PACIFICORP

Community Solar Project Interconnection

Community Solar Project System Impact Study Report

Completed for

("Applicant")
OCS080

Proposed Point of Interconnection
Circuit 5P232 out of Knott substation at 12.5 kV

June 26, 2023

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1.0 DESCRIPTION OF THE COMMUNITY SOLAR PROJECT

("Applicant") proposed interconnecting 360 KW of new generation to PacifiCorp's ("Public Utility") circuit 5P232 out of Knott substation located in Multnomah County, Oregon. The project ("Project") will consist of three (3) SolarEdge SE120KUS solar inverters for a total requested output of 360 KW.

The Public Utility has assigned the Project "OCS080."

2.0 APPROVAL CRITERIA FOR TIER 4 INTERCONNECTION REVIEW

Pursuant to the Section I(1) of the Public Utility's CSP Interconnection 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 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 Section I(6)(g) of the CPS Interconnection Procedures, the System Impact Study Report shall consist of: (1) the underlying assumptions of the study; (2) a short circuit analysis; (2) a stability analysis; (3) a power flow analysis; (4) voltage drop and flicker studies; (5) protection and set point coordination studies; (6) grounding reviews; (7) the results of the analyses; and (8) any potential impediments to providing the requested Interconnection Service, including a non-binding informational NRIS portion that addresses the additions, modifications, and upgrades to the Public Utility's Transmission System that would be required at or beyond the point at which the Interconnection Facilities connect to the Public Utility's Transmission System to accommodate the interconnection of the CSP Project In addition, the System Impact Study shall provide a list of facilities that are required as a result of the Community Solar Project request and non-binding good faith estimates of cost responsibility and time to construct.

4.0 PROPOSED POINT OF INTERCONNECTION

The Applicant's proposed Community Solar Project is to be interconnected to the Public Utility's distribution circuit 5P232 out of Knott substation via a 12.5 kV primary meter. The proposed Point of Interconnection will be located at approximately 45.5489°N, 122.6757°W located in Multnomah County, Oregon. Figure 1 below is a one-line diagram that illustrates the interconnection of the proposed generating facility to the Public Utility's system. Figure 2 below is a map of the Public Utility's distribution system near the proposed Point of Interconnection.

