

**GENERATOR INTERCONNECTION
SYSTEM IMPACT STUDY REPORT**

for integration of the proposed

20 MW [REDACTED] PROJECT

(GI PROJECT #756)

to the

IDAHO POWER COMPANY ELECTRICAL SYSTEM

in

ADA COUNTY, ID

for

[REDACTED]

Report v1.0

July 16, 2025

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Introduction

██████ has contracted with Idaho Power Company (Transmission Provider) to perform a Generator Interconnection System Impact Study (SIS) for the integration of the proposed 20 MW ██████ (the Project) at a single Point of Interconnection (POI) at 230kV at Idaho Power's ██████ station. The Project is located in Ada County, ID at approximately ██████. The Project is assigned Generation Interconnect (GI) queue number 756 (GI #756).

This report documents the basis for and the results of this SIS for the GI #756 Interconnection Customer. The report describes the study assumptions, the proposed Project, the determination of the Project interconnection requirements, and estimated costs for integration of the Project to the Transmission Provider's transmission system. This report satisfies the SIS requirements of the Idaho Power Tariff.

1.0 Study Assumptions

- As a Small Generating Facility, the Project is studied using Energy Resource Interconnection Service (ERIS).
- For ERIS, the Interconnection Customer's ability to inject its Small Generating Facility output beyond the Point of Interconnection (POI) will depend on the existing capacity of Transmission Provider's Transmission System at such time as a transmission service request is made that would accommodate such delivery. Transmission Service may require the construction of additional Network Upgrades.
- If Interconnection Customer wishes to interconnect its Small Generating Facility using Network Resource Interconnection Service (NRIS), it must do so under the Standard Large Generator Interconnection Procedures and execute the Standard Large Generator Interconnection Agreement.
- Senior-queued generator interconnection requests that were considered in this study are listed in Section 4.0. If any of these requests are withdrawn, the Transmission Provider reserves the right to restudy this request, and the results and conclusions could significantly change.
- Power flow analysis requires WECC base cases to reliably balance under peak load conditions the aggregate of generation in the local area, with the Generating Facility at full output, to the aggregate of the load in the Transmission Provider's Transmission System. However, Idaho Power's balancing authority area has proposed generation in the interconnection queue that far surpasses projected load. To reliably balance the power flow case, it is necessary to assume some portions of other resources are displaced by this Project's output in order to assess the impact of interconnecting this Project's generation and that some generation is being transferred regionally through the transmission system.
- Idaho Power will not mitigate thermal or voltage violations with remedial action schemes (RAS) in the generation interconnection process.
- The following Idaho Power planned system improvements were assumed in service. Any facility that has been determined to be contingent will be listed in Section 7 of this report.

- Boardman to Hemingway (B2H) 500kV transmission line (2027)
- 50% series capacitance compensation on the Kinport to Midpoint 345kV transmission line (2026)
- Midpoint Substation T502 500:345kV transformer (2026)
- Bowmont to Hemingway #2 230kV transmission line (2026)
- Bowmont to Hubbard 230kV transmission line (2026)
- Hemingway to Mayfield 500kV transmission line (2028)
- Mayfield to Midpoint 500kV transmission line (2030)

2.0 Description of Proposed Generating Project

The primary POI for the Project is at the [REDACTED] 230kV station with a maximum injection of 20 MW. The Project's Commercial Operation Date (COD) is [REDACTED].

Project Location	[REDACTED]
Generator Nameplate Rating	[REDACTED] MVA battery
Total Output Power Rating	20 MW to POI
Number and Type of Inverters	[REDACTED] inverters
Main Power Transformer	230kV/34.5kV/13.8kV [REDACTED] MVA @ 65°C Z= [REDACTED]
Rated Power Factor	0.95

Table 1. GI #756 Project Specifications

3.0 Protection and Control

For 230kV line protection, Idaho Power's System Protection Department utilizes permissive and line differential protection schemes integrated with digital communication infrastructure. Idaho Power will require optical ground wire (OPGW) in the static wire position for any gen-tie lines and fiber communication between co-located facilities. Interconnection Customer is responsible to provide communication infrastructure between Interconnection's Customer's 230kV collector substation and Idaho Power.

