

TRANSMISSION PLANNING**GENERATION INTERCONNECTION REPORT****2025 TRANSITION CLUSTER STUDY (TCS)****CLUSTER AREA: SOUTH #1, PHASE 1, Revision 2****25TCS CA-SO1 P1-2**

G0675

G0693

G0826

September 2026

PREPARED BY
BPA Transmission Planning

<u>Version</u>	<u>Summary of Edits</u>
0.0	Original
1.0	Executive Summary & Sec 11.4, Cost Corrections to Tables
2.0	Errata, Customer Modifications, Cost Allocations. Withdrawals: G0673, G0694, G0695, G0702, G0758, G0841, G0861, G0887, G0888, G0900, G0901, G1050, G1051, G1052, G1053, G1054, G1055



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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.

Revision #1 of this report captures customer modifications made after TCS PH1, reallocated costs, minor errata corrections, and withdrawals of the following requests: G0673, G0694, G0695, G0702, G0758, G0841, G0861, G0887, G0888, G0900, G0901, G1050, G1051, G1052, G1053, G1054, and G1055.

Cluster Area South 1 (SO1) is in Central and Southern Oregon, comprised of Interconnection Requests (IRs) in Crook and Lake counties of Oregon state. SO1 includes 3 total IRs seeking combined 980 MW total generation Interconnection Service and total 980 MW of grid-charging.

Table 1.1: Participants in 2025 TCS PH1 CA Central Oregon

IR #	Gen Type	Studied POI	MW Requested (Generating)	MW Requested (Charging)	Plant Location (County, State)	Requested COD
G0675	Pumped Hydro Storage, Biofuel, BESS	Bonanza 230 kV	600	-600	Crook, OR	4/3/2029
G0693	Pumped Hydro Storage, Biofuel, BESS	Bonanza 230 kV	100	-100	Crook, OR	1/1/2027
G0826	Solar, BESS	Bonanza-NOB 500 kV	280	-280	Lake, OR	12/31/2027

POI location requirements for each IR are summarized in Table 1.2.

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).

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



Table 1.2: 2025 TCS PH1 CA Central Oregon Requirements

IR #	Studied POI	Total Scope	Total Cost	Contingent Facilities
G0693	BNZA 230 kV	1. 1x 230 kV shared gen-tie terminal (shared with senior G0643/G0669)	\$9M	1. Bonanza 230 & 500 kV Plan 2. LaPine Long Range Plan 3. TSEP: North of Grizzly 500 kV
G0675	BNZA 230 kV	1. 1x 230 kV gen-tie terminal	\$12M	1. Bonanza 230 & 500 kV Plan 2. LaPine Long Range Plan 3. TSEP: North of Grizzly 500 kV
G0826	BNZA-NOB 500 kV	1. New 500 kV substation, 1x 500 kV gen-tie terminal 2. Single circuit BNZA-NOB 500 kV line	\$1540M	1. Bonanza 230 & 500 kV Plan 2. LaPine Long Range Plan 3. TSEP: North of Grizzly 500 kV

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 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 study 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 4.2: Senior Queued IRs Assumed In-Service

Queue #	POI (owner)	MW Generating	MW Grid- Charging	Fuel Type
G0527	Fort Rock 115 kV; LaPine 115 kV (BPA)	105	0	PV
G0537	Brasada-Harney 115 kV line tap (BPA)	20	0	PV
G0539	Ponderosa 230 kV (BPA)	600	0	PV
G0570	Fort Rock 115 kV; LaPine 115 kV (BPA)	20	0	PV
G0571	Fort Rock 115 kV; LaPine 115 kV (BPA)	20	0	PV
G0572	Fort Rock 115 kV; LaPine 115 kV (BPA)	20	0	PV
G0640	Captain Jack 500 kV (BPA)	238	0	Wind
G0642	Ponderosa 230 (BPA)	600	0	BESS
G0643	Ponderosa 230 kV (430MW) & Bonanza 230 kV (170MW) (BPA)	600	-600	BESS
G0651	Fort Rock 500 kV (BPA)	400	0	PV
G0654	LaPine-Fort Rock 115 kV; LaPine 115 kV (BPA)	170	0	PV
G0655	LaPine-Fort Rock 115 kV; LaPine 115 kV (BPA)	200	0	PV
G0657	Lapine-Chiloquin #1 230 kV (BPA)	500	-500	PV + BESS
G0669	Bonanza 230 kV (BPA)	600	0	PV
G0722	Harney - Brasada 115 kV line (BPA)	75	0	PV
TCS-44	Ponderosa 115 substation (PAC)	80	0	PV + BESS
TCS-53	Ponderosa 115 substation (PAC)	20	0	PV
TCS-54	Ponderosa 115 substation (PAC)	40	0	PV + BESS
C2-09	Ponderosa 115 substation (PAC)	80	0	PV + BESS
C1-46	CIO bus (PAC)	198.75	0	PV + BESS
C1-44	Summer Lake 500 kV (PAC)	400	0	PV + BESS
C2-170	Summer Lake 500 kV (PAC)	199	0	BESS



