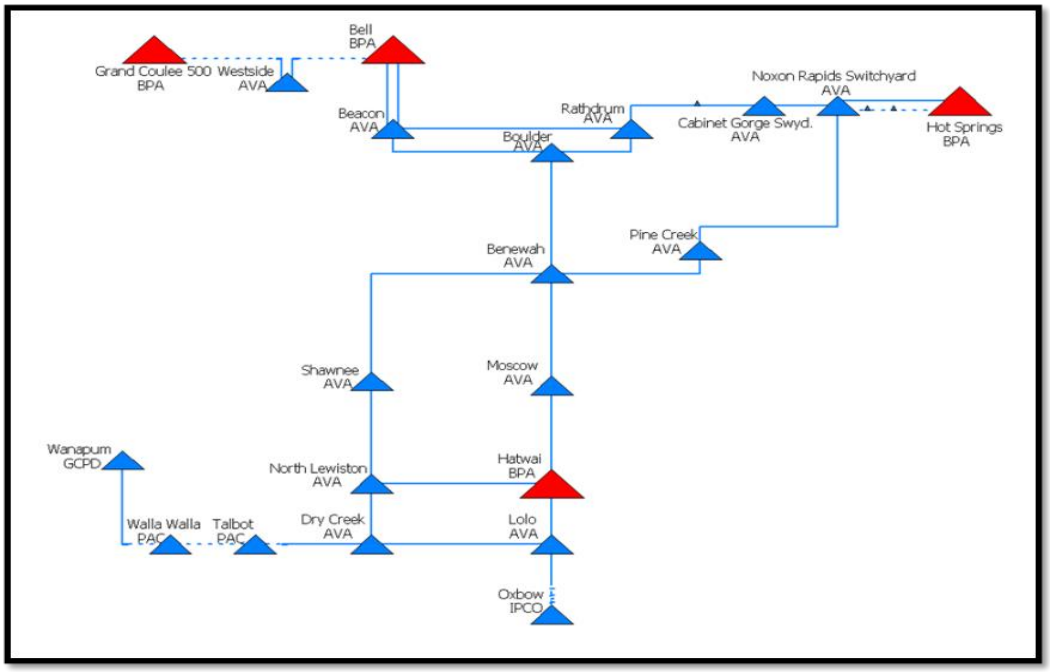
Designated Network Resource Study

2022



Avista 230kV Transmission System

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Version	Date	Description	Author	Review
A	8/9/2022	Initial draft for review	Spratt	-
B	08/25/22	Updated (4) existing facility estimates	Spratt	Power Supply
C	08/30/22	Updated 115kV line estimates	Spratt	-
0	12/xx/22	Release to Customer	Spratt	Gross

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1. Executive Summary

On November 30, 2021, Avista System Planning received a study request from Avista's Power Supply Department to complete a study identifying the system impacts of integrating additional generation for native load retail customers at the following interconnection points:

- New generation sites
  - Big Bend area near Lind 100MW
  - Big Bend area near Odessa 100, 200 and 300MW
  - Big Bend area near Othello 100, 200 and 300MW
  - Big Bend area near Reardan 50 and 100MW
  - Clarkston/Lewiston area 100, 200 and 300MW
  - Lower Granite area 100 and 300MW
  - Palouse area, near Benewah 100 and 200MW
  - Palouse area, near Tekoa 100 and 200MW
  - Rathdrum Prairie, near Lancaster Rd 100, 200, 300 and 400MW
  - Tokio area, northeast of Ritzville 100 and 200MW
  - West Plains area, north of Airway Heights 100, 200 and 300MW
- Existing generation sites (increase capacity or add generation to existing POI)
  - Kettle Falls 12, 50 and 100MW
  - Northeast 10 and 100MW
  - Palouse 10 and 50MW
  - Rathdrum 25, 50, 100 and 200MW

1.1. Results Summary

This study presents interconnection impacts and cost estimates associated with the integration of the above resources as Network Resource Interconnection Services (NRIS). During the study process, Avista's System Planning department conducts steady state power flow analysis to determine transmission system reinforcements necessary to integrate each project. Following is a summary of the study results:

POI Station or Area	Requested (MW)	POI Voltage	Cost Estimate ($ million)
Big Bend area near Lind (Tokio)	100/200	230kV	138.2
Big Bend area near Odessa	100	230kV	167.1
Big Bend area near Odessa	200/300	230kV	168.0
Big Bend area near Othello	100/200	230kV	222.2
Big Bend area near Othello	300	230kV	262.4
Big Bend area near Reardan	50	115kV	9.7
Big Bend area near Reardan	100	115kV	10.3
Clarkston/Lewiston area	100/200/300	230kV	1.9
Kettle Falls substation, existing POI	12/50	115kV	1.8
Kettle Falls substation, existing POI	100	115kV	24.9

POI Station or Area	Requested (MW)	POI Voltage	Cost Estimate ($ million)
Lower Granite area	100/200/300	230kV	2.9
Northeast substation, existing POI	10	115kV	1.6
Northeast substation, existing POI	100	115kV	6.7
Palouse area, near Benewah (Tekoa)	100/200	230kV	2.4
Rathdrum substation, existing POI	25/50	115kV	11.5
Rathdrum substation, existing POI	100	230kV	16.7
Rathdrum substation, existing POI	200	230kV	27.0
Rathdrum Prairie, north Greensferry Rd	100	230kV	32.7
Rathdrum Prairie, north Greensferry Rd	200	230kV	43.0
Rathdrum Prairie, north Greensferry Rd	300	230kV	54.4
Rathdrum Prairie, north Greensferry Rd	400	230kV	91.5
Thornton substation, existing POI	10/50	230kV	1.9
West Plains area north of Airway Heights	100	115kV	2.4
West Plains area north of Airway Heights	200/300	115kV	4.7

Table 1: Summary of Estimates for Generation Interconnection Requests

The Point of Interconnection (POI) estimates for integration onto Avista's existing transmission system, listed in Table 1, are based on previous Designated Network Resource Studies and Large Generation Interconnection Request study results. The POI designations conform to the latest Avista *SP-SPP-02 – Facility Interconnection Requirements*.

2. Scope of Study

This study evaluates the impacts of the proposed interconnections on the reliability of the transmission system. Results are based on steady state continency analysis, operational knowledge of the system, and results from previous generation integration studies. The study considers existing generating facilities, pending senior queued serial process interconnection requests, and interconnection requests currently in Avista's generation interconnection process. This study is for Avista's Power Supply Department to evaluate bundled retail service for native load customers only and does not replace tariffed generation interconnection process requirements for any future projects.

This interconnection study report includes the following information:

- Full contingency analysis identifying facility thermal and voltage violations resulting from the interconnection at the requested facility output level(s).
- Description and non-binding, good faith cost estimate of facilities required to interconnect the project to the Avista Transmission System and maintain reliable performance.

The transmission additions simulated in the study cases are based on the best information available at the time the study was initiated. The findings included in this study do not assure that the proposed Generation Project will be allowed to operate at full or reduced capacity under any or all operating conditions. Avista cannot guarantee future analysis (i.e. Transmission Service Requests or Operational Studies) will not identify additional problems or system constraints that require mitigation or reduced

operation. It is possible that the actual plan of service will differ from the plan of service studied, and System Planning reserves the right to restudy this request if necessary.

This study utilizes the annual Cluster Study base cases. Refer to *Avista's 2022 Generator Interconnection Cluster Study Plan*[1] for additional information regarding the study cases used, assumptions, and methodology.

2.1. Large Generation Interconnection Requests

Prospective generation may request interconnection studies to understand the cost and timelines for integrating potential new generation projects. These requests follow an interconnection process outlined in Avista's Open Access Transmission Tariff (OATT) that has been accepted by FERC. After this process is complete, a contract offer to integrate the project may occur and negotiations can begin to enter into an interconnection agreement. Table 2 lists information associated with potential third-party resource additions currently in Avista's interconnection queue.[2]

Serial or Cluster Number	Former Queue Number	Max MW Output	Type	County	State
Senior	46	126	Wind	Adams	WA
Senior	52	100	Solar	Adams	WA
Senior	60	150	Solar	Asotin	WA
Senior	66	71	Wood Burner/ CT	Stevens	WA
Senior	59	116	Solar/Storage	Adams	WA
Senior	63	26	Hydro	Kootenai	ID
Senior	79	2.1	Solar	Spokane	WA
Senior	80	19	Solar	Spokane	WA
Senior	84	5	Solar	Stevens	WA
Senior	97	100	Solar/Storage	Nez Perce	ID
TCS-02	62	123.2	Wind	Adams	WA
TCS-03	67	80	Solar/Storage	Adams	WA
TCS-04	73	94	Solar/Storage	Adams	WA
TCS-05	76	114.12	Solar	Grant	WA
TCS-06	81	94	Solar/Storage	Adams	WA
TCS-07	85	5	Solar	Adams	WA
TCS-08	99	200	Solar/Storage	Franklin	WA
TCS-09	100	100	Solar/Storage	Spokane	WA
TCS-10	103	40	Solar	Lincoln	WA
TCS-11	104	120	Wind	Spokane	WA
TCS-12	105	5	Solar	Stevens	WA
TCS-14	110	375	Wind/Solar/Storage	Garfield	WA
TCS-16	112	125	Solar/Storage	Lincoln	WA
TCS-18	119	200	Solar/Storage	Grant	WA

[1] https://www.oasis.oati.com/woa/docs/AVAT/AVATdocs/2022_Generator_Interconnection_Cluster_Study_Plan_-_Final.pdf

[2] https://www.oasis.oati.com/woa/docs/AVAT/AVATdocs/Transition_Cluster_Study_Queue_V2.pdf

Table 2: Existing Large Generation Interconnection Requests

3. Description of proposed Interconnections

Large Generation Interconnection Requests (LGIR) are typically integrated onto Avista's transmission system at 115kV or 230kV. The backbone of the Avista transmission system is operated at 230kV. A station-level drawing of Avista's 230kV Transmission System including interconnections to neighboring utilities is shown below. Avista's 230kV Transmission System is interconnected to the BPA 500kV transmission system at the Bell, Hatwai, and Hot Springs substations.

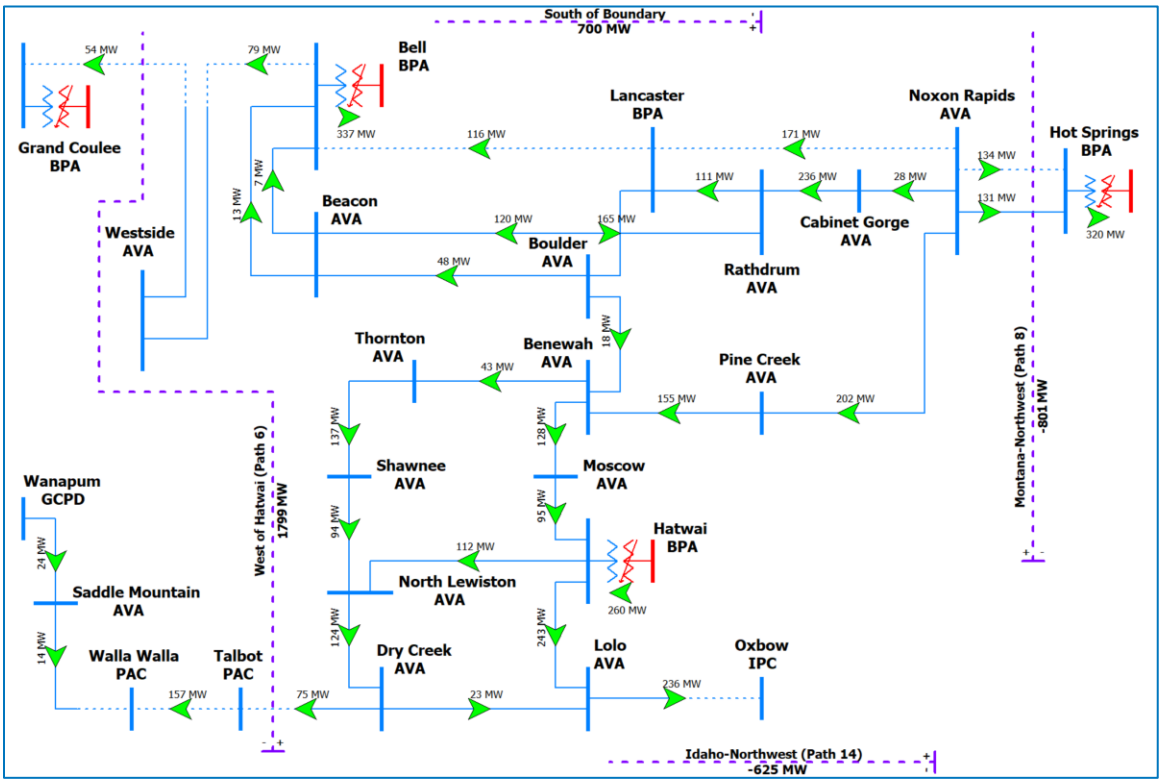

Figure 1: Avista 230kV Transmission System

The following sections describe the proposed generating facilities that have requested integration onto Avista's Transmission System. Assumptions, alternatives, and system performance are detailed for each individual Point of Interconnection (POI).

3.1. Big Bend Area near Lind (Tokio)

3.1.1. Project description and one-line diagram

Customer has requested that 100 to 200MW of new generation be integrated onto Avista's transmission system in the Lind area. The 115kV system in the Big Bend area, specifically the Lind area, is near capacity with existing generation, plus the previously queued Interconnection Requests. Previous studies have shown that new generation in this area will require an expansion of the 230kV network into the area.

This study will assume that the 1st phase of the 230kV expansion would add a 230kV hub approximately 15 miles east of Lind then build a (53) mile radial 230kV transmission line connecting the new hub station into Avista's primary load center with a termination at the Shawnee station. This request was modeled as a new 230kV system expansion as shown below.

These results are similar for the request at Tokio, given this location is withing 20 miles of 230kV network expansion.

