PACIFICORP

Large Generator Interconnection
Qualifying Facility
Facilities Study Report

FINAL

Completed for

(“Interconnection Customer”)
TCS-06

Proposed Point of Interconnection

Mustang-Spence 230 kV transmission line

December 22, 2021

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1.0 DESCRIPTION OF THE PROJECT

("Interconnection Customer") proposed interconnecting 80 MW of new generation to PacifiCorp's ("Transmission Provider") Mustang-Spence 230 kV transmission line located in Fremont County, Wyoming. The project ("Project") will consist of thirty-one (31) 3150 KVA Sungrow SG3150U solar inverters and DC coupled battery storage for a total output of 80 MW at the Point of Interconnection ("POI"). The requested commercial operation date is October 31, 2022.

Interconnection Customer will operate this generator as a Qualifying Facility as defined by the Public Utility Regulatory Policies Act of 1978 (PURPA).

The Transmission Provider has assigned the project "TCS-06."

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.

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 If any of these requests are withdrawn, the Transmission Provider reserves the right to restudy this request, as the results and conclusions contained within this study could significantly change.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 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 deliver 100% of the Project output to network load 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 POI.
- The Interconnection Customer will construct and own any facilities required between the POI and the Project unless specifically identified by the Transmission Provider.
- Under normal conditions, the Transmission Provider does not dispatch or otherwise directly control or regulate the output of generating facilities. Therefore, the need for transmission

modifications, if any, which are required to deliver 100% of Project output to the Network Customer's network load will be evaluated (i.e., no displacement of other resources in the same area).

- 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.
- The following transmission improvements were assumed in-service:
  - Transmission Provider's planned projects:
    - Energy Gateway South (Aeolus-Clover) 500 kV transmission line project. (Q4 2024).
    - A Transmission Provider planned upgrade of the existing Jim Bridger 345/230 kV #2 transformer to 700 MVA (Q3 2021)
    - Energy Gateway West Segment D.1 (Shirley Basin-Windstar) 230 kV transmission line. (Q4 2024)
    - Energy Gateway West Segment D.3 (Anticline-Populus) 500 kV transmission line. (Q1 2027)
  - Upgrades assigned to higher priority Interconnection Request Q0835:
    - A new 230 kV transmission line between Aeolus and Freezeout substations (Q4 2024)
  - Upgrades assigned to higher priority Interconnection Request Q0836:
    - A Static VAR Compensator at Anticline 345 kV. (Q4 2024)
    - Rebuild of the WAPA Casper–Spence 230 kV transmission line. (Q4 2024)
    - Replacement of the Jim Bridger 345/230 kV transformers # 1 and #3 with a single 700 MVA transformer. (Q4 2024)
- Spence substation is owned by Western Area Power Administration ("WAPA") therefore any requirements in the substation must be coordinated and approved by WAPA. The Transmission Provider assumes its requirements will be approved and implemented by WAPA.
- The Transmission Provider currently does not have an approved meter capable of metering DC coupled batteries. The Transmission Provider assumes that by the time this Large Generating Facility is constructed it will have a standard meter that can be utilized. However, the number of meters and associated costs are unknown at this time therefore there will be cost impacts not captured in this study.
- 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 http://www.pacificorp.com/tran.html

4.0 PROPOSED POINT OF INTERCONNECTION

The Interconnection Customer's proposed Generating Facility is to be interconnected through PacifiCorp's Mustang-Spence 230 kV transmission line via a new POI substation. Figure 1 below, is a one-line diagram that illustrates the interconnection of the proposed Generating Facility to the Transmission Provider's system.

