DRAFT

Environmental Impact Statement (DEIS)
H-POWER Expansion Project
Kapolei, Oahu, Hawaii

Submitted to: Department of Environmental Services
City and County of Honolulu
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ACRONYMS AND ABBREVIATIONS

APC	Air Pollution Control
APE	Area of Potential Effect
BACT	Best Available Control Technology
BAMRS	Bottom Ash Metal Recovery System
Bgs	below ground surface
CHRRV	Covanta Honolulu Resource Recovery Venture
CO	Carbon Monoxide
CRM	Cultural Resource Management
CSP	Covered Source Permit
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
CZMP	Coastal Zone Management Program
DLNR	Department of Land and Natural Resources
DOH	Department of Health
DP	Development Plan
DPP	Department of Planning and Permitting
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EfW	Energy from Waste
ERC	Environmental Report Card
Expansion	H-POWER Expansion Project
FAA	Federal Aviation Administration
FBC	Fluidized Bed Combustion
FEMA	Federal Emergency Management Area
FIRM	Flood Insurance Rate Map
GCP	Good Combustion Practices
GHG	Greenhouse Gas
GO	General Obligation
HAR	Hawaii Administrative Rules
HAPs	Hazardous Air Pollutants
HCl	Hydrogen Chloride
HDOH	Hawaii Department of Health
HECO	Hawaii Electric Company
HELCO	Hawaii Electric Light Company
HES	Hawaii Energy Strategy
HIOSH	Hawaii Division of Occupational Safety and Health (HIOSH)
HNL	Honolulu International Airport
H-POWER	Honolulu Program of Waste Energy Recovery
HRS	Hawaii Revised Statutes
IGR	Internal Gas Recirculation
ISWMP	Integrated Solid Waste Management Plan
JCIP	James Campbell Industrial Park
LOS	Level of Services
LUO	Land Use Ordinance
MACT	Maximum Achievable Control Technology
MBT	Mechanical-Biological-Treatment
MCR	Maximum Continuous Rating
MECO	Maui Electric Company

ACRONYMS AND ABBREVIATIONS CONTINUED

MSW	Municipal Solid Waste
MWC	Municipal Waste Combustor
n/a	not applicable
NAAQS	National Ambient Air Quality Standards
NEL	Noise Exposure Levels
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NSR	New Source Review
NWS	National Weather Services
OECD	Organization for Economic Cooperation and Development
OEQC	Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
OSHA	Occupational Safety and Health Administration
OSWM	Office of Solid Waste Management
PCPI	Per Capita Personal Income
PCSI	Pacific Consultant Services Inc.
PSD	Prevention of Significant Deterioration
PTWC	Pacific Tsunami Warning Center
RDF	Refused Derived Fuel
RPS	Renewable Portfolio Standard
SAAQS	State Ambient Air Quality Standards
SDA	Spray Dryer Absorber
SHPD	State Historic Preservation Division
SIA	Significant Impact Area
SIL	Significant Impact Level
SMA	Special Management Area
SNCR	Selective Non-catalytic Reduction
SO_2	Sulfur Dioxide
SOW	Scope of Work
SSC	Submerged Scrapper Conveyor
SWPCP	Storm Water Pollution Control Plan
TLV	Time Limited Value
TPD	Tons Per Day
TPY	Tons Per Year
TPI	Total Personal Income
TSP	Total Suspended Particulates
TWA	Time Weighted Average
UBC	Uniform Building Code
UIC	Underground Injection Control
USBEA	United States Bureau of Economic Analysis
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VLN™	Very Low NO_x

EXECUTIVE SUMMARY

The City and County of Honolulu (City) and Covanta Honolulu Resource Recovery Venture (CHRRV) are proposing an Expansion of the existing Honolulu Program of Waste Energy Recovery facility (H-POWER or the Facility) located at the James Campbell Industrial Park (JCIP) in Kapolei (Expansion Project). H-POWER has been in operation for over 18 years, providing a reliable, cost effective solid waste solution and source of renewable electric power to the City and County of Honolulu. Over that time period, H-POWER has converted over 10 million tons of refuse into over 5,000 million kilowatt-hours of electric power and saved the importation of over 10 million barrels of oil.

The proposed Expansion consists of the addition to the Facility of a third combustor unit. The new unit will be a 900 ton per day (TPD) Mass Burn waterwall municipal waste combustor (MWC), its associated air pollution control equipment, and all the equipment required to tie the addition into the existing H-POWER facility. It includes modifications and additions to the existing waste feed, ash handling and other utility systems necessary for the new equipment, and a new turbine generator which will provide an additional source of renewable energy to the City and County of Honolulu. The Expansion does not include any changes to the two existing Refuse Derived Fuel (RDF) combustors.

The Expansion is needed to address the solid waste disposal needs of the island of O‘ahu by increasing the disposal capacity from 610,000 tons to 910,000 tons of Municipal Solid Waste (MSW) per year. As a result of the additional waste disposal capacity, the City will benefit from increased energy production and recovered metals recycling and reductions in the landfilling of municipal solid waste in Honolulu. While the Expansion and increased recycling will not eliminate the need for landfill disposal of MSW, it will extend the life of the Waimanalo Gulch Sanitary Landfill and reduce the capacity needs of landfills yet to be developed.

The Expansion Project will fully comply with federal, state and local permits and programs designed for the protection and stewardship of Hawaii’s environmental resources. Following the completion of the permitting process, construction is expected to commence in the second half of 2009 with commercial operation planned for the second half of 2012.

ES-1.0 DESCRIPTION OF PROPOSED ACTION

The following sections provide a discussion of the objectives, nature and extent of the Expansion, including a description of proposed facility operations and components.

ES-1.1 MSW Receiving, Storage and Processing

The existing MSW receiving and storage areas will not be impacted by the proposed Expansion Project. The existing MSW storage area can hold approximately three days of MSW. A completely separate tipping floor and refuse pit for the Expansion facility is proposed. MSW processing activities at the Facility will also not be altered by the proposed Expansion. MSW will continue to be shredded and sorted using the existing systems to supply the two existing units (Unit 1 and Unit 2) with RDF. The Expansion (Unit 3) is proposed to be a Mass Burn facility greatly reducing the processes performed on the MSW prior to combustion. The existing RDF storage area and the refuse pit for the Expansion will allow for three days of storage.

ES-1.2 Combustion Process

In order to deliver the MSW to the new combustor, a new tipping floor and refuse pit will be constructed. From the refuse pit, all refuse will be transferred by overhead crane to the feed hopper and feed chute of the waterwall furnace. Refuse will be metered out onto the surface of the Martin stoker from the bottom of the feed chute by hydraulic feed rams. In the furnace, a ram type volumetric feeder will move the waste onto the stoker grate. Above the grate and integrated with the waterwall furnace will be the steam boiler, designed specifically for solid waste combustion.

The proprietary reverse-reciprocating action of the stoker grate agitates the fuel bed continuously in a manner which causes refuse burning from the bottom of the refuse bed, resulting in a burnout of better than 98 percent of all combustible matter. Unlike conventional stoker designs, the moving grate bars will push upward at 30 to 50 strokes per hour against the natural gravitational downward movement of the refuse. This stoker action will agitate the burning refuse to form an even depth of fuel bed. Burning refuse will be pushed back underneath the freshly fed refuse to achieve continuous drying, volatilization, ignition, and combustion.

This series of equipment is designed to extract enough heat to generate the desired steam rate while keeping the flue gas temperature in a range that is appropriate for long-term operation. The system is also designed to maintain combustion temperatures of 1,800 F for two seconds. The boiler design will incorporate state-of-the-art features including combustion air distribution and control, location and sizing of heating surfaces and appropriate cleaning methods during operations.

ES-1.3 Air Pollution Control

The Expansion is designed to include state-of-the-art pollution control equipment. Flue gas from the combustion of MSW will be processed by five different post combustion air pollution control processes.

The sequence of control systems includes:

- Very Low NOx (VLN)™ system, good combustion control and furnace operating practices to control carbon monoxide (CO), nitrogen oxides (NOx), and dioxin/furan formation;
- Selective non-catalytic reduction system (SNCR) for NOx control;
- Powdered activated carbon injection for control of mercury;
- Semi-dry alkaline (lime) scrubber to control sulfur dioxide (SO_2), sulfuric acid mist, MWC acid gases (SO_2 and hydrogen chloride (HCl)), fluorides, as Hydrogen Fluoride; and

- Fabric filter to control particulate matter (total suspended particulates, particulate matter 10 microns or less (PM10), and particulate matter of 2.5 microns or less)) and particulate bound-SO_2, metals, sulfuric acid, fluorides, and MWC acid gases and organics.

The air pollution control processes for the new Unit will require use and storage of ammonia. Aqueous ammonia will be stored in a new tank (sufficient to hold a minimum of seven days of supply at normal consumption rate), to be located within a concrete containment to control spills. A truck unloading pad sized to hold the volume of the delivery truck will also be provided.

ES-1.4 Ash Handling

There are two internal ash streams generated through the combustion of MSW: bottom ash and fly ash. The stoker will be furnished with a proprietary Martin ash discharger, which will receive the burned-out material as it falls over the clinker roller and cool it in a quench bath. A hydraulically driven ram will push the ash up an inclined draining/drying chute. In the chute, excess water from the ash will drain back into the quench bath.

Bottom ash containing enough moisture to prevent dusting (15 to 25 percent by weight), will then fall to a vibrating conveyor. The conveyor will feed the ash to a grizzly scalper to remove large materials from the ash before it is transferred by an enclosed inclined belt conveyor to the ash loadout building. A feed conveyor will direct the ash from the trommel to a magnetic drum which separates the ferrous metal from the ash. The ash is then discharged onto a spreader feeder and past an eddy current separator to remove non-ferrous material.

The fly ash handling system will collect fly ash from the second/third pass hoppers, the superheater hoppers, the economizer hoppers, and the air pollution control systems. It will then be combined with the bottom ash in the ash loadout building. Ash will be conveyed to the fly ash silo, situated next to the ash loadout building. It will then be conveyed to a pugmill for wetting and combined with the bottom ash in the ash loadout building as it is loaded into the trailers.

ES-1.5 Energy Production

The high pressure, superheated steam generated in the new boiler will be supplied via the main steam piping header to a new turbine generator, where electricity will be produced for delivery to Hawaii Electric Company (HECO) and for in-house use.

Based on operating data from 2001-2006, the current annual average net electrical production (exported) is approximately 313 million kWh and comprises a significant portion of HECO’s and Honolulu’s renewable energy portfolio. According to HECO (2008) [Website; Renewable Energy for Our Customers], the renewable electricity generated by H-POWER comprised 32% of the total renewable energy portfolio in 2007. The Expansion will yield an approximate 50% increase for a new total of approximately 520 million kWh net electrical production, and the Expansion will help Hawaii meet the state’s planned goals for increased production of renewable energy.

ES-1.6 Materials Recovery/Recycling

The Facility has two different process steps to recover ferrous metal and non-ferrous components and to enable recycling. The first step metals are separated from the ash after combustion via a magnetic drum which separates the ferrous metal from the ash. This system is designed for a greater than 80 percent recovery of ferrous metal. In the second step, the ash is then discharged onto a spreader feeder and past an eddy current separator to remove non-ferrous material. Increased output is anticipated due to the increased processing and combustion of MSW and the reductions in landfilling of waste.

ES-1.7 Temporary Construction Elements

Temporary construction, vehicle parking, and equipment laydown areas will be required during the Expansion Project. Parking will be in an area owned by the City that is adjacent to the facility but separate from plant personnel parking. It will have a separate entrance and exit. The area will have a vehicle capacity of approximately 150 vehicles and security provisions. This area will also be used for materials storage, construction activity, staging and fabrication work. Construction vehicle and equipment movement between the facility and this temporary storage site will require the existing process steam line between AES and the Chevron refinery to be modified. Construction is anticipated over a 34-month period with the peak construction months projected to occur at month 13 with the highest truck deliveries (240 truck trips, 90 personnel) and month 22 with the highest personnel trips (165 personnel, 120 truck deliveries).

ES-2.0 SIGNIFICANT BENEFICIAL AND ADVERSE IMPACTS

The Expansion is proposed to be co-located at the H-POWER site to minimize potential impact to the natural environment that might otherwise result from selection of an alternative site. By selecting the H-POWER site, the Expansion will utilize many of the existing facilities. The parcels selected for temporary use during construction have previously been disturbed, are adjacent to H-POWER, and are currently owned by the City and County of Honolulu.

The following is a brief summary of the potential impacts to the natural environment:

- Geology and Soils – Impacts, both temporary and permanent, are to previously disturbed areas.
- Climate and Air Quality – Emissions will result, but the Expansion will be in compliance with applicable regulatory standards that consider potential cumulative effects and will utilize air pollution control equipment to mitigate potential impacts.
- Groundwater Resources/Hydrology – Additional water use and re-injection of cooling waters will be required, existing permit thresholds will be modified, and existing infrastructure will be utilized.
- Biological Resources – Existing resources will be safeguarded and will be buffered during the temporary construction period. Biologists will be on-call should the potential for impact to even transient, protected species arise.

The following is a brief summary of the potential impacts to the human environment:

- Archaeology, Historic, and Cultural Resources – No impacts are anticipated. Mitigation is proposed should resources be encountered.

- Roadways and Traffic – Temporary impacts are expected as well as a minor impact from operational levels. However no significant permanent impacts to roadway levels-of-service are projected.

- Noise – Temporary and permanent noise impacts are projected, but no significant impacts are estimated due to the existing industrial nature of the site and its surroundings.

- Visual Resources – There will be the temporary presence of construction equipment, but viewsheds from potentially sensitive areas are estimated to experience minimal permanent visual impacts.

- Socioeconomics – It is estimated that there will be a temporary boost to the area economy during construction, but not enough to impact schools, housing, or cause other cumulative effects. The permanent increase of employment will be small in the overall economy and negligible with respect to potential impacts.

- Solid Waste – Substantial improvement in the City and County of Honolulu's ability to dispose of solid waste while minimizing landfill disposal is anticipated. The Expansion will reduce the impact of landfill disposal of MSW.

- Energy – There will be an increased supply and reliability of a renewable source of electricity.

- Human Health – Emissions will result, but the Expansion will be in compliance with applicable regulatory standards and will utilize air pollution control equipment to mitigate potential impacts.

ES-3.0 PROPOSED MITIGATION MEASURES

The vast majority of potential impacts can and will be fully mitigated. This will be accomplished through the use of proper planning (avoidance or minimization in design stages), construction mitigation, and compliance with the rules and regulatory policies that are in place to govern such impacts and to ensure protection of the natural and human environment. The proposed mitigation measures identified for the natural environment include:

- Geology and Soils – Both the H-POWER site and the proposed construction laydown area were selected in part because it has been previously disturbed, thus minimizing impact to soils and geology. Construction laydown was planned to avoid areas with potentially "intact" sinkhole characteristics.

- Climate and Air Quality – The Expansion will be in compliance with applicable regulatory standards that consider potential cumulative effects and will utilize air pollution control equipment to mitigate potential impacts.

- Groundwater Resources/Hydrology – Additional water supply and discharge demands will be in compliance by modifying existing permit thresholds and the required additional water will be able to utilize existing infrastructure.

- Biological Resources – Existing resources will be safeguarded and will be buffered during the temporary construction period. Furthermore, biologists will be on-call should the potential for impact to even transient, protected species arise.

The proposed mitigation measures identified for the human environment include:

- Archaeology, Historic, and Cultural Resources – No impacts are anticipated, but monitors will be on-call should areas of resource potential be identified. Applicable regulatory guidelines will be adhered to in the event resources are encountered.
- Roadways and Traffic – A variety of construction mitigation measures are currently under consideration including worker car-pooling, temporary traffic control officers during construction, worker shuttles from remote locations and construction shift adjustments.
- Visual Resources – The facility design ensures that new structures are no higher than current structures and the building façades will be designed to blend with the existing H-POWER facility materials, color, and so as to minimize perceptible changes in views of the facility.
- Human Health – Emissions will result, but the Expansion will be in compliance with appropriate regulatory standards and will utilize air pollution control equipment to mitigate potential impacts.

ES-4.0 ALTERNATIVES CONSIDERED

Alternatives to the proposed project were evaluated by comparing them to the criteria or requirements the City established in procurements related to its waste management system. The criteria and requirements are summarized in the alternatives discussion in this EIS and are detailed in Appendix F. In addition to the appendix material, the analysis relied on extensive evaluations of alternative technologies completed by the City of New York[1] and Los Angeles County[2].

The following alternatives to the proposed project were evaluated:

- No Project – H–POWER Unit #3 would not be built, with no alternative technology available.

[1] Evaluation of New and Emerging Solid Waste Management Technologies, September 2004, New York City Economic Development Corporation and New York City Department of Sanitation
[2] Los Angeles County Conversion Technology Evaluation Report, Phase II, October 2007.

- Delayed Project – The action on H–POWER Unit #3 would be delayed. The Delayed Project and No Action alternatives have the same effect, and the Delayed Project action could increase the cost of the Expansion.

- Transshipment – O‘ahu’s MSW would be baled and transported to a mainland landfill for disposal. Even with this alternative, not all MSW can be transshipped.

- Alternative Technologies – Technologies other than H–POWER Unit #3 that could reduce the amount of material requiring disposal and generate electricity or another beneficial reuse product would be used. Alternative technologies that were considered include:

    1. Thermal and non-thermal technologies; and

    2. Enhanced recycling.

ES-4.1 No Project/Delayed Project Alternative

Under this alternative, Unit #3 of H–POWER would not be constructed or construction would be delayed. The existing plant could continue to operate providing energy recovery, recycling and disposal reduction.

Under this alternative, the City would continue to send the MSW that would be converted to energy at H–POWER Unit #3 to the Waimanalo Gulch Sanitary Landfill. The landfill currently receives ash, RDF processing residue, and non-processibles waste from H–POWER. It is also the disposal site for MSW that exceeds the capacity at H–POWER.

The environmental benefits of the Expansion do not occur with the *No Project* alternative and are postponed with the *Delayed Project* alternative. The positive energy impacts are also not realized or delayed. There are likely increases in cost of the project with the *Delayed Project* alternative. Taken together, the negative impacts of not building the project or delaying it are greater than building the project.

The disadvantages to the No Project Alternative and use of the Waimanalo Gulch Sanitary Landfill rather than expanding H–POWER are that doing so is wasting land resources. It also precludes the benefit of the energy generation and fuel conservation by using H–POWER rather than importing oil to produce the electricity. The Expansion of H–POWER reduces disposal thereby reducing the traffic to the landfill, which relieves traffic on Farrington Highway.

Reducing landfill disposal is one of the goals of the project. Continued use of the Waimanalo Gulch Sanitary Landfill to dispose of the 900 TPD of MSW that the H-POWER Expansion would treat does not accomplish that goal.

ES-4.2 Transshipment

The transshipment of waste would involve securely shrink wrapping the MSW, shipping it to the mainland, and disposing of it at a mainland landfill. On January 22, 2008 the City advised potential bidders that it would entertain proposals for transshipping waste as an interim measure for several years before the proposed Expansion is completed. The City received three offers.[3] The companies proposed sending O'ahu's waste to the Roosevelt Sanitary Landfill in Washington State or to a landfill in Idaho.

The vendors will have to comply with requirements for the handling and storage established by the federal government, with state regulations for handling and processing the MSW, and with local land use permitting requirements. One of the potential transshipment vendors has approved federal Compliance Orders for the Hawaii and mainland operations and a permit for the transfer station to shrink wrap and transfer the waste.

The City would also need to consider the effects of transshipment on H-POWER in the long term. With the shipment of O'ahu's waste off-island, waste disposed in H-POWER may be reduced and revenue from the energy sold would diminish.

The City's review of the transshipment bids has been delayed due to a protest to the bid submitted by Hawaiian Waste Systems, one of the bidders. The other two bidders question Hawaiian Waste Systems' bid which was half the cost of their proposals.[4] A statutorily-mandated stay on the award of the bid is in effect while the City reviews the protests. The issue remains unresolved. [5]

Transshipment does offer the City a short term alternative for reducing the material being sent to the local landfill. The Expansion of H-POWER offers long term benefits of energy production and reduction in disposal not offered by transshipment.

In addition transshipment produces much greater greenhouse gas emissions than taking the waste to H–POWER. H–POWER results in a reduction in island-wide greenhouse gas emissions (or negative emissions) of 38,883 metric tons of CO_2 equivalent compared to *positive* emissions from transshipment of 44,978 metric tons per year of CO_2 equivalent. See Appendix F for additional references and calculations.

ES-4.3 Alternative Technologies

Alternative technologies were considered for the H-POWER Expansion. The alternative technologies fall into several categories:

- Thermal: These processes use heat to reduce the waste to energy or a fuel that can be used to produce energy and may produce recyclables. Pyrolysis, plasma arc gasification, and Energy from Waste (EfW) are examples of thermal processes.

[3] Laurie Au. "City Reviews Bids to Ship O'ahu Trash." Star Bulletin on the Web Vol. 13, Issue 171. 19 June 2008. (23 July 2008) http://starbulletin.com/2008/06/19/news/story08.html.
[4] Peter Boylan. "Firm Claims City Pressured on Bids to Ship Trash." Honolulu Advertiser on the Web 11 July 2008. (23 July 2008)
[5] Peter Boylan. "Waste Shipment Contract Delayed by Bid Protest." Honolulu Advertiser on the Web 31 October 2008.

- Non-thermal: These processes produce a material, such as compost, that is sold and may also have an energy output. Digestion and hydrolysis are two examples of non-thermal technology.

- Enhanced Recycling: Rather than combusting the waste, such as at H–POWER, this alternative would institute additional recycling programs to remove the materials from the waste stream.

The City's criteria for alternative technologies to be considered were detailed in a request for bidders[6] and are summarized below:

- There exists at least one operational facility processing at least 500 TPD of MSW for at least the past two years.

- Such facility has been fully operational 85 percent of this time while meeting all performance and environmental compliance requirements.

- The facility, without major modification or equipment changes, would substantially represent the system proposed for Honolulu.

- The product produced at the facility has for the past two years been marketed and resulted in the beneficial reuse of energy.

- The process shall be commercially available with a proven design such that the proposed facility is not the first of its kind. The equipment proposed has operated successfully at least 85 percent of rated capacity. The equipment is regarded as being reliable and not subject to excessive maintenance, operational problems, or requires major re-designs.

- The ash slag and residue by products from the proposed facility have met all environmental requirements for either marketing or landfill disposal.

In Table ES-1, the alternative technologies are compared to the City's criteria for alternatives.

[6] City and County of Honolulu, Notice to Bidders, Project to Construct and Operate Alternative Energy Facility and/or H–POWER Facility. Competitive Sealed Proposals for Alternative Technology (CSP) NO. 037, 16 January 2007.

TABLE ES-1 COMPARISON OF COMPLIANCE OF ALTERNATIVE TECHNOLOGIES TO CITY'S CRITERIA

Technology	Criterion and Note #						
	1	2	3	4	5	6	7
	One Facility Operating for 2 Years	500 TPD	85% Capacity	85% of time	Products Marketed	Compliance	Residue
EfW	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Anaerobic Digestion	No	No	ND	ND	ND	ND	ND
Aerobic Digestion	No	Possibly	ND	ND	ND	ND	ND
Hydrolysis	No	No	ND	ND	ND	ND	ND
Plasma Arc	No	No	ND	ND	ND	ND	ND
Gasification/Pyrolysis	Yes	No	ND	ND	ND	ND	ND

ND — not determinable

The thermal technologies include EfW, which includes the RDF process used by H–POWER Units #1 and 2. It has been operating in the City since 1990 and has met all of the City's criteria. The proposed H–POWER Mass Burn Unit #3 is also an EfW technology. Both the RDF and Mass Burn processes meet the City's criteria.

Other thermal processes evaluated do not meet the City's criteria and were not considered further.

The non-thermal processes did not meet the City's criteria because they had not been processing 500 TPD for at least two years. Most produce a product, such as MSW compost, that needs to be marketed, and the market has not been proven on O'ahu.

Enhanced recycling meets the City's criteria and implementation has started on the island. However, it will not provide the reduction in landfill disposal offered by EfW. The City has characterized its EfW program as being "recycling to energy".

In Table ES-2, the other four non-technology based alternatives are compared to the Project based on the greenhouse gas emissions and need for imported oil.

TABLE ES-2 COMPARISON OF OTHER ALTERNATIVES WITH RESPECT TO PROPOSED PROJECT

Alternative	Criterion and Note #	
	1	2
	GHG Emissions	Imported Oil
No Project	Increased	Increased
Delayed Project	Increased	Increased
Enhanced Recycling	ND	Increased
Transshipment	Increased	Increased

Notes:

1 GHG Emissions refers to whether the greenhouse gas emissions would be increased (detrimental or negative effect) or decreased (beneficial or positive effect) with the alternative as compared to the Project.

2 Imported oil refers to whether the need to import oil for energy production would be increased (detrimental or negative effect) or decreased (beneficial or positive effect) with the alternative as compared to the Project.

Enhanced recycling is indicated as a "ND" for greenhouse gas emissions because the calculation depends on the truck trips and the GHG benefits from recycling the materials, and this information is not known.

ES-4.4 Conclusions

H–POWER Unit #3 offers the following benefits:

- Significant reduction in landfill disposal;
- Significant production of energy, offsetting the need to import oil;
- Long-term, proven, reliable, cost effective operation, meeting all the City's criteria; and
- Reduction of greenhouse gas emissions (more than landfilling locally) compared to increased global greenhouse gas emissions from transshipment.

The Expansion of H–POWER would be the most environmentally beneficial to the City.

ES-5.0 UNRESOLVED ISSUES

Review and analysis of the potential impacts and mitigation measures associated with the proposed Expansion indicates that the vast majority of potential impacts can and will be fully mitigated. Accordingly, there are no unresolved issues.

ES-6.0 COMPATIBILITY WITH LAND USE PLANS AND POLICIES

A wide variety of Land Use Plans and Policies were reviewed and evaluated to ensure that the proposed Expansion meets the goals and objectives as developed and implemented by federal, state and local guidance. These included:

- Federal Aviation Administration (FAA) guidelines regarding construction activities and air safety relative to nearby airports were reviewed and information relative to project plans and land use will be submitted to FAA for review within 30 days of the initiation of construction activities. In 2004, the FAA made a determination of "No Hazard to Air Navigation" based on an aeronautical study that revealed that structures (construction cranes) would not be a hazard to air navigation with appropriate marking/lighting.

- Federal Coastal Zone Consistency is implemented at the state level under the state Coastal Zone Management Program (CZMP). In 2004, it was determined that a CZM federal consistency review is not required for this project but the project may be subject to Special Management Area (SMA) requirements administered by the City and County of Honolulu Department of Planning and Permitting (DPP).

- SMA and Shoreline Setback Areas were reviewed by requesting available delineations from the DPP. The Expansion and construction laydown area is outside of the mapped Shoreline Setback Areas.

- The Hawaii State Plan was enacted in 1978 to guide the long-range development of the State of Hawaii. The Expansion is consistent with the State Plan in that it is a prudent use of resources, recovering renewable energy while satisfying waste disposal needs in a proven and cost effective manner, and consistent with other state and county plans.

- The Hawaii State Energy Plan was updated in January 2000 and has objectives that include reliability/contingency planning and the increased use of renewable energy resources. The proposed Expansion's energy increases and increased reliability are fully consistent with the Energy Plan goals.

- Hawaii State Water Code requires that the Commission on Water Resources Management (CWRM) of the Department of Land and Natural Resources (DLNR) utilize comprehensive water resources planning in the regulation and management of water resources. The Expansion has complied with this goal in that it has applied to modify the existing H-POWER permit limits for water withdrawal and reinjection as permitted through CWRM and Hawaii Department of Health (HDOH) respectively.

- The O‘ahu General Plan is "a comprehensive statement of objectives and policies which sets forth the long-range aspirations of O‘ahu's residents and the strategies of actions to achieve them". The General Plan addresses eleven areas of concern. Of the eleven categories, the three that relate to the proposed Expansion are Transportation and Utilities, Energy, and Government Operations and Fiscal Management. The Expansion will provide safe, efficient and sensitive waste-disposal services and will recover resources (material and electricity) from solid waste. The Expansion will help to meet the needs of the people of O‘ahu for environmentally sound systems of waste disposal and will support the increased use of operational solid waste energy recovery utilizing proven sources of energy. The Expansion will also help to maintain City and County government services at the level necessary to be effective and will promote increased efficiency in the provision of government (waste disposal) services by the City and county of Honolulu.

- The ‘Ewa Development Plan (DP) is the development plan for one of the eight planning areas on O‘ahu. The latest version of ‘Ewa DP was released in 1997. A public review draft of the 2008 'Ewa DP is available for review. It will not be finalized until after the public commenting period ending in January 2009. The proposed Expansion is consistent with the industrial land use objectives of the ‘Ewa DP for the James Campbell Industrial Park and is consistent with the energy use objective for that region.

- The Hawaii Integrated Solid Waste Management Plan (ISWMP), last updated in October 2008, was developed to guide solid waste management activity. The 2008 Plan set forth as its primary objective to "design an integrated solid waste management system for the City was to maximize the recovery of solid waste through reuse, recycling, composting and energy conversion, in order to minimize the amount of waste that requires landfill disposal." Expansion of H-POWER will significantly reduce material for landfill disposal, consistent with the "ultimate goal" of the City and County of Honolulu.

- The City and County of Honolulu Land Use Ordinance (LUO) regulates land use in a manner that will encourage orderly development in accordance with adopted land use policies and promote and protect public health, safety and welfare. The James Campbell Industrial Park, within which H-POWER is located, is defined as I-2 Intensive (Industrial). Under the LUO, waste disposal and processing are allowed under a Conditional Use Permit. The Expansion will comply with the requirements of the Conditional Use Permit and will be consistent with the Specific Use Development Standards that are applicable.

The following table identifies the approvals and permits required prior to construction of the proposed Expansion. Each approval/permit is identified along with the approving agency. In addition to the approvals/permits listed in the table, the Expansion project has also been designed to ensure consistency with federal, state, and local plans, policies and controls, identified and discussed in greater detail in Chapter 7.0 of this EIS.

TABLE ES-3 REQUIRED APPROVALS AND PERMITS

Approving Agency/Authority	Approval/Permit
FEDERAL	
Federal Aviation Administration (FAA)	Notice of Construction
STATE	
Hawaii Department of Health (HDOH), Clean Air Branch	Covered Source/PSD Air Permit, Chapter 60.1 of Title 11 of HAR
HDOH, Clean Water Branch	Notice of General Permit Coverage NPDES Construction Stormwater Discharge Permit
HDOH, Clean Water Branch	NPDES General (operational) Stormwater Discharge Permit
HDOH, Indoor and Radiological Health Branch	Construction Noise Permit
HDOH, Safe Drinking Water Branch	UIC Permit Modification
HDOH, Solid and Hazardous Waste Branch	Solid Waste Management Permit
DLNR, Commission on Water Resource Management	Groundwater Use Permit Modification
DLNR, Commission on Water Resource Management	Well Construction / Pump Installation Permit
CITY	
City and County of Honolulu Department of Planning and Permitting (DPP)	Building Permit
City and County of Honolulu Department of Planning and Permitting (DPP)	Conditional Use Permit Modification
City and County of Honolulu Department of Planning and Permitting (DPP)	Grading Permit and Drainage Plan Approval
City Department of Environmental Services	Construction Dewatering Permit

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

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1.0 INTRODUCTION

The following introductory sections provide a description of the proposed Expansion of the H-POWER facility, including a description of H-POWER's surroundings, the background and need for the proposed action, as well as the purpose of this Environmental Impact Statement (EIS). Details regarding the timing of the project and related activities, as well as the project costs and sources of funding, are also provided.

1.1 Proposed Action

The H-POWER Expansion Project (Expansion) consists of the addition to the Facility of a third combustor unit. The third unit will be a 900 tons per day (TPD) Mass Burn waterwall municipal waste combustor (MWC), its associated air pollution control equipment, and all the equipment required to tie the addition into the existing H-POWER facility. It includes modifications and additions to the existing waste feed, ash handling and other utility systems necessary for the new equipment, and a new turbine generator which will provide an additional source of renewable energy to the City and County of Honolulu (City). The Expansion does not include any changes to the two existing Refuse Derived Fuel (RDF) combustors.

The proposed Expansion will increase the facility's waste disposal capacity, increase the energy and recyclable metals recovered annually, and reduce the need for landfilling of municipal solid waste in Honolulu. The environmental characteristics of the proposed Expansion will fully comply with federal, state, and local permits and programs designed for the protection and stewardship of Hawaii's environmental resources.

1.2 Purpose of Document and Parties Consulted

This EIS has been prepared by Covanta Honolulu Resource Recovery Venture (CHRRV), the operator of the facility, the City and County of Honolulu (City), and their environmental consultants and subcontractors to satisfy the requirements of Hawaii Revised Statutes (HRS) Chapter 343. The use of County lands and funds is the reason the City and County of Honolulu has determined that an EIS be prepared. An Environmental Impact Statement Preparation Notice (EISPN) was published in the Office of Environmental Quality Control (OEQC) Bulletin on August 8, 2008 in order to initiate the environmental review process, inform interested parties of the Expansion and seek public input on subject areas that should be addressed in this EIS. The EIS documents and analyzes the effects of the Expansion on the environment and proposes mitigation measures to prevent or reduce the Expansion's potential effects. This EIS also evaluates potential alternative methods, modes or designs of the proposed action.

As noted above, a key component of the EIS process is public participation. CHRRV and the City and County of Honolulu have therefore consulted with numerous state and federal agencies in formulating plans for addressing the County's solid waste disposal needs. In addition, a comprehensive community outreach program was undertaken to solicit, identify, and better understand and address the concerns of those who will be affected by the Expansion and to respond to those concerns directly and within the text of this EIS. The outreach program included an open house meeting and consultation letters and was designed to include residents, businesses and other stakeholders. The outreach efforts are described in Chapter 13 of this

EIS. The comments received, as well as the responses provided, are documented in Chapter 14.

1.3 Background/Historical Perspective

Prior to 1977, the City and State had conducted, commissioned or sponsored a number of studies over an approximate 12-year period in order to find a solution to what was then a growing solid waste problem. At that time, approximately 80 percent of O'ahu's refuse was disposed of at City-operated landfills, and space at these landfills was rapidly being used. In 1977, analysis of possible waste disposal solutions was conducted by MITRE Corporation. That analysis evaluated development of a solid waste resource recovery system (1983 Revised EIS) to address the solid waste issue. The City at that time embarked on a program to implement the recommendations contained in MITRE's final report. In the summer of 1978, the City issued a Request for Proposals for what was then referred to as H-POWER – the Honolulu Program Of Waste Energy Recovery. In 1982, bidders were asked to submit bid prices. At that time it was hoped to award a contract by the end of December 1983 and to enter full-scale operation by January 1987. After a series of submittals and reviews, including environmental considerations, a final decision was reached, and in May of 1990 the H-POWER facility went into commercial operation at its current location in the James Campbell Industrial Park (JCIP).

The H-POWER facility has been operational for over 18 years, providing reliable service to the City. Over that time period, H-POWER has converted over 10 million tons of refuse into over 5,000 million kilowatt-hours of electric power and saved the importation of over 10 million barrels of oil. H-POWER, with the Expansion, will continue to provide reliable service, cost-effective solid waste solutions, and a critical source of renewable energy to the Island of O'ahu. H-POWER generates approximately 5 percent of O'ahu's electricity from a renewable resource, helping Hawai'i achieve its goal of becoming more energy self-sufficient by reducing dependence on imported fossil fuels.

1.4 Need for the Proposed Action

In 2008, the City and County is again facing the need to address solid waste issues on the island of O'ahu. In fact, solid waste projections issued by the City and County of Honolulu in 2008 indicate that even with the Expansion of H-POWER and increased recycling, landfill disposal of Municipal Solid Waste (MSW) will still be required (Integrated Solid Waste Management Plan (ISWMP), CCH 2008a). The H-POWER Expansion is designed to offer increased efficiency and capacity at the existing H-POWER Facility in Kapolei, Hawaii. The Expansion is being developed to expand a competitively priced, environmentally sound and proven waste disposal technology on O'ahu, thereby extending the life of the Waimanalo Gulch Sanitary Landfill and of landfills yet to be developed.

1.5 Timing of Action

The proposed Expansion will be evaluated by numerous State and Federal agencies that will review applications and this EIS. Upon completion of the EIS process and after the facility has secured all necessary permits and approvals, construction is expected to commence in the second half of 2009. There would be an approximately 34-month construction timeframe. Commercial operation of the Expansion is planned for 2012 after an approximate 3-month startup program.

1.6 Description of the Property

The H-POWER Expansion is proposed to occur on the existing H-POWER parcel. The site consists of 24.635 acres (1,073,100 ft^2) of industrially zoned and developed property situated within the JCIP in Kapolei. The parcel's Tax Map Key number is 9-1-026:030 (Parcel 30). Figure 1.6-1 depicts the site location and shows the major roadways in the vicinity of the existing H-POWER facility. Due to the site's existing industrial nature, there are no designated environmental site constraints on the parcel. Additional detailed information on the site is presented within this EIS.

Figure 1.6-2 depicts the parcels to be used temporarily for construction equipment laydown and construction parking. These parcels are situated immediately to the west of the H-POWER site and are also owned by the City and County of Honolulu. The Parcels are industrially zoned, previously disturbed, but currently undeveloped. The parcels Tax Map Key numbers are 9-1-026:033 and 9-1-026:034. Parcel 033 is 6.041 acres and Parcel 034 is 8.164 acres and both include portions of a fenced area which is a plant sanctuary that will not be utilized. The plant sanctuary is mapped, and the measures proposed to avoid impact to it are presented within applicable sections of this EIS. Only a portion of parcel 34, not inclusive of the drainage easement or the plant sanctuary, is expected to be used for construction laydown.

1.7 Surrounding Land Uses and Zoning

Figure 1.7-1 is an aerial photograph showing the existing industrial nature of the site, the adjacent parcels to be utilized during construction, and the surroundings within 1-mile of the H-POWER site. As can be seen from the aerial photograph, the surrounding land uses are predominantly industrial in nature. Figure 1.7-2 depicts occupied/leased lots neighboring H-POWER and Table 1.7-1 identifies each of them and their direction relative to H-POWER.

TABLE 1.7-1 OCCUPIED/LEASED LOTS WITHIN JCIP AND THEIR DIRECTION RELATIVE TO H-POWER

Direction Relative to H-POWER	Neighbor
South	AES coal-fired facility
South	Rock Mountain Prestress
East	Hawaiian Electric Company (HECO) Substation
North (roadway parcel)	Campbell Hawaii Investor, LLC
North	HECO (Utility)
West	Undeveloped but disturbed land owned by the City and County of Honolulu

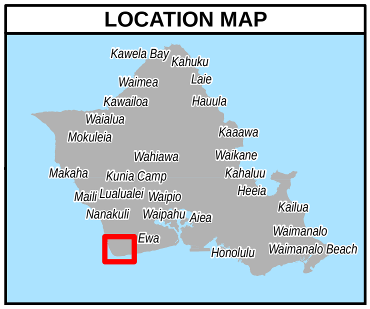
The JCIP, and most of the area within 1 mile of the site, is zoned I-2 Intensive, as shown on Figure 1.7-3 Zoning. Under Chapter 21 – Land Use Ordinance (LUO), waste disposal and processing are allowed under a Conditional Use Permit – minor and subject to the Specific Use Development Standards identified in Article 5 of the Ordinance.

Although the H-POWER facility is an existing facility, alterations, additions, or modifications require a permit. H-POWER will comply with the requirements of the Conditional Use Permit, as well as other federal, state, and local permits and approvals. Each of the required permits and approvals is addressed in Chapter 3 of this EIS.

LEGEND

- H1 FREEWAY
- FARRINGTON HWY
- SITE BOUNDARY
- CONSTRUCTION LAYDOWN AREA
- CITY AREAS
- SCHOOL
- GOLF COURSE
- SHOPPING CENTER
- GOVERNMENT CENTER
- MILITARY INSTALLTION
- PARK

LOCATION MAP



NOTES & SOURCES
MAP COORDINATES
UTM NAD83, ZONE 4N, UNITS METERS
BASEMAP DATA FROM ESRI, 2007

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

N

0 0.2 0.4 0.6 0.8 1 MILES

amec

SITE LOCATION MAP

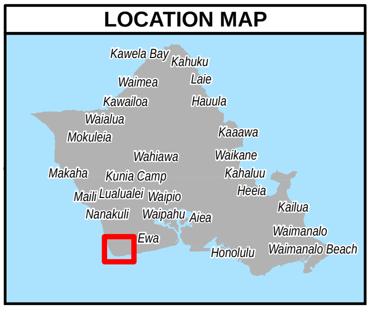
FIGURE 1.6-1

Figure 1.6-1 back side

LEGEND

- H-POWER
- CONSTRUCTION LAYDOWN AREA
- PLANT SANCTUARY

LOCATION MAP



NOTES & SOURCES
MAP COORDINATES
UTM NAD83, ZONE 4N, UNITS METERS
BASEMAP DATA FROM USGS, 2005

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

N

Feet
0 270 540

CONSTRUCTION LAYDOWN AREA & PLANT SANCTUARY

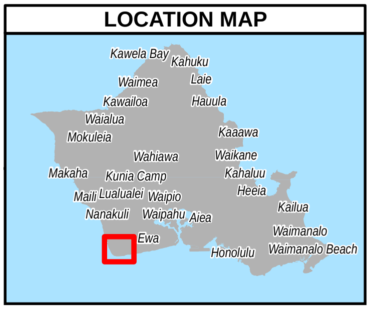
FIGURE 1.6-2

Figure 1.6-2 back side

LEGEND

- SITE BOUNDARY
- CONSTRUCTION LAYDOWN AREA

LOCATION MAP



NOTES & SOURCES
MAP COORDINATES
UTM NAD83, ZONE 4N, UNITS METERS
BASEMAP DATA FROM USGS, 2005

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

N

MILES
0 0.1 0.2 0.3 0.4 0.5

amec

AERIAL PHOTO

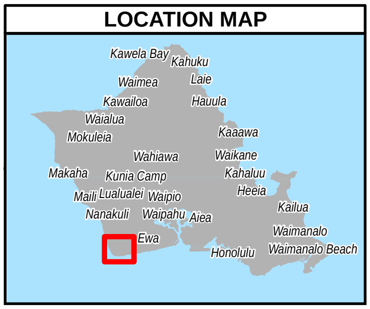
FIGURE 1.7-1

Figure 1.7-1 back side

LEGEND

- H-POWER
- CONSTRUCTION LAYDOWN AREA
- PLANT SANCTUARY

LOCATION MAP



NOTES & SOURCES
MAP COORDINATES
UTM NAD83, ZONE 4N, UNITS METERS
BASEMAP DATA FROM USGS, 2005

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

N

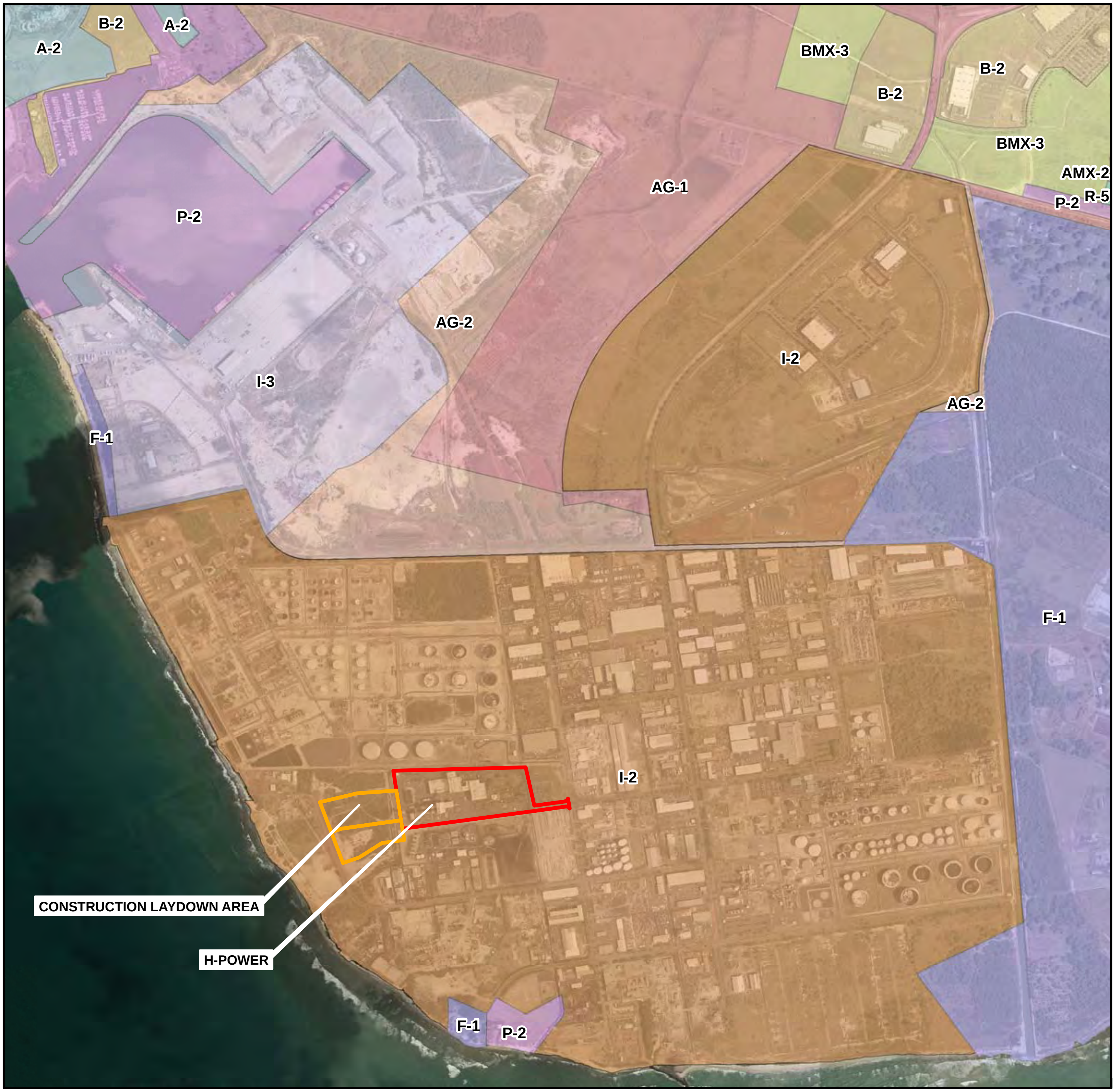
Feet
0 270 540

amec

CONSTRUCTION LAYDOWN AREA & PLANT SANCTUARY

FIGURE
1.7-2

Figure 1.7-2 back side



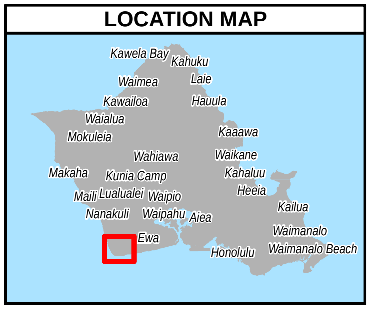
LEGEND

- SITE BOUNDARY
- CONSTRUCTION LAYDOWN AREA

COUNTY OF HONOLULU ZONING

- A-2 MEDIUM-DENSITY APARTMENT DISTRICT
- AG-1 RESTRICTED AGRICULTURE DISTRICT
- AG-2 GENERAL AGRICULTURE DISTRICT
- AMX-2 MEDIUM-DENSITY APARTMENT MIXED USE DISTRICT
- B-2 COMMUNITY BUSINESS DISTRICT
- BMX-3 COMMUNITY BUSINESS MIXED USE DISTRICT
- F-1 FEDERAL AND MILITARY PRESERVATION DISTRICT
- I-2 INTENSIVE INDUSTRIAL DISTRICT
- I-3 WATERFRONT INDUSTRIAL DISTRICT
- P-2 GENERAL PRESERVATION DISTRICT
- R-5 RESIDENTIAL DISTRICT
- RESORT DISTRICT

LOCATION MAP



NOTES & SOURCES
MAP COORDINATES
UTM NAD83, ZONE 4N, UNITS METERS
BASEMAP DATA FROM USGS, 2005 &
CITY & COUNTY OF HONOLULU, 2008

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

N

0 0.25 0.5 MILES

amec

ZONING

FIGURE 1.7-3

Figure 1.7-3 back side

2.0 DESCRIPTION OF THE PROJECT

The following sections provide a discussion of the objectives, nature and extent of the Expansion, including a description and diagrams of proposed facility operations and components.

2.1 Project Objectives and Policies

In an effort to address ongoing concerns regarding the handling of solid waste in the City and County of Honolulu, the City analyzed and reviewed various technological, recycling, landfilling and transshipment solid waste disposal options. The result of these reviews was a City request to CHRRV to prepare a proposal for the installation of a third boiler at the H-POWER facility. CHRRV, in response, prepared a proposal to install a Mass Burn waterwall MWC, air pollution control equipment and other associated equipment to connect the new combustor to the existing plant. The City has issued further instructions to CHRRV to begin project planning and permitting activities. This EIS is a necessary component of the permitting effort and is designed to evaluate alternatives as well as the environmental impacts of the selected action.

The H-POWER Expansion is designed to offer increased efficiency and capacity at the existing H-POWER facility. The Expansion is being developed to expand a competitively priced, environmentally sound and proven waste disposal technology on O‘ahu, thereby minimizing the need to dispose of MSW in existing or future landfills. This is consistent with, and an integral part of, the City and County of Honolulu’s 2008 Integrated Solid Waste Management Plan’s (ISWMP’s) primary objective (CCH, 2008a). The 2008 ISWMP set forth as its primary objective to “design an integrated solid waste management system for the City was to maximize the recovery of solid waste through reuse, recycling, composting and energy conversion, in order to minimize the amount of waste that requires landfill disposal.” Expansion of H-POWER will significantly reduce material for landfill disposal, consistent with the “primary objective” of the City and County of Honolulu.

As noted above, the Expansion consists of the addition to the Facility of a 900 TPD Mass Burn waterwall MWC unit which will increase disposal capacity from approximately 610,000 tons to 910,000 tons of MSW per year. It includes modifications and additions to the existing waste feed system and ash handling and other utility systems necessary for the new equipment. A new turbine generator, in addition to the existing turbine generator, will be installed including a fuel feeding system, state-of-the-art reverse reciprocating grate, integrated furnace/boiler, and the most advanced air pollution control system used on these types of facilities in the country. The air pollution control system consists of a semi-dry scrubber, fabric filter baghouse, carbon injection system, selective non-catalytic reduction (SNCR) system in combination with Covanta’s proprietary control technology called Very Low NOx system (VLN®), and associated ash handling systems.

2.2 Process Flow Description

The following is an overview of the H-POWER facility operations once the Expansion is complete. Sections 2.2.1 through 2.2.10 provide a more detailed description of the various components of the Facility:

- MSW Receiving and Storage (see section 2.2.1)
- MSW Processing (see section 2.2.2)
- RDF Storage (see section 2.2.3)
- Combustion Process (see section 2.2.4)
- Furnace and Boiler (see section 2.2.5)
- Air Pollution Control (APC) Equipment (see section 2.2.6)
- Ash Handling (see section 2.2.7)
- Chemical Storage and Handling (see section 2.2.8)
- Energy Production and Distribution (see section 2.2.9)
- Materials Recovery/Recycling (see section 2.2.10)

A simplified process flow diagram of the proposed Expansion is presented in Figure 2.2-1. A site plan and elevation drawing of the proposed Expansion structural elements is provided in Figure 2.2-2 and Figure 2.2-3, respectively.

2.2.1 MSW Receiving and Storage

Units 1 and 2

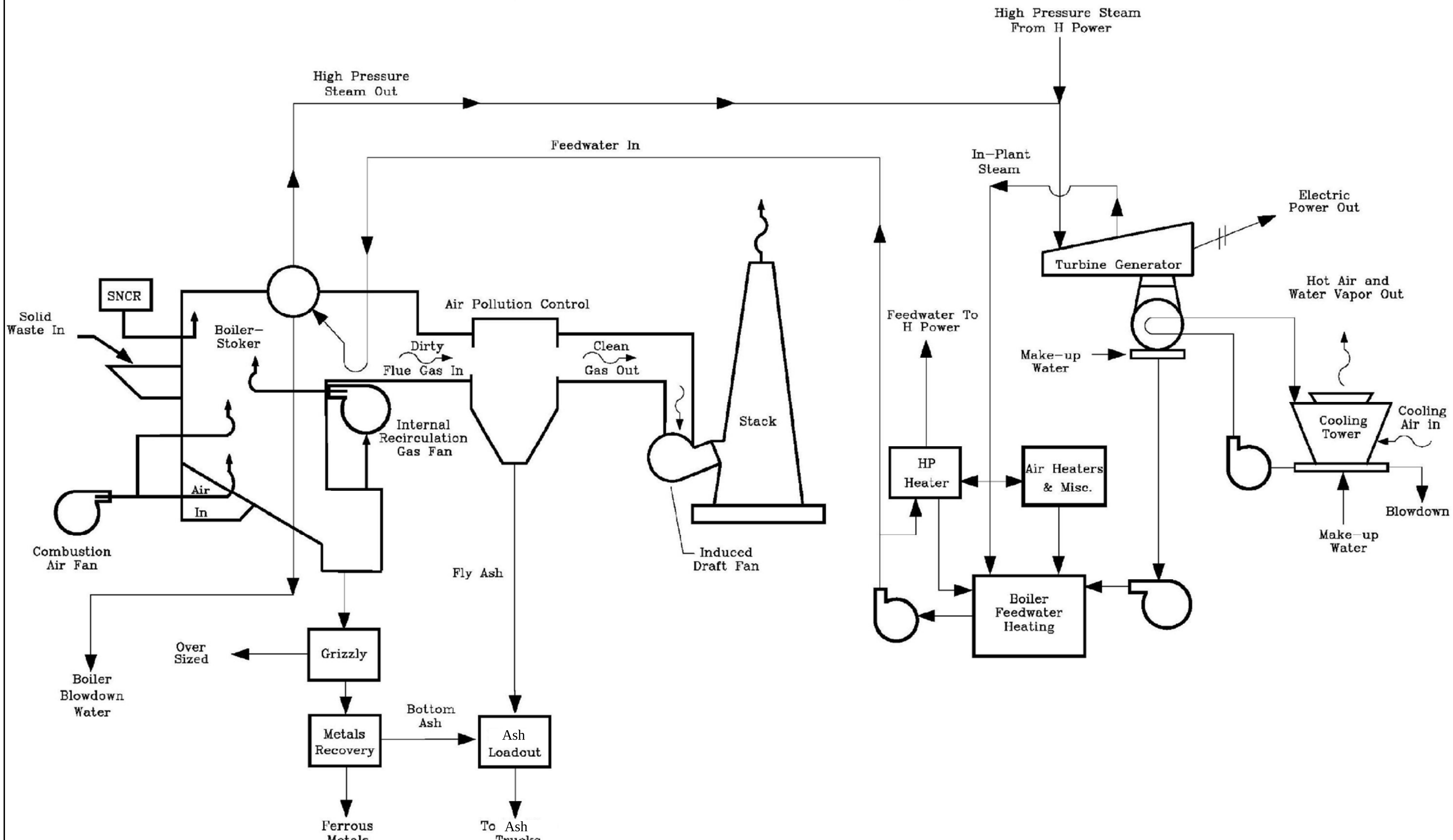
Acceptable MSW is delivered to the Facility by transfer trailer, packer trucks, City and County route collection vehicles, and private vehicles. All delivery vehicles are weighed into the Facility on a 60-ton, 70-foot capacity receiving scale located adjacent to the central scale house. A second scale of equal capacity is utilized for determining vehicle tare weights, as required, and for weighing recovered metals, RDF processing residue, and ash leaving the site. Waste delivered to the Facility is essentially limited to residential, institutional, commercial, military and light industrial solid waste or that fraction which might normally be handled efficiently at a municipal solid waste energy recovery facility.

All vehicles using the Facility are identified by vehicle license number. A computer database contains specific information required for billing purposes. The weighmaster inputs the vehicle identification which initiates the weighment and automatic billing systems. During a typical week approximately 15,000 tons of MSW is received at the facility.

From the central scale house, incoming trucks are currently directed to one of the two receiving locations in the Processing Plant. In general, route collection vehicles and packer trucks are directed to the tipping locations along the elevated dumping platform of the receiving and storage area. Transfer trailers are directed to the ground level dumping area. Typically a spotter directs trucks to the appropriate locations for tipping.

At the central scale house, the vehicles pass between two radiation detectors to monitor for radioactive materials. In the event the alarms are set off, the vehicle is moved to an area where exposure to personnel is minimized. The Hawaii State Department of Health (HDOH), Indoor and Radiological Health branch is notified after facility personnel verify the concentration of the material. The HDOH representative determines how to properly handle and dispose of this waste. At no time will CHRRV accept any radioactive waste for processing.

Simplified Process Flow Diagram

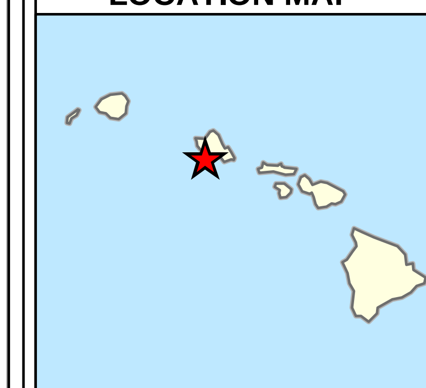


TITLE

SIMPLIFIED PROCESS FLOW DIAGRAM

H-POWER
KAPOLEI, OAHU, HAWAII

LOCATION MAP



NOTES & SOURCES

SOURCE: COVANTA ENERGY, 2008

AMEC EARTH AND ENVIRONMENTAL, INC.

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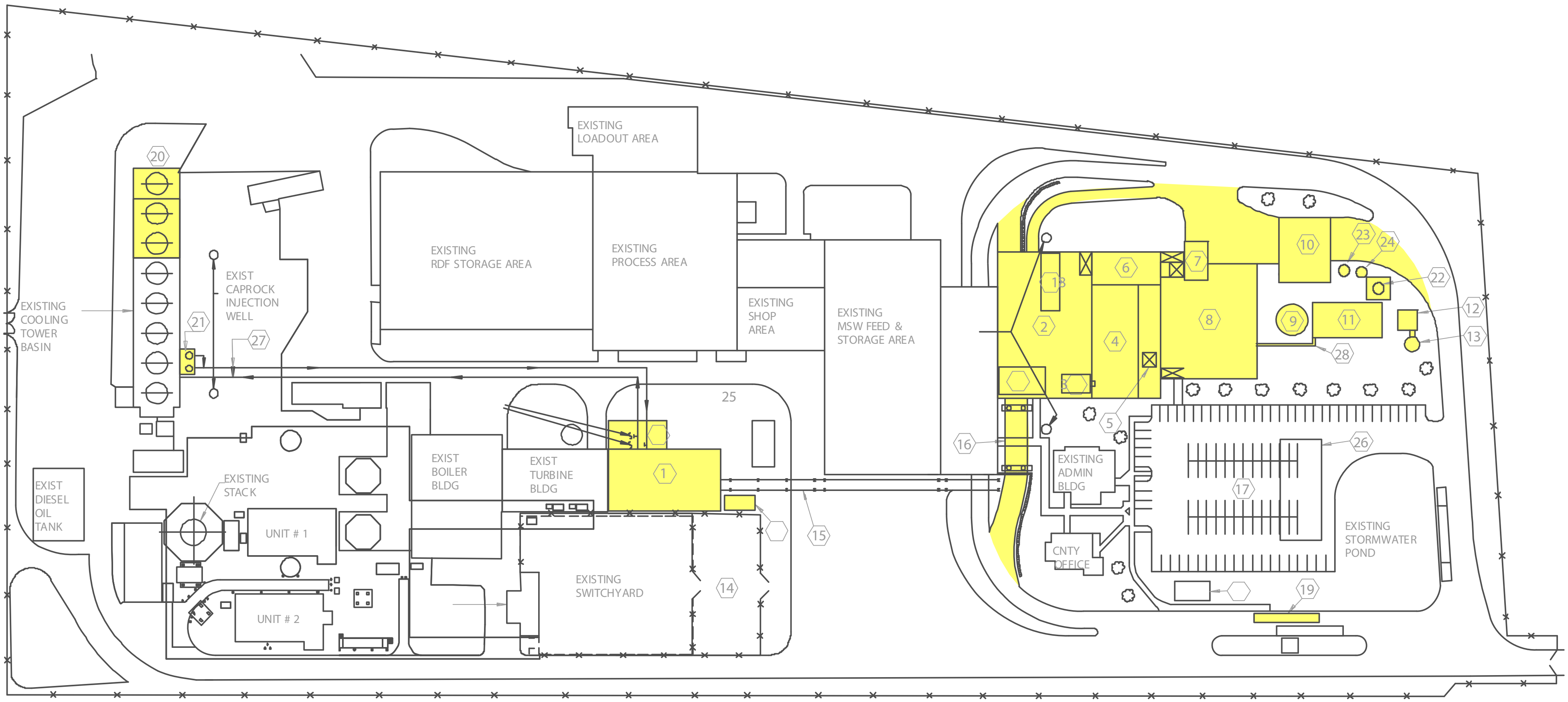
H:\H-Power\Oahu_HI\Task7\MXD\2-1.mxd
Sept 23, 2008 DWN: DJK CHKD: KMP

FIGURE
2.2-1

Figure 2.2-1 back side



LEGEND

1. NEW TURBINE GEN BLDG
2. NEW TIPPING FLOOR EXPANSION
3. NEW SHEDDER
4. NEW REFUSE PIT
5. NEW EQUIPMENT HATCH
6. NEW CRANE PULPIT AND ELECT ROOM
7. NEW GRIZZLY BLDG
8. NEW BOILER BLDG
9. NEW SDA
10, NEW ASH LOADOUT BLDG
11. NEW BAGHOUSE
12. NEW ID FAN
13. NEW STACK
14. NEW EXTENSION SWITCHYARD
15. NEW UTILITY RACK
16. NEW ELEVATED ROADWAY
17. EXPANDED PARKING LOT
18. NEW BALER
19. NEW INCOMING SCALE
20. NEW COOLING TOWER BASIN
21. NEW COOLING TOWER PUMP STRUCTURE
22. AQUEOUS AMMONIA TANK/CONTAINMENT
23. CARBON SILO
24. LIME SILO
25. DIESEL GENERATOR
26. NEW UNDERGROUND STORM WATER STORAGE (IF REQ'D)
27. NEW CW PIPING
28. NEW SCREEN WALL

N

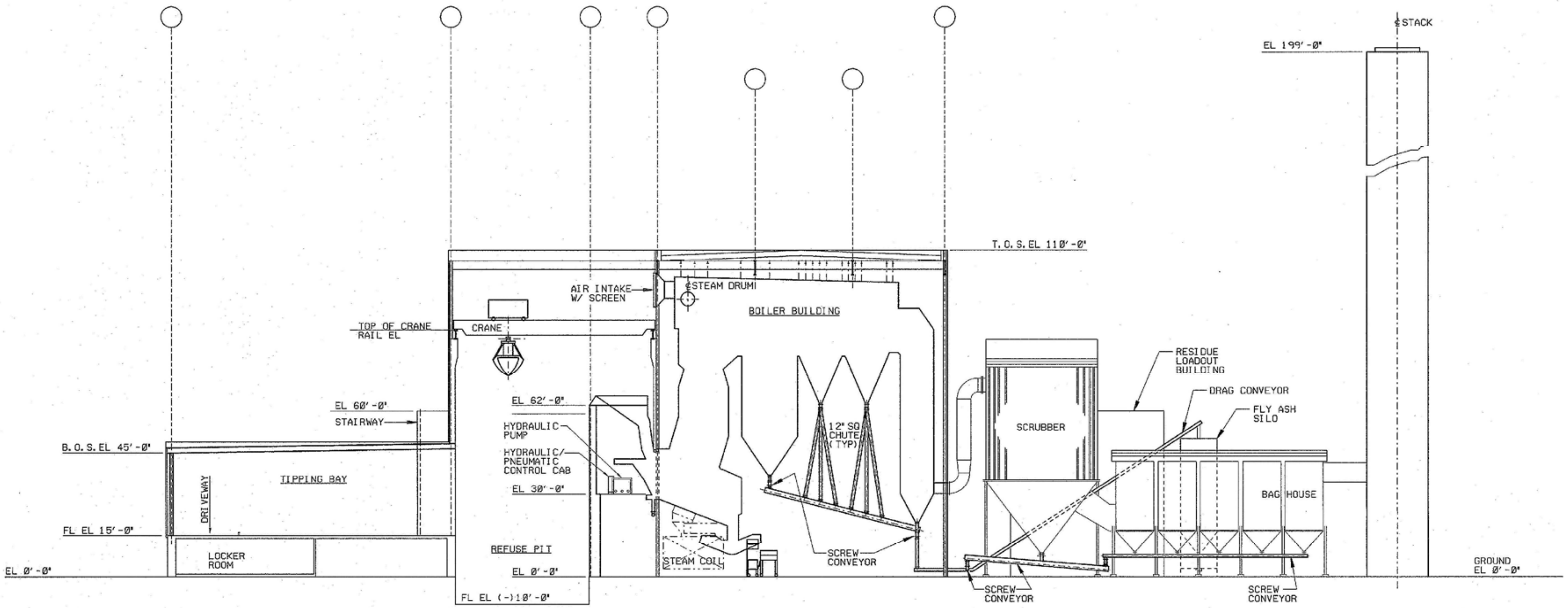
FEET
0 100 200
APPROXIMATE SCALE

amec

SITE PLAN OF THE PROPOSED EXPANSION

FIGURE 2.2-2

Figure 2.2-2 back side



SECTIONAL ELEVATION

GRAPHIC SCALE

0 10' 20' 40' 60'

1"=20.0'

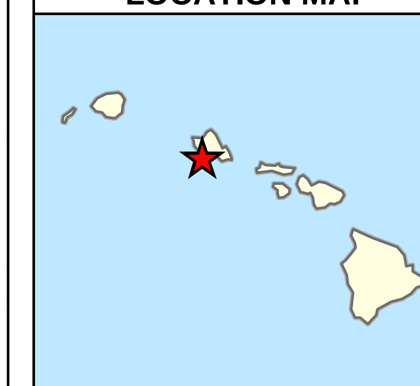
TITLE

ELEVATION DRAWING OF THE PROPOSED EXPANSION

COVANTA/H-POWER KAPOLEI, OAHU, HAWAII

LEGEND

LOCATION MAP



NOTES & SOURCES

SOURCE: BURNS AND ROE, DRAWING M215_I_C

AMEC EARTH & ENVIRONMENTAL, INC.

