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December 3, 2010

TO: Director/Acting Administrator
Office of Environmental Quality Control
Department of Health

FROM: Mr. Theodore A. Peck, Administrator
Hawai'i State Energy Office
Department of Business, Economic Development & Tourism

SUBJECT: Environmental Assessment/Environmental Impact Statement Preparation Notice for BioEnergy Hawai'i Waste Conversion Facility
Natural Energy Laboratory of Hawai'i Authority
Keahole, North Kona, Hawai'i
TMK: (3) 7-3-43:073 por. Lot A-2-A (1)

The Department of Business, Economic Development & Tourism (DBEDT), as the Approving Agency under Chapter 201N-8, Hawai'i Revised Statutes (HRS), for the proposed BioEnergy Hawai'i Waste Conversion Facility, has reviewed the attached Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN) prepared pursuant to Chapter 343, HRS, and Chapter 11-200, Hawai'i Administrative Rules (HAR). Based on our determination that the proposed project may have a significant effect on the environment, applicant BioEnergy Hawai'i, LLC, must prepare an Environmental Impact Statement. Please publish notice of availability of the BioEnergy Hawai'i Waste Conversion Facility EA/EISPN in the December 23, 2010, issue of The Environmental Notice.

We have enclosed the following items:

1. One (1) hard copy of the EA/EISPN and one (1) electronic copy (PDF) on a compact disk.
2. A completed OEQC Publication Form (on compact disk).

If you have any questions, please have your staff call Mr. Joshua B.Y. Strickler at 587-3837.

Attachments

ENVIRONMENTAL ASSESSMENT/ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
BIOENERGY HAWAI`I WASTE CONVERSION FACILITY
NATURAL ENERGY LABORATORY OF HAWAI`I AUTHORITY
KEAHOLE, NORTH KONA, HAWAI`I

PREPARED FOR THE STATE OF HAWAI`I
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM

PREPARED BY

NORTH SHORE CONSULTANTS, LLC
PO Box 790
Haleiwa, HI 96712

DECEMBER 2010

ENVIRONMENTAL ASSESSMENT/ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

BIOENERGY HAWAI`I WASTE CONVERSION FACILITY

NATURAL ENERGY LABORATORY OF HAWAI`I AUTHORITY
KEAHOLE, NORTH KONA, HAWAI`I

PREPARED FOR THE STATE OF HAWAI`I
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM

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Haleiwa, HI 96712

DECEMBER 2010

PROJECT SUMMARY

This Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN) has been prepared in accordance with Chapter 343, Hawai`i Revised Statutes (HRS), for the BioEnergy Hawai`i Thermal Waste Conversion Facility proposed for the Natural Energy Laboratory of Hawai`i Authority in North Kona, Island of Hawai`i.

Name: BioEnergy Hawai`i Thermal Waste Conversion Facility

Location: Keahole, North Kona, Hawai`i

Judicial District: North Kona

Applicant: BioEnergy Hawai`i, LLC

Approving Agency: State of Hawai`i, Hawai`i Department of Business, Economic Development and Tourism

Recorded Fee Owner: State of Hawai`i, Department of Land and Natural Resources

Tax Map Keys: TMK (3) 7-3-43:073 por. Lot A-2-A

Land Area: 25 acres

Existing Use: Vacant

Proposed Use: Construction of a bioconversion facility designed to use gasification technology to divert up to 75% of the 400 tons per day of municipal solid waste (MSW) from West Hawai`i's landfill, with the resultant production of electrical power and possibly liquid fuels in response to public policy which encourages the domestic production of renewable energy.

Land Use Designations:
State Land Use: Urban District
General Plan: Industrial Designation
County Zoning: MG-3, General Industrial
Special Management Area (SMA): Within the SMA

Major Approvals Required:
Lease agreement with NELHA
Special Management Area (SMA) Permit
Solid Waste Management Permit
Clean Air Permit
NPDES Permits
County Use Permit
Grading/Building Permits

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Acronyms and Abbreviations

ALISH	Agricultural Lands of Importance to the State of Hawai`i
BEH	BioEnergy Hawai`i, LLC
BMP	Best Management Practice
BTU	British Thermal Units
CDUP	Hawai`i State Conservation District Use Permit
CFR	Code of Federal Regulations
CGP	Construction General Permit
CWA	Clean Water Act
CY	Cubic Yards
CZM	Coastal Zone Management
dB	Decibels
DEBDT	Hawai`i State Department of Business, Economic Development and Tourism
DEIS	Draft Environmental Impact Statement
DEM	Hawai`i County Department of Environmental Management
DHHL	Hawai`i State Department of Hawaiian Home Lands
DLNR	Hawai`i State Department of Land and Natural Resources
DOH	Hawai`i State Department of Health
DWS	Hawai`i County Department of Water Supply
EA	Environmental Assessment
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EPA	U. S. Environmental Protection Agency
FAA	U. S. Federal Aviation Agency
FEIS	Final Environmental Impact Statement
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
HAR	Hawai`i Administrative Rules
HCM	Highway Capacity Manual
HELCO	Hawai`i Electric Light Company
HEPA	Hawai`i Environmental Policy Act
HCGP	Hawai`i County General Plan
HRS	Hawai`i Revised Statutes
ISWMP	Integrated Solid Waste Management Plan
Kv	Kilovolt
KWh	Kilowatt-hours
LOS	Level of Service
LUPAG	Land Use Pattern Allocation Guide
MGD	Million Gallons per Day
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
MW	Megawatts
MWh	Megawatt-hour
NELHA	Natural Energy Laboratory of Hawai`i Authority
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OEQC	Hawai`i State Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
RCRA	Resource Conservation and Recovery Act
RDF	Refuse Derived Fuel
SHPD	Hawai`i State Historic Preservation Division
SMA	Special Management Area
SWPPP	Stormwater Pollution Prevention Plan
TIAR	Traffic Impact Assessment Report
TMK	Tax Map Key
TPD	Tons per day
TSS	Total Suspended Solids
USDA	U. S. Department of Agriculture
VPH	Vehicles per hour
WHA	Wildlife Hazard Assessment
WHV	Waste hauling vehicles
WTE	Waste-to-Energy

Executive Summary

BioEnergy Hawai`i, LLC (BEH) intends to lease approximately 25 acres of land within the Natural Energy Laboratory of Hawai`i Authority (NELHA) to construct and operate a waste conversion facility with a capacity to accept up to 400 tons per day (TPD) of municipal solid waste (MSW). Of this volume approximately 75% will be usable and the remaining 25% will be disposed at the West Hawaii Sanitary Landfill (WHSL). Energy in the form of electricity will be produced for sale to Hawaiian Electric Light Company (HELCO), NELHA or other local users, in the form of dispatchable baseload power to meet variable demands. It is possible that advanced biofuels may be co-produced as well to meet the local renewable energy demand.

The facility will be located *mauka* (landward) of the southern end of the Kona Airport in a currently vacant portion of NELHA land. The plan is to build a dedicated access road constructed from a westerly extension of Ka`imi`nani Drive. Seven and one-half acres of the total will be used for waste processing, gasification, and electrical generating facilities. Up to 17 and one-half acres will be used for cultivation of algae fed by sunlight and the carbon dioxide and other emissions from the generation equipment. BEH hopes to minimize its carbon footprint by sequestering carbon emissions in algal biomass.

BEH intends to bring the facility to its design capacity in the fifth year of operation. At design capacity, an average of 10 trucks per hour will deliver MSW inside of an enclosed warehouse between the hours of 7 AM and 4 PM Monday through Saturday. Once inside the receiving area MSW will be visually inspected and pre-sorted to remove non-combustible, and other unsuitable materials. After tipping and sorting the conversion technology is accomplished in four steps:

1) Convert MSW into a raw fuel stock through an automated process which includes recovery of recyclables;
2) Gasifying the fuel stock into a synthesis gas also known as producer gas;
3) Cleaning of the synthesis gas to remove tars and other impurities; and
4) Production of energy.

Incoming waste will be collected and delivered by private haulers and/or County vehicles. All waste processing and conversion will be performed inside a building, which is under negative pressure to control fugitive dust and odors. Waste products generated by the facility include:

Solid waste:
- Bulky waste that cannot be easily shredded,
- Dirt, rock and sand,
- Fly ash that is captured by the emissions control equipment,
- Bottom ash (char), and used gasifier sand.

Liquid waste:
- Domestic wastewater from staff bathrooms,
- Wash water from cleaning the tipping floor,
- Condensed steam and boiler exchange water.

Gaseous waste:
- Steam, and
- Carbon dioxide, carbon monoxide and minor air emission components

ENVIRONMENTAL ASSESSMENT/ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
BIOENERGY HAWAI`I WASTE CONVERSION FACILITY
AT THE
NATURAL ENERGY LABORATORY OF HAWAI`I AUTHORITY
KEAHOLE, NORTH KONA, HAWAI`I

1. Introduction

1.1 Applicant and Approving Agency

BioEnergy Hawai`i, LLC (BEH) intends to develop a waste conversion facility at the Natural Energy Laboratory of Hawai`i and will prepare a Draft Environmental Impact Statement (DEIS) and Final Environmental Impact Statement (FEIS) through its consultant North Shore Consultants, LLC (NSC).

BEH was formed in March of 2006. The purpose and mission of the company is to establish a waste conversion plant on the Island of Hawai`i to produce alternative energy from a sustainable renewable energy source (trash) thereby helping to reduce the Island's dependence on fossil fuel as its primary energy source and provide an environmentally sound alternative to landfill disposal. Pacific Waste, Inc. with offices in Kailua-Kona is the managing partner of BEH. Guy Kaniho is General Manager of BEH and represents the applicant in all matters.

The proposed location for the project will be the Natural Energy Laboratory of Hawai`i, which is represented by the Natural Energy Laboratory of Hawai`i Authority (NELHA). NELHA is a special division of the State of Hawai`i Department of Business, Economic Development and Tourism (DBEDT). The applicant is proposing to develop a renewable energy facility under the definition provided in HRS 201N-1. As a renewable energy facility, the proposed action falls under the authority of the State Renewable Energy Coordinator, within DBEDT which is NELHA's parent agency. The State Renewable Energy Coordinator has the resources and mandate to act as a consultant and facilitator to renewable energy facilities and is the appropriate approving agency. HRS 201N-8 states:

> *(c) Notwithstanding any provision of chapter 343 to the contrary, the department of business, economic development, and tourism shall be the accepting authority for any final environmental impact statement that is prepared by an applicant for any renewable energy facility under this chapter.*

1.2 Location

The proposed location of the facility will be near the south end of the Kona International Airport on currently undeveloped lava land (Figure 1-1). The location is centered at latitude 19°43' 40" and longitude 156°02'16". The current designation of the property is TMK # 7-3-043:073, por. Lot A-2-A (25 acres). Under NELHA rules, the sublease cannot be approved until after the EIS is accepted. We understand that it is customary for NELHA to subdivide parcels upon approval of the lease; therefore the tax key number is likely to change after acceptance of this EIS. The site will be at the proposed intersection between the lower airport connector road and a *makai*

extension of Ka`imi`nani Road (Figure 1-2). Although both roads are in the planning stages, neither has been constructed at this time. Roadway construction is included in the public discussion and disclosures covered in this EIS.

Figure 1-1 Location Map

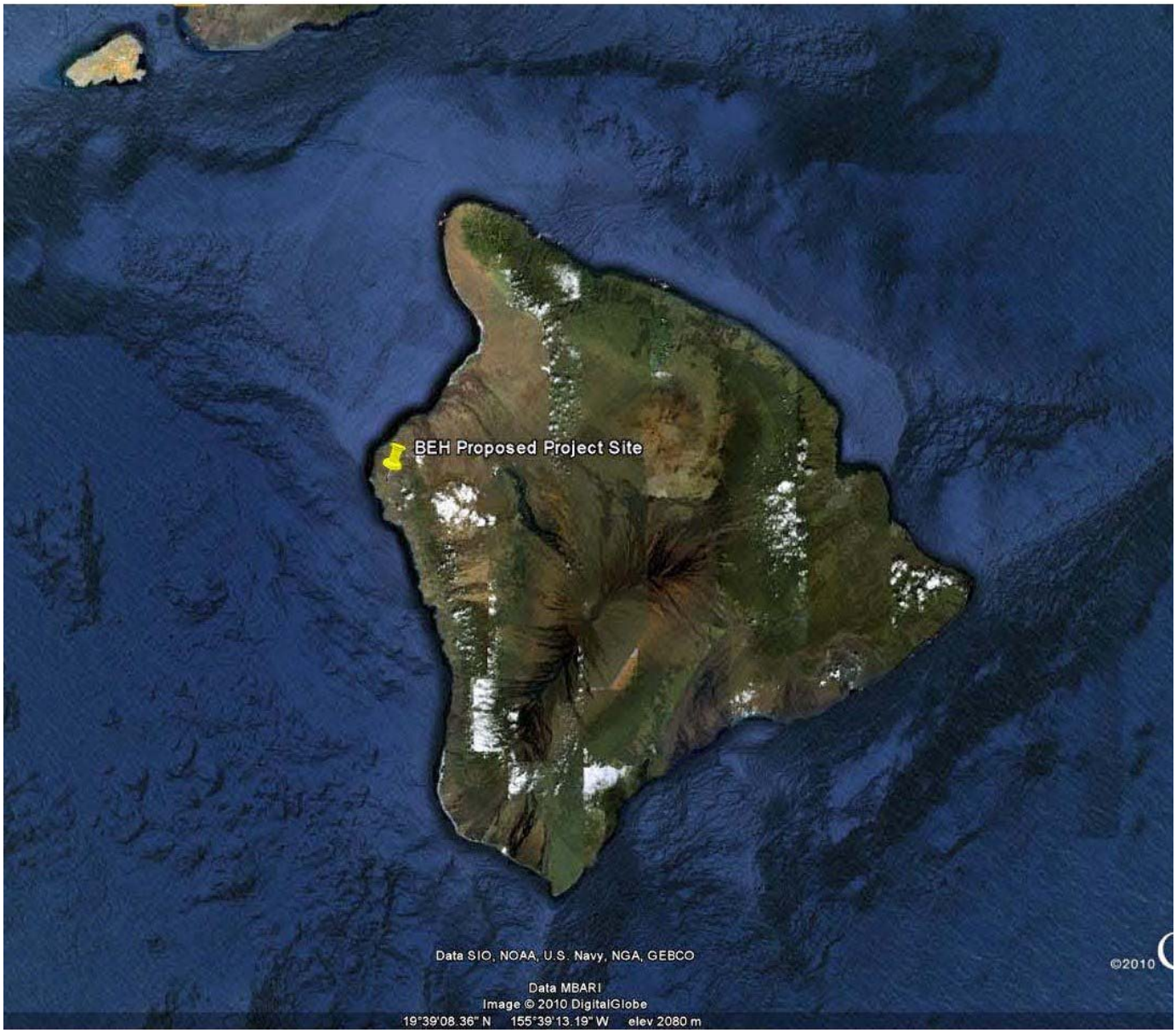
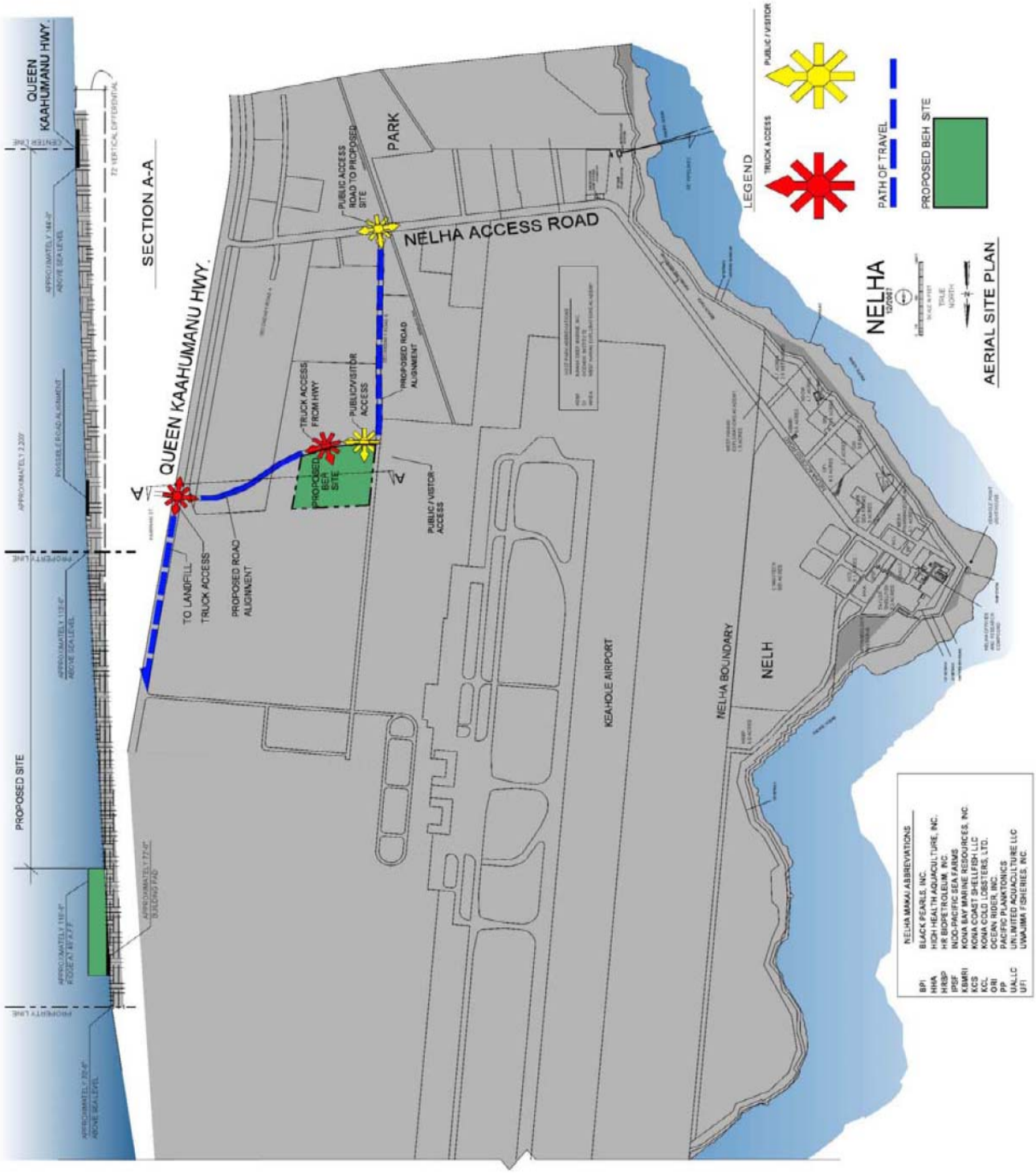


