Draft Environmental Assessment

KAHE GENERATING STATION 2011 PROJECTS

KAHE, O'AHU

PREPARED FOR:
Hawaiian Electric Company, Inc.

PREPARED BY:
PLANNING SOLUTIONS

NOVEMBER 2011

PROPOSED ACTION

Project:	**Kahe Generating Station 2011 Projects**
Applicant:	Hawaiian Electric Company, Inc. P.O. Box 2750 Honolulu, Hawai‘i 96840-0001 Contact: Russell Hisamoto (808-543-7003)
Approving Agency:	Department of Planning and Permitting City and County of Honolulu 650 South King Street Honolulu, HI 96813
Location:	Kahe Generating Station, 92-200 Farrington Highway, Kapolei, HI, 96792
Proposed Action:	Installation of two 75,000-barrel and one 30,000-barrel biofuel storage tanks, associated piping and truck rack; construction of new weld shop and valve recertification shop; construction of a new hazardous material storage site; installation of seven office trailers; and construction of a storm water berm.
Associated Actions Requiring Environmental Assessment:	Construction within the Special Management Area.
Tax Map Key:	(1) 9-2-003:027
Parcel Area:	454.4 acres
Project Area:	12.3 acres
Judicial District:	‘Ewa
Development Plan Designation:	Public Facility
State Land Use District:	Urban
County Zoning:	I-2 Intensive Industrial
Required Permits & Approvals:	• Special Management Area Use Permit • National Pollutant Discharge Elimination System – Notice of Intent [Construction] (NPDES-NOI[C]) • Minor Modification to Existing Use Permit • Flammable and Combustible Liquids Tank Installation Permit • Grubbing, Grading, and Stockpiling Permit • Building permits
Anticipated Determination:	Finding of No Significant Impact
Parties Consulted:	See Chapter 7
Consultant:	Planning Solutions, Inc. 210 Ward Avenue, Suite 330 Honolulu, HI 96814 Contact: Perry White (808-550-4483)

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LIST OF TABLES

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1. PURPOSE AND NEED

1.1 INTRODUCTION AND OVERVIEW

This Environmental Assessment (EA) was prepared in accordance with Chapter 25, Revised Ordinances of Honolulu in support of a Special Management Area (SMA) Permit application. It evaluates the potential environmental effects of several construction projects that are planned for the Hawaiian Electric Company, Inc.'s (HECO) Kahe Generating Station (KGS) (see Figure 1.1). These projects include: (*i*) installation of three biofuel storage tanks, associated piping and a truck rack capable of receiving 5,400 to 9,000-gallon deliveries; (*ii*) replacing the existing weld and valve recertification shops; (*iii*) relocating the hazardous materials storage facilities to a new site; (*iv*) installing seven office trailers, and (*v*) reconfiguring and expanding an existing storm water berm. Except for the proposed biofuel storage tanks and storm water berm, all of these projects are on portions of the property that have already been developed. All are on land that is zoned for heavy industrial use (I-2) and are situated within the Special Management Area (SMA). The City and County of Honolulu, Department of Planning and Permitting (DPP) has indicated its preference that these projects be grouped together for efficient processing by DPP and the County Council, and this EA has been written accordingly.

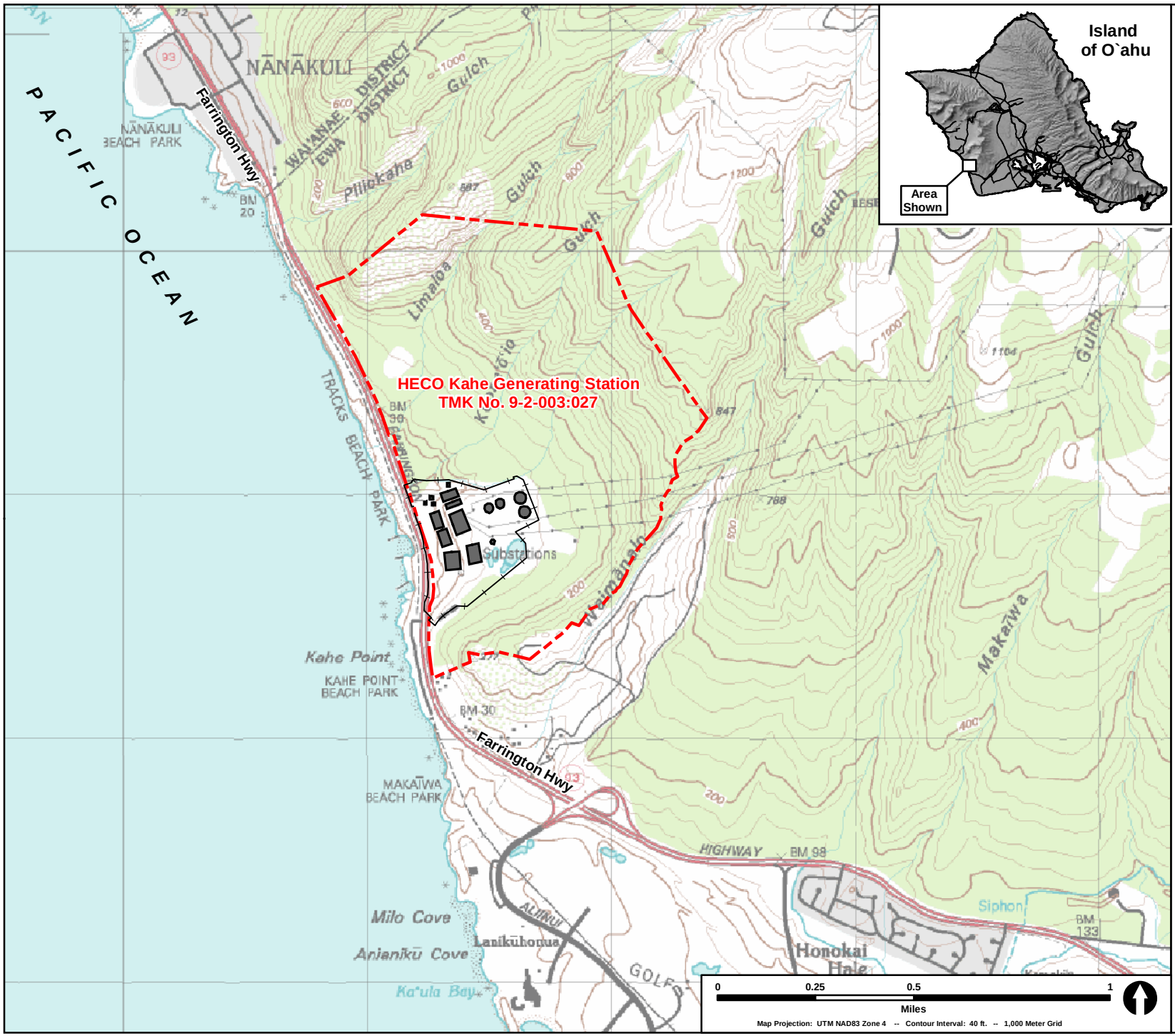
The EA is organized as follows:

- Chapter 1 describes the geographic context and use of the project area, discusses the need for the additions, repairs, and modifications that HECO is proposing, and lists the objectives of the proposed action.
- Chapter 2 describes the proposed facilities in detail, including their location, design, construction, cost, and mode of operation. It also outlines the alternatives analyzed in this EA, as well as several other alternatives that were considered and rejected by HECO during earlier planning phases.
- Chapter 3 describes the existing environment and analyzes the ways in which the proposed action could impact environmental, cultural, and socioeconomic resources. It also outlines strategies for minimizing and mitigating unavoidable adverse effects.
- Chapter 4 discusses the consistency of the proposed improvements with relevant plans, policies, and controls at county, state, and federal levels.
- Chapter 5 provides justification for the anticipated Finding of No Significant Impact (FONSI) by considering each individual significance criterion with respect to the proposed project.
- Chapters 6 and 7, respectively, list the references cited and parties consulted during preparation of this EA.

1.2 KAHE GENERATING STATION: LOCATION AND EXISTING USES

The Kahe Generating Station occupies the *makai* part of Kahe Valley on O'ahu's leeward coast (see Figure 1.2). Approximately 10 percent (50 acres) of the 454.4-acre parcel within which the generating station is located [TMK (1) 9-2-3:27] is used for various power generation activities; the remainder is vacant. The six generating units located at the facility have a combined capacity of approximately 650 megawatts (MW); this is slightly more than half of HECO's existing company-owned generating capacity.[1] In addition to the electrical generating units themselves, HECO also maintains and operates extensive support facilities within the KGS. These include welding and repair bays, fuel and water storage tanks, water treatment facilities, cooling water intake and discharge facilities, electrical substation equipment, offices, and warehouses.

[1] Capacity figures are for mid-2010 and are from http://www.heco.com/vcmcontent/StaticFiles/pdf/PowerFacts_6-2010.pdf.



Legend:

Kahe Fence Line

TMK 9-2-003:027 Boundary

Prepared for:

Hawaiian Electric Co., Inc.

Prepared by:

PLANNING SOLUTIONS

Sources:

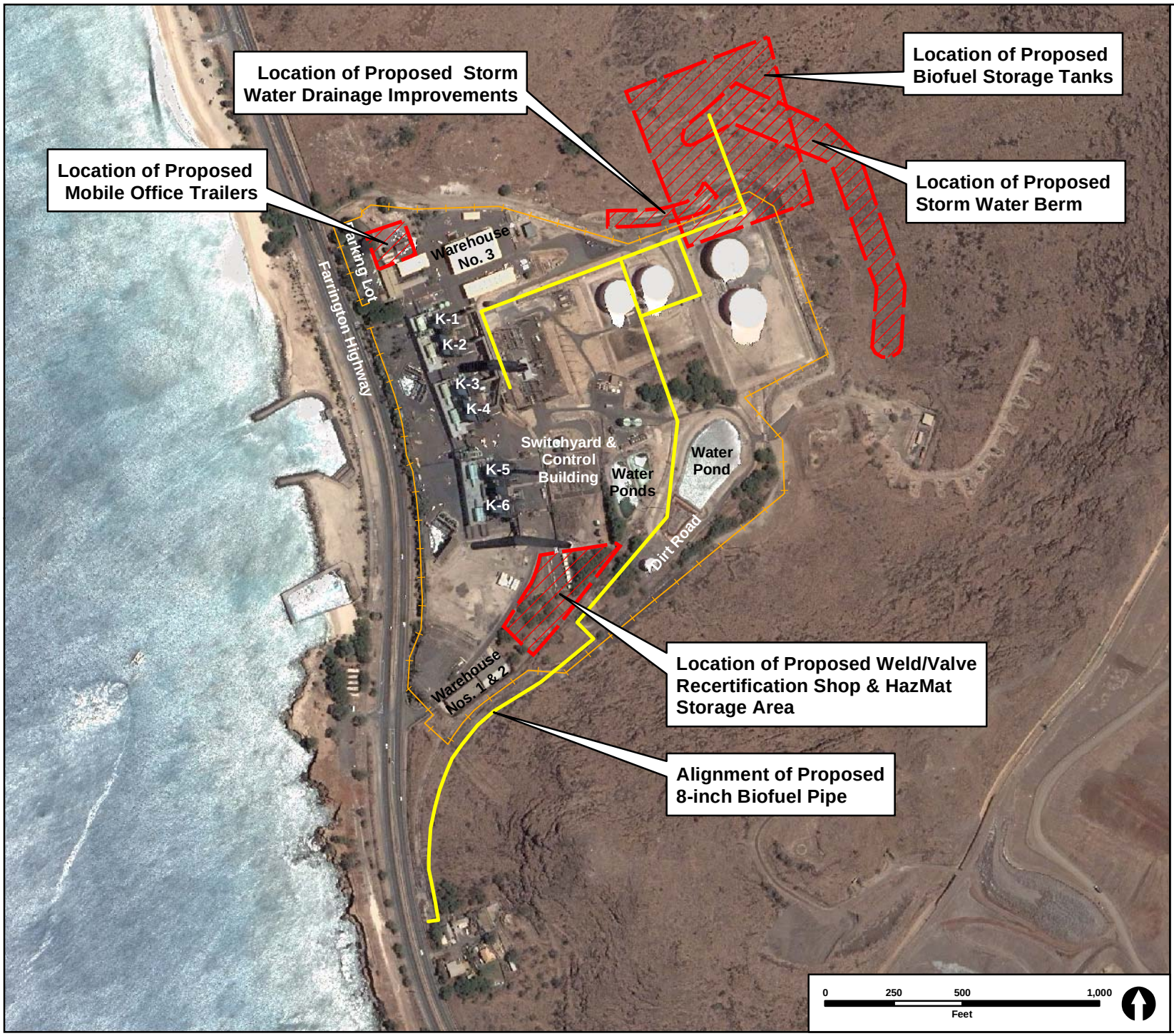
C & C Honolulu GIS
HECO Energy Services Dept.
USGS Quadrangle Maps:
-`Ewa (1999)
-Schofield Barracks (1999)

Figure 1.1:

Location Map

HECO Kahe 2011

Figure 1-1 Location Map 2011-10-03.mxd



Legend:

Kahe Fence Line

Approximate Extent of Construction

Prepared for:

Hawaiian Electric Co., Inc.

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Sources:

-HECO Energy Services Dept.
-Space Imagine, Inc.
(Photo taken July 3, 2009)

Figure 1.2:

Location of Proposed Projects at Kahe Generating Station

HECO Kahe 2011

Figure 1-2 Location of Proposed Projects at KGS 2011-10-26.mxd

1.3 OVERVIEW OF THE PROPOSED WORK WITHIN THE SMA

During calendar years 2012-2015, HECO proposes to undertake the following KGS projects within the SMA (see Figure 1.2 for the approximate boundaries of each of the projects).

(1) *Biofuel Storage Tanks.* Construct two new 75,000 barrel (bbl) and one 30,000 bbl-capacity biofuel storage tanks along the northern perimeter of the Kahe Generating Station. The construction of the storage tanks would include some grubbing and grading outside of the existing fence line. Improvements to the fuel infrastructure at KGS would also include the replacement of the existing, on-site 12-inch low sulfur fuel oil (LSFO) supply line with a new 8-inch line and the addition of a biofuel piping system between the new storage tanks and the existing steam generating units; this would entail some trenching activities within the developed portion of the Kahe facility. It would also include a truck rack capable of handling 5,400 to 9,000-gallon truck deliveries and auxiliary equipment necessary to support the new infrastructure.

(2) *Weld Shop and Valve Recertification Shop.* Construct a new building to replace the existing structure currently used for the weld shop and valve recertification shop. The two shops would be housed in a single two-story structure having either a concrete or metal roof. A concrete apron would be installed around the building. The work would include excavation into the adjacent hillside to create a level building pad and relocation of the hazardous material storage area that now occupies the *makai* side of the proposed site.

(3) *Hazardous Materials Storage Area*. Construct a new hazardous materials storage area within the Kahe complex and shift hazardous materials storage from its existing location to this new area. The hazardous materials storage area will be approximately 40′ x 100′ and will have metal roofing.

(4) *Office Trailers*. Install one generation maintenance office trailer (36′ x 60′), one generation planning trailer (24′ x 60′), four travel maintenance trailers (24′ x 60′ each), and one engineering trailer (also 24′ x 60′) on an asphalt lot in the northwest portion of the plant area adjacent to Farrington Highway. Each trailer may be provided with a concrete foundation and utility connections.

(5) *Storm Water Berm*. Construct an additional berm and repair adjacent drainage channel to improve the flood protection provided by the existing storm water system at KGS.

These actions are considered necessary for continuing the safe and efficient operation of the KGS. The individual additions, repairs, and modifications are not necessarily functionally or physically related to one another, but they have been combined in accordance with guidelines set by DPP to reduce the number of separate applications that must be processed and to ensure that cumulative effects are considered.

The following figures show existing conditions in the areas that would be directly affected by the proposed action:

- Figure 1.2, which contains an overall site plan of the generating station, shows the relationship of the proposed work to existing facilities.
- The photographs reproduced in Figure 1.3 depict existing conditions in the vicinity of the proposed biofuel storage tanks site and along the proposed piping alignments.
- The photographs in Figure 1.4 depict the existing conditions in the vicinity of the proposed shops and hazardous materials storage site.
- The photographs in Figure 1.5 show existing conditions in and around the area where the trailer sites would be constructed.
- Finally, the photographs in Figure 1.6 depict existing conditions where the proposed storm water berm would be built.

A view of existing conditions along the proposed 8" biofuel pipe alignment.

Another view along the proposed 8" biofuel pipe alignment.

A view of existing conditions at the proposed biofuel storage tanks site.

A view of existing conditions across proposed biofuel storage tanks site.

Prepared For:	Prepared By:	Source:	Project:	Figure 1.3:
Hawaiian Electric Company, Inc.	PLANNING SOLUTIONS	HECO	HECO Kahe 2011	**Existing Conditions at Biofuel Storage Tanks and Along Piping Alignment**

Figure 1-3 Photographs of Existing Conditions at Biofuel Storage Tanks Site 2011-10-26.cdr

View of conditions at existing hazardous materials storage site (to be demolished) and the site of proposed new weld shop and valve recertification shop.

View of conditions at site of proposed hazardous materials storage site.

Prepared For:	Prepared By:	Source:	Project:	Figure 1.4:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	HECO	HECO Kahe 2011	**Existing Conditions at Proposed Shop & Hazardous Materials Storage Area**

Figure 1-4 Existing Conditions at Proposed Shop & Hazardous Materials Storage Site 2011-10-03.cdr

Prepared For:	Prepared By:	Source:	Project:	Figure 1.5:
Hawaiian Electric Co., Inc. (HECO)	PLANNING SOLUTIONS	HECO	HECO Kahe 2011	**Photographs of Existing Conditions at the Proposed Mobile Office Trailers Site**

Figure 1-5 Photograph of Existing Conditions at the Proposed Mobile Office Trailer Site 2011-10-03.cdr

View north towards proposed storm water berm site.

Alternate view northwest towards the proposed storm water berm site.

Prepared For:	Prepared By:	Source:	Project:	Figure 1.6:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	HECO	HECO Kahe 2011	Photographs of Existing Conditions at Proposed Storm Water Berm Site

Figure 1-6 Photographs of Existing Conditions at Proposed Storm Water Berm 2011-10-04.cdr

1.4 NEED FOR THE PROPOSED IMPROVEMENTS

1.4.1 NEED FOR NEW BIOFUEL STORAGE TANKS & PIPING

Additional bulk biofuel storage and handling capacity is required at the Kahe Generating Station to help HECO achieve the Renewable Portfolio Standards (RPS) goal of having 25 percent of the company's consolidated sales generated by renewable energy resources in 2020. As detailed in the Hawaiian Electric Company's "Scenario Analysis of the Renewable Portfolio Standards ("RPS") Strategy" report (see Appendix C), the use of scenario analysis has led to targeted biofuel procurement of 300,000 barrels for 2015, 1.3 million barrels in 2020, and 3 million barrels in 2030. Construction of the tanks, piping, truck rack, and ancillary equipment will allow HECO's Kahe generating units to operate safely and reliably while using both LSFO and biofuel. The proposed dual fuel system will be capable of receiving batch deliveries of LSFO and biofuel via an existing 8-inch, non-insulated, pipeline from Barber's Point Tank Farm (BPTF). Approximately 2,500 feet of the pipeline within KGS will be re-sized from 12 inches to 8 inches so that a consistent diameter is established from BPTF to KGS. A uniform 8-inch pipeline will allow for a "pig" receiving station to be installed adjacent to the existing LSFO tanks.[2] This receiving point is where the LSFO and biofuel systems are derived; fuel can be pumped to either the four existing LSFO tanks or to the new biofuel tanks.

The new tank arrangement will contain two 75,000 bbl tanks and one 30,000 bbl tank, each specifically designed to handle the unique characteristics of biofuel.[3] Under normal operating conditions, one 75,000 bbl tank will be receiving biofuels, undergoing sampling and testing, or settling its contents. The other 75,000 bbl tank will be supplying fuel directly to one or more of the generating units, as required. The 30,000 bbl capacity biofuel tank is intended to handle truck deliveries from local biofuel sources and to provide operational flexibility.[4]

Three fuel pipes will be included in the fuel infrastructure improvements. The first pipe, the retrofitted 8-inch pipeline (formerly a 12-inch LSFO line), will receive incoming fuel from BPTF. The second pipe, referred to as a "supply" line, will carry fuel from the new tanks to the steam generating units and may be supplemented by an equivalent backup line as required. The third pipe, known as a "return" line will re-circulate unused fuel back to the biofuel tanks.[5] These pipes will be routed in parallel from the biofuel tank valve manifold, across the drainage ditch and onto the existing LSFO pipe racks. The 8-inch line will connect to a valve manifold at the "pig" receiving station; the supply and return lines will run in parallel down to the six Kahe generating units.

The biofuel storage tanks will require the necessary auxiliary equipment to operate effectively. This equipment includes piping, valves, pumps, fire suppression equipment, electronic controls, power and communications systems, and other similar items. A Motor Control Center (MCC), or power room, will be constructed outside of the surrounding berm and provide the necessary low voltage (i.e., less than 600 volts) power to the tank equipment. The MCC step-down transformer will be supplied from an existing 46 kV overhead power line running parallel to the Kahe fence line. All communication and control cables will be routed back to the KGS control room, either underground or slightly above grade, via electrical conduit.

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[2] A "pig" is a physical barrier that is pushed through a pipeline to separate two dissimilar fuels. This component is essential to the proper handling of batch fuel delivers.

[3] The new biofuel storage tanks will have propeller mixers, electric heaters, and a floating roof design to minimize spoilage and contamination of the biofuel.

[4] Biofuel is a relatively broad term; HECO anticipates that biofuels may come from various suppliers, each offering a product with unique physical properties and chemical composition. A third tank allows HECO to segregate dissimilar fuels and isolate deliveries which do not meet HECO specifications without impacting fuel delivery to the generating units.

[5] Because of its physical characteristics, crude biofuel must be kept above ambient temperatures to keep it liquid and consequently it must be returned to the heated storage tanks.

The proposed truck rack will allow HECO to directly receive and test locally produced biofuels prior to their introduction into the operating fuel system. The truck rack will be designed so that deliveries ranging between 5,400 and 9,000 gallons can be unloaded into two (2) 400-barrel test tanks at the new biofuel storage tanks. Transfer piping will allow the delivered fuel to be pumped from the 400-barrel tanks, or directly from the truck rack, to any of the three proposed biofuel storage tanks. Power and communication service connections for the truck rack will be tied back to the new storage tanks' MCC.

1.4.2 NEED FOR NEW WELD SHOP AND VALVE RECERTIFICATION SHOP STRUCTURE

1.4.2.1 Weld Shop

HECO's Facilities Division is proposing to build a new weld shop and valve recertification shop at the Kahe Generating Station to replace the existing shop, which is 30 years old. In the time since the existing shops were erected, new generating units have been added at Kahe to meet increasing demand for electricity. However, the existing infrastructure has not been improved or modified to support the increased volume of operations and maintenance.

Of key concern is the safety of HECO's employees; the increase in the number of welders has created a space problem in the existing shop which at times raises safety concerns. Additionally, where once only the welders worked, the electrical and machinist crews have joined them due to lack of sufficient covered workspace elsewhere at the Kahe facility. Currently, fumes from welding circulate through the structure. Due to the orientation of the existing shop structure, trade winds blow the fumes in the direction of the electrical and machinist workers. Welding exhaust hoods have been installed, but are often less effective than intended because of the prevailing trade winds and the antiquated design of the existing structure.

A storage shed is being used as a temporary welding shop to separate the welding crew from the rest of the staff working inside the old structure. Also, the existing temporary shop was not structurally designed to include the use of an overhead crane to lift heavy and/or oversized pieces of steel and equipment into place for welding. Consequently, the welders must work out in the open when repairing such pieces, exposing them to sun and excessive heat.

1.4.2.2 Valve Recertification Shop

Kahe Generating Station is the only HECO facility which is capable of testing and recertifying high pressure valves used in the generating units. Currently, Maui Electric Co., Ltd. (MECO) and Hawaii Electric and Light Co. (HELCO) ships their valves to HECO for testing and recertification before shipping them back to the islands of Maui and Hawai‘i for use at MECO and HELCO power plants. At this time, there are no outside vendors in the state capable of testing and certifying the types of valves HECO uses in support of the generators that supply electrical power on O‘ahu. The only other option is to ship the valves to the mainland for testing and recertification, which would increase the time and cost of these operations. HECO proposes to build a valve recertification shop as a joint structure with the new weld shop in order to maintain an on-island capacity for this operation.

1.4.3 NEED FOR NEW HAZARDOUS MATERIAL STORAGE AREA

In a July 23, 2008 letter to HECO, the State of Hawai‘i Department of Health (DOH) identified the existing hazardous material storage area at the Kahe Generating Station as a facility in need of an upgrade. The new hazardous materials storage area that HECO is proposing is consistent with the DOH recommendations. It will allow HECO to store chemicals and other hazardous materials necessary to operations and maintenance in a safe manner. Consistent with the letter, the proposed facility contains a concrete floor, all-purpose lighting, electrical outlets, permanent roof, and communications system to support efficient and effective response to accidental chemical spills. The proposed facility also includes an emergency shower and eye wash station. The new hazardous

storage site is essential for HECO to remain in compliance with DOH and Environmental Protection Agency (EPA) requirements, and to support ongoing operations at Kahe Generating Station.

1.4.4 NEED FOR PLANNING, MAINTENANCE, AND ENGINEERING OFFICE TRAILERS

The volume of HECO personnel conducting operations at the Kahe Generating Station has increased substantially since the facility was first built. This growth has resulted from, among other things, changes in control room technology, increased environmental regulation (with its associated monitoring and testing requirements), and increased generating unit maintenance requirements. As the size of the staff has increased, the existing office space and infrastructure has been over-burdened. The objective of adding new office trailers is to support the operational staff at Kahe by supplying them with adequate space to conduct their administrative duties.

1.4.5 NEED FOR NEW STORM WATER BERM

As noted elsewhere in this document, the facilities at Kahe Generating Station represent the single largest element of HECO's electrical generation capacity on O'ahu. The proposed storm water berm is an expansion of an existing berm and is intended to protect the Kahe access road and fire break from being damaged by storm water resulting from large storm events. The berm will decrease storm water velocity as it travels downslope, dissipating the flow volume and providing protection to sensitive facility components. The berm will also reduce the total rate of erosion and help to safeguard the reliability of electrical generation at Kahe Generating Station.

1.5 OBJECTIVES OF THE PROPOSED ACTION

Table 1.1 lists HECO's objectives for each component of the proposed action:

Table 1.1. Project Objectives

New Tank Biofuel Storage Tanks
• Provide adequate biofuel storage capacity which supports minimum standards practice. • To connect these new biofuel storage tanks with the existing 8-inch pipeline from BPTF via a new 8-inch internal pipeline, allowing for the efficient transfer of biofuels from CIP to Kahe Generating Station. • To create a secure reserve of biofuel at KGS to allow HECO to meet its commitment to provide reliable and renewably sourced power to its customers. • To allow for receipt of locally sourced biofuels. • Facilitate the burning of biofuels at HECO's most efficient generating units.
New Weld Shop and Valve Recertification Shop
• Ensure the safety of workers in and around the welding operations. • Provide adequate covered space for welding, electrical, and machinist crews. • Maintain on-site valve repair and recertification capacity.
New Hazardous Materials Storage Area
• Provide adequate hazardous materials storage capacity which supports minimum standards practice. • Provide sufficient safety and decontamination equipment to effectively respond to accidental hazardous materials spills. • Maintain compliance with DOH and EPA requirements for the Kahe Generating Station.
New Office Trailers
• Accommodate the demand for space by HECO personnel at Kahe Generating Station. • Ensure that planning, maintenance, and engineering staff have adequate facilities to conduct their duties.
Construction of Storm Water Berm
• Maintain adequate storm water runoff control at the Kahe Generating Station. • Reduce erosion in adjacent areas including an access road and fire break.
Source: Hawaiian Electric Company, Inc. (2011).

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2. PROPOSED ACTION & ALTERNATIVES CONSIDERED

2.1 INTRODUCTION

This chapter provides detailed information about the design of the proposed facilities, the construction materials and procedures that would be used, and the estimated costs and timetable for the project. It also describes the alternative means that HECO has considered for achieving the objectives outlined in the preceding chapter. The discussion is organized as follows:

- Section 2.2 describes the proposed action of constructing new biofuel storage tanks and associated facilities, a new weld shop and valve recertification shop, hazardous materials storage area, planning, maintenance, and engineering office trailers, and storm water berm.
- Section 2.3 describes the framework HECO used in considering possible alternatives to the proposed action.
- Section 2.4 describes the alternatives that were selected for analysis in the environmental assessment for the project.
- Section 2.5 describes the alternatives that were eliminated from further analysis and the reasons for their exclusion from the impact analysis.

2.2 DESCRIPTION OF THE PROPOSED ACTION

The proposed action consists of the following improvements to HECO's Kahe Generating Station:

(1) Construction of biofuel storage tanks including two new 75,000 bbl-capacity tanks and one 30,000 bbl-capacity tank for biofuel storage, an 8-inch biofuel pipeline, associated biofuel "supply" and "return" piping, a truck rack capable of handling up to 9,000 gallon deliveries, and ancillary equipment necessary to support the new fuel infrastructure.

(2) Constructing a new weld shop and valve recertification shop in a single structure. The two-story structure would have either a concrete or metal roof. A concrete apron would be installed around the building. The work would include excavation into the adjacent hillside to create a level foundation. It would also require the relocation of the hazardous materials storage site which currently occupies this portion of the Kahe complex.

(3) Construction of a new hazardous materials storage site to replace the old one which will be removed to accommodate the new weld and valve recertification shops.

(4) Installation, with electrical utility connections, of seven office trailers north of the main entrance to Kahe Generating Station and the relocation of some existing temporary trailers. The trailers are to be used for generation planning, maintenance, and engineering offices.

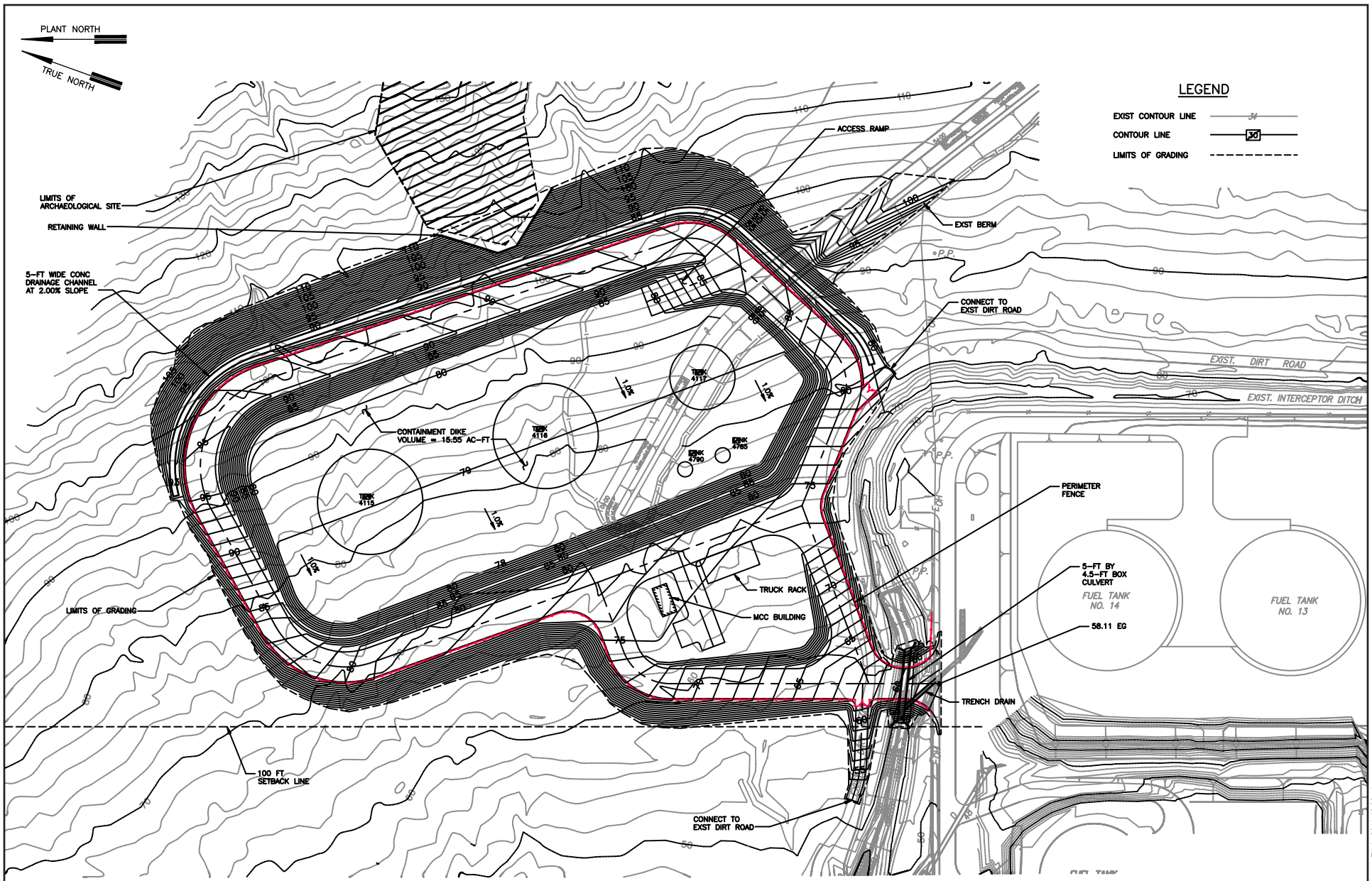
(5) Construction of a new berm to slow and direct storm water runoff into an existing armored drainage ditch.

The remainder of this section describes each of these improvements in detail.

2.2.1 NEW BIOFUEL STORAGE TANKS & PIPING

2.2.1.1 New Biofuel Storage Tanks: Construction Activities

The three new tanks will be constructed with a lined berm outside of the existing developed area; the majority of the piping will be constructed within the Kahe fence line in order to benefit from the existing roadways and access points. The new truck rack will be constructed adjacent to the storage tanks outside of the existing developed area. Access to the truck rack and new tanks site would be through the existing entrance off of Farrington Highway and paved roadways within the developed portion of KGS. As part of construction activities, a paved crossing will be installed over the existing drainage ditch to serve as a connection point between the power plant and the biofuel storage tanks and the MCC building.



Prepared For:	Prepared By:	Source:	Project:	Figure 2.1:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	HECO	HECO Kahe 2011	**Plan View of Proposed Biofuel Storage Tanks**

Figure 2-1 Plan View of Proposed Biofuel Storage Tanks 2011-10-26.cdr

2.2.1.2 New Biofuel Storage Tanks: Operation and Maintenance

Once the new biofuel storage tanks are constructed, the crossing and access road will be used primarily by plant personnel to service and maintain the new equipment. A 20′ graded drive will also be added around the tank farm berm to act as a maintenance buffer between the berm and the new fence line.

Access to the truck rack will be by established roadways within the Kahe Generating Station. The truck rack has been designed to accommodate 3,000,000 gallons of biofuel deliveries per year. Assuming 260 workdays per year, this equates to about two 5,400 gallon deliveries per day (~550 deliveries per year). During typical operations, these deliveries will occur between 7:00 AM and 5:00 PM, Monday through Friday, via Farrington Highway.

2.2.2 NEW WELD SHOP AND VALVE RECERTIFICATION SHOP

2.2.2.1 Weld Shop and Valve Recertification Shop: Construction Activities

Construction of the new weld shop and valve recertification shop would commence with excavation of the existing site to create a level grade for the ~10,000 sq. ft. structure. The grading process would also encompass the future site of the new ~4,000 sq. ft. hazardous material storage area. Most of that excavated material will be removed from the Kahe facility as there is currently no space on the property to store it. Other work will include installation of water, electrical, and communication connections, installation of equipment needed to meet the shops' mechanical and fire protection needs, installation of new valve testing equipment, and construction of a two-story structure consisting of concrete structural walls, a concrete or metal roof, and a small office area on the second floor of the weld and valve recertification shops. Figure 2.2 contains a plan view of the weld shop and valve recertification shop building and surroundings. Figure 2.3 presents conceptual elevation drawings of the buildings.

2.2.2.2 Weld Shop and Valve Recertification Shop: Operation and Maintenance

Once installed, the concrete weld and valve recertification shops will require little maintenance over its projected life span of 40 or more years. In general, maintenance will entail visual inspection and re-painting as needed.

