Draft Environmental Assessment

HONUA POWER PROJECT

Prepared For:

Honua Power, LLC

Prepared by:

PLANNING SOLUTIONS

JUNE 2009

PROJECT SUMMARY

Project:	**Honua Power Project**
Applicant	Honua Power, LLC 500 Ala Moana Blvd., Suite 7-220 Honolulu, HI 96813 Contact: Peter Barba Phone: (808) 538-1813
Approving Agency	Department of Planning and Permitting City and County of Honolulu 650 South King Street Honolulu, HI 96813 Contact: Jamie Peirson Phone: (808) 768-8014
Location	James Campbell Industrial Park (JCIP) Barbers Point, ‘Ewa District, Island of O‘ahu
Tax Map Key	9-1-031:032
Parcel Area	2.504 acres
State Land Use District	Urban
County Zoning	I-2 Intensive Industrial
Proposed Action	Construction of an approximately 12 MW waste-to-energy facility in Campbell Industrial Park, ‘Ewa, O‘ahu. The project will be constructed in two 6MW phases, with the second phase to be constructed about 2 years following the first phase.
Associated Actions Requiring Environmental Assessment	Waste-to-energy facility.
Required Permits & Approvals	Conditional Use Permit, NPDES Construction Permit, Well Construction and Well Operation Permits, Initial Covered Source/Prevention of Significant Deterioration Permits, Individual Wastewater Treatment System Approval, Grading Permit, Building Permit, Solid Waste Management Facility Permit.
Anticipated Determination	Finding of No Significant Impact.
Consultant	Planning Solutions, Inc. 210 Ward Ave, Suite 330 Honolulu, HI 96814 Contact: Perry White (808) 550-4483

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1.0 PURPOSE AND NEED

1.1 INTRODUCTION AND OVERVIEW

Honua Power LLC (hereinafter referred to as Honua Power) is a limited liability company formed by Honua Technologies for the purpose of designing, constructing, and operating a waste-to-energy facility (the Honua Power Project) in West Oʻahu's James Campbell Industrial Park (JCIP) (see Figure 1.1).[1] The facility will gasify several types of feedstock derived from waste material and burn the resulting synthetic gas (syngas) to create steam; the steam will be used in a turbine-generator to produce approximately 12 megawatts (MW) of electricity. Honua Power will use some of this electricity to power its own equipment and processes, but the great majority will be sold to the Hawaiian Electric Company (HECO) under a power purchase agreement that it is negotiating with the utility.

Honua Power anticipates producing electrical power by gasifying a blend of four different types of feedstock: (i) scrap tires; (ii) sterilized waste paper and plastics; (iii) select construction & demolition debris; and (iv) organic materials left after shredding automobiles for scrap steel recovery.[2] At present these materials must either be placed in landfills on Oʻahu or shipped off-island for eventual disposal, a system that is costly, forfeits the opportunity to recover a valuable energy source, and consumes scarce landfill space.

This chapter summarizes the reasons leading Honua Power to seek permission to construct and operate the proposed waste-to-energy facility on a site within the JCIP. It is divided into the following major parts:

- Section 1.2 presents an overview of the way that the four feedstocks targeted are presently handled and the reasons why alternate means of handling each of them are desirable.
- Section 1.3 discusses existing electrical energy use patterns and demand, and describes the reasons why additional, non-fossil fueled electrical generating capability is needed on Oʻahu.
- Finally, Section 1.4 lists Honua Power's objectives with respect to the proposed action.

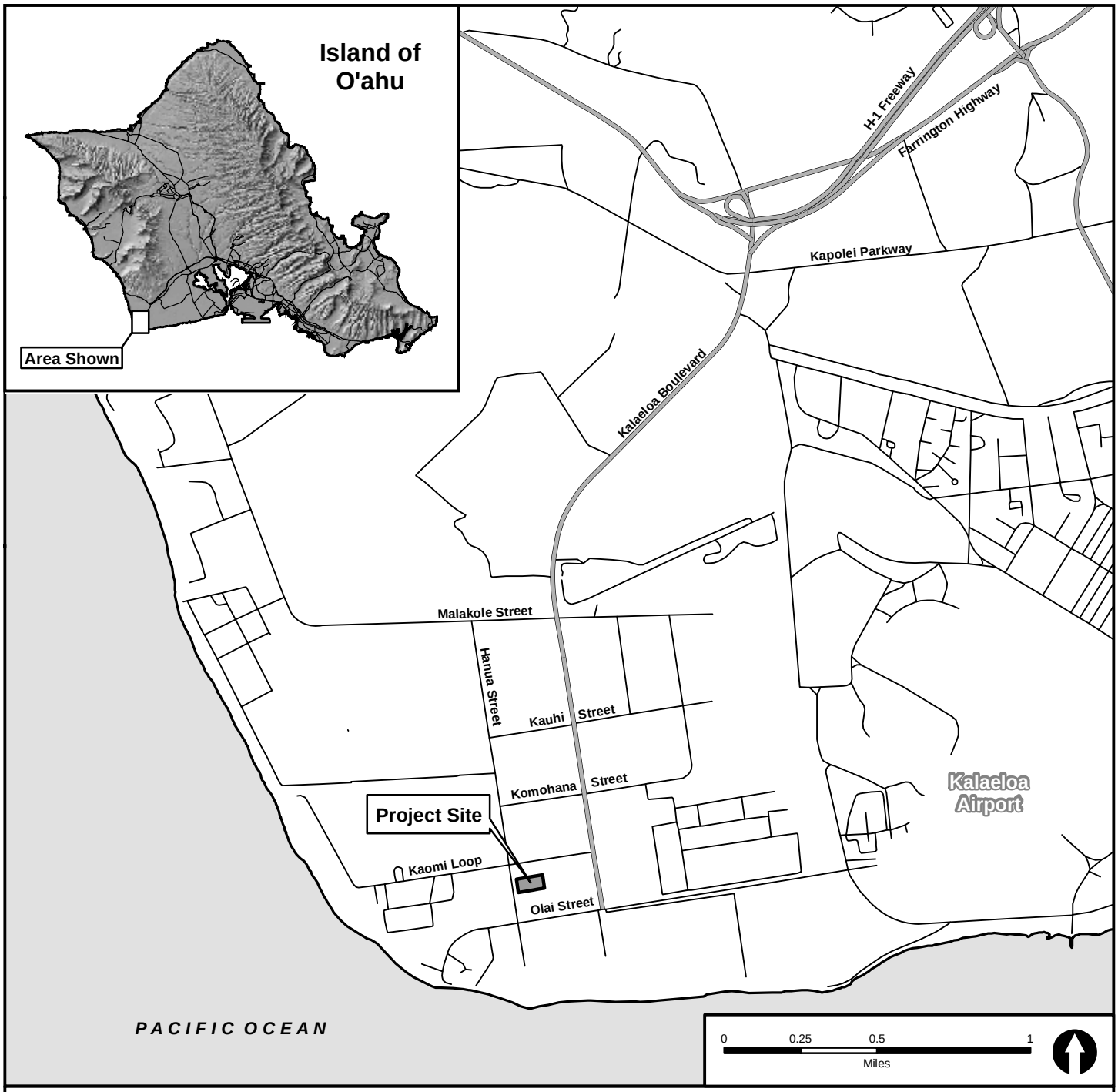
1.2 NEED FOR ALTERNATE WASTE HANDLING STRATEGIES

1.2.1 EXISTING WASTE GENERATION AND DISPOSAL ON OʻAHU

Oʻahu has a *de facto* population of nearly one million people. This includes approximately 910,000 permanent residents and about 83,000 visitors (the average number of visitors on the island). The City estimates that in 2009 these people, and the businesses and industries that support them, will generate approximately 1.9 million tons of solid waste per year (R.W. Beck, October 2008). Many types of waste streams comprise this total, including recyclable materials, municipal solid waste (MSW), construction and demolition (C&D) waste, and commercial waste of all types. In addition to the residential and commercial waste streams that HPOWER accepts, Oʻahu generates well over 200,000 tons of construction and demolition (C&D) waste per year (R.W. Beck, October 2008). Some C&D waste is recycled and the remainder disposed of in the privately owned and operated PVT construction and demolition landfill in Nānākuli.

[1] Honua Power LLC is a Domestic Limited Liability Company whose principal place of business is Seven Waterfront Plaza, 500 Ala Moana Boulevard, Suite 7-220, Honolulu, HI, 96813.

[2] Additional feedstock types may be considered for the facility in the future as well.



Prepared For:

Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Source:

--Honua Power, LLC
--City & County of Honolulu GIS
--State of Hawaii GIS

Legend:

Highways — Roadways

Figure 1.1:

Location Map

Honua Power Project

Figure 1-1 Location Map 2008-03-17.mxd

Table 1.1 Waste Flow Estimates: 2009

Parameter	*Amount*
Resident Population	978,720
Generation Rate (in tons/person/year)[1]	1.90
Waste Generated (in tons/year)[2]	1,859,180
Commercial Waste Reused, Recycled, Composted (in tons/year) [3]	427,600
Reused, Recycled, Composted That Is Managed By the City [4]	247,980
Recycling Rate Per Capita	0.25
Waste Disposed At PVT & Unpermitted Facilities (in tons/year) [5]	233,770
Trans- Ship	0
WTE Capacity (in tons/year)	610,000
Non-Combustible Waste Requiring Landfill Disposal (in tons/year) [6]	144,230
Combustible MSW Requiring Landfill Disposal (in tons/year) [7]	195,320
WTE Ash And Residue Requiring Disposal (in tons/year)	167,800

Notes:

[1] The per capita generation rate is projected to increase by approximately 1% annually until FY 2013 and for this analysis remains constant after that.

[2] Includes MSW and C&D. Annual waste generation projections are based on population changes and the per capita generation rate.

[3] In FY 2005, 23% of the waste stream was recycled by commercial sources. This recycling rate is projected to remain constant for this analysis. This represents 23% of total waste generated.

[4] This is the waste stream the recycled and composted waste stream that the City manages either directly or via contracts. Recycling quantities reflect an increase in the annual per capita recycling rate from 0.22 tons in FY2005 to 0.32 tons in FY2013 due to the introduction of the residential mixed recycling program, increase diversion of green waste and the expansion of the Community Recycling Bin program during that time.

[5] During 2005, approximately 12.5% of the waste generated in O‘ahu was disposed at PVT Landfill and unpermitted facilities. For planning purposes, this percent is projected to remain constant.

[6] In 2006, approximately 6% of the waste that was generated and disposed at the Landfill can be defined as non-combustible, and this percent was projected to remain constant.

[7]Combustible MSW Requiring Disposal at MSW Landfills is Waste Generated minus Waste Reused/Recycled/Composted minus Waste Converted to Energy minus Waste Disposed at PVT Landfill/unpermitted facilities minus waste Transshipped minus Non-Combustible waste.

[8] Based on data from H-POWER, approximately 28% of waste receipts become ash and residue that requires landfill disposal.

Source: R.W. Beck, October 2008, Table ES-4.

At present, approximately 35 percent of Oahu’s solid waste (610,000 tons per year) is incinerated and converted into electricity at the HPOWER waste-to-energy facility each year (R.W. Beck, October 2008). This waste is nearly evenly split between residential waste and commercial waste The City’s *Solid Waste Management Plan Update* ((R.W. Beck, October 2008) proposes to add additional waste-to-energy capacity which, if implemented, would handle an additional 300,000 tons of waste per year starting in 2013.[3]

[3] Brannon, Johnny. “Oahu’s Trash Options Aren’t That Attractive.” *The Honolulu Advertiser, November 17, 2007. URL: http://the.honoluluadvertiser.com/article/2007/Nov/17/ln/hawaii711170334.html*

The following section describes the waste streams that Honua Power proposes to use in its facility and describes their current sources and methods of disposal.

1.2.2 EXISTING TREATMENT AND DISPOSAL OF PROPOSED FEEDSTOCK SOURCES

The proposed Honua Power Project would utilize four types of waste as feedstock. Those are:

- scrap tires,
- non-recyclable paper and plastic waste (e.g., low grade paper, wax paper, wax cardboard, glossy paper, magazines, PET plastics, plastics with recycling symbols No. 2, 3, 4, and 5, rigid plastics, PVC plastics, and ABS plastics);
- select construction and demolition (C&D) waste; and
- auto-shredder residue ("ASR" i.e., materials left after shredding automobiles for scrap steel recovery).[4]

All four of these waste streams are categorized as "Special Waste" sources by the City and County of Honolulu.[5] Special Waste is any material in the solid waste stream that requires special handling and/or has disposal restrictions or that the City desires to handle separately. Special wastes typically are not collected with other municipal solid waste because they require specialized processing, preparation, or treatment before reuse, recycling, or disposal (City and County of Honolulu 2004). The great majority of special waste generated on O‘ahu is presently disposed of in the Waimānalo Gulch Sanitary Landfill.

The City and County has emphasized the need for diversion of these four waste streams for productive purposes, but there are no programs in place to do so. All four of the feedstocks Honua Power is proposing to utilize have good energy conversion values (i.e., extracting energy from the waste streams requires considerably less energy than the processing requires). In fact, their energy conversion values exceed that of municipal solid waste and they are easier to handle, store, and process. Nonetheless, with the exception of tires, none of these waste streams are presently used for energy-generation or other useful purposes. The following sections describe these waste streams in detail and discuss their composition and current disposal methods.

1.2.2.1 Scrap Tires

Motor vehicle tires are generated at residential, commercial, and industrial sites. Used tires create a potential health risk when disposed of intact. They can harbor vectors (mosquitoes) and, when landfilled, can "float" to the landfill surface. The desire to avoid vectors led to the City and County of Honolulu to ban disposal of whole tires within the County's landfills in 1992.

The supplier of used tires is currently responsible for processing and marketing most (about 85 percent in FY 2005) of O‘ahu's recovered scrap tires. It sells the tire chips to Applied Energy Systems' (AES), which uses them to augment the coal that is the main source of fuel for its power plant located adjacent to the City's HPOWER facility in Campbell Industrial Park. Exhaust limitations in the AES power plant's air permit limit the amount of alternative materials they can accept, and the facility presently limits tires to approximately 1 percent (about 7,000 tons) per year of its fuel. R.W. Beck (October 2008) reports that it is unlikely that the AES plant will be willing to accept greater amounts of scrap tires for fuel in the future, as they are concerned with their air emissions and consistency of their ash.

[4] The ASR activity would begin with Phase 2.

[5] As defined in Section 11-58.1-03, Hawai'i Administrative Rules, "Special wastes" means any solid waste that, because of its source or physical, chemical, or biological characteristics, require special consideration for its proper processing or disposal, or both. This term includes, but is not limited to, asbestos, lead acid batteries, municipal waste combustion ash, sewage sludge that is nonhazardous, medical wastes, tires, white goods, and derelict vehicles.

Some tires continue to go to H-POWER, which processed an estimated 1,515 tons of tires in 2005. However, the City does not expect this volume to increase significantly. There are currently no other large end-markets for scrap tires on the island, and consequently scrap tires must sometimes be shipped to processors on the mainland.

The City and County of Honolulu's *Integrated Solid Waste Management Plan Update for the City and County of Honolulu* (R.W. Beck, October 2008) lists the lack of sufficient infrastructure for producing tire-derived aggregate or ground rubber products, poor processing economics caused by low volume, and lack of demand for tire-derived-aggregate (TDA) in engineering applications as barriers to strengthening scrap tire demand. It reports that the City is searching for additional markets for the material.

1.2.2.2 Non-Recyclable Paper and Plastic

.R.W. Beck (April 2007) reports that each year O'ahu produces over 8,400 tons of recyclable and non-recyclable plastics[6], 7,864 tons of recyclable and non-recyclable paper, and nearly 6,000 tons of textiles and carpet that reach the Waimānalo Gulch Landfill (2006 data). These materials, and other non-recyclable organic materials[7] which are all suitable for gasification, comprise a majority of the items which are either deposited directly in the landfill or diverted from H-Power (diversion volume from H-Power is nearly 20%). There is currently no secondary recyclable market for these materials in Hawai'i.

1.2.2.3 Select Construction & Demolition (C&D) Debris

Material recovery for C&D debris starts at the construction and demolition site. Materials in good condition are separated and sent to the Baseyard Hawaii Reuse Facility, where the materials are stored and channeled out to new projects. Some contractors process C&D material that cannot be directly reused. Materials are crushed and sorted so recyclable material can be pulled out. The non-recyclable portion of the waste stream is disposed of at the privately owned PVT landfill, which is the only permitted disposal location for commercial C&D waste on O'ahu. Other contractors bring demolition waste to the PVT landfill without any recovery processing. The PVT landfill shreds selective loads of C&D waste for the recovery of scrap steel and to create a better material for landfill compaction.

1.2.2.4 Auto Shredder Residue

Thousands of automobiles are taken out of service each year on O'ahu. Those that cannot be sold at auction are taken to a contractor for recycling. After recyclable materials (such as copper) and contaminating materials (such as the gas tanks, tires, and batteries) are removed, the contractor shreds the vehicles and sells the scrap metal to recyclers. The non-metal waste product from the shredding process, typically comprising about 25 percent of the vehicle, is known as Auto Shredder Residue (ASR). ASR generally consists of a combination of organic materials comprised mostly of plastics, rubber, glass, wood products, cloth, paper, foam, and electrical wiring. Presently, ASR in Hawai'i is disposed of in the City's Waimānalo Gulch Landfill since there is no secondary recyclable market in the United States.

1.2.3 NEED FOR ADDITIONAL WASTE DIVERSION PROGRAMS

The Office of Solid Waste Management, within the State of Hawai'i Department of Health (DOH), is responsible for integrated solid waste management planning and for implementing solid waste management policy and regulations on the state level. On O'ahu, waste management is the responsibility of the Refuse Division of the City and County of Honolulu's Department of Environmental Services.

[6] Recyclable and non-recyclable plastics include PET bottles/containers, HDPE bottles/containers, rigid plastics, film/wrap, PVC plastic and other waste plastics.

[7] Non-recyclable organic materials include furniture, lumber, pallets, crating, stumps, and other wood waste.

Both agencies agree that waste management in Hawai‘i faces significant challenges. The economy lacks diversity and market access for recovered materials, and management options are severely limited by the shortage and expense of available land. The State and County *Integrated Solid Waste Management Plans* (*IWMP*) (2000 and 2008, respectively) emphasize that burying wastes in island landfills is not a sustainable strategy for the long term. Likewise, the *IWMP*s acknowledge that shipping waste to the Mainland is not the best solution in terms of both environmental and economic costs. Instead, the *IWMP*s stress the importance of diverting materials from these existing waste streams through reuse, recycling, and alternative technologies such as waste-to-energy.

Presently, few re-use programs are in place for the four types of waste streams that the proposed Honua Power Project would utilize. The only major exception is scrap tires, some of which are burned at AES' coal-fired generating facility and the remainder of which are shipped to the mainland for further processing. Adequate recycling/reuse programs are not in place for the remainder. As mentioned, sterilized medical waste and ASR are presently landfilled. So is the non-reusable fraction of C&D waste. While the current use of the PVT private landfill in Nānākuli for most of the C&D materials is adequate, that landfill has a finite capacity and there is presently no other permitted site on O‘ahu for C&D waste disposal.

The first phase of the proposed Honua Power Project would utilize 200 tons a day of processed waste material, nearly 90 percent of which is presently landfilled. The ash byproduct that would result from the gasification process constitutes less than 19 percent of the initial tonnage. This amounts to about 52,000 tons of landfill-bound material saved annually and instead contributing to meeting O‘ahu's electrical energy needs.[8] Phase II of the project would utilize an additional 150 tons per day of waste diverted from landfills to nearly 95,000 tons and would provide about 12 MW of electrical power to O‘ahu's grid. The Honua Power project will also reduce the volume of heavy truck traffic by allowing trucks removing ASR waste from the shredder facility at JCIP to travel the short distance (under ½ mile) to the Honua Power facility rather than the much longer distance to the Waimānalo Landfill. The reduction in truck traffic reduces fossil fuel consumption, air pollutant emissions, and noise.

1.3 NEED FOR/BENEFITS OF ADDITIONAL RENEWABLE ENERGY GENERATING CAPACITY

1.3.1 LIMITED EXISTING RENEWABLE POWER GENERATION

HECO provides nearly all of the electricity for O‘ahu's *de facto* population of roughly a million people. In 2006, approximately 95 percent of this was generated using non-renewable fossil fuel. The State of Hawai‘i Department of Business, Economic Development, and Tourism 2007 Data Book reports that at the end of 2007 the utility served 294,591 customers through its generation, transmission, and distribution systems. The total net electrical generating capacity installed at O‘ahu's existing generating facilities is 1,614.6 megawatts (Net MW). These facilities include 1,208.6 Net MW of HECO oil-fired units, which include the Kahe Generating Station (620.5 Net MW), the Waiau Generating Station (480.8 Net MW), and the Honolulu Generating Station (107.3 Net MW). In addition to its own generating units, HECO has firm-capacity contracts with three independent power producers (IPPs) that have a total generating capacity of 406 Net MW.[9]

All of HECO's generating units burn fossil fuel (either Low Sulfur Fuel Oil or Diesel), as does Kalaeloa Power Partners, an independent power producer (IPP) that operates a 205 MW power

[8] [Calculation: 200 tons per day (tpd), 7 days per week, 50 weeks per year (2 weeks down for maintenance) = 70,000 tons per year (tpy). 92% currently goes to the landfill = 46,725 tpy. 19% is residue that will go to the landfill, so 81% of the landfill bound material does not get there = 52,164 tpy.]

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

generation facility in Campbell Industrial Park. AES-Hawai'i operates a 180 MW coal-fired generating facility that is also located in Campbell Industrial Park. Of the existing major generating facilities, only HPOWER (which burns municipal solid waste from city and commercial collection sources) relies on renewable fuel sources.[10]

1.3.2 CONTRIBUTION TO HECO'S RENEWABLE ENERGY PORTFOLIO

On June 2, 2004, Hawaii's Governor signed Act 95 (Session Laws of Hawai'i 2004) into law. Act 95 replaced the previous renewable portfolio standard (RPS) goal with an enforceable standard. These standards require Hawai'i's utilities to make renewable energy account for an increasing percentage of their electric power generation portfolio, comprising:

- 7% of net electricity sales by December 31, 2003;
- 8% of net electricity sales by December 31, 2005;
- 10% of net electricity sales by December 31, 2010;
- 15% of net electricity sales by December 31, 2015; and
- 20% of net electricity sales by December 31, 2020.[11]

Since the establishment of the RPS, Hawai'i has continued to pass legislation intended to enhance the state's energy self-sufficiency and reduce greenhouse gas emissions. House bills passed in 2006 and 2007 provided Hawai'i with a framework to move toward energy self-sufficiency by focusing on energy efficiency and promoting renewable energy sources. In 2008, the Hawai'i State Legislature established a full-time, temporary renewable energy facilitator position within the Department of Business, Economic Development, and Tourism and provided funding for designated energy program personnel and activities. It also established a renewable energy facility siting process to expedite the review and action upon State and county permits necessary for the siting, development, construction, and operation of a renewable energy facility of at least 200 megawatts of electricity and established a renewable energy facility siting special fund. The State of Hawai'i and the U.S. Department of Energy (USDOE) have signed a Memorandum of Understanding (MOU) establishing the Hawai'i Clean Energy Initiative (HCEI). The HCEI MOU creates a long-term partnership designed to help transform Hawai'i's energy system into one that utilizes renewable energy and energy efficient technologies to supply 70 percent of its energy needs by 2030 (State of Hawai'i and USDOE 2008).[12]

HECO has nearly completed construction of a 110 MW combustion-turbine generating unit in Campbell Industrial Park that will be fired principally with biodiesel, a renewable fuel, after it completes its shakedown and testing. That project, as well as wind energy projects that have been proposed for the windward side of the island, will substantially increase the percentage of O'ahu's power that comes from renewable resources. However, even with these, the utility will remain challenged with respect to meeting its long-range renewable energy goals. The proposed Honua Power Project would help HECO meet its RPS standard and other long-range renewable energy goals by providing 6 (and eventually 12) MW of as-available renewable power to HECO's grid.[13] While

[10] HPOWER provides approximately 7 percent of the electricity used on O'ahu, saving about 42 million gallons of oil annually. The contract capacity of H-POWER is 561,600 tpy. The facility is currently processing over 600,000 tpy and averages 607,000 tpy.

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

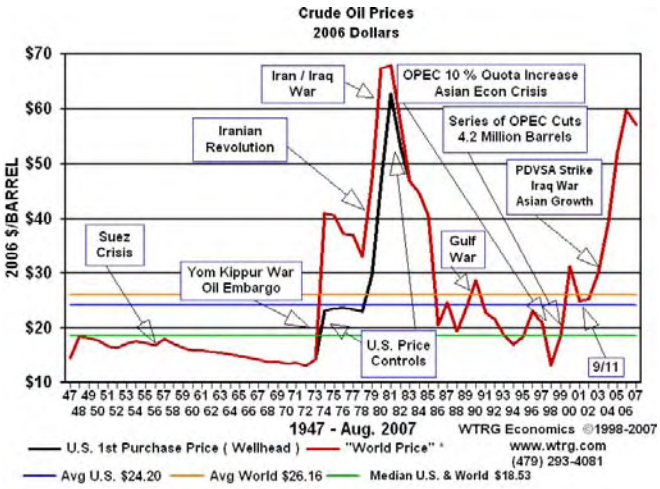
[12] http://hawaii.gov/gov/news/releases/2008/hawaii-and-u.s.-department-of-energy-partner-to

[13] The proposed Honua Power facility qualifies as renewable energy according to HRS §269-91(3), which includes energy generated utilizing biogas, including landfill and sewage-based digester gas. The proposed facility would gasify organic and non-organic wastes, the great majority of which would normally be disposed of in a landfill.

this is only a small part of the amount that is needed, it will still be an important and useful step toward the ultimate goal.

1.3.3 ECONOMIC BENEFITS

Initially, the project would generate economic activity through construction employment and equipment and material sales. Over the long term, its operation will create additional operation and maintenance jobs, business activity (by suppliers), and tax revenues. By reducing the island's dependence on imported fossil fuels, the alternative source of energy will help decouple electricity prices from the cost of imported fuels, thereby reducing price volatility. To the extent that the feedstock is from renewable sources (such as paper), it will also help limit the net addition of gases that contribute to global warming and climate change. Finally, because the power purchase contract with HECO will link the price paid for power from the proposed facility to the overall rate of inflation rather than to the cost of imported oil (which is expected to increase at a faster rate), it could allow island residents and businesses to pay less for electrical energy than they would almost certainly have to pay without it.



The proposed facility would help reduce the island's dependence on imported fossil fuels. Honua Power estimates that the first phase of the proposed project would reduce fossil fuel consumption by an estimated 79,340 barrels per year.[14] The second phase would double that amount. Reducing the proportion of its energy that comes from fossil fuel would also help buffer the system from the oil price volatility shown in the graph at right (www.wtrg.com/ oilgraphs/oilprice1947.gif). Conservatively assuming a current U.S. market value of $90 per barrel of crude oil (or about $15.50 per million British Thermal Units [MMBtu]), the amount of oil that the first phase of the Honua Power project would replace is worth over $7 million per year; the second phase would double that to over $14 million.

The initial contract price that HECO will pay renewable energy producers such as Honua Power is based on HECO's current cost to produce electricity, among other factors. However, price increases will not be tied to the price of fuel and thus, over the lifetime of their power purchase agreement, the price paid for electricity from Honua will be substantially less volatile and less expensive than for power produced from fossil fuels as fuel cost rises.

1.4 OVERALL OBJECTIVES OF THE PROPOSED ACTION

Honua Power has identified the following as the objectives for the proposed action:

(1) Reduce pressure on existing landfills as much as possible by converting waste to energy;

(2) Reduce O'ahu's dependence on fossil-fueled electrical power by providing up to 12 MW of renewable energy;

(3) Reduce emissions from fossil fuel;

[14] This estimate is based on the following: A typical oil fired power plant will run at about 36% energy conversion efficiency. To produce 5.775 mW of power per hour will require an input of 51,899,013 Btu/hr. This is the equivalent of 9.4 barrels of oil per hour. Operating 24/7 for 50 weeks per year results in a reduction of fossil fuel of 74,760 barrels of crude oil energy equivalent per year.

(4) Ensure that the size and operating characteristics of the new facility is compatible with HECO's overall system requirements to facilitate its integration into the company's grid;

(5) Locate the additional generating capacity in such a way as to minimize the need for additional transportation and electrical infrastructure;

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

(7) Maintain environmental quality; and

(8) Contribute to stabilized electric power costs to the residents of O'ahu.

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2.0 PROJECT DESCRIPTION & ALTERNATIVES CONSIDERED

2.1 INTRODUCTION

As described in Chapter 1 of this report, Honua Power plans to construct a new waste-to-energy facility in James Campbell Industrial Park (JCIP). This chapter provides detailed information about the physical and operational characteristics of the facility. The description is divided into four major parts.

- Section 2.2 describes the facilities and activities that would make up the Honua Power Project. It includes a conceptual site plan for the facility.
- Section 2.3 discusses the anticipated schedule for the work.
- Section 2.4 provides preliminary cost estimates for each of the major components.
- Section 2.5 describes alternatives considered and rejected.

2.2 TECHNICAL DESCRIPTION OF THE PROPOSED PROJECT

2.2.1 OVERVIEW

Honua Power proposes to construct and operate a new facility that will convert certain types of solid waste that are presently sent to landfills into a gas. The gas will then be burned to create steam that will be used to generate electricity. The electricity will be sold to the Hawaiian Electric Company (HECO) under a Power Purchase Agreement (PPA) approved by the State of Hawai‘i Public Utilities Commission. This will allow the utility to satisfy more of its customers’ electrical energy needs from non-fossil fuel sources at the same time that it reduces the need for additional landfill space. If all necessary permits and approvals are granted, Honua Power will construct the following facilities on the site:

- An access driveway.
- A feedstock receiving area and three feedstock storage silos.
- Two gasification systems, each of which includes a gasifier, boiler, emissions control system, and 6 megawatt (MW) turbine-generator.
- A two-story, 50 foot by 100 foot operations and maintenance building.
- A small electrical power substation that will allow the facility to connect to HECO’s existing electrical distribution lines.

The site plan provides space for both 6 MW gasification system trains, though only one will be installed in the first phase. The expansion (“Phase II”) is expected to be constructed within two years of completion of the first phase, although this would be contingent upon electrical energy demand and Honua Power’s ability to negotiate a second PPA with HECO.

2.2.2 LOCATION AND EXISTING USE OF THE PROJECT SITE

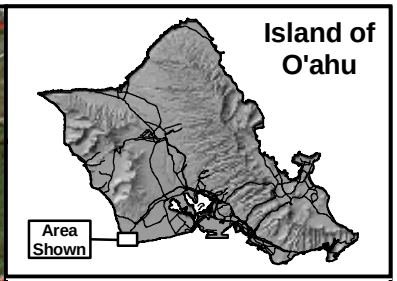
Honua Power would construct the facility on a 2.5-acre parcel it leases from A Pacific Island Properties, LLC in Campbell Industrial Park on the island of O‘ahu (see Figure 2.1 for an aerial photograph showing existing conditions on and immediately around the site). The site does not presently have any structures on it, although portions are temporarily being used for storage of used tires and other automotive parts. The site is bordered by Hanua Street on the west and is surrounded on the three remaining sides by industrial uses. The proposed facility is compatible with the heavy industrial nature of the surrounding land uses and its location optimizes the use of existing electrical and other infrastructure.

2.2.3 GASIFICATION AND POWER GENERATION PROCESS

A conceptual site plan showing the layout of the proposed facility is included as Figure 2.2. Elevation drawings are given in Figure 2.3 and Figure 2.4. Normal operation of the proposed facility is described below, and the gasification and power generation processes are illustrated in Figure 2.5, and Figure 2.6, respectively. The cross-references in each bullet-item below indicate where the facilities that are involved are described in more detail. Readers should note that each supplier of feedstock will continue to use its own existing facilities located elsewhere on the island to process waste to create the small, thin pieces that allow the most efficient gasifier performance. It will then transport that component of the feedstock to the facility in covered dump trucks (see 2.2.4). The second process train that Honua eventually hopes to add would utilize the same process, with the possible exception of a slightly different feedstock composition. Where other minor differences exist they are discussed below.

- Once the trucks arrive at the facility, they will back into the feedstock receiving building and dump their contents into a receiving conveyor (see Section 2.2.5.1).
- The conveyor system will deliver the feedstock to one of three storage silos, where it will remain until it is fed to the gasification equipment (see Section 2.2.5.2). A fourth feedstock silo will be added for Phase II.
- Each of the silos will continuously meter the proper quantity of feedstock into the accumulation conveyor. A metering bin will mix the feedstock and deliver it to a bucket elevator conveyor which will raise the material to a height that allows it to gravity flow to the gasifier feeder system (see Section 2.2.5.3).
- In the temperature and air-controlled gasifier, the hydrocarbons of the feedstock break down into “Syngas”. The combustible components of the Syngas are primarily hydrogen and carbon monoxide (see Section 2.2.5.4).
- The Syngas will leave the gasifier and flow through a cyclone separator to remove suspended particles; after that it will enter a combustion tube where the temperature of the Syngas will be raised to 2,500°F. The reducing atmosphere at this temperature causes nitrogen compounds to break down into nitrogen atoms and other base materials, reducing the emission of nitrogen oxide (NO_x) pollutants.
- The hot Syngas will then flow into a special, low-NO_x burner[15] that will fire into the boiler entrance. The heat from the combustion will be absorbed through the boiler tubes producing high pressure, high temperature, superheated steam. The exhaust from the boiler will be treated in a dry scrubber system for emission control and discharged into the atmosphere (see Section 2.2.5.5).

[15] A low- NOx burner is a type of burner that is typically used in utility boilers that produce steam and electricity. These are designed to minimize the amount of nitrogen oxides that are produced during the combustion process.



Legend:

Project Parcel

TMK Boundaries

Prepared For:

Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Sources:

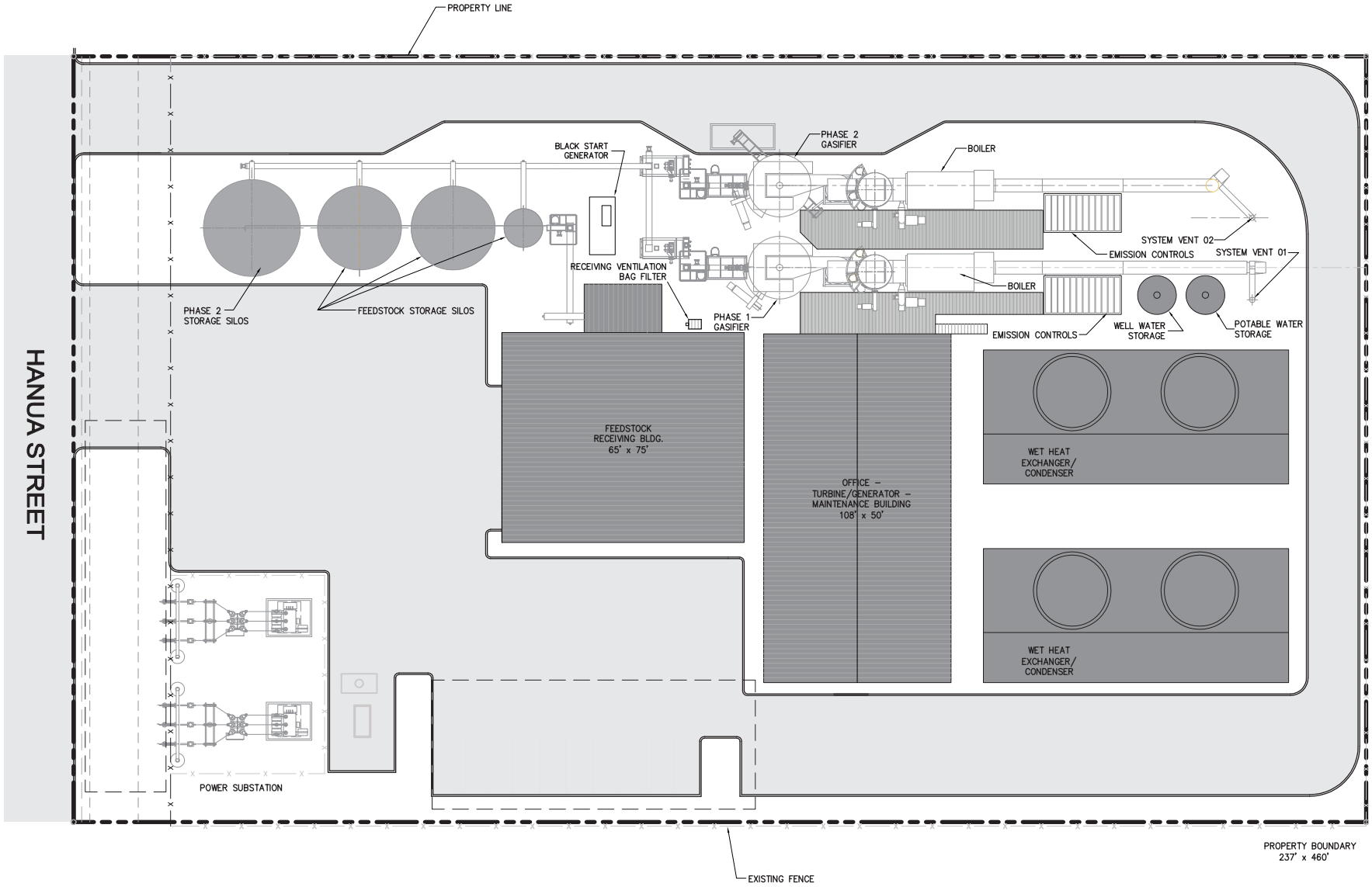
-City & County of Honolulu GIS
-State of Hawaii GIS
-Space Imaging, Inc. (2005)

Figure 2.1:

Vicinity Map

Honua Power Project

Figure 2-1 Vicinity Map 2008-03-17.mxd



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Source:

Honua Power, LLC

20' 0 20' 40' 60'

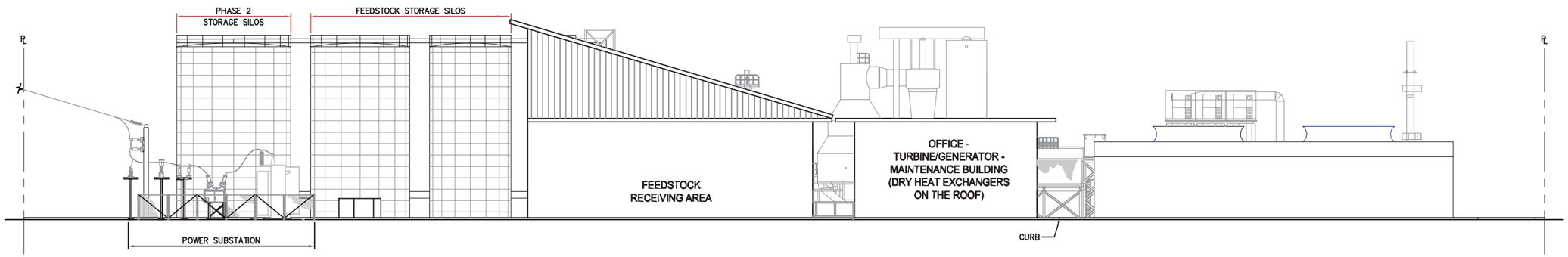
Feet

Figure 2.2:

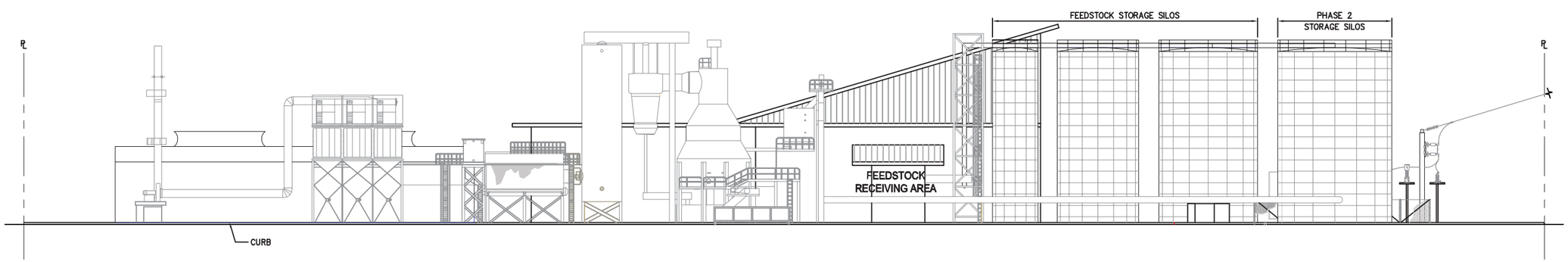
Conceptual Facility Layout

Honua Power Project

Figure 2-2 Conceptual Facility Layout 2009-02-11.cdr



SOUTH ELEVATION



NORTH ELEVATION

0 155" 310"

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Honua Power, LLC

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Source:

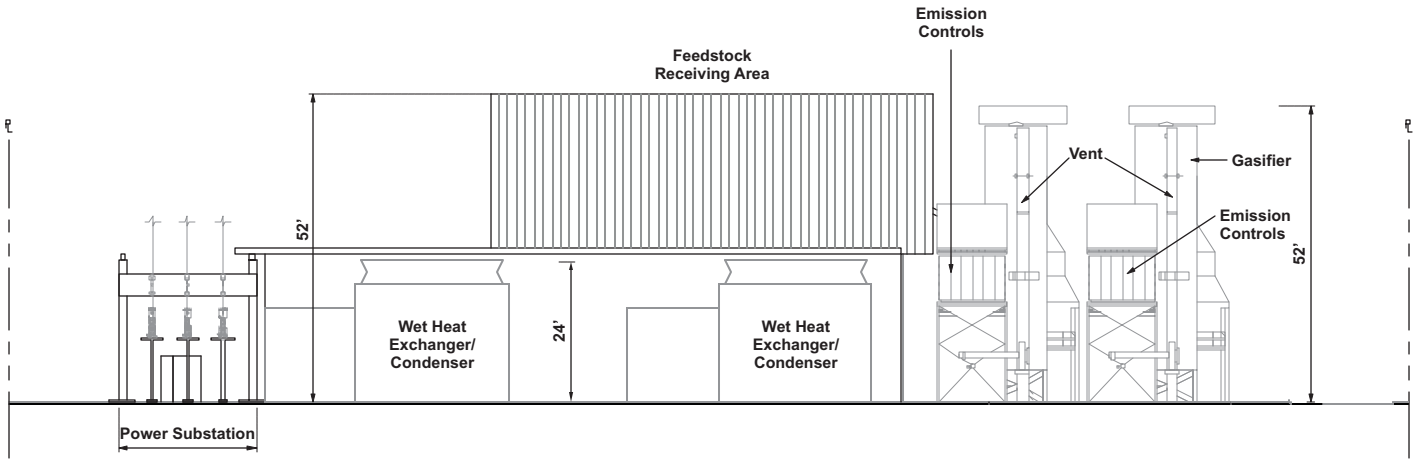
Honua Power, LLC

Figure 2.3:

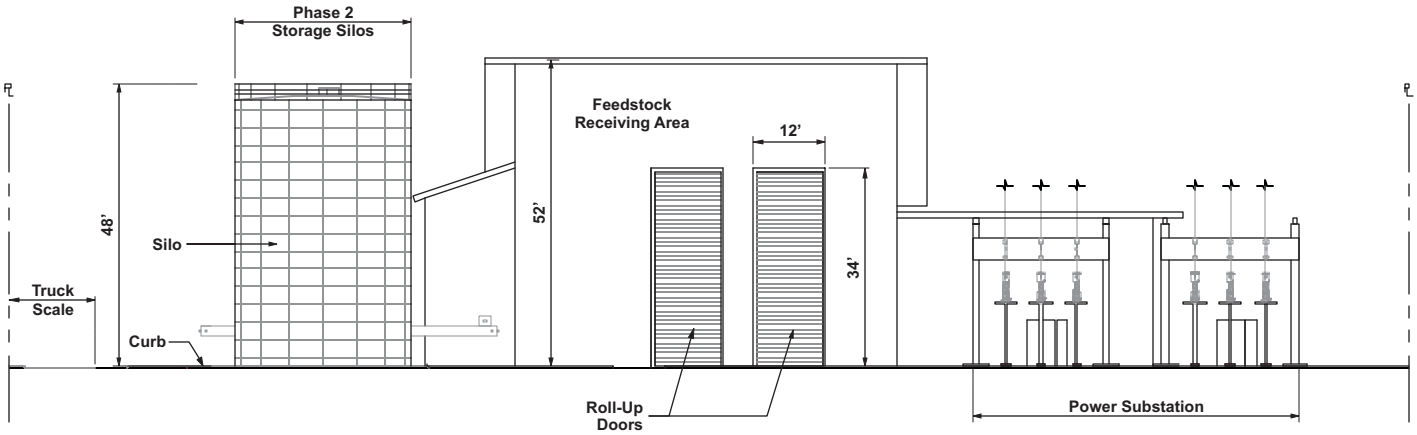
Preliminary North & South Elevations

Honua Power Project

Figure 2-3 Preliminary North & South Elevations 2009-03-12.cdr



EAST ELEVATION
SCALE: 1/16"=1'-0"