Figure 1-2 Site Map of the Proposed Location



1.3 EIS Triggers and controlling regulations

The subject Environmental Impact Statement (EIS) will be prepared in conformance with HRS 343, "Environmental Impact Statements" which is commonly referred to as The Hawai`i Environmental Policy Act (HEPA).

An EIS is required by HRS 343-5(1)A
for p*ropose(d) use of state or county lands or the use of state or county funds, other than funds to be used for feasibility or planning studies for possible future programs or projects that the agency has not approved, adopted, or funded, or funds to be used for the acquisition of unimproved real property; provided that the agency shall consider environmental factors and available alternatives in its feasibility or planning studies;…*,

The proposed action will be developed on state land belonging to NELHA; however, a programmatic EIS has been prepared for most activities within the NELHA grounds. To date, no other tenants have been required to prepare an EIS as they have been covered under the programmatic EIS completed in 1983 and supplemented in 1987.

A second trigger is defined in HRS 343-5 (9)B:
…any proposed:

- *(A) Wastewater treatment unit, except an individual wastewater system or a wastewater treatment unit serving fewer than fifty single-family dwellings or the equivalent;*
- *(B) Waste-to-Energy Facility;*
- *(C) Landfill;*
- *(D) Oil refinery; or*
- *(E) Power-generating facility.*

The use of a Special Purpose Revenue Bond (SPRB) authorized by the State Legislature may be considered Use of Public Funds and constitutes a third trigger to the Hawaii EIS Law.

BEH proposes to develop a waste conversion facility. Power-generating facility as defined in HRS 343 does not apply to the proposed BEH facility as the definition of "power Generating facility" is limited to:

- *(1) A new, fossil-fueled, electricity-generating facility, where the electrical output rating of the new equipment exceeds 5.0 megawatts; or*
- *(2) An expansion in generating capacity of an existing, fossil-fueled, electricity-generating facility, where the incremental electrical output rating of the new equipment exceeds 5.0 megawatts*

1.4 Environmental Impact Statement Process Description

Adopted in 1974 and patterned after the National Environmental Policy Act (NEPA) requirements, Hawai`i's environmental impact statement law (HRS 343) requires the preparation of environmental assessments and EISs for many development projects. The law requires that government give systematic consideration to the environmental, social and economic

consequences of proposed development projects prior to allowing construction to begin. The law also assures the public the right to participate in planning projects that may affect their community. The Office of Environmental Quality Control implements this law in Hawai`i.

If a proposed action is subject to the EIS law, the environmental review process may begin with the development of a draft environmental assessment (EA). If an action is likely to be contested, be controversial, or result in significant impacts an applicant may go directly to an EIS. An EA or EIS is an informational document prepared by the proposing agency or the private applicant and used to evaluate the possible environmental effects of a proposed action. An EA must give a detailed description of the proposed action or project and evaluate direct, indirect and cumulative impacts. The document must consider alternatives to the proposed project and describe any measures proposed to minimize potential impacts. An EIS assesses the proposed project through research, discussion and review. It must, at a minimum, identify environmental concerns, obtain various relevant data, conduct necessary studies, receive public input, evaluate alternatives, and propose measures for minimizing adverse impacts. The EIS must be structured to disclose information in a concise manner using understandable terms. The EIS is prepared in both draft and final stages by the proposing agency or applicant. It is initially published as a DEIS, and subjected to a 45-day review by the public and government agencies. After public comments are responded to, the draft is revised and submitted as the final EIS (FEIS).

For agency actions, the accepting authority is the Governor or Mayor, who must determine the acceptability of a FEIS. For private applicant actions, the approving agency determines the acceptability of a FEIS. After a FEIS is accepted, the action may be implemented. The publication in *The Environmental Notice* of an acceptance or non-acceptance determination by either the accepting authority or the approving agency initiates a 60-day legal challenge period.

Figure 1-3: EIS Process Flow Diagram

Begin EA/EIS Preparation Notice preparation

↓

Applicant consults community, experts

↓

EA/EIS Prep Notice reviewed and accepted by agency

↓

EA/EIS Prep Notice submitted to OEQC

↓

OEQC publishes notice of EA/EIS Prep Notice

↓

30-Day Comment Period

↓

Applicant review comments and begins DEIS preparation

↓

Studies performed, comments answered DEIS reviewed by Agency

↓

Agency accepts DEIS

↓

DEIS submitted to OEQC

↓

OEQC publishes notice of DEIS

↓

45-Day Comment Period

↓

Applicant review comments and begins FEIS process

↓

DEIS revised, comments answered, FEIS reviewed by Agency

↓

FEIS submitted to Agency

↓

OEQC publishes availability of FEIS

↙ ↘

Agency accepts FEIS

↓

OEQC publishes acceptance

↓

60-Day Legal Challenge Period

Agency rejects FEIS

↓

OEQC publishes non-acceptance

↓

60-Day appeal Period

Part 2: Purpose and Need for the Proposed Action

2.1 Project Objective

The objective of the proposed action is to develop a waste conversion facility to divert MSW in an environmentally responsible manner and to utilize this renewable energy source to produce alternative energy which will reduce Hawai`i's reliance on foreign oil.

The facility may be utilized by commercial waste haulers and the County to dispose of MSW collected on the Island each day. The initial waste will be collected and delivered by Pacific Waste, Inc. from collections primarily in Kailua-Kona. To encourage private haulers and the County to take advantage of the disposal facility, the gate fee or tipping fee at the facility will be kept as low as possible to encourage recycling and diversion of waste. This pricing will reduce the operating expenses for the island's commercial haulers while insuring adequate feedstock for the facility and accompanying environmental benefits for the island.

The facility and the power produced have many environmental as well as economic advantages. The use of this energy source will reduce the Island's demand for fossil fuels by approximately 48,000 barrels of oil per year. If BEH opts to direct production toward liquid fuels the facility could produce as much as 10 million gallons of transportation or stationary power fuel.

The plant will diminish the volume of MSW deposited into the WHSL by up to 76,000 tons per year thereby increasing its useful life. This volume reduction means a proportionate reduction in escaping greenhouse gases such as methane, carbon dioxide, and other volatile organic compounds being produced by existing landfill activities and released to the atmosphere.

2.2 Supporting Policies and Programs

2.2.1 NELHA Facility Objectives

The Natural Energy Laboratory of Hawai`i Authority (NELHA) was established from its predecessors in 1990 within the Department of Business Economic Development and Tourism by HRS §227D. The purpose of NELHA established in the statute is "to facilitate research, development, and commercialization of natural energy resources and ocean-related research, technology, and industry in Hawai`i and to engage in retail, commercial, or tourism activities…"

Historically NELHA's primary focus was on geothermal and thermal energy production from deep sea water; however, its original mission as defined in its DEIS (RCUH, 1976):

> *The basic purpose of the Natural Energy Laboratory is to provide the essential support facilities for future energy programs and to interest research organizations in using these facilities. By providing a centralized location with favorable development conditions it is hoped that groups examining alternative sources of energy will select Hawai`i as the location for their research and test facilities.*

Biomass energy is considered in the original EIS documents and is rated among those technologies with the least potential impact (RCUH, 1976 Table A-1).

Despite these efforts, power costs for NELHA tenants have always been a primary impediment to further development of the facility. NELHA solicited support from the Governor in 2006 for a subsidy for the cost of electricity to help aquaculture tenants adjust to the high price of electricity, which accounts for the majority of seawater production costs. The Legislature passed a $365,000 per annum subsidy for two years as a result of this effort.

The 2006-2007 Annual report stated "*We are diligently working toward proposals to make NELHA not only energy self-sufficient but to produce our own energy and demonstrate new energy technologies using the unique conditions that exist at NELHA. These projects, which we plan to fund through public/private partnerships, will demonstrate to Hawai`i that it can do projects of large scale alternative energy natures to reduce its dependence on foreign fossil fuels as well as contribute to a reduction in greenhouse gas emissions."*

The proposed action has the potential to meet NELHA's demand for energy self sufficiency while using seawater resources to sequester CO_2 and produce an algae-based biofuels.

2.2.2 County of Hawai`i Energy Policies

The Hawai`i County General Plan is the controlling document for development throughout the county (Hawai`i County General Plan, 2005). Energy concerns are referenced throughout the Plan but the overall policy for the county is described below:

Hawai`i County's Energy Goals and Policies

Goals:

1. Strive towards energy self-sufficiency.
2. Establish the Big Island as a demonstration community for the development and use of natural energy resources.

Policies:

1. Encourage the development of alternative energy resources.
2. Encourage the development and use of agricultural products and by-products as sources of alternative fuel.
3. Encourage the expansion of energy research industry.
4. Strive to educate the public on new energy technologies and foster attitudes and activities conducive to energy conservation.
5. Ensure a proper balance between the development of alternative energy resources and the preservation of environmental fitness and ecologically significant areas.
6. Strive to assure a sufficient supply of energy to support present and future demands.
7. Provide incentives that will encourage the use of new energy sources and promote energy conservation.
8. Seek funding from both government and private sources for research and development of alternative energy resources.
9. Coordinate energy research and development efforts of both the government and private sectors.
10. Encourage the continuation of studies concerning the development of power that can be distributed at lower costs to consumers.

11. Strive to diversify the energy supply and minimize the environmental impacts associated with energy usage.
12. Continue to encourage the development of geothermal resources to meet the energy needs of the County of Hawai`i.
13. Encourage the use of solar water heating through the continuation of State tax credit programs, through the Building Code, and in County construction.
14. Encourage energy-saving design in the construction of buildings.
15. Support net-metering and other incentives for independent power producers.

The Land Use Pattern Allocation Guide (LUPAG) contained within the General Plan is also an important declaration of permissible land uses around the county. The NELHA lease is designated as industrial land within the LUPAG.

2.2.3 State Energy Policies

Policy development is key to achieving the goal of meeting 70% of Hawai`i's energy needs with clean energy by 2030. Statewide, 90% of our energy comes from imported petroleum. By working to develop policies that support energy-efficiency efforts, renewable energy development, and transportation clean energy objectives, the Hawai`i Clean Energy Initiative is paving the way for Hawai`i to reach its clean energy goals.

On June 25, 2009, the initiative reached an important milestone when Gov. Linda Lingle signed into law four key energy bills that enhance Hawai`i's energy efficiency and renewable energy programs. The energy agreement, part of the Hawai`i Clean Energy Initiative, puts Hawai`i on a path to supply 40 percent of electricity needs and 70 percent of overall energy needs (including transportation) using clean sources by 2030, a far-reaching change for a state now over 90 percent dependent on imported fossil fuels.

The 2009 Hawai`i State Legislature enacted this goal into law by establishing a renewable portfolio standard of 40 percent and an energy efficiency standard of 30 percent by 2030 in Act 155. Hawai`i Revised Statutes, Chapter 226-18, "Objectives and policies for facility systems - energy," as amended: "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 Hawai`i's energy supplies and systems; and
4. Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use.

2.2.4 Federal Policy

Waste conversion is a renewable energy technology because its fuel source, post-recycled MSW, is sustainable and non-depletable. According to the U.S. EPA, waste conversion is a "clean, reliable, renewable source of energy." In addition, the Energy Policy Act of 2005, the Federal

Power Act, the Public Utility Regulatory Policies Act, the Biomass Research and Development Act of 2000, the Federal Energy Regulatory Commission's regulations, recognize waste conversion power as renewable.

2.3 Power and Infrastructure Needs

2.3.1 Current sources of power generation

According to Johnson et al (2006), the peak demand for electricity in Hawai`i County was reached in early December, 2005, was 196 megawatts (MW). Seasonal differences are modest, with only a 23 MW difference in peak demand between the lowest and highest days of the year. Per capita demand is lower than the U.S. average across all sectors – commercial, industrial and residential.

