

TRANSMISSION PLANNING

GENERATION INTERCONNECTION REPORT

2025 TRANSITION CLUSTER STUDY (TCS)

CLUSTER AREA: LOWER COLUMBIA #2, PHASE 1 Revision 0

(25TCS CA LC2 P1-0)

G0711	G0712	G0773
G0774	G0792	G0796
G0843	G0844	G0862
G0863	G0932	G0933
G0947	G0948	G0979
G0980	G1031	G1036

January 2026

**PREPARED BY:
BPA Transmission Planning**



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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 Tarriff (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 2 (LC2) is comprised of Interconnection Requests (IRs) in Hood River, Wasco and Sherman Counties in the state of Oregon, and Klickitat County in the state of Washington. It includes 18 total IRs seeking a total combined 6,723 MW of Interconnection Service and 5,860 MW of grid-charging.

Table 1.1: Participants in 2025 TCS PH1 CA LC2

GI #	Gen Type	Studied POI	MW Requested (Generating)	MW Requested (Charging)	Plant Location (County, State)	Requested ISD
G0711	Solar	John Day Annex 230	300	0	Sherman, OR	Jan 2027
G0712	Solar	John Day Annex 230	448	0	Sherman, OR	Jan 2027
G0773	Solar, BESS	Big Eddy 500	650	-650	Wasco, OR	Dec 2028
G0774	BESS	Big Eddy 500	650	-650	Wasco, OR	Dec 2028
G0792	BESS	Big Eddy 500	650	-650	Wasco, OR	Jan 2029
G0796	BESS	Big Eddy 500	650	-650	Sherman, OR	Jan 2029
G0843	Solar, BESS	Crider Valley 500	120	-60	Klickitat, WA	Jan 2027
G0844	Solar, BESS	Crider Valley 500	280	0	Klickitat, WA	Jan 2027
G0862	BESS	John Day Annex 230	0	-400	Sherman, OR	May 2027
G0863	BESS	John Day Annex 230	0	-500	Sherman, OR	May 2027
G0932	Solar, BESS	Crider Valley 500	400	-400	Klickitat, WA	Dec 2029
G0933	Solar, BESS	Crider Valley 500	400	-400	Klickitat, WA	Dec 2029
G0947	BESS	Big Eddy 500	650	-650	Wasco, OR	Dec 2028
G0948	BESS	Big Eddy 500	650	-650	Wasco, OR	Dec 2028
G0979	Solar, BESS	Rock Creek 230	200	-200	Klickitat, WA	Dec 2029
G0980	Wind	John Day Annex 230	191	0	Sherman, OR	Sep 2028
G1031	Solar	Crider Valley 500	250	0	Klickitat, WA	May 2028
G1036	Wind	Parkdale 230	234	0	Hood River, OR	Mar 2028

Studied POI locations and requirements for each IR are summarized in Table 1.2 and Table 1.3.

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



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 CA LC2 Requirements

GI #	POI	Total GI Scope	Total Cost	Contingent Facilities
G1036	Parkdale 230	Construct 230 kV ring bus, 4 230 kV breakers and associated disconnects Participation in Big Eddy RAS Algorithms	\$90M	(a)Big Eddy-Quenett Ck 230 kV Line Upgrade (b)TSEP: Big Eddy-Chemawa 500 kV Rebuild
G0773 G0774	Big Eddy 500	1x 500 kV gen-tie terminal (shared gen-tie), Participation in WOJ RAS algorithms	\$47M	(a)Big Eddy-Quenett Ck 230 kV Line Upgrade (b) TSEP: Big Eddy-Chemawa 500 kV Rebuild (c)G0608 Project
G0792 G0796		1x 500 kV gen-tie terminal (shared gen-tie) Participation in WOJ RAS algorithms	\$47M	
G0947 G0948		1x 500 kV gen-tie terminal (shared gen-tie) Participation in WOJ RAS algorithms	\$47M	
G0711 G0863	John Day Annex 500,230	New 500 kV and 230 kV substation, 1x new 500/230 transformer, 1x 230 kV gen-tie terminal (shared) Participation in WOJ RAS algorithms	\$148M	(a) G0608 Project (JDAY station upgrades) (b)TSEP: Rock Creek-John Day rebuild
G0712 G0862		New 500 kV and 230 kV substation, 1x new 500/230 transformer, 1x 230 kV gen-tie terminal (shared) Participation in WOJ RAS algorithms	\$168M	
G0980		New 500 kV and 230 kV substation, 1x new 500/230 transformer, 1x 230 kV gen-tie terminal (shared) Participation in WOJ RAS algorithms	\$124M	
G0979	Rock Creek 230	1x 230 kV gen-tie terminal Participation in WOJ, RCCK RAS algorithms	\$30M	(a)TSEP: Rock Creek-John Day rebuild
G0843 G0844	Crider Valley 500	1x 500 kV gen-tie terminal (shared) Participation in WOJ, WOM RAS algorithms	\$50M	(a)G0585/G0645 Projects (Crider Valley station) (b)G0608 Project (JDAY station upgrades)
G0932 G0933		1x 500 kV gen-tie terminal (shared) Participation in WOJ, WOM RAS algorithms	\$50M	
G1031		1x 500 kV gen-tie terminal (shared) Participation in WOJ, WOM RAS algorithms	\$41M	

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 Generating 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-TS 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.

IRIR

The TCS PH1 assumes all Generating Facilities study were 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. Where applicable, these senior-queued resources were dispatched online as starting assumptions.

Table 4.1: Senior Queued IRs Assumed In-Service

Queue #	POI (owner)	MW Generating	MW Grid-Charging	Fuel Type
G0345	Big Eddy-Maupin (BPA)	201	0	Wind
G0367	Maupin (BPA)	202	0	Solar
G0368	Maupin (BPA)	101	0	Solar
G0585	Horse Heaven-Harvalum (BPA)	313	0	Wind
G0586	Big Horn (AVA)	100	0	Solar
G0589	Knight (BPA)	381	0	Solar
G0608	John Day (BPA)	1200	-1200	BESS
G0637	Knight (BPA)	190	-190	BESS
G0645	McNary-John Day (BPA)	200	0	Solar
G0676	Big Horn (AVA)	125	-125	Solar, BESS
G0717	Lund Hill (AVA)	75	-75	BESS
G0917	Juniper Canyon (repower)	0	0	Wind
G0978	Bigelow Canyon (surplus)	0	0	Wind
G1074	Juniper Canyon (repower)	0	0	Wind

4.3 Communications and 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

LC2 spans a portion of the Columbia Gorge, from Hood River to John Day. LC2 contains three 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 wind resources.

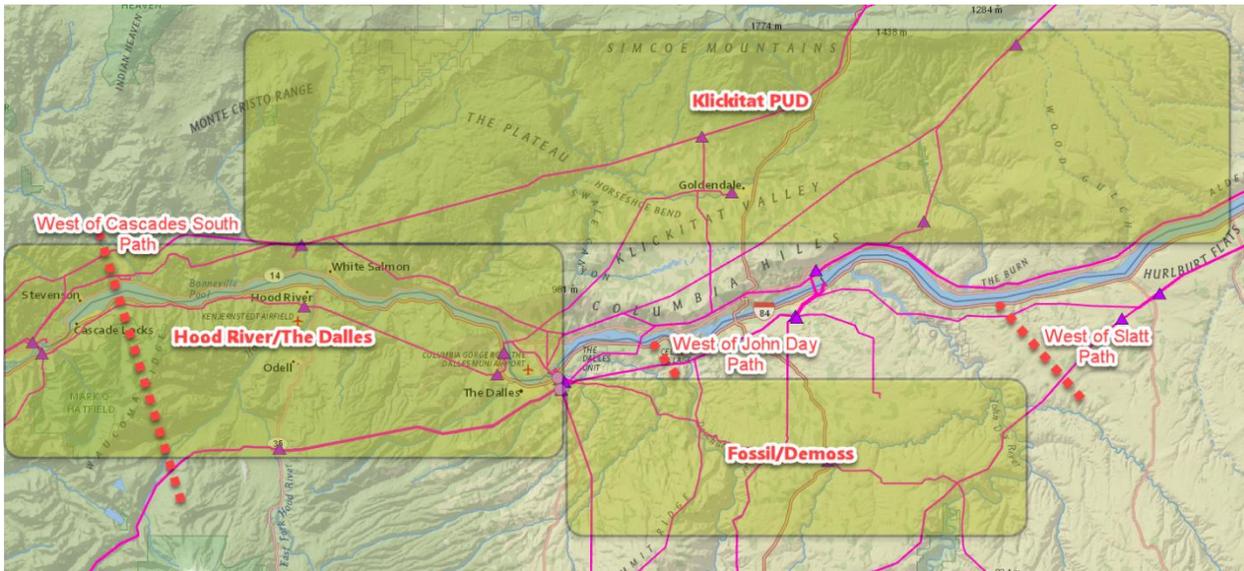


Figure 1: Lower Columbia Planning Area



The following maps illustrate the geographic coordinates for the IRs assessed in LC2. Locations of new stations are identified in green squares, existing stations are shown as purple triangles, senior queue GIs are shown as blue circles and transition cluster GIs are shown as red circles. IRs with the same coordinates appear as a single point.