Queue #	POI (owner)	MW Generating	MW Grid- Charging	Fuel Type
C2-171	Summer Lake 500 kV (PAC)	199	0	BESS
C2-173	Summer Lake 500 kV (PAC)	199	0	PV + BESS
C2-181	Summer Lake 500 kV (PAC)	80	0	PV + BESS
C2-187	Summer Lake 500 kV (PAC)	320	0	PV + BESS
C3-011	Summer Lake 500 kV (PAC)	199.9	0	BESS
C2-152	Burns-Summer Lake 500 kV (PAC)	320	0	PV + BESS
C2-180	Burns-Summer Lake 500 kV (PAC)	80	0	PV + BESS
C2-182	Burns-Summer Lake 500 kV (PAC)	320	0	PV + BESS
C2-208	Burns-Summer Lake 500 kV (PAC)	320	0	PV + BESS
C2-210	Burns-Summer Lake 500 kV (PAC)	80	0	PV + BESS
C3-041	Burns 500 kV (PAC)	400	0	PV + BESS
C2-04	Snow Goose 230 substation (PAC)	199.9	0	BESS
C2-203	Klamath CoGen-Meridian 500 kV line (PAC)	400	0	PV + BESS
C2-114	Corral 500 kV (PAC)	199	0	PV + BESS
C2-158	Corral 500 kV (PAC)	199	0	PV + BESS
C2-178	Corral 500 kV (PAC)	199	0	BESS
C3-008	Corral 500 kV (PAC)	199.9	0	BESS
QF19-081	Round Butte 500 kV (PGE)	53	0	PV
21-098	Round Butte 500 kV (PGE)	250	0	PV + BESS
23-233 (T019)	Round Butte 500 kV (PGE)	400	0	PV + BESS
23-234 (T020)	Round Butte 500 kV (PGE)	400	0	PV + BESS

Table 4.3: New Loads Assumed In-Service

Queue #	POI (owner)	MW Load
L0393	LaPine 115 kV Bus (BPA)	100
L0422	Ponderosa 230 kV (BPA)	220
L0448	PAC system near BPA Ponderosa (BPA)	120
L0513	Thielsen (BPA)	24
L0538	Harney-Brasada 115 kV line (BPA)	25
L0543	Bonanza 230 kV (BPA)	300
L0588	Bonanza 115 kV (BPA)	50
L0589	Bonanza 115 kV (BPA)	23



4.3 Communications & Control Capability (C&C)

The TCS PH1 assumed:

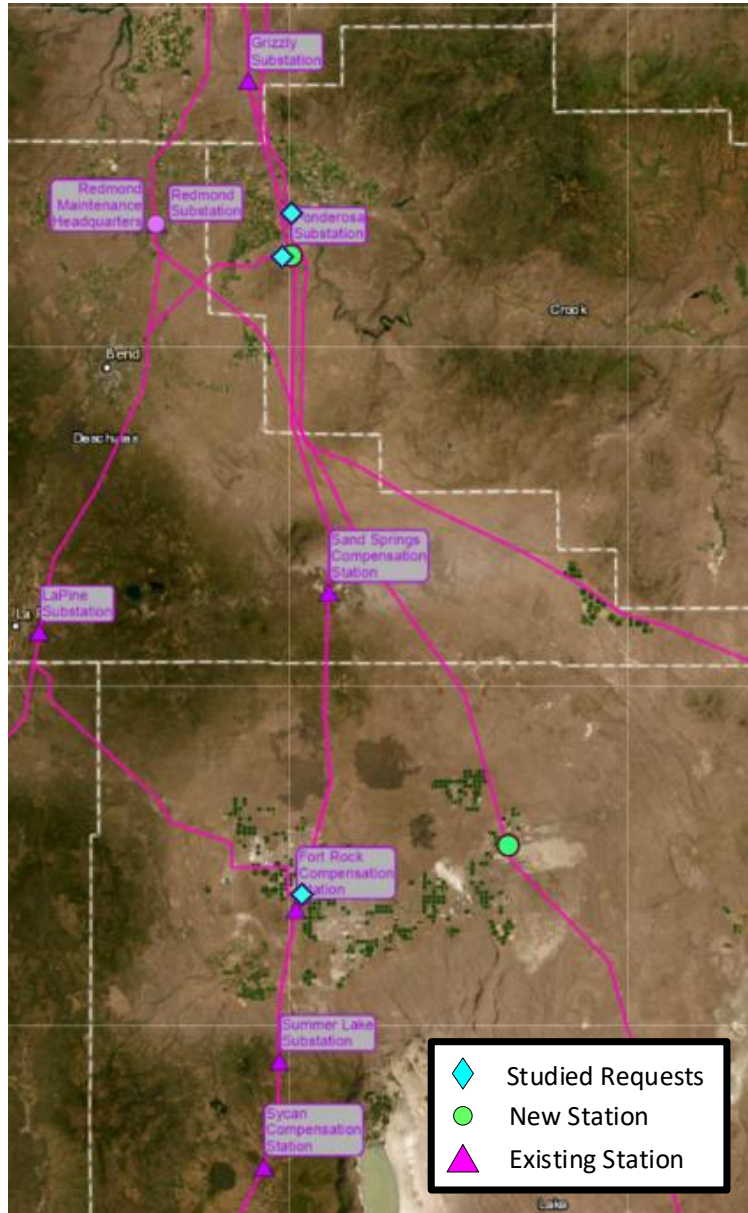
1. All POI stations are capable of BPA Main Grid Remedial Action Scheme (RAS) participation. There is WECC-Class 1 communications (fully redundant, alternately routed) to each generation facility where the Main Grid RAS Generation Dropping (GD) will occur.
2. All POI stations have:
 - a. BPA SCADA Control & 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

