PACIFICORP

Community Solar Project Interconnection

Community Solar Project Facilities Study Report

Completed for

("Applicant")
OCS056

Proposed Point of Interconnection
Circuit 4M22 out of Independence substation

June 4, 2021

TABLE OF CONTENTS

1.0 DESCRIPTION OF THE PROJECT

("Applicant") proposed interconnecting 2.9 MW of new generation to PacifiCorp's ("Public Utility") circuit 4M22 out of Independence substation at 20.8 kV located in Polk County, Oregon. The project ("Project") will consist of twenty-four (24) SCA125KTL-DO/US-600-UL for a total requested output of 2.9 MW (factory nameplate limited). The requested commercial operation date was April 2, 2021.

The Public Utility has assigned the Project "OCSQ056."

2.0 APPROVAL CRITERIA FOR TIER 4 INTERCONNECTION REVIEW

Pursuant to Public Utility Commission of Oregon Order 19-392 approved Community Solar Project procedures, a Public Utility must use the Tier 4 review procedures for an application to interconnect a Community Solar Project that meets the following requirements:

(a) The Community Solar Project does not qualify for or failed to meet Tier 2 interconnection review requirements; and
(b) The Community Solar Project must have a nameplate capacity of three (3) megawatts or less.

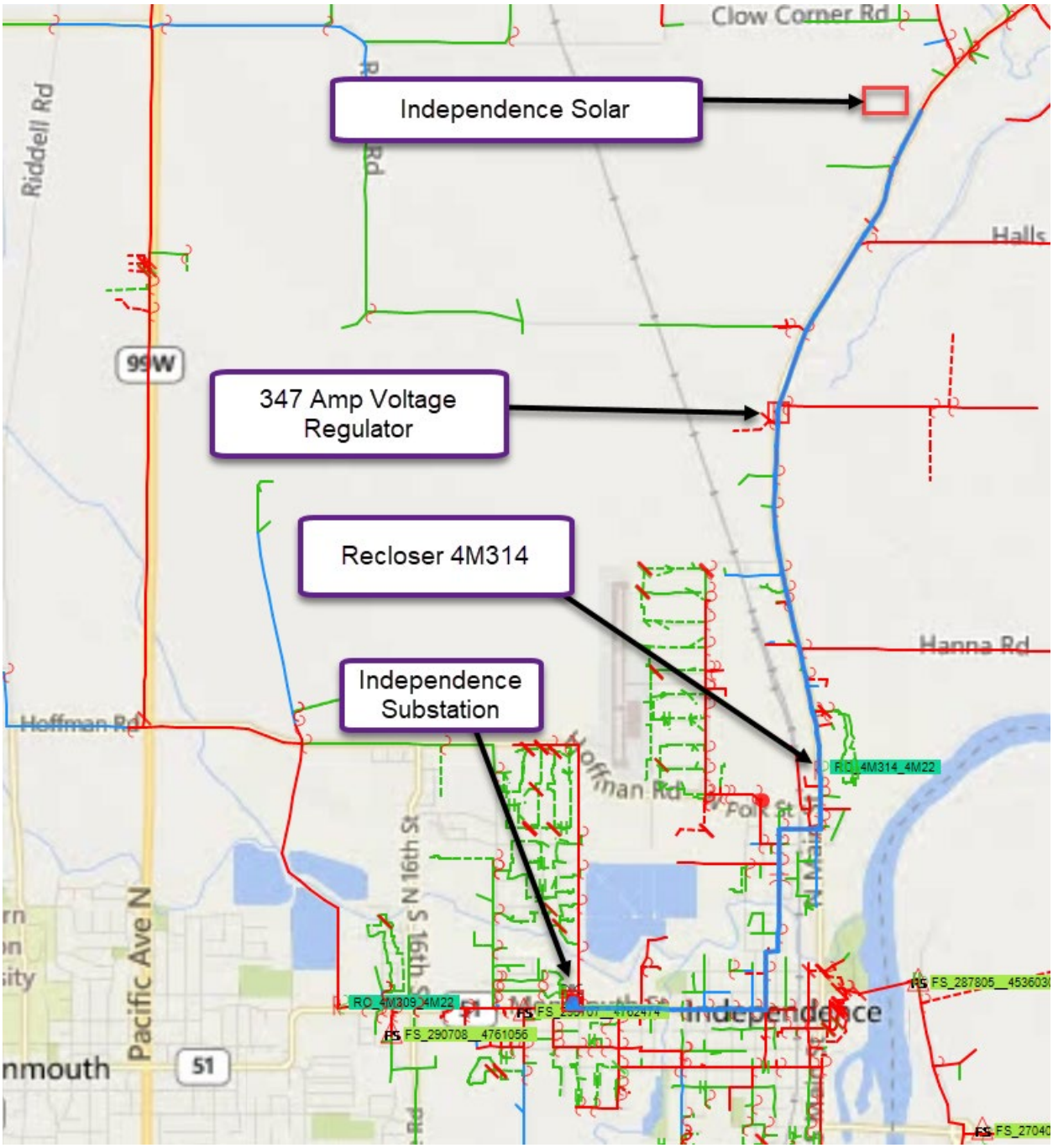
3.0 SCOPE OF THE STUDY

Pursuant to Public Utility Commission of Oregon Order 19-392 approved Community Solar Project procedures the Facilities Study Report shall consist of:

(a) A detailed scope identifying the interconnection facilities and system upgrades required to safely interconnect the Community Solar Project including the electrical switching configuration of the equipment, including the transformer, switchgear, meters, and other station equipment as applicable;
(b) A good-faith, non-binding estimate of the costs for the facilities and upgrades, including equipment, engineering, procurement, and construction costs, and;
(c) A detailed estimate of the time required to procure, construct, and install the required interconnection facilities and system upgrades.

4.0 PROPOSED POINT OF INTERCONNECTION

The Applicant's proposed Community Solar Project is to be interconnected to the Public Utility's distribution circuit 4M22 out of Independence substation (Figure 1) via a 20.8 kV primary meter. The proposed Point of Interconnection will be located at approximately 44.894288°N, 123.178132°W located in Polk County, Oregon. Figures 1 and 2 below are a map and a one-line diagram that illustrate the interconnection of the proposed generating facility to the Public Utility's system.


Independence Solar
347 Amp Voltage Regulator
Recloser 4M314
Independence Substation
Clow Corner Rd
Riddell Rd
99W
Hanna Rd
Hoffman Rd
Pacific Ave N
51
RC_4M314_4M22
RC_4M309_4M22
FS_290708__4761056
Independence

