
ENVIRONMENTAL COMPLIANCE PLAN

VARIABLE RENEWABLE DISPATCHABLE GENERATION AND ENERGY STORAGE AT THE KEAHOLE GENERATING STATION

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CHAPTER 1 INTRODUCTION

1.1 OVERVIEW OF THE PROPOSED KEAHOLE BESS PROJECT

The proposed project involves the construction and operation of a Battery Energy Storage System (BESS) on approximately 0.2-acres of land situated at the Hawai'i Electric Light Company's existing Keahole Generating Station (TMK No. 7-3-049:036) in North Kona, Hawai'i. These facilities would deliver power to the existing Keahole Generating Station Substation, which would then distribute it through the island-wide transmission and distribution grid.

The general location of the proposed project is shown on Figure 1.1. The proposed facilities' relationship with the adjacent area is depicted on Figure 1.2. A conceptual site plan is provided in Figure 1.3.

The proposed project consists of batteries and related equipment capable of storing 12 megawatt (MW) of energy and discharging it at a rate of 12-megawatts (MW) per hour. In addition to the batteries, the Keahole BESS project will include inverters and transformers, concrete pads, underground cables and ducts, switchgear, and other electrical equipment. There will be a direct electrical interconnect from the BESS site into the existing Keahole Substation at the 69-kV level along with a fiber cable communication link. Vehicular access to the site will be via the existing generating station roadways. Hawai'i Electric Light plans to have the proposed facility in operation no later than December 31, 2022.

Figure 1.1 Location Map, Keahole Generating Station



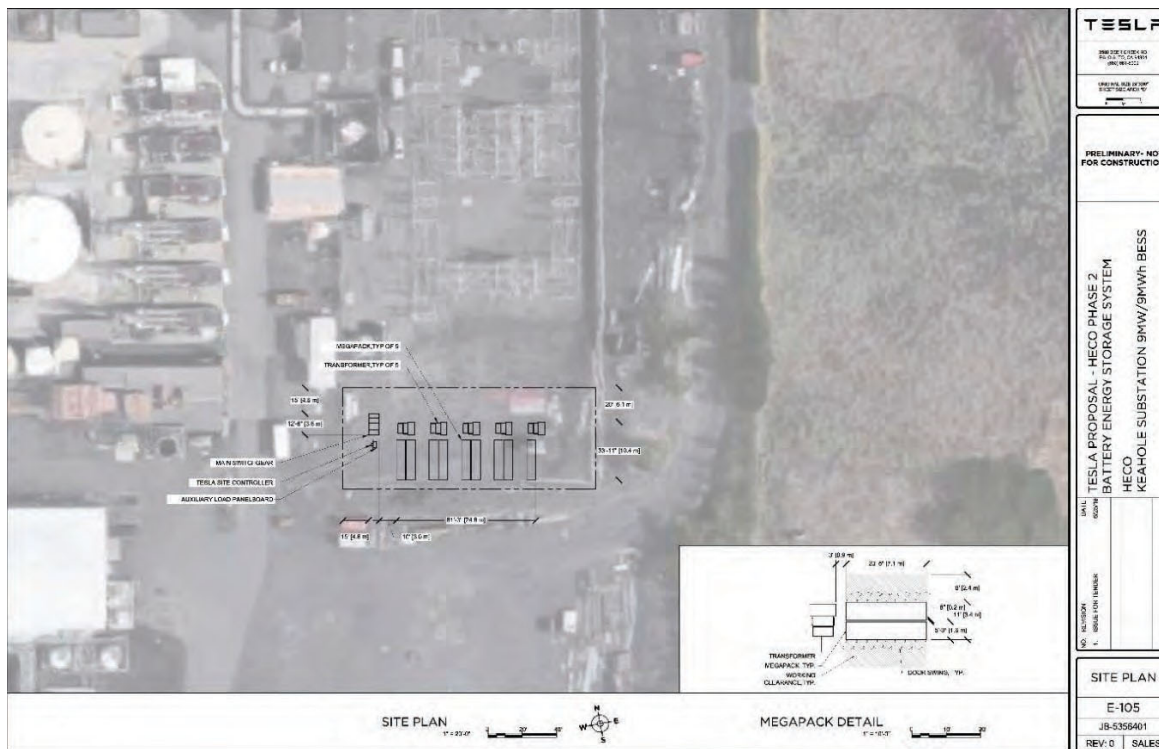
Source: Planning Solutions, Inc.

Figure 1.2 Vicinity Map, Keahole Generating Station



Source: Planning Solutions, Inc.

Figure 1.3 Conceptual Site Plan, BESS site within Keahole Generating Station



Source: Hawaiian Electric (2019)

1.2 PURPOSE OF THE REPORT

This document is intended to provide all the information Hawaiian Electric will need to respond to portions of Appendix B, Sections 2.6, 2.7, and 2.8.1 of Hawaiian Electric Company, Inc.’s (Hawaiian Electric) *Final Variable Renewable Dispatchable Generation and Energy Storage Stage 2 RFP for the Island of Hawai’i* (RFP) dated August 22, 2019 [Docket No. 2017-0352] that relate the Keahole BESS Site.

1.3 ORGANIZATION OF THE REPORT

The remainder of the report is divided into the following main parts:

- Chapter 2 outlines an overall land use and environmental permits and approvals strategy as called for in Section 2.6.1 of the RFP.
- Chapter 3 summarizes the existing County Zoning and State Land Use District classifications called for in Section 2.6.2 of the RFP.
- Chapter 4 provides details regarding the specific environmental permits and approvals that will be needed as called for in Section 2.6.3 of the RFP.
- Chapter 5 contains a Preliminary Environmental Assessment (PEA) for the site as called for in Section 2.6.4 of the RFP.
- Chapter 6 discusses potential cultural effects as called for in Section 2.7 of the RFP.
- Chapter 7 identifies communities and stakeholders that may be affected as called for in Section 2.8.1 of the RFP.

CHAPTER 2 OVERALL LAND USE/ENVIRONMENTAL PERMIT STRATEGY

Hawaiian Electric's overall strategy for obtaining all required approvals in a timely and cost-efficient manner has involved:

- Siting the proposed facilities in an area with which it is familiar;
- Laying them out in a way that is intended to minimize the amount of ground disturbance that is required, taking advantage of existing infrastructure to the greatest extent practicable to minimize the need for new construction;
- Interfacing with permitting authorities at the earliest possible time to fully understand (and be able to address) their concerns;
- Collecting, reviewing, and extracting information from available reports and studies containing relevant information about the sites;
- Conducting reconnaissance-level site visits to confirm that conditions have not changed visibly since earlier studies and/or databases were prepared;
- Siting the proposed facilities in a way that recognizes site limitations and attempts to avoid unnecessary impacts; and
- Providing for site investigations to minimize the probability of encountering previously unknown adverse conditions late in the design/development process.

The conceptual site development plan shown in Figure 1.3 provides for the needs of the BESS system while minimizing effects on surrounding areas.

2.1 AGENCIES AND AUTHORITIES HAVING JURISDICTION

The property on which the Keahole BESS facilities would be developed consists of an approximately 0.2-acre portion of TMK No. (3)7-3-049:036.¹ The property lies within Hawai'i Electric Light's Keahole Generating Station property. The BESS Site is within the State's Urban Land Use District, and land use is regulated by the County of Hawai'i as provided for in Section 25 of the Hawai'i County Code (HCC).

As discussed in Chapter 4, the Hawai'i County Planning Department (HCPD) and the County Department of Public Works are responsible for regulatory approvals that are needed.

2.2 EXISTING STUDIES AND ASSESSMENTS

Hawaiian Electric has not yet conducted any site-specific geotechnical or environmental studies of the project site. Should development of the BESS move forward at this site, additional design and engineering studies would be conducted to inform construction permit applications.

¹ The total area of the TMK is 64.777 acres as indicated on the Preliminary Land Court Map that is part of Land Court Application 1069) and which was prepared in support of the proposed subdivision of Lot 18250 into Lots 18250-A and 18250-B.

2.3 OVERALL APPROVAL PROCESS

The overall approval process is depicted in Figure 2.1.