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H:\H-Power\Oahu_HI\Task7\MXD\6-1.mxd
Sept 23, 2008 DWN: DJK CHKD: KMP

FIGURE 2.2-3

Figure 2.2-3 back side

The Acceptable Waste is stockpiled in the storage areas as it is received and fed out of storage for processing. A large crawler-dozer stockpiles the Acceptable Waste. Front end loaders retrieve the waste for process feed. The receiving and storage areas are designed to hold approximately three days storage of Acceptable Municipal Solid Waste. White goods, discarded stoves, refrigerators and other appliances and bulky items that cannot be processed, are occasionally received with Acceptable Waste. These unacceptable items are retrieved and placed on the west wall of the MSW receiving room. These metal products are taken to the metal recycler for recycling. There are some non-MSW wastes that are destructed by direct injection for combustion at the facility. Typical non-MSW wastes include: contraband confiscated by the local law enforcement agencies, expired pharmaceutical supplies, and military classified documents. Nonprocessible wastes and items mixed with incoming Acceptable Waste that cannot be processed are pushed aside by loader operators and, when time permits, pushed to the bulky waste loadout area for transfer to a recycler or the landfill.

Unit 3 (Expansion Facility)

Similar to the process described above for Units 1 and 2, acceptable MSW for the Mass Burn unit will be delivered to the Facility by transfer trailer, packer trucks, City and County route collection vehicles, and private vehicles. All delivery vehicles will be weighed into the Facility on a new 60-ton, 70-foot capacity receiving scale located adjacent to the central scale house. A second scale of equal capacity is currently utilized for determining vehicle tare weights, as required, and for weighing recovered metals, RDF processing residue, and ash leaving the site. A fully furnished and equipped receiving weigh station with one additional sixty-foot (60') long truck scale will be included with the Expansion. Following the Expansion, MSW received at the facility will increase from 15,000 tons to approximately 21,000 tons of per week.

From the central scale house, incoming trucks will be directed to one of the three receiving locations. Route collection vehicles and packer trucks will be directed to the tipping locations along the elevated dumping platform of the receiving and storage area for RDF processing or the Mass Burn pit. Transfer trailers will be directed to the ground level dumping area or the Mass Burn Pit. Typically a spotter directs trucks to the appropriate locations for tipping.

At the central scale house, the vehicles pass between two radiation detectors to monitor for radioactive materials. In the event the alarms are set off, the vehicle is moved to an area where exposure to personnel is minimized. The Hawaii State Department of Health (HDOH), Indoor and Radiological Health branch is notified after facility personnel verify the concentration of the material. The HDOH representative determines how to properly handle and dispose of this waste. At no time will HRRV accept any radioactive waste for processing.

The Acceptable Waste stockpiled in the receiving pit for the new Unit 3 is retrieved by an overhead crane and fed into the Mass Burn Unit. The receiving and storage areas are designed to hold approximately three days of Acceptable Municipal Solid Waste. Any bulky waste received in the Unit 3 Mass Burn receiving area will be transferred to the bulky waste shredder in the Unit 3 Mass Burn receiving area. If not combustible, it will be transferred to the landfill.

2.2.2 MSW Processing

Units 1 and 2

Acceptable Waste is delivered by front end loader from the storage area to the conveyor. The front end loader loads the waste onto a high impact steel apron feed conveyor. The waste is metered by the feed conveyor onto an inclined conveyor which carries the waste onto a horizontal drag conveyor feeding the primary shredder. The picking station equipment operator stationed in the grapple control bunker at the horizontal drag conveyor inspects all waste being carried to the primary shredder. Oversized or nonprocessible items observed on the conveyor are removed for disposal.

The primary shredder performs coarse shredding as the first step in the processing line. It breaks open closed bags and boxes, exposes ferrous materials for subsequent recovery and breaks larger glass containers.

Following primary shredding, the coarsely shredded waste will be carried by an inclined belt conveyor to the magnetic separator. The equipment selected for the magnetic separation system consists of two electromagnetic drums. The secondary magnetic drum will take the separated ferrous metal away from the primary magnetic drum and direct it to the ferrous collection conveyor.

After passing the ferrous removal system, the waste enters the primary separation unit where the waste is divided into three streams:

1. A RDF process residue stream consisting of fine sand, glass, dirt, etc. This material is conveyed directly to the RDF process residue loadout area with no further processing.

2. A sized fraction consisting primarily of small combustible products together with some heavy particles of rock, bone, ceramic, glass, etc. This stream is directed to the inlet of the secondary separation units for further processing.

3. An oversized fraction consisting primarily of paper and plastic, which is conveyed to the secondary shredder for size reduction.

The secondary separation units are of proprietary Combustion Engineering, Inc. design and are similar to the primary units with essentially the same design features. The action of the unit breaks up and loosens entrapped combustible material which is separated from the noncombustible material. There are two streams that are generated from this process:

1. Combustible material that is conveyed to the RDF storage room as RDF; and
2. The noncombustible RDF residue that is conveyed to the RDF process line residue loadout area.

Unit 3 (Expansion Facility)

The Expansion proposes that, except when screening of waste is required, MSW will be bought in by trucks and dumped into the refuse storage pit. For loads that are screened, MSW will be dumped onto the tipping floor. After visual inspection a front end loader will push the Acceptable Waste into the refuse storage pit. Unacceptable waste will be removed.

All refuse will be transferred by overhead crane to the feed hopper and feed chute of the waterwall furnace. In the furnace, a ram type volumetric feeder will move the waste onto the stoker grade. Above the grate and integrated with the waterwall furnace will be the steam boiler, designed specifically for solid waste combustion. Flue gases from the boiler will be directed through air pollution control equipment for the removal of acid gases and particulate matter. Steam generated in the boilers will be delivered to a new turbine-generator to produce electricity for in-plant needs and for sale to HECO.

2.2.3 RDF/MSW Storage

The existing RDF Storage Area is presently designed for approximately three days of storage of RDF (4,000 to 4,500 tons of RDF) with existing operating conditions. The proposed Expansion facility is a Mass Burn facility which will not produce RDF from the MSW, and therefore will not need an additional RDF storage area. However, the proposed refuse pit will have a storage capacity for three days of MSW.

2.2.4 Combustion Process

Units 1 and 2

In the existing facility, RDF is recovered from storage for boiler feed by front end loaders. The front end loaders attempt to maintain a constant burden depth on horizontal steel pan conveyors located in the floor of the building. The horizontal conveyor discharges onto an inclined pan conveyor to MWC Unit 1 or 2. Control of the RDF feed metering and transport system is primarily from the power plant control area which provides speed control for the feed transport conveyors in the RDF storage area. The power plant control area start controls for the augers and feed transport conveyors are interlocked to require a simultaneous permissive signal from the process plant control area in order to allow startup of the metering and transport system.

The Facility incorporates two Combustion Engineering, Inc. VU-40 steam generators (boilers), each designed to burn RDF alone, RDF and diesel fuel in combination or diesel fuel only. The two boilers can fire the RDF produced from operation at the peak processing rate of 12,096 tons per week of RDF. This is approximately 36 tons per hour per boiler. Both boilers are operated during normal operation. The VU-40 boilers are designed with provision for a controlled flow of air from underneath the stoker grates to assist in complete burning of the material on the grate and to provide cooling of the grates themselves. In addition, an overfire air system distributes additional combustion air over the grate to complete the combustion requirements.

Unit 3 (Expansion Facility)

After being charged into the feed chute, the refuse will be metered out onto the surface of the Martin stoker from the bottom of the feed chute by hydraulic feed rams. The proprietary reverse-reciprocating action of the stoker grate agitates the fuel bed continuously in a manner which causes refuse burning from the bottom of the refuse bed, resulting in a burnout of better than 98 percent of all combustible matter.

The stoker grate will be inclined downward from the feed end toward the discharge end and will consist of alternating rows of fixed and moving grate bars. Unlike conventional stoker designs, the moving grate bars will push upward at 30 to 50 strokes per hour against the natural gravitational downward movement of the refuse. This stoker action will agitate the burning refuse to form an even depth of fuel bed. Burning refuse will be pushed back underneath the freshly fed refuse to achieve continuous drying, volatilization, ignition, and combustion.

As distinguished from typical stokers utilized for refuse combustion, the grate bars of the Martin stoker are machined on their sides to achieve intimate contact between adjacent bars. Combustion air admitted to installations utilizing this system show flame patterns wherein the completion of the combustion is maintained within the confines of the lower furnace (below the upper level of the refractory lined furnace portions) and away from the walls without stratification. Resulting carbon monoxide levels at the furnace outlet are 50 ppm or less in normal operation. Consistent with the low levels of carbon monoxides are the low levels of dioxin and furan emissions from Martin units.

The combustion air will be taken from the tipping floor and pit area and will be directed to the underfire and overfire air fan inlet. This will also maintain a negative pressure in the tipping floor to reduce odor and dust escaping to the ambient environment. To ensure maximum burnout of refuse with high moisture content, a steam-heated combustion air preheater will be located at the combustion air fan outlet. This heater will be capable of preheating incoming ambient air to 300 F when firing refuse having low heating value.

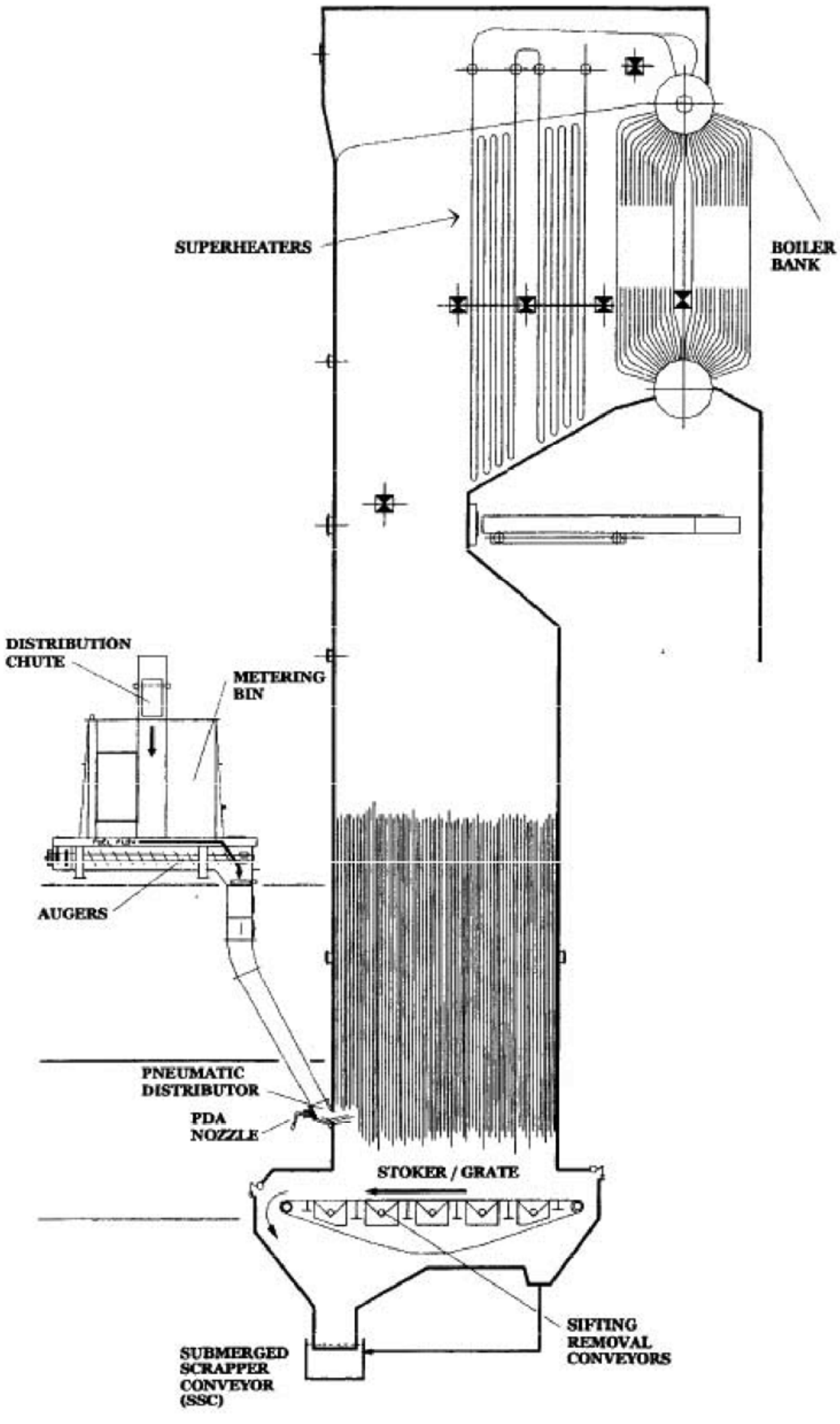
2.2.5 Furnace and Boiler

The Expansion will have a boiler furnace/combustion chamber similar to Units 1 and 2. Above the stoker grate will be the boiler furnace/combustion chamber, constructed of gas-tight, continuously welded waterwalls down to the grate surface. Figure 2.2-4, a typical boiler cross section, shows the relationship of the integrated furnace and boiler.

As mentioned above, the RDF/MSW feedrate and combustion air supply are maintained to assure complete combustion and compliance with all combustion-related permit requirements. The flue gas that results from the combustion process is extremely hot and carries the heat that is used to generate steam in the furnace water walls and downstream equipment. The sequence of equipment that provides for steam generation includes:

1. Furnace waterwalls;
2. Primary and secondary superheater;
3. Convection heat transfer surfaces;
4. Economizer; and
5. Air heater.

This series of equipment is designed to extract enough heat to generate the desired steam rate while keeping the flue gas temperature in a range that is appropriate for long-term operation. The boiler design will incorporate state-of-the-art features including combustion air distribution and control, location and sizing of heating surfaces and appropriate cleaning methods during operations. Soot blower sequencing will be completely programmable and set to maintain the most efficient boiler operations. The program can be changed if, during plant operation, it is



TYPICAL BOILER CROSS SECTION

FIGURE 2.2-4

Figure 2.2-4 back side

found that certain sootblowers need to be operated more frequently to maintain boiler cleanliness.

2.2.6 Air Pollution Control Equipment

The Expansion is designed to include state-of-the-art pollution control equipment. Flue gas from the new combustor will be treated by air pollution control technologies that have been designated by the USEPA as Maximum Available Control Technology (MACT). In addition, Unit 3 will be equipped with the Covanta Very Low NOx (VLN™) system, which is an integral component of all new Martin® stokers, and varies the combustion process over typical stokers in order to significantly reduce NOx emissions. Flue gas in the furnace will then be processed by a selective non-catalytic reduction (SNCR) system to further reduce nitrogen oxide emissions. From the boiler, the flue gases will be directed through specially designed air pollution control equipment for effective control and removal of municipal waste combustor acid gases and organics, particulate matter, mercury and other heavy metals and acid gases. The sequence of control systems include:

- VLN™ system, good combustion control and furnace operating practices to control carbon monoxide (CO), nitrogen oxides (NOx), and dioxin formation;
- Selective non-catalytic reduction system (SNCR) for NOx control;
- Powdered activated carbon injection for control of mercury;
- Semi-dry alkaline (lime) scrubber to control sulfur dioxide (SO_2), sulfuric acid mist, MWC acid gases (SO_2 and hydrogen chloride (HCl)), fluorides, as Hydrogen Fluoride; and
- Fabric filter to control particulate matter (total suspended particulates, particulate matter 10 microns or less (PM10), and particulate matter of 2.5 microns or less)) and particulate bound-SO_2, metals, sulfuric acid, fluorides, and MWC acid gases and organics.

<u>Flue Gas Recirculation</u>
The Covanta VLN™ system, a type of flue gas recirculation (FGR), is an integral component of all new Martin® stokers. It varies the combustion process offered in Martin® stokers as follows:

- Reduces the overall excess air rate from approximately 90 to 110 percent excess air to 50-55% excess air;
- Reduces the amount of secondary air and adds a tertiary gas stream at a higher elevation in the furnace; and
- Includes an internal gas recirculation system.

The combination of these process changes reduces the NOx generated in the furnace as well as increases the overall boiler efficiency.

The secondary or overfire air system consists of two rows of closely spaced overfire air nozzles, one row in the front wall above the stoker feeder ram(s) and the second row in the rear wall above the rear arch. The overfire air system will be designed to provide approximately 13 percent of the total combustion air for combustion above the stoker grate.

The internal gas recirculation (IGR) air system consists of a dedicated IGR air fan and four rows of closely spaced tertiary air nozzles, two rows in the front wall above the overfire air nozzles near the boiler's nose and two rows in the rear wall. The IGR system will be designed to provide approximately 26% percent of the total combustion air flow.

The overfire air and IGR nozzle design is such that complete penetration of the gas stream above the stoker is achieved for flame shaping and thorough burnout of combustion products including organics. Actual testing at Martin installations shows flame patterns wherein the completion of combustion is maintained within the confines of the furnace and away from the walls without stratification.

The combustion air will be taken from the tipping floor and pit area and directed to the combustion air fan inlet. The internal gas recirculation will be taken from above the stoker's clinker weir and directed to the IGR fan inlet. To ensure maximum burnout of refuse with low heating value and high moisture content, steam heated combustion air heaters will be located at the combustion air fan outlet to heat the incoming air to 200-300 °F.

Selective Non-Catalytic Reduction

A selective non-catalytic reduction (SNCR) system will be installed and designed to meet the NOx emission standard of New Source Performance Standards (NSPS), Subpart Eb and the Best Available Control Technology (BACT) emission rate as determined by the BACT evaluation. The SNCR system will be designed for operation with the new Unit 3 at 110% of maximum continuous rating (MCR). Aqueous ammonia will be injected into the boiler to promote the conversion of NOx to nitrogen and water vapor. The quantity of aqueous ammonia injected will be automatically controlled to maintain a manually selected stack setpoint that is below the final permit emission limit.

Aqueous ammonia with a concentration of less then 20% by weight (19.2% proposed) will be used. Ammonia storage and handling will be designed on good engineering practices relative to other ammonia handling and storage facilities and other HDOH requirements. The aqueous ammonia system will consist of an ammonia storage tank, ammonia pumps, purge air blowers, and ammonia injection nozzles at the boiler. The ammonia storage tank will provide a minimum of seven-day supply of aqueous ammonia at the expected normal operation consumption rate. The ammonia storage tank will be located within a concrete containment to prevent any spills from spreading throughout the Facility site. A truck unloading pad sized to hold the volume of the delivery truck will also be provided.

Carbon Injection

A powdered activated carbon injection system will be designed to operate in conjunction with the spray dryer-baghouse system to control mercury emissions from the new unit. The activated carbon control system will be designed to inject powdered activated carbon into the flue gas upstream of the semi-dry scrubber where it will become well mixed to promote reduction of mercury. The carbon will be pneumatically conveyed to the flue gas duct. A new activated carbon storage silo will provide on-site storage of activated carbon. The amount of carbon, if any, to be injected to achieve the required level of control will be determined during initial start up and performance testing. If testing demonstrates that carbon is not needed to achieve compliance with mercury limits, the carbon injection system will be maintained but not necessarily operated on a continuous basis.

Spray Dryer Absorber

The air pollution control system will include a semi-dry scrubber (also known as a spray dryer absorber). The scrubber will use a lime slurry reagent and be designed to meet the NSPS

Subpart Eb emission standards for SO_2 and HCl and the BACT emission limit for sulfuric acid mist and fluorides (as hydrogen fluoride).

The Expansion will include a new lime storage silo for lime and a new lime slurry preparation system to provide lime slurry for the new scrubber. Lime for the semi-dry scrubber system will be delivered by truck and stored in the new lime storage silo. Lime will be slaked and fed as a slurry to the atomizers of the new scrubber and injected as a fine mist of droplets into the flue gas. Acid gas removal performance will be controlled by adjusting the injection rate of lime slurry, which will be automatically adjusted in response to the flue gas SO_2 content. Scrubber outlet temperature will be controlled by adjusting the quantity of dilution water added to the slurry.

The flue gas will be ducted through a cylindrical vertical chamber where it will be intimately mixed with an atomized spray of lime slurry droplets. Dissolved lime provides the mechanism for removal of acid gases while evaporation of water reduces the flue gas temperature. The treated and cooled flue gas will then flow to a high efficiency pulse jet baghouse where the fly ash particulate, semi-dry scrubber reaction products, and unreacted lime will be collected and removed from the flue gas. The filter cake that accumulates on the fabric filter bags will also provide a substrate of unreacted lime carried over from the semi-dry scrubber, allowing additional reaction with acid gases and further reduction of acid gas emissions.

Dry product that falls into the hopper at the bottom of the semi-dry scrubber chamber will be removed by the fly ash conveying system associated with the baghouse system.

Fabric Filter Baghouses

Following the flue gas spray dryer absorber (SDA) system will be a multi-module fabric filter dust collector (baghouse) including a pulse jet bag cleaning system with controls, compartment isolation system and ash collecting hoppers with heaters. The baghouse will be designed to meet the emission limitations for particulates and opacity of USEPA NSPS, Subpart Eb as well as the BACT emission limits for PM10, PM2.5 and Municipal Waste Combustor (MWC) metals.

The baghouse will be installed with multiple compartments to allow bag cleaning with one module off line while maintaining system operation. The fabric filter unit will be designed for continuous operation at the specified conditions and for long bag life. The captured fly ash will be collected in hoppers and that will be connected to the ash handling system.

After leaving the air pollution control system and the induced draft fan, the flue gases will be discharged to the atmosphere through a round, single shell, 199 feet (60.7 m) high stack.

2.2.7 Ash Handling

The stoker will be furnished with a proprietary Martin ash discharger, which will receive the burned-out material as it falls over the clinker roller and cool it in a quench bath. The stoker will also include an automatic grate siftings removal system which will periodically (approximately every 30 minutes) sweep the undergrate plenums and convey the siftings to the ash discharger. No manual cleaning of the stoker undergrate plenums will be required

From the quench chamber, a hydraulically driven ram will push the ash up an inclined draining/drying chute. In the chute, excess water from the ash will drain back into the quench bath.

Ash containing enough moisture to prevent dusting (15 to 25 percent by weight), will then fall to a vibrating conveyor. The conveyor will feed a grizzly scalper to remove large materials from the ash before it is transferred by an enclosed inclined belt conveyor to the ash loadout building. A feed conveyor will direct the ash to a magnetic drum which separates the ferrous metal from the ash. The ash is then discharged onto a spreader feeder and past an eddy current separator to remove non-ferrous material. The bottom ash portion of the ash stream will be directed onto a distribution chute which deposits it in the loadout trailers. A distributing conveyor and chute system will deposit the ash and ferrous metals into trailers for disposal at the monofill at the Waimanalo Gulch Landfill.

The ash handling system will accommodate items equal in size to an item which can leave the ash discharger. Items larger than 10 inches will be separated at the grizzly scalper and transported to a covered rolloff via a front end loader. These bulky items will be removed at the scalper because the design of the ferrous separation system requires that the magnetic separator be located as close as possible to the residue stream in order to achieve the desired high ferrous recovery rate of 80 percent by weight of all magnetic ferrous contained in ash that contains at least 8 percent (by net weight) of magnetic ferrous materials greater than 1 inch in size in all dimensions but less than 10 inches. The non-ferrous recovery system is designed to remove the non-ferrous metals from the bottom ash stream. The system will consist of a rotary eddy current separator to recover the non-ferrous material and all necessary chute work and product distribution conveyors.

The fly ash handling system will collect fly ash from the second/third pass hoppers, the superheater hoppers, the economizer hoppers, and the air pollution control systems. Flap gates or rotary valves will be located below collection hoppers or between collection hopper screw conveyors and downstream transport screw conveyors to maintain the combustion system pressure boundary and prevent air infiltration. Ash will be conveyed to the fly ash silo, situated next to the ash loadout building. It will then be conveyed to a pugmill for wetting and combined with the bottom ash in the ash loadout building as it is loaded into the trailers.

2.2.8 Chemical Storage and Handling

The air pollution control processes for the Expansion require the use and storage of three different chemicals, summarized in Table 2.2-1.

TABLE 2.2-1 CHEMICALS USED IN AIR POLLUTION CONTROL PROCESSES

APC Process	Chemical	Storage
SNCR	Aqueous ammonia	New 10,000 gallon tank
Semi-dry scrubber	Lime	Two new lime silos that are approximately 14 feet wide by 50 feet high
Mercury control system	Powder activated carbon	New storage silo that is approximately 12 feet wide by 50 feet high

Lime for the air pollution control system will be stored in two lime silos that are approximately 14 feet wide by 50 feet high. Truck access to the lime silo will be provided such that the combined horizontal and vertical run of fill pipe does not exceed 150 feet. The lime silos will have baghouses to control fugitive dust.

Aqueous ammonia solution for the air pollution control system will be delivered to the facility in tank trucks carrying approximately 6,000 gallons to a tank with approximately 10,000 gallon capacity. The tank will include relief valve, vacuum breaker and instrumentation. The aqueous ammonia system will consist of an ammonia storage tank, ammonia pumps, purge air blowers, and ammonia injection nozzles at the boiler. The ammonia storage tank will provide a minimum of seven-day supply of aqueous ammonia at the expected normal operation consumption rate. The ammonia storage tank will be located within a concrete containment to prevent any spills from spreading throughout the Facility site. A truck unloading pad sized to hold the volume of the delivery truck will also be provided.

The ammonia storage tank installation will be in accordance with local and state requirements. The tank will be encircled by an above ground dike with capacity for the contents of the tank, plus the rainfall associated with a 25 year, 24 hour storm event and 6 inches of free board. The bottom will be sloped to a pump-out sump. The tank will be provided with a truck unloading area directly adjacent to the dike. Spill containment of the truck unloading area will be provided by means of a curbed area sloped to the in-ground dike. Trucks will be unloaded using truck mounted transfer pumps, and vapor displaced from the receiving tank will vent back to the truck to prevent the release of ammonia vapor during the unloading process.

Safety features of the ammonia storage area include two hard-piped eyewash and shower stations. One will be on the platform near the pumps and one will be at grade near the truck unloading area). Eyewash and showers stations will also be provided at the injection nozzle locations within ten seconds of each hazard at the same elevation as required by ANSI-358.1. Ammonia leak detectors will be provided to monitor potential ammonia vapor leaks. One leak detector with multiple sensors will be located to monitor the ammonia storage tank and ammonia pumps area. One (1) leak detector with multiple sensors will be located at the upper ammonia header level to monitor the sides of the new boiler. Both local and control room alarms will be provided.

Carbon for the air pollution control system will be stored in a common activated carbon storage silo that is approximately 12 feet wide by 50 feet high and is equipped with a baghouse to control fugitive dust. The injection train will include a blower, eductor, surge bin, gravimetric feeder, piping, wiring, process controls and other accessories needed for a complete, operational system. All activated carbon injection train equipment will be located in the skirted area of the carbon storage system.

2.2.9 Energy Production and Distribution

The high pressure, superheated steam generated in the new boiler will be supplied via the main steam piping header to a new turbine generator, where electricity will be produced for delivery to Hawaii Electric Company (HECO) and for in-house use.

The current annual average net electrical production (exported) is approximately 319,000 mWh. The Expansion will yield an approximate 50% percent increase for a new total of approximately 476,000 mWh net electrical production.

Table 2.2-2 provides an overview of the H-POWER's five-year average, 2002 through 2006, values (CCH, 2008a) with future projected average values after expansion.

TABLE 2.2-2 APPROXIMATE ANNUAL PROCESS VALUES

Operating Parameter	Approximate Annual Process Values		
	Average over last five years	**Post Expansion**	**Difference**
MSW Processed (tons)	610,000	910,000	300,000
Net Electrical (mWh)	319,000	520,000	201,000
Combined Ash (tons)	92,000	137,000	45,000
RDF Processing Residuals (tons)	90,000	90,000	0
Ferrous/Non-ferrous Metals (tons)	21,000	31,000	10,000

Source: ISWMP (CCH, 2008a)

These five-year average values enable the estimation of future operating conditions after completion of the Expansion, although the exact values may vary depending on waste stream characteristics. This long-term mass balance demonstrates that current operations are reducing the mass of material delivered to the landfill by approximately 70 percent while generating approximately 0.5 mWh/ton of MSW processed and that approximately 4 percent of the MSW is ferrous and non-ferrous components that are recycled.

2.2.10 Materials Recovery/Recycling

The existing Facility has two different process steps to recover ferrous metal components and to enable recycling. The first step is a magnetic separator that removes ferrous constituents from bulk MSW. This ferrous material is then conveyed to more refined ferrous recovery processes. The second step is a ferrous and non-ferrous recovery system that separates metals, a noncombustible component of MSW, from the bottom ash.

In the Expansion Facility, metals are separated from the ash via a feed conveyor which will direct the ash from the trommel to a magnetic drum which separates the ferrous metal from the ash. The ash is then discharged onto a spreader feeder and past an eddy current separator to remove non-ferrous material.

Table 2.2-3 identifies the tons of ferrous and non-ferrous material recovered for recycling for years 2004 to 2006.

TABLE 2.2-3 FERROUS AND NON-FERROUS MATERIAL RECYCLED (TONS)

Year	Material	MSW Process	Bottom Ash	Total
2004	Ferrous	13,167	5,525	18,692
	Non-ferrous	---	1,847	1,847
	Total	13,167	7,372	20,539
2005	Ferrous	12,777	4,144	16,921
	Non-ferrous	---	1,652	1,652
	Total	12,777	5,796	18,573
2006	Ferrous	14,478	5,414	19,892
	Non-ferrous	---	2,034	2,034
	Total	14,478	7,448	21,926

Source: ISWMP (CCH, 2008a)

2.2.10.1 Ferrous Metal Recovery

<u>Units 1 and 2</u>
In the existing facility, following primary shredding, the coarsely shredded waste will be carried by an inclined belt conveyor to the magnetic separator. The equipment selected for the magnetic separation system consists of two electromagnetic drums. The secondary magnetic drum will take the separated ferrous metal away from the primary magnetic drum and direct it to the ferrous collection conveyor. Each magnetic separator is capable of continuously processing an average of 100 tons per hour of coarsely shredded waste and separating in excess of 80 percent of the magnetic ferrous scrap in the Acceptable Municipal Solid Waste.

The ferrous collection conveyors transport the magnetically separated ferrous metal to the Enhanced Ferrous Metal recovery system which consists of a non-shreddable picking station, a vertical shaft Ferrous Metal Shredder, and an air classifier. Non-shreddable material is removed from the ferrous shredder feed conveyor at a manual picking station. This non-shredded metal material is loaded into a trailer and hauled to the appropriate metal recycling facility. The shreddable metal material is fed into a vertical shaft hammer mill and shredded to nugget size piece. Adhering paper and plastic material (fluff) are liberated during the shredding process and recovered in an air classifier. The fluff is loaded into a trailer which is subsequently discharged into the RDF storage area or returned to the MSW tip floor. The shredded metal is recovered by a rotating magnet drum, loaded via transport and shuttle conveyors into trailers and hauled to an appropriate metal recycling facility. The Enhanced Ferrous Metal Recovery system can be by-passed. The by-passed separated ferrous metal is loaded via transport and shuttle conveyors into trailers

Unit 3 (Expansion Facility)
In the Expansion facility, a feed conveyor will direct the ash from the trommel to a magnetic drum which separates the ferrous metal from the ash. Items larger than 10 inches will be separated at the grizzly scalper, because the design of the ferrous separation system requires that the magnetic separator be located as close as possible to the residue stream in order to achieve the desired high ferrous recovery rate of 80 percent by weight of all magnetic ferrous contained in ash which contains at least 8 percent (by net weight) of magnetic ferrous materials greater than 1 inch in size in all dimensions but less than 10 inches.

2.2.10.2 Bottom Ash Metal Recovery System

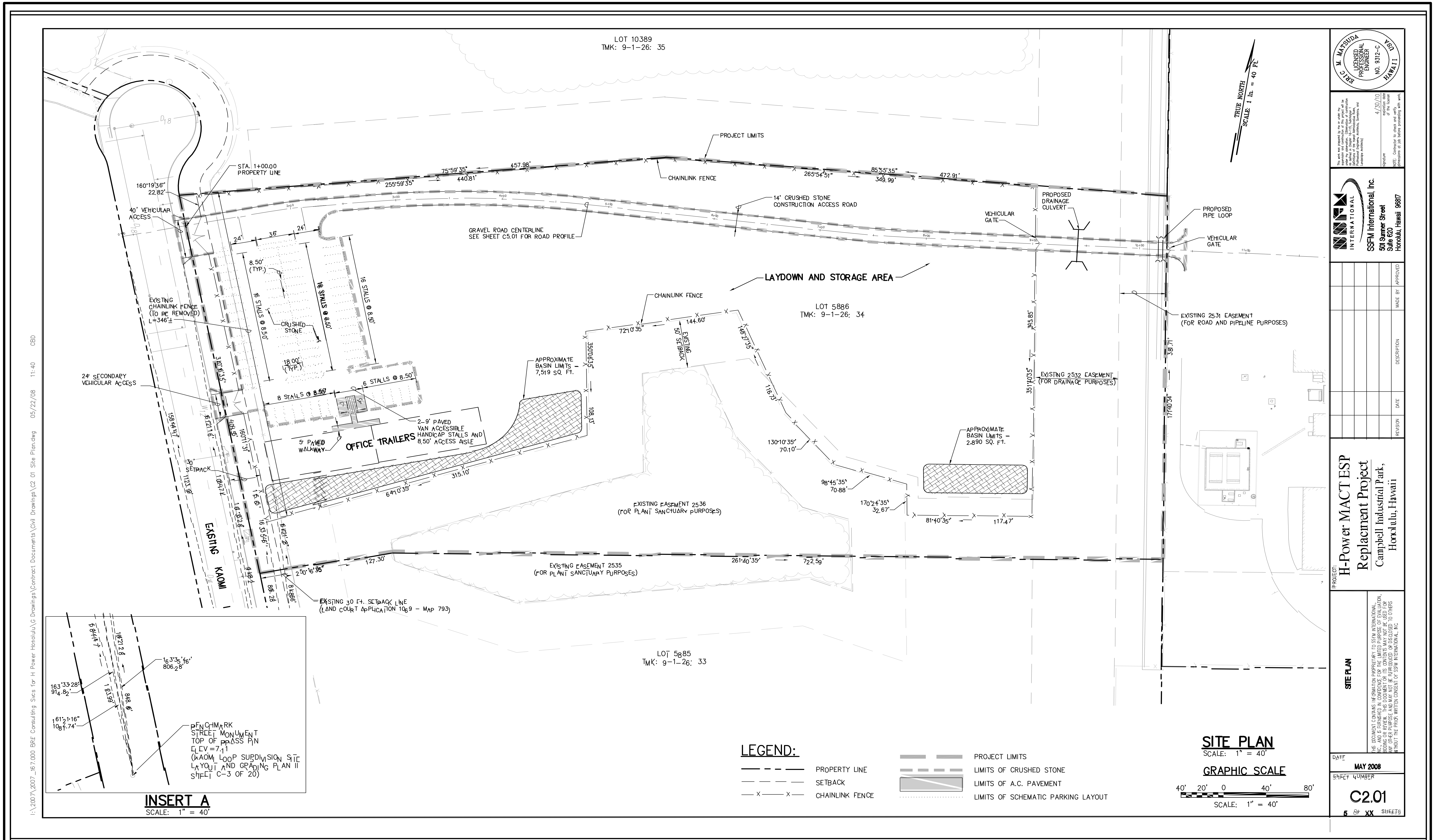
Unit 1 and 2
In the existing facility, each of the steam generators is equipped with a submerged scrapper conveyor (SSC) for management of bottom ash. As ash is discharged from the SSC, it falls onto the main transport belt conveyor. This conveyor transports ash from the boiler building to either the Bottom Ash Metal Recovery System (BAMRS) or the ash tower where it is combined with fly ash and loaded into trailers.

The bottom ash in the BAMRS is conveyed through a magnet to remove the coarse ferrous materials, then through a finger screen separator to remove material greater than 4 inches (overs). These materials are collected in roll-off storage containers. The materials greater than 4 inches may be sent back to the tip floor if further size reduction is necessary. All of this recovered metal is recycled. The bottom ash is classified by size: (1) Material between 3/8" and 4" and (2) fine material (3/8" or less). The fine material will be conveyed back to the ash tower. The coarse material is further processed and fine ferrous and non-ferrous metals are removed. The coarse ash material (less metals) is conveyed with the fine material back to the ash tower where it is mixed with the fly ash.

Unit 3 (Expansion Facility)
In the Expansion facility, a feed conveyor will direct the ash to a magnetic drum which separates the ferrous metal from the ash. The ash is then discharged onto a spreader feeder and past an eddy current separator to remove non-ferrous material. The system will include all necessary chute work and product distribution conveyors.

2.2.10.3 Temporary Construction Phase Elements

Temporary construction vehicle parking and equipment laydown areas will be required at the H-POWER site during the Expansion Project. Figure 2.3-1 provides a site plan depicting the areas to be used for temporary construction activities, as well as areas to be avoided. Table 2.3-1, Construction Matrix, provides a summary of the staffing and trucking trips on a monthly basis. As shown on Table 2.3-1, the highest construction activity month is anticipated to occur approximately between months 10 through 13 and 21 through 24 after project initiation. Months 10 through 13, have a higher number of trucking trips at approximately 240 truck deliveries (trips/month), while the expected staffing on site range between 69 and 90 personnel. During months 21 through 24, approximately 165 staff will be on site, and approximately 120 truck deliveries (trips/month) will be required to construct the facility.



CONSTRUCTION FACILITIES SITE PLAN

FIGURE 2.3-1

Figure 2.3-1 back side

TABLE 2.3-1 CONSTRUCTION STAFFING AND DELIVERY MATRIX

	Total	**Month**																													
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Staffing																															
GC		30	30	30	30	30	30	40	40	50	50	50	50	50	40	40	35	30	30	30	20	20	20	20	15	15	15	5	5	5	5
Boiler															40	40	40	40	40	40	40	40	40	40	40	30	30	10			
APC																	20	20	20	20	30	30	30	30	30	30	15				
T/G																									15	15	15	15	15	15	
Mechanical														10	10	10	10	15	15	20	20	25	25	25	25	20	20	20	20	20	15
Electrical				2	2	2	2	2	4	4	4	4	10	15	20	20	20	25	25	25	30	30	30	30	25	25	25	25	20	15	10
Administrative/Management		5	5	5	10	10	10	10	10	10	15	15	15	15	15	15	20	20	20	20	20	20	20	20	15	15	15	15	25	10	10
Total		**35**	**35**	**37**	**42**	**42**	**42**	**52**	**54**	**64**	**69**	**69**	**75**	**90**	**125**	**125**	**145**	**150**	**150**	**155**	**160**	**165**	**165**	**165**	**165**	**150**	**135**	**90**	**85**	**65**	**40**
Trucking Trips per Month																															
Excavation and Backfill	240	80	80	80																											
Concrete	700							100	100	100	100	100	100	100																	
Boiler	560		80	80	80	80	80	80	80																						
APC	560										80	80	80	80	80	80	80														
Turbine Generator	120																						60	40	20						
General Deliveries	1800	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Total	3980	**140**	**220**	**220**	**140**	**140**	**140**	**240**	**240**	**160**	**240**	**240**	**240**	**240**	**140**	**140**	**140**	**60**	**60**	**60**	**60**	**60**	**120**	**100**	**80**	**60**	**60**	**60**	**60**	**60**	**60**

2.2.10.4 Construction Parking

Parking will be in an area owned by the City that is adjacent to the facility but separate from plant personnel parking. It will have a separate entrance and exit. The area will have a vehicle capacity of approximately 200 vehicles and security provisions.

2.2.10.5 Equipment Laydown

An area owned by the City that is adjacent to the facility (Parcel 33 and portions of Parcel 34) will be used for materials storage, construction activity, staging and fabrication work. Construction vehicle and equipment movement between the facility and this temporary storage site will require the existing process steam line between AES and the Chevron refinery to be modified.

3.0 REQUIRED APPROVALS AND PERMITS

This chapter describes the approvals and permits required prior to construction of the proposed Expansion. Each approval/permit is identified in Table 3.0-1 along with the approving agency and status.

TABLE 3.0-1 REQUIRED APPROVALS AND PERMITS

Approving Agency/Authority	Approval/Permit	Status
FEDERAL		
Federal Aviation Administration (FAA)	Notice of Construction	To Be Submitted
STATE		
Hawaii Department of Health (HDOH), Clean Air Branch	Covered Source/PSD Air Permit, Chapter 60.1 of Title 11 of HAR	Application Pending
HDOH, Clean Water Branch	Notice of General Permit Coverage NPDES Construction Stormwater Discharge Permit	To Be Submitted
HDOH, Clean Water Branch	NPDES General (operational) Stormwater Discharge Permit	To Be Submitted
HDOH, Indoor and Radiological Health Branch	Construction Noise Permit	To Be Submitted
HDOH, Safe Drinking Water Branch	UIC Permit Modification	Application Pending
HDOH, Solid and Hazardous Waste Branch	Solid Waste Management Permit	Application Pending
DLNR, Commission on Water Resource Management	Groundwater Use Permit Modification	Permit Granted
DLNR, Commission on Water Resource Management	Well Construction / Pump Installation Permit	To Be Submitted
CITY		
City and County of Honolulu Department of Planning and Permitting (DPP)	Building Permit	To Be Submitted
City and County of Honolulu Department of Planning and Permitting (DPP)	Conditional Use Permit Modification	To Be Submitted
City and County of Honolulu Department of Planning and Permitting (DPP)	Grading Permit and Drainage Plan Approval	To Be Submitted
City Department of Environmental Services	Construction Dewatering Permit	To Be Submitted

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4.0 ASSESSMENT OF THE EXISTING NATURAL ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

This chapter describes the existing natural environment of the areas that would potentially be affected by the proposed H-POWER Expansion. These areas include the existing H-POWER site as well as the adjoining parcels proposed for temporary storage of construction equipment, pre-fabrication activities, and for construction parking and trailers. This discussion is organized by topic (e.g., geology and soils, climate and air quality, surface water, groundwater, and biological resources).

This chapter also assesses the environmental consequences of the Expansion. Within each topic, potential temporary and permanent impacts are described and evaluated and mitigation measures that would eliminate and/or reduce potential adverse impacts are identified.

4.1 Geology and Soils

This section discusses the existing geologic environment. Baseline conditions are presented in the context of prior site work that has impacted original conditions on both the site and the proposed laydown area. The potential impacts of the proposed Expansion are evaluated as well as the potential for geologic hazards that may be encountered.

4.1.1 Existing Conditions – Geology and Soils

The Hawaiian Islands are the exposed parts of the Hawaiian Ridge, a large volcanic mountain range extending northwestward across the central Pacific Ocean (USGS 1999). The island of O'ahu is the eroded remnant of two volcanoes – the older Waianae Volcano in the west and the larger Koolau Volcano in the east. Clastic sedimentary deposits, which primarily are alluvium derived from erosion of the volcanic rocks, have accumulated on the flanks of the island. In some places, the clastic sediments are interbedded with coralline limestone that formed as reef deposits in shallow marine waters. O'ahu has larger areas of sedimentary deposits than any other Hawaiian island and these deposits contain coralline limestone in coastal areas (USGS 1999).

The proposed H-POWER Expansion, including the adjacent construction laydown and parking areas, is situated within the JCIP in Kapolei, Hawaii. This area is underlain by the 'Ewa Plain, which is an emerged coral-algae limestone reef formed during the Pleistocene period when the ocean level was at higher elevation (C.E. Maguire 1986). The 'Ewa Plain extends from sea level at the coastline to approximately 3 to 5 miles inland. Figure 4.1-1, excerpted from a 1986 geotechnical report by C.E. Maguire, presents the extent of the emerged reef deposits on the island of O'ahu and specifically in the project area. The following local and site-specific information is in large measure excerpted from that 1986 final geotechnical report conducted for the original H-POWER facility.

The local geology is typical of mid-Pacific volcanic islands in that the central volcanic core is surrounded and sometimes overlain by a coastal plain of interbedded marine sediments, alluvium, and coral reef formations. In the area of the H-POWER site, on the basis of a projected dip slope of 5 degrees from the volcanic formation, this overlying coastal plain is estimated to be 600 to 800 feet thick (C.E. Maguire 1986). The coral reef deposits on-site in 1986 (pre-construction of H-POWER) were typical of those found throughout the Barbers Point area. The surficial layer typically consists of corals, calcareous algae, cemented beach sand, and cemented mixtures of coralline sand, gravel and coral fragments often termed “coral rock”. This coral rock often contains cavities of various sizes and at various depths. The ground surface topography is termed “shallow karst” topography marked by small sink holes generally 0.5 to 3.0 feet in diameter and from approximately 3 to 10 feet deep, which have been dissolved out of the limestone by fresh rain water (C.E. Maguire 1986).

Soil throughout the area, and underlying both the H-POWER site and the laydown parcels, is classified as Coral Outcrop by the United States Department of Agriculture (USDA) Soil Conservation Service (USDA SCS 1965). This soils data is mapped on Figure 4.1-2.

4.1.1.1 H-POWER

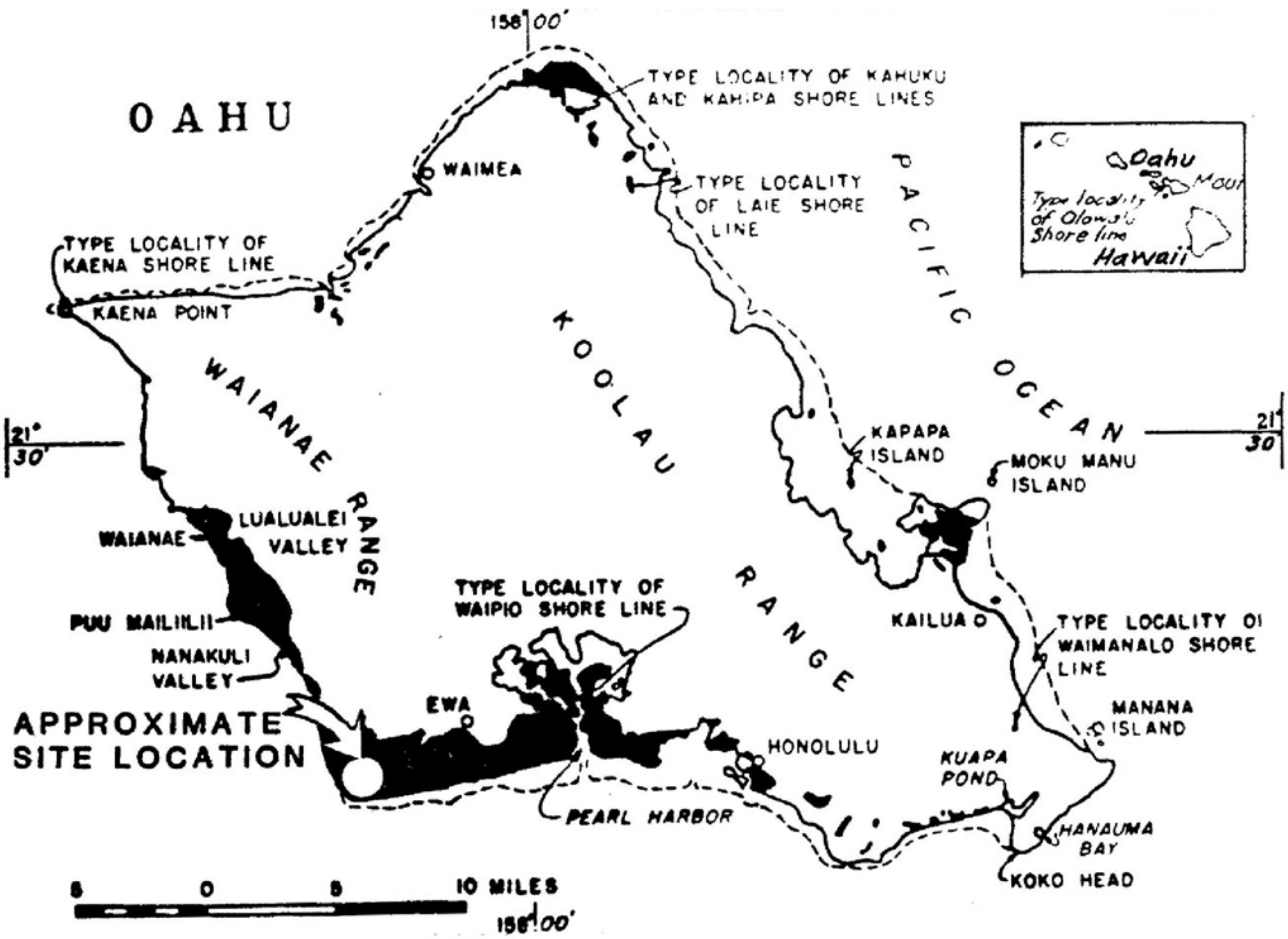
Prior to construction of the existing H-POWER facility, vegetation was cleared and grubbed in preparation for a proposed refinery project in 1969. Many of the site sinkholes in the area were loosely filled during the site clearing of 1969. In 1985 H-POWER was constructed in accordance with the site preparation and foundation recommendations developed by the geotechnical consultant, C.E. Maguire. Site preparation included initial site subgrade preparation, consisting of clearing, grubbing and stripping of soft silty organic topsoil from the site. Site preparation also consisted of repairing surface cavities and leveling the site. A systematic probing, breakdown and grouting of below surface voids proceeded where cavities were identified. General surface cavity repair was conducted. Proof rolling (with 100 ton vehicles) to detect cavities or weak areas was also conducted in roadways, important equipment areas and footing areas. In areas where excavation was required, heavy equipment was used, but blasting was not permitted due to possible damage to structures supporting coral rock. Thus extensive geologic excavation and the addition of structural fill and construction components have changed much of the native conditions once found on the H-POWER site and increased the site’s suitability for construction.

4.1.1.2 Construction Laydown Area (Tax Map Key number 9-1-026:033 and 034)

As noted above, soil throughout the area, and underlying the laydown parcels, is classified as Coral Outcrop by the USDA Soil Conservation Service (USDA SCS 1965). Field reconnaissance of the construction laydown parcels indicates that clearing and grubbing activities of unknown date have occurred but that the parcels are currently undeveloped and dominated by brushland with interspersed stands of low lying herbaceous plants. Where soils are exposed, in the tracks left by recreational vehicles and in cleared areas, they are comprised of a very shallow (0-6” bgs) silt with sand surface soil layer over coral outcrop bedrock. Field observations of surface soil indicated a chroma range from 3 to 4, and very little organic matter present in the soils. No mottles or gleying were observed in the soils.

4.1.2 Impacts and Mitigation

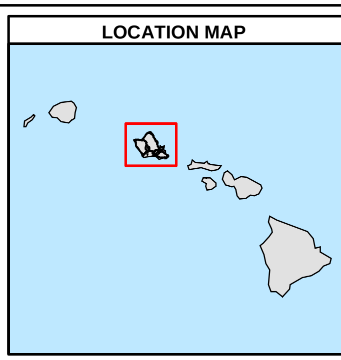
Though native geology and soils conditions are relatively similar throughout the H-POWER site and the adjacent construction laydown parcels, the construction impacts and mitigation measures



LEGEND

- EMERGED REEFS[1]
- FRINGING REEFS[1]

[1] FROM "GEOLOGY OF THE HAWAIIAN ISLANDS", STERNS, 1969



NOTES & SOURCES
MAP COORDINATES:
UTM NAD83, ZONE 4N, UNITS METERS

MAP SOURCE: HONOLULU RESOURCE RECOVERY VENTURE
CAMPBELL INDUSTRIAL PARK SITE
HONOLULU, HI
JANUARY, 1986
CE MAGUIRE, INC.

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

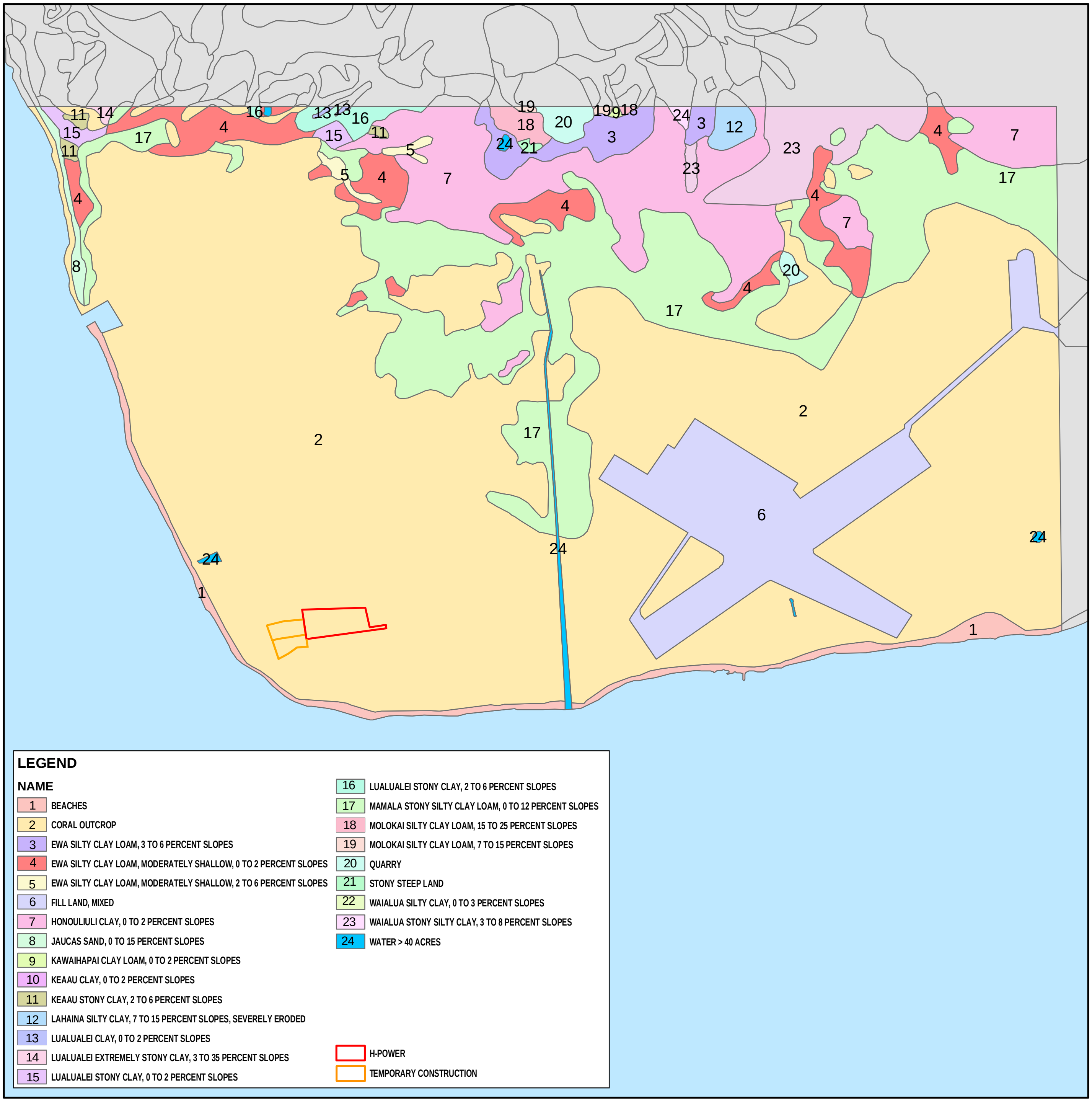
N

EMERGED AND FRINGING REEFS OF OAHU

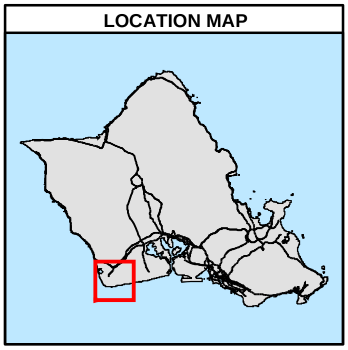
FIGURE 4.1-1

H:/H-POWER/MXD_CURRENT/ENVIRONMENTAL/REEFS.MXD
H:/H-POWER/EXPORT/ENVIRONMENTAL/REEFS.PDF
MARCH 4, 2005 DWN: RLO CHKD:

Figure 4.1-1 back side



LOCATION MAP



H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

NOTES & SOURCES
MAP COORDINATES:
UTM NAD83, ZONE 4N, UNITS METERS

SOILS: SOIL CONSERVATION SERVICE, 1996
DOWNLOADED FROM HAWAII DPP

N

0 2,500 FEET

amec

GENERALIZED SOILS

FIGURE 4.1-2

Figure 4.1-2 back side

for each area are anticipated to differ. This is due to the fact that proposed changes to H-POWER are permanent structural changes, whereas the laydown parcels are proposed to undergo temporary, predominantly non-structural impacts. The impacts and mitigation are addressed separately.

4.1.2.1 H-POWER Site

The proposed Expansion will require geotechnical excavation, similar to that already conducted at the site for the original H-POWER facility. On the basis of preliminary assessments made by potential contractors, reviewing the conceptual design, it is anticipated that some soils will be excavated and removed from the site and that some structural fill will be imported to complete preparation of the site prior to slab and footing construction and full construction of the Expansion. These impacts to site geology and soils will be permanent, but are required to ensure safe and secure foundations and structural integrity. Temporary storage of excavated soil and fill will occur on-site or at the adjacent laydown area.

Prior to excavation and stockpiling activities, one of the first steps in the construction process will be the installation of siltation barriers around the limit of work. The barriers will act as a boundary for the limit of work, minimizing intrusion into areas outside the construction footprint. In addition, the barriers will collect sediment that may be transported from the construction area and will prevent sediment from leaving the site or degrading the existing on-site stormwater collection system. The sedimentation barriers will remain in place throughout the construction effort. Routine inspections will be undertaken to ensure that their integrity is maintained, and to remove accumulated sediments following storm events.

Once site stabilization is completed, siltation barriers will be removed.

4.1.2.2 Construction Laydown Area (Tax Map Key Number 9-1-026:033 and 034)

As noted above, the parcels to be used on a temporary basis for construction parking and equipment laydown are in much the same condition that the H-POWER site was prior to construction of the facility in 1985. The parcels are representative of the local geology and soils conditions, and exhibits the same propensity for cavities of various sizes and at various depths. However, this parcel has been previously impacted by clearing and grubbing activities. In certain areas, the ground surface topography remains marked by small sinkholes generally 0.5 to 3.0 feet in diameter and estimated to be approximately 3 to 10 feet deep. However, because these parcels are proposed for temporary construction use only, geotechnical site preparation will be less involved than that proposed for the H-POWER site. Clearing, grubbing and grading will be needed, and since heavy equipment storage will be required, the laydown area will be proof rolled to ensure structural integrity. Limited grading will also be required to provide appropriate work and parking areas and to minimize potential stormwater runoff in work areas. Figure 2.3-1 (shown previously) depicts the design of the temporary laydown site and activities. Sufficient acreage exists to modify construction activities should constraints be encountered.

As noted above for the H-POWER site, prior to clearing and stockpiling activities, one of the first steps in the construction process will be the installation of siltation barriers around the limit of work. The barriers will act as a boundary for the limit of work, minimizing intrusion into areas outside the construction footprint and collecting sediment that may be transported from the construction area. In addition, because the laydown parcel contain a fenced area with protected species, this area is excluded from the zone of impact and will be surrounded by siltation barriers around the perimeter. In order to ensure that runoff from construction areas poses no detrimental effect upon this fenced resource, the siltation barriers will be arranged to include a 25-foot buffer area surrounding the enclosure. Once construction activities are completed, the site will be stabilized, and the siltation barriers will be removed. The fencing currently in place will be retained during construction and upon completion of the Expansion.

4.1.3 Geologic Hazards

This Section identifies and analyzes the potential geologic hazards within O'ahu and more specifically, the JCIP. There are four potential geologic hazards in this region that are evaluated below:

- Subsidence, Settlement and Karst
- Seismic Ground Shaking (earthquake)
- Volcanic Activity
- Tsunami

Subsidence and Settlement
As noted in Section 4.1.1, Existing Conditions- Geology and Soils, the principal geologic hazard in the region of both the H-POWER site and the construction laydown area consists of the "shallow karst" topography of this region. It is marked by small sink holes generally 0.5 to 3.0 feet in diameter and from approximately 3 to 10 feet deep, which have been dissolved out of the limestone by fresh rain water. Though previously cleared and grubbed, this shallow karst topography requires special construction measures to ensure the stability of foundations and to increase the load bearing capacity of the local soils.

Seismic Ground Shaking
The entire island of O'ahu is considered to be in Earthquake Hazard Zone 2A of the Uniform Building Code (UBC) seismic provisions (USGS 2001). This corresponds to a value of 0.075g to 0.15g, where g is gravitational force. The UBC seismic provisions contain six seismic zones, ranging from 0 (no chance of severe earthquake occurrence in a 50-year interval) to 4 (10 percent chance of severe earthquake occurrence in a 50-year interval).

The H-POWER Expansion will be constructed in accordance with the construction standards and seismic provisions of the UBC for Hazard Zone 2A.

Volcanic Activity
The island of O'ahu was formed by two volcanoes, the Waianae Range on the west side of the island and the Koolau Range on the east. Both of these volcanoes are now extinct. The Waianae Range is approximately 2.95 to 3.8 million years old and the Koolau Range is approximately 1.8 to 2.7 million years old (Keinle and Wood 1990). However, there has been volcanic activity on the island of O'ahu since these two volcanoes have gone extinct. The Honolulu Volcanic Series consisted of over 30 separate eruptions ranging from approximately 850,000 to 32,000 years ago (Abbott et. al. 1983). Although there has not been any volcanic activity on the island of O'ahu for over 30,000 years, there is a very slight possibility of future volcanic activity on O'ahu.

Tsunami
As quoted from the Honolulu City and County, Department of Emergency Management web site:

> Tsunamis, or seismic sea waves, potentially the most catastrophic of all ocean waves, are generated by tectonic displacement – for example, volcanism, landslides or earthquakes – of the sea floor, which in turn cause a sudden displacement of the water above and the formation of a small group of water waves having wavelength equal to the water depth (up to several thousand meters) at the point of origin. These waves can travel rapidly outward for thousands of kilometers while retaining substantial energy. Their speed-characteristic of gravity waves in shallow water and thus equal to the square root of gD, where g is the gravitational constant and D is the depth – is generally about 500 km/h (300mph), and their periods range from 5 to 60 minutes. In the open ocean their amplitude is usually less than 1 m (3.3 ft); thus tsunamis often go unnoticed by ships at sea. In very shallow water, however, they undergo the same type of increase in amplitude as swell approaching a beach. The resultant waves can be devastating to low-lying coastal areas; the 37-m (120-ft) waves from the 1883 Krakatoa eruption, for example, killed 36,000 people.

The characteristics of tsunamis as they approach shore are greatly affected by wave refraction over the local bathymetry. Tsunami-producing earthquakes usually exceed 6.5 on the Richter scale, and most tsunamis occur in the Pacific Ocean because of the seismic activity around its perimeter. A tsunami warning system for the Pacific Ocean has been established; it consists of strategically placed seismic stations and a communications network (Department of Emergency Management, 2008)

Figure 4.1-3, Tsunami Evacuation Zones, depicts the O‘ahu evacuation zone identified for the Expansion area in the event of Tsunami. The evacuation zones, shown on The Department of Emergency Management’s Tsunami Evacuation Map for Kahe Point to ‘Ewa Beach, include the majority of the H-POWER site and all of the construction laydown area., The Department of Emergency Management also notes that steel and/or concrete buildings of six or more stories in height should provide adequate protection if people move to the third floor or above. The H-POWER facility, though industrial, is of comparable height and scale and so may offer protection should no warning be available. However, in the event of advance warning issued by the Pacific Tsunami Warning Center (PTWC), Emergency Broadcast System or Civil Defense Sirens, H-POWER construction and/or operational staff will immediately begin shut down operations at the plant and evacuate to the designated Public Shelter Refuge Area, the Makakilo Elementary School or other identified location at a safe elevation. Facility Emergency Response Plans currently address this issue and all temporary construction personnel will be instructed on Emergency Response Procedures prior to initiating construction activities.

4.2 Climate and Air Quality

Section 4.2.1 discusses the existing climate and air quality of O‘ahu. Section 4.2.2 discusses the potential impacts of the proposed Expansion. Mitigation measures, such as emission control technologies are also evaluated.

4.2.1 Baseline Climate and Air Quality

Wind Direction and Speed

From October 1, 1992 through September 30, 1993 a meteorological tower within JCIP gathered the hourly weather data at several levels. Figure 4.2-1 illustrates the windrose generated from the data collected during this period. Figure 4.2-1 illustrates that the prevailing wind is dominated by the northeasterly trade winds. In addition, these data also show that the average wind speed is approximately 3.78 m/s at 10 meters.

