Cluster 1

Cluster Area 4 Study Report

November 26, 2025

Report v2.0

Table of Contents

1. Study Overview

1.1 Introduction

Cluster Area 4 (CA4) is generally described as the Midpoint to Treasure Valley area and includes the following Interconnection Requests: GI #758, GI #759, GI #760, GI #761, GI #762, GI #765, GI #767, GI #772, GI #773, GI #776, GI #777, GI #778, GI #779, GI #786, GI #787, GI #789, GI #791, GI #792, and GI #793. Interconnection Requests within CA4 have proposed a total of 4,574 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 #551, GI #588, GI #590, GI #604, GI #605, GI #629, GI #632, GI #634, GI #636, 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 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 #761, GI #762, GI #763, GI #764, GI #765, GI #767, GI #768, GI #769, GI #770, GI #771, GI #772, GI #773, GI #774, GI #775, GI #776, GI #777, GI #778, GI #779, GI #781, GI #782, GI #785, GI #786, GI #787, GI #788, GI #789, GI #790, GI #791, 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 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)
- Boardman to Hemingway (B2H) 500kV 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 500kV transmission line (2028)
- Bennett Mountain to Danskin to Rattlesnake 3-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 Idaho-to-Northwest (Path 14) WECC path and Midpoint West internal 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 Idaho-to-Northwest (Path 14) WECC path and Midpoint West internal 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 CA4 in this Cluster Study.

CA4 is generally described as Idaho Power's Transmission System in the Midpoint to Treasure Valley area. This Cluster Area consists of the Interconnection Requests described below.

2.1 GI #758 Description

Interconnection Customer has proposed to interconnect 167 MW of reciprocating internal combustion engine generation to Idaho Power's Bennett Mountain Switchyard 230kV substation located in Elmore County, Idaho. The requested Commercial Operation Date (COD) is October 1, 2028.

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

The Interconnection Request will be studied for NRIS.

2.2 GI #759 Description

Interconnection Customer has proposed to interconnect 500 MW of natural gas combustion turbine generation to Idaho Power's Danskin to Pleasant Valley Solar 230kV transmission line located in Elmore County, Idaho. The requested COD is April 1, 2030.

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

The Interconnection Request will be studied for NRIS.

2.3 GI #760 Description

Interconnection Customer has proposed to interconnect 526 MW of natural gas combustion turbine generation to Idaho Power's Danskin to Pleasant Valley Solar 230kV transmission line located in Elmore County, Idaho. The requested COD is April 1, 2030.

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

The Interconnection Request will be studied for NRIS.

2.4 GI #761 Description

Interconnection Customer has proposed to interconnect 250 MW of battery storage generation to Idaho Power's Bennett Mountain Switchyard 230kV substation located in Elmore County, Idaho. The requested COD is January 6, 2029.

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

The Interconnection Request will be studied for NRIS.

2.5 GI #762 Description

Interconnection Customer has proposed to interconnect 402 MW of hybrid solar and battery storage generation to Idaho Power's Hemingway to Midpoint 500kV transmission line located in Elmore County, Idaho. The requested COD is May 1, 2030.

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

The Interconnection Request will be studied for NRIS.

2.6 GI #765 Description

Interconnection Customer has proposed to interconnect 485 MW of hybrid solar and battery storage generation to Idaho Power's Hemingway to Midpoint 500kV transmission line located in Ada County, Idaho. The requested COD is May 1, 2030.

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

The Interconnection Request will be studied for NRIS.

2.7 GI #767 Description

Interconnection Customer has proposed to interconnect 50 MW of battery storage generation to Idaho Power's Boise Bench 138kV substation located in Ada County, Idaho. The requested COD is June 1, 2026.

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

The Interconnection Request will be studied for NRIS.

2.8 GI #772 Description

Interconnection Customer has proposed to interconnect 300 MW of hybrid solar and battery storage generation to Idaho Power's future Mayfield 500kV substation located in Elmore County, Idaho. The requested COD is January 24, 2030.

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

The Interconnection Request will be studied for NRIS.

2.9 GI #773 Description

Interconnection Customer has proposed to interconnect 130 MW of hybrid solar and battery storage generation to Idaho Power's future GI #669 230kV substation on the Boise Bench to Chip 230kV transmission line located in Ada County, Idaho. The requested COD is January 24, 2030.