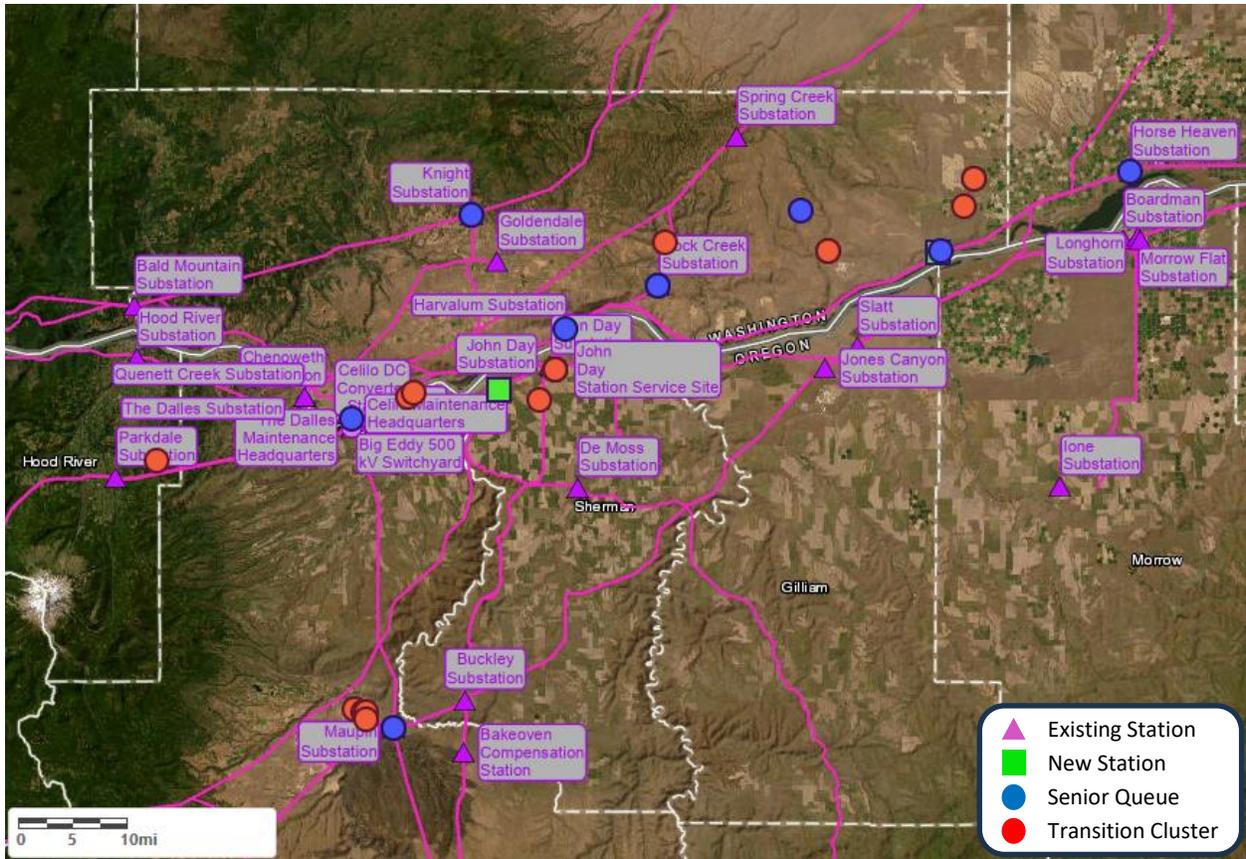


Figure 2: Lower Columbia LC2 Senior and Transition Cluster Area



5.1.1 Parkdale

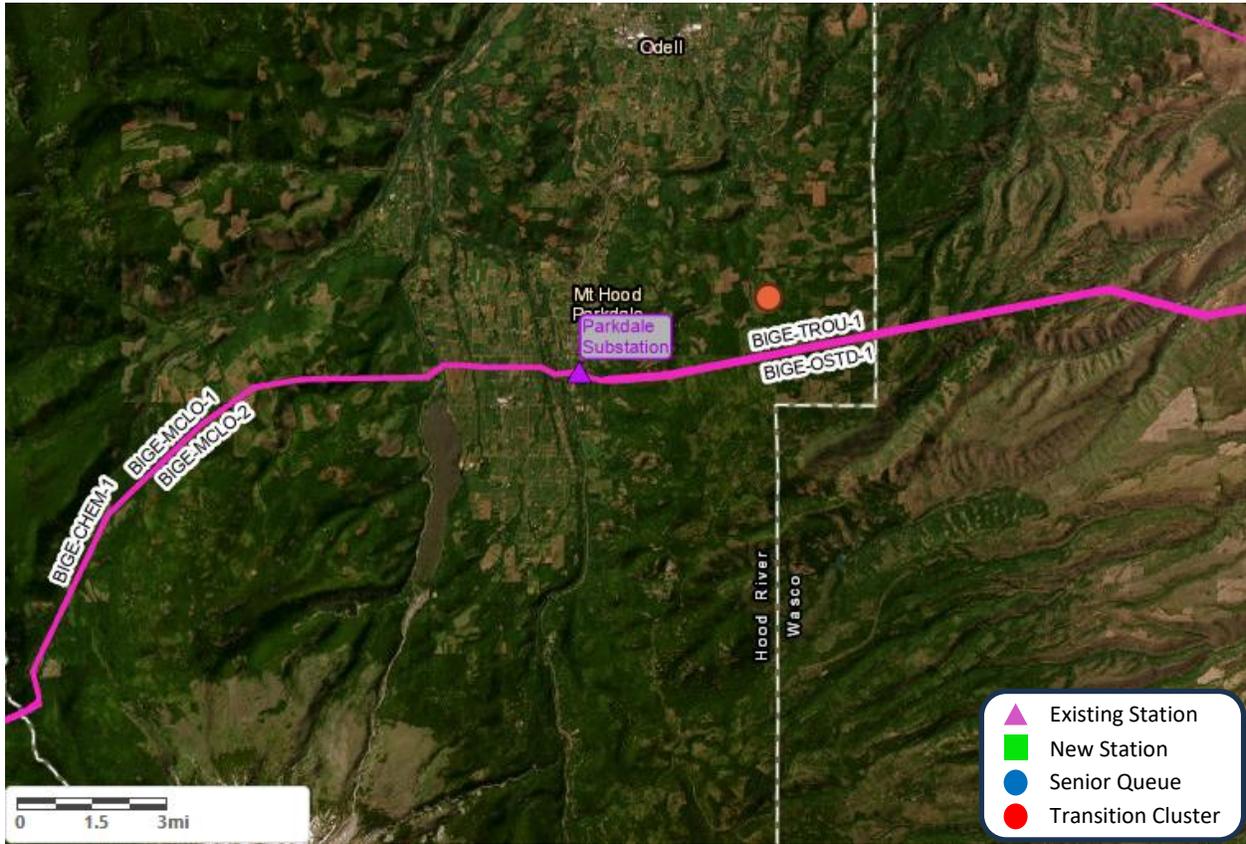


Figure 3: Parkdale POI Area



5.1.2 Big Eddy

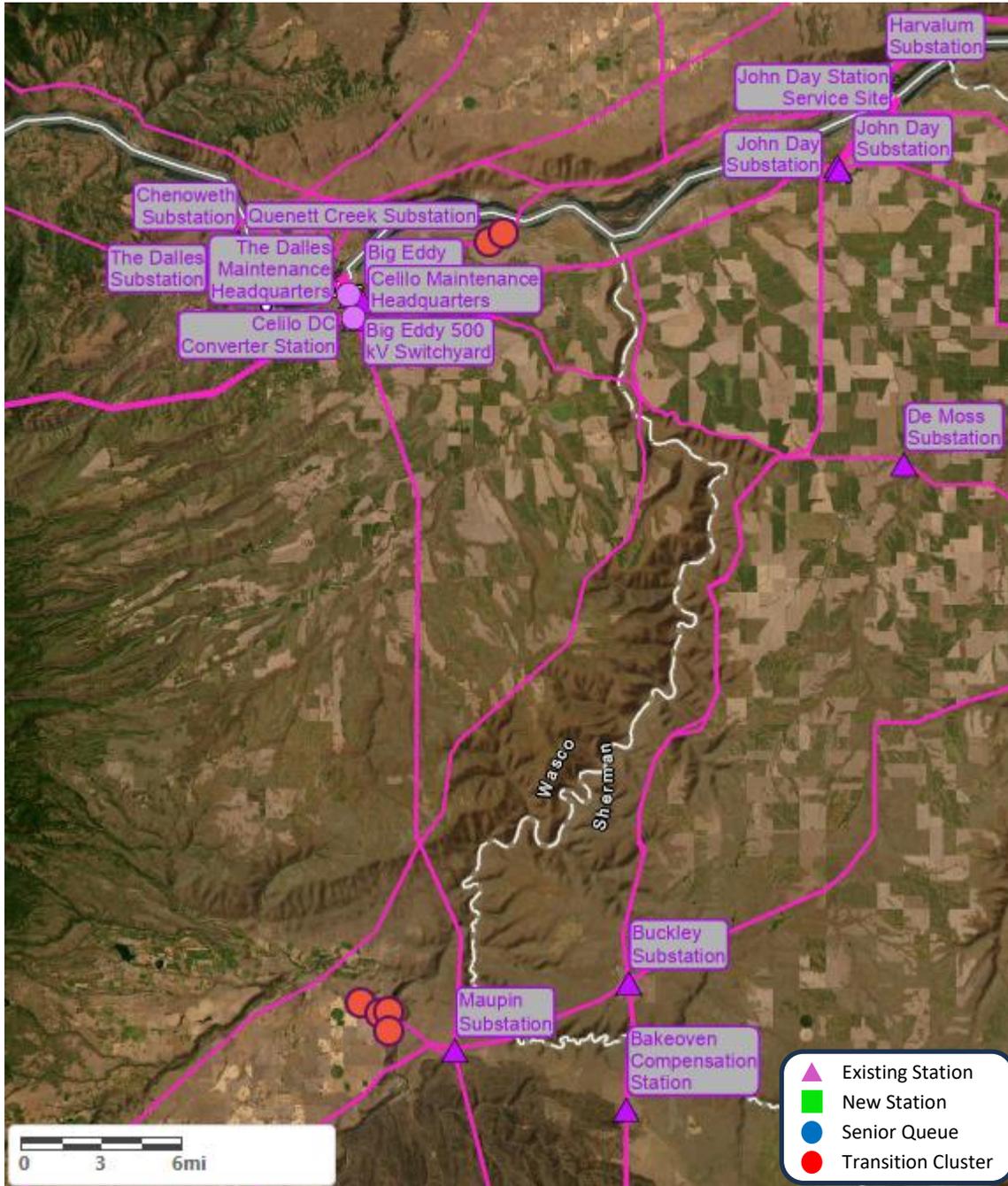


Figure 4: Big Eddy POI Area