Figure 2.1 Overall Approval Process



Source: Planning Solutions, Inc.

The process involves only permits and approvals from the County of Hawai'i. The two permits can be processed in parallel and the total processing time is estimated to be 3 months (90 days).

CHAPTER 3 STATE AND COUNTY LAND USE DESIGNATION COMPLIANCE EVALUATION

This chapter summarizes the existing County Zoning and State Land Use classifications, assesses the extent to which the proposed use is allowable under the existing designations, and describes the process and approximate schedule for obtaining the required designation if a change appears to be necessary. This discussion is intended to provide the information called for in Section 2.6.2 of the RFP.

3.1 STATE LAND USE REGULATIONS

Chapter 205, Hawai'i Revised Statutes (HRS), establishes state land use law. It provides for all lands in the state to be placed into one of four Land Use Districts (Urban, Rural, Agricultural, and Conservation). The land on which the proposed Keahole BESS facilities would be constructed is in the Urban District. As provided for in HRS §205-2(b), activities and land use in areas within the State Urban District are regulated solely by the county in which they occur.

3.2 HAWAII COUNTY ZONING CODE

Chapter 25 of the Hawai'i County Code (HCC) contains the land use zoning regulations applicable to the project. The land on which the proposed BESS facilities would be constructed has been zoned as General Industrial (MG). The General Industrial district applies to areas for uses that are generally considered to be offensive or have some element of danger. Permitted uses within the MG District are specified in HCC §25-5-152(a), and include:

- Utility facilities, public and private, including power plants, offices or yards for equipment, material, vehicle storage, repair or maintenance. [HCC §25-5-152(a)(63)] and
- Utility substations, as permitted under HCC §25-4-11. [§25-5-152(a)(64).

In addition, HCC §25-5-152(e) also permits accessory uses which are customarily associated with and subordinate to the main or principal use on the property.

As discussed below, the site layout shown in Figure 1.3 appears to comply with all of the size and other restrictions applicable in the MG District.

- The maximum allowable height in the MG District as specified in HCC §25-5-153 is 50 feet except that an industrial structure may be built to a height of 100 feet, provided the extra height is determined by the director to be functionally necessary. All of the proposed facilities are less than that height.
- The minimum building site area in the MG District is 20,000 square feet (HCC §25-5-154). The parcel on which the proposed BESS facilities would be constructed greatly exceeds that size.
- HCC §25-5-155 provides that each building site in the MG district shall have a minimum building site average width of 100 feet. The parcel on which the proposed BESS facilities would be located has an average width in excess of that amount.

- HCC §25-5-156 specifies a minimum front yard setback of 20 feet in the MG District. The proposed project complies with this setback requirement.
- HCC §25-5-156 does not require side and rear yard setbacks within the MG District unless the parcel is adjacent to a parcel in the RS, RD, RM or RCX districts. As that does not apply to the proposed site, this setback is not required for the proposed project.
- HCC §25-5-157 contains certain additional requirements for development in the MG District. Specifically: (a) All front yards in the MG district shall be landscaped, except for drives and walkways; (b) where any required side or rear yard in the MG district adjoins a building site in an RS, RD, RM or RCX district, a solid wall six feet in height shall be erected and maintained along the side and rear property lines so adjoining; and (c) plan approval shall be required for all new structures and additions to existing structures in the MG district. The Keahole Site has already met the landscaping requirement and it does not adjoin a zoning district for which a wall is required. However, plan approval, as discussed in Section 4.1 of this report, is required by the Planning Director prior to construction as provided for in HCC §25-2-72.

CHAPTER 4 REQUIRED PERMITS AND REGULATORY APPROVALS

This section addresses permitting requirements specific to the proposed project. As used here, the terms “permit” and “approval” differ from the land use authorizations discussed in Section Chapter 3. For each of these, it lists: (i) the name of the permit; (ii) the agency and/or authorities having jurisdiction over its issuance; (iii) the anticipated timeline for obtaining the required permit, approval, and/or license; and (iv) the interrelationships/interdependencies with other required permits, approvals, and/or licenses.

The engineering and environmental permits and approvals that will be needed are listed in Table 4.1. In addition to the name, the table indicates the agency that grants the approval, the prior approvals (if any), on which application processing and/or approval is contingent, and the approximate amount of time that should be allowed for processing. A more detailed discussion of the regulatory requirements is presented in Section 4.1. The Gantt chart in Figure 2.1 indicates the interrelationship and dependencies of the various processes.

Table 4.1 Required Permits and Regulatory Approvals

| Name | Discussion | Agency/Authority | Status and Timeline | Basis of Timeline |
|----------------------------------|---|---|---|--|
| HCC 25-2-71(c)(1), Plan Approval | The application must include items listed in Section 4.1. | Administrative Permits Division of the Hawai'i County Planning Department | Application will be submitted after selection; timeline is estimated to be 60 days | Experience with agency and DBEDT renewable energy project permit briefs, which indicates 60 days for plan review |
| HCC §5-19, Building Permit | As discussed in Section 4.2. | Building Division, of the County of Hawai'i Department of Public Works, | Application will be submitted after selection; timeline is variable, assume 90 days | |

4.1 PLAN APPROVAL

The “Plan Approval” called for in the Zoning Code provides a method of allowing closer inspection of certain development and inspection of all development in certain districts in order to ensure conformance with the general plan, to assure that the intent and purpose of this chapter are carried out, and to ensure pertinent conditions of previous approvals related to the development have been implemented. HCC §25-2-72 lays out the information that must be provided when applying for plan approval. It stipulates that the application must be accompanied by a site plan, drawn to scale and fully dimensioned indicating clearly the following information: (a) the location and dimension of the building site; (b) the location, size, height, and use of all existing and proposed structures; (c) all yards and open spaces; (d) location, height, and material of all fences and walls; (e) the standard of improvement and location, number, and size of parking spaces, arrangement and on-site circulation of all off-street parking and loading facilities including points of access thereto from adjoining streets; (f) the location, general nature, and type, and protection

or shielding devices of all exterior lighting; (g) all proposed landscaping and planting; and (h) All proposed street dedication and improvement if any. It does not appear that the proposed facilities fall into one of the categories for which approval of a site drainage plan will be required.

4.2 BUILDING PERMIT

HCC §5-19 stipulates that except as otherwise provided in this chapter, no person, firm, or corporation shall erect, construct, enlarge, alter, repair, move, convert, or demolish any building or structure in the County, or cause the same to be done, without first obtaining a separate building permit for each building or structure.

HCC §5-19.1 identifies activities for which permits are not required, but the list does not include the types of facilities that would be constructed as part of the proposed project. Hence, Hawaiian Electric will need to obtain a Building Permit for the proposed facilities from the Hawai'i County Department of Public Works.

HCC §5-20 describes the information that must be provided when applying for a building permit. Required information includes: a legal description of the property on which the improvements will be made; the use and occupancy for which the proposed work is intended; construction documents and other information as required by HCC §5-25; the valuation of the proposed work, and other relevant data, e.g., the type of construction, floor area, accessible floor area, setbacks, etc.

HCC §5-23 requires that the construction documents submitted in support of the application include plans, specifications, engineering calculations, diagrams, soil investigation reports, code search, special inspection and structural observation programs and other data needed to fully evaluate the request. The plans and specifications must clearly indicate the nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and all relevant laws, ordinances, rules and regulations. Plans must include a plot plan showing the location of the proposed building and every existing building on the property. Upon request, applicants must also provide such things as computations, stress diagrams, and other data sufficient to show the correctness of the plans.

4.3 SELECTED PERMITS THAT WILL NOT BE REQUIRED

4.3.1 GRADING, SOIL EROSION, AND SEDIMENT CONTROL

HCC Chapter 10 address erosion and sediment control. Section 10-9(a) provides that except as excluded in section 10-3: (1) no grading work shall be commenced or performed without a grading permit; (2) no grubbing work shall be commenced or performed without a grubbing permit except where grubbing concerns land for which a grading permit has been issued, and (3) no stockpiling work shall be commenced or performed without a stockpiling permit. It further provides that no grading, grubbing, or stockpiling permit shall be issued without the director of public works' review of the applicant's compliance with the County general plan or with HRS Chapters 6E, 205 and 343.

