GENERATOR INTERCONNECTION

FEASIBILITY STUDY REPORT

for integration of the proposed

0.075 MW [redacted]

IPC PROJECT QUEUE #755

PRIMARY POINT OF INTERCONNECTION

to the

IDAHO POWER COMPANY ELECTRICAL SYSTEM

for

[redacted]

REPORT v.0

March 31, 2025

Revision History

Date	Revision	Initials	Summary of Changes
3/31/2025	0	AEF	FeSR GI #755 – Original issue.

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1.0 Introduction

[redacted] has contracted with Idaho Power Company (IPC) to perform a Generator Interconnection Feasibility Study for the integration of the proposed 0.075 MW [redacted] Project (the Project). The Project is located in IPC's Western Region near [redacted] in Gem County, Idaho (See Figure 3: Location of [redacted] Project – GI # 755 in Appendix B). The project latitude and longitude are approximately [redacted]. The Project is Generation Interconnect queue number 755 (GI #755).

The Project has applied to connect to the Idaho Power distribution system for an injection of 0.075 MW at a single Point of Interconnection (POI) at 12.47 kilovolts (kV). The POI evaluated is located in the [redacted] distribution circuit boundary approximately 4.75 miles northeast of the [redacted] substation at [redacted].

This report documents the basis for and the results of this feasibility study for the GI #755 Generation Interconnection Customer. The report describes the proposed project, the determination of project interconnection feasibility and estimated costs for integration of the Project to the Idaho Power System. This report satisfies the feasibility study requirements of the Idaho Power Tariff. The next step is to complete a facility study.

2.0 Summary

The feasibility of interconnecting the 0.075 MW [redacted] to IPC's 12.47 kV [redacted] distribution circuit was evaluated.

The power flow analysis indicated that interconnecting the [redacted] Project to [redacted] is feasible with modifications discussed in this report.

The Project will be required to control voltage in accordance with a voltage schedule as provided by Idaho Power Grid Operations. The Project will be required to use inverters which have UL1741-SB certification in order to meet system support functions such as voltage and frequency ride through requirements. The project will need to size the step-up transformers appropriately for the total plant MVA.

The interconnection transformer will need to have a Wye-grounded: Wye-grounded configuration.

Generator interconnection service, either as an Energy Resource or a Network Resource, does not in any way convey any right to deliver electricity to any specific customer or point of delivery.

The total preliminary cost estimate to interconnect the [redacted] to the [redacted] distribution circuit is $232,000, and includes the following tasks:

- Install a three-pole 12.47 kV generation interconnection package at the POI. This includes 3-phase potential transformers (PTs), 3-phase current transformers (CTs), metering and three fused disconnects.
- Rebuild 500 feet of single phase #4 ACSR distribution circuit to 3-phase 2/0 AAC.

The cost estimate includes direct equipment and installation labor costs, indirect labor costs and general overheads. These are cost estimates only and final charges to the customer will be based on the actual construction costs incurred. It should be noted that the preliminary cost estimate of $232,000 does not include the cost of the customer's owned equipment to construct the solar generation site or required communication circuits.

3.0 Scope of Interconnection Feasibility Study

The Interconnection Feasibility Study was done and prepared in accordance with Idaho Power Company Standard Generator Interconnection Procedures to provide a preliminary evaluation of the feasibility of the interconnection of the proposed generating project to the Idaho Power system. As listed in the Interconnection Feasibility Study agreement, the Interconnection Feasibility Study report provides the following information:

- preliminary identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection;
- preliminary identification of any thermal overload or voltage limit violations resulting from the interconnection; and
- preliminary description and non-binding estimated cost of facilities required to interconnect the Small Generating Facility to the IPC system and to address the identified short circuit and power flow issues.

All other proposed generation projects prior to the Project in the Generator Interconnect queue were considered in this study**.** A current list of these projects can be found in the Generation Interconnection folder located on the Idaho Power web site at the link shown below:

http://www.oatioasis.com/ipco/index.html

4.0 Description of Proposed Generating Project

The proposed [redacted], GI #755, consists of a single 0.075 MW [redacted] which requested to be connected to Idaho Power's 12.47 kV [redacted] distribution circuit. The supplied single line drawing shows the project using [redacted]

The Project will need to provide evidence that the proposed inverters do have UL1741-SB certification or select alternative inverters which do meet that requirement. The project also will need to size the step-up transformers appropriately for the total plant MVA.

