

Waiawa Solar Farm

Waiawa, 'Ewa, Island of O'ahu
Tax Map Key: (1) 9-6-004:024 por.

Preliminary Civil Engineering Considerations

Prepared for:

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KS Exhibit 14

1 Project Description

The proposed Waiawa Solar Farm Project will be located on a portion of Kamehameha Schools (KS) property in Waiawa, 'Ewa, O'ahu identified as Tax Map Key No. (1) 9-6-004: 024. The solar farm project will be developed by Waiawa Solar Power LLC, a subsidiary of Clearway Energy Group LLC and is planned to generate approximately 36-MW of power (the "Project"). The Project will be constructed within an approximately 200-acre easement area (the "Project Site") as shown on [Figure 1 – Site Plan]. The Project Site is within the 1,395-acre area that was reclassified by the State of Hawai'i Land Use Commission from the Agricultural District to the Urban District by action taken in 1988 (the entire 1,395-acre area being referred to as the KS Property) The actual solar farm footprint will vary in size, depending on existing topography and system design and layout, but will be contained within the easement area within the State Land Use Urban District, and located over the area designated as the Waiawa Shaft Zone of Contribution ("ZOC").

Photovoltaic modules (PV Panels) will be mounted on steel racks which are anchored to the ground on piers. The racks will be fixed to the piers and will rotate from east to west throughout the day to follow movement of the sun across the sky. Groups of racks will be arranged and combined to deliver power to inverters which will be mounted on concrete pads. Power will be transmitted from inverters to a dedicated Project substation and battery storage system located near the north edge of the Project Site. A 46kV overhead electrical line will transmit power from the substation and battery storage to the point of interconnection (POI) into HECO's existing 46kv transmission line. The POI is proposed to be directly west, across the gulch near the Ka Uka Blvd exit of H-2 Freeway. The gentle alignment crosses the gulch immediately north of the Project Site and follows the top-of-bank westward to the POI.

Infrastructure improvements required for the solar farm include: substation with a building area under 500 square feet, transformers, battery storage system (fully contained, modular enclosures on roughly 1.5 acres of land within the Project Site), approximately 110,000 to 134,400 PV panels, pad mounted inverters and electrical equipment, access driveways, perimeter fencing, security systems, and drainage and vegetation improvements.

2 Access

The proposed access point for construction traffic, including trucks and employees' personal vehicles, is at Ka Uka Boulevard-Mililani Cemetery Road, mauka of the H-2 Freeway, which connects to Waiawa Prison Road. Figure 1 shows the access roads to the Project Site. The Project Site is within 1,395 acres of Urban District lands that are owned by Kamehameha Schools (KS Property). Access to the KS Property is over existing roads and through an existing driveway. As shown, minor road improvements are proposed south of Waiawa Prison Road west of the Project Site that would provide two points of connection to the Project. The primary entrance and gate will be located on the southern end of the Project Site, approximately three (3) miles from the Ka Uka Boulevard interchange. A secondary access point to the Project Site is along an existing 20-foot wide road, approximately 3,000 feet north of the primary entrance and gate. Once operational, employee and maintenance vehicles may access the KS Property and Project Site from a private road connection on Waihona Street via Kamehameha Highway.

3 Grading and Drainage

In general, the solar farm will be located on the ridgelines where the former tilled sugar cane fields were located. Based on available topographic information, the Project Site generally slopes mauka to makai. Elevations range from 550 feet to 240 feet above mean sea level (MSL). Optimal placement of the PV panels will be on the flatter, more gradually sloped areas on the ridgelines and away from the steep ravines that slope into to the adjacent gulches.

Clearing, grubbing and grading will be needed on the Project Site for placement of the solar panels, equipment, facilities, access driveways, fence and vegetated buffer. In general, the steeper areas of the Project Site will be avoided, and PV racks will be concentrated in areas of more gradual slopes. The initial rough estimates of potential earthwork volumes for the Project contemplated roughly 350,000-400,000 cubic yards of balanced cut/fill across the Project Site in order to construct access driveways, equipment pads, substation/battery storage pads and to install the tracking-type PV racks on relatively consistent slopes. It is anticipated that the earthwork volumes and related construction costs will be minimized by optimal placement of the PV racks by following the existing grades and elevations. Where possible, the existing agricultural roads will continue to be utilized for access. All grubbed material not reused on the site will be hauled off-site. No foreign or organic material will be used as fill material.

Grading at the Project Site will be in accordance with the Revised Ordinances of Honolulu (ROH) Chapter 14, Articles 13-16. Pursuant to the grading ordinance, a geotechnical engineer will provide cut and fill recommendations prior to design and testing/observation during construction.

Permits and approvals will be required from the State of Hawai'i and the City and County of Honolulu (C&C) to allow grading and grubbing of the site including:

- State of Hawai'i Department of Health (DOH) - NPDES General Permit for Construction Activities, Notice of Intent (NOI-C)
- City and County of Honolulu - Grading, Grubbing and Stockpiling Permit

The applications for both State and C&C grading and erosion control permits identified above require agency review and approval of Grading Plans, Erosion and Sediment Control Plans with temporary Best Management Practices (BMPs), a Storm Water Pollution Prevention Plan, and Drainage Reports that discuss permanent BMPs.

4 Stormwater Quantity Management

Since the solar farm is located on the ridgelines, the Project Site is generally not subject to runoff from offsite areas mauka of the site. Existing runoff currently exhibits sheet flow or shallow concentrated flow into swales that discharge toward adjacent, downstream areas. Existing drainage patterns will not be altered in this Project and 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.