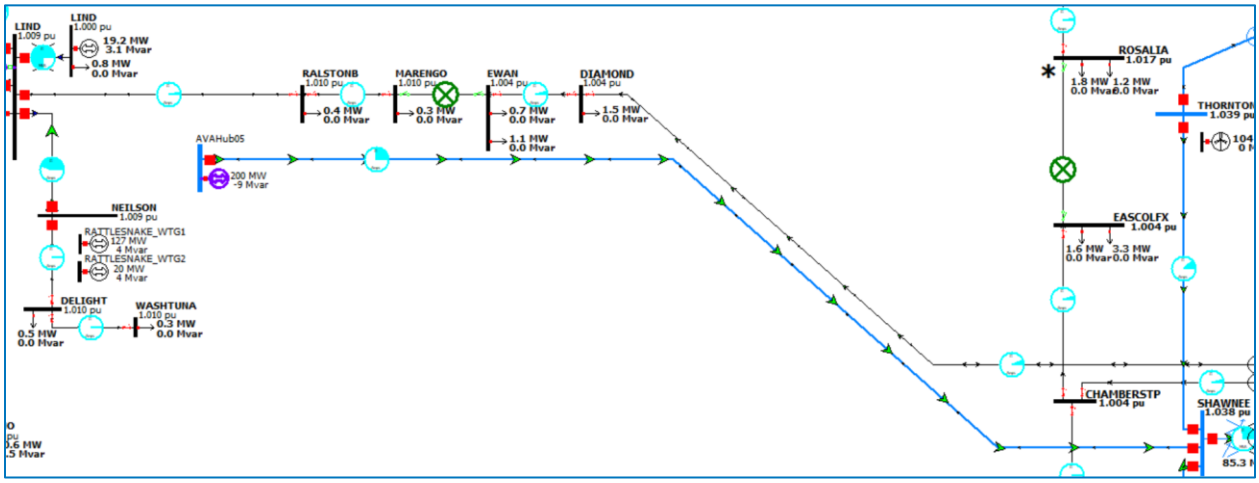

Figure 2: Proposed Generation at a 230kV Hub near Lind, 2027 Heavy Summer

System performance in this area is dominated by several factors:

- 230kV expansion transfers the proposed generation into the Palouse area.
- System flows are typically north to south.
- Existing local generation (104MW) from Palouse Wind.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow south into the Clarkston/Lewiston load center.

3.1.2. Contingency Analysis

The worst system performance was during heavy summer conditions with high north to south ID-NW transfers. The issues identified below can be mitigated by adjustments to ID-NW flows. The spring and winter scenarios did not identify any issues.

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW
P1			
N-1: Hatwai - Lolo 230kV			
Clearwater - North Lewiston 115kV			96.4
P2			
BF: 1W18 Talbot-Walla Walla, Walla Walla-Saddle Mountain			
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	99.1	100.2	101.2
BF: 1W5 Walla Walla-Wallula, Talbot-Walla Walla			
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	95.5	96.5	97.6
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.7	95.7	95.8
BF: 1W10 Hurricane-Walla Walla, Walla Walla 230/69 kV Transformer			
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.6	95.7	95.8
Lolo - Oxbow 230kV (Lolo - Imnaha)			95.3
BF: 1W4 Walla Walla-Saddle Mountain, Walla Walla 230/69 kV Transformer			
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	96.2	96.3	96.4
BF: 206A Brownlee-NorthPowder, Brownlee-Oxbow #2, Brownlee T231 & T232 GSU			
OXBOW (60275) -> BROWNLEE (60095) CKT 1 at OXBOW	96	96.8	97.6
BF: 1W6 Walla Walla 230/69 kV Transformer, Hurricane-Walla Walla			
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.1	95.2	95.3
Lolo - Oxbow 230kV (Lolo - Imnaha)			95.3

Table 3: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below. This is a N-1-1 loss of the 230kV lines going south into Clarkston/Lewiston, showing the system would be capable of absorbing the full output of the proposed generation.

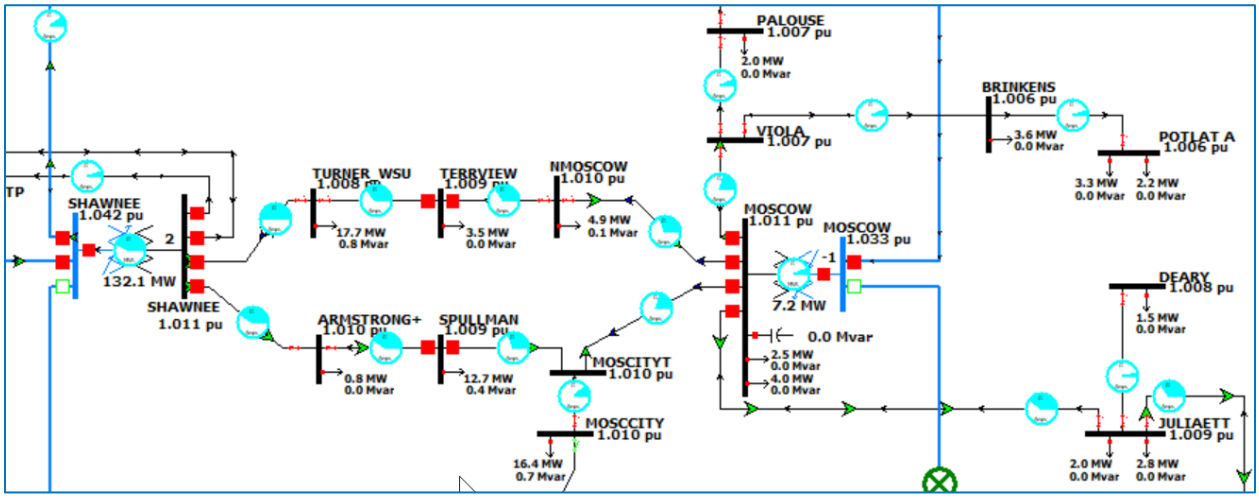

Figure 3: Worst Performing Contingency, Heavy Spring 2027

A three-phase short circuit fault at the new radially fed 230kV hub is approximately 1,000MVA, therefore new generation should be limited to about 300MW to maintain grid stability. Generation additions beyond this limit, should require a second 230kV line into the area to complete a more robust system network.

3.1.3. Integration costs

The Shawnee substation has a 230kV main/aux arrangement with space for a new line position and will also require a new 230kV auxiliary circuit breaker for reliability.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 230kV AVAHub05 station – property, termination, comms and metering	16.5
Projects necessary to mitigate new system violations at 100/200MW	
New (53) mile AVAHub05-Shawnee 230kV SCT transmission line	119.3
New 230kV line position and aux breaker at Shawnee	2.4
total	***138.2***

Table 4: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.3. Big Bend Area near Odessa

3.3.1. Project description and one-line diagram

Customer has requested that 100 to 300MW of new generation be integrated onto Avista's transmission system in the Odessa area. The 115kV system in the Odessa area is near capacity and existing generation at Devils Gap and Stratford is already being curtailed for multiple N-1 operational issues. Previous studies have shown that new generation in this area will require an expansion of the 230kV network.

This study assumes that the first phase of that expansion would add a 230kV hub near Odessa substation, then build a (64) mile radial 230kV transmission line that will connect to the new hub station into Avista's primary load center with a termination at the planned Bluebird station. This request was modeled as a new 230kV system expansion as shown below.

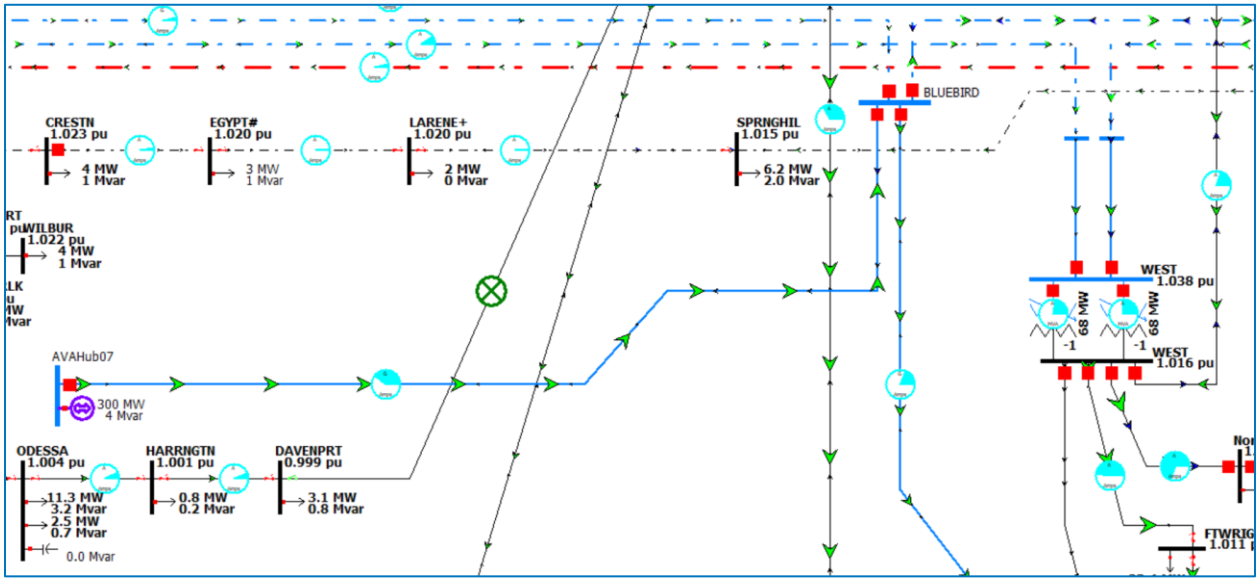

Figure 4: Proposed Generation at Bluebird 230kV, 2027 Heavy Summer

System performance in this area is dominated by several factors:

- 230kV expansion transfers the proposed generation into the West Plains area.
- System flows are typically east to west in the spring and west to east during heavy summer.
- No existing local generation.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow east into the greater Spokane area.

3.3.2. Contingency Analysis

The worst system performance was during heavy summer conditions. The issues identified below result from moving power from the West Plains into the downtown Spokane load center. The spring and winter scenarios did not identify any issues.

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW	27 HS 300 MW
P1				
N-1: Garden Springs - Sunset#2 115kV				
Garden Springs - Sunset#1 115kV			101.6	111.8
N-1: Garden Springs - Sunset#1 115kV				
Garden Springs - Sunset#2 115kV			101.6	111.8
P2				
BF: R427 Beacon North & South 230kV				
BELL S2 (40088) -> BELL BPA (40087) CKT 6 at BELL S2	113.8	112.9	111.9	111.1
Francis and Cedar - Northwest 115kV	95.9	96.1	96.3	96.5
Northwest - Westside 115kV		95	95.2	95.4
BF: A600 Beacon North & South 115kV				
Francis and Cedar - Northwest 115kV	100.2	98.8	97.4	96.1
Northwest - Westside 115kV	98.3	97.2	96.1	95.1
BF: AXXX9 Airway Heights - Garden Springs 115kV, Garden Springs - Sunset#1 115kV				
Garden Springs - Sunset#2 115kV			104	114.2
BF: AXX10 Garden Springs - Westside 115kV, Garden Springs - Sunset#2 115kV				
Garden Springs - Sunset#1 115kV				103.7
BF: AXXX4 Garden Springs - Sunset#1 115kV, Ninth & Central - Sunset 115kV				
Garden Springs - Sunset#2 115kV				95.3

Table 5: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below. This is a N-1 loss of a 115kV line connecting the West Plains to downtown Spokane. Showing the system will need reinforcements as the proposed generation increases over 100MW.

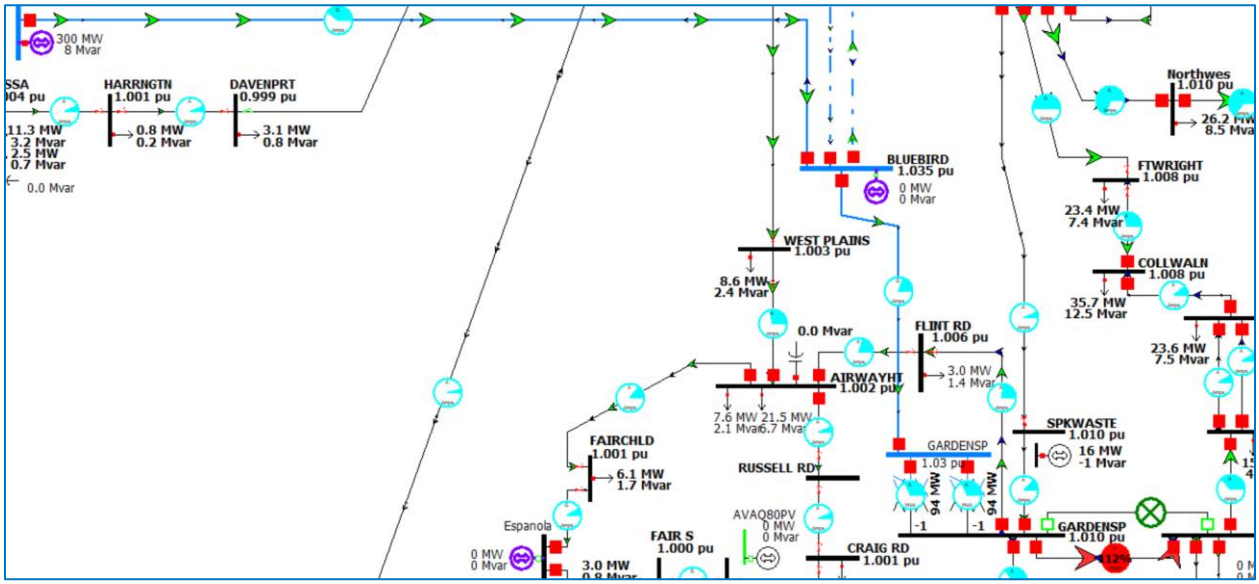

Figure 5: Worst Performing Contingency, Heavy Summer 2027

A three-phase short circuit fault at the new radially fed 230kV hub is approximately 950MVA, therefore new generation should be limited to about 300MW to maintain grid stability. Generation additions beyond this limit, should require a second 230kV line into the area to complete a more robust system network.

3.3.3. Integration costs

The planned Bluebird substation has a 230kV double breaker double bus arrangement with space for a new line position.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 230kV AVAHub07 station – property, termination, comms and metering	16.5
Projects necessary to mitigate new system violations at 100MW	
New (64) mile AVAHub07-Bluebird 230kV SCT transmission line	148.7
New 230kV line position and xfmr breaker at Bluebird	1.9
total	***167.1***
Projects necessary to mitigate new system violations at 200/300MW	
New (64) mile AVAHub07-Bluebird 230kV SCT transmission line	148.7
New 230kV line position and xfmr breaker at Bluebird	1.9
Rebuild GardenSprings-Sunset #1 115 kV (fix 2.3mi 556aac)	0.9
total	***168.0***

Table 6: Summary Estimates for Generation Interconnection

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.5. Big Bend Area near Othello

3.5.1. Project description and one-line diagram

Customer has requested that 100 to 300MW of new generation be integrated onto Avista's transmission system in the Othello area. The 115kV system in the Big Bend area is near capacity with existing generation, plus previously queued Interconnection Requests. Previous studies have shown that new generation in this area will require an expansion of the 230kV network into the area.

This study assumes that the second phase of a Big Bend 230kV expansion would add a 2nd 230kV hub approximately 6 miles east of Othello, then Avista would build a (30+53) mile radial 230kV transmission line connecting the new hub station into Avista's primary load center with a termination at the Shawnee station. This request was modeled as a new 230kV system expansion as shown below.