HCC §10-3 list actions that are excluded from the permit requirements. Exclusions include the following:

- *(6) Excavation which does not alter the general drainage pattern with respect to abutting properties, which does not exceed one hundred cubic yards of material on any one site, and*

does not exceed five feet in vertical height at its highest point; provided that the cut meets the cut slopes and the distance from property lines requirements in article 3 of this chapter.

- *(7) Fill which does not alter the general drainage pattern with respect to abutting properties, which does not exceed one hundred cubic yards of material on any one site and does not exceed five feet in vertical depth at its deepest point, provided that the fill meets the fill slopes and distance from property lines requirements in article 3 of this chapter.*
- *(8) Grubbing which does not alter the general and localized drainage pattern with respect to abutting properties and does not exceed a total area of one acre.*

The work that will be required for the proposed BESS project appears to qualify for these exclusions. If that is confirmed to be the case once plans are finalized, no grading, grubbing or stockpiling permit will be required for the proposed project.

4.3.2 STORM DRAINAGE

In deciding whether or not to grant “Plan Approval”, the Administrative Permits Division of the Hawai'i County Planning Department will review the plans that are submitted to ascertain that adequate provisions are being made for storm drainage. The design engineer will need to provide calculations and other information documenting that this is the case.

Preliminary analysis by the design engineer has concluded that the addition of up to 0.20 acres of new impervious surface, may subject the proposed project to post-construction stormwater requirements. If it does, then detailed civil design plans (including drainage calculations and sediment and erosion control plan) will be required. That, in turn, may require incorporation of permanent storm water BMPs into the project design. This report assumed that the proposed small increase in impervious area, when viewed in the context of the entire parcel and the high permeability of the subsurface, will not trigger post-construction stormwater requirements.

4.3.3 NPDES CONSTRUCTION STORMWATER PERMIT

HAR §11-55 regulates activities that have the potential to pollute state waters. It provides that any industrial, public, or private project or development which could be considered a new source of pollution or an increased source of pollution shall, in its initial project design and subsequent construction, provide the highest and best degree of waste treatment practicable under existing technology. HAR §11-55-04 provides that before discharging any pollutant, or beginning construction activities that disturb one or more acres of land, or substantially altering the quality of any discharges, or substantially increasing the quantity of any discharges, a person shall submit a complete NPDES Permit application.

Because the proposed project involves the disturbance of only 0.2 acres of land, an NPDES Construction Stormwater Permit will not be required.

CHAPTER 5 PRELIMINARY ENVIRONMENTAL ASSESSMENT

The following summary of potential environmental effects is based on the data contained in past reports and publicly available environmental databases. It summarizes identifiable pre-existing environmental conditions and describe the kinds of short- and long-term direct, indirect, and cumulative environmental impacts likely to result from development, operation, and decommissioning of the proposed project.

5.1 NATURAL ENVIRONMENT

5.1.1 AIR QUALITY

5.1.1.1 *Existing Air Quality*

Air quality in the project area is generally good. Measurements taken as part of the permitting work for the Keahole Generating Station are summarized in Table 5.1. As shown by these data, air quality in the area during this year (which is generally representative) never exceeded the short-term or long-term State or National standards for the five pollutants measured [PM_{2.5} and PM₁₀, NO₂, SO₂, CO].

Table 5.1 Keahole Air Quality circa 1990.

| <i>Pollutant</i> | <i>Averaging Period</i> | <i>Maximum (micrograms/ cubic meter)</i> |
|---|-------------------------|--|
| SO ₂ (ppm) | 3-hour | 110.0 |
| | 24-hour | 20.4 |
| | Annual | 0.3 |
| NO ₂ (ppm) | Annual | 2 |
| PM ₁₀ (µg/m ³) | 24-hour | 28 |
| | Annual | 14 |
| CO (ppm) | 1-hour | 1.20 |
| | 8-hour | 1.05 |
| Source: Table 3-1 in the Revised Final Environmental Impact Statement for the Keahole Generating Station Expansion. | | |

5.1.1.2 *Potential Effects on Air Quality*

The proposed project is intended to increase Hawaiian Electric's ability to use non-polluting renewable energy resources to meet its customers' needs. The operation of the proposed facilities does not result in emissions that have the ability to affect air quality. The project will have no negative effects on air quality, and we expect incorporation of this project into the Hawaii Electric Light grid to reduce overall emissions on the island. Assessment of these reductions will be assessed after production simulations are completed. If selected, the Company will perform the required GHG analyses.

Site preparation will involve limited grading. However, the very small area that would be disturbed (less than 0.2 acre), the rocky nature of the substrate, the short time that would pass

between the original clearing of the ground and the placement the BESS units, and the absence of nearby development means that the potential effects are very limited so long as appropriate dust control measures are implemented during construction.

5.1.2 BIOLOGICAL RESOURCES

5.1.2.1 *Flora*

5.1.2.1.1 *Overview*

Even before the existing generating facilities were developed the vegetation on the project site was dominated by introduced species, with the few native plants occurring as scattered individuals. As the site has been developed the vegetation has been further reduced and today there is virtually no vegetation present on or near the area of the proposed BESS facilities. There are no areas that the USFWS has designated as “Critical Habitat” on or within a quarter mile of the project site.

5.1.2.1.2 *Potential Effects*

The proposed project will not entail the direct or indirect removal of any floral communities and will not, therefore, have a significant adverse effect on vegetation.

5.1.2.2 *Fauna*

5.1.2.2.1 *Overview*

At the time of a previous survey,² no endemic birds were observed at the Keahole Generating Station site. While not observed during the course of the survey, the biologists opined that the only endemic species that might occasionally occur in this area are the short-eared owl or pueo (*Asia flammeus sandwichensis*) and Hawaiian hawk or 'Io (*Buteo solitarius*). If anything, the development of the site that has occurred since the time of the survey has probably further reduced the likelihood that these endemic species utilize the property.

The initial field survey identified ten species of exotic (introduced) birds on the project site. They included the Black francolin (*Francolinus francolinus*), Gray francolin (*Francolinus pondicerianus*), Spotted dove (*Streptopelia chinensis*), Zebra dove (*Geopelia striata*), Common myna (*Acridotheres tristis*), Northern cardinal (*Cardinalis cardinalis*), Japanese white-eye (*Zosterops japonicus*), Nutmeg mannikin (*Lonchura punctulata*), House finch (*Carpodacus mexicanus*), and House sparrow (*Passer domesticus*). The field biologists identified several other bird species that might occur on or near the property; they included barn owl (*Tyto alba*), saffron finch (*Sicalis flaveola*), yellow-billed cardinal (*Paroaria capitata*) and warbling silverbill (*Lonchura malabarica*). Finally, they identified two other migratory bird species, ruddy turnstone (*Arenaria interpres*) and Pacific golden plover (*Pluvialis fulva*), that may be present on the property from September to April but which were not seen at the time the survey was conducted.

One small Indian mongoose (*Herpestes auropunctatus*) was observed. It is quite likely that one or more species of rats and mice may be present as well.

² Surveys were performed to support the *Revised Final Environmental Impact Statement, Keahole Generating Station Expansion*, dated December 1993.

The endangered Hawaiian Hoary bat (*Lasiurus cinereus semotus*), Hawai'i's only native terrestrial mammal, occurs in many locations on the Big Island in a wide range of habitats. On the island of Hawai'i, bats are found primarily at elevations ranging from sea level to 7,500 feet). They roost primarily in woody vegetation exceeding 15 feet in height (Bonaccorso et al. 2015). Their diet consists primarily of nocturnal aerial beetles and moths (Jacobs 1999, Todd 2012).

5.1.2.2.2 *Potential Effects*

In view of the low value of the existing habitat and the absence of any consistent use by known rare or endangered species, the addition of the few new facilities that are proposed as part of the proposed project is unlikely to have any effect on fauna.

