TRANSMISSION PLANNING

GENERATION INTERCONNECTION REPORT

2025 TRANSITION CLUSTER STUDY (TCS)

CLUSTER AREA: LOWER COLUMBIA 1, PHASE 1, Revision 0

(25TCS CA-LC1 P1-0)

G0699	G0728	G0768
G0787	G0791	G0795
G0797	G0825	G0838
G0839	G0849	G0850
G0864	G0865	G0866
G0867	G0941	G0946
G0972	G0974	G0989
G0994	G1002	G1041

January 2026

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1 Executive Summary

In 2025, Bonneville Power Administration (BPA) initiated the Transition Cluster Study (TCS) under the new Large Generator Interconnection Transition Process, Attachment R of BPA's Open Access Transmission Tariff (OATT).[1] BPA received 167 Transition Requests that were eligible to participate in the Transition Cluster Study with a total requested Interconnection Service level of approximately 61,100 MW.

This TCS Phase One Cluster Study (TCS PH1) report examines the feasibility and impact of interconnecting the proposed generation projects to BPA's transmission system. Requests in the Cluster Area were studied at the Points of Interconnection (POIs) according to table below. The generation type, requested MW of Interconnection Service level, project location, and requested Commercial Operation Date are also shown.

Cluster Area Lower Columbia 1 (LC1) is comprised of Interconnection Requests (IRs) in Wasco, Sherman, Gilliam and Morrow Counties in the state of Oregon. It includes 24 total IRs seeking a total combined 8,692 MW of Interconnection Service and 7,083 MW of grid-charging.

Table 1.1: 2025 TCS PH1 LC1 Participants

GI #	Gen Type	Studied POI	MW Requested (Generating)	MW Requested (Charging)	Plant Location (County, State)	Requested COD
G0699	Solar, BESS	Buckley 500 kV	600	-600	Sherman, OR	Jan 2027
G0728	Wind, BESS	Rosebush 230 kV	210	-210	Sherman, OR	Jan 2027
G0768	Wind, BESS	Diamond Butte 500 kV	300	-100	Gilliam, OR	Dec 2027
G0787	Pump Hydro BESS	Rosebush 500 kV	600	-600	Sherman, OR	Dec 2028
G0791	Solar, BESS	Rosebush 500 kV	650	-650	Sherman, OR	Dec 2028
G0795	Solar, BESS	Rosebush 500 kV	650	-650	Sherman, OR	Dec 2028
G0797	Solar, BESS	Rosebush 500 kV	650	-650	Wasco, OR	Dec 2028
G0825	Solar, BESS	Buckley 500 kV	400	-400	Wasco, OR	Dec 2027
G0838	Solar, BESS	Pinegrove 500 kV	150	-80	Wasco, OR	April 2027
G0839	Solar, BESS	Pinegrove 500 kV	150	-80	Wasco, OR	Dec 2027
G0849	Solar, BESS	Buckley 500 kV	400	-400	Wasco, OR	Dec 2027
G0850	Solar, BESS	Buckley 500 kV	400	-400	Wasco, OR	Dec 2027
G0864	BESS	Rosebush 500 kV	500	-500	Sherman, OR	May 2027
G0865	Solar, BESS	Buckley 500 kV	200	-100	Sherman, OR	Sep 2027
G0866	Solar	Buckley 500 kV	300	0	Sherman, OR	Sep 2027
G0867	Wind	Buckley 500 kV	100	0	Sherman, OR	Dec 2027
G0941	BESS	Diamond Butte 500 kV	0	-488	Morrow, OR	Dec 2028
G0946	BESS	Buckley 500 kV	650	-650	Wasco, OR	Dec 2028
G0972	Wind	Diamond Butte 500 kV	300	0	Gilliam, OR	Dec 2029
G0974	Wind	Diamond Butte 500 kV	250	0	Gilliam, OR	Dec 2029
G0989	Solar, BESS	Rosebush 230 kV	275	-275	Sherman, OR	Dec 2027
G0994	Wind	Rosebush 230 kV	277	0	Sherman, OR	Dec 2028
G1002	Solar	Rosebush 230 kV	200	0	Sherman, OR	Dec 2029

[1] Capitalized terms that are not defined in the text of this report refer to defined terms in BPA's OATT.

GI #	Gen Type	Studied POI	MW Requested (Generating)	MW Requested (Charging)	Plant Location (County, State)	Requested COD
G1041	Wind, BESS	Diamond Butte 500 kV	500	-250	Sherman, OR	Jan 2027

Studied POI locations and requirements for each IR are summarized in Table 1.2. Scalable Plan Blocks (SPB) are indicated where applicable.

All IRs will be required to have the necessary communications and controls equipment installed to be available for generator tripping to maintain flexibility and effectiveness of BPA's Main Grid Remedial Action Schemes (RAS).

Table 1.2: 2025 TCS PH1 LC1 Requirements

GI #	POI	Total GI Scope	Total Cost	Contingent Facilities
G0768	Diamond Butte 500 kV	1x 500 kV gen-tie terminal, ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) New BPA P7 RAS Algorithms	$91M	G0344/G0619 Projects (Diamond Butte Station)
G0941		C&C (shared gen-tie G344), ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) New BPA P7 RAS Algorithms	$9M	
G0972 G0974		1x 500 kV gen-tie terminal (shared), ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) New BPA P7 RAS Algorithms	$139M	
G1041		1x 500 kV gen-tie terminal, ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) New BPA P7 RAS Algorithms	$122M	
G0787 G0791	Rosebush 500 kV	1x 500 kV gen-tie terminal (shared), ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment) New BPA P7 RAS Algorithms	$172M	G0687 Rosebush Station
G0795 G0797		1x 500 kV gen-tie terminal (shared), ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment) New BPA P7 RAS Algorithms	$223M	
G0864		C&C (shared gen-tie G687), ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment) New BPA P7 RAS Algorithms	$103M	G0687 Gen-Tie line, Rosebush Station
G0728	Rosebush 230 kV	New 230 kV substation w/ 1300MVA 500/230 kV transformer, 1x 230 kV gen-tie terminal, ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, New BPA P7 RAS Algorithms	$66M	G0687 Rosebush Station

GI #	POI	Total GI Scope	Total Cost	Contingent Facilities
G0989		New 230 kV substation w/ 1300MVA 500/230 kV transformer, 1x 230 kV gen-tie terminal, ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment) New BPA P7 RAS Algorithms	$108M	
G0994		New 230 kV substation w/ 1300MVA 500/230 kV transformer, 1x 230 kV gen-tie terminal, ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment) New BPA P7 RAS Algorithms	$108M	
G1002		New 230 kV substation w/ 1300MVA 500/230 kV transformer, 1x 230 kV gen-tie terminal, ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment) New BPA P7 RAS Algorithms	$87M	
G0699 G0946	Buckley 500 kV	1x 500 kV gen-tie terminal (shared), ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment) New BPA P7 RAS Algorithms	$411M	Buckley GIS Rebuild Project
G0825 G0849 G0850		1x 500 kV gen-tie terminal (shared), ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment New BPA P7 RAS Algorithms	$406M	
G0865 G0866 G0867		1x 500 kV gen-tie terminal (shared), ASHE-MARN #2 500 kV and SLAT-BUCK 500 kV Loop-ins, SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) SPB2: JCYN-SANT500 project #2 (BUCK-MARN #2 segment New BPA P7 RAS Algorithms	$231M	
G0838 G0839	Pinegrove 500 kV	1x 500 kV gen-tie terminal (shared) New BPA P7 RAS Algorithms	$ 65M	G0681 Project (Pinegrove Station)

BPA's construction of equipment and facilities required to interconnect a generator typically takes between 3 and 10 years to complete depending on the scope and scale of the plan of service. The estimated time to construct a plan of service is refined through the subsequent stages of the interconnection process.

2 Purpose

The Bonneville Power Administration (BPA) processes requests to interconnect Large Generating Facilities to the BPA Transmission System under the Large Generator Interconnection Transition Process, Attachment R of BPA's OATT, and the Standard Large Generator Interconnection Procedures (LGIP), Attachment L of BPA's OATT. BPA conducted the TCS PH1 to evaluate the impacts of all eligible Transition Requests in the Transition Cluster on the reliability of BPA's Transmission System. The TCS PH1 evaluates equipment and facilities required to reliably interconnect requests at the requested MW of Interconnection Service. The TCS PH1 consists of short circuit analysis and power flow analysis. The TCS PH1 report preliminarily identifies: (1) equipment where short circuit capability limits or thermal or voltage ratings have been exceeded, and (2) Interconnection Facilities and Network Upgrades expected to be required to address those issues.

BPA performed the TCS PH1 by segmenting and studying the Interconnection Requests according to geographically and electrically relevant areas on BPA's Transmission System; those segments are identified as Cluster Areas. BPA identified plans of service for a subset of Interconnection Requests within a Cluster Area in some instances, identified as Scalable Plan Blocks. Cost and timeframe estimates for plans of service identified in this report are non-binding good faith estimates. Costs are allocated amongst Interconnection Requests as outlined in Section 4.2.3 of the LGIP.

3 Disclaimers

This document contains the technical study results of an evaluation of the impact of all proposed Interconnection Requests in the Cluster Area on the reliability of BPA's Transmission System. The TCS PH1 evaluates providing Interconnection Service, meaning the service provided by BPA to interconnect a Large Generating Facility to BPA's Transmission System to enable BPA's Transmission System to receive energy and capacity from the Large Generation Facility at the Point of Interconnection. The study results reflect evaluation of providing Energy Resource Interconnection Service to all Interconnection Requests, allowing each Large Generating Facility to connect and be eligible to deliver output on an "as available" basis up to the requested MWs of Interconnection Service. The interconnection process for Large Generating Facilities does not evaluate the requirements or potential impediments to providing transmission of the electrical output of a Large Generating Facility beyond the Point of Interconnection. A customer that wishes to obtain the right to deliver or inject energy from a Large Generating Facility beyond the Point of Interconnection must take a separate action to obtain transmission delivery service under BPA's OATT. The provision of Point-to-Point Transmission Service or Network Integration Transmission Service may require the construction of additional transmission equipment and facilities.

In addition, the technical studies results do not address generator balancing services that may be required to interconnect a Large Generating Facility to BPA's Transmission System.

These studies were conducted using the best available information at the time of the study. Findings and recommendations are based on information and assumptions that could

change. BPA reserves the right to add, delete, or modify any content in this report if new information is provided.

Additional Disclaimers

1) A customer's inclusion of an optional requested POI on a Transition Request does not guarantee that the customer's request was studied for interconnection at that POI. BPA, in its sole discretion, determined the POI for each Large Generating Facility to improve the reliability benefits, cost and/or benefits of the interconnection for the Cluster Area.
2) Energy storage grid charging is defined for this study as importing energy from beyond the POI to the IR storage device. This study evaluates grid charging where elected by each IR, but does not assess all resultant Transmission System requirements beyond the POI. This study presumes that energy storage grid charging connected to BPA's Transmission System will be treated as a generator (not a load) in context of expected transmission curtailments, expected transmission operating limits, or generation tripping RAS.
3) The TCS PH1 does not include the following analyses, which will be provided in the Transition Cluster Study Phase Two Cluster Study or Interconnection Facilities Study:
    a) Provision of Network Resource Interconnection Service (NRIS);
    b) Voltage & Transient Stability studies;
    c) Electromagnetic Transient (EMT) studies; and
    d) Fault Duty studies for detailed equipment sizing.
4) In electing to participate in the TCS, all customers attested that the Generating Facility proposed in a Transition Request would be designed to meet the BPA Transmission Standard *"Technical Requirements for Interconnection to the BPA Transmission Grid"* (STD-N-000001) posted to the BPA Interconnection webpage.
5) Any plan of service identified in this study report that would require access and usage of property associated with the Northwest AC Intertie (NWACI) to construct may require the consent of all owners of NWACI facilities to proceed and be beyond BPA's ability to grant. BPA will continue to study this plan of service but cannot guarantee that the Large Generating Facility may be interconnected under that plan of service.
    i) As noted above, the TCS PH1 does not evaluate requirements or potential impediments to providing transmission delivery service. Any plan of service identified in this study report that would provide electrical connectivity between a Large Generating Facility and a NWACI facility does not provide the customer any right or ability to obtain transmission delivery service on a NWACI facility.

4 Study Assumptions

4.1 General Assumptions

BPA Transmission uses PowerWorld for positive sequence analysis (CTG Tool add-on, ATC Tool add-on, PV/QV Tool add-on, Transient Stability Tool add-on).

For the TCS PH1, "MW injection limit" tests are applied at each POI, to determine IR's MW thresholds at which a steady state system limiter occurs and requires mitigation. Injection limits are also applied in the reverse direction, at POIs that have requested Battery Energy Storage

System (BESS) grid charging. PowerWorld's ATC Tool is used to conduct these injection limit tests.

All analysis presumes Energy Resource Interconnection Service (ERIS) only. BPA Planning presumes IRs are not all dispatched simultaneously. Generally, BPA Planning only presumes IRs are dispatched simultaneously when at most one to two Bulk Electric System (BES) nodes away from the POI under study.

The TCS PH1 assumes all Generating Facilities studied are designed to the standards in STD-N-000001 at the time of publication of this report. Adherence to BPA STD-N-000001 includes many detailed requirements covering but not limited to: minimum BPA communications network transport; BPA control system hardware; participation in BPA RAS; protective relaying; disturbance monitoring; scheduling and metering; voltage control; frequency response; reactive power quality; and more.

4.2 Senior-Queued IRs and Non-BPA IRs

The following list of IRs were deemed impactful and senior to the Cluster Area and were assumed to be dispatched online for the TCS PH1. The list includes Interconnection Requests that were not subject to Attachment R of BPA's OATT (Bypass IRs), Late-Stage Projects that elected to proceed serially, and non-BPA queued IRs in adjacent Transmission Provider queues if known.

