

**Large Generator Interconnection
Facilities Study Report**

FINAL

Completed for

**(“Interconnection Customer”)
C1-20**

**Proposed Point of Interconnection
230 kV Diamond Hill substation**

June 9, 2022

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1.0 DESCRIPTION OF THE PROJECT

(“Interconnection Customer”) proposed interconnecting 199 megawatts (“MW”) of new solar and battery storage generation to PacifiCorp’s (“Transmission Provider”) 230 kV Diamond Hill substation located in Linn County, Oregon. The Interconnection Request is proposed to consist of fifty-seven (57) Sungrow SG3600UD-MV, 3.6 MVA solar inverters for a total output of 199 MW at the POI. The Interconnection Request also consists of sixty-six (66) Sungrow SG3450UM-MV-US, 3.45 MVA battery storage inverters. The requested commercial operation date is December 31, 2025.

Interconnection Customer will NOT operate this generator as a Qualified Facility as defined by the Public Utility Regulatory Policies Act of 1978 (PURPA).

The Transmission Provider has assigned the Project “C1-20.”

2.0 STUDY SCOPE AND OBJECTIVES

The objective of the facilities study is to:

- complete a facilities analysis, which shall specify and estimate the cost of equipment, engineering, procurement, and construction required to address issues as outlined in the system impact study, and
- provide a scope of work and an estimated cost and schedule for completing the scope of work.

The information contained in this study report is based on preliminary information and not to be used for construction.

3.0 STUDY ASSUMPTIONS

- All active higher priority transmission service and/or generator interconnection requests will be considered in this study and are listed in Appendix 1. If any of these requests are withdrawn, the Transmission Provider reserves the right to restudy this request, as the results and conclusions contained within this study could significantly change.
- For study purposes there are two separate queues:
 - Transmission Service Queue: to the extent practical, all network upgrades that are required to accommodate active transmission service requests will be modeled in this study.
 - Generation Interconnection Queue: Interconnection Facilities associated with higher queue interconnection requests will be modeled in this study.
- The Interconnection Customer’s request for energy or network resource interconnection service in and of itself does not convey transmission service. Only a Network Customer may make a request to designate a generating resource as a Network Resource. Because the queue of higher priority transmission service requests may be different when a Network Customer requests network resource designation for this Generating Facility, the available capacity or transmission modifications, if any, necessary to provide network resource interconnection service may be significantly

- different. Therefore, the Interconnection Customer should regard the results of this study as informational rather than final.
- This study assumes the Project will be integrated into Transmission Provider's system at the agreed upon and/or proposed point of interconnection.
 - The Interconnection Customer will construct and own any facilities required between the Point of Interconnection and the Project.
 - Line reconductor or fiber underbuild required on existing poles will be assumed to follow the most direct path on the Transmission Provider's system. If during detailed design the path must be modified it may result in additional cost and timing delays for the Interconnection Customer's Project.
 - Generator tripping may be required for certain outages.
 - All facilities will meet or exceed the minimum Western Electricity Coordinating Council ("WECC"), North American Electric Reliability Corporation ("NERC"), and Transmission Provider performance and design standards.
 - Bonneville Power Administration ("BPA") has been identified as a potential Affected System by the Transmission Provider. As of the production of this report BPA has not notified the Transmission Provider for the need of an Affected System study. However, should BPA determine an Affected System study is required the milestone dates identified in this report could be impacted.
 - This report is based on information available at the time of the study. It is the Interconnection Customer's responsibility to check the Transmission Provider's web site regularly for Transmission system updates at (<https://www.oasis.oati.com/ppw>)

4.0 TYPE OF INTERCONNECTION SERVICE

The Interconnection Customer has selected Network Resource (NR) Interconnection Service.

5.0 PROPOSED POINT OF INTERCONNECTION

The Interconnection Customer's proposed Generating Facility is to be interconnected to the Transmission Provider's Diamond Hill 230 kV substation via a new line position. Figure 1 below, is a one-line diagram that illustrates the interconnection of the proposed Generating Facility to the Transmission Provider's system.

