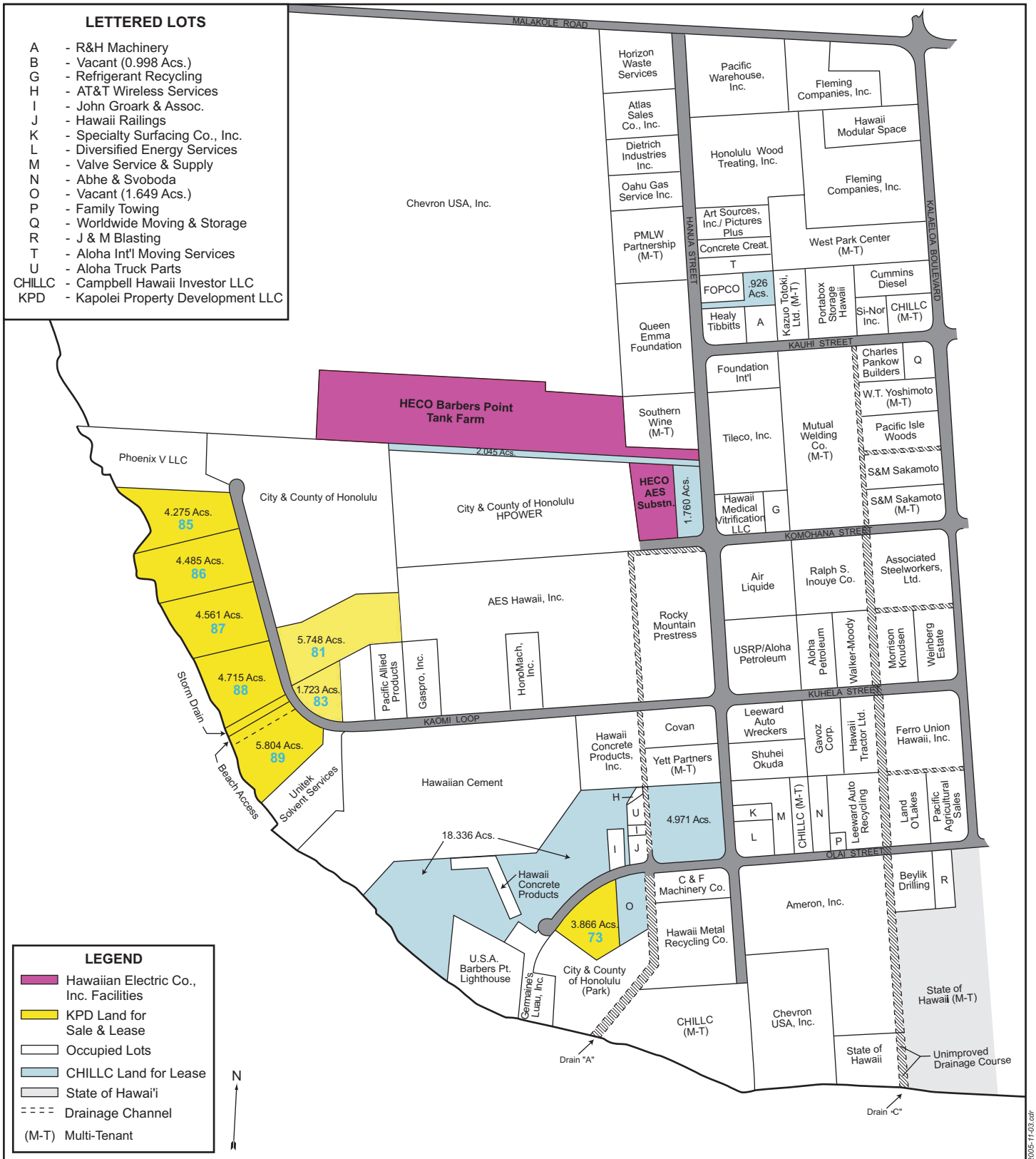
Generally, the project area is relatively flat and undistinguished. Being entirely within an industrial park, there are no scenic resources in the immediate area. The ‘Ewa Development Plan's list of visual landmarks and significant vistas in the ‘Ewa area includes the following:

- Distant vistas of the shoreline from the H-1 Freeway above the ‘Ewa Plain,
- Views of the ocean from Farrington Highway between Kahe Point and the boundary of the Wai‘anae Development Plan Area,
- Views of the Wai‘anae Range from H-1 Freeway between Kunia Road and Kalo‘i Gulch and from Kunia Road,
- Views of napu‘u at Kapolei, Pālailai, and Makakilo,
- *Mauka* and *makai* views, and
- Views of central Honolulu and Diamond Head.

Because nearby communities are located well upland of CIP, the existing facilities there do not significantly affect these views of interest.

3.12 LAND OWNERSHIP

The BPTF property is located between industrial sites owned by Chevron (its Barbers Point Refinery) and the City & County of Honolulu (HPOWER). Other nearby tenants and landowners include Southern Wine and Spirits, the Queen Emma Foundation, Rocky Mountain Prestress, and AES Hawai‘i, Inc. (see Figure 3.7). The properties along the transmission corridor are owned by HRPT Properties Trust, a successor to Campbell Estate, and will be developed as part of the future Kapolei Business Park. The transmission corridor comes within about 1,000 feet of State-owned land to the west, which includes the Barbers Point-Kalaeloa Harbor and Coral Waste Pit. Across the former railroad to the north of the CEIP Substation is a large parcel owned by Aina Nui Corporation, a successor to Campbell Estate.



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Prepared By:

PLANNING SOLUTIONS

Source:

James Campbell Estate, LLC
(January, 2003)

Figure 3.7:

Businesses & Land Ownership Within the CIP

CIP Generating Station & Transmission Additions Project

Figure 3-7 Businesses & Land Ownership Within the CIP 2005-11-03.cdr

3.13 LAND USE CONTROLS

Figure 3.8 shows State Land Use Districts within the area. All of the facilities affected by the project are within the State Urban Land Use District, with the exception of part of the transmission corridor, which passes over land in the State Agricultural District.

The City & County of Honolulu has zoned the BPTF and the AES Substation I-2, Intensive Industrial use. The CEIP Substation is in the Ag-1 (Restricted Agriculture) zone, as is most of the land along the transmission corridor (see Figure 3.9). Only the part of the proposed 138 kV transmission line that is south of Malakole Street is in the I-2 District.

The parcels on which the proposed generating facilities would be constructed are within an area designated for Industrial use on the ‘Ewa Development Plan (DP) Urban Land Use Map (August 1997). That Development Plan land use designation is not a site-specific land use control, but it is an indication of the appropriateness of the use for the area and a reflection of the ‘Ewa Development Plan text policies.

3.14 TRANSPORTATION FACILITIES

3.14.1 ROADWAYS

The facilities that would be constructed or modified by the project are all accessible from existing roadways. Roadway access to the proposed generation complex on the BPTF site would be via Hanua Street and a new site access road to be constructed along the southern edge of the property. Hanua Street was designed and constructed to carry heavy vehicular traffic and experiences only moderate traffic volumes at the present time. It provides access to the H-1 Freeway via Malakole Road and Kalaeloa Boulevard.

3.14.2 HARBORS

Barbers Point-Kalaeloa Deep Draft Harbor, located approximately one mile north of the BPTF site, provides a nearby location for unloading heavy equipment and construction materials needed for the proposed project. However, most construction materials would probably arrive at the more developed facilities in Honolulu Harbor and be trucked to the site. The petroleum that would be used in the proposed generating units would be produced at the local refineries from crude oil brought to Hawai‘i by ocean-going ships and offloaded offshore.

3.14.3 AIRPORTS

The BPTF is about 9,000 feet southwest of the approach end of Runway 11 at Kalaeloa Airport (formerly the Barbers Point Naval Air Station). Because of the height of the exhaust stacks, HECO is required to submit a Notice of Intent to the Federal Aviation Administration for construction of the proposed facilities at the BPTF. The FAA reviewed and approved the stacks for the neighboring HPOWER and AES Barbers Point facilities, both of which have stacks higher than those proposed for the current project.

3.15 PUBLIC INFRASTRUCTURE AND SERVICES

3.15.1 WATER SUPPLY

The City and County of Honolulu Board of Water Supply (BWS) owns and maintains waterlines in the CIP. One runs along Hanua Street adjacent to the BPTF. As discussed in Section 2.2.4.2, HECO anticipates using a small amount of potable water from the BWS system for drinking water and other

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Sources:

--Hawaiian Electric Co., Inc
--State of Hawai'i GIS
--Space Imaging, Inc. (08/17/04)

Legend:

AES-CEIP #1

AES CEIP #2

0 1,000 2,000
Feet

Figure 3.8:

State Land Use Districts

CIP Generating Station & Transmission Additions Project

Figure 3-8 State Land Use Districts 2005-11-03.mxd

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Prepared By:

PLANNING SOLUTIONS

Sources:

--Hawaiian Electric Co., Inc
--City & County of Honolulu
--Space Imaging, Inc. (08/17/04)

Legend:

AES-CEIP #1

AES CEIP #2

0 1,250 2,500
Feet

Figure 3.9:

City & County of Honolulu Zoning Districts

CIP Generating Station & Transmission Additions Project

Figure 3-9 Zoning 2005-11-03.mxd

domestic purposes, but the majority of process water for the generating facility would come from on-site wells and/or from the Honouliuli WWTP. BWS will confirm the availability of potable water for the project once the building permit application has been submitted for approval.

3.15.2 WASTEWATER AND STORMWATER COLLECTION, TREATMENT, AND DISPOSAL

There are no municipal wastewater collection and treatment facilities in Campbell Industrial Park. Sewage generated at the existing properties is either treated and disposed of through injection wells or stored in a septic tank and periodically trucked away for offsite disposal. Rain falling on the BPTF site at the present time either ponds and percolates into the ground or sheet flows until it reaches a natural or manmade drainageway. Rainfall along the existing transmission corridor either immediately percolates into the ground or travels a short distance along naturally defined drainageways before doing so.

3.15.3 TELECOMMUNICATIONS

Hawaiian Telcom (formerly Verizon Hawai‘i) provides telephone service to the area via lines that run within the roadways throughout CIP. In addition, HECO has its own fiber-optic system linking the Tank Farm site with the Waiau Generating Station that was installed as part of the Waiau Fuel Pipeline project.

3.15.4 POLICE AND FIRE SERVICE

The CIP is served by Kapolei #40 Fire Station and Kapolei Police Station, both of which are within five miles of the Barbers Point Tank Farm. In addition, the proposed generating facility would have its own on-site security staff and a supply of fire water for immediate response to emergencies.

3.15.5 HEALTH CARE FACILITIES

The nearest public hospital is St. Francis West, located approximately 7 miles to the northeast of the Barbers Point Tank Farm.

3.15.6 SCHOOLS

The nearest school to the proposed project is Barbers Point Elementary School, which is approximately 2 miles from the BPTF. The future West Kapolei Middle School is also slated to be constructed at a site approximately 2 miles from the BPTF, not far from the CIP substation.

3.15.7 RECREATIONAL FACILITIES

The nearest recreational area is the Barbers Point Beach Park, owned and maintained by the City & County of Honolulu Department of Parks and Recreation. The entrance to the park is at the end of Olai Street, approximately 0.5 miles south of the BPTF.

3.15.8 SOLID WASTE DISPOSAL

The existing facilities on the parcels that would be used for the proposed improvements generate little solid waste. HECO has a contract with Chevron for the collection and disposal of the small amount of solid waste that originates in the office space that is used in support of the Waiau Fuel Line facilities that are co-located on the parcel.

4.0 POTENTIAL IMPACTS

This Chapter describes the probable adverse and beneficial effects of constructing and operating the proposed facilities and alternatives to them identified in Section 2.7.2. These include:

- Alternative 1: Proposed Action (Combustion Turbine + Overhead Transmission Circuit With Possibility of Future Second Combustion Turbine);
- Alternative 2: Transmission Circuit & Single Combustion Turbine;
- Alternative 3: Single Combustion Turbine Only;
- Alternative 4: Additional Transmission Circuit Only.

The discussion is organized by type of potential impact (e.g., air quality, water quality, visual, etc.). Differences between the alternatives are described within each topic. The discussion within each topical area begins with a description of the components of the project that have the potential to impact the particular aspect of the environment being discussed. In the case of air quality impacts, for example, this involves characterizing the emissions that the different facilities are expected to generate. Because they typically involve substantially different types of impacts, the analysis also distinguishes between activities that are needed to construct the facilities and those associated with its operation.

In order to avoid redundancy, the impacts discussion is parsed by alternative only when the types and intensities of impacts would differ between them. In those cases, Alternative 1 and Alternative 2 would be discussed under separate subheadings. Because Alternatives 3 and 4 are simply subsets of Alternatives 1 and 2, they are not discussed separately. Rather, their impacts can be inferred by the discussions under the first two alternatives.

Good design integrates features intended to avoid or mitigate potential environmental effects into the overall design of the project. Because of this, in most cases the discussion of "mitigation measures" is integrated into the overall discussion rather than limited to a separate section of the report or section. Major design features that contribute most to environmental quality are summarized in the Executive Summary.

The remainder of this Chapter is divided into the major subsections listed below, each corresponding to one aspect of the environment:

- Section 4.1 - Physiography and Topography;
- Section 4.2 - Geology and Soils;
- Section 4.3 - Air Quality and Climate;
- Section 4.4 – Hydrology and Water Resources;
- Section 4.5 – Exposure to Natural Hazards;
- Section 4.6– Impacts on Biota;
- Section 4.7 – Noise Impacts;
- Section 4.8 – Impacts on Archaeological, Historic, & Cultural Resources;
- Section 4.9 – Visual Impacts;
- Section 4.10 – Impacts on Transportation Facilities;
- Section 4.11 – Impacts on Public Infrastructure and Services;
- Section 4.12 – Land Use and Socio-Economic Effects; and
- Section 4.13 – Electric and Magnetic Fields.

4.1 IMPACTS TO PHYSIOGRAPHY AND TOPOGRAPHY

Power Generation and Substation Facilities. All of the areas where facilities would be constructed are nearly flat. While some excavation will be needed for foundations and some fill will be required for protective berms, the construction of pads suitable for large equipment, and other specific functions, the volumes are small and there will be no significant change in topography as a result of construction of the proposed power generation and substation facilities.

Power Transmission Facilities. If the electrical power transmission towers that are HECO's preferred means of providing additional capacity between the AES Substation and the CIP Substation are installed, the only earthwork that will be needed is borings for the pole foundations. If the underground alternative is selected, substantial trenching will be required. However, neither of these will result in significant topographic changes.

4.2 IMPACTS TO GEOLOGY AND SOILS

4.2.1 PROJECT COMPONENTS RELATED TO GEOLOGY & SOILS

The proposed project will involve the disturbance of approximately 10 acres of land, the great majority of it on the tank farm site. Small amounts of structural fill will be needed for this, but the total is expected to be no more than a few thousand cubic yards. Most of this material would be similar in character to the material already at the site. The facilities that comprise the proposed project will impose both static and dynamic loads on their foundations. The soils and underlying geologic strata on which they are constructed must accommodate these loads and be free of conditions (e.g., high shrink-swell potential) that cannot be readily accommodated through standard design practices. The soils must be sufficiently resistant to erosion that development will not create undue erosion or sedimentation hazard. Finally, to insure adequate safety, foundations and structural elements must be designed to tolerate anticipated seismic loads.

4.2.2 GENERAL IMPACTS ON GEOLOGY & SOILS (ALL ALTERNATIVES)

As mentioned in Chapter 3, most of the Barbers Point area is underlain by coral outcrop, including the BPTF, the AES Substation, and most of the transmission corridor (Foote 1972, General Soil Map, O'ahu Island, Hawai'i). According to the Soil Survey of the State of Hawai'i (Foote et al. 1972), coral outcrop is suited for military installations, quarries, and urban development. Its Soil Conservation Service (SCS) capability rating is VIIIs.[49] It provides a stable foundation for buildings and is erosion resistant. All of the existing industrial facilities within the BPTF have been constructed on coral outcrop.

The soil at the CEIP Substation site is Mamala stony silty clay loam. This soil type is typically underlain by coral limestone and consolidated calcareous sand at depths of 8 to 20 inches. Permeability is moderate. Runoff is very slow to medium, and the erosion hazard is slight to moderate. This soil type is used for sugarcane, truck crops, and pasture and is rated IIIs if irrigated, VIs if non-irrigated.[50] Currently, none of the land characterized by this soil type in the project area is used for agriculture.

There are two small patches of 'Ewa silty clay loam along the transmission corridor which are designated "Prime" on the Agricultural Lands of Importance to the State of Hawai'i (ALISH) map.

[49] In general, Class VIII soils and miscellaneous areas have limitations that preclude agricultural use. Subclass s is assigned to soils that have soil limitations within the rooting zone, such as shallowness of the rooting zone, stones, low moisture-holding capacity, low fertility that is difficult to correct, and salinity or sodium content.

[50] Class III soils have severe limitations that reduce the choice of plants or require special conservation practices, or both. Class VI soils have severe limitations that make them generally unsuited to cultivation and that limit their use mainly to pasture, range, forestland, or wildlife food and cover.

The SCS capability classification of this soil type is IVs if non-irrigated (i.e., very severe limitations that restrict the choice of plants or require very careful management, or both.) Neither of these small areas is currently in agricultural use, and they are unlikely to be in the future since the area is slated for the development of the Kapolei Business Park.

Installation of the transmission poles requires a relatively stable substratum. While the soils present along the proposed transmission corridor are typically shallow, they are underlain by coral limestone. That material provides a suitable substrate for the poles and can be trenched using conventional methods if the underground transmission option is selected. Very little ground disturbance would be involved if the lines are suspended on overhead poles as proposed. If the transmission lines are installed underground, the work would require trenching along the entire length of the transmission corridor. Because this disturbance would be generally limited to areas along existing and/or planned roadways, it would not represent a substantial additional impact.

4.3 IMPACTS ON AIR QUALITY AND CLIMATE

4.3.1 PROJECT COMPONENTS RELATED TO AIR QUALITY AND CLIMATE

4.3.1.1.1 Preferred Alternative

The proposed CIP Generating Station and Transmission Additions Project has the potential to affect ambient air quality in several ways. The most important is through air emissions resulting from the combustion of fossil fuels in the generating unit(s) and emergency blackstart generator that HECO proposes as part of its Preferred Alternative (see Table 4.1 for estimates of amounts).[51] Operation of the transmission and substation components of the project will not have measurable impacts on air quality; the primary emissions associated with those would be the temporary dust and exhaust from the construction vehicles used to install the equipment (see Sections 4.3.1.3 and 4.3.1.4 below). Thus, the majority of this chapter focuses on the anticipated emissions from the proposed generating units.

4.3.1.1.2 Alternatives 2, 3, and 4

Alternatives 2 and 3, both of which involve installing and operating only one of the two generating units that are included in HECO's preferred alternative, cut potential maximum emissions by half relative to the Preferred Alternative, but because the single unit is likely to be operated for more hours each day to help meet the system load, the actual emissions would probably be more than half that for the two units together. Alternative 4, which does not include the construction and operation of generating units, would have no emissions from that source; the only potential emissions would be those related to construction of the transmission circuit.

The remainder of this subsection (4.3.1.2 through 4.3.1.4) provides a general introduction to other sources of emissions anticipated from the proposed project. Subsequent sections introduce applicable regulations and quantify the anticipated emissions from various sources.

4.3.1.2 <u>Overview of Potential Emission Sources: Fuel Storage</u>

4.3.1.2.1 Preferred Alternative

The proposed CTs will be capable of burning naphtha, No. 2 diesel, or similar light fuels. Two internal floating roof tanks, each with a capacity of 4,146,000 gallons will be used to store these fuels.[52] Because No. 2 diesel oil has a true vapor pressure[53] less than 3.5 kilopascal (kPa), its storage

[51] Note, as indicated elsewhere in this report, the combustion turbines will be fuel flexible, using a cleaner fossil fuel, such as naphtha and/or diesel-, with ability to convert to a bio-fuel, like ethanol or hydrogen, when it becomes commercially available. CIP1 and CIP2 will burn naphtha with 0.05% maximum sulfur content when available. However, because the availability of 0.05% sulfur cannot be guaranteed, the emission rates used in the air quality analysis are based on the use of 0.35% sulfur diesel and naphtha. As such, they represent a worst-case emissions scenario, not the one most likely to be achieved. The blackstart diesel units, which are used only in an emergency, will burn No. 2 diesel fuel with a 0.4% maximum sulfur content.

[52] These fuel storage tanks will be designed to meet the specification pursuant to 40 CFR Part 60, Section 60.112b(a)(1).

[53] § 60.111b Definitions. "Maximum true vapor pressure" means the equilibrium partial pressure exerted by the volatile organic compounds (as defined in 40 CFR 51.100) in the stored volatile organic compounds at the temperature equal to

is not subject to New Source Performance Standard (NSPS) Subpart Kb (see Section 4.3.3.2 below). The vapor pressure of naphtha and some jet fuels is greater than 3.5 kPa and the tanks' volume is greater than 39,890 gallons; hence, these are subject to NSPS Subpart Kb. Because the two tanks are multi-purpose tanks that must accommodate all three fuels (naphtha, diesel, and jet fuel), they will use internal floating roofs to control VOC emissions in accordance with the requirements of Subpart Kb.[54]

The diesel generators required to "blackstart" the CTs when the electrical grid is unable to provide power to the generating station will fire No. 2 diesel up to 500 hours per year each. The fuel that they require would be stored in a separate oil storage tank nearby. Because of their small size and the relatively low vapor pressure of diesel fuel, air emissions from these tanks is very limited and has not been included in the analysis.

4.3.1.2.2 Alternatives 2, 3, and 4

Alternatives 2 and 3, which involve construction and operation of only a single combustion turbine plus the blackstart generator, require the same number of fuel storage tanks as the Preferred Alternative and would, therefore, have the same emissions. Alternative 4, which is to construct only the transmission line, would have no emissions from this source.

4.3.1.3 Overview of Potential Emission Sources: Construction

4.3.1.3.1 Preferred Alternative

Construction activities at the power plant, along the transmission line route, and at the substations will generate two types of air emissions: (*i*) exhaust emissions from construction vehicles and (*ii*) fugitive dust from earthmoving operations. Nearly all of these will be limited to the power plant site, but small quantities of construction-related emissions would also occur as new equipment is installed at the AES Substation and along the transmission line route. With respect to the latter, the underground transmission line option has by far the greatest potential to produce construction-related emissions because it involves extensive trenching. On the other hand, because the bulk of the underground option route follows along the route of the proposed extension of Hanua Street, it would have little incremental effect on air quality if it is installed in conjunction with the road-building that would be required for that extension.

All of the construction-related emissions would be short-term in nature and most would occur away from existing development. Consequently, none would be substantial so long as proper pollution control measures are implemented as part of the construction work. HECO will limit fugitive dust emissions in compliance with HAR 11-60.1-33 (e.g., through the use of such measures as regular watering).

4.3.1.3.2 Alternatives 2, 3, and 4

Construction of the single combustion turbine that is included in Alternatives 2 and 3 requires the same support structures, access roads, and other facilities as the Preferred Alternative. In all likelihood, its construction would involve ground disturbance to essentially all of the site and would, therefore, have the same potential to cause airborne particulate matter during site preparation. The main difference would be that fewer operating hours would be required for the heavy equipment used in its construction and for vehicles transporting construction materials and construction workers to the site, resulting in slightly fewer emissions. The overhead transmission line that is the only major component of Alternative 4 would entail very limited ground disturbance during installation of the 22 poles that would be required and does not, therefore, have the potential for significant construction air emissions. The underground variant of Alternative 4 would involve much greater ground disturbance

the highest calendar-month average of the volatile organic compounds storage temperature for volatile organic compounds stored above or below the ambient temperature or at the local maximum monthly average temperature as reported by the National Weather Service for volatile organic compounds stored at the ambient temperature.

[54] At a little over 30 gallons per tank per day, the losses would have an insignificant effect on air quality.

than would the overhead line, but the cumulative impacts could be reduced if the line were installed in conjunction with the Hanua Street road extension that the landowner already plans along the mauka portion of the route between the CIP and AES substations.

4.3.1.4 Overview of Potential Emission Sources: Other

4.3.1.4.1 Preferred Alternative

Certain other project-related activities also have limited potential to affect air quality. These include maintenance work that involves exterior cleaning and refinishing (a source of particulates and volatile organic compounds), vehicle-trips made by staff and vendors traveling to and from the site, the operation of the electrical substation and transmission equipment (a minor source of ozone), and employee and vendor vehicular traffic to and from the site. These are so limited in magnitude that we have not attempted to quantify them.

4.3.1.4.2 Alternatives 2, 3, and 4

Because of their smaller scale, other emissions from most or all of these sources would be reduced for these alternatives relative to the Preferred Alternative. However, because those from the proposed action are insignificant, the reduction would not be significant.

4.3.2 OVERVIEW AND SUMMARY OF FINDINGS[55]

The Campbell Industrial Park Generating Station will be a new major stationary source as defined by the State of Hawai‘i Department of Health. Consequently, it is subject to the Prevention of Significant Deterioration (PSD) regulations. Because the potential emissions of sulfur dioxide (SO_2), carbon monoxide (CO), volatile organic compounds (VOCs), beryllium (Be), benzene (C_6H_6), and arsenic (As) from the proposed project are above the PSD significance levels, a PSD permit is required.

The following analyses are required for SO_2, CO, VOC, Be, benzene, and arsenic:

- Application of Best Available Control Technology (BACT),
- Analysis of air quality and/or visibility impacts on Class I areas, and
- Analysis of impact on soils, vegetation, and growth.

On December 13, 2004, HECO submitted a Covered Source Permit and Prevention of Significant Deterioration (CSP/PSD) application satisfying all the requirements of HAR §11-60.1 Subchapter 5 - Covered Sources, and HAR §11-60.1 Subchapter 7 - Prevention of Significant Deterioration Review.

The results of the analyses conducted in support of the CSP/PSD application show:

- The BACT for nitrogen oxides (NO_x) is the use of water injection.
- The BACT for sulfur dioxide (SO_2) and sulfuric acid (H_2SO_4) mist is the use of No. 2 fuel oil with a maximum sulfur content of 0.05% when available.
- The BACT for CO, VOC, beryllium, PM/PM_{10}, benzene, and arsenic is combustion design.
- Predicted impacts from the proposed sources are below the *de minimis* ambient monitoring exemption level for all pollutants except for ozone (O_3). Because an existing monitoring station provides adequate background data for ozone, additional preconstruction monitoring is not required.
- The proposed project will <u>not</u> cause or contribute to an exceedance of the PSD Class I and Class II allowable increments.

[55] Discussion is drawn largely from *Covered Source And Prevention Of Significant Deterioration Permit Application Main Section Amendment Campbell Industrial Park Generating Station,* Hawaiian Electric Company, November 2004.

- The project will not cause or contribute to an exceedance of any federal or State ambient air quality standard.
- Modeling results indicate that the proposed project's emissions of hazardous air pollutants will not cause ambient concentrations above significant thresholds listed in HAR §11.60.1-179(c).

The remainder of this discussion of potential air quality impacts is divided into the following major subsections:

- Section 4.3.3 describes the air quality regulations that are applicable to facilities proposed for the proposed CIP Generating Station.
- Section 4.3.4 discusses the Best Available Control Technology that would be incorporated into the proposed combustion turbines.
- Section 4.3.5 describes the methodology that was used to predict the project's air quality impacts.
- Section 4.3.6 describes the forecast air quality with the Preferred Alternative and with Alternatives 2 and 3.
- Section 4.3.7 summarizes the project's compliance with ambient air quality standards.
- Section 4.3.8.2 summarizes the extent to which the proposed project would consume the available Prevention of Significant Deterioration (PSD) increment.
- Section 4.3.9 discusses the effect that the proposed project would have on non-criteria pollutants.
- Section 4.3.10 reviews indirect (secondary) effects on air quality.
- Section 4.3.11 discusses global warming and the extent to which the proposed project might contribute to it.
- Section 4.3.12 focuses on construction period air quality impacts of the four alternatives.

4.3.3 APPLICABLE AIR QUALITY REGULATIONS

The U.S. Environmental Protection Agency (EPA) is responsible for enforcing, on a national basis, the requirements of many of the country's environmental laws. Hawai'i is under the jurisdiction of EPA Region IX, which has its offices in San Francisco. Region IX is responsible for the local administration of EPA programs for California, Arizona, Nevada, Hawai'i, and certain Pacific Trust Territories. While EPA has delegated the implementation of some federal air pollution programs to the State of Hawai'i, it retains general oversight and enforcement authority.

4.3.3.1 Federal Prevention of Significant Deterioration Program

EPA has promulgated Prevention of Significant Deterioration (PSD) regulations for areas that have achieved the National Ambient Air Quality Standards (NAAQS).[56] O'ahu is such a region and is therefore subject to the PSD regulations. These regulations allow new sources to be constructed or existing sources to be modified, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I areas (e.g., national parks and wilderness areas).

The PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing stationary source. The Prevention of Significant Deterioration (PSD) regulations (40 CFR Part 52.21, and Hawaii Administrative Rules (HAR) Title 11, Chapter 60.1, Subchapter 7) define a major stationary source as any type belonging to a list of 28 source categories which emits or has the potential to emit 100 tons per year or more of any pollutant regulated under the Clean Air Act, or any other source type which emits or has the potential to emit such pollutants in amounts equal to or greater than 250 tons per year. The proposed Campbell

[56] Areas where the standards are met are called "attainment areas."

Industrial Park Generating Station is a major stationary source. The substation improvements and transmission line are not major new sources. The State of Hawai‘i Department of Health (DOH) has been delegated the authority to implement its own PSD regulations; however, EPA retains oversight and approval authority over BACT determinations and ambient air quality modeling analyses.[57]The five principal requirements of the PSD program are as follows:

- Emissions must be controlled using Best Available Control Technology (BACT);
- Air quality impacts in combination with other increment-consuming sources must not exceed maximum allowable incremental increases for NO_2, SO_2 and PM_{10};
- Air quality resulting from all emission sources in the area plus natural ambient pollutant background levels cannot exceed the NAAQS;
- Pre- and/or post-construction air quality monitoring may be required; and
- The air quality impacts on soils, vegetation, and nearby PSD Class I areas (national parks and wilderness areas) must be evaluated.

A PSD review is required for all pollutants emitted by a new major source that is located in a project area which is in compliance with the applicable National Ambient Air Quality Standards (NAAQS). Because the Campbell Industrial Park area has been designated as either attainment or unclassifiable for all of the NAAQS, a PSD review is required for all pollutants that are emitted above the PSD significance level.

4.3.3.1.1 Preferred Alternative

The worst-case project emissions for each PSD regulated air pollutant in comparison with the PSD significance level for each pollutant are shown in Table 4.1. The proposed project is significant for sulfur dioxide (SO_2), sulfuric acid mist (H_2SO_4), total particulate matter (PM), particulate matter less than 10 microns (PM_{10}), volatile organic compounds (VOC), oxides of nitrogen (NO_x), carbon monoxide (CO), beryllium (Be), benzene, and arsenic (As). Therefore, the proposed source is subject to PSD review for SO_2, H2SO_4, PM, PM_{10}, VOC, NOX, CO, Be, benzene, and arsenic as follows:

- Application of Best Available Control Technology (BACT);
- Analysis of ambient air quality impacts (O_3 for VOC and NO_2 for NO_X);
- Analysis of air quality and/or visibility impacts on Class I areas, and
- Analysis of impacts on soils, vegetation, and growth.

Other pollutants are regulated by the Clean Air Act, but “significant” emission rates have not been promulgated for these pollutants. Until rates are established, <u>any</u> emissions of these by a new major source may be “significant”. Hence, these pollutants are also addressed in the Covered Source Permit and Prevention of Significant Deterioration (CSP/PSD) application and are included in this discussion of potential impacts.

4.3.3.1.2 Alternatives 2 & 3

HECO analyzed the air quality impacts of installing and operating only one CT, which represents the anticipated air quality impacts of Alternatives 2 & 3. The worst-case emissions for each PSD regulated air pollutant in comparison with the PSD significance level for each pollutant are shown in Table 4.2.

[57] 40 CFR Part 52, effective January 5, 1989.

Table 4.1. Worst-Case Emissions from Preferred Alternative.

	Emission Rates											
	CIP1		CIP2		BSG1		BSG2		Naphtha Storage	Potential to Emit (tpy)	Significant Level	Significant Increase
Air Pollutant	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY[a]	lb/hr	TPY[a]	TPY[b]		(tpy)	(Yes/No)
Carbon Monoxide	402	1,761	402	1,761	10.6	2.65	10.6	2.65	--	3,527	100	Yes
Nitrogen Oxides	247	1,082	247	1,082	62.6	15.65	62.6	15.7	--	2,195	40	Yes
Sulfur Dioxide	527	2,308	527	2,308	5.80	1.45	5.80	1.45	--	4,619	40	Yes
Particulate Matter												
Total Suspended Particulates	80.0	350	80.0	350	0.54	0.13	0.54	0.135	--	701	25	Yes
PM_{10}	80.0	350	80.0	350	0.54	0.13	0.54	0.135	--	701	15	Yes
Volatile Organic Compounds	38.3	168	38.3	168	0.684	0.17	0.68	0.171	11.6	347	40	Yes
Lead	0.02076	0.09091	0.02076	0.09091	0.00020	0.00005	0.00020	0.00005	--	0.18193	0.6	No
Asbestos	Not Expected		Not Expected		Not Expected		Not Expected		--	--	0.007	No
Beryllium	0.00022	0.00098	0.00022	0.00098	0.000002	0.000001	0.00000	0.00000	--	0.00196	0.0004	Yes
Mercury	0.00178	0.00779	0.00178	0.00779	0.00002	0.00000	0.00002	0.00000	--	0.01559	0.1	No
Vinyl Chloride	Not Expected		Not Expected		Not Expected		Not Expected		--	--	1	No
Fluorides	0.01497	0.06559	0.01497	0.06559	0.00015	0.00004	0.00015	0.00004	--	0.13125	3	No
Sulfuric Acid Mist	52.0	228	52.0	228	0.802	0.20046	0.802	0.200	--	456	7	Yes
Hydrogen Sulfide	Not Expected		Not Expected		Not Expected		Not Expected		--	--	10	No
Total Reduced Sulfur	Not Expected		Not Expected		Not Expected		Not Expected		--	--	10	No
Reduced Sulfur Compounds	Not Expected		Not Expected		Not Expected		Not Expected		--	--	10	No
MWC Organics	Not Expected		Not Expected		Not Expected		Not Expected		--	--	0.0000035	No
MWC Metals	Not Expected		Not Expected		Not Expected		Not Expected		--	--	15	No
MWC Acid Gases	Not Expected		Not Expected		Not Expected		Not Expected		--	--	40	No
Benzene	0.08154	0.35716	0.08154	0.35716	0.01125	0.00281	0.01125	0.00281	--	0.71994	Any Amount	Yes
Arsenic	0.01631	0.07143	0.01631	0.07143	0.00016	0.00004	0.00016	0.00004	--	0.14294	Any Amount	Yes

Notes:

a. Annual operation of the blackstart generators are limited to 500 hrs/yr each.

b. VOC emission calculated using EPA's Tanks 4.0.

c. Based on a fuel-sulfur content of 0.35%.

Source: Form S-1 and Form S-1a in Jim Clary & Associates, November 2004. *Covered Source and Prevention of Significant Deterioration Permit Application: Campbell Industrial Park Generating Station.*

Table 4.2. Worst Case Emissions from Alternatives 2& 3 (one CT only)

	Emission Rates							
	CIP1		BSG1		Naphtha Storage	Potential to Emit	Significant Level	Significant Increase
Air Pollutant	lb/hr	TPY	lb/hr	TPY[a]	TPY[b]	(tpy)	(tpy)	(Yes/No)
Carbon Monoxide	402	1,761	32.9	8.21	--	1,769	100	Yes
Nitrogen Oxides	247	1,082	49.0	12.24	--	1,094	40	Yes
Sulfur Dioxide	527	2,308	6.81	1.70	--	2,310	40	Yes
Particulate Matter								
Total Suspended Particulates	80.0	350	1.50	0.38	--	351	25	Yes
PM_{10}	80.0	350	1.50	0.38	--	351	15	Yes
Volatile Organic Compounds	38.3	168	0.660	0.17	11.6	180	40	Yes
Lead	0.0208	0.0909	0.0002	0.0001	--	0.0910	0.6	No
Asbestos	Not Expected		Not Expected		--	--	0.007	No
Beryllium	0.0002	0.0010	0.00000	0.00000	--	0.0010	0.0004	Yes
Mercury	0.0018	0.0078	0.00002	0.00001	--	0.0078	0.1	No
Vinyl Chloride	Not Expected		Not Expected		--	--	1	No
Fluorides	0.0150	0.0656	0.0002	0.00004	--	0.0656	3	No
Sulfuric Acid Mist	52.0	228	0.942	0.2355	--	228	7	Yes
Hydrogen Sulfide	Not Expected		Not Expected		--	--	10	No
Total Reduced Sulfur	Not Expected		Not Expected		--	--	10	No
Reduced Sulfur Compounds	Not Expected		Not Expected		--	--	10	No
MWC Organics	Not Expected		Not Expected		--	--	0.0000035	No
MWC Metals	Not Expected		Not Expected		--	--	15	No
MWC Acid Gases	Not Expected		Not Expected		--	--	40	No
Benzene	0.0815	0.3572	0.0131	0.0033	--	0.3604	Any Amount	Yes
Arsenic	0.0163	0.0714	0.0002	0.00005	--	0.0715	Any Amount	Yes

Notes:

a. Annual operation of the blackstart generators are limited to 500 hrs/yr each.

b. VOC emission calculated using EPA's Tanks 4.0.

c. Based on a fuel-sulfur content of 0.35%.

Source: Form S-1 and Form S-1a in Jim Clary & Associates, October 2003. *Covered Source and Prevention of Significant Deterioration Permit Application: Combustion Turbine BP1 & Diesel Engine Generator BSG 1; Barbers Point Generating Station.*

As shown, with only one CT and one BSG, the project is significant for all of the same pollutants as the preferred alternative: sulfur dioxide (SO_2), sulfuric acid mist (H_2SO_4), total particulate matter (PM), particulate matter less than 10 microns (PM_{10}), volatile organic compounds (VOC), oxides of nitrogen (NO_x), carbon monoxide (CO), beryllium (Be), benzene, and arsenic (As). Therefore, the proposed source is subject to PSD review for SO_2, H2SO_4, PM, PM_{10}, VOC, NOX, CO, Be, benzene, and arsenic as follows:

- Application of Best Available Control Technology (BACT);
- Analysis of ambient air quality impacts (O_3 for VOC and NO_2 for NO_X);
- Analysis of air quality and/or visibility impacts on Class I areas, and
- Analysis of impacts on soils, vegetation, and growth.

4.3.3.2 Federal New Source Performance Standards

Construction of the proposed generating facilities is also subject to Standards of Performance for New Stationary Sources, which are source-specific federal regulations, limiting the allowable emissions of criteria pollutants (i.e., those that have a NAAQS) and their precursors (40 CFR 60). This program has been delegated by EPA to the State of Hawai‘i (40 CFR 60.4). The emission standards imposed by the New Source Performance Standards (NSPS) that are applicable to one or more of the facilities that would be developed at the Campbell Industrial Park Generating Station are as follows.

Subpart GG — Stationary Gas Turbines: [58]

- Nitrogen oxides: 99 parts per million, dry, in the exhaust at 15% O_2.
- Sulfur dioxide: 0.015% by volume SO_2 in the exhaust or 0.8 % by weight sulfur in fuel.

Subpart Kb — Organic Liquid Storage Vessels;

- Evaporative emissions of volatile organic compounds must be controlled using one of the following: (1) a fixed-roof with an internal floating roof; (2) an external floating-roof with a secondary seal; or (3) a closed-vent system and control device to capture organic vapors.

4.3.3.3 National Emissions Standards for Hazardous Air Pollutants

The National Emissions Standards for Hazardous Air Pollutants (NESHAPS) are source-specific and pollutant-specific regulations limiting the allowable emissions of hazardous air pollutants (40 CFR 61). Unlike “criteria air pollutants”, hazardous air pollutants are those that do not have a NAAQS but that have been identified by EPA as causing or contributing to the adverse health effects. The EPA has delegated administration of the hazardous air pollutants program to the SDOH.

4.3.3.4 State of Hawai‘i Permitting Requirements

The proposed project will be subject to State of Hawai‘i Administrative Rules (HAR), Title 11, Chapter 60.1, Air Pollution Control, Subchapters 1, 2, 5, 6, 7, 8, and 9. Each of these rules requires, in various forms, descriptions and analyses of the proposed project, its emissions, and its impact on air quality. The analyses presented below indicate that the proposed CIP Generating Station will comply with all applicable State and federal air quality requirements.

Under the State regulations, the proposed project will be a major source; as such, it is considered a “covered source” for the purposes of HAR §11-60.1.[59] Following is a summary of the HAR §11-60.1

[58] On February 18, 2005, EPA proposed a rule, to be codified as 40 CFR Subpart KKKK, that would establish new NSPS for new combustion turbines that commence construction after February 18, 2005. (70 FR 8314, Feb. 18, 2005). If the rule is adopted, the CTs that comprise this action would have to meet the Subpart KKKK requirements, which would be included in the CSP/PSD permit that would authorize construction of the units.

[59] This section defines “covered source” to include any “major source”, or any source subject to NSPS, NESHAPS, or PSD. A "major source" includes all sources with a "potential to emit" in excess of 100 tons per year of any air pollutant. The proposed project is considered to be a "covered source" because it is a "major source," and is subject to NSPS and PSD.

air quality permitting standards or requirements that will be applicable to one or more facilities or activities planned for the CIP Generating Station project.

- §32 Visible emissions. Emissions of visible air pollutants (not including uncombined water vapor) from sources modified or constructed after March 20, 1972, may not exceed 20% opacity, except during periods of "start-up and shut-down" and "breakdown of equipment" when emissions may be 60% opacity for not more than 6 minutes in any 60-minute period.
- §33 Fugitive dust. "Reasonable precautions" must be taken to prevent particulate matter emissions during construction or material handling, and "best practical operation or treatment" must be implemented to prevent visible emissions of fugitive dust beyond the property line. Several examples of "reasonable precautions" are cited in this section, including use of water or chemical dust suppressants, paving of roads, and installing hoods and fabric filters.
- §34 Motor vehicles. Visible emissions and engine idling time for mobile sources used in the construction, maintenance, and operation of the facility must comply with the requirements of this section.
- §38 Sulfur oxides from fuel combustion. This section limits fuel sulfur content to 2% by weight, and limits fossil-fuel-fired power generating plants greater than 25 megawatts or 250 MMBtu/hr to 0.5% sulfur by weight in the fuel. This requirement is applicable to the facilities proposed for the CIP Generating Station project.[60]
- §39 Storage of volatile organic compounds. This section requires all "volatile organic compounds" stored in vessels larger than 250 gallons capacity to have a permanent submerged fill pipe, or be stored in a pressure vessel or vented to a control device. Distillate oil is a "volatile organic compound" as defined in HAR §11-60.1-1, and therefore the fuel storage tanks for this project must have at least a submerged fill pipe. Further controls are required for storage of volatile organic compounds with true vapor pressures exceeding 1.5 psia (pounds/square inch absolute) and capacities exceeding 40,000 gallons. Naphtha has a true vapor above 1.5 psia, and the naphtha storage tanks will be designed to comply with this requirement.
- §40 Volatile organic compound water separation. This section requires that any volatile organic compound water separator handling more than 200 gallons per day of any volatile organic compound (defined as a compound having a Reid vapor pressure of 0.5 psia or greater) must be equipped with a vapor loss control device. Because the oily water separator that will be used to handle stormwater and other oil-containing water will not contain more than 200 gallons per day of volatile organic compounds, this section does not apply to the project.
- §41 Pump and compressor requirements. This section limits emissions from pumps and compressors handling volatile organic compounds with true vapor pressures exceeding 1.5 psia. Pumps that handle naphtha will be equipped with mechanical shaft seals that comply with this section.
- HAR §11-60.1, Clean Air Act Title I Part C, and EPA regulations require that the proposed facilities incorporate the "Best Available Control Technologies" (BACT) to limit emissions of pollutants subject to any NAAQS or State ambient air quality standard. This demonstration must be made on a unit-by-unit basis at the time the air permit for the unit is being sought (typically 2-3 years before the desired in-service date for the unit).

4.3.3.5 Other Health- and Safety-Related Requirements

4.3.3.5.1 Ammonia Storage & Handling (If Needed for SCR Technology)

HECO has not proposed selective catalytic reduction (SCR) technology as BACT for the generating units.[61] If the SDOH were to determine that SCR does represent BACT or if the new NSPS for

[60] Plans for the project call for the liquid fuel sulfur content of the fuel for the combustion turbines never to exceed 0.35% by weight; typical values are expected to be 0.05% or less.

[61] Selective catalytic reduction means a non-combustion control technology that converts nitrogen oxides to molecular nitrogen and water by injecting a reducing agent (e.g., ammonia) into the flue gas in the presence of a catalyst (e.g., vanadium, titanium, or zeolite).

combustion turbines is adopted (proposed 40 CFR Subpart KKKK), then HECO would install SCR. In this case, HECO would install a urea system at the facility. Urea systems convert granular urea or urea solution to ammonia. The systems are safer than the anhydrous system and are available in several designs.

One design involves dry urea, which is delivered in palletized form. Dry urea is solid under ambient conditions, is a nontoxic substance, and presents essentially no danger to humans and the environment. Urea can be economically and safely shipped and stored in bulk quantities until it is eventually mixed with water. Dry urea would be transported in pelletized form to the site by truck and unloaded by pneumatic conveying into a dry storage silo. The typical capacity of a truck transporting urea is approximately 25 tons. A storage silo of approximately 1,000 cubic feet would be provided to allow complete unloading of the tank truck. The urea would be delivered from the storage silo to a mixing tank via a rotary feeder where the urea would be mixed with demineralized water to produce a 40 percent urea solution.

An alternate design would involve delivering a 40 percent urea solution to the plant site by truck. The solution would require a 7,000 gallon storage tank to allow complete truck unloading. This system has a lower capital cost and operating cost compared to the dry urea system discussed above; however its viability depends on the availability of the urea solution.

In a typical urea to ammonia system, the ammonia solution is delivered to a pressurized vessel, with the heat input controlled to maintain the pressure. The urea is decomposed into a NH_3, CO_2 and water vapor mixture, and the mixture is further diluted with air prior to discharge into the flue gas. Another type of urea system introduces ammonia into the flue gas by spray injection of ammonia solution into a hot flue gas bleed stream followed by a decomposition catalyst. The mixture is discharged into a hot flue gas bleed stream as a fine mist and subsequently vaporized. The flue gas and ammonia mixture is then injected into the main flue gas stream upstream of the SCR catalyst.

Prior to entering the flue gas, ammonia vapor from the ammonia storage tank is supplied to a flow control skid where the ammonia flow rate is controlled and also the ammonia is diluted with air below the LEL. The NH_3 is diluted with air to less than 3 percent by volume, which is considerably below the LEL of 16.5 percent. The ammonia/air mixture is then delivered to an injection grid, which distributes the ammonia into the flue gas directly upstream of the catalyst.

Although ammonia is widely used for agricultural and refrigeration purposes, it is considered a hazardous material and must be transported, stored, handled, and used in accordance with the following State and federal regulations:

- Federal Occupational Safety and Health Administration: *Occupational Safety and Health Act of 1970* (OSHA), 29 USC § 651 et seq.; 29 CFR Parts 1910, 1926, and 1952;
- Environmental Protection Agency: *Emergency Planning and Community Right-to-Know Act of 1986 (*SARA Title III), 42 USC § 11001 et seq.; 40 CFR Parts 350, 355, and 370;
- Environmental Protection Agency: *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA), 42 USC § 9601 et seq.; 40 CFR Part 302;
- Environmental Protection Agency: *Clean Air Act,* 42 USC § 7412(r); 40 CFR Part 68 (Chemical Accident Prevention – applicable if ammonia stored in its anhydrous form);
- Department of Transportation: 49 CFR Chap. III, Subchapters B and C*, national safety standards for the transport of goods, materials, and substances over public highways, including hazardous materials transportation regulations*; and
- National Fire Protection Association Standards.

A final decision regarding whether, and in what form, the ammonia needed for SCR would be produced, stored, and used would be made in consultation with the permitting agencies (DOH and EPA) if SCR is required as BACT.

4.3.3.5.2 PSD Area Classification

The PSD requirements provide for a system of area classifications, which affords States an opportunity to identify local land use goals. There are three area classifications; each differs in terms of the amount of growth it will permit before significant air quality deterioration would be deemed to occur.

- Class I areas have the smallest increments and thus allow only a small degree of air quality deterioration.
- Class II areas accommodate normal well-managed industrial growth.
- Class III areas have the largest increments and thereby provide for greater development than either Class I or Class II areas.

Congress established certain areas, e.g., wilderness areas and national parks, as mandatory Class I areas. These areas cannot be redesignated as any other area classification. All other areas of the country were initially designated as Class II. Procedures exist under the PSD regulations to redesignate the Class II areas to either Class I or Class III, depending upon a State's land management objectives. The Campbell Industrial Park area is designated as a Class II area. Haleakala National Park on Maui, the closest Class I area, is located over 200 kilometers to the east of the project site. The Class II PSD increments and the NAAQS for SO_2, PM/PM_{10}, CO, O_3 and NO_2 are presented in Table 4.3, which also shows the significant impact levels for these pollutants.

Table 4.3. Significant Impact Levels, PSD Class II Increments, and NAAQS and SAAQS.

		Significant Impact Levels		PSD Increment			
Pollutant	**Averaging Period**	**Modeling ($\mu g/m^3$)**	**Monitoring de mininis ($\mu g/m^3$)**	**Class I ($\mu g/m^3$)**	**Class II ($\mu g/m^3$)**	**NAAQS ($\mu g/m^3$)**	**SAAQS ($\mu g/m^3$)**
SO_2	3-hour	25	-	25[a]	512[a]	1300[a,b]	1,300[a]
	24-hour	5	13	5[a]	91[a]	365[a]	365[a]
	Annual	1	-	2[c]	20[c]	80[c]	80[c]
NO_2	Annual	1	14	2.5[c]	25[c]	100[c]	70[c]
PM_{10}	24-hour	5	10	8[f]	30[f]	150[d]	150[d]
	Annual	1	-	4[f]	17[f]	50[e]	50[e]
PM	24-hour	5	10	10[a]	37[a]	-	-
	Annual	1	-	5[a]	19[c]	-	-
CO	1-hour	2,000	-	-	-	40,000[a]	10,000[a]
	8-hour	500	575	-	-	10,000[a]	5,000[a]
O_3	1-hour	-	-	-	-	235[d]	-
	8-hour	-	-	-	-	-	157[d]
	Annual	-[g]	-[h]	-	-	-	-

Notes:
a. Not to be exceeded more than once per year.
b. Secondary Standard.
c. Never to be exceeded.
d. Standard is attained when the expected number of exceedances is less than or equal to 1.
e. Standard is attained when the expected annual arithmetic mean is less than or equal to 50 mg/m^3.
f. Effective June 3, 1994.
g. No significant ambient impact concentration has been established. Instead, any net emissions increase of 100 tons per year of VOC subject to PSD would be required to perform an ambient impact analysis.
h. Any new source or modified existing source located in an unclassified or attainment area for ozone that is equal to or greater than 100 tons per year emissions will be required to monitor ozone.

Source: Jim Clary & Associates, November 2004. Table 2.0-2 Significant Impact Levels, PSD Class II Increments, and NAAQS and SAAQS.

4.3.4 BEST AVAILABLE CONTROL TECHNOLOGY

BACT is defined in the Clean Air Act and in PSD regulations as:

> *"an emissions limitation . . . based on the maximum degree of reduction for each pollutant . . . which the review authority, on a case by case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable…through the application of production processes or available methods, systems, and techniques…"*

Combustion Turbines. The range of control technologies potentially applicable to combustion turbines was evaluated in the BACT analyses for reducing emissions of NO_x, SO_2, CO, H_2SO_4 mist, VOC, PM/PM_{10}, benzene, and arsenic. Alternative methods of control were identified based on a review of the EPA Reasonably Available Control Technology (RACT)/BACT/Lowest Achievable Emission Rate (LAER) Clearinghouse database, recent permitting activity, and general knowledge of the potential control technologies for the industry. The potentially feasible technologies for each pollutant were then ranked in order of decreasing stringency (i.e., highest emissions reduction to lowest emissions reduction) to develop a hierarchy of alternatives for consideration in the analyses.[62] The control alternative hierarchies for NO_x, SO_2, CO, VOC, PM/PM_{10}, arsenic, beryllium, benzene, and H_2SO_4 mist and proposed BACT technologies and emission limits are presented in Table 4.4 for the turbines.

Black Start Generators. HECO also assessed BACT for the Black Start Generators, Storage Tanks, and Fugitive air emissions as part of the PSD application. The emission rates for NO_x, SO_2, CO, H_2SO_4 mist, VOC, PM/PM_{10}, arsenic, beryllium, and benzene from the black start generator engines are relatively low because each engine will be limited to no more then 500 hours of operation per year. In addition, the engines have design features that inherently minimize emissions. Due to the low annual emissions, BACT for the generator does not require controls beyond good operating practices and engine design for the control of NO_x, CO, VOC, PM/PM_{10}, and toxics. BACT for SO_2 (and H_2SO_4 mist) from the engines is proposed as burning 0.4% sulfur diesel fuel. Annual SO_2 emissions from each engine are less than 1.5 tons per year. Because these emissions are so low, burning diesel fuel with a lower sulfur content is not warranted.

Storage Tanks. Internal floating roof design will be used to meet BACT for the two storage tanks that will be used to hold either diesel or naphtha fuels. This is consistent with other recent permits for similar types of facilities in Hawai'i. The tanks will be designed in accordance with 40 CFR Part 60, §60.112b(a)(1) and will be equipped with one of the following closure devices between the wall of the storage vessel and the edge of the internal floating roof:

- Foam- or liquid-filled seal mounted in contact with the liquid (liquid-mounted seal);
- Two seals mounted one above the other so that each forms a continuous closure that completely covers the space between the wall of the storage vessel and the edge of the internal floating roof; or
- A mechanical shoe seal.

This will maintain the true vapor pressure of the volatile organic liquid (VOL) stored in the tanks below 11.1 psia (76.6 kPa) at all times.

Fugitive Emissions. There may be some fugitive emissions associated with the equipment components (valves, flanges, etc.) in diesel or naphtha service. Consistent with permits for other similar facilities, no leak detection and repair program is proposed due to the expected low emission rates.

[62] In no event can the application of BACT result in emissions of any pollutant that would exceed the level allowed by an applicable New Source Performance Standard or National Emissions Standard for Hazardous Air Pollutants. The BACT analyses for the proposed project evaluated alternative control techniques for each pollutant subject to review, and BACT was determined according to the regulatory definition.

Table 4.4. Control Hierarchy for Campbell Industrial Park - Combustion Turbines.

Pollutant	Control Technology	Control Level (%) [a]	Emission Limit/Rate (Total		Analysis Conclusion
			(ppmv) [b]	(lbs/hr) [c]	
NO_x	SCR + Water injection – Diesel SCR + Water injection – Naphtha	65-80 d, g	14.7-8.4 14.7-8.4	173-98.8 171-97.6	Technically infeasible, Environmental impacts (H_2SO_4 mist, ammonium salt formation)
	Water injection – Diesel	-	42 e	494	Proposed BACT
	Water injection – Naphtha		42 e	488	
SO_2	Low Sulfur Fuels (max. 0.05% S - Naphtha or other)	85.7	9.4	151	Proposed BACT (fire 0.05% sulfur fuel preferentially, with allowances for 0.35% as described in Section 3.0)
	Flue gas desulfurization	60g	26.3	422	Technically infeasible
CO	Catalytic oxidation – Diesel	90f g	2.1 (80)h	14.3 (208)h	Technically infeasible, Environmental impacts (H_2SO_4 mist)
	Catalytic oxidation – Naphtha		2.1 (80)h	14.2 (218)h	
	Combustion design – Diesel	-	20.8 (800)h	143 (2,080)h	Proposed BACT
	Combustion design – Naphtha		21.0 (800)h	142 (2,182)h	
VOC	Catalytic oxidation – Diesel	60f 9	8.2 (205)h	16.3(41 O)h	Technically infeasible, Environmental impacts (H_2SO_4 mist)
	Catalytic oxidation – Naphtha		8.1 (215)h	16.2 (430)h	
	Combustion design – Diesel	-	20.4 (513)h	40.8 (1,026)h	Proposed BACT
	Combustion design – Naphtha		20.2 (538)h	40.4 (1,076)h	
PM/PM_{10}	Combustion design – Diesel	-	-	108 (160)h	Proposed BACT
	Combustion design – Naphtha			103 (152)h	
Arsenic	Combustion design	-	-	3.26E-02	Proposed BACT
Beryllium	Combustion design	-	-	4.48E-04	Proposed BACT
Benzene	Combustion design – Diesel	-	-	1.63E-01	Proposed BACT
	(Also included in VOC, see above)				
H_2SO_4 Mist	Low Sulfur Fuels (max. 0.05% S – Naphtha or other)	85.7	-	15.0	Proposed BACT (fire 0.05% sulfur fuel preferentially, with allowances for 0.35%
	Flue gas desulfurization	60g	-	41.9	Technically infeasible

[a] Assumes emission reductions from the baseline control level. Reductions shown for SO_2 and H_2SO_4 are based on a baseline maximum fuel sulfur content of 0.35%
[b] Emissions are given in ppmvd corrected at 15% O2 in the exhaust gas
[c] Emission rates are based on peak load operation for the two turbines combined.

Source: Update No. 1 to Amended Covered Source and Prevention of Significant Deterioration Permit Application No. 0548-1 Table 1-2, January 5, 2005.

4.3.5 AIR QUALITY IMPACT ASSESSMENT METHODOLOGY[63]

EPA- and DOH-accepted air dispersion models were used to determine the maximum concentrations of pollutants in areas around the proposed Campbell Industrial Park Generating Station site for the Preferred Alternative and for the single combustion turbine and blackstart diesel engine that are part of Alternatives 2 and 4. All the modeling was conducted in accordance with DOH and EPA guidelines including "40 CFR Part 51, Appendix W - Guideline on Air Quality Models."

Air Quality Models Used. Because of the proposed facility's location relative to surrounding hills, HECO used a model known as "ISC_RTDM" (Industrial Source Complex/Rough Terrain Diffusion Model) to estimate the potential effects of emissions from the proposed generating facilities.[64] EPA and DOH consider ISC_RTDM a refined model in simple terrain and a screening model in complex terrain.

Meteorological Data. HECO's monitoring station number 064 (see Figure 4.1) provided the hourly meteorological data used in the analysis. The one-year data collection period was from October 1, 1992 through September 30, 1993. Temperature measurements were collected at a height of 2 meters for use as ambient temperature in plume rise calculations. Wind speed and direction measurements were collected at a height of 10 meters for stability calculations. The 64-meter wind speed and direction measurements were collected and used as representative stack-top transport winds.

Background Concentrations. Background concentrations to which the proposed project would add were estimated using data available from the State Department of Health (see Figure 4.2 for locations of existing air quality monitoring stations in the area).

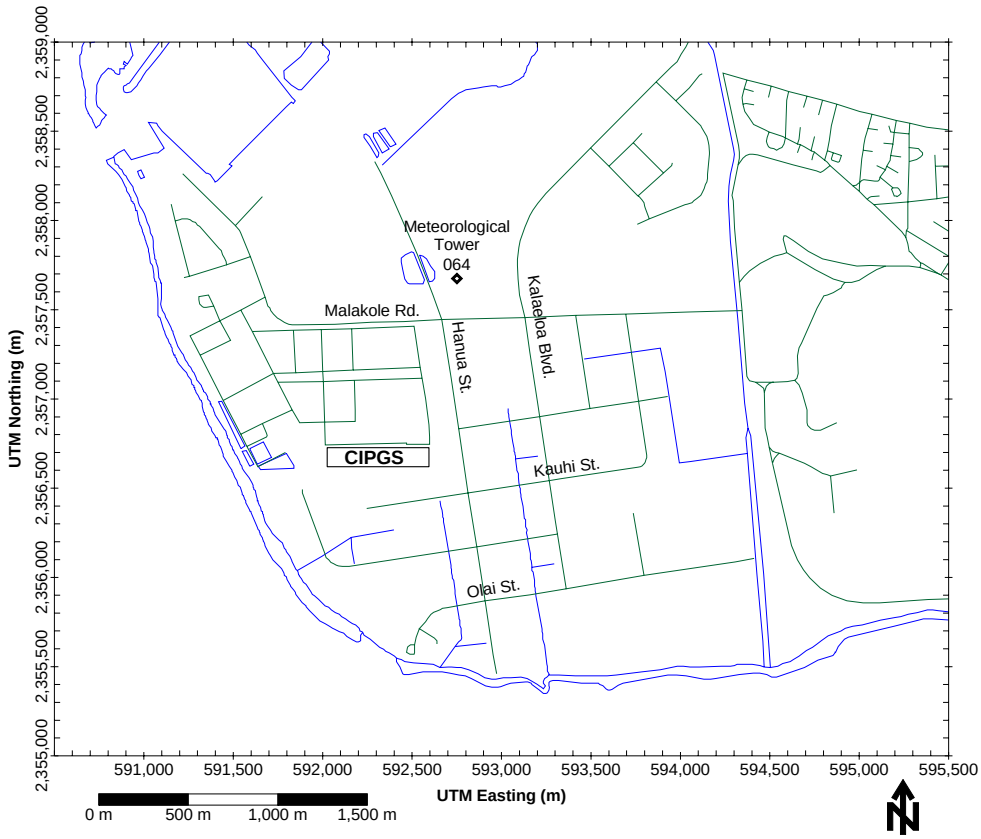
Stack Parameters and Building Downwash. Modeling considered impacts from both combustion turbine (CIP1 and CIP2) and the blackstart diesel generators (BSG1 and BSG2). Worst-case emissions and stack parameters from those units were developed for the minimum, 50%, 75%, base, and peak loads for use in the modeling. Stack parameters and emission rates were also developed for the blackstart generators (BSG1 and BSG2).

Emission Inventories. An emission inventory of existing sources located in Campbell Industrial Park (CIP) was developed from information obtained from Covered Source Permit Applications and the DOH report "Campbell Industrial Park/Kahe Area Ambient Air Quality Assessment Study".

[63] Details of the air quality impact assessment can be found in Jim Clary & Associates, November 2004, Covered Source and Prevention of Significant Deterioration Permit Application: Air Quality Modeling Analysis for Combustion Turbines CIP1 and CIP2 and Blackstart Diesel Generators BSG1 and BSG2 Amendment.

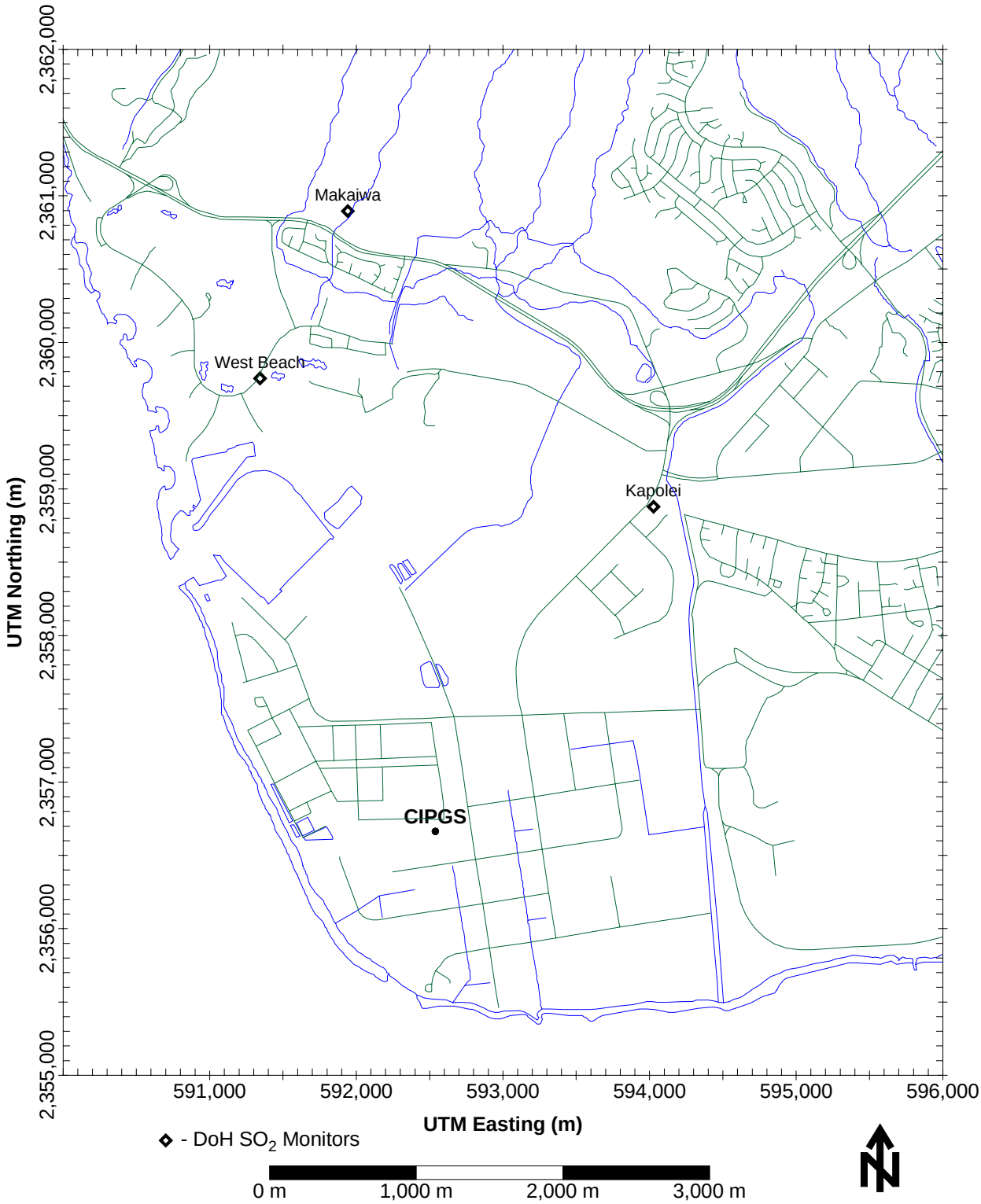
[64] The implementation of the ISC_RTDM model used is based on version 02035 of ISCST3 and version 89226 of RTDM. RTDM is capable of modeling simple, intermediate, and complex terrain receptors. ISCST3 (EPA 1995) and RTDM (Environmental Research and Technology 1987). RTDM was developed for HECO and combines two EPA Guideline models that together are capable of addressing all types of terrain. ISC_RTDM replicates the RTDM in complex terrain, the ISCST3 model in simple terrain, and implements the EPA Intermediate Terrain Guidance found in ISCST3.

Figure 4.1. HECO Meteorological Monitoring Station Number 064 Location



Source: Jim Clary & Associates, November 2004, page 3, Figure 2.0-1, Campbell Industrial Park Generating Station Location Map.

Figure 4.2. Locations of Existing DOH Air Quality Monitoring Stations Near CIP.



Source: Jim Clary & Associates, November 2004, page 11. Figure 3.5-1, Locations of Existing DOH Monitors Near Campbell Industrial Park.

4.3.6 AIR QUALITY IMPACT ASSESSMENT

4.3.6.1 Preliminary Modeling Analysis

EPA guidance[65] provides for a two-step modeling process. The first step (or preliminary analysis) models only the significant increase in potential emissions of a pollutant from a new source or the significant net emissions increase of a pollutant from a proposed modification to an existing source. The results of this preliminary analysis determine whether a full impact analysis is needed. A full impact analysis for a particular pollutant is not required when emissions of that pollutant would not increase the ambient concentration by more than the prescribed "significant impact" level.

4.3.6.1.1 Preferred Alternative

HECO's preliminary modeling analysis for the preferred alternative compared the maximum impacts for all PSD-regulated pollutants from the two combustion turbines and blackstart diesel engines at the worst-case operating scenarios with the modeling significant impact levels and monitoring *de minimis* levels. Section IV.A in Chapter C of the New Source Review Workshop Manual (EPA 1990) states: "The preliminary analysis models only the significant increase in potential emissions of a pollutant from a new source or the significant net emissions increase of a pollutant from a proposed modification. The results of this preliminary analysis determine whether the applicant must perform a full impact analysis…" A full impact analysis for a particular pollutant is not required when emissions of that pollutant would not increase the ambient concentration by more than the prescribed modeling significant impact level. HAR §11-60.1-133(e) gives the Director of Health the authority to exempt a stationary source from the preconstruction monitoring requirements of HAR §11-60.1-143 for a particular pollutant if the new source's emissions increase would cause, in any area, air quality impacts less than those concentrations defined in HAR §11-60.1-133(e)(l), (i.e., the "monitoring de minimis levels"). Table 4.3 lists the modeling significant impact levels and monitoring *de minimis* levels.

The first step of the preliminary modeling analysis identified the worst-case operating scenario. This was done by evaluating the two combustion turbines (CIP1 and CIP2) operating at peak, base, 75%, 50%, and 25% loads combined with the black start generators (BSG1 and BSG2) operating at their peak loads (see Table 4.5). HECO used ISC_RTDM to determine the maximum impacts in simple and complex terrain corresponding to these five different operating scenarios. This step was important because the highest concentrations do not always occur when units are operating at full load, something that is not intuitively obvious.

Once the worst-case conditions had been identified, additional fine grid receptors (50 meter spacing in simple terrain and 25 meter spacing in complex terrain) were added to the areas of the maximum impacts for the worst-case load scenarios. Finally, the maximum combined impacts from CIP1, CIP2, and BSG1 and BSG2 were compared with the PSD modeling significant impact levels and PSD monitoring *de minimis* levels. All proposed structures will be less than 83.5 ft tall; therefore the maximum formula Good Engineering Practice (GEP) height equals 209 ft (83.5 ft + 1.5(83.5 ft)). The proposed stack height of 210 ft (64 m) is greater than the GEP formula height based on the plant layout, but less than the *de minimis* GEP height of 213 ft (65 m). Additional off-property structures, including AES and HPOWER, do not impact downwash on the BPTF site.

Worst-case scenarios are summarized in Table 4.6. Table 4.7 compares maximum impacts from the proposed units for SO_2, PM_{10}, NO_2, and CO with the PSD modeling significant impact levels. The tables show that 3-hour and 24-hour SO_2 are the only pollutant averaging periods above the modeling significant impact levels; hence, SO_2 is the only pollutant which requires a full impact analysis. Finally, Table 4.8 shows that the maximum potential impacts for all pollutants are below PSD monitoring *de minimis* levels. Consequently, a year of pre-construction pollutant monitoring at the site is not required.

[65] Section IV.A in Chapter C of the *New Source Review Workshop Manual* (EPA 1990).

Table 4.5. Maximum Impacts by Load (Preferred Alternative).

CIP1 and CIP2	Concentration from CIP1, CIP2, BSG1, and BSG2 (μg/m^3)				
Load	**1-hr**	**3-hr**	**8-hr**	**24-hr**	**Annual**
			SO_2		
Peak	--	**65.3**	--	**11.5**	**0.829**
Base	--	62.8	--	11.1	0.822
75%	--	54.1	--	9.65	0.794
50%	--	44.3	--	7.80	0.751
25%	--	33.4	--	5.88	0.684
			PM/PM_{10}		
Peak	--	--	--	1.18	0.0851
Base	--	--	--	1.20	0.0885
75%	--	--	--	1.35	0.111
50%	--	--	--	2.02	0.194
25%	--	--	--	**2.30**	**0.269**
			CO		
Peak	62.8	--	7.85	--	--
Base	63.2	--	7.90	--	--
75%	65.1	--	8.17	--	--
50%	134	--	18.7	--	--
25%	**190**	--	**26.0**	--	--
			NO_2		
Peak	--	--	--	--	0.388
Base	--	--	--	--	0.387
75%	--	--	--	--	0.388
50%	--	--	--	--	**0.390**
25%	--	--	--	--	**0.390**

General Notes:

a. Short-term concentrations are maximum first high concentrations.

b. Modeling results based on grid 1 only.

c. NO_X to NO_2 conversion based on the Ambient Ratio Method (75% $NO_X = NO_2$).

Source: Jim Clary & Associates, November 2004, page 29. Table 4.1.2-1, Maximum Impacts by Load from Siemens SCCTs (CIP1 and CIP2) and Blackstart Units (BSG1 and BSG2).

Table 4.6. Worst-Case Scenario Summary (Preferred Alternative).

Pollutant	Averaging Period	Maximum Concentration µg/m^3	Worst-Case Scenario
SO_2	3-hr	65.3	CIP1 and CIP2 at Peak Load
	24-hr	11.5	CIP1 and CIP2 at Peak Load
	Annual	0.829	CIP1 and CIP2 at Peak Load
PM/PM_{10}	24-hr	2.30	CIP1 and CIP2 at 25% Load
	Annual	0.269	CIP1 and CIP2 at 25% Load
NO_2	Annual	0.390	CIP1 and CIP2 at 50% or 25% Load
CO	1-hr	190	CIP1 and CIP2 at 25% Load
	8-hr	26.0	CIP1 and CIP2 at 25% Load

General Notes:
a. Short-term concentrations are maximum first high concentrations.
b. Modeling results based on grid 1 only.
c. NO_X to NO_2 conversion based on the Ambient Ratio Method (75% $NO_X = NO_2$).

Source: Jim Clary & Associates, November 2004, page 30. Table 4.1.2-2 Worst-Case Scenario Summary for Siemens SCCTs (CIP1 and CIP2) and Blackstart Units (BSG1 and BSG2).

Table 4.7. Comparison of Maximum Impacts with the Modeling Significant Impact Levels (Preferred Alternative).

Pollutant	Averaging Period	Maximum Conc. µg/m³	Modeling SIL µg/m³	Exceeds Modeling SIL	Location of Maximum (UTM) Easting (m)	Location of Maximum (UTM) Northing (m)	Elevation (m)
SO_2	3-hr	65.8	25	Yes	592,800	2,362,475	247
	24-hr	11.6	5	Yes	592,800	2,362,475	247
	Annual	0.830	1	No	585,900	2,353,650	0.00
PM/PM_{10}	24-hr	2.30	5	No	592,775	2,362,000	207
	Annual	0.269	1	No	587,750	2,354,500	0.00
NO_2	Annual	0.391	1	No	589,650	2,355,250	0.00
CO	1-hr	197	2,000	No	592,800	2,362,025	209
	8-hr	27.0	500	No	592,200	2,362,375	219

General Notes:

a. Short-term concentrations are maximum first high concentrations.

b. Modeling results based on grid 1 and fine grid receptors.

c. NO_X to NO_2 conversion based on the Ambient Ratio Method (75% $NO_X = NO_2$).

Source: Jim Clary & Associates, November 2004, page 30. Table 4.1.2-3 Comparison of Maximum Impacts with the Modeling Significant Impact Levels for Siemens SCCTs (CIP1 and CIP2) and Blackstart Units (BSG1 and BSG2).

Table 4.8. Comparison of Maximum Impacts with the Monitoring de Minimis Levels (Preferred Alternative).

Pollutant	Averaging Period	Maximum Conc. µg/m³	Monitoring *de minimis* µg/m³	Exceeds *de minimis* (yes/no)	Location of Maximum (UTM) Easting (m)	Location of Maximum (UTM) Northing (m)	Elevation (m)
SO_2	3-hr	65.8	N/A	N/A	592,800	2,362,475	247
	24-hr	11.6	13	No	592,800	2,362,475	247
	Annual	0.830	N/A	N/A	585,900	2,353,650	0.00
PM/PM_{10}	24-hr	2.30	10	No	592,775	2,362,000	207
	Annual	0.269	N/A	N/A	587,750	2,354,500	0.00
NO_2	Annual	0.391	14	No	589,650	2,355,250	0.00
CO	1-hr	197	N/A	N/A	592,800	2,362,025	209
	8-hr	27.0	575	No	592,200	2,362,375	219
Lead[a]	24-hr	0.00046	N/A	N/A	592,800	2,362,475	247
	Cal Qtr[b]	0.00046	0.1	No	592,800	2,362,475	247
Fluoride[a]	24-hr	0.00033	0.25	No	592,800	2,362,475	247
H_2S	1-hr	not expected	0.2	No	--	--	--
Beryllium[a]	24-hr	0.00000	0.001	No	592,800	2,362,475	247
Mercury[a]	24-hr	0.00004	0.25	No	592,800	2,362,475	247
Vinyl Chloride	24-hr	not expected	15	No	--	--	--
TRS	1-hr	not expected	10	No	--	--	--
Reduced Sulfur Compounds	1-hr	not expected	10	No	--	--	--

Notes:

a. Lead, fluoride, beryllium, mercury maximum impacts scaled from 24-hr SO_2 impact.

b. The maximum 24-hr lead concentration is used for the quarterly average.

General Notes:

NO_X to NO_2 conversion is based on the Ambient Ratio Method (75% $NO_X = NO_2$).

Modeling results are based on grid 1 and fine grid receptors.

Short-term concentrations are maximum first high concentrations.

Source: Jim Clary & Associates, November 2004, page 31. Table 4.1.2-4 Comparison of Maximum Impacts with the Monitoring de Minimis Levels for Siemens SCCTs (CIP1 and CIP2) and Blackstart Units (BSG1 and BSG2).

4.3.6.1.2 Alternatives 2 & 3

HECO also conducted a preliminary modeling analysis for only one CT and one BSG, as in Alternatives 2 and 3. It compared the maximum impacts for all PSD-regulated pollutants from the CT and BSG at the worst-case operating scenarios with the previously defined modeling significant impact levels and monitoring *de minimis* levels.

The first step of the preliminary modeling analysis identified the worst-case operating scenario. This was done by evaluating one Siemens combustion turbine operating at peak, base, 75%, 50%, and 25% load combined with one black start generator (BSG1) operating at peak load (see Table 4.9).

Worst-case scenarios are summarized in Table 4.10. Table 4.11 compares maximum impacts from the proposed units for SO_2, PM_{10}, NO_2, and CO with the PSD modeling significant impact levels. The tables show that 3-hour and 24-hour SO_2 is the only pollutant averaging periods above the modeling significant impact levels and the only pollutant which therefore requires a full impact analysis.

Finally, Table 4.12 compares maximum impacts with the PSD monitoring *de minimis* levels. It shows that the maximum potential impacts for all pollutants are below *de minimis* levels. Consequently, a year of pre-construction pollutant monitoring at the site is not required.

Table 4.9. Maximum Impacts by Load (One CT and BSG Only).

		Concentration from BP1 and BSG1 (mg/m^3)				
Fuel	**Load**	**1-hr**	**3-hr**	**8-hr**	**24-hr**	**Annual**
			SO_2			
No. 2 Diesel	Peak	--	**37.3**	--	**6.57**	**0.475**
	Base	--	35.9	--	6.33	0.470
	75%	--	30.9	--	5.51	0.455
	50%	--	25.3	--	4.46	0.431
	25%	--	19.0	--	3.35	0.392
			PM/PM_{10}			
No. 2 Diesel	Peak	--	--	--	0.594	0.0435
	Base	--	--	--	0.602	0.0452
	75%	--	--	--	0.684	0.0568
	50%	--	--	--	1.02	0.0984
	25%	--	--	--	**1.16**	**0.136**
			CO			
No. 2 Diesel	Peak	109.7	--	13.7	--	--
	Base	109.9	--	13.7	--	--
	75%	110.9	--	13.9	--	--
	50%	114.5	--	14.3	--	--
	25%	**118.6**	--	**14.8**	--	--
			NO_2 as NO_x			
No. 2 Diesel	Peak	--	--	--	--	**0.2434**
	Base	--	--	--	--	0.2428
	75%	--	--	--	--	0.2418
	50%	--	--	--	--	0.241
	25%	--	--	--	--	0.236

Note - Modeling results based on grid 1 only.

Source: Jim Clary & Associates, October 2003, page 27. Table 4.1.2-1, Maximum Impacts by Load from Siemens SCCT (BP1) and BSG1.

Table 4.10. Worst-Case Scenario Summary (One CT and BSG Only).

Pollutant	Averaging Period	Maximum Concentration µg/m^3	Worst-Case Scenario
SO_2	3-hr	37.3	BP1 at Peak Load
	24-hr	6.57	BP1 at Peak Load
	Annual	0.475	BP1 at Peak Load
PM/PM_{10}	24-hr	1.164	BP1 at 25% Load
	Annual	0.1362	BP1 at 25% Load
NO_2 as NO_x	Annual	0.243	BP1 at Peak Load
CO	1-hr	118.6	BP1 at 25% Load
	8-hr	14.8	BP1 at 25% Load

Note - Modeling results based on grid 1 only.

Source: Jim Clary & Associates, October 2003, page 27. Table 4.1.2-2, Worst-Case Scenario Summary for Siemens SCCT (BP1) and BSG1.

Table 4.11. Comparison of Maximum Impacts with the Modeling Significant Impact Levels (One CT and BSG Only)

Pollutant	Averaging Period	Maximum Conc. µg/m^3	Modeling SIL µg/m^3	Exceeds Modeling SIL	Location of Maximum (UTM) Easting (m)	Northing (m)	Elevation (m)
SO_2	3-hr	37.9	25	Yes	592,850	2,362,450	247.9
	24-hr	6.69	5	Yes	592,850	2,362,450	247.9
	Annual	0.476	1	No	585,900	2,353,650	0.0
PM/PM_{10}	24-hr	1.164	5	No	592,800	2,362,000	205.2
	Annual	0.136	1	No	587,900	2,354,550	0.0
NO_2 as NO_x	Annual	0.244	1	No	587,300	2,354,200	0.0
CO	1-hr	122	2,000	No	592,500	2,361,125	113.9
	8-hr	15.2	500	No	592,500	2,361,125	113.9

Notes:

a. Short-term concentrations are maximum first high concentrations.

b. Modeling results based on grid 1 and fine grid receptors.

Source: Jim Clary & Associates, October 2003, page 28. Table 4.1.2-3 Comparison of Maximum Impacts with the Modeling Significant Impact Levels for Siemens SCCT (BP1) and BSG1.

Table 4.12. Comparison of Maximum Impacts with the Monitoring De Minimis Levels (One CT and BSG Only)

Pollutant	Averaging Period	Maximum Conc. ($\mu g/m^3$)	Monitoring *de minimis* ($\mu g/m^3$)	Exceeds *de minimis* (yes/no)	Location of Maximum (UTM) Easting (m)	Northing (m)	Elevation (m)
SO_2	3-hr	37.9	N/A	N/A	592,850	2,362,450	247.9
	24-hr	6.69	13	No	592,850	2,362,450	247.9
	Annual	0.476	N/A	N/A	585,900	2,353,650	0.0
PM/PM_{10}	24-hr	1.16	10	No	592,800	2,362,000	205.2
	Annual	0.136	N/A	N/A	587,900	2,354,550	0.0
NO_2 as NO_x	Annual	0.244	14	No	587,300	2,354,200	0.0
CO	1-hr	122	N/A	N/A	592,500	2,361,125	113.9
	8-hr	15.2	575	No	592,500	2,361,125	113.9
Lead[a]	24-hr	0.0002305	N/A	N/A	592,850	2,362,450	247.9
	Cal Qtr[b]	0.0002305	0.1	No	592,850	2,362,450	247.9
Fluoride[a]	24-hr	0.0001663	0.25	No	592,850	2,362,450	247.9
H_2S	1-hr	not expected	0.2	No	--	--	--
Beryllium[a]	24-hr	0.0000025	0.001	No	592,850	2,362,450	247.9
Mercury[a]	24-hr	0.0000198	0.25	No	592,850	2,362,450	247.9
Vinyl Chloride	24-hr	not expected	15	No	--	--	--
TRS	1-hr	not expected	10	No	--	--	--
Reduced Sulfur Compounds	1-hr	not expected	10	No	--	--	--

Notes:

a. Lead, fluoride, beryllium, mercury maximum impacts scaled from 24-hr SO_2 impact.

b. The maximum 24-hr lead concentration is used for the quarterly average.

General Notes:

Short-term concentrations are maximum first high concentrations.

Modeling results based on grid 1 and fine grid receptors.

Source: Jim Clary & Associates, June 2004 Revision, page 29. Table 4.1.2-4 Comparison of Maximum Impacts with the Monitoring De Minimis Levels for Siemens SCCT (BP1) and BSG1.

4.3.7 COMPLIANCE WITH AMBIENT AIR QUALITY STANDARDS

Additional modeling (including non-HECO sources) was conducted for those pollutants whose concentrations exceeded the Significant Impact Level (SIL). The objective of this step was to determine if the operation of the Campbell Industrial Park Generating Station would cause or contribute to a violation of National or State ambient air quality standards at any significant receptor. The analyses were performed using the emissions and background concentrations presented earlier.

Table 4.13 summarizes the results of the modeling for SO_2. It demonstrates that the operation of the Campbell Industrial Park Generating Station will not cause or contribute to an exceedance of the NAAQS/SAAQS.

4.3.8 PSD INCREMENT CONSUMPTION

4.3.8.1 PSD Class I Increment Consumption and Visibility

The nearest Class I area is Haleakala National Park on the island of Maui (see Figure 4.3. Haleakala is approximately 140 miles (226 kilometers) from the proposed project. Because the proposed project has little potential to affect air quality at such a great distance, HECO has asked the National Park Service (NPS) for an exemption from preparing an Air Quality Related Value analysis. If the NPS determines that an analysis is required, HECO will follow NPS instructions.

Figure 4.3. Location of Nearest Class I Area.

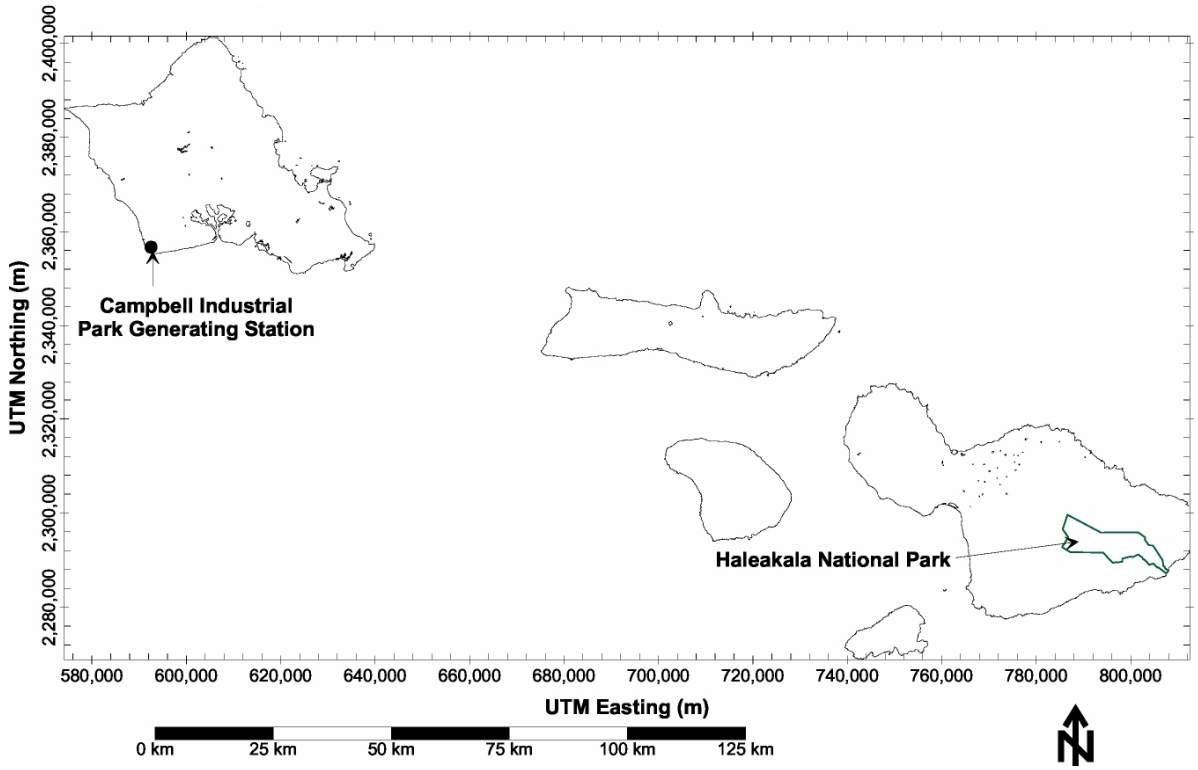


Table 4.13. Comparison of Maximum Impacts with Ambient Air Quality Standards (Preferred Alternative).

Pollutant	Averaging Period	Maximum CIP Conc. µg/m^3	Maximum Kahe Conc. µg/m^3	Background Conc. µg/m^3	Total Conc. µg/m^3	NAAQS/ SAAQS µg/m^3	% of NAAQS/ SAAQS	Location of CIP Maximum UTM Coordinates Easting (m)	Northing (m)	Elevation (m)	Period of CIP Maximum YYMMDDHH
SO_2	3-hr	321	539	91	951	1,300	73%	591,875	2,362,075	162	92121303
	24-hr	78.3	139	18	236	365	65%	591,550	2,361,650	118	92110324

Notes:

1. Maximum Campbell Industrial Park (CIP) SO_2 concentrations are highest second high concentrations.
2. Maximum CIP concentrations are the combined impact of the proposed project and existing CIP sources.
3. Maximum Kahe concentrations are not at the same location or time period as CIP maximum. See Attachment D for details.
4. Background concentrations from DOH Makaiwa Air Quality Monitor for the year 2003.
5. The project has an insignificant impact for all other pollutant averaging periods.

Source: Jim Clary & Associates, November 2004. Appendix B, Air Quality Modeling Analysis for Combustion Turbines CIP1 and CIP2 & Blackstart Diesel Generators BSG1 and BSG2 Amendment, Table 4.2.1-2.

Table 4.14. Comparison of Maximum Impacts with Ambient Air Quality Standards (One CT and BSG Only).

Pollutant	Averaging Period	Maximum CIP Conc. µg/m³	Maximum Kahe Conc. µg/m³	Background Conc. µg/m³	Total Conc. µg/m³	NAAQS/ SAAQS µg/m³	% of NAAQS/ SAAQS	Location of CIP Maximum UTM Coordinates Easting (m)	Northing (m)	Elevation (m)	Period of CIP Maximum YYMMDDHH
SO_2	3-hr	272	539	61	872	1,300	67%	592,175	2,362,275	186.5	93012321
	24-hr	46	114	18	178	365	49%	592,650	2,361,925	193.9	92110324

Notes:

1. Maximum Campbell Industrial Park (CIP) SO_2 concentrations are highest second high concentrations.
2. Maximum CIP concentrations are the combined impact of the proposed project and existing CIP sources.
3. Maximum Kahe concentrations are not at the same location or time period as CIP maximum. See Attachment D for details.
4. Background concentrations from DOH Makaiwa Air Quality Monitor for the year 2001.
5. The project has an insignificant impact for all other pollutant averaging periods.

Source: Jim Clary & Associates, June 2004 Revision, page 33. Table 4.2.1-2. Comparison of Maximum Impacts with NAAQS/SAAQS (Siemens SCCT Scenario). *Appendix B to Covered Source and Prevention of Significant Deterioration Permit Application: Air Quality Modeling Analysis for Combustion Turbine BP1 and Blackstart Diesel Generator BSG1.*

4.3.8.2 Class II Increment Consumption

HECO used ISC_RTDM to model the proposed and existing CIP sources to calculate the highest, second highest 3-Hr, and 24-Hr SO_2 concentrations under the Preferred Alternative and Alternatives 2 & 3 (only one CT and BSG).[66] The modeling that was conducted for pollutants exceeding the Significant Impact Level showed that the preferred alternative would not cause or contribute to a PSD Class II increment violation at any significant receptor.[67] Table 4.15 and Table 4.16 summarize the results of this analysis.

4.3.9 OTHER REGULATED POLLUTANTS

Fuel naturally contains trace amounts of various trace elements, especially metallic compounds. Its combustion would result in the emission of small quantities of those compounds. In addition, the combustion process may potentially result in the formation of other toxic compounds not initially present in the fuel. Hazardous air pollutant (HAP) emissions from CIP1, CIP2, BSG1, and BSG2 are less than the major source thresholds of 10 tons per year for any single HAP and 25 tons per year total for all HAPs.[68] Therefore, neither the preferred alternative nor Alternatives 2 & 3 would represent a major source for HAPs. Alternative 4, which includes only the transmission lines and associated substation improvements, does not require fuel.

Modeling was conducted to determine the maximum unit 8-hour and annual concentrations. The unit emission rate is based on the ratio of each unit's heat input to the total heat input. The concentration for each pollutant is determined by multiplying the unit concentration by the total pollutant emission rate from CIP1, CIP2, BSG1, and BSG2.

HAR §11-60.1-179(c) specifies impact levels, which are considered insignificant for HAPs. For non-carcinogens, these are 1/100 of the Threshold Limit Values – Time Weighted Average (TLV-TWA) for the maximum 8-hour concentration and 1/420 of the TLV-TWA for the maximum annual concentration. For carcinogens, the impact level is a cancer risk of less than 10 in one million.

As a first step in determining the cancer risk posed by the plant, one may use the EPA Region IX Preliminary Remediation Goals (PRGs) for ambient air. The PRGs allow for the determination of a worst-case screening lifetime cancer risk associated with the carcinogenic hazardous air pollutant emissions from the proposed project. PRGs are concentrations that equate to a one-in-a-million cancer risk. Therefore, a cancer risk of a given air pollutant concentration is calculated by dividing the concentration by the PRG and multiplying by the cancer risk at the PRG level (i.e., 1 × 10-6). PRGs are based on EPA toxicity with "standard" exposure factors and are protective of humans, including sensitive groups, over a lifetime (Smucker 2002).

Table 4.17 compares the preferred alternative's maximum 8-hour impacts to 1/100 of the TLV-TWA; Table 4.18 presents the same information for Alternatives 2 & 3. Table 4.19 compares the maximum annual impacts of the preferred alternative to 1/420 of the TLV-TWA. The tables show comparisons for both non-carcinogenic and carcinogenic air pollutants. Table 4.21 shows the worst-case inhalation risk calculations for the preferred alternative based on the EPA Region IX air PRGs for the year. In all cases, the maximum estimated impacts from the preferred alternative are less than the significance levels and are, therefore, insignificant for HAPs per HAR §11-60.1-179(c).

[66] HECO's Kahe Generating Station is located west of the proposed project's significant impact area and some of the emissions from it affect the same airshed. The maximum increment consumption from Kahe inside the project's significant impact area was determined separately and added to the ISC_RTDM modeling results. Kahe units 6, A, and B are the only emission sources that consume increment.

[67] The modeling is conservative (i.e., tends to over-estimate cumulative effects) since it does not take credit for any baseline emissions from any of the CIP sources.

[68] Hazardous air pollutant emissions are proportional to the heat input rate as are SO_2 emissions; therefore, worst-case impacts occur at the maximum load scenarios (i.e., CIP1, CIP2, BSG1, and BSG2 at peak load). Modeling was conducted to determine the maximum unit 8-hour and annual concentrations.

Table 4.15. Comparison of Maximum Impacts with PSD Class II Increment (Preferred Alternative).

Pollutant	Averaging Period	Maximum CIP Conc. µg/m³	Maximum Kahe Conc. µg/m³	Total Conc. µg/m³	PSD Class II Increment µg/m³	% of PSD Class II Increment	Location of CIP Maximum UTM Coordinates Easting (m)	Northing (m)	Elevation (m)	Period of CIP Maximum YYMMDDHH
SO_2	3-hr	321	109	430	512	84%	591,875	2,362,075	162	92121303
	24-hr	78.3	4.23	82.6	91	91%	591,550	2,361,650	118	92110324

General Notes:

a. Modeling does not take credit for any baseline emissions from existing CIP sources.

b. The project has an insignificant impact for all other pollutant averaging periods.

c. The 3-hour CIP concentration is the highest second high combined SO_2 impact of the proposed project and existing CIP sources.

d. The 3-hour maximum Kahe concentrations are not at the same location or time period as CIP concentration.

e. The 24-hour CIP concentration is the highest second high combined SO_2 impact of the proposed project and the existing CIP sources at the location where the combined maximum CIP and Kahe concentration occurs.

f. The 24-hour Kahe concentration is at the location where the maximum combined CIP and Kahe concentration occurs.

g. The 24-hour CIP concentration does not occur at the same time period as the 24-hour Kahe concentration.

Source: Jim Clary & Associates, November 2004. Appendix B, Air Quality Modeling Analysis for Combustion Turbines CIP1 and CIP2 & Blackstart Diesel Generators BSG1 and BSG2 Amendment, Table 4.2.2-2.

Table 4.16. Comparison of Maximum Impacts w/ PSD Class II Increment (One CT & BSG).

Pollutant	Averaging Period	Maximum CIP Conc. µg/m³	Maximum Kahe Conc. µg/m³	Total Conc. µg/m³	PSD Class II Increment µg/m³	% of PSD Class II Increment	Location of CIP Maximum UTM Coordinates Easting (m)	Northing (m)	Elevation (m)	Period of CIP Maximum YYMMDDHH
SO_2	3-hr	272	109	381	512	74%	592,175	2,362,275	186.5	93012321
	24-hr	46	27	73	91	80%	592,650	2,361,925	193.9	92110324

General Notes:

a. Maximum CIP (Campbell Industrial Park) SO_2 concentrations are highest second high concentrations.
b. Maximum CIP concentrations are the combined impact of the proposed project and existing CIP sources.
c. Modeling does not take credit for any baseline emissions from existing CIP sources.
d. Maximum Kahe concentrations are not at the same location or time period as CIP maximum.
e. The project has an insignificant impact for all other pollutant averaging periods.

Source: Jim Clary & Associates, June 2004 Revision, page 35. Table 4.2.2-2 Comparison of Maximum Impacts with PSD Class II Increment (Siemens SCCT Scenario). *Appendix B* to *Covered Source and Prevention of Significant Deterioration Permit Application: Air Quality Modeling Analysis for Combustion Turbine BP1 and Blackstart Diesel Generator BSG1.*

Table 4.17. Maximum 8-Hr. Impact: Other Regulated Pollutants (Preferred Alternative).