5.1.3 John Day Annex

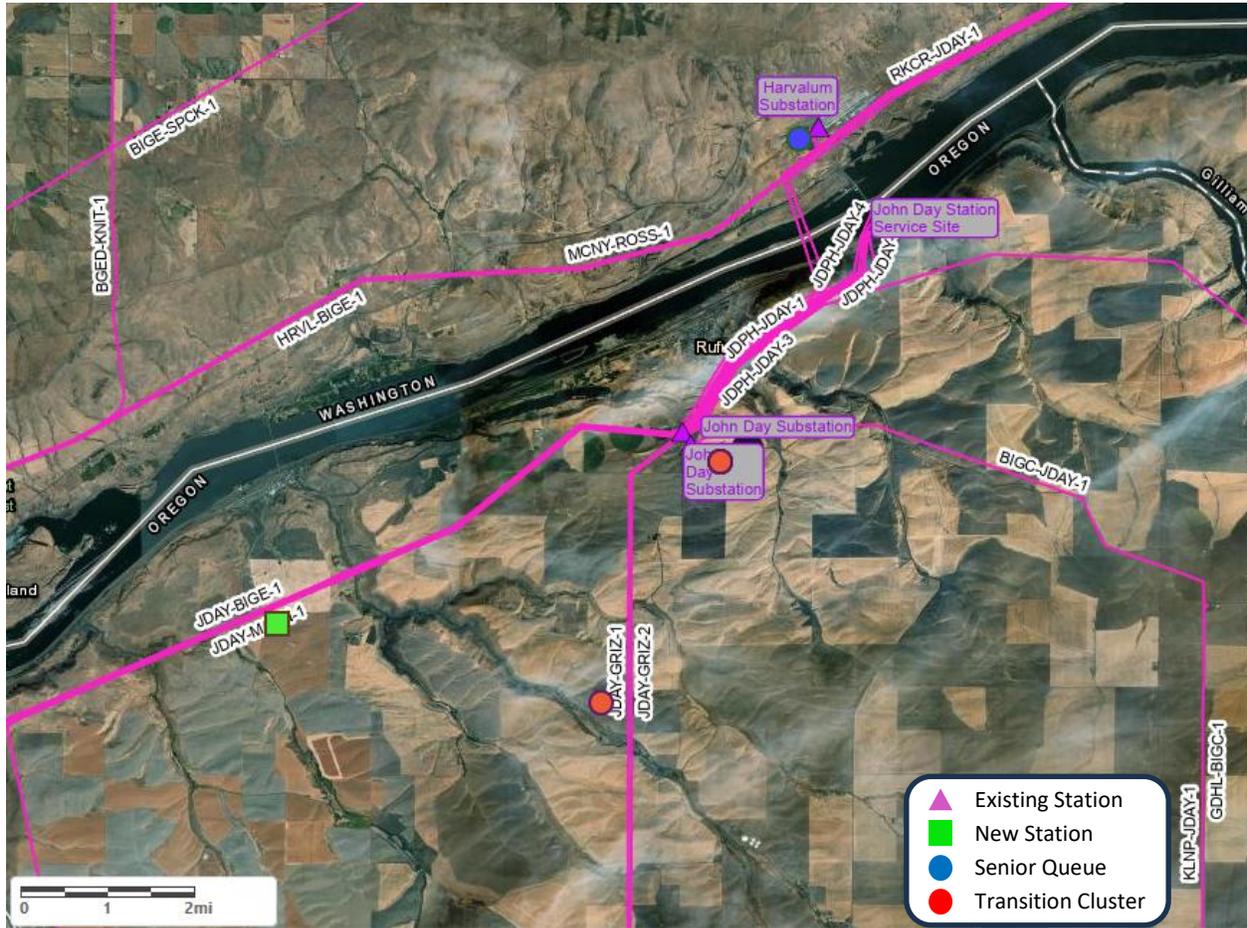


Figure 5: John Day Annex POI Area



5.1.4 Rock Creek

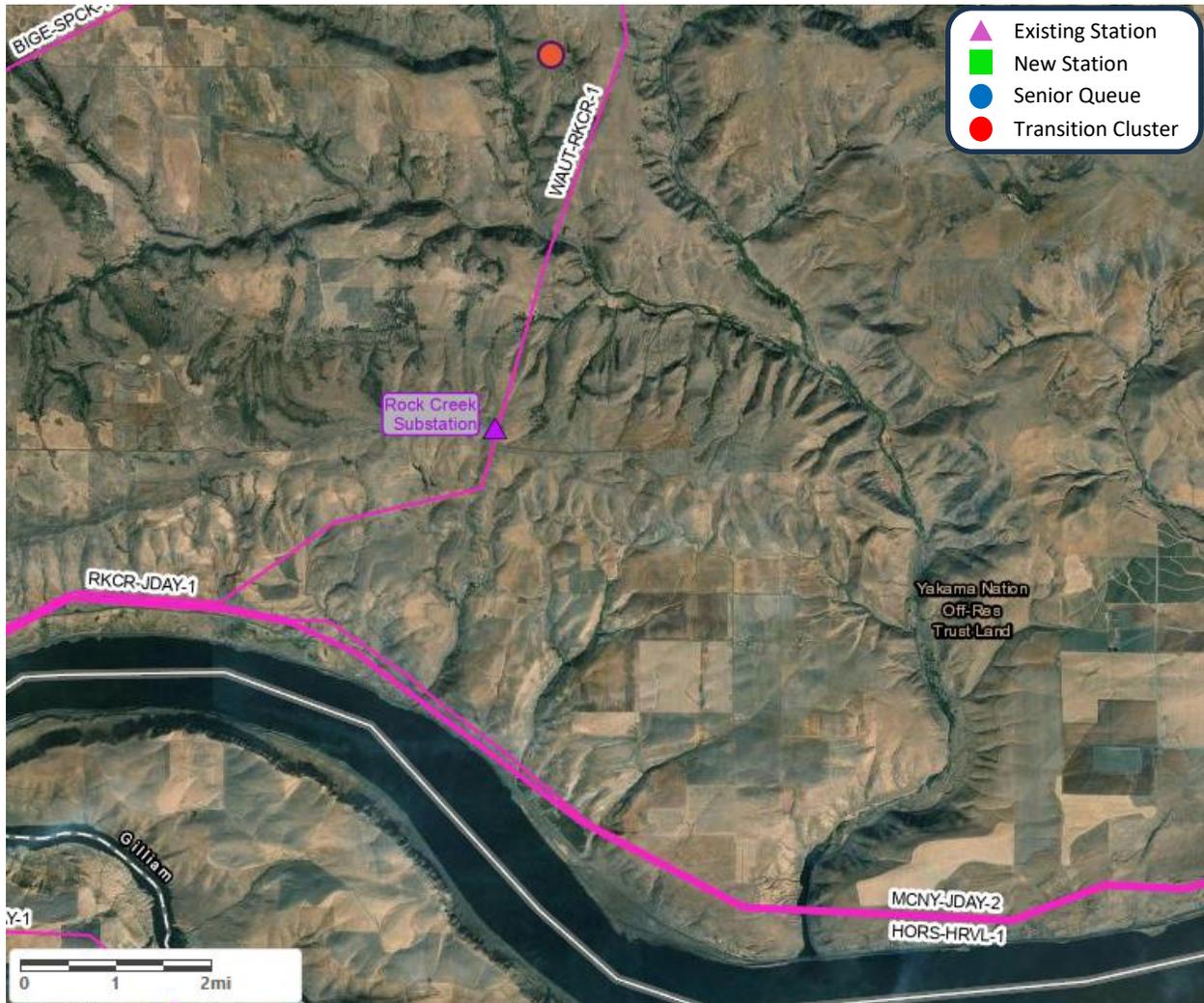


Figure 6: Rock Creek POI Area



5.1.5 Crider Valley

(Mid-line on McNary-John Day 500 kV Line)