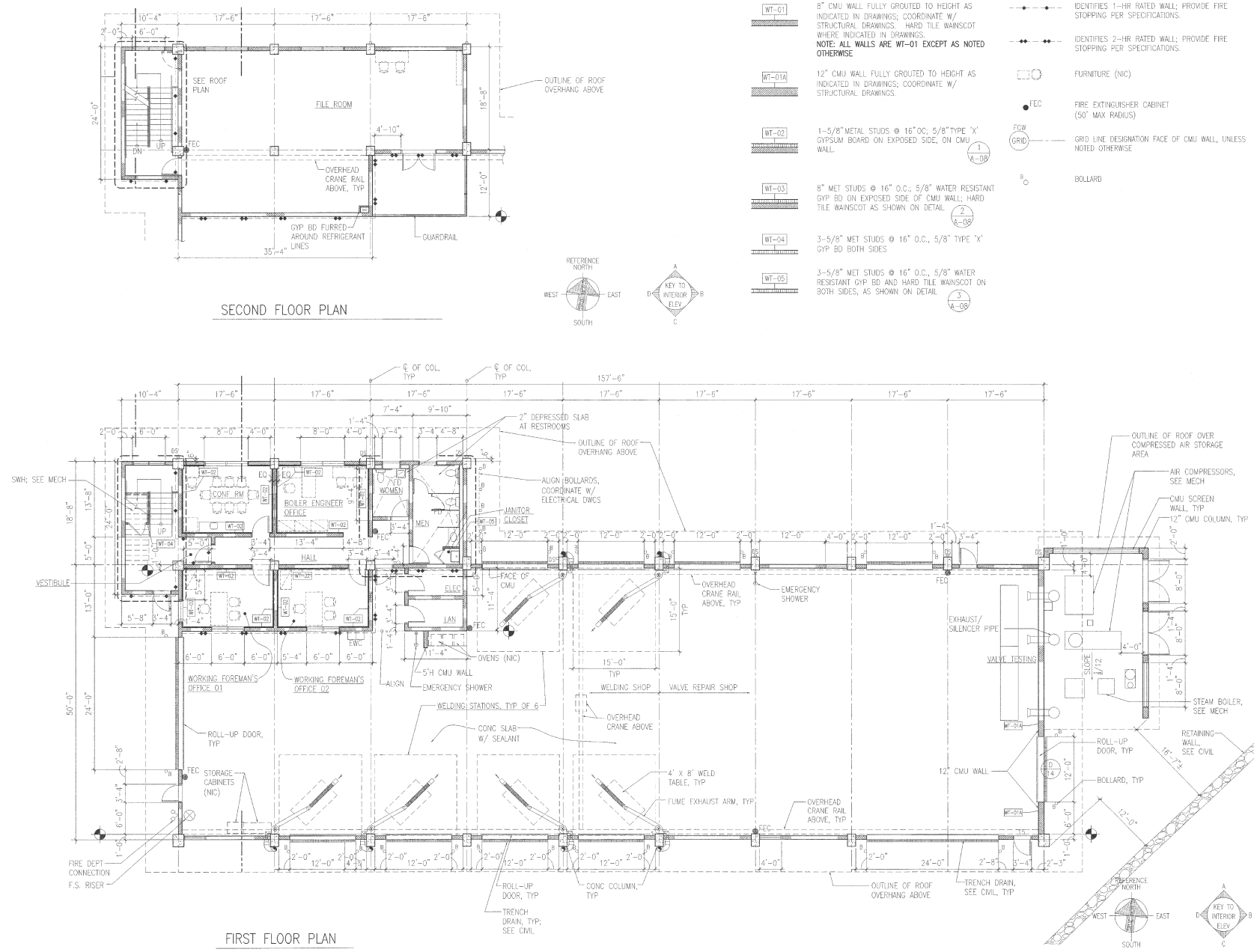
2.2.3 NEW HAZARDOUS MATERIALS STORAGE AREA

2.2.3.1 Hazardous Materials Storage Area: Construction Activities

The new hazardous materials storage area will be constructed with a steel frame and metal roofing. To comply with fire code requirements, one wall will be constructed of concrete while the remaining three will be constructed of fencing material to minimize entry by unauthorized personnel. Plan and elevation drawings of the areas are provided in Figure 2.4.
The new hazardous storage site will meet requests from the State Board of Health to improve existing conditions such as adding an emergency communication system, lighting, run off catch basin and emergency shower.

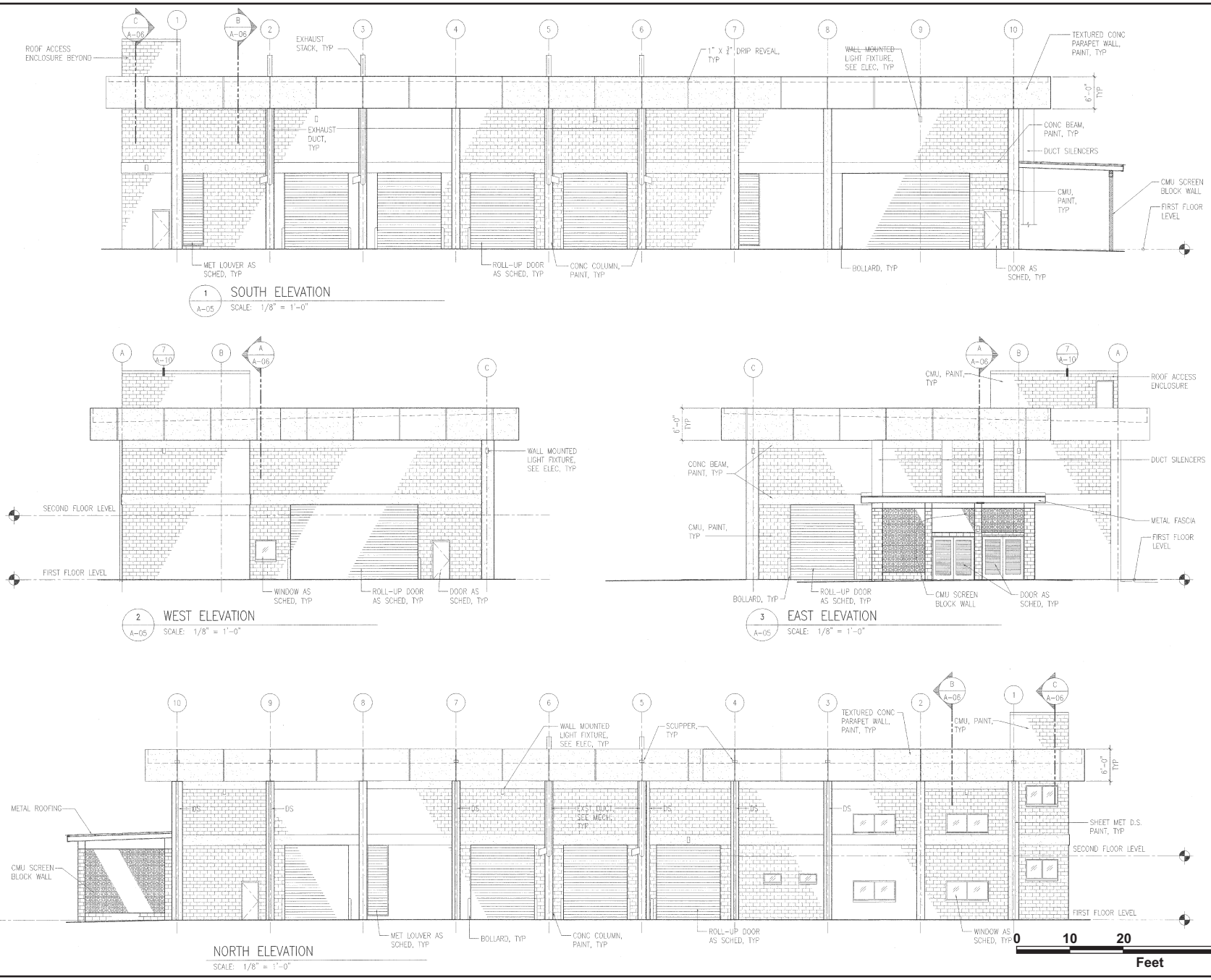
2.2.3.2 Hazardous Materials Storage Area: Operation & Maintenance

Maintenance of the hazardous materials storage area will include periodic coatings to protect the metal frame and roofing material from the elements. The structure itself has a life expectancy of at least 25 years.



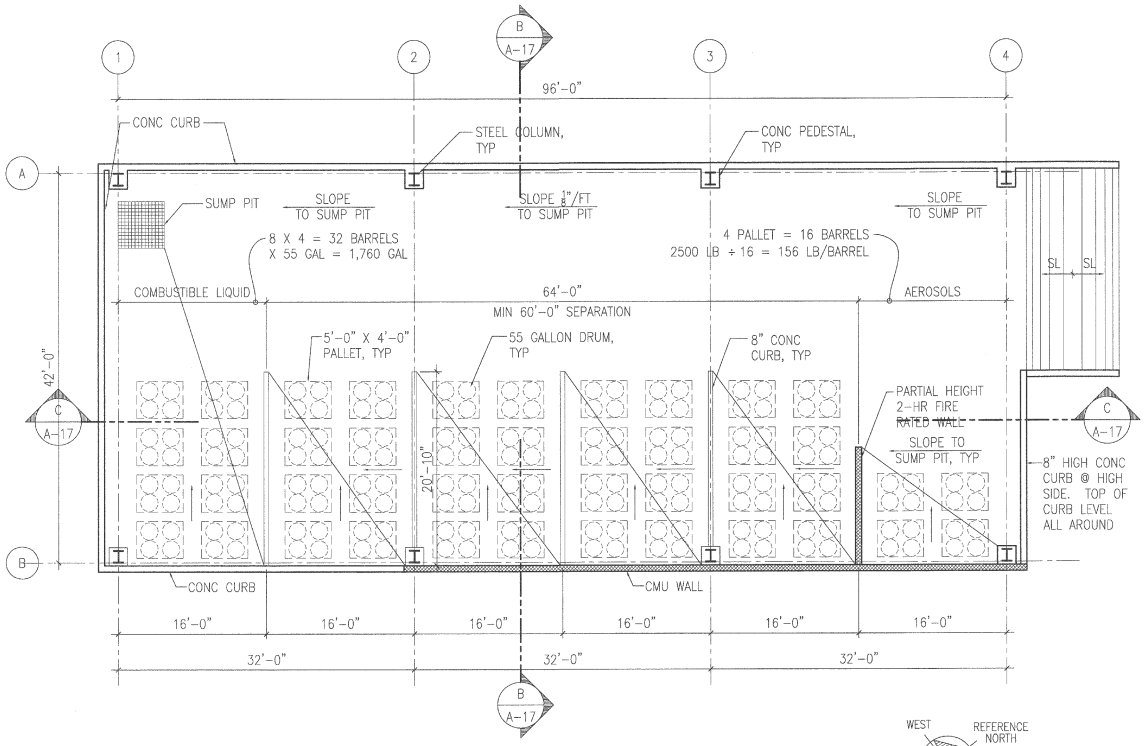
Prepared For:	Prepared By:	Source:	Project:	Figure 2.2:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	Richard Matsunaga & Associates	HECO Kahe 2011	**Plan View of Weld Shop & Valve Recertification Shop**

Figure 2-2 Plan View of Weld Shop & Valve Recertification Shop 2011-10-27.cdr

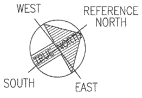


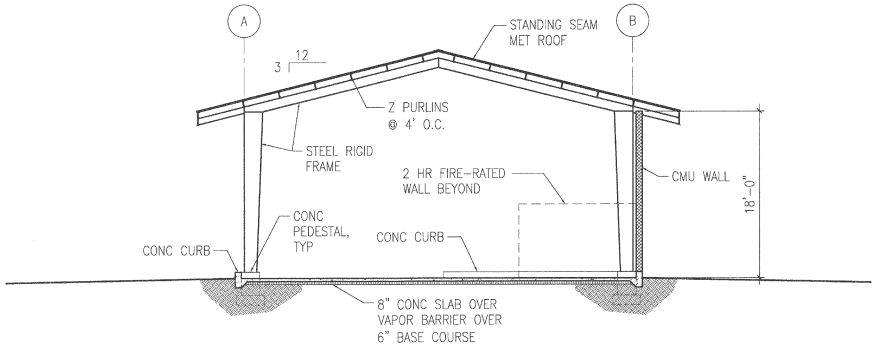
Prepared For:	Prepared By:	Source:	Project:	Figure 2.3:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	Richard Matsunaga & Associates	HECO Kahe 2011	**Elevation View of Weld Shop & Valve Recertification Shop**

Figure 2-3 Elevation View of Weld Shop & Valve Recertification 2011-10-27.cdr



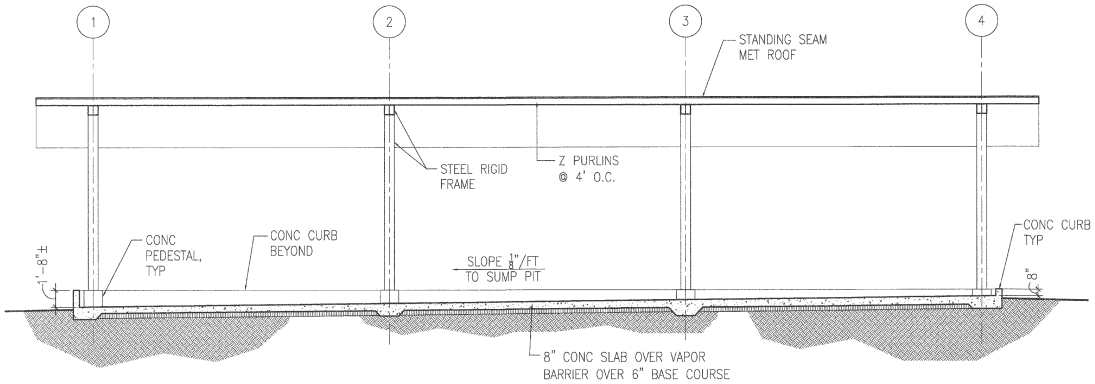
FLOOR PLAN – HAZARDOUS MATERIAL STORAGE





B / A-17 CROSS-SECTION – HAZARDOUS MATERIAL STORAGE

SCALE: 1/8" = 1'-0"



LONGITUDINAL SECTION @ HAZARDOUS MATERIAL STORAGE

Prepared For:	Prepared By:	Source:	Project:	Figure 2.4:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	Richard Matsunaga & Associates	HECO Kahe 2011	Plan & Elevation Views of Hazardous Materials Storage Area

Figure 2-4 Plan & Elevation of Hazardous Materials Storage Area 2011-10-27.cdr

2.2.4 MAINTENANCE, PLANNING, & ENGINEERING OFFICE TRAILERS

2.2.4.1 Office Trailer Expansion: Construction Activities

HECO currently uses temporary trailers at Kahe Generating Station to meet some of its office space requirements. It is now proposing to add seven semi-permanent office trailers for use by maintenance, planning, and engineering personnel. The area where these trailers would be installed is already paved with asphalt; installation would not require re-grading the area and the electrical and communication lines will all be installed aboveground. Because the occupants of the trailers spend most of their time away from the offices, this complex does not include restroom facilities or other uses that require water and wastewater connections. Figure 2.5 shows the conceptual layout of the office trailers area. Figure 2.6 and Figure 2.7 show a plan and elevation view of the generation maintenance office trailer (36' x 60'), the largest trailer proposed.

2.2.4.2 Office Trailer Expansion: Operation and Maintenance Activities

Other than periodic cleaning, very little maintenance is required. Personnel to be based in these trailers typically visit the site daily, and are already traveling there via Farrington Highway in their personal or company vehicles.

2.2.5 STORM WATER BERM

2.2.5.1 Storm Water Berm: Construction Activities

HECO proposes to construct, grade, and compact an earthen storm water berm to control rainwater flowing into Kahe Generating Station, redirecting the flow into an armored section of the existing ditch channel. The earthwork berm would be grassed over or armored with grouted rip-rap, depending on the anticipated velocities of the rainwater as it moves downslope. Construction of a new storm water berm would involve approximately 3,850 cubic yards of cut and 7,400 cubic yards of fill. Excavated material would be reused for fill, with some additional structural fill to be imported from elsewhere on the island. The berm will be designed by a civil engineer, including specifications for backfill material and procedures.

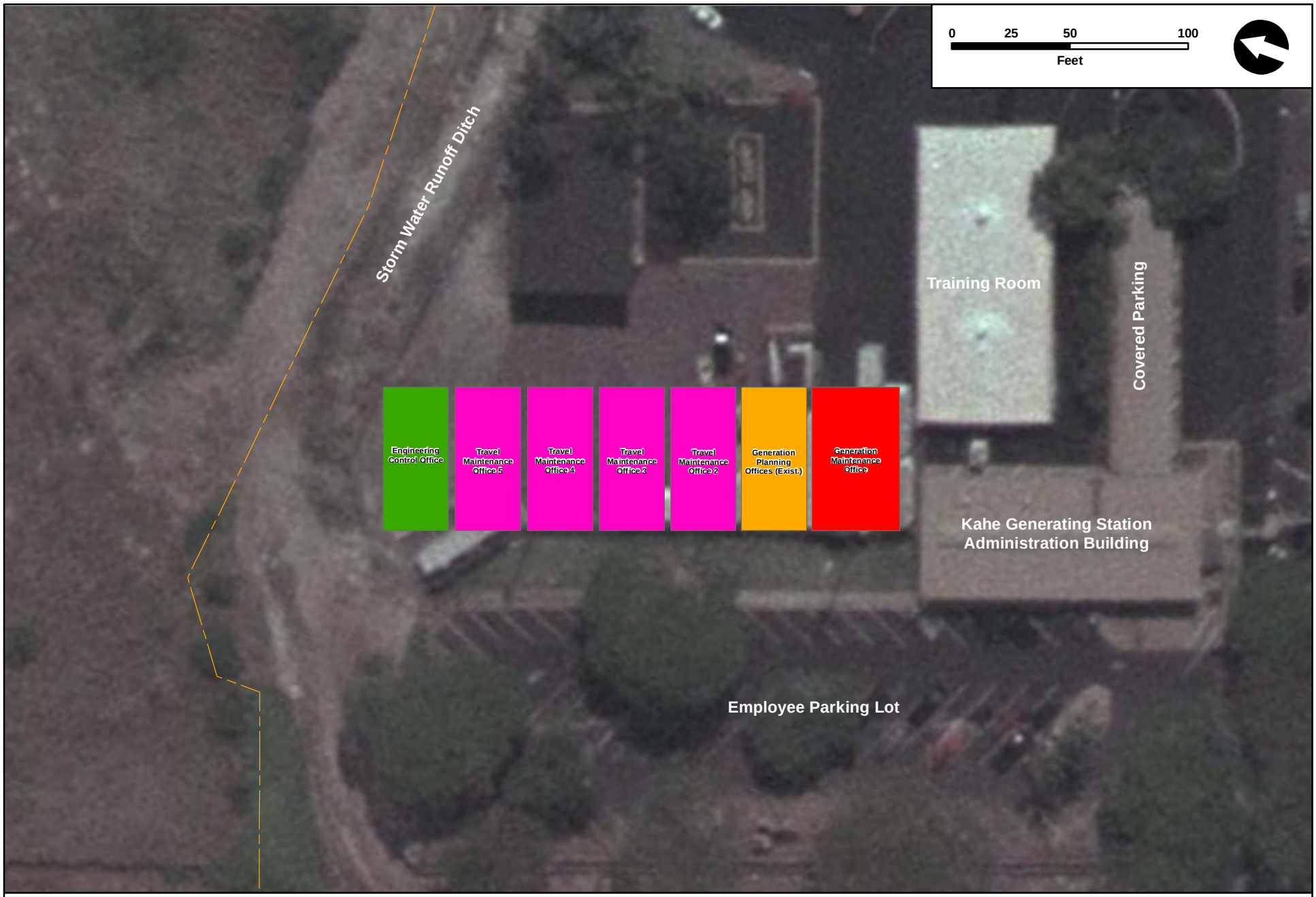
Construction equipment and workers would access the site using the existing internal access road shown in Figure 2.8 (labeled "Exist. Dirt Road,") turning towards the worksite at the 90-degree bend in the existing storm water ditch. As part of this design, ditch construction will require clean-up of the existing channel prior to laying grouted rip-rap material to limit or prevent erosion, which has been observed in the existing channel.

2.2.5.2 Storm Water Berm: Operation and Maintenance Activities

As noted above, the new berm will be covered with grass or lined with concrete to minimize erosion and required maintenance. Aside from regular inspections and clearing of any accumulated debris, the new berm is expected to require minimal maintenance. Once constructed, the geotextile material placed within the storm water ditch should reduce the frequency of required maintenance by limiting ongoing erosion during storm events.

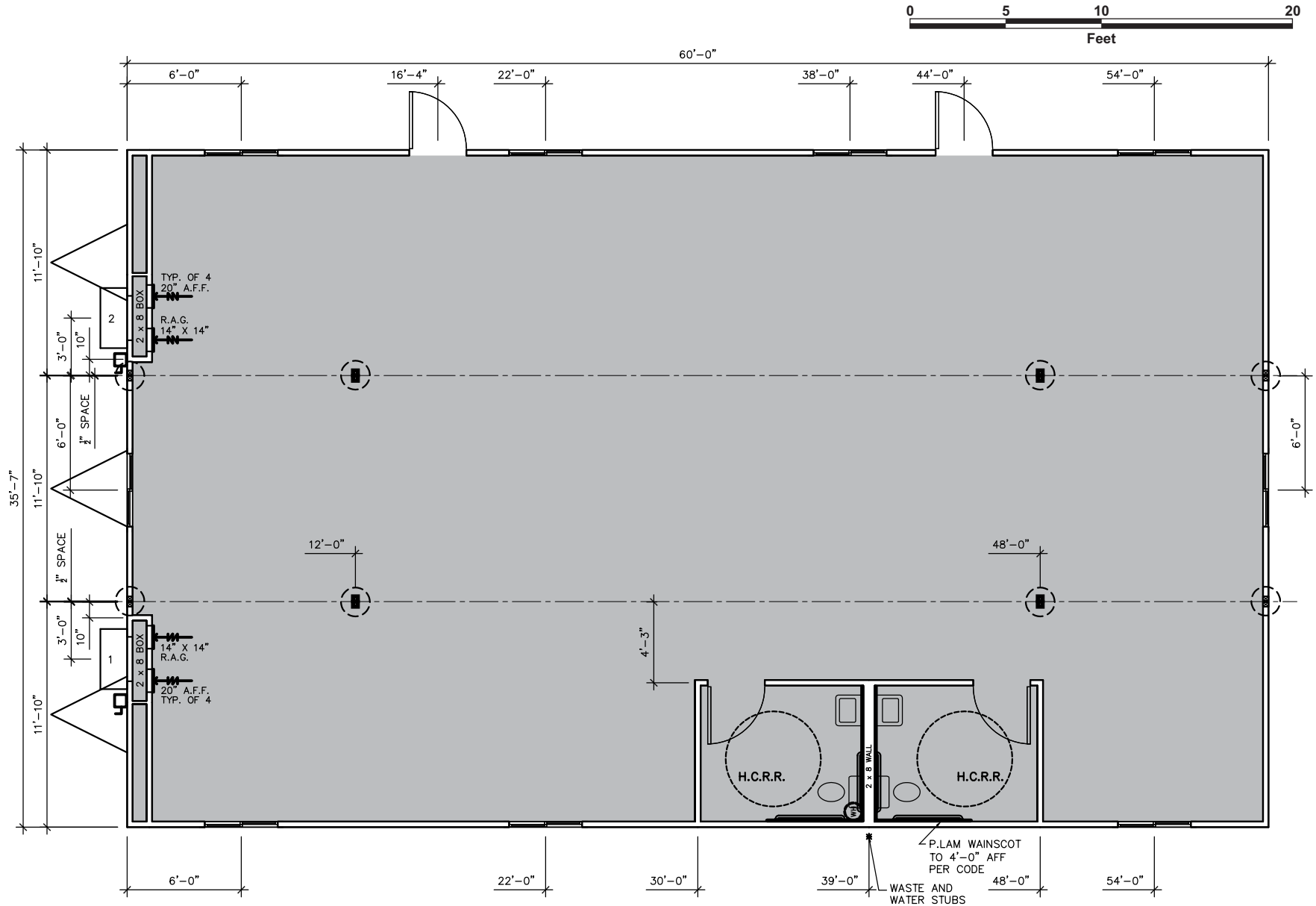
2.2.6 IMPLEMENTATION SCHEDULE

The improvements are scheduled to take place during fiscal years 2012 through 2013. The estimated duration for construction of each of the project components are presented in Table 2.1.



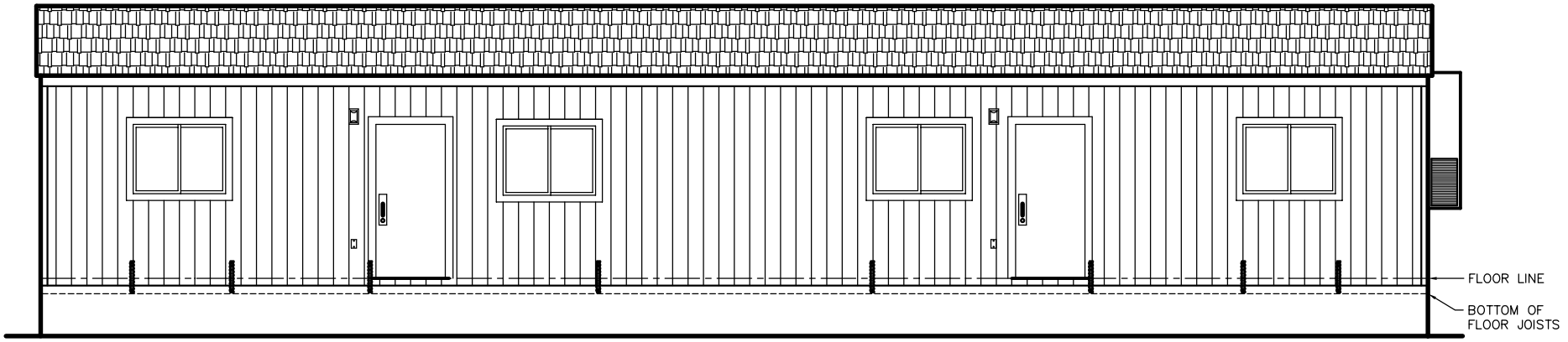
Prepared For:	Prepared By:	Source:	Project:	Figure 2.5:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	Hawaiian Electric Co., Inc.	HECO Kahe 2011	**Conceptual Layout of Mobile Office Trailers Area**

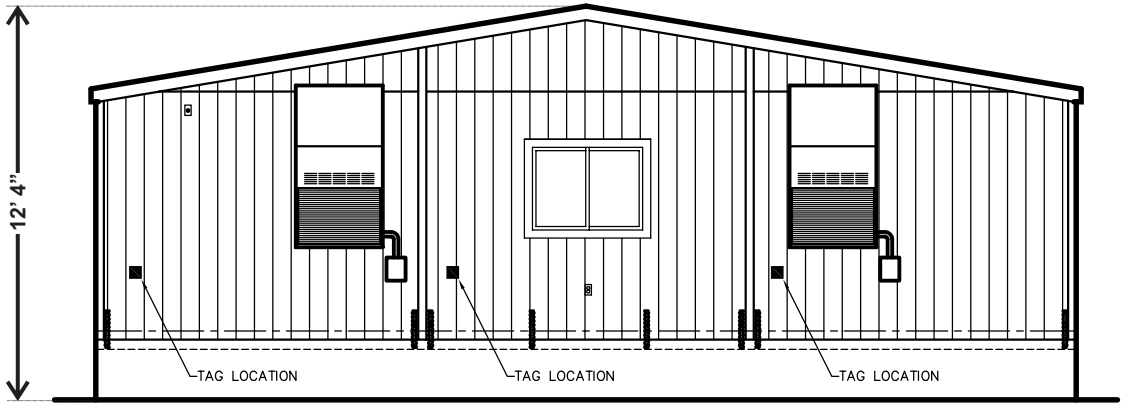
Figure 2-5 Conceptual Layout of Mobile Office Trailers 2011-10-27.mxd



Prepared For:	Prepared By:	Source:	Project:	Figure 2.6:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	Blazer	HECO Kahe 2011	**Plan View of Generation Maintenance Office Trailer**

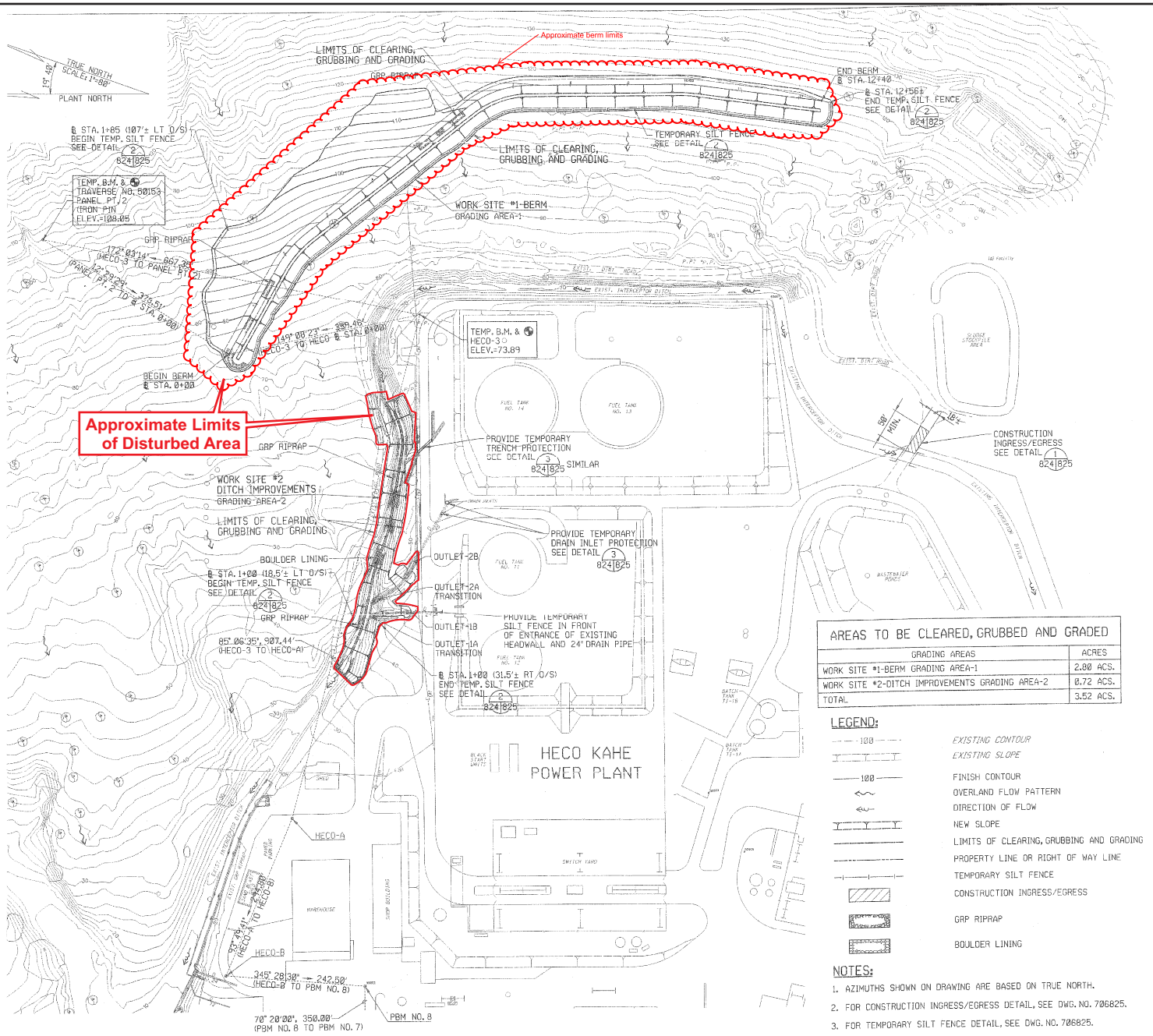
Figure 2-6 Plan View of Generation Maintenance Office Trailer 2011-10-27.cdr





Prepared For:	Prepared By:	Source:	Project:	Figure 2.7:
Hawaiian Electric Co., Inc.	PLANNING SOLUTIONS	Blazer Industries, Inc.	HECO Kahe 2011	**Elevation Views of Generation Maintenance Office Trailer**

Figure 2-7 Elevation View of Generation Maintenance Office Trailer 2011-10-27.mxd



AREAS TO BE CLEARED, GRUBBED AND GRADED

GRADING AREAS	ACRES
WORK SITE #1-BERM GRADING AREA-1	2.80 ACS.
WORK SITE #2-DITCH IMPROVEMENTS GRADING AREA-2	0.72 ACS.
TOTAL	3.52 ACS.

LEGEND:

NOTES:

1. AZIMUTHS SHOWN ON DRAWING ARE BASED ON TRUE NORTH.
2. FOR CONSTRUCTION INGRESS/EGRESS DETAIL, SEE DWG. NO. 706825.
3. FOR TEMPORARY SILT FENCE DETAIL, SEE DWG. NO. 706825.
4. FOR TEMPORARY DRAIN INLET DETAIL, SEE DWG. NO. 706825

Prepared For: Hawaiian Electric Co., Inc.

Prepared By: PLANNING SOLUTIONS

Source: HECO

Project: HECO Kahe 2011

Figure 2.8: **Site Plan of Proposed Storm Water Berm**

Figure 2-8 Site Plan of Proposed Storm Water Berm 2011-10-27.cdr

Table 2.1. Preliminary Project Schedule

Task	*Estimated Start Date*	*Estimated Duration (in months)*
Final Design	7/2012	9
Construction of New Biofuel Storage Tanks	8/2013	15
Construction of New Weld Shop/Valve Recertification Shop	1/2013	10
Construction of New Hazardous Materials Storage Area	1/2013	2
Construction of Trailers Site	6/2012	5
Construction of Storm Water Berm	7/2012	6
Source: Hawaiian Electric Company, Inc. (2011)		

2.2.7 PROJECT COSTS

HECO has prepared preliminary construction cost estimates based on the facility concepts presented above. These estimates are summarized in Table 2.2.

Table 2.2 Estimated Project Costs

Action	*Cost*
Biofuel Storage Tanks and Piping	**$70,000,000**
Weld Shop/Valve Recertification Shop & Hazardous Material Storage Area	**$8,500,000**
Office Trailers	**$2,300,00**
Storm Water Berm	**$975,000**
Total	**$81,775,000**
Source: Hawaiian Electric Company, Inc. (2011)	

2.3 FRAMEWORK FOR CONSIDERATION OF ALTERNATIVES

The improvements described in this report arise out of HECO's continuing review of its operations and facility needs at the Kahe Generating Station. As a part of this process, HECO identifies functional needs which are not currently being met, and selects possible projects which could meet them. The five work items included in this environmental assessment have been identified as ones which are needed over the short term and which can be accomplished within HECO's budgetary constraints.

Title 11, Chapter 200 of the Hawai'i Administrative Rules (HAR §11-200) contains the Department of Health's Environmental Impact Statement Rules. HAR §11-200-6 deals with "applicant actions" such as the one that HECO is proposing.[6] HAR §11-200-9 requires the approving agency (in this

[6] Because there is no Chapter 343 environmental assessment "trigger", this document is being prepared only in support of the Special Management Area permit application. While HAR 11-200 is not strictly applicable, the Chapter 343 process

case the City and County of Honolulu Department of Planning and Permitting) to analyze alternatives, in addition to the proposed action in the environmental assessment. HAR §11-200-10 establishes the required contents of environmental assessments. Among the requirements listed, HAR §11-200-10 (6) calls for an identification and summary of impacts and alternatives considered (emphasis added). In accordance with these requirements, HECO considered a number of alternatives before choosing the proposed course of action. This process consisted of defining the objectives of the project, identifying possible alternatives (including those required by Chapter 343), and evaluating each alternative with respect to the project objectives.

HECO concluded that only two of these alternatives merit consideration in the impact analysis portion of this EA. They are the proposed action of constructing the improvements as currently designed and "No Action" (as required by Chapter 343). Those alternatives are described in Section 2.4. The other alternatives failed to achieve the project objectives outlined in Section 1.5 above and were, therefore, eliminated from detailed consideration. The reasons for their elimination are described in Section 2.5. Readers should note that some of the elements of the proposed design were included in order to avoid and/or mitigate adverse effects that might otherwise have occurred.