The following maps illustrates the geographic coordinates for the IRs assessed in Cluster Area South 1.



5.2 Studied POIs

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

For requests in Harney and Lake counties, the nearest BPA facility is the Pacific DC Intertie (PDCI) line. However, the PDCI is not feasible for interconnections. Therefore, requests in those counties are assumed to have a POI on the proposed Bonanza to Nevada-Oregon-Border (NOB) 500 kV line.

Table 5.2: Studied POI locations

IR #	Gen Type	MW Requested (Generating)	MW Requested (Charging)	Studied POI
G0675	Battery, Biofuel, Pumped-Storage Hydro	600	-600	Bonanza 230 kV
G0693	Battery, Biofuel, Pumped-Storage Hydro	100	-100	Bonanza 230 kV
G0826	Solar, BESS	280	-280	Bonanza-NOB 500 kV

5.3 Starting Base Cases

Following WECC Cases were used for CA South 1.

- 2026HS
- 2034HS

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 CA Central Oregon include:

- Bonanza 500 kV and 230 kV Substation (BPA)
- LaPine Long Range Plan (BPA)
- Bonanza-LaPine #1 500 kV line
 - Construction will be to BPA 500 kV conductor and tower design specifications. Initial operation will be 230 kV.
 - Conversion to 500 kV operation will occur once a LaPine 500 kV Annex station is available to re-terminate. For purposes of this study, line is modeled as 500 kV connection between Bonanza and LaPine.
- Pilot Butte-Lapine 230 kV rebuild
- New LaPine-G0657POI #2 500 kV line

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 Topology Sensitivity Descriptions

Sensitivity studies with and without Contingent Facilities and proposed interconnection plans of service were performed to confirm those facilities are required.



- With and without Bonanza-NOB 500 kV transmission lines (TCS PH1 requirement – Cluster Area South 1)
- With and without Bonanza-Grizzly #4 and Grizzly-Big Eddy 500 kV transmission lines (TSEP Contingent Facilities)

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:

- Area 30 (PG&E) or BPA Upper Columbia generation were used to balance the MWs injected by generation or charging at Bonanza or Bonanza-NOB POIs.

Detailed findings of these injection tests can be found in the Results Section.

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.

Bonanza POI passed BPA's SCR strength test. This means that no plan of service elements are driven by the SCR for that POI.

Bonanza-NOB 500 kV POI fails the SCR tests for injections greater than 500 MW. Due to withdrawals, additional transmission circuits to the POI will not be required.

6 Contingent Facilities Assumed In-Service

6.1 Bonanza and Bonanza-NOB POIs

The following projects are assumed in-service for Bonanza and Bonanza-NOB POIs. They are deemed Contingent Facilities for this study and are required to be energized prior to IRs at Bonanza POI and Bonanza-NOB POI taking Interconnection Service.

