Cluster 1

Cluster Area 2 Restudy Report

June 04, 2026

Report v2.0

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1. Study Overview

1.1 Introduction

Following issuance of the Cluster 1 Cluster Area 2 (C1CA2) Study Report on November 14, 2025, equally queued Generation Interconnection (GI) Requests in C1CA2—GI #764, GI #768, and GI #769—were withdrawn from Idaho Power's (IPC) GI queue. This withdrawal resulted in a Cluster Restudy of C1CA2. C1CA2 is generally described as the Midpoint to Borah West area and includes the following Interconnection Request: GI #770. Interconnection Requests within C1CA2 have proposed a total of 56 megawatts (MW) of new generation.

In accordance with Section 7.3 of Transmission Provider's (hereinafter referred to as Idaho Power) Large Generator Interconnection Procedures (LGIP), this Cluster 1 Study (Cluster Study) evaluated the impact of the proposed generation interconnections (GI) on the reliability of Idaho Power's Transmission System. The Cluster Study considered the Base Case as well as all Generating Facilities—and with respect to (iii) below, any identified Network Upgrades associated with such Generating Facilities—that, on the date the Cluster Study is commenced:

- (i) are directly interconnected to the Transmission System;
- (ii) are interconnected to Affected Systems and may have an impact on the Interconnection Request;
- (iii) have a pending higher queued Interconnection Request to interconnect to the Transmission System; and
- (iv) have no Queue Position but have executed a Large Generator Interconnection Agreement (LGIA) or requested that an unexecuted LGIA be filed with FERC.

1.2 Study Assumptions

- Generation Interconnection Requests GI #558 and GI #633 are higher-queued Interconnection Requests in the affected area of Idaho Power's Transmission System. Idaho Power studied this Cluster Area with all Network Upgrades for the identified higher-queued Interconnection Requests as in-service. Changes to higher-queued Interconnection Requests, including in-service date and withdrawal from Idaho Power's GI queue, may trigger a restudy of this Cluster Area, and the results and conclusions could significantly change.

- Generation Interconnection Requests GI #758, GI #759, GI #760, GI #763, GI #767, GI #770, GI #771, GI #772, GI #773, GI #776, GI #777, GI #782, GI #785, GI #786, GI #788, GI #790, GI #792, and GI #793 are equally queued Interconnection Requests in Idaho Power's Cluster Study. Changes to equally queued Interconnection Requests within the Cluster Study, including in-service date and withdrawal from the queue, may trigger a restudy of this Cluster Area, and the results and conclusions could significantly change.

- Neither Network Resource Interconnection Service (NRIS) nor Energy Resource Interconnection Service (ERIS) convey transmission service.

- 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 Facilities at full output, to the aggregate of the load in Idaho Power's Transmission System. However, Idaho Power's Balancing Authority Area has proposed generation in the GI queue that far surpasses projected load. Based on the volume of proposed generation in the GI queue generation is being transferred regionally through the Transmission System and some potential resources are being displaced by the current Interconnection Requests under study. Changes to the assumptions needed to balance the power flow case with respect to the level of proposed interconnection generation may trigger a restudy of this Cluster Area, and the results and conclusions could significantly change.

- The Most Severe Single Contingency (MSSC) is the balancing contingency event, due to a single contingency, that results in the greatest loss (measured in MW) of resource output used by the Balancing Authority at the time of the event to meet firm system load and export obligation. An NRIS Interconnection Request greater than the MSSC must mitigate single contingencies that would result in the loss of the Interconnection Request. This includes, but is not limited to, single contingencies in the Interconnection Customer's Interconnection Facilities.

- Idaho Power will not mitigate thermal or voltage violations with remedial action schemes (RAS) in the GI process.

- Interconnection Requests interconnecting at new greenfield stations (Transmission Provider Interconnection Facilities) will require primary and/or secondary local distribution service be constructed to feed the station. The scope and cost of these potential distribution facilities are not contemplated in this study and will be analyzed in the Interconnection Facilities Study, as applicable.

- Telecommunication requirements are not fully contemplated in this study and could require significant upgrades, up to and including line rebuilds to accommodate optical ground wire (OPGW), for example. Telecommunication requirements identified during the Interconnection Facilities Study could impact the estimated cost of the project included in this report.