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

The Interconnection Request will be studied for NRIS.

2.10 GI #776 Description

Interconnection Customer has proposed to interconnect 190 MW of battery storage generation to Idaho Power's Zilog 138kV substation located in Canyon County, Idaho. The requested COD is June 1, 2028.

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

The Interconnection Request will be studied for NRIS.

2.11 GI #777 Description

Interconnection Customer has proposed to interconnect 190 MW of battery storage generation to Idaho Power's Hill 138kV substation located in Canyon County, Idaho. The requested COD is June 1, 2028.

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

The Interconnection Request will be studied for NRIS.

2.12 GI #778 Description

Interconnection Customer has proposed to interconnect 190 MW of battery storage generation to Idaho Power's Hemingway 230kV substation located in Owyhee County, Idaho. The requested COD is December 31, 2031.

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

The Interconnection Request will be studied for NRIS.

2.13 GI #779 Description

Interconnection Customer has proposed to interconnect 60 MW of hybrid solar and battery storage generation to Idaho Power's Hawk 138kV substation located in Ada County, Idaho. The requested COD is October 1, 2030.

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

The Interconnection Request will be studied for NRIS.

2.14 GI #786 Description

Interconnection Customer has proposed to interconnect 199 MW of hybrid solar and battery storage generation to Idaho Power's future GI #708 230kV substation on the Cole to Pleasant Valley Solar 230kV transmission line located in Ada County, Idaho. The requested COD is October 1, 2028.

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

The Interconnection Request will be studied for ERIS.

2.15 GI #787 Description

Interconnection Customer has proposed to interconnect 70 MW of solar generation to Idaho Power's Mountain Home Junction #1 138kV substation located in Elmore County, Idaho. The requested COD is December 1, 2028.

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

The Interconnection Request will be studied for NRIS.

2.16 GI #789 Description

Interconnection Customer has proposed to interconnect 150 MW of battery storage generation to Idaho Power's Hawk 138kV substation located in Ada County, Idaho. The requested COD is May 4, 2029.

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

The Interconnection Request will be studied for NRIS.

2.17 GI #791 Description

Interconnection Customer has proposed to interconnect 135 MW of hybrid solar and battery storage generation to Idaho Power's Sinker Creek 138kV substation located in Owyhee County, Idaho. The requested COD is September 10, 2029.

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

The Interconnection Request will be studied for NRIS.

2.18 GI #792 Description

Interconnection Customer has proposed to interconnect 330 MW of battery storage generation to Idaho Power's future Mayfield 230kV substation located in Elmore County, Idaho. The requested COD is December 31, 2029.

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

The Interconnection Request will be studied for NRIS.

2.19 GI #793 Description

Interconnection Customer has proposed to interconnect 250 MW of hybrid solar and battery storage generation to Idaho Power's future GI #708 230kV substation on the Cole to Pleasant Valley Solar 230kV transmission line located in Ada County, Idaho. The requested COD is December 31, 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 #758 Interconnection Facilities

- One (1) 230kV disconnect switch
- Meter, dead-end structure, 3-phase potential transformers (PTs), 3-phase current transformers (CTs), foundations, and cabling
- The last span of the Project's gen-tie line, including insulators, conductor, and associated hardware

3.1.2 GI #759 Interconnection Facilities

- Two (2) 230kV power circuit breakers

- Five (5) 230kV 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

3.1.3 GI #760 Interconnection Facilities

- Four (4) 230kV power circuit breakers
- Nine (9) 230kV 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

3.1.4 GI #761 Interconnection Facilities

- One (1) 230kV power circuit breaker
- Two (2) 230kV 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

3.1.5 GI #762 Interconnection Facilities

- One (1) 500kV disconnect switch
- 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

3.1.6 GI #765 Interconnection Facilities

- One (1) 500kV disconnect switch
- 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

3.1.7 GI #767 Interconnection Facilities

- Contingent on GI #639 terminal addition and gen-tie line at Boise Bench 138kV Station

3.1.8 GI #772 Interconnection Facilities

- One (1) 500kV disconnect switch
- 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