A conductor size and type of #4 ACSR was assumed to connect the generating project from the project site to the POI for the study.

5.0 Description of Transmission Facilities

Preliminary power flow analysis indicated that interconnection of a 0.075 MW injection at the POI considered in this study is feasible with the recommended modifications.

6.0 Description of Substation Facilities

Idaho Power's [redacted] substation is located in Gem County, Idaho. The existing substation transformer, [redacted], is a three-phase 138-12.5 kV transformer rated for 44.8 MVA.

7.0 Description of Distribution Facilities

The requested POI for the Project is on the [redacted] distribution circuit. This is a grounded-wye circuit operating at 12.47 kV at the POI. The Project must have a grounded-wye transformer connection on the IPC side, as well as a wye or grounded wye connection on the Project side of the transformer.

Refer to Appendix A, Section 3, for additional grounding requirements.

8.0 Short Circuit Study Results

Fault Duty at [redacted] 12.5 kV Bus:

SLG Fault (A)		11036.8
3PH Fault (A)		10065.4

Fault Duty at POI – 12.5 kV Bus:

SLG Fault (A)	667.8
3PH Fault (A)	801.3

The fault current contribution from the [redacted] generators does not exceed any circuit breaker rating.

9.0 Description of Required Facility Upgrades

The Project will be required to set the inverters to Idaho Power's default inverter settings which will operate the Project in Volt/VAr control mode. This is to regulate voltage according to a voltage schedule that will be provided by Idaho Power.

The following upgrades will be required to IPC-owned facilities to facilitate the interconnection of GI #755:

- Install a three-pole 12.47 kV generation interconnection package at the POI. This includes 3-phase potential transformers (PTs), 3-phase current transformers (CTs), metering and three fused disconnects.
- Rebuild 500 feet of single phase #4 ACSR distribution circuit to 3-phase 2/0 AAC.

See the conceptual-level cost estimate in Table 1.

Table 1: Conceptual-level Cost Estimate for GI #755

Item of Work	Estimate

Generation interconnection and protection package	$150,000
Substation upgrades	$0
Distribution upgrades	$35,000
Transmission upgrades	$0
Unloaded costs	$185,000
20% Contingency (1)	$37,000
Total unloaded costs	$222,000
Overheads (2)	$10,000
Total loaded costs (3)	$232,000
Total Conceptual-level Cost Estimate in 2025 dollars (3)	**$232,000**

(1) Contingency is added to cover the unforeseen costs in the estimate. These costs can include unidentified design components, material cost increases, labor estimate shortfalls, etc.
(2) Overhead costs cover the indirect costs associated with the Project.
(3) This cost estimate includes direct equipment, material, labor, and overheads as shown.

- Note that these estimates do not include the cost of the customer's equipment/facilities or required communication circuits for metering.
- Note that the overhead rates are subject to change during the year.
- These are estimated costs only and final charges to the customer will be based on the actual construction costs incurred.
- These are non-binding conceptual level cost estimates that will be further refined upon the request and completion of Transmission and Distribution Facility Studies.

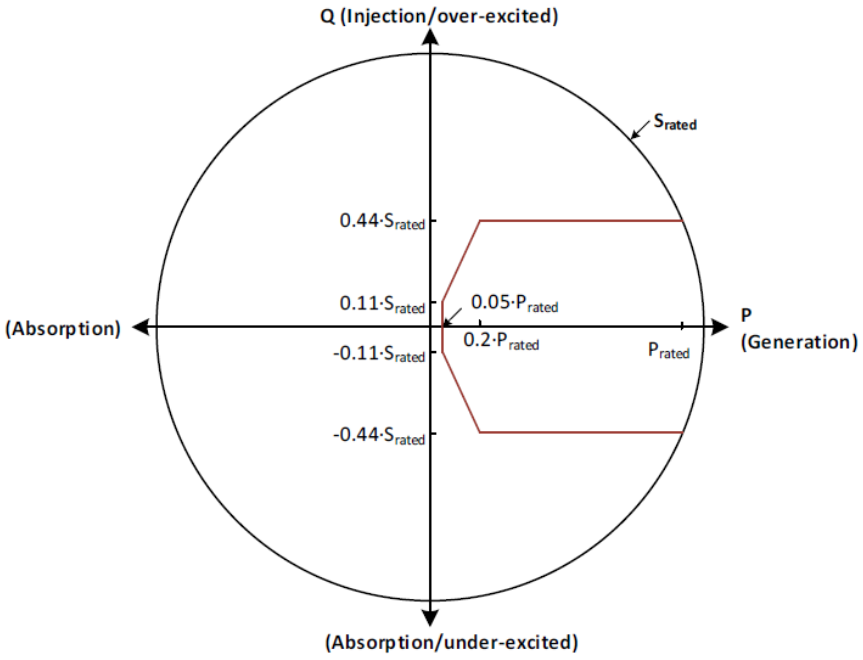
10.0 Description of Operating Requirements