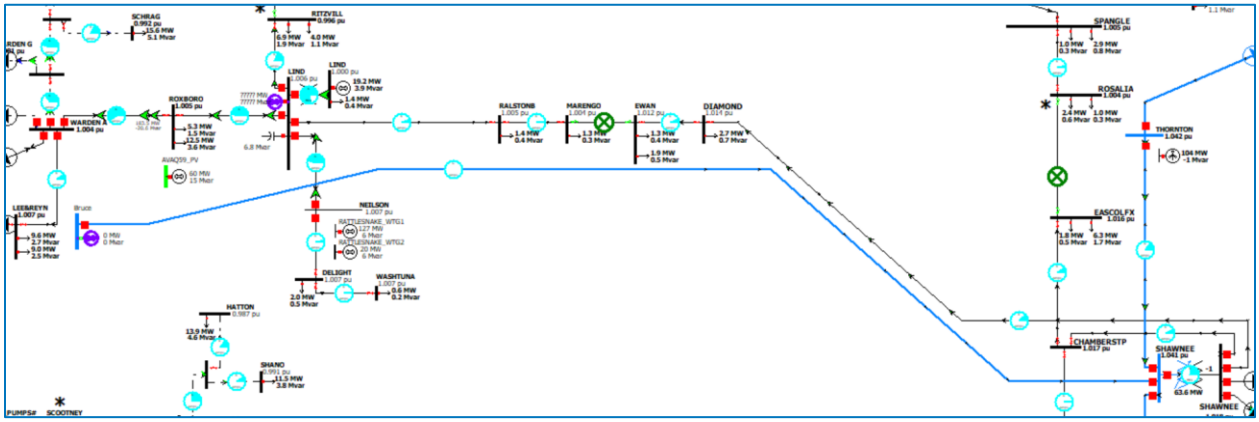

Figure 6: Proposed Generation at Shawnee 230kV, 2027 Heavy Summer

System performance in this area is dominated by several factors:

- 230kV expansion transfers the proposed generation into the Palouse area.
- System flows are typically north to south.
- Existing local generation (104 MW) from Palouse Wind.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow south into the Clarkston/Lewiston load center.

Additionally, this long of a radial 230kV line will only support about 200MW, to meet the 300MW generation requested the above 230kV expansion would also need to be networked. This will require an additional 17 miles of new 230kV transmission and a new 230kV line termination into the existing Saddle Mountain substation as shown below.

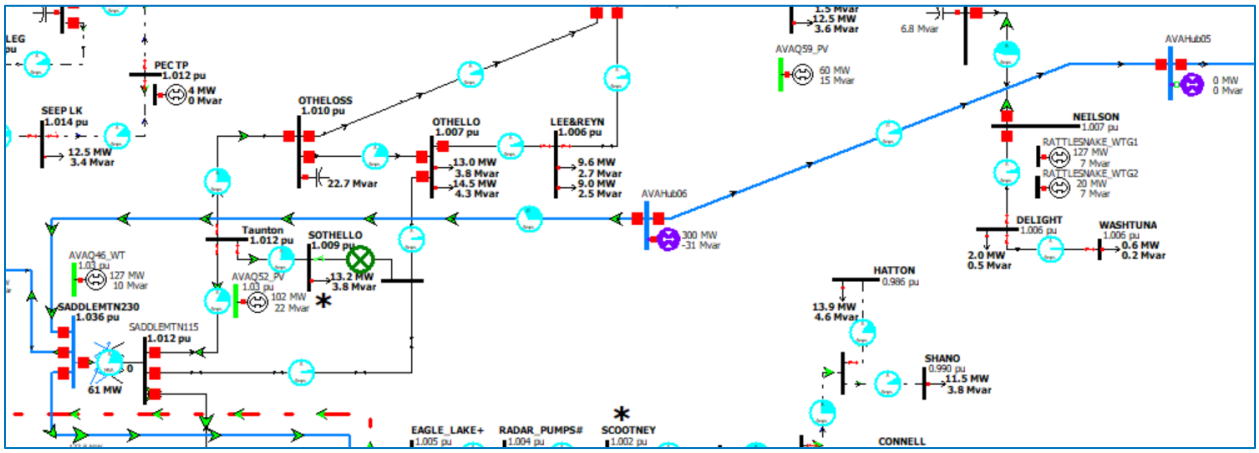

Figure 7: Proposed Generation at 230kV networked, 2027 Heavy Summer

3.5.2. Contingency Analysis

The worst system performance was during heavy summer conditions with high north to south ID-NW transfers. The issues identified below can be mitigated by adjustments to ID-NW flows. The spring and winter scenarios did not identify any issues.

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW	27 HS 300 MW
P1				
N-1: Hatwai - Lolo 230kV				
Clearwater - North Lewiston 115kV			96.4	
P2				
BF: 1W18 Talbot-Walla Walla, Walla Walla-Saddle Mountain				
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	99.1	100.2	101.2	100.6
BF: 1W5 Walla Walla-Wallula, Talbot-Walla Walla				
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	95.5	96.5	97.6	
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.7	95.7	95.8	96
BF: 1W10 Hurricane-Walla Walla, Walla Walla 230/69 kV Transformer				
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.6	95.7	95.8	95.8
Lolo - Oxbow 230kV (Lolo - Imnaha)			95.3	
BF: 1W4 Walla Walla-Saddle Mountain, Walla Walla 230/69 kV Transformer				
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	96.2	96.3	96.4	96.3
BF: 206A Brownlee-NorthPowder, Brownlee-Oxbow #2, Brownlee T231 & T232 GSU				
OXBOW (60275) -> BROWNLEE (60095) CKT 1 at OXBOW	96	96.8	97.6	96.3
BF: 1W6 Walla Walla 230/69 kV Transformer, Hurricane-Walla Walla				
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.1	95.2	95.3	95.3
Lolo - Oxbow 230kV (Lolo - Imnaha)			95.3	

Table 7: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below. This is a N-1-1 loss of the 230kV lines going south into Clarkston/Lewiston, showing the system would be capable of absorbing the full output of the proposed generation.

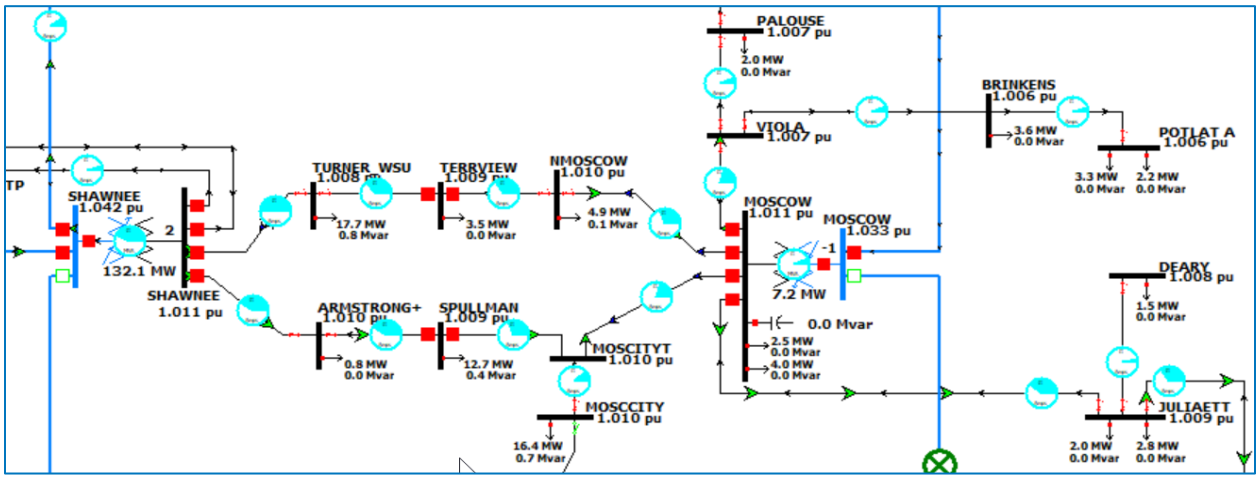

Figure 8: Worst Performing Contingency, Heavy Spring 2027

A three-phase short circuit fault at the new longer radially fed 230kV hub is approximately 650MVA, therefore new generation should be limited to about 200MW to maintain grid stability. Generation additions beyond this limit, should require a second 230kV line into the area to complete a more robust 230kV network.

3.5.3. Integration costs

The Shawnee substation has a 230kV main/aux arrangement with space for a new line position and will also require a 230kV auxiliary circuit breaker for reliability. The Saddle Mountain substation additionally has space to terminate a new line position.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 230kV AVAHub06 station – property, termination, comms and metering	16.5
Projects necessary to mitigate new system violations at 100/200MW	
New 230kV AVAHub05 station – property, termination, comms and metering	16.5
New (53) mile AVAHub05-Shawnee 230kV SCT transmission line	119.3
New (30) mile AVAHub05- AVAHub06 230kV SCT transmission line	67.5
New 230kV line position and aux breaker at Shawnee	2.4
total	***222.2***
Projects necessary to mitigate new system violations at 300MW	
New 230kV AVAHub05 station – property, termination, comms and metering	16.5
New (53) mile AVAHub05-Shawnee 230kV SCT transmission line	119.3
New (30) mile AVAHub05- AVAHub06 230kV SCT transmission line	67.5
New 230kV line position and xfmr breaker at Shawnee	2.4
New (17) mile AVAHub06- SaddleMtn 230kV SCT transmission line	38.3
New 230kV line position at Saddle Mountain	1.9
total	***262.4***

Table 8: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.6. Big Bend Area near Reardan

3.6.1. Project description and one-line diagram

Customer has requested that 50 to 100MW of new generation be integrated onto Avista's transmission system in the Big Bend area near Reardan. The Devils Gap – Lind 115 kV line is normally operated open at Ritzville, therefore any additional generation will flow north into Devils Gap, where the local hydro generation is using most of the existing transmission capacity and currently is curtailed under N-1 conditions. Adding generation only exacerbates the known issues as shown below.

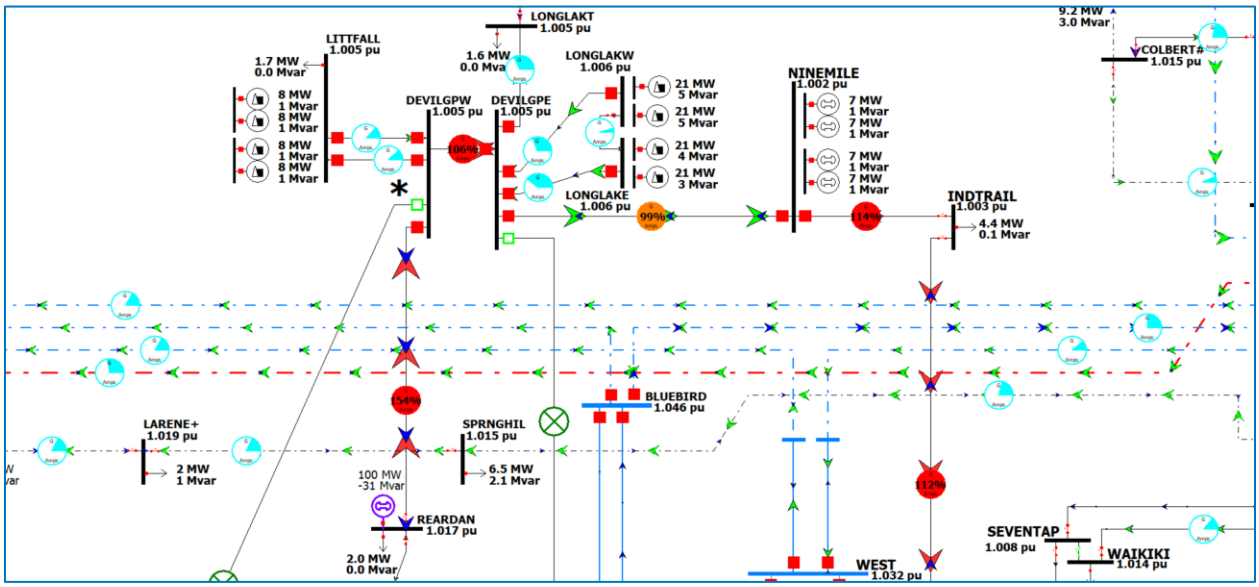

Figure 9: Proposed Generation at Reardan, 2027 Heavy Spring

Given the existing 115kV system into Devils Gap is near capacity, this request was modeled as a new 115kV switching station in the West Plains load center near Espanola on the Airway Heights – Melville 115kV line as shown below.

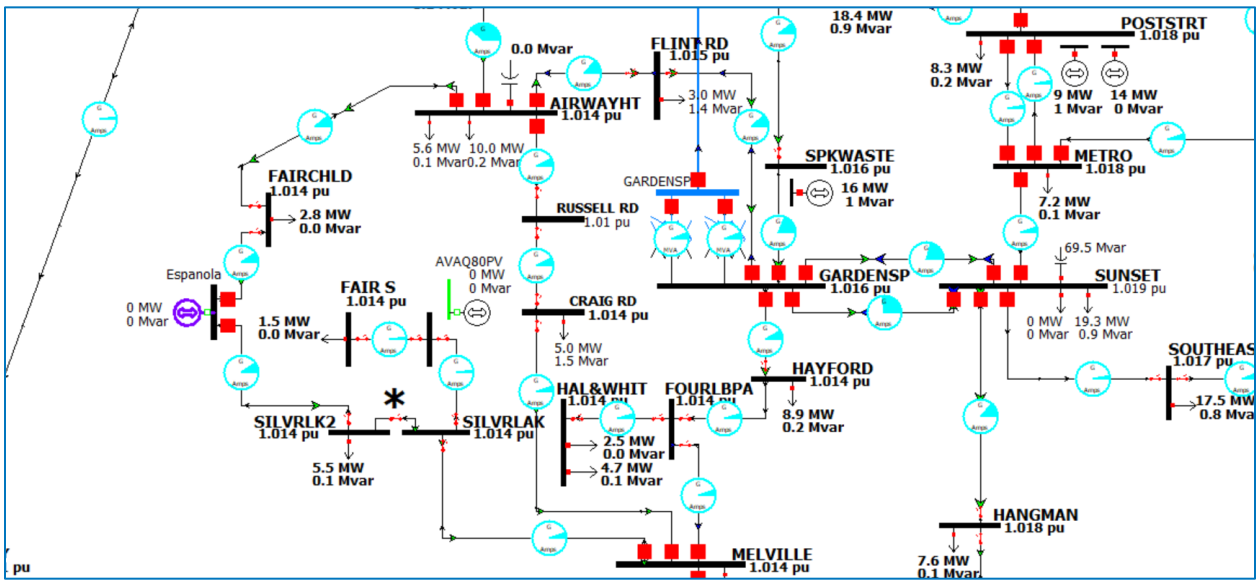

Figure 10: Proposed Generation into West Plains, 2027 Heavy Spring

System performance in this area is dominated by several factors:

- 115kV expansion transfers the proposed generation into the West Plains area.
- West Plains area load is 77MW to 160MW
- Existing local generation (18MW) from Waste to Energy.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will east into the downtown Spokane load center.

3.6.2. Contingency Analysis

Worst system performance was during heavy spring conditions with high east to west transfers and during heavy summer conditions. Outages on the 230kV system results in overloads on the underlying 115kV system, as shown below. The winter scenarios did not identify any issues.

The worst system performance was during heavy spring conditions with high north to south ID-NW transfers. The issues identified below can be mitigated by adjustments to ID-NW flows. The spring and winter scenarios did not identify any issues.