2.4 ALTERNATIVES EVALUATED IN THE EA

2.4.1 THE PROPOSED ACTION

The proposed action, as described in detail in Section 2.2, stems from HECO's need to ensure the following: (*i*) provide adequate biofuel storage at Kahe Generating Station to meet RPS standards for renewable generation capacity; (*ii*) provide a reliable and adequate facility for welding and valve recertification available to its Kahe generating units at all times; (*iii*) increase existing storage and office space by expanding the available warehouse area; (*iv*) continue to store hazardous materials in a safe and sanitary containment facility; (*v*) continue to manage storm water at the site in a safe and contained manner; (*vi*) provide reliable electricity at a reasonable cost to its customers; and (*vii*) ensure the safety of its workers at all times. HECO believes that the improvements described in Section 2.2 would best allow them to meet all of their stated objectives while minimizing adverse impacts, and as such, they collectively represent HECO's preferred course of action.

2.4.2 NO ACTION

Biofuel Storage Tanks. Under the "No Action" alternative, the proposed new biofuel storage tanks would not be constructed. Without this facility, HECO would be unable to meet the increasing demand for biofuel storage capacity at Kahe Generating Station and would not be able to meet the RPS standards instituted by the State of Hawai'i.

Weld Shop and Valve Recertification Shop: Under the "No Action" alternative, the new weld shop and valve recertification shop structure would not be constructed. Without this new facility, Kahe Generating Station would be forced to increase its reliance on costlier offsite maintenance and fabrication capacity. It would also compromise the reliability of the facility by increasing the risk of equipment failure due to prolonged use and increasing the amount of time required to effect repairs to damaged system components.

Hazardous Materials Storage Area: If the new weld and valve recertification shops are not built under the "No Action" alternative, the new hazardous material storage site would therefore not be constructed since the new shops are planned for an area currently occupied by the existing hazardous materials storage area. Under this alternative, HECO would not have adequate storage capacity for hazardous materials required for operations and maintenance activities. HECO views this possibility as unacceptable to its operations and to the safety of its employees.

is so well established and provides such a useful framework for the analysis that its provisions have been followed in preparing the document.

Office Trailers: "No Action" would also mean not installing the seven proposed office trailers. HECO believes that it is not in the interest of its workers to neglect providing additional office space at the Kahe Generating Station. To continue smooth and efficient operations, HECO believes adequate space for workers is an operational necessity.

Storm Water Berm: In the "No Action" alternative, no changes or improvements would be made to the storm water drainage system at Kahe Generating Station. Specifically, a "No Action" alternative would involve not constructing the proposed storm water berm. During large storm events, storm water moving downslope would continue to erode areas around the existing access road and drainage ditch. Thus, "No Action" would also necessitate frequent maintenance and repairs to these facilities throughout the years.

"No Action" would not achieve the objective of any of the proposed actions. Consequently, it is not considered a feasible or desirable alternative, and is included in this EA primarily to fulfill the legal requirements of Chapter 343 and HAR §11-200. It also provided as a baseline against which to measure the impacts of the proposed actions.

2.5 ACTION ALTERNATIVES CONSIDERED AND ELIMINATED

As part of the planning process HECO has examined alternative sizes, locations, and timetables for the various project components. In considering alternative locations, the project components fall into one of two categories. The first category consists of those project components which cannot be sited anywhere except where they are proposed in order to fulfill their need (e.g. the storm water berm). The second category consist of project components, such as the proposed new weld and valve recertification shops, which theoretically could be constructed elsewhere, but in doing so, would fail to meet all of their objectives and without offering compensatory advantages. For these reasons, all subsequent discussion of alternative sizes and locations are within the Kahe facility, as originally proposed.

2.5.1 NEW BIOFUEL STORAGE TANKS: ALTERNATIVES CONSIDERED AND ELIMINATED

2.5.1.1 Alternate Sizes/Locations of Tanks

HECO has considered the possibility of locating new bulk biofuel storage at some other location or creating a smaller bulk storage facility than it currently proposes at KGS. However, the bulk biofuel storage is a need particular to KGS, where the HECO generating units most suited to the use of biofuel are located; thus, constructing biofuel storage tanks elsewhere would not obviate the need for increased biofuel storage at Kahe and would not fulfill another need. While it might be feasible to construct the tank farm on a different part of the KGS parcel, HECO has concluded that the site selected is optimal. Other locations on the property would require more extensive construction, including cut and fill, without providing commensurate advantage. Also, the proposed storage tanks site is close to other fuel storage tanks, allowing for efficient transfer of fuels between tanks.

2.5.1.2 Delayed Action

A delayed action alternative would mean that HECO would not build a biofuel tank farm at Kahe Generating Station at this time, presumably delaying construction until some later date. In reviewing this alternative, HECO has determined that delaying the construction of the proposed tank farm would not allow the utility to store enough biofuel on site to meet project objectives as outlined in Table 1.1.

2.5.2 NEW WELD SHOP AND VALVE RECERTIFICATION SHOP: ALTERNATIVES CONSIDERED AND ELIMINATED

2.5.2.1 Alternate Sizes/Locations of Shops

As previously discussed, the existing weld shop and valve recertification shop have not been improved or modified to support the increased volume of operations and maintenance (i.e., addition

of new generating units) occurring at the Kahe Generating Station. Due to limited space that is available in the central part of the generating station, the shops cannot be increased in size more than what is proposed.[7] Reducing the size of the shops would not accommodate the growing number of staff and would therefore continue to create safety concerns for the workers. Because reducing the scale of, or relocating, the shops would not meet the on-site workspace requirements it faces, HECO has concluded that the reduction in size and/or relocation of the weld shop and valve recertification shop is not desirable, and this possibility is not being considered.

2.5.2.2 Delayed Action

As indicated in Section 1.4.2.1, the existing weld shop does not provide sufficient work space for the welders and at times, raises safety concerns for the workers. Because the construction of the new weld shop and valve recertification shop would provide immediate benefits, HECO has concluded that postponing development of the project would not be advantageous. HECO wants to act quickly to ensure the safety of their workers and efficient operation of the facility. Thus, delayed action is not an acceptable alternative as it would not ensure the safety and comfort of the shop workers, nor would it maintain the valve repair and recertification capacity HECO needs on-site, and therefore would not meet their objective.

2.5.3 NEW HAZARDOUS MATERIALS STORAGE SITE: ALTERNATIVES CONSIDERED AND ELIMINATED

2.5.3.1 Alternate Size/Location

DOH has identified the existing hazardous material storage area as a facility in need of an upgrade to support minimum standards practice. As a result, HECO is proposing to build the new hazardous material storage site according to the requirements of the DOH and the EPA. A larger storage area would not be feasible due to the limited space available at the Kahe Generating Station. A reduction in size would not meet their needs.

The proposed location for the new hazardous materials storage site is already an alternative to a location immediately to the north that HECO engineers had originally considered. After internal discussions, HECO staff concluded that use of the original site would unduly limit the potential uses of the larger area to the south of Units K-5/K-6 and eliminated it from further consideration for this use.

2.5.3.2 Delayed Action

The State DOH has already identified the existing hazardous material storage area as in need of an upgrade to support minimum standards practice. As described in Section 1.4.3, the new hazardous storage site is essential for HECO to remain in compliance with DOH and EPA requirements, and to support ongoing operations at the facility. HECO wants to act quickly to ensure the safety of their workers and have their operations remain in compliance with state and federal requirements. Thus, delaying construction of the storage area does not meet the stated objectives of the proposed action and, therefore, is not a feasible option.

2.5.4 NEW TRAILERS

2.5.4.1 Alternate Size/Location

As described in Section 1.4.4, the existing office space and planning infrastructure at Kahe Generating Station has not kept pace with the growth in personnel. As a result, HECO needs to provide additional space for operational staff so that they are able to conduct their duties more efficiently. Smaller additions, or additional office space at an alternative location, would make it impossible to meet the needs of the staff who work at KGS. Further, due to limited space at Kahe, a

[7] Sufficient space is available along the periphery of the generating station to accommodate a larger building, but such a location would place the shops too far from the activities that they serve to allow for efficient operation.

larger set of trailers would not be feasible at this location. Therefore, HECO concludes that an alternative size, location, or number of trailers would not meet their objective.

2.5.4.2 Delayed Action

Under the "delayed action" alternative, HECO would neither conduct any site preparation work, nor create any utility connections, nor install the proposed trailers at this time. In doing so, HECO would fail to keep pace with the growth of administrative staff at KGS and in turn would limit the staff's ability to conduct their duties efficiently. As this would not meet the project's cited goal of providing adequate office space, HECO does not consider this a viable alternative.

2.5.5 STORM WATER BERM

2.5.5.1 Alternate Size/Route

The proposed storm water berm is intended to shield the existing access road and fire break from storm water moving downslope into Kahe Generating Station. By moving the location of the proposed berm, HECO would be unable to achieve this objective. Other possible locations have been considered, but HECO has selected this location as being the one which optimizes use of space while still protecting the existing access road and channeling storm water into the existing ditch. Additionally, alternative sizes for the proposed berm have been considered, but the proposed design is of the scale (i.e., capacity) which HECO believes is necessary to fulfill its intended purpose.

2.5.5.2 Delayed Action

The purpose of the proposed storm water berm is to protect the existing access road and ditch from erosion during storm events, while maintaining effective storm water runoff drainage. Under this alternative, delaying construction of the proposed berm would necessitate frequent maintenance and repairs of these facilities which would have long-term undesirable repercussions for operations at KGS. As a result, HECO has eliminated this alternative from further consideration as it would prevent it from achieving several of the objectives outlined in Table 1.1.

3. EXISTING ENVIRONMENT, POTENTIAL IMPACTS, & MITIGATION MEASURES

This chapter describes the potential environmental effects of the proposed actions. It is organized by impact topic (e.g., air quality, noise, geology and soils, water quality, etc.). The discussion under each topic begins with an overview of existing conditions related to that topic. Where appropriate, this includes the larger environmental context (e.g., West O'ahu); in other cases the focus is narrower (e.g., Kahe Generating Station). The discussion also distinguishes between short-term construction impacts and those that may result from the facilities' continuing long-term presence or operation. Where appropriate, the discussion includes the measures that HECO proposes to take to minimize or mitigate potential adverse effects.

3.1 PHYSIOGRAPHY AND TOPOGRAPHY

3.1.1 EXISTING CONDITIONS

The Kahe Generating Station is situated at the mouth of one of a series of parallel-trending gulches that drain from the upper reaches of the southwest portion of the Wai'anae Range down towards the southwest facing shoreline of the island. The developed area of the generating station inland of Farrington Highway ranges from 10 to 60 feet above mean sea level (msl), with the property sloping gently downward from the northeast to the southwest. The bowl-shaped hills surrounding the complex on three sides rise sharply from the gently sloping valley floor to elevations of 600 to 800 feet msl at the property line (even higher further inland). The areas affected by the proposed project are entirely within the low-lying, developed portion of the parcel.

3.1.2 PROBABLE IMPACTS ON TOPOGRAPHY

3.1.2.1 Construction Period

3.1.2.1.1 New Biofuel Storage Tanks

Construction of these facilities would involve grading and grubbing activities which will affect local topography. The estimated volumes of cut and fill are shown in Table 3.1. Because not all of the material that is cut will be suitable for use as structural fill, it will not be possible to balance the two. Consequently, the contractor will need to import approximately 3,952 cubic yards of select fill for that purpose. The excess material will either be spread on nearby areas within the Kahe fence or trucked off-site to a location where it can be used.

3.1.2.1.2 New Weld Shop/Valve Recertification Shop & Hazardous Materials Storage Area

Construction of these facilities involves minimal grading or other activities that have the potential to affect topography. Consequently, construction activities do not have the potential to disturb or otherwise measurably impact the topography of these areas.

3.1.2.1.3 Office Trailers Area

The area where HECO proposes to install seven trailers has been previously graded and paved with asphalt, and is currently used to accommodate temporary trailers. Some minor clearing of brush or patching of asphalt may occur as part of the installation of utility connections for the new office trailers. Consequently, HECO does not anticipate any impact to area topography.

3.1.2.1.4 New Storm Water Berm

This structure is planned for a sloping, peripheral area of the existing development at KGS. Conceptual engineering for the facility indicates that the maximum cut will be approximately 4 feet below the existing grade. This material will be used in part for the fill required for the berm. However, some may be stockpiled within HECO's Kahe property; there will be little if any need to transport this material away from the property. The maximum fill depth will be approximately 6 to 7 feet. The estimated cut and fill volumes for the two facilities are shown in Table 3.1.

Table 3.1. Estimated Earthmoving Volumes

Facility	*Estimated Volume (in cubic yards)*		
	Cut	*Fill*	*Excess*
Biofuel Storage Tanks	51,994	29,775	22,219
Weld Shop/Valve Recertification Shop	8,500	0	0
Hazardous Materials Storage Area	1,500	0	0
Trailers Area	0	0	0
Storm Water Berm	3,850 cy	7,400 cy	0
Sources: HECO, February 18, 2011.			

3.1.2.2 Operation and Maintenance Activities

Operation and maintenance of the facilities covered by this report does not have the potential to affect topography.

3.2 GEOLOGY AND SOILS

3.2.1 EXISTING CONDITIONS

The Kahe Generating Station is located in the lee of the Waiʻanae Mountain Range on the island of Oʻahu. The Waiʻanae Range is the remnant of the Waiʻanae Volcano, the older of the two large shield volcanoes that created most of the island. The land on which most of the proposed facilities are located is mixed fill land (Foote et al. 1972). This material consists of engineered fill that was placed during construction of the existing facilities. It is not suitable for agricultural use and, by virtue of the modest slope, it has a relatively low erosion potential.

There are two exceptions to this. The first "rock land" in the southwest corner of the proposed weld and valve recertification shops site. Rock land is made up of areas where exposed rock covers 25 to 90 percent of the surface. The second exception relates to the steeper portions of the storage tanks site, which is Lualualei Extremely Stony Clay, 3 to 35 percent slopes (LPE). Because of its relatively steep slope and stoniness, this area is not well-suited for agricultural use (Foote et al. 1972:84).

3.2.2 PROBABLE IMPACTS ON GEOLOGICAL AND SOIL RESOURCES

3.2.2.1 Construction Period: All Facilities

The proposed project will not change the soil composition of the property, nor will it impact any significant geologic features or resources. Small portions of some of the project elements, such as the shops and berm sites, will require excavation that may encounter soft rock that will have to be removed using heavy equipment during the course of construction. The material does not have any notable natural resource value and it is not suitable for agricultural or other productive use. All of the soils and underlying rock that would be affected by the proposed projects are suitable for construction of the proposed facilities as they are designed.

As indicated in Section 3.1.2.1, small amounts of select fill from off-site sources will be emplaced during the additions and modifications to the complex. This will come from approved on-land sources and the small volume that is involved can be obtained without significantly affecting off-site soil resources.

3.2.2.2 Operation and Maintenance: All Facilities

Routine operation and maintenance of the facilities covered by this report does not have the potential to affect geological or soil resources.

3.3 CLIMATE/MICRO-CLIMATE

3.3.1 EXISTING CONDITIONS

The Hawaiian Island chain is situated south of the large Eastern Pacific semi-permanent high-pressure cell, the dominant feature affecting air circulation in the region. Over the Hawaiian Islands, this high-pressure cell produces very persistent winds called the northeast trade winds. During the winter months, cold fronts sweep across the north central Pacific Ocean, bringing rain to the Hawaiian Islands and intermittently modifying the trade wind regime. Thunderstorms, which are rare but most frequent in the mountains, also contribute to annual precipitation. Temperature, rainfall, and humidity averages (by month) that are typical of the project area are shown in Table 3.2 below.

Table 3.2. Average Temperature, Rainfall, and Humidity, by Month

	Ambient Temperature, °Fahrenheit			
Month	***Minimum***	***Maximum***	***Average Monthly Rainfall (inches)***	***Average Relative Humidity (%)***
January	66	80	3.3	77.2
February	66	80	2.4	74.5
March	67	81	2.7	69.0
April	69	82	1.3	67.8
May	70	84	1.0	66.0
June	72	86	0.4	64.8
July	74	87	0.6	65.0
August	74	88	0.6	66.0
September	74	88	0.7	65.5
October	73	86	2.0	67.0
November	70	84	2.8	71.0
December	67	81	3.4	73.5
Source: U.S. Department of Commerce (2009)				

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° F. (January) and 81.4° F. (July), respectively. These temperature variations are quite modest compared to those that occur at inland continental locations.

3.3.1.2 Rainfall and Humidity

The terrain on O‘ahu strongly influences its rainfall. Near the top of the Ko‘olau Range on the windward side of O‘ahu, rainfall averages nearly 250 inches per year. On the leeward side of the island, where the project is located, the annual average rainfall is much lower (see Table 3.2). Annual average rainfall at the Kahe Generating Station is approximately 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-60s to the mid-70s.

3.3.1.3 Wind Patterns

The northeast trade winds predominate in the project area. Data from the Honolulu International Airport show that they are strongest and most persistent in the summer, a pattern that is also evident in the wind data that was collected at Barbers Point when there was an active Naval Air Station situated there. During July, for example, winds from the northeast through east are present over 85 percent of the time and winds average 12.8 miles per hour. The trade winds become weaker and less persistent in the winter. During January, for example, winds from the northeast through east are present only 35 percent of the time and the average wind speed is only 10.5 miles per hour. The island is also influenced by occasional Kona storms, which are intense low-pressure centers that pass near the island, bringing moderate to strong southerly winds and rain. When the trade winds or storms do not dominate the wind flows, the winds are typified by land/sea breezes and Kona winds.

3.3.2 PROBABLE IMPACTS ON CLIMATE/MICRO-CLIMATE

3.3.2.1 Construction Period

None of the activities or work required to construct the proposed facilities involve substantial heat or moisture emissions or alter shade/reflectivity in ways that have the potential to affect climate or microclimate. Neither do they entail the erection of tall structures or the sufficient re-grading of land with the potential to substantially alter wind flow within the Kahe Generating Station or surrounding areas to any measurable extent.

3.3.2.2 Operation and Maintenance Activities

The operation and maintenance of the facilities covered by this assessment does not entail substantial heat or moisture emissions or other activities with the potential to have a measurable effect on microclimate. The hazardous materials storage area represents a one-for-one replacement of the existing storage facility and does not, therefore, have the potential to further alter existing wind patterns or other microclimatic features. The new biofuel storage tanks and weld shop and valve recertification shop structure will slightly alter wind flow in the vicinity, but the effect will be localized and quite modest (i.e., readily detectable only within a few hundred feet on the lee side of the tanks). Overall, the actions that are covered by this document do not have the potential to have a substantial effect on microclimate at the power plant site.

3.4 AIR QUALITY

3.4.1 EXISTING CONDITIONS

Generally, ambient air quality in the area is excellent. The State of Hawai‘i Department of Health monitors ambient air quality on O‘ahu using a system of 9 monitoring sites. The primary purpose of the monitoring network is to measure ambient air concentrations of the six criteria pollutants that the United States Environmental Protection Agency (EPA) has promulgated as National Ambient Air Quality Standards (NAAQS). These include ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, 10 and 2.5-micron particulate matter (PM_{10} & $PM_{2.5}$), and airborne lead. The State of Hawai‘i has also adopted ambient air quality standards for some pollutants. In some cases, these are more stringent than the federal standards. At present, the State has set standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, lead, and hydrogen sulfide. Table 3.3 presents the state and national ambient air quality standards for selected pollutants.

Air quality data collected at the Kapolei, West Beach, and Makaīwa monitoring stations (the stations nearest the project site) and in downtown Honolulu during the year 2009 are presented in Table 3.4. As shown by these data, air quality in the area never exceeded the short-term or long-term State or National standards for particulate matter (PM_{10}) or carbon monoxide (the two pollutants that could be released during construction of the proposed project) during the period of measurement.

Table 3.3. State and National Ambient Air Quality Standards

Pollutant	Unit	Averaging Period	NAAQS	SAAQS
CO	ppm	1-hour	35[b]	9
		8-hour	9[b]	4.4
Pb	$\mu g/m^3$	Quarterly	1.5[h]	1.5
NO_2	ppb	1-hour	100	None
	ppm	Annual	0.053[c]	0.04
H_2S	ppm	1-hour	None	0.025
PM_{10}	$\mu g/m^3$	24-hour	150[d]	150
		Annual	None [e]	50
$PM_{2.5}$	$\mu g/m^3$	24-hour block avg.	35	None
		Annual	15[f]	None
O_3	ppm	8-hour rolling avg.	0.075[g]	0.08
SO_2	ppm	3-hour	0.5[a]	0.5
		24-hour	0.14[b]	0.14
		Annual	0.03[c]	0.03

Notes:
a. Federal Secondary Standard.
b. Not to be exceeded more than once per year.
c. Average of all 1-hour values in the year may not exceed the level of the standard.
d. May not be exceeded more than one day per year.
e. EPA revoked the annual PM_{10} standard effective December 17, 2006 due to a lack of evidence linking health problems to long-term exposure. The State still has an annual standard.
f. The 3-year average of 24-hour values must not exceed the level of the standard.
g. The 3-year average of the fourth highest daily maximum value must not exceed the level of the standard.
h. Average of all 24-hour values in any calendar quarter may not exceed the level of the standard.

Source: DOH (2010)

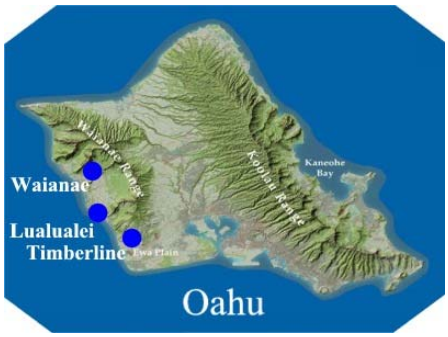
Table 3.4. Air Quality at Selected Locations: 2009

Sampling Station	*PM_{10} [1]*			*$PM_{2.5}$*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*98th %*	
Downtown Honolulu	34	34	13	21	13	4.8
West Beach	134[2]	91	16	-	-	-
Kapolei	37	36	16	25	13	5.5
Pearl City	67[3]	45	20	23[4]	12	4.9
	1-Hour Carbon Monoxide[5]			*8-Hour Carbon Monoxide[6]*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Downtown Honolulu	1.6	1.6	0.4	0.9	0.9	0.4
Kapolei	2.7	2.6	0.3	1.2	1.2	0.3
	3-Hour SO_2[7]			*24-Hour SO_2[9]*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Downtown Honolulu	0.023	0.021	0.001	0.005	0.004	0.001
West Beach	0.009	0.009	0.001	0.004	0.003	0.001
Kapolei	0.010	0.007	0.001	0.003	0.003	0.002
Makaiwa[8]	0.015	0.012	0.002	0.005	0.005	0.002

1: PM_{10} samplers operated for 24 hours once every 6 days in accordance with EPA guidelines.
2: Construction activities.
3: New Year's fireworks.
4: New Year's fireworks.
5: Attainment = 1-hour values not to exceed 35 ppm more than once per year. In 2009, Hawai'i was in attainment with the 1-hour CO NAAQS.
6: Attainment = 8-hour values not to exceed 9 ppm more than once per year. In 2009, Hawai'i was in attainment with the 8-hour CO NAAQS.
7: Attainment = 3-hour values not to exceed 0.500 ppm more than once per year. In 2009 Hawai'i was in attainment with the 3-hour SO_2 NAAQS.
8: Makaīwa station was permanently closed on June 30, 2009.
9: Attainment = 24-hour values not to exceed 0.14 ppm more than once per year. In 2009 Hawai'i was in attainment with the 24-hour SO_2 NAAQS.

Source: DOH (2009)

In addition to these data, detailed air quality information is also available from three ambient air quality monitoring stations located on the Waianae Coast as shown in the map to the right.[8] The monitoring stations were placed into operation in April 2009 as part of a commitment made by Hawaiian Electric to the west O'ahu communities. The monitoring stations are one of six commitments made in conjunction with the development of a new power generating station at Campbell Industrial Park. The data are updated hourly at about 15 minutes after the hour. Air quality at all of these stations has been good since monitoring began.



3.4.2 PROBABLE AIR QUALITY IMPACTS

3.4.2.1 Construction Period: All Projects

Only minor amounts of work with the potential to affect air quality will be needed to prepare the site on which the office trailers would be located. This includes replacing/adding small amounts of asphalt paving, removal of existing trailers and other items that have been temporarily located on the site, and the installation of overhead electrical and telecommunication lines from the nearest existing takeoff point. Emissions will originate from the internal combustion engines used to power the construction equipment and the vehicles that transport material and construction workers to and from the site. None of these would be substantial.

Construction of the proposed biofuel storage tanks, the building housing the new weld shop and valve recertification shop, and the associated relocation of the hazardous materials storage area will entail more substantial site work. The heavy construction equipment that will be used for this work (e.g., large bulldozers, dump trucks, excavators, etc.) will be powered by internal combustion engines that emit a variety of air pollutants, all in small quantities.[9] None of these will add substantially to existing pollution sources in the area.

Air quality impacts attributed to construction of the proposed improvements will be temporary and limited to exhaust emissions of construction vehicles and dust generated by short-term, construction-related activities. Access roadways within the Kahe facility are paved, and thus fugitive dust caused by construction vehicle traffic will not be an issue. Construction of the new buildings, relocation of the hazardous materials storage facility, and realignment of the storm water trench could generate some airborne particulates. In general, the small volume of dust that could be generated combined with the project area's distance from sensitive receptors mean that this can easily be managed through normal construction dust control measures such as regular watering.

Construction-related exhaust emissions will be minimized by ensuring the project contractors maintain their internal combustion engines in proper working order and immediately repair or replace faulty equipment. The volume of pollutants that could be released from the limited work involved is too small to have a measurable effect on air quality.

The work will conform with the air pollution control standards contained in Hawai'i Administrative Rules (HAR), Title 11, Chapters 59, "Ambient Air Quality Standards," and Chapter 60, "Air Pollution Control." Once they are in place, the improvements will not constitute an emission source.

[8] The Waianae, Lualualei, and Timberline monitoring stations each measure the concentrations of sulfur dioxide (SO_2), ozone (O_3), carbon monoxide (CO), particulate matter (PM), and nitrogen dioxide (NO_2),

[9] Construction equipment emissions result from the following sources and activities: (1) construction equipment engine exhaust; (2) motor vehicle exhaust, brake and tire wear; (3) entrained dust from material delivery trucks roads; (4) entrained dust from trucks traveling on roads; (5) entrained dust from construction worker vehicles; (6) fugitive dust from bulldozing, grading and scraping and from the handling of excavated material, such as dropping material into haul trucks; and (7) fugitive dust from wind erosion of disturbed areas.

3.4.2.2 Operation and Maintenance Activities

The only potential air quality impacts for any of the proposed project elements are limited to the construction phase as described above. When looked at cumulatively and over the long term, operations and maintenance of this project does not have the potential to harm air quality in the area.

New Biofuel Storage Tanks. Operation and maintenance of the proposed new biofuel storage tanks will not create any increase in emissions at KGS. While the storage of biofuel on site does represent a new activity, fuel storage is a long-standing process at the power plant, and will neither produce emissions nor will it adversely impact air quality.

In January, 2011, HECO conducted a full-scale demonstration project test of the effects of burning biofuel (in this instance crude palm oil, or "CPO") as a substitute for LSFO at Kahe Unit. The objectives of the test project were to determine the maximum percentage of biofuel that could be burned while complying with all environmental requirements (including emission limits that are part of the air permit for the facility), and maintaining adequate generating capacity from the units, preserving the ability to switch between biofuel and LSFO as needed. As part of this demonstration project, it tested blends of CPO and LSFO from 0 to 100% biofuel were tested between 38-MW (minimum load) and 88-MW (near full load). During the test burns, contractors measured gaseous emissions, took in-furnace measurements of furnace exit gas temperature, and documented boiler performance. Following the demonstration test, HECO conducted a nitric oxide/nitrogen dioxide emissions test.

A critical difference between LSFO and the biofuel used in the test project is the heating value of the two fuels.[10] The heating value for the CPO was approximately 14 percent less than LSFO on a volume (Btu/gallon) basis. Consequently, 1.14 gallons of biofuel (by volume) must be burned in order to generate the amount of electricity as can be generated using 1 gallon of LSFO. For the test burn, HECO achieved the higher fuel throughput by installing new, higher-capacity oil pumps and atomizers.

The ash, sulfur, and fuel nitrogen contents and carbon-hydrogen ratio of biofuel are much lower than LSFO. Consequently, emissions of sulfur dioxide, particulate matter, nitrogen oxides, and carbon dioxide were expected to be lower than for LSFO firing.

The results of the demonstration project indicate that substituting the biofuel that the new tanks would hold for the LSFO that is currently burned in the units at Kahe would decrease air pollutant emissions from the facility as follows:

- Lower emissions of nitrogen oxides by 26 to 29 percent.
- Reduce sulfur dioxide emissions by 67 to 94 percent.
- Slightly lower or maintain at present levels emissions of other regulated pollutants.
- Maintain clear stack plume at CPO blends greater than 70 percent biofuel and meet opacity limits at mixtures having less than 70 percent CPO.

There were no operational or emissions limitations identified that would restrict the biofuel/LSFO blend ratio in the Kahe 3 generator or other similar boilers in the HECO system. However, operating the boiler with biofuels or a biofuel/LSFO blend constitutes a major change to the fuel system, triggering the requirement for the addition of a Burner Management System, per the National Fire Protection Association Code.

New Weld Shop/Valve Recertification Shop & Hazardous Materials Storage Area. The proposed new weld shop and hazardous materials storage areas planned for KGS represent an exchange of old structures for new ones; as such, they do not represent any increase in emissions-producing activities

[10] The heating value or energy value of a fuel is the amount of heat released during the combustion of a specified amount of fuel. The energy value is a characteristic for each substance and is measured in units of energy per unit of the substance, with Btu/gallon most often used for measurements of combustion of petroleum products.

at Kahe Generating Station. While the presence of the valve recertification operations at Kahe will represent a new activity, valve recertification does not involve emissions-producing activities and will not impact air quality. A more spacious welding facility may result in more welders working in the area at any given time, the on-site welding capacity will result in fewer vehicle trips required to carry out the same work elsewhere.

Generation Planning, Maintenance, and Engineering Office Trailers & Storm Water Berm. At the present time, HECO maintains several temporary trailers used for additional office space adjacent to the proposed generation maintenance office and generation planning trailers area. The presence of one or more new trailers will not involve any activities which are not currently taking place in the area and will not involve the production of any airborne emissions. Similarly, once it is constructed, the earthen storm water berm will not have any effect on air quality in the area.

3.5 HYDROLOGY

3.5.1 EXISTING CONDITIONS

3.5.1.1 Surface Water

*Inland Water*s. In the developed areas of the generating station where the improvements are proposed, there are no streams or natural water bodies. There are three unnamed rill erosion channels north of the generating station in undeveloped portions of the parcel.[11] Storm water flows are conveyed by the rill channels only during periods of heavy rainfall, and these are natural features completely unrelated to the facilities that HECO has constructed on portions of the valley floor.

Ocean Waters. Offshore waters in the Pacific Ocean to the west of the Kahe facility are classified Class "A" by the State Department of Health. According to HAR Title 11-54:

> *"It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class."*

The majority of surface water runoff that passes through the Kahe Generating Station originates on areas *mauka* of HECO's property. Runoff currently enters the power plant operations area from off-site in sheet flows and along two natural drainageways. Sheet flows are collected by storm water drainage trenches located in the eastern and northwestern boundaries of the Kahe Generating Station property, as well as into onsite storm drains. The two natural drainageways permit discharges to flow onto existing drainage facilities located along and beneath Farrington Highway. From these, the discharges continue toward waters along the shoreline.

3.5.1.2 Groundwater

The principal groundwater reservoir in the southeastern portion of the Waiʻanae Range is in the middle and lower members of the Waianae Volcanic Series. The volcanic aquifers are recharged by infiltration of rainfall and surface runoff originating in the Waiʻanae Mountains. Groundwater flows from inland areas outward toward the coastline. The caprock that overlies this basal groundwater to the east is absent at Kahe.

The proposed facilities are situated *makai* of the Underground Injection Control line established by the State Department of Health and regulated under Hawaiʻi Administrative Rules Title 11, Chapter 23 (HAR §11-23). The designation, which stems from the fact that the total dissolved solids (TDS)

[11] Rill erosion is a result of runoff which begins to form small, concentrated channels. As rill erosion begins, erosion rates increase dramatically due to the resulting concentration of water at higher velocities.

concentration of the groundwater is more than five thousand mg/L, means that the aquifer is not an existing or potential source of drinking water.

3.5.2 PROBABLE IMPACTS

3.5.2.1 Construction Period

The total land area affected by this project is approximately 12.3 acres. Consequently, this project will require coverage for the discharge of storm water under the State of Hawai‘i NPDES General Permit program (HAR §11-55, Appendix C).

New Biofuel Storage Tanks. The proposed new biofuel storage tanks will disturb approximately 7.33 acres of land and will lead to a slight re-routing of a portion of the storm water drainage. It will not affect the location of the discharge or substantially alter the frequency or composition of storm water that does flow. The contractor will comply with all best management practices as necessary during the construction phase to prevent contaminants such as sediment, petroleum products, and debris from leaving the site via storm water runoff. The location for the proposed storage tanks will interrupt the existing path of the rill erosion channels in the vicinity; the tank farm facility will be designed to channel that flow into the existing drainage ditch adjacent to the site.

New Weld Shop/Valve Recertification Shop & Hazardous Materials Storage Area. The proposed new weld and valve recertification shops, and the adjacent replacement hazardous materials storage area would disturb slightly more than an acre of land (1.231 acres) and would not alter the overall drainage pattern or substantially increase the volume of impervious area or the volume of storm water runoff. As with construction of the proposed biofuel tanks, the contractor will comply with all best management practices as necessary during the construction phase to prevent fugitive contaminants from leaving the site with storm water runoff.

Planning, Maintenance, and Engineering Office Trailers. The area (0.237 acres) where the proposed trailers would be placed is already level and paved with asphalt and their installation would not significantly increase the impervious area. Consequently, no substantial earthwork or dewatering is required to install the foundations for the trailers. Hence, there would be no change in the volume or quality of runoff from the site; neither would it affect groundwater recharge.

Storm Water Berm. Construction of the proposed storm water berm will involve two distinct work areas; the first area (2.80 acre) is the actual berm construction site, the second area (0.72 acres) is the existing storm water ditch, which will require improvements to accommodate the water diverted by the new berm. The contractor will install erosion control structures and silt fences to prevent fugitive material from leaving the construction site via storm water runoff. The land disturbance required for the storm water berm and ditch improvements would be limited to the construction phase of this project and would not have any long-term impact on the quality of storm water runoff.

In order to properly protect the existing KGS fire road in the near-term, work on the storm water berm will commence before construction of the biofuel storage tanks. The storm water berm will eventually be partially demolished and integrated into the tank berm.

3.5.2.2 Ongoing Operation and Maintenance Activities

Once construction is complete, the only project components which have the capacity to impact area hydrology are the proposed biofuel storage tanks and the storm water berm. Water currently travels downslope into the existing interceptor ditch which travels around the berm which protects Fuel Tanks No. 12 and 14, crossing the existing dirt road and causing substantial erosion. Once the berm is constructed, storm water will be diverted around the area, reducing overland flow across the protected areas and increasing it at the point where the diverted water is released. The drainage facilities are being designed to resist erosion at the flow velocities that are planned, and there is little likelihood that they would be overtopped. Similarly, the proposed biofuel storage tanks will be constructed with an interceptor ditch which will channel water into the existing drainage ditch

adjacent to the developed portion of KGS. Consequently, the change does not have the potential to significantly affect adjacent areas.

3.6 BIOTA

3.6.1 EXISTING CONDITIONS

There is little vegetation within the working areas of the Kahe Generating Station fence line. Because the vegetation poses a fire risk, it is kept to a minimum and controlled by cutting and regular application of herbicide. Sparse landscaping is employed in a few areas (i.e., around the parking areas). Natural vegetation is mostly limited to the periphery of the developed area, such as the proposed biofuel storage tanks and storm water berm sites, as well as the portion of the parcel that extends *makai* of Farrington Highway near the shoreline. The biofuel storage tanks and storm water berm sites are characterized by common lowland dry shrubs such as *kiawe* (*Prosopis pallida*), *koa haole* (*Leucaena leucocephala*), and buffel grass (*Cenchrus ciliaris*). Some common native species were present, including *'ilima* (*Sida fallax*), and *'uhaloa* (*Waltheria indica*) but there were no threatened or endangered plants known or likely to be present on the subject property. The complete biological survey is included as Appendix B of this document.

