Emily M. Farah
Counsel, Regulatory

411 Seventh Avenue
Mail drop 15-7
Pittsburgh, PA 15219

Tel: 412-393-6431
efarah@duqlight.com

June 12, 2019

Via Electronic Filing

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Keystone Bldg. 2nd Floor W
400 N. Street
Harrisburg, PA 17120

RE: Letter of Notification of Duquesne Light Company, Filed Pursuant to 52 Pa. Code Chapter 57 Subchapter G, for Approval to install a new 138 kV line and reconductor existing circuits to support the Southeast Capacity Project located in the Borough of Dravosburg, Borough of West Mifflin, Borough of Jefferson Hills, Union Township, and Forward Township in Allegheny and Washington Counties, Pennsylvania.
Docket No. A-2019-3009698

Dear Secretary Chiavetta:

By Letter dated July 5, 2019 the Bureau of Technical Utility Services ("TUS") propounded seven Data Requests (identified as Set II, A-2 through A-8) upon Duquesne Light Company ("Duquesne Light" or the "Company") in connection with the Letter of Notification filed at Docket No. A-2019-3009698 ("Southeast Capacity Project LON"). Enclosed are Duquesne Light's responses to Set II and two attachments, labeled "DR Attachment 1" and "DR Attachment 2."

A copy of this cover letter and the enclosed responses have been served upon TUS staff by electronic mailing. Please contact me if you have any questions, comments, or concerns.

Respectfully,

Emily M. Farah
Counsel, Regulatory
Duquesne Light Company

cc: Jeremy Haring (w/ encl.)

Bureau of Technical Utility Services
Data Request Set 2
Docket No. A-2019-3009698

Witness: Joseph Pilch

A-2 Reference the Letter of Notification, Paragraph 11. Please provide a more detailed description of the identified NERC violations.

Response:

These refer to violations of PJM and Duquesne Light Company ("Duquesne") planning criteria[1] which are developed in accordance with NERC Reliability Standard TPL-001-4. TPL-001-4 establishes transmission system performance requirements to ensure that the Bulk Electric System will operate reliably over a broad spectrum of system conditions and following a wide range of probable contingency events. A violation of the planning criteria is said to occur, if upon the activation of a contingency as defined within Table 1 of TPL-001-4, system simulations indicate the inability of system to meet the performance requirements. If Duquesne were to fail to act upon and appropriately mitigate a violation of the planning criteria, the planning criteria violation could result in a violation of TPL-001-4.

As a result of the generator deactivations discussed in the Letter of Notification, the PJM analyses identified multiple instances where Duquesne transmission facilities would exceed their thermal limit as required by the PJM and Duquesne planning criteria.[2] The Southeast Capacity Project will address all of these violations.

[1] As referenced in the Letter of Notification, Paragraph 8.

[2] A summary of the thermal limit exceedances are provided in the following presentations to the PJM Transmission Expansion Advisory Committee ("TEAC"), and attached to this response as "DR Attachment 1" and "DR Attachment 2."

Bureau of Technical Utility Services
Data Request Set 2
Docket No. A-2019-3009698

Witness: Joseph Pilch

A-3 Reference the Letter of Notification, Paragraph 11. Please explain whether the NERC violations occur all the time or only during contingency scenarios.

Response:

The planning criteria violations only occur during certain contingency scenarios which are required to be evaluated in accordance with the NERC TPL-001-4 Reliability Standard. These contingency scenarios include the loss of transmission lines, transformers, bus sections, circuit breakers, and transmission towers.

Bureau of Technical Utility Services
Data Request Set 2
Docket No. A-2019-3009698

Witness: Joseph Pilch

A-4 Reference the Letter of Notification, Paragraph 11. Please explain how the Southeast Capacity Project resolves the NERC reliability violations.

Response:

In order to meet the transmission system performance requirements as defined within the NERC Reliability Standard TPL-001-4, the Southeast Capacity Project resolves these identified planning criteria violations by increasing the thermal capacity of the existing infrastructure in the affected areas of the transmission system as well as providing additional paths for the influx of power from the southeast caused by the generator deactivations.

Bureau of Technical Utility Services
Data Request Set 2
Docket No. A-2019-3009698

Witness: Meenah Shyu

A-5 Reference the Letter of Notification, Paragraph 15. Please provide the specific number of existing towers that will be reinforced with steel.

Response: There are approximately 39 existing towers that will be reinforced with steel.

Bureau of Technical Utility Services
Data Request Set 2
Docket No. A-2019-3009698

Witness: Meenah Shyu

A-6 Reference the Letter of Notification, Paragraph 16. Please provide the height of the replacement structures

Response: The replacement structures' approximate heights are listed below:

Structure Number	Existing Structure Height (ft)	Approximate Structure Height* (ft)
7030	93	95
7060	93	95
7061	103	105
7062	103	105
7063	103	110
7064	133	140
7102	93	95
7103	103	105
7104	116	125
7105	103	105
7106	93	100
7018	106	105
7107	93	100
7108	93	100
7109	96	104
7110	116	125
7111	106	115
7112	113	115
7113	116	120
7114	113	120
7115	116	115
7116	103	111
7117	116	125
7118	116	115
7119	113	115
7130	113	161
7230	113	161
7231	113	112

*Based on preliminary designs.

Bureau of Technical Utility Services
Data Request Set 2
Docket No. A-2019-3009698

Witness: Nicholas Anderson

A-7 Reference the Letter of Notification, Paragraph 20. Please provide the proposed in-service date.

Response:

The current in-service date for the Southeast Capacity Project is May 31, 2021.

Bureau of Technical Utility Services
Data Request Set 2
Docket No. A-2019-3009698

Witness: Nicholas Anderson

A-8 Reference the Letter of Notification, Paragraph 22. Is the Southeast Capacity Project part of a larger project? If so, please describe the larger project.

Response:

No. The Southeast Capacity Project work scope is representative of Duquesne Light's construction responsibilities to address violations caused by the generator deactivations outlined in the Letter of Notification, Paragraph 10. PJM assigned projects other utilities, but those projects are not addressed by Duquesne Light's filing. Refer to DR Attachment 1 and DR Attachment 2 regarding projects assigned to other utilities.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Letter of Notification of Duquesne Light Company, Filed Pursuant to 52 Pa. Code Chapter 57 Subchapter G, for Approval to install a new 138 kV line and reconductor existing circuits to support the Southeast Capacity Project located in the Borough of Dravosburg, Borough of West Mifflin, Borough of Jefferson Hills, Union Township, and Forward Township in Allegheny and Washington Counties, Pennsylvania.	:	Docket No. A-2019-3009698

VERIFICATION

I, Jason Harchick, being the GENERAL MANAGER OF SYSTEM PLANNING, PROTECTION, AND COMPLIANCE at Duquesne Light Company, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief, and that I expect Duquesne Light Company to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities).

Jason Harchick, P.E.
General Manager, System Planning, Protection, and Compliance

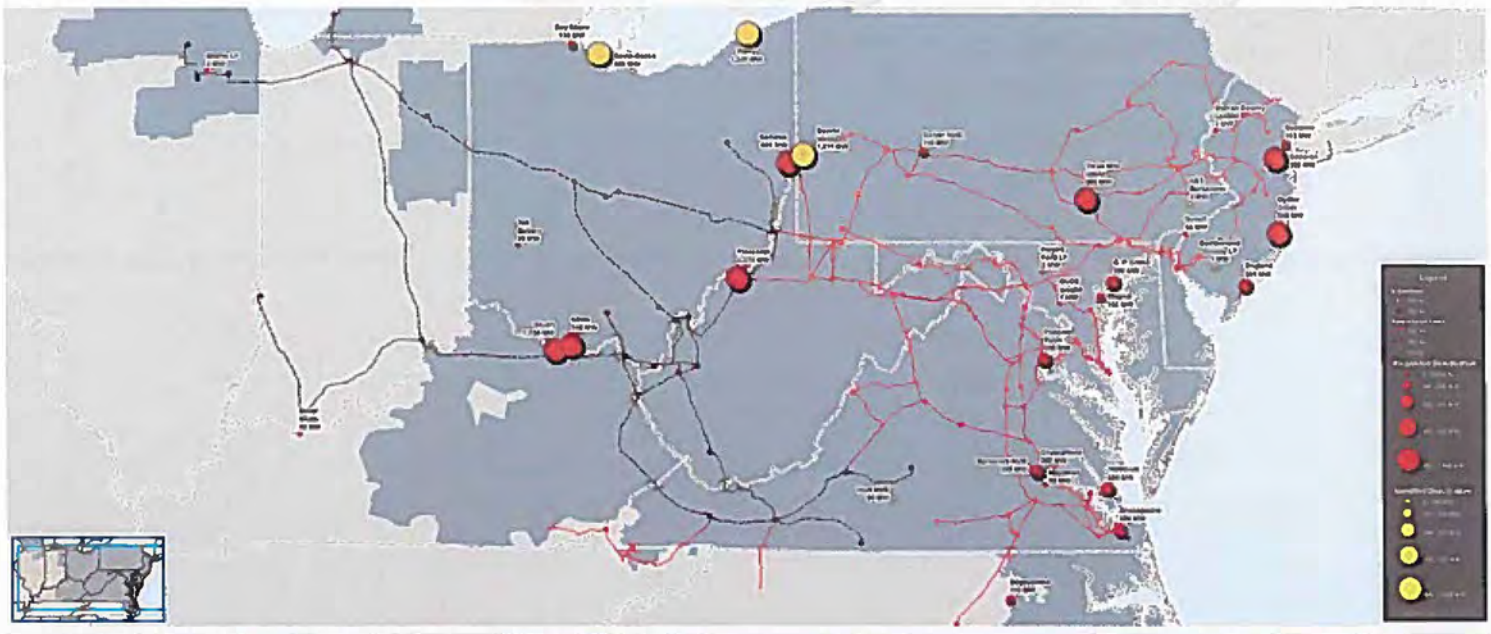
Date: 7/11/2019

DR
ATTACHMENT 1

Generation Deactivation Notification Update

Transmission Expansion Advisory Committee
June 7, 2018

Generation Deactivation



Deactivation Status

Unit(s)	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Davis Besse Unit 1 (896 MW)	ATSI	5/31/2020	Reliability analysis complete. New and existing baselines resolve identified impacts. Units can retire as scheduled. Operational flexibility allows to bridge any delays with the transmission upgrades.
Perry Unit 1 (1247 MW)	ATSI	5/31/2021	
Beaver Valley Unit 1 (909 MW)	DUQ	5/31/2021	
Beaver Valley Unit 2 (902 MW)	DUQ	10/31/2021	