Table 6.1: Bonanza POI and Bonanza-NOB POI Contingent Facilities

Project Name	Required POIs	Driver	Estimated Cost	Estimated I/S Date
Customer substations and gen-tie to BNZA 230	BNZA 230	G0643, G0669	N/A	N/A
Bonanza substation	BNZA 230, BNZA-NOB 500	TSEP, LLIRs, Senior IRs	\$548M ¹	2033
Bonanza-LaPine #1 500 kV transmission line	BNZA 230, BNZA-NOB 500	LLIRs, Senior IRs	\$150 ¹	2033
Mid-Oregon RAS Algorithm	BNZA 230, BNZA-NOB 500	Senior IRs	N/A	N/A
2023 TSEP: North of Grizzly (NOG) 500 kV • New BGED-GRIZ #1 500 kV line (99mi) • New GRIZ-BNZA #4 500 kV line (18mi)	BNZA 230, BNZA-NOB 500	TSEP	N/A ¹	N/A ¹

1. Scoping is ongoing these projects, schedules and costs will be refined when design begins



The Bonanza Substation project is a 500/230 kV substation planned near the existing Ponderosa substation. It is required for many generator and load interconnections as well as transmission service requests in the Central Oregon area. Two 500/230 kV transformers are planned, and the substation will loop in two major 500 kV transmission lines in Central Oregon.

The Bonanza-LaPine #1 transmission line is to be constructed to a 500 kV design specification but initially operated at 230 kV. The line is approximately 50 miles in length. Several previous interconnections, both generation and load, require this project prior to energization.

The Mid-Oregon RAS is a local RAS involving generation in the Central Oregon Area.

TSEP North of Grizzly (NOG) 500 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 Bonanza 230 kV POI

TCS System Performance

Table 7.1: Results for Bonanza 230 kV POIs

POI MW Threshold	Affected IRs	Limiter (Element or Contingency)	Mitigation
0 to 700	G0675, G0693	None	N/A
-700 to 0	G0675, G0693	Grizzly-Captain Jack 500 kV (TPL-001, P1, P7 and P6)	Participation in new BPA AC-RAS Algorithms (BESS Grid Charging)

Proposed Mitigations

The total 880 MW of requests can be enabled without any new reinforcements.

Participation in new BPA AC-RAS will be required for any grid charging between 0 and 880 MW.

7.2 Bonanza-NOB POI

TCS System Performance

Table 7.2: Results for Bonanza-NOB POI

POI MW Threshold	Affected IRs	Limiter (Element or Contingency)	Mitigation
0	G0826	N/A	New BNZA-POI #1 500 kV line, New POI-NOB #1 500 kV line, New midline POI station
1 to 280	G0826	None	N/A
-280 to 0	G0826	Grizzly-Captain Jack 500 kV (TPL-001, P1, P7 and P6)	Participation in new BPA AC-RAS Algorithms (BESS grid charging)

Proposed Mitigations

Single 500 kV circuits to Bonanza and NOB stations are required to energize the new POI station.



The maximum injection for this POI is 500 MW, before the Short Circuit Ratio (SCR) strength test fails (less than 3.0). Injecting 500MW or more at the new POI will require construction of a 2nd Bonanza-NOB #2 500 kV circuit in parallel, looped into the POI station.

Participation in new BPA AC-RAS will be required for any grid charging.

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 System	Elements Impacted	POIs
PAC	Bonanza 230 kV	Bonanza 230 kV, Bonanza-NOB 500 kV
PGE	Bonanza 230 kV	Bonanza 230 kV, Bonanza-NOB 500 kV



9 Interconnection Requirements

9.1 Bonanza 230 kV POI

Table 9.1: Bonanza POI Facility requirements

G#	BPA Station Work	BPA Non-Station Work
G0693	None (G0643/G0669 shared gen-tie terminal)	Participation in BPA AC-RAS
G0675	1x 230 kV gen-tie Terminal	Participation in BPA AC-RAS

1. Install one 230 kV breakers in Bonanza 230 kV yard, 3 disconnect switches, and associated control, relaying, and communications equipment.
 - a. one PCB in 500 kV bay 2
2. Participation in new and existing BPA AC-RAS algorithms near Bonanza, Grizzly and Captain Jack
3. Installation of BPA-required C&C equipment at each customer's collector site (RAS, Meters, relays, Control House space).
4. Minor Development of C&C hardware at BPA's POI substation.
5. The Bonanza battery energy storage system must be grid-forming to meet the SCR requirement and per STD-N-000001-00-10. The customer is responsible for procuring the grid-forming BESS, and the costs and schedule for the grid-forming BESS are not included in cost and schedule estimates in this report.

The customers will construct 230 kV lines from the BPA POI station to their generation facilities. The customers will construct their generation facilities. Communications and relaying will be coordinated with BPA.

