

Community Solar Project Interconnection  
**Community Solar Project Facilities Study Report**

Completed for

**(“Applicant”)**  
**OCS077**

Proposed Point of Interconnection  
**Circuit 5R55 out of Oak Knoll substation at 12.47 kV**  
**(At approximately 42°10'2.39"N, 122°36'23.5"W)**

**December 17, 2021**

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## **1.0 DESCRIPTION OF THE PROJECT**

(“Applicant”) proposed interconnecting 1.85 MW of new generation to PacifiCorp’s (“Public Utility”) circuit 5R55 out of Oak Knoll substation located in Jackson County, Oregon. The project (“Project”) will consist of ten (10) Delta M125HV inverters (factory limited to 124 kW) and five (5) Delta M125HV inverters (factory limited to 122 kW) for a total requested output of 1.85 MW. The requested commercial operation date is November 30, 2022.

The Public Utility has assigned the Project “OCS077.”

## **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**

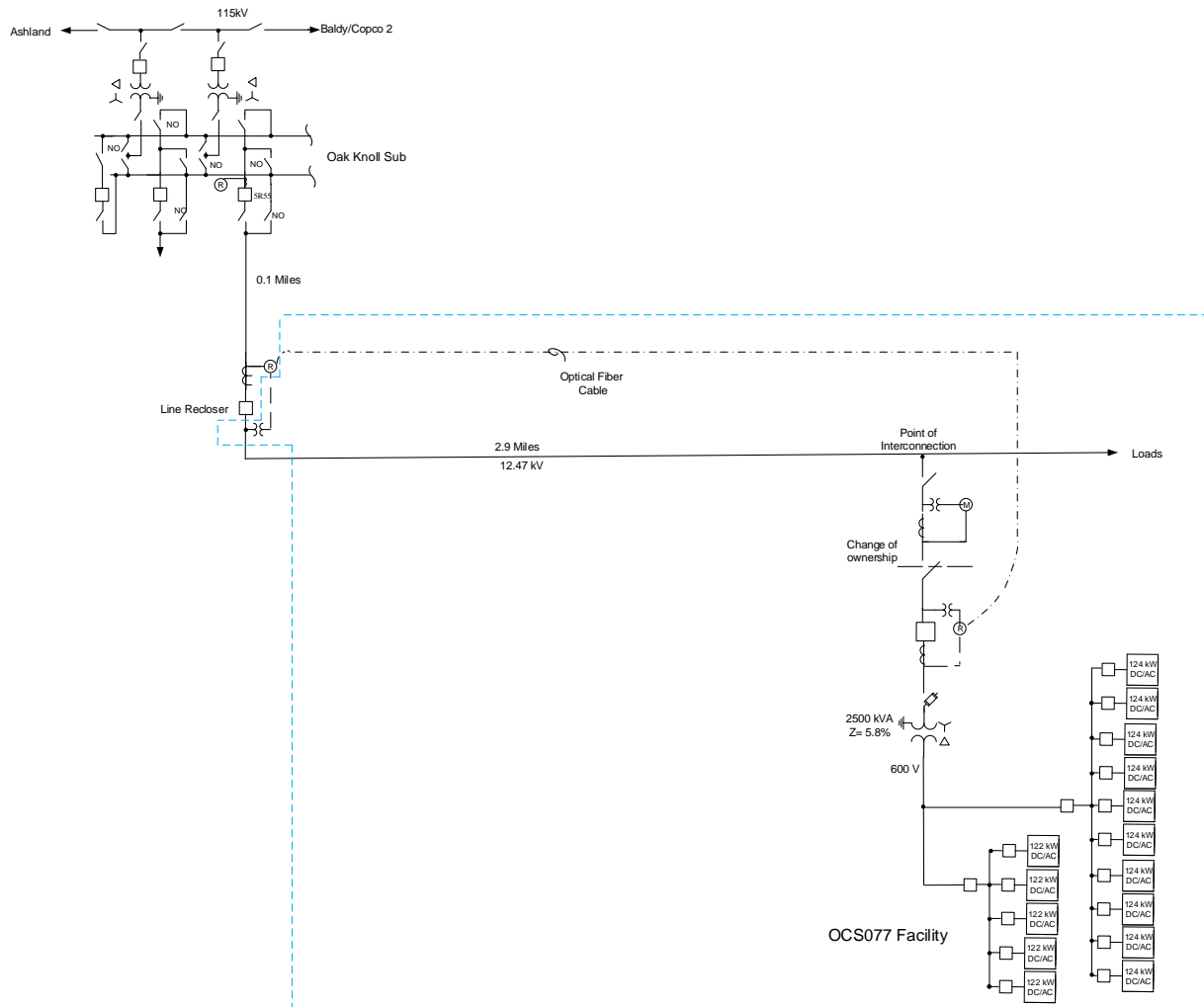
Pursuant to Public Utility Commission of Oregon Order 19-392 approved Community Solar Project procedures the Facilities Study Report shall consist of:

- (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.

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

## **4.0 PROPOSED POINT OF INTERCONNECTION**

The Applicant’s proposed Community Solar Project is to be interconnected to the Public Utility’s distribution circuit 5R55 out of Oak Knoll substation via a 12.47 kV primary meter. The proposed Point of Interconnection (“POI”) will be located at approximately 42°10'2.39"N, 122°36'23.5"W located in Jackson County, Oregon. Figure 1 below is a one-line diagram that illustrates the interconnection of the proposed Community Solar Project to the Public Utility’s system.