ELEVATION @ HANUA STREET
SCALE: 1/16"=1'-0"

Prepared For:

Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Sources:

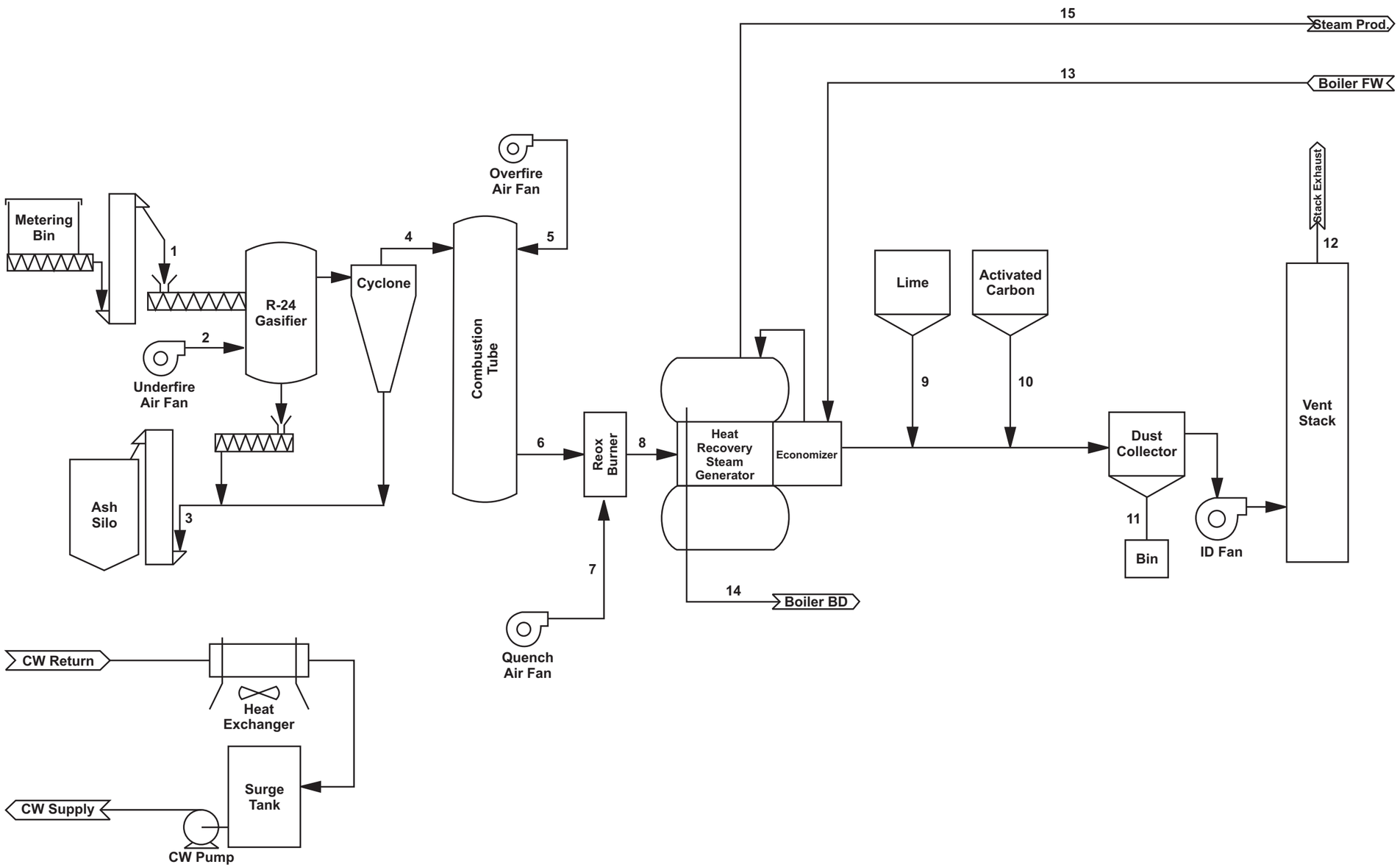
Honua Power, LLC

Figure 2.4:

Preliminary East & West Facility Elevation Views

Honua Power Project

Figure 2-4 East & West Facility Elevations 2009-04-21.cdr



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Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Source:

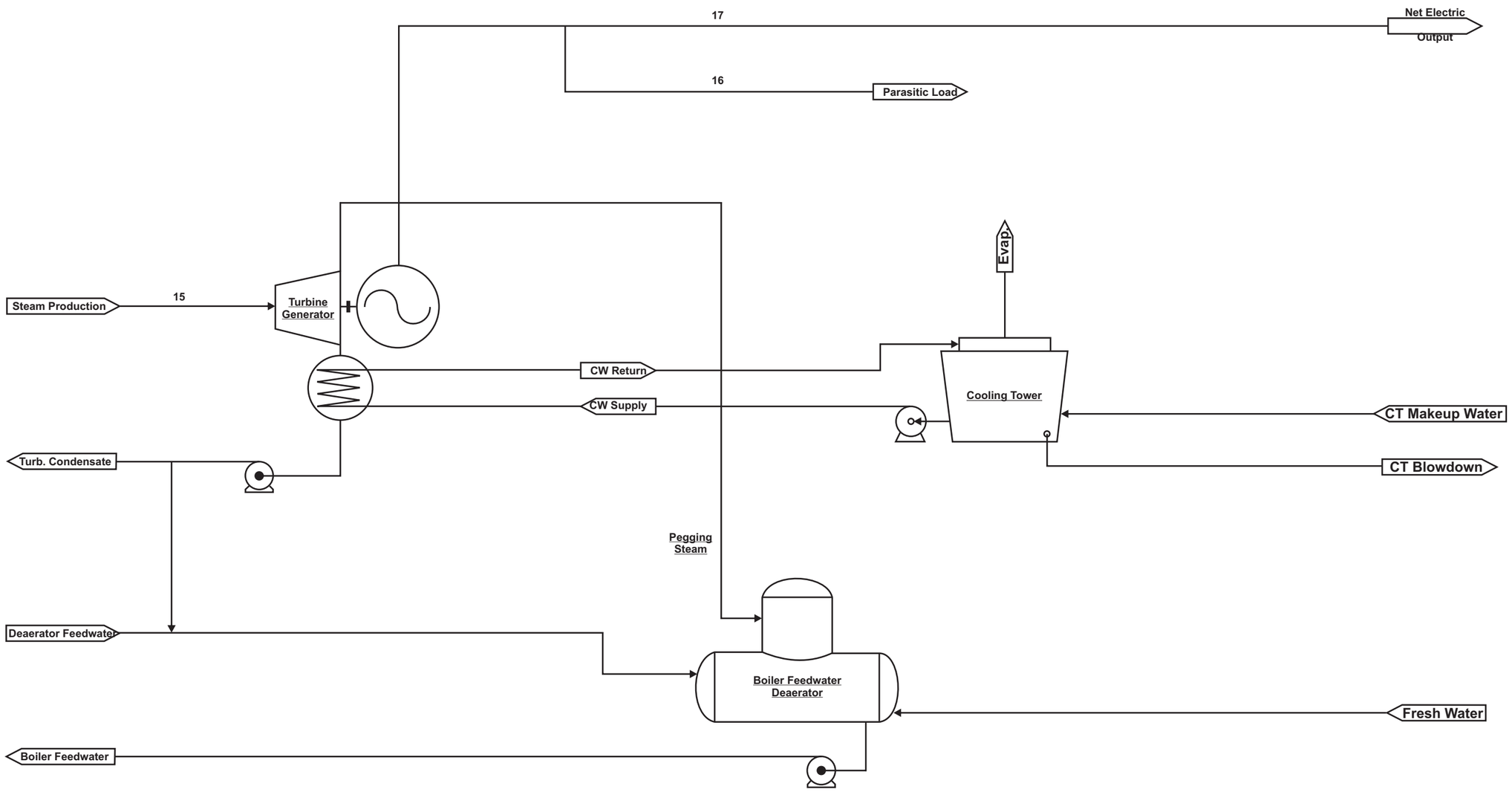
Primenergy, LLC

Figure 2.5:

Gasification Process Diagram

Honua Power Project

Figure 2-5 Gasification Process Diagram 2009-03-13.cdr



Prepared For:

Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Source:

Primenergy, LLC

Figure 2.6:

Power Generation Process Diagram

Honua Power Project

Figure 2-6 Power Generation Process Diagram 2009-03-13.cdr

- The superheated steam from the boiler will be piped to the Turbine/Generator building and passed through a steam turbine, turning it at high speed. The turbine shaft is connected to an electrical generator, which will produce up to 6.4 megawatts (MW) of electricity at 13,800 volts.
- The electric power from the generator will be carried through underground wiring to the onsite power substation, where a transformer will boost it to 46,000 volts (46 kV) for transmission by overhead wire to the existing HECO 46 kV distribution circuit along Hanua Street. A small portion of the energy generated will be diverted through a separate transformer and used to run the components of the power plant (see Section 2.2.5.10).

2.2.4 OFF-SITE FEEDSTOCK SUPPLY & PROCESSING

The type and supply of feedstock are critical to the project. Honua Power has secured commitments for 200 tons per day of high quality feedstock, as shown in Table 2.1 below. The facility will use three types of feedstock from three different suppliers for Phase I of the project. Honua Power is currently negotiating long-term supply/disposal contracts with each of the suppliers.

Table 2.1 Summary of Phase 1 Feedstock Sources

Source	*Type*	*Volume (tons/day)*
Supplier A	Shredded Tires	16
Supplier B	Non-Recyclable Plastics and Paper	4
Supplier C	Construction and Demolition	180
Note: Suppliers are unnamed for commercial/proprietary reasons.		
Source: Honua Power LLC.		

Scrap tires will be supplied by the largest processor of scrap tires in Hawai‘i. The non-recyclable paper and plastic waste will come from a supplier that generates approximately 3 to 4 tons per day of non-recyclable paper and plastic waste.[16] Honua Power will contract for the supply of non-recyclable construction and demolition waste from a local processor. Auto Shredder Residue (ASR) used in Phase 2, will be supplied by a local scrap metal recycler that generates approximately 50 tons of ASR waste per day. When Phase II is eventually constructed, Honua Power will seek out additional suppliers and types of feedstock and/or expand its existing contracts to accommodate greater volumes of feedstock supplied to the facility.

2.2.5 DESIGN & SPECIFICATIONS OF THE PROPOSED EQUIPMENT & STRUCTURES

2.2.5.1 Feedstock Receiving Area

The feedstock receiving area will be an enclosed structure approximately 30 feet high. It will house a tipping floor to allow feedstock trucks to back into designated stalls (according to feedstock type) and unload their contents onto the conveyor. The doors of the feedstock receiving building will have plastic curtains that open to receive a truckload of feedstock into the building and then close prior to the load being dumped. Exhaust fans will maintain a negative air pressure within the feedstock receiving building. The dust-laden air will be passed through a baghouse fabric filter to remove airborne dust before the air is released back into the atmosphere. The particulate that collects in the

[16] Regulated waste includes waste that has been sterilized with an autoclave, shredded, and compacted. The supplier of this waste is the largest processor of regulated non-recyclable waste in the State.

baghouse will be mixed into the gasifier feedstock and used as supplemental fuel. This system minimizes fugitive dust emissions and allows the system to meet the applicable air quality standards.

2.2.5.2 Feedstock Storage Silos

The first phase of the project will include three storage silos: (1) paper, plastic, rubber, foam silo (54 ton capacity); (2) shredded scrap tires silo (16 ton capacity); and (3) C&D waste silo (80 ton capacity). These provide sufficient storage so that the deliveries of material can be limited to normal working hours five days per week while the gasifier will operate continuously, seven days per week. The design provides for the material to be fed directly to the gasification equipment as well so that the storage silos can be bypassed if need be. A fourth feedstock silo will be added to accommodate feedstock for Phase II.

2.2.5.3 Feedstock Sorter, Conveyor, & Metering Bin

The accumulation conveyor will be designed to deliver approximately 17,000 pounds per hour of feedstock to the gasifier metering bin. The live-bottom metering bin that is part of the conveyance system further mixes the feedstock and delivers it to a bucket-elevator conveyor which raises the material to a height that allows it to gravity-flow to the gasifier feeder system. A second conveyor would be added to the site for Phase II to allow feedstock to flow to the new gasification system.

2.2.5.4 Gasification Equipment

Honua Technologies will use gasification equipment as specified in Table 2.2.[17] The gasifier is a chamber with a heat-resistant lining that is maintained at a temperature of approximately 1,400°F. Temperature, air flow, and air distribution in the chamber are precisely controlled to keep a "reducing" (starved-for-air) atmosphere in the chamber. These conditions cause the hydrocarbons of the feedstock to break down into "Syngas".[18] The combustible components of the Syngas are primarily hydrogen and carbon monoxide. The cyclone separator that is provided removes suspended particles from the exhaust stream; these are conveyed from the separator to a bin where they are stored for periodic removal and disposal. The heated gas flows from the cyclone into the combustion tube. Controlled addition of air to the tube allows partial combustion to occur while remaining in a reducing condition; this reduces bound nitrogen compounds to diatomic nitrogen (N_2), thus controlling the emission of nitrogen oxides (NO_x). The temperature in this chamber is maintained at 2,500°F.

The feedstock storage silo, the tallest part of the facility, is approximately 48 feet high. The facility will also have a 45-foot high, 48 inch diameter exhaust stack.[19] A continuous emission monitoring system will sample the exhaust gas as it travels up the stack.

2.2.5.5 Steam Boiler

The hot Syngas then flows into a special, low-NO_x burner that fires into the boiler entrance releasing all the energy inside the boiler while minimizing the formation of nitrogen oxide emissions. The energy is absorbed through the boiler tubes producing high pressure, high temperature, superheated steam (650 pounds per square inch, gauge [psig], 700°F).

[17] This technology and feedstock meet the Federal Energy Regulatory Commission requirements as a Qualifying Facility. Honua Power LLC's docket number from its filing with the FERC is QF05-150-000.

[18] Syngas (from synthesis gas) is the name given to a gas mixture that contains varying amounts of carbon monoxide and hydrogen generated by the gasification of a carbon containing fuel to a gaseous product with a heating value. Syngas is combustible and often used as a fuel source, though it has less than half the energy density of natural gas.

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

Table 2.2 Gasification Equipment Specifications

Parameter	*Gasifier*	*Steam Boiler*
Maximum Design Capacity	200 tons/day	75,000 lb/hr (steam)
Fuel Type	n/a	Syngas
Fuel Use	n/a	56.575 acfm[1] @1500°F
Production Capacity	200 tons/day	75,000 lb/hr (steam)
Raw Materials	Tires, Select C&D debris, ASR, Sterilized medical waste	Syngas & water
Note 1: "acfm" = Actual cubic feet per minute.		
Source: Honua Power LLC Initial Covered Source Permit Application (2007).		

2.2.5.6 Steam-Turbine/Electrical Generator

Honua Power has selected a 75,000 pound per hour steam-turbine/electrical generator for the facility. The generator will be housed in the building near the center of the site that also contains the offices and maintenance facilities. The superheated steam from the boiler system will turn the turbine at high speed, thereby powering the generators, each of which would produce up to 6.6 megawatts of electricity at 13.8 kV.

2.2.5.7 Exhaust System & Ash Collection

The exhaust gas will leave the boiler at approximately 350°F. Powdered lime and activated carbon will be injected into the exhaust gas stream immediately after it leaves the boiler through a conventional injection process. The lime reacts to neutralize impurities in the exhaust, and the activated carbon absorbs organic compounds (such as dioxins) and heavy metals (such as mercury), removing them from the exhaust gases. From there, the exhaust gas will pass through a high-efficiency bag filter that will remove entrained dust (which includes ash particles, salts, excess lime, and activated charcoal). A blower will suck the cleaned exhaust gas from the system and discharge it up the exhaust vent and into the atmosphere. The entire system will be maintained under slight negative pressure, thus preventing the leakage of any emissions from the equipment.

Each gasifier, cyclone, and baghouse will produce approximately 2,200 pounds per hour of ash residue when the facility is operating at full capacity. The residue will be collected by a water-filled ash conveyor that will cool it and transfer it to a disposal container. When it is full, the disposal container will be taken by truck to an approved landfill for disposal.

2.2.5.8 Black-Start Generator

The proposed project includes a black-start generator that will allow the facility to be started without depending upon electrical energy from HECO's system. It consists of a diesel-powered, one megawatt electrical generator that is capable of supplying all the electric needs of the plant equipment. The diesel fuel will be "Power Diesel" (which is produced from waste engine oil and cooking oil); it burns cleaner than regular diesel fuel and is produced on O'ahu from recycled waste oil. Fuel for the black-start generator will be stored in a double-wall tank that meets all federal and state regulations for the storage of liquid hydrocarbon fuels.

2.2.5.9 Control /Administration Building

The facility includes a two-story control/administration building. The structure would be approximately 50 feet long by 100 feet wide, and 30- to 40-feet high. Besides office space, controls, and equipment storage, the building would house the steam turbine-generator used to generate electrical power from the gasification process.

2.2.5.10 Electrical Substation & Connection to Transmission System

The on-site substation will include a transformer to boost the electricity generated by the facility to 46,000 volts. The substation will also contain switchgear to protect the power grid and the power generating equipment in case of an equipment malfunction or a power problem in the grid and to connect the facility with the existing 46 kV power lines along Hanua Street. A separate transformer will reduce the voltage to 460 volts to be used to run the components of the power plant. The substation footprint will be approximately 1,500 square feet. The tallest piece of equipment in the substation will be the vertical break structure at 25 feet.

2.2.6 WATER SUPPLY/WATER STORAGE

2.2.6.1 Amount and Source of Required Water

As shown in Figure 2.7, the Honua plant would use water from three different sources: (1) groundwater from an onsite well drawing from the limestone ("caprock") aquifer; (2) reverse osmosis (RO) filtered wastewater from the Honouliuli WWTP; and (3) potable water from the Honolulu Board of Water Supply (BWS) system. The schematic represents generalized water flow diagrams for the probable range of salinity (brackish to saline) of the groundwater that is likely to be obtained from the caprock aquifer. The water use rates are representative of the Phase 2 (12 MW) full build-out of the project. Use rates would be approximately half of these amounts for the first phase (i.e., for 6 MW). Each of the three sources of supply is described below.

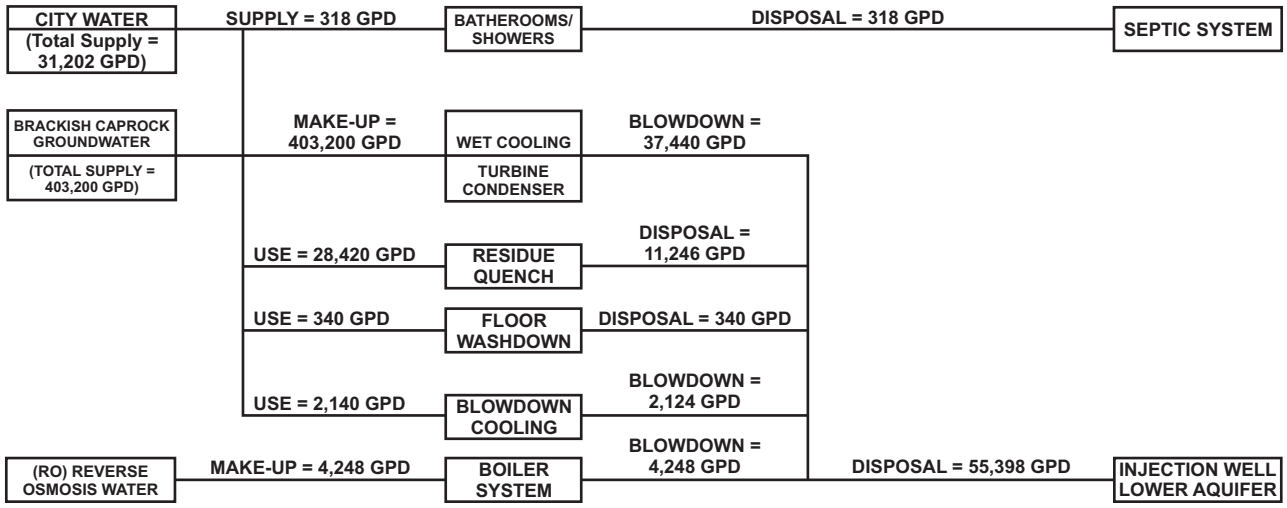
Groundwater from the Underlying Limestone (Caprock) Aquifer. By far the largest amount of water (400,000 to 550,000 gallons per day [GPD]) would be groundwater drawn from the underlying caprock aquifer. This would be used as make-up for an indirect evaporative condenser system cooling system. From two-thirds to as much as 90 percent of this supply would be lost to the atmosphere by evaporative cooling; the remainder would be discharged into the lower, confined limestone aquifer via onsite disposal wells.

RO Filtered Honouliuli WWTP Effluent. A relatively small amount (4,250 GPD, on average) of Reverse Osmosis (RO) treated effluent from the Honouliuli WWTP would be used as boiler feedwater when both phases are in operation. Blowdown from the boiler of an identical amount would be disposed of in the onsite disposal wells.

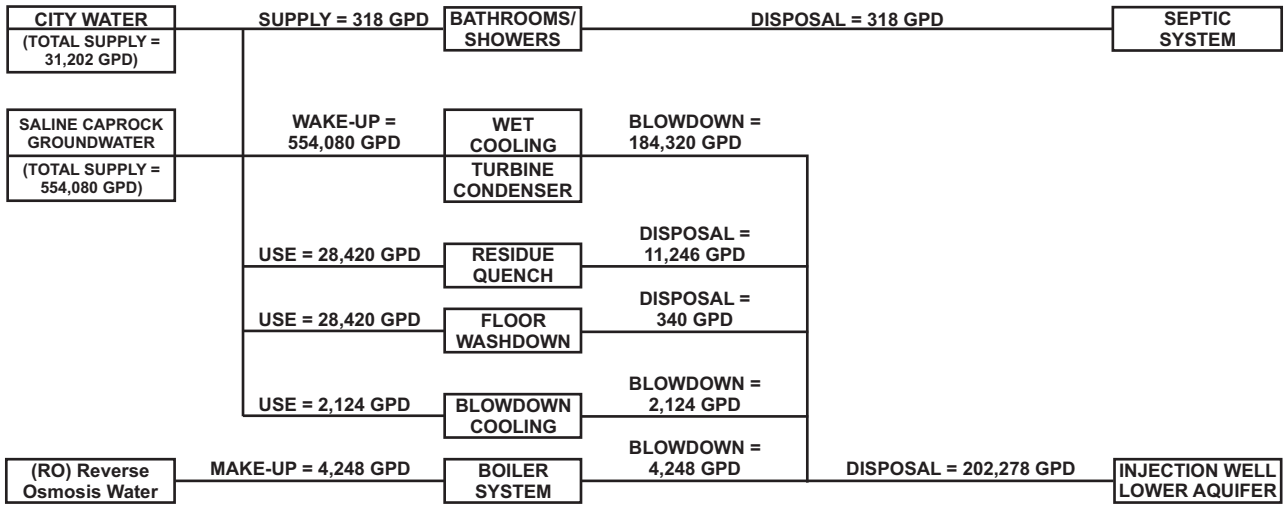
Potable Water Use from the Honolulu BWS System. Approximately 31,200 GPD of potable water from the municipal system will be used when both phases are in operation. A small amount of this (about 320 GPD) would be used by plant personnel and be directed to a septic system with disposal in an onsite leach field. The remainder would be used for industrial purposes – residue quench, floor washdown, and blowdown cooling. Of the 30,880 GPD used for these purposes, 17,170 GPD would be lost to atmosphere in the residue quench process and the remaining 13,710 GPD would be directed to the onsite disposal wells.

2.2.6.2 *On-Site Process Water Storage*

The brackish water from the on-site wells would be stored in a 10,000 gallon vertical tank. This storage would function as a buffer between the different rates of incoming supply and the rate of use within the site. This surge tank would be approximately 12 feet in diameter and 14 feet high.



Flow Diagram for the Cooling Water Supply from Brackish Caprock Water



Flow Diagram for the Cooling Water Supply from Saline Caprock Water

Prepared For:	Prepared By:	Source:	Project:	Figure 2.7:
Honua Power, LLC	PLANNING SOLUTIONS	TNWRE	Honua Power Project	Water Balance Diagram

Figure 2-7 Water Balance Diagram 2009-05-18.cdr

The domestic potable water used on the site would be stored in a second 10,000 gallon vertical tank. This storage would function as a back-up in the case of a short term loss of water supply. This tank would be approximately 12 feet in diameter and 14 feet high.

Recycled RO water from the Board of Water Supply will be stored in a 3,000 gallon tank. This storage would function as a back-up in the case of a short-term loss of water supply. This tank would be approximately 8 feet in diameter and 10 feet high.

2.2.6.3 On-Site Fire-Protection Facilities

Campbell Industrial Park has a hydrant and fire protection water supply along the street. This supplies the necessary reserve supply of water for fire protection at the site. All facilities will comply with the National Fire Protection Association's (NFPA) recommendations, local codes, and other applicable fire protection regulations.

2.2.7 WASTEWATER DISPOSAL

2.2.7.1 Industrial Wastewater Disposal

In keeping with the practice established by the three existing cogeneration power plants in JCIP, industrial wastewater would be disposed of in one or the other of two onsite wells designed and constructed to discharge into the lower, confined caprock aquifer.[20] Depending on the salinity of the supply from the upper caprock aquifer, disposal rates are expected to be in the range of 40 to 140 gallons per minute (GPM), the exact amount dependent on the salinity of the caprock supply.[21] This is about one order of magnitude less than the disposal rates at the nearby Kalaeloa and HPOWER generating stations and two orders of magnitude less than the disposal rate at the AES generating station.

Table 2.3 and Table 2.4 present the chemical makeup of the various wastewaters that would be directed into the disposal wells for the range of salinity that may be provided by the onsite supply well. With a brackish caprock supply, the combined water to the disposal wells would be warm (about 88° F) and hypersaline (Total Dissolved Solids [TDS]) would be about 2.7 times higher than the receiving groundwater in the lower, confined aquifer). If the caprock supply is more saline, the water discharged would be cooler (about 75° F) but still hypersaline (TDS about 2.3 times higher than the receiving groundwater). Depending upon regulatory requirements, treated wash water (which is produced infrequently in batches) would either be disposed of into the sanitary system or held in tanks and periodically trucked away for disposal at an approved site.

2.2.7.2 Treatment and Disposal of Domestic and Sanitary Wastewater

This system has not yet been designed. However, Honua Power anticipates that it would collect the small amount of sanitary waste that would be generated at the facility; provide treatment in an improved individual wastewater treatment system; and dispose of the treated effluent in an on-site leach field. If site constraints make this impossible, it would hold the collected wastewater in an on-site septic tank for periodic collection and off-site disposal by a waste contractor.

[20] Since the site is *makai* of the State of Hawai'i, Department of Health's Underground Injection Control (UIC) line, injection wells are an allowable means of disposal.

[21] The salinity will not be known with certainty until after the wells are drilled and data from pump tests are available.

Table 2.3 Anticipated Quality of the Wastewater Delivered to the Disposal Wells Using Brackish Caprock Water (TDS of 12,600 PPM) for the Cooling System

Constituent or Characteristic	*Cooling System Blowdown*	*Residue Discharge Water*	*Wash-Down Water*	*Boiler Water Cooling*	*Boiler Blow-Down*	*Total*
Flow Rate, GPD	37,440	11,246	340	2,124	4,248	55,398
Temperature, F	70	106	80	70	212	88
pH	7.5	7	7.5	7.5	6	7
Total Dissolved Solids (TDS), ppm	138,600	8,400	450	450	10	95,397
Calcium hardness (ppm as CaCO3)	2,530	3,085	12.3	12.3	1.25	2,337
Magnesium hardness (ppm as CaCO3)	17,600	2	95	80	2.06	11,899
Chloride, ppm as Cl	72,600	110	110	110	12.6	49,094
Dissolved Sodium, ppm as Na	40,300	110	90	90	92.5	27,270
Dissolved Iron, ppm as Fe	28	0.3	0.2	0.2	0.025	19
Dissolved Copper, ppm as Cu	0.3	0.05	0.05	0.05	0.158	0.23
Dissolved Manganese, ppm as Mn	1.6	0.38	0.3	0.3	0.04	1.17
Dissolved Silicon, ppm as SiO2	57	70	70	70	2.87	56
Dissolved Zinc, ppm as Zn	1.6	2.2	0.3	0.3	0.221	1.6
Potassium, ppm of K	18,700	40,00	4.5	4.5	0.5	13450
Source: Tom Nance Water Resources, Inc.						

Table 2.4 Anticipated Quality of the Wastewater Delivered to the Disposal Wells Using Brackish Caprock Water (TDS of 29,800 ppm) for the Cooling Water

Constituent or Characteristic	*Cooling System Blowdown*	*Residue Discharge Water*	*Wash-Down Water*	*Boiler Water Cooling*	*Boiler Blow-Down*	*Total*
Flow Rate, GPD	184,320	11,246	340	2,124	4,248	202,278
Temperature, F	70	106	80	70	212	75
pH	7.5	7	7.5	7.5	6	7.4
Total Dissolved Solids (TDS), ppm	89,400	8400	450	450	10	81,936
Calcium hardness (ppm as CaCO3)	3,900	3085	12.33	12.33	1.25	3725
Magnesium hardness (ppm as CaCO3)	12,900	2	95	80	2.06	11,756
Chloride, ppm as Cl	47,600	110	110	110	12.6	43,382
Dissolved Sodium, ppm as Na	26,000	110	90	90	92.5	23,701
Dissolved Iron, ppm as Fe	7.6	0.3	0.2	0.2	0.025	6.9
Dissolved Copper, ppm as Cu	0.2	0.05	0.05	0.05	0.158	0.2
Dissolved Manganese, ppm as Mn	1.0	0.38	0.3	0.3	0.04	0.9
Dissolved Silicon, ppm as SiO2	13	70	70	70	2.87	16.7
Dissolved Zinc, ppm as Zn	1.6	2.2	0.3	0.3	0.221	1.6
Potassium, ppm of K	18,700	4,000	4.5	4.5	0.5	13,450
Source: Tom Nance Water Resources, Inc.						

2.2.8 STORM WATER RUNOFF

The proposed drainage system for the site is to maintain existing drainage patterns. Storm run-off from the site will be by surface flow towards the lowest portion of the property. To avoid any adverse impact caused by any increase in runoff due to the development, the difference between the pre-development and post-development runoff from the 1-hour/50-year rainfall event will be retained in the proposed subsurface retention chambers. This is discussed in greater detail in Sections 3.5.3, 3.5.4, and 3.5.5 of this report.

2.2.9 FACILITY OPERATIONS & MAINTENANCE

Since the shredded tired supplier has a continuously running facility within a half mile of the project site, Honua Power will work closely with it for contracted maintenance. Honua Power intends to hire approximately 20 full-time employees and will contract additional maintenance services from third party contractors. The other major categories of expenses are annual maintenance at 1.5 percent of capital cost and potentially the disposal of the residue. The residue will be about 10 percent of the feedstock weight or 15 tons per day. This residue will be deposited in an approved, lined landfill. This residue will be subject to regular Toxicity Characteristic Leaching Procedure (TCLP) testing as required by regulation for landfill disposal.

2.3 SCHEDULE

Major schedule milestones for the proposed project are as follows:

- Complete Chapter 343 EA Process – 2nd Quarter 2009.
- Notice-to-proceed to construction contractor – 4th Quarter 2009.
- Facility enters service – 1st Quarter 2011.
- Possible second gasification system enters service – 3rd Quarter 2013.

2.4 ANTICIPATED COSTS

Table 2.5 summarizes Honua Power's estimates of the anticipated project costs. These are preliminary numbers. Additional costs could be incurred if special features must be incorporated into the design.

Table 2.5 Order-of-Magnitude Estimated Costs

Item	*Order-of Magnitude Cost (in million 2007$)*
Phase I Facility	27 to 33
Phase II Additional Processing Capacity	21 to 25
Source: Honua Power LLC	

2.5 ALTERNATIVES

2.5.1 FRAMEWORK FOR CONSIDERATION OF ALTERNATIVES

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 Honua Power is proposing. HAR §11-200-9 requires the approving agency (in this 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, Honua Power 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.

Honua Power concluded that only two of these alternatives merit consideration in the impact analysis portion of this EA. They are: 1) the proposed action of constructing a 6 MW single process train facility while providing for the eventual addition of a second process train to increase the power generating capacity to 12 MW; and 2) "No Action" (as required by Chapter 343). The other alternatives failed to achieve the project objectives outlined in Section 1.4 above.

2.5.2 ALTERNATIVES TO BE EVALUATED IN THE EA

2.5.2.1 Alternative 1: Proposed Action (12 MW Honua Power Project, Phase I & II)

Alternative 1 consists of Honua Power's proposed action as described above in Section 2.2. Implementation of this alternative would initially provide an additional 6 MW of renewable energy to HECO's grid while simultaneously diverting about 45,000 tons of waste from island landfills each year. This alternative also provides for a second 6MW gasification system to be added to the site at some point in the future, doubling the output to 12MW and diverting an additional 45,000 tons of waste from landfills. The timing and feasibility of the addition of a second gasification system at the site would be determined by the success of the facility and Honua Power's ability to negotiate a second PPA with HECO. This alternative would meet all the project objectives listed in Section 1.4.

2.5.2.2 No Action

In the case of the proposed Honua Power Project, "No Action" consists of failing to install the waste recovery and energy generation capacity that the facility would provide. Under this alternative, the special waste streams that the Honua facility proposes to utilize would instead continue flowing into landfills on the order of 90,000 tons annually, contributing to O‘ahu's waste disposal problems. Likewise, "No Action" would represent a missed opportunity to add up to 12 MW of renewable energy generation capacity to the island's grid. This alternative would not meet any of the objectives listed in Section 1.4. Consequently, it is not considered a feasible alternative, and is included in this EA primarily to fulfill the legal requirements of Chapter 343 and HAR §11-200. It also provides a baseline against which to measure the impacts of the proposed action.

2.5.3 ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

2.5.3.1 6 MW Facility (Phase I Only, Omit Second Gasification System)

This "reduced scale" alternative consists of only constructing Phase I of the proposed facility without providing for the future addition of a second 6MW gasification system. Thus, the maximum generating capacity provided by this alternative would be the 6 MW provided by the first of the two planned systems. This alternative would forgo an opportunity to add an additional 6MW of renewable energy to O‘ahu's grid and to recover 45,000 additional tons of waste annually without providing substantial environmental benefits. The proposed project site is already heavily industrialized and is within an area designated for industrial uses, and not adding a second

gasification system at the site would constitute a less efficient and beneficial use of the site. Alternative 2 would not meet Objectives 1 & 2, and consequently it is not evaluated in detail in this EA.

2.5.3.2 Develop Honua Power Project on Another Site

Relatively few areas on the island have the existing land use, zoning, proximity to feedstock suppliers, and other qualities that facilitate development of the proposed waste-to-energy facility. The alternate locations that Honua Power considered but eliminated from detailed consideration follow below.

Other I-2 Zoned Property: The City and County of Honolulu GIS database shows approximately 2,400 parcels with I-2 zoning. However, nearly all of them are already developed, are too small to accommodate the required facilities, or have other characteristics that make them unsuitable for the proposed project. Of the few that do have these qualities, nearly all are within JCIP and, therefore, do not differ significantly from the proposed site with respect to regional land use issues. Moreover, with the following exceptions, all are inferior to the site that Honua Power has proposed with respect to their ability to tie into existing electrical substations, electrical transmission facilities, and proximity to feedstock suppliers. The exceptions are the undeveloped shoreline parcels *makai* (south) of the AES, HPOWER, and Tank Farm parcels and a parcel near the Tesoro Refinery. Use of these areas in lieu of the proposed site offers no discernible advantages and would require Honua Power to acquire land from an owner with which it does not already have an agreement. Because these other locations do not provide measurable environmental advantages to the proposed site, Honua Power is not considering them.

Other Areas Where Re-Zoning Would Be Required: Obtaining the I-2 zoning needed to develop a new industrial facility of the type that is proposed is a very time-consuming process. Examples of projects on O‘ahu and on other islands show that it typically takes a minimum of 7 to 10 years to obtain the approvals needed to start construction and several more years before a generating unit can begin delivering power to the grid. This is much longer than the 2 to 3 years needed for a site (such as the one that Honua Power has proposed) that already has the appropriate zoning. Equally important, while it is by no means certain that approval would eventually be obtained if the proposed facility is located on a site that already has the appropriate zoning, the likelihood of success has proven to be much greater than it is for “green fields” sites. In view of the foregoing, Honua Power believes that areas that do not already have the required zoning are not feasible alternatives for the proposed action and is not considering them.

2.5.3.3 Delayed Action/Slower Implementation

Because of the substantial benefits that diverting waste from landfills and substituting renewable energy for fossil fuel use has for the natural environment and for O‘ahu’s economy, Honua Power has concluded that postponing development of the project is not advantageous. It believes that the sooner additional renewable energy is brought online to replace fossil fuels and reduce pressures on landfills, the sooner the economic and environmental benefits described in Chapter 1 can be realized. Consequently, it is not considering a slower development schedule at the present time. Similarly, slowing development tends to increase costs and extends the time during which the site has been disturbed and increases the potential for erosion and other adverse effects on the natural environment.

2.5.3.4 Different Feedstock Sources

At present, Honua Power is not considering different types of feedstock other than C&D waste, sterilized medical waste, and ASR. If in the future other types of feedstock become available and economically viable (and if demand warrants continued or expanded waste-to-energy generation capacity), Honua Power may consider utilizing additional types of feedstock. If and when that occurs, a new analysis will be performed to determine suitability and permitting requirements.

2.5.3.5 Smaller Generating Units

Installing and operating smaller (i.e., less-than 6 MW capacity) processing and generating equipment at the site is possible. However, the construction impacts would be essentially identical to those of the full-scale version and the operating emissions would be comparable. In addition, a detailed discussion of such an alternative would not add substantially to the readers' understanding of potential effects. Consequently, Honua Power is not considering generating units of less than 6-megawatt capacity.

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3.0 EXISTING ENVIRONMENT, POTENTIAL IMPACTS, & MITIGATION MEASURES

This chapter describes the existing environment of the areas that would be affected by the Honua Power Project and the potential environmental effects of the project. The discussion is organized by topic (e.g., topography, hydrology, sound levels, 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., the ‘Ewa Plain, West O‘ahu); in other cases the focus is narrower (e.g., the 2.5-acre project site). The discussion also distinguishes between short-term construction impacts and those that may result from the facility’s continued presence or operation. Where appropriate, the discussion includes the measures that Honua Power proposes to take to minimize or mitigate potential adverse effects.

3.1 PHYSIOGRAPHY AND TOPOGRAPHY

3.1.1 EXISTING CONDITIONS

The area affected by the proposed project is on O‘ahu’s southern coastal plain. The terrain on the project site is relatively flat, with slopes of a few percent or less. The site is less than 5 feet above mean sea level (msl). The nearest part of the Wai‘anae Mountain range is located approximately 4.5 kilometers to the north of the site. There are no notable topographic features on the project site or in the immediate vicinity.

3.1.2 PROBABLE IMPACTS

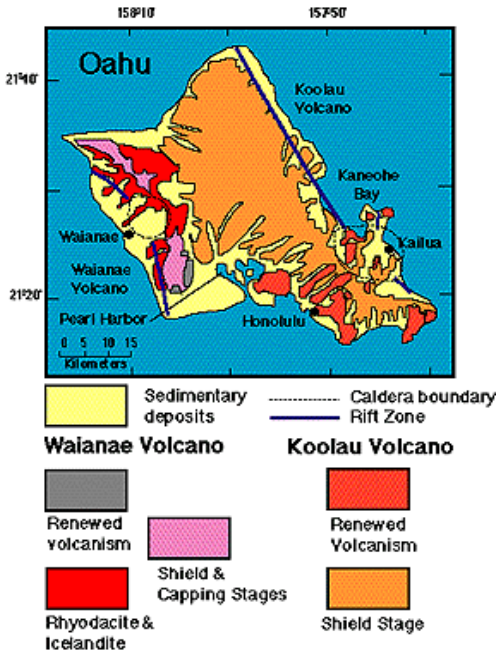
No significant topographic changes to the property will occur. As can be seen from Figure 2.2, the proposed facility will require minimal site preparation and grading due to the nearly flat topography. The on-site supply and disposal wells will be installed using vertical drilling and will not result in significant surface disturbance. All ground disturbance associated with the project will be limited to the 2.5-acre project site.

3.2 GEOLOGY AND SOILS

3.2.1 EXISTING CONDITIONS

O‘ahu is the eroded remnant of the Wai‘anae and Ko‘olau volcanoes. Lava flows from the western flank of the Ko‘olau Volcano banked against the eastern flanks of the older Wai‘anae Volcano to form the gently sloping surface of the Schofield Plateau between the two (see Figure 3.1, from Langenheim and Clague 1987). The ‘Ewa Plain, on which the new facility would be constructed, is formed from a seaward thickening wedge of emerged coral reefs and alluvial deposits that developed along the southern side of the island. The coralline reef deposits include carbonate sinkholes and solution channels; the surface expressions of these karst-like structures have been mostly filled by subsequent sedimentation. These interbedded marine and non-marine sediments, which are hundreds of feet thick in the site vicinity, are collectively referred to as caprock. The caprock is underlain by fractured basalt from the Wai‘anae volcano.

Figure 3.1 Geological Setting



The ‘Ewa Plain and Pearl Harbor receive the bulk of the sediments eroded from the Schofield Plateau as well as erosional products from the southern portions of the Wai‘anae and Ko‘olau Ranges. Most of the Barbers Point area is underlain by coral outcrop, including the project site (Foote 1972, General Soil Map, O‘ahu Island, Hawai‘i). Coral outcrop consists of coral or cemented calcareous sand. A thin layer of friable red soil material is occasionally present in crevices. Coral outcrop has high permeability, very slow runoff, and slight erosion hazard. Identified uses are for military installations, quarries, and urban development. Vegetation is sparse and generally limited to kiawe, koa haole, and fingergrass. None of the lands affected by the proposed project are classified as Agricultural Lands of Importance to the State of Hawai‘i.

3.2.2 PROBABLE IMPACTS

The proposed project will not affect any significant geologic features or resources. Small amounts of fill and gravel will be emplaced on the site for the facility; this will come from approved on-land sources and is estimated at approximately 10,500 cubic yards. Installation of the on-site water supply and disposal wells will require drilling through the coral substrate, but the effects will be localized and will not significantly affect the geological composition of the site.

3.3 CLIMATE/MICRO-CLIMATE

3.3.1 EXISTING CONDITIONS

3.3.1.1 Temperature

Due to the tempering influence of the Pacific Ocean and their low-latitude location, the Hawaiian Islands experience extremely small diurnal and seasonal variations in ambient temperature. Average temperatures in the coolest and warmest months at Honolulu International Airport are 72.9˚ Fahrenheit (F) (January) and 81.4˚F (July), respectively. These temperature variations are quite modest compared to those that occur at inland continental locations. Additional temperature data from Honolulu International Airport are summarized in Table 3.1.

3.3.1.2 Rainfall and Humidity

Topography and the dominant northeast trade winds are the two primary factors that influence the amount of rainfall that falls on any given location on O‘ahu. Near the top of the Ko‘olau Range on the windward side of O‘ahu that is fully exposed to the trade winds, rainfall averages nearly 250 inches per year. On the leeward side of the island, where the project is located, the annual average rainfall is much lower (see Table 3.1). Average annual rainfall in the area is less than 20 inches per year. Although the project area is on the leeward side of the island, the humidity is still moderately high, ranging from the mid-60 to the mid-70 percent.