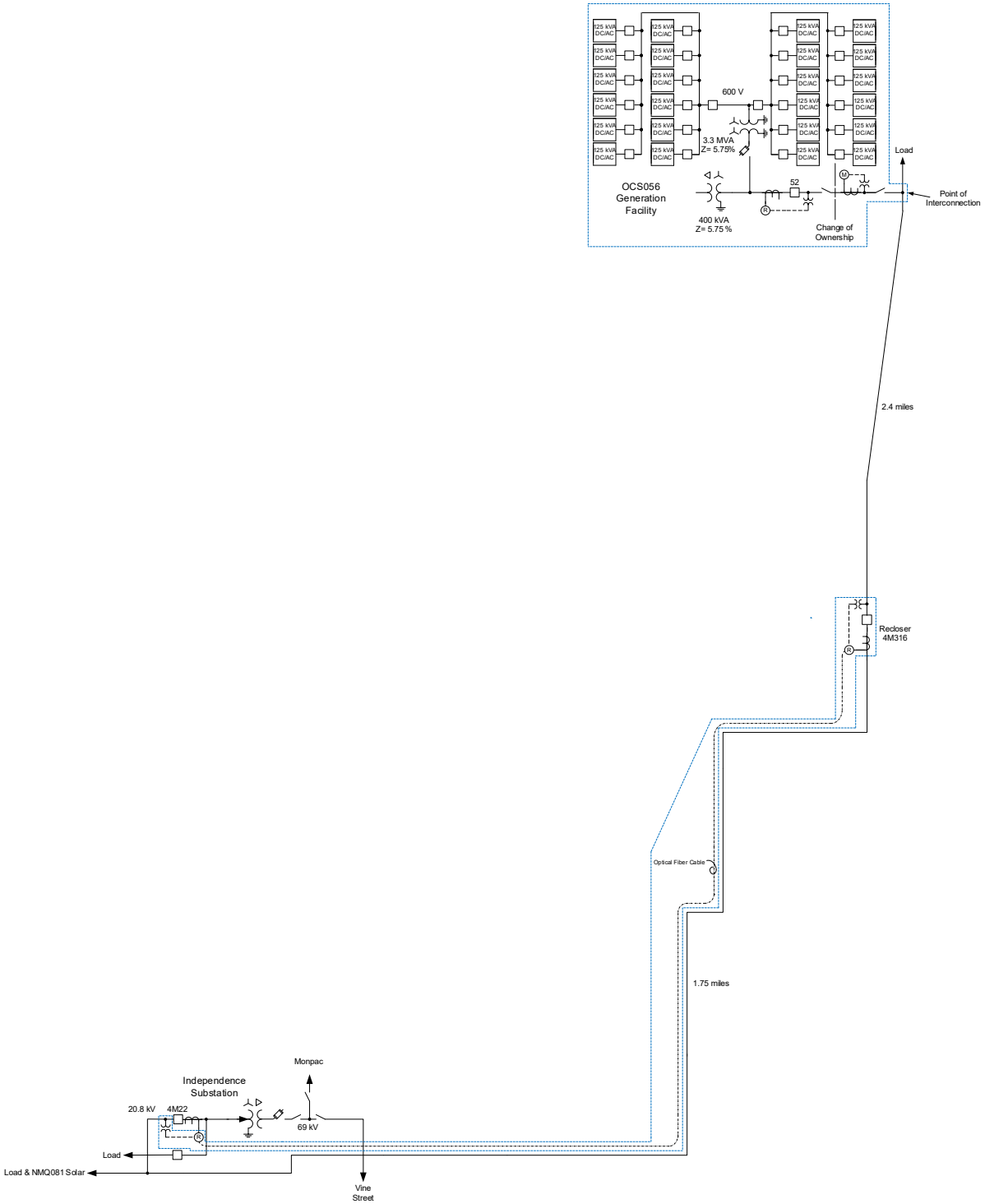


Figure 1: System One Line Diagram

5.0 STUDY ASSUMPTIONS

- All active higher priority transmission service and/or generator interconnection and Community Solar Project requests will be considered in this study and are listed in Appendix

1. If any of these requests are withdrawn, the Public Utility 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 System Upgrades that are required to accommodate active transmission service requests will be modeled in this study.
  - Generation Interconnection Queue and Community Solar Queue: all relevant higher queue interconnection requests will be modeled in this study.
- The Applicant's request for interconnection service in and of itself does not convey any other form or service.
- This study assumes the Project will be integrated into Public Utility's system at the agreed upon and/or proposed Point of Interconnection ("POI").
- The Applicant will construct and own the facilities required between the POI and the Project unless specifically identified by the Public Utility.
- Line reconductor or fiber underbuild required on existing poles will be assumed to follow the most direct path on the Public Utility's system. If during detailed design the path must be modified it may result in additional cost and timing delays for the Applicant'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 Public Utility performance and design standards.
- This report is based on information available at the time of the study. It is the Applicant's responsibility to check the Public Utility's web site regularly for transmission system updates (https://www.oasis.oati.com/ppw)

6.0 REQUIREMENTS

6.1 COMMUNITY SOLAR PROJECT MODIFICATIONS

The following outlines the design, procurement, construction, installation, and ownership of equipment at the Applicant's Community Solar Project.

6.1.1 APPLICANT TO BE RESPONSIBLE FOR

- Design, construct, own and maintain the Applicant's generating facility and associated collector system.
- Design the Community Solar Project 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 POI. The reactive compensation must be designed such that the discreet switching of all reactive devices (if required by the Applicant) does not cause step voltage changes greater than +/-3% on the Public Utility's system.
- Equip the Community Solar Project generators capable of operating under voltage reactive power mode, active power reactive power mode, and constant reactive power mode as per IEEE standard 1547-2018. This project shall be capable of activating each of these modes one at a time. The Public Utility reserves the right to specify any mode and settings within the limits of IEEE standard 1547-2018 needed before or after the Community Solar Project enters

service. The Applicant shall be responsible for implementing settings modifications and mode selections as requested by the Public Utility within an acceptable timeframe.