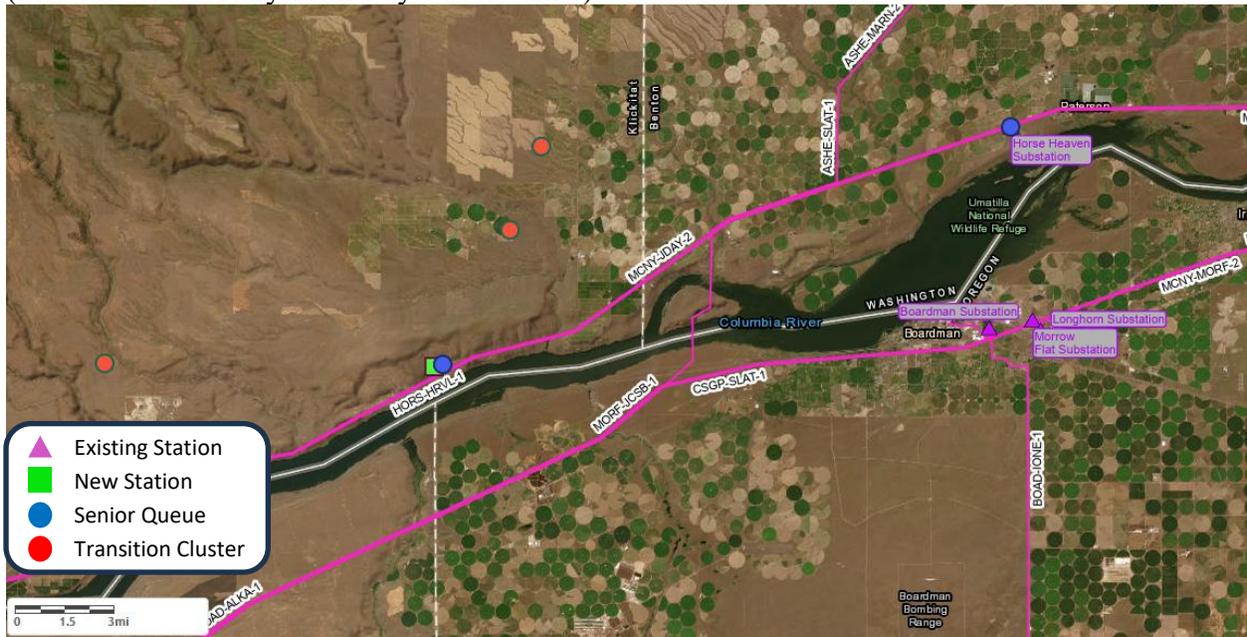


Figure 7: Crider Valley POI Area



5.2 Studied POIs

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

Table 5.1: Studied POI Locations

GI #	Gen Type	MW Generating	MW Grid-Charging	Studied POI
G0773	Solar, BESS	650	-650	BGED 500
G0774	BESS	650	-650	BGED 500
G0792	BESS	650	-650	BGED 500
G0796	BESS	650	-650	BGED 500
G0947	BESS	650	-650	BGED 500
G0948	BESS	650	-650	BGED 500
G0843	Solar, BESS	120	-60	CRID 500
G0844	Solar, BESS	280	0	CRID 500
G1031	Solar	250	0	CRID 500
G0932	Solar, BESS	400	-400	CRID 500
G0933	Solar, BESS	400	-400	CRID 500
G0711	Solar	300	0	JDAA 230
G0712	Solar	448	0	JDAA 230
G0862	BESS	0	-400	JDAA 230
G0863	BESS	0	-500	JDAA 230
G0980	Wind	191	0	JDAA 230
G1036	Wind	234	0	PARK 230
G0979	Solar, BESS	200	-200	ROCK 230

5.3 Starting Base Cases

Following WECC Cases were used for LC2.

- 2026 Heavy Summer
- 2030 Heavy Summer

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 LC2 include:

- Big Eddy-Quennett Creek 230 kV Line Upgrade (BPA)
- Big Eddy-Chemawa 500 kV Rebuild (BPA)
 - Big Eddy-McLoughlin No1&2 230 kV Reconductor to 100C MOT (BPA,PGE)
- Rock Creek-John Day 500 kV Rebuild (BPA)
- G0676 (mid-line POI on Big Eddy-Spring Creek 230 kV)
- G0345 (mid-line POI on Big Eddy – Maupin 230 kV)
- G0367, G0368 (POI Maupin 230 kV Station)
- Crider Valley 500 kV station (mid-line POI on John Day-McNary 500 kV line) (BPA)

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 John Day and Rock Creek 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 studies POIs 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 LC2 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	Driver	Cost (\$M)	Estimated ISD
Big Eddy-Quenett Ck 230 kV Line Upgrade ^[1]	PARK, BGED	Internal BPA	N/A	Jan 2026
Big Eddy-Chemawa 500 kV Rebuild ^[2]	PARK, BGED	TSEP	\$ 870 M	Jan 2033
G0608 (Pumped Storage project) ^[3]	JDAA, BGED, CRID	Senior IR	\$ 60 M	Jan 2028
Rock Creek-John Day Project ^[4]	JDAA, ROCK	TSEP	\$ 114 M	Jan 2031
G0585/G0645 (new Crider Valley station) ^[5]	CRID	Senior IR	\$ 151 M	Jan 2028
23TSEP: North of Grizzly (NOG) 500 kV Project ^[6]	BGED	TSEP	N/A	N/A

^[1] Rebuilds Big Eddy-Quenett Creek #1 and #2 230 kV circuits to minimum rating of 1430A at 40C ambient temperature. This is a BPA internal project.

^[2] A West of Cascades South path upgrade required for BPA TSRs. Rebuilds the existing Big Eddy-Chemawa 230 kV line to create the following new circuits: Pearl-Chemawa 230 kV, Big Eddy-Ostrander 500 kV #2 and Ostrander-Pearl 500 kV #2. Big Eddy-Troutdale #1 230 kV line section between Parkdale and Troutdale will be single 1-ACSR/TW Deschutes conductor type. Includes Big Eddy-McLoughlin 230 kV reconductor on both PGE and BPA sections.

^[3] G0608 requires critical equipment upgrades at John Day substation including higher ratings for interrupt capability of circuit breakers, current limiting reactors and double circuit river-crossing to Rock Creek substation

^[4] Reconductors Rock Creek-John Day #1 500 kV line to minimum rating of 4200 A at 40 C ambient temperature

^[5] Senior queued GIs G0585 and G0645 construct the Crider Valley substation

^[6] TSEP NOG500 kV project is required for BPA TSRs between the Lower Columbia and South Cluster Areas, and is comprised of the following new lines: Big Eddy-Grizzly 500 kV and Grizzly-Bonanza 500 kV. The project is still in pre-scoping. Estimated costs and schedule are not available at this time.

7 Technical Analysis & Study Results

7.1 Parkdale POI

TCS System Performance

Parkdale 230 kV is an existing switching station owned by BPA. Parkdale is a mid-line switching station on the Big Eddy-Troutdale 230 kV Line that feeds Hood River Electric Co-Op and has local generation. There is existing local area RAS scheme associated with this line due to islanding concerns. This station does not have any circuit breakers.

The required Contingent Facilities are noted under Section 6.

Table 7.1: Parkdale POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Charging	Big Eddy-Quenett Creek 230 kV Line	P0, P1, P2
Discharging	Big Eddy-McLoughlin #1 230 kV Line	P1, P2, P7
Charging/Discharging	Big Eddy-Troutdale #1 230 kV Line	P1, P7



Table 7.2: Worst-Case Results for Parkdale POI

POI MW Threshold	IR ^[1]	Limitier (Element or Contingency)	Mitigation ^[2]
0	N/A	N/A	See Table 6.1
1-560	G1036	Big Eddy-McLoughlin #1 230 kV Line	Full TCS requested amount reached

^[1] Refer to one-line drawings in **Error! Reference source not found.** Section 10 of this report for identification of IRs sharing a tie line

^[2] Refer to Table 6.1 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 for required POI Contingent Facilities

Proposed Mitigations

No mitigations are required for this POI beyond Contingent Facility requirements (Big Eddy-Chemawa 500 rebuild project, Big Eddy-Quennet Creek 230 line upgrade). Participation in existing BPA RAS algorithms near Big Eddy will also be required.

7.2 Big Eddy POI

TCS System Performance

Big Eddy 500 kV station is an existing 5-bay breaker-and-half configuration station owned by BPA. Big Eddy station also consists of a 230 kV and 115 kV yard. This station is near large hydro plants, has the Pacific DC Intertie (PDCI) and several transmission lines are associated with RAS schemes. The required Contingent Facilities are noted under Section 6.

Table 7.3: Big Eddy POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Discharging	Big Eddy-Quennett Creek 230 kV Line	P0, P1, P2
Discharging	Big Eddy-McLoughlin #1 230 kV Line	P1, P2, P7
Discharging	Big Eddy-Troutdale #1 230 kV Line	P1, P7
Discharging	Troutdale 500/230 kV Bank 8	P1
Discharging	Big Eddy-Ostrander #1 500 kV Line	P1
Discharging	Ostrander-McLoughlin #1 230 kV Line	P1
Charging/Discharging	Big Eddy-John Day #1 or #2 500 kV Line	P1, P2



Table 7.4: Worst-Case Results for Big Eddy POI

POI MW Threshold	IR ^[1]	Limiters (Element or Contingency)	Mitigation ^[2]
0	N/A	N/A	See Table 6.1
1-1790	G0773 G0774	Big Eddy-John Day #1 or #2 500 kV Line	New WOJ P1 RAS Algorithm
1790-3300	G0792 ^[3] G0796 G0947	Any P2 with Big Eddy-John Day #1 or #2 500 kV Line	New WOJ P2 RAS Algorithm
3300-4200	G0948 ^[4]	Big Eddy-John Day #1 or #2 500 kV Line	Contingent Facility (Big Eddy-Grizzly-Bonanza 500 kV build)

^[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 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 for required POI Contingent Facilities

^[3] G0792 exceeds the 1790MW threshold by 160MW and requires the P2 RAS for additional capacity

^[4] G0948 exceeds the 3300MW threshold by 600MW and requires the Contingent Facility 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. The common limiting element for the Big Eddy POI is the Big Eddy-John Day #1 or #2 500 kV Lines. Due to the lack of available terminals at John Day substation, interconnecting into John Day is infeasible. To mitigate the thermal overloads on the identified lines, new P1 and P2 RAS schemes are proposed and enable a new threshold of up to 3,300 MW. Participation in existing BPA RAS algorithms near John Day and Big Eddy will also be required.

To accommodate the remaining required capacity, the Big Eddy-Grizzly-Bonanza 500 kV build is required (Contingent Facility) to accommodate the full interconnection amount at Big Eddy, and increases the POI threshold up to 4,200 MW.

