PACIFICORP

Small Generator Interconnection
Tier 4 Facilities Study Report

Completed for

(“Applicant”)
TCS-40

Proposed Interconnection
On PacifiCorp’s
Circuit 4M182 out of Hillview sub @ 20.8 kV

August 31, 2021

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1.0 DESCRIPTION OF THE PROJECT

("Applicant") proposed interconnecting 0.8 megawatts ("MW") of new generation to PacifiCorp's ("Public Utility") distribution circuit 4M182 located in Benton County, Oregon. The Interconnection Request is proposed to consist of eight (8) 100 kVA Solaredge SE100KUM solar inverters for a total output of 0.8 MW at the POI. The requested commercial operation date is September 1, 2021.

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

The Public Utility has assigned the project "TCS-40."

2.0 APPROVAL CRITERIA FOR TIER 4 INTERCONNECTION REVIEW

Pursuant to 860-082-0060(1), a public utility must use the Tier 4 interconnection review procedures for an application to interconnect a small generator facility that meets the following requirements:

(a) The small generator facility does not qualify for or failed to meet Tier 1, Tier 2, or Tier 3 interconnection review requirements; and
(b) The small generator facility must have a nameplate capacity of ten (10) megawatts or less.

3.0 SCOPE OF THE STUDY

Pursuant to 860-082-0060(8) the Facilities Study Report shall consist of:

(a) A detailed scope identifying the interconnection facilities and system upgrades required to safely interconnect the small generator facility including the electrical switching configuration of the equipment, including the transformer, switchgear, meters, and other station equipment as applicable;
(b) A reasonable schedule for completion of the study;
(c) A good-faith, non-binding estimate of the costs for the facilities and upgrades, including equipment, engineering, procurement, and construction costs, and;
(d) 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 Small Generator Facility is to be interconnected to the Public Utility's distribution circuit 4M182 out of Hillview substation. Figure 1 below is a one line diagram that that illustrates the interconnection of the proposed generating facility to the Public Utility's system.