Table 3.1 Average Monthly Temperature, Rainfall, and Humidity

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

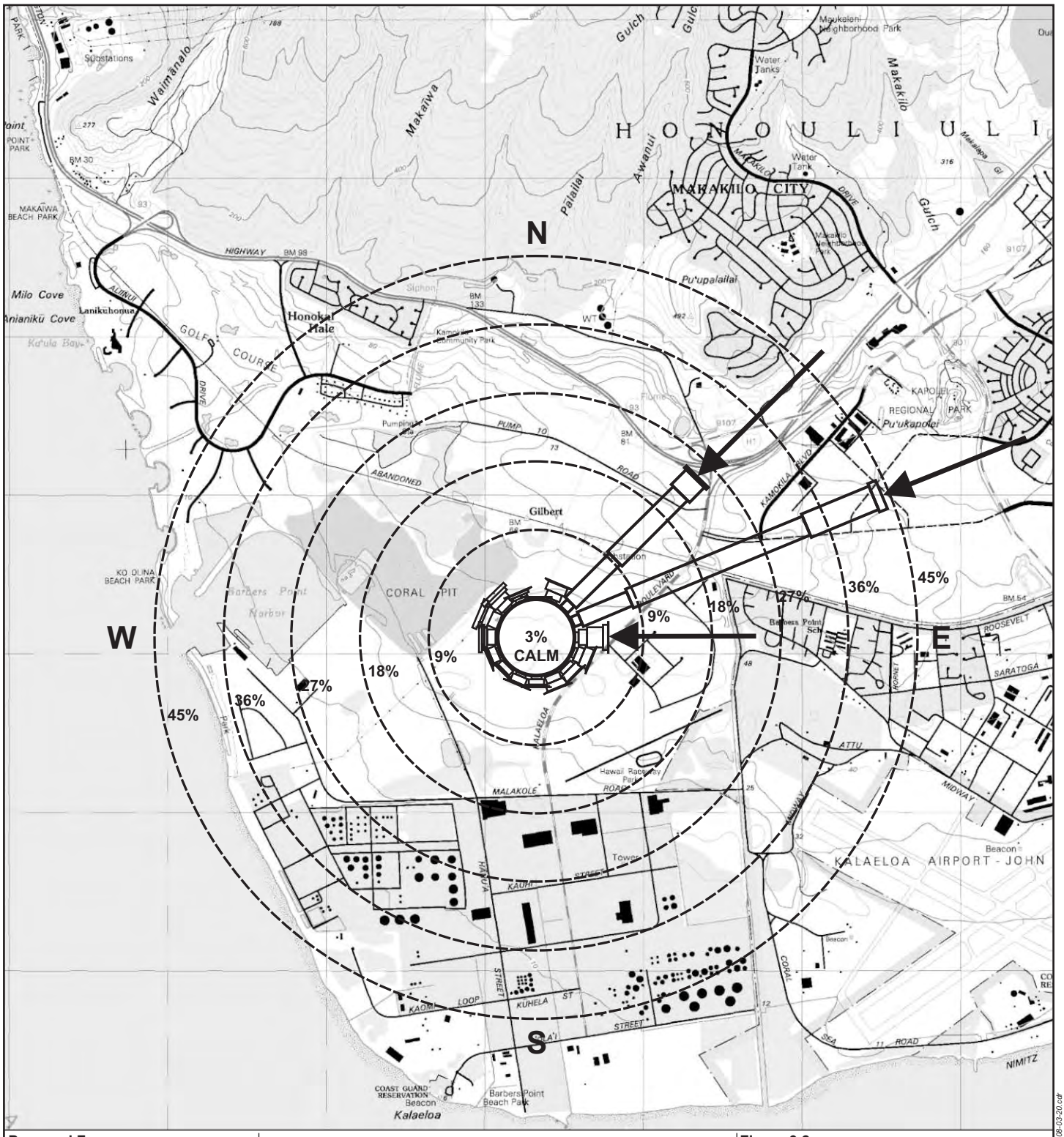
3.3.1.3 Wind Patterns

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 northeasterly winds called the 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.

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

3.3.2 PROBABLE IMPACTS

The tallest equipment planned for the proposed facility is about 45 feet in height; much of the planned equipment is smaller than this. The equipment is sufficiently small that it does not have the potential to significantly affect airflow or otherwise affect microclimate.



Prepared For:

Honua Power, LLC

Prepared By:

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Source:

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

0 1500 3000
Feet

Figure 3.2:

Annual Wind Rose for Campbell Industrial Park

Honua Power Project

Figure 3-2 Annual Wind Rose for Campbell Industrial Park 2008-03-20.cdr

3.4 AIR QUALITY

The discussion of existing air quality and potential impacts of the proposed facility is broken down into the following subsections:

- Section 3.4.1 summarizes data on existing air quality in the vicinity of the proposed project;
- Section 3.4.2 provides an overview of the Federal and State standards that are applicable to the proposed project and describes the activities or emissions that triggered them;
- Section 3.4.3 discusses the air quality impacts likely to result from the proposed Honua Power Project and describes the measures that Honua Power is taking to minimize and mitigate them.

3.4.1 EXISTING AIR QUALITY

Generally, air quality in the area is excellent. The State of Hawai‘i Department of Health monitors ambient air quality on O‘ahu using a system of 9 monitoring sites. The primary purpose of the monitoring network is to measure ambient air concentrations of particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and ozone (O_3). Lead sampling was discontinued in October 1997 with EPA approval (Morrow 2008).

The three monitoring sites closest to the proposed project are listed in Table 3.2, and the air quality at these locations during the year 2006 is summarized in Table 3.3. As shown by these data, air quality in the area during this year never exceeded the short-term or long-term State or National standards for the pollutants measured.

Table 3.2 Nearby Air Quality Monitoring Stations

Station	*Site Name/Type*	*Description*	*Station Type*				
			PM_{10}	*$PM_{2.5}$*	*CO*	*SO_2*	*NO_2*
7	Makaīwa	Rural/Industrial				S	
8	West Beach	Rural/ Industrial	S			S	
9	Kapolei	Rural/Industrial	S	S	S	S	S

C= Co-located Site
S= State and Local Air Monitoring Stations

Source: DOH (2007)

Table 3.3 Air Quality at Nearby Locations: 2007

Sampling Station	*PM 10 (µg/m³)*			*PM2.5 (µg/m³)*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*98th%*	
Makaīwa	--	--	--	--	--	--
Kapolei	75*	57	17	20	8	3.5
West Beach	28	20	13	--	--	--
	1-Hour Carbon Monoxide (ppm)			*8-Hour Carbon Monoxide (ppm)*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Makaīwa	--	--	--	--	--	--
Kapolei	3.8	0.9	0.2	0.8	0.7	0.2
West Beach	--	--	--	--	--	--
	3-Hour SO_2 (ppm)			*24-Hour SO_2 (ppm)*		
	Highest Values		*Annual Mean*	*Highest Values*		*Annual Mean*
	Highest	*2nd Highest*		*Highest*	*2nd Highest*	
Makaīwa	0.031	0.028	0.0002	0.009	0.008	0.002
Kapolei	0.010	0.008	0.0002	0.003	0.003	0.002
West Beach	0.006	0.006	0.001	0.002	0.002	0.001
	Nitrogen dioxide (ppm)			*1-hour Hydrogen Sulfide*		
	Annual range		*Annual Mean*	*Highest Values*		*Annual Mean*
	Minimum	*Minimum*		*Highest*	*2nd Highest*	
Makaīwa	--	--	--	--	--	--
Kapolei	0.036	0.034	0.005	--	--	--
West Beach	0.032	0.028	0.003	--	--	--

* High attributed to New Year's Eve fireworks.

Notes: PM_{10} samplers operated for 24 hours once every 6 days in accordance with EPA guidelines. $PM_{2.5}$ samplers operated for 24 hours once every 3 days in accordance with EPA guidelines.

As shown by these data, air quality in the area never exceeded the short-term or long-term State or National standards for any pollutant during the period of measurement.

Source: DOH (2007.)

3.4.2 APPLICABLE AIR QUALITY STANDARDS

3.4.2.1 National & State Ambient Air Quality Standards

The U.S. Environmental Protection Agency (EPA) has set national ambient air quality standards (NAAQS) for ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), 2.5-micron and 10-micron particulate matter ($PM_{2.5}$ and PM_{10}), and airborne lead (Pb). These ambient air quality standards establish the maximum concentrations of pollution considered acceptable, with an adequate margin of safety, to protect the public health and welfare. The State of Hawai‘i has also adopted ambient air quality standards (SAAQS) for some pollutants. At present, the State has set

standards for five of the criteria pollutants (excluding $PM_{2.5}$) in addition to hydrogen sulfide (H_2S) (DOH 2007).

Both NAAQS and SAAQS consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is measured. The allowable concentrations are based on studies of the effects of the pollutants on human health, crops, and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposure to a high concentration for a short time (one hour, for instance), or to a lower average concentration over a longer period (8 hours, 24 hours, or one month). For some pollutants there is more than one air quality standard, reflecting both its short-term and long-term effects. Table 3.4 lists the NAAQS and SAAQS for selected pollutants.

Table 3.4 National and State Ambient Air Quality Standards.

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

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: Morrow (2008), DOH (2007)

3.4.2.2 State Air Pollution Control Program

The proposed project will be subject to State of Hawai‘i Administrative Rules (HAR), Title 11, Chapter 60.1, Air Pollution Control, Subchapters 1, 2, 5, 6, 7, 8, and 9. Each of these rules requires, in various forms, descriptions and analyses of the proposed project, its emissions, and its impact on air quality.

Under the State regulations, any proposed new major stationary source requires a Covered Source permit. Hawai‘i Administrative Rules (HAR) Title 11, Chapter 60.1, Subchapter 5 defines a major stationary source as:

> *(1) For hazardous air pollutants, a source … that emits or has the potential to emit considering controls and fugitive emissions, any hazardous air pollutant, except radionuclides, in the aggregate of* ***ten tons per year*** *or more or twenty-five tons per year or more of any combination; or*
>
> *(2) For any other pollutant, a source…. belonging to a single major industrial grouping (i.e., all having the same two-digit Standard Industrial Classification Code) and that emits or has the potential to emit, considering controls,* ***one hundred tons per year*** *or more of any air pollutant.* (Emphasis added).

The proposed Honua Power Project is a new major stationary source because the potential emissions from the gasification and power generation process (at the completion of Phase 2) are expected to exceed 100 tons per year for NO_x and SO_2, and emissions of HCl (considered a hazardous air pollutant) will exceed 10 tons per year. Consequently, the facility will require a Covered Source permit from the State Department of Health.

HAR §11-60.1-140 specifies that in order to obtain a Covered Source permit, a major stationary source must show that it will meet all applicable emissions limitations and performance standards for air quality during operation of the facility. It also requires that a proposed facility apply best available control technology (BACT) for each pollutant that it would have the potential to emit in significant amounts.[22] Table 3.5 below lists significance levels for selected pollutants.

Emissions of NO_x, HCl, and SO_2 at full build-out of the proposed Honua Power facility are expected to exceed their respective significance levels. Consequently, the facility will be required to implement BACT for those pollutants.

HAR §11-60.1-131 contains guidelines for compliance with Prevention of Significant Deterioration (PSD) regulations. The U.S. Environmental Protection Agency created the PSD regulations to regulate development in areas that have achieved the National Ambient Air Quality Standards (NAAQS).[23] O‘ahu is such a region and is therefore subject to the PSD regulations, which are implemented by the State Department of Health. PSD compliance review is required for facilities falling into one of 26 defined categories and emitting 100 tons per year or more of any regulated pollutant, or to facilities not within the defined categories which will emit 250 tons per year or more of any regulated air pollutant. The proposed Honua Power Project does not fall under one of the 26 defined facility categories and will not emit 250 tpy or more of any regulated pollutant; consequently, it is not subject to PSD review.[24]

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[22] "Best available control technology" is an emissions limitation based on the maximum degree of reduction achievable for each regulated pollutant, taking into account energy, environmental, and economic impacts and other costs. BACT can include application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of regulated pollutants. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard promulgated pursuant to 40 CFR Parts 60, 61, and 63.

[23] Areas where the standards are met are called “attainment areas.”

[24] The 26 facility categories subject to PSD review if they emit 100 tpy or more are: (A) Fossil fuel fired steam electric plants of more than two hundred fifty million BTU per hour heat input; (B) Coal cleaning plants (with thermal dryers); (C) Kraft pulp mills; (D) Portland cement plants; (E) Primary zinc smelters; (F) Iron and steel mills; (G) Primary aluminum

Table 3.5 Significance Levels for Selected Airborne Pollutants

Pollutant	*Significance Level (tons per year)*
Carbon Monoxide (CO)	100
Nitrogen Oxides (NO_x)	40
Sulfur Dioxide (SO_2)	40
Particulate Matter (any size)	25
Particulate Matter (10 microns)	15
Ozone (O_3)	40
Lead (Pb)	0.6
Hydrogen Sulfide (H_2S)	10
Hydrogen Chloride (HCl)	40
Source: HAR §11-60.1-1	

In addition to obtaining a Covered Source permit, HAR §11-60.1-31, Subchapter 2 outlines "General Prohibitions" that all air pollution sources are subject to, regardless of whether they require a permit. Following is a summary of the general prohibitions that are applicable to one or more facilities or activities planned for the Honua Power Project.

- §32(b) Visible emissions. Emissions of visible air pollutants (not including uncombined water vapor) from sources modified or constructed after March 20, 1972, may not exceed 20% opacity, except during periods of "start-up and shut-down" and "breakdown of equipment" when emissions may be 60% opacity for not more than 6 minutes in any 60-minute period.
- §33 Fugitive dust. "Reasonable precautions" must be taken to prevent particulate matter emissions during construction or material handling, and "best practical operation or treatment" must be implemented to prevent visible emissions of fugitive dust beyond the property line.
- §34 Motor vehicles. Visible emissions and engine idling time for mobile sources used in the construction, maintenance, and operation of the facility must comply with the requirements of this section.
- §38 Sulfur oxides from fuel combustion. This section limits fuel sulfur content to 2% by weight and is applicable to the facilities proposed for the Honua Power Project.

3.4.2.3 Federal New Source Performance Standards

Standards of Performance for New Stationary Sources are source-specific federal regulations limiting the allowable emissions of criteria pollutants (i.e., those that have a NAAQS) and their precursors (40 CFR 60). EPA has delegated this program to the State of Hawai‘i (40 CFR 60.4). The proposed boiler is subject to new source performance standards (NSPS) under 40 CFR 60, Subpart Dc – *Small Industrial-Commercial-Institutional Steam Generating Units* because its fuel heat input is greater than 10 but less than 100 million BTU per hour (MMBTU/hr). Since the boiler will be fired on a synthetic gas ("Syngas") and will not be fired on coal, oil or wood, it will only be subject to reporting

ore reduction plants; (H) Primary copper smelters; (I) Municipal incinerators capable of charging more than fifty tons of refuse per day; (J) Hydrofluoric, sulfuric, and nitric acid plants; (K) Petroleum refineries; (L) Lime plants; (M) Phosphate rock processing plants; (N) Coke oven batteries; (O) Sulfur recovery plants; (P) Carbon black plants (furnace process); (Q) Primary lead smelters; (R) Fuel conversion plants; (S) Sintering plants; (T) Secondary metal production plants; (U) Chemical process plants; (V) Fossil fuel boilers (or combinations thereof) totaling more than two hundred fifty million BTU per hour heat input; (W) Petroleum storage and transfer units with a total storage capacity exceeding three hundred thousand barrels; (X) Taconite ore processing plants; (Y) Glass fiber processing plants; and (Z) Charcoal production plants.

requirements specified in Subpart Dc. This subpart contains no specific emission limits or monitoring requirements for sulfur dioxide (SO_2) or particulate matter (PM) for gas-fired boilers.

3.4.2.4 National Emissions Standards for Hazardous Air Pollutants

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

The facility will be subject to NESHAPS because its projected emissions of hydrogen chloride (HCl) make it a "major source" of hazardous air pollutants (HAP), and the U.S. Environmental Protection Agency has failed to promulgate required emission standards by the applicable statutory deadline for industrial and commercial boilers (see 40 CFR 63.50). Honua Power will be required to implement maximum available control technology ("MACT") to ensure that its HAP emissions are minimized.[25]

3.4.3 PROBABLE IMPACTS & MINIMIZATIONS MEASURES

3.4.3.1 Construction Air Quality Impacts

Construction activities at the proposed Honua Power Project site will generate two types of air emissions: (i) exhaust emissions from construction vehicles and (ii) fugitive dust from earthmoving operations. All of the construction-related emissions would be short-term in nature and largely limited to the project site. Consequently, none would be substantial so long as proper pollution control measures are implemented as part of the construction work. Honua Power will require the contractor to limit fugitive dust emissions in compliance with HAR 11-60.1-33 (e.g., through the use of such measures as regular watering).

3.4.3.2 Operational Air Quality Impacts

Operation of the proposed Honua Power Project has the potential to affect ambient air quality in several ways. The most important is through air emissions resulting from the gasification and power generation processes. Operation of the feedstock storage and substation components of the project will not have measurable impacts on air quality; the primary emissions associated with those would be the temporary dust and exhaust from the construction vehicles used to install the equipment (see Section 3.4.3.1 above).

3.4.3.2.1 Air Quality Impacts from Gasification and Power Generation Process

Table 3.6 summarizes the anticipated facility emissions based on the feedstock material entering the plant and the planned pollution control measures. As mentioned previously, the anticipated NO_x and SO_2 emissions are greater than 100 TPY and thus trigger the Covered Source permit requirements described in Section 3.4.2.2. HCl emissions exceed the 10 TPY threshold for "major sources" of HAPs thus triggering the requirements described in Section 3.4.2.4. Emissions of volatile organic compounds (VOC) and the other HAPs listed in Table 3.6 are all well below regulatory thresholds and trigger no additional requirements.

NO_x will be controlled by a staged combustion burner in the boiler which inhibits the oxidation of nitrogen (N_2) in the air to NO_x. SO_2 and HCl will be controlled by injection of alkaline sorbent into the flue gas stream which reacts with the acid gases to form neutral salt particles which are then collected by the baghouse filters along with other particulate matter (PM) emissions. Carbon powder injected into the flue gas will collect volatile organic compounds by adsorption on the carbon particle surfaces with final collection again occurring in the baghouse.

[25] "Maximum achievable control technology" is defined as the maximum degree of reduction in emissions of the hazardous air pollutants, on a case-by-case basis, taking into consideration the cost of achieving such emission reduction and any non-air quality health and environmental impacts and energy requirements, that is deemed achievable.

Honua Power submitted an application for an Initial Covered Source permit for Phase I of the project from the Clean Air Branch of the SDOH. The application satisfies all the requirements of HAR §11-60.1 Subchapter 5 - Covered Sources. When Phase II is proposed, Honua Power will submit a permit modification request.

Once the facility is operational, Honua Power will monitor and record visible emissions on a monthly basis. The facility will also keep records of operating hours, Syngas firing, and equipment inspections, maintenance, and repair. In accordance with SDOH requirements, Honua Power will submit annual performance and emissions reports and an annual compliance certification for the facility to the SDOH.

Table 3.6 Estimated Annual Emissions from 12 MW Honua Power Project

Pollutant	*Emissions (tons)*
NO_x	143
SO_2	185
CO	26
PM	24
VOC	15
HCl	94
Lead (Pb)	0.90
Arsenic (As)	0.31
Mercury (Hg)	0.0016
Dioxins/Furans	0.00011
Source: Honua Power Project Air Quality Impact Report (Morrow 2008).	

3.4.3.2.2 Overall Impacts on Ambient Air Quality

Honua Power commissioned a computer modeling analysis in order to assess the impacts of the proposed facility's emissions on ambient air quality in the project area and determine its compliance with National and State ambient air quality standards. The analysis employed EPA's Industrial Source Complex (ISC3)[26] short-term model. The following data was used as input to the model:

- Proposed new boiler operating parameters and building/structure dimensions;
- Dimensions of nearby buildings and structures;[27]
- 1 year of meteorological data;[28] and
- Digital terrain data.[29]

The results of the modeling analysis are presented in Table 3.7 below. They demonstrate that the facility at full buildout will be in compliance with the ambient standards described in the preceding sections. As emissions from the first phase alone will be only half this, it follows that it will also comply with the applicable limits.

[26] U. S. Environmental Protection Agency. User's Guide for the Industrial Source Complex (ISC3) Dispersion Models - Volume 1- User Instructions, EPA-454/B-95-003a, September 1995.

[27] EPA's Building Profile Input Program 23 was used to process the building dimensions for input to the ISC3 model. This was necessary in order to account for the effects of building induced aerodynamic downwash which can cause high ground level pollutant concentrations.

[28] State of Hawai'i, Department of Health. AES Barbers Point meteorological data set (1992) preprocessed for use with the ISC3 model.

[29] U. S. Geological Survey. Digital Elevation Model (DEM) - Ewa Quadrangle, 1998.

Table 3.7 Ambient Air Quality Modeling Results for 12 MW Honua Power Project

Pollutant	*Averaging Period*	*Concentration (μg/m³)*		
		Plant	**Existing Background***	**Total**
NO_2	Annual	18	7	25
SO_2	Annual	9.9	5	14.9
	24-hr	134	8	142
	3-hr	304	26	330
CO	8-hr	36	912	948
	1-hr	53	4,300	4,353
PM_{10}	Annual	1.3	17	18.3
	24-hr	17	57	74
Pb	Month	0.13	n/a	0.13
Note: * 2007 Data from DOH Kapolei monitoring station.				
Source: Honua Power Project Air Quality Impact Report (Morrow 2008).				

3.4.3.2.3 Air Quality Impacts from Other Project-Related Activities

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

3.5 SURFACE WATER

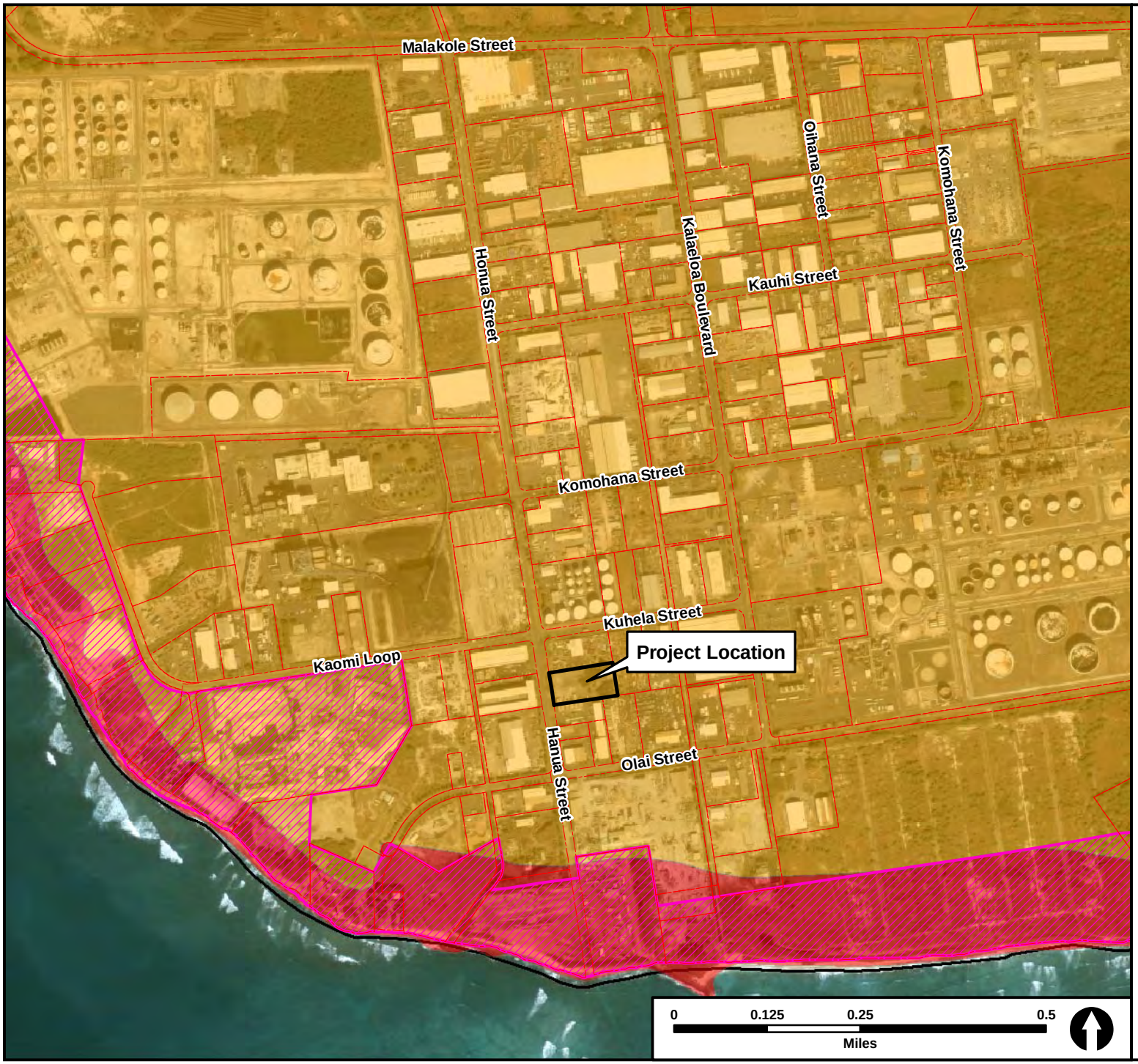
3.5.1 EXISTING SURFACE WATER FEATURES

There are no lakes or perennial streams in the project area, and it is not in a flood hazard area (see Figure 3.3). Storm water runoff from Campbell Industrial Park leaves via a system of storm drains, swales and manmade channels that lead to the public storm water system along Hanua Street. The nearest tidally influenced waters are the Pacific Ocean (approximately 2,000 feet to the east) and the Barbers Point-Kalaeloa Harbor, which is nearly a mile from the project site. There are no wetlands on or neighboring the site in question.

3.5.2 EXISTING STORM WATER RUNOFF

At present, storm water runoff within the property flows from northeast to southwest across the site. It is intercepted by the existing paved driveway, conveys runoff away from the property before it enters Hanua Street, flowing down the driveway and into the gutters on the side of the street. From there it flows along the street gutter and into the catch basin that is located near the entrance drive to the proposed project.

Lyon Associates (January 2009) investigated existing drainage conditions on the project site and evaluated how these would change if the proposed work were undertaken. It based its calculations on the City and County of Honolulu's *Rules Relating to Storm Drainage Standard* (January 2000), and the findings from the Lyons Associates report serve as the principal basis of the information presented below.



Legend:

TMK Parcel Boundaries

Special Management Area (SMA)

Legend:

Zone A; a 1% Annual Chance/100 Year Floodplain.

Zone D; an area of undetermined but possible flood hazards.

Prepared For:

Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Source:

-City & County of Honolulu GIS
-State of Hawaii GIS
-Space Imaging, Inc.

Figure 3.3:

Flood Hazard Map

Honua Power Project

Figure 3-3 Flood Hazard Map 2009-06-05.mxd

Since the project site is less than 100 acres, Lyon Associates used the Rational Method in its analysis. That methodology estimates the total runoff as the product of the runoff coefficient, the magnified rainfall intensity, and the drainage area.

Q = CIA, where:

Q= Flow rate (cubic feet per second)
C= Runoff Coefficient
I = Magnified Rainfall Intensity (in inches/hour)
A =Drainage Area (in acres)

The runoff calculations incorporated the following assumptions:

- Time of Concentration was estimated to be 15 minutes for the existing drainage system due to the relatively flat ground profile (slopes are less than 1%). For the "with project" situation (where the slopes would be 1 to 2%), the time of concentration was assumed to be 10 minutes.
- Runoff Coefficient for the site as conservatively assumed as 0.35 for the bare ground. The with-project runoff coefficient was estimated using a weighted average of the different surfaces expected to be present.
- Magnified 1-Hour Rainfall Intensity was estimated (using Plates 1 and 2 from the Storm Drainage Standards) at 1.8 inches for the 10-year design event and 2.5 inches for the 50-year design event.

The magnified rainfall intensity from the 10-year and 50-year storm events was calculated using the following:

Type of Cover	Tc (min.)	CF	I (10-year)	I (50-year)
Bare Soil	15	2	3.6 inches	5.0 inches
Source: Lyon Associates, January 2009, Table 2.				

Based on this, Lyon Associates (January 2009) estimated the existing runoff from the 10-year and 50-year storm events as shown in Table 3.8.

Table 3.8 Existing Runoff from 1-Hour Rainfall with 10- & 50-Year Recurrence Intervals

C	Inches of Rainfall		Area (in acres)	Q (cfs)	
	10-Year	50-Year		10-Year	50-Year
0.35	3.60	5.00	2.18	2.75	3.81
Source: Lyon Associates, January 2009, Table 3.					

3.5.3 "WITH-PROJECT" STORM RUNOFF

As discussed in Section 3.5.1 above, there are no surface water features on or near the Honua Power site or along the area that would be disturbed during construction of the proposed facility. All rainfall percolates into the ground, evaporates, or runs off into the Pacific Ocean following overland flow routes and the existing Campbell Industrial Park storm drainage system.

Construction of the proposed project will alter the ground cover and create three sub-areas within the existing single drainage unit that makes up the site. The magnified rainfall intensity for those areas and the anticipated runoff for 1-hour rainfall events with 10-year and 50-year recurrence intervals are shown in Table 3.9.

Table 3.9 With-Project Magnified Rainfall Intensity, by Sub-Area

Drainage Area	*Type of Cover*	*Tc (min.)*	*CF*	*I (10-year)*	*I (50-year)*
A	Paved Industrial	10	2.29	3.6 inches	5.0 inches
B	Lawns, Paved, Industrial				
C	Paved Industrial				
Note: The drainage area boundaries are shown on Figure 3.4.					
Source: Lyon Associates, January 2009, Table 4.					

Based on this, the "with-project" runoff from the 10-year and 50-year storm events was estimated as shown in Table 3.10.

Table 3.10 "With-Project" Runoff: 1-Hour Rainfall w/10- & 50-Year Recurrence Intervals.

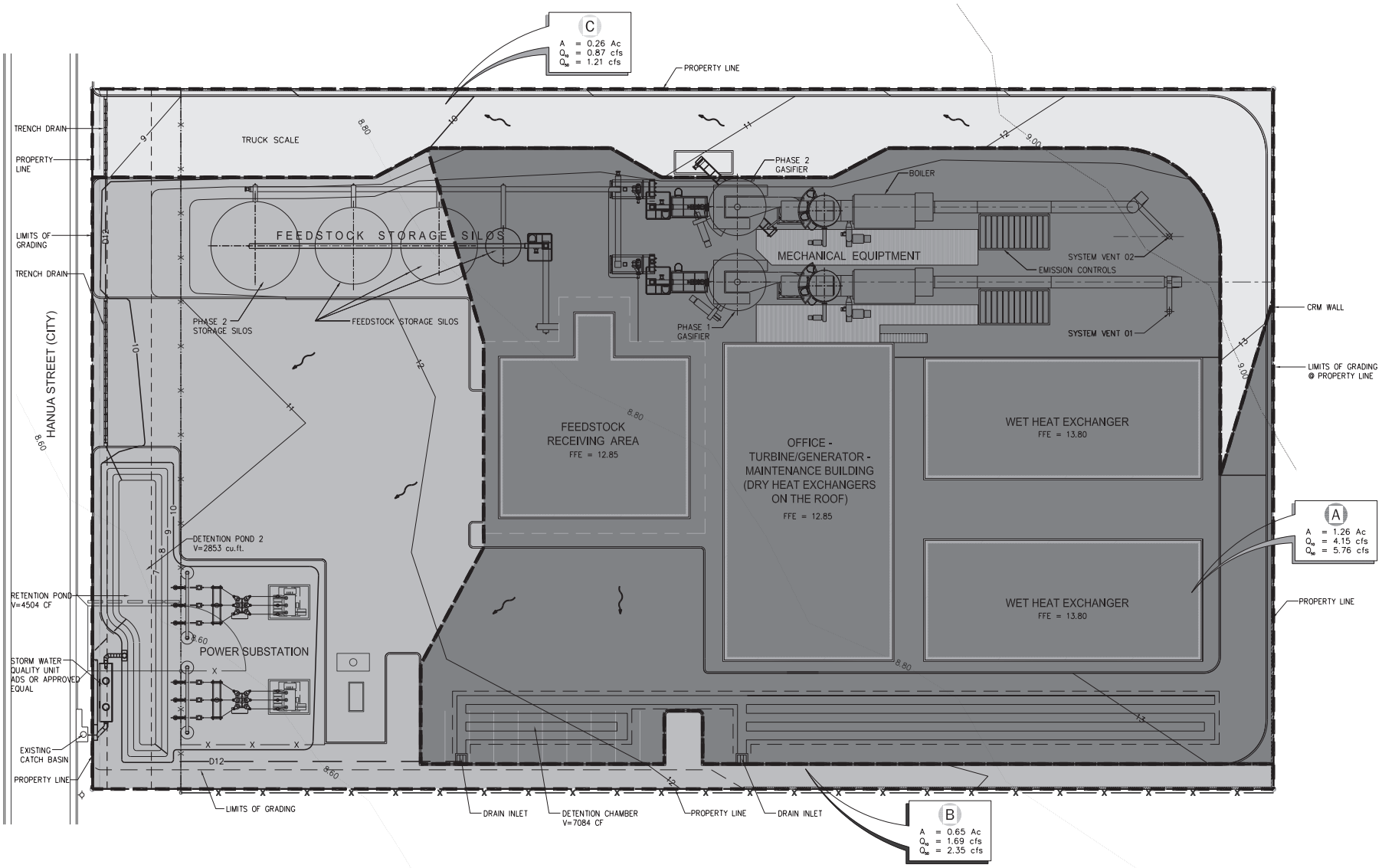
Drainage Area	*C*	*Inches of Rainfall*		*Area (in acres)*	*Q (cfs)*	
		10-Year	*50-Year*		*10-Year*	*50-Year*
A	0.80	4.12	5.72	1.26	4.15	5.76
B	0.63	4.12	5.72	0.65	1.69	2.35
C	0.80	4.12	5.72	0.26	0.87	1.21
Source: Lyon Associates, January 2009, Table 5.						

3.5.4 ABILITY OF SYSTEM TO ACCOMMODATE ANTICIPATED STORM WATER RUNOFF

The site will be graded to prepare the site for the proposed facilities. Since it is relatively flat, a retaining wall will be constructed prior to grading, this will make it possible to attain slopes of 1-2 % required by the City Standards for the driveway and walkways. Drainage Areas A and C will discharge towards the retention pond that is planned (see Figure 3.4). Runoff from Drainage Area B will be accommodated by the underground detention chambers. These facilities are described below.

Required Detention Capacity. The detention ponds provided in the proposed design are designed to accommodate all runoff from a 1-hour rainfall event having a recurrence interval of 50 years before starting to discharge to the off-site storm drainage system. Two different methods were used to determine the appropriate sizing of the pond. The first, the simplified hydrograph method resulted in an estimated storage capacity requirement of 9,918 cubic feet.[30] The second method was the City and County of Honolulu method that uses the percentage of pervious and impervious areas to determine the runoff coefficient resulted in a pond storage volume estimate of 6,701 cubic feet. In the end, choosing the more conservative of the two estimates, they used the higher of the two estimates (i.e., 9,918 cubic feet) as the basis for the detention system design.

[30] In arriving at this estimate the engineers doubled the time of concentration (increasing it from 10 to 20 minutes), which led to a calculated storage requirement that is twice that which would otherwise have been estimated.



Prepared For:

Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Source:

Honua Power, LLC

Legend:

PROPERTY LINE	
EXISTING MAJOR CONTOUR	9.00
EXISTING MINOR CONTOUR	8.00
PROPOSED MAJOR CONTOUR	9.00
PROPOSED MINOR CONTOUR	8.00
EXISTING DRAINAGE LINE	
SURFACE FLOW	

20' 0 20' 40' 60'

Feet

Figure 3.4:

Drainage Area Boundaries

Honua Power Project

Figure 3-4 Drainage Area Boundaries 2009-06-05.cdr

Capacity of Proposed Underground Chambers. The project design calls for the installation of an underground storm water retention / detention pipe system with a capacity of 7,084 cubic feet beneath the driveway; these will collect runoff from Area B. The system consists of a 42-inch system with one lateral that is 260 feet long, two 165-foot-long laterals, and two 60-foot wide laterals. During most rainfall events, the collected water will percolate out of the system and into the ground. Only during larger rainfall events will runoff leave the system. In those events it will be piped towards the treatment system and outlet described below before being discharged to Hanua Street.

Capacity of Proposed Retention/Detention Pond. The proposed plan provides an above-ground retention/detention pond located between the electrical substation and Hanua Street to provide just over 4,000 cubic feet of storage capacity.

3.5.5 MITIGATION MEASURES FOR STORM WATER

The proposed system will not discharge to the area's storm drainage system until after the capacity of the on-site storm water detention/retention systems has been exceeded. Once that occurs, the system will begin releasing storm water through the outlet to the Hanua Street system.

An ADS® Water Quality System Unit (WQU) will be installed at the retention/detention pond outlet to control the water quality before it will be released to the street catch basin. This unit is constructed from a 60-inch diameter HDPE pipe with a series of weirs for removal of coarse solids and floatables. The infiltration unit (IU) consists of three, 40-foot sections of 48-inch diameter, perforated HDPE pipe, laid over an infiltration base composed of two feet of bank run gravel. The top and sides of the excavation basin are wrapped in non-woven geotextile to protect the system from the migration of fine particles from the surrounding soil. Storm water flows of one cubic foot per second (cfs) enter the treatment train through the WQU and then flow into the IU. Flows exceeding one cfs bypass the WQU and flow directly into the IU, which prevents the re-suspension of solids.

Because the area disturbed during site preparation will exceed one acre, the contractor will obtain coverage under the State of Hawai‘i NPDES General Permit program (HAR §11-55, Appendix C) for construction of the facility. Storm water runoff during construction will be contained and minimized through the use of BMPs.

3.6 GROUNDWATER

3.6.1 GROUNDWATER OCCURRENCE BENEATH THE HONUA SITE

The project site is located within the Malakole Sector of the ‘Ewa (Limestone) Caprock Aquifer (Aquifer Code 30207 as designated by the State of Hawai‘i Water Use Commission). As described in more detail below, the groundwater underlying the project area is non-potable and is comprised of an upper brackish to saline aquifer that is hydrologically isolated from a lower aquifer of seawater salinity by an impermeable layer of calcareous silt and siltstone. The three existing power generation plants in the JCIP (HPOWER, Kalaeloa Power Partners, and AES Hawaii) all use the upper aquifer as a source of cooling water supply and the lower, confined aquifer for disposal of this water at somewhat elevated temperatures. Table 3.11 and Table 3.12 present dimensions and depths of the supply and disposal wells at these plants.

There are three physically separate groundwater aquifers beneath the Honua project site, two in the calcareous caprock formation and the third in the volcanics at depth beneath the caprock. Their characteristics are described below.

Table 3.11 Information on the Supply Wells at the Three Power Generation Plants in JCIP

State No.	*Owner/User*	*Year Installed*	*Casing Diameter (inches)*	*Well Depth (feet)*	*Elevations Open to the Aquifer (Feet MSL)*	*Capacity of Installed Pump (GPM)*	*Hydraulic Performance Drawdown (Ft.) @ Flow rate (GPM)*
1806-09	City & County / HRRV	1986	18	103	-38 to -91	1,450	1.8 @ 3,030
1806-10	City & County / HRRV	1986	18	105	-38 to -93	1,450	4.7 @ 3,070
1805-04	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.11 @ 340
1805-05	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.70 @ 340
1805-06	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.60 @ 340
1805-07	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.23 @ 340
1805-08	Kalaeloa Partners, LLC	1990	11	25	-3 to -12	200	0.23 @ 340
1805-09	Kalaeloa Partners, LLC	1990	14	40	-3 to -26	350	0.23 @ 870
1806-11	AES Hawaii, Inc	1989	20	115	-48 to -103	3,000	19 @ 4,500
1806-12	AES Hawaii, Inc.	1990	20	124	-24 to -111	3,000	2.4 @ 3,027
1806-13	AES Hawaii, Inc.	1990	20	124	-26 to -113	3,000	1.3 @ 2,000
1806-14	AES Hawaii, Inc.	1990	20	125	-24 to -112	3,000	5.1 @3,021

Source: Tom Nance Water Resource Engineering, Inc.

Table 3.12 Information on the Disposal Wells at the Three Power Generation Plants in JCIP

Well Name	*Owner/User*	*Year Installed*	*Casing Diameter (inches)*	*Elevations Open to the Aquifer (Feet MSL)*	*Hydraulic Performance Drawdown (Ft.) @ Flow rate (GPM)*
North	City & County / HRRV	1986	16	-188 to -244	14.5 @ 535
South	City & County / HRRV	1986	16	-193 to -414	16.8 @ 530
No. 1	Kalaeloa Partners, LLC	1989	12	-210 to -292	4.2 @ 600
No. 2	Kalaeloa Partners, LLC	1989	12	-210 to -294	5.0 @ 575
A	AES Hawaii, Inc.	1989	16	-200 to -405	8.0 @ 2500
B	AES Hawaii, Inc.	1991	16	-207 to -404	2.6 @ 2700
C	AES Hawaii, Inc.	1991	16	-200 to -410	3.2 @ 1800
D	AES Hawaii, Inc.	1991	16	-200 to -410	7.3 @ 2900

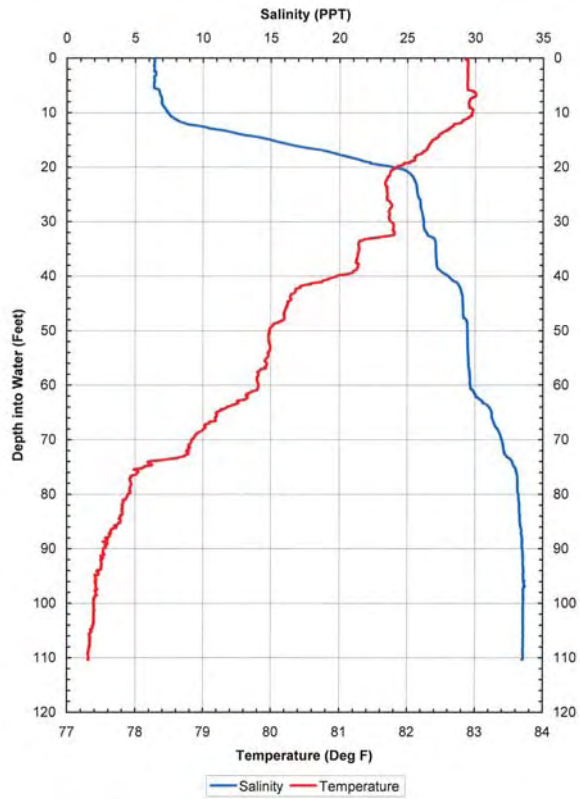
Source: Tom Nance Water Resource Engineering, Inc.

Upper Caprock Aquifer. The uppermost 100 to 120 feet on the *makai* half of the ‘Ewa Plain where JCIP is located consists of reef material composed of roughly equal parts of consolidated limestone and limestone rubble. Solution cavities are common in this material in the vicinity of the Honua project site, and these cavities contribute significantly to the formation's substantial permeability on a macro-scale. In this upper layer of the caprock, groundwater occurs as a brackish basal lens floating on seawater.

Figure 3.5 and Figure 3.6 contain salinity and temperature profiles of the upper caprock aquifer in boreholes that are 2,000 feet southeast (Figure 3.5) and 3,500 feet northwest (Figure 3.6) of the

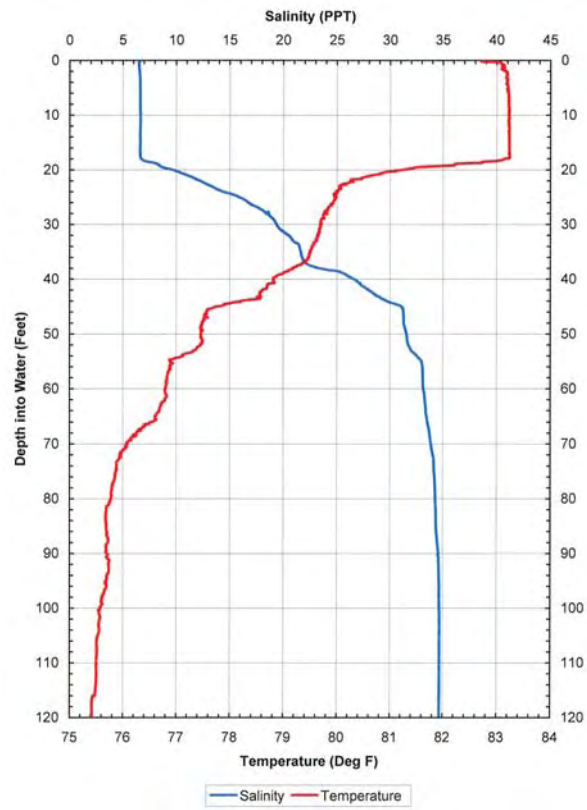
Honua project site. These profiles have remarkably similar characteristics: salinity of 6 to 7 parts per thousand (PPT) at the surface and near seawater salinity (30 PPT or greater) at depth; and warm water in the brackish layer (about 83° F) near the surface and cooler water (76° to 77° F) in the saline water at depth. They differ in two ways. The first is in the thickness of the brackish layer (10 feet southeast of the Honua site and 20 feet in the borehole to the northwest). The second is in the sharpness of the transition zone, this latter being primarily the result of differences in the permeabilities of the formations. Tidal fluctuations in this aquifer at the Honua site lag three to four hours behind the ocean tide and are 50 to 60 percent of the tidal amplitude.

Figure 3.5 Salinity and Temperature Profiles through the Upper Caprock Aquifer at the Grove Farm Hatchery Well (State No. 1705-01) on October 25, 2006.



Source: Tom Nance Water Resource Engineering, Inc., April 2008, Figure 4.

Figure 3.6 Salinity and Temperature Profiles through the Upper Caprock Aquifer at the HECO CIP Generating Station Site.



Source: Tom Nance Water Resource Engineering, Inc., April 2008, Figure 5.

The three existing cogeneration plants in JCIP that are near the site of the proposed project (AES, Kalaeloa, and HPOWER) all draw water from this upper aquifer for cooling purposes. A fourth power plant now under construction by HECO in JCIP will utilize water from the upper aquifer as one of three alternative sources of supply.

Lower (Confined) Aquifer in the Caprock. To the extent it has been delineated by boreholes of sufficient depth, there is a distinctly separate lower and confined aquifer in the caprock formation across the entire *makai* half of the ‘Ewa Plain. In the vicinity of the Honua Power project, the

limestone strata in which this aquifer resides is estimated to be 200- to 400-feet below ground. On a macro-scale, and based primarily on differences in lag and attenuation of the tidal signal, the strata which contain the lower aquifer are even more permeable than the strata in which the upper aquifer resides. The intervening aquitard separating the two aquifers is poorly permeable marine material consisting of calcareous mud, chalky limestone, and/or silty sand.

