Schatz Energy Research Center

Humboldt Bay Offshore Wind Heavy Lift Marine Terminal Project

Electrical Infrastructure and Green Port Preliminary Design Technical Memorandum

Date of Report: April 16, 2024

Recipient Organization: Moffatt & Nichol

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Submitted by: Schatz Energy Research Center

Disclaimer: This draft technical memorandum is a work-in-progress and is intended to be an internal document for use by the Humboldt Bay Offshore Wind Heavy Lift Marine Terminal Project team as a part of the conceptual design process and the ongoing permitting process. This memorandum is meant to be read as a part of a comprehensive packet of technical analyses. It is not written to be a standalone document and it is assumed that the reader has substantial project knowledge and context to understand the memorandum's content. All aspects of this memorandum are subject to change and may become less accurate over time. To better understand the project, please review the more comprehensive and up to date documents posted to the Humboldt Bay Harbor District's website at: https://humboldtbay.org/humboldt-bay-offshore-wind-heavy-lift-marine-terminal-project-3.

Introduction

This technical memorandum presents the preliminary designs for the electrical utility infrastructure and green port options for the Humboldt Bay Offshore Wind Heavy Lift Multipurpose Marine Terminal Project (Humboldt Wind Terminal). The areas covered in this memo include the electrical utility infrastructure, the Phase 1 and Phase 2 building substations and microgrids, and an offsite PV system at the local landfill.

For supporting documentation and detailed information refer to the following appendices:

A. *Integrated Capacity Analysis*
B. *Moffatt & Nichol - Redwood Marine Multipurpose Terminal Replacement Project - Electrical Distribution and Lighting Technical Memo*
C. *Schatz Energy Research Center - Humboldt Wind Terminal Preliminary Overall Electrical Plan*
D. *Overhead Pole Specifications*
E. *HelioScope Rooftop Annual Production Report*

F. *HelioScope Landfill Annual Production Report*
G. *California Regional Water Quality Control Board North Coast Region ORDER NO. R1-2017-0001 Waste Discharge Requirements*
H. *Landfill Solar PV Array - Concepts & Site Conditions*

Summary

A summary of the existing infrastructure and preliminary electrical designs are provided below.

Existing Utility Infrastructure

- the two 60kV transmission circuits feeding the Fairhaven substation have a capacity of 38MVA with a pre-project loading of < 90% (as of 2021)
- total load hosting capacity on the two 12kV lines leaving the Fairhaven substation is 15.05 MW, 7.27 MW to the south (1104 circuit) and 7.79 MW to the north (1103 circuit)
- the Fairhaven substation 12 kV circuits do not have the available capacity to meet the project's estimated full buildout load
- the project site is currently fed from PG&E 1103 circuit

Electrical Load Estimate

- the estimated site loads are approximately 10 MVA for phase 1 and 20 MVA for phase 2, for a combined buildout load of approximately 30 MVA (basis of design)

Electrical Infrastructure Preliminary Design

- at this time, the load hosting capacity of the Fairhaven 1103 circuit is 7.27MW, which may be adequate to feed Phase 1 of the project; however, with the planned buildout of this project as well as of the Town of Samoa and with the development of the Nordic Aquafarms project, an alternate design is being proposed.
- two 60 kV feeders will be routed overhead on ~60' tall steel double circuit poles from Fairhaven substations upgraded 60 kV switchyard to the project site, where they will transition underground and terminate at two 30 MVA substations within the project site
- the phase 1 (North) substation will be fed from one 60kV line during phase 1 and will be designed for the full buildout load (30 MVA). This substation can meet the entire sites load demand during all phases of the project, including the manufacturing buildout phase
- the phase 2 (South) substation will be fed by the other 60kV line installed during Phase 2 and will provide redundancy to the electrical system by establishing a primary selective 34.5 kV ring throughout the site

Building Substations and Microgrids

- for onsite renewable energy generation and site resiliency, grid-connected PV-battery-generator building microgrids are proposed at the site buildings
- the microgrids will provide energy cost savings through onsite renewable energy generation from rooftop photovoltaic systems, and will provide resiliency through short term backup power capability from battery energy storage systems and emergency power capability from natural gas generators during extended outages
- the potential aggregate nameplate DC capacity of rooftop PV systems on anticipated buildings for both phases is approximately 6.3 MW and has an estimated annual energy production of 7.1 GWh

- the preliminary nameplate DC capacity for the landfill PV system is 2.5 MW and has an estimated annual energy production of 2.9 GWh
- the combined PV power rating from all systems is ~ 8.8 MW of power with an estimated annual production of 10 GWh of solar energy

Offsite Landfill PV System

- a 2.5 MWDC, PV system is proposed for the Harbor District-owned solid waste landfill and will connect to the upgraded Harbor District 12 kV substation

Potential Opportunity for a Future Terminal-wide Microgrid

- a utility-scale battery energy system project is under developed west of the Fairhaven substation and could provide future site-wide resiliency beyond just supporting the battery (critical) loads

Electrical Utility Infrastructure

The Schatz Energy Research Center collaborated with Moffatt & Nichol (M&N) to develop a preliminary design for the electrical utility infrastructure and distribution system for the buildout of the terminal.

The Schatz Center was tasked to evaluate this portion of the local utility transmission system for the feasibility to meet the power requirements of the project with maximization of renewable energy and resiliency, and to develop a preliminary design for the delivery and distribution of that power to and throughout the project site. A preliminary design for the utility infrastructure required to serve the estimated site electrical loads is presented in this section and illustrated in the attached *Preliminary Overall Electrical Plan*. The plan shows the routing and general specifications of the electrical infrastructure required to feed power from the utility substation and future battery energy storage system to the proposed onsite terminal substations.

For information on the estimated site loads, overall design approach, and an electrical one-line drawing - overview of the electrical distribution system, refer to the *Moffatt & Nichol's Redwood Marine Multipurpose Terminal Replacement Project - Electrical Distribution and Lighting Technical Memo*.

The project is expected to require a significant power demand on a constrained portion of the local utility system and in an area of ongoing development. Planning and communications with the local utility company will be important to ensure adequate power capacity and the necessary new electrical infrastructure will be available to the site.

Existing Utility Infrastructure

The Samoa peninsula is currently fed by two PG&E 60kV circuits, the Humboldt #1 and Essex Junction-Fairhaven circuits, both of which terminate in PG&E's Fairhaven Substation located approximately 1/3 mile south of the project site. As of the end of 2021, the 60kV Humboldt #1 and Essex Junction- Arcata- Fairhaven circuits feeding the Fairhaven substation had a capacity of 38MVA with a pre-project loading of < 90%[1].

[1] CA North Coast OSW Study: Transmission Analysis, Quanta Technology, December 9, 2021

The Fairhaven Substation 60kV switchyard feeds a currently unused substation located in the north-west corner of the property directly south of the project site initially supplied power to the former Evergreen Pulp mill site and is currently owned by the Humboldt Bay Harbor, Recreation, and Conservation District. This line is tapped to feed the inactive Fairhaven biomass power plant located approximately 1/2 a mile southwest of the project site. See Figure 1 below for a single line diagram of the Humboldt Substation[2], which includes the configuration of the Fairhaven Substation 60kV system.

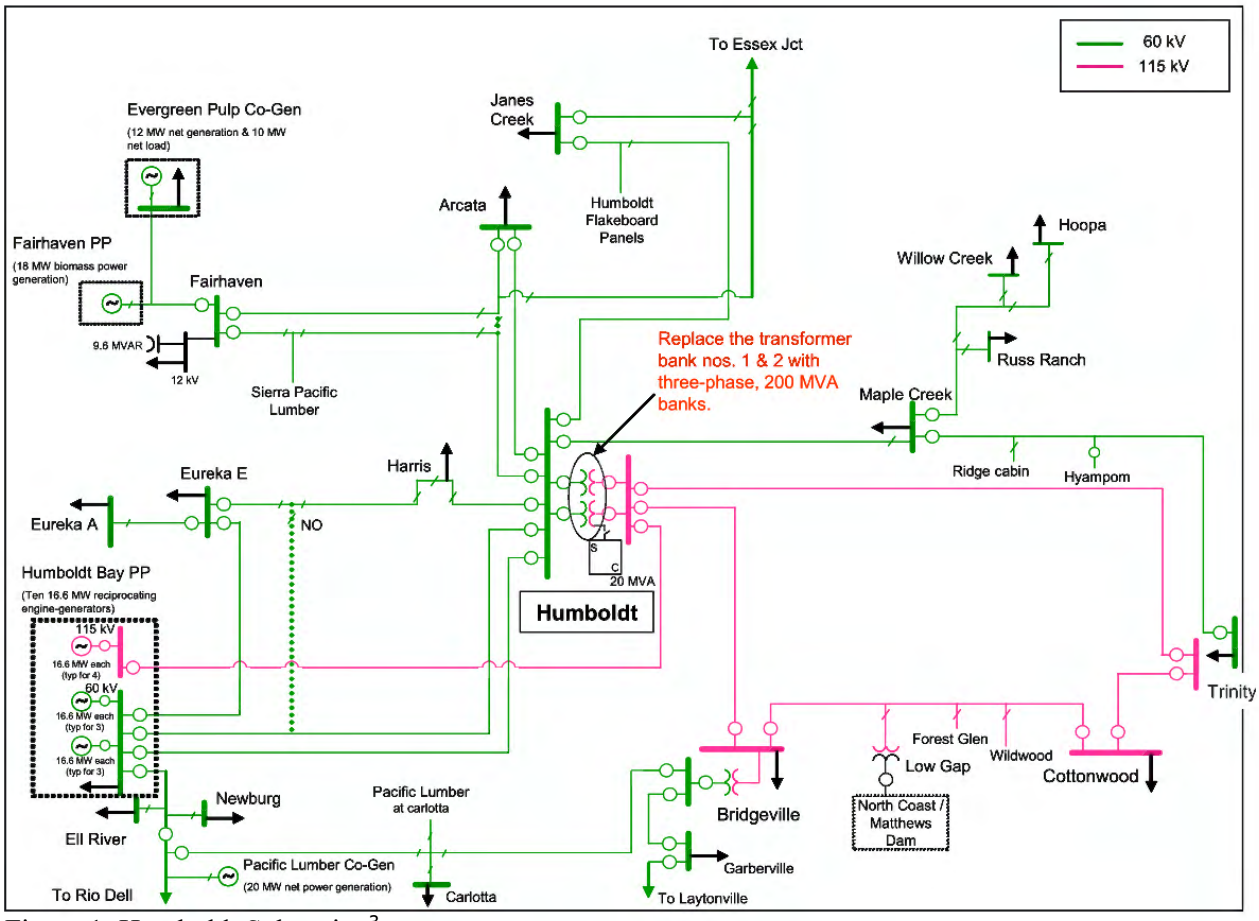

Figure 1: Humboldt Substation[3]

Two 12 kV lines, circuits 1103 and 1104 currently distribute power to the rest of the Samoa Peninsula from the Fairhaven Substation 12kV switchyard. An assessment of PG&E's Integrated Capacity Analysis maps was conducted to evaluate the available capacity on the local utility distribution system to accept additional project load and photovoltaic generation.[4] The results of

[2] PG&E's 2009 Electric Transmission Grid Expansion Plan (Formerly the 2008 Electric Transmission Expansion Plan, PG&E, March 5, 2009

[3] PG&E's 2009 Electric Transmission Grid Expansion Plan (Formerly the 2008 Electric Transmission Expansion Plan, PG&E, March 5, 2009)

[4] Customers are encouraged to use the Pre-Application process to get a general engineering review of a specific site without committing to a project application or queue. The ICA maps are designed to help contractors and developers find information on potential project sites for distributed energy resources. The maps show hosting capacity, grid needs, and other information about PG&E's electric distribution grid. The information on these maps is illustrative and it may not be representative of the current grid conditions.

this assessment show that at the time of this report the total load hosting capacity on the two 12kV lines leaving the Fairhaven substation is 15.05 MW, 7.27 MW to the south (1104 circuit) and 7.79 MW to the north (1103 circuit). The map also shows the PV hosting capacity on the 12kV system is 0.[5]

The project site is currently fed from PG&E 1103 circuit, a 12kV distribution line on wood poles, which currently transverses the project site from the Fairhaven substation 12kV switchyard in-route to feeding the town of Samoa. At this time, the load hosting capacity of the Fairhaven 1103 circuit is 7.27MW, which may be adequate to feed Phase 1 of the project; however, with the planned buildout of this project as well as of the Town of Samoa and with the development of the Nordic Aquafarms project, an alternate design is being proposed. A PG&E Service Application will be necessary to confirm load serving and PV generation capacity.

See the *Integrated Capacity Analysis* (Appendix A) for detailed information regarding existing electrical infrastructure.

Electrical Load Estimate

Estimates of the expected project electrical loads are presented in the Moffatt and Nichol Humboldt Marine Terminal – Electrical Loads and Lighting technical memo dated December, 2023 included in Appendix B. Given that the project is in the early stages of design and that the future facilities and their associated electrical loads are not known, a 10% contingency has been factored into the estimates. The maximum combined Phase 1 and 2 load estimate of 28.265 MVA will be used for planning and preliminary design phase of the project.

Electrical Infrastructure Preliminary Design

The electrical infrastructure has been designed to serve the site with redundant 60 kV lines from the Fairhaven substation. Each feeder is sized to independently supply the full buildout power of 30 MVA to new customer-owned project substations.[6] Refer to Appendix C - Humboldt Wind Terminal Preliminary Overall Electrical Plan for a plan view of the infrastructure routing and specifications.

While the Phase 1 load is estimated to be between 6.821 and 8.185MVA, the combined electrical load for Phase 1 and 2 of the project development is estimated to be between 22.267 and 28.265 MVA. For full project buildout, while individual Phase loads could be independently fed by a single 12 kV lines, this would require upgrade of the Fairhaven Substation transformer bank and 12 kV yard and would not provide redundancy in the power supply to the site; therefore, for planning purposes, it is assumed that redundant 60kV lines from the Fairhaven Substation will ultimately feed the site each independently capable of supplying power to the full site once built out. However, the preliminary design infrastructure footprint could easily support a 12kV service for Phase 1 and an upgrade to 70kV for Phase 2 if desired.

As shown in the Preliminary Electrical Plan, the utility infrastructure design consists of an overhead double-circuit 60kV transmission line on ~60’ tall steel poles to be constructed from an

[5] Integrated Capacity Analysis Map, PG&E

[6] Moffatt & Nichol’s Redwood Marine Multipurpose Terminal Replacement Project - Electrical Distribution and Lighting Technical Memo

upgraded 60kV switchyard at the Fairhaven substation to the project site. A 15-foot expansion of the existing Fairhaven-Evergreen Pulp-Fairhaven Power Plant 60kV PG&E easement will be required to accommodate this new transmission pole line. Once at the project southern boundary, the lines will transition underground and be routed to their prospective substation. See Figure 2 below for a typical 69kV overhead to underground transition.

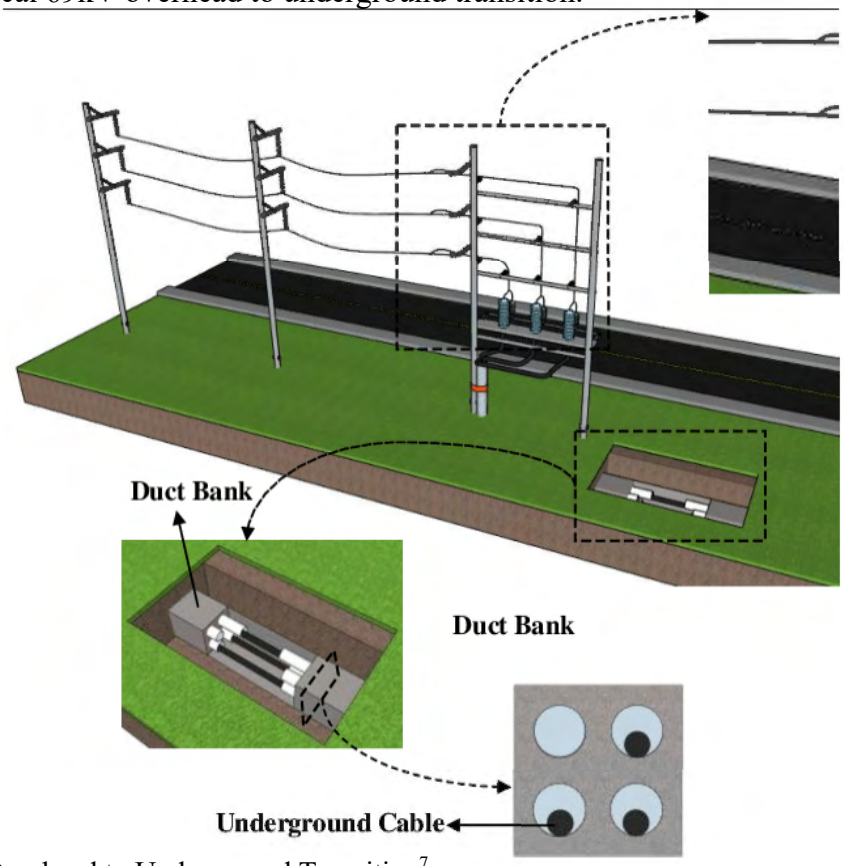

Figure 2: 69kV Overhead to Underground Transition[7]

Optionally, one of these lines could be fed from the Fairhaven Energy Storage Project, once built,[8] for back-up islanded project operations when the utility is unavailable. See the Green Port section for more information on the Fairhaven Energy Storage Project.

Two new approximately 100' x 60' customer-owned project substations are to be constructed at the terminus of the new transmission lines for transformation from 60 kV to 34.5 kV for distribution throughout the project site. One substation will be constructed during Phase 1 (Substation North) and the other substation during Phase 2 (Substation South). Revenue metering shall be designed and installed in accordance with PG&E specification 063436 Electric Revenue High Voltage Metering. See Figure 3 below for a typical layout for the proposed substations.

[7] Klomjit, Jittiphong, A. Ngaopitakkul Comparison of Artificial Intelligence Methods for Fault Classification of the 115-kV Hybrid Transmission System, Jun 2020

[8] https://redwoodenergy.org/energy-storage/

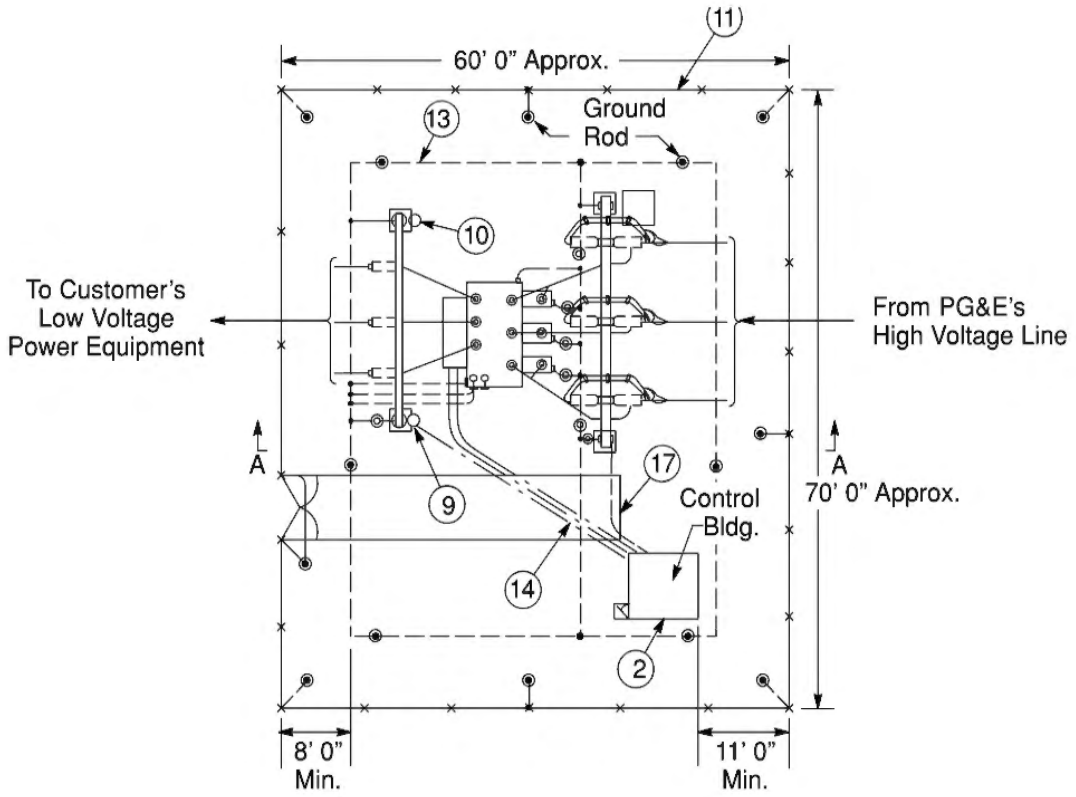

Figure 3: Typical 60 or 70kV Substation[9]

As shown in the M&N one-line diagram, power distribution throughout the site will be via a 34.5 kV underground ring with 38 kV outdoor switchgear located at each substation. This switchgear will be equipped with a main circuit breaker and two feeder circuit breakers, one to feed the loads associated with each phase and a normally open tie breaker to feed the other substation in the case one of the two redundant 60 kV electrical services is down.