Pollutant	Hazardous Air Pollutant	Carcinogenic Rating[d]	TLV-TWA[c] ($\mu g/m^3$)	Maximum 8-Hr Unit Impact[a] ($\mu g/m^3$ per g/s)	Maximum CIP1, CIP2, BSG1, and BSG2 Emission Rate (g/s)	Maximum 8-Hr Concentration[b] ($\mu g/m^3$)	1/100 of TLV - TWA ($\mu g/m^3$)	Exceeds 1/100 of TLV - TWA (Yes/No)
Sulfuric Acid Mist	No	None	1,000	0.212	13.31	2.83	10.0	No
Fluorides	No	None	2,500	0.212	0.00381	0.00081	25.0	No
Acetaldehyde	Yes	B2	180,000	0.212	0.00951	0.00202	1,800	No
Acrolein	Yes	None	230	0.212	0.00297	0.00063	2.30	No
Benzene	Yes	A	32,000	0.212	0.02338	0.00497	320.00	No
1,3-Butadiene	Yes	A	22,000	0.212	0.00604	0.00128	220	No
Formaldehyde	Yes	B1	370	0.212	0.10490	0.02228	3.70	No
Naphthalene	Yes	C	52,000	0.212	0.01355	0.00288	520	No
Toluene	Yes	D	188,000	0.212	0.10601	0.02252	1,880	No
Xylene	Yes	D	434,000	0.212	0.07281	0.01546	4,340	No
Arsenic	Yes	A	200	0.212	0.00415	0.00088	2.00	No
Beryllium	Yes	B1	2.00	0.212	0.00006	0.00001	0.0200	No
Cadmium	Yes	B1	50.0	0.212	0.00181	0.00038	0.5000	No
Chromium	Yes	A	50	0.212	0.00415	0.00088	0.50	No
Lead	Yes	B2	150	0.212	0.00528	0.00112	1.50	No
Manganese	Yes	D	1,000	0.212	0.29804	0.06330	10.0	No
Mercury	Yes	D	50.0	0.212	0.00045	0.00010	0.500	No
Nickel	Yes	A, B2	100	0.212	0.00174	0.00037	1.000	No
Polycyclic Organic Matter	Yes	B2	None	0.212	0.01572	0.00334	--	--
Selenium	Yes	D	200	0.212	0.00943	0.00200	2.00	No

Notes:

a. Maximum unit impact is based on Grid 1 and Fine Grid modeling for the peak load scenario.

b. Maximum concentrations are the product of the maximum 8-hr unit impact and maximum emission rate.

c. TLV-TWA obtained from "Documentation of the Threshold Limit Value and Biological Exposure Indices," sixth edition, published by the American Conference of Governmental Industrial Hygienists, Inc.

d. Carcinogenic Rating from EPA's Integrated Risk Information System (http://www.epa.gov/iris/index.html)

A = Human Carcinogen

B1 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in humans.

B2 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in animals.

C = Possible human carcinogen

D = Not Classifiable as to Human Carcinogenicity

Source: Table 4.3-2A. Jim Clary & Associates, November 2004. Appendix B, Air Quality Modeling Analysis for Combustion Turbines CIP1 and CIP2 and Blackstart Diesel Generators BSG1 and BSG2 Amendment.

Table 4.18 Maximum 8-Hour Impact from Other Regulated Pollutants (One CT & BSG)

Pollutant	Hazardous Air Pollutant	Carcinogenic Rating[d]	TLV-TWA[c] ($\mu g/m^3$)	Maximum 8-Hr Unit Impact[a] ($\mu g/m^3$ per g/s)	Maximum BP1 plus BSG1 Emission Rate (g/s)	Maximum 8-Hr Concentration[b] ($\mu g/m^3$)	1/100 of TLV - TWA ($\mu g/m^3$)	Exceeds 1/100 of TLV - TWA (Yes/No)
Sulfuric Acid Mist	No	None	1,000	0.212	7.61	1.61	10.0	No
Fluorides	No	None	2,500	0.212	0.00191	0.00040	25.0	No
Acetaldehyde	Yes	B2	180,000	0.212	0.00476	0.00101	1,800	No
Acrolein	Yes	None	230	0.212	0.00149	0.00032	2.30	No
Benzene	Yes	A	32,000	0.212	0.01193	0.00253	320.00	No
1,3-Butadiene	Yes	A	22,000	0.212	0.00302	0.00064	220	No
Formaldehyde	Yes	B1	370	0.212	0.05247	0.01112	3.70	No
Naphthalene	Yes	C	52,000	0.212	0.00682	0.00144	520	No
Toluene	Yes	D	188,000	0.212	0.05309	0.01126	1,880	No
Xylene	Yes	D	434,000	0.212	0.03646	0.00773	4,340	No
Arsenic	Yes	A	200	0.212	0.00208	0.00044	2.00	No
Beryllium	Yes	B1	2.00	0.212	0.00003	0.00001	0.0200	No
Cadmium	Yes	B1	50.0	0.212	0.00091	0.00019	0.5000	No
Chromium	Yes	A	50	0.212	0.00208	0.00044	0.50	No
Lead	Yes	B2	150	0.212	0.00265	0.00056	1.50	No
Manganese	Yes	D	1,000	0.212	0.14926	0.03164	10.0	No
Mercury	Yes	D	50.0	0.212	0.00023	0.00005	0.500	No
Nickel	Yes	A, B2	100	0.212	0.00087	0.00018	1.000	No
Polycyclic Organic Matter	Yes	B2	None	0.212	0.00792	0.00168	--	--
Selenium	Yes	D	200	0.212	0.00472	0.00100	2.00	No

Notes:
a. Maximum unit impact is based on Grid 1 and Fine Grid modeling for the peak load scenario.
b. Maximum concentrations are the product of the maximum 8-hr unit impact and maximum emission rate.
c. TLV-TWA obtained from "Documentation of the Threshold Limit Value and Biological Exposure Indices," sixth edition, published by the American Conference of Governmental Industrial Hygienists, Inc.
d. Carcinogenic Rating from EPA's Integrated Risk Information System (http://www.epa.gov/iris/index.html)
A = Human Carcinogen
B1 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in humans.
B2 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in animals.
C = Possible human carcinogen
D = Not Classifiable as to Human Carcinogenicity

Source: Jim Clary & Associates, February 2004 Revision, page 37a. Table 4.3-2a Maximum 8-Hr Impacts from Other Regulated Pollutants (Siemens SCCT Scenario). *Appendix B* to *Covered Source and Prevention of Significant Deterioration Permit Application: Air Quality Modeling Analysis for Combustion Turbine BP1 and Blackstart Diesel Generator BSG1*.

Table 4.19. Maximum Annual Impact: Other Regulated Pollutants (Preferred Alternative).

Pollutant	Hazardous Air Pollutant	Carcinogenic Rating[d]	TLV-TWA[c] ($\mu g/m^3$)	Maximum Annual Unit Impact[a] ($\mu g/m^3$ per g/s)	Maximum CIP1, CIP2, BSG1, and BSG2 Emission Rate (g/s)	Maximum Annual Concentration[b] ($\mu g/m^3$)	1/420 of TLV - TWA ($\mu g/m^3$)	Exceeds 1/420 of TLV - TWA (Yes/No)
Sulfuric Acid Mist	No	None	1,000	0.00745	13.31	0.0992	2.38	No
Fluorides	No	None	2,500	0.00745	0.00381	0.00003	5.95	No
Acetaldehyde	Yes	B2	180,000	0.00745	0.00951	0.00007	428.6	No
Acrolein	Yes	None	230	0.00745	0.00297	0.00002	0.548	No
Benzene	Yes	A	32,000	0.00745	0.02338	0.00017	76.190	No
1,3-Butadiene	Yes	A	22,000	0.00745	0.00604	0.00004	52.4	No
Formaldehyde	Yes	B1	370	0.00745	0.10490	0.00078	0.881	No
Naphthalene	Yes	C	52,000	0.00745	0.01355	0.00010	124	No
Toluene	Yes	D	188,000	0.00745	0.10601	0.00079	448	No
Xylene	Yes	D	434,000	0.00745	0.07281	0.00054	1,033	No
Arsenic	Yes	A	200	0.00745	0.00415	0.00003	0.476	No
Beryllium	Yes	B1	2.00	0.00745	0.00006	0.00000	0.00476	No
Cadmium	Yes	B1	50.0	0.00745	0.00181	0.00001	0.11905	No
Chromium	Yes	A	50	0.00745	0.00415	0.00003	0.12	No
Lead	Yes	B2	150	0.00745	0.00528	0.00004	0.357	No
Manganese	Yes	D	1,000	0.00745	0.29804	0.00222	2.38	No
Mercury	Yes	D	50.0	0.00745	0.00045	0.00000	0.119	No
Nickel	Yes	A, B2	100	0.00745	0.00174	0.00001	0.238	No
Polycyclic Organic Matter	Yes	B2	None	0.00745	0.01572	0.00012	--	--
Selenium	Yes	D	200	0.00745	0.00943	0.00007	0.476	No

Notes:

a. Maximum unit impact is based on Grid 1 and Fine Grid modeling for the peak load scenario.

b. Maximum concentrations are the product of the maximum annual unit impact and maximum emission rate.

c. TLV-TWA obtained from "Documentation of the Threshold Limit Value and Biological Exposure Indices," sixth edition, published by the American Conference of Governmental Industrial Hygienists, Inc.

d. Carcinogenic Rating from EPA's Integrated Risk Information System (http://www.epa.gov/iris/index.html)

A = Human Carcinogen

B1 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in humans.

B2 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in animals.

C = Possible human carcinogen

D = Not Classifiable as to Human Carcinogenicity

Source: Table 4.3-2B, Jim Clary & Associates, November 2004. *Appendix B*, *Air Quality Modeling Analysis for Combustion Turbines CIP1 and CIP2 and Blackstart Diesel Generators BSG1 and BSG2 Amendment*.

Table 4.20. Maximum Annual Impact: Other Regulated Pollutants (1 CT & BSG)

Pollutant	Hazardous Air Pollutant	Carcinogenic Rating[d]	TLV-TWA[c] ($\mu g/m^3$)	Maximum Annual Unit Impact[a] ($\mu g/m^3$ per g/s)	Maximum BP1 plus BSG1 Emission Rate (g/s)	Maximum Annual Concentration[b] ($\mu g/m^3$)	1/420 of TLV - TWA ($\mu g/m^3$)	Exceeds 1/420 of TLV - TWA (Yes/No)
Sulfuric Acid Mist	No	None	1,000	0.00778	7.61	0.0592	2.38	No
Fluorides	No	None	2,500	0.00778	0.00191	0.00001	5.95	No
Acetaldehyde	Yes	B2	180,000	0.00778	0.00476	0.00004	428.6	No
Acrolein	Yes	None	230	0.00778	0.00149	0.00001	0.548	No
Benzene	Yes	A	32,000	0.00778	0.01193	0.00009	76.190	No
1,3-Butadiene	Yes	A	22,000	0.00778	0.00302	0.00002	52.4	No
Formaldehyde	Yes	B1	370	0.00778	0.05247	0.00041	0.881	No
Naphthalene	Yes	C	52,000	0.00778	0.00682	0.00005	124	No
Toluene	Yes	D	188,000	0.00778	0.05309	0.00041	448	No
Xylene	Yes	D	434,000	0.00778	0.03646	0.00028	1,033	No
Arsenic	Yes	A	200	0.00778	0.00208	0.00002	0.476	No
Beryllium	Yes	B1	2.00	0.00778	0.00003	0.00000	0.00476	No
Cadmium	Yes	B1	50.0	0.00778	0.00091	0.00001	0.11905	No
Chromium	Yes	A	50	0.00778	0.00208	0.00002	0.12	No
Lead	Yes	B2	150	0.00778	0.00265	0.00002	0.357	No
Manganese	Yes	D	1,000	0.00778	0.14926	0.00116	2.38	No
Mercury	Yes	D	50.0	0.00778	0.00023	0.00000	0.119	No
Nickel	Yes	A, B2	100	0.00778	0.00087	0.00001	0.238	No
Polycyclic Organic Matter	Yes	B2	None	0.00778	0.00792	0.00006	--	--
Selenium	Yes	D	200	0.00778	0.00472	0.00004	0.476	No

Notes:

a. Maximum unit impact is based on Grid 1 and Fine Grid modeling for the peak load scenario.

b. Maximum concentrations are the product of the maximum annual unit impact and maximum emission rate.

c. TLV-TWA obtained from "Documentation of the Threshold Limit Value and Biological Exposure Indices," sixth edition, published by the American Conference of Governmental Industrial Hygienists, Inc.

d. Carcinogenic Rating from EPA's Integrated Risk Information System (http://www.epa.gov/iris/index.html)

A = Human Carcinogen

B1 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in humans.

B2 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in animals.

C = Possible human carcinogen

D = Not Classifiable as to Human Carcinogenicity

Source: Jim Clary & Associates, February 2004 Revision, page 37b. Table 4.3-2b Maximum Annual Impacts from Other Regulated Pollutants (Siemens SCCT Scenario).

Table 4.21. EPA Region IX Air-Program Risk Calculation (Preferred Alternative).

Pollutant	Carcinogenic Rating[c]	Maximum Annual Unit Impact[a] ($\mu g/m^3$ per g/s)	Maximum CIP1, CIP2, BSG1, and BSG2 Emission Rate (g/s)	Maximum Annual Concentration[b] ($\mu g/m^3$)	EPA Region IX AIR-PRG ($\mu g/m^3$)	EPA Region IX AIR-PRG Cancer Risk[g]
Acetaldehyde	B2	0.00745	0.00951	0.00007	0.87000	0.00000
Benzene	A	0.00745	0.02338	0.00017	0.23000	0.00000
1,3-Butadiene	B2	0.00745	0.00604	0.00004	0.00690	0.00000
Formaldehyde	B1	0.00745	0.10490	0.00078	0.15000	0.00000
Naphthalene	C	0.00745	0.01355	0.00010	3.10000	0.00000
Arsenic	A	0.00745	0.00415	0.00003	0.00045	0.00000
Beryllium	B1	0.00745	0.00006	0.00000	0.00080	0.00000
Cadmium	B1	0.00745	0.00181	0.00001	0.00110	0.00000
Chromium[d]	A	0.00745	0.00415	0.00003	0.00002	0.00000
Lead	B2	0.00745	0.00528	0.00004	Not Available	Not Available
Nickel[e]	A, B2	0.00745	0.00174	0.00001	0.00800	0.00000
Polycyclic Organic Matter[f]	B2	0.00745	0.01572	0.00012	0.00092	0.00000
Total[h]						0.00000
Percentage of Significance Level[i]						15.67%

Notes:
a. Maximum unit impact is based on Grid 1 and Fine Grid modeling for the peak load scenario.
b. Maximum concentrations are the product of the maximum annual unit impact and maximum emission rate.
c. Carcinogenic Rating from EPA's Integrated Risk Information System (http://www.epa.gov/iris/index.html)
A = Human Carcinogen
B1 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in humans.
B2 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in animals.
C = Possible human carcinogen
D = Not Classifiable as to Human Carcinogenicity
d. The most conservative (i.e., most carcinogenic) PRG for all chromium compounds is used to calculate worst-case risk.
e. The most conservative (i.e., most carcinogenic) PRG for all nickel compounds is used to calculate worst-case risk.
f. The most conservative (i.e., most carcinogenic) PRG for all polycyclic organic matter compounds is used to calculate worst-case risk.
g. Individual pollutant cancer risks are calculated by dividing the maximum concentration by the AIR-PRG and multiplying by $1x10^{-6}$.
h. The cancer risk for the project is the sum of all individual pollutant cancer risks.
i. HAR Section 11-60.1-179(c) states that risks less than 10 in one million (10.0E-06) are considered insignificant.

Source: Table 4.3-2C, Jim Clary & Associates, November 2004. *Appendix B, Air Quality Modeling Analysis for Combustion Turbines CIP1 and CIP2 and Blackstart Diesel Generators BSG1 and BSG2 Amendment*.

Table 4.22. EPA Region IX Air-Program Risk Calculation (One CT & BSG).

Pollutant	Carcinogenic Rating[c]	Maximum Annual Unit Impact[a] ($\mu g/m^3$ per g/s)	Maximum BP1 plus BSG1 Emission Rate (g/s)	Maximum Annual Concentration[b] ($\mu g/m^3$)	EPA Region IX AIR-PRG ($\mu g/m^3$)	EPA Region IX AIR-PRG Cancer Risk[g]
Acetaldehyde	B2	0.00778	0.00476	0.00004	0.87000	0.00000
Benzene	A	0.00778	0.01193	0.00009	0.23000	0.00000
1,3-Butadiene	B2	0.00778	0.00302	0.00002	0.00690	0.00000
Formaldehyde	B1	0.00778	0.05247	0.00041	0.15000	0.00000
Naphthalene	C	0.00778	0.00682	0.00005	3.10000	0.00000
Arsenic	A	0.00778	0.00208	0.00002	0.00045	0.00000
Beryllium	B1	0.00778	0.00003	0.00000	0.00080	0.00000
Cadmium	B1	0.00778	0.00091	0.00001	0.00110	0.00000
Chromium[d]	A	0.00778	0.00208	0.00002	0.00002	0.00000
Lead	B2	0.00778	0.00265	0.00002	Not Available	Not Available
Nickel[e]	A, B2	0.00778	0.00087	0.00001	0.00800	0.00000
Polycyclic Organic Matter[f]	B2	0.00778	0.00792	0.00006	0.00092	0.00000
Total[h]						0.00000
Percentage of Significance Level[i]						8.20%

Notes:

a. Maximum unit impact is based on Grid 1 and Fine Grid modeling for the peak load scenario.
b. Maximum concentrations are the product of the maximum annual unit impact and maximum emission rate.
c. Carcinogenic Rating from EPA's Integrated Risk Information System (http://www.epa.gov/iris/index.html)
   A = Human Carcinogen
   B1 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in humans.
   B2 = Probable Human Carcinogen - Based on limited evidence of carcinogenicity in animals.
   C = Possible human carcinogen
   D = Not Classifiable as to Human Carcinogenicity
d. The most conservative (i.e., most carcinogenic) PRG for all chromium compounds is used to calculate worst-case risk.
e. The most conservative (i.e., most carcinogenic) PRG for all nickel compounds is used to calculate worst-case risk.
f. The most conservative (i.e., most carcinogenic) PRG for all polycyclic organic matter compounds is used to calculate worst-case risk.
g. Individual pollutant cancer risks are calculated by dividing the maximum concentration by the AIR-PRG and multiplying by $1x10^{-6}$.
h. The cancer risk for the project is the sum of all individual pollutant cancer risks.
i. HAR Section 11-60.1-179(c) states that risks less than 10 in one million (10.0E-06) are considered insignificant.

Source: Jim Clary Associates, February 2004 Revision, page 37c. Table 4.3-2c EPA Region IX AIR-PRG Risk Calculations (Siemens SCCT Scenario).

4.3.10 INDIRECT EFFECTS ON AMBIENT AIR QUALITY

The proposed units are intended to help accommodate the economic and population growth planned for the island. The potential change in electric rates resulting from the addition of this new electrical power generation would not markedly promote or discourage economic activity. Consequently, it would not lead to growth or changes in the character of economic activity (e.g., the opening of new industries not previously practical) that might have secondary air quality impacts.

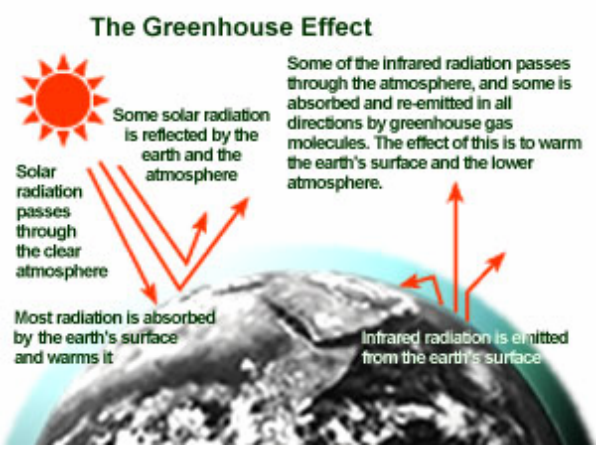
The higher efficiency of the new units may lead to them be dispatched (i.e., used to supply system demand) ahead of older existing units at the Waiau and Honolulu Generating Stations. To the extent that this occurs, emissions from those facilities would decrease slightly, and the quality of the air that is affected by their operation could improve slightly. The substitution effect would be small, however, and would not have a measurable effect on air quality.

The maximum estimated concentrations for SO_2, CO, NO_2, and PM/PM_{10} are all below the applicable secondary ambient air quality standards. The federal secondary standards are identical to the primary standards, with the exception of an additional 3-hour SO2 standard (1,300 $\mu g/m^3$). The secondary standards were established to prevent adverse impacts to the public welfare, including impacts on vegetation. Because these standards will be met, no significant adverse impacts on vegetation are expected.

Soils act as a sink for SO_2, CO, NO_2, and particulates, all of which are removed from the air and adsorbed on soil and plant surfaces. Considering local conditions, the quantities of particulate, sulfate, and nitrate that may be added to the soil and assimilated into soil-plant system would be insignificant compared with those normally present in the soil or transported to the soil-plant environment via water or winds from the surroundings. Thus, soils in the area of influence of the proposed Campbell Industrial Park Generating Station would not be adversely affected.

4.3.11 GLOBAL WARMING

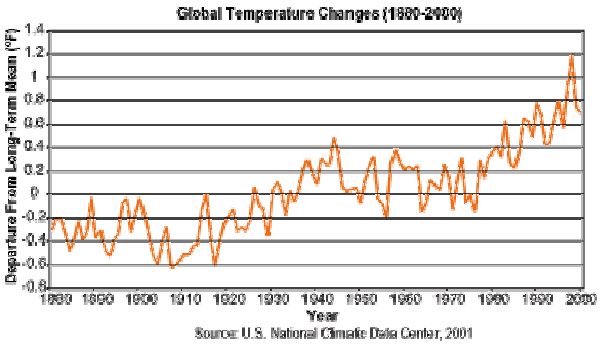
4.3.11.1 Overview of the Issue



The earth's atmosphere consists of a mixture of gases including nitrogen, oxygen and water vapor. Also present are small quantities of carbon dioxide, methane and a number of other "trace" gases. Sunlight passes through the atmosphere, warming the earth's surface. In turn, the land and oceans release heat in the form of infrared radiation into the atmosphere, thus balancing the incoming energy. Water vapor, carbon dioxide and some of the other trace gases absorb part of this radiation, allowing it to warm the lower atmosphere, while the remainder is emitted to space. Without heat-trapping greenhouse gases the surface of the earth would have an average temperature of approximately 0° Fahrenheit (-18°C) rather than the 15° C that we presently experience.[69] This retention of heat, which keeps the surface of the planet warm enough to sustain us, is called the "greenhouse effect". About three-quarters of the natural greenhouse effect is due to water vapor; the next most significant natural greenhouse gas is carbon dioxide.

[69] See www.dar.csiro.au/publications/holper%5F2001b.html.

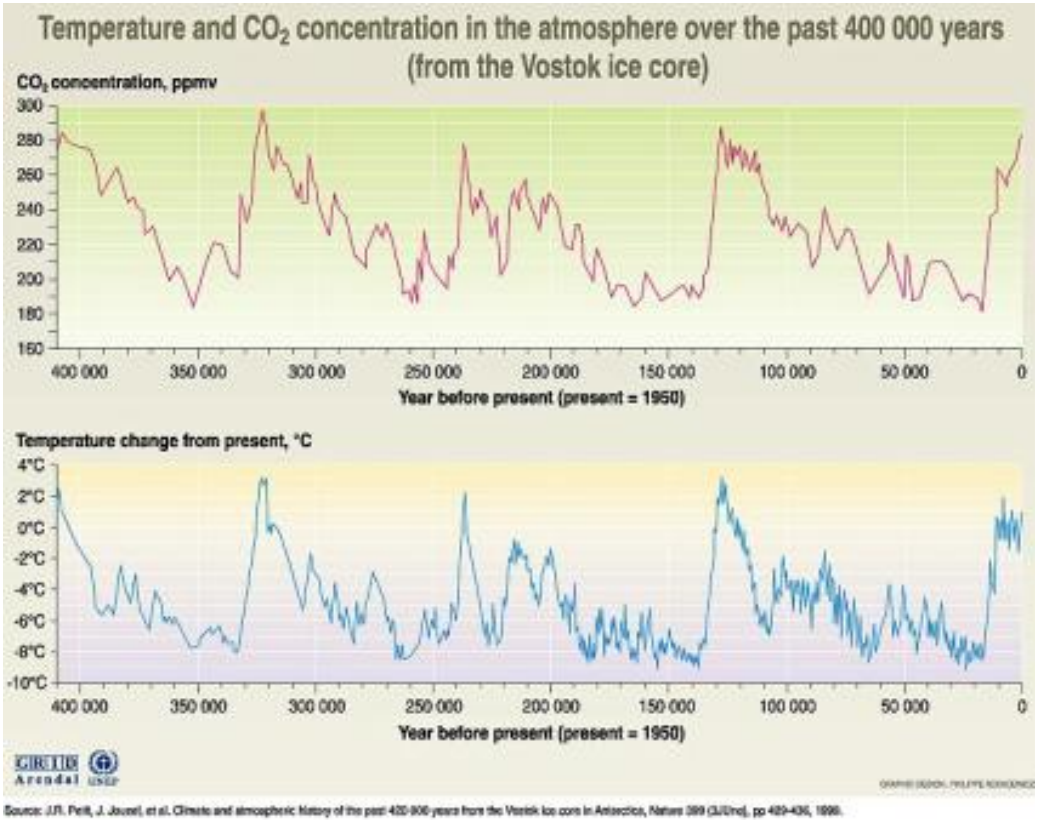
The green house gases associated with human activities that are of greatest concern are CO_2 from the combustion of fossil fuels and industrial processes (e.g., cement manufacturing), methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride. Of these six gases, CO_2 is the most prevalent.



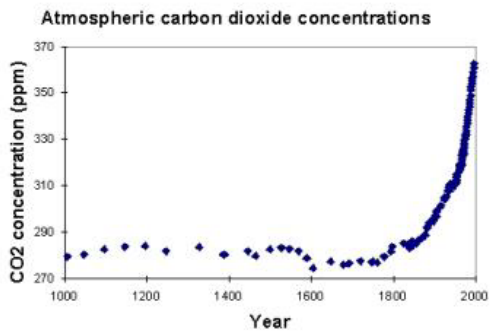
The EPA (U.S. Environmental Protection Agency, September 1998) estimates that global mean surface temperatures increased 0.6-1.2°F between 1890 and 1996. The nine warmest years in this century all have occurred in the last 14 years. Of these, 1995 was the warmest year on record, suggesting the atmosphere has rebounded from the temporary cooling caused by the June 15, 1991, explosive eruption of Mount Pinatubo in the Philippines. The average temperature in Honolulu has increased 4.4° F over the past century. Other observed environmental changes, including a decrease in Northern Hemisphere snow cover, a decrease in Arctic Sea ice, and continued melting of alpine glaciers, tend to corroborate the temperature data. Globally, sea levels have risen 4-10 inches over the past century, and precipitation over land has increased slightly.

Data from entrapped air inclusions in ice cores obtained from the Russian Vostok station in East Antarctica provide direct records extending through four climate cycles of past changes in atmospheric trace-gas composition. As shown by the tracing reproduced in Figure 4.4, they indicate that temperature and atmospheric CO_2 concentrations have fluctuated substantially over the past 400,000 years.

Figure 4.4. Atmospheric CO_2 and Temperature Over Past 400,000 years.



However, as shown in the chart to the right, recent changes have carried the values for CO_2 concentrations well outside the historical range. After remaining nearly constant during the thousand years before the Industrial Revolution, the concentration of carbon dioxide has increased by more than 30% since pre-industrial times and is still increasing at an unprecedented rate of on average 0.4% per year.[70]



4.3.11.2 Anthropogenic Sources of Climate Change

When the possibility that human activities might be having a substantial effect on global climate was first raised, it was as a controversial hypothesis. By the time the Intergovernmental Panel on Climate Change (IPCC) issued its *Second Assessment Report (SAR)*[71] there was an emerging consensus, but the IPCC was still being diplomatic when it concluded: "*The balance of evidence suggests a discernible human influence on global climate.*"

Since the SAR, progress has been made in reducing uncertainty, particularly with respect to distinguishing and quantifying the magnitude of responses to different external influences. As the scientific evidence has mounted, the scientific community has become increasingly certain of the link between human activities and climate change. The scientific evidence indicates that the increase is mainly due to the combustion of fossil fuels and deforestation.[72] The additional evidence and improved understanding led to an updated conclusion in the IPCC's *Third Assessment Report* (IPCC 2001).[73] The updated report concludes:

- Emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate.
- Concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities.
- Anthropogenic aerosols are short-lived and mostly produce negative radiative forcing.
- Natural factors have made small contributions to radiative forcing over the past century.
- There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.

4.3.11.3 Probable Nature of Climate Change

The IPCC's *Summary for Policymakers* highlights a number of climate changes that are likely to accompany global warming. These, and the confidence levels associated with them, are presented in Table 4.23.

[70] Analysis of the composition of air bubbles trapped in Antarctic ice shows that carbon dioxide concentrations are now higher than at any time in the past 400,000 years and that it may be higher than it has been for 20 million years. If proven representative, these results indicate that the current rate of increase of carbon dioxide is greater than at any time in the past 20,000 years.

[71] Intergovernmental Panel on Climate Change (1995). IPCC Second Assessment - Climate Change 1995: IPCC Second Assessment Synthesis of Scientific-Technical Information Relevant to Interpreting Article 2 of the UNFCCC - Summaries for Policymakers of the three Working Group reports. Author: Geneva, Switzerland. pp 64.

[72] The changing isotopic composition of the atmospheric CO_2 shows the fossil origin of the increase, linking it to human activity. Currently, about 7 billion tons of carbon (as carbon dioxide) are emitted each year during the combustion of fossil fuels and 1-2 billion tons per year from land clearing.

[73] http://www.grida.no/climate/ipcc_tar/wg1/004.htm. Climate Change 2001: The Scientific Basis Climate Change 2001: Working Group I: The Scientific Basis.

Temperature. The updated forecasts list the following likely changes temperature:

- A 1.4°C to 5.8°C (2.5°F to 10.4°F) increase in the globally averaged surface temperature over the period 1990 to 2100. This projected temperature increase is greater than the previous estimate, which were about 1.0 to 3.5°C. The difference is due primarily to lower projected sulfur dioxide emissions.
- The warming will occur much more rapidly than it did during the 20th century. In fact, it will probably change more rapidly than it has at any time during the last 10,000 years. Anthropogenic warming is likely to lie in the range of 0.1 to 0.2°C per decade over the next few decades.
- Nearly all land areas are likely to warm more rapidly than the global average, particularly those at northern high latitudes in the cold season. The anticipated warming in south and Southeast Asia in summer and in southern South America in winter is less than the global mean change.
- Surface temperature is expected to become more El Niño-like in the tropical Pacific, with the eastern tropical Pacific warming more than the western tropical Pacific.

Model calculations by the U.S. Environmental Protection Agency (September 1998) are on the same order of magnitude, suggesting that the global surface temperature could increase an average of 1.6-6.3°F by the year 2100, with significant regional variation. Projections by the IPCC and results from the United Kingdom Hadley Center's climate model (HadCM2) suggest that by 2100 temperatures in Hawai'i could increase by 3°F (with a range of 1-5°F) in all seasons, slightly more in fall (U.S. Environmental Protection Agency, September 1998).

Precipitation. The changes in temperature noted above are expected to affect precipitation in a number of ways. While difficult to predict with certainty, the IPCC forecasts that global average water vapor concentration and precipitation will increase during the 21st century. By the second half of the 21st century, it is likely that precipitation will have increased over northern mid- to high latitudes and Antarctica in winter. At low latitudes there are both regional increases and decreases over land areas. Larger year to year variations in precipitation are very likely over most areas where an increase in mean precipitation is projected. Future changes in precipitation in Hawai'i are highly uncertain. This is because they depend in part on how El Niño might change, and no reliable projections of this are available. However, at least one model suggests that quite large precipitation increases could occur here in summer (particularly) and fall.

El Niño. Current projections show little change or a small increase in amplitude for El Niño events over the next 100 years. However, the confidence in projections of changes in future frequency, amplitude, and spatial pattern of El Niño events in the tropical Pacific is tempered by some shortcomings in how well El Niño is simulated in complex models. Even with little or no change in El Niño amplitude, global warming is likely to lead to greater extremes of drying and heavy rainfall and increase the risk of droughts and floods that occur with El Niño events in many different regions.

Monsoons. The IPCC believes it likely that warming associated with increasing greenhouse gas concentrations will cause an increase of Asian summer monsoon precipitation variability. However, the confidence is also limited by how well the climate models simulate the detailed seasonal evolution of the monsoons.

Thermohaline Circulation. Tidal forces, wind stress, and density differences are the three main processes that make the water in the oceans circulate. The density of sea water is controlled by its temperature (*thermo*) and its salinity (*haline*). The thermohaline circulation is a term for the global density-driven circulation of the oceans.

The key features of the global-scale thermohaline circulation are outlined below:

- The Gulf Stream (and its extension, the North Atlantic Drift) bring warm, salty water to the NE Atlantic, warming Western Europe.

- The water cools, mixes with cold water coming from the Arctic Ocean, and becomes so dense that it sinks, both to the south and east of Greenland.
- The sinking water spreads out below the surface, spreading out and affecting almost all the world's oceans at depths from 3,000 feet and below.
- The rising to the surface of the dense water as it gradually warms and returns to the surface, throughout the world's oceans. On its journey, the water carries both energy (in the form of heat) and matter (solids, dissolved substances and gases) around the globe and has a large impact on global climate.

Most models indicate that global warming will weaken the ocean thermohaline circulation; this will lead to a reduction of the heat transport into high latitudes of the Northern Hemisphere. The current projections do not exhibit a complete shut-down of the thermohaline circulation by 2100. However, the IPCC warns that beyond 2100, the thermohaline circulation could completely, and possibly irreversibly, shut-down in either hemisphere if the change in radiative forcing is large enough and applied long enough.[74]

Sea Level. The IPCC forecasts that global mean sea level will rise by 0.09 to 0.88 meters 0.3 to 2.9 feet) between 1990 and 2100, principally due to loss of mass from glaciers and ice caps and thermal expansion.

4.3.11.4 Likely Persistence of Effects

Emissions of long-lived greenhouse gases have a lasting effect on atmospheric composition, radiative forcing and climate. This means that the effects of anthropogenic climate change will persist for many centuries. For example, several centuries after CO_2 emissions occur, about a quarter of the increase in CO_2 concentration caused by these emissions is still present in the atmosphere.

After greenhouse gas concentrations have stabilized, global average surface temperatures would rise at a rate of only a few tenths of a degree per century rather than several degrees per century as projected for the 21st century without stabilization. The lower the levels at which concentrations are stabilized, the smaller the total temperature change.

Because of the long time that it takes for the deep ocean to adjust to climate change, sea level (as well as global mean temperature) is projected to continue rising for hundreds of years after greenhouse gas concentrations are stabilized. Melting ice sheets will contribute to sea level rise for thousands of years after climate has been stabilized. In Greenland, for example, where climate models indicate that the local warming is likely to be one to three times the global average, the IPCC report notes that models project that a sustained warming would lead to virtually a complete melting of the Greenland ice sheet with a resulting sea level rise of about 7 meters (23 feet). Current ice dynamic models suggest that the West Antarctic ice sheet could contribute up to 3 meters (9.8 feet) to sea level rise over the next 1,000 years. There is considerable uncertainty in all of these forecasts, but they make it clear that CO_2 levels are of immediate and significant concern.

[74] The critical part of the thermohaline circulation (THC) that could be affected by global warming is the sinking in the North Atlantic Ocean. This occurs here (and not in the North Pacific) because the Atlantic is much more saline (and hence, denser). Some fairly simple models of the world's oceans do simulate a rapid break down of the THC, when the density of the water in the North Atlantic Ocean is lowered by adding fresh water (rain and melting ice) and/or by warming. Increased fresh water input and warming over the North Atlantic are both expected as a result of increased greenhouse gas concentrations, and some relatively simple models suggest that global warming may cause a rapid collapse of the thermohaline circulation. The system is very complex in reality, and the climate models that take some of these complexities into account generally predict only a gradual weakening of the THC in response to global warming. Due to the potentially serious impact on the earth's climate of a collapse of the THC, it is a low-risk, high-impact event.

Table 4.23. Estimates of confidence in observed and projected changes in extreme weather and climate events.

Changes in Phenomenon	*Confidence in observed changes (latter half of the 20th century)*	*Confidence in projected changes (during the 21st century)*
Higher maximum temperatures and more hot days over nearly all land areas	Likely	Very likely
Higher minimum temperatures, fewer cold days and frost days over nearly all land areas	Very likely	Very likely
Reduced diurnal temperature range over most land areas	Very likely	Very likely
Increase of heat index [12] over land areas	Likely, over many areas	Very likely, over most areas
More intense precipitation events	Likely, over many Northern Hemisphere mid- to high-latitude land areas	Very likely, over many areas
Increased summer continental drying and associated risk of drought	Likely, in a few areas	Likely, over most mid-latitude continental interiors. (Lack of consistent projections in other areas)
Increase in tropical cyclone peak wind intensities	Not observed in the few analyses available	Likely, over some areas
Increase in tropical cyclone mean and peak precipitation intensities	Insufficient data for assessment	Likely, over some areas
Source: *Summary for Policymakers*, A Report of Working Group I of the Intergovernmental Panel on Climate Change.		

~~The scientific evidence indicates that the increase is mainly due to the combustion of fossil fuels and deforestation.[75] Most scientists now agree that the increased concentration of infrared absorbing gases, e.g., carbon dioxide (CO_2) and several trace gases, in the atmosphere is likely to lead to a measurable increase in average global surface temperature by the middle of the next century. These and other data have led the Intergovernmental Panel on Climate Change (IPCC) to conclude that "*…the balance of evidence suggests a discernible human influence on global climate*."~~

~~The IPCC estimates that a global average warming of 1.0-4.5°F (0.6-2.5°C) in the next fifty years and 2.5 to 10.4°F (1.4 to 5.8°C) by the year 2100, compared with the global average temperature in 1990. Model calculations by the U.S. Environmental Protection Agency (September 1998) are on the same order of magnitude, suggesting that the global surface temperature could increase an average of 1.6-6.3°F by the year 2100, with significant regional variation. These temperature changes would be far greater than recent natural fluctuations, and they would occur significantly faster than any known changes in the last 10,000 years.~~

~~The most obvious effect that an increase in average global temperature could have on Hawai'i is a rise in ocean level. It could also alter climatic patterns, and this, in turn, could have a number of secondary effects (e.g., changes in rainfall, increased air pollution, etc.).~~

~~Projections by the IPCC and results from the United Kingdom Hadley Center's climate model (HadCM2) suggest that by 2100 temperatures in Hawai'i could increase by 3°F (with a range of 1-5°F) in all seasons, slightly more in fall (U.S. Environmental Protection Agency, September 1998). Future changes in precipitation in Hawai'i are highly uncertain. This is because they depend in part on how El Niño might change, and no reliable projections of this are available. However, it appears~~

[75] The changing isotopic composition of the atmospheric CO_2 shows the fossil origin of the increase, linking it to human activity. Currently, about 7 billion tons of carbon (as carbon dioxide) are emitted each year during the combustion of fossil fuels and 1-2 billion tons per year from land clearing.

~~possible that quite large precipitation increases could occur in summer (particularly) and fall. Other climate models may show different results, especially regarding estimated changes in precipitation.~~

4.3.11.5 Project-Related ~~Effects~~ Contribution

The *Hawai'i Energy Strategy* (DBEDT, 2000) provides a 1990 baseline for emissions of global warming gases in Hawai'i.[76] The most important by far is the 16,961,453 tons of CO_2 that were emitted that year, but two other greenhouse gases (CH_4 and N_2O) were also significant. To allow the effects of the three different gases to be aggregated, the "global warming potential" (GWP) was calculated.[77] As shown in Table 4.24., the GWP of Hawai'i's 1990 emissions was 18,810,906 tons CO_2-equivalent; approximately 40 percent of this was from the energy sector.[78]

The State Department of Business, Economic Development, and Tourism estimates that in 1990 approximately 90% of Hawaii's emissions of greenhouse gas were from carbon dioxide, 9% from methane, and 1% from nitrous oxides (Department of Business, Economic Development, and Tourism, 1998:3-2). In that year, two sectors (Transportation and Electricity) accounted for over 90 percent of the State's greenhouse gas emission, with the amounts nearly evenly split between the two. This excluded international aircraft and marine fuel use, and military fuels.

Operation of the combustion turbines that are part of the proposed CIP Generating Station and Transmission Line project will increase the release of greenhouse gases, principally CO_2 in proportion to the amount that they are used in addition to, rather than as a substitute for, existing generating The extent to which this occurs will depend upon the level of operation (both number of hours and load) of the combustion turbines and on any off-setting effect that may result from HECO being able to reduce the use of (and therefore CO_2 output from) the other units in its system.[79] The number of hours of operation will also depend upon the extent to which HECO's efforts to encourage conservation and to substitute renewable energy sources such as wind and solar for fossil fuel-fired generating capacity are successful. These facts mean that there is no simple answer to the question of how the proposed project is likely to affect Hawai'i's contribution to global warming, and the following discussion must be read with that in mind.

Based on anticipated operating scenarios, the combustion turbines are expected to produce approximately 100,000 to 380,000 tons per year of CO_2. The low end scenario of 100,000 tons per year, which assumes the CTs are not being operated in lieu of other generating units, represents about 1.3% of the current Global Warming Potential (GWP) for the Electricity Sector in Hawaii as shown in Table 4.24. The higher end scenario of 380,000 tons per year would only occur if the CTs are run in place of other units that must be taken off-line for maintenance. Consequently, most of the difference between the low and high estimates of CO_2 emissions from the proposed unit would represent a substitution rather than a net increase. In other words, emissions from the proposed unit at CIP would be offset by decresed emissions from HECO's other generating units.

[76] Hawai'i's per capita emissions were about half the national average and accounted for 0.3% of total U.S. emissions in 1990.

[77] GWP is a measure used to compare the relative effects of each of the different greenhouse gases on warming of the atmosphere over some future time-horizon. For such comparisons, using a 100-year time horizon, CH_4 has 22 times the radiative forcing direct impact of CO_2, and N_2O has 270 times the direct impact (USEPA 1995b, viii).

[78] Emissions data are reported in metric units as favored by the international scientific community. A metric ton (1,000 kilograms) is about 10 percent heavier than the 2,000 pound short ton that is typically used in the United States. When discussing global warming, emissions of carbon dioxide and other greenhouse gases are usually given in "carbon dioxide equivalents". In the case of carbon dioxide, emissions denominated in the molecular weight of the gas or in carbon dioxide equivalents are the same. Carbon dioxide equivalent data can be converted to carbon equivalents by multiplying by 12/44. Emissions of other greenhouse gases (such as methane) can also be measured in carbon dioxide equivalent units by multiplying their emissions (in metric tons) by their global warming potentials. Carbon dioxide equivalents are the amount of carbon dioxide by weight emitted into the atmosphere that would produce the same estimated radiative forcing as a given weight of another radiatively active gas. Carbon dioxide equivalents are computed by multiplying the weight of the gas being measured (for example, methane) by its estimated GWP (which is 23 for methane).

[79] One of the functions of the CTs is to provide backup power so that other units can be taken off-line for maintenance of other units.

Table 4.24. Estimated Global Warming Potential of Hawaii Greenhouse Gas Emissions, 1990 (Tons CO_2-Equivalent).

Sector	GWP	% Total GWP	% Energy GWP
Energy Use			
Residential Sector	94,804	0.5%	1%
Commercial Sector	282,412	1.5%	2%
Industrial Sector	837,599	4.5%	5%
Electricity Sector	7,652,966	40.7%	46%
Marine Transportation	155,599	0.8%	1 %
Air Transportation	3,865,711	20.6%	23%
Ground Transportation	3,923,915	20.9%	23%
Subtotal	16,813,006	89.4%	100%
Non-Energy Sources			
Oil Refining	5,214	0.03%	
Cement Production	109,274	0.6%	
MSW Management*	1,366,464	7.3%	
Wastewater Treatment	22,594	0.1%	
Domestic Animals	294,096	1.6%	
Manure Management	133,232	0.7%	
Sugar Cane Burning	14,106	0.1%	
Fertilizer	52,920	0.3%	
Subtotal	1,997,900	10.6%	
Total	18, 810,906	100.0%	

*Municipal solid waste.

Source: Department of Business, Economic Development, and Tourism, State of Hawai‘i. *Hawai‘i Energy Strategy*, Table 2.3.

4.3.11.6 Mitigation Measures

4.3.11.6.1 Basing Fuel Choice on CO_2 Emissions

The proposed combustion turbines inevitably produce CO_2 as a byproduct of their operation. As shown in Table 4.25., there is relatively little difference between various types of petroleum fuels (e.g., gasoline, kerosene, fuel oil, etc.) with respect to the amount of CO_2 they release per million BTUs of energy that they contain. Hence, there is no measurable advantage from biasing the fuel selection toward naphtha, a naphtha/ethanol blend, or diesel fuel. On average, gaseous fuels (such as methane, landfill gas, flare gas, and natural gas) release somewhat less carbon than petroleum-based fuels, but they are either not available or not readily available in the needed quantities in Hawai‘i. Coal releases measurably larger amounts of CO_2 per million BTUs, and so simply switching from petroleum fuel to coal fuels is not a means of mitigating CO_2 emissions.

Table 4.25. Fuel CO_2 Emission Coefficients.

Fuel	Emission Coefficients		
	Pounds CO_2 per Unit Volume or Mass		Pounds CO_2 per Million Btu
Aviation Gasoline	18.355	per gallon	152.717
	770.916	per barrel	
Distillate Fuel (No. 1, No. 2, No. 4 Fuel Oil & Diesel)	22.384	per gallon	161.386
	940.109	per barrel	
Jet Fuel	21.095	per gallon	156.258
	885.98	per barrel	
Kerosene	21.537	per gallon	159.535
	904.565	per barrel	
Liquefied Petroleum Gases (LPG)	12.805	per gallon	139.039
	537.804	per barrel	
Motor Gasoline	19.564	per gallon	156.425
	822.944	per barrel	
Petroleum Coke	32.397	per gallon	225.130
	1,356.461	per barrel	
	6,768.667	Per short ton	
Residual Fuel (No. 5 and No. 6 Fuel Oil)	26.033	per gallon	173.906
	1,093.38	per barrel	
Methane	116.376	per 1000 ft^3	115.258
Landfill Gas	1.0	per 1000 ft^3	115.258
Flare Gas	133.759	per 1000 ft^3	120.721
Natural Gas	120.5931	per 1000 ft^3	117.080
	12.669	per gallon	139.178
	532.085	per barrel	
Anthracite Coal	3852.16	per short ton	227.400
Bituminous Coal	931.30	per short ton	205.300
Sub-Bituminous Coal	3715.90	per short ton	212.700
Lignite Coal	2791.60	per short ton	215.400
Tires/Tire-Derived Fuel	6,160.0	per short ton	189.538
Wood and Wood Waste[1]	3,812.0	per short ton	195.0
Municipal Solid Waste[1]	1,999.0	per short ton	199.854

Notes: [1]Biofuels (such as wood and wood waste) contain "biogenic" carbon. Under international greenhouse gas accounting methods developed by the Intergovernmental Panel on Climate Change, biogenic carbon is part of the natural carbon balance and it will not add to atmospheric concentrations of carbon dioxide. Hence, it is also legitimate to use an emission factor of zero for wood, wood waste, and other biomass fuels in which the carbon is entirely biogenic.

[2]Municipal solid waste is a mixture of biogenic and inorganic materials (principally plastics). Hence, not all of the carbon in it is biogenic. The proportion of plastics in municipal solid waste varies considerably depending on climate, season, socio-economic factors, and waste management practices. The U.S. EPA estimates that in the United States MSW contained approximately 16 percent plastics and the carbon dioxide emission factor for these materials was 5,771 lbs per ton.4 Using this information, a proxy for a national average non-biogenic emission factor of 919 lbs carbon dioxide per short ton of municipal solid waste can be derived. This represents 91.9 lbs carbon dioxide per million Btu, assuming the average energy content of municipal solid waste is 5,000 Btu/lb.

Source: Energy Information Administration.

4.3.11.6.2 CO_2 Capture and Sequestration

If one is to mitigate the effect of fossil fuel combustion one must first capture the CO_2 that is present and then store it (sequestration) so that it does not enter the atmosphere. The technology is already available to capture the CO_2 that is produced by large point sources, such as fossil fuel or biomass energy facilities, major CO_2 emitting industries, natural gas production, synthetic fuel plants and fossil fuel-based hydrogen production plants. Engineers estimate that carbon capture and sequestration (CCS) applied to a modern conventional power plant could reduce CO_2 emissions to the atmosphere by approximately 80-90% compared to a plant without CCS. Capturing and compressing CO_2 requires much energy and would increase the energy needs of a plant with CCS by about 10-40%. This and other system costs are estimated to increase the costs of energy from a power plant with CCS by 30-60% depending on the specific circumstances (IPCC 2005).

Unfortunately, the efficiencies of both CO_2 capture and sequestration are very much dependent upon the scale of the operation. Capturing CO_2 emissions before they escape into the atmosphere requires relatively large facilities and is feasible only for large power plants (Jordal, Anheden, and Jinying 2004). Sequestration of captured CO_2 in geological formations, ocean waters, and by conversion to solid carbonates has been considered with mixed results. CO_2 can be pumped into depleted oil fields to enhance secondary recovery, but no such strata are available in Hawai‘i. Sequestration in deep ocean waters may eventually prove to be technically feasible, but some believe it would cause potentially prohibitive environmental impacts. Finally, the conversion of CO_2 emissions into stable minerals would require a very large facility and would consume 60 to 180 percent of the energy generated (IPCC 2005); in other words, might well consume more energy that is created. None of these options is feasible for the relatively small facility that is appropriate for HECO’s unit addition.

4.3.12 CONSTRUCTION PERIOD AIR QUALITY IMPACTS

Project development of Alternatives 1 through 3 will involve demolition, site grading and preparation, and construction of the proposed improvements. Alternative 4, unless the underground variant is selected, would require very little earthwork other than that needed to install the transmission poles. Because the sites on which the generating units and substation facilities would be constructed are already close to the required grade, they will also require limited earthwork. The most substantial grading will be the creation of the berms that are planned around the fuel storage tanks. Consequently, nearly all of the site preparation is expected to be completed within one month of the start of work. After that, earth disturbance will generally be limited to trenching and finished grading for small items such as equipment pads and trenches for piping and electrical ducts.

Use of heavy equipment and earth moving operations during this work will generate fugitive dust and internal combustion engine emissions that may have temporary impacts on local air quality. However, combustion emissions, such as NO_x and diesel particulate matter (diesel PM), are most significant when using large, diesel-fueled scrapers, loaders, dozers, haul trucks, compressors, generators and other heavy equipment. The proposed project involves limited amounts of the kind of work that requires such construction equipment, limiting its potential air quality impact.

Specific information concerning the construction equipment that would be used will not be available until a construction contractor is selected. Consequently, overall construction emissions were estimated using screening emission rates and procedures recommended in the *Air Quality Handbook: A Guide For Assessing the Air Quality Impacts for Projects Subject to CEQA Review (*San Louis Obispo Air Quality Control District, April 2003) (see Table 4.26).

Table 4.26. Screening Emission Rates for Construction Operations.

Pollutant	*grams/Yds^3 of Material Moved*	*Lbs/ Yds^3 of Material Moved*	*Yds^3 of Material Moved*	*Emissions*
Diesel PM	2.2	0.0049	717	3.51 lbs
Carbon Monoxide (CO)	138.0	0.304	717	217.97lbs
Reactive Organic Gases (ROG)	9.2	0.0203	717	14.56 lbs
Oxides of Nitrogen (NOx)	42.4	0.0935	717	67.04 lbs
Sulfur Oxides (SOx)	4.6	0.010	717	7.17 lbs
Fugitive Dust (PM10)	0.75 tons/acre-month of construction		3 acre-months	2.25 tons

Note: These rates assume an average of 0.27 gallons of diesel fuel is burned for each cubic yard of earth moved.

Sources: Bay Area Air Quality Monitoring District: *Guidelines for Assessing Impacts of Projects and Plans* - April 1996, and EPA-AP 42.

The emission estimates from Table 4.26 can be used together with the fuel use estimate presented above to assess whether or not mitigation is needed. Table 4.27 shows the approximate level of construction activity that would require mitigation for each pollutant of concern and compares these with the estimated emission from the proposed project. The results indicate that special mitigation is not needed for the construction phase of the proposed project.

Table 4.27. Level of Construction Activity Where Mitigation May be Appropriate.

Pollutant of Concern	*Thresholds ([1])*		*Amount of Material Moved*		*Threshold Exceeded?*
	Tons/Qtr	*Lbs/Day*	*Cu. Yds/Qtr*	*Cu. Yds/Day*	
Reactive Organic Gases	2.5	185	247,000	9,100	No
	6.0	185	593,000	9,100	No
NOx	2.5	185	53,500	2,000	No
	6.0	185	129,000	2,000	No
PM10	2.5	n/a	Any project with a grading area greater than 4.0 acres of continuously worked area will exceed the 2.5 ton PM10 quarterly threshold.		No

Note: Thresholds were approximated using the screening level emission rates from Table 4.26. Daily emission thresholds are based upon the level of daily emissions that may result in a short-term exceedance of the ozone standard.

Notwithstanding the absence of significant impact, HECO intends to require construction contractors to take the following standard mitigation measures for its equipment.

- Maintain all construction equipment in proper tune according to manufacturer's specifications.

- Fuel all off-road and portable diesel powered equipment, including but not limited to bulldozers, graders, cranes, loaders, scrapers, backhoes, generator sets, compressors, auxiliary power units, with motor vehicle diesel fuel.
- Maximize to the extent feasible, the use of diesel construction equipment meeting the latest certification standard for off-road heavy-duty diesel engines.
- Minimize the extent disturbed area where possible.
- Use water trucks or sprinkler systems in sufficient quantities to minimize the amount of airborne dust leaving the site.
- Cover or continuously wet dirt stockpile areas containing more than 100 cubic yards of material.
- Implement permanent dust control measures identified in the project landscape plans as soon as possible following completion of any soil disturbing activities.
- Stabilized all disturbed soil areas not subject to revegetation, paving, or development using approved chemical soil binders, jute netting, or other methods.
- Pave all roadways, driveways, sidewalks, as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.
- Limit vehicle speed for all construction vehicles moving on any unpaved surface at the construction site to 15 mph or less.
- Cover all trucks hauling dirt, sand, soil, or other loose materials.

4.4 HYDROLOGIC AND WATER RESOURCES IMPACTS

4.4.1 PROJECT COMPONENTS WITH POTENTIAL IMPACTS ON HYDROLOGY

Construction of the proposed facilities will disturb the ground within the existing Barbers Point Tank Farm parcel, but it will not alter the overall drainage pattern or significantly alter runoff volumes. The proposed changes within the AES Substation and along the transmission line route will have even less effect on drainage patterns or water quality. Thus, the following discussion focuses on the generating components of the project. For the most part the water use and disposal estimates are provided on a "per-unit" basis. This means that they represent the amounts that would be used for Alternatives 2 (a single 110 MW unit plus the Transmission line) and Alternative 3 (single generating unit only). HECO's preferred Alternative (Alternative 1) would consume twice as much water and generate approximately twice the volume of wastewater, and this is noted in the narrative.

The discussion is divided into the following main parts:

- Section 4.4.2 describes sources of the water that will be used and wastewater disposal methods, including wastewater from the generating process and sanitary wastewater. It also briefly describes stormwater handling.
- Section 4.4.3 addresses surface water resources and the reasons why the proposed project does not have the potential to affect them.
- Section 4.4.4 evaluates potential effects on groundwater resources. The discussion outlines key assumptions about the system that will be used and the way in which the supply and disposal wells will be constructed.

4.4.2 WATER USE AND DISPOSAL

4.4.2.1 Source of Water for Generating Units

As explained previously, the proposed facilities are designed as peaking units. System modeling by HECO anticipates the plant's will operate about 200 days each year at an average of five hours on each of these days (i.e., for a total of about 1,000 hours per year). While the units may be operated as "spinning reserve" at less than full output for many of those hours, for the purpose of assessing potential impacts on water resources, this analysis conservatively assumes the units would be at full capacity during those hours. Consequently, actual water use and wastewater reinjection is likely to be substantially less that the amounts shown below (see Table 4.29 for summary).

Table 4.28. Summary of Water and Wastewater Flows by Alternative.

Parameter	*Average Amounts in Gallons Per Day*		
	Alternative 1	*Alternatives 2 and 3*	*Alternative 4*
Water Use: If Treated RO Water from Honouliuli WWTP	106,000	53,000	0
Water Use: If Saline Groundwater from an Onsite Well	252,000	126,000	0
Wastewater from the Generating Process: RO	17,800	8,900	0
Wastewater from the Generating Process: Onsite Saline Well	162,000	81,000	0
Sanitary Wastewater	165	165	0
On-Site Stormwater Retention Pond Capacity (in gal)	195,000	195,000	0
RO Water Replacement for Potable Water at Kahe	140,000	140,000	0
Source: Compiled by Planning Solutions, Inc., from various sources.			

To insure that water is always available, the proposed generating units have two sources of water.

- The first and principal source is treated wastewater effluent from the Honouliuli Wastewater Treatment Plant (WWTP). The effluent would first be treated to tertiary quality (R-1 standards) and then subsequently desalinized by reverse osmosis (RO) filtration at the Honouliuli WWTP site. This RO supply would be purchased from the Honolulu Board of Water Supply (BWS) and delivered to the site via the existing BWS RO distribution system in CIP. During the plant's operation with one generating unit, the required supply of RO would be 324 gallons per minute (GPM). Over 1,000 operating hours per year, this would amount to 19.44 million gallons or an average of about 53,000 gallons per day (GPD). If and when a second unit is added, this usage would double to approximately 106,000 GPD.
- The second, alternative source of water for power generation is saline groundwater from an onsite well. Groundwater of essentially seawater salinity from this well would be desalinized in an on-site RO filtration unit. When saline groundwater is being used, a supply of about 765 GPM would be required from the well. Over 1,000 operating hours a year, this would amount to 45.9 million gallons or an average of about 126,000 GPD. If and when a second unit is added, this usage would double to over 250,000 gallons per day.

The last line in Table 4.28 related to one of the community benefit items that HECO has agreed to implement as part of the proposed project. This entails installing the infrastructure needed to substitute RO water from the Honouliuli Wastewater Treatment Plant for the potable water that is now used for industrial process purposes at the Kahe Generating Station.

4.4.2.2 Disposal of Wastewater

4.4.2.2.1 Wastewater from the Generating Process

Water is consumed in the generating process, largely through water injection to control emissions of nitrogen oxides (NO_x). That water is vented to the atmosphere. The remainder of the wastewater would be delivered to a settling basin and then discharged to one of the two planned onsite disposal wells. An underground Injection Control (UIC) permit will be needed from the State Department of Health in order to construct the injection wells.

- When RO from the Honouliuli WWTP is the source of supply, the discharge rate to the disposal well would be 54 GPM. Over 1,000 hours in a year, the total for one unit would be 3.24 million gallons or an average of about 8,900 GPD.
- When water from the onsite saline well is the source of supply, the rate of discharge to the disposal well would be increased by the brine reject from the saltwater RO unit. The discharge rate for disposal in an onsite well would be about 494 GPM or 29.64 million gallons a year for each unit. This is equivalent to a daily average of about 81,000 GPD.

As with all of the water numbers, the eventual addition of a second generating unit would double these numbers.

4.4.2.2.2 Disposal of Domestic Wastewater

Water from BWS' potable system would be used for potable drinking water and other domestic uses by plant operating personnel. The portion which becomes domestic wastewater would be treated in an onsite septic tank and then delivered to the disposal well that also handles wastewater from the power generating process. The quantity of domestic wastewater is anticipated to average one GPM during the plant's operating hours or 60,000 gallons a year.

Domestic and sanitary wastewater, anticipated to average about 165 gallons per day, would be treated in an individual wastewater treatment system and the liquid fraction would be disposed of in the proposed injection well. The State Department of Health (SDOH) requires that the wastewater disposal system be set back 1,000 feet from any drinking water source. There are no drinking water sources within that distance of the proposed new well.

4.4.2.2.3 Disposal of Onsite Rainfall-Runoff

Onsite rainfall-runoff would be collected in swales, inlets, and subsurface conduits and routed to a detention basin. The basin has been tentatively sized in accordance with requirements of "Detention Based Water Quality Control" in the City and County of Honolulu Drainage Standards (January 2002). This translates to retention of the surface runoff from 8.0 acres of the power plant site during a 1.0-inch rainfall event. Based on a runoff coefficient of 0.9, the required retention volume is approximately 26,000 cubic feet, equivalent to about 195,000 gallons. The basin would slow the rainwater runoff to allow entrained particles to settle out. The basin is sized to include a 1-foot depth of sediment accumulation before dredging/cleanup is required. The ultimate disposal point (on-site infiltration wells or an off-site system) has not been ~~decided upon~~determined. HECO's preferred disposal method is to direct the stormwater leaving the settling basin into the existing stormwater drainage ditch adjacent to the HPOWER driveway, which currently accepts rainfall runoff from Hanua Street. This drainage ditch is labeled as "Drain A" on Figure 3.7. On-site infiltration wells would only be pursued if the appropriate permits and approvals cannot be obtained for the preferred option.

The substation sites are relatively flat and covered with gravel. Therefore, during a rainfall event, the runoff produced will remain on site due to percolation and evaporation. Similarly, neither the electrical transmission lines nor the underground water pipeline between the Honouliuli WWTP and Kahe that would be installed as part of the proposed project would significantly alter the runoff characteristics of the area through which they pass.

4.4.3 POTENTIAL EFFECTS ON SURFACE WATER RESOURCES

As discussed in Section 3.4.1 of this report, there are no surface water features on or near the BPTF site or along the area that would be disturbed during construction of the proposed transmission corridor. Stormwater runoff during construction will be contained and minimized through the use of BMPs, and runoff on the BPTF site during operation of the generating station will be contained on site. Therefore, there is no potential for project-related runoff to negatively effect surface water resources.

4.4.4 POTENTIAL EFFECTS ON GROUNDWATER RESOURCES

4.4.4.1 Information on Existing Power Plant Supply Wells in the CIP

Existing Power Plant Supply Wells. As described in Section 3.4.2 of this report, the groundwater underlying the project area is comprised of an upper saline aquifer that is hydrologically isolated from a lower aquifer of seawater salinity by an impermeable layer of calcareous silt and siltstone. The three existing cogeneration plants in the CIP (HPOWER, Kalaeloa Power Partners, and AES Hawaii) all use the upper aquifer as a source of cooling water supply and the lower, confined aquifer for disposal of this water at somewhat elevated temperatures. Table 4.29 and Table 4.30 present dimensions and depths of the supply and disposal wells at these plants.

Table 4.29. Information on the Supply Wells at the Three Cogeneration Plants in CIP.

State No.	*Owner/User*	*Year Installed*	*Casing Diameter (inches)*	*Well Depth (feet)*	*Elevations Open to the Aquifer (Feet MSL)*	*Capacity of Installed Pump (GPM)*	*Hydraulic Performance Drawdown (Ft.) @ Flow rate (GPM)*
1806-09	City & County / HRRV	1986	18	103	-38 to -91	1,450	1.8 @ 3,030
1806-10	City & County / HRRV	1986	18	105	-38 to -93	1,450	4.7 @ 3,070
1805-04	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.11 @ 340
1805-05	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.70 @ 340
1805-06	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.60 @ 340
1805-07	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.23 @ 340
1805-08	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.23 @ 340
1805-09	Kalaeloa Partners, LLC	1990	14	40	-3 to -26	350	0.23 @ 870
1806-11	AES Hawaii, Inc	1989	20	115	-48 to -103	3,000	19 @ 4,500
1806-12	AES Hawaii, Inc.	1990	20	124	-24 to -111	3,000	2.4 @ 3,027
1806-13	AES Hawaii, Inc.	1990	20	124	-26 to -113	3,000	1.3 @ 2,000
1806-14	AES Hawaii, Inc.	1990	20	125	-24 to -112	3,000	5.1 @3,021
Source: Tom Nance Water Resource Engineering, Inc.							

Table 4.30. Information on the Disposal Wells at the Three Cogeneration Plants in CIP

Well Name	*Owner/User*	*Year Installed*	*Casing Diameter (inches)*	*Elevations Open to the Aquifer (Feet MSL)*	*Hydraulic Performance Drawdown (Ft.) @ Flow rate (GPM)*
North	City & County / HRRV	1986	16	-188 to -244	14.5 @ 535
South	City & County / HRRV	1986	16	-193 to -414	16.8 @ 530
No. 1	Kalaeloa Partners, LLC	1989	12	-210 to -292	4.2 @ 600
No. 2	Kalaeloa Partners, LLC	1989	12	-210 to -294	5.0 @ 575
A	AES Hawaii, Inc.	1989	16	-200 to -405	8.0 @ 2500
B	AES Hawaii, Inc.	1991	16	-207 to -404	2.6 @ 2700
C	AES Hawaii, Inc.	1991	16	-200 to -410	3.2 @ 1800
D	AES Hawaii, Inc.	1991	16	-200 to -410	7.3 @ 2900
Source: Tom Nance Water Resource Engineering, Inc.					

The intervening silt and siltstone stratum prevents the warmer water discharged into the lower limestone from recirculating into the upper aquifer. Prior to the start of this practice in the early 1990s, the water level in the upper water table aquifer was a fraction of a foot above sea level at the cogeneration plant sites. The piezometric head in the lower, confined aquifer was a little lower and essentially at sea level. As a result of the ongoing disposal practice at these plants, the piezometric head in the lower, confined aquifer has risen to 2.5 to 3.0 feet above sea level and has stabilized there for the last several years. This is above the water level in the upper aquifer which has remained essentially unchanged. Despite the creation of this "reverse gradient" due to disposal, no recirculation of the warmer, cooling water discharge into the upper aquifer has been detected.

Results From Wells Previously Developed on the Proposed Power Plant Site. In anticipation of using water from the aquifer upper limestone layer for a power plant at this site, HECO had an initial high capacity production well drilled, cased, and pump tested in 1993 (its location on the site is shown on Figure 4.5 and it is identified as State Well No. 1806-15). Ground elevation at the site is about 12 feet. The well was completed with solid casing in the upper 40 feet and perforated casing in the lower 72 feet (to a depth of 112 feet). The intent of the design was to avoid drawing water from the surface and near surface of the water table aquifer to avoid contaminants which may be at the surface of the aquifer.

Results of pump testing done on March 29 to April 1, 1993, as presented in Harding Lawson (1993), demonstrate the following:

- As shown on Figure 4.6, the well is exceptionally productive. For example, drawdown was less than three (3) feet at 3,200 GPM. This establishes that the upper limestone layer at the project site is exceptionally permeable.
- Under the high rate of test pumping, the pumped water salinity was 27.5 parts per thousand (ppt) or about 80% seawater. This suggests that the well may have been drawing water from strata above the bottom of the solid casing, a not uncommon occurrence in Karstic limestone such as that which is found on the 'Ewa Plain. The fact that hydrocarbons at 40 µg/l were also detected in the pumped water appears to confirm this.
- During test pumping, water level responses in three onsite monitor wells were recorded (Wells MW-1, WW-2, and BV-9 on Figure 4.5). Wells MW-2 and BV-9 are open to the upper aquifer and drawdowns of a small fraction of a foot in response to pumping Well 1806-15 were recorded in

these. Well MW-1 is only open to the lower, confined aquifer (specifically, from 300 to 390 feet below sea level). No drawdown response to pumping was recorded in it, demonstrating the effective hydrologic separation of the two aquifers.

- Tidal variation in the lower aquifer in the MW-1 well was essentially identical to the upper aquifer in the MW-2 and BV-9 wells. This suggests that the permeabilities in the two limestone layers are quite similar.

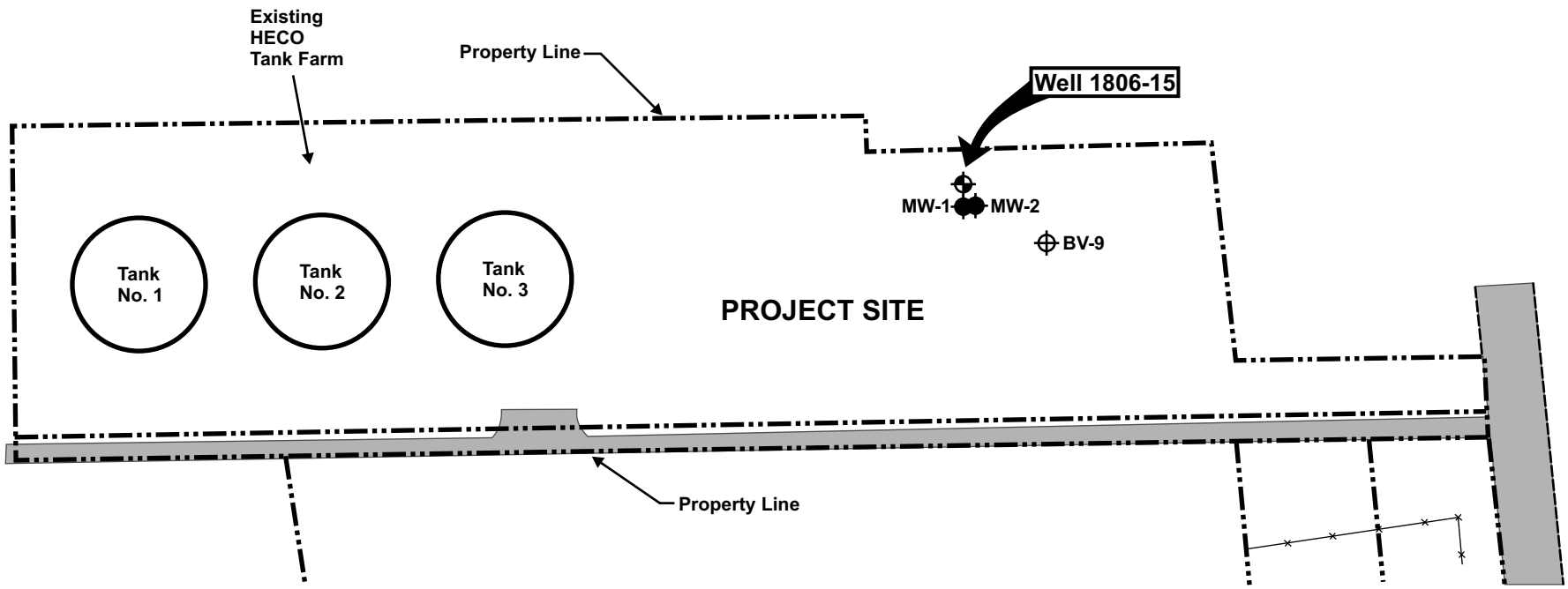
Results of Recent Well Testing. Additional information concerning existing groundwater conditions at the proposed power plant site was obtained for this assessment. Figure 4.6 shows the variation of salinity and temperature through the water column of Well 1806-15 as measured on October 26, 2005. The dashed line on the figure indicates the depth of the bottom of the well's solid casing. Above the dashed line, water is trapped in the solid casing and it is not indicative of conditions in the aquifer. Results below the dashed line show that the top of the well's perforated casing is about midway through the aquifer's relatively sharp transition zone. The data show that below about 50 feet into groundwater, the water is essentially of sea water salinity.

Monitor Well BV-9 extends about 24 feet into groundwater. Figure 4.7 contains a composite profile of salinity in the aquifer based on profiles of BV-9 and Well 1806-15 below its solid casing. The salinity is about 4 PPT (11% seawater) for the upper 10 feet; its transition zone extends from 10 to about 50 feet into groundwater; and essentially seawater salinity occurs below 50 feet into groundwater.

Figure 4.8 depicts the recorded tidal variation in Well 1806-15 over October 26 to 29, 2005. Compared with the predicted ocean tide, tidal variations in the well are about 2.3 hours later than in the ocean and about 50% in amplitude. This tidal response is somewhat less than occurs in wells at the AES, Kalaeloa Partners and HPOWER plants in Campbell Industrial Park.

4.4.4.2 Assumed New Supply and Disposal Well Characteristics

Required supply and disposal rates would be greater when onsite groundwater rather than Honouliuli RO effluent is the source of supply, so these rates will govern the sizing of supply and disposal wells. The maximum anticipated groundwater supply rate is 765 GPM. The existing well 1806-15 is quite capable of producing this, but its location is not compatible with the required layout of the power plant. Hence, a new supply well will be developed.



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Harding & Lawson (1993)

Legend:

- Production Well
- Monitoring Well & Designation
- Piezometer Installed by Black & Veatch

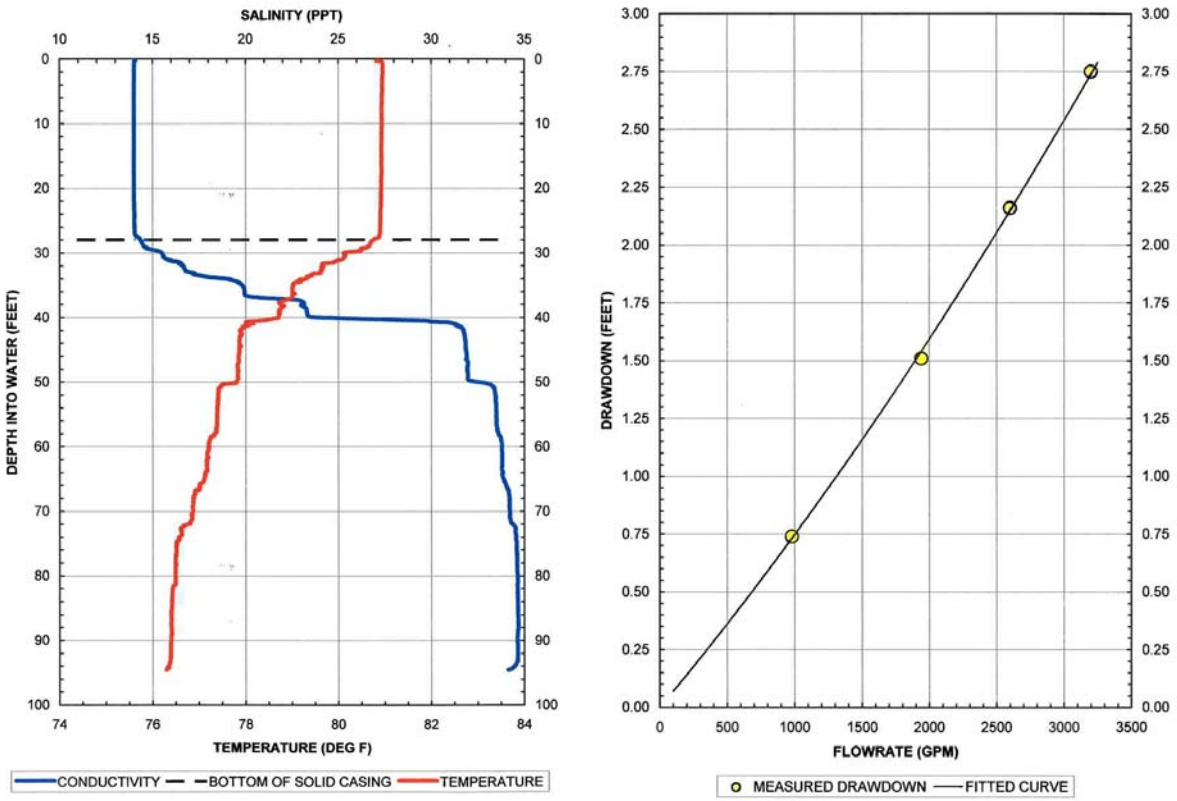
Figure 4.5:

Location Of Well No. 1806-15

CIP Generating Station & Transmission Additions Project

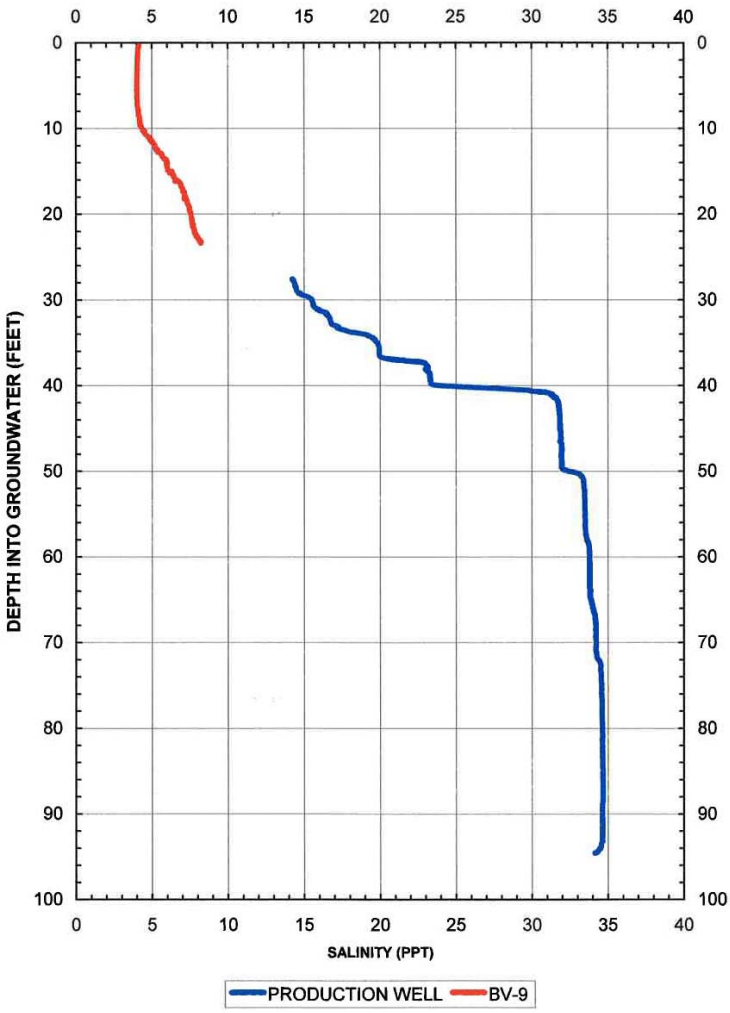
Figure 4-5 Location of Well 1806-15 2006-01-04.cdr

Figure 4.6. Hydraulic Performance & Salinity & Temperature Variation in Well 1806-15



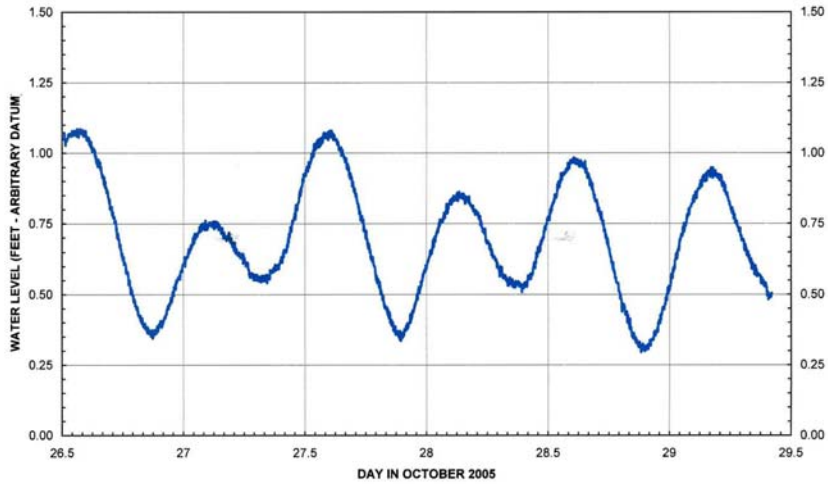
Source: Tom Nance Water Resource Engineering (Figures 3 and 4).

Figure 4.7. Composite Profile of Salinity in the Aquifer.



Source: Tom Nance Water Resource Engineering, Inc.

Figure 4.8. Recorded tidal variation in Well 1806-15 over October 26 to 29, 2005.



Source: Tom Nance Water Resource Engineering, Inc.

For the purposes of this assessment, it is assumed that HECO will use a single, 110-foot deep, 12-inch diameter well that would be designed to draw water from the aquifer in the upper limestone layer. Its solid casing would extend 60 feet into groundwater. Perforated casing would be placed from 60 to 100 feet into groundwater. The well would draw groundwater of essentially seawater salinity in order to avoid possible contaminants nearer to top of the aquifer. Experience with the nearby wells indicates that the drawdown at 765 GPM is likely to be only a fraction of a foot. Instead of drilling a second well for backup, redundant pumping capacity would be achieved by building a vault around the well with its bottom extending about five feet into groundwater and installing two or more pumps in the vault.

The maximum discharge of process and domestic wastewater would be 495 GPM. In keeping with the practices of the three existing cogeneration plants in the CIP and to avoid recirculation back to the supply well, disposal would be into the hydrologically separate aquifer in the second limestone layer. This assessment assumes that this would be done using two 400-feet-deep, 8-inch diameter wells (see Section 4.4.2.2.1). A spacing of 50 feet between the wells would suffice. Each well would have solid casing in its upper 200 feet and perforated casing for the bottom 200 feet. Each well would have sufficient capacity to accommodate the 495 GPM flow rate, thereby providing 100 percent backup capacity for the disposal system.

4.4.4.3 Regulatory Requirements for the New Supply and Disposal Wells

Supply Well. The State Commission on Water Resource Management (CWRM) would regulate the development and use of the new supply well through three permits: (i) well construction permit; (ii) pump installation permit; and (iii) water use permit. The first and third of these would be applied for concurrently. The second would be issued administratively after the well is completed and pump tested and all required information (well as-built information and pump test results) is submitted to the CWRM. Since HECO does not intend to use existing Well 1806-15, a condition of the approval of the new well may be the satisfactory sealing of Well 1806-15 according to the CWRM's standards. If this is the case, the sealing would be done after development and testing of the new well so that it can be used for monitoring purposes.

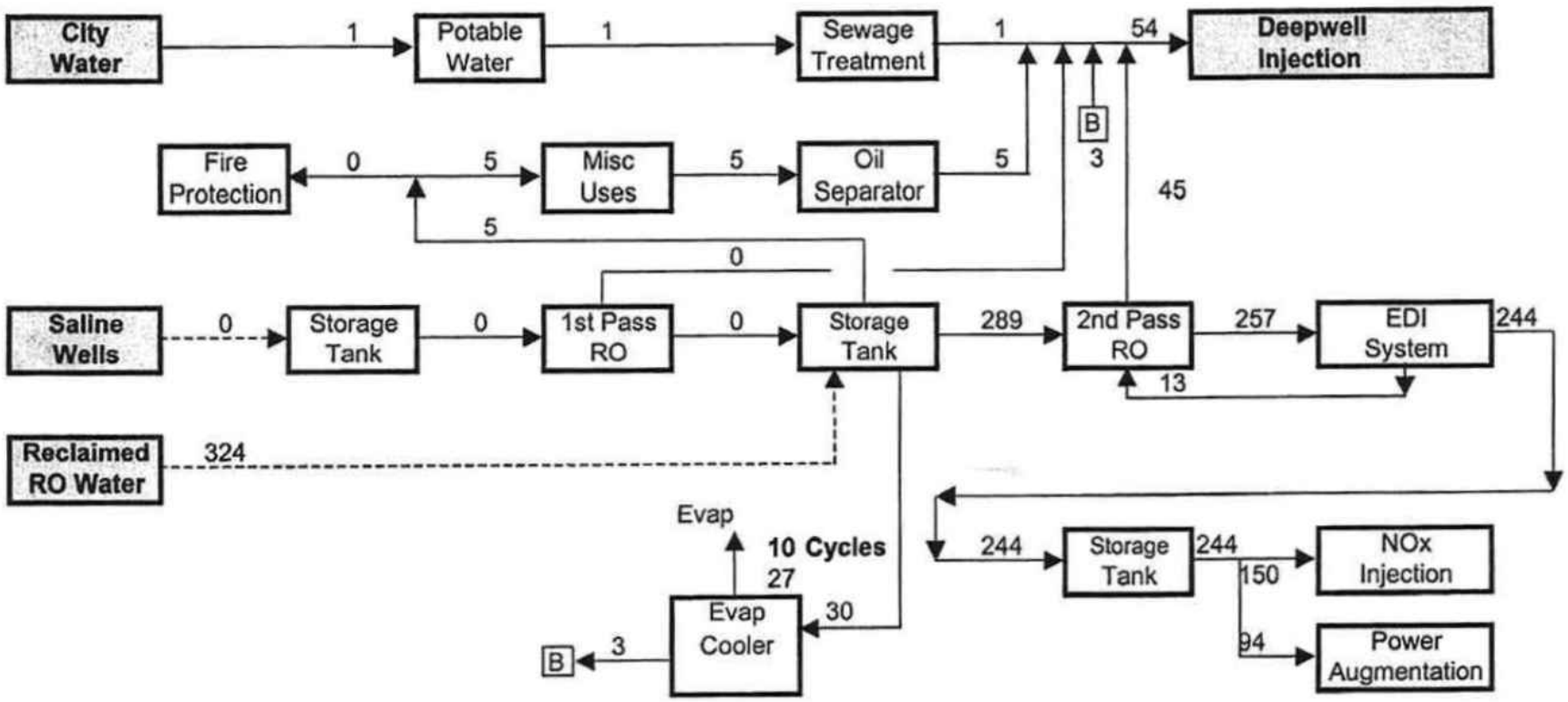
Disposal Wells. Approval and use of the two new disposal wells would come under the regulatory authority of the Underground Injection Control section of the State Department of Health (DOH-UIC). The approval process by DOH-UIC is in two distinct steps. First, information on well dimensions, anticipated rates and periods of use, and the expected quality of the discharge is submitted. After DOH-UIC's review, an "approval to construct" is issued. The wells would then be constructed and injection-tested and the information submitted to DOH-UIC. Pending complete and satisfactory reporting of these results, a permit to use the wells would be issued. Conditions of this permit would set limits on the quantity and quality of water to be discharged, including that no hazardous constituents above regulatory thresholds (or limits) would be allowed in the discharge.

4.4.4.4 Potential Impacts on Groundwater Resources

4.4.4.4.1 Effects When Honouliuli WWTP RO Effluent is the Source of Supply

Figure 4.9 is a water balance diagram prepared by Sargent & Lundy (2005) for a single Siemens W501D5A combustion turbine when RO effluent from the Honouliuli WWTP is the source of water supply. The RO supply would be delivered at 324 GPM and 54 GPM of this would ultimately be discharged in one or the other of the two 8-inch disposal wells.

Figure 4.9. Single-Unit Water Balance Diagram with RO Effluent as Supply Source.



Source: TNWRE after Sargent and Lundy, 2005.

The discharge to the disposal wells would be as follows:

- Blowdown from the evaporative cooler (3 GPM or 6%);
- Plant wash water run through the oil/water separator (5 GPM or 9%);
- Reject water from a second-pass RO unit and electro-deionization (EDI) treatment system (45 GPM or 83%); and
- Domestic wastewater (1 GPM or 2%).

Table 4.31 provides the anticipated quality of the supply and wastewater streams for operation with RO as the source of supply. Due to the very low salt content of the RO supply, the discharge to the disposal well would be quite fresh. Its total dissolved solids of less than 100 milligrams/liter (MG/L) would be lower than most drinking water sources in Hawai‘i and it would contain no hazardous constituents.

This very fresh water would be delivered by gravity to the lower, confined aquifer which is entirely of seawater salinity. The aquifer's only present use is for disposal of cooling tower blowdown[80] and other plant washwaters at the three cogeneration plants in Campbell Industrial Park. These ongoing rates of disposal - about 500 GPM at HPOWER and Kalaeloa Partners LLP and 4,500 GPM at AES Hawai‘i - are substantially greater than for the proposed project. The discharge that would result from the proposed project would not have an adverse effect on the usefulness of this lower aquifer when RO water is used as the source of supply.

4.4.4.4.2 Effects When Saline Groundwater is the Source of Supply

Figure 4.10 is a water balance diagram for a single Siemens W501D5A combustion turbine when saline groundwater is the source of supply (Sargent & Lundy, 2005). Groundwater would be drawn at 765 GPM from the saline zone of the aquifer in the upper limestone layer. There are a number of existing wells in Campbell Industrial Park which utilize this aquifer. In addition to those of the three cogeneration plants listed in Table 4.29, Chevron and Grace Pacific also have active wells. With the single exception of the six supply wells for the Kalaeloa Partners LP plant, all of these wells draw water of seawater or near-seawater salinity. These non-salinity dependent uses would not be impacted by the relatively modest draft of a new well for HECO's proposed power plant.

Kalaeloa Partner LP's plant's brackish to saline supply wells are a salinity-dependent use. These wells are shallow (25 to 40 feet deep) and were intended to draw brackish water from the top of the basal lens in the upper limestone layer. The HECO peaking plant's well would not adversely impact this use. HECO's well would be about 4,000 feet from the Kalaeloa Partners plant's supply wells. Because the proposed HECO well would draw water of seawater salinity at depth in the basal lens and at great distance from the Kalaeloa Partners plant's wells, no impact is expected to occur.

Table 4.31 presents the anticipated quality of the supply and wastewater streams when saline groundwater is the source of supply. Water delivered to the disposal well at 495 GPM would be comprised of the following:

- Brine effluent from the first pass RO unit (486 GPM or 98%);
- Miscellaneous in-plant uses run through an oil/water separator (5 GPM or 1%);
- Blowdown from the evaporative cooler (3 GPM or 0.6%); and
- Domestic wastewater (1 GPM or 0.2%).

[80] Blow-down - The portion of the circulating water flow that is removed in order to maintain the amount of dissolved solids and other impurities at an acceptable level.

Table 4.31. Supply and Wastewater Quality: Honouliuli WWTP RO Supply Source

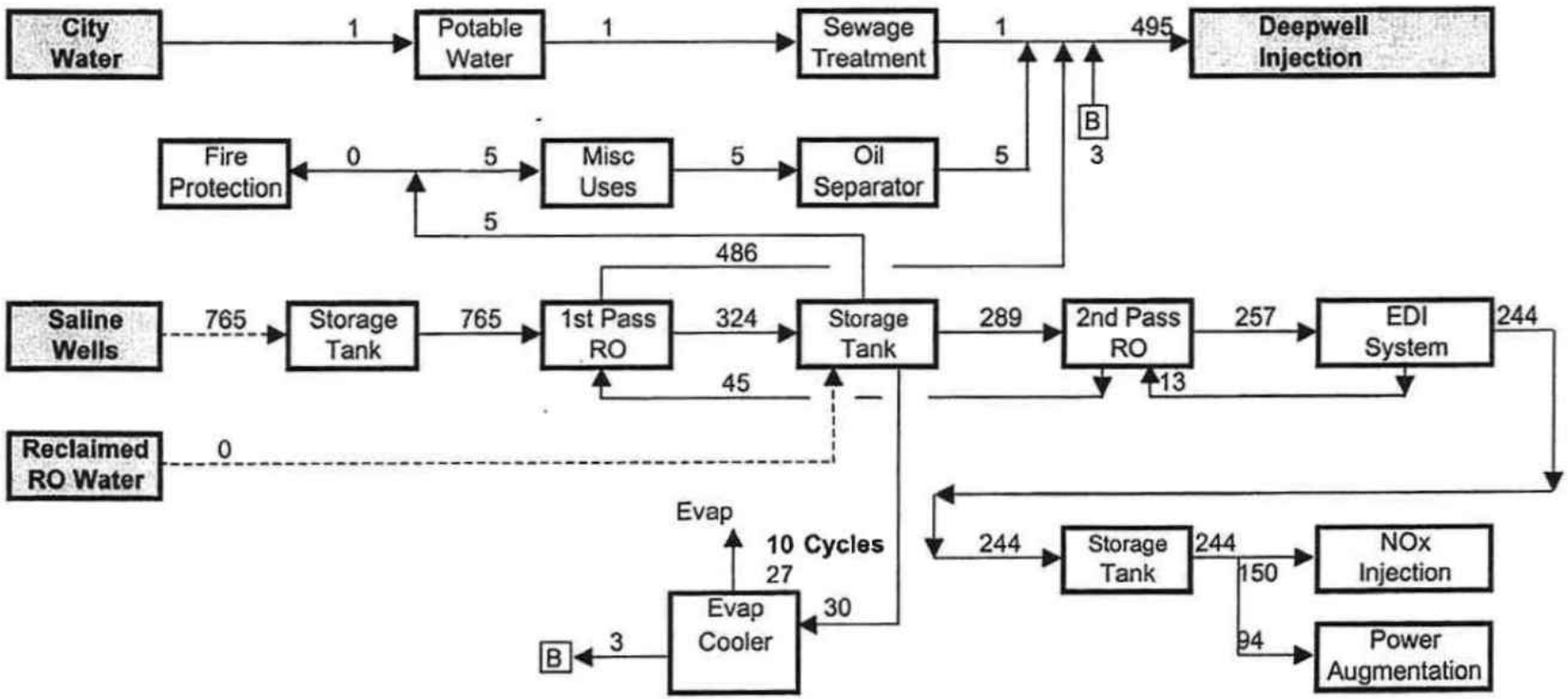
Parameter	*Units*	*RO Blowdown*	*In-Plant Wastewater Streams*				*Discharge to the Disposal Well*
			Evaporative Cooler Blowdown	*Plant Drains*	*2MI Pass RO Effluent*	*Domestic Wastewater*	
Flowrate	GPM	324	3	5	45	1	54
Calcium	MG/L	<1	10	N/A	N/A	25	<6.4
Magnesium	MG/L	<1	10	N/A	N/A	15	<6.22
Sodium	MG/L	N/A	N/A	N/A	N/A	85	N/A
Ammonia as N	MG/L	N/A	N/A	N/A	N/A	50	N/A
Alkalinity as C_aCO_3	MG/L	<10	66.7	10	63.5	85	<59
Chloride	MG/L	N/A	N/A	N/A	N/A	100	N/A
Fluoride	MG/L	N/A	N/A	N/A	N/A	1	N/A
Nitrate as N	MG/L	N/A	N/A	N/A	N/A	10	N/A
Sulfate as SO_4	MG/L	N/A	N/A	N/A	N/A	30	N/A
Phosphate as PO_4	MG/L	N/A	N/A	N/A	N/A	10	N/A
Silica as S_iO_2	MG/L	<1.5	15	1.5	9.53	50	<10
pH	pH Units	5 to 8	7 to 8.5	5 to 8	6	7.2	6 to 9
Total Dissolved Solids	MG/L	<15	150	15	95.25	500	<98
Turbidity	NTU	<1	10	1	6.35	15	<6.22
Total Suspended Solids	MG/L	N/A	N/A	N/A	N/A	15	N/A
Total Organic Carbon	MG/L	N/A	N/A	N/A	N/A	50	N/A
Biological Oxygen Demand	MG/L	N/A	N/A	N/A	N/A	12	N/A
Chemical Oxygen Demand	MG/L	N/A	N/A	N/A	N/A	5	N/A
Residual Chlorine	MG/L	N/A	N/A	N/A	N/A	5	<0.2

Note: 1.Parameter values prepared by Sargent & Lundy dated November 3, 2005.
2. RO quality obtained from BWS' specifications.
3. "N/A" in the table means that the concentration in the RO.

Source: Tom Nance Water Resource Engineering, Inc., 2005. Table 3.

The dominant component, brine effluent from the first and second pass RO units, would have a salt concentration about 2.35 times higher than seawater. However, since there are no present or anticipated uses of the lower confined aquifer as a source of supply, the hypersaline discharge into it should have no adverse impact on the aquifer's use for disposal. The hypersaline water would eventually discharge into the marine environment at an unknown distance and depth offshore. However, its salinity level would be mixed to background (seawater) levels while moving through the confined aquifer before it enters the ocean.

Figure 4.10. Single-Unit Water Balance Diagram with Saline Groundwater Supply Source



Source: Tom Nance Water Resource Engineering after Sargent & Lundy, 2005.

Table 4.32. Supply and Wastewater Quality: Saline Groundwater Supply Source

Parameter	*Units*	*Ground-water Supply*	*In-Plant Wastewater Streams*				*Discharge to the Disposal Well*
			Evap. Cooler Blowdown	*Plant Drains*	*RO Brine Effluent*	*Domestic Waste-water*	
Flowrate	GPM	765	3	5	486	1	495
Calcium	MG/L	410	77	7.8	960	25	945
Magnesium	MG/L	1,290	240	24	3030	15	2975
Sodium	MG/L	10,400	1,950	190	24,400	85	23,970
Ammonia as N	MG/L	0.1	0.02	0.002	0.24	50	0.34
Alkalinity as C_aCO_3	MG/L	200	38	3.8	470	85	460
Chloride	MG/L	19,000	3,560	360	44,600	100	43,810
Fluoride	MG/L	0.5	0.08	0.008	1.2	1	1.2
Nitrate as N	MG/L	0.5	0.1	0.01	1.2	10	1.2
Sulfate as SO_4	MG/L	2,800	520	52	6,580	30	6,465
Phosphate as PO_4	MG/L	N/A	N/A	N/A	N/A	10	<.05
Silica as S_iO_2	MG/L	10	2.0	0.2	24	50	24
pH	pH Units	7.3	7.0 to 8.5	7.0 to 8.5	6.5	7.2	6.0 to 9.0
Total Dissolved Solids	MG/L	34,000	5,600	560	80,000	500	78,600
Turbidity	NTU	<1	0.2	0.02	2.3	15	<2
Total Suspended Solids	MG/L	<1	<1	0.4	2.3	15	2.3
Total Organic Carbon	MG/L	<0.5	0.1	0.01	1.2	50	1.3
Biological Oxygen Demand	MG/L	<5	1	0.1	<12	12	11.8
Chemical Oxygen Demand	MG/L	40	8	0.8	90	50	88
Residual Chlorine	MG/L	N/A	<0.2	N/A	0	5	<0.2

Note: 1. Modified from Sargent & Lundy dated November 2005 Plant Discharge Quality table.
2."N/A" means the concentration of the particular constituent is not known.

