

October 5, 2019

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FAI Project No. 19-1530

Subject: Groundwater Impact Assessment for the Proposed Waiawa Solar Project,
Portion of Tax Map Key (TMK) Number: (1) 9-6-004: Parcel 024, Waiawa, Oahu,
Hawaii

Dear Ms. Motosue:

Ford & Associates, Inc. (FAI) is pleased to present this groundwater impact assessment for the proposed Waiawa Solar Project, Portion of TMK Number: (1) 9-6-004: Parcel 024, Waiawa, Oahu, Hawaii (herein referred to as the "site").

PURPOSE

The purpose of this project is to provide a groundwater impact assessment for the proposed Waiawa Solar Project.

BACKGROUND

The site is an irregular-shaped area approximately 200 acres in size, located along the eastern-central portion of the parcel, and is owned by Kamehameha Schools (KS). The site is in the State Land Use urban district and zoned as *AG-1 Restricted Agriculture*. The site is currently vacant and primarily covered by overgrown scrub vegetation.

Waiawa Solar Power LLC (Waiawa Solar) intends to construct a solar project at the site, which is within the Waiawa Shaft groundwater recharge area or zone of contribution.

In 2013/ 2014, a previously proposed solar farm project (by SunEdison) for the subject parcel, including the current site, was accepted by Kamehameha Schools, the State Department of Health, and the Department of the Navy to proceed with construction. However, the Public Utilities Commission did not approve the Power Purchase Agreement and SunEdison declared bankruptcy, therefore the solar farm was not built.

Groundwater Conditions

The Aquifer Identification and Classification for Oahu: Groundwater Protection Strategy for Hawaii (Mink, J.F. and L.S. Lau, 1990), published by the Water Resources Research Center at the University of Hawaii, was reviewed for information on groundwater conditions below the subject property. The report describes the aquifer below the subject property as part of the Waiawa Aquifer System of the Pearl Harbor Aquifer Sector, on the Island of Oahu.

The aquifer below the subject property is an unconfined basal aquifer of the flank type, occurring in horizontally extensive lavas. Its status is described as an irreplaceable drinking water supply with fresh salinity (<250 mg/L Chloride) that is currently used. The groundwater in this aquifer has a high vulnerability to contamination.

The site is located above the State of Hawaii Department of Health (HDOH) Safe Drinking Water Branch defined Underground Injection Control (UIC) line. Areas above the UIC line generally denote potential underground drinking water sources. Areas below the UIC line generally denote groundwater that is unsuitable for drinking water purposes. Consequently, the groundwater below the site is considered a potential drinking water source.

Waiawa Shaft Water Well

The Waiawa Shaft is an inclined "Maui-type" water well located in the Waiawa Stream gulch outside of the KS property, with the well head and pump house located approximately 300 feet east of the site at an elevation of approximately 130 feet above mean sea level (msl). The well shaft extends toward the site and along the eastern boundary, and the bottom of the well (infiltration tunnel) projects below the eastern portion of the site. According to the State of Hawaii, Department of Land and Natural Resources (DLNR), Commission on Water Resource Management *Ground Water Well Index / Summary* map and database (2013), the Waiawa Shaft is designated as Well No. 3-2558-010. The depth of the shaft is approximately 170 feet below ground surface. The well was constructed in 1951 and is owned/used by the United States Navy Public Works Center. The use of the well is listed as "Military."

The elevations across the site range from approximately 550 feet to 240 feet above msl. Based on historical groundwater measurements, the depth to the surface of groundwater table is assumed at approximately 25 feet above msl. Based on these elevations, there is approximately 215 to 525 feet of soil and weathered lava flows/bedrock between the site and the surface of the groundwater table.

DOCUMENTATION REVIEW AND ASSESSMENT

The following documents were reviewed in order to assess potential groundwater impact (if any) of the proposed Waiawa solar project to the Waiawa Shaft zone of contribution.

- Site Plan (Preliminary-Not for Construction), Waiawa Phase I-East Solar by Revamp Engineering, Inc.
- Waiawa Solar Power, Application for Conditional Use Permit (Minor), DRAFT by G70 International, Inc., July 2019.
- Letter to the Navy from Clearway Energy, July 22, 2019.
- Waiawa Solar Farm Preliminary Civil Engineering Conditions, G70, July 19, 2019
- Letter to Kamehameha Schools from Hawaii Department of Health (HDOH), March 28, 2019.
- Letter to Joint Base Pearl Harbor-Hickam (JBPHH) from Kamehameha Schools, November 26, 2013.
- Letter to Kamehameha Schools from Department of the Navy/JBPHH. Ser JB00/0623, May 28, 2014.
- Letter to Clearway Energy Group from Department of the Navy, September 30, 2019.

General Project Description and Characteristics

The site is located along the southwestern boundary of the Waiawa Shaft zone of contribution. The site generally slopes from the northeast (mauka) to the southwest (makai) with elevations ranging from approximately 550 feet to 240 feet above msl.

The photovoltaic (PV) solar panels (estimated to be between 110,000 to 135,000 panels) will be placed on the flatter, more gradually sloped areas on the ridgeline in contrast to the more steeply sloped areas. The project's associated interconnection equipment (substation, battery energy storage area and control building) is tentatively located along the western boundary of the site. The heights of the panels will not exceed 18 feet above grade, while the battery storage area, associated equipment and control building will not exceed 15.5 feet. The associated equipment will be located within a fenced area.