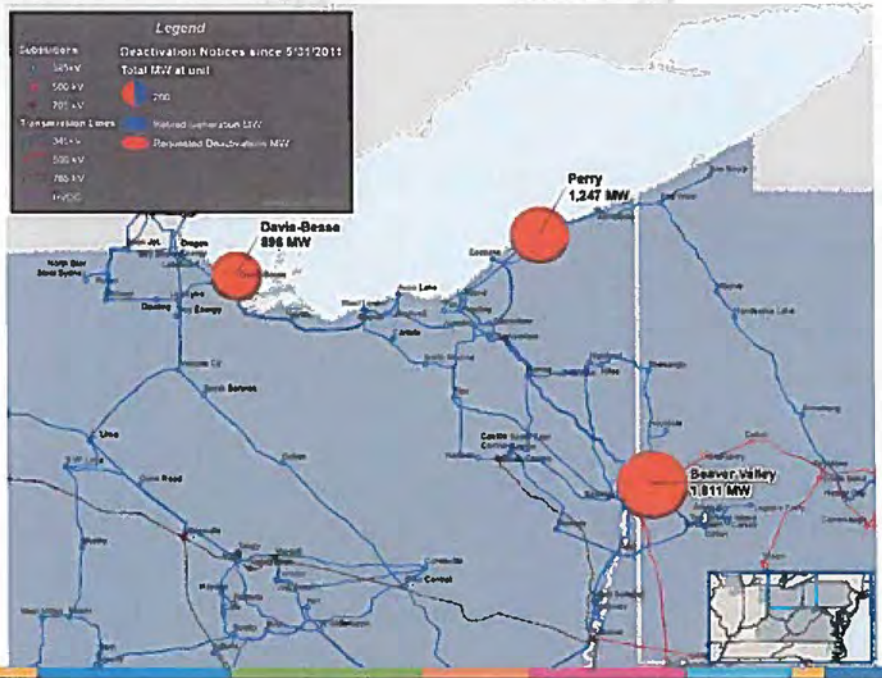
Deactivation Status

Unit(s)	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Cumberland County Landfill (1.6 MW)	ACE	1/1/2019	Reliability analysis complete. No impacts
Barbados AES Battery (2 MW)	PECO	7/29/2018	Reliability analysis complete. No impacts
Hurt NUG (83 MW)	Dominion	7/29/2018	Reliability analysis complete. No impacts

Deactivation Update: Deactivation Notifications

ATSI and Duquesne Transmission Zones

- Davis-Besse (5/31/2020)
  - Unit 1 896 MW
- Beaver Valley Unit 1 (5/31/2021)
  - Unit 1 909 MW
- Perry (5/31/2021)
  - Unit 1 (1247 MW)
- Beaver Valley Unit 2 (10/31/2021)
  - Unit 2 902 MW



APS Transmission Zone

Problem Statement: Generation Deliverability

- Allenport - Charleroi 138 kV line is overloaded for the following tower contingencies:

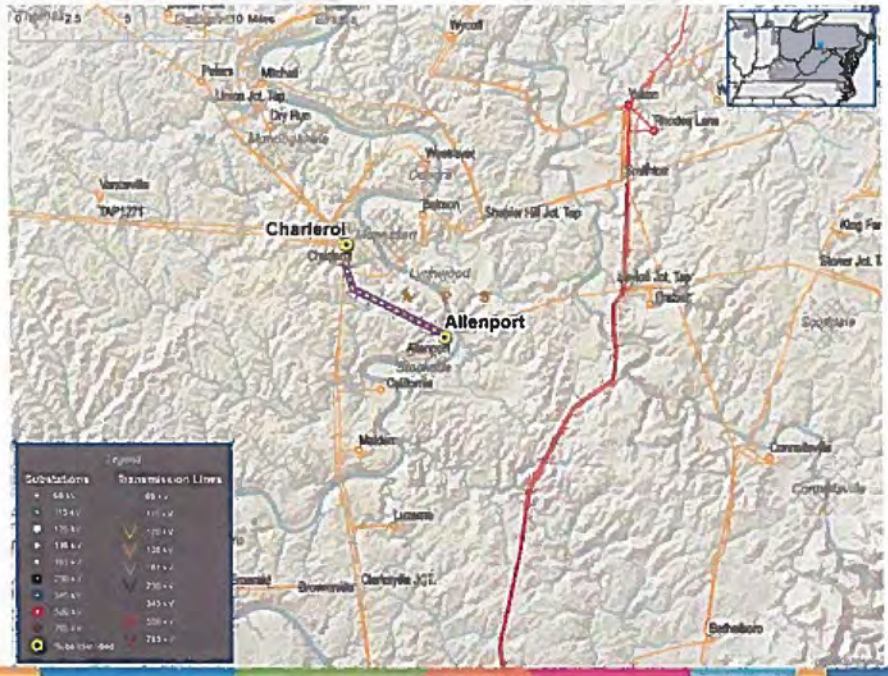
- Loss of Yukon - Charleroi 138 kV and Yukon-Westraver 138 kV lines.
- Loss of Charleroi - Westraver 138 kV and Charleroi – Yukon 138 kV lines.

Recommended Solution:

- Existing baseline **b2965** - Replace the Charleroi – Allenport 138 kV line with 954 ACSR, and replace breaker Risers at two ends.

Required IS Date: 06/01/2020
Projected IS Date: 06/01/2021
* Operating measures identified to mitigate reliability impacts in interim

Original Required IS Date: 06/01/2022
Original TEAC Date: 11/02/2017



APS Transmission Zone

Problem Statement: Generation Deliverability

- Shanor Manor - Krendale138 kV and Butler – Shanor Manor 138 kV lines are overloaded for the single contingency tripping Cabot – Cranberry 500 kV line.

Recommended Solution:

- Existing baseline **b2967** - Convert the existing 6 wire Butler - Shanor Manor - Krendale 138 kV Line into two separate 138 kV lines. New lines will be Butler - Keisters and Butler - Shanor Manor - Krendale 138 kV lines .

Required IS Date: 06/01/2020
Projected IS Date: 06/01/2021
* Operating measures identified to mitigate reliability impacts in interim

Original Required IS Date: 06/01/2022
Original TEAC Date: 11/02/2017

APS Transmission Zone

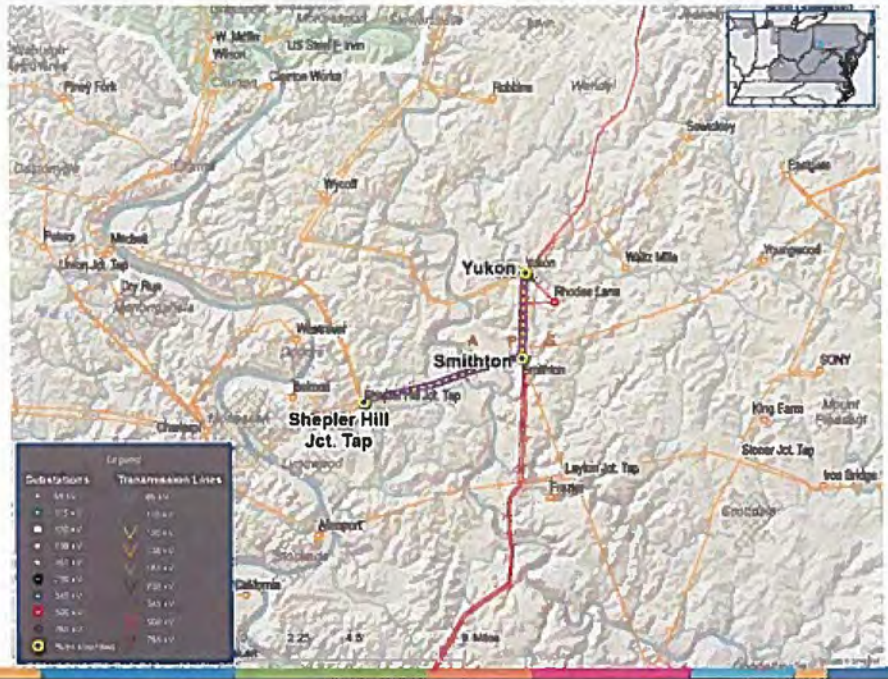
Problem Statement: Generation Deliverability

- Yukon-Smithton #62 138 kV and Smithton #62 - Shepler Hill Jct 138 kV lines are overloaded for the following tower contingencies:
- Loss of Yukon - Charleroi 138 kV and Yukon-Westraver 138 kV lines.
- Loss of Charleroi - Westraver 138 kV and Charleroi - Yukon 138 kV lines

Recommended Solution:

- Existing baseline **b2966** – need to rescope with a larger conductor: Reconductor the Yukon-Smithton #62 - Shepler Hill Jct with 954 ACSS, and replace line disconnect switch at Yukon.