Row Labels	27 HSp Base	27 HSp 50 MW	27 HSp 100 MW
P1			
N-1: Airway Heights - Garden Springs 115 kV			
Cheney Tap 115 kV (Four Lakes Tap - Melville)			105.3
P2			
BF: AXXX31 Airway Heights - Melville 115kV, Melville - Silver Lake 115kV			
Airway Heights - Garden Springs 115 kV (Airway Heights - Flint Rd)			99.4
Airway Heights - Garden Springs 115 kV (Flint Rd - Garden Springs)			97.2
BF: AXXX9 Airway Heights - Garden Springs 115kV, Garden Springs - Sunset#1 115kV			
Cheney Tap 115 kV (Four Lakes Tap - Melville)			104.6
P2.1			
N-1: Airway Heights - Garden Springs 115 kV Open @ AIR			
Cheney Tap 115 kV (Four Lakes Tap - Melville)			105.4
N-1: Airway Heights - Garden Springs 115 kV Open @ GSP			
Cheney Tap 115 kV (Four Lakes Tap - Melville)			102.9

Table 9: Contingency Results, Heavy Spring 2027

The worst performing contingency is shown below.

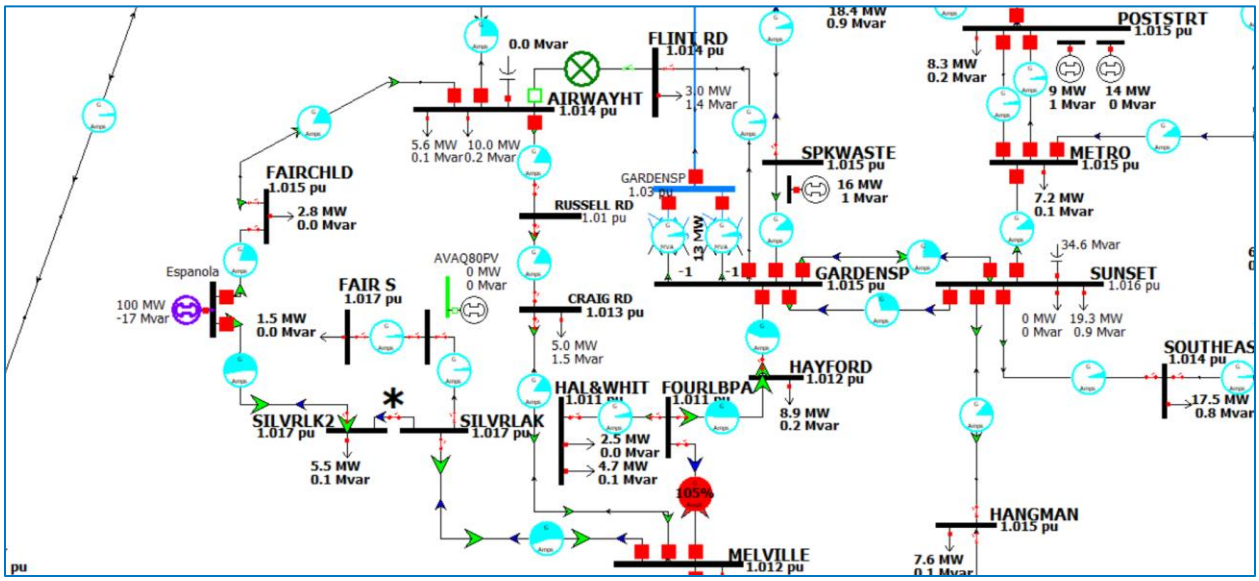

Figure 11: Worst Performing Contingency, Heavy Spring 2027

3.6.3. Integration costs

Integration will require a new Avista 115kV POI station on the west edge of the West Plains 115kV system.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 115kV Espanola station – property, termination, comms and metering	9.1
Loop-in AirwayHeights-Silverlake 115kV into POI station	0.6
Projects necessary to mitigate new system violations at 50MW	
None	0
total	***9.7***
Projects necessary to mitigate new system violations at 100MW	
Rebuild GardenSpr-Melville 115kV (4LK-MVL, fix 0.6mi 266acsr)	0.6
total	***10.3***

Table 10: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.8. Clarkston/Lewiston Area

3.8.1. Project description and one-line diagram

Customer has requested that 100 to 300MW of new generation be integrated onto Avista's transmission system in the Clarkston/Lewiston area. This request was modeled as a new 230kV line position at the Lolo substation as shown below.

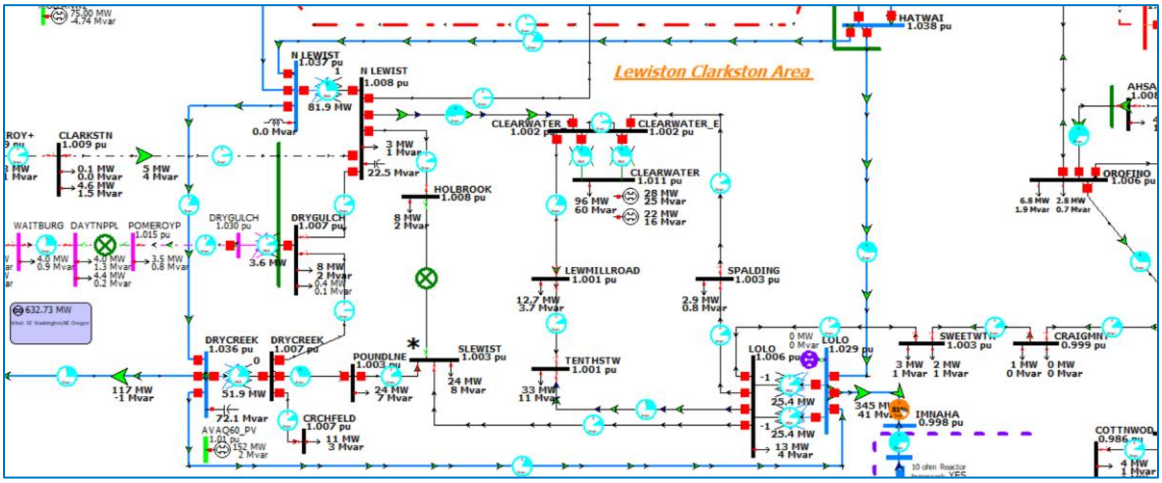

Figure 12: Proposed Generation at Lolo 230kV, 2027 Heavy Summer

System performance in this area is dominated by several factors:

- High ID-NW transfers south in late spring and early summer. Idaho Power manages ID-NW flows and will insert line reactors or redispatch generation to mitigate overloads on the Lolo-Oxbow 230kV line.
- Large wind penetration to the west around the Walla Walla and Wallula load centers.
- Existing local generation (behind the meter 48MW) from Potlatch Forest Industries.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow south into Idaho, west into southeast Washington or up onto BPA's 500kV system at Hatwai.

3.8.2. Contingency Analysis

The worst system performance was during heavy summer conditions with high north to south ID-NW transfers. The issues identified below can be mitigated by adjustments to ID-NW flows. The spring and winter scenarios did not identify any issues.

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW	27 HS 300 MW
P1				
N-1: Talbot - Walla Walla 230kV				
Lolo - Oxbow 230kV (Lolo - Imnaha)				**95.5**
P2				
BF: 1W18 Talbot-Walla Walla, Walla Walla-Saddle Mountain				

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW	27 HS 300 MW
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	99	100.1	101.3	102.5
Lolo - Oxbow 230kV (Lolo - Imnaha)				97.4
BF: 1W5 Walla Walla-Wallula, Talbot-Walla Walla				
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	95.4	96.4	97.5	98.6
Lolo - Oxbow 230kV (Lolo - Imnaha)				97.2
BF: 1W10 Hurricane-Walla Walla, Walla Walla 230/69 kV Transformer				
Lolo - Oxbow 230kV (Lolo - Imnaha)		95.3	97.5	99.7
BF: 206A Brownlee-NorthPowder, Brownlee-Oxbow #2, Brownlee T231 & T232 GSU				
OXBOW (60275) -> BROWNLEE (60095) CKT 1 at OXBOW	96.4	98.3	99.7	101.1
Lolo - Oxbow 230kV (Lolo - Imnaha)				96.5
BF: 1W6 Walla Walla 230/69 kV Transformer, Hurricane-Walla Walla				
Lolo - Oxbow 230kV (Lolo - Imnaha)		95.3	97.5	99.7

Table 11: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below. This is a non-credible loss of the three 230kV lines into Lolo, showing that the 115kV system would be capable of absorbing the full output of the proposed generation.

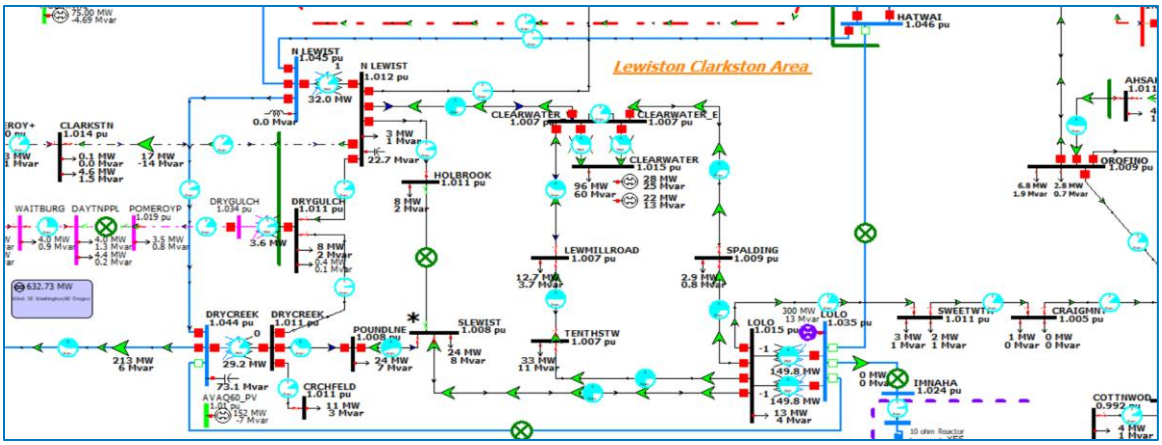

Figure 13: Worst Performing Contingency, Heavy Summer 2027

3.8.3. Integration costs

The Lolo substation has a 230kV double breaker double bus arrangement with space for a new line position.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 230kV position at Lolo substation	1.9
Projects necessary to mitigate new system violations at 100/200/300MW	
None	0
total	***1.9***

Table 12: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.9. Kettle Falls Substation - Existing Generation Site

3.9.1. Project description and one-line diagram

Customer has requested that 12, 50 and 100MW of new generation be added to the existing Kettle Falls generation site. This request was modeled as a new 115kV line position at the Kettle Falls substation as shown below.

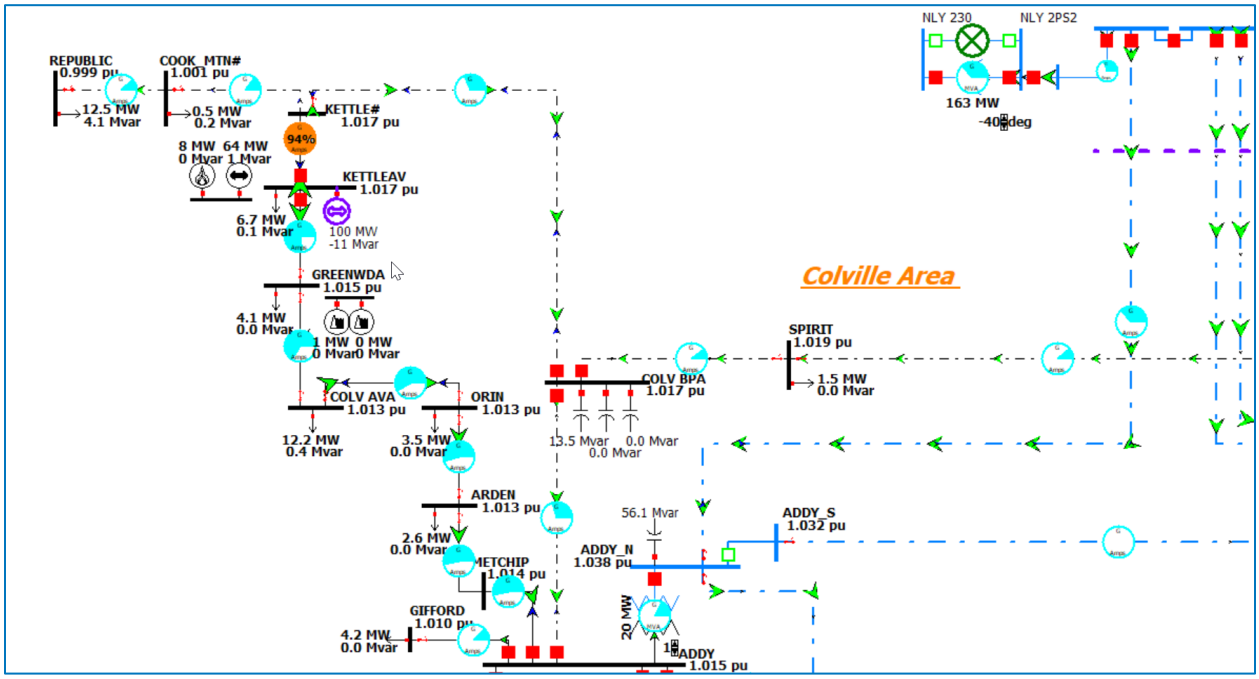

Figure 14: Proposed Generation at Kettle Falls, 2027 Heavy Spring

System performance in this area is dominated by several factors:

- North to south flows on BPA's 230kV system and limited by the South of Boundary cut plane.
- integration primary flows into the West Plains area.
- Kettle Falls area load is 46MW to 62MW
- Existing local generation (74MW) from Kettle Falls and Meyer Falls.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow south into the greater Colville area.

3.9.2. Contingency Analysis

The worst system performance was during heavy spring conditions with high South of Boundary transfers.