Source: Tom Nance Water Resource Engineering, Inc., 2005. Table 4

4.4.4.4.3 Potential Leaks or Spills of Fuels

The generating site is immediately adjacent to three existing LSFO storage tanks that HECO operates on the site and close to other petroleum storage tanks on the adjacent Chevron property. Two new oil fuel storage tanks will be constructed as part of the proposed project. As indicated in the project description, numerous design features will be used to minimize the chance of fuel escaping into the surrounding environment. These include such things as (*i*) containment walls and berms around the fuel storage tanks, *(ii)* impermeable membranes placed beneath fuel storage areas, (*iii*) containment pads beneath equipment and work areas where leaks or spills of fuel or other contaminants could occur, and (*iv*) an oil-water separator at the downstream end of that portion of the storm sewer system that receives rainwater runoff and wash-down water from fuel handling areas.

Federal (CFR 40 §110 and §112) and State (HAR, Title 11, Chapter 451) rules and regulations have been promulgated to prevent oil pollution and to create procedures regarding discovery and notification of oil releases. When it prepares detailed construction plans for the facility, HECO will prepare a Spill Prevention Control and Countermeasure (SPCC) plan addressing these measures. This plan will:

- Identify all areas and equipment with the potential for fuel or lube oil spills, leaks, or other releases;
- For each identified potential release point:
  - describe the containment system,
  - identify possible spill routes,
  - describe contingency actions and special precautionary measures HECO would take, and
  - establish procedures to maximize compliance with Federal and State rules and regulations.
- Describe prevention and control procedures, including maintenance, monitoring, personnel training, and regular inspections and testing; and
- Identify spill response and notification procedures.

The system described above, when operated in compliance with applicable rules and regulations, makes fuel leakage from the facility highly unlikely.

4.5 EXPOSURE TO NATURAL HAZARDS

4.5.1 INTRODUCTION

While they have been designed to all applicable code and are outside of defined hazard zones, the components of the proposed project (e.g., buildings, storage tanks, exhaust stacks, transmission poles, substation equipment, etc.) are vulnerable to natural hazards of sufficient magnitude. This section describes the potential consequences of seismic events and other natural disasters on the proposed facilities. The discussion excludes existing facilities such as the fuel storage tanks at the BPTF, which would continue to be used in their present manner, and activities at the Chevron and Tesoro refineries related to the production of the fuel that would be used. The latter are part of ongoing operations at those locations, and HECO does not anticipate the refineries will make significant changes to process the fuels destined for the new generating station.

4.5.2 FLOOD, STORM WAVE, AND TSUNAMI HAZARD

As discussed in Section 3.5 and shown on Figure 3.6, all of the generating, substation, and transmission components of the proposed project are outside the coastal high hazard area identified in the FIRM maps and none are within the Special Flood Hazard Area. Hence, constructing the facilities as proposed will not increase the electrical system's exposure to these risks. There is no difference between the various alternatives in this regard.

4.5.3 SEISMIC HAZARDS

All the structures planned as part of the project will conform to Seismic Zone 2a Building Standards, the level recommended by the U. S. Geological Survey. Hence, construction and operation of the proposed facilities will not increase the risk of damage to the electrical system as a result of seismic activity. There is no difference between the various alternatives in this regard.

4.5.4 HURRICANE AND HIGH WIND HAZARDS

In 1966, Hawaii's PUC adopted General Order No.6 - Rules for Overhead Electric Line Construction (GO-6) based on California's GO-95. GO-6 specified a "Light Loading" condition applied to facilities where the elevation above sea level is 6,250 feet or less. It called for designs to be based on a horizontal wind pressure of 8 pounds per square foot (which translates into 56 miles per hour) on cylindrical surfaces and 13 pounds per square foot (71 mph) on flat surfaces. In 1972, HECO's Engineering Department adopted portions of the National Electrical Safety Code (NESC) for use in HECO's design criteria for transmission lines; under this system, O‘ahu was classified as a "Light Loading District" and the design horizontal wind pressure was set at 9 pounds/square foot (60 mph).

On November 23, 1982, the islands of O‘ahu, Kaua‘i, and Ni‘ihau were exposed to Hurricane Iwa. The center of the hurricane did not pass through O‘ahu, and the maximum sustained wind speed of 46 mph and the peak gust of 81 mph recorded at 6:55 PM at Honolulu International Airport were below hurricane levels. Nonetheless, HECO's system experienced severe service interruptions. On September 11, 1992, Hurricane Iniki made landfall on the south shore of the Island of Kaua‘i, causing more than $60 million damage to that island's electrical transmission and distribution system, but Iniki did not result in hurricane wind speeds on O‘ahu. During the aftermath of Hurricane Iniki, a team from the Wind Engineering Research Council surveyed the damage on Kaua‘i and published a preliminary report (Chiu, et al., 1995). One of their findings suggested that electric utilities re-evaluate their wind design philosophy, increasing the robustness of the transmission and distribution system.

Following the experience with these two storms, HECO increased the wind speed used in its design criteria for overhead transmission lines.

- After Hurricane Iwa, it adopted a design wind speed of 80 mph for all major 138 kV overhead lines except in areas where wind channeling occurs as the wind passed over ridges and through valleys. In areas subject to those effects a 100 to 125 mph design wind speed was used.
- HECO revisited the wind speed issue after Hurricane Iniki. The primary focus of the wind speed discussion was whether 80 mph was sufficient for design if an "Iniki-type" storm passed through the transmission system. Further investigation revealed that the American Society of Civil Engineers (ASCE-7) Minimum Design Loads for Buildings and Other Structures, which is the reference standard of the International Building Code 2003 (IBC) methodology, would provide a better method of determining design wind pressures. Hence, HECO adopted the 100 mph wind design criteria for its Waiau-CIP transmission lines.

Chock, et al. (2003) conducted the most recent evaluation of wind speeds appropriate for use in structural design on O'ahu. They concluded that Monte-Carlo simulations have found that the UBC criteria probably underestimate the basic wind speed by approximately 10 mph, and suggest that a 105 mph 3-second peak gust for O'ahu be used for design in accordance with the ASCE-7 as the starting point for design. They place the Tank Farm site in Exposure Category A (the lowest wind speed area) with inland portions of the proposed transmission line extending into an area that they have rated as Exposure Category B. Based on this, HECO is designing the facilities on the generating station and AES Substation sites and the transmission circuit using a wind speed of 120 mph 3-second peak gusts. Use of these design criteria will make the proposed new facilities among the most robust on the island with respect to their ability to withstand pressures generated by high winds.

4.6 IMPACTS ON BIOTA

4.6.1 PROJECT COMPONENTS ABLE TO IMPACT FLORA AND FAUNA

The principal means through which the proposed project could affect terrestrial flora and fauna is through ground clearance and the erection of new structures. These would either occur, or be initiated during the construction phase. Factors related to the ongoing operation of the facilities (e.g., noise, wastewater discharges, vehicular traffic, and other emissions associated with the ongoing operation of the facilities) are so limited that they do not have the potential to cause significant effects of this nature.

In general, the BPTF and the transmission corridor (where the only ground-disturbing activities will occur) are located in areas that have been highly disturbed by industrial development and past agricultural use. As explained in Chapter 3, the biological survey conducted for the project indicates that sensitive biota does not inhabit any of the areas that would be directly affected by any aspect of the project (generation, substation, or transmission). Consequently, the discussion does not attempt to differentiate between the different alternatives.

4.6.2 IMPACTS ON FLORA

The results of the botanical survey described in Section 3.6.1 indicate there are no special concerns related to botanical resources on the several properties and alternative transmission routes considered. One plant species of special interest was observed, but this species is not a listed (threatened or endangered) species, although its rarity suggests it could be considered for listing in the future.

The three specimens of this rare Naio variety are all located along the HPOWER fence towards the far western end of the 44-foot right-of-way parcel (opposite the middle of the three existing fuel oil storage tanks on the BPTF site). No new facilities are proposed for this area, and it would not be disturbed as part of the proposed action.

Construction of the proposed project does not have the potential to affect the area where the Naio plants are located directly. However, regular maintenance activities within HECO's Barbers Point Tank Farm Site include regular spraying with herbicides to suppress the fire hazard posed by too

much dry vegetation. In order to avoid harming the existing Naio plants while still performing needed vegetation maintenance, HECO will limit its herbicide spraying to the northern third (15 feet) of the 44-foot right-of-way in this area. ~~Consequently, HECO will investigate the adoption of special maintenance procedures in this area that restrict the spread of the Naio but do not harm the existing plants.~~

4.6.3 IMPACTS ON TERRESTRIAL FAUNA

The surveys conducted for this project ~~indicate that no avian or mammalian species currently listed or proposed for listing as endangered, threatened, proposed, under either federal or State of Hawai'i endangered species statutes are present in the area that would be affected by any of the alternatives under consideration~~concluded that the birds and mammals present in the project area are for the most part common and introduced species. The exceptions were the Hawaiian Duck and Black-Necked Stilt, both of which are listed as endangered under federal and State endangered species laws (see Section 3.6.2 and Section 3.6.3). Because the area be affected by the project does not contain habitat that is important for either of these listed avian species, the project is not expected to negatively affect them. Similarly, because project-related activities are limited to areas that are already highly disturbed and do not support substantial number of organisms, it does not have the potential to substantially alter the area's ecology. ~~There is nothing unique about the habitat present in the project area, and none of the habitat is important habitat for any listed avian species currently known from the Island of O'ahu.~~

4.6.4 POTENTIAL IMPACTS ON AQUATIC BIOTA

The construction and operation of electrical power generating facilities and associated equipment, as well as the construction of certain types of electrical transmission facilities, involve activities that, under certain circumstances, have the potential to affect aquatic biota. These include: 1) direct disturbance or displacement of aquatic habitat during construction; 2) construction-generated storm water runoff entering aquatic habitats; and 3) the release of airborne pollutants generated during operation of the generating units that could be transported via wind and eventually settle upon aquatic habitats. For reasons discussed below, such effects are unlikely to occur as a result of any of the alternatives under consideration.

As discussed in Chapter 3, there are no sensitive aquatic habitats nearby, and the Pacific Ocean is approximately one-half mile from the nearest facility that would be constructed as part of the proposed project. There is no surface runoff pathway that would allow material from the site or from project-related activities to enter any aquatic site. Because of the absence of nearby aquatic habitats, construction of the 138 kV transmission line has no potential for negative effects on aquatic biota. Further, normal operation of the transmission lines will not generate airborne pollutants or runoff that could significantly impact aquatic habitats or biota.

HECO will implement best management practices (BMPs) during the construction period to prevent polluted storm water runoff from leaving the site and affecting surrounding areas. HECO will also implement control measures during the operational period to control runoff and airborne pollutants. Consequently, there is no potential for the proposed project to affect aquatic biota adversely.

Some community members have expressed a concern over effects that they believe air emissions from the proposed facilities could have on marine resources. While the results of the air quality impact analyses that have been conducted indicate that these are unlikely, HECO has agreed to establish an air quality monitoring station makai of the project site so that pollutant concentrations in that area can be measured as well as modeled. Should the data that is collected from this station indicate that the effects differ substantially from those that are predicted, HECO will undertake additional studies to determine the reasons for the differences and, if necessary, undertake corrective action.

4.7 NOISE IMPACTS

4.7.1 INTRODUCTION

Operation of the substation and transmission equipment produces relatively little noise. Similarly, the low volume of vehicle-traffic that would result from the proposed project does not have the potential to generate significant amounts of vehicular noise. On the other hand, construction activities and operation of the generating units and ancillary facilities proposed for the Barbers Point Tank Farm site do have the potential to affect noise levels, and the anticipated magnitude of these is discussed below, with particular reference to the project's compliance with applicable noise standards.

The discussion is divided into four main parts.

- Section 4.7.2 summarizes applicable noise standards. It also defines two key terms used in the analysis.
- Section 4.7.3 describes existing noise sources and noise levels.
- Section 4.7.4 describes the effects that operation of the proposed facilities would have on noise levels.
- Section 4.7.5 describes construction-related noise.

4.7.2 APPLICABLE NOISE STANDARDS

Hawaii Administrative Rules (HAR) Title 11, Chapter 46, Section 4 (§11-46-4) defines the maximum permissible community sound levels in dBA. These differ according to the kind of land uses that are involved (as defined by zoning districts) and time of day (daytime or nighttime). They are as shown in Table 4.11-1. Definitions of two technical terms used in this discussion are as follows:

- A-Weighted Sound Level (dBA). The sound level, in decibels, read from a standard sound-level meter using the "A-weighting network". The human ear is not equally sensitive in all octave bands. The A-weighting network discriminates against the lower frequencies according to a relationship approximating the auditory sensitivity of the human ear at moderate sound levels.
- Decibel (dB). This is the unit that is used to measure the volume of a sound.[81] The decibel scale is logarithmic, which means that the combined sound level of 10 sources, each producing 70 dB will be 80 dB, not 700 dB. It also means that reducing the sound level from 100 dB to 97 dB requires a 50 percent reduction in the sound energy, not a 3 percent reduction. Perceptually, a source that is 10 dB louder than another source sounds about twice as loud. Most people find it difficult to perceive a change of less than 3 dB.

The maximum permissible sound levels specified in HAR §11-46-4(b) apply to any excessive noise source emanating within the specified zoning district, and at any point at or beyond the property line of the premises in a manner deemed appropriate by the Director of the State Department of Health (SDOH). The entire project area is on Class C land (the least restrictive category) and is zoned for general industrial use, with the exception of a portion of the transmission corridor which is zoned for agricultural use (also a Class C category).

[81] The sound pressure level in decibels is equal to twenty times the logarithm to the base ten of the ratio of the pressure of the sound measured to a reference pressure of 20 micropascals, or 0.0002 dynes per square centimeter.

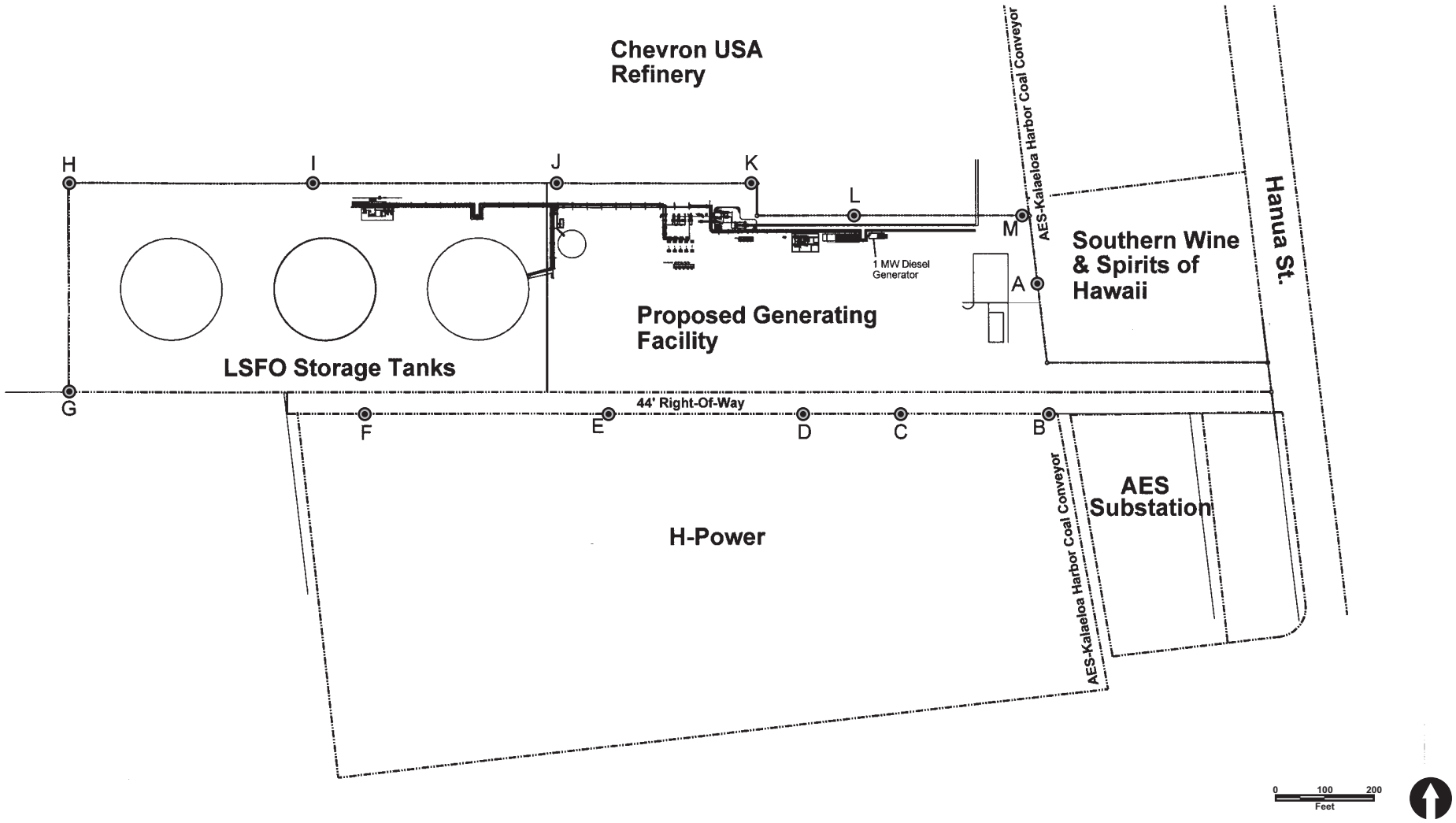
Table 4.33. Hawaii Administrative Rules §11-46 Noise Limits.

Zoning District	*Noise Limit (in dBA)*	
	Daytime (7:00 a.m. to 10:00 p.m.)	***Nighttime (10:00 p.m. to 7:00 a.m.)***
Class A: Areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type	55	45
Class B: All areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C: All areas equivalent to lands zoned agriculture, country, industrial, or similar type.	70	70

4.7.3 EXISTING NOISE SOURCES AND BACKGROUND NOISE LEVELS

Existing noise levels at the BPTF site were measured by Y. Ebisu & Associates in September 2005. Noise measurements were taken in the daytime and the evening at locations "A" through "M" as depicted on Figure 4.11; the results of the A-Weighted noise measurements are presented in Appendix A and summarized below.

- The measurements show that the existing equipment on the BPTF site generates relatively little noise during normal operations. This applies to the pumps, heaters, and other equipment that are part of the Waiau Fuel pipeline facilities, as well to the existing LSFO fuel storage tanks that occupy the *makai* half of the parcel.
- The Waiau fuel pipeline's 1.0 MW diesel-powered emergency generator is by far the noisiest piece of equipment now located on the site. Located near the northern boundary of the BPTF parcel (see Location "L" on Figure 4.11), it is approximately 250 feet from the eastern boundary of HECO's property, but is much closer to the northern boundary parcel boundary separating HECO and Chevron property. Measured noise levels from this emergency generator, which operates only when normal power is not available or during relatively short monthly tests, ranges from 78.4 to 87.2 dBA at 50 feet. At its maximum during the measurement period, the generator registered 84.5 dBA at the north property line.
- The coal conveyor adjacent to the eastern property boundary of the BPTF produces relatively high noise levels on the BPTF site when it is in operation. Measurements at 7 to 50 feet distances made when the conveyor was operating during the morning of September 6, 2005, showed noise levels ranging from 83.7 dBA at Location "A" to 74.5 dBA 50 feet west of the conveyor. The noise from the coal conveyor also controlled background noise levels at Locations "B" and "C" on September 9, 2005.
- During periods when the coal conveyor and diesel engine generator are not operating, the major noise source audible on the BPTF site is the metal shredder at the HPOWER facility, located approximately 75 feet southwest of Location "E" as shown on Figure 4.11. Noise levels from the metal shredder were impulsive, with maximum noise levels at Location "E" of 92 to 97 dBA and average noise levels of 76 to 78 dBA.



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Y. Ebisu & Associates;
YEA #43.032

Legend:

Noise Measurement Location

Figure 4.11:

Location of Noise Measurements Taken at BPTF

CIP Generating Station &
Transmission Additions Project

Figure 4-11 Location of Noise Measurements Taken at BPTF 2005-12-20.cdr

In summary, existing noise levels along the future southern boundary of the generating station site exceed 70 dBA at Location "E" during operation of the HPOWER metal shredder, and exceed 70 dBA at Location "B" during operation of the coal conveyor. Along the east property boundary, existing noise levels exceed 70 dBA during operation of the coal conveyor. Along the north boundary, existing noise levels exceed 70 dBA in the vicinity of Location "L" during operation of the emergency diesel generator.

4.7.4 NOISE IMPACTS OF THE PROPOSED GENERATING UNITS

4.7.4.1 Assumed Generating Equipment Noise Levels

Y. Ebisu & Associates (October 18, 2005) developed average (or Leq) noise contours for the future generating plant equipment using measured noise data from recently installed new combustion turbine generators operating on the Big Island of Hawai'i, which were scaled upward to estimate the noise from the future equipment at the BPTF site (see Table 4.34). For Alternative 2, the analysis assumed that a single 110 MW combustion turbine generator would be operating at the location shown in Figure 4.12. For the Alternative 1 scenario, it was assumed that two identical, 110 MW combustion turbine generators would be operating at the locations shown in Figure 4.13. The far field, source noise modeling assumptions used to develop the noise contours for Phase I were as follows, with identical equipment assumed for the second generating set in Phase 2:

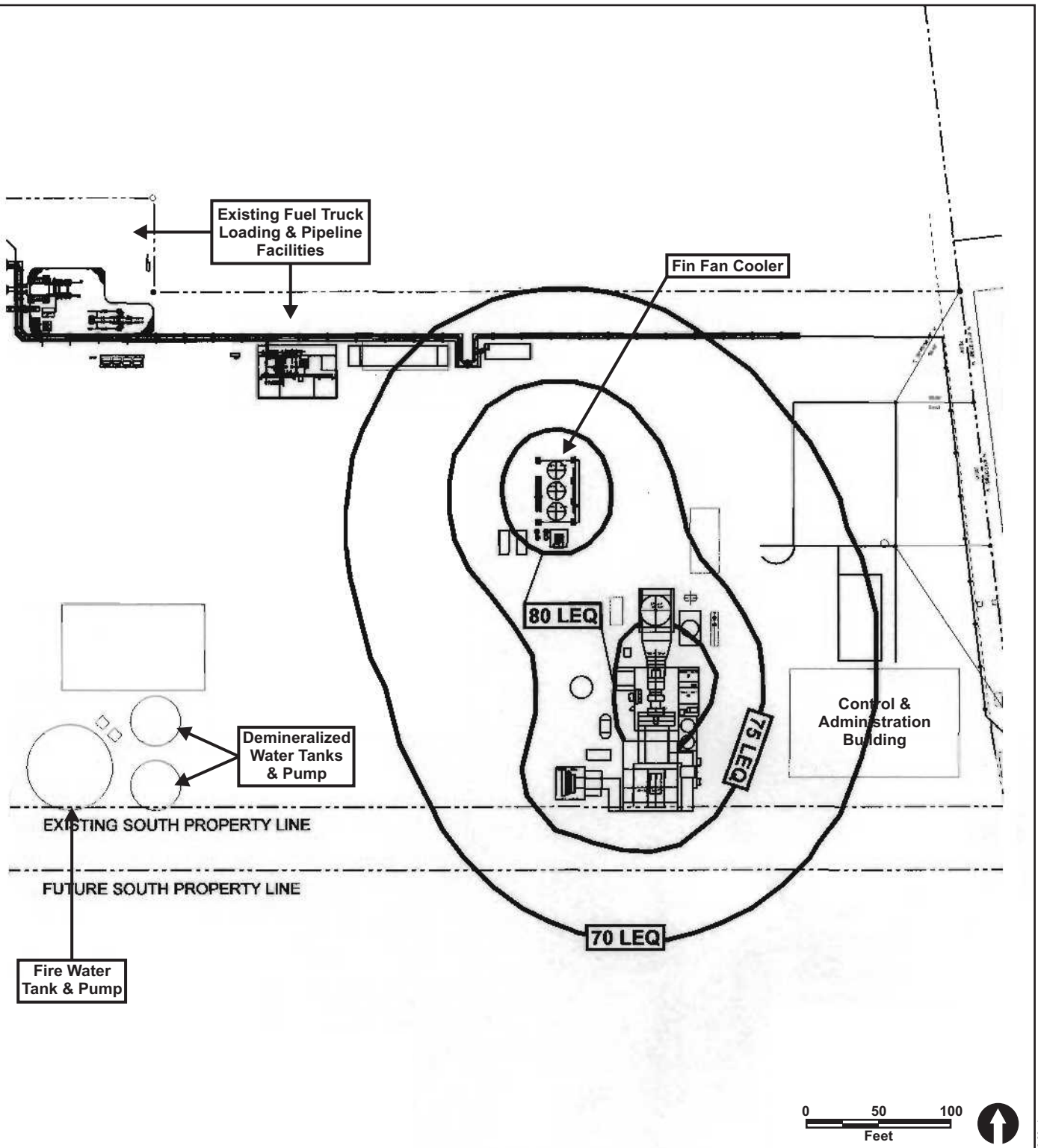
Table 4.34. Equipment Noise Levels.

Equipment Item	*Noise Level (in dBA)*
Step-Up Transformer	53 dBA
Fuel Pump Skid	47 dBA
Water Injection Skid	52 dBA
Fin Fan Cooler	62 dBA
Combustion Turbine Stack	62 dBA
Combustion Turbine Housing and Inlet	61 dBA
Note: All estimates are at a distance of 300 feet from the noise source. Noise levels are estimated using measured noise data from combustion turbine generators operating on the Island of Hawai'i, which were scaled upward to estimate the noise from the future equipment at the BPTF site.	
Source: Y. Ebisu & Associates (October 10, 2005)	

4.7.4.2 Anticipated Power Generation Noise Impacts

The resulting noise contours for the one CT (Alternatives 2& 3) and two CT (Alternative 1) scenarios are shown in Figure 4.12 & Figure 4.13. The analysis did not take into account any sound attenuation measures or noise shielding effects from structures. For Alternative 1, it was concluded that noise levels from the generating station could exceed 70 dBA along both the north and future south boundary lines. For Alternatives 2 and 3 (both of which have only a single CT), it was concluded that noise levels from the generating station could exceed 70 dBA along the future south boundary line. For all the Alternatives, it was concluded that the noise levels from the generating station should not exceed 70dBA along the east boundary line.

The adjoining land areas where the noise levels from the generating station could exceed 70 dBA are not considered to be noise sensitive, or areas where noise levels of 70 to 75 dBA would interfere with current activities. To the south are HPOWER refuse vehicle circulation driveways and open space, and to the north are Chevron fuel storage tanks. The 70 dBA contour would not cross the eastern boundary into the Southern Wine & Spirits of Hawai'i property. Hence, noise from the AES Barbers Point coal conveyor would continue to control peak noise levels there.



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Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Y. Ebisu & Associates
YEA #43.032

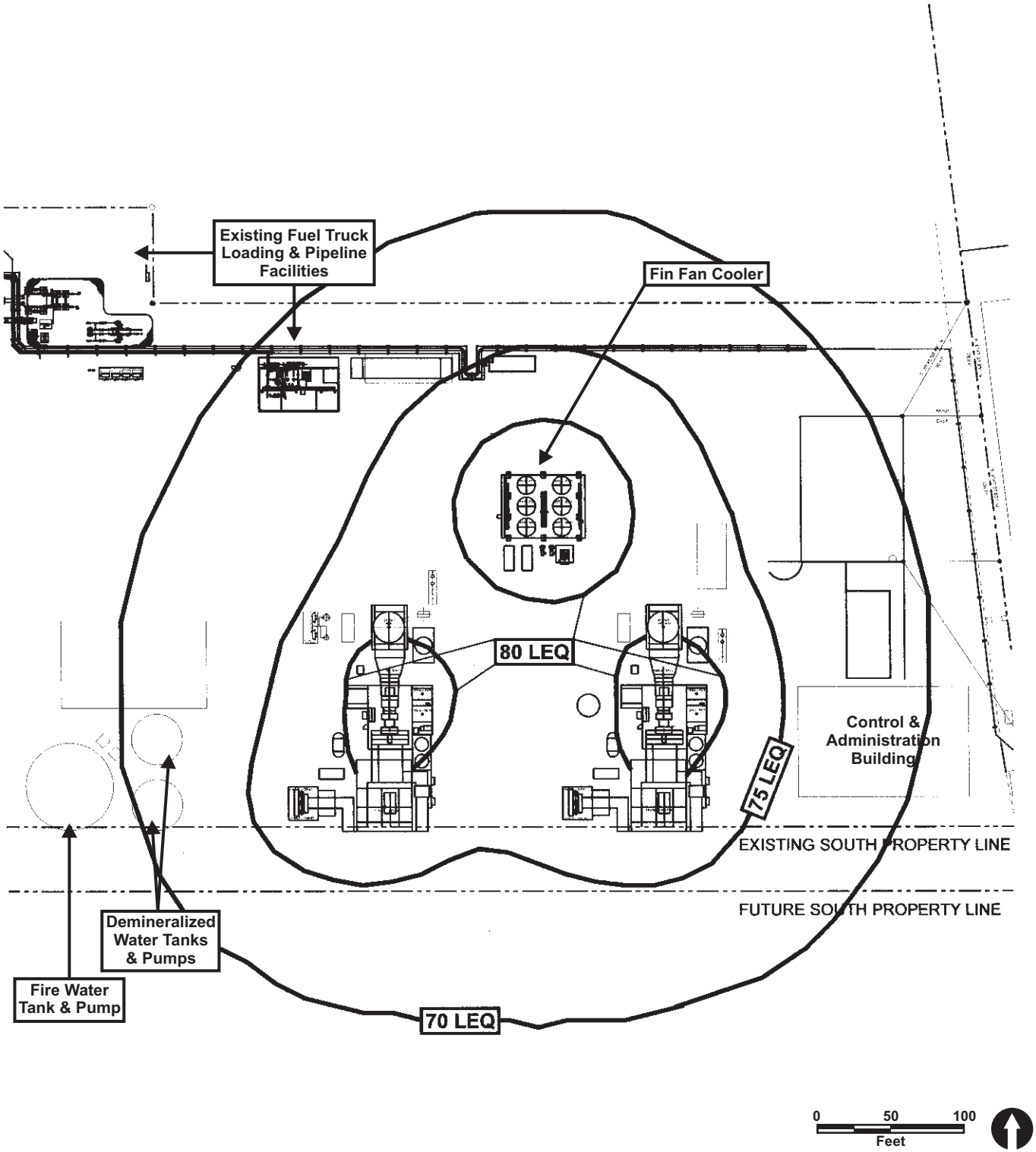
Legend:

Figure 4.12:

Maximum A-Weighted Noise Contours for a Single CT

CIP Generating Station & Transmission Additions Project

Figure 4-12 Predicted Noise Level from Single Generator 2005-12-20.cdr



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Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Y. Ebisu & Associates
YEA #43.032

Figure 4.13:

Maximum A-Weighted Noise Contours for Two CTs

CIP Generating Station & Transmission Additions Project

Figure 4-13 Predicted Noise Level from Dual Generator 2005-12-20.cdr

In summary, risks of adverse noise impacts from the proposed generating station are considered to be low. The future noise levels from the generating station equipment may exceed the 70 dBA State DOH limit if equipment noise evaluation and possible quieting are not employed prior to installation, but risks of activity interference or annoyance at the adjoining properties are low. The future risks of activity interference or annoyance are similar to the current situation, where property line noise levels periodically exceed 80 dBA during operation of HECO's emergency diesel generator, the AES coal conveyor, and the HPOWER metal shredder.

4.7.4.3 Noise Mitigation Measures

While existing property line noise levels already exceed 70 dBA at certain times, largely as a result of noise produced by activities on neighboring parcels, containment of the 70 dBA noise contour within the generating station's property boundaries should remain a goal of the proposed generating station installation.

Actual far field noise data on the plant equipment was not available from the equipment vendors at the time the analysis was prepared. Hence, it is possible that the actual noise levels that will be experienced will differ from those shown in Figure 4.12 and Figure 4.13. In order to ensure that no unanticipated effects occur, far field equipment noise data will be obtained from the equipment vendors prior to installation and conditions re-analyzed with the final noise source levels. Final equipment selection will take into consideration compliance with HAR 11-46.

4.7.5 CONSTRUCTION NOISE

Installation of the new transmission lines and generating equipment at the BPTF will involve the use of excavators, trucks, and other heavy equipment. Installation of the water line needed to allow RO water from the Honouliuli Wastewater Plant to be transmitted to the Kahe Generating Station so that the use of potable water for industrial purposes that now occurs there can be discontinued will entail similar construction activities. Some of the construction equipment and activities are inherently noisy. Earthmoving equipment, *e.g.*, bulldozers and diesel-powered trucks, would probably be the loudest equipment used during construction. In cases where construction noise exceeds, or is expected to exceed, the SDOH's "maximum permissible" property line noise levels, a permit must be obtained from the SDOH to allow the operation of construction equipment, power tools, etc., which emit noise levels in excess of "maximum permissible" levels. Specific permit restrictions for construction activities are:

- No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels...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...before 9:00 a.m. and after 6:00 p.m. on Saturday.
- No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays.

In addition, construction equipment and on-site vehicles or devices whose operations involve the exhausting of gas or air, excluding pile hammers and pneumatic hand tools weighing less than 15 pounds, must be equipped with mufflers.

4.8 IMPACTS ON ARCHAEOLOGICAL, HISTORIC, & CULTURAL RESOURCES

4.8.1 INTRODUCTION

Construction of the generation, electrical power transmission, and other facilities has the potential to affect historic and archaeological resources directly if it physically disturbs remains at or near the ground surface. Indirect impacts are possible if construction or operation of the facilities entails noise or other emissions that adversely affect the ambience of remains or the context within which they are seen or used. Similarly, direct effects on cultural resources could occur if cultural uses of an area are displaced or disturbed by the proposed facilities.

In order to evaluate the potential for adverse effects on archaeological remains, International Archaeological Research Institute, Inc. (IARII) conducted an archaeological assessment of the areas that would be directly impacted by the proposed generating station and transmission additions (IARII October 2005). The archaeological assessment involved: a) a review of historical records and archaeological reports; b) preparation of a summary of the project context in terms of physical setting, cultural and historical setting, and archaeological setting; and c) a field survey of the project area. Given the disturbance of much of the project area during former sugarcane plantation activities and recent industrial developments, cultural materials (e.g., artifacts and midden) were not expected. A surface survey was conducted in recognition of the slight possibility that cultural materials could be present in disturbed context on the surface, perhaps indicating the potential for disturbed or truncated subsurface cultural deposits in the vicinity. The archaeological assessment did not include extensive subsurface testing.

The potential for adverse cultural effects was assessed through a review of available literature, including the results of interviews with individuals conducted for other projects in the area, and project-specific interviews with two individuals knowledgeable with the area. These individuals had been identified by the Office of Hawaiian Affairs and others as good sources of information.

4.8.2 POTENTIAL IMPACTS TO HISTORIC AND ARCHAEOLOGICAL RESOURCES

4.8.2.1 Background

All of the area on which power generation and substation facilities would be constructed has been disturbed by modern industrial developments, and sugarcane plantation activities affected virtually all of the area through which the proposed transmission line would run. The eastern portion of the water line that HECO proposes to construct to allow RO water from the Honouliuli Wastewater Treatment Plant to be used in lieu of potable water for industrial purposes at the Kahe Generating Station also passes through this previously disturbed area (see photos in Figure 4.14).

4.8.2.2 Effects on Archaeological Resources and Proposed Mitigation Measures

The surface inspection carried out by IARII within Campbell Industrial Park did not reveal any surface archaeological materials in primary (in situ) or secondary (disturbed) context. The ground surface consisted almost entirely of exposed coral that had been disturbed. A few scattered pits (from abandoned fence posts and utility poles) revealed only a hard coral substrate. Thus, the survey concluded that no further archaeological investigation is needed for resource identification in the project area (IARII 2005). This is consistent with the experience of other projects in the Industrial Park. Similarly, as explained in Section 3.9, previous archaeological studies conducted in areas through which the proposed water line to the Kahe Generating Station would run show that it would not disturb known sites.

Example of disturbed coral ground.

Area of recent industrial development at Barbers Point Tank Farm.

Portion of existing coal-conveyor, beside proposed utility corridor in area of massively disturbed coral ground.

Disturbed coral terrain.

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Prepared By:

PLANNING SOLUTIONS

Source:

International Archaeological Research Institute, Inc.

Figure 4.14:

Photographs of Project Terrain Area

CIP Generating Station & Transmission Additions Project

Figures 4-14 Photographs of Project Area Terrain 2005-12-20.cdr

The information available from all of the studies indicates that the probability of encountering subsurface remains is relatively low. However, it does not eliminate the potential entirely. Remains appear most likely to be encountered in the area traversed by the pipeline segment closest to Kahe Point. One isolated burial has been reported in that area, although it was north of the furthest extent of the proposed new water line. Based on the experience to date, burials and prehistoric cultural deposits may be present where sand or alluvial layers occur under fill deposits. In addition, isolated burials could be found in beach sands not associated with prehistoric/historic settlement. It is not possible to predict the exact location of the finds. However, the characteristics of the stratigraphy and the nature of the strata present, within particular trenches, will key the archaeologist to the potential findings.

In order to minimize the potential for construction of the water pipeline to affect subsurface archaeological remains or burials, HECO proposes the mitigation measures described below. These measures are modeled after those used for previous water pipeline construction along the Wai‘anae Coast.

- Contracting for Archaeological Monitoring of Construction. Prior to commencing construction HECO will contract with a qualified archaeologist for on-site/on-call monitoring of construction work. HECO's construction contract will make the contractor responsible for halting work and reporting any archaeological or cultural materials encountered to the archaeological monitor. The monitoring contract will provide for on-site monitoring in the vicinity of Kahe Point and ~~on-call~~ periodic spot-checking~~monitoring~~ of all other areas. The proposed program of archaeological monitoring will be conducted in accordance with Chapter 279: Rules Governing Minimal Standards for Archaeological Monitoring Studies and Reports; Hawai‘i Administrative Rules; Title 13, Department of Land and Natural Resources; Subtitle 13, State Historic Preservation Division (adopted December 2003). The proposed monitoring plan will be submitted to the SHPD for review and approval prior to beginning work, unless otherwise agreed to by the SHPD.
- Pre-Construction Conference. Before work commences on the project, the consulting archaeologist will meet with the construction supervisors and all regular members of the construction crew to explain to them what kinds of cultural or archaeological materials might be encountered and the procedures they are to follow in the event they are uncovered during the course of construction. The archaeologist will also explain his/her role and that the monitoring archaeologist will have the authority to halt construction in the immediate area of any find.
- Treatment of Finds: SHPD's mandated scope of work for an archaeological monitoring program includes the documentation of historic properties encountered by the excavation associated with the water pipeline project. If cultural deposits are discovered during monitoring, appropriate data will be collected. This would include recording their geographic location on project area maps, general written descriptions, sampling, and section drawings, plan views, and photographs as appropriate. For traditional Hawaiian deposits, this may include analysis of recovered artifacts and midden and possible radiocarbon dating of samples from cultural contexts. If historic deposits are located (e.g. older than 50 years) then analysis of associated historic artifacts may be required. If any findings are deemed significant, and if the deposit is likely to be further impacted by construction activities, the archaeologist will halt work in the immediate affected area and will develop an appropriate mitigation strategy in consultation with SHPD. All cultural and historic remains other than burials will be treated in accordance with the current requirements and specifications contained in the SHPD Hawai‘i Administrative Rules (HAR) §13-280 (Rules Governing General Procedures for Inadvertent Discoveries of Historic Properties During a Project Covered by the Historic Preservation Review Process; effective December 11, 2003).

  Any human skeletal remains would be treated in accordance with the current requirements and specifications contained in the SHPD Hawai‘i Administrative Rules (HAR) §13-300:40 (Rules of Practice and Procedure Relating to Burial Sites and Human Remains: Inadvertent discovery of human remains; effective September 1996), and HRS 6E-43.6.

In the event that burials are encountered during the course of construction of the generation, electrical power transmission, and other associated facilities, HECO will also adhere to the laws cited above relating to the inadvertent discovery of human remains

4.8.2.3 Effects on Historic Sites

The only known historic property in the project area is the OR&L railroad line, which runs just north of the CEIP Substation. The activities planned at the substation are limited to minor equipment modifications within the existing substation site; these will not involve significant construction activity or substantial changes in the appearance of the facility. The RO water line from Honouliuli WWTP to the Kahe Generating Station will be constructed mostly within the railroad right-of-way. While the line's exact location within the right-of-way has not yet been set, HECO intends to minimize disruption to the railroad's use whenever possible. Once construction is completed, the buried RO line will have no impact on use of the right-of-way except in the unlikely event that it requires repairs that involve re-excavation of part or all of it.

4.8.3 EFFECT ON TRADITIONAL HAWAIIAN CULTURAL RESOURCES AND PRACTICES

The proposed action was also evaluated to determine the extent to which it might adversely affect traditional cultural practices. The evaluation included consideration of information included in previous reports of the area and interviews with two *kupuna* with knowledge of the project area. They are Mr. Shad Kane and Ms. Nettie Tiffany. Both individuals have been identified as knowledgeable about the cultural history of the area in previous studies of the region, and the Office of Hawaiian Affairs and others have identified both as excellent sources of information.

As discussed elsewhere in this report, the proposed generating units, electrical transmission line, and electrical substation improvements are located in an area which the archaeological record indicates was never permanently inhabited. However, the project area probably provided temporary habitation for gatherers and fisherman traveling to and from the coast. It also was almost certainly used for bird catching, and the people engaged in this work probably built temporary habitation structures in the area to support their work. Planters could have also used the natural limestone sinks for agriculture, though it would have been seasonal and on a small scale.

Discussions of specific aspects of traditional Hawaiian culture as they may relate to the project area are presented below. Information from *kupuna* and *kama'aina* interviews are incorporated where appropriate.

Gathering for Plant Resources. Plants were gathered, not only for the basic needs of food and clothing, but for tools, weapons, canoe-building, house construction, dyes, adornments, hula, medicinal and religious purposes. These resources were typically found and gathered at higher elevations than the present project area. There is no specific documentation of plant gathering during traditional Hawaiian times in areas on which the proposed facilities would be constructed, and no ongoing practices related to traditional gathering were identified in the present project area during the preparation of this assessment. None of the individuals contacted or interviewed for this assessment identified any native gathering practices within the project area. Hence, the proposed action is not expected adversely affect this use.

Marine Resources. The sea is a rich resource and the Hawaiian people were traditionally expert fishermen. Fish supplied the Hawaiian diet with a rich source of protein. The gathering of seaweed and salt was practiced by Hawaiian women. Fishing, *limu* collection, and other food gathering continues along the region's shoreline. None of the proposed facilities involve disturbance of shoreline areas, and they will not reduce the ability of persons to move between inland areas and coastal resources. Hence, none of the action alternatives have the potential to affect traditional Hawaiian practices adversely in this regard.

Burials. There are no known burials in areas that would be physically disturbed by the proposed project. None of the community contacts or interviewees are aware of any burials that would be

affected by the proposed project, though they could not discount the possibility that some might exist in unknown sinkholes.

Trails. As described in Chapter 3, trails connected the various settlements throughout the ‘Ewa District. All of the major trails passed inland of the generating station and transmission facilities. No clear remnant of these trails is known to exist, though it seems possible that there would have been a spur trail off of this main trail descending down to the sea near Kalaeloa approximating the route followed by modern Kalaeloa Boulevard. Construction of the proposed facilities does not have the potential to affect any of the traditional routes substantially.

Legendary Places. While Pu‘uokapolei and Honouliuli are associated with a number of Hawaiian traditions, these are well away from the proposed generating, substation, and transmission facilities that make up the various alternatives.

Interview with Ms. Nettie Tiffany. Dr. Charles Morgan of Planning Solutions, Inc. interviewed Ms. Nettie Tiffany (Auntie Nettie) during the morning of December 6, 2005. Ms. Tiffany, who is a member of the O‘ahu Island Burial Council, has lived at Lanikohonua (now within the Ko Olina resort complex) since her youth. The interview took place in Campbell Industrial Park so that it could be carried out while visiting the areas where the proposed generating and transmission facilities would be constructed. Mr. Alani Apio, an independent community consultant for Hawaiian Electric, also participated in the tour and joined in the conversations as necessary to clarify points and to request elaboration on specific subjects. Dr. Morgan provided a copy of maps and aerial photographs showing the relationship of the proposed facilities to surrounding areas. He also gave a brief verbal description of the facilities that would be constructed and the reasons they are needed.

Dr. Morgan asked Auntie Nettie about her concerns regarding the project and its potential for impacting the area and its resources. She noted that the HECO Tank Farm site selected for the generation facility seemed an appropriate location, since the area is already devoted to heavy industrial use and the site has already been heavily disturbed.

In response to Dr. Morgan’s questions, Auntie Nettie expressed her preference for the overhead options for the transmission line, rather than the underground option. Auntie noted several times that, though she knew of no specific sites of special concern in the area, it would be quite possible that the underground installation could disturb archaeological features and/or burials that cannot be seen from the surface. Her preference for the overhead options was based on the fact that the total footprint for the poles used in the overhead line would be far smaller than that of a trench—thus significantly reducing the potential impact on any sites that may exist along the route.

Interview with Mr. Shad Kane. Mr. Perry White of Planning Solutions, Inc., met with Mr. Shad Kane in the afternoon on December 6, 2005, and showed Mr. Kane the areas that would be affected by construction of the proposed facilities. Mr. Alani Apio joined in this meeting as well. They toured the same areas that Dr. Morgan had taken Auntie Nettie to in the morning, and Mr. White provided the same background information that Dr. Morgan had provided in the morning.

Mr. Kane was born in Honolulu in early 1945. He was raised on the Pearl City Peninsula and currently resides in Makakilo. Now retired from the Honolulu Police Department, he is active as a community leader and volunteer. His memberships in community organizations include: The Nature Conservancy, the ‘Ahahui Siwila Hawai‘i o Kapolei Hawaiian Civic Club, and the Makakilo/ Kapolei/Honokai Hale Neighborhood Board. Mr. Kane often hikes and goes horseback riding in the mountains above the project area. He is presently working on the establishment of a cultural center below Pu‘uokapolei.

After seeing the areas where project-related facilities would be constructed, Mr. Kane expressed the belief that the proposed facilities would not have an adverse effect on any aboveground archaeological or cultural remains of which he was aware. Neither did he think it would directly affect any traditional Hawaiian practices.

At the same time, Mr. Kane cautioned that there could well be archaeological remains, cultural artifacts, and burials beneath the surface. In particular, Mr. Kane called special attention to the many sinkholes that are present throughout the region, many of which have been filled and are now difficult to locate. He felt it was possible, though not likely, that excavation could uncover material not previously known to exist, and that it would be important to keep watch for these when excavation work is underway. The possibility that such remains might exist made Mr. Kane feel that the overhead transmission line option, which would involve far less excavation than would the underground line, is preferable.

Mr. Kane also noted that the underground movement of water was an important feature of this region. He said that when there is rain in the mountains it does not reach the ocean overland, but rather flows underground, causing sinkholes to fill with water as the water table rises. He said that this water movement made it important to pay attention to the control of pollutants, including those contained in wash water.

Based on the information presented in Section 3.9 of this report and the results of the interviews that were conducted for this analysis, there do not appear to be any known traditional Hawaiian cultural practices that would be adversely affected by the proposed project. Neither does it appear that activities or facilities associated with the proposed action conflict with traditional cultural values as expressed in legend.

The proposed facilities would be constructed in a region that is known to contain numerous sinkholes, some of which have been found to contain cultural remains and, in some cases, burials. While it is not expected that these will be encountered during construction of the proposed facilities, the possibility that this may occur cannot be completely ruled out.

Based on the above findings, the proposed project will not adversely affect rights customarily and traditionally exercised for subsistence, cultural and religious purposes. It will have minimal or no impact on Hawaiian culture, its practices and traditions.

4.9 VISUAL IMPACTS

4.9.1 INTRODUCTION

With the exception of the completely underground option for Alternative 4 (transmission line only), all of the alternatives involve the construction of above-ground facilities that would be visible from off-site. This section discusses the nature of the effect that these would have on views and the overall appearance of the area.

The visual impact assessment had several principal objectives. The most important were to:

- Identify the locations from which the proposed facilities would be visible.
- Determine the extent to which their presence would cause a significant change to the existing visual environment.
- Identify measures that could be taken to screen the facilities from view or otherwise mitigate potentially adverse effects.

In order to complete the visual impacts analysis, we:

- Drove and walked the surrounding area to identify vantage points from which the areas that would be occupied by generating and/or transmission facilities might be seen.
- Evaluated the nature of the view (near, middle, or far) and the circumstances in which the person seeing the facilities would find her or himself.
- Rated the potential for adverse effect from the different possible vantage points according to whether the combination of proximity to the proposed facilities and viewer sensitivity to visual intrusions made created a substantial potential for adverse visual effect.
- Documented the findings using digital renderings of the proposed facilities, overlaid on aerial photographs of the area.

4.9.2 SELECTED VANTAGE POINTS

4.9.2.1 Close Views/Appearance of ~~Generating~~ Proposed Facilities

4.9.2.1.1 Close Views of Generating Facilities

The proposed generating facilities at the Barbers Point Tank Farm site are set back approximately 600 feet from Hanua Street. Moreover, they would all be behind perimeter fencing and located in an industrialized zone. Once in operation, they would be directly visible from only a handful of locations:

- Passengers in vehicles traveling northbound on Hanua Street would have a brief view channel to the proposed facilities at Barbers Point Tank Farm. For the most part the view would be screened by existing landscaping and existing facilities within the AES Substation. However, the exhaust stack and, possibly, the tops of some of the taller structures on the site would be visible from a longer stretch of the roadway.
- Employees and drivers of trucks entering and leaving the HPOWER facility would have a brief view of the proposed facilities.
- Employees working doing maintenance work on the few facilities located on the extreme southeastern corner of the Chevron facility would be able to see the proposed facilities through the fence.
- Drivers of trucks accessing the cargo bays located on the southern side of the warehouse used by Southern Wine and Spirits would be able to see the top of the proposed control building over the fence and AES Coal conveyor belt that separates the two facilities. Because there are no windows

on the western side of that warehouse, the proposed generating facilities would not be visible from the building itself.

- Initially, people west of the Barbers Point Tank Farm on Kaomi Loop or on the shoreline may be able to see some of the equipment that would be installed through the narrow space between the existing large LSFO storage tanks on the Tank Farm site and existing structures on the HPOWER site. That possibility will almost certainly end when the industrially zoned parcels on either side of Kaomi Loop are built upon.

In view of the limited extent to which the proposed new generating facilities would be visible from close at hand, their construction and operation does not have the potential to affect close-up views. Consequently, no detailed visual impact assessment of them was conducted.

4.9.2.1.2 Close Views of Substation Facilities

The proposed equipment additions to the AES Substation would be visible from vehicles on Hanua Street. However, they would be virtually identical to the equipment that is already there and would not have a substantial effect on the appearance of the area from the street or from other nearby properties. This is particularly true in view of the enhanced landscaping that HECO would install and maintain along the Hanua Street side of the substation as part of the proposed project. The changes that would be made to the CEIP Substation are even more limited than those that would be made at the AES Substation. In view of the foregoing, no detailed visual impact assessment of the effects of proposed changes to the substations was conducted.

4.9.2.1.3 Close Views of Transmission Lines

The southern portion of the proposed transmission line alignment is through an existing heavy industrial facility (the Chevron Refinery), and across Malakole Road (which serves commercial traffic moving to and from Kalaeloa Harbor and is already crossed by the AES coal conveyor and the existing 138 kV transmission line). The remainder of the transmission corridor traverses~~, and through~~ a large ~~extent~~ expanse of vacant land that is planned for eventual commercial and industrial development as part of the Kapolei Harborside Center (KHC) project. Once this development occurs, ground-level views of the transmission lines from roads and sidewalks within the development will largely be obstructed by buildings. The buildings in the development could be up to 60 feet high if the area is re-zoned to I-2 Industrial as proposed in the EISPN for the project. HECO is working with the developer to ensure that the transmission alignment corresponds to the alignment of the natural drainageway that is planned.

The only potentially sensitive vantage points from which the transmission line would be visible are the OR&L railroad right-of-way and~~Just before reaching the CEIP Substation, a few hundred feet of the route passes~~ the eastern end of the golf course that is proposed as part of the Kapolei West Expansion Project. Because the transmission route runs nearly perpendicular to the OR&L right-of-way, only the first couple of poles will present a close-up view. The remainder of the alignment will be visible farther away, as shown in the rendering included as Figure 4.15, although as development of that area proceeds views of the more distant poles are likely to become partially to completely obscured from the railroad. In general, the several existing transmission and distribution lines running alongside of the right-of-way will be much more noticeable to railroad users than the proposed new line.

Figure 4.15. Photographic Simulation of Transmission Line from OR&L Right-of-Way.

Source: Sargent & Lundy (2006).

Some users of the planned Kapolei West golf course would also have closer views of the last few hundred feet of the transmission lines before they connect to the CEIP Substation. While *makai* views from the golf course and the development in general will be dominated by the industrial skyline of the CIP and future KHC, the closer-up views of the transmission lines would impair the aesthetics of the view further. HECO is working with the developer to discuss possibilities for minimizing or mitigating those effects through undergrounding a portion of the transmission line or providing vegetative screening. ~~With the possible exception of the golf course crossing, none of these uses are particularly sensitive to the visual and aesthetic effects that would result from an additional transmission line passing nearby.~~

4.9.2.2 Far Views

4.9.2.2.1 Far Views of the Generating Station and Substations

Because of the relatively flat terrain in the Campbell Industrial Park area, the proposed generating and substation facilities would not be visible from middle distances. Instead, they only become visible as one moves to the higher ground which begins approximately two miles from the proposed generating site. ~~The proposed electrical transmission line, as well as the existing overhead lines that lace the area, are visible from vantage points such as Makakilo and Honokai Hale, but even at its closest point Honokai Hale is approximately 3,000 feet from the proposed new transmission line. The nearest point on the proposed transmission line is more than four-fifths of a mile from the closest residences in Makakilo, and the average distance is much further (more than 1.5 miles from the mid-point on the transmission line to the closest part of Makakilo).~~

Because of this separation, graphical depictions of the facilities from these distant vantage points (which would show only that the facilities appear relatively small) are less helpful than illustrations of the facilities as they would appear from a helicopter hovering much closer to the site. The discussion in the following section ~~discussion~~ is based on such photo renderings, which depict both single and dual generator alternatives. While the renderings are not composed in a point-of-view context, they do indicate which elements of the proposed facility would be most visible and place them in context with their surroundings. Further, the renderings are useful in determining which measures, if any, would be useful in tempering visual impacts to surrounding areas.

4.9.2.2.2 Far Views of the Transmission Lines

Three of the possible alternatives include a second transmission line from the AES Substation north to the CEIP Substation. The proposed electrical transmission line, as well as the existing overhead lines that lace the area, are visible from vantage points such as Makakilo and Honokai Hale, but even at its closest point Honokai Hale is approximately 3,000 feet from the proposed new transmission line. The nearest point on the proposed transmission line is more than four-fifths of a mile from the closest residences in Makakilo, and the average distance is much further (more than 1.5 miles from the mid-point on the transmission line to the closest part of Makakilo). Because of the extensive network of transmission and distribution lines that already criss-cross the horizon of the CIP, the addition of another line would not be apparent to residents of these communities or to vehicles traveling along H-1 and Farrington Highway. Similarly, many lines are already visible from Kalaeloa Boulevard, and with the planned development there the new line would not significantly detract from views there.

~~Three of the possible alternatives include a second transmission line from the AES Substation north to the CEIP Substation.~~ The possibility exists that all or a portion of the~~se~~ proposed transmission ~~lines~~line might be placed underground, which would involve a greater construction period impact than an overhead line, but it would eliminate long-term visual effects.

4.9.3 POTENTIAL CONSTRUCTION PERIOD VISUAL IMPACTS

Construction of the proposed facilities will entail minor grading, equipment parking, materials storage, the erection of structures and placement of equipment, and other aboveground activities. Because most of these activities will occur on portions of the Barbers Point Tank Farm site that are not readily seen from Hanua Street or other public areas, it will have little visual effect. Work on the

AES Substation site will be more visible, but will be limited to the placement of electrical equipment and the erection of a few takeoff poles, all of which can be completed within one to two months and will not substantially alter the appearance of the area, much of which already contains electrical switching equipment.

Only a few of the transmission elements of the proposed project are located in areas where construction activities would be readily visible to the public. The principal example is the crossing of Malakole Road adjacent to the existing coal conveyor crossing, but some of the other pole installation work would also be visible from the service road that provides access between Malakole Road and the compost facility. These areas are all either vacant or used for heavy industrial purposes. The work needed to erect the transmission line will not adversely affect the appearance of these areas.

4.9.4 POTENTIAL LONG-TERM VISUAL IMPACTS

4.9.4.1 Structures

The proposed project is industrial in nature. Some of the structures (e.g., the equipment added to the substations, the administrative offices) are relatively unobtrusive and closely resemble the kinds of structures found in light industrial areas throughout the Island. Other structures (most notably the transmission lines, combustion turbines, fuel storage tanks, and the administration/control building) are higher and bulkier; however they are still within the range of heights and sizes allowed without variance in areas that are zoned General Industrial. Further, none of the structures represents a departure from other buildings and installations in the area, which is heavily developed with similar facilities.

At a height of 210 feet above ground level, the stacks attached to the combustion turbine are the tallest structures that would be constructed at the Barbers Point Tank Farm. The stacks and the above-ground transmission lines are the two elements of the project which would be most visible to the public. All other structures and equipment would be at or below the 60-foot height limit applicable within the Heavy Industrial (I-2) zoning district. They would be far lower and less massive than the existing structures at the nearby AES Generating Station and HPOWER facilities.

Figure 4.16 consists of an oblique aerial photograph of the portion of Campbell Industrial Park in which the proposed electrical generating facilities and AES Substation are located. Taken from approximately 800 feet above ground and looking toward the southeast, it contains a computer-generated rendering of the first generating unit and related facilities.[82] In addition to demonstrating the small scale of the proposed facilities relative to other existing facilities within CIP, the depiction makes it clear that they are modest in size even in comparison to the existing fuel storage tanks that are already present on the BPTF site. The sole exception to this is the generating unit's exhaust stack, which would be the same height as the stacks at the other electrical power generating facilities located nearby (the HPOWER facility, the AES Barbers Point Generating Station, and the Kalaeloa Generating Station).

Figure 4.17 consists of another oblique aerial photograph with a computer-generated image of the first generating unit and related facilities depicted on it. This photo was taken from a point approximately 500 feet above Hanua Street and is looking directly west. This is similar to the direction that residents of lower Makakilo would see the facilities, but is very much (two miles) closer. This photo also helps illustrate features of adjacent areas that help to minimize the potential for adverse visual effects. These include the existing equipment storage along the makai side of the warehouse that is immediately west of the Tank Farm site and the open nature of the portion of the HPOWER site that is immediately to the south of the proposed generating site. Figure 4.18 and

[82] This vantage point is actually above the ocean, Hence, no one other than those in passing aircraft, will actually see the facilities from this perspective.

Figure 4.19 show simulated view of both proposed CTs from the same vantage points as described above.

As described in Chapter 2, the new transmission lines that would connect the Barbers Point Tank Farm generating station to HECO's existing CEIP Substation would be mounted on steel poles with an average height of approximately 120 feet. The alignment would follow planned roads and a future drainageway within the future Kapolei Harborside Center. The *mauka* end of the proposed alignment passes close to the OR&L right of way and near the southern tip of the golf course that is planned for the future Kapolei West development. The~~se~~ lines would also be visible from Makakilo and other vantage points well removed from the alignment, but would appear small because of the distance and are similar to existing lines that already lace the industrial area (see Figure 4.20).

4.9.4.2 Activities and Visible Emissions

There are few visible activities as a result of ongoing power plant operation. Because of this, there is little potential for adverse impact on visual resources. Vehicular traffic is minimal, and maintenance does not involve equipment or activities that are readily visible from off the generating site. Similarly, ongoing maintenance of the substations and transmission lines does not involve activities with the potential for adverse visual effects.

Finally, there is little potential for adverse visual effect as the result of visible emissions from the proposed generating units. State Department of Health regulations limit visible emissions (not including uncombined water vapor) from the proposed facility to no greater than 20% opacity. In addition, specific regulations require that: (*i*) plant operators take "reasonable precautions" to prevent particulate matter emissions during construction or material handling and (*ii*) "best practical operation or treatment" (e.g. water or chemical dust suppressants, paving of roads, and the installation of hoods and fabric filter dust screens) be implemented to prevent visible emissions of fugitive dust beyond the property line. The ability of the existing generating units within CIP to operate without noticeable visible emissions can be seen from the photographs of existing conditions reproduced above, and the emissions from the proposed new units would be at least as transparent.[83]

[83] Under normal operating conditions, the only visible sign of emissions would be some shimmering distortion of the air rising out of the stacks due to heat exhaust. There are certain combinations of plant operations and meteorological conditions (e.g. generating unit startup, and high humidity/low wind speed) that may cause a light-colored water-vapor plume to become visible. Visible plumes of this sort would occur infrequently and would be short-lived; they would be no greater than the exhaust plumes from other industrial activities in the Campbell Industrial Park area.

Figure 4.16. Simulated View Toward SE of New CIP Generating Station (Alternatives 1, 2 & 3: One CT)

Source: HECO (2005).

Figure 4.17. Simulated View South from New CIP Generating Station (Alternatives 1, 2 & 3: One CT)

Source: HECO (2005).

Figure 4.18. Simulated View Toward SE of New CIP Generating Station (Alternative 1: Proposed Action – Two CTs)

Source: HECO (2005).

Figure 4.19. Simulated View South from New CIP Generating Station (Alternative 1: Proposed Action – Two CTs).

Source: HECO (2005).

Figure 4.20. Existing View from Kapolei Toward the CIP

Source: Hawaiian Electric Company, Inc.

4.10 IMPACTS ON TRANSPORTATION FACILITIES

This section describes the effects that the proposed project would have on existing and planned transportation facilities in the region. While the focus is principally on land transportation facilities (i.e., roads and highways), the discussion also covers air and water transportation.

4.10.1 PROJECT COMPONENTS ABLE TO IMPACT TRANSPORTATION FACILITIES

Construction and operation of the proposed generating station will generate vehicle trips for the purpose of delivering equipment and workers to the site. The number of daily vehicle trips to and from the site will drop sharply once operation commences, consisting only of employees and occasional deliveries of replacement parts. Fuel will be delivered via pipeline, thus eliminating vehicle trips associated with fuel delivery. Construction of the facilities will also involve the one-time importation of equipment from off-island, which will be unloaded at ports. Finally, the 210-foot smokestack associated with each CT is at a height which requires clearance by the Federal Aviation Administration.

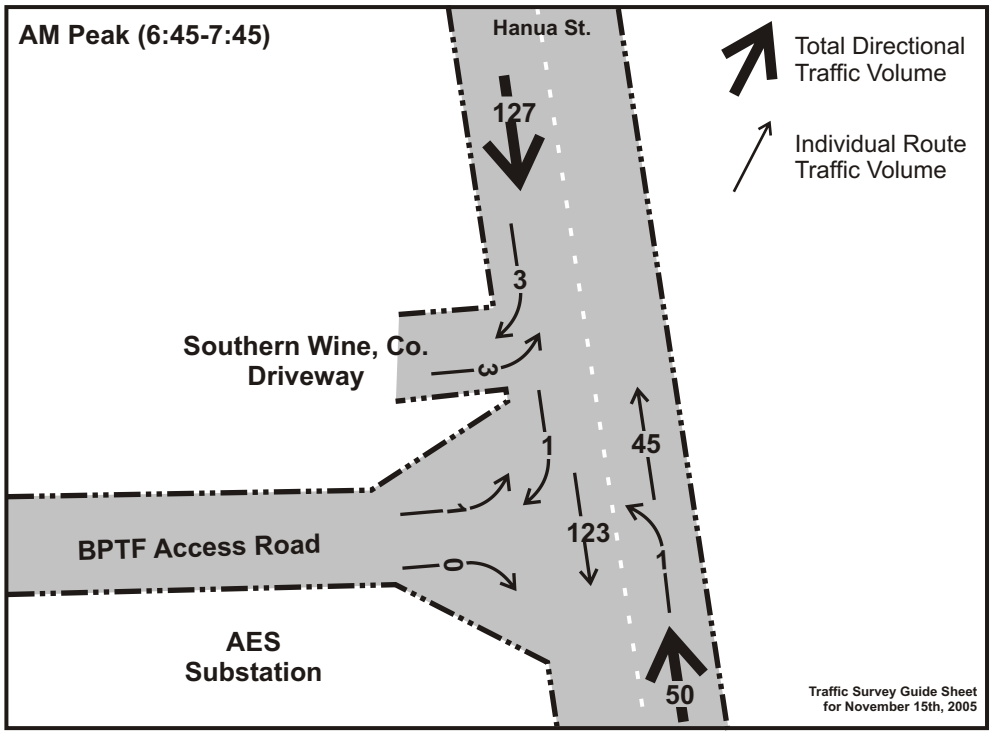
Outside of the construction period, which will involve vehicle trips to transport workers and equipment to the area, no transportation impacts are expected as a result of the proposed transmission lines.[84] Occasionally, HECO personnel will perform maintenance on the lines, but this will be infrequent and will require no more than one or two vehicles. Thus, it is not considered a serious disruption. The transmission lines are not tall enough to represent a hazard to air traffic, nor will they involve the transport of large amounts of materials from ports. Unless the underground alternative is selected, their construction will not disturb existing roadways or require significant traffic controls. If undergrounding is used for the portion of the route that is within the already developed portion of CIP, trenching will be required within existing travelways, but the roadway width is sufficient that this will not greatly reduce the roadway capacity even in the area that are affected. Consequently, the following discussion of impacts focuses primarily on the generation component of the project.

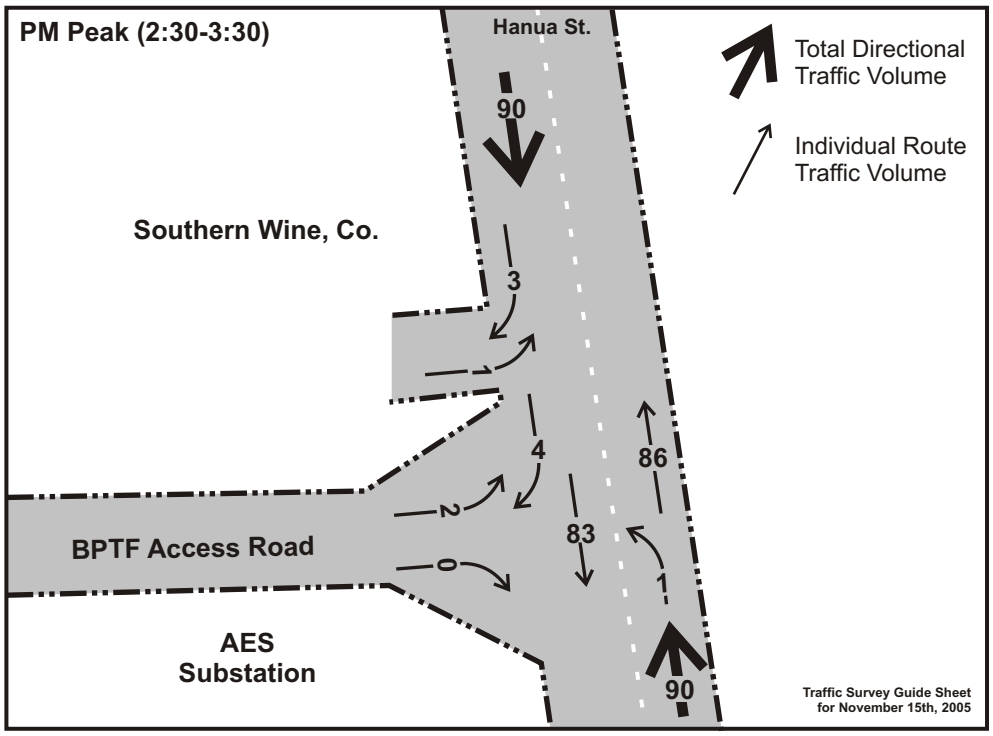
4.10.2 EXISTING TRAFFIC CONDITIONS

As discussed in Section 3.14.1, roadway access to the proposed generation complex on the BPTF site would be via Hanua Street and a new site access road to be constructed along the southern edge of the property. The former was designed for heavy vehicular traffic and currently experiences only moderate traffic volumes. Traffic consists primarily of passenger cars and light trucks driven by employees, but some heavy trucks also use the road (e.g., HPOWER transfer trucks, container delivery trucks to nearby warehouses, etc.). Existing peak-hour traffic at the intersection of Hanua Street and the entrance to the facility is shown in Figure 4.21; it is low relative to roadway capacity.

All of the equipment, employees, and materials needed for construction and operation of the generating station would probably access the site from H-1 using Kalaeloa Boulevard and Malakole Road before turning onto Hanua Street. Kalaeloa Boulevard is the main arterial road from H-1 into the CIP and Barbers Point Harbor area, and thus it receives all of the traffic traveling to and from those areas. Malakole Street is an east-west thoroughfare that leads to the Harbor and several other roads within the CIP.

[84] Placing the transmission line underground would require construction activity within existing and planned road rights-of-ways, increasing the intensity of construction-related traffic impacts. However, because this would occur before the area through which they pass is fully developed, it would not have the kinds of traffic impacts that undergrounding lines through areas that are already built-up can have.





Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

Planning Solutions, Inc..

NOTE: AM and PM peaks represent the sum of cars, light trucks and heavy trucks.

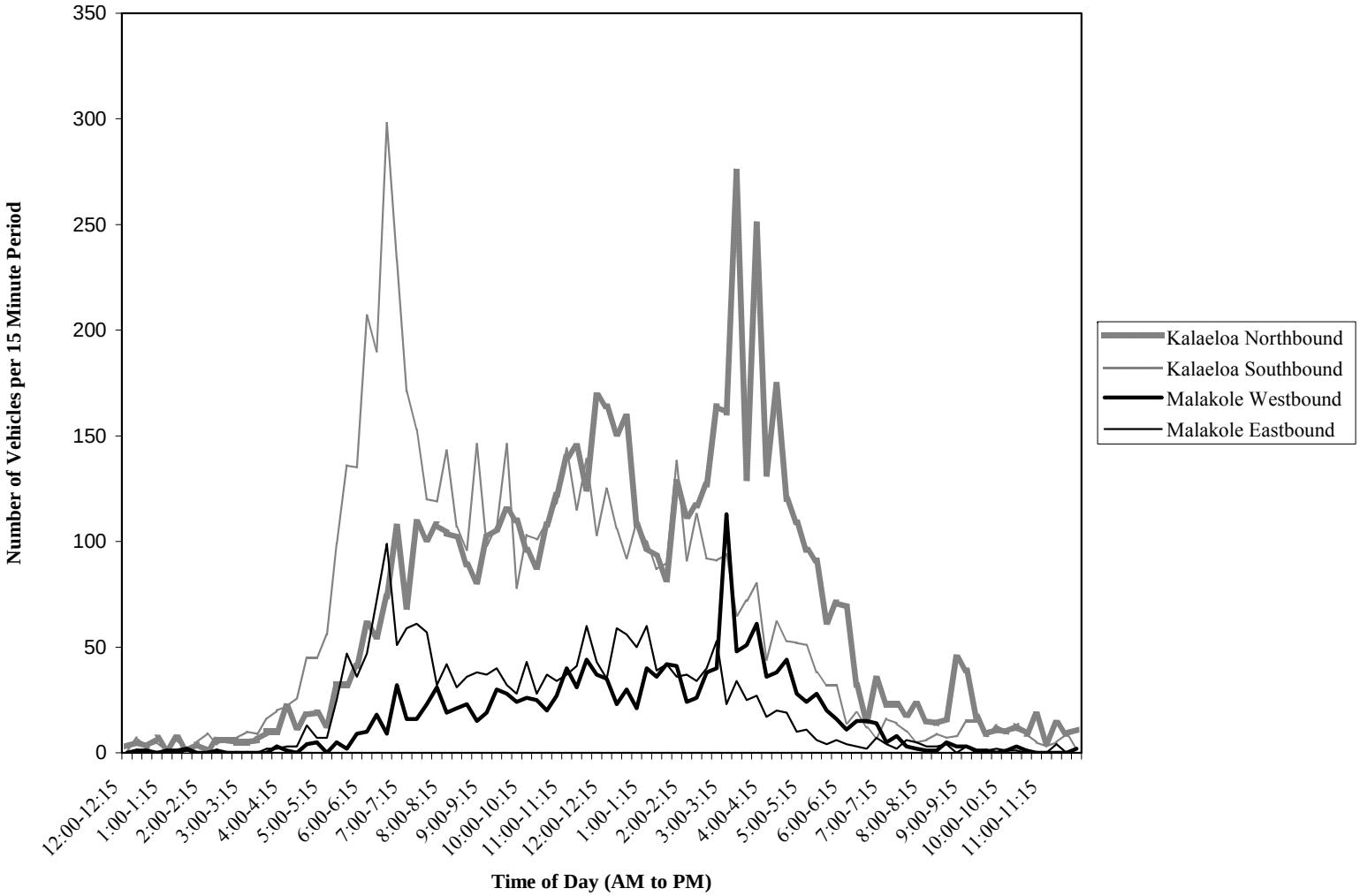
Figure 4.21:

Peak-Hour Traffic at Facility Entrance

CIP Generating Station & Transmission Additions Project

Figure 4-21 Peak-Hour Traffic at Facility Entrance 2006-06-02.cdr

Figure 4.22. 24-Hour Traffic Counts for Kalaeloa Boulevard & Malakole Street (February 9-10, 2004)



Source: Hawai‘i Department of Transportation (HDOT).

Traffic volumes on Kalaeloa Boulevard and Malakole Street were obtained from the State of Hawaii, Department of Transportation, Highways Division Traffic Count Station 10-H located at the intersection of those two streets. As shown on Figure 4.22, the peak hours of traffic for Kalaeloa Boulevard are between 6:00 and 7:00 a.m. (mostly southbound traffic heading into the CIP) and from 3:00 to 4:00 p.m. (mostly northbound toward H-1). Traffic patterns on Malakole Street largely mirror those on Kalaeloa Boulevard (with the eastbound lane experiencing the bulk of the morning peak and the westbound lane experiencing the afternoon peak), although the former experiences a significantly smaller traffic volume.

4.10.3 VEHICLE-TRIP GENERATION

4.10.3.1 Construction-Phase Trip Generation

4.10.3.1.1 Preferred Alternative

Construction of the first phase of the preferred alternative (consisting of the proposed generating station, the first CT, the transmission lines, and substation additions) would generate a small number of vehicle-trips on area roadways. Most of these would be associated with the delivery of construction materials to staging areas and with employee commute trips to and from working areas. No work is planned in existing road rights-of-ways under the preferred alternative, and thus any disruptions would be minor and temporary. Construction of the second CT, if needed, would generate even fewer vehicle-trips and would not entail work off the BPTF site.

Employee Work Trips. In view of the relatively small size of the work crew that would be on site at any point in the construction process (estimated at a maximum of 50 persons and averaging closer to 30), construction workers are expected to make at most 50 vehicle-trips in the morning and 50 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.

Equipment Delivery Trips. Construction of the proposed project will involve the importation of several relatively large pieces of equipment.[85] These include the combustion turbines, electrical generators, and diesel engines. Many smaller pieces of equipment will be needed as well. These will have to be imported to the Island. Those that travel by container ship will be landed in Honolulu Harbor and transshipped by truck to the site. Very large pieces of equipment may arrive by barge, in which case they could be landed at the Kalaeloa Deep Draft Harbor. While the number of equipment delivery trips will be low (probably no more than 5 to10 on even the busiest day), some will require oversize vehicles that could slow traffic in a localized area for a brief time.

Excavated Material and Select Fill. Small amounts of structural fill will be needed for the construction of the proposed generating station at the BPTF, but the total is expected to be no more than a few thousand cubic yards. If 20-cubic-yard capacity trucks are used for this material, this would entail a total of a hundred or so truck-loads and these would be spread over a number of weeks. Even at its peak, this activity would generate at most 10 to15 truck-trips per day.

4.10.3.1.2 Construction-Phase Vehicle-Trips: Alternatives 2 and 3

The impacts associated with Alternatives 2 and 3 are similar to those discussed above for Alternative 1. In the case of Alternative 2, the number of construction-related vehicle-trips would be reduced by the absence of work needed to construct a second generating unit on the site and to expand the AES Substation. In the case of Alternative 3, the number of vehicle-trips would decrease slightly because three would be no need to erect the second transmission circuit. Finally, because Alternative 4 entails only the construction of the second transmission circuit, construction-related traffic would be small and there would be virtually no effect on Hanua Street.

[85] The transmission line support poles will be brought to the area in sections and assembled thee, limiting the size of the pieces that must be transported over public roadways.

4.10.3.2 Operational Phase Vehicle-Trip Generation

The majority of the vehicular-traffic associated with the proposed facilities would be HECO employees reporting to or leaving the generating station service trips by vendors and HECO maintenance personnel would add a few additional vehicle-trips to this. The number of trips that this would generate is summarized in Table 4.35. The compilation makes it clear that:

- Operation of the proposed generating facilities would contribute little traffic to the roadways in and around Campbell Industrial Park.
- The number of vehicle-trips is the same regardless of whether one or two generating units are eventually constructed on the site.
- The transmission line contributes virtually no traffic to the total.

Table 4.35. Vehicle-Trips by Type and Alternative

Time Period		*In-Bound Vehicle-Trips*	*Outbound Vehicle-Trips*	*Total Vehicle-Trips*
Alternatives 1, 2, and 3				
5:00 am to 9:00 am	Employee	5	2	7
	Other	3	0	3
9:00 am to 2:00 pm	Employee	2	2	4
	Other	2	2	4
9:00 pm to 11:00 pm	Employee	2	5	7
	Other	0	0	0
Alternative 4				
5:00 am to 9:00 am	Employee	1	0	1
	Other	0	0	0
9:00 am to 2:00 pm	Employee	0	1	1
	Other	0	0	0
9:00 pm to 11:00 pm	Employee	0	0	0
	Other	0	0	0

Note: The estimated number of employees by shift is as follows: 5:30 am to 1:30 pm – 5 employees; 1:30 pm to 9:30 pm – 5 employees; 9:30 pm to 5:30 am – 2 employees.

Periodic inspections and maintenance activities would bring a few additional personnel to the generating station, substations, and transmission corridor for at most a few days each year. These might increase the number of round-trip employee commute trips by 5-10 per day for up to a week. Because the fuel for the combustion turbines is delivered to the site via pipeline, there will be no fuel trucks traveling to and from the site.

Source: Compiled by Planning Solutions, Inc. using employee estimates by HECO.

4.10.4 IMPACTS TO ROADWAYS

As discussed above, the number of vehicle trips generated by the construction and operation of the project is too small to have a significant effect on the level of service of roadways within the CIP. Truckloads of oversized equipment will be transported to the generating station site during off-peak hours and with appropriate supervision. These could cause very small delays to vehicles in the area. Such deliveries would be timed to minimize interference with other nearby businesses.

If the transmission line is placed entirely underground, some trenching would be required. This would be limited to the segment of Hanua Street between the entrance to the proposed generating facility and Malakole Road. The road is wide enough that the trenching would not require closing more than a quarter to a third of the roadway width, leaving at least one full lane. During off-peak hours this should not present a delay to vehicles along Hanua Street, however during peak hours delays of one to two minutes could occur. If this option were implemented, a traffic control plan would be developed and submitted to the City and County of Honolulu for review and approval.

4.10.5 IMPACTS TO AIRPORTS & AIR TRAFFIC – ALL ALTERNATIVES

None of the alternatives under consideration would generate significant amounts of passenger or cargo traffic at O‘ahu’s airports. Consequently, the only mechanism through which the proposed project could affect air transport is by obstructing the airspace used by the aircraft that provide this service. Most of the facilities that comprise the project are too low to be of concern, with the exception of the 210-foot exhaust stack associated with each proposed CT.

The BPTF site is about 9,000 feet southwest of the approach end of Runway 11 at Kalaeloa Airport (formerly the Barbers Point Naval Air Station). Because of the height of the exhaust stacks, HECO is required to submit a Notice of Intent to the Federal Aviation Administration for construction of the proposed facilities at the BPTF.[86]

The FAA reviewed and approved the stacks for the neighboring HPOWER and AES Barbers Point facilities, both of which have stack heights equal to those proposed for the current project and both of which are closer to Kalaeloa Airport. Hence, while the FAA has not yet made a determination on the project, HECO anticipates that the proposed facilities will be determined not to adversely affect navigable airspace so long as they are properly marked and lighted.

4.10.6 IMPACTS TO HARBORS & OCEAN NAVIGATION – ALL ALTERNATIVES

Barbers Point-Kalaeloa Deep Draft Harbor, located approximately one mile north of the BPTF site, provides a nearby location for unloading heavy equipment and construction materials needed for the proposed project. However, most construction materials would probably arrive at the more developed facilities in Honolulu Harbor and be trucked to the site. The petroleum that would be used in the proposed generating units would be produced at the local refineries from crude oil brought to Hawai‘i by ocean-going ships and offloaded offshore.

The extent to which the proposed project would affect the movement of petroleum products into and out of the State is impossible to predict at this time. The volume will change over time, of course, depending upon the way in which the proposed units are operated. If they are operated at an average of 75 percent load for the 1,000 hours per year that HECO estimates they may be needed, it is estimated the units would consume a little under 400,000 barrels per year per year.[87] The refineries currently produce enough excess naphtha to provide for the needs of the new generating station without importing more crude oil.

[86] The Federal Aviation Administration’s (FAA) Federal Aviation Regulations (FAR) Part 77.13, Construction or Alteration Requiring Notice, sets forth “imaginary surfaces.” These are used to identify construction or alteration proposals that require notification to the FAA on FAA Form 7460 1. The regulations require that for runways longer than 3,200 feet (i.e., both runways at Kalaeloa Airport), a project proponent must notify the FAA in advance of any construction or alteration proposal which is higher than an imaginary surface extending outward and upward for a horizontal distance of 20,000 feet at a slope of 1 foot upward for every 100 feet outward from the nearest point of the nearest runway.

[87] This is based on fuel oil operation at 75% power for the W501D5A at 58,200 pounds per hour, 7 pounds per gallon (approx, 8,300 gallons per hour) times 1,000 hours per year. At 42 gallons per barrel, the total is approximately 197,000 barrels per unit per year.

4.11 IMPACTS ON PUBLIC INFRASTRUCTURE AND SERVICES

4.11.1 POTABLE WATER SUPPLY

4.11.1.1 Construction Period

Small amounts of water would be used during construction of the generating, substation, and transmission facilities that are proposed. Nearly all of this construction water use would occur during the construction of the first generating unit that is part of Alternatives 1, 2, and 3. Consequently, there is virtually no difference between these three alternatives in this regard. Alternative 4 (which consists only of the second transmission line) would require virtually no water during the construction phase. This water would be obtained from the existing BWS system, which has adequate source and transmission capacity to meet the expected need.

4.11.1.2 Operational Period

As discussed in Section 4.4.2, the proposed facilities would use recycled and/or saline groundwater for all process-related needs. Hence, the only use of potable water would be for domestic purposes. The current allocation for potable water to the site is 12,000 gallons per day from the Board of Water Supply's existing potable water system. Because of the low staffing on the site, the amount used for human consumption would be on the order of 200 gallons per day, a small fraction of the amount that is available.

4.11.2 WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL

HECO will collect, treat, and dispose of all the wastewater it generates using its own facilities. The potential effects of the collection, treatment, and disposal of the small amount of sanitary wastewater that would be produced by the proposed facilities are discussed in Section 4.4 of this report. The discussion shows that the proposed action will not affect existing or planned public wastewater collection, treatment, or disposal systems except by providing the City & County of Honolulu a customer for treated wastewater from its Honouliuli Wastewater Treatment Plant.

4.11.3 TELECOMMUNICATIONS

As discussed in Section 2.2, telecommunications provided by Hawaiian Telcom already exist at the BPTF site, as well as fiber optic cables that link several of HECO's facilities. A data communications system is required for the protective relays on either end of a transmission line to share information and for the substation breakers to receive commands. HECO's standard is to have two independent communications systems of differing technologies for each transmission line for redundancy and reliability. For the proposed new transmission line, one communication system will use a fiber optic cable installed in the shield wire that travels the length of the transmission line. Communications hardware associated with the fiber optic cable will be installed at both the AES and CEIP Substations. As the other means of communication, a microwave antenna and its associated communication hardware will be installed at each substation. Telephone lines that serve the existing Waiau Fuel Pipeline building on the Tank Farm site would be extended to the new buildings as needed. No additional external circuits are needed.

4.11.4 POLICE AND FIRE SERVICE AND PUBLIC SAFETY

The proposed generating facility would have perimeter fencing, lockable gates, a 24-hour on-site security staff, and a video monitoring system. It would not place substantial additional demands upon the existing police service within the CIP. Similarly, as described in Section 2.2.4.3, the facility includes fire water storage and other fire protection facilities required by the County Building Code and by other applicable ordinances and regulations, thus reducing the potential for additional burden on the Fire Department. All facilities would comply with the National Fire Protection Association's (NFPA) recommendations, local codes, and other applicable fire protection regulations.

4.11.5 HEALTH CARE FACILITIES

St. Francis West medical center offers complete medical, surgical, and support services. It includes an emergency center that is open 24 hours per day and extensive diagnostic equipment. Ambulances could reach the hospital from any part of the project area in less than 15 minutes.

4.11.6 SCHOOLS

As discussed elsewhere in this chapter, the proposed generating facilities would employ approximately ten people at full build-out, and these would most likely represent existing employees who are presently based elsewhere on the Island. Consequently, there is no potential for pressures on school enrollment as a result of the project. The Barbers Point Elementary School and the proposed future site of Kapolei West Middle School are both approximately two miles away from the proposed generating station and therefore would not be subject to noise or other direct disruptions as a result of the facility's operation. Potential environmental impacts on the areas in which the schools are located are addressed as part of the overall impact analysis presented in earlier sections of this chapter.

4.11.7 RECREATIONAL FACILITIES

The BPTF is approximately 0.5 mile from Barbers Point Beach Park. Existing vegetation and structures obstruct views of the site from the Beach Park, although the tops of the exhaust stacks would be visible from certain vantage-points. Access to the park is via Olai Street, which can be reached by Hanua Street or Kalaeloa Boulevard. Because Kalaeloa Boulevard is the main road into the CIP, most vehicles traveling to the park are likely to take it all the way to Olai Street; however some vehicles may choose to travel along Hanua Street. Those vehicles would mix with vehicles traveling to and from HECO's facilities along Hanua Street. In view of the small volume of traffic that either would generate, as well as the other industrial traffic that uses the road, this would not represent a substantial change from present conditions.

4.11.8 SOLID WASTE

HECO anticipates that the generating station as proposed in the preferred alternative would produce very small amounts of municipal solid waste. While no exact estimate is available, installations of the type proposed typically maintain a small dumpster on-site that is emptied once per week, and HECO expects that would be true for Alternative 1. HECO estimates that Alternatives 2 and 3 (with only one generating unit) would produce approximately 75 percent of the volume that would result from Alternative 1. HECO would contract with a private solid waste management company for the collection and disposal of this refuse. The contractor would pick up the refuse once each week and haul it to a permitted landfill for disposal. No hazardous material is present in this waste stream. The proposed transmission and substation additions would generate no solid waste once operational.

4.12 LAND USE & SOCIOECONOMIC EFFECTS

4.12.1 LAND USE IMPACTS

The proposed generating facilities and adjacent AES Substation are located in the midst of an area devoted to heavy industrial uses. As discussed in Chapter 6 of this report, they are consistent with the existing zoning, and their construction and operation will not alter the existing land use pattern. This is true whether two generating units are installed (Alternative 1) or only one is constructed (Alternatives 2 and 3).

There are three immediate neighbors. Two of those, the HPOWER waste-to-energy facility immediately to the south and the Chevron USA refinery immediately to the south are also heavy industrial operations that are not sensitive to the kinds of activities that would be carried out at the CIP Generating Station. HPOWER's waste-to-energy system processes up to 1,700 tons per day of municipal solid waste that is brought to the site in large transfer trucks. A large warehouse leased by

Southern Wine and Spirits, Inc., occupies the parcel immediately to the east of the Barbers Point Tank Farm site on which the facilities would be constructed, and the owners of that business have expressed some concern that it might affect their operations. However, the results of the analyses described above do not reveal a basis for potential effect.

The 138 kV transmission line that HECO is part of Alternatives 1, 2, and 4, is routed through vacant land that is zoned for agricultural and industrial use. It is similar to existing transmission lines in the area that have not limited the ongoing build-out within the commercial and industrial area. The developer of the proposed Kapolei West Project has expressed a preference for having the portion of the line that passes closest to its project placed underground to minimize visual effects, but has indicated that ~~it does not believe that~~ the benefits of doing so ~~this are~~may not be sufficient to warrant the cost if it were given the option of paying for the undergrounding that would benefit its development. HECO is coordinating with KPD to determine whether undergrounding that portion is appropriate or whether visual impacts can be minimized in other ways (e.g., vegetative screening). Placing the line partially or completely underground will make the line more compatible with the residential setting of the proposed Kapolei West Project. However, it will not have a significant effect on the line's compatibility with the majority of existing and future land uses in the surrounding area, which is heavily industrialized and already criss-crossed by transmission lines.

The recycled water line that HECO has committed to construct if its proposed plan is approved would be completely buried within existing linear rights-of-way. Consequently, it does not have the potential to affect land use directly. The ability to substitute non-potable water for the existing potable water that is now used at Kahe would free a substantial quantity of that important resource for other, higher uses. This, in turn, could allow the water to be used for other important uses or simply allowed to reduce the demand on O'ahu's limited water resources.

4.12.2 SOCIO-ECONOMIC IMPACTS

The direct socio-economic effects of the proposed facilities include: (i) construction employment and business activity; (ii) ongoing employment for power plant staff; and (iii) ongoing expenditures for materials and outside services. These benefits are relatively small compared to the economic and social costs associated with not providing needed generating capacity. HECO's forecasts and modeling indicate that failure to provide the additional generating capacity in a timely fashion will necessitate voluntary and/or mandatory limits on the use of electricity. In the most optimistic circumstances, these limits would be in the form of planned rolling blackouts. More serious consequences would result if the sudden failure of a generating unit or transmission line leads to unplanned power outages. In either event, the resulting disruption would have a severe adverse effect on the health and welfare of Oahu's residents and businesses as well as the island's economy. This issue is explored at some length in the discussion of the "No Action Alternative" presented in Section 5, and so is not further addressed here.

While a reliable supply of electricity is critical to the continued operation of most businesses on the island, the additional peaking capacity that the proposed project is intended to supply is not likely to induce secondary growth. This is because it will not allow HECO to provide power at a lower cost than is presently the case (which could make more businesses economically viable than at present) or reduce customers' costs to the point where they could use their resources to support other economic activity.

Because of its location in the heart of a large industrial park that is devoted to heavy industry, there is no evidence that construction and operation of the proposed generating facilities and AES Substation expansion that is part of Alternatives 1, 2, and 4, would impact property values. This conclusion is supported by the accelerating development in Kapolei, Ko Olina, and other nearby areas.

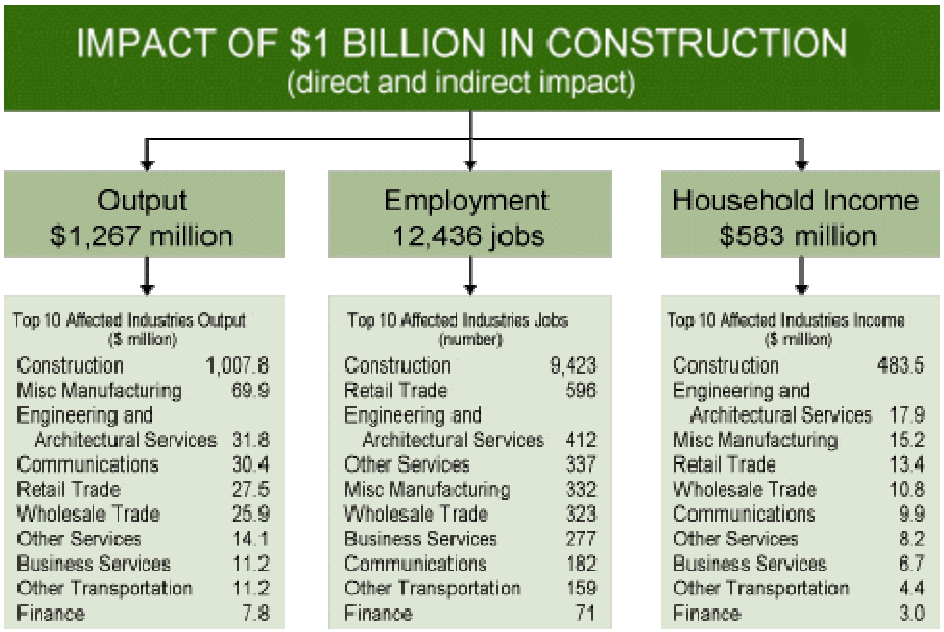
Because nearly the entire proposed transmission line route is through land that is slated to remain in industrial or commercial use, those facilities are unlikely to have a substantial affect on property values. As previously noted, the developer of the Kapolei West Expansion Area has expressed the

belief that the value of its property would be enhanced if the portion of the proposed transmission line that passes closest to its property were placed underground (which implies the belief that an above-ground line would decrease property values). At the same time, the developer's reluctance to assume the cost of undergrounding the line seems to reflect the belief that any possible benefit (i.e., increased property value) would not warrant the cost.

4.12.3 CONSTRUCTION EXPENDITURES AND EMPLOYMENT

As part of its economic modeling program, the State of Hawaii Department of Business, Economic Development, and Tourism (DBEDT) has developed estimates of the impact construction expenditures have on other industries in the economy.[88] Figure 4.23 shows how money spent in construction expenditures creates *indirect* economic activity in addition to the *direct* economic activity in the construction industry itself. The figure shows that, on average, a dollar in *direct* construction spending actually generates, about $1.30 of total output in the economy. [89]

Figure 4.23. Impact of Construction Expenditures on Economy.



Source: Department of Business, Economic Development, and Tourism.

The lower boxes in Figure 4.23 show how this economic activity was distributed among the key industries that provide inputs into the construction sector. They show that most of the output, jobs, and income from construction spending generated is in the construction industry itself. But activity is also generated in related industries such as real estate, engineering and banking. Moreover, activity was also generated in industries seemingly unrelated to construction such as medical care, eating and drinking and retailing.

Applying these output factors to the construction expenditures for the proposed project results in the employment and income estimates shown in Table 4.36. These are broken down by component so that the differences between the proposed project and the alternatives can be seen.

[88] The estimates are the product of the State of Hawai'i Department of Business, Economic Development and Tourism (DBEDT, 1998) Hawai'i Input-Output Model. This input-output model, which is based on historical economic data in Hawai'i, estimates the extent to which the direct economic inputs from various activities lead to indirect economic effects.

[89] The output is defined as the value of sales for most industries and "trade margins" for a few industries such as retail and wholesale trade, which do not actually make the goods they sell.

4.12.4 OPERATIONAL EMPLOYMENT

A dozen workers, approximately, will man the generating station over a typical 24 hour period.[90] HECO estimates that most of these workers would be drawn from its existing pool of employees.

The number of generation-related employees is likely to be the same regardless of whether one or two combustion turbines are eventually installed, and the substation and transmission facilities do not have any employees assigned specifically to them. Consequently, operational employment is about the same for Alternatives 2 and 3 as for Alternative 1. Alternative 4 would not require additional employees.

Table 4.36 Economic Impacts of Construction.

Cost Category	*Construction Cost (million $)*	*Construction Employment (person-years)*	*Direct, Indirect & Induced Impacts in Hawai'i (million $)*	*Household Income (million $)*
First Combustion Turbine	$115	1,155	$145.71	$67.0
AES-CEIP #2 Transmission Line	$19	179	$24.07	$11.1
Second Combustion Turbine	$75	707	$95.03	$43.7
Community Benefit Capital Costs	$6	57	$7.60	$3.5
Totals	**$215.0**	**2,098**	**$272.4**	**$125.30**
Alternative 1 Total	$215.0	2,674	$272.4	$250.60
Alternative 2 Total	140.0	1,741	$177.0	$81.6
Alternative 3 Total	$121.0	1,505	$153.3	$70.5
Alternative 4 Total	19.0	75	$24.0	$3.5

[1] Derived from cost estimates in Table 2.2. All of these costs are in 2004 dollars.
[2]The estimates for Alternatives 1, 2, and 3 assume implementation of the community benefit capital improvements. The estimate for Alternative 4 assumes that the community benefits would not be made in the absence of additional generating capacity.