Table 4.1: Senior Queued IRs Assumed In-Service

Queue #	POI (owner)	MW Generating	MW Grid-Charging	Fuel Type
G0615	Buckley 500 kV(BPA)	800	-400	Solar, BESS
G0714	Buckley 500 kV (BPA)	200	-200	Solar, BESS
G0715	Buckley 500 kV (BPA)	200	-200	Solar, BESS
G0344	Diamond Butte 500 kV (BPA)	488	0	Wind
G0619	Diamond Butte 500 kV (BPA)	500	0	Wind
G0681	Pinegrove 500 kV (BPA)	1000	-1000	Solar, BESS
G0687	Rosebush 500 kV (BPA)	900	0	Solar

4.3 Communications & Control Capability (C&C)

The TCS PH1 assumed:

1. All POI stations are capable of BPA Main Grid Remedial Action Scheme (RAS) participation. There is WECC-Class 1 communications (fully redundant, alternately routed) to each generation facility where the Main Grid RAS Generation Dropping (GD) will occur.
2. All POI stations have:
    a. BPA SCADA Control & Indication
    b. Transfer Trip or Current Differential protective relaying on all gen-ties from BPA station to customer station
    c. Control Phasor Measurement Units (CPMUs)
    d. Revenue Metering and telemetry for each IR

5 Study Methodology

5.1 Cluster Area Definition

LC1 spans a portion of the Columbia Gorge, from Hood River to Boardman. LC1 contains 3 load areas (Hood River/The Dalles, Fossil/De Moss, and Klickitat PUD). Customers include PacifiCorp (PAC), Hood River Electric Co-Op (HREC), Northern Wasco County PUD (NWPUD), Klickitat PUD (KPUD), Skamania PUD (SPUD) and Wasco Electric Co-Op (WPUD).

Generation in this area includes large hydro on the Federal Columbia River Power System (Bonneville, The Dalles, and John Day) as well as existing renewable resources.

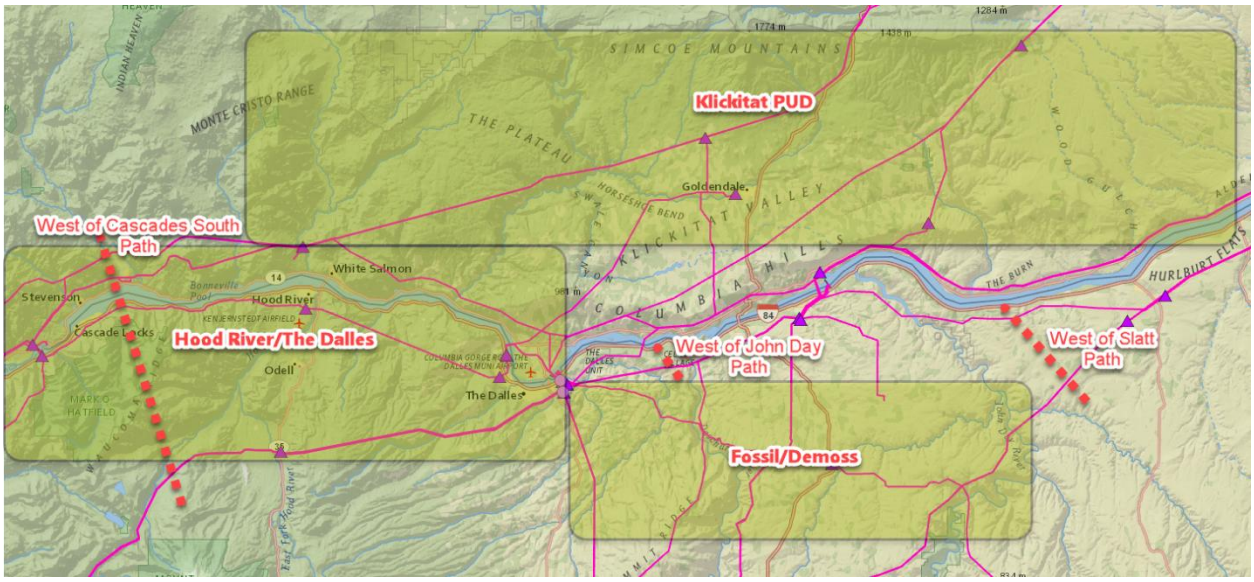


Figure 1: Lower Columbia Cluster Area

The following maps illustrate the geographic coordinates for the IRs assessed in LC1. Locations of new stations are identified in green squares, existing stations are shown as purple triangles, senior queue IRs are shown as blue circles and transition cluster IRs are shown as red circles. IRs with the same coordinates appear as a single point.