In JCIP, this second (confined) aquifer is used exclusively for disposal. Use for this purpose was begun in 1994 by all three of the existing cogeneration plants. Prior to this use, the aquifer's salinity was on the order of 32 to 35 PPT (ocean water is 35 PPT), its temperature was 76° to 78° F (essentially the same as seawater above the thermocline), and its piezometric head was a small fraction of a foot above the mean ocean level. Today, as a result of the ongoing disposal by the cogeneration plants tabulated characterized in Table 3.13, the aquifer's piezometric head in the vicinity of the ongoing disposal has been raised to 3.5 to 4.0 feet above the ocean level and its salinity and temperature are locally reflective of the water being delivered into it (refer to the salinity and temperature profiles on Figure 3.7 and Figure 3.8 of the confined aquifer at the Kalaeloa and AES plants).

Table 3.13 Disposal into the Second (Confined) Aquifer by JCIP Cogeneration Plants

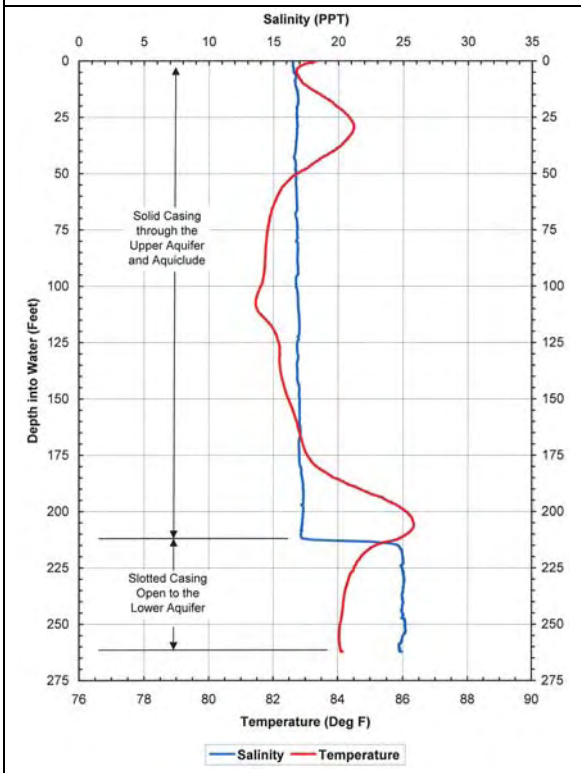
Cogeneration Plant	*Disposal Rate (MGD)*	*Salinity (PPT)*	*Temperature (°F.)*	*Distance From Honua Site (Feet)*
AES	7.5	32.7	76	2300
Kalaeloa PSEG	0.6	27.5	81	1600
HPOWER	0.6	45	86	2550
Source: Tom Nance Water Resource Engineering, Inc.				

A recently drilled borehole on the HECO CIP power plant site provides some insight on the movement of water delivered by the three existing cogeneration plants into the lower, confined aquifer. With the borehole at a depth of 160 feet (i.e., with its bottom within the aquiclude between the two aquifers), the salinity and temperature profiles reflected conditions in the upper aquifer (this profile is shown on Figure 3.6). As drilling progressed into the lower aquifer and encountered its higher piezometric head, water from the lower aquifer moved up the borehole and displaced the upper aquifer water (Figure 3.9).

When the aquiclude is not breached by a borehole, in-situ conditions of the two aquifers are as presented on Figure 3.10 (a composite of Figure 3.6 and Figure 3.9). At this location, water in the confined aquifer is hypersaline (salinity of 44 to 45 PPT) and warm (84° to 85° F). It is essentially identical to the salinity and temperature of water disposed of at the adjacent HPOWER site into the lower aquifer. This indicates that the ongoing disposal at AES, which is an order of magnitude greater than at HPOWER, has pushed the water disposed of at HPOWER to the north rather than allowing it to go directly west toward the shoreline.

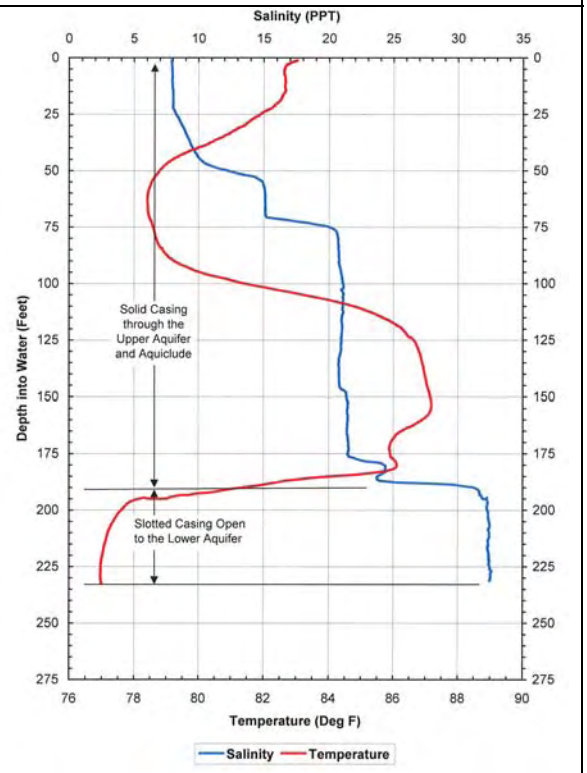
Saline Groundwater in the Volcanics at Depth Beneath the Caprock. The interface between the caprock formation and the volcanics beneath the caprock is likely to be on the order of 900 to 1,000 feet below ground at the Honua project site. Based on the salinity and temperature profile of a deep borehole at Ko Olina shown on Figure 3.11, water in the volcanics beneath the Honua site is of seawater salinity (35 PPT) and quite cold (61° to 64° F). Groundwater in the volcanics is hydrologically isolated from groundwater in the two caprock aquifers described above. None of the activities related to the Honua project will impact the saline groundwater in the volcanics.

Figure 3.7 Salinity and Temperature Profiles of the Deep Monitor Well at the Kalaeloa Cogeneration Plan.



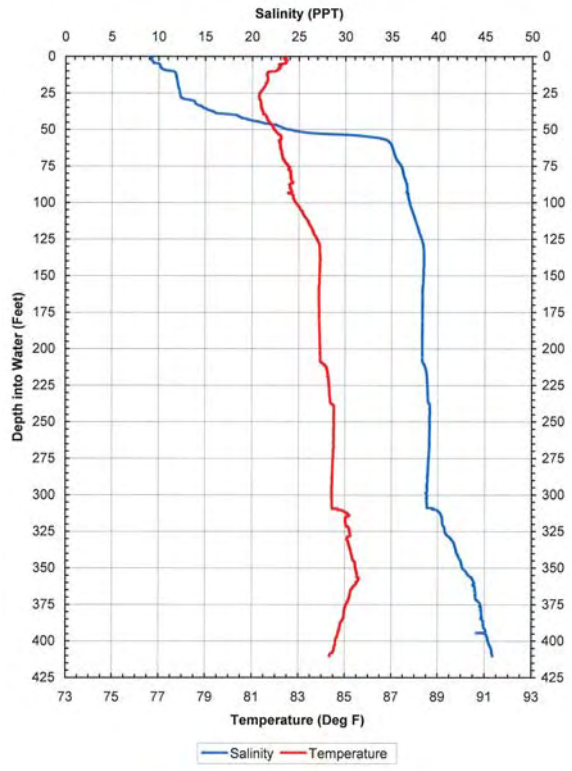
Source: Tom Nance Water Resource Engineering, Inc., April 2008, Figure 6.

Figure 3.8 Salinity and Temperature Profiles of the Deep Monitor Well at the AES Cogeneration Plant.



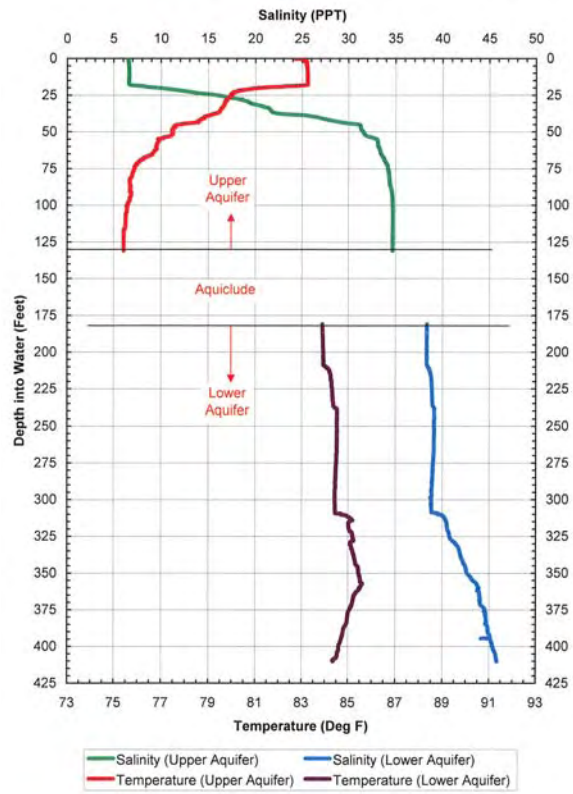
Source: Tom Nance Water Resource Engineering, Inc., April 2008, Figure 7.

Figure 3.9 Profile in a Deep Borehole on the HECO CIP Site.



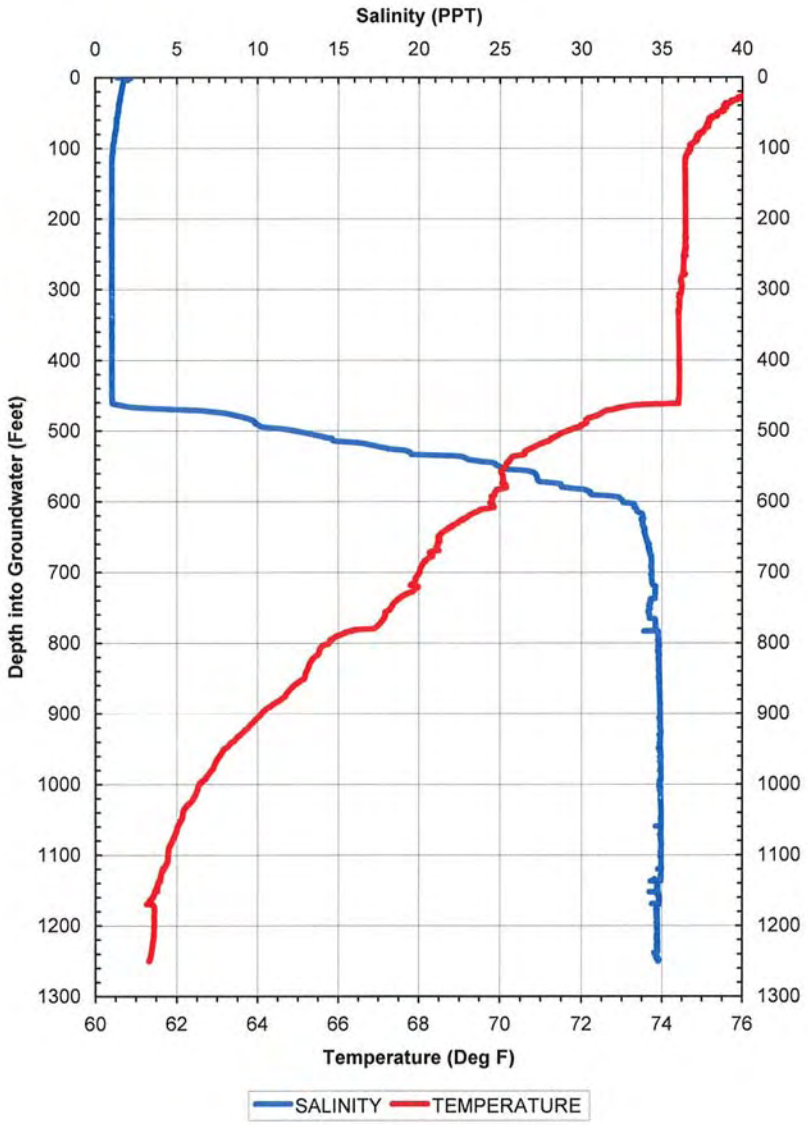
Source: Tom Nance Water Resource Engineering, Inc., April 2008, Figure 8.

Figure 3.10 Salinity and Temperature Profiles in the Upper and Lower Aquifers at the HECO CIP Site.



Source: Tom Nance Water Resource Engineering, Inc., April 2008, Figure 9.

Figure 3.11 Salinity and Temperature Profiles of the Saltwater Well at Ko Olina Resort



Note: State Well No. 1906-12 as recorded on July 25, 2006.

Source: Tom Nance Water Resource Engineering, Inc., April 2008, Figure 8.

3.6.2 PROBABLE IMPACTS ON GROUNDWATER RESOURCES

There are six potential impacts to groundwater resources to assess:

- use of 400,000 to 550,000 GPD drawn from the upper limestone aquifer;
- disposal of 55,000 to 202,000 GPD of industrial wastewater into the lower, confined aquifer;
- disposal of domestic wastewater in an onsite leach field;
- storm water runoff discharged from the site into the Hanua Street drainage system;
- use of 31,200 GPD from the BWS potable system; and

- use of about 4250 GPD from BWS' RO/R1 treated wastewater effluent system. Each of these is discussed below.

3.6.2.1 Drawing Water From the Upper Limestone Aquifer

One well with a pumping capacity of up to 380 GPM would be capable of supplying the water needed for the project's cooling system. Using a wet sump configuration, two or more pumps (one serving as a backup) could draw from this single well. As the well would draw water from the Malakole Aquifer System, a Water Use Permit (WUP) would be required from the State Commission on Water Resource Management (CWRM). As of March 2009, the Malakole Aquifer had 17 WUPs issued for 37 wells and a combined allowed use of 46.536 million gallons per day (MGD). However, actual pumpage is approximately 10 MGD or a little over 20 percent of the authorized use. Due to the saline character of the aquifer's water, the CWRM has not set a sustainable yield limit for the aquifer.

Since the proposed use fits the CWRM's "reasonable/beneficial" criterion, there is no reason not to grant a WUP for the proposed water use. The pumping rate would be too small to have a discernable impact beyond the immediate project area and therefore would have no adverse impact on existing or foreseeable uses of the aquifer.

3.6.2.2 Process Wastewater Discharge in Onsite Wells

The quantity of process wastewater to be discharged, on the order of 55,000 to 202,000 GPD at the completion of Phase 2 (12 MW of power), is actually quite small in comparison to ongoing disposal elsewhere in JCIP. It would be about an order of magnitude less than at the Kalaeloa and HPOWER cogeneration plants and about two orders of magnitude less than at AES. Discharge would be into the lower, confined aquifer, to be consistent with the established practice in JCIP and to avoid any impact on ongoing use of the upper aquifer. Two disposal wells would be installed, with one providing full backup capacity for the other. Subject to modification when the actual drilling is done, the wells would be 400 feet deep and be completed with 200 feet of solid and 200 feet of slotted, Schedule 80 PVC casing.

Development and use of such wells is regulated by the Underground Injection Control section in the State Department of Health (DOH-UIC). In comparison to the receiving groundwater, the discharged water would be substantially more saline (salinity of about 80 to 95 PPT versus 34 PPT in the groundwater). The lower, confined aquifer is used exclusively for wastewater discharge by the existing cogeneration plants. Given that the quantities that would be disposed of at the Honua site would be modest and at some distance from the ongoing disposals, no adverse impact on these activities would occur. The hypersaline water would move toward and eventually discharge into the marine environment offshore. Mixing would readily dilute the discharge to background salinity levels.

3.6.2.3 Domestic Wastewater Treatment and Disposal in a Septic Tank and Leach Field System

Sewer service from the C&C of Honolulu is not available in JCIP *makai* of Malakole Road. Essentially all tenants use individual onsite wastewater treatment and disposal systems such as will be used for the Honua project. At present, total wastewater disposal in this manner in JCIP amounts to several hundred thousand gallons per day (based on potable water use numbers). The addition of about 320 GPD by the Honua project would not represent a significant increase. The wastewater would percolate to the upper caprock aquifer and ultimately be discharged along the JCIP shoreline. This discharge will not impair any of the ongoing uses of the upper caprock aquifer and its quantities are far too small to have a discernable impact on water chemistry or marine life in nearshore waters.

3.6.2.4 Discharge of Storm Water Runoff

With regard to conveyance capacity, the drainage system within JCIP was designed in anticipation of an increase in runoff due to full development and occupancy of the industrial park. However, the project's design intent, as discussed above in Section 3.5.4, the project design provides sufficient storm water retention/detention storage so that the peak discharge from the site is no greater than in its present, undeveloped state. The proposed 11,580 cubic feet of storage is greater than the

computed 9,918 cubic feet that would be required to achieve this during a 50-year, one-hour storm. The proposed storage is also greater than the volume of runoff from a one-inch rainfall (equivalent 6,700 cubic feet). This meaning that it exceeds the City and County of Honolulu drainage standards for water quality purposes. As such, no negative impact due to storm water runoff from the site is anticipated.

3.6.2.5 Use of Water From the BWS Potable System

At full build-out, the project would use about 31,200 GPD from BWS' municipal (potable) system. BWS' infrastructure is in place to provide this supply and, with the addition of the 'Ewa Shaft (State No. 2202-21) to its sources supplying uses on the 'Ewa Plain, BWS will also have sufficient sources as well.

3.6.2.6 RO/R1 Effluent From the Honouliuli Wastewater Treatment Plant (WWTP)

The project will use about 4,250 GPD of effluent from the Honouliuli WWTP that has been first treated to R1 standards and then passed through reverse osmosis filtration to remove dissolved solids, making it suitable for use in the project's boiler system. Similar use is made of this high quality effluent at the existing cogeneration plants in JCIP. To access this source, the project will have to install a pipeline connection in Hanua Street. This proposed reuse is exactly what the RO/R1 system was designed for.

3.7 BIOTA

3.7.1 EXISTING CONDITIONS

3.7.1.1 Terrestrial and Avian Biota

Currently, Campbell Industrial Park is devoted exclusively to industrial uses and is mostly covered with pavement and buildings. The Phase 1 Environmental Site Assessment for the Honua Power Project noted that groundcover at the site generally consists of bare soil with limited areas of asphalt. The site is presently vacant except for a few remaining used tires and automotive parts.

The biological survey that was conducted on the proposed Honua Power site (David 2008) noted that vegetation on the site is sparse, with plants growing in the few areas that are not paved or covered with tires, trucks or other material. There is an ornamental oleander (*Nerium oleander*) hedge growing along the fence line that separates the site from Hanua Street. The hedge appears to be maintained, although the remaining plants on the site do not appear to be. Other vegetation observed on the site included the following species: koa haole (*Leucaena leucocephala*), sourbush (*Pluchia carolinensis*), tree tobacco (*Nicotiana glauca*), coat buttons (*Tridax procumbens*), teasel gourd (*Cucumis dipsaceus*), golden crownbeard (*Verbesina encelioides*), garden spurge (*Chamaesyce hirta*), graceful spurge (*Chamaesyce hypericifolia*), mottled candlestick (*Euphorbia lacteal*), Castor bean (*Ricinus communis*), fuzzy rattlepod (*Crotalaria incana*), indigo (*Indigofera suffruticosa*), pigweed (*Portulaca oleracea*), 'uhaloa (*Waltheria indica*), sand bur (*Cenchrus echinatus*), wiregrass (*Eleusine indica*), molasses grass (*Melinus minutiflora*), and natal redtop (*Melinus repens*). This rather eclectic mix of species is typical of ruderal plant assemblages found in previously disturbed xeric areas on the 'Ewa plain. All of the plants recorded on the site are alien to the Hawaiian Islands with the lone exception of the 'uhaloa, which is a commonly occurring indigenous species.

Only three avian species were observed on the site: House Sparrow (*Passer domesticus*), Common Waxbill (*Estrilda astrild*), and Zebra Dove (*Geopelia striata*). Avian diversity and densities were in keeping with the location and the depauperate habitat present on the site. No mammalian species were heard or observed, though dog tracks and scat (*Canis f. familiaris*) were present within the fenced site. No botanical, avian or 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 the most recent surveys of the area (David 2008, DLNR 1998, *Federal Register* 2005, USFWS 2005, 2008).

3.7.1.2 Aquatic Biota

As noted elsewhere, no aquatic habitat is present on or immediately adjacent to the project site.

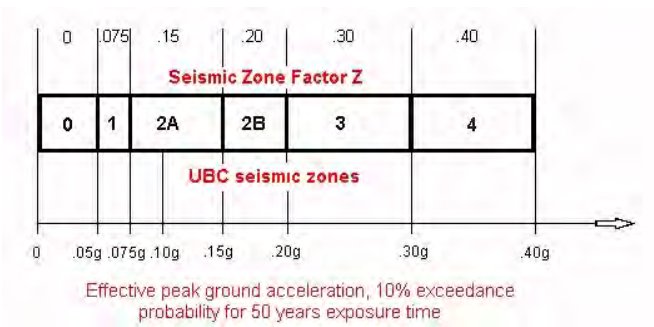
3.7.2 PROBABLE IMPACTS

The lack of unique or sensitive habitat at the site and its disturbed, industrial nature make it unlikely that the project will result in adverse impacts to terrestrial flora or fauna. No threatened or endangered fauna was observed or likely to be present in the area. Thus, there is no potential for significant construction or operation-related impacts to those resources.

3.8 NATURAL HAZARDS

3.8.1 SUSCEPTIBILITY TO SEISMIC DAMAGE

Seismic hazards are those related to ground shaking; they include landslides, ground cracks, rock falls, and tsunami. Scientists and engineers have devised a system of classifying seismic hazards on the basis of the expected strength of ground shaking and the probability of the shaking actually occurring within a specified time. The results are incorporated into the Uniform Building Code (UBC) seismic provisions, which establish minimum design criteria for structures to address the potential for damages due to seismic disturbances. These establish seismic zones, ranging from "0" (where there is considered to be no chance of severe ground shaking) to "4" (10 percent chance of severe shaking in a 50-year interval). The shaking is quantified in terms of g-force (a unit of force equal to the force exerted by the earth's gravity) as indicated in the following diagram:



The entire island of O'ahu is in Seismic Zone 2A, in which a force of 0.075g to 0.15 g is expected to occur once every 50 years (USGS 1997). 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.

3.8.2 SUSCEPTIBILITY TO FLOODING AND TSUNAMI INUNDATION

According to the Flood Insurance Rate Map, the Honua Power site is in Flood Zone D, an area of undetermined flood hazards.[31] 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. Hence, the Zone D rating implies that the proposed facilities are situated in areas with minimal risk of flooding. The portions of the areas where activities related to the proposed action would take place are located outside the City & County of Honolulu tsunami evacuation zone, the coastal high hazard area and are also outside of the Special Flood Hazard Area (see Figure 3.3).

[31] 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.

3.8.3 SUSCEPTIBILITY TO HURRICANE DAMAGE

Hurricane season begins in June and lasts through November in the Hawaiian Islands. During the last 50 years many hurricanes and tropical storms have come close to the main Islands, but only three have directly impacted them. In all three cases, Kaua‘i was the hardest hit, although O‘ahu suffered significant damages as well.

Hurricane Iniki, which struck Kaua‘i on September 11, 1992, was by far the most destructive storm to strike Hawai‘i in recorded history; it did more than $2.2 billion in damage. Losses in Hurricane Dot, August of 1959 were about $6 million. Hurricane Iwa, in November of 1982 caused over $250 million in damages. None of the facilities within Campbell Industrial Park were significantly damaged by either of these major storm events.

The facilities 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 hurricane winds of the sort that have been experienced in the past.

3.9 NOISE

3.9.1 REGULATORY CONTEXT

Hawaii Administrative Rules (HAR) Title 11, Chapter 46, Section 4 (§11-46-4) defines the maximum permissible community sound levels in dBA. These differ according to the kind of land uses that are involved (as defined by zoning districts) and time of day (daytime or nighttime). They are as shown in Table 3.14.

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.[32] The decibel scale is logarithmic, which means that the combined sound level of 10 sources, each producing 70 dB will be 80 dB, not 700 dB. It also means that reducing the sound level from 100 dB to 97 dB requires a 50 percent reduction in the sound energy, not a 3 percent reduction. Perceptually, a source that is 10 dB louder than another source sounds about twice as loud. Most people find it difficult to perceive a change of less than 3 dB.

The maximum permissible sound levels specified in HAR §11-46-4(b) apply to any excessive noise source emanating within the specified zoning district, and at any point at or beyond the property line of the premises in a manner deemed appropriate by the Director of the State Department of Health (SDOH). Mobile noise sources, such as construction equipment or motor vehicles are not required to meet the 70 dBA noise limit.

The Honua Power Project site and adjacent properties are designated Class C (the least restrictive category) and are zoned I-2 Intensive Industrial, with noise limits of 70 dBA at the property line. There are no nearby residential or other noise-sensitive uses in the area. The most significant existing noise sources affecting the project area are the ongoing industrial activities at surrounding properties. Vehicles traveling within JCIP also contribute to ambient noise in the project area.

[32] 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.

3.9.2 EXISTING SOUND LEVELS

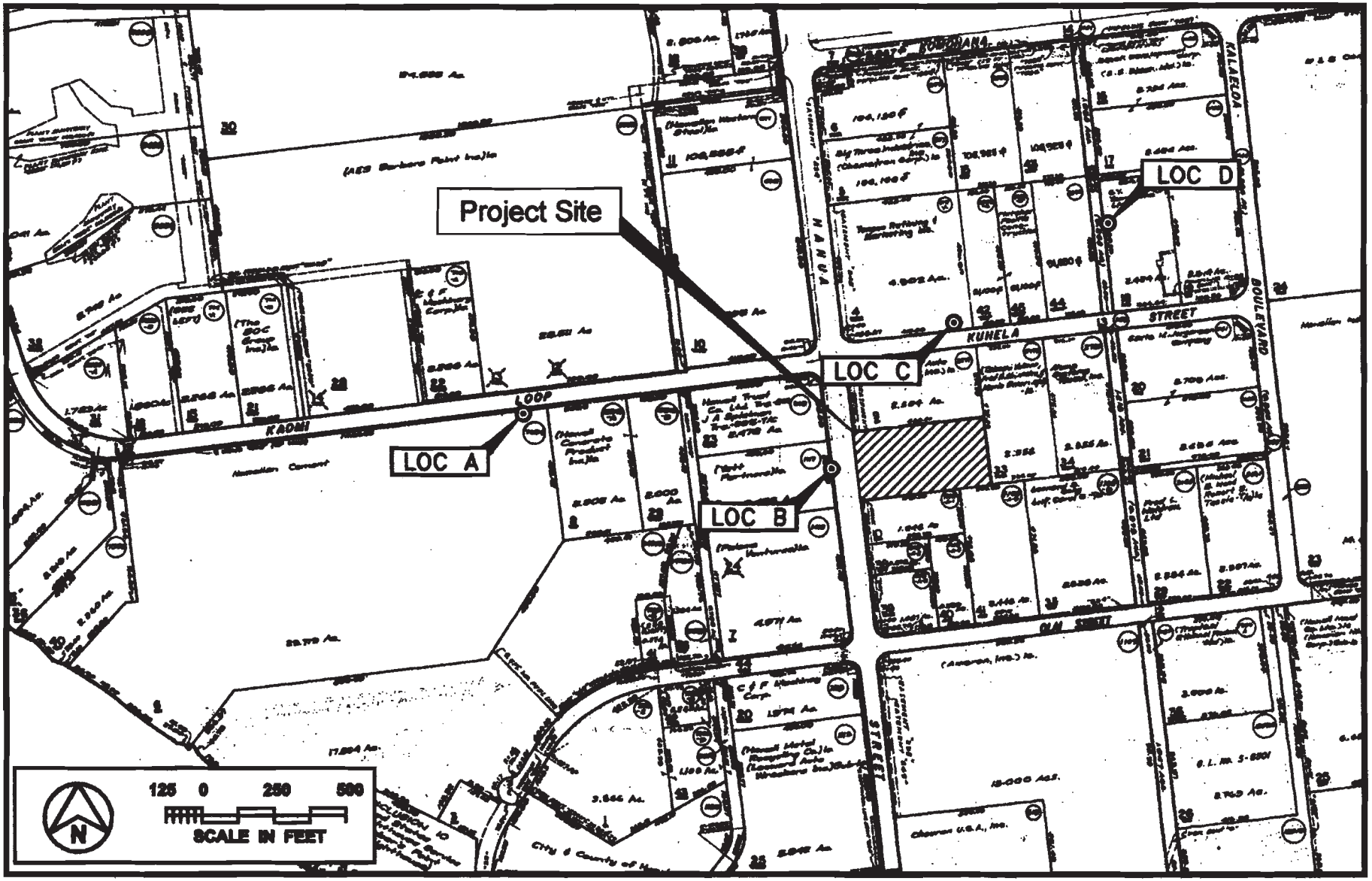
Y. Ebisu & Associates conducted daytime and nighttime traffic and background sound level measurements at eight locations within Campbell Industrial Park that could be affected by noise from the proposed project (see Figure 3.12). Measurement Locations "A" through "D" were used to record existing traffic and daytime background noise levels along the heavy truck routes anticipated to be used by project vehicles delivering feedstock to the waste-to-energy facility. Locations "E" through "H" were used to measure existing background noise levels in the project environs during the nighttime period. Steady background noise levels during the daytime ranged from 57 to 63 dBA, with maximum noise levels ranging from 85 to 94 dBA. During the daytime, street traffic and operating heavy equipment controlled the maximum background noise levels in the project environs. During the nighttime, steady background noise levels ranged from 51 to 65 dBA, with the noise from the Kalaeloa Partners combined cycle power plant on Kalaeloa Boulevard being the dominant noise source in the project environs. Loud and intermittent noise emissions from the Kalaeloa Partners facility also occurred at 20 minute intervals.

Existing traffic noise levels along the anticipated truck routes to be used by project heavy vehicles currently do not exceed the 71 Leq(h) (or Equivalent Hourly Noise Level) noise abatement criteria at 50 feet distance from the roadway centerlines. This noise abatement criteria is currently used by the Hawaii State Department of Transportation, Highways Division (HDOT) for commercial or industrial land uses (see “Noise Analysis and Abatement Policy;” State of Hawaii Department of Transportation, Highways Division, June 26, 1997).

Existing steady background noise levels in the project environs from stationary sources such as air conditioning and ventilation equipment or power generation plants, do not exceed the SDOH noise limit of 70 dBA for lands zoned for industrial uses (see Table 3.14).

Table 3.14 Hawaii Administrative Rules §11-46 Noise Limits

Zoning District	***Noise Limit (in dBA)***	
	Daytime (7:00 a.m. to 10:00 p.m.)	***Nighttime (10:00 p.m. to 7:00 a.m.)***
Class A: Areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type	55	45
Class B: All areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C: All areas equivalent to lands zoned agriculture, country, industrial, or similar type.	70	70



Prepared For:	Prepared By:	Source:	Project:	Figure 3.12:
Honua Power, LLC	PLANNING SOLUTIONS	Y. Ebisu & Assoc.	Honua Power Project	**Noise Measurement Locations**

Figure 3-12 Noise Measurement Locations 2009-06-05.cdr

3.9.3 CONSTRUCTION PERIOD NOISE IMPACTS

Construction activities and operation of the gasification system proposed for the Honua Power Project site have the potential to affect noise levels in the project area, as does the increased vehicle traffic associated with feedstock deliveries to the site. The anticipated magnitude of construction period noise is discussed below, with particular reference to the project's compliance with applicable noise standards. Sound levels associated with the long-term operation of the facility are described in Section 3.9.4.

Installation of the gasification and generating equipment, control building, and other facilities at the Honua Power site will involve the use of excavators, trucks, and other heavy equipment. 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 and away from noise-sensitive uses. In cases where construction noise exceeds, or is expected to exceed, SDOH's "maximum permissible" property line noise levels, a permit must be obtained from SDOH to allow the operation of construction equipment, power tools, etc., which emit noise levels in excess of "maximum permissible" levels. Specific permit restrictions for construction activities are:

- No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels...before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday.
- No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels...before 9:00 a.m. and after 6:00 p.m. on Saturday.
- No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays.

In addition, construction equipment and on-site vehicles or devices whose operations involve the exhausting of gas or air, excluding pile hammers and pneumatic hand tools weighing less than 15 pounds, must be equipped with mufflers. Construction activities will comply with Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control." No long-term impacts are anticipated and therefore no long-term mitigation is needed.

3.9.4 OPERATIONAL PERIOD NOISE IMPACTS

3.9.4.1 Predicted Noise Impacts from Heavy Truck Traffic

The potential noise increases and impacts from the heavy trucks used to deliver the feedstock to the Honua waste-to-energy facility were evaluated by calculating the potential increases in traffic noise levels along the roadways expected to be used by the project traffic. Table 3.15 presents the measured and calculated traffic noise levels at 50 foot setback distance from the five roadway sections which are anticipated to be used by the project's heavy trucks during the working hours on Monday through Saturday. As shown in Table 3.15, the existing traffic noise levels along the five roadway sections ranged from 64.1 to 67.5 Leq(h). The anticipated maximum number of heavy truck trips per hour was assumed to be 20 trips in and out of the Honua waste-to-energy facility. The distribution of these project related heavy truck trips following the Phase 2 expansion of the facility ranged from 3.7 trips south of the facility to 16 trips north of the facility. The potential increase in traffic noise levels along the five roadway segments due to project related heavy truck traffic ranged from 0.5 to 1.9 Leq(h). Total project plus non-project traffic noise levels were predicted to remain below the DOT criteria level of 71 Leq(h) along all five roadway segments. Based on these results, and because the typical building setbacks exceed 50 feet from the roadways' centerlines, the noise from the project's heavy truck traffic should not cause adverse noise impacts on existing businesses in the project environs.

Table 3.15 Increased Traffic Noise Levels Associated With Project's Truck Traffic, Phase 2

Street Segment	*Existing HT Per Hr.*	*Existing HT Ave. Lmax (in dBA)*	*Existing Leq(h) (All Vehicles)*	*Project HT Per Hour*	*Project HT Leq(h)*	*Total Leq(h) With Project*	*Increase In Leq(h) Due to Project*
Hanua St. *Mauka* of Project	23	78.9	65.2	16.0	62.7	67.1	1.9
Hanua St. *Makai* of Project	23	78.9	65.2	3.7	56.4	65.7	0.5
Kaomi Loop	27	77.0	64.1	8.0	57.9	65.0	0.9
Kuhele Street	32	79.0	67.0	8.0	60.1	67.8	0.8
Kalaeloa Boulevard	23	79.3	67.5	8.0	61.2	68.4	0.9

Notes:
1. All project heavy truck traffic normalized to 20 trips per hour for 10 hours per day, or 200 trips per day.
2. Existing heavy truck (HT) maximum sound levels (Lmax) measured at 50 feet from roadway centerlines.
3. Future with project traffic noise levels to remain below 71 Leq(h) at 50 feet from roadways' centerlines.
4. Assumed existing Auto Shredder Residue (ASR) trucks use Olai Street when going to and from Waimanalo Landfill,

Source: Y. Ebisu & Associates

3.9.4.2 Predicted Noise Impacts from On-Site Equipment Operation

Average (or Leq) noise contours for the future facility equipment were developed using the far field, source noise modeling assumptions shown in Table 3.16 for the major outdoor equipment. The resulting noise contours for the Phase 1 and Phase 2 configurations are shown in Figure 3.13 and Figure 3.14 assuming no sound attenuation benefit for noise shielding effects from structures. From Figure 3.13, it was concluded that noise levels from the Phase 1 Honua facility could exceed 70 dBA along the north boundary line for the assumed noise level of the Storage Silo/Conveyors. From Figure 3.14, it was concluded that noise levels from the Phase 2 Honua facility could exceed 70 dBA along the north, boundary line for the assumed noise level of the Storage Silo/Conveyors and gasifier blowers. The adjoining lots where the noise levels from the Honua facility could exceed 70 dBA are not considered to be noise sensitive. The neighboring lot to the north is Leeward Auto Wreckers; the neighboring lot to the east is BENDCO (Mike's Repair and Equipment Rental), and the neighboring lots to the south are Family Towing, Inc. and Valve Service & Supply Co.

Table 3.16. Estimated Equipment Sound Levels.

Equipment Name	Sound Level (at 50 feet Distance)
1. Step-Up Transformer	57 dBA
2. Single Cell of Dry Heat Exchanger	47 dBA
3. Single Cell of Wet Heat Exchanger	66 dBA
4. System Vent Stack	47 dBA
5. Silenced Re-Ox Fan Inlet	61 dBA
6. Silenced Overfire Fan Inlet	65 dBA
7. Silenced Underfire Fan Inlet	68 dBA
8. Feedstock Storage Silo	67 dBA

Source: Y.Ebisu & Associates

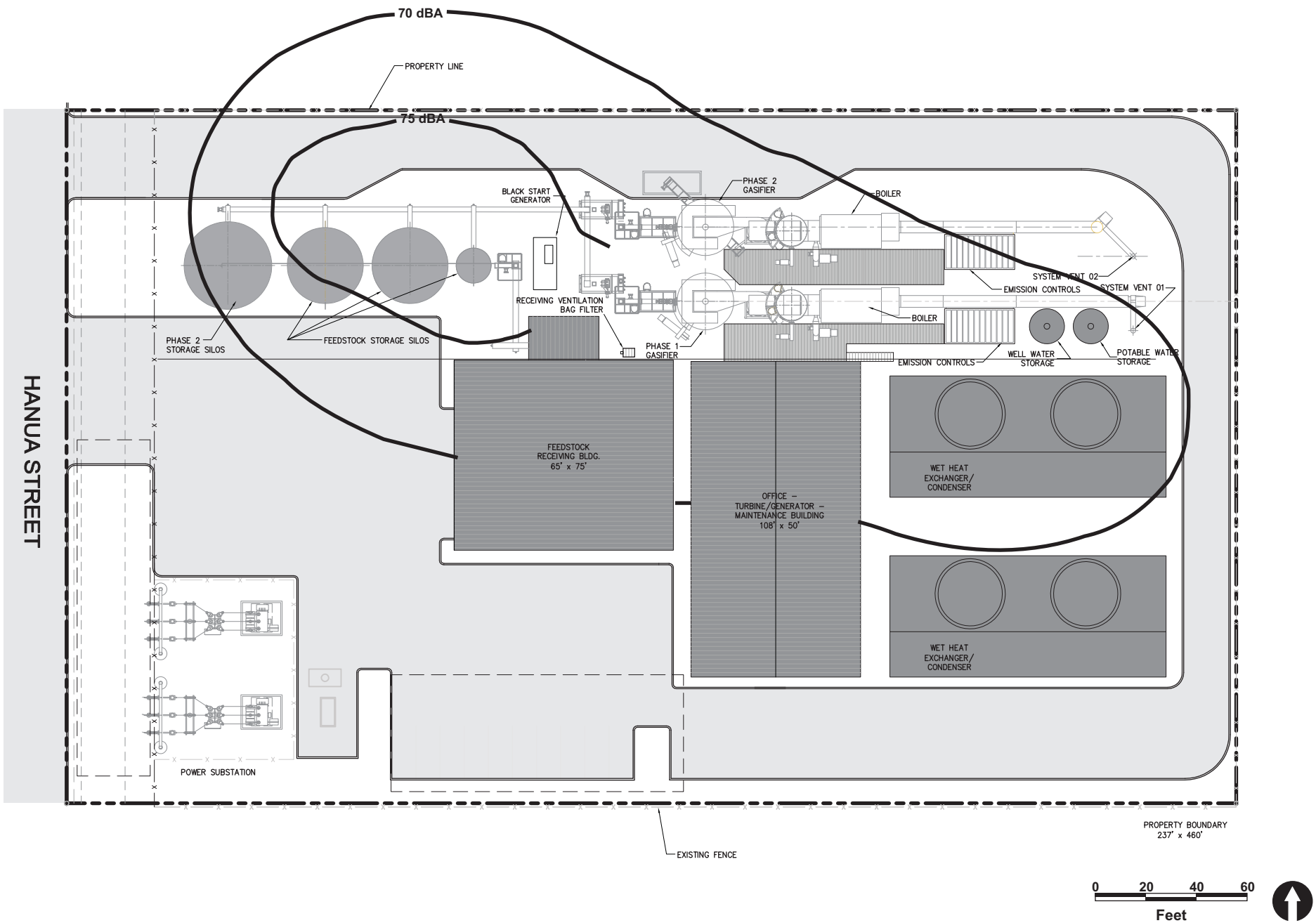
The amount of noise spillover from the Honua waste-to-energy facility into neighboring properties ranges from approximately 74 to 70 dBA, with 70 dBA being the SDOH noise limit for industrial zoned lands. These spillover levels are approximately 10 to 14 dBA above the current steady daytime background noise levels, and 17 to 21 dBA above the current steady nighttime background noise levels. These spillover levels of 74 to 70 dBA are relatively high, and will be noticed by the neighboring businesses to the north because of the relatively large increases in the steady background noise levels resulting from the Honua facility operations. Outdoors, speech communication between talkers and listeners will become more difficult at talker-to-listener separation distances of 3 feet or more. Adverse noise impacts associated with Honua Power's stationary equipment noise emissions are possible, and include realization by the neighbor to the north that the steady background noise levels have increased and that speech communication is more difficult at relatively short distances.

Recommended Noise Mitigation Measures. The noise contours shown in Figure 3.13 and Figure 3.14 were developed using the eight source noise level assumptions listed previously. Substantially quieter (by at least 7 dBA quieter than the originally planned wet heat exchanger) equipment for the wet heat exchanger has been selected prior to construction, because it will be very difficult to provide the required sound attenuation treatments to the wet heat exchanger following installation. This has been done so as to avoid other more difficult noise mitigation measures which would have been required to contain the 70 dBA noise contours within the east and south property boundaries.

The source noise level information available on the feedstock silos and associated material conveyor system may not be as accurate as those available for the other stationary equipment. If an operating waste-to-energy facility similar to that proposed for Honua currently is in operation, the noise level contours shown in Figure 3.13 and Figure 3.14 should be validated using actual sound level measurements of an operating facility. The validation may also be performed following completion of the Phase 1 installation, and prior to the construction of the Phase 2 facility. The feedstock silos and associated material conveyor system installed at the Honua facility should have source noise levels which do not exceed 60 to 62 dBA at 50 feet. If they exceed these values, the use of additional shrouds over the conveyors and at the material transfer locations will probably be required to comply with the SDOH 70 dBA limit along the north property line.

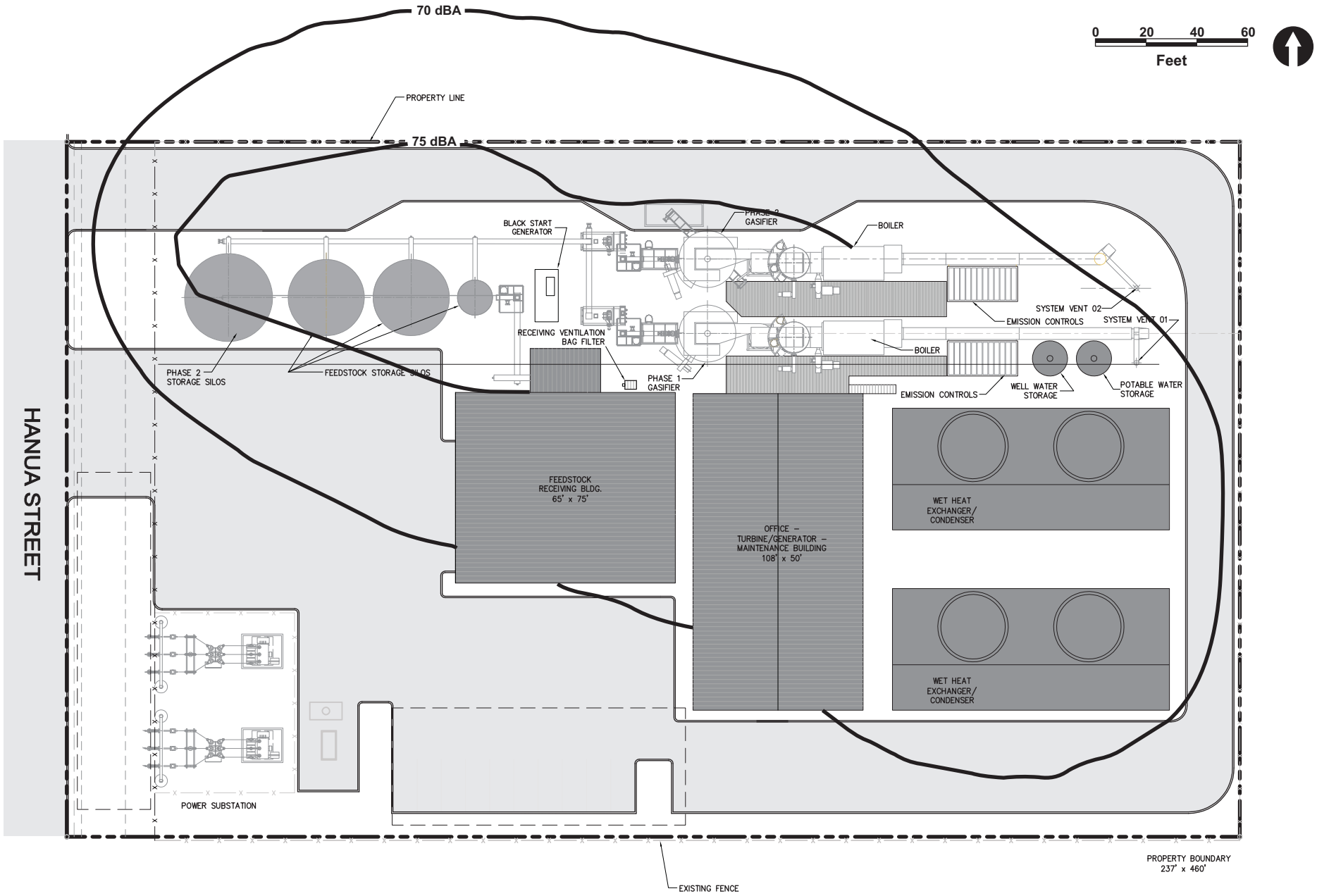
The intake duct silencers planned for the underfire and overfire fans may need to be lengthened or reselected to provide approximately 5 dBA additional sound insertion loss. Alternately, the addition of lined elbow inlet duct sections may be used to provide the additional sound attenuation. A validation of the noise levels from the fans can be performed following the Phase 1 installation, with any required mitigation measures identified prior to construction of the Phase 2 facility.