Source: Calculated by Planning Solutions, Inc. using factors from State of Hawaii Department of Business, Economic Development and Tourism

4.13 ELECTRIC AND MAGNETIC FIELDS (EMF)

4.13.1 INTRODUCTION

Electric and magnetic fields (EMF) are invisible lines of force created by electricity. There are many natural sources for electric and magnetic fields, and they appear throughout nature and in all living things. Many of the equipment and devices on which modern society depends also generate EMF. This section identifies project-related sources of EMF, estimates the level of EMF which they will produce in the surrounding environment, and assesses the implications that those levels have for human health and safety. The discussion is divided into the following main parts:

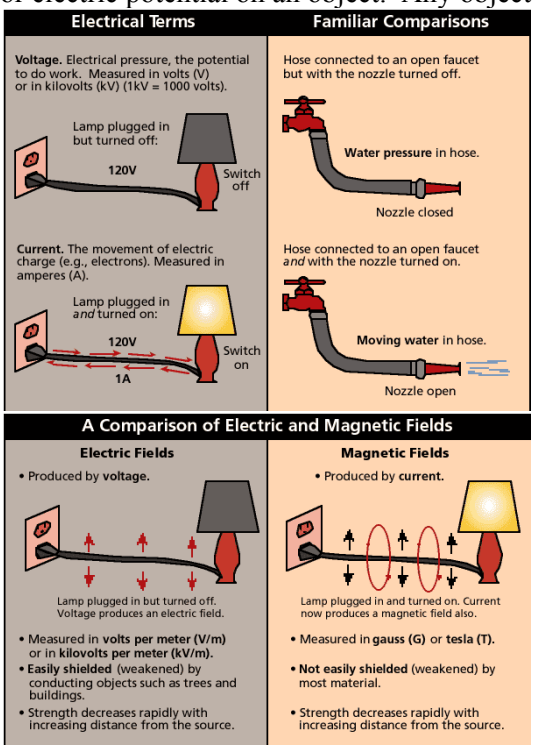
[90] During two daytime shifts (5:30 am to 1:30 pm and 1:30 pm to 9:30 pm), HECO expects that five regular employees will man the station. During the nighttime shift (9:30 pm to 5:30 am) two workers will man the station. This does not include other HECO employees that would occasionally visit the station to conduct maintenance, repair work, or inspections.

- Section 4.13.2 provides an overview of electrical terms used in the discussion.
- Section 4.13.3 presents a brief overview of sources of EMF in the existing environment and as related specifically to the proposed project.
- Section 4.13.4 discusses standards and guidelines relating to EMF levels.
- Section 4.13.5 discusses the levels of EMF that are expected from the proposed facilities and the extent to which they are consistent with the guidelines and standards discussed in the previous section.
- Section 4.13.6 reviews other transmission line electrical factors relevant to the proposed project.

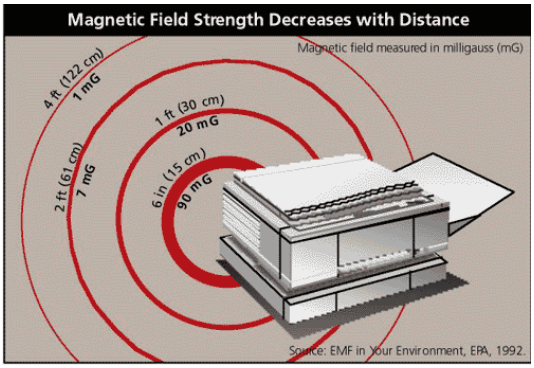
4.13.2 OVERVIEW OF ELECTRICAL TERMS

Before discussing EMF related to the facilities that are proposed as part of this project, it is useful to discuss a few of the terms that scientists and engineers use when describing and analyzing EMF.

Electric Fields. Electric fields are a result of the voltage or electric potential on an object. Any object with an electric charge on it has a voltage at its surface caused by the accumulation of more electrons on that surface as compared to another object or surface (see the sketch to the right for a help understanding these terms). The voltage effect is not limited to the surface but exists in the space surrounding the object. The change in voltage over distance is known as the electric field. The units describing an electric field are volts per meter (V/m) or kilovolts per meter (kV/m). The electric field is strongest near a charged object and decreases rapidly with increasing distance from an object. Electric fields are a common phenomenon. Static electric fields can result from taking off a sweater or walking across a carpet. Most household appliances and other devices that operate on electricity create electric fields. An appliance doesn't need to be in operation to create an electric field; one exists whenever it is plugged into an outlet. Electric fields are shielded by objects in the environment, especially objects that conduct electricity. For example, buildings, tall fences, and even trees can partially shield electric fields originating from nearby power lines.



Magnetic Fields. Whenever an electrical current flows through any conductor (e.g., a power line, electrical equipment, or a household appliance), it creates a magnetic field; the strength of the field increases as the current increases. Unlike the electric field, the magnetic field does not have a beginning or an end, but forms closed, continuous loops of force around the source of the field. Also unlike electric fields, because they are caused by the flow of current through a wire, magnetic fields are present only when an electrical device is in operation or a wire is transmitting electricity. Like electric fields, the strength of magnetic fields decreases with distance. Magnetic fields are measured in units of gauss (G) or tesla



(T).[91] Most electrical equipment has to be turned on, i.e., current must be flowing, for a magnetic field to be produced. In contrast to electric fields, magnetic fields can pass through most objects and can be blocked only by special shielding materials.

Even though electrical equipment, appliances, and power lines produce both electric and magnetic fields, most recent research has focused on potential health effects of magnetic field exposure. This is because some epidemiological studies have reported an increased cancer risk associated with estimates of magnetic field exposure. No similar associations have been reported for electric fields; many of the studies examining biological effects of electric fields were essentially negative.

4.13.3 SOURCES OF EMF — GENERAL

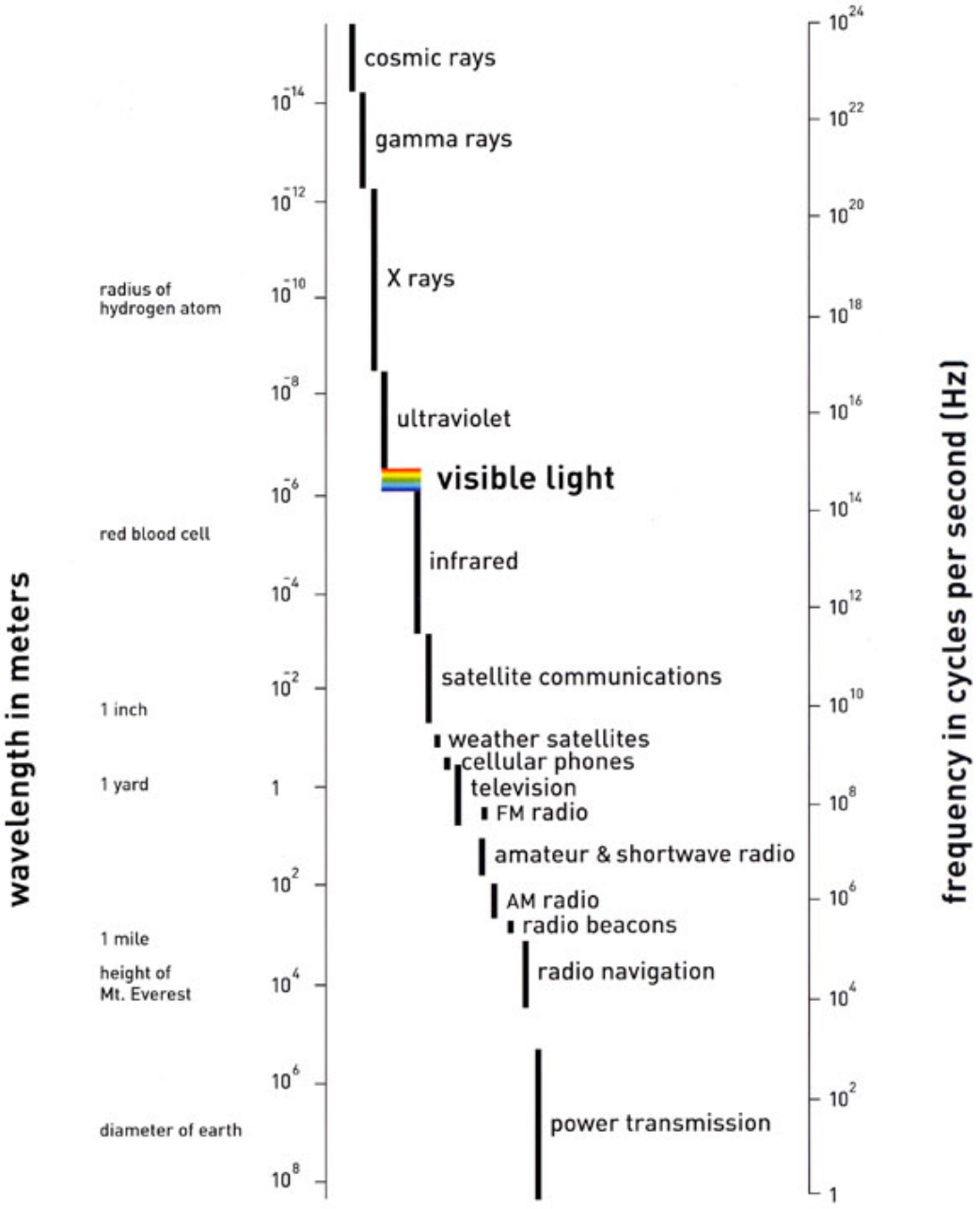
EMF comes from both natural and manmade sources (see Figure 4.24). One example of a natural magnetic field is the strong one that surrounds the earth as a result of the rotation of its inner core. Two other examples are the large magnetic field at the earth's surface during thunderstorms and the magnetic field that surrounds some minerals in the earth's crust, particularly iron and its compounds. On a much smaller scale, the body itself is a strong source of internal electric fields. All cells in the body maintain large natural electric fields across their outer membranes; these naturally occurring fields are at least 100 times more intense than those that can be induced by exposure to common electric power-frequency fields.

Since the development of commercial and domestic uses of electricity in the last century, many manmade sources of EMF have been added to these natural sources. Power lines, electrical wiring, and electrical equipment (such as generators) all produce EMF, but there are many other sources of EMF as well, many of them inside peoples' homes. One common source of such fields is the electrical wiring inside buildings. Although the magnetic fields from wiring in modern buildings are usually low, wiring in older buildings can make significant contributions to the average magnetic field in homes and buildings. In addition, "ground currents" flow through the water pipes, gas lines, or steel framing typically used for grounding the wiring system of a building. Magnetic fields produced by ground currents can contribute substantially to the overall magnetic field in homes.

A third common source of EMF is electric equipment and appliances. For industry, this means all machines and tools powered by electricity—virtually all industrial machinery in use today. In the office, this means fluorescent light fixtures and equipment such as computers, video display terminals, printers, copiers, typewriters, and fax machines. In the home, this means television sets, videocassette recorders, compact disc players, radios, table lamps, vacuum cleaners, power tools, air conditioners, electric shavers, hair dryers, clothes washers and dryers, irons, electric ovens and ranges, refrigerators and freezers as well as toasters, coffee makers, food processors, and all other small kitchen appliances. Magnetic fields produced by these appliances are generally not the main source of background magnetic field levels. Although household appliances can produce higher, more concentrated magnetic fields, they originate from a single point. Line sources, such as power lines, produce lower, less concentrated magnetic fields, but are distributed along the line. Magnetic fields decrease rapidly with distance from the source. Fields that originate from a single point source drop off more rapidly than fields that originate from a line source.

[91] The most commonly used units of measurement of the strength of a magnetic field, or more accurately, the magnetic flux density are the tesla (T) or gauss (G), where 1 T = 104 G. Because the range of magnetic fields encountered is usually quite small, the fields are generally described in units of microtesla (l μT = 0.000001 T) or milligauss (1 mG = 0.001 G), with milligauss (mG) being the most commonly used magnetic field intensity unit of measure. As a general reference, the earth has a natural static or direct current (DC) magnetic field of about 360 mG in Honolulu (Merrill 1983). As with electric fields, the magnetic fields from electric power facilities and appliances differ from static (or DC) fields because they are caused by the flow of 60 Hz alternating currents. Power frequency magnetic fields also reverse direction at a rate of 60 cycles per second, corresponding to the 60 Hz operating frequency of the power systems in the United States. The magnetic field is stronger near an electric current source and decreases with distance away from the source.

Figure 4.24. Electromagnetic Spectrum.



Source: http://www.basearts.com/curriculum/workshops/oxbow/electrospectLRG.jpg

It is important to note that power frequency electric and magnetic fields are different from other types of energy such as x-rays, visible light, microwaves and radio waves with which many people are familiar. For example, cellular telephones communicate by emitting high-frequency electric and magnetic fields similar to those used for radio and television broadcasts. Microwave ovens produce 60-Hz fields of several hundred milligauss (mG), but they also create microwave energy inside the oven that is at a much higher frequency (about 2.45 billion Hz) (NIEHS 2002). These radio frequency and microwave fields are quite different from the extremely low frequency EMF produced by the proposed power lines.

The magnetic fields under transmission lines are relatively low in comparison with fields measured near many household appliances and other common electrical equipment (see Table 4.37. In fact, the most intense magnetic fields in the home are found near appliances (particularly those with small motors or transformers such as hairdryers and fluorescent light fixtures). However, users generally spend only brief periods of time around these household appliances (with the exception of television sets, home computers, fans, and air conditioners).

Enertech (1998) performed a comprehensive study of contemporary magnetic field exposure for the U.S. Department of Energy. Its investigation was aimed at estimating the general population's exposure to ambient 60 Hz magnetic fields. In order to do this, researchers recruited a random group of over a thousand people representative of the general population throughout the United States and commissioning them to wear a recording magnetic field meter during a typical 24-hour period (Silva 1999). The results of the study are summarized in Table 4.38.

Table 4.37. Typical Magnetic Field Values for Household Appliances

Appliance	Magnetic Field (mG)		Appliance	Magnetic Field (mG)	
	12 Inches Away	Maximum		12 Inches Away	Maximum
Electric Range	3-30	100-1,200	Blender, Popper, Food Processor	6-20	250-1,050
Electric Oven	2-5	10-50	Vacuum Cleaner	20-200	2,000-8,000
Garbage Disposal	10-20	85-1,280	Portable Heater	1-40	100-1,100
Refrigerator	0.3-3	4-15	Fans, Blowers	0.4-40	20-300
Clothes Washer	2-30	10-400	Hair Dryer	1-70	60-20,000
Clothes Dryer	1-3	3-80	Electric Razor	1-100	150-15,000
Coffee Maker	0.8-1	15-250	Color Television	9-20	150-500
Toaster	0.6-8	70-150	Fluorescent Lights	2-40	140-2,000
Crock Pot	0.8-1	15-80	Fluorescent Desk Lamp	6-20	400-3,500
Iron	1-3	90-300	Circular Saws	10-250	2,000-10,000
Can Opener	5-250	10,000-20,000	Electric Drill	25-35	4,000-8,000
Mixer	6-100	500-7,000			
Source: Illinois Institute of Technology Research Institute for the U.S. Navy (Gauger 1985).					

Table 4.38. U.S. Population with Average Field Exposure Exceeding Given Level

24-Hr Field Level	*Proportion of Population Experiencing Exposure*
≤0.5 mG	23.7%
> 0.5 mG	76.3%
>1 mG	43.6%
> 2 mG	14.3%
>3 mG	6.3%
> 4 mG	3.6%
> 5 mG	2.42%
> 7.5 mG	0.58%
>10 mG	0.46%
>15 mG	0.17%
Source: (Enertech 1998)	

4.13.4 GUIDELINES AND STANDARDS RELATING TO EMF

The following subsections outline guidelines, standards, and policies established by national and international bodies pertaining to EMF levels.

4.13.4.1 Electric and Magnetic Field Standards, Guidelines, and Policies

In Hawai‘i, general transmission line safety standards are imposed by the State of Hawai‘i Public Utilities Commission General Order No. 6 (Rules for Overhead Electric Line Construction) and No. 10 (Rules for Construction of Underground Electric and Communications Systems). On issues not covered by General Orders 6 and 10, the National Electrical Safety Code may be used as guidance. These rules address the electrical safety of the public, but do not specifically address EMF.

Neither the federal government nor any of the State governments have developed health-related standards specifically for the 60-hertz EMF that is emitted by transmission lines such as the ones proposed. A few States have set non health-related standards, specifically for 60-hertz EMF, but Hawai‘i is not among them. Several state and national agencies have developed guidelines and policies to assist in the siting of future transmission lines and to aid in developing research into the potential effects of electric and magnetic fields. Some of the more relevant guidelines and policies relating to EMF are outlined below.

4.13.4.1.1 U.S. EPA

The U.S. EPA issued a booklet *Questions and Answers About Electric and Magnetic Fields (EMF)* (402-R-92-009) in December 1992. This document stated that neither the EPA nor any other federal regulatory agency has established a standard for EMF, because the scientific evidence is inadequate to determine if magnetic fields are harmful, and if they are, at what levels.

4.13.4.1.2 State of Hawai‘i Department of Health

On January 19, 1994, the Hawai‘i State Department of Health (DOH) issued a statement entitled “DOH Policy Relating to Electric and Magnetic Fields from Power-Frequency Sources.” The statement reads:

> *The Department of Health, in response to continuing but inconclusive scientific investigation concerning EMF from low-frequency power sources, recommends a “prudent avoidance”*

policy. "Prudent avoidance" means that reasonable, practical, simple, and relatively inexpensive actions should be considered to reduce exposure.

A cautious approach is suggested at this time concerning exposure to EMF around low-frequency sources, such as electric appliances and power lines. The existing research data on possible adverse health effects, including cancer, are inconclusive and not adequate to establish or quantify a health risk. For example, the biological mechanisms that might underlie any apparent relationship between EMF and cancer have yet to be clearly defined. Also, some epidemiological studies suggest that, if these fields increase the risk of cancer, it is a very small increase. Other epidemiological studies suggest that there is no increased risk.

The Department of Health will continue to collect and evaluate information on possible health hazards associated with electric and magnetic fields. If adequate data ever become available to establish what levels may be harmful, appropriate standards will be established.

4.13.4.1.3 State of Hawai'i Public Utilities Commission

In reaching its decision on the Waiau-CIP Transmission Lines Project,[92] the PUC considered the potential adverse health effects from the project's magnetic fields, including extensive testimony by national experts of different viewpoints submitted during the evidentiary hearing and related proceedings. The PUC's position on this issue is contained in its *Decision and Order*, which states:

Based upon a thorough examination of all of the evidence presented in this docket with regard to the possible health effects of exposure to EMF, we find that a causal link between EMF and adverse health effects has yet to be established by those in the scientific community who have been researching this matter. We will, however, expect HECO to exercise "prudent avoidance" with respect to EMF.

The PUC's position in the *Decision and Order* adopted the following explanation of prudent avoidance put forth by the EPA in its *Questions and Answers About Electric and Magnetic Fields (EMF)*:

Prudent avoidance is an approach to making decisions about risks. This decision-making process is based on judgment and values, can be applied to groups and individuals, and can be considered for all aspects of our lives, not just EMFs. Prudent avoidance applied to EMFs suggests adopting measures to avoid EMF exposures when it is reasonable, practical, relatively inexpensive and simple to do. This position or course of action can be taken even if the risks are uncertain and even if safety issues are unresolved.

4.13.4.1.4 Transmission Line Standards in Other States

Several states have adopted some form of electric field limits, and two states (Florida and New York) have magnetic field limits (see Table 4.39). According to the National Institute of Environmental Health Sciences (NIEHS), in most cases, the maximum fields permitted by each state are the maximum fields that existing lines produce at maximum load-carrying conditions. Some states further limit electric field strength at road crossings to ensure that electric current induced into large metal objects such as trucks and buses does not represent an electric shock hazard. None of the State standards in effect at the time of the NIEHS compilation was based on any established health-based conclusions. The widths of these rights-of-way vary greatly, according to the voltage of the lines and the regulatory requirements of each state.

[92] Hawai'i PUC Decision and Order No. 13201 issued April 7, 1994.

Table 4.39. State Regulations Limiting Field Strengths on Transmission Line Rights-of-Way

State Transmission Line Standards and Guidelines				
State	**Electric Field**		**Magnetic Field**	
	On R.O.W.*	**Edge R.O.W.**	**On R.O.W.**	**Edge R.O.W.**
Florida	8 kV/m[a] 10 kV/m[b]	2 kV/m	—	150 mG[a] (max. load) 200 mG[b] (max. load) 250 mG[c] (max. load)
Minnesota	8 kV/m	-	—	—
Montana	7 kV/m	1 kV/m[e]	—	—
New Jersey	-	3 kV/m	—	—
New York	11.8 kV/m 11.0 kV/m[f] 7.0 kV/m[d]	1.6 kV/m	—	200 mG (max. load)
Oregon	9 kV/m	—	—	—

Notes:
*R.O.W. = right-of-way (or in the Florida standard, certain additional areas adjoining the right-of-way).
kV/m = kilovolt per meter. One kilovolt = 1,000 volts.
[a] For lines of 69-230 kV.
[b] For 500 kV lines.
[c] For 500 kV lines on certain existing R.O.W.
[d] Maximum for highway crossings.
[e] May be waived by the landowner.
[f] Maximum for private road crossings.

Source: National Institute of Environmental Health Sciences, Questions and Answers Booklet (June 2002), EMF Rapid http://www.niehs.nih.gov/emfrapid/booklet/standard.htm

4.13.4.1.5 Swedish National Electric Safety Board

The Swedish National Electrical Safety Board (NESB, November 1995) stated, "Our knowledge regarding how weak magnetic fields affect humans is not sufficient to set any limit values." The agency, which is responsible for establishing a Swedish public EMF policy, decided not to set EMF exposure limits, but it did recommend caution. The NESB suggested the following guidelines:

- Strive to design and site new power lines and electrical installations in such a way that magnetic fields are reduced.
- Avoid building homes, schools, day care centers, and similar facilities in proximity to existing power lines that produce significant magnetic fields—but only if alternative sites are available.
- Work to limit high-level fields in existing homes, schools, and workplaces.

4.13.4.1.6 Other Guidelines

The International Commission on Non-Ionizing Radiation Protection of the International Radiation Protection Association (April 1998) has published guidelines for EMF exposure (see Table 4.40). The organization has confirmed the guidelines after considering evidence in laboratory and epidemiological studies of both occupational and general populations. Its conclusion is that the data related to cancer does not provide a basis for health risk assessment of human exposure to power frequency fields.

Table 4.40. Guidelines on Limits of Exposure to 50/60-Hz Electric and Magnetic Fields.

Exposure Characteristics	*Electric Field Strength (kV/m)*	*Magnetic Flux Density (mG)*
General Public Exposure	4.16	830
Occupational Exposure	8.3	4,160
Note: International Commission on Non-Ionizing Radiation Protection (ICNIRP) is an organization of 15,000 scientists from 40 nations who specialize in radiation protection.		
Source: International Commission on Non-Ionizing Radiation Protection of the International Radiation Protection Association. 1998.		

The American Conference of Governmental Industrial Hygienists (ACGIH) publishes "Threshold Limit Values" (TLVs) for various physical agents. The TLVs it has suggested for 60-Hz EMF are shown in Table 4.41. They are identified as guides to control exposure; they are not intended to demarcate safe and dangerous levels.

Table 4.41. ACGIH Guidelines for Occupational Exposure to 60-Hz EMF.

Exposure Guideline	*Electric field*	*Magnetic field*
Occupational exposure should not exceed	25 kV/m	10,000 mG
Prudence dictates the use of protective clothing above	15 kV/m	---
Exposure of workers with cardiac pacemakers should not exceed	1 kV/m	1,000 mG
Note: American Conference of Governmental Industrial Hygienists (ACGIH) is a professional organization that facilitates the exchange of technical information about worker health protection. It is not a government regulatory agency.		
Source: ACGIH, 2001.		

4.13.4.2 Health Effects of Electric and Magnetic Fields

4.13.4.2.1 Overview of Health Effects of Electric and Magnetic Fields

Public concern regarding possible health risks from residential and occupational exposure to low-strength, low-frequency electric and magnetic fields produced by power lines and electrical appliances has generated considerable debate among scientists and public officials. The concern over power frequency magnetic fields began with an epidemiological study of childhood leukemia, conducted by Wertheimer and Leeper in Denver, Colorado, in 1979. Until this study, no association between magnetic fields and human health had been reported. Since then, some epidemiology studies have reported similar associations while others have not.

Epidemiology is the study of patterns of health and disease in human populations. Interpretation of epidemiological studies regarding potential causal relations between exposures and health outcomes is a complex process and relies upon a wide range of supporting data. Although there have been studies that reported positive associations between magnetic fields and human health effects, the number of well-designed studies supporting this association are not sufficient in themselves to conclude that the association is causal.

Mechanistic and animal toxicology studies have failed to demonstrate any consistent pattern of biological effects, including increased cancers in animals. This lack of connection between human data (epidemiology) and the experimental data (mechanistic and animal) weakens the belief that this association is actually due to EMF.

In 1992, Congress mandated an EMF research program, which was managed by the NIEHS. In 1998, the NIEHS convened a Working Group to evaluate the results of this research program and other EMF research. The Working Group concluded that the epidemiologic data was limited, but they categorized EMF as possibly carcinogenic. At the same time, using the methods routinely applied by of the National Toxicology Program (NTP) of the National Institute of Health (NIH), the NIEHS concluded that EMF exposure would not be listed in the NTP Report on Carcinogens as a "known human carcinogen" or as "reasonably anticipated to be a human carcinogen." The NIEHS reported to the U.S. Congress that the probability that EMF is a health hazard is relatively small and evidence is insufficient to warrant aggressive regulatory actions (NIEHS 1999). It recommended that:

> *"…the power industry continue its current practice of siting power lines to reduce exposures and continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards" (p. 38).*

The NIEHS further stated:

> *The NIEHS believes that the probability that ELF-EMF [Extremely-Low-Frequency EMF] exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal, scientific support that exposure to this agent is causing any degree of harm…. The NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard.* [NIEHS, 1999, p.36]

In 1999, the National Academy of Sciences National Research Center (NRC), after reviewing and evaluating the research conducted under the DOE/NIEHS National EMF Research and Public Information Dissemination (EMF-RAPID) Program, stated:

> *The results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger.... In view of the negative outcomes of the EMF-RAPID replication studies, it now appears even less likely that MFs [Magnetic Fields] in the normal domestic or occupational environment produce important health effects, including cancer.* [NRC, 1999, pp.78 and 8]

4.13.4.2.2 Results of Subsequent Evaluations of EMF Research

The epidemiological and laboratory data published in the United States after the NIEHS report was completed in 1998 have provided additional evidence that EMF does not contribute to childhood cancer. For example:

- A large (more than 1,000 cases) and well-designed epidemiologic study of childhood leukemia was conducted in England by the United Kingdom Childhood Cancer Study investigators (UKCCS 1999). These researchers reported no increased risk of leukemia in those children with average annual exposures to EMF from 2 mG up to 4 mG in the home and school. No statistically significant increase was found for children whose exposure was above 4 mG, that is, a small increase was reported but chance could not be excluded as an explanation.

- Investigators at the National Cancer Institute reported no association between childhood leukemia and EMF in their study (Linet et al. 1997), and a reanalysis using a different measure of exposure also found no evidence of cancer risk (Kleinerman et al, 2000). In addition, the majority of studies of breast cancer have not supported an association with residential EMF (Gammon et al, 1998; Forssén et al, 2000; Kabat et al, 2003; London et al, 2003; Schoenfeld et al. 2003).
- Laboratory studies published after the NIEHS report, some of which were part of the research program and available for review by the NIEHS, provide evidence for a lack of carcinogenicity, or provide no basis to conclude that EMF affects the development or promotion of cancer (e.g., Babbitt et al, 1998; Anderson et al, 1999; Boorman et al, 1999; McCormick et al, 1999; Morris et al, 1999; Mandeville, 2000).

Several organizations outside of the United States have sponsored comprehensive reviews of EMF research by multidisciplinary groups of scientists. The International Agency for Research on Cancer (IARC), the International Commission on Nonionizing Radiation Protection (ICNIRP), the Health Council of the Netherlands (HCN), the National Radiological Protection Board of Great Britain (NRPB) have all convened large groups of independent scientists with different expertise (epidemiologists, toxicologists, biologists, neurobiologists, physicists, etc.) to review the body of literature surrounding EMF and health. Each organization has produced a report that is available to the public.

- IARC reviewers evaluated the animal data and concluded that they were "inadequate" to support a risk for cancer. The scientists stated that the EMF data does not merit the category "carcinogenic to humans" or the category "probably carcinogenic to humans," nor did they find that "the agent is probably not carcinogenic to humans." Many hypotheses have been suggested to explain possible carcinogenic effects of electric or magnetic fields; however, no scientific explanation for carcinogenicity of these fields has been established (IARC 2002). In the rating system used by IARC, the recognition of an association between exposure and cancer in epidemiology studies is considered "limited evidence" of carcinogenicity. A rating of "limited evidence" for epidemiology studies, even without any evidence from laboratory studies that an exposure might pose a cancer risk, requires that the exposure be categorized as a "possible carcinogen," even though chance, bias and confounding cannot be ruled out with reasonable confidence (IARC, 2002).
- The IARC Working Group did not regard the association between magnetic fields and childhood leukemia as reflecting a causal association because there was insufficient evidence from epidemiology studies that magnetic fields caused cancer in humans, insufficient evidence that magnetic fields caused cancer in laboratory studies of animals, and no evidence for a mechanism to lead to cancer. The Working Group concluded that the epidemiologic studies do not provide support for an association between childhood leukemia and residential magnetic fields at intensities less than 4 mG. Overall, magnetic fields were evaluated as "possibly carcinogenic to humans" (Group 2B), based on the statistical association of higher-level residential magnetic fields with childhood leukemia. Other very common materials have been classified as 2B as well, including coffee, pickled vegetables, and gasoline engine exhaust.
- Reviews of the scientific research regarding EMF and health by the HCN were published in 2000 and updated in 2001 and 2004. ICNIRP published its review in 2003. The NRPB published reviews in 2001 and 2004, which included comprehensive discussions of the individual research studies. The assessments by the NIEHS, IARC, ICNIRP, NRPB, and HCN agree that there is little evidence that EMF is associated with adverse health effects, including most forms of adult and childhood cancer, heart disease, Alzheimer's disease, depression, and reproductive effects. However, all of the assessments concluded that epidemiology studies in total suggest a possible association between magnetic fields at higher exposure levels (annual average greater than 4 mG) and childhood leukemia. All agree that the experimental laboratory data do not support a causal link between EMF and any adverse health effect, including leukemia, and have not concluded that EMF is, in fact, the cause of any disease. These organizations have not recommended exposure

limits or required measures to reduce exposures since they have not concluded that a causal relationship between EMF and adverse health effects exists.

California EMF Program. In response to a request from the California Public Utilities Commission, three scientists from the California EMF program (two epidemiologists and a physicist) reviewed the scientific research regarding EMF and health (Neutra et al. 2002). The scientists agree that EMF is not a universal carcinogen. After evaluating data regarding thirteen health conditions, they concluded that the epidemiologic data provided little support for an association of EMF with nine of the conditions. For the rest, they expressed the belief "that EMFs can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's disease, and miscarriage." Their median "confidence ratings" for these conditions, however, was not high enough to indicate any strong certainty or "high probability" that EMF was a cause of these conditions.

NIEHS Update. At the time the conclusions of the California EMF Program became available, the NIEHS published a brochure on questions and answers on EMF and health (NIEHS 2002). It characterized the status of scientific knowledge of the relationship between EMF and health as follows:

> *Over the past 25 years, research has addressed the question of whether exposure to power-frequency EMF might adversely affect human health. For most health outcomes, there is no evidence that EMF exposures have adverse effects. There is some evidence from epidemiology studies that exposure to power-frequency EMF is associated with an increased risk for childhood leukemia. This association is difficult to interpret in the absence of reproducible laboratory evidence or a scientific explanation that links magnetic fields with childhood leukemia* (p. 57).

The NIEHS also noted that:

> *At the current time in the United States, there are no federal standards for occupational or residential exposure to 60-Hz EMF (p. 57).*

4.13.5 FORECAST LEVELS OF EMF

As discussed in the following subsections, all of the forecast EMF levels for the proposed project are far below those which have been deemed potentially harmful to human health by any of the aforementioned governmental and scientific bodies.

4.13.5.1 Generating Equipment

Electric Field. The power conductors within the generating station would be inside grounded metal housings (e.g., the conductor would be inside a shielded cable, the bus conductor inside an Isophase bus enclosure, etc.). Because of this shielding, the electric field outside the conductor enclosure or cable shield would be negligible. The grounded metallic enclosure forms the shield for the conductor and contains the electric field inside.

Magnetic Field. The magnetic field strength decreases sharply with distance from the source of the field. The magnetic field from a transformer is typically reduced by about 90 percent at a distance of about 20 feet away from the facility. The electrical generating equipment, including the transformer, is a minimum of 300 hundred feet from the eastern property line and farther from other property lines. Because of the distance of the equipment from the station property line, the magnetic field strength is anticipated to be reduced to ambient levels at the generating station perimeter.[93]

[93] Note that all the EMF calculations were based on the maximum anticipated current flow through the conductors and were performed at a calculation height of 1 meter above ground level (3.28 feet), in accordance with IEEE Standards (IEEE 1994).

4.13.5.2 Substation Power Feed

Electric Field. Since the power conductors from the generator transformer to the substation will be installed within conduit, the cables will not produce an electric field external to the concentric cable shield and metallic sheath.

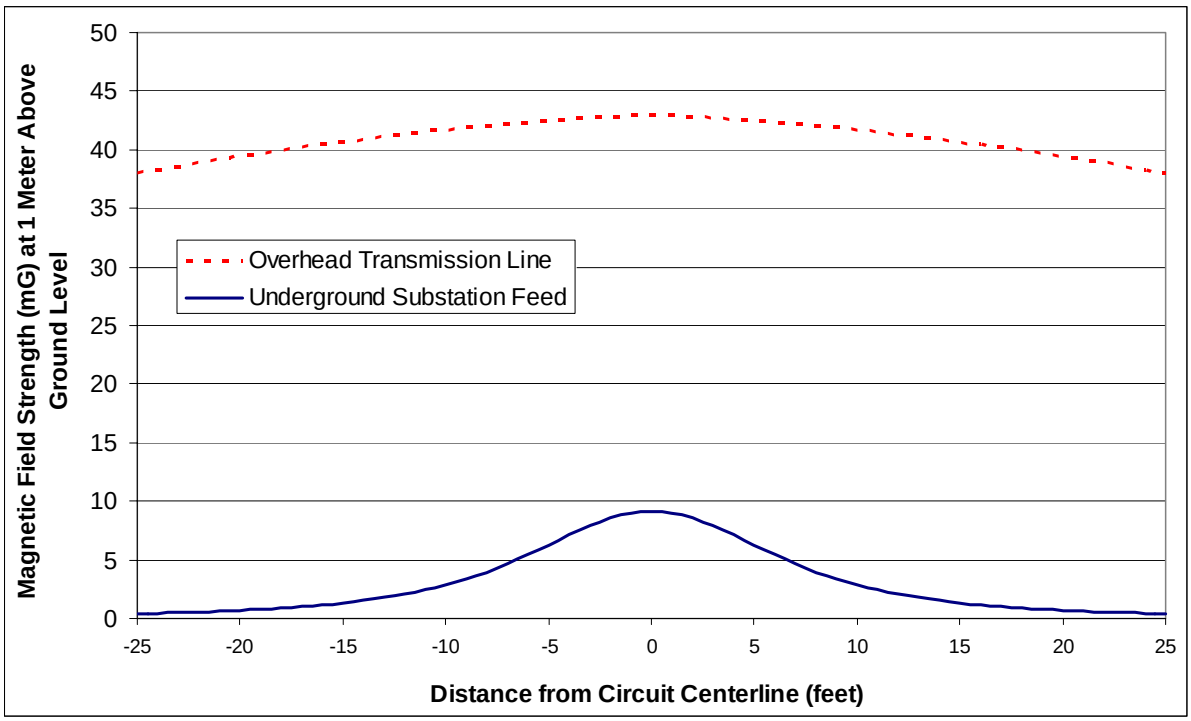
Magnetic Field. The estimated magnetic fields from the underground cables connecting the generator transformer to the substation are shown in the bottom part of Figure 4.25. This graph indicates that the highest magnetic field strength at the closest property line (approximately 80 feet away from the cables) will be less than 0.2 mG.

4.13.5.3 Overhead Transmission Lines

Electric Field. Calculated levels of the electric field strength as a function of distance from the transmission centerline as shown in Figure 4.26. As the nearest property boundary is approximately 25 feet away from the transmission line, the maximum anticipated field at the edge of HECO's property is less than 0.4 kV/M.

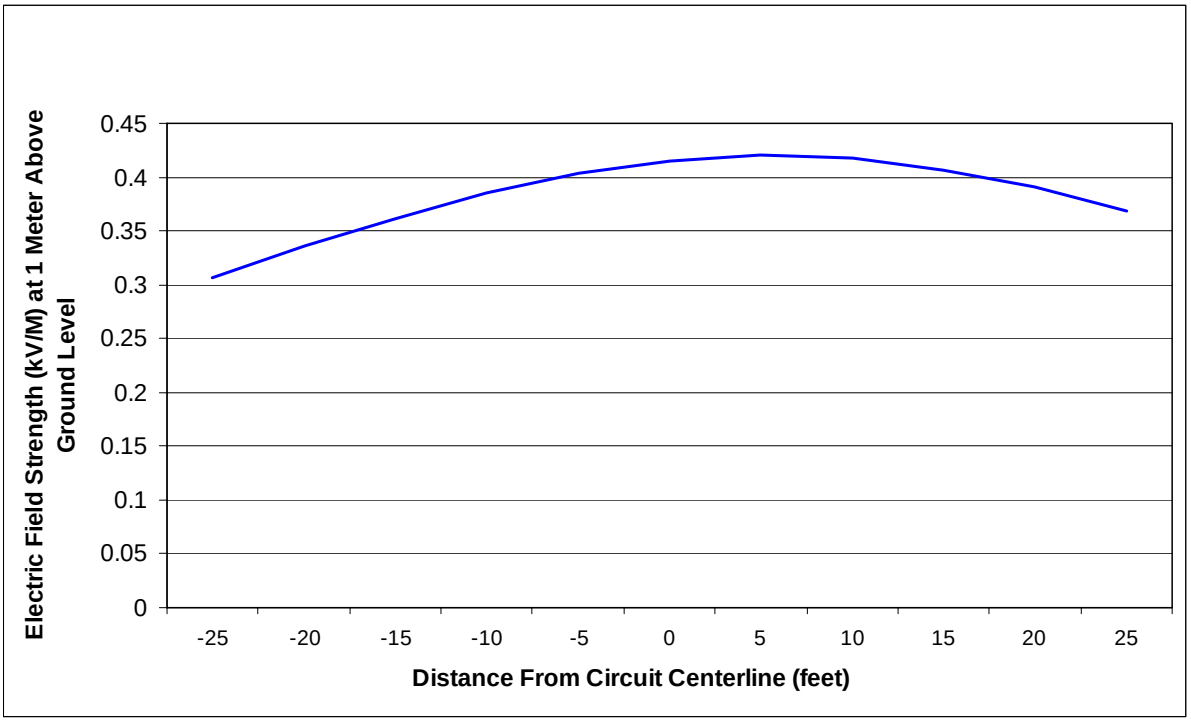
Magnetic Field. The calculated magnetic fields produced by the proposed new overhead transmission line are shown in Figure 4.25. At the property boundary, 25 feet from the centerline, the estimated magnetic field strength is approximately 38 mG.

Figure 4.25. Estimated Magnetic Field Values.



Source: Personal communication from Sargent & Lundy, May 2005, to Robert Isler, Hawaiian Electric Company.

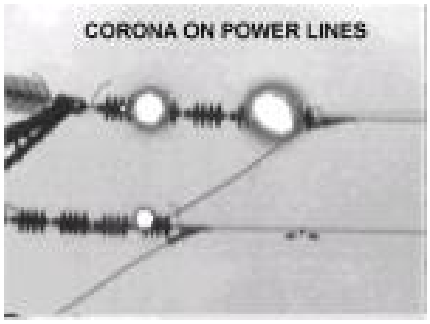
Figure 4.26. Estimated Electric Field Strength Values.



Source: Personal communication from Sargent & Lundy, May 2005, to Robert Isler, Hawaiian Electric Company.

4.13.6 OTHER TRANSMISSION LINE ELECTRICAL FACTORS

In addition to health-related effects, the potential for the proposed project to cause other electrical phenomena and effects was also evaluated. The results of that evaluation are summarized below.



Corona. Overhead high-voltage transmission lines can sometimes produce a corona. An example is shown in the picture to the right. A corona discharge is an electrical discharge brought on by the ionization of a fluid surrounding a conductor, which occurs when the potential gradient exceeds a certain value, in situations where sparking is not favored. Corona is the physical manifestation of energy loss and can transform energy into very small amounts of light, sound, radio noise, chemical reaction, and heat. During corona activity, overhead transmission lines generate a small amount of sound energy, but this rarely occurs with the 138 kV voltage that is proposed. The corona effect is well understood by engineers and good design practice can prevent coronas from forming for lines rated at 230kV and lower.

In view of the foregoing, no corona is anticipated from the overhead 138 kV line that is proposed. Corona does not occur with underground lines such as the configuration that is an alternative to the proposed overhead design.

***Radio and Television Interference*.** Overhead transmission lines do not, as a general rule, interfere with normal radio or television reception. There are two potential sources of interference: corona and gap discharges. Corona may affect AM radios; gap discharge can affect television and radio reception.

- As described above, corona discharges can sometimes generate unwanted electrical signals. Corona activity is minimized by proper line design and, therefore, is almost never a source of interference, especially on lines (such as the one that is proposed) having voltage lower than 230kV. Radio and television interference does not occur at all with underground lines, such as those proposed for this project.
- Gap discharges on overhead lines are a very different problem. They are caused by electrical discharges between broken or poorly fitting hardware (e.g., insulators, clamps, and brackets). The discharges act as small transmitters at frequencies that may be received on some radio and television receivers. The transmission line hardware is designed and installed to be problem-free, but gunshot damage, wind motion, or corrosion damage sometimes can create conditions in which gap discharges occur. In such instances, small electrical discharges can occur at intermittent gaps at connection points between hardware items. This phenomenon is not limited to transmission lines and can often be found on distribution lines. HECO engineers can locate and repair gap discharge sources. Underground lines, such as the lines proposed for this project, will not produce gap discharges.

***Ozone*.** Ozone is another possible byproduct of very high-voltage overhead transmission lines (345kV and above) that have been constructed in Europe and on the Mainland. Ozone (0_3) can be formed from charged air molecules through the combination of three oxygen atoms. The type of 138 kV overhead lines that HECO is proposing does not normally produce significant amounts of ozone. The same is true for the underground option.

***Cardiac Pacemakers: Electric Fields*.** Another concern associated with some of the high-voltage transmission lines (usually 345kV or higher) is the possibility of interference with cardiac pacemakers. There are two general types of pacemakers: asynchronous and synchronous.

- Asynchronous pacemakers pulse at a predetermined rate. This type of pacemaker is practically immune to interference because it has no sensing circuitry and is not exceptionally complex.
- Synchronous pacemakers pulse only when their sensing circuitry determines pacing is necessary. The transmission line electric field that sometimes surrounds very high voltage lines is capable of causing a spurious signal on the pacemaker's sensing circuitry. Because this is a known issue, synchronous pacemakers are programmed to revert to an asynchronous or fixed pacing mode of operation when they detect a spurious signal (such as the 60-hertz signal emitted from electrical transmission lines).

Because cardiovascular specialists do not consider prolonged asynchronous pacing to be a problem, wearers of both types of pacemakers are safe around transmission lines. Underground lines, such as the lines being considered for this project, will not generate electric fields and will not interfere with cardiac pacemakers.

4.13.7 PRUDENT AVOIDANCE

In designing the transmission facilities that are the subject of this report, HECO has adopted strategies consistent with the Department of Health's prudent avoidance approach in routing and designing transmission lines. HECO will use computer modeling which examines factors such as the physical and electrical properties of existing overhead and underground circuits, including proximity to new circuits, loading of the existing and future power lines and current direction to determine whether, and to what extent, cancellation of magnetic fields can be achieved. HECO will phase the new circuits to achieve cancellation of magnetic fields in those areas where prudent avoidance measures can be implemented.

5.0 NO ACTION ALTERNATIVE

5.1 INTRODUCTION

Section 2.7.1 of this EIS sets the framework for the consideration of Alternatives and Section 2.7.2 describes the action alternatives to be considered in detail in the impact analysis portion of this EIS. These alternatives consist of implementing Alternative 1 (the proposed action), installing only one combustion turbine in conjunction with the transmission line (Alternative 2), constructing a single combustion turbine without adding a transmission line (Alternative 3), and installing only the transmission line without adding generating capacity (Alternative 4). Chapter 2 also describes a number of other power supply and transmission alternatives that HECO considered but eliminated when it became clear that they would not meet the objectives of the proposed action.

This chapter discusses the potential effects of the "No Action" alternative as required by HAR §11-200-17(f) (1). "No Action" consists of failing to install or arrange for the installation of the additional generating capacity needed to meet the demand for electricity on O'ahu and the transmission capacity needed to ensure that power from generating units in CIP can be reliably fed into O'ahu's electrical grid. Failure to balance demand and supply would lead to systematic load shedding (i.e. curtailing the supply of electricity to some customers), or, if the load-shedding were insufficient or could not be implemented in time, would lead to unplanned power outages of indeterminate geographic extent and duration. In either case, the adverse effect that this would have on HECO's customers would be substantial and HECO would fail to meet its PUC mandate to provide reliable power.

Simply put, "No Action" avoids capital expenditures, operating expenses, and environmental effects associated with the construction and operation of electrical generating and transmission facilities at the ever-increasing risk (and eventual certainty) of converting the "savings" into a penalty and transferring it to the ratepayers by curtailing their electrical service and quality of life. The costs to customers of temporarily halting the supply of electrical power to certain areas – commercial enterprises, in particular – are very high. It cannot be emphasized too strongly that this alternative would not meet the objectives of the proposed action listed in Section 1.5. Instead, "No Action" is included because it is needed to fulfill the requirements of Chapter 343, Hawai'i Revised Statutes.

In order to understand the implications of not installing the additional generating and transmission capacity at the CIP, HECO:

- Assessed the extent to which the generating and transmission capacity of its system could continue to meet their customers' needs and their obligation to serve under current and future scenarios.
- Identified scenarios through which the expected generating capacity shortfall could be made up by load-shedding, i.e., the purposeful suspension of service to customers (blackouts).
- Assessed the implications that the suspension of service would have on its customers.

The remainder of this Chapter discusses these topics in more detail. Section 5.2 quantifies the shortages in generating capacity that would eventually occur as demand for energy increases. Section 5.3 discusses the way load reduction can occur. Finally, Section 5.4 examines the economic impact of the no action alternative.

5.2 NO ACTION EFFECT ON RELIABILITY

5.2.1 GENERATING CAPACITY-RELATED OUTAGES

The amount of generating capacity on O'ahu has been sufficient for at least fifty years to prevent the need for planned customer outages (e.g. rolling blackouts). This is in large part due to the backup (reserve) capacity that HECO has maintained in its system. If current trends continue and no action is taken, this record will not continue. The company's generating reserve margins have dropped to the

point where a mechanical failure (an unplanned outage) in a large unit during a period of high usage could already leave HECO's system with insufficient generating capacity to meet the demand. As demand continues to increases, the risk of periods of insufficient system capacity also increases. If present trends continue and additional generating capacity is not added to the system, electrical service will have to be rationed on a regular basis.

HECO carefully schedules its regular maintenance on generating units to make sure that it always has enough generating capacity available to meet the expected demand. For the same reason, HECO also must coordinate its maintenance schedules with the independent power producers. In part, this entails scheduling major overhauls on large units during the months when the demand for electricity is traditionally lowest. The amount of downtime needed for this differs from unit to unit and from year to year, but typically ranges from two weeks to twelve weeks per year for each generating unit. In addition to maintaining sufficient generating capacity so that it can carry out this scheduled maintenance, HECO must keep generating units on standby so that it can pick up the load immediately if one of the units in operation experiences a problem that requires it to be taken off-line unexpectedly. In order to supply its customers when equipment failures occur, HECO maintains what is called "spinning reserve."[94] Two factors are making it ever more difficult to keep this reserve at desirable levels.

- First, as the peak demand on the system has grown over time without an off-setting increase in generating capacity, more and more of the capacity is needed just to meet the current demand. This has left less capacity "in reserve" for use if something breaks.
- Second, as its equipment has accumulated run-hours over the years, more time must be spent performing scheduled maintenance and the frequency of breakdowns requiring unscheduled maintenance increases. Coupled with rising demand, this increases the risk of electrical service interruptions.

When all of the generating units that are available are already committed and something breaks, HECO must stop supplying power to some customers. In other words, a "service interruption" (i.e., "blackout") results.

As discussed in Chapter 1 of this EIS, HECO's generation capacity planning criteria include a calculation of the risk[95] (expressed in years per day) of service interruptions and stipulate that corrective action be considered when the risk exceeds the specified threshold. Simply stated, in order to satisfy the criteria, HECO must have enough generating capacity in its system that, on average, it is unable to meet all of the demand no more than once every 4.5 years. A number greater than 4.5 years per day is desirable. A number less than 4.5 years per day indicates a lower level of reliability and an increased risk of generation-related customer outages.[96]

[94] "Spinning reserve" is electric power plant or utility capacity on-line and running at low power in excess of actual load.

[95] This risk is usually expressed as the Loss of Load Probability ("LOLP") and is a measure of the probability on a given day of not having sufficient generation available to serve the system load, due to forced outages of one or multiple generating units (owned by HECO or IPPs). LOLP is computed using an hour-by-hour computer simulation that takes into account projected system daily peak loads to be served by central station generation, scheduled maintenance, and unit forced outage rates (expressed as equivalent forced outage rate ("EFOR"). Energy efficiency DSM programs, interruptible load management DSM programs, and customer-sited CHP resource also have an effect of reducing the daily peak load, so they affect the LOLP calculation as well. While LOLP gives HECO an indication of the probability that the peak demand may or may not be served, it does not provide a measure of the expected duration of outages due to insufficient generation, the magnitude (in MW) of the outage, or the projected number of unserved kilowatt-hours (kWh) or customers due to insufficient generation.

[96] The probabilities are estimated on the basis of numerous forecasts and assumptions. Whether or not there are actual outages due to insufficient generation depends on factors that impact (1) the actual system load to be served (2) the extent to which scheduled maintenance of generating units is actually performed, (3) the equivalent forced outage rate (EFORs) for all units (see Section 1.3.2.9) that is actually experienced, and (4) HECO's ability to add firm generating capacity to its system. The actual system load to be served by HECO's power plants will be affected by (1) actual daily loads (versus forecasted loads and load profiles), (2) the amount of non-firm power that HECO is able to obtain from various sources (e.g., wind power), (3) the actual impacts (versus forecasted impacts) of HECO's CHP, energy efficiency DSM, and load management DSM initiatives (see Section 1.3.2.3 above).

HECO has used computer models to calculate the probability that it would be unable to provide all of the power that its customers demand because of a shortfall in generating capacity over the next fifteen years.[97] Those estimates are summarized in Table 5.1.[98] As can be seen from the table, the model suggests that a generation-related outage could occur at least once in each of the years between now and 2009. This probability of a shortfall is roughly four times greater (i.e., worse) than HECO's target. After that time, the calculated probability of a generation-related outage occurring if no additional generating capacity is added to the system increases until by the year 2020, the probability of a generation-related outage is more than six times HECO's target.

At the very least, the shortfall could adversely affect large numbers of customers by forcing HECO to suspend service temporarily to selected areas through rolling blackouts. At worst, it has the potential to disrupt service throughout the entire grid. If rolling blackouts were to be needed, their scheduling would be coordinated with various federal, state and county agencies. Additionally, HECO would ask the public through various media for voluntary reductions in their electricity consumption as a means of forestalling service interruptions. The frequency, duration, and the number of customers affected by scheduled rolling blackouts would depend upon the particular load profile and capacity shortages for each day.

Table 5.1. Probability of Generating Capacity Shortfall: 2009 to 2023.

Year	*Generation System Reliability (years/day)*	*Year*	*Generation System Reliability (years/day)*
2005	1.2	2013	0.7
2006	1.0	2014	1.9
2007	0.9	2015	1.7
2008	1.6	2016	0.8
2009	1.1	2017	1.4
2010	1.3	2018	1.2
2011	2.4	2019	0.8
2012	2.6	2020	0.7
Source: Table 1, HECO PUC Application, June 17, 2005, and other HECO estimates from IRP.			

5.2.2 TRANSMISSION-RELATED OUTAGES

5.2.2.1 Historical Transmission-Related Outages

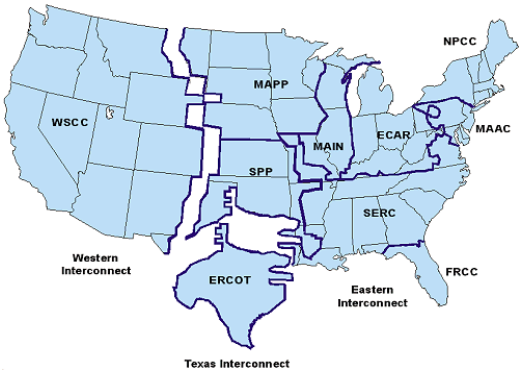
While HECO has been able to avoid generation-related outages in the past, this is not true of transmission-related outages. Here it is important to distinguish between power failures that result from the failure of small components of the distribution system (e.g., a small transformer or a pole)

[97] These estimates assume that HECO's electrical transmission and distribution system is intact. As discussed in Section 5.2.2, a failure in that system can make it impossible to utilize all of the generating units that would otherwise be available fully, exacerbating the electrical energy shortfall.

[98] Historically, the actual outage rate has been less than the rate calculated by the model. This is due in part to the extraordinary lengths that HECO personnel have gone to keep the system stable even when a series of problems occurs simultaneously. It is also due in part to good fortune. The company's past success in avoiding outages that the computer model predicts does not mean that it will be able to beat the odds in the future.

and those that are related to the large-scale electrical transmission system. Damage to, and failure of, the smaller components of the system occur on a near-daily basis, often due to uncontrollable events such as auto accidents. This typically affects only a few customers and the problems are resolved quickly. Failures in the 138 kV transmission system occur much less frequently.

HECO's transmission system is quite reliable. However, like all manmade systems, it is subject to disruption as a result of equipment outages, weather, human errors, and other factors. The fact that O'ahu is an island entirely reliant on its own resources is an important consideration in this regard. Other things being equal, the larger the system, the less susceptible it is to failure. As illustrated in the sketch to the right, all electric utilities in the mainland United States are connected to at least one other utility via a regional electrical transmission grid. These interconnections allow power to be transmitted over long distances from areas that have a surplus of power to those where the demand for electricity exceeds the supply. Because of its mid-Pacific location, O'ahu does not have the same ability to interconnect with other systems. Hence, it must maintain a higher level of internal reliability than its Mainland counterparts in order to provide the same level of service reliability to its customers.



Failure to add a third line to serve the CIP area would not increase the likelihood that the existing generating facilities would break. It would, however, increase the probability that the transmission lines from CIP could break and that the transmission system as a whole would be unable to adequately perform its essential function, which is to ensure that power from the company's generating system reaches its electrical substations so that it can be distributed to customers. This, in turn, would increase the likelihood that rolling blackouts might be needed and the potential for a system-wide blackout such as the 1991 outage described below.

The most recent example of a large-scale, transmission-related outage on O'ahu began at 7:42 a.m. on March 3, 2004. It affected approximately 40,000 customers in the Waikīkī, Mānoa, Pālolo, St. Louis Heights, McCully, Mōili'ili, Kaimukī, Diamond Head and Kapahulu areas of urban Honolulu for at least 45 minutes. Service to most customers was restored by 9:45 a.m., with service to the remaining customers restored by 11:20 a.m. At its peak, the outage affected approximately 14% of the electricity demand on O'ahu that morning. The principal cause of the outage was the failure of several modules in the microwave communication system used to control the electric transmission system. As in most outages of this size, there were a number of contributing factors. First, one of two 138-kV transmission lines serving the Pūkele Substation had been de-energized so employees could work safely on a transmission line structure. Second, the digital microwave communication system used to insure that the line remained de-energized while the work was being done malfunctioned. Together, these caused the circuit breaker on the second 138-kV line to open, the line to be de-energized, and the outage to occur. A much longer and more widespread system blackout occurred on April 9, 1991. In that instance, three major transmission lines were out of service (one for regular maintenance and two that tripped unexpectedly) and the resulting overloads on other lines caused them to shut down automatically. With nowhere for the power they were producing to go, the generating units that were on-line shut down. In the 1991 outage most of HECO's customers were without power for 8 to 12 hours.

5.2.2.2 Specific Circumstances at CIP

The existing generating units within the CIP area represent nearly a quarter of HECO's total generating capacity. Presently, CIP generation is operationally limited to a maximum of 180 MW (the capacity of the largest generating unit that is located there) whenever one of the two existing transmission lines serving the CIP area is out of service. This operational practice minimizes the

likelihood of a load-shedding event if the remaining transmission line trips. It does this by limiting the amount of generation subject to loss to no more than the amount of spinning reserve available.

In the past, with this 180 MW restriction to CIP generation, sufficient reserve capacity was available at HECO's three generating stations (Kahe, Waiau, and Honolulu) to cover the load for the duration of a line outage and maintain 180 MW of spinning reserve. However, there no longer is sufficient reserve generation capacity elsewhere in the system to provide sufficient spinning reserve if one of the two lines is out of service for repair and the other transmission line then trips unexpectedly. If that were to occur and the system were deprived of the ability to use any of the generating capacity installed in the CIP area, HECO could be forced to shed a substantial proportion of its load immediately. Even with the automatic load-shedding that the system provides, system frequency could drop to levels low enough to risk loss of other generating units and an outage of the entire power system.

5.3 WAYS LOAD REDUCTION CAN OCCUR

As the reserve margin continues to decline, the probability of an outage increases. When one does occur, it can be either planned and controlled or unplanned and uncontrolled. The effects that these can have are typically quite different from one another and are discussed separately.

5.3.1 PLANNED AND CONTROLLED LOAD REDUCTIONS

HECO constantly monitors the balance between the amount of electricity its customers are using and the amount that it is generating. This allows it to start and stop generating units over the course of a day so that it does not have to use more fuel than is needed. If the demand for power continues to increase over the coming years as expected, HECO will keep more of its units running more of the time. Forecasts indicate that it will be unable to meet all of the peak demand with the existing generating units it can place on line at any one time.

HECO has numerous standard operating procedures that govern what it will do to prevent a mismatch where demand exceeds supply if it sees one developing over the course of a day. These include contacting large users with whom it has interruptible power supply agreements and other large users with whom it has a regular working arrangement and asking them to curtail their use of electrical energy for period of time. In the case of those customers who have interruptible power agreements, HECO can actually disconnect them from the grid at any time and keep them disconnected until the shortage is past. Other users can be asked to reduce power use, but HECO cannot force them to comply with its request. HECO can also contact the public through the various media and request customers to curtail or reduce their power consumption for the duration of the identified shortage.

If demand exceeds supply despite this effort at voluntary load reductions and disconnection of customers with interruptible service agreements, HECO must begin disconnecting users from the grid without their permission. This is typically 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). HECO regards rolling blackouts as a last resort, but there are times when they are necessary. The timing, duration, and areas that must be disconnected in order to deal with a supply shortage depend on the availability of generating units and transmission and distribution circuits, as well as on judgments concerning which areas have the most critical need for power.

With few exceptions, it is not possible to disconnect a single customer. Instead, the finest level of control for planned load reductions is over individual transformers at substations that provide power to a group of users. HECO's procedures establish a priority for load-shedding. They call for it to maintain service to areas that contain activities that are critical to the maintenance of public health and safety (e.g., hospitals, wastewater pumping stations and treatment plants, water supply facilities, airport control towers, etc.) and to be equitable in the way that it disconnects areas that have only

non-essential activities (e.g., residences, shops, etc.). Areas such as Salt Lake, Pearl City, Mākiki, and Waikīkī in which high rises are concentrated are given an intermediate priority because of the way in which the interruption of service can stop operations of critical pieces of equipment such as elevators, fire alarm systems, etc. Whenever possible, HECO works with TV and radio broadcast stations to alert customers of affected areas ahead of time of the approximate times when rolling blackouts may affect their areas, but this cannot always be done.

5.3.2 UNPLANNED AND UNCONTROLLED LOAD REDUCTION

Unplanned and uncontrolled load reductions generally occur when an equipment malfunction suddenly affects HECO's ability to deliver power to its customers. As discussed in previous sections, this can result either from a mechanical problem that forces one or more generating units off-line or from a failure in the transmission system that makes it impossible for HECO to transmit power from the generating units to the areas where it is needed. While some problems with generating units develop so quickly that HECO is unable to reduce its load in an orderly manner, most historically "unplanned" load reductions have resulted from failures in the transmission system.

5.4 ECONOMIC IMPACTS OF BLACKOUTS

5.4.1 KINDS OF ECONOMIC IMPACTS

The geographic extent and duration of outages is so potentially variable that it is difficult to generalize about them. The economic cost of both unplanned outages and planned load reduction is dependent upon the duration of the outage, the extent of the area affected, and the specific uses that are interrupted by the outage.

At one end of the spectrum, short blackouts that affect limited geographic areas have very little long-term economic consequence for most individuals and businesses. They may waste individuals' time and prevent businesses from concluding sales at the time they would normally have done so. However, so long as the outages are infrequent and brief, they do not affect economic activity over the long term or cause most businesses to lose customers or transactions that they do not regain at a later date. In the case of rolling blackouts, HECO typically tries to limit the duration of the outage in any one area to less than an hour and to avoid disconnecting customers located in areas that have power-sensitive activities and land uses. Thus, so long as they remain very occasional events of limited duration, their collective economic impact tends to be relatively small.

While the kinds of power shortages that Hawai‘i has experienced in recent years have had limited effects, widespread, frequent, or long blackouts can cause substantial financial losses and have long-term economic effects. This is particularly true if they are recurring, something the United States in general and Hawai‘i in particular have not experienced for many decades. If the need for rolling blackouts persists (as it would if a conscious decision were made to forego the installation of additional generating capacity), the harm would compound over time, with each successive event adding its damage to the ones that preceded it. More importantly, repeated power shortages would cause businesses and individuals to limit investment, relocate activities, and make other business and family decisions that could have profound adverse effects on the economic health of the island.

Rolling blackouts represent a kind of planned outage. As discussed in the preceding sections, imbalances between supply and demand cannot always be accommodated in such an orderly manner. Despite all of the safeguards that are built into the electrical system to limit effects, a power disruption that in many circumstances would be limited to a small area sometimes propagates in such a way that outages cascade throughout a system. This is what happened on O‘ahu in 1991, and it is also what in 2003 on the mainland led to the most widespread power outage that the United States has ever experienced.

On August 14, 2003, large portions of the Midwest and Northeast United States and Ontario, Canada, experienced an electric power blackout (U.S.-Canada Power System Outage Task Force, April 2004). The outage affected an area with an estimated 50 million people and 61,800 megawatts (MW) of electric load in the states of Ohio, Michigan, Pennsylvania, New York, Vermont, Massachusetts, Connecticut, New Jersey and the Canadian province of Ontario. The blackout affected urban centers that are heavily industrialized and important financial centers (e.g., New York City and Toronto). Service in the affected states and provinces was gradually restored with most areas fully restored within two days, although parts of Ontario experienced rolling blackouts for more than a week before full power was restored (U.S.-Canada Power System Outage Task Force, November 2003).

A number of studies have been conducted that were aimed at estimating the cost of that blackout. These studies concluded that the total costs of the outage were between $4 billion and $10 billion, including a net loss of 18.9 million work hours, $4.2 billion in lost income to workers and investors, $15 to $100 million in extra costs to government agencies (e.g., due to overtime and emergency service costs), $1 to $2 billion in costs to the affected utilities, and between $380 and $940 million in costs associated with lost or spoiled commodities (ELCON 2004; Parks 2003; ICF Consulting, 2003; Anderson & Geckil 2003). On a per capita basis, these estimates indicate a cost of between $80 and $200 for every person in the affected area.

No detailed assessment of the economic impact of the 1991 O‘ahu outage is available. However, press reports from the time cite one unnamed local economist’s estimate that the total cost of the one blackout was on the order of $60 million. This cost estimate, which was approximately $70 per person in 1991 dollars (equivalent to about $94 dollars per person in 2003 dollars), is toward the low end of the range of estimates of the per-person cost of the 2003 mainland outage.

5.4.2 METHODOLOGIES FOR ESTIMATING THE ECONOMIC IMPACTS OF OUTAGES

5.4.2.1 General

Because power outages in Hawai‘i have been infrequent, no in-depth studies of the economic effects of power shortages here have been conducted that rely on locally collected data. However, some sense of the magnitude of these costs can be obtained by examining studies conducted on the Mainland and using these to estimate the effect if a similar outage were to occur in Hawai‘i. Some of the key results from three such studies are outlined below, and specific results from them are used in subsequent sections to infer the economic impacts if such outages were to occur on O‘ahu.

5.4.2.2 Lawton et al. Framework Report Methodology

This analysis draws upon the results of twenty-four studies conducted by eight electric utilities between 1989 and 2002 and representing residential and commercial/industrial (small, medium and large) customer groups (see Table 5.2). The studies cover virtually the entire Southeast, most of the western United States, including California, rural Washington and Oregon, and the Midwest south and east of Chicago. All variables were standardized to a consistent metric and dollar amounts were adjusted to the 2002 Consumer Price Index. These studies were chosen because they employed a common survey methodology including sample designs, measurement protocols, survey instruments and operating procedures.[99]

[99] This methodology is described in detail in the Electric Power Research Institute’s (EPRI’s) *Outage Cost Estimation Guidebook* (Sullivan and Keane, 1995).

Table 5.2. Summary of Studies Used in Lawton et al. 2003

Company Location	*Survey Year*	*Large Commercial & Industrial*	*Small / Medium Commercial & Industrial*	*Residential*
Southeast-1	1997		●	
Southeast-2	1993	●	●	●
	1997	●	●	●
Southeast-3	1990	●	●	
	1991	●		
Midwest	2002	●	●	
West	2000	●	●	●
Southwest	2000	●	●	●
Northwest-1	1989		●	●
Northwest-2	1999	●	●	●

Notes: After reviewing the variables and developing common metrics, a total of 24 studies were used to develop three outage costs datasets—a large commercial and industrial customer dataset (customer greater than 1 MW of demand); a small and medium commercial and industrial dataset; and a residential dataset. (In cases where the cells are merged, there was one study but the respondents were separated by usage into either small-medium or large Commercial and Industrial categories.)

Source: Lawton et al., November 2003.

Lawton et al.'s study summarizes unadjusted average outage costs reported in a number of previous studies and presents Tobit (multiple regression) models that estimate customer damage functions. The customer damage functions express customer outage costs for a given outage scenario and customer class as a function of four factors: (i) location, (ii) time of day, (iii) energy consumption, and (iv) business type. The damage functions can be used to calculate outage costs for specific customer types. Results were developed in two basic formats: (1) summary (bivariate analysis) tables for various scenario factors and customer characteristics for an outage of one hour, and (2) customer damage functions using multiple regression (Tobit) models for estimating outage costs while controlling for all factors simultaneously. The Tobit models predict that the average cost experienced by an "average" customer for a single summer afternoon outage of one hour is approximately $3 for residential, $1,200 for small-medium commercial and industrial, and $82,000 for large commercial and industrial. The study found that outage costs increase substantially, but not linearly, as the outage duration increases from one to eight hours; it also revealed important differences in outage costs across regions, time of day, customer size, and business type.[100]

[100] Use of the data is subject to several caveats. The most important of these is collinearity, which means that the findings are inextricably linked to aspects of the original studies from which they were derived and that, therefore, the extrapolations cannot be fully supported on statistical grounds. In addition, as noted earlier, data on the Northeast and some areas of the Midwest were not available for inclusion in this initial study. Finally, the original studies were not identical in every respect; all variables were not collected consistently by each study. Nonetheless, though the outages of similar type and duration in Hawai'i might not yield results identical to these studies, the studies do provide a sense of the range of economic impacts that would likely emerge if Hawai'i endured similar outages.

Table 5.3. Summary of Predicted Outage Costs: Mainland United States.

Time and Duration	*Residential*	*Small Commercial & Industrial*		*Large Commercial & Industrial*	
		Cost per Event	*Cost per Employee*	*Cost per Event*	*Cost per Employee*
Summer Afternoon -- 1 Hour	$2.90	$1,200.00	$54.54	$8,200.00	$21.98
Summer Afternoon - 8 Hour	$7.20	$4,400.00	$200.00	$41,000.00	$109.91
Winter Afternoon -- 1 Hour	$3.30	$1,800.00	$900.00	$20,000.00	$53.62
Winter Afternoon --8 Hour	$8.32	$6,300.00	286.36	$105,000.00	$281.50
Note: The average large commercial and industrial customer had 373 employees. The average small commercial and industrial customer had 22 employees.					
Source: Lawton et al., November 2003.					

The graphs from the study that are reproduced as Figure 5.1 and Figure 5.2 illustrate some of the ways in which the costs can vary as a function of duration, business type and the time of day or season when the outage occurs.

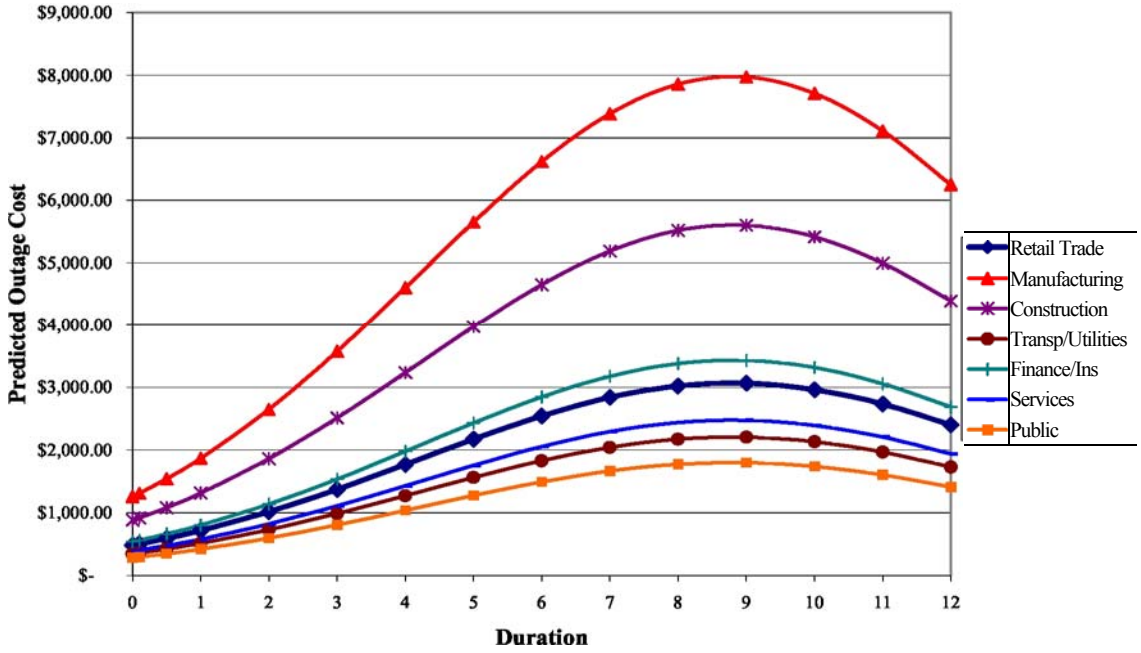
5.4.2.3 Willingness to Pay Approach

Another way to estimate the economic costs of a power outage is to calculate consumer's willingness-to-pay (WTP) to avoid such outages. This is also referred to as the "Value of Service" (VOS) because it indicates how much a customer of the utility values a particular level of reliability. This gives a measure of the "worth of reliability" of electrical services measured in terms of the amount that customers are willing to pay for that reliability.

Several studies provide survey-based estimates of this WTP for different groups of electric customers.[101] The following discussion draws on the methodology and data contained in Energy and Environmental Economics, Inc. (February 2005) report estimating the cost of wildlife-caused power outages to California's economy. In this approach, the total cost of outages is the sum of the costs customers incur as a result of a sustained outage and the cost the utility incurs in restoring service. In all but outages of very short duration, the cost to customers tends to be substantially larger than those to the company. The customer outage cost equals: (a) the total unserved energy in kWh; multiplied by (b) the unit outage cost ($/kWh unserved) (Forte et al. 1995).

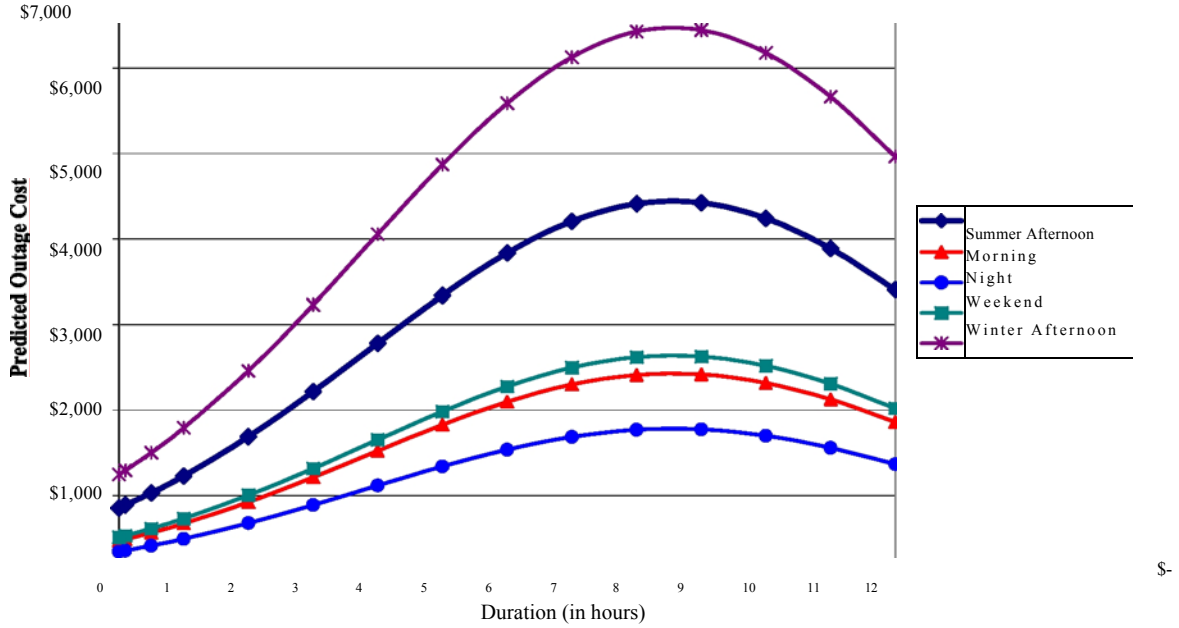
[101] For example, an analysis done on the 1977 outage in New York City that resulted in a loss of more than 5,000 MW and lasted for 25 hours estimated that the direct cost (for example, losses due to spoilage, and lost production and wages) was about $0.66/kWh, and the indirect cost (due to the secondary effects of the direct costs) was $3.45/kWh. Thus the total unit cost of that blackout was $4.11/kWh or over $4,000/MWh in 1977 dollars. This estimate was based on the national average retail price of electricity in 1977 for all customers, which was about $34/MWh. Similar ratios were identified during the simulation scenario on the California grid.

Figure 5.1. Customer Damage Functions Varying Business Type.



Source: Lawton et al., November 2003, Figure 4-6.

Figure 5.2 Customer Damage Functions Varying Time of Day and Season.



Source: Lawton et al., November 2003, Figure 4-4.

A Value of Service estimate reflects the usefulness and/or necessity of electricity to the consumer. It is the net benefit customers derive from using the electricity (i.e., the gross benefit minus the cost of the electricity). If there were a market for reliability, then electricity consumers would buy varying degrees of it to achieve their desired tradeoff between cost and reliability. In this case, the market price of reliability would allow a direct inference of Value of Service. But it is not practical to give each household a choice as to the level of reliability they want to purchase. As a result, Value of Service is generally taken to be the same as the costs that a customer would incur if she or he were deprived of the power. For example, if an individual normally earned $20 per hour and were unable to work for five hours because of an outage, the cost of the outage to that individual would be calculated at $100 (5 hours x $20/hour).[102]

A common Value of Service estimation method is to analyze survey data. The analysis can range from examining simple descriptive statistics (such as the average cost per outage) as was done by Pacific Gas and Electric Company (PG&E 2000) to sophisticated econometric modeling (Southern California Edison [SCE] 1999); Lawton et al. 2003). Absent consensus on which type of estimate can best provide the "true" value of an outage cost estimate, these researchers develop three types of estimates: Willing to Pay (WTP); Direct Costs (DC); and Willingness to Accept (WTA). These also differ between electric user groups, particularly residential and nonresidential (e.g., agricultural, commercial, industrial, etc.) user groups, as discussed below.

5.4.2.3.1 Residential Customer Outage Costs

Table 5.4 reports the estimated cost per kWh unserved for residential customers in California. This table presents this Value of Service data in 2004 dollars, using the Consumer Price Index published by the California Department of Finance. It indicates that the WTP estimates from SCE and PG&E are between $1.40 ~~to~~ and $3.80 per kWh unserved, the WTA estimates from SCE are between $2.90 ~~to~~ and $9.70 per kWh unserved, and the DC estimates from PG&E are between $5 ~~to~~ and $9.40 per kWh unserved. An initial inference from these findings is that the lower bound of the residential outage cost range should exceed $1 per kWh unserved and the upper bound should be around $9.70/kWh unserved depending upon the length of the outage. Table 5.5 compares the average costs (not adjusted for inflation) per outage for four outage types, thus providing a check of the reasonableness of the range shown in the previous table.

5.4.2.3.2 Nonresidential Customer Outage Costs

Based on Southern California Edison (SCE) (1999) and Pacific Gas and Electric Company (PG&E 2000) outage cost studies, Table 5.6 reports the estimated costs per kWh unserved for nonresidential customers in California. This table employs the CPIs published by California Department of Finance to adjust all original estimates (which were based on the dataset used for the original studies) to 2004 dollars.

[102] An outage cost estimate can be *ex ante* (before an outage occurs) or *ex post* (after an outage occurs). An example of an *ex ante* outage cost estimate is the amount of bill savings required to make a customer indifferent between the service reliability under the standard tariff and the one under a curtailable service rate option. An *ex post* outage cost refers to what the consumer suffers from an actual outage. Since this report focuses on the economic loss due to outages, it uses *ex post* estimates.

Table 5.4. Residential customer outage Cost in $/kWh Unserved in California.

Outage Type	SCE Estimates Based on SCE 1999		PG&E Estimates based on PG&E 2000	PG&E Estimates based on Woo and Pupp 1992 (Table 2)	
	Willingness to pay (WTP)	Willingness to accept (WTA)	Direct Cost (DC)	Willingness to pay (WTP)	Direct Cost (DC)
Summer weekday afternoon: 1 hour	N.A.	N.A.	5.10	3.80	8.50
Summer weekday evening: 1-hour	4.60	9.70	N.A.	N.A.	N.A.
Summer weekday afternoon: 4-hour	1.50	3.10	5.00	2.00	7.40
Summer weekend afternoon 4-hour	1.40	2.90	N.A.	N.A.	N.A.
Summer weekday morning: 8-hour	1.60	3.80	N.A.	N.A.	N.A.
Summer weekday afternoon: 12-hour	N.A.	N.A.	N.A.	1.50	6.60
Winter weekday afternoon: 4-hour	N.A.	N.A.	7.20	2.30	9.40
Winter weekday afternoon: 8-hour	1.60	4.40	N.A.	N.A.	N.A.
Winter weekday morning: 12-hour	N.A.	N.A.	N.A.	1.60	7.20
Source: Energy and Environmental Economics, Inc. (February 2005), Table 1.					

Table 5.5. Comparison of the Estimates in Dollars per <u>Residential</u> Outage Event.

Outage Type	Lawton et. Al. (p. 46)	SCE 1999 (p.60)		PG&E 2000	Woo and Pupp 1992 (p. 116)	
	WTP	WTP	WTA	Direct Cost	WTP	Direct Cost
Summer afternoon: 1 hour	2.60	4.70	9.90	4.40	1.85	4.10
Summer afternoon: 8-hour	7.20	8.20	20.10	N.A.	N.A.	N.A.
Winter afternoon: 1-hour	3.30	N.A.	N.A.	N.A.	3.33	12.1
Winter afternoon: 8-hour	8.30	8.30	22.40	N.A.	N.A.	N.A.
Source: Table 2, Energy and Environmental Economics, Inc. (February 2005).						

Table 5.6. California Nonresidential Customer Outage Cost in 2004 $/kWh Unserved.

Outage Type	SCE Estimates in 2004 dollars per kilowatt-hour unserved				PG&E Estimates in 2004 dollars per kilowatt-hour unserved (based on PG&E 2000, p.22)		
	Commercial/ Industrial WTP	Commercial/Industrial Direct Cost			Commercial Direct Cost	Industrial Direct Cost	Agricultural Direct Cost
		Lost Product	Idle Input	Total			
Summer Weekday afternoon: 1 hour	$10.00	$158.90	$90.00	$248.90	$68.20	24.80	11.50
Summer Weekday Evening: 1-hour	$9.60	$308.50	$110.20	$418.70	N.A.	N.A.	N.A.
Summer Weekday afternoon: 4-hour	N.A.	N.A.	N.A.	N.A.	40.60	12.70	11.70
Summer Weekday: 12-hour	$3.00	$75.20	$41.80	$116.90	N.A.	N.A.	N.A.
Winter Weekday afternoon: 4-hour	$15.90	$114.90	$60.90	$175.80	51.90	16.00	N.A.

Note: The SCE (1999) estimates are high relative to others reported in the literature, most of which are less than $30/kWh unserved. This large difference is likely due to the way that SCE estimates the unserved energy per outage using the average customer 1995 load information for SCE's Commercial and industrial (C&I) customers with 0–1,000 kW peak demand. The source report makes the point that even if the per-event outage cost estimates from two studies are similar for an identical event, the $/kWh estimate (which is what is shown in this table) in one study can be much higher if it uses a lower estimate of the per event unserved energy.

Only PG&E provides VOS data for agricultural customers, which likely reflects that Northern California has more agricultural customers than Southern California.

Source: Table 3, Energy and Environmental Economics, Inc. (February 2005).

Table 5.7. Comparison of California Estimates of $ per Outage Event Per Commercial and Industrial Customer.

Outage Type	Lawton et. al. (2003 p. 46)		SCE 1999 (p.66)		PG&E 2000 (p.21)	
	Small C/I	Large C/I	Lost Sales	Idle Factor	Commercial	Industrial
Summer afternoon: 1 hour	$1,200	$8,200	$1,599	$872	$537	$22,400

Source: Table 4 Energy and Environmental Economics, Inc. (February 2005).

5.4.2.4 HECO's 1998 Performance-Based Regulation Study

HECO's position statement in Docket No. 96-0493 examined existing published research and other publicly-available information to determine the value (cost) of an outage. The report estimated outage costs for HECO by surveying a sample of 21 published outage cost studies (a number of which were included in one or both of the two studies described above). It concluded that the best, "off the shelf" estimate of outage costs for HECO is $7.51/kWh. This, in turn, reflects outage cost values for residential, commercial, and industrial customers shown in Table 5.8 (all in 1996$). Like the other studies mentioned above, it did not involve original research, relying instead on the published literature for the estimated costs that outages impose on different types of customers under different circumstances. Each estimate was for a one-hour outage, which is about the average Customer Average Interruption Duration Index (CAIDI) figure for HECO.[103]

The report estimated the total value of an average one hour, system-wide outage for HECO as being equal to $7.50/kWh multiplied by the unserved kWh during an average hour. The average amount of unserved kWh is equal to total kWh sales divided by 8,760 hours per year. Applying this formula to 1996 HECO sales data, the analysis estimated the total value for each one-hour, system-wide outage for HECO is equal to $6,071,190.[104] Using the same methodology to estimate the cost of a 1-hour outage in 2004 after adjusting for inflation (11.66%) and the increase in kilowatt hour sales between 1996 and 2004 (9.05%) implies the total value (i.e., cost) of a one-hour, system-wide outage for HECO at the end of 2004 was is equal to approximately $7.4 million (see Table 5.9 for derivation of adjustments). While the various studies report a range of costs, they do not vary widely from the estimates that were prepared for HECO in 1998.[105]

An important caveat is that the studies discussed above covered infrequent outages that did not affect the fundamental willingness of customers to make economic investments in their communities, to maintain and/or expand their businesses, or to continue to reside in the areas where the outages were occurring. None of these assumptions hold true for the "no action" alternative that is the subject of this chapter. On the contrary, no action would lead to an ever-increasing shortfall in the amount of electrical power needed to meet O'ahu's demand. In the best of situations this would lead to rolling blackouts during peak use periods (typically in the evening) for at least a portion of the year. In the worst case, the regular rolling blackouts could be accompanied by much less frequent, but recurring, system-wide power outages that would affect virtually all of the island for longer periods of time. Consequently, the estimates above are more likely to underestimate the long-term adverse effect on the economy than to over-estimate it.

[103] CAIDI is the average interruption duration time for those customers that experience an interruption during the year. It approximates the average length of time required to complete service restoration. It is determined by dividing the annual sum of all customer interruption durations by the sum of customers experiencing an interruption over a one-year period.

[104] The weights used for residential, commercial, and other customers in calculating the estimate were 64%, 33%, and 3%, respectively.

[105] Kaufmann, Lawrence (June 5, 1998) Performance-Based Regulation for Hawaiian Electric Company.

Table 5.8. Outage Costs per Kilowatt-Hour Unserved from HECO 1998 Study.

Year	Residential		Commercial		Other		Weighted Average
	$/KWH	%	$/KWH	%	$/KWH	%	$/KWH
1996	$3.69	64	$14.91	33	$7.70	3	$7.51
2004	$4.12	64	$16.65	33	$8.60	3	$8.39

Source: 1996 estimates are from HECO's position statement on Docket No. 96-0493. 2004 estimates are 1996 estimates adjusted to account for inflation as shown in Table 5.9.

Table 5.9. CPI and Electricity Sales Changes: 1996-2004.

Year	*Consumer Price Index*	*Change from Previous Year*		*Electricity sales (1,000 kWh)*	*Change from Previous Year*	
		Amount	*Percent*		*Amount (1,000 kWh)*	*Percent*
1996	469.9	n.a.	n.a.	7,091,147	n.a.	n.a.
1997	473.4	3.5	0.74%	7,040,291	-50,856	-0.72%
1998	472.2	-1.2	-0.25%	6,938,326	-101,965	-1.45%
1999	477.0	4.8	1.02%	6,997,936	59,610	0.86%
2000	485.4	8.4	1.76%	7,211,760	213,824	3.06%
2001	491.2	5.8	1.19%	7,276,681	64,921	0.90%
2002	496.3	5.1	1.04%	7,390,367	113,686	1.56%
2003	507.8	11.5	2.32%	7,522,230	131,863	1.78%
2004	524.7	16.9	3.33%	7,732,834	210,604	2.80%
Total for Period		54.8	11.66%		641,687	9.05%

Source: U.S. Department Of Labor, Bureau Of Labor Statistics, www.bls.gov/ro9/9226.pdf
State of Hawai'i Department of Business, Economic Development, and Tourism Data Book. Table 17.13-- Service Provided By Hawaiian Electric Company, Inc.

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6.0 CONSISTENCY WITH EXISTING POLICIES, CONTROLS, & 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 CIP Generating Station and Transmission Additions Project. Table 6.1 lists the permits and approvals required for the project and provides the current status of each. The subsequent discussion 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.

Table 6.1. Status of Required Permits and Approvals

Permit or Approval	***Issuing Agency***	***Status***
Public Infrastructure Map Amendment	Department of Planning and Permitting, City & County of Honolulu (DPP)	~~Not Started~~City Council Approved July 19, 2006
Conditional Use Permit	DPP	Not Started
NPDES Construction Permit	Environmental Management Division, State Department of Health (DOH)	Not Started
PUC Approval	Public Utilities Commission	Submitted June 17, 2005
Well Construction ~~& Operation~~ Permit~~s~~	State Commission on Water Resource Management (CWRM)	Not Started
Pump Installation Permit	State Commission on Water Resource Management (CWRM)	Not Started
Water Use Permit	State Commission on Water Resource Management (CWRM)	Not Started
Underground Injection Control Permit	Safe Drinking Water Branch, State DOH	Not Started
Initial Covered Source & Prevention of Significant Deterioration Permits	Clean Air Branch, DOH	Revised Application Submitted 12/13/2004
Individual Wastewater Treatment System Permit	State Department of Health	Not Started
Fuel Tank Construction Permit	Honolulu Fire Department	Not Started
FAA Clearance	Federal Aviation Administration	Application ~~in Preparation~~Submitted
Grading Permit	DPP	Not Started
Building Permit	DPP	Not Started
Source: Compiled by Planning Solutions, Inc.		

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."*

According to the objectives listed in Section 1.5, the proposed project is intended to provide generation and transmission facilities to ensure the adequate and reliable supply of electric power to HECO's growing customer base. Ancillary objectives include continuing to provide energy at reasonable costs while maintaining environmental quality. The discussion included in Chapters 1 and 2 explains why HECO believes the selected alternative best fulfills these objectives, and therefore why it is compatible with the vision of the O'ahu General Plan. Further, as discussed in Section 1.3.2, the project should be viewed in the context of HECO's comprehensive Integrated Resource Plan, which incorporates various complementary strategies for power generation and energy conservation (e.g., distributed generation, demand-side management, exploration of renewable energy sources) in addition to the proposed fossil-fueled generating units. Together, all of these approaches will help to reduce energy use and promote cost efficiency in HECO's system.

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 generation and transmission additions. Its consistency with the provisions of these sections is discussed separately after each.

§2.2.9 PRESERVATION AND ENHANCEMENT OF HISTORIC AND CULTURAL RESOURCES

'Ewa'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 Historic Railroad right-of-way,*
- *Lanikuhonua, and*
- *Native Hawaiian cultural and archaeological sites in the Barbers Point and One'ula Archaeological Districts.*

Discussion: The OR&L right-of-way (ROW) passes immediately *mauka* of the CEIP Substation which the transmission lines connect to. Guidelines for protecting it are included below. The project area is not near to Lanikuhonua (which is adjacent to the Ko 'Olina Resort) or to the 'Ewa Villages (which are well east of the CIP, along the OR&L right-of-way). No potential activities or accidents related to the construction or operation of the project would be expected to affect these historic and cultural resources. As discussed in Section 3.9, there are no known archaeological sites in this area that could be potentially disturbed by the construction of the generating unit and transmission lines, 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.

§3.4.3.1 OR&L HISTORIC RAILWAY

New development should be set back a minimum of 50 feet on either side of the OR&L right-of-way, unless it is directly related to the operation of the railroad, or is consistent with the use of the right-of-way for open space and bikeway purposes in stretches where railroad operation is not feasible, or is otherwise specified in existing land use approvals.

Discussion: The proposed project would not interfere with long term recreational use of the OR&L ROW within the 'Ewa District. Attachment of the transmission lined to the CEIP Substation will occur on the existing substation's *makai* side, which faces away from the ROW and is well over 50 feet from the ROW. Portions of the proposed water line would be situated within the OR & L ROW parallel to existing pipelines buried there. Once installed, the water line would not be visible and would not in any way affect the use of the ROW for open space, bikeway, and/or railroad operation.

§3.7.3.2 PLANNING PRINCIPLES [for Industrial Centers]

- *Appropriate Scale. The visibility of large building volumes and tall building or machinery elements from resort areas, residential areas, commercial and civic districts, and parks should be minimized through site planning and landscaping.*

Discussion: The CIP is zoned I-2 Intensive Industrial. The only large structures and machinery proposed will be installed on the BPTF, AES Substation, and adjacent parcels HECO is planning to acquire. These areas are all surrounded by uses of a similar industrial nature (e.g. HPOWER, Chevron USA, etc.). The nearest park is Barbers' Point Beach Park, which is about a half mile south of the BPTF. The nearest commercial area is across Renton Road to the north, about a quarter mile east of the CEIP Substation and over a mile from the BPTF. There are no residential areas, resorts, or civic districts within a mile of the large buildings proposed by the project. Thus, the project will not be visible from these vantage points at ground level and will not require screening.

- *Environmental Compatibility. Industries and utilities that discharge air or water pollutants, even when treated, should be located in areas where they would impose the least potential harm on the natural environment in case the treatment process fails to perform adequately. Uses that generate high noise levels should be located and operated in a way that will keep noise to an acceptable level in existing and planned residential areas. The building setback from the shoreline should be a minimum of 60 feet in the Ewa coastal area, as recommended in the Oahu Shoreline Study (1989), and 150 feet where possible.*

Discussion: The proposed project is well away from noise-sensitive land uses, and there are no sensitive environmental areas nearby that would be negatively affected should the proposed water treatment system fail. All proposed structures are over 60 feet from the shoreline.

§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 in the direction of the shoreline for the proposed modifications. 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.*

- *Taller, vertical structures are acceptable when required as part of an industrial operation, but a viewplane study should be conducted for structures over 100 feet in height to determine if they can be sited or designed to minimize visibility from residential, resort and commercial areas, public rights-of-way and the shoreline.*

Discussion: All of the structures proposed for the project are equal to or less than 60 feet high, with the exception of the CT exhaust stack and the transmission lines. At a height of 210 feet above ground level, the stacks attached to the combustion turbine are the tallest structures that would be constructed at the Barbers Point Tank Farm. The stacks and the above-ground transmission lines (which are about 120 feet high on average) are the two elements of the project which would be most visible to the public. Neither of these two exceptions has a large mass and are, therefore, consistent with the industrial guidelines. Further, none of the structures represents a departure from other buildings and installations in the area, which is heavily developed with similar facilities. As discussed in Section 4.9, the transmission lines would be visible from Makakilo and other vantage points well removed from the alignment, but would appear small because of the distance and are similar to existing lines that already lace the industrial area. Nearly all of the areas that are close to the proposed new transmission line are designated or planned for industrial uses that are compatible with the existing and planned overhead transmission lines. The exception to this is the relatively short portion of the transmission route that passes adjacent to the golf course that is planned as part of the Kapolei West Development. ~~All of the structures proposed for the project are equal to or less than 60 feet high, with the exception of the CT exhaust stack, which is 210 feet high, and the transmission lines, which are about 100 feet high. Neither of these structures has a large mass and therefore they do not conflict with the intent of the industrial guidelines.~~

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 generating station is a Type B Utility Installation as classified by the LUO (see Section 6.1.5). As such, HECO is required to prepare a landscaping plan that details plans for screening the facility from roads and neighboring properties. HECO will submit the landscaping plan for approval as part of its application for a Conditional Use Permit.

§4.4 ELECTRICAL POWER DEVELOPMENT

- *The Hawaiian Electric Company forecasts that increased demand and the proposed retirement of the Honolulu Power Plant from service will create a need for additional island-wide power generation capacity by 2020. Potential sites in Ewa for additional generating units include Campbell Industrial Park and Kahe Point.*
- *Major system improvements -- such as development of a new power generating plant and/or major new transmission lines -- should be analyzed and approved based on islandwide studies and siting evaluations. Strong consideration should be given to placing any new transmission lines underground.*
- *Electrical power plants should generally be located in areas shown as planned for Industrial use and away from Residential areas shown on the Urban Land Use Map in Appendix A.*
- *Any proposed major new electrical power plant or proposals for a new above-ground or underground transmission corridor carrying voltages of 138kV or greater shall be considered through a City review and approval process, such as the Plan Review Use process, which provides public review, complete analysis, and approval from the Department of Land Utilization and the City Council.*

Discussion: The facilities that HECO has proposed are located in areas that the Development Plan specifically identifies as appropriate for such uses. HECO's Integrated Resource Plan (IRP-3) and this report considered a variety of possible locations for the facilities needed to provide the required electrical power, including facilities (such as solar panels and energy conservation measures) that are not centrally located, and HECO is implementing these types of measures as approved by the PUC. Public review of the Chapter 343 environmental documentation for the project, as well as the site-specific public review that will occur when HECO seeks the Conditional Use Permit that is needed to construct the generating facilities, will ensure thorough public review, complete analysis, and approval from the Department of Planning and Permitting (formerly the Department of Land Utilization) and the City Council.

6.1.3 PUBLIC INFRASTRUCTURE MAPS

Revised Ordinances of Honolulu §4.8 establishes "Public Infrastructure Maps". Section 4.8.1(a) provides for the City Council to adopt Public Infrastructure Maps (PIM) reflecting major public infrastructure projects, as defined in ROH §4-8.4, for each of the Development Plan areas in the City and County of Honolulu. The public infrastructure maps, which are not part of the Development Plans themselves, are adopted by resolution. The Ordinance requires the City in its decision-making *"…to consider the potential impact of the decision on those proposed projects that are represented by symbols on the public infrastructure maps when making any land use decision.*" The symbols are intended to show the general locations of certain major public facilities. In order to be placed on the PIM, projects must meet certain criteria and be consistent with the O'ahu General Plan, the relevant Development Plan, any applicable special area plans, and the appropriate functional plans. ROH §4-8.3 Sec. 4-8.3 (a)(4) lists "energy generation facility" and "electrical transmission line" among the facilities that require a symbol on the PIM.[106] The symbols depicting the alignment of linear facilities and the location of project boundaries are intended to be approximate and conceptual.

Applications for additions to the public infrastructure map are reviewed from the perspective of the extent to which they would contribute to the well-being of the people of O'ahu and support implementation of the applicable Development Plan and/or Sustainable Communities Plan. All phases of a project are considered when determining whether the project meets the public infrastructure map applicability criteria.

Discussion: HECO ~~is applying~~applied for a Public Infrastructure Map Amendment for the proposed generating station in March 2006. After reviewing the application, the Department of Planning and Permitting forwarded it to the Honolulu City Council on June 20, 2006, with a recommendation for approval. At its meeting on July 19, 2006, the Council adopted Resolution 06-240 placing an energy generation facility symbol for the project on the public infrastructure map for the 'Ewa Development Plan area. ~~As discussed in detail in Chapter 1 of this document, HECO believes the proposed electrical infrastructure is essential if the utility is to continue to provide reliable electrical energy to the people of O'ahu. The project's consistency with applicable land use plans and policies is discussed elsewhere in this chapter.~~

6.1.4 PEARL HARBOR HISTORIC TRAIL MASTER PLAN

The OR&L historic railroad ROW also serves as a pedestrian and bicycle path, the Pearl Harbor Historic Trail. As discussed above, the proposed project will not conflict with the long-term preservation and use of the right-of-way. Construction of the proposed new water line to Kahe that is part of the community benefits package that HECO has proposed could result in temporary interruptions in the use of the right-of-way, but these would be brief.