3.1.9 GI #773 Interconnection Facilities

- Contingent on GI #669 230kV POI Station construction and gen-tie line

3.1.10 GI #776 Interconnection Facilities

- One (1) 138kV power circuit breaker
- Two (2) 138kV 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

3.1.11 GI #777 Interconnection Facilities

- One (1) 138kV power circuit breaker
- Two (2) 138kV 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

3.1.12 GI #778 Interconnection Facilities

- One (1) 230kV disconnect switch
- 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

3.1.13 GI #779 Interconnection Facilities

- One (1) 138kV power circuit breaker
- Two (2) 138kV 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

3.1.14 GI #786 Interconnection Facilities

- One (1) 230kV disconnect switch
- 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

3.1.15 GI #787 Interconnection Facilities

- One (1) 138kV disconnect switch
- 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

3.1.16 GI #789 Interconnection Facilities

- One (1) 138kV power circuit breaker
- Two (2) 138kV 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

3.1.17 GI #791 Interconnection Facilities

- One (1) 138kV power circuit breaker
- Two (2) 138kV 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

3.1.18 GI #792 Interconnection Facilities

- One (1) 230kV disconnect switch
- 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

3.1.19 GI #793 Interconnection Facilities

- One (1) 230kV disconnect switch
- 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 Substation Network Upgrades required to interconnect the Projects at their respective requested POIs.

3.2.1 GI #758 & GI #761 Substation Network Upgrades

[redacted]

Figure 1 GI #758 & GI #761 Point of Interconnection

- **New Terminal at Bennett Mountain Substation**
  Two generation interconnection and protection packages at the Bennett Mountain 230kV substation with one (1) 230kV line bay and one (1) 230kV power circuit breakers, two (2) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity. The additional breaker and line bay in Figure 1 are included as Transmission Provider's Interconnection Facilities.

3.2.2 GI #759 & GI #760 Substation Network Upgrades

[redacted]

Figure 2 GI #759 & GI #760 Point of Interconnection

- **New GI #759 & GI #760 POI Substation**
  Two generation interconnection and protection packages at the new 230kV POI substation with two (2) 230kV line bays and three (3) 230kV power circuit breakers, six (6) switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity. Additional breakers and line bays in Figure 2 are included as Transmission Provider's Interconnection Facilities and System Network Upgrades.

3.2.3 GI #762 Substation Network Upgrades

[redacted]

Figure 3 GI #762 Point of Interconnection

- **New GI #762 POI Substation**
  A generation interconnection and protection package at the new 500kV POI substation with three (3) 500kV line bays and six (6) 500kV power circuit breakers, seventeen (17) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

- **Series Capacitor at GI #762 POI**
  Install a new [redacted]-Ohm series capacitor at the new 500kV POI substation on the [redacted] 500kV transmission line.

3.2.4 GI #765 Substation Network Upgrades

[redacted]

Figure 4 GI #765 Point of Interconnection

- **New GI #765 POI Substation**
  A generation interconnection and protection package at the new 500kV POI substation

with three (3) 500kV line bays and six (6) 500kV power circuit breakers, seventeen (17) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

- **Series Capacitor at GI #765 POI**
  Install a new [redacted]-Ohm series capacitor at the new 500kV POI substation on the [redacted] 500kV transmission line.

3.2.5 GI #767 Substation Network Upgrades

[redacted]

Figure 5 GI #767 Point of Interconnection

- **Contingent on GI #639 Terminal Addition at Boise Bench 138kV Station**

3.2.6 GI #772 Substation Network Upgrades

[redacted]

Figure 6 GI #772 Point of Interconnection

- **New Terminal at Mayfield Substation**
  A generation interconnection and protection package at the future Mayfield 500kV substation with two (2) 500kV power circuit breakers and line terminals, four (4) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

3.2.7 GI #773 Substation Network Upgrades

[redacted]

Figure 7 GI #773 Point of Interconnection

- **Contingent on GI #669 230kV POI Station Construction**

3.2.8 GI #776 Substation Network Upgrades

[redacted]

Figure 8 GI #776 Point of Interconnection

- **New GI #776 POI Substation (Zilog POI)**
  A generation interconnection and protection package at the new 138kV POI substation with three (3) 138kV line bays and three (3) 138kV power circuit breakers, six (6) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