- 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 5 of this report.
    - 50% series capacitance compensation on the Kinport to Midpoint 345 kV transmission line (2026)
    - Midpoint Substation T502 500:345 kV transformer (2026)
    - Bowmont to Hemingway #2 230 kV transmission line (2026)
    - Bowmont to Hubbard 230 kV transmission line (2026)
    - Pronghorn 138kV substation (2026)

- Boardman to Hemingway (B2H) 500 kV transmission line (2027)
- Kramer to Pingree 138kV transmission line (2027)
- Mayfield to Pleasant Valley Solar 230kV transmission line (2028)
- Loop Boise Bench to Midpoint #2 230kV transmission line in-and-out of Mayfield 230kV station (2028)
- Hemingway to Mayfield 500 kV transmission line (2028)
- Bennett Mountain to Danskin to Rattlesnake three-terminal 230kV transmission line (2029)
- Southwest Intertie Project – North (SWIP-N) 500kV transmission line (2029)
- Loop Boise Bench to Midpoint #3 230kV transmission line in-and-out of Rattlesnake 230kV station (2030)
- Mayfield to Midpoint 500kV transmission line (2030)

1.3 Power Flow Case Description

The WECC 2026 Light Spring and 2030 Heavy Summer cases serve as the Base Cases for the power flow and transient stability analysis for this Cluster 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,
- include higher-queued generation Interconnection Requests, their Interconnection Facilities, and their Network Upgrades in accordance with Section 7.3 of Idaho Power's LGIP, and
- include Generating Facilities interconnected to Affected Systems that may have an impact on the Interconnection Requests in this Cluster Area.

The WECC 2030 Heavy Summer base case was modified to represent a summer month with high west-to-east (eastbound) transfers across the Borah West (Path 17) WECC path. The WECC 2030 Heavy Summer base case was also modified to represent a summer month with high load and high generation.

The WECC 2026 Light Spring base case was modified to represent a shoulder month condition with high east-to-west (westbound) transfers across the Borah West (Path 17) WECC path.

2. Cluster Area

Idaho Power performed the Cluster Study based on geographically and/or electrically relevant areas on Idaho Power's Transmission System known as Cluster Areas. Idaho Power has determined that the Interconnection Requests described below are in a geographically and/or electrically relevant area on Idaho Power's Transmission System and thus were assigned Cluster Area 2 (CA2) in this Cluster Study.

CA2 is generally described as Idaho Power's Transmission System in the Midpoint to Borah West area. This Cluster Area consists of the Interconnection Requests described below.

2.1 GI #770 Description

Interconnection Customer has proposed to interconnect 56 MW of solar and energy storage generation to Idaho Power's Paul 138 kV substation located in Minidoka County, Idaho. The requested COD is December 15, 2029.

Interconnection Customer will NOT operate this generator as a Qualified Facility as defined by PURPA.

The Interconnection Request will be studied for NRIS.

3. Interconnection Facilities and Upgrades

3.1 Transmission Provider's Interconnection Facilities

Transmission Provider's Interconnection Facilities (hereinafter referred to as Idaho Power's Interconnection Facilities) are defined in Section 1 of Idaho Power's LGIP as all facilities and equipment owned, controlled, or operated by Idaho Power from the Point of Change of Ownership (POCO) to the POI, including any modifications, additions, or upgrades to such facilities or equipment. In accordance with Section 4.2.1 of Idaho Power's LGIP, costs for Idaho Power's Interconnection Facilities are directly assigned to Interconnection Customer.

Listed below are Idaho Power's Interconnection Facilities required to interconnect the generation Interconnection Requests at their respective requested POIs.

3.1.1 GI #770 Interconnection Facilities

- One (1) 138 kV power circuit breaker
- Two (2) 138 kV disconnect switches
- Meter, dead-end structure, 3-phase PTs, 3-phase CTs, foundations, and cabling
- The last span of the Project's gen-tie line, including insulators, conductor, and associated hardware

3.2 Substation Network Upgrades

Substation Network Upgrades are defined in Section 1 of Idaho Power's LGIP as Network Upgrades that are required at the substation located at the POI; this includes all switching stations. In accordance with Section 4.2.1(a) of Idaho Power's LGIP, costs for Substation Network Upgrades are allocated per capita to each Generating Facility interconnecting at the same substation.