Estimated Project Cost: From $6.2M to $6.7M
Required IS Date: 06/01/2020
Projected IS Date: 06/01/2021
Project Status: Engineering
* Operating measures identified to mitigate reliability impacts in interim
Original Required IS Date: 06/01/2022
Original TEAC Date: 11/02/2017



PENELEC Transmission Zone

Problem Statement: Generation Deliverability

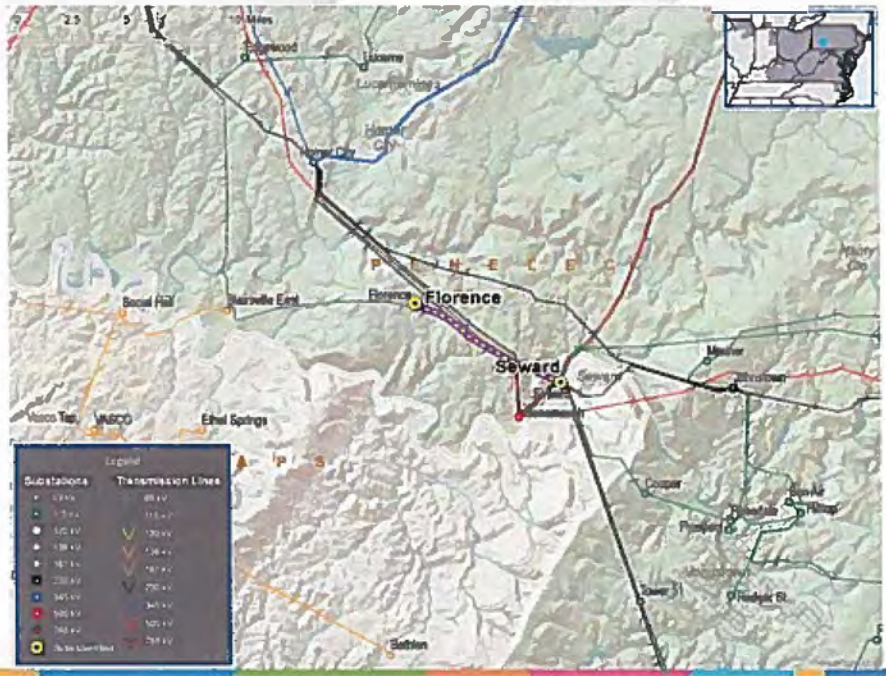
- Seward - Florence138 kV line is overloaded for the breaker failure contingency for loss of Shelocta - Keystone 230 kV, Homer CT - Shelocta 230 kV, Shelocta - Blairsville 115 KV, Shelocta - Edgewood 115 kV lines, Shelocta 115/23 kV and Shelocta 230/115 kV transformers.

Recommended Solution:

- Existing baseline **b2951.1, b2951.2, and b2951.3**- Upgrade terminal equipment at Seward SS, replace line tuner, coax, relay and carrier set at Shelocta SS, replace Seward/Shelocta line CVT, tuner, coax, and line relaying at Blairsville East SS.

Required IS Date: 06/01/2020
Projected IS Date: 10/19/2018

Original Required IS Date: 06/01/2022
Original TEAC Date: 10/31/2017



AEP Transmission Zone

Problem Statement: Generation Deliverability

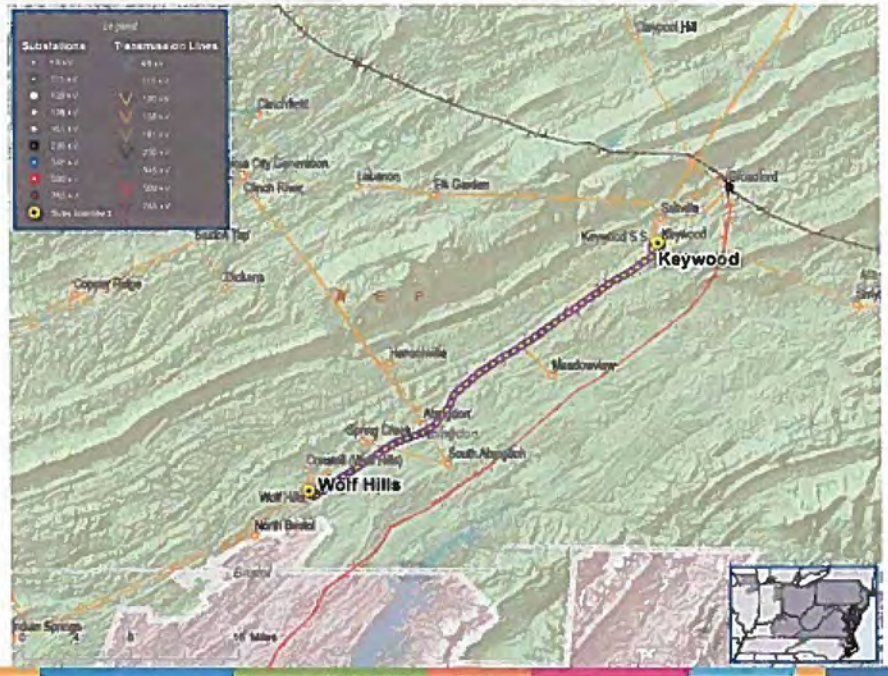
- Wolf Hills - Keywood 138 kV line is overloaded for the following contingencies:
- Breaker Failure: Loss of Broadford 765/500 kV transformer, Baker - Broadford 765 kV line, and Sullivan – Broadford 500 kV line.
- Single: Loss of Loss of Broadford 765/500 kV transformer, and Sullivan – Broadford 500 kV line.

Recommended Solution:

- Existing baseline **b2938** - Perform a sag mitigation on the Broadford – Wolf Hills 138kV circuit to allow the line to operate to a higher maximum temperature.

Required IS Date: 06/01/2021
Projected IS Date: 06/01/2022
* Operating measures identified to mitigate reliability impacts in interim

Original Required IS Date: 06/01/2022
Original TEAC Date: 09/11/2017



APS Transmission Zone

Problem Statement: Generation Deliverability

- Keystone - Cabot 500 kV line is overloaded for the single contingency for loss of the Yukon – South Bend 500 kV line.

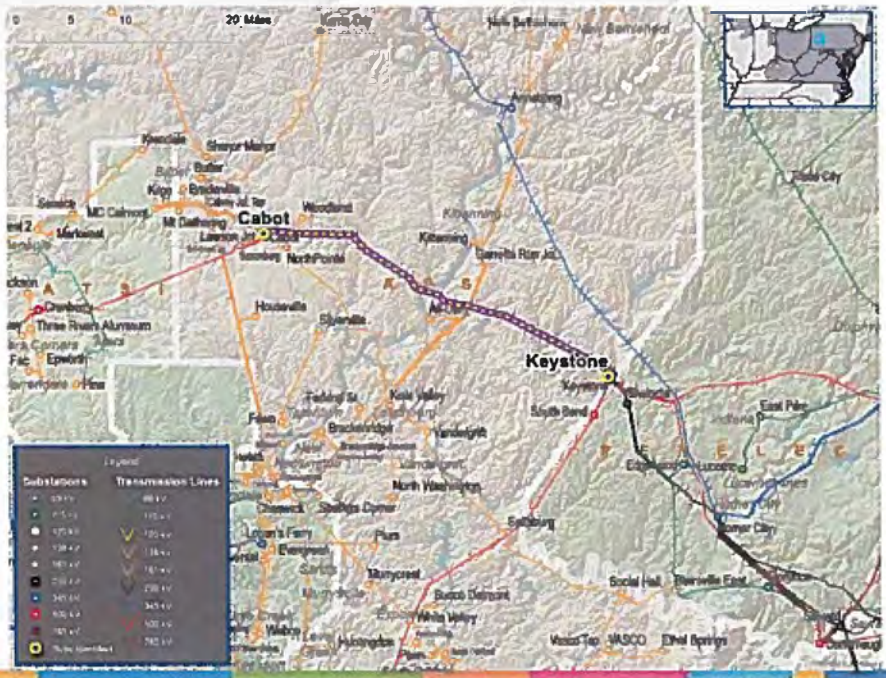
Recommended Solution:

- Replace terminal equipment at both Keystone and Cabot 500kV ends **(b3010: SN 3683 MVA / SE 4514 MVA)**

Estimated Project Cost: $0.26M

Required IS Date: 06/01/2021

Projected IS Date: 06/01/2021



APS Transmission Zone

Problem Statement: Generation Deliverability

- Yukon 500/138 kV #2, #3 and #4 transformers are overloaded for the following bus (first two) and breaker failure contingencies:
- Loss of the Yukon #1 and #3 transformers
- Loss of the Yukon #2 and #4 transformers
- Loss of the Yukon #1 and #3 transformers, and the Yukon - Rhodes Lane 500 kV line
- Loss of the Yukon #1 and #3 transformers, and the Yukon - Rhodes Lane 500 kV line