The future noise levels from the stationary facility equipment may exceed the 70 dBA SDOH limit under both Phase 1 and Phase 2 scenarios. As long as there is a commitment to not exceed the 70 dBA SDOH limit, the completed Phase 2 installation should provide the opportunity to refine the noise modeling, and to take whatever noise mitigation measures are required for both the Phase 1 and Phase 2 facilities. Risks of activity interference or annoyance at the neighboring property to the north are of concern because the noise emissions from the Honua facility are anticipated to be continuous. Additional noise attenuation features will be built into the material handling equipment during final design to ensure that the facility can meet the State Department of Health property line noise limits.



Prepared For:	Prepared By:	Source:	Project:	Figure 3.13:
Honua Power, LLC	PLANNING SOLUTIONS	Y. Ebisu & Associates	Honua Power Project	Maximum A-Weighted Noise Contours for Single Process Train (Phase 1)

Figure 3-13 Maximum A-Weighted Noise Contours for Phase 1 2009-06-05.cdr



Prepared For:	Prepared By:	Source:	Project:	Figure 3.14:
Honua Power, LLC	PLANNING SOLUTIONS	Y. Ebisu & Associates	Honua Power Project	Maximum A-Weighted Noise Contours for Two Process Trains (Phase 2)

Figure 3-14 Maximum A-Weighted Noise Contours for Phase 1 2009-06-05.cdr

3.10 SOLID & HAZARDOUS WASTE

3.10.1 EXISTING CONDITIONS

A Phase I Environmental Site Assessment (ESA) was conducted for the proposed Honua Power Project Site in January 2006 by Enviroservices & Training Center, LLC (ETC).[33] The ESA included an evaluation of the proposed project site's physical characteristics, observations of historic and current conditions, visual confirmation of uses on adjacent properties, and a review of available federal, State, and local records to identify known or suspected hazardous waste activities located on or near the site which could have an adverse impact.

At the time of the assessment, the proposed Honua Power site was being used for storage of used tires and other automotive parts. The Phase I report indicated that no leaking or evidence of ground surface contamination was observed in connection with the storage areas. Petroleum staining was observed throughout the open areas of the site; however there were no indications that the subsurface soils and groundwater were adversely affected by these stains. Therefore, ETC concluded that the stains are *de minimis* conditions. Additionally, the assessment noted that hydraulic equipment, electrical equipment or transformers that may contain PCB's were not present at the site.

The proposed Honua Power Project site was not listed in any of the standard regulatory agency databases related to hazardous substances or activities. However, ETC's search of federal, State and local records in the ESA identified twelve sites in proximity to the Honua site with potential to impact the property. ETC requested and reviewed facility files for each of these facilities from the Department of Health (DOH) Solid and Hazardous Waste Branch (SHWB), DOH Hazard Evaluation and Emergency Response (HEER) Office and the DOH Office of Solid Waste Management (OSWM). Of the twelve facility files reviewed, only the former Leeward Auto Wreckers facility on the adjacent property to the north was considered to be a concern.

Facility files for Leeward Auto Wreckers, Inc. (LAW) indicated the facility was under enforcement action by the DOH OSWM for operating without a solid waste permit.[34] ETC also reviewed files for the LAW site at the DOH HEER Office and DOH SHWB. File review indicated that these facility files generally pertained to potential hazardous waste release(s) and violations. Additionally, both the DOH HEER Office and DOH SHWB files appeared to be "open" files, in which site closure and/or cleanup has not been completed. ETC concluded that the LAW facility and its potential impacts to the Honua site are considered a Recognized Environmental Condition.

During the course of preparing this document, staff from Planning Solutions Inc. reviewed SDOH files in order to update the information that was available in the previously published documents. They found that the report of the most recent site inspection, which the DOH SHWB conducted on April 9, 2009, concluded that there are no longer any potential violations found at the facility. The reports determined that LAW was conducting business according to its approved Solid Waste Management Permit. More specifically, the inspection team concluded that the number of scrap tires at the facility was within permitted levels and were stored in accordance with their permit; the lead

[33] The goal of the Phase I ESA process is to identify recognized environmental conditions (RECs). The term REC is defined as the presence or likely presence of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be subject of an enforcement action if brought to the attention of the appropriate government agencies. Conditions determined to be *de minimis* are not RECs.

[34] The proposed Honua Power Project site was previously sub-leased to LAW, during which the site was used to store solid waste. A DOH inspection revealed that the LAW waste storage had in fact extended to the proposed project site, therefore, the DOH OSWM issued the Gavoz Corporation (former owner of the Honua site) a letter indicating that as the landowner of the Subject Property, the Gavoz Corporation may be held "responsible for providing correction actions" on the Subject Property if the operator (LAW) is "unable to complete remedial actions."

acid batteries were being stored properly; and all solid waste had been removed from the site; and there was no evidence of an active solid waste management operation.

3.10.2 PROBABLE IMPACTS & MITIGATION MEASURES

As part of the sale of the property to Honua Power LLC, A Pacific Island Properties, LLC has agreed to remove the tires and other automotive waste stored on the site and to dispose of those materials in an approved manner. It has already started the removal process and will complete it before construction begins. The Phase I ESA documented no hazardous materials or Recognized Environmental Conditions (REC) on the site itself; therefore no further investigations or site cleanup is proposed. The LAW facility to the north of the site is considered a REC, but once the Honua facility is under construction the site will be secured and no storage of waste materials will be permitted to occur on the property.

Construction of the Honua Power facility would not employ hazardous or toxic materials other than those normally found on construction sites (e.g., equipment lubricants and fuels), and the feedstock that the proposed facility would gasify is likewise non-toxic and will be contained in on-site storage silos prior to entering the gasification process. Bio-diesel for the backup generator will be stored on-site, but it will be held in a tank with containment and is, therefore, unlikely to escape into the environment where it could contaminate soil or water.

3.11 ARCHAEOLOGICAL, HISTORIC, AND CULTURAL RESOURCES

3.11.1 EXISTING CONDITIONS

The Historic Preservation Division of the State of Hawai‘i Department of Land and Natural Resources reviewed preliminary plans for the proposed project and determined that no historic properties would be affected by this undertaking. SHPD cited several bases for its conclusion, including the fact that soils are extremely shallow and rest directly upon coral outcrop and the extent to which urbanization and previous grubbing and grading has altered the land.

In addition to seeking input from SHPD, Honua Power also commissioned International Archaeological Research Institute, Inc., to prepare a Cultural Impact Assessment (CIA) for the project (Prashad, September 2008). The CIA, which is included as Appendix B, provides background on historic, cultural, and archaeological resources in the project area and assesses the possible cultural impacts associated with the proposed project. The following description of existing historic, cultural, and archaeological features is adapted primarily from the CIA for the project.

3.11.1.1 The Ahupua‘a of Honouliuli

The proposed Honua Power Project site is within the *ahupua‘a* of Honouliuli, in the *moku* (district) of ‘Ewa. Honouliuli is the largest traditional land unit on the island of O‘ahu. It includes all the land from the western boundary of Pearl Harbor (West Loch) westward to the ‘Ewa/Wai‘anae District Boundary, with the exception of the west side of the harbor entrance which is in the *ahupua‘a* of Pu‘uloa (the ‘Ewa Beach/Iroquois Point area). Honouliuli has both a long (12 mile) open coastline along the normally calm waters of leeward O‘ahu and 4 miles of waterfront running along the west side of the West Loch of Pearl Harbor.

There are several places within Honouliuli *ahupua‘a* that are associated with traditional Hawaiian land uses. Of these, Kalaeloa (or Barbers Point) is situated just southwest of the current project site. The original Hawaiian name for this area was either Lae Loa or Kalaeloa; both names are seen in historic maps and text. Lae meaning cape or point and loa meaning distance or length, is seen on 1873 and 1889 maps. Kalaeloa may translate to “clear or calm stretch” of either water or land. Barbers Point is the post-contact name of the area and is attributed to Captain Henry Barber, whose ship ran aground on the shoals of Kalaeloa in 1796 Kamakau (1992:174):

Kualakaʻi, which lies just east of Barbers Point, is an important and well documented traditional place in Honouliuli. Though possibly no longer in existence or identifiable, Kualakaʻi is a coastal strip within the former Barbers Point Naval Air Station that had a famous spring called "Hoaka-lei." The spring *"is called Hoaka-lei (lei reflection) because Hiʻiaka (sister of the goddess Pele) picked lehua flowers here to make a lei and saw her reflection in the water"* (Pukui et al. 1976:119). More importantly, this is known as the place where the breadfruit was first introduced to Hawaiʻi (Tuggle and Tomonari-Tuggle 1997a). Tax records and ethnographic data indicate that people lived at Kualakaʻi until the beginning of the 20th century (Kelly 1991:152).

3.11.1.2 Paleontology & Paleogeology of the Project Area[35]

In pre-contact times, the flat Karstic plain that comprises the ʻEwa Plain was covered by a thin or non-existent soil mantle, with numerous sinkholes in some areas. Paleontological and archaeological finds in the Barbers Point area are often concentrated in and around these sinkholes. Tuggle and Tomonari-Tuggle (1997a:68) write:

> *Traditional Hawaiian utilization of limestone sinkholes is a hallmark of the ʻEwa Plain sites, where sinkholes are the most common natural feature in the karst landscape. Sinkholes range in size from several centimeters to 400 m in diameter and ca. 50 cm to at least 6 cm in depth. A majority of sinks are less than 2 m wide and from 1 to 3 m deep.*

Wickler and Tuggle (1997:105) found that, "structurally modified sinkholes are common in ʻEwa sites and include a variety of formal types…sinkholes with rock mounds or walls in close proximity, enclosed sink opening, filled or capped sinks, and stone structures built within sinkholes." Although some of the findings predate human arrival in Hawaiʻi, several of the caves have yielded highly significant archaeological data indicating their early human use.

The recovery of extinct bird bones has become almost synonymous with the prehistory of Barbers Point. Along with various seabirds and terrestrial birds, remains of a flightless species of bird (family Anatidae and Rallidae) are found in some of the sites. Bird hunting by humans seems to have focused primarily on seabirds (Tuggle and Tomonari-Tuggle 1997b:13). But the greatest number of bones belonging to seabirds (Procellariiformes) is found in non-cultural sites (Davis 1990:345). According to Davis (*ibid*), the issue of whether human predation led to the extinction of the various species found in the Barbers Point area is still being questioned since knowledge of "the prehuman environment of Barbers Point still remains largely circumstantial" (1990:330). Several other studies, some which are more recent, support the pre-human extinction of birds and other animals. In his work on animal fossils from the same archaeological sites, Ziegler (1990a) found shells of many ancient and modern species of lands snails, claws of an apparently undescribed native land crab, remains of two bats (one new to science) along with bones of various other indigenous and introduced land animals. Recent work by Wickler and Tuggle (1997), Tuggle and Tomonari-Tuggle (1997a), and Athens et al. (1999), indicate that the time of extinction may well predate human settlement of the area. These later studies also support the possibility that avifaunal extinction most likely coincided with the pre-human decline of the natural forest.

3.11.1.3 Pre-Historic, Historic, and Modern Land Use

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

[35] Several detailed overviews are available for archaeological investigations in the greater ʻEwa Plain area (Athens et al. 1999; Cleghorn and Davis 1990; Davis 1990; McDermott et al. 2000; Tuggle 1997a, 1997b; Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997).

probable quarrying site (50-80-12-4322) is present in Makaʻiwa Gulch at an elevation of approximately 500 feet and so the upper valley slopes may have also been a resource for sporadic quarrying of basalt for the manufacturing of stone tools.

Post-Contact. During the late eighteenth and early nineteenth centuries the landscape of the ʻEwa plains and Waiʻanae slopes was substantially altered by the removal of the sandalwood forest and the introduction of domesticated animals and exotic plant species. Domesticated animals including goats, sheep, and cattle were brought to the Hawaiian Islands by Capt. George Vancouver in the early 1790s, and allowed to graze freely about the land for some time after.

During the early 1800s, Honouliuli Village was the only significant community on the ʻEwa Plain. There were as many as ten missionary schools in the area but these later closed due to a lack of students (Kamakau 1992:424). In the land distribution during the mid-1800s, the ahupuaʻa of Honouliuli was awarded to Kekauʻōnohi, the daughter of Wahinepiʻo; Wahinepiʻo was the sister of Kalanimōkū, who had been given the land by Kamehameha after his conquest of Oʻahu (Indices of Awards 1929; Kameʻeleihiwa 1992:112-114). Kekauʻōnohi was also the granddaughter of Kamehameha through his son Kahōʻanokū Kīnaʻu.

About 150 acres of Honouliuli Ahupuaʻa were set aside for kuleana or land awards for commoners. There were a total of 74 Land Commission Awards (LCA) made in Honouliuli Ahupuaʻa, all of which were in or adjacent to Honouliuli Gulch (Indices of Awards 1929). The primary land use in the area, as indicated in claims and testimonies (Native Register and Native and Foreign Testimonies, Hawaiʻi State Archives) was taro cultivation. The Land Commission records indicate that within the ahupuaʻa, nearly every award included a parcel for a house or houses for extended family members (Magnuson 1999:9). While the cultivation of taro was focused around Honouliuli Gulch, irrigated pond fields and coastal fishponds were also used for raising fish.

Previous ethnographic research indicates that people lived at Kualakaʻi until at least the turn of the 20th century. The following account is cited by Kelly (E. Williamson n.d., in Kelly 1991:152):

> *In the Honouliuli area the train stopped among the kiawe (algaroba) trees and malina (sisal) thickets. We disembarked with the assorted food bundles and water containers. Some of the Kualakaʻi ʻohana met us to help carry the ʻukana (bundles) along a sandstone pathway through the kiawe and malina. The distance to the frame house near the shore seemed long…When we departed our ʻukana contained fresh lobsters, limu (algae), fresh and iʻa maloʻo (dried fish)….Tutu ma (grandfolks and others) shared and ate the seafoods with great relish.*

Following Kekauʻōnohi's death in 1851, her husband Levi Haʻalelea inherited her property. In 1863, the kuleana lands were deeded to Haʻalelea by their owners in payments for their various debts (Frierson 1973:12, in Magnuson 1999:10). Haʻalelea died in 1864, and his second wife transferred ownership of the lands to her brother-in-law, John Coney (Yoklavich et al. 1995:16, in Magnuson 1999:10). In 1871, Coney rented the Honouliuli lands to James Dowsett and John Meek for cattle ranching.

In 1877 James Campbell purchased most of Honouliuli *ahupuaʻa* for less than $100,000, removed the more than 30,000 head of cattle that were being grazed there, and fenced the property (Bordner and Silva, 1983: C-12). By 1881 Campbell's Honouliuli property was prospering as a cattle ranch. In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oʻahu Railway and Land Company (OR&L) in 1890. Dillingham subleased all land below 200 feet to William Castle who in turn sublet the area to the ʻEwa Plantation Company for sugar cane cultivation (Frierson 1972:15). To increase the extent and quality of arable land on the coral plain, the ʻEwa Plantation Co. dug ditches running from the lower slopes of the mountain range to the lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972:17).

Modern Land Use. In the 1930s, the U.S. Military began development in the Barbers Point area. Army, Navy, and Marine facilities were constructed there in the 1930s and early 1940s; the largest and most lasting of these was Naval Air Station (NAS) Barbers Point. Tuggle and Tomonari-Tuggle (1997:23-47) reviewed the historic and modern land use changes in detail.

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

Aerial photographs of the Honua Power Project site taken in 1950 and 1952 indicate it was undeveloped at that time with no visible structures. A 1963 aerial photograph indicated the property was beginning to be used for storage of cars and automotive parts associated with the north adjacent property. From 1970 onward the use and level of development at the project site remained essentially the same, while surrounding areas became further developed with commercial and industrial type structures (EnviroServices & Training Center, LLC, January 2006).

3.11.1.4 Archaeological Context

The history of archaeological investigations in and around the Barbers Point area has been reviewed in detail elsewhere (Tuggle and Tomonari-Tuggle 1997:49-55), and numerous resource identification and data recovery projects have been completed in this part of the ‘Ewa Plain.[36] Synthesis of this research suggests that the earliest occupation of the ‘Ewa Plain probably did not occur until after AD 1250, and more substantial settlement there occurred after ca. AD 1350. The extended limestone plain would have been used for bird catching (until the hunters’ success led to the extinction of the most readily exploited species), and would include the temporary habitation features associated with this activity. Planters could have also used the natural limestone sinkholes mentioned previously for agriculture, though it would have been seasonal and on a small scale.

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

Archaeological research at Kalaeloa/Barbers Point, where the project site is located, has focused on the areas in and around the Harbor. A series of small clustered shelters, enclosures and platforms show limited but recurrent use at the shoreline zone for marine resource exploitation. This settlement covers much of the shoreline, with more concentrated features around small marshes and wet sinks. The archaeological content of the sites indicates a major focus on marine resources. Considering rainfall, agriculture would have been constrained by accessibility to water and was probably concentrated on tree crops and roots (sweet potatoes). There is some indication of agriculture in

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

mulched sinkholes and soil areas. The proposed Honua Power Project site is inland of this previous settlement area. There is no indication that any permanent settlements existed at the site, but it is likely that the area was traversed and used for the gathering of resources.

3.11.1.5 Traditional Beliefs and Accounts Associated with the Project Area

Places of traditional Hawaiian importance are found throughout the ʻEwa Plain. Features and sites such as Pu'uokapolei are natural features within the landscape that are associated with cultural use. While the use of these features/sites predate development of the Campbell Industrial Park, it is possible that some traditional uses of the land area and its features continued during the sugar plantation operations in the early to mid 1900s. In an interview, Shad Kane, a long term resident of Honouliuli, talked about meeting *kūpuna* Sara Kauka who had known about Kualakaʻi and visited the area during the 1930s. He reported:

> *As a young woman, Auntie Sara visited Kualakaʻi with her family. She remembers taking the train to ʻEwa, and from there going on horseback to Kualakaʻi. There was a cobblestone wall which the horses followed to Kualakaʻi. She would go with her family to buy limu, fish and lobster from a Hawaiian family that lived at Kualakaʻi. She recalls the sand dunes here that had to be crossed over in order to reach the ocean. She also recalls a lake (possibly the spring) that was just mauka of Kualakaʻi (S. Kane, pers. comm., 2005).*

Previous oral histories of Kalaeloa (Prasad 2007) identified at least one family that regularly camped along the shores of Kalaeloa before construction of the barge harbor. Logan Williams has worked at Kalaeloa for more than ten years. His grandmother is Mary Lou Keaulana, surfing legend Buffalo Keaulana's older sister. Logan has spent all his years growing up in and around Kalaeloa. His great grandfather (patriarch of the Keaulana clan) worked for Oʻahu Sugar Company as a truck driver. As a truck driver, "Papa" (grandfather) was given keys to access the coastal area. He regularly took his family to Kalaeloa, where Logan spent many summer months. The family would often set up camp for an entire three months. He believes that camp was nicknamed "Kole:"

> *We would pitch tents and stay the whole time. Papa would go back to work but we would just stay…fish and play here. When I was little, there was no harbor. The current harbor opening was only about one hundred to hundred-fifty yards, and we would swim from this end (east side of the entrance) to the Kōʻolina end. It was too far to walk around to Kōʻolina so we would just pack things in a dingy and swim/boat across (interview with Logan Williams, 2005).*

One of the area's most significant cultural features is Lanikūhonua, a fishing village located approximately three miles north of the project site within what is now the Kōʻolina Resort. The *kahu* (caretaker) for Lanikūhonua, Auntie Nettie Tiffany, was born and raised on these lands. Her family's history in the area extends quite far. Her grandfather was a *kahuna* in Kamehameha's time. Auntie Tiffany's mother, who was *kahu* of Lanikūhonua before her, spent a great deal of time with Kamakila Campbell. It was Mrs. Campbell who set aside Lanikūhonua for future preservation.

Oral histories completed in the vicinity of the project site indicate that traditions and beliefs about the area still persist among *kūpuna* and other Hawaiians. One legend tells of Pohaku-o-Kauaʻi, near Kalaeloa, which is said to be the home of a famous giant *kupua* (magical) fish, Uhumakaikai; this fish taught Kawelo, a chief who lived in the time of Kakuhihewa, the art of fighting. In an interview completed with Kumu hula John Kaʻimikaua (Prasad 2007), he told about the ancient stories of the area relating to the gods Kāne and Kanaloa. He notes there are several places along the Waiʻanae coastline where the gods traveled and stopped for fresh water. Kāne would dig into the freshwater springs to get water for making *ʻawa*.

The coralline shoreline of Kalaeloa and its surrounding areas were known by the ancient Hawaiians for the freshwater lens that lies below and behind it. The caves (sinkholes) discussed earlier in this report were an important resource for native Hawaiians. The spring named Hoaka-lei at Kualakaʻi is well recorded in the traditional lore of the islands. But as Mr. Kaʻimikaua suggests, there were likely

numerous caves that held fresh water known to the ancient Hawaiians. Along with being sources for fresh water, the caves in this area were important for other cultural uses. According to Mr. Ka‘imikaua, “some of the holes were used for shelter… some had steps built into them while others were smaller holes purposely dug for use as burials…they dug little nooks and lay the bodies into them…that’s how they (Hawaiians) buried on this (‘Ewa) side”.

Traditions and beliefs about the area also tell about its important food sources. There are numerous accounts of the historical importance of the marine resources of the ‘Ewa Plain area. Many of these are associated with the food gathering activities around Pearl Harbor. Closer to the project site, along the southern coast of the ‘Ewa Plain, the favored seaweed *lipoa* (*Dictyopteris*) and the *‘o‘io* (*Albula vulpes*) fish were found (Kelly 1991:155). *Lipoa* was gathered along the shoreline between Keahi and Kualaka‘i; the *‘o‘io* came from Keahi.

Stories such as the following by Pukui (1943, in Sterling and Summers 1978:44) tell of the value *‘o‘io* from Keahi:

> *Those caught at Keahi have a fragrance somewhat like the lipoa sea weed and when brought to market, sold readily. All the market man had to say was “These are from Keahi”, and his supply would vanish in a short time. There were times when the market man would try to palm off some ‘o‘io from another locality as Keahi’s but no old timer was ever deceived, for his nose knew the difference.*

Food sources on the land known from the Kalaeloa area include *‘ulu* (breadfruit, *Artocarpus altilis*). In their summary of the marine, land, and (fresh) water resources of the project site, Tuggle and Tomonari-Tuggle (1997a) discuss the connection between breadfruit and the famous place of Kualaka‘i, and its spring Hoaka-lei.

According to Kamakau, the “first breadfruit was planted at Pu‘uloa, ‘Ewa, brought by Mo‘ikeha’s grandson, Kaha‘i-a-Ho‘okamali‘i, in a round-trip voyage that began at Kalaeloa” (Kamakau 1991:110, in Tuggle and Tomonari-Tuggle 1997a). Fornander recorded several myths concerning the planting of breadfruit at Pu‘uloa. In one account, Kaha‘i, the son of Moikeha of Waipi‘o, Hawaii, is said to have made a voyage to Kahiki (possibly Tahiti) and brought back the breadfruit from ‘Upolu (Fornander 1916-17:392, in Handy and Handy 1991:150). In another myth, Fornander tells of two fishermen who brought back the breadfruit from Kanehuna-moku (The hidden land of Kane or Kahiki) after they were blown out to sea (ibid).

The Plain of Kaupe‘a is located northwest of Kalaeloa . According to Kamakau, it was one of the areas where souls without ‘aumakua wandered endlessly (Kamakau 1964:47, 49, in Tuggle and Tomonari-Tuggle 1997a). One account by Pukui (1943:60-61, in Sterling and Summers 1978:44) tells of the “homeless ghosts” of the plain of Kaupe‘a:

> *We (my cousin, aunt and I) were walking to Kalae-loa (Barber’s Point) from Pu‘uloa accompanied by Teto, the dog. The dog was a native dog (not the so-called poi dog of today) with upright ears and a body the size of a fox terrier. For no accountable reason, Teto fell into a faint and lay still. My aunt exclaimed and sent me to fetch sea water at once which she sprinkled over the dog saying, “Mai hana ino wale ‘oukou i ka holoholona a ke kaikamahine. Uoki ko ‘oukou makemake ilio” (“Do not harm the girl’s dog. Stop your desire to have it”.). Then with a prayer to her ‘aumakua for help she rubbed the dog. It revived quickly and after being carried a short way, was frisky and lively as ever.*

Then it was that my aunt told me of the homeless ghosts and declared that some of them must have wanted Teto that day because she was a real native dog, the kind that were roasted and eaten long before foreigners ever came to our shores. Accounts of the presence of night marchers at Honokai Hale supports the idea that beliefs associated with the area’s past Hawaiian uses still persist in the general vicinity of the project site.

Pu‘ukapolei itself (which is approximately 3 miles from the project site) is one of the more significant places in the region. In his island-wide survey, McAllister (1933) recorded a heiau on Pu‘ukapolei that had been destroyed. The heiau may have been associated with the sun (Fornander 1916-20, III:292). Pu‘ukapolei was also an important landmark for travelers between Pearl Harbor and the Wai‘anae coast.

3.11.1.6 Existing Cultural Land Uses & Resources in the Project Area

3.11.1.6.1 Marine Resources

The ocean off of Kalaeloa provides one of the most important fishing grounds on the island of O‘ahu. Commercial, subsistence, and recreational fishing all take place there.[37] In oral histories, Keone Nunes and kupuna Walter Kamana noted the great importance of the fish and other marine resources of the Wai‘anae coast. Kupuna Kamana lived and fished along this coastline all of his life. He reports that during the early 1900s, the fish were more abundant than at present. According to Mr. Williams, *akule* and *aholehole* are two of the major fishes caught along this part of the ‘Ewa-Wai‘anae coastline.

Limu is an important traditional Hawaiian and contemporary food source, and the ‘Ewa coastline in general is well known for its special varieties of *limu*. A 2006 amendment to Chapter 188-22.8 of the Hawai‘i Revised Statutes and subsequent amendments to HAR 13-93 established a limu management area extending 150 feet off the ‘Ewa Beach shoreline from the gunnery range to the boat ramp on Mu‘umu‘u Street. At its closest, the limu management area is over five miles from the project site.[38] While not as renowned for its limu as is ‘Ewa Beach, the cultural impact assessment reports that several fishermen gather seaweed from the shoreline along the entrance channel to Kalaeloa Harbor.

Kūpe‘e (Nerita polita) is a small mollusk found along rocky shorelines of the islands; it is a traditional Hawaiian food source, and its shell is used to make lei. *Kūpe‘e is harvested* primarily at night since the animal is nocturnal. Since other marine invertebrates such as *pipipi* and *‘opihi* are also found along Kalaeloa’s shoreline, it is likely this shoreline is used for general (food) shellfish collection.

In addition to *limu* and *kūpe‘e*, the shoreline along Kalaeloa provides several other important marine food sources. The *a‘ama* (also known to some as the “dryland” crab); *Paiea* (the “wet one”); and *he‘e* (octopus; more commonly referred to as tako [Japanese]) are all caught around the harbor.

3.11.1.6.2 Existing Cultural Land Uses

There are no cultural land uses identified with the project site proper. The only known Hawaiian cultural activity in the area takes place along the shores of Kalaeloa Deep Draft Harbor and includes fishing and the gathering of *limu* (seaweed) and shellfish along the shoreline. Although the majority of the fishermen use Kalaeloa for nearshore fishing, open water or commercial fishing from small and large boats is also done. Commercial fishing in this area is primarily for *akule*, but other types of fish (particularly reef fish) are also caught. Recreational and subsistence fishing takes place along the shoreline of Kalaeloa as well as within the harbor. Some fishermen travel to Kalaeloa from as far as the windward towns of Waimanalo, Kane‘ohe, and Kailua. One of the reasons why Kalaeloa is a popular fishing site is that it is good for catching *halalu* or baby *akule*.

[37] The recreational fishermen interviewed for the cultural impact assessment come from all parts of O‘ahu. The commercial fishermen who fish in the Kalaeloa area come primarily from the Wai‘anae coast (the Waianae Boat Harbor is the only public docking area near Kalaeloa). Karl Jellings, one of the CIA informants, believes there are probably six to ten crews or boat operations doing near-shore fishing in the Wai‘anae area; he believes that the subsistence fishermen also appear to be primarily from the Wai‘anae area.

[38] The management area was established principally in response to excessive heavy picking pressure. The temporary restrictions that the regulation establishes are designed to give the limu an opportunity to regenerate. Once it has regrown, seasons will be allowed during the year during which limu can be picked.

3.11.2 PROBABLE IMPACTS & MITIGATION MEASURES

While the ‘Ewa Plain and Honouliuli Ahupua‘a in general are places of prehistoric and historic significance and there are continued traditions, beliefs, and cultural uses of the area, none of these historical accounts or uses is specific to the project site. The area on and for some distance around the parcel has been completely graded. There are no known historic, archaeological, or cultural resources within the immediate vicinity of the project site that may be impacted as a result of the proposed project. More specifically:

- The Hawai‘i Register of Historic Places and the National Register of Historic Places does not show any historically significant site in or adjacent to the Honua property.
- The Department of Land and Natural Resources State Historic Preservation Division (SHPD) has determined that no historic properties would be affected by the project.
- The Cultural Impact Assessment for the project also concludes that it would have no significant impacts on cultural uses or resources. This conclusion in based several findings:
  - The lands on which the project site is situated have been significantly altered.
  - Historic and modern alterations have involved massive ground disturbance to the extent that no archaeological resources are likely to be found in the general vicinity.
  - Traditional Hawaiian uses of the lands along the nearby coastline are known from prehistoric times and such uses, especially collection of marine resources, continue along the Kalaeloa coastline but not within the immediate vicinity of the project site.
  - Access to these areas will not be compromised by the proposed Honua Power Plant.
  - Traditional Hawaiian beliefs and traditions associated with the ‘Ewa Plain persist but these are general associations that are not specific to the project site.
  - No kūpuna could be located that still have knowledge about the traditional uses of the project site lands.

Mitigation Measures. The construction documents for the project will require that in the unlikely event that undocumented archaeological and/or cultural remains are encountered, the contractor will: (1) cease work immediately; (2) protect the inadvertent discovery from additional disturbance; and (3) notify the SHPD immediately. As appropriate, additional mitigative measures will be proposed and coordinated with SHPD.

3.12 RECREATION & SHORELINE ACCESS

3.12.1 EXISTING CONDITIONS

The proposed Honua Power Project site is located about one-half mile from the shoreline. The nearest recreational area is the Barbers Point Beach Park, which is owned and maintained by the City & County of Honolulu Department of Parks and Recreation. The entrance to the park is at the end of Olai Street, approximately one-third mile south of the project site.

3.12.2 PROBABLE IMPACTS

The construction site will not be visible from the Barbers Point Beach Park, and none of the work required for the facility will restrict access to the beach park or to the shoreline. Operation of the project will not restrict access to or lateral movement along the shoreline, nor will it affect access to the Barbers Point Beach Park. It will not significantly increase traffic volumes along the routes typically followed by users traveling to and from the park. Consequently, no recreational impacts are anticipated.

3.13 SCENIC AND AESTHETIC RESOURCES

3.13.1 EXISTING CONDITIONS

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

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

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

3.13.2 PROBABLE IMPACTS

3.13.2.1 Construction Period

Construction of the proposed Honua Power facility will occur in the midst of the intensive industrial complex of Campbell Industrial Park. It will entail minor grading, equipment parking, materials storage, the erection of structures and placement of equipment, and other aboveground activities. Because the site fronts Hanua Street some of these activities will be visible to vehicles traveling along it, as wells as to users of adjacent properties. Due to the industrial nature of the surrounding area, the relatively short construction period (18-24 months total for both phases), and the construction fencing that the contractor will be required to erect around the site, visual impacts due to construction are not expected to be significant.

3.13.2.2 Operational Period

The proposed project is industrial in nature. All of the structures (e.g., the gasification equipment, substation, administration building) are characteristic of the kinds of structures already found in the JCIP. Further, all of the proposed facilities are within the range of heights and sizes allowed without variance in areas that are zoned I-2 Intensive Industrial.

At a height of 50 feet above ground level, the exhaust stacks attached to the gasification systems are the tallest structures that would be constructed at the Honua Power Project site. These stacks are well within the 60-foot height limit applicable within the Intensive Industrial (I-2) zoning district. They would be less than 25 percent the height and far less massive than the existing stacks at nearby power generating facilities in the JCIP (e.g., AES Generating Station, HPOWER).

Once in operation, the facility would be directly visible from only a handful of locations:

- Passengers in vehicles traveling along Hanua Street would have a brief view channel to the proposed facility. For the most part, the view would be screened by planned fencing and landscaping. The exhaust stack and possibly, the tops of some of the taller structures on the site would be visible from a slightly longer stretch of the roadway.
- Employees at neighboring facilities may be able to see portions of the proposed facilities through the fence.

- Passengers in aircraft flying over the area will be able to see the proposed facility from above.

The relatively small stature and similar appearance of the facility to other neighboring industrial facilities means that it would not have a substantial effect on the appearance of the area from the street, the air, or from other nearby properties. This is particularly true in view of the enhanced landscaping that Honua Power will install and maintain along the Hanua Street side of the facility as part of the proposed project. In view of the foregoing, no detailed visual impact assessment of the effects of proposed changes to the substations was conducted.

Finally, there is little potential for adverse visual effect as the result of visible emissions from the proposed facility. State Department of Health regulations limit visible emissions (not including uncombined water vapor) from the proposed facility to no greater than 20% opacity. In addition, specific regulations require that: (i) plant operators take "reasonable precautions" to prevent particulate matter emissions during construction or material handling and (ii) "best practical operation or treatment" (e.g. water or chemical dust suppressants, paving of roads, and the installation of hoods and fabric filter dust screens) be implemented to prevent visible emissions of fugitive dust beyond the property line. Existing power generating facilities within JCIP are able to operate without noticeable visible emissions, and the emissions from the proposed Honua Power Project would be at least as transparent. Consequently, the project will not result in significant adverse impacts to scenic and aesthetic resources.

3.14 LAND USE/SOCIOECONOMIC & CULTURAL ENVIRONMENT

3.14.1 EXISTING CONDITIONS

JCIP represents the largest intensive industrial area on O‘ahu. The kinds of uses that are present are consistent with this. In addition to the generating facilities that are discussed throughout this report, users include the state's two oil refineries, a large cement factory, many construction yards, and large warehouses. Figure 3.16, which is based on January 2006 records, shows businesses and landowners within JCIP. The Honua Power Project site is bordered by several businesses including the former Leeward Auto Wreckers site to the north, Mike's Repair and Equipment Rental to the east, Valve Service & Supply, Co. and Family Towing, Inc. to the south, and Hanua Street to the west. The adjacent properties and other areas in the vicinity are used for industrial and commercial purposes.

The residential communities closest to the generation site are Makakilo (2.5 miles), Honokai Hale/Nanakai Gardens (2.3 miles), Ko Olina (1.7 miles), and Kalaeloa (2.2 miles). Other communities in the vicinity of the Honua site are further away.

The JCIP is located in the Makakilo/Kapolei/Honokai Hale Neighborhood Board Area. It is situated in the ‘Ewa Development Plan Area. The proposed Honua Power site is located within Census Tract 86.03, which includes the community of Makakilo. The population of this Census Tract was 9,882 in 2000. Unemployment was 3.3 % of the civilian labor force, slightly lower than the countywide unemployment of 3.7% for that same year. Median household income was $65,538 compared to a countywide figure of $51,914. The City and County of Honolulu's General Plan designates the ‘Ewa Development plan area as the location for a Secondary Urban Center for O‘ahu to be centered in the Kapolei area. The Secondary Urban Center is to be the focus of major economic activity and housing development, and a center for government services. Consequently, continued growth and development is expected to occur in this area.

3.14.2 PROBABLE IMPACT

The proposed facility will not affect land use within the Campbell Industrial Park or surrounding areas. It is consistent in character and appearance with the existing industrial uses in the area. The construction expenditures will not have a substantial effect on the local economy, and the operation of

the facility will not create a substantial number of new jobs and would therefore not encourage substantial growth in Makakilo or other surrounding areas.

Construction and operation of the proposed facilities will have a number of socio-economic impacts. Direct socio-economic effects of the proposed facilities include: (1) construction employment and business activity; (2) ongoing employment of facility staff (which would be relatively limited); and (3) ongoing expenditures for materials and outside services; and (4) State revenues in the form of excise taxes, lease revenues, and other taxes. These are discussed below. Additional benefits are discussed in Section 1.3.

3.14.2.1 Construction Employment and Expenditures

As reported in Section 2.4, the total estimated cost for construction ranges from $27 to $33 million for Phase 1 and $21 to 25 million for Phase 2. In order to estimate the effect that these expenditures would have on the O‘ahu and State economy, Honua Power first split each of the construction cost line items in Table 3.17 between those that would be spent in-state and those that would be spent out-of-state. Those estimates indicate that about three-quarters of the expenditures would be for equipment and materials that are made elsewhere; the remaining quarter would be spent in-state.

The State of Hawai‘i Department of Business, Economic Development, and Tourism (DBEDT) has developed an econometric model that allows it to estimate the impact that construction expenditures such as those shown in Table 3.17 have on the State and County economies (see Figure 3.15).[39] The figure shows how money spent in construction expenditures creates indirect economic activity in addition to the direct economic activity in the construction industry itself. The figure shows that, on average, a dollar in direct construction spending actually generates, nearly $1.27 of total output in the economy.[40]

A module of the State Input-Output model refines the statewide figures and allows the model to produce estimates of the effect that construction expenditures in individual Counties will have on the overall level of business output, earnings, and employment. The multipliers in that model were applied to the in-state direct expenditure estimate ($13.8 million) to calculate the direct, indirect and induced output effects (in dollars) and jobs (in person-years of employment) that are shown in Table 3.18. It should be noted that these estimates focus on Hawai‘i. When all of the expenditures that would be made on the Mainland are considered as well, the total effect on the American economy is much greater, probably on the order of 3 to 4 times the amount shown for Hawai‘i alone.

[39] The estimates are the product of the State of Hawai‘i Department of Business, Economic Development and Tourism (DBEDT, 2002) Hawai‘i Input-Output Model. This input-output model, which is based on historical economic data in Hawai‘i, estimates the extent to which the direct economic inputs from various activities lead to indirect economic effects.

[40] The output is defined as the value of sales for most industries and "trade margins" for a few industries such as retail and wholesale trade, which do not actually make the goods they sell.

Table 3.17 Allocation of Construction Costs Between Out-of-State and in Hawai'i

Item	*Order-of Magnitude Cost (in million 2007$)*	*Location of Expenditures (% of Total)*		*Expenditures (in million $) by Location)*	
		Out of State	*Hawai'i*	*Out of State*	*Hawai'i*
PHASE I FACILITY					
Site Development	0.3	0%	100%	$0	$0.3
Machinery/Equipment	20.3	95%	5%	$19.2	$1.1
Installation/Balance of Plant	5.5	20%	80%	$1.1	$4.4
Electrical Substation, Lines, & Interconnect	2.4	30%	70%	$0.72	$1.68
Other	1.5	50%	50%	$0.75	$0.75
TOTAL	**$30**[1]	**72%**	**28%**	**$21.77**	**$8.23**
PHASE II ADDITION					
Site Development	0	0%	0%	$0	$0
Machinery/Equipment	18.0	95%	5%	$17.1	$0.9
Installation/Balance of Plant	3.0	20%	80%	$0.6	$2.4
Electrical Substation Lines, & Interconnect	1.5	30%	70%	$0.45	$1.05
Other	1	50%	50%	$0.5	$0.5
TOTAL	**$23.5**[2]	**79%**	**21%**	**$18.65**	**$4.85**
PROJECT TOTAL	**$53.5**	**75%**	**25%**	**$40.42**	**$13.08**

Notes:
[1]Estimated cost of Phase I Facility ranges from $27-$33 million.
[2]Estimated cost of Phase II Additional Processing Capacity ranges from $21-$25 million.

Source: Compiled by Planning Solutions Inc. based percentage and cost on estimates by Honua Power, LLC.

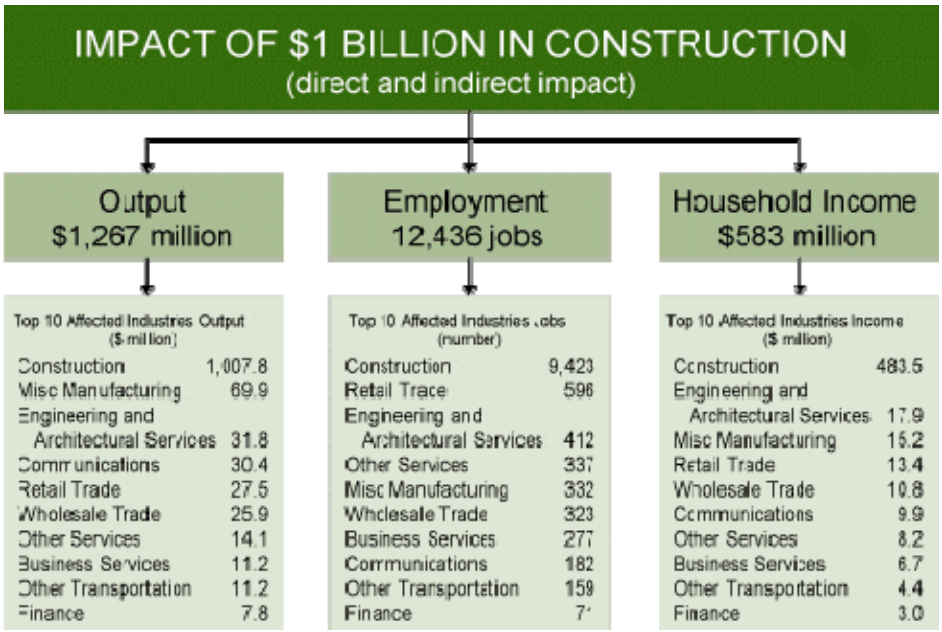
The lower boxes in Figure 3.15 provide a rough indication of the way in which this economic activity is likely to be distributed among the key industries that provide inputs into the construction sector. They show that most of the output, jobs, and income from construction spending generated is in the construction industry itself.[41]

3.14.2.2 Operational Employment

Honua Power estimates that 20 workers will be present at the proposed facility once the project is completely operational.

[41] Note, that this more detailed breakdown applies at a statewide level and should not be compared directly with the estimates from the County-level model.

Figure 3.15 Impact of Construction Expenditures on Hawai'i Economy



Source: Department of Business, Economic Development, and Tourism.

Table 3.18 Impact of Project-Related Construction Expenditures on Economic Output, Earnings, & Employment in Hawai'i

Parameter	*Type 1 (Direct & Indirect*		*Induced*		*Total (Type 2)*	
	Multiplier	*Amount*	*Multiplier*	*Amount*	*Multiplier*	*Amount*
Output	1.42	$18.57 million	0.58	$7.59 million	2.00	$26.6 million
Earnings	0.47	$6.15 million	0.17	$2.50 million	0.64	$8.37 million
Jobs	10.80	141 Person-yr	5.30	69 Person-yr	29.60	210 Person-yr

Source: Compiled by Planning Solutions, Inc. using Expenditures from Table 3.17 and factors from State of Hawai'i Department of Business, Economic Development and Tourism (DBEDT, 2007) Hawai'i Input-Output Model (Honolulu Inter-County module).

3.14.3 LAND USE CONTROLS

Figure 3.17 shows State Land Use Districts within the area. The City and County of Honolulu has zoned the project site I-2, Intensive Industrial Use. The site is entirely within the State Urban Land Use District.

The parcel proposed for the Honua Power Project is designated as part of the State Urban Land Use District (see Figure 3.17), as are all the immediately adjacent parcels. The County Zoning designation for the site and surrounding areas is I-2 Intensive Industrial (see Figure 3.18). The proposed improvements are located outside the City and County of Honolulu's Special Management Area. The proposed improvements will require Honua Power to obtain a minor Conditional Use Permit for construction of a waste disposal/management facility pursuant to the County Land Use Ordinance.