5.1.2.3 Natural Habitats/Ecosystems, Especially if Threatened or Endangered

The USFWS has not designated Critical Habitat on or near the project site. Past surveys³ have shown that it does not contain any rare or particularly valuable habitat, and no threatened or endangered species have been identified as using the site. Some protected avian species (birds and bats) may overfly the site, but the small size of the proposed facilities is such that they do not have the potential to adversely affect them as they overfly it.

5.1.3 CLIMATE

5.1.3.1.1 *Overview of Existing Climate*

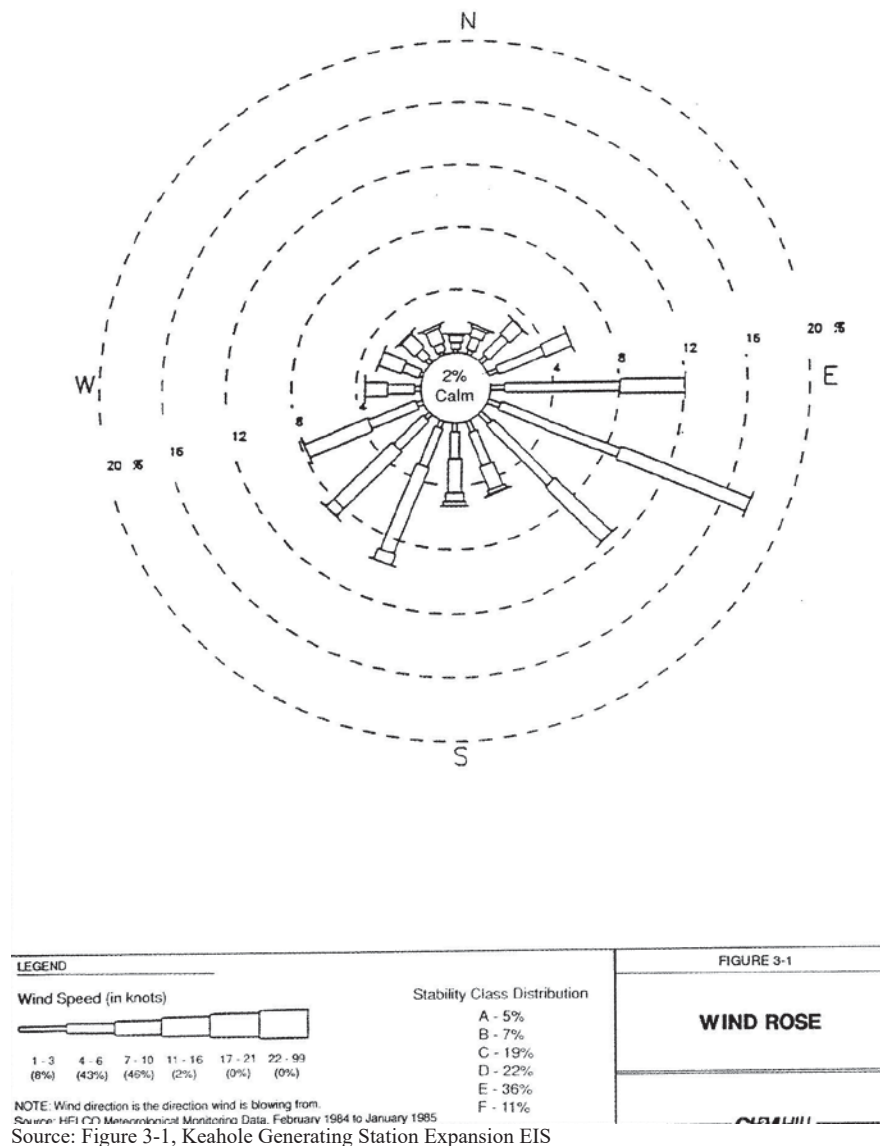
Due to the tempering influence of the Pacific Ocean and their low-latitude location, the Hawaiian Islands experience extremely small diurnal and seasonal variations in ambient temperature. Average monthly temperatures at the Keahole site range from the low 70s (°F) in the coldest month of February to the upper 70s in August and September.

Annual rainfall at the project site is low, generally ranging between 10 and 20 inches per year. January (1.3"), February (1.2"), October (1.0"), and December (1.0") are generally the wettest months. May (0.6"), July (0.5"), and August (0.6") are generally the driest.

A wind rose for the project site is reproduced in Figure 5.1. It is based on meteorological data from February 1984 to January 1985 at an air quality monitoring station located approximately 0.8 mile southeast of the project site. It reflects a diurnal pattern with winds typically blowing onshore during the day and downslope (i.e., offshore), during the night.

³ Surveys were performed previously to support the *Revised Final Environmental Impact Statement, Keahole Generating Station Expansion*, dated December 1993.

Figure 5.1 Wind Rose for Keahole Generating Station



5.1.3.1.2 Potential Climatic Effect

The low, relatively compact BESS units do not have the potential to alter airflow and will not substantially increase the thermal signature of the area. The proposed project is intended to increase Hawaiian Electric’s ability to use non-polluting renewable energy resources to meet its customers’ needs. This, in turn will reduce the extent to which emissions from the facility contribute to climate change.

5.1.4 SOILS

5.1.4.1.1 Overview

The presence of soil on the 'a'a and pahoehoe is sparse. Where present, soils consist of thin accumulations of windblown sand and silt. They are not suitable for agricultural use.

5.1.4.1.2 Potential Effects

Because of the sparse soil cover that is present, construction and operation of the proposed facilities will not create undue risk of erosion or loss of land that is likely to be used for agricultural purposes.

5.1.5 TOPOGRAPHY AND GEOLOGY

5.1.5.1 Topography

5.1.5.1.1 Overview

The project site consists of previously graded land that has an average slope of less than 1 percent.

5.1.5.1.2 Potential Effects

The site topography does not present any special construction challenges and the alterations that will be required will not require substantial alteration of significant landforms. However, care will have to be taken when preparing the grading plan to provide positive drainage.

5.1.5.2 Geology/Geologic Hazards

5.1.5.2.1 Overview

The project site is located on the western slope of the Hualalai Volcano, which rises 8,271 feet above sea level and is the westernmost of the five major Big Island volcanoes. It has a well-developed Northwest rift zone, a moderately well-developed South-Southeast rift zone, and a poorly developed North rift zone. Hualalai is the third youngest and third-most historically active volcano on the Island of Hawai'i; it is considered to be in the post-shield stage of activity.

The oldest dated Hualalai rocks are from about 128,000 years ago, and it was last active in 1801. During the eruption in that year pahoehoe lava flowed from two vents along the northwest trending rift of the volcano, which at its closest is approximately 4.5 miles northeast of the project site. Lava flow from the vent at the 1,500-foot elevation spread out along the coast as far south as the current site of Keahole Airport, approximately 1 mile north of the Keahole Generating Station site.

The project site itself is located on prehistoric 'a'a and pahoehoe lava flows from the volcano. Pahoehoe lava flows, consisting of dense vesicular basalt with aropy or smooth surface, cover approximately 95 percent of the Keahole Generating Station property. While lava tubes are known to exist in nearby pahoehoe flows, no lava tube entrances are known to exist beneath the project site. 'A'a lava occurs in the northeast portion of the site and appears to be an extension of a larger flow that is located north of the site. It consists of a surface layer of loose, jumbled blocks of jagged, highly vesicular basalt; large vesicular basalt spines protrude through the clinker layer. The thickness of the clinker layer is unknown because the underlying dense interior of the flow is not exposed. The total thickness of the 'a'a flow is also unknown because its base is concealed beneath more recent pahoehoe flows.⁴

⁴ The EIS for the Keahole Generating Station project reports that a review of boring and probing logs drilled at the site indicated that cavities, ranging from a few inches to more than 3.5 feet, are present in the subsurface of the

Volcanic Hazards. Hualalai is the third most active volcano on the Island of Hawai'i and typically erupts 2 to 3 times per 1,000 years. Six different vents erupted lava between the late 1700s and 1801, two of which generated lava flows that poured into the sea on the west coast of the island. The Keahole Airport, located just west of the project site, is built atop the larger flow. Hualalai last erupted in 1801 and, more recently, had a damaging seismic swarm in 1929 that was probably the result of a shallow intrusion of magma.