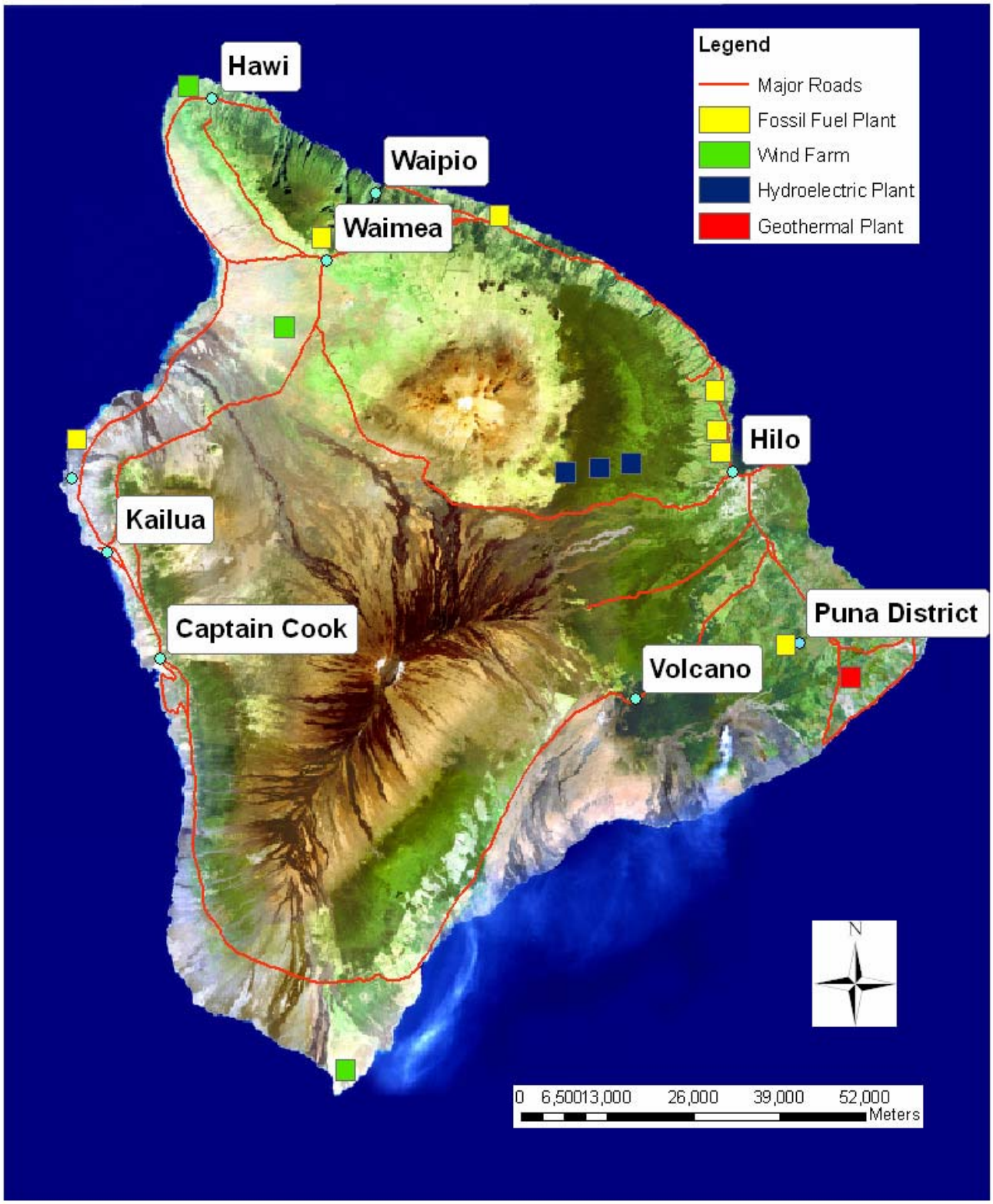
Hawai`i County is heavily dependent on oil to meet its energy needs. Petroleum products were used for 78% of electricity generation in 2005, decreasing to 68% in 2009 (DBEDT, 2009). The proportion of electricity generated by renewable energy sources has varied significantly over the past thirty years, due mainly to geothermal production and changes in biomass-based generation tied to the now-defunct sugar plantations. The island currently has approximately 300 MW of electricity generation capacity. Petroleum based generators account for roughly 80% of this capacity, roughly one third of which is combined-cycle. The remainder of the island's existing capacity comes mostly from a single geothermal power plant, Puna Geothermal Venture, with smaller contributions from wind, hydropower, and distributed solar. More than a quarter of the Island's generation capacity comes from oil-fired plants built over 30 years ago. Since 1986, 200 MW of mostly petroleum-based capacity has come online. Over the ten years prior to 2006, when the 10.5 MW Upolu Point wind farm began operation, no new utility-scale renewable capacity was added (Johnson et al. 2006). Installed capacity of all renewable electricity sources is proximately 60 MW, half of which is considered firm capacity from geothermal.

The electricity transmission system has not been fully modernized to accommodate increased levels of supply. The majority of the system consists of 69 kV lines, and the long, cross-island distances between generators and customers result in system line losses of about 8%. There is a spatial mismatch which exacerbates this problem: recent population growth, and thus electricity demand, has occurred on the west side of the island, whereas the bulk of electrical generating capacity is in the east (Figure 2-1). Since there is no inter-island transmission, the Big Island's grid must be completely self-sufficient. Potential impacts of the proposed project on HELCO's power transmission infrastructure will be discussed in the DEIS.

In terms of production, renewable sources accounted for 285 million kWh of energy in 2005, or about 23% of the Big Island's electricity needs. Geothermal dominates the production of energy from renewable sources, but there are sizeable inputs from solar thermal and run-of-the-river hydropower as well. There is more than enough resource potential for the island to meet all of its electricity needs through renewable sources.

Wind was only a small part of the energy system, providing less than 1% of the Big Island's electricity in 2005, but has increased to more than 10% as of 2009.

Figure 2-1 Location of major generating facilities in Hawai`i County



Source: Johnson et al (2006)

Geothermal currently contributes the vast majority of Hawai`i County's renewable energy production, accounting for almost 60% of renewable energy used in 2009. There is one existing geothermal plant, Puna Geothermal Venture, which plans to ramp up its capacity incrementally as demand grows in the coming years. There is sufficient economic potential to satisfy the entirety of the island's energy needs.

Solar energy is harnessed both directly, for thermal applications, and through photovoltaics (PV) for electricity generation. A popular incentive program has led to widespread use of solar water heaters, which are in place in about 10% of the island's residences and displace the equivalent of 1.5% of electricity demand. PV use is considerably smaller, with distributed sources existing at hotels, other businesses, and individual residences. PV is not currently in use for large-scale grid distribution. Both forms of energy production have huge potential for growth, although PV systems are quite expensive and therefore not as competitive as other renewables under current prices. Power generation by fuel type is shown as of 2009 in Table 2.1

Table 2.1 Hawai`i County Electric Generating Capacity by BTU

Source	**BTU (millions)**	**Percent of total**
Petroleum	845	68
Biomass	0	0
MSW	0	0
Hydroelectric	36	3
Wind	129	10
Geothermal	234	19
Coal	0	0
PV or solar thermal	5	0
Total	1249	100

Source: 2009 Hawai`i State Databook http://hawaii.gov/dbedt/info/economic/databook/db2009

As of 2005, the majority of power production was on the east side of the island, while current populations are roughly equivalent. Johnson et al (2006) estimate that up to 8 % of the power generated is lost in transmission.

Table 2.2 Hawai`i County Generators, 2006

Facility	Power production (kWh/year)	Percentage	Fuel	Year started
Pueo	5,543	.4	Diesel	1918
Waiau	3,626	.3	Diesel	1925
Shipman	8,108	.6	Residual oil	1956
Kanoelehua	2,919	0.2	Diesel	1963
Hill	230,066	19	Residual oil	1965
Waimea	5,136	.4	Diesel	1969
Puna	115,367	9.5	Residual oil	1991
Hamakua	431,413	35	Naptha	2000
Keahole	157,391	13	Diesel	2004
Lalamilo	1,697	.1	Wind	1984
Kamaoa	4,841	.4	Wind	1987
Puna Geothermal	220,639	18	Geothermal	1991
Wailuku	29,726	2.5	Hydro	1922
Upolo	3,022	.2	Wind	2006
Total	**1,219,494**	**100**		

Source: Johnson et al (2006) Note: Lalamilo Wind Farm is currently decommissioned.

2.3.2 Distribution System infrastructure

The proposed waste conversion facility will be located on NELHA property between the south end of the Kona International Airport and Queen Kaahumanu Highway. Electrical infrastructure belonging to HELCO provides adequate electrical power service to the Airport and NELHA. HELCO's Keahole Power generator is immediately east of Queen Kaahumanu Highway approximately ½ mile away. Power transmission and distribution equipment is currently under design and will depend on the details of power sales that are currently not available.

2.4 Comparison of Land Filling to Gasification of Waste

Landfilling is one of the most common ways of MSW disposal. Air pollutants emitted from landfills contributes to the emission in the atmosphere of greenhouse gases and may cause serious problems to the human health and the environment. Methane emission from landfill represents the most serious environmental global concern as it accounts for up to 19 percent of current greenhouse gas emissions worldwide (US EPA 2006). In the last decades the greenhouse gases produced by human activities have been predominating over those of natural origin (Hansen, 2004).

According to the Energy Recovery Council (2008), converting MSW to energy has tremendous potential to reduce climate-changing greenhouse gases. According to a model developed by the EPA, each megawatt-hour (MWh) of electricity generated through conversion of MSW results in a net negative CO2 footprint of 3,636 lbs of carbon dioxide equivalent (CO_2-eq). If one considers life cycle carbon budgets, recycling and the thermal conversion of organic waste recover almost

pound-for-pound the same amount of greenhouse gasses as are disposed. Conversion systems achieve this net reduction by offsetting fossil sources of electricity, eliminating the methane emissions that would have occurred if the waste were landfilled, and recovering metals that can be recycled (which is much more energy-efficient than using raw materials).

A study of emissions from the known gasification, pyrolysis and plasma facilities worldwide was completed by the University of California at Riverside in 2009 (UCR, 2009). The study examined each operating facility with emphasis on those engaged in thermal conversion of MSW and medical waste. The study identified more than 100 facilities worldwide and compared emissions from those with available data to the known emissions standards. The study concludes:

> *Independently-verified emissions test results show that thermochemical conversion technologies are able to meet existing local, state, federal, and international emissions limits. Today, there are advanced air pollution control strategies and equipment that were not available even ten years ago. It is obvious from the results that emissions control of thermochemical conversion processes is no longer a technical barrier. That said, it is recommended that facilities and agencies provide both continuous and periodic monitoring to keep the public informed and ensure ongoing compliance*.

Over the same period the Federal government has tightened up on air emissions from landfills, requiring certain landfills to install gas recovery systems primarily to reduce the amount of greenhouse gas emissions from landfills.

The DEIS will include a discussion of the impacts of the proposed action on air quality and the County's solid waste infrastructure.

Part 3: Description of the Proposed Action

3.1 Location and appearance of the proposed facility

The main structure, the material-handling building is a sixty thousand (60,000) square foot, clear-span metal building. The building will be approximately thirty-nine (39) feet high at its roof eave and rises to forty-eight (48) feet high at its roof peak. This building contains the receiving area (or tipping floor), material-handling equipment that is utilized to sort and shred the MSW, and the storage bunkers which hold the processed RDF until it is conveyed to the gasifier. Immediately to the east of an exterior screened area is the maintenance and water treatment facility. It will be a two-story metal building enclosing approximately sixteen thousand (16,000) square feet. The truck scales and the scale house of approximately one hundred (100) square feet are located at the southeast edge of the industrial acreage near the commercial truck entrance to the facility. Immediately to the south of the main structure is a two-story office building of approximately ten thousand (10,000) square feet that will house the administrative offices and visitor center for BEH (Figure 3-1).

To the north of the main structure, is an uncovered, exterior screened area of approximately sixty thousand (60,000) square feet which contains most of the production conversion equipment. The perimeter screening fence is thirty (30) feet high along the west side and twenty (20) feet high along the north side with an enhanced screening element in the northwest corner which rises to approximately forty-eight (48) feet which serves to shield conversion equipment from view. The area also contains a ten thousand (10,000) square-foot sound insulated building which will house the power generation equipment (Figure 3-2). All structures will be less than 60 feet above ground level. Using the existing contours, the existing viewplanes of the ocean and airport from Queen Ka`ahumanu Highway will not be significantly affected.

Aerial renderings as viewed from above the Queen Ka`ahumanu Highway of the plant and facilities are shown in Figure 3.3. A drawing depicting the overall site plan for the total acreage to be subleased from NELHA is included as Figure 3-3.

Waste collection vehicles ("WCVs") bound for the BEH facility will enter the NELHA property at a proposed controlled intersection of Queen Ka`ahumanu Highway and Ka'imi'nani Extension Road, which should be completed before the waste conversion facility commences operations. An extension of Ka`imi`nani road was planned by the Hawai`i Department of Transportation, but these plans may have been modified. BioEnergy Hawaii and NELHA are currently discussion the need for this improvement with the DOT in an effort to coordinate the timing of the extension. A traffic study for the potential impacts of facility operation is currently underway and will be reported in the DEIS.

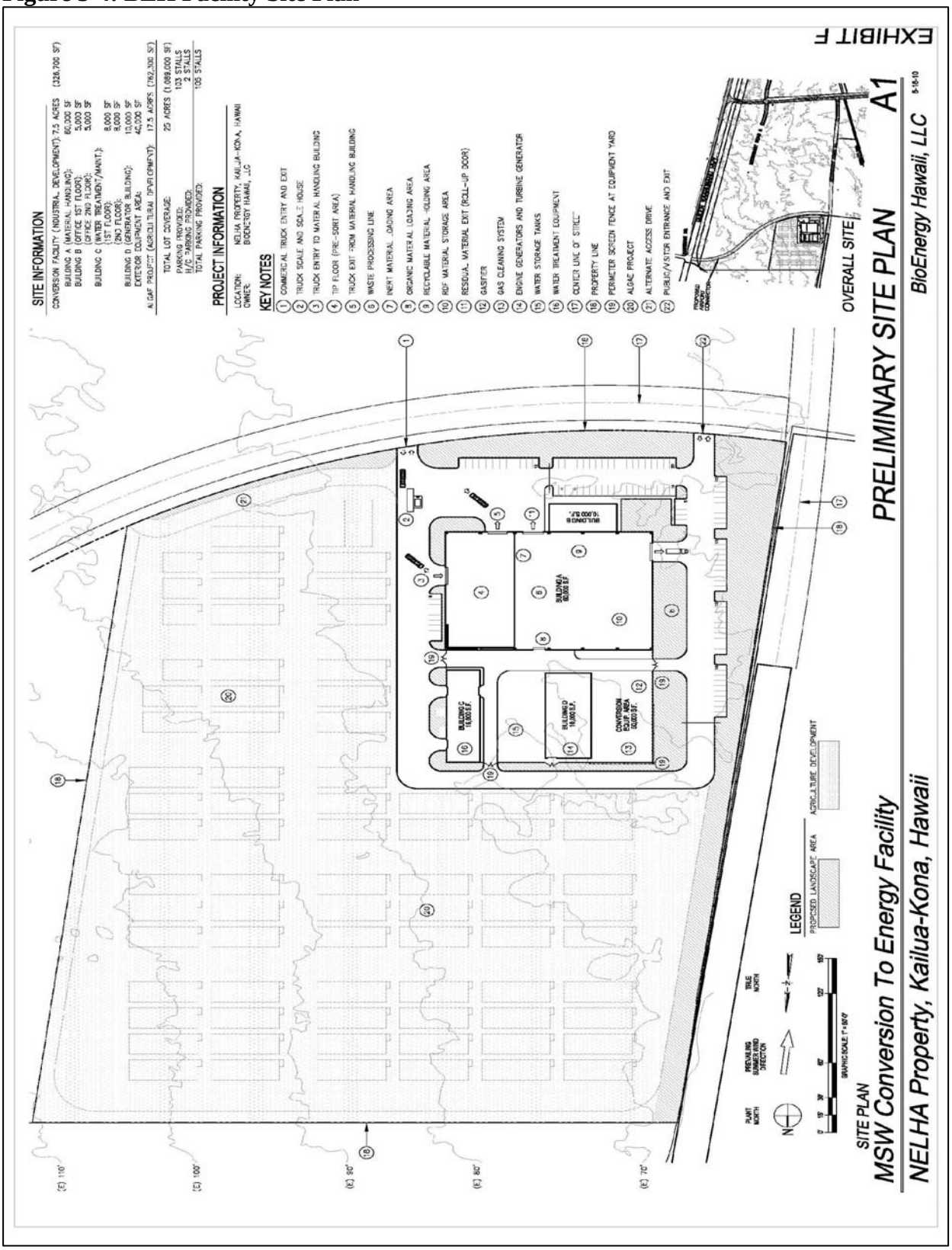
Once onto the NELHA property, the WCVs will proceed west on the Ka'imi'nani Extension and then turn right at the commercial entrance to the facility and proceed to the scale house. Members of the public and employees bound for the facility will have the ability to enter the BEH premises at the NELHA Access Road, proceed west to the Secondary "B" Road (which is to be extended) turn north (or to the right) at the Ka'imi'nani Extension Road and proceed to the entrance of BEH on the left (See Figure 3-4).