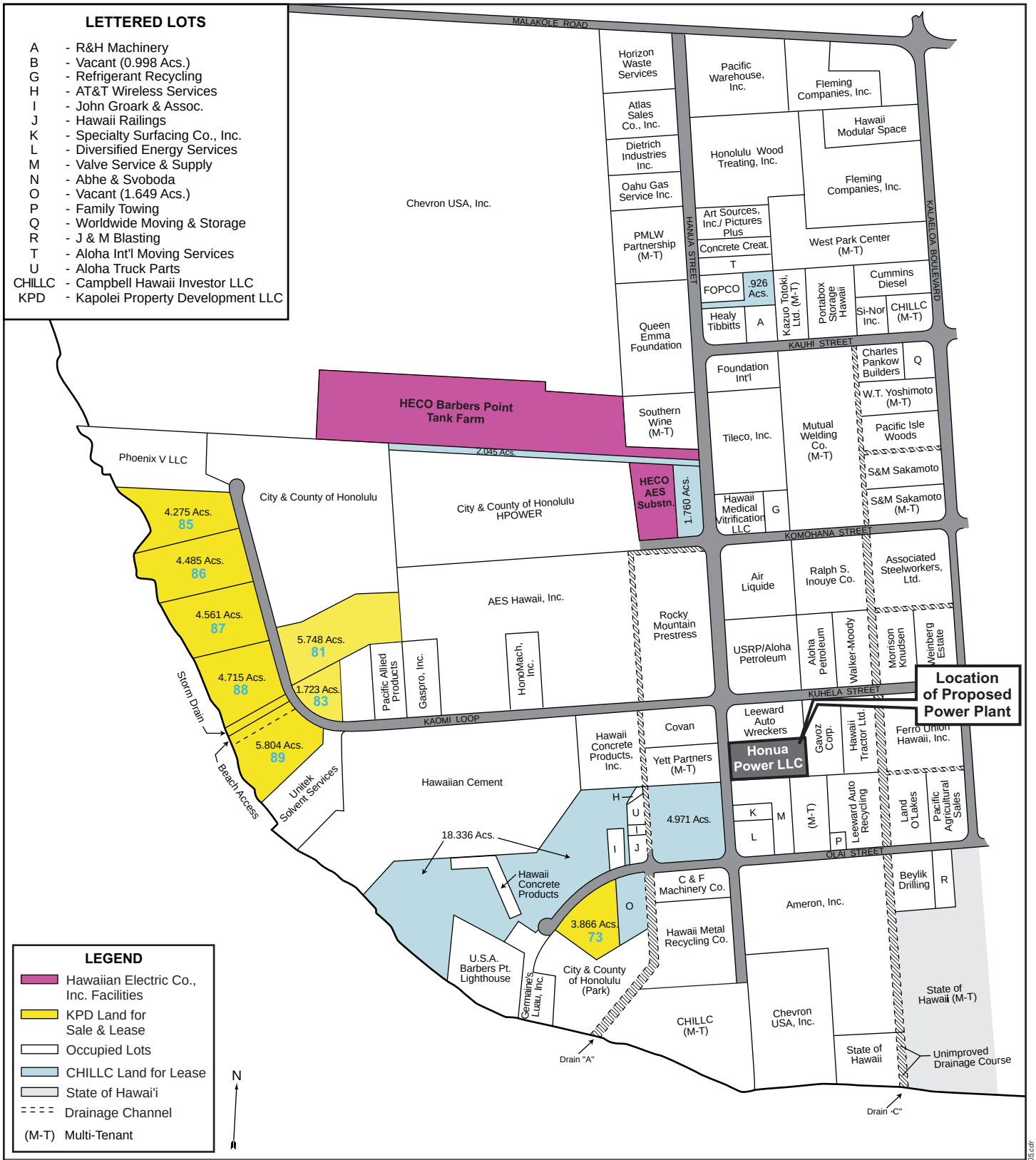
3.15 TRANSPORTATION FACILITIES

This section describes the effects that the proposed project would have on existing and planned transportation facilities in the region. Because the Honua Power project does not have the potential to add measurably to the number of passengers or cargo passing through Honolulu International Airport or the volume of cargo handled at Honolulu or Kalaeloa Harbors, it focuses on roads and highways. Air and waterborne transportation facilities are discussed briefly at the end of the section.

3.15.1 EXISTING CONDITIONS

Roadway access to the project site is via the following existing public roadways (see Figure 2.1).

- Hanua Street is a 48-foot wide, City and County owned collector road. Parking is allowed along the road. Hence, while the only marking is the roadway centerline, it provides space for more than two lanes in each direction. Hanua Street was designed and constructed to carry heavy vehicles and experiences only moderate traffic volumes at the present time. It provides access to the H-1 Freeway via either Malakole Road, Kauhi Street, Komohana Street, or Kuhela Street (all cross-streets connecting Hanua Street with Kalaeloa Boulevard) and Kalaeloa Boulevard. Honua Power, LLC will also receive feedstock deliveries from ASR, Inc. by truck, located one-half mile further south on Hanua Street, thus deliveries of feedstock will arrive from both directions on Hanua Street.
- Malakole Road is a two-lane, State-owned roadway that connects the westernmost portion of Campbell Industrial Park and Kalaeloa Harbor with Kalaeloa Boulevard.
- Kalaeloa Boulevard is a four-lane, State-owned arterial roadway that connects Campbell Industrial Park with the H-1 Freeway and Farrington Highway. The posted speed limit is 35 miles per hour on Kalaeloa Boulevard and 25 miles per hour on Malakole Road and Hanua Street. The nearest traffic light is at the intersection of Kalaeloa Boulevard and Kamokila Boulevard, which is more than 1 road-mile away.



Prepared For:

Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Source:

James Campbell Estate, LLC
(January, 2003)

Figure 3.16:

Businesses & Land Ownership at Campell Industrial Park

Honua Power Project

Figure 3-16 Business & Land Ownership in CIP 2009-06-05.cdr

Prepared For:

Hawaiian Electric Co., Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

--Hawaiian Electric Co., Inc
--State of Hawai'i GIS
--Space Imaging, Inc. (2006-12-26)

0 1,000 2,000
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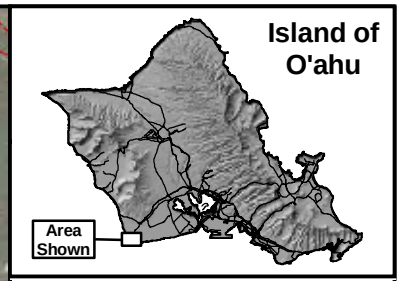
Figure 3.17:

State Land Use Districts

Honua Power Project

Figure 3-17 State Land Use Districts 2009-06-05.mxd



Zoning Districts:

- AG-1 Restricted Agriculture
- AG-2 General Agriculture
- F-1 Federal & Military Preservation
- I-3 Waterfront Industrial
- P-2 General Preservation

Prepared For:

Honua Power, LLC

Prepared By:

PLANNING SOLUTIONS

Sources:

-City & County of Honolulu GIS
-State of Hawaii GIS
-Space Imaging, Inc. (2006-12-26)

Figure 3.18:

County Zoning Map

Honua Power Project

Figure 3-18 County Zoning Map 2009-06-05.mxd

As shown in Figure 2.2, the entrance driveway to the Honua Power, LLC site would be constructed along the western edge of the property, about 0.75 mile south of the intersection of Malakole and Hanua Streets. Currently, traffic on Hanua Street consists predominantly of passenger cars and light trucks driven by employees working in the area, but many medium-duty and heavy trucks also use the roadway (e.g. HPOWER transfer trucks, container delivery trucks traveling to nearby warehouses, etc.). A traffic count conducted on July 11, 2008, indicates that existing peak-hour traffic on Hanua Street between Kuhela Street and Olai Street (less than 200 vehicles per hour during both the morning and afternoon peak hours) is low (see Table 3.19). It is also only a small fraction of the roadway's capacity (more than 2,000 vehicles per hour).

Data on existing traffic volumes on Kalaeloa Boulevard and Malakole Street, the two other roads which most vehicles would use to access the site, are collected by the State of Hawai‘i Department of Transportation. The most recent count on Kalaeloa Boulevard between the Palailai Overpass and Malakole Road was taken on January 24, 2007. Morning and afternoon peak-hour traffic volumes on that date are shown in Table 3.20. The traffic data for Kalaeloa Boulevard and Malakole Street were obtained from the State of Hawaii, Department of Transportation, Highways Division traffic count station 10-H located at the intersection of these two roads.

Table 3.19 Peak Hour Traffic on Hanua Street (North of Entrance)

Time	Hanua Street Southbound				Hanua Street Northbound				2-WAY TOTAL
	Movement		*South-bound Total*	*60-Min Total*	*Movement*		*North-bound Total*	*60-Min Total*	
	(1) Straight	(3) Left In			(2) Straight	(5) Right Out			
7:30-7:45	15	1	16	65	9	0	9	48	113
7:45-8:00	17	1	18		17	0	17		
8:00-8:15	8	1	9		8	0	8		
8:15-8:30	21	1	22		14	0	14		
3:00-3:15	22	1	23	82	16	0	16	82	164
3:15-3:30	15	1	16		23	0	23		
3:30-3:45	21	0	21		22	0	22		
3:45-4:00	21	1	22		21	0	21		

Source: Planning Solutions, Inc., Count taken July 11, 2008.

As shown in Table 3.20, the peak hours of traffic for Kalaeloa Boulevard are between 6:00-7:00 a.m. (mostly southbound traffic consisting of workers heading into JCIP) and from 3:00 to 4:00 p.m. (mostly northbound towards H-1). Traffic patterns on Malakole Street largely reflect those on Kalaeloa Boulevard, with the eastbound lane experiencing the bulk of the morning peak and the westbound lane experiencing the afternoon peak, although there is a considerably smaller traffic volume on Malakole Street.

Table 3.20 Peak-Hour Traffic on Kalaeloa Boulevard between Palailai Overpass and Malakole Road

Time	*In-bound to JCIP*		*Out-bound from JCIP*		*2-WAY TOTAL*
	15-Min	*60-Min Total*	*15-Min*	*60-Min Total*	
6:30-6:45	315	1,304	58	360	1,664
6:45-7:00	356		85		
7:00-7:15	331		109		
7:15-7:30	302		108		
3:30-3:45	115	412	347	1,224	1,636
3:45-4:00	115		266		
4:00-4:15	104		310		
4:15-4:30	78		301		

Source: State of Hawai‘i Department of Transportation, Highways Division, Highways Planning Survey Section. Traffic count station B720095000000. Palailai Overpass and Malakole Road were taken on January 24, 2007.

Table 3.21 Peak-Hour Traffic on Malakole Rd. between Kalaeloa Blvd. and Hanua St.

Time	*Malakole Rd. West-Bound to Harbor*		*Malakole Rd. East-Bound to Kalaeloa Blvd.*		*2-WAY TOTAL*
	15-Min	*60-Min Total*	*15-Min*	*60-Min Total*	
6:45-7:00	111	371	24	109	480
7:00-7:15	104		23		
7:15-7:30	72		30		
7:30-7:45	84		32		
3:00-3:15	47	152	71	177	329
3:15-3:30	36		44		
3:30-3:45	31		32		
3:45-4:00	38		30		

Source: State of Hawai‘i Department of Transportation, Highways Division, Highways Planning Survey Section. Traffic count station B720095000000. Palailai Overpass and Malakole Road taken on January 24, 2007.

3.15.2 ANTICIPATED IMPACTS

The following discussion is divided into the following major parts:

- Section 3.15.2.1 discusses the volume of vehicle-trips that the proposed project would generate.
- Section 3.15.2.2 summarizes the effect that the additional traffic would have on the level of service in area roadways.

The analysis addresses both the construction/start-up phase of the project, which is expected to last approximately six months, and the operational phase, which is expected to continue for the life of the facilities (a minimum of two decades).

3.15.2.1 Project-Related Vehicle-Trip Generation

3.15.2.1.1 Construction Phase Vehicle-Trip Generation

Construction of the waste-to-energy facility would generate vehicle-trips on area roadways. Most of these would be associated with the delivery of construction materials to the site, and employee commute trips to and from working areas. Detailed estimates of the number of construction-phase trips that would be generated by each alternative follow below. Because the processing trains will be installed in two increments, construction traffic will actually occur during two different periods. Because only some of the facilities must be expanded to accommodate the second processing train, the level and duration of construction activity during installation of the second increment will be far less than that during construction of the first. Consequently, when all factors are considered, the total number of project-related construction vehicle-trips during Phase II will probably amount to no more than a third the number during construction of Phase I. The difference between the two phases in the number of vehicle-trips generated on the days with the most intense construction activity are modest, however, and for this reason the analysis does not attempt to differentiate between Phase I and Phase II construction.

Construction Employee Work Trips. The construction phase will increase the number of vehicle-trips into and out of the facility. It is estimated that on average 14, and at most 26 workers, will be going to and from the project site daily. Assuming one worker per vehicle and two one-way vehicle-trips per worker each day during construction, it is expected that between 28 and 52 vehicle-trips will be generated. These vehicle-trips will occur from 7:00AM until 5:00PM, Monday through Saturday. The majority of these vehicle trips will be made by light passenger vehicles carrying construction workers to the facility.

Earthmoving Trucks. As indicated elsewhere in this report, preliminary estimates are that approximately 10,500 cubic yards of fill will need to be brought to the site to create the desired slopes and drainage. Assuming the use of trucks with a haul capacity of 20 cubic yards, this will entail approximately 500 haul loads of material. Assuming this would be accomplished over a period of 6 to 8 weeks, it would require between 15 and 20 truck trips per day over that brief period.

Construction Equipment Delivery Trips. Construction of the proposed project will include the importation of several relatively large pieces of gasification and power generation apparatus. These will be landed in Kalaeloa Harbor and trucked to the site via Malakole Street and Hanua Street using oversize vehicles. Many smaller pieces of equipment will be needed as well, and Honua Power estimates that over the course of the construction period the delivery of equipment and construction materials will generate approximately 215 truck-trips over the course of the work.

3.15.2.1.2 Operational Phase Vehicle-Trip Generation

Once the facility is put into service, it will operate 24 hours a day, with an annual 2 week shut down period for maintenance. Traffic to the facility will consist of employees, coming and going in light vehicles, and dump-trucks traveling back and forth to the generation station carrying feedstock from its source locations. The total number of additional vehicle-trips expected as a result of the facility's regular operations, including all work shifts, maintenance visits and feedstock transport, is 90 per day for the first increment. The second increment will add 36 vehicle-trips per day to this, bringing the total to 126 vehicle-trips per day when both phases are in full operation. Table 3.22, Table 3.23, and Table 3.24 provide a breakdown of these totals.

Employee Work Trips. The majority of the vehicular traffic associated with the proposed facility would be Honua Power, LLC employees entering or leaving the facility. Service trips to and from the facility by vendors and maintenance personnel would add a few additional trips to this. The number of trips that this would generate is summarized in Table 3.22 below.

Table 3.22 Employee Vehicle-Trip Generation by Shift

Shift	No. of Employees			Start	End	Vehicle-Trips Generated		
	Incr 1	Incr 2	Total			Incr 1	Incr 2	Total
1st Office Shift	2	1	3	8:00 am	5:00 pm	4	2	6
1st Plant Shift	4	4	8	7:00 am	3:30 pm	8	8	16
2nd Plant Shift	2	1	3	3:00 pm	11:30 pm	4	2	6
3rd Plant Shift	2	1	3	11:00 pm	7:30 am	4	2	6
Source: Honua Power, LLC.								

During each shift there will also be maintenance personnel traveling between the facility and their base, about 0.5 mile away at 91-125 Kaomi Loop (see Figure 1.1). Table 3.23 depicts the maintenance-related vehicle-trips.

Table 3.23 Maintenance-Related Vehicle-Trip Generation

Shift	No. of People			Start	End	Vehicle-Trips Generated		
	Incr 1	Incr 2	Total			Incr 1	Incr 2	Total
1st Shift	2	2	4	7:00 am	3:30 pm	8	4	12
2nd Shift	1	1	2	3:00 pm	11:30 pm	4	2	6
3rd Plant Shift	1	1	2	11:00 pm	7:30 am	4	2	6
Source: Honua Power, LLC.								

Feedstock Delivery Trips. Once operation has begun, feedstock will be delivered to the project site daily using standard six-axle dump trucks. The deliveries will be continuous, from 7:00 AM to 5:00 PM, Monday through Saturday, but the precise timing of the deliveries will depend upon the needs of the feedstock suppliers. Table 3.24 summarizes the expected vehicle trip load for feedstock deliveries.

Table 3.24 Feedstock Transport Trip Generation

Source	*Feedstock*	*Vehicle-Trips/Day*			*Notes*
		Phase I	*Phase II*	*Total*	
C&D Feedstock	Construction and demolition debris.	64	28	92	These deliveries will be made using trucks that normally haul ash from the AES Power Plant to the PVT Landfill, returning from there empty. Honua Power, LLC will fill these return trips with feedstock for power generation. Honua Power, LLC is currently negotiating the specifics of this arrangement.
Auto Shredder Residue (ASR)	Plastic, rubber, glass, wood, cloth, paper and foam.	0	22	22	The ASR facility is approximately ½ mile away from Honua Power, LLC project site. Their shredder facility is located at the end of Hanua Street, about one block away. Previously they would have hauled their output to the Waimanalo Landfill, so this will reduce truck traffic and landfill volumes.
Supplier A	Tires	2	0	2	Tires would be brought into Honua Power, LLC from the Supplier A facility, ½ mile away on Komohana Street.
Supplier B	Non-Recyclable Paper and Plastic Waste	2	0	2	This feedstock will be brought from the Supplier B facility on Sand Island.
	TOTAL	***68***	***50***	***118***	
Note: All feedstock transport trips are from 7:00 AM to 5:00 PM, Monday through Saturday.					
Source: Honua Power, LLC.					

Table 3.25 combines all of the vehicle-trips into one summary table. It shows that the great majority of project-related vehicle-trips (152 of the 176 total) will occur between 7:00 a.m. and 4:00 p.m. Of these, only 20 to 25 are likely to occur during the busiest 1-hour period. The hour during which the proposed project generates the greatest number of vehicle-trips is also likely to be offset slightly from the busiest hour on the affected roadways, but in order not to underestimate potential effects, this analysis does not attempt to account for that.

3.15.2.2 Effect on Level of Service

Construction Period. During the construction phase, nearly all vehicle-trips generated will travel along Kalaeloa Boulevard, Malakole Street, and Hanua Street. The number of vehicle-trips generated during the morning and afternoon peak hours (conservatively estimated at 14 to 28 depending upon the phase of construction) is very small (0.8 to 1.6 percent) relative to the existing volume on Kalaeloa Boulevard (1,664 in 2007 as shown in Table 3.20). It represents a more substantial percentage increase in peak-hour traffic on Malakole Road (14-28 vehicle-trips added to the existing 480 vehicle-trips per hour during the morning peak and 329 vehicle-trips per hour during the afternoon peak) and on Hanua Street (14 to 28 vehicle-trips per hour added to the existing morning and afternoon peaks of 113 vehicle-trips and 164 vehicle-trips, respectively). However, the with-project totals on both roadways will remain far below their capacities and the level-of-service unchanged. Construction of the access driveway will require curbside lane closure for a short time

over several days. Because of the wide pavement width on Hanua Street and the low traffic volume, this can be accomplished without causing long travel delays.

Table 3.25 Total Vehicle-Trip Generation

Time	*Employee Vehicle-Trips*			*Maintenance Vehicle-Trips*			*Feedstock Vehicle-Trips*			*Total Vehicle-Trips*		
	1	2	Total	1	2	Total	1	2	Total	1	2	Total
1st Office Shift 0800-1700	4	2	6	0	0	0	0	0	0	4	2	6
1st Shift (0700-1530)	8	8	16	8	4	12	68	50	118	84	62	146
2nd Shift (1500-2330)	4	2	6	4	2	6	0	0	0	8	4	12
3rd Plant Shift (2300-0730)	4	2	6	4	2	6	0	0	0	8	4	12

Source: Honua Power, LLC. Compiled by Planning Solutions, Inc. from information in previous tables.

Because there is widespread street parking available on both Hanua Street and cross streets such as Kuhela and Komohana, it is unlikely that there will be a critical shortage of parking during construction of either the driveway or the second increment. Workers will park on site whenever possible, and in the case of any overflow may use available street parking when necessary, mostly during the second construction increment.

Operational Period. The proposed facility will generate more vehicle-trips per day once it is in operation than it will during construction, but these will be spread more evenly over the course of the day. Consequently, it will generate fewer vehicle-trips during both the morning and afternoon peak-hours and will have even less effect on the level-of-service during those key periods than it will during the construction phase. Even if the peak-hour traffic from the proposed project were to occur at the same time as the existing peak volumes depicted in Table 3.19, Table 3.20, and Table 3.21, the addition of 20 vehicle-trips from the proposed project does not have the potential to affect the level of service. It has even less potential to cause travel delays during less-busy times of the day.

3.15.3 AIR AND OCEAN TRANSPORTATION FACILITIES

Harbors. Barbers Point-Kalaeloa Deep Draft Harbor, located approximately one mile north of the BPTF site, provides a nearby location for unloading heavy equipment and construction materials needed for the proposed project. However, most construction materials would probably arrive at the more developed facilities in Honolulu Harbor and be trucked to the site. The volume and nature of the construction materials is such that they can be readily accommodated by the existing harbor facilities. Hence, the proposed project would not adversely affect harbors or the flow of goods through them.

Airports. The project site is about 9,000 feet west of the intersection of the two runways at Kalaeloa Airport (formerly the Barbers Point Naval Air Station). As mentioned in Chapter 2, the tallest planned building will be 40-50 feet high, and the tallest piece of equipment will be 25 feet high. These are far below the height of structures on nearby properties and do not need special FAA permission to construct.[42]

The project would not directly affect air or ocean transportation facilities. Most of the construction materials and equipment would be imported by sea, increasing the volume of cargo passing through the State's port facilities. However, the volume is small. Hence, the additional cargo can be handled easily by existing harbor facilities. The proposed stack and other facilities are far below the height that would require notification of the Federal Aviation Administration.

3.16 UTILITIES & PUBLIC SERVICES

3.16.1 WATER SUPPLY

The amount and source of water that will be used by the proposed project is described above in Section 2.2.6. Both the well and the Honolulu Board of Water Supply potable water sources have adequate capacity to meet the project's needs. The existing water pipeline has sufficient excess capacity to deliver water to the site.

3.16.2 WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL

All of the process and sanitary wastewater that is generated by the proposed facilities will be treated and disposed of on-site. The facilities that will be used for this purpose are discussed in Sections 2.2.6 and 3.6.2 of this report.

3.16.3 COMMUNICATION SYSTEMS

Hawaiian Telcom provides telephone service within JCIP via lines that run within the roadways throughout the industrial park. The same communication lines supply internet access service. In addition to standard voice and data connection into the public switched telephone network and internet, the facility will have a fiber connection to HECO's communication network that connects to the HECO control center. This fiber connection will be an extension to the existing HECO fiber network in JCIP attached to existing utility poles and other structures. Honua Power does not anticipate material additional infrastructure requirements. HECO will supply access to their fiber-optic communication system in JCIP for monitoring the proposed project's power generating parameters and allowing emergency disconnect activation.

3.16.4 ELECTRICAL SERVICE

The on-site electrical substation (see Section 2.2.5.10) will provide power to the proposed facility. It will also deliver power generated by the facility into the existing HECO 46 kV power lines along Hanua Street. Honua Power is in the process of concluding a power connection agreement with HECO that will stipulate the details of this connection.

3.16.5 PUBLIC SERVICES

Police Protection. The project site is in Honolulu Police Department District 8, which encompasses the Wai'anae Coast, Makakilo, 'Ewa, and the city of Kapolei. The district headquarters is in Kapolei. The proposed facilities will be surrounded by their own security fence and will be manned 24-hours per day. There are no features of the proposed facilities which require greater police attention than

[42] Stacks for HPOWER, the CIP Generating Station, and the AES Generating Station, all of which are located along Hanua Street within a quarter mile of the proposed Honua Power project, extend more than 200 feet above ground level.

other facilities within JCIP. Hence, the proposed project does not have the potential to affect the burden on the Honolulu Police Department in a substantial way.

Fire Protection. Leeward O‘ahu is served by the Honolulu Fire Department’s Fourth Battalion. The Kapolei Fire Station, Station 40, also serves as the headquarters for Battalion 4. Station 28, Nānākuli, and Station 26, Wai‘anae, each have an engine and a tanker. The Makakilo Fire Station (No. 35) has a single engine. Station 24, the ‘Ewa Beach Fire Station, has one fire engine as well. There are no features of the proposed facilities which require greater fire protection than other facilities within JCIP. Hence, the proposed project does not have the potential to affect the work load on the Honolulu Fire Department in a substantial way.

Medical/Health Services. Leeward O‘ahu is served by St. Francis West, a 100-bed hospital outside Waipahu, the Wai‘anae Coast Comprehensive Health Clinic, between Nānākuli and Wai‘anae, and clinics in 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. Staffing at the proposed facility is low, and the kinds of activities that would take place there do not pose a disproportionate risk to employees.

Other Public Services. The proposed facility will slightly increase the number of jobs on the island, but these are not expected to lead to a measurable increase in the need for other public services. There are several reasons for this. First, the worker skills that are required are ones possessed by the existing labor force; hence, they are likely to be filled by existing residents (who would require public services even if they were not employed at the Honua Power Plant). Second, the proposed facilities will not lower the operating costs of other businesses to the point where it might lead to greater business activity (and associated in-migration of workers) than would otherwise occur. Consequently it will not require additional schools, libraries, or other public services.

4.0 CONSISTENCY WITH EXISTING POLICIES, CONTROLS, AND LAND USE PLANS

In accordance with the requirements of HAR §11-200-17 (h), this chapter discusses the relationship of the proposed actions to land use plans, policies, and controls for the area that would be affected by the proposed Honua Power Project. It identifies 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 the jurisdiction (County, State, or Federal) and then by specific ordinance, regulation, or law.

4.1 REQUIRED PERMITS AND APPROVALS

Required City and State permits and approvals for the Honua Power Project are listed in Table 4.1 below. No Federal approvals are required for this project.

Table 4.1 Required Permits and Approvals

Permit Type	*Issuing Agency*	*Application Status*
Conditional Use Permit	City & County Department of Planning & Permitting	Not yet submitted
Grading Permit	City & County Department of Planning & Permitting	Not yet submitted
Building Permit	City & County Department of Planning & Permitting	Not yet submitted
NPDES NOI-C: Construction-Related Storm Water Discharges	State of Hawai‘i Department of Health	Not yet submitted
Well Construction and Well Operation Permits	State of Hawai‘i Department of Health	Not yet submitted
Individual Wastewater Treatment System Approval	State of Hawai‘i Department of Health	Not yet submitted
Solid Waste Management Facility Permit	State of Hawai‘i Department of Health	Not yet submitted
Initial Covered Source/Prevention of Significant Deterioration Permit	State of Hawai‘i Department of Health	Not yet submitted
Source: Compiled by Planning Solutions, Inc. (2008)		

4.2 CITY & COUNTY OF HONOLULU

4.2.1 O‘AHU GENERAL PLAN

The O‘ahu General Plan sets forth the long-range objectives and policies for the County and, together with the City Charter, provides a direction and framework to guide the programs and activities of the City and County of Honolulu. Several of the objectives and policies contained in the plan relate to the proposed Honua Power Project. These are listed below.

ENERGY

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 insulation;

b. biomass energy conversion;

c. wind energy conversion;

d. geothermal energy; and

e. ocean thermal energy conversion.

Discussion: Both of these objectives support the addition of renewable energy to Hawai‘i’s electrical grid, and Objective C specifically mentions energy recovery from solid waste such as that being proposed by Honua Power.

TRANSPORTATION & UTILITIES

Objective B - To meet the needs of the people of O‘ahu for an adequate supply of water and for environmentally sound systems of waste disposal.

Policy 3: Encourage the development of new technology which will reduce the cost of providing water and the cost of waste disposal.

Policy 5: Provide safe, efficient, and environmentally sensitive waste-collection and waste-disposal services.

Policy 6: Support programs to recover resources from solid-waste and recycle wastewater.

Discussion: This objective relates to encouraging environmentally sensitive waste disposal and management. The Honua Power Project contributes to this objective by diverting waste that would otherwise occupy costly landfill space and using it to produce energy.

4.2.2 ‘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.

The ‘Ewa Development Plan was adopted by Ordinance 97-49 in 1997 and revised in 2000. A 5-year review is currently underway.

The Development Plan includes the following statement with regards to Solid Waste Handling and Disposal (Section 4.5):

Two major solid waste handling and disposal facilities are located in Ewa. The H-Power plant at Campbell Industrial Park is operating at maximum capacity, receiving over 600,000 tons of solid waste each year. The Waimanalo Gulch Sanitary Landfill, located between the proposed Makaiwa Hills residential development and Kahe Valley, is the major active waste disposal site on Oahu. It will run out of capacity within ten to twenty five years.

The proposed project will help to reduce pressures on the Waimānalo Gulch and PVT construction waste disposal sites by diverting waste that is presently landfilled or sent off-island and converting it to energy. Consequently it is consistent with the general goals and policies contained in the ‘Ewa Development Plan.

4.2.3 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 Honua Power Project site 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 proposed Honua Power facility is considered a “waste disposal and processing” facility according to Section 21-10.1 of the LUO.[43] Waste disposal and processing facilities are allowed in the I-2 district with the issuance of a minor Conditional Use Permit (CUP). The applicant intends to apply for a minor CUP once it has completed the Chapter 343 environmental impact assessment process and is sure that it is eligible.

§21-2.90 of the LUO states that the purpose and intent of the Conditional Use Permit process is allow for permitting certain uses in some zoning districts so long as certain minimum standards and conditions are met. In order to obtain a CUP, an applicant must be a developer, owner or lessee (holding a lease for the property, the unexpired term of which is more than five years from the date of filing of the application). By virtue of being a lessee of A Pacific Island Properties, LLC under an agreement that will not expire for more than five years, Honua Power LLC is a qualified applicant for a Minor CUP.

The director of the Department of Planning and Permitting (DPP) may allow a conditional use if the proposed use satisfies the following criteria:

- It is permitted as a conditional use in the underlying zoning district and conforms to the requirements of §21.
- The site is suitable for the proposed use considering size, shape, location, topography, infrastructure and natural features.
- The proposed use will not alter the character of the surrounding area in a manner substantially limiting, impairing or precluding the use of surrounding properties for the principal uses permitted in the underlying zoning district.
- The use at its proposed location will provide a service or facility which will contribute to the general welfare of the community-at-large or surrounding neighborhood.

The DPP director may grant conditional use permits by modifying district regulations relating to yards, landscaping, lot dimensions and other factors. In determining whether the proposed conditional use qualifies for a CUP, the director will, where applicable, consider traffic flow and control; access to and circulation within the property; off-street parking and loading; sewerage; drainage and flooding; refuse and service areas; utilities; screening and buffering; signs; setbacks;

[43] The LUO defines “waste disposal and processing facilities” as those “for the disposal and processing of solid waste, including refuse dumps, sanitary landfills, incinerators, and resource recovery plants.”

yards and other open spaces; lot dimensions; height, bulk and location of structures; location of all proposed uses; hours and manner of operation; and noise, lights, dust, odor and fumes.

The findings of this environmental assessment show that the proposed project satisfies the requirements for a Minor CUP. More specifically, it:

- The vehicular traffic moving to and from the facility will not have a significant adverse effect on other roadway users.
- The facility provides sufficient on-site parking and loading to keep from increasing the number of vehicles parking or loading on nearby streets.
- Adequate provisions are made in the project design to accommodate project-related storm drainage runoff and wastewater (both process and sanitary).
- It will substantially reduce the volume of solid waste and refuse being disposed of at public and private landfills on the island.
- Existing and proposed electrical and telecommunications utility service is adequate to support the proposed use.
- The design provides sufficient screening and buffering.
- Minimal signage would be installed and that would meet all of the requirements of the LUO.
- The design conforms to all required setbacks, yards and other open spaces, lot dimensions, height, bulk and location of structures; and hours and manner of operation.

4.2.4 SPECIAL MANAGEMENT AREA REVIEW

The entire project lies outside the Special Management Area (SMA). Consequently, it does not require permitting under the City & County of Honolulu SMA Review Guidelines found in the *Revised Ordinances of Honolulu 1990* (ROH), Chapter 25 (Shoreline Management).

4.3 STATE OF HAWAI‘I

4.3.1 HAWAI‘I STATE PLAN

The *Hawaii State Plan* is intended to guide the long-range development of the State of Hawai‘i by:

- Identifying goals, objectives, and policies for the State and its residents;
- Establishing a basis for determining priorities and allocating resources; and
- Providing a unifying vision to enable coordination between the various counties’ plans, programs, policies, projects and regulatory activities to assist them in developing their county plans, programs, and projects and the State’s long-range development objectives.

The *Hawai‘i State Plan* is a policy document. It depends upon implementing laws and regulations to achieve its goals. The sections of the *State Plan* that are most relevant to the Honua Power project are Sections 226-15 and 226-18, which establish objectives and policies for waste disposal and energy facility systems, respectively. These sections are reproduced in italics below, and the proposed action’s consistency with each of them is discussed.

§226-15 (a) *Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:*

(2) *Promote re-use and recycling to reduce solid and liquid wastes and employ a conservation ethic.*

(3) *Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes. [L 1978, c 100, pt of §2; am L 1986, c 276, §14]*

Discussion: The proposed Honua Power Project centers around the concept of reusing and recycling waste into electrical energy. Presently, most of the waste is landfilled, which represents a lost opportunity to reap valuable economic and environmental benefits. The proposed facility will help remedy that and will contribute to reducing energy costs on O‘ahu.

§226-18 (a) *Planning for the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:*

(1) *Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;*

(2) *Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased;*

(3) *Greater energy security in the face of threats to Hawaii's energy supplies and systems; and*

(4) *Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use.*

§226-18 (b) *To further achieve the energy objectives, it shall be the policy of this State to:*

(1) Support research and development as well as promote the use of renewable energy sources.

Discussion: The 12 MW of power that the proposed Honua Power Project would add to O‘ahu’s grid supports several of the objectives above. The use of locally generated waste as fuel to produce electricity would contribute to increased energy security and self-sufficiency, and the gasification process would result in reductions of several greenhouse gas emissions compared to fossil fuels.

4.3.2 CHAPTER 205, HAWAI‘I REVISED STATUTES - LAND USE LAW

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

The Honua Power Project site 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 Honua Power Project, as a waste disposal and processing facility, is consistent with the land uses envisioned for the State Urban District.

4.3.3 COASTAL ZONE MANAGEMENT PROGRAM

Enacted as Chapter 205A, HRS, the Hawai‘i Coastal Zone Management (CZM) Program was promulgated in 1977 in response to the Federal Coastal Zone Management Act of 1972. The CZM area encompasses the entire state, including all marine waters seaward to the extent of the state’s police power and management authority, including the 12-mile U.S. territorial sea and all archipelagic waters.

The Hawai‘i Coastal Zone Management Program focuses on ten policy objectives:

- Recreational Resources. To provide coastal recreational opportunities accessible to the public and protect coastal resources uniquely suited for recreational activities that cannot be provided elsewhere.
- Historic Resources. To protect, preserve, and where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.
- Scenic and Open Space Resources. To protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.
- Coastal Ecosystems. To protect valuable coastal ecosystems, including reefs, from disruption and to minimize adverse impacts on all coastal ecosystems.
- Economic Uses. To provide public or private facilities and improvements important to the state's economy in suitable locations; and ensure that coastal dependent development such as harbors and ports, energy facilities, and visitor facilities, are located, designed, and constructed to minimize adverse impacts in the coastal zone area.
- Coastal Hazards. To reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.
- Managing Development. To improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- Public Participation. To stimulate public awareness, education, and participation in coastal management; and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program.
- Beach Protection. To protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion.
- Marine Resources. To implement the state's ocean resources management plan.

Other key areas of the CZM program include: a permit system to control development within a Special Management Area (SMA) managed by the Counties and the Office of Planning; a Shoreline Setback Area which serves as a buffer against coastal hazards and erosion, and protects view-planes; and the Marine and Coastal Affairs. Finally, a Federal Consistency provision requires that federal activities, permits and financial assistance be consistent with the Hawai‘i CZM program.

The proposed project is located more than 2,000 feet from the coastline. It does not involve the placement, erection, or removal of materials near the coastline. As documented in this EA, the type and scale of the activities that it involves do not have the potential to affect coastal resources significantly, and thus the project does not require a CZM Federal consistency determination. However, it is consistent with the CZM objectives that are relevant to a project of this sort. A copy of the *Draft EA* will be sent to the Office of Coastal Zone Management at the State of Hawai‘i Department of Business, Economic Development, and Tourism, and their comments, if any, will be reproduced in the *Final EA*.

4.4 FEDERAL ACTS & LEGISLATION

4.4.1 ARCHEOLOGICAL AND HISTORIC PRESERVATION ACTS

As documented in Section 3.11, Honua Power has complied fully with the provisions of the Archaeological and Historic Preservation Act (16 U.S.C. § 469a-1) and the National Historic Preservation Act (16 U.S.C. § 470(f)).

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

As discussed in Section 3.4.3, 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 water tanks and pipelines 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.

4.4.3 CLEAN WATER ACT

The CWA (Federal Water Pollution Control Act, 33 USC 1251, et seq.) is the principal law governing pollution control and water quality of the nation's waterways. As discussed above, there are no waterbodies near the project area that could be affected, and construction will disturb well under an acre of land. Thus, the project does not require approvals under the Clean Water Act.

4.4.4 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 4.3.3 above discusses the consistency of the projects with the CZMP's ten policy objectives.

4.4.5 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 3.7.1. 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.

4.4.6 RESOURCE CONSERVATION AND RECOVERY ACT (42 U.S.C. 6962)

The Resource Conservation and Recovery Act (RCRA) regulates solid and hazardous waste. Its goals are: 1) To protect human health and the environment from the hazards posed by waste disposal; 2) To conserve energy and natural resources through waste recycling and recovery; 3) To reduce or eliminate, as expeditiously as possible, the amount of waste generated, including hazardous waste; and 4) To ensure that wastes are managed in a manner that is protective of human health and the environment.

To achieve these goals, RCRA established three distinct yet interrelated programs:

- RCRA Subtitle D, the solid waste program, encourages states to develop comprehensive plans to manage nonhazardous industrial solid waste and municipal solid waste, sets criteria for municipal solid waste landfills (MSWLFs) and other solid waste disposal facilities, and prohibits the open dumping of solid waste.
- RCRA Subtitle C, the hazardous waste program, establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal — in effect, from cradle to grave.
- RCRA Subtitle I, the underground storage tank (UST) program, regulates underground tanks storing hazardous substances and petroleum products.

Honua will comply with all RCRA requirements for the generation, treatment, and disposal of solid and hazardous waste. As discussed elsewhere in this document, all solid waste and wastewater streams will be well within defined limits for hazardous pollutants.

4.4.7 FLOODPLAIN MANAGEMENT (42 U.S.C. § 4321, EX. ORDER NO. 11988)

As described in Section 3.8.2, the proposed Honua Power site 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. The constructed improvements would not exacerbate existing flood hazards in the area.

5.0 ANTICIPATED DETERMINATION

5.1 SIGNIFICANCE CRITERIA

Hawai‘i Administrative Rules §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. §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. Hawai‘i Administrative Rules §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 in the middle of an industrial park containing the largest concentration of heavy industrial uses on the island. The parcel on which the proposed facilities would be constructed was cleared and grubbed several decades ago. As described in the preceding sections of this report, it does not have the potential to have an adverse effect on any significant cultural or natural resources.

5.2.2 CURTAILS BENEFICIAL USES

As discussed in the preceding sections of this report, the site is presently used for the temporary storage of used tires and other automotive parts. There are no valuable natural or cultural resources. Consequently, construction and operation of the proposed facilities does not have the potential to curtail beneficial uses.

5.2.3 CONFLICTS WITH LONG-TERM ENVIRONMENTAL POLICIES OR GOALS

The proposed project is consistent with the O‘ahu General Plan (see Section 4.2.1) 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

The proposed project is intended to allow waste materials to be converted into usable energy rather than placed in a landfill. It will have a small positive effect on the level of employment and economic activity on the island. It is supportive of the State and County governments’ strong desire to reduce the use of imported fossil fuels and the amount of solid waste placed in landfills.

5.2.5 PUBLIC HEALTH EFFECTS

Project-related emissions will not have a significant adverse effect on air quality or any water sources used for drinking or recreation. Operation of the proposed facilities will reduce the amount of solid waste that must be land-filled and decrease emission from the combustion of fossil fuels. It does not involve other activities with the potential to have a significant adverse effect on public health.

5.2.6 PRODUCE SUBSTANTIAL SECONDARY IMPACTS

The proposed project will not produce significant secondary impacts. It is not designed to foster population growth or to promote economic development.

5.2.7 SUBSTANTIALLY DEGRADE ENVIRONMENTAL QUALITY

The proposed project 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.

5.2.9 EFFECTS ON RARE, THREATENED, OR ENDANGERED SPECIES

No rare, threatened, or endangered species are known to utilize the project areas. The project 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 project will not have a significant adverse effect on air quality (see Section 3.4.3) or water quality (see Section 3.5 and Section 3.6). Noise levels will temporarily increase during construction and once the project is in operation, but the facility will comply with all applicable noise regulations.

5.2.11 ENVIRONMENTALLY SENSITIVE AREAS

There are no environmentally sensitive areas or resources near the proposed project. The project site is outside defined flood and tsunami hazard zones. The structures built as part of the project 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 the surrounding area (see Section 3.13.2).

5.2.13 REQUIRES SUBSTANTIAL ENERGY CONSUMPTION

Construction of the improvements will use some energy, however once in operation, the proposed facility will be a net exporter of electrical energy produced from a solid waste.

5.3 ANTICIPATED DETERMINATION

In view of the foregoing, Honua Power 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 action.

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6.0 CONSULTATION & DISTRIBUTION

6.1 CONSULTATION

Honua Power consulted with the City and County of Honolulu's Department of Planning and Permitting regarding the permitting requirements of the project. It and/or its consultants have also contacted the Honolulu Board of Water Supply, various branches within the State of Hawai'i Department of Health, the Historic Preservation Division of the State of Hawai'i Department of Land and Natural Resources, the State of Hawai'i Commission on Water Resource Management, and other government agencies. The public will also have an opportunity to comment on this *EA.*

6.2 DISTRIBUTION OF THE DRAFT EA

Honua will distribute this EA to the individuals and organizations listed in Table 6.1 and request their comments on the proposed scope of the analysis and on the alternatives that it proposes to evaluate. It will provide a limited number of loan copies of this document to libraries.

Table 6.1 Draft EA Distribution List

City and County of Honolulu	**Libraries and Depositories**
Board of Water Supply	DBEDT Library
Department of Design and Construction	Ewa Beach Public & School Library
Department of Environmental Services	Hawai‘i State Library Hawai‘i Documents Center
Department of Facility Maintenance	Library, Honolulu Department of Customer Services
Department of Parks and Recreation	Legislative Reference Bureau
Department of Planning & Permitting	Pearl City Regional Library
Department of Transportation Services	UH Hamilton Library
Fire Department	Kapolei Library
Police Department	Waianae Public Library
City & County Civil Defense	**Elected Officials**
State Agencies	U.S. Senator Daniel K. Inouye
Commission on Water Resource Management	U.S. Senator Daniel Akaka
Department of Defense	U.S. Congressman Neil Abercrombie
Department of Hawaiian Homelands	State Senator Mike Gabbard
Hawai‘i State Civil Defense	State Senator Colleen Hanabusa
Office of Environmental Quality Control	State Representative Maile Shimabukuro
Office of Hawaiian Affairs	State Representative Karen Leinani Awana
State Department of Accounting and General Services	State Representative Sharon E. Har
State Department of Agriculture	City Councilmember Todd Apo
State Department of Business, Economic Development, and Tourism (Office of Planning, Energy Resources & Technology Division)	Neighborhood Board No. 34 Chair
State Department of Education	Neighborhood Board No. 24 Chair
State Department of Health, Environ. Planning Office	**Local Utilities**
State Department of Land and Natural Resources	Verizon
State Department of Transportation	The Gas Company
State DLNR Historic Preservation Division	Hawaiian Telcom
SHPD - O‘ahu Burial Council	**Other Parties**
Public Utilities Commission	James Campbell Estate
UH Environmental Center	City & County of Honolulu HPOWER
UH Water Resources Research Center	
Federal Agencies	
Environmental Protection Agency (PICO & Reg. 9)	US Fish and Wildlife Service
National Marine Fisheries Service	US Federal Aviation Administration
US Army Engineer Division	US Natural Resources Conservation Service
Source: Compiled by Planning Solutions, Inc.	

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APPENDIX A. NOISE IMPACT ANALYSIS

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YEA Job #46.030
May 4, 2009

Planning Solutions, Inc.
Ward Plaza, Suite 330
210 Ward Avenue
Honolulu, Hawai`i 96814-4012

Attention: Mr. Perry White

Subject: Evaluation of Potential Noise Impacts from the Proposed Honua Waste-To-Energy Facility at Campbell Industrial Park

Dear Mr. White:

The following letter report describes our findings regarding potential noise impacts from the proposed facility, and noise mitigation recommendations related to the subject waste-to-energy facility. The proposed facility is located where shown in Figure 1 off Hanua Street, and is surrounded by neighbors which are engaged in commercial operations within the heavy industrial category. The project site and its neighboring lands are located in the I-2 (Intensive Industrial) Zoning District.