9.2 Bonanza-NOB 500kV POI

Table 9.2: Bonanza-NOB POI Facility requirements

G#	BPA Station Work	BPA Non-Station Work
G0826	New 500 kV station, 1x 500 kV terminal	1. Bonanza-POI 500 kV #1 line (66 miles single circuit) with new Bonanza Series capacitors 2. POI-NOB 500 kV #1 line (99 miles single circuit) with new NOB station series capacitors 3. Participation in BPA AC-RAS

1. Construct new ring-bus 500 kV substation laid out for future breaker-and-half expansion, including 1 new 180 MVAR shunt reactor. The substation will include four 500 kV breakers, nine disconnect switches, and associated control, relaying, and communications equipment.
2. Construct 165 miles of 500 kV transmission line from Bonanza to POI to NOB. The choice of conductor for the new line shall ensure capacity of at least 4550 MVA; 3-ACSR Deschutes or other equivalents conductor. Structure sizes are double-circuit 500-kV for future expandability inside the Right of Way.
3. Construct two series capacitor platforms:
 - a. one at Bonanza end, rated 2000 Amps and 460 MVAR and
 - b. one at NOB end, 2000 Amps and 460 MVAR.



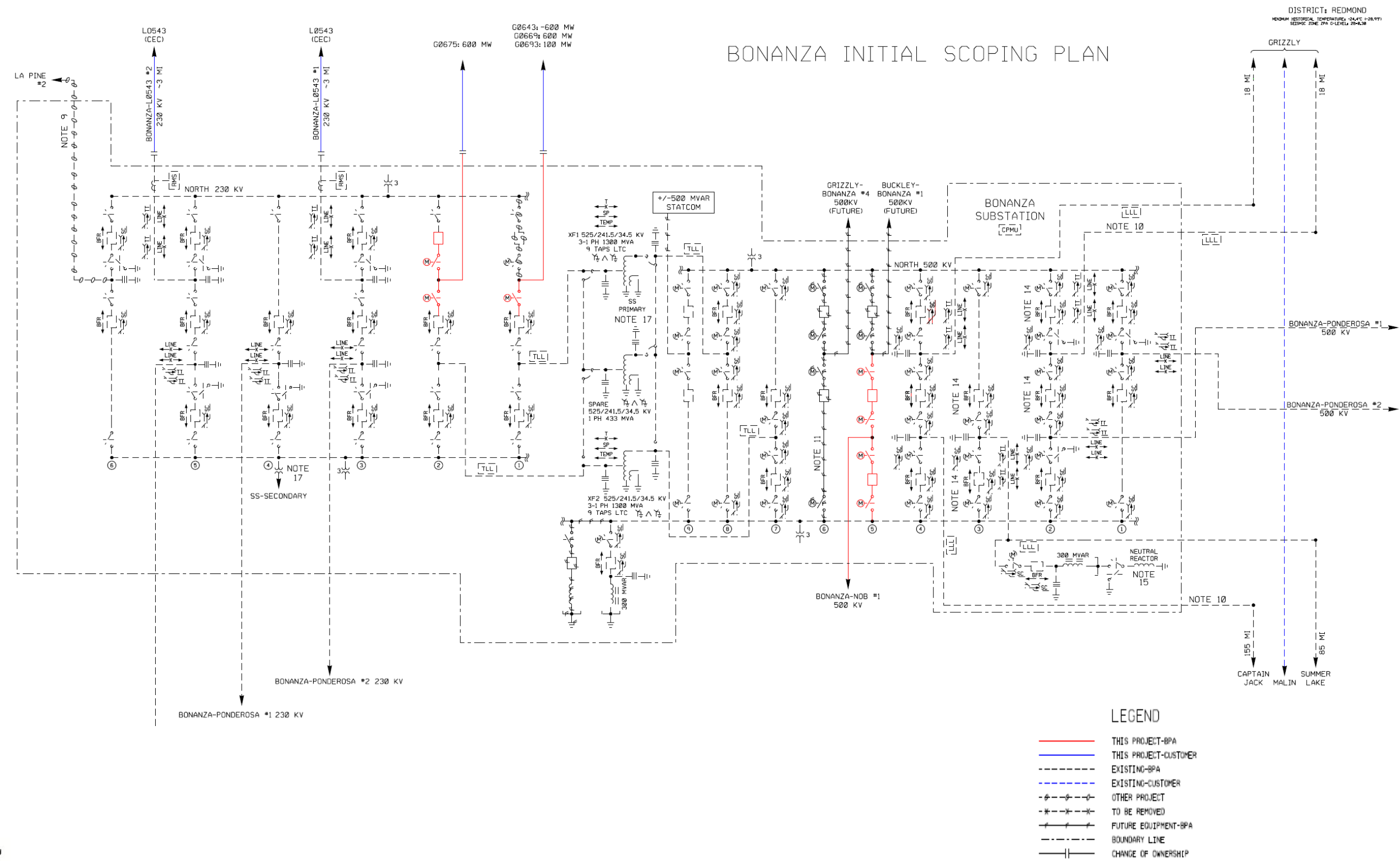
4. Participation in New and Existing BPA AC-RAS algorithms near Bonanza, Grizzly and Captain Jack
5. Installation of BPA-required C&C equipment at each customer's collector site (RAS, Meters, relays, Control House space).
6. Significant Development of C&C hardware at BPA's POI substation.
7. The Bonanza POI battery energy storage system must be grid-forming to meet the SCR requirement and per STD-N-000001-00-10. The customer is responsible for procuring the grid-forming BESS, and the costs and schedule for the grid-forming BESS are not included in cost and schedule estimates in this report.