Listed below are the required Substation Network Upgrades required to interconnect the Projects at their respective POIs.

3.2.1 GI #770 Substation Network Upgrades

XXXX

Figure 4 GI #770 Point of Interconnect at Paul Substation

- **Replace Terminal at XXXX Substation**
  Replace 103T switch at XXXX Substation with a circuit breaker to terminate the three terminal XXXX transmission line. One (1) 138 kV line bay, one (1) 138 kV power circuit breaker, two (2) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA.

3.3 System Network Upgrades

System Network Upgrades are defined in Section 1 of Idaho Power's LGIP as Network Upgrades that are required beyond the substation located at the POI. In accordance with Section 4.2.1(b) of Idaho Power's LGIP, costs for each specific System Network Upgrades are allocated based on proportional impact of each individual Generating Facility in the Cluster Study.

There are no required System Network Upgrades for C1CA2.

3.4 Battery Charging

The energy storage system (ESS) component of each Interconnection Request was studied charging from the grid in an unstressed case and limited local area N-1 contingency analysis. There may be times during the year where system load in the local area will prevent charging of the ESS from the grid at full capacity; for example, a forced outage that would require Idaho Power to curtail grid charging. Should the Generating Facility require non-curtailable grid charging, firm Point-to-Point transmission service from the energy market/source to the ESS would be required.

If Interconnection Customer does not intend to charge the ESS portion of the project from the grid, Interconnection Customer must notify Idaho Power of this election in writing prior to the closure of the thirty (30) Calendar Day comment period on the Cluster Study Report, if not previously requested, and the results of the charging study will not be included in the scope of the Interconnection Facilities Study. Interconnection Customer will be required to demonstrate operating procedures and control measures that prevent the ESS from grid charging. Additionally, Idaho Power shall enable a relay setting at the POI to trip the ESS if grid-charging is detected.

No additional upgrades are required to support charging the ESS from the grid for any of the CA2 Interconnection Requests.

3.5 Cost Estimates[1]

The below cost estimates include a 30% contingency and current overhead rates, which are subject to change.

<u>GI #770</u>	
Interconnection Facilities	$1,616,724
Substation Network Upgrades	$1,862,081
System Network Upgrades	$0
	Total Cost: $3,478,805

3.6 Estimated Time to Construct

Based on the identified scope of work for this CA2, Idaho Power's non-binding, good-faith estimate of time to construct is a minimum of 4–5 years from LGIA execution, funding, and notice to proceed (Project Initiation). A detailed and refined timeline will be provided for each Interconnection Request in the Interconnection Facilities Study Report.

4. Contingent Facilities and Affected Systems

Contingent Facilities are defined in Section 1 of Idaho Power's LGIP as those unbuilt Interconnection Facilities and Network Upgrades upon which the Interconnection Request's costs, timing, and study findings are dependent, and if delayed or not built, could cause a need for restudies of the Interconnection Request or a reassessment of the Interconnection Facilities and/or Network Upgrades and/or costs and timing.

There are no Contingent Facilities for C1CA2.

5. Transient Stability Analysis

The WECC 2026 Light Spring case, WECC 2030 Heavy Summer case, and PowerWorld Simulator version 24 Transient Stability analysis tool were used to perform the transient stability analysis.

The results showed no transient stability violations. Per NERC 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.

6. Voltage Stability Analysis

A Voltage Stability analysis was performed using the WECC 2030 Heavy Summer case with Midpoint to Borah West West-to-East flows at 105% of their path ratings and the WECC 2026

[1] Cost estimates do not include Distribution Upgrades. At a minimum, new stations will require station service, which is typically provided by a distribution circuit extension from a nearby distribution line. Distribution Upgrades will be identified and detailed in the Facilities Study for any projects proceeding to that phase.

Light Spring case with Midpoint to Borah West East-to-West flows at 105% of their path ratings. All contingencies solved successfully; there were no voltage stability issues found for the Project.