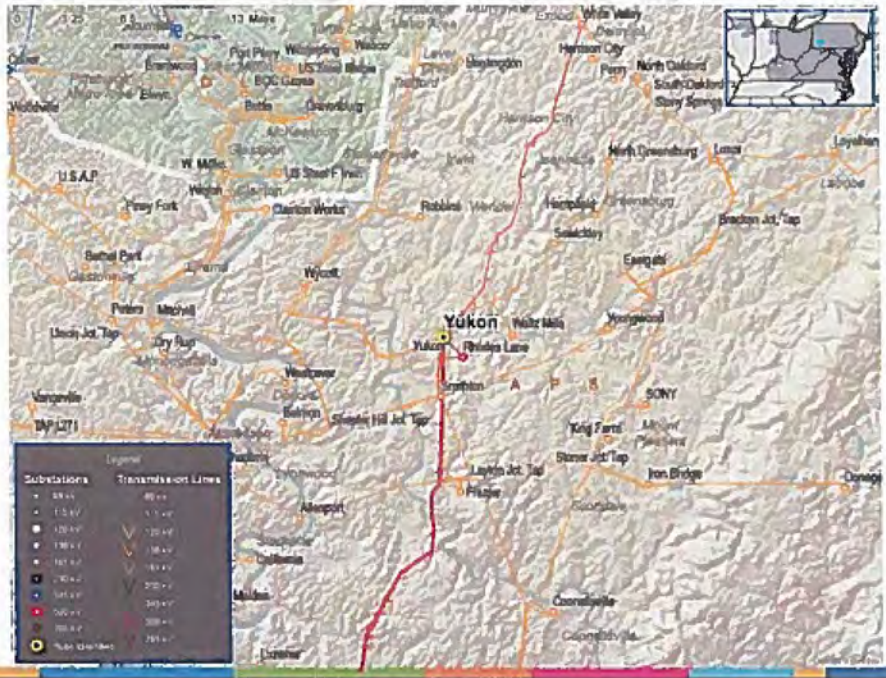
Recommended Solution:

- Replace four Yukon 500/138 kV transformers with three transformers with higher ratings, and reconfigure 500 kV bus **(b3006: SN 1096 MVA / SE 1376 MVA).**

Estimated Project Cost: $55.65M

Required IS Date: 06/01/2021

Projected IS Date: 06/01/2021



APS Transmission Zone

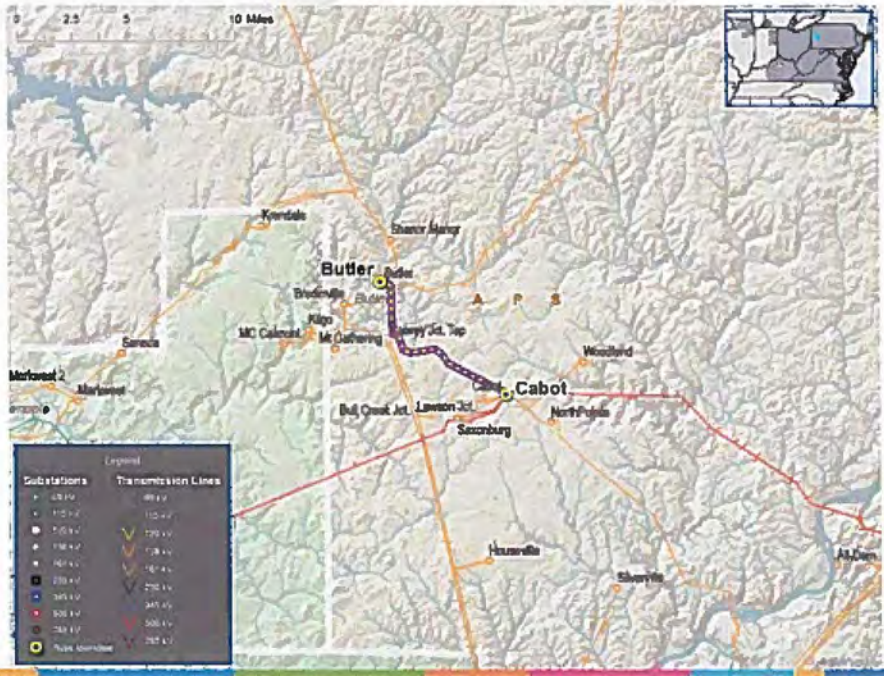
Problem Statement: Generation Deliverability

- Cabot - Butler 138 kV line is overloaded for the single contingency for loss the Yukon – South Bend 500 kV line.

Recommended Solution:

- Reconductor 3.1 mile 556 ACSR portion of Cabot to Butler 138 kV with 556 ACSS and upgrade terminal equipment (**b3005: SN 308 MVA / SE 376 MVA**)

Estimated Project Cost: $4.5M
Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021



APS Transmission Zone

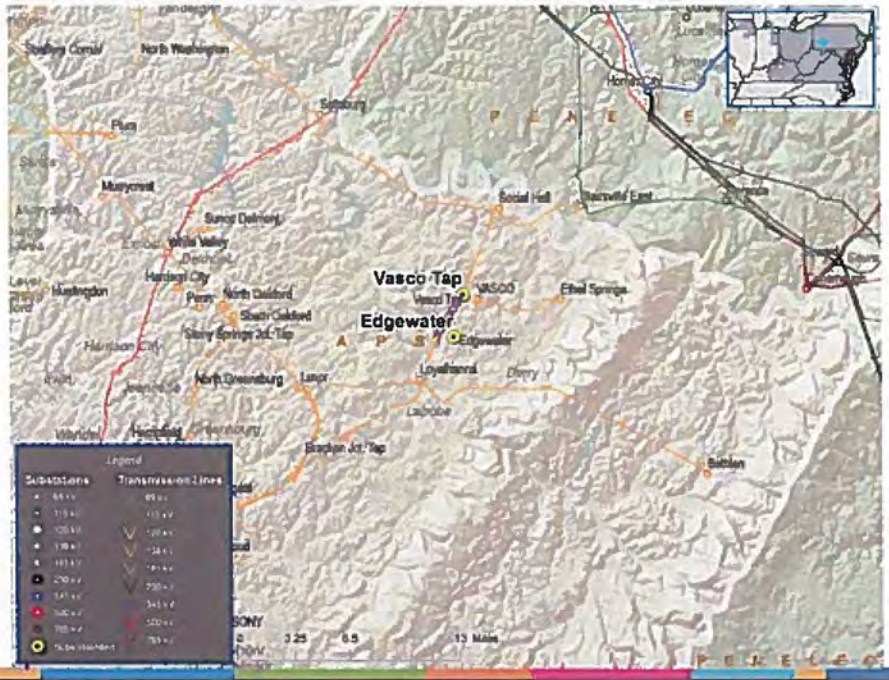
Problem Statement: Generation Deliverability

- Vasco Tap - Edgewater Tap 138 kV line is overloaded for the single contingency for loss of the Yukon – South Bend 500 kV line.

Recommended Solution:

- Reconductor Vasco Tap - Edgewater Tap 138 kV line with 336 ACSS (**b3013: SN 252 MVA / SE 291 MVA**).

Estimated Project Cost: $5M
Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021



PENELEC Transmission Zone

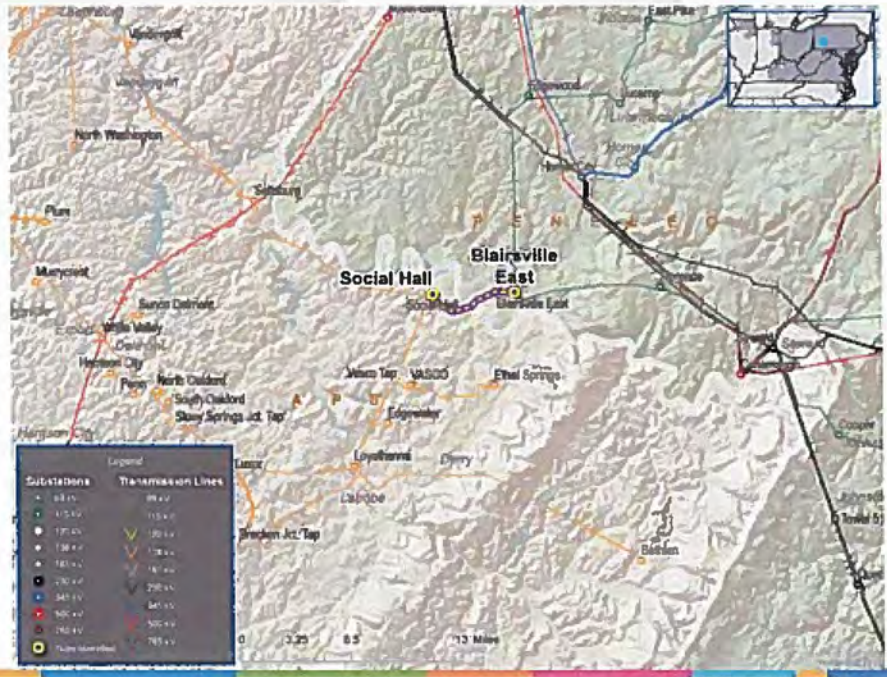
Problem Statement: Generation Deliverability

- Blairsville - Social Hall 138 kV line, Blairsville 138/115 kV transformer, and Blairsville-Blairsville East 115 kV line are overloaded for the single contingency for the Keystone – Cabot 500 kV line

Recommended Solution:

- Reconductor Blairsville – Social Hall138 kV line with 636 ACSS, and upgrade terminal equipment (**b3007.1 and b3007.2: SN 387 MVA / SE 444 MVA**).
- Upgrade transformer terminal equipment at Blairsville East 115 kV side (**b3008: SN 291 MVA / SE 364 MVA**).
- Upgrade terminal equipment at Blairsville East 115kV tap (**b3009: SN 339 MVA / SE 406MVA**).