*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.

- The Applicant will construct and own the facilities required between the Point of Interconnection 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.
- 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. The Community Solar Project shall have sufficient reactive capacity to enable the delivery of 100 percent of the plant output to the POI at unity power factor measured at 1.0 per unit voltage under steady state conditions.
- 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 Point of interconnection. Under normal conditions, the Public Utility's system should not supply reactive power to the Community Solar Project.
- Design, procure, install, and own a Public Utility approved 12.5 kV recloser containing a Schweitzer Engineering Laboratories ("SEL") 651R relay/controller to perform the following functions:
  - Detect faults on the 12.5 kV equipment at the Community Solar Project
  - Detect faults on the 12.5 kV line to Oak Knoll Substation
  - Monitor the voltage and react to under or over frequency, and /or magnitude of the voltage
  - Receive transfer trip from line recloser
- 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 Utility 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 Point of Interconnection.

### **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 12.5 kV facilities from Public Utility's existing facilities near facility point 01439002.0207701 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 communications equipment.
- Terminate the fiber optic cable running from the Public Utility's line recloser.
- Design, procure and install 12.5 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 Point of Interconnection.

### **6.3.1 PUBLIC UTILITY TO BE RESPONSIBLE FOR**

- Distribution
  - Install approximately three miles of fiber optic cable along the distribution line between the Public Utility's line recloser and the Applicant's recloser.
  - Procure and install a pole mounted enclosure to house the Public Utility's communications equipment.
  - Terminate the fiber optic cable running from the POI.
  - Develop and implement a transfer trip scheme for faults on the line past the line recloser.
  - Install a deadline check control circuit at the line recloser.
  - Implement the following phase swaps:
    - At 01440002.0280001, swap A-phase to B-phase.
    - At 01440002.0163900, swap A-phase to B-phase.
    - At 01439002.0324201, swap B-phase to C-phase.

- At 01439002.0319502, swap B-phase to C-phase.
- Install a new pole and line to neutral regulator east of existing pole 01439002.0301201.
- Install two new 100-amp, 7200-volt line to neutral regulators near pole 01439002.0066602.
- Install three new 100-amp, 7200-volt line to neutral regulators near pole 1439002.207700.
- Oak Knoll Substation
  - Develop and implement settings changes on the Oak Knoll T-3234 load tap changer.

## **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.

<b>Project Administration</b> <i>Project management, administrative support</i>	<b>\$17,000</b>
<b>Relay Setting Development</b> <i>P&amp;C Engineer and Relay Technician</i>	<b>\$15,000</b>
<b>Distribution</b> <i>Line extension, regulators, poles, bypass switches, phase swaps &amp; settings</i>	<b>\$236,000</b>
<b>Metering</b> <i>Metering equipment</i>	<b>\$11,000</b>
<b>Communications</b> <i>Communications at POI and recloser, install fiber</i>	<b>\$204,000</b>
<b>Other Costs</b> <i>Capital surcharge &amp; contingency</i>	<b>\$111,000</b>
<b>Total</b>	<b>\$594,000</b>

\*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	March 4, 2022
Provision of First Progress Payment	May 6, 2022
Applicant and Public Utility Establish Retail Service Request	May 20, 2022
*Applicant Initial Design Package Provided	June 3, 2022
Public Utility Engineering & Procurement Commences	July 11, 2022
Applicant Property/Permits/ROW Procured	December 2, 2022
Public Utility Property/Permits/ROW Procured	February 10, 2023
*Applicant Final Design Package Provided	April 7, 2023
Public Utility Engineering Design Complete	June 16, 2023
Construction Begins	August 14, 2023
Applicant Maintenance and Commissioning Plans Provided	August 25, 2023
Applicant and Public Utility Construction Complete	October 6, 2023
Public Utility Commissioning Activities Complete	October 30, 2023
Public Utility Commissioning Document Review Complete	November 6, 2023
Applicant's Facilities Receive Backfeed Power	November 8, 2023
Initial Synchronization/Generation Testing	November 13, 2023
Commercial Operation	November 15, 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.

Please note, the time required to perform the scope of work identified in this report does not support the Applicant’s requested commercial operation date of November 30, 2022.

## **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:

GI Queue	Size (MW)	GI Queue	Size (MW)
721	55	OCS046	2.25
741	40	OCS047	2.25
849	100	OCS048	1.50
905	50	OCS049	2.99
971	2.7	OCS050	1.00
1055	4.2	OCS051	1.50
OCS003	0.8	OCS054	0.90
OCS004	0.8	OCS055	1.35
OCS019	0.88	OCS058	1.25
OCS020	0.17	OCS059	0.63
OCS025	2.80	OCS065	1.25
OCS034	0.98	OCS066	1.13
OCS036	1.13	OCS067	1.00
OCS037	1.50	OCS068	1.00
OCS039	2.25	OCS070	2.00
OCS042	0.13	OCS072	1.00
OCS044	0.36	C1-15	2.30
		OCS074	0.36

**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 point of interconnection 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.