Rainfall

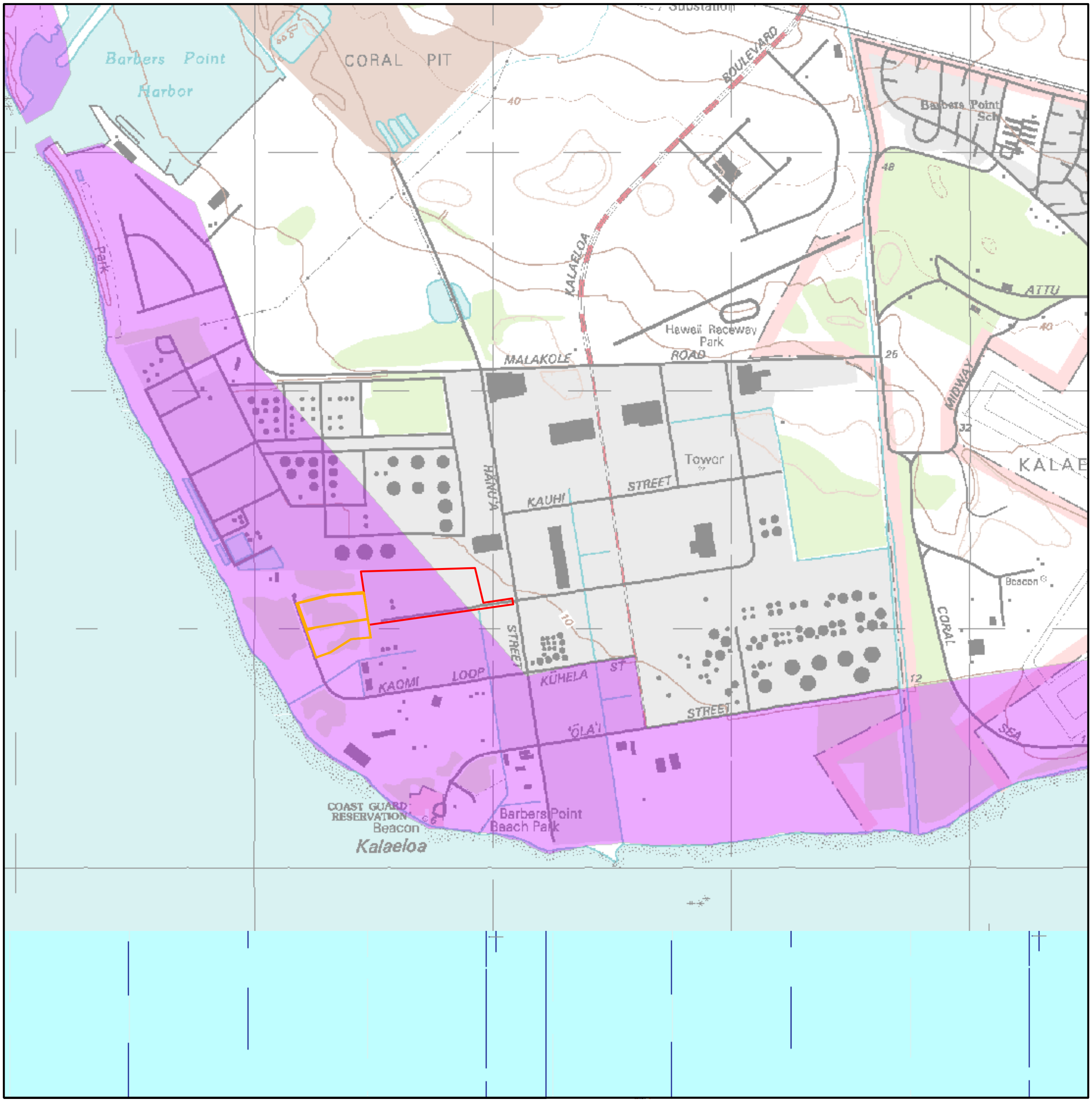
The rainfall recorded at the JCIP meteorological tower from October 1, 1992 through September 30, 1993 was 13.5 inches. The average rainfall recorded at the Honolulu NWS station over the 30-year period from 1971-2000 is 18.29 inches.

Temperature

The mean monthly temperature recorded at the JCIP station between October 1992 and September 1993 ranged from 70.16 degrees Fahrenheit to 78.3 degrees Fahrenheit, with an average of 74.6 degrees Fahrenheit. This compares well with the average monthly temperature recorded at the Honolulu NWS station between the 30-year period from 1961-1990, which is 77.2 degrees Fahrenheit.

Air Quality

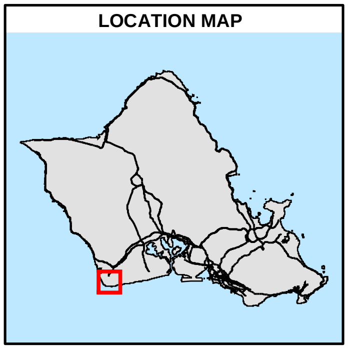
The area in the vicinity of JCIP is in attainment with the National Ambient Air Quality Standards (NAAQS) and the State Ambient Air Quality Standards (SAAQS) for the criteria air pollutants. Table 4.2-1 summarizes the maximum measured ambient air concentrations of criteria pollutants on O‘ahu ambient air monitoring stations in 2006. Table 4.2-1 shows that, in general, the air quality on O‘ahu is excellent.



LEGEND

- CONSTRUCTION LAYDOWN AREA
- H-POWER SITE BOUNDARY
- TSUNAMI EVACUATION ZONE

LOCATION MAP



NOTES & SOURCES
MAP COORDINATES:
UTM NAD83, ZONE 4N, UNITS METERS
TOPOGRAPHIC MAP SOURCE: USGS, 2000
TSUNAMI EVACUATION DATA:
PACIFIC DISASTER CENTER (PDC), 1998
DOWNLOADED FROM HAWAII STATEWIDE
GIS PROGRAM (2008)
URL: http://hawaii.gov/dbedt/gis/

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96862

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0 1,800 FEET

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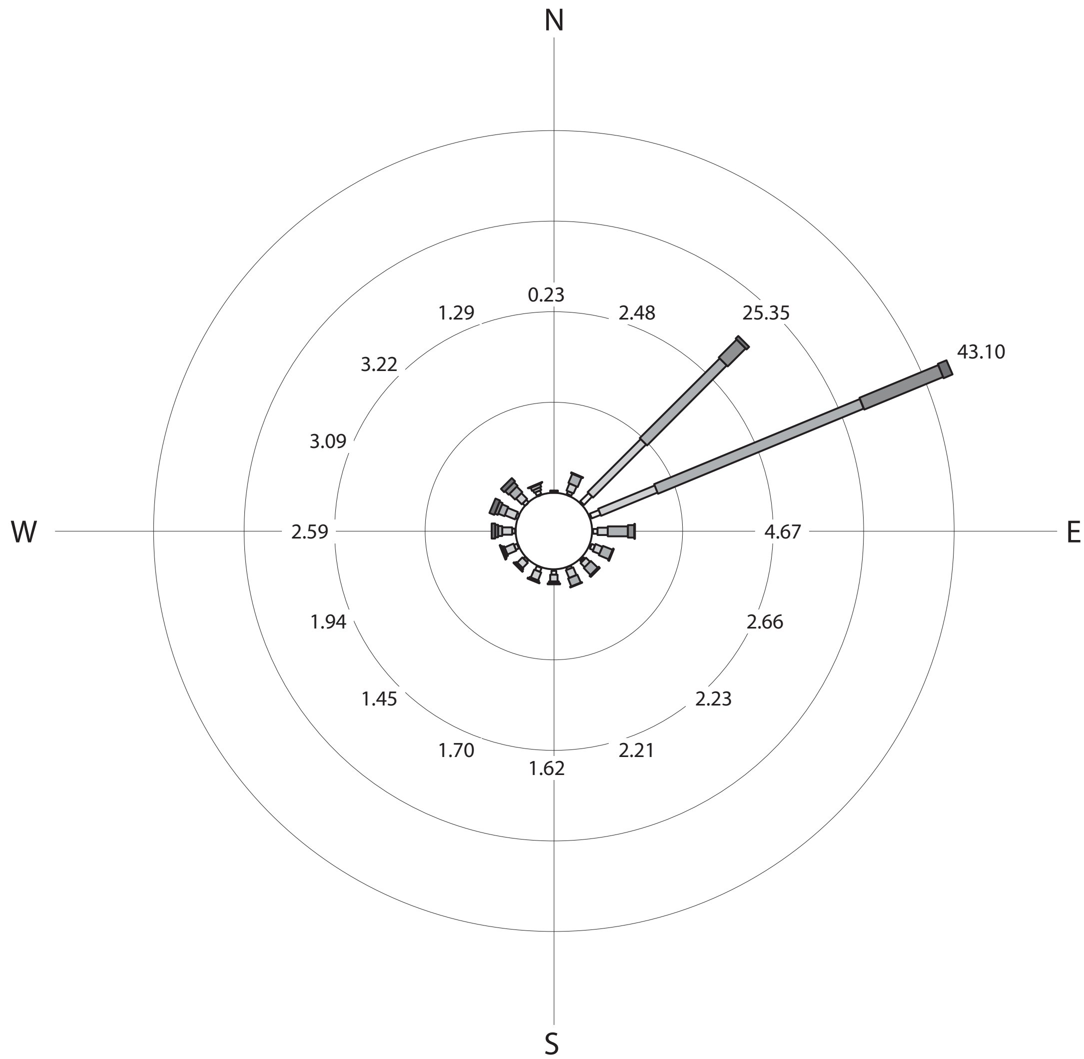
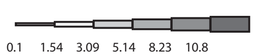
TSUNAMI EVACUATION ZONES

FIGURE 4.1-3

Figure 4.1-3 back side





WIND SPEED (METERS PER SECOND)

CALMS EXCLUDED.
RINGS DRAWN AT 10% INTERVALS.
WIND FLOW IS FROM THE DIRECTIONS SHOWN.
0.17% OF OBSERVATIONS WERE MISSING.

PERCENT OCCURRENCE: WIND SPEED (METERS PER SECOND)
LOWER BOUND OF CATEGORY

DIR	0.1	1.54	3.09	5.14	8.23	10.8
N	0.00	0.09	0.14	0.00	0.00	0.00
NNE	0.14	0.31	0.83	1.10	0.10	0.00
NE	0.16	1.26	8.30	12.46	2.80	0.38
ENE	0.17	1.07	6.74	24.60	9.44	1.07
E	0.07	0.49	1.14	2.21	0.70	0.06
ESE	0.19	0.38	0.82	1.15	0.11	0.00
SE	0.15	0.21	0.65	1.06	0.16	0.00
SSE	0.05	0.24	0.91	0.94	0.08	0.00

TOTAL OBS = 8759 MISSING OBS = 15

PERCENT OCCURRENCE: WIND SPEED (METERS PER SECOND)
LOWER BOUND OF CATEGORY

DIR	0.1	1.54	3.09	5.14	8.23	10.8
S	0.15	0.41	0.75	0.21	0.10	0.00
SSW	0.06	0.45	0.96	0.14	0.10	0.00
SW	0.06	0.25	0.82	0.22	0.10	0.00
WSW	0.09	0.37	1.05	0.22	0.11	0.10
W	0.06	0.32	1.08	0.45	0.31	0.38
WNW	0.02	0.24	1.21	0.73	0.34	0.55
NW	0.02	0.40	0.87	0.89	0.51	0.53
NNW	0.14	0.38	0.32	0.37	0.03	0.06

CALM OBS = 0

amec

JOINT FREQUENCY DISTRIBUTION FOR RAW DATA FILE 64 M CIP

FIGURE 4.2-1

Figure 4.2-1 back side

4.2.2 Impacts and Mitigation

The following presents an overview of the ambient air quality analysis requirements associated with the H-POWER Expansion and estimates of regulated air pollutants to be emitted from the new MWC unit. A complete air permit application was prepared and submitted to Hawaii Department of Health (HDOH) on October 24, 2008 for review and approval.

TABLE 4.2-1 AIR QUALITY DATA – O'AHU 2006

Pollutant	Averaging Period	Maximum Concentration (ug/m^3)	Lesser of NAAQS/ SAAQS (ug/m^3)	% of Standard	HDOH Monitoring Station
SO_2	3-Hr	62	1,300	5%	Makaiwa
SO_2	24-Hr	17	365	5%	Makaiwa
SO_2	Annual	5	80	6%	Kapolei
PM_{10}	24-Hr	59	150	39%	Kapolei
PM_{10}	Annual[(1)]	16	50	32%	Kapolei
$PM_{2.5}$	24-Hr	9	35	26%	Kapolei[(2)]
$PM_{2.5}$	Annual	4	15	27%	Kapolei
NO_2	Annual	9	70	13%	Kapolei
CO	1-Hr	1596	5,000	32%	Kapolei
CO	8-Hr	1183	10,000	12%	Kapolei
O_3	8Hr	83	157	53%	Sand Island
Lead	quarterly	NA [(3)]	1.5[(4)]	NA	NA

(1) The annual NAAQS has been revoked by USEPA.
(2) Maximum 24-hr concentration was flagged by HDOH as being elevated due to New Year's fireworks. Second highest value is shown.
(3) Ambient air monitoring for lead in Hawaii was discontinued in October 1997 with USEPA approval.
(4) USEPA signed the final rule to lower the lead NAAQS to 0.15 ug/m3 on a rolling 3-month basis on October 15, 2008. However, the final rule is not effective until 60 days after publication in the Federal Register.

4.2.2.1 New Source Review (NSR) Permitting

The federal New Source Review program was established to prevent degradation of air quality in regions of the country that are in attainment with the ambient air quality standards and to assist areas that are not in attainment with ambient air quality standards to attain the standards. The State of Hawaii is currently in attainment or unclassifiable for all criteria pollutants. Therefore, Prevention of Significant Deterioration (PSD) permits are required for major sources or major modifications. A modification to an existing PSD major source is deemed a major modification subject to PSD review if it results in a significant increase in emissions of any regulated pollutant.

The H-POWER facility is classified as a major source because it is a municipal waste combustor capable of charging more than 50 tons per day of MSW and it has the potential to emit more than 100 tons per year of at least one regulated pollutant. Construction of Unit 3 at the H-POWER facility constitutes a major modification to an existing major source because potential emissions of a number of regulated pollutants from the addition of the new Mass Burn unit exceed PSD significance levels. Therefore, addition of Unit 3 constitutes a major modification that is subject to PSD review. Units 1 and 2 will not be affected by this project, therefore Units 1 and 2 are not subject to further PSD review at this time.

The HDOH has been delegated authority by the USEPA to issue major source air permits in Hawaii. The HDOH has established a class of permit termed “Covered Source Permits” issued under Subchapter 5 of HAR §11-60.1 for major sources, sources subject to standards under Section 111 of the Clean Air Act, sources subject to emissions standards for hazardous air pollutants under Section 112 of the Clean Air Act, and any source subject to Prevention of Signification Deterioration (PSD) requirements. Covered Source Permits serve as both construction and operating (Clean Air Act Title V) permits for Covered Sources. As an existing major source, the H-POWER facility operates under a Covered Source Permit (CSP No. 0255-01-C).

Modifications to existing Covered Source Permits (CSPs) are classified as either minor modifications or significant modifications. As described above, and according to HDOH regulations, the facility will require a major modification to the existing Covered Source Permit under Subchapter 5 of HAR §11-60.1, and the application for major modification must also include all of the information required under Subchapter 7 of HAR §11-60.1 (Prevention of Signification Deterioration Review).

The revised Covered Source Permit will provide construction approval for the new third unit and incorporate PSD required terms and conditions, e.g., application of best available control technology (BACT), for the new unit into the existing CSP.

In addition, as a new large MWC, the third unit is subject to federal New Source Performance Standard (NSPS) requirements under 40 CFR Part 60 subpart Eb, which include the application of Maximum Achievable Control Technology (MACT) standards for Hazardous Air Pollutants (HAPs). The air pollution control equipment that will be installed with the new unit will enable compliance with the MACT requirements. The revised Covered Source Permit will incorporate the MACT requirements for the new unit into the existing CSP.

4.2.2.2 Air Emissions Information

Table 4.2-2 presents estimated emissions of PSD-regulated air pollutants for the new unit. The table also identifies which air pollutants exceed their respective PSD significant emission increase threshold.

It is important to recognize, as noted on Table 4.2-2, that certain pollutants covered by HDOH's air pollution control regulation as defined under section 11-60.1-1 do not have specific significant net emission increase values. These air contaminants are pollutants that are subject to regulation pursuant to the Clean Air Act (CAA). More specifically, as it conforms to the adoption of HDOH's PSD regulations, these pollutants are those air contaminants regulated under the CAA prior to passage of the 1990 amendments. The PSD significant net emission increase threshold for any of these pollutants is "any emission rate".

Table 4.2-3 presents the Eb MACT emission standards for new MWC units. H-POWER will meet these MACT standards with the modern air pollution control systems that will be installed for the third unit.

4.2.2.3 Mitigation

Under HAR, section 11-60.1-140, a major modification shall apply BACT for each pollutant that results in a significant net emission increase. A detailed BACT analysis has been completed and is presented in the Covered Source air permit application that was submitted to HDOH.

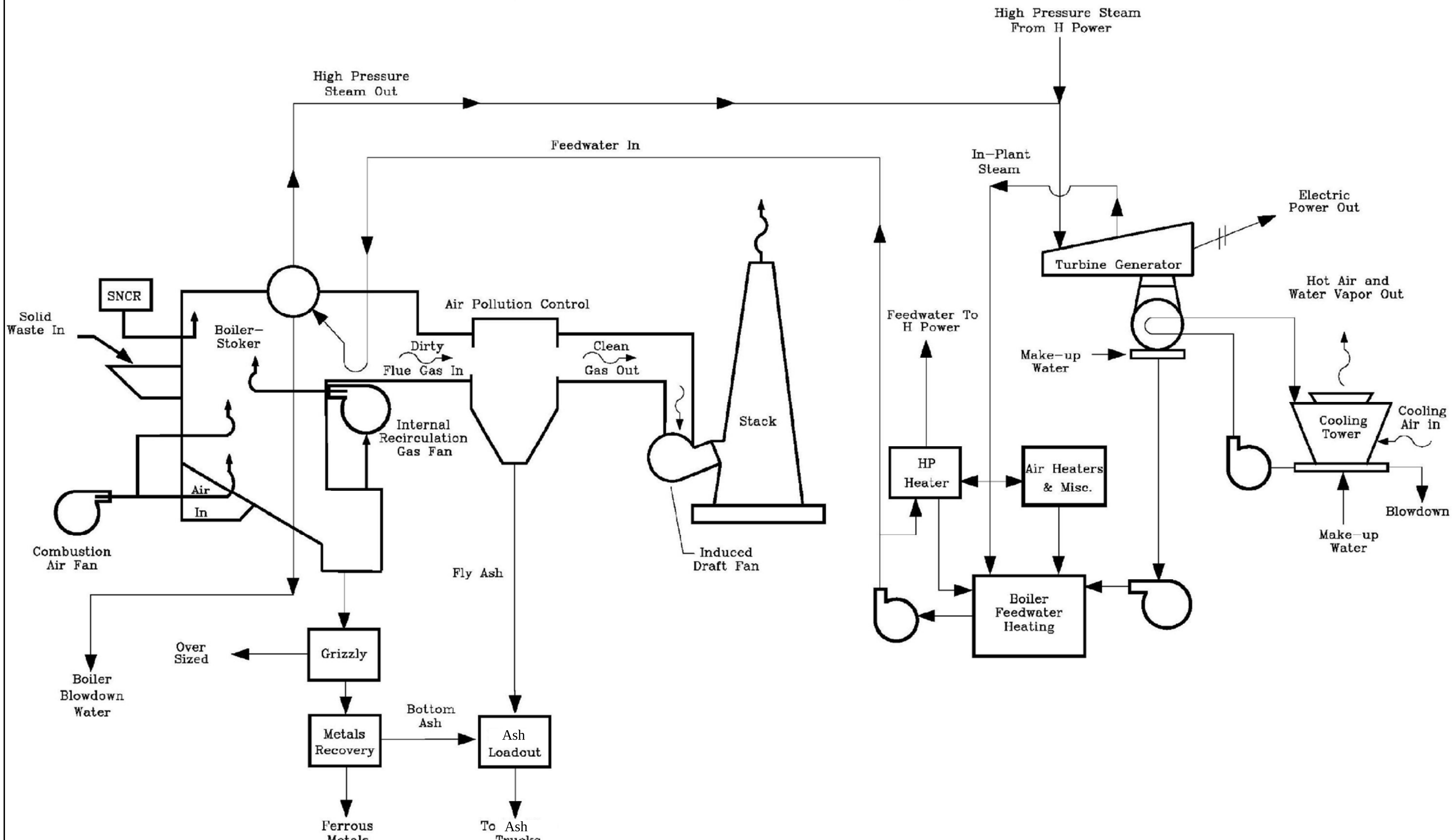
The following provides a brief description of the air pollution control devices that will be installed and operated with the new unit and a summary of the BACT determinations for the PSD air pollutants that will be emitted from the new unit. These control devices also represent the application of MACT. Figure 4.2-2 presents a process flow diagram depicting the air pollution control equipment and flue gas handling system.

TABLE 4.2-2 COMPARISON OF TOTAL PROJECT POTENTIAL EMISSIONS TO HDOH PSD SIGNIFICANT NET EMISSION INCREASE THRESHOLDS

Potential Air Pollutant Emitted	Estimated Potential Emissions (tpy)	PSD Significance Level (tpy)	PSD Applicable?
Carbon monoxide	212.7	100	YES
Nitrogen oxides	314.6	40	YES
Sulfur dioxide	126.4	40	YES
Particulate Matter (PM)(1)	33.0(2)	25	YES
Particulate Matter < 10 microns (PM10)(1)	59.5(2)	15	YES
Particulate Matter < 2.5 microns (PM2.5)(1)	54.8(2)	10	YES
Ozone (as VOCs)	12.2	40	NO
Lead	0.26	0.6	NO
Fluorides	5.3	3	YES
Sulfuric acid mist	37.2	7	YES
Total reduced sulfur compounds (including H_2S)	NA(3)	10	NO
Chlorofluorocarbons 11, 12, 112, 114, 115	NA(3)	Any emission rate(4)	NO
Halons 1211, 1301, 2402	NA(3)	Any emission rate(4)	NO
Municipal Waste Combustor (MWC) Acid Gases (5)	195.8	40	YES
MWC Metals(6)	21.9	15	YES
MWC Organics (dioxins and furans)	2.38E-05	3.50E-06	YES

Notes:
(1) PM includes filterable particulate matter only; PM10 and PM2.5 include filterable + condensable.
(2) Total emissions for the Expansion including MWC and ancillary sources.
(3) Air pollutant not expected to be emitted from H-POWER therefore not applicable (NA).
(4) See text in this Section for discussion of pollutants covered by “any emission rate” threshold.
(5) MWC Acid Gases include sulfur dioxide and hydrogen chloride.
(6) According to 40CFR 52.21(b)(23), PSD applicability for MWC Metals is determined based on particulate matter.

Simplified Process Flow Diagram

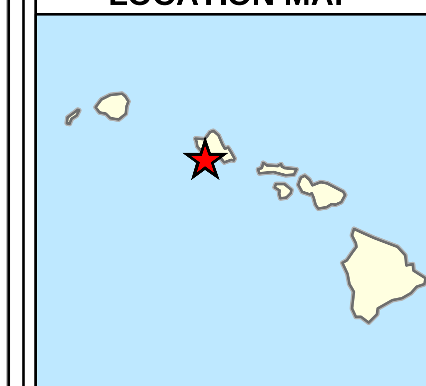


TITLE

PROCESS FLOW AND AIR POLLUTION CONTROL SYSTEM DIAGRAM

H-POWER
KAPOLEI, OAHU, HAWAII

LOCATION MAP



NOTES & SOURCES

SOURCE: COVANTA ENERGY, 2008

amec

AMEC EARTH AND ENVIRONMENTAL, INC.

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Sept 23, 2008 DWN: DJK CHKD: KMP

FIGURE
4.2-2

Figure 4.2-2 back side

TABLE 4.2-3 SUBPART Eb MACT EMISSION LIMITS FOR MASS BURN UNITS

AIR POLLUTANT/PARAMETER	Eb EMISSION LIMITS FOR MASS BURN UNITS(1)	UNITS	BACT(2)
Carbon monoxide	100	ppmdv	Same as Eb
Nitrogen oxides	180 – first year; 150 – thereafter	ppmdv	90 (annual) 110 (24 hr)
Sulfur dioxide	30 or 80% reduction(4)	ppmdv	44 (3-hr) (3) 26 (24-hr) 26 (annual) or 80% reduction(4)
Particulate matter(5)	20	mg/dscm	12
Lead	0.14	mg/dscm	Same as Eb
Cadmium	0.010	mg/dscm	Same as Eb
Mercury	0.05 or 85% reduction(4)	mg/dscm	0.028 or 85% reduction(4)
Hydrogen chloride	25 or 95% reduction(4)	ppmdv	Same as Eb
Dioxins and furans	13	ng/dscm	Same as Eb
Opacity	10	percent	NA

(1) All values corrected to 7% O_2.

(2) The best available control technology (BACT) analysis has determined that these pollutants have a more stringent emission limit than MACT.

(3) The 3-hr SO_2 block average concentration of 44 ppmdv @ 7% O_2 results in a maximum modeled concentration of 90% of the 3-hr SIL for SO_2.

(4) Achieve numerical value or percent reduction whichever is less stringent.

(5) Measured by USEPAMethod 5.

The sequence of air pollution control systems include:

- Good combustion control and furnace operating practices to control carbon monoxide (CO) and dioxin formation;
- VLN™ system and selective non-catalytic reduction system (SNCR) for NO_x control;
- Powdered activated carbon injection for control of mercury;
- Semi-dry alkaline (lime) scrubber to control sulfur dioxide (SO_2), sulfuric acid mist, fluorides, MWC acid gases (SO_2 and hydrogen chloride (HCl)), and
- Fabric filter to control particulate matter (total suspended particulates, particulate matter 10 microns or less (PM10), and particulate matter of 2.5 microns or less)) and particulate bound-SO_2, metals, sulfuric acid, and MWC Acid Gases and Organics.

Table 4.2-4 lists the expected removal efficiencies of the various control systems for the target air pollutant.

TABLE 4.2-4 EXPECTED REMOVAL EFFICIENCY OF CONTROL SYSTEMS

Pollutant	Control System[1]	Expected Removal Efficiency (%)
Carbon monoxide	GCP	NA[2]
Nitrogen oxides	VLN™, SNCR	74
Sulfur dioxide	DS, FF	80
Total suspended particulates (TSP), MWC Metals	FF	99
Particulate Matter < 10 microns (PM10)	FF	99
Mercury	CI,DS,FF	>85
Sulfuric acid mist	DS,FF	80
Fluorides	DS,FF	80
MWC Acid Gases	DS,FF	>95[3]
MWC Organics (dioxins and furans)	GCP,DS,FF	> 95

(1) Air pollution control equipment key:
VLN™= Very low NOx system design
GCP = Good Combustion Practice
FF = Fabric Filter (baghouse)
SNCR = Selective Non-catalytic Reduction
DS = Semi-dry Scrubber
CI = Carbon Injection

(2) Not available; control inherent to furnace design and operation.

(3) HCl is used to establish an estimated removal efficiency

It is important to recognize that the air pollution control (APC) system to be installed with the new Unit 3 represents the highest level of control identified by USEPA during its rulemaking of the New Source Performance Standards for new MWCs. This APC train of GCP, SNCR, CI, DS, and FF was established as the MACT floor for new MWCs as the most stringent level of emission control achieved in practice by the best controlled similar MWCs.

Table 4.2-5 below presents the results of the BACT determination. It is important to note that the BACT analysis determined that some pollutants have a more stringent emission limit than MACT.

TABLE 4.2-5 RESULTS OF BACT DETERMINATION FOR NEW UNIT AT H-POWER

PSD Pollutant	BACT/MACT Emission Limit	BACT/MACT Method of Control
Carbon monoxide	100 ppmdv, at 7% O_2 as a four hour block average	Good Combustion Practices (GCP)
Nitrogen oxides	110 ppmdv, at 7% O_2 as a 24 hour block average 90 ppmdv, at 7% O_2 as an annual average	GCP and SNCR
Sulfur dioxide	26 ppmdv or 80% reduction, at 7% O_2 as a 24 hour block average 26 ppmdv or 80% reduction, at 7% O_2 as an annual average 44 ppmdv or 80% reduction at 7% O_2 as a 3-hour block average	Spray Dryer Absorber
Particulate Matter[(2)] and MWC Metals	PM: 12 mg/dscm, at 7% O_2 Cadmium: 10 µg/dscm, at 7% O_2 Lead: 140 µg/dscm, at 7% O_2 Mercury: 28 µg/dscm, at 7% O_2	Activated Carbon Injection[(1)] (Hg only), Spray Dryer Absorber, and Fabric Filter
Particulate Matter< 10 microns (PM10)[(2)]	32 mg/dscm, corrected to 7% O_2	Fabric Filter
Particulate Matter < 2.5 microns (PM2.5)[(2)]	30 mg/dscm, corrected to 7% O_2	SNCR, Spray Dryer Absorber, and Fabric Filter
Sulfuric acid mist	5 ppmdv, at 7% O_2	Spray Dryer Absorber
Fluorides	3.5 ppmdv, at 7% O_2	Spray Dryer Absorber
MWC Acid Gases	SO_2 – as above HCl: 25 ppmdv or 95% reduction, at 7% O_2	Spray Dryer Absorber
MWC Organics (dioxins and furans)	13 ng/dscm, at 7% O_2	GCP, Spray Dryer Absorber, Fabric Filter

(1) Operation of the activated carbon system is dependent on compliance test results.
(2) PM includes only filterable particulate matter; PM10 and PM2.5 include filterable + condensable.

4.2.2.4 Impacts

The PSD review process requires an evaluation of ambient air quality impacts associated with a proposed project. The components of the ambient air quality impacts analysis are:

- Demonstrations that the new emission source will comply with PSD allowable incremental increases of ambient air concentrations; and
- Demonstrations that the new emission source together with other sources in the region will comply with NAAQS and SAAQS.

The allowable PSD increment is the maximum increase in concentration that is allowed to occur above baseline values in an area for a given pollutant. This allowable increment may not be exceeded by the combination of the impact of any new source of emissions and other neighboring sources that have triggered PSD review previously in the same area.

Modeling Results

Compliance with the PSD increment and NAAQS and SAAQS has been demonstrated using USEPA-approved air dispersion modeling methods. The air quality model uses information on source locations, emission rates of pollutants, and topographic and meteorological data to predict the changes in ambient air quality concentrations that may result from construction of the proposed new MWC Unit.

Air dispersion modeling also was used to calculate ambient air quality concentrations of Hazardous Air Pollutants (HAPs) to provide information to assess health impacts based on inhalation.

The following summarizes the results of the ambient air quality impacts analysis that was completed as part of the HDOH air permitting process.

AERMOD was programmed to compute maximum predicted pollutant concentrations for averaging times that are relevant to each pollutant. The results of the modeling using the 1992/1993 JCIP meteorological data are summarized in Tables 4.2-6, 4.2-7, 4.2-8 and 4.2-9 for scenarios 1 though 4, respectively. These tables also compare the maximum predicted results with their respective PSD Significant Impact Levels (SILs). According to the USEPA, compliance with the PSD increments and NAAQS is demonstrated if modeling results are less than SILs.

As shown in Tables 4.2-6 through 4.2-9, all maximum predicted concentrations of the modeled pollutants are below their respective SILs. Based on these modeling results, the proposed modification, though defined as a major modification, will not contribute significantly to PSD increment consumption or to the deterioration of air quality as measured with the NAAQS/SAAQS.

Other Regulated Pollutants

Table 4.2-10 presents a comparison of the maximum eight-hour ambient air concentration to 1/100 of the time limited value (TLV) – time weighted average (TWA) for non-carcinogenic HAPs. Table 4.2-11 presents a comparison of the maximum annual average ambient air concentration to 1/420 of the TLV-TWA for non-carcinogenic HAPs. Table 4.2-12 presents a comparison of carcinogenic HAPs with corresponding HDOH thresholds.

TABLE 4.2-6 SUMMARY OF SIGNIFICANT IMPACT ANALYSIS MODELING FOR H-POWER – OPERATIONAL SCENARIO 1: UNIT 3 @ 110% MCR, 6400 BTU/LB

Pollutant	Estimated Emission Rate For Unit 3	Estimated Emission Rate For Cooling Towers[1]	Estimated Emission Rate For Carbon Silo	Estimated Emission Rate For Lime Silo	Estimated Emission Rate Vehicle Dust	Highest Predicted Concentration ($\mu g/m^3$)					PSD Sig Impact Levels ($\mu g/m^3$)[3]				
	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/ft^2-hr)	ANNUAL	1-HR	3-HR	8-HR	24-HR	ANNUAL	1-HR	3-HR	8-HR	24-HR
Carbon monoxide	48.6	NA[4]	NA	NA	NA		38		16.4			2000		500	
Nitrogen dioxide	71.8	NA	NA	NA	NA	0.33					1.0				
Sulfur dioxide[2]	28.9	NA	NA	NA	NA	0.96		22		3.4	1.0		25		5.0
PM-10	13.4	0.188	0.00027[5]	0.0035[5]	2.5E-07	0.72				2.0	1.0				5.0
PM-2.5	12.5	0.0027	0.00027[5]	0.0035[5]	3.6E-08	0.43				1.5					

[1] Emission rates shown represent the sum of the three cooling tower cells.

[2] Emission rates correspond to 24-hr and annual average time periods. Modeled 3-hr concentration is based on a 48.8 lb/hr (44 ppmdv7).

[3] USEPA has not yet promulgated $PM_{2.5}$ SILs.

[4] Not applicable.

[5] Value shown is the annual average emission rate. 24-hour average emission rates are 0.0106 lbs/hr for both PM-10 and PM-2.5.

TABLE 4.2-7 SUMMARY OF SIGNIFICANT IMPACT ANALYSIS MODELING FOR H-POWER – OPERATIONAL SCENARIO 2: UNIT 3 @ 110% MCR, 4420 BTU/LB

Pollutant	Estimated Emission Rate For Unit 3	Estimated Emission Rate For Cooling Towers[1]	Estimated Emission Rate For Carbon Silo	Estimated Emission Rate For Lime Silo	Estimated Emission Rate Vehicle Dust	Highest Predicted Concentration ($\mu g/m^3$)					PSD Sig Impact Levels ($\mu g/m^3$)[3]				
	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/ft^2-hr)	ANNUAL	1-HR	3-HR	8-HR	24-HR	ANNUAL	1-HR	3-HR	8-HR	24-HR
Carbon monoxide	48.0	NA[4]	NA	NA	NA		38		16.0			2000		500	
Nitrogen dioxide	71.2	NA	NA	NA	NA	0.32					1.0				
Sulfur dioxide[2]	28.5	NA	NA	NA	NA	0.94		22		3.3	1.0		25		5.0
PM-10	13.2	0.188	0.00027[5]	0.0035[5]	2.5E-07	0.71				2.0	1.0				5.0
PM-2.5	12.4	0.0027	0.00027[5]	0.0035[5]	3.6E-08	0.42				1.5					

(1) Emission rates shown represent the sum of the three cooling tower cells.

(2) Emission rates correspond to 24-hr and annual average time periods. Modeled 3-hr concentration is based on a 48.2 lb/hr (44 ppmdv7).

(3) USEPA has not yet promulgated $PM_{2.5}$ SILs.

(4) Not applicable.

(5) Value shown is the annual average emission rate. 24-hour average emission rates are 0.0106 lbs/hr for both PM-10 and PM-2.5.

TABLE 4.2-8 SUMMARY OF SIGNIFICANT IMPACT ANALYSIS MODELING FOR H-POWER – OPERATIONAL SCENARIO 3: UNIT 3 @ 60% MCR, 5860 BTU/LB

Pollutant	Estimated Emission Rate For Unit 3	Estimated Emission Rate For Cooling Towers[1]	Estimated Emission Rate For Carbon Silo	Estimated Emission Rate For Lime Silo	Estimated Emission Rate Vehicle Dust	Highest Predicted Concentration ($\mu g/m^3$)					PSD Sig Impact Levels ($\mu g/m^3$)[3]				
	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/ft^2-hr)	ANNUAL	1-HR	3-HR	8-HR	24-HR	ANNUAL	1-HR	3-HR	8-HR	24-HR
Carbon monoxide	26.3	NA[4]	NA	NA	NA		25		11.3			2000		500	
Nitrogen dioxide	38.9	NA	NA	NA	NA	0.25					1.0				
Sulfur dioxide[2]	15.7	NA	NA	NA	NA	0.72		17		2.5	1.0		25		5.0
PM-10	7.2	0.188	0.00027[5]	0.0035[5]	2.5E-07	0.67				2.0	1.0				5.0
PM-2.5	6.8	0.0027	0.00027[5]	0.0035[5]	3.6E-08	0.33				1.1					

(1) Emission rates shown represent the sum of the three cooling tower cells.

(2) Emission rates correspond to 24-hr and annual average time periods. Modeled 3-hr concentration is based on a 26.4 lb/hr (44 ppmdv7).

(3) USEPA has not yet promulgated $PM_{2.5}$ SILs.

(4) Not applicable.

(5) Value shown is the annual average emission rate. 24-hour average emission rates are 0.0106 lbs/hr for both PM-10 and PM-2.5.

TABLE 4.2-9 SUMMARY OF SIGNIFICANT IMPACT ANALYSIS MODELING FOR H-POWER – OPERATIONAL SCENARIO 4: UNIT 3 @ 88% MCR, 3535 BTU/LB

Pollutant	Estimated Emission Rate For Unit 3	Estimated Emission Rate For Cooling Towers[1]	Estimated Emission Rate For Carbon Silo	Estimated Emission Rate For Lime Silo	Estimated Emission Rate Vehicle Dust	Highest Predicted Concentration (μg/m³)					PSD Sig Impact Levels (μg/m³)[3]				
	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/ft²-hr)	ANNUAL	1-HR	3-HR	8-HR [2]	24-HR	ANNUAL	1-HR	3-HR	8-HR	24-HR
Carbon monoxide	37.9	NA[4]	NA	NA	NA		29		13.9			2000		500	
Nitrogen dioxide	56.0	NA	NA	NA	NA	0.28					1.0				
Sulfur dioxide[2]	22.5	NA	NA	NA	NA	0.82		19		2.9	1.0		25		5.0
PM-10	10.4	0.188	0.00027[5]	0.0035[5]	2.5E-07	0.69				2.0	1.0				5.0
PM-2.5	9.8	0.0027	0.00027[5]	0.0035[5]	3.6E-08	0.37				1.3					

(1) Emission rates shown represent the sum of the three cooling tower cells.
(2) Emission rates correspond to 24-hr and annual average time periods. Modeled 3-hr concentration is based on a 38.1 lb/hr (44 ppmdv7).
(3) USEPA has not yet promulgated $PM_{2.5}$ SILs.
(4) Not applicable.
(5) Value shown is the annual average emission rate. 24-hour average emission rates are 0.0106 lbs/hr for both PM-10 and PM-2.5.

TABLE 4.2-10 SUMMARY OF PREDICTED NON-CARCINOGENIC HAZARDOUS AIR POLLUTANT CONCENTRATIONS FROM UNIT 3 AND COMPARISON TO 1/100TH OF TLVS

Air Pollutant [(1)]	Hazardous Air Pollutant	Carcinogenic Rating [(2)]	TLV-TWA [(3)] µg/m³	Maximum 8-hr Unit Impact (µg/m³ per lb/hr)	Maximum Unit 3 Emission Rate Emission Rate (lb/hr) [(4)]	Maximum 8-hr Concentration [(5)] (µg/m³)	1/100 of TLV - TWA (µg/m³)	Exceeds 1/100 of TLV - TWA (Yes/No)
Cadmium	Yes	B1	2	0.33679	4.17E-03	1.40E-03	0.02	No
Fluorides (Hydrogen fluoride)	Yes	NA	415	0.33679	1.21E+00	4.08E-01	4.15	No
Hydrogen chloride	Yes	NA	3040	0.33679	1.58E+01	5.32E+00	30.4	No
Lead (elemental)	Yes	B2	50	0.33679	5.84E-02	1.97E-02	0.5	No
Mercury	Yes	D	25	0.33679	1.17E-02	3.94E-03	0.25	No
Dioxins and furans	Yes	NA	---	0.33679	5.42E-06	1.83E-06	NA	No

(1) Air pollutants reportedly emitted from MWC Units.

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

A = Human Carcinogen
B1 = Probable Human Carcinogen - based on limited evidence of carcinogenicity in humans
B2 = Probable Human Carcinogen - based on limited evidence of carcinogenicity in animals
C = Possible Human Carcinogen
D = Not Classifiable as a Human Carcinogen

(3) TLV - TWA obtained from 2005 TLVs and BEIs Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

(4) Emission rates for 110% MCR at 6400 BTU/hr.

(5) Maximum concentrations are the product of the maximum 8-hr average impact unit and maximum emission rate.

NA - Not Available

TABLE 4.2-11 SUMMARY OF PREDICTED NON-CARCINOGENIC HAZARDOUS AIR POLLUTANT CONCENTRATIONS FROM UNIT 3 AND COMPARISON TO 1/420TH OF TLVS

Air Pollutant (1)	Hazardous Air Pollutant	Carcinogenic Rating (2)	TLV-TWA (3) µg/m^3	Maximum Annual Unit Impact (µg/m^3 per lb/hr)	Maximum Unit 3 Emission Rate Emission Rate (lb/hr) (4)	Maximum Annual Concentration (5) (µg/m^3)	1/420 TLV - TWA (µg/m^3)	Exceeds 1/420 of TLV - TWA (Yes/No)
Cadmium	Yes	B1	2	0.03315	4.17E-03	1.38E-04	0.0048	No
Fluorides (Hydrogen fluoride)	Yes	NA	415	0.03315	1.21E+00	4.01E-02	0.9881	No
Hydrogen chloride	Yes	NA	3040	0.03315	1.58E+01	5.24E-01	7.2381	No
Lead (elemental)	Yes	B2	50	0.03315	5.84E-02	1.94E-03	0.1190	No
Mercury	Yes	D	25	0.03315	1.17E-02	3.88E-04	0.0595	No
Dioxins and furans	Yes	NA	---	0.03315	5.42E-06	1.80E-07	NA	No

(1) Air pollutants reportedly emitted from MWC Units.

(2) Carcinogenic Rating from USEPA's Integrated Risk Information System (http://www.epa.gov/iris/index.html):
A = Human Carcinogen
B1 = Probable Human Carcinogen - based on limited evidence of carcinogenicity in humans
B2 = Probable Human Carcinogen - based on limited evidence of carcinogenicity in animals
C = Possible Human Carcinogen
D = Not Classifiable as a Human Carcinogen

(3) TLV - TWA obtained from 2005 TLVs and BEIs Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

(4) Emission rates for 110% MCR at 6400 BTU/hr.

(5) Maximum concentrations are the product of the maximum annual average unit impact and maximum emission rate.

NA - Not Available

TABLE 4.2-12 SUMMARY OF POTENTIAL INHALATION CANCER RISK FROM CARCINOGENIC HAZARDOUS AIR POLLUTANT CONCENTRATIONS FROM UNIT 3

Air Pollutant (1)	Carcinogenic Rating (2)	Maximum Annual Unit Impact ($\mu g/m^3$ per lb/hr)	Maximum Unit 3 Emission Rate Emission Rate (lb/hr) (3)	Maximum Annual Concentration (4) ($\mu g/m^3$)	USEPA Region IX AIR-PRG(5) (ug/m^3)	Estimated Potential Maximum Inhalation Cancer Risk (6)
Cadmium	B1	0.03315	4.17E-03	1.38E-04	1.40E-03	9.87E-08
Fluorides (Hydrogen fluoride)	NA	0.03315	1.21E+00	4.01E-02	NA	NA
Hydrogen chloride	NA	0.03315	1.58E+01	5.24E-01	2.10E+01	2.49E-08
Lead (elemental)	B2	0.03315	5.84E-02	1.94E-03	NA	NA
Mercury	D	0.03315	1.17E-02	3.88E-04	3.10E-01	1.25E-09
Dioxins and furans(7)	NA	0.03315	5.42E-06	3.59E-09	6.40E-08	5.61E-08
				Total Cancer Risk =		1.81E-07

(1) Air pollutants reportedly emitted from MWC Units.

(2) Carcinogenic Rating from USEPA's Integrated Risk Information System (http://www.epa.gov/iris/index.html):
A = Human Carcinogen
B1 = Probable Human Carcinogen - based on limited evidence of carcinogenicity in humans
B2 = Probable Human Carcinogen - based on limited evidence of carcinogenicity in animals
C = Possible Human Carcinogen
D = Not Classifiable as a Human Carcinogen

(3) Emission rates for 110% MCR at 6400 BTU/hr.

(4) Maximum concentrations are the product of the maximum annual unit impact and maximum emission rate.

(5) Residential USEPA Region IX Preliminary Remediation Goals (PRGs) from http://www.epa.gov/region09/waste/sfund/prg/ (Sept 2008)

(6) Computed as [(max. ann. conc.)/(PRG)] x 1E-06.

(7) Dioxin TEQ computed as MWC Organics concentration/50 as per USEPA MACT Rule official docket documentation.

NA - Not Available

4.2.2.5 Impacts and Mitigation Summary

The proposed new unit is a major modification that has been analyzed in accordance with HDOH PSD review requirements, including completing an ambient air quality impacts analysis. Modeling results demonstrate that all maximum predicted concentrations of the modeled pollutants are below their respective SILs. Based on these modeling results, the proposed modification, though defined as a major modification, will not contribute significantly to PSD increment consumption or to the deterioration of air quality as measured with the NAAQS/SAAQS.

Potential emissions of HAPs from the proposed Expansion will not adversely impact human health either from a carcinogenic and non-carcinogenic standpoint, and thus comply with HAR§11-60.1-179(c)(1) and (3).

Additionally, the H-POWER Expansion provides a considerable climate and air quality benefit by off-setting greenhouse gas (GHG) emissions caused by electric power generation. H–POWER Units #1 and 2 have been providing disposal reduction, electrical energy production, and reduction of greenhouse gas (GHG) emissions since it began operations in 1990. This discussion summarizes the reduction in GHG emissions from the existing H–POWER Units #1 and 2 and the projected emissions reduction from the proposed Unit #3. It is included in this evaluation to highlight the reduction in GHG emissions that can be expected when all three units are operational.

The emissions estimates provided here are based on official reports that Covanta has provided to the State of Hawaii (for H–POWER Units #1 and 2) and to the California Climate Action Registry (CCAR) (for its California plants). The GHG emissions have been verified as correct by an independent third party, RMA, for the CCAR reporting and reviewed by ICF, the State of Hawaii GHG Taskforce's independent contractor, for the Units #1 and 2 reporting.

The emissions from Units #1 and 2 have been reported to State of Hawaii GHG Taskforce as part of the Hawaii Greenhouse Gas Inventory for the years 2005, 2006, and 2007. The emissions include the direct emissions of anthropogenic CO_2 expressed as metric tons of CO_2 equivalent ($MTCO_2e$). The emissions include anthropogenic CO_2 and two other greenhouse gases (CH_4 and N_2O), which are converted to the equivalent amount of CO_2 for reporting purposes.

In addition to the CO_2e emissions we have reported the emissions that would have been produced by HECO to generate the power that H–POWER sold into the grid. Table 4.2-13, Summary of GHG Emissions from Units #1 and 2, shows the calculated emissions for the existing facility.

The emissions for H–POWER Unit #3 were estimated differently. Units #1 and 2 are RDF combustors so the emissions would be different than for Unit #3, which will be a Mass Burn combustor. We used the emissions reported by Covanta for its Stanislaus plant in California, which is a Mass Burn plant accepting nearly the same amount of waste as the proposed Unit #3. Using the emissions reported to CCAR for 2007 and the net energy sales for the Stanislaus plant, we calculated the expected emissions, energy sales, and reduction in HECO emission scaled to that which can be expected from Unit #3. Table 4.2-14, Estimated Future H–POWER

GHG Emissions combines the average emissions impact from Units #1 and 2 with the calculated emissions impact from Unit #3 to project what the emissions impact of the three units might be after full operation of Unit #3 in 2013.

TABLE 4.2-13 SUMMARY OF GHG EMISSIONS FROM UNITS #1 AND #2

Activity	Quantity		Emissions (MTCO2e per year)
Emissions in 2005	153,028	MTCO2e	153,028
Emissions in 2006	177,194	MTCO2e	177,194
Emissions in 2007	159,838	MTCO2e	159,838
Net energy produced in 2005	292,926	MWh	
Net energy produced in 2006	338,857	MWh	
Net energy produced in 2007	302,127	MWh	
Credit for reduced HECO emissions in 2005	(229,614)	MTCO2e	(229,614)
Credit for reduced HECO emissions in 2006	(265,617)	MTCO2e	(265,617)
Credit for reduced HECO emissions in 2007	(236,826)	MTCO2e	(236,826)
Average emissions			163,353
Average credit for reduced HECO emissions			(244,019)
Average net reduction in emissions			(80,666)

As can be seen from Table 4.2-14, the effect of H–POWER Units #1, 2, and 3 is to reduce the emissions of CO_2 equivalent on the island, and globally, by a total of 104,691 metric tons of CO_2 equivalent per year.

TABLE 4.2-14 ESTIMATED FUTURE H-POWER GHG EMISSIONS

Activity	Emissions (MTCO2e per year) *
Estimated emissions from Units #1 and 2	163,353
Estimated emissions from Unit #3	95,287
Estimated credit for reduced HECO emissions from Units #1 and 2	-244,019
Estimated credit for reduced HECO emissions from Unit #3	-119,312
Net annual estimated emissions	-104,691

* Metric tons of CO_2 equivalent

4.3 Surface Water

This section discusses the existing surface water environment. Baseline conditions, including designated resource areas of concern, are identified and the potential impacts of the proposed

Expansion are presented. Mitigation measures, such as avoiding or minimizing impacts to resource areas of concern are evaluated.

4.3.1 Baseline Surface Water Conditions

Surface waters for the Island of O'ahu are classified by water quality standards established under Hawaii Administrative Rules, Title 11, Chapter 54 (HAR 11-54). The regulations categorize all State waters as either marine or inland. It is also important to note that "State Waters", as defined by section 342D-1, HRS, exclude "…drainage ditches, ponds, and reservoirs required as part of a water pollution control system…" Figure 4.3-1 provides a broad overview map of the Water Quality Standards for the island. As can be seen from Figure 4.3-1, the project site is located within the defined hydrographic area IV and has an Inland (Water) Classification of Class 2. Class 1 waters are more heavily restricted, and it is the objective that Class 1 waters remain in their natural state as nearly as possible. The objective of Class 2 waters, is defined as follows: "The objective of Class 2 waters is to protect their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation. The uses to be protected in this class of waters are all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters" (HAR 11-54-3).

Figure 4.3-1 also depicts the Marine Classifications and shows that the site is located most proximate to Class A marine waters. Class AA marine waters are more heavily restricted, and it is the objective that these waters remain in their natural pristine state as nearly as possible. The objective of Class A waters is defined as follows: "It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters" (HAR 11-54-3).

As noted earlier (Section 4.1), the Expansion is located on what is commonly referred to as the 'Ewa Plain, an emerged coral-algae reef formed during the Pleistocene period when the ocean was at a higher level. The 'Ewa Plain today is one of the driest areas on O'ahu, so dry that it has commonly been characterized as "barren" and "desolate" and even referred to as a desert (Pacific Consultant Services Inc (PCSI), 2008).

Site specific water resources, for both the H-POWER site and the construction laydown area are addressed below.

4.3.1.1 H-POWER Surface Waters

As shown previously on the site locus map, Figure 1.7-1, there are no perennial or intermittent streams, tidal channels or springs located on the H-POWER site. The H-POWER site is roughly 24.6 acres in size, or 1,071,576 square feet. Of that, approximately one-third, 357,192 square feet is not paved. The remaining area, 714,384 square feet consists of impervious surface area.

Other than the Pacific Ocean, the nearest surface waters to H-POWER are industrial holding ponds and industrial park drainage canals. These consist of: (1) A drainage canal abutting the southeast corner of H-POWER that extends south to the Pacific Ocean; (2) drainage canals that exist proximate to the Kaomi Loop bend, that drain to the Pacific Ocean; and (3) nearby holding

WATER QUALITY STANDARDS

LEGEND

EXPLANATION:

WATER QUALITY STANDARD CLASSIFICATION

INLAND CLASSIFICATION

- CLASS 1
- CLASS 2
- PEARL HABOR ESTUARY

MARINE CLASSIFICATION

- CLASS A (BOUNDED BY 100-FATHON CONTOUR)
- CLASS AA (BOUNDED BY 100 FATHOM CONTOUR)
- RESERVE, PRESERVE, WILDLIFE REFUGE, SANCTUARY OR NATIONAL OR STATE PARK
- MARINE CONSERVATION AREA
- ZONE OF MIXING
- 100-FATHOM CONTOUR OR 600-FOOT-DEPTH CONTOUR
- REEF
- BEACH
- MARSH OR SWAMP
- STREAM, INTERMITTENT STREAM, OR GULCH
- HYROGRAPHIC BOUNDARY AND AREA NUMBER

NOTES & SOURCES

OFFICE OF ENVIRONMENTAL PLANNING
HAWAII DEPARTMENT OF HEALTH
OCTOBER 1987

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

amec

FIGURE
4.3-1

Figure 4.3-1 back side

ponds situated on the industrial Chevron property. Each of these surface waters can be seen on the previously provided site locus Figure 1.7-1.

The facility is permitted under the State of Hawaii, Department of Health (HDOH), National Pollutant Discharge Elimination System (NPDES) permit program which requires Storm Water Pollution Control planning and storm water sampling. In addition to compliance with NPDES requirements, the H-POWER waste handling operations take place indoors to minimize exposure to the elements and for good housekeeping practice. Two grounds keeping personnel work Monday through Friday to clean up any MSW that escaped from the MSW Feed and Storage Area and to provide general clean-up around the facility. Facility personnel are also trained in Spill Prevention Countermeasure and Control annually which increases their awareness on the necessity to be careful in handling liquid materials around the facility.

4.3.1.2 Construction Laydown Surface Waters

As shown previously on the site locus map, Figure 1.7-1, there are no perennial or intermittent streams, tidal channels or springs located on the parcels proposed for temporary construction laydown. There are no surface water resources located on or proximate to the proposed construction laydown parcels. Field reconnaissance of these sites, conducted following rain events, indicated that surface water is limited to puddling within existing tracks and trails onsite. Waters are also reported to sometimes occur within sinkholes on protected areas of the site, but these areas may also be affected by tidally influenced groundwaters. (Interview with Shad Kane, 2004) There are currently no stormwater systems, swales or designed controls in place, though natural drainage patterns do exist. Field reconnaissance indicates that the site is relatively flat, but that in addition to the existing depressions caused by small sinkholes, the tracks and trails from human activity influence stormwater patterns due to the slightly lower grade of these disturbed portions of the site. A prominent track abutting the eastern property line likely dominates runoff patterns along the eastern boundary of the laydown parcels. The eastern boundary is defined by a berm that supports an aboveground pipeline from the adjacent AES facility, which further accentuates the drainage swale aspect of this linear track. Interviews conducted by the cultural resource investigators, PCSI, with City representatives (see Appendix A) indicated that the area along Kaomi Loop was used for many years by dune buggy enthusiasts. The tracks and trails and maze of small roads or paths still visible on aerial photography (see Figure 4.3-2) are likely remnants of that and other unauthorized activities such as dumping of rubbish. The area is currently fenced in an effort to eliminate unauthorized access.

As noted previously, other than the Pacific Ocean, the nearest surface waters are industrial holding ponds and industrial park drainage canals. These consist of: (1) A drainage canal abutting the southeast corner of H-POWER that extends south to the Pacific Ocean; (2) drainage canals that exist proximate to the Kaomi Loop bend, that drain to the Pacific Ocean; and (3) nearby holding ponds situated on the industrial Chevron property. Each of these surface waters can be seen on the previously provided site locus Figure 1.7-1.

4.3.2 Surface Water Impacts and Mitigation

This section presents the system of pollution prevention measures that the Expansion will utilize to (1) minimize pollutants in the project's stormwater discharges, (2) assure compliance with the terms and conditions of both construction and operational NPDES permits, and (3) attenuate peak stormwater runoff discharge rates.

Though baseline surface water resources are similar throughout the H-POWER site and the adjacent construction laydown parcels, the construction and operational impacts and mitigation measures are anticipated to differ and are therefore addressed separately for each site area.

4.3.2.1 H-POWER

H-POWER is currently authorized to discharge storm water runoff that is not associated with industrial activity (operational activities), under an NPDES General Permit. However, stormwater from construction activity associated with the proposed Expansion will include construction activities on the adjacent City owned parcels, as well as on the H-POWER site. This will require coverage under a General Permit for storm water runoff associated with construction activity for the entire acreage to be affected by these temporary construction impacts. A Notice of Intent (NOI) for coverage under the General Permit will be filed for construction activities. This NOI will also include a construction site best management practices plan, timetables and nature of the activities proposed, and calculated stormwater runoff quantities for the affected area(s). The contents of the NOI will satisfy the requirements for the General Permit and will describe the measures that will minimize discharge of pollutants via storm water. Both structural and non-structural controls will be outlined. A brief summary of controls and practices specific to the H-POWER site is provided below.

<u>Construction Stormwater Management</u>
To prevent sedimentation and erosion on the H-POWER site, one of the first steps in the construction process will be the installation of siltation barriers around the limit of work. The barriers will act as a boundary for the limit of work, minimizing intrusion into areas outside the construction footprint. In addition, the barriers will collect sediment that may be transported from the construction area and will prevent sediment from leaving the site or degrading the existing H-POWER stormwater management system. The sedimentation barriers will remain in place throughout the construction effort. Routine inspections will be undertaken to ensure that their integrity is maintained, and to remove accumulated sediments following storm events.

Details with regard to erosion and sediment control measures undertaken during construction will be included within the Construction SWPCP which will be prepared prior to construction. This document will outline the measures that will be followed to ensure minimal impact on water quality throughout the construction effort. These measures will remain in place until the site is stabilized.

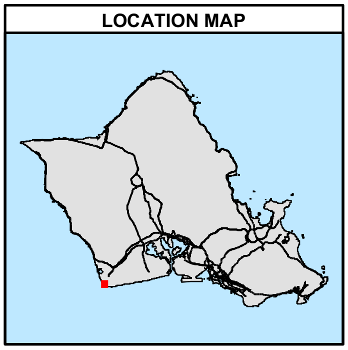
<u>Post-Development Stormwater Management</u>
Once construction is finished and site stabilization is completed, the temporary construction siltation barriers will be removed.

Once the Expansion is complete, the facility's Operational SWPCP will be updated to comply with stormwater quality standards.

LEGEND

H-POWER

LOCATION MAP



H-POWER EXPANSION
91-174 HANUA ST.
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NOTE & SOURCES
MAP COORDINATES:
UTM NAD83, ZONE 4N, UNITS METERS

SOURCE: AERIAL PHOTO COURTESY OF NOAA,
MAY 16, 2000

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amec

AERIAL PHOTOGRAPH - KAOMI LOOP

FIGURE
4.3-2

H:/H-POWER/MXD_Current/Environmental/SitePhotoZoom.mxd
H:/H-POWER/Export/Environmental/SitePhotoZoom.pdf
March 25, 2005 DWN: RLO CHKD:

Figure 4.3-2 back side

4.3.2.2 Construction Laydown Area

Stormwater from construction activity associated with the proposed Expansion will include construction activities on the laydown parcels, as well as on the adjacent H-POWER site. This will require coverage under a General Permit for storm water runoff associated with construction activity for the entire acreage to be affected by these temporary construction impacts. A NOI for coverage under the General Permit will be submitted for construction activities. This NOI will also include a construction site best management practices plan, timetables and nature of the activities proposed, and calculated stormwater runoff quantities for the affected area(s). The contents of the NOI will satisfy the requirements for the General Permit and will describe the measures that will minimize discharge of pollutants via storm water.

Both structural and non-structural controls will be outlined. A brief summary of some of the controls and practices anticipated during construction, and upon completion, is provided below.

<u>Construction Stormwater Management</u>
To prevent sedimentation and erosion, one of the first steps in the construction process will be the installation of siltation barriers around the limit of work. The barriers will act as a boundary for the limit of work, minimizing intrusion into areas outside the construction zone. In addition, the barriers will collect sediment that may be transported from the construction area and will prevent sediment from leaving the site or degrading the fenced enclosures and the habitats they safeguard. In order to ensure that the enclosed areas are safeguarded, the siltation barriers will be placed 25-feet from the fencelines, creating an additional protected buffer area. The sedimentation barriers and absorbant material will remain in place throughout the construction effort. Routine inspections will be undertaken to ensure that their integrity is maintained, and to remove accumulated sediments following storm events. Details with regard to erosion and sediment control measures undertaken during construction will be included in the Construction SWPCP which will be prepared prior to construction. This document will outline the measures that will be followed to ensure minimal impact on water quality throughout the construction effort. These measures will remain in place until the site is stabilized.

<u>Post-Development Stormwater Management</u>
The proposed post-development drainage concept for the construction parking and equipment laydown area will seek to return the area to pre-construction conditions. Once construction is finished, temporary crushed stone construction roads and parking areas will be removed and the area re-graded. Once site stabilization is completed, the temporary construction siltation barriers will be removed.

4.3.3 Designated Surface Water Resource Areas

A review of known or designated surface water features and coastal constraints was conducted, to determine proximity to potential resources of concern. These included coastal constraints as well as designated floodplains. Figure 4.3-3, Surface Water Constraints, depicts these designated areas with respect to the H-POWER site and the construction laydown parcels.

4.3.3.1 Coastal Constraint Areas

Surface water constraints on O'ahu are shown on Figure 4.3-3 and are regulated by a variety of state and local agencies. The following is a brief summary of these designated coastal resource areas proximate to H-POWER and the proposed construction laydown area. Additional detailed discussion regarding consistency with various federal, state and local plans and permits, and the jurisdiction of the identified agencies is found in Chapter 3, Required Approvals and Permits, and Chapter 7, Conformance to Federal, State, and City Planning Policies.

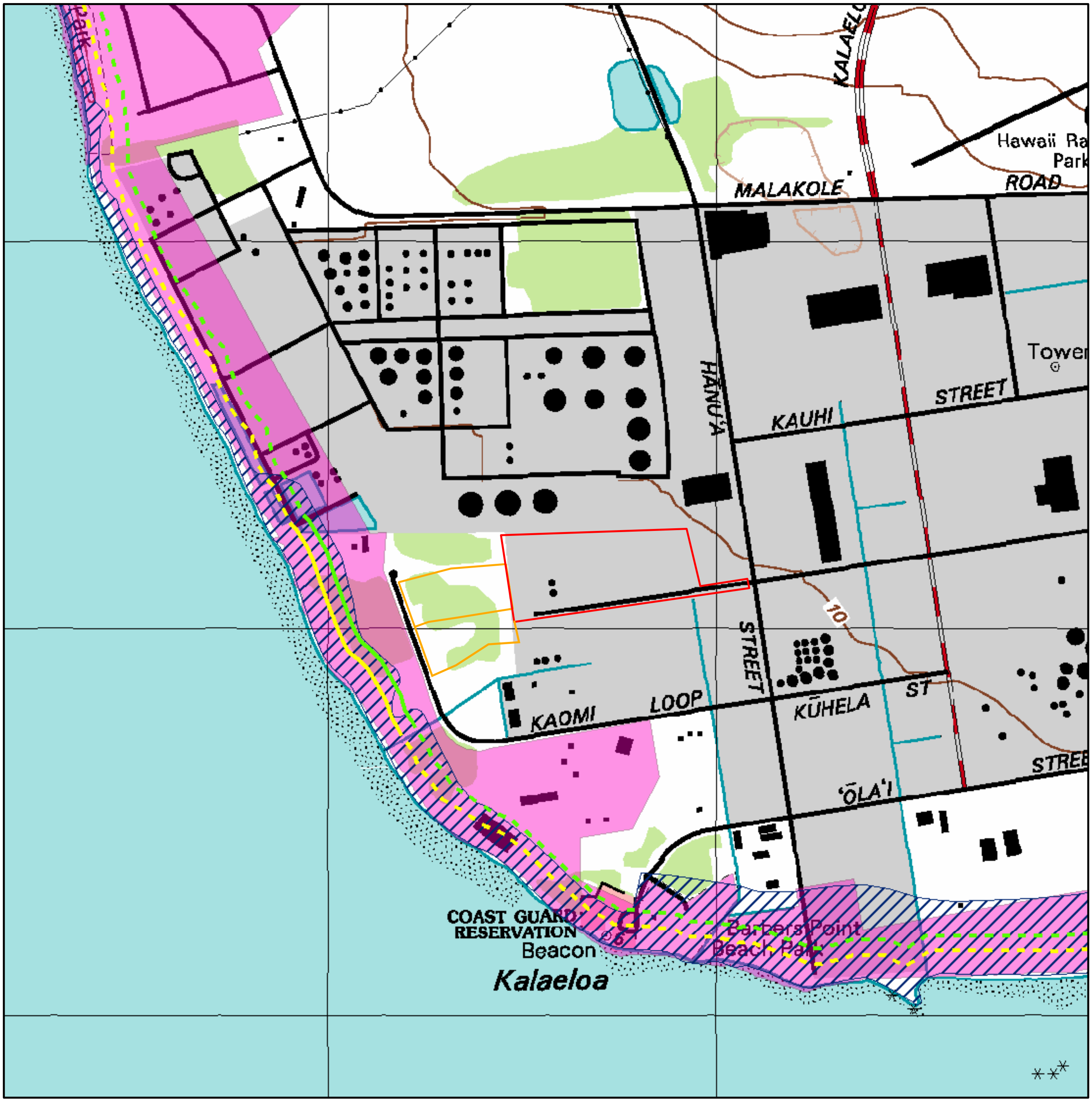
<u>Coastal Zone</u>
The entire Island of O'ahu is classified as within the Coastal Zone, as footnoted on Figure 4.3-3, with the exception of regulatory exemptions for federally owned lands. Though not mapped, both the H-POWER site and the construction laydown parcels are within the Coastal Zone. The Hawaii Coastal Zone Management (CZM) Program (under the Department of Business, Economic Development & Tourism's Office of Planning) conducts CZM federal consistency review for certain types of projects. The thresholds and triggers requiring CZM consistency review are discussed in greater detail in Chapter 7 of this EIS.