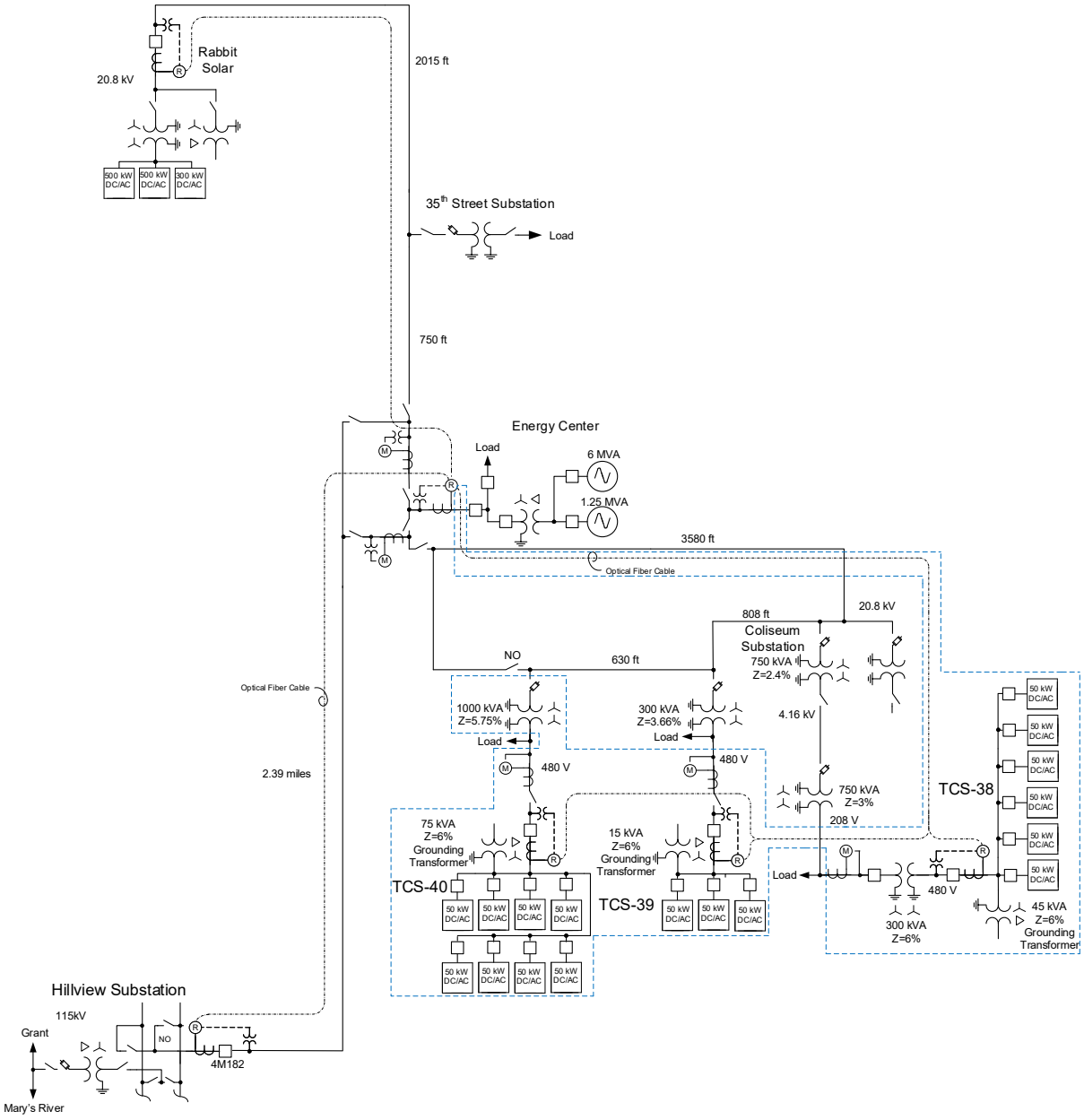

Figure 1: System One Line Diagram

5.0 STUDY ASSUMPTIONS

- All active higher priority transmission service and/or generator interconnection 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 network upgrades that are required to accommodate active transmission service requests and are expected to be in-service on

or after the Applicant's requested in-service date for the Project will be modeled in this study.
  - Generation Interconnection Queue: when relevant, interconnection facilities associated with higher queue interconnection requests will be modeled in this study. However, no generation will be simulated from any higher queued project unless a commitment has been made to obtain transmission service.
- 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 the facilities required between the point of interconnection and the Project.
- Generator tripping may be required for certain outages.
- All facilities will meet or exceed the minimum WECC, NERC, and Public Utility performance and design standards.
- The Public Utility has assumed that the current contractual arrangement of the leased system between the Applicant and the Public Utility remains as it currently stands. Should that contractual arrangement change, metering and communications changes could be required.
- The Public Utility assumes that the generation from the Applicant's Small Generating Facility will be fully absorbed by the load on the Applicant's distribution system and not flow onto the Public Utility's system.
- The Public Utility assumes the Applicant's existing campus communications system can be utilized for transfer trip requirements. Should this system not be available or not meet Public Utility standards the requirements and cost estimate will change.
- 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 (http://www.pacificorp.com/tran.html)

6.0 REQUIREMENTS

6.1 SMALL GENERATOR FACILITY REQUIREMENTS

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

6.1.1 APPLICANT TO BE RESPONSIBLE FOR

- Design, construct, own and maintain the Applicant's generating facility and associated collector system.
- Design the Small 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 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 Small Generating Facility 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 Small Generating Facility 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 Small Generating Facility under constant power factor mode with a unity power factor setting unless specifically requested otherwise by the Public Utility. The Small Generating Facility is expressly forbidden from actively participating in voltage regulation of the Public Utility's system without written request or authorization from the Public Utility.
- Operate the Small Generating Facility 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 Small Generating Facility.
- 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 480 V generation breaker that can disconnect all generation sources from the distribution network and which has stored energy operate capability so that the breaker can be tripped open in a zero AC voltage state. A Schweitzer Engineering Laboratories ("SEL") 751 relay would be capable of meeting the Public Utility's requirement. The relay needs to be configured to perform the following functions:
  - Detect faults on the 480 V equipment at the Generating Facilities
  - Detect faults on the 20.8 kV line to Hillview substation
  - Monitor the voltage and react to under or over frequency, and /or magnitude of the voltage
  - Monitor the unbalance current flowing through the grounding transformers and protect the transformers from damage due to phase unbalances on the 20.8 kV circuit
  - Receive transfer trip from Hillview substation via the Energy Center
- Procure and install instrument transformers on the Public Utility side of the breaker to sense the voltage.
- Input the settings provided by the Public Utility into the breaker relay.
- Provide the Public Utility Level 2 password control of the 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 install its interconnection facilities.
- Provide Public Utility unfettered and maintained access to its interconnection facilities.
- Provide any construction or backup retail service necessary for the Project.
- Provide the Public Utility a Professional Engineer ("PE") stamped maintenance plan for all Applicant facilities.