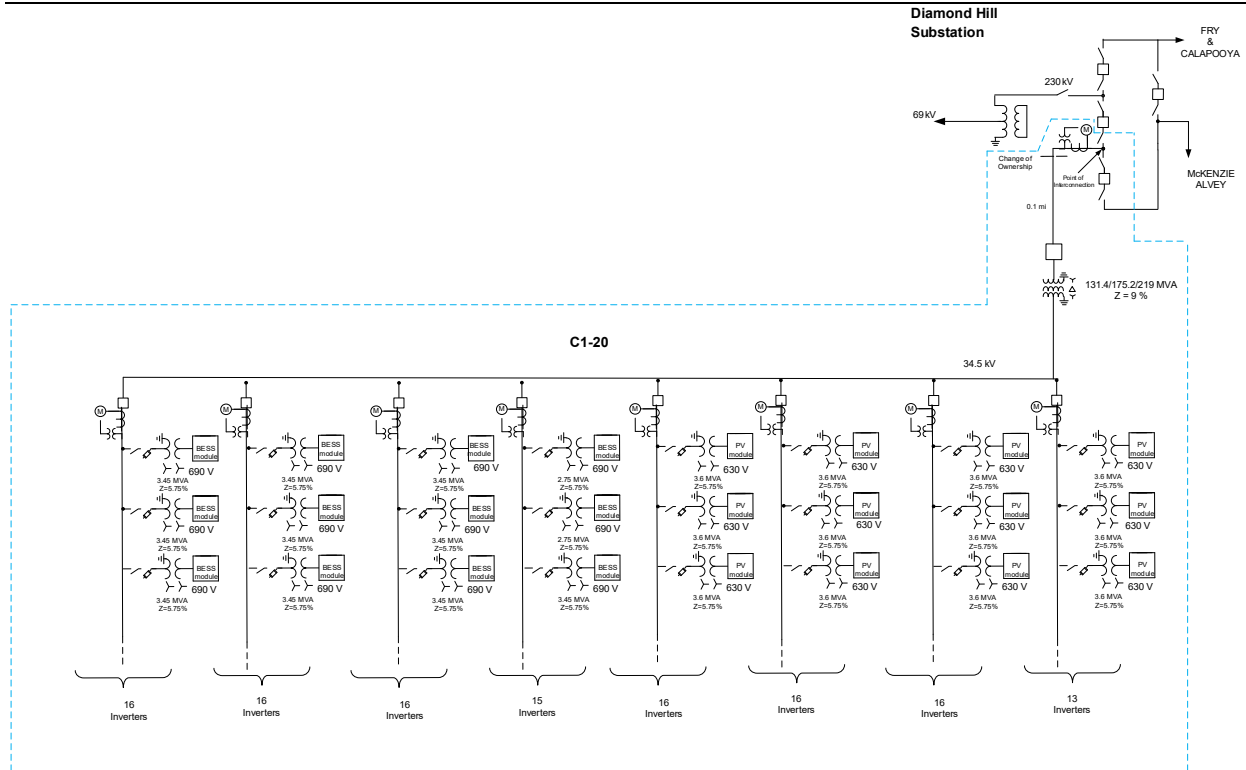


Figure 1: System One Line Diagram

6.0 SCOPE OF WORK

6.1 Generating Facility Requirements

The following outlines the design, procurement, construction, installation, and ownership of equipment at the Interconnection Customer's Generation Facility.

6.1.1 INTERCONNECTION CUSTOMER TO BE RESPONSIBLE FOR

- Procure all necessary permits, lands, rights of way and easements required for the construction and continued maintenance of the Interconnection Customer's Generating Facility and collector substation.
- Design, procure, construct, own and maintain the Interconnection Customer's Generating Facility and associated collector substation.
- Design the Generating Facility with reactive power capabilities necessary to operate within the full power factor range of 0.95 leading to 0.95 lagging as measured at the high side of the Interconnection Customer's GSU transformer. This power factor range shall be dynamic and can be met using a combination of the inherent dynamic reactive power capability of the generator or inverter, dynamic reactive power devices and static reactive power devices to make up for losses.
- Design the generating facility such that it can provide positive reactive support (i.e., supply reactive power to the system) immediately

following the removal of a fault or other transient low voltage perturbations or install dynamic voltage support equipment. These additional dynamic reactive devices shall have correct protection settings such that the devices will remain on line and active during and immediately following a fault event.