Row Labels	27 HSp Base	27 HSp 12 MW	27 HSp 50 MW	27 HSp 100 MW
PI				
N-1: Addy - Kettle Falls 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)		101.1	152.3	219.9
T-1: Addy #3 230/115 kV				

Row Labels	27 HSp Base	27 HSp 12 MW	27 HSp 50 MW	27 HSp 100 MW
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				95.7
T-1: Bell #1 500/230 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				97.4
T-1: Boundary 230/115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				100.5
N-1: Kettle Falls Tap 115 kV				
Addy - Kettle Falls 115 kV (Arden Tap - Metchip)				102.1
Addy - Kettle Falls 115 kV (Arden Tap - Orin)				104
Addy - Kettle Falls 115 kV (Colville - Greenwood)				115.2
Addy - Kettle Falls 115 kV (Colville - Orin)				106.5
Addy - Kettle Falls 115 kV (Greenwood - Kettle Falls)				133.7
Addy - Kettle Falls 115 kV (Addy - Metchip)				102.1
N-1: Addy - Colville BPA 115 kV				
Addy - Kettle Falls 115 kV (Colville - Greenwood)				103.7
Addy - Kettle Falls 115 kV (Greenwood - Kettle Falls)				120.6
G-1: Boundary Units 1-6				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				97
G-1: Box Canyon Units 1-4				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				95.9
N-1: 3TM Boundary - Box Canyon - Colville BPA 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				107.7
N-1: Addy - Bell 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				99.8
N-1: Addy - Devils Gap 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				96.6
N-1: Nine Mile - Westside 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				95.7
N-1: Airway Heights - Devils Gap 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				95.5
N-1: Devils Gap - Nine Mile 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				95.2
P7				
N-2: Beacon - Greensferry 230 kV & Boulder - Lancaster 230 kV				
Boulder - Rathdrum 115kV (Moab - Pleasant)	96.1	96.1	96.1	96.1
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)	101.5	101.5	101.5	101.6
N-2: Bell - Boundary #3 230 kV & Addy - Bell 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				108.9
N-2: Boundary - Usk 230 kV and 3TM Boundary - Box Canyon - Colville 115 kV				
Colville - Kettle Falls 115 kV (Kettle Falls - Republic Tap)				107

Table 13: Contingency Results, Heavy Spring 2027

The worst performing contingency is shown below.

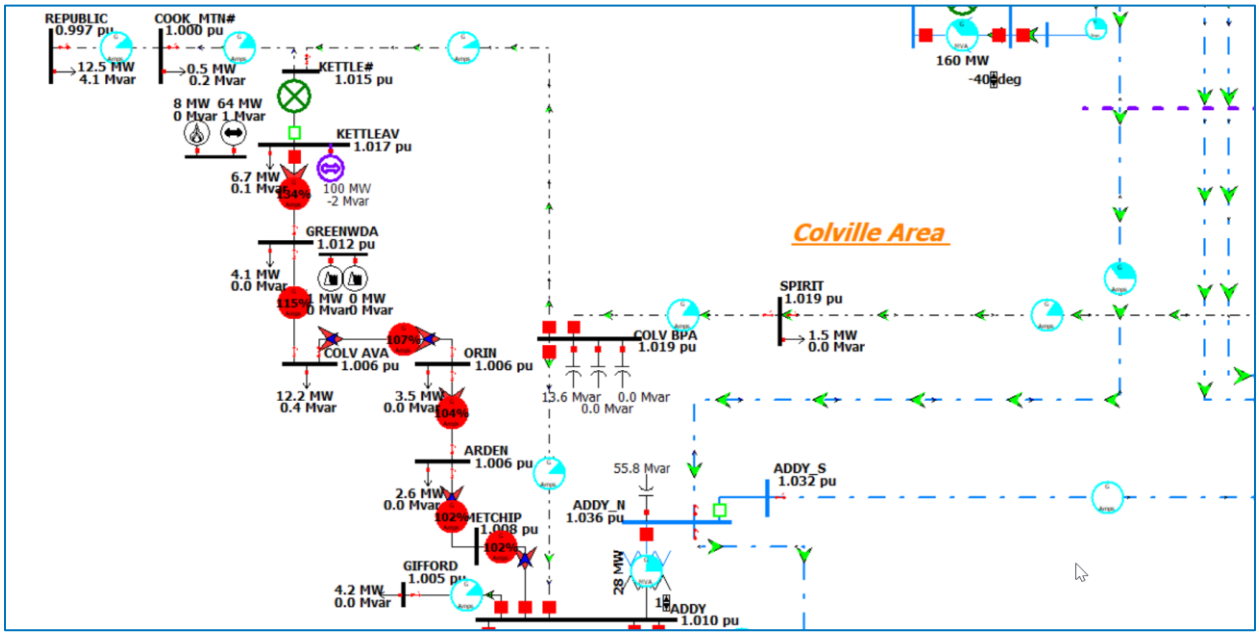

Figure 15: Worst Performing Contingency, Heavy Spring 2027

3.9.3. Integration costs

The Kettle Falls substation has a 115kV single bus arrangement with space for a new line position.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 115kV line position at Kettle Falls w/ metering & termination str	1.6
Projects necessary to mitigate new system violations at 12/50MW	
Upgrade protection at Kettle Falls A621 – KettleFalls 115kV Tap position	0.2
total	***1.8***
Projects necessary to mitigate new system violations at 100MW	
Upgrade protection at Kettle Falls A621 – KettleFalls 115kV Tap position	0.2
Rebuild Addy-KettleFalls 115kV (all sections, fix 27.1mi 556AAC)	23.1
total	***24.9***

Table 14: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.11. Lower Granite Area

3.11.1. Project description and one-line diagram

Customer has requested that 100 to 300MW of new generation, north of Lower Granite Dam, be integrated onto Avista's transmission system in the Palouse area. This request was modeled as a new 230kV line position at Shawnee substation as shown below.

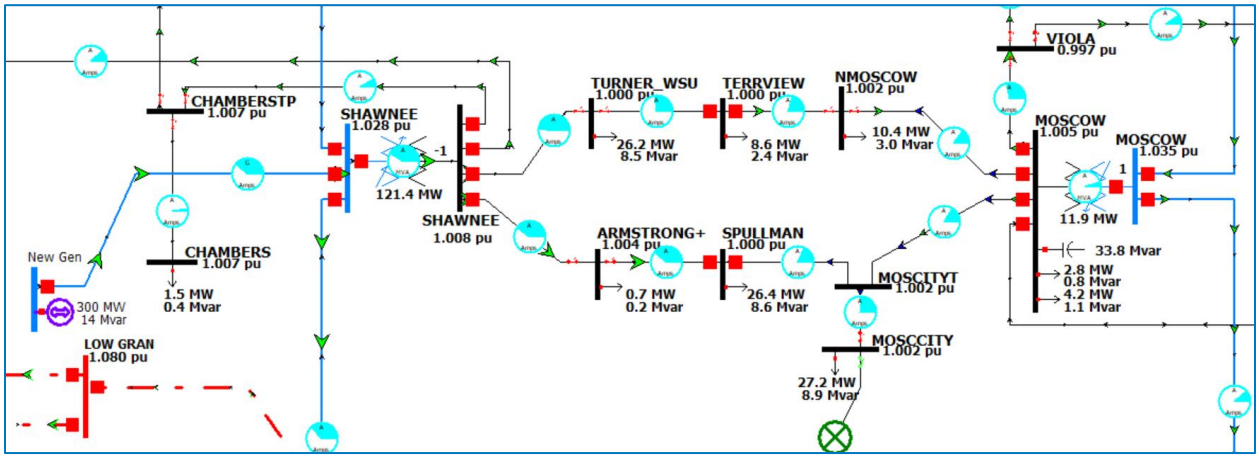

Figure 16: Proposed Generation at Shawnee 230kV, 2027 Heavy Summer

System performance in this area is dominated by several factors:

- System flows are typically north to south.
- Existing local generation (104 MW) from Palouse Wind.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow south into the Clarkston/Lewiston load center.

3.11.2. Contingency Analysis

The worst system performance was during heavy summer conditions with high north to south ID-NW transfers. The issues identified below can be mitigated by adjustments to ID-NW flows. The spring and winter scenarios did not identify any issues.

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW	27 HS 300 MW
P1				
N-1: Hatwai - Lolo 230kV				
Clearwater - North Lewiston 115kV			96.4	97.5
P2				
BF: 1W18 Talbot-Walla Walla, Walla Walla-Saddle Mountain				
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	99.1	100.2	101.2	102.3
BF: 1W5 Walla Walla-Wallula, Talbot-Walla Walla				
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	95.5	96.5	97.6	98.5
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.7	95.7	95.8	95.8
BF: 1W10 Hurricane-Walla Walla, Walla Walla 230/69 kV Transformer				

WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.6	95.7	95.8	96
Lolo - Oxbow 230kV (Lolo - Imnaha)			95.3	96.5
BF: 1W4 Walla Walla-Saddle Mountain, Walla Walla 230/69 kV Transformer				
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	96.2	96.3	96.4	96.6
BF: 206A Brownlee-NorthPowder, Brownlee-Oxbow #2, Brownlee T231 & T232 GSU				
OXBOW (60275) -> BROWNLEE (60095) CKT 1 at OXBOW	96	96.8	97.6	98.3
BF: 1W6 Walla Walla 230/69 kV Transformer, Hurricane-Walla Walla				
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.1	95.2	95.3	95.5

Table 15: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below. This is a N-1-1 loss of the 230kV lines going south into Clarkston/Lewiston, showing the system would be capable of absorbing the full output of the proposed generation.

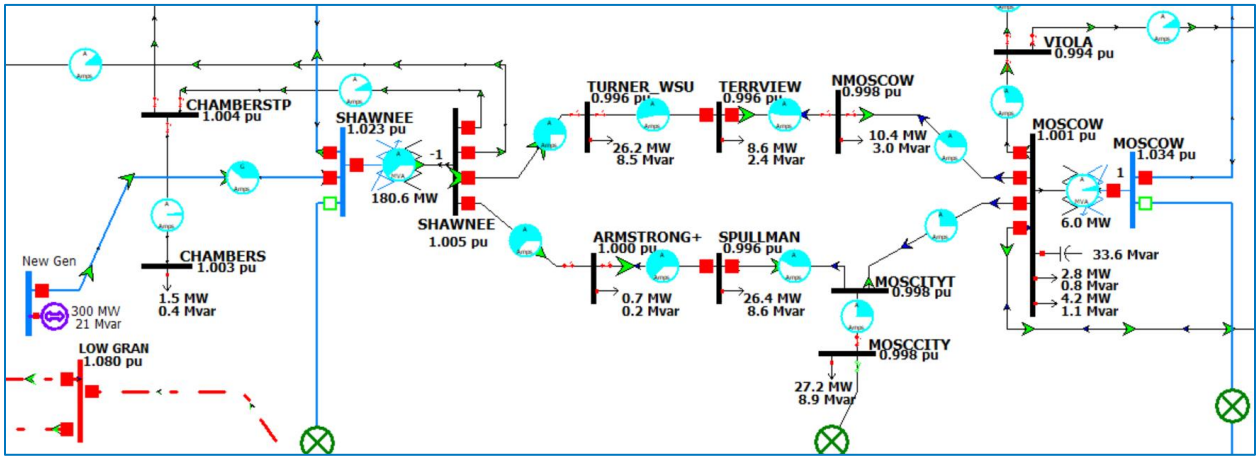

Figure 17: Worst Performing Contingency, Heavy Spring 2027

3.11.3. Integration costs

The Shawnee substation has a 230kV main/aux arrangement with space for a new line position and will also require a new 230kV auxiliary circuit breaker for reliability.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 230kV line position and aux breaker at Shawnee	2.4
New 230kV termination structure, comms and metering	0.5
Projects necessary to mitigate new system violations at 100/200/300MW	
None	0
total	***2.9***

Table 16: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.12. Northeast Substation - Existing Generation Site

3.12.1. Project description and one-line diagram

Customer has requested that 50 and 100MW of new generation be integrated onto Avista's transmission system in the northern Spokane area. This request was modeled as a new 115kV line position at Northeast substation as shown below.

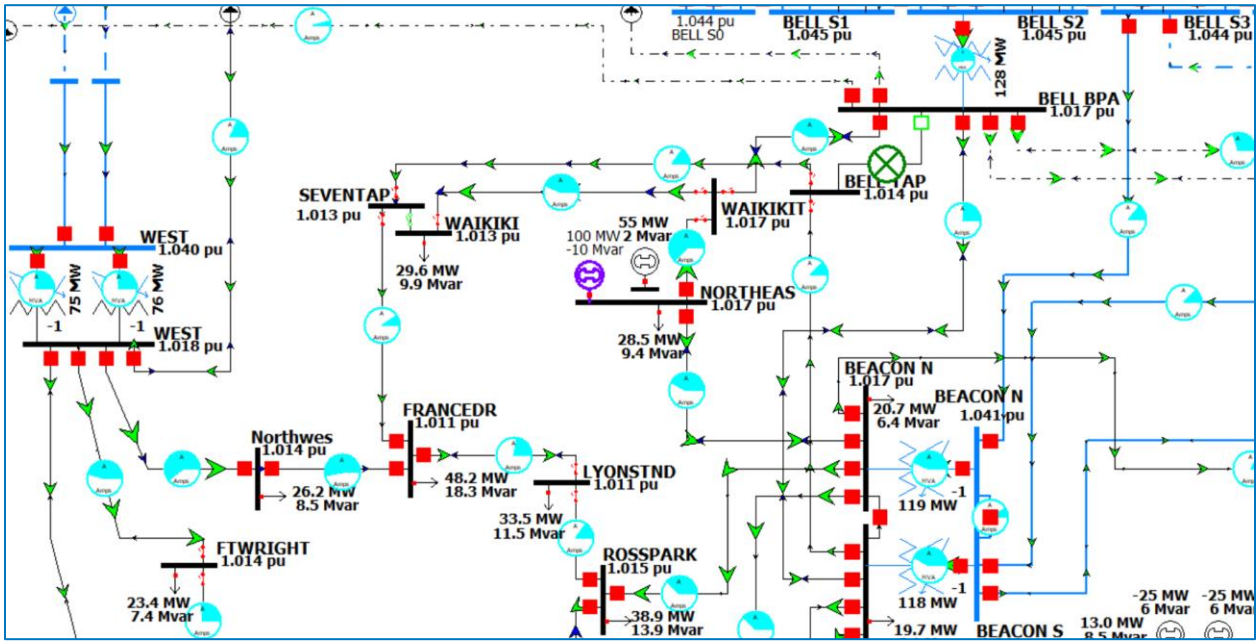

Figure 18: Proposed Generation at Northeast, 2027 Heavy Summer

System performance in this area is dominated by several factors:

- Site is between the two primary sources for the Spokane area, which are Bell and Beacon substations.
- North to south flows during heavy summer.
- Loading on this 115kV line is 24MW to 59MW
- Existing local generation (55MW) from Northeast CT's.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow south into the greater Spokane area.

3.12.2. Contingency Analysis

The worst system performance was during heavy summer conditions with high north to south flows.

Row Labels	27 HS Base	27 HS 10 MW	27 HS 100 MW
PI			
N-1: Bell - Northeast 115 kV			
Beacon - Northeast 115 kV			105.6
N-1: Beacon - Northeast 115 kV			

Row Labels	27 HS Base	27 HS 10 MW	27 HS 100 MW
Bell - Northeast 115 kV (Waikiki Tap - Northeast)			102.7
T-1: Bell #6 230/115 kV			
Bell - Northeast 115 kV (Waikiki Tap - Northeast)			108.9
P2			
BF: A370 Bell S1 & S2 230 kV			
Bell - Northeast 115 kV (Waikiki Tap - Northeast)			105.7
BF: A388 Bell S2 & S3 230 kV			
Bell - Northeast 115 kV (Waikiki Tap - Northeast)			101
BF: B356 Bell 115 kV, Bell-Northeast			
Beacon - Northeast 115 kV			105.5
BF: R427 Beacon North & South 230 kV			
BELL S2 (40088) -> BELL BPA (40087) CKT 6 at BELL S2	103.2	101.1	
BF: A600 Beacon North & South 115 kV			
Francis and Cedar - Northwest 115 kV	101.2	101.2	101.3
Northwest - Westside 115 kV	99.1	99.1	99.2
Bell - Northeast 115 kV (Waikiki Tap - Northeast)			102
BUS: Beacon North 115 kV			
Bell - Northeast 115 kV (Waikiki Tap - Northeast)			102.6
BUS: Bell S2 230 kV			
Bell - Northeast 115 kV (Waikiki Tap - Northeast)			106.7
P2.1			
N-1: Bell - Northeast 115 kV Open @ NE			
Beacon - Northeast 115 kV			105.8

Table 17: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below.