3.2.9 GI #777 Substation Network Upgrades

[redacted]

Figure 9 GI #777 Point of Interconnection

- **Three New Terminals at Hill Substation**
  A generation interconnection and protection package at the Hill 138kV substation with three (3) 138kV line bays and three (3) 138kV power circuit breakers, six (6) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

3.2.10 GI #778 Substation Network Upgrades

[redacted]

Figure 10 GI #778 Point of Interconnection

- **New Terminal at Hemingway Substation**
  A generation interconnection and protection package at the Hemingway 230kV substation with one (1) 230kV line bay and two (2) 230kV power circuit breakers, four (4) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity. Additional breakers and line bays in Figure 10 are included as System Network Upgrades.

3.2.11 GI #779 & GI #789 Substation Network Upgrades

[redacted]

Figure 11 GI #779 & GI #789 Point of Interconnection

- **Four New Terminals at Hawk Substation**
  Two generation interconnection and protection packages at the Hawk 138kV substation with four (4) 138kV line bays and four (4) 138kV power circuit breakers, eight (8) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

3.2.12 GI #786 & GI #793 Substation Network Upgrades

[redacted]

Figure 12 GI #786 & GI #793 Point of Interconnection

- **Two New Terminals at GI #708 Substation**
  Redesign the future GI #708 230kV substation from ring bus to breaker-and-a-half. Add two generation interconnection and protection packages at the substation with two (2) new 230kV line bays and five (5) 230kV power circuit breakers, ten (10) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

3.2.13 GI #787 Substation Network Upgrades

[redacted]

Figure 13 GI #787 Point of Interconnection

- **New Terminal at Mountain Home Junction #1 Substation**
  Complete the ring bus and add one generation interconnection and protection package at

the Mountain Home Junction #1 138kV substation with one (1) 138kV line bay and two (2) 138kV power circuit breakers, four (4) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

3.2.14 GI #791 Substation Network Upgrades

[redacted]

Figure 14 GI #791 Point of Interconnection

- **Three New Terminals at Sinker Creek Substation**
  A generation interconnection and protection package at the Sinker Creek 138kV substation with three (3) 138kV line bays and three (3) 138kV power circuit breakers, six (6) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

3.2.15 GI #792 Substation Network Upgrades

[redacted]

Figure 15 GI #792 Point of Interconnection

- **New Terminal at Mayfield Substation**
  A generation interconnection and protection package at the Mayfield 230kV substation with one (1) 230kV line bay and one (1) 230kV power circuit breaker, two (2) disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.

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.

Listed below are the required System Network Upgrades.

- **Remove [redacted] 500kV Series Capacitor**
  Remove the series capacitor at the [redacted] Station on the [redacted] 500kV transmission line.
- **[redacted] RAS**
  Modify the [redacted] RAS to accommodate the new [redacted] and [redacted] substations.
- **Cut-in Line [redacted] to new GI #759/760 POI Substation**
- **Cut-in Line [redacted] to new GI #762 POI Substation**
- **Cut-in Line [redacted] to new GI #765 POI Substation**
- **Cut-in Line [redacted] to new GI #776 POI Substation**