- Operate the Community Solar Project under constant power factor mode with a unity power factor setting unless specifically requested otherwise by the Public Utility. The Community Solar Project is expressly forbidden from actively participating in voltage regulation of the Public Utilities system without written request or authorization from the Public Utility.
- Operate the Community Solar Project so minimum power quality requirements in PacifiCorp's Engineering Handbook section 1C are met, the standards are available at https://www.pacificpower.net/about/power-quality-standards.html. Requirements specified in the System Impact Study that exceed requirements in the Engineering Handbook section 1C power quality standards shall apply.
- As per NERC standard VAR-001-1, the Public Utility is required to specify voltage or reactive power schedule at the POI. Under normal conditions, the Public Utility's system should not supply reactive power to the Community Solar Project.
- Install a transformer that will hold the phase to neutral voltages within limits when the generation facility is isolated with the Public Utility's local system until the generation disconnects.
- Design, procure, install, and own a Public Utility approved 20.8 kV recloser containing a Schweitzer Engineering Laboratories ("SEL") 651R relay/controller to perform the following functions:
  - Detect faults on the 20.8 kV equipment at the Community Solar Project
  - Detect faults on the 20.8 kV line to Independence substation
  - Monitor the unbalance current flowing through the grounding transformer and protect the transformer from damage due to phase unbalances on the 20.8 kV circuit
  - Monitor the voltage and react to under or over frequency, and /or magnitude of the voltage
  - Receive transfer trip from Independence substation and the line recloser 4M316
- Procure and install instrument transformers on the Public Utility side of the recloser.
- Input the settings provided by the Public Utility into the recloser relay.
- Provide the Public Utility Level 2 password control of the recloser relay.
- Terminate the control cable provided by the Public Unity in the recloser relay.
- Provide the Public Utility the necessary easement to allow the Public Utility to construct its line extension between its existing facilities and the Point of Change of Ownership.
- Provide Public Utility unfettered and maintained access to its interconnection facilities.
- Construct the Applicant's last pole at the Point of Change of Ownership to Public Utility's standard.

- Provide any construction or backup retail service necessary for the Project.
- Arrange for and provide permanent retail service for power that will flow from the Public Utility's system when the Project is not generating. Applicant shall coordinate with the Public Utility's customer service group establish a request number and account number.
- Provide the Public Utility a Professional Engineer ("PE") stamped maintenance plan for all Applicant facilities.

6.1.2 PUBLIC UTILITY TO BE RESPONSIBLE FOR

- Coordinate with the Applicant to establish request and account numbers.
- Develop and provide the settings for Applicant's recloser relay.
- Observe and provide acceptance of the relay settings in the Applicant recloser relay.
- Observe and provide acceptance of the installation of the Applicant's final pole at the point of change of ownership.
- Terminate the final span of conductor onto the Applicant's final pole.
- Provide the Applicant control cable for Applicant to terminate to its recloser relay. Observe the installation and confirm connectivity and functionality of the transfer trip communications path.

6.2 POINT OF INTERCONNECTION

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

6.2.1 PUBLIC UTILITY TO BE RESPONSIBLE FOR

- Design, procure, install, own and maintain at the Applicant's expense the required extension of the 20.8 kV facilities from Public Utility's existing facilities near facility point 01308004.0098700 to the point of change of ownership including a minimum of two poles, conductor, cutouts, fuses, jumpers and a gang operated switch.
- Procure and install a pole mounted enclosure to house the Public Utility's radio system.
- Procure and install a radio system to communicate with the radio at line recloser 4M316 including radio, antenna, transceiver, DC power supply and battery.
- Design, procure and install 20.8 kV pole mounted revenue metering equipment for the Project including a revenue quality meter and instrument transformers.
- Provide and install a cellular 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 POI.

6.3.1 PUBLIC UTILITY TO BE RESPONSIBLE FOR

- Distribution Circuit
  - Install approximately 1.75 miles of fiber optic cable between Independence substation and line recloser 4M316.
  - Replace line recloser 4M316 with a model with transfer trip and deadline check functionality.
  - Procure and install pole mounted enclosures to house the Public Utility's radio system and fiber termination equipment.
  - Procure and install a patch panel, jumper and transceiver and terminate the fiber running from Independence substation.
  - Procure and install a radio system to communicate with the radio at the Applicant's generating facility including pole, radio, antenna, transceiver, DC power supply and battery.
  - Develop and implement transfer trip schemes for faults between Independence substation, line recloser 4M316 and the Applicant's generating facility recloser.
  - Reprogram the existing voltage regulator installed at facility point 01308004.0163706 to accommodate reverse power flow.