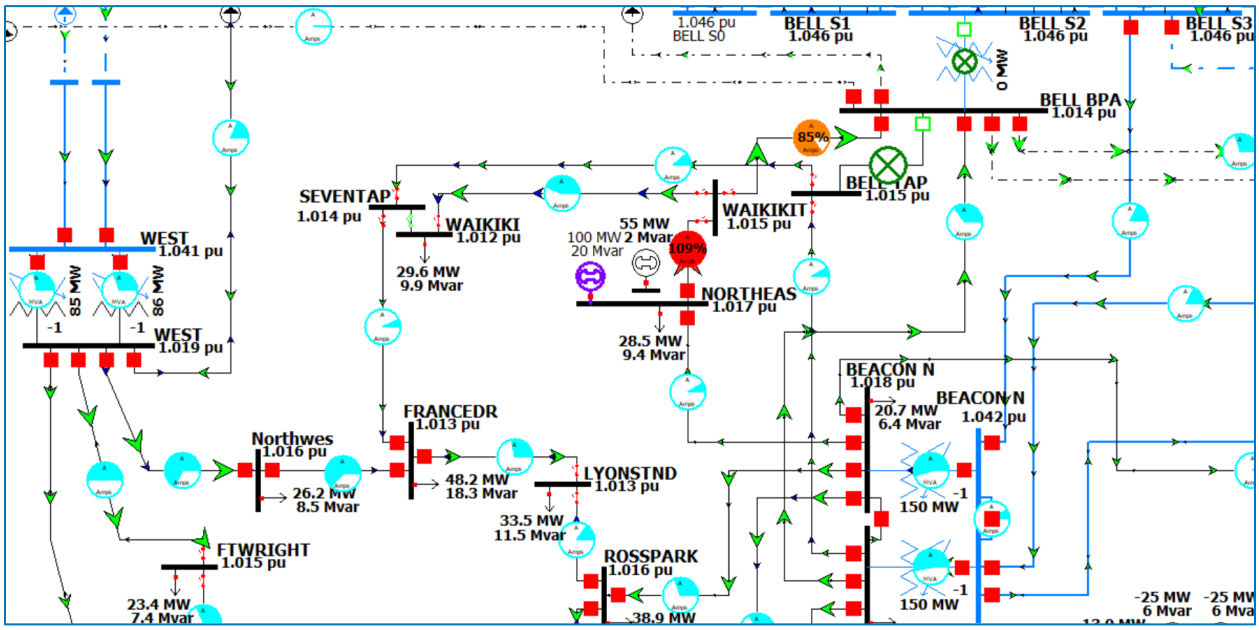

Figure 19: Worst Performing Contingency, Heavy Spring 2027

3.12.3. Integration costs

The Northeast substation has a 115kV single bus arrangement with space for a new line position.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 115kV line position at Northeast w/ metering & termination structure	1.6
Projects necessary to mitigate new system violations at 10MW	
None	0
total	***1.6***
Projects necessary to mitigate new system violations at 100MW	
Rebuild Beacon-Northeast 115kV (fix 5.25mi 556acsr)	3.9
Rebuild Bell-Northeast 115kV (fix 1.53mi 556acsr)	1.2
total	***6.7***

8Table 18: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.14. Palouse area near Benewah (Tekoa)

3.14.1. Project description and one-line diagram

Customer has requested that 100 to 200MW of new generation be integrated onto Avista's transmission system in the northern Palouse area. This request was modeled as a new 230kV line position at Benewah substation as shown below.

These results are similar for the request at Tekoa, given this location is withing 10 miles of Benewah substation.

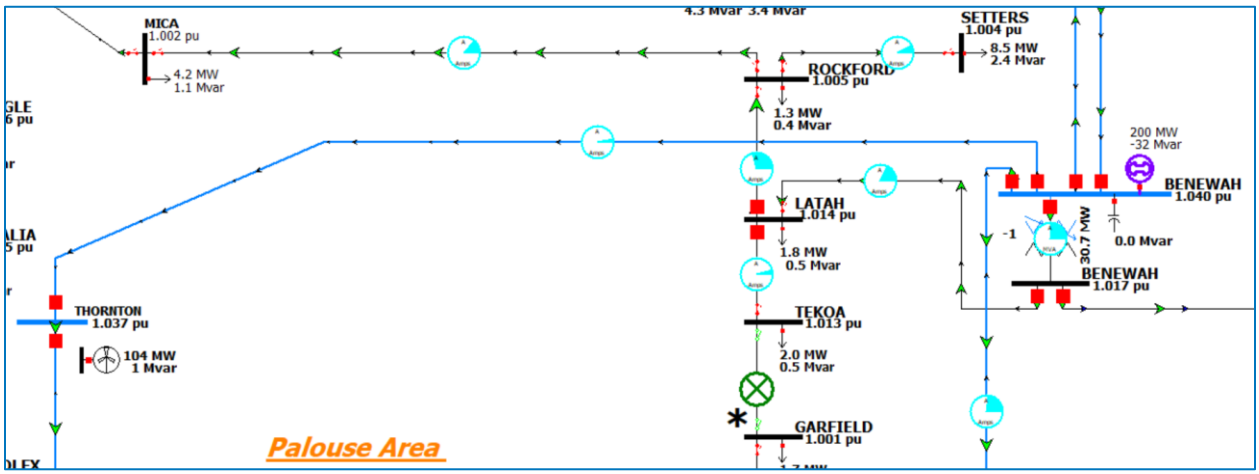

Figure 20: Proposed Generation at Benewah 230kV, 2027 Heavy Summer

System performance in this area is dominated by several factors:

- System flows are typically north to south.
- Existing local generation (104 MW) from Palouse Wind.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow south into the Clarkston/Lewiston load center.

3.14.2. Contingency Analysis

The worst system performance was during heavy summer conditions with high north to south ID-NW transfers. The issues identified below can be mitigated by adjustments to ID-NW flows. The spring and winter scenarios did not identify any issues.

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW
P1			
N-1: Hatwai - Lolo 230 kV			
Clearwater - North Lewiston 115 kV		95.2	95.7
P2			
BF: 1W18 Talbot-Walla Walla, Walla Walla-Saddle Mountain			
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	99	99.6	100.2
BF: 1W5 Walla Walla-Wallula, Talbot-Walla Walla			
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	95.4	96	96.6
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	95.6	95.7	95.7

BF: 1W10 Hurricane-Walla Walla, Walla Walla 230/69 kV Transformer			
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	**95.3**	**95.4**	**95.4**
BF: 1W3 Walla Walla-Wallula, Walla Walla 230/69 kV Transformer			
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	**96.4**	**96.5**	**96.5**
BF: 1W4 Walla Walla-Saddle Mountain, Walla Walla 230/69 kV Transformer			
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK	**96**	**96.1**	**96.1**
BF: 206A Brownlee-NorthPowder, Brownlee-Oxbow #2, Brownlee T231 & T232 GSU			
OXBOW (60275) -> BROWNLEE (60095) CKT 1 at OXBOW	**96.5**	**96.9**	**97.3**
BF: 1W6 Walla Walla 230/69 kV Transformer, Hurricane-Walla Walla			
WW CEN T (45347) -> MILL CRK (45205) CKT 1 at MILL CRK			**95**

Table 19: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below. This is a N-1-1 loss of the 230kV lines going south into Clarkston/Lewiston, showing the system would be capable of absorbing the full output of the proposed generation.

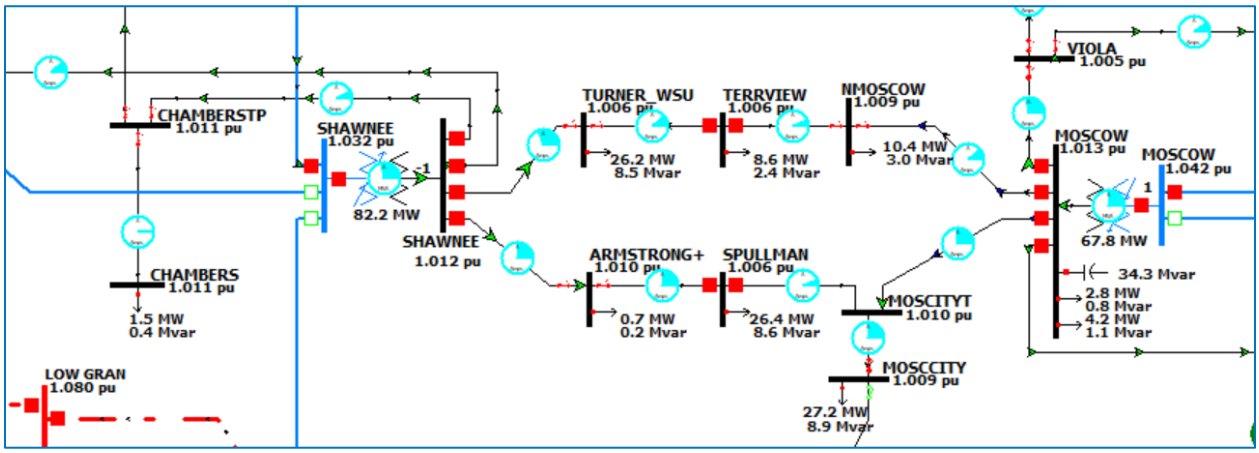

Figure 21: Worst Performing Contingency, Heavy Spring 2027

3.14.3. Integration costs

The Benewah substation has a 230kV double breaker double bus arrangement with space to terminate a new line position.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 230kV line position at Benewah	2.4
Projects necessary to mitigate new system violations at 100/200/MW	
None	0
total	***2.4***

Table 20: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.15. Rathdrum Substation - Existing Generation Site

3.15.1. Project description and one-line diagram

Customer has requested that 25, 50, 100 and 200MW of new generation be integrated onto Avista's transmission system in the northern Rathdrum Prairie area. The 25MW and 50MW requests were modeled as a new 115kV line position at Rathdrum substation. The 100MW and 200MW requests were modeled as a new 230kV line position at Rathdrum substation.

The existing Rathdrum CT's utilize 140 MW of the available integration capacity on the 115kV portion of the Rathdrum substation, leaving only 60 MW available per Avista's interconnection standard. Both integration points are shown below.

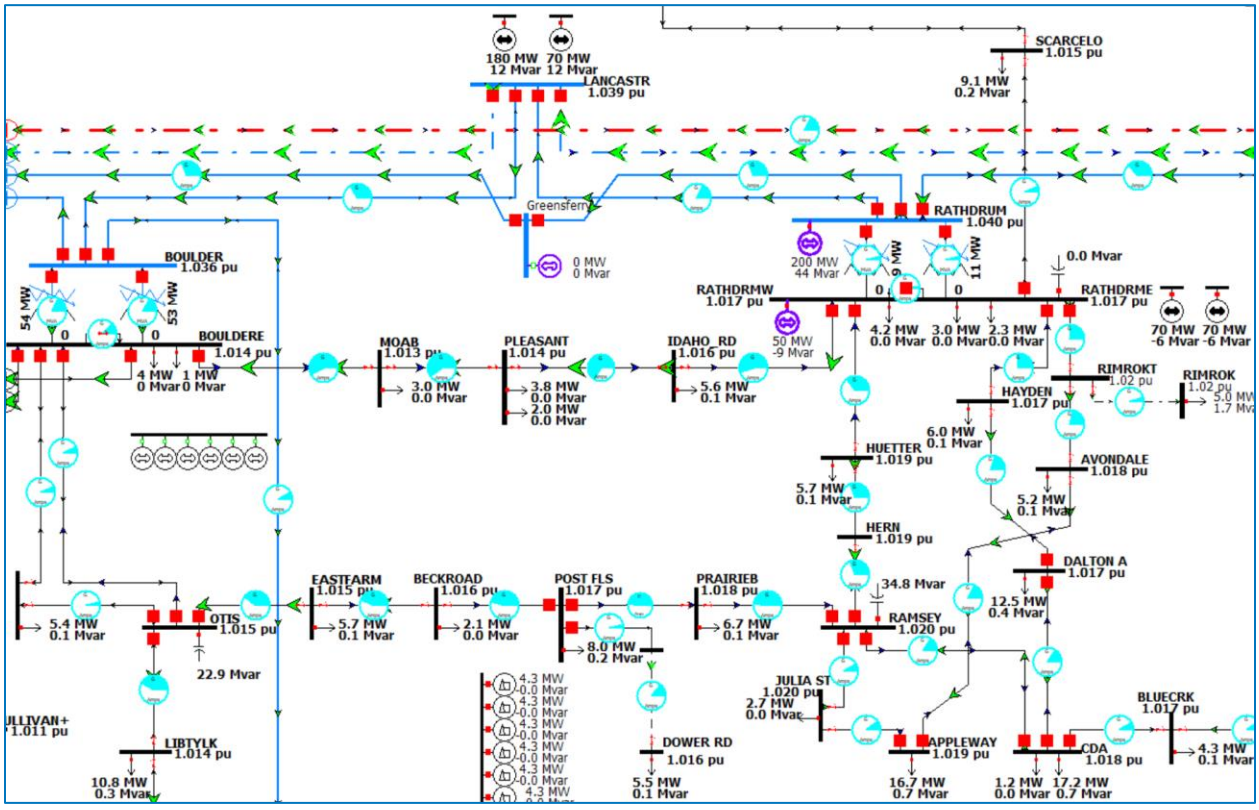

Figure 22: Proposed Generation at Rathdrum, 2027 Heavy Spring

System performance in this area is dominated by several factors:

- High east to west transfers on the Cabinet – Rathdrum and Lancaster – Noxon 230kV transmission lines during spring runoff.
- Typical outflows to the west on the Beacon – Rathdrum, Bell – Lancaster, and Boulder – Lancaster 230kV transmission lines.
- Load in the Coeur d' Alene area is primarily served from the Rathdrum station.
- Existing local generation (440MW) from Boulder, Lancaster, Post Falls, and Rathdrum stations.

In general, new generation in this area will sink into local load. As the local load is met the additional power will typically flow west into the Spokane load center or further west on BPA's 230kV system and up onto BPA's 500kV system at Bell.

3.15.2. Contingency Analysis

Worst system performance was during heavy spring conditions with high east to west transfers. Outages on the 230kV system results in overloads on the underlying 115kV system, as shown below. The summer and winter scenarios did not identify any issues.