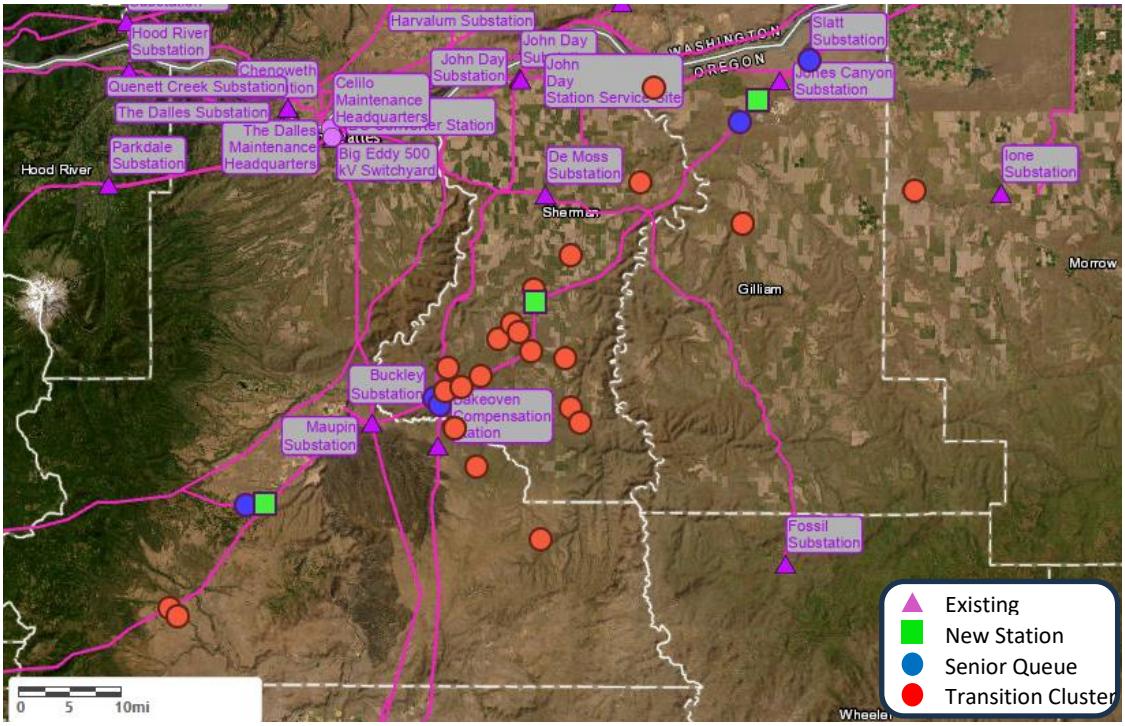


Figure 2: Lower Columbia LC1 Senior and Transition Cluster Area

5.1.1 Diamond Butte POI

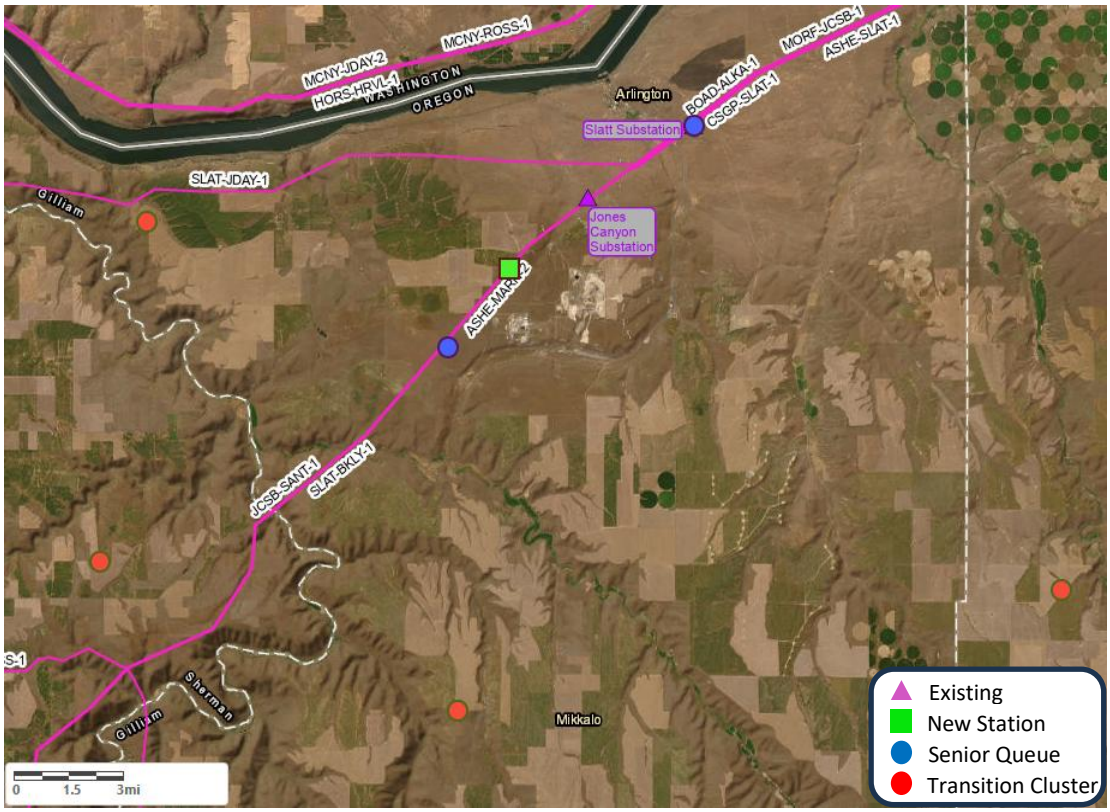


Figure 3: Diamond Butte POI Area

5.1.2 Rosebush POI

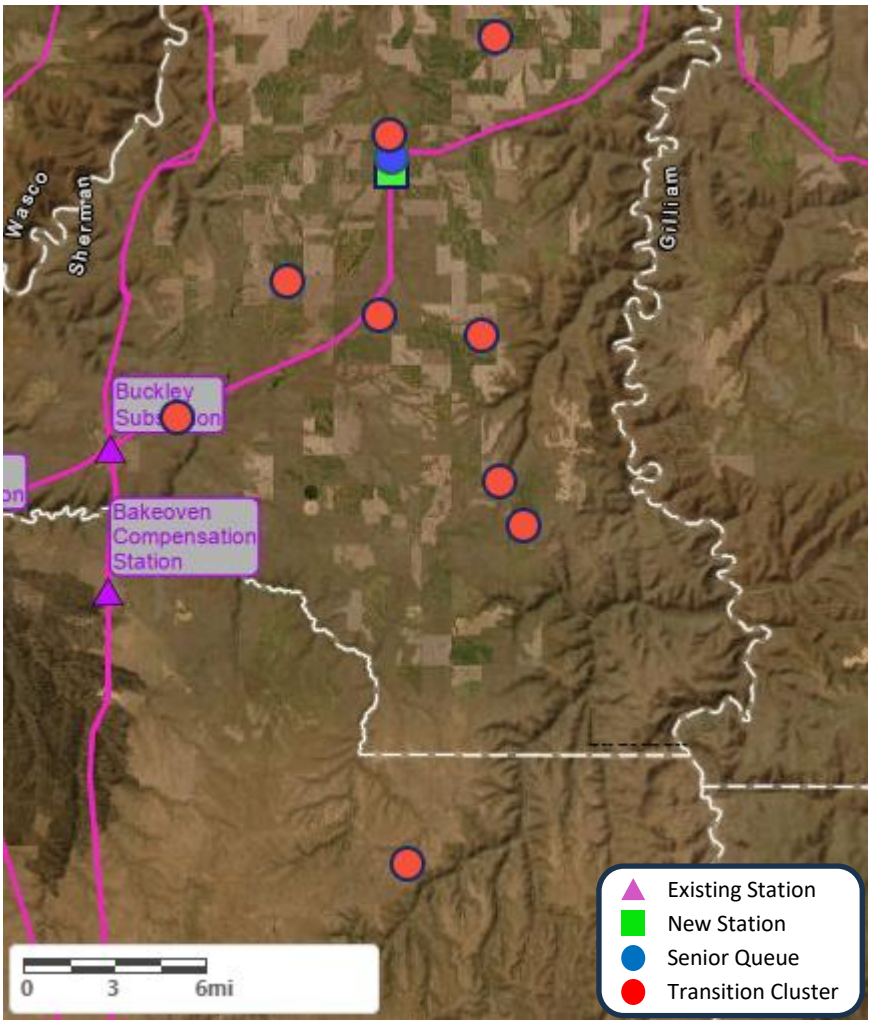


Figure 4: Rosebush POI Area

5.1.3 Buckley POI

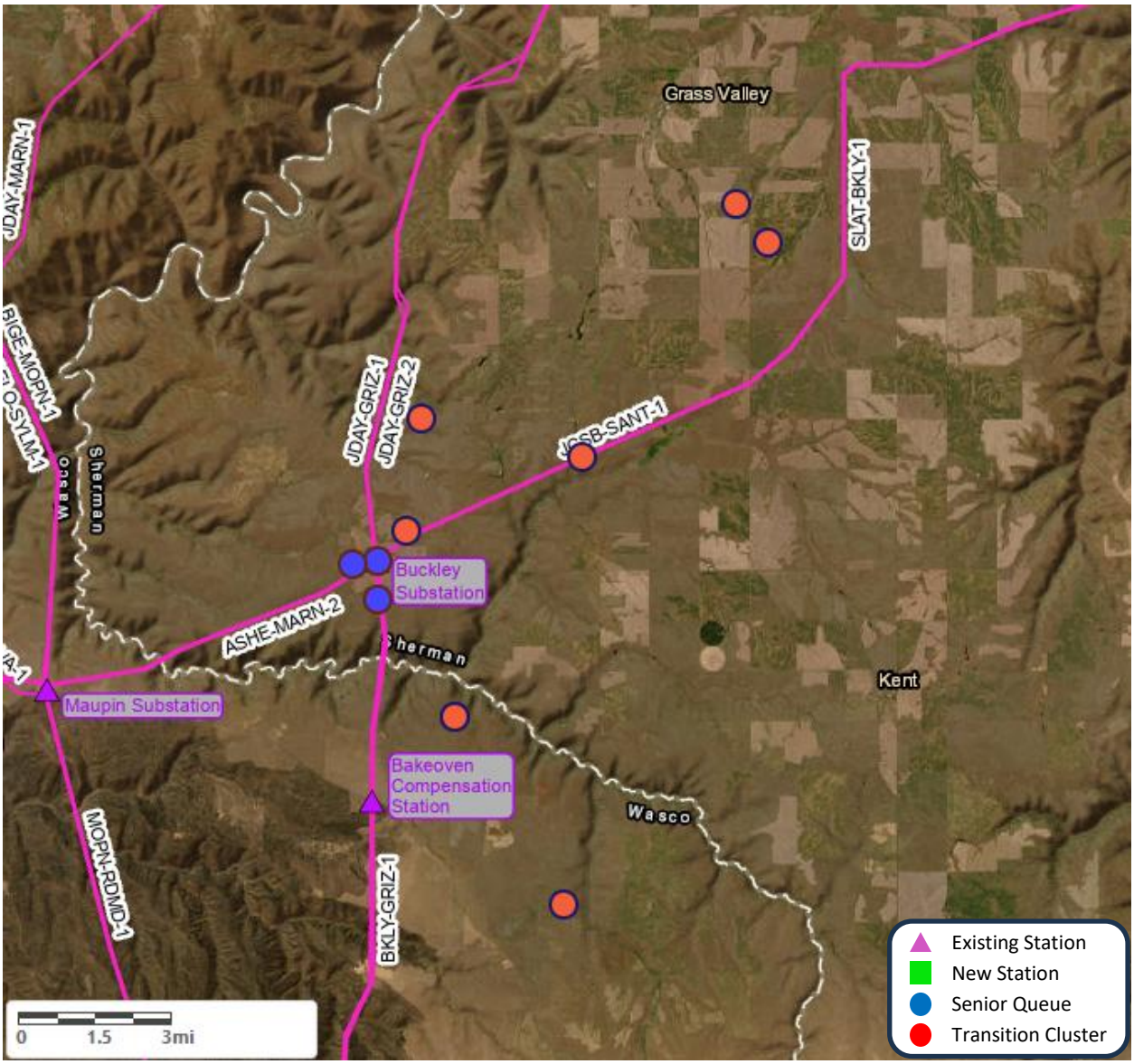


Figure 5: Buckley POI Area

5.1.4 Pinegrove POI

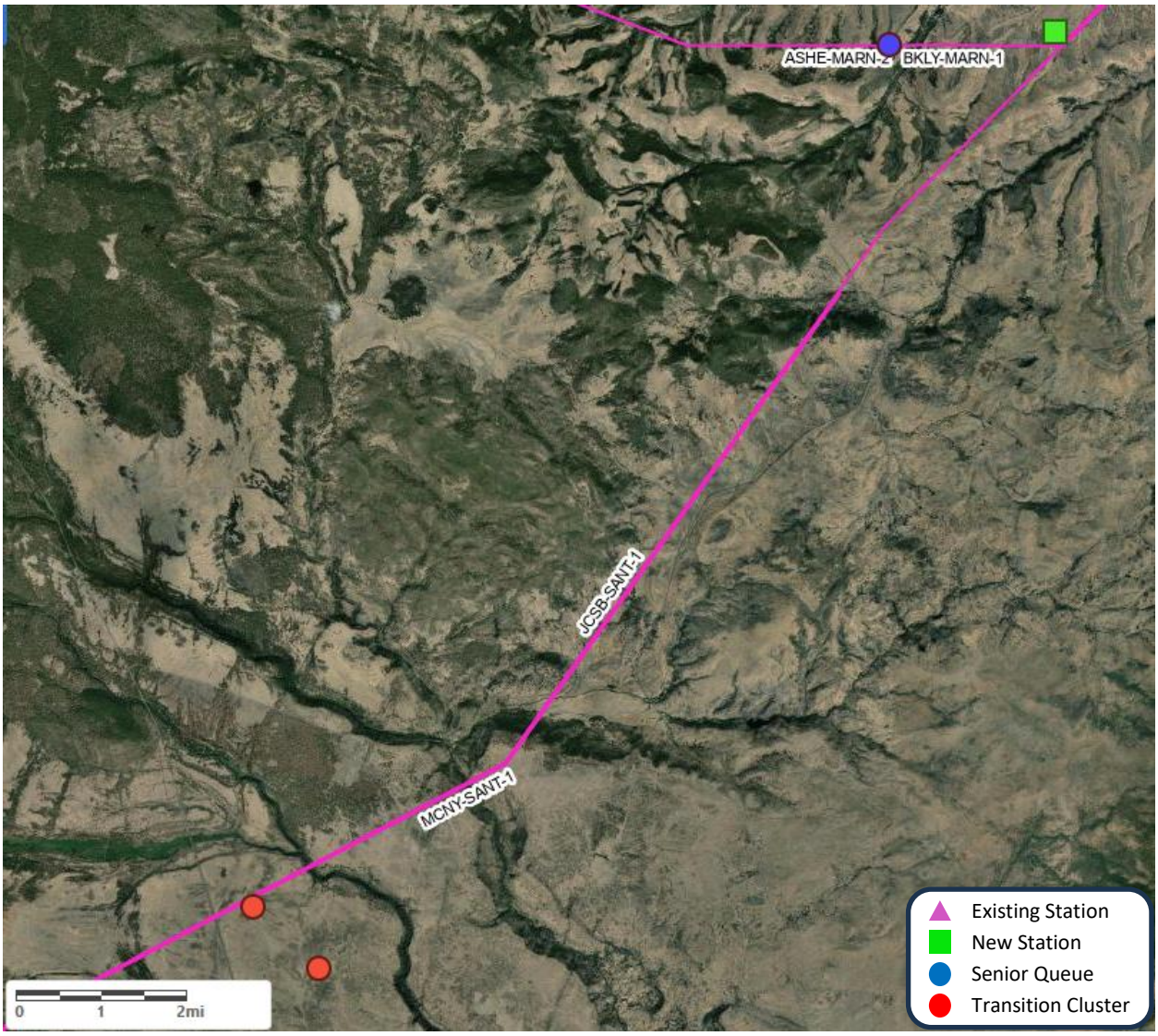


Figure 6: Pinegrove POI Area

5.2 Studied POIs

The following table indicates the studied POI for each request in the Cluster Area.

Table 5.1: 2025 TCS PH1 LC1 Studied POIs

GI #	Gen Type	MW Generating	MW Grid-Charging	Studied POI
G0699	Solar, BESS	600	-600	BUCK 500
G0825	Solar, BESS	400	-400	BUCK 500
G0849	Solar, BESS	400	-400	BUCK 500
G0850	Solar, BESS	400	-400	BUCK 500
G0865	Solar, BESS	200	-100	BUCK 500
G0866	Solar	300	0	BUCK 500
G0867	Wind	100	0	BUCK 500
G0946	BESS	650	-650	BUCK 500
G0768	Wind, BESS	300	-100	DBUT 500
G0941	BESS	0	-488	DBUT 500
G0972	Wind	300	0	DBUT 500
G0974	Wind	250	0	DBUT 500
G1041	Wind, BESS	500	-250	DBUT 500
G0838	Solar, BESS	150	-80	PINE 500
G0839	Solar, BESS	150	-80	PINE 500
G0728	Wind, BESS	210	-210	ROSE 230
G0989	Solar, BESS	275	-275	ROSE 230
G0994	Wind	277	0	ROSE 230
G1002	Solar	200	0	ROSE 230
G0787	Pump, BESS	600	-600	ROSE 500
G0791	Solar, BESS	650	-650	ROSE 500
G0795	Solar, BESS	650	-650	ROSE 500
G0797	Solar, BESS	650	-650	ROSE 500
G0864	BESS	500	-500	ROSE 500

5.3 Starting Base Cases

Following WECC Cases were used for LC1.

- 2026 Heavy Summer (HS)
- 2030 Heavy Summer (HS)

Cases were modified to include applicable senior-queued IR POIs and their associated plans of service as reported in their associated System Impact or Facility study reports published on host utility's OASIS.

In addition, select planned BPA projects were modeled as senior to the TCS and impactful to the POI performance. Impactful topology additions for LC1 include:

- Buckley 500 kV Rebuild Project (BPA)

- Webber Canyon 500 kV proposed station (BPA)
  - Mid-line on Ashe-Marion 500 kV #2
  - G0558 generation at Webber Canyon 500 kV was assumed online
- Sixmile Canyon 500 kV proposed station (BPA)
  - Mid-line on Ashe-Slatt 500 kV
  - Load interconnection was assumed online
- Boardman to Hemingway 500 kV line build (BPA/PGE)

Additional summary of significant projects deemed Contingent Facilities and assumed in-service as base-state for this Cluster Area are specified in section 6.

5.3.1 Load and Resource Scenario Descriptions

In all studies, it was assumed that the senior queued projects shared operating mode; that is, all resources were either discharging or charging simultaneously.

Generating Scenarios

The local wind generation was increased near Slatt to inform a conservative approach to determine the required facilities and upgrades necessary to accommodate the requested discharging interconnection amounts at each POI. Thermal generation along the I-5 corridor were also assumed offline.

Charging Scenarios

The local renewable sources were increased for the Lower Columbia region and I-5 thermal generation was in-service to support charging studies to determine limiting elements and upgrades necessary to accommodate the requested charging interconnection amounts at each POI.

5.3.2 Topology Sensitivity Descriptions

No additional topology sensitivities were performed in the TCS PH1. Additional topology sensitivities may be further evaluated in the Phase Two Cluster Study.

5.4 Phase 1 POI Injection Tests

Steady state contingency analysis was conducted at each POI increasing total generating or grid-charging amounts until a reliability limit was reached. The assumed source/sink pairs for these injection tests were as follows. Detailed findings of these injection tests can be found in the Results Section.

All POI's used an Outage Transfer Distribution Function (OTDF) linear sensitivity of 3% and a Path Transfer Distribution Function (PTDF) linear sensitivity of 0%. This provided a comprehensive screening methodology and threshold to determine relevant steady state system limiters and required mitigations.

The study disables existing Remedial Action Schemes (RAS) to determine system needs for RAS to establish the baseline capabilities of the system. Interconnections that require new RAS as part of their plan of service are noted in their appropriate sections.

The POIs studied are referenced in the Technical Analysis Section. The Sink (Discharging) node/Source (Charging) nodes were chosen in areas of concentrated loads.

Studied POI's
Discharging/Generating
Source node: Studied POI
Sink node: Malin, Sno-King, Paul, Raver, Allston, Keeler, Meridian Point, Upper Columbia

Charging
Source node: Malin, Sno-King, Paul, Raver, Allston, Keeler, Meridian Point, Upper Columbia
Sink node: Studied POI

5.5 Phase 1 POI Short Circuit Ratio Strength Tests

Per BPA STD-N-000001, all IR POIs shall have Short Circuit Ratio (SCR) of 3 or greater for all critical NERC TPL-001 P1 conditions.

All POIs evaluated for LC1 passed BPA's SCR strength test.

6 Contingent Facilities Assumed In-Service

The following projects are assumed in-service for the associated POIs. They are deemed Contingent Facilities for this study, and are required to be energized prior to IRs taking Interconnection Service.

Table 6.1: Required Contingent Facilities for TCS POIs

Contingent Facility	Required For POI	Cost	Driver	Estimated ISD
Buckley Rebuild Project[3]	DBUT, ROSE, BUCK, PINE	$ 154M	Internal BPA, Senior IRs	Dec 2029
G0344 & G0619 Projects[1]	DBUT, ROSE, BUCK	$ 112M	Senior IR	Dec 2027
G0687 Project[2]	DBUT, ROSE, BUCK	$ 82M	Senior IR	Jan 2027
G0681 Project[4]	BUCK, PINE	$ 66M	Senior IR	Dec 2027

[1] G0344 and G0619 construct the Diamond Butte station mid-line on ASHE-MARN500 #2
[2] G0687 constructs the Rosebush substation mid-line on ASHE-MARN500 #2
[3] Rebuilds the existing 500 kV station by replacing gas-insulated equipment
[4] G0681 constructs the Pinegrove station mid-line on BUCK-MARN 500 #1

7 Technical Analysis & Study Results

7.1 Diamond Butte POI

TCS System Performance

Diamond Butte 500 kV station is a new proposed breaker-and-half configuration station owned by BPA for senior queued projects G0344 and G0619. Diamond Butte is a mid-line station and is looped in on the Ashe-Marion #2 500 kV line.

The Ashe-Marion #2 500 kV line spans 226 miles going east to west through several counties in both Washington state and Oregon state. This line is associated with multiple existing RAS schemes and has a shunt reactor near the Ashe end for voltage control. Additionally, this line is part of a transmission path definition (West of Cascades South). The Ashe-Marion 2 500 kV line

shares common towers with Ashe-Slatt 500 kV, Slatt-Buckley #1 500 kV, and Buckley-Marion #1 500 kV lines. Currently, the Ashe-Marion #2 500 kV Line runs adjacent to Slatt 500 kV substation and Buckley 500 kV substation.

The required Contingent Facilities are noted under Section 6. Senior queue facilities at this POI are identified in Table 4.1.