Figure 3-1: Waste receiving and Administration buildings

Figure 3-2: Gasifier, gas scrubber and Materials Handling Building

Figure 3-3: Aerial view of the buildings

Figure 3-4: BEH Facility Site Plan



3.2 Operational description

The conversion technology proposed by BEH to transform MSW into energy is accomplished in six steps:

1) Waste receiving;
2) Waste sorting, shredding, screening and classification;
3) Separation of recyclable materials;
4) Gasification of the refuse derived fuel (RDF) into a synthesis gas (syngas) also known as producer gas;
5) Cleaning of the syngas to remove tars and other impurities; and
6) Production of energy through a system of internal combustion engines, boilers, or heat-recovery steam turbines and generators. Alternatively, BEH is considering inclusion of technologies that utilize a portion of the syngas treated in catalytic reactors to produce liquid fuels for offsite use.

A process flow drawing depicting the conversion process is shown in Figure 3.5 and described below.

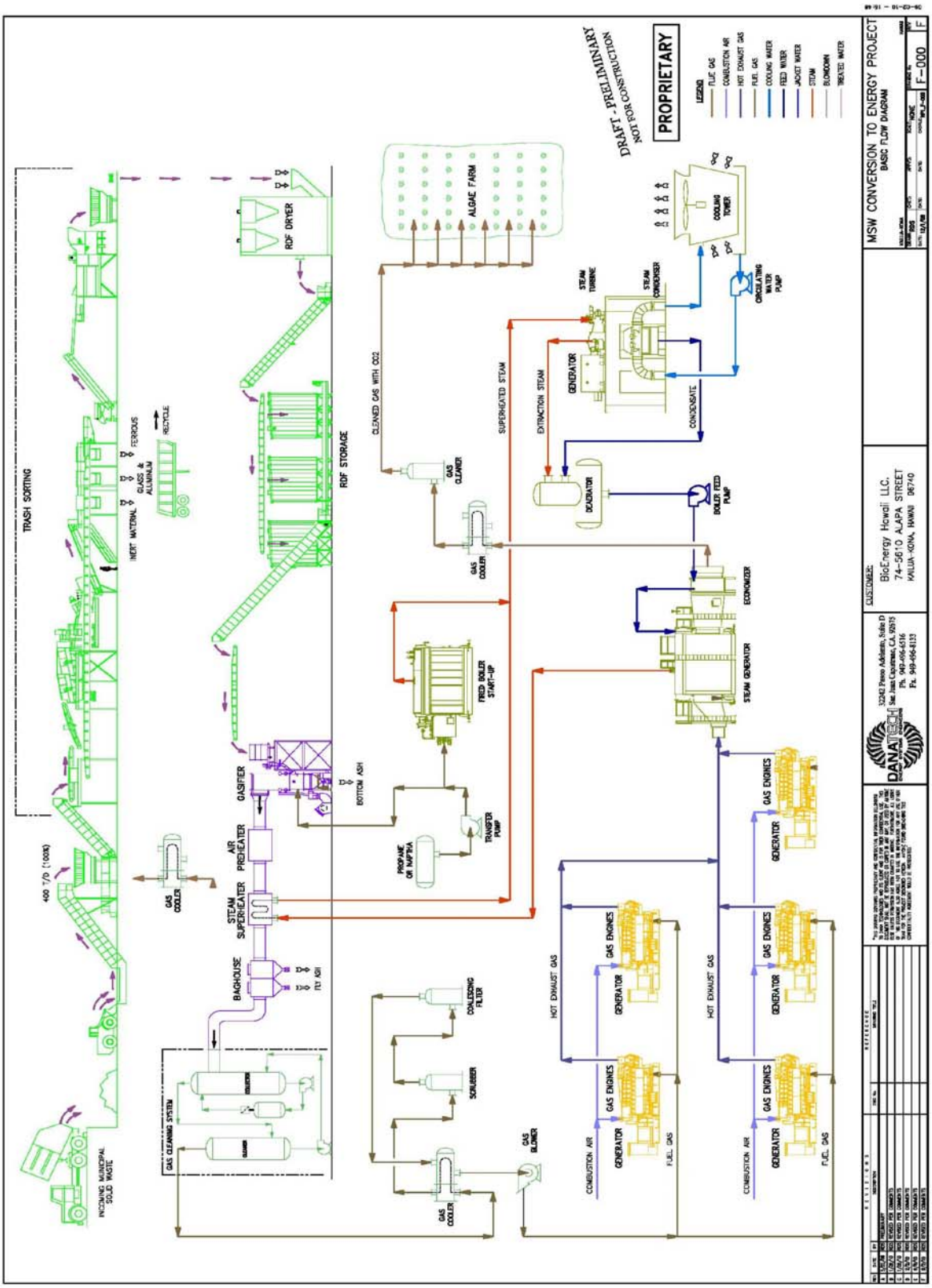
3.2.1 Waste receiving

The conversion process commences when MSW arrives at the facility in waste collection vehicles (WCVs) such as front loaders, roll-off trucks and transfer trailers. The facility will be open approximately three hundred forty (340) days per year. When operating at full capacity commencing in the fifth year of operations, it is slated to receive four hundred (400) tons of MSW per day Monday through Friday and two hundred (200) tons on Saturday for a total of two thousand two hundred (2200) tons of MSW per week. It is anticipated that the facility will receive no more than ten (10) WCVs per hour between the hours of 7 a.m. and 4 p.m. Monday through Saturday. The WCVs enter the material handling building on the east side, through a fast operated bay door that automatically opens as the vehicle approaches and closes once it is inside. The WCV will then maneuver within the building as directed to a partitioned receiving area to unload its contents. It will then pull forward to exit the building through a second fast operated bay door on the south side of the building (Figure 3.1). As described above, the MSW is discharged and sorted within an enclosed building, under negative pressure, onto a steel-impregnated concrete sorting floor (tipping floor). No waste will ever be stored outside of the building or in any uncontrolled area. Waste will not be visible to persons outside the building and fugitive litter such as paper or plastic waste will not be released once inside the building. Leachate generated from incoming waste will be treated in on-site septic systems before being discharged underground. Exhaust air from the building will be directed through a filter to remove odor and dust. Waste screening for inappropriate materials will be done for each load entering the tipping floor.

3.2.2 Waste Sorting, Shredding, Screening and Classification

MSW is deposited on the tipping floor. Visual inspection and first level sorting is performed manually to remove large and noticeable prohibitive materials (i.e. appliances, structural steel, automobile parts, tires, large metal and steel items, concrete, large rocks, etc.).

Figure 3-5 Process Flow



All extracted items will be placed in roll-off containers for disposal or commodity sale depending on the inherent value or lack thereof. An appropriate Litter Abatement Program will be instituted at the facility to insure containment of all waste material. A Hazardous Waste Exclusion Program will also be implemented.

The program will include the following:

- Random inspection of incoming loads,
- Visual inspection of all incoming loads on the tipping floor,
- Operator training for inspection of loads for suspicious materials,
- A record keeping component for inspection, and
- A procedure of notifying the Department of Health if hazardous waste is found.

For incoming hazardous waste that cannot be returned to the generator, appropriate containers shall be utilized to store these materials until legal disposal or reuse can be accommodated. Hazardous materials will be properly disposed by licensed contractors that are permitted within the State.

The waste that remains after sorting is loaded into a conveyor which feeds into the main processing line and shredder, which is also located inside the waste receiving building and has its own air filtration system. The shredder will cut the waste material to a uniform size of no more than 6" to 8" minus for air classification to heavy and light fractions. The shredded waste material will then be transferred via conveyor to a Debris Roll Screen ("DRS"). The DRS creates a unique wavelike action which agitates the incoming material as it is conveyed forward. The agitation releases smaller materials through the screen openings. The DRS will be calibrated to drop out 1" minus material consisting primarily of dirt, rock, broken glass, etc. ("inert material") and organic material. The inert material is then transferred to a trailer for disposal. The organic material will be sent to a conveyor leading to another transfer trailers that will be returned to the gasification system.

3.2.3 Separation of recyclable materials

An air drum separator will next separate the "light" high caloric shredded material (i.e. paper, fiber, plastics, textiles and wood), "light" ferrous metal ("FE") shredded material (i.e. tin cans and lids and thin sheet metal) and "light" non-ferrous ("NF") material (i.e. aluminum cans, pie tins, brass and copper) from the "heavy" low caloric material (i.e. metal, rock, stone and concrete). The "heavy" low caloric material will ultimately be transferred to the same transfer trailers as the inert material.

Next, the "light" FE material will be extracted by a magnetic separator and conveyed into roll-off containers for recycling or disposal. The NF material will be removed by an eddy-current separator that uses a magnetic field to sort out conducting metals. These valuable metals are collected in separate bins and sent for recycling. The processing treatment is so advanced that it can even remove small cell phone and camera batteries as well as bits of broken glass and small rocks.

The processing produces a fuel that is almost entirely metal-free, low in moisture content, and quite uniform in composition and physical properties. The remaining material is deposited onto a conveyor and then sent through a second shredder further reducing its size to no greater than 2" minus. The remaining material (sometimes referred to as "fluff") constitutes the finished refuse derived fuel (RDF). RDF is a highly refined form of MSW that has been used as an alternate renewable fuel source which can be converted into thermal energy. Each one hundred (100) tons of MSW processed will yield sixty-seven (67) tons of RDF on average. The RDF is then conveyed to a material storage area where it is stored until it is ready to be metered out on a "first in, first out" basis and fed into the gasifier.

3.2.4 Gasification

The RDF is metered into the gasifier through an airlock system with just enough air to oxidize a small amount of fuel which generates the high temperature necessary to break down the fuel material to a synthesis gas or syngas and char. Syngas consists primarily of nitrogen, carbon dioxide, carbon monoxide, hydrogen, and methane. It has a low energy density compared to that of natural gas, but it is sufficient to be utilized in a wide variety of power generation technologies. Char is the residual biomass consisting of ash and residual carbon. During the gasification procedure the char is continuously removed. It is then recycled or disposed in a landfill.

The syngas leaving the gasifier is next cooled in a heat recovery system designed to produce superheated steam for a steam turbine for use in the cogeneration cycle discussed in Section 3.2.7.

3.2.5 Gas Cleaning

The cooled gas is then fed upstream into a three step cleaning and scrubbing process that will remove fly ash, tars, acid gases, volatile metal vapors, and moisture. This cleaning system is composed of special filters and scrubbers that have been designed specifically for this type of application. The gas cleaning system is equipped with an emergency flare that would burn off gas during start-ups and emergencies. The flare is shielded from view.

Fly ash is light particulate materials that is entrained in the syngas is first removed in a special high temperature filter. It will be recovered in loose form and can be disposed in the West Hawai`i Sanitary Landfill. Fly ash and char may have application for use in the manufacture of concrete, asphalt or road beds depending upon their composition. The heavy tars are condensed from the syngas by contacting the gas with cool oil scrubbing liquid. Most of the remaining dust is also removed with the scrubbing liquid. The combined scrubbing oil streams are then cooled and passed through a separator and returned to the first scrubber. In the separator the remaining dust is removed and the liquid heavy tars are continuously separated from the oil and recycled as feedstock to the gasifier resulting in the complete destruction of the liquid heavy tars. In the final stage, the light tars are removed with oil. The tars are then returned to the gasifier where they are reused or destroyed. Once the syngas has been cleaned as indicated above, it will pass into a second scrubber for a final cleaning operation. The final scrubber is a water based scrubber that removes acid gasses.

The syngas leaving the aqueous scrubber will flow through a coalescing filter for removal of excess moisture. At this point the gas purification process is complete. The gas will be heated to 25 degrees above the dew point to prevent condensation of moisture. The clean syngas may then be stored in pressurized tanks onsite for later use or transported for offsite use in a variety of power generation and energy production technologies.

3.2.6 Power Generation and Energy Production

Power and/or energy will be generated using some combination of traditional internal combustion engines, steam turbines or conversion of syngas to liquid fuels. The first two methods are similar to those used in most existing power plants. The exact mixture of steam and internal combustion power will be determined according to the needs of the end users. All power generating equipment will be include emissions control devices to reduce air emissions to levels that are below the limits considered safe by the Clean Air Act. Combustion of syngas in either an internal combustion engine or gas turbine will be the primary source of emissions from the waste conversion equipment. The exhaust gasses will be cleaned by air pollution control equipment before being delivered to the algae production units for removal of CO2 and nitrous oxides. Regulated pollutants such as nitrous oxide (NOX), carbon monoxide (CO) and minor component such as volatile organic compounds (VOC) generated by these engines are anticipated to be well below the limits established under the Clean Air Act. Emission of greenhouse gasses from thermal conversion have been shown to be far less than those from landfilling, even without their proposed capture in algal reactors.

BEH is considering the possibility of co-producing liquid fuels and electricity at its NELHA facility, as reducing fossil fuel dependence is a primary consideration in energy production and transportation in the state.

Imported petroleum provides nearly nine-tenths of all the energy consumed in Hawaii. The State of Hawaii now requires utilities to generate 10 percent of their net electricity sales from renewable sources by the end of 2010, increasing to 40 percent by 2030. The state also mandates that at least 85 percent of Hawaii's gasoline to contain 10 percent ethanol. The demand for ethanol or other non-fossil fuels is projected to be 78.9 million gallons by 2015 and 93.7 million gallons a year by 2020. Local production of biofuels is now quite small by comparison.

As the state depends highly on tourism and transportation, a substantial market exists for both biodiesel (for marine, truck and bus consumption) and biobutanol (jet fuel). Due in large part to heavy jet-fuel use by military installations and commercial airlines, the transportation sector is the leading energy-consuming sector, accounting for over one-half of the State's total energy consumption. If all of the waste entering the BEH facility were directed to production of liquid fuels production, the volume would still be a small fraction of the roughly 1 billion gallons of petroleum fuels consumed annually in the State (DBEDT, 2009).

The DEIS will discuss liquid fuels technologies considered, potential environmental impacts, and environmental benefits associated with their production and use.