A November 5, 2008 letter was sent to the Hawaii CZM Program requesting a determination as to whether a CZM federal consistency review would be required for the H-POWER Expansion (Appendix B). That letter included a copy of the Preparation Notice describing the Expansion along with information about the parcels under consideration for construction laydown use. The Hawaii CZM Program is currently reviewing the request.

<u>Special Management Area (SMA)</u>
As mapped on Figure 4.3-3, the H-POWER site and the proposed laydown parcels are not within the SMA.

<u>Shoreline Setback Line</u>
As mapped on Figure 4.3-3, Surface Water Constraints, neither the H-POWER site nor the parcels to be used temporarily for construction laydown, are located within the Designated Shoreline Setback line, or the Shoreline Buffer Zone Line. As shown on Figure 4.3-3, the Designated Shoreline Setback and Buffer Zone Lines are each situated west of Kaomi Loop. The City and County of Honolulu, DPP regulates activities within the Shoreline Setback Line and the thresholds and triggers requiring DPP review are discussed in greater detail in Chapter 7.

A November 5, 2008 letter was sent to the City and County of Honolulu, DPP. That letter indicated that on the basis of available mapping obtained from DPP, the Expansion project and the temporary construction area impacts would be outside of the Shoreline Setback Line and the Buffer Area and requested a formal determination from DPP confirming that assessment. The City and County of Honolulu, DPP is currently reviewing the request.

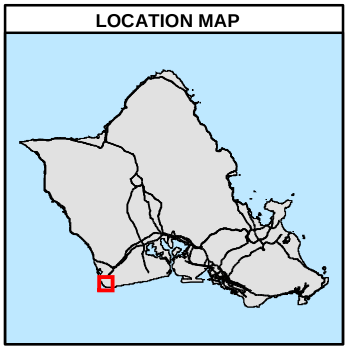


LEGEND

- H-POWER SITE BOUNDARY
- CONSTRUCTION LAYDOWN AREA
- SHORLINE SETBACK LINE (60 FT) [2]
- SHORELINE BUFFER ZONE LINE (100 FT) [2]
- APPROXIMATED SHORELINE SETBACK LINE
- APPROXIMATED SHORELINE BUFFER ZONE
- FEMA 100-YEAR FLOODPLAIN [1,3]
- SHORELINE MANAGEMENT AREA [3]

[1] FEMA FLOOD BOUNDARY, 1996
[2] PROVIDER BY DPP FOR IMMEDIATE AREA ONLY (SOLID LINE)
[3] PROVIDER BY HAWAII STATEWIDE GIS PROGRAM (2008)
(http://www.state.hi.us/dbedt/gis/index.html)

LOCATION MAP



NOTE & SOURCES
MAP COORDINATES:
UTM NAD83, ZONE 4N, UNITS METERS
TOPOGRAPHIC MAP SOURCE: USGS, 2000

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

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SURFACE WATER CONSTRAINTS MAP

FIGURE
4.3-3

Figure 4.3-3 back side

Tsunami Evacuation Zone

As described previously in Section 4.1.3, tsunamis pose a risk to many coastal areas on O‘ahu. Figure 4.1-3, Tsunami Evacuation Zones, shown previously depicts the O‘ahu evacuation zone identified for this area of O‘ahu. The evacuation zones, developed by the National Oceanic and Atmospheric Administration (NOAA) in partnership with the State of Hawai'i Civil Defense, include the majority of the H-POWER site and all of the construction laydown area. In the event of advance warning issued by the PTWC, Emergency Broadcast System or Civil Defense Sirens, H-POWER construction and operational staff will immediately shut down operations and evacuate to the designated Public Shelter Refuge Area, the Makakilo Elementary School or other identified location at a safe elevation. All temporary construction personnel will be instructed on Emergency Response Procedures prior to initiating construction activities.

4.3.3.2 Floodplains

The H-POWER site and the construction laydown parcels are located outside of designated Special Flood Areas. Figure 4.3-3, Surface Water Constraints, depicts the mapped Flood Area (DPP, 2004). A review of the most recent Federal Emergency Management Area (FEMA) Flood Insurance Rate Map (FIRM) was also conducted (FEMA 2008). The FIRM maps were not available in hard copy or electronic format. However, no change from the DPP electronic map data was observed in the project area. A copy of the 2004 FIRM is provided in Figure 4.3-4. The project parcels, both permanent and temporary, are clearly outside of the designated Flood Hazard Zones. As shown on Figure 4.3-3 and confirmed on the FIRM map, the closest designated Flood Hazard Area is situated west of Kaomi Loop along the coast and is designated Zone AE which is a flood insurance rate zone that correspond to the 1-percent annual chance floodplains that are determined in the Flood Insurance Study. Mandatory flood insurance purchase requirements apply.

4.4 Groundwater

This section discusses the existing groundwater environment. Baseline conditions, including resource areas of concern and existing withdrawal limits, are identified and the potential impacts of the proposed Expansion project are presented. Mitigation measures, such as maintaining existing permit/usage limits when possible, are also evaluated.

4.4.1 Baseline Conditions

Groundwater is a key resource for the island of O‘ahu. Of the total freshwater used on O‘ahu, 326 Mgal/d is from ground water and 71 Mgal/d is from surface water. Most of the groundwater on the island of O‘ahu is derived from extensive volcanic aquifers of thin-bedded basalts in central and southern O‘ahu. These aquifers are unconfined and though often at great depth (600-1,000 ft) are essentially “surficial” aquifers and therefore vulnerable to contamination. (USGS 1998). As a result, water resource protection and management is important on O‘ahu.

The H-POWER facility and the temporary construction laydown area are each located within the ‘Ewa (Limestone) Caprock Aquifer. The ‘Ewa limestone aquifer is a brackish to saline groundwater body that exists as a thin basal lens in the permeable coralline reef deposits that comprise the ‘Ewa Plain. Figure 4.4-1 Aquifers, depicts aquifers, the ‘Ewa Caprock zone, and the location of H-POWER.

The Hawaii Water Plan: Water Resource Protection Plan and H-POWER's consistency with the Plan, are discussed in greater detail in Chapter 7.

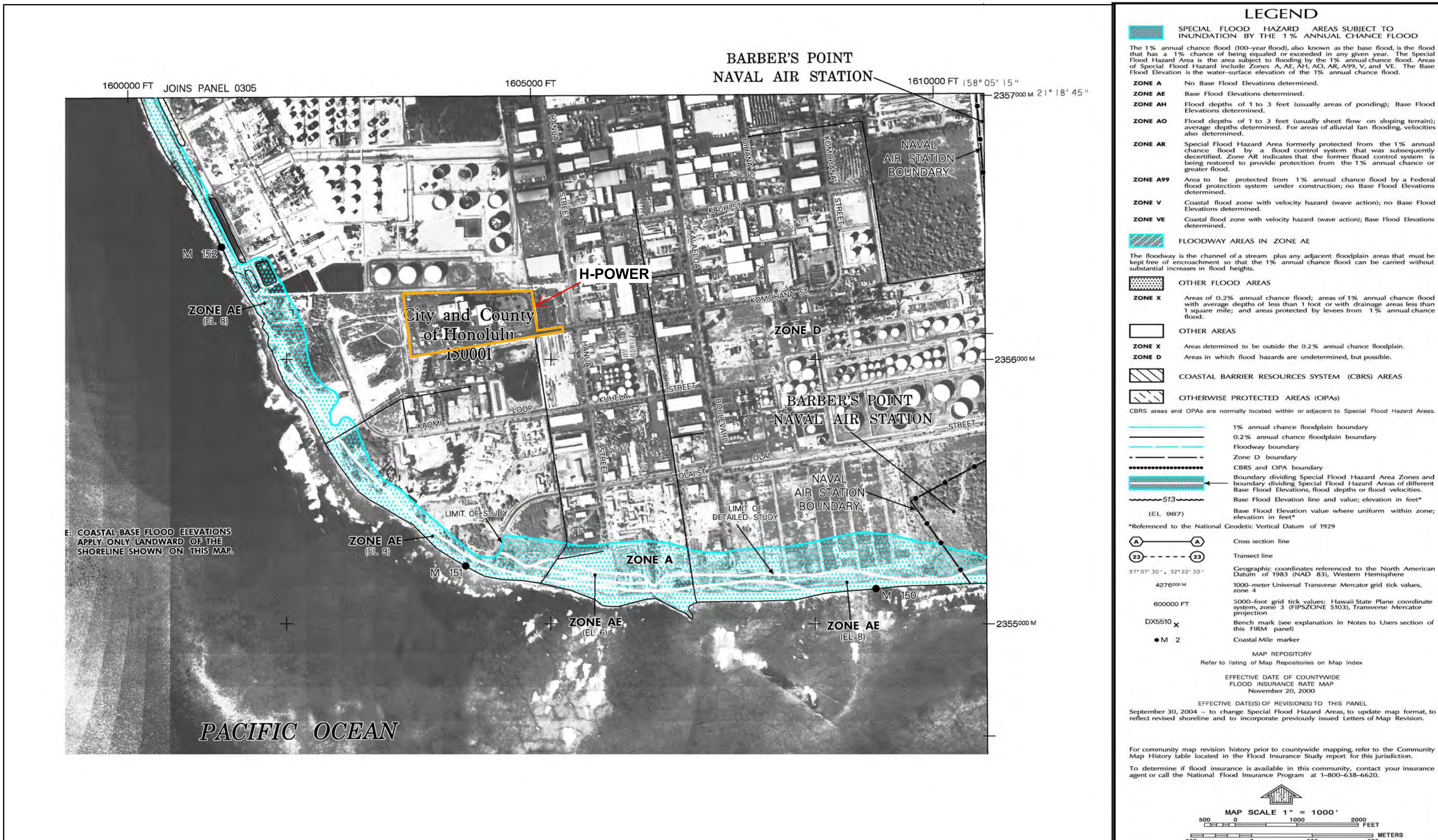
Consistent with the goals of protecting water resources, groundwater governance in Hawaii is split into two distinct aspects: (1) Groundwater withdrawals and (2) injection wells. Groundwater withdrawals, stream diversions and water use are regulated under the State Water Code and its implementing rules. The Commission on Water Resource Management (CWRM), Department of Land and Natural Resources (DLNR) manages the designation and regulation of Water Management Areas, water withdrawals and well construction activities. Groundwater injection wells, typically used for disposal of cooling waters, are governed by rules administered by HDOH.

The permitting of underground injection wells on O'ahu is also affected by the location of the wells. Figure 4.4-2, Island of O'ahu Underground Injection Control Areas, shows that in coastal regions where waters can be saline at depth, the underlying aquifers may not be considered a drinking water source and though permit limitations are imposed, wells may be permitted.

The H-POWER facility is currently permitted for, and operating, two water withdrawal wells to supply primarily industrial (non-potable) water for facility operations. The industrial process water, permitted at an average annual withdrawal rate of 2.26 mgd and maximum daily withdrawal rate of 2.26 mgd, is used primarily for industrial cooling. The Expansion proposes to modify this permit to 3.34 mgd. The water withdrawal wells are permitted through DLNR, and the injection wells are permitted by the HDOH. The underground injection wells are permitted to discharge primarily non-contact cooling water of an average concentration of 1.7 times caprock water (source water) with residual amounts of dispersants, biodispersants, corrosion inhibitors, biocides and pH control agents. Intermittent discharges of reject water from the on-site reverse osmosis water treatment system, with trace amounts of dechlorination agents and antiscalents may also be injected. The above additives are typical components of water treatment systems. The maximum disposal quantity for the underground injection wells is currently permitted for 1.2 mgd, and monitoring and reporting requirements dictate a daily record of the injectant quantity (gpd) and representative grab samples (three types) of the injectant are collected for analysis in accordance with USEPA methods and standards. The Expansion proposes to increase the injection to 1.82 mgd without changing the quality of injection.

4.4.2 Groundwater Impacts & Mitigation from Construction and Operation

This section presents the expanded H-POWER facility's groundwater withdrawal and reinjection process, and the systems in place to (1) minimize groundwater withdrawals; (2) assure safe and appropriate reinjection of primarily cooling waters; and (3) ensure that construction operations are designed to protect groundwaters, both at the H-POWER site and the adjacent construction laydown area.



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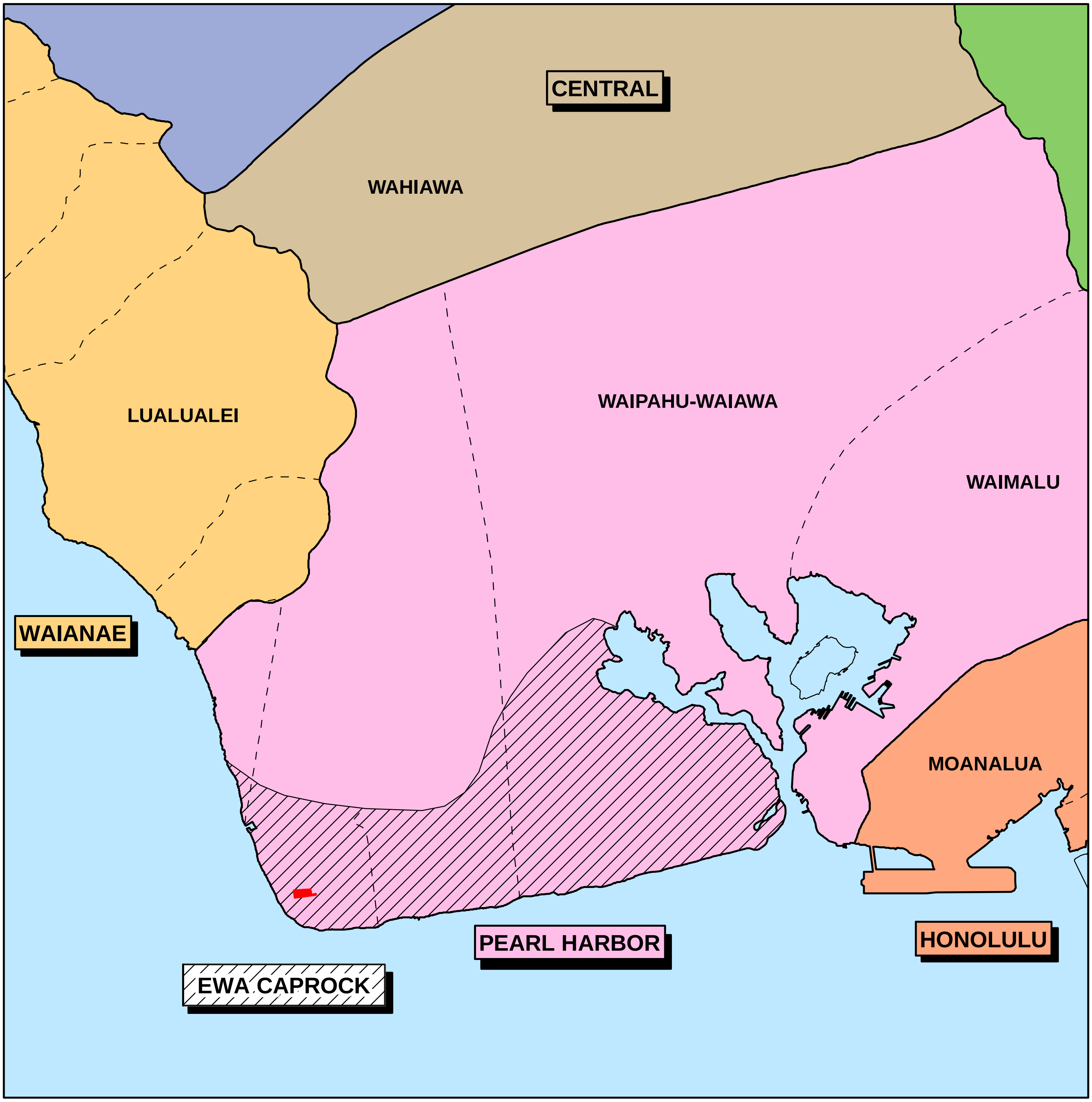
FLOOD INSURANCE RATE MAP (FIRM) EFFECTIVE 9/30/2004

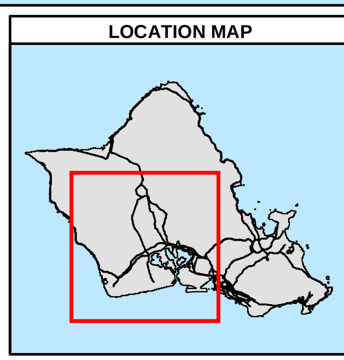
FIGURE
4.3-4

Figure 4.3-4 back side



LEGEND

H-POWER



H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

NOTE & SOURCES
MAP COORDINATES:
UTM NAD83, ZONE 4N, UNITS METERS

AQUIFER SOURCE: COMMISSION ON WATER RESOURCE MANAGEMENT, HAWAII, 2000

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0 10,000 Feet

amec

AQUIFERS

FIGURE 4.4-1

H:/H-POWER/MXD_Current/Environmental/Aquifer.mxd
H:/H-POWER/Export/Environmental/Aquifer.pdf
March 4, 2005 DWN: RLO CHKD: AP

Figure 4.4-1 back side

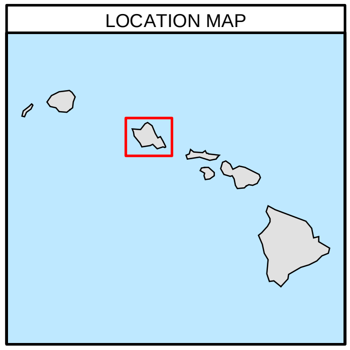
LEGEND

BELOW (makai) UIC LINE
- Underlying aquifer not considered drinking water source
- Wider variety of wells allowed
- Injecton wells need UIC Permit or Permit Exemption
- Permit limitations are imposed

ABOVE (mauka) UIC LINE
- Underlying aquifer considered a drinking water source
- Limited types of injection wells allowed
- Injection wells need UIC Permit or Permit Exemption
- Permit limitations are imposed and requirements are more stringent

Major Roads

LOCATION MAP



H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

NOTES & SOURCES
MAP COORDINATES:
UTM NAD83, ZONE 4N, UNITS METERS

MAP SOURCE: HAWAII DEPARTMENT OF HEALTH
(http://www.hawaii.gov/health/environmental/water/sdwb/uic/uicmaps.html)

amec

UNDERGROUND INJECTION CONTROL AREAS

FIGURE
4.4-2

H:/H-POWER/MXD_Current/Environmental/UIC.mxd
H:/H-POWER/Export/Environmental/UIC.pdf
March 4, 2005 DWN: RLO CHKD:

Figure 4.4-2 back side

4.4.2.1 Construction Impacts & Mitigation

Potential construction effects upon groundwater resources are very limited and would be similar for construction activities both at the H-POWER site as well as at the nearby construction laydown area. Construction activities will not involve the use of substantial amounts of chemicals or other potential contaminants so potential for impact to groundwater would be limited to contamination from a leak or accidental spill of fuel or lubricants from construction vehicles or equipment. Oil absorbent pads and/or mats will be available at the construction site for use in the event of a spill or leak from construction equipment, and it is not anticipated that significant groundwater impacts would result from construction operations. All construction activities will occur in compliance with the construction SWPCP.

Excavation at the laydown area will be minimal, limited primarily to relocation of a steam pipe at depth of approximately 3 feet and grading and storage activities. However, excavation at the H-POWER site will extend to a depth of approximately 10 feet for placement of footings, comparable to the depths of such footings at the existing facility. As a result, some temporary dewatering activities may be required during certain phases of construction excavation. Construction dewatering would be directed to the existing stormwater management basin. Thus no significant impact from construction operations would occur.

4.4.2.2 Operation Impacts & Mitigation

Operational impacts due to the proposed Expansion are restricted to the H-POWER site since the laydown area will not be utilized post-construction, after site stabilization is complete. As noted above in Section 4.4.1, the H-POWER facility is currently permitted both for water withdrawal and underground injection of predominantly cooling water. The proposed Expansion has been designed to minimize water demands and resultant discharges, however applications to modify the Groundwater Use and UIC permits have been submitted to increase withdrawal and injection limits. Under normal conditions, the water use and injection rates are well below the permit limits. All proper flow rate testing will be done as required to insure no negative impact to the underlying aquifer. There are currently no limitations imposed on withdrawal of high chloride content water from this aquifer.

4.4.3 Alternative Water Sources

Currently, H-POWER extracts Brackish/saline water from the Malakole coralline water table caprock aquifer that is current located beneath the Site and is adequate for these operations. The current Water Use Permit, issued by the Commission on Water Resource Management of the Department of Land and Natural Resources, is regulated by a set of standard conditions. This includes that:

- *Should an alternate permanent source of water be found for this use, then the Commission reserves the right to revoke this permit, after a hearing.*
- *This permit shall be subject to the Commission's periodic review for the Malakole Aquifer System Area's sustainable yield. The amount of water authorized by this permit may be reduced by the Commission if the sustainable yield of the Malakole Aquifer System Area, or relevant modified aquifer(s), is reduced.*

Although the use of groundwater is the most convenient, cost effective, and has been shown to have no environmental impact, CHRRV is currently exploring possible alternatives to extracting groundwater for its water resource needs, with the main focus on Wastewater Reuse. Wastewater Reuse could be a viable source of water for the H-POWER facility if at some point the Commission on Water Resource Management determines that wastewater can be a permanent source of water or that the Malakole aquifer can no longer be the main water resource for the area.

The Honouliuli Water Recycling Facility operated by the City and County of Honolulu Board of Water Supply is the largest water recycling facility in Hawaii. This facility takes 13 million gallons per day wastewater secondary effluent treatment and produces approximately 12 million gallons of reclaimed water per day for industrial and irrigation use. The plant recycles wastewater to produce two grades of recycled water. R-1 for irrigation and Reverse Osmosis (RO) for industry.

- *R-1 water is the highest level of treatment as regulated by the State of Hawaii Department of Health. R-1 water is currently being used in the State of Hawaii for irrigating golf courses, schools, green spaces and growing crops like bananas, papayas, ornamental plants and seed corn.*
- *RO or "reverse osmosis" water is an ultra pure water suitable for industrial purposes, such as refineries and power plants. It will be sold to power and petro-refining companies at nearby Campbell Industrial Park.*

Both of these grades of water would be of sufficient quality to support the needs of H-POWER. Potential obstacles in converting H-POWER to rely solely on wastewater reuse include the permitting of injections of wastewater into the Malakole Aquifer. H-POWER is currently permitted to inject a large percentage of the water it withdrawals back into the Malakole Aquifer. The current UIC permit issued through the HDOH Safe Drinking Water Branch would need significant modification to address any environmental issues which may arise with the injection of wastewater (R-1 or RO) into the Malakole Aquifer. The use of R-1 Water is also regulated through the HDOH Wastewater Branch, and additional consultation and environmental studies may be warranted before any further action is taken. Additionally, the development to provide H-POWER with sufficient wastewater resources would require a significant amount of additional infrastructure. RO water is supplied to other facilities within JCIP, but would still require a significant amount of infrastructure to supply H-POWER as compared to using existing wells. R-1 water is not currently supplied to JCIP, and would require a major amount of infrastructure before it would be reasonably feasible.

4.5 Biological Resources

This section discusses the existing biologic environment in the proposed Expansion and construction laydown area (Parcel 33 and portions of Parcel 34). Baseline conditions, including resource areas of concern and special status species, are identified and the potential impacts of the proposed Expansion are presented. Mitigation measures, such as stormwater controls and use of buffer areas are evaluated.

4.5.1 Existing Conditions - Biological Resources

The project site and the parcels directly west of the facility (Parcel 33 and portions of Parcel 34) under consideration for use as construction laydown area are located in what is commonly referred to as the ‘Ewa Plain. The ‘Ewa plain is characterized as:

> A semiarid region of intense sunshine, warm tradewinds, and sparse rainfall. At the western end of the plain these conditions are all the more accentuated. Except for a few coastal marshlands and other favored localities, the vegetation is typically xeric and, where undisturbed by modern developments, is dominated by hardy exotics (Davis 1990a).

Figure 4.5-1 depicts National Wetland Inventory (NWI) data for the region surrounding the H-POWER site. As shown on that figure, no onsite resources are identified. An initial biological resource site reconnaissance survey of the 24.6-acre H-POWER facility and the adjacent laydown area (8.164 acres) was conducted by an AMEC biologist during November 9 – 11, 2004. A confirmation biological survey was conducted by an AMEC biologist on August 27, 2008 to update the findings of the initial survey for this current EIS. Findings from the August 2008 survey were in agreement with the findings from the November 2004 survey. A list of plant species observed is presented in Table 4.5-1.

<u>Survey Methodology</u>
Methodology for the November 2004 survey included a pedestrian survey of the H-POWER facility perimeter and open lawn areas and transects through the laydown areas. Due to limited site access, perimeter-only survey of a fenced enclosure (endangered plant preservation area) within the laydown area was also conducted in the November 2004 survey.

The methodology for the August 2008 survey was modified from the 2004 survey since the vegetation throughout the laydown area had become more dense (over 12 feet tall in the fenced enclosures and typically at least four feet tall outside the enclosures). A pedestrian survey was conducted around the perimeter of the H-POWER facility, open lawn areas of the facility, and surrounding access roads bordering the laydown area. Transects were also surveyed in open areas around the perimeter of the laydown area. Dense surrounding vegetation provided only limited access to the fenced enclosures within the laydown area. When openings in the vegetation permitted, the perimeter of the fenced enclosure was surveyed during the August 2008 survey.

4.5.1.1 H-POWER Facility

The majority of the H-POWER site consists of developed infrastructure (e.g., concrete parking lots, asphalt roads, buildings, ancillary facilities, etc.). Undeveloped areas consist of manicured lawns with ornamental trees and shrubs.

Flora

The open lawn areas of the H-POWER facility area consist of introduced and ornamental vegetation, including Bermuda grass (*Cynodon dactylon*), monkey pod trees (*Samanea saman*), autograph trees (*Clusia rosea*), *Hibiscus sp*., and milo trees (*Thespesia populnea*). Other plant species included coconut trees (*Cocos nucifera*)*, beach naupaka* (*Scaevola* sericea), and yellow oleander (*Cascabela thevetia*).

Fauna

Animals currently found in the area include feral cats and a variety of other non-native species wildlife such as mongoose, mice, and rats. Bird species observed included: zebra doves (*Geopelia striata*), spotted doves (*Streptopelia chinensis*), sharp-tailed sandpipers (*Calidris acuminata*), mynah birds (*Acridotheres tristis*), feral chickens (*Gallus gallus*), red vented bulbuls (*Pycnonotus cafer*), common waxbills (*Estrilda astrild*), and cattle egrets (*Bubulcus ibis*). These animal species are transient over much of the 24.6 acres of the facility. Additionally, the ornamental trees and bushes may serve as nesting sites for various bird species.

4.5.1.2 Laydown Area (Parcels 33 and 34)

Aerial photographs of the site from the early 1990's indicate that clearing and grubbing activities (of unknown date) have occurred in these parcels (Figure 4.5-2). The presence of a plant preservation enclosure (within Parcels 33-34) is evident in the early 1990's aerial photograph.

Field reconnaissance of the construction laydown parcels conducted in November 2004 and August 2008 indicate that current conditions are representative of an open brush habitat interspersed with stands of low lying herbaceous plants. Access trails and tracks through the stands of vegetation are evident on aerial photography from 2000, shown previously in Figure 4.3-2. A cleared area, at the southern boundary of the enclosure in Parcels 33 and 34, is comprised of exposed soils and coral limestone outcrop. The terrain appears to be predominantly level with drainage affected by the trails and tracks interspersed throughout, including a prominent track abutting the eastern property line which likely dominates runoff patterns along the eastern boundary of the laydown parcels. The eastern boundary is defined by a berm that supports an aboveground pipeline from the adjacent AES facility, which further accentuates the drainage swale aspect of this linear track. The outer perimeter of the laydown parcels area is fenced and gated with pedestrian access in the western and eastern boundaries. According to Mr. Kane, this outer perimeter fence line was installed in November 2003 (Kane 2004). Mr. Kane was hired in November 2003 by the City and County of Honolulu to prepare a Habitat Conservation Plan for the enclosures. Mr. Kane was again consulted in 2008. In a letter dated August 11, 2008, Mr. Kane reiterated his recommendations from 2004 in regards to the protection of endangered flora located in fenced plant sanctuaries in the construction laydown area.

Flora

Vegetation in the brush land of the laydown parcels is dominated by Indian pluchea (Pluchea indica) with interspersed stands of low lying herbaceous plants (Sesuvium portulacastrum, Atriplex semibaccata, and Batis maritima), grasses, and kiawe trees (Prosopis pallida). Other plant species included nena (Heliotropium curassavicum), sourbush (Pluchea symphytifolia), and naio (Myoporum sandwicense).

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NATIONAL WETLANDS INVENTORY MAP

FIGURE 4.5-1

Figure 4.5-1 back side

TABLE 4.5-1 PLANT SPECIES OBSERVED OR KNOWN TO OCCUR AT THE H-POWER FACILITY AND THE LAYDOWN AREA NOVEMBER 2004 BIOLOGICAL RECONNAISSANCE SURVEY

Plant Species	Common Names	Family	Status
Asystasia gangetica	Chinese violet	Acanthaceae	non-native
Sesuvium portulacastrum	akulikuli; sea purslane	Aizoaceae	indigenous; common
Achyranthes splendens var. rotundata	--	Amaranthaceae	endemic; endangered
Amaranthus spinosus	spiny amaranth	Amaranthaceae	non-native
Amaranthus viridis	slender amaranth	Amaranthaceae	non-native
Cascabela thevetia	yellow oleander; be-still tree	Apocynaceae	non-native
Schefflera actinophylla	octopus tree	Araliaceae	non-native
Cocos nucifera	coconut tree; niu	Arecaceae	non-native
Bidens alba	beggar's tick	Asteraceae	non-native
Pluchea indica	Indian pluchea; Indian fleabane	Asteraceae	non-native
Pluchea symphytifolia	Sourbush	Asteraceae	non-native
Tridax procumbens	coat buttons	Asteraceae	non-native
Verbesina encelioides	golden crown-beard	Asteraceae	non-native
Batis maritima	pickleweed; salt wort	Bataceae	non-native
Heliotropium curassavicum	seaside heliotrope; kipukai; nena	Boraginaceae	indigenous; common
Heliotropium procumbens	--	Boraginaceae	non-native
Opuntia ficus-indica	prickly pear cactus; panini	Cactaceae	non-native
Capparis sandwichiana	maiapilo; pilo; pua pilo	Capparaceae	endemic, vulnerable
Atriplex semibaccata	Australian saltbush	Chenopodiaceae	non-native
Clusia rosea	autograph tree	Clusiaceae	non-native
Ipomea cairica	ivy-leaved morning glory; koali ai	Convolvulaceae	non-native
Momordica charantia	balsam pear; bitter gourd	Cucurbitaceae	non-native
Chamaesyce hirta	garden spurge	Euphorbiaceae	non-native
Acacia fernesiana	Klu	Fabaceae	non-native
Alysicarpus vaginalis	Alysicarpus	Fabaceae	non-native
Desmanthus virgatus	slender mimosa; virgate mimosa	Fabaceae	non-native
Leucaena leucocephala	haole koa; koa haole; wild tamarind	Fabaceae	non-native
Mimosa pudica	sensitive plant; sleeping grass	Fabaceae	non-native

Plant Species	Common Names	Family	Status
Prosopis pallida	kiawe; mesquite	Fabaceae	non-native
Samanea saman	monkeypod tree	Fabaceae	non-native
Scaevola sericea	beach naupaka; naupaka kahakai	Goodeniaceae	non-native
Abutilon grandifolium	hairy abutilon	Malvaceae	non-native
Sida fallax	Ilima	Malvaceae	indigenous, common
Myoporum sandwicense	naio; naeo; naieo; bastard sandalwood	Myoporaceae	indigenous; common
Boerhavia coccinea	--	Nyctaginaceae	non-native
Oxalis corniculata	wood sorrel; 'ihi' ai	Oxalidaceae	non-native
Passiflora foetida	love-in-a-mist; wild passionfruit; pohapoha	Passifloraceae	non-native
Brachiaria subquadripara	--	Poaceae	non-native
Cenchrus ciliaris	buffel grass	Poaceae	non-native
Chloris barbata	swollen finger grass; mau'u lei	Poaceae	non-native
Cynodon dactylon	Bermuda grass; manienie	Poaceae	non-native
Dactyloctenium aegyptium	beach wiregrass	Poaceae	non-native
Eleusine indica	goose grass; manienie ali'i	Poaceae	non-native
Sporobolus diander	Indian dropseed	Poaceae	non-native
Lycopersicon pimpinellifolium	cherry tomato	Solanaceae	non-native
Nicotiana glauca	tree tobacco; Indian tobacco; makahala	Solanaceae	non-native
Waltheria indica	Uhaloa	Sterculiaceae	indigenous; common

Fauna

Terrestrial biota includes various reptiles (geckos and anoles) and rodents (mice and rats). Other mammal species include mongoose and feral cats. Bird species observed included: zebra doves, spotted doves, sharp-tailed sandpipers, and mynah birds. These species are transient over much of the 8.164 acres of the laydown area.

Though not observed during the AMEC November 2004 and August 2008 surveys, Mr. Kane mentioned that he has occasionally observed populations of tiny shrimp living in the sinkholes located in the plant preservation enclosure of Parcels 33 and 34. These shrimp are likely to be the endemic species of Hawaiian red shrimp (Halocaridina rubra), commonly called ‘ōpae’ula. Though not endangered, it is recommended that care should be taken to minimize impacts to the habitat of this native species.

4.5.2 Special Status Species

Flora and Invertebrate Fauna

On October 8, 2004, the U.S. Fish and Wildlife Service (USFWS) replied to a letter requesting a list of rare, threatened, or endangered species, and significant natural communities that may be affected by the proposed Expansion. The USFWS list included one endangered plant, *Achyranthes splendens* var. *rotundata*, as occurring in the vicinity of the proposed project, specifically, within the footprint of the proposed temporary construction (laydown) area (USFWS 2004a). This species is a low shrub varying in height from 1½ to 6½ feet. Three locations within the laydown area have been fenced and are currently protected as plant preservation areas. Due to limited site access, only the perimeters of the three fenced enclosures were surveyed during the November 2004 biological site reconnaissance. When the dense surrounding vegetation occasionally permitted access, the perimeters of the fenced enclosures were surveyed in August 2008.

No populations or individuals of *Achyranthes splendens* var. *rotundata* were observed during the November 2004 and August 2008 site reconnaissance surveys. However, according to Mr. Kane, the enclosures within Parcels 33 and 34 shelters the last two naturally occurring populations of the endangered plant, *Achyranthes splendens* var. *rotundata* and a population of this plant was transplanted in the third enclosure in another adjacent parcel. Mr. Kane also shared his observation that condensation from precipitation and runoff that collects in the sinkholes within the plant preservation enclosures appears to support the *Achyranthes* populations, especially during the drier summer months.

Additionally, prior communication on July 20, 2004 with USFWS (USFWS 2004b) indicated that the endangered plant *Chamaesyce skottsberegi* var. *skottsbergii* is known from the surrounding area. The July 2004 correspondence also indicated that an invertebrate species of concern, *Lyropupa perlonga,* is thought to be present in an area adjacent to the project site, though a specific location was not identified, and no individuals of this species were observed during the November 2004 and August 2008 site reconnaissance surveys.

Vertebrate Fauna

The shoreline, estuarine, and freshwater areas associated with Pearl Harbor are known habitat for four species of endemic waterfowl which are listed by both federal government and by the

State of Hawaii as endangered species: the Hawaiian moorhen (*Gallinula chloropus sandvicensis*), the Hawaiian coot (*Fulica americana alai*) the Hawaiian duck (*Anas wyvilliana*) and the Hawaiian stilt (*Himantopus mexicanus knudseni*) [50 CFR Part 17]. Previous sightings of three of these four species (Hawaiian coot, Hawaiian moorhen and Hawaiian stilt) have been documented in the vicinity of the project area (USFWS 2004a). Population levels of these endangered waterfowl have been severely reduced primarily because of the loss of wetland habitat. Other threats to these species include predation by introduced mammals, invasion of wetlands by alien plants and fish, hybridization, disease, and possibly environmental contaminants (USFWS 1994). No endangered waterfowl species were observed during the November 2004 and August 2008 site reconnaissance surveys.

Two additional species of birds, listed as threatened or endangered by the State of Hawaii, but not listed by the federal government, are found in the vicinity of Pearl Harbor. These two species include the state-threatened white tern (*Gygis alba rothschildi*), a diminutive, arboreal-nesting seabird which can be seen around Pearl Harbor, and the state-endangered Hawaiian owl (*Asio flammeus sandwichensis*) an endemic race of the crepuscular, ground-nesting short-eared owl). Neither of these species was encountered during the November 2004 and August 2008 site reconnaissance surveys.

4.5.3 Impacts and Mitigation

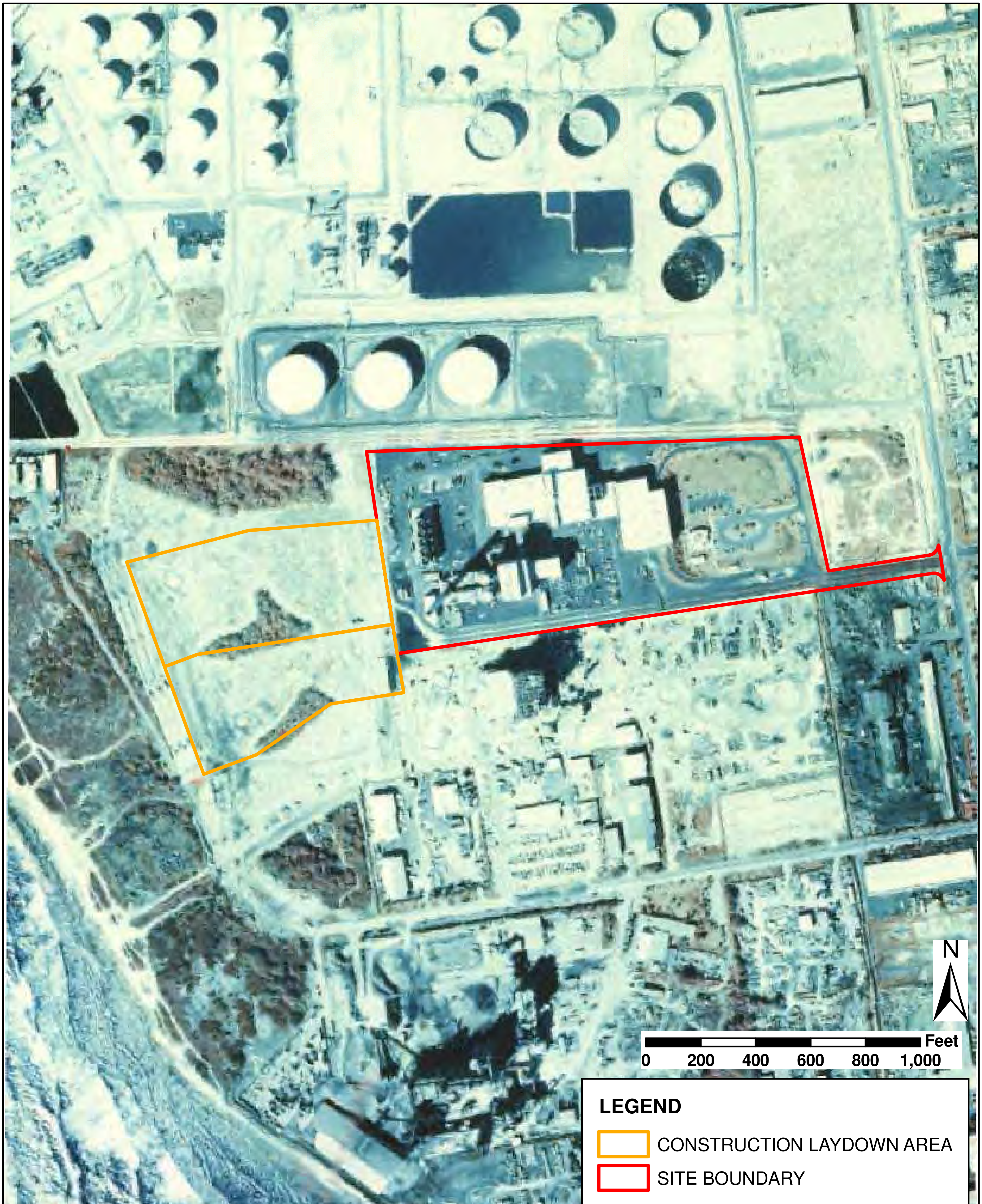
The construction impacts and mitigation measures for the H-POWER site and the adjacent construction laydown parcels are anticipated to differ. This is due to the fact that proposed changes at the H-POWER facility are permanent structural changes, whereas the laydown parcels are proposed to undergo temporary, predominantly non-structural impacts. Upon completion of the Expansion, temporary parking and staging/fabrication improvements will be removed and the area stabilized. Proposed impacts and mitigation measures for both the H-POWER site and laydown parcels are described in the following sections.

4.5.3.1 H-POWER Facility

No threatened or endangered species were observed onsite, and construction activities within the boundaries of the H-POWER facility should pose no risk to any sensitive species. The likelihood of any sensitive species occurring within this highly developed area is minimal.

Impacts to potential transient and nearby native biota will be minimized by maintaining onsite drainage patterns that will direct runoff from the site into the existing stormwater basins located in the southeast and southwest corners of the facility. Onsite surface runoff will be contained to minimize surface flow to the off-site laydown parcels located to the west of the facility. Thus, impacts to the adjacent laydown area plant preservation enclosure and the dense vegetation will be avoided.

Though not likely to occur due to the existing dryland habitat and industrial nature of the site, construction workers will be trained to suspend construction activities if transient bird species of concern are encountered at or near the site. A biologist will conduct the initial training and provide a short information packet so that workers are familiar with (1) the endangered Hawaiian coot or alae keokeo (*Fulica alai*), (2) the Hawaiian gallinule or alae ula (*Gallinule chloropus sandvicensis*), and (3) the black-necked stilt or aeo (*Himantopus mexicanus knudsenii*). Workers will be instructed to notify their supervisor who will contact an on-call



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AERIAL PHOTOGRAPH - EARLY 1990's

FIGURE 4.5-2

Figure 4.5-2 back side

biologist for confirmation. If confirmed, the biologist will contact the Pacific Islands Fish and Wildlife Office. In the event that the on-call biologist is unavailable the construction supervisor will be provided with the contact information and will be instructed to contact the Pacific Islands Fish and Wildlife Office directly.

4.5.3.2 Laydown Area

Populations of the endangered plant, *Achyranthes splendens* var. *rotundata*, are known to exist in the plant preservation enclosures. Other seasonal or transient protected species may sometimes occur within the laydown parcels, but no endangered species were observed during the November 2004 and August 2008 surveys. A survey is performed for a limited amount of time, and a certain species may or may not be observed during this timeframe. An evaluation of habitat quality is therefore used to determine the probability of whether or not a species will occur onsite.

The lack of wetland habitat onsite minimizes the potential for impacts to waterfowl species due to lack of proper habitat. The plant preservation enclosures may serve as nesting areas for the state-endangered Hawaiian owl and state-threatened white tern, respectively. Also, it has been reported that the endemic ‘ōpae’ula shrimp may occur in the enclosure sinkholes when tidal and rainfall conditions are adequate (Kane 2004). The endangered plant species and invertebrate snail species previously discussed in Section 4.5.2 could also occur in these areas as well. For these reasons, there will be no construction activity in the plant preservation areas in Parcels 33 and 34.

Mitigation measures will be implemented to minimize impacts to known and likely endangered species habitat (see previously provided construction site plan in Figure 2.31). Silt fencing and petroleum abatement measures will surround the construction areas designated for parking, equipment storage, prefabrication operations, trailer office space, and crushed stone roadways. A 25-foot buffer zone will be placed around the plant protection areas in Parcels 33 and 34 to further protect these areas from exposure to construction activities. The aboveground pipeline on the eastern boundary of the laydown area will be buried temporarily and the area will be graded to facilitate access to the H-POWER site from the laydown area. Post construction site restoration will include removal of any structures and concrete pads and stabilization of the area.

As discussed earlier in this section, animal species are transient, and construction contractors will be informed about endangered bird species that may potentially forage or nest onsite. Due to insufficient habitat and constant site activity, the likelihood of sighting an endangered bird species is low. However, should any of these birds be seen at or near the site, construction activity will be suspended and the Pacific Islands Fish and Wildlife Office will be informed of the sighting. As noted in Section 4.5.3.1 above, the procedure will specify that workers who identify a potential species of concern will notify their supervisor who will contact an on-call biologist for confirmation. If confirmed, the biologist will contact the Pacific Islands Fish and Wildlife Office. In the event that the on-call biologist is unavailable, the construction supervisor will be provided with the contact information and will be instructed to contact the Pacific Islands Fish and Wildlife Office directly.

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5.0 ASSESSMENT OF THE EXISTING HUMAN ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATIVE MEASURES

This chapter describes the existing human environment in the area of the H-POWER facility that would potentially be affected by the proposed Expansion. The area includes the existing H-POWER site as well as the adjoining parcels under consideration for temporary storage of construction equipment, pre-fabrication activities, and for construction parking and trailers. In addition, because the human environment can be regional in nature, regional issues are addressed where necessary to establish an appropriate perspective on the human environment. This discussion is organized by topic (e.g., cultural resources, transportation, noise, visual resources, socioeconomics, infrastructure, solid waste, energy, and human health).

This chapter also assesses the environmental consequences to the human environment that may result from the Expansion Project. Within each topic, potential temporary and permanent impacts are described and evaluated and mitigation measures that would eliminate and/or reduce potential adverse impacts are identified.

5.1 Archeological and Cultural Resources

Pacific Consulting Services, Inc. (PCSI) undertook an archaeological and cultural impact assessment study in support of the proposed Expansion of the H-POWER facility. PCSI, a Honolulu-based consulting firm offering professional archaeology services, evaluated both the H-POWER site, consisting of 24.635 acres of industrially zoned land and designated by Tax Map Key (TMK) number 9-1-026:030, and the adjacent parcels, 9-1-026:033 and 9-1-026:034, consisting of vacant land and totaling an additional 14.205 acres, being proposed as construction laydown area. Their analysis included an evaluation of baseline (existing) and potentially existing resources, as well as an assessment of the effect that the Expansion might have upon archaeological or cultural resources. The PCSI study is provided in Appendix A. This section summarizes the results of that study. Standards and guidelines for archaeological and cultural resource assessments are presented, baseline conditions described, anticipated impacts are evaluated and the potential for mitigation discussed.

5.1.1 Standards and Guidelines for Archaeological and Cultural Resource Assessments

Various local and federal agencies have established guidelines and standards for assessing archaeological and cultural impacts. The applicable guidelines and standards are summarized below:

5.1.1.1 National Historic Preservation Act

The National Historic Preservation Act (NHPA) was passed in 1966 which, in the words of the Act, the Federal Government's role would be to "provide leadership" for preservation, "contribute to" and "give maximum encouragement" to preservation, and "foster conditions under which our modern society and our prehistoric and historic resources can exist in productive harmony."

To achieve this, NHPA and related legislation sought a partnership among the Federal Government and the States that would capitalize on the strengths of each. The Federal

Government, led by the National Park Service as the agency with the longest and most direct experience in studying, managing, and using historic resources, would provide funding assistance, basic technical knowledge and tools, and a broad national perspective on America's heritage.

The States, through State Historic Preservation Officers appointed by the Governor of each State, would provide matching funds, a designated State office, and a statewide preservation program tailored to State and local needs and designed to support and promote State and local historic preservation interests and priorities. In Hawaii the State Historic Preservation Office is referred to as the State Historic Preservation Division (SHPD).

5.1.1.2 State Historic Preservation Division

The Hawaii SHPD issued draft guidelines for the preparation of archaeological studies in December 2002 and the requirements for certain archaeological assessments are described in Chapters 13-275 and 13-276 of the Hawaii Administrative Rules. Section 13-275 (a) 5(A) states that:

> An archaeological assessment shall include the information on the property and the survey methodology as set forth in subsections 13-276-5(a) and (c), as well as a brief background section discussing the former land use and types of sites that might have been previously present.

The archaeological assessment that was undertaken follows the draft guidelines issued by SHPD and the Hawaii Administrative Rules.

5.1.1.3 State Office of Environmental Quality Control

The State OEQC publishes *Guidelines for Assessing Cultural Impact*, which are designed to comply with the requirements of Chapter 343 HRS as amended in 2000 and approved by the Governor as Act 50 that same year. The archaeological assessment that was undertaken follows these guidelines.

5.1.2 Study Methodology and Scope

The study methodology and scope of the work conducted included the following:

- Archival background research on the culture history and previous land uses of the project area;
- Literature review of previous archaeological studies within the project area and in areas near the H-POWER facility;
- Verbal and written consultation with the Office of Hawaiian Affairs (OHA);
- Interviews with community members recommended by the State Historic Preservation Division; and
- Archaeological reconnaissance survey of the parcels (TMK: 9-1-026:033 and 034) adjacent to the current H-POWER facility to determine the presence/absence of cultural resources.

An archaeological reconnaissance survey and follow-up test excavations of possible historic sites at the H-POWER site were undertaken as part of the environmental review process for the H-POWER facility in 1983-84 (Ahlo and Hommon 1983; Hommon and Ahlo 1984). No historic properties were found at that time. Human remains were found during construction of the facility, in 1986. There is a possibility that more burials might be found during the construction phase of the proposed project, although the area has already been landscaped and developed. For this reason, CHRRV and the City and County of Honolulu propose that the site will be monitored during the initial stages of excavation for the Expansion (see Mitigation discussion in Section 5.1.4, below).

Due to the extensive prior disturbance at depth from construction of the original H-POWER facility in 1985, in combination with construction mitigation (on-call monitoring) already proposed, the current archaeological assessment did not include additional survey or excavations of Parcel 30, which will be monitored during the initial stages of excavation for the Expansion (see Recommendations below). The study did include, however, archaeological and cultural impact assessments of the adjacent vacant parcels, Parcel 33 (6.041 acres) and Parcel 34 (8.164 acres). Parcel 33 and a portion of Parcel 34 will be needed for a laydown area for temporary staging areas and parking during construction, which is expected to take place over a period of approximately 34 months.

The results of the site reconnaissance and cultural resource investigations form the basis of the summary of existing conditions that follows in Section 5.1.3 below.

5.1.3 Existing Conditions - Archeological and Cultural Resources

In discussing existing conditions for archaeological and cultural resources, it is important to understand that much of the evaluation must focus on resource potential and oral history. Though some information about identified resources does exist, often, existing conditions are defined on the basis of resources suspected to have existed or on the basis of those potentially remaining at a given location. The project area is located on what is commonly known today as the ‘Ewa Plain, a vast expanse of land that is part of an emerged Pleistocene age coral reef that was subsequently covered to varying depths with a mantle of marine sediments, alluvium and a shallow calcareous soil mantle, except for a few places on or near the shoreline where the reef surface is still exposed. The surface of the reef is pock-marked with solution cavities or “sinkholes” of widely varying sizes. The soil survey map for O‘ahu shows the project area as coral outcrop (Foote et al. 1972)

5.1.3.1 Archeological Resources

As noted above, the H-POWER site is a heavily industrialized site that has undergone extensive ground disturbance at depth, during construction of the original H-POWER facility. Though archaeological resources are therefore not likely, the fact that human remains were found during construction of the facility in 1986 indicates that however remote, there is a possibility that more burials may exist. For this reason, CHRRV and the City and County of Honolulu propose that the site will be subject to on-call monitoring during the initial stages of excavation for the Expansion (see Mitigation discussion in Section 5.1.4, below).

A walk- through survey of Parcels 33 and 34, the proposed laydown area, was undertaken by Patrick McCoy and Stephan D. Clark of PCSI on October 20, 2004. The survey was conducted over a period of 1 1/2 hours. The entire survey area was found to have been extensively disturbed, except for the fenced plant sanctuaries which were not surveyed since none of them will be utilized during the proposed Expansion project. There is evidence that large portions of Parcels 33 and 34 have been grubbed and graded. Clearing may have occurred on more than one occasion. As already noted, aerial photographs suggest that the land clearing project undertaken by Campbell Estate in the early 1960s on Parcel 30 and documented during the archaeological reconnaissance survey in 1983 also included Parcels 33 and 34. Mr. Shad Kane, one of the individuals interviewed for the cultural impact assessment (see below), noted that a number of sinkholes were buried at the time the land was bulldozed.

Mr. Colin Jones, former Energy Recovery Administrator of the Refuse Division of the City Department of Environmental Services, provided valuable information concerning the recent land use history of the subject parcels, which helped to explain the various kinds of land disturbance that were observed during the brief field survey. According to Mr. Jones (personal communication), the area below the H-POWER facility, along Kaomi Loop, was used for many years by dune buggy enthusiasts and for illegal dumping of all kinds of materials, including industrial waste. A maze of small roads or paths is still visible in many areas. Mr. Jones recalled seeing, some years ago, piles of what appeared to be foundry slag, tools for the grinding of eye glasses, and other kinds of rubbish, primarily along the road, which for many years was unpaved. Some of the rubbish appears to have been removed, either by persons interested in salvaging certain items or citizens simply interested in cleaning up the area. Mr. Jones did not recall that there was ever any systematic cleanup of the area by the City after the land was purchased from Campbell Estate. Some trash remains in the area. Mr. Jones noted that the City erected a chain link fence along Kaomi Loop in 2004 to prevent further dumping and unauthorized use of the area. Installation of the fence appears to have involved the addition of some introduced reddish brown clayey soil, which was observed in the easement between the chain link fence and Kaomi Loop and on a small area of Parcel 34.

It appears that the eastern edge of Parcel 33 and Parcel 34 were also filled, most probably during the construction of the existing H-POWER facility in the 1980s. The land along the chain fence separating the H-POWER Facility (Parcel 30) from the adjacent parcels to the west (Parcels 33-34) and extending some 15 to 20 meters into the three parcels is raised roughly 1 meter or so above the adjoining land surface, which is flat. Situated on top of the fill is a roughly north-south oriented steam pipe that runs from the AES facility north to the Chevron USA Oil refinery.

A brief reconnaissance of the proposed location of the third municipal waste combustor unit was conducted on August 13, 2008. This location, immediately east (mauka) of the existing H-POWER plant, includes the plant's existing parking lot and adjacent landscaped lawn areas. While the karst landscape of the ‘Ewa Plain no longer exists in the proposed building site, Burial Site 6684 is located nearby

A reconnaissance survey of Parcels 33 and 34, the proposed equipment laydown area, was also conducted on August 13, 2008. While the vegetation in the parcels has grown denser, little else has changed in these parcels since the 2005 reconnaissance survey. It was noted that the chain link fence that marks the west (*makai*) boundary of the Parcels 33-34 along Kaomi Loop is broken in two areas and tire tracks were observed in the area of the fence breaks.

5.1.3.2 Cultural Resources

The cultural impact assessment for this project involved: (1) a literature search prior to the archaeological field assessment to determine the presence/absence of Traditional Cultural Properties; (2) verbal and written consultation with the Office of Hawaiian Affairs (OHA), and (3) field interviews with two individuals from the Kapeolei area, Ms. Lynette ("Auntie Nettie") Tiffany and Mr. Shad Kane, who were recommended by Muffet Jourdane (Assistant O'ahu Archaeologist) and Nathan Napoka (History and Culture Branch Chief) of the State Historic Preservation Division (SHPD). Auntie Nettie, who is employed by the Estate of James Campbell, is the supervisor (*kahu*) for Lanikuhonua. She is also a member of the O'ahu Island Burial Council. Mr. Kane, who is actively involved in community affairs in the 'Ewa area, also manages the plant sanctuaries on Parcels 32-33 and 33-34 for the City. He was hired by the City to assist in the preparation of a habitat preservation plan and the establishment of "wild sites" for the endangered species contained within the sanctuaries.

The site visit with Auntie Nettie and Shad Kane took place on November 16, 2004. After an initial meeting in the office of Colin Jones, which included an overview of the proposed project and examination of the aerial photographs showing recent changes to the project area, Mr. Rodney Smith (Covanta) accompanied PCSI to the site of the re-interred burial.

Following a brief discussion about the burial, Mr. Kane took PCSI into the plant sanctuary on Parcels 33-34, which contains *Achyranthes splenden* var. *rotundata*, *naio* (*Myoporum sandwicense*) and various other plants. Mr. Kane noted the presence of an endemic shrimp *('opae'ula*) in the brackish water located in the sinkholes within the enclosure. According to Mr. Kane, the sinkholes fill up with water after heavy rains. There are two species of *'ōpae'ula* (*Halocaridina rubra* and *Metabetaeus lohena*). It is unclear which of the two species occur in these particular sinkholes. The *'ōpae'ula* was used in traditional times as bait for *'ōpelu* fishing (Pukui and Elbert 1986:291). Mr. Kane expressed a concern that the *'ōpae'ula* population could be adversely affected by contaminants entering the water table, depending on what kinds of equipment and supplies will be temporarily placed in the laydown area. Both Mr. Kane and Auntie Nettie emphasized the importance of preserving more sinkholes in the Kalaeloa area and other areas because of the native plants, human remains, and other evidence of past human uses that are often found in and around them. The sinkholes, which once numbered in the thousands and formed part of a vast natural and cultural landscape in the Kalaeloa area, are now restricted to a small number of undeveloped or undisturbed properties. The sinkholes contained within the two plant enclosures represent some of the last remaining examples of this landscape in the local area. Auntie Nettie and Mr. Kane also expressed a concern that more attention be given to protecting the shoreline area across the road from the proposed laydown area.

No information on beliefs, cultural practices, or culturally important places within the boundaries of the proposed project area or adjacent areas was provided, except for a story Auntie Nettie related about her mother, Leilani Fernandez, exchanging dried fish and salted meat for *'ōkole hao*, a liquor made from ti plants, that was made by a man who lived somewhere nearby. No response was received from OHA to a letter dated October 14, 2004 requesting information on traditional Hawaiian beliefs, cultural practices, and culturally significant sites (now commonly referred to in the Cultural Resource Management (CRM) literature as Traditional Cultural Properties) in or near the proposed project area. A second letter was sent to OHA on August

13, 2008 requesting information concerning traditional cultural practices and places. OHA's response, dated September 4, 2008, requested that burials and plant sanctuaries be protected during Expansion activities and reiterated the elevated potential of additional undiscovered subsurface burial sites existing in the area (Appendix A).

On current evidence, there are no known Traditional Cultural Properties or on-going cultural practices within or near the Area of Potential Effect (APE) based on a review of the pertinent literature for the area and the consultation with Auntie Nettie and Mr. Kane. While it is likely that culturally significant sites did exist at one time within or in close proximity to the H-POWER plant, the nearest (approximately 2.7 miles) known surviving site with cultural significance is Pu'uokapolei, a small cinder cone that is the most prominent landmark on the ‘Ewa Plain and the former site of Fort Barrette. In their synthesis of cultural resource studies on the ‘Ewa Plain, Tuggle and Tomonari-Tuggle (1997:21) noted that Pu'uokapolei was the sacred center of that part of O‘ahu:

Probably the most important of all traditional locales on the ‘Ewa Plain is the hill known as Pu'uokapolei. This volcanic cone at the inland edge of the ‘Ewa Plain was the location of a temple, (of unknown affiliation), a residence of the family of the demi-god Kamapua'a, a reference point for solar observation, and a traveller's landmark (McAllister 1933:108; Kamakau 1976:14; Ii 1959:27; Thrum 1907:46).

Additional information on Pu'uokapolei is summarized in *Sites of O‘ahu* (Sterling and Summers 1978:33-34).

In 2008, follow-up consultation was conducted in the form of contacting Mr. Shad Kane and Ms. Lynette (Auntie Nettie) Tiffany, as well as the Office of Hawaiian Affairs. When Auntie Nettie was contacted, she indicated that she did not have any further concerns regarding the H-POWER project.

5.1.4 Impacts Mitigation - Archaeological and Cultural Resources

The archaeological assessment included a review of previous work in and near the proposed project area, including the existing H-POWER parcel, and a field survey of the adjacent parcels (TMK: 9-1-026:033 and 034) that may be utilized as a temporary construction laydown area. These parcels had not been previously surveyed based on a review of reports on file in the State Historic Preservation Division. Research undertaken prior to the survey indicated that the parcels had probably been cleared in the early 1960s. The field survey confirmed that the proposed laydown area is in fact highly disturbed, except for the plant sanctuaries. The cultural impact assessment, which included a literature search, consultation with the Office of Hawaiian Affairs, and interviews with two individuals from the ‘Ewa area, did not result in the identification of any Traditional Cultural Properties or on-going cultural practices in the Area of Potential Effect (APE).

While no historic properties were identified in the APE during the current project, there is a possibility that subsurface cultural and paleontological deposits and human remains might be found in some areas of the proposed project area in sinkholes, some of which are still partially open and others that were undoubtedly covered (filled) when the land was cleared. The possibility of subsurface historic sites in the proposed project area points to the need for on-call monitoring of selected areas and/or phases of work and other precautionary measures. The following measures were recommended by PCSI and will be implemented:

- Although the area of the proposed additions to the H-POWER facility has been cleared, graded and covered with gravel, there is a slight possibility that additional burials might be found in sinkholes during construction of the third combustor foundation given the close proximity to the burial found in a previously unidentified sinkhole in 1986. Excavations in this area, below the level of previous disturbance, should be subjected to on-call monitoring by a qualified archaeologist.

- The plant sanctuary in Parcels 32-33 and 33-34, though protected by chain-link fences, should be protected with an additional 20-25 foot buffer because of the unknown extent of the sinkholes within each of the two areas.

- The plans for the laydown area call for: (a) the use of compactors to identify areas suitable for fabrication and storage areas; (b) grading of usable areas to a depth of approximately 1 to 1.5 feet, and (c) burial of the steam pipe at least 3 feet below grade. The latter two ground altering activities should be subjected to on-call monitoring by a qualified archaeologist.

5.2 Roadways and Traffic

This section discusses the existing access to H-POWER and the Expansion. A traffic analysis and summary of vehicle trip generation for the surrounding area under both construction and operational scenarios is presented. Mitigation measures to ensure safe and functional traffic operations are discussed.

5.2.1 Existing Conditions - Traffic

Figure 5.2-1 illustrates the H-POWER site and the surrounding roadway system. H-1, located north of the site, is an east-west freeway that provides access for the majority of traffic approaching the site, and feeds onto the north-south interchange at Kalaeloa Blvd. Kalaeloa Blvd. feeds traffic into the H-POWER Site from H-1, and is a four lane divided arterial that widens to include left and right-turn lanes at major intersections. Kalaeloa Blvd. has four major intersections on the way to H-POWER that are evaluated in order to present baseline findings from which to determine the impacts of both construction and operation of the H-POWER Expansion.

Kalaeloa Blvd. intersects Farrington Highway and the H-1 Westbound Ramps at the very north end of the traffic impact area. A few hundred feet south of this intersection, Kalaeloa Blvd. intersects with the H-1 Eastbound Ramps. A few hundred feet south of the H-1 Eastbound Ramps, Kalaeloa Blvd. intersects with Kapolei Parkway into the Honolulu Advertiser Building. Kapolei Parkway serves both the Honolulu Advertiser Building, west of Kalaeloa Blvd. and a new commercial/industrial mixed use development to the east of Kalaeloa Blvd. South of the Honolulu Advertiser Building access road, Kalaeloa Blvd. intersects with Malakole Road, a two-lane street that provides access to the predominantly industrial areas south of Malakole Road.