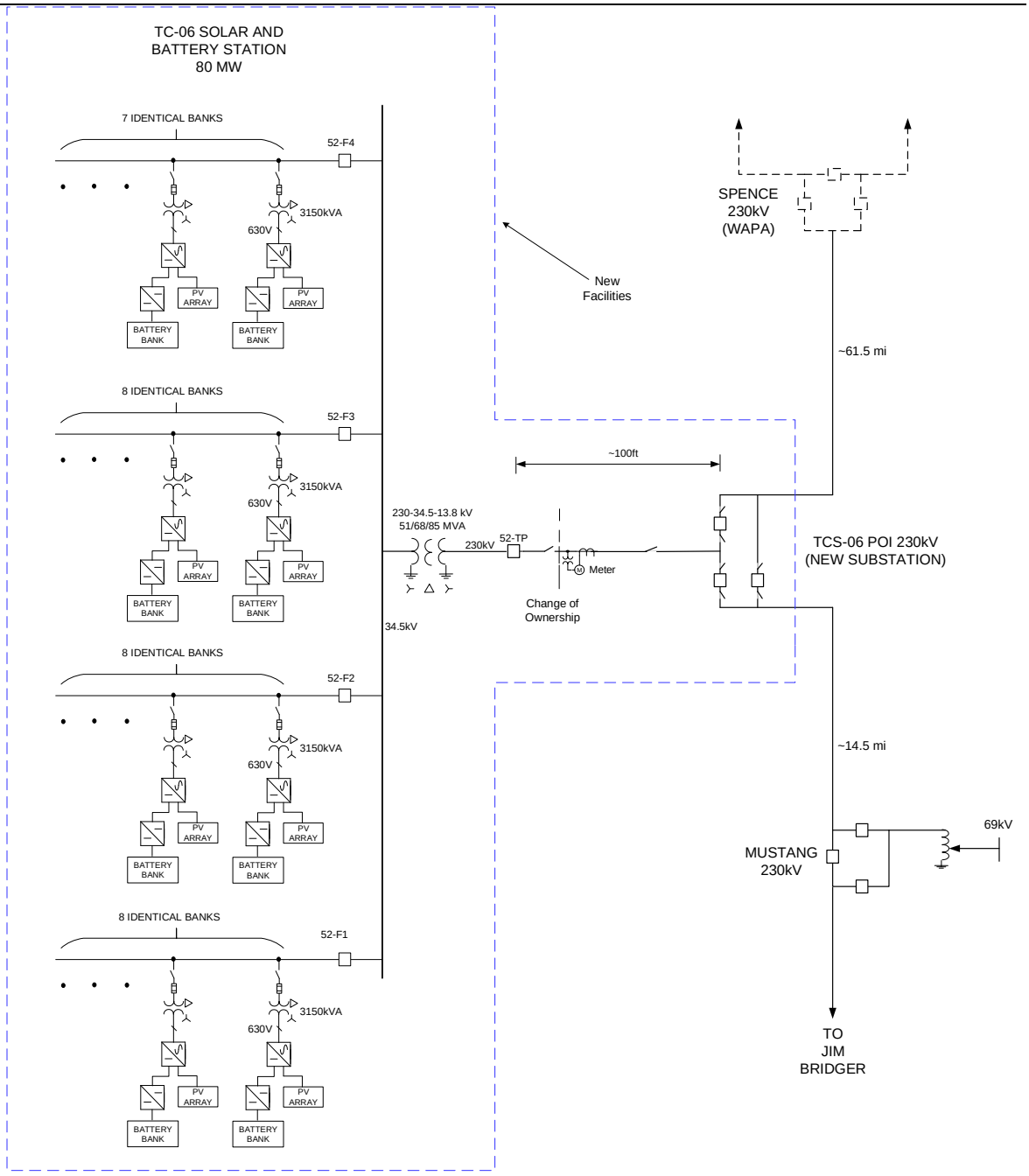

Figure 1: System One Line Diagram

5.0 SCOPE OF WORK

5.1 Generating Facility Modifications

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

5.1.1 INTERCONNECTION CUSTOMER TO BE RESPONSIBLE FOR

- 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.
- 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 POI, or other designated point as deemed appropriated 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 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.
- Design, procure and install conduit and control cabling and hard wire the Interconnection Customer's source devices to Transmission Provider's marshalling cabinet to be installed on the POI substation fence. 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:
  Analog Outputs
  - Max Gen Limit MW

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

  Status:
  - 34.5 kV 52-F1 circuit breaker
  - 34.5 kV 52-F2 circuit breaker
  - 34.5 kV 52-F3 circuit breaker
  - 34.5 kV 52-F4 circuit breaker
  - 230kV 52-TP circuit breaker
- 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 Transmission Provider's retail business unit. The arrangement must be in place prior to backfeed.

- Provide any construction or backup retail service necessary for the Project.

5.1.2 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.
- Identify the data that the Interconnection Customer must provide for the PMU.
- 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.

5.2 Point of Interconnection

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

5.2.1 TRANSMISSION PROVIDER TO BE RESPONSIBLE FOR

- Procure the necessary permits and property rights required in order to construct and own the new POI substation.
- Design, procure and construct, own and maintain a new 230 kV, three breaker ring bus substation which will include the following major pieces of equipment:
  - (3) – 230 kV, 3000 A Circuit Breakers
  - (2) – 230kV-120/240V, 100KVA, SSVT
  - (8) – 230kV, 3000A, horizontal mount, vertical break switch
  - (3) – 230kV, 3000A, vertical mount, vertical break switch with motor operator
  - (1) – 230kV, 3000A, vertical mount, vertical break switch
  - (6) – 230 kV CCVT
  - (3) – 230 kV CT/VT metering units
  - (1) – 28' x 40' control house
  - (6) – 230KV surge arresters
- Perform a CDEGS grounding analysis of the POI substation location.
- Terminate the last bus/line segment running from the Interconnection Customer's collector substation deadend structure into the POI substation deadend structure using Interconnection Customer provided and installed conductor, shield wire and line hardware.
- Terminate the transmission lines running from Mustang and Spence substations.

- Terminate the fiber optic cable to be installed on the transmission line to Mustang substation into the POI substation control building communications infrastructure.
- 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 and 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.
- Procure and install a redundant line current differential relay system for the line to Mustang substation.
- Procure and install a redundant POTTD relay scheme for the line to Spence substation.
- Include the following data points from the new POI substation into the new substation RTU:
- Analogs:
  - Net Generation real power MW
  - Net Generator reactive power MVAR
  - Energy Register KWH
  - A-phase 12.5 kV voltage
  - B-phase 12.5 kV voltage
  - C-phase 12.5 kV voltage
- Procure and install the necessary communications equipment for protection and data provision to the Transmission Provider's 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.