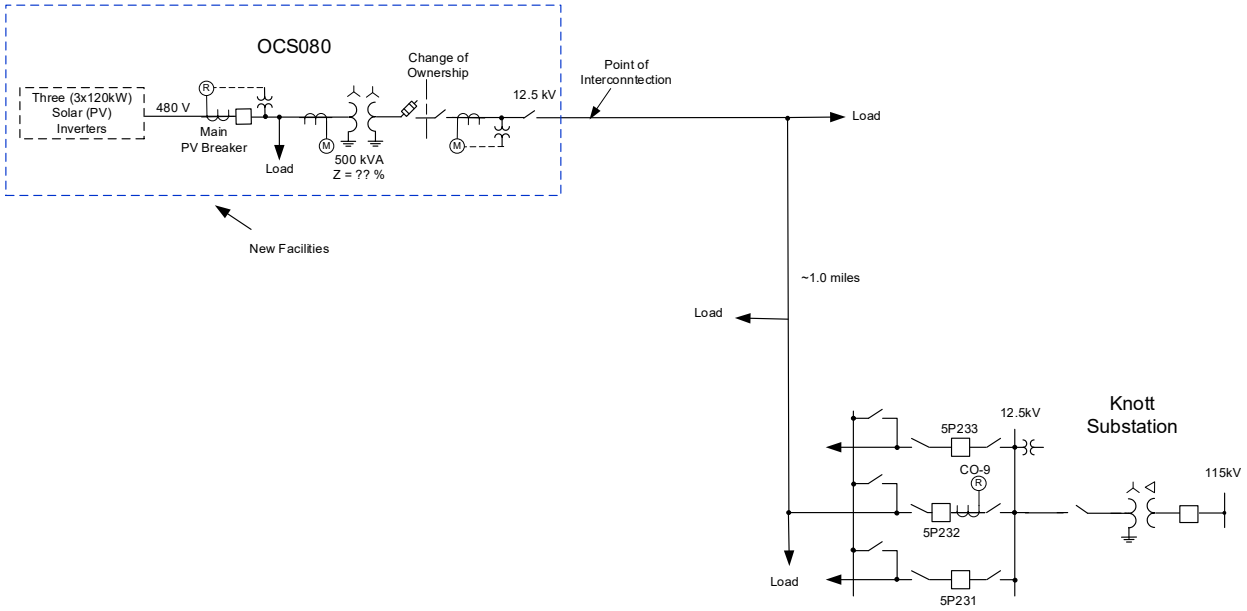

Figure 1: System One Line Diagram

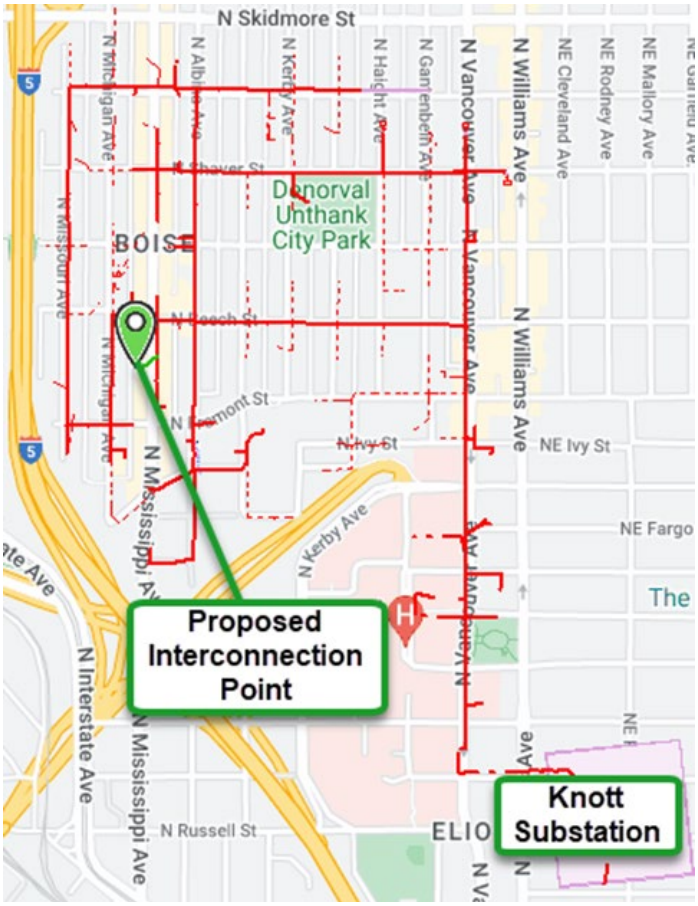

Figure 2: System Map

5.0 STUDY ASSUMPTIONS

- All active higher-priority requests for transmission service and/or generator interconnection service (including requests in the traditional interconnection queue and other requests in the Community Solar queue) in the local area of the requested POI 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.
- The Applicant's request for interconnection service in and of itself does not convey transmission 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 any 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.
- The Public Utility distribution facility point closest to the POI is 01101001.0223007 on Mississippi Avenue.
- The Public Utility assumes it will not need to upgrade existing distribution facilities to extend to the Point of Interconnection and that the Applicant has property to allow the new Public Utility infrastructure to be installed without modifying existing facilities.
- 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 REQUIREMENTS

The Community Solar Project and Interconnection Equipment owned by the Applicant are required to operate 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.

Generators shall be capable of operating under Voltage-reactive power mode, Active power-reactive power mode, and Constant reactive power mode as per IEEE Std. 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 Std 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. The reactive compensation must be designed such that the discreet switching of the reactive device (if required by the Applicant) does not cause step voltage changes greater than +/-3% on the Public Utility's system. In all cases the minimum power quality requirements in PacifiCorp's Engineering Handbook section 1C shall be met and 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.

All generators must meet applicable WECC low voltage ride-through requirements as specified in the interconnection agreement.

The Applicant will be required to install its own step-up transformer. The Applicant's technical information indicates using an existing, Public Utility owned, retail transformer which will not be acceptable for the Community Solar program. The Public Utility assumes the Applicant will install a pad mounted transformer near the building on which the solar array will be installed. The location will need to be coordinated with the Public Utility in order to allow the Public Utility to install its metering equipment near the transformer location. In addition, the Public Utility will need to determine how to extend its existing facilities to the transformer location and install a switch between the transformer and its existing facilities based on the location selected by the Applicant.

6.2 Distribution/Transmission Line Modifications

Due to the urban nature of the location of the proposed Community Solar Project the Public Utility will need to coordinate with the Applicant to determine the specific requirements to extend its existing facilities to the POI. This will include the installation of three phase conductor from existing infrastructure near the Applicant's building to the POI. The Public Utility assumes this will be a combination of both overhead and underground facilities. The line extension will also include a group operated switch. The Applicant will be responsible for procuring all necessary permits and easements for the new Public Utility line extension and will provide unfettered and maintained access to all Public Utility owned facilities.

6.3 Existing Breaker Modifications – Short-Circuit

The increase in the fault duty on the system as the result of the addition of the Community Solar Project with photovoltaic arrays fed through three (3) 120 kw inverters connected to a 500 kVA, 12.5 kV – 600 V transformer will not push the fault duty above the interrupting rating of any of the existing fault interrupting equipment.

6.4 PROTECTION REQUIREMENTS

The Applicant will be required to manage transient overvoltage (effective grounding). The inverter(s) specified for the proposed Community Solar Project are equipped to react to the transient overvoltage so no grounding transformers will be required. The neutrals of the inverters will need to be connected to the neutral of the service transformer to meet these criteria. If the type of inverters change this requirement will need to be evaluated again which may result in the need for a grounding transformer.

The Applicant's step-up transformer (12470-480 V, Yg-yg)) must have a high voltage fuse for its protection according to Public Utility standards.