The H-POWER facility is located at the intersection of Hanua Street and Komohana Street (southwest of Kalaeloa Blvd. and Malakole Road intersection). As described above, to reach H-

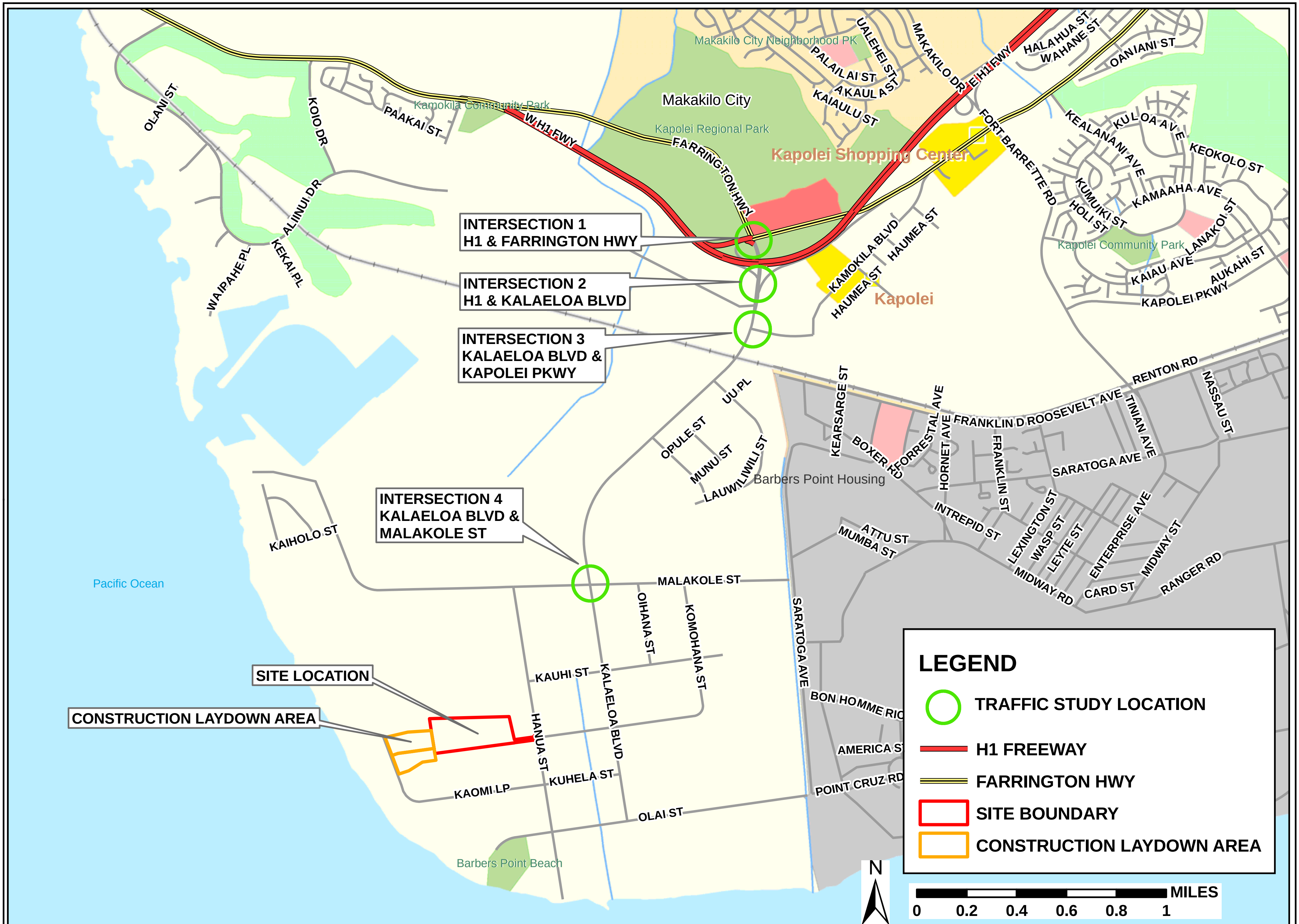
POWER the traffic proceeds through four main intersections as follows, from north to south on Kalaeloa Blvd.:

1. Kalaeloa Blvd. and H-1 Westbound Ramps (North-South Stop Signs)
2. Kalaeloa Blvd. and H-1 Eastbound Ramps (Eastbound Stop Signs)
3. Kalaeloa Blvd. and Honolulu Advertiser Building (Traffic Signal)
4. Kalaeloa Blvd. and Malakole Road (Traffic Signal)

The geometries of each of these key intersections are depicted, from north to south, on Figures 5.2-2, 5.2-3, 5.2-4, and 5.2-5. These four intersections are the only major crossroads locations on Kalaeloa Blvd., starting from the H-1 Ramps south to the H-POWER site. These are the locations that changes in traffic caused by the H-POWER Expansion would likely be felt. Kalaeloa Blvd. ends just north of Farrington Road/H-1 Westbound Ramps, into a private driveway. South of Malakole Road, traffic begins to disperse over a much larger network of local and collector-distributor type roadways. Also, the H-POWER Expansion Site is only a few blocks south of Malakole Road, and there would likely be no significant traffic impacts south of Malakole Road.

Peak hour traffic counts (AM and PM) were conducted between July 21 through 24, 2008. A single intersection was observed each day. Each intersection was videotaped for a period of three hours during perceived peak morning (between 5:30 am and 8:30 am) and afternoon (between 3:00 pm and 6:00 pm) travel time to ensure capture of the peak hour. The video was observed and counts were recorded for vehicles and trucks for each directional movement at the individual intersections. Based on the vehicle and truck counts, the traffic hour with the highest counts was selected as the peak traffic hours. Peak traffic hours are presented below, while peak traffic counts are presented in Figures 5.2-6 through 5.2-11.

A Level of Service (LOS) analysis was conducted at each of the four intersections using the Highway Capacity Manual software (Highway Capacity Software). LOS refers to the quality of traffic flow along roadways and intersections. It is described in terms of levels A through F, where A indicates nearly free-flow conditions, and LOS F, indicates congested or forced flow traffic conditions. For unsignalized intersections, Average Total Delay (the delay encountered by each approach, averaged for the entire intersection) is used to determine LOS. LOS for signalized intersections are determined by Delay Ranges relating to the mean stopped delay incurred by all vehicles entering the intersection. These measurements are briefly explained in Table 5.2-1. Appendix C provides the Highway Capacity Software input and output spreadsheets for the various scenarios described in the sections below.



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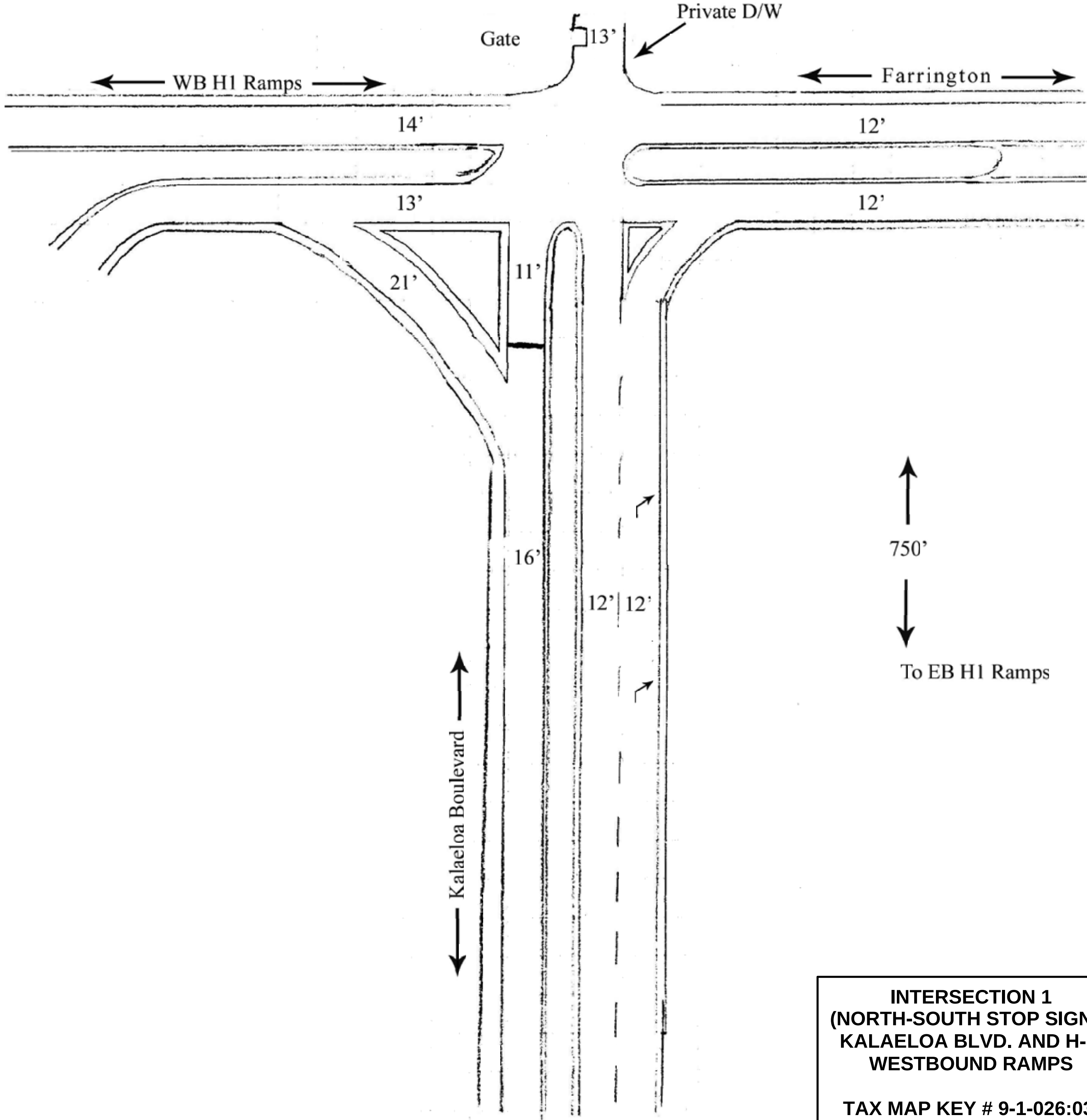
H-POWER SITE AND SURROUNDING ROADWAY SYSTEM

FIGURE 5.2-1

Figure 5.2-1 back side



INTERSECTION 1
(NORTH-SOUTH STOP SIGNS)
KALAELOA BLVD. AND H-1
WESTBOUND RAMPS

TAX MAP KEY # 9-1-026:030

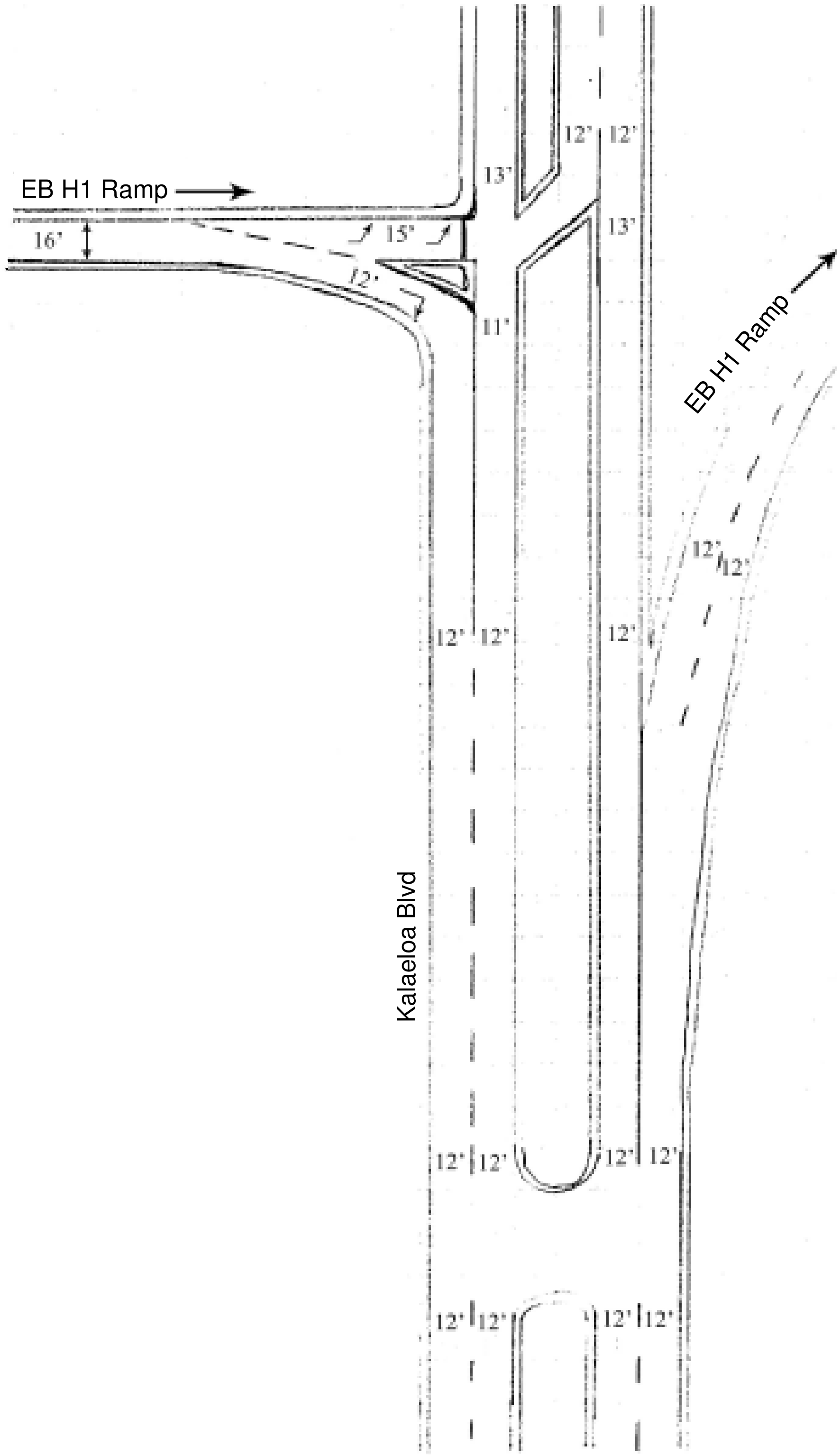
H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

N

amec

FIGURE 5.2-2

Figure 5.2-2 back side



INTERSECTION 2
(EASTBOUND STOP SIGNS)
KALAELOA BLVD. AND
H-1 EASTBOUND RAMPS

TAX MAP KEY # 9-1-026:030

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

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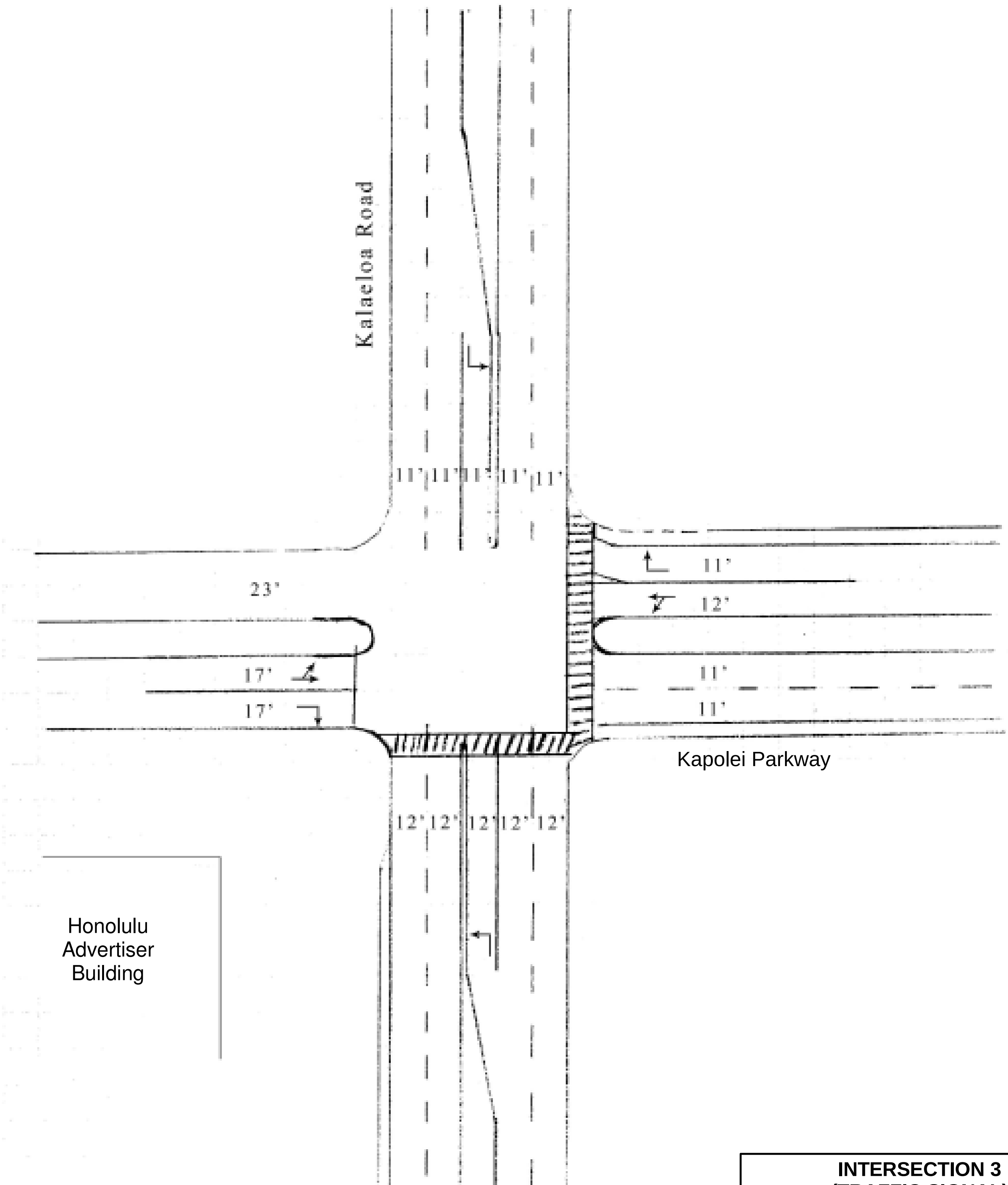
FIGURE 5.2-3

Figure 5.2-3 back side



INTERSECTION 3
(TRAFFIC SIGNAL)
KALAELOA BLVD. AND
KAPOLEI PARKWAY
HONOLULU ADVERTISER BUILDING

TAX MAP KEY # 9-1-026:030

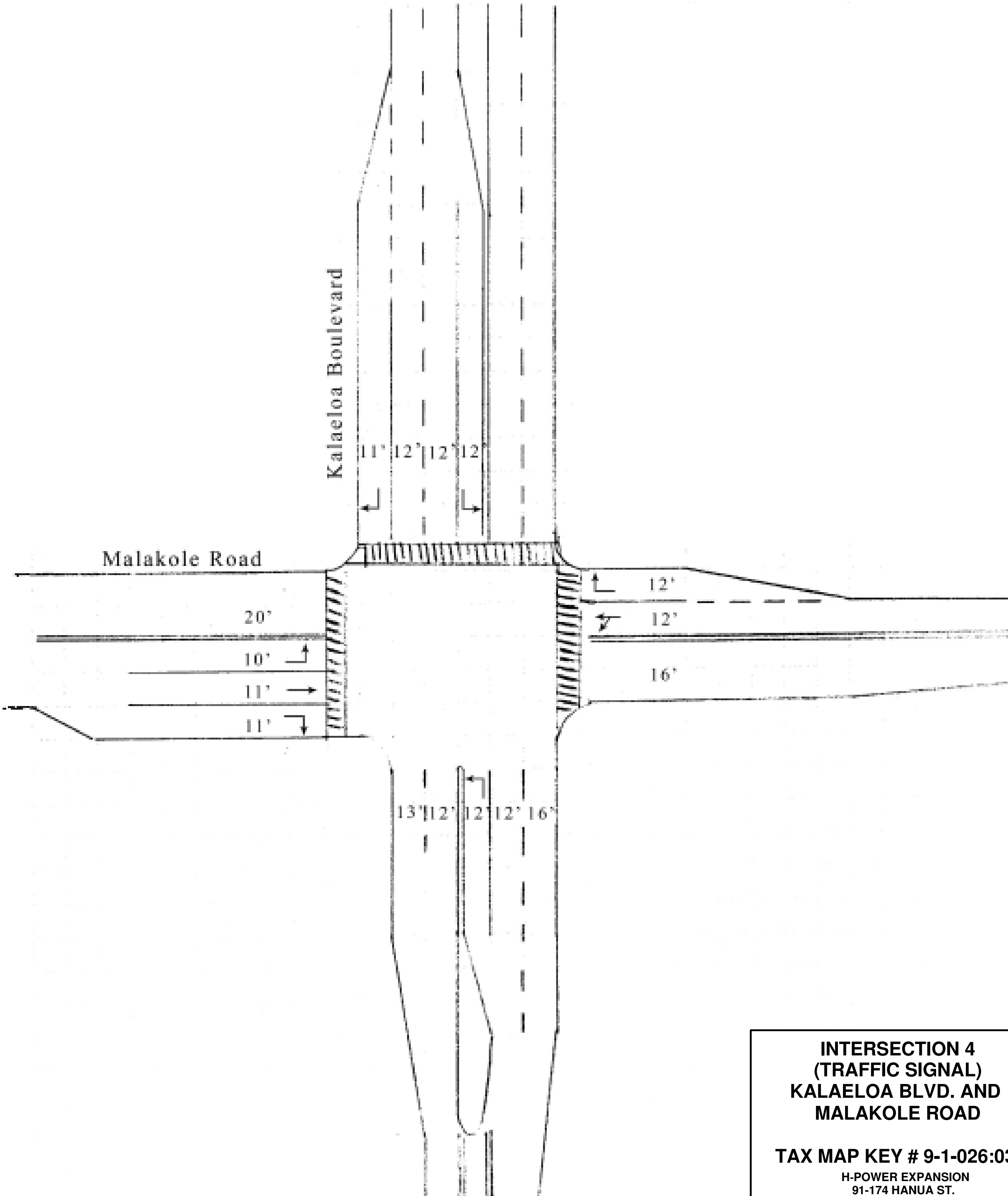
H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

N

amec

FIGURE
5.2-4

Figure 5.2-4 back side



INTERSECTION 4
(TRAFFIC SIGNAL)
KALAELOA BLVD. AND
MALAKOLE ROAD

TAX MAP KEY # 9-1-026:030
H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

amec

FIGURE
5.2-5

Figure 5.2-5 back side

TABLE 5.2-1 LEVEL OF SERVICE (LOS) DESIGNATIONS*

Category	Description	Signalized Intersections: Delay Range** (Seconds per Vehicle)	Unsignalized Intersections: Average Total Delay*** (Seconds per Vehicle)
LOS A	No Traffic Congestion	≤ 10	≤ 10
LOS B	Some Minor Congestion	> 10-20	> 10-15
LOS C	Noticeable Traffic Congestion	> 20-35	> 15-25
LOS D	Significant Congestion	> 35-55	> 25-35
LOS E	At Capacity	> 55-80	> 35-50
LOS F	Forced Flow	> 80	> 50

*Source: "Highway Capacity Manual", Transportation Research Board, 2000 edition.
**Delay ranges relate to the mean stopped delay incurred by all vehicles entering the intersection and do not consider the effects of traffic signal coordination. This criteria is intended for use in the evaluation of individual signalized intersections.
***Average Total Delay refers to the delay encountered by each approach, averaged for the entire intersection. This criteria is limited to use in the evaluation of two-way stop-controlled unsignalized intersections.

As noted above, peak hour traffic counts (AM and PM) were conducted at each of the four intersections. The morning peak hour for Intersections 1, 2 and 4 was observed to occur from 6:30 a.m.-7:30 a.m. The intersection of the Advertiser Building (Intersection 3) was observed to have an AM peak hour from 6:20 a.m. to 7:20 a.m. The PM peak hour for the intersections varied as follows:

- Intersection 1: 3:50 p.m. - 4:50 p.m.
- Intersection 2: 4:00 p.m. - 5:00 p.m.
- Intersection 3: 3:40 p.m. - 4:40 p.m.
- Intersection 4: 3:20 p.m. - 4:20 p.m.

Figures 5.2-6 and 5.2-7 illustrate the relative location of the four intersections along Kalaeloa, as well as the AM and PM peak hour traffic counts. The total number of trucks observed is also noted, including but not limited to refuse trucks. For instance, $100/27^T$ indicates 100 vehicles, 27 of which were trucks. In addition, a discriminatory visual analysis was conducted at the H-1 westbound and H-1 eastbound intersections (Intersections 1 and 2) during the AM peak hour to differentiate refuse trucks from other trucks accessing Kalaeloa Boulevard. The results of that visual analysis indicated that roughly 21% of the trucks during the AM peak period were refuse trucks. As might be expected, the vast majority of the refuse trucks, or roughly 77%, were accessing Kalaeloa from the H-1 East on/off ramp, which is consistent with most refuse originating in the east from sources proximate to the City of Honolulu.

The "existing LOS" values for the four intersections are shown in Table 5.2-2 as follows:

TABLE 5.2-2 LEVEL OF SERVICE ANALYSIS FOR BASELINE CONDITIONS

INTERSECTION 1: KALAELOA + FARRINGTON/WESTBOUND H-1 RAMPS

	Northbound	Southbound	Eastbound	Westbound
AM Peak	**F(59 sec)**	D(26 sec)	A(0)	A(0)
PM Peak	**F(645 sec)**	D(28 sec)	A(0)	A(0)

INTERSECTION 2: KALAELOA + EASTBOUND H-1 RAMPS

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(0)	A(0)	D(34 sec)	n/a
PM Peak	A(0)	A(0)	B(13 sec)	n/a

INTERSECTION 3: KALAELOA + HONOLULU ADVERTISER BLDG. (SIGNAL)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	B(13 sec)	**F(103 sec)**	B(12 sec)	**E(77 sec)**
PM Peak	**F(147 sec)**	B(18 sec)	B(13 sec)	C(29 sec)

INTERSECTION 4: KALAELOA + MALAKOLE (SIGNAL)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(9 sec)	A(8 sec)	C(24 sec)	B(13 sec)
PM Peak	B(14 sec)	A(10 sec)	C(33 sec)	B(10 sec)

*Bolded items either "At Capacity" (LOS E) or "Forced Flow" (LOS F).

It can be seen that there is an existing problem for NB traffic in both the AM and PM peak conditions at Kalaeloa and Farrington/WB H-1 Ramps. The LOS is F for the northbound left-turn movement. This movement is Stop sign controlled, and conflicts with a fairly heavy westbound through and left-turn movement. It should be noted (see Figure 5.2-7) that a very small percentage of traffic at that intersection consists of trucks during the PM peak hour: $315/10^T$ indicates only ten trucks of the total 315 vehicles. The AM peak hour traffic count has a higher percentage of trucks: $103/18^T$ indicates 18 trucks of the total 103 vehicles. Even the conflicting westbound and left-turn movement consists of predominantly non-truck traffic (AM: $378/11^T$ for westbound and $267/13^T$ for the left turn; PM: $752/17^T$ for westbound and $138/16^T$ for the left turn).

A problem also exists for northbound traffic in the PM and southbound and westbound traffic in the AM for the Kalaeloa and Honolulu Advertiser Bldg intersection. Traffic is signal controlled. The LOS is F for the southbound through movement. A small percentage of the vehicles at that intersection consist of trucks ($1488/115^T$). Northbound traffic also resulted in a LOS of F for through movement. As previously, a small percentage of the traffic is trucks ($1129/85^T$). The LOS is E for the westbound through movement. The remaining locations and time periods result in acceptable LOS values.

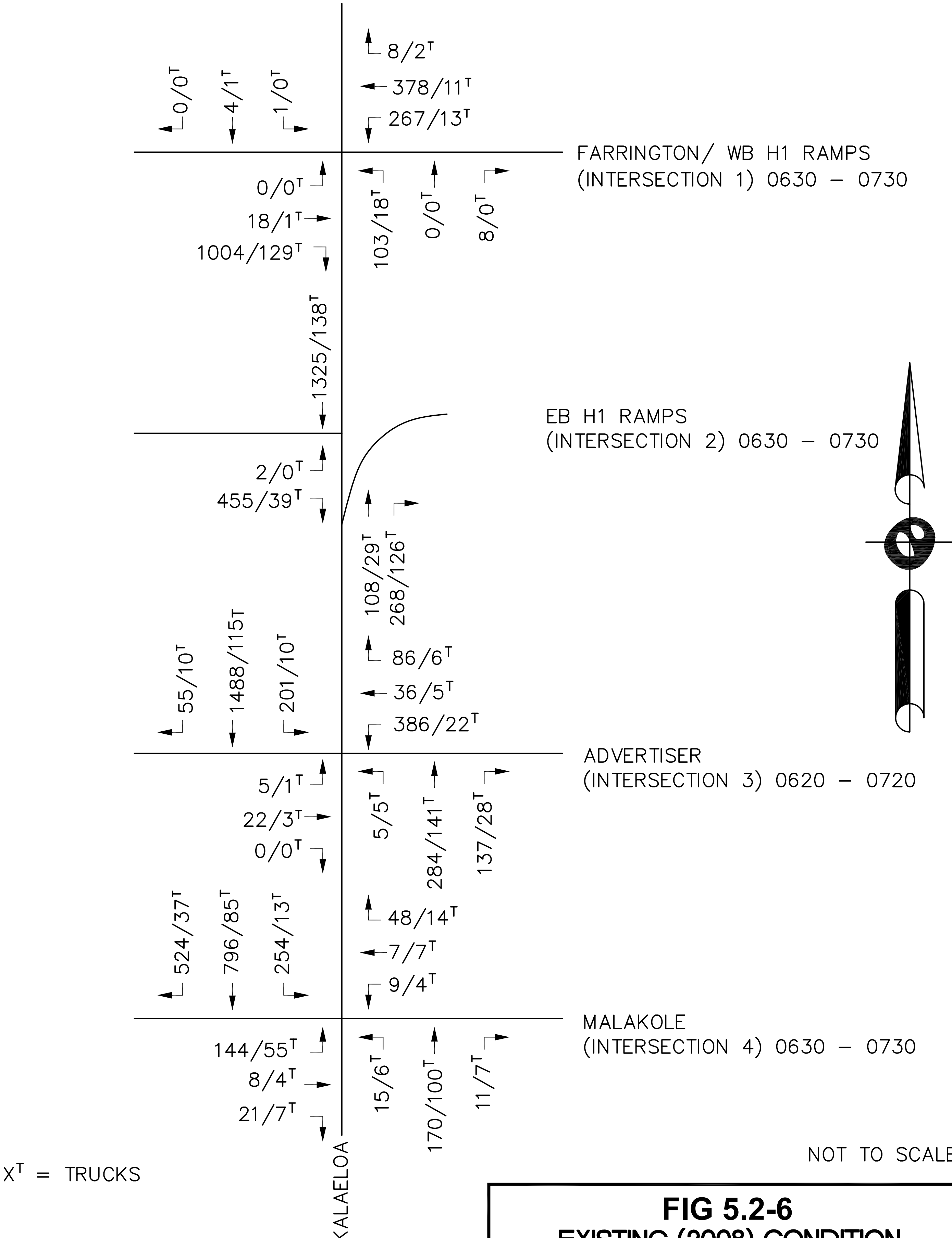


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FIG 5.2-6
EXISTING (2008) CONDITION

AM PEAK HOUR TURNING MOVEMENT COUNT

DRAWING NUMBER EXPANSION (OPERATION) CONDITION	FIGURE NUMBER 5.2-6
PROJECT NUMBER 776350000	

Figure 5.2-6 back side

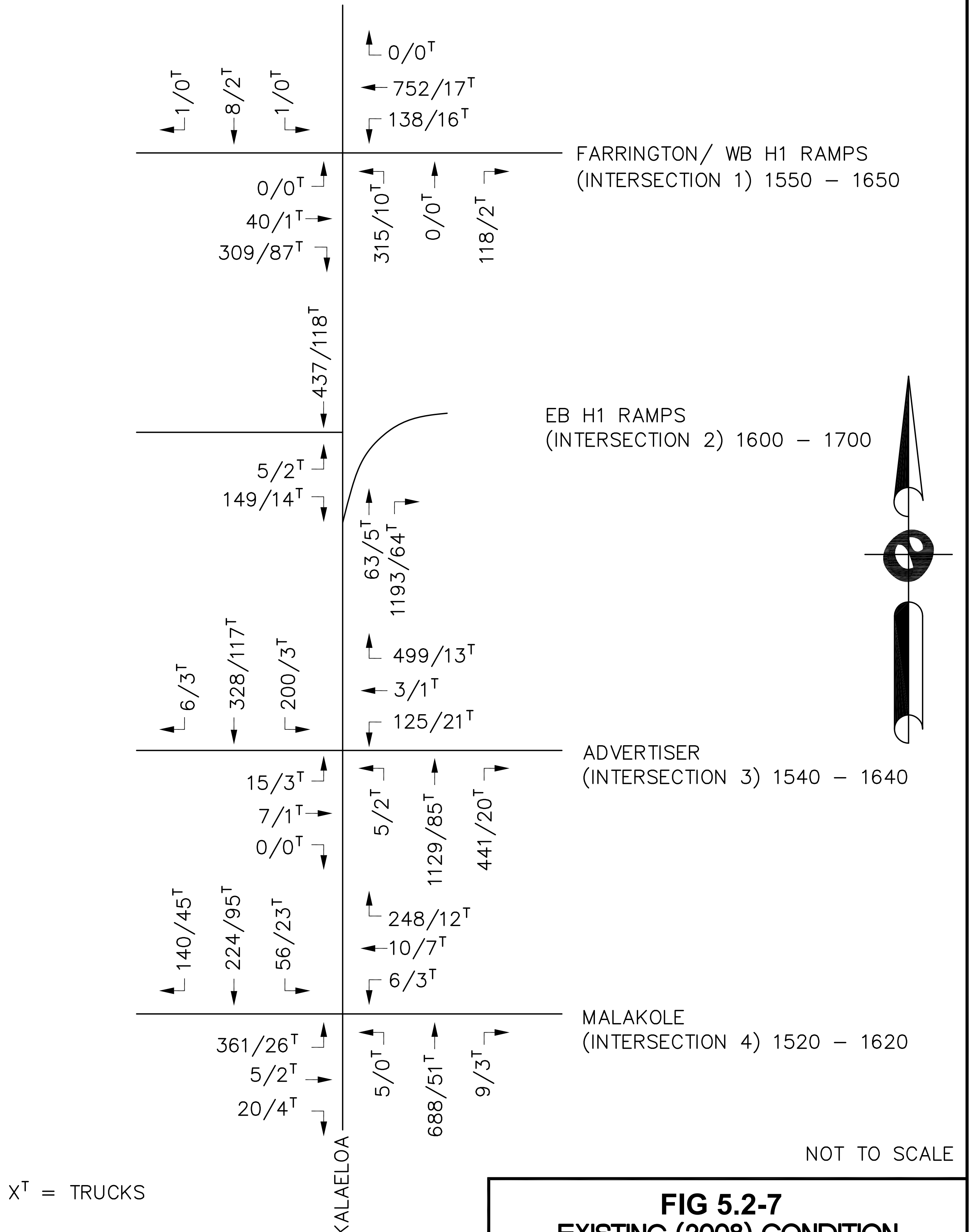


FIG 5.2-7
EXISTING (2008) CONDITION

PM PEAK HOUR TURNING MOVEMENT COUNT

DRAWING NUMBER EXPANSION (OPERATION) CONDITION	FIGURE NUMBER 5.2-7
PROJECT NUMBER 776350000	

Figure 5.2-7 back side

5.2.2 Traffic Impacts During Facility Operation

The H-POWER Expansion consists of expanding the waste capacity intake of the facility from 610,000 tons to 910,000 tons of MSW per year. Commercial operation of the proposed Expansion is anticipated in 2012. As noted in Section 5.1, the baseline number of trucks at each intersection (existing traffic) was counted and the percentage of total trucks that are bound for H-POWER during peak hours was estimated from the traffic counts taken at the H-1 intersections (Intersection 1 and 2). This estimate, roughly 21 percent, was based on visual observation of the trucks accessing Kalaeloa Boulevard from H-1 and was consistent with H-POWER truck count for that day. A higher estimate, assuming that H-POWER trucks reflect 30 percent of truck traffic during the peak hours, was used for the operational impact assessment to ensure a conservative analysis.

To account for the additional trucks generated by the H-POWER Expansion, the H-POWER trucks (only) will be increased by a 900,000/600,000 (or 1.50) factor. This equates to a truck factor of 1.15 (0.30 x 1.50 = 0.45, plus the "other" trucks (0.7) = 1.15 factor), or overall truck volumes are anticipated to be 15 percent greater than existing truck volumes. To determine the traffic impact following the H-POWER Expansion, it was determined that the number of refuse trucks using Kalaeloa Blvd. would increase in a ratio similar to the increase in the H-POWER Expansion.

Figures 5.2-8 and 5.2-9 illustrate the increased number of trucks and the impacts of such, during the AM and PM peak hours. It can be seen from the post-Expansion LOS analyses (Table 5.2-3) at the four intersections that the LOS and delay values do not change appreciably (and in most instances, do not change at all) when the total truck volumes are increased by a factor of 1.15 (to account for the H-POWER Expansion).

As shown in Table 5.2-3, based on the estimated increase in traffic volume, the existing problems are estimated to remain (but do not change appreciably) for northbound traffic in the AM and PM conditions at Kalaeloa and Farrington/WB H-1 Ramps. The LOS is F for the northbound left-turn movement. This movement is Stop sign controlled, and conflicts with a fairly heavy westbound through and left-turn movement. As noted earlier and shown on Figure 5.2-7, a very small percentage of traffic during the PM peak hour at that "Forced Flow" northbound left-turn movement consists of trucks: 315/10^{T}. The AM peak hour traffic count has a higher percentage of trucks: 103/18^{T} with trucks accounting for 18 of the total 103 vehicles. Post-Expansion, the PM traffic at that "Forced Flow" northbound left-turn movement is estimated to increase by two trucks: 317/12^{T}, as shown on Figure 5.2-9. The AM traffic is estimated to increase by three trucks: 106/21^{T}.

A projected increase in traffic is estimated to lower the LOS at the Kalaeloa & Eastbound H-1 Ramps eastbound movement. Prior to Expansion, the LOS is estimated to be D. Post-Expansion the LOS is estimated to be E. AM traffic at eastbound movement that is now "Significantly Congested" will increase by 19 trucks: 287/145^{T}.

The existing problem for northbound traffic in the PM and southbound traffic in the AM for the Kalaeloa and Honolulu Advertiser Bldg. intersection is estimated to remain unchanged after the Expansion. PM northbound traffic was estimated to be LOS F in the baseline study, and it remains LOS F after the Expansion. As noted in the baseline study, a small percentage of the baseline traffic is trucks ($1129/85^T$). Post-Expansion,

TABLE 5.2-3 LEVEL OF SERVICE ANALYSIS DURING OPERATION FOLLOWING EXPANSION

INTERSECTION 1: KALAELOA + FARRINGTON/WESTBOUND H-1 RAMPS

	Northbound	Southbound	Eastbound	Westbound
AM Peak	**F(65 sec)**	D(26 sec)	A(0)	A(0)
PM Peak	**F(672 sec)**	D(28 sec)	A(0)	A(0)

INTERSECTION 2: KALAELOA + EASTBOUND H-1 RAMPS

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(0)	A(0)	***E(36 sec)***	n/a
PM Peak	A(0)	A(0)	B(14 sec)	n/a

INTERSECTION 3: KALAELOA + HONOLULU ADVERTISER BLDG. (SIGNAL)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	B(14 sec)	**F(92 sec)**	B(12 sec)	***F(94 sec)***
PM Peak	**F(157 sec)**	B(18 sec)	B(13 sec)	C(30 sec)

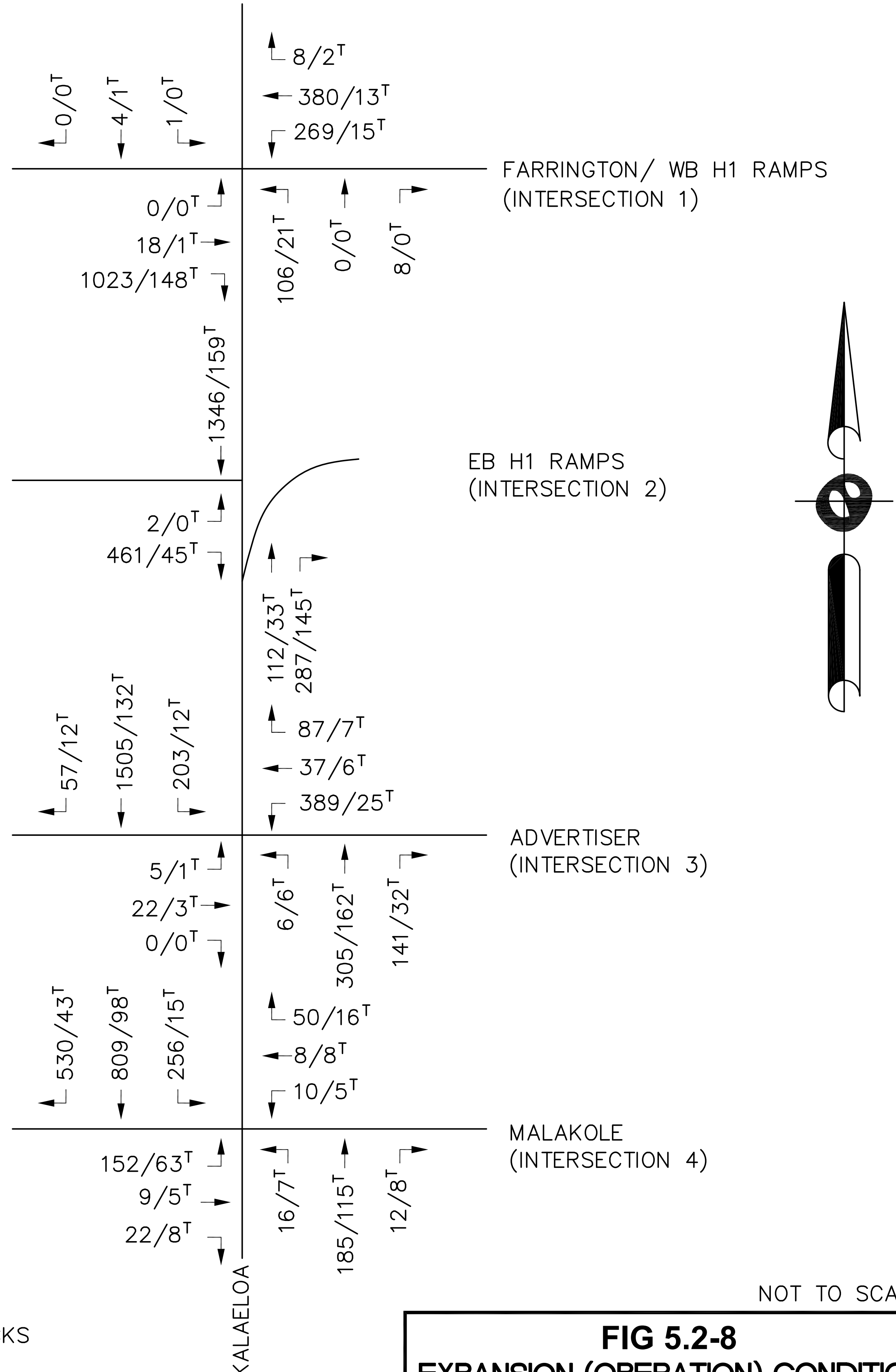
INTERSECTION 4: KALAELOA + MALAKOLE (SIGNAL)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(9 sec)	A(8 sec)	C(28 sec)	B(13 sec)
PM Peak	B(15 sec)	B(10 sec)	C(33 sec)	B(10 sec)

*Bolded items either “At Capacity” (LOS E) or “Forced Flow” (LOS F).
Italicized items indicate a change in LOS from Existing Conditions.

the PM traffic at that failing northbound movement will increase truck traffic by only 13 trucks: $1142/98^T$, as shown on Figure 5.2-9. For the southbound through movement, the baseline LOS was estimated to be F. Traffic at this intersection is signal controlled. As shown previously, a small percentage of the vehicles at that intersection consist of trucks ($1488/115^T$). The “Forced Flow” southbound AM traffic will increase by only 17 trucks: $1505/132^T$ and its LOS remains F. The baseline AM traffic in the westbound movement was estimated to be LOS E in the baseline study. Post-Expansion the LOS is estimated to be F. AM traffic at the “Forced Flow” westbound movement increases by 1 truck: $37/6^T$. Although only one vehicle is added to the westbound movement, the Highway Capacity Software system redistributes green times in an effort to minimize average delay for all entering vehicles and evaluates the intersection in summation (total of all directions). The values and delay times observed in the LOS analysis are therefore a product of this effort. Eastbound traffic is estimated to remain unchanged following Expansion with traffic designated by an LOS of B for both AM and PM periods.

The remaining locations and time periods result in lower LOS values.



NOT TO SCALE

X^T = TRUCKS

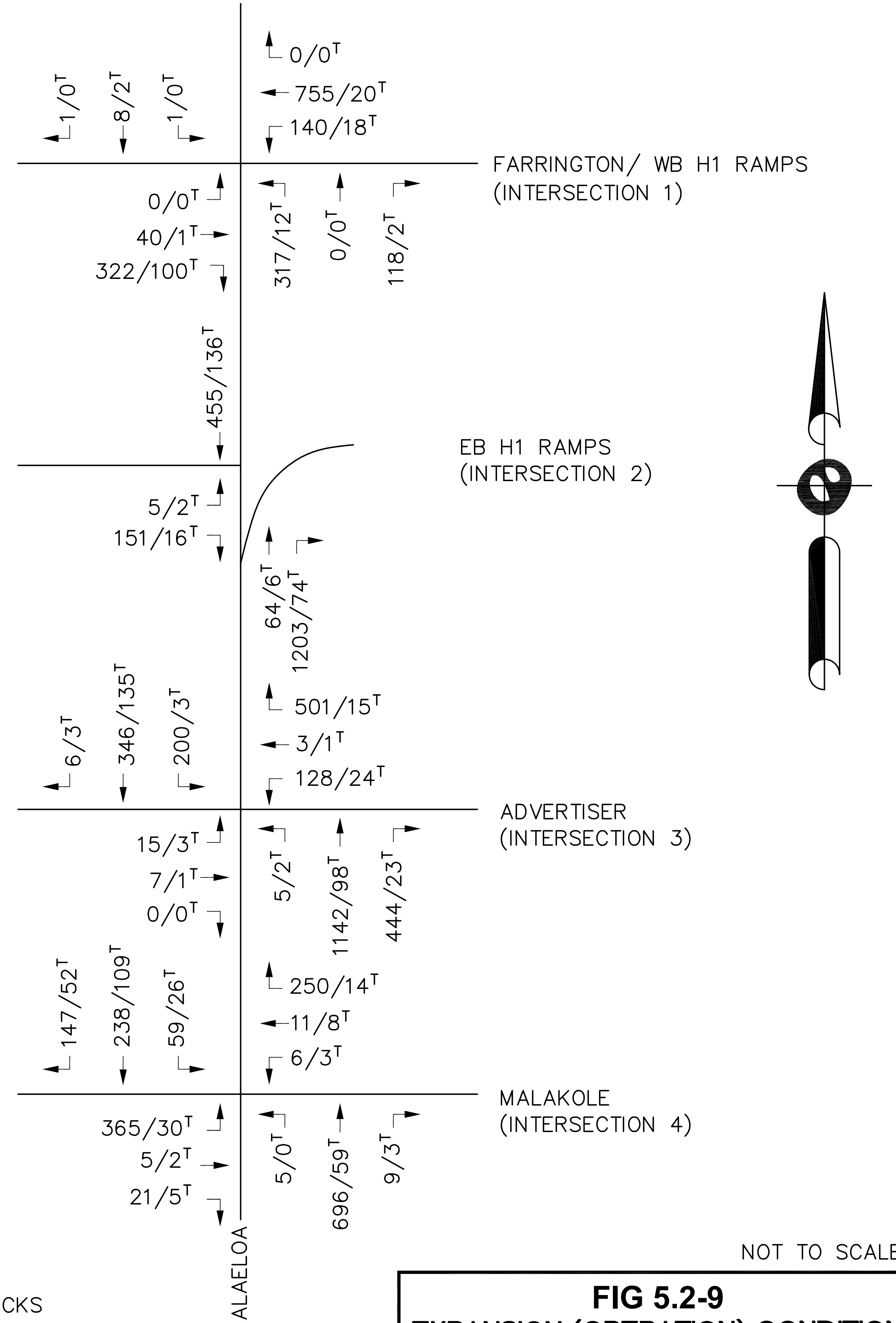
FIG 5.2-8
EXPANSION (OPERATION) CONDITION

AM PEAK HOUR TURNING MOVEMENT COUNT

DRAWING NUMBER	FIGURE NUMBER
EXPANSION (OPERATION) CONDITION	5.2-8
PROJECT NUMBER 776350000	

amec

Figure 5.2-8 back side



X^T = TRUCKS

FIG 5.2-9
EXPANSION (OPERATION) CONDITION

PM PEAK HOUR TURNING MOVEMENT COUNT

DRAWING NUMBER: EXPANSION (OPERATION) CONDITION	FIGURE NUMBER: 5.2-9
PROJECT NUMBER: 776350000	

Figure 5.2-9 back side

5.2.3 Traffic Impacts During Facility Construction

As shown previously in Table 2.3-1, Construction Staffing and Delivery Matrix construction is anticipated to begin in mid 2009, and run for 34 months, followed by a 3-month start-up and testing period. The highest construction activity month is anticipated to occur approximately between months 10 through 13 and 21 through 24 after project initiation. Months 10 through 13, have a higher number of trucking trips at approximately 240 truck deliveries (trips/month), while the expected staffing on site range between 69 and 90 personnel. During months 21 through 24, approximately 165 staff will be on site, and approximately 120 truck deliveries (trips/month) will be required to construct the facility. For the analysis, month 13 was selected for the highest truck delivery month (240 truck trips, 90 personnel). Month 22 was selected for the peak personnel month (165 personnel, 120 truck deliveries). The additional construction trips are a temporary condition and vans, carpooling, or peak spreading could be used to mitigate traffic impacts through Traffic Demand Management. To be conservative this analysis examines the impacts as if each staff person drove to the construction site, individually, during the AM and PM peak hours on weekdays (presenting a “worst case” scenario). This is an extremely conservative assumption, since the construction process could utilize multiple shifts, involve car-pooling and/or weekend shifts. Furthermore, it is not anticipated that all staff will arrive and depart at exactly the same time.

For the purposes of this analysis, all the additional trips related to the construction of the facility will be assumed to utilize the H-1 and Kalaeloa interchange, and progress southbound to the H-POWER Expansion site. Construction traffic may impact the four intersections along Kalaeloa, including the H-1 interchange (both Farrington and the EB H-1 Ramps), the Honolulu Advertiser Building intersection, and the Malakole intersection. Figures 5.2-10 and 5.2-11 illustrate the impacts of construction traffic during the peak month of 2010.

Month 13: The impact of adding 90 employee vehicles and 12 trucks per day (240 monthly delivery trucks/20 work days) or 6 additional directional (delivery) trucks per peak hour were analyzed, with the following results presented in Table 5.2-4.

The addition of 90 vehicles and 12 delivery trucks per day during the construction phase is not anticipated to have any impact to traffic. LOS designations are not estimated to change from current baseline conditions.

Month 22: The impact of adding 165 employee vehicles and 6 trucks per day (120 monthly delivery trucks/20 work days) or 3 additional directional (delivery) trucks per peak hour were analyzed, with the following results as noted in Table 5.2-5.

The addition of 165 vehicles and 6 delivery trucks per day during the construction phase is not anticipated to have any impact to traffic. LOS designations are not estimated to change from current baseline conditions.

TABLE 5.2-4 LEVEL OF SERVICE ANALYSIS DURING CONSTRUCTION – MONTH 13

Intersection 1: Kalealoa + Farrington/Westbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	**F(59 sec)**	D(26 sec)	A(0)	A(4 sec)
PM Peak	**F(687 sec)**	D(28 sec)	A(0)	A(2 sec)

Intersection 2: Kalealoa + Eastbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(0)	A(0)	C(35 sec)	n/a
PM Peak	A(0)	A(0)	B(13 sec)	n/a

Intersection 3: Kalealoa + Honolulu Advertiser Bldg. (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	B(13 sec)	**F(112 sec)**	B(12 sec)	**E(77 sec)**
PM Peak	**F(150 sec)**	B(18 sec)	B(13 sec)	C(29 sec)

Intersection 4: Kalealoa + Malakole (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(9 sec)	A(8 sec)	C(25 sec)	B(13 sec)
PM Peak	B(15 sec)	A(10 sec)	C(33 sec)	B(11 sec)

*Bolded items either “At Capacity” (LOS E) or “Forced Flow” (LOS F).
Italicized items indicate a change in LOS from Existing Conditions.

It should be restated that this is a conservative estimate for the peak traffic months of construction (month 13 for increase in truck deliveries and month 22 for increase in personnel). The additional traffic, although transitory, will be experienced for a period of 34 months, although the other months’ impacts will not be as great as the illustrated months. The already heavily congested locations, Kalaeloa + Farrington/Westbound H-1 Ramps, and Kalaeloa + Honolulu Advertiser Building will become slightly more congested. However, the LOS designations for these locations remain unchanged. In summary, additional H-POWER traffic generated on a temporary basis by construction will not add significantly to the existing congestion.

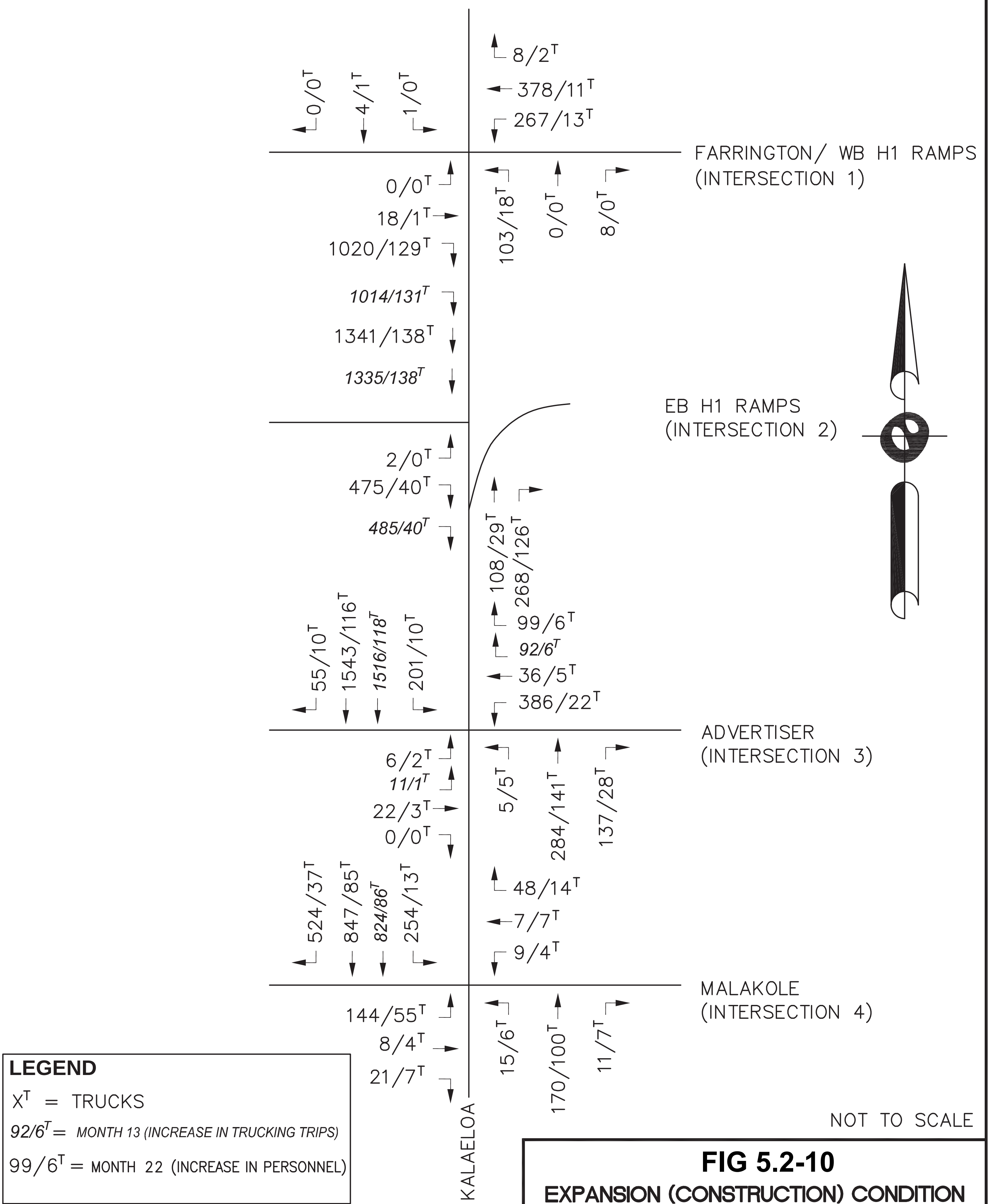


FIG 5.2-10

EXPANSION (CONSTRUCTION) CONDITION

AM PEAK HOUR TURNING MOVEMENT COUNT

DRAWING NUMBER: EXPANSION (OPERATION) CONDITION	FIGURE NUMBER: 5.2-10
PROJECT NUMBER: 776350000	

Figure 5.2-10 back side

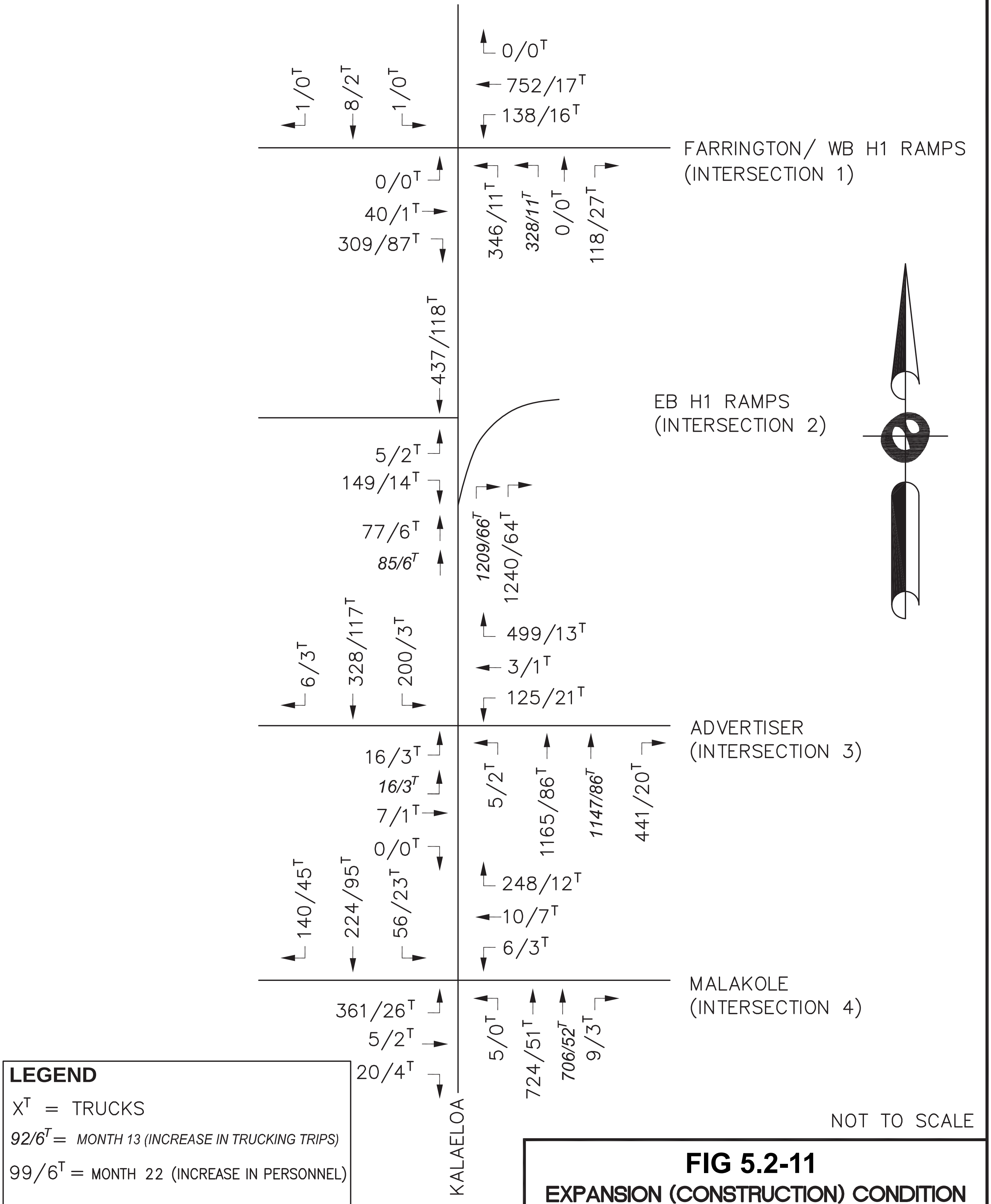


FIG 5.2-11

EXPANSION (CONSTRUCTION) CONDITION

PM PEAK HOUR TURNING MOVEMENT COUNT

DRAWING NUMBER	FIGURE NUMBER
EXPANSION (OPERATION) CONDITION	5.2-11
PROJECT NUMBER 776350000	

Figure 5.2-11 back side

TABLE 5.2-5 LEVEL OF SERVICE ANALYSIS DURING CONSTRUCTION – MONTH 22

Intersection 1: Kalealoa + Farrington/Westbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	**F(59 sec)**	D(26 sec)	A(0)	A(0)
PM Peak	**F(744 sec)**	D(28 sec)	A(0)	A(0)

Intersection 2: Kalealoa + Eastbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(0)	A(0)	D(35 sec)	n/a
PM Peak	A(0)	A(0)	B(14 sec)	n/a

Intersection 3: Kalealoa + Honolulu Advertiser Bldg. (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	B(13 sec)	**F(120 sec)**	B(12 sec)	**E(77 sec)**
PM Peak	**F(157 sec)**	B(18 sec)	B(13 sec)	C(30 sec)

Intersection 4: Kalealoa + Malakole (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(9 sec)	A(8 sec)	C(25 sec)	B(13 sec)
PM Peak	B(15 sec)	A(10 sec)	C(33 sec)	B(11 sec)

*Bolded items either “At Capacity” (LOS E) or “Forced Flow” (LOS F).
Italicized items indicate a change in LOS from Existing Conditions.

5.2.4 Traffic Mitigation

The traffic impacts of the H-POWER Expansion will be limited. The anticipated truck growth at each of the four impacted intersections is on the order of 15 percent. This 15 percent growth in total truck volume will not significantly degrade the current LOS values, and should not be distinguishable to drivers from today’s conditions except in the westbound movement at the Kalaeloa and Honolulu Advertiser Bldg intersection (Baseline LOS E vs an estimated Expansion LOS F) and the eastbound movement at the Kalaeloa and Eastbound H-1 Ramps (Baseline LOS D vs an estimated Expansion LOS E) during operations of the expanded facility.

In addition, the H-POWER Expansion will include the construction of a new 60-ton, 70-foot capacity receiving scale located adjacent to the central scale house. With two receiving scales, the flow of in-coming truck traffic will be improved.

Currently there is roadwork underway that would improve these intersections and widen Kalaeloa Blvd from four lanes to six lanes. An LOS analysis was conducted for the intersections assuming these roadway improvements were implemented but assuming Expansion construction or operations have not occurred. With the exception of the deterioration of traffic in the Eastbound direction of the Kalaeloa and Eastbound H-1 ramp at intersection 2 (LOS D estimated to change to LOS E), traffic remained the same or improved at all intersections and in all flow directions. The deterioration of traffic in the eastbound direction at intersection 2 may be attributed to vehicles needing to cross more lanes to get to the signal controlled left turn lane. Additionally, the Highway Capacity Software system redistributes green times in an effort to minimize average delay for all entering vehicles and evaluates the intersection in summation (total of all directions). The values and delay times observed in the LOS analysis are therefore a product of this effort. The roadway improvement project should be completed by 2010, which would coincide with construction increases and the subsequent operations Expansion. The LOS analysis was recalculated for the Operations and Construction scenarios utilizing the roadway improvements.

5.2.4.1 Traffic Impacts During Facility Operation Post Kalaeoloa Roadway Improvements

An increase in traffic due to Expansion operation is estimated to cause greater traffic delays at the Kalaeloa & Eastbound H-1 Ramps eastbound movement (Intersection 2). Prior to Expansion, the LOS was estimated as D. Post-Expansion the LOS is estimated as E. This LOS is estimated to remain the same (E) after the Kalaeloa roadway improvement.

TABLE 5.2-6 LEVEL OF SERVICE ANALYSIS DURING OPERATION FOLLOWING EXPANSION – EFFECT OF ROADWAY IMPROVEMENTS

Intersection 1: Kalaeloa+Farrington/Westbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	**F(65 sec)**	D(26 sec)	A(0)	A(0)
PM Peak	**F(672 sec)**	D(28 sec)	A(0)	A(0))

Intersection 2: Kalaeloa+Eastbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(0)	A(0)	**E(37 sec)**	n/a
PM Peak	A(0)	A(0)	B(14 sec)	n/a

Intersection 3: Kalaeloa+Honolulu Advertiser Bldg. (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	C(23 sec)	C(23 sec)	B(14sec)	C(34sec)
PM Peak	C(22 sec)	B(15 sec)	B(13 sec)	C(27 sec)

Intersection 4: Kalaeloa+Malakole (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	B(10 sec)	A(7 sec)	D(35 sec)	B(15 sec)
PM Peak	B(16 sec)	B(12 sec)	C(24 sec)	B(11 sec)

*Bolded items either “At Capacity” (LOS E) or “Forced Flow” (LOS F).
Italicized items indicate a change in LOS from Existing Conditions.

The existing traffic congestion for northbound traffic in the PM and southbound traffic in the AM for the Kalaeloa and Honolulu Advertiser Bldg intersection (Intersection 3) improves greatly from existing conditions. The LOS was F for the southbound through movement and northbound traffic. Once roadway improvements are completed, the LOS improves to C for both directions.

Westbound AM movement improves from an LOS of F for pre-roadway improvement conditions to C for post-roadway improvement.

In summary, the roadway improvements are projected to improve traffic on Kalaeloa during operational activities post-Expansion.

5.2.4.2 Traffic Impacts During Facility Construction Post Kalaeloa Roadway Improvements

It should be restated that the analysis presented herein is a conservative estimate for the peak traffic months of construction (months 13 and 22). Selection of peak months has previously been described in Section 5.2.3. The additional traffic due to construction, although transitory, will be experienced for a period of 34 months, although the other months' impacts will not be as great as the peak months analyzed.

Month 13:

Traffic problems at Intersection 1 are not improved by the Kalaeloa roadway improvements because the failing lane is northbound traffic onto the H-1 ramp. The estimated LOS remains F for the northbound left-turn movement.

As previously noted, an increase in traffic due to roadway improvement activities increases congestion at the Kalaeloa & Eastbound H-1 Ramps, eastbound movement (Intersection 2). Prior to Expansion (baseline), the LOS was designated D. During construction the LOS was estimated to remain D, with a delay in the Eastbound direction of 35 seconds. This LOS dropped to E post-roadway improvement with an estimated delay of 37 sec in the eastbound direction. The deterioration of traffic flow in the eastbound direction at intersection 2 may be attributed to vehicles needing to cross more lanes to get to the signal controlled left turn lane. Additionally, the Highway Capacity Software system redistributes green times in an effort to minimize average delay for all entering vehicles and evaluates the intersection in summation (total of all directions). The values and delay times observed in the LOS analysis are therefore a product of this effort. The degradation observed is not a result of construction activities and rather is a product of roadway improvements. Baseline traffic counts have been evaluated under the roadway improvement scenario (without the Expansion) and this analysis resulted in an LOS of E for the AM eastbound movement at Intersection 2.