Table 7.1: Diamond Butte POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Discharging	Diamond Butte-Rosebush #1 500 kV Line *(ASHE-MARN #2 500 kV)*	P1, P2, P7
Charging/Discharging	Webber Canyon-Badger Canyon #1 115 kV Line	P1, P2, P7
Discharging	Slatt-John Day 500 kV Line	P7

Table 7.2: Worst-Case Results for Diamond Butte POI

POI MW Threshold	IR[1][3]	Limiter (Element)	Mitigation[2]
0	N/A	N/A	*See Table 6.1*
1–1350	G0768 G0941 G0972 G0974 G1041	Diamond Butte-Rosebush #1 500 kV Line Webber Canyon-Badge #1 115 kV Line Slatt-John Day 500 kV Line	(a) ASHE-MARN #2 500 kV loop-in w/ BUCK (b) SLAT-BUCK 500 kV Loop-ins w/ DBUT and ROSE, Decommission SLAT-BUCK Series Capacitor (c)SPB1 (Slatt-Buckley segment) (d) New P7 RAS South of Ashe

[1] Refer to one-line drawings in Section 10 of this report for identification of IRs sharing a tie line
[2] Refer to Table 6.1for required POI Contingent Facilities
[3] All listed IRs at Diamond Butte require the listed mitigations to accommodate the full requested capacity

Proposed Mitigations

The study results show that the requested IRs can interconnect their full requested amounts, provided that the appropriate mitigations are performed. To resolve capacity issues at Diamond Butte a series of loop-ins at Buckley, Diamond Butte and Rosebush stations is required, including: Ashe-Marion #2 500 kV line and Slatt-Buckley #1 500 kV line. Loop-ins of the Slatt-Buckley line will also require retirement of the Slatt series capacitor bank.

To further increase capacity at Diamond Butte, the existing Jones Canyon-Santiam 230 kV line must be rebuilt to 500 kV, and terminated into: Slatt, Diamond Butte, Rosebush and Buckley 500 kV substations (**JCYN-SANT500 Rebuild #1**). This line rebuild also requires a new 4 mile Jones Canyon-Slatt 230 kV circuit, a new Slatt 500/230 kV transformer, and operating the Dalreed Tap 230 kV radially from Morrow Flat 230 kV.

A new P7 RAS algorithm South of Ashe 500 kV is required to mitigate the thermal limit of the Slatt-John Day 500 kV Line. This enables the full interconnection amount at Diamond Butte, and increases the POI threshold to 1,350 MW. Participation in existing BPA RAS algorithms near Webber Canyon, Buckley and Slatt will also be required.

7.2 Rosebush POI

TCS System Performance

Rosebush 500 kV station is a new proposed breaker-and-half configuration station owned by BPA for senior queued IR projects (G0687). Rosebush is a mid-line station and is looped in on the Ashe-Marion 2 500 kV line.

The Ashe-Marion #2 500 kV line spans 226 miles going east to west through several counties in both Washington state and Oregon state. This line is associated with multiple existing RAS schemes and has a shunt reactor near the Ashe end for voltage control. Additionally, this line is part of a transmission path definition (West of Cascades South). The Ashe-Marion 2 500 kV line shares common towers with Ashe-Slatt 500 kV, Slatt-Buckley #1 500 kV, and Buckley-Marion #1 500 kV lines. Currently, the Ashe-Marion #2 500 kV Line runs adjacent to Slatt 500 kV substation and Buckley 500 kV substation.

The required Contingent Facilities are noted under Section 6.

Table 7.3: Rosebush POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Discharging	Webber Canyon 500/115 kV Transformer	P1, P7
Discharging	Slatt-John Day 500 kV Line	P7
Discharging	Buckley-Rosebush 500 kV #3 Line (ASHE-MARN #2 500 kV)	P7
Charging	Webber Canyon-Badger Canyon 115 kV Line	P1, P2, P7
Charging	Buckley-Grizzly 500 kV Line	P7
Charging	Diamond Butte-Rosebush #3 500 kV Line (ASHE-MARN #2 500 kV)	P7

Table 7.4: Worst-Case Results for Rosebush POI

POI MW Threshold	IR[1]	Limiter(Element)	Mitigation[2]
0	N/A	N/A	*See Table 6.1*
1–550	G0728[3]	Webber Canyon 500/115 kV Transformer	(a) ASHE-MARN #2 500 kV loop-in w/ BUCK (b) SLAT-BUCK 500 kV Loop-ins w/ DBUT and ROSE, Decommission SLAT-BUCK Series Capacitor
550–1360	G0787[4]	Slatt-John Day 500 kV Line	SPB1: JCYN-SANT 500 rebuild #1(Slatt-Buckley segment)
1360–2000	G0791[5]	Slatt-John Day 500 kV Line	SPB2: JCYN-SANT 500 rebuild #2 (Buckley-Marion segment)
2000–4200	G0795[6] G0797 G0864 G0989 G0994 G1002	Buckley-Rosebush 500 kV #3 Line (ASHE-MARN #2 500 kV)	New P7 RAS West of Rosebush

[1] Refer to one-line drawings in Section 10 of this report for identification of IRs sharing a tie line
[2] Refer to **Table 6.1** for required POI Contingent Facilities
[3] G0728 exceeds the as-built threshold of the station and requires the ASHE-MARN#2 500 kV and SLAT-BUCK 500 kV loop-ins for additional capacity
[4] G0787 exceeds the 550MW threshold by 260MW and requires the SPB1 project for additional capacity
[5] G0791 exceeds the 1360MW threshold by 100MW and requires the ASHE-MARN#2 500 kV loop-in to Buckley station and the SPB2 project for additional capacity
[6] G0795, and subsequent IRs, exceeds the 2000MW threshold by 110MW and requires P7 RAS for additional capacity

Proposed Mitigations

The study results show that the requested IRs can interconnect their full requested amounts, provided that the appropriate mitigations are performed. To resolve capacity issues at Rosebush a series of loop-ins at Buckley, Diamond Butte and Rosebush stations is prescribed, including: Ashe-Marion #2 500 kV line and Slatt-Buckley #1 500 kV line. Loop-ins of the Slatt-Buckley line will also require retirement of the Slatt series capacitor bank.

John Day-Slatt 500 kV is an existing limiter for the West of Slatt path, and the conductor type is the second largest BPA design standard. Rebuilding this circuit yields a minimal capacity increase, and constructing a second John Day-Slatt 500 kV circuit is not possible due to infeasibility of expanding John Day substation. To further increase capacity at Rosebush, the existing Jones Canyon-Santiam 230 kV line must be rebuilt to 500 kV, and terminated into: Slatt, Diamond Butte, Rosebush and Buckley 500 kV substations (**JCYN-SANT500 Rebuild #1**). This line rebuild also requires a new 4 mile Jones Canyon-Slatt 230 kV circuit, a new Slatt 500/230 kV transformer, and operating the Dalreed Tap 230 kV radially from Morrow Flat 230 kV.

To further increase capacity at Rosebush the remainder of Jones Canyon-Santiam 230 kV line must be rebuilt to a 500 kV line between Buckley and Marion (**JCYN-SANT500 Rebuild #2**), adding a second line directly between the two stations to increase export capacity.

To accommodate the remaining required capacity and mitigate the thermal limit of the Buckley-Rosebush 500 kV #3 line, a new P7 RAS scheme is required. This enables the full

interconnection amount at Rosebush, and increases the POI threshold to 4,200 MW. Participation in existing BPA RAS algorithms near Webber Canyon, Buckley and Slatt will also be required.

7.3 Buckley POI

TCS System Performance

Buckley 500 kV station is an existing BPA owned and operated station that has contingent project to rebuild the station from a Gas Insulated Substation (GIS) to an Air Insulated Substation (AIS). Currently, the Buckley-Grizzly 500 kV, Buckley-Marion 500 kV and the Slatt-Buckley 500 kV Lines are tied together to bypass Buckley 500 kV.

Buckley AIS (which will be the Buckley POI) will be developed as a breaker-and-half configuration. All three 500 kV transmission lines noted will be tied back into Buckley on separate bays. These lines all have RAS schemes associated with them. Slatt-Buckley 500 kV line currently has series capacitor that is located on the Slatt station end.

The required Contingent Facilities are noted under Section 6.

Table 7.5: Buckley POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Charging/Discharging	Slatt-John Day 500 kV Line	P7
Charging/Discharging	Buckley-Grizzly 500 kV Line	P7
Charging	Buckley-Rosebush 500 kV #3 Line	P7
Charging	Slatt-Buckley 500 kV Line	P1

Table 7.6: Worst-Case Results for Buckley POI

POI MW Threshold	IR[1]	Limiter(Element)	Mitigation[2]
0	N/A	N/A	*See **Table 6.1***
1–2170	G0699[3] G0825 G0849 G0850 G0865	Slatt-Buckley 500 kV Line Buckley-Grizzly 500 kV Line & Buckley-Rosebush 500 kV #3 Line	(a) ASHE-MARN #2 500 kV loop-in w/ BUCK (b) SLAT-BUCK 500 kV Loop-ins w/ DBUT and ROSE, Decommission SLAT-BUCK Series Capacitor (c) SPB1: JCYN-SANT 500 rebuild #1 (Slatt-Buckley segment) (d) SPB2: JCYN-SANT 500 rebuild #2 (Buckley-Marion segment)
2170–4370	G0866[4] G0867 G0946	Buckley-Rosebush 500 kV #3 Line	P7 RAS

[1] Refer to one-line drawings in Section 10 of this report for identification of IRs sharing a tie line
[2] Refer to **Table 6.1** for required POI Contingent Facilities
[3] G699 exceeds the as-built threshold of the station and requires the SPB1 and SPB2 projects and the ASHE-MARN #2 loop-ins for additional capacity
[4] G866 exceeds the 2170MW threshold by 130MW and requires P7 RAS for additional capacity

Proposed Mitigations

The study results show that the requested IRs can interconnect their full requested amounts, provided that the appropriate mitigations are performed. To resolve capacity issues at Buckley a series of loop-ins at Buckley, Diamond Butte and Rosebush stations is prescribed, including: Ashe-Marion #2 500 kV line and Slatt-Buckley #1 500 kV line. Loop-ins of the Slatt-Buckley line will also require retirement of the Slatt series capacitor bank.

To further increase capacity at Buckley, the existing Jones Canyon-Santiam 230 kV line must be rebuilt to 500 kV, and terminated into: Slatt, Diamond Butte, Rosebush and Buckley 500 kV substations (**JCYN-SANT500 Rebuild #1**). This line rebuild also requires a new 4 mile Jones Canyon-Slatt 230 kV circuit, a new Slatt 500/230 kV transformer, and operating the Dalreed Tap 230 kV radially from Morrow Flat 230 kV.

To further increase capacity at Buckley, the remainder of Jones Canyon-Santiam 230 kV line rebuilt to a 500 kV line between Buckley and Marion (**JCYN-SANT500 Rebuild #2**), adding a second line directly between the two stations to increase export capacity.

To accommodate the remaining required capacity and mitigate the thermal limit of the Buckley-Rosebush 500 kV #3 line a new P7 RAS scheme is proposed. This enables the full interconnection amount at Buckley, and increases the POI threshold to 4,370 MW. Participation in existing BPA RAS algorithms near Webber Canyon, Buckley and Slatt will also be required.

7.4 Pinegrove POI

TCS System Performance

Pinegrove 500 kV station is a new proposed breaker-and-half configuration station owned by BPA for senior queued projects G0681. Pinegrove is a mid-line station and is looped in on the Buckley-Marion 500 kV line.

The Buckley-Marion 500 kV line is a 100 mile line going east to west through numerous counties in Oregon state. This line is associated with multiple existing RAS schemes. The Buckley-Marion 500 kV line is on common tower as the Ashe-Marion 2 500 kV line.

The required Contingent Facilities are noted under Section 6.

Table 7.7: Pinegrove POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Charging/Discharging	Pinegrove-Marion 500 kV Line	P1, P7

Table 7.8: Worst-Case Results for Pinegrove POI

POI MW Threshold	IR[1]	Limiter(Element)	Mitigation[2]
0	N/A	N/A	*See Table 6.1*
1–2600	G0838 G0839	Pinegrove-Marion 500 kV Line	Full TCS requested amount reached

[1] Refer to one-line drawings in Section 10 of this report for identification of IRs sharing a tie line
[2] Refer to **Table 6.1** for required POI Contingent Facilities

Proposed Mitigations

No mitigations are required for this POI beyond Contingent Facility requirements. Participation in existing BPA AC-RAS algorithms will be required. Participation in existing BPA RAS algorithms near Buckley will also be required.

8 Affected System Impacts

The analysis of the proposed interconnections studied in this Cluster Area identified potential adverse system impacts on the Affected Systems identified below. The results of this study report will be shared with the Affected System Operator/s of those Affected System/s. The Affected System Operator/s identified below may determine a study is required and that actions are required on that Affected System to mitigate the impacts of the proposed interconnection on BPA's Transmission System. **Plans of service identified in this report may be modified or revised in response to an affected utility system study result.**

Any plans of service identified to interconnect a request, including plans of service identified in an affected system study, that require access and usage of real property associated with the Northwest AC Intertie (NWACI) to construct or impact the rights of an owner of a NWACI facility may require the consent of all owners to proceed and be beyond BPA's ability to grant. BPA cannot guarantee that the Large Generating Facility can be interconnected under that plan of service.