Equipment will be mounted on equipment pads or concrete footers. The battery storage area will consist of multiple enclosures within an approximately 2 acre area, which will include fire suppression mechanisms, telecommunications and heating, ventilation and air-conditioning (HVAC) systems.

The project batteries will be lithium-ion batteries and do not contain any liquid that can spill or leak. The cells use dry-cell technology and are comprised of chemicals in powder form. Batteries will be housed within steel enclosures. Concrete pads will be constructed under each of the battery enclosures.

PV panels will be mounted on a single axis tracker racking system made of steel and aluminum construction. Based on preliminary design criteria, there may be approximately one structural pile for every ten PV panels. The foundations are comprised of galvanized steel I-beam style piles that are driven directly into the ground. The PV panels produce direct current (DC) which then will input into inverters to convert the electricity to alternating current (AC) power. The AC power system will be mounted on a concrete pad or steel skid.

During construction activities, appropriate Best Management Practices (BMP's) will be utilized for fugitive dust, noise, and stormwater runoff and drainage.

Clearing, grubbing and grading of the site will be conducted during construction activities. However, earthwork will be limited to leveling for access driveways, equipment pads, substation/battery storage, and for smoothing of contours, as necessary, for installation of the PV racks.

The project is not expected to increase stormwater flows. The site will continue to be mostly grassy areas. These areas will be mowed and no chemicals will be used to control the grassy areas.

No lubricants, coolant fluids or other liquid chemicals will be used in the maintenance and operation of the inverters, medium-voltage transformers or battery storage area. The high-voltage transformers will utilize a soy-based vegetable coolant (ester dielectric fluid) identified by the trade name *Envirotemp FR3*. The oil is not composed of hazardous material.

The PV panels are not pollution generating surfaces. Cleaning of the PV panels will only use water and occur once or twice a year.

Fire suppression will not involve water. The proposed fire suppressant is *FM 200 NOVEC 1230* (or similar product). It is not a fire fighting foam but a lightly pressurized liquid that turns into a gas immediately upon contact with the air.

The high-voltage transformer will be equipped with a spill containment area. The containment system would be designed to temporarily contain discharge. The medium-voltage transformers used at the inverter skids will be dry type transformers and will not require any secondary containment.

HDOH Acceptance of the Proposed Solar Project

The HDOH stated in a response letter to Kamehameha Schools dated March 28, 2019 that *“the proposed solar farm should have minimal or no impact on ground water”* and that *“the operation and construction of the proposed solar farm is acceptable to the DOH-EMD and HEER Office”*.

2014 Department of the Navy Acceptance of Previous (SunEdison) Proposed Solar Project

In a response letter from the Department of the Navy/ JBPHH to Kamehameha Schools dated May 28, 2014, for a previous solar project at the site, the Department of the Navy stated that *“all of our concerns have been adequately addressed and we agree that the proposed solar farm development is a compatible land use within the designated ZOC.”*

2019 Department of the Navy Support of the (Clearway) Waiawa Solar Project

In a response letter from the Department of the Navy/ JBPHH to Clearway Energy Group dated September 19, 2019, the Department of the Navy stated that they are *“supportive of the effort to supply clean, renewable energy for the island of Oahu”* and *“presents an acceptable approach towards protecting against contamination of groundwater within the Waiawa Pumping Station’s ZOC.”* In addition, the Department of the Navy stated that any material changes made to the project, *“in particular, the contamination mitigation measures, the Navy should be notified.”*

CONCLUSIONS

Based on the review of the aforementioned documents, the proposed solar project will not use lubricants, coolant fluids or other liquid chemicals in the maintenance and operation of the inverters, medium-voltage transformers or battery storage area. The high-voltage transformers will utilize a soy-based vegetable coolant. In addition, the fire suppression system will not use water or foam but a lightly pressurized liquid that turns into a gas immediately upon contact with the air. Therefore, there would be minimal impact to the ground surface from the construction, operation or eventual decommissioning of the project.

Associated equipment, substation, battery storage area, and transformers will be mounted on concrete pads, footers, metal skids, and/or other containment. These methods are accepted best management practices for sensitive environments.

Clearing, grubbing and grading of the site will be limited to leveling for access driveways, equipment pads, substation/battery storage, and for smoothing of contours, as necessary, for installation of the PV racks. Maintenance of grassy areas within the site will utilize mowers and not chemicals or animals. Cleaning of PV panels will use water only and would be conducted once or twice a year. Therefore, the construction, operation and decommissioning of the

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proposed Waiawa solar project would have minimal or no impact to the Waiawa Shaft or the Waiawa Shaft zone of contribution. In addition, there is approximately 215 to 525 feet of soil and lava flows/bedrock between the site and the surface of the groundwater table, further limiting any potential for impacts.

This document is for the exclusive use of Ashford & Wriston, LLP and no other party shall have any right to rely on any service provided by FAI without prior written consent.

Sincerely,

A handwritten signature in black ink, appearing to read "D. P. Ford". The signature is fluid and cursive, with the first letter of each name being capitalized and prominent.

Daniel P. Ford, P.G.
Principal Geologist