The existing traffic congestion for northbound traffic in the PM and southbound traffic in the AM for the Kalaeloa and Honolulu Advertiser Bldg intersection (Intersection 3) improves greatly from existing conditions. The LOS was F for the southbound through movement and northbound traffic. Once roadway improvements are completed, the LOS improves to C and B, respectively.

In summary, the roadway improvements in general are projected to improve traffic on Kalaeloa during construction activities as noted in Table 5.2-7.

TABLE 5.2-7 LEVEL OF SERVICE OF ANALYSIS DURING CONSTRUCTION – MONTH 13 – EFFECTS OF ROADWAY IMPROVEMENTS

Intersection 1: Kalaeloa+Farrington/Westbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	**F(59 sec)**	D(26 sec)	A(0)	A(4 sec)
PM Peak	**F(687 sec)**	D(28 sec)	A(0)	A(2 sec)

Intersection 2: Kalaeloa+Eastbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(0)	A(0)	***E(37 sec)***	n/a
PM Peak	A(0)	A(0)	B(14 sec)	n/a

Intersection 3: Kalaeloa+Honolulu Advertiser Bldg. (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	B(19 sec)	*C(20 sec)*	B(16 sec)	*D(46 sec)*
PM Peak	*B(17 sec)*	B(18 sec)	B(15 sec)	*D(42 sec)*

Intersection 4: Kalaeloa+Malakole (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(10 sec)	A(7 sec)	C(31 sec)	B(15 sec)
PM Peak	B(16 sec)	*B(11 sec)*	C(24 sec)	B(11 sec)

*Bolded items either “At Capacity” (LOS E) or “Forced Flow” (LOS F).
Italicized items indicate a change in LOS from Existing Conditions.

Month 22:

An increase in traffic due to roadway improvements increases congestion at the Kalaeloa & Eastbound H-1 Ramps eastbound movement (Intersection 2). Prior to the Expansion, the LOS was designated D. During construction the LOS was estimated to remain D, with a delay in the Eastbound direction of 35 seconds. As before in the 13 month analysis, this LOS is estimated to deteriorate to E post Kalaeloa roadway improvement with an estimated delay of 37 sec in the eastbound direction. Again, the deterioration of traffic in this area in the eastbound direction may be attributed to signal controlled left turn vehicles needing to cross more lanes which may sometimes result in an increased delay. Under improved conditions, the intersection should be viewed in summation (total of all directions) as the Highway Capacity Software redistributes green times in an effort to minimize average delay for all entering vehicles. Additionally, this increase in traffic congestion is not a result of Expansion activities and is a product of roadway improvements. As stated above, baseline traffic counts have been evaluated under the roadway improvement scenario (without the Expansion) and this analysis resulted in an LOS of E for the eastbound movement at Intersection 2.

The existing traffic congestion for northbound traffic in the PM and southbound traffic in the AM for the Kalaeloa and Honolulu Advertiser Bldg intersection (Intersection 3) improves greatly from existing conditions. The LOS was estimated to be F for the southbound through movement and northbound traffic. Once roadway improvements are completed, the LOS is estimated to improve to C and B, respectively. Westbound movement improves from an LOS of E for pre-roadway improvement conditions to C for post-roadway improvement.

In summary, the roadway improvements in general are projected to improve traffic on Kalaeloa during construction activities.

TABLE 5.2-8 LEVEL OF SERVICE ANALYSIS DURING CONSTRUCTION MONTH 22 – EFFECTS OF ROADWAY IMPROVEMENTS

Intersection 1: Kalaeloa+Farrington/Westbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	**F(59 sec)**	D(26 sec)	A(0)	A(4 sec)
PM Peak	**F(744 sec)**	D(28 sec)	A(0)	A(2 sec)

Intersection 2: Kalaeloa+Eastbound H-1 Ramps

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(0)	A(0)	***E(37 sec)***	n/a
PM Peak	A(0)	A(0)	B(14 sec)	n/a

Intersection 3: Kalaeloa+Honolulu Advertiser Bldg. (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	*C(20 sec)*	*C(22 sec)*	B(14 sec)	*C(34 sec)*
PM Peak	*B(16 sec)*	B(18 sec)	B(16 sec)	*D(49 sec)*

Intersection 4: Kalaeloa+Malakole (Signal)

	Northbound	Southbound	Eastbound	Westbound
AM Peak	A(10 sec)	A(7 sec)	C(32 sec)	B(15 sec)
PM Peak	B(16 sec)	*B(11 sec)*	C(25 sec)	B(11 sec)

*Bolded items either "At Capacity" (LOS E) or "Forced Flow" (LOS F).
Italicized items indicate a change in LOS from Existing Conditions.

5.2.4.3 Mitigation Recommendations

The intersection of Kalaeloa and Farrington/Westbound H-1 Ramps is a congested intersection today, and adding construction or operational traffic to the mix is estimated to slightly increase traffic delays. Traffic is also estimated to slightly worsen at the Kalaeloa and Eastbound H-1 Ramps during both construction and operational activities. The analysis described herein depicts a "worst-case" scenario. It is likely that actual traffic impacts would be minimal. Traffic consultants concluded that mitigation was not necessary; however, once construction plans and schedules are complete, the following options can be considered:

- Encourage staggered work shifts;
- Encourage the use of work shifts during off-peak hours;
- Encourage construction work-force car-pooling;
- Offer bus or shuttle service from remote parking;

- Provide a temporary traffic control officer at the unsignalized intersection of Kalaeloa and Farrington (Intersection 1) during the peak hours of the peak construction month(s);
- Provide temporary traffic control officer(s) at other unsignalized intersections on an as needed basis, during peak hours of the peak construction month(s); or
- Investigate use of Barber's Point Port for unloading, rather than the Port of Honolulu, in order to minimize distances traveled by delivery vehicles and keep deliveries within the industrial zone surrounding H-POWER and the Barber's Point Port.

It should be noted that the construction impacts to Kalaeloa should only occur during the AM and PM peak hours, are temporary in nature, and should not cause any long-term traffic congestion impacts. In addition, since adequate construction parking will be provided at the parcels proposed for temporary construction laydown and parking, no mitigation regarding construction parking will be required.

5.3 Noise

AMEC has assessed the effect that the Expansion might have upon the noise environment of the Campbell Industrial Park (JCIP) in which the H-POWER facility and its industrial neighbors are located. This section summarizes the results of that study. Noise standards are presented, baseline noise conditions are described, anticipated impacts are evaluated and the potential for mitigation is discussed. The anticipated effects from temporary construction activities as well as operation of the Expansion are evaluated.

5.3.1 Noise Standards

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts. The applicable guidelines and standards are summarized below.

Community Noise Control Rule

The Hawaii Department of Health (HDOH) Community Noise Control Rule (HAR Chapter 11-46) defines three classes of zoning districts (A, B, and C) and specifies corresponding maximum permissible sound levels due to stationary noise sources (Table 5.3-1). Sound levels for "A" districts are more restrictive while sound levels for "C" districts are least restrictive. These levels may be enforced by the HDOH for any location at or beyond the property line. More specifically, the HDOH rule states that the specified noise levels shall not be exceeded for more than 10% of the time during any 20-minute period. The noise limits are a function of the zoning and time of day. Industrial districts are classified as "C" and both day and nighttime noise limits are 70 dBA. H-POWER is industrially zoned and is therefore subject to the 70 dBA guideline.

TABLE 5.3-1 COMMUNITY NOISE CONTROL RULE: MAXIMUM PERMISSIBLE SOUND LEVELS

ZONING DISTRICT	DAY HOURS (7 AM TO 10 PM)	NIGHT HOURS (10 PM TO 7 AM)
Class A Residential, Conservation, Preservation, Public Space, Open Space	55 dBA[1]	45 dBA
Class B Multi-Family Dwellings, Apartments, Business, Commercial, Hotel, Resort	60 dBA	50 dBA
Class C Agriculture, County, Industrial	70 dBA	70 dBA

[1] dBA – A-weighted sound level or unit of measurement describing the total sound level of all noises as measured with a sound level meter using the "A" weighting network. dB (decibel) – Unit for measuring the volume of sound.

In determining the maximum permissible sound level, the HDOH considers the ambient (existing) noise level. In general, if the background noise levels are less than 5 dB from the given criteria then the threshold can be increased by 3 dBA (as indicated in HAR Chapter 11-46). If the background level is equal to the given criteria, the new threshold is +5 dBA. Background/ambient noise levels in the JCIP area range from 55-69 dBA. Thus, the accepted HDOH maximum permissible noise threshold for the H-POWER facility is 73 dBA (70 dBA + 3 dBA). The background sound measurement assessment is described in Section 5.3.2. Background measurement locations are depicted in Figure 5.3-1.

Exceedances of the HDOH Community Noise Rules values are determined via comparison of the maximum permissible sound levels detailed above to a site-specific LN10 value calculated over a specified time period. The LN10 is a statistically-based value of sound or noise that represents the sound level that is exceeded for 10% of the measurement time. Thus, for this evaluation, the community noise rule value of 73 db was compared to the maximum LN10 for any 20-minute time period.

To calculate the maximum 20-minute LN10, this assessment utilized the 1 minute average noise levels as reflected by LEQ data (1-minute average). The maximum 20-minute LN10 is the sound level that is exceeded by the two highest 1-minute LEQs during the worst case 20-minute period.

$$L_{eq} = 10\log\left[\frac{1}{t_2 - t_1}\int_{t_1}^{t_2}\frac{p_A^2}{p_0^2}dt\right]$$

Where:

- Leq = equivalent continuous sound pressure level [dB]
- p0 = reference pressure level = 20 μPa
- pA= acquired sound pressure in Pa
- t1 = start time for measurement
- t2 = end time for measurement

Construction Noise Rule

The HDOH also regulates temporary noise due to construction activities. In cases where construction noise exceeds, or is expected to exceed, the State's "maximum permissible" property line noise levels (described above), a permit must be obtained from the HDOH to allow the operation of vehicles, cranes, construction equipment, power tools, etc., which emit noise levels in excess of the "maximum permissible" levels. A HDOH noise permit does not limit the noise *level* generated at the construction site, but rather the *times* at which noisy construction can take place. Specifically, permit restrictions for construction activities (HAR 1996) are:

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

"No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels... before 9:00 a.m. and after 6:00 p.m. on Saturday."

"No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

5.3.2 Existing Baseline Conditions Assessment

This section describes the current existing noise levels at the H-POWER site as well as current existing background noise in the JCIP area.

H-POWER Site: Continuous ambient (existing) noise level measurements were conducted at eight locations around the H-POWER Facility; two at the north property line, three at the south property line, one at the western property line and two within the perimeter of the H-POWER site (Figure 5.3-2, Noise Measurement Locations). Measurements were conducted on August 11, 2008 between 5:30 am and 5:30 pm. Quest Model 2900 Integrating/Datalogging Sound Level Meters were used. At each measurement location, the Quest Sound Level Meter was propped approximately 5' above grade. A windscreen covered the microphone during the entire measurement period. Continuous, LEQ, A-weighted measurements were recorded over the measurement period. Summarized data are presented in Table 5.3-2. Noise measurement data are presented in Appendix D.

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BACKGROUND NOISE MEASUREMENT LOCATIONS

FIGURE 5.3-1

Figure 5.3-1 back side

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NOISE MEASUREMENT LOCATIONS

FIGURE 5.3-2

Figure 5.3-2 back side

TABLE 5.3-2 RESULTS AND NOISE SOURCES: H-POWER FACILITY

LOCATION	LEQ[1]	MAX LN10[3]	MAX LN10 TIMEPERIOD	LEQ RANGE	NOISE SOURCES	
	(dBA)[2]	(dBA)		(dBA)	PRIMARY	SECONDARY
1	67	***81***	***16:50 – 17:10***	***52-87***	***HECO & Metal Separation***	***H-POWER Activities, Vehicle Traffic, Miscellaneous Industrial Activities***
2	70	***78***	***05:30 – 05:50***	***66-81***	***HECO & Metal Separation***	***H-POWER Activities, Vehicle Traffic, Miscellaneous Industrial Activities***
3[4]	75	80	05:50 – 06:10	73-81	Cooling Tower	H-POWER Activities, Miscellaneous Industrial Activities
4	***77***	***80***	***05:30 – 05:50***	***58-80***	***AES, H-POWER MSW combustion, steam turbine, HD exhaust fans***	***Vehicle Traffic, Miscellaneous Industrial Activities***
5	***77***	***79***	***07:50 – 08:10***	***63-79***	***AES, H-POWER MSW combustion, steam turbine, HD exhaust fans***	***Vehicle Traffic, Miscellaneous Industrial Activities***
6	**71**	***81***	***06:30 – 06:50***	***68-87***	***AES, H-POWER activities***	***Vehicle Traffic, Miscellaneous Industrial Activities***
7[4]	65	80	09:50 – 10:10	56-82	H-POWER activities, Vehicle Traffic	AES, Miscellaneous Industrial Activities
8	70	***76***	***05:30 – 05:50***	***58-78***	***Cooling Tower***	***H-POWER Activities, Miscellaneous Industrial Activities***

* Bolded and italicized locations exceed the HDOH noise criteria (with background taken into account) for Class C districts.

(1) LEQ – Equivalent Sound Level. Computed by Sound Level Meter for each minute.12-hour averages of 1-minute LEQs are shown.

(2) dBA – A-weighted sound level or unit of measurement describing the total sound level of all noises as measured with a sound level meter using the "A" weighting network. dB (decibel) – Unit for measuring the volume of sound.

(3) LN10 – Sound level that is exceeded for 10% of any specified time period. In this case, the relevant time period is 20 minutes. The maximum 20 minute LN10 is the sound level that is exceeded by the two highest 1-minute LEQs during the worst case 20-minute period.

(4) The LN10 standard for Locations 3 and 7 are not applicable as the standard is only relevant at the perimeter of the property.

Background: Noise measurements were also taken from within the JCIP area to determine a background range of noise for comparison. Background noise measurements were taken on

July 15, 2008 between 8:00 am and 5:00 pm. Casella CEL-490 Real Time Sound Level Meters were used. At each measurement location, the Casella Sound Level Meter was held approximately 5' above grade. A windscreen covered the microphone during the measurement period. Measurements were obtained from the instrument after a period of 15 minutes at each location. Noise measurements ranged between 55 dBA to 68 dBA within JCIP (see Appendix D). At the outer fringe of JCIP the noise measurements ranged between 50 dBA and 66 dBA.

5.3.2.1 Selection of Noise Measurement Locations (H-POWER Site)

Noise measurement locations at the H-POWER site were selected to give a representative depiction of noise for the Site as a whole (Figure 5.3-2).

Location 1: Location 1 was positioned along the north H-POWER property line approximately 450 feet west of the east property line.

Location 2: Location 2 was positioned mid-point along the north H-POWER property line approximately 875 feet west of the east property line and 875 feet east of the west property line.

Location 3: Location 3 was positioned between the cooling towers and the Existing RDF Storage Area building approximately 375 feet east of the west H-POWER property line, 400 feet south of the north H-POWER property line and 400 feet north of the south H-POWER property line.

Location 4: Location 4 was positioned along the south H-POWER property line approximately 250 feet east of the west H-POWER property line.

Location 5: Location 5 was positioned mid-point along the south H-POWER property line approximately 875 feet east of the west H-POWER property line and 875 feet west of the east H-POWER property line.

Location 6: Location 6 was positioned along the south H-POWER property line approximately 450 feet west of the east H-POWER property line.

Location 7: Location 7 was positioned between the H-POWER parking lot and the front of the H-POWER office building approximately 300 feet from the east H-POWER property line, 235 feet from the north H-POWER property line and 400 feet north of the south H-POWER property line.

Location 8: Location 8 was positioned on City & County of Honolulu property 30 feet west of the western H-POWER property line mid-point between the north and south H-POWER property lines.

5.3.2.2 Existing/Baseline - Noise Measurement Results

As noted above, continuous current ambient (existing) noise levels were measured at eight locations, along the H-POWER north, south, east, and west property lines. Current conditions include noise contributions from H-POWER as well as other surrounding industrial facilities, traffic, aircraft flyovers, etc. These may or may not have been present when the H-POWER facility was designed and constructed. The numerical results are summarized below and in Table 5.3-2. Also provided are likely noise contributors at each location.

5.3.2.2.1 Noise Contributors at Each Location

Location 1 and 2: Maximum noise levels along the north property line bordering the HECO property (Locations 1 and 2) were 87 and 81 dBA (LEQ 1-minute average), respectively. The high maximum noise levels at these locations can be attributed to their close proximity to the H-POWER metal separating equipment located within the Existing Load-out Area building. However, the metal separating equipment is not operated continuously and consequently; the noise level at this boundary and these specific locations is dynamic and variable. The 20-minute maximum LN10 values at Locations 1 and 2 were 81 and 78 dBA, respectively. These values exceed the HDOH Community Noise Rule limit of 73 dBA for any 20-minute time period.

Location 3: Noise levels at Location 3 ranged from 73 to 81 dBA (LEQ 1-minute average). This sampling location is directly proximate to the H-POWER cooling towers and is located within the H-POWER site between the cooling towers and the existing RDF Storage Area building. As this sampling location is not at the perimeter, the LN10 standard is not applicable.

Locations 4, 5 and 6: Noise levels at Locations 4 through 6 ranged from 58 to 87 dBA (LEQ 1-minute average). These locations are situated west to east along the AES Hawaii – H-POWER property line. Noise contributors include the AES Hawaii Coal Plant facility, H-POWER MSW combustors, steam turbine and HD exhaust fans. Maximum LEQ (1-minute average) values were 80, 79, and 87 dBA, respectively. 20-minute maximum LN10 values at these locations were 80, 79 and 81, dBA, respectively. These locations exceed the HDOH Community Noise Rule Maximum Permissible LN10 level of 73 dBA.

Location 7: On the eastern perimeter of the site (Location 7), vehicular truck traffic was determined to be the greatest contributor to area noise. Noise levels at this location ranged from 56 to 82 dBA (LEQ 1-minute average), Location 7 is located in the current parking lot of the H-POWER Site. As this sampling location is not at the perimeter, the LN10 standard is not applicable.

Location 8: Location 8 is located at the far western end of the Site. Noise at this location can be attributed to the nearby cooling towers. Noise in the area ranged from 58 to 78 dBA (LEQ 1-minute average). The 20-minute maximum LN10 value at this location was 76 dBA. This value exceeds the HDOH Community Noise Rule limit of 73 dBA for any 20-minute time period.

5.3.2.2.2 Comparison to Regulatory Standards

Data collected from the field investigation were compared to the HDOH Community Noise Rules. The following describes the results of the areas exceeding the HDOH Community Noise Rules.

Community Noise Rules Comparison

As discussed above, the HDOH Community Noise Rules threshold for the H-POWER facility is 73 dB. At 73 dBA, all perimeter measurement locations operating under current conditions (i.e., without the Expansion) exceed the HDOH noise threshold for Class C industrial areas.

As noted in Figure 5.3-2, Location 3 is positioned within the interior of the H-POWER site between the cooling towers and the existing RDF Storage Area building; Location 7 is located within the current facility parking lot. As these are not perimeter sample locations, the HDOH Community Noise Rule does not apply. The community noise rules are only pertinent at locations at or beyond the property line.

Measurement locations 1 and 2 are situated along the northern boundary of the H-POWER property line. The northern boundary is completely bounded by the HECO site to the north. Locations 4, 5 and 6 are all situated along the AES Hawaii – H-POWER property line. AES Hawaii is a large coal burning power plant and provides the Hawaiian Electric Company (HECO) with over 189 megawatts of electricity annually. HECO operations to the north and AES Hawaii operations to the south are highly industrial in nature and noise contributions from these facilities are likely (or will be likely in the future as in the case of the planned HECO Biodiesel plant) to be significant contributors to noise at the H-POWER Site. Unfortunately, it is not feasible to determine the magnitude of the current and future noise contributions from these facilities because AES Hawaii and H-POWER operate 24 hours per day, 7 days per week.

Location 8 is situated on the City and County property to the west near the H-POWER property line. Noise contributions at this location can almost solely be attributed to the impact of the H-POWER cooling towers.

As the intent of the HDOH community noise rule is to protect public health and welfare and to prevent significant degradation of the environment and quality of life, the exceedances identified by this study are not considered significant. Locations 1 and 2 (i.e., the north property line) is completely bounded by a future HECO Biodiesel facility. Meter locations 4, 5 and 6 (the south property line) is bounded completely by the AES Hawaii, also a highly industrial facility. Additionally, JCIP in its entirety is comprised of industrial facilities only. Although exceedances are observed at all property boundaries the closest residences are over a mile away and would not be impacted by H-POWER noise. No significant degradation of the environment and quality of life is anticipated.

5.3.3 Impacts of the Expansion and Mitigation

The noise impacts from the Expansion will consist of temporary increases during construction as well as permanent operational effects once the Expansion is completed. Since these construction and operational impacts are anticipated to differ, they are addressed separately below.

5.3.3.1 Construction Impacts and Mitigation

Development of project areas will involve excavation, grading and traffic from the associated trucks, cranes and other types of heavy equipment necessary for these construction activities. The various construction phases of the project may generate significant, but temporary, amounts of noise. The actual noise levels produced during construction will be a function of the methods employed during each stage of the construction process.

Noise due to construction equipment falls under the terms and conditions of a HDOH- issued noise permit. Such a permit allows noisy construction activities to take place during the daytime hours (see the specific hours referenced above). However, any activities that require overnight operation or operation outside of the permit hours, such as water pumps or electric generators for lights, must meet the State's maximum permissible sound limits for a "C" class industrial zoning district. Temporary enclosures or barrier walls may be required to adequately mitigate noise from such equipment if it is planned for use. If it is not feasible or practical to meet the State's noise limits, the Contractor may apply for a noise variance with the HDOH. As noted in Section 3, a Construction Noise Permit is required and will be obtained through the HDOH Indoor and Radiological Health Branch prior to construction of the proposed Expansion.

5.3.3.2 Operational Impacts and Mitigation

The installation of the H-POWER Expansion equipment will likely increase noise levels in the immediate vicinity of the new equipment. However, a significant increase in noise level is not expected at the H-POWER property lines. The specifications associated with the proposed Expansion specify that the noise radiated from any equipment will be less than or equal to 80 dB at a distance of one (1) meter from the equipment and less than or equal to 60 dB at a distance of 50' from the equipment. Specific attention will be paid to outside areas and equipment such as cooling towers, fans, rappers, air cooled condensers and ducts, steam pipes, relief valves, safety valves, ash handling equipment, etc. and to continuously occupied spaces such as administrative buildings and control rooms.

5.4 Visual Resources

This section discusses the existing visual environment in the region surrounding the H-POWER Facility. Baseline conditions are presented and the methodology for selection of potential vantage points from which to evaluate impacts is discussed. The potential impacts of the Expansion project upon regional viewsheds are identified, and proposed mitigation measures described.

5.4.1 Existing Conditions - Visual Environment

The H-POWER Facility is located in a developed industrial area. As noted in Chapter 1, the current H-POWER facility is located adjacent to existing industrial buildings and structures, comprised of the AES coal-fired power plant to the south, HECO parcels to the east and north, a Chevron tank farm to the north, and a HECO substation to the east. West of the H-POWER site lies currently undeveloped but industrially zoned parcels that are proposed for use as temporary construction laydown. All of these neighboring industrial facilities sites are located within the JCIP. As previously shown on Figure 1.8-3, Zoning, most of the area within 1-mile of the site is zoned I-2 Intensive and is currently in industrial use.

5.4.2 Selection of Viewshed Locations

Due to the industrial nature of the JCIP, existing views from proximate locations are heavily industrial. The visual receptors, comprised of nearby industrial locations, are therefore not expected to be sensitive to a changed industrial view in the way that residential or recreational visual receptors might be. Therefore, in order to assess the potential visual impacts associated with the proposed Expansion, visual receptors at various distances and elevation were specifically selected in an effort to gauge impacts to the more sensitive viewers. Topographic maps and aerial photography were reviewed and a “windshield” reconnaissance conducted to select locations on the basis of residential and recreational areas that have existing views of H-POWER. Five representative locations (viewsheds), identified below and shown on Figure 5.4-1, were selected. A sixth “birds-eye view” rendering of the existing H-POWER facility was generated so as to provide a vantage point from which the proposed facility modifications could best be viewed and compared to existing condition. Lastly, four aerial photographs are shown that depict what the proposed expansion will look like from the air.

The adjacent industrial parcels proposed for construction laydown are to be used on a temporary basis for approximately 34 months. Since these vacant parcels are situated within the heavily industrialized JCIP, no significant permanent impact is anticipated and therefore no viewshed analysis was performed. However, some existing vegetation will be cleared at that location and construction equipment and cranes will be used and/or stored at various periods during the 34-month construction period. Upon completion of construction all equipment will be removed and the parcels will be allowed to revegetate, eventually returning to current conditions.

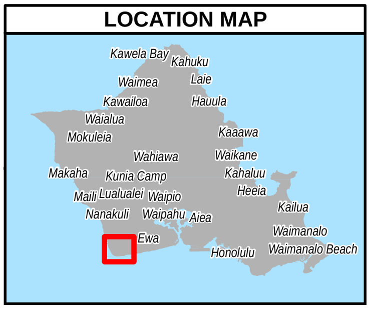
5.4.3 Visual Impact Analysis

The Expansion will consist of the addition of a Mass Burn MWC to the two existing H-POWER RDF combustors. The Expansion will not exceed the height of the existing building and stack, and all structures and equipment will be less than the 60-foot height limit applicable within the Heavy Industrial (I-2) zoning district. The highest building is currently 149 feet, and the highest proposed building is 100 feet. In addition, the highest building at the adjacent AES facility is 161 feet. The current stack is 290 feet, and the proposed stack is 199 feet. In addition, the stack at the adjacent AES facility is 285 feet. The additional square footage will expand the overall coverage of the H-POWER property, bringing the facility buildings closer to the eastern property boundary in proximity to the existing HECO electrical substation. The change is not visually

LEGEND

- 1 VIEWSHED PHOTO LOCATION & NUMBER
- H1 FREEWAY
- FARRINGTON HWY
- SITE BOUNDARY
- CONSTRUCTION LAYDOWN AREA

LOCATION MAP



NOTES & SOURCES
MAP COORDINATES
UTM NAD83, ZONE 4N, UNITS METERS
BASEMAP DATA FROM ESRI, 2007

H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

N

MILES
0 0.1 0.2 0.3 0.4 0.5

amec

VIEWSHED LOCATIONS

FIGURE
5.4-1

Figure 5.4-1 back side

substantial given the size and scale of the existing H-POWER facility and that of its industrial neighbors. In addition, HECO is currently constructing a power generation facility to the north of the H-POWER facility on HECO's southern property boundary. The estimated height of the stacks associated with this new facility is 210 feet. Associated with the new facility is an electrical transmission line that will require 120 foot high structures. The following viewshed analysis is presented to discuss both the scale of the change and the relative impact to potential visual receptors.

Figures 5.4-2 through 5.4-6 present photographs from the selected residential/recreational locations. A 3D rendering software program has been utilized to provide an approximated visualization for each viewshed following completion of the proposed construction. This visualization allows for a pre-construction and post-construction visual comparison to qualitatively determine the visual impacts of the proposed expansion. Table 5.4-1 provides a description of the visual impacts of the proposed expansion for each viewshed.

TABLE 5.4.1 VISUAL IMPACTS FOR EACH VIEWSHED

Viewshed No.	Location	Description of Visual Impact
1	Midway Rd & Franklin Ave	The proposed expansion will be visible from this location. However, it is difficult to distinguish the additional structure from the existing H-POWER facility. Visual impact of the proposed expansion is considered very low.
2	Kamokila Park Back Fence	The proposed expansion is clearly visible from this location, the visual impact is considered low due to the presence of many visually similar structures around the Barbers Point area.
3	Nohopaa St & Palailai St	The proposed expansion is visible from this location. The nearby Chevron refinery structures and H-POWER structures appear joined from this perspective. The proposed expansion adds approximately 20% size to the appearance of the combined mass of structures. The proposed stack is visually identifiable. Due to similar structures from this perspective, the visual impact is considered low.
4	Malakole St	The primary objects in view from this perspective are refinery holding tanks. The proposed expansion will add a stack to this visualization. Again, due to the mass of industrial features, the expansion is considered to be of low visual impact.
5	Kapolei Hale, Room 688	The proposed expansion adds a stack to the view from this location. Many similar structures can be on the skyline from this perspective. Again, the expansion is considered to be of low visual impact.

Figure 5.4-7 is provided, from which a "birds-eye" perspective is shown in order to capture a vantage point from which the proposed modifications are clearly visible and can be compared to existing conditions. As shown on that Figure, the Expansion footprint is oriented on the northeast portion of the existing H-POWER facility. Figures 5.4-8 through 5.4-11 show aerial photographs from different directions with the proposed expansion added to the photograph using computer graphics.

5.4.4 Mitigation - Visual Environment

As shown on the viewshed photographs, the Expansion is predominantly obstructed from view or barely distinguishable from the surrounding industrial features from areas that would be considered sensitive. The obstructions generally consist of the existing H-POWER facility and vegetation or other intervening facilities, buildings, structures or terrain. As a result, the Expansion will only be seen clearly from neighboring industrial facilities. Since no significant change to the visual environment will result from the Expansion, the proposed mitigation measures will consist of the following:

- The Expansion façade will be designed to blend with the existing H-POWER facility materials, color, and appearance. This is depicted on Figures 5.4-7 through 5.4-11.
- Upon completion of construction, the area of the Expansion will be landscaped consistent with the existing H-POWER facility. Post-construction, the landscaping will include additional paved/gravel access as well as manicured lawn and drainage swales.
- Upon completion of construction, the adjacent parcels used for temporary construction will be emptied of construction equipment and allowed to revegetate, eventually returning to current conditions.

As depicted in the viewshed photographs taken from regional vantage points, there will be no significant change in views from potentially sensitive viewshed locations.

5.5 Socioeconomics

The potential to impact local socioeconomic resources like population, housing, employment, education (schools), public services, and fiscal resources are addressed in this Section. This section compares the project demands with the existing socioeconomic resources of the affected area. This section also analyzes the impacts of the proposed project on each of these areas.

5.5.1 Definition of Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Human population is affected by regional birth and death rates as well as net in-or out-migration. Economic activity typically comprises employment, personal income, and industrial growth. Impacts on these fundamental

BEFORE VIEW OF SITE PHOTO #1

AFTER VIEW OF SITE PHOTO #1

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VIEWSHED 1 – MIDWAY RD & FRANKLIN AVE

FIGURE 5.4-2

Back side of Figure 5.4-2

BEFORE VIEW OF SITE PHOTO #2

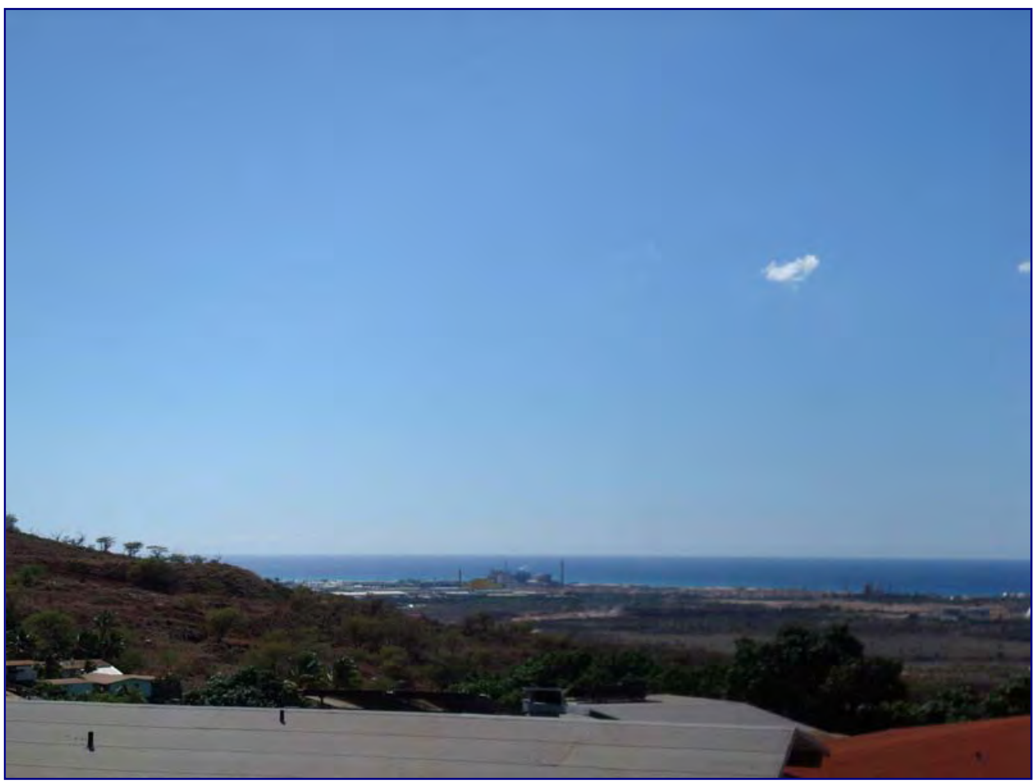
AFTER VIEW OF SITE PHOTO #2

VIEWSHED 2 - KAMOKILA PARK BACK FENCE

FIGURE 5.4-3

Back side of Figure 5.4-3

BEFORE VIEW OF SITE PHOTO #3



AFTER VIEW OF SITE PHOTO #3

VIEWSHED 3 – NOHOPAA ST & PALAILAI ST

FIGURE 5.4-4

Back side of Figure 5.4-4

BEFORE VIEW OF SITE PHOTO #4

AFTER VIEW OF SITE PHOTO #4

amec

VIEWSHED 4 - MALAKOLE ST

FIGURE

5.4-5

Back side of Figure 5.4-5

BEFORE VIEW OF SITE PHOTO #5

AFTER VIEW OF SITE PHOTO #5

amec

VIEWSHED 5 - KAPOLEI HALE, ROOM 688

FIGURE

5.4-6

Back side of Figure 5.4-6

3D SITE RENDERING

FIGURE
5.4-7

Figure 5.4-7 back side

amec

AERIAL VISUALIZATION LOOKING SSE

FIGURE

5.4-8

Figure 5.4-8 back side

amec

AERIAL VISUALIZATION LOOKING NNW

FIGURE

5.4-9

Figure 5.4-9 back side

amec

AERIAL VISUALIZATION LOOKING ENE

FIGURE

5.4-10

Figure 5.4-10 back side

AERIAL VISUALIZATION LOOKING ESE

FIGURE
5.4-11

Figure 5.4-11 back side

socioeconomic indicators can also influence other components such as housing availability and public services provision.

Socioeconomic data in this section are presented at the county, state, and national level to analyze baseline socioeconomic conditions in the context of regional, state, and national trends. Data have been collected from previously published documents issued by Federal, state, and local agencies and from state and national databases.

5.5.2 Existing Conditions - Socioeconomics

The H-POWER project site is located in JCIP, on the Island of O‘ahu. JCIP is adjacent to Kapolei, approximately 20 miles west of downtown Honolulu.

The Island of O‘ahu is divided into eight planning areas, shown on Figure 5.5-1 and the H-POWER facility is located within ‘Ewa. ‘Ewa is located in The City and County of Honolulu on the southern coast of O‘ahu, between Waipahu and ‘Ewa Beach along Highway 76 near the West Loch of Pearl Harbor, Kapolei, and Barbers Point Naval Air Station. ‘Ewa is part of the Honolulu, Hawaii metropolitan statistical area.

5.5.2.1 Population

From 1980 to 2000, the population of the City and County of Honolulu increased by 14.9 percent, from 762,565 people to 876,156 people (see Table 5.5-1). During the same time period, the State of Hawaii’s population increased by 25.6 percent, and the nation increased by 24 percent (U.S. Bureau of the Census 2000). Approximately 72 percent of Hawaii’s population resides in the City and County of Honolulu.

TABLE 5.5-1 SUMMARY OF POPULATION GROWTH, 1980 - 2000

	1980	1990	2000
‘Ewa*		42,931	67,718
City and County of Honolulu	762,565	836,231	876,156
Hawaii	964,691	1,108,229	1,211,537
United States	226,545,805	248,709,873	281,421,906

Source: U.S. Bureau of the Census 2000
*Census STF1 File, Planning Division, Honolulu Division of Planning and Permitting

According to *Enterprise Honolulu*, a non-profit economic development organization funded by O‘ahu's private sector, the City and County of Honolulu is expected to reach a population of 964,800 by 2015 and 1,029,800 by 2025.

As part of their directed growth policies, the City and County of Honolulu approved a General Plan that designated ‘Ewa as the Secondary Urban Center for O‘ahu. This urban area will be centered on the Kapolei area and will function as a center for government services and as the focus of major economic activity and housing development. It is projected that population in this urban center will grow from 43,000 in 1990 to 125,000 in 2020. 28,000 new housing units are scheduled to be built during that same time span (City and County of Honolulu DPP 1997; Revised 2000).

5.5.2.2 Job Growth and Unemployment

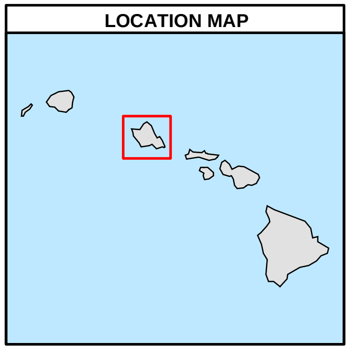
Employment

Table 5.5-2 presents the distribution of jobs by employment sector in the City and County of Honolulu for 1980, 1990, 2002, and 2006. Employment sectors providing the greatest number of jobs in 2006 (the most recent year for which these data were available) were Services (42 percent), Government and Government Enterprises (23 percent), Retail Trade (10 percent), and Finance, Insurance, Real Estate (8 percent). Combined, these sectors provide jobs for 83 percent of Honolulu's workforce, which totaled 622,373 people in 2006. Of these employment sectors, from 1980 to 2006, a net increase of 146 percent was experienced in services (increased by 153,371 jobs); a net increase of 6 percent was experienced in government and government enterprises (increased by 7,998 jobs); a net decrease of 23 percent was experienced in retail trade (decreased by 18,110 jobs); and a net decrease of 2 percent was experienced in finance, insurance and real estate (decreased by 1,170 jobs). Mining experienced the most significant percentage increase during the 22-year period, with an increase of 192 percent (increased by 251 jobs) (U.S. Bureau of Economic Analysis [BEA] 2008).

TABLE 5.5-2 CITY AND COUNTY OF HONOLULU EMPLOYMENT BY SECTOR

Employment Sector	1980	1990	2002	2006	Total Change 1980 - 2006
Farm	3,766	3,429	2,978	2,572	-47%
Non-Farm	464,119	559,350	570,411	619,801	34%
Ag. Services, Forestry, & Fishing	2,830	4,192	2,472	1,750	-38%
Mining	131	251	333	382	192%
Construction	21,900	29,251	22,328	31,024	42%
Manufacturing	18,758	17,877	13,299	13,817	-26%
Wholesale Trade	17,636	21,124	16,293	17,438	-1%
Retail Trade	79,552	97,898	57,764	61,442	-23%
Transportation and Public Utilities	27,428	36,897	25,305	27,578	1%
Finance, Insurance, Real Estate	51,603	48,536	45,919	50,433	-2%
Services	105,394	153,052	231,747	258,765	146%
Govt. and Govt. Enterprises	138,887	150,272	143,976	146,885	6%

LOCATION MAP



H-POWER EXPANSION
91-174 HANUA ST.
KAPOLEI, HI 96707

NOTES & SOURCES
MAP COORDINATES:
UTM NAD83, ZONE 4N, UNITS METERS

DATA SOURCE: CITY & COUNTY OF HONOLULU
DEPARTMENT OF PERMITTING & PLANNING

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0 8 16
MILES

amec

PLANNING REGIONS

FIGURE
5.5-1

Figure 5.5-1 back side

As shown on Table 5.5-3, Honolulu employment levels increased between 1990 and 2006, experiencing a cumulative increase of 59,594 jobs (11 percent overall increase).

TABLE 5.5-3 ECONOMIC INDICATORS

	1980	1990	2002	2006
City and County of Honolulu				
Total full-time and part-time employment	467,885	562,779	573,389	622,373
Average earnings per job (dollars)	$16,214	$29,231	$39,092	$40,185
Per capita personal income (PCPI)	$11,799	$23,562	$31,707	$39,653
Net earnings	6,935,650	14,756,846	20,098,846	29,223,464
State of Hawaii				
Total full-time and part-time employment	575,172	730,455	772,941	864,393
Average earnings per job (dollars)	$15,922	$27,689	$37,030	$38,775
PCPI	$11,443	$22,186	$29,628	$37,023
Net earnings	8,377,346	18,112,069	25,644,893	37,757,555
United States				
Total full-time and part-time employment	114,231,200	139,380,900	166,500,000	178,332,900
Average earnings per job (dollars)	$15,894	$26,561	$41,017	$41,991
PCPI	$10,114	$19,477	$30,795	$36,714
Net earnings	1,649,427,000	3,292,748,000	6,081,438,000	8,432,719,000

Unemployment

In 2000, the unemployment rate for the City and County of Honolulu was 3.7 percent, 3.8 percent for Hawaii, and 3.7 percent for the nation. In 2003, the unemployment rate was 6.6 percent in the City and County of Honolulu, 6.4 percent for Hawaii, and 7.6 percent in the United States. In 2007, the unemployment rate for the City and County of Honolulu was 2.5 percent, 2.6 percent for Hawaii, and 4.6 percent for the United States (U.S. Bureau of the Census 2000). Comparing state and local unemployment to that of the nation, Hawaii appears to have been slightly buffered against the national increase in unemployment experienced between 2000 and 2003.

Job Composition

Figure 5.5-2 presents the distribution of jobs by employment sector in the City and County of Honolulu for 1980, 1990, 2002, and 2006.

5.5.2.3 Earnings

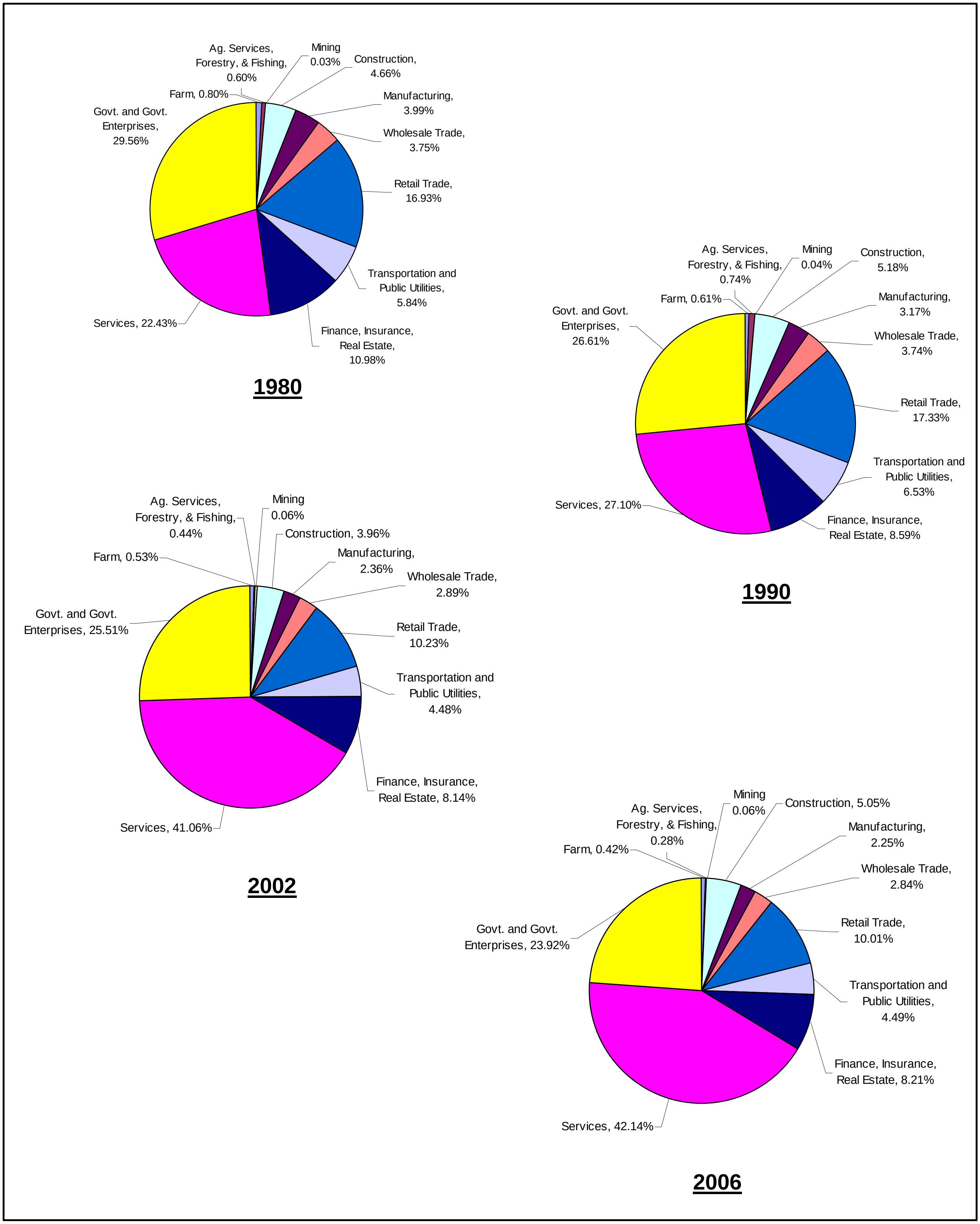
From 2005 to 2006, The City and County of Honolulu's net earnings increased by 6.2 percent, from $27.5 billion to $29.2 billion; during the same timeframe, the state's net earnings increased by 6.4 percent. The most significant industries in 2006 were *services* (34.4 percent of earnings) and *government and government enterprises* (31.9 percent of earnings). Of *government and government enterprises*, the industry with the largest net earnings was the *military*, which accounted for 11.9 percent of City and County of Honolulu's total net earnings. In 2006, the City and County of Honolulu had a total personal income (TPI) of $35.9 billion. This TPI ranked highest in the state and accounted for 76 percent of the state total. The 2006 TPI for Honolulu reflected an increase of 6.7 percent from 2005; the 2005-2006 TPI increase statewide was 6.9 percent.

In addition, the City and County of Honolulu had a per capita personal income (PCPI) of $39,653 in 2006. This PCPI ranked highest in the state and was 107 percent of the state average ($37,023) and 108 percent of the national average ($36,714). Honolulu's 2006 PCPI reflected an increase of 6.1 percent from 2005. The 2005-2006 statewide change was 5.9 percent and the national change was 5.6 percent. In 2006, Hawaii had a PCPI of $37,023, which ranked 19th in the United States and reflected an increase of 5.9 percent from 2005 (U.S. BEA 2008).

5.5.2.4 Schools

Hawaii has one school district for the entire state. It has a total of 285 schools and educates 182,818 students annually (http://nces.ed.gov/ccd/schoolsearch/). The office for the Hawaii Department of Education is located in Honolulu. There are seven geographical districts in the Hawaii School District: Honolulu, Central, Leeward, and Windward on O'ahu; and Hawaii, Maui (including Molokai and Lanai) and Kauai (including Niihau) on the Neighbor Islands. Schools on O'ahu are organized into nine complex areas. A complex consists of a high school and all of the intermediate and elementary schools that flow into it. A group of two to four complexes are grouped into a complex area that is under the supervision of a complex area superintendent, essentially comprising "mini-districts." Kapolei schools are located in the Campbell-Kapolei complex area, which is located in the Leeward geographical district (http://doe.k12.hi.us/index.html).

For the 2005-2006 school year, the complex of Kapolei had six schools with a total enrollment of 6,697 students: four elementary schools (2,784 students), one middle school (1,580 students), and one high school (2,333 students) (http://nces.ed.gov/ccd/schoolsearch/). For the same period, the Leeward district had a total of 45 schools with a 38,250 students enrolled (http://doe.k12.hi.us/index.html). The Kapolei complex has an average student/teacher ratio of 17.6. The State of Hawaii has an average student/teacher ratio of 17.5 (http://nces.ed.gov/ccd/schoolsearch/).



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DISTRIBUTION OF JOBS

FIGURE 5.5-2

Figure 5.5-2 back side

5.5.2.5 Fire and Emergency Response

The island of O‘ahu has 42 fire stations with over 1,000 fire fighters. The island is divided into five battalions, which include 42 engine companies, 14 ladder companies, two rescue companies, two hazardous materials companies, one snorkel company, one fireboat company, five tankers, one helicopter, and one helicopter tender (http://www.honolulu.gov/hfd). The project area is served by Station 40 in Kapolei, which also serves as the headquarters for Battalion 4. Kapolei is also home to one of the two hazardous materials companies.

The Honolulu Police Department has divided the island of O‘ahu into eight patrol districts. Kapolei is located in District 8, which serves the communities of ‘Ewa, ‘Ewa Beach, Westloch, Barbers Point, Kapolei, Makakilo, Campbell Industrial Park, Honokai Hale, Koolina, Nanakuli, Maili, Waianae, Makaha, Makua and Kaena. The District 8 headquarters is located in Kapolei (http://www.honolulupd.org/). District 8, which serves 111,000 people has 18 beats and employs 223 officers (http://www.co.honolulu.hi.us/budget/execbgt/fy2008_oper_vol1.pdf).

5.5.2.6 Housing

Kapolei Property Development LLC, a local source of housing information, reports that there were 25,660 housing units available in 2005. They report that 41,280 should be available by 2015 and 56,710 should be available in 2025.

The City’s DPP reports that in 2000, there were 20,804 housing units available in ‘Ewa, of which 1,872 (9 percent) were vacant. By 2015, ‘Ewa is expected to have 36,405 housing units available, and by 2025 expects 50,430 housing units available. The City’s DPP reports that in 2000, there were 2,508 units available in Kapolei Villages. In 2000 there was an available housing vacancy rate of 3.7 percent, homeowner vacancy rate of 3.3 percent, and a rental vacancy rate of 6.3 percent (SF1 File 2002).

5.5.2.7 Tax Revenues

The City and County of Honolulu has projected that it will receive $1.869 billion in operating resources in FY2008. This includes a capital improvement budget of $724 million. Real property tax makes up 41.85 percent of the operating budget. Revenue received from the Public Utility Franchise comprises 2.05 percent of the operating budget. The FY2008 operating resources and expenditures are summarized in Figures 5.5-3 and 5.5-4.

5.5.3 Socioeconomic Impact Analysis

Significance of population and expenditure impacts are assessed in terms of their direct effects on the local economy and related effects on other socioeconomic resources. The magnitude of potential impacts varies depending on the location of a proposed action. For example, an action that creates 20 employment positions may be unnoticed in an urban area, but may have significant impacts in a more rural region. If potential socioeconomic impacts would result in substantial shifts in population trends, or adversely affect regional spending and earning patterns, they would be significant.

5.5.3.1 Socioeconomic Impact of H-POWER Expansion (Construction)

Economic Activity

Economic activity associated with proposed construction activities, such as hiring of laborers, contractors, and the purchasing of materials over a potential 34-month construction and 3-month start-up/testing period, would provide regional economic benefits. Therefore, the construction phase of the H-POWER Expansion would have an economic boost to the local economy.

Employment

Approximately 300 construction-related jobs would be supported temporarily by the project, and the spending of payrolls earned by construction workers and other project expenditures for the goods and services in the local area would support a number of indirect jobs. There were 31,024 jobs in the construction industry in the City and County of Honolulu in 2006 (U.S. BEA 2006). If the 2007 unemployment rate (2.5 percent) is applied to the construction sector, approximately 795 construction workers were unemployed in the City and County of Honolulu [out of work construction workers = (number of construction workers / (1-unemployment rate)) – number of construction workers]. The construction of the H-POWER Expansion is expected to add 300 jobs for the 34-month construction period, approximately 38 percent of the available construction force; therefore, no in-migration into the area is expected to complete the construction of the H-POWER Expansion.

Schools

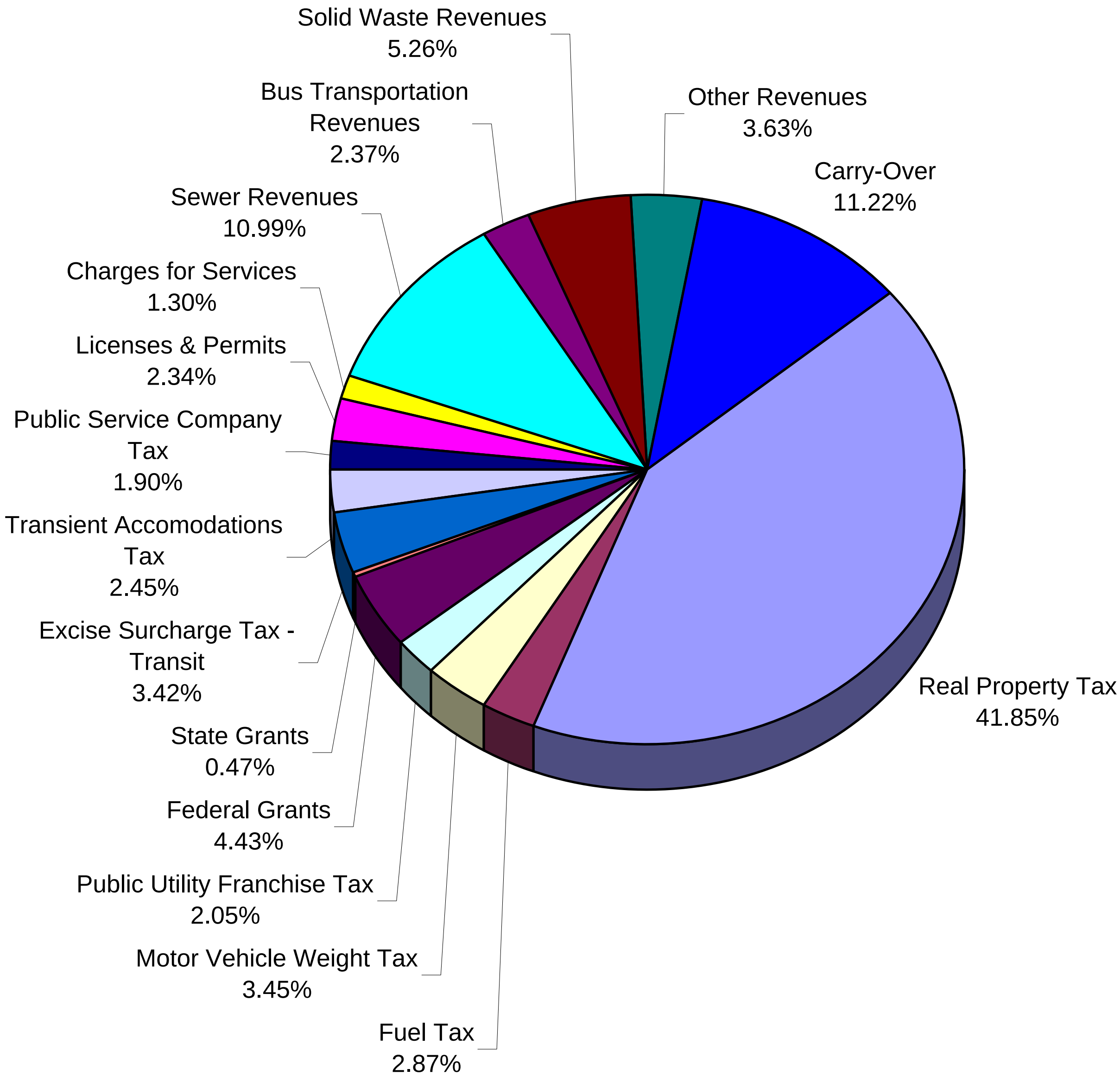
Education services are defined to be elementary and secondary educational programs provided by public school systems. The influx of children accompanying in-migrating workers can impact the ability of the existing system to provide public school services. However, as stated above, the Expansion is not expected to cause workers to migrate to Honolulu. Therefore, the impact of this project on education services will not be significant.

Police and Fire

Police and fire protection are public safety services provided to communities by police and fire departments. Impacts are considered significant if the project causes a temporary or permanent increase in need for police and fire protection personnel, or for equipment that is not matched by availability of such services and the financial resources to acquire such additional services. Without an in-migrating population, no additional need for police or fire protection is anticipated to be caused by implementation of the Expansion.

Housing

The significance of potential housing impacts is determined by the impact the proposed project would have on the availability of existing housing. Vacancy rates are used to measure the availability of housing in the City and County of Honolulu and in the Kapolei area. An impact on the availability of housing is considered significant if a substantial change in vacancy rates occurs. A change created by the project affecting more than 0.5 percent of the housing availability is substantial and would be considered a significant impact. However since no in-

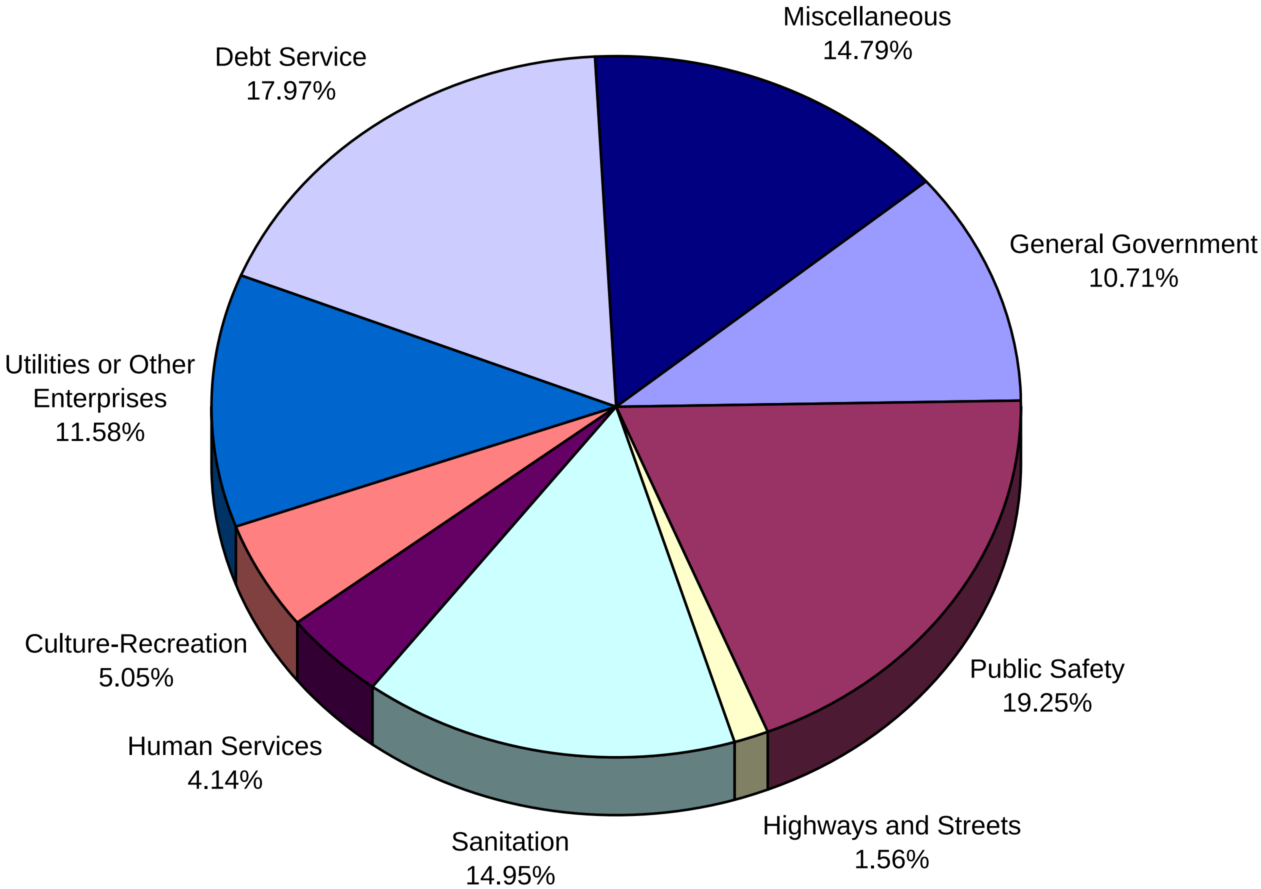


TOTAL OPERATING RESOURCES: $1.869 BILLION

NOTE: THE PIE CHART SHOWS THE COMPOSITION OF RESOURCES FOR THE CITY'S VARIOUS FUNDS FOR FY 2008. CARRY-OVER INCLUDES UNAPPROPRIATED AND RESTRICTED FUND BALANCES.

SOURCE: CITY & COUNTY OF HONOLULU PROPOSED OPERATING BUDGET FY 2008

Figure 5.5-3 back side



TOTAL OPERATING EXPEDITURE: $1.637 BILLION

NOTE: THE PIE CHART SHOWS THE COMPOSITION OF EXPENDITURES FOR THE CITY'S VARIOUS FUNDS FOR FY 2008

SOURCE: CITY & COUNTY OF HONOLULU PROPOSED OPERATING BUDGET FY 2008

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CITY & COUNTY OF HONOLULU FY2008 OPERATING EXPENDITURES

FIGURE 5.5-4

Figure 5.5-4 back side

migration of workers is expected for the Expansion, there would not be any substantial change in housing vacancy rates and no significant impact on the area housing stock.

5.5.3.2 Socioeconomic Impact of H-POWER Expansion (Operation)

The proposed action would increase the number of personnel required to staff the new H-POWER Expansion once it is completed. Approximately five to eight new fulltime positions would be created to support the expanded operation. This would represent a 0.03 percent increase (8 employees/25,673) in Transportation and Public Utilities sector over 2006 employment numbers and a negligible increase in percent of total jobs in the City and County of Honolulu. Increased secondary spending would also be negligible on a regional scale, but any realized impact would be beneficial.

As described previously in Chapter 2, Description of Project, the H-POWER Expansion will increase net electrical production from 319,000 mWh (average over the last 5 years) to 520,000 mWh, an increase of 201,000 mWh. This amount of additional electric power generation will decrease the need to purchase approximately 550,000 barrels of residual fuel oil on an annual basis.

According to Appendix M of the Hawaiian Electric Company, Inc.'s 2008 Integrated Resource Plan (HECO, 2008), the price of residual fuel oil that would be offset by the generation of electric power by the proposed Unit 3 would range from $70.80 per barrel to $126.00 per barrel in 2012. Thus, in 2012 dollars, the amount of money that would not need to be spent on residual fuel oil (cost savings) would range between $38,000,000 and $69,000,000, depending on residual fuel oil costs, starting in 2012. These costs savings would then increase or decrease over time as the cost of residual fuel changed. Based on the most recent fuel oil price forecast[7], the cumulative present value[8] of the total cost savings realized by reducing the need to purchase foreign oil over the entire period from 2012 to 2030 is expected to range from $740,000,000 to $1,200,000,000. This represents the sum of all total cost savings if realized all at once today. It should be noted that the most recent forecasts assume that the real cost of a barrel of residual fuel oil (ignoring inflation) will decrease over the next 20 years. If real energy costs were to rise, the potential foreign oil costs savings arising from increased production from the H-POWER project could be substantially higher. Reducing the City and County of Honolulu's dependence on foreign oil is a substantial benefit expected from the proposed Expansion.

No other economic indicators would be substantially affected by long-term operation of the expanded H-POWER facility.

[7] EIA & NYMEX BASE – See Appendix M of (HECO, 2008)
[8] Calculated using the current federal reserve discount rate of 1.25%.

5.6 Solid Waste

This section discusses the solid waste environment, both from the perspective of solid waste disposal provided by H-POWER as well as with respect to regional integrated solid waste management planning and goals. Baseline conditions are presented and the potential impacts of the proposed Expansion Project upon the Hawaii solid waste disposal situation are evaluated and mitigating factors discussed.

5.6.1 Existing Conditions – H-POWER Waste Disposal Capacity

The H-POWER facility converts ordinary garbage into environmentally sound, renewable electricity that powers thousands of O‘ahu households. However, the primary function of the H-POWER facility is to provide disposal of MSW. The facility, comprised of an MSW processing plant which produces RDF and two 854 ton per day RDF combustors, processes an average of 610,000 tons of MSW per year. This has reduced the volume of processed refuse that would otherwise go to a landfill by 90 percent, saving valuable landfill space. Additionally, H-POWER annually recovers 20,000 tons of metal such as aluminum and steel from the waste stream. Table 5.6-1 Waste Management, provides an overview of the current waste stream management options for O‘ahu, and the integrated approach to solid waste reuse and disposal provided by the City and County of Honolulu.

TABLE 5.6-1 SOLID WASTE MANAGEMENT

MSW Management Option	Quantity (tons)*	Percent of Waste
Total Waste Quantity:	1,793,560	
Recycle Quantity:	628,373	35%**
Waste Disposed at PVT & Unpermitted Facilities	225,000	12.5%**
Present H-POWER Capacity:	610,000	34%**
MSW Remaining for Landfill:	330,187	18.4**
*Waste Generated, July 1, 2005 to June 30, 2006. Source of data is Table 8-7, City and County of Honolulu ISWMP, October 2008. **Percent of Total Waste Quantity of 1,793,560 tons.		