- Operate the Generating Facility to the voltage set point to be provided by the Transmission Provider.
- Equip the Generating Facility with automatic voltage-control equipment and operate with the voltage regulation control mode enabled unless explicitly authorized to operate another control mode by the Transmission Provider.
- Install, maintain and operate a functioning governor or equivalent controls to ensure primary frequency capability as required under FERC Order 842.
- Install a Phasor Measurement Unit to collect data from the Project. The data must be collected, held for a minimum of 90 days and be able to stream to the Planning Coordinator for each of the Generator Facility's step-up transformers measured on the low side of the GSU at a sample rate of at least 60 samples per second and synchronized within +/- 2 milliseconds of the Coordinated Universal Time (UTC). Initially, the following data must be collected:
 - Three phase voltage and voltage angle (analog)
 - Three phase current (analog)

Data requirements are subject to change as deemed necessary to comply with local and federal regulations.

- Operate the Generating Facility so as to maintain the voltage at the Point of Interconnection, or other designated point as deemed appropriate by Transmission Provider, at a voltage schedule to be provided by the Transmission Provider following testing. Voltage will typically be required to operate between 1.00 and 1.04 per unit.
- Operate the Generating Facility with a voltage droop.
- Have any Transmission Provider required studies, such as a voltage coordination study, performed and provide results to Transmission Provider. Any additional requirements identified in these studies will be the responsibility of the Interconnection Customer.
- Meet the Federal Energy Regulatory Commission (FERC) and WECC low voltage ride-through requirements as specified in the interconnection agreement.
- Provide test results to the Transmission Provider verifying that the inverters for this Project have been programmed to meet all PRC-024 requirements rather than manufacturer IEEE distribution standards.
- Provide the Transmission Provider the manufacturer Electromagnetic Transient Modeling ("EMT") model a minimum of 180 days prior to Commercial Operation.

- Provide the Transmission Provider a standard model from the WECC Approved Dynamic Model Library.
- Design the Generating Facility control system such that it can receive an analog output from the Transmission Provider for setpoint control and provide an analog input back to the Transmission Provider on the status of the setpoint.
- Design and construct the collector substation such that the ground grid can be connected to the POI substation ground grid to support the installation of a Transmission Provider owned and maintained bus differential scheme. The Interconnection Customer is responsible to ensure the ground grid design supports safe step and touch potentials.
- Design, provide and install conduits between the Interconnection Customer collector substation and the marshalling cabinet to be installed just inside the fence of the POI substation to support copper circuits installed between the facilities.
- Provide and install two sets of current transformers to be fed into the bus differential relays with a maximum current transformer ratio matching the maximum CT ratio of the breakers at the POI substation. Provide and install conduit and cabling to the POI substation marshalling cabinet with these outputs.
- Provide a separate graded, grounded and fenced area along the perimeter of the Interconnection Customer's collector substation for the Transmission Provider to install a control building. The site will share a fence and ground grid with the Interconnection Customer collector substation and have separate, unencumbered access for the Transmission Provider. Fencing, gates and road access shall meet Transmission Provider standards. The Interconnection Customer shall provide a Transmission Provider approved easement for its control building.
- Perform a CDEGS grounding analysis for both the collector substation site and the Transmission Provider control building and provide the results to the Transmission Provider.
- Provide permanent AC power to the Transmission Provider's control building.
- Design, procure and install conduit and control cabling and hard wire the Interconnection Customer's source devices to Transmission Provider's marshalling cabinet. Replicated values are not acceptable.
- Provide the following points which are based on the Interconnection Customer's most recent design information. Please note that this list of points could change if the Interconnection Customer's final design changes:
From each of the generator (4) and battery (4) configurations
Analogs:
 - 34.5 kV A phase voltage
 - 34.5 kV B phase voltage