The inverter(s) will be required to be UL1741-SB certified prior to the installation. The inverters for the project will be set to Idaho Power's default inverter settings unless the System Impact Study identifies alternative setting requirements. The default inverter settings are available in the Common File Format and may be found at:

https://docs.idahopower.com/pdfs/BusinessToBusiness/CustomerGeneration/Idaho_Power_Inverter_Settings.csv.

If alternative inverter settings are required for the Project, a specific separate inverter setting file using the Common File Format will be provided as part of the Generation Interconnection Agreement.

The Project shall be capable of injecting reactive power (over-excited) and absorbing reactive power (under-excited) equal to 0.033 MVAR at all active power output between 20% and 100% of nameplate active power rating as defined in IEEE 1547-2018 Category B reactive power capability and shown in Figure 1.



Category B

Figure 1. Operating requirements

The Project will be required to control voltage at the Project POI in accordance with a voltage schedule provided by Idaho Power Grid Operations. The Project will be required to follow a voltage-reactive power characteristic curve as shown in Figure 2 with the settings shown in Table 2.

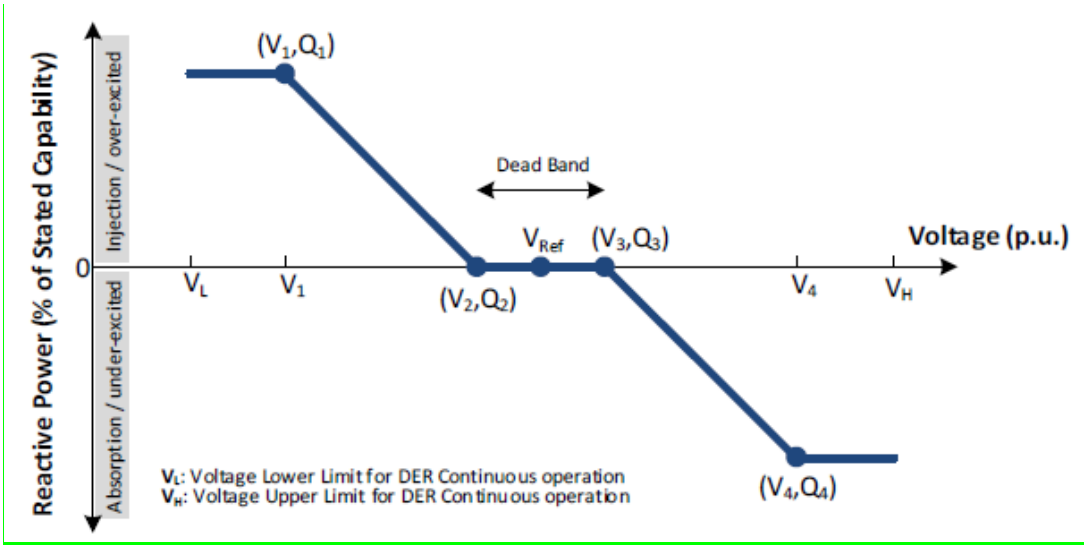


Figure 2. Voltage-Reactive Power Settings (IEEE 1547-2018)

Table 2: Voltage-Reactive Power Settings for GI #752 (1)

Set Point	V (per unit nominal voltage)	Set Point	Q (per unit)
V_1	0.92	Q_1	44%, injecting
V_2	0.98	Q_2	0
V_3	1.03	Q_3	0
V_4	1.06	Q_4	44%, absorption

(1) Open-loop response time – 5 seconds

Voltage flicker at startup and during operation will be limited to less than 5% as measured at the Project POI. The allowable voltage flicker limit is further reduced during operation due to multiple voltage fluctuations per hour or minute, per Idaho Power's T&D Advisory Information Manual.