Affected Systems	Elements Impacted	POIs
PAC	Buckley 500 kV station, Marion 500 kV station, Slatt 500 kV station, Slatt-Buckley #1 500 kV, Buckley-Marion #1 500 kV	Buckley, Rosebush, Pinegrove, Diamond Butte
PGE		

9 Interconnection Requirements

9.1 Diamond Butte POI

Table 9.1: Diamond Butte POI Facility requirements

G#	BPA Station Work	BPA Non-Station Work
G0768	**Terminal** • (1) 500 kV Terminal **Substation Build** N/A	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment)
G0941	**Terminal** • Shared Gen-tie with (1) 500 kV Terminal **Substation Build** N/A	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment)
G0972, G0974	**Terminal** • (1) 500 kV Terminal **Substation Build** N/A	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment)
G1041	**Terminal** • (1) 500 kV Terminal **Substation Build** N/A	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment)

1. Install (11) 500 kV breakers and (23) 500 kV disconnect switches on (4) new BAAH bays, and associated control, relaying, and communication equipment.
2. Loop-in Ashe-Marion #2 line into Buckley and loop-in Slatt-Buckley 500 kV line into Diamond Butte and Rosebush stations.
    a. Retire Slatt-Buckley series capacitor.
3. See Section 9.5 for requirements applicable to Diamond Butte, Rosebush and Buckley stations. (Scalable Plan Block 1)
4. New P7 RAS Participation for loss of common tower 500 kV lines.
5. Installation of BPA-required C&C equipment at each customer's collector site (RAS, Meters, relays, Control House space)
6. Minor Development of C&C hardware at BPA's POI substation.

The customer(s) will construct a 500 kV line from the BPA POI station to its generation facility. The customer will then construct a 500/34.5kV substation directly adjacent to the POI line to support the 34.5kV feeders at its collector site.

9.2 Rosebush POI

Table 9.2: Rosebush POI Facility requirements

G#	BPA Station Work	BPA Non-Station Work
G0728	**Terminal** • (1) 230 kV Terminal **Substation Build** • 230 kV BAAH Station Build	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE **Transformer** • New Rosebush 500/230 kV bank
G0787, G0791	**Terminal** • (1) 500 kV Terminal **Substation Build** N/A	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment)
G0795, G0797	**Terminal** • (1) 500 kV Terminal **Substation Build** N/A	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment)
G0864	**Terminal** • none (shared gen-tie with Senior G687) **Substation Build** N/A	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment)
G0989	**Terminal** • (1) 230 kV Terminal **Substation Build** • 230 kV BAAH Station Build	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE

		• SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment) **Transformer** • New Rosebush 500/230 kV bank
G0994	**Terminal** • (1) 230 kV Terminal **Substation Build** • 230 kV BAAH Station Build	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment) **Transformer** • New Rosebush 500/230 kV bank
G1002	**Terminal** • (1) 230 kV Terminal **Substation Build** • 230 kV BAAH Station Build	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment) **Transformer** • New Rosebush 500/230 kV bank

For 500 kV interconnections:

1. Install (10) 500 kV breakers and (22) 500 kV disconnect switches on (4) new BAAH bays, and associated control, relaying, and communications equipment.
2. Loop-in Ashe-Marion #2 and Slatt-Buckley 500 kV lines into Diamond Butte, Rosebush and Buckley stations.
    a. Retire Slatt-Buckley series capacitor.
3. See Section 8.5 for requirements applicable to Diamond Butte, Rosebush and Buckley stations.
4. See Section 8.6 for requirements applicable to Rosebush and Buckley stations.
5. New P7 RAS Participation for loss of common tower 500 kV lines.
6. Installation of BPA-required C&C equipment at each customer's collector site (RAS, Meters, relays, Control House space)
7. Minor Development of C&C hardware at BPA's POI substation.

The customer will construct a 500 kV line from the BPA POI station to its generation facilities. The customers will then construct a 500/34.5kV substation directly adjacent to the POI line to support the 34.5kV feeders at their collector sites.

For 230 kV interconnections:

1. Construct new 230 kV yard. Install (3) new 230 kV BAAH bays with (8) 230 kV breakers, (17) disconnect switches and associated control, relaying, and communication equipment.
2. Install (1) 1300MVA 500/230 kV step down transformer for the 230 kV yard.

3. Installation of BPA-required C&C equipment at each customer's collector site (RAS, Meters, relays, Control House space)
4. New P7 RAS Participation for loss of common tower 500 kV lines.

The customer will construct a 230 kV line from the BPA POI station to its generation facilities. The customers will then construct a 230/34.5kV substation directly adjacent to the POI line to support their 34.5kV feeders at their collector sites.

9.3 Buckley POI

Table 9.3: Buckley POI Facility requirements

G#	BPA Station Work	BPA Non-Station Work
G0699, G0946	**Terminal** • (1) 500 kV Terminal • Ashe-Marion 2 500 kV loop-in to Buckley • Slatt-Buckley 500 kV loop-in with Rosebush and Diamond Butte	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment)
G0825, G0849, G0850	**Terminal** • (1) 500 kV Terminal • Ashe-Marion 2 500 kV loop-in to Buckley • Slatt-Buckley 500 kV loop-in with Rosebush and Diamond Butte	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment)
G0865, G0866, G0867	**Terminal** • (1) 500 kV Terminal • Ashe-Marion 2 500 kV loop-in to Buckley • Slatt-Buckley 500 kV loop-in with Rosebush and Diamond Butte	**RAS** • New P7 RAS Participation **Equipment Decommissioning** • Slatt-Buckley Series Capacitor retirement **Transmission work** • Ashe-Marion #2 500 kV loop-in to BUCK • Slatt-Buckley 500 kV loop-ins to DBUTE and ROSE • SPB1: JCYN-SANT500 project #1 (SLAT-BUCK #2 segment) • SPB2: JCYN-SANT500 Project #2 (BUCK-MARN segment)

1. Install (10) 500 kV breakers and (16) 500 kV disconnect switches on (1) new BAAH bays and (6) expanded existing bays, and associated control, relaying, and communications equipment.
2. Install (1) 180 MVAR shunt reactor at Buckley station.
3. Loop-in Ashe-Marion #2 500 kV and Slatt-Buckley 500 kV lines into Diamond Butte, Rosebush and Buckley stations.
    a. Retire Slatt-Buckley 500 kV series capacitor.
4. See Section 9.5 for requirements applicable to Diamond Butte, Rosebush and Buckley stations. (Scalable Plan Block 1)

5. See Section 9.6 for requirements applicable to Rosebush and Buckley stations. (Scalable Plan Block 2)
6. New P7 RAS Participation for loss of common tower 500 kV lines.
7. Installation of BPA-required C&C equipment at each customer's collector site (RAS, Meters, relays, Control House space)
8. Minor Development of C&C hardware at BPA's POI substation.

The customers will construct a 500 kV line from the BPA POI station to their generation facilities. The customers will then construct a 500/34.5kV substation directly adjacent to the POI line to support their 34.5kV feeders at their collector sites.

9.4 Pinegrove POI

Table 9.4: Pinegrove POI Facility requirements

G#	BPA Station Work	BPA Non-Station Work
G0838,G0839	**Terminal** • (1) 500 kV Terminal	• New P7 RAS Participation

1. Install (2) 500 kV breakers and (4) 500 kV disconnect switches on a new termination on existing bay, and associated control, relaying, and communication equipment.
2. Participation in new AC-RAS P7 algorithms is required.
3. Installation of BPA-required C&C equipment at each customer's collector site (RAS, Meters, relays, Control House space)

The customer will construct a 500 kV line from the BPA POI station to its generation facility. The customer will then construct a 500/34.5kV substation directly adjacent to the POI line to support the 34.5kV feeders at its collector site.

9.5 SPB1: Jones Canyon-Santiam Rebuild #1 (Slatt-Buckley Segment)

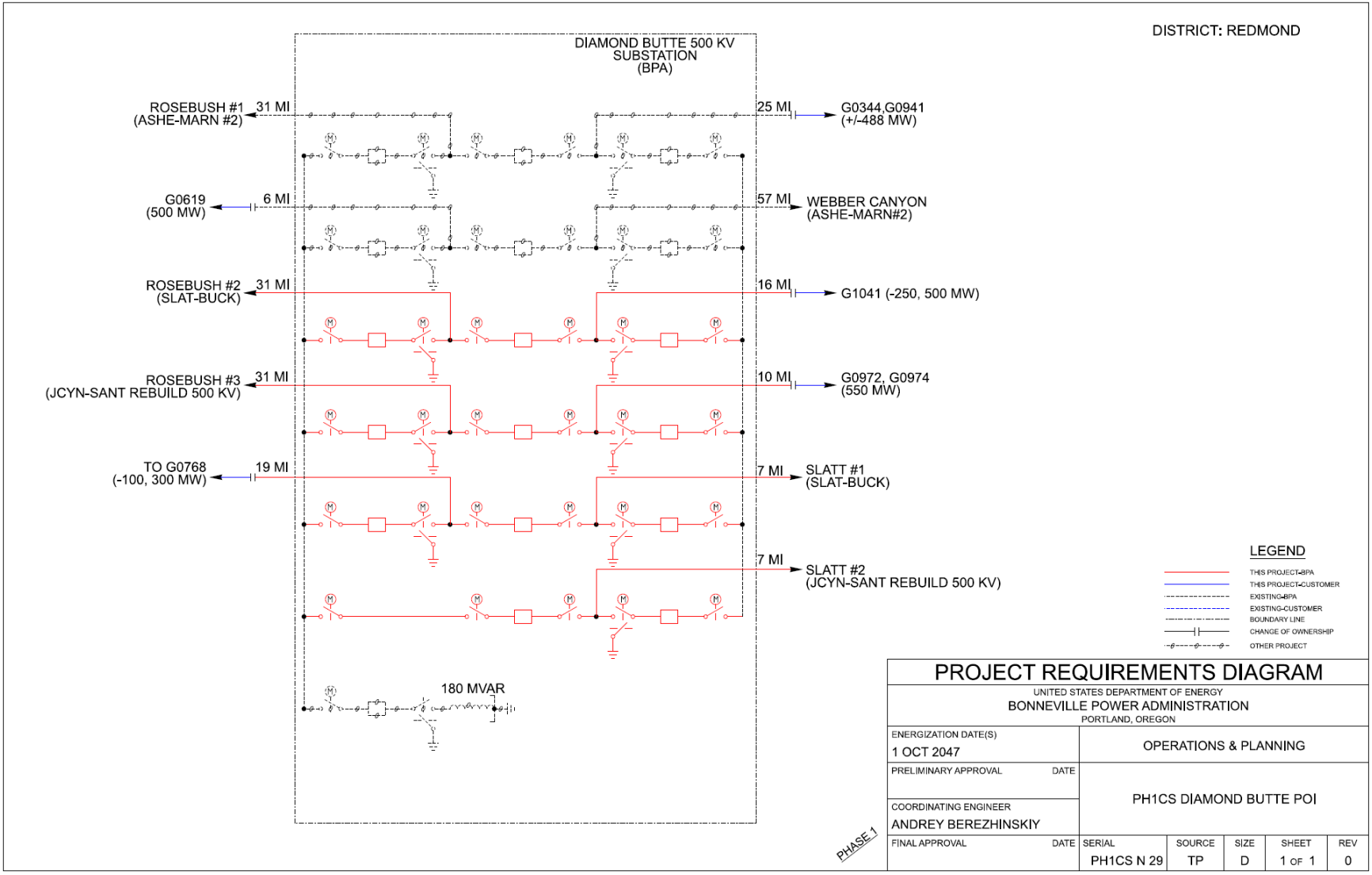
1. Rebuild Jones Canyon-Santiam 230 kV line to 500 kV and loop line into Slatt, Diamond Butte, Rosebush and Buckley stations **(~53 mi)**
2. Install (1) 500 kV breaker and (1) 500 kV disconnect switch into an existing bay at Slatt substation, and associated control, relaying, and communications equipment.
3. Install a new (1) 500/230 kV step down transformer at Slatt substation
4. Construct new 230 kV ring bus at Slatt substation, with (3) 230 kV breakers and (6) disconnect switches and associated control, relaying, and communications equipment.
5. Build a new Slatt-Jones Canyon 230 kV line **(~4 mi)**
6. Disconnect existing Jones Canyon-Dalreed 230 kV line.

9.6 SPB2: Jones Canyon-Santiam Rebuild #2 (Buckley-Marion Segment)

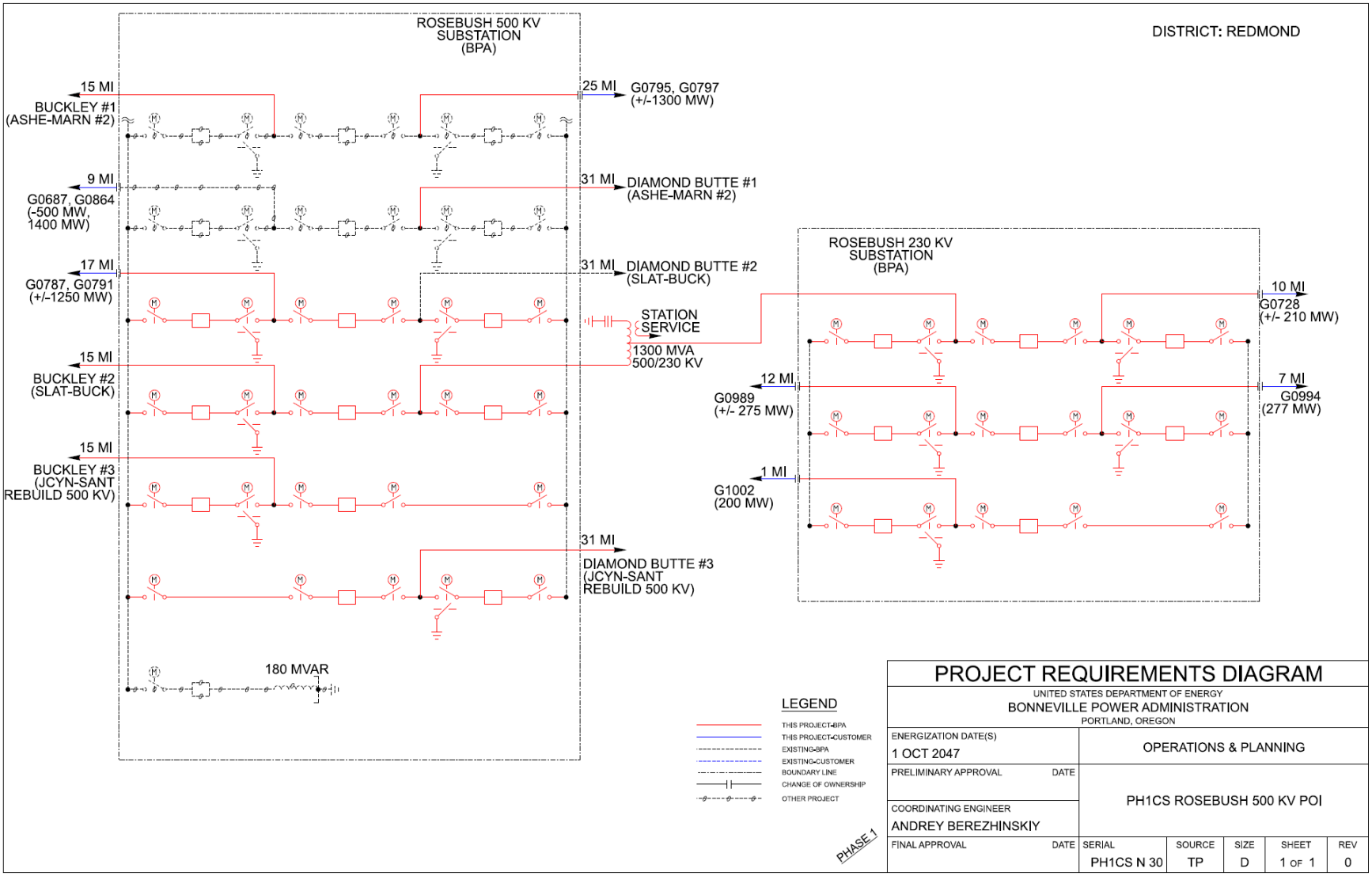
1. Install (1) new BAAH bay at Buckley station with (2) 500 kV breakers and (5) disconnect switches and associated control, relaying, and communications equipment.
2. Install (1) new BAAH bay at Marion station with (2) 500 kV breakers and (5) disconnect switches and associated control, relaying, and communications equipment.
3. Rebuild Jones Canyon-Santiam 230 kV line to 500 kV between Buckley and Marion 500 kV stations. Terminate line into Buckley 500 kV and Marion 500 kV substations.**(~104 mi)**