The Community Solar Project will need to be equipped with a main 480 V breaker that can disconnect the inverters from the distribution network. The main breaker needs to have stored energy operate capability so that the breaker can be tripped open in a zero AC voltage state. An SEL 751 relay or similar would be sufficient for the relay applied to the main breaker. The SEL 751 relay must be configured to perform the following functions:

- Detect faults on the 480 V bus at the generation facility
- Monitor the voltage and react to under or over frequency, and /or magnitude of the voltage according to the Utility present policies.

The Applicant will provide a copy of its relay settings to the Public Utility to review prior to energization of the Community Solar Project.

6.5 DATA REQUIREMENTS (RTU)

No data requirements due to the size of the proposed Community Solar Project.

6.6 COMMUNICATION REQUIREMENTS

No communications upgrades are required.

6.7 SUBSTATION REQUIREMENTS

No substation upgrades are required.

6.8 METERING REQUIREMENTS

Interchange Metering

Due to the size of the project at 360 kW, the revenue metering equipment will be located on the low side of the Applicant's generator step up transformer. The metering will be bi-directional to measure KWH and KVARH quantities. The metering will measure both generation received by the Public Utility and delivered retail load to the Applicant per tariff when not generating. The metering generation and billing data will be remotely interrogated via the Public Utility's MV90 data acquisition system.

The present output rating does not require metering DNP real time data.

The Public Utility will provide the metering instrument transformers, meter, test switch and communication cellular package. The Public Utility will create meter program/design, test, and complete an in-service accuracy verification of the metering package.

The Applicant has indicated 600 volts at the low side of the generator step up transformer. If this is the final design, metering voltage transformers (i.e. JVA-0C) will be required to step 600 volts down to metering voltages

The Applicant will install the secondary service entrance equipment. The meter mounting and transformer enclosure will conform to the Public Utility's Six State Electric Service Requirements manual. The Applicant will supply the transformer electrical test data as the meter will be transformer loss compensated.

Station Service/Construction Power
Prior to construction, Applicant must arrange temporary construction power metering and retail load power that is drawn from the distribution line when the Project is not generating. Applicant must call the PCCC Solution Center 1-800-640-2212 to arrange this service

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 *Project management, administrative support*	$11,000
Relay Setting Development *P&C Engineer and Relay Technician*	$7,000
Distribution *Line extension*	$30,000
Metering *Metering equipment*	$11,000
Other Costs *Capital surcharge and contingency*	$14,000
Total	**$73,000**

*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 is as accurate as possibly given the level of detailed study that has been completed to date and approximates the costs incurred by Public Utility to interconnect this Community Solar Project to Public Utility's electrical distribution or transmission system. An estimate, based on finer detail, will be calculated during the Facilities Study. The Applicant will be responsible for all actual costs, regardless of the estimated costs communicated to or approved by the Applicant.

8.0 SCHEDULE

The Public Utility estimates it will require approximately 15-18 months to design, procure and construct the facilities described in this report following the execution of an Interconnection Agreement. The schedule will be further developed and optimized during the Facilities Study.

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: Informational Network Resource Interconnection Service Assessment
Appendix 3: Property Requirements

10.1 APPENDIX 1: HIGHER PRIORITY REQUESTS

All active higher priority transmission service and/or generator interconnection and Community Solar Project 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:

OCS12

10.2 APPENDIX 2: INFORMATIONAL NETWORK RESOURCE INTERCONNECTION SERVICE ASSESSMENT

The study results described above reflect an energy resource interconnection service ("ERIS") evaluation, modified in the CSP program rules to examine only generation and load conditions local to the requested CSP project's interconnection point (sometimes referred to as the "zoomed in view"). The "zoomed in view" functions to: (1) study the project's proposed interconnection without considering certain existing or higher-queued requests outside of the local area; and (2) to inform whether the CSP facility must cap its project to mitigate, although not eliminate, the risk of potential deliverability-related network upgrades to accommodate the proposed CSP generator.

By contrast, the following informational section provides a network resource interconnection service ("NRIS") evaluation performed with traditional assumptions, i.e., not modified to examine only local generation and load conditions, but rather one that assumes that all existing interconnections, higher-queued requests for interconnection service (in both the traditional and CSP queue), and generators with executed contracts beyond the local area are in-service. Depending on the severity of the conditions created when absorbing additional generation (capped or not capped) in that broader, "zoomed out" area, the local area-focused generator size cap developed in the "zoomed in" examination may not be sufficient to mitigate the need for deliverability-related network upgrades. Regardless of this report's informational NRIS results, the deliverability-related network upgrades ultimately necessary to accommodate the proposed CSP generator will depend on conditions present when the future transmission service study is performed, as well as whether network upgrade alternatives are available at that time.

Considering existing generation and higher-queued requests to interconnect in the Portland area where the CSP generator proposes to interconnect, 0.36 MW of additional generation can be absorbed. As a result, the transmission provider determines that no additional network upgrades would be required for the aggregate of generation in the local area to be delivered to the aggregate of load on the transmission provider's transmission system (the NRIS study scope).

10.3 APPENDIX 3: 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.

10.4 APPENDIX 4: TRANSMISSION/DISTRIBUTION STUDY RESULTS

No thermal or voltage issues were observed with the addition of the proposed generating facility.