[106] Other facilities that must be placed on the PIM are Corporation yard; Desalination plant; Drainage way (open channel); Fire station; Government building; Golf course (municipal); Electrical transmission line and substation (above 46kV but less than 138kV); Park; Police station; Parking facility; Water reservoir; Sewage treatment plant; Solid waste facility; Transit corridor; Major collector or arterial roadway; Sewage pump station; and Potable water well.

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 project's consistency with applicable provisions of the LUO.

The LUO classifies the proposed generating station as a Type B utility installation. The area where it would be constructed includes the BPTF and the 44-foot-wide parcel that HECO plans to acquire. These are located within the I-2, or Intensive Industrial Zoning District. Type B utility installations are an approved use in that District. The transmission lines are classified as a Type B utility installation ~~(including the connection between the generating station and the AES Substation)~~ and the planned improvements to the AES and CEIP Substations (including the connection between the generating station and the AES Substation) are classified as Type A utility installations. The CEIP Substation is located in the Ag-1 (Restricted Agriculture) zone, as is most of the land along the transmission corridor (the remainder passes through the Ag-2 General Agriculture and I-2 Intensive Industrial zones). Type A & B utility installations are permitted uses in all of those zones with the issuance of a minor Conditional Use Permit (CUP). HECO's CUP application will demonstrate that ~~T~~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).

6.1.6 SPECIAL MANAGEMENT AREA REVIEW

The entire project lies outside the Special Management Area (SMA), as shown on Figure 6.1. Consequently, it does not require permitting under the City & County of Honolulu SMA Review Guidelines found in the *Revised Ordinances of Honolulu 1990* (ROH), Chapter 25 (Shoreline Management).

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 CIP Generating Station and Transmission Additions 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;*

Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

--City & County of Honolulu GIS
--Hawaiian Electric Co., Inc.
--Space Imaging, Inc. (2004)

Legend:

- Special Management Area (SMA)
- AES CEIP 1 Existing
- AES CEIP 2 Existing
- AES CEIP #2 Underground Alternative

0 125 250 500
Feet

Figure 6.1:

Special Management Area Boundary

CIP Generating Station & Transmission Additions Project

Figure 6-1 Special Management Area Boundary 2005-11-04.mxd

Discussion: The goal of the proposed action, which is to provide an assured means of continuing to supply electric power while maintaining environmental quality and maintaining costs to HECO customers at a reasonable level is consistent with this provision of the State Plan. As discussed in Section 1.3.3, the additional generating capacity proposed is a necessary component of HECO's long term Integrated Resource Plan (IRP). HECO is engaged in several ancillary efforts to reduce energy consumption and explore alternative energy sources, all of which will contribute to the efficiency and sustainability of the system. However, while these efforts may delay or eliminate the need for a second additional generating unit, they will not preclude the necessity of adding at least one generating unit to the system in order to support the needs of O'ahu.

(2) *Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased;*

Discussion: The proposed project in and of itself does not improve the ratio of indigenous to imported energy use. It does not preclude increased self-sufficiency, as the generating unit will be capable of using several types of fuels if and when they are locally available. However, as discussed in Section 1.3, the proposed project should be understood as a component of HECO's long term Integrated Resource Plan. The systemwide strategies detailed in the IRP are cumulatively compatible with the goal of increasing energy self sufficiency. However, it is important to note that these are also dependent to some extent on the advancement of specific technologies. The proposed facility's ability to use biofuels creates a greater opportunity for the use of indigenous fuel sources.

(3) *Greater energy security in the face of threats to Hawaii's energy supplies and systems; and*

Discussion: The proposed generating station would enhance energy security by adding redundancy to the system. However, the proposed units, at least initially, would rely on fuel that is imported from off-island (although it is refined locally). The proposed transmission lines would only benefit the system by enabling the delivery of energy to various parts of the island in case of emergency.

(4) *Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use.*

Discussion: The proposed project, when viewed by itself, does not reduce, avoid, or sequester greenhouse gas emissions. The proposed generating units burn fossil fuels. However, this project is not an isolated undertaking and should not be viewed as such. When viewed as part of HECO's overarching IRP strategy for supplying energy to O'ahu into the future, it becomes clear that the cumulative effect of HECO's various approaches to energy supply and conservation are much more consistent with reducing greenhouse gas emissions. This can be accomplished in particular through reducing energy consumption through DSM and continuing to explore alternative energy and fuel sources.

§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: Sections 1.3 and 1.4 discuss at length the reasons why additional generating capacity is needed to meet present and forecasted demand and why additional transmission capability is needed in order to maintain and enhance the reliability of HECO's energy delivery system. Both of these improvements are intended to enhance electrical service and avoid costly disruptions to HECO's customers.

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 not cover industrial processes. HECO intends to adhere to the precepts of the model code to the extent practicable.

6.2.3 HAWAI'I REVISED STATUTES, CHAPTER 269, §27.6

HRS Section 269 27.6 provides that whenever a public utility applies to the Public Utilities Commission *"…for approval to place, construct, erect, or otherwise build a new forty-six kilovolt or greater high-voltage electric transmission system, either above or below the surface of the ground…"* the PUC determines whether it should be overhead or underground. The law requires the PUC to consider the following factors in arriving at its decision:

(1) Whether a benefit exists that outweighs the costs of placing the electric transmission system underground;

(2) Whether there is a governmental public policy requiring the electric transmission system to be placed, constructed, erected or built underground, and the governmental agency establishing the policy commits funds for the additional costs of undergrounding;

(3) Whether any governmental agency or other parties are willing to pay for the additional costs of undergrounding;

(4) The recommendation of the Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs, which shall be based on an evaluation of the factors set forth under this subsection; and

(5) Any other relevant factors.…

The law stipulates that the PUC must evaluate and make specific findings on the following factors in determining whether or not a new 138 kilovolt or greater high-voltage transmission line should be overhead or underground:

(1) The amortized cost of construction over the respective usable life of an above-ground versus underground system;

(2) The amortized cost of repair over the respective usable life of an above-ground versus underground system;

(3) The risk of damage or destruction over the respective usable life of an above-ground versus underground system;

(4) The relative safety and liability risks of an above-ground versus underground system;

(5) The electromagnetic field emission exposure from an above-ground versus underground system;

(6) The proximity and visibility of an above-ground system to:

(A) High density population areas;

(B) Conservation and other valuable natural resource and public recreation areas;

(C) Areas of special importance to the tourism industry; and

(D) Other industries particularly dependent on Hawai'i's natural beauty;

(7) The length of the system;

(8) The breadth and depth of public sentiment with respect to an above ground versus underground system; and

(9) Any other factors that the public utilities commission deems relevant.

HECO took the above factors into consideration in reaching its conclusion that an overhead line is preferable to an underground transmission circuit. For example, HECO considered the fact that:

- An underground circuit would be less susceptible to damage from wind, but would be more susceptible to flooding and seismic damage. It would also incur greater construction and maintenance costs.
- EMF levels associated with underground lines are lower than those associated with overhead lines. However, even with the overhead option the EMF levels produced would be too low to be considered detrimental to human health. This, combined with the prudent avoidance measures that HECO will use (i.e., routing the lines along roads and drainage channels rather than over residences and businesses), will help ensure safety and minimize liability risks.
- The route of the proposed AES-CEIP #2 138 kV transmission line runs adjacent to an existing coal conveyor, past unmanned fuel storage facilities and the rear of low-occupancy warehouse buildings, along the proposed route of a major storm drainage channel through land on which low-density industrial uses have been proposed and over vacant land where the owner has proposed future development of an adjacent golf course and possible business uses.
- The AES-CEIP #2 138 kV transmission line runs somewhat parallel to the existing AES-CEIP #1 transmission line and the construction route of the AES-CEIP #2 transmission line crosses over the existing AES-CEIP #1 transmission line.
- The proposed AES-CEIP #2 138 kV transmission line is in the Campbell Industrial Park area and does not run through any residential areas or popular tourist destinations.

6.2.4 CHAPTER 205, HAWAI'I REVISED STATUTES - LAND USE LAW

Chapter 205, Hawaii 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 within the project area are shown in Figure 3.8. The BPTF and AES Substation are located in the State Urban District. The CEIP Substation and the transmission corridor north of Malakole Road is within the State Agricultural District. Utility installations are permitted uses in those districts.

6.2.5 COASTAL ZONE MANAGEMENT PROGRAM

Enacted as Chapter 205A, HRS, the Hawai'i Coastal Zone Management (CZM) Program was promulgated in 1977 in response to the Federal Coastal Zone Management Act of 1972. The CZM area encompasses the entire state, including all marine waters seaward to the extent of the state's police power and management authority, including the 12-mile U.S. territorial sea and all archipelagic waters.

The Hawai'i Coastal Zone Management Program focuses on ten policy objectives:

- Recreational Resources. To provide coastal recreational opportunities accessible to the public and protect coastal resources uniquely suited for recreational activities that cannot be provided elsewhere.
- Historic Resources. To 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.

- Scenic and Open Space Resources. To protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.
- Coastal Ecosystems. To protect valuable coastal ecosystems, including reefs, from disruption and to minimize adverse impacts on all coastal ecosystems.
- Economic Uses. To provide public or private facilities and improvements important to the state's economy in suitable locations; and ensure that coastal dependent development such as harbors and ports, energy facilities, and visitor facilities, are located, designed, and constructed to minimize adverse impacts in the coastal zone area.
- Coastal Hazards. To reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.
- Managing Development. To improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- Public Participation. To stimulate public awareness, education, and participation in coastal management; and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program.
- Beach Protection. To protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion.
- Marine Resources. To implement the state's ocean resources management plan.

Other key areas of the CZM program include: a permit system to control development within a Special Management Area (SMA) managed by the Counties and the Office of Planning; a Shoreline Setback Area which serves as a buffer against coastal hazards and erosion, and protects view-planes; and the Marine and Coastal Affairs. Finally, a Federal Consistency provision requires that federal activities, permits and financial assistance be consistent with the Hawai‘i CZM program.

The proposed project is located more than 1,200 feet from the coastline. It does not involve the placement, erection, or removal of materials near the coastline. As documented in this EIS, the type and scale of the activities that it involves do not have the potential to affect coastal resources significantly, and thus the project does not require a CZM Federal consistency determination. However, it is consistent with the CZM objectives that are relevant to a project of this sort. A copy of ~~this~~ the *Draft EIS* ~~will be~~was sent to the Office of Coastal Zone Management at the State of Hawai‘i Department of Business, Economic Development, and Tourism, but the Office did not comment on that document.~~, and the Office's comments, if any, will be included in the Final EIS.~~

6.3 FEDERAL

6.3.1 ARCHEOLOGICAL AND HISTORIC PRESERVATION ACT (16 U.S.C. § 469A-1) & NATIONAL HISTORIC PRESERVATION ACT (16 U.S.C. § 470(F))

As discussed in Section 4.8, there are no known historic or archaeological resources in the area to be affected by the project. The survey that was conducted indicated that none are likely to be found during construction of the project due to the heavily disturbed nature of the area. SHPD ~~will~~ was ~~be~~ provided a copy of ~~this~~ the *DEIS*. ~~and t~~Their comments are reproduced in Section 10.3.2. ~~s, if any, will be included in the *Final EIS*.~~

6.3.2 CLEAN AIR ACT (42 U.S.C. § 7506(C))

Section 4.3 includes a thorough discussion of the project's potential impacts on air quality, and concludes that the project as proposed would comply with all applicable standards at the county, State, and federal level. Thus, it is compliant with the Clean Air Act.

6.3.3 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). HECO applies the appropriate procedures and guidelines, consistent with this law and its implementing regulations, in all oil spill prediction, response, and remediation efforts. Chevron USA, which operates the existing facilities on the BPTF property, has an *Oil Spill Contingency Plan* for the facility. If the proposed project is approved, HECO will assume responsibilities for the operation of the existing and new facilities and will prepare and implement its own *Oil Spill Contingency Plan* .

6.3.4 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. 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. 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. HECO has consulted the Army and State Department of Health and confirmed that the project will not affect navigable waters. Thus, Section 401 and 404 permits will not be required.

6.3.5 ENDANGERED SPECIES ACT (16 U.S.C. 1536(A)(2) AND (4))

The Endangered Species Act (16 U.S.C. §§ 1531-1544, December 28, 1973, as amended) provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered in the U.S. or elsewhere. The Act mandates that federal agencies seek to conserve endangered and threatened species and use their authorities in furtherance of the Act's purposes. It provides for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The Act outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species, and contains exceptions and exemptions.

Section 3.6 of this EA discusses existing biota on and near the project site. The discussion documents that no threatened, endangered, or candidate species are likely to be adversely affected by the construction and operation of the project. Copies of the Draft EIS ~~will be~~were provided to the U.S. Fish and Wildlife Service and to the State Department of Land and Natural Resources for review and comment. Neither agency expressed special concern about the potential effects of the proposed project.

6.3.6 SAFE DRINKING WATER ACT (42 U.S.C. § 300H-3(E))

The groundwater that would be drawn for operation of the proposed generating facility is brackish water from a non-potable aquifer. Similarly, the treated wastewater that would be disposed of via injection wells would return to the non-potable aquifer and thus would have no effect on drinking water supply. The small amount of potable water required will be drawn from the Board of Water Supply's existing system. As such, the proposed project is consistent with the Safe Drinking Water Act.

6.3.7 RESOURCE CONSERVATION AND RECOVERY ACT (42 U.S.C. 6962)

The Resource Conservation and Recovery Act (RCRA) regulates solid and hazardous waste. Its goals are: 1) To protect human health and the environment from the hazards posed by waste disposal; 2) To

conserve energy and natural resources through waste recycling and recovery; 3) To reduce or eliminate, as expeditiously as possible, the amount of waste generated, including hazardous waste; and 4) To ensure that wastes are managed in a manner that is protective of human health and the environment.

To achieve these goals, RCRA established three distinct yet interrelated programs:

- RCRA Subtitle D, the solid waste program, encourages states to develop comprehensive plans to manage nonhazardous industrial solid waste and municipal solid waste, sets criteria for municipal solid waste landfills (MSWLFs) and other solid waste disposal facilities, and prohibits the open dumping of solid waste.
- RCRA Subtitle C, the hazardous waste program, establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal — in effect, from cradle to grave.
- RCRA Subtitle I, the underground storage tank (UST) program, regulates underground tanks storing hazardous substances and petroleum products.

HECO will comply with all RCRA requirements for the generation, treatment, and disposal of solid and hazardous waste. As discussed elsewhere in this document, all solid waste and wastewater streams will be well within defined limits for hazardous pollutants.

6.3.8 EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW ACT (EPCRA) (42 U.S.C. 11001 ET SEQ.)

Also known as Title III of SARA, EPCRA was enacted by Congress as the national legislation on community safety. This law was designated to help local communities protect public health, safety, and the environment from chemical hazards.

6.3.8.1 Tier II Reporting

Under EPCRA Tier II reporting requirements, any facility that uses or stores hazardous materials in quantities greater than 10,000 pounds (or 500 pounds for extremely hazardous chemicals) must report the types and quantities of chemicals stored to the State Department of Health and Honolulu Fire Department (HFD) annually.

HECO anticipates that EPCRA reporting requirements will apply to the following substances stored at the proposed BPTF generating facility: 1) Fuel (diesel, naphtha, or other), 2) sulfuric acid, and 3) caustic soda. The latter two are used in the water treatment process. In the event that HECO applies SCR technology, (see Section 4.3.3.5.1) ammonia would be added to this list as well. Annual EPCRA reports for the facility will be available to the public upon written request to HFD or DOH.

6.3.8.2 Toxic Release Inventory Reporting

Under this section of the EPCRA, HECO is required to complete a toxic chemical release form for each toxic chemical that was manufactured, processed, or otherwise used in quantities exceeding the toxic chemical threshold quantity (i.e., 10,000 pounds per year for chemicals used at the facility and 25,000 pounds per year of chemicals manufactured at the facility) once each calendar year. Chemicals to be used at the proposed generating facility that could be subject to this requirement include polyaromatic compounds and naphthalene, which are organic byproducts of the fuel burning process. HECO will consult with the DOH once it has finalized the potential chemical inventory for the facility, to ensure that it complies with all provisions of the EPCRA.

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7.0 OTHER CHAPTER 343 TOPICS

Hawai‘i 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 generating unit and transmission additions are integral components of HECO’s long-term strategy for providing adequate and reliable electrical power to meet O‘ahu’s needs. The proposed improvements are not directly related to other possible actions by HECO. The potential change in electric rates resulting from the addition of this new electrical power generation would not markedly promote or discourage economic activity.

HECO would continue to purchase fuel, certain maintenance services, and other items from independent suppliers. Additional fuel will be required to power the generating unit, but HECO expects that this will be naphtha and other products that are already produced at the two refineries located in Campbell Industrial Park. Currently, excess naphtha not used on island is exported, and the proposed generating station would utilize much of that product. Hence, it would not substantially alter the level of activity at/emissions from the two existing oil refineries located there, and it would slightly reduce emissions related to shipping fuels off-island. Further, the proposed generating station is also capable of utilizing alternate fuels, such as biofuels (ethanol and biodiesel) and hydrogen, thus creating a market for those products if and when they are commercially available and economical to use on O‘ahu.

The construction and operation of the proposed transmission line does not involve the extension of electrical power service into new service areas. Neither does it involve the provision of services not previously available to HECO’s customers. Hence, it does not have the ability to cause secondary impacts except insofar as it helps forestall accidental power outages that might otherwise encourage businesses to locate their activities elsewhere.

The proposed project is located in the midst of a large heavy industrial park. As discussed elsewhere in this report, it would not induce changes in the type or intensity of uses on nearby land, and the noise, emissions, and effluent are within regulatory limits. Thus, no indirect effects on land use or land values are expected.

7.2 SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY

As discussed in Chapter 1 of this report, constructing and operating the proposed peaking units at the BPTF and installing a second transmission line between the AES and CEIP Substations will allow HECO to maintain reliable electrical service to its customers. It would not prevent other uses of the property that might be more productive over the long term.

7.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

HECO’s plans for the proposed facilities do not foreclose any options. Because it is designed as a peaking unit to be used only when needed to meet peak demand it involves the minimum capital investment required to maintain service reliability. If demand should be lower than anticipated, HECO will operate the units for fewer hours. The availability of the firm capacity will allow HECO to continue its alternate energy efforts with the confidence that a shortfall from those sources can be made up by operating the peaking hours during those periods when the alternate energy sources are not available.

The construction of the proposed generating units, substation additions, and transmission improvements does not irrevocably commit HECO to the continued use of fossil fuels for power generation. As mentioned, both proposed generating units can utilize biofuels should they become commercially available and economical for use in Hawai‘i. The transmission lines simply function to distribute the electricity that is created through power generation, regardless of the fuel source. The project will also require some non-renewable resources (i.e., building materials) and the emission of air pollutants during construction and operation.

7.4 UNRESOLVED ISSUES

At present, the only known unresolved issue that is not directly a function of the Public Utility Commission’s final decision on HECO’s pending application is the extent to which the *mauka* portion of the transmission line may be constructed underground in response to the landowner’s request. ~~there are no known unresolved issues.~~

7.5 RATIONALE FOR PROCEEDING

Chapter 4 describes the environmental effects that could result from construction and operation of the proposed generating station, substation additions, and transmission improvements. HECO is committed to avoiding or mitigating adverse effects to the greatest extent practical. 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.

8.0 GLOSSARY AND LIST OF ACRONYMS

AES	Referring to AES Hawai‘i (an independent power producer) and the AES Substation
Alien	Introduced to Hawai‘i by humans
AOS	Adequacy of Supply
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
BACT	Best Available Control Technology; Measures to control air pollutant emissions in accordance with the Prevention of Significant Deterioration (PSD) regulation.
Baseload units	Generating units that operate continuously and are usually run near their full capacity during the day when demand is higher.
BMP	Best Management Practice
BPTF	Barbers Point Tank Farm
BSG	Blackstart diesel generator
Btu	British thermal unit
BWS	Board of Water Supply, City & County of Honolulu
CDF	Customer Damage Function
CEIP	Campbell Estate Industrial Park (referring to the CEIP Substation and transmission lines)
CERCLA	Comprehensive Environmental Response, Compensation, & Reliability Act
CFR	Code of Federal Regulations
CHP	Combined Heat and Power program
CIP	Campbell Industrial Park
Crepuscular	Active at twilight hours (dawn and dusk)
CT	Combustion Turbine
CUP	Conditional Use Permit
CWRM	Commission on Water Resource Management, State of Hawai‘i
Cycling units	Generating units that are started up before the morning peak and shut down daily after the evening peak.
CZM	Coastal Zone Management
CZMP	Coastal Zone Management Program
dB	Decibel, the basic, logarithmic unit of sound level measurement
dBA	A-weighted sound level: 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 Costs
DEM	Digital Elevation Model
DG	Distributed Generation

DLNR	Department of Land and Natural Resources, State of Hawai‘i
DNL	Day-Night Average Sound Level (also expressed as Ldn)
DOH	Department of Health, State of Hawai‘i
Domesticated	Feral species, not considered established in the wild on the Island of O‘ahu
DPP	Department of Planning and Permitting, City & County of Honolulu
DSM	Demand-Side Management
EA	Environmental Assessment
EE	Energy Efficiency
EIS	Environmental Impact Statement (DEIS = Draft EIS; FEIS = Final EIS)
EISPN	Environmental Impact Statement Preparation Notice
Emergency conductor ratings	The maximum amount of current that power lines are capable of carrying on a limited basis.
Endangered	Listed and protected under the Endangered Species Act as an endangered species
Endemic	Native and unique to the Hawaiian Islands
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ESA	Endangered Species Act of 1973, as amended
◦F	Fahrenheit degrees
FEMA	Federal Emergency Management Agency, U.S. Federal Government
FIRM	Flood Insurance Rate Map
Firm Capacity	The electric power (expressed in megawatts) that a supplier guarantees to be available for dispatch at all times except when uncontrollable forces produce outages.
Generation driven problems	Problems occurring when generation capacity exceeds the capability of the surrounding power lines to carry the output of the generating units under certain circumstances.
GIS	Geographic Information System
gpm	Gallons per minute
HAP	Hazardous Air Pollutant
HAR	Hawai‘i Administrative Rules
HECO	Hawaiian Electric Company, Inc.
HELCO	Hawai‘i Electric Light Company
HNEI	Hawaii Natural Energy Institute
HRRV	Honolulu Resource Recovery Venture
HRS	Hawai‘i Revised Statutes
Hz	Hertz, the basic unit of frequency, cycles per second

IARII International Archaeological Research Institute, Inc.

IBC International Building Code

ICS Initial Covered Source

Indigenous Native to the Hawaiian Islands, but also found elsewhere naturally

IPP Independent Power Producer

IRP Integrated Resource Plan

ISC RTDM Industrial Source Complex Rough Terrain Diffusion Model (to model air quality impacts across varying terrain)

kPa kilopascal (unit of vapor pressure)

kV Kilovolt

kWh Kilowatt hour

Ldn Day-Night Average Sound Level (also expressed as DNL)

LM Load management

Load driven problems
Problems occurring due to an increase in demand (i.e., use) on the system or in a specific area.

Load Service Capability Criterion
The LSCC ensures that an adequate amount of reserve capacity will be available in the event of the sudden loss of the largest unit in service. The criterion states that the total capability of the system plus the total amount of interruptible loads must at all times be equal to or greater than the summation of: 1) the capacity needed to serve the estimated system peak load; 2) the capacity of the unit scheduled for maintenance; and 3) the capacity that would be lost by the forced outage of the largest unit in service.

Load shedding The automated or manual process of disconnecting customers from the system, thereby decreasing demand (i.e., shedding load), in order to protect against a system-wide blackout.

LOLH Loss of load hours

LOLP Loss of load probability; The estimated probability of an outage due to generation shortfall

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 Towards the ocean

mauka Inland; towards the mountains

MECO Maui Electric Company

MGD Millions of Gallons per Day flow

moku District; a Hawaiian land division within an *ahupua'a*

MPH Miles per hour

MPRM Meteorological Processor for Regulatory Models

MSL	Mean sea level
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
Naphtha	A light petroleum fuel intermediate between diesel oil and gasoline.
NCDC	National Climatic Data Center
NE	Northeast
NESC	National Electric Safety Code
NESHAPS	National Emissions Standards for Hazardous Pollutants
NFPA	National Fire Protection Association
NLT	No later than
No. 2 fuel oil	Diesel-grade fuel oil.
NOAA	National Oceanic and Atmospheric Administration, Department of Commerce, U.S. Federal Government
Nocturnal	Active at night-time, after dark
Normal conductor ratings	The maximum amount of current that power lines are capable of carrying on a continuous basis without damaging or weakening the conductor.
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service, Department of the Interior, U.S. Federal Government
NSPS	New Source Performance Standards (Federal)
NTU	Nephelometric Turbidity Units
NW	Northwest
Octave frequency band	A group or band of frequencies that encompasses an octave.
OEQC	Office of Environmental Quality Control, Department of Health, State of Hawai‘i
OR&L	O‘ahu Rail and Land Co
OSHA	Federal Occupational Safety & Health Administration
Peaking units	Generating units designed to start up and shut down daily to respond quickly to the sharp rise and fall of electricity demand experienced during peak use hours and emergency situations.
PGV	Puna Geothermal Venture
pH	Measure of acidity; the negative logarithm (Base 10) of the effective molar concentration of hydronium ions in water
PHHT	Pearl Harbor Historic Trail
PHNWR	Pearl Harbor National Wildlife Refuge
PHRI	Paul H. Rosendahl, Inc.
Piezometric	The compressibility of a material or fluid under pressure.
PIMA	Public Infrastructure Map Amendment

PM_{10}	Concentration of airborne Particulate Matter that will pass through a 10 micrometer filter
ppt	parts per thousand, by weight unless otherwise specified
PM	Particulate matter
PRG	Preliminary Remediation Goals (EPA-defined, for ambient air quality)
PSD	Prevention of Significant Deterioration in air quality
psia	pounds per square inch absolute (a unit of vapor pressure)
PUC	Public Utilities Commission
ROH	Revised Ordinances of Honolulu of 1990
ROW	Right-of-Way
RPS	Renewable Portfolio Standard
Ruderal	Disturbed, rocky, rubbishy areas, such as old agricultural fields and rock piles
RWC	Reasonable Worst Case
S	South
SAAQS	State Ambient Air Quality Standards
SCR	Selective Catalytic Reduction Technology
SCS	Soil Conservation Service, US Department of Agriculture (now the Natural Resource Conservation Service)
SEC	State Energy Corridor, State of Hawai‘i
SHPD	State Historical Preservation Division, Department of Land and Natural Resources, State of Hawai‘i
SIL	Significant Impact Level
Simple-cycle Combustion Turbine	
SLUC	State Land Use Commission, State of Hawai‘i
SMA	Special Management Area
SMP	Special Management Area Permit
Spinning Reserve	Electric power plant or utility capacity running at low power in excess of actual load.
SPL	Sound Pressure Level (SPL or Lp)
SWAC	Sea Water Air Conditioning
SWL	Sound Power Level (other abbreviations are PWL or L_w).
System Peak	The maximum amount of energy required by the electrical system at a point in time.
Threatened	Listed and protected under the ESA as a threatened species
TLV-TWA	Threshold Limit Values-Time Weighted Average
TMK	Tax Map Key
tpy	tons per year (air pollutant emissions unit)
UBC	Uniform Building Code

UIC Underground Injection Control

Unit Minimum Rating
The lowest rate at which it is practical to operate the unit.

Unit Normal Top Load Ratings
Gross numbers represent the nameplate rating of the units. Net numbers represent the power that the unit can deliver to the system after subtracting the power used by all ancillary equipment (e.g., pumps, blowers, etc.)

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

VOS Value of Service (i.e., reliable electric service)

WERC Wind Engineering Research Council

WTA Willingness to Accept

WTP Willingness to Pay

Xeric Extremely dry conditions or habitat

µS/cm Micro-Siemens per centimeter, the standard unit for measuring specific conductance (which is generally directly proportional to salinity in natural waters)

z_o Surface roughness length unit

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10.0 PARTIES CONSULTED

10.1 EA/ EIS PREPARATION NOTICE

HECO distributed the EISPN to the individuals and organizations listed in Table 10.1 and requested their comments on the proposed scope of the analysis and on the completeness of the alternatives that HECO proposed to evaluate.

Table 10.1. EISPN Distribution List

City and County of Honolulu	**Libraries and Depositories**
Board of Water Supply	DBEDT Library
Department of Design and Construction	Ewa Beach Public & School Library
Department of Environmental Services	Hawai‘i State Library Hawai‘i Documents Center
Department of Facility Maintenance	Library, Honolulu Department of Customer Services
Department of Parks and Recreation	Legislative Reference Bureau
Department of Planning & Permitting	Pearl City Regional Library
Department of Transportation Services	UH Hamilton Library
Fire Department	Kapolei Library
Police Department	**Elected Officials**
City & County Civil Defense	US Representative Ed Case
State Agencies	U.S. Senator Daniel K. Inouye
Commission on Water Resource Management	U.S. Senator Daniel Akaka
Department of Defense	State Senator Brian Kanno
Department of Hawaiian Homelands	State Senator Colleen Hanabusa
Hawai‘i State Civil Defense	State Representative Maile Shimabukuro
Office of Environmental Quality Control	State Representative Michael Kahikina
Office of Hawaiian Affairs	State Representative Mark Moses
State Department of Accounting and General Services	County Councilmember Todd Apo
State Department of Agriculture	Neighborhood Board No. 34 Chair
State Department of Business, Economic Development, and Tourism	Neighborhood Board No. 24 Chair, Cynthia Rezentes
State Department of Education	**Local Utilities**
State Department of Health, Environ. Planning Office	Verizon
State Department of Land and Natural Resources	The Gas Company
State Department of Transportation	**Other Parties**
State DLNR Historic Preservation Division	James Campbell Estate
UH Environmental Center	Hawaiian Railway Society
UH Water Resources Research Center	O‘ahu Island Burial Council
Federal Agencies	AES Hawai‘i, Inc.
Environmental Protection Agency (PICO)	City & County of Honolulu HPOWER
National Marine Fisheries Service	Chevron
US Army Engineer Division	Southern Wine & Spirits of Hawai‘i
US Fish and Wildlife Service	Tesoro
US Federal Aviation Administration	Queen Emma Foundation
	Hawaii’s Thousand Friends
US Natural Resources Conservation Service	**News & Media**
US Coast Guard	Honolulu Advertiser
US Navy, Pacific Division Naval Facilities Engineering Command (PACDIV)	Honolulu Star-Bulletin
Source: Compiled by Planning Solutions, Inc.	

10.1.1 WRITTEN COMMENTS RECEIVED ON THE EISPN

HECO received written comments on the EISPN from the individuals and organizations listed in Table 10.2 below. The comment letters and HECO's responses to them are reproduced in Appendix B~~Section~~.

Table 10.2. Written Comments Received on the EISPN

Number	*Name & Title of Commenter*	*Organizational Affiliation*
1	George P. Young, P.E., Chief	Department of the Army Regulatory Branch
2	Lester K.C. Chang, Director	Department of Parks and Recreation, City and County of Honolulu
3	Darice B.N. Young, Realty Contracting Officer	Federal Aviation Administration
4	Russ K. Saito, State Comptroller	Department of Accounting and General Services, State of Hawai‘i
5	Charles A. Prentiss, President	Hawai‘i's Thousand Friends
6	Matthew Riel, President	AES Hawaii, Inc.
7	Genevieve Salmonson, Director	Office of Environmental Quality Control, State of Hawai‘i Department of Health
8	Harold Lao, Acting Manager	Environmental Planning Office, State of Hawai‘i Department of Health
9	Attilio K. Leonardi, Fire Chief	Honolulu Fire Department
10	Paul Hanohano, OSP Engineering	Hawaiian Telcom
11	Clyde W. Nāmu‘o, Administrator	Office of Hawaiian Affairs, State of Hawai‘i
12	Keith S. Shida, Principal Executive, Customer Care Division	Board of Water Supply, City and County of Honolulu
13	Edward Y. Hirata, Director	Department of Transportation Services, City and County of Honolulu
14	Dean A. Nakano, Acting Deputy Director	State of Hawai‘i Commission on Water Resource Management
15	Henry Eng, FAICP, Director	Department of Planning and Permitting, City and County of Honolulu
16	Patricia Hamamoto, Superintendent	Department of Education, State of Hawai‘i
17	The Honorable Daniel K. Akaka	United States Senate
18	Wayne M. Hashiro, P.E., Director	Department of Design and Construction, City and County of Honolulu
19	Boisse P. Correa, Chief of Police	Honolulu Police Department
20	Rodney K. Haraga, Director	Department of Transportation, State of Hawai‘i
21	Laverne Higa, P.E., Director & Chief Engineer	Department of Facility Maintenance, City and County of Honolulu
22	Philip W. Miyoshi	McCorriston Miller Mukai MacKinnon LLP
23	Charles E. Calvet, P.E., Manager	The Gas Company
Source: Compiled by Planning Solutions, Inc.		

10.2 COMMUNITY OUTREACH

HECO began meeting with representatives of the West O‘ahu/Wai‘anae Coast communities in 2004 to discuss its plans for energy-related facilities in the region and possible ways of giving back to communities for burdens being imposed by major infrastructure facilities. The meetings identified many of the residents’ needs and concerns, and culminated in HECO agreeing to implement specific practices (mostly related to public funding and information sharing) as well as several measures that will be implemented if the proposed generating station is approved (see Section 2.4).

The public ~~will~~ also ~~have~~ had an opportunity to review and comment on ~~this~~ the DEIS in accordance with HRS Chapter 343.

10.3 EIS PREPARATION & DISTRIBUTION

The CIP Generating Station and Transmission Additions Draft & Final~~D~~ EIS was prepared by Planning Solutions, Inc. The respective contributions of the individuals and organizations are as follows:

Planning Solutions, Inc.

Perry J. White	Principal-in-Charge
Charles Morgan	Contributing Author
Melissa M. White	Contributing Author
Makena B. White	Maps and Graphic Design

Technical Consultants

Y. Ebisu & Associates	Noise Impact Analysis
Rana Productions, Ltd.	Faunal Survey
AECOS Consultants	Botanical Survey
Tom Nance Water Resource Engineering	Water Resources Impact Analysis
International Archaeological Research Institute, Inc.	Archaeological/Cultural Assessment
Jim Clary & Associates	Air Quality Impact Analysis

10.3.1 DRAFT EIS DISTRIBUTION

HECO ~~will~~ distributed ~~this~~ the DEIS to the individuals and organizations listed in Table 10.3 and requested their comments on the project. ~~It will provide a limited number of loan copies of this document to libraries.~~ The 45-day public comment period ~~expired~~ended on March 28, 2006.

10.3.2 DRAFT EIS WRITTEN COMMENTS AND RESPONSES

HECO received written comments on the DEIS from the individuals and organizations listed in Table 10.4 below. The comment letters and HECO’s responses to them are reproduced in Appendix C~~Section 10.3.2 below.~~

Table 10.3. Draft EIS Distribution List

State Agencies	**Libraries and Depositories**
Commission on Water Resource Management	DBEDT Library
Department of Defense	Ewa Beach Public & School Library
Department of Hawaiian Homelands	Hawaii State Library Hawaii Documents Center
Hawai‘i State Civil Defense	Library, Honolulu Department of Customer Services
Office of Environmental Quality Control	Legislative Reference Bureau
Office of Hawaiian Affairs	Pearl City Regional Library
Department of Accounting and General Services	UH Hamilton Library
Department of Agriculture	Kaimuki Regional Library
Department of Business, Economic Development, and Tourism	Kane‘ohe Regional Library
Department of Education	Hawai‘i Kai Regional Library
Department of Health, Env. Planning Office (3 copies)	Hilo Regional Library
Department of Land and Natural Resources (5 copies)	Kahului Regional Library
State Department of Transportation	Līhu‘e Regional Library
State DLNR Historic Preservation Division	Wai‘anae Library
UH Environmental Center (4 copies)	Kapolei Library
UH Water Resources Research Center	**Elected Officials**
Consumer Advocate	US Representative Ed Case
Public Utilities Commission	Senator Daniel K. Inouye
DBEDT Energy, Resources, & Technology Division	Senator Daniel Akaka
Federal Agencies	State Senator Brian Kanno
Environmental Protection Agency (PICO)	State Senator Colleen Hanabusa
National Marine Fisheries Service	State Representative Mark Moses
US Army Engineer Division	State Representative Michael Puamamo Kahikina
US Fish and Wildlife Service	State Representative Maile Shimabukuro
US Federal Aviation Administration	Neighborhood Board No. 24 Chair, Cynthia Rezentes
US Natural Resources Conservation Service	Neighborhood Board No. 34 Chair, Maeda Timson
US Coast Guard	County Councilmember Todd Apo
US Navy, Pacific Division Naval Facilities Engineering Command (PACDIV)	**Other Parties**
City and County of Honolulu	James Campbell Estate
Board of Water Supply	Hawaiian Railway Society
Department of Design and Construction	O‘ahu Island Burial Council
Department of Environmental Services	AES Hawai‘i, Inc.
Department of Facility Maintenance	City & County of Honolulu HPOWER
Department of Parks and Recreation	Chevron
Department of Planning & Permitting	Southern Wine & Spirits of Hawaii
Department of Transportation Services	Tesoro
Fire Department	Hawaii’s Thousand Friends
Police Department	Life of the Land
City & County Civil Defense	Queen Emma Foundation
News & Media	Aina Nui Corporation
Honolulu Advertiser	HRPT Properties Trust
Honolulu Star-Bulletin	Damon Key Leong Kupchak Hastert
Local Utilities	McCorriston Miller Mukai MacKinnon LLP
Hawaiian Telcom	Sierra Club
The Gas Company	
Source: Compiled by Planning Solutions, Inc.	

Table 10.4. Written Comments Received on the DEIS

Number	*Name & Title of Commenter*	*Organizational Affiliation*
1	Lester K.C. Chang, Director	Dept of Parks and Recreation, C&C of Honolulu
2	William D. Balfour, Jr., Acting Administrator	Oahu Civil Defense Agency
3	Eugene C. Lee, P.E., Dep. Dir.	Department of Design & Construction, C&C of Honolulu
4	Kenneth G. Silva, Chief	Fire Department, C&C of Honolulu
5	Keith S. Shida, Principal Exec.	Customer Care Div., Honolulu Board of Water Supply
6	Darice B. N. Young, Realty Contracting Officer	Federal Aviation Administration, U.S. Dept. of Transp.
7	Jack Pobuk, Program Coordinator	Dept. of Environmental Services, C&C of Honolulu
8	George P. Young, P.E., Chief	Regulatory Branch, Dept of the Army
9	Dean A. Nakano, Acting Deputy Director	Commission on Water Resource Management, State of Hawai‘i
10	Paul Hanohano, OSP Engineering	Hawaiian Telcom
11	Mike Fitzgerald, President & CEO	Enterprise Honolulu
12	Ernest Y.W. Lau, Public Works Administrator	Dept. of Accounting & General Services, State of Hawai‘i
13	Laverne Higa, P.E., Director & Chief Engineer	Dept of Facility Maintenance, C&C of Honolulu
14	C.K. Yokota, Director	Regional Environmental Dept, Department of the Navy
15	Melanie Chinen	Historic Preservation Division, DLNR, State of Hawai‘i
16	Genevieve Salmonson	Office of Environmental Quality Control, State of Hawai‘i
17	Cynthia K.L. Rezentes, Chair	Waianae Neighborhood Board
18	Patricia Hamamoto, Superintendent	Department of Education, State of Hawai‘i
19	Rodney K. Haraga	Department of Transportation, State of Hawai‘i
20	Clyde W. Namuo	Office of Hawaiian Affairs, State of Hawai‘i
21	Steve Kelly, AICP	Kapolei Property Development LLC
22	Theodore E. Liu	Department of Business, Economic Development & Tourism, State of Hawai‘i
23	Kenneth G.K. Hoo	On behalf of Southern Wine & Spirits, LLC
24	Henry Eng	Dept. of Planning & Permitting, City & County of Honolulu
25	Kelvin H. Sunada	Department of Health, State of Hawai‘i
26	Richard M. Moss	Moss Engineering, Inc.
Source: Compiled by Planning Solutions, Inc.		

APPENDIX A. NOISE IMPACT ANALYSIS

Prepared by Y. Ebisu & Associates

October 18, 2005

Y. Ebisu & Associates
Acoustical and Electronic Engineers

1126 12th Ave., Room 305
Honolulu, Hawaii 96816
Ph. (808) 735-1634 – Fax (808) 732-0409
e-mail: ebisuyassoc@aol.com

YEA Job #43.032
October 18, 2005

Planning Solutions, Inc.
Ward Plaza, Suite 330
210 Ward Avenue
Honolulu, Hawaii 96814-4012

Attention: Mr. Perry White

Subject: Evaluation of Potential Noise Impacts from the Proposed HECO Power Generating Station at Campbell Industrial Park

Dear Mr. White:

The following letter report describes our findings regarding potential noise impacts from the proposed facility, and noise mitigation recommendations related to the subject generating station. The proposed power generating station is located where shown in Figure 1, with the HPOWER facility to the south, fuel tank farm to the west, Chevron facilities to the north, and a commercial business establishment (Southern Wine & Spirits of Hawaii) to the east. Locations "B" through "F" were located along the future south boundary of the project site.

Existing background noise measurements were obtained at locations "A" through "M" to describe the existing noise environment at the project site. In addition, noise measurements during operation of a 1.0 MW generator and during operation of the AES coal conveyor were also obtained. Potential future noise levels from the power generating station equipment were predicted for conditions with single and dual generator operations at the project site. Both existing and future noise levels were compared with the existing State Department of Health (DOH) noise limit of 70 dBA (for lands zoned for industrial use) along the project site boundaries. The State DOH limit of 70 dBA was used as the threshold for potential noise impacts on neighboring properties, which are all zoned I-2 (General Industrial District). Where predicted noise levels from the generating station exceeded the 70 dBA DOH noise limit, recommendations for reducing the generating station equipment noise emissions were provided.

Existing Noise Measurement Results. Daytime and evening background noise measurements at Locations "A" through "M" were obtained where shown in Figure 1. The results of the A-Weighted noise measurements are shown in Enclosures 1 through 4. The coal conveyor was operating during the morning of September 6, 2005 and close-in measurements at 7 to 50 feet were obtained as shown in Enclosure 5. Measured noise level from the coal conveyor ranged from 83.7 dBA at Location "A" to

74.5 dBA at 50 feet west of the conveyor. The noise from the coal conveyor also controlled background noise levels at Locations "B" and "C" on September 9, 2005 (see Enclosure 1). The loudest noise source measured on the project site was a 1.0 MW diesel engine emergency generator located southeast of Location "L" (see Enclosure 5). Measured noise levels from this generator ranged from 78.4 to 87.2 dBA at 50 feet distance from the generator, and was 84.5 dBA at the north property line.

During periods when the coal conveyor or diesel engine generator was not operating, the loudest noise source was the metal shredder at the HPOWER facility, which was located approximately 75 feet southwest of Location "E". Noise levels from the metal shredder were impulsive, with maximum noise levels at Location "E" of 92 to 97 dBA and average noise levels of 76 to 78 dBA.

In summary, existing noise levels along the future south boundary of the project exceed 70 dBA at Location "E" during operation of the HPOWER metal shredder, and exceed 70 dBA at Location "B" during operation of the coal conveyor. Along the east property boundary, existing noise levels exceed 70 dBA during operation of the coal conveyor. Along the north boundary, existing noise levels exceed 70 dBA in the vicinity of Location "L" during operation of the emergency diesel generator.

Predicted Noise Levels from Future Generating Plant Equipment. Average (or Leq) noise contours for the future generating plant equipment were developed using measured noise data from combustion turbine generators operating on the Big Island of Hawaii, which were scaled upward to estimate the noise from the future equipment at the Campbell Industrial Park site. For the Phase 1 scenario, it was assumed that a single 107 MW combustion turbine generator would be operating where shown in Figure 2. For the Phase 2 scenario, it was assumed that two identical, 107 MW combustion turbine generators would be operating where shown in Figure 3. The far field, source noise modeling assumptions used to develop the noise contours for Phase 1 were as follows, with identical equipment assumed for the second generating set in Phase 2:

1. Step-Up Transformer: 53 dBA at 300 feet distance;
2. Fuel Pump Skid: 47 dBA at 300 feet distance;
3. Water Injection Skid: 52 dBA at 300 feet distance;
4. Fin Fan Cooler: 62 dBA at 300 feet distance;
5. Combustion Turbine Stack: 62 dBA at 300 feet distance; and
6. Combustion Turbine Housing and Inlet: 61 dBA at 300 feet distance.

The resulting noise contours for the Phase 1 and Phase 2 scenarios are shown in Figures 2 and 3, and no sound attenuation benefit was allowed for noise shielding effects from structures. From Figure 2, it was concluded that noise levels from the generating station could exceed 70 dBA along the future south boundary line. From Figure 3, it was concluded that noise levels from the generating station could exceed 70 dBA along the north and future south boundary lines. The adjoining land areas where the noise levels from the generating station could exceed 70 dBA are not considered to be noise sensitive, or areas where noise levels of 70 to 75 dBA would interfere with current activities. To the south are HPOWER refuse vehicle circulation driveways and open space, and to the north are Chevron fuel storage tanks. The 70 dBA contour should not cross the east boundary into the Southern Wine & Spirits of Hawaii property.

Recommended Noise Mitigation Measures. Because actual, far field, noise data on the plant equipment was not available from the equipment vendors, it is possible that the noise contours shown in Figures 2 and 3 may not be accurate. Therefore, far field, equipment noise data from the equipment vendors should be obtained prior to generator installation. In addition, combustion turbines and fin fan coolers with lower noise levels than were assumed should be installed so as to not exceed the 70 dBA State DOH limit along the north and future sound boundary lines. The recommended maximum far field noise levels for the fin fan cooler, combustion turbine stack, and combustion turbine housing and inlet are 57 dBA, 56 dBA, and 55 dBA at 300 feet distance, respectively. These source noise levels are 5 and 6 dBA lower than those used for the fin fan coolers and combustion turbine components, respectively, when developing the noise contours of Figures 2 and 3. If more refined, far field, source noise data is available for all generating station equipment, revised "not to exceed" source noise levels for the fin fan coolers and combustion turbines should be developed.

In summary, risks of adverse noise impacts from the proposed generating station are considered to be low. The future noise levels from the generating station equipment may exceed the 70 dBA State DOH limit if equipment noise evaluation and possible quieting are not employed prior to installation, but risks of activity interference or annoyance at the adjoining properties are considered to be low. The future risks of activity interference or annoyance are similar to the current situation, where property line noise levels periodically exceed 80 dBA during operation of the emergency diesel generator, coal conveyor, and metal shredder. Nevertheless, if possible, containment of the 70 dBA noise contour within the generating station's property boundaries should be a goal of the proposed generating station installation.

Let me know if you have any questions regarding this letter report.

Sincerely,

Yoichi Ebisu, P.E.

encl.

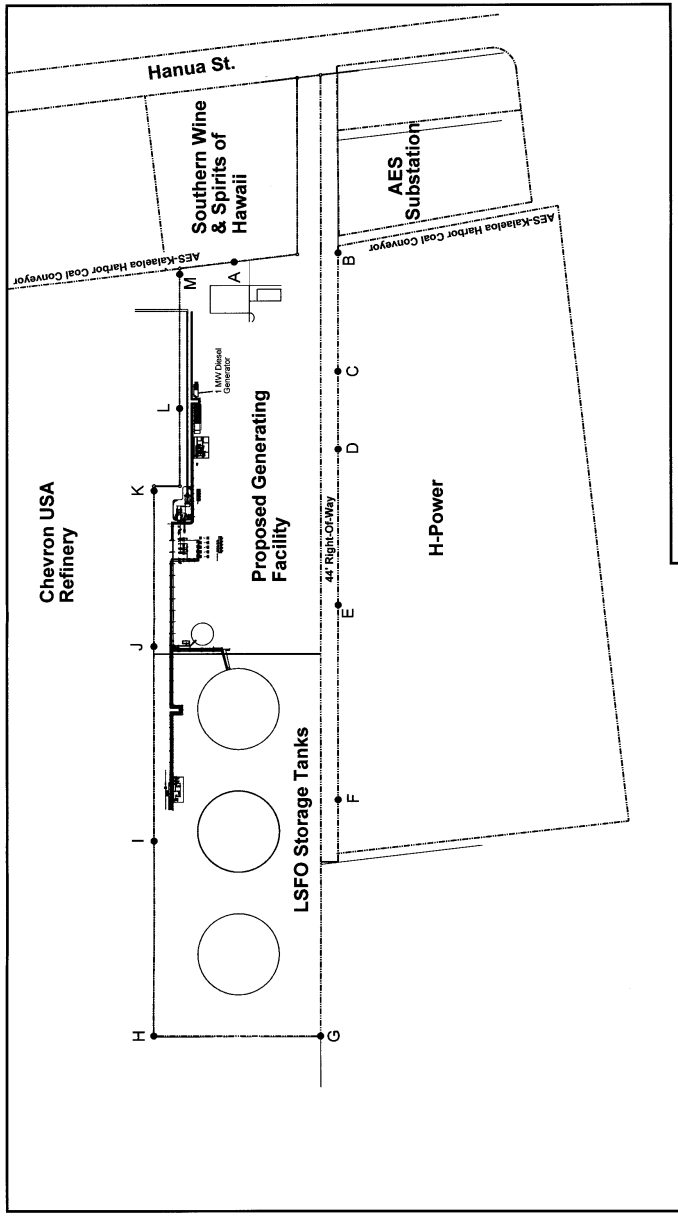
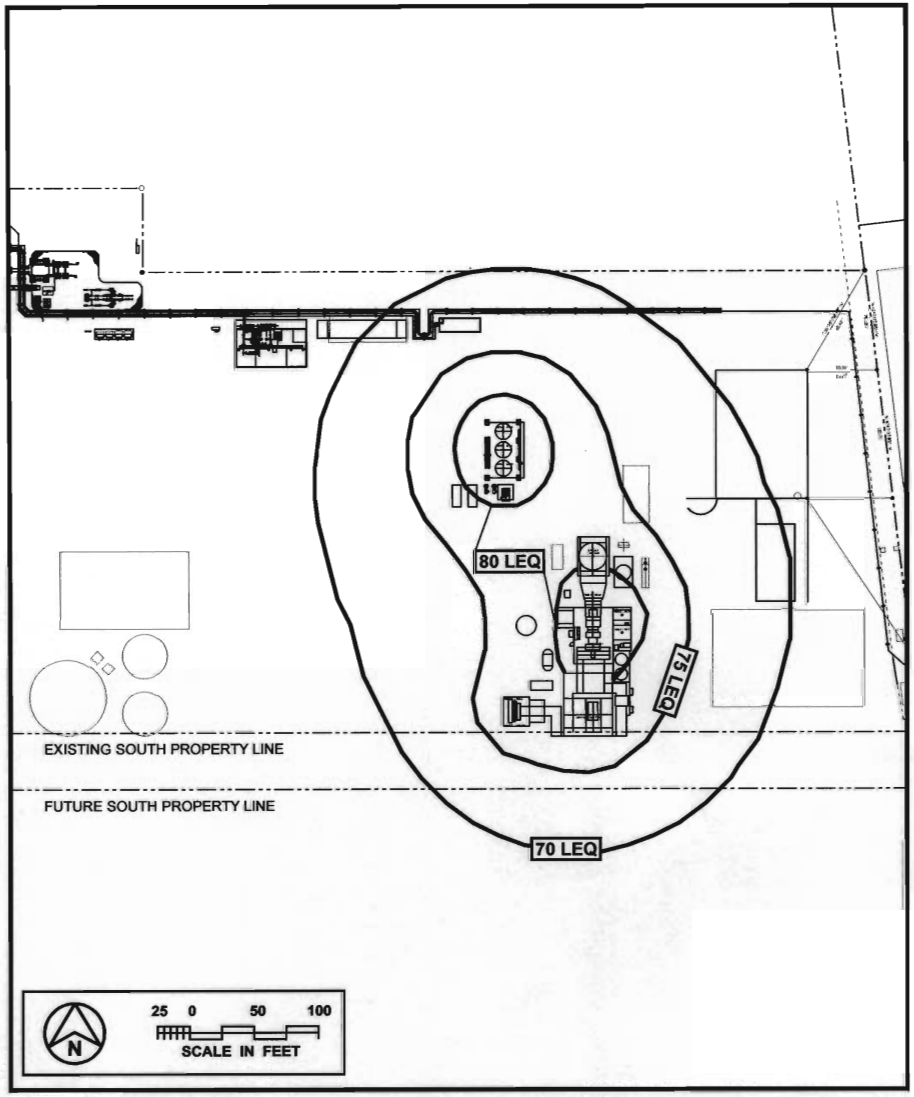


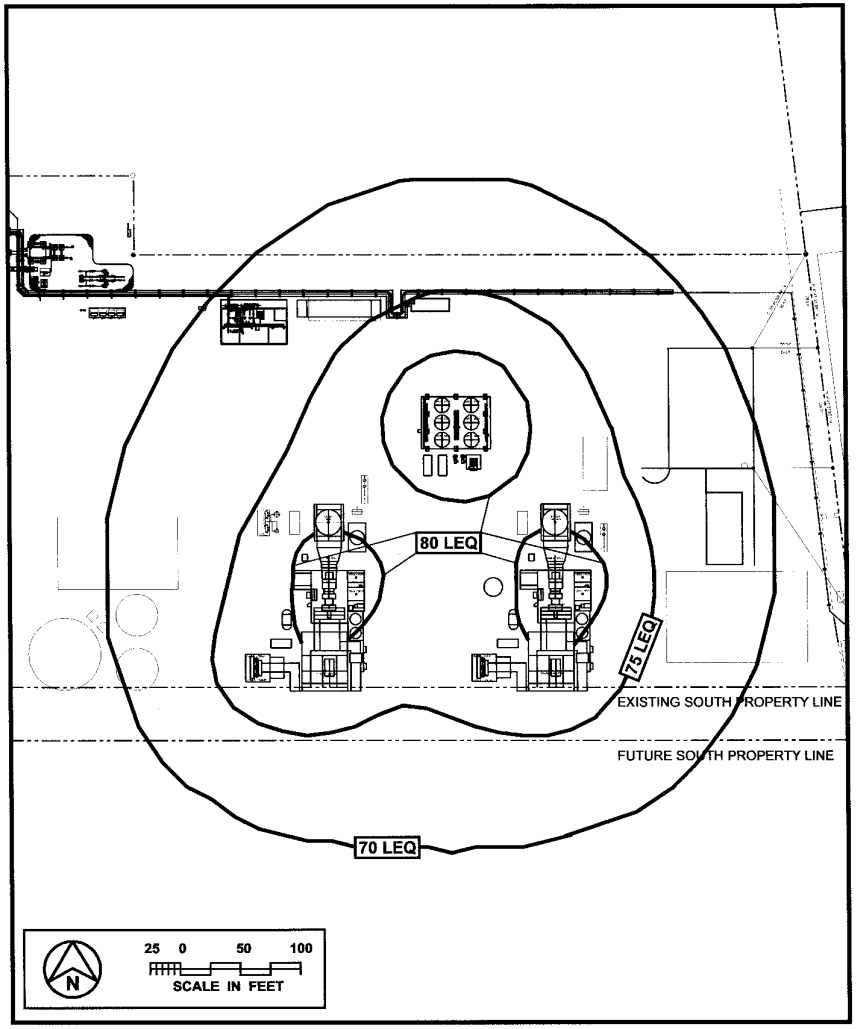
FIGURE 1

PROJECT LOCATION MAP AND NOISE MEASUREMENT LOCATIONS



PREDICTED NOISE LEVELS FROM SINGLE GENERATOR INSTALLATION (PHASE 1)

FIGURE 2



PREDICTED NOISE LEVELS FROM DUAL GENERATOR INSTALLATION (PHASE 2)

FIGURE 3

LOCATION: HECO CIP FUEL TANK PROP
DATE: September 9, 2005

CONDITION: Daytime Background Ambient Noise Measurements
Averaging Period: 15 Minutes

Time	Location	Lmax	Leq	Lmin		Remarks
0933	B	89.6	80.5	79.1		Noise from Coal Conveyor
0953	C	83.0	70.0	66.2		Noise from Coal Conveyor; Trucks
1014	D	87.3	67.9	64.4		Noise from Coal Conveyor; Trucks
1034	E	96.6	78.2	70.8		Noise from HPOWER Metal Shredder
1054	F	87.0	70.5	62.7		Noise from HPOWER Metal Shredder
1125	G	80.1	61.3	57.8		Coal Conveyor Operating
1145	H	71.7	56.3	53.4		Coal Conveyor Operating
1208	I	65.5	57.0	53.9		Coal Conveyor Shut Down
1227	J	68.3	56.9	51.3		Coal Conveyor Not Operating
1246	K	79.4	61.6	56.3		Coal Conveyor Not Operating
1305	L	75.3	61.2	57.2		Coal Conveyor Not Operating
1324	M	70.9	58.7	55.7		Coal Conveyor Not Operating
0930	A	83.9	81.9	80.0		Coal Conveyor Operating
1215	A	70.9	52.7	48.4		Coal Conveyor Not Operating

Note: Lmax = A-Weighted, maximum sound level; Leq = A-Weighted, average sound level; Lmin = A-Weighted, minimum sound level.

ENCLOSURE 1

LOCATION: HECO CIP FUEL TANK PROP
DATE: September 15, 2005

CONDITION Evening Background Ambient Noise Measurements
10 to 15 mph wind.
Averaging Period: 15 Minutes

Time	Location	Lmax	Leq	Lmin		Remarks
2003	B	64.1	56.5	52.4		Machinery noise from across Hanua Street.
2021	C	86.2	62.0	54.7		HPOWER refuse trailer truck on driveway.
2039	D	80.3	63.8	58.6		HPOWER high frequency plant noise.
2000	A	55.5	51.2	48.2		
2045	A	55.9	51.8	49.5		

Note: Lmax = A-Weighted, maximum sound level; Leq = A-Weighted, average sound level; Lmin = A-Weighted, minimum sound level.

ENCLOSURE 2

LOCATION: HECO CIP FUEL TANK PROP
DATE: October 14, 2005

CONDITION Daytime Background Ambient Noise Measurements
Averaging Period: 15 Minutes

Time	Location	Lmax	Leq	Lmin		Remarks
0935	B	67.9	58.9	53.7		No City Refuse Trucks
0954	C	69.2	58.3	54.4		No City Refuse Trucks
1013	D	86.5	69.1	61.8		
1033	E	95.5	76.7	68.2		Noise from HPOWER Metal Shredder
1053	F	80.7	67.1	58.3		
1125	G	73.8	60.3	57.4		
0940	A	66.9	52.7	48.6		
1145	A	66.7	52.5	48.5		

Note: Lmax = A-Weighted, maximum sound level; Leq = A-Weighted, average sound level; Lmin = A-Weighted, minimum sound level.

ENCLOSURE 3

LOCATION: HECO CIP FUEL TANK PROP
DATE: October 14, 2005

CONDITION Evening Background Ambient Noise Measurements
10 to 15 mph wind.

Time	Location	Lmax	Leq	Lmin		Remarks
1930	E	92.4	76.9	69.0		Noise from HPOWER Metal Shredder
1948	F	80.3	67.4	62.0		Metal Shredder Audible
2013	G	73.5	61.7	58.6		HPOWER Plant; Shredder; Chevron Plant
2031	H	68.3	58.8	56.2		Noise from Chevron Plant
2049	I	75.7	58.0	54.3		Steam Vent; Pipe Banging
2107	J	72.8	57.7	52.1		Racetrack Noise; Pipe Banging
2125	K	79.4	61.3	54.0		HPOWER Plant and Shredder Noise
2143	L	76.6	60.9	54.4		Racetrack Noise; Pipe Banging
2200	M	72.3	57.9	54.6		Condenser Noise; Shredder OFF
1930	A	65.5	53.4	50.3		
2200	A	62.3	49.8	45.8		

Note: Lmax = A-Weighted, maximum sound level; Leq = A-Weighted, average sound level; Lmin = A-Weighted, minimum sound level.

ENCLOSURE 4

OCTAVE BAND DATA LOG SHEET

JOB NO. #43-032
DATE 9/6/05

LOCATION HECO Campbell Ind. Park Tank Farm Site
LOGGER Y.E. Windy (15 mph) Day

EVENT TIME	FLAT	A	OCTAVE BAND CENTER FREQUENCY (HZ) 32	63	125	250	500	1K	2K	4K	8K	DIST.	COMMENTS
0916		83.7	76.3	72.9	69.1	72.4	78.7	81.6	75.1	68.2	65.0	7 FT	Coal Conveyor At Location A
0922		78.4	74.5	75.5	66.7	67.5	72.2	75.7	69.5	65.0	62.0	25 FT	Coal Conveyor Near Location A
0927		74.5	75.6	73.2	65.3	64.1	69.8	72.5	66.2	61.1	57.1	50 FT	Coal Conveyor Near Location A
0950		65.9	76.2	72.1	67.2	60.9	60.6	62.3	57.2	52.9	44.1	50 FT	Gen. Off; E.of 1.1 MW Gen. Radiator Discharge
0955		87.2	81.5	84.4	82.4	79.2	81.3	83.0	79.8	71.8	66.0	50 FT	Gen. On; E. of 1.1 MW Gen. Radiator Discharge
0958		78.4	80.2	77.7	75.1	72.1	75.2	74.0	72.4	67.2	59.6	50 FT	Gen On; S. of 1.1 MW Gen. Enclosure Side
1001		83.4	79.1	77.3	77.9	72.8	79.0	78.5	77.8	71.5	65.0	50 FT	Gen On; SW. of 1.1 MW Gen. Rear Intake
1005		84.5	82.2	84.2	82.9	78.4	80.5	79.0	78.7	73.1	66.2	39 FT	Gen On; N. of 1.1 MW Gen. Encl. Side At Fence
1010		79.9	76.2	78.4	78.1	76.5	76.6	73.1	73.0	66.6	59.6	100 FT	Gen On; E. of 1.1 MW Gen. Radiator Discharge
1013		72.6	77.7	76.0	73.5	69.4	67.4	68.0	65.5	60.3	53.3	100 FT	Gen On; S. of 1.1 MW Gen. Enclosure Side

ENCLOSURE 5

APPENDIX B. EISPN COMMENTS AND RESPONSES

1

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

REPLY TO ATTENTION OF

August 29, 2005

Regulatory Branch

Henry Eng, Director
Dept. of Planning & Permitting (Attn: Matt Higashida)
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

Subject: Department of the Army (DA) comments on an Environmental Impact Statement Preparation Notice (EISPN) regarding the Hawaiian Electric Company's proposed Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa, Oahu, Hawaii.

File No. POH-2005-444

Dear Mr. Eng:

This office has reviewed the above-referenced EISPN dated July 2005. The proposed project includes the construction of a new fossil-fueled electrical generating station, a new transmission line and associated improvements at two existing electrical substations in the Campbell Industrial Park. The information was reviewed pursuant to Section 10 of the Rivers and Harbors Act (RHA) and Section 404 of the Clean Water Act (CWA). Section 10 of the RHA requires that a Department of the Army (DA) permit be obtained for certain structures and/or work in or affecting navigable waters of the United States (33 U.S.C. 403). Section 404 of the CWA requires that a DA permit be obtained for the placement or discharge of dredged and/or fill material into waters of the United States, including wetlands (33 U.S.C. 1344).

A final determination of DA jurisdiction could not be made with the information provided in the EISPN. Several features were identified within the project footprint that require further review. An irrigation ditch formerly used to support sugar cane cultivation, and that has historically served as a tributary to the Palailai and Awanui Gulches, falls within portions of both transmission line alternatives. Information regarding the current status of the irrigation canal and the nature of its hydrological connection to the Barber's Point Harbor and/or the Pacific Ocean will be necessary. A site inspection may also be necessary to make a final determination. The design of the transmission line will also dictate the need for a DA permit: an above-ground, pole-supported design will likely not result in the discharge of dredged or fill material into waters of the U.S., whereas an underground installation by open trenching across waters of the U.S. would be regulated by the Corps pursuant to Section 404 of the CWA.

The "excavated" wetland referenced in Section 3.4 (Surface Water) of the document may also be impacted by one of the transmission line alignments. Information on the purpose of the excavated wetland north of Malakole Road and its hydrological connection to other waters of the U.S. will also be required, unless it can be demonstrated that the transmission line alignment will not impact this feature.

If you need further assistance, please contact Ms. Connie Ramsey by phone at 438-2039, by facsimile at 438-4060, or by electronic mail at Connie.L.Ramsey@usace.army.mil. Please refer to the above-referenced file number for further inquiries regarding this project. Thank you for your cooperation with our regulatory program.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Copy Furnished:
Robert Isler, Hawaiian Electric Company, Inc., P.O. Box 2750, Honolulu, HI 96840
Perry J. White, Planning Solutions, Ward Plaza, 210 Ward Avenue, #330, Honolulu, HI 96814

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. George P. Young, P.E., Chief
Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawai'i 96858-5440

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Young:

Thank you for your August 29, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions 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 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.

Comment 1:

A final determination of DA jurisdiction could not be made with the information provided in the EISPN. Several features were identified within the project footprint that require further review.

An irrigation ditch formerly used to support sugar cane cultivation, and that has historically served as a tributary to the Palailai and Awanui Gulches, falls within portions of both transmission line alternatives. Information regarding the current status of the irrigation canal and the nature of its hydrological connection to the Barber's Point Harbor and/or the Pacific Ocean will be necessary. A site inspection may also be necessary to make a final determination.

The design of the transmission line will also dictate the need for a DA permit: an above-ground, pole-supported design will likely not result in the discharge of dredged or fill material into waters of the U.S., whereas an underground installation by open trenching across waters of the U.S. would be regulated by the Corps pursuant to Section 404 of the CWA.

Response: Thank you for identifying the additional information that will be needed before reaching a final determination concerning possible Department of the Army jurisdiction over elements of the proposed project. To the best of our knowledge, the irrigation ditch has been abandoned for a number of years; it does not discharge water into Kalaeloa (Barbers Point) Harbor or the Pacific Ocean. We will investigate this further as we develop the Draft Environmental Impact Statement (DEIS) and will include

additional information in that report. In the meantime, we would be happy to attempt to arrange a site visit with a representative of the landowner if that will facilitate your final determination.

The proposed design of the transmission line calls for an above-ground, pole-supported facility. As you surmised, there is no potential for that to result in the discharge of dredged or fill material into waters of the U.S. We do not believe that the underground route will involve such a crossing either. However, as indicated above we will explore that further during preparation of the DEIS and will base that report, as well as related permitting efforts, on the results of those investigations.

Comment 2:

The "excavated" wetland referenced in Section 3.4 (Surface Water) of the document may also be impacted by one of the transmission line alignments. Information on the purpose of the excavated wetland north of Malakole Road and its hydrological connection to other waters of the U.S. will also be required, unless it can be demonstrated that the transmission line alignment will not impact this feature.

Response: The small, excavated wetland to the north of Malakole Street and to the east of the planned AES-CEIP #2 transmission line alignment **is more than 300 feet from the nearest point on the proposed new transmission line and** would not be affected in any way by its construction or operation. This will be clarified in the DEIS.

Thank you again for your comments. If you have any further questions or would like to arrange a site visit, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCIpt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, PSI

2

DEPARTMENT OF PARKS AND RECREATION

CITY AND COUNTY OF HONOLULU

KAPOLEI HALE, 1000 ULUOHIA STREET, STE. 309 • KAPOLEI, HAWAII 96707
Phone: (808) 692-5561 • FAX: 692-5131 • Internet: www.honolulu.gov

MUFI HANNEMANN
MAYOR

LESTER K.C. CHANG
DIRECTOR

DANA L. TAKAHARA-DIAS
DEPUTY DIRECTOR

August 26, 2005

Mr. Robert Isler, Project Manager
Hawaiian Electric Company
P. O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: HECO Campbell Industrial Park Generating Station and Transmission Additions Project: Environmental Assessment/Environmental Impact Statement (EA/EISPN)

Thank you for the opportunity to review and comment on Hawaiian Electric's proposed Campbell Industrial Park Generating Station and Transmission Additions Project.

The Department of Parks and Recreation has no comment on this project at this time.

Should you have any questions, please contact Mr. John Reid, Planner, at 692-5454.

Sincerely:

LESTER K. C. CHANG
Director

LKCC:ea
(116067)

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. Lester K.C. Chang, 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: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Chang:

Thank you for your August 26, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions 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 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* late this year. 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 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, PSI

3

U.S. Department of Transportation
Federal Aviation Administration

Western-Pacific Region
Real Estate and Utilities Section, AHNL-54B

P. O. Box 50109
Honolulu, Hawaii 96850-5000

September 1, 2005

Mr. Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, HI 96840-0001

Dear Mr. Isler:

HECO Campbell Industrial Park Generating Station and Transmission Additions Project: Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)

Your letter of August 8, 2005, requested comments or suggestions from the Federal Aviation Administration (FAA) regarding the subject project. To provide our agency with the information needed to more effectively review your proposed project, we ask that you submit the "Notice of Construction or Alteration" FAA Form 7460.1 that is available online at http://www.faa.gov.

We appreciate this opportunity to comment. Please contact me at 541-1236, if there are any questions.

Sincerely,

Darice B. N. Young
Realty Contracting Officer

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Ms. Darice B. N. Young, Realty Contracting Officer
Federal Aviation Administration
U.S. Department of Transportation
P.O. Box 50109
Honolulu, Hawai'i 96850-5000

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Young:

Thank you for your September 1, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/ Environmental Impact Statement Preparation Notice* and preparing your letter.

HECO will submit a completed "Notice of Construction or Alteration" FAA Form 7460.1 for your review once we have chosen the specific generating unit that we will use. Because we expect we will make that selection shortly, we hope to include a determination from your office in the Draft EIS when we submit it later this year.

In the meantime, if you have any questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, PSI

(4)

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
COMPTROLLER

KATHERINE H. THOMASON
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

(P)1230.5

SEP - 1 2005

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Subject: HECO Campbell Industrial Park Generating Station and Transmission Additions 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, and we have no comments to offer.

If you have any questions, please call me at 586-0400 or have your staff call Mr. Allen Yamanoha of the Public Works Division at 586-0488.

Sincerely,

RUSS K. SAITO
State Comptroller

c: Ms. Genevieve Salmonson, OEQC

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. Russ K. Saito, State Comptroller
Department of Accounting and General Services
State of Hawai'i
P.O. Box 119
Honolulu, Hawai'i 96810

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Saito:

Thank you for your September 1, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions 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 pleased to hear that the project does not impact any of Department of Accounting and General Services' projects or existing facilities. We understand that the Department has no comments to offer on the project at this time.

If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, PSI

Hawaii's Thousand Friends

305 Hahani St., PMB 282 • Kailua, HI 96734 • Phone/Fax: (808) 262-0682 E-mail: htf@lava.net

Robert Isler, Project Manager
Hawaiian Electric Company
P.O. Box 2750
Honolulu, HI 96840-0001

September 6, 2005

Dear Mr. Isler:

We have the following comments on the EISPN for the HECO Campbell Industrial Park Generating Station and Transmission Additions, and wish to be further consulted on this project.

The EISPN does not indicate that there will be sufficient study of some of the important environmental issues related to a decision to build another generating facility and transmission lines.

An important issue is alternative energy, especially photovoltaics (PV). PV as a source needs to be addressed in greater detail, especially in light of the recent announcement by the contractor for the military that new military housing on Oahu will be powered by PV. In addition, the HECO position that land is not available for PV panels needs to be addressed in light of the military announcement, and also because the panels usually are located on building roofs. It also appears that this issue affects the results of the calculation made for DSM in the Strategist model (Ref. EISPN p. 1-18) because commercial and residential use of PV could significantly alter the demand side, thereby lessening the need for the proposed facility.

Needed, also, is a discussion of why State residential tax credits for alternative electric generation sources are only up to $1,750, while in states which have electric rates less than half (1/2) of ours provide residential credits up to $10,000 for home PV systems. A larger tax credit could conceivably offset the need for additional HECO generation capacity. A discussion of this should be included. Incentives, as provided in other states, can also significantly expedite residential PV installations, and puts into question the information provided (Ref. EISPN p. 1-19) to consider residential PV only after 2016.

The statement that sufficient sun is not available in Hawaii for PV (Ref. EISPN p. 1-23) requires clarification.

In light of the pending military installation of PV, and the fact that PV systems are in use elsewhere, the footnote (17) that storage technology (especially for residential PV) is not available appears to be incorrect.

As a result of the above issues, the preferred plan selection scenario analysis (Ref. EISPN p.1-20) should include the effects of various levels of governmental commercial and residential PV incentives.

The question of availability of bio-fuel must be addressed in greater detail. For example, how much bio-fuel can realistically be expected to be available, in what time frame, from what source, and at what cost? What will HECO do to promote its availability? How much land is needed for that?

The public should be informed of how many years it will take to amortize the cost of the subject facilities. In other words, how long would the rate-payers be committed to paying for the fossil-fueled facility and related construction?

The need for the proposed transmission facility additions will also be lessened by increased PV installations even with negative metering.

Finally, you make reference to the State Energy Task Force decisions. We know that, at the time the task force met, oil was approximately $20.00 a barrel, and now it is more than three times that cost. As a result, the conclusions of the task force are dated. Also, their decision to base a Renewable Portfolio Standard (RPS) on a percentage of HECO "sales" appears inconsistent with the fact that commercial and residential PV systems are not HECO "sales". More appropriate would be to base the percentage on total islandwide electric energy requirements.

Thank you for the opportunity to comment. We look forward to your response.

Sincerely,

Charles A. Prentiss, President
Hawaii's Thousand Friends

Cc DPP
Perry White
OEQC

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

HECO C3
GENPP 10-16
YA/G

January 6, 2006

Mr. Charles A. Prentiss, President
Hawaii's Thousand Friends
305 Hahani Street. PMB 282
Kailua, Hawai'i 96734

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Prentiss:

Thank you for your September 6, 2005, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and other members of Hawaii's Thousand Friends spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and preparing your letter. We understand your interest in energy-related projects such as this and will include your organization among those we continue to consult with as we move through the environmental assessment process.

I regret that you feel we may not be giving sufficient study to some of the important environmental issues related to a decision to build the proposed generating facility and transmission lines. It is certainly our intention to comply with both the spirit and the letter of the environmental impact assessment regulations. The remainder of this letter addresses each of your comments, explaining how we intend to address them in the *Draft Environmental Impact Statement* (*DEIS)* and the reasons why we believe our approach is appropriate. To simplify your review of the response, we have reproduced your comment verbatim before each response.

Comment 1

> *An important issue is alternative energy, especially photovoltaics (PV). PV as a source needs to be addressed in greater detail, especially in light of the recent announcement by the contractor for the military that new military housing on Oahu will be powered by PV. In addition, the HECO position that land is not available for PV panels needs to be addressed in light of the military announcement, and also because the panels usually are located on building roofs. It also appears that this issue affects the results of the calculation made for DSM in the Strategist model (Ref. EISPN p. 1-18) because commercial and residential use of PV could significantly alter the demand side, thereby lessening the need for the proposed facility.*

Response: HECO values PV technology and has included it in the proposed Five-Year Action Plan in the Integrated Resource Plan (IRP) that it submitted to the Public Utilities Commission (PUC). The announcement that PV will be used to supply part of the power used by the new military housing that is being developed on O'ahu is not news to us; on the contrary, our renewable energy group has

known about the military's plans to use PV since their early planning stages and commends them for their initiative.

Section 1.3.3 of the EISPN, which explains the need for additional fossil fuel-fired generating capacity, makes two important points with regard to the integration of PV technology into this island's energy supply:

- The analysis in HECO's IRP-3 indicates that even if all of the potential demand-side and DG/CHP technologies (including PV) are deployed on the HECO system, the available resources will not be able to meet the forecast demand.
- While renewable energy sources play a prominent role in HECO's IRP-3 proposal, PV alone (i.e., without battery or other storage) does not provide the firm dispatchable power needed to ensure the integrity of O'ahu's electrical system.

As reported in the August 5, 2005, edition of *The Honolulu Advertiser*, the state-of-the art photovoltaic (PV) cells that Actus Lend Lease, the prime contractor for thousands of new Army and Coast Guard housing units that the military is developing on O'ahu, will deliver as much as 7 megawatts of energy into the island's power grid. In addition, most homes also will be provided with solar-powered water heaters, a design feature made possible in part by the generous benefits that HECO's PUC-approved solar water heating program provides to island residents and developers. However, as noted in the *The Honolulu Advertiser* article, the military's use of PV is relatively expensive. It reports that while officials will not say precisely how much it will cost, if it were not for the substantial resources of the U.S. military, there are doubts it would have happened.

There is a second, more important point that the announcement does not emphasize but that is critical to PV's relevance as a substitute for our proposed Campbell Industrial Park Generating Station and Transmission Additions Project. The PV units that the military is installing do not take the new housing units off the grid. Hence, while they will reduce the number of kilowatt hours that we must produce, power from them will be available only when the sun is shining. HECO will be called upon to provide power to the homes during those periods when the PV units are unable to provide the energy that the residents of the new homes require (e.g., during the evening, night, and cloudy periods). And, because the peak demand period that is targeted by our proposed unit addition project is in the evening when output from the PV cells is low or non-existent, building more PV units of the sort the military is incorporating into its new housing units does not eliminate, or even reduce, the need for the Campbell Industrial Park Generating Station and Transmission Additions Project.

It is possible to combine PV with storage, typically in the form of batteries, to allow users to disconnect from the grid. However, the storage component of PV systems is typically quite costly. PV systems with storage are unlikely to become economically competitive for the foreseeable future except in unique situations where they make it possible to forego long and costly extensions of the electric grid to serve geographically remote customers.

We would like to provide one final thought with respect to the viability of PV as a substitute for the proposed project. The magnitude of the near-term shortfall in peak generating capacity that the island faces is so great that it would not be physically possible to install the amount of PV-plus-storage capacity that would be needed to eliminate the need for the first unit that is proposed for the Campbell Industrial Park Generating Station.

Comment 2

Needed, also, is a discussion of why State residential tax credits for alternative electric generation sources are only up to $1,750, while in states which have electric rates less than half (1/2) of ours provide residential credits up to $10,000 for home PV systems. A larger tax credit could conceivably offset the need for additional HECO generation capacity. A discussion of this should be included.

Incentives, as provided in other states, can also significantly expedite residential PV installations, and puts into question the information provided (Ref. EISPN p. 1-19) to consider residential PV only after 2016.

Response: The State of Hawaii sets tax policy, including those for state tax credits. However, HECO was a member of the State Energy-Efficiency Policy Task Force, along with other notable stakeholders. The Task Force was charged by the State Legislature to examine alternative mechanisms to tax credits that would increase energy-efficiency and sustainability in a cost-effective manner. In all, the Task Force examined six alternative mechanisms and concluded that tax credits were the most cost-effective mechanism from the perspective of impacts to the State budget to achieving the stated goal. HECO supported and continues to support the Task Force findings and recommendations. Tax credits provide Hawaii residents valuable incentives to invest in renewable energy technologies.

Comment 3

The statement that sufficient sun is not available in Hawaii for PV (Ref. EISPN p. 1-23) requires clarification.

Response: Despite looking over this page several times, we did not find any statement to the effect that there is too little sun in Hawai'i for PV. We did note that the language in the footnote may have been confusing. To clarify this, we will revise it by adding the underlined words as shown below in the DEIS:

"Energy storage technology that would be required to utilize wind and photovoltaics on the scale needed to eliminate the need for the proposed project is such that the size required for centralized PV is not commercially available or an approvable site (in the case of pumped storage hydroelectric) has not been identified."

Comment 4

In light of the pending military installation of PV, and the fact that PV systems are in use elsewhere, the footnote (17) that storage technology (especially for residential PV) is not available appears to be incorrect.

Response: As noted above, HECO believes that there is a very useful role for PV on O'ahu and is working with the military and others who wish to install systems that would reduce their use of HECO-generated power and/or feed power into the island's electrical grid. One possible point of misunderstanding is that the footnote you mention was referring to large, central station storage. While costly, battery storage for small, separated residential PV systems is technically available.

However, even PV systems incorporating battery storage only eliminate the need for the sort of peaking units that we have proposed as part of this project if they result in the user being totally

disconnected from the grid. To the best of our knowledge, that is not the case for any of the PV systems that are being considered for large-scale implementation.

Though I suspect you may already familiar with it, I would like to call your attention to the renewable energy area of HECO's website (see www.heco.com). The following are among the PV items you will find there:

- PV system at Bishop Museum. Increasing public education and awareness of renewable energy technology is an important step towards establishing a sustainable market for renewable energy. HECO provided funding for a grid-connected photovoltaic system and renewable energy exhibit located at Bishop Museum. The photovoltaic energy system/exhibit, named Hale Ikehu (or "Energy House"), is operational and open to the public. Visitors are able to observe a working photovoltaic system and learn about solar energy and other renewable energy technologies..
- More Sun Power for Schools. HECO, HELCO, and MECO have extended their Sun Power for Schools program with the State of Hawaii Department of Education through 2006. The utilities will continue to install photovoltaic systems at Hawai'i public schools using voluntary customer contributions. To date, twenty (20) public schools have received photovoltaic systems and benefited from the educational material developed as part of the program.
- Hilo bay front PV partnership. HELCO, the County of Hawai'i, and the U.S. Department of Energy Million Solar Roofs program (MSR) teamed up to design and install a solar lighted educational kiosk and solar lighting for the Hilo bay front public restrooms. The kiosk features a building integrated PV (BIPV) system that uses PV roofing shingles along with a display board featuring renewable energy information.
- Kona base yard grid-connected PV system. To demonstrate a net energy metered PV system that would be similar to what a small commercial or residential customer might consider, HELCO has installed a 5.4 kW PV system along with battery back-up and an educational display at their Kona base yard. The system also provides HELCO staff with an opportunity to gain experience with a net energy metered PV system.
- Maui building-integrated PV. MECO provided a solar roof to the County of Maui's Lahaina Civic Center. The solar modules form an attractive roofing material that also produces electricity.
- Kawaihae transitional shelter PV lights. Using a grant from the Hawaiian Electric Industries Charitable Foundation, HELCO has installed two solar-powered lights that provide dusk to dawn security and improve the safety of the parking lot at the transitional shelter Ka Hale 'O Kawaihae.
- PV park lights for Puna. A partnership between HELCO and the County of Hawai'i has installed pole-mounted area lights at Ahalanui Beach Park and the Poho'iki Beach Park in Puna. These installations are examples of situations where connecting the facilities to the regular electrical grid is either too costly or otherwise impractical.

We believe that these efforts, as well as those that HECO proposes to undertake as part of its overall renewable energy and conservation effort outlined in the IRP demonstrate our commitment to renewable energy. Continuing with these plans will not eliminate the need for the proposed project.

Comment 5

As a result of the above issues, the preferred plan selection scenario analysis (Ref. EISPN p.1-20) should include the effects of various levels of governmental commercial and residential PV incentives.

Response: When the IRP preferred plan was selected, the effects of state and federal governmental incentives for commercial and residential PV systems were taken into consideration. For commercial PV systems, the state tax credit was 35% up to $250,000 and the federal tax credit 10% without any cap. For residential PV systems, the state tax credit was 35% up to $1,750 and there was no federal tax credit. While HECO did anticipate that some customers may install some amount of PV systems during the forecast period, it considered that level to be negligible to overall energy sales. Furthermore, customers are not obligated to and generally do not inform HECO of their PV system plans until they are ready to move forward with their projects. As a result, projecting the amount of customer PV installations or sales is not practical.

Recent developments at the federal level may contribute to increased installation of PV systems by HECO's customers. The federal government recently increased the tax credit incentives for PV systems. Beginning January 1, 2006, the federal tax credit for commercial PV systems increases from 10% to 30% with no cap and there is a new 30% credit up to $2,000 for residential PV systems. The federal and state tax credits end December 31, 2007 and the fate of the tax credits after expiration is uncertain at this time. State tax credits for PV systems remain unchanged at this time. However, the changes in federal incentives may stimulate market response to PV systems and HECO will take this into consideration in its next IRP. For more information about governmental incentives for PV systems consult the appropriate taxing authority or refer to the Energy Policy Act of 2005 for federal credits and Renewable Energy Tax Credit (Act 207 SLH 2003) for state credits.

Comment 6

The question of availability of bio-fuel must be addressed in greater detail. For example, how much bio-fuel can realistically be expected to be available, in what time frame, from what source, and at what cost? What will HECO do to promote its availability? How much land is needed for that?

Response: Electric utility experience within and outside the U.S. with biofuels for stationary power generation is very limited. To this end, HECO has initiated a multi-phased program to investigate the use of biofuels for power generation in its existing and planned generating units. Phase 1 of the program (biofuel resource screening and evaluation) was completed by the University of Hawaii in 2004. In Phase 2, which is currently underway, Southwest Research Institute will perform combustion tests to yield information on combustion turbine performance and emissions on blends of liquid biofuels (ethanol and biodiesel) with diesel (No. 2 distillate). In addition, HECO is developing the scope of Phase 3 whereby various technical, operational, environmental, and policy issues faced by the electric utility regarding the use of biofuels will be examined. It is envisioned that these phases will ultimately lead to Phase 4 of the program – a utility-scale demonstration of a biofuel-fired generating unit.

Because HECO does not have the capability needed to become a biofuel supplier, we are dependent upon third parties for its production. From Phase 1 of HECO's biofuels program, the University of Hawaii determined that biodiesel and ethanol are the most promising liquid biofuels for power generation. At present, the volume of these biofuels that are available in Hawai'i is quite limited.

Biodiesel

Limited local supply of biodiesel is the major drawback for this biofuel. Currently, less than 500,000 gallons per year of biodiesel is produced from yellow grease (waste cooking oils and grease) in Hawaii. The potential biodiesel supply in Hawaii, based on estimates of the waste grease resource (restaurants, hotels, etc.), is estimated to be about 3.3 million gallons per year. The potential to produce biodiesel from oil crops appears to be limited due to the low oil yield of oil seed crops (e.g., soybeans).

Ethanol

Ethanol is not currently produced in Hawaii. However, a rule signed by the Governor in September 2004 implements the State's ethanol requirement for gasoline, whereby at least 85% of Hawaii's gasoline must contain 10% ethanol by April 2006. To meet this requirement, four ethanol production plants (two on Kauai, one on Maui, and one on Oahu) are planned that can potentially supply over 40 million gallons per year from sugarcane molasses and bagasse. Should a sufficient ethanol supply become available, over and beyond what is supplied for the transportation sector, there is potential for HECO to utilize this locally produced alternative fuel to generate electricity.

Low biofuel supply is in part due to the absence of an economic market for such fuel. By ensuring that our proposed generation addition project is able to accommodate such fuels if and when biofuel supplies become commercially available, HECO would help create the market needed to stimulate capital investment into biofuel production and storage facilities. The land area and other inputs (infrastructure, water, labor and support services, etc.) that would be required for biofuel utilization depend upon the extent to which third parties respond to the market that we will create and the choices that they make with regard to the best way to meet that demand. The ultimate goal of HECO's biofuels program is to be ready to use biofuels when supplies become available and its use is technically feasible and economically viable.

Comment 7

The public should be informed of how many years it will take to amortize the cost of the subject facilities. In other words, how long would the rate-payers be committed to paying for the fossil-fueled facility and related construction?

Response: The capital cost of the proposed improvements will be amortized over the expected useful life of the equipment. The facility is expected to have a useful life of at least 30 years.

Comment 8

The need for the proposed transmission facility additions will also be lessened by increased PV installations even with negative metering.

Response: As indicated in the EISPN, HECO would like to construct the additional transmission line it has proposed even if the generation addition is not approved. The proposed transmission line would electrically parallel two existing transmission lines and would provide necessary redundancy to substantially enhance our ability to rely upon the large existing generating capacity in Campbell Industrial Park.

Comment 9

Finally, you make reference to the State Energy Task Force decisions. We know that, at the time the task force met, oil was approximately $20.00 a barrel, and now it is more than three times that cost. As a result, the conclusions of the task force are dated. Also, their decision to base a Renewable Portfolio Standard (RPS) on a percentage of HECO "sales" appears inconsistent with the fact that commercial and residential PV systems are not HECO "sales". More appropriate would be to base the percentage on total islandwide electric energy requirements.

Response: The EISPN does not contain a specific reference to the State Energy Task Force decisions. However, I believe your two basic points are: (i) IRP decisions should be made in view of oil price scenarios that appear reasonable in the context of recent experience and (ii) Renewable Portfolio Standard (RPS) should be based on the percentage on total islandwide electric energy requirements rather than on a percentage of HECO "sales".

The Integrated Resource Plan: 2006–2025 that HECO submitted to the State Public Utility Commission on October 28, 2005 (Docket No. 03-0253) addressed oil prices at some length. It explained that forecasting fuel oil prices was one of the most difficult and controversial parts of this IRP-3 process. It noted that HECO's IRP-3 fuel price forecast relies primarily on three sets of forecasted fuel prices; a base case developed using the traditional forecasting methodologies (2002 Fuel Price Forecast by the U.S. Department of Energy's Energy Information Administration) and two scenario analyses (Integration Technical Committee High Oil Price Forecast and Additional High Fuel Price Forecast) to evaluate the impact of higher fuel prices.

Section 13.2.1 of the IRP report explains the fuel prices used in the IRP decision-making process as follows:

As discussed above, as a result of the unexpected rise in fuel oil prices and concerns expressed by the Advisory Group and its Integration Technical Committee, HECO has analyzed several fuel price forecast scenarios to determine the least-cost resources for the scenarios to understand the changes that may be required should fuel price continue to rise. The scenario analyses performed for the ITC High Fuel Oil Price and Additional High Fuel Price forecasts have not resulted in dramatic changes in the Action Plan elements for 2006-2010. There are three principle reasons for that result: 1) the demand-side and CHP programs which reduce use of fuel oil are as aggressive as possible; 2) siting and construction of any sizable additional power generation facility (renewable or fossil fuel) within the Action Plan period beyond that already identified is unlikely; and 3) the resource most favored under high fuel price scenarios which is coal, faces particular challenges.

The more significant changes to the IRP-3 plan that would be required for higher fuel prices occur in the later period of the 20-year plan, with the acceleration of the proposed coal unit and potential wind farms. The Action Plan contains items relating to coal and

wind farms. Other possible resources that could come into play are: 1) expanded MSW facilities (to be installed for municipal solid waste reduction purposes rather than least cost); 2) increased photovoltaic projects, particularly if significant increased tax credits become available; and 3) seawater air conditioning projects, such as that being proposed for downtown Honolulu.

As discussed in Chapters 11, 13 and 15, HECO's Final Preferred Plan, Action Plan and risk mitigation measures provide a high degree of flexibility and robustness that will allow HECO to modify its plans to respond to changing market conditions, including high fuel prices.

On a fundamental level, oil prices are now expected by many experts to be higher in the long-term than those reflected in the January 2005 EIA Annual Energy Outlook (AEO), upon which HECO's updated 2005 forecast was based. The 2006 AEO which should be available in January 2006, should better take into account the higher prices actually experienced in 2005, and the fundamentals underlying those prices. HECO will continue to monitor fuel prices, what experts in the market predict for the future fuel prices, and any changes in the EIA fuel price forecasts (resulting from the recent fuel oil price increases) which HECO believes may in fact occur in the near future. HECO will provide updates to the Commission on fuel prices and reflect these updates in its IRP Evaluation Reports.

Finally, in response to your statement regarding the bases for RPS percentages, these are set by the State of Hawaii and not within HECO control.

If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

6

AES Hawaii, Inc.
A Subsidiary of The AES Corporation
The Global Power Company

August 30, 2005

Robert Isler
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Subject: HECO Campbell Industrial Park Generating Station and Transmission Additions Project

Dear Mr. Isler:

Thank you for the opportunity to review the EA/EISPN. It is clear to me that the island of Oahu needs more generating capacity. I have but one question on the proposed project at this time. Why has HECO failed to acknowledge the possibility of purchasing more power from its most reliable power supplier, AES Hawaii, as an option or alternative to this project? On a different matter, I wonder why it is that HECO's IRP-3 similarly doesn't acknowledge or consider purchasing more power from AES.

I feel compelled to point out to all of the interested parties in this matter that AES Hawaii stands ready to deliver 9 MW of additional power from its existing plant without having to make any significant modifications to the existing plant.

AES Hawaii (AES) currently provides 180 MW of energy and capacity to HECO under a long-term contract. AES' plant went into commercial operation in September 1992. AES originally declared a Committed Capacity of 189 MW, but HECO refused to accept any amount of power greater than 180 MW claiming among other things that HECO's system did not need any more power at that time. The dispute was resolved at that time by the parties entering into an agreement that essentially gave AES the first consideration for providing up to an additional nine (9) MW of dispatchable firm capacity (see the attached letter agreement).

AES Hawaii has offered this additional firm capacity to HECO multiple times since HECO has indicated the need for more power exists. In fact, despite AES' offer to provide this extra power, HECO has increased its contractual commitment to purchase power from another Independent Power Producer in the Campbell industrial park rather than honoring it's commitment to AES in this regard. HECO has stated their reasons for not committing to AES to purchase the additional power is because of some new accounting rules that would preclude this. AES disagrees with HECO's position on this, but has been unsuccessful in engaging HECO in any substantive discussions of this possibility.

I think the PUC and the people of Oahu deserve to know that AES could begin delivering these additional 9 MW of power almost immediately without any new construction and only incremental environmental impacts. The EA/EISPN does not even acknowledge these additional 9 MW from AES as an alternative or option.

If you, the PUC, or any other interested party would like to learn more about this alternative, please contact me at (808) 682-3419.

Sincerely,

Matthew Riel
President

91-086 Kaomi Loop • Kapolei, Hawaii 96707 • Phone (808) 682-5330 • Fax (808) 682-4915

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-000

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October 23, 1992

Mr. Daniel J. Rothaupt
Vice President
AES-BARBERS POINT, INC.
91-086 Kaomi Loop
Ewa Beach, HI 96707

Dear Mr. Rothaupt:

Subject: Committed Capacity

This letter follows up on your September 2, 1992 discussions with Mr. William Beauchamp and your discussions with me on October 9, 1992.

HECO understands that AES-BP desires to declare a Committed Capacity of greater than 180 MW as of September 1, 1992 (since confirmed in your letter of September 4, 1992). However, AES-BP understands that a declaration of Committed Capacity of greater than 180 MW as of September 1, 1992, is not acceptable to HECO because:

1. HECO considers that the Power Purchase Agreement ("PPA") between AES-BP and HECO limits the Committed Capacity to 180 MW;

2. HECO does not have authority from the Hawaii Public Utilities Commission ("PUC") to recover through base rates any Capacity Charge payments to AES-BP based on a Committed Capacity greater than 180 MW; and,

3. HECO's system demand as of September 1, 1992, does not establish a need for Committed Capacity from AES-BP greater than 180 MW.

Accordingly, AES-BP agrees not to propose to increase the Committed Capacity above 180 MW except under the terms herein; and, HECO and AES-BP further agree that:

1. AES-BP declares a Committed Capacity of 180 MW as of September 1, 1992, in lieu of the AES-BP declaration dated September 4, 1992;

2. HECO will provide AES-BP with a copy of the annual Adequacy of Supply letter submitted to the Hawaii Public Utilities Commission in accordance with paragraph 5.3a of G.O. No. 7 showing the expected reserve margin, forecasted peaks and additional capacity requirements for the next three years, as long as there is additional uncommitted capacity available from AES-BP or the term of the contract, whichever is shorter;

3. AES-BP shall be given first consideration for providing up to 9 MW of additional dispatchable firm capacity (up to 189 MW from the declared 180 MW committed capacity) from AES-BP under the provisions outlined in paragraphs 4 and 5 below. The amount of capacity needed will be determined by HECO and dispatched on an economic basis to the customers when HECO demonstrates a need to commit to additional resource capacity at any time within the contract period. Such need will have been identified by a resource assessment analysis or an Integrated Resource Plan using the adopted resource planning criteria in effect at the time;

4. After HECO has demonstrated a need to commit to additional resource capacity and established that the additional firm capacity by AES-BP is available to HECO, AES-BP and HECO will establish a test period for a forty-eight (48) hour continuous performance test to determine if the AES-BP facility can provide HECO with the needed firm capacity (up to 9 MW of additional Committed Capacity), at 85% power factor at the Metering Point, with the unit operated consistent with its design and Good Engineering and Operating Practices, required process steam flow, and other test conditions as mutually agreed.

5. If the increased level of Committed Capacity required by HECO (up to 9 MW from AES-BP) is successfully demonstrated, AES-BP and HECO agree to amend, as needed, the PPA to implement an increased Committed Capacity. HECO agrees to seek PUC approval of such amendment and the authority to recover through base rates the Capacity Charge payments corresponding to the increased Committed Capacity in its next rate case. AES-BP would not require HECO to pay capacity charges prior

to the effective date of corresponding full rate recovery, as authorized by the PUC.

Please signify your acceptance of this agreement by your signature below and return one signed original for our files.

Sincerely yours,

Edward Y. Hirata
Vice President, Planning

David M. Rodrigues
Vice President, Operations

WHB/EYH:dnn

ACCEPTED:

AES-BARBERS POINT, INC.

Daniel J. Rothaupt
Vice President

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

HECO C3
GENPP 10-16
YA/G

January 6, 2006

Mr. Matthew Riel
President
AES Hawaii Inc.
91-086 Kaomi Loop
Kapolei, Hawaii 96707

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Riel:

Thank you for your August 30, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing written comments. Item-by-item responses to your comments are provided below. To simplify your review of these answers we have reproduced the text of your comments in *italics* before each response.

Comment 1:

It is clear to me that the island of Oahu needs more generating capacity. I have but one question on the proposed project at this time. Why has HECO failed to acknowledge the possibility of purchasing more power from its most reliable power supplier, AES Hawaii, as an option or alternative to this project?

Response:

We appreciate your understanding that the island of Oahu needs more generating capacity. As explained in Chapter 1 of the EISPN, Purpose and Need, HECO proposes to construct a generating station in Campbell Industrial Park. This project is part of the solution to meet the existing and forecasted future system load growth on O'ahu and is an integral part of HECO's continuous process to provide safe, adequate and reliable electric service to its customers.