- **Rebuild [redacted] 138kV Line as Double-Circuit**
  Rebuild [redacted]-mile 138kV line section as double-circuit with [redacted] conductor and steel poles with OPGW.
- **New [redacted] 230kV Line**
  Build a new [redacted]-mile 230kV transmission line from [redacted] to [redacted] station with [redacted] conductor and steel poles with OPGW. Install one new breaker and line terminal at [redacted] station and one new breaker and line terminal at [redacted] station, with associated disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.
- **New [redacted] 230kV Line**
  Build a new [redacted]-mile 230kV transmission line from [redacted] to [redacted] station with [redacted] conductor and steel poles with OPGW. Install one new breaker and line terminal at [redacted] station and one new breaker and line terminal at [redacted] station, with associated disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.
- **New 230kV Switchyard on [redacted] 230kV Line**
  Build a new 230kV ring bus station with three breakers and line terminals with associated disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity. Cut-in [redacted] 230kV line to the new 230kV Switchyard.
- **New [redacted] 230kV Line**
  Build a new [redacted]-mile 230kV transmission line from [redacted] to [redacted] with [redacted] conductor and steel poles with OPGW. Install one new breaker and line terminal at [redacted] station with associated disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.
- **New [redacted] 138kV Line**
  Build a new [redacted]-mile 138kV transmission line from [redacted] to [redacted] with [redacted] conductor and steel poles with OPGW. Install two new breakers and a line terminal at [redacted] station and a line terminal at [redacted] station, with associated disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity.
- **Rebuild [redacted] 138kV Line**
  Rebuild [redacted]-mile 138kV line with [redacted] conductor and steel poles with OPGW.
- **Rebuild [redacted] 230kV Line**
  Rebuild [redacted]-mile 230kV line with [redacted] conductor and steel poles with OPGW.
- **Rebuild [redacted] 230kV Line**
  Rebuild [redacted]-mile 230kV line with [redacted] conductor and steel poles with OPGW.
- **Rebuild [redacted] 138kV Line**
  Rebuild [redacted]-mile 138kV line section with [redacted] conductor and steel poles with OPGW.
- **New [redacted] 500/230kV Transformer**
  Install a [redacted] 500/230kV transformer.

- **Upgrade [redacted] 500/345kV Transformer**
  Upgrade Midpoint T501 500/345kV transformer from [redacted] MVA to [redacted] MVA.
- **New [redacted] 230kV Line Terminal at [redacted]**
  Install one new breaker and line terminal at [redacted] with associated disconnect switches, protective relays, 3-phase PTs, 3-phase CTs, and SCADA and remote connectivity. Move the [redacted] 230kV line to the new terminal at [redacted].
- **Upgrade [redacted] 138kV Line Rating**
  Replace a 138kV jumper at [redacted] and a 138kV jumper and bus tube at [redacted] to increase the overall rating of the [redacted] 138kV line.

Table 1 System Network Upgrades

Facility Description	Outage(s)	Cost Allocation		Cost Estimate[1]
Remove [redacted] 500kV Series Capacitor	[redacted]	GI762	45.3%	$405,600
		GI765	54.7%	
[redacted] RAS	[redacted]	GI762	45.3%	$135,200
		GI765	54.7%	
Cut-in Line [redacted] to new GI #759/760 POI Substation	[redacted]	GI759	48.7%	$1,705,475
		GI760	51.3%	
Cut-in Line [redacted] to new GI #762 POI Substation	[redacted]	GI762	100%	$6,494,443
Cut-in Line [redacted] to new GI #765 POI Substation	[redacted]	GI765	100%	$6,494,443
Cut-in Line [redacted] to new GI #776 POI Substation	[redacted]	GI776	100%	$1,815,706
Rebuild [redacted] 138kV Line as Double-Circuit	[redacted]	GI791	100%	$5,678,400
Rebuild [redacted] 138kV Line	[redacted]	GI791	100%	$13,741,389
Build new [redacted] 230kV Line	[redacted]	GI759	48.7%	$18,252,000
		GI760	51.3%	
Build new [redacted] 230kV Line	[redacted]	GI759	45.5%	$86,190,000
		GI760	47.8%	
		GI793	6.7%	
Build new 230kV Switchyard on [redacted] 230kV Line with new [redacted] 230kV Line	[redacted]	GI778	17.9%	$35,747,341
		GI779	14.6%	
		GI789	36.6%	
		GI791	24.6%	
		GI793	6.3%	
Build new [redacted] 138kV Line	[redacted]	GI791	100%	$44,867,680

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

Facility Description	Outage(s)	Cost Allocation		Cost Estimate[1]
Rebuild [redacted] 230kV Line	[redacted]	GI759	48.7%	$7,436,000
		GI760	51.3%	
Rebuild [redacted] 230kV Line	[redacted]	GI758	25.7%	$15,210,000
		GI759	17.4%	
		GI760	18.4%	
		GI761	38.5%	
Rebuild [redacted] 138kV Line	[redacted]	GI759	13.4%	$11,026,120
		GI760	14.1%	
		GI761	7.4%	
		GI779	15.9%	
		GI789	39.7%	
		GI792	9.5%	
Install new [redacted] 500/230kV Transformer	[redacted]	GI759	9.7%	$40,587,386
		GI760	10.3%	
		GI778	54.4%	
		GI789	14.9%	
		GI791	10.7%	
Upgrade [redacted] 500/345kV Transformer	[redacted]	GI762	22.3%	$16,224,000
		GI764[2]	27.2%	
		GI765	17.5%	
		GI768[2]	11.5%	
		GI769[2]	15.0%	
		GI772	6.5%	
New [redacted] 230kV Line Terminal at [redacted]	[redacted]	GI759	45.5%	$2,724,284
		GI760	47.8%	
		GI793	6.7%	
Upgrade [redacted] 138kV Line Rating	[redacted]	GI779	26.2%	$608,400
		GI789	65.5%	
		GI791	8.3%	