Estimated Project Cost: $6.85M
Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021



PENELEC Transmission Zone

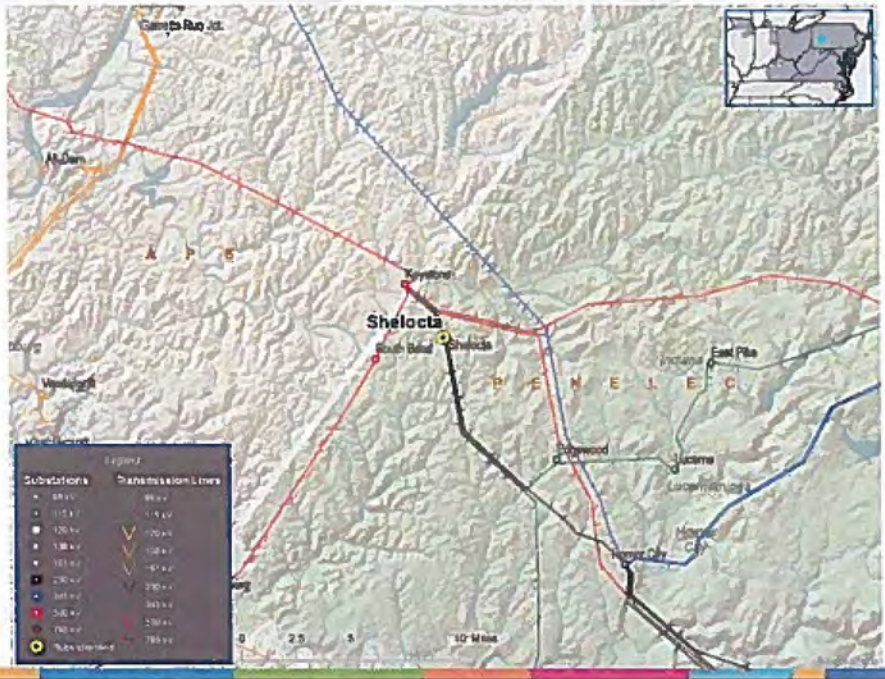
Problem Statement: Generation Deliverability

- Shelocta 230/115 kV transformer is overloaded for the breaker failure contingency for loss of the Glory - Seward 115 kV, Jackson RD - Seward 115 kV, Seward - Cooper 115 kV, Seward – Conemaugh 115 kV, Seward - Florence 115 kV, Seward - Tower 115 kV, Seward 230/115 kV transformer, and Seward 115/23 kV transformer.

Recommended Solution:

- Replace transformer with a larger unit and construct a 230 kV ring bus (**b3014: SN 406 MVA / SE 456 MVA**).

Estimated Project Cost: $4.8M
Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021



PENELEC Transmission Zone

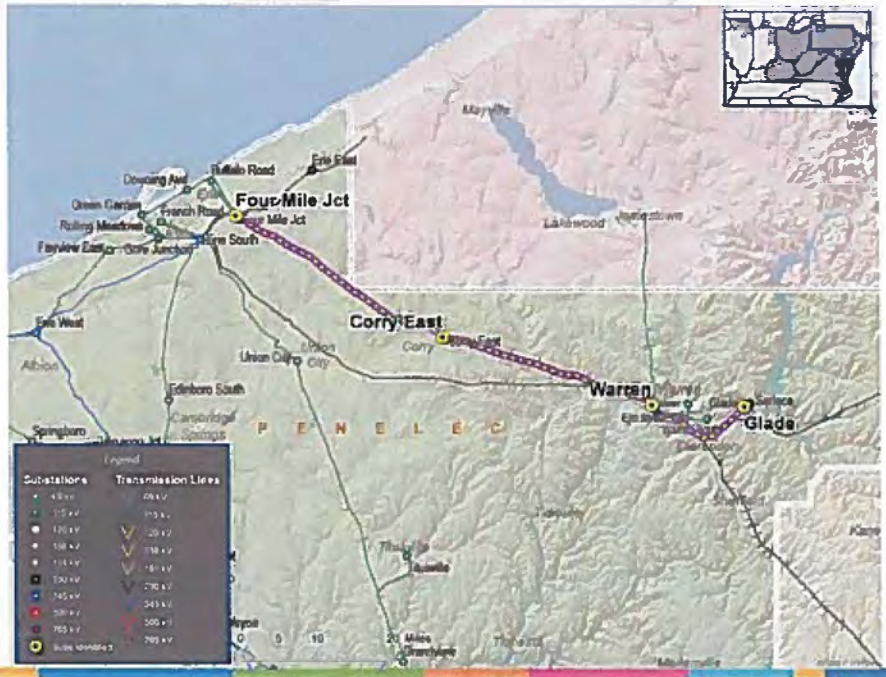
Problem Statement: Generation Deliverability

- Glade - Warren 230 kV, Warren - Corry East 115 kV and Corry East - Four Mile 115 kV lines are overloaded for the single contingency for loss of the Erie South East - Warren 230 kV line.

Recommended Solution:

- Rebuild the Glade - Warren 230 kV line with 1033 ACSS **(b3017.1, b3017.2, b3017.3: SN 855 MVA / SE 984 MVA).**
- Replace terminal equipment on the Warren - Corry East 115 kV line **(b3024: SN 202 MVA / SE 245 MVA).**
- Replace terminal equipment on the Corry East - Four Mile 115 kV line **(b3016 SN 202 MVA / SE 245 MVA).**

Estimated Project Cost: $33.5M
Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021



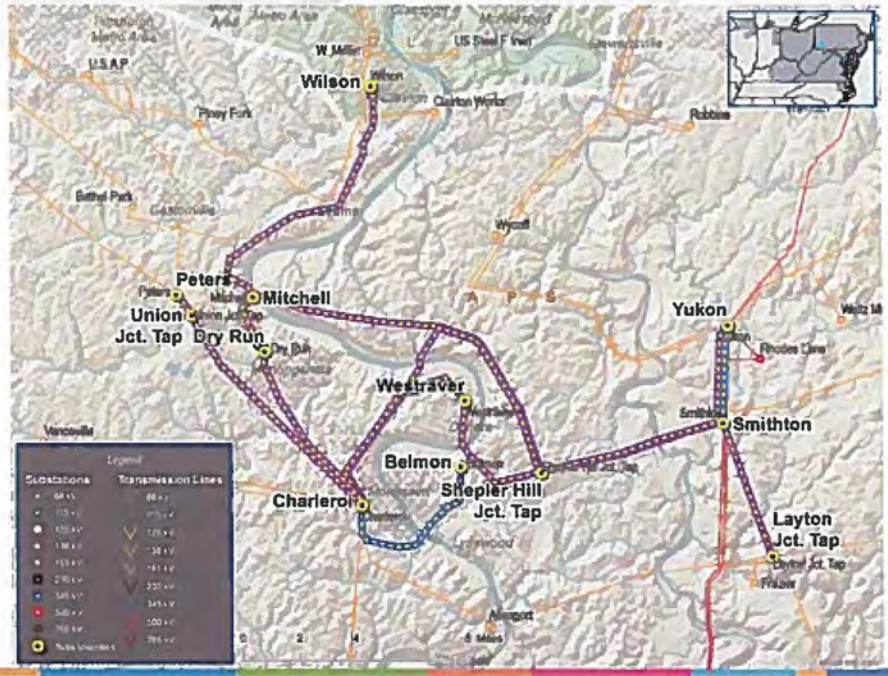
APS and Duquesne Transmission Zones

Problem Statement: Generation Deliverability

- Belmon - Charleroi 138 kV, Yukon - Smithton #61 138 kV lines are overloaded for the following tower contingencies:

- Loss of Yukon - Charleroi 138 kV and Yukon - Westraver 138 kV lines.
- Loss of Charleroi - Westraver 138 kV and Charleroi – Yukon 138 kV lines.

Required IS Date: 06/01/2021

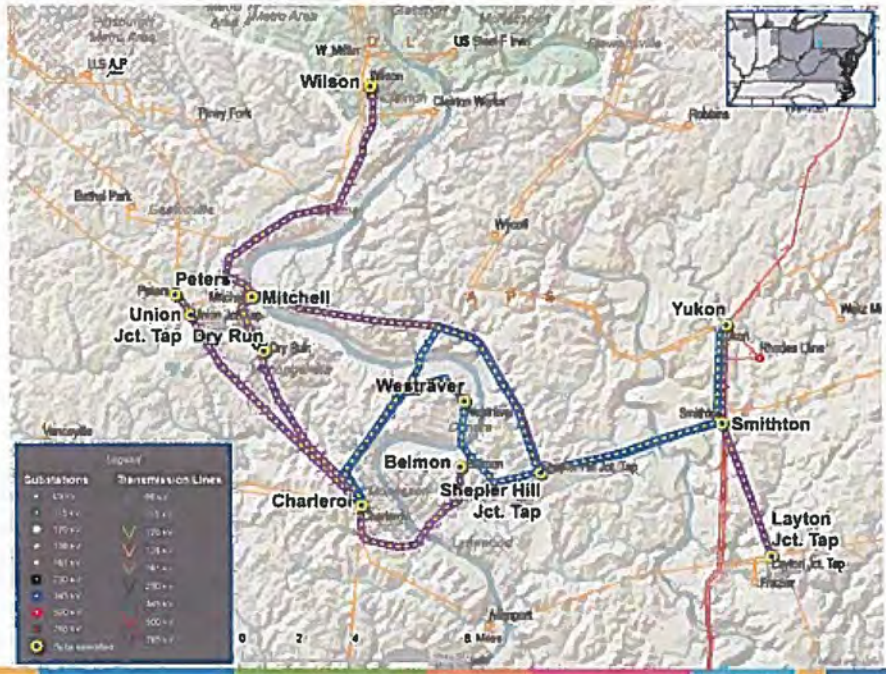


Problem Statement: Generation Deliverability

- Yukon - Westraver 138 kV , Westraver - Charleroi 138 kV, and Yukon - Charleroi 138 kV lines are overloaded for the following contingencies:
  - Tower contingency for loss of Frazier - Layton Jct 138 KV, Iron Bridge - Layton Jct 138 kV, Layton Jct - Smithton #61 138 kV, Mitchell - Shepler Hill Jct 138 kV, Belmon - Shepler Hill Jct 138 kV, Shepler Hill Jct - Smithton #62 138 kV, Smithton #61 – Yukon 138 kV, and Smithon#62 - Yukon 138 kV lines
  - Breaker failure contingency for loss of Mitchell - Union Jct 138 kV, Mitchell - Shepler Hill Jct 138 kV, Mitchell - Charleroi 138 kV lines.