The predominant terrestrial fauna at the Kahe Generating Station property are introduced avifauna including Common Indian Mynah (*Acridotheres tristes*), Zebra Dove (*Geopelia striata*), House Finch (*Carpodacus mexicanus*), and Common Waxbill (*Estrilda astrild*). Native birds may occasionally traverse the area, including the Hawaiian short-eared owl or *pueo* (*Asio flammeus sandwichensis*). Four terrestrial mammalian species were detected: dog (*Canis f. familiaris*), small Indian mongoose (*Herpestes a. auropunctatus*), cat (*Felis catus*), and pig (*Sus s. scrofa*). No threatened or endangered species have been detected in the project area nor is there habitat within the working areas of the power plant that could be considered suitable for hosting endangered or threatened species.

3.6.2 PROBABLE IMPACTS ON BIOTA

No adverse impacts to terrestrial flora and fauna are anticipated or expected. As noted above, vegetation is regularly removed from working areas of the power plant to ensure clear access and use of the property and to minimize fire hazards. No threatened or endangered fauna is likely to be present in the area except for the occasional fly-over, and these flyovers occur far too high to have any potential to be affected by the low structures that comprise the various projects. Thus, there is no potential for significant construction or operation-related impacts to those resources.

3.7 NATURAL HAZARDS

3.7.1 SUSCEPTIBILITY TO SEISMIC DAMAGE AND VOLCANIC 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 Seismic Zone 4, with Zone 0 as the lowest level for potential seismic induced ground movement. Like all of O'ahu, the Kahe Generating Station site is designated Seismic Zone 2a (U. S. Geological Survey, 2001). All of the proposed structures will conform to Seismic Zone 2a Building Standards, and their construction and operation will not increase the seismic vulnerability of the area.

The Wai'anae and Ko'olau volcanoes that formed the bulk of O'ahu are extinct. Smaller vents in the Honolulu Volcanic Series are more recent and formed volcanic features such as Diamond Head, Punchbowl, Salt Lake Crater, Koko Head, and Koko Crater. In general, these features are believed to be between 70,000 and 500,000 years old. As most scientists agree that there is little likelihood that there will be further eruptions in this series, Kahe does not appear to be susceptible to volcanic hazards.

3.7.2 SUSCEPTIBILITY TO FLOODING AND TSUNAMI INUNDATION

The Flood Insurance Rate Map (FIRM) for the area shows that the Kahe Generating Station is located in Flood Zone D, signifying that it is an area where flood hazards are undetermined.[12] While this classification indicates that a detailed flood analysis has not been conducted in settled urban areas, the general practice is to assign Zone D status only to areas where there is no history of flooding. For reasons summarized below, none of the proposed additions to the Kahe Generating Station are believed to be at serious risk from flooding or tsunami inundation.

- *Proposed Biofuel Storage Tanks*. The area selected for the tanks is far inland of the area that is susceptible to tsunami inundation and is well outside the tsunami evacuation zone (see the map dated Apr. 12, 2010 at http://www1.honolulu.gov/dem/map16pokaibaytokahepointinset2.pdf). The proposed biofuel storage tanks would be located at an elevation of approximately 79 feet above sea level (msl). The tanks will be surrounded by a berm and interceptor ditch which will guide water into the existing drainage ditch adjacent to the developed portion of KGS. Hence, they will not be susceptible to flooding by storm runoff.
- *Weld & Valve Recertification Shops and Hazardous Materials Storage Site*. The proposed weld and valve recertification shops and adjacent hazardous materials storage sites are also outside the tsunami evacuation zone. They are situated at an elevation of approximately 25-35 feet above sea level and are located well away from the drainage diversions that carry storm water runoff from *mauka* areas around the power plant facilities. They are not in a location that is susceptible to flooding by storm runoff.
- *Office Trailers Area*. The proposed office trailers area is located in an area where several other trailers have been temporarily sited for a variety of purposes at various times. The City and County of Honolulu tsunami evacuation maps indicate that the western two-thirds of the area designated for the trailers is within the tsunami evacuation area. Its location indicates that there would be no flooding with velocity in the event of a tsunami, but it is possible that the area could be inundated. This area is not in an area that is subject to flooding from surface runoff.
- *Storm Water Berm*. The storm water berm is located even further inland and at a higher elevation. It is outside the area susceptible to inundation by tsunami. It is designed to divert storm water from its natural course into an existing (and to be improved) drainage ditch in order to prevent flooding at KGS during storm events.

3.7.3 SUSCEPTIBILITY TO HURRICANE DAMAGE

Hurricane season in the Hawaiian Islands begins in June and lasts through November. During the last 50 years, many hurricanes and tropical storms have come close to the Hawaiian Islands, but only three hurricanes have had direct impact. In all three cases, Kauaʻi was the hardest hit, although Oʻahu suffered significant damages as well. Hurricane Iniki, which struck in September of 1992, was by far the most destructive storm to strike Hawaiʻi in recorded history, with widespread wind and water damage exceeding 2.2 billion dollars. In August of 1959, losses in Hurricane Dot were about 6 million dollars. In November of 1982, Hurricane Iwa caused over $250 million in damages. None of the facilities at the Kahe Generating Station were damaged by the two most recent of these major storm events. The Kahe Generating Station did not exist when Hurricane Dot passed the island.

The additions and replacements that are proposed as part of this project will be designed and constructed to withstand wind loadings specified in the Uniform Building Code and would, therefore, be expected to escape substantial damage from similar hurricane winds that have been experienced in the past.

[12] The Zone D designation on NFIP maps is used for areas where there are possible but undetermined flood hazards. Mandatory flood insurance purchase requirements do not apply, but coverage is available.

3.8 SOUND LEVELS

3.8.1 REGULATORY CONTEXT

Hawai'i 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 3.5. 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.[13] 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 (DOH). Mobile noise sources, such as construction equipment or motor vehicles are not required to meet the 70 dBA noise limit.

Table 3.5 Hawai'i 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
Source: Hawai'i Administrative Rules §11-46 "Community Noise Control"		

The Kahe Generating Station site is zoned I-2 Intensive Industrial, which makes it a Class C area (the least restrictive) for the purposes of noise. The State Department of Health limits noise levels in Class C areas to 70 dBA at the property line. There are no nearby residential or other noise-sensitive uses near the area that would be affected by the project. The most significant existing noise sources at Kahe are HECO's generating equipment (for inland areas) and vehicles traveling on Farrington Highway (for *makai* areas of KGS). No on-site noise measurements were made during preparation of the document. However, because none of the proposed projects are located near the generating

[13] 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.

equipment or other significant existing noise sources, existing ambient sound levels are believed to be well within DOH limits.

3.8.2 PROBABLE IMPACTS ON SOUND LEVELS

3.8.2.1 Construction Period

Grading and building construction will involve the use of excavators, trucks, and other heavy equipment. As depicted in Table 3.6, some of these are inherently noisy. 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. Construction-related noise impacts will be short-term. Moreover, because the majority of the noise-producing work is located on inland portions of the Kahe Generating Station site that are far removed from noise-sensitive uses, none would generate noise in excess of the property line noise limits. Noise generated from construction activity and use of machinery will be minimized by requiring contractors to adhere to State and County noise regulations. This will include use of properly muffled internal combustion equipment.

Construction activities will comply with Hawai‘i Administrative Rules, Chapter 11-46, “Community Noise Control.” No grading work will be done on Saturdays, Sundays and holidays at any time without prior notice to the Department of Health, provided that such grading work is also in conformance with HAR, Chapter 11-46. No long term impacts are anticipated and therefore no long-term mitigation is needed.

3.8.2.2 Operation and Maintenance Activities

Operation of the facilities comprising these projects is inherently quiet. Moreover, they would not substantially increase on-site employment or require markedly increased servicing that would lead to increased vehicular traffic. In fact, by reducing the need to send equipment off-site for work, operation of the facilities could actually marginally reduce vehicular traffic noise.

3.9 SOLID & HAZARDOUS WASTE

3.9.1 EXISTING CONDITIONS

Except for what is stored in the existing hazardous materials storage area, no hazardous materials are known to exist in the vicinity of any of the planned construction activities. The existing hazardous materials storage site that will be replaced as part of the proposed action consists of steel support pillars standing on concrete piers, and CMU walls set on a concrete slab foundation. Piping associated with the new construction consists principally of steel and steel alloys. The paint used on the proposed biofuel storage tanks, weld shop and valve recertification shop, hazardous materials storage area, and all other construction will be free of lead and other toxic contaminants.

3.9.2 PROBABLE IMPACTS & MITIGATION MEASURES

No hazardous materials will be used in the construction of the proposed new facilities. Removal of the existing hazardous materials storage area will generate construction waste. For the most part, this will consist of the rubble from which the existing storage area was constructed. If feasible, scrap will be sold to a dealer for recycling. However, if this cannot be done, the material will be disposed of at a construction landfill. Construction will also lead to some other types of solid waste, principally construction materials. Solid waste from the proposed project will be disposed of at approved off-site locations. No further mitigation measures are expected to be required.

Table 3.6. Construction Equipment Noise Emission Levels

Equipment	*Typical Noise Level (dBA) 50 ft., U. S. Dept. of Trans. study 1979*	*Average Noise Level (dBA) 50 ft., CA/T Project study 1994*	*Typical Noise Level (dBA) 50 ft., U. S. Dept. of Trans. study 1995*	*Lmax Noise (dBA) 50 ft., CA/T Project Spec. 721.560*
Air Compressor		85	81	80
Backhoe	84	83	80	80
Chain Saw				85
Compactor	82		82	80
Compressor	90	85		80
Concrete Truck		81		85
Concrete Mixer			85	85
Concrete Pump			82	82
Concrete Vibrator			76	80
Crane, Derrick	86	87	88	85
Crane, Mobile		87	83	85
Dozer	88	84	85	85
Drill Rig		88		85
Dump Truck		84		84
Excavator				85
Generator	84	78	81	82
Gradall		86		85
Grader	83		85	85
Hoe Ram		85		90
Impact Wrench			85	85
Jackhammer*		89	88	85
Loader	87	86	85	80
Paver	80		89	85
Pile Driver, Impact		101	101	95
Pile Driver, Sonic			96	95
Pump	80		85	77
Rock Drill			98	85
Roller			74	80
Scraper	89		89	85
Slurry Machine		91		82
Slurry Plant				78
Truck	89	85	88	84
Vacuum Excavator				85

Note: * There are 82 dBA @ 7 meter rated jackhammers (90 lb. class) available. This would be equivalent to 74 dBA @ 50 ft. These are silenced with molded intricate muffler tools.

Source: http://ops.fhwa.dot.gov/wz/workshops/accessible/Schexnayder_paper.htm

3.10 ARCHAEOLOGICAL, HISTORIC, AND CULTURAL RESOURCES

3.10.1 ARCHAEOLOGICAL AND HISTORIC RESOURCES: EXISTING CONDITIONS

The Kahe Generating Station is situated within the *ahupua'a* of Honouliuli, the largest traditional *ahupua'a* land unit on the island of O'ahu. Honouliuli includes all the land from the western boundary of Pearl Harbor (West Loch or Kaihuopala'ai) westward around the southwest corner of O'ahu 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 *ahupua'a* includes approximately nineteen kilometers (12 miles) of open coastline from One'ula westward to the boundary known as Pili o Kahe.

Neither Thrum (1906), McAllister (1933), nor Sterling and Summers (1978) indicate any lore on the Kahe area or its place names and state that the area northwest of Kahe Point and into Nānākuli seems to be devoid of almost any archaeological activity. The paucity of material distinguishes Kahe from the area south of Kahe, in the West Beach area and in Waimānalo and Makaīwa Gulches, where archaeological studies have located a number of both prehistoric and post-contact sites.

The most recent Waimānalo Gulch investigation was conducted for the expansion of the sanitary landfill (Hammatt and Shideler 1999). No archaeological sites were located within the landfill expansion area. However, two sites – the Battery Arizona bunker complex and a modern "shrine" site – were observed along the northern ridge which separates Waimānalo Gulch from the Kahe Generating Station property, south of the current project area. The stones from that site were understood to have been previously relocated from the central portion of Waimānalo Gulch circa 1988.

The Kahe Generating Station and surrounding areas have been the subject of extensive archaeological reconnaissance. The most recent of these is an archaeological inventory survey (AIS) of two adjacent survey areas (termed Survey Area A and Survey Area B - see Figure 3.1), within TMK 9-2-003:027 (Yucha and Hammatt, 2011).

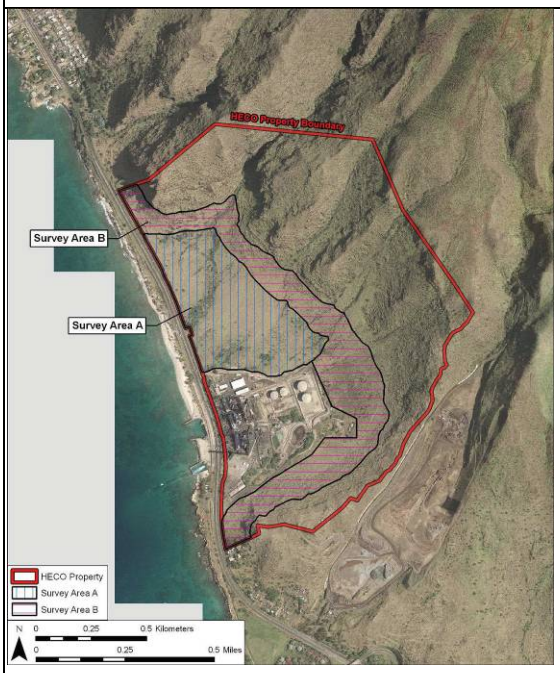
- Survey Area A (approximately 72 acres) includes the majority of undeveloped land below +120-foot msl elevation.
- Survey Area B (approximately 88 acres) includes the majority of undeveloped land between +120 feet and +200 feet msl.

The AIS involved: (*i*) a 100 percent coverage pedestrian inspection of both survey areas at 5 to 10 meter intervals; (*ii*) subsurface testing of selected features;[14] and (*iii*) climber inspection of cliff faces.[15] The work was conducted in accordance with the guidelines contained in HAR §13-13-282. Background research included a review of previous archaeological studies on file at the SHPD/DLNR library and of historical documents at Hamilton Library of the University of Hawai'i, the Hawai'i State Archives, the Mission Houses Museum Library, the Hawai'i Public Library, and the Archives of the Bishop Museum. In addition, researchers studied historic photographs at the Hawai'i State Archives and the Archives of the Bishop Museum, historic maps at the Hawai'i State Land Survey Division, and historic maps and photographs at the CSH library. This research provided the environmental, cultural, historic, and archaeological background for the project area. It also helped the researchers formulate a predictive model regarding the expected types and locations of historic properties that may be located in the project area.

[14] Subsurface testing consisted of the partial excavation, by hand, of selected surface archaeological features located during the pedestrian survey. All excavated material was screened to separate out the soil matrix. Each test excavation was documented with a scale section profile, photographs, and sediment descriptions.

[15] The cliff faces were inspected because of a disassociated human skeletal element that had been found at the base of the cliff. Climbers completed a thorough visual inspection of each cavity, terrace, or cave within the overlying vicinity of the disassociated human skeletal element, documenting their work with photographs and field notes.

Figure 3.1 Archaeological Inventory Survey



Source: Yucha and Hammatt, 2011, Figure 3.

The AIS report identified ten historic and archaeological properties within the Kahe Generating Station (see Table 3.7). Only one site (SIHP#-7138) is near any of the projects that are covered by this report. That complex, a historic period clearing or stockpiling mound complex consisting of 56 features, straddles the line between Survey Areas A and B and is less than 100 feet from the new biofuel storage tanks that HECO has proposed. While the site appears to be unmodified, it is bounded by a large (and unrelated), linear storm water berm and grading to the south and a bulldozer road to the west and north. Topography within this site consists of an intermittent series of low, undulating rises and depressions of extremely rocky sediment along the edge of a narrow, vertically cut, drainage ditch. The AIS report describes the vegetation at SIHP#-7138 as consisting of *koa haole*, *kiawe*, and exotic grasses.

Table 3.7 Known Historic Properties at Kahe Generating Station

State Inventory of Historic Place (SIHP) Number	***Site Description***	***Recommendation***
#50-80-12-6647	A pre-contact to historic era agricultural and/or ceremonial complex consisting of three features.	Develop preservation plan.
#50-80-12-6648	A historic habitation/infrastructure complex consisting of three features.	No further preservation work.
#50-80-12-6649	A historic water control wall.	No further preservation work.
#50-80-12-6650	A pre-contact agricultural complex consisting of eight features.	No further preservation work.
#50-80-12-7137	A historic (military) defensive position/observation post complex consisting of 15 features.	Develop preservation plan.
#50-80-12-7138	A historic clearing/stockpiling mound complex consisting of two features.	No further preservation work.
#50-80-12-7139	A pre-contact temporary habitation/activity area consisting of two features.	Develop preservation plan with provision for preservation of *iwi*. .
#50-80-12-7140	A historic (military) defensive bunker (pillbox).	No further preservation work.
#50-80-12-7141	A historic water control/infrastructure structural foundation.	No further preservation work.
#50-80-12-7142	A historic animal husbandry/infrastructure wall.	No further preservation work.

Source: Yucha and Hammatt (2011)

The AIS report describes SIHP# 50-80-12-7138 as consisting of 56 rectangular, circular, and irregular-shaped basalt cobble and small to medium boulder mounds piled both on top of the gentle rises, and within the low depressions of the site area. In general, the mounds are constructed of one to four courses of basalt stone. The downslope edges of several mounds are faced. Mound surfaces are relatively level to sloping and concave, which varied and correlated with the area's topography. No paving or internal structure was detected within any of the mounds. The report notes that it is of interest that the mounds are evenly spaced throughout the landscape, located approximately six to ten meters apart, and are generally equal in size, ranging in maximum dimensions from 2 to 10 meters.

CSH performed subsurface testing at four of the features associated with SIHP # 50-80-12-7138 (Features S, T, Z, and J) within Survey Area A in an effort to assess each feature's content, internal structures, and underlying stratigraphy. Test excavations consisted of one meter by one meter test units that were excavated to within 10 cm of compacted sterile soil. No artifacts or diagnostic material were recovered during subsurface testing. Subsurface testing suggests that diagnostic material were recovered during subsurface testing; this suggests that the mounds at SIHP# 50-80-12-7138 are surficial constructions without internal sediment accumulation or content.

The AIS report describes the construction methodology of the 56 features at this site as consisting of the clearing of small, evenly spaced areas of loose talus accumulation into discrete, relatively uniform piles or mounds. It notes that the mounds were constructed first by the formation of a perimeter wall of basalt stone consisting of one or more 90-degree corners, that was then filled with between one and four courses of loosely piled basalt stone. The report concludes that SIHP# 50-80-12-7138 is a historic complex of clearing mounds and speculates that these may have been created in an effort to stockpile raw materials for future construction or sale.

3.10.2 CULTURAL RESOURCES: EXISTING CONDITIONS

Access to the working areas of the power plant site is restricted for security and safety purposes. Consequently, no cultural uses presently exist there. However, the Kahe area does have a rich cultural history and Cultural Surveys Hawai‘i staff consulted with a number of community members as part of its work. Following the completion of its field work for the AIS, CSH sent consultation letters seeking archaeological, cultural, and historic information about the survey areas, as well as past land use information for the vicinity to the parties listed in Table 3.8. It was able to obtain information on cultural resources from the majority of these individuals. In-depth interviews with Glen Kila and Nettie Tiffany that CSH conducted in August 2011 were particularly informative. None of the individuals contacted expressed knowledge of any traditional or customary use of the features in SIHP # 50-80-12-7138.

Table 3.8 Parties Consulted in Preparation of the AIS

Name	*Organization*	*Position*	*Provided Input*
William Ailā	Department of Land and Natural Resources, State of Hawai‘i Hui Mālama I Nā Kūpuna ‘O Hawai‘i Nei	Director, DLNR	No
Eric Enos	The Cultural Learning Center at Ka‘ala	Director, Educator, and Cultural Practitioner	Yes
Josiah “Black” Ho‘ohuli	Wai‘anae Coast Neighborhood Board No. 24	Board Member	Yes
Kamaki Kanahele	Wai‘anae Coast Comprehensive Health Center – Native Hawaiian Traditional Healing Center	Co-founder and *Lā‘au Lapa‘au* Practitioner	No
Agnes Cope	Wai‘anae Coast Comprehensive Health Center – Native Hawaiian Traditional Healing Center	Co-founder and *Lā‘au Lapa‘au* Practitioner	No
Nettie Tiffany	Kahu of Lanikuhonua at Ko‘olina Formerly of O‘ahu Island Burial Council	Member	Yes
Shad Kane	‘Ahahui Siwila Hawai'i O Kapolei – Hawaiian Civic Club	Member	Yes
Glen Kila	Koa Mana Koa ‘Ike	Member	Yes
Douglas “McD” Philpotts	Hawaiian Cultural Practitioner, Campbell descendant, Makakilo kama‘āina	Hawaiian Cultural Practitioner, Campbell Family Descendent, and Makakilo Kama‘āina.	Yes
Note: CSH mailed the consultation letters on June 13, 2011.			
Source: Yucha and Hammatt (2011), Section 5.2.			

3.10.3 PROBABLE IMPACTS & MITIGATION MEASURES

3.10.3.1 Construction Period

As noted above, the available evidence indicates that there are no historic, archaeological or cultural resources in the areas on or near any of the projects that HECO has proposed. The nearest historical property (SIHP# 50-80-12-07138) consists of historic period mounds that have been tested and found not to contain information of historic or cultural significance. This, together with the fact that the proposed action would leave all of the mounds intact, means that the proposed project would have no adverse effect on these features. Similarly, the lack of any evidence that the affected areas are used for traditional cultural purposes and the fact that it would not further impair or limit the ability of native Hawaiian practitioners to access cultural resources in adjacent areas leads to the conclusion that it would have no adverse effect.

While HECO believes that the likelihood of further discoveries in the area is low, mitigation to address this potential for discovery of undocumented archaeological and/or historical remains will include, but is not limited to: (*i*) the immediate cessation of work in the area; and (*ii*) notification of the State Historic Preservation Division (SHPD) to assess impacts. As appropriate, further mitigation measures will be proposed and coordinated with SHPD.

3.10.3.2 Operation and Maintenance Activities

Once constructed none of the proposed facilities will have the potential to harm archaeological, historic, or cultural properties in any way. Neither will their operation limit or otherwise adversely affect traditional and customary practices.

3.11 IMPACTS ON RECREATION & SHORELINE ACCESS

3.11.1 EXISTING CONDITIONS

The proposed projects are located in the City and County of Honolulu Department Parks and Recreation's District III, which encompasses 23 parks on the leeward side of O'ahu. These include parks in each of the major residential zones and numerous beach parks (along the Wai'anae Coast, at Barbers Point and Campbell Industrial Park, and 'Ewa Beach). There are two parks on the *makai* side of Farrington Highway opposite the Kahe Generating Station. The southernmost is Kahe Beach Park (the portion of that which is directly across from the KGS is often referred to as "Electrics"). The northernmost is Tracks Beach Park. These beach parks support recreational activities typical across the leeward coast including, but not limited to swimming, sunbathing, surfing, and fishing.

3.11.2 PROBABLE IMPACTS

The existing parks are separated from the Kahe Generating Station by Farrington Highway and the existing landscaped fence along the *makai* side of HECO's property. All except the office trailers area are also screened from view from the parks by the existing power plant structures. With the exception of the office trailers site and the portion of the 8-inch pipeline closest to the highway, the construction will not be visible from the highway or from the beach park, and none of the work required for the facility improvements will restrict access to the beach park or the shoreline. The trailers will be in an area screened by vegetation, where temporary trailers are already present, and will not represent a net change in visual quality from the existing conditions. Construction and operation of the proposed facilities will not generate noise of air emissions that have the potential to adversely affect the existing recreational experience. Neither will it generate vehicular traffic or changes in water quality that could degrade the recreational experience. Consequently, no recreational impacts are anticipated.

3.12 IMPACTS ON SCENIC AND AESTHETIC RESOURCES

3.12.1 EXISTING CONDITIONS

The *makai* portions of the Kahe Generating Station complex are visible from Farrington Highway immediately fronting the power plant and from Kahe Point Beach Park to the west. However, the facility is obscured from other on-land public vantage points due to the natural topography (see Figure 3.2). The 'Ewa Development plan lists views of the ocean from Farrington Highway between Kahe Point and the boundary of the Waianae Development Plan Area as a significant view and vista that should be preserved.

The areas where the work covered by this proposal would occur are shielded from public view by the existing landscape screen along the Kahe Generating Station fence line and by the generating units and other large existing structures on the property. Existing landscaping along the perimeter fence marking the *makai* edge of the complex helps soften the appearance of the generating complex as seen from the highway and nearby shoreline and offshore areas. However, the great bulk and height of the existing facilities give the area a clearly industrial feel despite the landscaping.

3.12.2 PROBABLE IMPACTS ON SCENIC AND AESTHETIC RESOURCES

Most of the proposed improvements will occur in the midst of the intensive industrial complex of the Kahe Generating Station. The proposed combined weld and valve recertification shops, hazardous storage materials area, and the storm water berm will occur outside of the public view, as the Kahe Generating Units 3, 4, 5, and 6 completely block views of the sites from Farrington Highway and Kahe Beach Park. Portions of the proposed new trailers and piping may be visible from a brief stretch of the roadway. However, with a roof height (including foundation) of less than 13 feet, the modular trailers are low and located where temporary trailers are already present; likewise the proposed 8-inch pipeline will parallel an existing 12-inch pipe and is low-lying. Thus, together with the visual screening that would be provided by existing trees and ornamental vegetation mean they would not constitute a significant new visual presence in the context of the industrial complex. Consequently, the project will not result in adverse impacts to scenic and aesthetic resources.

3.13 LAND USE & SOCIOECONOMIC ENVIRONMENT

3.13.1 EXISTING CONDITIONS

The parcel containing the Kahe Generating Station is within the State "Urban" Land Use District (see Figure 3.3) and the Special Management Area (SMA). It is zoned I-2 Intensive Industrial by the City and County. The immediately adjacent parcels are within the Agriculture District, but the Urban District designation resumes farther south. Except for the office trailers, the areas on which the proposed new and relocated facilities would be constructed are deep within the Kahe Generating Station property. They are completely surrounded by the other industrial uses that HECO maintains on the property and are supportive of them.

Kahe Beach Park occupies the area just across Farrington Highway from the Kahe Generating Station, sharing the shoreline in this area with HECO-owned land on which the ocean water cooling inlet and discharge structures are located. None of the proposed facilities would be visible from the park areas or from the offshore water areas that are used by swimmers, surfers, and divers.

View of Kahe Generating Station from hillside north of facility.

Vew of Kahe from Farrington Highway.

View from Kahe Beach Park.

Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

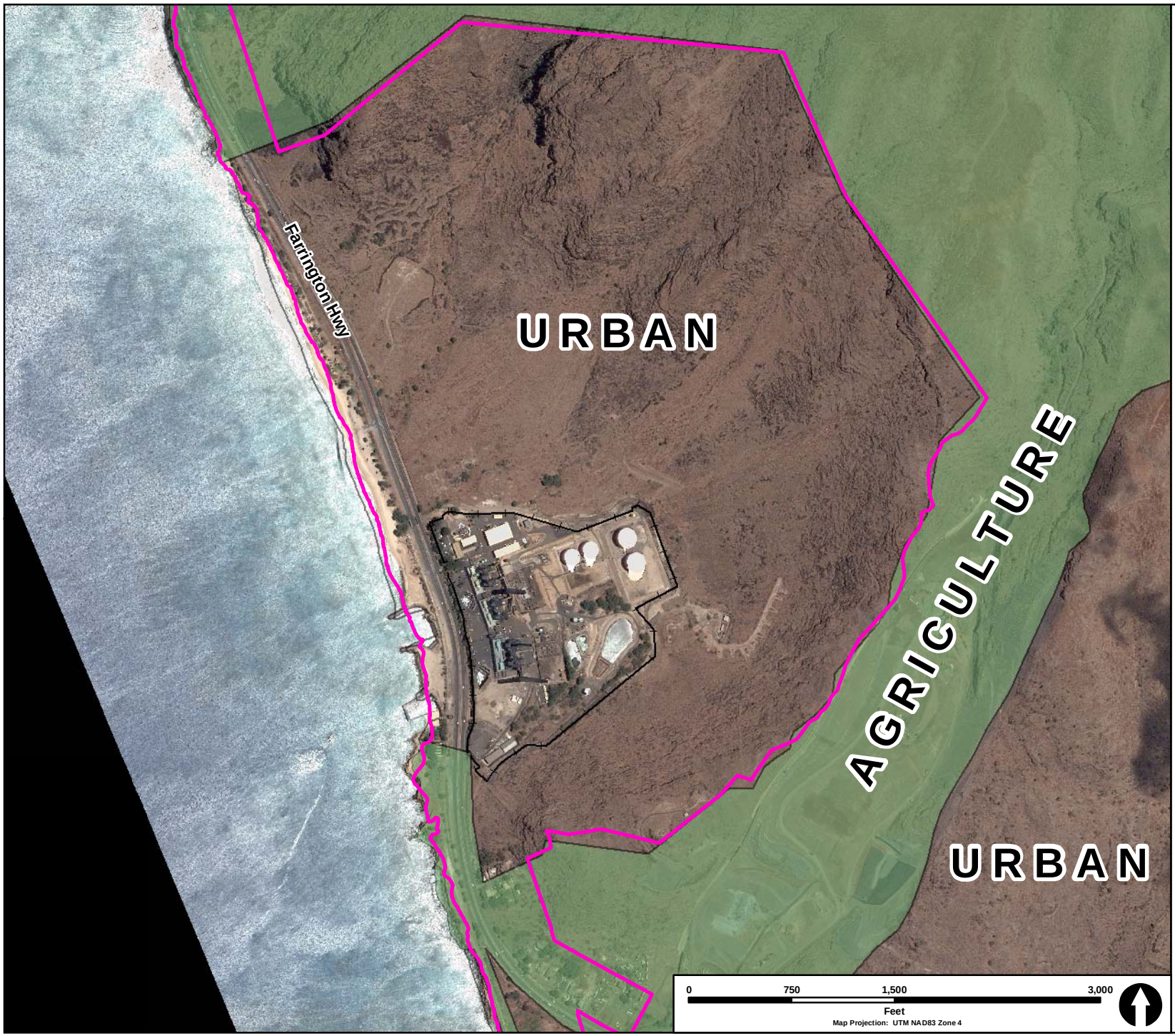
--Hawaiian Electric Co., Inc.
--City & County of Honolulu GIS
--Photo B and C by PSI, Inc.

Figure 3.2:

Views of HECO Kahe Generating Station

HECO Kahe 2011

Figure 3-2 Views of the Kahe Generating Station 2011-10-04.ctr



Legend:

Special Management Area at Kahe

Kahe Fence Line

Prepared for:

Hawaiian Electric Co., Inc.

Prepared by:

PLANNING SOLUTIONS

Sources:

-HECO Energy Services Dept.
-City & County of Honolulu GIS
-State of Hawaii GIS
-Space Imagine, Inc.
(Photo taken July 3, 2009)

Figure 3.3:

State Land Use Districts & SMA Boundary

HECO Kahe 2011

Figure 3-3 State Land Use Districts & SMA Boundary 2011-10-07.mxd

The nearest residences are situated just to the south of Kahe Point. Their distance (about 0.4 miles) and the presence of intervening high ground means that the proposed facilities will not be visible from these homes. The nearest homes to the north of the property are even further away and views of the project sites are similarly blocked. The only other nearby use is the Waimānalo Gulch Sanitary Landfill, which occupies the valley immediately to the south of the Kahe Generating Station.

The Kahe Generating Station is located on the boundary of the Makakilo/Kapolei/Honokai Hale and Waiʻanae Neighborhood Board Areas. It is situated in the ʻEwa Development Plan Area and is designated as a "Public Facility" on the Development Plan map. The power plant is located within the sparsely-populated Census Tract 86.11, which includes Kahe Point, the adjacent shoreline, and (from south to north) Awanui, Pālailai, Makaīwa, Waimanalo, Keoneʻōʻio, and Limaloa Gulches. This census tract contains only a very small resident population of fewer than twenty homes; the population of this Census Tract was 84 in 2010 (http://hawaii.gov/dbedt/info/census/Census_2010/PL94-171/hsdc_rep2010_2.pdf.) Disaggregated socioeconomic data for these residents is not available.

3.13.2 PROBABLE LAND USE AND SOCIO-ECONOMIC IMPACTS

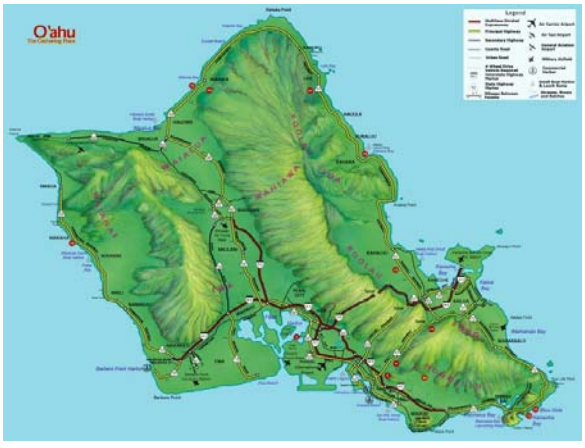
The proposed actions will not alter the kinds of land use that occur within the Kahe Generating Station or surrounding areas. They are meant to support the current industrial use of the facility and are consistent with all land use and zoning controls. They will not increase the intensity of use and do not have other characteristics that have the potential to generate secondary growth or that would lead to other land use changes in adjoining areas.

While substantial, the construction expenditures are small relative to the overall level of construction activity on the island, which is estimated at approximately $1.4 billion in new construction authorizations in 2010.[16] Hence, they do not have the potential to have a major impact on the local economy or to cause demand for construction workers that cannot be met by the existing local labor force. Moreover, the proposed changes will not create a significant new revenue stream or create substantial ongoing costs that would have a considerable effect on the island's economy. At most, their construction will provide short-term employment. Apart from five additional personnel supporting biofuel operations, the projects would not increase the number of employees at the power plant or attract new residents to the area.

3.14 IMPACTS ON TRANSPORTATION FACILITIES

3.14.1 ROADWAYS & TRAFFIC

3.14.1.1 Existing Conditions



Road access to the entrance to the Kahe Generating Station is from Farrington Highway, State Route 93. From the point where it connects with the H-1 Freeway, Farrington Highway is a four-lane, two-way roadway. The speed limit in the segment fronting the generating station is 35 miles per hour. Peak-hour traffic volumes on Farrington Highway are relatively high (see Table 3.9). As a result, it is often congested during peak periods.

[16] Estimate based on State of Hawaiʻi Department of Business and Economic Development, Construction Expenditures estimates, Table E-8. "Estimated Value of Private Building Construction Authorizations, by County," assumes that Q4 construction expenditures (which were not available at the time the table was compiled) were the average of the level experienced during the first three quarters of 2010. http://hawaii.gov/dbedt/info/economic/data_reports/qser/construction.

The State of Hawai'i Department of Transportation, Highways Division, Highways Planning Survey Section conducts regular traffic counts for Farrington Highway near the Kahe Generating Station. The most recent count was conducted on October 27 and 28, 2009. The 24-hour traffic volumes were similar on the two days: 38,238 on October 27 and 39,131 on October 28. The peak-hour volumes on the two days were also similar. To be conservative, the following discussion is based on the data from October 28, when vehicle volumes were slightly higher. PSI has used the counts for October 28 which had the higher peak-hour and 24-hour volumes. The difference between the two counts was such that the data from the other date would not have altered the conclusions.

Table 3.9. Existing Traffic Volumes on Farrington Highway at Keone'ō'io Bridge Near Kahe

Direction	***Direction 1: Waianae-Bound***	***Direction 2: Town-Bound***	***Total***
24-Hour Volume	20,682	18,449	39,131
Morning Peak-Hour (6:30-7:30 a.m.)	1,588	1,394	2,982
Afternoon Peak-Hour (3:30-4:30 p.m.)	1,393	1,398	2,782
Note: Site ID No. B72009300330 Farrington highway at Keone'ō'io Bridge between Piliokahi Avenue and Kahe Generating Station.			

Road access into the generating station is provided at two points. The main entrance is situated toward the northwestern corner of the complex, between Kahe Unit No. 1 and the main offices. A 300-foot-long left-turn deceleration and storage lane allows vehicles southbound on Farrington Highway to queue as they wait to turn left into the facility. Because of the heavy peak-hour traffic, left-turns into and out of the facility (i.e., turns that have to cross in front of oncoming traffic) can be challenging. HECO security staff recorded existing traffic volumes into Kahe Generating Station are shown in Table 3.10. A comparison of the data in Table 3.9 and Table 3.10 shows that the Kahe Generating Station accounts for no more than 0.4 percent of the overall traffic on Farrington Highway. An extensive internal road network serves the generating station itself, but it is used almost exclusively for service trucks; few vehicles go beyond the parking areas situated at the *makai* end of the facility.