As explained in HECO's March 10, 2005 annual *Adequacy of Supply Report* submitted to the Public Utilities Commission ("PUC"), HECO expects to have sufficient generating capacity to meet the forecasted peak demands of electricity used on O'ahu in 2005. However, HECO may not, at times, have sufficient generating capacity on its system to cover for the loss of the largest unit or for multiple generating unit outages. The analysis shows there may be reserve capacity shortfalls ranging between 50 MW to 70 MW from 2005 until the next generating unit can be added in 2009, which results in the increased likelihood of generation-related customer outages. To counter this risk, HECO has a series of action plans, including the addition of generation, various demand side management programs and implementation of mitigation measures, to address system reliability. Even with the implementation of all the action plans and mitigation measures, there will continue to be a significant reserve capacity shortfall and hence the need for this Project.

1124701.1

The purchase of an additional 9 MW of power from AES Hawaii is not an alternative to the Project given the significant magnitude of the present and projected reserve capacity shortfall. Nonetheless, HECO has considered and remains interested in whether AES Hawaii can cost-effectively provide additional energy and/or firm capacity to HECO.

Comment 2:

AES Hawaii has offered this additional firm capacity to HECO multiple times since HECO has indicated the need for more power exists. In fact, despite AES' offer to provide this extra power, HECO has increased its contractual commitment to purchase power from another Independent Power Producer in the Campbell industrial park rather than honoring it's commitment to AES in this regard. HECO has stated their reasons for not committing to AES to purchase the additional power is because of some new accounting rules that would preclude this. AES disagrees with HECO's position on this, but has been unsuccessful in engaging HECO in any substantive discussions of this possibility.

Response:

HECO has engaged in substantive discussions with AES Hawaii regarding its proposed additional energy and/or firm capacity supply through meetings, conversations and letters. As you know, any modification to the current power purchase arrangement with AES Hawaii will require an amendment to the power purchase agreement ("PPA") and the approval of the Public Utilities Commission. An amendment to the PPA will trigger a review under accounting standards EITF No. 01-8 and SFAS No. 13, as to capital lease treatment of the supply arrangement. HECO continues to be concerned with the negative impact to HECO and its ratepayers of treating the AES Hawaii PPA as a capital lease. The significant debt in AES Hawaii's capitalization after its recent refinancing may result in significantly more debt being shown on HECO's financial statements. HECO also remains concerned that a PPA amendment might trigger the consolidation of AES Hawaii on HECO's books under another accounting standard, FIN 46R.

There is another hurdle HECO faces in attempting to cost-effectively accept more capacity from AES Hawaii. HECO's spinning reserve and quick load pickup (QLPU) requirements are based on AES Hawaii's committed capacity of 180MW. Any increase in AES Hawaii's output above 180MW would impact HECO spinning reserve and QLPU requirements, and the resulting increase in costs has to be considered.

In order to obtain PUC approval for any agreement with AES Hawaii, HECO will need to demonstrate that the agreement is just and reasonable from the ratepayer perspective. HECO must take all cost impacts into account, including those arising out of new accounting standards and/or interpretations. These are substantial hurdles to overcome. Nonetheless, HECO remains interested in purchasing additional capacity and/or energy from AES Hawaii if the financial, operational and contractual issues can be addressed.

Comment 3:

I think the PUC and the people of Oahu deserve to know that AES could begin delivering these additional 9 MW of power almost immediately without any new construction and only incremental environmental impacts. The EA/EISPN does not even acknowledge these additional 9 MW from AEA as an alternative or option.

Response:

See response to Comment No. 1. Unfortunately, even if the additional 9 MW of firm capacity proposed by AES Hawaii could be secured under terms favorable to ratepayers, as stated above, such additional firm capacity is not a viable alternative to the Project given the magnitude of the present and projected reserve capacity shortfall.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

7

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE K. Y. SALMONSON
DIRECTOR OF OEQC

STATE OF HAWAI'I
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
DEPARTMENT OF HEALTH
LEIOPAPA A KAMEHAMEHA
235 SOUTH BERETANIA STREET, SUITE 702
HONOLULU, HAWAI'I 96813
TELEPHONE (808) 586-4185

In reply, please refer to:
File:

September 2, 2005

Mr. Robert Isler
Hawaiian Electric Company, Inc.
820 Ward Avenue
Honolulu, HI 96813

Mr. Henry Eng, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

Mr. Perry J. White
Planning Solutions, Inc.
210 Ward Avenue, Suite 330
Honolulu, HI 96813

Dear Messrs. Isler, Eng, and White:

The Office of Environmental Quality Control has reviewed the final environmental assessment and environmental impact statement preparation notice for the Campbell Industrial Park Generating Station and Transmission Additions Project, Tax Map Key (1st) 9-1-15-16; 9-1-15-20; 9-1-14-33; 9-1-14-34; 9-1-14-35; 9-14-10; 9-1-14-14; 9-1-26-18; 9-1-26-39; 9-1-14-29; and 9-1-26-38, situated in the district of 'Ewa, and offers the following comments for your consideration and response.

1. ***Environmental Setting for Surface Water and Ground Water in DEIS***: In Section 3.4, relating to surface water, you correctly note that there are no perennial streams in the area. In the draft environmental impact statement (DEIS), please include a map of the public storm water system along Hanua Street. In Section 3.5 relating to ground water, please consult with the Solid and Hazardous Waste Branch of the Department of Health as to the location of post-closure hazardous waste ground water monitoring wells for hazardous waste facilities that have been closed pursuant to the Resource Conservation and Recovery Act (RCRA) and/or Chapter 342J, Hawai'i Revised Statutes. Please include data from these post-closure hazardous waste ground water monitoring wells in the environmental setting for the DEIS.
2. ***Indirect and Cumulative Environmental Impacts of the Project***: Please discuss indirect and cumulative environmental impacts of the project in the DEIS, especially with respect to air, surface water and ground water quality in the region, and growth inducing effects on the island of O'ahu.

Thank you the opportunity to comment, if you have any questions, please call Mr. Leslie Segundo, Environmental Health Specialist at (808) 586-4185.

Sincerely,

Genevieve Salmonson

GENEVIEVE SALMONSON
Director

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
Department of Health
State of Hawai'i
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Salmonson:

Thank you for your September 2, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/ Environmental Impact Statement Preparation Notice* and providing written comments. 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.

Comment 1:

Environmental Setting for Surface Water and Groundwater in DEIS: *In Section 3.4, relating to surface water, you correctly note that there are no perennial streams in the area. In the draft environmental impact statement (DEIS), please include a map of the public storm water system along Hanua Street. In Section 3.5 relating to ground water, please consult with the Solid and Hazardous Waste Branch of the Department of Health as to the location of post-closure hazardous waste ground water monitoring wells for hazardous waste facilities that have been closed pursuant to the Resource Conservation and Recovery Act (RCRA) and/or Chapter 342J, Hawai'i Revised Statutes. Please include data from these post-closure hazardous waste ground water monitoring wells in the environmental setting for the DEIS.*

Response: There is no existing or proposed public stormwater drainage system along Hanua Street. Instead, the area is served by private drainage facilities. Many of these are stormwater injection wells, but there are a few small drainage channels that were cut into the limestone at the time Campbell Industrial Park was originally constructed. None of these are close to the project site and none would receive water from it.

Per your recommendation, we will also consult with the Solid and Hazardous Waste Branch of the Department of Health to determine whether any post-closure hazardous waste ground water monitoring wells for hazardous waste facilities exist within the vicinity of the Barbers Point Tank Farm. The results of this inquiry and other pertinent data will be included in the DEIS.

Comment 2:

> ***Indirect and Cumulative Environmental Impacts of the Project:*** *Please discuss indirect and cumulative environmental impacts of the project in the DEIS, especially with respect to air, surface water and ground water quality in the region, and growth inducing effects on the island of O'ahu.*

Response: The *DEIS* will discuss indirect and cumulative environmental impacts of the project. However, it should be noted that the proposed project is intended to allow HECO to meet the peak demand on its system that will result from approved development throughout the island. The effect of that growth is addressed as each of the land uses goes through the lengthy approval process, and it is not feasible to repeat that analysis in the *DEIS*. Other than the modest effect of business-related expenditures on construction and operation of the facilities, the proposed project does not have the potential to induce growth that would not otherwise occur.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, PSI

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EPO-05-069

September 1, 2005

Mr. Robert Isler, Project Manager
Hawaii Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

SUBJECT: Environmental Assessment / Environmental Impact Statement Preparation Notice
HECO Campbell Industrial Park Generating Station and Transmission Additions
Ewa District, Oahu, Hawaii

Thank you for allowing us to review and comment on the subject document. Please find the enclosed comments from our Safe Drinking Water Branch and also please refer to our website for the Standard Comments (http:// www.state.hi.us/health/environmental/env-planning/landuse/landuse.html). If there are any questions about these standard comments please contact Jiacai Liu with the Environmental Planning Office at 586-4346.

Sincerely,

HAROLD LAO, ACTING MANAGER
Environmental Planning Office

c: EPO
SDWB

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O.BOX 3378
HONOLULU, HAWAII 96801-3378

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EMD/SDWB

August 23, 2005

To: Jacai Liu
Environmental Planning Office

Through: William Wong, P.E., Chief
Safe Drinking Water Branch

Harold Lao, Planner
Environmental Planning Office

From: Chauncey Hew, Geologist
Underground Injection Control Program

SUBJECT: DOCUMENT REVIEW FOR
HECO CAMPBELL INDUSTRIAL PARK GENERATING STATION AND
TRANSMISSION ADDITIONS PROJECT
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Underground Injection Control (UIC)

The Department of Health's written approval/permit is required for the construction, testing, and operation of an injection well for industrial wastewater disposal. UIC application forms may be obtained from the Safe Drinking Water Branch's website or by calling the Branch's UIC program at 586-4258.

The design of an injection well in Campbell Industrial Park should accommodate the general practice of keeping the injection zone below and separated from shallow groundwater that is used for supply well water purposes. In general, industrial wastewater injection should be confined to the caprock aquifer existing below elevation minus 250 feet.

Questions about the application process or about injection practices may be directed to the UIC program.

CH:nbp

1-0025

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. Harold Lao, Acting Manager
Environmental Planning Office
Department of Health
State of Hawai'i
P. O. Box 3378
Honolulu, Hawai'i 96801-3378

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Lao:

Thank you for your September 1, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice.*

The Draft EIS will address relevant items from your Standard Comments as they appeared on the website you provided on September 13, 2005. If we have any questions as we address these issues, we will contact Jiacai Liu of your office at your suggestion.

Thank you for providing a copy of the August 23, 2005 memo from Chauncey Hew of the Safe Drinking Water Branch. We understand that a written approval and permit is needed for the construction, testing, and operation of an injection well for industrial wastewater disposal.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425 • HONOLULU, HAWAII 96819-1869
TELEPHONE: (808) 831-7761 • FAX: (808) 831-7750 • INTERNET: www.honolulufire.org

MUFI HANNEMANN
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

September 6, 2005

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice
Hawaiian Electric Company, Inc.
Campbell Industrial Park Generating Station and Transmission Additions

We received your letter dated August 8, 2005, requesting our comments on the above-mentioned subject.

The Honolulu Fire Department (HFD) requires that the following be complied with:

1. Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from fire apparatus access as measured by an approved route around the exterior of the building or facility. (1997 Uniform Fire Code, Section 902.2.1)

2. Provide a water supply, approved by the county, capable of supplying the required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

   On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of the 150 feet (45 720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building. (1997 Uniform Fire Code, Section 903.2 as amended)

3. Installation of the aboveground fuel tanks shall be in accordance with Article 79, Flammable and Combustible Liquids, of the 1997 Edition of the Uniform Fire Code (attached).

4. Submit civil and construction drawings to the HFD for review and approval.

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

Sincerely,

ATTILIO K. LEONARDI
Fire Chief

AKL/SY:bh

Attachment

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

HECO C3
GENPP 10-16
YA/G

October 26, 2005

Mr. Attilio K. Leonardi, Chief
Fire Department
City and County of Honolulu
3375 Koapaka Street, Suite H425
Honolulu, Hawai'i 96819-1869

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Chief Leonardi:

Thank you for your September 6, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing written comments. 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.

Comment 1:

Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45,720 mm) from fire apparatus access as measured by an approved route around the exterior of the building or facility. (1997 Uniform Fire Code, Section 902.2.1)

Response: Our plans provide fire apparatus access as required by the code.

Comment 2:

Provide a water supply, approved by the county, capable of supplying the required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of the 150 feet (45,720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building. (1997 Uniform Fire Code, Section 903.2 as amended)

Response: Our plans for the facility provide water supply capable of supplying the required fire flow for fire protection. They also provide on-site fire hydrants and mains capable of supplying the required fire flow for portions of the facility that are more than 150 feet from a water supply on a fire apparatus access road.

Comment 3:

Installation of the aboveground fuel tanks shall be in accordance with Article 79, Flammable and Combustible Liquids, of the 1997 Edition of the Uniform Fire Code (attached).

Response: The above-ground tanks will be designed and installed in accordance with Article 79, Flammable and Combustible Liquids, of the 1997 Edition of the Uniform Fire Code.

Comment 4:

Submit civil and construction drawings to the HFD for review and approval.

Response: HECO will prepare and submit civil and construction drawings to the Fire Department as part of the detailed design process. This will be done after discretionary permits have been granted.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

Hawaiian Telcom

September 6, 2005

Reply to
HIABY3

Mr. Robert Isler
Hawaiian Electric Company
P.O. Box 2750
Honolulu, HI 96840-0001

Dear Mr. Isler:

Subject: **Campbell Industrial Park Generating Station and Transmission Project - Environmental Assessment**

Thank you for the opportunity to review and comment on the environmental assessment document for the **Proposed Campbell Industrial Park Generating Station and Transmission Additions Project**. We have no comments to add to your document at this time.

If you have any questions or require assistance in the future, please call me at 840-1447.

Sincerely,

Paul K. Hanohano

Paul Hanohano
OSP Engineering

1177 Bishop Street · Honolulu · HI 96813

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. Paul Hanohano, OSP Engineering
Hawaiian Telcom
1177 Bishop Street
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Hanohano:

Thank you for your September 6, 2005 letter (your reference HIABY3) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions 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 comments on the project at this time. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD05/1988

September 2, 2005

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

RE: Proposed Hawaiian Electric Company, Inc. Campbell Industrial Park Generating Station and Transmission Additions Project, Barbers Point, O'ahu, Various TMK's.

Dear Mr. Isler,

The Office of Hawaiian Affairs (OHA) is in receipt of your August 8, 2005 request for comment on the above listed proposed project. OHA offers the following comments:

It appears as though no formal archaeological or cultural studies have been completed as part of the Environmental Assessment. OHA asks that, if not already completed, that a Cultural Impact Assessment and an Archaeological Assessment be completed in support of the proposed project. The studies should be undertaken in light of the following:

The 'Ewa plain has historically been known to contain sinkholes in which human skeletal and avi-faunal remains have been encountered. These sinkholes can continue to exist in areas that have been graded or heavily cultivated for agricultural uses.

According to records at the Bishop Museum pertaining to inventories conducted for compliance with the Native American Graves Protection and Repatriation Act of 1990, burial sites in Honouliuli and in 'Ewa in general have been documented in the past including:

> *In 1938, human remains representing six individuals from Honouliuli, 'Ewa, O'ahu were collected by Kenneth P. Emory and William A. Lessa and acquired by the Bishop Museum. Museum documentation indicates these remains were in a shallow crypt burial one mile from the coast;*
>
> *In 1933, human remains representing three individuals from stone pits at 'Ewa, O'ahu were collected by J.W. Barrington and Edwin H. Bryan;*
>
> *In 1942, human remains representing two individuals from Kualakai, 'Ewa Beach, O'ahu were donated to the Bishop Museum;*

> *In 1959, human remains representing seven individuals from 'Ewa, O'ahu were donated to the Bishop Museum by the Anthropology Club of the University of Hawaii (from Standard Oil Refinery land);*
>
> *In 1980, human remains representing nine individuals from Honouliuli, O'ahu were collected and donated to the Bishop Museum by Albert, Borthwick and Folk. Donor information indicates these human remains were recovered from coral sinkholes.*

In the last decade, unmarked burial sites have been found in the area of St. Francis West, West Loch Estates, Old Fort Weaver Road, Kalaeloa, One'ula Beach, Campbell Estate, Ko'Olina and other areas in the vicinity of this project.

The depth of grading activities and the likelihood of adversely impacting any sub-surface cultural sites or deposits is contingent upon understanding the original surface grade as it may have existed prior to agricultural activities such as sugarcane.

Native Hawaiian burial sites have been found just on and under the surface to depths of eight or nine feet depending upon the nature of the terrain. Furthermore, the nature of documented interments in the 'Ewa area (stone pits, sinkholes, crypts, etc.) could lead to the survival of these sites despite intensive agricultural activities on the surface.

As for the future consultation process, OHA recommends contacting two individuals in particular: Shad Kane and Nettie Tiffany. Both individuals have served as cultural resources on past projects and would likely aid in the community consultation process.

OHA further requests your assurances that if the project goes forward, should iwi or Native Hawaiian cultural or traditional deposits be found during ground disturbance, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck at (808) 594-0239 or jessey@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

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

HECO C3
GENPP 10-16
YA/G

October 26, 2005

Mr. Clyde W. Nāmu'o, Administrator
Office of Hawaiian Affairs
State of Hawai'i
711 Kapi'olani Boulevard, Suite 500
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Nāmu'o:

Thank you for your September 2, 2005 letter (your reference HRD05/1988) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing written comments.

Thank you for the information you provided concerning known sites in the area. HECO has commissioned archaeological studies and is preparing a cultural impact assessment for the project. We will pass that information on to the individuals responsible for that work. We are particularly grateful that you provided specific individuals for further consultation. We will contact both Mr. Shad Kane and Ms. Nettie Tiffany. As you indicated, both individuals have served as cultural resources on past projects and can provide valuable assistance in the community consultation process. Should 'iwi or Native Hawaiian cultural or traditional deposits be found during ground disturbance, we will halt work in the area and contact the appropriate agencies.

The findings of these analyses will be included in the Draft Environmental Impact Statement for the project, which is expected to be completed near the end of this year. We will send OHA a copy of the DEIS when it becomes available for public comment.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

September 7, 2005

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Incorporated
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Subject: Your Letter of August 8, 2005, on the Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN) for HECO Campbell Industrial Park Generation Station and Transmission Additions Project

Thank you for the opportunity to comment on the proposed project.

The proposed project will be required to obtain a water allocation from Campbell Estate. The availability of water will be confirmed when the building permit is submitted for approval.

The construction drawings should also be submitted for our approval.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

The RO water requirements should be coordinated with Erwin Kawata of the Board of Water Supply, Strategic Development Division. He can be contacted at 748-5080.

If you have any questions, please contact Joseph Kaakua at 748-5442.

Very truly yours,

KEITH S. SHIDA
Principal Executive
Customer Care Division

cc: Erwin Kawata

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. Keith S. Shida, Principal Executive
Customer Care Division
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Shida:

Thank you for your September 7, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/ Environmental Impact Statement Preparation Notice* and providing written comments. 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.

Comment 1:

The proposed project will be required to obtain a water allocation from Campbell Estate. The availability of water will be confirmed when the building permit is submitted for approval.

Response: HECO will obtain a water allocation for the small amount of potable water that the facility requires for domestic use.

Comment 2:

The construction drawings should also be submitted for our approval.

Response: We will submit the construction drawings for you approval when they become available.

Comment 3:

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

Response: The Fire Prevention Bureau has submitted comments on the EISPN, and HECO will coordinate with them to ensure that on-site fire protection is adequate. Their comments and HECO's response will be included in the Draft Environmental Impact Statement for the project.

Comment 4:

The RO water requirements should be coordinated with Erwin Kawata of the Board of Water Supply, Strategic Development Division. He can be contacted at 748-5080.

Response: HECO has identified RO water from the Hono'uli'uli Wastewater Treatment Plant as a possible source of process water for the proposed facility. As we move forward with the design of the proposed facilities we will coordinate the RO water requirements with Erwin Kawata of BWS, per your suggestion and will include further information in the Draft EIS.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR • HONOLULU, HAWAII 96813
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MUFI HANNEMANN
MAYOR

EDWARD Y. HIRATA
DIRECTOR

ALFRED A. TANAKA, P.E.
DEPUTY DIRECTOR

TP8/05-115922R

September 9, 2005

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Subject: HECO Campbell Industrial Park Generating Station and Transmission Additions Project

Thank you for your August 8, 2005 letter, requesting our review of and comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN). We have the following comments as the result of this review:

1. Figure 1-1 (Page 1-3) includes a note that says, "See Figure 1-2 for CIP Detail". However, Figure 1-2 (Page 1-6) shows the variation in energy use over a typical 24-hour period.

2. Figure 2-1 (Page 2-2) should have the boundaries of the facilities in the project area shown.

3. Figure 2-3 (Page 2-4) should have the boundaries of the facilities in the project area shown and identify what the diagonally hatched area is.

4. Figure 2-4 (Page 2-5) should have the boundaries of the facilities in the project area shown and identify what the dotted line at the top portion indicates.

5. Section **4.6 TRANSPORTATION IMPACTS** (Page 4-4) discusses the vehicular traffic impacts of the project. The EIS should discuss the impacts of the project on existing City streets and what mitigation measures, if any, would be required.

We look forward to reviewing the draft EIS. Should you have any questions regarding this matter, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

EDWARD Y. HIRATA
Director

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. Edward Y. Hirata, Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Hirata:

Thank you for your September 9, 2005 letter (your reference TP8/05-115922R) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing written comments. 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.

Comment 1:

Figure 1-1 (Page 1-3) includes a note that says, "See Figure 1-2 for CIP Detail". However, Figure 1-2 (Page 1-6) shows the variation in energy use over a typical 24-hour period.

Response: Thank you for pointing out this discrepancy. The note will be corrected in the Draft Environmental Impact Statement (DEIS) to have the correct figure reference.

Comment 2:

2. Figure 2-1 (Page 2-2) should have the boundaries of the facilities in the project area shown.

Response: In response to your request, the figure in the DEIS that depicts existing facilities will delineate the approximate property boundaries of other major facilities that appear on the aerial photograph.

Comment 3:

3. Figure 2-3 (Page 2-4) should have the boundaries of the facilities in the project area shown and identify what the diagonally hatched area is.

Response: The hatched area on Figure 2-3 is correctly labeled as the 15-foot Coal Conveyor Easement. However, we will edit the Figure in the DEIS to make the label more apparent. The figure is purposely focused on the layout within the project site. Consequently, we will not add information concerning

other facilities in the project area to this drawing. However, other figures in the DEIS will provide that information.

Comment 4:

4. Figure 2-4 (Page 2-5) should have the boundaries of the facilities in the project area shown and identify what the dotted line at the top portion indicates.

Response: Like Figure 2-3, this drawing is purposely focused on the layout within the project site; in fact, this drawing shows only that part of the project site where the layout differs from the layout that would be used for the Alstom and Siemens units that are shown on that drawing. We anticipate that by the time the Draft EIS is published we will have selected a specific turbine. Hence, in that document the equivalent of Figure 2-3 will show the overall site plan for the selected units and Figure 2-4 will be a close-up that shows additional detail. For reasons outlined in our response to Comment 3, we will not add information concerning other facilities in the project area to this drawing.

Comment 5:

Section 4.6 TRANSPORTATION IMPACTS (Page 4-4) discusses the vehicular traffic impacts of the project. The EIS should discuss the impacts of the project on existing City streets and what mitigation measures, if any, would be required.

Response: The EIS will include an analysis of potential impacts of the project on existing public roadways and will discuss potential mitigation measures for any unavoidable impacts as necessary.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

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CHAIRPERSON

MEREDITH J. CHING
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LAWRENCE H. MIIKE, M.D., J.D.
STEPHANIE A. WHALEN

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR

September 15, 2005

REF: heco eispn.dr

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, HI 96840-0001

Dear Mr. Isler:

SUBJECT: HECO Campbell Industrial Park Generating Station and Transmission Additions Project: Environmental Assessment/Environmental impact Statement Preparation Notice

FILE NO.:

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at *http://www.hawaii.gov/dlnr/cwrm*.

Our comments related to water resources are checked off below.

☒ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. There may be 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.

Permits required by CWRM: Additional information and forms are available at *www.hawaii.gov/dlnr/cwrm/forms.htm*.

☒ 4. The proposed water supply source for the project is located in a designated ground-water management area, and a Water Use Permit is required prior to use of ground water.

☒ 5. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.

☒ 6. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☐ 7. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 8. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☐ 9. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.

☐ 10. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 11. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 12. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☐ 13. We recommend that the report identify feasible alternative non-potable water resources, including reclaimed wastewater.

☒ OTHER:

The document identifies on-site brackish wells as a possible water supply source for forecasted non-potable needs (air pollution control, equipment cooling, plant wash down, landscape irrigation, and fire protection) of up to 2.3 million gallons per day. The development and use of brackish water wells would require permits from the Commission, as indicated above. We recommend the EIS disclose the status of any Commission permits related to the proposed brackish water use.

If there are any questions, please contact Lenore Nakama at 587-0218.

Sincerely,

W. Paul Conry
for DEAN A. NAKANO
Acting Deputy Director

c: Office of Environmental Quality Control

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. Dean A. Nakano, Acting Deputy Director
Commission on Water Resource Management
State of Hawai'i
Department Of Land and Natural Resources
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice:Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Nakano:

Thank you for your September 15, 2005, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing written comments. Item-by-item responses to the comments you checked related to water resources are provided below. To simplify your examination, we have reproduced the text of your comments in *italics* before each response.

Comment 1:

We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

Response: We have consulted with the City and County of Honolulu Board of Water Supply (BWS) as part of our planning for this project. The BWS has indicated that we will be required to obtain a water allocation from Campbell Estate and that it will confirm the availability of water during its review of the building permit application. We are also working with the BWS on an agreement that will allow us to use non-potable water for most of the facility's needs.

Comment 2:

[The following] Permits [are] required by CWRM:

4. The proposed water supply source for the project is located in a designated ground-water management area, and a Water Use Permit is required prior to use of ground water.

5. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.

6. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

Response: HECO will apply for the permits you have listed once the overall plans for the project have been approved.

Comment 3:

The document identifies on-site brackish wells as a possible water supply source for forecasted non-potable needs (air pollution control, equipment cooling, plant wash down, landscape irrigation, and fire protection) of up to 2.3 million gallons per day. The development and use of brackish water wells would require permits from the Commission, as indicated above. We recommend the EIS disclose the status of any Commission permits related to the proposed brackish water use.

Response: The *Draft Environmental Impact Statement* will list the status of all permits that are needed for the proposed project.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
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MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

2005/ELOG-1714

September 20, 2005

Mr. Robert Isler
Hawaiian Electric Company, Inc.
820 Ward Avenue
Honolulu, Hawaii 96813

Dear Mr. Isler:

Re: Environmental Impact Statement Preparation Notice (EISPN) for Campbell Industrial Park Generating Station & Transmission Additions, Tax Map Keys: 9-1-015:016; 9-1-015:020; 9-1-014:033; 9-1-014:034; 9-1-014:035; 9-1-014:010; 9-1-014:014; 9-1-026:018; 9-1-026:039; 9-1-014:029; and 9-1-026:038, Ewa District, Oahu, Hawaii

We have reviewed the subject EISPN and offer the following comments:

1. To assist the reader, the Draft Environmental Impact Statement (DEIS) should include a glossary of all acronyms and a list of terms with their definitions.

2. The following are suggestions for the DEIS maps:

   a. The first, and possibly second, simple-cycle combustion turbine are proposed for the eastern half of the existing HECO Barbers Point Tank Farm (BPTF) site. For clarification purposes, the site on all maps should be labeled "HECO Barbers Point Tank Farm" and a separate label noting "Proposed Generating Facility" should also be included, perhaps with an arrow pointing to the eastern portion of the site.

   b. The DEIS should include: (1) a location map, including an inset map of Oahu which shows the project's approximate location; and

   c. The DEIS should include a map showing the tax map parcels with the corresponding tax map key numbers.

3. Although the Integrated Resource Plan (IRP-3) proposes the expansion of five (5) existing energy and efficiency programs, the continuation of two load management programs, and three new demand-side management programs (Table 1.5, page 1-15), the IRP continues to rely predominantly on petroleum-based fossil fuels for Oahu's energy

requirements. More must be done in the way of providing incentives for using alternative sources of energy. For example, there does not appear to be strong incentives for residential homeowners and businesses to consider owning or leasing a renewable energy generator, e.g., photovoltaics. Furthermore, although HECO has and continues to install photovoltaic systems at Hawaii public schools through its Sun Power for Schools program, there does not appear to be equivalent effort made to install renewable energy generators at other public facilities. These concerns should be addressed in the DEIS and a discussion should be provided on how these efforts, if fully implemented, could increase the use of renewable sources for Oahu's energy needs.

4. Section 2.2.1 Overview, page 2-6: The EISPN states that, until the technological and fuel supply barriers can be overcome, the primary fuel source for the next generating unit will likely be petroleum-based fuels. The DEIS should discuss these barriers and should provide an approximate time frame of when HECO anticipates using biofuels in the proposed generating unit(s). Furthermore, the DEIS should discuss if biofuels are currently being used in the existing generating units and if there are long-term plans for doing so.

5. Section 2.2.4.4. Wastewater Disposal, page 2-10: This section implies that the project will utilize an individual wastewater treatment system and on-site leach field. Private sewer system falls under the jurisdiction of the State Department of Health.

6. Section 2.4 Off-Site Community Benefits Activities, page 2-15: This section notes that HECO has made a commitment to provide $100,000 a year for ten (10) years to support a resource conservation education program spearheaded by community leaders. Given the importance of demand-side management in reducing the island's reliance on petroleum-based fuels, this amount seems inadequate. The DEIS should address this concern and should discuss HECO's current efforts and long-range plans at addressing resource conservation as a means of demand-side management.

7. Section 2.4 Off-Site Community Benefits Activities, page 2-15: This section states that a "report card" on Company activities in areas such as energy management, renewable energy, and electrical use will be provided to West Oahu/Waianae communities. These activities, however, are also of concern to communities throughout Oahu and thus copies of the C.L.E.A.N. report should be available to all residents island-wide.

8. Section 2.6 Anticipated Costs: This section states that HECO would be in favor of selecting the least-cost alternative. As stated in the report, it is the utility's objective to serve its customers in the most efficient and reliable manner at the lowest reasonable cost. Cost, however, should not be the only deciding factor in determining the particular combustion turbine and the alignment and configuration of the overhead transmission

line. Other factors, particularly environmental concerns, should be considered, especially given the long-life span of the proposed action.

9. The DEIS should include a full discussion of compliance with the General Plan.

10. The DEIS should discuss if, as called for by the Ewa Development Plan (DP), an island-wide study and siting evaluation were done to determine the need and appropriate site for the project.

11. The Ewa DP contains a planning principle that whenever possible, overhead utility lines and poles that significantly obstruct public views should be relocated or placed underground (Section 3.4.2 of the Ewa DP). Furthermore, Section 4.4.1 of the Ewa DP states that strong consideration should be given to placing any new transmission lines underground. Given the above, in considering design alternatives (Section 2.7.5 of the EISPN), the DEIS should include a complete assessment of using an underground, rather than an overhead transmission line. The assessment should include how the proposed action affects views from public vantage points, including from the higher elevation communities of Honokai Hale and Makakilo.

12. The Ewa DP contains a general policy pertaining to industrial centers which states that an additional electrical power generating plant could be constructed at the Barbers Point Industrial Area (includes Campbell Industrial Park), possibly taking advantage of cogeneration opportunities with other industrial activities (Section 3.7.3.1 of the Ewa DP). Cogeneration opportunities should be discussed in the DEIS.

13. The Ewa DP contains planning principles pertaining to industrial areas (Section 3.7.3.2 of the Ewa DP). The Draft EIS should discuss how the proposed action supports these principles.

14. The Ewa DP contains guidelines pertaining to industrial areas (Section 3.7.3.3 of the Ewa DP). The Draft EIS should discuss how the proposed action supports the relevant Barbers Point Industrial Area guidelines. One of the guidelines states that taller, vertical structures are acceptable when required as part of an industrial operation, but a viewplane study should be conducted for structures over 100 feet in height to determine if they can be sited or designed to minimize visibility from residential, resort and commercial areas, public rights-of-way and the shoreline. Since the proposed action includes approximately 22 tubular steel poles with an average height of 120 feet, a viewplane study should be included in the Draft EIS.

15. The project proposes a generating station on industrially zoned land and additional transmission lines partially within an easement presently used by a coal conveyor. It

appears that portions of TMKs 9-1-014:010 and 9-1-014:033 referenced in the EISPN are within the Special Management Area (SMA) and along the shoreline. Therefore, the Draft EIS should include a map with the SMA boundary and the proposed project site. The project will possibly require a Special Management Area Use Permit (SMP) for those portions within the SMA.

16. The EISPN identifies a Conditional Use Permit (CUP) as a required permit for the project. We confirm that the project will require a CUP minor.

17. Section 4.6 Transportation Impacts, page 4-4, should include the following:

    a. Construction plans for all work within or affecting existing and proposed City streets are required to be submitted for review and comment. Traffic control plans during the construction phase of this project must also be submitted for review and approval.

    b. Depending on the magnitude of construction activity both on-site and within the road rights-of-way, a construction management plan should be considered to mitigate the impacts resulting from any construction activity and address the potential for increased traffic resulting from these construction activities and include any possible mitigative traffic measures.

Should you have any questions, please contact Matt Higashida of our staff at 527-6056.

Very truly yours,

for Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:mh

cc: Genevieve Salmonson, Director, Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

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

CONSTPR P0000064
GENPP 10-16
YA/G

January 6, 2006

Mr. Henry Eng, FAICP, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project

Dear Mr. Eng

Thank you for your September 20, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing written comments. Item-by-item responses to your comments are provided below. To simplify your review of these answers we have reproduced the text of your comments in *italics* before each response.

Comment 1:

To assist the reader, the Draft Environmental Impact Statement (DEIS) should include a glossary of all acronyms and a list of terms with their definitions.

Response: We will include a glossary of acronyms and terms in the DEIS.

Comment 2:

The following are suggestions for the DEIS maps:

a. The first, and possibly second, simple-cycle combustion turbine are proposed for the eastern half of the existing HECO Barbers Point Tank Farm (BPTF) site. For clarification purposes, the site on all maps should be labeled "HECO Barbers Point Tank Farm" and a separate label noting "Proposed Generating Facility" should also be included, perhaps with an arrow pointing to the eastern portion of the site.

b. The DEIS should include: (1) a location map, including an inset map of Oahu which shows the project's approximate location; and

c. The DEIS should include a map showing the tax map parcels with the corresponding tax map key numbers.

Response: In response to your suggestions, we will include the following in the DEIS for the project:

- Labels identifying the overall Barbers Point Tank Farm Site (BPTF) and proposed generating unit site wherever possible in the figures.
- A new drawing modeled after Figure 3-2 in the EISPN that shows the location of the proposed facilities (including an inset of the Island of O'ahu).
- A map showing TMKs.

Comment 3:

Although the Integrated Resource Plan (IRP-3) proposes the expansion of five (5) existing energy and efficiency programs, the continuation of two load management programs, and three new demand-side management programs (Table 1.5, page 1-15), the IRP continues to rely predominantly on petroleum-based fossil fuels for Oahu's energy requirements. More must be done in the way of providing incentives for using alternative sources of energy. For example, there does not appear to be strong incentives for residential homeowners and businesses to consider owning or leasing a renewable energy generator, e.g., photovoltaics. Furthermore, although HECO has and continues to install photovoltaic systems at Hawaii public schools through its Sun Power for Schools program, there does not appear to be equivalent effort made to install renewable energy generators at other public facilities. These concerns should be addressed in the DEIS and a discussion should be provided on how these efforts, if fully implemented, could increase the use of renewable sources for Oahu's energy needs.

Response: We appreciate your suggestions concerning the desirability of incorporating additional incentives for the use of alternate energy sources into HECO's *Integrated Resource Plan* (*IRP-3*). The type, nature, and magnitude of incentives for energy conservation and expanded use of renewable energy were a major focus of the IRP-3 process. Representatives from the City and County of Honolulu were members of the IRP Advisory Group that helped us prepare the plan and raised no major objections with the provisions of the final plan.

With respect to the *DEIS*, we are unaware of any practicable incentive program that would eliminate the need to build additional central station generating capacity at the earliest possible date. Hence, we believe that the level of discussion of incentives presented in the *EISPN* (updated to reflect the provisions of the IRP-3 submitted to the PUC) is appropriate for the *DEIS*.

Comment 4:

Section 2.2.1 Overview, page 2-6: The EISPN states that, until the technological and fuel supply barriers can be overcome, the primary fuel source for the next generating unit will likely be petroleum-based fuels. The DEIS should discuss these barriers and should provide an approximate time frame of when HECO anticipates using biofuels in the proposed generating unit(s). Furthermore, the DEIS should discuss if biofuels are currently being used in the existing generating units and if there are long-term plans for doing so.

Response: HECO does not currently use biofuels in any of its generating units. As discussed in the *EISPN*, we have made sure that the units that would be installed if the Campbell Industrial Park Generating Station is approved are capable of burning biofuels. We believe that doing this could create a market for such fuels that has heretofore been absent and could encourage potential fuel suppliers to make the capital investments needed to take advantage of this opportunity. At this time

HECO does not intend to become a biofuels producer and is not able to predict when biofuels might become available.

Comment 5:

Section 2.2.4.4. Wastewater Disposal, page 2-10: This section implies that the project will utilize an individual wastewater treatment system and on-site leach field. Private sewer system falls under the jurisdiction of the State Department of Health.

Response: We understand that we will need to obtain approvals for the individual wastewater treatment system from the State of Hawai'i Department of Health.

Comment 6:

Section 2.4 Off-Site Community Benefits Activities, page 2-15: This section notes that HECO has made a commitment to provide $100,000 a year for ten (10) years to support a resource conservation education program spearheaded by community leaders. Given the importance of demand-side management in reducing the island's reliance on petroleum-based fuels, this amount seems inadequate. The DEIS should address this concern and should discuss HECO's current efforts and long-range plans at addressing resource conservation as a means of demand-side management.

Response: The $100,000 mentioned is in addition to considerable resources HECO already spends to promote increased energy efficiency and conservation. For example, in 2005 HECO expects to spend approximately $1.2 million on advertising, education and community outreach programs designed to promote energy efficiency and conservation (this does not include the employee labor time spent on such programs). In addition, through our demand-side management programs, in 2005 we expect to spend over $3 million for rebates paid to residential customers as incentives for them to install energy saving equipment and devices such as solar water heating for homes and for business and institutional customers to install energy efficient equipment for lighting, cooling and other activities. The additional $100,000 per year you have identified, unlike many of our other programs, is focused on a specific geographic area for a grass-roots effort not primarily directed by HECO but by members of the community near the proposed new plant. The purpose and amount was arrived at after long discussions with the affected community.

Comment 7:

Section 2.4 Off Site Community Benefits Activities, page 2-15: This section states that a "report card" on Company activities in areas such as energy management, renewable energy, and electrical use will be provided to West Oahu/Waianae communities. These activities, however, are also of concern to communities throughout Oahu and thus copies of the C.L.E.A.N. report should be available to all residents island-wide.

Response: C.L.E.A.N. (Campbell Local Emergency Action Network) is a voluntary, non-government not-for-profit local organization that aims to facilitate relationships among industrial facilities in Campbell Industrial Park (CIP), the Honolulu Local Emergency Planning Committee (LEPC), Emergency Response Agencies, and residents of the communities that surround CIP.

C.L.E.A.N is involved in a number of activities to promote the welfare of CIP and its surroundings. Included among these are: continuing development of the community-based *CIP Emergency*

Resources Guide; community education programs; training and response efforts to protect employees; support of community organizations and the families they represent; environmental protection; emergency response exercises; and the enhancement of emergency warning systems -- just to name a few. The *CIP Emergency Resources Guide*, which is updated each year, serves as a supplement to the Honolulu LEPC's *Hazardous Materials Response Plan* for the CIP area. C.L.E.A.N. has distributed over 300 copies to CIP businesses, government agencies and local groups, electronic copies are available at http://www.co.honolulu.hi.us/ocda/lepc/cleam04vol1and2.pdf. Thus, the report is widely available for any interested party to access.

The report card and its contents were arrived at after long discussions with representatives of the affected communities. This action is intended to demonstrate the company's commitment to vigorously promote and encourage energy efficiency and conservation and willingness to share the results of its ongoing efforts. The underlying hope among the affected communities is that this island will be able to reduce its dependency on fossil-fueled generation and sustain its energy needs through conservation and the efficient use of electricity and alternative energy sources.

Comment 8:

Section 2.6 Anticipated Costs: This section states that HECO would be in favor of selecting the least-cost alternative. As stated in the report, it is the utility's objective to serve its customers in the most efficient and reliable manner at the lowest reasonable cost. Cost, however, should not be the only deciding factor in determining the particular combustion turbine and the alignment and configuration of the overhead transmission line. Other factors, particularly environmental concerns, should be considered, especially given the long-life span of the proposed action.

Response: Section 2.6 in the *EISPN* focuses on project cost, and in order to state those accurately they had to be linked to certain assumptions with respect to the permit conditions that would be imposed on the project. The statement that "*...they assume that permit conditions would allow HECO to select the least-cost alternative*" was not intended to imply that cost was the only, or even the most important factor in the decision-making process. Instead, it was intended to call attention to the fact that the cost estimates assume that public agencies will approve certain aspects of the project as HECO has proposed them. Examples include the State Department of Health accepting low-sulfur fuel rather than Selective Catalytic Conversion to be the Best Available Control Technology for sulfur emissions, and the Public Utilities Commission and the City and County of Honolulu approving the use of overhead transmission lines in this industrial area). Our siting of the generating facilities in an area where they will be largely hidden from public view and will not require extensive new fuel transport infrastructure is a good example of the attention that we have paid to such issues in the design process.

Comment 9:

The DEIS should include a full discussion of compliance with the General Plan.

Response: The DEIS will include a full discussion of compliance with the O'ahu General Plan.

Comment 10:

The DEIS should discuss if, as called for by the Ewa Development Plan (DP), an island-wide study and siting evaluation were done to determine the need and appropriate site for the project.

Response: HECO considered a wide range of possible locations before deciding on the proposed site. The factors that led to our choice of Campbell Industrial Park are presented in Section 2.7.3.2 of the *EISPN*. The bases for our choice of site were discussed with DPP planners many months ago, and at that time the Department representatives raised no objections that suggested our reasoning was unsound.

Comment 11:

The Ewa DP contains a planning principle that whenever possible, overhead utility lines and poles that significantly obstruct public views should be relocated or placed underground (Section 3.4.2 of the Ewa DP). Furthermore, Section 4.4.1 of the Ewa DP states that strong consideration should be given to placing any new transmission lines underground. Given the above, in considering design alternatives (Section 2.7.5 of the EISPN), the DEIS should include a complete assessment of using an underground, rather than an overhead transmission line. The assessment should include how the proposed action affects views from public vantage points, including from the higher elevation communities of Honokai Hale and Makakilo.

Response: The *DEIS* will assess the relative impacts of underground versus overhead lines.

Comment 12:

The Ewa DP contains a general policy pertaining to industrial centers which states that an additional electrical power generating plant could be constructed at the Barbers Point Industrial Area (includes Campbell Industrial Park), possibly taking advantage of cogeneration opportunities with other industrial activities (Section 3.7.3.1 of the Ewa DP). Cogeneration opportunities should be discussed in the DEIS.

Response: Typically, peaking units, which are designed to operate during the hours of peak demand, do not offer cogeneration opportunities because they do not provide predictable, constant heat or other energy to potential partners. However, as discussed in Section 1.3.2.4 of the *EISPN*, HECO is actively seeking partners for combined heat and power projects throughout O'ahu, and these are an important part of IRP-3.

Comment 13:

The Ewa DP contains planning principles pertaining to industrial areas (Section 3.7.3.2 of the Ewa DP). The Draft EIS should discuss how the proposed action supports these principles.

Response: The *DEIS* will discuss how the proposed action supports planning principles pertaining to industrial areas contained in Section 3.7.3.2 of the 'Ewa DP.

Comment 14:

The Ewa DP contains guidelines pertaining to industrial areas (Section 3.7.3.3 of the Ewa DP). The Draft EIS should discuss how the proposed action supports the relevant Barbers Point Industrial Area guidelines. One of the guidelines states that taller, vertical structures are acceptable when required as part of an industrial operation, but a viewplane study should be conducted for structures over 100 feet in height to determine if they can be sited or designed to minimize visibility from residential, resort and commercial areas, public rights-of-way and the shoreline. Since the proposed action includes approximately 22 tubular steel poles with an average height of 120 feet, a viewplane study should be included in the Draft EIS.

Response: The *DEIS* will discuss how the proposed action supports guidelines pertaining to industrial areas as expressed in Section 3.7.3.3 of the 'Ewa DP. The discussion will include the extent to which the transmission poles will be visible to residents of surrounding areas.

Comment 15:

The project proposes a generating station on industrially zoned land and additional transmission lines partially within an easement presently used by a coal conveyor. It appears that portions of TMKs 9-1-014:010 and 9-1-014:033 referenced in the EISPN are within the Special Management Area (SMA) and along the shoreline. Therefore, the Draft EIS should include a map with the SMA boundary and the proposed project site. The project will possibly require a Special Management Area Use Permit (SMP) for those portions within the SMA.

Response: While the proposed new transmission line parallels the existing coal conveyor along a portion of its route, it is not in the same easement. Instead, HECO will acquire an easement specific to the proposed transmission facilities. We will show the SMA boundary on one of the figures to make it clear that all of the facilities that would be constructed as part of the proposed project are outside the SMA.

Comment 16:

The EISPN identifies a Conditional Use Permit (CUP) as a required permit for the project. We confirm that the project will require a CUP minor.

Response: Thank you for confirming this.

Comment 17:

Section 4.6 Transportation Impacts, page 4-4, should include the following:

a. Construction plans for all work within or affecting existing and proposed City streets are required to be submitted for review and comment. Traffic control plans during the construction phase of this project must also be submitted for review and approval.

b. Depending on the magnitude of construction activity both on-site and within the road rights-of-way, a construction management plan should be considered to mitigate the impacts resulting from any construction activity and address the potential for increased

traffic resulting from these construction activities and include any possible mitigative traffic measures.

Response: The *DEIS* will note that Construction plans for all work within or affecting existing and proposed City streets must be submitted for review and comment and that traffic control plans may be needed for the construction phase of this project. Please note that the facilities as proposed do not involve work in existing or proposed streets; only the underground transmission line alternative entails such work. HECO will, of course, seek to mitigate any potential for adverse effect as a result of project-related construction activity.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

RECEIVED

STATE OF HAWAI'I '05 SEP 12 AM 10:06
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

DEPT. OF PLANNING AND PERMITTING
CITY & COUNTY OF HONOLULU

OFFICE OF THE SUPERINTENDENT

September 7, 2005

Mr. Henry Eng, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. Eng:

Subject: Environmental Impact Statement Preparation Notice for Campbell Industrial Park Generating State and Transmission Additions Ewa District, Oahu

The Department of Education (DOE) has reviewed the Environmental Impact Statement Preparation Notice (EISPN) for a new electrical generating station, new transmission lines, and improvement to substations in Campbell Industrial Park. The DOE would like to see a map of the proposed facilities in relation to the two schools that will be in the closest proximity to the facilities: Barbers Point Elementary and the proposed West Kapolei Middle. We would like to know the actual distance from any emission points to the schools.

The EISPN mentions that with this proposed project, Hawaiian Electric Company will establish three additional air-quality monitoring stations in the region. However, all three stations are in opposite directions from the two DOE schools mentioned above. The DOE would like to know which monitoring stations will be the closest to the schools and their actual distance from the schools.

Thank you for the opportunity to comment on the EISPN. Should you have any questions, please call Rae Loui, Assistant Superintendent of the Office of Business Services, at 586-3444 or Heidi Meeker of the Facilities Development Branch at 733-4862.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:hy

cc: Rae Loui, Asst. Supt., OBS
Mamo Carreira, CAS, Campbell/Kapolei/Waianae Complex Area

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

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

HECO C-3
GENPP 10-16
YA/G

October 26, 2005

Ms. Patricia Hamamoto, Superintendent
Department of Education
State of Hawai'i
P.O. Box 2360
Honolulu, Hawai'i 96804

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Hamamoto:

Thank you for your September 7, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing written comments. 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.

Comment 1:

The DOE would like to see a map of the proposed facilities in relation to the two schools that will be in the closest proximity to the facilities: Barbers Point Elementary and the proposed West Kapolei Middle. We would like to know the actual distance from any emission points to the schools.

Response: The "emission points" associated with the project consist of the smokestacks for the two proposed generating units at the Barbers Point Tank Farm. According to the State Geographical Information System (GIS), both the Barbers Point Elementary school and the proposed West Kapolei Middle School are nearly 2 miles away from the generating station site, and this will be mentioned in the Draft Environmental Impact Statement (DEIS) for the project. Because of their distance from the site, we had not planned to include a separate map showing the school's locations in relation to it. If your Department feels that one should be included, please notify us and we will prepare a figure for the DEIS.

Comment 2:

The EISPN mentions that with this proposed project, Hawaiian Electric Company will establish three additional air-quality monitoring stations in the region.

However, all three stations are in opposite directions from the two DOE schools mentioned above. The DOE would like to know which monitoring stations will be the closest to the schools and their actual distance from the schools.

Response: Of the three air quality monitoring stations that HECO is proposing to install as part of the community benefits package for the project, the one immediately *makai* of the proposed generating unit will be the closest to Barbers Point Elementary School and the proposed West Kapolei Middle School. It would be approximately 2 miles from both schools.

In addition to these new stations, the existing Kapolei air quality monitoring station located at 2052 Lauwiliwili Street in the Kapolei Business Park near the entrance to Campbell Industrial Park (approximately 0.5 miles from Barbers Point Elementary School) will continue to monitor 10-micron particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide levels as mentioned in Table 3.4 of the EISPN.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DANIEL K. AKAKA
HAWAII

WASHINGTON OFFICE:
141 HART SENATE OFFICE BUILDING
WASHINGTON, DC 20510
TELEPHONE: (202) 224-6361

HONOLULU OFFICE:
3106 PRINCE JONAH KUHIO
KALANIANAOLE FEDERAL BUILDING
P.O. BOX 50144
HONOLULU, HI 96850
TELEPHONE: (808) 522-8970

United States Senate
WASHINGTON, DC 20510-1103

COMMITTEES:
ARMED SERVICES
ENERGY AND NATURAL RESOURCES
HOMELAND SECURITY AND GOVERNMENTAL AFFAIRS
INDIAN AFFAIRS
VETERANS' AFFAIRS
SELECT COMMITTEE ON ETHICS

August 30, 2005

Mr. Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, HI 96840-0001

Dear Mr. Isler:

Thank you for contacting me regarding the Hawaiian Electric Company, Inc., Campbell Industrial Park Generating Station and Transmission Additions Project.

I appreciate being kept apprised of the recent developments associated with this project. I received a copy of the Environmental Impact Statement Preparation Notice prepared by Planning Solutions, Inc.

Once again, mahalo for contacting me on this matter.

Aloha pumehana,

Daniel K. Akaka

DANIEL K. AKAKA
U.S. Senator

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

The Honorable Daniel K. Akaka, U.S. Senator
3106 Prince Jonah Kuhio
Kalanianaole Federal Building
P.O. Box 50144
Honolulu, Hawai'i 96850

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Senator Akaka:

Thank you for your August 30, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate your interest in the project and will continue to keep you apprised of its development.

We will provide your office with a copy of the *Draft Environmental Impact Statement* for the project when it is completed. In the meantime, if you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 523-4564 • Fax: (808) 523-4567
Website: www.honolulu.gov

MUFI HANNEMANN
MAYOR

WAYNE M. HASHIRO, P.E.
DIRECTOR

EUGENE C. LEE, P.E.
DEPUTY DIRECTOR

116189

September 23, 2005

Mr. Robert Isler
Project Manager
Hawaii Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Subject: HECO Campbell Industrial Park
Generating Station and Transmission Additions Project
Environmental Impact Statement Preparation Notice (EISPN)

Thank you for your letter dated August 8, 2005, requesting our comments on the referenced EISPN for your proposed generating station and transmission additions in Campbell Industrial Park.

We have no comments to provide at this time. However, we would appreciate receiving future publications of the draft and final versions of the environmental impact statement. We may wish to provide comments when the draft report is issued.

Should there be any questions, please contact Terry Hildebrand, Facilities Division, at 523-4696.

Very truly yours,

for Wayne M. Hashiro, P.E.
Director

WMH:ei

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

HECO C3
GENPP 10-16
YA/G

September 29, 2005

Mr. Wayne M. Hashiro, P.E., Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN): Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Hashiro:

Thank you for your September 23, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions 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 your Department has no comments on the project at this time. As you requested, we will provide your office with copies of the Draft and Final Environmental Impact Statements for review and comment when they become available.

In the meantime, if you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org
www.honolulu.gov

MUFI HANNEMANN
MAYOR

BOISSE P. CORREA
CHIEF

GLEN R. KAJIYAMA
PAUL D. PUTZULU
DEPUTY CHIEFS

OUR REFERENCE BS-KP

September 1, 2005

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice for the Campbell Industrial Park Generating Station and Transmission Additions project.

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

If there are any questions, please call Major Michael Tamashiro of District 8 at 692-4253 or Mr. Brandon Stone of the Executive Bureau at 529-3644.

Sincerely,

BOISSE P. CORREA
Chief of Police

By
KARL GODSEY
Assistant Chief of Police
Support Services Bureau

Serving and Protecting with Aloha

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

HECO C3
GENPP 10-16
YA/G

October 26, 2005

Mr. Boisse P. Correa, Chief
Honolulu Police Department
City and County of Honolulu
801 South Beretania Street
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Chief Correa:

Thank you for your September 1, 2005 letter (your reference BS-KP) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions 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 pleased to hear that the project should have no significant impact on the facilities or operations of the Honolulu Police Department.

If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR

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

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.1900

September 23, 2005

Mr. Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
PO Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Subject: Environmental Impact Statement—Preparation Notice
Hawaiian Electric Company (HECO)
Campbell Industrial Park Generating Station and
Transmission Additions Project

Thank you for your advance notice on the proposed electric facilities project. We do not anticipate that the project will have a significant impact on our transportation facilities. However, there are several potential situations that may require coordination between our organizations. We would like to request that your company address these items in your environmental review and keep our departmental/divisional staff apprised of the items, such as:

1. Any transmission lines crossing the existing Malakole Street (Route 95), or crossing any other State roadway path being considered by our Highways Division connecting Kalaeloa Harbor to the H-1 Freeway. (Malakole Street is part of our highway system and any right-of-way or airspace use above the right-of-way of an existing or proposed road would need to be coordinated with our Highways Division.)

2. Any transmission lines running at or next to the perimeter boundary of Kalaeloa Harbor (Barbers Point), including any lines crossing a potential planned access/service road being considered by our Harbors Division leading off Kalaeloa Boulevard to and approximately perpendicular with the Pier P-7 area of the harbor. Any construction at or along our harbor facility would be of interest for our Harbors Division in case an unexpected concern or event were to arise at the harbor boundary or proposed roadway to the harbor.

3. Delivery of fuel at Kalaeloa Barbers Point Harbor for electric generation was mentioned in your report. Because of the growing volume of vessel traffic and cargo at Kalaeloa Barbers Point Harbor, it is important that we be provided with information on the anticipated number and volume of vessel or shipping calls for fuel delivery. Further, prior or advance notice of shipping calls at the harbor is necessary.

4. Any comments from the FAA on any impacts the proposed facilities, including transmission lines, may have on aircraft flight paths or navigation space in and out of Kalaeloa Airport and Honolulu International Airport. (While it initially appears that no material obstruction to flight operations will occur, the subject project is close to Kalaeloa Airport and under or near the aircraft paths to Honolulu International Airport. It is important to provide us with information on the height, placement, location, and dimensions of new structures and poles or towers so we can assess any potential impacts to our airport operations.)

We appreciate the opportunity to provide our comments.

Very truly yours,

RODNEY K. HARAGA
Director of Transportation

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

HECO C3
GENPP 10-16
YA/G

October 24, 2005

Mr. Rodney K. Haraga, Director
Department of Transportation
State of Hawai'i
Department of Transportation
869 Punchbowl. Street
Honolulu, Hawai'i 96813-5097

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Haraga:

Thank you for your September 23, 2005 letter (your reference STP 8.1900) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions 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 pleased to hear that you do not anticipate that the project will have a significant impact on our transportation facilities. We understand that there are several potential situations that may require coordination between our organizations and you would like us to address them in the environmental review and to keep your departmental/divisional staff apprised of the items. Based on your request, we will undertake the following as we prepare the Draft EIS:

1. We will coordinate any transmission lines crossing the existing Malakole Street (Route 95), or crossing any other State roadway path being considered by the Highways Division connecting Kalaeloa Harbor to the H-1 Freeway with the Highways Division. At present we believe that the transmission line would cross a portion of the roadway that is owned by Campbell Roads, LLC.
2. We will coordinate our proposal with the potential planned access/service road being considered by the Harbors Division leading off Kalaeloa Boulevard to and approximately perpendicular with the Pier P-7 area of the harbor.
3. The EISPN does not state that fuel would be delivered to Kalaeloa Barbers Point Harbor for electric generation. It notes that the *harbor "...provides a nearby location for unloading heavy equipment and construction materials needed for the proposed project. However, most construction materials would probably arrive at the more developed facilities in Honolulu Harbor and be trucked to the site. The petroleum that would be used in the proposed generating units would be brought to Hawai'i by ocean-going ships and offloaded offshore."* We understand that the vessel traffic at the harbor is growing, and we will work closely with your staff to ensure that any materials that must be landed at the harbor are done so only after advance notice is provided.

4. We expect to notify the FAA of our intention to construct a structure that has the potential to affect navigable air space as soon as we have selected a specific generating unit and finalized the site plan for it. We expect to pass this milestone shortly. We will include any comments we receive from the FAA in the Draft EIS.

If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483. I would also appreciate it if you would let me know by telephone or e-mail (robert.isler@heco.com) the telephone numbers of the individuals in the various Divisions we should contact.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF FACILITY MAINTENANCE
CITY AND COUNTY OF HONOLULU
1000 ULUOHIA STREET, SUITE 215, KAPOLEI, HAWAII 96707
TELEPHONE: (808) 692-5054 FAX: (808) 692-5857
Website: www.honolulu.gov

MUFI HANNEMANN
MAYOR

LAVERNE HIGA, P.E.
DIRECTOR AND CHIEF ENGINEER

GEORGE K. MIYAMOTO
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 05-883

September 15, 2005

Mr. Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Subject: **HECO Campbell Industrial Park Generating Station and Transmission Additions Project: Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN)**

Thank you for the opportunity to provide comments on the EA/EISPN, dated July 2005, for the subject proposed HECO additions within Campbell Industrial Park.

We have no comments to add to the document as the proposed additions will not have any adverse affects on our maintenance operations.

Should you have any questions, please call Charles Pignataro of our Division of Road Maintenance at 484-7697.

Very truly yours,

LAVERNE HIGA, P.E.
Director and Chief Engineer

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

CONSTPR P0000064
GENPP 10-16
YA/G

January 6, 2006

Ms. Laverne Higa, P.E., Director & Chief Engineer
Department of Facility Maintenance
City and County of Honolulu
1000 Uluohia Street, Suite 215
Kapolei, Hawai'i 96707

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Higa:

Thank you for your September 15, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions 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 comments on the project at this time and we are pleased that the proposed additions will not have any adverse effects on your Department's maintenance operations.

If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

October 21, 2005

Via E-mail
pwhite@psi-hi.inc

Perry J. White
Planning Solutions, Inc.
210 Ward Ave., Ste. 310
Honolulu, Hawaii 96813

Re: *EISPN - Campbell Industrial Park Generating Station & transmission Additions*

Dear Perry:

It was a pleasure meeting you over the telephone last week. As we discussed, our office represents Southern Wine and Spirits of America, Inc. ("Southern"), who owns and operates a wine and liquor distribution center immediately adjacent to the proposed above-referenced project (the "Project"). Also, as we discussed, Southern would like to participate in the anticipated EIS process by commenting or providing other appropriate input regarding the preparation of the EIS.

As a general matter, Southern's operations include a warehouse comprising approximately 90,000 square feet used to warehouse and distribute consumable products such as non-alcoholic beverages, wine , beers and distilled liquor. Southern currently employs approximately 35 employees at the warehouse, and has delivery trucks that go to and from the warehouse throughout the day.

Upon review of the EISPN, Southern is concerned that the EIS will not adequately address any impacts the Project may have on (i) the health and welfare of its employees and vendors that operate in and around the warehouse, (ii) the products that it stores at the warehouse for human consumption. In addition, Southern has the following comments on some of the specific provisions of the ESIPN:

Section 4.3.1 - This section references the fact that the Project will require a significant amount of water that will primarily be "brackish water" obtained from onsite wells and that the discharge from the treatment process would be disposed of on-site using injection wells. Will the nature of the discharge be described? Does the Project contemplate the use of retention ponds on the site that will hold the discharge prior to being disposed of through the injection wells? If so, has consideration been given to any impacts of such ponds such as odor?

Section 4.3.2 - This section references "reject water"? Is this the same as "discharge"? Also, this section also indicates that sanitary wastewater will be collected and treated on-site and disposed of in a leach field. Is the leach field

similar to an open air septic tank? What will be the impacts of any leach field, such as odor, bugs? Where will it be located?

Section 4.4 - Will the EIS discuss air quality issues that will impact properties in the immediately adjacent area of the Project?

Section 4.5 - Will the EIS discuss the impact, if any, of exposed power lines?

Section 4.8 - Will the EIS discuss any potential traffic, access issues that may affect Southern's operations? Will the Project's operations cause or result in vibrations that will impact adjacent properties?

We hope that some of these initial comments will assist in the preparation of a complete and thorough EIS. We thank you again for allowing us to provide our comments at this time. We look forward to your response and please let us know if you have any questions regarding the above or would like to discuss any of the above comments.

Very truly yours,

McCORRISTON MILLER MUKAI MacKINNON LLP

//Philip W. Miyoshi//

Kenneth G.K. Hoo
Philip W. Miyoshi

cc: Client
Matt Higashida

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

CONSTPR P0000064
GENPP 10-16
YA/G

January 6, 2006

Mr. Philip W. Miyoshi
McCorriston Miller Mukai MacKinnon LLP
Five Waterfront Plaza, 4th Floor
500 Ala Moana Boulevard
Honolulu, Hawai'i 96813

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Miyoshi:

Thank you for your October 21, 2005 letter on behalf of your client, Southern Wine and Spirits of America, Inc., concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. As you know, the official public comment period for the *Environmental Assessment/Environmental Impact Statement Preparation Notice* (EA/EISPN) for the project expired on September 22, 2005. However, per your telephone conversation with our environmental consultant Mr. Perry White of Planning Solutions, Inc., we will respond to your client's concerns in the *Draft Environmental Impact Statement (DEIS)* for the project.

Your letter indicated that your client is generally concerned with making sure that the DEIS adequately addressed impacts to its operations. Specifically, you named 1) the health and welfare of its employees and vendors in and around the warehouse, and 2) the products stored at the warehouse for human consumption as primary concerns. We believe that the environmental impact statement will adequately address these issues and will explain the measures that HECO has incorporated into the design to minimize and mitigate adverse effects.

Item-by-item responses to your specific comments are provided below. To simplify your review, we have reproduced the text of your comments in *italics* before each response.

Comment 1:

Section 4.3.1 *– This section references the fact that the Project will require a significant amount of water that will primarily be "brackish water" obtained from onsite wells and that the discharge from the treatment process would be disposed of on-site using injection wells. Will the nature of the discharge be described? Does the Project contemplate the use of retention ponds on the site that will hold the discharge prior to being disposed of through the injection wells? If so, has consideration been given to any impacts of such ponds such as odor?*

Response: Yes, the DEIS will describe the nature of the discharge into the on-site wells that are planned. The discharge will enter the injection wells directly and will not be retained in an above ground retention pond.

Comment 2:

Section 4.3.2 *- This section references "reject water"? Is this the same as "discharge"? Also, this section also indicates that sanitary wastewater will be collected and treated on-site and disposed of in a leach field. Is the leach field similar to an open air septic tank? What will be the impacts of any leach field, such as odor, bugs? Where will it be located?*

Response: Yes, the "reject water from the treatment system" in Section 4.3.2 is the same as the "discharge from the treatment process" that is mentioned in Section 4.3.1.

HECO's proposed design for the generating facility no longer includes a leach field, and this will be reflected in the DEIS. Instead, sanitary wastewater will be stored in a septic tank. The liquid waste would then be treated and disposed of in the injection wells on-site. Occasionally, the septic tank will be emptied and the waste trucked away. Because the proposed project will have no more than a few people on-site at one time, it will generate very little wastewater. Further, the system is likely to be similar to other underground systems used in the area to dispose of sanitary waste.

Comment 3:

Section 4.4 *- Will the EIS discuss air quality issues that will impact properties in the immediately adjacent area of the Project?*

Response: The DEIS will contain a detailed discussion of potential air quality impacts, including a comprehensive discussion of the project's compliance with applicable State and Federal ambient air quality standards.

Comment 4:

Section 4.5 *- Will the EIS discuss the impact, if any, of exposed power lines?*

Response: The DEIS will discuss the potential effects of the proposed new electrical transmission lines, including EMF and visual effects. The proposed 138 kV electrical transmission lines themselves will be nearly identical to the existing 138 kV lines that pass along the Hanua Street side of your client's warehouse.

Comment 5:

Section 4.8 *- Will the EIS discuss any potential traffic, access issues that may affect Southern's operations? Will the Project's operations cause or result in vibrations that will impact adjacent properties?*

Response: The DEIS will describe the traffic that will be generated by the proposed project, both during construction and once the facility becomes operational. The traffic volume will be very low, and once the facility is operational will consist almost entirely of passenger vehicles and light trucks. From our observations, we expect that the number and size of vehicles traveling to and from the power plant site will be less than those accessing your client's warehouse. Moreover, they will pass further from the warehouse than do the vehicles that support Southern Wine's operations. We do not

believe that traffic generated by the project will significantly impede access or otherwise affect Southern Wine's operations.

We appreciate your client's concern about possible vibrations from the operation of the proposed facilities. Based on experience with comparable electrical generating units, the operation of the proposed facilities would not create any vibrations measurable on adjacent property. No fuel trucks or other heavy vehicles would regularly access the site, and thus vibrations from large vehicles would also be rare or absent.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc. at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

THE GAS COMPANY

P.O. Box 3000
Honolulu, Hawaii 96802-3000

October 24, 2005

Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Attention: Mr. Robert Isler
Project Manager

Gentlemen:

Subject: Draft Environmental Assessment for
HECO Campbell Industrial Park Generating Station and
Transmission Additions Project

Please be advised that The Gas Company, LLC maintains underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area and is interconnected with the utility network in the Ewa District. We would appreciate your consideration during the project planning and design process to minimize any potential conflicts with the existing gas facilities in the project area.

Thank you for the opportunity to comment on the Draft Environmental Assessment. Should there be any questions, or if additional information is desired, please call Mr. Chris Anderson at 594-5564.

Sincerely,

Charles E. Calvet, P.E.
Manager, Engineering

CEC:krs
05-228

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

CONSTPR P0000064
GENPP 10-16
YA/G

January 6, 2006

Mr. Charles E. Calvet, P.E., Manager, Engineering
The Gas Company
P.O. Box 3000
Honolulu, Hawai'i 96802-3000

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Calvet:

Thank you for your October 24, 2005 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Environmental Assessment/Environmental Impact Statement Preparation Notice* and providing written comments.

Thank you for calling attention to the fact that The Gas Company, LLC maintains underground utility gas mains in the area. To the best of our knowledge, none of the construction that would be required would affect those lines. However, we will ensure that the construction plans and specifications note that underground utilities may be present and make it the responsibility of the construction contractor to contact The Gas Company, LLC before beginning work.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

APPENDIX C. DRAFT EIS COMMENTS AND RESPONSES

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
KAPOLEI HALE • 1000 ULUOHIA STREET, SUITE 309 • KAPOLEI, HAWAII 96707
TELEPHONE: (808) 692-5561 • FAX: (808) 692-5131 • INTERNET: www.honolulu.gov

MUFI HANNEMANN
MAYOR

LESTER K.C. CHANG
DIRECTOR

DANA TAKAHARA-DIAS
DEPUTY DIRECTOR

February 13, 2006

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: Draft Environmental Impact Statement
Hawaiian Electric Company, Inc. (HECO)
Campbell Industrial Park Generating Station and Transmission
Additions Project; Ewa District, Island of Oahu

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement relating to Hawaiian Electric's Generating Station and Transmission Additions at Campbell Industrial Park.

The Department of Parks and Recreation has no comment on this project, and as it will not impact any facility or program of this Department, you are invited to remove us as a consulted party to the balance of the EIS process.

Should you have any questions, please contact Mr. John Reid, Planner, at 692-5454.

Sincerely,

LESTER K. C. CHANG
Director

LKCC:mk
(139847)

cc: Mr. Matthew Higashida, Department of Planning and Permitting
Ms. Genevieve Salmonson, Office of Environmental Quality Control

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

HECO C3
GENPP 10-16
YA/G

March 3, 2006

Mr. Lester K.C. Chang, Director
Department of Parks & Recreation
City and County of Honolulu
1000 Uluohia Street, Suite 309
Kapolei, Hawai'i 96707

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Chang:

Thank you for your February 13, 2006 letter concerning Hawaiian Electric Company's proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement*, and we are pleased to hear that the project will not affect any of your Department's facilities or programs.

We understand that you have no further comments to offer at this time and that you wish to be removed as a consulted party for the balance of the EIS process. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

OAHU CIVIL DEFENSE AGENCY

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

Mufi Hannemann
MAYOR

William D. Balfour, Jr.
ACTING ADMINISTRATOR

February 15, 2006

Mr. Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
P.O. box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: Draft Environmental Impact Statement: Hawaiian Electric Company, Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa District, Island of O'ahu

Thank you for the opportunity to review the above subject statement.

The Oahu Civil Defense Agency has no comments at this time.

Sincerely,

WILLIAM D. BALFOUR, JR.
Acting Administrator

/ms

cc: Mr. Mathew Higashida
Department of Planning and Permitting

Ms. Genevieve Salmonson
Office of Environmental Quality Control

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

HECO C3
GENPP 10-16
YA/G

March 3, 2006

Mr. William D. Balfour, Jr., Acting Administrator
O'ahu Civil Defense Agency
City and County of Honolulu
650 South King Street
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Balfour:

Thank you for your February 15, 2006 letter concerning Hawaiian Electric Company's proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We understand that you have no comments to offer on the project at this time. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 523-4564 • Fax: (808) 523-4567
Web site: www.honolulu.gov

MUFI HANNEMANN
MAYOR

DIRECTOR
EUGENE C. LEE, P.E.
DEPUTY DIRECTOR

February 16, 2006

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: Draft Environmental Impact Statement: Hawaiian Electric Company, Inc. Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa District, Island of Oahu

Thank you for giving us the opportunity to submit our comments regarding the above Draft Environmental Impact Statement.

The Department of Design and Construction does not have any comments to offer at this time.

Very truly yours,

Eugene C. Lee, P.E.
Deputy Director

ECL:lt

c: Department of Planning & Permitting
Office of Environmental Quality Control

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

HECO C3
GENPP 10-16
YA/G

March 3, 2006

Mr. Eugene C. Lee, P.E., Deputy Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Lee:

Thank you for your February 16, 2006 letter concerning Hawaiian Electric Company's proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We understand that you have no comments to offer on the project at this time. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

3375 Koapaka Street, Suite H425
Honolulu, Hawaii 96819-1869
Phone: (808) 831-7761 Fax: (808) 831-7750 Internet: www.honolulufire.org

MUFI HANNEMANN
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ALVIN K. TOMITA
DEPUTY FIRE CHIEF

February 15, 2006

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: Draft Environmental Impact Statement
Hawaiian Electric Company, Inc.
Campbell Industrial Park Generating Station and Transmission Additions Project
Ewa District, Island of Oahu

In response to your letter dated February 2, 2006, regarding the above-mentioned project, the Honolulu Fire Department (HFD) has reviewed the material you provided and requires that the following be complied with:

1. Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from fire apparatus access as measured by an approved route around the exterior of the building or facility. (1997 Uniform Fire Code, Section 902.2.1.)

2. Provide a water supply, approved by the county, capable of supplying the required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

   On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of 150 feet (45 720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building. (1997 Uniform Fire Code, Section 903.2 as amended.)

3. Submit civil and construction drawings to the HFD for review and approval.

Should you have any questions, please call Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 723-7151.

Sincerely,

KENNETH G. SILVA
Fire Chief

KGS/SK:bh

cc: Genevieve Salmonson, Office of Environmental Quality Control
Matthew Higashida, Department of Planning and Permitting

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

HECO C3
GENPP 10-16
YA/G

March 3, 2006

Mr. Kenneth G. Silva, Chief
Fire Department
City and County of Honolulu
3375 Koapaka Street, Suite H425
Honolulu, Hawai'i 96819-1869

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Chief Silva:

Thank you for your February 15, 2006 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and outlining the requirements for complying with the applicable sections of the Fire Code.

Item-by-item responses to each of the listed requirements are provided below. To simplify your examination, we have reproduced the text of your comments in *italics* before each response.

Comment 1:

Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from fire apparatus access as measured by an approved route around the exterior of the building or facility. (1997 Uniform Fire Code, Section 902.2.1.)

Response: The proposed generating facility will comply with all fire access requirements pursuant to the 1997 Uniform Fire Code, Section 902.2.1. HECO will submit detailed construction plans for HFD's review once they become available.

Comment 2:

Provide a water supply, approved by the county, capable of supplying the required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of 150 feet (45 720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building. (1997 Uniform Fire Code, Section 903.2 as amended.)

Response: The plans for the proposed generating facility provide for on-site fire water supply and storage, as well as fire response capabilities in compliance with Uniform Fire Code Section 903.2. The Board of Water Supply has indicated that it will confirm the availability of water supply when the building permit is submitted for approval.

Comment 3:

Submit civil and construction drawings to the HFD for review and approval.

Response: HECO will submit the required civil and construction drawings pertaining to the proposed facilities for HFD review and approval once they are available.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

February 16, 2006

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Incorporated
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: Your Letter of February 2, 2006 on the Draft Environmental Impact Statement: Hawaiian Electric Company, Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa District, Island of Oahu

Thank you for the opportunity to comment on the proposed project.

The existing water system is presently adequate to accommodate the proposed development. However, please be advised that this information is based upon current data and, therefore, the Board of Water Supply reserves the right to change any position of information stated herein up until the final approval of your building permit. The final decision on the availability of water will be confirmed when the building permit is submitted for approval.

The construction drawings should also be submitted for approval.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

The RO water requirements should be coordinated with Erwin Kawata of the Board of Water Supply, Strategic Development Division. He can be contacted at 748-5080.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

KEITH S. SHIDA
Principal Executive
Customer Care Division

cc: Mr. Matthew Higashida, Department of Planning & Permitting
Ms. Genevieve Salmonson, Office of Environmental Quality Control
Erwin Kawata, Board of Water Supply

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

HECO C3
GENPP 10-16
YA/G

March 3, 2006

Mr. Keith S. Shida, P.E., Customer Care Division
Board of Water Supply
City & County of Honolulu
630 South Beretania Street
Fort Shafter, Hawai'i 96858-5440

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Shida:

Thank you for your February 16, 2006 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments.

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.

Comment 1:

The existing water system is presently adequate to accommodate the proposed development. However, please be advised that this information is based upon current data and, therefore, the Board of Water Supply reserves the right to change any position of information stated herein up until the final approval of your building permit. The final decision on the availability of water will be confirmed when the building permit is submitted for approval.

Response: Thank you for confirming that the existing water system is presently adequate to accommodate the proposed project. We understand that the availability of water will be confirmed when the building permit is submitted for approval.

Comment 2:

The construction drawings should also be submitted for approval.

Response: HECO will submit the construction drawings to the BWS for approval when they become available.

Comment 3:

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

Response: We will be coordinating the on-site fire protection requirements for the proposed facilities with the Fire Prevention Bureau of the HFD. The construction plans will be submitted to HFD for review and approval prior to construction.

Comment 4:

The RO water requirements should be coordinated with Erwin Kawata of the Board of Water Supply, Strategic Development Division. He can be contacted at 748-5080.

Response: Thank you for your suggestion. We are already working with Mr. Kawata to coordinate the RO water requirements.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Real Estate and Utilities Section, AHNL-54B

P. O. Box 50109
Honolulu, Hawaii 96850-5000

February 24, 2006

Mr. Robert Isler
Project Manager
Hawaiian Electric Company Inc.
P. O. Box 2750
Honolulu, HI 96840

Dear Mr. Isler:

Your letter of February 2, 2006, requested the review of your "Draft Environmental Impact Statement: Hawaiian Electric Company Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa District, Island of Oahu."

The Federal Aviation Administration (FAA) requests the submittal of a "Notice of Construction or Alteration" FAA Form 7460-1 for this project. The form is available at our website at http://www.faa.gov.

We appreciate this opportunity to comment. If there are any questions regarding the submittal, please contact Mr. Steve Wong of our Honolulu Airports District Office at 541-1225.

Sincerely,

Darice B. N. Young
Realty Contracting Officer

cc:
Mr. Mathew Higashida
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Ms. Genevieve Salmonson
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

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

HECO C3
GENPP 10-16
YA/G

May 16, 2006

Ms. Darice B.N. Young, Realty Contracting Officer
U.S. Department of Transportation
Federal Aviation Administration
P.O. Box 50109
Honolulu, Hawai'i 96850-5000

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Young:

Thank you for your February 24, 2006, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

As you requested, HECO submitted a "Notice of Construction or Alteration" to the FAA for the project on May 12, 2006.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
1000 ULUOHIA STREET, SUITE 308, KAPOLEI, HI 96707
TELEPHONE: (808) 692-5159 FAX: (808) 692-5113 WEBSITE: http://www.co.honolulu.gov

MUFI HANNEMANN
Mayor

ERIC S. TAKAMURA, Ph.D, P.E.
Director

KENNETH A. SHIMIZU
Deputy Director

PRO 06-015

February 24, 2006

Mr. Robert Isler, Project Manager
Hawaiian Electric Company
PO Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: Draft Environmental Impact Statement: Hawaiian Electric Company, Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa District, Island of O'ahu

In reply to your letter of February 2, 2006, we have no comments on the subject Draft Environmental Impact Statement. Thank you for the opportunity to review and comment.

Should you have any questions, please call me at 692-5727.

Sincerely,

Jack Pobuk
Program Coordinator

cc: Mr. Mathew Higashida, City DPP
Ms. Genevieve Salmonson, State OEQC

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

HECO C3
GENPP 10-16
YA/G

March 3, 2006

Mr. Jack Pobuk, Program Coordinator
Department of Environmental Services
City and County of Honolulu
1000 Uluohia Street, Suite 308
Kapolei, Hawai'i 96707

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Pobuk:

Thank you for your February 24, 2006, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We understand that your Department has no comments on the *DEIS*. If you have any questions about this project in the future, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

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

REPLY TO ATTENTION OF

February 28, 2006

Regulatory Branch

File No. POH-2005-444

Henry Eng, Director
Dept. of Planning & Permitting (Attn: Matt Higashida)
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

Subject: Department of the Army (DA) comments on a draft Environmental Impact Statement (dEIS) regarding the Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa, Oahu, Hawaii.

Dear Mr. Eng:

This office has reviewed the above-referenced draft EIS dated January 17, 2006. The proposed project includes the construction of a new fossil-fueled electrical generating station, a new transmission line, and associated improvements at two existing electrical substations in the Campbell Industrial Park. The information was reviewed pursuant to Section 10 of the Rivers and Harbors Act (RHA) and Section 404 of the Clean Water Act (CWA).

Comments on the project were previously provided by our office on August 29, 2005. Based on the information in the draft EIS and the statements made in HECO's September 29, 2005 letter responding to our comments, a DA permit will not be required for the proposed project.

If you need further assistance, please contact Ms. Connie Ramsey by phone at 438-2039, by facsimile at 438-4060, or by email at Connie.L.Ramsey@usace.army.mil. Please refer to the above-referenced file number for further inquiries regarding this project. Thank you for your cooperation with our regulatory program.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Copy Furnished:
Genevieve Salmonson, Office of Environmental Quality Control, 235 South Beretania Street, Suite 702, Honolulu, HI 96813
Perry J. White, Planning Solutions, Ward Plaza, 210 Ward Avenue, #330, Honolulu, HI 96814

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

HECO C3
GENPP 10-16
YA/G

April 19, 2006

Mr. George P. Young, P.E., Chief
Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawai'i 96858-5440

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i (POH-2005-444)

Dear Mr. Young:

Thank you for your February 28, 2006, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments.

Thank you very much for confirming that a DA permit will not be required for the proposed project. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON

MEREDITH J. CHING
JAMES A. FRAZIER
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
LAWRENCE H. MIIKE, M.D., J.D.
STEPHANIE A. WHALEN

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

March 1, 2006

Ref: 1806-15 to 18.let

Mr. Robert Isler
Hawaiian Electric Co., Inc.
P.O. Box 2750
Honolulu, HI 96840-0001

Dear Mr. Isler:

We recently reviewed a Draft Environmental Impact Statement (DEIS) for the Hawaiian Electric Co., Inc.'s (HECO) proposed generating station and transmission additions at Campbell Industrial Park. The DEIS indicated that only one caprock well, Well No. 1806-15, was drilled at the Tank Farm site. We have confirmed this with Mr. Ken Fong, our previous contact person for HECO well permits. Mr. Fong has informed us that you are the new project manager.

This is to notify you that we have canceled the Well Construction Permits for Well Nos. 1806-16 to 18, which have expired. If you decide to proceed with additional well development in the future, new permits from the Commission would be required.

Our comments on the draft Environmental Impact Statement outline additional permit information and requirements (attached).

Sincerely,

W. Roy Hardy
for

DEAN A. NAKANO
Acting Deputy Director

LYN:ss
Attachment

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON

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NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
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STEPHANIE A. WHALEN

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

March 1, 2006

REF: heco deis.dr

TO: Russell Tsujii, Administrator
Land Division

FROM: Dean A. Nakano, Acting Deputy Director DAN
Commission on Water Resource Management

SUBJECT: Draft Environmental Impact Statement
Hawaiian Electric Company, Inc., Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa District, Oahu

FILE NO.: HECOCIPARK-DEIS.CMT

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at *http://www.hawaii.gov/dlnr/cwrm*.

Our comments related to water resources are checked off below.

☒ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. There may be 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.

Permits required by CWRM: Additional information and forms are available at *www.hawaii.gov/dlnr/cwrm/forms.htm*.

☒ 4. The proposed water supply source for the project is located in a designated ground-water management area, and a Water Use Permit is required prior to use of ground water.

☒ 5. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.

☒ 6. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

DRF-LD 04/15/2005

☒ 7. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 8. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☐ 9. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.

☐ 10. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 11. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 12. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☐ 13. We recommend that the report identify feasible alternative non-potable water resources, including reclaimed wastewater.

☒ OTHER:

In 1992, Hawaiian Electric Company, Inc. obtained well construction and water use permits for four caprock wells at the Tank Farm site (assigned Well Nos. 1806-15 to 18). The water use permit authorized up to 14.4 million gallons per day of salt water to be used for industrial cooling. Based on the information provided in this report, only one well (Well No. 1806-15) was constructed.

Our records show that there is no pump in Well No. 1806-15. If Well No. 1806-15 is to be developed for industrial cooling use, a pump installation permit would be required. Thereafter, regular monthly reports of water use should be made (visit our website at www.hawaii.gov/dlnr/cwrm/forms.htm to download the water use reporting form.) If additional production wells are desired, well construction permits would also be required in addition to pump installation and water use permits. Use of any existing or proposed wells for any purpose other than industrial cooling would require a new water use permit from the Commission.

The report mentions that the technical feasibility of relying on caprock wells must be confirmed through test borings and pump testing. Please be advised that any test borings, constructed for the purposes of determining potential well yield or other hydrologic conditions, cannot be converted to exploratory, production, or permanent monitor wells. Test borings must be sealed in accordance with the sealing standards in the HWCPIS immediately after their purpose has been served. If it is desired or contemplated to convert the test borings, if successful, to exploratory, production, or permanent monitor wells, then the test borings should be drilled as exploratory wells, with the proper permits from the Commission. Additionally, if the quality of water pumped is less than 17,000 mg/l chlorides then it will not qualify as a saltwater well and may need to be modified by the Commission.

If there are any questions, please contact Lenore Nakama at 587-0218.

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

HECO C3
GENPP 10-16
YA/G

April 19, 2006

Mr. Dean A. Nakano, Acting Deputy Director
Commission on Water Resource Management
Department of Land & Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Nakano:

Thank you for your March 1, 2006 letter (your reference 1806-15 to 18.let) concerning the Hawaiian Electric Company, Inc.'s (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments.

Thank you for notifying us that the Well Construction Permits for Well Nos. 1806-16 to 18 have expired. We understand that further well development would require new permits from the Commission.

Item-by-item responses to your additional comments are provided below. To simplify your examination, we have reproduced the text of your comments in *italics* before each response.

Comment 1:

We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

Response: Thank you for your recommendation. HECO is working with the City and County of Honolulu Board of Water Supply to coordinate the potable and non-potable water supply for the proposed facilities.

Comment 2:

The proposed water supply source for the project is located in a designated ground-water management area, and a Water Use Permit is required prior to use of ground water.

Response: HECO will obtain a Water Use Permit for the use of groundwater at the proposed generating facility.

Comment 3:

A Well Construction Permit(s) is (are) required before the commencement of any well construction work.

Response: Thank you for confirming that Well Construction Permits are required for the proposed wells. HECO will seek these before beginning work on this aspect of the proposed project.

Comment 4:

A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

Response: We appreciate your confirming that Pump Installation Permits are required before ground water is developed as a source of supply for the project. HECO will seek these before beginning work on this aspect of the proposed project.

Comment 5:

There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

Response: HECO will abandon the existing well as part of this project. It expects to submit an application for a well abandonment permit shortly.

Comment 6:

In 1992, Hawaiian Electric Company, Inc. obtained well construction and water use permits for four caprock wells at the Tank Farm site (assigned Well Nos. 1806-15 to 18). The water use permit authorized up to 14.4 million gallons per day of salt water to be used for industrial cooling. Based on the information provided in this report, only one well (Well No. 1806-15) was constructed.

Our records show that there is no pump in Well No. 1806-15. If Well No. 1806-15 is to be developed for industrial cooling use, a pump installation permit would be required. Thereafter, regular monthly reports of water use should be made (visit our website at www.hawaii.gov/dlnr/cwrm/forms.htm to download the water use reporting form.) If additional production wells are desired, well construction permits would also be required in addition to pump installation and water use permits. Use of any existing or proposed wells for any purpose other than industrial cooling would require a new water use permit from the Commission.

Response: HECO will seek Pump Installation Permits for all wells which it intends to construct for the proposed project. We further understand that any well used for a purpose other than industrial cooling would require a new Water Use Permit.

Comment 7:

The report mentions that the technical feasibility of relying on caprock wells must be confirmed through test borings and pump testing. Please be advised that any test borings, constructed for the purposes of determining potential well yield or other hydrologic

conditions, cannot be converted to exploratory, production, or permanent monitor wells. Test borings must be sealed in accordance with the sealing standards in the HWCPIS immediately after their purpose has been served. If it is desired or contemplated to convert the test borings, if successful, to exploratory, production, or permanent monitor wells, then the test borings should be drilled as exploratory wells, with the proper permits from the Commission. Additionally, if the quality of water pumped is less than 17,000 mg/l chlorides then it will not qualify as a saltwater well and may need to be modified by the Commission.

Response: Thank you for your advice concerning the wells. HECO will seek the permits needed to drill the wells as exploratory wells so that they can be converted to production wells if they prove successful.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

Hawaiian Telcom

February 28, 2006

Reply to
HIABY3

Mr. Robert Isler
Hawaiian Electric Company
P.O. Box 2750
Honolulu, HI 96840-0001

Dear Mr. Isler:

Subject: **Campbell Industrial Park Generating Station and Transmission Project - Draft Environmental Impact**

Thank you for the opportunity to review and comment on the draft environmental impact statement for the **Campbell Industrial Park Generating Station and Transmission Additions Project**. We have no comments to add to your document at this time.

If you have any questions or require assistance in the future, please call me at 840-1447.

Sincerely,

Paul K. Hanohano

Paul Hanohano
OSP Engineering

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

HECO C3
GENPP 10-16
YA/G

April 19, 2006

Mr. Paul Hanohano, OSP Engineering
Hawaiian Telcom
1177 Bishop Street
Honolulu, HI 96813

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Hanohano:

Thank you for your February 28, 2006 letter (your reference HIABY3) concerning the Hawaiian Electric Company, Inc's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We understand that you have no comments at this time. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

ECONOMIC DEVELOPMENT.
ISLAND OF OAHU

February 28, 2006

Mr. Matthew Higashida
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

RE: CIP Generating Station and Transmission Additions

Dear Mr. Higashida:

I am writing on behalf of Enterprise Honolulu in strong support of HECO's application for a CIP Generating Station and Transmission Additions Project.

I am the President and CEO of Enterprise Honolulu, a nonprofit economic development organization whose purpose is to diversify O'ahu's economy by assisting the expansion of current innovation business, helping local entrepreneurs to start new growth businesses, and attracting new job creating investments. I was a member of the HECO Integrated Resource Plan Advisory Committee and now Chair the Hawai'i Energy Reliability Committee.

Enterprise Honolulu and the Energy Reliability Committee members are acutely aware of O'ahu's urgent need for additional electrical generating capacity. O'ahu has come perilously close to losing power several times in the past few months, and any reputation that Hawai'i – O'ahu in particular – acquires for having an unreliable power supply will scare new investors away from our Islands and curtail our current economic boom.

We are particularly interested in preserving the tech based businesses in Hawaii, bringing high-tech and innovation businesses to Hawai'i to accelerate the diversification of the economy, create higher paying jobs, new exciting careers and new entrepreneurial opportunities for Hawaii citizens. However, most tech based businesses and particularly biotech require a reliable, uninterruptible supply of electricity, which is at risk in the near future if the new power plant is not built.

We have noted the arguments that a new fossil fuel plant should not be built on O'ahu. We wish O'ahu could immediately transition to renewables, however, this does not realistically address individuals' and companies' growing demand for electric power even with increased efficiencies, conservation and maximum implementation of proven renewable energy technology. While we strongly support accelerating the alternative energy sector, the fact remains that in the short term we will not likely achieve reliability without building this new power plant to ensure near-term (5-10 years) energy needs. Hopefully the new plant will ultimately burn biofuels, which will make it part of Hawai'i's move away from traditional fossil-fuel dependence.

O'ahu faces a serious electrical generation capacity shortage in the near future (now to 2015). Building the proposed power plant will help ensure reliable energy while alternative, renewable-energy technologies come online over the next 5 to 20 years. That is why we support the draft EIS and the proposal to build a new power plant in the Campbell Industrial Park.

Attached for your information as background, are pieces that I have written about the importance of energy reliability.

Sincerely,

Mike Fitzgerald

Mike Fitzgerald
President & CEO
Enterprise Honolulu

Enclosures

Cc: Enterprise Honolulu Board of Directors
Enterprise Honolulu Investors
Energy Reliability Committee Members
Hawaiian Electric Company, Inc.

ENTERPRISE
HONOLULU

737 Bishop Street, Suite 2030, Honolulu, Hawaii 96813 • 808-521-5611
Fax: 808-536-2281 • info@enterprisehonolulu.com • www.EnterpriseHonolulu.com

HonoluluAdvertiser.com

Posted on: Thursday, June 16, 2005

COMMENTARY

New power plant critical for O'ahu's future

By Mike Fitzgerald

Given O'ahu's growing energy demands, a new plant in Campbell Industrial Park is an essential part of Hawai'i's short-term (one to five years) energy solutions in addition to everything we can do with renewable energy, conservation and maximizing efficiencies.

Hawaiian Electric Co. released its Integrated Resource Plan (IRP) last week, which outlines O'ahu's projected energy needs for the next five to 20 years. Hawaiian Electric is projecting that by 2009, O'ahu's energy demands will increase by about 285 megawatts. From my experience on the IRP Advisory Board, HECO is doing everything it can to meet this need. The plan calls for additional energy conservation measures amounting to 69 megawatts to ensure there's enough power to go around. Unfortunately, renewable energy resources alone will not come close to filling the demand within the next five years.

For example, one renewable energy measure is a proposed wind farm on Kahe Ridge comprising 24 to 26 wind towers. This, however, will generate only 39 of the projected 285 megawatts of power necessary to meet O'ahu's energy requirements. Moreover, a wind farm requires a sufficient amount of wind to function. So, on days with no wind, it doesn't work.

The Kahe wind towers may also face opposition from neighbors who might object to towers adjacent to their homes.

Photovoltaic solar panels also would take up a huge amount of space to generate enough energy to supply demand. Do we want panel farms covering half of O'ahu to meet a quarter of our energy needs? It's doubtful that the residents would support this.

Without the new plant, we won't be able to meet our current energy needs. However, once the new plant is built, we need to look at ways to ensure it's the last power plant built on O'ahu.

How do we do this? We can take immediate steps to reduce energy use in our homes and businesses by installing solar water heaters, building new homes with energy-efficient construction and positioning them to take advantage of trade winds for cooling. We can also buy energy-efficient lighting, computers and copiers for our businesses. We can demand energy-efficient building standards.

HECO is working to ensure rebates are awarded for taking such energy-saving measures. We also should work with our legislators to create tax breaks to encourage Hawai'i businesses to be energy efficient.

Most importantly, we must look at new renewable-energy technologies for the long run. Fortunately, the new power plant is actually part of the renewable solution. It can burn biofuel when the feed stock is available in large enough quantities. Biofuels from plants, such as corn, can be grown on O'ahu and burned instead of fossil fuels in the new power plant, which could be a big opportunity for agriculture growers on all the islands.

HonoluluAdvertiser.com

Posted on: Saturday, October 15, 2005

Hawai'i residents turning down the juice

By Jan TenBruggencate
Advertiser Science Writer

Hawai'i residents in every county are using less electricity this year than last — the first statewide decline in per-household power consumption since 1997.

Industry and utility officials say they can't be sure it's a result of high energy costs, but that's one conclusion that makes sense to them.

"It's logical that people would find ways to use less to deal with (increased costs), but it's hard to measure that," said Dave Waller, Hawaiian Electric Co. vice president for customer solutions.

One indicator of consumer desire to cut power bills is that more people are buying solar water-heating systems than at any other time in the last 30 years, said Cully Judd, owner of the state's largest and oldest solar equipment firm, Inter-Island Solar Supply.

But utility officials say the decline could have other causes. One is that last year's hot and humid weather made for heavy air-conditioner use, and power consumption reached record highs statewide. This year's reduction of less than 1.5 percent in average monthly kilowatt-hours could simply be a drawback from an unusual year, and it is notable that household electricity use this year is still higher than in 2003.

Denise McCurdy says she moved into an energy-efficient house in 'Ewa Beach because she was fed up with $400-a-month power bills.

JOAQUIN SIOPACK | The Honolulu Advertiser

LEARN MORE

For tips on energy efficiency, go to www.heco.com.

But Waller said the reduction also may be attributed to the widespread availability of energy-efficient lighting and electronics, and an indication that savings from the use of these products are finally taking hold.

It also could be that people are simply opting for conservation in response to the urging of utilities, government and environmental groups.

Waller said it's likely a combination of these factors, and he believes the change is significant.

"We've had a substantial increase in energy use for several years, and beginning in 2005 we began to see a moderation in energy use. Starting in the first quarter, we saw this trend reverse," he said.

ENERGY-EFFICIENT HOME

For 'Ewa Beach resident Denise McCurdy, electricity costs are driving her family's consumer decisions. Three weeks ago, they moved into an energy-efficient home built by Gentry Homes after their frustration at $400-a-month power bills in new but not energy-efficient military housing.

He said he knows "there are a lot of people who aren't with the program" but still have the systems.

"It's a no-brainer to put it on the house. As electric rates go up, it is economically ridiculous not to put in a solar," Judd said.

He said consumers clearly are getting the message. "We've sold more stuff in the last six months than in any six-month period in the last 30 years," he said.

McCurdy said the benefits of designed-in energy efficiency are clear to her family. They turn off the air conditioning in the daytime; when they come home, the house is comfortable enough to prepare dinner without turning on the air conditioner.

They do turn it on at night for sleeping, "because I like it cold," she said.

Reach Jan TenBruggencate at jant@honoluluadvertiser.com.

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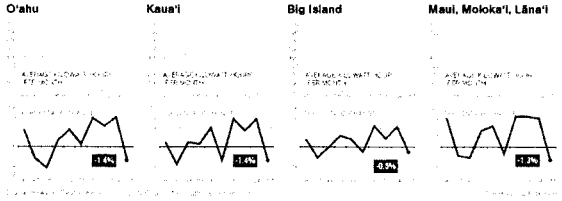
RESIDENTIAL USE OF ELECTRICITY IN HAWAI'I: IT'S GOING DOWN



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HonoluluAdvertiser.com

Posted on: Sunday, October 23, 2005

COMMENTARY

We need self-reliance in fuel, food

By Mike Fitzgerald and Adm. Robert Kihune

To ensure that O'ahu's homes and businesses have reliable energy without brownouts or blackouts, Hawaiian Electric Co. must construct — as quickly as possible, but no later than 2009 — the proposed 100-megawatt generating plant at Campbell Industrial Park.

Fortunately, this plant will burn naphtha, a fuel that is produced in surplus in Hawai'i, so no new oil imports are required. This new plant also can convert to biofuels or hydrogen when they are available and economical.

This could be the last power-generating plant built in Hawai'i that uses nonrenewable fossil fuel. And other existing plants in the state that generate power with fossil fuel may be modernized and retrofitted so that Hawai'i can ultimately convert to all renewable energy.

HECO's total generation capacity on O'ahu is now 1,669 megawatts. Record peak demand last October was 1,327 megawatts. The margin is slim, given the increased housing development and new demands for air conditioning, new appliances and overall increasing energy demands.