Also shown in the one-line diagram is a typical building substation. Each building will be fed at 34.5 kV via outdoor 38 kV switchgear. Power will be stepped down to 480V for interconnection of a roof-mount photovoltaic system, a grid-interactive battery energy storage system, a back-up generator, and building 480V loads.

All pad-mount transformers associated with this project are to utilize natural ester insulating fluid for reduced flammability and biodegradability.

For Phase 2 of the project, PG&E circuit 1103, which currently traverses the Phase 2 project site, will be required to be rerouted around the project site overhead or underground to the Town of Samoa. A new or expanded utility easement will be required around the south and west boundaries of the project site to accommodate rerouting of this circuit. For typical overhead pole details

[9] PG&E specification 055103: Planning Guide for Single Customer Substations Served from Transmission Lines, PG&E, 01-30-06

associated with project electrical infrastructure, refer to the *Overhead Pole Specifications*[10, 11, 12] in Appendix D.

The Harbor District has communicated to the project team that the Pulp Mill 60 kV substation and 12 kV switchyard is expected to be upgraded and sized to provide an additional 5 MW of capacity dedicated to the project site. Given the additional 5 MW of capacity, it is proposed that the Phase 1 2.5-MW, landfill photovoltaic system connect to the Pulp Mill substation via a new overhead or underground interconnection 12kV distribution line. Interconnection at this location will require a new 12 kV switchyard that is anticipated to comprise a 15 kV switchgear line-up including PG&E metering, a main circuit breaker and a feeder circuit breaker collecting power from step-up transformers located throughout the array. See the Green Port Section for more information on the landfill PV system.

Green Port - Renewable Energy System Designs

The goal of using 100% carbon-free energy to meet site electrical loads can be met through a combination of procurement of renewable energy from local electrical service providers and the generation of onsite and local energy from the proposed renewable energy systems.

The electrical load for marine terminal operations is expected to be greater than the amount of energy that could be generated onsite or locally from renewable resources for both phases of the project. Therefore, it will be necessary to purchase the remaining balance from either the local utility Pacific Gas & Electric (PG&E), the local Redwood Coast Energy Authority (RCEA) or through a power purchasing agreement with an offshore wind developer. The types of programs and availability for enrollment change over time requiring further investigation in the later stages of the project.

For onsite renewable energy generation and site resiliency, grid-connected building substation microgrids are proposed for the two phases of the project. PV-battery-generator microgrids will provide energy cost savings through onsite renewable energy generation from rooftop photovoltaic systems, and provide resiliency through short term backup power capability from battery energy storage systems and emergency power capability from natural gas generators during extended outages. Preliminary designs for a typical building substation microgrid for each phase are presented in the following sections.

For additional solar generation, the nearby Harbor District-owned solid waste landfill has been identified as a potential site for local offsite generation from a large, ground-mounted solar PV system. Background information on the landfill and a preliminary design of the PV system including an estimate of the annual solar production is provided.

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[10] Specifications and Drawings for 12.47_7.2kV Line Construction, UEP_Bulletin_1728F-804, US Department of Agriculture Rural Utilities Service, 2018

[11] Overhead Electric Line Construction, GO-95, California Public Utilities Commission, 2015

[12] Electrical Transmission Specifications and Drawings for 34.5kV to 69kV, UEP_Bulletin_1728F-810, US Department of Agriculture Rural Utilities Service, April 1998

Estimated PV System Sizes and Energy Production

The performance of the proposed PV systems presented in the following sections were modeled using a solar PV design software. The software sized the PV systems based on the available rooftop space and area for the ground-mount PV system and simulated system operation to estimate the annual solar energy production. The results of the analysis are provided below:

- the aggregate nameplate DC capacity of rooftop PV systems on buildings for both phases is approximately 6.3 MW and has an estimated annual energy production of 7.1 GWh.
- the nameplate DC capacity for the landfill PV system is 2.5 MW and has an estimated annual energy production of 2.9 GWh.
- the combined PV power rating from all systems is ~ 8.8 MW of power with an estimated annual production of 10 GWh of solar energy.

For additional details on the PV systems, refer to the *HelioScope Rooftop Annual Production Report* and *HelioScope Landfill Annual Production Report* in Appendix E and F.

Future Planning for Utility-Scale Battery Integration

There may be an opportunity to integrate a nearby utility-scale battery energy system into the site's electrical system during Phase 2 of the project buildout. The availability of a large battery system could present some interesting future design options for site-wide resiliency beyond just supporting the battery (critical) loads. The Fairhaven Energy Storage Project is currently being developed at the DG Fairhaven Biomass Plant located just west of the Fairhaven substation.[13] Once commissioned, the 17.25 MW battery system will be providing grid services to the local grid during normal utility grid operations. During grid outages, the battery system could potentially provide backup power services to the terminal. Discussions of potential options, including the development of a terminal-wide microgrid, should be pursued in later stages of the terminal project development.

Phase 1 Building Substation and Microgrid

A Phase 1 microgrid electrical substation is proposed to be sited adjacent to the Storage & Assembly building and provide power to the facility and also serve critical loads in the north end of the terminal. A 480V microgrid is proposed for the Storage & Assembly Building in Phase 1 of the project. A preliminary one-line diagram of a typical building substation is available in the electrical drawing of the M&N memo. A typical arrangement of the major equipment and the estimated footprint of the substation is shown in Figure 4.

13 https://redwoodenergy.org/energy-storage/

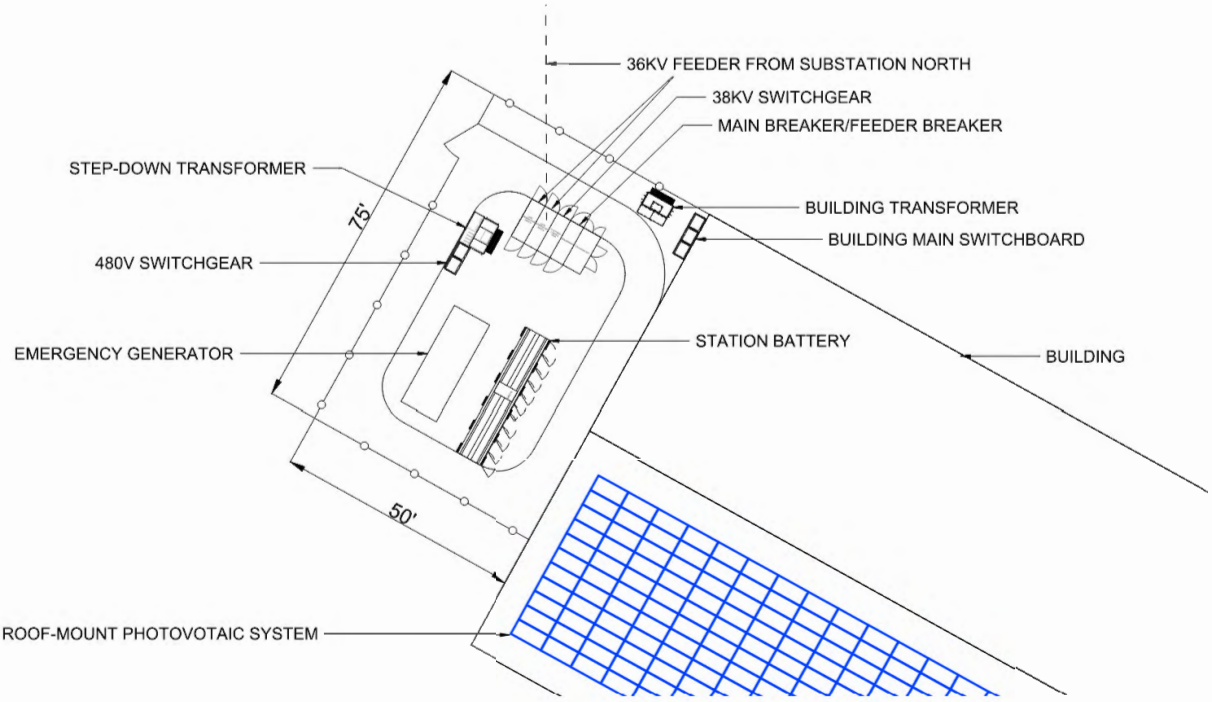

Figure 4: Typical Building Substation General Arrangement

Photovoltaic System

The preliminary PV system design is based on a 50,000 sq ft. Storage and Assembly building. The PV system would be a roof-mounted photovoltaic (PV) array with an approximate system size of 300kWDC. The system was designed to utilize rows of 420W high efficiency, monocrystalline modules flush-mounted in rows in landscape orientation at a tilt of 14 degrees. The modules are designed for flush-mount attachment to a standing seam metal roof. IBC access pathways and smoke ventilation setbacks were included in the design.

Power generated by the arrays was designed for AC conversion through three 100kW, 480V inverters adjacent to the building for 480V three phase interconnection into a building's 480V switchgear. These inverters are UL 1741-SA listed and can be frequency-controlled by the battery energy storage system to ramp PV output to balance generation with the load. The DC/AC ratio is 1.01 for minimization of equipment variation on the overall site; however, inverter capacity could be downsized to a DC/AC ratio of up to 1.25 with minimal clipping with further inverter optimization. The inverters are anticipated to be connected to the building's 480V switchboard through a solar subpanel and a visible, lockable disconnect to be located next to the inverters for ease of shutdown in the case of a fire.

Battery Energy Storage System

The preliminary design includes a 1.9-MW battery energy storage system with a 3-hour duration of energy storage. The duration is based on a battery load estimate of 1.3MVA for the Phase 1

critical loads identified in the M&N load estimate table.[14] Load shedding of non-critical loads during grid outages can be implemented to extend the hours of resiliency.

38 kV Switchgear

The preliminary substation includes a new 34.5 kV, raintight main switchgear lineup containing a controllable main breaker to be supervised by a Schweitzer Engineering Laboratories 700GT+ Intertie and Generation Relay Islanding Controller, which interfaces with the integrated site controller to provide seamless transitions to an islanded battery-powered state and retransfers back to the local utility grid. The main switchgear contains all the metering, control, and UPS equipment required for operation and for PV, BESS, and load control and monitoring to ensure safe stable grid-connected and microgrid operation. The switchgear feeds a loop-feed, pad-mount 34.5kV step-down transformer and secondary 480V switchgear for interconnection of the battery, generator, and to feed the building and wharf loads.

Emergency Generator

A 2-MW generator is included for emergency back-up operations to serve the Phase 1 critical load of 1.3MVA identified in the M&N load estimate table.

The expected runtime of the emergency generator is based on the reliability of the grid serving the project site. For short term grid outages, the microgrid battery system will provide backup power. With the ability of the Humboldt Bay Generating Station to island during state-wide Public Safety Power Shutoff (PSPS) events, the number of long-term transmission-level outages due to out of county safety issues are expected to be infrequent. Generator runtime could range from 12 hours to 500 hours per year. Generator operation of 1 hour per month is required for maintenance purposes to ensure proper lubrication of the generator and verify system functionality and load transfer capability. Generator operation may be required during future electrical infrastructure work as the project phases are implemented. These planned utility grid outages could require up to 500 hours of operation during these construction activities.

Phase 2 Building Substation and Microgrids

The preliminary design for a Phase 2 substation and microgrid is similar to that of Phase 1 with the primary differences being the increased number of buildings available for solar generation and the higher estimated load and projected battery (critical) load in Phase 2.

Photovoltaic System

The combined available rooftop space of 560,000 sq ft. for Phase 2 buildings was used to model system performance and estimate the annual production of solar energy. The general equipment specifications and design are similar to the Phase 1 design.

Battery Energy Storage System

The preliminary design includes a 1.9-MW/2-hr battery energy storage system with a 1.5-hour duration of energy storage. The duration is based on a battery load estimate of 2.3MVA for the

[14] Moffatt & Nichol's Redwood Marine Multipurpose Terminal Replacement Project - Electrical Distribution and Lighting Technical Memo

Phase 2 critical loads identified in the M&N load estimate table. Load shedding of non-critical loads during grid outages can be implemented to extend the hours of resiliency.

38 kV Switchgear

In general, the 38 kV switchgear will be similar to Phase 1 equipment, but will be sized and specified for individual or groups of buildings and their associated solar generation capacities.

Emergency Generator

A 2-MW generator is included for emergency back-up operations to serve the Phase 2 critical load of 2.3MVA for the Phase 2 critical loads.

The expected runtime of the emergency generator is based on the reliability of the grid serving the project site. For short term grid outages, the microgrid battery system will provide backup power. With the ability of the Humboldt Bay Generating Station to island during state-wide Public Safety Power Shutoff (PSPS) events, the number of long-term transmission-level outages due to these out of county safety issues are expected to be infrequent. Generator runtime could range from 12 hours to 500 hours per year. Generator operation of 1 hour per month is required for maintenance purposes to ensure proper lubrication of the generator and verify system functionality and load transfer capability. Generator operation may be required during future electrical infrastructure work as the project phases are implemented. These planned utility grid outages could require up to 500 hours of operation during these construction activities.

Offsite Landfill PV System

For additional solar generation, the nearby Harbor District-owned solid waste landfill has been identified as a potential site for local offsite generation from a large, ground-mounted solar PV system. Solar energy generated from the system could be used to offset energy use at the terminal.

The preliminary design (Figure 5) is for a 2.5 MWDC, ballasted PV system installed on the east-west facing planes of the WMUs utilizing generic PV modules and string inverters. The PV system connects to the upgraded Harbor District substation via an underground 12kV line during Phase 1 of the project. Interconnection at this location will require a new 12 kV switchgear line-up comprised of PG&E metering, a main and a feeder circuit breaker collecting power from step-up pad-mount transformers distributed throughout the array, control power, and a back-up battery system to ensure safe and reliable interconnection.

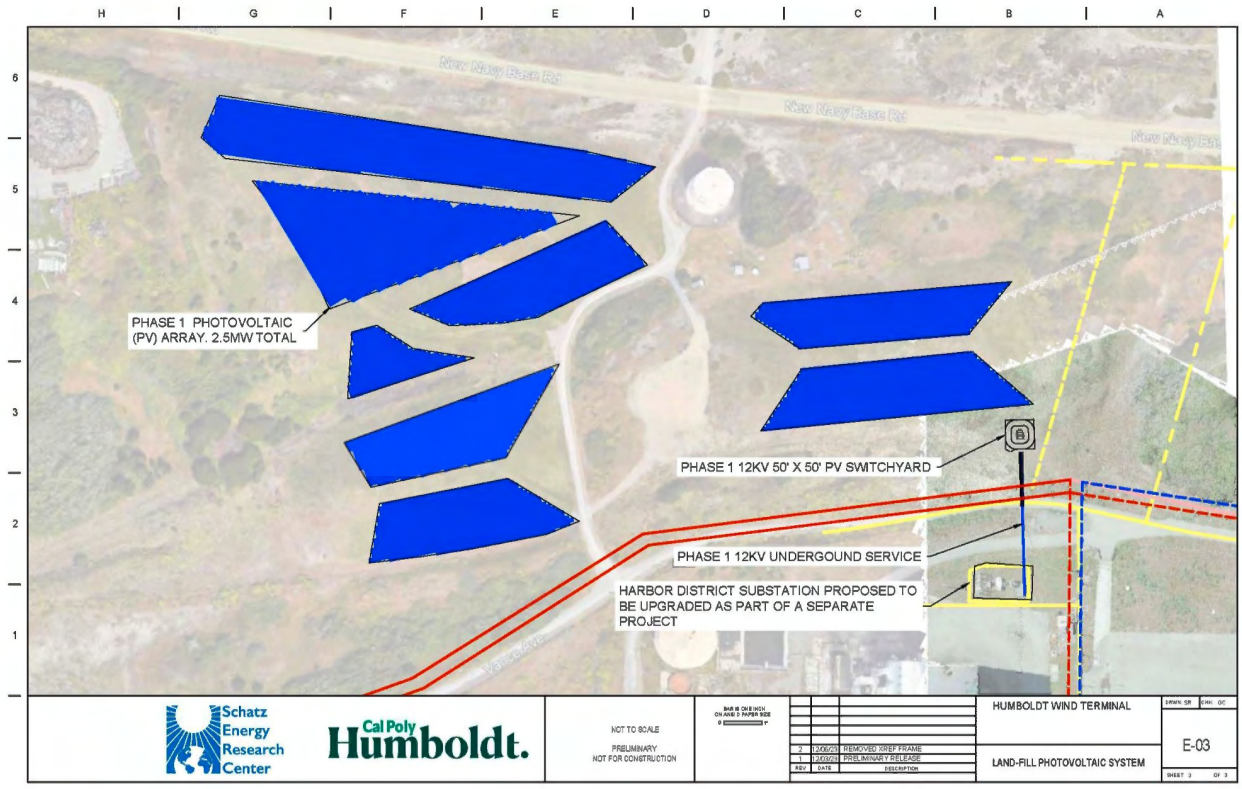

Figure 5: Preliminary Plan View of Landfill PV System

Phase 2 Terminal-wide Microgrid Option

For Phase 2 of the project buildout, the Fairhaven Energy Storage Project and the landfill PV system could be integrated into a terminal-wide microgrid that could provide a significant amount of solar energy and site resiliency. This size of a microgrid has the potential to serve a large portion, if not all of the site's loads during grid outages.

Solid Waste Landfill

The Harbor District is the operator and co-owner of the Samoa Class III Solid Waste Disposal Site (SWDS). According to the *California Regional Water Quality Control Board North Coast Region ORDER NO. R1-2017-0001 Waste Discharge Requirements* (Appendix G), the SWDS was closed in 1998 and has a post-closure land use designated for non-irrigated open space. The total landfill area is 36 acres with four capped waste management units (WMUs) comprising 15 acres. The WMUs are 20–25-foot high, capped mounds containing approximately 98 percent wood ash from a former pulp mill. The landfill cap consists of a two-foot-thick ash foundation layer, overlain by a one-foot minimum thickness barrier layer, overlain by a two-foot minimum thickness vegetation layer and six inches of mulch.[15]

Further research is required to assess the feasibility of installing photovoltaic arrays on the landfill. Figure 6 shows the WMU slopes and surrounding vegetation. As noted in the Waste

[15] California Regional Water Quality Control Board North Coast Region ORDER NO. R1-2017-0001 Waste Discharge Requirements

Discharge Requirements document, "*The final cap surface is sloped to promote drainage away from the waste footprint. Slopes are no steeper than three to one nor flatter than three percent."*

Anchoring systems for supporting the PV array structures, particularly on the steeper slopes, will need to be evaluated to ensure the integrity of the landfill cover is maintained. The types of system options include ballasted systems, shallow poured concrete footers/prefabricated concrete footings, concrete slabs, and augur or helical pile supports.[16]

Figure 6: Photo of Solid Waste Landfill

More information on the site description, surface water, storm water, site geology, groundwater and general requirements can be found in Appendix G.

For information on the landfill PV system concepts and site conditions refer to Appendix H.