5.3 Other

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

5.3.1 Interconnection Customer to be Responsible For

- Western Area Power Administration
  - Execute a construction agreement with WAPA for any required upgrades to WAPA's system.

5.3.2 Transmission Provider to be Responsible For

- Mustang-Spence Transmission Line
  - Loop the transmission line in/out of the POI substation which will require the installation of a minimum of four transmission structures.

- Install approximately 14.5 miles of fiber optic cable from the new POI substation to Mustang substation in place of existing shield wire.

- Mustang Substation
  - Install new panel and relays that are compatible with the relays being installed in the POI substation.
  - Install communications equipment to support fiber termination.
  - Terminate the fiber being installed from the POI substation.

- Western Area Power Administration
  - Execute an agreement to allow the Transmission Provider to utilize WAPA's communications system to develop communications between the POI substation and Spence substation.
  - WAPA Spence Substation
    - Modify the settings of the existing relays to coordinate with the relays to be installed in the POI substation.

- System Operations Centers
  - Update databases to include the Interconnection Customer's Generating Facility along with Interconnection Facilities and Network Upgrades.

6.0 COST ESTIMATE

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 and Affected Systems are not included.

Estimated Costs	
POI Substation *Line termination and metering*	$652,000
POI Substation *Build 3-breaker 230 kV substation for interconnection*	$7,595,000
Mustang Substation *Install line protection panel and communications*	$272,000
WAPA Spence Substation *Install line protection panel and communications*	$197,000
Mustang-Spence 230 kV Loop and OPGW *Loop line through new POI substation, install fiber*	$1,631,000
Grand Total	**$10,347,000**

*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.

Note: Costs for any excavation, duct installation and easements shall be borne by the Interconnection Customer and are not included in this estimate. 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.

7.0 SCHEDULE

Execute Interconnection Agreement Amendment	October 15, 2021
Provision of Financial Security	January 10, 2025
Interconnection Customer Approval for Transmission Provider to Commence Engineering and Procurement Activities	January 24, 2025
*Interconnection Customer Initial Design Package Provided	February 21, 2025
Transmission Provider Engineering & Procurement Commences	March 3, 2025
Energy Imbalance Market Modeling Data Submittal	April 4, 2025
Interconnection Customer Property/Permits/ROW Procured	June 2, 2025
Transmission Provider Property/Permits/ROW Procured	August 1, 2025
*Interconnection Customer Final Design Package Provided	August 15, 2025
Transmission Provider Engineering Design Complete	January 9, 2026
Interconnection Customer EMT Modeling Provided	February 6, 2026
Interconnection Customer Commences Voltage Coordination Study	February 6, 2026
Interconnection Customer Approval for Transmission Provider to Commence Construction Activities	March 6, 2026
Construction Begins	April 6, 2026
Interconnection Customer Submits Request for Voltage Schedule	August 14, 2026
Interconnection Customer Maintenance and Commissioning Plans Provided	November 6, 2026
Interconnection Customer and Transmission Provider Construction Complete	December 18, 2026
Transmission Provider Commissioning Activities Complete	February 5, 2027
Transmission Provider Commissioning Document Review Complete	February 11, 2027
Interconnection Customer's Facilities Receive Backfeed Power	February 12, 2027
Contingent Facilities Complete	March 12, 2027

Initial Synchronization/Generation Testing	March 15, 2027
Commercial Operation	May 3, 2027

*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 does not support the Interconnection Customer's requested Commercial Operation date of October 31, 2022.

8.0 Participation by Affected Systems

Transmission Provider has identified the following affected systems: WAPA and Tri State

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

9.0 APPENDICES

Appendix 1: Higher Priority Requests
Appendix 2: Property Requirements

9.1 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.

Q0409 (320 MW)
Q0713 (350 MW)
Q0719 (280 MW)
Q0783 (30 MW)
Q0784 (80 MW)
Q0785 (100 MW)
Q0789 (74.9 MW)
Q0801 (80 MW)
Q0802 (50 MW)
Q0807 (75.9 MW)
Q0835 (190 MW)
Q0836 (400 MW)
TSR Q2594 (500 MW)

9.2 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:

The following requirements assigned to higher priority Interconnection Request Q0836 are Contingent:

- Installation of a 345 kV Static VAR Compensator at Anticline substation.
- Replacement of the existing 345/230 kV transformers #1 and #3 at Jim Bridger substation with a single 700 MVA transformer.

These upgrades are estimated to cost ~$52M and are anticipated to be placed into service Q4 2024.

The following Transmission Provider planned projects are Contingent:

- Gateway South (Aeolus-Clover) 500 kV transmission line (2024)
- An upgrade of the existing Jim Bridger 345/230 kV #2 transformer to 700 MVA (2021)
- Gateway West Segment D.3 (Anticline-Populus) 500 kV transmission line (Q1 2027)

9.3 Appendix 3: 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 POI 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.