A 10- to 20-year conversion period will likely be required for the full transition from traditional to renewable energy to get under way. This will require integration of these two sources over a couple decades and will necessitate extraordinary levels of coordination and management of capacity, and perhaps billions of dollars in new investment.

Fortunately, Hawai'i is a rare place that has every known renewable energy source under development in experimental projects. These include wind, solar (passive and photovoltaics), hydropower, ethanol, geothermal, biomass, biofuels, hydrogen fuel cells, deep-ocean cooling and wave energy.

To ensure energy reliability, Hawai'i must accelerate the production of all of these alternatives. Doing so, particularly with biofuels from the production of agriculture, could revive the sugarcane industry in Hawai'i. Lester Brown of the World Watch Institute estimates that sugarcane is the highest value converter of any agricultural crop to biofuels (7 to 1).

Hawaiian Electric now provides 8 percent of electricity from renewables, about four times the national average. Hawaiian Electric has been and continues to be one of the leading U.S. utilities pioneering renewable energy. However, it is now essential for Hawai'i's energy reliability to further accelerate the commercial development of renewable energy using every state or federal incentive available. In addition, all Hawai'i residents, agencies and organizations must maximize the conservation of energy. This is the best-value return, requiring the shortest and least cost implementation.

More efficient use of energy is also essential. This includes new technology as well as equipment changes: long-lasting light bulbs, time management systems for energy use, glazed windows, insulation, "green" building materials, more energy-efficient building designs, energy-saving building codes, incentives for using less energy at peak use times. Many energy-efficient adaptations are cost-benefit investments that

Recent events should have convinced us that no one is coming to save us in Hawai'i. If there is a hurricane, tsunami, earthquake or oil shortage that disrupts delivery of fuel and/or food, it's prudent to assume that, initially at least, for several days or weeks, we will be on our own.

We could deny these realities and hope for the best, accepting the inevitable. We could also deceive ourselves into believing that the current national government is competently prepared with prevention and response strategies and is genuinely concerned about us. They are not and will not likely be in the foreseeable future. With several trillion dollars national debt — 30 percent of which is dependent upon foreign government central banks buying U.S. Treasury bonds — and with about $600 billion current accounts deficit, the federal government will have to either make budget cuts across the board to avoid accelerating inflation and a recession, or raise taxes. Either way, there will be some economic adjustments that will likely slow the economy.

The recent Base Realignment and Closure Commission threat to the Pearl Harbor Naval Shipyard shows us how dependent we are on Sen. Daniel Inouye's power and influence and how vulnerable Hawai'i would be if he were no longer on duty. It's time to take new local initiatives, while he is still in Washington, to help move Hawai'i toward more self-reliance in fuel and food to lessen our vulnerability.

Hawai'i has the opportunity to turn two of our biggest challenges — fuel and food — into two of our biggest economic successes over the next 20 years.

Mike Fitzgerald is president and CEO of Enterprise Hono-lulu. He is co-founder and chairman of the Hawaii Energy Reliability Committee and a co-founder and member of the Hawaii Alternative Energy Development Council. Adm. Robert Kihune is chairman of the Economic Development Alliance of Hawaii and a member of the Hawaii Alternative Energy Development Council. They wrote this commentary for The Advertiser.

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WHERE YOU CAN LEARN MORE

Here is a list of Web sites that provide specific solutions on increasing energy conservation and efficiency.

- HECO: www.heco.com
- Consortium for Energy Efficiency: www.energystar.gov
- Energy Industries: www.energy-industries.com
- Hawaii State Government: http://www.hawaii.gov/dbedt/ert/
- Institute of Energy and Sustainable Development: www.iesd.dmu.ac.uk

BUSINESS Round table

Lighting Future Holidays

By Mike Fitzgerald
Chair, Hawaii Energy Reliability Advisory Committee

During the holiday season we look forward to an array of beautiful light displays throughout Oahu, which have become a part of our holiday tradition. Beautiful as they may be, they are also a reminder that we need to think about addressing Oahu's long-term energy needs to ensure we always have reliable electricity for many future holiday celebrations.

Our economy is expected to continue growing over the next several years. Will we have enough reliable energy to fuel that growth? More importantly, what can we all do to ensure we have enough power from now through 2009, when HECO is expected to bring its new power plant online? And what will we do beyond 2009 to ensure this is the last new fossil-fuel power plant built on O'ahu?

HECO has repeated over the past several years that the best way to ensure there is enough energy for us all is for all of us to use less of it. Conservation not only helps make certain there is enough to go around, but helps businesses and residents save money.

Most measures are simple and painless, such as turning off the lights if you aren't in the room and switching from standard bulbs to compact fluorescent lights. For businesses, incorporating energy conservation measures — in lighting, heating water and air conditioning, for example — when planning renovations can save a lot of money, year in and year out, down the line. For example, the Ward entertainment center saves about $20,000 per year with its energy saving air conditioning and lights.

However, one of the best ways to conserve our energy use is to look at alternative sources. Hawaii has one of the best solar power programs in the nation, but we can do better. Many more homes should have a solar water heater on their roofs. And homeowners' associations should allow clotheslines in back yards if residents want that option.

Energy Reliability Advisory Committee members: Scott Howard, Pua Alu, Terry Surles, James Maskrey and Mike Fitzgerald.

Developers also need to be aware that how a house sits in relation to the elements can create a much more energy-efficient home by taking advantage of trade winds, solar power and natural shade. Contractors must also use the most energy-efficient materials and make sure that all ducts and connections are tightly sealed. Some builders are making great strides in this area. Gentry Homes' Montecito and Tuscany models in Ewa have each won the EPA's Energy Star award for exceeding energy-efficiency standards in building design. In the process, they have built better, more valuable homes.

Other alternative energy sources, such as wind and photovoltaics, also need to be seriously considered. Although community opposition derailed plans for a Leeward wind farm in the near future, HECO is now beginning discussions with the community and landowners in Kahuku as an alternative location. It will be a learning process for everyone. We will have to learn to accept wind farms in our back yards if we are going to move toward energy self-sufficiency. Leeward Oahu residents can no longer be expected to shoulder all the infrastructure burdens for Oahu's energy needs.

In the long term, Hawaii must become more energy self-reliant. We should all look forward to the day when biofuels grown in Hawaii can power all our electric plants. Our leaders, too, must learn to work together to make this happen. If they do, Hawaii could become a role model for energy self-sufficiency in the 21st century. And our holiday lights will shine brighter than ever.

Next Week: Richard Valezquez, AAA Hawaii

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

HECO C3
GENPP 10-16
YA/G

April 19, 2006

Mr. Mike Fitzgerald, President & CEO
Enterprise Honolulu
737 Bishop Street, Suite 2040
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Fitzgerald:

Thank you very much for your February 28, 2006, letter to the Department of Planning and Permitting expressing support for Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project.

We greatly appreciate the time you took to express your strong support for the proposed project. We share your belief that it is essential if we are to continue providing reliable energy to the people of O'ahu. We are very pleased to know that you are committed to educating the public on this issue through your involvement.

Thank you again for your comments. If you have any questions, please call me at 543-7206 or at Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
COMPTROLLER

KATHERINE H. THOMASON
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

(P)1061.6

FEB 27 2006

Mr. Robert Isler, Project Manager
Hawaiian Electric Co., Inc.
P. O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: Hawaiian Electric Co., Inc.
Campbell Industrial Park Generating Station and Transmission
Addition Project, Ewa District, Island of Oahu
Draft Environmental Assessment
TMK: Varies

Thank you for the opportunity to review the subject project. This project does not impact any of the Department of Accounting and General Services projects or existing facilities, and we have no comments to offer.

If you have any questions, please have your staff call Mr. Allen Yamanoha of the Public Works Division at 586-0488.

Sincerely,

ERNEST Y.W. LAU
Public Works Administrator

AY:mo
c: Mr. Matthew Higashida, COH-DPP
Ms. Genevieve Salmonson, OEQC

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

HECO C3
GENPP 10-16
YA/G

April 3, 2006

Mr. Ernest Y.W. Lau, Public Works Administrator
Department of Accounting & General Services
State of Hawai'i
P.O. Box 119
Honolulu, HI 96810

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Lau:

Thank you for your February 27, 2006, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We are pleased that the project does not impact any of your Department's projects and existing facilities, and we understand that you have no comments to offer. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, SUITE 215, KAPOLEI, HAWAII 96707
TELEPHONE : (808) 692-5054 FAX: (808) 692-5857
Website: www.honolulu.gov

MUFI HANNEMANN
MAYOR

LAVERNE HIGA, P.E.
DIRECTOR AND CHIEF ENGINEER

GEORGE K. MIYAMOTO
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 06-210

March 8, 2006

Mr. Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: **Draft Environmental Impact Statement (DEIS), Hawaiian Electric Company, Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa District, Island of Oahu**

Thank you for the opportunity to provide comments on the DEIS dated January 17, 2006, for the subject proposed HECO additions within Campbell Industrial Park.

We have no comments to add to the document as the proposed additions will not have any adverse affects on our maintenance operations.

Should you have any questions, please call Charles Pignataro of the Division of Road Maintenance, at 484-7697.

Very truly yours,

Laverne Higa, P.E.
for Director and Chief Engineer

LH:sm

cc: Department of Planning and Permitting-(Mr. Matthew Higashida)
Office of Environmental Quality Control-(Ms. Genevieve Salmonson)

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

HECO C3
GENPP 10-16
YA/G

April 3, 2006

Ms. Laverne Higa, P.E., Director & Chief Engineer
Department of Facility Maintenance
City & County of Honolulu
1000 Uluohia Street, Suite 215
Kapolei, Hawai'i 96707

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Higa:

Thank you for your March 8, 2006, letter (your reference DRM 06-210) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We are pleased to hear that the proposed generating and transmission additions will not have any adverse effects on your Department's maintenance operations, and we understand that you have no comments at this time. Should you have any questions in the future, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, SUITE 215, KAPOLEI, HAWAII 96707
TELEPHONE : (808) 692-5054 FAX: (808) 692-5857
Website: www.honolulu.gov

MUFI HANNEMANN
MAYOR

LAVERNE HIGA, P.E.
DIRECTOR AND CHIEF ENGINEER

GEORGE K. MIYAMOTO
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 06-210

March 8, 2006

Mr. Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: **Draft Environmental Impact Statement (DEIS), Hawaiian Electric Company, Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa District, Island of Oahu**

Thank you for the opportunity to provide comments on the DEIS dated January 17, 2006, for the subject proposed HECO additions within Campbell Industrial Park.

We have no comments to add to the document as the proposed additions will not have any adverse affects on our maintenance operations.

Should you have any questions, please call Charles Pignataro of the Division of Road Maintenance, at 484-7697.

Very truly yours,

Laverne Higa, P.E.
for Director and Chief Engineer

LH:sm

cc: Department of Planning and Permitting-(Mr. Matthew Higashida)
Office of Environmental Quality Control-(Ms. Genevieve Salmonson)

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

HECO C3
GENPP 10-16
YA/G

April 3, 2006

Ms. Laverne Higa, P.E., Director & Chief Engineer
Department of Facility Maintenance
City & County of Honolulu
1000 Uluohia Street, Suite 215
Kapolei, Hawai'i 96707

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Higa:

Thank you for your March 8, 2006, letter (your reference DRM 06-210) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We are pleased to hear that the proposed generating and transmission additions will not have any adverse effects on your Department's maintenance operations, and we understand that you have no comments at this time. Should you have any questions in the future, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
850 TICONDEROGA ST STE 110
PEARL HARBOR HI 96860-5101

5750
Ser N45/ 00070
07 MAR 2006

CERTIFIED MAIL NO. 7004 1350 0001 3925 7966

Mr. Robert Isler, Project Manager
Hawaiian Electric Company
P .O. Box 2750
Honolulu HI 96840

Dear Mr. Isler:

Thank you for the opportunity to review and comment the Draft Environmental Impact Statement for Hawaiian Electric's proposed Campbell Industrial Park Generating Station and Transmission Additions Project.

We do not have any comments on this project at this time.

Should you have any questions, please contact Ms. Mika Orimoto at 473-4137, extension 224.

Sincerely,

C. K. YOKOTA
Director
Regional Environmental Department
By direction of
Commander, Navy Region Hawaii

Copy to: Mr. Matthew Higashida, Department of Planning & Permitting, City & County of Honolulu
Ms. Genevieve Salmonson, Office of Environmental Quality Control

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

HECO C3
GENPP 10-16
YA/G

April 3, 2006

C. K. Yokota, Director
Regional Environmental Department
Navy Region Hawaii
850 Ticonderoga Street, Suite 110
Pearl Harbor, Hawai'i 96860-5101

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Director Yokota:

Thank you for your March 7, 2006 letter (your reference 5750 Ser N45/00070) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We understand that you have no comments to offer on the project at this time. Should you have any questions in the future, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

March 23, 2006

Mr. Robert Isler
HECO, Inc.
P.O. Box 2750
Honolulu, Hawai'i, 96840

LOG NO: 2006.0744
DOC NO: 0603CM69
Archaeology

Dear Mr. Isler

SUBJECT: Chapter 6E-8 Historic Preservation Review –
Draft Environmental Impact Statement-HECO, Campbell Industrial Park
Generating Station & Transmission Additions
Hono'uli'uli Ahupua'a, 'Ewa District, Island of O'ahu
TMK: (1) 9-1-various plats & parcels, 9-2-various plats & parcels

Thank you for the opportunity to review the aforementioned project, which we received on February 3, 2006. You provided this office with a brief cover letter and a Draft Environmental Impact Statement (DEIS). The proposed undertaking involves the construction of a new fossil-fueled electrical generating station, a new 138kV overhead transmission line, and associated improvements in and around Campbell Industrial Park.

As summarized in the DEIS, the proposed undertaking has been evaluated for its potential for adverse effects on archaeological, historic, and cultural resources. An archaeological assessment of the project area was conducted by International Archaeological Research Institute (IARII), Inc. (Carson 2005), including a field inspection. This study did not reveal any surface archaeological material, and documented little or no soil deposit within which historically-significant subsurface deposits might exist. Commercial sugarcane operations have disturbed nearly the entire project area.

In general, the project area is dominated by exposed coral; and, the probability of encountering subsurface sites, including burials, is relatively low. However, one portion of the project area, near Kahe Point, has a higher probability of preserving subsurface sites where sand and/or alluvial layers occur under fill deposits. One subsurface burial has previously been documented in this general area, although not within the proposed project area. In order to mitigate against adverse effects to historically-significant resources that may be present in this area, the DEIS calls for the implementation of an archaeological monitoring program, in accordance with Hawaii Administrative Rules (HAR) Chapter 13-279.

Two individuals with specific knowledge of the project area (Mr. Shad Kane and Ms. Nettie Tiffany) were also interviewed in order to assess possible adverse cultural effects associated with the proposed undertaking. Based on these interviews, and on other oral-historical sources, the DEIS concludes that the proposed undertaking will have minimal or no impact on Hawaiian culture, its practices and/or traditions.

We concur with the findings of the archaeological assessment by IARII, and with the mitigation recommendations. We look forward to reviewing an archaeological monitoring plan, and continuing to consult on this project.

Please call Dr. Chris Monahan at 808-692-8015 if you have any questions regarding this letter.

Aloha,

Melanie Chihen, Administrator
State Historic Preservation Division

CM

Cc: Mr. Matthew Higashida, Department of Planning and Permitting, City & County of Honolulu
Ms. Genevieve Salmonson, Office of Environmental Quality Control

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

HECO C3
GENPP 10-16
YA/G

May 4, 2006

Ms. Melanie Chinen, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawai'i
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96707

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Chinen:

Thank you for your March 23, 2006 letter (your reference LOG NO: 2006.0744, DOC NO: 0603CM69) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments.

We are very pleased to hear that your Department concurs with the findings of the archaeological assessment by IARII, and with the mitigation recommendations for the project. We likewise look forward to submitting an archaeological monitoring plan for your review and continuing to consult with you on this project.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR OF HAWAII

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
E-mail: oeqc@health.state.hi.us

March 24, 2006

Mr. Robert Isler
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawai'i 96840

Mr. Perry White
Planning Solutions, Inc.
210 Ward Avenue, Suite 330
Honolulu, Hawai'i 96814

Mr. Henry Eng
Director of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, Hawai'i 96813

Dear Messrs. Isler, White and Eng:

The Office of Environmental Quality Control has reviewed the draft environmental impact statement (DEIS) for the Campbell Industrial Park Generating Station and Transmission Additions and submits the following comment for your consideration and response.

1. **Adoption of Special Maintenance Procedures for *Myoporum sandwicense* var. *stellatum***

In the final environmental impact statement, please discuss what special maintenance procedures (see page 4-62, DEIS) will be undertaken to preserve and protect the rare endemic naio (*Myoporum sandwicense* var. *stellatum*) population identified on page 3-13 of the DEIS.

If there are any questions, or if you would like to discuss this matter further, please call Mr. Leslie Segundo, Environmental Health Specialist, at (808) 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

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

HECO C3
GENPP 10-16
YA/G

April 3, 2006

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
Department of Health
State of Hawai'i
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Salmonson:

Thank you for your March 24, 2006 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments. Your comment is reproduced below, followed by our response.

Comment 1:

In the final environmental impact statement, please discuss what special maintenance procedures (see page 4-62, DEIS) will be undertaken to preserve and protect the rare endemic naio (Myoporum sandwicense var. stellatum) population identified on page 3-13 of the DEIS.

Response: The *FEIS* will contain the following description of the special maintenance procedures that HECO will undertake to preserve and protect the rare endemic *naio* (*Myoporum sandwicense var. stellatum*) present within the 44-foot right-of-way:

Construction of the proposed project does not have the potential to affect the area where the naio plants are located directly. However, regular maintenance activities within HECO's Barbers Point Tank Farm Site include regular spraying with herbicides to suppress the fire hazard posed by too much dry vegetation. In order to avoid harming the existing naio plants while still performing needed vegetation maintenance, HECO will limit its herbicide spraying to the northern third (15 feet) of the 44-foot right-of-way in this area.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

facsimile transmittal

To:	Mr. Robert Isler	**Fax:**	203-1650
From:	Cynthia Rezentes	**Date:**	03/28/06
Re:	DEIS for HECO Power Plant	**Pages:**	2 including cover sheet
CC:	Ms. Genevieve Salmonson, Mr. Perry White, Mr. Matthew Higashida		

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

Notes: Please find attached testimony from the Wai`anae Coast Neighborhood Board No. 24 in support of the DEIS HECO Campbell Industrial Park Generating Station and Transmission Additions Project

WAIANAE COAST NEIGHBORHOOD BOARD NO. 24

c/o NEIGHBORHOOD COMMISSION • 530 SOUTH KING STREET, ROOM 400 • HONOLULU, HAWAII 96813
PHONE: (808) 527-5749 • FAX: (808) 527-5760 • INTERNET: www.honolulu.gov

March 22, 2006

Mr. Robert Isler
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, HI 96840

Subject: **Draft Environmental Impact Statement: Hawaiian Electric Compnay, Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, `Ewa District, Island of O`ahu**

Dear Mr. Isler:

At the regularly scheduled March 7, 2006 Wai`anae Coast Neighborhood Board No. 24 meeting, the above referenced item was presented by yourself and Ms. Lori Hoo. After hearing about the project and discussing the benefits and whether there were any concerns about the project parameters, the board heard a motion to support the project as presented in the Draft Environmental Impact Statement. The motion passed by a vote of 9-0-9 (Ayes-Nays-Abstentions).

The one concern rasied was whether or nto HECO would engage cultural monitors during the ground construction of the poles placement when running the 138 KV lines to interface with the CEIP Substation and also during the construction of the RO water line that is intended to run to Kahe Power Plant to replace the need for utilizing potable water. While there is no legal requirement for having cultural monitors during a construction project, the community's experience with other construction projects when cultural monitors were engaged has been positive.

We wish you best wishes in proceeding forward with your project.

Sincerely,

Cynthia K. L. Rezentes, Chair
Wai`anae Coast Neighborhood Board No. 24

cc: Mr. Matthew Higashida, DPP
Ms. Genevieve Salmonson, Office of Environmetal quality Control
Mr. Perry White, Planning Solutions, Inc.
Neighborhood Commission Office
Councilmember Todd Apo
Senator Colleen Hanabusa
Representative Michael P. Kahikina
Representative Maile Shimabukuro

wcnb24ch060322

Oahu's Neighborhood Board System – Established 4973

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HECO C3
GENPP 10-16
YA/G

April 3, 2006

Ms. Cynthia Rezentes, Chair
Wai'anae Coast Neighborhood Board No. 24
c/o Neighborhood Commission
530 South King Street, Room 400
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Rezentes:

Thank you for your March 22, 2006 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you spent reviewing the *Draft Environmental Impact Statement* and preparing your letter summarizing the March 7, 2006 Wai'anae Coast Neighborhood Board meeting.

In accordance with the one concern raised at the meeting regarding archaeological monitoring during construction, we are preparing an archaeological monitoring plan that will be in place during the construction of the RO waterline to Kahe Generating Station. The Plan will provide for the kind of oversight you suggested.

Because installation of the proposed overhead transmission lines does not involve trenching or significant ground disturbance that could uncover remains, on-site archaeological monitoring is not planned for that portion of the project. Instead, the monitoring plan will provide for on-call monitoring of that area.

For your information, SHPD has expressed their agreement with the archaeological mitigation measures outlined in the Draft EIS, and their comments will be reproduced in the *Final EIS*. As it would provide an additional level of oversight, I am sure they will be pleased by the additional monitoring that you requested and that HECO has agreed to provide.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

March 15, 2006

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

SUBJECT: Draft Environmental Impact Statement (DEIS) for Campbell Industrial Park Generating State and Transmission Additions, Ewa District, Oahu

The Department of Education (DOE) has reviewed the Draft Environmental Impact Statement for a new electrical generating station, new transmission lines, and improvement to substations in Campbell Industrial Park. The DOE previously raised questions about the distance from the station to Barbers Point Elementary School and the proposed middle school in the West Kapolei project. We also asked about the location of the monitoring stations closest to the school. These questions were answered in the DEIS to our satisfaction. The DOE has no other comment or concerns at this time.

Thank you for the opportunity to comment. Should you have any questions, please call Heidi Meeker of the Facilities Development Branch at 733-4862.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:jmb

c: Randolph Moore, Acting Assistant Superintendent, OBS
Duane Kashiwai, FDB
Mamo Carreira, CAS, Campbell/Kapolei/Waianae Complex Areas

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

HECO C3
GENPP 10-16
YA/G

April 3, 2006

Ms. Patricia Hamamoto, Superintendent
Department of Education
State of Hawai'i
P.O. Box 2360
Honolulu, Hawai'i 96804

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Ms. Hamamoto:

Thank you for your March 15, 2006 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and preparing your letter.

We are pleased that the questions your Department raised regarding the *EISPN* for the project were addressed to your satisfaction in the *DEIS,* and we understand that you have no other comments or concerns at this time. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR

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

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.2089

March 22, 2006

Mr. Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

Subject: Draft Environmental Impact Statement (DEIS)
HECO Campbell Industrial Park Generating Station and
Transmission Addition Project

We have the following comments on the Draft EIS for the subject project:

1. We acknowledge the response you provided in your letter dated October 24, 2005, for the environmental preparation notice regarding our Kalaeloa (Barber's Point) Harbor, to coordinate HECO's work with our Harbors Division. We look forward to your cooperation.

2. Your October 24, 2005 letter also mentions that your project intends to build a tall structure. If you are referring to the proposed combustion turbine stack (210 feet high), the stack will penetrate the horizontal approach surface for Kalaeloa Airport. We understand that HECO will be submitting a construction plan review to the FAA for this structure. When you receive the determination from the FAA, please provide a copy to our Airports Division.

3. Campbell Estate plans to extend Hanua Street to the H-1 Freeway and construct a new road from Kalaeloa (Barber's Point) Harbor across the extension of Hanua Street to Kalaeloa Boulevard. The approximate alignment for the proposed roads is shown on the attached map.

   Our Highways Division is working with Campbell Estate on the extension and new harbor road. We have requested that the mauka portion of the Hanua Street extension to the freeway and the western part of the harbor road, from the harbor to its intersection with the Hanua Street extension, be dedicated through our Department to establish a continuous route under State jurisdiction from the harbor to the freeway.

   HECO's coordination of the overhead utility and transmission line crossings over the new harbor road will be needed with Campbell Estate, and our Harbors and Highway Divisions.

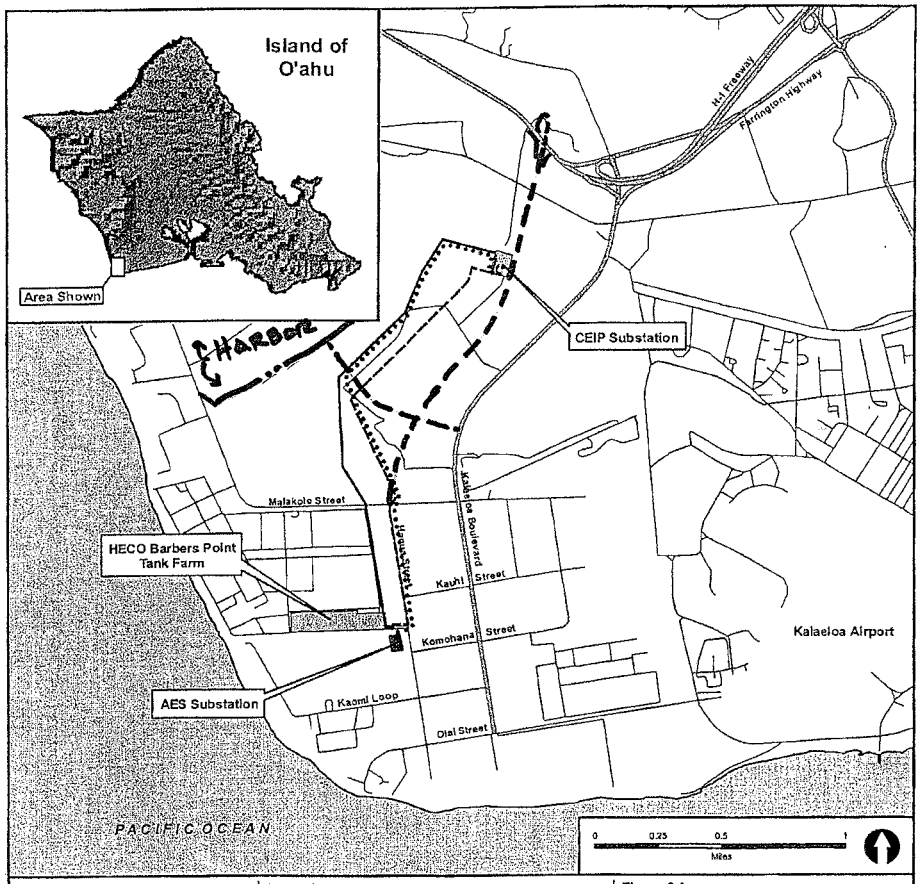
We appreciate the opportunity to provide our comments.

Very truly yours,

RODNEY K. HARAGA
Director of Transportation

Attachment

c: Matthew Higashida, C & C Department of Planning and Permitting
Genevieve Salmonson, Office of Environmental Quality Control



Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

–Hawaiian Electric Co., Inc.
--City & County of Honolulu GIS
--State of Hawaii GIS

Legend:

- AES CEIP #1
- AES CEIP #2
- AES CEIP #2 Underground Alternative
- Highways
- Roadways

Figure 2.1:

Location Map

CIP Generating Station & Transmission Additions Project

Figure 2-1 Location Map 2005-11-02.mxd

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

HECO C3
GENPP 10-16
YA/G

April 3, 2006

Mr. Rodney K. Haraga, Director
Department of Transportation
State of Hawai'i
869 Punchbowl Street
Honolulu, Hawai'i 96813-5097

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Haraga:

Thank you for your March 22, 2006 letter (your reference STP 8.2089) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments. 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.

Comment 1:

We acknowledge the response you provided in your letter dated October 24, 2005, for the environmental preparation notice regarding our Kalaeloa (Barber's Point) Harbor, to coordinate HECO's work with our Harbors Division. We look forward to your cooperation.

Response: Thank you for following up on this. As stated in our October 24, 2005 response to your comments on the *EISPN* for the project, HECO will notify your Harbors Division staff well in advance of any anticipated deliveries of construction materials to the Harbor.

Comment 2:

Your October 24, 2005 letter also mentions that your project intends to build a tall structure. If you are referring to the proposed combustion turbine stack (210 feet high), the stack will penetrate the horizontal approach surface for Kalaeloa Airport. We understand that HECO will be submitting a construction plan review to the FAA for this structure. When you receive the determination from the FAA, please provide a copy to our Airports Division.

Response: We will provide a copy of FAA's determination to your Department's Airports Division when it is available.

Comment 3:

Campbell Estate plans to extend Hanua Street to the H-1 Freeway and construct a new road from Kalaeloa (Barber's Point) Harbor across the extension of Hanua Street to Kalaeloa Boulevard. The approximate alignment for the proposed roads is shown on the attached map.

Our Highways Division is working with Campbell Estate on the extension and new harbor road. We have requested that the mauka portion of the Hanua Street extension to the freeway and the western part of the harbor road, from the harbor to its intersection with the Hanua Street extension, be dedicated through our Department to establish a continuous route under State jurisdiction from the harbor to the freeway.

HECO's coordination of the overhead utility and transmission line crossings over the new harbor road will be needed with Campbell Estate, and our Harbors and Highway Divisions.

Response: Thank you for informing us of the plans to extend Hanua Street and construct a new roadway to the Harbor. We will coordinate the transmission line crossings with your Harbors and Highway Divisions and with Campbell Estate.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD06/1988

March 22, 2006

Robert Isler
Hawaiian Electric Company, Inc.
PO Box 2750
Honolulu, HI 96840

RE: Draft Environmental Impact Statement for the Proposed Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Numerous TMKs.

Dear Mr. Isler,

The Office of Hawaiian Affairs (OHA) is in receipt of your February 2, 2006 request for comment on the above listed proposed project. After reviewing the Draft Environmental Impact Statement (DEIS), OHA offers the following three recommendations:

1) As found on page 4-72 of the DEIS, in the section entitled 'Contracting for Archaeological Monitoring of Construction', the applicant intends to draft and Archaeological Monitoring Plan in support of the proposed project. Our staff concurres with the plans to have an on-site monitor for excavations in the vicinity of Kahe Point; however, we feel that on-call monitoring may not be appropriate for the remainder of the project area's excavations. Our staff recommends that the remainder of the earth-altering activities be observed, to some extent, by an archaeological monitor. This can be accomplished by stipulating in the Archaeological Monitoring Plan that the remainder of the project area will be 'spot-checked' periodically by a professional archaeologist in addition to the on-call requirement.

2) As is recommended by both Shad Kane and Nettie Tiffany on page 4-74, OHA recommends that the 'overhead' alternative for transmission lines be implemented. This recommendation appears to be appropriate as it will lessen any potential impacts to subsurface cultural deposits, which would be anticipated if the 'underground option' were to be employed.

3) As they appears on pages 2-25, 2-26 and tables 4.1 and 4.2, OHA feels that Alternatives 2 & 3 are culturally and environmentally preferable to the Alternative 1.

This recommendation is based on the expected increase in both Benzene and Arsenic emissions that would result from implementing Alternative 1.

OHA asks that, in accordance with Section 6E-46.6, Hawaii Revised Statutes and Chapter 13-300, Hawaii Administrative Rules, if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the State Historic Preservation Division (SHPD/DLNR) shall be contacted.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck, Native Rights Policy Advocate, at (808) 594-0239 or jessey@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

CC: Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Matthew Higashida
Department of Planning & Permitting
City and County of Honolulu
650 South King Street
Honolulu, HI96813

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

HECO C3
GENPP 10-16
YA/G

April 3, 2006

Mr. Clyde W. Nāmuʻo, Administrator
Office of Hawaiian Affairs
State of Hawaiʻi
711 Kapiʻolani Boulevard, Suite 500
Honolulu, Hawaiʻi 96813

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, ʻEwa, Oʻahu, Hawaiʻi

Dear Mr. Nāmuʻo:

Thank you for your March 22, 2006 letter (your reference HRD06/1988) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments.

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.

Comment 1:

As found on page 4-72 of the DEIS, in the section entitled 'Contracting for Archaeological Monitoring of Construction', the applicant intends to draft an Archaeological Monitoring Plan in support of the proposed project. Our staff concurs with the plans to have an on-site monitor for excavations in the vicinity of Kahe Point; however, we feel that on-call monitoring may not be appropriate for the remainder of the project area's excavations. Our staff recommends that the remainder of the earth-altering activities be observed, to some extent, by an archaeological monitor. This can be accomplished by stipulating in the Archaeological Monitoring Plan that the remainder of the project area will be 'spot-checked' periodically by a professional archaeologist in addition to the on-call requirement.

Response: Thank you for providing input on this matter. In response to your request, we will ensure that the archaeological monitoring plan provides for occasional "spot-checking" by a professional archaeologist during construction.

Comment 2:

As is recommended by both Shad Kane and Nettie Tiffany on page 4-74, OHA recommends that the 'overhead' alternative for transmission lines be implemented. This recommendation appears to be appropriate as it will lessen any potential impacts to subsurface cultural deposits, which would be anticipated if the 'underground option' were to be employed.

Response: Thank you for your recommendation on the transmission line alternatives. HECO also prefers the overhead alternative, but the PUC will be the ultimate arbiter of this design issue.

Comment 3:

As they appears on pages 2-25, 2-26 and tables 4.1 and 4.2, OHA feels that Alternatives 2 & 3 are culturally and environmentally preferable to the Alternative I. This recommendation is based on the expected increase in both Benzene and Arsenic emissions that would result from implementing Alternative 1.

Response: Thank you for expressing your preference regarding the Action Alternatives.

Comment 4:

OHA asks that, in accordance with Section 6E-46.6, Hawaii Revised Statutes and Chapter 13-300, Hawaiʻi Administrative Rules, if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the State Historic Preservation Division (SHPD/DLNR) shall be contacted.

Response: We will comply with all the provisions of HRS 6E-46.6 and HAR 13-300 during construction.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

Kapolei Property
Development LLC
an affiliate of the Estate of James Campbell

KapoleiHawaii

1001 Kamokila Boulevard, Suite 250 / Kapolei, Hawaii 96707 Tel 808.674.3541 / Fax 808.674.3111 www.kapolei.com

March 27, 2006

Mr. Robert Isler, Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, HI 96840

Subject: Campbell Industrial Park Generating Station and Transmission Additions Draft Environmental Impact Statement

Dear Mr. Isler:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (EIS) for the Campbell Industrial Park Generating Station and Transmission Additions project dated January 17, 2006.

Kapolei Property Development LLC. (KPD), a subsidiary of the Estate of James Campbell, is the primary landowner and manager for lands between Malakole Street and the existing Campbell Industrial Park Substation. As noted in the Draft EIS, easements across these lands will need to be acquired for the additional two-mile long 138 kV overhead transmission circuit linking the expanded AES Substation with the existing Campbell Industrial Park Substation. As these lands are planned for development, we anticipate the need for HECO to provide additional information and coordinate with KPD on the following issues:

1. Alignment of transmission line easements with future improvements for KPD lands: We anticipate that the overhead transmission lines will need to be aligned with a proposed regional drainage channel, future major roadways, and the existing coal conveyor belt crossing the site. The roadways include the future alignment of Hanua Street which deviates from the road's present alignment north of Malakole Street. The transmission line alignments represented in the Draft EIS do not reflect the future Hanua Street alignment.

   Easements to cross Malakole Street, owned by the Estate of James Campbell, will also need to be coordinated with KPD.

2. Impacts of 138 kV overhead transmission lines to land uses proposed for KPD/Aina Nui Corporation lands: KPD lands in this area are proposed for business/industrial uses. Section 4.12.1, Land Use Impacts, does not describe impacts to potential uses other than mentioning that the proposed lines are similar to existing transmission lines that have not limited build-out within the

surrounding commercial and industrial area. Please describe any anticipated specific impacts to business/industrial development beneath or in proximity to the lines.

Section 4.9.4 of the Draft EIS does not address potential visual impacts of the transmission lines to the future residential development of Kapolei West proposed by Aina Nui Corporation, an affiliate of the Estate of James Campbell, though such impacts are anticipated in Section 4.12.1.

We appreciate the opportunity to provide our comments and look forward to coordinating with you on the project.

Sincerely,

Steve Kelly, AICP
Manager, Entitlements & Infrastructure
Kapolei Property Development LLC

cc: Planning Solutions, Inc.
210 Ward Avenue, Suite 230
Honolulu, HI 96814
ATTN: Perry White

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

HECO C3
GENPP 10-16
YA/G

May 23, 2006

Mr. Steve Kelly, AICP
Manager, Entitlements & Infrastructure
Kapolei Property Development LLC
1001 Kamokila Boulevard, Suite 250
Kapolei, Hawai'i 96707

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Kelly:

Thank you for your March 27, 2006, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you spent reviewing the *Draft Environmental Impact Statement (DEIS)* and providing written comments. We also appreciate the time that you spent discussing your concerns with us when we met on May 1, 2006.

Item-by-item responses to your comments are provided below. To the extent possible, they reflect the additional information that we exchanged at our meeting. To simplify your examination, we have reproduced the text of your comments in *italics* before each response.

Comment 1:

Alignment of transmission line easements with future improvements for KPD lands: We anticipate that the overhead transmission lines will need to be aligned with a proposed regional drainage channel, future major roadways, and the existing coal conveyor belt crossing the site. The roadways include the future alignment of Hanua Street which deviates from the road's present alignment north of Malakole Street. The transmission line alignments represented in the Draft EIS do not reflect the future Hanua Street alignment.

Easements to cross Malakole Street, owned by the Estate of James Campbell, will also need to be coordinated with KPD.

Response: As we discussed at our May 1, 2006 meeting, HECO will continue to work with KPD to ensure the new transmission line routing is compatible with the proposed drainage channel, future major roadways, and the existing coal conveyor belt crossing the site. We appreciate KPD's acknowledgement in the *EISPN* for Kapolei Harborside Center that *"The*

plan for future uses of this property will integrate the various ongoing needs of HECO, as addressed in the Draft EIS."

Comment 2:

Impacts of 138 kV overhead transmission lines to land uses proposed for KPD/Aina Nui Corporation lands: KPD lands in this area are proposed for business/industrial uses. Section 4.12.1, Land Use Impacts, does not describe impacts to potential uses other than mentioning that the proposed lines are similar to existing transmission lines that have not limited build-out within the surrounding commercial and industrial area. Please describe any anticipated specific impacts to business/industrial development beneath or in proximity to the lines.

Section 4.9.4 of the Draft EIS does not address potential visual impacts of the transmission lines to the future residential development of Kapolei West proposed by Aina Nui Corporation, an affiliate of the Estate of James Campbell, though such impacts are anticipated in Section 4.12.1.

Response: I would like to respond to each of the points made in this comment.

- First, based on the discussions that we had in early 2005 and more recently, it is our understanding that no businesses within KPD or Aina Nui Corporation lands are expected to be located immediately beneath the proposed transmission lines. This is because the lines will be aligned along the proposed drainage channel and/or planned roadways. Consequently, they are consistent with the planned land use pattern, and there is no evidence that locating the lines as shown will impair either the ability to develop or market the proposed development.
- Second, as discussed in Sections 4.13, 4.7, 4.3, and 4.10 of the *DEIS*, operation of the proposed new transmission line will not generate EMF levels sufficient to affect human health, will not produce significant noise or air emissions, and will generate little traffic.
- Third, the lines would be constructed before the adjacent properties are developed for commercial use, eliminating the possibility that construction activities might adversely affect businesses. In short, we do not believe there is any mechanism through which the proposed overhead transmission lines could have a significant adverse effect on businesses in the Kapolei Business Park.

You are correct that Section 4.9.4 does not specifically mention visual impacts of the proposed transmission lines on the Kapolei West Development. However, the topic is covered elsewhere. Section 4.9.2.1.3 of the *DEIS* addresses this topic as follows (underlining added):

The proposed transmission line alignment is through an existing heavy industrial facility (the Chevron Refinery), across Malakole Road (which serves commercial traffic moving to and from Kalaeloa Harbor and is already crossed by the AES coal conveyor and the existing 138 kV transmission line), and through a large extent of vacant land that is planned for eventual commercial and industrial development.

> *Just before reaching the CEIP Substation, a few hundred feet of the route passes the eastern end of the golf course that is proposed as part of the Kapolei West Expansion Project. With the possible exception of the golf course crossing, none of these uses are particularly sensitive to the visual and aesthetic effects that would result from an additional transmission line passing nearby.*

After considering your written comment and the concerns expressed at our meeting with you, we have revised the discussion of visual impacts in Section 4.9 of the *FEIS* to note the potential effect that overhead transmission lines would have on the golf course and other visually sensitive areas within the proposed development.

I would also like to reiterate the concept we discussed at our meetings to work with you to place lines underground in locations where you believe that the additional cost to KPD warrants it.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

LINDA LINGLE
GOVERNOR
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March 28, 2006

Mr. Robert Isler
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Isler:

Subject: Draft Environmental Impact Statement: Hawaiian Electric Company, Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa District, Island of Oahu.

Thank you for your letter dated February 2, 2006, requesting our comments on the Draft Environmental Impact Statement (DEIS): Hawaiian Electric Company, Inc. (HECO) Campbell Industrial Park Generating Station and Transmission Additions Project, Ewa District, Island of Oahu. HECO's proposed project includes the construction of a new oil-fired 110 MW simple-cycle combustion turbine (CT) electrical generating unit with an operational date of no later than July 1, 2009, a second oil-fired 110 MW CT generating unit with an operational date of 2022, an additional 138kV overhead transmission line between the AES and CEIP substations, and associated improvements to two existing substations in the Campbell Industrial Park (CIP) area.

The Department of Business, Economic Development, and Tourism (DBEDT) reviewed the subject DEIS in accordance with §11-200-10, and §11-200-17, and Chapter 226-18, HRS, and the following are DBEDT's comments:

1. The DEIS should provide additional support and justification of the need for additional generation to meet the growth in system peak load. While the DEIS includes a general discussion of the problem in Section 1.2, examples are from 2003, and should be brought up to date. In addition, it is especially surprising that no current peak forecast is provided. An update to the 2004 forecast is needed to reflect implementing DSM programs in the HECO Integrated Resource Plan (IRP-3), revised expectations of CHP deployment, effects of rate design options for load management, new information about the plans of major customers, and any reduction in demand that may have occurred due to the increase in the price of electricity caused by the jump in fuel prices in 2005.

Based upon the forecast, the DEIS should also provide an estimate of annual operating hours for each year of the IRP and annual fuel requirements based upon the operating hours. This information is needed to assess variable costs and to more accurately estimate pollution and other consequences of operation.

2. Section 1.3 of the DEIS discusses the selection of the CT based upon a summary of HECO's Integrated Resource Planning (IRP) Process. HECO's presumptive conclusion that the CT was always to be a component of any IRP plan does not constitute support or justification for the proposed CT as the most cost-effective or preferred option to meet Oahu's future electricity needs. In addition, the discussion of the IRP finalist plans in Section 1.3.2.7 does not make it clear that a CT in 2009 was a basic assumption in all of the plans HECO presented. The CT is not mentioned in the narrative on plans 2 and 3, but should be included as it was part of these plans. Perhaps most important in presenting the project in the context of the IRP is that the Public Utilities Commission (PUC) must approve HECO's IRP, but the PUC has yet to give its approval.

3. The DEIS should provide a clear explanation as to the sizing of the CT units proposed. The proposed two new 110 MW CT units are not among the list of supply-side resources selected in HECO's IRP-3 as listed In Table 1.6 of the DEIS. HECO's integration model that identified the "Finalist Plan" was based on the unit information for 76 MW units as a proxy for a 100 MW CT which HECO's integration model identified as "the preferred generation unit type for installation in 2009 in order to best meet the forecasted electricity demand." The DEIS does not provide any information on how this "preferred generating unit type" (100 MW CT) was determined or the assumptions used. The DEIS also does not discuss whether the proposed 110 MW unit, which is about 45% larger in capacity than the 76 MW unit used in the analysis, would affect the results of HECO's integration model.

   HECO's response to the letter from Mr. Matthew Riel, President of AES Hawaii Inc., that was included in the DEIS, indicates that HECO's analysis shows that "there may be reserve capacity shortfalls ranging between 50 MW to 70 MW from 2005 until the next unit can be added in 2009". The proposed new oil-fired 110 MW CT unit planned for 2009 is more than double the lower range of HECO's estimated reserve capacity shortfall. HECO should include a table and narrative comparing the CTs it considered. The table should compare, among other things, capacity, heat rate in the peaking mode, cost to install, life cycle O&M, and life cycle fuel costs.

4. Table 1.6, mentioned above, provides the list of supply-side resources that were evaluated in HECO's IRP-3. The DEIS should include the complete list of supply resources that were evaluated and from which the supply resources listed in Table 1.6 were selected.

5. The DEIS does not provide justification for the second 110 MW CT generating unit included in HECO's proposed project. Neither IRP-3 nor the DEIS provides the basis for selecting an oil-fired generating unit as the preferred unit to install in 2022.

6. The DEIS does not comply with the requirements of §11-200-10 that the environmental assessment include among other things, a general description of the economic impacts of the proposed project. Table 2.2 provides the preliminary estimate of the construction cost of the first 110 MW CT, the new 138 kV transmission line, and the community benefit capital cost at $140M ($230M with the 2nd CT). This cost will be recovered from HECO's ratepayers, and the DEIS should to provide an assessment and description of the rate impact of such costs to Oahu's consumers.

   Additionally, the DEIS should provide an assessment and description of the rate impact of fuel costs, to include alcohol fuels as announced by HECO on March 21, 2006, as the primary fuel desired for the new unit, plus naphtha and diesel in the event alcohol fuels are not available. The rate impact of the proposed project on the ratepayers, will inevitably impact Oahu's economy. The DEIS should provide an assessment and description of the proposed project's economic impact resulting from the rate impact on ratepayers from both capital and operating costs (to include fuel) pursuant to §11-200-17(B.2) which requires that the draft EIS shall include a discussion of the beneficial and adverse impacts including the cumulative and secondary impacts. Therefore, to meet these standards, DBEDT believes that any such economic impact analysis must consider up-to-date fuel price forecasts, as well as include sensitivity analyses to assess the impact of severe, sudden oil price spikes that are reasonable assumptions given the expected operational life of the proposed project.

7. The DEIS does not comply with §11-200-17(F), which requires that the draft EIS shall include "alternatives which could attain the objectives of the action, regardless of cost, in sufficient detail to explain why they were rejected." The four 'Alternatives' to the proposed project included in the DEIS do not represent alternative options that would achieve the objective of the proposed project which is to meet the existing and forecasted system peak load, and address the projected reserve capacity shortfall which HECO anticipates to continue until 2009. The

   alternatives required under §11-200-17(F) are intended to include alternative energy resources, regardless of cost, both demand-side and supply-side resources, that would meet the requirements of the existing and future growth in energy load.

   a. All involve scaling down or eliminating components of the proposed project. For example, Alternative 2 is the same as the proposed project with elimination of the CT unit planned for 2022. Similarly, Alternative 4 only includes the proposed additional 138 kV transmission line. Clearly, if the proposed project is needed to meet the needs of the growth in system peak load, Alternative 4 is not a reasonable alternative to the proposed project, because it cannot produce or offset the need to produce electricity, which HECO has claimed is required.

   b. The DEIS has not shown whether obvious alternative energy supply resources, regardless of cost as required by §11-200-17(F), were considered and rejected by HECO. These include expanding the H-POWER capacity by 16 MW, increasing the amount of power to be delivered by AES Hawaii from the current contract amount of 180 MW to the plant's capacity of 189 MW to meet the growth in the system peak load.

   c. The DEIS has not shown what alternative demand-side options (in addition to its regular technology-based demand-side management programs), such as rate design options that would encourage load shifting (i.e., various forms of Time-of-Use Rates such as Critical Peak Demand Rate, Demand Response, Real Time Pricing) were considered for application of additional resources to increase their peak demand savings and to mitigate the need for a new central generating plant.

   d. The DEIS should report total CT project costs, including capital costs, O&M, and all variable costs, such as taxes, interest and fuel. Variable costs should be estimated based upon forecast operating hours. These costs could be compared then to the costs of other plausible alternatives.

8. Page 2-9, Table 2.1. Selected Characteristics of the Siemens WD501D5A. Recommend the table be expanded to allow comparison of characteristics of other CT options. The table should also provide the number of days of supply represented by the fuel storage in gallons value provided on the table. The number of days of supply should be based upon forecast operating hours.

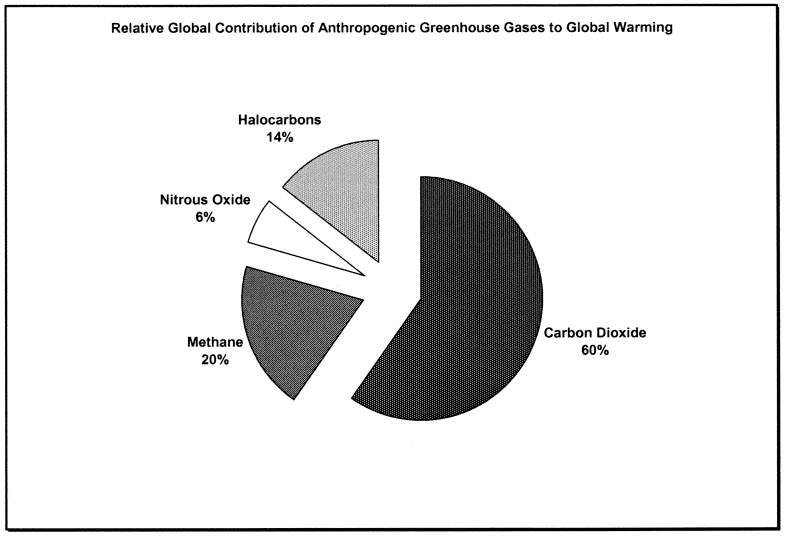
9. Page 2-23, Anticipated Costs. Based upon the discussion, it appears that Table 2.2, on the following page, should be labeled "Estimated Capital Costs" instead of "Estimated Construction Costs". If the values in Table 2.2 are not full capital costs, they should be corrected and components of capital costs should also be enumerated in the text.

10. Page 3-5, Figure 3.3 depicts the Annual Wind Rose for Campbell Industrial Park in support of the discussion of Wind Patterns in Section 3.3.1.3 on the next page. The figure would more clearly show the potential effects of the wind pattern on dispersal of the plant's pollution if the surrounding terrain were also shown. The downwind flow patterns should also be shown to give the reader a better idea of how neighboring businesses and residential areas might be affected.

11. Page 3-9, Section 3.3.5.2. Global Warming. The discussion is misleading and inadequate as an explanation of global warming. The supporting Table 3.4 is out-of-date and from an obscure source which did not document the data sufficiently.

    We suggest that HECO review *Climate Change 2001: The Scientific Basis, Summary for Policymakers, A Report of Working Group 1 of the Intergovernmental Panel on Climate Change* (http://www.ipcc.ch/pub/spm22-01.pdf). For example, the IPCC report opens with "an increasing body of observations gives a collective picture of a warming world and other changes in the climate system" (p.2). The report then discusses a number of observations of increasing temperature, sea level rise and increased ocean heat content, and other observations of changes in climate and some which have not changed. On page 5, the IPCC report states that, "emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate." It then goes on to explain the concept of radiative forcing that warms the surface of the planet (commonly called global warming).

    We are providing a suggested replacement table below. It is based upon Table 6.11 from *Climate Change 2001: Working Group 1: The Scientific Basis*, the latest report of the Intergovernmental Panel on Climate Change. The table presents the numerical values of global and annual mean radiative forcings due to greenhouse gases from pre-industrial (1750) time to the present (2000). The chart referenced by HECO's source appears to have used an earlier report, which based its estimate upon a different timeframe.
    (See http://www.grida.no/climate/ippcc_tar/wg1/251.htm)



It should be noted that carbon dioxide emissions from energy uses are characterized as the main source of global warming. Furthermore, 90% of Hawaii's emissions were from carbon dioxide, 9% from methane, and 1% from nitrous oxide in 1990, the base year inventory of Hawaii's greenhouse gases. While there may have been some halocarbon emissions, they were likely minimal. About 89% of Hawaii's emissions came from the energy sector, with electricity use, accounting for 41% of total greenhouse gas emissions as counted under the approach used by the U.S. Environmental Protection Agency. This excluded international aircraft and marine fuel use, and military fuels. (*Hawaii Climate Change Action Plan*. Honolulu: Department of Business, Economic Development, and Tourism, 1998.)

12. Page 4-8, Table 4.1. Worst Case Emissions from Preferred Alternatives and Page 4-9, Table 4.2. Worst Case Emissions from Preferred Alternatives. The annual values in these two tables appear to be based upon 8760 hours of operation - constant operation. This does not seem likely since this unit is slated to be a peaking unit and some maintenance will be required annually. It would be more realistic to base this estimate on a forecast of operating hours. In addition, given

HECO's announcement of its intention to use ethanol in this unit, the worst-case emissions should also be calculated for ethanol and a nominal ethanol/naphtha blend, which HECO is also considering.

13. Page 4-30 and page 4-36 each contain a Table 4.18 with different information. This is apparently a typographical error.

14. Page 4-40, Section 4. 3.11 Global Warming. This discussion is based upon the Second Assessment Report, produced in 1995. Newer, more complete and more accurate information is available in the Third Assessment Report, produced in 2001. The current conclusion of the intergovernmental panel on climate change is that, "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities (*Summary for Policymakers*, attached, page 10)." This is a much stronger statement made in the Second Assessment Report, which is cited in the DEIS, "the balance of evidence suggests a discernible human influence on global climate."

15. We recommend that HECO prepare a new discussion of global warming and climate change based on the attached *Summary for Policymakers*. In addition, annual and life cycle greenhouse gas emissions should be calculated for the various fuels that may be used in the CT, including ethanol which HECO has announced as the preferred fuel and a nominal ethanol/naphtha blended fuel also under consideration.

Thank you for the opportunity to review and comment on the DEIS. If you have any questions regarding DBEDT's comments, please call Maurice Kaya at 587-3812 or email at mkaya@dbedt.hawaii.gov.

Sincerely,

Theodore E. Liu

Attachment

c: Mr. Matthew Higashida
Ms. Genevieve Salmonson

Summary for Policymakers

A Report of Working Group I of the Intergovernmental Panel on Climate Change

Based on a draft prepared by:
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Summary for Policymakers

The Third Assessment Report of Working Group I of the Intergovernmental Panel on Climate Change (IPCC) builds upon past assessments and incorporates new results from the past five years of research on climate change.[1] Many hundreds of scientists[2] from many countries participated in its preparation and review.

This Summary for Policymakers (SPM), which was approved by IPCC member governments in Shanghai in January 2001,[3] describes the current state of understanding of the climate system and provides estimates of its projected future evolution and their uncertainties. Further details can be found in the underlying report, and the appended Source Information provides cross references to the report's chapters.

An increasing body of observations gives a collective picture of a warming world and other changes in the climate system.

Since the release of the Second Assessment Report (SAR[4]), additional data from new studies of current and palaeoclimates, improved analysis of data sets, more rigorous evaluation of their quality, and comparisons among data from different sources have led to greater understanding of climate change.

The global average surface temperature has increased over the 20th century by about 0.6°C.

- The global average surface temperature (the average of near surface air temperature over land, and sea surface temperature) has increased since 1861. Over the 20th century the increase has been 0.6 ± 0.2°C[5,6] (Figure 1a). This value is about 0.15°C larger than that estimated by the SAR for the period up to 1994, owing to the relatively high temperatures of the additional years (1995 to 2000) and improved methods of processing the data. These numbers take into account various adjustments, including urban heat island effects. The record shows a great deal of variability; for example, most of the warming occurred during the 20th century, during two periods, 1910 to 1945 and 1976 to 2000.
- Globally, it is very likely[7] that the 1990s was the warmest decade and 1998 the warmest year in the instrumental record, since 1861 (see Figure 1a).
- New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the 20th century is likely[7] to have been the largest of any century during the past 1,000 years. It is also likely[7] that, in the Northern Hemisphere, the 1990s was the warmest decade and 1998 the warmest year (Figure 1b). Because less data are available, less is known about annual averages prior to 1,000 years before present and for conditions prevailing in most of the Southern Hemisphere prior to 1861.
- On average, between 1950 and 1993, night-time daily minimum air temperatures over land increased by about 0.2°C per decade. This is about twice the rate of increase in daytime daily maximum air temperatures (0.1°C per decade). This has lengthened the freeze-free season in many mid- and high latitude regions. The increase in sea surface temperature over this period is about half that of the mean land surface air temperature.

[1] *Climate change* in IPCC usage refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the Framework Convention on Climate Change, where *climate change* refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

[2] In total 122 Co-ordinating Lead Authors and Lead Authors, 515 Contributing Authors, 21 Review Editors and 337 Expert Reviewers.

[3] Delegations of 99 IPCC member countries participated in the Eighth Session of Working Group I in Shanghai on 17 to 20 January 2001.

[4] The IPCC Second Assessment Report is referred to in this Summary for Policymakers as the SAR.

[5] Generally temperature trends are rounded to the nearest 0.05°C per unit time, the periods often being limited by data availability.

[6] In general, a 5% statistical significance level is used, and a 95% confidence level.

[7] In this Summary for Policymakers and in the Technical Summary, the following words have been used where appropriate to indicate judgmental estimates of confidence: *virtually certain* (greater than 99% chance that a result is true); *very likely* (90–99% chance); *likely* (66–90% chance); *medium likelihood* (33–66% chance); *unlikely* (10–33% chance); *very unlikely* (1–10% chance); *exceptionally unlikely* (less than 1% chance). The reader is referred to individual chapters for more details.

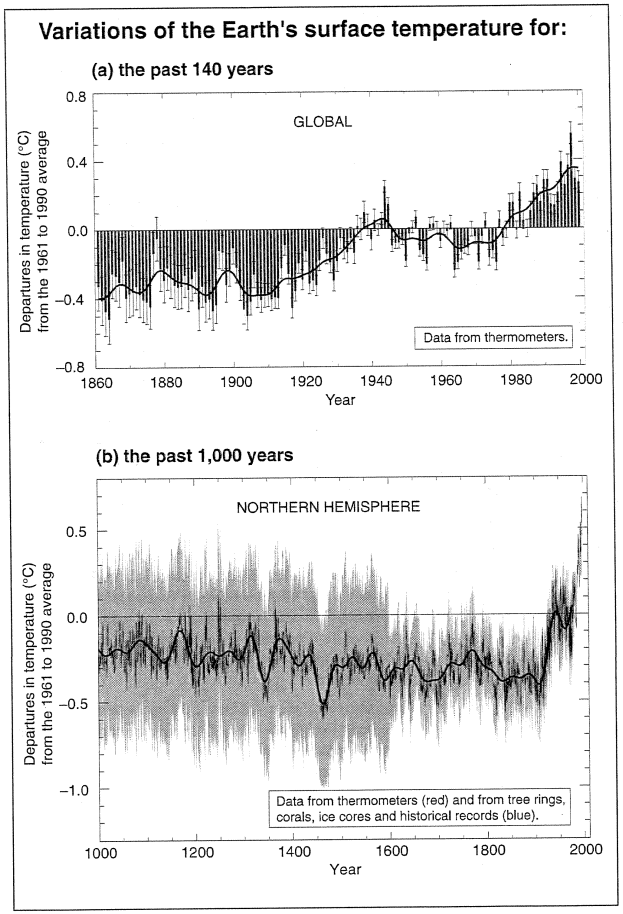


Figure 1: Variations of the Earth's surface temperature over the last 140 years and the last millennium.

(a) The Earth's surface temperature is shown year by year (red bars) and approximately decade by decade (black line, a filtered annual curve suppressing fluctuations below near decadal time-scales). There are uncertainties in the annual data (thin black whisker bars represent the 95% confidence range) due to data gaps, random instrumental errors and uncertainties, uncertainties in bias corrections in the ocean surface temperature data and also in adjustments for urbanisation over the land. Over both the last 140 years and 100 years, the best estimate is that the global average surface temperature has increased by 0.6 ± 0.2°C.

(b) Additionally, the year by year (blue curve) and 50 year average (black curve) variations of the average surface temperature of the Northern Hemisphere for the past 1000 years have been reconstructed from "proxy" data calibrated against thermometer data (see list of the main proxy data in the diagram). The 95% confidence range in the annual data is represented by the grey region. These uncertainties increase in more distant times and are always much larger than in the instrumental record due to the use of relatively sparse proxy data. Nevertheless the rate and duration of warming of the 20th century has been much greater than in any of the previous nine centuries. Similarly, it is likely[7] that the 1990s have been the warmest decade and 1998 the warmest year of the millennium.

[Based upon (a) Chapter 2, Figure 2.7c and (b) Chapter 2, Figure 2.20]

Temperatures have risen during the past four decades in the lowest 8 kilometres of the atmosphere.

- Since the late 1950s (the period of adequate observations from weather balloons), the overall global temperature increases in the lowest 8 kilometres of the atmosphere and in surface temperature have been similar at 0.1°C per decade.
- Since the start of the satellite record in 1979, both satellite and weather balloon measurements show that the global average temperature of the lowest 8 kilometres of the atmosphere has changed by +0.05 ± 0.10°C per decade, but the global average surface temperature has increased significantly by +0.15 ± 0.05°C per decade. The difference in the warming rates is statistically significant. This difference occurs primarily over the tropical and sub-tropical regions.
- The lowest 8 kilometres of the atmosphere and the surface are influenced differently by factors such as stratospheric ozone depletion, atmospheric aerosols, and the El Niño phenomenon. Hence, it is physically plausible to expect that over a short time period (e.g., 20 years) there may be differences in temperature trends. In addition, spatial sampling techniques can also explain some of the differences in trends, but these differences are not fully resolved.

Snow cover and ice extent have decreased.

- Satellite data show that there are very likely[7] to have been decreases of about 10% in the extent of snow cover since the late 1960s, and ground-based observations show that there is very likely[7] to have been a reduction of about two weeks in the annual duration of lake and river ice cover in the mid- and high latitudes of the Northern Hemisphere, over the 20th century.
- There has been a widespread retreat of mountain glaciers in non-polar regions during the 20th century.
- Northern Hemisphere spring and summer sea-ice extent has decreased by about 10 to 15% since the 1950s. It is likely[7] that there has been about a 40% decline in Arctic sea-ice thickness during late summer to early autumn in recent decades and a considerably slower decline in winter sea-ice thickness.

Global average sea level has risen and ocean heat content has increased.

- Tide gauge data show that global average sea level rose between 0.1 and 0.2 metres during the 20th century.
- Global ocean heat content has increased since the late 1950s, the period for which adequate observations of sub-surface ocean temperatures have been available.

Changes have also occurred in other important aspects of climate.

- It is very likely[7] that precipitation has increased by 0.5 to 1% per decade in the 20th century over most mid- and high latitudes of the Northern Hemisphere continents, and it is likely[7] that rainfall has increased by 0.2 to 0.3% per decade over the tropical (10°N to 10°S) land areas. Increases in the tropics are not evident over the past few decades. It is also likely[7] that rainfall has decreased over much of the Northern Hemisphere sub-tropical (10°N to 30°N) land areas during the 20th century by about 0.3% per decade. In contrast to the Northern Hemisphere, no comparable systematic changes have been detected in broad latitudinal averages over the Southern Hemisphere. There are insufficient data to establish trends in precipitation over the oceans.
- In the mid- and high latitudes of the Northern Hemisphere over the latter half of the 20th century, it is likely[7] that there has been a 2 to 4% increase in the frequency of heavy precipitation events. Increases in heavy precipitation events can arise from a number of causes, e.g., changes in atmospheric moisture, thunderstorm activity and large-scale storm activity.
- It is likely[7] that there has been a 2% increase in cloud cover over mid- to high latitude land areas during the 20th century. In most areas the trends relate well to the observed decrease in daily temperature range.
- Since 1950 it is very likely[7] that there has been a reduction in the frequency of extreme low temperatures, with a smaller increase in the frequency of extreme high temperatures.

- Warm episodes of the El Niño-Southern Oscillation (ENSO) phenomenon (which consistently affects regional variations of precipitation and temperature over much of the tropics, sub-tropics and some mid-latitude areas) have been more frequent, persistent and intense since the mid-1970s, compared with the previous 100 years.
- Over the 20th century (1900 to 1995), there were relatively small increases in global land areas experiencing severe drought or severe wetness. In many regions, these changes are dominated by inter-decadal and multi-decadal climate variability, such as the shift in ENSO towards more warm events.
- In some regions, such as parts of Asia and Africa, the frequency and intensity of droughts have been observed to increase in recent decades.

Some important aspects of climate appear not to have changed.

- A few areas of the globe have not warmed in recent decades, mainly over some parts of the Southern Hemisphere oceans and parts of Antarctica.
- No significant trends of Antarctic sea-ice extent are apparent since 1978, the period of reliable satellite measurements.
- Changes globally in tropical and extra-tropical storm intensity and frequency are dominated by inter-decadal to multi-decadal variations, with no significant trends evident over the 20th century. Conflicting analyses make it difficult to draw definitive conclusions about changes in storm activity, especially in the extra-tropics.
- No systematic changes in the frequency of tornadoes, thunder days, or hail events are evident in the limited areas analysed.

Emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate.

Changes in climate occur as a result of both internal variability within the climate system and external factors (both natural and anthropogenic). The influence of external factors on climate can be broadly compared using the concept of radiative forcing[8]. A positive radiative forcing, such as that produced by increasing concentrations of greenhouse gases, tends to warm the surface. A negative radiative forcing, which can arise from an increase in some types of aerosols (microscopic airborne particles) tends to cool the surface. Natural factors, such as changes in solar output or explosive volcanic activity, can also cause radiative forcing. Characterisation of these climate forcing agents and their changes over time (see Figure 2) is required to understand past climate changes in the context of natural variations and to project what climate changes could lie ahead. Figure 3 shows current estimates of the radiative forcing due to increased concentrations of atmospheric constituents and other mechanisms.

[8] *Radiative forcing* is a measure of the influence a factor has in altering the balance of incoming and outgoing energy in the Earth-atmosphere system, and is an index of the importance of the factor as a potential climate change mechanism. It is expressed in Watts per square metre (Wm^{-2}).

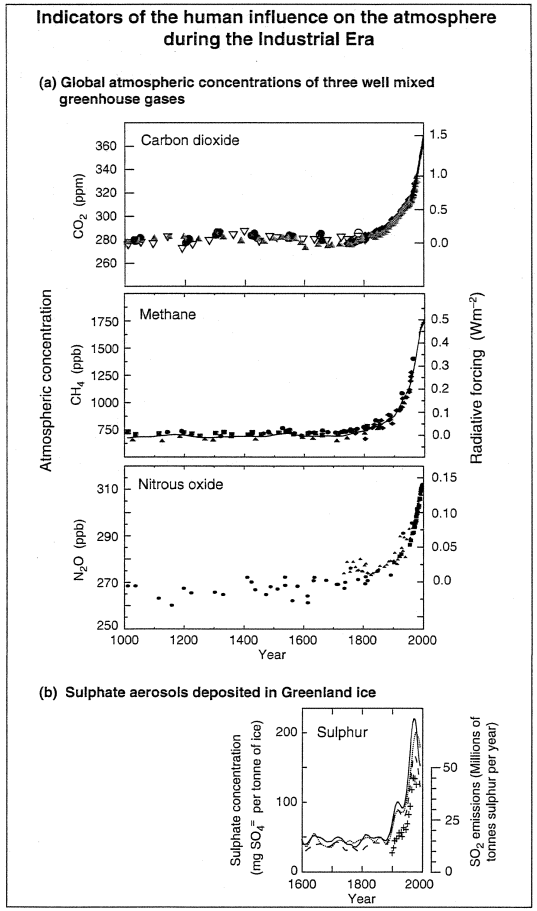


Figure 2: Long records of past changes in atmospheric composition provide the context for the influence of anthropogenic emissions.

(a) shows changes in the atmospheric concentrations of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) over the past 1000 years. The ice core and firn data for several sites in Antarctica and Greenland (shown by different symbols) are supplemented with the data from direct atmospheric samples over the past few decades (shown by the line for CO_2 and incorporated in the curve representing the global average of CH_4). The estimated positive radiative forcing of the climate system from these gases is indicated on the right-hand scale. Since these gases have atmospheric lifetimes of a decade or more, they are well mixed, and their concentrations reflect emissions from sources throughout the globe. All three records show effects of the large and increasing growth in anthropogenic emissions during the Industrial Era.

(b) illustrates the influence of industrial emissions on atmospheric sulphate concentrations, which produce negative radiative forcing. Shown is the time history of the concentrations of sulphate, not in the atmosphere but in ice cores in Greenland (shown by lines; from which the episodic effects of volcanic eruptions have been removed). Such data indicate the local deposition of sulphate aerosols at the site, reflecting sulphur dioxide (SO_2) emissions at mid-latitudes in the Northern Hemisphere. This record, albeit more regional than that of the globally-mixed greenhouse gases, demonstrates the large growth in anthropogenic SO_2 emissions during the Industrial Era. The pluses denote the relevant regional estimated SO_2 emissions (right-hand scale).

[Based upon (a) Chapter 3, Figure 3.2b (CO_2); Chapter 4, Figure 4.1a and b (CH_4) and Chapter 4, Figure 4.2 (N_2O) and (b) Chapter 5, Figure 5.4a]

Concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities.

- The atmospheric concentration of carbon dioxide (CO_2) has increased by 31% since 1750. The present CO_2 concentration has not been exceeded during the past 420,000 years and likely[7] not during the past 20 million years. The current rate of increase is unprecedented during at least the past 20,000 years.
- About three-quarters of the anthropogenic emissions of CO_2 to the atmosphere during the past 20 years is due to fossil fuel burning. The rest is predominantly due to land-use change, especially deforestation.
- Currently the ocean and the land together are taking up about half of the anthropogenic CO_2 emissions. On land, the uptake of anthropogenic CO_2 very likely[7] exceeded the release of CO_2 by deforestation during the 1990s.
- The rate of increase of atmospheric CO_2 concentration has been about 1.5 ppm[9] (0.4%) per year over the past two decades. During the 1990s the year to year increase varied from 0.9 ppm (0.2%) to 2.8 ppm (0.8%). A large part of this variability is due to the effect of climate variability (e.g., El Niño events) on CO_2 uptake and release by land and oceans.
- The atmospheric concentration of methane (CH_4) has increased by 1060 ppb[9] (151%) since 1750 and continues to increase. The present CH_4 concentration has not been exceeded during the past 420,000 years. The annual growth in CH_4 concentration slowed and became more variable in the 1990s, compared with the 1980s. Slightly more than half of current CH_4 emissions are anthropogenic (e.g., use of fossil fuels, cattle, rice agriculture and landfills). In addition, carbon monoxide (CO) emissions have recently been identified as a cause of increasing CH_4 concentration.
- The atmospheric concentration of nitrous oxide (N_2O) has increased by 46 ppb (17%) since 1750 and continues to increase. The present N_2O concentration has not been exceeded during at least the past thousand years. About a third of current N_2O emissions are anthropogenic (e.g., agricultural soils, cattle feed lots and chemical industry).
- Since 1995, the atmospheric concentrations of many of those halocarbon gases that are both ozone-depleting and greenhouse gases (e.g., $CFCl_3$ and CF_2Cl_2), are either increasing more slowly or decreasing, both in response to reduced emissions under the regulations of the Montreal Protocol and its Amendments. Their substitute compounds (e.g., CHF_2Cl and CF_3CH_2F) and some other synthetic compounds (e.g., perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6)) are also greenhouse gases, and their concentrations are currently increasing.
- The radiative forcing due to increases of the well-mixed greenhouse gases from 1750 to 2000 is estimated to be 2.43 Wm^{-2}: 1.46 Wm^{-2} from CO_2; 0.48 Wm^{-2} from CH_4; 0.34 Wm^{-2} from the halocarbons; and 0.15 Wm^{-2} from N_2O. (See Figure 3, where the uncertainties are also illustrated.)
- The observed depletion of the stratospheric ozone (O_3) layer from 1979 to 2000 is estimated to have caused a negative radiative forcing (–0.15 Wm^{-2}). Assuming full compliance with current halocarbon regulations, the positive forcing of the halocarbons will be reduced as will the magnitude of the negative forcing from stratospheric ozone depletion as the ozone layer recovers over the 21st century.
- The total amount of O_3 in the troposphere is estimated to have increased by 36% since 1750, due primarily to anthropogenic emissions of several O_3-forming gases. This corresponds to a positive radiative forcing of 0.35 Wm^{-2}. O_3 forcing varies considerably by region and responds much more quickly to changes in emissions than the long-lived greenhouse gases, such as CO_2.

[9] ppm (parts per million) or ppb (parts per billion, 1 billion = 1,000 million) is the ratio of the number of greenhouse gas molecules to the total number of molecules of dry air. For example: 300 ppm means 300 molecules of a greenhouse gas per million molecules of dry air.

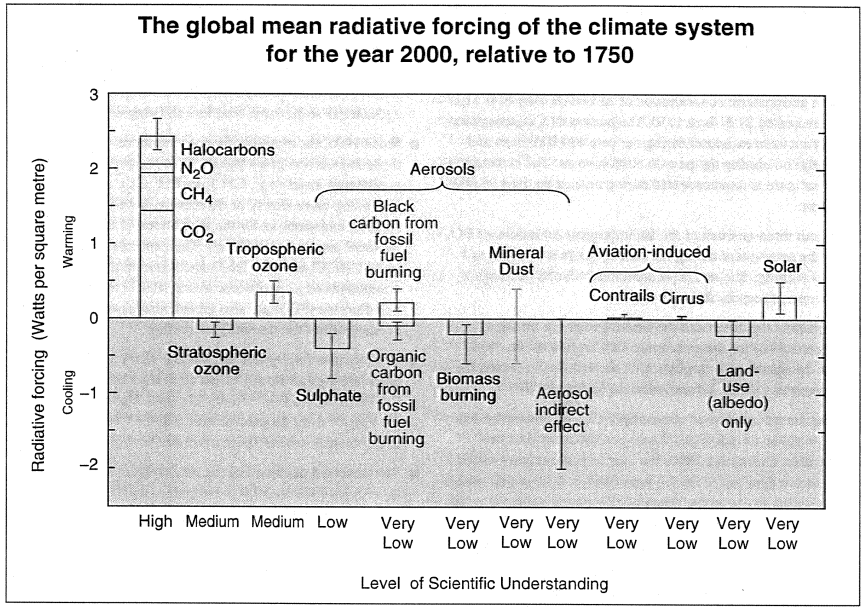


Figure 3: Many external factors force climate change.

These radiative forcings arise from changes in the atmospheric composition, alteration of surface reflectance by land use, and variation in the output of the sun. Except for solar variation, some form of human activity is linked to each. The rectangular bars represent estimates of the contributions of these forcings – some of which yield warming, and some cooling. Forcing due to episodic volcanic events, which lead to a negative forcing lasting only for a few years, is not shown. The indirect effect of aerosols shown is their effect on the size and number of cloud droplets. A second indirect effect of aerosols on clouds, namely their effect on cloud lifetime, which would also lead to a negative forcing, is not shown. Effects of aviation on greenhouse gases are included in the individual bars. The vertical line about the rectangular bars indicates a range of estimates, guided by the spread in the published values of the forcings and physical understanding. Some of the forcings possess a much greater degree of certainty than others. A vertical line without a rectangular bar denotes a forcing for which no best estimate can be given owing to large uncertainties. The overall level of scientific understanding for each forcing varies considerably, as noted. Some of the radiative forcing agents are well mixed over the globe, such as CO_2, thereby perturbing the global heat balance. Others represent perturbations with stronger regional signatures because of their spatial distribution, such as aerosols. For this and other reasons, a simple sum of the positive and negative bars cannot be expected to yield the net effect on the climate system. The simulations of this assessment report (for example, Figure 5) indicate that the estimated net effect of these perturbations is to have warmed the global climate since 1750. [Based upon Chapter 6, Figure 6.6]

Anthropogenic aerosols are short-lived and mostly produce negative radiative forcing.

- The major sources of anthropogenic aerosols are fossil fuel and biomass burning. These sources are also linked to degradation of air quality and acid deposition.
- Since the SAR, significant progress has been achieved in better characterising the direct radiative roles of different types of aerosols. Direct radiative forcing is estimated to be –0.4 Wm^{-2} for sulphate, –0.2 Wm^{-2} for biomass burning aerosols, –0.1 Wm^{-2} for fossil fuel organic carbon and +0.2 Wm^{-2} for fossil fuel black carbon aerosols. There is much less confidence in the ability to quantify the total aerosol direct effect, and its evolution over time, than that for the gases listed above. Aerosols also vary considerably by region and respond quickly to changes in emissions.
- In addition to their direct radiative forcing, aerosols have an indirect radiative forcing through their effects on clouds. There is now more evidence for this indirect effect, which is negative, although of very uncertain magnitude.

Natural factors have made small contributions to radiative forcing over the past century.

- The radiative forcing due to changes in solar irradiance for the period since 1750 is estimated to be about +0.3 Wm^{-2}, most of which occurred during the first half of the 20th century. Since the late 1970s, satellite instruments have observed small oscillations due to the 11-year solar cycle. Mechanisms for the amplification of solar effects on climate have been proposed, but currently lack a rigorous theoretical or observational basis.
- Stratospheric aerosols from explosive volcanic eruptions lead to negative forcing, which lasts a few years. Several major eruptions occurred in the periods 1880 to 1920 and 1960 to 1991.
- The combined change in radiative forcing of the two major natural factors (solar variation and volcanic aerosols) is estimated to be negative for the past two, and possibly the past four, decades.

Confidence in the ability of models to project future climate has increased.

Complex physically-based climate models are required to provide detailed estimates of feedbacks and of regional features. Such models cannot yet simulate all aspects of climate (e.g., they still cannot account fully for the observed trend in the surface-troposphere temperature difference since 1979) and there are particular uncertainties associated with clouds and their interaction with radiation and aerosols. Nevertheless, confidence in the ability of these models to provide useful projections of future climate has improved due to their demonstrated performance on a range of space and time-scales.

- Understanding of climate processes and their incorporation in climate models have improved, including water vapour, sea-ice dynamics, and ocean heat transport.
- Some recent models produce satisfactory simulations of current climate without the need for non-physical adjustments of heat and water fluxes at the ocean-atmosphere interface used in earlier models.
- Simulations that include estimates of natural and anthropogenic forcing reproduce the observed large-scale changes in surface temperature over the 20th century (Figure 4). However, contributions from some additional processes and forcings may not have been included in the models. Nevertheless, the large-scale consistency between models and observations can be used to provide an independent check on projected warming rates over the next few decades under a given emissions scenario.
- Some aspects of model simulations of ENSO, monsoons and the North Atlantic Oscillation, as well as selected periods of past climate, have improved.

There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.

The SAR concluded: "The balance of evidence suggests a discernible human influence on global climate". That report also noted that the anthropogenic signal was still emerging from the background of natural climate variability. Since the SAR, progress has been made in reducing uncertainty, particularly with respect to distinguishing and quantifying the magnitude of responses to different external influences. Although many of the sources of uncertainty identified in the SAR still remain to some degree, new evidence and improved understanding support an updated conclusion.

- There is a longer and more closely scrutinised temperature record and new model estimates of variability. The warming over the past 100 years is very unlikely[7] to be due to internal variability alone, as estimated by current models. Reconstructions of climate data for the past 1,000 years (Figure 1b) also indicate that this warming was unusual and is unlikely[7] to be entirely natural in origin.
- There are new estimates of the climate response to natural and anthropogenic forcing, and new detection techniques have been applied. Detection and attribution studies consistently find evidence for an anthropogenic signal in the climate record of the last 35 to 50 years.
- Simulations of the response to natural forcings alone (i.e., the response to variability in solar irradiance and volcanic eruptions) do not explain the warming in the second half of the 20th century (see for example Figure 4a). However, they indicate that natural forcings may have contributed to the observed warming in the first half of the 20th century.
- The warming over the last 50 years due to anthropogenic greenhouse gases can be identified despite uncertainties in forcing due to anthropogenic sulphate aerosol and natural factors (volcanoes and solar irradiance). The anthropogenic sulphate aerosol forcing, while uncertain, is negative over this period and therefore cannot explain the warming. Changes in natural forcing during most of this period are also estimated to be negative and are unlikely[7] to explain the warming.
- Detection and attribution studies comparing model simulated changes with the observed record can now take into account uncertainty in the magnitude of modelled response to external forcing, in particular that due to uncertainty in climate sensitivity.
- Most of these studies find that, over the last 50 years, the estimated rate and magnitude of warming due to increasing concentrations of greenhouse gases alone are comparable with, or larger than, the observed warming. Furthermore, most model estimates that take into account both greenhouse gases and sulphate aerosols are consistent with observations over this period.
- The best agreement between model simulations and observations over the last 140 years has been found when all the above anthropogenic and natural forcing factors are combined, as shown in Figure 4c. These results show that the forcings included are sufficient to explain the observed changes, but do not exclude the possibility that other forcings may also have contributed.

In the light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last 50 years is likely[7] to have been due to the increase in greenhouse gas concentrations.

Furthermore, it is very likely[7] that the 20th century warming has contributed significantly to the observed sea level rise, through thermal expansion of sea water and widespread loss of land ice. Within present uncertainties, observations and models are both consistent with a lack of significant acceleration of sea level rise during the 20th century.

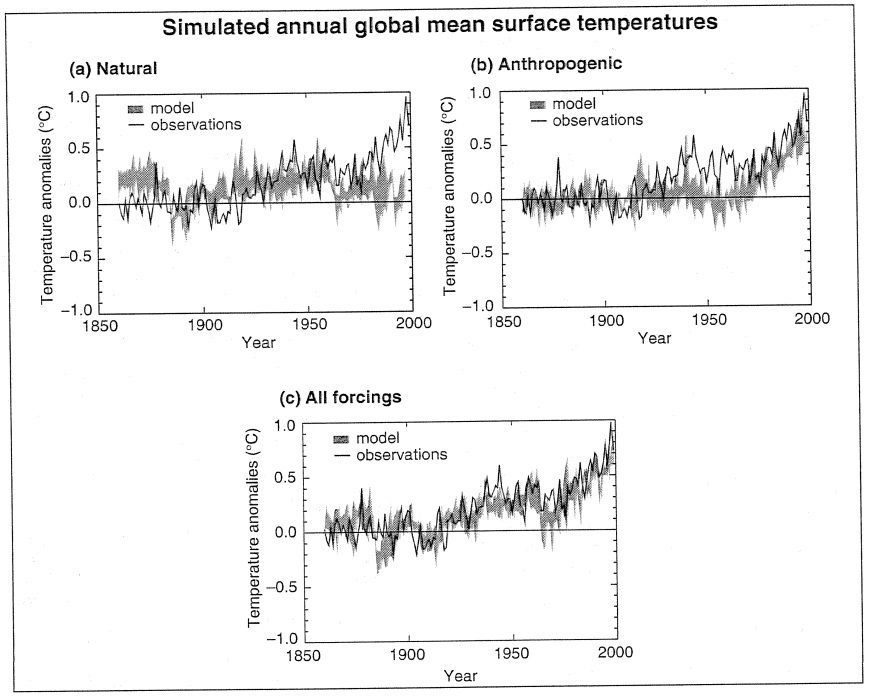


Figure 4: Simulating the Earth's temperature variations, and comparing the results to measured changes, can provide insight into the underlying causes of the major changes.

A climate model can be used to simulate the temperature changes that occur both from natural and anthropogenic causes. The simulations represented by the band in (a) were done with only natural forcings: solar variation and volcanic activity. Those encompassed by the band in (b) were done with anthropogenic forcings: greenhouse gases and an estimate of sulphate aerosols, and those encompassed by the band in (c) were done with both natural and anthropogenic forcings included. From (b), it can be seen that inclusion of anthropogenic forcings provides a plausible explanation for a substantial part of the observed temperature changes over the past century, but the best match with observations is obtained in (c) when both natural and anthropogenic factors are included. These results show that the forcings included are sufficient to explain the observed changes, but do not exclude the possibility that other forcings may also have contributed. The bands of model results presented here are for four runs from the same model. Similar results to those in (b) are obtained with other models with anthropogenic forcing. [Based upon Chapter 12, Figure 12.7]

Human influences will continue to change atmospheric composition throughout the 21st century.

Models have been used to make projections of atmospheric concentrations of greenhouse gases and aerosols, and hence of future climate, based upon emissions scenarios from the IPCC Special Report on Emission Scenarios (SRES) (Figure 5). These scenarios were developed to update the IS92 series, which were used in the SAR and are shown for comparison here in some cases.

Greenhouse gases

- Emissions of CO_2 due to fossil fuel burning are virtually certain[7] to be the dominant influence on the trends in atmospheric CO_2 concentration during the 21st century.
- As the CO_2 concentration of the atmosphere increases, ocean and land will take up a decreasing fraction of anthropogenic CO_2 emissions. The net effect of land and ocean climate feedbacks as indicated by models is to further increase projected atmospheric CO_2 concentrations, by reducing both the ocean and land uptake of CO_2.
- By 2100, carbon cycle models project atmospheric CO_2 concentrations of 540 to 970 ppm for the illustrative SRES scenarios (90 to 250% above the concentration of 280 ppm in the year 1750), Figure 5b. These projections include the land and ocean climate feedbacks. Uncertainties, especially about the magnitude of the climate feedback from the terrestrial biosphere, cause a variation of about −10 to +30% around each scenario. The total range is 490 to 1260 ppm (75 to 350% above the 1750 concentration).
- Changing land use could influence atmospheric CO_2 concentration. Hypothetically, if all of the carbon released by historical land-use changes could be restored to the terrestrial biosphere over the course of the century (e.g., by reforestation), CO_2 concentration would be reduced by 40 to 70 ppm.
- Model calculations of the concentrations of the non-CO_2 greenhouse gases by 2100 vary considerably across the SRES illustrative scenarios, with CH_4 changing by −190 to +1,970 ppb (present concentration 1,760 ppb), N_2O changing by +38 to +144 ppb (present concentration 316 ppb), total tropospheric O_3 changing by −12 to +62%, and a wide range of changes in concentrations of HFCs, PFCs and SF_6, all relative to the year 2000. In some scenarios, total tropospheric O_3 would become as important a radiative forcing agent as CH_4 and, over much of the Northern Hemisphere, would threaten the attainment of current air quality targets.
- Reductions in greenhouse gas emissions and the gases that control their concentration would be necessary to stabilise radiative forcing. For example, for the most important anthropogenic greenhouse gas, carbon cycle models indicate that stabilisation of atmospheric CO_2 concentrations at 450, 650 or 1,000 ppm would require global anthropogenic CO_2 emissions to drop below 1990 levels, within a few decades, about a century, or about two centuries, respectively, and continue to decrease steadily thereafter. Eventually CO_2 emissions would need to decline to a very small fraction of current emissions.

Aerosols

- The SRES scenarios include the possibility of either increases or decreases in anthropogenic aerosols (e.g., sulphate aerosols (Figure 5c), biomass aerosols, black and organic carbon aerosols) depending on the extent of fossil fuel use and policies to abate polluting emissions. In addition, natural aerosols (e.g., sea salt, dust and emissions leading to the production of sulphate and carbon aerosols) are projected to increase as a result of changes in climate.

Radiative forcing over the 21st century

- For the SRES illustrative scenarios, relative to the year 2000, the global mean radiative forcing due to greenhouse gases continues to increase through the 21st century, with the fraction due to CO_2 projected to increase from slightly more than half to about three quarters. The change in the direct plus indirect aerosol radiative forcing is projected to be smaller in magnitude than that of CO_2.

Global average temperature and sea level are projected to rise under all IPCC SRES scenarios.

In order to make projections of future climate, models incorporate past, as well as future emissions of greenhouse gases and aerosols. Hence, they include estimates of warming to date and the commitment to future warming from past emissions.

Temperature

- The globally averaged surface temperature is projected to increase by 1.4 to 5.8°C (Figure 5d) over the period 1990 to 2100. These results are for the full range of 35 SRES scenarios, based on a number of climate models[10,11].
- Temperature increases are projected to be greater than those in the SAR, which were about 1.0 to 3.5°C based on the six IS92 scenarios. The higher projected temperatures and the wider range are due primarily to the lower projected sulphur dioxide emissions in the SRES scenarios relative to the IS92 scenarios.
- The projected rate of warming is much larger than the observed changes during the 20th century and is very likely[7] to be without precedent during at least the last 10,000 years, based on palaeoclimate data.
- By 2100, the range in the surface temperature response across the group of climate models run with a given scenario is comparable to the range obtained from a single model run with the different SRES scenarios.
- On timescales of a few decades, the current observed rate of warming can be used to constrain the projected response to a given emissions scenario despite uncertainty in climate sensitivity. This approach suggests that anthropogenic warming is likely[7] to lie in the range of 0.1 to 0.2°C per decade over the next few decades under the IS92a scenario, similar to the corresponding range of projections of the simple model used in Figure 5d.
- Based on recent global model simulations, it is very likely[7] that nearly all land areas will warm more rapidly than the global average, particularly those at northern high latitudes in the cold season. Most notable of these is the warming in the northern regions of North America, and northern and central Asia, which exceeds global mean warming in each model by more than 40%. In contrast, the warming is less than the global mean change in south and southeast Asia in summer and in southern South America in winter.
- Recent trends for surface temperature to become more El Niño-like in the tropical Pacific, with the eastern tropical Pacific warming more than the western tropical Pacific, with a corresponding eastward shift of precipitation, are projected to continue in many models.

Precipitation

- Based on global model simulations and for a wide range of scenarios, global average water vapour concentration and precipitation are projected to increase during the 21st century. By the second half of the 21st century, it is likely[7] that precipitation will have increased over northern mid- to high latitudes and Antarctica in winter. At low latitudes there are both regional increases and decreases over land areas. Larger year to year variations in precipitation are very likely[7] over most areas where an increase in mean precipitation is projected.

[10] Complex physically based climate models are the main tool for projecting future climate change. In order to explore the full range of scenarios, these are complemented by simple climate models calibrated to yield an equivalent response in temperature and sea level to complex climate models. These projections are obtained using a simple climate model whose climate sensitivity and ocean heat uptake are calibrated to each of seven complex climate models. The climate sensitivity used in the simple model ranges from 1.7 to 4.2°C, which is comparable to the commonly accepted range of 1.5 to 4.5°C.

[11] This range does not include uncertainties in the modelling of radiative forcing, e.g. aerosol forcing uncertainties. A small carbon-cycle climate feedback is included.

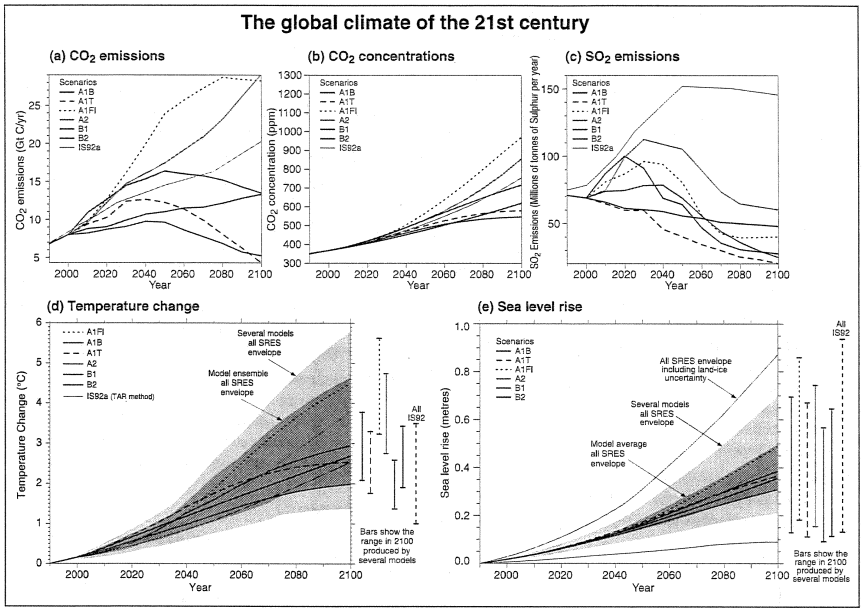


Figure 5: The global climate of the 21st century will depend on natural changes and the response of the climate system to human activities.

Climate models project the response of many climate variables – such as increases in global surface temperature and sea level – to various scenarios of greenhouse gas and other human-related emissions. (a) shows the CO_2 emissions of the six illustrative SRES scenarios, which are summarised in the box on page 18, along with IS92a for comparison purposes with the SAR. (b) shows projected CO_2 concentrations. (c) shows anthropogenic SO_2 emissions. Emissions of other gases and other aerosols were included in the model but are not shown in the figure. (d) and (e) show the projected temperature and sea level responses, respectively. The "several models all SRES envelope" in (d) and (e) shows the temperature and sea level rise, respectively, for the simple model when tuned to a number of complex models with a range of climate sensitivities. All SRES envelopes refer to the full range of 35 SRES scenarios. The "model average all SRES envelope" shows the average from these models for the range of scenarios. Note that the warming and sea level rise from these emissions would continue well beyond 2100. Also note that this range does not allow for uncertainty relating to ice dynamical changes in the West Antarctic ice sheet, nor does it account for uncertainties in projecting non-sulphate aerosols and greenhouse gas concentrations. [Based upon (a) Chapter 3, Figure 3.12, (b) Chapter 3, Figure 3.12, (c) Chapter 5, Figure 5.13, (d) Chapter 9, Figure 9.14, (e) Chapter 11, Figure 11.12, Appendix II]

Extreme Events

Table 1 depicts an assessment of confidence in observed changes in extremes of weather and climate during the latter half of the 20th century (left column) and in projected changes during the 21st century (right column)[a]. This assessment relies on observational and modelling studies, as well as the physical plausibility of future projections across all commonly-used scenarios and is based on expert judgement[7].

- For some other extreme phenomena, many of which may have important impacts on the environment and society, there is currently insufficient information to assess recent trends, and climate models currently lack the spatial detail required to make confident projections. For example, very small-scale phenomena, such as thunderstorms, tornadoes, hail and lightning, are not simulated in climate models.

Table 1: Estimates of confidence in observed and projected changes in extreme weather and climate events.

Confidence in observed changes (latter half of the 20th century)	Changes in Phenomenon	Confidence in projected changes (during the 21st century)
Likely[7]	**Higher maximum temperatures and more hot days over nearly all land areas**	Very likely[7]
Very likely[7]	**Higher minimum temperatures, fewer cold days and frost days over nearly all land areas**	Very likely[7]
Very likely[7]	**Reduced diurnal temperature range over most land areas**	Very likely[7]
Likely[7], over many areas	**Increase of heat index[12] over land areas**	Very likely[7], over most areas
Likely[7], over many Northern Hemisphere mid- to high latitude land areas	**More intense precipitation events[b]**	Very likely[7], over many areas
Likely[7], in a few areas	**Increased summer continental drying and associated risk of drought**	Likely[7], over most mid-latitude continental interiors. (Lack of consistent projections in other areas)
Not observed in the few analyses available	**Increase in tropical cyclone peak wind intensities[c]**	Likely[7], over some areas
Insufficient data for assessment	**Increase in tropical cyclone mean and peak precipitation intensities[c]**	Likely[7], over some areas

[a] For more details see Chapter 2 (observations) and Chapter 9, 10 (projections).

[b] For other areas, there are either insufficient data or conflicting analyses.

[c] Past and future changes in tropical cyclone location and frequency are uncertain.

[12] Heat index: A combination of temperature and humidity that measures effects on human comfort.

El Niño

- Confidence in projections of changes in future frequency, amplitude, and spatial pattern of El Niño events in the tropical Pacific is tempered by some shortcomings in how well El Niño is simulated in complex models. Current projections show little change or a small increase in amplitude for El Niño events over the next 100 years.

- Even with little or no change in El Niño amplitude, global warming is likely[7] to lead to greater extremes of drying and heavy rainfall and increase the risk of droughts and floods that occur with El Niño events in many different regions.

Monsoons

- It is likely[7] that warming associated with increasing greenhouse gas concentrations will cause an increase of Asian summer monsoon precipitation variability. Changes in monsoon mean duration and strength depend on the details of the emission scenario. The confidence in such projections is also limited by how well the climate models simulate the detailed seasonal evolution of the monsoons.

Thermohaline circulation

- Most models show weakening of the ocean thermohaline circulation which leads to a reduction of the heat transport into high latitudes of the Northern Hemisphere. However, even in models where the thermohaline circulation weakens, there is still a warming over Europe due to increased greenhouse gases. The current projections using climate models do not exhibit a complete shut-down of the thermohaline circulation by 2100. Beyond 2100, the thermohaline circulation could completely, and possibly irreversibly, shut-down in either hemisphere if the change in radiative forcing is large enough and applied long enough.

Snow and ice

- Northern Hemisphere snow cover and sea-ice extent are projected to decrease further.

- Glaciers and ice caps are projected to continue their widespread retreat during the 21st century.

- The Antarctic ice sheet is likely[7] to gain mass because of greater precipitation, while the Greenland ice sheet is likely[7] to lose mass because the increase in runoff will exceed the precipitation increase.

- Concerns have been expressed about the stability of the West Antarctic ice sheet because it is grounded below sea level. However, loss of grounded ice leading to substantial sea level rise from this source is now widely agreed to be very unlikely[7] during the 21st century, although its dynamics are still inadequately understood, especially for projections on longer time-scales.

Sea level

- Global mean sea level is projected to rise by 0.09 to 0.88 metres between 1990 and 2100, for the full range of SRES scenarios. This is due primarily to thermal expansion and loss of mass from glaciers and ice caps (Figure 5e). The range of sea level rise presented in the SAR was 0.13 to 0.94 metres based on the IS92 scenarios. Despite the higher temperature change projections in this assessment, the sea level projections are slightly lower, primarily due to the use of improved models, which give a smaller contribution from glaciers and ice sheets.

Anthropogenic climate change will persist for many centuries.