[2] GI764, GI768, and GI769 are in Cluster Area 2.

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 CA4 Interconnection Requests.

3.5 Cost Estimates[3]

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

GI #758	
Interconnection Facilities	$946,343
Substation Network Upgrades	$1,176,041
System Network Upgrades	$3,908,970
	Total Cost: $6,031,354

GI #759	
Interconnection Facilities	$2,706,530
Substation Network Upgrades	$12,826,517
System Network Upgrades	$61,857,638
	Total Cost: $77,390,685

GI #760	
Interconnection Facilities	$2,706,530
Substation Network Upgrades	$12,826,517
System Network Upgrades	$65,087,704
	Total Cost: $80,620,751

[3] 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.

<u>GI #761</u>

Interconnection Facilities	$1,863,516
Substation Network Upgrades	$1,176,041
System Network Upgrades	$6,671,783
	Total Cost: $9,711,340

<u>GI #762</u>

Interconnection Facilities	$2,422,224
Substation Network Upgrades	$92,294,529
System Network Upgrades	$10,357,377
	Total Cost: $105,074,130

<u>GI #765</u>

Interconnection Facilities	$2,422,224
Substation Network Upgrades	$69,435,372
System Network Upgrades	$9,629,460
	Total Cost: $81,487,057

<u>GI #767</u>

Interconnection Facilities	$0
Substation Network Upgrades	$0
System Network Upgrades	$0
	Total Cost: $0

<u>GI #772</u>

Interconnection Facilities	$2,045,861
Substation Network Upgrades	$15,076,821
System Network Upgrades	$1,054,560
	Total Cost: $18,177,243

<u>GI #773</u>

Interconnection Facilities	$0
Substation Network Upgrades	$0
System Network Upgrades	$0
	Total Cost: $0

<u>GI #776</u>

Interconnection Facilities	$1,542,251
Substation Network Upgrades	$11,432,743
System Network Upgrades	$1,815,706
	Total Cost: $14,790,700

GI #777

Interconnection Facilities	$1,410,195
Substation Network Upgrades	$7,391,147
System Network Upgrades	$0
	Total Cost: $8,801,343

GI #778

Interconnection Facilities	$937,429
Substation Network Upgrades	$3,259,929
System Network Upgrades	$28,478,312
	Total Cost: $32,675,670

GI #779

Interconnection Facilities	$1,484,614
Substation Network Upgrades	$1,832,872
System Network Upgrades	$7,131,666
	Total Cost: $10,449,151

GI #786

Interconnection Facilities	$904,273
Substation Network Upgrades	$10,132,396
System Network Upgrades	$0
	Total ERIS: $11,036,669

GI #787

Interconnection Facilities	$816,527
Substation Network Upgrades	$3,259,929
System Network Upgrades	$0
	Total Cost: $4,076,456

GI #789

Interconnection Facilities	$1,484,614
Substation Network Upgrades	$1,832,872
System Network Upgrades	$23,906,919
	Total Cost: $27,224,404

GI #791

Interconnection Facilities	$1,640,471
Substation Network Upgrades	$4,276,709
System Network Upgrades	$77,474,662
	Total Cost: $83,391,842

<u>GI #792</u>

Interconnection Facilities	$910,903
Substation Network Upgrades	$1,911,385
System Network Upgrades	$1,047,481
	Total Cost: $3,869,769

<u>GI #793</u>

Interconnection Facilities	$904,273
Substation Network Upgrades	$10,132,396
System Network Upgrades	$8,209,340
	Total Cost: $19,246,008

3.6 Estimated Time to Construct

Based on the identified scope of work for this CA4, 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.