[16]https://www.epa.gov/system/files/documents/2022-05/best-practices-siting-solar-photovoltaics-municipal-solid-waste-landfills_051722-pub.pdf

Appendices

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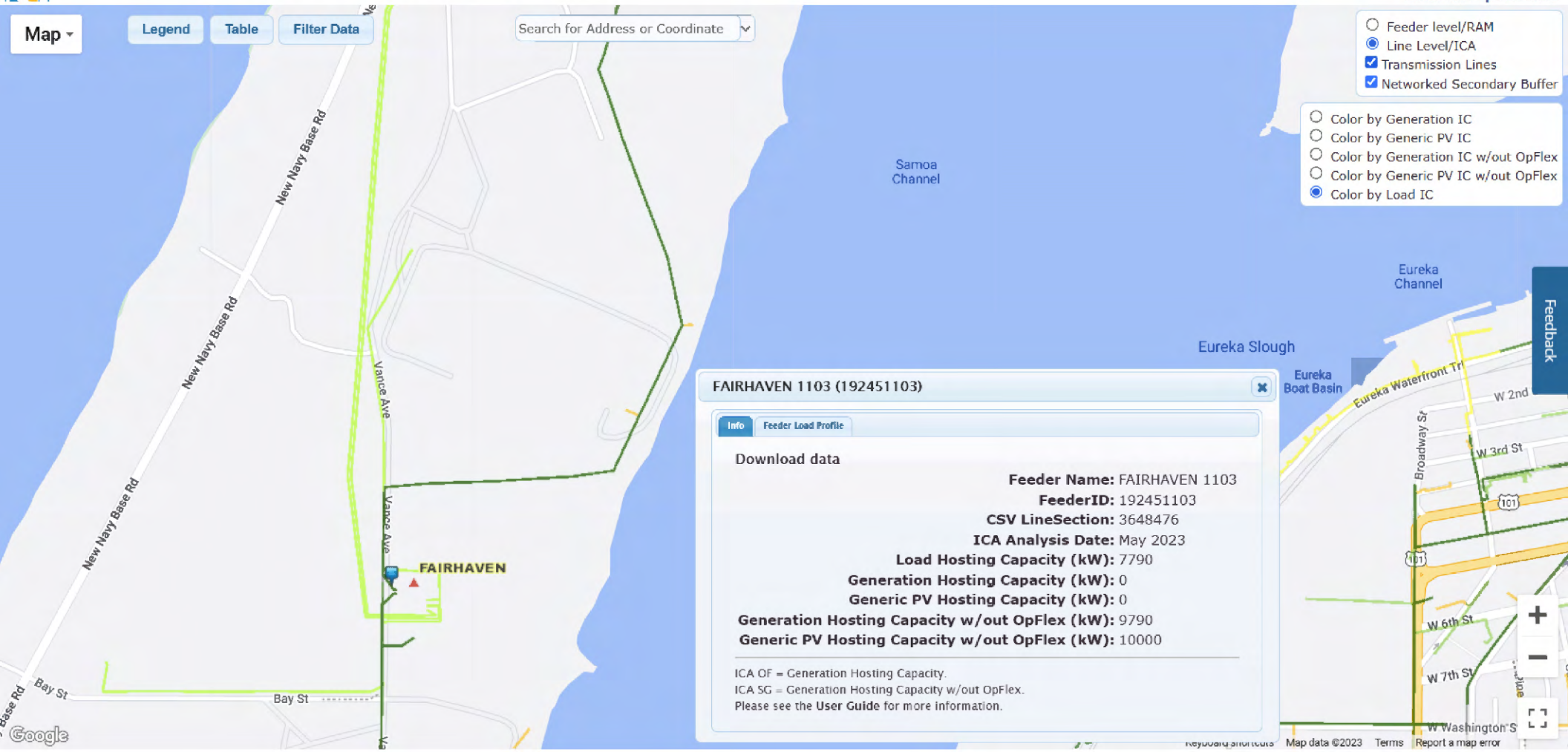
Appendix A: Integrated Capacity Analysis

Integration Capacity Analysis (ICA) Map

User Guide
Download Spatial Data



FAIRHAVEN 1103 (192451103)

Info | Feeder Load Profile

Download data

Feeder Name: FAIRHAVEN 1103
FeederID: 192451103
CSV LineSection: 3648476
ICA Analysis Date: May 2023
Load Hosting Capacity (kW): 7790
Generation Hosting Capacity (kW): 0
Generic PV Hosting Capacity (kW): 0
Generation Hosting Capacity w/out OpFlex (kW): 9790
Generic PV Hosting Capacity w/out OpFlex (kW): 10000

ICA OF = Generation Hosting Capacity.
ICA SG = Generation Hosting Capacity w/out OpFlex.
Please see the **User Guide** for more information.

Appendix B: Moffatt & Nichol - Redwood Marine Multipurpose Terminal Replacement Project - Electrical Distribution and Lighting Technical Memo

moffatt & nichol

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www.moffattnichol.com

Redwood Marine Multipurpose Terminal Replacement Project – Electrical Distribution, and Lighting

To:	Shane Phillips, P.E.
From:	Pablo Faria, P.E.
Date:	December 07, 2023
Subject:	Terminal Electrical Distribution and Lighting – Technical Memo
M&N Job No.:	212991-03

1 PURPOSE

The purpose of this memorandum is to provide the Redwood Marine Multipurpose Terminal with a summary of the expected electrical loads in order to define the power demand for the terminal's operation.

2 Electrical Load Estimate

The load calculation was developed based on the most updated phasing and shall be updated accordingly, if needed, in case of any modifications.

The project is divided into two phases. Phase 1 is the development of the north side of the terminal site while Phase 2 is the development for the south side.

Refer to Section 3 - Electrical Power Distribution, of this report for more information.

2.1 Electrical Loads - Phase 1

High mast light towers: Lighting for the facility will be achieved with eight (8) high mast light towers of 150 ft using LED light fixtures at 150 ft and 145 ft. The total load for each light tower is estimated at 15.18kVA, which in total, considering 125% of demand factor, is a total load of 152kVA for all light towers.

Storage/Assembly Building: The facility will include a fabrication and assembly building, with an estimated size of 50,000 square feet. Expected electrical loads within the building are lighting, ventilation, machinery power, small tool power outlets, heating, with some general office loads. The estimated load per square foot of the building is 21 watts. At 50,000 square feet the total estimated load of the Fabrication/Assembly Building is 1050 kVA, with the addition of a demand factor of 0.75, the total demand load is 788kVA.

Entry Gate and Miscellaneous: Two entry gates with possible manned guard kiosk will be required, and along with smaller miscellaneous loads, it was estimated 160kVA considering 0.8 of demand factor.

Cold Ironing Vessel: Vessels at berth may be required to plug into power, and tugs may plug in to charge batteries. The load summary includes a single shore power connection at Phase 1, with a power load of 2000 kVA.

Tug Charging: Three tug charging points are being considered for this phase with 500 kVA per charger. In total, 900 kVA of demanded power load with 0.6 demand factor.

Wharf Crane: The wharf crane will have multiple motors for its operational movements, with the hoist motor being the largest. Depending on the type of crane, multiple motors may be used during lifts. The combined continuous load of the crane is estimated at 1650 kVA with an applied demand factor of 80%, for a total continuous load of 1320 kVA.

Wind Turbine Nacelle Receptacles / Heaters: Nacelles will be stored on site and will require heaters to prevent condensation and moisture buildup. The expected load for each nacelle is 30 kVA, with the total nacelle heating load being 600kVA.

Power Outlets: It is expected that a variety of power tools, including arc-welding equipment will be used at the terminal, and outlets for the equipment will be required. Twenty outlets are included in the summary at 10 kVA each, with a 50% demand factor applied. The total power outlet electrical load is estimated at 100 kVA.

Tower Foundation: Two tower foundations are being considered for this construction phase, with a unitary load of 53kVA. For the demand factor of 0.8, the total load expected is 84.8kVA.

Office Building: The terminal facility also includes an administration building, with an estimated size of 20000 square feet, of which the expected electrical loads are lighting, ventilation, power outlets, heating, and general office loads. The estimated load per square feet for this building is 15watts, calculated in total with 75% of demand factor for a total load of 225 kVA for the administration building.

Trailers Marine / Locker: Three trailers of 50kVA each, are being considered during Phase 1, with a total of 113kVA in addition to 75% of demand factor.

Tower Assembly Rack: Assembly racks for the towers are being considered and expected to include lighting, lifts, and trolley movements, with an estimated total load of 270 kVA for 6 units of 45kVA each.

Battery Charging including Self-Propelled Modular Transports (SPMT): Yard transport equipment, including SPMTs, will be utilized at the facility. Included in the load summary for this phase are six chargers at 180 kVA each, with a 70% demand factor applied. The total load for battery charging is 756 kVA.

Crawler Cranes: Two crawler cranes, including mobile cranes, are included in Phase 1, estimated at 80 kVA per crane. An 80% demand factor has been applied giving a total crane load of 128 kVA.

For Phase 1, some additional energy support equipment is being considered as the following:

- (1) Natural gas generator 2MVA, continuous operation capacity of 500hrs per year.
- (1) 1.9MW/2-hr battery, 3 hours at 1.263MW.
- (1) 3.2MW landfill photovoltaic cells DC.

See power demand electrical summary calculations for additional information.

2.2 Electrical Loads - Phase 2

High Mast Light Towers: Lighting for the facility will be achieved with ten (10) high mast light towers of 150 ft using LED light fixtures. The total load for each light tower is estimated at 22.05kVA, which in total, considering 125% of demand factor, is a total load of 276kVA for all light towers.

Tug Charging: Three tug charging points are being considered for this phase with 500 kVA per charger. In total, 900 kVA of power load considering 60% of demand factor.

Cold Ironing Vessel: The shore power is estimated at 2000 kVA.

Battery Charging including SPMTs: Six chargers are considered at 180 kVA each, with a 70% demand factor applied. The total load for battery charging is 756 kVA.

Wharf Crane: The wharf crane is estimated at 1650 kVA with an applied demand factor of 80%, for a total continuous load of 1320 kVA.

Tower Assembly Rack: Six assembly racks for the towers are being considered and expected to include lighting, lifts, and trolley movements, with an estimated total load of 270 kVA for 6 units of 45kVA each.

Crawler Cranes: Two crawler cranes, including mobile cranes, are included in this phase, estimated at 80 kVA per equipment. An 80% demand factor has been applied giving a total crane load of 128 kVA.

Tower Manufacturing Facility: The terminal will include a tower manufacturing facility, an estimated size of 180,000 square feet. Expected electrical loads within the building are lighting, ventilation, machinery tower, small tool power outlets, heating, with some general office loads. The estimated load per square foot of the building is 35 watts. At 180,000 square feet the total estimated load of the tower manufacturing facility is 6,300 kVA, with the addition of a demand factor of 0.75, the total demand load is 4,725 kVA.

Entry Gate and Miscellaneous: Two entry gates with possible manned guard kiosk will be required, and along with smaller miscellaneous loads, it was estimated 160kVA considering a demand factor of 0.8.

Office Building: The planned office building on site will be approximately 20,000 square feet. At 15 watts per square feet, the total office building load is estimated to be 300 kVA. In addition to 75% demand factor, the total demanded load is 225kVA.

Manufacturing Buildings: Three manufacturing buildings are included in the terminal load summary. The first is 40,000 square feet, the second is 60,000 square feet and the third is 240,000 square feet. The first building at 35 watts per square feet, is estimated at 1,400 kVA while the second and third ones at 21 watts per square feet each, are estimated at 1,260 kVA and 5,040 kVA respectively. Applying a demand factor of 0.75 in all three buildings, the final demanded load is 1050 kVA, 945 kVA and 3780 kVA, respectively.

Trailers Marine / Locker: Three trailers of 50kVA are being considered with a total of 113kVA in addition to 75% of demand factor.

For Phase 2, some additional energy support equipment is being considered as the following:

- (1) Natural gas generator 2MVA, continuous operation capacity of 500hrs per year.
- (1) 1.9MW/2-hr battery, 1.5 hours at 2.249MW.

See power demand electrical summary calculations for additional information.

3 ELECTRICAL POWER DISTRIBUTION

Redwood Marine Multipurpose Terminal will be powered by Fairhaven Substation located outside the terminal limits with two dedicated high voltage circuits of 60kV as follows:

Fairhaven Substation:

- Phase 1 - Substation North 60/36kV rated 30 MVA with initial loading of 10 kVA for Phase 1.
- Phase 2 - Substation South 60/36kV rated 30 MVA.

Substations North and South are the main power supply source in the terminal, which distributes medium voltage to the typical 36-0.48kV substations as per the one-line diagram. Optionally, the Phase 2 60kV line may be fed from the Future Fairhaven BESS 60kV Switchyard.

3.1 Topology

Aiming for the most viable solution, the terminal's power distribution was designed as a continuous loop, in order to provide the most reliable system with enough redundancy. The power distribution loops will be connected throughout different substations and switchboards located at the site.

During Phase 1, Substation North will interconnect all typical substations located at the north side of the terminal, while in Phase 2 Substation South will interconnect the south typical substations as well as form a continuous loop to the north side.

Once North and South loops are interconnected the ring should be complete between both main substations providing a main and a redundant feeder. Refer to the one line and site plan for additional information.

Regardless of the construction of Phase 2, it is recommended the design of the incoming connection to North substation consider the demanded load from both phases, that is: 30MVA (10MVA – Phase 1, 20MVA – Phase 2) in order to avoid new costs associated with materials, infrastructure, and equipment de-energization, leading to a more cost-effective solution.

During Phase 1, a request for a 10MVA demand from the electrical utility shall be performed, and this load value shall be readjusted to 30MVA at the end of Phase 2 construction, allowing the powering of the entire terminal from either of the two main substations, North or South.

3.2 SUBSTATIONS

Estimated required substations sizes shall be:

- North and South substations: 100’ x 60’ (WxL)
- Shore Power substations: 40’ x 40’ (WxL)
- Building substations: 70’ x 70’ (WxL)

The number of manholes estimated per phase shall be:

- Phase 1: 16 manholes.
- Phase 2: 26 manholes.

4 LIGHTING

For the lighting design of Redwood Marine Multipurpose Terminal, 1.6 kVA LED fixtures were considered with 150 ft. high masts light towers. The quantities for each construction phase as well as their respective loads are as follows:

- Phase 1: 8 high mast light towers, average of 15.6kVA for each light mast. Total demanded load: 152kVA.
- Phase 2: 10 high mast light towers, average of 22.05kVA for each light mast. Total demanded load: 276kVA.

The lighting design for the terminal site adheres to the ANSI/IES RP-40-19 standards, achieving the recommended average foot-candle of 3.5 and a uniformity max/min ratio of 6:1 with the auxiliary of AGi 32 (lighting calculation software). The study also confirms that spill light outside the property boundary is minimal or nonexistent, thanks to the careful placement of light mast poles.

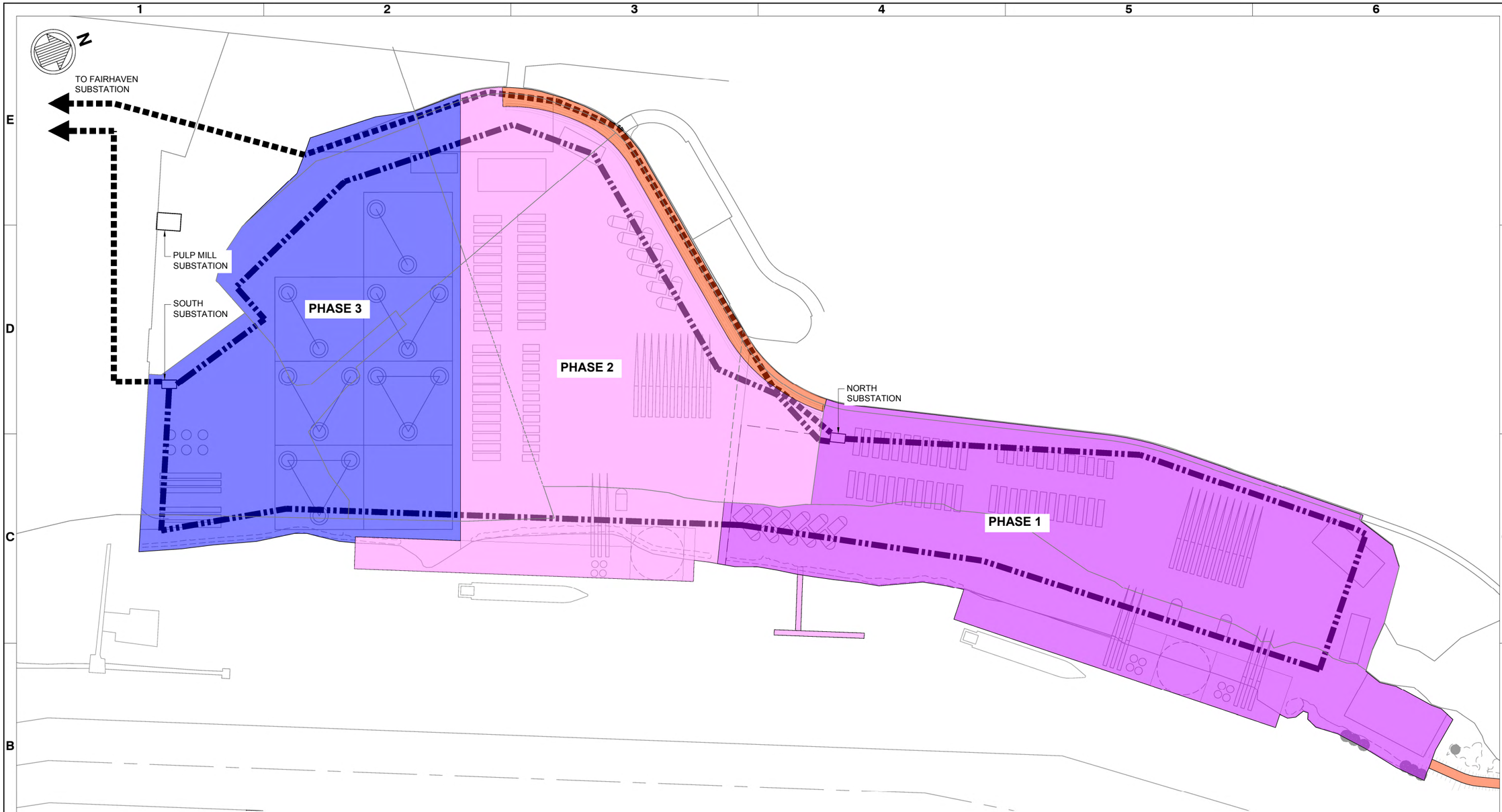
To further enhance the lighting quality, it is advised by IES RP-40-19 to minimize glare by selecting luminaires with precise light control and avoiding high-angle light output exceeding 70 degrees. The IES RP-40-19 standard does not specify a value for this, but studies suggest that 70 is considered high. In our analysis, the average glare rating was found to be 59.

5 ELECTRICAL LOADS AND LIGHTING LIST

Redwood Marine Multipurpose Terminal
Electrical Load Estimate

Electrical Load Phase	Description	Equipment	Quantity	Load per Equipment (kVA)	Total Load (kVA)	Demand factor	Total Demanded Load (kVA)	Battery Load Factor	Battery Load (kVA)
1	Entry Storage/Assembly Building, Wharf Wind Turbine Laydown Area	High Mast Lighting Towers	8	15.19	121	1.25	152	1.00	152
		Storage/Assembly Building (50,000 sqft)	50,000	0.021	1,050	0.75	788	0.15	118
		Entry Gate / Miscellaneous	2	100	200	0.80	160	1.00	160
		Cold ironing Vessel	1	2,000	2,000	1.00	2,000		0
		Tug charging	3	500	1,500	0.60	900		0
		Wharf Crane	1	1,650	1,650	0.80	1,320		0
		Wind Turbine Nacelle Receptacles/heaters	20	30	600	1.00	600	1.00	600
		Power Outlets (welding, tools, equipment)	20	10	200	0.50	100		0
		Tower Foundation	2	53	106	0.8	84.8	1.00	85
		Office Building (20,000 sqtf)	20,000	0.015	300	0.75	225	0.10	23
		Trailers marine/locker	3	50	150	0.75	113	0.10	11
		Tower Assembly Rack	6	45	270	1.00	270		
		Battery Charging including SPMTs	6	180	1,080	0.70	756		
		Crawler Crane (Electric)	2	80	160	0.80	128		
						Total	7,596		1,149
				Contingency		20%	9,115	10%	1,263
2	Tower Building Manufacturing Blade Manufacturing Buildings and Laydown area	High Mast Lighting Towers	10	22.05	221	1.25	276	1.00	276
		Tug charging	3	500	1,500	0.60	900		
		Cold ironing Vessel	1	2,000	2,000	1.00	2,000		
		Battery Charging including SPMTs	6	180	1,080	0.70	756		
		Wharf Crane	1	1,650	1,650	0.80	1,320		
		Tower Assembly Rack	6	45	270	1.00	270		
		Crawler Crane (Electric)	2	80	160	0.80	128		
		Tower Manufacturing Facility (180,000 sqft)	180,000	0.035	6,300	0.75	4,725	0.15	709
		Entry Gate / Miscellaneous	2	100	200	0.80	160	1.00	160
		Office Building (20,000 sqft)	20,000	0.015	300	0.75	225	0.10	23
		Blade Manufacturing Building (240,000 sqft)	240,000	0.021	5,040	0.75	3,780	0.15	567
		Manufacturing Building (60,000 sqft)	60,000	0.021	1,260	0.75	945	0.15	142
		Manufacturing Building (40,000 sqft)	40,000	0.035	1,400	0.75	1,050	0.15	158
		Trailers marine/locker	3	50	150	0.75	113	0.10	11
						Total	16,647		2,044
				Contingency		30%	21,641	10%	2,249
						Total connected (kVA)	24,243		
						Total connected with contingency (kVA)	30,756		

6 GENERAL DRAWINGS



LEGEND:

- PORT POWER DISTRIBUTION RING
- UTILITY POER DISTRIBUTION CONNECTION
- PHASE 0: ACCESS CORRIDORS
- PHASE 1: S&I SITE #1 UPLANDS & NORT WHARF.
- PHASE 2: S&I SITE #2 UPLANDS & FULL SOUTH WHARF.
- PHASE 3: FLOATING FOUNDATION ASSEMBLY SITE UPLANDS.