10 Project One-Line Drawings

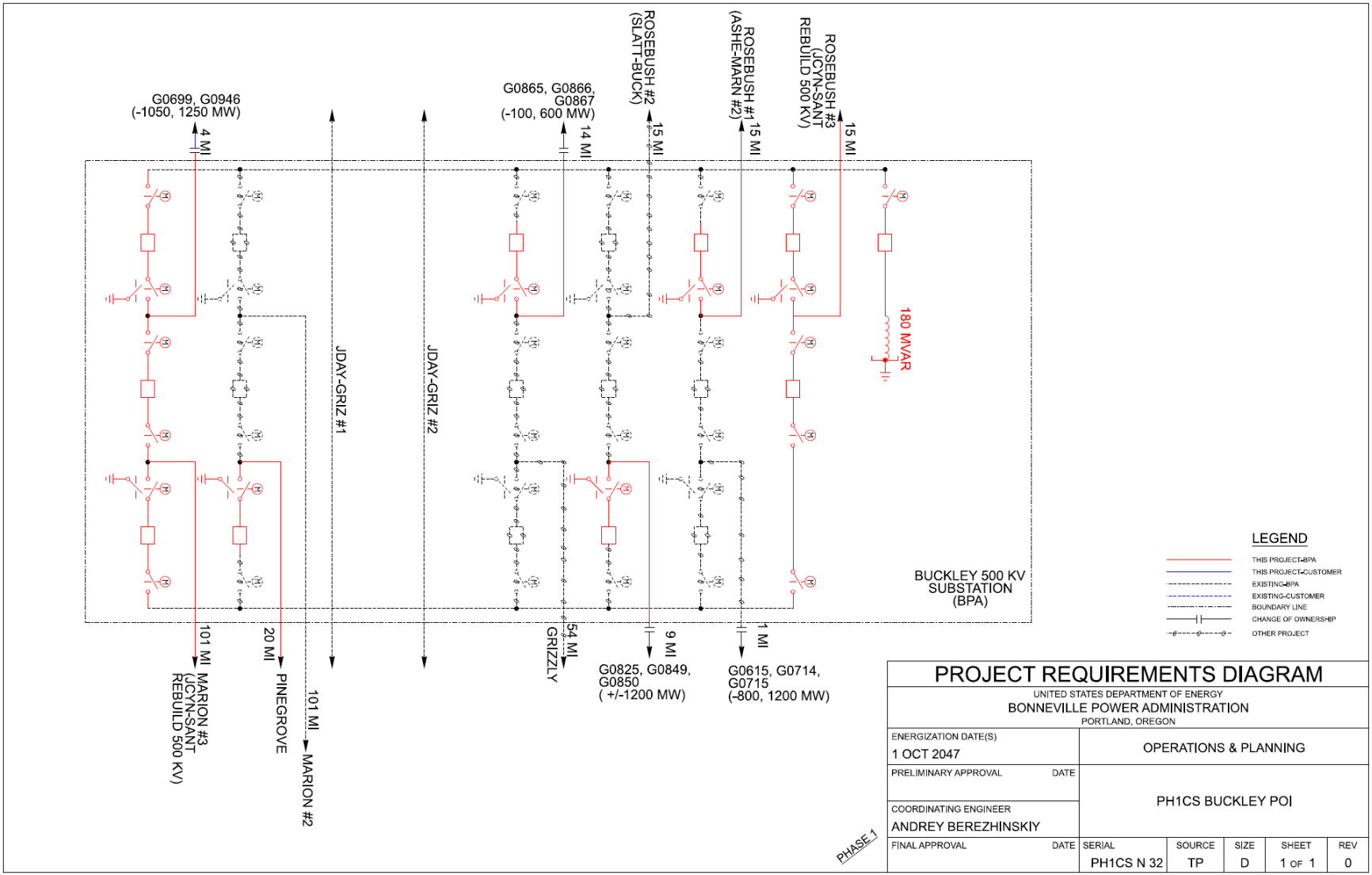
10.1 Diamond Butte POI



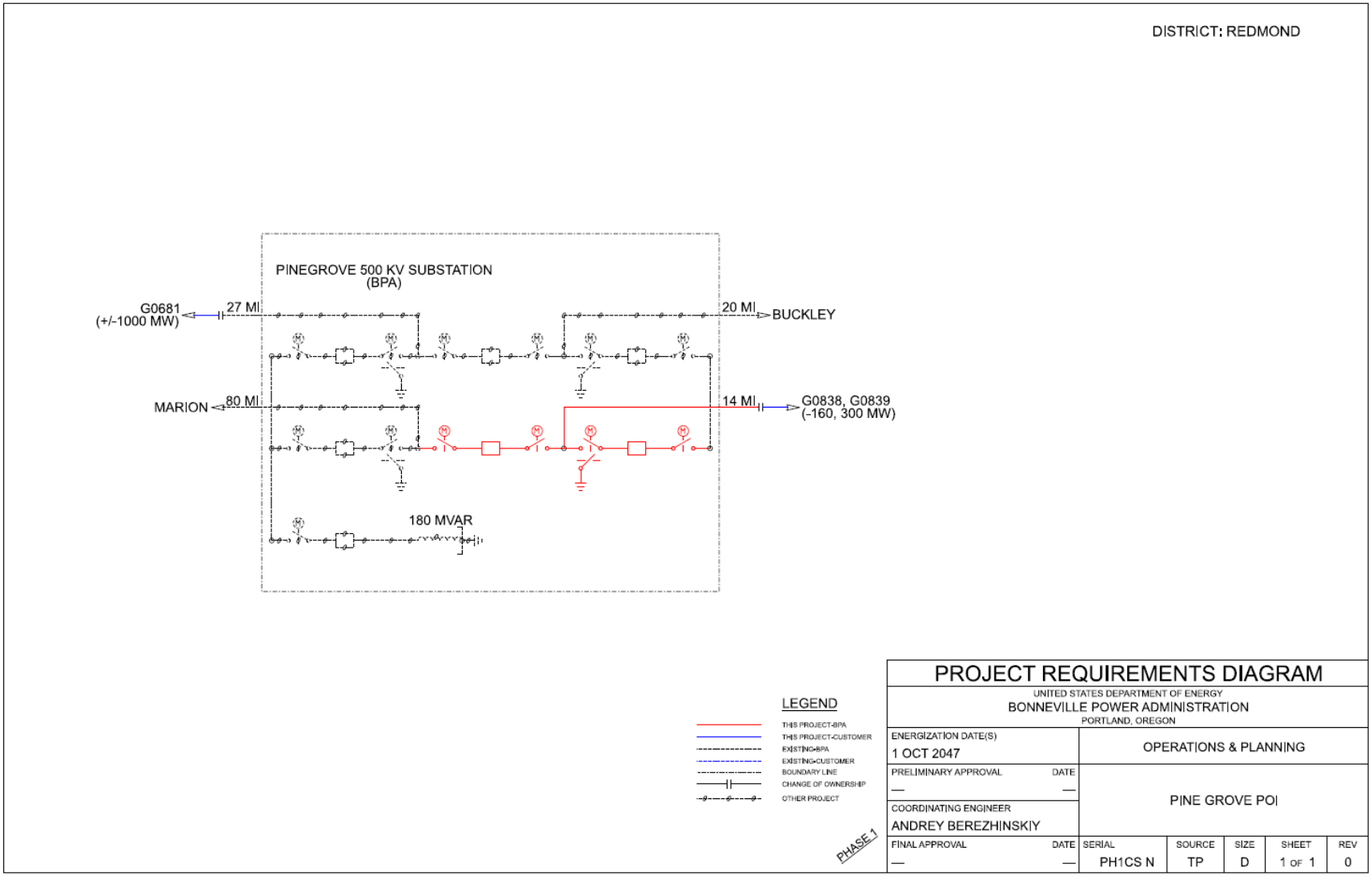
10.2 Rosebush POI



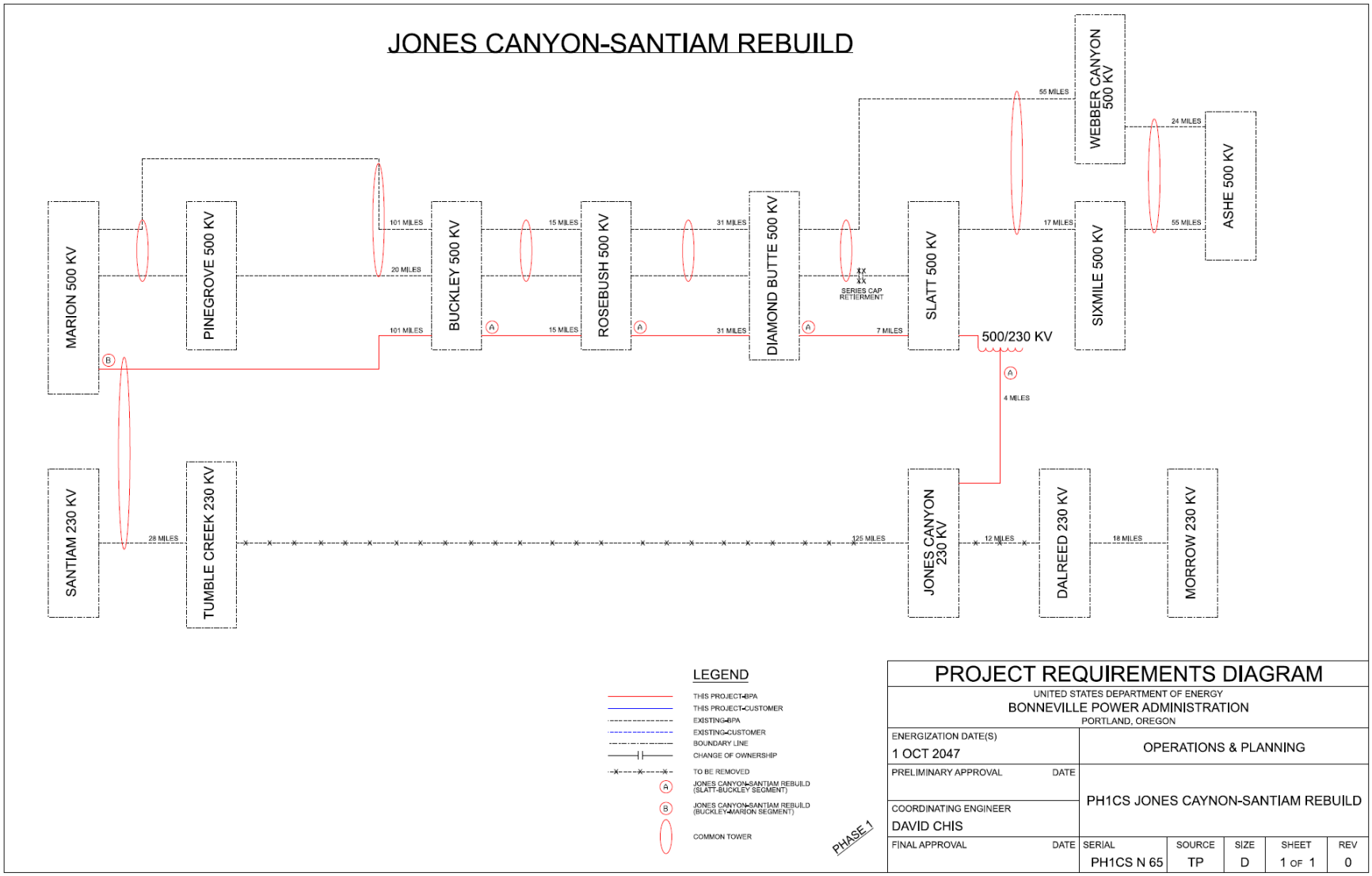
10.3 Buckley POI



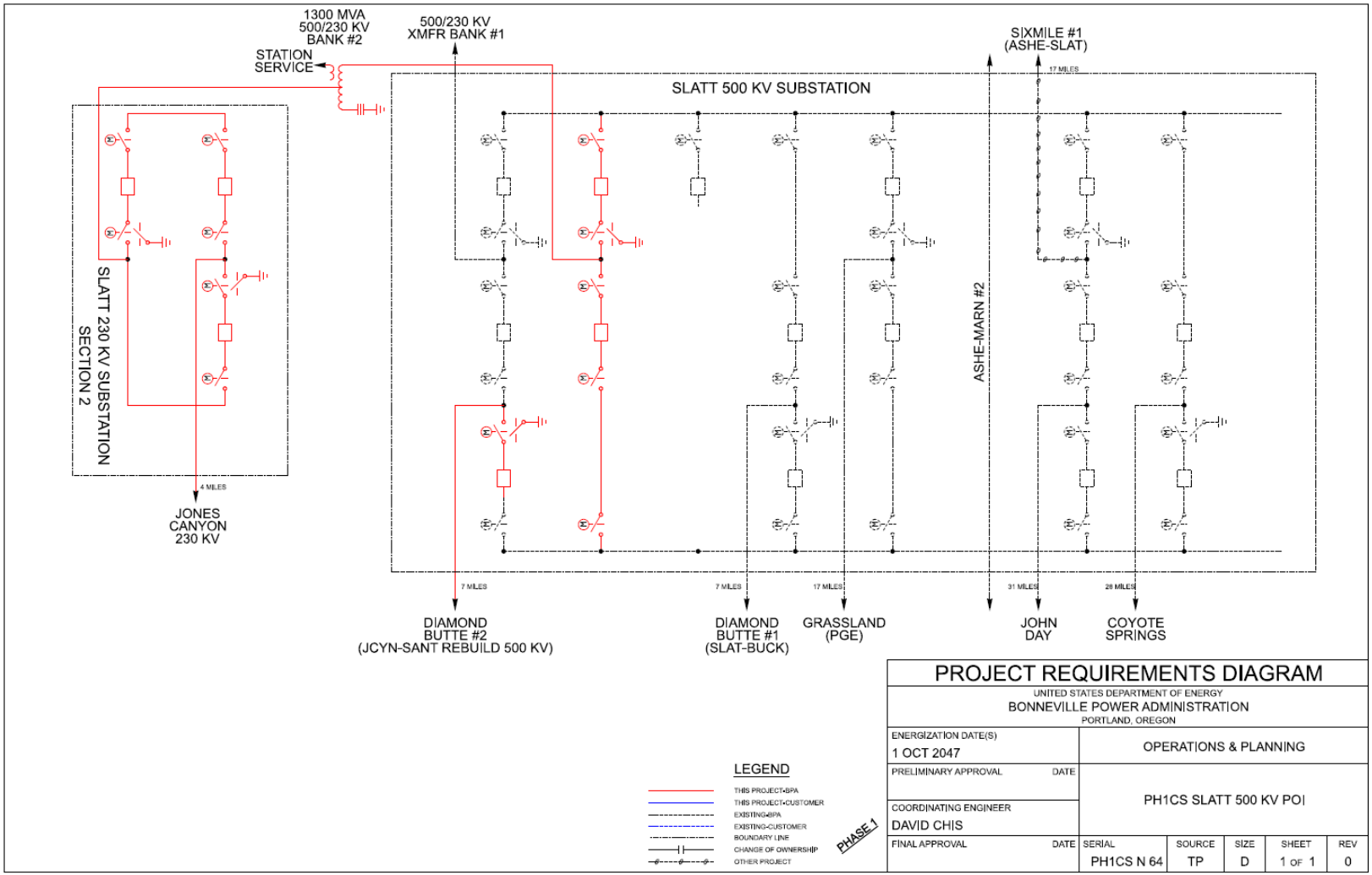
10.4 Pinegrove POI



10.5 SPB1 and SPB2: Jones Canyon-Santiam 500 kV rebuilds



10.6 Slatt Station Work



11 Cost and Schedules

11.1 Estimated Schedule

The schedule is dependent on,

1) The acquisition of long lead time equipment,
2) BPA's ability to fit the project into its construction work plan, and
3) The customer's ability to obtain any necessary permits for the project and progress through the interconnection process in a timely manner.

A non-binding good faith estimated time to construct is 3-5 years for substation equipment and 7-10 years for transmission line upgrades after design activities begin. The estimated time to construct a plan of service is refined through the subsequent stages of the interconnection process.

BPA will not begin construction of a plan of service required for interconnection until the Interconnection Customer has executed a Standard Large Generator Interconnection Agreement (LGIA). BPA's decision to offer an LGIA is dependent on the completion of an environmental compliance decision under the National Environmental Policy Act (NEPA). BPA's environmental compliance decision under NEPA requires the Interconnection Customer to have obtained required permitting, certification, and environmental approvals for any facilities that BPA will not own.

11.2 Cost Estimates and Cost Allocations

The following are non-binding good faith estimates of cost based on previous estimates for similar projects. They represent only scopes of work that will be performed by BPA. Costs for any work being performed by the customer are not included. These costs include overhead rates for BPA labor & materials, and for contract labor & materials. The costs also include a 40% contingency. Not included in these estimates are costs for land acquisition, permitting and environmental mitigations. More accurate estimates based on scoping for the project will be available at the completion of the Interconnection Facilities Study.

Detailed Communications and Control (C&C) equipment required for each generation facility and interconnection into the BPA transmission system at the BPA-TS POI substation will be determined in an Interconnection Facilities Study. The TCS PH1 estimates C&C equipment scope and costs based on whether required upgrades fall into the following categories:

1) Customer Station ($5M): for BPA-required C&C equipment at a customer's collector site (RAS, Meters, relays, Control House space)
2) Minor ($5M): BES additions to an existing BPA station
3) Moderate ($10M): BES creation of a new BPA substation near existing C&C infrastructure, or significant expansion of an existing BPA substation
4) Significant ($15M): BES creation of BPA substation very remote from any existing C&C infrastructure.

When multiple projects owned by affiliated entities interconnected at the same POI, BPA assumed the IRs to be sharing a tie line where applicable. These IRs were treated as a single customer for per capita cost allocation of station equipment Network Upgrades as outlined in Section 4.2.3(a) of the LGIP. In the below cost estimate tables, this treatment is identified by the senior-queued IR being allocated the full per capita cost share and the junior-queued IR being allocated 0% of costs for station equipment Network Upgrades. IRs assumed to be sharing a tie line are identified in the one-line drawings provided in section 10 of this report.

11.3 POI 1: Diamond Butte 500

Table 11.1 POI 1 – Diamond Butte 500 kV Station Cost Estimate

Estimate Summary

Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Diamond Butte POI		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		2	$23,416,000	$19,228,000	$3,620,000	$0	$116,000	$46,380,000
C&C	C&C: Other Placeholder (Fiber)		1	$0	$0	$0	$0	$8,000,000	$8,000,000
C&C	C&C: Collector Stations		5	$0	$0	$0	$0	$25,000,000	$25,000,000
C&C	C&C: BPA station (Med.)		1	$0	$0	$0	$0	$10,000,000	$10,000,000
Contingency %	40%		Subtotal:	$23,416,000	$19,228,000	$3,620,000	$0	$43,116,000	$89,380,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$9,366,400	$7,691,200	$1,448,000	$0	$17,246,400	$35,752,000
	26%	9%	Overhead:	$8,523,424	$2,422,728	$1,317,680	$0	$15,694,224	$27,958,056
Grand Total:	*(rounded to two significant figures)*			**$41,000,000**	**$29,000,000**	**$6,400,000**	**$0**	**$76,000,000**	**$150,000,000**

[1] Estimate does not include Slatt-Buckley Series Capacitor retirement costs.

Table 11.2 POI 1 – Diamond Butte 500 kV POI Cost Allocation