Addition of impervious area from concrete equipment pads, equipment buildings and micro-pile/pier foundations will be minimal. Due to the even distribution of impervious area throughout the Project Site, slight leveling of driveway areas, and use of gravel driveways, the increase in impervious area is not anticipated to increase runoff rates. As a result, there will not be a significant pre-development to post-development increase in stormwater flows due to the construction of the Project. Any increase of stormwater generated within the Project Site will be detained within the Project Site. If required, diversion channels will be constructed with check dams, drop structures or other velocity reducing controls prior to discharge back into the natural drainage features.

Onsite stormwater will be properly directed away from equipment pads and any other structures to minimize erosion. Drainage channels with velocity reduction controls will be constructed in which water will flow through stormwater basin(s) and/or other volume control facilities. The volume control facilities will be situated at the proper downstream locations and will discharge back into the natural drainage features with non-erosive velocities.

5 Stormwater Quality Management

BMPs are required to be implemented for the Project through the grading and erosion control regulations and permits required by the State and C&C agencies. Temporary BMPs are required during construction activities and will remain in place until permanent BMPs can be established. Temporary erosion control measures will be incorporated during the construction period to minimize soil loss and erosion hazards. It is anticipated that the erosion control BMPs to be used on-site may include the following (pending final design):

- Preservation of natural vegetation
- Minimizing areas of clearing and grubbing
- Utilization of vegetated buffers
- Temporary soil stabilization with grass and/or mulch
- Silt fences/fiber filtration tubes
- Gravel bag berms/check dams
- Stabilized construction entrances
- Sediment traps and basins
- Temporary diversion swales and ditches
- Dust control – water application and/or dust screens

Due to the size of the Project, the above temporary BMPs will be implemented in a phased manner through grading increments as required by the regulatory agencies. Details on the grading increments and related BMPs will be shown on the Grading Plans and Erosion and Sediment Control Plans.

Permanent erosion control BMPs will also be incorporated into the design and are required to close out grading and erosion control permits. Typically, permanent BMPs primarily include final stabilization of exposed soils through landscaping or installation of impervious surfaces including pavement and buildings. Additional BMPs are also typically required to provide treatment of stormwater runoff to remove pollutants. For solar farm projects, the total additional impervious surface is minimal, and the PV panels and project components are not pollution-generating surfaces. However, C&C regulations include minimum thresholds

for requirements related to installation of BMPs for stormwater quality based on total disturbed area regardless of the added impervious area or pollutant generation from a project.

C&C Civil Engineering Branch (CEB) is responsible for interpreting and approving BMP and drainage system designs. For solar farms, CEB has been defining the project's disturbed area as all the area within the project fence line, regardless of actual ground disturbance. This determination results in the solar farm project being classified as a Priority A project that triggers the low impact development (LID) requirements defined in the Department of Planning and Permitting Administrative Rules Title 20, Chapter 3. The City, however, treats solar farms on a case-by-case basis and will not impose LID requirements if adequately demonstrated that the proposed condition does not adversely impact onsite stormwater quality. The Project is not anticipated to adversely impact stormwater quality because the Project Site will continue to be mostly grass following construction.

6 PV Panel Maintenance

During operations, the Project Site would be largely unoccupied. Panel cleaning will typically occur a couple of times per year, depending on rainfall. It is anticipated that the panels will be cleaned with water delivered by truck to the Project Site unless a closer source of water is later made available. Cleaning solutions and other chemicals will not be used to clean the panels.

A variety of easily controlled grasses are anticipated to be used as a vegetated groundcover. The vegetated groundcover will be maintained through mechanical means, by utilizing zero-turn mowers and weed trimmers. Animals will not be used for grass control.

7 Noise Impacts

Noise impacts are regulated based on HAR Title 11, Chapter 46, which sets decibel limits to noise emanating beyond the property line. Allowable limits are based on time of day and zoning district of the Project Site.

The solar farm is a relatively passive operation. Although the racking systems are a tracking-type system, motors are small and will not generate noise that exceeds acceptable noise levels as limited in HAR Chapter 11-46. The electrical equipment does not include any mechanical or motorized equipment that will generate noise. There will be some minimal corona noise coming from the electrical equipment and battery storage equipment. Operation and maintenance activities may result in minimal vehicular noise from maintenance staff. It is not anticipated that operations at the site would generate noise that exceeds acceptable noise levels.

During construction, noise levels are likely to increase as a result of earth moving equipment, installation of solar panels, construction vehicles and other construction activities. Noise generated from construction activities will comply with the regulations for community noise control in HAR Chapter 11-46. Due to the remote location of the Project and distance from communities it is anticipated that any impacts would be minimal. If necessary, noise permits will be obtained through DOH.

8 Air Quality

There are no direct air emissions from operating the solar farm. Operation and maintenance activities may result in fugitive dust or tailpipe emissions from vehicular traffic and landscape maintenance. However, it is not anticipated that the operations at the Project Site would adversely affect air quality.

During construction, there will be short-term impacts in the form of exhaust from increased traffic and fugitive dust generated by the construction activity. Temporary BMPs will be used to mitigate impact from fugitive dust during construction. These BMPs may include dust fences, windbreaks, watering of disturbed areas and other soil management measures. BMPs will be identified and included on the erosion and sediment control plans that are required for both C&C and State grading and erosion control permit approvals. Construction activities at the Project Site will comply with the regulations for fugitive dust control in HAR, Section 11-60.1.