240' 0' 240' 480'

SCALE: 1"=240'

FOR CONCEPTUAL DESIGN
ISSUED: 2023-12-07
NOT TO BE USED FOR CONSTRUCTION

HUMBOLDT BAY HARBOR RECREATION & CONSERVATION DISTRICT

Mark	Description	Date	Appr

REDWOOD MARINE MULTIPURPOSE TERMINAL REPLACEMENT PROJECT

ELECTRICAL POWER DISTRIBUTION

1300 CLAY STREET, SUITE 350
OAKLAND, CA 94612
moffatt & nichol

INSERT SUB-CONSULTANT OR CLIENT LOGO AND INFO HERE

Designed by:	GS
Drawn by:	TC
Checked by:	MJ
Reviewed by:	EC
Submitted by:	SUBMITTER'S NAME MOFFATT & NICHOL
Date:	2023-12-07
M&N Project No.	212991-03
Drawing code:	
Drawing Scale:	
Plot scale:	1:1 (D SHEET)
Rev:	-

SEAL

Sheet Reference No.

ES-100

INDEX: 36 OF 38

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

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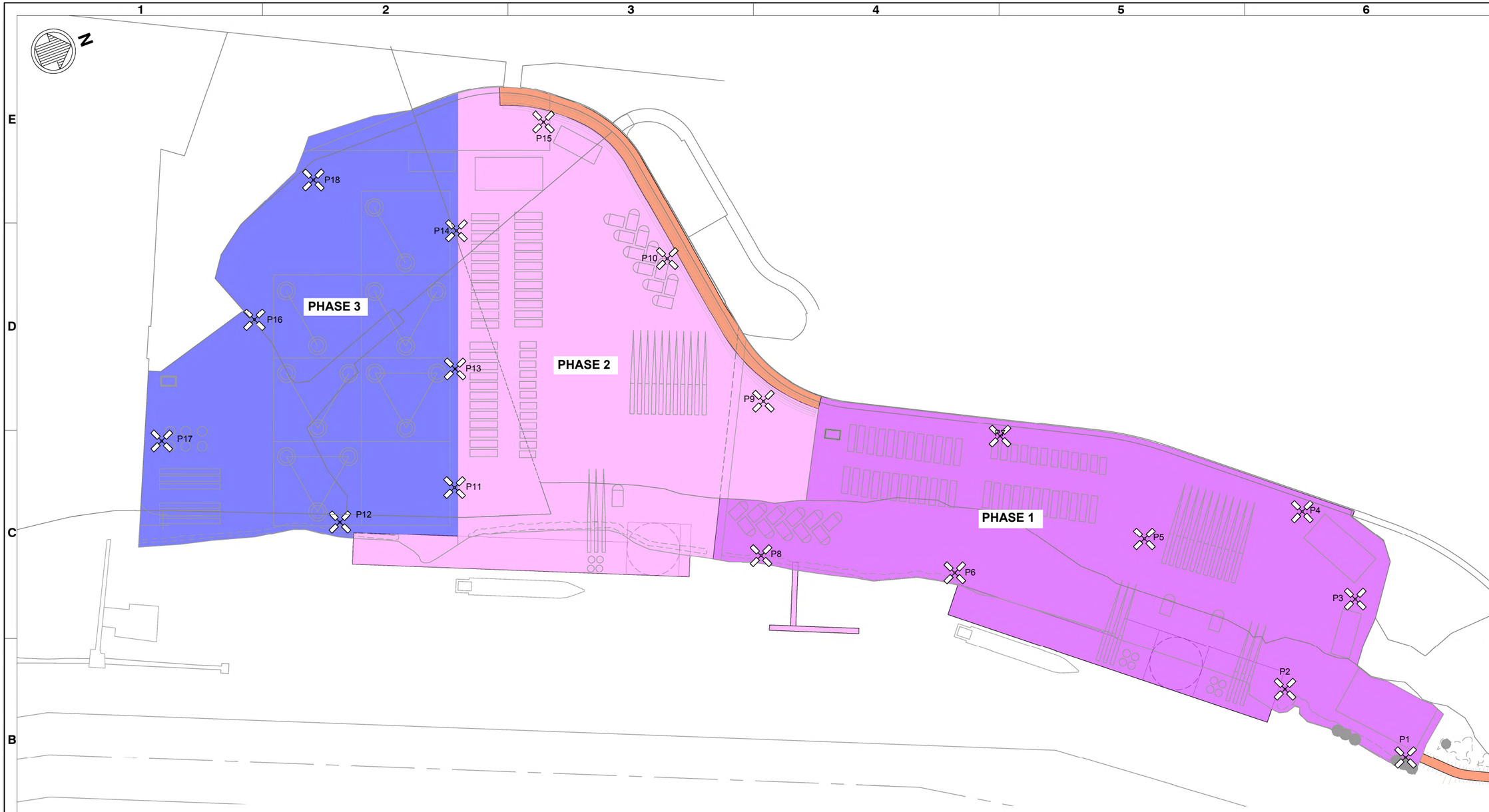

LEGEND:

- LIGHTBULB
- PHASE 0: ACCESS CORRIDORS
- PHASE 1: S&I SITE #1 UPLANDS & NORT WHARF.
- PHASE 2: S&I SITE #2 UPLANDS & FULL SOUTH WHARF.
- PHASE 3: FLOATING FOUNDATION ASSEMBLY SITE UPLANDS.

Calculation Summary

Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Yard	Illuminance	Fc	3.50	6	1	3.50	6.00

Luminaire Schedule

Qty	Label	Mounting Height	LLF	Luminaire Lumens	Luminaire Watts	Total Watts
37	Modus R1500 FS (5000K)	145	1.000	204540	1500	55500
191	Modus R1500 NS (RV) (5000K)	150	1.000	190909	1500	286500

240' 0' 240' 480'

SCALE: 1"=240'

FOR CONCEPTUAL DESIGN
ISSUED: 2023-12-07
NOT TO BE USED FOR CONSTRUCTION

HUMBOLDT BAY HARBOR RECREATION & CONSERVATION DISTRICT

Mark	Description	Date	Appr

REDWOOD MARINE
MULTIPURPOSE TERMINAL
REPLACEMENT PROJECT

ELECTRICAL LIGHTING DISTRIBUTION

Designed by: GS
Drawn by: TC
Checked by: MJ
Reviewed by: EC
Submitted by: SUBMITTER'S NAME MOFFATT & NICHOL
Date: 2023-12-07
M&N Project No. 212991-03
Drawing code:
Drawing Scale:
Plot scale: 1:1 (D SHEET)
Rev: -

1300 CLAY STREET, SUITE 350
OAKLAND, CA 94612
moffatt & nichol

INSERT SUB-CONSULTANT OR CLIENT LOGO AND INFO HERE

SEAL

Sheet Reference No.
ES-101
INDEX: 37 OF 38

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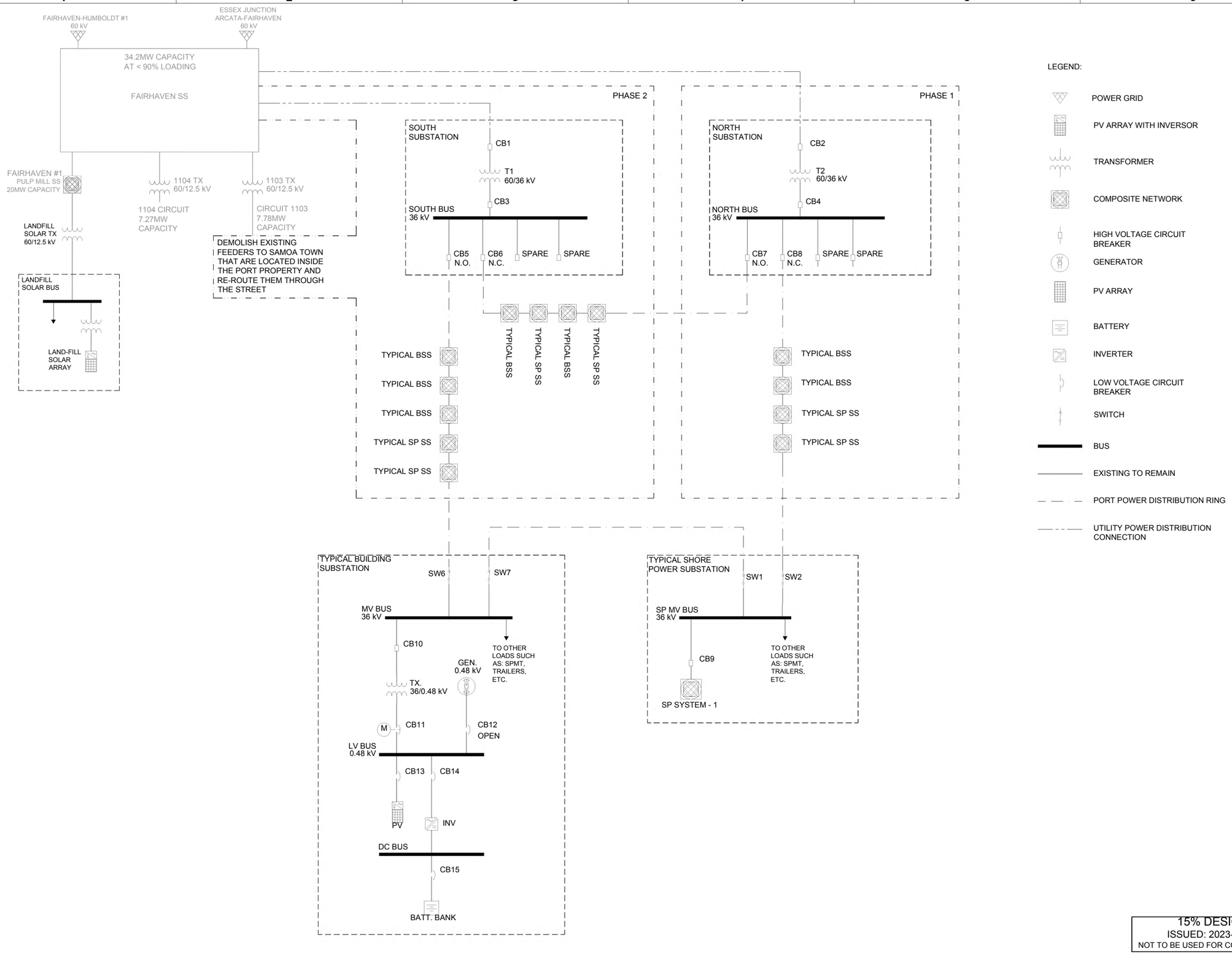

15% DESIGN
ISSUED: 2023-12-07
NOT TO BE USED FOR CONSTRUCTION

HUMBOLDT BAY HARBOR RECREATION & CONSERVATION DISTRICT

Mark	Description	Date	Appr

REDWOOD MARINE MULTIPURPOSE TERMINAL REPLACEMENT PROJECT

ELECTRICAL ONE-LINE DIAGRAM - OVERVIEW

1300 CLAY STREET, SUITE 350
OAKLAND, CA 94612
moffatt & nichol

INSERT SUB-CONSULTANT OR CLIENT LOGO AND INFO HERE

Designed by:	GS
Dwn by:	TC
Ckd by:	MJ
Reviewed by:	EC
Submitted by:	SUBMITTER'S NAME MOFFATT & NICHOL
Date:	2023-12-07
M&N Project No.	212991-03
Drawing code:	
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Rev.	-

SEAL

Sheet Reference No.
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INDEX: 38 OF 38

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DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Appendix C: Schatz Energy Research Center - Humboldt Wind Terminal Preliminary Overall Electrical Plan

H G F E D C B A

6 5 4 3 2 1

(E) FAIRHAVEN POWER PLANT

EXPANSION TO (E) PG&E EASEMENT FOR OPTIONAL PHASE 2 TIE-IN FROM (F) FAIRHAVEN BESS SWITCHYARD BEING PROPOSED AS PART OF A SEPARATE PROJECT TO PHASE 2 SUBSTATION SOUTH

APPROXIMATE LOCATION OF (F) FAIRHAVEN BESS SWITCHYARD

PHASE 1 12KV 50' X 50' PV SWITCHYARD

12KV PHASE 1 UNDERGOUND SERVICE

HARBOR DISTRICT SUBSTATION PROPOSED TO BE UPGRADED AS PART OF A SEPARATE PROJECT

PHASE 1 60KV OVERHEAD TO UNDERGROUND TERMINATION STRUCTURE

PHASE 2 UNDERGROUND 60KV LINE FROM FAIRHAVEN SUBSTATION TO SUBSTATION SOUTH AND (F) UNDERGROUND 12KV LINE TO THE TOWN OF SAMOA IN A (N) EASEMENT

PHASE 1 UNDERGROUND 60KV LINE FROM THE FAIRHAVEN SUBSTATION TO SUBSTATION NORTH AND THE (F) UNDERGROUND 12KV LINE TO THE TOWN OF SAMOA

PHASE 1 PHOTOVOLTAIC (PV) ARRAY. 2.5MW TOTAL

(E) SERVICE DROP TO THE TOWN OF SAMOA

(E) BLD SERVICE

PHASE 2 100' x 60' SUBSTATION SOUTH. 60/34.5KV

PHASE 2 12KV OVERHEAD TAP LINE TO BE UPGRADED DURING PHASE 2

PHASE 1 100' x 60' SUBSTATION NORTH. 60/34.5KV

UPGRADED (E) PG&E FAIRHAVEN 60KV SWITCHYARD

PHASE 1 60KV DOUBLE CIRCUIT POLE LINE FROM THE FAIRHAVEN SUBSTATION TO THE PROJECT SITE WITHIN EXPANDED PG&E ROW

(E) 12KV OVERHEAD LINE FROM THE FAIRHAVEN SUBSTATION TO THE TOWN OF SAMOA IN AN (E) EASEMENT TO BE REMOVED DURING PHASE 2

Google Earth

Schatz Energy Research Center

Cal Poly Humboldt.

NOT TO SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ANSI D PAPER SIZE
0 1"

REV	DATE	DESCRIPTION
2	12/06/23	REMOVED XREF FRAME
1	12/03/23	PRELIMINARY RELEASE

HUMBOLDT WIND TERMINAL

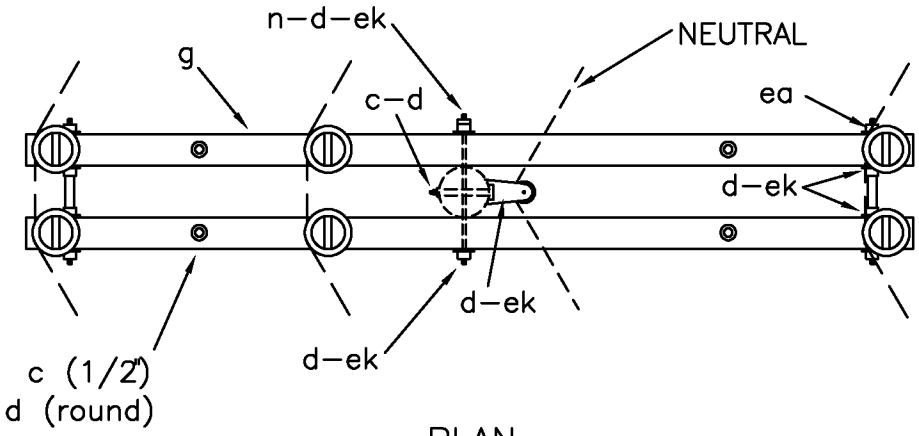
OVERALL ELECTRICAL PLAN

DRWN: SR CHK: GC

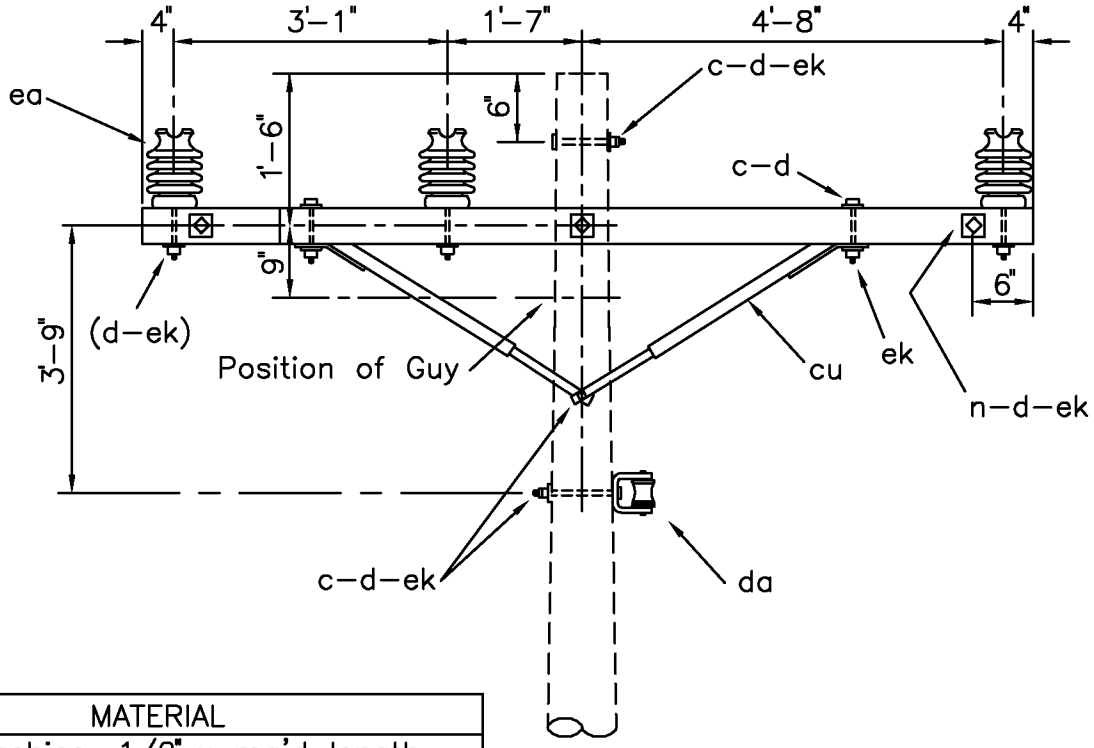
E-01

SHEET 1 OF 3

Appendix D: Overhead Pole Specifications



PLAN



ITEM	QTY	MATERIAL
c	4	Bolt, machine, 1/2" x req'd length
c	3	Bolt, machine, 5/8" x req'd length
d	4	Washer, round, 1 3/8"
d	14	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
n	3	Bolt, double arm, 5/8" x req'd length
cu	2	Brace, wood, 60" span
da	1	Bracket, Insulated
ea	6	Insulator, post type (12.47/7.2 kV)
ek	17	Locknuts

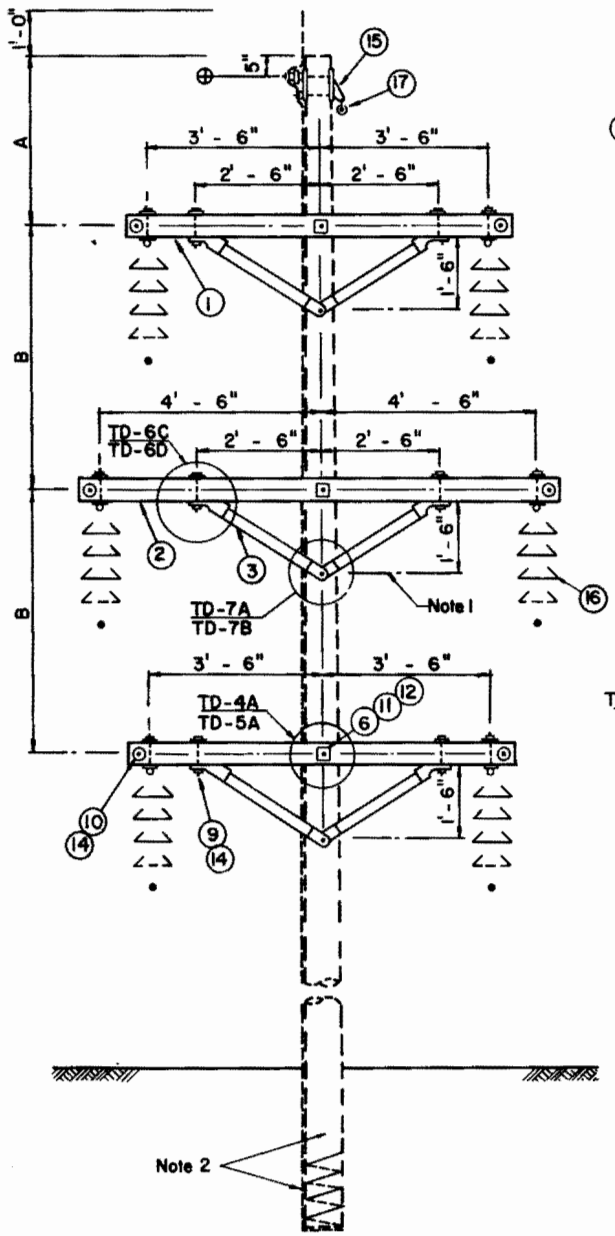
NOTE:
Neutral assembly may be installed on opposite side of pole when necessary to increase midspan conductor clearance.