Queue #	Requested MW	Station Equipment	Station Equipment Allocation (Per Capita)	Station Equipment Cost	Non-Station Equipment (1)	Non-Station Equipment (1) Allocation (Per MW)	Non-Station Equipment (1) Cost	Non-Station Equipment (2)	Non-Station Equipment (2) Allocation (Per MW)	Non-Station Equipment (2) Cost	Non-Network Direct Assigned	Direct Assigned Cost	Cost Assignment
G0768	300	Diamond Butte 500kV Expansion w/ Comm Expansion	33.33%	$105M	SPB1: Jones Canyon - Santiam 500kV Rebuild #1 (Slatt - Buckley Segment)	5.76%	$690M	SPB3: Slatt-Buckley 500kV loop-in w/DBUT and ROSE ASHE-MARN #2 500kV loop-in to BUCK	6.061%	$116M	Collector Station C&C and RAS	$9M	$91M
G0941	0		0.00%			0.00%			0.000%		Collector Station C&C and RAS	$9M	$9M
G0972	300		33.33%			5.76%			6.061%		Collector Station C&C and RAS	$9M	$91M
G0974	250		0.00%			4.80%			5.051%		Collector Station C&C and RAS	$9M	$48M
G1041	500		33.33%			9.60%			10.101%		Collector Station C&C and RAS	$9M	$122M

11.4 POI 2: Rosebush 500

Table 11.3 POI 2 – Rosebush 500 kV Station Cost Estimate

Estimate Summary									
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Rosebush POI station work (500 kV yard)		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		1.5	$17,562,000	$14,421,000	$2,715,000	$0	$87,000	$34,785,000
C&C	C&C: Collector Stations		5	$0	$0	$0	$0	$25,000,000	$25,000,000
C&C	C&C: BPA station (Medium)		1	$0	$0	$0	$0	$10,000,000	$10,000,000
Contingency %	40%		Subtotal:	$17,562,000	$14,421,000	$2,715,000	$0	$35,087,000	$69,785,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$7,024,800	$5,768,400	$1,086,000	$0	$14,034,800	$27,914,000
	26%	9%	Overhead:	$6,392,568	$1,817,046	$988,260	$0	$12,771,668	$21,969,542
Grand Total:	*(rounded to two significant figures)*			**$31,000,000**	**$22,000,000**	**$4,800,000**	**$0**	**$62,000,000**	**$120,000,000**

Table 11.4 POI 2 – Rosebush 230 kV Station Cost Estimate

Estimate Summary									
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Rosebush POI station work (230kV yard)		-	-	-	-	-	-	-
ST-070-39-12	230kV New POI: 3x PCB, 3pos, 2x bay BAAH		1	$18,348,000	$12,624,000	$4,830,000	$0	$118,000	$35,920,000
ST-070-124-6	230kV Add: 1x bay 2pos BAAH		1.5	$12,345,000	$7,542,000	$1,728,000	$0	$27,000	$21,642,000
C&C	C&C: Collector Stations		4	$0	$0	$0	$0	$20,000,000	$20,000,000
Contingency %	40%		Subtotal:	$30,693,000	$20,166,000	$6,558,000	$0	$20,145,000	$77,562,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$12,277,200	$8,066,400	$2,623,200	$0	$8,058,000	$31,024,800
	26%	9%	Overhead:	$11,172,252	$2,540,916	$2,387,112	$0	$7,332,780	$23,433,060
Grand Total:	*(rounded to two significant figures)*			**$54,000,000**	**$31,000,000**	**$11,600,000**	**$0**	**$36,000,000**	**$130,000,000**

Table 11.5 POI 2 – Rosebush 500 kV Non-Station Cost Estimate

Estimate Summary									
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Rosebush POI non-station work (500/230 bank)		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		0.5	$5,854,000	$4,807,000	$905,000	$0	$29,000	$11,595,000
ST-070-141-6	500kV: 1x 525/241 433 MVA bank (1ph)		3	$24,306,000	$28,137,000	$4,176,000	$6,384,000	$0	$63,003,000
ST-070-124-6	230kV Add: 1x bay 2pos BAAH		0.5	$4,115,000	$2,514,000	$576,000	$0	$9,000	$7,214,000
Contingency %	40%		Subtotal:	$34,275,000	$35,458,000	$5,657,000	$6,384,000	$38,000	$81,812,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$13,710,000	$14,183,200	$2,262,800	$2,553,600	$15,200	$32,724,800
	26%	9%	Overhead:	$12,476,100	$4,467,708	$2,059,148	$804,384	$13,832	$19,821,172
Grand Total:	*(rounded to two significant figures)*			**$60,000,000**	**$54,000,000**	**$10,000,000**	**$9,700,000**	**$67,000**	**$130,000,000**

Table 11.6 POI 2 – Rosebush 500 kV Cost Allocation

Queue #	Requested MW	Station Equipment	Station Equipment Allocation (Per Capita)	Station Equipment Cost	Additional Non-Station Cost (Table 11.8)	Non-Network Direct Assigned	Direct Assigned Cost	Cost Assignment
G0787	600	Rosebush 500kV Substation Expansion w/ Comm Expansion	33.33%	$75M	$42M	Collector Station C&C and RAS	$9M	$76M
G0791	650		0.00%		$87M	Collector Station C&C and RAS	$9M	$96M
G0795	650		33.33%		$90M	Collector Station C&C and RAS	$9M	$124M
G0797	650		0.00%		$90M	Collector Station C&C and RAS	$9M	$99M
G0864	500		33.33%		$69M	Collector Station C&C and RAS	$9M	$103M

Table 11.7 POI 2 – Rosebush 230 kV Cost Allocation

Queue #	Requested MW	Station Equipment	Station Equipment Allocation (Per Capita)	Station Equipment Cost	Non-Station Equipment (1)	Non-Station Equipment (1) Allocation (Per MW)	Non-Station Equipment (1) Cost	Additional Non-Station Cost (Table 11.8)	Non-Network Direct Assigned	Direct Assigned Cost	Cost Assignment
G0728	210	New Rosebush 230kV Substation w/ New Comms	25.00%	$94M	New Rosebush 500/230kV Transformer	21.83%	$130M	$5M	Collector Station C&C and RAS	$9M	$66M
G0989	275		25.00%			28.59%		$38M	Collector Station C&C and RAS	$9M	$108M
G0994	277		25.00%			28.79%		$38M	Collector Station C&C and RAS	$9M	$108M
G1002	200		25.00%			20.79%		$28M	Collector Station C&C and RAS	$9M	$87M