- 34.5 kV C phase voltage
- Real Power MW
- Reactive Power MVAR

Status:

- 34.5 kV circuit breaker (8)

From the collector station:

Analog:

- Global Horizontal Irradiance (GHI)
- Average Plant Atmospheric Pressure (Bar)
- Average Plant Temperature (Celsius)
- Max Generator Limit MW (one set point control and feedback)
- Potential Power MW

From the transformer substation site:

Analog:

- 230 kV A phase voltage
- 230 kV B phase voltage
- 230 kV C phase voltage
- Real Power MW
- Reactive Power MVAR

Status:

- 230 kV transformer circuit breaker
- Provide and install conductor, shield wire and line hardware in sufficient quantities to allow the Transmission Provider to terminate the segment running from the collector substation deadend structure into the POI substation deadend structure. The last segment will be owned by the Transmission Provider.
- Procure and install Transmission Provider approved H-Frame structures for the Transmission Provider's instrument transformers. The installation locations shall be coordinated with the Transmission Provider.
- Install complete conduit and control cable provided by the Transmission Provider from each of the Transmission Provider's instrument transformers to the Transmission Provider's collector substation control building. Leave sufficient quantities of control cable to allow the Transmission Provider to terminate the cable inside its control building.
- Install the Transmission Provider provided instrument transformers.
- Procure and install disconnect switches on each side of each of the instrument transformers.
- Provide Transmission Provider unfettered and maintained access to the Transmission Provider's instrument transformers.
- Install Transmission Provider approved fiber optic cable in conduit from the Transmission Provider's collector substation control building to the POI substation fence line. Leave sufficient amounts of cable for the Transmission Provider to terminate the fiber in both its collector substation control building and POI substation control building.

- Provide Transmission Provider approved easements for all Transmission Provider Interconnection Facilities to be installed in the Interconnection Customer's collector substation.
- Arrange for and provide permanent retail service for power that will flow from the Transmission Provider's system when the Project is not generating with the utility holding service territory rights at this location. The arrangement must be in place prior to backfeed.
- Coordinate with the retail service provider to procure the transmission service rights from the Transmission Provider to wheel the retail service across the Transmission Provider's system.
- Provide any construction or backup retail service necessary for the Project.
- Provide a professional engineer ("PE") stamped maintenance plan package for all Interconnection Customer protective equipment prior to energization.
- Design

6.1.2 TRANSMISSION PROVIDER TO BE RESPONSIBLE FOR

- Provide the Interconnection Customer the designated point at which the voltage is to be maintained and the associated voltage schedule.
- Identify any necessary studies that the Interconnection Customer must have performed.
- Provide the Interconnection Customer the necessary specifications to allow the ground grid of the Interconnection Customer's collector substation and the POI substation to be tied together.
- Provide the Interconnection Customer the necessary specifications for the bus between the Interconnection Customer's collector substation and the new POI substation to be connected.
- Coordinate with Interconnection Customer on the location, size, and types of conduits and control cables between the POI substation and the collector substation.
- Install a control building on the property prepared by the Interconnection Customer.
- Procure and install a backup DC battery system for the Transmission Provider control building.
- Procure and install a communications racks and associated communications equipment in the Transmission Provider's control building.
- Coordinate with the Interconnection Customer on the location of the Transmission Provider's instrument transformers.
- Provide the Interconnection Customer the specifications for the instrument transmission installation structures.
- Procure and provide to the Interconnection Customer eight sets of 34.5 kV instrument transformers to be on installed on each of the Interconnection Customer's collector strings.

- Design, procure and install eight sets of 34.5 kV revenue metering equipment including metering panels, primary and secondary revenue quality meters, test switches, junction boxes and secondary metering wire.
- Provide the control cable to be installed by the Interconnection Customer from the instrument transformers to the Transmission Provider's control building and coordinate on the location of the cable.
- Terminate the fiber optic cable provided by the Interconnection Customer in the control building communications panel.
- Establish an Ethernet connection for retail sales and generation accounting via the MV-90 translation system.