Existing traffic and background noise measurements were obtained at locations "A" through "H" to describe the existing noise environment at the project environs. The potential increase in traffic noise levels associated with the project's heavy truck traffic were evaluated along the possible truck routes to and from the waste-to-energy facility. Potential future noise levels from the waste-to-energy facility equipment were predicted for the initial Phase 1 plant configuration and for the ultimate Phase 2 plant configuration. Both existing and future noise levels were compared with the existing State Department of Health (DOH) noise limit of 70 dBA (for lands zoned for industrial use) along the project site boundaries. The State DOH limit of 70 dBA was used as the threshold for potential noise impacts on neighboring properties, which are all zoned I-2. Where predicted noise levels from the waste-to-energy facility exceeded the 70 dBA DOH noise limit, recommendations for reducing the generating station equipment noise emissions was provided.

Existing Noise Measurement Results. Daytime and nighttime traffic and background noise measurements at Locations "A" through "H" were obtained where shown in Figure 1. The results of the A-Weighted noise measurements are shown in Enclosures 1 through 8. Measurement Locations "A" through "D" were used to record existing traffic and daytime background noise levels along the heavy truck routes anticipated to be used by project vehicles delivering feedstock to the waste-to-energy facility. Locations "E" through "H" were used to measure existing background noise

levels in the project environs during the nighttime period. Steady background noise levels during the daytime ranged from 57 to 63 dBA, with maximum noise levels ranging from 85 to 94 dBA. During the daytime, street traffic and operating heavy equipment controlled the maximum background noise levels in the project environs. During the nighttime, steady background noise levels ranged from 51 to 65 dBA, with the noise from the Kalaeloa Partners combined cycle power plant on Kalaeloa Boulevard being the dominant noise source in the project environs. Loud and intermittent noise emissions from the Kalaeloa Partners facility also occurred at 20 minute intervals.

Existing traffic noise levels along the anticipated truck routes to be used by project heavy vehicles currently do not exceed the 71 Leq(h) (or Equivalent Hourly Noise Level) noise abatement criteria at 50 feet distance from the roadway centerlines. This noise abatement criteria is currently used by the Hawai`i State Department of Transportation, Highways Division (HDOT) for commercial or industrial land uses (see "Noise Analysis and Abatement Policy;" State of Hawai`i Department of Transportation, Highways Division, June 26, 1997).

Existing steady background noise levels in the project environs from stationary sources such as air-conditioning and ventilation equipment or power generation plants, do not exceed the DOH noise limit of 70 dBA for lands zoned for industrial uses. This noise limit is enforced at or beyond the property boundaries of the noise source, typically in response to complaints regarding stationary noise sources in accordance with "Title 11, Administrative Rules, Department of Health; Chapter 46, Community Noise Control." Mobile noise sources, such as construction equipment or motor vehicles are not required to meet the 70 dBA noise limit.

Predicted Noise Impacts from Heavy Truck Traffic. The potential noise increases and impacts from the heavy trucks used to deliver the feedstock to the Honua waste-to-energy facility were evaluated by calculating the potential increases in traffic noise levels along the roadways expected to be used by the project traffic. Enclosure 9 presents the measured and calculated traffic noise levels at 50 foot setback distance from the five roadway sections which are anticipated to be used by the project's heavy trucks during the working hours on Monday through Saturday. As shown in Enclosure 9, the existing traffic noise levels along the five roadway sections ranged from 64.1 to 67.5 Leq(h). The anticipated maximum number of heavy truck-trips per hour was assumed to be 20 trips in and out of the Honua waste-to-energy facility. The distribution of the origin/destination of these project related heavy truck-trips following the Phase 2 expansion of the facility ranged from 3.7 trips south of the facility to 16 trips north of the facility. The potential increase in traffic noise levels along the five roadway segments due to project related heavy truck traffic ranged from 0.5 to 1.9 Leq(h). Total project plus non-project traffic noise levels were predicted to remain below the DOT

criteria level of 71 Leq(h) along all five roadway segments. Based on these results, and because the typical building setbacks exceed 50 feet from the roadways' centerlines, it was concluded that the noise from the project's heavy truck traffic should not cause adverse noise impacts on existing businesses in the project environs.

Predicted Noise Levels from Honua Waste-To-Energy Plant Equipment. Average (or Leq) noise contours for the future facility equipment were developed using source sound levels provided by Honua Technologies, Inc. for the major outdoor equipment such as the heat exchangers and the large fans. Source sound levels for the transformer and storage silos/conveyors were developed using in-house noise data. For the Phase 1 installation, it was assumed that the waste-to-energy facility would be operating with the equipment shown in Figure 2. For the Phase 2 expansion, the operating equipment would be essentially doubled as shown in Figure 3. The far field, source noise modeling assumptions used to develop the noise contours for Phase 1 were as follows, with identical equipment assumed for the gasification equipment in Phase 2:

1. Step-Up Transformer: 57 dBA at 50 feet distance;
2. Single Cell of Dry Heat Exchanger: 47 dBA at 50 feet distance;
3. Single Cell of Wet Heat Exchanger: 66 dBA at 50 feet distance;
4. System Vent Stack: 47 dBA at 50 feet distance;
5. Silenced Re-Ox Fan Inlet: 61 dBA at 50 feet distance;
6. Silenced Overfire Fan Inlet: 65 dBA at 50 feet distance;
7. Silenced Underfire Fan Inlet: 68 dBA at 50 feet distance; and
8. Feedstock Storage Silo/Conveyors: 67 dBA at 50 feet distance.

The resulting noise contours for the Phase 1 and Phase 2 configurations are shown in Figures 2 and 3; these noise contours were calculated assuming there would be no sound attenuation from structures, a conservative assumption. From Figure 2, it was concluded that noise levels from the Phase 1 Honua facility could exceed 70 dBA along the north boundary line if the assumed noise level for the Storage Silo/Conveyors is accurate. From Figure 3, it was concluded that noise levels from the Phase 2 Honua facility could exceed 70 dBA along the north boundary line if the assumed noise level for the Storage Silo/Conveyors and gasifier blowers are accurate. The existing uses on the adjoining lots where the noise levels from the Honua facility could exceed 70 dBA are not considered to be noise-sensitive. The neighboring lot to the north is Leeward Auto Wreckers; the neighboring lot to the east is BENDCO, and the neighboring lots to the south are Family Towing and a construction materials supply company.

The amount of noise spillover from the Honua waste-to-energy facility into neighboring properties ranges from approximately 74 to 70 dBA, with 70 dBA being the DOH noise limit for industrial zoned lands. These spillover levels are approximately 10

to 14 dBA above the current steady daytime background noise levels, and 17 to 21 dBA above the current steady nighttime background noise levels. These spillover levels of 74 to 70 dBA are relatively high, and will be noticed by the neighboring business to the north because of the relatively large increases in the steady background noise levels resulting from the Honua facility operations. Outdoors, speech communication between talkers and listeners will become more difficult at talker-to-listener separation distances of 3 feet or more (see Figure 4). Adverse noise impacts associated with Honua's stationary equipment noise emissions are possible, and include realization by the neighbor to the north that the steady background noise levels have increased and that speech communication is more difficult at relatively short distances.

Recommended Noise Mitigation Measures. The noise contours shown in Figures 2 and 3 were developed using the eight source noise level assumptions listed previously. Substantially quieter (by at least 7 dBA quieter than the originally planned wet heat exchanger) equipment for the wet heat exchanger has been selected prior to construction, because it will be very difficult to provide the required sound attenuation treatments to the wet heat exchanger following installation. This has been done so as to avoid other more difficult noise mitigation measures which would have been required to contain the 70 dBA noise contours within the east and south property boundaries.

The source noise level information available on the feedstock silos and associated material conveyor system may not be as accurate as those available for the other stationary equipment. If an operating waste-to-energy facility similar to that proposed for Honua currently is in operation, the noise level contours shown in Figures 2 and 3 should be validated using actual sound level measurements of an operating facility. The validation may also be performed following completion of the Phase 1 installation, and prior to the construction of the Phase 2 facility. The feedstock silos and associated material conveyor system installed at the Honua facility should have source noise levels which do not exceed 60 to 62 dBA at 50 feet. If they exceed these values, the use of additional shrouds over the conveyors and at the material transfer locations will probably be required to comply with the DOH 70 dBA limit along the north property line.

The intake duct silencers planned for the underfire and overfire fans may need to be lengthened or reselected to provide approximately 5 dBA additional sound insertion loss. Alternately, the addition of lined elbow inlet duct sections may be used to provide the additional sound attenuation. A validation of the noise levels from the fans can be performed following the Phase 1 installation, with any required mitigation measures identified prior to construction of the Phase 2 facility.

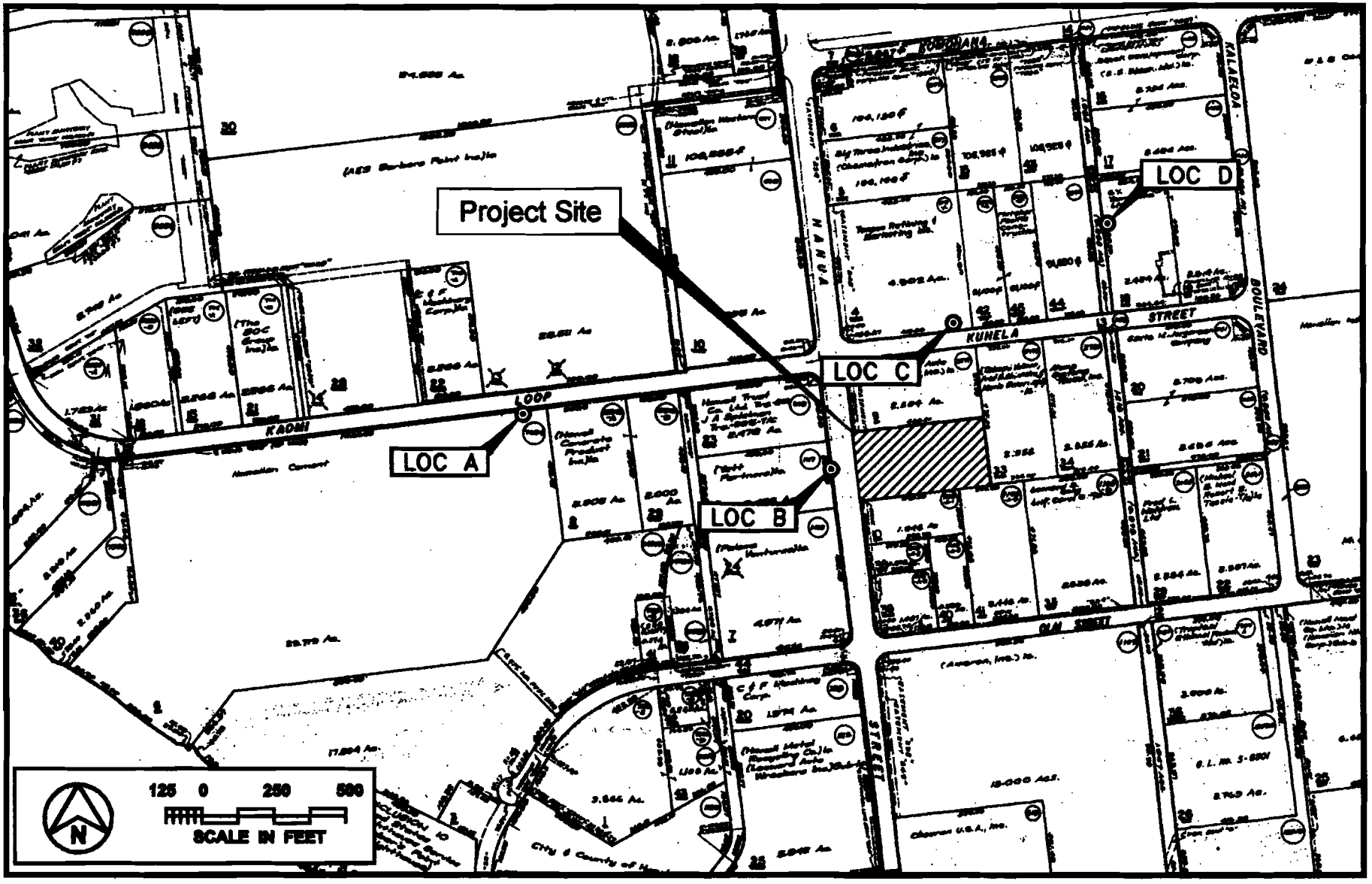
In summary, risks of adverse noise impacts from the project's heavy truck traffic are considered to be very low, and special noise mitigation measures should not be necessary for truck traffic noise. The future noise levels from the stationary facility equipment may exceed the 70 dBA State DOH limit under both Phase 1 and Phase 2 scenarios. As long as there is a commitment to not exceed the 70 dBA DOH limit, the completed Phase 1 installation should provide the opportunity to refine the noise modeling, and to take whatever noise mitigation measures are required for both the Phase 1 and Phase 2 facilities. Risks of activity interference or annoyance at the neighboring property to the north are of concern because the noise emissions from the Honua facility are anticipated to be continuous. Containment of the 70 dBA noise contour within the Honua facility's property boundaries should be a goal of the proposed facility planning, with corrective taken as required following the completion of the Phase 1 facility.

Let me know if you have any questions regarding this letter report.

Sincerely,

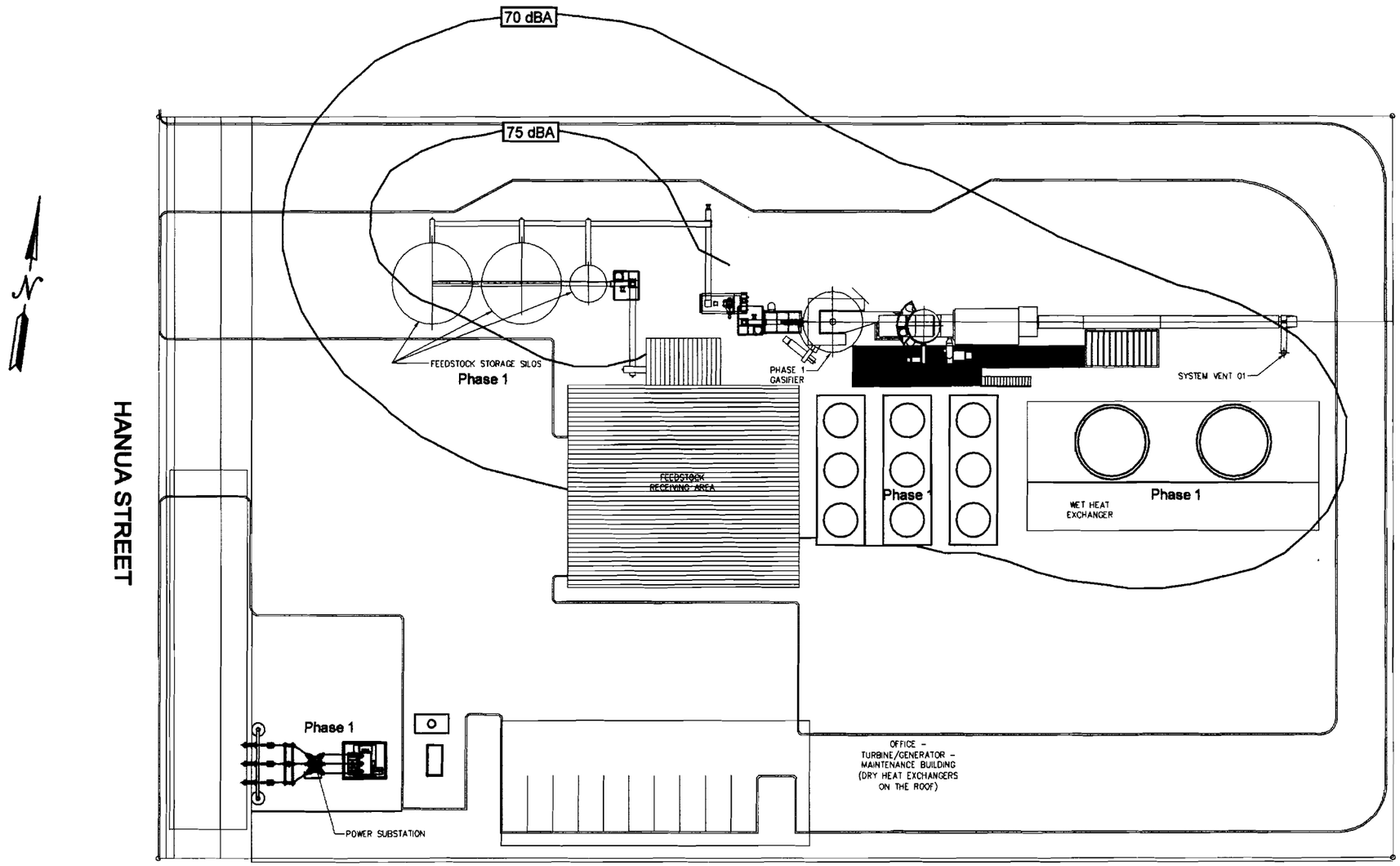
Yoichi Ebisu, P.E.

encl.



PROJECT LOCATION AND NOISE MEASUREMENT LOCATIONS

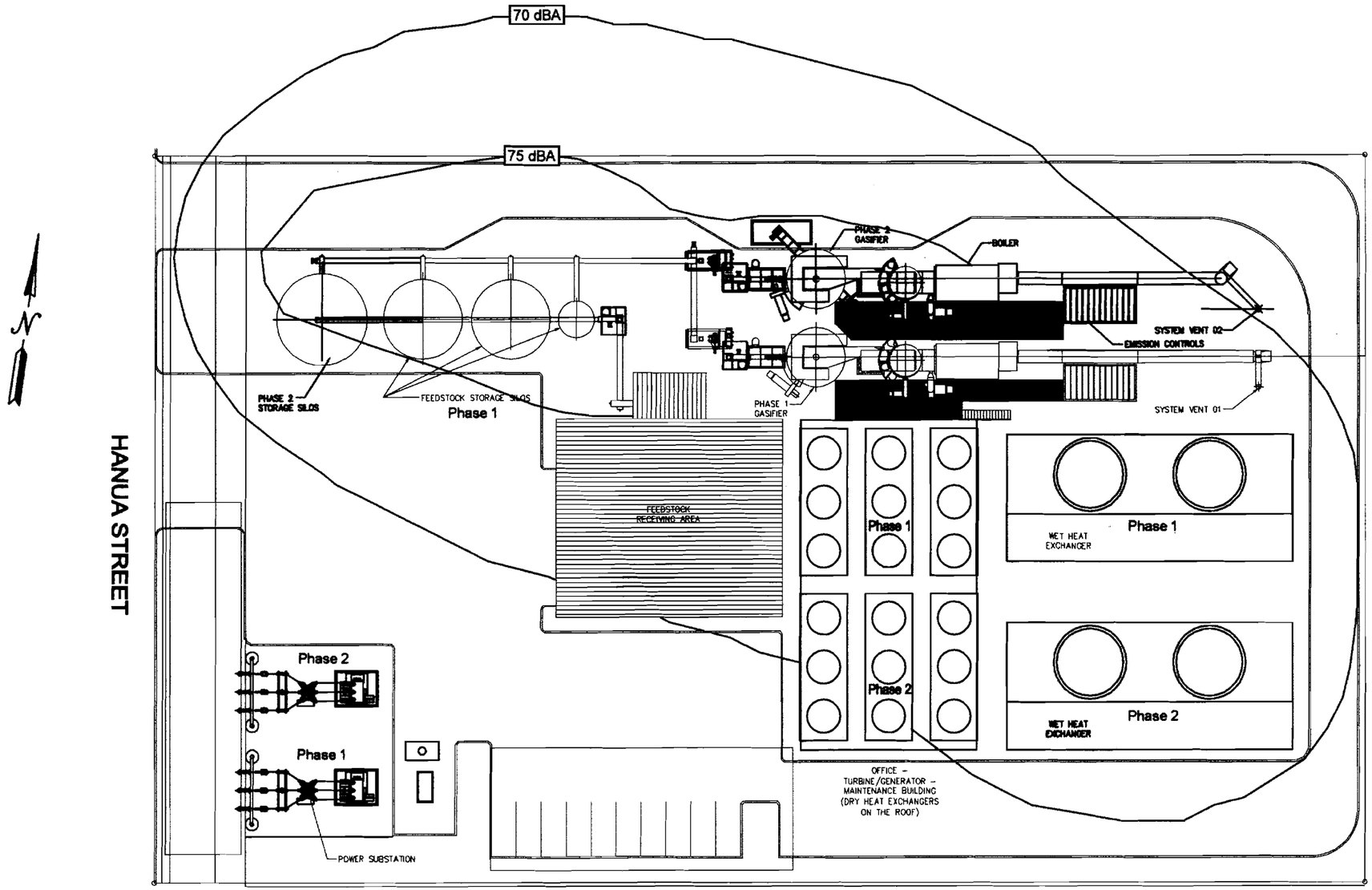
FIGURE 1



20' 0 20' 40' 60'
SCALE: 1"=40'

75 AND 70 dBA NOISE CONTOURS ASSOCIATED WITH PHASE 1 PLANT OPERATIONS

FIGURE 2



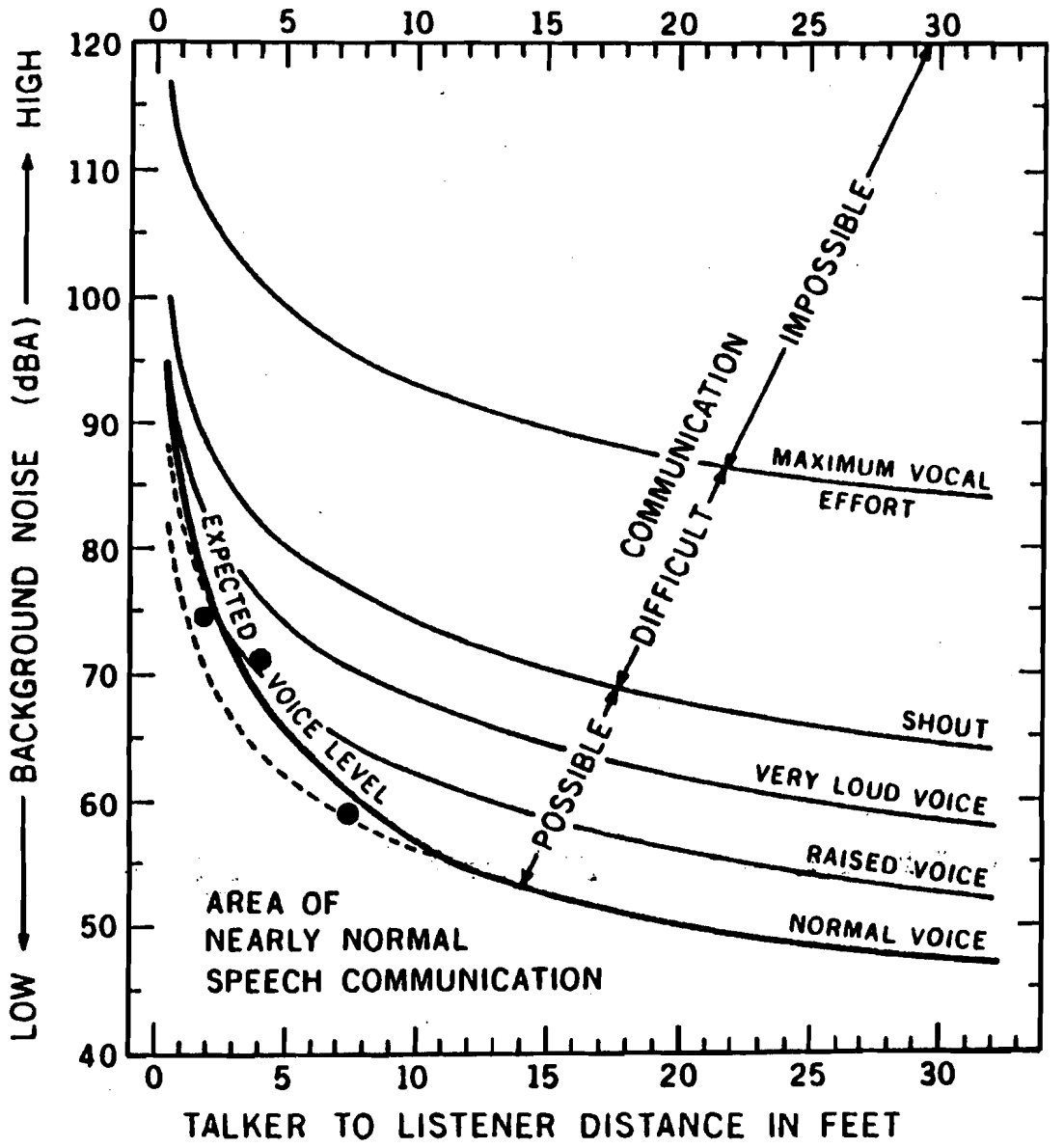
20' 0 20' 40' 60'
SCALE: 1"=40'

75 AND 70 dBA NOISE CONTOURS ASSOCIATED WITH PHASE 2 PLANT OPERATIONS

FIGURE 3

FIGURE 4

SPEECH COMMUNICATION DIFFICULTY VS. A-WEIGHTED BACKGROUND AMBIENT NOISE LEVEL AND DISTANCE BETWEEN THE TALKER AND LISTENER



Quality of speech communication as dependent on the A-weighted sound level (dBA) of the background noise and the distance between the talker and listener. The heavy data points represent scores of 90% correct with tests done with phonetically balanced lists of one-syllable words. The types of speech communication typical of various talker-listener distances are based on observation.

APPENDIX B. CULTURAL IMPACT ASSESSMENT

— Final Report —

A Cultural Impact Assessment Study for the Proposed Honua Power Plant, Honouliuli Ahupua‘a ‘Ewa District, Island of O‘ahu

TMK: (1)9-1-031:032

By:

Usha K. Prasad

Prepared for:

Planning Solutions, Inc.
210 Ward Avenue, Suite 330
Honolulu, Hawai‘i 96814

INTERNATIONAL ARCHAEOLOGICAL RESEARCH INSTITUTE, INC.

JUNE 2009

— FINAL REPORT —

A CULTURAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED HONUA POWER PLANT, HONOULIULI AHUPUA‘A ‘EWA DISTRICT, ISLAND OF O‘AHU

TMK: (1)9-1-031:032

By:

Usha K. Prasad, Ph.D.

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June 2009

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I. INTRODUCTION

This Cultural Impact Assessment (CIA) has been prepared for International Archaeological Research Institute, Inc. (IARII) by Usha K. Prasad, LLC, and assesses the possible cultural impacts associated with the proposed Honua Power Plant, Honouliuli Ahupuaʻa, ʻEwa District, Island of Oʻahu (TMK: (1)9-1-031:032). The project site is currently in use for industrial activities.

Preparation of the CIA, as explained in the State of Hawaiʻi CIA guidance document (Environmental Council 1997), involves collection of ethnographic and ethnohistorical information for the purpose of identifying impacts of a "proposed action on cultural practices and features associated with the project site." The conclusions of this study are based on ethnographic and documentary data collected about the project site. Ethnographic information is fairly limited as (1) individuals and families associated with any traditional uses of the area can no longer be found, and (2) the project site has been in continuous commercial/industrial use for up to 70 years. Documentary information comes from a CIA study previously done at Kalaeloa by this researcher (Prasad 2007), archaeological studies in the general vicinity of the project site, land and survey maps, and land records maintained at the State of Hawaiʻi Bureau of Conveyances.

This draft report concludes the primary analysis for the CIA. The finding of no cultural impacts is presented here. The results of the present study (Section IV) are summarized by addressing the six protocols established by the Environmental Council (EC) guidelines.

STUDY GOALS

Articles IX and XII of the State Constitution of Hawaiʻi (Chapter 343, Hawaiʻi Revised Statutes) require government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups. As such, environmental impact assessments and statements need to study the impacts of a proposed action on cultural practices and features associated with a project site. Act 50 (April 26, 2000), Section 343-2, of the Hawaiʻi Revised Statutes (HRS) further amends the definition of environmental impact statement to include "effects of a proposed action on the economic [and] welfare, social welfare, and cultural practices of the community and State." The "Guidelines for Assessing Cultural Impacts," adopted by the Environmental Council of the State of Hawaiʻi, on November 19, 1997, identifies the protocol for conducting cultural assessments (see Appendix A).

PROJECT METHODS

An important note regarding the guidelines for completing CIA studies in the State of Hawaiʻi (see Appendix A) is the need "to promote and preserve the cultural beliefs, practices, and resources of native Hawaiians, as well as those of other ethnic groups." For much of the 20th century, the project site has been used for various commercial and/or industrial purposes. Native Hawaiian uses of the project site were discontinued for a fairly lengthy period. No *kūpuna* (Hawaiian elders) who are knowledgeable about the project site's native Hawaiian cultural properties and practices could be located. Attemps to locate *kūpuna* (Hawaiian elders) were made by contacting the Office of Hawaiian Affairs (OHA), and the Kalaeloa Neighborhood Board. Neither organization could identify *kūpuna* for the project site, but they did provide names of individuals who had general knowledge about the Kalaeloa area. However, interviews have been completed with *kūpuna* and Hawaiian residents, some of whom continue to live in the *ahupuaʻa* (traditional Hawaiian land unit) of Honouliuli, who have knowledge about the general area. The information from these interviews is presented here.

Visits to the project site were made to identify any cultural features, undisturbed areas, and to conduct interviews. No obvious cultural features were identified within the immediate vicinity of the project site. Likewise, no undisturbed areas were identified. Interviews were carried out with individuals who currently work in the project site and its nearby environs; they did not include any *kūpuna* or Hawaiians. However, a few of the individuals who were interviewed have ancestral ties to the plantation camps that were once found on the ‘Ewa Plain.

PROJECT LOCATION

The project site is located in west O‘ahu. The property lies among various other industrial businesses that form part of the Campbell Industrial Park. The businesses which border on the project site include Leeward Auto Wreckers along its northern boundary, Gavoz Corporation along the eastern boundary, and Campbell Hawaii Investor LLC, Specialty Surfacing Co., Inc., and Valve Service & Supply along the southern boundary. Hanua Street forms the western boundary of the project site. At present, the project site appears to be used as a storage and day parking area (Fig. 2).

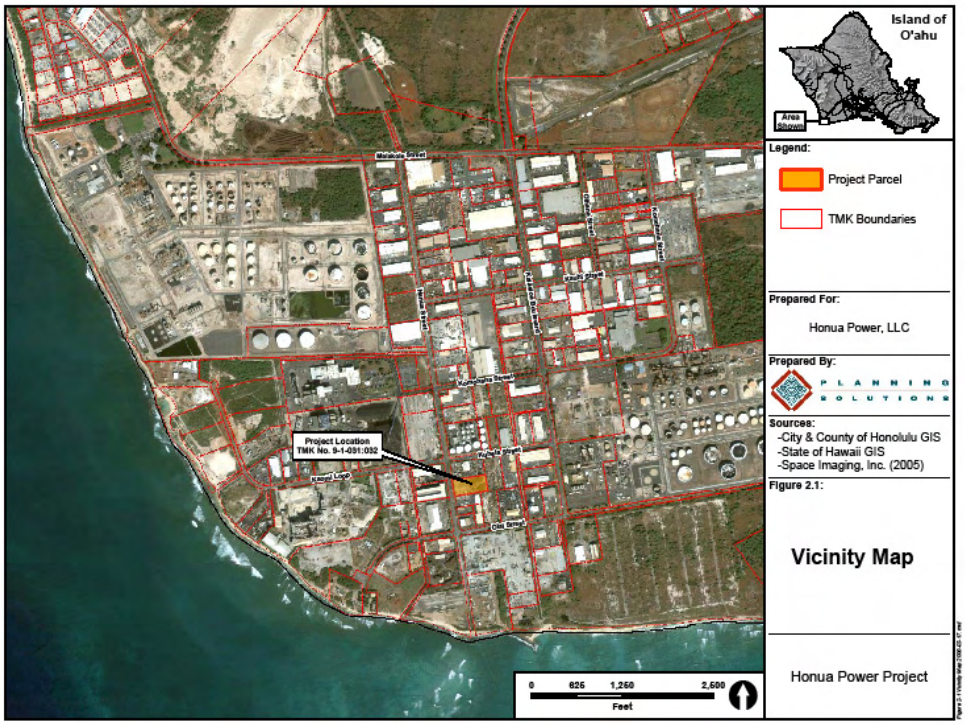

Figure 1. Aerial photograph of the Project Site (Planning Solutions 2003).

Figure 2. Photograph of Project Site TMK:(1)9-1-031:032.

II. TRADITIONAL AND CULTURAL SIGNIFICANCE OF THE PROJECT SITE

This section of the CIA study discusses the prehistory and history of the Kalaeloa region, as the context for the traditional and cultural significance of the project site.

THE AHUPUA‘A OF HONOULIULI

The project site lies in the *ahupua'a* of Honouliuli in the *moku* (traditional Hawaiian district) of ‘Ewa (Fig. 3) and is part of the unique geological feature known as the ‘Ewa Plain (or the ‘Ewa Karst; see discussion the next section). Oral histories cited in *Sites of Oahu* (Sterling and Summers 1978) tell of the traditional importance of the *mauka* or upland areas of Honouliuli Ahupua‘a. Being one of the largest traditional Hawaiian land units on O‘ahu, Honouliuli served as a crossroads to many points east (towards Pearl Harbor and Honolulu), west (towards Wai‘anae) and north (towards Wahiawā and Waialua). The information presented on the traditional and cultural significance of the project site comes largely from *Oral History Studies for the Determination of Traditional Cultural Properties and Cultural Impact Assessment for the (Kalaeloa) Barbers Point Harbor Modification Project, O‘ahu Island, Hawai‘i* (Prasad 2007).

There are several places within Honouliuli Ahupua‘a that are associated with traditional Hawaiian land uses. Of these, Kalaeloa (or Barbers Point) is situated just southwest of the current project site. The original Hawaiian name for this area was either Lae Loa or Kalaeloa; both names are seen in historic maps and text. *Lae* meaning cape or point and *loa* meaning distance or length, is seen on 1873 and 1889 maps. Lae Loa is also a point south of Hōnaunau Bay on Hawai‘i Island (Pukui et al. 1976:126). Kalaeloa may translate to “clear or calm stretch” of either water or land. According to Pukui et al. (1975:52), *kala‘e* means “clear or calm.” Barbers Point is the post-contact name of the area and is attributed to Captain Henry Barber, whose ship ran aground on the shoals of Kalaeloa in 1796. According to Kamakau (1992:174):

> In October, 1796, a ship [Arthur, under Henry Barber] went aground at Kalaeloa, Oahu. This ship had visited the island on several occasions during the rule of Ka-lani-ku-pule. This was the first time a foreign ship had grounded on these shores. Kamehameha was on Hawaii, but Young had remained on Oahu. All the men on the ship came ashore at night in their boats. At daylight when the ship was seen ashore Ku-i-helani placed a ban on the property of the ship and took care of the foreigners. Hawaiian divers recovered the valuables, and they were given over to the care of Ku-i-helani, but part were given by Captain Barber to the men who had recovered them.

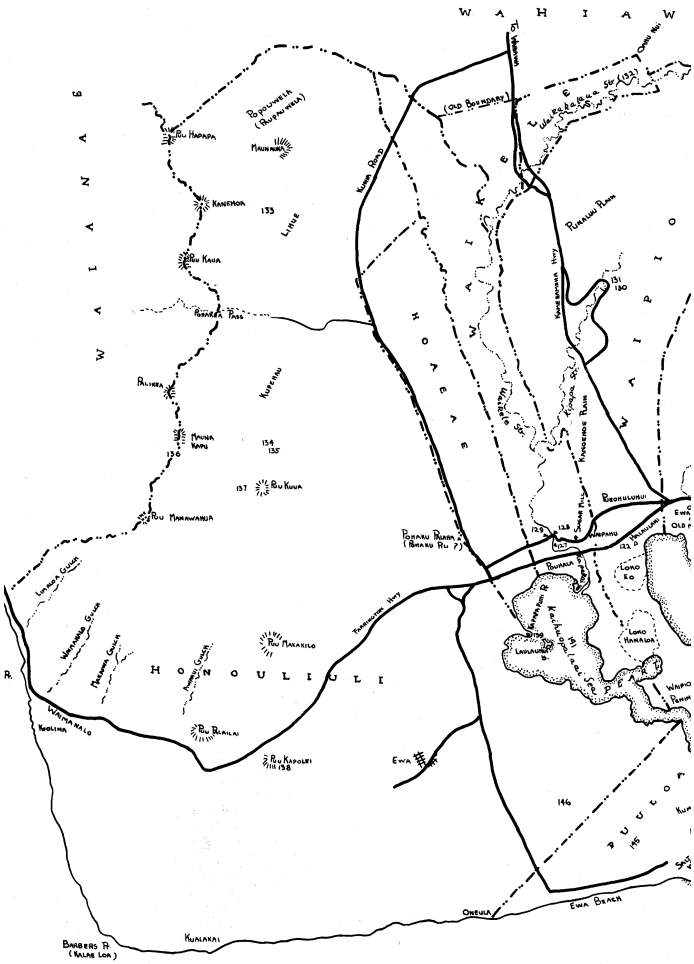

Figure 3. The *ahupua'a* of Honouliuli (from Sterling and Summers 1978).

There are several other accounts related to Captain Barber, mostly re-telling the same event(s) with slight variations. One of the stories recalls an incident just prior to the ship going aground when Captain Barber tried to dupe Kamehameha by giving the king a gift of a keg of diluted brandy because he felt that keg of good brandy would be a waste. After the wreck of his ship, Barber appealed to the king for assistance in retrieving goods that had been stolen off the ship. During a feast, the ship's captain found the *'awa* he was given had been similarly diluted by Kamehameha (Joseph Emerson, as told to Mrs. Beatrice Greenwell, in Sterling and Summers 1978:39). Some accounts describe Barber as an unscrupulous man whose primary interest was in trading sea otter pelts and transporting supplies to and from penal colonies in Australia (Sterling and Summers 1978:39-40). Personality aside, Captain Barber's visit to Kalaeloa made a lasting mark on Hawaiian history, so much so that the point was relabeled (especially in written literature) in his name.

PREHISTORIC LAND USE IN THE VICINITY OF THE PROJECT SITE

While oral history accounts of the *mauka* portion of Honouliuli Ahupua'a significantly outnumber those for the *makai* (coastal) area, the number of archaeological studies conducted in and around Barbers Point outnumber those done for the upland. The information revealed by these studies is equally substantive. Largely known from oral histories, *mauka* sites are less studied simply because they no longer exist or have been highly

disturbed as a result of sugar-related land use change of Honouliuli lands. In the low lying plains, however, the archaeological data shows a fairly consistent and important history, especially about the subsistence base of early Hawaiians using the coastal areas. Subsistence activities appear to have centered on bird hunting, fishing, and collection of seaweed and shellfish. The recovery of extinct bird bones has become almost synonymous with the prehistory of Barbers Point.

Along with various seabirds and terrestrial birds, the presence of a flightless species of bird (family Anatidae and Rallidae) is found in some of the sites. Bird hunting by humans seems to have focused primarily on seabirds (Tuggle and Tomonari-Tuggle 1997b:13). But the greatest number of bones belonging to seabirds (Procellariiformes) is found in non-cultural sites (Davis 1990:345). According to Davis (ibid), the issue of whether human predation led to the extinction of the various species found in the Barbers Point area is still being questioned since "the prehuman environment of Barbers Point still remains largely circumstantial" (1990:330). Several other studies, some which are more recent, support the pre-human extinction of birds and other animals. In his work on animal fossils from the same archaeological sites, Ziegler (1990a) found shells of many ancient and modern species of lands snails, claws of an apparently undescribed native land crab, remains of two bats (one new to science) along with bones of various other indigenous and introduced land animals. Recent work by Wickler and Tuggle (1997), Tuggle and Tomonari-Tuggle (1997a), and Athens et al. (1999), indicate that the time of extinction may well predate human settlement of the area. These later studies also support the possibility that avifaunal extinction most likely coincided with the pre-human decline of the natural forest.

Much of the paleontological and archaeological finds discussed above are found in the extensive cave (commonly referred to as sink holes in archaeological studies)[1] system that is found in the general vicinity of the project site. The geological formation of the 'Ewa Plains, particularly closer to the shoreline, lends to natural depression-like formations that were culturally significant to Hawaiians.[2] Tuggle and Tomonari-Tuggle (1997a:68) write:

> Traditional Hawaiian utilization of limestone sinkholes is a hallmark of the 'Ewa Plain sites, where sinkholes are the most common natural feature in the karst landscape. Sinkholes range in size from several centimeters to 400 m in diameter and ca. 50 cm to at least 6 cm in depth. A majority of sinks are less than 2 m wide and from 1 to 3 m deep.

Wickler and Tuggle (1997:105) found that, "structurally modified sinkholes are common in 'Ewa sites and include a variety of formal types…sinkholes with rock mounds or walls in close proximity, enclosed sink opening, filled or capped sinks, and stone structures built within sinkholes." Although some of the findings predate human arrival in Hawai'i, several of the caves have yielded highly significant archaeological data indicating their early human use. Table 1 includes a description of some of the caves that have yielded important natural and cultural materials. Figures 4a through 4c are photographs taken in the late 1970s of the interior and surroundings of some of the caves. The first two photographs (Fig. 4a and 4b) show some the interior and contents of cave B6-139. The rather large cave contained stalactites and stalagmites, and bones of various bird species. It no longer exists. Figure 4c is a fairly recent photograph that shows the general appearance of a cave hole from the surface and the common vegetation/ground cover within which it is found. The location of this "8 Acre Tract" (Fig. 4c) lies at the northern border of Campbell Industrial Park, at the intersection of Malakole and Powerline roads, extending north and northwest, away from Hanua Street. This feature is fairly close to the current project site.

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[1] According to karstographers and speleologists, sinkholes is an inappropriate term for describing these "typical small dissolution pit caves" (Mylroie and Carew 1995:60, in Halliday 1998).

[2] According to Halliday (1998), some of the sinking streams and closed depressions within the karst are artificial, and the likely result of past water diversion for farming, ranching and domestic use. He adds that "most of the land surface of the karst has been subjected to more than a century of extensive reworking by man" (1998:2).

Table 1. Notable Caves in the Vicinity of the Project Site.

Identification #	**Size**	**Contents**	**Status**
B6-09	Large	Unknown	Destroyed (under harbor)
B6-22 (Site 50-Oa-B6-22)	10 x 20m, 6m deep	Early Hawaiian habitation site with burned bone of extinct giant goose	Fenced (Campbell Estate)
B6-78	Large	Recent and subfossil mollusca	unknown
B6-100C	Large		unknown
B6-137	Small	Tools, food midden and human skeletal remains	Fenced
B6-139	Large	Extinct bird bones	Destroyed (under harbor)
"8 Acre Tract"*	Various (up to 100 pit caves)	Extinct bird, land snail	Unknown

* The area referred to as the "8 Acre Tract" was identified by Dr. Alan Ziegler (1990a; 1990b). Within this tract are the two caves known as "Coralloid Cave" and "Rusty Wire Sinkhole."

Figure 4a. Stalactites and stalagmites in Destroyed Cave B6-139 (J. K. Obata, courtesy of A. Ziegler, August 1977, in Halliday 1998).

Figure 4b. Subfossil bird bones from Destroyed Cave B6-139 (J. K. Obata, courtesy of A. Ziegler, August 1977, in Halliday 1998).

Figure 4c. Typical landscape in the "8 Acre Tract" (Halliday, July 1997).

Kualakaʻi, which lies just east of Barbers Point (see Fig. 3), is an important and well documented traditional place in Honouliuli. Though possibly no longer in existence or identifiable, Kualakaʻi is a coastal strip within the former Barbers Point NAS that had a famous spring called "Hoaka-lei." The spring "is called Hoaka-lei (lei reflection) because Hiʻiaka (sister of the goddess Pele) picked *lehua* flowers here to make a lei and saw her reflection in the water" (Pukui et al. 1976:119). More importantly, this is known as the place where the breadfruit was first introduced to Hawaiʻi (Tuggle and Tomonari-Tuggle 1997a). Tax records and ethnographic data indicate that people lived at Kualakaʻi until the beginning of the 20th century (Kelly 1991:152).

The following section looks at the ʻEwa Plain after contact with Europeans. Much of the historical background was prepared by Magnuson (1999) for an archaeological study completed during the recent expansion of Farrington Highway.

THE ʻEWA PLAIN AFTER CONTACT

During the early 1800s, Honouliuli Village was the only significant community on the ʻEwa Plain. There were as many as ten missionary schools in the area but these later closed due to a lack of students (Kamakau 1992:424). In the land distribution during the mid-1800s, the *ahupuaʻa* of Honouliuli was awarded to Kekauʻōnohi, the daughter of Wahinepiʻo; Wahinepiʻo was the sister of Kalanimōkū, who had been given the land by Kamehameha after his conquest of Oʻahu (Indices of Awards 1929; Kameʻeleihiwa 1992:112-114). Kekauʻōnohi was also the granddaughter of Kamehameha through his son Kahōʻanokū Kīnaʻu.