3.2.7 Heat Recovery

The cleaned engine exhaust gases will then flow through a heat recovery system to convert this thermal energy into steam. Heat recovery steam generators are commonly used in power and industrial applications because they improve the efficiency of power generation waste heat. Gasifiers operate at between 1,200 and 1,500 F and the syngas requires cooling as it exits the gasifier. This cooling system will be used to create a significant amount of steam and electrical power without additional combustion. Steam turbines have formed the backbone of stationary power generation over the past 100 years, they are low-cost, reliable and easy to maintain. The power conversion efficiency is lower than that of internal combustion engine generators. Cost-benefit relationships are currently under consideration and rely to some extent on the demand variability of power end-users.

Whether steam is the primary or secondary source of power, it will be used for multiple purposes. Low pressure steam will be extracted from the turbine to serve in-house auxiliary services such as feed water de-aeration, activated carbon regeneration, housekeeping operation and other services. The amount of electricity it will generate will depend on the amount of steam that is delivered to it from all the heat recovery systems throughout the process. The engine-generators will be controlled to burn the syngas that is delivered to them so electricity production will be a function of the RDF feed rate to the gasifier. If electricity production is scheduled by dispatch instructions, the RDF feed rate will be metered so as to make the amount of syngas that is needed to make the scheduled power delivery rate.

3.2.8 Carbon Dioxide Recapture and Algae Production

At maximum capacity, the waste conversion process will emit approximately three hundred twenty-eight (328) tons per day of carbon dioxide ("CO2") when operating at full capacity In order to reduce the emissions of CO2 from the facility, BEH intends, in partnership with one or more entities, to utilize up to approximately 17.5 acres of agricultural land to establish algae production facilities to grow local strains of algae and possibly to produce algae end products on site. Algal grow-out operations are expected to use approximately 200,000 gallons of seawater per day, and may utilize as much as 2 MW of the BEH power production. Algae culture holds promise for liquid fuels, pharmaceuticals and other valuable products. Algae has the added benefit in that it can be grown on lands that are completely unsuitable for traditional agriculture such as those at the project site.

Exhaust gas from the facility contains CO2, nitrogen and water vapor, all of which can be utilized in the growing of algae. Algae are one of the most efficient natural carbon capture crops. Conservatively, about two tons of CO2 are captured in producing one ton of harvested (solid) algae biomass. This biomass then can be converted into a variety of products such as biofuel or fish feed that could offset the initial capital expenditure and the operational costs of the CO2 recapture process.

BEH has executed a Letter of Intent ("LOI") with Kuehnle Agrosystems, Inc. of Honolulu ("KAS") to grow algae on the agricultural acreage subleased from NELHA for carbon capture and biomass production for energy-related applications. Using the most appropriate local algal species, KAS is proposing to establish a 5-acre algae farm prior to the waste conversion facility completion, and scaling the project up to 20 acres if the farming operation proves financially

viable. KAS anticipates production of 63 dry tons of algae biomass per acre per year. KAS proposes to extract fuel and/or pharmaceuticals from their algae production and return residual biomass to the gasifier.

BEH has also entered into a LOI with Kai BioEnergy Corp. ("KAI") an R&D algae producer with local ties. KAI has proposed to partner with BEH at NELHA to:

1) Develop its site-agnostic algae continuous cultivation methodology;
2) Scale up its method for extracting algae oils in a cost-effective manner; and
3) Develop a commercial conversion facility to produce high-grade renewable diesel fuel.

Until that third objective is reached, KAI would recapture CO2, grow algae on site, and return algal biomass to the gasification system for production of additional energy. Both algae producers have assured BEH that they will use locally derived species for cultivation. BEH will contractually prohibit cultivation or possession of imported exotic species, without written authorization from the Hawaii Plant Quarantine Branch of the Department of Health.

3.2.9 Summary of Inputs and Outputs

A thorough mass balance will be prepared for the DEIS. The following information on inputs and outputs are presented for discussion purposes. All inputs and emissions/discharges are calculated on the basis of the design capacity of 400 tons of waste per day. This quantity is not anticipated until the fifth year of operations.

Solid Waste: The facility handling and processing will be designed for a maximum capacity of 400 tons per day. Of this quantity approximately 100 tons per day will be unacceptable for use due to its size or composition. This waste will be separated on the tipping floor or during processing and delivered to WHSL. Fly ash and bottom ash (char) will be produced at a rate of approximately 36 and 5 tons per day respectively. Ash will be monitored for its components and if they are within an acceptable range they will be utilized in the construction industry or disposed in the WHSL. A solid waste management permit will be required for accepting and processing waste at the facility. This permit will be obtained from the Hawai`i Department of Health prior to accepting waste at the facility. Discussions with the Office of Solid Waste Management have begun in conjunction with the NEPA process.

Hazardous Waste: Small and variable quantities of hazardous waste or petroleum will be collected at the facility. These components will be separated on the tipping floor and placed in specially designed bins. Hazardous materials haulers and other licensed contractors will be contracted to properly dispose or recycle these materials. An EPA Form 8700-12, "Notification of Regulated Waste Activities" will be submitted and BEH will obtain the required approvals from DOH.

Seawater and Freshwater: The production process will utilize approximately two hundred thousand (200,000) gallons of seawater per day. BEH does not anticipate it will require any freshwater for industrial use. Freshwater will be produced by BEH in a reverse osmosis system for drinking, steam production, washing and other minor uses. Additional seawater consumption is anticipated in conjunction with the algae production facilities. The exact amount is unknown at this time, but it is expected to be at least an additional two hundred thousand (200,000) gallons.

Approximately half of this quantity will be evaporated by solar insulation or vaporized as lost steam. The remainder will be discharged from boiler exchange water or brine from the reverse osmosis systems to a dispersion pit. A more precise description of the quantity and quality of seawater discharged in this manner will be included in the DEIS. Any Clean Water Act permits required will be obtained from the Hawai`i Department of Health.

Air Emissions: The major source of emissions will be from the internal combustion engines or gas-fired boilers that utilize syngas fuel. Potential minor sources of emissions include:

- Particulate matter and volatile organic carbons (VOCs) escaping from the negative pressure processing building,
- VOCs and other gasses escaping from the waste storage trailers,
- NOX, SOX, CO2, CO and particulate matter from the power generating units,
- VOCs, NOX, SOX, CO2, CO, particulate matter and minor volatile components from the emergency flare during operation, and
- CO2 from algal respiration at night

A more complete analysis of emissions will be made available in the DEIS. Air emissions will comply with the Federal Clean Air Act and appropriate clean air permits will be obtained prior to the start of construction.

3.3 Financial Description and Development Schedule

In 2009, the Hawai`i legislature approved legislation authorizing the issuance of up to $100,000,000 in special purpose revenue bonds ("SPRB") to assist BEH in the development of a waste conversion facility in Hawai`i. BEH intends to utilize the SPRB to finance eighty percent (80%) of the capital costs to develop the property at NELHA, construct the facility and purchase and install the necessary equipment for the cogeneration plant.

BEH shall submit its LOI to the Department of Budget and Finance either in the first quarter of 2011 or not later than after the public hearing on the DEIS (second quarter of 2011). The application and review procedures and the preparation of documents may take up to one year to complete. The SPRB therefore will be put to sale in the first or second quarter of 2012 once the EIS is approved. The remaining twenty percent (20%) required to fund the balance of the cost and expenses will be paid through additional capital contributions made by the members of the limited liability company, Pacific Waste, Inc. and Kosti Shirvanian. The company is also investigating private financing with a commercial financial institution, a private equity group, and/or private individuals.

3.4 Required Permits and Approvals

A preliminary list of the major permits and approvals required for completion of the project include:

Land Lease from the Natural Energy Laboratory of Hawaii Authority (NELHA):
BEH has held extensive discussion regarding locating their waste conversion facility at NELHA. The NELHA Board has accepted BEH's term sheet with caveats, may be prepared to offer a

lease agreement to BEH. It is NELHA's stated policy that no lease agreement of final terms may be accepted in advance of the completion of this EIS.

Special Management Area (SMA) Permit: The land holdings of NELHA are completely within the special management area. A blanket SMA permit exists for the facility and may be applicable to the proposed action; however, previous NELHA tenants have prepared a supplemental SMA permit. BEH will apply for this permit prior to the commencement of construction. Initial discussions with the County of Hawai`i Planning Department have begun in support of the HEPA process.

Solid Waste Management Permit: All solid waste management facilities in the State are required to obtain a solid waste management permit from the Hawai`i Department of Health. Initial discussions with the appropriate personnel in DOH have begun to support the HEPA process.

RCRA Small Quantity Generator Permit: The EPA requires businesses and individuals who regularly generate less than 1,000kg per month of hazardous wastes or less than 10 KG of extremely hazardous waste to register as a small quantity generator. Although the facility will not accept any hazardous materials for thermal conversion, it is likely that some household hazardous wastes will get through the inspections and be left with the operator. A RCRA small quantity generators permit will be obtained in the event that hazardous materials are left at the facility.

Clean Air Permit: The facility will require a permit to operate under the Clean Air Act. The type of Air permit whether covered or non-covered is yet to be determined; however, the process for obtaining an air permit has begun and is likely to continue until after publication of the FEIS. Initial discussions with the Hawai`i Department of Health Clean Air Branch have begun as part of the HEPA process.

NPDES Permit: Grading of the facility will ultimately cover approximately 25 acres of lava land at NELHA. A National Pollution Discharge Elimination System (NPDES) Form C construction stormwater permit will be required along with a notice of Intent for general coverage under the NPDES program. This permit will be obtained from the Hawai`i Department of Health prior to the start of construction. Initial discussions with the Clean Water Branch of DOH have begun to support the HEPA process.

County of Hawaii Land Use Permit: Industrial facilities usually require a land-use permit even on industrial land. The County has not made a final determination at this time, but the proponent is anticipating preparation of a Use Permit for review by the County Planning Department.

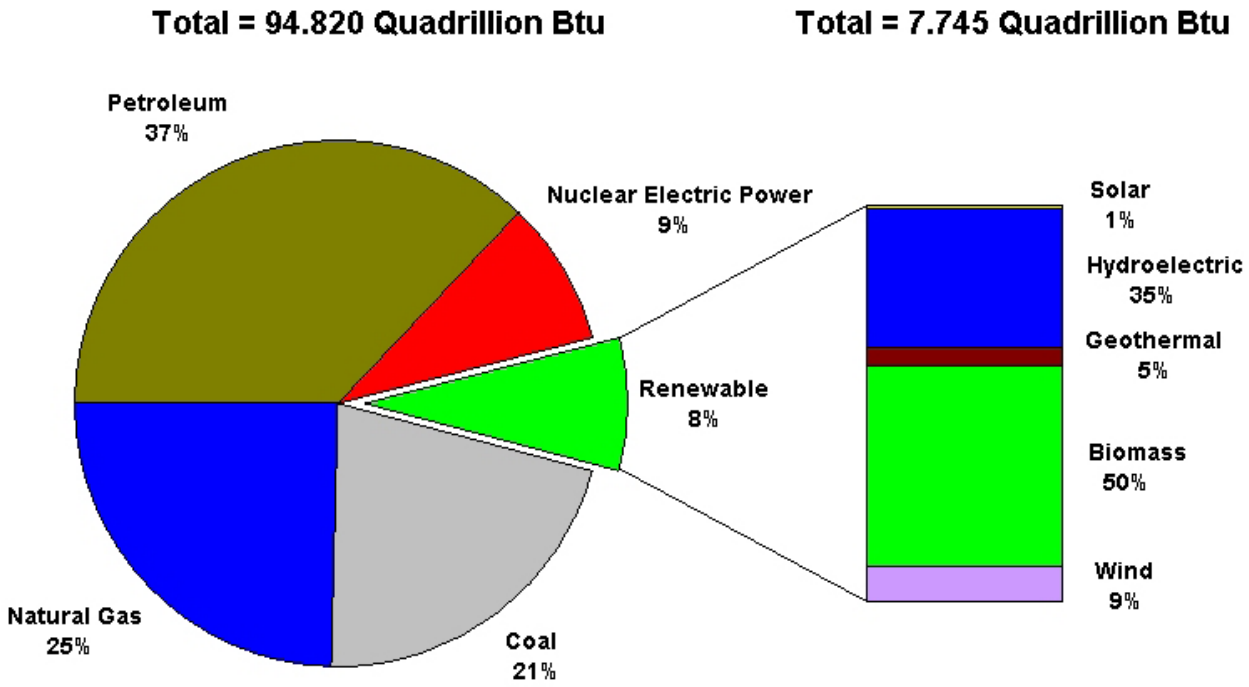
Grading/Building Permits: Building and grading permits will be obtained from the County of Hawai`i at such time as the final designs are completed.

Part 4: Alternatives to the proposed action

4.1 Alternate Technologies

The US Energy Information Administration publishes statistics on energy production and consumption annually. As of August 2009, renewable sources provided 8% of the total US energy demand including utility and transportation power. Of that 8% half was supplied by biomass including waste to energy facilities (Figure 4.1)

Figure 4-1. Nationwide Production of Energy by Fuel Source.



Source: U.S. Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels 2010

In 2007 Hawai`i ranked fourth nationally in the percentage of total state non-hydroelectric renewable energy generated. Hawai`i State's renewable portfolio was 6.5% at that time and has now increased in late 2009 to be estimated at 9% of Hawai`i's total electricity generation (Doris et. al, 2009).

The economic security of the State of Hawai`i is extremely vulnerable due to its over-dependence on imported oil. In 2008, about 76% of the net megawatt-hours of electricity generated in Hawai`i and slightly over 97% of its transportation fuels, as measured in Btu, are produced from oil. The state has begun addressing this vulnerability through the Hawai`i Clean Energy Initiative (HCEI), a partnership between the State and the US Department of Energy (USDOE) aimed at providing 70% of Hawai`i's energy from efficiency and renewables by 2030 (DEBDT, 2009). As of 2008, over 91% of our stationary power was derived from oil or coal.

Table 4.1 Energy Production by Fuel Source in State of Hawai`i as of 2008.

Source	MW hours	Percentage of total
Petroleum	8,779	76.5
Hydroelectric	91	1
Landfill gas or MSW	329	3
Biomass other than MSW	133	1.2
Geothermal	234	2
Coal	1,648	14.5
Solar PV and Solar Thermal	15	1
Wind	240	2
Total	11,496	100

Hawai`i County is in a much better position than the state average in terms of renewable energy, largely due to its abundant geothermal and wind resources. Only 68% of power was generated by fossil fuels in 2008 (Table 4-2).

More than a quarter (28%) of the Island's generators were permitted more than 30 years ago, and 98% of these older plants are oil-fired. There was a gap in capital investment from 1976 to 1986, with only 2.5% of the current capacity built in that time frame. Between 1986 and 1996, 103 MW of capacity went online: 51% oil-fired, 30% geothermal, 10% hydro, and 9% wind. The past decade has seen similar levels of construction with the addition of 110 MW of additional capacity, all of which is oil-fired with the exception of the new Upolu Point Wind Farm. The total capacity of Hawai`i County's production assets is over 300 MW, up to 30% more than the average daily demand.

Table 4.2 Total Energy production by fuel source for Hawai`i County as of 2008

Source	MW hours	Percentage of total
Petroleum	845	68
Hydroelectric	36	2.8
Landfill gas or MSW		
Other biomass		
Geothermal	234	18.7
Coal		
Solar PV and Solar Thermal	4.8	.2
Wind	129	10.3
Total	1,249	100

Many new technologies are becoming available to power producers in Hawai`i. Their rapid development is partially due to Federal and State initiatives to develop energy independence. Activity in Hawai`i is at a very high level due to the high cost of electricity in Hawai`i and abundance of natural resources such as sun, wind, and waves. Alternative power technologies that rely on wind, solar thermal, solar photovoltaic, waves or tides are inherently intermittent. These intermittent sources of power have created management difficulties for the utility due to

grid stability issues which are particularly difficult on neighbor islands where non-utility generators, particularly wind farms, can account for a substantial fraction of the total demand.