Required IS Date: 06/01/2021

APS and Duquesne Transmission Zones

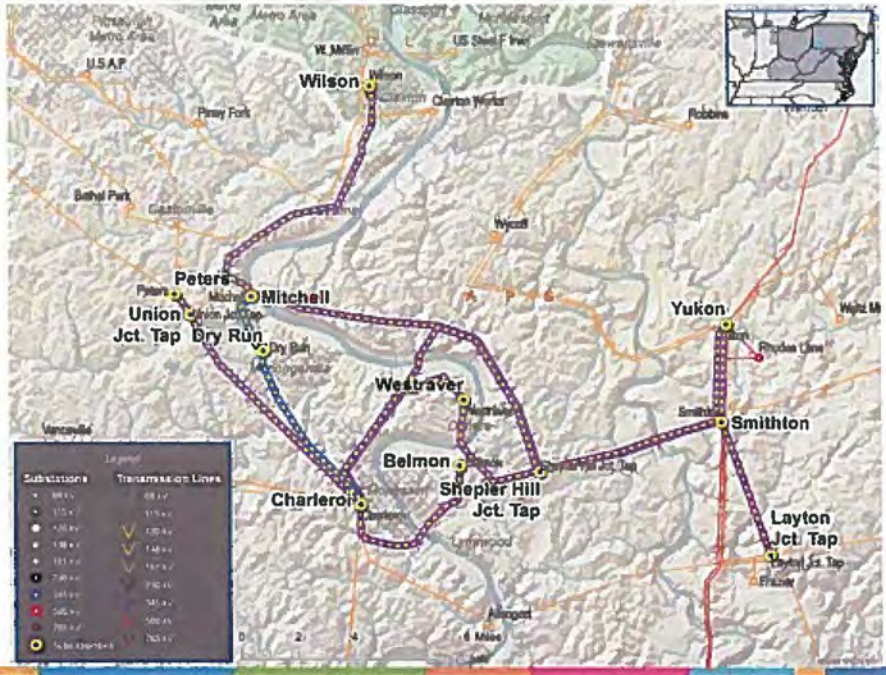


Problem Statement: Generation Deliverability

- Charleroi - Dry Run 138 kV and Dry Run - Mitchell 138 kV lines are overloaded for the bus contingency for the following contingencies:
  - Bus contingency for loss of Mitchell - Shelpler Hill Jct 138 kV, Mitchell - Charleroi 138 kV, Mitchell - Union Jct 138 kV lines, and Mitchell 138/25 KV transformer.
  - Breaker failure contingency for loss of Mitchell - Union Jct 138 kV, Mitchell - Shepler Hill Jct 138 kV, Mitchell - Charleroi 138 kV lines.

Required IS Date: 06/01/2021

APS and Duquesne Transmission Zones

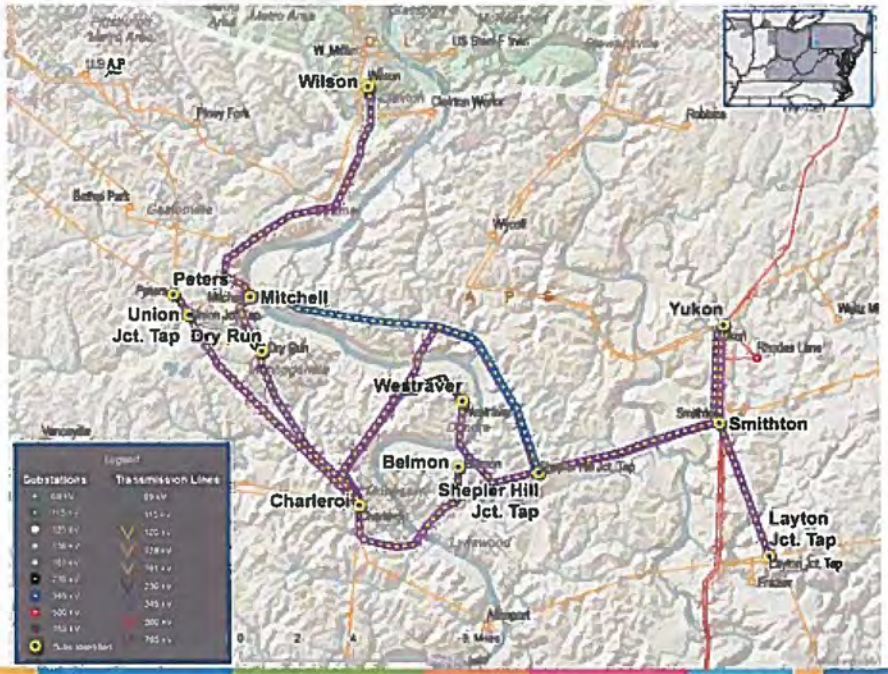


APS and Duquesne Transmission Zones

Problem Statement: Generation Deliverability

- Shepler Hill Jct - Mitchell 138 kV line is overloaded for the following breaker failure contingencies:
  - Loss of Mitchell - Charleroi 138 kV, Charleroi - Yukon 138 kV, Charleroi - Union Jct 138 kV, Charleroi - Gordon 138 kV, Allenport - Charleroi 138 kV, Belmon - Charleroi 138 kV lines.
  - Loss of Charleroi - Union Jct 138 kV, Charleroi - Westraver 138 kV, Allenport - Charleroi 138 kV, and Belmon - Charleroi 138 kV lines.

Required IS Date: 06/01/2021

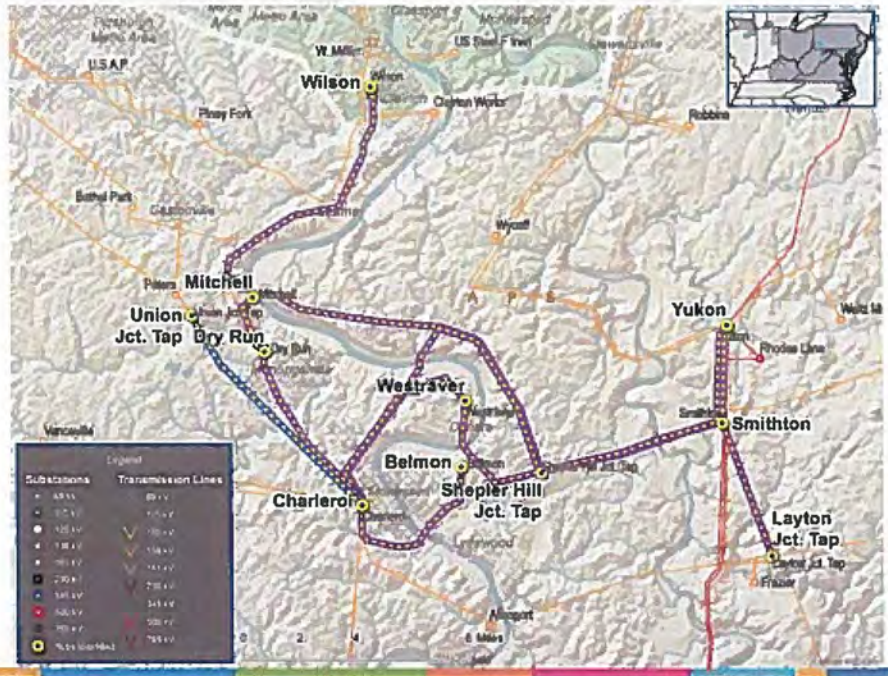


APS and Duquesne Transmission Zones

Problem Statement: Generation Deliverability

- Charleroi 138 kV - Union Jct 138 KV line is overloaded for the following tower contingencies:
  - Loss of Mitchell - Charleroi and Mitchell - Dry Run 138 KV lines
  - Loss of Mitchell - Charleroi and Charleroi - Dry Run 138 kV lines.
- Union Jct - Peters 138 KV line is overloaded for the single contingency for loss of Mitchell - Wilson 138 kV line.

Required IS Date: 06/01/2021

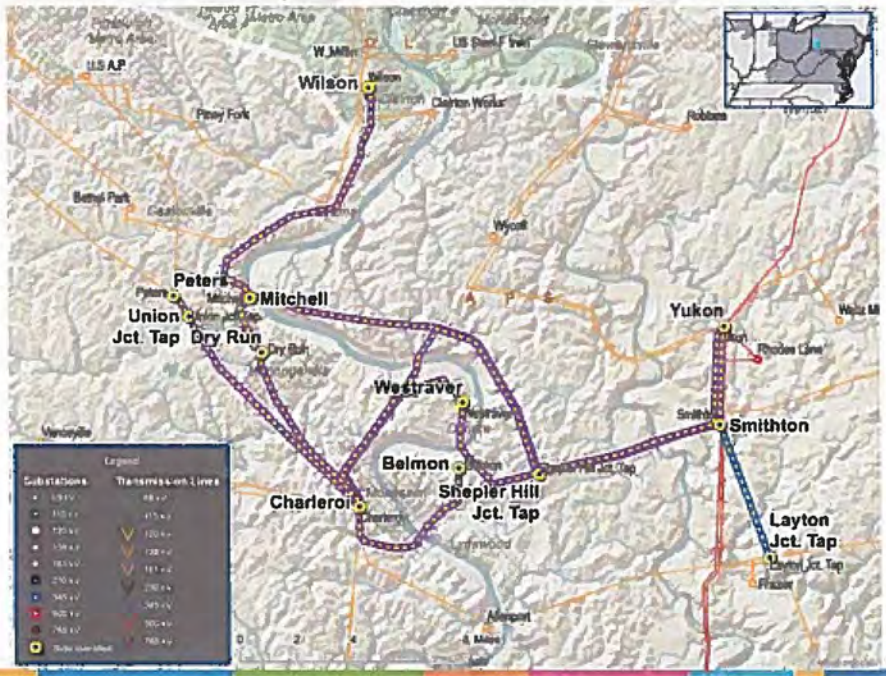


APS and Duquesne Transmission Zones

Problem Statement: Generation Deliverability

- Smithton #61 - Layton Jct 138 kV line is overloaded for the tower contingency for loss of Charloroi - Yukon 138 kV and Westraver - Yukon 138 kV lines.