About 150 acres of Honouliuli Ahupuaʻa were set aside for *kuleana* or land awards for commoners. There was a total of 74 Land Commission Awards (LCA) made in Honouliuli Ahupuaʻa, all of which were in or adjacent to Honouliuli Gulch (Indices of Awards 1929). The primary land use in the area, as indicated in claims and testimonies (Native Register and Native and Foreign Testimonies, Hawaiʻi State Archives) was growing taro. The Land Commission records indicate that within the *ahupuaʻa*, nearly every award included a parcel for a house or houses for extended family members (Magnuson 1999:9). While the cultivation of taro was focused around Honouliuli Gulch, irrigated pondfields and coastal fishponds were used for raising fish.

One of the most informative features of Land Commission Awards[3] (LCA) is the written data recorded on the type(s) of land use for a particular LCA. More often than not, the LCA record is accompanied by notes or comments that further describe the specific locality of the award. In her work for the West Loch Estates, Silva (1987) summarized all 74 of the LCA for Honouliuli Ahupuaʻa. For the most part, the awarded lands appear to be the upland, slope areas of Honouliuli. The lack of any award may indicate that lands were usurped or claimed by a royal family or one of its members.[4] Between the years of 1885 and 1888, the names of 45 taxpayers are found for nearby Kualakaʻi (see Appendix B). Three taxpayers are on record for the year 1885 (Tuggle and Tomonari-Tuggle 1997a:39); only one name, "Keoni," is listed under Kalaeloa.

According to Magnuson (1999:9), LCA records and government documents suggest that there was a women's prison in the Honouliuli area. An 1848 letter from a school teacher named Naheana describes "prisoners taro patches" were overgrown and neglected (ibid). Privy Council Records from 1851 document "disorders existing at Ewa" which resulted in the need "to have the prison for women in Ewa enclosed by a secure fence" (Privy Council Records 6:342, in Silva 1987:A-8).

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[3] Land Commission Awards can be reviewed by area (*ahupuaʻa*) at the Bureau of Conveyances. In addition, archival information about land use and tenancy can be found at the Hawaiʻi State Archives office.

[4] According to William Aila, claims for land by commoners could be superseded by a claim to the same piece of land by someone of royalty. Given the importance of traditional use/occupation of Kalaeloa lands, it is very likely that there were family or lineage claims to the land other than just by royalty.

Previous ethnographic research indicates that people lived at Kualakaʻi (see Fig. 3) until at least the turn of the 20th century. The following account is cited by Kelly (E. Williamson n.d., in Kelly 1991:152):

> In the Honouliuli area the train stopped among the *kiawe* (algaroba) trees and *malina* (sisal) thickets. We disembarked with the assorted food bundles and water containers. Some of the Kualakaʻi *ʻohana* met us to help carry the *ʻukana* (bundles) along a sandstone pathway through the *kiawe* and *malina*. The distance to the frame house near the shore seemed long…When we departed our *ʻukana* contained fresh lobsters, *limu* (algae), fresh and *iʻa maloʻo* (dried fish)….Tutu ma (grandfolks and others) shared and ate the seafoods with great relish.

Following Kekauʻōnohi's death in 1851, her husband Levi Haʻalelea inherited her property. In 1863, the *kuleana* lands were deeded to Haʻalelea by their owners in payments for their various debts[5] (Frierson 1973:12, in Magnuson 1999:10). Haʻalelea died in 1864, and his second wife transferred ownership of the lands to her brother-in-law, John Coney (Yoklavich et al. 1995:16, in Magnuson 1999:10). In 1871, Coney rented the Honouliuli lands to James Dowsett and John Meek for cattle ranching. Except for the *ʻili* of Puʻuloa (see Fig. 3) the remaining Honouliuli lands were sold to James Campbell in 1871. Campbell continued ranching on the *mauka* lands but converted a substantial portion for agricultural use. Lanikūhonua,[6] the Campbell family estate, was set up on the western edge of the ʻEwa Plain (Fig. 5).

Figure 5. Photographs showing *ahu* and *aniani kū* fishpond (looking west) at Lanikūhonua.

[5] It is assumed that the entirety of the 150 acres that made up the 74 LCAs were deeded to Haʻalelea.

[6] Lanikūhonua sits between the resort of Kōʻolina and Paradise Cove, home of Germaine's Luau.

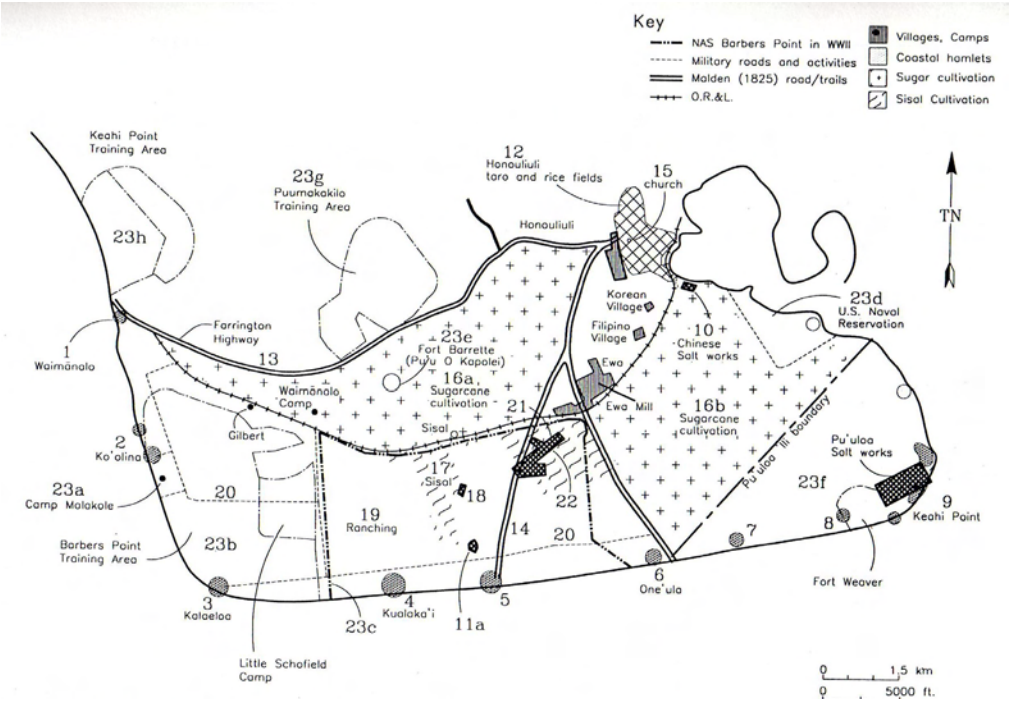

Figure 6. Historical Features of the ‘Ewa Plain from 1825 to World War II (from Tuggle and Tomonari-Tuggle 1997a:32).

Campbell leased a large portion of Honouliuli Gulch to Chinese rice farmers, and soon rice farming became a major agricultural product from the region. In Figure 6, the Honouliuli taro and rice fields are shown in the northwestern end of the *ahupua‘a*. It is would appear that rice simply replaced taro once the Hawaiians had left and the Chinese began farming the land.[7] In 1889, James Campbell leased Honouliuli to B.F. Dillingham, whose main business and concern was the Oahu Railway and Land Company. Dillingham in turn, leased the lower portions of Honouliuli to Ewa Plantation Company (Fig. 7) in 1890 for sugarcane cultivation.

The next major land use change began in the 1930s, as the U.S. military moved into the ‘Ewa Plain. The various military facilities included Barbers Point Training Area, Camp Malakole, Little Schofield Camp, Fort Weaver, Fort Barrette, Puu Makakilo Training Area, U.S. Naval Reservation, and Keahi Point Training Area (see Fig. 6). By 1947, the Ewa Plantation Company ended its use of railroads; that same year, the Oahu Railway and Land Company ran its last train on the ‘Ewa Plain (Magnuson 1999:11).

CURRENT CULTURAL LAND USES OF THE PROJECT SITE AND ITS VICINITIES

There are no cultural land uses identified with the project site proper, which is a developed parcel within the industrial area of Campbell Industrial Park. The only known Hawaiian cultural activity takes place along the shores of Kalaeloa Deep Draft Harbor[8] and includes fishing, and the gathering of *limu* (seaweed) and shellfish

[7] In oral histories completed with *kupuna* Pops Fujishiro during a field trip to identify the terraced fields found at Schofield Army Base, this researcher learned that Chinese farmers often used the existing *lo‘i* to grow rice. The farmers found that *lo‘i* provided a very suitable terrain and, as well, were of manageable size for use as rice paddies.

[8] The name change from Barbers Point to Kalaeloa has officially taken place. Since it is the name now commonly used by residents and land users of the area, it seems most appropriate to use Kalaeloa in this section discussing current land uses.

along the shoreline. Although the majority of the fishermen use Kalaeloa for near shore fishing, open-water or commercial fishing from small and large boats is also done. Commercial fishing in this area is primarily for *akule*, but other types of fish (particularly reef fish) are also caught. Recreational and subsistence fishing takes place along the shoreline of Kalaeloa as well as within the harbor. Some fishermen travel to Kalaeloa from as far as the windward towns of Waimanalo, Kane'ohe, and Kailua. One of the reasons why Kalaeloa is a popular fishing site is that it is good for catching *halalu* or baby *akule*. Previous observations done by this researcher (Prasad 2007) indicate that when the *halalu* "are running" (in season), the number of fishermen along the harbor's walls increases significantly.

Kūpe'e (*Nerita polita*)[9] is an important traditional Hawaiian food source; its shell is used to make *lei*. It is a marine invertebrate that is found along the rocky shorelines of the islands. The harvesting of *kūpe'e* was not observed at Kalaeloa but it is an activity that may take place primarily at night since the animal is nocturnal. It is also highly likely that most *kūpe'e* collectors comb the accessible rocky shorelines on or near full moon nights when it is easier to see the mollusk. Since other marine invertebrates such as *pipipi* and '*opihi* are also found along Kalaeloa's shoreline, it is likely this shoreline is used for general (food) shellfish collection. *Limu* picking was observed on two field visits to the project site.

In the near distance and to the north of the current project site is the alignment of the former railroad of the Oahu Sugar Company. At present, a portion of the railroad is used to transport tourists and visitors westward through the resort community of Kō'olina.

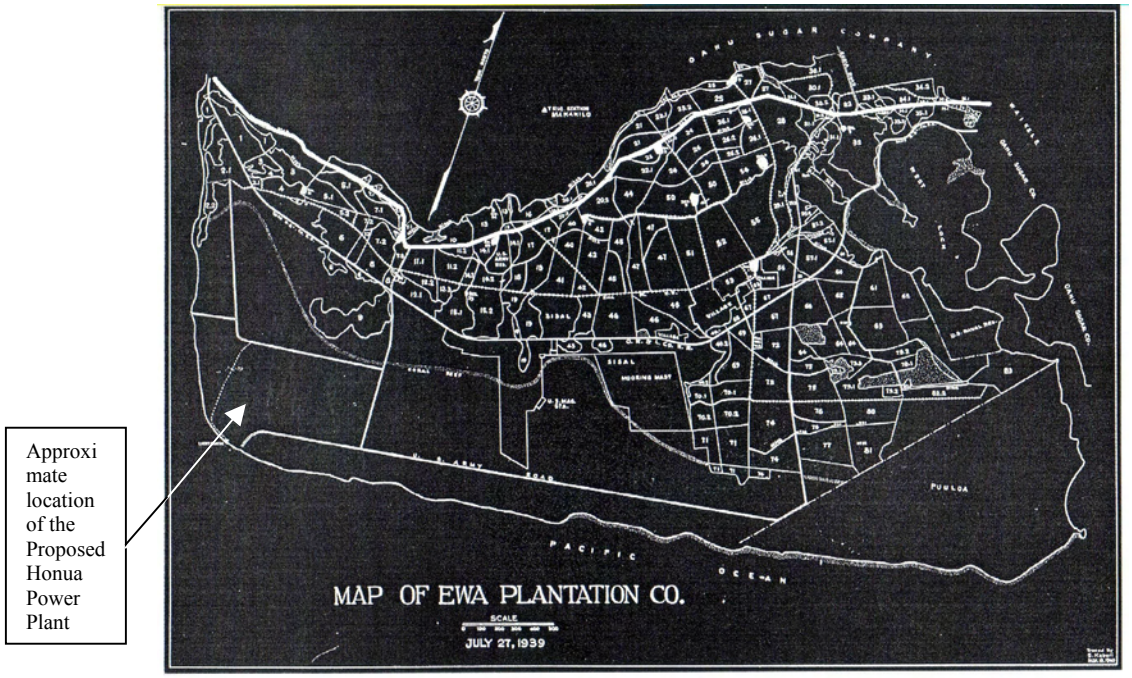

Figure 7. Ewa Plantation Company, 1939, showing Farrington Highway, Oahu Rail and Land Company (OR&L) Railroad, and the Ewa Plantation Company sugar railroads (Conde and Best 1973:285).

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[9] *Kūpe'e* is a small nocturnal mollusk, similar to *pipipi* (*N. picea*). According to William Aila, *kūpe'e* appear along rocky shoreline at night only. It is larger than its molluscan cousin, the *pipipi,* and has a 'glowing' effect at night.

III. TRADITIONS, BELIEFS, AND TRADITIONAL RESOURCES OF THE ‘EWA PLAIN

This section of the CIA discusses cultural traditions and beliefs, and traditional resources of the general ‘Ewa Plain region. There are no identified traditions, beliefs, or resources specifically related to the project site.

ORAL ACCOUNTS OF TRADITIONS AND BELIEFS, AND TRADITIONAL RESOURCES

Places of traditional Hawaiian importance are found throughout the ‘Ewa Plain (see Figs. 5 and 6). Features and sites, such as Site B622 (referenced earlier in this report) and Pu‘ukapolei (see Fig. 6), are natural features within the landscape that are associated with cultural use. While the use of these features/sites predate development of the Campbell Industrial area, it is possible that some traditional uses of the land area and its features continued during the sugar plantation operations in the early to mid 1900s. During an interview with Shad Kane, a long term resident of Honouliuli, he talked about meeting *kupuna* Sara Kauka who had known about Kualaka‘i (see Figs. 3 and 6) and visited the area during the 1930s:

> As a young woman, Auntie Sara visited Kualaka‘i with her family. She remembers taking the train to ‘Ewa, and from there going on horseback to Kualaka‘i. There was a cobblestone wall which the horses followed to Kualaka‘i. She would go with her family to buy *limu*, fish and lobster from a Hawaiian family that lived at Kualaka‘i. She recalls the sand dunes here that had to be crossed over in order to reach the ocean. She also recalls a lake (possibly the spring) that was just *mauka* of Kualaka‘i (S. Kane, pers. comm., 2005).

Oral histories completed for the earlier study of Kalaeloa (Prasad 2007; see Appendix C) identified at least one family that regularly camped along the shores of Kalaeloa before construction of the barge harbor. Logan Williams has worked at Kalaeloa for more than ten years. Logan’s grandmother is Mary Lou Keaulana, surfing legend Buffalo Keaulana’s older sister. Uncle “Buff” was raised by his sister; he is her kid brother. Logan has spent all his years growing up in and around Kalaeloa. His great grandfather (patriarch of the Keaulana clan) worked for Oahu Sugar Company as a truck driver. As a truck driver, “Papa” (grandfather) was given keys to access the coastal area. He regularly took his family to Kalaeloa, where Logan spent many summer months. The family would often set up camp for an entire three months. He believes that camp was nicknamed “Kole:”

> We would pitch tents and stay the whole time. Papa would go back to work but we would just stay…fish and play here. When I was little, there was no harbor. The current harbor opening was only about one hundred to hundred-fifty yards, and we would swim from this end (east side of the entrance) to the Kō‘olina end. It was too far to walk around to Kō‘olina so we would just pack things in a dingy and swim/boat across (interview with Logan Williams, 2005).

One of the area’s most significant cultural features is Lanikūhonua (see Fig. 5), a fishing village located at neighboring Kō‘olina. The *kahu* (caretaker) for Lanikūhonua, Auntie Nettie Tiffany, was born and raised on these lands. Her family’s history in the area extends quite far. Her grandfather was a *kahuna* in Kamehameha’s time. Her mother, who was *kahu* of Lanikūhonua before her, spent a great deal of time with Kamakila Campbell. It was Mrs. Campbell who set aside Lanikūhonua for future preservation. Auntie Tiffany inherited the position of *kahu* from her mother. She recalls that her mother would *‘ai* (feed) the fish at *aniani kū*, the fishpond (enclosure) immediately fronting the shore of Lanikūhonua. *Aniani kū*, which means “looking glass” (translated as “standing mirror” by Pukui et al. 1975:13), was the birthing pond for *aholehole*, *‘ama‘ama*, and the white *weke*.

Lanikūhonua (see Fig. 5) has been the residence of James Campbell since the late 1800s. However, it may once have been the small coastal village of Kō‘olina (see Fig. 6). It may also have been the site of the village that John Papa Ii witnessed being burned when he was a small child visiting relatives in Nanakuli (Ii 1959:29, in Tuggle and Tomonari-Tuggle 1997a):

> The overseer in charge of the burning told them that it was so ordered by the royal court because the people there had given shelter to the chiefess, Kuwahine, who ran away from her husband Kalanimoku after associating wrongfully with someone…She had remained hidden for about four or five days before she was found. Here we see the sadness that befell the people through the fault of the chiefs. The punishment fell on others, though they were not to blame.
>
> Kō‘olina (or Lanikūhonua) is also described as "a vacationing place for chief Kakuhihewa and the priest Napuaikamao was the caretaker of the place…It is a lovely and delightful place and the chief, Kakuhihewa, loved this home of his" (*Ke Au Hou*, July 13, 1910).

In describing the historical significance of fishing along this coastline, Auntie Tiffany recalls the changes that have resulted from both the resort and harbor development of the area. The traditional practices of controlling the number and amount of fish caught, of feeding (*‘ai*) the fish, and fishing only for subsistence have all changed. Part of this change is a reflection of the changing times, e.g. sport fishing is more common nowadays, and part of it is due to changes of the fishing grounds as a result of development of the coastline.

CURRENT TRADITIONS AND BELIEFS ASSOCIATED WITH THE ‘EWA PLAIN

Through oral histories completed in the vicinity of the project site, it was learned that traditions and beliefs about the area still persist among *kūpuna* and other Hawaiians. Traditional and historical accounts cited earlier in this report indicate that Kalaeloa is situated along a part of the coastline that was regularly used by native Hawaiians (this is also supported by archaeological finds). Kalaeloa is also known as a place where turtles used to inhabit (Sterling and Summers 1978:40). One legend tells of Pohaku-o-Kaua‘i, near Kalaeloa, which is said to be the home of a famous giant *kupua* (magical) fish, Uhumakaikai; this fish taught Kawelo, a chief who lived in the time of Kakuhihewa, the art of fighting (ibid:41). In an interview completed with *Kumu hula* John Ka‘imikaua by this researcher (Prasad 2007), he told about the ancient stories of the area relating to the gods Kāne and Kanaloa. He notes there are several places along the Wai‘anae coastline where the gods traveled and stopped for fresh water. Kāne would dig into the freshwater springs to get water for making *‘awa*. The coralline shoreline of Kalaeloa and its surrounding areas were known by the ancient Hawaiians for the freshwater lens that lies below and behind it.

The caves (sink holes) discussed earlier in this report were an important resource for native Hawaiians. The (fresh water) spring named Hoaka-lei at Kualaka‘i is well recorded in the traditional lore of the islands. But as Mr. Ka‘imikaua suggests, there were likely numerous caves that held fresh water known to the ancient Hawaiians. Since Kualaka‘i was inhabited well into the late 1800s, the legends and stories about it are better known. If Kalaeloa was continuously inhabited or was left relatively unchanged, it is quite possible that more would be known about caves such as the one that was located at the site of the present harbor. Since this latter cave was very large (see Ziegler [1990b]), it very likely was known about and used by ancient Hawaiians. Along with being sources for fresh water, the caves in this area were important for other cultural uses. According to Mr. Ka‘imikaua, "some of the holes were used for shelter… some had steps built into them while others were smaller holes purposely dug for use as burials…they dug little nooks and lay the bodies into them…that's how they (Hawaiians) buried on this (‘Ewa) side".

Traditions and beliefs about the area also tell about its important food sources. There are numerous accounts of the historical importance of the marine resources of the ‘Ewa Plain area. Many of these are associated with the food gathering activities around Pearl Harbor. Closer to the project site, along the southern coast of the ‘Ewa Plain, the favored seaweed *lipoa* (*Dictyopteris*) and the *‘o‘io* (*Albula vulpes*) fish were found (Kelly 1991:155). *Lipoa* was gathered along the shoreline between Keahi and Kualaka‘i; the *‘o‘io* came from Keahi. Stories such as the following by Pukui (1943, in Sterling and Summers 1978:44) tell of the value *‘o‘io* from Keahi:

> Those caught at Keahi have a fragrance somewhat like the lipoa sea weed and when brought to market, sold readily. All the market man had to say was "These are from Keahi", and his supply would vanish in a short time. There were times when the market man would try to palm off some ʻoʻio from another locality as Keahi's but no old timer was ever deceived, for his nose knew the difference.

Food sources on the land known from the Kalaeloa area include *ʻulu* (breadfruit, *Artocarpus altilis*). In their summary of the marine, land, and (fresh) water resources of the project site, Tuggle and Tomonari-Tuggle (1997a) discuss the connection between breadfruit and the famous place of Kualakaʻi, and its spring Hoaka-lei. According to Kamakau, the "first breadfruit was planted at Puʻuloa, ʻEwa, brought by Moʻikeha's grandson, Kahaʻi-a-Hoʻokamaliʻi, in a round-trip voyage that began at Kalaeloa" (Kamakau 1991:110, in Tuggle and Tomonari-Tuggle 1997a). Fornander recorded several myths concerning the planting of breadfruit at Puʻuloa in ʻEwa, Oahu. In one account, Kahaʻi, the son of Moikeha of Waipiʻo, Hawaii, is said to have made a voyage to Kahiki (possibly Tahiti) and brought back the breadfruit from ʻUpolu (Fornander 1916-17:392, in Handy and Handy 1991:150). In another myth, Fornander tells of two fishermen who brought back the breadfruit from Kane-huna-moku (The hidden land of Kane or Kahiki) after they were blown out to sea (ibid).

Figure 6 shows the Plain of Kaupeʻa, located just northwest of Kalaeloa towards Puʻukapolei. According to Kamakau, the Plain of Kaupeʻa was one of the areas where souls without *ʻaumakua* wandered endlessly and is described as a *wiliwili* grove next to Puʻuloa (Kamakau 1964:47, 49, in Tuggle and Tomonari-Tuggle 1997a). Kamakau (1964) also makes references to places known as *ao kuewa*, including the *wiliwili* grove of Kaupeʻa on Oʻahu (Kamakau 1964:47), and the "plain of Puʻukapolei" on Oʻahu (Kamakau 1964:29), suggesting that both locations are one and same (Tuggle and Tomonari-Tuggle 1997a:29). Emerson (1978:167) notes two place names in the Hiʻiaka myth – Kane-hili and Peʻe-Kaua, which also appears as Kau-peʻe (a possible variant of Kaupeʻa) – as referring to portions of the ʻEwa Plain. The myth refers to going downhill from Kaupeʻe to Kane-hili which would make it likely the same as the Plain of Kaupeʻa (see Fig. 5).

One of the most significant places in tradition is Puʻukapolei. In his island-wide survey, McAllister (1933) recorded a *heiau* on Puʻukapolei that had been destroyed. The *heiau* may have been associated with the sun (Fornander 1916-20, III:292). Tuggle and Tomonari-Tuggle (1997a:28) make the inference that Puʻukapolei ("hill of beloved Kapo") might have been the gate of the setting sun since the eastern gate of Kumukahi in Puna is the rising sun and is associated with Kapo. The authors also infer that Puʻukapolei "may have been a jumping-off place (also connected with the setting sun) and associated with the dead who roam the Plain of Kaupeʻa (see above) (ibid). Puʻukapolei was also an important landmark for travelers between Pearl Harbor and the Waiʻanae coast. As seen in Figure 5, a trail from Honouliuli Village ran past Puʻukapolei to the shoreline.

In interviews with Auntie Jane Ross and Auntie Martha Makaiwi, the story of Kapo was retold to this researcher. Both of these *kūpuna* recall that early Hawaiians had much reverence for this goddess who was a sister of Pele. Although the mound at Kapolei has been significantly altered (used as a bunker during WWII) in this century, it is the original home of Kapo. Goddess Kapo had the ability to change into an eel. She likely traveled between the sea and the land. Kamakila Campbell, who herself was known to be a *kahuna*, paid great respect to Kapo. Today, there is a statue of Kapo near the police station in Kapolei.

AN ACCOUNT OF NIGHT MARCHERS IN THE KŌʻOLINA-HONOKAI HALE AREA

According to Auntie J. Ross, night marchers have been seen and are known from the Kōʻolina-Honokai Hale area. She knows this area (including Kalaeloa) was once populated by Hawaiians, and believes much of their history/ties to the land remain. Auntie Ross, along with *kupuna* Makaiwi, has lived in Honokai Hale since 1964; they purchased one of the first homes built in this subdivision. Both women have witnessed night marchers in their area. She recalls once seeing these 'figures' near the corner of Laʻaloa Street. Both ladies recall some of the unusual events that have occurred during the construction of the Kōʻolina resort. Other incidents that she recalled include strange things being found, rocks returning to their original place of location, engines of bulldozers turning on by themselves, and a woman in white who is said to be seen along Farrington Highway prior to accidents.

One account by Pukui (1943:60-61, in Sterling and Summers 1978:44) tells of the "homeless ghosts" of the plain of Kaupeʻa:

> We (my cousin, aunt and I) were walking to Kalae-loa (Barber's Point) from Puʻuloa accompanied by Teto, the dog. The dog was a native dog (not the so-called poi dog of today) with upright ears and a body the size of a fox terrier. For no accountable reason, Teto fell into a faint and lay still. My aunt exclaimed and sent me to fetch sea water at once which she sprinkled over the dog saying, "*Mai hana ino wale ʻoukou i ka holoholona a ke kaikamahine. Uoki ko ʻoukou makemake ilio*" ("Do not have the girl's dog. Stop your desire to have it".). Then with a prayer to her *ʻaumakua* for help she rubbed the dog. It revived quickly and after being carried a short way, was frisky and lively as ever.
>
> Then it was that my aunt told me of the homeless ghosts and declared that some of them must have wanted Teto that day because she was a real native dog, the kind that were roasted and eaten long before foreigners ever came to our shores.

In two previous studies (Prasad 2003; Prasad 2005), residents of each area told accounts of night marchers. One area is near the Kūkaniloko Birthing Stones at Helemano, Oʻahu, where accounts of night marchers were given by both Hawaiian and non-Hawaiian residents of the area. A similar account was related by a *kupuna* who resides on *kuleana* lands along Īʻao Stream in Wailuku, Maui. Current accounts of the presence of night marchers at Honokai Hale supports the idea that beliefs associated with the area's past Hawaiian uses still persist in the general vicinity of the project site.

MARINE RESOURCES ALONG THE KALAELOA SHORELINE: FISH, *LIMU*, AND *KŪPEʻE*

Kalaeloa provides one of the most important fishing grounds on the island of Oʻahu. Commercial, subsistence, and recreational fishing all take place at and off of Kalaeloa. The commercial fishermen who fish in the Kalaeloa area come primarily from the Waiʻanae coast. According to Karl Jellings, there are probably six to ten crews or boat operations doing near-shore fishing in the Waiʻanae area. (Waianae Boat Harbor is the only public docking area near Kalaeloa.) The subsistence fishermen also appear to be primarily from the Waiʻanae area. However, the recreational fishermen interviewed for this study come from all parts of Oʻahu.

Fishing along Kalaeloa is a traditional activity that has carried over to modern times. Although methods have changed through the decades, the importance of fishing along this coastline is well documented in historic references. In earlier oral histories done with Keone Nunes and this researcher, *kupuna* Walter Kamana expressed the importance of the fish and other marine resources of the Waiʻanae coast. *Kupuna* Kamana lived and fished along this coastline for the duration of his life. During his earlier years, in the early 1900s, the fish were abundant. Fishing was done according to what was needed and according to seasons. Seasonal fishing for *halalu* is still known from the project site. However, the fishing that once took place along the shores of Kōʻolina appears to have completely ended. According to Mr. Williams, *akule* and *aholehole* are two of the major fishes caught along this part of the ʻEwa-Waiʻanae coastline. No fishing is allowed in Kōʻolina's private harbor.

Limu is an important traditional Hawaiian and contemporary food source. The ʻEwa coastline is well known for its special varieties of *limu*. Presently there is a joint effort by the Department of Land and Natural Resources (DLNR) and the community to create a "fisheries management area" to manage *limu* (Alden Miyasaka, pers. comm.). Known as the "'Ewa Limu Program," one of the central elements of this project is the role of the cultural advisor who provides traditional knowledge about this (*limu*) resource. Prior to his death, *kupuna* Kamana served as the cultural advisor for this program.[10] Although the ʻEwa Limu Program does not extend to the project site, the importance of *limu* gathering along this general coastline remains. In the project site, several fishermen indicated that they gather seaweed on the shoreline along the entrance to the harbor channel. Observations of *limu* gathering were also made.

[10] Since Walter Kamana's death, Uncle Henry Chang Wo has taken over the role of cultural advisor.

Kūpe'e is a food item of the traditional Hawaiian diet; its shell is also valued as an ornament. Although the frequency with which this particular mollusk is collected has likely changed with population depletion and general changes to the Hawaiian diet, the significance of *kūpe'e* in the Hawaiian diet has been well documented by Titcomb et al. (1978).

In Hawaiian food economy, there was great dependence upon marine resources to supplement *poi*, the starchy mainstay among land foods. The figurative expression for food was *i'a a me poi* (fish and *poi*). The term *i'a* signified not only fish but all animal foods from the sea and land. While the emphasis was on the use of marine invertebrates as food, they were also used for medicinal purposes and in making tools. It was chiefly women's work to gather shellfish and seaweeds (*limu*) (Titcomb et al. 1978:326, 338-344).

> The name *pūpū* was used by itself to indicate snail shells in general; there is some indication that it was sometimes used in a more specific sense to connote various shells that terminate in a point, or perhaps to connote all nocturnal species…In addition to *pūpū*, frequently encountered Hawaiian names for gastropods include *hihiwai, kūpe'e, leho, 'opihi,* and *pipipi*. These terms, which were widely used throughout the Hawaiian Islands, seem to have been treated as names for shell groups rather than for particular kinds of shells…Snails included in these groups were obviously the most important gastropod food sources…All *pūpū* are gathered during the day, as well as the night when they come out from hiding and climb up onto the stones. There is a special word for this journeying: *e'e. Ua e'e ka pūpū* means "the *pūpū* have come up onto the rocks"... *kūpe'e* come out on some nights but lie under the sand or rocks during the day.

Titcomb et al. (1978) combine written information with oral histories conducted throughout the islands. It is clear from their descriptions that *kūpe'e* is a category of several animals all of which are described by their outward appearance. According to Titcomb et al. (1978:339), the following types of *kūpe'e* are collected by Hawaiians:

> *Kūpe'e: N. polita*, a polished nerite, a dweller of sandy, rocky shores with strikingly nocturnal habits, similar in form to the *pipipi* (in fact, closely related to it in the *haole* classification) but sharply differentiated from the latter by the Hawaiians on the basis of the differences in behavior and habitat. The Hawaiians had names for many *kūpe'e* according to their markings. There were the *kūpe'e'ula* (red); the *ānuenue* (rainbow), red or black striped; the *palaoa* (what tooth ivory), creamy white, the *'ele'ele* (black), the most common; the *kāni'o* (vertical stripes), black with white streaks; the *mahiole* (warrior's helmet), white with red stripes; and the *puna*, rare. The rarest were the *'ula, ānuenue, mahiole*, and *puna*, and these were therefore saved for the chiefs. The rare *'ula* was believed to have the ability to leap and hide. The common *kūpe'e* were used by commoners.

As with many small snail type marine shells, the animal (flesh of *kūpe'e*) had to be removed from its shell by using a small pricking type tool. Figure 8 shows a bone pick that was used for removing *kūpe'e* from its shell.

Information from two oral histories (William Aila and Shad Kane) indicates that *kūpe'e* is still collected by fishermen and Hawaiian families who use this shellfish as a food source and ornament in the making of *lei*. Mr. Kane recalls harvesting *kūpe'e* from the Honolulu side of Kō'olina before it was built up as a resort. Mr. Aila emphasized that the *lei* made from the *kūpe'e* shell is often used by hula dancers. The significance of the shell is that it "captures any bad things that approach the person wearing the shell" (W. Aila, pers. comm.). Mr. Aila took me to look for *kūpe'e* off the Waianae Boat Harbor but we didn't see any during our brief attempt. He added that the *kūpe'e* appear at night and have a special "glow" about them, so they are best seen during the full moon. In an oral history completed with *kupuna* Elizabeth Lee, she describes the weekends and summer months she spent as a young girl camping with family along the shores of Kailua Bay, Kona:

> On weekends, we walked down from Kalaeloa, leaving on Saturday morning. The walk was about two hours long. We would also camp for the whole of the summer months. We ate just what was there…didn't waste anything. We would pick *'opihi, hā'uke'uke, wana, pipipi* and *kūpe'e* as snacks. We didn't use the shells (of *kūpe'e*) for lei making but we did use *leho* (the general Hawaiian name for cowries) for making bracelets and lei.

Figure 8. Bone Pick for Extracting Flesh from *kūpe'e* (from Titcomb et al. 1978:Fig. 11).

In addition to *limu* and *kūpe'e*, the shoreline along Kalaeloa provides several other important marine food sources. The *a'ama* (also known to some as the "dryland" crab); *Paiea* (the "wet one"); and *he'e* (octopus; more commonly referred to as *tako* [Japanese]) are all caught around the harbor. According to Mr. Williams, the breeding season for the *he'e* is in January. At this time, it is possible to catch *he'e* without entering the water by waiting on the "males to chase the females up onto the rocks" (L. Williams, pers. comm.). He has found that females actually "sun" themselves on the rocks in the harbor.

IV. STUDY RESULTS: APPLICATION OF THE ENVIRONMENTAL COUNCIL GUIDELINES FOR CULTURAL IMPACT ASSESSMENTS IN THE COMPLETION OF THIS CIA STUDY

The goal of this CIA study has been to study the [potential] impacts the proposed Honua Power Plant will have on cultural practices and features associated with a project area. The present community that uses and would be directly affected by the proposed project is part of the Campbell Industrial Park, and is made up primarily of commuters whose presence is limited to daytime activities. Also, no residences were identified at or within the immediate vicinity of the project site. In brief, the information gathered for this study shows that:

1. Any potential cultural impacts that may result from the undertaking (construction of a power plant) will not be negative.
2. No traditional (or modern Hawaiian) cultural activities are taking place at the project site today.

Efforts were taken to meet the EC's specific guidelines for conducting cultural impact assessments in the state of Hawai'i. In summary, how each of the council's six-point protocol was followed/adhered to is explained here:

1. Attempts were made to identify individuals (see App. C) who have expertise concerning the types of cultural resources, practices and beliefs found within the vicinity of Proposed Honua Power Plant Project Site. The efforts were specifically directed towards identifying *kūpuna*, elders who have long histories to share about the project site, and long-term non-Hawaiian residents who may know of be a part of the area's history. These efforts were not successful. In lieu of not finding individuals during the current study, information from oral histories completed for a recent study of the Kalaeloa area (c.f. Prasad 2007) that included interviews with four *kūpuna*, a *kumu hula* and a *kahu*, are incorporated here. For the present study, some of the same individual's names were provided by OHA and the Kalaeloa Neighborhood Board, the two organizations contacted. No new names were obtained either through these resources or by contacting those previously interviewed. Although the search was not exhaustive, it is generally believed that very few *kūpuna* with knowledge about the area remain today. With the exception of *Kupuna* Nettie Tiffany, who previously shared information about the cultural uses of Lanikūhonua, no new *kūpuna* were identified from the area. Several unsuccessful attempts were made to contact *Kupuna* Martha Makaiwi who has lived in Honokai Hale (Kō`olina) since 1964. *Kupuna* Makaiwi had previously recounted (c.f. Prasad 2007) the history of Kapo, the sister of Goddess Pele, for whom Kapolei mound is named, and about seeing night marchers at the corner of La`aloa Street [Honokai Hale] during the construction of the Kō`olina resort.

2. Individuals and organizations that may be directly affected by the proposed project are those who are directly involved in or associated with the various commercial ventures surrounding the project site. Included are companies such as Bekins Moving and Storage, Leeward Auto Wreckers, Gavoz Corporation, Specialty Surfacing Co., Inc., and Valve Service & Supply. Immediately across the street from the project site is Campbell Hawaii Investor LLC., which is a consortium of companies/offices. None of the individuals or organizations represented here will be culturally impacted by the proposed project. There are likely to be social and economic impacts, both of which are concerns outside of the present study's scope of work.

3. A total of nine informal interviews (see App. C) were completed for this study; no formal interviews were done. All of these informal interviews were with individuals that work within the immediate vicinity of the project site. None of these individuals were familiar with traditional or cultural uses of the land prior

to its industrial use. However, several area workers are descendants of Hawaiian and Filipino families that once worked for the sugar plantation. Again, information from oral histories completed by this researcher with *kūpuna* for the Kalaeloa study (Prasad 2007) was incorporated because of its relevance to the area.

4. Documentary research, particularly on identifying traditional and cultural uses of the area, was completed throughout the duration of the study. Much of what is known about the traditional and cultural uses of the area comes from written records that tell of its prehistoric uses (e.g. archaeological studies); the myths/legends associated with early coastal and *mauka* area uses by early Hawaiians (e.g. writings of John Papa Ii, Pukui, et al.); and early historic plantation/railroad uses by individuals such as James Campbell.

5. Cultural resources in the project area are briefly referenced in this report (see Section III) as part of the traditions, beliefs and traditional resources known from the general Campbell Industrial Park - Kalaeloa area. Cultural resources, however, are not seen as a major component of the current study's purpose. At the same time, some of the *kūpuna* and elders who have provided information about the traditional and cultural significance of the general area are themselves considered to be cultural resources for the project area.

6. The completion of this report is felt to meet the goals and objectives set forth for this CIA study. The project site is a parcel that has long been altered, first by ranching and later by industrial use. More importantly, cultural and traditional use of the site and its immediate vicinities has long been discontinued. There are no cultural impacts foreseen as the element of traditional, or Hawaiian, or local culture is absent from the current project site.

V. NO CULTURAL IMPACTS: A SUMMARY

The preceding sections of this report have presented the cultural history of the general vicinity of the project site. The ʻEwa Plain and Honouliuli Ahupuaʻa are places of prehistoric and historic significance to Hawaiians. Oral histories tell of the continued traditions, beliefs, and cultural uses of the area. However, none of this historical presentation is specific to the project site parcel. One reason for the "absence" of cultural or traditional information about the project site is that the area has undergone dramatic change throughout history. The parcel appears to have been completely graded and is presently used for a storage and day parking area (see Fig. 2).

There are no known (existing) historic cultural resources within the immediate vicinity of the project site that may be impacted as a result of the proposed project. This conclusion in based on the following:

1. The lands on which the project site is situated have been significantly altered. Further, conclusions from a recent archaeological assessment (Carson 2005) of an area that stretches from near Farrington Highway to within 1,000 meters of the current project show that historic and modern alterations have involved massive ground disturbance to the extent that no archaeological resources are likely to be found in the general vicinity.

2. Traditional Hawaiian uses of the lands along the nearby coastline are known from prehistoric times. Such uses, especially collection of marine resources, continues along the Kalaeloa coastline but not within the immediate vicinity of the project site. Access to these areas will not be compromised by the proposed Honua Power Plant.

3. Traditional Hawaiian beliefs and traditions associated with the ʻEwa Plain persist but these are general associations that are not specific to the project site.

4. No *kūpuna* could be located that still have knowledge about the traditional uses of the project site lands.

In conclusion, this study has met the guidelines (see Appendix A) set forth for completing CIA studies in Hawaiʻi. There are no known or potential cultural impacts as a result of the proposed project. There also are no known potential cultural impacts to the historic (archaeological) resources in the area.

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APPENDIX A

GUIDELINES FOR ASSESSING CULTURAL IMPACTS
ADOPTED BY THE ENVIRONMENTAL COUNCIL, STATE OF HAWAI‘I
NOVEMBER 19, 1997

I. INTRODUCTION

It is the policy of the State of Hawaii under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making. Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

II. CULTURAL IMPACT ASSESSMENT METHODOLOGY

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants, including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An ahupuaʻa is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupuaʻa and the geographical extent of the study area should take into account those cultural practices.

The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

(1) identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupuaʻa;

(2) identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;

(3) receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;

(4) conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;

(5) identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and

(6) assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the precise location of human burials are likely to be withheld from a cultural impact assessment, but it is important that the document identify the impact a project would have on the burials. At times an informant may provide information only on the condition that it remain in confidence. The wishes of the informant should be respected.

Primary source materials reviewed and analyzed may include, as appropriate: Mahele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

III. CULTURAL IMP ACT ASSESSMENT CONTENTS

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

1. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.

2. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

3. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

4. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

5. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.

6. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

7. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.

8. An explanation of confidential information that has been withheld from public disclosure in the assessment.

9. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

10. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

11. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call us at 586-4185.

APPENDIX B

LIST OF TAXPAYERS IN KUALAKA‘I, 1855-1888

(After Tuggle and Tomonari-Tuggle 1997a)

List of Taxpayers in Kualaka'i, 1855-1888.

Name	1855	1865	1866	1867	1869	1870	1871	1872	1873	1874	1875	1876	1878	1879	1880	1881	1882	1884	1885	1887	1888
Kekai	x								x	x	x										
Oili	x		P	x	x							x	x								
Kalimahaalulu	x				x	x	x	x	x	x	x				x	x			x		
Okoi	x	P	P																		
Haunaele	x																				
Kamau 1	x	P		x	x	x	x		x												
Kamau 2	x	P	P																		
Kawelea	x																				
Kawahalepo	x																				
Kuiki	x																				
Oniole	x																				
Kahula	x																				
Kanekupuna	x																				
Mahe	x																				
Keoni	K		P	x	x								x	x							
Mihie (?)					x																
Keloha/Kealoha				P	x			x	x	x	x	x									
Kuia					x																
Kekua						x	x	x	x	x	x	x		x	x	x					
Mahoe	P							x	x	x	x										
Kiliona								x													
Kaiehu									x	x	x										
S.B. Pewrrows									x												
J. Kauwa									x												
Geogi (?)									x												
Pua									x												
W.B. Aarona										x	x	x	x	x	x	x	x	x	x	x	x
Kekapala										x	x										
Kaluaikou										x				x	x	x	x				
Haili										x	x	x									
Niolopua										x	x	x									
Makulu												x									
Ulunui											x										
Mahoe Napikao											x	x	x	x	x			P	P		
Kou												x									
Keaupuni														x	x	x	x	x	x	x	

Name	1855	1865	1866	1867	1869	1870	1871	1872	1873	1874	1875	1876	1878	1879	1880	1881	1882	1884	1885	1887	1888
Makua														x	x	x	x				
Makai																	x	x			
Kalimahuki								P					P	x					x	x	x
Kaanaana																				x	
Kupihea																				x	x
Kimo																				x	x
Pupue																				x	
I. Naole																					x
TOTAL BY YEAR	15	3	4	4	8	3	3	6	11	11	12	9	5	8	7	6	5	4	5	7	4

P = listed under Puuloa
K = listed under Kalaeloa

APPENDIX C

KŪPUNA AND OTHERS CONSULTED FOR INFORMATION ABOUT TRADITIONAL BELIEFS AND LAND USES IN THE PROJECT SITE FOR THE CURRENT AND PREVIOUS STUDIES COMPLETED IN THE ‘EWA PLAIN

Kupuna Agnes Cope
Kupuna Elizabeth Lee
Kupuna Martha Makaiwi
Kupuna Henry Chang Wo, ‘Ewa Limu Program’
Kumu hula John Ka‘imikaua
Kahu Nettie Tiffany, Lanikūhonua

Kalaeloa Neighborhood Board
Kapolei Neighborhood Board
Kapolei Hawaiian Civic Club
Shad Kane, Kapolei Native Hawaiian Civic Club
Maeda Timson, Kapolei Neighborhood Board Chair
Ken Williams, Kō‘olina Community Association
Ku‘ulei Jalonino, President - Honokai Hale/Nanakai Gardens Community Association
Cynthia Rezentes, Chair Waianae Neighborhood Board
Logan Williams, Kalaeloa Deep Draft Harbor Officer
Mary Emerson, Real Estate Manager, Campbell Estate
William Aila, Harbormaster, Waianae Boat Harbor
Donna Goth, Campbell Estate
Tarisha McMurdo, Campbell Estate
Eric Enos, Ka‘ala Farms Inc./Opelo Project
Puanani Burgess, Waianae Lands Use Concern Committee
Eric Whitman, ‘Ewa Limu Program
Alden Miyasaka, Aquatic Resources, DLNR
Alan Murakami, Native Hawaiian Legal Corporation
Dietrix Duhaylonsod, fisherman
Audi, fisherman
Victor, fisherman
Mark, fisherman
Karl Jellings, commercial fisherman
Jane Ross, Honokai Hale resident