Base load generators such as the Utility's oil-fired generators must be available to provide uninterrupted power during periods when wind and solar power facilities are not producing. The second tier of providers should be dispatchable generating systems; those that can be increased or decreased on scheduled demand. Of the currently available technologies in Hawai`i only Geothermal and biomass plants fit this category. Geothermal steam production is slightly more difficult to throttle back than biomass, but each can be run at all times of the day at a predictable production rate.

Geothermal power production on the Big Island has been in service since the early 1980s and has a proven track record. The resource is available to many areas of Hawai`i County. Its environmental record in Hawai`i began with some difficulties due to odors and noise produced from it earlier designs. Cultural issues associated with traditional Hawaiian deities have also limited the development of geothermal power.

Biomass power in Hawai`i has historically centered on waste materials that would represent a cost or environmental problem if not used for energy. The economics of most biomass technologies rely on a tipping fee. Examples include H-Power and AES Power in Honolulu that burn MSW and tires respectively. Hawaiian Commercial and Sugar's (HC&S) Mill on Maui uses bagasse that would otherwise be a significant disposal problem. The historical relationship between biomass power and waste products is long and closely tied.

Pacific Waste, the majority owner of BEH, is a waste management company currently operating collection services throughout the County of Hawai`i, and in parts of Maui. The objectives of the proposed action is to develop a more efficient method of waste management which reduces environmental impacts and waste management cost in their area of operation. Alternative technologies to be considered in the DEIS are those that involve biomass or waste to produce stable dispatchable power. Intermittent sources are not considered a suitable alternative due to the excess capacity that now exists in the generating infrastructure. Replacement of stable power sources with intermittent sources may be difficult for HELCO to justify on the basis of grid stability. Methods that do not utilize waste are also not considered because the proponents' primary objective is to improve current waste management practices. The DEIS will review currently available waste conversion technologies with potential to:

- Provide an alternative to landfilling,
- Produce a reliable source of fuels or electric power,
- Reduce environmental impacts associated with traditional waste disposal, and
- Create positive cash flow to the proponent.

4.2 Alternative Locations

The proposed action is to place the BEH waste conversion facility in a currently undeveloped location at NELHA as discussed in Section 1.2. Three alternative locations were analyzed for suitability. The criteria for assessing the site selection are:

- Sufficient available land and water,

- Proximity to electrical infrastructure,
- Proximity to the source of waste generation,
- Proximity to sensitive areas,
- Potential impacts to view planes, and
- Adequate access and egress.

The site selection criteria are not weighted but the first criterion is considered a project killer; and as a result, no sites without at least twenty acres of land and ability to obtain water for agricultural and industrial uses are considered.

The proximity to major electrical corridors impact the development expense due to potential impacts and costs associated with transmission of electricity. Transmission costs will be assessed for each alternative location as part of the DEIS.

BEH's parent company is Pacific Waste Inc., who has been a successful waste hauler since 1997. Pacific Waste collects MSW from as far south as Naʻalehu and as far north as Waimea and North Kohala, with customers as far away as Lapahoehoe and other operations in East Hawaii. The majority of waste originates within urban Kailua-Kona. For this document we assume that the center of generation is at the intersection of Ali`i Drive and Kuakini Highway in Kailua Kona. The haul distance between the collection and disposal points has a significant effect on the cost of doing business as well as social and environmental impacts associated with heavy truck traffic and emissions. The average haul distance in ton-miles will be calculated for the proposed location and each alternative site for the DEIS.

The proximity of this facility to sensitive areas may have influence on both environmental quality and quality of life issues. Sensitive areas can include those frequented by threatened and endangered species, a scenic natural area, any unique or irreplaceable site from a cultural or historical perspective, or sensitivity can be defined as a location with competing land uses that may be impacted by the proposed development. An assessment of potential sensitive areas will be conducted for the proposed location and alternative sites as part of the DEIS.

The view planes along the coastline of the Big Island are quite important to residents and visitors alike. An assessment of the impact on view planes will be conducted for the proposed location and alternatives sites as part of the DEIS.

The adequacy of access and egress from the facility is important to safety of BEH drivers and other highway users as well as the cost of development. An assessment of the access and egress points to the proposed location and alternative sites will be reviewed in the DEIS.

4.2.1 DHHL Property Keahole Point

Two lots owned by DHHL in the Kalaoa area are directly across Queen Ka`ahumanu Highway from the Kona Airport, and adjacent to the new HELCO generating station at Keahole Point. The two parcels under consideration are TMK 7-3-10:039 (127 acres) and TMK 7-3-10:040 (25.5 acres) (see Figure 4-2) The access road for Parcels 39 and 40 is the same utilized for the existing power plant and forms the least developed leg of a four-way intersection. The land

surface is entirely underlain by recent pāhoehoe lava. Opportunistic grasses are seen taking hold in the cracks and fissures of the surface. Although the rock itself is impermeable there are enough cracks, fractures, fissures and lava tubes that rainfall generally percolates immediately to the subsurface without running off. The bearing strength of this type of lava is quite good, but grading, installation of underground utilities and even telephone poles present unique challenges common to the North Kona district.

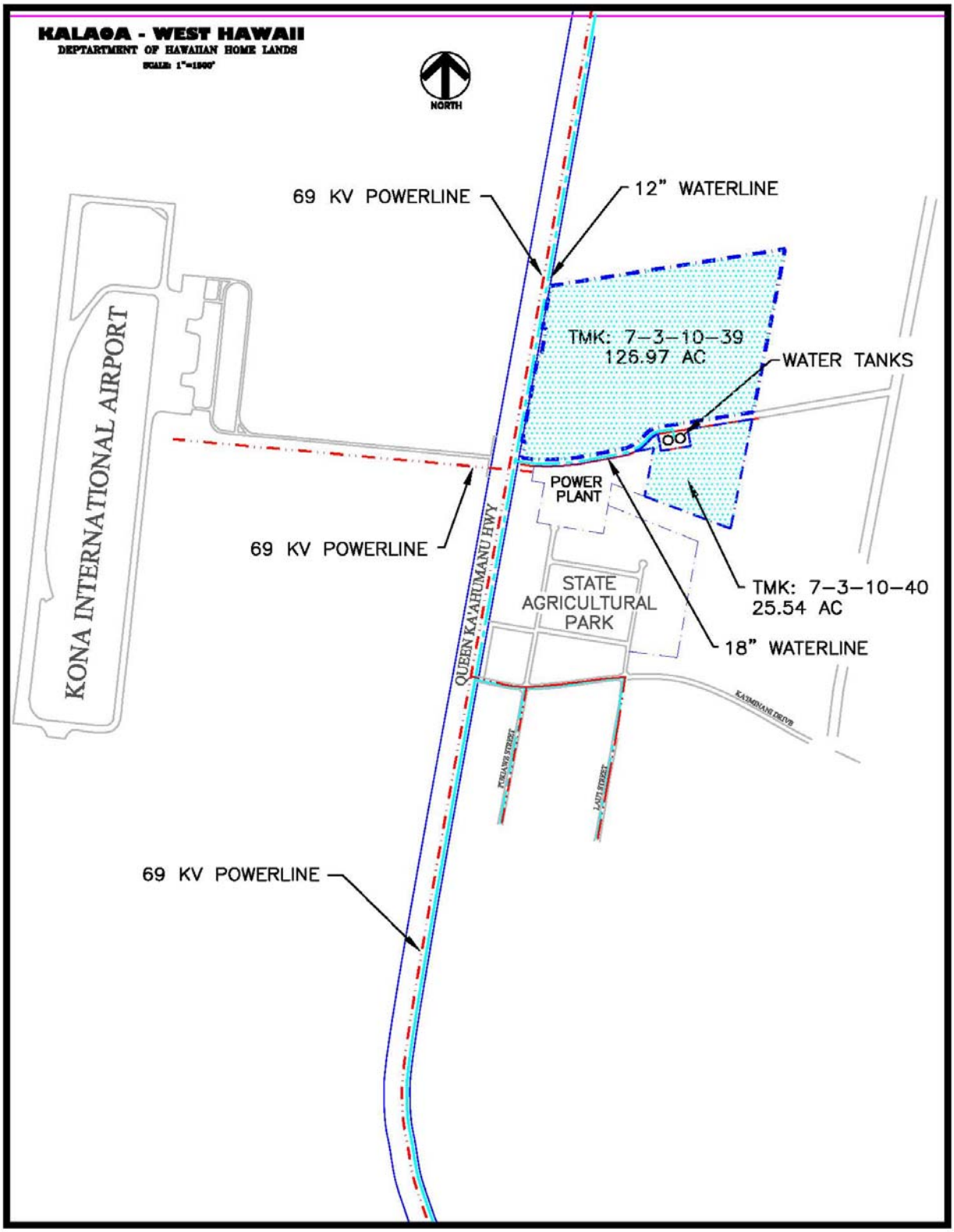
Sufficient land and water are available to the Kalaoa parcels. Parcel 39 would have to be subdivided to minimize the lease cost, but Parcel 40 is the correct size. Parcel 39 and 40 are adjacent to a new HELCO cogeneration plant. These same parcels surround a municipal drinking water source and storage facility designed to supply the Kona Airport and other area users. Both power and water infrastructure are on adjacent parcels. Although a through interconnection study is beyond the scope of the EIS, it is assumed that transmission costs would be toward the lower end of the range for both power and potable water.

Each lot of record in the year 2000 is allowed 50 water units per lot. If these lots are subdivided the allotment only increases by a total of 6 water units for all of the new lots of record. One water unit is a unit of measure that roughly corresponds to the amount expected to flow through a 5/8 inch residential water meter. This amount is more than sufficient to supply the potable needs of the plant, but not the industrial needs. Seawater is not immediately available at Kalaoa. BEH may be able to drill deep wells to supply seawater; however, this may be a significant expense. Seawater derived from underground formations may not have water components to support rapid growth of microalgae. Disposal of seawater from a mauka parcel may impact downgradient water users.

The location of the Kalaoa parcels in relation to Kailua-Kona is quite similar to the NELHA site. The haul distance from Kailua-Kona to Kalaoa is 7 miles in comparison to 6.8 miles to the NELHA site.

The Kalaoa parcels are bounded on the east and north by vacant and undeveloped land. Immediately south of the industrial development is an agricultural park established by the State. The agricultural park contains a large number of 10-acre parcels that house agricultural equipment suppliers and a few other businesses. It also is used for nurseries and other single family farming activities. Queen Ka`ahumanu Highway is immediately west of the parcels as are the power plant and potable water storage facility. The water storage facility is apparently not co-located with a municipal well. The presence of threatened and endangered species will be further investigated in the DEIS; however, wildlife are not likely to be abundant on the parcels due to the harsh conditions and lack of soil or significant vegetation. The adjacent agricultural users would probably not be impacted by the facility; however adjacent land users are not likely to welcome a waste conversion facility.

Figure 4.2 Alternative DHHL Site at Kalaoa



Viewplanes between Queen Ka`ahumanu Highway and Parcel 40 are likely to be blocked at most angles by the existing power and water infrastructure. Parcel 39 has highway frontage and no existing use to provide a visual barrier. BEH waste warehouse and structures are in character, and would resemble much of the existing development on the mauka side of the highway. Landscaping may also be designed to provide visual relief for the facility. The DEIS will provide a more complete assessment of the site selection criteria for this alternative location.

4.2.2 West Hawai`i Sanitary Landfill

The West Hawai`i Sanitary Landfill (WHSL) is located in the Pu`uanahulu ahupua'a near the boundary between the North Kona District and South Kohala District of the Big Island (see Figure 4-3).

The County of Hawai`i owns the WHSL, which is operated under a contract with Waste Management of Hawai`i. The site opened in 1993 and is approximately 300 acres, of which 149 acres are permitted for landfill activities. The landfill accepts approximately 360 tons per day or 130,000 tons per year. The current life of West Hawai`i Landfill is 55 years, based on current tonnage. Waste collected by Pacific Waste is now disposed at this location. Tipping fees paid by all users are now set at $85/ton, a cost that is passed on to the consumer.

The county is currently developing the non-landfill portions of the site for recycling greenwaste, metal other essential functions. These will be transferred away from the old Kona Landfill site which has been overtaken by competing land uses. Also among the new non-landfill portions are sites set aside for disaster debris management and for alternative waste processing. Either of these areas would be suitable for the proposed action. Lease acquisition for non-county development would be through a solicitation and bid process originated by the County Department of Environmental Management.

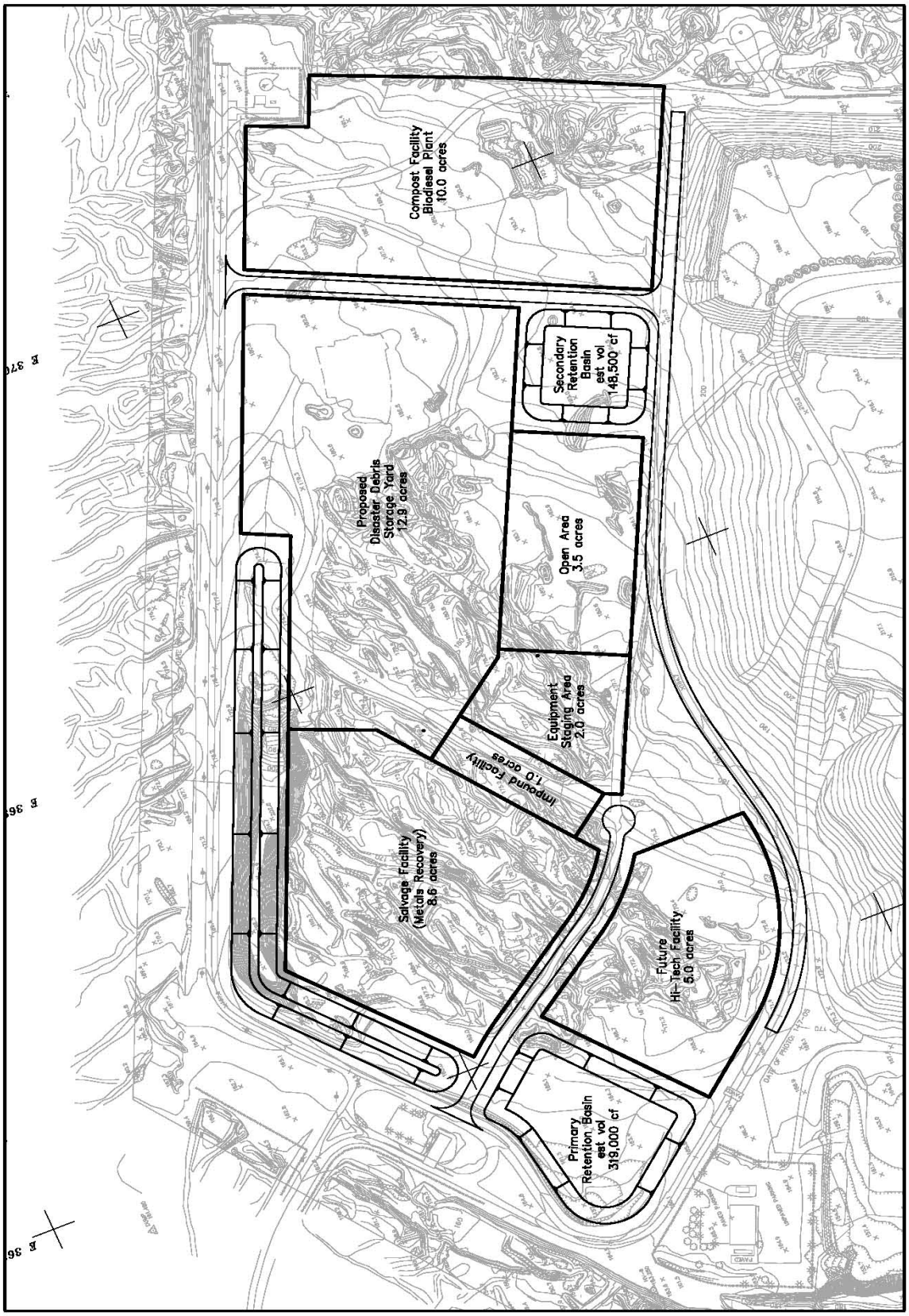
The WHSL currently has no access to potable water or seawater. Industrial water could be derived from shallow wells installed on the site. The landfill's existing fire protection system works from a brackish water well of similar design.