Table 2 Contingent Facilities

Service	Assigned To	Facility Description	Outage	Planned ISD
ERIS	[redacted]	Build new line terminal at [redacted] 138kV Station	[redacted]	Q2 2026
ERIS	[redacted]	Build new [redacted] 230kV Station	[redacted]	Q1 2028
ERIS	[redacted]	Replace [redacted] series capacitor and reactor	[redacted]	Q2 2027
ERIS	[redacted]	Build new [redacted] 230kV Station	[redacted]	Q4 2028
ERIS	Idaho Power	Rebuild Bowmont–Mora 138kV	[redacted]	Q4 2026
NRIS	Idaho Power	Build new Bowmont–Hemingway #2 230kV	[redacted]	Q4 2025
NRIS	Idaho Power	Install Midpoint T502 500/345kV transformer	[redacted]	Q2 2026
NRIS	Idaho Power	Build new Bowmont–Hubbard 230kV	[redacted]	Q3 2026
NRIS	Idaho Power	Rebuild Mountain Air Wind Park–Rattlesnake 230kV	[redacted]	2026
NRIS	Idaho Power	Build B2H Project	[redacted]	2027
NRIS	Idaho Power	Build new Mayfield 500/230kV Station	[redacted]	2028

Service	Assigned To	Facility Description	Outage	Planned ISD
NRIS	Idaho Power	Build new Mayfield–Pleasant Valley Solar 230kV	[redacted]	2028
NRIS	Idaho Power	Loop Boise Bench–Midpoint #2 230kV in-and-out of Mayfield 230kV Station	[redacted]	2028
NRIS	Idaho Power	Build new Hemingway–Mayfield 500kV	[redacted]	2028
NRIS	Idaho Power	Build Bennett Mountain–Danskin–Rattlesnake 230kV 3-terminal line	[redacted]	2029
NRIS	Idaho Power	Loop Boise Bench–Midpoint #3 230kV in-and-out of Rattlesnake 230kV Station	[redacted]	2030
NRIS	Idaho Power	Build new Midpoint–Mayfield 500kV	[redacted]	2030
NRIS	[redacted]	Build new [redacted] 230kV	[redacted]	TBD
NRIS	[redacted]	Rebuild [redacted] 230kV	[redacted]	TBD

PacifiCorp has been identified as an Affected System for GI #762 and GI #765 and may conduct their own study which may have an impact on the Interconnection Customers' cost and timing to interconnect the Generating Facilities to Idaho Power's Transmission System.

5. Transient Stability Analysis

The WECC 2026 Light Spring 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 West and Idaho-to-Northwest West-to-East flows at 105% of their path ratings and the WECC 2026 Light Spring case with Midpoint West and Idaho-to-Northwest 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 #758 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 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 two (2) proposed 230kV Wye-Grounded/Delta with a Delta tertiary transformers specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

7.2 GI #759 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 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 two (2) proposed 230kV Wye-Grounded/Delta transformers specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

7.3 GI #760 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 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 two (2) proposed 230kV Wye-Grounded/Delta transformers specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

7.4 GI #761 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 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 two (2) proposed 230kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformers specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

7.5 GI #762 Protection and Control

For 500kV 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 500kV collector substation and Idaho Power.

Studies indicate that there is adequate load and short circuit interrupting capability on the Transmission Provider's existing 500kV breakers after this Project is interconnected.

The two (2) proposed 500kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformers specified in the Interconnection Request should provide an adequate ground return path for transmission line protection/relaying.

Since the Project is connecting on a series compensated line (Midpoint to Hemingway 500kV), a Sub-Synchronous Control Interaction (SSCI) study will be required. In addition to the SSCI, the Midpoint to Hemingway 500kV line is expected to operate with single-pole switching capability; thus, Interconnection Customer will be required to complete a switching study for this Interconnection Request. Both studies would be performed as LGIA milestones and may result in additional Network Upgrades.

7.6 GI #765 Protection and Control

For 500kV 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 500kV collector substation and Idaho Power.

Studies indicate that there is adequate load and short circuit interrupting capability on the Transmission Provider's existing 500kV breakers after this Project is interconnected.