6.2 Point of Interconnection

The following outlines the design, procurement, construction, installation, and ownership of equipment at the Point of Interconnection.

6.2.1 INTERCONNECTION CUSTOMER TO BE RESPONSIBLE FOR

- Coordinate with the Transmission Provider on the location and design of the final span between the Interconnection Customer's collector substation and the POI substation.
- Coordinate with the Transmission Provider on the commissioning of the communications coming from the Interconnection Customer's collector substation.

6.2.2 TRANSMISSION PROVIDER TO BE RESPONSIBLE FOR

- Procure the necessary permits and/or property rights to allow for the expansion of the POI substation as necessary to allow for the construction of a new line position.
- Design, procure and construct, own and maintain equipment necessary to create a new 230 kV line position including the following major equipment:
 - (1) 230kV Circuit Breaker
 - (1) 230kV Vertical Mount Vertical Break Switches W/MO
 - (3) 230kV Group Operated Switches
 - (3) 230kV CT/VT Combo Units
 - (3) 230kV Surge Arresters
- Perform a CDEGS grounding analysis of the expanded portion of the substation.
- Re-terminate the transmission line running from Alvey substation into the new line position.
- Terminate the last bus/line segment running from the Interconnection Customer's collector substation deadend structure into the POI substation deadend structure position vacated by the Alvey line using Interconnection Customer provided and installed conductor, shield wire and line hardware.

- Design, procure and install a marshalling cabinet near the Interconnection Customer's collector substation shared fence line.
- Provide and install conduit and control cabling between the marshalling cabinet and the control building bus differential cabinet.
- Design, procure and install a bus differential relay system for the connection to the Interconnection Customer's collector substation.
- Procure and install a relay for under/over voltage and over/under frequency protection of the system.
- Include the following data points into the substation RTU:
Analogs:
 - Net Generation MW
 - Net Generator MVar
 - Energy Register kWh
- Procure and install the necessary communications equipment for protection and data provision to the Transmission Provider's existing communications network.
- Design, procure and install 230 kV revenue metering equipment for the Project including two (2) revenue quality meters, test switch, instrument transformers, metering panels, junction box and secondary metering wire.
- Provide and install an Ethernet connection for retail sales and generation accounting via the MV-90 translation system.

6.3 Other

The following outlines the design, procurement, construction, installation, and ownership of equipment past the Point of Interconnection.

6.3.1 INTERCONNECTION CUSTOMER TO BE RESPONSIBLE FOR

- Bonneville Power Administration Requirements
 - If deemed necessary by Bonneville Power Administration ("BPA") and the Transmission Provider, execute an agreement with BPA for any BPA required work.

6.3.2 TRANSMISSION PROVIDER TO BE RESPONSIBLE FOR

- Bonneville Power Administration Requirements
 - Coordinate with BPA on any Affected System requirements.
- Alvey-Fry Transmission Line
 - Re-route the transmission line so it can be re-terminated into the new line position in the POI substation which will require the installation of a minimum of one new transmission structure.
- Diamond Hill-McKenzie Transmission Line
 - If necessary, acquire permits and/or property rights to allow the transmission line to be re-routed.

- Re-route the transmission line on the south side of the POI substation to allow enough space for the required substation expansion. This will require moving or replacing a minimum of three transmission structures.
- System Operations Center
 - Update databases to include the Interconnection Customer's Generating Facility along with Interconnection Facilities and Network Upgrades.

7.0 COST ESTIMATE (+/- 20%)

The following estimate represents only scopes of work that will be performed by the Transmission Provider. Costs for any work being performed by the Interconnection Customer are not included.

Direct Assigned

Diamond Hill substation	\$748,000
<i>Install new line position and metering</i>	
C1-20 Collector substation	\$992,000
<i>Install control house, metering, and communications equipment</i>	
Total:	\$1,740,000

Network Upgrades
Station Equipment

Diamond Hill substation	\$1,945,000
<i>Install 230 kV breaker, switches arresters, and panels</i>	
Total:	\$1,945,000

Shared Network Upgrades

The following estimated costs are the Interconnection Customer's proportional share of the overall estimated costs for these upgrades for the entire cluster area in which this Interconnection Request resides.