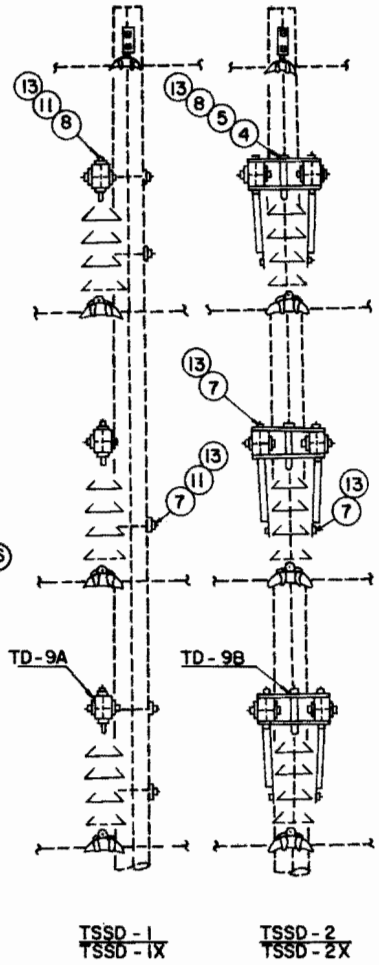
DESIGN PARAMETERS:

See TABLE IV

DOUBLE SUPPORT ON 10 FOOT CROSSARMS (POST INSULATORS)

APRIL 2005	3 – PHASE PRIMARY 12.47/7.2 kV	C2.52P (C2–2PL)
RUS		





TSSD - 1 / TSSD - 1X

TSSD - 2 / TSSD - 2X

	TSSD -		LIST OF MATERIALS			
DRG. REF.	1, 1X	2, 2X	DESCRIPTION	ITEM	DET.	CODE No.
1	2	4	X-Arm, 4-5/8" x 5-5/8" x 8'-0", #14		TCD-6	
2	1	2	X-Arm, 4-5/8" x 5-5/8" x 10'-0", #22		TCD-10	
3	3pr	6pr	Brace, X-Arm, 60"/18"	cu		
4	-	12	Plate, Double Arming, 17" x 4" x 1/4"	ct		
5	-	6	Pipe Spacer, 3/4" Schedule 80 x 5-5/8"	-		
6	3	3	3/4" Bolt, Machine, by req'd length	c		
7	3	15	5/8" Bolt, Machine, by req'd length	c		
8	6	6	5/8" Bolt, Shoulder Eye, by req'd l.	o		
9	6	12	1/2" Bolt, Washer Head, by req'd length	c		
10	6	10	1/2" Bolt, Washer Head, w/Washer Nut	c		
11	15	6	Washer, Flat, 2-1/4"sq.x 3/16", 13/16" h.	d		
12	3	3	3/4" Locknut, MF Type	ek		
13	9	21	5/8" Locknut, MF Type	ek		
14	12	24	1/2" Locknut, MF Type	ek		
15	1	1	OHGW SUPPORT ASSEMBLY	-	TM-6___	
16	6	6	INSULATOR ASSEMBLY, TANGENT	-	TM-___ A	
17	1	1	OHGW ASSEMBLY, TANGENT	-	TM-4___	

NOTES:

1. Field drilled holes shall be thoroughly treated.
2. The following materials are to be specified separately on plan and profile drawings and staking sheets: POLE, POLE GROUNDING ASSEMBLY.

DIMENSIONS A & B		
STRUCTURE	A	B
TSSD - 1, TSSD - 2	3' - 6"	6' - 0"
TSSD - 1X, TSSD - 2X	4' - 6"	7' - 0"

NO.	REVISION	DATE

Reissued 03/98

TRANSMISSION LINE STRUCTURE

TANGENT DOUBLE CIRCUIT SUSPENSION
(69 kV MAXIMUM)

Aug., 1986

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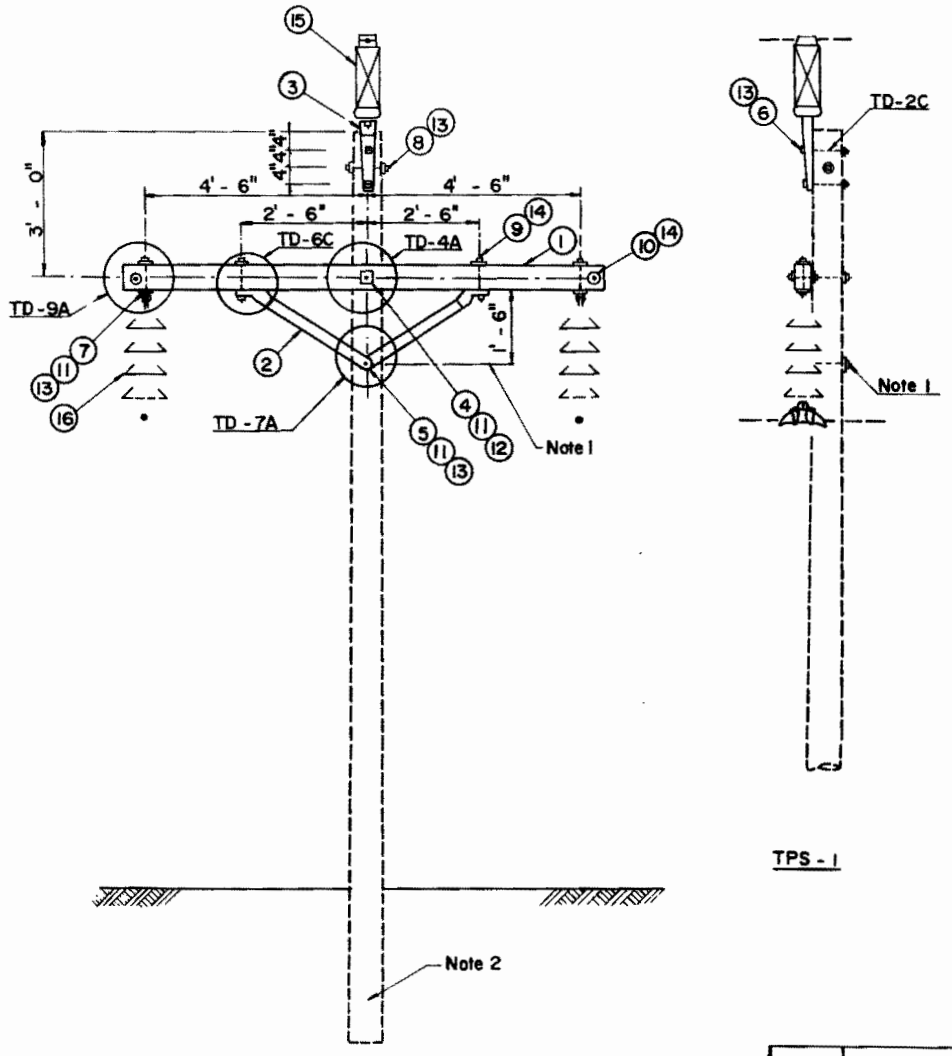


TPS - 1

LIST OF MATERIALS

DRG. REF.	QTY.	DESCRIPTION	ITEM	DET.	CODE No.
1	1	X-Arm, 4-1/8" x 5-1/8" x 10'-0", #21		TCD-10	
2	1pr.	Brace, X-Arm, 60"/18"	cu		
3	1	Bracket, Pole Top	eb		
4	1	3/4" Bolt, Machine, by req'd length	c		
5	1	5/8" Bolt, Machine, by req'd length	c		
6	2	5/8" Bolt, Machine, w/Washer Nut	c		
7	2	5/8" Bolt, Shoulder Eye, by req'd l.	o		
8	1	5/8" Bolt, Washer Head, w/Washer Nut	c		
9	2	1/2" Bolt, Washer Head, by req'd l.	c		
10	2	1/2" Bolt, Washer Head, w/Washer Nut	c		
11	5	Washer, Flat, 2-1/4"sq.x3/16",13/16"h.	d		
12	1	3/4" Locknut, MF Type	ek		
13	6	5/8" Locknut, MF Type	ek		
14	4	1/2" Locknut, MF Type	ek		
15	1	INSULATOR, VERTICAL POST,w/CLAMP&HDWR		TM-3___	
16	2	INSULATOR ASSEMBLY, TANGENT	-	TM-__A	

Notes:

1. Field drilled holes shall be thoroughly treated.
2. The following materials are to be specified separately on plan and profile drawings and staking sheets: POLE AND FOUNDATION UNITS.

TRANSMISSION LINE STRUCTURE

TANGENT SINGLE POLE - POST/SUSPENSION

(69 kV MAXIMUM)

NO.	REVISION	DATE

Reissued 03/98

Aug., 1986

TPS - 1

Appendix E: HelioScope Rooftop Annual Production Report

Design 1 OSW Wind Port, 936 Vance Ave, Samoa, CA 95564

Report

Project Name	OSW Wind Port
Project Address	936 Vance Ave, Samoa, CA 95564
Prepared By	Steve Richards steven.c.richards@humboldt.edu

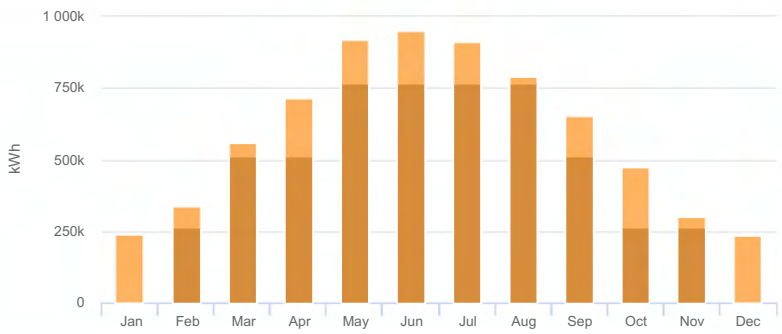
Schatz Energy Research Center

System Metrics

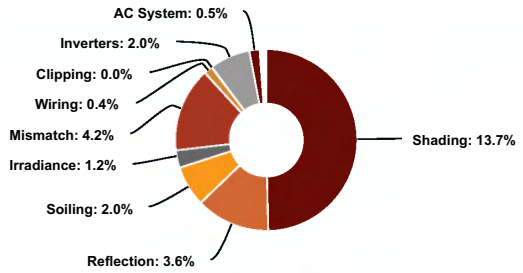
Design	Design 1
Module DC Nameplate	6.35 MW
Inverter AC Nameplate	5.10 MW Load Ratio: 1.25
Annual Production	7.097 GWh
Performance Ratio	75.2%
kWh/kWp	1,117.0
Weather Dataset	TMY, 10km Grid (40.85,-124.15), NREL (prospector)
Simulator Version	ada662d322-df0e856433-c90e500374-981fef9d56

Project Location

Monthly Production



Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,450.6	
	POA Irradiance	1,485.6	2.4%
	Shaded Irradiance	1,281.6	-13.7%
	Irradiance after Reflection	1,234.9	-3.6%
	Irradiance after Soiling	1,210.2	-2.0%
	Total Collector Irradiance	**1,210.2**	**0.0%**
Energy (kWh)	Nameplate	7,693,915.2	
	Output at Irradiance Levels	7,602,838.9	-1.2%
	Output at Cell Temperature Derate	7,627,499.1	0.3%
	Output After Mismatch	7,310,069.3	-4.2%
	Optimal DC Output	7,278,645.6	-0.4%
	Constrained DC Output	7,277,946.9	0.0%
	Inverter Output	7,132,380.7	-2.0%
	Energy to Grid	**7,096,719.0**	**-0.5%**
Temperature Metrics			
	Avg. Operating Ambient Temp		12.0 °C
	Avg. Operating Cell Temp		18.6 °C
Simulation Metrics			
	Operating Hours		4654
	Solved Hours		4654

Condition Set

Description	Condition Set 1
Weather Dataset	TMY, 10km Grid (40.85,-124.15), NREL (prospector)
Solar Angle Location	Meteo Lat/Lng
Transposition Model	Perez Model
Temperature Model	Sandia Model

Temperature Model Parameters	Rack Type	a	b	Temperature Delta
	Fixed Tilt	-3.56	-0.075	3°C
	Flush Mount	-2.81	-0.0455	0°C

Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2

Irradiation Variance	5%
Cell Temperature Spread	4° C
Module Binning Range	-2.5% to 2.5%
AC System Derate	0.50%

Module Characterizations	Module	Uploaded By	Characterization
	CS3W-420P (1000V) (Canadian Solar)	HelioScope	Spec Sheet Characterization, PAN

Component Characterizations	Device	Uploaded By	Characterization
	CPS SCH100KTL-DO/US-480 (Chint Power Systems)	HelioScope	Spec Sheet

Components

Component	Name	Count
Inverters	CPS SCH100KTL-DO/US-480 (Chint Power Systems)	51 (5.10 MW)
Strings	10 AWG (Copper)	561 (305,313.6 ft)
Module	Canadian Solar, CS3W-420P (1000V) (420W)	15,127 (6.35 MW)

Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	20-29	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 11	Fixed Tilt	Landscape (Horizontal)	14°	319°	0.0 ft	1x1	0	0	0
Field Segment 3	Fixed Tilt	Landscape (Horizontal)	14°	349°	0.0 ft	1x1	0	0	0
Field Segment 4	Fixed Tilt	Landscape (Horizontal)	14°	169°	0.0 ft	1x1	4,551	4,551	1.91 MW
Field Segment 5	Fixed Tilt	Landscape (Horizontal)	14°	289.5°	0.0 ft	1x1	286	286	120.1 kW
Field Segment 6	Fixed Tilt	Landscape (Horizontal)	14°	109.5°	0.0 ft	1x1	286	286	120.1 kW
Field Segment 7	Fixed Tilt	Landscape (Horizontal)	14°	267.4°	0.0 ft	1x1	583	579	243.2 kW
Field Segment 8	Fixed Tilt	Landscape (Horizontal)	14°	87.3°	0.0 ft	1x1	583	579	243.2 kW
Field Segment 9	Fixed Tilt	Landscape (Horizontal)	14°	247°	0.0 ft	1x1	954	950	399.0 kW
Field Segment 10	Fixed Tilt	Landscape (Horizontal)	14°	67°	0.0 ft	1x1	954	950	399.0 kW
Field Segment 11	Fixed Tilt	Landscape (Horizontal)	14°	247.9°	0.0 ft	1x1	3,172	3,152	1.32 MW
Field Segment 12	Fixed Tilt	Landscape (Horizontal)	14°	67.8°	0.0 ft	1x1	3,172	3,152	1.32 MW
Field Segment 12	Fixed Tilt	Landscape (Horizontal)	14°	138.7°	0.0 ft	1x1	650	642	269.6 kW

Detailed Layout

Appendix F: HelioScope Landfill Annual Production Report

Design 2 Landfill, 936 Vance Ave, Samoa, CA 95564

Report

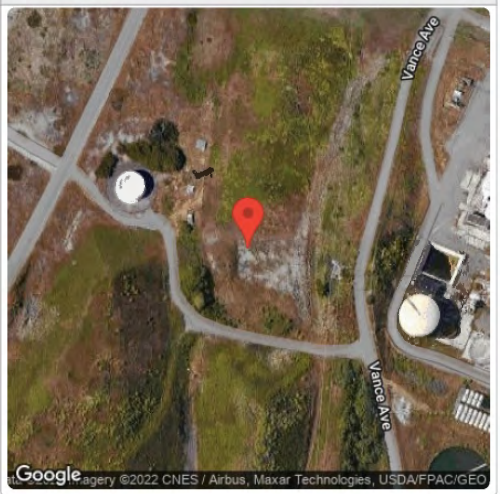
Project Name	Landfill
Project Address	936 Vance Ave, Samoa, CA 95564
Prepared By	Steve Richards steven.c.richards@humboldt.edu

Schatz Energy Research Center

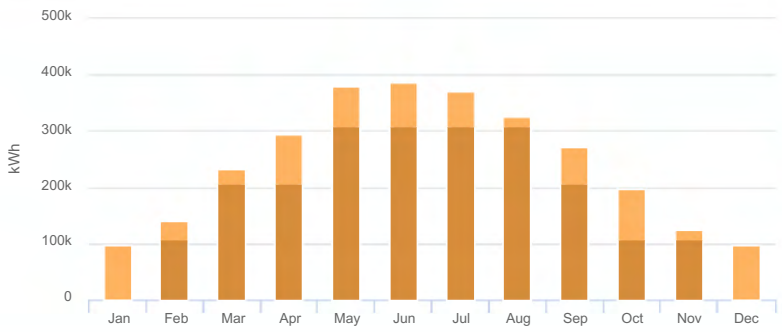
System Metrics

Design	Design 2
Module DC Nameplate	2.51 MW
Inverter AC Nameplate	2.02 MW Load Ratio: 1.24
Annual Production	2.920 GWh
Performance Ratio	82.0%
kWh/kWp	1,163.0
Weather Dataset	TMY, 10km Grid (40.85,-124.15), NREL (prospector)
Simulator Version	6d631a840a-5f7ded908c-38381c2dbb-6ef8d412e1

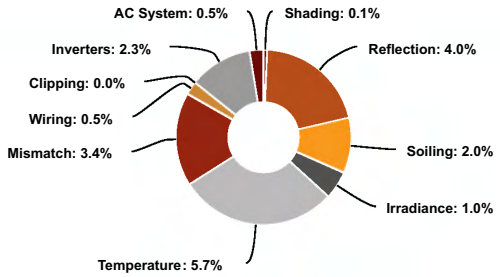
Project Location



Monthly Production



Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,450.6	
	POA Irradiance	1,418.2	-2.2%
	Shaded Irradiance	1,416.3	-0.1%
	Irradiance after Reflection	1,359.0	-4.0%
	Irradiance after Soiling	1,331.8	-2.0%
	Total Collector Irradiance	**1,331.8**	**0.0%**
Energy (kWh)	Nameplate	3,346,545.0	
	Output at Irradiance Levels	3,312,837.1	-1.0%
	Output at Cell Temperature Derate	3,123,624.1	-5.7%
	Output After Mismatch	3,018,390.3	-3.4%
	Optimal DC Output	3,003,880.4	-0.5%
	Constrained DC Output	3,003,871.6	0.0%
	Inverter Output	2,935,135.7	-2.3%
	Energy to Grid	**2,920,460.0**	**-0.5%**
Temperature Metrics			
	Avg. Operating Ambient Temp		12.0 °C
	Avg. Operating Cell Temp		26.9 °C
Simulation Metrics			
	Operating Hours		4654
	Solved Hours		4654

Condition Set

Description	Condition Set 1												
Weather Dataset	TMY, 10km Grid (40.85,-124.15), NREL (prospector)												
Solar Angle Location	Meteo Lat/Lng												
Transposition Model	Perez Model												
Temperature Model	Sandia Model												
Temperature Model Parameters	Rack Type	a	b	Temperature Delta									
	Fixed Tilt	-3.56	-0.075	3°C									
	Flush Mount	-2.81	-0.0455	0°C									
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D	
	2	2	2	2	2	2	2	2	2	2	2	2	
Irradiation Variance	5%												
Cell Temperature Spread	4° C												
Module Binning Range	-2.5% to 2.5%												
AC System Derate	0.50%												
Module Characterizations	Module	Uploaded By	Characterization										
	CS3W-420P (1500V) (Canadian Solar)	HelioScope	Spec Sheet Characterization, PAN										
Component Characterizations	Device	Uploaded By	Characterization										
	Sunny Tripower 24000TL-US (SMA)	HelioScope	Modified CEC										