7.3 John Day Annex POI

TCS System Performance

John Day substation is not expandable for new interconnection terminals. John Day Annex 500/230 kV substation is a new proposed mid-line station with a breaker-and-half configuration. The station would be looped-in on the existing Big Eddy-John Day #1 500 kV Line. John Day-Marion 500 kV line is not feasible due to capacity limits at Marion substation. This station is near large hydro plants and several transmission lines associated with RAS schemes. The required Contingent Facilities are noted under Section 6.



Table 7.5: John Day Annex POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Discharging	Big Eddy-Quennett Creek 230 kV Line	P0
Discharging	Big Eddy-Ostrander #1 500 kV Line	P1
Charging/Discharging	Big Eddy-John Day #1 or #2 500 kV Line	P1, P2
Discharging	Big Eddy-John Day Annex 500 kV Line	P1, P2
Charging	John Day-John Day Annex 500 kV Line	P1, P2

Table 7.6: Worst-Case Results for John Day Annex POI

POI MW Threshold	IR ^[1]	Limiter (Element or Contingency)	Mitigation ^[2]
0	N/A	N/A	See Table 6.1
1-1820	G0711 G0712 G0862 G0863 G0980	John Day 500 kV Station Big Eddy-John Day Annex 500 kV Line	Construct JDAA substation ^[3]

^[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 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 for required POI Contingent Facilities

^[3] Existing John Day 500 kV station is not expandable. John Day Annex (JDAA) 500/230 kV station is required to accommodate the listed IRs

Proposed Mitigations

No proposed mitigations are required for this POI beyond construction of the new John Day Annex substation and Contingent Facility requirements (G0608 Project upgrades to John Day 500 kV substation equipment, TSEP: Rock Creek-John Day rebuild). Participation in existing BPA RAS algorithms near John Day and Big Eddy will also be required.

7.4 Rock Creek POI

TCS System Performance

Rock Creek 500/230 kV station is an existing station in a ring bus configuration, owned by BPA. Rock Creek radially interconnects local wind plants with a total generating capacity of 1,080MW. There is existing local area RAS associated with Rock Creek. The required Contingent Facilities are noted under Section 6.

Table 7.7: Rock Creek POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Charging/Discharging	Rock Creek 500/230 kV Transformer	P1



Table 7.8: Worst-Case Results for Rock Creek POI

POI MW Threshold	IR ^[1]	Limitier (Element or Contingency)	Mitigation ^[2]
0	N/A	N/A	See Table 6.1
1-460	G0979	Rock Creek 500/230 kV Transformer	None. Full TCS requested amount reached

^[1] Refer to one-line drawings in **Error! Reference source not found.** Section 10 of this report for identification of IRs sharing a tie line

^[2] Refer to Table 6.1 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 for required POI Contingent Facilities

Proposed Mitigations

No proposed mitigations are required for this POI beyond Contingent Facility requirements (TSEP: Rock Creek-John Day rebuild). Participation in existing BPA RAS algorithms at Rock Creek station will be required.

7.5 Crider Valley POI

TCS System Performance

Crider Valley 500 kV station is a new proposed breaker-and-half configuration station owned by BPA for senior queued projects G0585 and G0645. Crider Valley is a mid-line station and is looped in on the McNary-John Day 2 500 kV line. The McNary-John Day 2 500 kV line is a 80 mile going east to west through both Washington State and Oregon State and numerous counties. This line is associated with multiple existing RAS schemes. The required Contingent Facilities are noted under Section 6. Senior queued projects on Crider Valley POI are identified in Table 4.1.

Table 7.9: Crider Valley POI Critical Limiting Elements

Scenario	Limiting Elements	TPL-001 Contingency Category
Discharging	McNary 345/230 kV Transformer	P1
Charging	McNary-Crider Valley 500 kV Line	P1, P2

Table 7.10: Worst-Case Results for Crider Valley POI

POI MW Threshold	IR ^[1]	Limitier (Element or Contingency)	Mitigation ^[2]
0	N/A	N/A	See Table 6.1
1-2100	G0843 G0844 G0932 G0933 G1031	McNary 345/230 kV Transformer	None. Full TCS requested amount reached

^[1] Refer to one-line drawings in **Error! Reference source not found.** Section 10 of this report for identification of IRs sharing a tie line

^[2] Refer to Table 6.1 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 for required POI Contingent Facilities

Proposed Mitigations

No proposed mitigations are required for this POI beyond Contingent Facility requirements (G0608 Project upgrades to John Day 500 kV substation equipment, G0585/G0645 new Crider Valley station). Participation in existing BPA RAS algorithms near McNary and John Day will also be required.

8 Affected System Impacts

The analysis of the proposed interconnections studied in this Cluster Area identified 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 System	Elements Impacted	POIs
PAC PGE	John Day 500 kV substation	John Day “Annex” (G0711, G0712, G0862, G0863, G0980)



9 Interconnection Requirements

9.1 Parkdale POI

Table 9.1: Parkdale POI Facility Requirements

G#	BPA Station Work	BPA Non-Station Work
G1036	Substation Build <ul style="list-style-type: none"> 230 kV Ring bus (1) 230 kV Terminal 	N/A

- Construct a 230 kV, (4) 230 kV breaker ring-bus substation at the POI. This includes (8) 230 kV disconnect switches and associated control, relaying, and communications equipment.
- Installation of BPA-required C&C equipment at each customer’s collector site (RAS, Meters, relays, Control House space).
- Moderate Development of C&C hardware at BPA’s POI substation.
- Participation in existing Big Eddy local RAS algorithms

The customer(s) will construct a 230 kV line from the BPA POI station to its generation facility. The customer will then construct a 230/34.5kV substation directly adjacent to the POI line to support their 34.5 kV feeders at its collector site.

9.2 Big Eddy POI

Table 9.2: Big Eddy POI Facility Requirements

G#	BPA Station Work	BPA Non-Station Work
G0773, G0774	Terminal addition <ul style="list-style-type: none"> (1) 500 kV Terminal 	RAS <ul style="list-style-type: none"> New WOJ P1 RAS Participation
G0792, G0796	Terminal addition <ul style="list-style-type: none"> (1) 500 kV Terminal 	RAS <ul style="list-style-type: none"> New WOJ P2 RAS Participation
G0947, G0948	Terminal addition <ul style="list-style-type: none"> (1) 500 kV Terminal 	RAS <ul style="list-style-type: none"> New WOJ P2 RAS Participation

- Install (1) 500 kV breaker and (1) 500 kV disconnect switch into an existing bay and install (2) new BAAH bays with (4) 500 kV breakers and (10) 500 kV disconnect switches, and associated control, relaying, and communications equipment.
- New West of John Day P1 RAS participation for applicable single contingencies.
- New West of John Day P2 RAS participation for applicable breaker failure contingencies.
- G0947 and G0948 also require Contingent Facility Big Eddy-Grizzly-Bonanza 500 kV build (see table 6.1).
- Installation of BPA-required C&C equipment at each customer’s collector site (RAS, Meters, relays, Control House space).
- 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 their 34.5kV feeders at its collector site.

9.3 John Day Annex POI

Table 9.3: John Day Annex POI Facility Requirements

G#	BPA Station Work	BPA Non-Station Work
G0711, G0863	Substation Build <ul style="list-style-type: none"> 500 kV and 230 kV BAAH Station Build Terminal <ul style="list-style-type: none"> (1) 230 kV Terminal 	RAS <ul style="list-style-type: none"> WOJ RAS Participation Transmission work <ul style="list-style-type: none"> New 500/230 kV bank
G0712, G0862	Substation Build <ul style="list-style-type: none"> 500 kV and 230 kV BAAH Station Build Terminal <ul style="list-style-type: none"> (1) 230 kV Terminal 	RAS <ul style="list-style-type: none"> WOJ RAS Participation Transmission work <ul style="list-style-type: none"> New 500/230 kV bank
G0980	Substation Build <ul style="list-style-type: none"> 500 kV and 230 kV BAAH Station Build Terminal <ul style="list-style-type: none"> (1) 230 kV Terminal 	RAS <ul style="list-style-type: none"> WOJ RAS Participation Transmission work <ul style="list-style-type: none"> New 500/230 kV bank

1. Construct new mid-line substation on the Big Eddy-John Day #1 500 kV Line, with 500 kV and 230 kV yards.
 - a. Install (2) new 500 kV BAAH bays with (6) 500 kV breakers, (12) 500 kV disconnect switches, and associated control, relaying, and communication equipment.
 - b. Install (2) new 230 kV BAAH bays with (6) 230 kV breakers, (12) disconnect switches and associated control, relaying, and communication equipment.
 - c. Install (1) 1300MVA 500/230 kV step down transformer for the 230 kV yard.
 - d. Install (1) 180MVAR shunt reactor at John Day Annex 500 kV Station
2. Installation of BPA-required C&C equipment at each customer’s collector site (RAS, Meters, relays, Control House space).
3. Moderate Development of C&C hardware at BPA’s POI substation.
4. Participation in existing and new West of John Day (WOJ) BPA RAS

The customer(s) will construct a 230 kV line from the BPA POI station to its generation facility. The customer will then construct a 230/34.5kV substation directly adjacent to the POI line to support their 34.5kV feeders at its collector site.