Alvey – Diamond Hill 230kV transmission line	\$127,000
<i>Reroute transmission line at Diamond Hill substation</i>	
Diamond Hill – McKenzie EWEB 69kV transmission line	\$345,000
<i>Reroute transmission line at Diamond Hill substation</i>	
Total:	\$472,000

Network Upgrade Total:	\$2,417,000
Total:	\$4,157,000

*Any distribution line modifications identified in this report will require a field visit analysis in order to obtain a more thorough understanding of the specific requirements. The estimate provided above for this work could change substantially based on the results of this analysis. Until this field analysis is performed the Transmission Provider must develop the Project schedule using conservative assumptions. The Interconnection Customer may request that the Transmission Provider perform this field analysis, at the Interconnection Customer's expense, prior to the execution of an Interconnection Agreement in order to obtain more cost and schedule certainty.

This estimate is as accurate as possibly given the level of detailed study that has been completed to date and approximates the costs incurred by Transmission Provider to interconnect this Generator Facility to Transmission Provider's electrical distribution or transmission system. The Interconnection Customer will be responsible for all actual costs, regardless of the estimated costs communicated to or approved by the Interconnection Customer.

8.0 SCHEDULE

Execute Interconnection Agreement	July 1, 2022
Provision of Financial Security	October 6, 2023
Interconnection Customer Approval for Transmission Provider to Commence Engineering and Procurement Activities	October 6, 2023
*Interconnection Customer Initial Design Package Provided	October 20, 2023
Transmission Provider Engineering & Procurement Commences	November 13, 2023
Interconnection Customer Energy Imbalance Market Submittal	January 12, 2024
Interconnection Customer Property/Permits/ROW Procured	April 5, 2024
Transmission Provider Property/Permits/ROW Procured	June 7, 2024
*Interconnection Customer Final Design Package Provided	August 23, 2024
Transmission Provider Engineering Design Complete	December 20, 2024
Interconnection Customer Approval for Transmission Provider to Commence Construction Activities	January 24, 2025
Transmission Provider Construction Begins	March 10, 2025
Interconnection Customer Submits Request for Voltage Schedule	April 4, 2025
Interconnection Customer Maintenance and Commissioning	

Plans Provided	June 13, 2025
Interconnection Customer and Transmission Provider Construction Complete	August 15, 2025
Transmission Provider Commissioning Activities Complete	September 26, 2025
Transmission Provider Commissioning Document Review Complete	October 2, 2025
Interconnection Customer's Facilities Receive Backfeed Power	October 3, 2025
Initial Synchronization/Generation Testing	October 10, 2025
Commercial Operation	December 31, 2025

*Interconnection Customer initial design package shall include final generating facility location, inverter/turbine selection, basic protection package, tie line route and collector system locations and data as applicable. Interconnection Customer final design package shall include PE stamped issued for construction ("IFC") drawings for generating facility, collector substation, tie line as well as an updated PSS/e model and updated WECC approved model, electromagnetic transient ("EMT") model and a detailed short circuit model of its generation system using the ASPEN OneLine short circuit simulation program as applicable. The WECC model parameters must be adjusted to reflect the plant's actual anticipated performance. The plant controller must be included in the model. If there is to be coordination between facilities or a master VAR controller, this must be included in the detailed WECC dynamic model, as well as in the PSS/e user-written model.

Please note, the time required to perform the scope of work identified in this report appears to result in a timeframe that does support the Interconnection Customer's requested Commercial Operation date of December 1, 2025.

9.0 PARTICIPATION BY AFFECTED SYSTEMS

Transmission Provider has identified the following affected systems: Bonneville Power Administration

A copy of this report will be shared with each Affected System.

10.0 APPENDICES

Appendix 1: Higher Priority Requests

Appendix 2: Contingent Facilities

Appendix 3: Property Requirements

10.1 APPENDIX 1: HIGHER PRIORITY REQUESTS

All active higher priority Transmission Provider projects, and transmission service and/or generator interconnection requests will be considered in this study and are identified below. If any of these requests are withdrawn, the Transmission Provider reserves the right to restudy this request, as the results and conclusions contained within this study could significantly change.