The customers will construct 500 kV lines from the BPA POI station to their generation facilities. The customers will construct their generation facilities. Communications and relaying will be coordinated with BPA.



10 Project One-Line Drawings

10.1 Bonanza POI One Line



10.2 Bonanza-NOB POI One Line
(500kV bus shunt reactor not shown)

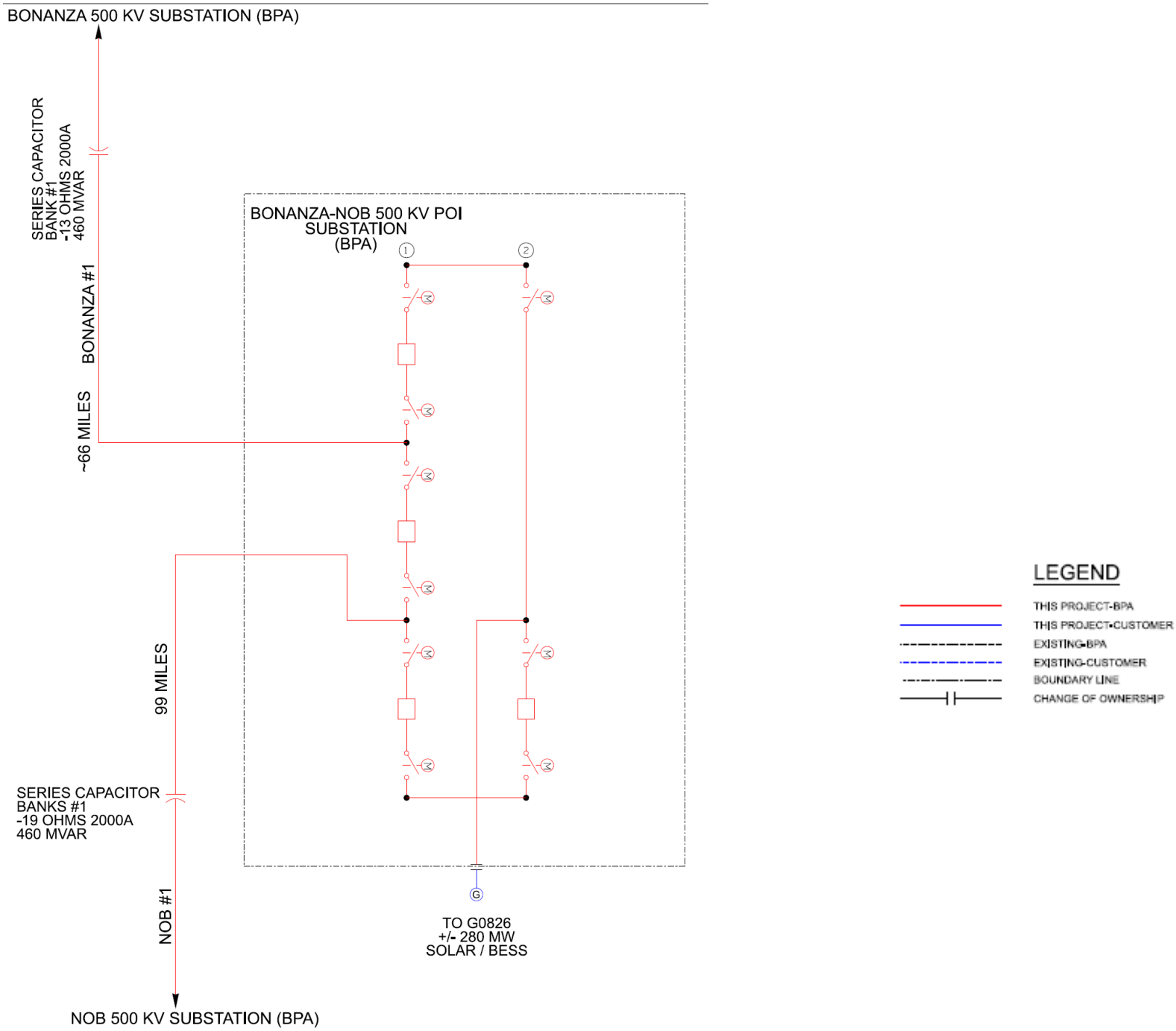
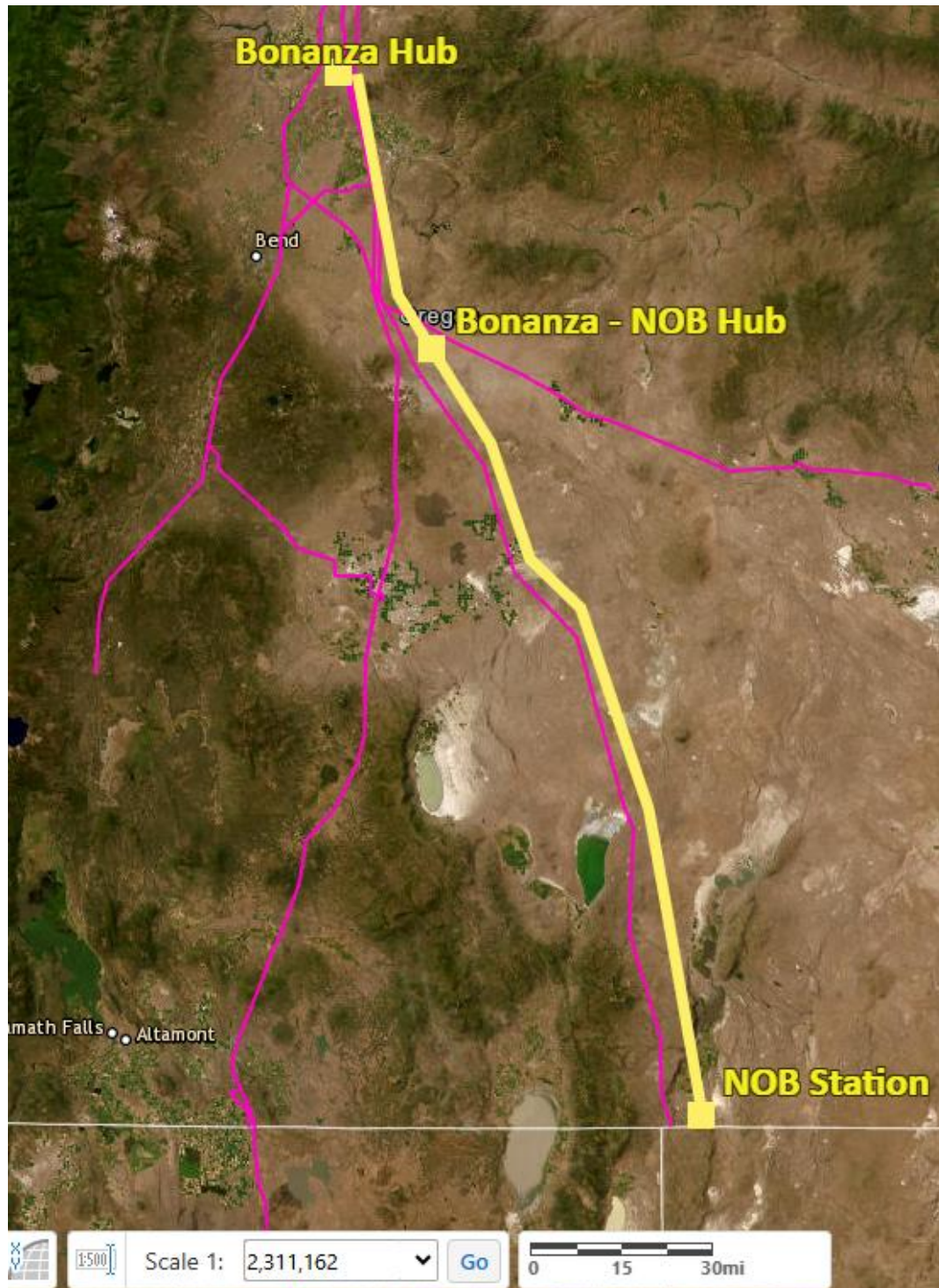


Figure 10.2: Estimated route for BZNA-POI-NOB 500 kV circuit



11 Costs and Schedules

11.1 Estimated Schedule

The schedule is dependent on,

- 1) The acquisition of long lead time equipment,
- 2) BPA 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 Bonanza 230 kV