Components

Component	Name	Count
Inverters	Sunny Tripower 24000TL-US (SMA)	84 (2.02 MW)
Strings	10 AWG (Copper)	405 (90,480.2 ft)
Module	Canadian Solar, CS3W-420P (1500V) (420W)	5,979 (2.51 MW)

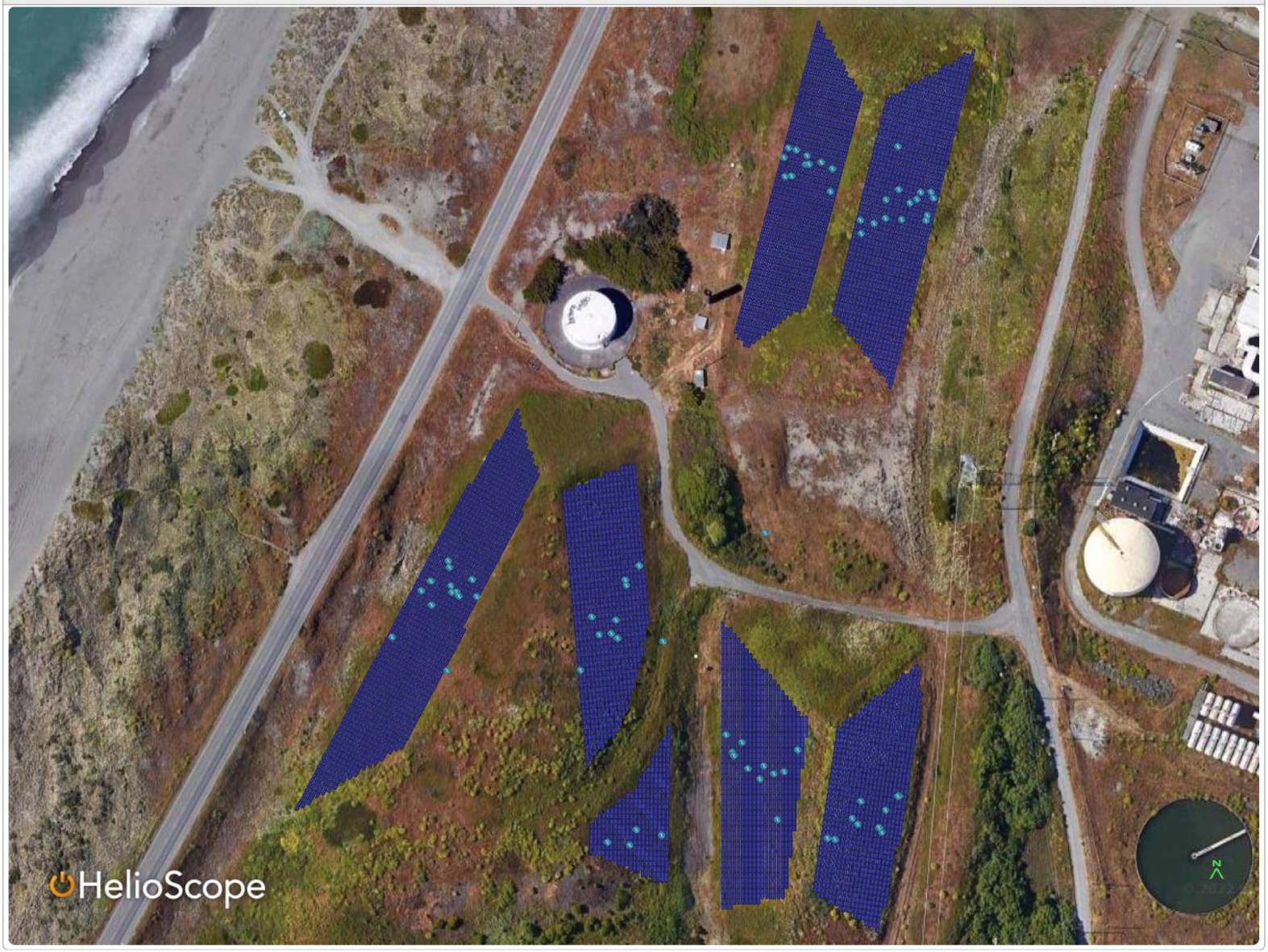
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	4-19	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Flush Mount	Landscape (Horizontal)	15°	270°	2.0 ft	1x1	882	882	370.4 kW
Field Segment 2	Flush Mount	Landscape (Horizontal)	15°	98.5°	2.0 ft	1x1	832	832	349.4 kW
Field Segment 3	Flush Mount	Landscape (Horizontal)	15°	298°	2.0 ft	1x1	1,181	1,181	496.0 kW
Field Segment 4	Flush Mount	Landscape (Horizontal)	15°	85°	2.0 ft	1x1	863	863	362.5 kW
Field Segment 5	Flush Mount	Landscape (Horizontal)	15°	91°	2.0 ft	1x1	323	323	135.7 kW
Field Segment 6	Flush Mount	Landscape (Horizontal)	15°	104°	2.0 ft	1x1	1,037	1,037	435.5 kW
Field Segment 7	Flush Mount	Landscape (Horizontal)	15°	285°	2.0 ft	1x1	861	861	361.6 kW

Detailed Layout



Appendix G: California Regional Water Quality Control Board North Coast Region ORDER NO. R1-2017-0001 Waste Discharge Requirements

California Regional Water Quality Control Board
North Coast Region

ORDER NO. R1-2017-0001

WASTE DISCHARGE REQUIREMENTS

FOR

POST-CLOSURE OF THE

HUMBOLDT BAY HARBOR, RECREATION, AND CONSERVATION DISTRICT,
FRESHWATER TISSUE COMPANY LLC,
AND
LOUISIANA PACIFIC CORPORATION

SAMOA CLASS III SOLID WASTE DISPOSAL SITE
WDID NO. 1B73061OHUM

Humboldt County

The California Regional Water Quality Control Board, North Coast Region, (hereinafter the Regional Water Board) finds that:

1. Humboldt Bay Harbor, Recreation, and Conservation District (Harbor District) and Freshwater Tissue LLC (Freshwater Tissue) own the former Louisiana Pacific Corporation (LP) Samoa Solid Waste Disposal Site (SWDS, also referred herein as "Site" or "Facility"), which is comprised of four known closed and capped Waste Management Units (WMUs) and an additional area within the SWDS facility boundaries which may contain other closed WMUs. The Harbor District is the current operator of the closed SWDS. The SWDS was owned and operated by LP during all waste disposal activities and closure. The Harbor District acquired ownership of the Samoa Pulp Mill complex, which included a portion of the Samoa SWDS which contains the four known WMUs, from Freshwater Tissue LLC on August 13, 2013. Freshwater Tissue retains ownership of a portion of the SWDS's property that may contain other closed WMUs. Harbor District, Freshwater Tissue, and LP are hereinafter collectively referred to as the "Discharger" for the purposes of this Order. LP no longer owns the SWDS, but has remained a co-discharger for the purpose of providing the financial assurance required by California Code of Regulations, title 27, sections 20950(f) and 22212(a).

2. On June 17, 2014, LP and the Harbor District submitted a Report of Waste Discharge/Joint Technical Document (ROWD/JTD) for a proposed change in monitoring requirements and an update of the post-closure maintenance and reasonably foreseeable release costs for the SWDS. This prompted Regional Water Board staff to review and update the Waste Discharge Requirements (WDR) and the Monitoring and Reporting Programs (MRP). Revision 1 of the ROWD/JTD was submitted in February 2016. The final ROWD/JTD, Revision 2, was submitted in May 2016.

3. LP formerly owned and operated the SWDS. In May 1998, LP submitted the *Final Closure and Post Closure Maintenance Plan* prepared by Winzler and Kelly Consulting Engineers, dated March 1998, for the closure of the SWDS.

4. The SWDS is located within the County of Humboldt, approximately 1 mile west of the City of Eureka, on Navy Base Road in portions of Sections 16, 17, 20, and 21, Township 5 North, Range 1 West, Humboldt Base and Meridian, as shown on Attachment "A," which is incorporated herein and made part of this Order. The SWDS latitude and longitude are 40° 48' 00" and 124° 12' 00", respectively. The SWDS is present on portions of Assessor's Parcel Numbers 401-112-021-000, 401-112-022-000, and 401-031-068-000.

5. The SWDS has four known closed and capped Waste Management Units, WMU No.1, WMU No.2, WMU No. 2A, and WMU No. 3. There may be additional closed WMUs north of the known WMUs, but they have not been defined. The Site Plan showing the location of the four known WMUs, survey control points, and the monitoring wells is incorporated herein and made part of this Order as Attachment "B". The SWDS is bound by TCF (or LP) Road to the north, the property boundary with DG Fairhaven Power Company facilities to the south, Navy Base Road to the west and Vance Avenue to the east. A facility is defined as the entire parcel at which waste discharge operations are conducted. The facility boundaries are shown on Attachment "C".

6. WDRs Order No. 73-61, adopted by the Regional Water Board on August 29, 1973, designated the SWDS as a Class II-2 landfill. The landfill classification system was later modified and Class II-2 landfills became Class III landfills under the revised nomenclature. The discharge is presently authorized by WDR Order No. R1-2003-0064 and 0125b.

7. The SWDS is an unlined Class III landfill, as defined in California Code of Regulations, title 27. The wastes contained in the landfill are approximately 98 percent wood ash with less than one percent each of slaker grits (unreacted lime nodules from the pulping process), pulp rejects, wood chips, and construction debris. All wastes came from LP activities. The SWDS had been operating since 1970 and ceased accepting waste in May 1997.

8. The total area of the SWDS is 36 acres with the four WMUs capped in 1998 comprising approximately 15 acres of this SWDS. Over 400,000 cubic yards of ash are contained within the WMUs. Wastes were placed directly on the ground in piles. It is possible that additional small piles of ash, capped prior to 1984, are present on the North end of the SWDS.

9. Post-closure land use for the SWDS is non-irrigated open space.

10. Effective July 18, 1997, the Water Quality Regulations for Class II and Class III disposal facilities formerly contained in California Code of Regulations, title 23, chapter 15, and the Solid Waste Regulations formerly in California Code of Regulations, title 14, were re-codified into California Code of Regulations, title 27, chapters 1 through 7, subdivision 1, division 2. Chapter 15 is therefore no longer applicable to this facility.

SITE DESCRIPTION

11. The SWDS is accessed from Highway 101 by heading west on State Route 255, then turning south onto Navy Base Road. After turning left onto TCF Drive, the internal site road is 0.5 miles south on TCF Drive. The access road is gravel. The SWDS is not specifically gated, however the entire complex perimeter is fenced and the road accessing the SWDS has a locked gate.

12. At the SWDS, the North Spit of the Samoa Peninsula separating Humboldt Bay and the Pacific Ocean is approximately 4,000 feet wide. Dune elevations near the SWDS range from 10 to 50 feet above mean sea level. The top of the highest WMU is approximately 65 feet above mean sea level.

13. The zoning and general plan designations for SWDS are general industrial. The surrounding land use and zoning include natural resource zones with coastal wetland, dune, and beach areas; industrial zones that are coastal dependent with archeological areas; and general industrial zones.

14. Land use within one mile of the SWDS is primarily industrial and recreational. The former pulp mill operations lie to the east and northeast of the SWDS. DG Fairhaven Power Company facilities lie to the south. Vacant Harbor District property lies to the north and Navy Base Road lies west of the Site. A water tank owned by the Humboldt Bay Municipal Water District (HBMWD) is west of WMU No. 3 and north of WMU No. 1. The SWDS also has right-of-way easements for HBMWD, Northwestern Pacific Railroad, and Pacific Gas and Electric facilities. The town of Samoa is located approximately half a mile to the northeast of the SWDS.

SURFACE WATER

15. The SWDS lies in a sand dune area on the Samoa Peninsula where there are no surface water drainage courses, seeps, or springs. The Samoa Peninsula is bordered by Humboldt Bay to the east and the Pacific Ocean to the west.

16. The SWDS is within the Eureka Plain Hydrologic Unit. The Eureka Plain discharges into Humboldt Bay and the Pacific Ocean or directly into the Pacific Ocean.

17. Pursuant to the Water Quality Control Plan for the North Coast Region (Basin Plan), including State Water Resources Control Board (State Water Board) Resolution No. 88-63, the existing and potential beneficial uses of the Eureka Plain Hydrologic Unit are:

    a. MUN - municipal and domestic supply
    b. AGR - agricultural supply
    c. IND - industrial service supply
    d. PRO – industrial process supply
    e. FRSH – freshwater replenishment
    f. NAV – navigation
    g. POW – hydropower generation
    h. REC-1 - water contact recreation
    i. REC-2 - non-contact water recreation
    j. COMM commercial and sport fishing

k. COLD - cold freshwater habitat
l. WILD - wildlife habitat
m. RARE - rare, threatened, or endangered species
n. MAR - marine habitat
o. MIGR - migration of aquatic organisms
p. SPWN - spawning, reproduction, and/or early development
q. SHELL - shellfish harvesting
r. EST - estuarine habitat
s. AQUA – aquaculture
t. CUL – native American culture

18. The SWDS is not located within a 100-year floodplain.

19. The SWDS is located within a Tsunami Inundation Area.

STORM WATER

20. This Order does not replace a future need for a National Pollutant Discharge Elimination System (NPDES) storm water permit as required by provisions of the Clean Water Act. The Site's NPDES Permit No. 112S014264 was terminated on November 25, 1999.

21. The WMUs are configured to direct storm water off the units. WMU No. 1 has a filter fabric and rock lined ditch running from the top deck down the access road to the end of the unit. There are no surface drainage features that drain off the Site.

22. The mean annual precipitation for the area is approximately 37.72 inches per year, based on data recorded at the Eureka National Weather Station. The 100-year, 24-hour precipitation event intensity is 6.25 inches. The average intensity is 0.26 inches per hour. The 100-year, 10-minute precipitation event intensity is 3.0 inches per hour.

SITE GEOLOGY

23. Surficial deposits at the SWDS are dune sand ranging from seven to 26 feet below ground surface, based on four borings drilled from 32 to 42 feet below ground surface. Holocene littoral marine (beach) deposits underlie the dune sands. Based on the literature, the Holocene marine deposits are thought to be 50 to 80 feet thick. Middle Pleistocene Hookton Formation unconformably underlies the marine deposits.

24. There are no known Holocene faults at the SWDS. The SWDS is not within an Alquist-Priolo Special Studies Zone.

25. The nearest potentially active fault is the North Spit Fault, which is two miles offshore of the SWDS. Other potentially active faults within a 5-mile radius include the Buhne Point, Hookton Channel, Bay Entrance, and Little Salmon Faults. Additional sources of potentially significant seismic shaking include the Mendocino Fault, located approximately 30 miles southwest of Humboldt Bay off the California coast; the Mad River Fault Zone approximately 5 miles northeast of the Site; and the San Andreas Fault System in the vicinity of Point Delgada.

GROUNDWATER

26. Underlying groundwater exhibits a wide variation of mineral and general water quality constituents due to the proximity with saline water bodies and the climate of the coastal dune environment. There is a thin layer of fresh groundwater above and brackish water below.

27. No springs have been documented within one mile of the SWDS.

28. The surrounding area relies upon water provided by the Humboldt Bay Municipal Water District, so usage of the freshwater lens underlying the SWDS is believed to be minimal based on past surveys.

29. In April 1988, LP submitted a Solid Waste Assessment Test (SWAT) report describing a groundwater monitoring network installed at the SWDS in 1986. Four wells, MW-1 through MW-4, were installed from depths of 23 to 34 feet below ground surface.

30. Based on the expected groundwater movement, wells MW-3 and MW-4 are located upgradient and well MW-2 is located downgradient of the known WMUs. Well MW-1 is downgradient during the wet season, but upgradient during the dry season. Well MW-1 is located northwest of the landfill and is screened from 18 to 23 feet deep. Well MW-2 is located southwest of the landfill and is screened from 22 to 27 feet deep. Well MW-3 is located southeast of the landfill and is screened from 28 to 33 feet deep. Well MW-4 is located to the northeast of the landfill and is screened from 24 to 29 feet deep.

31. There are five industrial supply wells within one mile of the SWDS. The three wells on the Samoa Pulp Mill complex were built by LP in the 1970's for use during drought years. They were not regularly used. Simpson Paper Company installed the other two wells in 1985. Usage of these wells is unknown. The Samoa Pulp Mill complex is now owned by the Harbor District and the groundwater beneath this complex is being evaluated by 33 monitoring wells for various constituents of concern. The Samoa Pulp Mill complex has been broken into eleven areas of interest. These areas of interest are in different phases of the cleanup process from active cleanup to no further assessment required. More detailed information on this cleanup may be accessed in the GeoTracker Database at http://geotracker.waterboards.ca.gov under Case No. 1NHU892.

32. Beneficial uses of areal groundwaters include:

    a. MUN - domestic water supply
    b. AGR - agricultural water supply
    c. IND - industrial service supply
    d. PRO - industrial process supply

CLOSURE AND FINANCIAL ASSURANCES

33. The SWDS is subject to the closure requirements of California Code of Regulations, title 27, subchapter 5, chapter 3.

34. California Code of Regulations, title 27, sections 20950(f) and 20380(b), require that the Discharger establish a formal financial mechanism to fund Site closure and known or reasonably foreseeable releases from the facility. California Code of Regulations, title 27, section 22212, requires that the Discharger establish a formal financial

mechanism to fund the Site post-closure maintenance fund. The Discharger has chosen to submit an annual Financial Means Test, per California Code of Regulations, title 27, section 22246 to meet these requirements.

35. The known and foreseeable release scenario is for the WMUs to be partially damaged by a tsunami. The 2016 ROWD/JTD has updated the known and foreseeable release cost estimate to be $712,507. The post-closure maintenance fund costs are estimated to be $31,605 per year. The Financial Means Test will be updated in April 2017 to reflect the updated costs.

36. The Discharger is required to update approved cost estimates annually to account for inflation, per California Code of Regulations, title 27, sections 22221(a)(2) and 22236.

37. LP conducted final closure activities on the SWDS from May through September 1998, and subsequently submitted *Construction Quality Assurances Documentation* prepared by Winzler and Kelly Consulting Engineers dated January 1999, describing closure of the landfill.

38. During closure construction Louisiana Pacific Corporation uncovered an additional pile of ash to the east of WMU No. 2, on the other side of the railroad tracks, and designated this WMU No. 2A. Most of the ash in WMU No. 2A was excavated down to grade and placed on WMU No. 2. The remaining ash was capped in place with the cap crowned to promote positive drainage.

39. The landfill cap consists of a two-foot thick ash foundation layer, overlain by a one foot minimum thickness barrier layer, overlain by a two foot minimum thickness vegetation layer and six inches of mulch. The barrier layer was compacted to greater than 83 percent relative compaction. The barrier layer permeability was determined by laboratory permeability tests. All ten laboratory permeability tests had permeability less than 1×10^{-7} centimeter per second. The vegetation layer was compacted to greater than 90 percent relative compaction.

40. Soil cover for the WMUs was material from a Humboldt Bay dredge disposal site located on the north end of the Samoa Peninsula, the waste material comprised the foundation layer, the vegetation layer came from on-site borrow sources and the mulch was wood fines from the Louisiana Pacific Samoa operations. The landfill cap was compacted in lifts, drainage and erosion control measures were established in accordance with the March 1998 *Closure Plan* prepared by Winzler and Kelly Consulting Engineers.

41. The final cap surface is sloped to promote drainage away from the waste footprint. Slopes are no steeper than three to one nor flatter than three percent. The drainage ditch and contours were constructed to drain surface water away from the landfill cap. Erosion control consisted of seeding disturbed areas.

42. The closed WMUs have two permanent surveying monuments installed nearby, but off the waste footprints per California Code of Regulations, title 27, Section 20950(d). These monuments are known as Point 28 and Point 100 and are shown on Attachment "B".

43. The closed WMUs have been subject to iso-settlement mapping every five years per California Code of Regulations, title 27, section 21090(e)(2) since closure. Surveys occurred in 2003, 2008, and 2013 and have shown no significant settlement. Given

the landfill's waste characteristics and the iso-settlement results, the requirement for further regularly scheduled iso-settlement surveys has been suspended unless significant settlement is visually observed.