Required IS Date: 06/01/2021



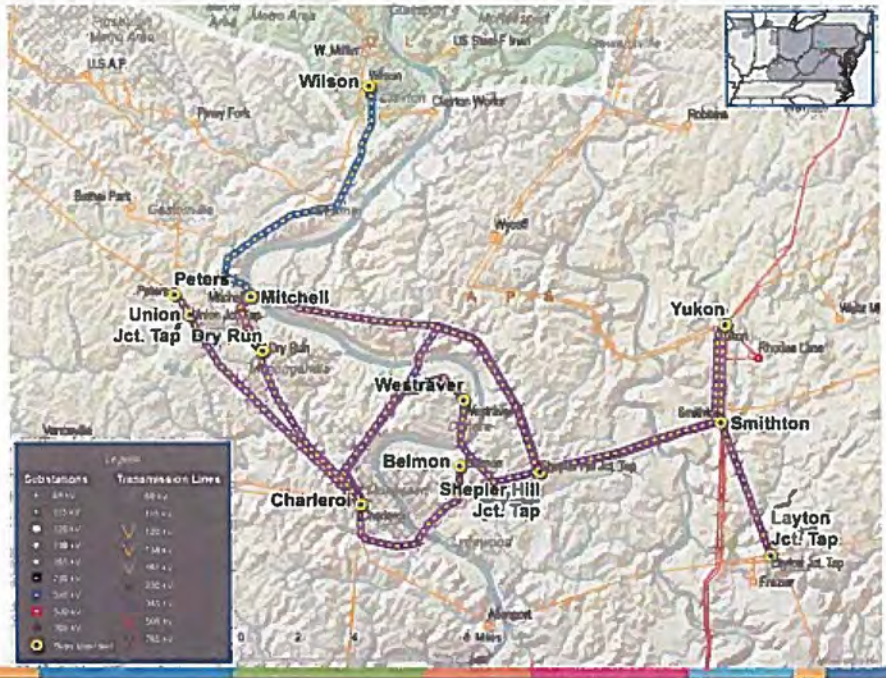
APS and Duquesne Transmission Zones

Problem Statement: Generation Deliverability

- Mitchell - Wilson 138 kV line is overloaded for the following single contingencies:

- Loss of Keystone - Cabot 500 kV line
- Loss of Cabot - Cranberry 500 kV line
- Loss of Cheswick unit 1
- Loss of Peters - Union Jct 138 kV

Required IS Date: 06/01/2021

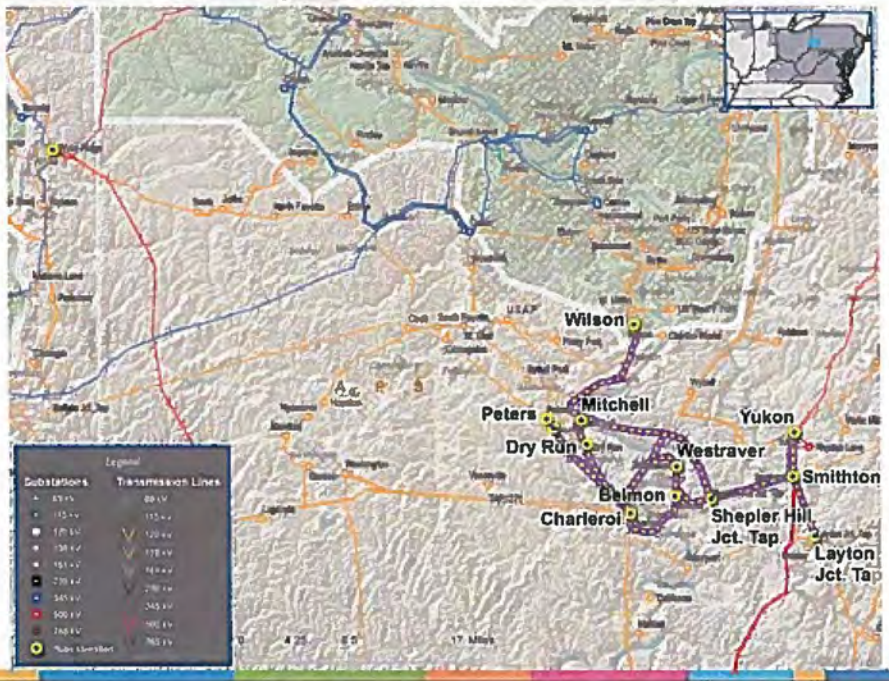


APS and Duquesne Transmission Zones

Problem Statement: Generation Deliverability

- Wylie Ridge 500/345 kV transformer is overloaded for the breaker failure for loss of Wylie Ridge - AA2-121 Tap 138 kV, and Wylie Ridge #5, #6 500/345 kV transformers.

Required IS Date: 06/01/2022

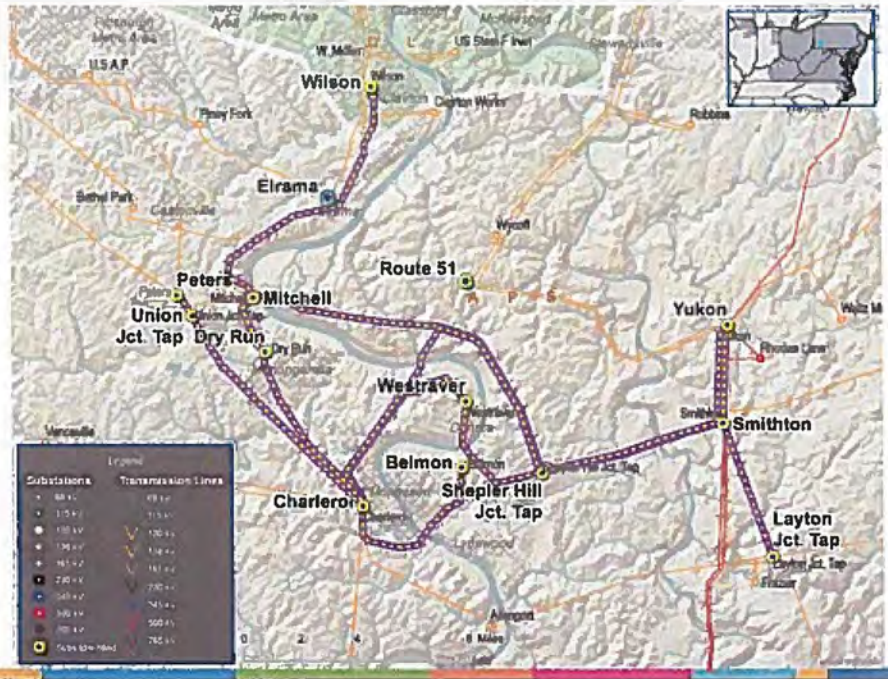


APS Transmission Zone

Recommended Solution:

- Construct new Route 51 substation in APS and connect 10 138 kV lines to new substation (**b3011.1**).
- Upgrade terminal equipment at Yukon to increase rating on four Yukon to Route 51 138 kV lines
  - **b3011.2: SN 308 MVA / SE 376 MVA**
  - **b3011.3: SN 297 MVA / SE 365 MVA**
  - **b3011.4: SN 297 MVA / SE 365 MVA**
  - **b3011.5: SN 308 MVA / SE 376 MVA**
- Upgrade remote end relays for Yukon - Allenport - Iron Bridge 138 kV line (**b3011.6: SN 234 MVA / SE 297 MVA**).