Studies indicate that there is adequate load and short circuit interrupting capability on the Transmission Provider's existing 230kV breakers after this Project is interconnected.

The proposed 230kV [REDACTED] transformer specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

Grounding requirements and acceptability criteria are found in Appendix A.

4.0 Description of Power Flow Cases

The WECC 2026 Light Spring and 2030 Heavy Summer operating cases serve as the Base Cases for the power flow analysis for this System Impact Study. The Base Cases have been modified to:

- increase power flow across the Transmission System to stress relevant transmission paths,
- include future Idaho Power transmission projects identified in Section 1.0 of this report,
- include senior-queued generation Interconnection Requests, their Interconnection Facilities, and their Network Upgrades, and
- Generating Facilities interconnected to Affected Systems that may have an impact on the Interconnection Requests in this Cluster Area.

The WECC 2030 Heavy Summer Operating base case was modified to represent a summer month with high west-to-east (eastbound) transfers across the Idaho-to-Northwest (Path 14) WECC path and Midpoint West internal path. The WECC 2030 Heavy Summer Operating base case was also modified to represent a summer month with high load and high generation.

The WECC 2026 Light Spring Operating base case was modified to represent a shoulder month condition with high east-to-west (westbound) transfers across the Idaho-to-Northwest (Path 14) WECC path and Midpoint West internal path.

5.0 Senior-Queued Interconnections

Idaho Power generation interconnection projects GI #551, GI #588, GI #590, GI #604, GI #605, GI #629, GI #632, GI #634, GI #636, GI #638, GI #639, GI #640, GI #657, GI #665, GI #666, GI #667, GI #669, GI #696, GI #704, GI #708, GI #710, GI #716, GI #723, and GI #724 are senior-queued projects in the affected area of Idaho Power's transmission system. Idaho Power studied the Project with all Network Upgrades for the identified senior-queued projects as in-service (potential contingent facilities). Any facility that has been determined to be contingent will be listed in Section 7 of this report.

Changes to senior-queued projects, including in-service date and withdrawal from the queue, may trigger a restudy associated with the Project.

6.0 POI Facilities

Listed below are the required transmission facilities to interconnect the Project at the POI.

The actual station layout and detailed equipment requirements will be determined in the Facilities Study should the Interconnection Customer choose to move to that study phase of the interconnection process. In Table 2 below, a summary is provided of the facilities and conceptual costs required to interconnect the Project to the Transmission Provider's transmission system.

Item of Work	Estimate
A generation interconnection and protection package at the POI with 1 new 230kV power circuit breaker and line terminal at the Substation, associated switches, protective relays, 3-phase potential transformers (PTs) and 3-phase current transformers (CTs), SCADA and remote connectivity	\$2,282,095
Contingency 30% ⁽¹⁾	\$684,629
Overheads ⁽²⁾	\$103,835
Total Conceptual-level Cost Estimate ⁽³⁾	\$3,070,559
<p>(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.</p> <p>(2) Overhead costs cover the indirect costs associated with the Project and are subject to change.</p> <p>(3) This cost estimate includes direct equipment, material, labor, and overheads as shown.</p>	

Table 2. Estimated GI #756 Project's POI Costs

Note the following regarding Table 2:

- These estimates do not include the cost of the customer's equipment/facilities or required communication circuits for SCADA, PMU, Protection, and metering.
- These costs assume the use of Idaho Power resources.
- These are non-binding conceptual level cost estimates that will be further refined upon the request and completion of the Facilities Study; final charges to the customer will be based on the actual construction costs incurred.
- These costs include both Interconnection Facilities (direct assigned) and Network Resources (reimbursable). These costs will be explicitly broken out in the Facilities Study.

The schedule for designing, procuring, and constructing facilities will be developed and optimized during the Facilities Study should the Interconnection Customer choose to move to that study phase of the interconnection process.