Lava flow hazard maps for the island were first developed in 1974 by Donald Mullineaux and Donald Peterson of the U.S. Geological Survey and later revised in 1987 and 1992. The current map divides the island into zones that are ranked from 1 through 9 based on the probability of coverage by lava flows. Zone 1 is the area of the greatest hazard, Zone 9 of the least. The ranking is based chiefly on the location and frequency of both historic and prehistoric eruptions. "Historic eruptions" include those for which there are written records, beginning in the early 1800's and those that are known from the oral traditions of the Hawaiians. Prehistoric eruptions have been dated using geologic mapping and dating of the old flows of each volcano. The hazard zones also consider the larger topographic features of the volcanoes that will affect the distribution of lava flows; they do not reflect smaller variations in topography that will affect the course of any particular flow, particularly ones of limited size.

Though Hualalai is not nearly as active as Mauna Loa or Kilauea, geologic mapping of the volcano shows that 80 percent of Hualalai's surface has been covered by lava flows in the past 5,000 years. Using all of the information available to it, the USGS has placed the project site in Hazard Zone 4, which is squarely in the middle of the possible range. Other direct hazards from eruptions, such as tephra fallout and ground cracking and settling, are not specifically considered on this map; however, these hazards also tend to be greatest in the areas of highest hazard from lava flows.

Based on the available information, the possibility that the project site could be affected by lava flows during the anticipated life of the proposed facilities is extremely low. While, it cannot be completely discounted, any flow that would cause this would inevitably affect the remainder of the Keahole Generating Station and many of the land uses that depend upon it for electrical power. Hence, it does not appear to be a significant factor in the choice of locations.

Seismic Risk. According to USGS Earthquake Hazards Program, website, the earthquake hazard on the Island of Hawai'i is among the highest in the United States, with thousands of earthquakes occurring every year. Many of these earthquakes are directly related to volcanic activity and are very small. Even ones that are more noticeable to local residents are seldom large enough to cause widespread damage, but they may produce locally extensive ground fractures and subsidence.

The southern side of the Island of Hawai'i is under the greatest threat because of relatively high seismic activity of Mauna Loa and Kilauea. The largest Hawaiian earthquake in recorded history occurred in 1868 beneath the Ka'u District on the southeast flank of Mauna Loa; it had an estimated magnitude of between 7.5 and 8.1. The Kealakekua fault zone on the island's Kona coast was the site of an earthquake of about magnitude 6.9 in 1951 that may have been related to the 1950 eruption of Mauna Loa's southwest rift zone. Also on the west side of Hawai'i Island, two quakes occurred on October 15, 2006, one with a magnitude of 6.0 and the other 6.7. Figure

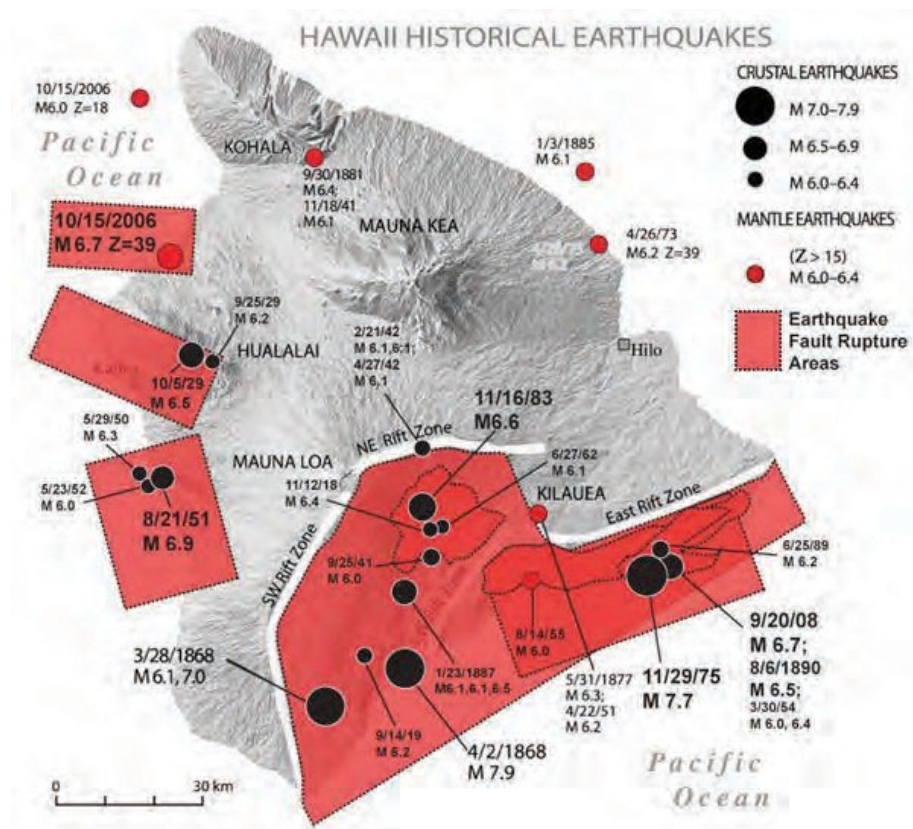
site. In addition, probing in the area of Fuel Oil Storage Tank No. 2 encountered 3-foot-thick layers of basalt clinker beginning at depths of approximately 5 feet and 12.5 feet below the ground surface.

5.2 Depicts the location and approximate magnitude of the earthquakes that have occurred on Hawai'i Island during historical times.

As reported in Volume 91, No. 3, of the *Bulletin of the Seismological Society of America*, Klein et al. (2001) have concluded that the seismic hazard and earthquake occurrence rates in Hawaii are locally as high as that near the most hazardous faults elsewhere in the United States. They have generated maps of peak ground acceleration (PGA) and spectral acceleration (SA) (at 0.2, 0.3 and 1.0 sec, 5% critical damping) at 2% and 10% exceedance probabilities in 50 years. They calculate that the highest hazard is on the south side of Hawai'i Island (see Figure 5.4 for examples). As can be seen from the maps, while moderately high, the estimated ground accelerations for the area in which the Keahole site is located are in the middle of the range found on the Big Island.

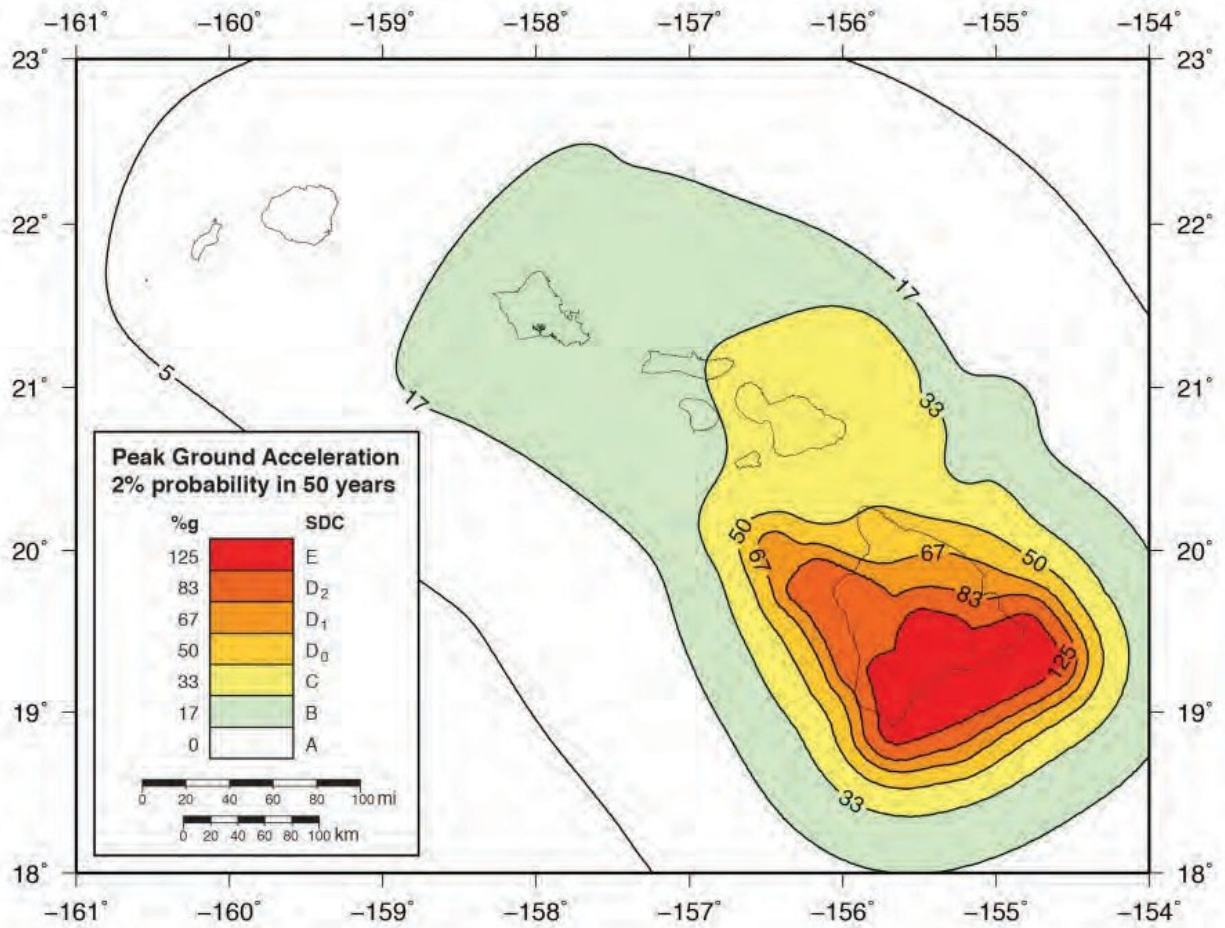
The seismic hazard zones depicted on the map reflect the intensity and probability of shaking. Descriptions of the risks are summarized in Table 5.2.