Electric power is available for existing uses at the landfill; however, the existing capacity is insufficient for the proposed development. Electric power would be delivered approximately one mile to the 69 Kv transmission line near the intersection of Queen Ka`ahumanu Highway and the landfill access road. A new electric sub-station would be installed at that point to support the addition of the new power source.

The WHSL is approximately 24 miles north of Kailua-Kona, the source of the majority of waste. Waste originating from Waimea has a shorter haul distance; however, the majority of waste originates in, or south of Kailua-Kona.

This site is currently used for solid waste management and is almost entirely graded. The potential for sensitive biological, historical and cultural issues associated with the site have been well documented.

Figure 4.3 Alternative WHSL Site at Pu`uanahulu



The landfill access road is sufficient to handle the additional traffic created from the proposed action.

WHSL is well shielded from view for most parts of Queen Ka`ahumanu Highway; however, some parts of the landfill development are visible from the resort development at Waikoloa. Waste Management has taken steps to shield their buildings from view by building and later expanding a large rock berm between the resort and landfill. The resort management has also complained of odor at certain times. Although there are several miles of undeveloped land between the Waikoloa and WHSL, the historical difficulties indicate that these are competing land uses that would require some level of mitigation if a new thermal conversion facility were to be developed at the site. A more detailed assessment of potential mitigation measures will be addressed in the DEIS.

4.2.3 Waimea Transfer Station

The Waimea Transfer Station (WTS) is located on County-owned land near the south-west side of the village of Waimea (Figure 4-4). The County transfer station itself is not sufficient size to house either the thermal conversion facility or any sort of algae cultivation, but it is adjacent to another closed landfill and vacant privately owned land. If the site is considered further, the availability of adjacent land would be investigated. The site does have access to potable and industrial water but no seawater.

Sufficient electrical infrastructure is located within one mile of the site, but the nearest sub-station does not have excess capacity. A new electric substation would be installed near the WTS site to accommodate power distribution.

The area is adjacent en route for a closed landfill that has occasional fires and hot spots that may represent a fire hazard to the thermal conversion facility. The Waimea area is frequented by Hawaiian Hoary Bats which are listed as federal threatened species. Hawaiian bats frequent the eucalyptus forests on the east side of Waimea but may be a consideration for the proposed action. Residential land uses are encroaching to within 500 feet of the site. These would be considered competing land uses for any solid waste management facility.

The WTS is not visible from any main roadway, but it can be seen from residential areas to the north. Access and Egress is shared by a County baseyard. Traffic studies would be required to determine whether intersection improvements would be required to accommodate additional traffic related to the proposed action. A more detailed assessment of the WTS site will be included in the DEIS.

4.3 No Action Alternative

The no action alternative is to not build any type of thermal waste conversion. The current waste management infrastructure in West Hawai`i utilizes a state of the art landfill that has sufficient capacity to last for more than 50 years at current rates. This capacity is quite long in comparison to other areas in Hawai`i.

Figure 4.4 Waimea Transfer Station Site

Landfilling is traditionally considered the least cost waste management system; however, the BEH thermal conversion facility intends to charge less than the landfill tip fee. Landfilling is also the least environmentally-friendly method of waste management. There is no incentive to recycle wastes with a large capacity landfill available; many materials that could be cost-effectively recovered in a more advanced waste-processing system are buried and lost. Landfilling also releases the most greenhouse gasses of all waste management methods. All organic wastes decompose directly into carbon dioxide, methane or volatile organic carbons that are released directly to the atmosphere.

Alternatively, large amounts of energy, capital and vacant space are lost during development of new waste processing facilities. The DEIS will discuss environmental impacts and benefits of the no action alternative in greater detail.

4.4 Decision Criteria

The DEIS will weigh the impacts and benefits of technology, location and no-action alternatives against the proposed action to form an opinion as to the merits of developing a thermal waste conversion facility at NELHA. These decision criteria will be as tabulated and discussed so that subjective elements of the assessment are identified.

Part 5: Description of the Affected Environment

5.1 Physical Environment, Water and Air Quality

5.1.1 Geography and geology

NELHA is located on the central west coast of the Big Island of Hawai`i. This location was formed by geologically-recent volcanic activity from Mount Hualalai, the third oldest shield volcano on the Island of Hawai`i. According to the US Geological Survey, Hualalai has an area of approximately 290 square miles, accounting for 7.2 percent of the island. The summit is located 8,271 feet above mean sea level (msl) and approximately 15 km southeast from Kailua-Kona (USGS, 1996). Hualalai grew above sea level more than 300,000 years ago (USGS, 1996). Post-shield volcanism began 100,000 years ago and covered the entire surface of the volcano. Shallow materials are comprised of alkaline lavas erupted during the post-shield stage of volcanism, with the surface consisting mostly of olivine basalts, but limited quantities of Trachyte (USGS, 1996).

Hualalai is classified as an active volcano, which erupted last in 1800-1801 from its northwest rift zone, sending two large flows to the ocean. The larger of the two, known as the Kapulehu flow, is composed of rough, angular fragments of A`A lava, which is several meters thick (Hawai`i Center for Volcanology, 2004). This flow formed Keahole Point, which now accommodates the project site as well as the Kona International Airport. Although Hualalai is still considered an active volcano, mapping and dating studies indicate that eruptions have been separated by centuries of inactivity (Hawai`i Center for Volcanology, 2004). Since 1971, a seismic station has been maintained about three kilometers east of the summit by the Hawaiian Volcano Observatory to monitor the volcano for signs of activity.

Hualalai experiences earthquakes, ranging to 4.0 magnitude, which stem from a deep source off the coast of the northwest rift zone and is not related to magma movement (Hawai`i Center for Volcanology, 2004). The site is located in an area of moderate seismic activity, codified as seismic hazard class 4.

The site is covered by a mixture of *a`a* and *pāhoehoe* lavas, which are described by the former Soil Conservation Service (SCS, 1972) as follows:

Lava Flows, *Pāhoehoe* (rLW) - This soil has a billowy, glassy surface that is relatively smooth. In some areas, the surface is rough and broken and there are hummocks and pressure domes. The soil has no cover and is typically bare of vegetation, except for mosses and lichens. Some flat slabs are used as facings on buildings and fireplaces.

The NRCS Land Capability Grouping, rates soil types according to their suitability for field crop cultivation, for pāhoehoe is in the classification with the lowest suitability for agricultural production.

Lava Flows, *A`A* (rLV) – This soil is rough and broken, consisting of a mass of clinkery, hard,

glassy, sharp pieces piled in tumbled heaps. There is practically no soil covering and it is typically bare of vegetation, except for mosses, lichens, ferns and a few small Ohia trees. Like pāhoehoe, a`a lava has very limited potential for agriculture.

5.1.2 Surface Water and Groundwater

Due to the high level of the soil permeability on the site and surrounding regions, surface water runoff does not occur even during the most intense rainstorms. The area has no natural gulches or other surface water features, and even Queen Ka`ahumanu Highway has no drainage structures. All rainfall that is not captured by man-made collection devices or pavements either percolates into the subsurface or evaporates. Potential impacts to surface and groundwater will be discussed in the DEIS.

Groundwater at the site is not well studied, but the area is characterized by a thin brackish water lens that floats upon saline groundwater and moves rapidly toward the ocean. Recent data from a monitoring well located approximately ½ mile south of the site indicates that the lens has a salinity of approximately 7 parts per thousand to a depth of 10 feet (Tom Nance, 2008). This water is unlikely to be useful for irrigation or industrial purposes.

5.1.3 Air Quality and Climate

The County of Hawai`i has very few sources of industrial air pollutants. Those sources in probable order of importance to the project site are Kilauea volcano, the HELCO Kona Generating Station that is mauka of the site, aircraft emissions from the Kona Airport and automobile exhaust emissions originating along Queen Ka`ahumanu Highway.

Air emissions from the volcano consist primarily of sulfur dioxide and particulate matter. Although these emissions originate over 50 miles to the east, the magnitude and the predominant northeasterly trades bring volcanic haze (VOG) to West Hawai`i on a regular basis.

The Hawai`i Department of Health consistently rates air quality in the area as acceptable despite the persistent VOG.

Kona's climate provides an international attraction for tourists because of its consistent weather patterns and mild climate. The annual average temperature range is between 65 and 85 degrees Fahrenheit. The average annual rainfall is around 25 inches, with rainfall more consistent than in the northerly islands of Hawai`i at around 2 inches per month. Tradewinds are somewhat mitigated by the mountains that lie windward of the project site, and are generally hidden beneath a diurnal convection pattern cause by differential heating of the land and sea. Potential impacts to air quality will be discussed in the DEIS.

5.1.4 Noise and Odor

The existing sources of noise at the proposed project site include:

- Kona International Airport
- Traffic along Queen Ka`ahumanu Highway,

- Natural noises such as wind, rain and large ocean waves.

The noise level measurement standard used by the FAA and State Department of Transportation is the Day-Night Sound Level (DNL). The DNL represents the noise level exposure during a typical day of the year. Standard DNL levels are 55 in rural areas, 65 in urbanized areas, and greater than 65 in densely populated or locations adjacent to highways or other high volume roadways. According to the State Department of Transportation, naturally ventilated homes and businesses are not recommended to be located in areas having DNL greater than 60. Commercial and public uses are not recommended in areas with greater than 65 DNL rating.

An aircraft noise study prepared for the O`oma Beachside Village Development by Y. Ebesu shows the project site on the noise DNL 65 noise contour. Locations closer to the end of the airport runway, including most of NELH were higher than DNL 70 (Y. Ebesu and Associates, 2008).

Odors associated with MSW will be controlled using three different methods. Best Management practices will be developed and implemented as part of the solid waste management permit.

Waste delivery will be in trucks that are required to cover their loads. Incoming waste hauling vehicles owned and operated by Pacific Waste and the County are completely enclosed. Odors on delivery vehicles are minimized by restricting air circulation within the waste. Waste that is rejected from the facility will also be hauled to the landfill in closed trucks.

The tipping floor is located inside a negative pressure building with rapid roll-up doors. As a waste vehicle approaches the rollup door is opened and subsequently closed by an electric eye switch. Once inside the building odors are controlled by ventilating the structure through an odor filter. These filters are commonly available and effective at reducing odors. Different models may have compost or diatomaceous earth as the active filter media. The tipping floor will be washed at the end of each day to minimize bacterial degradation and resultant odors within the facility. No waste will be stored outdoors.

Gasses generated by thermal conversion processes will be scrubbed and captured for use by algae. The filter media from scrubbers captures volatile organic carbons that create the majority of odors. Standard Air pollution control equipment will reduce emissions to levels beneath the limits set by the clean air act.

A thorough assessment of both noise and odors will be prepared for the DEIS.

5.2 Biological Environment

The DEIS will include site survey data and detailed descriptions of the flora and fauna of the area.

5.2.1 Vegetation

Vegetation in the area is quite hardy and may be classified as to its proximity to the shoreline. Shoreline strand areas have sandy soil, grasses and shrubs. The proposed site and all alternatives are removed from the strand and can be characterized as upland areas.

Upland areas, consisting of lava rock substrate, has sparse to nearly continuous vegetation comprised primarily of scattered bunch grasses, specifically fountain grass (*Pennisetum setaceum*), *pili* grass (*Heteropogon contortus*) and Natal red-top grass (*Rhynchelytrum repens*). Low shrubs and herbs may also be identified. *Plectranthus parviflorus is commonly* present in cave underhangs. Vegetation at the NELHA and Kalaoa sites is quite similar. There may be a few widely scattered trees, including the alien *koa haole* (*Leucaena leucocephala*), or the native *naio* (*Myoporum sandwicense*).

The Waimea site, although dry, has some soil development and supports native and alien grasses, shrubs and trees. The latter is principally Koa haole and Kiawe. There are no known endangered plants at the proposed and alternative sites. A thorough botanical survey is underway and will be reported in the DEIS.

5.2.2 Fauna

The DEIS will contain a faunal survey of the proposed property as well as descriptions of the alternative sites.

In a recent survey of the O`oma Beachside village, which adjoins the south boundary of the NELHA property, only two feral mammal species were identified (PBR Hawai`i, 2009). The Small Indian Mongoose (*Herpestes auropunctatus*) and the feral cat (*Felis catus*), were observed. Other mammals that may be found in the vicinity include feral goats (*Capra hircus*). Upland areas including Waimea Transfer Station may also have feral pigs, and the Hawaiian Hoary Bat as an occasional visitor.

According to the PBR Hawai`i report, avifauna common to the area include four species of common migratory birds, the Pacific Golden-Plover or Kölea (*Pluvialis fulva*), Wandering Tattler or U`lili (*Heteroscelus incanus*), Ruddy Turnstone or Akekeke (*Arenaria interpres*) and Sanderling or Hunakai (*Calidris alba*). Most of the avifauna are more commonly observed along the shoreline strand than in upland lava habitats. There are no known endangered animals at the proposed or alternative sites. A thorough faunal assessment is underway and will be discussed in the DEIS.

5.3 Socioeconomic and Cultural Environment

5.3.1 Public Views and Viewplanes

The property is currently vacant, with sparse vegetation, and few distinguishing features. It can be characterized as a mix of recent pāhoehoe and a`a lava originating approximately 20 miles to the east on Hualalai and ending in the vicinity of Keahole Point. The land slopes irregularly toward the west from Queen Ka`ahumanu Highway toward the shoreline. Bunch grasses growing from fissures in the rock are primarily yellow or brown. The shoreline is obstructed at most angles by the Kona Airport of the Natural Energy Laboratory development.
Mauka of the highway views are of the flanks of Hualalai with agricultural development slightly north of the site and residential development slightly to the south.

The waste conversion structures will be warehouse-type buildings similar to those now present in the water plants that are closest to the proposed location. The maximum elevation of buildings and appurtenances will be approximately 39 feet above ground level. Figure 5-1 and 5-2 show architectural renderings of the viewplane and surroundings.

A thorough assessment of the potential impacts of the proposed action on public viewplanes will be discussed in the DEIS.

Figure 5-1: Aerial view of the facility from above Queen Ka`ahumanu Highway

Figure 5-2: Close-up aerial view

5.3.2 Historical and Archaeological Resources

As part of the due diligence process, BioEnergy Hawai`i had a preliminary archaeological reconnaissance completed by Rechtman Consulting, LLC. One archaeological feature had been previously identified at the proposed site as documented in the records of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD). The location of that feature, a rock cairn, was confirmed during the recent reconnaissance. Rechtman Consulting, LLC also identified and mapped several additional archaeological features at the proposed site. These include:

- 4 rock cairns (or *Ahu*) (in addition to the ones previously documented),
- 3 lava tubes that may have had human occupation in the past,
- 1 rock shelter
- 4 pāhoehoe excavations,
- 1 site of collected pāhoehoe slabs on bedrock, and
- 2 sites each with a water-worn cobble.