- Independence Substation
  - Procure and install a 20.8 kV voltage instrument transformer on the line side of circuit breaker 4M22.
  - Replace the existing 4M22 relay control system with a relay with transfer trip and deadline check functionality.
  - Install a deadline check control circuit on circuit breaker 4M22.
  - Install a new communications rack and communications equipment to support the fiber optic cable path to line recloser 4M316.
  - Terminate the fiber optic cable into the new communications rack.

7.0 COST ESTIMATE

The following estimate represents only scopes of work that will be performed by the Public Utility. Costs for any work being performed by the Applicant are not included.

Project Administration $17,000
Project management, administrative support

Protection & Control $22,000
P&C Engineer and Relay Technician

Metering $14,000
Metering equipment

Distribution $38,000
Load side VT's, poles, conductor, jumper, disconnect switch

Communications *Install 1.8 miles of fiber, communications equipment at recloser, Independence substation, and generating facility*	$176,000
Substation *Installation of instrument transformer*	$77,000
Other Costs *Capital surcharge and contingency*	$61,000
Total Project Cost	**$405,000**

*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 Public Utility must develop the project schedule using conservative assumptions. The Applicant may request that the Public Utility perform this field analysis, at the Applicant'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 Applicant and are not included in this estimate. This estimate approximates the costs incurred by the Public Utility to interconnect this Community Solar Project to the Public Utility's electrical distribution or transmission system based upon the level of study completed to-date. The Applicant will be responsible for all actual costs, regardless of the estimated costs communicated to or approved by the Applicant.

8.0 SCHEDULE

Execute Interconnection Agreement	August 6, 2021
Provision of First Progress Payment	August 6, 2021
Applicant and Public Utility Establish Retail Service Request	September 3, 2021
*Applicant Initial Design Package Provided	September 3, 2021
Public Utility Engineering & Procurement Commences	September 20, 2021
Applicant Property/Permits/ROW Procured	November 5, 2021
Public Utility Property/Permits/ROW Procured	February 4, 2022
*Applicant Final Design Package Provided	May 6, 2022

Public Utility Engineering Design Complete	September 2, 2022
Construction Begins	October 10, 2022
Applicant Maintenance and Commissioning Plans Provided	December 2, 2022
Applicant and Public Utility Construction Complete	January 6, 2023
Public Utility Commissioning Activities Complete	February 17, 2023
Public Utility Commissioning Document Review Complete	February 24, 2023
Applicant's Facilities Receive Backfeed Power	February 27, 2023
Initial Synchronization/Generation Testing	March 1, 2023
Commercial Operation	March 3, 2023

*Applicant 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. Applicant 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.

9.0 Participation by Affected Systems

Public Utility has identified the following Affected Systems: None

10.0 Appendices

Appendix 1: Higher Priority Requests
Appendix 2: Property Requirements

10.1 APPENDIX A: HIGHER PRIORITY REQUESTS

All active higher priority 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 Public Utility reserves the right to restudy this request, as the results and conclusions contained within this study could significantly change.

Transmission/Generation Interconnection/Community Solar Queue Requests considered:

Q#	Size (MW)
1149	0.108
1150	0.504
1151	0.285
OCS008	2.16
OCS026	1.5
OCS035	2.25
OCS038	.981
OCS041	1.875
NMQ081	1.12

10.2 APPENDIX B: PROPERTY REQUIREMENTS

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

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

The Applicant 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.

Applicant 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 Public Utility. The real property shall be a permitted or able to be permitted use in all zoning districts. The Applicant shall provide Public Utility with a title report and shall transfer property without any material defects of title or other encumbrances that are not acceptable to Public Utility. 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:

- 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 Public Utility unless waived by Public Utility.

- 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. Public Utility may require Applicant to procure various studies and surveys as determined necessary by Public Utility.

- Operational: inadequate access for Public Utility'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 Public Utility.