5.6.2 Regional Solid Waste Generation and Disposal Projections

According to statistics available from the Organization for Economic Co-operation and Development (OECD)[9], the United States records the highest rate of municipal waste generation (2 kg/person/day) among OECD countries (UN 2005). However, the U.S. has made great progress in controlling the rate of increase in waste generation and in promoting recycling (UN 2005). Currently in the U.S., 32.5 percent of MSW is recovered and recycled or composted, 12.5 percent is combusted for energy recovery in combustion facilities, and the remaining 55 percent is disposed of in landfills. As shown on Table 5.6-1 the City and County of Honolulu is currently recovering materials and energy at a greater rate than the overall U.S. and

[9] “The OECD groups 30 member countries sharing a commitment to democratic government and the market economy. With active relationships with some 70 other countries, NGOs and civil society, it has a global reach. Best known for its publications and its statistics, its work covers economic and social issues from macroeconomics, to trade, education, development and science and innovation” (OECD, 2005).

is sending a smaller percentage of waste to landfill: roughly 35 percent recycled/composted, 34 percent converted to energy, and 31 percent sent to landfill. This matches the general trend of data provided on USEPA's MSW website which cites 1999 data that ranks Hawaii as falling within a 20-29 percent recycle rate, a greater than 20 percent combustion rate (highest category available) and a land disposal rate of less than 50% (lowest category available) (USEPA, 2006).

Solid waste disposal in Hawaii is regulated by the State DOH and is coordinated and implemented at the City and County level. A summary of the ISWMP and goals at the State and City and County level are provided in sections 5.6.2.1 and 5.6.2.2.

5.6.2.1 State of Hawaii ISWMP and ERC

HDOH has had a solid waste program since 1969. HRS Chapter 342G established the Office of Solid Waste Management (OSWM). In 1991 the first Hawaii ISWMP was published by OSWM, and the most recently available update, the Hawaii 2000 Plan, builds upon and revises prior ISWMP and goals. According to the Hawaii 2000 Plan, the Plan has two basic purposes:

- To address the primary environmental burdens and liabilities caused by improper handling of solid wastes in Hawaii; and
- To develop programs that have the greatest potential to reduce the quantity of wastes generated and to increase recycling and composting.

Additionally, the Plan included a number of recommendations, including reaffirmation of the State's commitment to the priorities of solid waste management, identified as:

1. Source reduction;
2. Recycling and bioconversion; and
3. Landfilling and incineration.

Each year the State Environmental Council publishes the Hawaii Environmental Report Card (ERC) to monitor the progress of state, county, and federal agencies' environmental goals and policies and to advise state policy makers on issues affecting Hawaii's environment (ERC 2006). The ERC 2006 addresses solid waste generation and diversion under the chapter on Use and Recycling of Resources. The Environmental Council, states that "Renewable and alternative energy currently accounts for only 5% of total energy supply. For example, the largest electric utility in the state currently produces only 7% of its energy from renewable and alternative sources, which is significantly short of the Governor's goal of 20% by 2020". The report also specifically recommends that "priority permitting processes for renewable-energy and energy-efficient projects be instituted, and that these processes emphasize public participation and community benefits". This is consistent with the definitions and concepts of sustainability that are discussed in greater detail in Chapter 9.

5.6.2.2 City and Council of Honolulu Plans and Goals

The Hawaii Revised Statutes (HRS), Chapter 342G (see also Section 9-.13 of the Revised Ordinances of Honolulu 1990), requires each county to develop an integrated solid waste management plan (Plan) and revise the Plan once every five years. The October 2008 ISWMP was developed to guide solid waste management activity for the City and County of Honolulu for the next 25 years, with the first five years discussed in greater detail (CCH, 2008a). The October 2008 Plan set forth as its primary objective to "design an integrated solid waste management system for the City was to maximize the recovery of solid waste through reuse, recycling, composting and energy conversion, in order to minimize the amount of waste that requires landfill disposal."

H-POWER is an integral component of existing City and County disposal plans. The Expansion of H-POWER will significantly reduce material for landfill disposal and is consistent with the "primary objective" of the City and County of Honolulu. Table 5.6-2 is a summary of waste projections and disposal options for the next 22 years. It considers population growth, increase in waste generation, recycling, transshipment and the Expansion (CCH, 2008a).

As shown on Table 5.6-2, even with additional recycling recovery, there remains a significant quantity of waste that will require proper handling and disposal. In fact, the H-POWER Expansion alone cannot satisfy future waste disposal needs.

5.6.3 Expansion Impacts and Mitigating Factors

As described previously in Chapter 2, Description of Project, the H-POWER Expansion will increase the amount of solid waste processed from approximately 610,000 tons (average over the last 5 years) to 910,000 tons, an increase of 300,000 tons. This is approximately a 50 percent increase in solid waste disposal capacity, though these are projections and exact values may vary on the basis of future operational and waste stream characteristics. Clearly, a 50 percent increase in solid waste disposal capacity at H-POWER will contribute to the achievement of Hawaii's overall solid waste management goals. It is also important to understand that H-POWER fits into an integrated approach to solid waste management.

As shown on Table 5.6-2, H-POWER's existing solid waste disposal capacity is significant, and in the future it may be critical to achieving the goals of the ISWMP. Thus, even as enhanced waste minimization and recycling recovery is sought, there is remaining waste that requires management.

The benefits derived from H-POWER and those anticipated to result from the Expansion include:

- Landfill space will continue to be minimized because the volume of processed MSW is reduced by approximately 90 percent;
- Production of renewable energy to provide a reliable and sustainable on-island source of electricity and reduce dependence upon imported fuels will be increased; and
- The separation of ferrous and non-ferrous material for recycling in an environmentally sound way will increase, saving energy and landfill space.

TABLE 5.6-2 OVERVIEW OF WASTE MASS (TPY)

FY Year	Waste Generated	Commercial Waste Reused, Recycled, Composted	Reused, Recycled, Composted That Is Managed By the City	Waste Disposed At PVT and Unpermitted Facilities	Trans-Ship	WTE Capacity	Waste Requiring Landfill Disposal*	WTE Ash and Residue Requiring Disposal
2006	1,793,560	411,828	216,545	225,000		610,000	330,187	167,800
2007	1,821,730	419,660	232,670	229,280		610,000	330,120	167,800
2008	1,859,180	427,880	247,980	233,770		610,000	339,550	167,800
2009	1,897,220	436,260	283,390	238,350		610,000	329,220	167,800
2010	1,935,810	444,800	306,280	243,010	100,000	610,000	231,720	167,800
2011	1,975,030	453,510	312,230	247,780	100,000	610,000	251,510	167,800
2012**	2,015,100	462,460	318,350	252,660	100,000	610,000	271,630	167,800
2013**	2,056,120	471,660	324,640	257,690		910,000	92,130	250,320
2014	2,097,760	481,040	331,040	262,810		910,000	112,870	250,320
2015	2,118,300	485,750	334,250	265,390		910,000	122,910	250,320
2016	2,139,050	490,510	337,510	267,990		910,000	133,040	250,320
2017	2,158,900	495,060	340,620	270,470		910,000	142,750	250,320
2018	2,177,840	499,400	343,580	272,850		910,000	152,010	250,320
2019	2,196,950	503,780	346,690	275,240		910,000	161,340	250,320
2020	2,216,210	508,200	349,610	277,650		910,000	170,750	250,320
2021	2,235,640	512,660	352,650	280,090		910,000	180,240	250,320
2022	2,254,770	517,040	355,660	282,480		910,000	189,590	250,320
2023	2,273,570	521,350	358,610	284,840		910,000	198,770	250,320
2024	2,292,530	525,700	361,570	287,210		910,000	208,050	250,320
2025	2,311,650	530,090	364,580	289,610		910,000	217,370	250,320
2026	2,330,940	534,510	367,600	292,030		910,000	226,800	250,320
2027	2,349,800	538,840	370,560	294,390		910,000	236,010	250,320
2028	2,368,220	543,060	373,440	296,700		910,000	245,020	250,320
2029	2,386,800	547,320	376,350	299,020		910,000	254,110	250,320
2030	2,405,500	551,610	379,270	301,370		910,000	263,250	250,320

From Table 8-7, Beck (2008)
* Sum of “Non Combustible Waste Requiring Landfill Disposal” and “Combustible MSW Requiring Landfill Disposal.”
** The H-POWER Expansion is now planned for 2012.

The H-POWER Expansion impacts are positive with respect to meeting Hawaii’s existing and future solid waste disposal needs. The Project will increase the state’s solid waste disposal capabilities and reduce the need for additional landfill space. Therefore no mitigation measures with respect to solid waste impacts are anticipated. To the contrary, should H-POWER not be expanded, significant mitigation would be required to ensure adequate disposal options are available to handle projected waste quantities in a responsible and environmentally sound manner.

5.7 Energy

This section discusses the energy environment, both from the perspective of energy generation at H-POWER as well as with respect to regional energy resource supply and demand. Baseline conditions are presented and the potential impacts of the proposed Expansion upon Hawaii Energy Resources are evaluated and mitigating factors discussed.

5.7.1 Existing Conditions - Regional Energy Resources

Hawaii is the most oil-dependent of the 50 states, relying on imported petroleum for over 89 percent of its primary energy. Hawaii residents pay among the nation's highest costs for electricity and gasoline (ERC 2006). However, a large percentage of energy consumption in Hawaii can be attributed to aircraft and other fuels so of the 89 percent, not all of it is attributable to electricity production (ERC 2006).

The most recent electricity production statistics available from HECO's website, sourced to data as of December 31, 2007, indicate that of the electricity sold to customers of HECO and its subsidiaries Maui Electric Company (MECO) and Hawaii Electric Light Company (HELCO), 77 percent is from petroleum, 13 percent from coal, 9 percent from Non-Hydro Renewables, and less than 1 percent from Hydro (HECO 2007).

On June 2, 2004, with the signing of SB2474 SD3 HD2 (Act 95, Session Laws of Hawaii 2004, amended by Act 162, 2006), Hawaii's existing renewable portfolio standard (RPS) goal was replaced with an even higher goal. Under the new standard, 20 percent of electricity is to be generated from renewable resources by the end of 2020. Each electric utility is required to establish the following RPS percentages:

1. 10 percent of its net electricity sales by December 31, 2010;
2. 15 percent of its net electricity sales by December 31, 2015; and
3. 20 percent of its net electricity sales by December 31, 2020.

Renewable energy is defined in different ways and includes different forms of energy depending upon state regulations. In Hawaii it is defined as electrical energy produced by wind, solar energy, hydropower, landfill gas, waste-to-energy, geothermal resources, ocean thermal energy conversion, wave energy, biomass (including MSW, biofuels, or fuels derived from organic sources), hydrogen fuels derived from renewable energy, or fuel cells where the fuel is derived from renewable sources (HECO IRP 2008). Hawaii also allows electrical savings that meet specific criteria to be classified and credited as renewable energy.

H-POWER's existing energy production, as well as its significant role in helping to achieve the goals of Hawaii's RPS, are described below.

5.7.2 Existing Conditions – H-POWER

The 1983 EIS for the H-POWER facility identified two ways that the facility would benefit the energy situation: (1) it would promote greater energy self-sufficiency by reducing the dependence on imported fossil fuels, and (2) the recycling of ferrous metals would result in substantial energy savings for the metals industry (EIS 1983). Both of these advantages have been realized over the facility's eighteen year operating history. These advantages are even more important in today's environment.

The H-POWER facility currently generates approximately 46 MW of renewable electricity, which is distributed to customers by HECO and represents approximately 5 percent of O'ahu's electricity. On an annual basis, H-POWER generates enough power for approximately 45,000 local homes today and approximately 68,000 local homes with the Expansion. 46 MW also represents a substantial amount of Hawaii's renewable energy supply according to HECO, MECO and HELCO statistics. The HECO website currently cites 2007 data indicating a total of 175 MW from renewable energy sources. The website also cites H-POWER as generating a total of 46 MW, which represents roughly 26 percent of the 2007 renewable supply, roughly 2 percent of the total energy supply for the state.

Data from 2007 shows that renewable energy as a percent of total was 16.1 percent, up from 8.2 percent in 2003. Thus, due to expanding renewable energy sources, H-POWER in 2007 represented a slightly smaller though still significant portion of the renewable portfolio. This still represents a large percentage of Hawaii's existing renewable energy supply and demonstrates that H-POWER remains a significant factor in meeting both existing and future goals, as defined within Hawaii's RPS.

5.7.3 Impacts and Mitigating Factors

As described previously in Chapter 2, Description of Project, the H-POWER Expansion will increase net electrical production from 319,000 mWh (average over the last 5 years) to 520,000 mWh, an increase of 201,000 mWh. This is more than a 50% increase in net electrical production. Clearly, this magnitude increase in renewable energy production from H-POWER will contribute to the achievement of Hawaii's overall RPS goals and reduce Hawaii's reliance upon imported fuels. In addition, the separation of ferrous and non-ferrous material for recycling is an environmentally sound activity that saves energy.

The Expansion impacts are substantial and positive with respect to existing and future energy supplies. The Project will increase the state's renewable energy supply and reduce reliance on imported fuels therefore no mitigation measures with respect to energy resources are proposed.

5.8 Human Health

A human health risk assessment of the H-POWER Expansion (using existing H-POWER emissions plus estimated Expansion emissions) was conducted by AMEC to estimate the hypothetical health risk to the local population due to emissions from the expanded Facility. The health risk assessment is a quantitative tool that estimates the exposure of various groups of people by different pathways including respiration and consumption of food products (produce, fish, dairy, etc.). This is referred to as a Multi-pathway Human Health Risk Assessment. This section summarizes the results of that study and relates those results to the guidelines established by the USEPA and the HDOH. A copy of the Human Health Risk Assessment is provided in Appendix E.

5.8.1 Human Health Guidance

The approach adopted in the risk assessment is consistent with the approach recommended by the United States National Research Council, a group established by the National Academy of Sciences to further scientific knowledge and to advise the Federal government. This risk assessment estimates both potential carcinogenic risks (that is, the chance of developing cancer) and noncarcinogenic risks (that is, the likelihood that toxic health effects other than cancer may occur). USEPA has established a benchmark cancer risk level for combustion facilities of $1x10^{-5}$, or one extra cancer case in one hundred thousand exposed people, and a benchmark noncancer hazard index of 1.

USEPA guidance (2005) for conducting risk assessments of combustion facilities requires evaluation of risks for three hypothetical groups of people (residents, farmers, and fishers) so that all of the ways that facility emissions could affect human health are evaluated. These groups of people (called “receptors”) must be assumed to be located in areas of maximum facility impact where it is reasonable to anticipate that they could be exposed to facility emissions. Assuming people are located in the areas of maximum facility impact is a worst case assumption. People may not actually live in the locations evaluated in the risk assessment or engage in the activities assumed in the risk assessment, in which case their actual risks would be lower than those estimated. Because of the many conservative assumptions used in the risk assessment, it is most likely that the risk assessment overestimates any actual risks associated with Facility emissions.

For example, the evaluation assumes that chemicals will be emitted from the Expansion at the maximum limit allowed by USEPA regulations. Actual emissions are expected to be lower than these levels. Also, the groups of people evaluated in the risk assessment are assumed to be present continuously in the maximum impact area for up to 30 years, which almost certainly overestimates actual exposures.

5.8.2 Risk Assessment Methodology

This risk assessment followed the four step method developed by the National Research Council of the U.S. National Academy of Sciences. The four steps are:

1. Hazard Identification;
2. Toxicity Assessment;
3. Exposure Assessment; and
4. Risk Characterization.

The methods and results of each of the four steps of the risk assessment are summarized in the following paragraphs. The methodology used to estimate potential exposures and risks is consistent with guidance from USEPA (2005).

5.8.2.1 Hazard Identification

The compounds to be quantitatively assessed in the risk assessment are selected in the Hazard Identification step. The compounds evaluated in the risk assessment are those which have been measured in emissions from the Facility. Each compound was evaluated for its potential to pose a threat to human health. For each boiler, an emission rate was estimated for each compound based on previous emissions testing from existing boilers and/or emissions standards required by USEPA.

In order to estimate air concentrations of the compounds of potential concern in the region around the Facility, air dispersion modeling was conducted using computer models. These models take into account emission rates, physical properties of the emitted compounds and local weather data to predict the annual average air concentrations. The results were used to provide the air concentration data used to evaluate the various receptor locations.

Deposition modeling was performed using the results of the air dispersion modeling and meteorological data to describe the behavior of compounds associated with particles and vapors in the air that deposit on soils or water bodies. Additional modeling was performed to predict compound concentrations in soils and surface waters resulting from deposition, runoff, and other environmental fate and transport processes.

5.8.2.2 Toxicity Assessment

In order to determine if exposures to the compounds of potential concern may potentially result in adverse human health effects, it is necessary to have a numerical estimate of the toxicity of each compound of potential concern. The toxicity assessment identifies the types of adverse health effects a compound of potential concern may potentially cause and defines the relationship between the dose of a compound and the likelihood or magnitude of an adverse effect (dose-response).

Adverse effects are characterized as carcinogenic or noncarcinogenic. Dose-response relationships are defined for oral exposure and for exposure by inhalation. In the risk assessment conducted, the relationship between the dose of a compound and the likelihood and magnitude of an adverse effect was determined for each compound included in the quantitative risk assessment. Both potential carcinogenic and potential noncarcinogenic effects were considered in the risk assessment. Dose-response information used in the risk assessment was identified from USEPA sources.

5.8.2.3 Exposure Assessment

The results of the various modeling tasks performed in the Hazard Identification step provide estimates of the concentrations of the compounds of potential concern in air, soil, surface water, and food products as a result of facility emissions. These concentrations are used to predict receptor exposure to the compounds. To estimate potential human exposure to compounds of potential concern, potential exposure pathways were defined for each receptor. Potential exposure pathways describe ways in which receptors may be exposed to compounds of potential concern in the various environmental media.

For each of the receptors identified in this risk assessment, it was assumed that exposure could occur through some or all of the following direct and indirect pathways:

- Inhalation of emissions from the Facility;
- Incidental ingestion of soil while working or playing outdoors;
- Ingestion of produce grown in backyard gardens or farms;
- Ingestion of fish caught from Pearl Harbor, the West Loch, and the Wahiawa Reservoir; and
- Consumption of locally grown food products (beef, dairy, pork, poultry, and eggs).

Compound concentrations at each receptor location (residential area, farm, poultry area, compost area, and water bodies) were estimated using conservative (health-protective) assumptions. In addition, conservative assumptions were also made about the magnitude of each exposure, such as the quantity of soil or fish that is ingested on a daily basis. The use of many upper-bound factors (conservative factors) in calculating potential risks results in an estimate that tends to overstate actual risks, if any, which may occur as a result of receptors' potential exposure to facility emissions.

5.8.2.4 Risk Characterization

The potential exposure dose for each receptor from each compound via each route of exposure was combined with the appropriate dose-response value for that compound in order to estimate the potential for adverse health effects. In the risk characterization process, to evaluate if potential noncarcinogenic effects may occur due to exposure to compounds of potential concern, the ratio of the receptor's exposure dose to the noncarcinogenic dose-response value is calculated for each compound of potential concern. This ratio is termed the hazard quotient. If the hazard quotient is less than one, no adverse noncarcinogenic health effects are expected to occur as a result of exposure to that compound via that route of exposure.

The hazard quotient for each pathway by which each receptor is assumed to be exposed are summed to yield a hazard index for that compound. A total hazard index is then calculated for each receptor by summing the compound-specific hazard indices for that receptor for each toxicity endpoint (such as liver effects or kidney effects) for which it is appropriate to sum the effects of several compounds of potential concern. A total hazard index of less than one for a given receptor for each toxicity endpoint provides further evidence that no adverse noncarcinogenic health effects are expected to occur as a result of that receptor's potential exposure to environmental media given the emission rates and exposures assumed in the risk assessment. As a screening step, hazard indices for all compounds are summed to determine if it is necessary to calculate toxicity endpoint-specific hazard indices. If the total hazard index is less than one, then hazard indices for each toxicity endpoint are not necessary.

The purpose of carcinogenic risk characterization is to estimate the likelihood, over and above the background cancer rate, that a receptor will develop cancer in his or her lifetime as a result of exposures to compounds of potential concern in environmental media due to facility emissions. The product of the exposure dose of a compound via a particular pathway times the cancer slope factor for that compound is a unitless value. It provides an estimate of the potential carcinogenic risk associated with a receptor's exposure to that compound via that pathway. This value is termed the excess lifetime cancer risk. The excess lifetime cancer risk for each compound is calculated by summing the excess lifetime cancer risk values for each pathway by which the receptor is assumed to be exposed. The total excess lifetime cancer risk for each receptor is calculated by summing the compound- and pathway-specific excess lifetime cancer risks. Excess lifetime cancer risks are compared to a target risk range of $1x10^{-6}$ to $1x10^{-4}$ or one to 100 excess cancer cases per 1,000,000 people exposed. In addition, the USEPA has designated $1x10^{-5}$, or 1/100,000, as the acceptable risk benchmark for the siting of combustor facilities. An excess lifetime cancer risk for a compound that is less than the target risk of 1/100,000 is less than the regulatory level of concern. A total excess lifetime cancer risk for a receptor that is less than the target risk of 1/100,000 provides further evidence that the receptor's potential exposure to facility emissions will not result in unacceptable cancer risk.

5.8.3 Impacts and Mitigation

Potential risks were estimated for each receptor for the facility after the Expansion is completed. The total hazard index for all compounds of potential concern is below 1 for each receptor, and the total carcinogenic risk for all compounds of potential concern is less than $1x10^{-5}$ or 1/100,000 for each receptor.

Table 5.8-1 shows the estimated total excess lifetime cancer risk and total hazard index for each receptor.

TABLE 5.8-1 SUMMARY OF CARCINOGENIC AND NONCARCINOGENIC RISK ESTIMATES

Receptor	Total Excess Lifetime Cancer Risk	Total Hazard Index
Child Resident	1×10^{-8}	0.003
Adult Resident	2×10^{-8}	0.0009
Child Resident Using Compost from the Compost Area	4×10^{-8}	0.01
Adult Resident Using Compost from the Compost Area	4×10^{-8}	0.003
Child Fisher (Pearl Harbor)	1×10^{-8}	0.006
Adult Fisher (Pearl Harbor)	2×10^{-8}	0.004
Child Fisher (West Loch)	1×10^{-8}	0.008
Adult Fisher (West Loch)	2×10^{-8}	0.008
Child Fisher (Wahiawa Reservoir)	1×10^{-8}	0.01
Adult Fisher (Wahiawa Reservoir)	2×10^{-8}	0.02
Child Farmer	5×10^{-8}	0.005
Adult Farmer	2×10^{-7}	0.003
Child Resident at Poultry Area	3×10^{-9}	0.0006
Adult Resident at Poultry Area	4×10^{-9}	0.0002

Note that the maximum estimated lifetime cancer risk of $2x10^{-7}$ or 0.02/100,000 is 50 times lower than the USEPA benchmark. The estimated lifetime cancer risk for a child resident of $1x10^{-8}$ or 0.001/100,000 is 1,000 times lower and the estimated lifetime cancer risk for an adult of $2x10^{-8}$ or 0.002/100,000 is 500 times lower than the USEPA benchmark.

Because of the many conservative assumptions used in the risk assessment, it is most likely that the risk assessment overestimates any actual risks associated with Facility emissions. For example, the evaluation assumes that chemicals will be emitted from the Expansion at the maximum limit allowed by USEPA regulations. Actual emissions are expected to be lower than these levels. Also, the groups of people evaluated in the risk assessment are assumed to be present continuously in the maximum impact area for up to 30 years, which almost certainly overestimates actual exposures.

In conclusion, a human health risk assessment for the H-POWER facility including the third unit Expansion was conducted in accordance with USEPA requirements. The estimated risks are 50 to 3,333 lower than the USEPA's combustion facility benchmark for cancer risk, 50 to 5,000 times lower than USEPA's noncancer risk benchmark (Hazard Index).

6.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Consistent with HRS Chapter 343 and the rules for implementing the Hawaii environmental review process, CHRRV and the City and County of Honolulu have undertaken a review of the likely irreversible and irretrievable commitments of resources that might result from the Expansion, and in certain cases the irreversible and irretrievable commitments of resources that might result if the Expansion is not built. To best present this information, the irreversible/irretrievable commitment of resources is evaluated for each of the subject areas addressed in Chapters 4 and 5.

6.1 Commitment of Resources - Natural Environment

The following sections summarize the commitment of resources of the natural environment. They include: geology and soils (Section 6.1.1), climate and air quality (6.1.2), groundwater and hydrology (6.1.3) and biological resources (6.1.4).

6.1.1 Geology and Soils

Impacts to geology and soils will occur at both the H-POWER site and the adjacent parcels proposed for temporary construction use. These impacts will consist of excavation for foundations and grading and stockpiling activities. Each site area will experience some change in surficial characteristics even with proposed post-construction stabilization and re-vegetation. These changes will not differ from those that would result from any other industrial development and are not significant. In fact, most of these impacts exist currently due to construction of the original H-POWER facility and prior site disturbance. Since the geologic environment has already been impacted, the irreversible or irretrievable impacts anticipated to result from the Expansion will be minimal. Furthermore, these minimal impacts will occur in areas that have already been impacted, rather than at undisturbed location(s).

6.1.2 Climate and Air Quality

Air emissions do result from the consumption of MSW for energy production, though within highly regulated state and federal limits. The flue gas from the Expansion will be treated by the most modern air pollution control technologies designed to minimize impact to air quality. Furthermore, the H-POWER facility currently, and with the Expansion, produces energy that would otherwise need to be generated from other sources, predominantly through the consumption of petroleum or coal since these comprise 90% of the region's power supply (HECO 2007). Thus, emissions would occur even if H-POWER were to cease operation. In fact, even if the energy supplied by H-POWER could entirely be replaced by something other than imported fuels, emissions would still occur as a result of the formation of landfill gases, since land disposal would be the most likely remaining disposal option for the MSW. Thus, irreversible or irretrievable commitments of resources would still occur. Furthermore, H-POWER's production of electricity is supplied from a renewable source, consistent with the goal of reduced dependence upon non-renewable, imported fuels. Increased use of renewable fuels is consistent with recommendations from many forums concerned with potential impacts to global climate. Therefore, though irreversible and irretrievable impacts are anticipated (i.e., air emissions), these impacts are within regulatory limits and would therefore not be significant.

Furthermore, these impacts are not avoidable without extensive changes to existing solid waste and energy production technologies and options – changes that however desirable, may take decades to research, design, and fully implement.

6.1.3 Groundwater Resources/Hydrology

Impacts to groundwater resources and hydrology consist of both construction impacts, due to construction dewatering and stormwater controls, and operational impacts, from withdrawal of groundwater for cooling and from stormwater controls. Stormwater controls, both during construction and operation, will have minimal impact upon groundwater and hydrology. They are designed to be consistent with stormwater regulatory requirements, and to allow recharge on-site. The permanent use of groundwater via the two existing groundwater wells for cooling water supply is a partially consumptive use of water, with the remainder recharged via the two existing injection wells on-site. Importantly, though increases in demand and discharge will result from the Expansion, the water requirements for the Expansion will be reviewed and permitted to ensure the withdrawal and discharge quantities for both water supply and injection will have little to no negative impact. Thus, impact to groundwater resources and hydrology will be minimal and will be consistent with regulatory requirements.

6.1.4 Biological Resources

Operational impacts to biological resources are negligible due to the existing industrial nature of the H-POWER site, and the footprint area proposed for the Expansion, as well as the industrial nature of the neighboring land uses. Impacts to biological resources consist predominantly of temporary construction impacts, due to clearing and grading activities at the temporary construction laydown area. Construction activities will avoid the known resources of significance, which are located within fenced enclosures. An additional 25-foot setback will be maintained around the fencelines of these enclosed areas. The irreversible and irretrievable commitment of biological resources is therefore limited to the clearing of the existing scrub/shrub vegetation on the laydown parcels. These vegetated areas consist predominantly of post-disturbance regrowth, that, post-construction, will be stabilized and allowed to revegetate once again. Thus, though biological disturbance will occur, critical resources will be avoided and irreversible and irretrievable impacts limited to disturbance of previously impacted areas that will be stabilized and allowed to revegetate once construction is completed.

6.2 Commitment of Resources - Human Environment

Section 6.2.1 through 6.2.8 discusses the commitment of resources regarding the human environment. It includes a summary of potential impacts to archaeological and cultural resources, traffic, noise, visual, socioeconomics, solid waste, energy and human health.

6.2.1 Archaeological and Cultural Resources

No impact to archaeological and cultural resources is anticipated to result from the Expansion, though mitigation is proposed to ensure that in the event that resources are identified that they will be adequately and appropriately protected. Potential construction impacts are acknowledged, and mitigation measures proposed to minimize the potential for impact. Significant ground altering activities will be subject to on-call monitoring by a qualified archaeologist. Thus no irretrievable or irreversible impacts to archaeological or cultural resources are anticipated. If resources are identified they will be treated in accordance with Hawaii regulation and guidelines for inadvertent discovery.

6.2.2 Roadways and Traffic

The estimated impacts to roadways and traffic from the proposed Expansion will consist of both operational and temporary construction impacts. However, the majority of these impacts is alleviated by the Kalaeloa Roadway Expansion currently being conducted. It should be noted that the traffic impacts assessment was conservative to ensure "worst-case" impacts were captured and it is highly unlikely that actual impacts would be as described. The traffic analysis indicates that although traffic is increased during both construction and operation, the need for mitigation during the construction phase or operation of the Expansion are not required. Mitigation measures, however, could consist of work-force car-pooling, shift adjustments to avoid peak periods, and the use of temporary traffic control officers at unsignalized intersections. These impacts are not irreversible or irretrievable, since they are insignificant and can be mitigated even during the period of impact.

6.2.3 Noise

Background noise measurements from the perimeter of the H-POWER facility exceed the threshold for class "C" industrial zoning district. As the intent of the HDOH community noise rule is to protect public health and welfare and to prevent significant degradation of the environment and quality of life, these exceedances are not relevant. The H-POWER facility is situated in what has become a heavily industrialized area. The closest residences are over a mile away and would not be impacted by H-POWER noise. No significant degradation of the environment and quality of life is anticipated. Furthermore, background measurements include substantial contribution from neighboring sources and traffic.

Temporary construction impacts will fall under the terms and conditions of the HDOH issued noise permit that allows noisy construction activities to take place during daytime hours. Any activities that require overnight operation must meet the State's maximum permissible sound limits for industrial zoning districts. If needed, temporary enclosures or barriers may be used to mitigate noise from such activities/equipment or contractors may apply for a noise variance with the HDOH. These potential construction impacts, though temporary, will be follow HDOH guidelines and are not significant, irreversible, or irretrievable.

The installation of the H-POWER Expansion equipment will likely increase noise levels in the immediate vicinity of the new equipment. However, a significant increase in noise level is not expected at the H-POWER property lines. The specifications associated with the proposed Expansion specify that the noise radiated from any equipment will be less than or equal to 80 dB at a distance of one (1) meter from the equipment and less than or equal to 60 dB at a distance of 50' from the equipment.

6.2.4 Visual Resources

Upon completion of the Expansion project there will be no significant change to the facility appearance. The Expansion will not exceed the height of the existing building and stack, and all structures and equipment will be less than the 60-foot height limit applicable within the Heavy Industrial (I-2) zoning district. The highest building is currently 149 feet, and the highest proposed building is 100 feet. In addition, the highest building at the adjacent AES facility is 161 feet. The current stack is 290 feet, and the proposed stack is 199 feet. The façade will be designed to blend with the existing H-POWER facility materials, color and appearance.

In addition, the stack at the adjacent AES facility is 285 feet. The additional square footage will expand the overall coverage of the H-POWER property, bringing the facility buildings closer to the eastern property boundary in proximity to the existing HECO electrical substation. The change is not visually substantial given the size and scale of the existing H-POWER facility and that of its industrial neighbors. In addition, HECO is currently constructing a power generation facility to the north of the H-POWER facility on HECO's southern property boundary. The estimated height of the stacks associated with this new facility is 210 feet. Associated with the new facility is an electrical transmission line that will require 120 foot high structures.

Structural changes will be irreversible or irretrievable for the life of the facility, but viewsheds taken from regional vantage points demonstrate that there are no significant changes in views from potentially sensitive areas. It is anticipated that even temporary impacts during construction will largely be blocked from view by the surrounding industrial structures, and though cranes may be visible from regional vantage points, most potential views outside the adjacent industrial areas are at substantial distances. Thus, the irreversible and irretrievable impacts to views are minor, and the impact to potentially sensitive views is negligible due to intervening industrial structures.

6.2.5 Socioeconomics

The socioeconomic impacts anticipated to result from the proposed Expansion include significant increases in construction employment distributed over an approximately 34-month construction period and an additional 3-month start-up and testing period. The socioeconomic impacts will also include significant material and equipment expenditures and therefore tax revenues locally. Though temporary, the increased employment and construction expenditures and tax revenues will improve the economy of Hawaii during that roughly 33-month period. The workforce will be predominantly local so no significant demands upon local infrastructure, such as housing or schools, is expected. Additionally, the H-POWER facility and the proposed Expansion provide a cost effective solution to solid waste disposal and simultaneously provide a renewable source of energy production. This helps to avoid the otherwise expensive proposition of increasing landfill capacity and constructing new power facilities elsewhere on O'ahu. This long-term cost effective and reliable solution to solid waste disposal, providing renewable energy, is likely the most significant and beneficial impact of the H-POWER Expansion upon the local economy.

6.2.6 Solid Waste

The H-POWER Expansion impacts are positive with respect to meeting O'ahu's existing and future solid waste disposal needs. The Project will increase the state's solid waste disposal capacity while simultaneously reducing reliance on imported fuels and reducing the need for additional landfill space. The beneficial impacts are irreversible and irretrievable, in that waste, including recyclable ferrous and non-ferrous material, will be permanently diverted from landfill destinations. Furthermore, demand for imported fuel to satisfy electricity production will be reduced. However, even with the Expansion, solid waste projections indicate that future landfill capacity will be required. Without the H-POWER Expansion, the quantities of MSW sent to landfill would nearly double (Fiscal Year projection for 2030), and the amount of waste produced would increase by approximately 34 percent. Thus, a substantial and irreversible/irretrievable impact would result in the absence of the proposed Expansion.

6.2.7 Energy

The existing H-POWER facility and the proposed H-POWER Expansion impacts are positive with respect to existing and future energy supplies. The Expansion will increase the state's renewable energy supply and reduce reliance on imported fuels. The existing H-POWER facility has already saved more than 10 million barrels of oil since its start of operation and represents roughly 26 percent of Hawaii's total renewable energy supply. The Expansion will result in an approximately 50 percent increase in net electrical production. Thus, detrimental irreversible/ irretrievable impacts would occur only in the absence of the proposed Expansion.

6.2.8 Human Health

Emissions from the proposed H-POWER Expansion are estimated to result in human health impacts that are within state and federal regulatory limits and guidelines. Therefore, the impacts are minimal and are not significant. As stated above regarding air quality resources, the Expansion will result in energy production that would otherwise need to be produced by other means. If the energy to be produced by the facility needed to be generated by other means, such operations would result in emissions (from combustion of other fuel sources such as coal or petroleum products), and diverted waste would result in emissions from landfilled MSW.

6.3 Conclusion

The proposed Expansion of the H-POWER facility is not without some impact to both the natural and human environment, impacts which, when fully evaluated, are:

1. Unavoidable given current waste disposal technologies and economics;
2. Positive, providing strong benefits to either the natural or human environment; or
3. Insignificant in light of the overriding project benefits offered and given the selection of a heavily industrialized and previously impacted area well suited for project development

Given these considerations, it is the absence of the H-POWER Expansion that would require greater use of non-renewable resources (imported fuels) and a resultant irreversible and irretrievable commitment of resources (fuel supply, decreased ferrous and non-ferrous recycling, greater commitment of land for waste disposal, reduced generation of renewable energy, etc.). Thus, when balancing the impact from expanding the H-POWER facility against the impact of not doing so, it is clear that the proposed Expansion will result in fewer irreversible and irretrievable impacts, and is an important part of ISWM planning on O‘ahu.

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7.0 CONFORMANCE TO FEDERAL, STATE, AND LOCAL PLANNING POLICIES

In accordance with the requirements of HAR §11-200-17(h), this chapter discusses the relationship of the proposed action to land use plans, policies and controls for the area that would be affected by the Expansion. It identifies the extent to which the Expansion would conform or conflict with the objectives or terms of land use plans, policies, and controls. This chapter is organized first by jurisdiction (Federal, State, or City/County) and then by specific ordinance, regulation, law or plan that regulates land use. Under each of those subheadings, the objectives and authority of the plan, policy or control are discussed followed by an evaluation of the consistency of the proposed Expansion to the specific plan, policy or control.

7.1 Federal

The following sections provides the Federal requirements associated with the Expansion

7.1.1 Federal Aviation Administration

Federal Aviation Administration (FAA) Regulations, Part 77 – Objects Affecting Navigable Airspace, outline the specific criteria for FAA notification and determinations. The FAA review process begins with the filing of a Notice of Proposed Construction or Alteration for projects – FAA Form 7460-1. This is required for projects of ranging heights at varying distances from airports, airfields, and heliports. FAA Form 7460-1 must be filed for any construction or alteration of more than 200 feet in height and for any construction or alteration extending outward and upward in excess specified slopes: 100 to 1 for a horizontal distance of 20,000 feet from nearest runway greater than 3,200 feet in length, excluding heliports; 50 to 1 for a horizontal distance of 10,000 feet from the nearest runway less than 3,200 feet in length, excluding heliports; and 25 to 1 for a horizontal distance of 5,000 feet from the nearest landing and takeoff area of a heliport.

Importantly, the Notice is required both for the presence of temporary construction equipment at a project site (such as cranes) as well as with respect to the estimated final build out heights of the new structure(s). If advised by FAA a Supplemental Notice (Form 7460-2) is required to be filed within 5 days after the construction or alteration reaches its greatest height.

Evaluation: A preliminary review of topographic maps, airport locations and Expansion design and construction plans indicated that the project would not trigger the thresholds for review. However, to ensure that the Expansion is consistent with FAA requirements and to ensure safe and proper construction planning, CHRRV and the City and County of Honolulu shall submit an FAA Form 7460-1 30 days prior to construction advising the FAA of the Expansion and requesting a determination. .

7.1.2 Federal Coastal Zone Consistency

The Coastal Zone Management Program (CZMP) is authorized by the Coastal Zone Management Act of 1972 and administered at the federal level by the Coastal Programs Division of the National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management. The National Coastal Management Program is a federal-state partnership and the CZMP leaves day-to-day management decisions at the state level in the 34 states and territories with federally approved coastal management programs. The state of Hawaii gained federal approval for their state coastal management program in 1978. Consistency with both federal and state CZMP is discussed and evaluated below in Section 7.2.1.

7.2 State of Hawaii

The following sections summarize the State of Hawaii requirements as they pertain to the Expansion.

7.2.1 Hawaii State Coastal Zone Management Program

As discussed above in Section 7.1.2, CZM is a federal-state partnership with delegated states implementing the day-to-day management decisions. The Hawaii Coastal Zone Management Program, delegated in 1978, is administered by the Hawaii Office of Planning and seeks to balance marine and coastal resource protection with sustainable economic development. The program encompasses the entire state (federal lands are exempted) including the 12-mile U.S. territorial sea and all archipelagic waters. The program is built upon ten policy areas: Recreational Resources, Historic Resources, Scenic and Open Space Resources, Coastal Ecosystems, Economic Uses, Coastal Hazards, Managing Development, Public Participation, Beach Protection, and Marine Resources. Other key areas of the CZMP include designated SMA managed by the Counties and the Office of Planning and discussed in Section 7.3.3 below, and a Shoreline Setback Area which serves as a buffer against coastal hazards and erosion, and protects view-planes, also discussed in Section 7.3.4 below.

Evaluation: A November 6, 2008 letter was sent to the Hawaii CZMP requesting a determination as to whether a CZM federal consistency review would be required for the Expansion. That letter included attachments describing the Expansion project along with information about the parcels under consideration for construction laydown use. The Hawaii CZMP responded in a letter dated November 17, 2008 and determined that a CZM federal consistency review is not required for this project.

7.2.2 Hawaii State Plan

The Hawaii State Plan, HRS Chapter 226, was enacted in 1978 and is intended to guide the long-range development of the State of Hawaii, as excerpted:

> The Hawaii state plan that shall serve as a guide for the future long-range development of the State; identify the goals, objectives, policies, and priorities for the State; provide a basis for determining priorities and allocating limited resources, such as public funds, services, human resources, land, energy, water, and other resources; improve coordination of federal, state, and county plans, policies, programs, projects, and regulatory activities; and to establish a system for plan formulation and program coordination to provide for an integration of all major state, and county activities.

The section of the State Plan that is most relevant to the H-POWER Expansion is HRS §226-14 Objective and policies for facility systems--in general, excerpted as follows:

(a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.

(b) To achieve the general facility systems objective, it shall be the policy of this State to:

Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.
Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.
Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.
Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

Evaluation: The Proposed Expansion is fully consistent with the goals and policies of the Hawaii State Plan, in that the Expansion will support statewide economic objectives in providing safe and reliable disposal of solid waste. The Expansion also supports the goals of the State Plan in that it is consistent with State solid waste management plans and is an integral component of the City and County of Honolulu's ISWMP discussed in Section 5.6 Solid Waste and Section 7.3.5, below. The H-POWER Expansion is a prudent use of resources, recovering renewable energy while satisfying waste disposal needs. H-POWER has proven its reliability and cost effectiveness over the last 18 years and the Expansion will ensure continued capacity to satisfy public demand for waste disposal at reasonable cost.

7.2.3 State Energy Plan

The first Hawaii Energy Strategy (HES) was initiated in 1992 and completed in 1995 (HES 2000). The HES was updated in January 2000 by the Energy, Resources, and Technology Division of the State of Hawaii Department of Business, Economic Development & Tourism. As of July 2006, a new HES 2007 project began its planning stages.

The purpose of the HES 2000 is to "assist State of Hawaii planners and policy makers, members of the Hawaii energy community, and Hawaii's people to better understand Hawaii's current energy situation" (HES 2000). The specific objectives of HES 2000 are to:

- Increase diversification of fuels and the sources of supply of these fuels;
- Increase energy efficiency and conservation;
- Develop and implement regulated and non-regulated energy development strategies with the least possible overall cost to Hawaii's society;
- Enhance a system of comprehensive energy policy analysis, planning, and evaluation;
- Increase the use of indigenous renewable energy resources; and

- Enhance contingency planning capabilities to effectively contend with energy supply disruptions.

The HES 2007 will build upon previous work and the Governor's "Energy for Tomorrow" initiative to chart a clear, executable path to:

- Reduce the state's dependence on oil;
- Protect the environment;
- Reduce negative economic impacts related to use of imported fuels;
- Enhance renewable energy use and energy efficiency; and
- Improve the security and reliability of Hawaii's energy system.

With regard to increasing diversification and renewable energy use in Hawaii, the HES Summary states that: "Hawaii's current use of renewable energy provides important diversification of the state's energy supply, helps keep funds spent for energy in the state, provides local jobs, and reduces damage to the environment when compared to other forms of energy used for electricity generation." The summary goes on to state: "Additional use of renewable energy will add to these benefits and reduce Hawaii's dependence on imported fossil fuels" (HES 2000).

Evaluation: H-POWER's existing energy production, as well as the proposed Expansion energy increases and increased reliability, are fully consistent with the goals of increased diversification of fuels as well as increased use of renewable energy resources.

7.2.4 Hawaii State Water Plan

The State of Hawaii's CWRM, was established in 1987 when the Legislature enacted the State Water Code, Chapter HES 174C (CWRM 2004). The State Water Code requires that the CWRM implement and utilize comprehensive water resources planning in its regulation and management of Hawaii's water resources. The development and updating of the Hawaii Water Plan guides CWRM in executing its general powers, duties and responsibilities (CWRM 2000). There is currently a Statewide Framework for Updating the Hawaii Water Plan published in 2000 by the CWRM, DLNR.

Evaluation: The Expansion has been designed to minimize demand for water and will modify the existing H-POWER permit limits for water withdrawal and re-injection as permitted through CRWM and HDOH respectively. This is consistent with the goals and regulations implemented by CWRM.

7.3 City and County of Honolulu

The following sections provide City and County of Honolulu general requirements as they pertain to the Expansion.

7.3.1 O‘ahu General Plan

As described within the O‘ahu General Plan for the City and County of Honolulu, the O‘ahu General Plan is “a comprehensive statement of objectives and policies which sets forth the long-range aspirations of O‘ahu’s residents and the strategies of actions to achieve them.” The General Plan addresses eleven areas of concern:

1. Population
2. Economic activity
3. The natural environment
4. Housing
5. Transportation and utilities
6. Energy
7. Physical development and urban design
8. Public safety
9. Health and education
10. Culture and recreation
11. Government operations and fiscal management

Of these eleven categories, the three that directly relate to the proposed Expansion are Transportation and Utilities, Energy, and Government Operations and Fiscal management. Within each of these areas of concern, the O‘ahu General Plan itemizes key objectives, followed by specific policies. Those most relevant to the proposed Expansion are cited below along with an evaluation of consistency:

7.3.1.1 Transportation and Utilities

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

> Policy 5 – Provide safe, efficient, and environmentally sensitive waste-collection and waste-disposal services.
>
> Policy 6 – Support programs to recover resources from solid-waste and recycle wastewater.

Evaluation: The Expansion will provide safe, efficient and sensitive waste-disposal services and will recover resources (materials and electricity) from solid waste. The Expansion will help to meet the needs of the people of O‘ahu for environmentally sound systems of waste disposal.

7.3.1.2 Energy

Objective C – To fully utilize proven alternative sources of energy.

Policy 2 – Support the increased use of operational solid waste energy recovery and other biomass energy conversion systems.

Evaluation: The Expansion will support the increased use of operational solid waste energy recovery. The Expansion will fully utilize proven alternative sources of energy.

7.3.1.3 Government Operations and Fiscal Management

Objective A – To promote increased efficiency, effectiveness, and responsiveness in the provision of government services by the City and County of Honolulu.

Policy 1 – Maintain City and County government services at the level necessary to be effective.

Evaluation: The Expansion will help to maintain City and County government services at the level necessary to be effective and will promote increased efficiency in the provision of government (waste disposal) services by the City and County of Honolulu.

7.3.2 ‘Ewa Development Plan

As shown previously on Figure 5.5-1, Planning Areas, O‘ahu is divided into eight planning areas, each area has a Development Plan (DP) which is adopted by City Council ordinance and administered by the DPP. A public review draft of the 2008 'Ewa DP is available for review. It will not be finalized until after the public commenting period ending in January 2009.

With regard to relevant consistency review of the Expansion, Chapter 3 of the ‘Ewa DP addresses Land Use Policies, Principles and Guidelines and Chapter 4 addresses Public Facilities and Infrastructure Polices and Guidelines.

7.3.2.1 Land Use Policies, Principles and Guidelines

According to Chapter 3 of the 2008 Public Review Draft of the ‘Ewa DP, the Barbers Point Industrial Area/Kalaeloa including the site of the State’s largest heavy industrial area (JCIP) continue “as one of O‘ahu and the State’s most important industrial areas.” This area is an important industrial harbor and fuel transfer point. It is further stated in the 2008 Public Review Draft of the ‘Ewa DP to “Allow construction of an additional electrical power generating plant at the Barber’s Point Industrial Area, possibly taking advantage of cogeneration opportunities with other industrial activities”. The 2008 Public Review Draft of the ‘Ewa DP also recommends that building heights should generally not exceed 60 feet when they consist of large mass and that taller vertical structures are acceptable when required as part of an industrial operation but that a viewplane study should be conducted for structures over 100 feet in height to minimize visibility from residential, resort, and commercial areas, public rights-of-way and the shoreline.

Evaluation: The proposed Expansion is fully consistent with the stated industrial land use objectives of the 2008 Public Review Draft of the ‘Ewa DP for the Barbers Point Industrial Area and the JCIP. It is also consistent with the stated energy use objective for that region as well.

The building height of the Expansion is consistent with the existing facility height and a viewshed analysis from potentially sensitive locations, such as shoreline parks and residential areas was conducted and demonstrates no significant visual impact.

7.3.2.2 Public Facilities and Infrastructure Policies and Guidelines

Within Chapter 4 of the 2008 Public Review Draft of the ‘Ewa DP, Section 4.5 addresses Solid Waste Handling and Disposal. According to that DP the two major solid waste handling and disposal facilities located in ‘Ewa consist of the H-POWER facility and the Waimanalo Gulch Sanitary Landfill. The general policies with respect to solid waste disposal are to “Analyze and approve siting and/or Expansion of sanitary landfills based on islandwide studies and siting evaluations.” The 2008 Public Review Draft of the 'Ewa DP does address the proposed Expansion of H-POWER that would increase “capacity up to 720,000 tons per year and provide a significant reduction of material sent to the landfill for disposal. That DP also cites the updated 2004 Solid Waste Integrated Management (SWIM) Plan. This updated version of the SWIM Plan has since been produced and the consistency of the H-POWER Expansion with that plan is addressed in section 5.6 Solid Waste as well as below in Section 7.3.5. The SWIM Plan identifies the following goals for ‘Ewa in regards to H-POWER:

- Constructing and operating a third boiler at the H-POWER Plant;
- Exploring alternatives to disposal in landfills and burning waste in the H-POWER plant, such as mass burn waste-to-energy, gasification, and plasma torch/arc;
- Continuing to work with the State Department of Health to obtain approval for alternative uses for H-POWER ash.

<u>Evaluation</u>: The proposed H-POWER Expansion is consistent with the pre-existing uses identified within the 2008 Public Review Draft of the ‘Ewa DP and is, consistent with the 2008 ISWMP and the 2004 SWIM Plan prepared by the City and County of Honolulu, which is referenced within the 2008 Public Review Draft of the ‘Ewa DP.

7.3.3 Special Management Area (SMA)

As described above in Section 7.2.1 - State CZMP, the SMA is a key aspect of the Hawaii State Coastal Management Program. Administered by the City and County of Honolulu, DPP, no development can occur in the SMA unless the DPP first issues a permit. Development is defined to include most uses, activities and operations on land and in the water.

The SMA originally encompassed all lands extending not less than 100 yards inland from the shoreline, though in some areas, the SMA’s extend several miles inland to cover areas in which coastal resources are likely to be directly affected by development activities.

<u>Evaluation</u>: A letter was sent to the City and County of Honolulu, DPP on November 5, 2008. informing the agency that Expansion and its associated construction is outside of the SMA and requested a formal determination confirming that assessment. A determination from the DPP has not yet been received.

7.3.4 Shoreline Setback Area

As described above in Section 7.2.1 – State CZMP, the shoreline setback area is a key aspect of the Hawaii State Coastal Management Program. Administered by the City and County of Honolulu, DPP, the shoreline setback area is the area between the shoreline and the shoreline setback line. Currently most shoreline setback lines are set at 40 feet from the shoreline, although in some places the Shoreline Setback boundaries extend further inland. The counties have the authority to set deeper setbacks.

Evaluation: A November 6, 2008 letter was sent to the City and County of Honolulu, DPP. That letter indicated that on the basis of available mapping obtained from DPP, the Expansion project and the temporary construction area impacts would be outside of the Shoreline Setback Line and the Buffer Area and requested a formal determination from DPP confirming that assessment. A determination from the DPP has not yet been received.

7.3.5 Honolulu Solid Waste Master Plan

The October 2008 ISWMP was developed to guide solid waste management activity (CCH, 2008a). The October 2008 Plan is intended to plan for solid waste-related activities for the City and County of Honolulu for the next 25 years, with the first five years discussed in greater detail (CCH, 2008a). The 2008 Plan set forth as its primary objective to "design an integrated solid waste management system for the City was to maximize the recovery of solid waste through reuse, recycling, composting and energy conversion, in order to minimize the amount of waste that requires landfill disposal."

Evaluation - H-POWER is an integral component of existing City and County disposal plans as noted in the October 2008 Plan. The Expansion of H-POWER will significantly reduce material for landfill disposal, and is consistent with the "primary objective" of the City and County of Honolulu – to significantly minimize the amount of material to be disposed of in landfill.

7.3.6 City and County of Honolulu Land Use Ordinance (LUO)

The purpose of the City and County of Honolulu LUO is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, and to promote and protect the public health, safety, and welfare. It is the intent that the LUO provide reasonable development and design standards for the location, height, bulk and size of structures, yard areas, off-street parking facilities, and open spaces, and the use of structures and land for agriculture, industry, business, residences or other purposes.

As described in Chapter 1 of this EIS, the City and County of Honolulu LUO defines the JCIP as I-2 Intensive (Industrial). "The intent of the I-2 intensive industrial district is to set aside areas for the full range of industrial uses necessary to support the city. It is intended for areas with necessary supporting public infrastructure, near major transportation systems and with other locational characteristics necessary to support industrial centers."

Under the LUO, waste disposal and processing are allowed under a Conditional Use Permit – minor, and subject to the Specific Use Development Standards identified in Article 5 of the Ordinance. Table 7.3-1 provides a summary of the I-2 Industrial Development Standards, as

TABLE 7.3-1 I-2 – INDUSTRIAL DEVELOPMENT STANDARDS

<table>
<tr><th colspan="2">Development Standard</th><th>District I-2</th></tr>
<tr><td colspan="2">Minimum lot area (square feet)</td><td>7,500</td></tr>
<tr><td colspan="2">Minimum lot width and depth (feet)</td><td>60</td></tr>
<tr><td rowspan="2">Yards (feet):</td><td>Front[1]</td><td>5</td></tr>
<tr><td>Side and rear</td><td>0</td></tr>
<tr><td colspan="2">Maximum building area (percent of zoning lot)</td><td>80

However, the building area may be increased to include all of the buildable area of the zoning lot provided all structures beyond the designated 80 percent building area shall:

a. Provide a minimum clear interior height of 18 feet;
b. Contain no interior walls, except for those between a permitted use and a special accessory office; and
c. Provide a minimum distance of 40 feet between interior columns and other structural features</td></tr>
<tr><td colspan="2">Maximum density (FAR)</td><td>2.5</td></tr>
<tr><td colspan="2">Maximum height (feet)</td><td>Per zoning map</td></tr>
<tr><td colspan="2">Height setbacks</td><td>Additional Development Standards.

(1) Transitional Height Setbacks. Where a zoning lot adjoins a zoning lot in a residential, apartment, apartment mixed use or resort district, the residential, apartment, apartment mixed use or resort district height setbacks shall be applicable at the buildable area boundary line on the side of the industrial zoning lot (see Figure 7.3-1).
(2) Street Setbacks. In the I-2 districts on zoning lots adjacent to a street, no portion of a structure shall exceed a height equal to twice the distance from the structure to the vertical projection of the center line of the street (see Figure 7.3-2).</td></tr>
</table>

[1]Except for necessary access drives and walkways, all front yards shall be landscaped

excerpted from the LUO. Although the H-POWER facility is an existing use, alterations, additions, or modifications shall be processed under the applicable permit.

Evaluation: H-POWER will comply with the application requirements of the Conditional Use Permit, and will be consistent with the Specific Use Development Standards identified in Article 5 of the Ordinance and summarized in Table 7.3-1, above.

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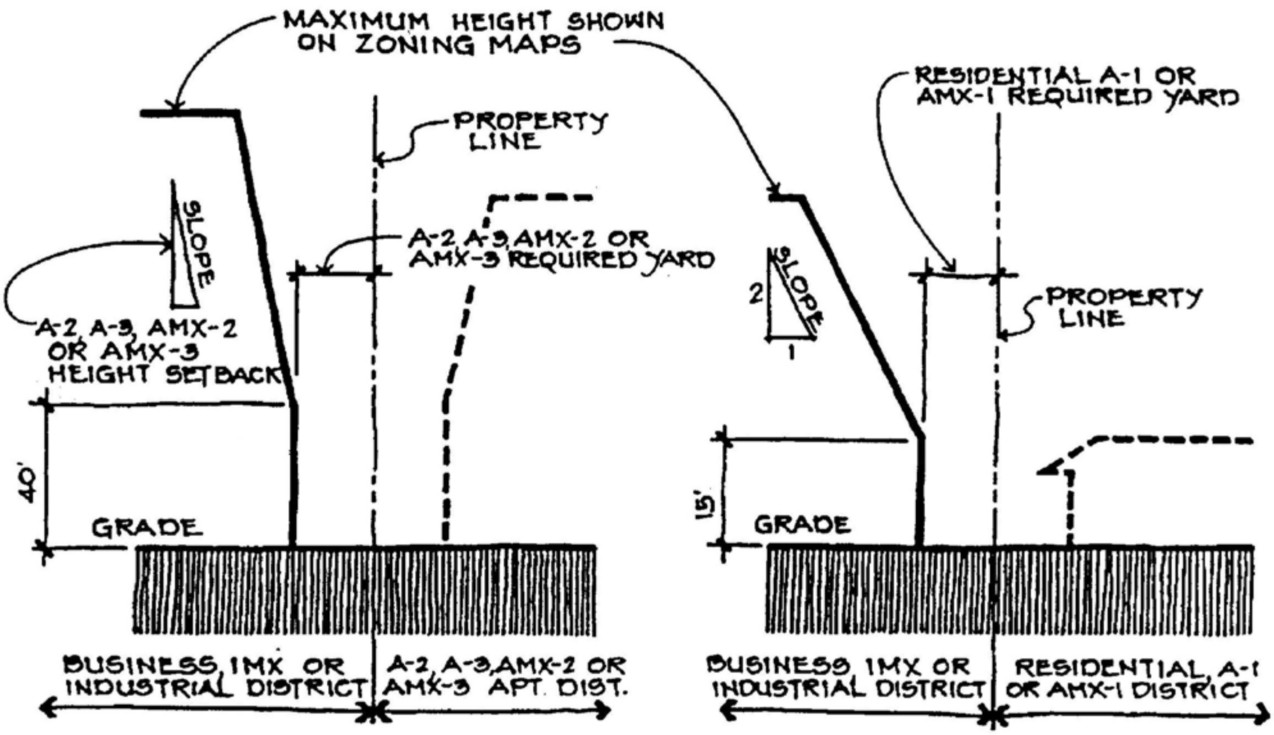


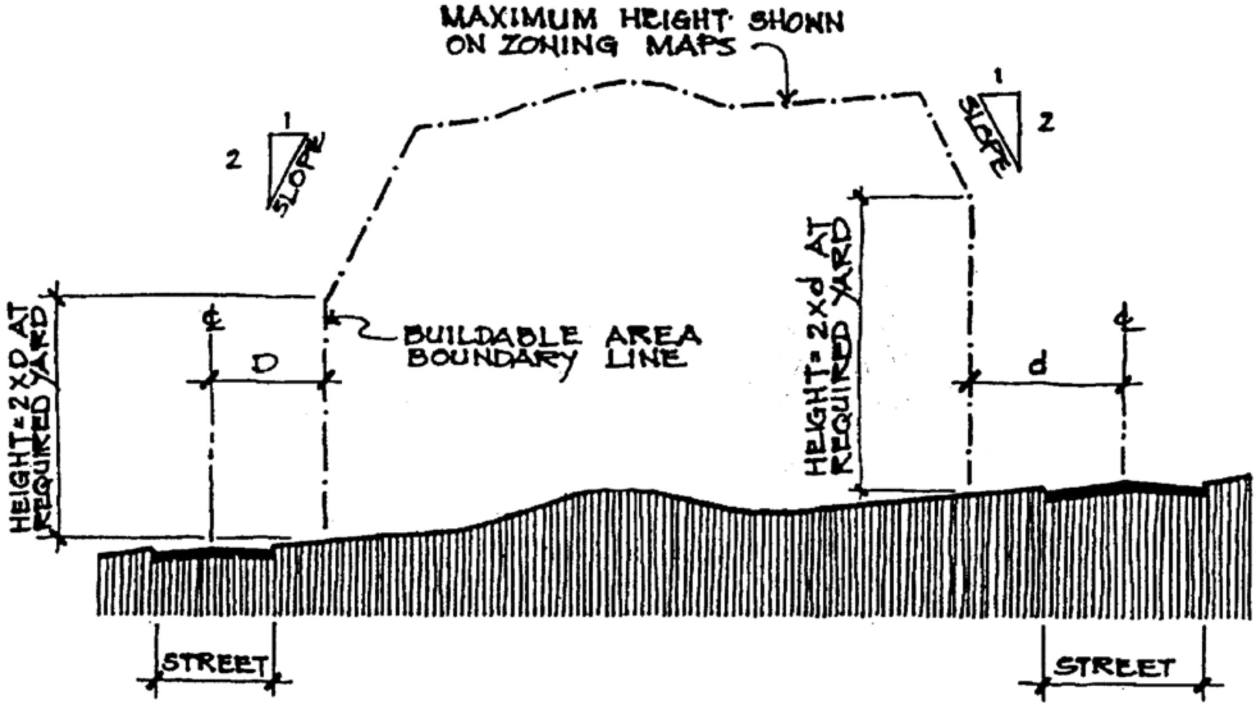
amec

TRANSITIONAL HEIGHTS
(BUSINESS, BMX, IMX AND ALL INDUSTRIAL DISTRICTS)

FIGURE
7.3-1

H:/H-POWER/MXD_Current/Environmental/street1.mxd
H:/H-POWER/Export/Environmental/street1.pdf
March 4, 2005 DWN: RLO CHKD:

Figure 7.3-1 back side



amec

STREET SETBACKS
(B-2, BMX-3, I-2, I-3 AND IMX DISTRICTS)

FIGURE
7.3-2

H:/H-POWER/MXD_Current/Environmental/street.mxd
H:/H-POWER/Export/Environmental/street.pdf
March 4, 2005 DWN: RLO CHKD:

Figure 7.3-2 back side

8.0 ALTERNATIVES TO THE PROPOSED ACTION

8.1 Alternatives Considered

In December 2008, the Alternatives Analysis for the Expansion of H-POWER report was completed for the subject EIS by Pacific Waste Consulting Group (PWCG) (Appendix F). The following includes a summary of the report and evaluation.

The following alternatives to the proposed project were evaluated:

- No Project – The Expansion would not be built, with no alternative site or technology available.

- Delayed Project – The action on the Expansion would be delayed. The delayed and No Action alternatives have the same effect, and the Delayed Project action could increase the cost of the Expansion.

- Transshipment – O‘ahu’s MSW would be baled and transported to a mainland landfill for disposal in Washington, Oregon, or Idaho. Even with this alternative, not all MSW can be transshipped.

- Alternative Technologies – Technologies other than the Expansion that could reduce the amount of material requiring disposal and generate electricity or another beneficial reuse product. Alternative technologies that were considered include:

    1. Thermal and non-thermal technologies; and

    2. Enhanced recycling.

The analysis was performed for each of the alternatives. The examination of alternative technologies involved a review of currently operating facilities and includes information describing the technologies.

Alternative technologies were compared to criteria or guidelines established by the City & County of Honolulu in the June 20, 2007 *Competitive Sealed Proposal for Alternative Technology*. The transshipment requirements were compared to criteria or guidelines established in the City’s bid documents from January 22, 2008.

8.2 No Project Alternative

Under this alternative, Unit #3 of H–POWER would not be constructed. The existing plant could continue to operate providing energy recovery, recycling and disposal reduction. These benefits would not be increased by the construction of the Expansion. Several actions would result:

- The Waimanalo Gulch Sanitary Landfill would continue to receive an additional 900 TPD of MSW that would have been reduced to 225 TPD through operation of the Expansion. Truck traffic to the landfill would have been reduced by the Expansion. The result would be a reduction in the life of the landfill.

- The loss of energy produced by the Expansion would decrease the potential amount of energy produced from this renewable fuel, which is estimated to increase from five to eight percent of the island needs after the Expansion. Under this alternative, that energy benefit would not be realized and additional oil would be imported to offset the lost power.

Under this alternative, the City would continue to send the MSW that would be converted to energy in H–POWER Unit #3 to the Waimanalo Gulch Sanitary Landfill. The landfill is currently in the environmental process to obtain approval for a 92.5-acre Expansion to allow for operation of the landfill for at least an additional 15 years. The landfill currently receives ash, RDF processing residue, and non-processibles waste from H–POWER. It is also the disposal site for MSW that exceeds the capacity at H–POWER.[10]

Under the *No Project* alternative, the use of the Waimanalo Gulch Sanitary Landfill rather than expanding H–POWER offers an opportunity in that the landfill can be used immediately since it already exists, is in an Expansion mode, and is a long-term resource to be conserved for the City's use, without the permitting and construction needed for the Expansion.

There are several disadvantages to the *No Project* alternative and the use of the Waimanalo Gulch Sanitary Landfill rather than expanding H–POWER, including:

- The landfill has a finite capacity and disposing of MSW in it rather than converting the MSW into energy in H–POWER is wasting precious land resources and the energy generation resources in the MSW.

- There are energy generation and oil fuel conservation benefits using H–POWER rather than importing oil to produce the electricity needed on the island.

8.3 Delayed Project Alternative

This alternative would have the project benefits realized, but at a later time. The results would be:

- The Waimanalo Gulch Sanitary Landfill would continue to receive an additional 900 TPD of MSW, but for a limited amount of time. The impact on the life of the landfill would be reduced compared to the "No Project" alternative, but the landfill life would be shortened.

- The energy penalty due to the loss of electric power generation from the Expansion would occur, but would be reversed when the Expansion was built.

[10] Draft Environmental Impact Statement Waimanalo Gulch Sanitary Landfill Expansion, May 2008.

- The project cost would likely increase if for no other reason than inflation.

The environmental benefits of the Expansion are not realized with the *No Project* alternative and are postponed with the *Delayed Project* alternative. The positive energy impacts of the Expansion are likewise not realized or delayed. There are likely increases in cost of the *Delayed Project* alternative. Taken together the negative impacts of not building the project or delaying it are greater than building the project.

8.4 Technology Alternatives

Alternative technologies could be used in lieu of an H-POWER Expansion, but the environmental and economic performance of energy from waste (EfW) is well documented through long-term operation, which is not the case with alternative technologies.

The alternatives fall into several categories:

- Alternative Technology — Thermal. These processes use heat to reduce the waste to energy or a fuel that can be used to produce energy and may produce recyclables. Pyrolysis, gasification, and EfW are examples of thermal processes.