Table 3.10 Entrances to Main Gate at Kahe Generating Station.

Month	***Average Vehicles Per Day***
August, 2010	171
September, 2010	141
Source: Data collected at KGS Main Gate by HECO Security Division.	

3.14.1.2 Vehicle-Trip Generation

Activities required to construct the proposed improvements at Kahe Generating Station would generate vehicle-trips on area roadways. As these would occur while the existing operations continue in their present form, they would lead to a short-term increase in the number of vehicles entering and leaving the facility. However, since the proposed projects are related principally to providing

improved facilities for activities and work already occurring at Kahe, their ongoing operation would not substantially increase the number of vehicle-trips on area roadways over the long-term.

Construction Worker Vehicle-Trips. The proposed project components would require a relatively small size work crew to be on-site at any point in the construction process. The number of workers that would be employed for each project during a typical "busy" week during the construction period is shown in Table 3.11. As shown in Table 3.12, those construction workers are expected to generate approximately 15 two-way (i.e., 15 in-bound and 15 out-bound) vehicle-trips during a typical "busy" period of work on the weld and valve repair shops, with an equal number making trips in the morning and evening. The other projects would generate lesser volumes of construction worker traffic, and not all could (or would) overlap. Hence, it is unlikely that even under the worst circumstances there would be more than 25 construction-worker vehicle trips in a single day. Based on normal 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.

Table 3.11. Estimated Construction Work Force and duration, by Project.

Project	*Typical High Period Employment*	*Expected Duration (in mo.)*	
		Peak Period	*Start-to-Finish*
Biofuel Storage Tanks	12	4	15
Weld & Valve Repair Shops	15	5	10
Hazardous Materials Storage Area	5	1	2
Trailers Area	3	3	5
Storm Water Berm	8	3	6
Source: Compiled by Planning Solutions, Inc. using HECO estimates.			

Table 3.12 Summary of Construction Phase Trip-Generation (Excluding Materials).

Time Period	*Type*	*Biofuel Storage Tanks*			*Weld & Valve Repair Shops*			*Hazardous Materials Storage Area*			*Trailers Area*			*Storm Water Berm*		
		In	*Out*	*Total*	*In*	*Out*	*Total*	*In*	*Out*	*Total*	*In*	*Out*	*Total*	*In*	*Out*	*Total*
5:00am to 9:00am	Worker	12	0	12	15	0	15	5	0	5	3	0	3	8	0	8
	Other	2	1	3	3	1	4	1	1	2	1	1	2	1	0	1
9:00am to 2:00pm	Worker	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	Other	1	2	3	2	3	5	1	1	2	1	1	2	1	1	2
2:00pm to 11:00pm	Worker	0	12	12	0	15	15	0	5	5	0	3	3	0	8	8
	Other	1	2	3	2	3	5	1	1	2	1	1	2	2	2	4
24-hour TOTAL		***16***	***17***	***33***	***22***	***22***	***44***	***8***	***8***	***16***	***6***	***6***	***12***	***12***	***12***	***24***
Note: Estimates do not include material deliveries because they will be irregular and will generally be limited to brief periods during project construction.																
Source: Compiled by Planning Solutions, Inc. using estimates by HECO.																

Equipment & Material Delivery Trips. Construction of the proposed project components will involve the importation of several relatively large pieces of diesel-powered construction equipment such as trucks, bulldozers, and earthmovers. Many smaller pieces of equipment will be needed as well. This equipment will all have to be brought in from elsewhere on the island. Additionally, construction activities will involve the transport of construction material to the site, including metal tank forms, concrete, piping, steel, and pre-fabricated modular office trailers. Small quantities of gravel and other fill material will also be brought in from off-site. The number of equipment and material deliveries is expected to be low (probably no more than 15 on even the busiest day). A few (principally the delivery of the tank material and office trailers) may require oversize loads. If so, such deliveries would be made at night.

Demolition Waste. Several of the proposed improvements will involve replacing existing structures with newer ones. Material that is removed when existing facilities are demolished will either be kept within Kahe Valley or trucked away for disposal at an approved location (e.g., the PVT construction waste landfill in Nānākuli.) The number of truck-trips that this would require is small, with no more than 10 trips per day envisioned for a period not exceeding a week.

Fill Material. HECO anticipates that moderate amounts of select structural fill will be needed for some of the project components. It will be obtained from suitable offsite sources and trucked to the Kahe site. HECO anticipates that the volume of such material will be small and will generate no more than a few vehicle-trips in any one day. The great majority of the fill needed for the projects discussed in this document is for the proposed biofuel storage tanks. Nearly all of that will come from material cut for the same project component (subject to the necessary approval) and will not necessitate additional off-site truck-trips.

3.14.1.3 Potential Impacts on Area Roadways

Construction Period Impacts. The proposed projects do not involve any work outside the Kahe Generating Station parcel. They will not require temporary lane closures or other actions that would affect the roadway system's ability to accommodate traffic. Hence, the only mechanism through which the proposed projects could affect the level of service on area roadways is through the temporary increase in traffic that the proposed projects will cause. The magnitude of those effects is discussed below.

As indicated in Section 2.2.6, construction of the proposed facilities is expected to take place over several years. Some project components, such as the relocation of the existing hazardous materials storage area, must be completed before others, such as the new weld and valve recertification shops can be initiated. Hence, not all construction-period traffic will overlap. When all factors are considered, HECO anticipates that project-related construction traffic during the busiest week of construction will be as shown in Table 3.12.

Table 3.13. Impact of Construction Period Traffic

Time Period	*Existing Farrington Highway (vehicle-trips per hour)*			*Proposed Projects*			*Proposed Projects As % of Total*
	Waianae Bound	*Town Bound*	*Total*	*In*	*Out*	*Total*	
Morning Peak-Hour (6:30 a.m. to 7:30 a.m.)	1,588	1,394	2,982	31	2	33	1.11%
Afternoon Peak-Hour (3:30-4:30 p.m.)	1,393	1,398	2,791	5	32	37	1.33%
Note: Site ID No. B72009300330 Farrington highway at Keone‘ō‘io Bridge between Piliokahi Avenue and Kahe Generating Station.							
Source: Planning Solutions, Inc.							

Operational Period Impacts. Normal operation and regular maintenance of the proposed improvements do not involve activities with the potential to significantly affect transportation facilities. No significant impacts to onsite or offsite traffic volumes are predicted during the operational phase. The proposed new weld and valve repair shops and hazardous materials storage area are both replacements of existing structures which will be demolished. Because they replace existing structures and will accommodate existing uses, they are not expected to create additional operational traffic. Likewise, the proposed office trailers will be a new addition, but are intended to provide additional office space for employees already working at KGS. The storm water berm does not have the potential to increase traffic. Also, even if the biofuel storage tanks do receive the projected number of fuel truck deliveries, it would amount to no more than two deliveries per day, five days a week. Thus, none of the proposed facilities are expected to generate significant additional trip volume, either on public roads or on the lightly travelled service roads within the Kahe Generating Station.

3.14.2 AIR AND OCEAN TRANSPORTATION FACILITIES

The project would not directly affect air or ocean transportation facilities. However, most of the construction materials and equipment would be imported by sea, increasing the volume of cargo passing through the State’s port facilities. The biofuel that would be stored in the proposed new tanks would be used in lieu of the LSFO that is presently employed for the same purpose. Hence, the only way that it would alter the required fuel throughput through existing facilities is due to the 14-percent-lower heating value of biofuel relative to the LSFO that it would replace. The resulting difference in fuel throughput volume is a tiny fraction of the total tonnage that the existing fuel import facilities handle. Because of this, the only aspect of the biofuel substitution that has the potential to affect transportation facilities is a function of the way in which the biofuel is landed on O‘ahu. If it is brought to the island and unloaded through one of the two existing offshore moorings (owned and operated by Tesoro and Chevron), then there will be little change to existing operations. If, on the other hand, the imported fuel is landed through pier facilities in Kalaeloa Harbor, then the delivery ships will require pier time that is not presently devoted to that purpose. HECO has consulted with the Harbors Division of the State Department of Transportation with respect to the ability of existing and programmed harbor facilities to accommodate the associated increase in harbor traffic and it has been informed that existing and planned facilities are adequate to accommodate this.

All of the proposed structures are far below the height that would require notification of the Federal Aviation Administration. Hence, they do not have the potential to adversely affect air transportation.

3.15 IMPACTS ON UTILITIES AND PUBLIC INFRASTRUCTURE/SERVICES

3.15.1 PUBLIC INFRASTRUCTURE

3.15.1.1 Existing Conditions

Electric Power. The Kahe Generating Station is connected to HECO's island wide electric power grid. It generally provides its own electrical power, but the interconnection allows it to draw from other sources within the grid as well. Similarly, HECO has its own internal telecommunications system which it uses to control the operation of the various generating, transmission, and distribution facilities that it owns. However, certain functions at Kahe are also connected into Hawaiian Telcom's voice telecommunications system, and these are provided through telephone lines along Farrington Highway.

Potable Water. The potable water that is used at Kahe is obtained from the existing Honolulu Board of Water Supply system 24-inch water line along Farrington Highway. A lateral from the main enters the generating station site near the main gate, and smaller lines distribute it throughout the property. In July 2009, HECO completed installation of its new reclaimed water pipeline to transport RO reuse water from the Honouliuli Wastewater Treatment Plant (WWTP) to the Kahe Power Plant. The new pipeline allowed HECO to reduce its potable water consumption at the Kahe facility by more than 140,000 gallons per day, conserving potable water for other uses.

Sanitary Wastewater. There is no municipal sanitary wastewater system serving the Kahe Generating Station.[17] Instead, the facility is served by one individual wastewater system ("IWS") and one cesspool system. The IWS was installed in 2006-2007 to replace three then-existing Class 5 cesspool systems in the Kahe Power Plant Sanitary Wastewater system in order to comply with new U.S. Environmental Protection Agency requirements.[18] The IWS consists of: (*i*) four low pressure sewage ("LPS") pump systems at the locations of the old cesspools; (*ii*) approximately 7,200 linear feet of sanitary sewer force mains; and (*iii*) approximately 10 septic tanks. The septic tanks connect into an adjacent disposal field where the wastewater drains into the ground.

3.15.1.2 Potential Impacts on Public Infrastructure

None of the proposed projects will disturb any existing public electrical, wastewater, water, or other utility lines, or require that new ones be installed. While the new shops and the seven new office trailers will provide additional square footage, this space will generally accommodate employees already working elsewhere at Kahe. Consequently, it will not increase water use or place additional burden on the existing electric power, water supply, or wastewater disposal facilities.

3.15.2 PUBLIC SERVICES

3.15.2.1 Existing Conditions

Police. Honolulu Police Department District 8 encompasses the Waiʻanae Coast, Makakilo, ʻEwa, and the City of Kapolei. The district headquarters is in Kapolei. A substation is located in Waiʻanae, providing a base of operations for officers patrolling the Waiʻanae Coast.

Fire Protection. Leeward Oʻahu is served by the Honolulu Fire Department's Fourth Battalion, which is headquartered at Station 40, the Kapolei Fire Station. The Nānākuli Fire Station (Station 28) and Waiʻanae Fire Station (Station 26), each have an engine and a tanker. The Makakilo Fire Station (Station 35) has a single engine, as does the ʻEwa Beach Fire Station (Station 24).

Health Services. Leeward Oʻahu is served by: St. Francis West, a 100-bed hospital outside Waipahu; the Waiʻanae Coast Comprehensive Health Clinic, between Nānākuli and Waiʻanae; and clinics in

[17] The nearest possible points of connection are the interceptor sewer at Fort Barrett Road in Kapolei or the Nanakuli Wastewater Pump Station.

[18] The IWS serves Kahe Units 1 through 6, and the office building.

Kapolei maintained by other health care providers. Emergency Medical Services (EMS) Division staff and trucks are located at the Wai‘anae Fire Station and at St. Francis West Hospital in ‘Ewa. A quick response unit - with a paramedic and a truck, but without the ability to transport patients - is located at the Navy medical clinic in Barbers Point. The Fire Department co-responds to calls for emergency services.

3.15.2.2 Probable Impacts

None of the proposed actions will increase the burden on existing public services or facilities. They will not alter the level of fire and police protection that is needed. Because the facilities will only require minimal additional manpower, their operation will marginally increase the number of people present on the property who might require medical attention. The absence of any significant long-term increase in employment means that there is no potential to place demands upon educational or healthcare services.

4. CONSISTENCY WITH EXISTING POLICIES, CONTROLS, AND LAND USE PLANS

In accordance with the requirements of HAR §11-200-17 (h), this chapter discusses the relationship of the proposed actions to land use plans, policies, and controls for the area. HECO has evaluated the biofuel storage tanks, new weld and valve recertification shops, hazardous materials storage area, mobile office trailers, and storm water berm for consistency with these regulations. It has also identified the extent to which the proposed actions 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 jurisdiction (county, state, or federal) and then by specific ordinance, regulation, or law. This is followed by a listing of the required permits and approvals.

4.1 CITY & COUNTY OF HONOLULU

4.1.1 O'AHU GENERAL PLAN

The *O'ahu General Plan* poses several objectives with regard to utilities. In Section V, Transportation and Utilities, Objective C states: *"To maintain a high level of service for all utilities."* The proposed improvements to the Kahe Generating Station are consistent with and support this objective by allowing HECO to ensure the safety and efficiency of its operations while providing affordable and dependable electricity to O'ahu's residents, businesses, and public institutions. Adding new facilities such as the office trailers and storm water berm, as well as replacing inadequate facilities (e.g., the weld and valve replacement shops) will maintain safety for workers, reduce costs for HECO and hence the consumer, and enhance the overall reliability of the facility.

Section VI of the General Plan contains objectives and policies related to energy, and several of these relate to the biofuel storage facilities that HECO is proposing. They include the following:

- *Objective A. To maintain an adequate, dependable, and economical supply of energy for Oahu residents.*
  - *Policy 1. Develop and maintain a comprehensive plan to guide and coordinate energy conservation and alternative energy development and utilization programs on Oahu.*
  - *Policy 2. Establish economic incentives and regulatory measures which will reduce Oahu's dependence on petroleum as its primary source of energy.*
  - *Policy 3. Support programs and projects which contribute to the attainment of energy self-sufficiency on Oahu.*

- *Objective C. To fully utilize proven alternative sources of energy.*
  - Policy 2. Support the increased use of operational solid waste energy recovery and other biomass energy conversion systems.

- *Objective D. To develop and apply new, locally available energy resources.*
  - Policy 1. Support and participate in research, development, demonstration, and commercialization programs aimed at producing new, economical, and environmentally sound energy supplies from:

    a. solar insolation;
    b. biomass energy conversion;
    c. wind energy conversion;
    d. geothermal energy; and
    e. ocean thermal energy conversion.

While it is possible to use small amounts of biofuel at Kahe without the proposed additional fuel storage tanks and appurtenant facilities, the operational limitations add substantially to the cost and, more importantly, reduce the extent to which HECO can rely on the alternate fuel to meet its generating commitments. With the proposed improvements, HECO will be able to carry through with the renewable energy commitments that it has made.

4.1.2 'EWA DEVELOPMENT PLAN

The island of O'ahu is divided into eight Development/Sustainable Communities Plan areas. Each plan implements the objectives and policies of the General Plan and serves as a guide for public policy, investment, and decision making within their respective region. The project site is located within the region encompassed by the 'Ewa Development Plan (EDP).

The EDP was adopted by Ordinance 97-49 in 1997 and revised in 2000. A 5-year review is currently underway, and in August 2011 the City and County Department of Planning and Permitting announced that it would present its recommended changes to the Honolulu City Council before the end of 2011.

Among its general policies for Industrial Centers (Section 3.7.3) the EDP states:

> *"The Hawaiian Electric Company generating plant in Kahe Valley should remain the largest source of electrical power on Oahu. The plant could be expanded which would take advantage of available land area, cooling system capacity, and power transmission lines."*

The proposed projects are intended to allow HECO to continue operating its existing facilities at Kahe in a safe, efficient, and environmentally sound manner and are, therefore, consistent with these EDP policies. The additions and replacements will provide for safe working conditions and increase reliability by ensuring that HECO can pursue ongoing system improvements. The proposed actions are integral to the Kahe facility's continued central role in supplying electrical power to O'ahu.

4.1.3 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 Kahe Generating Station is located in the I-2, or Intensive Industrial Zoning District. 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). As discussed in Chapter 3, construction of the projects is not expected to significantly impact surrounding properties with more sensitive zoning and land uses.

The Kahe Generating Station was granted an Existing Use Permit for a Type B Utility Installation in 1989 (89/CUP 1-46) (see Appendix A). The permit has been modified several times in subsequent years. If the Special Management Area Permit application which this document supports is approved, HECO will apply for another minor modification to the Existing Use Permits to allow the proposed modifications to the complex that are discussed in this environmental assessment.

4.1.4 SPECIAL MANAGEMENT AREA REVIEW

As mentioned in Section 3.13.1, the proposed improvements would take place in the Special Management Area (SMA) and will require HECO to obtain a Special Management Area Use Permit (SMP). The following subsections discuss the project's consistency with the SMA Review Guidelines found in the *Revised Ordinances of Honolulu 1990* (ROH), Chapter 25 (Shoreline Management). Each subsection addresses one of the guidelines listed in this ordinance. For convenience, the guidelines are reproduced in italics.

4.1.4.1 Impacts on Public Access

All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:

§25-3.2a(1) Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas and natural reserves is provided to the extent consistent with sound conservation principles;

Discussion: The improvements are entirely on HECO's Kahe Generating Station property. They would not affect the shoreline and would not impair public access to beaches, recreation areas, or reserves (see Section 3.11.2).

4.1.4.2 Impacts on Recreation Areas and Wildlife Reserves

All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:

§25-3.2a(2): Adequate and properly located public recreation areas and wildlife preserves are reserved;

Discussion: As discussed in Section 3.11.2, the only recreational resource near the project area is the Kahe Beach Park. The proposed improvements will not be visible from the park, and they are far enough away that construction-related noise and traffic will not create a nuisance to park users. The improvements also would not affect the government's ability to reserve adequate and properly locate public recreation areas and wildlife preserves.

4.1.4.3 Impacts on Solid and Liquid Waste Treatment Facilities

All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:

§25-3.2a(3): Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources;…

Construction of the proposed improvements would not generate significant quantities of solid or liquid waste. The (to be demolished) existing weld shop and hazardous materials storage area will constitute the primary sources of construction waste. This, and any other waste such as vegetation cleared for the installation of the office trailers, would be disposed of properly (see Section 3.9.2). The mitigation measures specified in Chapter 1 will ensure that the proposed improvements have minimal or no effect on special management area resources.

4.1.4.4 Impacts on Land Forms, Vegetation, and Water Resources

All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:

§25-3.2a(4) Alterations to existing land forms and vegetation; except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation or failure in the event of earthquake.

Discussion: Most of the improvements would not affect landforms or vegetation, as discussed in Sections 3.1.2 and 3.6.2. The exceptions are for the grubbing and grading in the vicinity of the new biofuel storage tanks and storm water berm. Because erosive rilling is currently occurring in this area, the proposed action will actually reduce the level of erosion below current levels. None of the construction proposed as part of this document is expected to cause adverse effects to hydrological, scenic, or recreational resources or amenities.

4.1.4.5 Cumulative Impacts and Impacts on Planning Options

No development shall be approved unless the council has first found that:

§25-3.2b(1) The development will not have any substantial, adverse environmental or ecological effect except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health and safety, or compelling public interest. Such adverse effect shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect and the elimination of planning options;

Discussion: None of the activities proposed in this EA is anticipated to have substantial individual or cumulative adverse environmental effects, as established by the discussion in Chapter 3. Furthermore, the proposed improvements are not part of a larger action which could have substantial adverse effects or eliminate planning options in the future.

4.1.4.6 Consistency with CZMP Objectives and Policies and with the State SMA Guidelines

No development shall be approved unless the council has first found that:

§25-3.2b (2)The development is consistent with the objectives and policies set forth in Section 25-3.1 and area guidelines contained in HRS Section 205A-26;

Discussion: As discussed below in Section 4.2.3, the improvements are consistent with the Coastal Zone Management (CZM) Program Objectives. The City and County of Honolulu SMA Review Guidelines, discussed in this Section, are based upon and consistent with the State of Hawai‘i SMA Guidelines. A CZM Consistency certification is not required for the project.

4.1.4.7 Consistency with County General Plan, Development Plans, and Zoning

No development shall be approved unless the council has first found that:

§25-3.2b(3) The development is consistent with the county general plan, development plans and zoning. Such a finding of consistency does not preclude concurrent processing where a development plan amendment or zone change may also be required.

Discussion: Sections 4.1.1 through 4.1.4 document the consistency of the projects with the appropriate County plans and zoning requirements.

4.1.4.8 Impacts on Bays, Salt Marshes, River Mouths, Sloughs, or Lagoons

The council shall seek to minimize, where reasonable:

§25-3.2c(1) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;

Discussion: Construction and operation of the improvements would not include any dredging, filling or other modifications to the above-named natural resources.

4.1.4.9 Impacts on Beaches and Public Recreation

The council shall seek to minimize, where reasonable:

§25-3.2c(2) Any development which would reduce the size of any beach or other area usable for public recreation;

Discussion: The proposed improvements would have no impact on the size of any beach or other area within the SMA that is usable for public recreation.

4.1.4.10 Impacts on Other Coastal Resources within the Special Management Area

The council shall seek to minimize, where reasonable:

§25-3.2c(3) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management area and the mean high tide line where there is no beach;

Discussion: The proposed projects would not restrict public access to any coastal resource in the area.

4.1.4.11 Impacts on Lines of Sight Toward the Sea

The council shall seek to minimize, where reasonable:

§25-3.2c(4) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast;…

Discussion: The proposed projects would not lead to modifications to the existing lines of sight toward the sea. All new above-ground structures proposed as part of this project are *mauka* of the state highway nearest the coast (Farrington Highway) and would not interfere with any intervening view of the sea.

4.1.4.12 Impacts on Water Quality, Open Water, Fisheries, Fishing Grounds, Wildlife Habitats & Agricultural Land Use

The council shall seek to minimize, where reasonable:

§25-3.2c(5) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

Discussion: None of the proposed project elements would affect any of these resources of concern. There are no such resources on the property, as discussed in Chapter 3.

4.2 STATE OF HAWAI'I

4.2.1 HAWAI'I STATE PLAN

The *Hawai'i State Plan* is intended to guide the long-range development of the State 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 proposed 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:

Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;

Discussion: The proposed improvements would contribute to the efficiency of Kahe Generating Station while maintaining environmental quality and maintaining costs to HECO customers at a reasonable level. Therefore the projects are consistent with this provision of the *Hawai'i State Plan*.

4.2.2 CHAPTER 205, HAWAI'I REVISED STATUTES - LAND USE LAW

Chapter 205, Hawai'i Revised Statutes (HRS), establishes the State Land Use Commission (SLUC) and gives this body the authority to designate all lands in the State as Urban, Rural, Agricultural, or Conservation District lands. The Counties make all land use decisions within the Urban Districts in accordance with their respective County general plans, development plans, and zoning ordinances. The Counties also regulate land use in the State Rural and Agricultural Districts, but within the limits allowed by Chapter 205.

The Kahe Generating Station is in the State Urban District. Hawai'i Administrative Rule §15-15-18 characterizes the Urban District as exhibiting "city-like" concentrations of people, structures, streets, urban level of services and other related land uses. It also stresses the importance of ensuring availability of basic services and utilities in urban areas. The Kahe Generating Station is consistent with the land uses envisioned for the State Urban District. The proposed improvements will contribute to that use and will not alter the facility's overall character. Therefore they are consistent with land uses in the Urban District.

The total land area that would be disturbed by the facility improvements incorporated into this project is approximately 12.3 acres. Consequently, this project will require coverage under the State of Hawai'i NPDES General Permit program (HAR §11-55, Appendix C).

4.2.3 COASTAL ZONE MANAGEMENT PROGRAM

The objectives of the Hawai'i Coastal Zone Management (CZM) Program are set forth in the Hawai'i Revised Statutes, Chapter 205A. The program is intended to promote the protection and maintenance of valuable coastal resources. All lands in Hawai'i are classified as valuable coastal resources. The State Office of Planning administers Hawai'i's CZM program. A general discussion of the project's consistency with the objectives and policies of Hawai'i's CZM Program follows.

4.2.3.1 Recreational Resources

Objective: *Provide coastal recreational opportunities accessible to the public.*

Policies:

1. *Improve coordination and funding of coastal recreational planning and management; and*
2. *Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:*
    a. *Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*
    b. *Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;*

c. *Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*

d. *Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*

e. *Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;*

f. *Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;*

g. *Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and*

h. *Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of section 46-6.*

Discussion: The proposed project would have no effects on coastal recreational resources. With the possible exception of some portion of the new office trailers, once constructed the proposed facilities will not be visible from Kahe Beach Park, and their construction would not disrupt ongoing use of the park or access to the shoreline.

4.2.3.2 Historic Resources

Objective: *Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.*

Policies:

1. *Identify and analyze significant archaeological resources;*
2. *Maximize information retention through preservation of remains and artifacts or salvage operations; and*
3. *Support state goals for protection, restoration, interpretation, and display of historic resources.*

Discussion: The proposed work will occur in areas that have already been extensively disturbed. Section 3.10 describes the known locations of historic and pre-contact resources and discusses the steps that HECO would take to preserve any resources inadvertently discovered during construction. SHPD will be sent a copy of this EA for review and their comments, if any, will be reproduced in the *Final EA*.

4.2.3.3 Scenic and Open Space Resources

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

Policies:

1. *Identify valued scenic resources in the coastal zone management area;*

2. *Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;*
3. *Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and*
4. *Encourage those developments that are not coastal dependent to locate in inland areas.*

Discussion: Coastal open space and scenic resources would not be affected by the proposed action. None of the proposed improvements would substantially alter the size or character of facilities already present, and they are not visible from public vantage points. Even the largest project component, the proposed biofuel storage tanks, will only minimally alter natural landforms and is sited well away from any public view of the shoreline.

4.2.3.4 Coastal Ecosystems

Objective: *Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.*

Policies:

1. *Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;*
2. *Improve the technical basis for natural resource management;*
3. *Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;*
4. *Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and*
5. *Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.*

Discussion: The proposed action will not affect coastal ecosystems or any other water body, as described in Section 3.5.2.

4.2.3.5 Economic Uses

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

Policies:

1. *Concentrate coastal dependent development in appropriate areas;*
2. *Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and*
3. *Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:*
    a. *Use of presently designated locations is not feasible;*

b. Adverse environmental effects are minimized; and

c. The development is important to the State's economy.

Discussion: The proposed project would not lead to any changes in the concentration or location of coastal developments. The work would be constructed entirely within an area designated for industrial use, and would not change the character or normal use of Kahe Generating Station.

4.2.3.6 Coastal Hazards

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

Policies:

1. *Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;*
2. *Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;*
3. *Ensure that developments comply with requirements of the Federal Flood Insurance Program; and*
4. *Prevent coastal flooding from inland projects.*

Discussion: Section 3.7.2 confirms that the project area is outside a designated Special Flood Hazard Area and with the exception of a portion of the office trailers area is not within the City & County of Honolulu's Tsunami Evacuation Zone.

4.2.3.7 Managing Development

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

Policies:

1. *Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;*
2. *Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and*
3. *Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.*

Discussion: HECO has initiated contact and continues to work cooperatively with all government agencies with oversight responsibilities to facilitate efficient processing of permits and informed decision making by the responsible parties.

4.2.3.8 Public Participation

Objective: *Stimulate public awareness, education, and participation in coastal management.*

Policies:

1. *Promote public involvement in coastal zone management processes;*

2. *Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and*
3. *Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.*

Discussion: The public will have an opportunity to review and comment on the EA, pursuant to the requirements of Hawai'i Administrative Rules §11-200. In addition, the public participation objective will be addressed during the processing of the SMP, which will include public notification and a public hearing.

4.2.3.9 Beach Protection

Objective: *Protect beaches for public use and recreation.*

Policies:

1. *Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;*
2. *Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and*
3. *Minimize the construction of public erosion-protection structures seaward of the shoreline.*

Discussion: The project poses no risks to beaches. No structures are planned seaward of the shoreline, and no interactions with littoral processes would be involved.

4.2.3.10 Marine Resources

Objective: *Promote the protection, use, and development of marine and coastal resources to assure their sustainability.*

Policies:

1. *Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;*
2. *Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;*
3. *Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;*
4. *Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and*
5. *Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.*

Discussion: The proposed project does not have the potential to affect marine resources.

4.3 FEDERAL ACTS & LEGISLATION

4.3.1 ARCHEOLOGICAL AND HISTORIC PRESERVATION ACTS

As documented in Section 3.10, HECO has complied fully with the provisions of the Archeological and Historic Preservation Act (16 U.S.C. § 469a-1) and the National Historic Preservation Act (16 U.S.C. § 470(f)).

4.3.2 CLEAN AIR ACT (42 U.S.C. § 7506(C))

As discussed in Section 3.4.2, any emissions of fugitive dust during construction of the project are expected to be temporary and relatively minor. The contractors will employ Best Management Practices (BMPs) to control fugitive dust emissions during the construction phase. Normal operation of the proposed improvements will not produce on-site air emissions, will not alter air flow in the vicinity, and will have no other measurable effect on the area's micro-climate. Substitution of biofuel for the LSFO that is presently being burned will reduce emissions of regulated pollutants below existing levels. Hence, it will have a beneficial effect on air quality.

4.3.3 CLEAN WATER ACT

The Clean Water Act (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. As discussed above, there are no water bodies near the project area that could be affected, and construction will disturb less than 13 acres of land. This project does not require HECO to seek approvals under the Clean Water Act. It will, however, obtain an NPDES Construction permit from the State of Hawai'i Department of Health.

4.3.4 COASTAL ZONE MANAGEMENT ACT (16 U.S.C. § 1456(C) (1))

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, as well as the 12-mile U.S. territorial sea and all archipelagic waters. Section 4.2.3 above discusses the consistency of the projects with the CZMP's ten policy objectives.

4.3.5 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 1976-1982, 1984 and 1988) 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.

Existing biota on and near the project site is discussed in Section 3.6.1. The discussion documents the fact that there are no known rare or endangered species on or immediately adjacent to the project site that would be adversely affected by the project.

4.3.6 FLOOD PLAIN MANAGEMENT (42 U.S.C. § 4321, EX. ORDER NO. 11988)

As described in Section 3.7.2, the Kahe Generating Station lies within Flood Zone D, signifying an area with undetermined flood hazards. The proposed improvements comply with the standards of the National Flood Insurance Program. Neither the new structures, nor those structures being relocated would exacerbate existing flood hazards in the area.

4.4 REQUIRED PERMITS AND APPROVALS

The permits and approvals required for the proposed projects include:

- Special Management Area Use Permit
- National Pollutant Discharge Elimination System – Notice of Intent [Construction] (NPDES-NOI[C]) (HAR §11-55, Appendix C)
- Minor Modification to Existing Use Permit
- Flammable and Combustible Liquids Tank Installation Permit
- Grubbing, Grading, and Stockpiling Permit
- Building Permits

All of these approvals are issued by the City & County of Honolulu. No state or federal permits are required for the project.

5. ANTICIPATED DETERMINATION

5.1 SIGNIFICANCE CRITERIA

Hawai‘i Administrative Rules (HAR) §11-200-11.2 establishes procedures for determining if an environmental impact statement (EIS) should be prepared or if a finding of no significant impact is warranted. HAR §11-200-11.2 (1) provides that applicants should issue an environmental impact statement preparation notice (EISPN) for actions that it determines may have a significant effect on the environment. HAR §11-200-12 lists the following criteria to be used in making that determination:

In most instances, an action shall be determined to have a significant effect on the environment if it:

1. *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;*
2. *Curtails the range of beneficial uses of the environment;*
3. *Conflicts with the State's long-term environmental policies or goals as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;*
4. *Substantially affects the economic or social welfare of the community or State;*
5. *Substantially affects public health;*
6. *Involves substantial secondary impacts, such as population changes or effects on public facilities;*
7. *Involves a substantial degradation of environmental quality;*
8. *Is individually limited but cumulatively has considerable effect on the environment or involves a commitment for larger actions;*
9. *Substantially affects a rare, threatened, or endangered species, or its habitat;*
10. *Detrimentally affects air or water quality or ambient noise levels;*
11. *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;*
12. *Substantially affects scenic vistas and view planes identified in county or state plans or studies; or,*
13. *Requires substantial energy consumption.*

5.2 FINDINGS

The potential effects of the proposed work described earlier in this document were evaluated using these significance criteria. The findings with respect to each criterion are summarized below.

5.2.1 IRREVOCABLE LOSS OR DESTRUCTION OF VALUABLE RESOURCE

The proposed improvements would be constructed entirely within and adjacent to an existing HECO facility used for power generation. They do not involve the loss of any significant cultural or natural resources.

5.2.2 CURTAILS BENEFICIAL USES

Construction and operation of the new structures and berm would not curtail beneficial uses of the site and are designed to enhance usage. They will not substantially modify any of the existing uses of the power plant.

5.2.3 CONFLICTS WITH LONG-TERM ENVIRONMENTAL POLICIES OR GOALS

The proposed projects are consistent with the O‘ahu General Plan (see Section 4.1.1) and with the State’s long-term environmental policies and goals as expressed in Chapter 344, Hawai‘i Revised statutes and elsewhere in State law.

5.2.4 SUBSTANTIALLY AFFECTS ECONOMIC OR SOCIAL WELFARE

One of the objectives of the proposed actions is to improve working conditions and safety at Kahe Generating Station. They will not have substantial effects on economic or social welfare except insofar as they allow HECO to improve the efficiency of its operations and continue to provide electricity at a low cost, while maintaining environmental quality.

5.2.5 PUBLIC HEALTH EFFECTS

The proposed projects will not adversely affect air quality or any water sources used for drinking or recreation. Neither will they generate large amounts of solid waste or produce other emissions that will have a significant adverse effect on public health.

5.2.6 PRODUCE SUBSTANTIAL SECONDARY IMPACTS

The proposed projects will not produce significant secondary impacts. They are not designed to foster population growth or to promote economic development. Instead, they are intended to support HECO’s current operations at Kahe Generating Station.

5.2.7 SUBSTANTIALLY DEGRADE ENVIRONMENTAL QUALITY

The proposed projects will not have substantial long-term environmental effects. The work will temporarily elevate noise levels and generate airborne dust during construction, but these impacts will be localized and of limited duration. So long as adequate measures are taken to control the intensity of the construction noise and the release of dust, effects will be minimal.

5.2.8 CUMULATIVE EFFECTS OR COMMITMENT TO A LARGER ACTION

The proposed improvements are not a commitment to a larger action and are not intended to facilitate substantial population growth. They are part of regular, ongoing maintenance of Kahe Generating Station.

5.2.9 EFFECTS ON RARE, THREATENED, OR ENDANGERED SPECIES

No rare, threatened, or endangered species are known to utilize the project areas. The projects will not utilize a resource needed for the protection of rare, threatened, or endangered species.

5.2.10 AFFECTS AIR OR WATER QUALITY OR AMBIENT NOISE LEVELS

Construction and operation of the proposed projects will not have a measurable effect on air quality or water quality (see Sections 3.4.2 and 3.5.2). Noise levels will temporarily increase during construction of the improvements but are not anticipated to affect any noise-sensitive uses, as discussed in Section 3.8.2.

5.2.11 ENVIRONMENTALLY SENSITIVE AREAS

There are no environmentally sensitive areas or resources near the proposed projects. The project sites, with the exception of a portion of the office trailers area, are outside defined flood and tsunami hazard zones. The structures built as part of the projects will be constructed consistent with the Hawai‘i Uniform Building Code for Earthquake Zone 2a.

5.2.12 AFFECTS SCENIC VISTAS AND VIEW PLANES

The proposed improvements are not within a designated scenic area. They will not significantly alter the visual character of the site or significantly change views across it (see Section 3.12.2).

5.2.13 REQUIRES SUBSTANTIAL ENERGY CONSUMPTION

Construction of the improvements will use some energy, however once operation commences the structures will consume little to no energy and will require infrequent maintenance.

5.3 ANTICIPATED DETERMINATION

In view of the foregoing, HECO and DPP have concluded that the proposed project will not have a significant adverse impact on the environment. Consequently, DPP anticipates issuing a Finding of No Significant Impact for the proposed actions.