9.4 Rock Creek POI

Table 9.4: Rock Creek POI Facility Requirements

G#	BPA Station Work	BPA Non-Station Work
G0979	Terminal <ul style="list-style-type: none"> (1) 230 kV Terminal 	RAS <ul style="list-style-type: none"> Rock Creek RAS Algorithm Participation



1. Install (1) 230 kV breaker and (2) 230 kV disconnect switches and associated control, relaying, and communication equipment.
2. Installation of BPA-required C&C equipment at each customer’s collector site (RAS, Meters, relays, Control House space).
3. Minor Development of C&C hardware at BPA’s POI substation.
4. Participation in existing BPA RAS at Rock Creek substation

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

9.5 Crider Valley POI

Table 9.5: Crider Valley POI Facility Requirements

G#	BPA Station Work	BPA Non-Station Work
G0843, G0844	Terminal • (1) 500 kV Terminal	RAS • WOJ and WOM RAS Participation
G0932, G0933	Terminal • (1) 500 kV Terminal	RAS • WOJ and WOM RAS Participation
G1031	Terminal • (1) 500 kV Terminal	RAS • WOJ and WOM RAS Participation

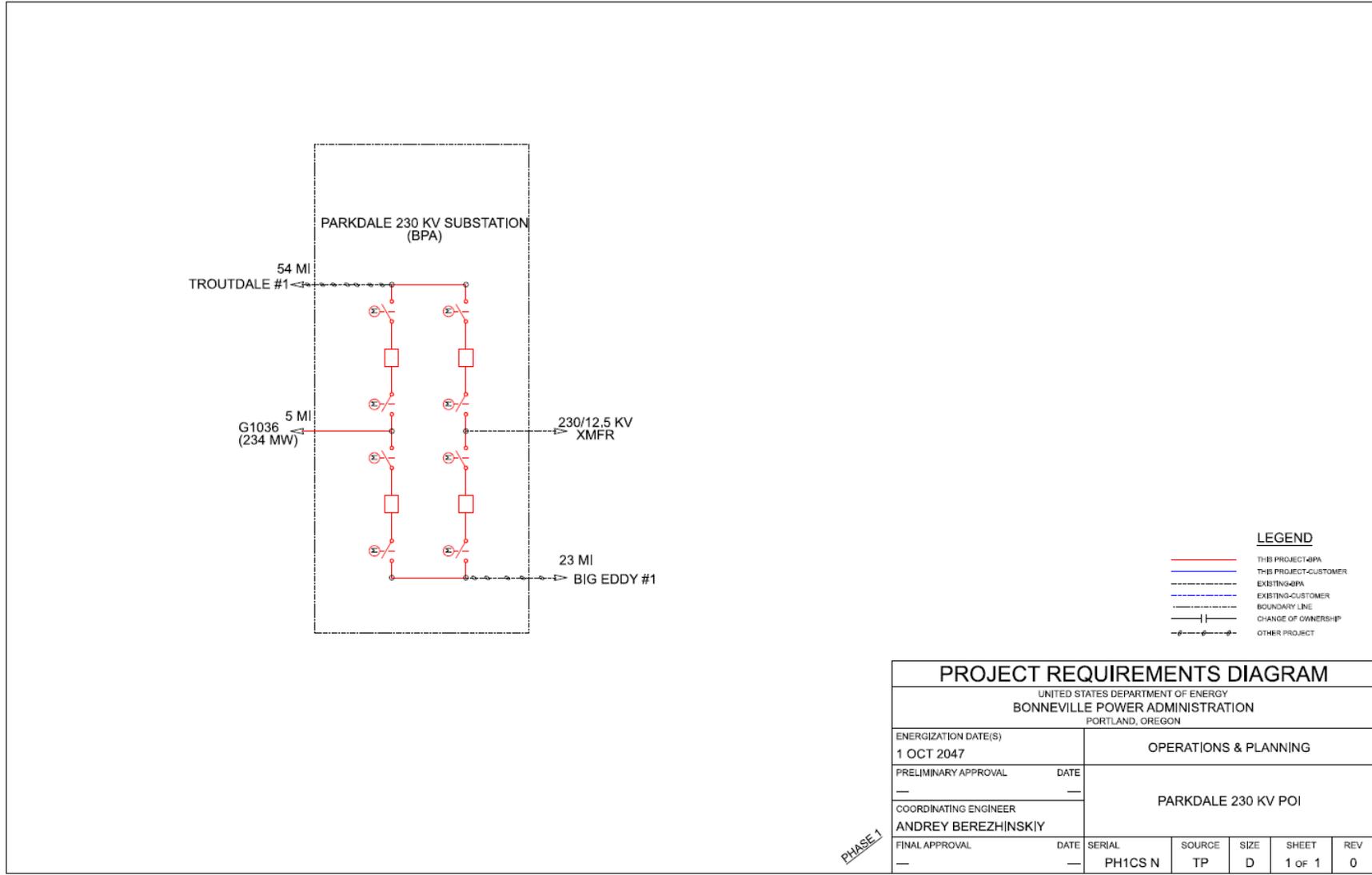
1. At proposed BPA Crider Valley 500 kV station, install (2) new BAAH 500 kV bays with (6) breakers and (12) disconnect switches and associated control, relaying, and communication equipment.
2. Installation of BPA-required C&C equipment at each customer’s collector site (RAS, Meters, relays, Control House space).
3. Minor Development of C&C hardware at BPA’s POI substation.
Participation in existing and new West of John Day (WOJ) RAS, and West of McNary (WOM) RAS.

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 their 34.5kV feeders at its collector site.