Figure 5.2 Hawai'i Historical Earthquakes



Source: https://volcanoes.usgs.gov/observatories/hvo/hazards_earthquakes.html

Figure 5.3 Seismic Hazards for the State of Hawai'i

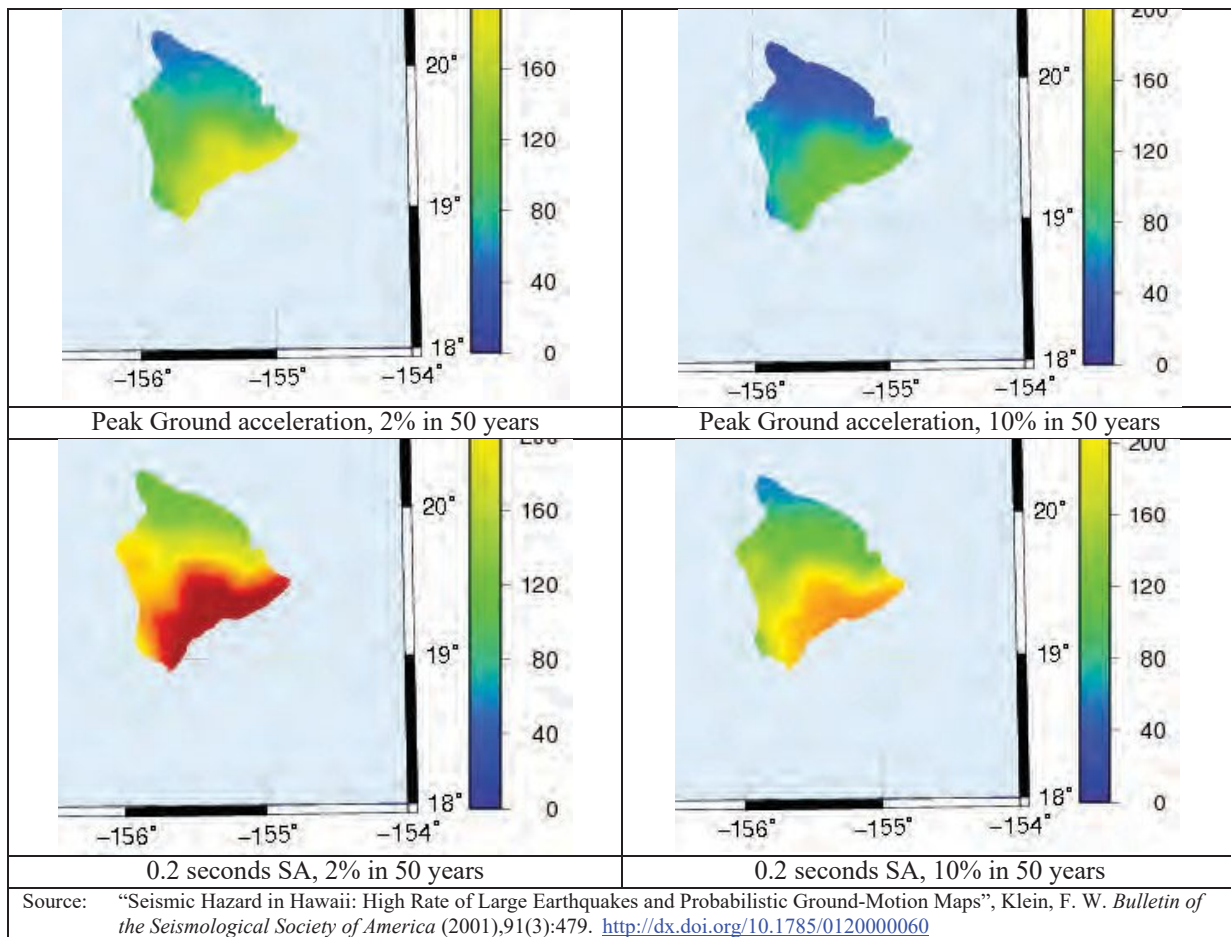


Source: https://volcanoes.usgs.gov/observatories/hvo/hazards_earthquakes.html

Table 5.2 Key to Seismic Hazard Zones and Probability of Shaking Maps

| <i>SDC</i> | <i>Map Color</i> | <i>Earthquake Hazard</i> | <i>Potential Effects of Shaking*</i> |
|---|------------------|--|--|
| A | White | Very small probability of experiencing damaging earthquake effects. | |
| B | Green | Could experience shaking of moderate intensity. | Moderate shaking—Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. |
| C | Yellow | Could experience strong shaking. | Strong shaking—Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built structures. |
| D ₀ | Dark Yellow | Could experience very strong shaking (the darker the color, the stronger the shaking). | Very strong shaking—Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. |
| D ₁ | Light Orange | | |
| D ₂ | Orange | | |
| E | Red | Near major active faults capable of producing the most intense shaking. | Strongest shaking—Damage considerable in specially designed structures; frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. Shaking intense enough to completely destroy buildings. |
| * Abbreviated descriptions from The Modified Mercalli Intensity Scale. | | | |
| Source: https://volcanoes.usgs.gov/observatories/hvo/hazards_earthquakes.html | | | |

Figure 5.4 Mapped Ground Motion Hazard Values: Hawai'i Island



5.1.5.2.2 Potential Effects

The proposed facilities would be designed to survive the shaking that would result from an earthquake with a 2% probability of occurring within a period of 50 years as indicated by the maps in Figure 5.3 and Figure 5.4. Because the amount of time that engineers estimate would be required to relocate the battery storage units that are used for the proposed project using equipment that is normally available on the Island of Hawai'i is less than the time that it would take lava to reach the site were Hualalai to erupt, the battery packs have a very low likelihood of being damaged. Much of the other electrical equipment that would be installed is less portable and would be destroyed in the unlikely even lava were to overrun the site.

5.2 LAND USE AND LAND USE REGULATIONS

5.2.1 LAND USE AND LAND USE REGULATION

As discussed above in Section 3.2, the project site is in the State Urban District on land that the County of Hawai'i has zoned General Industrial (MG). The proposed facilities are permitted uses (with plan approval) in that zoning district. Uses on the land immediately adjacent to the project

site are principally associated with the operation of the Keahole Generating Station, and the proposed use of the property for the BESS project is compatible with those uses.