7.0 System Upgrades

Studies discovered no overloads in the power flow cases and no Network Upgrades or contingent facilities are required for the Project.

8.0 Voltage

A Voltage Stability study was performed using the WECC 2030 Heavy Summer case with Midpoint West west-to-east flows at 105% of the path rating and the WECC 2030 Light Summer case with Midpoint West east-to-west flows at 105% of the path rating. All contingencies solved successfully; there were no voltage stability issues found for the Project.

The Project will be required to control voltage in accordance with a voltage schedule as provided by Idaho Power's Load Serving Operations. The Project will be required to manage the real

power output of their generation project at the POI. Also, it may be beneficial for the Interconnection Customer, for their own modeling compliance requirements, to install additional PMU devices at their facilities to monitor the generation source.

9.0 Transient Stability Analysis

The WECC 2030 Heavy Summer operating case and PowerWorld Simulator version 24 analysis tool were used to perform the transient stability analysis.

The results showed no transient stability violations. Per NERC Reliability Standards, the Generator Owner is responsible to ensure the modeling data utilized accurately reflects inverter operations, and to provide updates to Idaho Power if testing or real-time observations indicate a need.

10.0 Description of Operating Requirements

The Project will be required to control voltage in accordance with a voltage schedule as provided by Idaho Power Load Serving Operations. The Project will be required to manage the real power output of their Generating Facilities at the POI. The Project will be required to provide reactive power versus real power capability measured at the high side of the main power transformer that complies with IEEE 2800.

The Project is required to comply with the applicable Voltage and Current Distortion Limits found in IEEE Standard 519-2014 *IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems* or any subsequent standards as they may be updated from time to time.

Installation of phasor measurement unit devices at the POI and maintenance costs associated with communication circuits needed to stream PMU data will also be required to be provided to interconnect the Project. The specific costs associated with the Idaho Power requirements for Interconnection Customers with aggregate facilities larger than 20 MW to provide PMU data to Idaho Power will be identified in the Facilities Study should the Interconnection Customer choose to proceed to that phase of the interconnection process. Also, it may be beneficial for the Interconnection Customer, for their own modeling compliance requirements, to install additional PMU devices at their facilities to monitor the generations sources separately.

11.0 Conclusion

Interconnection requirements detailed in Section 6.0 totaling \$3,070,559 are required to interconnect the Project at the POI. There are no additional upgrades or contingent facilities required by the Project.

APPENDIX A

A-1.0 Method of Study

The power flow case for the System Impact Study is built using Western Electricity Coordinating Council (WECC) power flow cases as a Base Case in Power World Simulator. The Base Cases are then modified to include the senior-queued generation Interconnection Requests identified in Section 5.0 and their respective Network Upgrades and Interconnection Facilities. The Interconnection Request being studied is then added to the cases with the model provided by the Interconnection Customer at the requested MW injection at the agreed-upon POI. The Base Cases are then rebalanced such that the applicable WECC transmission paths are at their WECC path rating with reasonable pre-contingency energy transfers utilizing the Idaho Power Transmission System. The power flow model is then analyzed using P1, P2, and P7 category contingencies contained in Table 1 of NERC standard TPL-001. WECC and Idaho Power reliability criteria are applied to the results of the contingency analysis and any violations are mitigated with Network Upgrades or Contingent Facilities.

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 (P-0) 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. These state, 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 while starting or stopping the generator is limited to 5% as measured at the POI, 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, or Path ratings used will be those that are in use at the time of the study or that are represented by Idaho Power 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 POI.

A-4.0 Electrical System Protection Guidance

IPC requires electrical system protection per Facility Connection Requirements found on the Idaho Power website,

<https://docs.idahopower.com/pdfs/BusinessToBusiness/FacConnReq.pdf>

A-5.0 WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Requirements

IPC requires frequency operational limits to adhere to WECC Under-frequency and Over-frequency Limits per the WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Requirements available upon request.

Revision History

Date	Revision	Initials	Summary of Changes
07/16/2025	1.0	SWL	System Impact Study Report issued.