10 Project One-Line Drawings

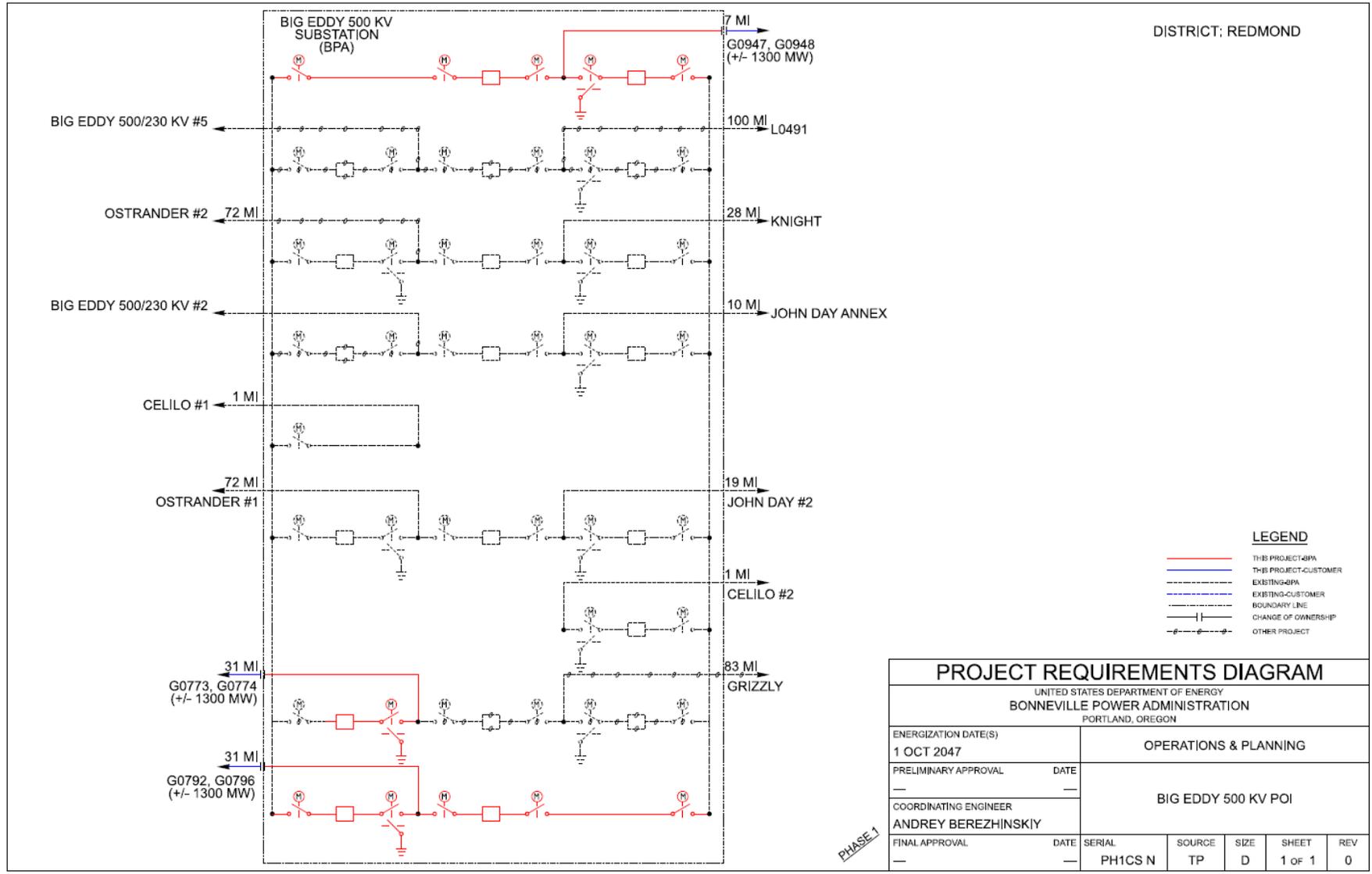
10.1 Parkdale POI



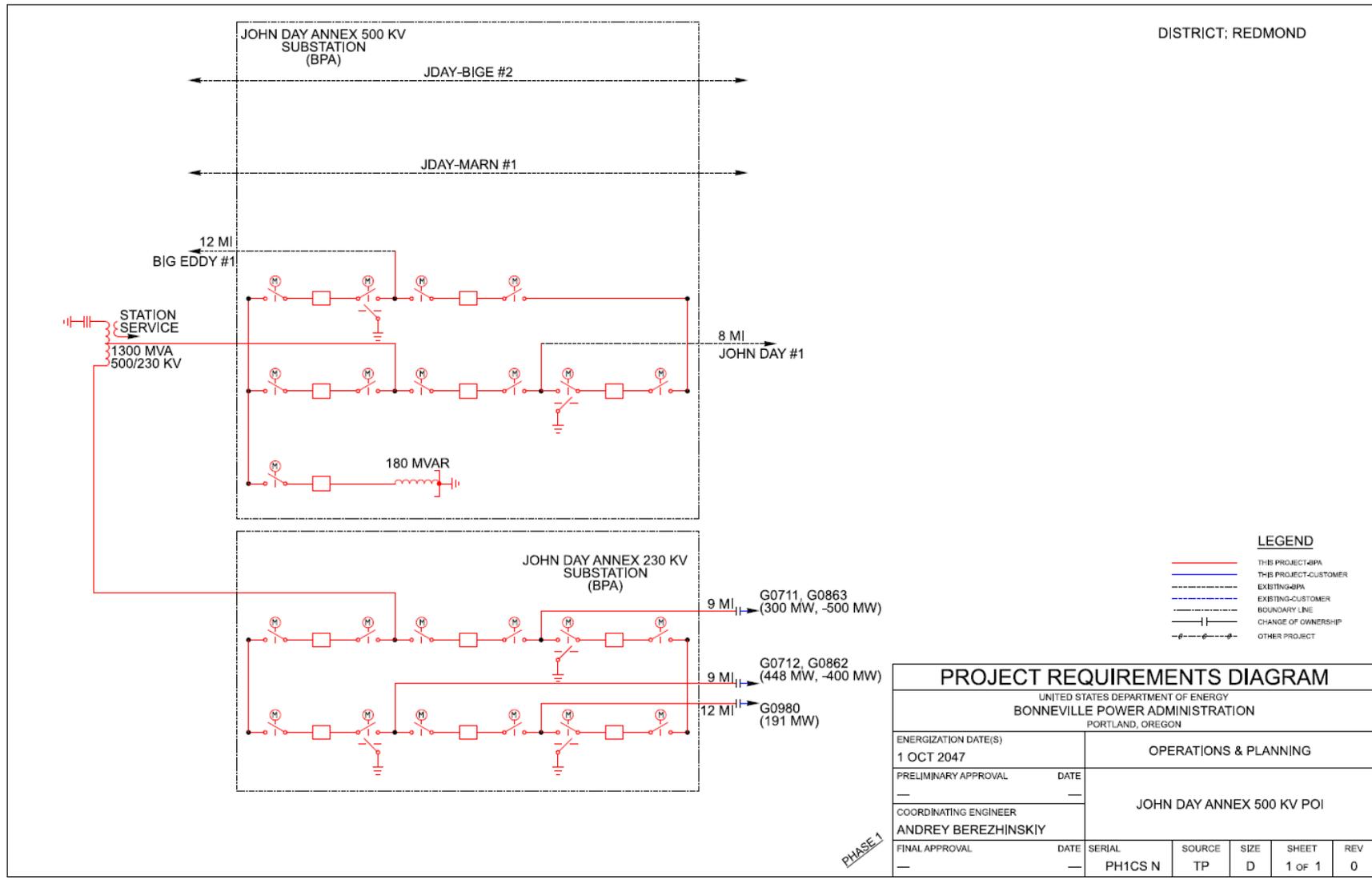
PROJECT REQUIREMENTS DIAGRAM						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION PORTLAND, OREGON						
ENERGIZATION DATE(S) 1 OCT 2047		OPERATIONS & PLANNING				
PRELIMINARY APPROVAL	DATE	PARKDALE 230 KV POI				
—	—					
COORDINATING ENGINEER ANDREY BEREZHINSKIY						
FINAL APPROVAL	DATE	SERIAL	SOURCE	SIZE	SHEET	REV
—	—	PH1CS N	TP	D	1 OF 1	0



10.2 Big Eddy POI



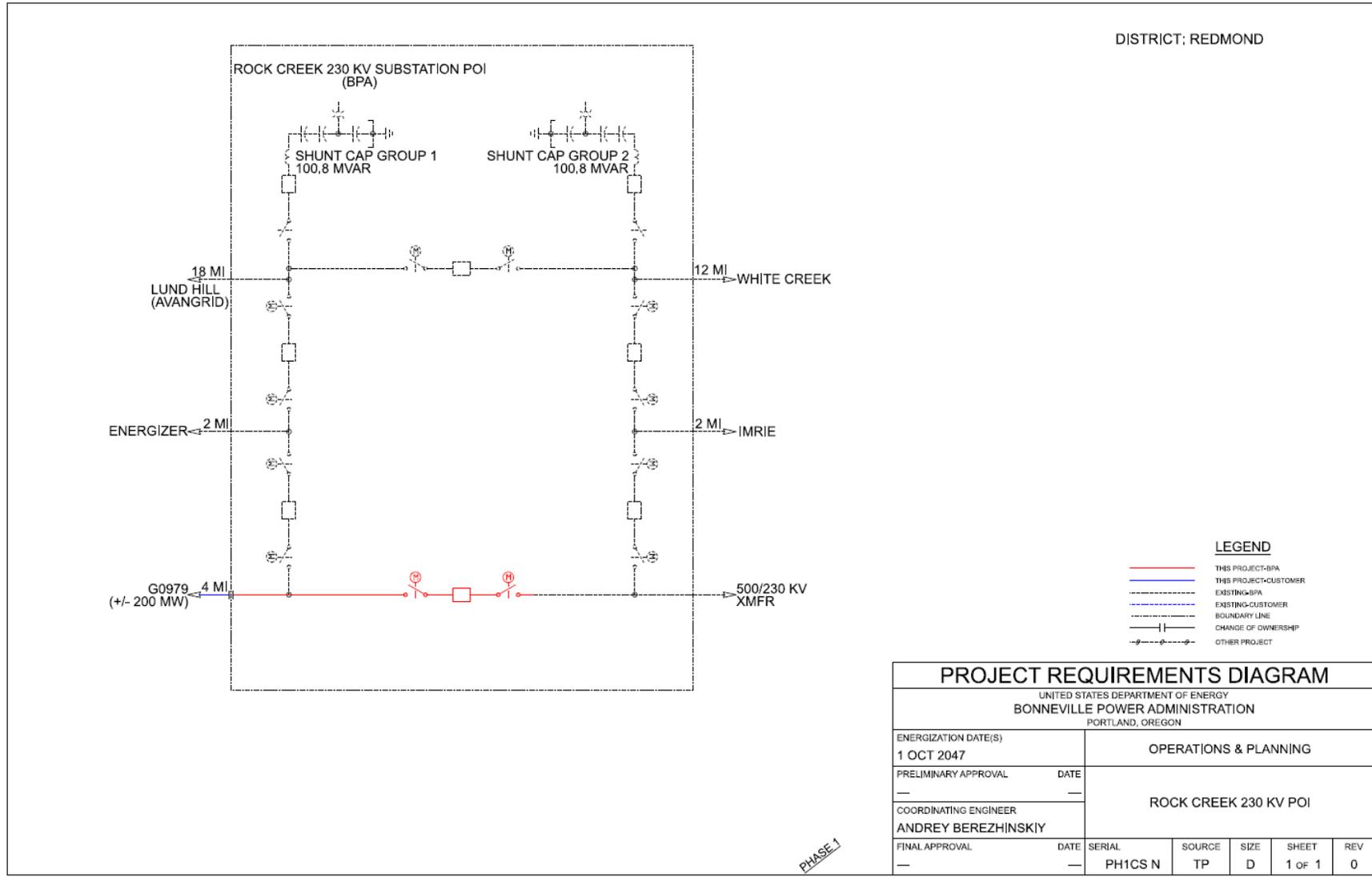
10.3 Big Eddy-John Day 500 POI (John Day Annex)



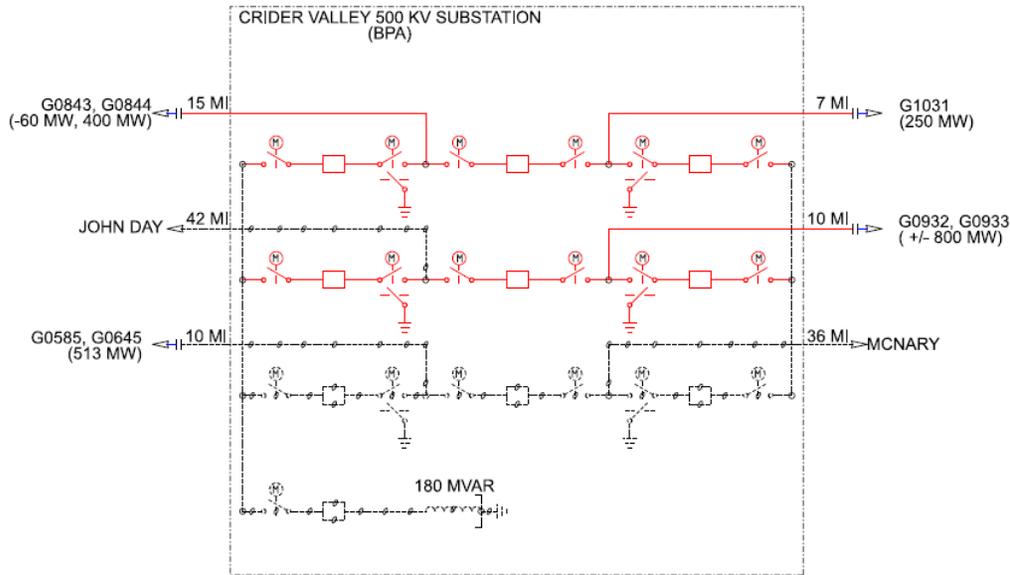
PROJECT REQUIREMENTS DIAGRAM							
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION PORTLAND, OREGON							
ENERGIZATION DATE(S) 1 OCT 2047				OPERATIONS & PLANNING			
PRELIMINARY APPROVAL		DATE		JOHN DAY ANNEX 500 KV POI			
COORDINATING ENGINEER ANDREY BEREZHINSKIY							
FINAL APPROVAL		DATE		SERIAL	SOURCE	SIZE	SHEET
				PH1CS N	TP	D	1 of 1
							REV
							0