PROCEDURAL REQUIREMENTS AND OTHER CONSIDERATIONS

44. As an existing facility, this project is exempt from the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.) pursuant to California Code of Regulations, title 14, section 15301.

45. The Humboldt County Planning Commission prepared and approved a negative declaration for the 1998 closure construction on March 31, 1998, to satisfy the requirements of CEQA. The Regional Water Board, acting as a responsible agency under CEQA, has considered this negative declaration pursuant to California Code of Regulations, title 14, section 15096.

46. The Regional Water Board *Water Quality Control Plan for the North Coast Region* (Basin Plan) includes water quality objectives and receiving water limitations.

47. This order implements:

    a. The Basin Plan; and
    b. The prescriptive standards and performance goals of California Code of Regulations, title 27, chapters 1 through 6, subdivision 1, division 2, effective July 18, 1997, and subsequent revisions.

48. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for the discharge and has provided them with an opportunity to submit written comments and recommendations.

49. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.

50. The permitted discharge is consistent with the provisions of State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California.* Resolution No. 68-16 requires the Regional Water board, in regulating the discharge of waste, to maintain high quality waters of the state unless it is demonstrated that any change in water quality will be consistent with the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality lower than applicable standards. The Regional Water Board finds that the discharge, as allowed in these waste discharge requirements, is consistent with Resolution No. 68-16 as this Order: 1) requires compliance with title 27 requirements for waste management units, which is considered best practicable treatment and control for discharges; 2) requires implementation of the provisions and prohibitions contained in this Order to assure the discharge does not cause pollution or nuisance and the maintenance of the highest water quality consistent with the maximum benefit to the people of the state; and 3) requires implementation of monitoring and reporting programs as required by title 27 to assure protection of water quality. If the discharge causes or threatens to cause degradation of water quality the Discharger will be required to take corrective action.

THEREFORE, IT IS HEREBY ORDERED that Waste Discharge Requirements Order No. R1-2003-0064 and 0125b (for the former Louisiana Pacific Company Samoa Solid Waste Disposal Site, Class III Waste Management Unit) are rescinded. It is further ordered that the Discharger, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, shall comply with the following:

A. DISCHARGE PROHIBITIONS

1. The discharge of any waste not specifically regulated by this Order is prohibited.

2. The discharge of waste to a closed WMU is prohibited.

3. The discharge of solid and liquid wastes at this Facility is prohibited. Water may be discharged in amounts reasonably necessary for dust control, compaction, and the establishment and maintenance of vegetation.

4. The Discharger shall not cause the concentration of any Constituents of Concern (COC) to exceed its respective concentration limit in any monitored medium. The concentration limit for each monitoring parameter shall be set at the background concentration. Data analysis shall be performed in accordance with the approved Monitoring and Reporting Program.

5. The discharge of "hazardous wastes" and "designated wastes" at this facility as defined in California Code of Regulations, title 27 is prohibited. The discharge of leachate from the landfill is prohibited.

6. The discharge of waste, including leachate, solid, or waste derived gas to surface waters, any portion of the storm water control system, or groundwater is prohibited.

7. The discharge of waste to surface waters or within 50 feet of surface waters is prohibited.

8. The discharge of wastes into ponded water from any source is prohibited.

9. Ponding of liquids, including rainfall runoff and leachate, over solid waste disposal cells is prohibited.

10. The discharge of any waste in any manner not specifically described or quantified in the findings and regulated by this Order is prohibited.

11. Creation of a pollution, contamination, or nuisance, as defined by California Water Code, section 13050, is prohibited.

B. GENERAL SPECIFICATIONS

1. The discharge of wastes shall not cause water quality degradation by allowing a measurably significant increase over background or baseline concentrations, as determined in accordance with Provisions 22 through 39 of this Order and MRP No. R1-2017-0001.

2. Any leachate generated and collected at the SWDS shall be handled and disposed of in a manner approved by the Executive Officer of the Regional Water Board (Executive Officer).

3. Surface drainage from tributary areas or internal site drainage from surface or subsurface sources shall not contact or percolate through wastes discharged at the SWDS.

4. Precipitation and drainage control systems for storm water shall be designed and constructed to limit, to the greatest extent possible, ponding, inundation, erosion, slope failure, washout and overtopping from precipitation conditions of a 100-year, 24-hour storm event.

5. Unlined drainage ditches shall be located, to the maximum extent practicable, so that they do not cross over the landfill. Site drainage over the landfill shall be contained in drainage conveyance structures such as corrugated metal or plastic pipe or in drainage ditches which are lined with at least one foot of compacted soil having an in-place permeability of 1×10^{-6} cm/sec or less.

6. Prior to the anticipated rainy season, but no later than October 1, annually, any necessary erosion control measures shall be implemented, and any necessary construction, maintenance, or repairs of precipitation and drainage control facilities shall be completed to prevent erosion or flooding of the facility and to prevent surface drainage from contacting or percolating through wastes. By October 15, annually, the Discharger shall submit a report to the Executive Officer describing measures taken to comply with this specification.

C. POST-CLOSURE COVER SPECIFICATIONS

1. All WMUs have been closed and capped. Final cover shall be maintained to conform to criteria specified in these Post-Closure Cover Specifications.

2. WMU containment structures and any repairs or maintenance to containment structures shall be designed, constructed, and operated to prevent inundation or washout due to floods with a 100-year return period. WMU containment structures shall be constructed and maintained to prevent, to the greatest extent possible, ponding, infiltration, inundation, erosion, slope failure, washout, and overtopping under 100-year, 24-hour precipitation conditions.

3. WMU containment structures and erosion and drainage control systems and any repairs or maintenance to containment structures and erosion and drainage control systems shall be designed and constructed under the direct supervision of a California registered professional civil engineer, or a certified engineering geologist, and shall be certified by that individual as meeting the prescriptive standards and performance goals of California Code of Regulations, title 27. Designs shall include a Construction Quality Assurance (CQA) Plan, which must:

   a. demonstrate that the structures have been constructed according to the specifications and plans approved by the Regional Water Board, and
   b. provide quality control specifications on the material and construction practices used to construct the structures and to prevent the use of inferior products and/or materials that do not meet the approved design plans and specifications.

4. Materials used to maintain or repair the final cover shall have appropriate physical and chemical properties to ensure containment of wastes over the closure and post-closure maintenance period. Construction quality assurance and as-built drawings shall be submitted to the Regional Water Board within 60 days of final cover construction or maintenance.

5. Final cover shall be maintained to consist of at least two feet of compacted foundation materials, overlain by at least one foot of compacted clay at a hydraulic conductivity less than 1×10^{-6} centimeters per second, overlain by two feet of vegetative layer, and overlain by a six inch soil amendment layer consisting of wood waste fine particulates. Permeability of final cover repairs or maintenance shall be determined in the field and in the laboratory using techniques approved by the Executive Officer. Construction methods and quality assurance procedures shall be sufficient to ensure that all parts of the final cover repairs or maintenance meet the permeability and stability requirements. Final cover materials shall be designed and constructed to function with a minimum of maintenance. Installation of the final cover repairs or maintenance shall be under the direct supervision of a California registered professional civil engineer or certified engineering geologist. Materials and construction techniques shall meet the specifications and requirements in the final closure plan.

6. Vegetation shall be established immediately upon completion of the final cover repairs or maintenance. Vegetation shall be selected to require a minimum of irrigation and maintenance. Rooting depth shall not be in excess of the vegetative soil thickness.

7. Closed WMUs shall be maintained to at least a three-percent grade and maintained to prevent ponding and infiltration.

8. The Discharger shall continue to maintain at least two permanent survey monuments near the WMUs from which elevation of the WMUs can be

determined. Such monuments shall be installed by a California licensed surveyor or registered professional civil engineer. [Cal. Code Regs., title 27, § 20950(d)]

9. Closure of each WMU and maintenance or repairs shall be performed under the direct supervision of a California registered professional civil engineer or certified engineering geologist.

10. All containment structures and repairs to containments structures shall meet the general criteria set forth in California Code of Regulations, title 27, section 20320.

11. All containment structures and repairs to the containment structures shall meet the requirements of California Code of Regulations, title 27, sections 20310 through 20370.

D. PROVISIONS

1. A copy of this Order shall be maintained at the Facility and be available at all times to operating personnel. Key operating personnel shall be familiar with its contents.

2. The Discharger shall comply with the WDRs and the attached Monitoring and Reporting Program (MRP) No. R1-2017-0001, incorporated herein by this reference. This MRP requires preparation and submittal of technical and monitoring reports pursuant to California Water Code, section 13267(b). A violation of the MRP is a violation of the WDRs.

3. The Discharger may file a written request, including appropriate supporting documents, with the Executive Officer proposing modifications to MRP No. R1-2017-0001. The Discharger shall implement any changes in the revised Monitoring and Reporting Program upon receipt of a signed copy of the revised Monitoring and Reporting Program.

4. The Discharger shall comply with all applicable provisions of California Code of Regulations, title 27 not specifically referred to in this Order.

5. By October 1 annually, any necessary erosion control measures shall be implemented and any necessary construction, maintenance, or repairs of drainage control facilities shall be completed to minimize erosion and prevent flooding at the SWDS. All disturbed areas shall be seeded with an appropriate vegetation mixture to minimize sedimentation. Rainfall runoff from disturbed areas shall be channeled through sedimentation basins or other appropriate structures to minimize sedimentation in surface drainage courses downgradient of the SWDS. Sedimentation basins and other appropriate structures shall be cleaned out during the rainy season as necessary to maintain adequate sedimentation capacity.

6. Prior to any construction, the Discharger shall obtain any and all permits required under federal, state, or local laws.

7. Iso-settlement surveys occurred in 2003, 2008, and 2013 and have shown no significant settlement. Given the landfill's waste characteristics and the iso-settlement results, the requirement for further regularly scheduled iso-settlement surveys has been suspended unless significant settlement is visually observed using best professional judgement. If significant settlement is visually observed, the Discharger shall produce and submit to the Regional Water Board within six months of the observation an iso-settlement map accurately depicting the estimated total change in elevation of the final cover's low-hydraulic-conductivity layer. The iso-settlement map will then be produced every five years thereafter. For each portion of the landfill, this map shall show the total lowering of the surface elevation of the final cover, relative to the baseline topographic map submitted in the January 1999 Construction Quality Assurances Documentation, and shall indicate all areas where visually noticeable differential settlement may have been obscured by grading operations. The map shall be drawn to the same scale and contour interval as the topographic map included in the January 1999 Construction Quality Assurances Documentation, but showing the current topography of the final cover and featuring overprinted isopleths indicating the total settlement to-date. The Executive Officer may again suspend this requirement for any given WMU upon finding two successive versions of the iso-settlement map indicate that the WMU has stabilized. [Cal. Code Regs., title 27, § 21090(e)(2)]

8. The Discharger shall note on a map of the landfill the approximate location and outline of any areas where differential settlement is visually obvious prior to conducting periodic grading operations on the closed landfill [Cal. Code Regs., title 27, § 21090(e)(4)]. This information shall be included in the Annual Monitoring Report, as well as each five-year iteration of the iso-settlement map. The map shall show all areas where differential settlement has been noted since the previous map submittal, and shall highlight areas of repeated or severe differential settlement. Map notations and delineations made pursuant to this paragraph need not be surveyed, so long as all areas where differential settlement was visually identifiable prior to regrading can be relocated. Such notation and delineation shall be made by, or under the supervision of, a California registered professional civil engineer or registered geologist.

9. During times of repair to the waste containment, drainage, or monitoring facilities, legible copies of the daily CQA field notes and summary reports shall be submitted to the Regional Water Board via facsimile at (707) 523-0135 or email to Gina.Morrison@waterboards.ca.gov by noon the following weekday. The document shall be addressed to the Regional Water Board, Groundwater Permitting Unit, and include the name of the staff person assigned to the SWDS.

10. Throughout the post-closure maintenance period, pursuant to California Code of Regulations, title 27, section 21090 (c), the Discharger shall:

    a. maintain the structural integrity and effectiveness of all containment structures, and maintain the final cover as necessary to correct the effects of settlement or other adverse factors;
    b. maintain monitoring systems and monitor the ground water, surface water, and the unsaturated zone in accordance with applicable requirements of

California Code of Regulations, title 27, article 1, chapter 3, subchapter 3, subdivision 1 (section 20380 et seq.);
c. prevent erosion and related damage of the final cover due to drainage; and
d. protect and maintain surveyed monuments.

11. The Discharger shall provide proof to the Regional Water Board within sixty days after completing final closure that the Discharger has filed a detailed description of the closed site, including a map, with the Recorder of the County in which the site is located, with the Local Enforcement Agency, and with the local agency that has been selected to maintain the county integrated waste management plan. The site description, upon completion of closure of the site, shall include but not be limited to the following:

    a. the date that closure was completed;
    b. the facility boundaries and that the parcel has been used as a solid waste landfill;
    c. the boundaries including height and depths of the filled area, and if the site was closed in increments, the boundaries of each WMU;
    d. the location where the closure and post-closure maintenance plans can be obtained;
    e. a statement that future site use is restricted in accordance with the post-closure maintenance plan; and
    f. a statement that in the event that the Discharger defaults on carrying out either the post-closure maintenance plan or any corrective action needed to address a release, then the responsibility for carrying out such work falls to the property owner. [Cal. Code Regs., title 27, § 21170]

12. The Discharger shall obtain and maintain adequate assurances of financial responsibility for closure and corrective action for all known and reasonably foreseeable releases from a WMU at the facility, in accordance with California Code of Regulations, title 27, sections 20380(b), 20950, 22210, 22211, 22212, 22220, 22221, and 22222.

13. The Discharger is required to update approved cost estimates annually to account for inflation, in accordance with California Code of Regulations, title 27, section 22236.

14. The Discharger shall annually by April 15, submit the following:

    a. Evidence that adequate financial assurance for corrective action and post-closure maintenance is still in effect.
    b. Adjustment to update approved cost estimates annually to account for inflation.
    c. A statement that the amount of adequate financial assurance for corrective action and post-closure maintenance is still adequate or showing the amount of increase as necessary.
    d. A statement that the post-closure maintenance plan is still adequate and in conformance with the existing regulations.

15. In the event the Regional Water Board determines that the Discharger has failed to pay or are failing to perform corrective action as required by law, the California Department of Resources, Recycling and Recovery (CalRecycle) may direct the Discharger to pay

such amounts as necessary to ensure sufficient corrective action. The Discharger shall be obligated to use such funds for corrective action, in accordance with the directive of the Regional Water Board.

16. The Discharger shall maintain waste containment facilities and precipitation and drainage control systems throughout the post-closure maintenance period. The Discharger shall immediately notify the Executive Officer by telephone or via email of any flooding, equipment failure, slope failure, or other change in SWDS conditions that could impair the integrity of waste containment facilities or of precipitation and drainage control structures and take corrective action. Written notification by certified mail shall confirm this notification within two weeks of the telephone or email notification. The written notification shall include pertinent information explaining reasons for the issue and shall indicate the steps taken to correct the problem and the dates thereof, and the steps being taken to prevent the problem from recurring.

17. The Discharger shall continue to monitor each WMU, surface drainage, and underlying media throughout the post-closure maintenance period per MRP No. R1-2017-0001. Monitoring shall continue until the Regional Water Board determines that the SWDS no longer threatens water quality.

18. The Discharger or persons employed by the Discharger shall comply with all notice and reporting requirements of the State Department of Water Resources with regard to the construction, alteration, destruction, or abandonment of all monitoring wells used for compliance with this Order or with MRP No. R1-2017-0001, as required by California Water Code, sections 13750 through 13755.

19. Monitoring points, including those representing groundwater sampling for the Point of Compliance, shall be as listed in the MRP No. R1-2017-0001 for the SWDS. Potential leachate seeps, if encountered, shall be sampled in accordance with MRP No. R1-2017-0001.

20. The Discharger shall provide Regional Water Board staff a minimum of **one week** notification prior to commencing any field activities related to the installation, repair, or abandonment of monitoring devices, and a minimum 48 hour notification prior to the collection of samples associated with a detection monitoring program, evaluation monitoring program, or corrective action program.

21. All analyses shall be performed in a laboratory certified to perform such analyses by the State Water Board Division of Drinking Water or a laboratory approved by the Executive Officer.

22. The Water Quality Protection Standard, as defined in California Code of Regulations, title 27, section 20390, for organic compounds which are not naturally occurring and not detected in background groundwater samples shall be taken as the detection limit of the analytical method used (i.e., U.S. EPA Methods 8260 and 8270). The detection (the Discharger may choose to retest in conformance with California Code of Regulations, title 27, section 20420 (j)(2)) of one or more non-naturally occurring organic

compounds in samples above the Water Quality Protection Standard from detection monitoring wells is considered measurably significant evidence of a release from the WMU.

23. The Water Quality Protection Standard, as defined in California Code of Regulations, title 27, section 20390, for compounds which are naturally occurring shall be taken as the concentration limit, as defined in California Code of Regulations, title 27, section 20400. The detection (the Discharger may choose to retest in conformance with California Code of Regulations, title 27, section 20420 (j)(2)) of one or more naturally occurring compounds in samples above the Water Quality Protection Standard from detection monitoring wells is considered measurably significant evidence of a release from the WMU.

24. For any given monitored medium, the samples taken from all monitoring points and background monitoring points to satisfy the data analysis requirements for a given reporting period shall all be taken **within a span not to exceed 15 days**, unless a longer time period is approved by the Executive Officer, and shall be taken in a manner that ensures sample independence to the greatest extent feasible. Specific methods of collection and analysis must be identified. Sample collection, storage, and analysis shall be performed according to the most recent version of U.S. EPA Methods, such as the latest editions, as applicable, of: (1) Methods for the Analysis of Organics in Water and Wastewater U.S. EPA 600 Series), (2) Test Methods for Evaluating Solid Waste (SW-846, latest edition), and (3) Methods for Chemical Analysis of Water and Wastes (U.S. EPA 600/4-79-020).

25. If methods other than U.S. EPA-approved methods or Standard Methods are used, the exact methodology shall be submitted for review and approval by the Executive Officer prior to use.

26. The methods of analysis and the detection limits used must be appropriate for the expected concentrations. For the monitoring of any constituent or parameter that is found in concentrations which produce more than 90% non-numerical determinations (i.e., "trace" or "ND") in data from background monitoring points for that medium, the analytical method having the lowest method detection limit (MDL) shall be selected from among those methods which would provide valid results in light of any matrix effects or interferences.

27. "Trace" results - results falling between the MDL and the practical quantitation limit (PQL) - shall be reported as such, and shall be accompanied both by the estimated MDL and PQL values for that analytical run.

28. MDLs and PQLs shall be derived by the laboratory for each analytical procedure, according to State of California laboratory accreditation procedures. These MDLs and PQLs shall reflect the detection and quantitation capabilities of the specific analytical procedure and equipment used by the lab, rather than simply being quoted from U.S. EPA analytical method manuals. In relatively interference-free water, laboratory-

derived MDLs and PQLs are expected to closely agree with published U.S. EPA MDLs and PQLs.

29. If the laboratory suspects that, due to a change in matrix or other effects, the true detection limit or quantitation limit for a particular analytical run differs significantly from the laboratory-derived MDL/PQL values, the results shall be flagged accordingly, along with estimates of the detection limit and quantitation limit actually achieved. **The MDL shall always be calculated such that it represents the lowest achievable concentration associated with a 99% reliability of a nonzero result**. The PQL shall always be calculated such that it represents the lowest constituent concentration at which a numerical value can be assigned with reasonable certainty that it represents the constituent's actual concentration in the sample. Normally, PQLs should be set equal to the concentration of the lowest standard used to calibrate the analytical procedure.

30. All QA/QC data shall be reported, along with the sample results to which they apply, including the method, equipment, analytical detection and quantitation limits, the percent recovery, an explanation for any recovery that falls outside the QC limits, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name and qualifications of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recoveries. The accompanying sample results shall be appropriately flagged in cases where contaminants are detected in QA/QC samples (i.e., field, trip, or lab blanks).

31. Unknown chromatographic peaks shall be reported, flagged, and tracked for potential comparison to subsequent unknown peaks that may be observed in future sampling events. Identification of unknown chromatographic peaks that recur in subsequent sampling events may be required.