Table 11.1 POI – Bonanza 230 kV Station Cost Estimate

<i>Estimate Summary</i>								
Estimate #	Description	Quantity	Contract		BPA		Misc.	Total
			Labor	Material	Labor	Material		
	Bonanza 230kV POI	-	-	-	-	-	-	-
ST-070-53-12	230kV Add: 1x PCB	1	\$1,098,000	\$628,000	\$270,000	\$6,000	\$0	\$2,002,000
C&C: Customer Site	C&C Placeholder per collector site	2	\$0	\$0	\$0	\$0	\$10,000,000	\$10,000,000
Contingency %	40%	Subtotal:	\$1,098,000	\$628,000	\$270,000	\$6,000	\$10,000,000	\$12,002,000
Overhead %	Labor	Contingency:	\$439,200	\$251,200	\$108,000	\$2,400	\$4,000,000	\$4,800,800
	26%	Overhead:	\$138,348	\$228,592	\$98,280	\$756	\$3,640,000	\$4,105,976
Grand Total:	(rounded to two significant figures)		\$1,700,000	\$1,110,000	\$480,000	\$9,200	\$18,000,000	\$21,000,000

Table 11.2 POI – Bonanza 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
G0675	600	Bonanza 230kV Substation Expansion w/ Expanded Comms	100.00%	\$3M	N/A	N/A	N/A	Collector Station C&C and RAS	\$9M	\$12M
G0693	100		0.00%		N/A	N/A	N/A	Collector Station C&C and RAS	\$9M	\$9M



11.4 POI Bonanza-NOB 500 kV

Table 11.3 POI – Bonanza-NOB 500 kV New POI, Station Cost Estimate

Estimate Summary			Station Costs						
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Bonanza-NOB 500 kV POI		-	-	-	-	-	-	-
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
C&C	C&C Collector Site Placeholder		1	\$0	\$0	\$0	\$0	\$5,000,000	\$5,000,000
C&C	C&C BPA Site Placeholder		1	\$0	\$0	\$0	\$0	\$15,000,000	\$15,000,000
Contingency %	40%		Subtotal:	\$44,512,000	\$46,842,000	\$5,690,000	\$816,000	\$20,000,000	\$117,860,000
Overhead %	Labor	Materials & Turnkey	Contingency:	\$0	\$0	\$0	\$0	\$8,000,000	\$8,000,000
	26%	9%	Overhead:	\$4,006,080	\$4,215,780	\$1,479,400	\$73,440	\$7,280,000	\$17,054,700
Grand Total: (rounded to two significant figures)				\$49,000,000	\$51,000,000	\$7,200,000	\$890,000	\$35,000,000	\$140,000,000

Table 11.4 POI –BNZA-POI-NOB #1 500 kV Line, Non-Station Cost Estimate

Estimate Summary			Non-Station Costs						
Estimate #	Description		Quantity	Contract		BPA		Misc.	Total
				Labor	Material	Labor	Material		
	Bonanza-NOB 500 kV POI		-	-	-	-	-	-	-
ST-070-65-10	500kV Add: 1x bay 2pos BAAH (@BNZA, @POI, and @NOB terminals)		2	\$23,416,000	\$19,228,000	\$3,620,000	\$0	\$116,000	\$46,380,000
LT-040-54-8	500kV: 1 mi, 3-Deschutes, SC all new towers		165	\$299,970,000	\$246,180,000	\$160,050,000	\$0	\$0	\$706,200,000
SB-8071-1-0	500kV: 1x series capacitor platform		2	\$0	\$0	\$0	\$0	\$96,376,000	\$96,376,000
C&C	C&C Misc. Placeholder (Fiber)		1	\$0	\$0	\$0	\$0	\$46,000,000	\$46,000,000
Contingency %	40%		Subtotal:	\$323,386,000	\$265,408,000	\$163,670,000	\$0	\$142,492,000	\$894,956,000
Overhead %	Labor	Materials & Turnkey	Contingency:	\$119,988,000	\$98,472,000	\$64,020,000	\$0	\$56,950,400	\$339,430,400
	26%	9%	Overhead:	\$39,903,660	\$32,749,200	\$59,199,400	\$0	\$51,855,024	\$183,707,284
Grand Total:	(rounded to two significant figures)			\$480,000,000	\$400,000,000	\$290,000,000	\$0	\$250,000,000	\$1,400,000,000

Table 11.5 POI – Bonanza-NOB 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
G0826	280	New 500kV Substation w/ New Comms	100.00%	\$131M	BONZ-POI-NOB #1 500kV Line	100.00%	\$1400M	Collector Station C&C and RAS	\$9M	\$1540M