Table 11.8 POI 2 – Rosebush 500 kV and 230 kV Non-Station Cost Allocation

Queue #	Requested MW	MW Split	Plan of Service	MW Enabled	Non-Station Equipment Allocation	Non-Station Equipment Cost	Cost Assignment
G0728	210	210	SPB3: Slatt-Buckley 500kV loop-in w/DBUT and ROSE ASHE-MARN #2 500kV loop-in to BUCK	550	4.24%	$116M	$5M
G0787	600	340			6.87%		$42M
		260	SPB1: Jones Canyon - Santiam 500kV Rebuild #1 (Slatt - Buckley Segment)	810	4.99%	$690M	
G0791	650	550			10.56%		$87M
		100	SPB2: Jones Canyon - Santiam 500kV Rebuild #1 (Buckley-Marion Segment)	2840	1.75%	$790M	
G0795	650	650			11.40%		$90M
G0797	650	650			11.40%		$90M
G0864	500	500			8.77%		$69M
G0989	275	275			4.82%		$38M
G0994	277	277			4.86%		$38M
G1002	200	200			3.51%		$28M

11.5 POI 3: Buckley 500

Table 11.9 POI 3 –Buckley 500 kV Station Cost Estimate

Estimate Summary

Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Buckley POI (station work)		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		2	$23,416,000	$19,228,000	$3,620,000	$0	$116,000	$46,380,000
C&C	C&C: Collector Stations		8	$0	$0	$0	$0	$40,000,000	$40,000,000
C&C	C&C: BPA station (Low)		1	$0	$0	$0	$0	$5,000,000	$5,000,000
Contingency %	40%		Subtotal:	$23,416,000	$19,228,000	$3,620,000	$0	$45,116,000	$91,380,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$9,366,400	$7,691,200	$1,448,000	$0	$18,046,400	$36,552,000
	26%	9%	Overhead:	$8,523,424	$2,422,728	$1,317,680	$0	$16,422,224	$28,686,056
Grand Total:	*(rounded to two significant figures)*			**$41,000,000**	**$29,000,000**	**$6,400,000**	**$0**	**$80,000,000**	**$160,000,000**

[1] Estimate does not include Slatt-Buckley Series Capacitor retirement costs.

Table 11.10 POI 3 –Buckley 500 kV Cost Allocation

Queue #	Requested MW	Station Equipment	Station Equipment Allocation (Per Capita)	Station Equipment Cost	Non-Station Equipment (1)	Non-Station Equipment (1) Allocation (Per MW)	Non-Station Equipment (1) Cost	Non-Station Equipment (2)	Non-Station Equipment (2) Allocation (Per MW)	Non-Station Equipment (2) Cost	Non-Station Equipment (3)	Non-Station Equipment (3) Allocation (Per MW)	Non-Station Equipment (3) Cost	Non-Network Direct Assigned	Direct Assigned Cost	Cost Assignment
G0699	600	Buckley 500kV Substation Expansion w/ Comm Expansion	33.33%	$88M	SPB1: Jones Canyon - Santiam 500kV Rebuild #1 (Slatt - Buckley Segment)	11.52%	$690M	SPB2: Jones Canyon - Santiam 500kV Rebuild #1 (Buckley-Marion Segment)	10.52%	$790M	SPB3: Slatt-Buckley 500kV loop-in w/DBUT and ROSE ASHE-MARN #2 500kV loop-in to BUCK	10.52%	$116M	Collector Station C&C and RAS	$9M	$213M
G0825	400		33.33%			7.68%			7.02%			7.02%		Collector Station C&C and RAS	$9M	$155M
G0849	400		0.00%			7.68%			7.02%			7.02%		Collector Station C&C and RAS	$9M	$126M
G0850	400		0.00%			7.68%			7.02%			7.02%		Collector Station C&C and RAS	$9M	$126M
G0865	200		33.33%			3.84%			3.51%			3.51%		Collector Station C&C and RAS	$9M	$97M
G0866	300		0.00%			5.76%			5.26%			5.26%		Collector Station C&C and RAS	$9M	$96M
G0867	100		0.00%			1.92%			1.75%			1.75%		Collector Station C&C and RAS	$9M	$38M
G0946	650		0.00%			12.48%			11.40%			11.40%		Collector Station C&C and RAS	$9M	$198M

11.6 POI 4: Pinegrove 500

Table 11.11 POI 4 – Pinegrove 500 kV Station Cost Estimate

Estimate Summary

Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Pinegrove POI		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		1	$11,708,000	$9,614,000	$1,810,000	$0	$58,000	$23,190,000
C&C	C&C: Collector Stations		2	$0	$0	$0	$0	$10,000,000	$10,000,000
C&C	C&C: BPA station (Low)		1	$0	$0	$0	$0	$5,000,000	$5,000,000
Contingency %	40%		Subtotal:	$11,708,000	$9,614,000	$1,810,000	$0	$15,058,000	$38,190,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$4,683,200	$3,845,600	$724,000	$0	$6,023,200	$15,276,000
	26%	9%	Overhead:	$4,261,712	$1,211,364	$658,840	$0	$5,481,112	$11,613,028
Grand Total:	*(rounded to two significant figures)*			**$21,000,000**	**$15,000,000**	**$3,200,000**	**$0**	**$27,000,000**	**$65,000,000**

Table 11.12 POI 4 – Pinegrove 500 kV Cost Allocation

Queue #	Requested MW	Station Equipment	Station Equipment Allocation (Per Capita)	Station Equipment Cost	Non-Station Equipment	Non-Station Equipment Allocation (Per MW)	Non-Station Equipment Cost	Non-Network Direct Assigned	Direct Assigned Cost	Cost Assignment
G0838	150	Pinegrove 500kV Substation Expansion w/ Comm Expansion	100.00%	$47M	N/A	N/A	N/A	Collector Station C&C and RAS	$9M	$56M
G0839	150		0.00%			N/A		Collector Station C&C and RAS	$9M	$9M

11.7 SPB1: Jones Canyon-Santiam 500 kV Rebuild #1 (Slatt-Buckley Segment)

Table 11.13 SPB1 – Jones Canyon-Santiam 500 kV Rebuild #1 (Slatt-Buckley Segment) Cost Estimate

Estimate Summary

Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Jones Canyon-Santiam Rebuild #1 (Slatt-Buckley Segment)		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		1.5	$17,562,000	$14,421,000	$2,715,000	$0	$87,000	$34,785,000
ST-070-141-6	500kV: 1x 525/241 433 MVA bank (1ph)		3	$48,612,000	$56,274,000	$8,352,000	$12,768,000	$0	$126,006,000
ST-070-124-6	230kV Add: 1x bay 2pos BAAH		1	$8,230,000	$5,028,000	$1,152,000	$0	$18,000	$14,428,000
ST-040-19-10	230kV 1-mile conductor, new towers		4	$4,424,000	$2,176,000	$776,000	$0	$0	$7,376,000
ST-040-54-8	500kV 1-mile conductor, new towers		53	$96,354,000	$79,076,000	$51,410,000	$0	$0	$226,840,000
C&C	C&C: BPA station (Low)		1	$0	$0	$0	$0	$5,000,000	$5,000,000
Contingency %	40%		Subtotal:	$175,182,000	$156,975,000	$64,405,000	$12,768,000	$5,105,000	$414,435,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$70,072,800	$62,790,000	$25,762,000	$5,107,200	$2,042,000	$165,774,000
	26%	9%	Overhead:	$63,766,248	$19,778,850	$23,443,420	$1,608,768	$1,858,220	$110,455,506
Grand Total:	*(rounded to two significant figures)*			**$310,000,000**	**$240,000,000**	**$114,000,000**	**$19,000,000**	**$9,000,000**	**$690,000,000**

[1] Estimate does not include the Jones Canyon-Santiam 230 kV Line teardown costs.

Table 11.14 SPB1 – Jones Canyon-Santiam 500 kV Rebuild #1 (Slatt-Buckley Segment) Cost Allocation

Queue #	MW Enabled	Percent Allocation	Cost Allocation
G0699	600	11.516%	$ 79,462,572
G0768	300	5.758%	$ 39,731,286
G0787	260	4.990%	$ 34,433,781
G0791	550	10.557%	$ 72,840,691
G0825	400	7.678%	$ 52,975,048
G0849	400	7.678%	$ 52,975,048
G0850	400	7.678%	$ 52,975,048
G0865	200	3.839%	$ 26,487,524
G0866	300	5.758%	$ 39,731,286
G0867	100	1.919%	$ 13,243,762
G0946	650	12.476%	$ 86,084,453
G0972	300	5.758%	$ 39,731,286
G0974	250	4.798%	$ 33,109,405
G1041	500	9.597%	$ 66,218,810
Total:	5210	100%	$ 690,000,000

11.8 SPB2: Jones Canyon-Santiam 500 kV Rebuild #2 (Buckley-Marion Segment)

Table 11.15 SPB2 – Jones Canyon-Santiam 500 kV Rebuild #2 (Buckley-Marion Segment) Cost Estimate

Estimate Summary

Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Jones Canyon-Santiam Rebuild #1 (Buckley-Marion Segment)		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		1	$11,708,000	$9,614,000	$1,810,000	$0	$58,000	$23,190,000
ST-040-54-8	500kV 1-mile conductor, new towers		101	$183,618,000	$150,692,000	$97,970,000	$0	$0	$432,280,000
C&C	C&C: Other Placeholder (Fiber)		1	$0	$0	$0	$0	$16,000,000	$16,000,000
Contingency %	40%		Subtotal:	$195,326,000	$160,306,000	$99,780,000	$0	$16,058,000	$471,470,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$78,130,400	$64,122,400	$39,912,000	$0	$6,423,200	$188,588,000
	26%	9%	Overhead:	$71,098,664	$20,198,556	$36,319,920	$0	$5,845,112	$133,462,252
Grand Total:	*(rounded to two significant figures)*			**$340,000,000**	**$240,000,000**	**$180,000,000**	**$0**	**$28,000,000**	**$790,000,000**

[1] Estimate does not include the Jones Canyon-Santiam 230 kV Line teardown costs.

Table 11.16 SPB2 – Jones Canyon-Santiam 500 kV Rebuild #2 (Buckley-Marion Segment) Cost Allocation

Queue #	MW Enabled	Percent Allocation	Cost Allocation
G0699	600	10.523%	$ 83,128,727
G0791	100	1.754%	$ 13,854,788
G0795	650	11.400%	$ 90,056,121
G0797	650	11.400%	$ 90,056,121
G0825	400	7.015%	$ 55,419,151
G0849	400	7.015%	$ 55,419,151
G0850	400	7.015%	$ 55,419,151
G0864	500	8.769%	$ 69,273,939
G0865	200	3.508%	$ 27,709,576
G0866	300	5.261%	$ 41,564,363
G0867	100	1.754%	$ 13,854,788
G0946	650	11.400%	$ 90,056,121
G0989	275	4.823%	$ 38,100,666
G0994	277	4.858%	$ 38,377,762
G1002	200	3.508%	$ 27,709,576
Total:	5702	100%	$ 790,000,000

11.9 SPB3: Slatt-Buckley #1 500 kV and Ashe-Marion #2 500 kV Loop-Ins

Table 11.17 SPB3 – Slatt-Buckley 500 kV Loop-In to Diamond Butte and Rosebush Cost Estimate

Estimate Summary

Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	SLAT-BUCK 500 kV loop-in (DBUTE, ROSE) non-station project		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		2	$23,416,000	$19,228,000	$3,620,000	$0	$116,000	$46,380,000
Contingency %	40%		Subtotal:	$23,416,000	$19,228,000	$3,620,000	$0	$116,000	$46,380,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$9,366,400	$7,691,200	$1,448,000	$0	$46,400	$18,552,000
	26%	9%	Overhead:	$8,523,424	$2,422,728	$1,317,680	$0	$42,224	$12,306,056
Grand Total:	*(rounded to two significant figures)*			**$41,000,000**	**$29,000,000**	**$6,400,000**	**$0**	**$200,000**	**$77,000,000**

[1] Estimate does not include Slatt-Buckley Series Capacitor retirement costs.

Table 11.18 SPB3 – Ashe-Marion #2 500 kV Loop-In to Buckley Cost Estimate

Estimate Summary

Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	ASHE-MARN 500 kV loop-in (BUCK) non-station project		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH		1	$11,708,000	$9,614,000	$1,810,000	$0	$58,000	$23,190,000
Contingency %	40%		Subtotal:	$11,708,000	$9,614,000	$1,810,000	$0	$58,000	$23,190,000
Overhead %	Labor	Materials & Turnkey	Contingency:	$4,683,200	$3,845,600	$724,000	$0	$23,200	$9,276,000
	26%	9%	Overhead:	$4,261,712	$1,211,364	$658,840	$0	$21,112	$6,153,028
Grand Total:	*(rounded to two significant figures)*			**$21,000,000**	**$15,000,000**	**$3,200,000**	**$0**	**$102,000**	**$39,000,000**

Table 11.19 SPB3 – Slatt-Buckley 500 kV and Ashe-Marion #2 Loop-Ins Cost Allocation

Queue #	MW Enabled	Percent Allocation	Cost Allocation
G0699	600	12.121%	$ 14,060,606
G0728	210	4.242%	$ 4,921,212
G0768	300	6.061%	$ 7,030,303
G0787	340	6.869%	$ 7,967,677
G0825	400	8.081%	$ 9,373,737
G0849	400	8.081%	$ 9,373,737
G0850	400	8.081%	$ 9,373,737
G0865	200	4.040%	$ 4,686,869
G0866	300	6.061%	$ 7,030,303
G0867	100	2.020%	$ 2,343,434
G0946	650	13.131%	$ 15,232,323
G0972	300	6.061%	$ 7,030,303
G0974	250	5.051%	$ 5,858,586
G1041	500	10.101%	$ 11,717,172
Total:	4950	100%	$ 116,000,000