- Alternative Technology — Non-thermal. These processes produce a material, such as compost, that is sold and may also have an energy output. Digestion and hydrolysis are two examples of non-thermal technologies.

- Alternative Disposal Location — Transshipment to the Mainland. This alternative would have the waste material shrink wrapped at a facility in Honolulu, barged to the mainland, and disposed at a landfill there.

- Alternative Technology — Enhanced Recycling. Rather than recovering the energy content of the waste in a combustor, such as H–POWER, this alternative would institute additional recycling programs to remove the materials from the waste stream. The City has characterized the H–POWER plant as “recycling to energy” because it reuses the energy value of the waste as electricity.

8.4.1 City & County of Honolulu Requirements for Alternative Technologies

In its June 20, 2007 *Competitive Sealed Proposal for Alternative Technology* the City identified the following six minimum requirements (not applicable to the Alternative Disposal Location or for Alternative Technology — Enhanced Recycling): [11]

- “There exists at least one (1) operational facility processing municipal solid waste that over the past two (2) years has been operating at a rate of at least five hundred (500) TPD in which the Offeror or its design and operational members have been substantially

[11] City and County of Honolulu, Notice to Bidders, Project to Construct and Operate Alternative Energy Facility and/or H–POWER Facility. Competitive Sealed Proposals for Alternative Technology (CSP) NO. 037, 16 January 2007.

involved. Names, addresses, and phone numbers of persons that can be contacted at the facility or at the agency responsible for the facility shall be provided.

- Such facility has been operated successfully for the past two (2) years and has been fully operational eighty five percent (85 percent) of this time while meeting all performance and environmental compliance requirements.

- The facility without major modification or equipment changes, other than for the acceptable application of good engineering practice for scale up or scale down, would substantially represent the system proposed for Honolulu.

- The product produced at the facility has for the past two (2) years been marketed and resulted in the beneficial reuse of energy. The Offeror shall provide descriptions and documentation of the beneficial reuse such as, operating reports, weight records, names of purchasers, revenues from sales, etc. in sufficient detail to demonstrate fulfillment of this requirement. For example, producing steam for steam sale is not as complex as producing steam for generating electric power. For an Offeror to be able to claim an ability to contract for electric power to a utility, the Offeror must demonstrate that it has power purchase contracts on going and that the utility or energy customer, to which the power is to be sold, provides evidence in writing that it shall enter into a power purchase contract based on its understanding of the proposed facility's ability to produce such power. If energy sales at existing facilities are not comparable to those proposed, anticipated revenues shall not be included in the Offeror's Price Proposal. Research and development projects or similar efforts that have not resulted in a contracted marketed product with actual sales are not acceptable and shall not be included as Revenue in the Offeror's Price Proposal. For the Options proposed, the selected Offerors shall participate with the City in the development and maintenance of the Power Purchase Agreement (PPA) between the City and the Utility similar to the PPA included as Appendix D of the Contract Documents. In order to assure a good understanding of the Hawaiian Electric Co., Inc. service requirements, the Offeror shall complete and submit Sections 1 and 2 of Attachment 'A' as part of its Proposal. In addition, the selected Contractor shall be required to enter into an Interconnection Requirements Study Agreement as provided for in Attachment 'B'. Attachment 'C' Sample Information on Performance Requirements is provided as information for the bidders. The specific values for these performance parameters would be finalized in the course of the PPA negotiations. It is understood that the selected Contractor shall be responsible for the payment of all cost required for the development of and adherence to conditions of the Power Purchase Agreement and those of Attachments 'A', 'B' and 'C' of this Notice to Bidders and for the payment of all penalties for non performance due to Contractors fault associated with these Contract Documents.

- The proposed Facility shall be commercially available such that: (1) The design is proven and the proposed facility is not the first of its kind; (2) The equipment proposed has operated successfully at least eighty-five percent (85 percent) of rated capacity while at the same time operating for at least eighty-five percent (85 percent) of the time during the past twenty-four (24) month period; (3) The equipment is regarded as being reliable and not subject to excessive maintenance, operational problems, or requires major re-designs; (4) The facility has processed a minimum of five hundred (500) TPD of municipal solid waste while operating in accordance with all environmental permits.

- Certification that the ash slag and residue by products from the proposed facility have met all environmental requirements for either marketing or landfill disposal including passage of the [Toxicity Characteristic Leaching Procedure (TCLP)] test and classification as non-hazardous materials, or, if deemed hazardous certification from the final disposal site that materials have been properly disposed of and how it would be disposed of for this project."

8.4.2 Summary of Alternative Evaluation

Each of the technology and non-technology alternatives is compared either to criteria that the City has published or to general criteria that came out of this evaluation. This section summarizes the results of the comparison of the alternatives to the Project, which is the construction and operation of H–POWER Unit #3.

The following two tables summarize the comparison of the alternatives to the Project. In Table 8.4-1 Comparison of Compliance of Alternative Technologies to City's Criteria, the alternative technologies are compared to the City's criteria for alternatives, which it has published in its Notice to Bidders released on January 22, 2008. Only one technology, EfW, satisfies all of the criteria. One other, Gasification/pyrolysis, satisfies one of the criteria, but none of the others. A criterion was indicated as "ND" if the technology vendor did not satisfy the threshold criteria of having an operating facility for two years processing 500 TPD of MSW. "ND" was not determinable.

Table 8.4-1 COMPARISON OF COMPLIANCE OF ALTERNATIVE TECHNOLOGIES TO CITY'S CRITERIA

Technology	Criterion and Note #						
	1	2	3	4	5	6	7
	One Facility Operating for 2 Years	500 TPD	85% Capacity	85% of time	Products Marketed	Compliance	Residue
EfW	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Anaerobic Digestion	No	No	ND	ND	ND	ND	ND
Aerobic Digestion	No	Possibly	ND	ND	ND	ND	ND
Hydrolysis	No	No	ND	ND	ND	ND	ND
Plasma Arc	No	No	ND	ND	ND	ND	ND
Gasification/Pyrolysis	Yes	No	ND	ND	ND	ND	ND

ND — not determinable
Notes:
1 The vendor has at least one facility that has been operating for two or more years processing MSW and has also met criteria 2 though 7.

2. The technology processes 500 TPD of MSW or more
3. The technology operates at 85 percent of the rated capacity.
4. The technology operates 85 percent of the time, that is has 85 percent availability.
5. Products produced are marketed. The products can range from electricity, steam, a gaseous fuel, and MSW compost.
6. The technology has operated in compliance with all environmental regulations.
7. The residue and by-products meet environmental requirements for marketing or landfilling.

In Table 8.4-2 Comparison of Other Alternatives, the other four non-technology based alternatives are compared to the Project based on the greenhouse gas emissions and need for imported oil. These alternatives were the only ones compared in this table because none of the technology alternatives met the City's criteria except EfW, which is the Project for the purposes of this analysis. None of the alternatives in Table 8.4-2 results in an improvement in either greenhouse gas emissions or importation of oil.

Table 8.4-2 COMPARISON OF OTHER ALTERNATIVES WITH RESPECT TO PROPOSED PROJECT

Alternative	Criterion and Note #	
	1	2
	GHG Emissions	Imported Oil
No Project	Increased	Increased
Delayed Project	Increased	Increased
Enhanced Recycling	ND	Increased
Transshipment	Increased	Increased

Notes:

1. GHG Emissions refers to whether the greenhouse gas emissions would be increased (detrimental or negative effect) or decreased (beneficial or positive effect) with the alternative as compared to the Project.
2. Imported oil refers to whether the need to import oil for energy production would be increased (detrimental or negative effect) or decreased (beneficial or positive effect) with the alternative as compared to the Project.

Enhanced recycling is indicated as a "ND" for greenhouse gas emissions because the calculation depends on the truck trips and the GHG benefits from recycling the materials, and this information is not known.

8.4.3 Energy from Waste

There are two general approaches to EfW - Mass Burn and RDF. In a RDF plant (the existing H-POWER facility is an RDF plant), MSW is processed through shredders and screens, through which dirt, glass, and other recyclable and non-combustible materials are sorted out. The remaining material is combusted, resulting in the creation of ash, RDF processing residue, and steam used to generate electricity. Metals are separated in the pre-combustion processing and from the ash post-combustion and are recycled.

Mass burn plants combust MSW without pre-processing. Waste is introduced into the furnace after being unloaded from the collection vehicle. The waste combustion creates steam, which is used to make electricity. By-products are ash and residual waste. Metals are separated from the ash and are recycled.

The project host and technology vendor are responsible for the disposal of ash and residual waste.

H-POWER extracts ferrous metals from the waste using magnets and non-ferrous metals from the ash using an eddy current separator. Approximately 18,600 tons of ferrous metals and 2,100 tons of non-ferrous metals were recycled in FY 2006. The sale of ferrous and non-ferrous metals generated approximately $1.5 million in that fiscal year.[12]

Additionally, H-POWER reduces the island's dependence on imported oil. One ton of trash produces saleable energy equivalent to 60 gallons of imported oil.

8.4.4 Other Jurisdictions Using Waste to Energy

EfW is a proven technology with facilities found throughout the United States and in many areas of the world. Covanta, the operator of H–POWER, owns and/or operates plants in Alabama, California, Connecticut, Florida, Indiana, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New York, Oregon, Pennsylvania, and Virginia. EfW plants have been operating for more than 75 years in some areas of the world.[13]

8.4.5 Consistency with City Requirements

EfW is consistent with the City requirements.

8.5 Non-Thermal Technologies

For the purpose of this report, non-thermal processes are defined as those that primarily produce a solid material, such as MSW compost, which is then marketed. Non-thermal technologies included in this analysis are digestion and hydrolysis.

[12] Department of Environmental Services. http://www.opala.org/solid_waste/archive/How_our_City_manages_our_waste.html#hpower. 24 July 2008.
[13] Covanta Holding. http://www.covantaholding.com/. 21 July 2008.

8.5.1 Anaerobic Digestion

Anaerobic digestion is the decomposition of MSW without the introduction of oxygen. End by-products tend to be liquid, gas, and solid materials. The organic fractions of MSW are converted into single-celled proteins, which can be used for compost and fertilizers. Due to the length of time anaerobic digestion takes, a significant amount of land is required to process the amount of MSW the City requires of an alternative technology.

8.5.1.1 Other Jurisdictions Using Anaerobic Digestion

Currently the only ArrowBio facility in operation is at the Hiriya transfer station. ArrowBio plans to build a 500 TPD plant in Mexico [14]. A 90,000 TPY facility that is part of Australia's Macarthur Resource Recovery Park at the Jack's Gully landfill site opened its doors on July 4, 2008.[15] [16]

8.5.1.2 Consistency with City Requirements

The anaerobic digestion facilities do not meet the City's requirements:

- The existing facilities either process less than the City's minimum waste stream (the existing ArrowBio facility 210 TPD of MSW, 290 TPD less than what the City requires) or they process source-separated organics.[17] ArrowBio could use multiple units to meet the City requirement.

- The facility design for the ArrowBio is the first full size facility.

- There is no proven market for the MSW compost product.

8.5.2 Aerobic Digestion

Aerobic digestion is the decomposition of MSW with the introduction of air. Examples of aerobic digestion include Converted Organics (formerly Mining Organics)[18], Real Earth Technologies, and Herhof Environmental's MBT Process. Due to the lack of readily available information about both Converted Organics and Real Earth Technologies, a generic explanation of Herhof Environmental's MBT Process is included in Appendix F. Different companies use different approaches and equipment, but produce similar products.

[14] Oaktech Environmental. http://www.oaktech-environmental.com/news.htm, 18 July 2008.
[15] WSN Environmental Solutions. http://wasteservice.nsw.gov.au/. 18 July 2008.
[16] Marshall, A.T. and Morris, J.M., "A Watery Solution," Chartered Institute of Waste Management Journal, August 2006.
[17] *Evaluation of New and Emerging Solid Waste Management Technologies,* New York City Economic Development Corporation and New York City Department of Sanitation, 16 September 2004.
[18] Mining Organics merged with/bought out by Converted Organics in February 2006. 21 July 2008.

8.5.2.1 Other Jurisdictions Using Aerobic Digestion

Composting of kitchen, food, and green waste scraps is well established in Europe. Germany has more than 500 biochemical treatment facilities processing more than eight million TPY of food and green wastes; the majority of those facilities are aerobic compost facilities. However, these facilities are not processing MSW.[19] Vancouver, Canada has a 30 TPD demonstration plant by Herhof in operation processing separated food and other organic wastes.[20] There are currently seven commercial MSW Herhof plants in operation in Germany, Belgium, and Italy, with one proposed for the United Kingdom that will use the solid fuel produced by the MBT Process in a combustion plant. In 2009, Herhof plans to open a 160,000 TPY MSW facility in Larnaka, Cyprus and a 40,000 TPY CI&I facility in Athens, Greece.

8.5.2.2 Consistency with City Requirements

None of the Herhof Environmental plants have been in operation more than two years processing more than 500 TPD of MSW. However, Herhof Environmental states their MBT Process is capable of processing up to approximately 1,095 TPD.[21]

8.5.3 Hydrolysis

Hydrolysis is a chemical reaction in which water and another substance react, forming two or more new substances. With the hydrolysis of MSW, the reaction is between water and the cellulose fraction of the wastes to produce sugars. To obtain the cellulose fraction of the MSW, glass, metals, and other inorganic materials must first be removed.

Several types of hydrolysis technologies exist. The description by BlueFire Ethanol, Inc. (formerly Arkenol Fuels) is provided in Appendix F as an example for discussion. Another technology is the Masada Oxynol process.

8.5.3.1 Other Jurisdictions Using Hydrolysis

There are no hydrolysis facilities currently in operation that process MSW as feedstock and none are the size the City requires.[22]

8.5.3.2 Consistency with City Requirements

Hydrolysis is inconsistent with the City requirements because there has not yet been a successful facility at the size required by the City operating on MSW.

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[19] Oaktech Environmental, http://www.oaktech-environmental.com/, 11 March 2008.
[20] *Evaluation of New and Emerging Solid Waste Management Technologies,* New York City Economic Development Corporation and New York City Department of Sanitation, 16 September 2004.
[21] Herhof Environmental. http:// www.herhof.com/en/. 21 July 2008.
[22] Interstate Waste Technologies, http://www.iwtonline.com/. 21 July 2008.

8.6 Thermal Technologies

Thermal or combustion technologies produce a significant amount of heat which can be turned into energy. During the processes, both organic and non-organic materials are combusted while the non-combustible materials can be recycled either before or after combustion. Common thermal technologies are gasification, plasma arc, hydrolysis, pyrolysis, and combustion. Examples of thermal technologies include those listed below. Some of these companies may no longer be providing service.

- Covanta Energy — the City's H-POWER facility.
- Rigel Resource Recovery — Westinghouse Plasma Arc Gasification.
- Dynecology — Gasification with Briquetting of Refuse Derived Fuel (RFD)/Coal/Sewage Sludge.
- International Environmental Solutions (IES)—Advanced Pyrolysis Systems
- EBARA Corporation — Fluidized Bed Gasification with Ash Vitrification.
- GEM America — GEM Thermal Cracking Technology (Gasification).
- Global Energy Solutions — Thermal Converter Technology (Gasification and Vitrification).
- Interstate Waste Technologies — Thermoselect Gasification.
- Pan American Resources — Destructive Distillation Lantz Converter.
- Pratt Industries/VISY Paper (RDF).
- Comprehensive Resources, Recovery, & Reuse, Inc. (RDF).
- Takuma Mass Burn Renaissance System.
- Resource Recycling, L.L.C. (Mass Burn).

H-POWER technology is discussed in its own section since it is a proven technology that is currently in use by the City.

8.6.1 Plasma Arc

This technology uses large carbon rods in a sealed vessel to generate a high temperature arc that converts the materials in the vessel into plasma (ionized gas). Heat generated by the arc melts the inorganic fractions into a running slag (that can appear like glass) and vaporizes the organic fractions, which become a synthetic fuel gas. The glass can be disposed in a landfill or may be used for beneficial purposes, such as for replacement of imported sand for sand blasting. The synthetic gas is cleaned and burned to produce power.

8.6.1.1 Other Jurisdictions Using Plasma Arc

Currently, there are two operating plasma arc facilities that process MSW. The longest running one and the only one that is not a demonstration plant is the Eco Valley Utashinai facility located in Utashinai, Japan. The facility processed more than 270 TPD of MSW and 130 TPD of automobile shredder residue and generated approximately 4,400 kWh of salable energy in fiscal year 2005.[23]

The City of St. Lucie, Florida has been in negotiations for a plasma arc facility. The Georgia-based company, Geoplasma, has agreed to build and operate the facility and claims at full capacity, the facility will process 2,000 TPD of MSW and 1,000 TPD of MSW mined from a landfill while producing 120 MW of electricity.[24]

Geoplasma has agreed to build and operate the facility, estimating that within the next 15 to 18 years the facility will have disposed of all the current waste in the landfill. Ron Roberts, the Assistant Solid Waste Director in St. Lucie, estimates the plant will be finished within 25 to 30 months.[25]

A second plasma plant operating on MSW started operation in late January 2008 in Ottawa, Canada. It is a demonstration project that is designed to processes 85 TPD. The information about the plant was obtained from news sources[26], which stated:

> "A demonstration waste-to-energy plant in Ottawa has finally turned its first load of trash into power…
>
> … The $27 million plant uses a process called plasma gasification to decompose waste under high heat and low oxygen into a gas mixture called syngas, and a glass-like material that can be turned into asphalt or concrete….
>
> Once the plant is running at full capacity, it is to divert 85 tonnes of waste a day from the city's landfills while generating enough electricity to run the facility and power 3,600 homes….
>
> Plasco hopes its demonstration plant in Ottawa will persuade other cities to buy the technology….
>
> Construction of the plant started in September 2006. It was to run as a two-year pilot project."

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[23] Shigehiro, Michiaki, General Manager of Eco Valley Utashinai.

[24] Sladky, Lynne. "Florida county plans to vaporize landfill trash." USA Today. September 9, 2006 and Margasak, Gabriel. "Trash zapper in St. Lucie County gets shot in arm from Crist", TCPalm, 10 November 2007.

[25] Miller, Dan. "State-of-the-art plant makes trash vanish into thin air." County News Online. National Association of Counties, Washington, D.C., 2 October 2006.

[26] Information from http://www.cbc.ca/technology/story/2008/02/07/ot-plasco-080207.html, 24 July 2008.

The PLASCO plant was partially funded by the Canadian government.

> "This brings to over C$90 million the equity invested in PlascoEnergy since August 2005. The Company had nominal debt and a modest cash position prior to this issue, and is well funded for development of commercial facilities next year," said Rod Bryden, PlascoEnergy President and CEO. "Commitment of funding from Sustainable Development Technology Canada ('SDTC') to the Ottawa demonstration project was a key factor in bringing the PlascoEnergy technology to reality and to attracting private capital that will fund its future commercial use around the world. SDTC has committed a non-repayable contribution of C$9.5 million," he said.[27]

In June 2008 the City of Ottawa and Plasco Energy agreed to a letter of intent for the company to build a 400 tonne per day commercial-scale plant in Ottawa.

8.6.1.2 Consistency with City Requirements

Currently, plasma arc technology does not meet the City requirements. The Eco Valley Utashinai facility processes 270 TPD of MSW, 230 TPD short of the City requirements. The Ottawa facility, at 85 metric TPD and with less than two years operation, is also short of the City requirements. In addition, as shown in Table 10, Operating Information and expressed in the company's online literature, the Ottawa facility is intended to be a demonstration plant with the full scale facility to be constructed

These facilities are the only ones operating on MSW.

Plasma arc does not meet the City's requirements.

8.6.2 Gasification/Pyrolysis

Gasification is the process of reducing MSW to a synthesis gas. Pyrolysis is similar to gasification and often considered a type of gasification technology. The by-products of gasification are syngas and vitrified material (slag) and pyrolysis by-products are solid carbon and liquid fuel. Pyrolysis generally takes place during the first steps of gasification. Examples of gasification technologies are as follows. Some of these companies may no longer be providing the service.

[27] Information from PLASCO new release dated December 12, 2007, http://www.plascoenergygroup.com/?News/23/2007-12-03:First_Reserve_leads_PlascoEnergy_equity_funding, 22 July 2008. Information about the expanded plant accessed on October 30, 2008 at http://www.zerowasteottawa.com/en/.

- Dynecology—Gasification with Briquetting of Refuse Derived Fuel (RDF)/Coal/Sewage Sludge.
- International Environmental Solutions (IES)—Advanced Pyrolysis Systems
- EBARA Corporation—Fluidized Bed Gasification with Ash Vitrification.
- GEM America—GEM Thermal Cracking Technology (Gasification).
- Global Energy Solutions—Thermal Converter Technology (Gasification and Vitrification).
- Interstate Waste Technologies—Thermoselect Gasification.
- Pan American resources—Destructive Distillation Lantz Converter

8.6.2.1 Other Jurisdictions Using this Technology

Global Energy Solutions has 14 facilities in operation in Japan, Asia, and Europe. Two facilities operating in Japan process solely MSW.

Since the start-up of the Aomori, Japan plant in 2000, EBARA has since opened nine TwinRec gasification facilities in Japan and one in Kuala Lumpur, Malaysia. None of these plants process the amount of waste required by the City, but the plant in Kawaguchi City is close.

Interstate Waste Technologies has the following facilities:[28]

- Fondotoce, Italy, operated the demonstration Thermoselect facility for six years, with commercialization commencing in 1994, from 1992-1998. The plant was decommissioned in 1999.
- Karlsruhe, Germany, operated a Thermoselect facility from 1999 until 2004, when it was closed due to “general business strategy decisions.” The facility processed 225,000 TPY of waste from surrounding towns and rural districts.
- Currently, seven Thermoselect facilities are operating in Japan. Three of the facilities operate on MSW. Commercialization of the Matsu facility began in 2003 and currently processes 140 TPD. The Nagasaki and Tokushima facilities commenced operations in 2005, with the Nagasaki facility processing 300 TPD and the Tokushima facility processing 120 TPD of MSW.

[28] http://www.iwtonline.com/docs/Thermoselect_process_description.pdf, 21 July 2008.

8.6.2.2 Consistency with City Requirements

Global Energy Solutions' Thermal Converter technology might be consistent with the City requirements; there is no information readily available regarding how long either of the two MSW facilities in Japan have been in operation. This residual by-product requires a market that is not proven on O'ahu.

Interstate Waste Management's Thermoselect technology is inconsistent with the City requirements. Although there are seven Thermoselect facilities in Japan, only three operate on MSW, none at the size the City requires (the Matsu facility processes 140 TPD, the Nagasaki processes 300 TPD, and the Tokushima facility processes 120 TPD.) All those listed here have been in operation for more than two years. The market for the metal pellets and vitrified granulate by-products would have to developed on O'ahu.

EBARA has a plant that processes 462 TPD that has been operating for 6 years. It might be an alternative if the cost is reasonable. In a tour of the facility in early July 2008, a question was asked about the cost and the response indicated that they do not discuss cost, but also do not propose in many areas of the US because the market does not support the project cost. [29]

8.7 Expanded Recycling

Expanding current recycling infrastructure within the City would not eliminate the need for expanding H–POWER; however, expanded programs would decrease the amount of materials sent for disposal. The recycling programs cannot handle all the materials in the MSW. As a result, expanded recycling is not a viable alternative to Expansion of H–POWER.

The expanded recycling could include expansion of the number of sites that accept materials from the HI5 beverage container program, addition of more sites to the school drop-off program, increasing the frequency of curbside collection of residential green waste, and adding a program to collect other recyclables from residences at the curb.

The City conducted a pilot three-bin curbside program with once-per-week solid waste collection and once-per-week recycling collection, alternating between recycling and green waste. The residents in the pilot locations, Mililani and Hawaii Kai, were generally successful at separating their recyclables and green waste from the solid waste bins and reducing their overall weekly disposal. Most neighborhoods still have twice-per-week solid waste collection and bi-weekly green waste collection, but the three-bin service was extended to other communities on a rolling basis beginning in November 2008. The program is set to be offered island-wide by May 2010. [30]

If the expanded recycling program achieves the higher level of penetration evaluated, it is expected to divert 35,000 tons of recyclables and 60,000 tons of green waste from the landfill. According to the City's Integrated Solid Waste Management Plan (CCH, 2008a), even

[29] Personal communication with Paul Philleo, Chief of the Sacramento County Department of Waste Management and Recycling.
[30] City and County of Honolulu, Curbside Recycling Pilot Program Evaluation, June 2008.

considering Enhanced Recycling and assuming that 300,000 tons of MSW will be recycled into electric power by H–POWER Unit #3, there will still be over 100,000 tons per year of waste requiring landfilling in addition to ash and RDF processing residue from H-POWER. Thus, Enhanced Recycling is not a viable alternative to the Proposed Expansion Project.

8.7.1 Consistency with City Requirements

Expanded recycling is consistent with the City's plans, but cannot provide the same diversion from landfilling as H–POWER Unit #3. As noted above, even with Enhanced Recycling, there is a need to landfill more than 400,000 tons of MSW per year into the future unless H-POWER is expanded by the addition of Unit #3.

8.7.2 City Study on Recycling Alternative

The City has recently compared the environmental and economic impacts of materials recycling of wastepaper to produce new products and energy recycling of wastepaper to produce electricity at Honolulu's existing H-POWER facility. In 2007, the City contracted with R. W. Beck, Inc. (R.W. Beck, 2007) to prepare this limited comparison. The report does not consider energy recovery of waste paper from the proposed Expansion unit at H-POWER. The study considers the existing units at H-POWER. It assumes the disposal and collection of waste paper with mixed MSW, the processing of mixed MSW (containing waste paper) to prepare RDF, and the combustion of RDF to produce electricity in the existing Units 1 and 2 at H-POWER. The report is discussed here to provide general insight into the Expanded Recycling Alternative to the proposed Expansion.

According to the R.W. Beck report (2007):

> "The study analyzes selected impacts associated with managing 73,555 tons of wastepaper as was recycled in Honolulu during 2005." [R.W. Beck (2007)]
>
> "To provide a balanced analysis, the scenarios were analyzed in two distinct ways:
>
> - First, a variety of environmental and economic impacts accruing on the Island of O'ahu were estimated directly; and
> - Second, global life-cycle energy and greenhouse gas impacts accruing both on- and off-Island were estimated using the Waste Reduction Model (WARM), developed by the U.S. Environmental Protection Agency (EPA)." [R.W. Beck (2007)]

The conclusions of the R.W. Beck (2007) report are presented below:

> "If only on-island impacts are considered, energy recycling (i.e., H-POWER) provides greater energy and greenhouse gas benefits compared to materials recycling. However, if off-island impacts and on-island impacts are considered, materials recycling has greater benefits. The off-island energy and greenhouse gas benefits associated with substituting recycled paper for wood pulp to manufacture paper products are greater than the on-island H-POWER benefits." [R.W. Beck (2007)]

"Managing wastepaper using both materials recycling (i.e., remanufacture into paper products) and energy recycling (i.e., H-POWER) yield environmental benefits. Both approaches reduce environmental impacts that would have occurred had the materials not been recycled for materials or energy recovery. Specifically:

- Generating electricity from the combustion of wastepaper at the H-POWER facility provides energy benefits by offsetting the need to generate electricity through combustion of fuel oil. This type of power generation benefits Honolulu directly by reducing fuel costs and air emissions associated with burning fuel oil; and

- Materials recycling of wastepaper yields energy benefits because it provides alternative raw material to paper manufacturers, thereby reducing the need for logging and production of "virgin" pulp products. In contrast to the energy benefits of H-POWER, materials recycling energy benefits accrue off-island, where wood pulp and paper products are produced." [R.W. Beck (2007)]

"Materials recycling creates more on-island jobs than energy recycling (i.e., H-POWER). However, H-POWER generates greater overall economic value for the Honolulu economy, resulting in a larger increase in business activity from providing products and services to HPOWER." [R.W. Beck (2007)]

8.8 Transshipment Off-Island

The transshipment of waste involves securely containing the MSW, shipping it to the mainland and disposing of it at a mainland landfill. On August 23, 2006, the US Animal and Plant Health Inspection Services (APHIS) announced its decision to allow the transshipment of MSW to the continental United States from Hawaii.[31] Transshipment will be allowed only under certain circumstances. Wastes by federal regulation that would be restricted from transshipment are, hard-to-handle wastes, such as white goods, sewage sludge, auto fluff, and precluded materials such as green and agricultural wastes (more than three percent of the bale weight). The announcement is attached as Attachment A to Appendix F.

On January 22, 2008 the City provided a notice to bidders that it would entertain proposals for transshipping waste to the mainland for disposal as an interim measure for several years before the proposed Expansion is completed. The City has received bids from three transshipment firms: the cost was $99.83 per ton from Hawaiian Waste Systems, $184.47 per ton from Simcoe Environmental Services Inc., and $204.21 per ton from Off-Island Transfer.[32] The companies proposed sending O'ahu's waste to Washington State to the Roosevelt Landfill or to a landfill in Idaho. If the City were to begin transshipping O'ahu's waste, the vendors would have to comply with requirements for the handling and storage established by the federal government in the Compliance Orders, with state regulations for handling and processing the MSW, and with local land use permitting requirements. One of the potential transshipment vendors has approved Compliance Orders for the Hawaii and mainland operations and a permit for the transfer station

[31] Federal Register volume 71, number 163, published 23 August 2006.
[32] Laurie Au. "City Reviews Bids to Ship O'ahu Trash." Star Bulletin on the Web Vol. 13, Issue 171. 19 June 2008. (23 July 2008) http://starbulletin.com/2008/06/19/news/story08.html.

to shrink wrap and transfer the waste. The City would also need to look at the effects of transshipment on H-POWER over the long term. With the shipment of O'ahu's waste off-island, waste disposed in H-POWER may be reduced and revenue from the energy sold would diminish.

The City's review of the transshipment proposals was delayed due to a protest filed against Hawaiian Waste Systems. The other two bidders challenge the bid of Hawaiian Waste Systems, whose bid was half the cost of their proposals.[33] A statutorily-mandated stay on award of the bid is in effect while the City reviews the protests.

8.8.1 Other Jurisdictions Using Transshipment

Shipment of MSW using shrink-wrap has been used in New Jersey and other areas of the US. It has been used in Europe for as long as 10 years. The Roosevelt Landfill in Washington receives MSW, not only from Washington State, but also from Oregon, Canada, Idaho, and Alaska.[34] Canada has transshipped its MSW to Michigan landfills for many years, while New York is in the process of transshipping its MSW to North Carolina. Most of these operations do not use the shrink-wrap technology.

APHIS determined, with its acceptance of transshipment of MSW stateside from Hawaii, that transshipment could occur from both O'ahu and the island of Hawaii once contracts and compliance agreements have been set up in Hawaii.

8.8.2 Consistency with City Requirements

The City guidelines regarding the transshipment of MSW off-island are listed in section 4.7.1 in Appendix F, which were summarized from the Notice to Bidders released on January 22, 2008.

Not all waste can be shipped off-island. Items such as flocked Christmas trees, sewage sludge, auto fluff, out of date medicines, and other hard-to-handle wastes cannot be shipped without special arrangements to dispose of these materials. The shipping alternative only accepts materials from a specific waste stream and does not eliminate the need for a landfill.

8.9 Sites

This section discusses the project site. The site could be a new location (a Greenfield site), not currently used as a waste processing plant. The project location could be in Campbell Industrial Park. Since the space and access needs for an EfW plant site are similar to a landfill, the sites located as replacements for the Waimanalo Gulch Sanitary Landfill could be considered as potential sites for this Expansion.

[33] Peter Boylan. "Firm Claims City Pressured on Bids to Ship Trash." Honolulu Advertiser on the Web 11 July 2008. (23 July 2008)

[34] Washington State Department of Ecology, Solid Waste and Financial Assistance Program, "Solid Waste in Washington State Fifteenth Annual Status Report", December 2006.

The environmental, operational, and infrastructure considerations would be the same, whether the potential site were in Campbell Industrial Park or in another area of the island. Comparing a new site to use of the proposed location on the H–POWER property highlights important advantages in using the current H–POWER property rather than a new site.

8.10 Preferred Alternative

Several of the alternative technologies, the continued use of the Waimanalo Gulch landfill, and the transshipment alternative show promise to offer the City an alternative option to the Expansion of H-POWER at the project site.

A viable alternative must meet several considerations:

- It needs to provide for the health and safety of Honolulu residents and visitors by properly managing the waste produced on the island.

- Because of the complexity of the siting requirements in Hawaii, the high degree of public interest and input into any siting process, the environmental clearances needed, and the permitting process, a significant amount of time (some say up to 10 years for a new landfill site or new alternative technology) may be needed for an alternative to become operational.

Expanding the H-POWER facility with technology proven over the long-term shows the most promise in reducing the amount of waste sent to the landfill while producing electricity. Expansion of H-POWER at the existing project site is the Preferred Alternative.

8.10.1 Expansion of H-POWER at the Project Site

EfW, such as H-POWER, is a technology of choice due to the direct benefits of energy production and reduction in disposal. Approximately 90 percent of the residential garbage and 77 percent of the commercial waste collected on O‘ahu is disposed at the H-POWER facility and is converted into energy that powers approximately 45,000 homes.[35] Combusting 90 percent of the garbage that goes through the H-POWER facility means only one-tenth, by volume, remains to be landfilled. Expanding the H-POWER facility would be the most beneficial to the City in reducing the amount of waste sent to the landfill.

8.10.2 Landfill Disposal at Waimanalo Gulch Landfill

The Waimanalo Gulch Sanitary Landfill is the only alternative currently available to dispose of MSW and H–POWER ash and RDF processing residue. The Waimanalo Gulch Sanitary Landfill has capacity to handle MSW for at least 15 years. The site is providing that service today.

[35] City and County of Honolulu Department of Environmental Services. Solid Waste Integrated Management Plan. Updated: November 2007. Table 63a, Table 63b and Table 2-7.

However, reducing landfill disposal is one of the goals of the project. Continued use of the Waimanalo Gulch Sanitary Landfill does not accomplish that goal.

8.10.3 Transshipment

Transshipment of waste transfers the responsibility for stewardship of the land to the mainland landfill that disposes of the transshipped waste. However, transshipment does offer the City a short term alternative for reducing the material being sent to the Waimanalo Gulch Sanitary Landfill for disposal

While transshipment offers an alternative for some of the MSW, there are parts of the waste stream that cannot be shipped due to federal restrictions; some items cannot be accepted due to the process used, and financial and solid waste management considerations that may limit transshipment to a select portion of the waste stream. The expansion of H-POWER offers long term benefits of energy production and reduction in landfill disposal not offered by transshipment.

In addition to the other disadvantages of transshipment, that activity produces much higher greenhouse gas emissions than taking the waste to H–POWER. H–POWER results in a reduction in island-wide greenhouse gas emissions (or negative emissions) of 38,883 metric tons per year of CO_2 equivalent compared to a positive generation from transshipment of 48,120. See Appendix F for additional references and calculations.

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9.0 SUSTAINABILITY ANALYSIS

Consistent with HRS Chapter 343 and the rules for implementing the Hawaii environmental review process, CHRRV and the City and County of Honolulu have undertaken a sustainability analysis of the proposed Expansion. Sustainability is defined for the purpose of this analysis as an assessment of short-term uses versus long-term productivity. A similar definition is offered by the United Nation's Department of Economic and Social Affairs – Division for Sustainable Development: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (UN 2005) As discussed in Chapter 1 of this EIS, CHRRV and the City and County of Honolulu believe that there are substantial advantages to the construction of a third MWC at the existing H-POWER facility, with attention to both short-term uses and long-term productivity. These short-term and long-term uses, benefits, and productivity issues are discussed below.

9.1 Short-Term Uses and Long-Term Productivity

As described in greater detail within Section 5.6, the demand for suitable solid waste disposal options continues to increase, both on O'ahu and nationwide. Short-term, the options for increasing waste disposal capacity are very limited, consisting primarily of continuing to dispose of solid waste at existing landfills that are reaching capacity, and disposal of waste at the existing H-POWER facility, which is also operating at capacity. Thus, current disposal options are not sustainable for either the short-term or long-term and for these reasons the City and County of Honolulu began examining solid waste disposal options for the future. The analysis was, and continues to be, conducted in terms of an integrated approach, with the proposed Expansion representing one facet. That integrated approach includes:

- Expansion of landfill capacity;
- Expansion of the H-POWER facility; and
- Expansion of recycling and composting programs.

One additional "short-term" option, discussed in Chapter 8 as part of the detailed alternatives analysis, could involve the shipment of waste to off-island locations for disposal via landfilling. From a sustainability perspective this solution would bring greater uncertainty in ensuring disposal of solid waste, both short and long-term, and would decrease the amount of control that O'ahu has over its solid waste destiny, for the following reasons:

- As of the writing of this EIS, a transshipment contractor has not been selected by the city.
- Disposal would involve an added layer of transportation. This adds an element of uncertainty regarding the timely disposal of wastes, which would be subject to potential shipping issues, such as weather, future ports and harbors environmental or homeland security concerns, or labor agreements or disputes. Once again, decisions are tied and to, and ultimately made by, off-island decision-makers.
- Should problems beyond the control of O'ahu decision-makers occur, a back-up plan could be challenging and extremely costly. An on-island alternative would not be

available in the short-term due to the time needed for site acquisition proper permitting and engineering of solid waste disposal facilities.

The off-island option of waste disposal would therefore not ensure that O‘ahu residents could meet their future solid waste disposal needs. The proposed Expansion of H-POWER offers continued local control, reliable solid waste disposal and predictable disposal costs. In addition, the Expansion brings the added benefit of increasing the supply of reliable renewable energy available to the island. This is discussed in greater detail in Section 5.7, and represents a key factor in Hawaii’s ability to reach state-defined renewable energy goals, which is an important consideration in a sustainability analysis.

9.2 Conclusion

The short-term and long-term solid waste solution for O‘ahu will likely be a combination of the three existing on-island initiatives, along with continued examination of new technologies and other options. None of the current solutions is mutually exclusive; together they provide an integrated approach to solid waste management for the island of O‘ahu that meets the needs of the present without compromising the ability of future generations to meet their own needs. This tiered approach to managing O‘ahu’s solid waste consists primarily of:

- Reducing the quantities of waste generated, through source reduction, composting and recycling;
- Maximizing the reliable production of sustainable, renewable energy from waste, while minimizing the quantity of waste that is landfilled; and
- Maintaining an on-island landfill, to provide disposal options that are within local control to manage appropriately.

This integrated approach to solid waste management does not preclude the option of incorporating off-island options, or new technologies, once they are proven feasible and cost-effective.

10.0 CUMULATIVE AND SECONDARY IMPACTS

Consistent with HRS Chapter 343 and the rules for implementing the Hawaii environmental review process, CHRRV and the City and County of Honolulu have undertaken a review of the cumulative and secondary impacts that might result from the Expansion.
According to HRS Chapter 343:

> "Cumulative impact" means the impact on the environment 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.

> "Secondary impact" or "secondary effect" or "indirect impact" or "indirect effect" means effects which 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.

To best present this information, the potential for cumulative or secondary impacts is evaluated for impact to the natural environment in section 10.1, and then for impact to the human environment in section 10.2.

10.1 Cumulative and Secondary Impacts to the Natural Environment

The Expansion is located on the existing H-POWER site, originally named the Honolulu Program of Waste Energy Recovery to reflect the intent of its design and construction and the purpose of current operations at H-POWER. The H-POWER facility has demonstrated its effectiveness and reliability in disposing of solid waste, minimizing the need to divert waste to landfill, and simultaneously providing a source of renewable electricity to O'ahu. The Expansion is proposed to be co-located at the H-POWER site to minimize potential impact to the natural environment that might otherwise result from selection of an alternative site, particularly an undeveloped alternate site, or from increasing the landfilling of waste. By selecting the H-POWER site, the Expansion will utilize much of the existing facilities, further reducing potential impacts that might otherwise result from alternate sites or disposal options. Furthermore, the selection of the parcels to be used temporarily during construction also considered the fact that the parcels have previously been disturbed, are adjacent to H-POWER, and are currently owned by the City and County of Honolulu.

The primary consideration in assessing cumulative impacts is to assess the impacts of the proposed Expansion together with other past, present, and reasonably foreseeable future actions. The primary consideration in assessing secondary impacts is to assess impacts of the proposed Expansion on pattern of land use, population density or growth rate, etc;

The following is a brief summary of the potential cumulative and secondary impacts to the natural environment:

- Geology and Soils – Impacts, both temporary and permanent, are to previously disturbed areas. The cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future actions not significant. No significant secondary impacts will result because the project will not significantly affect the pattern of land use, population density or growth rate.
- Climate and Air Quality – Emissions will result, but the Expansion will be in compliance with appropriate regulatory standards that consider potential cumulative effects and will utilize air pollution control equipment to mitigate potential impacts. With mitigation proposed, no significant cumulative air quality impacts will result from the proposed project in conjunction with other past, present, and reasonably foreseeable future actions. With regard to global climate, there are significant positive cumulative impacts of the proposed project when considered in conjunction with other past, present, and reasonably foreseeable future actions. By off-setting the need to combust fossil fuels to generate electric power, the proposed Expansion in conjunction with the actions HECO will cause a significant positive cumulative impact on global greenhouse gas emissions. No significant secondary impacts will result because the project will not significantly affect the pattern of land use, population density or growth rate.
- Groundwater Resources/Hydrology – Additional water use and re-injection of cooling waters will be required and existing permit thresholds will be modified and existing infrastructure will be utilized. No significant cumulative or secondary impacts are expected from these actions.
- Biological Resources – Existing resources will be safeguarded and will be buffered during the temporary construction period. Furthermore, biologists will be on-call should the potential for impact to even transient protected species arise. With mitigation proposed, no significant cumulative or secondary impacts will result.

10.2 Cumulative and Secondary Impacts to the Human Environment

As noted above, the Expansion project is designed to be co-located at the existing H-POWER facility. For this reason the Expansion minimizes the need to construct additional public facilities or structures, such as expanded or new landfills and the water, sewer and roadways necessary to support such developments. The Expansion will not require changes to land use, and as noted above will utilize existing water and sewer infrastructure, with modifications to the existing H-POWER permit limits. Though the Expansion and the H-POWER facility are public facilities, owned by the City and County of Honolulu, they are designed to safely and reliably dispose of solid waste that would otherwise need to be disposed of elsewhere.

The primary consideration in assessing cumulative impacts is to assess the impacts of the proposed Expansion together with other past, present, and reasonably foreseeable future actions. The primary consideration in assessing secondary impacts is to assess impacts of the proposed Expansion on pattern of land use, population density or growth rate, etc;

The following is a brief summary of the potential cumulative and secondary impacts to the human environment:

- Archaeology, Historic, and Cultural Resources – No impacts are anticipated, and with proposed mitigation implemented, no cumulative impacts will occur. No significant secondary impacts will result because the project will not significantly affect the pattern of land use, population density or growth rate.
- Roadways and Traffic – Temporary impacts are expected as well as a minor increment to operational levels, however no significant permanent impact to roadway levels-of-service are projected and, with appropriate mitigation, even temporary impacts can be reduced to acceptable levels. Because there is considerable growth in the JCIP area, the slight increase in traffic from the proposed Expansion in conjunction with the increase in local traffic due to other past, present, and reasonably foreseeable future projects, minor cumulative impacts anticipated. No significant secondary impacts will result because the project will not significantly affect the pattern of land use, population density or growth rate.
- Noise – Temporary and permanent noise increments are projected, but no significant impacts are expected due to the existing industrial nature of the site and surroundings. When the noise from the proposed Expansion is considered in conjunction with the noise from the existing H-POWER facility and the other industrial facilities in JCIP, minor cumulative impacts are anticipated. No significant secondary impacts will result because the project will not significantly affect the pattern of land use, population density or growth rate.
- Visual Resources – There will be the temporary presence of construction equipment, but viewsheds from potentially sensitive areas will experience minimal permanent impacts. Negligible cumulative or secondary impacts are anticipated.
- Socioeconomics – A temporary boost to the area economy during construction is anticipated, but not enough to require significant secondary impacts to schools, housing, etc. A permanent increase of employment is negligible to overall economic measures. Negligible cumulative and secondary impacts are expected.
- Solid Waste – The proposed Expansion will cause a substantial improvement in the City and County of Honolulu’s ability to manage solid waste while minimizing landfill disposal. There will be significant positive cumulative effects of the proposed project on the lifetime of the Waimanalo Gulch Sanitary Landfill and the City’s overall waste management program. No significant secondary impacts will result because the project will not significantly affect the pattern of land use and is planned to account for increased solid waste due to increases in population.
- Energy – The proposed Expansion will result in an increased supply and reliability of a renewable source of electricity. The proposed Expansion when considered in conjunction with the electric power generation plans of HECO will cause significant positive cumulative effects. No significant secondary impacts will result because the project will not significantly affect the pattern of land use, population density or growth rate.

- Human Health – Emissions will result, but the Expansion will be in compliance with appropriate regulatory standards and will utilize air pollution control equipment to mitigate potential impacts. With mitigation proposed, no significant cumulative impacts will result when the emissions from the proposed Expansion are considered along with the emissions from other past, present, and reasonably foreseeable future actions. No significant secondary impacts will result because the project will not significantly affect the pattern of land use, population density or growth rate.

11.0 SUMMARY OF UNRESOLVED ISSUES

This section identifies those issues that remain unresolved at this time and discusses how such issues may be resolved in the future. This section also identifies the reasons for proceeding with the Expansion even in the event that all issues cannot be fully resolved.

11.1 Unresolved Issues and Potential Solutions

Review and analysis of the potential impacts and mitigation measures associated with the proposed Expansion indicates that the vast majority of potential impacts can and will be fully mitigated. This will be accomplished through the use of proper planning, construction mitigation, and compliance with the rules and regulatory policies that are in place to govern such impacts and to ensure protection of the natural and human environment. Accordingly, there are no unresolved issues.

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12.0 REFERENCES AND LIST OF PREPARERS

This chapter describes the sources of the information presented in this EIS, both in terms of authorship and bibliography. Section 12.1 is a summary of all references and citations and Section 12.2 identifies the people and firms responsible for preparation of the EIS.

12.1 References

The following information sources were used in the preparation of this EIS:

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12.2 List of Preparers

Table 12.2-1 lists the persons and firms who helped prepare the EIS.

TABLE 12.2-1 LIST OF PREPARERS

Name of Person	Firm	Qualifications	Responsibility
Brian Magee	AMEC	B.S. Chemistry M.S. Chemistry M.P.A. Public Administration Ph.D. Toxicology 25+ years experience	EIS Project Manager, Human Health Risk Assessment & Principal Author
Samuel Joshi	Covanta	B.S. Chemical Engineering M.S. Environmental Science M.B.A.; Public Policy Professional Engineer 16+ years of experience	Covanta Project Manager & Senior Reviewer
Robert Graham	Covanta	B.S. Mechanical Engineering M.B.A. 20+ years experience	Project Description & Engineering
Jeff Hahn	Covanta	B.S. Engineering M.S. Chemical Engineering PE 40 years experience	Covanta Project Manager & Senior Reviewer
Glen Kashiwabara	Covanta	B.S.C.E. Civil Engineering 20 years experience	Facility Coordinator & Peer Reviewer
Gary Thein	Covanta	B.S. Mechanical Engineering M.S. Mechanical Engineering 35 years experience	Project Description & Engineering, Senior Reviewer
Stephen Langham	City and County of Honolulu	B.S. Mechanical Engineering M. Finance 38 years experience	Senior Reviewer
Ahmad Sadri	City and County of Honolulu	B.S. Civil Engineering M.S. Environmental 2 years experience	Alternative Analysis
Kirk Dunbar	HDR	B.S. Aerospace Engineering 18 years experience	Owner's Engineer, Review on behalf of City and County of Honolulu
Greg Gesell	HDR	B.S. Mechanical Engineering MBA 20+ years experience	Owner's Engineer, Review on behalf of City and County of Honolulu

Name of Person	Firm	Qualifications	Responsibility
Russell Okoji	AMEC	B.S. Applied Ecology Ph.D. Toxicology 8 years experience	EIS Task Manager, Human Health and Local Coordination
Rachel Okoji	AMEC	B.S. Biology M.S. Industrial Hygiene 9 years of experience	EIS and Local Coordination
Vincent Yanagita	AMEC	B.S. Environmental Science 2 years experience	EIS, Human Health and Local Coordination
Lincoln King	AMEC	B.S. Geographical Information System 6 years experience	GIS and Graphics
Alissa Weaver	AMEC	B.S. Environmental Science 7 years experience	Human Health
Bruce Egan	AMEC	A.B. Engineering S.M. Mechanical Engineering S.M. Industrial Engineering Sc.D. Environmental Health Science – APC	Climate and Air Quality
Patrick Gwinn	AMEC	B.S. Industrial Chemistry M.S. Environmental Sciences 17 years experience	Climate and Air Quality Analysis
Kevin Jameson	AMEC	B.S. Chemical Engineering 24 years experience	Air Quality Analysis
Steffany Toma	AMEC	B.S. Zoology 10 years experience	Surface Water and Biological Resources
Katie Perry	AMEC	B.S. Geographical Information Systems 5 years experience	GIS and Graphics
Steve Clark	PCSI	B.S. Anthropology 32 years experience	Archaeology and Cultural Impacts
Pat McCoy	PCSI	B.A., M.A., Ph.D. Anthropology 34 years experience	Archaeology and Cultural Impacts
Mark White	Pacific Waste Consulting Group	B.S. Mechanical Engineering 30 years experience	Technology Alternatives

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13.0 AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONSULTED IN THE PREPARATION OF THE EIS

Consistent with HRS 343 and the guidelines for implementing the Hawaii State Environmental Review Process, CHRRV and the City and County of Honolulu have undertaken an extensive public participation program. This has consisted of agency and stakeholder consultations as well as community outreach. The outreach program was designed to solicit, identify and better understand and address potential concerns about the Expansion. In addition, CHRRV and the City and County of Honolulu consulted with state and federal agencies in formulating plans for addressing the County's solid waste disposal needs, and in evaluating the potential environmental impacts and regulatory implications of the Expansion. The consultations and outreach activities conducted thus far, as well as those planned as part of the distribution of this EIS are described in the following sections.

13.1 EIS Preparation Notice

CHRRV and the City and County of Honolulu prepared an EIS Preparation Notice (EISPN) for the proposed Expansion, a copy of which is provided in Appendix G. The EISPN was filed with the State OEQC in July 2008 and OEQC published an announcement of its availability in the August 8, 2008 edition of the *Environmental Notice*. The public comment deadline was September 8, 2008. Comments and responses are discussed and attached in Chapter 14 of this EIS.

During development of the EISPN, CHRRV and the City and County of Honolulu conducted initial agency consultations as well as stakeholder outreach. The stakeholder outreach efforts are summarized in Section 13.2 below. Table 13.1-1 provides a list of the Initial Agency Consultations.

TABLE 13.1-1 INITIAL AGENCY CONSULTATION LIST

Contact Name	Business/Organization
Jeff Newman, Acting Field Supervisor	U.S. Fish and Wildlife (USFW) Service
Eileen Mark	Dept. of Planning and Permitting
LaDonna James	Federal Aviation Administration
Peter Young	Dept. of Land & Natural Resources
Kai Markell	Office of Hawaiian Affairs
Craig Tasaka	Office of Planning
Muffet Jourdane	State Historic Preservation District
Nathan Napoka	State Historic Preservation District
Eric Komori	State Historic Preservation District
Kana'i Kapeliela	State Historic Preservation District
Roy Kam	Hawaii Natural Heritage Program
John Nakagawa	Office of Planning, CZMP

Table 13.1-2, below, provides the list of agencies and stakeholders that received letters informing them of publication of the EISPN and of the Open House. Though not listed on Table 13.1-2, copies of the EISPN were available to the attendees of the Open House as described in Section 13.2 below.

TABLE 13.1-2 PARTIES INFORMED OF THE EISPN

Contact Name		Business/Organization
Pat	Murphy	AES Hawaii Inc.
William	Clark	Aiea NH board Chair
Miles	Eligado	Air Liquide
Anne	Stevens	Ala Moana/Kakaako NH board Chair
Steven	Glanstein	Aliamanu/Salt Lake NH board Chair
John	Polischeck	American Piping & Boiler Co
Keith	Teramae	American Piping & Boiler Co
Mel	Kakazu	American Piping & Boiler Co
Ray	Sweeney	Ameron
Fred	Kubota	BEI Hawaii
Grace	Moss	BEI Hawaii
Jim	Mistysyn	BEI Hawaii
Peter	Young	Board of Land and Natural Resources
Cliff	Jamile	Board of Water Supply
Keith	Shida	Board of Water Supply
Timothy	Hiu	Building Division Chief
Karen	Nakamura	Building Industry Assn of Hawaii
Buzzy	Hong	Building Trades Council
Nancy	Thomas	c/o Jane Sugimura
Mary	Emerson	Campbell Estate
Susan	Graham	Campbell Estate
Roy	Kam	Center for Conservation Research & Training
Marty	Gilles	Chevron
Tom	Shaffer	Chevron
Donovan	Dela Cruz	City Council Chairman
Mike	Gabbard	City Council Dist. 1
Barbara	Marshall	City Council Dist. 3
Charles	Djou	City Council Dist. 4
Ann	Kobayashi	City Council Dist. 5
Rod	Tam	City Council Dist. 6
Romy	Cachola	City Council Dist. 7
Gary	Okino	City Council Dist. 8
Nestor	Garcia	City Council Dist. 9

Contact Name		Business/Organization
Tim	Johnson	Cummins Hawaii Diesel Power
Daniel	Ford	Clayton Group Services
Denis	Lau	Clean Water Branch
Jane	Sugimura	Condo Associations
Ken	Kanehiro	Condo Associations
Clyde	Kaneshiro	CWR Hawaii Inc.
Mike	Ojeda	D & M Hydraulic Sales & Services
Bert	Narita	D.Head/Kapahulu NH board Chair
Frank	Doyle	Department of Environmental Services
Keith	Kawaoka	Hawaii Department of Health, HEER Office
Stuart	Yamada	Hawaii Department of Health, Safe Drinking Water Branch (UIC)
Lene	Ichinotsubo	Hawaii Department of Health, SHWB
Janice	Fujimoto	Hawaii Department of Health, SHWB
Laura	Thielen	Department of Land & Natural Resources
Eileen	Mark	Department of Planning and Permitting
Mike	Miyashiro	Diamond Head Petroleum Inc.
andy	Chang	Diversified Energy Services
John	Tanner	Diversified Energy Services
Ken C.	Kawahara	DLNR, Commission on Water Resource Management
Eric	Hirano	DLNR, Engineering Division
Lynne	Matusow	Downtown NH board Chair
Brian	McKenna	E&I Hawaii
Tom	Battisto	Earth Tech Inc
Dave	Williams	East Bay Tire Co
Ed	Clizbe	Engineered Systems
Richard	Hargrave	‘Ewa Neighborhood Board Chair
Karen	MacDonald	FAA, Air Traffic Division, AWP-520
Jake	Ford	Fastenal Company
Bill	Pierce	Ferguson Familian
Chuck	Drummond	Flowserve
Glenna	Couts	Foster Equipment Co
David	Figueira	G E Betz Inc
Kerwin	Chong	Hawaii Crane & Rigging, Ltd.
Nolan	Hirai	Hawaii Department of Health, Clean Air Branch
Steven	Chang	Hawaii Dept of Health
Peter	Crum	Hawaii Electro Power
Judy	Kaaiai	Hawaii Fluid System Tech
Greg	Knudsen	Hawaii Kai NH board Chair
Bill	Mann	Hawaiian Dredging Construction Co.
Daniel	Guinaugh	Hawaiian Dredging Construction Co.
Tom	Valentine	Hawaiian Dredging Construction Co.

Contact Name		Business/Organization
Ward	Saunders	Hawaiian Electric Company Inc.
William	Bonnet	Hawaiian Electric Company Inc.
Bob	Clague	Hawaiian Fluid Power
Donna	Wong	Hawaii's Thousand Friends
Mel	Arita	Heide & Cook Ltd.
Charlie	DePonte	Honomach
Francis	Santos	Honomach
Peter	Hakala	HSI Electric
James	Nutter	Island Recycling
Jim	Wolarey	Island Truck Parts
David	Henkin	Kahaluu NH board Chair
Charles	Prentiss	Kailua NH board Chair
Vernon	Tam	Kaimuki NH board Chair
Mike	Rossio	Kalaeloa Partners LP
Ruedi	Tobler	Kalaeloa Partners LP
Ziad	Khalaf	Kalaeloa Partners LP
Jory	Watland	Kalihi Valley NH board Chair
Bernie	Young	Kalihi/Palama NH board Chair
Peter	anderson	Kaman Industrial Technologies
Bill	Sager	Kaneohe NH board
Roy	Yanagihara	Kaneohe NH board Chair
Michael	Miyamura	Kapolei Elementary School
Shad	Kane	Kapolei Hawn Civic Club
Al	Nagasako	Kapolei HS
Annette	Nishikawa	Kapolei Middle School
Mike	Golojuch	Kapolei NH board
Maeda	Timson	Kapolei NH board Chair
Bill	Reynolds	Kapolei Rotary Club
Dan	Fullenwider	Kapolei Rotary Club
Gale	Treiber	Kapolei Rotary Club
Keith	Briem	Kapolei Rotary Club
Keola	Lloyd	Kapolei Rotary Club
Larry	Howard	Kapolei Rotary Club
Robert	Singlehurst	Kapolei Rotary Club
Ross	Rolirad	Kapolei Rotary Club
Toni	Gonsalves	Kapolei Rotary Club
Van	McCrea	Kapolei Rotary Club
Jeff	Stone	Ko Olina Resort
Todd	Apo	Ko Olina Resort
Deedee	Letts	Koolauloa NH board Chair
Bob	Chuck	Kuliouou/Kalani Iki NH board Chair
Terry	Kaahaaina	Leeward Petroleum Inc.

Contact Name		Business/Organization
Bill	Carreira	Hawaiian Electric Company Inc.
Daniel	Ching	Hawaiian Electric Company Inc.
Maurene	Bishop	Hawaiian Electric Company Inc.
T Michael	May	Hawaiian Electric Company Inc.
Tom	Simmons	Hawaiian Electric Company Inc.
Henry	Curtis	Life of the Land
Kat	Brady	Life of the Land
Bob	Stubbs	Liliha NH board Chair
John	Steelquist	Makiki NH board Chair
Paul	Holtrop	Manoa NH board Chair
Mufi	Hannemann	City and County of Honolulu
Ron	Lockwood	McCully/Moiliili NH board Chair
Dean	Hazama	Mililani Mauka NH board Chair
Dick	Poirier	Mililani NH board
Gabe	Machado	Milo Nursery and Landscaping
Roxanne	Draxler	National Industrial Tire
Michael	Lyons	North Shore NH board Chair
Jack	Schweigert	Nuuanu/Punchbowl NH board Chair
Katherine	Kealoha	Office of Environmental Quality Control
John	Nakagawa	Office of Planning, Coastal Zone Management Program
Thelma	Higa	Pacific Machinery
Bruce	Coppa	Pacific Resource Partnership
Rachel	Orange	Palolo NH board Chair
James "Kimo"	Pickard	Pearl City NH board Chair
Gloria	Klein	Performance Contracting, Inc.
Joe	Morales	Petrochem Insulation Inc.
Chad	Harrison	Process Controls
Jim	Gates	PSC Industrial Outsourcing
Martin	Miller	RCI Construction Group
Harry	Kingery	RCI Environmental Inc.
Darryl	Barilla	Rd Technology of Hawaii
Wesley	Phillips	Safway Services Inc.
Robert	Bunda	Senate President
Donna	Kim	Senate Vice President
Clarence	Nishihara	Senator-Elect
Robin	Campeau	Siemens Industrial Services
Jeff	Mikulina	Sierra Club
Calvin	Say	Speaker, House of Representatives
Pua	Aiu	State Historic Preservation Division
Alex	Sonson	State House of Representatives
Lyla	Berg	State House of Representatives
Blake	Oshiro	State House of Representatives

Contact Name		Business/Organization
Tim	Brower	State House of Representatives
Rida T.R.	Cabanilla	State House of Representatives
Joey	Manahan	State House of Representatives
Glenn	Wakai	State House of Representatives
Barbara	Marumoto	State House of Representatives
Hermina	Morita	State House of Representatives
Jon	Karamatsu	State House of Representatives
Pono	Chong	State House of Representatives
Ken	Ito	State House of Representatives
Kirk	Caldwell	State House of Representatives
Lynn	Finnegan	State House of Representatives
Maile	Shimabukuro	State House of Representatives
Marcus	Oshiro	State House of Representatives
Marilyn	Lee	State House of Representatives
Colleen Rose	Meyer	State House of Representatives
Mark	Takai	State House of Representatives
John	Mizuno	State House of Representatives
Mike	Magaoay	State House of Representatives
Bob	Nakasone	State House of Representatives
Roy	Takumi	State House of Representatives
Scott	Nishimoto	State House of Representatives
Scott	Saiki	State House of Representatives
Sylvia	Luke	State House of Representatives
Tommy	Waters	State House of Representatives
Kymberly	Pine	State House of Representatives
Karl	Rhoads	State House of Representatives
Gene	Ward	State House of Representatives
Ryan	Yamane	State House of Representatives
Mike	Gabbard	State Senate
Clayton	Hee	State Senate
Brian	Taniguchi	State Senate
Clarence	Nishihara	State Senate
Carol	Fukunaga	State Senate
Colleen	Hanabusa	State Senate
David	Ige	State Senate
Fred	Hemmings	State Senate
Gordon	Trimble	State Senate
Lester	Ihara, Jr.	State Senate
Jill	Tokuda	State Senate
Norman	Sakamoto	State Senate
Ron	Menor	State Senate
Sam	Slom	State Senate

Contact Name		Business/Organization
Karen	Awana	State House of Representatives
Della Au	Belatti	State House of Representatives
Corrine	Ching	State House of Representatives
Cynthia	Thielen	State House of Representatives
Sharon	Har	State House of Representatives
Suzie	Chun-Oakland	State Senate
Willie	Espero	State Senate
Bob	Steinke	Steinke Brothers, Inc.
Wayne	Lu	Sun Home Metal Inc
Caleb	Yamanaka	Thyssenkrupp Elevator
Tom	Nance	Tom Nance Water Resource Engineering
Patrick	Leonard	U.S. Fish & Wildlife Service, U.S. Department of the Interior
Leon	Soong	Unitek Solvent Services, Inc.
Tony	Valdez	Valdez Painting Inc
Scott	Higa	Valve Service & Supply
Kevin	Vegas	W W Grainger Inc.
Ben	Acohido	Wahiawa NH board Chair
Kelley	Roberson	Waialae Kahala NH board Chair
Georgette	Jordan	Waianae NH board Chair
Bob	Finley	Waikiki NH board Chair
Wilson	Ho	Waimanalo NH board Chair
Darrlyn	Bunda	Waipahu Community Assn.
Stephen	Nakano	Waipahu High School
Richard	Oshiro	Waipahu NH board Chair
andy	anderson	Waipahu NH board
David	Fuiava	Waste Management
Joseph	Hernandez	Waste Management
Howard	Akagi	Water Resources International, Inc.
Shannon	Wood	Windward Ahapuaa Alliance
Georgette	Stevens	WOEDA/Grace Pacific
Nancy	Maeda	WOEDA/Haseko
Theodore	Metrose	WOEDA/Tesoro
Conchita	Malaqui	WOEDA/Waikele Outlets
Yuni	Shiramizu	Young Scale Company
Shane	Peters	

13.2 Community Outreach

As noted above, a comprehensive outreach program was conducted in order to solicit, identify and better understand and address potential concerns about the Expansion. The outreach program was designed to include residents, businesses and other stakeholders. It included neighborhood boards, community associations, condominium associations, State legislators, City council members, environmental organizations, Native Hawaiian organizations, labor organizations, economic development organizations, local public schools, and neighboring businesses. As part of the outreach program, the public was invited to learn more about the proposed Expansion of H-POWER at an Open House held at the Kapolei Hale on Saturday, August 21, 2008. Copies of the EISPN were available at the Open House. CHRRV and the City and County of Honolulu had representatives in attendance to answer questions regarding the Expansion of H-POWER as well as the ongoing operations at the facility.

13.3 Distribution of the Draft EIS

CHRRV and the City and County of Honolulu will have copies of the Draft EIS available for review at various libraries on O‘ahu. Copies of the Draft EIS will be available to individuals who submit a request.

14.0 COMMENTS ON THE EISPN AND THE APPLICANT'S RESPONSES

As described previously in Chapter 13, public outreach and participation is a key element of the Hawaii State Environmental Review Process. This Chapter provides both a list of the comments received on the EISPN, as well as copies of the comment letters. It also contains copies of the response letters prepared by CHRRV and the City and County of Honolulu to reply to the comments received.

14.1 List of Public Comments on the EISPN

Table 14.1-1 provides a list of the comment letter received on the EISPN. The letters have been assigned a comment letter number for ease of reference, sequenced by date of letter with a corresponding C-1, C-2, etc. with the "C" denoting "Comment".

TABLE 14.1-1 COMMENT LETTERS

Person/Organization	Date of Letter
Board of Water Supply, City and County of Honolulu	August 12, 2008
State of Hawaii – Office of Hawaiian Affairs	September 4, 2008

14.2 EISPN Comment Letters and the Applicants Response

The scanned copies of the comment letters received can be found in Appendix B. The letters are sequenced in alternating fashion, such that the response letter follows the comment letter it coincides with. In addition to responding via letter, each person or organization offering comment(s) will be added to the EIS distribution list.

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Appendix A – Final Report Archaeological and Cultural Impact Assessments

Appendix B – Agency Correspondence

Appendix C – Highway Capacity Software Input and Output Spreadsheets

Appendix D – Noise Data

Appendix E – Human Health Risk Assessment

Appendix F – Alternative Analysis for the Expansion of H-POWER

Appendix G – Environmental Impact Statement Preparation Notice