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6. REFERENCES

DOH (State of Hawai'i Department of Health) (2010); http://hawaii.gov/health/environmental/air/cab/cab_misc_pdf/ naaqs_sep_2010.pdf)

DOH (State of Hawai'i Department of Health). (2009). 2009 *Air Quality Data Book*, State of Hawai'i.

DOH (State of Hawai'i Department of Health). (2004). Hawai'i Administrative Rules, Title 11, Chapter 200. *Water Quality Standards.*

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamura, and Floyd Stephens (August 1972). *Soil Survey of Islands of Kaua'i, O'ahu, Maui, Molokai, and Lanai, State of Hawai'i.* U.S. Department of Agriculture Soil Conservation Service in cooperation with the University of Hawai'i Agricultural Experiment Station. US Government Printing Office, Washington, DC. 233 p.

Hammatt, Hallett H. and David W. Shideler. (1999). *An Archaeological Inventory Survey and Assessment for the Waimanalo Gulch Sanitary Landfill Project Site, Honouliuli, `Ewa, O`ahu,* , Cultural Surveys Hawaii, Kailua, HI.

Kogasaka, C. (2011), P.E. Personal Communication with Perry J. White (Planning Solutions, Inc.) regarding cut and fill for proposed storm water berm at Kahe Generating Station, O'ahu.

McAllister, J.G. (1933). *Archaeology of Oahu.* B.P. Bishop Museum Bulletin 104. Bishop Museum Press, Honolulu.

Planning Solutions, Inc. (2007). *Final Environmental Assessment & Finding of No Significant Impact: Kahe Generating Station Water Storage Tank Replacement and Addition.* Prepared for Hawaiian Electric Company, Inc. for submittal to the Department of Planning and Permitting, City and County of Honolulu.

State of Hawai'i (2002). *Hawaii Statewide GIS Program*. Hazard Layer. URL: http://www.state.hi.us/dbedt/gis/hazard.htm

Sterling, Elspeth P. and Catherine C. Summers (comp.) (1978). *Sites of O`ahu*, Dept. of Anthropology, B.P. Bishop Museum, Honolulu.

Thrum, Thomas G. (1906). *Heiaus and Heiau Sites Throughout the Hawaiian Islands,* IN Thos. G. Thrum, compiler, Hawaiian Almanac and Annual for 1907, pp. 38-47, Honolulu, HI.

U,S, Department of Commerce, National Oceanic and Atmospheric Administration, National Climatic Data Center, (2009). *Local Climatological Data, Annual Summary with Comparative Data, 2009*, "Normals, Means, and Extremes, Honolulu, HI" (annual) as cited in the *2009 State of Hawai'i Data Book*.

U.S. Geological Survey (2001). "Hazards in Hawai'i." http://hvo.wr.usgs.gov/earthquakes/hazards/

Yucha, Trevor M. and Hallett H. Hammatt, Ph.D. (September 2011). *DRAFT Archaeological Inventory Survey Report For Portions of Kahe Valley, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island TMK: [1] 9-2-003:027 por.* (Job Code: HONOULIULI 42). Prepared for Hawaiian Electric Company, Inc. by Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i

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7. CONSULTATION & DISTRIBUTION

7.1 CONSULTATION

HECO consulted with the City and County of Honolulu's Department of Planning and Permitting regarding the permitting requirements of the project. The public will also have an opportunity to comment on this *EA*.

7.2 DISTRIBUTION OF THE DRAFT EA

HECO distributed copies of the *Draft EA* to the parties listed in Table 7.1.

Table 7.1. Draft EA Distribution List

State Agencies	**City and County of Honolulu**
Office of Environmental Quality Control (1 HC, 1 CD)	Department of Planning & Permitting (5 copies)
Department of Agriculture	Board of Water Supply
Department of Accounting and General Services	Department of Community Services
Department of Business, Economic Development, and Tourism (DBEDT)	Department of Design & Construction
DBEDT - Energy Division	Department of Environmental Services
DBEDT – Office of Planning	Department of Facility Maintenance
Department of Defense	Department of Parks & Recreation
Department of Education	Department of Transportation Services
Department of Hawaiian Home Lands	Kapolei Fire Department – District 8
Environmental Planning Office, Department of Health	Honolulu Police Department – City of Kapolei
Clean Air Branch, Department of Health	
Clean Water Branch, Department of Health	**Elected Officials**
Wastewater Branch, Department of Health	U.S. Senator Daniel K. Inouye
Department of Human Services	U.S. Senator Daniel Akaka
Department of Labor and Industrial Relations	US Representative Colleen Hanabusa
Department of Land and Natural Resources (5 copies)	US Representative Mazie Hirono
DLNR Historic Preservation Division (1 HC)	State Senator Maile Shimabukuro
Department of Transportation	State Representative Karen Awana
Hawaii Housing Finance and Development Corp.	State Representative Jordan Jo
Office of Hawaiian Affairs	City Councilmember Tom Berg (District 1)
UH Environmental Center	Wai‘anae Neighborhood Board #24, Chair, D. Kawika Nahoopii
Federal Agencies	Nānākuli-Mā‘ili Neighborhood Board #36, Chair, Patty Teruya
US Department of the Army, Regulatory Branch	
US Fish and Wildlife Service	**Libraries and Depositories**
	Hawai‘i State Library Hawai‘i Documents Center
Utility Companies	Pearl City Regional Library
Hawaiian Telcom	Kapolei Public Library
The Gas Company	
	News Media
Other	Honolulu Star Advertiser
Nettie Tiffany	

Source: Compiled by Planning Solutions, Inc.

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A. EXISTING USE PERMIT FOR KAHE GENERATING STATION

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

DONALD A. CLEGG
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

89/CUP1-46(WE)

March 20, 1990

Mr. N.A. Hallonquist, AIA
Director of Facilities
Facilities and Project Management Dept.
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Hallonquist:

Hawaiian Electric Company Kahe Power Plant
Modification to Existing Use Permit
Tax Map Key: 9-2-3: 27 (89/CUP1-46)

The Department of Land Utilization has reviewed your request to modify the existing use permit for the Kahe Power Plant in order to construct an overhead facilities training center at the site.

We hereby APPROVE the subject overhead facilities training center as a minor modification to the existing use permit, subject to the following conditions:

1. The General Site Plan, dated and time-stamped February 20, 1990, 12:19 p.m., for the overhead facilities training center shall be the approved plan and used for future reference.

2. The conditions as stated in 89/SMA-85 and in our letter dated August 17, 1989 are still applicable and shall be complied with.

Please be apprised that under Section 4.308 of the Land Use Ordinance, additional requirements, safeguards and conditions may be added by the Director of Land Utilization as necessary for the protection of the public interest. In addition, approval of this modification does not constitute compliance with other governmental agency requirements.

A copy of this letter should accompany your building permit application.

Should you have any questions, please contact William Enriques of my staff at 523-4817.

Very truly yours,

Donald Clegg

DONALD A. CLEGG
Director of Land Utilization

DAC:fm
.02N

89/COP 1-4C
3 of 4

HAWAIIAN ELECTRIC COMPANY, INC.

HONOLULU, HAWAII

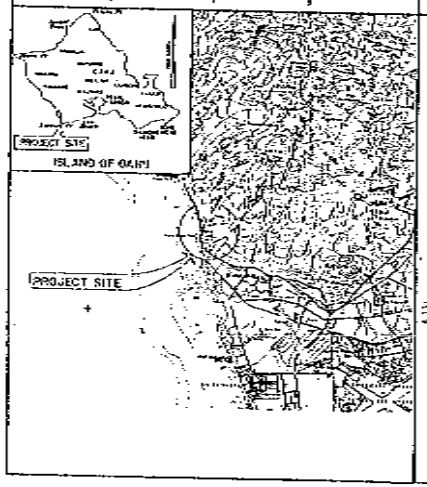
KAHE OVERHEAD FACILITIES TRAINING CENTER

KAHE POINT, OAHU HAWAII

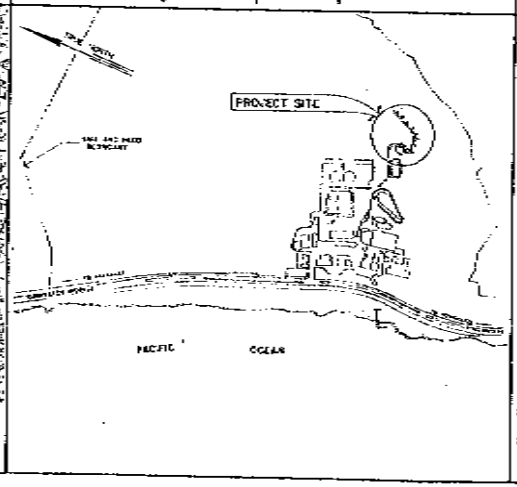
PREPARED BY:

M&E PACIFIC, INC.
ENGINEERS & ARCHITECTS
Suite 500, Pauahi Tower · 1001 Bishop St, Honolulu, Hawaii 96813

LOCATION MAP



VICINITY MAP



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5 OF 21	C - 3	PLAN & PROFILE (STA. 0+00 TO STA. 5+10.00)
6 OF 21	C - 4	PLAN & PROFILE (STA. 5+ 0.00 TO STA. 10+30.00)
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8 OF 21	C - 6	GRADING PLAN - 1
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19 OF 21	S - 2	STRUCTURAL DETAILS
20 OF 21	E - 1	ELECTRIC PLAN, DETAILS NOTES AND LEGEND
21 OF 21	E - 2	SINGLE LINE AND WIRING DIAGRAMS AND MISCELLANEOUS DETAILS

APPROVED

APPROVED:

CHIEF, DIVISION OF ENGINEERING
DEPARTMENT OF PUBLIC WORKS
IPOE GRADING ONLY

DATE

M & E PACIFIC, INC.
ENGINEERS & ARCHITECTS
HONOLULU, HAWAII

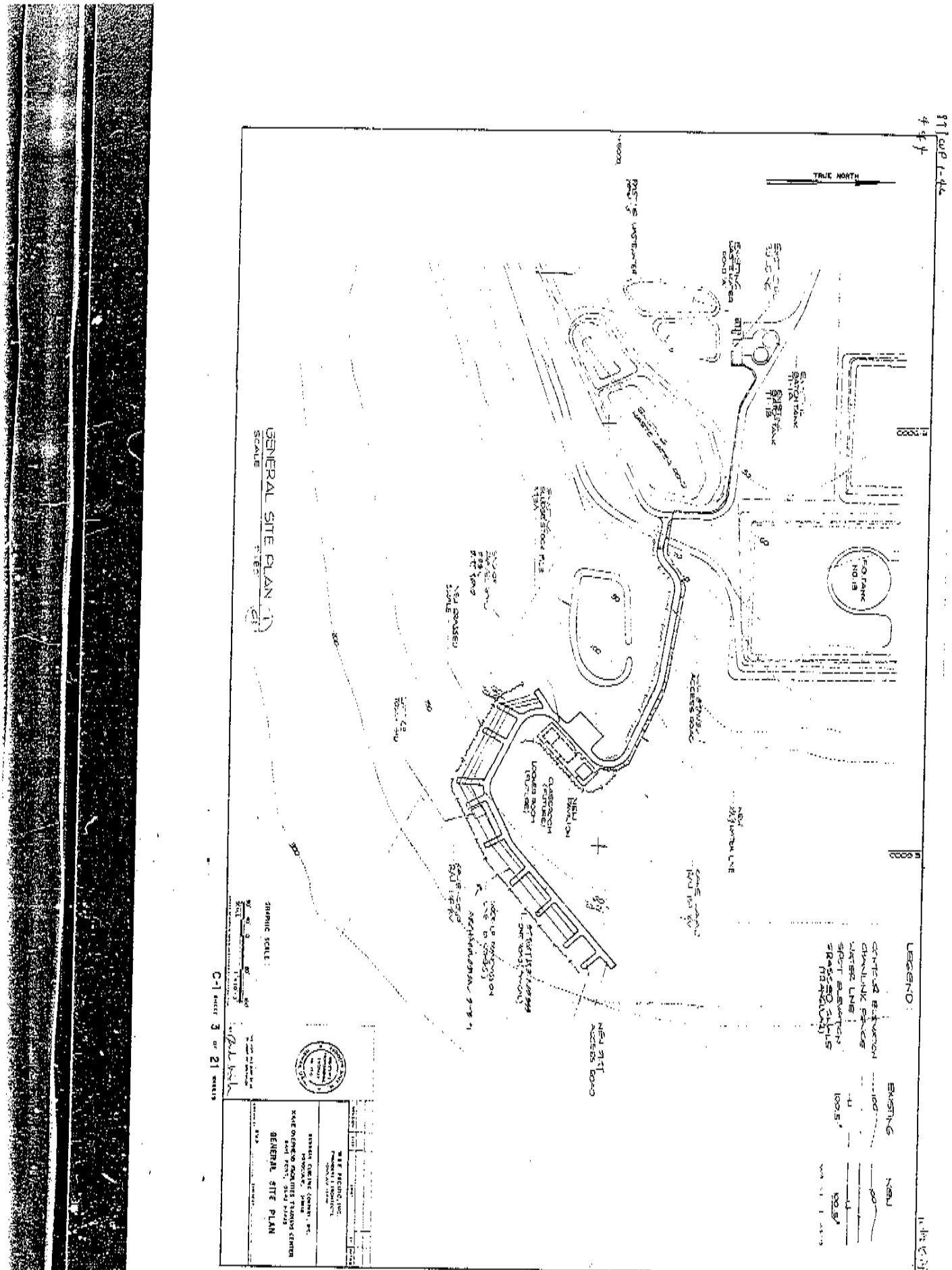
HAWAIIAN ELECTRIC COMPANY, INC.
HONOLULU, HAWAII

KAHE OVERHEAD FACILITIES TRAINING CENTER
KAHE POINT, OAHU HAWAII

TITLE SHEET

SCALE: AS NOTED
DRAWING NO.

T-1 SHEET 1 OF 21 SHEETS


GENERAL SITE PLAN
SCALE
TRUE NORTH
LEGEND
EXISTING
NEW
CONTOUR ELEVATION
CHAINLINK FENCE
WATER LINE
SPOT ELEVATION
GRASSED AREAS
PAVED AREAS
F.D. TANK NO. 18
NEW SITE ACCESS ROAD
NEW ENTRY
CLASSROOM (FUTURE)
LOCKER ROOM (FUTURE)
GRAPHIC SCALE
C-1
SHEET 3 OF 21 SHEETS
GENERAL SITE PLAN

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

1990 FEB 20 AM 9:16

February 14, 1990

Mr. Donald A. Klegg
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Klegg,

SUBJECT: Hawaiian Electric Company, Inc., Kahe Overhead Facilities Training Center, Modification to Existing Use Status, (SMA Permit No. 89/SMA-85)

The Hawaiian Electric Company respectfully requests approval of a modification to the Existing Use Status for the Kahe Generating Station located at 92-200 Farrington Highway, Ewa, Oahu. The modification is needed in order to construct an Overhead Facilities Training Center at this site.

The training center will consist of a pavilion, classroom/locker room, gravel access road, parking lot, and a mock-up transmission line. Although the facility is designed to provide HECO line crews with hands on experience with live, high voltage transmission lines, the health and safety of the instructors and trainees will be assured since the mock-up transmission lines will not be energized. See attached site plan.

The project site is located within the Special Management Area and therefore required and SMA use permit. The permit application process has been completed and was approved by the City Council on January 31, 1990, SMA Permit No. 89/SMA-85.

Should you require additional planning and design information please contact our consultant, M&E Pacific, Inc. The point of contact is Mr. Rudy Mina, at 521-3051.

Sincerely,

N.A. Hallonquist, AIA
Director of Facilities
Facilities and Project Management Dept.

Attachments

cc: FD/CF
M&E Pacific, Inc. (R. Mina)

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

BENJAMIN B. LEE
DEPUTY DIRECTOR

October 26, 1989

Mr. C. Dudley Pratt
President and Chief Executive Officer
Hawaiian Electric Industries, Inc.
P. O. Box 730
Honolulu, Hawaii 96808

Dear Mr. Pratt:

Subject: Potential Additions to Kahe Generating Station

As a follow-up to my letter of October 5, 1989, to your consultants, Belt Collins & Associates, concerning the HECO expansion at Kahe, please ensure that the Environmental Impact Statement (EIS) prepared by your consultants addresses concerns relating to the need for additional electric generating capacity on Oahu.

During the recent review of a Conditional Use Permit for the AES Barbers Point project, it was called to my attention that in the City's negotiations of the H-Power power purchase contract during the first quarter of 1986, HECO informed the City that the HECO system loads were such that the City supplied capacity was not needed until the year 2006. Additionally, HECO advised the City that off-peak loads were so low that it would have to modify its system at substantial cost ($2,000,000 to $4,000,000) in order to accept H-Power's minimum generation rate of 25 MW.

We understand that on April 15, 1986 HECO completed a new forecast which showed they required an additional capacity in 1995. This forecast was completed within three weeks after HECO testified to the Public Utilities Commission that they did not require additional capacity until 2006. Also, data filed with the Public Utilities Commission by HECO on April 15, 1987 in conjunction with the request for additional capacity shows HECO's plan for addition of 146 MW of capacity in 1990 which is 15 years earlier than anticipated by the City based on the data presented by HECO during negotiations with the City.

The discrepancy in projecting capacity requirements raises serious concern as to whether expansion of the Kahe plant is indeed required. Please ensure that the EIS addresses this issue.

Very truly yours,

John P. Whalen

JOHN P. WHALEN
Director of Land Utilization

JPW:fe

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

BENJAMIN B. LEE
DEPUTY DIRECTOR

89/CUP1-46(WE)

August 17, 1989

Mr. William F. Muench
Hawaiian Electric Company, Inc.
900 Richards Street
Honolulu, Hawaii 96813

Dear Mr. Muench:

Application for an Existing Use for a Utility Installation, Type B, for the Kahe Power Plant, Tax Map Key: 9-2 3: 26 and 27

The Department of Land Utilization (DLU) has reviewed your request for an Existing Use for the Kahe Power Plant which is considered a Utility Installation, Type B, under the Land Use Ordinance (LUO). Normally, Utility Installations, Type B, require a Conditional Use Permit, Type 1 (CUP1); however, since the Kahe Power Plant is already in existence and no expansion is planned, a CUP1 is not necessary. Instead an Existing Use is hereby GRANTED for the Kahe Power Plant subject to the following conditions:

1. The Land Use Status Aerial Photo, dated and time-stamped May 19, 1989, 1:34 p.m., for Kahe Power Plant (Exhibit A) shall be the approved plan.

2. Any future proposed alteration, repair, or modification of existing structures shall be submitted to the Director for review and approval prior to issuance of Building Permits. Any major alteration or modification of a nonconforming structure may require a waiver. New structures may be subject to compliance with all applicable provisions, such as parking, yard setbacks, and landscape requirements of the Land Use Ordinance.

The submitted written information, building permit, and HECO Generator Data (Exhibit B) shall be filed and used for future reference. A receipt of your filing fee of $100 is enclosed.

Should you have any questions, please contact William Enriques of our staff at 523-4817.

Very truly yours,

JOHN P. WHALEN
Director of Land Utilization

JPW:ik
0656N/1-2
Enclosure

EXISTING USE - KAHE POWER PLANT

General Information

A. Applicant: Hawaiian Electric Company, Inc.
900 Richards Street
Honolulu, Hawaii 96813
Ph. No. 543-5657

B. Recorded Fee Owner: Hawaiian Electric Company, Inc.
900 Richards Street
Honolulu, Hawaii 96813
Ph. No. 543-5657

C. Agent: William F. Muench
900 Richards Street
Honolulu, Hawaii 96813
Ph. No. 543-5657

D. TMK / Area / Zoning: 9-2-3:26 / 20.095 Acs / P-2
9-2-3:27 / 454.39 Acs / I-2

E. Use: Utility Installation, Type B

F. Staffing: See attached Table 1

G. Building Permits: See attached Table 2

H. Existing Structures: See attached Dwg. No. 70654

EXHIBIT B

Table No. 1

Current Shifts & Staffing
Kahe Power Plant

Building	Shift Hours	No. Persons
Generating Units No. 1 & 2	7:00 AM - 3:00 PM	7
	3:00 PM - 11:00 PM	3
	11:00 PM - 7:00 AM	3
Generating Units No. 3 & 4	7:00 AM - 3:00 PM	7
	3:00 PM - 11:00 PM	3
	11:00 PM - 7:00 AM	3
Generating Units No. 5 & 6	7:00 AM - 3:00 PM	8
	3:00 PM - 11:00 PM	5
	11:00 PM - 7:00 AM	5
Production Offices	7:00 AM - 3:30 PM	12
Warehouse	7:00 AM - 3:30 PM	3
Shop Building	7:00 AM - 3:00 PM	55
	9:30 PM - 5:00 AM	4
Maintenance Trailers	7:00 AM - 3:00 PM	11
	9:30 PM - 5:00 AM	1

Table No. 2

City Building Permits
Kahe Power Plant

Building	Permit No.	Remarks
Generating Units No. 1 & 2	---	Constructed Prior to 1969 See Attached HECo Generator Data Listing
Generating Units No. 3 & 4	67251, 87210	
Generating Units No. 5 & 6	3455, 115462	
Production Office	---	Constructed At Same Time w/ Unit 1 Prior to 1969
Locker Building	181124 244847	Permits For Interior Alterations, Original Building Constructed At Same Time w/Unit 1 Prior to 1969
Field Office	129597	
Maintenance Trailers	---	Unable To Locate Permit
Sandblasting Shelter	---	Unable To Locate Permit
Warehouse	126768	Warehouse Extension, Original Warehouse Built At Same Time w/Unit 1 Prior to 1969
Warehouse #1	129597	
Warehouse #2	129597	
Shop Building	126766	Building Extension, Original Building Constr. At Same Time w/Unit 1 Prior to 1969
Warehouse Shed	---	Unable To Locate Permit

Building	Permit No.	Remarks
Control Building K1-4 Substation	---	Constructed At Same Time w/Unit 1 Prior To 1969
Control Building K5-8 Substation	3455	Constructed Under Unit 5 Building Permit
Blackstart Generators	225663	
Raw Water Tank #1	---	Constructed At Same Time w/Unit 1 Prior To 1969
Raw Water Tank #2	3455	Constructed Under Unit 5 Building Permit
Fuel Oil Test Tank	---	Constructed At Same Time w/Unit 1 Prior To 1969
Fuel Oil Tank #11	---	Constructed At Same Time w/Unit 1 Prior To 1969
Fuel Oil Tank #12	---	Constructed At Same Time w/Unit 1 Prior To 1969
Fuel Oil Tank #13	106532	
Fuel Oil Tank #14	19398	
Distilled Water Tank #13	---	Constructed At Same Time w/Unit 1 Prior To 1969
Distilled Water Tanks #31 & #32	67251	Constructed Under Unit 3 Building Permit
Distilled Water Tanks #51 & #52	3455	Constructed Under Unit 5 Building Permit
Distilled Water Tank #53	---	Unable To Locate Permit
Units 1 thru 4 Stack	119900	
Unit #6 Stack	119899	

Building	Permit No.	Remarks
Units 1 thru 4 Screen Pump Str.	67251	First Portion Constructed w/Unit 1 Prior To 1969, Remainder Constructed Under Unit 3 Building Permit
Units 5 & 6 Screen Pump Str.	3455	Constructed Under Unit 5 Building Permit
Units 1 thru 4 Intake Str.	---	Constructed At Same Time w/Unit 1 Prior To 1969
Units 5 & 6 Intake Str.	3455	Constructed Under Unit 5 Building Permit
Discharge Str.	57967	
WWTF Operations Building	217840	
WWTF Batch Tank T1-1A	217839	

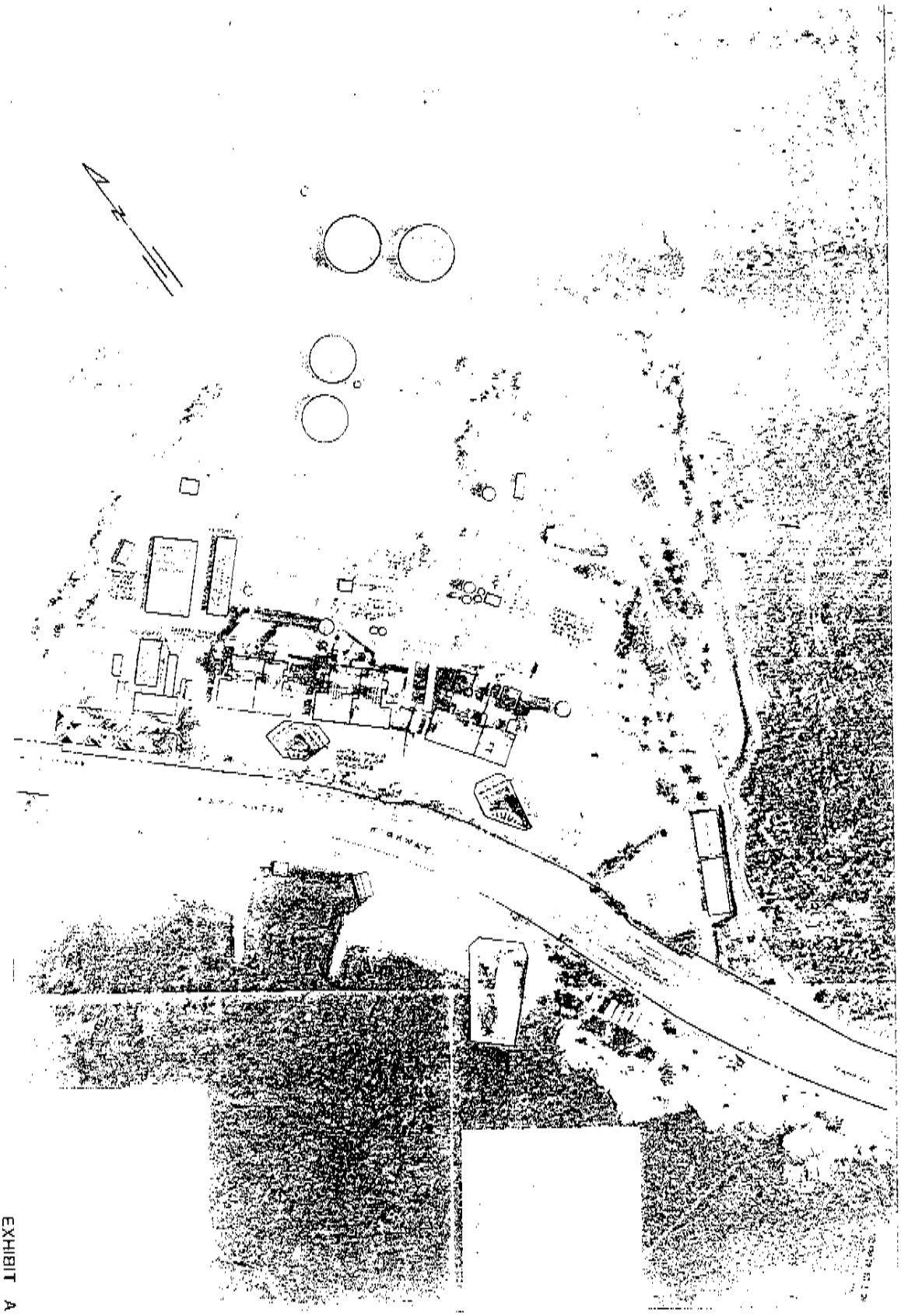
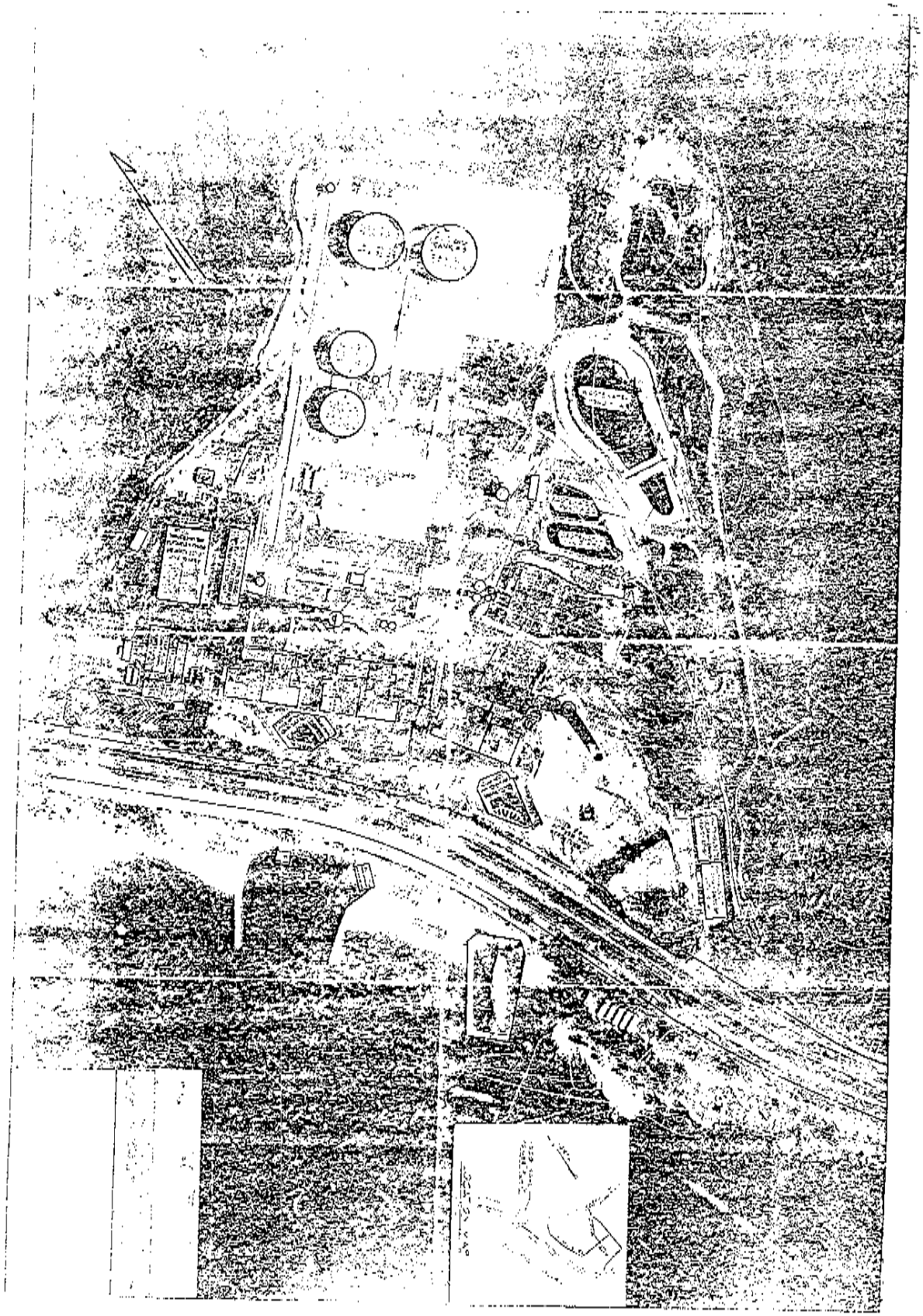


EXHIBIT A

CUP1 46/2



B. BIOLOGICAL SURVEY OF THE PROJECT AREA

Biological Surveys Conducted for Proposed Infrastructure Improvements at the Hawaiian Electric Company's Kahe Generation Station, Kahe Valley, Waiʻanae District, Island of Oʻahu

Prepared by:

Reginald E. David
Rana Biological Consulting, Inc.
P.O. Box 1371
Kailua-Kona, Hawaiʻi 96745

Prepared for:

Planning Solutions, Inc.
210 Ward Street
Suite 330 Ward Plaza
Honolulu, Hawaii 96814-4012

September 30, 2011

Table of Contents

Introduction

The Hawaiian Electric Company (HECO) is planning to construct various infrastructure improvements at their Kahe Generating Station, located in Kahe Valley, Waiʻanae District, Oʻahu. The subject property is owned by HECO and is currently the location of the largest power generation facility in the state.

This report describes the methods used and the results of the botanical avian and mammalian surveys conducted on the subject property as part of the environmental disclosure process associated with the proposed project.

The primary purpose of the surveys was to determine if there are any botanical, avian or mammalian species currently listed, or proposed for listing under either federal or State of Hawaiʻi endangered species statutes within or adjacent to the study area. The federal and State of Hawaiʻi listed species status refers to species identified in the following referenced documents, (Department of Land and Natural Resources (DLNR) 1998 and U. S. Fish & Wildlife Service (USFWS) 2005a, 2005b, 2011). Fieldwork was conducted on September 8, 2011.

Hawaiian and scientific names are italicized in the text. A glossary of technical terms and acronyms used in the document, which may be unfamiliar to the reader, are included at the end of the narrative text.

Project and General Site Description

The subject property is fronted by Farrington Highway, and bound by the walls of Kahe Valley to the north and south (Figure 1). HECO is planning on constructing the following facilities within and adjacent to their fenced generating station:

- Two 75,000 bbl biofuel tanks and one 30,000 bbl biofuel tank;
- A truck rack capable of handling 5,400 gallon deliveries;
- An 8" dual fuel supply line within the Kahe property; and
- The auxiliary equipment necessary to support the new fuel infrastructure.

The new facilities will be connected to the existing pipeline that runs from HECO's Barbers Point Tank Farm. In addition to the improvements and expansion detailed above HECO is also planning on grading and constructing a compacted earthen storm water berm to control rainwater flowing into Kahe Generating Station, redirecting the flow into an armored section of the existing ditch channel (Figure 2).

Legend:

- Proposed Alignment of Biofuel Pipe
- Approximate Existing HECO Pipeline Route
- Footprint of Proposed Tank Farm
- Kahe Fence Line
- Parcel Boundary

Prepared For:

HECO

Prepared By:

PLANNING SOLUTIONS

Source:

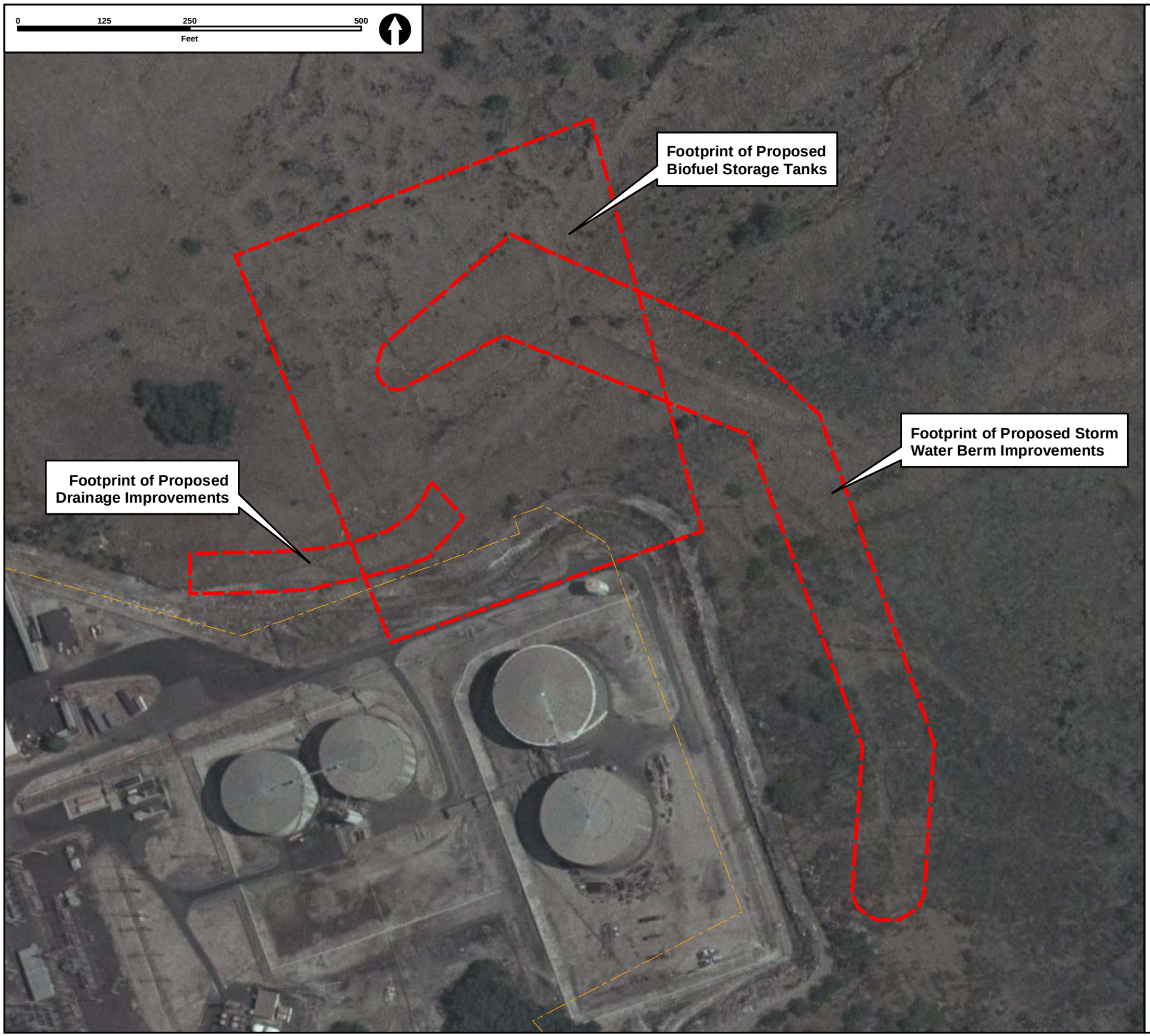
- HECO
- ESRI

Figure 1:

Pipe Alignment Survey Area

HECO Kahe 2011

Figure 1 Biofuel Pipe Alignment Survey Area 2011-10-26.mxd



Legend:

Kahe Fence Line

Prepared For:

HECO

Prepared By:

PLANNING SOLUTIONS

Source:

- HECO
- ESRI

Figure 2:

Storage Tanks & Storm Water Berm Survey Area

HECO Kahe 2011

Figure 2 Kahe Biofuel Storage Tanks Survey Area 2011-10-26.mxd

The vegetation present on the portions of the site that are located outside the fenced generating station is characterized as a *kiawe*/buffel grass savanna. The vegetation within the generating station is extremely sparse. As it poses a fire risk, the vegetation within the plant is kept to a minimum and controlled by cutting and regular herbicide applications.