Transmission/Generation Interconnection Queue Requests considered:

Oregon Community Solar:

OCS008 (2.125 MW)
OCS026 (1.5 MW)
OCS027 (2.875 MW)
OCS035 (2.21 MW)
OCS038 (0.981 MW)
OCS041 (1.5 MW)
OCS056 (2.9 MW)
OCS057 (1 MW)
OCS061 (0.875 MW)
OCS064 (0.5 MW)
OCS071 (2 MW)

Transition Cluster:

TCS-38 (0.3 MW)
TCS-39 (0.15 MW)
TCS-40 (0.8 MW)

10.2 Appendix 2: Contingent Facilities

The following Interconnection Facilities and/or upgrades to the Transmission Provider's system are Contingent Facilities for the Interconnection Customer's Interconnection Request and must be in service prior to the commencement of generation activities: None

10.3 APPENDIX 2: PROPERTY REQUIREMENTS**Property Requirements for Point of Interconnection Substation****Requirements for rights of way easements**

Rights of way easements will be acquired by the Interconnection Customer in the Transmission Provider's name for the construction, reconstruction, operation, maintenance, repair, replacement and removal of Transmission Provider's Interconnection Facilities that will be owned and operated by PacifiCorp. Interconnection Customer will acquire all necessary permits for the Project and will obtain rights of way easements for the Project on Transmission Provider's easement form.

Real Property Requirements for Point of Interconnection Substation

Real property for a point of interconnection substation will be acquired by an Interconnection Customer to accommodate the Interconnection Customer's Project. The real property must be acceptable to Transmission Provider. Interconnection Customer will acquire fee ownership for interconnection substation unless Transmission Provider determines that other than fee ownership is acceptable; however, the form and instrument of such rights will be at Transmission Provider's sole discretion. Any land rights that Interconnection Customer is planning to retain as part of a fee property conveyance will be identified in advance to Transmission Provider and are subject to the Transmission Provider's approval.

The Interconnection Customer must obtain all permits required by all relevant jurisdictions for the planned use including but not limited to conditional use permits, Certificates of Public Convenience and Necessity, California Environmental Quality Act, as well as all construction permits for the Project.

Interconnection Customer will not be reimbursed through network upgrades for more than the market value of the property.

As a minimum, real property must be environmentally, physically, and operationally acceptable to Transmission Provider. The real property shall be a permitted or able to be permitted use in all zoning districts. The Interconnection Customer shall provide Transmission Provider with a title report and shall transfer property without any material defects of title or other encumbrances that are not acceptable to Transmission Provider. Property lines shall be surveyed and show all encumbrances, encroachments, and roads.

Examples of potentially unacceptable environmental, physical, or operational conditions could include but are not limited to:

1. Environmental: known contamination of site; evidence of environmental contamination by any dangerous, hazardous or toxic materials as defined by any governmental agency; violation of building, health, safety, environmental, fire, land use, zoning or other such regulation; violation of ordinances or statutes of any governmental entities having jurisdiction over the property; underground or above ground storage tanks in area; known remediation sites on property; ongoing mitigation activities or monitoring activities; asbestos; lead-based paint, etc. A

phase I environmental study is required for land being acquired in fee by the Transmission Provider unless waived by Transmission Provider.

2. Physical: inadequate site drainage; proximity to flood zone; erosion issues; wetland overlays; threatened and endangered species; archeological or culturally sensitive areas; inadequate sub-surface elements, etc. Transmission Provider may require Interconnection Customer to procure various studies and surveys as determined necessary by Transmission Provider.

Operational: inadequate access for Transmission Provider's equipment and vehicles; existing structures on land that require removal prior to building of substation; ongoing maintenance for landscaping or extensive landscape requirements; ongoing homeowner's or other requirements or restrictions (e.g., Covenants, Codes and Restrictions, deed restrictions, etc.) on property which are not acceptable to the Transmission Provider.