32. The statistical method shall account for data below the practical quantitation limit (PQL) with one or more statistical procedures that are protective of human health and the environment. Any PQL validated pursuant to California Code of Regulations, title 27, section 20415(e)(7) that is used in the statistical method shall be **the lowest concentration (or value) that can be reliably achieved** within limits of precision and accuracy specified in the WDRs for routine laboratory operating conditions that are available to the facility. The Discharger's technical report, pursuant to California Code of Regulations, title 27, section 20415(e)(7), shall consider the PQLs listed in Appendix IX to Chapter 14 of Division 4.5 of California Code of Regulations, title 22, for guidance when specifying limits of precision and accuracy. For any given constituent monitored at a background or downgradient monitoring point, an indication that falls between the MDL and the PQL for that constituent (hereinafter called "trace" detection) shall be identified and used in appropriate statistical or nonstatistical tests. Nevertheless, for a statistical method that is compatible with the proportion of censored data (trace and ND indications) in the data set, the Discharger can use the laboratory's concentration estimates in the trace range (if available) for statistical analysis, in order to increase the statistical power by decreasing the number of "ties".

33. If the Discharger determines that there is measurably significant evidence of a release from the WMUs, as defined in California Code of Regulations, title 27, section 20164, the Discharger:

    a. shall immediately notify the Regional Water Board verbally and take all necessary corrective actions. Written notification by certified mail shall be provided within 7 days of occurrence. [Cal. Code Regs, title 27, § 20420(j)(1)]
    b. can immediately initiate the verification procedure pre-approved by the Executive Officer of the Regional Water Board to verify the release. [Cal. Code Regs, title 27, § 20420(j)(2)]

34. Immediately following detection of a release, or after completion of the retest, the Discharger:

    a. Shall immediately sample all Monitoring Points in the affected medium at the WMUs and determine the concentration of all COCs. [Cal. Code Regs, title 27, § 20420(k)(1)]
    b. Within 90 days of determining measurably significant evidence of release, submit an amended ROWD to establish an evaluation monitoring program, in accordance with California Code of Regulations, title 27, section 20420(k)(5).
    c. Within 180 days of verifying measurably significant evidence of a release from a WMU, submit an engineering feasibility study for a corrective action program. The corrective action program shall, at a minimum, meet the requirements of California Code of Regulations, title 27, section 20430. [Cal. Code Regs, title 27, § 20420(k)(6)]

35. The Regional Water Board may make an independent finding that there is a measurably significant evidence of release. The Regional Water Board shall send written notification of such a determination to the Discharger by certified mail, return receipt requested. The Discharger shall comply with all provisions of California Code of Regulations, title 27, section 20420 and Provisions in this Order that are required in response to a measurably significant evidence of release.

36. The Discharger shall report to the Regional Water Board by certified mail the results of both the initial statistical test and the results of the verification procedure, as well as all concentration data from samples collected for use in these tests within seven days of the last laboratory analysis of the samples collected for the verification procedure. [Cal. Code Regs, title 27, § 20415(e)(8)(E)(6)]

37. If the Discharger verifies that there has been a measurably significant release from the WMUs, the Discharger may demonstrate that a source other than the WMUs caused the evidence of a release or that the evidence is an artifact caused by an error in sampling, analysis, or the data analysis protocol. [California Code of Regulations, title 27, section 20420(k)(7)] The Discharger may make this demonstration in addition to or in lieu of submitting an amended report of waste discharge and an engineering feasibility study pursuant to California Code of Regulations, title 27 sections 20420(k)(5) and 20420(k)(6). The Discharger is not relieved of the requirements specified in California Code of Regulations, title 27, sections 20420(k)(5) and (k)(6) unless the demonstration

report is accepted by the Executive Officer. In making a demonstration, the Discharger shall:

a. Within 7 days of determining measurably significant evidence of a release, submit a report to the Regional Water Board by certified mail stating that the Discharger intends to make a demonstration pursuant to California Code of Regulations, title 27, section 20420(k)(7)(A).
b. Within 90 days of determining measurably significant evidence of a release, submit a report to the Regional Water Board that demonstrates that a source other than the WMU caused the apparent release. [Cal. Code Regs, title 27, § 20420(k)(7)(B)]
c. Within 90 days of determining measurably significant evidence of a release, submit an amended report of waste discharge to make any appropriate changes to the detection monitoring program. [Cal. Code Regs, title 27, § 20420(k)(7)(C)]

38. If the Discharger determines that there is significant physical evidence of a release, as described in California Code of Regulations, title 27, section 20385(a)(3) or that the detection monitoring program does not meet the requirements of California Code of Regulations, title 27, section 20420, the Discharger shall:

    a. notify the Regional Water Board by certified mail within 7 days of such a determination [Cal. Code Regs, title 27, § 20420(l)(1)]; and
    b. within 90 days of such a determination, submit an amended ROWD to the Regional Water Board to make any appropriate changes to the program. [Cal. Code Regs, title 27, § 20420(1)(2)]

39. Any time that the Regional Water Board or Executive Officer determines that the detection monitoring program does not satisfy the requirements of California Code of Regulations, title 27, section 20420, the Regional Water Board or Executive Officer shall send written notification of such a determination to the Discharger by certified mail, return receipt requested. The Discharger shall, within 90 days after receipt of notification by the Regional Water Board or Executive Officer, submit an amended ROWD to make any appropriate changes to the program. [Cal. Code Regs, title 27, § 20420(m)]

40. **Compliance Time Schedule:** Pursuant to California Water Code, section 13267(b), The Discharger shall complete the tasks outlined in these WDRs in accordance with the following time schedule:

Action	**Compliance Date**
The Discharger shall record a detailed description of the SWDS including maps at the Humboldt County Recorder's Office, the Local Enforcement Agency and with the local agency that has been selected to maintain the county integrated waste management plan in accordance with California Code of Regulations, title 27, section 21170. The description shall include the date of closure completion; the facility boundaries and that the parcel has been used as a	June 15, 2017

solid waste landfill; the boundaries including height and depths of the filled area and the boundaries of each WMU; location of the closure and post-closure maintenance plans; a statement that future site use is restricted in accordance with the post-closure maintenance plan regarding future use of the SWDS; and a statement that in the event that the Discharger defaults on carrying out either the post-closure maintenance plan or any corrective action needed to address a release, then the responsibility for carrying out such work falls to the property owner. Copies of the recorded documents shall be submitted to the Regional Water Board. (per PROVISION D. 11)	

41. The Discharger shall notify the Regional Water Board in writing of any proposed change of ownership or responsibility for construction, operation, closure or post-closure maintenance of the WMUs. This notification shall be given prior to the effective date of the change and shall include a statement by the new Discharger(s) that construction, operation, closure, and post-closure maintenance will be in compliance with any existing waste discharge requirements and any revisions thereof. Upon such notification, the Regional Water Board will amend the existing WDRs to name the new Discharger(s).

42. The Regional Water Board considers the property owner at the time of waste placement to have continuing responsibility for correcting problems that may arise in the future as a result of the waste discharge. This responsibility continues during subsequent use of the land, including use by subsequent owners.

43. After notice of and opportunity for hearing, this Order may be terminated or modified for cause, including but not limited to:

    a. violation of any term or condition in this Order;
    b. obtaining this Order by misrepresentation, or failure to fully disclose all relevant facts; and
    c. a change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

44. The Discharger shall remove and relocate to a legal disposal site any wastes discharged at this SWDS in violation of this Order.

45. Severability

    Provisions of these waste discharge requirements are severable. If any provision of these requirements is found to be invalid, the remainder of these requirements shall not be affected.

46. Operation and Maintenance

    The Discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed by the Discharger to achieve compliance with the waste discharge requirements.

47. Change in Discharge

    The Discharger shall file a report of waste discharge at least 120 days before making any material change or proposed change in the character, location, or volume of the discharge.

48. Signatory Requirements

    a. All applications, reports, or information submitted to the Regional Water Board Executive Officer shall be signed by either a principal executive officer, ranking elected official, or a responsible corporate officer, with the exception of financial assurances for solid waste disposal sites. Financial assurances shall follow the specific requirements for the selected financial mechanism per California Code of Regulations, title 27, chapter 6. For purposes of this provision, a responsible corporate officer means:

        i. a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation; or

        ii. the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

    b. Reports required by this Order, other information requested by the Regional Water Board, and Permit applications submitted for Group II storm water discharges under 40 Code of Federal Regulations (CFR) 122.26(b)(3) may be signed by a duly authorized representative provided:

        i. the authorization is made in writing by a person described in paragraph (a) of this provision;

        ii. the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and

iii. the written authorization is submitted to the Regional Water Board prior to or together with any reports, information, or applications signed by the authorized representative. [40 CFR 122.22(b)(c)]

c. Any person signing a document under paragraph (a) or (b) of this provision shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR 122.22(d)]

49. Change in Ownership

In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the following items by letter, a copy of which shall be forwarded to the Regional Water Board:

a. existence of this Order, and
b. the status of the Discharger's annual fee account.

50. Vested Rights

This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the Discharger from liability under federal, state, or local laws, nor create a vested right for the Discharger to continue the waste discharge.

51. Inspections

The Discharger shall permit authorized staff of the Regional Water Board:

a. entry upon premises in which a waste source is located or in which any required records are kept;
b. access to copy any records required to be kept under terms and conditions of this Order;
c. inspection of monitoring equipment or records; and
d. sampling of any discharge.

52. Noncompliance

In the event the Discharger is unable to comply with any of the conditions of this Order due to:

a. breakdown of waste treatment equipment;
b. accidents caused by human error or negligence; or
c. other causes such as acts of nature.

The Discharger shall notify the Executive Officer by telephone as soon as they or their agents have knowledge of the incident and shall confirm this notification in writing within two weeks of the telephone notification. The written notification shall include pertinent information explaining reasons for the noncompliance and shall indicate the steps taken to correct the problem and the dates thereof, and the steps being taken to prevent the problem from recurring.

53. Accidental Spills and Incident Reporting

The Discharger shall provide and comply with its Emergency Response Plan for any accidental spill or incident (Cal. Code Regs., tit. 37, § 21132). The Discharger shall immediately report the incident of unintentional or accidental spills and diligently act to abate the effects of the discharge. Written confirmation of the incident is required within two weeks of the discharge. Emergency Response Plans shall be reviewed, updated, and submitted to the Regional Water Board in the annual report by October 31, 2022, 2027, and every five years thereafter or after any significant emergency contact changes.

54. Monitoring

The Discharger shall comply with the MRP No. R1-2017-0001 and any modifications to this document as specified by the Executive Officer. The document is attached to this Order and incorporated herein. Chemical, bacteriological, and/or bioassay analyses shall be conducted at a laboratory certified for such analyses by the State Water Board Division of Drinking Water.

Monitoring and Reporting Provisions require sampling and analysis performance criteria in addition to compliance reporting criteria and timeframes.

55. Revision of Requirements

The Regional Water Board will review this Order periodically and may revise requirements when necessary.

Certification

I, Matthias St. John, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, North Coast Region, on February 2, 2017.

_____

Matthias St. John
Executive Officer

Appendix H: Landfill Solar PV Array - Concepts & Site Conditions

Redwood Multipurpose Marine Terminal Replacement Project

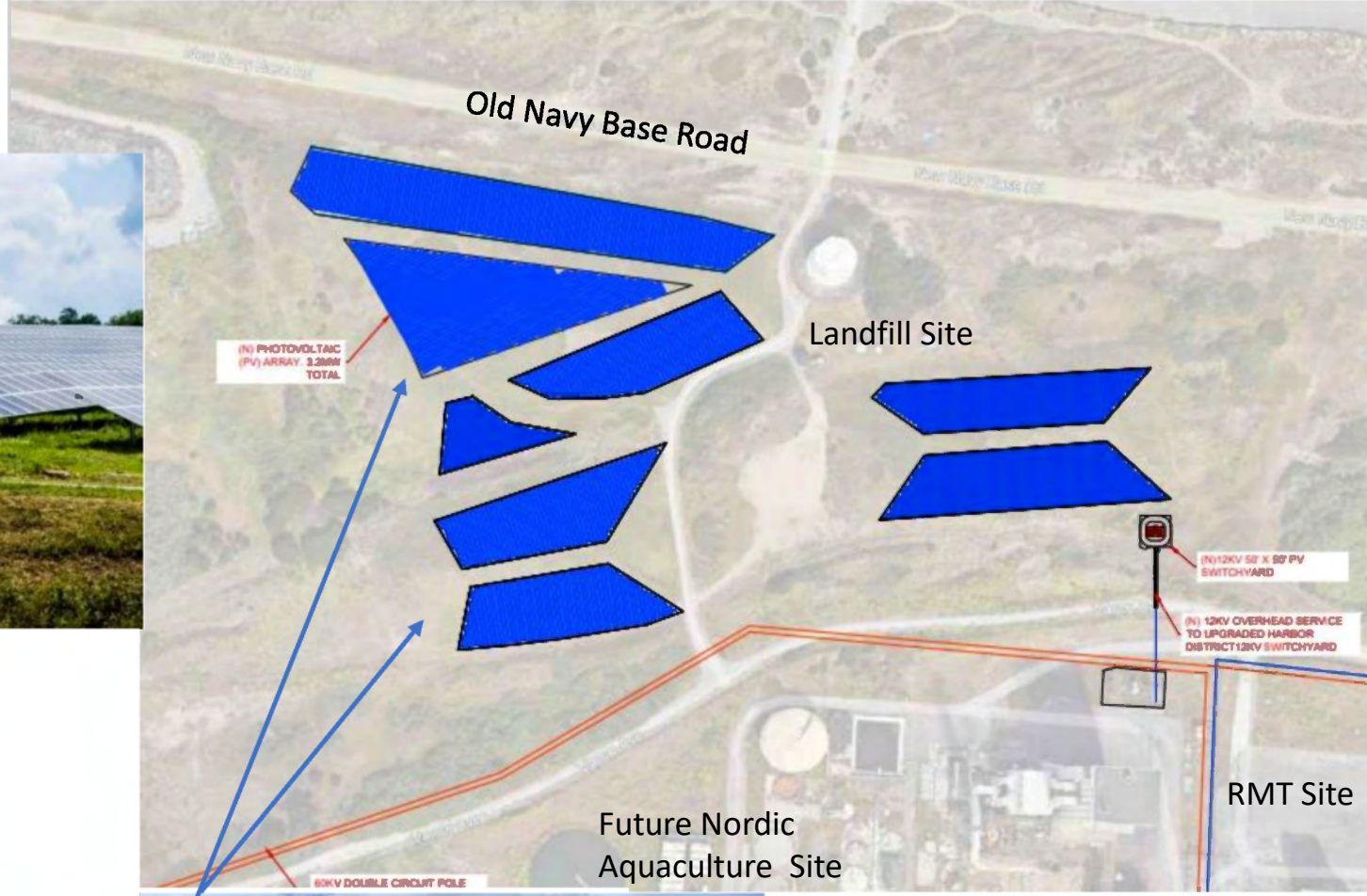
Progress Meeting #3 – Solar Array

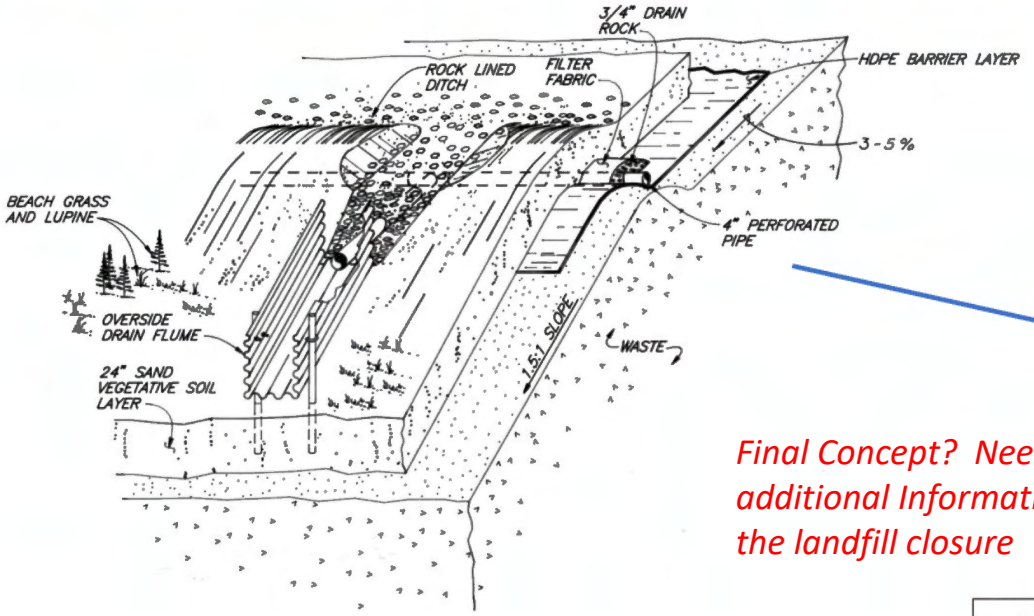
December 7, 2023

moffatt & nichol

HUMBOLDT BAY HARBOR RECREATION & CONSERVATION DISTRICT

Solar Array – Concept & Site Conditions





Final Concept? Need additional Information on the landfill closure

LOUISIANA–PACIFIC CORPORATION
SAMOA SOLID WASTE DISPOSAL SITE

CONCEPTUAL DESIGN OF CLOSURE AT EXISTING TOPO

SHN 920219
MARCH, 1993
FIGURE 5

Concept

- Offsite Solar Array at old landfill location on District Property
- Tie into power grid infrastructure or part of a microgrid systems

Solar Array – Details

Arcata Airport

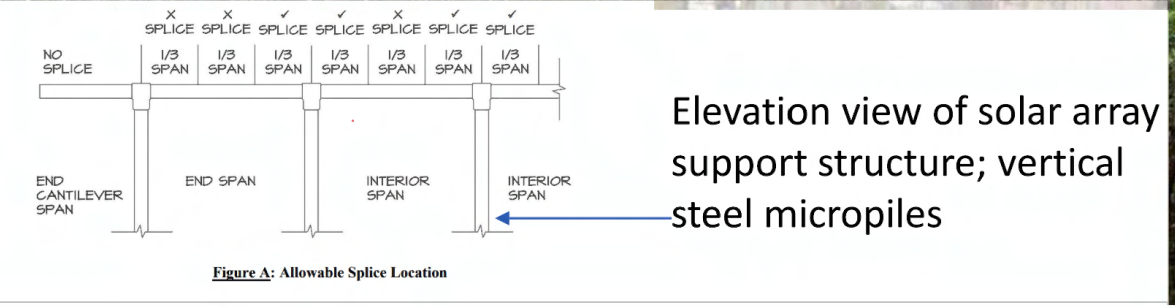


Figure A: Allowable Splice Location

Elevation view of solar array support structure; vertical steel micropiles

Concept

- Structural support on a slope will require some sort of micropile (deep foundation) or excavated shallow foundation due to the slope.

Solar Array – Post Closure Description

- Can the cap be breached with micropiles?
  - TBD
- Construction Access – Equipment and disturbance limitations.
- Buried power lines

California Regional Water Quality Control Board
North Coast Region

ORDER NO. R1-2017-0001

WASTE DISCHARGE REQUIREMENTS

FOR

POST-CLOSURE OF THE

HUMBOLDT BAY HARBOR, RECREATION, AND CONSERVATION DISTRICT,
FRESHWATER TISSUE COMPANY LLC,
AND
LOUISIANA PACIFIC CORPORATION

SAMOA CLASS III SOLID WASTE DISPOSAL SITE
WDID NO. 1B730610HUM

Humboldt County

39. The landfill cap consists of a two-foot thick ash foundation layer, overlain by a one foot minimum thickness barrier layer, overlain by a two foot minimum thickness vegetation layer and six inches of mulch. The barrier layer was compacted to greater than 83 percent relative compaction. The barrier layer permeability was determined by laboratory permeability tests. All ten laboratory permeability tests had permeability less than 1×10^{-7} centimeter per second. The vegetation layer was compacted to greater than 90 percent relative compaction.

40. Soil cover for the WMUs was material from a Humboldt Bay dredge disposal site located on the north end of the Samoa Peninsula, the waste material comprised the foundation layer, the vegetation layer came from on-site borrow sources and the mulch was wood fines from the Louisiana Pacific Samoa operations. The landfill cap was compacted in lifts, drainage and erosion control measures were established in accordance with the March 1998 *Closure Plan* prepared by Winzler and Kelly Consulting Engineers.

41. The final cap surface is sloped to promote drainage away from the waste footprint. Slopes are no steeper than three to one nor flatter than three percent. The drainage ditch and contours were constructed to drain surface water away from the landfill cap. Erosion control consisted of seeding disturbed areas.