- Emissions of long-lived greenhouse gases (i.e., CO_2, N_2O, PFCs, SF_6) have a lasting effect on atmospheric composition, radiative forcing and climate. For example, several centuries after CO_2 emissions occur, about a quarter of the increase in CO_2 concentration caused by these emissions is still present in the atmosphere.

- After greenhouse gas concentrations have stabilised, global average surface temperatures would rise at a rate of only a few tenths of a degree per century rather than several degrees per century as projected for the 21st century without stabilisation. The lower the level at which concentrations are stabilised, the smaller the total temperature change.

- Global mean surface temperature increases and rising sea level from thermal expansion of the ocean are projected to continue for hundreds of years after stabilisation of greenhouse gas concentrations (even at present levels), owing to the long timescales on which the deep ocean adjusts to climate change.

- Ice sheets will continue to react to climate warming and contribute to sea level rise for thousands of years after climate has been stabilised. Climate models indicate that the local warming over Greenland is likely[7] to be one to three times the global average. Ice sheet models project that a local warming of larger than 3°C, if sustained for millennia, would lead to virtually a complete melting of the Greenland ice sheet with a resulting sea level rise of about 7 metres. A local warming of 5.5°C, if sustained for 1000 years, would be likely[7] to result in a contribution from Greenland of about 3 metres to sea level rise.

- Current ice dynamic models suggest that the West Antarctic ice sheet could contribute up to 3 metres to sea level rise over the next 1000 years, but such results are strongly dependent on model assumptions regarding climate change scenarios, ice dynamics and other factors.

Further action is required to address remaining gaps in information and understanding.

Further research is required to improve the ability to detect, attribute and understand climate change, to reduce uncertainties and to project future climate changes. In particular, there is a need for additional systematic and sustained observations, modelling and process studies. A serious concern is the decline of observational networks. The following are high priority areas for action.

- Systematic observations and reconstructions:
  - Reverse the decline of observational networks in many parts of the world.
  - Sustain and expand the observational foundation for climate studies by providing accurate, long-term, consistent data including implementation of a strategy for integrated global observations.
  - Enhance the development of reconstructions of past climate periods.
  - Improve the observations of the spatial distribution of greenhouse gases and aerosols.
- Modelling and process studies:
  - Improve understanding of the mechanisms and factors leading to changes in radiative forcing.
  - Understand and characterise the important unresolved processes and feedbacks, both physical and biogeochemical, in the climate system.
  - Improve methods to quantify uncertainties of climate projections and scenarios, including long-term ensemble simulations using complex models.
  - Improve the integrated hierarchy of global and regional climate models with a focus on the simulation of climate variability, regional climate changes and extreme events.
  - Link more effectively models of the physical climate and the biogeochemical system, and in turn improve coupling with descriptions of human activities.

Cutting across these foci are crucial needs associated with strengthening international co-operation and co-ordination in order to better utilise scientific, computational and observational resources. This should also promote the free exchange of data among scientists. A special need is to increase the observational and research capacities in many regions, particularly in developing countries. Finally, as is the goal of this assessment, there is a continuing imperative to communicate research advances in terms that are relevant to decision making.

The Emission Scenarios of the Special Report on Emission Scenarios (SRES)

A1. The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1FI), non-fossil energy sources (A1T), or a balance across all sources (A1B) (where balanced is defined as not relying too heavily on one particular energy source, on the assumption that similar improvement rates apply to all energy supply and end use technologies).

A2. The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing population. Economic development is primarily regionally oriented and per capita economic growth and technological change more fragmented and slower than other storylines.

B1. The B1 storyline and scenario family describes a convergent world with the same global population, that peaks in mid-century and declines thereafter, as in the A1 storyline, but with rapid change in economic structures toward a service and information economy, with reductions in material intensity and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social and environmental sustainability, including improved equity, but without additional climate initiatives.

B2. The B2 storyline and scenario family describes a world in which the emphasis is on local solutions to economic, social and environmental sustainability. It is a world with continuously increasing global population, at a rate lower than A2, intermediate levels of economic development, and less rapid and more diverse technological change than in the B1 and A1 storylines. While the scenario is also oriented towards environmental protection and social equity, it focuses on local and regional levels.

An illustrative scenario was chosen for each of the six scenario groups A1B, A1FI, A1T, A2, B1 and B2. All should be considered equally sound.

The SRES scenarios do not include additional climate initiatives, which means that no scenarios are included that explicitly assume implementation of the United Nations Framework Convention on Climate Change or the emissions targets of the Kyoto Protocol.

Source Information: Summary for Policymakers

This appendix provides the cross-reference of the topics in the Summary for Policymakers (page and bullet point topic) to the sections of the chapters of the full report that contain expanded information about the topic.

An increasing body of observations gives a collective picture of a warming world and other changes in the climate system.

SPM Page	Cross-Reference: SPM Topic – Chapter Section
2	*The global average surface temperature has increased over the 20th century by about 0.6°C.* ● Chapter 2.2.2 ● Chapter 2.2.2 ● Chapter 2.3 ● Chapter 2.2.2
4	*Temperatures have risen during the past four decades in the lowest 8 kilometres of the atmosphere.* ● Chapter 2.2.3 and 2.2.4 ● Chapter 2.2.3 and 2.2.4 ● Chapter 2.2.3, 2.2.4 and Chapter 12.3.2
4	*Snow cover and ice extent have decreased.* All three bullet points: Chapter 2.2.5 and 2.2.6
4	*Global average sea level has risen and ocean heat content has increased.* ● Chapter 11.3.2 ● Chapter 2.2.2 and Chapter 11.2.1
4 – 5	*Changes have also occurred in other important aspects of climate.* ● Chapter 2.5.2 ● Chapter 2.7.2 ● Chapter 2.2.2 and 2.5.5 ● Chapter 2.7.2 ● Chapter 2.6.2 and 2.6.3 ● Chapter 2.7.3 ● Chapter 2.7.3
5	*Some important aspects of climate appear not to have changed.* ● Chapter 2.2.2 ● Chapter 2.2.5 ● Chapter 2.7.3 ● Chapter 2.7.3

Emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate system.

SPM Page	Cross-Reference: SPM Topic – Chapter Section
5	Chapeau: "Changes in climate occur …" Chapter 1, Chapter 3.1, Chapter 4.1, Chapter 5.1, Chapter 6.1, 6.2, 6.9, 6.11 and 6.13
7	*Concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities.*
	Carbon dioxide: ● Chapter 3.3.1, 3.3.2, 3.3.3 and 3.5.1 ● Chapter 3.5.1 ● Chapter 3.2.2, 3.2.3, 3.5.1 and Table 3.1 ● Chapter 3.5.1 and 3.5.2
	Methane: ● Chapter 4.2.1
	Nitrous oxide: ● Chapter 4.2.1
	Halocarbons: ● Chapter 4.2.2
	Radiative forcing of well-mixed gases: ● Chapter 4.2.1 and Chapter 6.3
	Stratospheric ozone: ● Chapter 4.2.2 and Chapter 6.4
	Tropospheric ozone: ● Chapter 4.2.4 and Chapter 6.5
9	*Anthropogenic aerosols are short-lived and mostly produce negative radiative forcing.* ● Chapter 5.2 and 5.5.4 ● Chapter 5.1, 5.2 and Chapter 6.7 ● Chapter 5.3.2, 5.4.3 and Chapter 6.8
9	*Natural factors have made small contributions to radiative forcing over the past century.* ● Chapter 6.11 and 6.15.1 ● Chapter 6.9 and 6.15.1 ● Chapter 6.15.1

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

HECO C3
GENPP 10-16
YA/G

July 20, 2006

Mr. Theodore E. Liu, Director
Department of Business, Economic Development, & Tourism
State of Hawai'i
P.O. Box 2359
Honolulu, Hawai'i 96804

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Liu:

Thank you for your March 28, 2006 letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments.

Item-by-item responses are provided below. We have reproduced the text of your comments in *italics* before each response.

Comment 1:

The DEIS should provide additional support and justification of the need for additional generation to meet the growth in system peak load. While the DEIS includes a general discussion of the problem in Section 1.2, examples are from 2003, and should be brought up to date. In addition, it is especially surprising that no current peak forecast is provided. An update to the 2004 forecast is needed to reflect implementing DSM programs in the HECO Integrated Resource Plan (IRP-3), revised expectations of CHP deployment, effects of rate design options for load management, new information about the plans of major customers, and any reduction in demand that may have occurred due to the increase in the price of electricity caused by the jump in fuel prices in 2005.

Based upon the forecast, the DEIS should also provide an estimate of annual operating hours for each year of the IRP and annual fuel requirements based upon the operating hours. This information is needed to assess variable costs and to more accurately estimate pollution and other consequences of operation.

Response: The comment includes several points, each of which is addressed below.

- The discussion of need presented in the *DEIS* synthesized the information that was used in preparing IRP-3. In response to your request, and because additional information became

available after publication of the *DEIS* that shows the need for new capacity is even greater now, we have included further information on need in the *FEIS*. This information is from HECO's annual "Adequacy of Supply" report to the Public Utilities Commission, submitted on March 6, 2006.

- The examples in Section 1.2 drawn from 2003 are used only to illustrate patterns, not absolute levels of energy use. For example, "Figure 1.2 - Variation in Energy Use Over a Typical 24-Hour Period" shows that energy use during the evening peak is nearly double the use in the early hours of the morning. While 2003 data were used to generate the chart, the pattern was similar in 2002, 2004, and 2005. Hence, Figure 1.2 provides an accurate illustration of the point. The same is true of Figure 1.3 - Variation in Peak Energy Use over a Typical Week, and Figure 1.4 -Seasonal Variation in Peak Energy Use. These figures are meant to illustrate patterns over time, and the pattern has not changed in subsequent years. Hence, we see no need for new charts.
- HECO plans to operate the proposed combustion turbine as a peaking unit. Peaking units are typically the last units dispatched on the system and are used when other available units are unable to reasonably supply the load. Much of the time when they are running they are operated only at low output levels to provide spinning reserve. Consequently, a peaking unit's operating hours and fuel use are much more variable than those of baseload and cycling units. For this reason, HECO analyzed how the proposed peaking unit might operate under various system scenarios. These analyses show that operating hours for this unit could be as low as 650 hours per year or as high as 2,500 hours per year. Similarly, depending upon the extent to which it must be run to support the electrical system, fuel use in any given year could be as low as 75,000 barrels or as high as 400,000 barrels.
- It should be noted that the "support and justification of the need for additional generation" will be decided by the Public Utilities Commission in Docket No. 05-0145. In Order No. 22381 (filed April 12, 2006), one of the issues is "whether HECO's proposed Project will provide facilities which are reasonably required to meet HECO's probable future requirements for utility purposes."

Comment 2:

Section 1.3 of the DEIS discusses the selection of the CT based upon a summary of HECO's Integrated Resource Planning (IRP) Process. HECO's presumptive conclusion that the CT was always to be a component of any IRP plan does not constitute support or justification for the proposed CT as the most cost-effective or preferred option to meet Oahu's future electricity needs. In addition, the discussion of the CRP finalist plans in Section 1.3.2.7 does not make it clear that a CT in 2009 was a basic assumption in all of the plans HECO presented. The CT is not mentioned in the narrative on plans 2 and 3, but should be included as it was part of these plans. Perhaps most important in presenting the project in the context of the IRP is that the Public Utilities Commission (PUC) must approve HECO's IRP, but the PUC has yet to give its approval.

Response: While HECO did include a CT in all of its IRP-3 plans, this resource was not an arbitrary selection. Based on an extensive integration analysis, the CT was identified as a 2009 resource in HECO's IRP-2 as well as the IRP-2 Evaluation. Planning and preliminary engineering efforts to install the CT were subsequently initiated, consistent with HECO's IRP-2 Evaluation Supply-Side Action Plan filed in 2002. At the time the integration work for IRP-3 began in 2004, HECO had already submitted an application for a Covered Source/Prevention of Significant Deterioration permit ("air permit") with the State of Hawaii Department of Heath. Additionally, HECO's 2004 Adequacy of Supply report identified a 30MW to 40MW capacity shortfall in the 2006 to 2009 timeframe. Therefore, for purposes of IRP-3, each of the finalist plans contained a simple cycle combustion turbine installed in 2009 as the first supply-side unit in the plan.

DBEDT questions "*the discussion of the CRP finalist plans in Section 1.3.2.7*" above. To clarify, the paragraph in Section 1.3.2.7 at the bottom of page 1-19 begins as follows:

> *Despite the different aims of the plans, they share some common elements. In particular, under all plans, integration modeling determined that a 100 MW class CT is the preferred generation unit type for installation in 2009 in order to best meet the forecasted electricity demand.*

However, for consistency, the Final EIS will repeat mention of the 2009 CT in the narrative discussion of plans 2 and 3.

Finally, we respectfully disagree with the Department's statement that the Public Utilities Commission (PUC) must approve HECO's IRP. HECO is required to file the IRP, as it did on October 28, 2005, but PUC approval of this plan is not a required condition for this project to proceed. The PUC's Decision & Order on the last IRP submitted by HECO (IRP-2) did not specifically approve the IRP, but stated "although HECO's 2nd IRP and Action Plans will have the status of plans filed with, but not approved by, the commission, HECO may execute the plans pursuant to Section II.C.3 of the IRP Framework as if approved by the commission." As previously noted, HECO's IRP-2 included a CT in 2009. And, as stated in footnote 9 at the bottom of page 1-11 of the *DEIS*:

> *Notwithstanding approval of an IRP plan, expenditures for any capital project in excess of $2,500,000 and specific demand-side management program elements included in an integrated resource plan or a program implementation schedule must be submitted to the PUC for review and approval.*

The PUC docket on HECO's application for the proposed new generating unit (filed by HECO on June 17, 2005) will be the proceeding in which the issue of the need for the proposed capacity addition is determined. This is confirmed in the PUC's March 24, 2006 letter to the City & County of Honolulu Department of Planning and Permitting, in which the PUC stated that it will address whether the project is needed to accommodate the forecasted load growth within Dockets No. 02-0253 and Docket No. 05-145.

Comment 3:

> *The DEIS should provide a clear explanation as to the sizing of the CT units proposed. The proposed two new 110 MW CT units are not among the list of supply-side resources selected in HECO's IRP-3 as listed In Table 1.6 of the DEIS. HECO's integration model that identified the "Finalist Plan" was based on the unit information for 76 MW units as a proxy for a 100 MW CT which HECO's integration model identified as "the preferred generation unit type for installation in 2009 in order to best meet the forecasted electricity demand." The DEIS does not provide any information on how this "preferred generating unit type" (100 MW CT) was determined or the assumptions used. The DEIS also does not discuss whether the proposed 110 MW unit, which is about 45% larger in capacity than the 76 MW unit used in the analysis, would affect the results of HECO's integration model.*
>
> *HECO's response to the letter from Mr. Matthew Riel, President of AES Hawaii Inc., that was included in the DEIS, indicates that HECO's analysis shows that "there may be reserve capacity shortfalls ranging between 50 MW to 70 MW from 2005 until the next unit can be added in 2009". The proposed new oil-fired 110 MW CT unit planned for 2009 is more than double the lower range of HECO's estimated reserve capacity shortfall. HECO should include a table and narrative comparing the CTs it considered. The table should compare, among other things, capacity, heat rate in the peaking mode, cost to install, life cycle O&M, and life cycle fuel costs.*

Response: In evaluating CT units, it is important to note that combustion turbines are generally grouped by size. One size category ranges from about 75 MW to 120 MW and is referred to as the nominal 100 MW size. The next larger size category ranges from about 160 MW to 170 MW. While the 110 MW CT unit is not listed in the main part of Table 1.6 of the DEIS, the note at the bottom of Table 1.6 states that "a simple-cycle combustion turbine from GE that generates 76.3 MW is considered a member of the 100 MW class of generators, as is a 110 MW generator from Siemens-Westinghouse." The preferred generating unit type (100 MW CT) was established through analyses done as part of the IRP-2 process. These analyses considered the effects of both a 76 MW CT and a 107 MW CT. Subsequent analyses for IRP-3 were done using a 76 MW unit as the 2009 installed CT unit. However, sensitivity analyses were done with a 107 MW unit being installed in 2009, which showed that the IRP-3 plans were not significantly altered regardless of which unit is installed.

IRP planning assumptions may not always align completely with the final project configurations. HECO may not be able to predict the exact project schedule or capacity during the IRP process, which nearly always occurs in advance of detailed design efforts. IRP Plans may be characterized as planning "strategies", rather than as fixed courses of action. Therefore, we do not believe a detailed comparison of the candidate CTs is necessary for the FEIS. HECO believes that such engineering and technical issues relating to design choices are more appropriately dealt with in PUC Docket No. 05-0145 (HECO application for permission to expend funds in excess of $2.5 million on the projects).

Comment 4:

Table 1.6, mentioned above, provides the list of supply-side resources that were evaluated in HECO's IRP-3. The DEIS should include the complete list of supply resources that were evaluated and from which the supply resources listed in Table 1.6 were selected.

Response: Attached is the Executive Summary of the IRP-3 Appendix O – Supply-side Portfolio Update, which explains the process that was followed to determine potential supply resources. This attachment includes the complete list of supply resources that were evaluated.

Comment 5:

The DEIS does not provide justification for the second 110 MW CT generating unit included in HECO's proposed project. Neither IRP-3 nor the DEIS provides the basis for selecting an oil-fired generating unit as the preferred unit to install in 2022.

Response: The *DEIS* does not state that HECO has selected "*an oil-fired generating unit as the preferred unit to install in 2022.*" Figure 1.10, which depicts HECO's "Final Preferred Plan" in IRP-3, and the narrative in Section 1.3.3 of the DEIS explain HECO's long-term generation addition plan as described in IRP-3. It states:

As discussed in Section 1.3.2.10, HECO hopes that its efforts to limit demand and meet customers' needs using existing resources and the first CT will eliminate the need to add even more firm capacity in the 2009 to 2013 time period and delay the need for the 180 MW coal unit. If HECO determines that additional capacity is needed that cannot be satisfied through the measures included in its IRP-3 Plan, it will seek a separate PUC approval for that capacity. In all likelihood HECO would request permission to provide that capacity with a second combustion turbine constructed on the same site as the 2009 unit. Because of this, the air pollution control permit application was amended to include the second CT and it will be included in HECO's application for a Public Infrastructure Map Amendment for the 2009 unit and is covered by this EIS. It should be emphasized that inclusion in this EIS does not commit HECO to actually install a second unit. It does allow full consideration of potential cumulative impacts and provides a sound factual basis for the City Administration and City Council's review of the proposed actions.

Thus, installation of additional generating capacity is part of a contingency plan – not a currently operative plan itself.

HECO has made concerted efforts to forestall additions of central station generation by emphasizing demand-side management (DSM) to reduce load and distributed generation to help offset system peaks that must be served by central station generation. HECO's DSM efforts also have aggressively pursued renewable resources, which contributed to Hawaii having one of the highest solar water heating usage rates in the nation. The load reduction from the aggregate installation of these solar water heaters is equivalent to the total electricity needs of over 6,200 homes.

HECO hopes that additional capacity will not be needed. The last unit that HECO installed was Kahe Unit 6, which went into service in 1981, a quarter of a century ago. Almost 14 years have passed since the last independent power producer installed new fossil-fuel generating capacity here.

Throughout all of our efforts, however, we operate on the maxim that "failure is not an option" when it comes to delivering reliable electric service. We have, therefore, engaged in parallel planning, moving along both non-generation and generation efforts. Any second 110 MW CT generating unit in the DEIS is part of our contingency plans, and is included to meet our responsibility to mention a possibility, while still not a certainty, in our planning.

Comment 6:

The DEIS does not comply with the requirements of §11-200-10 that the environmental assessment include among other things, a general description of the economic impacts of the proposed project. Table 2.2 provides the preliminary estimate of the construction cost of the first 110 MW CT, the new 138 kV transmission line, and the community benefit capital cost at 5140M ($230M with the 2nd CT). This cost will be recovered from HECO's ratepayers, and the DEIS should to provide [sic] *an assessment and description of the rate impact of such costs to Oahu's consumers.*

Additionally, the DEIS should provide an assessment and description of the rate impact of fuel costs, to include alcohol fuels as announced by HECO on March 21, 2006, as the primary fuel desired for the new unit, plus naphtha and diesel in the event alcohol fuels are not available. The rate impact of the proposed project on the ratepayers, will inevitably impact Oahu's economy. The DEIS should provide an assessment and description of the proposed project's economic impact resulting from the rate impact on ratepayers from both capital and operating costs (to include fuel) pursuant to §11-200-17(B.2) which requires that the draft EIS shall include a discussion of the beneficial and adverse impacts including the cumulative and secondary impacts. Therefore, to meet these standards, DBEDT believes that any such economic impact analysis must consider up-to-date fuel price forecasts, as well as include sensitivity analyses to assess the impact of severe, sudden oil price spikes that are reasonable assumptions given the expected operational life of the proposed project.

Response: HECO believes that the *DEIS* does provide a general description of the economic impacts of the proposed project, as required by HAR §11-200-10 and believes this discussion to be sufficient. Further, it should be noted that the PUC regulates HECO rates and will ultimately determine what costs may be added to the HECO rate base.

Nonetheless, it is possible to translate estimated capital costs into an annual amount that HECO would need to recover through rates to recoup those costs. Our calculation shows that the potential incremental bill impact beginning in 2010 for the average residential customer is approximately $2.38 per month (in 2009 dollars), assuming the CIP Generating Station is placed into service in 2009. This is consistent with the planned use of these units as peaking units,

where the initial capital cost typically has more effect on the ratepayer than the operational costs. As an example, even at $100 per barrel (a high estimate of fuel cost) and 200,000 barrels per year (the middle of the 75,000 to 400,000 barrel per year range noted in our response to comment 2), the cost of the $2 million per year fuel cost would be only a fraction of the cost of amortizing the capital cost of the unit.

The company's IRPs have compared how different alternatives for the next increment of generation would affect the overall cost to operate the entire electric generating system. These types of analyses, which factored in initial capital cost as well as operational costs led to selection of a nominal 100 MW simple-cycle peaking unit as the preferred option for the proposed generating unit. HECO believes that to redo the IRP process as part of the EIS is beyond the scope of Chapter 343 requirements.

As a point of clarification, HECO does plan to use ethanol as a blend with naphtha or diesel for use in the proposed combustion turbine. Regardless of which of these two alternative fuels is used, it is likely to be more expensive than the Low Sulfur Fuel Oil used in the majority of HECO's generating units.

Comment 7:

The DEIS does not comply with §11-200-17(F), which requires that the draft EIS shall include "alternatives which could attain the objectives of the action, regardless of cost, in sufficient detail to explain why they were rejected." The four 'Alternatives' to the proposed project included in the DEIS do not represent alternative options that would achieve the objective of the proposed project which is to meet the existing and forecasted system peak load, and address the projected reserve capacity shortfall which HECO anticipates to continue until 2009. The alternatives required under §11-200-17(F) are intended to include alternative energy resources, regardless of cost, both demand-side and supply-side resources, that would meet the requirements of the existing and future growth in energy load.

a. All involve scaling down or eliminating components of the proposed project. For example, Alternative 2 is the same as the proposed project with elimination of the CT unit planned for 2022. Similarly, Alternative 4 only includes the proposed additional 138 kV transmission line. Clearly, if the proposed project is needed to meet the needs of the growth in system peak load, Alternative 4 is not a reasonable alternative to the proposed project, because it cannot produce or offset the need to produce electricity, which HECO has claimed is required.

b. The DEIS has not shown whether obvious alternative energy supply resources, regardless of cost as required by §11-200-17(F), were considered and rejected by HECO. These include expanding the H-POWER capacity by 16 MW, increasing the amount of power to be delivered by AES Hawaii from the current contract amount of 180 MW to the plant's capacity of 189 MW to meet the growth in the system peak load.

c. The DEIS has not shown what alternative demand-side options (in addition to its regular technology-based demand-side management programs), such as rate design options that would encourage load shifting (i.e., various forms of Time-of-Use Rates such as Critical Peak Demand Rate, Demand Response, Real Time Pricing) were considered for application of additional resources to increase their peak demand savings and to mitigate the need for a new central generating plant.

d. The DEIS should report total CT project costs, including capital costs, O&M, and all variable costs, such as taxes, interest and fuel. Variable costs should be estimated based upon forecast operating hours. These costs could be compared then to the costs of other plausible alternatives.

Response: HECO believes that the *DEIS* does comply with §11-200-17(F). In formulating the above comment, DBEDT may have focused only on those alternatives listed in Section 2.7.2. HECO suggests that DBEDT consider the other alternatives discussed in Section 2.7.3 and in the extensive IRP discussion presented in Section 1.3.2. In the overall energy planning process, HECO has sought to comply fully with not only the letter, but the intent, of HAR §11-200. Taken together, these include consideration of alternative energy resources, regardless of cost, and both demand-side and supply-side resources that could satisfy customers' need for electrical power. Therefore, HECO believes that it has complied fully with HAR §11-200.

The following responds briefly to statements made in sub-paragraphs (a) through (d) of DBEDT's letter.

- HECO's Final Preferred Plan (see Figure 1.10) of the DEIS does not include a combustion turbine in 2022. It did not envision installation of the second CT in that year.
- The proposed project includes both generation and transmission components. While it is true that Alternative 4 does not fulfill the generation objectives, it does satisfy the transmission objectives and so may reasonably be considered an alternative as can the "no project" alternative, which satisfies none of the objectives, or the reduced-scale generation alternatives which fulfill only some of the generation objectives.
- The DEIS was delayed so that it could include a discussion of all of the alternatives that were included in IRP-3 as submitted to the PUC. HECO supports the City's plans to expand the amount of power that is provided by HPOWER. It has also been negotiating with AES for an increase in the power that it purchases from that facility, though the negotiations have been slow and complicated by requirements of new accounting rules and issues. Moreover, the IRP process provides for the consideration of non-monetary values, including potential environmental effects that might be avoided if alternative energy supply resources were implemented in lieu of the resource mix that was ultimately chosen.
- HECO does not believe that the DEIS is the appropriate place to explore more "alternative demand-side options …such as rate design options that would encourage load shifting (i.e., various forms of Time-of-Use Rates such as Critical Peak Demand Rate, Demand Response, Real Time Pricing)." We believe that the many tradeoffs that are involved in balancing these factors are best dealt with by the IRP process and in rate case proceedings before the PUC.

Not withstanding this, it should be noted that HECO has implemented time-of-use rates and the extent to which customers have taken advantage of HECO's existing time-of-use options is included in its sales and peak forecasts. Historical load reduction from time-of-use rates has been relatively small and the prospects for additional customer adoptions are uncertain. HECO has extended its time-of use rates to all classes of customers in its rate design proposals currently pending at the PUC in its rate case docket. Later this year HECO plans to request PUC approval to include demand load response programs into HECO's DSM programs. The 2006 Adequacy of Supply (AOS) letter provides more details of HECO's proposals and the load reduction impacts are included in the projected DSM impacts outlined in the 2006 AOS. Critical peak pricing places a heavy penalty on customers who use electricity during specifically identified periods. HECO has avoided heavily penalizing customers and has instead implemented and proposed programs that provide positive incentives for customers to shift load away from the system peak. Real-time pricing requires replacing electric meters with meters with real-time capabilities, which is costly from a hardware perspective and HECO will continue to evaluate this option.

- HECO has worked hard to avoid construction of new fossil-fuel generating units and is proposing to do so now only because it believes that it is absolutely needed to maintain the reliability of the island's energy supply. Moreover, the new generating unit will be able to use alternate fuels (such as ethanol and other biofuels) and HECO has solicited letters of interest from potential ethanol suppliers. As of June 30, 2006, HECO received seven responses from interested ethanol suppliers. This view of need for the new unit is reflected at least in part in the DBEDT's August 10, 2005 comments on the IRP-3, which stated: "*We believe acceleration of the deployment of the nominal 100 MW combustion turbine should be given the greatest priority.*"

- It is not clear what DBEDT means by the term "plausible alternatives." However, as discussed above, the IRP process compared alternatives based on overall costs. IRP-2 concluded that a nominal 100 MW simple-cycle combustion turbine should be installed as the next increment of generation capacity on Oahu. The PUC ruled that "although HECO's 2nd IRP and Action Plans will have the status of plans filed with, but not approved by, the commission, HECO may execute the plans pursuant to Section II.C.3 of the IRP Framework as if approved by the commission."

Comment 8:

Page 2-9, Table 2.1. Selected Characteristics of the Siemens WD501D5A. Recommend the table be expanded to allow comparison of characteristics of other CT options. The table should also provide the number of days of supply represented by the fuel storage in gallons value provided on the table. The number of days of supply should be based upon forecast operating hours.

Response: As discussed above, HECO does not believe that the EIS is the appropriate place to discuss the vast array of detailed technical options that were identified and evaluated in selecting the Siemens WD501D5A CT from among the many alternatives considered.

Comment 9:

Page 2-23, Anticipated Costs. Based upon the discussion, it appears that Table 2.2, on the following page, should be labeled "Estimated Capital Costs" instead of "Estimated Construction Costs". If the values in Table 2.2 are not full capital costs, they should be corrected and components of capital costs should also be enumerated in the text.

Response: Thank you for calling this to our attention. The table in the FEIS will be labeled "Estimated Capital Costs."

Comment 10:

Page 3-5, Figure 13 depicts the Annual Wind Rose for Campbell Industrial Park in support of the discussion of Wind Patterns in Section 3.3.1.3 on the next page. The figure would more clearly show the potential effects of the wind pattern on dispersal of the plant's pollution if the surrounding terrain were also shown. The downwind flow patterns should also be shown to give the reader a better idea of how neighboring businesses and residential areas might be affected.

Response: The wind rose in the *DEIS* is shown in accord with standard convention. Nonetheless, in response to DBEDT's concerns, a map of the surrounding area has been placed on the same figure which shows clearly that wind blows emissions from the facility away from populated areas for the vast majority of the time. We have not attempted to portray the "downwind flow patterns" for two reasons. First, "downwind" is not constant so it is not possible to show a single flow pattern. Second, if the drawing were simplified to show that the great majority of the time wind carries emissions way from populated areas, some observers might feel that downplays the fact that winds sometimes do blow from a direction that carries emissions toward populated areas.

Comment 11:

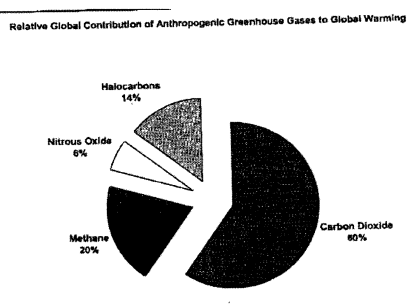
Page 3-9, Section 3.15.2. Global Warming. The discussion is misleading and inadequate as an explanation of global warming. The supporting Table 3.4 is out-of-date and from an obscure source which did not document the data sufficiently.

We suggest that HECO review Climate Change 2001: The Scientific Basis, Summary for Policymakers, A Report of Working Group 1 of the Intergovernmental Panel on Climate Change (http://www.ipcc.ch/pub/spm22- 01.pdf). For example, the IPCC report opens with "an increasing body of observations gives a collective picture of a warming world and other changes in the climate system" (p.2). The report then discusses a number of observations of increasing temperature, sea level rise and increased ocean heat content, and other observations of changes in climate and some which have not changed. On

page 5, the IPCC report states that, "emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate." It then goes on to explain the concept of radiative forcing that warms the surface of the planet (commonly called global warming).

We are providing a suggested replacement table below. It is based upon Table 6.11 from Climate Change 2001: Working Group 1: The Scientific Basis, the latest report of the Intergovernmental Panel on Climate Change. The table presents the numerical values of global and annual mean radiative forcings due to greenhouse gases from pre-industrial (1750) time to the present (2000). The chart referenced by HECO's source appears to have used an earlier report, which based its estimate upon a different timeframe.

(See http://www.grida.no/climate/ippcc_tar/wg1/251.htm)



It should be noted that carbon dioxide emissions from energy uses are characterized as the main source of global warming. Furthermore, 90% of Hawaii's emissions were from carbon dioxide, 9% from methane, and 1% from nitrous oxide in 1990, the base year inventory of Hawaii's greenhouse gases. While there may have been some halocarbon emissions, they were likely minimal. About 89% of Hawaii's emissions came from the energy sector, with electricity use, accounting for 41% of total greenhouse gas emissions as counted under the approach used by the U.S. Environmental Protection Agency. This excluded international aircraft and marine fuel use, and military fuels. (Hawaii Climate Change Action Plan. Honolulu: Department of Business, Economic Development, and Tourism, 1998.)

Response: HECO does not believe the discussion of global warming in the DEIS is misleading nor does HECO believe Environment Canada (that country's equivalent to the U.S. Environmental Protection Agency) is "an obscure source." The exact percentages that DBEDT has provided differ only slightly from those in the DEIS. These differences certainly do not

obscure the fundamental point: regardless of whether carbon dioxide constitutes 55% or 60% of total greenhouse gas emissions, it is a big part of the problem.

HECO also believes that the discussion on global warming in Chapter 3 of the *DEIS* is adequate in view of the information that is provided in the main discussion of that topic in Chapter 4. As indicated in the very first sentence in Chapter 3, "*This chapter provides an orientation* [underline added] *to the environmental, cultural, and social characteristics of the areas that would be affected by the alternatives described above.*" The following paragraph states, in part: "*The information is intended primarily as a means of orienting readers to the general characteristics of the project area and to outline the general kinds of resources that will be examined in further detail in the impact analysis included in Chapter 4.*"

The goal of the *DEIS* is to focus on potential impacts in a style consistent with the guidance of HAR §11-200-19, which states *"In developing the EIS, preparers shall make every effort to convey the required information succinctly in a form easily understood, both by members of the public and by public decision-makers, giving attention to the substance of the information conveyed rather than to the particular form, or length, or detail of the statement."* Hence, the discussion in Chapter 3 was not intended to be a primer on all aspects of global warming or any other aspect of the environment. It is intended to provide a brief overview of conditions, with detailed descriptions being presented in Chapter 4 as part of the discussion of potential impacts. HECO believes that this makes for a more useful document that is fully consistent with the requirements of Chapter 343, Hawaii Revised Statutes and HAR §11-200-19.

HECO does agree that it is better to have the more recent information on global warming and appreciates the suggestions DBEDT provided as to a specific source. Accordingly, we have updated the information in this chapter to include the information referenced in *Climate Change 2001: The Scientific Basis, Summary for Policymakers, A Report of Working Group 1 of the Intergovernmental Panel on Climate Change.*

HECO also appreciates the information provided about existing greenhouse gas emissions in Hawaii. We have included the following in Section 4.11.3.5 of the *FEIS.*

> *The State Department of Business, Economic Development, and Tourism estimates that in 1990 approximately 90% of Hawaii's emissions of greenhouse gas were from carbon dioxide, 9% from methane, and 1% from nitrous oxides (Department of Business, Economic Development, and Tourism, 1998:3-2). In that year, two sectors (Transportation and Electricity) accounted for over 90 percent of the State's greenhouse gas emission, with the amounts nearly evenly split between the two. This excluded international aircraft and marine fuel use, and military fuels.*

Please note that issues related to greenhouse gases are also addressed in HECO's response to Comments 14 and 15, below.

Comment 12:

Page 4-8, Table 4.1. Worst Case Emissions from Preferred Alternatives and Page 4-9, Table 4.2. Worst Case Emissions from Preferred Alternatives. The annual values in

these two tables appear to he based upon 8760 hours of operation - constant operation. This does not seem likely since this unit is slated to be a peaking unit and some maintenance will be required annually. It would be more realistic to base this estimate on a forecast of operating hours. In addition, given HECO's announcement of its intention to use ethanol in this unit, the worst-case emissions should also be calculated for ethanol and a nominal ethanol/naphtha blend, which HECO is also considering.

Response: DBEDT is correct that the annual values in the two tables are based upon 8,760 hours of operation per year. To ensure reliable service on O'ahu, HECO needs the flexibility to operate each of its generating units 24 hours per day, 7 days a week if that is needed. This is a function of being on an island with no other generation sources to provide backup in an emergency. It is true that it is very unlikely that peaking units would ever operate this much, but because they will have permits that allow them to do so, the DEIS indicates the extreme or "worst-case" estimates. Since the emissions from 8,760 hours of operation will not result in a violation of the Federal and State Ambient Air Quality Standards, HECO does not believe that the DEIS needs to quantify the lower emissions that would result from less than continuous operation. Further, since the peaking units are being permitted to operate 8,760 hours per year, it could be seen as misleading to focus on emission estimates for fewer hours of service.

As previously mentioned, HECO intends to use an ethanol/naphtha blend in this unit if it is approved by the PUC. Air emissions from using a naphtha/ethanol blend are anticipated to be the same or lower than those resulting from use of straight naphtha alone. Therefore, HECO also does not believe the EIS needs to quantify lower emissions resulting from a naphtha/ethanol blend.

Comment 13:

Page 4-30 and page 4-36 each contain a Table 4.18 with different information. This is apparently a typographical error.

Response: Thank you for calling this to our attention. The table following Table 4.13 is labeled Table 4.18, but should have been labeled Table 4.14. The *FEIS* contains the correct table number. This correction affects subsequent table numbers in this chapter as well.

Comment 14:

Page 4-40, Section 4.3.11 Global Warming. This discussion is based upon the Second Assessment Report, produced in 1995. Newer, more complete and more accurate information is available in the Third Assessment Report, produced in 2001. The current conclusion of the Intergovernmental Panel on Climate Change is that, "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities (Summary for Policymakers, attached, page 10)." This is a much stronger statement made in the Second Assessment Report, which is cited in the DEIS, "the balance of evidence suggests a discernible human influence on global climate."

Response: As discussed in response to Comment 15, below, the *FEIS* contains a revised discussion of this topic drawn from the IPCC's *Summary for Policy Makers*.

Comment 15:

We recommend that HECO prepare a new discussion of global warming and climate change based on the attached Summary for Policymakers. In addition, annual and life cycle greenhouse gas emissions should be calculated for the various fuels that may be used in the CT, including ethanol which HECO has announced as the preferred fuel and a nominal ethanol/naphtha blended fuel also under consideration.

Response: The *FEIS* contains a revised discussion of potential effects on global climate based on the IPCC's *Summary for Policy Makers*. Also, because DBEDT included the entire *Summary* as an attachment to its comment letter, the summary will be included in the *FEIS* as well.

As stated earlier, HECO does plan to use ethanol blended with naphtha in this unit.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

RCI:pt

Attachment:
(1) IRP-3 Appendix O: Supply-side Portfolio Update Executive Summary

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

Executive Summary

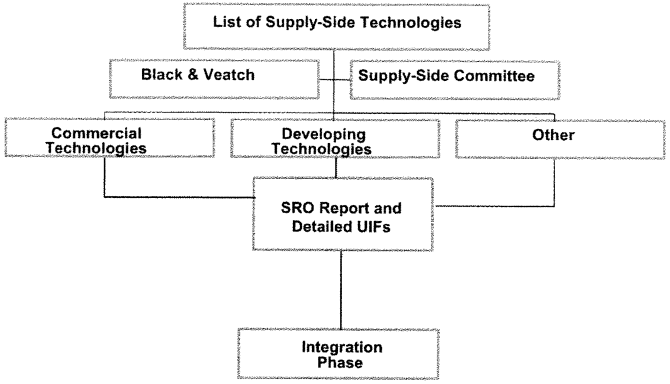
Energy utilities in Hawaii are required to develop an integrated resource plan (IRP) and program implementation schedule in accordance with a specific framework included in the Decision and Order as issued by the State of Hawaii Public Utilities Commission. In developing the IRP, the utility is required to consider all supply-side and demand-side resource options appropriate for Hawaii and available on the planning horizon.

This report summarizes the results of the supply-side resource option (SRO) study completed by Black & Veatch (B&V) in support of the Hawaiian Electric Company (HECO) IRP-3 work effort. Figure ES-1 depicts the process elements of the HECO IRP-3 SRO work effort. HECO provided overall direction for the project and coordinated information requests between HECO and B&V. B&V was responsible for resource option screening, fossil fueled commercial resource capital cost update, new resource option technical characterization, and renewable energy resource and selected commercial resource option technical characterization. A Supply-side Technical Committee (SSCOM), a subcommittee of the HECO IRP-3 Advisory Group, was formed to represent the state and county governments, private industry and the community and to provide input to the IRP process by attending meetings, participating in the resource option screening process, and providing input on the B&V work statement and the technical characterization content.

The objective of this study is to identify and assess supply-side resource options for use in developing HECO's IRP-3 long-range plans. The supply-side assessment requires the development of sufficiently detailed information and data for an accurate representation of the cost and performance of the resource options.

The selection of commercial resources for IRP-3 is built on the results of IRP-2. The IRP-2 screening process, where a large number of potential supply-side options were considered and then screened to eliminate resources "clearly not feasible" and not appropriate in Hawaii for the HECO system, was reviewed and updated. The objectives of this review are as follows.

- Review and update the IRP-2 screening approach.
- Identify candidate supply-side resource options.
- Develop technical briefs for selected options.
- Compare current status against screening criteria.
- Recommend IRP-3 resource screening changes.



HECO IRP-3 SRO Work Effort
Figure ES-1

In general, the IRP-2 screening criteria were found to still be appropriate. Since the completion of the IRP-2 process, several developing and emerging resource options have demonstrated improved performance and cost characteristics and more of a presence in the power industry. The SSCOM and B&V identified those resource options that exhibit the highest degree of transition toward commercialization in the power industry. Wind energy is considered a commercial technology. The following resource options warrant further consideration to determine the appropriate time frame placement for the IRP-3 process:

- Steam Injected Gas Turbine Cycle on Medium Frame Combustion Turbine Generator
- Waste-to-Energy Technologies
  - Municipal Solid Waste Mass Burn
  - Refuse Derived Fuel
  - Plasma Arc Gasification
- Central Station Photovoltaics
  - Fixed Tilt
  - Single Axis Tracking

- Residential Photovoltaics
  - Fixed Tilt Stand Alone
  - Hybrid Fixed Tilt Photovoltaics and Battery System with Back-up Battery Charging System
- Fuel Cell Technologies
  - Phosphoric Acid
  - Molten Carbonate
  - Solid Oxide
  - Proton Exchange Membrane
- Ocean Thermal Energy Conversion
- Ocean Wave Energy
- Solar Thermal Electric
  - Parabolic Trough
  - Parabolic Dish
  - Power Tower or Central Receiver
  - Solar Chimney
- NovelEdge™ Technology

The above set of resource options are considered as candidate commercial resource options for IRP-3 except for fuel cell technologies, ocean thermal energy conversion, ocean wave, solar thermal electric, and NovelEdge™. In the IRP-2 report, the steam injected gas turbine (STIG) cycle was considered as a developing resource and classified as an advanced combustion turbine system. Waste-to-energy technologies were not specifically identified in the IRP-2. Central station photovoltaics (PV) was grouped as a developing resource while the residential photovoltaics systems were not identified in IRP-2. Phosphoric acid fuel cell (PAFC) was considered as commercial in IRP-2, while the molten carbonate and solid oxide fuel cells were considered as developing in IRP-2. The proton exchange membrane technology was not identified in IRP-2. Ocean thermal energy conversion and ocean wave were retained as developing resources in IRP-2. Solar thermal electric resources were grouped as solar thermal power systems in IRP-2, except for parabolic dish with Stirling Engine which was listed separately, and solar chimney which was not considered. The solar thermal power systems and the parabolic dish with Stirling Engine were considered as developing in IRP-2.

The current status of technological development for each candidate commercial resource option was compared to the commercial resource option screening criteria on a pass/fail basis. Table ES-1 summarizes the comparison of each resource option against

the five commercial resource option screening criteria. As shown in Table ES-1, STIG, central station and residential PV, and MSW mass burn and RDF technologies meet all screening criteria and are considered new commercial IRP-3 resource options. All other resource options failed at least one or more of the commercial screening criteria and are subsequently classified as non-commercial resource options.

PAFC, at the time of evaluation, was dropped from further consideration as its sole vendor United Technologies Company Fuel Cells (UTC FC) was phasing out the technology. UTC FC is now considering offering their PAFC again. The current status of technological development for the remaining six non-commercial resource options was compared to the developing resource option screening criteria on a pass/fail basis. Table ES-2 summarizes the comparison of each resource option against the four developing resource option screening criteria. All of the six non-commercial technologies meet all screening criteria and are considered developing IRP-3 resource options.

The results of the IRP-3 resource screening activities were blended with the results from the IRP-2 resource screening for options whose development status was unchanged since 1997. Table ES-3 summarizes the time frame placement for the IRP-2 resource options and the recommended time frame placement for the IRP-3 candidate resource option.

Following the identification of the new IRP-3 commercial resource options, technical characterizations of the following technologies were completed:

- Steam Injected Gas Turbine Cycle on Medium Frame Combustion Turbine Generator
- Waste-to-Energy Technologies
  - Municipal Solid Waste - Mass Burn
- Residential Photovoltaics
  - Fixed Tilt Stand Alone
  - Hybrid Fixed Tilt Photovoltaics and Battery System with Back-up Battery Charging System

In addition to the above candidate commercial technologies, a technical characterization for wind technology was also completed. Wind technology was already considered as a commercial resource option in IRP-2 but there has been a significant development in wind turbine size since then such that the technology warrants further characterization in IRP-3. In addition, Black & Veatch was directed by HECO to provide biomass cofiring and NovelEdge™ technology technical briefs in this report.

From the results of the resource screening activities in Table ES-3, the SSCOM and B&V identified a reduced set of commercial resource options that would undergo more in-depth evaluation by B&V. The evaluation included the development of current technical and commercial parameters for each resource, including the preparation of a

complete set of updated Unit Information Forms (UIFs). In IRP-2, fifteen commercial resource options were identified and resulted in the preparation of thirty three UIFs. In IRP-3, the supply-side team has identified a total of nineteen commercial resource options including six new commercial resource options and thirteen commercial resource options that were also identified in IRP-2 and in IRP-1. A total of twenty four UIFs have been developed for these nineteen IRP-3 commercial resource options. The new commercial resource options are listed previously. Table ES-4 lists the other thirteen IRP-3 commercial resource options. The location listed is prototypical and utilized in the IRP-3 process as a basis for the capital cost estimating.

B&V reviewed and updated the IRP-2 assumptions and design features for the fossil energy, biomass combustion, and wind energy resource options listed in Table ES-4. These updated assumptions and design features form the basis for the development of a refined set of technical characteristics. The results of the IRP-3 evaluation for the new commercial resource options are summarized in Table ES-5 and in Table ES-6 for the commercial resource options that are listed in Table ES-4.

Table ES-1
Candidate Commercial Resource Option Screening Status

Candidate Resource Option	Vendor Availability	Proven Technology	Utility Scale	Established Capital/Op Cost	Resource Availability	IRP-3 Commercial Status Check
Photovoltaics	Yes	Yes	Yes	Yes	Yes	Pass
Residential Photovoltaics	Yes	Yes	-	Yes	Yes	Pass
Residential Photovoltaics with Battery and Generator Backup	Yes	Yes	-	Yes	Yes	Pass
Biomass Cofiring	Yes	Yes	Yes	Yes	Yes	Pass
Refuse Derived Fuel	Yes	Yes	Yes	Yes	Yes	Pass
MSW – Mass Burn	Yes	Yes	Yes	Yes	Yes	Pass
Steam Injected Gas Turbine Cycle	Yes	Yes	Yes	Yes	Yes	Pass
NovelEdge™ Technology	Yes	No	Yes	No	Yes	Fail
Ocean Thermal	No	No	Yes	No	Yes	Fail
Ocean Wave	Yes	Yes	Yes	No	Yes	Fail
Plasma Arc Gasification	Yes	Yes	Yes	No	Yes	Fail
Fuel Cell						
Phosphoric Acid	No[a]	Yes	Yes	Yes	Yes	Fail
Molten Carbonate	Yes	Yes	Yes	No	Yes	Fail
Solid Oxide	Yes	Yes	Yes	No	Yes	Fail
Proton Exchange Membrane	Yes	Yes	Yes	No	Yes	Fail
Solar Thermal Electric						
Parabolic Trough	Yes	Yes	Yes	No	Yes	Fail
Parabolic Dish	Yes	No	No	No	Yes	Fail
Power Tower	No	No	No	No	Yes	Fail
Solar Chimney	No	No	No	No	Yes	Fail

Notes:
[a] In 2003, United Technologies Company Fuel Cells (UTC FC) announced that it was preparing to phase out the PAFC system in favor of a proton exchange membrane design. In 2004, UTC FC is considering to offer their PAFC again.

Table ES-2
Candidate Non-Commercial (Developing) Resource Option Screening Status

Candidate Resource Option	Sole or Multiple Vendors	Emerging Technology	Potential for Competitive Capital/Op Cost	Resource Availability	IRP-3 Developing Status Check
NovelEdge™	Yes	Yes	Yes	Yes	Pass
Ocean Thermal	Yes	Yes	Yes	Yes	Pass
Ocean Wave	Yes	Yes	Yes	Yes	Pass
MSW - Plasma Arc Gasification	Yes	Yes	Yes	Yes	Pass
Fuel Cells					
Molten Carbonate	Yes	Yes	Yes	Yes	Pass
Solid Oxide	Yes	Yes	Yes	Yes	Pass
Proton Exchange Membrane	Yes	Yes	Yes	Yes	Pass
Solar Thermal Electric					
Parabolic Trough	Yes	Yes	Yes	Yes	Pass
Parabolic Dish	Yes	Yes	Yes	Yes	Pass
Power Tower	No	Yes	No	Yes	Fail
Solar Chimney	No	Yes	No	Yes	Fail

Table ES-3
Grouping of Candidate Supply-side Resource Options

Operating Mode and Technology	Time Frame Placement[a]					
	IRP-2			IRP-3		
	0 to 5 Years	6 to 20 Years	Other	0 to 5 Years	6 to 20 Years	Other
BASELOAD						
Naphtha / Oil						
Utility Boiler	xx			xx		
Combustion Turbine Combined Cycle	xx			xx		
Repowering	xx			xx		
Advanced Combustion Turbines		xx			xx	
Kalina Cycle		xx		Grouped as Adv. Comb. Turbines in IRP-3		
Steam Injected Gas Turbine (STIG)[f]	*Not considered in IRP-2*			*xx*		
NovelEdge™ Technology	*Not considered in IRP-2*				*xx*	
Coal						
Pulverized Coal	xx			xx		
Fluidized Bed Combustion	xx			xx		
Integrated Gasification Combined Cycle	xx			xx		
Pressurized Fluidized Bed Combustion	xx			xx		
Indirect Fired Combined Cycle		xx		Grouped as Adv. Comb. Turbines in IRP-3		
Biomass						
Direct Combustion	xx			xx		
Cofiring in Circulating Atmospheric Fluidized Bed	*Not considered in IRP-2*			xx		
Gasification		xx			xx	
Anaerobic Digestion		xx		xx		
Ocean						
Ocean Thermal Energy Conversion[b]		*xx*			*xx*	
Municipal Solid Waste						
Refuse Derived Fuel[b]	*Not considered in IRP-2*					*xx*[c]
Mass Burn[b]	*Not considered in IRP-2*			*xx*		
Plasma Arc Gasification[b]	*Not considered in IRP-2*				*xx*	
Fuel Cell						
Conventional Fuel Cell	Ungrouped in IRP-2 (see below)					xx
Advanced Fuel Cell	Ungrouped in IRP-2 (see below)				xx	
Phosphoric Acid Fuel Cell[f]	*xx*					*xx*
Molten Carbonate Fuel Cell		*xx*			*xx*	
Solid Oxide Fuel Cell		*xx*			*xx*	
Proton Exchange Membrane[b]	*Not considered in IRP-2*				*xx*	
INTERMEDIATE						
Naphtha / Oil						
Combustion Turbine Combined Cycle	xx			xx		
PEAKING						
Naphtha / Oil						
Combustion Turbine Simple Cycle	xx			xx		
SUPPLEMENTAL						
Wind						

Table ES-3
Grouping of Candidate Supply-side Resource Options

Operating Mode and Technology	Time Frame Placement[a]					
	IRP-2			IRP-3		
	0 to 5 Years	6 to 20 Years	Other	0 to 5 Years	6 to 20 Years	Other
Utility Scale Wind Energy Conversion	xx			xx		
Solar						
Solar Thermal Electric						
Solar Thermal Power Systems		xx		Ungrouped in IRP-3 (see below)		
Parabolic Dish with Stirling Engine			xx	Grouped as Parbolic Dish in IRP-3 (see below)		
Parabolic Trough		*xx*			*xx*	
Parabolic Dish		*xx*			*xx*	
Power Tower		*xx*				*xx*
Solar Chimney	*Not considered in IRP-2*					*xx*
Photovoltaic Systems						
Central Station Photovoltaic Power[b]		*xx*		*xx*		
Residential Photovoltaics	*Not considered in IRP-2*			*xx*		
Residential Photovoltaics with Battery and Generator Backup	*Not considered in IRP-2*			*xx*		
Ocean						
Ocean Wave Energy Conversion[b]		*xx*			*xx*	
STORAGE						
Pumped Storage Hydroelectric[e]	xx			xx		
Battery Energy Storage[e]		xx			xx	

Notes:
[a] Time frame placement in 0 to 5 years is indicative of commercial resource options. Time frame placement in 6 to 20 years is indicative of developing resource options.
[b] New resource options identified as IRP-3 candidate resource options
[c] Addition of City & County boiler will increase refuse derived fuel boiler reliability but not kilowatt output.
[d] In 2003, United Technologies Company Fuel Cells (UTC FC) announced that it was preparing to phase out the PAFC system in favor of a proton exchange membrane design. In 2004, UTC FC is considering to offer their PAFC again.
[e] The time frame placement and technological status for pumped storage hydro and battery energy storage systems have not changed since IRP-2. Based on HECO fatal flaw analysis and qualitative assessment of the IRP-2 results, the SSCOM recommended that pumped storage and battery energy storage options be screened out in IRP-3 due to permitting, environmental, and land use issues.

Table ES-4
IRP-3 Commercial Resource Options

Commercial Resource Options	Fuel	Prototypical Location
Simple Cycle Resources		
GE PG7121(EA)	Naphtha/No. 2 FO	Barbers Point
Combined Cycle Resources		
1 on 1 GE PG7121(EA)	Naphtha/No. 2 FO	Barbers Point
2 on 1 GE PG7121(EA)	Naphtha/No. 2 FO	Barbers Point
Thermal Plant Resources		
Atmospheric FBC (180 MW)	Coal	Barbers Point
Atmospheric FBC HECO / AES (180 MW)	Coal	Barbers Point
Biomass Combustion (25 MW)	Banagrass	Waialua
Wind Energy Resources		
Kahuku: 15 x 660 kW	Wind	Kahuku
Kahuku: 30 x 660 kW	Wind	Kahuku
Kaena Point: 23 x 660 kW	Wind	Kaena Point
Kahe: 17 x 1.5 MW	Wind	Kahe
Kahe: 34 x 1.5 MW	Wind	Kahe
Kahe: 38 x 660 kW	Wind	Kahe
Kahe: 76 x 660 kW	Wind	Kahe

Table ES-5
IRP-3 New Commercial Resource Option Summary

Commercial Resource Options	Fuel	Net Capacity MW	Net Heat Rate Btu/kWh	Capital Cost[a] $10[6]	Fixed O&M[a] $10[6]/yr	Variable O&M[a] $/MWh	Duty
STIG Resource							
STIG GE PG7121(EA)	Naphtha/ No. 2 FO	80.95	11,613	91.34	2.432	4.93	Intermediate
Waste-to-Energy Resource							
MSW Mass Burn	MSW	15.90	17,290	111.16	4.204	18.08	Baseload
Photovoltaic Resources							
Central Station Application							
100 kW Fixed Tilt	Solar	0.10	N/A	0.879	0.003	29	Supplemental
100 kW Single-Axis Tracking	Solar	0.10	N/A	1.058	0.003	30	Supplemental
Residential Application							
2 kW Fixed Tilt	Solar	0.002	N/A	0.026	0.00012	56	Supplemental
2 kW Hybrid Fixed Tilt and Battery System with Back-up Battery Charging System	Solar, Battery, Propane	0.002	N/A	0.042	0.00016	298	Supplemental

Notes:
[a] All costs in 2003$.

Table ES-6
IRP-3 Commercial Resource Option Summary

Commercial Resource Options	Fuel	Net Capacity MW	Net Heat Rate Btu/kWh	Capital Cost[a] $10[6]	Fixed O&M[a] $10[6]/yr	Variable O&M[a] $/MWh	Duty
Simple Cycle Resources							
GE PG7121(EA)	Naphtha/ No. 2 FO	76.3	12,181	73.20	1.444	18.77	Peaking
Combined Cycle Resources							
1 on 1 GE PG7121(EA)	Naphtha/ No. 2 FO	120.2	7,957	160.72	2.541	3.97	Intermediate
Phase 1 (1x 76.3 MW)	Naphtha/ No. 2 FO	76.3	12,181	73.67	1.444	18.77	Peaking
Phase 2 (120.2 MW)	Naphtha/ No. 2 FO	120.2	7,957	87.05	2.541	3.97	Intermediate
2 on 1 GE PG7121(EA)	Naphtha/ No. 2 FO	242.1	7,902	253.70	2.776	3.42	Intermediate
Phase 1 (1 x 76.3 MW)	Naphtha/ No. 2 FO	76.3	12,181	75.44	1.444	18.77	Peaking
Phase 2 (2 x 76.3 MW)	Naphtha/ No. 2 FO	76.3	12,181	61.12	0.029	18.77	Peaking
Phase 3: (242.1 MW)	Naphtha/ No. 2 FO	242.1	7,902	117.14	2.776	3.42	Intermediate
Thermal Plant Resources							
Atmospheric FBC (180 MW)	Coal	180	10,130	492.49	8.390	3.60	Baseload
Atmospheric FBC HECO / AES (180 MW)	Coal	180	10,130	468.95	5.501	3.28	Baseload
Biomass Combustion (25 MW)	Banagrass	25	15,600	82.65	3.800	4.67	Baseload
Wind Energy Resources							
Kahuku: 15 x 660 kW	Wind	9.9	N/A	18.52 - 21.28	0.396	1.68	Supplemental
Kahuku: 30 x 660 kW	Wind	19.8	N/A	32.53 – 37.81	0.615	1.68	Supplemental
Kaena Point: 23 x 660 kW	Wind	15.2	N/A	30.81 – 35.20	0.517	1.68	Supplemental
Kahe: 17 x 1.5 MW	Wind	25.5	N/A	46.28	0.442	1.68	Supplemental
Kahe: 34 x 1.5 MW	Wind	51.0	N/A	88.48	0.708	1.68	Supplemental
Kahe: 38 x 660 kW	Wind	25.1	N/A	45.73	0.732	1.68	Supplemental
Kahe: 76 x 660 kW	Wind	50.2	N/A	89.39	1.290	1.68	Supplemental

Notes:
[a] All costs in 2003$.

McCorriston Miller Mukai MacKinnon LLP
ATTORNEYS AT LAW

March 28, 2006

Robert Isler
Project Manager
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, HI 96840

RE: Draft Environmental Impact Statement: Hawaiian Electric Company, Inc.'s ("HECO") Campbell Industrial Park Generating Station & Transmission Additions Project, 'Ewa District, Island of O'ahu

Dear Mr. Isler:

Below are Southern Wine & Spirits of America, Inc.'s ("Southern") comments to the Draft Environmental Impact Statement prepared for Hawaiian Electric Company, Inc.'s Campbell Industrial Park Generating Station & Transmission Additions:

1. Section 4.4.2.2.3 states that "the ultimate disposal point (on-site infiltration wells or an off-site system) has not been decided upon." Please advise as to when this decision will be made and what factors will be taken into consideration in making this decision.

2. Section 4.4.4.2. states that "a new supply well will be developed." It also states that two new disposal wells will be developed. Where is HECO proposing to site these new wells? Also, when does HECO plan to begin the regulatory approval processes for the new supply and disposal wells?

3. Section 4.4.4.4.3 states that "HECO will be prepare a Spill Prevention Control and Countermeasure (SPCC) plan addressing these measures" (to prevent oil pollution and procedures regarding discovery and notification of oil releases). Will the plan be available for public review and comment?

4. Section 4.2.1 it states that "small amounts of structural fill will be needed". How does HECO plan to transport the structural fill to the site and will there be any traffic, dust, and/or noise impacts to the adjacent properties?

5. Section 4.2.2 states that "if the transmission lines are installed underground, the work would require trenching along the entire length of the transmission corridor." How long does HECO anticipate this trenching will take? What hours would HECO be trenching? Please describe any impacts due to such trenching; i.e. traffic, dust, and/or noise to adjacent properties.

6. Section 4.3.1.2.1 states that "the proposed CTs will be capable of burning naphtha, No. 2 diesel, or similar light fuels", however, what is the availability of these light fuels and what will

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HECO use if these lights fuels are not available? Are the CTs capable of operating without the use of these light fuels? If HECO does not use these light fuels what would be the impact on air emissions from the CTs?

7. Section 4.3.1.3 provides an "overview of potential emission sources: construction". Please describe the specific impacts to adjacent properties. Also, how does HECO define "short-term in nature"; i.e. a day, a week?

8. Section 4.3.2 states that HECO's analysis for its CSP/PSD permit concluded that "BACT for nitrogen oxides is the use of water injection". Did HECO consider selective catalytic reduction ("SCR ") in its analysis? If yes, how did SCR compare to water injection in the analysis.

9. Please provide a list of all "reasonable precautions" that HECO plans to take to prevent particulate matter emissions during construction or material handling.

10. Please provide HECO's "best practical operation or treatment" to prevent visible emissions of fugitive dust beyond its property line.

11. Please provide the anticipated hours for construction noise for the project. Also, please provide any mitigation measures that HECO will employ to contain construction noise and noise from the operation of the generating units and ancillary facilities proposed.

12. Please describe in detail the proposed "enhanced landscaping that HECO would install and maintain along the Hanua Street side of the substation as part of the proposed project."

Thank you for your attention to this matter. Please contact the undersigned if you have any questions.

Very truly yours,

McCorriston Miller Mukai MacKinnon LLP

Kenneth G. K. Hoo

KGKH:vu
cc : Matthew Higashida, Department of Planning and Permitting
Genevieve Salmonson, Office of Environmental Quality Control

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 968

HECO C3
GENPP 10-16
YA/G

May 4, 2006

Mr. Kenneth G.K. Hoo
McCorriston Miller Mukai MacKinnon LLP
P.O. Box 2800
Honolulu, Hawai'i 96803-2800

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Hoo:

Thank you for your March 28, 2006, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you spent reviewing the *Draft Environmental Impact Statement (DEIS)* and providing written comments on behalf of your client, Southern Wine & Spirits of America, Inc.

Item-by-item responses to your client's comments are provided below. To simplify your examination, we have reproduced the text of the comments in *italics* before each response.

Comment 1:

Section 4.4.2.2.3 states that "the ultimate disposal point (on-site infiltration wells or an off-site system) has not been decided upon." Please advise as to when this decision will be made and what factors will be taken into consideration in making this decision.

Response: HECO's preferred method to handle onsite rainfall runoff is to direct it into the existing stormwater drainage ditch adjacent to the HPower driveway, which currently accepts rainfall runoff from Hanua Street. This drainage ditch is labeled as "Drain A" on Figure 3.7 of the DEIS. On-site infiltration wells would only be pursued if the appropriate permits and approvals cannot be obtained for the preferred option.

Comment 2:

Section 4.4.4.2. states that "a new supply well will be developed." It also states that two new disposal wells will be developed. Where is HECO proposing to site these new wells? Also, when does HECO plan to begin the regulatory approval processes for the new supply and disposal wells?

Response: Details of the facility plan are still being developed. However, based on the conceptual layout presented in Figure 2.6 of the *DEIS*, we expect that the supply and disposal wells would be located within the current fuel oil storage tank berm area on the west side of the property. HECO expects to apply for the well permits after it has received the necessary land use and PUC approvals. At the present time we anticipate that will most likely occur in the middle of 2007.

Comment 3:

Section 4.4.4.4.3 states that "HECO will prepare a Spill Prevention Control and Countermeasure (SPCC) plan addressing these measures" (to prevent oil pollution and procedures regarding discovery and notification of oil releases). Will the plan be available for public review and comment?

Response: Typically the SPCC plan does not go out for public comment. If there are specific issues you would like to discuss, we would be happy to meet with you and provide whatever information we can.

Comment 4:

Section 4.2.1 it states that "small amounts of structural fill will be needed". How does HECO plan to transport the structural fill to the site and will there be any traffic, dust, and/or noise impacts to the adjacent properties?

Response: As described in the *DEIS*, fill would be brought to the site by truck over a period of several months. Trucks transporting fill would be covered to prevent fugitive dust. Because the trucks entering and leaving the site would be traveling slowly, they would generate considerably less noise than the many trucks that travel each day on Hanua Street.

Comment 5:

Section 4.2.2 states that "if the transmission lines are installed underground, the work would require trenching along the entire length of the transmission corridor." How long does HECO anticipate this trenching will take? What hours would HECO be trenching? Please describe any impacts due to such trenching; i.e. traffic, dust, and/or noise to adjacent properties.

Response: HECO anticipates that it would take approximately 12 months to install the 2-mile long underground transmission line needed to provide a second connection between the AES and CIP Substations. Only a fraction of this work, perhaps a quarter, would be within existing paved roads. The remainder would be within the planned rights-of-way of roads that the landowner expects to install in the future. Whether constructed immediately or as part of the roadway development, construction of those portions of the underground system would not affect traffic and would not generate noise or dust that would impact adjacent uses. HECO anticipates that the trenching would be conducted during normal work hours.

Comment 6:

Section 4.3.1.2.1 states that "the proposed CTs will be capable of burning naphtha, No. 2 diesel, or similar light fuels", however, what is the availability of these light fuels and what will HECO use if these lights fuels are not available? Are the CTs capable of operating without the use of these light fuels? If HECO does not use these light fuels what would be the impact on air emissions from the CTs?

Response: The air permit for the CTs will limit operation to use of light fuels such as diesel, biodiesel, ethanol, and naphtha. Naphtha and diesel are currently available from on-island producers and HECO expects that this availability will continue. In the unlikely event that something was to interfere with the supply from on-island sources, HECO would obtain the fuels elsewhere from one of many other sources.

Comment 7:

Section 4.3.1.3 provides an "overview of potential emission sources: construction". Please describe the specific impacts to adjacent properties. Also, how does HECO define "short-term in nature"; i.e. a day, a week?

Response: Section 4.3.12 of the *DEIS* discusses the construction period air quality impacts of the proposed project. It describes the kinds of effects that are anticipated and compares those with thresholds established in the San Francisco Bay Area Air Quality Management District: Guidelines for Assessing Impacts of Projects and Plans to determine if the effects are likely to be significant. As described in Table 4.23 of the *DEIS*, the results of the analysis indicate that the impacts to adjacent properties would not be significant.

In the context of the discussion to which your comment refers, "short-term" refers to the period during which the facilities are under construction. For the power plant, that is expected to be about 12 to 14 months. However, the site preparation work that involves the greatest earth disturbance and heavy equipment work (and, therefore, the greatest potential for fugitive emissions) will be limited to the first several months of construction.

Comment 8:

Section 4.3.2 states that HECO's analysis for its CSP/PSD permit concluded that "BACT for nitrogen oxides is the use of water injection". Did HECO consider selective catalytic reduction ("SCR ") in its analysis? If yes, how did SCR compare to water injection in the analysis.

Response: As described in Section 4.3.3.5.1 of the *DEIS*, HECO did consider SCR in its analysis. It concluded that water injection was preferable primarily due to the high exhaust temperature of the CT, approximately 1050°F. SCR catalysts do not work well at temperatures above 850°F. To reduce the CT exhaust temperature to SCR operational levels would involve installation of additional equipment estimated to cost in excess of $50 million. As BACT analysis takes cost into consideration, HECO concluded that this is too high of a cost to obtain the associated reduction of nitrous oxides emissions. Ultimately, however, the

Hawaii Department of Health and the Environmental Protection Agency will determine what BACT is for control of nitrous oxide emissions.

Comment 9:

Please provide a list of all "reasonable precautions" that HECO plans to take to prevent particulate matter emissions during construction or material handling.

Response: HECO will prepare a detailed Best Management Practices (BMP) plan as part of the construction documentation. It will describe the precautions that HECO plans to take to minimize particulate matter emissions during the construction period. As described in Section 4.3.1.3.1 of the *DEIS*, we expect that it will include, but will not be limited to regular watering of the site to keep dust levels down.

Comment 10:

Please provide HECO's "best practical operation or treatment" to prevent visible emissions of fugitive dust beyond its property line.

Response: Measures to prevent visible emissions of fugitive dust beyond the property line will also be detailed in the BMP plan that HECO will prepare. As described in Section 4.9.4.2 of the *DEIS*, these may include, but are not necessarily limited to, water or chemical dust suppressants and paving of roads.

Comment 11:

Please provide the anticipated hours for construction noise for the project. Also, please provide any mitigation measures that HECO will employ to contain construction noise and noise from the operation of the generating units and ancillary facilities proposed.

Response: HECO expects that the construction contractor may wish to obtain a noise permit from the Department of Health (DOH) for the construction of the proposed generating facility. As described in Section 4.7.5 of the *DEIS*, the permit would restrict exceedances of the maximum permissible noise levels (which in the industrial district is 70 dBA at the property line) to between 7:00 a.m. and 6:00 p.m. Monday through Friday, and between 9:00 a.m. and 6:00 p.m. on Saturday. No exceedances of maximum permissible noise levels are allowed on Sundays or holidays. DOH also stipulates that pneumatic tools be equipped with mufflers.

As discussed in Section 4.7.4.3 of the *DEIS*, HECO will take into consideration estimated noise levels and noise attenuation features when making its final selection of equipment for the generating station.

Comment 12:

Please describe in detail the proposed "enhanced landscaping that HECO would install and maintain along the Hanua Street side of the substation as part of the proposed project."

Response: Detailed landscaping plans for the portion of AES substation fronting Hanua Street will be developed once the PUC approves the project. This will be done as part of a Conditional Use Permit application that HECO will submit to the Department of Planning and Permitting for the substation improvements. We anticipate that the landscaping will be comparable to the landscaping provided along the Hanua Street side of your client's facility.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

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MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

2006/ELOG-158

March 30, 2006

Mr. Robert Isler
Hawaiian Electric Company, Inc.
820 Ward Avenue
Honolulu, Hawaii 96813

Dear Mr. Isler:

Re: Draft Environmental Impact Statement (DEIS)
for Campbell Industrial Park Generating Station & Transmission Additions, Tax Map Keys: 9-1-015:016; 9-1-015:020; 9-1-014:033; 9-1-014:034; 9-1-014:035; 9-1-014:010; 9-1-014:014; 9-1-026:018; 9-1-026:039; 9-1-014:029; and 9-1-026:038, Ewa District, Oahu, Hawaii

We have reviewed the subject DEIS and offer the following comments:

1. The Project Summary table lists a Conditional Use Permit among the required permits and approvals. Table 6.1 in Chapter 6 also lists a Conditional Use Permit as required for the facility, and notes the status of that permit as "Not Started." Therefore, the discussion of the Land Use Ordinance within Section 6.1.5 of the DEIS should also state that a Conditional Use Permit is required for the use.

2. Section 3.6.3.2 (Avian Survey Results) states that the avian survey conducted in the project area recorded the presence of the Hawaiian Duck and the Black-necked Stilt of which both are resident endangered endemic species. However, Section 4.6.3 (Impacts on Terrestrial Fauna) states that no avian or mammalian species currently listed or proposed for listing as endangered or threatened, under either federal or State of Hawaii endangered species statutes are present in the area. Although the proposed project is not expected to substantially alter the area's ecology, this discrepancy should be clarified in the Final Environmental Impact Statement (FEIS).

3. In the FEIS, Section 3.13 (Land Use Controls) should state that the parcels included under the proposed action are within an Industrial area on the Ewa Development Plan (DP) Urban Land Use Map (August 1997). It should also be noted that the subject properties'

current DP land use designation is not a site specific designation, but rather an illustration of text policies. The FEIS should also include this information in the Project Summary table.

4. Section 3.7.3.3 of the Ewa DP contains a guideline pertaining to building height and mass in the Barbers Point Industrial Area which states that taller, vertical structures are acceptable when required as part of an industrial operation, but a viewplane study should be conducted for structures over 100 feet in height to determine if they can be sited or designed to minimize visibility from residential, resort and commercial areas, public rights-of-way and the shoreline. Since the proposed action includes approximately 22 tubular steel poles with an average height of 120 feet, a views analysis of the transmission lines should be included in the FEIS. Section 4.9.4 (Potential Long-Term Visual Impacts) of the DEIS states that the proposed transmission lines that would connect the Barbers Point Tank Farm generating station to HECO's existing CEIP Substation would be visible from Makakilo and other vantage points well removed from the alignment, but would appear small because of the distance and are similar to existing lines that already lace the industrial area. Although Figures 4-15 through 4-19 in the DEIS are helpful, please include in the FEIS a scaled rendering of the transmission lines and station from typical viewing elevation i.e. ground level views. The information in Section 4.9.4 (Potential Long-Term Visual Impacts), particularly the portions pertaining to the views analysis, should also be included in the discussion section on building height and mass in the Barbers Point Industrial Area in Section 6.1.2 (Ewa DP) of the FEIS.

5. Section 3.4.2 of the Ewa DP contains a planning principle that, whenever possible, overhead utility lines and poles that significantly obstruct public views should be relocated or placed underground. Furthermore, Section 4.4.1 of the Ewa DP states that strong consideration should be given to placing any new transmission lines underground. Although Section 2.7.5 (Consideration of Design Alternatives) of the DEIS includes placing the transmission lines underground, the discussion of the environmental and economic impacts of underground versus overhead lines in Chapter 4 of the DEIS is minimal and should be expanded in the FEIS.

6. Regarding Section 4.4.2.2 (Disposal of Wastewater), two private onsite disposal wells will be utilized. The FEIS should state that approval of this type of system falls under the jurisdiction of the Underground Injection Control Section of the State Department of Health.

7. Regarding Section 4.4.2.2.3 (Disposal of Onsite Rainfall-Runoff), other than storm water quality, the FEIS should address the proposed change in drainage and how the increase in runoff will be handled. Since the ultimate disposal point (on-site infiltration wells or an off-site system) has not been decided upon yet, this remains an unresolved issue.

Should you have any questions, please contact Matt Higashida of our staff at 527-6056.

Very truly yours,

Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:js

cc: Genevieve Salmonson, Director, Office of Environmental Quality Control
Perry White, Planning Solutions, Inc.

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

HECO C3
GENPP 10-16
YA/G

May 16, 2006

Mr. Henry Eng, FAICP, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai'i 96813

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Eng:

Thank you for your March 30, 2006, letter concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments.

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.

Comment 1:

The Project Summary table lists a Conditional Use Permit among the required permits and approvals. Table 6.1 in Chapter 6 also lists a Conditional Use Permit as required for the facility, and notes the status of that permit as "Not Started." Therefore, the discussion of the Land Use Ordinance within Section 6.1.5 of the DEIS should also state that a Conditional Use Permit is required for the use.

Response: Thank you for pointing this out. The last two sentences in Section 6.1.5 of the *Final EIS* have been revised to read as follows:

Type A & B utility installations are permitted uses in all of those zones with the issuance of a minor Conditional Use Permit (CUP). HECO's CUP application will demonstrate that 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).

Comment 2:

Section 3.6.3.2 (Avian Survey Results) states that the avian survey conducted in the project area recorded the presence of the Hawaiian Duck and the Black-necked Stilt of which both are resident endangered endemic species. However, Section 4.6.3 (Impacts on Terrestrial Fauna) states that no avian or mammalian species currently listed or proposed for listing as endangered or threatened, under either federal or State of Hawaii endangered species statutes are present in the area. Although the proposed project is not expected to

substantially alter the area's ecology, this discrepancy should be clarified in the Final Environmental Impact Statement (FEIS).

Response: We appreciate your noting this discrepancy and have corrected Section 4.6.3. It now reads as follows:

The surveys conducted for this project concluded that the birds and mammals present in the project area are for the most part common and introduced species. The exceptions were the Hawaiian Duck and Black-Necked Stilt, both of which are listed as endangered under federal and State endangered species laws (see Section 3.6.2 and Section 3.6.3). Because the area be affected by the project does not contain habitat that is important for either of these listed avian species, the project is not expected to negatively affect them. Similarly, because project-related activities are limited to areas that are already highly disturbed and do not support substantial number of organisms, it does not have the potential to substantially alter the area's ecology.

Comment 3:

In the FEIS, Section 3.13 (Land Use Controls) should state that the parcels included under the proposed action are within an Industrial area on the Ewa Development Plan (DP) Urban Land Use Map (August 1997). It should also be noted that the subject properties' current DP land use designation is not a site specific designation, but rather an illustration of text policies. The FEIS should also include this information in the Project Summary table.

Response: The following has been added as a third paragraph in Section 3.13.

The parcels on which the proposed generating facilities would be constructed are within an area designated for Industrial use on the 'Ewa Development Plan (DP) Urban Land Use Map (August 1997). That Development Plan land use designation is not a site-specific land use control, but it is an indication of the appropriateness of the use for the area and a reflection of the 'Ewa Development Plan text policies.

The FEIS also includes this information in the Project Summary table.

Comment 4:

Section 3.7.3.3 of the Ewa DP contains a guideline pertaining to building height and mass in the Barbers Point Industrial Area which states that taller, vertical structures are acceptable when required as part of an industrial operation, but a viewplane study should be conducted for structures over 100 feet in height to determine if they can be sited or designed to minimize visibility from residential, resort and commercial areas, public rights-of-way and the shoreline. Since the proposed action includes approximately 22 tubular steel poles with an average height of 120 feet, a views analysis of the transmission lines should be included in the FEIS. Section 4.9.4 (Potential Long-Term Visual Impacts) of the DEIS states that the proposed transmission lines that would connect the Barbers Point Tank Farm generating station to HECO's existing CEIP Substation would be visible from Makakilo and other vantage points well removed from the alignment, but would appear small because of the distance and are similar to existing lines that already lace the industrial area. Although Figures 4-15 through 4-19 in the DEIS are helpful, please include in the FEIS a scaled rendering of the transmission lines and station from typical

viewing elevation i.e. ground level views. The information in Section 4.9.4 (Potential Long-Term Visual Impacts), particularly the portions pertaining to the views analysis, should also be included in the discussion section on building height and mass in the Barbers Point Industrial Area in Section 6.1.2 (Ewa DP) of the FEIS.

Response: On May 5, 2006, we met with Ms. Dina Wong, Mr. Ray Young, and Mr. Matt Higashida of your staff to discuss the additional items that DPP would like addressed in the visual impacts analysis of the proposed transmission lines. They identified three public vantage points as being of importance to address in the analysis: 1) Farrington Highway, 2) Kalaeloa Boulevard, and 3) the OR&L railroad right-of-way. Based on our discussion, we agreed upon the following changes to the *Final EIS:*

(1) In the discussion of alternative design variations presented in Chapter 2, HECO will mention the possibility of undergrounding a portion of the transmission line (as well as the entire line) in order to reduce visual impacts to sensitive areas.

(2) The visual impact analysis included in Chapter 4 will be revised as follows:

- We will add a narrative discussion describing potential effects on views from Farrington Highway and Kalaeloa Boulevard. A photo-simulation is not needed because of the distance from the highway and the planned presence of relatively tall industrial buildings in area between Kalaeloa Boulevard and the planned transmission line.
- We will include a new figure showing a photo-simulation of the proposed transmission lines from a vantage point near the OR&L Right-of-way and the planned golf course. The narrative discussion will explain that the view over time will be altered as the Kapolei Harborside Center is developed so that only the portion of the line in the foreground will be visible.
- We will include a short discussion of measures (including vegetative screening and undergrounding) that might be used in the vicinity of the substation to mitigate visual impacts.

In addition, the discussion section on building height and mass in the Barbers Point Industrial Area in Section 6.1.2 of the *FEIS* has been revised to include the following discussion of building height and mass as you requested.

All of the structures proposed for the project are equal to or less than 60 feet high, with the exception of the CT exhaust stack and the transmission lines. At a height of 210 feet above ground level, the stacks attached to the combustion turbine are the tallest structures that would be constructed at the Barbers Point Tank Farm. The stacks and the above-ground transmission lines (which are about 120 feet high on average) are the two elements of the project which would be most visible to the public. Neither of these two exceptions has a large mass and are, therefore, consistent with the industrial guidelines. Further, none of the structures represents a departure from other buildings and installations in the area, which is heavily developed with similar facilities. As discussed in Section 4.9, the transmission lines would be visible from Makakilo and other vantage points well removed from the alignment, but would appear small because of the distance and are similar to existing lines that already lace the industrial area. Nearly all of the areas that are close to the proposed new transmission line are designated or planned for industrial uses that are compatible with the existing and planned overhead transmission lines. The exception to

this is the relatively short portion of the transmission route that passes adjacent to the golf course that is planned as part of the Kapolei West Development.

Comment 5:

Section 3.4.2 of the Ewa DP contains a planning principle that, whenever possible, overhead utility lines and poles that significantly obstruct public views should be relocated or placed underground. Furthermore, Section 4.4.1 of the Ewa DP states that strong consideration should be given to placing any new transmission lines underground. Although Section 2.7.5 (Consideration of Design Alternatives) of the DEIS includes placing the transmission lines underground, the discussion of the environmental and economic impacts of underground versus overhead lines in Chapter 4 of the DEIS is minimal and should be expanded in the FEIS.

Response: As described in detail in the copy of HECO's application to the Public Utilities Commission that was transmitted to you previously and that we discussed at our meeting on May 5, 2006, HECO believes that the proposed 138 kV transmission line should be constructed above ground. In making this decision, HECO thoroughly considered the tradeoffs between overhead and underground transmission lines. We believe that the *DEIS* discussed those tradeoffs in the impact analysis included in Chapter 4. For example:

- Section 4.1 notes that neither the excavation for transmission pole foundations nor trenching for the underground alternative will produce significant topographic changes.
- Section 4.2 explains that the coral substratum is equally suitable for overhead or underground options. It notes that the underground option would require trenching along the entire length of the transmission corridor but that because this disturbance would be generally limited to areas along existing and/or planned roadways, it would not represent a substantial additional impact.
- Section 4.3 details construction emissions from the power plant and substation sites. While it does not attempt to quantify the greater particulate matter emissions that would result from the underground alternative, this is because it is likely that underground facilities, if they were installed, would be constructed in conjunction with roadway and drainage improvements that the landowner will undertake as part of its own development efforts. Because of this, no significant incremental effect is anticipated, a point which is made in the *DEIS*.
- Section 4.4 does not discuss differences in hydrologic impacts between the overhead and underground transmission line alternatives because there are none.
- While underground facilities are more resistant to certain types of natural hazards (e.g., high winds) they are more susceptible to problems associated with other types of natural events (e.g., flooding). Consequently, we believe that no useful purpose would be served by making overhead/underground distinctions in Section 4.5.
- As discussed in Section 4.6, construction of the 138 kV transmission line, whether overhead or underground, has no potential for negative effects on aquatic habitats or biota.
- Section 4.7 notes that installation of the new transmission lines will involve the use of excavators, trucks, and other heavy equipment. Some of this construction equipment is inherently noisy. The trenching that would be required for the underground alternative

would require more of this sort of work than the alternatives using overhead wires. However, because the duration of work on any one segment of underground line would be brief and (with the exception of a relatively short distance along Hanua Street) located well away from noise-sensitive uses, noise impacts from either an underground or overhead facility would be small.

- Section 4.8, which discusses effects on historic and archaeological resources, makes it clear that the overhead transmission line is less likely to disturb archaeologically or culturally significant materials than is the underground alternative. Because of the heavily disturbed nature of the area traversed by the proposed transmission facilities, neither overhead or underground facilities are likely to have significant effects on these resources. It is worth noting that Shad Kane & Nettie Tiffany (the cultural experts consulted for the project) and the Office of Hawaiian Affairs have all expressed a preference for the overhead alternative, as they believe it reduces the likelihood of impacts to archaeological and cultural resources.
- Section 4.12 discusses the compatibility of the overhead transmission line with adjacent land uses.
- Section 4.13 discusses EMR/EMF effects.

However, it is true that the *DEIS* did not draw as many distinctions between the overhead and underground alternatives as it could have. Consequently, in response to your request, we have incorporated additional discussion of the following items into the *FEIS*.

- A distinction in Section 2.7.5.2 that the underground alternative could entail placing the entire transmission alignment underground or just a portion (most likely the portion nearest the CEIP substation since it is nearest to sensitive uses).
- Additional information and an illustration showing the appearance of overhead lines from the vantage point of the OR&L right-of-way has been included in Section 4.9 of the FEIS as described elsewhere in this letter; this has been contrasted with the absence of visual effects of an underground line.
- Further discussion of the effect that trenching required for the underground alternative would have on traffic flow on area roadways is included in Section 4.10 of the *FEIS*.
- Additional information is included in Section 4.12 concerning potential effects on/compatibility with existing and planned land uses.
- A discussion of the overhead/underground question as it relates to the PUC's criteria for determining whether or not 138 kV lines should be overhead or underground (per HRS Section 269 27.6) is included in Section 6.2.3 of the *FEIS*.

Comment 6:

Regarding Section 4.4.2.2 (Disposal of Wastewater), two private onsite disposal wells will be utilized. The FEIS should state that approval of this type of system falls under the jurisdiction of the Underground Injection Control Section of the State Department of Health.

Response: The following sentence has been inserted at the end of the first paragraph in Section 4.4.2.2.1 of the *FEIS* to provide the information you requested:

An underground Injection Control (UIS) permit will be needed from the State Department of Health in order to construct the injection wells.

Comment 7:

Regarding Section 4.4.2.2.3 (Disposal of Onsite Rainfall-Runoff), other than storm water quality, the FEIS should address the proposed change in drainage and how the increase in runoff will be handled. Since the ultimate disposal point (on-site infiltration wells or an off-site system) has not been decided upon yet, this remains an unresolved issue.

Response: In response to your request, we have added the following discussion to Section 4.4.2.2.3 of the *FEIS*:

HECO's preferred disposal method is to direct the stormwater leaving the settling basin into the existing stormwater drainage ditch adjacent to the HPOWER driveway, which currently accepts rainfall runoff from Hanua Street. This drainage ditch is labeled as "Drain A" on Figure 3.7. On-site infiltration wells would only be pursued if the appropriate permits and approvals cannot be obtained for the preferred option.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EPO-06-039

March 24, 2006

Mr. Robert Isler
Hawaiian Electric Company, Inc
P. O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Isler:

SUBJECT: Draft Environmental Impact Statement for Campbell Industrial Park Generating Station and Transmission Additions, Ewa District, Oahu
TMK: (1) 9-1-015: 002, 016, 020, 022
TMK: (1) 9-1-014: 010, 014,029, 033, 034, 035
TMK: (1) 9-1-026: 018, 038, 039
TMK: (1) 9-2-003: 011, 027

Thank you for allowing us to review and comment on the subject document. The document was routed to the various branches of the Environmental Health Administration. We have the following comments to offer.

Wastewater Branch

The subject project is located in the Critical Wastewater Disposal Area (CWDA) as determined by the Oahu Wastewater Advisory Committee where no new cesspools will be allowed. The proposed project site is not served by the City sewer service system. Therefore, domestic wastewater that is generated must be disposed by use of an onsite individual wastewater system. We also encourage the project to use RO water from the Honouliuli reclamation facility.

Due to recent changes to HRS 343-5a, we recommend that additional details be provided on the treatment and disposal of non-domestic wastewater generated by the proposed facility.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater System." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at (808) 586-4294.

Safe Drinking Water Branch

We concur with the principle to inject cooling water deep into the caprock formation while shallower aquifer depths are used for water supply. We recommend that the injection be conservatively kept to below 250 feet depths. We also recommend that the supply wells be less than 150 feet deep.

Please contact Norris Uehara at 586-4258 if you have any questions.

Hazard Evaluation & Emergency Response Office (HEER)

1. A Phase I Environmental Site Assessment (ESA) should be conducted for developments or redevelopments. If the investigation shows that a release of petroleum, hazardous substances, pollutants or contaminants occurred at the site, the site should be properly characterized through an approved HEER soil and or groundwater sampling plan. If the site is found to be contaminated, then all removal and remedial actions to clean up hazardous substances or soil releases by past and present owners/tenants must comply with Chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.

2. All lands formerly in the production of sugarcane should be characterized for arsenic contamination. If arsenic is detected above the US EPA Region 9 preliminary goal (PRG) for non-cancer effects, then a removal and or remedial plan must be submitted to the HEER for approval. The plan must comply with Chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.

3. If the land has a history of previous releases of petroleum, hazardous substances, pollutants or contaminants, we recommend that the applicant request a "No Further Action" (NFA) letter from the HEER prior to the approval of the land use change or permit approval.

We strongly recommend that you review all of the Standard Comments on our website: www.state.hi.us/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this project should be adhered to.

If there are any questions about these comments please contact Jiacai Liu with the Environmental Planning Office at 586-4346.

Sincerely,

KELVIN H. SUNADA, MANAGER
Environmental Planning Office

c: EPO
WWB
SDWB
HEER

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

HECO C3
GENPP 10-16
YA/G

May 4, 2006

Mr. Kelvin H. Sunada, Manager
Environmental Planning Office
Department of Health
State of Hawai'i
P.O. Box 3378
Honolulu, Hawai'i 96801-3378

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Sunada:

Thank you for your March 24, 2006, letter (your reference EPO-06-039) concerning Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We appreciate the time you and your staff spent reviewing the *Draft Environmental Impact Statement* and providing written comments. Item-by-item responses to your various Divisions' comments are provided below. To simplify your examination, we have reproduced the text of your comments in *italics* before each response.

Wastewater Branch

Comment 1:

The subject project is located in the Critical Wastewater Disposal Area (CWDA) as determined by the Oahu Wastewater Advisory Committee where no new cesspools will be allowed. The proposed project site is not served by the City sewer service system. Therefore, domestic wastewater that is generated must be disposed by use of an onsite individual wastewater system. We also encourage the project to use RO water from the Honouliuli reclamation facility.

Response: Thank you for notifying us of this requirement and expressing your encouragement for the use of RO water at the proposed generating station. HECO is aware of the absence of City sewer service in the area and, as discussed in Section 2.2.4.4 of the *DEIS,* HECO anticipates that it would treat the small amount of sanitary waste that would be

generated at the facility in an approved individual wastewater treatment system and dispose of it in an on-site injection well.

Comment 2:

Due to recent changes to HRS 343-5a, we recommend that additional details be provided on the treatment and disposal of non-domestic wastewater generated by the proposed facility.

Response: We are mindful of the recent changes in HRS §343-5 (a) which resulted in the preparation of an EIS for this project. A detailed discussion of the sources, volumes, composition, treatment, and disposal of domestic and process wastewater associated with the proposed project and its impacts on hydrology and water resources is presented in Sections 2.2.4 and 4.4 of the *Draft EIS* and will be included in the *Final EIS*. HECO will be applying for the permits needed to construct and operate the proposed treatment and disposal system. The Department of Health will have an opportunity to review the details of the plan at that time.

Comment 3:

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater System." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules.

Response: The wastewater treatment and disposal for the new generating facility will conform to HAR §11-62. HECO will submit the plans to your office for review and approval in accordance with HAR §11-62-37 - Application for and Review of Building Permits and Individual Wastewater Systems and other applicable provisions of the Chapter as soon as they are available.

Safe Drinking Water Branch

Comment 1:

We concur with the principle to inject cooling water deep into the caprock formation while shallower aquifer depths are used for water supply. We recommend that the injection be conservatively kept to below 250 feet depths. We also recommend that the supply wells be less than 150 feet deep.

Response: Thank you for concurring with our proposed approach to disposing of wastewater. As a point of clarification, the water to be disposed is not cooling water, but primarily reject-water from the water treatment system. As described in Section 4.4.4.2 of the *DEIS*, our plans call for the depth separation between supply and disposal wells that you have suggested.

Hazard Evaluation and Emergency Response (HEER)

Comment 1:

A Phase I Environmental Site Assessment (ESA) should be conducted for developments or redevelopments. If the investigation shows that a release of petroleum, hazardous substances, pollutants or contaminants occurred at the site, the site should be properly characterized through an approved HEER soil and or groundwater sampling plan. If the site is found to be contaminated, then all removal and remedial actions to clean up hazardous substances or soil releases by past and present owners/tenants must comply with Chapter 128D, Environmental Response Law, FIRS, and Title 11, Chapter 451, HAR, State Contingency Plan.

Response: Thank you for your comment. HECO will comply with the Hawaii Environmental Response Law, Hawaii Revised Statutes Chapter 128D, and the State Contingency Plan, Title 11, Chapter 451 of the Hawaii Administrative Rules, where applicable.

Comment 2:

All lands formerly in the production of sugarcane should be characterized for arsenic contamination. If arsenic is detected above the US EPA Region 9 preliminary goal (PRG) for non-cancer effects, then a removal and or remedial plan must be submitted to the HEER for approval. The plan must comply with Chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.

Response: Thank you for this information concerning the possible presence of arsenic in lands that may at one time have been used for the cultivation of sugar cane. We are aware of this and have reviewed recent information concerning the presence of arsenic in Hawaiian soils (see, for example, M.E. Ortiz Escobar, N.V. Hue, and W. G. Cutler "Recent Developments on Arsenic: Contamination and Remediation"). Its presence is believed to stem from arsenic's use for the controls of weeds on sugarcane lands from the early part of the 20th century through the 1940s and early 1950s.

Aerial photographs of the area across which the proposed transmission line passes (see Figure 2-9 in the *DEIS*) show the location of former fields. They make it clear that the underground alternative skirts areas that were once used for the cultivation of sugarcane. Hence, there is no potential for arsenic contamination as a result of the trenching that would be required for that alternative. Approximately seven poles (P16 through P21 as shown on Figure 2.10 of the *DEIS*) are situated on former sugarcane fields. Because sugarcane was cultivated on this property for only a relatively short period of time and the cultivation took place after the use of arsenic-based compounds had been largely discontinued, arsenic contamination of the soil is not believed to be present.

Comment 3:

If the land has a history of previous releases of petroleum, hazardous substances, pollutants or contaminants, we recommend that the applicant request a "No Further Action" (NFA) letter from the HEER prior to the approval of the land use change or permit approval.

Response: Thank you for this suggestion. HECO has owned the property on which the proposed generating facilities would be developed since 1980. Since that time, no spills have occurred. Before that time the property was vacant, so we do not believe that the property has a history of previous releases.

Environmental Planning Office

Comment 1:

We strongly recommend that you review all of the Standard Comments on our website: www.state.hi.us/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this project should be adhered to.

Response: We have reviewed the Standard Comments of your Department's various Divisions as posted on the website you provided. We will ensure that the project adheres to all applicable guidelines related to fugitive dust, stormwater and other discharges, injection wells, wastewater treatment and disposal, noise, and hazardous materials. Thank you for pointing us to those guidelines.

Thank you again for your comments. If you have any further questions, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.

MOSS Engineering, Inc.
1357 Kapiolani Blvd. Suite 830
Electrical / Lighting Engineers
Honolulu, Hawaii 96814

Richard M. Moss, P.E.

March 02, 2006

Mr. Matthew Higashida
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Subject: CIP Generating Station and Transmission Additions

Dear Mr. Higashida:

I am writing to support HECO's application for a CIP Generating Station and Transmission Additions Project.

As President of MOSS Engineering, Inc., an Electrical / Lighting Engineering firm in Hawaii with over 30 years experience as a consulting electrical engineer for projects in Hawaii, I am personally aware of O'ahu's urgent need for reliable electrical generating capacity. I understand O'ahu has come perilously close to losing power several times in the past few months, and any reputation that Hawai'i – O'ahu in particular – acquires for having an unreliable power supply will scare new investors away from our Islands and curtail our current economic boom.

I am interested in preserving the tech based businesses in Hawaii, bringing high-tech and innovation businesses to Hawai'i to accelerate the diversification of the economy, create higher paying jobs, new exciting careers and new entrepreneurial opportunities for Hawaii citizens. Tech based businesses and particularly biotech require a reliable, uninterruptible supply of electricity, which is at risk in the near future if the new power plant is not built.

I have noted the arguments that a new fossil fuel plant should not be built on O'ahu. I wish O'ahu could immediately transition to renewables, however, this does not realistically address individuals' and companies' growing demand for electric power even with increased efficiencies, conservation and maximum implementation of proven renewable energy technology. While I strongly support accelerating the alternative energy sector, the fact remains that in the short term we will not likely achieve reliability without building this new power plant to ensure near-term (5-10 years) energy needs. Hopefully the new plant will ultimately burn biofuels, which will make it part of Hawai'i's move away from traditional fossil-fuel dependence.

O'ahu faces a serious electrical generation capacity shortage in the near future (now to 2015). Building the proposed power plant will help ensure reliable energy while alternative, renewable-energy technologies come online over the next 5 to 20 years. That is why I support the draft EIS and the proposal to build a new power plant in the Campbell Industrial Park.

Very truly yours,

MOSS Engineering, Inc.

Richard M. Moss, P.E.
President

CIP HECO Power Plant 02-02-06.doc

TEL: (808) 951-6632 mail@moss-engineering.net FAX: (808) 941-0917

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

HECO C3
GENPP 10-16
YA/G

May 4, 2006

Mr. Richard M. Moss, P.E., President
MOSS Engineering, Inc.
1357 Kapiolani Boulevard, Suite 830
Honolulu, Hawai'i 96814

Subject: Draft Environmental Impact Statement: Campbell Industrial Park Generating Station and Transmission Additions Project, 'Ewa, O'ahu, Hawai'i

Dear Mr. Moss:

Thank you very much for your March 2, 2006, letter to the Department of Planning and Permitting expressing support for Hawaiian Electric Company's (HECO) proposed Campbell Industrial Park Generating Station and Transmission Additions Project. We greatly appreciate the time you took to express your strong support. We share your belief that it is essential if we are to continue providing reliable energy to the people of O'ahu.

If you have any further questions concerning the project, please call me at 543-7206 or Mr. Perry White of Planning Solutions, Inc., our environmental consultant, at 550-4483.

Sincerely,

Robert Isler
Project Manager

cc: Mr. Matthew Higashida, DPP
Office of Environmental Quality Control
Mr. Perry White, Planning Solutions, Inc.