The Generating Facilities will be required to control voltage in accordance with a voltage schedule as provided by Idaho Power's Load Serving Operations. Interconnection Customers will be required to manage the real power output of their Generating Facilities at the POI.

7. Protection and Control

7.1 GI #770 Protection and Control

For 138 kV line protection, Idaho Power's System Protection Department utilizes permissive and line differential protection schemes integrated with digital communication infrastructure. Idaho Power will require 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 138 kV collector substation and Idaho Power.

Studies indicate that there is adequate load and short circuit interrupting capability on the Transmission Provider's existing 138 kV breakers after this Project is interconnected.

The proposed 138 kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformer specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

8. Description of Operating Requirements

Generating Facilities will be required to control voltage in accordance with a voltage schedule as provided by Idaho Power's Load Serving Operations. Interconnection Customers will be required to manage the real power output of their Generating Facilities at the POI. Projects 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 Standard 2800 *IEEE Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems*, or any subsequent standards as they may be updated from time to time.

Projects are required to comply with the applicable Voltage and Current Distortion Limits found in IEEE Standard 2800 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 Generating Facilities. 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 Interconnection Facilities Study should Interconnection Customer choose to proceed to that phase of the GI process. Also, it may be beneficial for Interconnection Customers, for their own modeling compliance requirements, to install additional PMU devices at their facilities to monitor the generation's sources separately.

9. Total Cost Summary

The cost estimates below are allocated in accordance with Section 4.2.1 of Idaho Power's LGIP. The total ERIS and NRIS cost estimates include the costs associated with Idaho Power's Interconnection Facilities, Substation Network Upgrades, and System Network Upgrades required for Energy Resource Interconnection Service or Network Resource Interconnection Service, including those facilities identified as necessary for grid-charging any ESS components.

GI #770	
Total Cost	**$3,478,805**

Appendices

A-1 Method of Study

The power flow case for the Cluster 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 1.2 and their respective Network Upgrades and Interconnection Facilities. The Interconnection Requests being studied are then added to the cases with the model provided by the Interconnection Customers 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 (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 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 2800 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 Grounding Guidance

Idaho Power requires interconnected transformers on the distribution system to limit their ground fault current to 20 amps at the POI.

A-4 Electrical System Protection Guidance

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

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

A-5 WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Requirements

Idaho Power 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, which are available upon request.

A-6 Grid Enhancing Technology

The following technologies are considered when addressing voltage instability: static synchronous compensator, static VAR compensator, and synchronous condensers. Voltage instability was not found in the study.

The Transmission System interconnects all major generating stations and main load centers in the system. For reliable service, a bulk electric system must remain intact and be capable of withstanding a wide variety of disturbances. The integrated electric system is designed and operated such that the more probable contingencies can be endured with no loss of load and the more adverse contingencies do not result in uncontrolled and widespread power outages. The need to modify the electric configuration of the system or apply transmission switching was not found in the study.

Voltage source converters are used to connect HVAC and HVDC systems. Idaho Power does not act as a Transmission Provider for HVDC systems.

Advanced conductors have a higher cost when compared to more traditional conductors. However, reconductoring with advanced conductors may be less expensive than building new transmission lines. The need to modify the conductors used in an existing line, or rebuild a line, was found in the study. The use of advanced conductors would mitigate violations identified in this study. Existing structures are steel poles. The existing steel pole structures may be capable of supporting a reconductor with advanced conductor, however, an advanced conductor solution is not more cost effective than using traditional conductors.

Power flow control devices are considered when a transmission element is overloaded and would benefit from a redistribution of flow. This can be accomplished through series reactors, series capacitors, or an equivalent technology. Power flow control devices were evaluated in this study and were identified as upgrades.

Raising lattice tower heights to provide more clearance may facilitate reconductoring a transmission line instead of rebuilding the transmission line. Tower lifting was not identified as a potential solution in this study because there are no lattice towers on existing transmission lines identified as needing to be rebuilt.

Revision History

Date	Author	Revisions
11/14/2025	Linnea Gentry	Cluster 1 Cluster Area 2 Study Report version 1.0 issued.
11/18/2025	Linnea Gentry	Revision to fix GI #764 costs
06/04/2026	Patrick Perry	Restudy, withdrawal of GI 764, GI 768, GI 769