Methods

Plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner *et al*., 1990, 1999). The avian phylogenetic order and nomenclature used in this report follow the *AOU Check-List of North American Birds* (American Ornithologists' Union, 1998), and the 42nd through the 52nd supplements to the Check-List (American Ornithologists' Union, 2000; Banks et al., 2002, 2003, 2004, 2005, 2006, 2007, 2008; Chesser *et al*., 2009, 2010, 2011). Mammal scientific names follow (Tomich, 1986). Place names follow (Pukui *et al.*, 1974).

Botanical Survey Methods

The reconnaissance level plant survey consisted of walking the study area and travelling the length of the pipeline route and recording the plants encountered within both sites.

Avian Survey

Two avian count stations were sited within the savanna outside of the generating station perimeter fence. A single eight-minute avian point count was made at each count station. Field observations were made with the aid of Leica 10 X 42 binoculars and by listening for vocalizations. The count and subsequent search of the remainder of the site was conducted between 8:00 am and 10:00 am. Time not spent counting the point count stations was used to search the rest of the site for species and habitats not detected during the point counts. Weather conditions were ideal, with no rain, unlimited visibility and winds of between 3 and 5 kilometers an hour.

Mammalian Survey

With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or *'ōpe'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. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all terrestrial vertebrate mammalian species detected within the project area.

Results

Botanical Surveys

Vegetation within the generating station fenced compound is extremely sparse. Along the pipeline route, what little vegetation is present is dominated by very short buffel grass (*Cenchrus ciliaris*), there is a small copse of fairly dense *kiawe* (*Prosopis pallida*) located along the southern boundary of the fence through which the pipeline passes. Vegetation along the pipeline located outside of the perimeter fence on the southwestern corner of the project site is denser and taller buffel grass mixed with small stature *kiawe* trees. There is very little vegetation within the existing storm water channel, as the vegetation is mechanical and chemically controlled to maintain the function of the channel (Figure 3).

Figure 3 – Storm water channel and habitat within the fenced generating station, looking southwest

Vegetation within the proposed biofuel storage tanks site and in the area where proposed improvements to storm water control structures are proposed is dominated by buffel grass and *kiawe* – in these locations the buffel grass is very dense and knee high. It is clear from the number of burnt *kiawe* stumps and deposits of charcoal on the ground that this area has been burnt over in the not too distant past, possibly more than once (Figure 4). A list of species detected within this habitat is presented in Table 1.

Figure 4 – New biofuel storage tanks site, looking southwest, taken from the storm water control berm

Table – 1 Plants documented on the Kahe Biofuel Storage Tanks Site

Species listed by family	***Common name***	***Status***
	FLOWERING PLANTS	
	DICOTYLEDONES	
ASTERACEAE (COMPOSITAE)		
*Bidens alba(*L.) DC	---	Nat
Emilia fosbergii Nicolson	*pualele*	Nat
Pluchia carolinensis (Jacq.) G. Don	sourbush	Nat
Pluchia x *fosbergii* Cooperr. & Galang	---	Nat
Pluchea indica (L.) Less.	Indian fleabane	Nat
Sonchus oleraceus L.	sow thistle	Nat
Verbesina enceliodes (Cav.) Benth. & Hook.	golden crown-beard	Nat
Xanthium strumarium L.	*kikiana,* cockleburr	Nat

Table 1 – Continued -

Species listed by family	*Common name*	*Status*
CONVOLVULACEAE		
Ipomoea obscura (L.) Ker-Gawl.	---	Nat
CUCURBITACEAE		
Cucumis dipsaceus Ehrenb. Ex. Spach	teasel gourd	Nat
EUPHORBIACEAE		
Ricinus communis L.	castor bean	Nat
FABACEAE		
Acacia farnesiana (L.) Willd.	*klu*	Nat
Leucaena leucocephala (Lam.) deWit	*koa haole*	Nat
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	*kiawe*	Nat
MALVACEAE		
Malvastrum coromandelianum (L.) Garcke	false mallow	Nat
Sida fallax	*'ilima*	**Ind**
Sida spinosa L.	prickly sida	Nat
PASSIFLORACEAE		
Passiflora foetida L.	running pop	Nat
SOLANACEAE		
Nicotiana glauca R.C. Graham	tree tobacco	Nat
STERCULIACEAE		
Waltheria indica L.	*'uhaloa*	**Ind**
MONOCOTYLEDONES		
POACEAE		
Cenchrus ciliaris L.	buffelgrass	Nat
Chloris barbata (L.) Sw.	swollen fingergrass	Nat
Leptochloa uninervia (K Presl.) Hitchc. & Chase	sprangletop	Nat
Melinus repens (Willd.) Zizka	Natal redtop	Nat
Setaria verticillata (L.) P. Beauv.	bristly foxtail	Nat
Sporobolus cf. *diander* (Retz.) P. Beauv.	Indian dropseed	Nat

Key to Table 1

Nat	Naturalized – Plant that is not native to Hawaii, but has become established in modern times
Ind	Indigenous – native to the Hawaiian Islands, but also found naturally elsewhere

A total of only 26 species of vascular plants was identified from the survey area. All but two species (8 percent) are alien species naturalized in the Hawaiian Islands. The two native species, *'ilima* and *'uhaloa* are both common indigenous plants.

Avian Survey

A total of 16 individual birds of seven species, representing five separate families, were recorded during station counts. All of the species recorded are alien to the Hawaiian Islands (Table 2). No avian species detected during the course of this survey are protected or proposed for protection under either the federal or State of Hawai'i endangered species statutes.

Avian diversity and densities were extremely low, though in keeping with the highly disturbed nature of the habitat present on the site, and the xeric nature of the area.

Table 2 – Avian Species Detected Within the Kahe Site

Common Name	*Scientific Name*	*ST*	*RA*
	COLUMBIFORMES		
	COLUMBIDAE – Pigeons & Doves		
Spotted Dove	*Streptopelia chinensis*	A	0.50
Zebra Dove	*Geopelia striata*	A	1.50
	PASSERIFORMES		
	ZOSTEROPIDAE – White-eyes		
Japanese White-eye	*Zosterops japonicus*	A	0.50
	STURNIDAE – Starlings		
Common Myna	*Acridotheres tristis*	A	2.50
	FRINGILLIDAE – Fringilline and Carduleline Finches & Allies		
	Carduelinae – Carduline Finches		
House Finch	*Carpodacus mexicanus*	A	1.50
	ESTRILDIDAE – Estrildid Finches		
	Estrildinae – Estrildine Finches		
Common Waxbill	*Estrilda astrild*	A	1.00
Java Sparrow	*Padda oryzivora*	A	0.50

Key to table 2

ST	Status
A	Alien – Introduced to the Hawaiian Islands by humans
RA	Relative Abundance - Number of birds detected divided by the number of count stations (2)

Mammalian Survey

Four terrestrial mammalian species were detected on site during the course of this survey. Tracks, scat and sign of dog (*Canis f. familiaris*), small Indian mongoose (*Herpestes a.*

auropunctatus), cat (*Felis catus*), and pig (*Sus s. scrofa*) were encountered at numerous locations within the areas outside of the generating station perimeter fence.

No mammalian species currently protected or proposed for protection under either the federal or State of Hawai‘i endangered species programs were detected during the course of this survey, nor were any expected (DLNR, 1998; USFWS; 2005a, 2005b, 2011).

Discussion

Botanical Resources

The findings of the reconnaissance level botanical survey are in keeping with the xeric, lowland site. Only two of the 26 species recorded are native, both of which are common indigenous species.

There is nothing special or unique about the vegetation on the site. It is typical of highly disturbed sites on the Wai‘anae coast, and bears little or no resemblance to the vegetation that would have occurred on the site prior to human contact.

Avian Resources

The findings of the avian survey are consistent with the habitat and the site’s location. All species detected are alien to the Hawaiian Islands.

Although no seabirds were detected during the course of this survey, several seabird species potentially overfly the site on occasion. The primary cause of mortality in resident seabirds is thought to be predation by alien mammalian species at the nesting colonies (USFWS 1983; Simons and Hodges 1998; Ainley *et al.,* 2001). Collision with man-made structures is considered to be the second most significant cause of mortality in locally nesting seabird species in Hawai‘i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with manmade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals (Hadley 1961; Telfer 1979; Sincock 1981; Reed *et al.*, 1985; Telfer *et al.*, 1987; Cooper and Day, 1998; Podolsky *et al*. 1998; Ainley *et al.*, 2001; Hue *et al.*, 2001; Day *et al* 2003).

There are no known nesting colonies of any of the resident seabird species present on O‘ahu on, or within close proximity of the project site.

Mammalian Resources

The findings of the mammalian survey are consistent with the habitat and the site location. All species detected are alien to the Hawaiian Islands.

Although no rodents were detected during the course of this survey, it is likely that the four established alien muridae fund on O'ahu, roof rat (*Rattus r. rattus*), Norway rat (*Rattus norvegicus*), European house mouse (*Mus musculus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use various resources found within the general project area on a seasonal basis. All of these introduced rodents are deleterious to native ecosystems and the native faunal species are dependant on them.

No Hawaiian hoary bats were detected during the course of this survey. Given the paucity of documented records of this species on O'ahu and the complete lack of suitable roosting vegetation on the site the chance that any use resources on the subject property are extremely low (USFWS, 1998; David, 2011).

Potential Impacts to Protected Species

Botanical

No species of plant listed as threatened or endangered under state or federal statutes was recorded during the survey and none is expected to occur on this highly disturbed site. Therefore the further modification of the habitat present on this site is not expected to result in deleterious impacts to any species currently proposed or listed under either the federal or State of Hawai'i endangered species statutes.

Seabirds

The principal potential impact that further disturbance to this site poses to protected seabirds is the increased threat that birds will be downed after becoming disoriented by lights associated with the project during the nesting season. The two main ways that outdoor lighting could pose a threat to these nocturnally flying seabirds is if, 1) during construction it is deemed expedient or necessary to conduct nighttime construction activities; or 2) following build-out, the use of streetlights or other exterior security lighting is used during the seabird nesting season.

Recommendations

- If nighttime construction activity or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground.

- If streetlights or exterior facility lighting is installed in conjunction with the project, it is recommended that the lights be shielded to reduce the potential for interactions of nocturnally flying seabirds with external lights and man-made structures (Reed *et al.*, 1985; Telfer *et al.*, 1987).

Critical Habitat

There is no federally delineated Critical Habitat present on the property. Thus the further development and operation of the proposed infrastructure will not result in impacts to federally designated Critical Habitat. There is no equivalent statute under state law.

Glossary

Alien – Introduced to Hawai‘i by humans
Endangered – Listed and protected under the Endangered Species Act of 1973, as amended (ESA) as an endangered species
Endemic – Native to the Hawaiian Islands and unique to Hawai‘i
Indigenous – Native to the Hawaiian Islands, but also found elsewhere naturally
Muridae – Rodents, including rats, mice and voles, one of the most diverse family of mammals
Naturalized – A plant or animal that has become established in an area that it is not indigenous to
Nocturnal – Night-time, after dark
‘Ōpe‘ape‘a – Endemic endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*)
Pelagic – An animal that spends its life at sea – in this case seabirds that only return to land to nest and rear their young
Phylogenetic – The evolutionary order that organisms are arranged by
Ruderal – Disturbed, rocky, rubbishy areas, such as old agricultural fields and rock piles
Sign – Biological term referring tracks, scat, rubbing, odor, marks, nests, and other signs created by animals by which their presence may be detected
Threatened – Listed and protected under the ESA as a threatened species
Xeric – Extremely dry conditions or habitat

DLNR – Hawai‘i State Department of Land & Natural Resources
DOFAW – Division of Forestry and Wildlife
ESA – Endangered Species Act of 1973, as amended
HECO – Hawaiian Electric Company
USFWS – United States Fish & Wildlife Service

Literature Cited

Ainley, D. G, R. Podolsky, L. Deforest, G. Spencer, and N. Nur. 2001. The Status and Population Trends of the Newell's Shearwater on Kaua'i: Insights from Modeling, *in*: Scott, J. M, S. Conant, and C. Van Riper III (editors) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna.* Studies in Avian Biology No. 22: Cooper's Ornithological Society, Allen Press, Lawrence, Kansas. (Pg. 108-123).

American Ornithologist's Union. 1998. *Check-list of North American Birds*. 7th edition. AOU. Washington D.C. 829pp.

_____. 2000. Forty-second supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 117:847-858.

Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz. 2002. Forty-third supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 119:897-906.

_____. 2003 Forty-fourth supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 120:923-931.

_____. 2004 Forty-fifth supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 121:985-995.

_____. 2005 Forty-sixth supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 122:1026-1031.

_____. 2006 Forty-seventh supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 123:926-936.

Banks, R. C., C. R. Terry Chesser, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz. 2007 Forty-eighth supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 124:1109-1115.

Banks, R. C., C. R. Terry Chesser, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz, and K. Winker. 2008 Forty-ninth supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 125:758-768.

Chesser, R. T., R. C. Banks, F. K. Barker, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz, and K. Winker. 2009. Fiftieth supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 126:1-10.

_____. 2010. Fifty-first supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 127:726-744.

_____. 2011. Fifty-second supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 128:600-613.

Cooper, B. A and R. H. Day. 1998. Summer Behavior and Mortality of Dark-rumped Petrels and Newells' Shearwaters at Power Lines on Kauai. Colonial Waterbirds, 21 (1): 11-19.

Day, R. H., B. Cooper, and T. C. Telfer. 2003. Decline of Townsend's (Newell's Shearwaters (*Puffinus auricularis newelli*) on Kauai, Hawaii. The Auk 120: 669-679.

David, R. E. 2011. Unpublished field notes – O'ahu 1980 - 2011.

Department of Land and Natural Resources (DLNR). 1998. Indigenous Wildlife, Endangered And Threatened Wildlife And Plants, And Introduced Wild Birds. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.

Hadley, T. H. 1961. Shearwater calamity on Kauai. Elepaio 21:60.

Hue, D., C. Glidden, J. Lippert, L. Schnell, J. MacIvor and J. Meisler. 2001. Habitat Use and Limiting Factors in a Population of Hawaiian Dark-rumped Petrels on Mauna Loa, Hawai'i. , *in:* : Scott, J. M, S. Conant, and C. Van Riper III (editors) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna*. Studies in Avian Biology No. 22. Cooper's Ornithological Society, Allen Press, Lawrence, Kansas (Pg. 234-242).

Podolsky, R., D.G. Ainley, G. Spencer, L. de Forest, and N. Nur. 1998. "Mortality of Newell's Shearwaters Caused by Collisions with Urban Structures on Kaua'i". Colonial Waterbirds 21:20-34.

Pukui , M. K., S. H. Elbert, and E. T. Mookini 1976. *Place Names of Hawaii*. University of Hawaii Press. Honolulu, Hawai'i. 289 pp.

Reed, J. R., J. L Sincock, and J. P. Hailman 1985. Light Attraction in Endangered Procellariform Birds: Reduction by Shielding Upward Radiation. Auk 102: 377-383.

Simons, T. R., and C. N. Hodges. 1998. Dark-rumped Petrel (*Pterodroma phaeopygia*). *In* A. Poole and F. Gill (editors). The Birds of North America, No. 345. The Academy of Natural Sciences, Philadelphia, PA. and the American Ornithologists Union, Washington, D.C.

Sincock, J. L. 1981. Saving the Newell□s Shearwater. Pages 76-78 in Proceedings of the Hawaii Forestry and Wildllife Conference, 2-4 October 1980. Department of Land and Natural Resources, State of Hawaii, Honolulu.

Telfer, T. C. 1979. Successful Newell's Shearwater Salvage on Kauai. 'Elepaio 39:71

Telfer, T. C. , J. L. Sincock, G. V. Byrd, and J. R. Reed. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. Wildlife Society Bulletin 15:406-413.

Tomich, P.Q. 1986. *Mammals in Hawaii*. Bishop Museum Press. Honolulu, Hawaii. 37 pp.

U.S. Fish & Wildlife Service (USFWS) 1983. Hawaiian Dark-Rumped Petrel & Newell's Manx Shearwater Recovery Plan. USFWS, Portland, Oregon. February 1983.

_____. 1998. Recovery Plan for the Hawaiian Hoary Bat. U.S. Fish & Wildlife Service, Portland, Oregon.

_____. 2005a. Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12 (Tuesday, November 1, 2005).

_____. 2005b. 50 CFR 17. Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petition; Annual Description of Progress on Listing Actions. Federal Register, 70 No. 90 (Wednesday, May 11, 2005): 24870-24934.

_____. 2011. USFWS Threatened and Endangered Species System (TESS), online at http://ecos.fws.gov/tess_public/StartTESS.do Last accessed on September 28, 2011

C. SCENARIO ANALYSIS FOR THE RENEWABLE PORTFOLIO STANDARDS STRATEGY

Scenario Analysis of the Renewable Portfolio Standards ("RPS") Strategy

October 11, 2011

Hawaiian Electric Company
Maui Electric Company
Hawaii Electric Light Company

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Scenario Analysis of the
Renewable Portfolio Standards ("RPS") Strategy

1 Executive Summary

This report provides an assessment of the strategy of Hawaiian Electric Company, Inc. ("Hawaiian Electric"), Maui Electric Company, Limited ("MECO"), and Hawaii Electric Light Company, Inc. ("HELCO") (collectively "the Companies"), to increase their renewable energy portfolio to meet or exceed the goals in the Renewable Portfolio Standards ("RPS") law.

The Companies' strategy is to actively seek and incorporate a diverse portfolio of new renewable energy resources as well as pursuing locally grown and processed biofuels for use in our existing generators. The objective of this analysis was to utilize scenario planning analysis to evaluate the Companies' strategy for meeting the RPS under different possible futures. The following summarizes the process the Companies utilized for this scenario planning analysis:

- Identify key uncertainties and key drivers of uncertainties.
- Develop four scenarios based on key uncertainties and driving forces.
- Quantify fundamental components to characterize the scenarios.
- Evaluate the scenarios.

Section 2 describes the key uncertainties that affect the RPS as renewable electrical energy and sales which are, in general, driven by oil prices, electricity prices, technology costs, project and procurement risks, customer behavior, and government policy. Giving consideration to these key uncertainties and driving forces behind them, the Companies identified four scenarios:

1. Growing the Green Community Scenario
2. Not Green Enough Scenario
3. Moderately Green Scenario
4. Living in a Green Community Scenario

Section 3 describes the process of how the Companies strategy for meeting or exceeding the RPS was evaluated. The scenario analysis illustrates the difficulty in predicting the Companies' RPS future given the uncertainties that exist. To help manage the risks of not achieving the RPS goals, the Companies used this scenario analysis to establish initial crude biofuel target volumes of:

- 2015: 300,000 barrels of crude biofuel
- 2020: 1,300,000 barrels of crude biofuel
- 2030: 3,000,000 barrels of crude biofuel

The scenario analysis indicates that the Companies' strategy to achieve the RPS goals can be successful and effective. The strategy balances the risks and uncertainties associated with incorporating a diverse portfolio of renewable energy resources. This scenario analysis exemplifies that there is no single answer to meet the challenges of meeting the RPS requirements, but the diversity that the strategy provides gives the Companies the flexibility to adjust to changes in the uncertainties and help manage the risks.

2 Introduction and Strategy

Providing secure, clean energy for Hawaii is a critical element of the Company's mission. The Companies are playing a critical role in transforming the State to a clean energy future by reducing our dependence on imported fossil fuels through the effective utilization of Hawaii's diverse and abundant natural resources to generate energy. In order to successfully achieve this aspect of the clean energy future, the Companies have a strategy to increase their renewable energy portfolio and to manage the risks of not achieving the goals in the Renewable Portfolio Standards ("RPS") law. This report provides an assessment of the Companies' strategy of to meet and/or exceed the RPS law. This study provides an update to the previous analyses that Hawaiian Electric conducted in other forums.[1]

Hawaii State Renewable Portfolio Standards Law

The Hawaii State Renewable Portfolio Standards ("RPS") law, Hawaii Revised Statutes §269-91, sets the minimum goals for using renewable energy resources to generate electricity. The law specifies a goal of achieving a 40% RPS by the year 2030 with interim renewable energy goals for the years preceding 2030. The RPS goals for target years are:

- Year 2010 – 10% of the company's sales must be met by using renewable energy resources to generate electricity and energy savings brought about by technologies such as energy efficiency programs and solar water heaters.[2]

[1] As a result of Act 155, which revised the RPS law, HRS §269-91, on July 1, 2009, Hawaiian Electric performed a high level assessment of where the Companies would stand relative to the RPS under a range of renewable energy scenarios. Hawaiian Electric identified many renewable energy projects that may be integrated into the Companies (Hawaiian Electric, HELCO and MECO) grids. An initial assessment was conducted in 2009 to focus on the 2015 RPS target. The results were provided in response to CA-IR-1 and CA-SIR-1 in Docket No. 2009-0155, Kahe 3 Biofuel Co-firing Demonstration Project. The scenarios that were used in the initial 2009 assessment were re-evaluated and updated appropriately in May 2010 for the "*Evaluation of Hawaiian Electric Company, Inc's Existing Generating Units*" report in Docket No. 2010-0286, Barbers Point Fuel Oil Tank 132 Renovation Project filed on October 12, 2010. The most recent assessment was provided as Exhibit J to the PUC Application for approval of HELCO's biodiesel supply contract with Aina Koa Pono in Docket No. 2011-0005 filed on January 6, 2011.

[2] In 2010, the Companies achieved a 20.7% RPS including renewable energy and energy efficiency savings. Without the energy efficiency savings, the RPS was 9.5% which means that the Companies need to significantly increase the amount of energy generated by renewable resources in order to meet the 2030 40% RPS goal.

- Year 2015 – 15% of the company's sales must be generated by renewable energy resources. Energy savings will no longer be allowed to count toward the RPS.

- Year 2020 – 25% of the company's sales must be generated by renewable energy resources.

- Year 2030 – 40% of the company's sales must be generated by renewable energy resources.

The Companies' RPS Strategy

The Companies are committed to meeting and exceeding the RPS goals and has developed a strategy to increase their renewable energy portfolio and to manage the risks associated with this effort. The Companies' strategy is to actively seek and incorporate a diversity of new renewable energy resources including wind, solar power, hydro, geothermal, biomass, and other types of renewable generation that may emerge several years down the road. Along with adding more renewable energy resources, the greening of existing generating units through the use of sustainable biofuels will also displace fossil fuels use and produce renewable energy. Biofuels, if locally grown and processed, can also represent a significant step towards reinvigorating Hawaii's agriculture industry, creating energy independence and security, and allowing dollars currently spent on imported oil to be reinvested here in Hawaii.

Liquid biofuels provide a source of renewable energy that can be readily used in existing generation facilities. Rather than abandoning billions of dollars of existing facilities (that are already designed to operate in Hawaii's unique isolated island environment) and building from scratch, resources can be saved by switching from "black" oil to "green" biofuels made from biomass, algae, waste animal fat, palm oil, and other energy crops. Using biofuels in the Companies' existing conventional generating units allows the continued provision of essential grid services including load following, frequency response, voltage control, system inertia, and on-line operating and spinning reserves without having to rely solely on fossil fuels to do so. Integrating renewable and sustainable biofuels into a portion of the Companies' existing generating systems is an important part of the Companies' renewable energy strategy of delivering clean, renewable energy to their customers. The Companies' firm power generating units are needed to support intermittent, as-available, renewable generation (such as wind or PV) on their respective systems.

There are risks that not all of the renewable energy resources that the Companies are counting on for renewable energy will be able to deliver the energy anticipated. A new renewable energy resource may not be able to deliver its energy as planned because it may be delayed or cancelled (for example, due to community opposition), an inability to obtain required permits, a lack of financing, or technology obstacles or challenges. Existing renewable resources may not be able to produce the same amount of renewable energy they have in the past due to unforeseen degradation, maintenance or operational issues. Energy from existing utility units using biofuels may not be able to generate renewable energy and contribute to the RPS goal because of a disruption in biofuel supply or unit forced outages.

Implementing the strategy of incorporating a diverse portfolio of new renewable energy resources, along with greening existing generating units, balances the risks and uncertainties associated with achieving the RPS goals.

It is plausible that the Companies strategy could result in renewable energy levels that exceed the interim RPS goals in the years leading up to 2030. It must be recognized that ramping up to the required 40% renewable energy to be generated in 2030 from the 9.5% level achieved in 2010 is not as simple as assuming an evenly distributed step function of adding 1% each year up to 2015, then 2% each year up to 2020, then 1.5% each year up to 2030. The uncertainties related to predicting an accurate level of renewable energy in any given year warrants the use of scenario planning to provide perspectives on the possible futures. Scenario planning will help formulate the strategy that places the Companies in a position to minimize risks associated with achieving the RPS goals and provide secure, clean energy for Hawaii.

3 Scenario Development

The strategy to achieve the RPS goals was evaluated using scenario planning analysis.[3] Several scenarios were developed to identify plausible futures that the Companies could face and what RPS levels would be achieved as a result of the strategy. The analysis aggregates the renewable energy from the Companies in accordance with HRS § 269-93 which permits the Hawaiian Electric Companies to aggregate their renewable portfolios to achieve the RPS. [4]

One of the first steps in any scenario planning process is to identify key uncertainties that affect the Companies' future. Since the RPS percentage is calculated by dividing the utility's renewable electrical energy by the utility's total electrical energy sales, the obvious uncertainties are the amounts of renewable electrical energy and sales in the future. For this analysis, the uncertainties in the utility's renewable energy and sales are driven by oil prices, electricity rates, technology costs, project and procurement risks, customer behavior, and government policy. The following are some examples of how these driving forces are inter-related and affect the utility:

1. High oil prices could raise electricity rates which increase customer self-generation, increase customer actions to reduce energy use, and create new government policies to reduce oil use, resulting in lower utility sales.
2. Low renewable energy technology costs could increase the penetration level and community acceptance of renewable energy resources on the utility system

[3] Scenario planning is a process used to examine, test, or develop plans and strategies against a range of possible but uncertain futures.

[4] By aggregating the renewable energy across the Companies, an individual Company with more renewable energy resources can share their renewable energy with other Companies with less renewable energy opportunities to help meet the RPS goals. The analysis from this report and from other dockets (see Exhibit C of response to CA-SIR-13 in Docket No. 2011-0005) have shown that under several scenarios, an individual Company could exceed the RPS goal in certain target compliance years while another Company would not meet the RPS goal in the same year. See Tables A2, A3, A7 and A8 in the Appendix.

by independent power producers and customers, which could result in lower utility sales.

3. High renewable energy technology costs, for example, from new technology or as the result of government policy eliminating tax credits and incentives (which could result in proposed projects losing financing), could decrease the penetration level and community acceptance of the renewable energy resources on the utility system by independent power producers and customers.
4. Government policy on carbon legislation or emission levels would increase the cost of electricity, decrease dependence on oil and increase the penetration level of renewable energy resources on the utility system.

After identifying the key uncertainties and driving forces behind them, the next step was to develop scenarios which are stories of plausible RPS futures for the Companies. The four scenarios identified were:

1. **Growing the Green Community Scenario** – This scenario presents a future where high levels of renewable energy are integrated into the electric grid. In this scenario, the costs for renewable energy technology are low, communities are embracing the move toward renewable energy, oil prices are moderately high, carbon legislation is in effect, customers continue to reduce energy use and some self-generate electricity to meet their lifestyle needs. This results in a moderate level of sales.
2. **Not Green Enough Scenario** – This scenario presents a future where there is a lack of community support for renewable energy resulting in low levels being obtained. In this scenario, the costs for renewable energy technology are high, the loss of government tax credits and incentives results in loss of financing for projects, oil prices are moderately low, no carbon legislation is in effect, and customers increase energy use to meet their lifestyle needs. This results in higher sales with the greatest risk for not achieving RPS goals.
3. **Moderately Green Scenario** – This scenario presents a future where there is some community support for renewable energy resulting in moderate levels from all sources being obtained. In this scenario, renewable energy technology prices are stable, oil prices are stable, no carbon legislation is in effect, and customers continue to reduce energy use and some self-generate electricity to meet their lifestyle needs. This results in a moderate level of sales.
4. **Living in a Green Community Scenario** – This scenario presents a future where Hawaii is living in a secure, clean energy environment where there is overall community acceptance of renewable energy resulting in high levels of attainment. In this scenario, the costs for renewable energy technology are low, oil prices are high, carbon legislation is in effect, and customers reduce energy use to lower levels and self-generate electricity to higher levels. This results in lower sales.

To perform the analysis, the scenarios needed to be characterized or defined by the key uncertainties that describe the plausible future. Projections of the key uncertainties were developed and include:

1. The forecasted **sales** level;
2. The amount of renewable energy generated from **existing renewable energy resources** that are already installed (pre-2011);
3. The amount of renewable energy generated from **new renewable resources** installed after 2010; and
4. The amount of energy produced using **biofuels** in existing utility generators.

The key uncertainties considered in this analysis are described below.

3.1 Forecasted Sales Levels

Sales levels can have a significant impact on the RPS goals since the RPS levels are calculated as a percentage of utility sales. Actual and forecasted sales levels are affected by a number of factors including, but not limited to, resident population, visitor arrivals, job growth, personal income, weather, residential electrical consumption per customer, electricity price, new construction projects, customer self generation levels, efficiency standards, and energy efficiency program impacts. The range of these variables are reflected in the three sales forecasts, base, high, and low, that the Companies develop to address the uncertainty of the sales forecast. The sales forecasts that were considered in this analysis are shown in Table 3.1.

Table 3.1: Consolidated Sales Forecasts used for Scenario Analysis

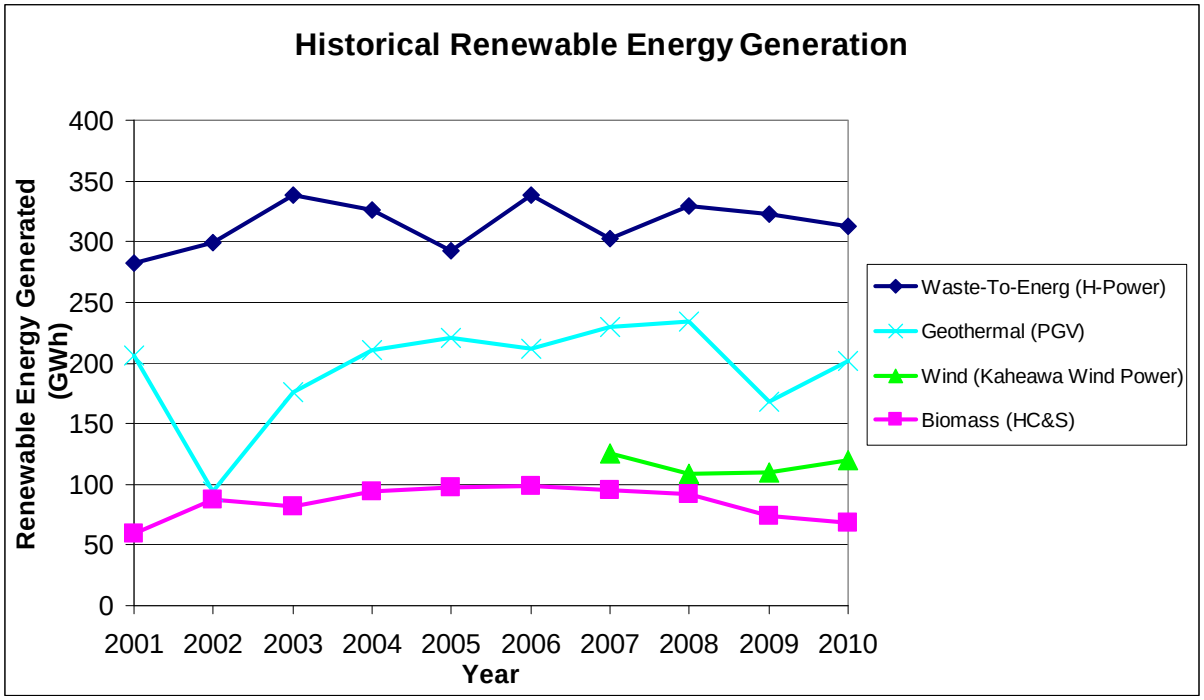
Consolidated Sales [GWh]	Year		
	2015	2020	2030
Base	10,078	10,149	8,863
High	11,461	12,343	13,549
Low	8,897	8,296	6,539

3.2 Existing Renewable Energy Resources

In 2010, approximately 911 GWH of electricity was produced by existing renewable resources that were installed prior to 2011. These existing resources produced renewable energy from several different renewable technologies including solar, waste-to-energy, biomass, wind, hydroelectric, geothermal, and some biofuels. There is no guarantee, however, that these resources will produce in the future the same amounts of renewable

energy that was obtained in 2010. From a historical perspective, the energy output from the existing renewable resources on Oahu, Maui, and on the Big Island have exhibited large historical year-to-year variations in energy output. Figure 3.2 illustrates the risk and variability of the existing renewable energy resources for four renewable energy generators and technologies on the Hawaiian Electric, MECO, and HELCO systems.

Figure 3.2: Historical Renewable Energy Generation



3.3 Future Renewable Energy Resources

The Companies are working to develop and incorporate a diversity of renewable energy resources to be acquired through new purchase power projects and customer generated energy. There are challenges and some uncertainty with being able to obtain new renewable energy from these projects for a specific RPS goal year, as there may be construction delays due to permitting challenges or financing difficulties.

To address the uncertainties in the timing of renewable energy projects being incorporated into the Companies' portfolio for the RPS goal years, three levels of future renewable energy projections were developed. These projections are summarized in Table 3.3 below. A high renewable energy projection was developed that reflects the Companies' estimate of the future level of renewable energy from existing and new renewable energy resources. The high projection reflects an optimistic estimate of future levels of renewable energy driven by high oil prices and/or low renewable energy technology costs, minimal permitting and financing challenges, and general community acceptance for a diversity in renewable energy projects. It could be reflective of a future where current renewable energy resources continue to produce energy at the 2010 levels and that new proposed and planned

renewable energy projects and customer self generation achieve high levels of renewable energy production. It could also represent a future where additional renewable energy from large renewable energy projects such as the proposed Interisland Wind project or other off-shore wind projects, waste-to-energy projects, Ocean Thermal Energy Conversion ("OTEC") projects, biomass projects, and solar PV projects are successful and achieve almost all of their projected energy outputs.

The moderate renewable energy projection reflects a future where more modest levels of renewable energy are achieved compared to the high projection. It represents a situation where moderate levels of renewable energy from large renewable energy projects and customer self generation efforts are attained. This projection could represent a future with no energy from the Interisland Wind project or where energy from other off-shore wind projects, waste-to-energy projects, OTEC projects, biomass projects, PV projects, and other resources are not achieved due to permitting and financing challenges or lack of community support. When compared to the high renewable energy projection, the moderate projection reflects a possible future without energy in large part attributed to the Interisland Wind project.