The Project is required to comply with the applicable voltage fluctuation limits found in IEEE Standard 1453-2022 *IEEE Standard for Measurement and Limits of Voltage Fluctuations and Associated Light Flicker on AC Power Systems*

The Project is required to comply with the applicable Voltage and Current Distortion Limits found in IEEE Standard 519-2022 *IEEE Standard for Harmonic Control in Electrical Power Systems*.

Additional operating requirements for the Project may be identified in the System Impact Study when it is performed.

The interconnection transformer will need to have a Wye-grounded: Wye-grounded configuration.

11.0 Conclusion

The requested interconnection of the [redacted] Project, GI #755, to Idaho Power's system was studied. The project will need to interconnect using a 12.47 kV grounded-wye connection to the [redacted] 12.47 kV distribution feeder. The results of this study work confirm that it is feasible to interconnect the [redacted] Project, GI #755, to the existing Idaho Power system with the modifications listed. A three-pole generation interconnect package with metering and 500 feet of distribution line build are required to integrate the 0.075 MW project. The next step is to complete a facility study.

All generation projects in the area ahead of the Project in the IPC generation interconnection queue and their associated transmission system improvements were modeled in a preliminary power flow analysis to evaluate the feasibility of interconnecting GI #755. The results and conclusions of this feasibility study are based on the realization of these projects in the unique queue/project order.

The estimated cost to interconnect GI #755 to the IPC system at the 12.47 kV point of interconnection considered in this study is approximately $232,000.

The interconnection transformer will need to have a Wye-grounded: Wye-grounded configuration.

Generator interconnection service, either as an Energy Resource or a Network Resource, does not in any way convey any right to deliver electricity to any specific customer or point of delivery.

APPENDIX A

A-1.0 Method of Study

For distribution circuit analysis, Idaho Power utilizes DNV GL's Synergi Electric software and EPRI's OpenDSS software.

A-2.0 Acceptability Criteria

The following acceptability criteria were used in the power flow analysis to determine under which system configuration modifications may be required:

The continuous rating of equipment is assumed to be the normal thermal rating of the equipment. This rating will be as determined by the manufacturer of the equipment or as determined by Idaho Power. Less than or equal to 100% of continuous rating is acceptable.

Idaho Power's Voltage Operating Guidelines were used to determine voltage requirements on the system. This states, in part, that distribution voltages, under normal operating conditions, are to be maintained within plus or minus 5% (0.05 per unit) of nominal everywhere on the feeder. Therefore, voltages greater than or equal to 0.95 pu voltage and less than or equal to 1.05 pu voltage are acceptable.

Voltage flicker during starting or stopping the generator is limited to 5% as measured at the point of interconnection, per Idaho Power's T&D Advisory Information Manual.

Idaho Power's Reliability Criteria for System Planning was used to determine proper transmission system operation.

All customer generation must meet IEEE 519 and ANSI C84.1 Standards.

All other applicable national and Idaho Power standards and prudent utility practices were used to determine the acceptability of the configurations considered.

The stable operation of the system requires an adequate supply of volt-amperes reactive (VAr or VArs) to maintain a stable voltage profile under both steady-state and dynamic system conditions. An inadequate supply of VArs will result in voltage decay or even collapse under the worst conditions.

Equipment/line/path ratings used will be those that are in use at the time of the study or that are represented by IPC upgrade projects that are either currently under construction or whose budgets have been approved for construction in the near future. All other potential future ratings are outside the scope of this study. Future transmission changes may, however, affect current facility ratings used in the study.

A-3.0 Grounding Guidance

IPC requires interconnected transformers on the distribution system to limit their ground fault current to 20 amps at the Point of Interconnection.

A-4.0 Electrical System Protection Guidance

IPC requires electrical system protection per Requirements for Generation Interconnections found on the Idaho Power Web site,

http://www.idahopower.com/pdfs/BusinessToBusiness/facilityRequirements.pdf

APPENDIX B

B-1.0 0.075 MW [redacted] Project GI #755 Site Locations

Figure 3. Location of 0.075 MW [redacted] Project – GI #755