During the EIS process, all archaeological features will be evaluated as part of an updated archaeological inventory survey, and treated in accordance with the standards and policies of DLNR-SHPD. To date, no evidence of human burials has been encountered; however, if burial sites are discovered as a result of the updated inventory survey, a burial treatment plan will be prepared in consultation with DLNR-SHPD, the Hawai`i Island Burial Council, and any identified descendants. If burials are inadvertently encountered during subsequent development or construction activities, such finds will be reported to DLNR-SHPD and the procedures outlined in HAR 13§13-300-40 will be followed.

5.3.3 Cultural Uses and Traditional Practices

Potential impacts on cultural values and traditional practices will be assessed as part of the DEIS. Rechtman Consulting has been retained to perform a limited Cultural Impact Assessment (CIA). The scope of work for the CIA includes background research and study of previous relevant reports and maps; all archaeological fieldwork necessary to provide an update on the resources present within the proposed development area; consultation with organizations and individuals knowledgeable about the proposed development area; preparation of reports sufficient for obtaining both state and county approvals; attendance and presentation at public hearings; and coordination with DLNR-SHPD, the County of Hawai`i, and other stakeholders.

5.3.4 Traffic and Transportation

Queen Ka`ahumanu Highway is a State highway that runs approximately ¼ mile to the east of the proposed project site. The Highway is currently being expanded to a four lane highway in two phases. Phase I of the expansion, from Henry Street to Kealakehe Parkway, is complete, and Phase II of the expansion from Kealakehe Parkway to Keahole Airport, has begun.

Access to the proposed project site will be through a new westerly extension of Ka`imi`nani Road. The existing 3-way intersection will be converted to a 4-way intersection. The Ka`imi`nani extension may connect to a North-South internal NELHA roadway now called

Secondary Road-B. B-Road may also be extended to connect the NELHA access Road to the Kona Airport Access Road. This would provide a more direct route for producers within NELHA to obtain goods and deliver products to the Airport. Figure 5-3 shows the proposed roadway configuration upon completion of the project.

Approximately 10 waste collection vehicles (WCVs) per hour would be expected to arrive at the facility at full utilization. WHVs will use the Ka`imi`nani Road extension for access and egress.

A Traffic Impact Assessment Report (TIAR) will be prepared by Philip Rowell and Associates for the DEIS. The TIAR will include an analysis of traffic counts for existing, ambient, and future conditions associated with the proposed development. Level of Service (LOS), circulation patterns and mitigation measures (if necessary) will be addressed in the TIAR. In addition to the standard TIAR, BEH will coordinate efforts to complete the Ka`imi`nani extension and connection of secondary Road B with the Hawaii State and County Traffic authorities.

5.3.5 Adjacent Land Use

The proposed location for the BEH facility is located in the middle of currently undeveloped State Land within the NELHA lease. There are no existing developments in close proximity. Queen Ka`ahumanu Highway and the farm lots mauka of the highway at Ka`imi`nani Road are approximately 0.25 miles east of the project site at the closest point. Koyo Water is approximately 0.2 miles south of the southern boundary along Secondary Road –B. Airport rental car facilities are approximately 0.6 miles to the north. Commuter facilities at the airport are approximately 0.2 miles to the west.

A 75-acre parcel reserved for the Gateway Ocean Center is the closest NELHA reserved area. The Ka`imi`nani Road extension passes through the proposed Gateway Center and adjoins the east end of the BEH property. The Gateway Ocean Center is envisioned as a future area reserved for distributed energy resources (DER), ocean sciences, and outreach according to the NELHA website (www.nelha.org). Precise information on the potential types of DER and other activities within the Gateway Center has not been determined at the time of this EISPN. Potential impacts to adjacent land-users will be among the primary focuses of the DEIS.

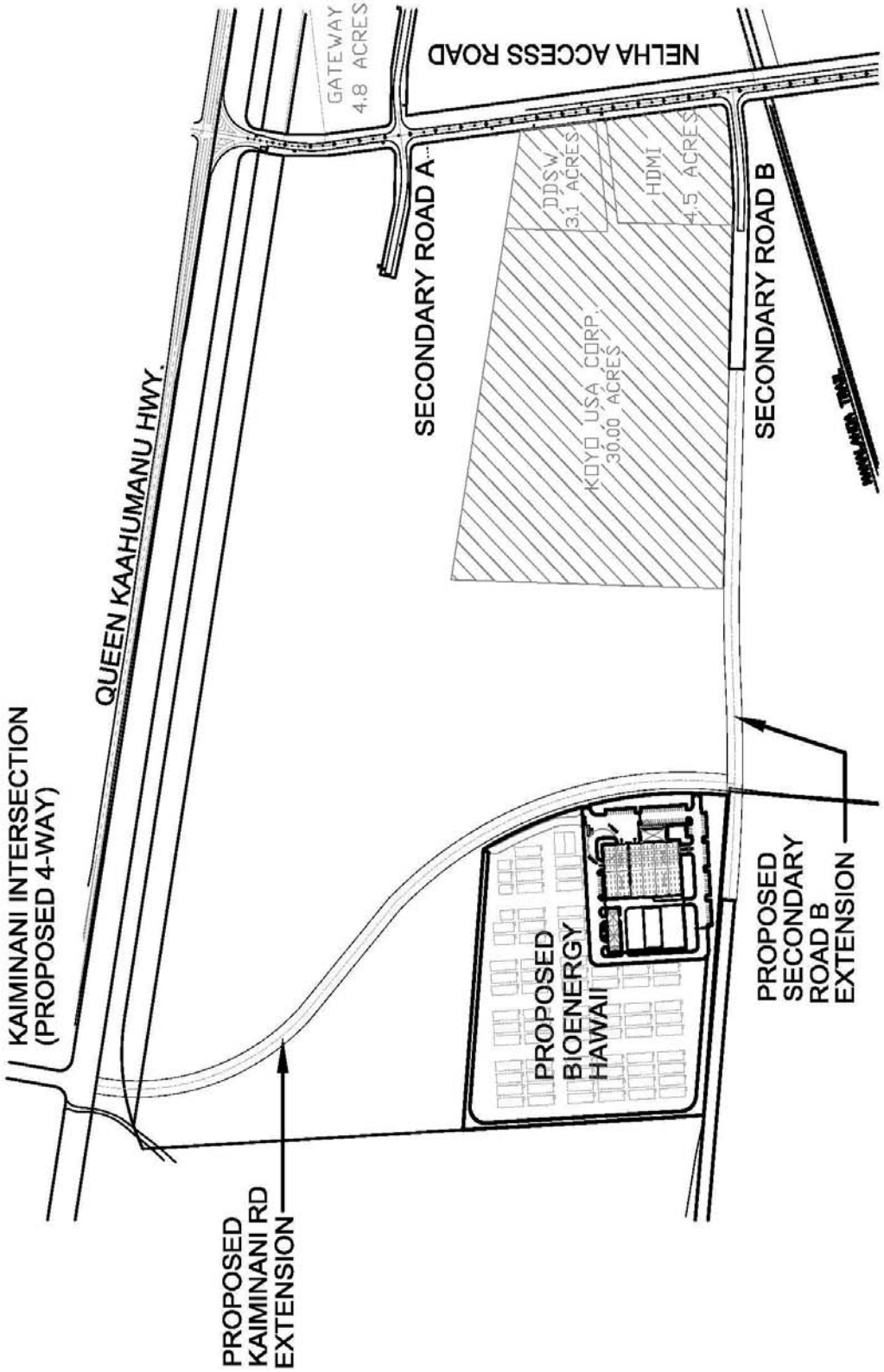
5.3.6 Demographics and Socioeconomic Conditions

The 2010 Census data is expected to be published before publication of the DEIS. For this reason minimal census data is included in the EISPN.

As of the US Census of 2000, there were 6,794 people, 2,402 households, and 1,724 families residing in the CDP. The population density was 172.1 people per square mile (66.4/km²). There were 2,541 housing units at an average density of 64.4/sq mi (24.9/km²). The racial makeup of the CDP was 49.34% White, 0.35% African American, 0.52% Native American, 13.39% Asian, 10.35% Pacific Islander, 0.78% from other races, and 25.27% from two or more races. Hispanics or Latinos of any race were 5.95% of the population.

There were 2,402 households out of which 34.6% had children under the age of 18 living with them, 57.8% were married couples living together, 9.7% had a female householder with no husband present, and 28.2% were non-families. 19.4% of all households were made up of

Figure 5.3 Traffic Map



individuals and 3.7% had someone living alone who was 65 years of age or older. The average household size was 2.83 and the average family size was 3.19.

In the CDP the population was spread out with 25.5% under the age of 18, 6.8% from 18 to 24, 29.5% from 25 to 44, 29.3% from 45 to 64, and 8.9% who were 65 years of age or older. The median age was 39 years. For every 100 females there were 102.5 males. For every 100 females age 18 and over, there were 101.2 males.

The median income for a household in the CDP was $53,024, and the median income for a family was $56,461. Males had a median income of $35,082 versus $27,130 for females. The per capita income for the CDP was $24,179. About 3.0% of families and 6.2% of the population were below the poverty line, including 7.2% of those under age 18 and 5.1% of those 65 or over.

5.3.7 Aviation

The proposed BEH facility will be located ½ mile east of the active runway at the Kona International Airport. This location is within the airport control zone and must not be a hazard to aircraft operations.

CFR Title 14 Part 77.13 states that any person/organization who intends to sponsor any of the following construction or alterations must notify the Administrator of the FAA:

- any construction or alteration exceeding 200 ft above ground level
- any construction or alteration:
    - within 20,000 ft of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with at least one runway more than 3,200 ft
    - within 10,000 ft of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 ft
    - within 5,000 ft of a public use heliport which exceeds a 25:1 surface
- any highway, railroad or other traverse way whose prescribed adjusted height would exceed the above noted standards
- when requested by the FAA
- any construction or alteration located on a public use airport or heliport regardless of height or location.

The appropriate notifications have been submitted to the FAA for review. It does not appear that the proposed construction will represent a hazard to aircraft operations; however, clearance from the FAA will be obtained.

5.3.8 Public Facilities and Services

The probable impact of the proposed action on public facilities and services will be addressed in the DEIS. Many of these potential impacts are addressed in other sections of the DEIS, but those not considered elsewhere will be discussed herein including, but not limited to:

- Wastewater treatment capacity,
- Potable water demand,
- NELHA seawater demand,
- Access to parks and recreational areas,
- Electric power demand, and
- Communications.

5.3.9 Employment

The facility will employ a total of twenty-seven (27) full-time employees. The employees will consist of the following:

- Plant Manager (1)
- Technical Manager (1)
- Controller (1)
- Office personnel (3)
- Control Room Operator (3)
- Power Generation Plant personnel (3)
- Waste Processing Facility Operators (Waste Processing) (3)
- Skilled Mechanics for both Power Generation and Waste Processing Facilities (4)
- Instrument Technicians (2)
- General Labor and Maintenance (6)

BEH will give hiring preference to local labor and management personnel. Additional labor and management requirements will be needed for algae production. At full scale the employment for the algae production may exceed the requirements for waste management.

Part 6: ENVIRONMENTAL CONSEQUENCES

The EISPN is being prepared to initiate the public and agency review of the proposed action through preparation of an EIS. The EIS document will provide an in-depth study that will analyze the direct, secondary and cumulative effects of the proposed waste conversion facility on the environment. The EIS will assess the potential significance of these effects and where necessary, provide mitigation measures to prevent or reduce the project's negative effects.

The EIS must consider every phase of a proposed action, the expected primary and secondary consequences, and the cumulative as well as the short and long-term effects of the action. The findings of the document and reasons supporting the determination comprise an analysis of the project vis-a-vis the significance criteria. In most cases, an agency determines that an action may have a significant impact on the environment if it meets any of the following criteria:

(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 and guidelines 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 upon 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 viewplanes identified in county or state plans or studies; or,
(13) Requires substantial energy consumption.

6.1 Direct Effects

The DEIS will provide a thorough assessment of the direct effects of the proposed action and alternatives on the physical environment of the region including soil, water and air quality of the region. Air quality will be further addressed within the Clean Air Act Permit being prepared simultaneously with the EIS. An assessment of the biological environment will be included and be based on field surveys by Geometrician Associates of Hilo, Hawai`i. The analysis of direct and indirect impacts of the proposed action on the socioeconomic and cultural environment will be supported by a cultural impact assessment by Rechtman Consulting, Inc of Hilo, Hawai`i. Traffic, noise and other direct impacts to the quality of life for tenants of NELHA and the general public will also be included in the DEIS.

6.2 Secondary and Cumulative Effects

A secondary impact or secondary effect may also be called an indirect impact or indirect effect. The term categorizes effects that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

A cumulative impact is one which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The DEIS will address potential secondary and cumulative impacts.

Part 7: Summary of Potential Impacts and Mitigation Measures

The DEIS will identify and summarize positive as well as negative, secondary and cumulative impacts. It will describe proposed mitigation measures, as necessary to reduce the impacts of the proposed action on the environment and quality of life resulting from the proposed action. Mitigation measures will directly address the corresponding impact. Best management practices will be described and employed whenever possible.

Part 7 of the DEIS will address:

- Direct impacts associated with the proposed action and alternatives,
- Secondary, indirect, and cumulative impacts proposed action and alternatives,
- Irretrievable commitment of resources,
- Short-term use vs. long-term productivity,
- Consistency with government plans and policies,
- Status of permits, variances and approvals,
- Unresolved issues, and
- Conclusions.

Part 8: Consulted parties, public participants and contributors

8.1 List of Preparers

This EISPN has been prepared by North Shore Consultants, LLC. David Robichaux, Project Manager, and Ronald Soroos, Technical Editor, are primarily responsible for its content. Invaluable assistance has been obtained from regulatory and technical experts as follows:

Joshua B.Y. Strickler, Esq., P.E. Hawai`i DBEDT as Accepting Authority
Bob Rechtman, Rechtman Consulting for archeological, historical and cultural impacts
Ron Terry Geometrician Associates for flora and fauna
Jim Leach, Dana Technologies for engineering and emissions data
Fred Peyer, EnvironMETeo Services, Inc. for air quality considerations,
Philip Rowell, Philip Rowell and Associates for traffic considerations

8.2 List of Agencies and Organizations and other Consulted Parties

Parties consulted during preparation of the EISPN represent a small subset of those who will be involved in the preparation of the DEIS. Agencies and individuals consulted to this point include:

Federal Agencies

EPA
FAA
DOE

State of Hawaii:

NELHA Board of Directors
Dept. of Budget and Finance
DOH- Clean Water Branch
DOH Environmental Planning Office
DOH Office of Environmental Quality Control
DOH –Solid Waste Management Office
DOH- Office of Planning
DOH - Clean Air Branch
DEBDT – Office of Planning
DBEDT - Energy
DLNR - Director
DLNR- Land Management Division
DLNR- Forestry and Wildlife
DLNR – SHPD
DOT- Highways Division
DOA - Plant Quarantine Branch
UH Environmental Center

County of Hawaii

Office of the Mayor
Department of Environmental Management
Department of Planning
Department of Water Supply
Dept. of Public Works
Chair County Council

Interested Parties

Kona Community Association
Kona Coast Resort Association
Big Island Burial Council
NELHA Tenants
West Hawaii Today

Part 9: Bibliography

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