The two (2) proposed 500kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformers specified in the Interconnection Request should provide an adequate ground return path for transmission line protection/relaying.

Since the Project is connecting on a series compensated line (Midpoint to Hemingway 500kV), an SSCI study will be required. In addition to the SSCI, the Midpoint to Hemingway 500kV line is expected to operate with single-pole switching capability; thus, Interconnection Customer will be required to complete a switching study for this Interconnection Request. Both studies would be performed as LGIA milestones and may result in additional Network Upgrades.

7.7 GI #767 Protection and Control

For 138kV 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 138kV collector substation and Idaho Power.

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

The proposed 138kV 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.

7.8 GI #772 Protection and Control

For 500kV 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 500kV collector substation and Idaho Power.

Studies indicate that there is adequate load and short circuit interrupting capability on the Transmission Provider's existing 500kV breakers after this Project is interconnected.

The two (2) proposed 500kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformers specified in the Interconnection Request should provide an adequate ground return path for transmission line protection/relaying.

Since the Project is connecting near series compensated lines (Midpoint to Mayfield 500kV and Hemingway to Mayfield 500kV), Interconnection Customer will be required to complete an SSCI study for this Interconnection Request. The SSCI study would be performed as an LGIA milestone and may result in additional Network Upgrades.

7.9 GI #773 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 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 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.

7.10 GI #776 Protection and Control

For 138kV 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 138kV collector substation and Idaho Power.

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

The proposed 138kV 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.

7.11 GI #777 Protection and Control

For 138kV 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 138kV collector substation and Idaho Power.

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

The proposed 138kV 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.

7.12 GI #778 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 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 two (2) proposed 230kV Wye-Grounded/Delta transformers specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

7.13 GI #779 Protection and Control

For 138kV 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 138kV collector substation and Idaho Power.

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

The proposed 138kV 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.

7.14 GI #786 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 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 two (2) proposed 230kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformers specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

7.15 GI #787 Protection and Control

For 138kV 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 138kV collector substation and Idaho Power.

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

The proposed 138kV 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.

7.16 GI #789 Protection and Control

For 138kV 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 138kV collector substation and Idaho Power.

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

The two (2) proposed 138kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformers specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

7.17 GI #791 Protection and Control

For 138kV 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 138kV collector substation and Idaho Power.

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

The proposed 138kV 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.

7.18 GI #792 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 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 two (2) proposed 230kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformers specified in the Project should provide an adequate ground return path for transmission line protection/relaying.

7.19 GI #793 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 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 two (2) proposed 230kV Wye-Grounded/Wye-Grounded with a Delta tertiary transformers 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 generations 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 #758
Total Cost $6,031,354

GI #759
Total Cost $77,390,685

GI #760
Total Cost $80,620,751

GI #761
Total Cost $9,711,340

GI #762
Total Cost $105,074,130

GI #765
Total Cost $81,487,057

GI #767
Total Cost $0

GI #772
Total Cost $18,177,243

GI #773
Total Cost $0

<u>GI #776</u>	
Total Cost	$14,790,700
<u>GI #777</u>	
Total Cost	$8,801,343
<u>GI #778</u>	
Total Cost	$32,675,670
<u>GI #779</u>	
Total Cost	$10,449,151
<u>GI #786</u>	
Total ERIS	$11,036,669
<u>GI #787</u>	
Total Cost	$4,076,456
<u>GI #789</u>	
Total Cost	$27,224,404
<u>GI #791</u>	
Total Cost	$83,391,842
<u>GI #792</u>	
Total Cost	$3,869,769
<u>GI #793</u>	
Total Cost	$19,246,008

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 wood poles and steel poles. Due to fire risk and age of existing wood pole transmission lines, advanced conductors are not an option. 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 new transmission lines.

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. They did not mitigate violations, rather they pushed violations to other locations. Therefore, power flow control devices were not identified as upgrades in this study.

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 feasible reconductor solution in this study.

Revision History

Date	Author	Version	Revisions
11/14/2025	Stephen Longmuir	1.0	Cluster 1 Cluster Area 4 Study Report issued.
11/26/2025	Stephen Longmuir	2.0	Fixed MYFD 211A contingency error and updated cost allocation for HMWY T502.