6.1.2 PUBLIC UTILITY TO BE RESPONSIBLE FOR

- Develop and provide the settings for Applicant's relay.
- Observe and provide acceptance of the relay settings in the Applicant relay.
- Provide the Applicant control cable for Applicant to terminate to its 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 APPLICANT TO BE RESPONSIBLE FOR

- Install the Public Utility's metering mounting equipment, instrument transformer enclosure and communications equipment enclosure per standards provided by the Public Utility.

6.2.2 PUBLIC UTILITY TO BE RESPONSIBLE FOR

- Provide the Applicant the standards for its metering mounting equipment, instrument transformer enclosure and communications equipment enclosure. Review and provide acceptance of the installations.
- Design, procure and install 480 V 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 beyond the Point of Interconnection.

6.3.1 APPLICANT TO BE RESPONSIBLE FOR

- Campus Distribution System
  - Provide the Public Utility a new location for the Public Utility to install a new vault, conduit and transformer.

- Provide a dedicated pair of single mode fiber from the Small Generating Facility location to the Interconnection Customer's Energy Center facility to facilitate jumpering to the Public Utility fiber to Hillview substation

6.3.2 PUBLIC UTILITY TO BE RESPONSIBLE FOR

- Campus Distribution System
  - Remove an existing 300 kVA transformer.
  - Install a new 1000 kVA transformer and vault at the location determined by the Applicant.
  - Install a new PME-3 gang operated switchgear and vault between an existing sectionalizer and the new transformer.
  - Install new conduit and 4/0 AL conductor from the sectionalizer to switchgear and on to the new transformer.
  - Review and provide acceptance of the Interconnection Customer's communications path from the Small Generating Facility to Hillview substation.

- Hillview Substation
  - Develop and implement a transfer trip scheme to trip the Applicant's Small Generating Facility offline for faults on the circuit 4M182 or faults in the Hillview 115-20.8 kV transformer.

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*	$7,000
Develop Relay Settings *P&C Engineer and Relay Technician*	$9,000
Metering *Metering equipment*	$9,000
Distribution *Install transformer, switchgear, conductor*	$64,000
Communications *Communications Engineer and Equipment*	$4,000
Other Costs *Capital surcharge and contingency*	$12,000
Total	**$105,000**

*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 Small Generator Facility 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 20, 2021
Provision of First Progress Payment	August 20, 2021
Applicant and Public Utility Establish Retail Service Request	October 1, 2021
*Applicant Initial Design Package Provided	October 1, 2021
Public Utility Engineering & Procurement Commences	October 18, 2021
Applicant Property/Permits/ROW Procured	December 1, 2021
Public Utility Property/Permits/ROW Procured	March 18, 2022
*Applicant Final Design Package Provided	March 25, 2022
Public Utility Engineering Design Complete	June 3, 2022
Construction Begins	July 11, 2022
Applicant Maintenance and Commissioning Plans Provided	July 29, 2022
Applicant and Public Utility Construction Complete	August 19, 2022
Public Utility Commissioning Activities Complete	September 9, 2022
Public Utility Commissioning Document Review Complete	September 16, 2022

Applicant's Facilities Receive Backfeed Power	September 19, 2022
Initial Synchronization/Generation Testing	September 21, 2022
Commercial Operation	September 23, 2022

*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 September 21, 2021.

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 Queue Requests considered: None

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 permittable 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.