5.2.2 FLOOD AND TSUNAMI HAZARDS

The project site is outside the tsunami inundation zone. It is located within FEMA Flood Zone X (i.e., an area of minimal flood hazard, which are the areas outside FEMA's Special Flood Hazard Area and higher than the elevation of the 0.2-percent-annual-chance flood). As such, no additional design features required.

5.2.3 NOISE

5.2.3.1 Existing Sound Levels

No on-site acoustical monitoring has been conducted for the proposed project. Information contained in environmental documents that have been prepared for the Keahole Generating Station indicate that sound levels resulting from operation of the existing facilities are below the regulatory limit (70- L_{eq}).

5.2.3.2 Potential Effects on Sound Levels

The BESS and interconnection facilities that would be installed and operated as part of the proposed project are not significant noise sources. The audible noise of the battery modules, measured at 1 meter from any side surface of the enclosure, is <75 dBA at full performance. Assuming a 6 dBA decrease for each doubling of the distance, sound levels from them would be below 50 dBA at the nearest external property boundary. This is too little to affect (i.e., increase) the cumulative sound level at the property line. Hence, operational sound levels would remain below the 70-dBA maximum permissible property line sound limit specified in HAR §11-46-3 for boundaries with industrial (i.e., Class C) uses.

The kind of construction activities needed to install the proposed facilities on the existing site are relatively quiet. Hence, it does not appear as though a construction noise permit will be needed.

5.2.4 ROADWAYS AND TRAFFIC

5.2.4.1 Proposed Roadway Access

Existing road access to the Keahole Generating Station is via either (a) Pukiawe Street, which runs parallel to Queen Ka'ahumanu Highway and is accessed via Kaimanani Drive; or (b) a 16-foot-wide, paved roadway that intersects the mauka side of Queen Ka'ahumanu Highway approximately 50-feet north of Keahole Airport Access Road. Once entering the site via a gate located approximately 800 feet uphill of the intersection, vehicles would travel on existing paved driveways along the northern and eastern sides of the property before entering the 0.2-acre area that has been set aside for the project from the south.

The battery module units that are at the core of the design would be produced at our Battery Partner's facilities in Nevada. From there they would be transported on flatbed truck to the Port of Oakland, California, where they would be loaded into 40-foot High Cube shipping containers for ocean transport to Hawai'i. The most likely route would be through Honolulu, where they would

be transshipped to Kawaihae Harbor, offloaded, and then moved by truck via Queen Ka'ahumanu Highway the approximately 28 miles to the project site. Other major equipment, such as transformers, will take a similar logistical route from their respective points of origin to the project site.

The proposed facilities will generate fewer than five (5) vehicle-trips per day once they are fully operational. Most of those trips will be made by passenger cars and light-duty utility vehicles. Larger vehicles will only be needed on those occasions when battery packs and/or sub-elements must be swapped out.

Delivering the battery module units (9), small transformers (5), and large transformers/switchgear to the site will require fewer than 20 vehicle-round-trips. Their dimensions and mass are such that oversize vehicles will not be required.⁵ Construction workers will also travel to and from the site during the construction period, but the total number of project-related vehicle-round-trips is unlikely to exceed 50 per day and would generally be much lower than that.

5.2.4.2 Impact on Transportation Service Levels

The total number of containers needed to ship the equipment to O'ahu (fewer than 15) represents an extremely small percentage of the more than 500,000 containers that pass through there each year. The deliveries would constitute a higher fraction of the traffic to Kawaihae Harbor, but even there their delivery would amount to no more than 0.03% to 0.04% of the total and would not adversely affect the performance of the port.

Because of the small number of vehicle-trips that are involved, they would not have a significant adverse effect on the level of service on Queen Ka'ahumanu Highway.

5.2.5 PUBLIC UTILITIES

The proposed facilities would facilitate Hawai'i Electric Light's delivery of reliable, economical electrical service to the people of the island. It would not use potable water or otherwise affect water supply facilities on the island. The facilities would use Hawai'i Electric Light's own telecommunications network and would not, therefore, burden the island's existing telecommunication network.

5.3 SOCIO-ECONOMIC CHARACTERISTICS

The site is within the boundaries of the existing generating station and is largely vacant. No existing uses will be displaced by the project. Therefore, there will be no direct adverse effects on socio-economic characteristics of the area. The project will not conflict with or otherwise interfere with adjacent land uses or economic activity. The proposed BESS is compatible with, and intended to support, existing use of the area and island. Aside from the temporary and relatively minor construction employment and expenditures, the project would not stimulate or otherwise promote population growth or economic activity. Thus, the project is not anticipated to have a significant effect on the socio-economic environment of the area.

⁵ Each battery module is 23'-5" long, 5'-3" wide, and 8'-3" tall. The standard shipping weight is approximately 43,500 pounds. The battery modules fit into ISO-668, 40-foot, high-cube containers for shipping.

5.4 AESTHETIC/VISUAL RESOURCES

There are several reasons why the proposed project does not have the potential to significantly affect aesthetic or visual resources:

- The proposed facilities are limited in area and short in height.
- They are small compared to other existing facilities at the Keahole Generating Station.
- Finally, the project site is internal to the existing power plant site and is located far away from public vantage points.

Given the characteristics of the proposed facility and the points listed above, the project would not have a significant impact on aesthetic or visual resources.

5.5 SOLID WASTE

The proposed batteries have a life expectancy of ten (10) years. The battery modules are field-replaceable units that integrate twelve battery trays, an isolated DC/DC converter, fusing and battery management system functions. Our Battery Partner is developing facilities that will allow its batteries to be returned to its manufacturing facility so that many of the materials they contain can be reused. Where that is not possible, it is committed to disposing of waste materials in an environmentally responsible way.

The cells in the battery modules are composed mainly of lithium metal oxides. Our Battery Partner is utilizing Nickel Manganese Cobalt chemistry battery (NMC) technology in its battery module product. It takes up more space than the technology used in its electric car batteries but has a longer cycle life.⁶ They are manufactured in the United States, where there are strict environmental laws. The cells meet the requirements set forth by the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment 2002/95/EC (commonly referred to as the Restriction of Hazardous Substances Directive or RoHS). They do not contain hazardous materials such as Lead, Mercury, Cadmium, Hexavalent chromium (chromium xxx or Cr6+), Polybrominated biphenyls (PBB), or Polybrominated diphenyl ether (PBDE). The battery module's lithium ion cells contain no heavy metals, nor any toxic materials and could, therefore, be disposed of in landfills. However, our Battery Partner is committed to recycling and Hawai'i Electric Light has indicated that it will recycle batteries that are used at this site. Based on the expected operation and design of the facility, battery modules are not anticipated to require disposal. If battery modules require replacement, our Battery Partner or a licensed battery disposal contractor will be used to remove the modules.

Day to day operation of the facility will not produce large volumes or unusual types of solid waste. All wastes generated will be collected and properly disposed.

The project, with the committed recycling of the batteries, will not have a significant impact on solid waste collection activities or landfills.

⁶The term "cycle life" is defined as the number of times a battery can charge/discharge before its maximum charging rate drops below 80%.

5.6 HAZARDOUS MATERIALS

5.6.1 EXISTING CONDITIONS

No recent site-specific investigations of subsurface conditions have been conducted. Our Battery Partner's review of the EPA EnviroMapper database did not identify any cases of soil or water contamination. However, it suggested that given the historical industrial use of the property and the fact that demolition/removal of an existing storage structure may be required, it might be advisable to conduct a Phase 1 Environmental Site Assessment (ESA).

5.6.2 POTENTIAL EFFECTS

As indicated in Section 5.5 above, the cells in battery modules are composed mainly of lithium metal oxides, utilizing Nickel Manganese Cobalt chemistry battery (NMC) technology. The cells meet the requirements set forth by the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment 2002/95/EC (commonly referred to as the Restriction of Hazardous Substances Directive or RoHS). They do not contain hazardous materials such as Lead, Mercury, Cadmium, hexavalent Chromium (Cr6+), polybrominated biphenyls (PBB), or polybrominated diphenyl ether (PBDE). Our battery module's lithium ion cells contain no heavy metals, nor any toxic materials. Therefore, the batteries themselves will not have an adverse effect on the subject property.