10.4 Rock Creek POI



10.5 Crider Valley POI



LEGEND

- THIS PROJECT-BPA
- THIS PROJECT-CUSTOMER
- - - - - EXISTING-BPA
- - - - - EXISTING-CUSTOMER
- — — — — BOUNDARY LINE
- | — CHANGE OF OWNERSHIP
- - - - - TO BE REMOVED

PHASE 1

PROJECT REQUIREMENTS DIAGRAM						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION PORTLAND, OREGON						
ENERGIZATION DATE(S)		OPERATIONS & PLANNING				
1 OCT 2047						
PRELIMINARY APPROVAL	DATE	CRIDER VALLEY 500 KV ANNEX POI				
—	—					
COORDINATING ENGINEER						
ANDREY BEREZHINSKIY						
FINAL APPROVAL	DATE	SERIAL	SOURCE	SIZE	SHEET	REV
—	—	PH1CS N	TP	D	1 OF 1	0



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 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: Parkdale 230

Table 11.1 POI 1 – Parkdale 230 kV Station Cost Estimate

Estimate Summary									
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Parkdale POI		-	-	-	-	-	-	-
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		0.5	\$4,115,000	\$2,514,000	\$576,000	\$0	\$9,000	\$7,214,000
C&C	C&C: Collector Station		1	\$0	\$0	\$0	\$0	\$5,000,000	\$5,000,000
C&C	C&C: BPA Station (Small)		1	\$0	\$0	\$0	\$0	\$5,000,000	\$5,000,000
Contingency %	40%		Subtotal:	\$22,463,000	\$15,138,000	\$5,406,000	\$0	\$10,127,000	\$53,134,000
Overhead %	Labor	Materials & Turnkey	Contingency:	\$8,985,200	\$6,055,200	\$2,162,400	\$0	\$4,050,800	\$21,253,600
	26%	9%		Overhead:	\$8,176,532	\$1,907,388	\$1,967,784	\$0	\$3,686,228
Grand Total:	<i>(rounded to two significant figures)</i>			\$40,000,000	\$23,000,000	\$9,500,000	\$0	\$18,000,000	\$90,000,000

Table 11.2 POI 1 – Parkdale 230 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
G1036	234	New Parkdale 230kV Substation w/ New Comms	100%	\$81M	N/A	N/A	N/A	Collector Station C&C and RAS	\$9M	\$90M



11.4 POI 2: Big Eddy 500

Table 11.3 POI 2 – Big Eddy 500 kV Station Cost Estimate

Estimate Summary								
Estimate #	Description	Quantity	Contract		BPA		Misc.	Total
			Labor	Material	Labor	Material		
	Big Eddy 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: Collector Stations	6	\$0	\$0	\$0	\$0	\$30,000,000	\$30,000,000
C&C	C&C: BPA Station (Small)	1	\$0	\$0	\$0	\$0	\$5,000,000	\$5,000,000
Contingency %	40%	Subtotal:	\$23,416,000	\$19,228,000	\$3,620,000	\$0	\$35,116,000	\$81,380,000
Overhead %	Labor Materials & Turnkey	Contingency:	\$9,366,400	\$7,691,200	\$1,448,000	\$0	\$14,046,400	\$32,552,000
	26% 9%	Overhead:	\$8,523,424	\$2,422,728	\$1,317,680	\$0	\$12,782,224	\$25,046,056
Grand Total:	<i>(rounded to two significant figures)</i>		\$41,000,000	\$29,000,000	\$6,400,000	\$0	\$62,000,000	\$140,000,000

Table 11.4 POI 2 – Big Eddy 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
G0773	650	Expansion of Big Eddy 500kV Substation w/ New Comms	33.33%	\$86M	N/A	N/A	N/A	Collector Station C&C and RAS	\$9M	\$38M
G0774	650		0.00%			N/A		Collector Station C&C and RAS	\$9M	\$9M
G0792	650		33.33%			N/A		Collector Station C&C and RAS	\$9M	\$38M
G0796	650		0.00%			N/A		Collector Station C&C and RAS	\$9M	\$9M
G0947	650		33.33%			N/A		Collector Station C&C and RAS	\$9M	\$38M
G0948	650		0.00%			N/A		Collector Station C&C and RAS	\$9M	\$9M



11.5 POI 3: Big Eddy-John Day 500 (John Day Annex)

Table 11.5 POI 3 – Big Eddy-John Day 500 kV Station Cost Estimate

Estimate Summary									
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	John Day Annex POI station work (Big Eddy-John Day 500)		-	-	-	-	-	-	-
ST-070-133-7	500kV New POI: 4x PCB, 3pos, 2x bay BAAH, w/180 MVAR Shunt Reactor		1	\$44,512,000	\$46,842,000	\$5,690,000	\$816,000	\$0	\$97,860,000
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-070-39-12	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		0.5	\$4,115,000	\$2,514,000	\$576,000	\$0	\$9,000	\$7,214,000
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:	\$72,829,000	\$66,787,000	\$12,001,000	\$816,000	\$35,156,000	\$187,589,000
Overhead %	Labor	Materials & Turnkey	Contingency:	\$29,131,600	\$26,714,800	\$4,800,400	\$326,400	\$14,062,400	\$75,035,600
	26%	9%	Overhead:	\$26,509,756	\$8,415,162	\$4,368,364	\$102,816	\$12,796,784	\$52,192,882
Grand Total:	<i>(rounded to two significant figures)</i>			\$128,000,000	\$102,000,000	\$21,000,000	\$1,250,000	\$62,000,000	\$310,000,000

Table 11.6 POI 3 – Big Eddy-John Day 500 kV Non-Station Cost Estimate

Estimate Summary									
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	John Day Annex POI non-station work (500/230 bank addition)		-	-	-	-	-	-	-
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:	<i>(rounded to two significant figures)</i>			\$60,000,000	\$54,000,000	\$10,000,000	\$9,700,000	\$67,000	\$130,000,000

Table 11.7 POI 3 – Big Eddy-John Day 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
G0711	300	New 500kV John Day Annex Substation, New 230kV John Day Annex Substation w/ New Comms	33.33%	\$265M	New 500/230kV Transformer	31.95%	\$130M	Collector Station C&C and RAS	\$9M	\$139M
G0712	448		33.33%			47.71%		Collector Station C&C and RAS	\$9M	\$159M
G0862	0		0.00%			0.00%		Collector Station C&C and RAS	\$9M	\$9M
G0863	0		0.00%			0.00%		Collector Station C&C and RAS	\$9M	\$9M
G0980	191		33.33%			20.34%		Collector Station C&C and RAS	\$9M	\$124M



11.6 POI4: Rock Creek 230

Table 11.7 POI 4 – Rock Creek 230 kV Cost Estimate

Estimate Summary								
Estimate #	Description	Quantity	Contract		BPA		Misc.	Total
			Labor	Material	Labor	Material		
	Rock Creek POI	-	-	-	-	-	-	-
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
C&C	C&C: Collector Stations	1	\$0	\$0	\$0	\$0	\$5,000,000	\$5,000,000
C&C	C&C: BPA station (Small)	1	\$0	\$0	\$0	\$0	\$5,000,000	\$5,000,000
Contingency %	40%	Subtotal:	\$4,115,000	\$2,514,000	\$576,000	\$0	\$10,009,000	\$17,214,000
Overhead %	Labor Materials & Turnkey	Contingency:	\$1,646,000	\$1,005,600	\$230,400	\$0	\$4,003,600	\$6,885,600
	26% 9%	Overhead:	\$1,497,860	\$316,764	\$209,664	\$0	\$3,643,276	\$5,667,564
Grand Total:	<i>(rounded to two significant figures)</i>		\$7,300,000	\$3,800,000	\$1,020,000	\$0	\$18,000,000	\$30,000,000

Table 11.8 POI 4 – Rock Creek 230 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
G0979	200	Rock Creek 230kV Substation Expansion w/ Expanded Comms	100.00%	\$21M	N/A	N/A	N/A	Collector Station C&C and RAS	\$9M	\$30M



11.7 POI 5: McNary-John Day 500 (Crider Valley)

Table 11.9 POI 5 – McNary-John Day 500 kV (Crider Valley) Cost Estimate

<i>Estimate Summary</i>									
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Crider Valley POI (McNary-John Day 500)		-	-	-	-	-	-	-
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		5	\$0	\$0	\$0	\$0	\$25,000,000	\$25,000,000
C&C	C&C: BPA station (Small)		1	\$0	\$0	\$0	\$0	\$10,000,000	\$10,000,000
Contingency %	40%		Subtotal:	\$23,416,000	\$19,228,000	\$3,620,000	\$0	\$35,116,000	\$81,380,000
Overhead %	Labor	Materials & Turnkey	Contingency:	\$9,366,400	\$7,691,200	\$1,448,000	\$0	\$14,046,400	\$32,552,000
	26%	9%	Overhead:	\$8,523,424	\$2,422,728	\$1,317,680	\$0	\$12,782,224	\$25,046,056
Grand Total:	<i>(rounded to two significant figures)</i>			\$41,000,000	\$29,000,000	\$6,400,000	\$0	\$62,000,000	\$140,000,000

Table 11.10 POI 5 – McNary-John Day 500 kV (Crider Valley) 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
G0843	120	Crider Valley 500kV Substation Expansion	33.33%	\$95M	N/A	N/A	N/A	Collector Station C&C and RAS	\$9M	\$41M
G0844	280		0.00%			N/A		Collector Station C&C and RAS	\$9M	\$9M
G0932	400		33.33%			N/A		Collector Station C&C and RAS	\$9M	\$41M
G0933	400		0.00%			N/A		Collector Station C&C and RAS	\$9M	\$9M
G1031	250		33.33%			N/A		Collector Station C&C and RAS	\$9M	\$41M