The low renewable energy projection reflects a future where poor levels of renewable energy are achieved driven by low oil prices and/or high costs for renewable energy technologies. It represents a future where only a fraction of the renewable energy from large renewable energy projects is attained, low levels of customer self generation is realized, and existing renewable resources produce less than the 2010 historical level of energy. This projection could represent a future with no energy from the Interisland Wind project, existing resources are faced with economic or technical challenges that affect their energy output, and where only small levels of energy from the waste-to-energy projects, OTEC projects, biomass projects, wind projects, PV projects, and other resources come to fruition due to difficulties with permitting and loss of financing of projects and minimal community acceptance of renewable energy projects.

Table 3.3: Summary of Renewable Energy (RE) Projections for Scenario Analysis

Renewable Energy Projections [GWh]	2015	2020	2030
High RE	1,990	4,079	4,397
Moderate RE	1,773	2,392	2,628
Low RE	1,410	1,683	1,777

A more detailed breakdown of the renewable energy projections are shown in Appendix A, Tables A9-A11.

3.4 Biofuels

The Companies are working to reduce Hawaii's dependence on fossil fuels and move toward increased energy security. The utilization of biofuels in the Companies' existing portfolio of resources plays an important role in achieving these objectives. Substituting or blending renewable biofuels in existing fossil fuel generating units provides an opportunity to "green" existing generating assets. The opportunity to incorporate renewable biofuels is not limited to the Companies' existing generating units, but also provides the opportunity for existing independent power producers to also contribute to Hawaii's clean energy objectives.

For this study, the uncertainty of the contribution to the RPS by incorporating biofuels in the Companies' existing generating units will be assessed separately from the future renewable energy projections described in the previous sections. The RPS for each of the scenarios will be assessed first without any new biofuels being added for use in the Companies' existing generating units. Only biodiesel used in Hawaiian Electric's Campbell Industrial Park combustion turbine ("CIP CT-1") and a small quantity of biodiesel used at Maui Electric's Maalaea Power Plant is included in the renewable energy projections. The possibility of new biofueled generating units being added to the systems, or existing independent power producers ("IPPs") switching to biofuels, would be considered as future renewable projects in the renewable energy projections in Table 3.3. Any shortfalls in meeting the RPS under the scenarios analyzed would then be assessed as the contribution to be met through the use of biofuels in the Companies' existing generating units.

3.5 Characterization of Scenarios

The projections of the key uncertainties (forecasted sales, existing renewable energy resources, new renewable energy resources, and biofuels) discussed above were used to define the scenarios described at the beginning of Section 3 that represent plausible RPS futures of the Companies. In its simplest form, the four scenarios can be characterized using combinations of the sales and renewable energy projections as follows:

1. **Growing the Green Community Scenario** – where high levels of renewable energy are obtained and a moderate level of sales is projected.
2. **Not Green Enough Scenario** – where there is the greatest risk for achieving RPS goals with low levels of renewable energy obtained and a high level of sales is projected.
3. **Moderately Green Scenario** – where moderate levels of renewable energy from all sources are obtained and a moderate level of sales is projected.
4. **Living in a Green Community Scenario** – where high levels of renewable energy are obtained and a low level of sales is projected.

Table 3.5 summarizes the composition of the scenarios based on the key uncertainties considered.

Table 3.5: Characterization of Scenarios

	Scenario 1: Growing the Green Community Scenario	Scenario 2: Not Green Enough Scenario	Scenario 3: Moderately Green Scenario	Scenario 4: Living in a Green Community Scenario
Sales Forecast	Base	High	Base	Low
Renewable Energy [RE] Projection	High	Low	Moderate	High

4 Assessment of Strategy

This section of the report assesses the Companies' strategy for managing the risks associated with achieving the Companies' RPS goals. It should be noted that this analysis does not include studying the impacts to system operations or grid stability[5] with having significantly high renewable energy penetration on the Companies' systems. It should be assumed that in any plausible future, the Companies will provide reliable service which includes consideration of any system improvements that would be necessary.

4.1 Incorporating Diversity of Renewable Resources

An assessment was made to determine the contribution that incorporating new renewable energy resources would have in meeting the RPS goals under each scenario. Table 4.1 shows the RPS percentage levels in 2015, 2020, and 2030 for each scenario. This assessment considered only the contribution from new renewable energy resources and not the greening of the Companies' existing fossil generating units by using biofuels. In seven of the states within the scenarios, the RPS goals are met if incorporating renewable resource diversity is successful and the projected levels of renewable energy are obtained. In five of the states, however, the RPS goals were not met where only new renewable energy resources were counted and the use of biofuels in the Companies' existing fossil generating units was not.

[5] The impacts to grid stability is not in the scope of this analysis but will be addressed in other studies such as those that may be a part of Docket No. 2011-0206 to investigate the reliability standards for the Companies, and other studies to investigate the integration of high penetrations of renewable energy on the utilities' grids.

Table 4.1: **RPS Percentages for Scenarios Based on Incorporating New Renewable Energy (RE) Resources**

	2015	2020	2030
RPS Goal	15%	25%	40%
Scenario 1 - Growing the Green Community Scenario [Base Sales/High RE]	19.7%	40.2%	49.6%
Scenario 2 - Not Green Enough Scenario [High Sales/Low RE]	**12.3%**	**13.6%**	**13.1%**
Scenario 3 - Moderately Green Scenario [Base Sales/Moderate RE]	17.6%	**23.6%**	**29.7%**
Scenario 4 - Living in a Green Community Scenario [Low Sales/High RE]	22.4%	49.2%	67.2%

4.2 Incorporating Biofuels

The next step of the scenario analysis was to assess the planning efforts for using biofuels in the Companies' existing generating units. The additional amounts of renewable energy, above what is projected from new renewable energy resources, required to meet the RPS goals were determined for each scenario and are shown in Table 4.2-1.

Table 4.2-1: Additional Renewable Energy (RE), Above Incorporating New RE Resource Projections, Required to Meet RPS Goals by Scenario [GWh]

	2015	2020	2030
Scenario 1 - Growing the Green Community Scenario [Base Sales/High RE]	0	0	0
Scenario 2 - Not Green Enough Scenario [High Sales/Low RE]	**310**	**1,403**	**3,643**
Scenario 3 - Moderately Green Scenario [Base Sales/Moderate RE]	0	**145**	**917**
Scenario 4 - Living in a Green Community Scenario [Low Sales/High RE]	0	0	0

The additional renewable energy required to meet the RPS goals shown in Table 4.2-1 above was assessed as the contribution to be provided by using biofuels in the Companies' existing generating units. The biofuels energy could be provided by either (or both) of these means: (1) crude biofuels as a fuel substitution for or blend with heavy fuel oil; and (2) biodiesel as a fuel substitution for diesel fuel. Each biofuel type will be assessed separately in the following sections.

4.2.1 Crude Biofuel

The Companies are working on using crude biofuel in existing units at Hawaiian Electric's Kahe Generating Station as a key part of the RPS strategy. In 2011, Hawaiian Electric tested a crude palm oil product, a form of crude biofuel, in its Kahe 3 unit blended with various levels of low sulfur fuel oil. The test showed that the Kahe 3 unit is capable of using blends up to a concentration of 100% crude palm oil. This capability to use crude biofuels provides needed flexibility and risk mitigation in implementing the RPS strategy so that the Companies are not reliant on only one fuel supply source.

The energy requirements identified in Table 4.2-1 were converted to crude biofuel volumes that would need to be used to produce equivalent amounts of energy from generating units at the Kahe Generating Station. The volumes for each scenario are shown in Table 4.2.1-1.

Table 4.2.1-1: Equivalent Crude Biofuel Volumes to Produce Additional Renewable Energy [Barrels]

	2015	2020	2030
Scenario 1 - Growing the Green Community Scenario [Base Sales/High RE]	0	0	0
Scenario 2 - Not Green Enough Scenario [High Sales/Low RE]	**590,000**	**2,660,000**	**6,910,000**
Scenario 3 - Moderately Green Scenario [Base Sales/Moderate RE]	0	**280,000**	**1,740,000**
Scenario 4 - Living in a Green Community Scenario [Low Sales/High RE]	0	0	0

Considering the crude biofuel volumes from Table 4.2.1-1, the units on the Hawaiian Electric system that would need to be capable of producing renewable energy from crude biofuel were identified for each scenario. To determine the minimum number of units required, the potential renewable energy using crude biofuel was based on assuming that the Kahe units were co-firing with a mix of 50% crude biofuel and 50% LSFO fuel. This planning assumption results in a conservative calculation of the number of units required to be capable of burning crude biofuels which mitigates operational risks. Should one unit be out of service for maintenance or forced outage, another unit could operate with 100% crude biofuel and provide the same renewable energy as two units at 50%.

Additionally, should the Kahe units be operated at lower capacity factors than in the past to accommodate increased renewable energy on the system from wind, solar PV or other technologies, a unit operating using 100% crude biofuel would produce the same amount of renewable energy running at half of the output of the same unit operating with a 50% crude biofuel blend. Even though the Kahe 3 biofuel testing tests showed that 100% crude biofuel operation was feasible, additional testing for the Kahe 1/2 and Kahe 5/6 units needs to be conducted to confirm the capability of these units. Table 4.2.1-2 shows what minimum combination of units would need to have the capability of producing the renewable energy amounts identified in Table 4.2-1.

Where "others" are identified, additional renewable energy output would need to be obtained from new resources, existing resources, or other generating units at Hawaiian Electric, HELCO, and/or MECO would need to also have the capability to produce renewable energy from biofuels. Additionally, the assessment also included using the same assumption of a 50% blend of biofuels in the Kalaeloa Power Plant as a possible option after 2015 as the term of the current contract with Kalaeloa ends in 2016. For this analysis it was assumed that the Kalaeloa Power Plant would continue operating as a base load unit providing approximately the same generation to the Hawaiian Electric system but with the capability to

use biofuels. Under Scenarios 2 and 3, the analysis results show that the Kahe units still need to have the capability of using biofuel by 2020 and especially by 2030 even when energy from Kalaeloa using 50% biofuels is included.

Table 4.2.1-2: Identification of Minimum Number of Units needed to be Capable of Producing Renewable Energy from Crude Biofuel by Scenario

	2015	2020	2030
Scenario 1 - Growing the Green Community Scenario [Base Sales/High RE]	none	none	none
Scenario 2 - Not Green Enough Scenario [High Sales/Low RE]	**2 Kahe Units**	**6 Kahe Units or Kalaeloa 50% & 4 Kahe Units**	**6 Kahe Units & others or Kalaeloa 50% & 6 Kahe Units & others**
Scenario 3 - Moderately Green Scenario [Base Sales/Moderate RE]	none	**2 Kahe Units or Kalaeloa 50%**	**4 Kahe Units or Kalaeloa 50% & 2 Kahe Units**
Scenario 4 - Living in a Green Community Scenario [Low Sales/High RE]	none	none	none

The crude biofuel volumes in Table 4.2.1-1 also provide a picture of the amounts of fuel that could be needed and can be used to set initial targets for incorporating biofuels in the Companies' portfolio of renewable resources. The scenario analysis indicates that the crude biofuel volume varies widely, depending upon the scenario. If the Companies were to only plan for the scenarios where zero biofuel volumes have been identified, then the RPS goals would not be met in about half of the states (see Table 4.2.1-1). Conversely, if the Companies were to conservatively plan for the highest volumes identified under the Not Green Enough Scenario, all of the RPS goals would be achieved in all scenarios, but probably with some

consequence to the Companies' ability to incorporate a diversity of renewable energy resources. A rational approach is to plan for some level of biofuels that reduces the risks of not achieving the RPS goals, has reasonable costs, and positions the Companies to have the flexibility to respond to the uncertainties associated with predicting the Companies' RPS futures. This approach is where scenario analysis has its merits and can be used to develop plans for a variety of futures.

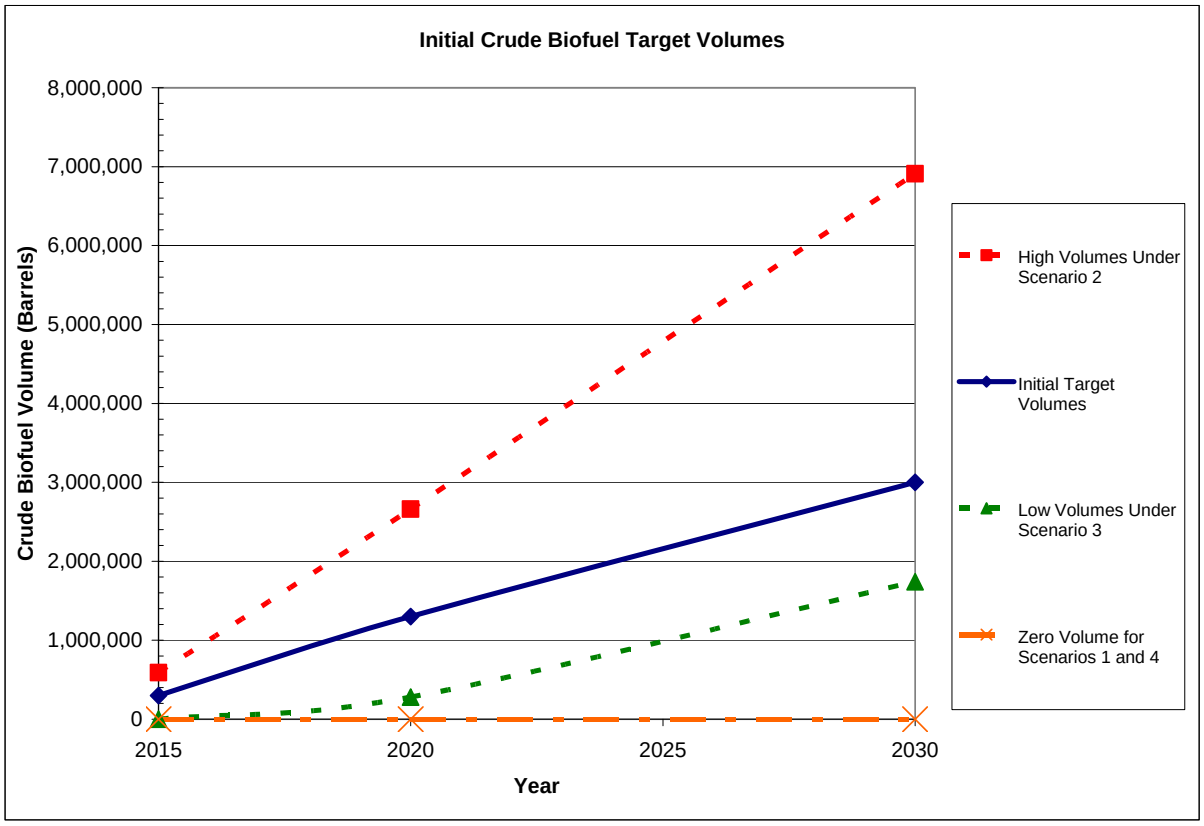
Based on a review of the biofuel volumes shown in Table 4.2.1-1 for the scenarios, the Companies have set the following initial crude biofuel target volumes:

- 2015: 300,000 Barrels of Crude Biofuel
- 2020: 1,300,000 Barrels of Crude Biofuel
- 2030: 3,000,000 Barrels of Crude Biofuel

Figure 4.2.1 illustrates how these initial crude biofuel target volumes compare to the volumes identified in Table 4.2.1-1 for the various scenarios. The initial target volumes fall between the low and high ranges identified by the scenarios. The initial target volume for 2015 was set at a level at about half of the fuel volume required to meet the 2015 state of Scenario 2 (590,000 Barrels). This volume should be large enough to help stimulate the crude biofuel market, especially locally, to help attract fuel suppliers. The initial 2015 amount also was selected considering the amount of crude biofuel required to meet the amount of fuel identified in 2020 under Scenario 3 (280,000 Barrels), which would provide compliance for one additional RPS state, should the future lead toward that path. Fuel logistics were also considered in setting this initial volume as existing fuel infrastructure may need to be used if new fuel infrastructure is not available prior to 2015. The capacity of one of the existing Hawaiian Electric tanks at the Barbers Point Tank Farm is about 300,000 barrels which could be used for storage until new tanks are available. Should this quantity of fuel be delivered by ship, transportation of this volume also appears to be manageable as it is in the range of the capacity of a single tanker shipment or be equal to about three smaller ship deliveries of the size that was handled to support the Kahe 3 biofuel testing.

The 2020 target volume was set at about half of the fuel volume required to meet the 2020 state of Scenario 2 (2,660,000 Barrels). The 2020 target volume ramps up the crude biofuel use considerably, by adding 1 million barrels to the initial 2015 target in preparation for the significantly large quantities required under plausible 2030 futures. The 2030 volume was set at a significant level above the 2020 target volume, a little less than half of the 2030 state of Scenario 3. This initial single set of target volumes attempts to balance upside and downside volume uncertainty and positions the Companies to be able to increase or decrease its crude biofuel use to respond to the renewable energy and sales uncertainties previously discussed. This also allows the Companies the flexibility of adjusting up or down from the target volumes as contracts for biofuels are procured. In negotiating future biofuel contracts, close attention must be given to fuel contract minimum take provisions over the long-term contracts to accommodate futures with low biofuel requirements and/or where breakthrough technologies become economically viable. These initial target volumes do not represent a conservative approach because they do not assure RPS compliance under all scenarios but do help to reduce risks.

Figure 4.2.1: Initial Crude Biofuel Target Volumes



Planning for the crude biofuel target volumes, the minimum number of units at Kahe that would need to be capable of producing the renewable energy from crude biofuel is identified in Table 4.2.1-3. As these results were solely determined by considering the potential renewable energy capability from individual units, the final implementation schedules and exact number of units capable of using crude biofuel would need to consider implementation schedules as well as operational risks which are beyond the scope of this analysis.

Table 4.2.1-3: Identification of Minimum Number of Units needed to be Capable of Producing Renewable Energy from Initial Crude Biofuel Target Volumes

	2015	2020	2030
Initial Crude Biofuel Target Volumes [Barrels]	300,000	1,300,000	3,000,000
Minimum Number of Units with Capability to Use Biofuels	2 Kahe Units	4 Kahe Units	6 Kahe Units

Planning for and implementing these levels of crude biofuel will help to manage the Companies' risks of achieving the RPS goals. Compared to only relying on new renewable energy resources (see Table 4.1), these initial crude biofuel target volumes reduce the number of states by two (from five to three) where RPS compliance is not achieved. Table 4.2.1-4 shows the RPS with the energy contribution from the initial target volumes of crude biofuel added to the renewable energy projections for each scenario that was assessed in Section 4.1.

Table 4.2.1-4: RPS Percentages for Scenarios Based on Using Crude Biofuel Target Volumes in Combination with Incorporating New Renewable Energy (RE) Resources

	2015	2020	2030
RPS Goal	15%	25%	40%
Initial Crude Biofuel Target Volumes [Barrels]	300,000	1,300,000	3,000,000
Scenario 1 - Growing the Green Community Scenario [Base Sales/High RE]	21.3%	46.9%	67.5%
Scenario 2 - Not Green Enough Scenario [High Sales/Low RE]	**13.7%**	**19.2%**	**24.8%**
Scenario 3 - Moderately Green Scenario [Base Sales/Moderate RE]	19.2%	30.3%	47.5%
Scenario 4 - Living in a Green Community Scenario [Low Sales/High RE]	24.1%	57.4%	91.4%

4.2.2 Biodiesel

In addition to the use of crude biofuel at the Kahe Generating Station, the use of biodiesel at Keahole had also been identified as part of the Companies' strategy of incorporating the use of biofuels in existing generating units. On January 6, 2011, the Companies submitted an application to the Commission in Docket No. 2011-0005, for approval of a biodiesel contract with Aina Koa Pono to supply 16 million gallons (~381,000 Barrels) of biodiesel to be used to produce renewable energy at HELCO's Keahole Power Plant. On September 29, 2011, the Commission issued its Decision and Order denying approval of the biodiesel contract. The RPS percentage would have increased approximately 2 percentage points over the RPS percentages shown in Table 4.1 with this biodiesel fueled energy.

4.3 A Second Perspective

To examine the robustness of the strategy, the analysis was done a second time in reverse order; meaning the RPS was determined for each scenario using the initial crude biofuel target volumes without any renewable energy resources included. Table 4.3-1 shows the RPS percentages for each scenario considering only the contribution from using crude biofuel at Kahe. As expected, the RPS goals are not met under all of the scenarios.

Table 4.3-1: RPS Percentages for Different Sales Forecasts Based on Using Crude Biofuel at Kahe

	2015	2020	2030
RPS Goal	15%	25%	40%
Base Sales	**1.6%**	**6.8%**	**17.8%**
High Sales	**1.4%**	**5.6%**	**11.7%**
Low Sales	**1.8%**	**8.3%**	**24.2%**

The additional amounts of renewable energy, above the initial crude biofuel target volumes at Kahe, required to meet the RPS goals were determined for each scenario and are shown in Table 4.3-2 below. As mentioned in Section 3.2, approximately 911 GWh of electricity was produced by existing renewable resources in 2010 which is less than the amounts of renewable energy required to meet the RPS under all the scenarios shown in Table 4.3-2.

Table 4.3-2: Additional Renewable Energy (RE), Above Biofuel Energy, Required to Meet RPS Goals for Different Sales Forecasts [GWh]

	2015	2020	2030
Base Sales	1,354	1,852	1,964
High Sales	1,561	2,401	3,838
Low Sales	1,176	1,389	1,034

The levels of renewable energy required to meet the RPS goals above the contribution provided by the target biofuels volumes were compared to the range of renewable energy projections shown in Table 3.3. A summary of the renewable energy projections that provide the minimum amount of additional renewable energy required to the meet the RPS in combination with the biofuels are shown in Table 4.3-3 below.

Table 4.3-3: Renewable Energy (RE) Projections Required to Meet RPS Goals in Combination with Incorporating Biofuels for Different Sales Forecasts [GWh]

	2015	2020	2030
Base Sales	Low RE	Moderate RE	Moderate RE
High Sales	Moderate RE	High RE	High RE
Low Sales	Low RE	Low RE	Low RE

This second analysis confirmed the value of having a strategy that incorporates both renewable energy resources and biofuels to mitigate the risks and uncertainties of the Companies' RPS future. This strategy places the Companies in a position to best balance future risks and uncertainties.

5 Summary of Results

The scenario analysis indicates that the Companies' strategy to achieve RPS goals can be successful and effective in meeting the RPS goals. The strategy balances the risks and

uncertainties associated with incorporating a diverse portfolio of renewable energy resources. As shown by the analysis, relying only on procuring new renewable resources has more risks than acting on procuring new renewable resources in combination with greening existing generating units.

The results of this scenario analysis will serve to guide the Companies' actions related to implementing the strategy to achieve RPS compliance. The activities to expand the renewable energy portfolio by seeking and incorporating a diversity of new renewable energy resources will continue to be a priority of the Companies. This includes acquiring wind, solar power, hydro, geothermal, biomass, and other types of renewable generation resources, such as OTEC, that may emerge several years down the road.

The Companies also plan to focus implementing the initial crude biofuel target volumes that were identified by this study. The volumes for the initial biofuel supply contracts, development of new fuel infrastructure to support biofuels, and the plans to build the capability to use biofuel in existing units will be centered on initially planning to use these crude biofuel target volumes:

- 2015: 300,000 Barrels of Crude Biofuel
- 2020: 1,300,000 Barrels of Crude Biofuel
- 2030: 3,000,000 Barrels of Crude Biofuel

Flexibility remains a constant theme in the Companies' plans. As shown by the scenario analysis, there are several uncertainties that could affect achieving RPS goals. For example, positioning the Companies to have the ability to increase or decrease the target amount of crude biofuel volumes to procure as a result of changes in sales levels, existing renewable energy production, or procurement of new renewable energy resources (including new firm capacity generation using biofuels, or IPPs fuel switching from fossil fuels to biofuels) is shown in the ranges of crude biofuels in Figure 4.2.1. The initial crude biofuel target volumes could also be adjusted as the Companies procure biofuel contracts for crude biofuel and/or biodiesel. No single answer for the Companies was identified to meet the challenges of meeting the RPS requirements, but the diversity that the strategy provides will help to manage the risks.

Appendix A provides backup information and additional data for other possible combinations of uncertainties to supplement the scenario analysis performed for this report.

APPENDIX A

Table A1: **Forecasted Sales by Company**

Sales Scenario [GWh]			
	2015	**2020**	**2030**
Base	**10,078**	**10,149**	**8,863**
HECO	7,681	7,629	6,434
HELCO	1,167	1,244	1,182
MECO	1,230	1,276	1,248
High	**11,461**	**12,343**	**13,549**
HECO	9,035	9,763	10,931
HELCO	1,183	1,278	1,290
MECO	1,243	1,303	1,328
Low	**8,897**	**8,296**	**6,539**
HECO	6,558	5,897	4,486
HELCO	1,135	1,177	966
MECO	1,205	1,223	1,087

Table A2: **RPS Percentages for Various Cases Based on Incorporating New Renewable Energy (RE) Resources (Consolidated)**

	2015	2020	2030	
Base Sales				
High RE	19.7%	40.2%	49.6%	Scenario 1
Moderate RE	17.6%	**23.6%**	**29.7%**	Scenario 3
Low RE	**14.0%**	**16.6%**	**20.0%**	
High Sales				
High RE	17.4%	33.0%	**32.5%**	
Moderate RE	15.5%	**19.4%**	**19.4%**	
Low RE	**12.3%**	**13.6%**	**13.1%**	Scenario 2
Low Sales				
High RE	22.4%	49.2%	67.2%	Scenario 4
Moderate RE	19.9%	28.8%	40.2%	
Low RE	15.8%	**20.3%**	**27.2%**	

Table A3: **RPS Percentages for Various Cases Based on Incorporating New Renewable Energy (RE) Resources (By Company)**

	2015			2020			2030		
	HECO	HELCO	MECO	HECO	HELCO	MECO	HECO	HELCO	MECO
Base Sales									
High RE	**13.9%**	48.6%	28.7%	40.7%	47.2%	30.2%	52.2%	51.4%	**34.6%**
Moderate RE	**12.6%**	39.1%	28.3%	**18.9%**	46.3%	29.4%	**25.3%**	49.9%	**32.8%**
Low RE	**8.7%**	38.5%	23.9%	**12.0%**	36.6%	**24.6%**	**15.2%**	**39.1%**	**27.0%**
High Sales									
High RE	**11.8%**	48.0%	28.4%	31.8%	45.9%	29.6%	**30.7%**	47.1%	**32.5%**
Moderate RE	**10.7%**	38.6%	28.0%	**14.8%**	45.1%	28.8%	**14.9%**	45.8%	**30.8%**
Low RE	**7.4%**	38.0%	23.6%	**9.4%**	35.6%	**24.1%**	**8.9%**	**35.8%**	**25.4%**
Low Sales									
High RE	16.3%	50.0%	29.3%	52.7%	49.9%	31.5%	74.9%	62.9%	**39.7%**
Moderate RE	**14.8%**	40.2%	28.9%	**24.4%**	49.0%	30.6%	**36.3%**	61.1%	**37.7%**
Low RE	**10.2%**	39.6%	24.4%	**15.5%**	38.7%	25.7%	**21.8%**	47.8%	**31.0%**

Table A4: **Additional Renewable Energy (RE), Above Incorporating New RE Resource Projections, Required to Meet RPS Goals for Various Cases [GWh]**

	2015	2020	2030	
Base Sales				
High RE	0	0	0	Scenario 1
Moderate RE	0	**145**	**917**	Scenario 3
Low RE	**102**	**854**	**1,769**	
High Sales				
High RE	0	0	**1,022**	
Moderate RE	0	**694**	**2,791**	
Low RE	**310**	**1,403**	**3,643**	Scenario 2
Low Sales				
High RE	0	0	0	Scenario 4
Moderate RE	0	0	0	
Low RE	0	**391**	**839**	

Table A5: **Equivalent Crude Biofuel Volumes to Produce Additional Renewable Energy [Barrels]**

	2015	2020	2030	
Base Sales				
High RE	0	0	0	Scenario 1
Moderate RE	0	**280,000**	**1,740,000**	Scenario 3
Low RE	**190,000**	**1,620,000**	**3,360,000**	
High Sales				
High RE	0	0	**1,940,000**	
Moderate RE	0	**1,320,000**	**5,300,000**	
Low RE	**590,000**	**2,660,000**	**6,910,000**	Scenario 2
Low Sales				
High RE	0	0	0	Scenario 4
Moderate RE	0	0	0	
Low RE	0	**740,000**	**1,590,000**	

Table A6: **Identification of Minimum Number of Units needed to be Capable of Producing Renewable Energy from Crude Biofuel**

Hawaiian Electric Units and/or Kalaeloa (after 2015) Capable of Burning Biofuels to Meet RPS	2015	2020	2030	
Base Sales				
High RE	none	none	none	Scenario 1
Moderate RE	none	**2 Kahe Units or Kalaeloa 50%**	**4 Kahe Units or Kalaeloa 50% & 2 Kahe Units**	Scenario 3
Low RE	**2 Kahe units**	**4 Kahe Units or Kalaeloa 50% & 2 Kahe Units**	**6 Kahe Units & others or Kalaeloa 50% & 6 Kahe Units**	
High Sales				
High RE	none	none	**6 Kahe Units or Kalaeloa 50% & 2 Kahe Units**	
Moderate RE	none	**4 Kahe Units or Kalaeloa 50%**	**6 Kahe Units & others or Kalaeloa 50% & 6 Kahe Units & others**	
Low RE	**2 Kahe Units**	**6 Kahe Units or Kalaeloa 50% & 4 Kahe Units**	**6 Kahe Units & others or Kalaeloa 50% & 6 Kahe Units & others**	Scenario 2
Low Sales				
High RE	none	none	none	Scenario 4
Moderate RE	none	none	none	
Low RE	none	**2 Kahe Units or Kalaeloa 50%**	**4 Kahe Units or Kalaeloa 50% & 2 Kahe Units**	

Table A7: **RPS % for Various Cases Based on Using Crude Biofuel at Kahe in Combination with Incorporating New Renewable Energy (RE) Resources**

	2015	2020	2030	
Initial Crude Biofuel Implementation Volumes [Barrels]	**300,000**	**1,300,000**	**3,000,000**	
Base Sales				
High RE	21.3%	46.9%	67.5%	Scenario 1
Moderate RE	19.2%	30.3%	47.5%	Scenario 3
Low RE	15.6%	**23.3%**	**37.9%**	
High Sales				
High RE	18.7%	38.6%	44.1%	
Moderate RE	16.9%	**24.9%**	**31.1%**	
Low RE	**13.7%**	**19.2%**	**24.8%**	Scenario 2
Low Sales				
High RE	24.1%	57.4%	91.4%	Scenario 4
Moderate RE	21.7%	37.1%	64.4%	
Low RE	17.6%	28.5%	51.4%	

Table A8: **RPS % for Various Cases Based on Using Crude Biofuel at Kahe in Combination with Incorporating New Renewable Energy (RE) Resources (By Company)**

	2015			2020			2030		
	HECO	**HELCO**	**MECO**	**HECO**	**HELCO**	**MECO**	**HECO**	**HELCO**	**MECO**
Base Sales									
High RE	16.0%	48.6%	28.7%	49.7%	47.2%	30.2%	76.8%	51.4%	**34.6%**
Moderate RE	**14.7%**	39.1%	28.3%	27.9%	46.3%	29.4%	49.9%	49.9%	**32.8%**
Low RE	**10.7%**	38.5%	23.9%	**21.0%**	36.6%	**24.6%**	**39.8%**	**39.1%**	**27.0%**
High Sales									
High RE	**13.6%**	48.0%	28.4%	38.8%	45.9%	29.6%	45.2%	47.1%	**32.5%**
Moderate RE	**12.5%**	38.6%	28.0%	**21.8%**	45.1%	28.8%	**29.4%**	45.8%	**30.8%**
Low RE	**9.1%**	38.0%	23.6%	**16.4%**	35.6%	**24.1%**	**23.4%**	**35.8%**	**25.4%**
Low Sales									
High RE	18.7%	50.0%	29.3%	64.3%	49.9%	31.5%	110.1%	62.9%	**39.7%**
Moderate RE	17.2%	40.2%	28.9%	36.1%	49.0%	30.6%	71.6%	61.1%	**37.7%**
Low RE	**12.6%**	39.6%	24.4%	27.1%	38.7%	25.7%	57.0%	47.8%	**31.0%**

Table A9: High Renewable Energy (RE) Projections

HIGH RENEWABLES [GWh]	2015	2020	2030
Existing Resources (Consolidated)	1,023	1,014	1,014
HECO	457	448	448
HELCO	384	384	384
MECO	183	183	183
New Resources (Consolidated)	788	2,666	2,738
HECO	469	2,324	2,383
HELCO	162	171	171
MECO	157	171	183
NEM/FIT/SIA (Consolidated)	179	399	645
HECO	144	335	527
HELCO	21	32	52
MECO	14	31	66
Total Renewable Energy (Consolidated)	1,990	4,079	4,397
HECO	1,069	3,107	3,359
HELCO	567	587	607
MECO	353	385	431

Total RE with Biofuels (Consolidated)	2,148	4,764	5,978
HECO	1,228	3,792	4,940
HELCO	567	587	607
MECO	353	385	431

New Resource/Biofuel Breakdown		2015	2020	2030
New Resource				
HECO	Interisland-Wind	-	1,554	1,554
	New Capacity	-	119	119
	Biomass	44	44	44
	Waste to Energy	190	207	207
	Wind	160	217	217
	OTEC	-	110	172
	PV	75	73	70
HELCO	Geothermal	58	61	61
	Biomass	104	111	111
MECO	Wind	148	162	174
	PV	9	9	9
New Resource (Consolidated)		788	2,666	2,738
Biofuel				
HECO	Crude Biofuel	158	685	1,581
HELCO		-	-	-
MECO		-	-	-

Table A10: Moderate Renewable Energy (RE) Projections

MODERATE RENEWABLES [GWh]	2015	2020	2030
Existing Resources (Consolidated)	1,023	1,014	1,014
HECO	457	448	448
HELCO	384	384	384
MECO	183	183	183
New Resources (Consolidated)	631	1,112	1,184
HECO	416	770	829
HELCO	58	171	171
MECO	157	171	183
NEM/FIT/SIA (Consolidated)	119	266	430
HECO	96	223	351
HELCO	14	21	35
MECO	9	21	44
Total Renewable Energy (Consolidated)	1,773	2,392	2,628
HECO	968	1,441	1,629
HELCO	456	576	590
MECO	348	375	409

Total RE with Biofuels (Consolidated)	1,931	3,078	4,209
HECO	1,127	2,127	3,210
HELCO	456	576	590
MECO	348	375	409

New Resource/Biofuel Breakdown		2015	2020	2030
New Resource				
HECO	Interisland-Wind	-	-	-
	New Capacity	-	119	119
	Biomass	44	44	44
	Waste to Energy	137	207	207
	Wind	160	217	217
	OTEC	-	110	172
	PV	75	73	70
HELCO	Geothermal	58	61	61
	Biomass	-	111	111
MECO	Wind	148	162	174
	PV	9	9	9
New Resource (Consolidated)		631	1,112	1,184
Biofuel				
HECO	Crude Biofuel	158	685	1,581
HELCO		-	-	-
MECO		-	-	-

Table A11: Low Renewable Energy (RE) Projections

LOW RENEWABLES [GWh]	2015	2020	2030
Existing Resources (Consolidated)	979	970	970
HECO	457	448	448
HELCO	384	384	384
MECO	138	138	138
New Resources (Consolidated)	371	580	592
HECO	162	355	354
HELCO	58	61	61
MECO	151	165	177
NEM/FIT/SIA (Consolidated)	60	133	215
HECO	48	112	176
HELCO	7	11	17
MECO	5	10	22
Total Renewable Energy (Consolidated)	1,410	1,683	1,777
HECO	667	914	977
HELCO	449	455	462
MECO	294	314	337

Total RE with Biofuels (Consolidated)	1,568	2,368	3,358
HECO	825	1,600	2,559
HELCO	449	455	462
MECO	294	314	337

New Resource/Biofuel Breakdown		2015	2020	2030
New Resource				
HECO	Interisland-Wind	-	-	-
	New Capacity	-	119	119
	Biomass	-	-	-
	Waste to Energy	137	154	154
	Wind	-	57	57
	OTEC	-	-	-
	PV	25	24	23
HELCO	Geothermal	58	61	61
	Biomass	-	-	-
MECO	Wind	148	162	174
	PV	3	3	3
New Resource (Consolidated)		371	580	592
Biofuel				
HECO	Crude Biofuel	158	685	1,581
HELCO		-	-	-
MECO		-	-	-