Limited quantities of cleansers and lubricants may be utilized during operation of the facility. These materials will not be stored on the site in large quantities and will be employed in compliance with safety data sheets (SDS) recommendations. Given these factors, the effects of utilizing cleansing materials will not be significant.

5.7 WATER QUALITY

5.7.1 EXISTING CONDITIONS

Because of the project site's limited areal extent and the relatively low rainfall (10-20 inches per year)/high evaporation that is characteristic of the area, the amount of groundwater recharge that occurs on the property is small. Most rainfall events produce little surface runoff and little groundwater recharge. Instead, the water replenishes soil moisture and is eventually returned to the atmosphere through evaporation. There are no defined surface water features on or near the site. It is makai of the Underground Injection Control (UIC) line established by the State Department of Health and regulated by the underground injection control (UIC) program (HAR §11-23).

5.7.2 POTENTIAL EFFECTS

Appropriate design of the foundations for the BESS units and related equipment will allow them to be installed without increasing the amount of runoff from the design storm. Use of generally accepted storm drainage best management practices is likely to result in no change in stormwater runoff from the 0.2-acre site. Stormwater runoff from whatever additional impervious surfaces are created will be collected by a system of swales and channeled to one of more stormwater

retention/infiltration basins designed to meet County standards. Because of the retention that will be provided, groundwater recharge is likely to equal or exceed the amount that presently occurs.

The proposed facilities do not require water for their operation and maintenance. While some water may be used for dust control during construction, the amounts are small, would be limited to no more than a month or two, and do not have the potential to affect water quality.

5.8 PUBLIC SAFETY SERVICES

5.8.1 FIRE PROTECTION

The battery module system proposed for this project portfolio is an evolution of our Battery Partner's field-proven battery module solution and is designed to meet NFPA 855, UL9540, and other important fire safety and testing protocols. According to our Battery Partner, their battery modules undergo rigorous testing to standards such as UL 1973 and IEC 62619 that ensure the battery modules are resistant to single cell thermal runaway propagation. This virtually eliminates all likelihood of a thermal event originating from an internal product failure. The company reports that as of the end of 2018, our battery partner has deployed over 1.5 GWh of energy products globally without a single recorded thermal runaway event.

To create a significant fire, the enclosures would need to be subject to an extreme external event, such as direct exposure to a large prolonged fire or severe physical impact. The design of the proposed facility makes this extremely unlikely to occur at Keahole. In the event there were to be a fire, full-scale fire testing has shown that the unit would burn in a safe and controlled manner, consuming itself slowly without explosive bursts or unexpected hazards, and without propagating to neighboring units. The battery modules include dedicated deflagration vents built into the thermal roof to mitigate damage to the equipment and surrounding personnel and exposures in case of hazardous thermal runaway or arc flash events. Hazards are vented upwards, ensuring the front doors remain closed to protect personnel and exposures. The cells used in our battery partner's products do not contain solid metallic lithium and thus do not react with water.

5.8.2 POLICE PROTECTION

The facilities will be in a fully fenced area with a locked gate. Their presence will not impose a measurable burden on the Hawai'i County Police Department. The site will be remotely monitored by Hawai'i Electric Light which will dispatch security personnel if needed to investigate suspicious activity.

5.8.3 MEDICAL SERVICES

The proposed facilities do not constitute a significant health risk. Should an accident occur, those injured can receive emergency attention at several facilities located on the island. The nearest hospital emergency room is located at the Kona Community Hospital. The facility, which attained Level III trauma center designation in 2011, provides resources for emergency resuscitation, stabilization, emergency surgery and intensive care of trauma patients. Located at 79-1019 Haukapila Street in Kealahou, the hospital is approximately 18 miles south of the project site.

5.9 RECREATIONAL RESOURCES

There are no parks or other significant recreational resources within a mile of the project site.

5.10 POTENTIAL CUMULATIVE AND SECONDARY IMPACTS

The additional electrical storage that the subject project will provide supports but does not necessarily accelerate or directly result in achieving the State of Hawai'i's renewable energy goals or increase the likelihood of either residential or commercial scale solar energy projects. The impacts associated future commercial scale solar energy projects or other related developments will be disclosed in separate documents, should they occur.

Similarly, the proposed project supports but does not directly result in Hawai'i Electric Light's achieving its goals of decommissioning certain fossil fuel generating stations. The impacts associated with future decommissioning and potential alternative use of existing fossil fuel generating stations will be disclosed in separate documents, should they occur.

CHAPTER 6 CULTURAL RESOURCE IMPACTS

Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological inventory survey of the 14.998-acre Keahole Generating Station site, including the property on which the BESS facilities would be constructed, in June 1992. The survey was conducted along north-south and east-west transects that were a maximum distance of 66 feet apart. The report is reproduced in Appendix G (Volume II) of the Draft EIS for the Keahole Generating Station project. This section draws on that information.

PHRI examined existing archaeological and historical literature relevant to the project area, including fourteen archaeological studies that been conducted in the project area between 1973 and the 1992 and additional studies in the North Kona District. A detailed Cultural Impact Assessment (CIA) and Archaeological Inventory Survey (AIS) has not yet been conducted to support the proposed project.

Four archaeological sites were identified in the project area during the survey. All were pahoehoe excavations that were interpreted to have been prospect pits rather than productive quarries. These site types had not been previously documented in Kalaoa, but they are widespread elsewhere in the Kona District. PHRI's report concluded that it is likely that the pahoehoe excavations are related to periods of prehistoric occupation.

Based on the National Register criteria for evaluation, the archaeological remains found within the proposed project area were determined to be significant solely for information content. These four sites were assessed as being of low significance for research value, interpretive value, and cultural value. The sites were measured, mapped, described, photographed, and their locations transferred onto a topographic map. Because the information recovered is considered sufficient, no further work was recommended for these sites.

Following extensive public and agency review of the proposed Keahole Generating Station project, the project was authorized and the existing facilities were developed. Given its history and longtime use for power generation, which involves controlling access to the site, the project area does not appear to be associated with traditional cultural practices for subsistence and religious purposes, and does not appear to provide access to other areas used for exercising those practices (i.e., gather of plant and marine resources; presence of burials, historic properties and storied places; documentation of trails, etc.). There is no specific documentation of plant gathering within the project area during traditional Hawaiian times and no ongoing practices related to traditional gathering have been identified and are unlikely given the present use of the property.

6.1 POTENTIAL IMPACTS

The project will not have an adverse effect on any historic or cultural resources or practices. The entire project site has been previously disturbed, and no historic resources are present.

6.2 MITIGATION MEASURES

Although there have been archaeological explorations conducted in the area, it is noted that there still exists the potential to uncover archaeological artifacts or human remains during

ground disturbing activities. There is a low potential for unrecorded subsurface deposits due to the extensive subsurface disturbance associated with development of its present use. Thus, archaeological construction monitoring is not deemed necessary, but the following mitigation measures would be implemented during the construction of the proposed project:

- If cultural materials are discovered during construction, all earth-moving activity within and around the immediate discovery area will be diverted until a qualified archaeologist can assess the nature and significance of the find and SHPD will be notified as soon as possible.
- If human remains are discovered, Hawai'i Administrative Rules Title 13, Subtitle 13, Chapter 300 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and SHPD and the Hawai'i Police Department will be contacted. If discovery occurs on Saturday, Sunday or a holiday, the Division of Conservation and Resource Enforcement of the State DLNR will be notified.

CHAPTER 7 COMMUNITIES AND STAKEHOLDERS THAT MAY BE AFFECTED

No communities would be directly affected by the proposed project as there are no existing developments, uses, or activities other than power generation and transmission occurring on the project site currently.

Communities that would be indirectly affected include:

- Those able to see the facility from their homes, places of business, or when travelling in the area. As discussed, in Section 5.4, visual impacts would be nominal as the area is remote and does not appear in identified view planes.
- Travelling public on roads that would be utilized for delivering equipment to the site during construction. The impact will be temporary and not significant, as discussed in Section 5.2.4.2.
- Hawai'i Electric Light rate payers. Rater payers may be indirectly affected as the project could assist the company achieve the renewable energy goals and decommissioning of fossil fuel powered generating stations.