Row Labels	27 HSp Base	27 HSp 25 MW	27 HSp 50 MW	27 HSp 100 MW	27 HSp 200 MW
P2					
BF: R427 Beacon North & South 230 kV					
Boulder - Irvin #1 115 kV (Boulder - Spokane Industrial Park)	100.3	102.1	104	106.8	113.4
Boulder - Irvin #1 115 kV (Irvin - Spokane Industrial Park)					95.8
P7					
N-2: Beacon - Greensferry 230 kV & Boulder - Lancaster 230 kV					
Boulder - Rathdrum 115kV (Moab - Pleasant)	99.1	102.9	106.8	108.8	118.7
Boulder - Rathdrum 115kV (Boulder - Moab)	96.3	100.1	103.9	105.9	115.9
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)	104.5	108.3	112.2	114.2	124.1
Post Falls - Ramsey 115kV (Post Falls - Prairie)					98
Boulder - Rathdrum 115kV (Idaho Rd - Rathdrum)					99.6
N-2: Greensferry - Rathdrum 230 kV & Lancaster - Rathdrum 230 kV					
Boulder - Rathdrum 115kV (Moab - Pleasant)	98	104.4	110.7	120.3	142.6
Boulder - Rathdrum 115kV (Boulder - Moab)	95.2	101.6	107.9	117.5	139.8
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)	103.4	109.8	116.1	125.7	148
Post Falls - Ramsey 115kV (Post Falls - Prairie)				99.2	118.5
Boulder - Rathdrum 115kV (Idaho Rd - Rathdrum)				100.8	118
Post Falls - Ramsey 115kV (Prairie - Ramsey)					103.4
Otis Orchard - Post Falls 115 kV (East Farms Tap - Beck Road Tap)					98.3
Otis Orchard - Post Falls 115 kV (Beck Road Tap - Post Falls)					99.9
N-2: Beacon - Boulder 230 kV & Boulder - Irvin #2 115 kV					
Boulder - Irvin #1 115 kV (Boulder - Spokane Industrial Park)	99.3	101.4	103.5	105.4	111.7
N-2: Beacon - Boulder 230 kV & Beacon - Greensferry 230 kV					
Boulder - Irvin #1 115 kV (Boulder - Spokane Industrial Park)	95.4	97.4	99.5	102.5	109.9

Table 21: Contingency Results, Heavy Spring 2027

The worst performing contingency is shown below. This shows the underlying 115kV system over capacity for the double-circuit outage.

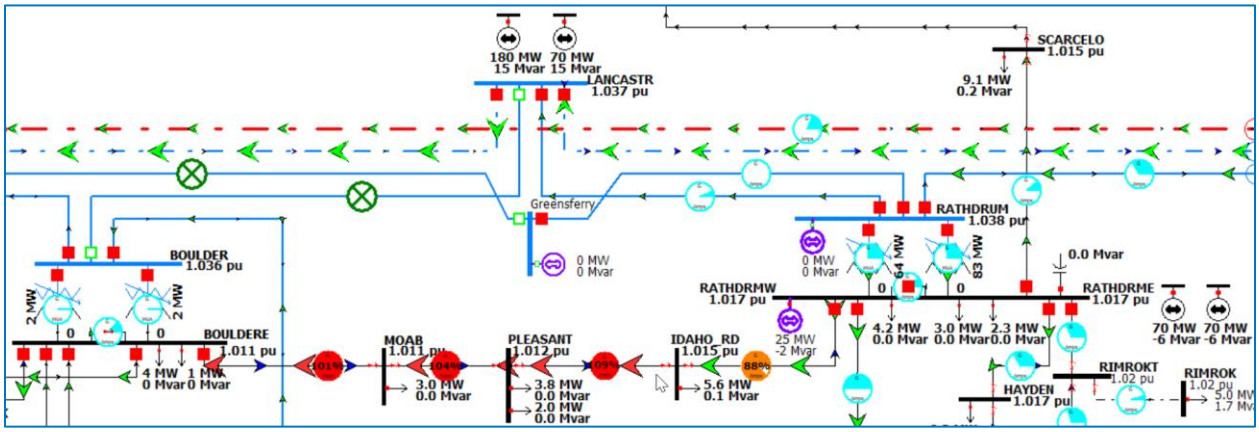

Figure 23: Worst Performing Contingency, Heavy Spring 2027

3.15.3. Integration costs

BPA's Lancaster substation is a 230kV ring-bus arrangement and is not designed to be expanded. Integration will require a new Avista 230kV POI station west of BPA's Lancaster station.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 115kV line position at Rathdrum w/ metering & termination str	1.6
New 230kV line position at Rathdrum w/ metering & termination str	1.9
Projects necessary to mitigate new facility violations at 25/50MW at 115kV	
Rebuild Boulder-Irvin #1 115kV (BLD-SIP, fix 1.8mi 556aac)	0.7
Rebuild Boulder-Rathdrum 115kV (BLD-IDR, fix 9.2mi 250cu & 337acsr)	9.2
total	***11.5***
Projects necessary to mitigate new facility violations at 100MW at 230kV	
Rebuild Boulder-Irvin #1 115kV (BLD-SIP, fix 1.8mi 556aac)	0.7
Rebuild Boulder-Rathdrum 115kV (fix 11.2mi 250cu, 337acsr & 556aac)	11.2
Rebuild PostFalls-Ramsey 115kV (PF-PRA, fix 2.9mi 250cu)	2.9
total	***16.7***
Projects necessary to mitigate new facility violations at 200MW at 230kV	
Rebuild Boulder-Irvin #1 115kV (BLD-SIP, fix 1.8mi 556aac)	0.7
Rebuild Boulder-Rathdrum 115kV (fix 14.7mi 250cu, 337acsr & 556/795aac)	14.7
Rebuild PostFalls-Ramsey 115kV (all sections, fix 4.9mi 250cu &556aac)	4.9
Rebuild OtisOrchards-PostFalls 115kV (EFM-PF, fix 4.8mi 250cu &556aac)	4.8
total	***27.0***

Table 22: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.17. Rathdrum Prairie, north Greensferry Rd

3.17.1. Project description and one-line diagram

Customer has requested that 100 to 400MW of new generation be integrated onto Avista's Transmission System in the Rathdrum Prairie area near Greensferry Road. This request was modeled as a new station approximately 2.75 electrical miles southwest of Rathdrum station on the Beacon – Rathdrum 230kV Transmission Line as shown below.

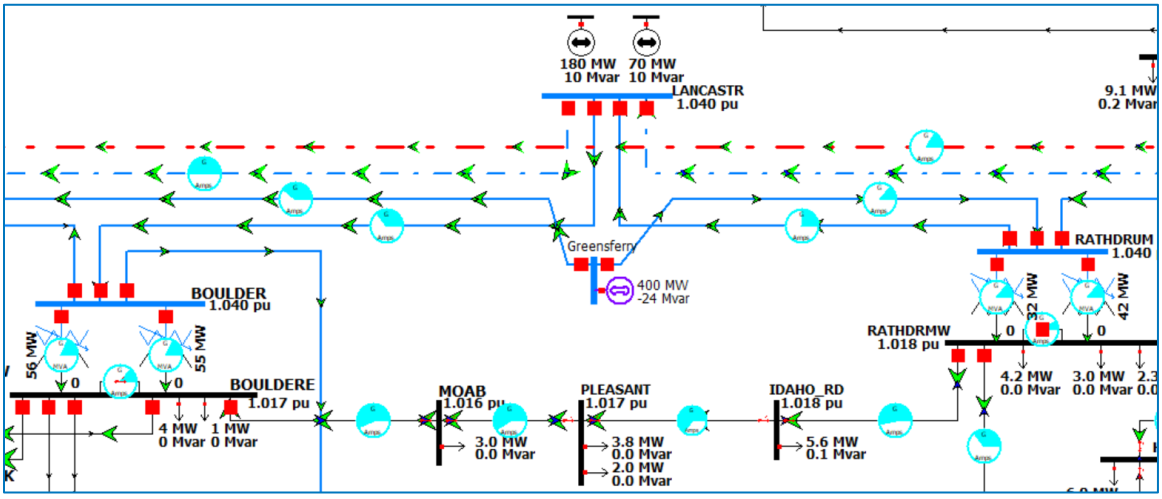

Figure 24: Proposed Generation at Greensferry 230kV, 2027 Heavy Spring

System performance in this area is dominated by several factors:

- High east to west transfers on the Cabinet – Rathdrum and Lancaster – Noxon 230kV transmission lines during spring runoff.
- Typical outflows to the west on the Beacon – Rathdrum, Bell – Lancaster, and Boulder – Lancaster 230kV transmission lines.
- Load in the Coeur d' Alene area primarily served from the Rathdrum station.
- Existing local generation (440MW) from Boulder, Lancaster, Post Falls, and Rathdrum stations.

In general, new generation in this area will sink into local load. As the local load is met the additional power will typically flow west into the Spokane load center or further west on BPA's 230kV system and up onto BPA's 500kV system at Bell.

3.17.2. Contingency Analysis

Worst system performance was during heavy spring conditions with high east to west transfers and during heavy summer conditions. Outages on the 230kV system results in overloads on the underlying 115kV system, as shown below. The winter scenarios did not identify any issues.

Many of the summer overload conditions are present with or without the added generation, due to isolation from P2 outages at Rathdrum. Mitigation for these issues are not included in the Network Upgrades and are shown here for reference only.

Row Labels	27 HSp Base	27 HSp 100MW	27 HSp 200MW	27 HSp 300MW	27 HSp 400MW
NA					
N-2 (ADJ): Beacon - Greensferry 230kV and Bell - Lancaster 230kV					
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)				95.2	103
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)				99.6	106
Boulder - Rathdrum 115kV (Moab - Pleasant)					97.6
P2					
BF: R427 Beacon North & South 230kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)	96.5	102.8	109.1	115.4	121.7
Boulder - Irvin #1 115kV (Irvin - Spokane Industrial Park)				97.7	104
BF: R454 Boulder-Lancaster, Boulder #2 230/115 Transformer					
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)					95.2
BF: R554 Boulder-Lancaster, Boulder #1 230/115 Transformer					
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)					95.2
P7					
N-2: Beacon - Greensferry 230kV & Boulder - Lancaster 230kV					
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)	99.7	109.6	119.5	129.3	139.3
Boulder - Rathdrum 115kV (Moab - Pleasant)		104.2	114.1	123.9	133.8
Boulder - Rathdrum 115kV (Boulder - Moab)		101.4	111.2	121.1	131
Boulder - Rathdrum 115kV (Idaho Rd - Rathdrum)			96	103.6	111.2
Post Falls - Ramsey 115kV (Post Falls - Prairie)				101.8	110.4
LANCASTR (40624) -> BELL S3 (40090) CKT 1 at LANCASTR					102.6
Post Falls - Ramsey 115kV (Prairie - Ramsey)					97.2
N-2: Greensferry - Rathdrum 230kV & Lancaster - Rathdrum 230kV					
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)	96.7	95.4			
N-2: Beacon - Boulder 230kV & Boulder - Irvin #2 115kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)		99.8	105	110.2	115.4
Boulder - Irvin #1 115kV (Irvin - Spokane Industrial Park)					97.5
N-2: Beacon - Boulder 230kV & Beacon - Greensferry 230kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)		97.6	104.7	111.9	119.1
Boulder - Irvin #1 115kV (Irvin - Spokane Industrial Park)					101.2
SSEE-2c					
SUB: Beacon 230 & 115 (AVA)					
Ninth and Central - Opportunity 115kV (Chester - Nelson Tap)					95.4
Ninth and Central - Opportunity 115kV (Chester - Opportunity)					101.3

Table 23: Contingency Results, Heavy Spring 2027

Row Labels	27 HS Base	27 HS 100MW	27 HS 200MW	27 HS 300MW	27 HS 400MW
NA					
N-2 (ADJ): Beacon - Greensferry 230kV and Bell - Lancaster 230kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)					101.9
P1					
N-1: Boulder - Irvin #2 115kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)					97.9

Row Labels	27 HS Base	27 HS 100MW	27 HS 200MW	27 HS 300MW	27 HS 400MW
P2					
BF: R427 Beacon North & South 230kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)	97.6	104.6	111.2	118.2	124.9
Boulder - Irvin #1 115kV (Irvin - Spokane Industrial Park)				97.1	103.8
Bell - Northeast 115kV (Bell - Waikiki Tap)	103	99.5	96.3		
Francis and Cedar - Northwest 115kV	99	95.9			
Northwest - Westside 115kV	97.5	95.1			
BUS: Beacon North 230kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)					97.3
BF: A624 Rathdrum East & West 115kV					
Post Falls - Ramsey 115kV (Post Falls - Prairie)	136.6	137.2	138.2	138.9	139.5
Otis Orchard - Post Falls 115kV (East Farms Tap - Beck Road Tap)	108.4	108.9	109.6	110.1	110.7
Otis Orchard - Post Falls 115kV (East Farms Tap - Otis Orchard)	118.2	118.7	119.5	120	120.5
Otis Orchard - Post Falls 115kV (Beck Road Tap - Post Falls)	104.9	105.3	106.1	106.6	107.1
BF: 1W18 Talbot-Walla Walla, Walla Walla-Saddle Mountain					
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	99.2	99.4	99.8	100	100.3
BF: 1W5 Walla Walla-Wallula, Talbot-Walla Walla					
WALAWALA (41131) -> WALA BPA (41129) CKT 3 at WALA BPA	95.6	95.9	96.2	96.4	96.6
BF: A600 Beacon North & South 115kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)	111.8	113.2	114.5	115.9	117.3
Boulder - Irvin #1 115kV (Irvin - Spokane Industrial Park)					96.3
Ninth and Central - Opportunity 115kV (Chester - Opportunity)			96.9	100.4	104
Francis and Cedar - Northwest 115kV	117.9	117	116	115.1	114.2
Northwest - Westside 115kV	112.7	112	111.3	110.5	109.8
BF: A506 Rathdrum 115kV, Pine Street-Rathdrum					
Ramsey - Rathdrum #1 115kV (Huetter - Rathdrum)	106.3	109.6	113.2	116.5	119.8
Ramsey - Rathdrum #1 115kV (Hern - Huetter)		96.7	100.3	103.7	107
Ramsey - Rathdrum #1 115kV (Hern - Ramsey)		96.7	100.3	103.7	107
BF: A638 Rathdrum 115kV, Appleway-Rathdrum					
Ramsey - Rathdrum #1 115kV (Huetter - Rathdrum)	99	102.4	105.9	109.3	112.6
Ramsey - Rathdrum #1 115kV (Hern - Huetter)				96.5	99.9
Ramsey - Rathdrum #1 115kV (Hern - Ramsey)				96.5	99.9
BUS: Rathdrum East 115kV					
Ramsey - Rathdrum #1 115kV (Huetter - Rathdrum)	106.2	109.5	113	116.4	119.7
Ramsey - Rathdrum #1 115kV (Hern - Huetter)		96.6	100.2	103.5	106.8
Ramsey - Rathdrum #1 115kV (Hern - Ramsey)		96.6	100.2	103.5	106.8
BF: A645 Otis Orchards 115kV, Boulder-Otis Orchards					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)			95.1	98.3	101.2
BF: A505 Rathdrum East 115kV, Coeur dAlene 15th St-Rathdrum					
Ramsey - Rathdrum #1 115kV (Huetter - Rathdrum)				98.2	101.5
BF: A642 Otis Orchards 115kV, Otis Orchards-Post Falls					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)				96.9	99.9
BUS: Otis Orchards 115kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)				96.2	99.2
BF: A388 Bell S2 & S3 230kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)					97.4
P2.1					

Row Labels	27 HS Base	27 HS 100MW	27 HS 200MW	27 HS 300MW	27 HS 400MW
N-1: Opportunity - Otis Orchards 115kV Open @ OTI					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)				95.4	98.7
P7					
N-2: Beacon - Greensferry 230kV & Boulder - Lancaster 230kV					
Boulder - Rathdrum 115kV (Pleasant - Idaho Rd)			97.6	108.6	119.6
Boulder - Rathdrum 115kV (Moab - Pleasant)				95.2	106.2
Boulder - Rathdrum 115kV (Boulder - Moab)					102.9
Boulder - Rathdrum 115kV (Idaho Rd - Rathdrum)					102.5
N-2: Beacon - Boulder 230kV & Boulder - Irvin #2 115kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)					100.3
N-2: Beacon - Boulder 230kV & Beacon - Greensferry 230kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)					97.4
N-2: Boulder - Otis Orchards #1 115kV & Boulder - Otis Orchards #2 115kV					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)					96.1
SSEE-2b					
N-2 (ROW): College & Walnut - Westside 115kV and Garden Springs - Westside 115kV					
Francis and Cedar - Northwest 115kV	101.6	99	96.2		
Northwest - Westside 115kV	99	97			
SSEE-2c					
SUB: Beacon 230 & 115 (AVA)					
Boulder - Irvin #1 115kV (Boulder - Spokane Industrial Park)	105.6	109	112.3	115.7	119.2
Boulder - Irvin #1 115kV (Irvin - Spokane Industrial Park)					98.1
Ninth and Central - Opportunity 115kV (Chester - Opportunity)				100	108.6
Francis and Cedar - Northwest 115kV	122.5	120.1	117.8	115.6	113.3
College and Walnut - Westside 115kV (Fort Wright - Westside)	98.9	96.4			
Northwest - Westside 115kV	116.4	114.5	112.7	110.9	109.2

Table 24: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below. This shows the underlying 115kV system over capacity for the double-circuit outage and that the 230kV system begins to overload at the maximum proposed generation level.

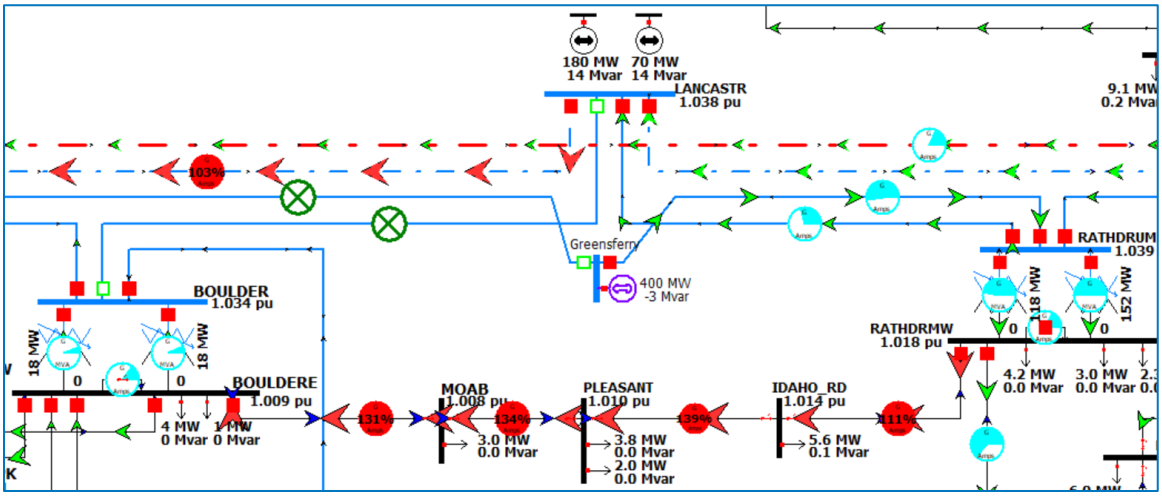

Figure 25: Worst Performing Contingency, Heavy Spring 2027

3.17.3. Integration costs

BPA's Lancaster substation is a 230kV ring-bus arrangement and is not designed to be expanded. Integration will require a new Avista 230kV POI station west of BPA's Lancaster station.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 230kV (3) position Greensferry station	16.5
Loop-in Beacon-Rathdrum 230kV into POI station	1.4
Projects necessary to mitigate new facility violations at 100MW	
Rebuild Boulder-Irvin #1 115kV (BLD-SIP, fix 1.8mi 556aac)	0.7
Rebuild Boulder-Rathdrum 115kV (fix 11.2mi 250cu, 337acsr & 556aac)*	11.2
Rebuild PostFalls-Ramsey 115kV (PF-PRA, fix 2.9mi 250cu)*	2.9
total	***32.7***
Projects necessary to mitigate new facility violations at 200MW	
Rebuild Boulder-Irvin #1 115kV (BLD-SIP, fix 1.8mi 556aac)	0.7
Rebuild Boulder-Rathdrum 115kV (fix 14.7mi 250cu, 337acsr & 556/795aac)*	14.7
Rebuild PostFalls-Ramsey 115kV (all sections, fix 4.9mi 250cu & 556aac)*	4.9
Rebuild OtisOrchards-PostFalls 115kV (EFM-PF, fix 4.8mi 250cu & 556aac)	4.8
total	***43.0***
Projects necessary to mitigate new facility violations at 300MW	
Rebuild Boulder-Irvin #1 115kV (BLD-SIP, fix 1.8mi 556aac)	0.7
Rebuild Boulder-Rathdrum 115kV (all sections, fix 19.2mi)*	19.2
Rebuild PostFalls-Ramsey 115kV (all sections, fix 9.0mi)*	9.0
Rebuild OtisOrchards-PostFalls 115kV (all sections, fix 7.6mi)*	7.6
total	***54.4***
Projects necessary to mitigate new facility violations at 400MW	
Rebuild Boulder-Irvin #1 115kV (BLD-SIP-IRV, fix 4.4mi 556aac & 795 aac)	2.5
Rebuild Boulder-Rathdrum 115kV (all sections, fix 19.2mi)*	19.2
Rebuild PostFalls-Ramsey 115kV (all sections, fix 9.0mi)*	9.0
Rebuild OtisOrchards-PostFalls 115kV (all sections, fix 7.6mi)*	7.6
Rebuild Bell-Lancaster 230kV (fix 23.5mi 1272 acsr)*	35.3
total	***91.5***

Table 25: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.

3.19. West Plains Area

3.19.1. Project description and one-line diagram

Customer has requested that 100 to 300MW of new generation be integrated onto Avista's transmission system in the West Plains area. This request was modeled as a new 230kV line position at planned Bluebird substation as shown below.

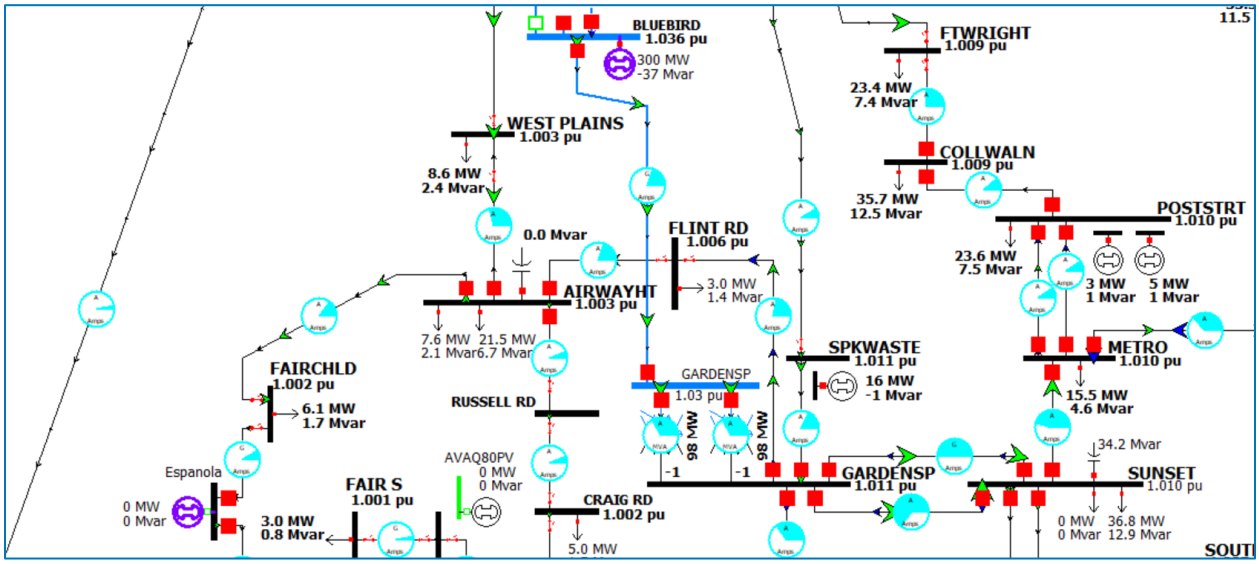

Figure 26: Proposed Generation at Bluebird 230kV, 2027 Heavy Summer

System performance in this area is dominated by several factors:

- 230kV integration primary flows into the West Plains area.
- West Plains area load is 77MW to 160MW
- Existing local generation (18MW) from Waste to Energy.

In general, new generation in this area will sink into local load. As the local load service is met the additional power will flow east into the greater Spokane area.

3.19.2. Contingency Analysis

The worst system performance was during heavy summer conditions. The issues identified below result from moving power from the West Plains into the downtown Spokane load center. The spring and winter scenarios did not identify any issues.

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW	27 HS 300 MW
P1				
N-1: Garden Springs - Sunset#2 115kV				
Garden Springs - Sunset#1 115kV			101.6	111.8
N-1: Garden Springs - Sunset#1 115kV				
Garden Springs - Sunset#2 115kV			101.6	111.8
P2				
BF: R427 Beacon North & South 230kV				
BELL S2 (40088) -> BELL BPA (40087) CKT 6 at BELL S2	113.8	112.9	111.9	111.1

Row Labels	27 HS Base	27 HS 100 MW	27 HS 200 MW	27 HS 300 MW
Francis and Cedar - Northwest 115kV	95.9	96.1	96.3	96.5
Northwest - Westside 115kV		95	95.2	95.4
BF: A600 Beacon North & South 115kV				
Francis and Cedar - Northwest 115kV	100.2	98.8	97.4	96.1
Northwest - Westside 115kV	98.3	97.2	96.1	95.1
BF: AXXX9 Airway Heights - Garden Springs 115kV, Garden Springs - Sunset#1 115kV				
Garden Springs - Sunset#2 115kV			104	114.2
BF: AXX10 Garden Springs - Westside 115kV, Garden Springs - Sunset#2 115kV				
Garden Springs - Sunset#1 115kV				103.7
BF: AXXX4 Garden Springs - Sunset#1 115kV, Ninth & Central - Sunset 115kV				
Garden Springs - Sunset#2 115kV				95.3
SSEE-2c				
SUB: Beacon 230 & 115 (AVA)				
Francis and Cedar - Northwest 115kV	102.9	101.6	100.4	99.2
Northwest - Westside 115kV	100.4	99.4	98.5	97.6

Table 26: Contingency Results, Heavy Summer 2027

The worst performing contingency is shown below. This is a N-1 loss of a 115kV line connecting the West Plains to downtown Spokane. Showing the system will need reinforcements as the proposed generation increases over 100MW.

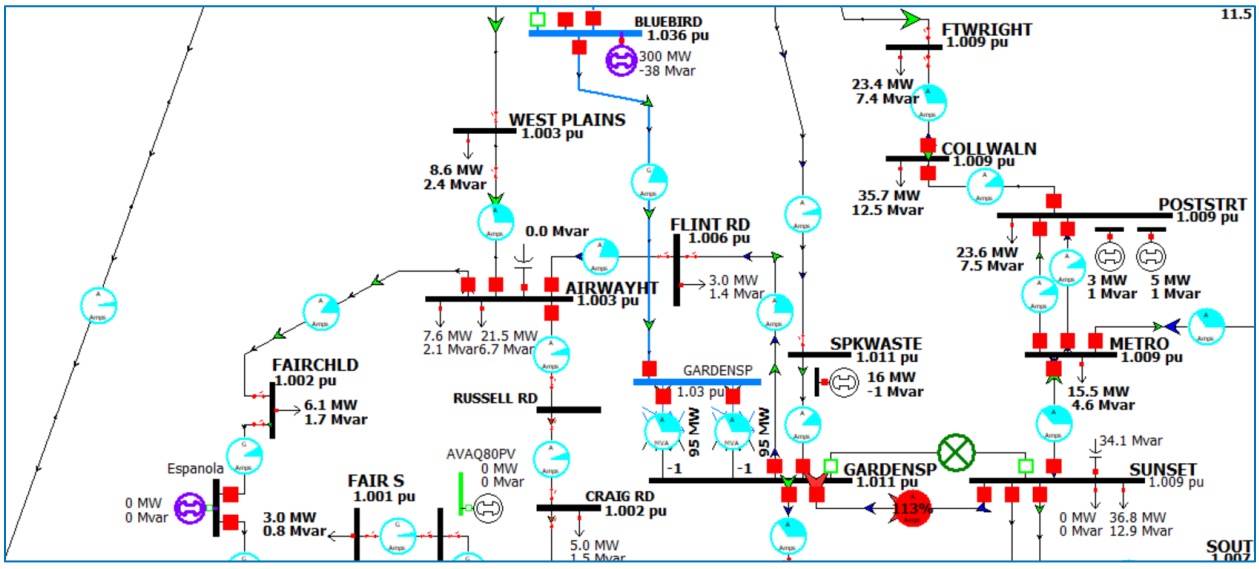

Figure 27: Worst Performing Contingency, Heavy Summer 2027

3.19.3. Integration costs

The planned Bluebird substation has a 230kV double breaker double bus arrangement with space for a new line position.

POI Station or Area	Cost Estimate ($ million)
Point of Interconnection station	
New 230kV line position at Bluebird 230kV	1.9
New 230kV termination structure, comms and metering	0.5
Projects necessary to mitigate new system violations at 100MW	
None	0
total	***2.4***
Projects necessary to mitigate new system violations at 200/300MW	
Rebuild GardenSprings-Sunset #2 115 kV (fix 2.3mi 556aac)	2.3
total	***4.7***

Table 27: Generation Interconnection Request Estimate

Estimates assume that the Interconnection Customer will be responsible for the lead line up to the change of ownership, which is a dead-end tower at the POI substation.