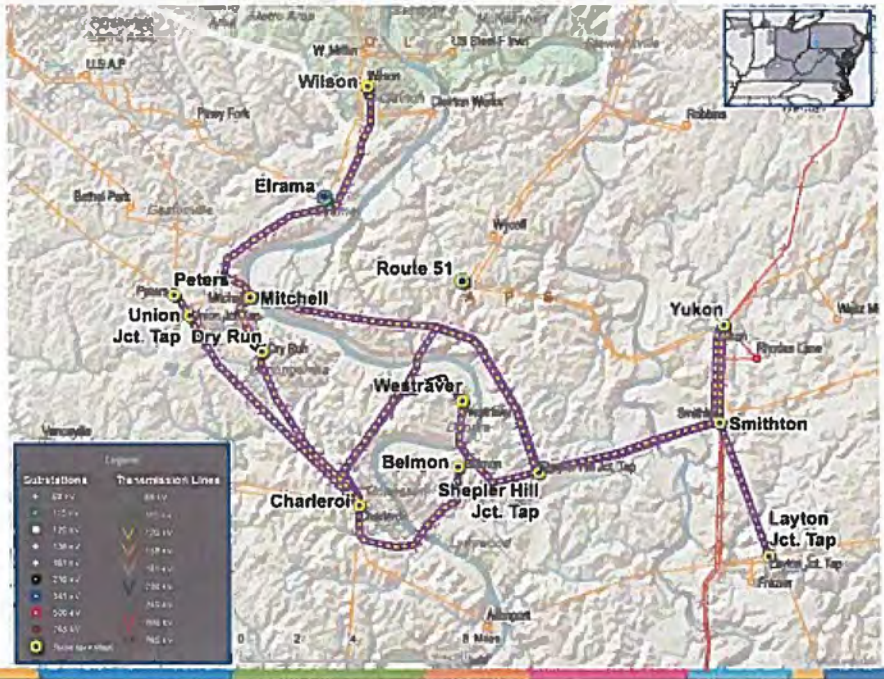
Estimated Project Cost: $27.6M
Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021



Duquesne Transmission Zone

Recommended Solution :

- Construct new Elrama substation in Duquesne and connect 7 138 kV lines to new substation (**b3015.1**).
- Reconductor the Elrama - Wilson 138 kV line with 2x795 ACSS **(b3015.2: SN 719 MVA SE 719 MVA).**
- Reconductor the Dravosburg - West Mifflin 138 kV line with 795 ACSS **(b3015.3: SN 382 MVA / SE 385 MVA).**
- Run new conductor with 796 ACSS over existing tower to establish a new Dravosburg - Elrama 138 kV line **(b3015.4: SN 395 MVA / SE 419 MVA).**

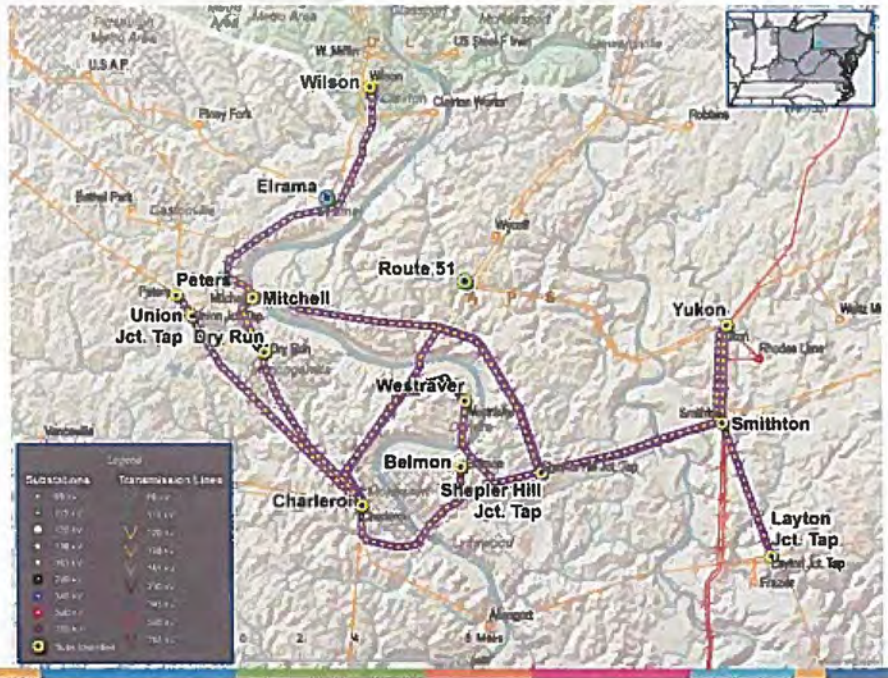


Duquesne Transmission Zone

Recommended Solution (continued):

- Reconductor the Elrama - Mitchell 138 kV line with 2x795 ACSS **(b3015.5** and **b3015.6: SN 498 MVA / SE 590 MVA).**
- Reconductor the Wilson - West Mifflin 138 kV line with 795 ACSS **(b3015.7: SN 395 MVA / SE 419 MVA).**

Estimated Project Cost: $35.5M
Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021

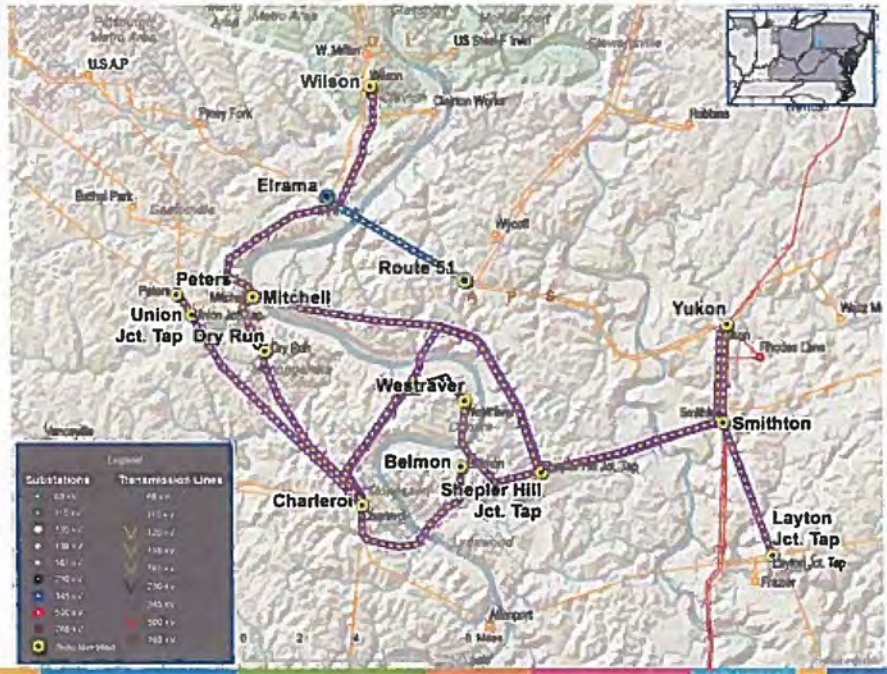


APS and Duquesne Transmission Zones

Recommended Solution:

- Construct two new 138 kV tie lines with 2x 954 ACSR between Route 51 and Elrama. **(b3012.1 and b3012.2: SN 1002 MVA / SE 1154 MVA).**

Estimated Project Cost: $9.2M
Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021



Revision History

- V1 – 6/1/2018 – Original Slides Posted.
- V2 – 6/5/2018 – Added the ratings for new baseline projects.
- V3 – 6/6/2018 – Added conductor types and contingencies, and fixed the cost and descriptions.
- V4 – 6/15/2018 – Fixed the projected IS date for b2951.1 and b2951.2
- V5 – 6/18/2018 – Fixed baseline upgrade ID numbers on Slide 15

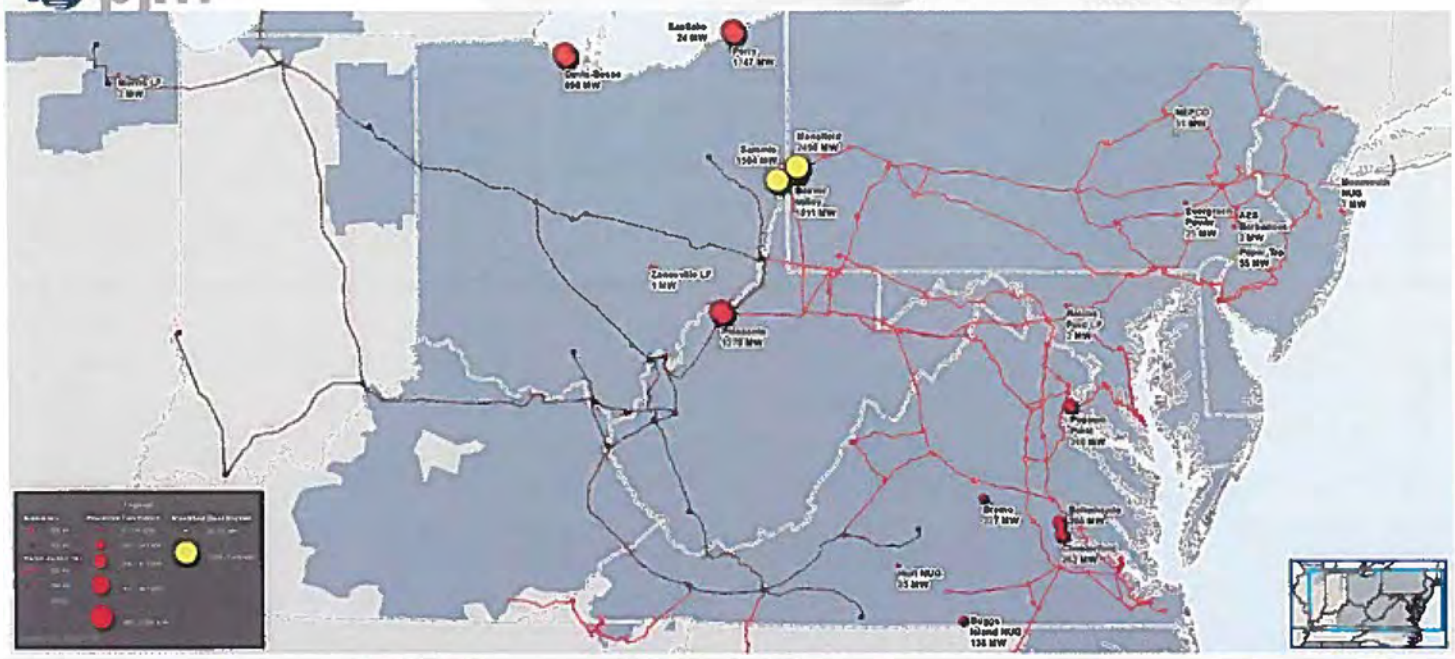
DR
ATTACHMENT 2

Generation Deactivation Notification Update

Transmission Expansion Advisory Committee

November 8, 2018

Generation Deactivations for 2018

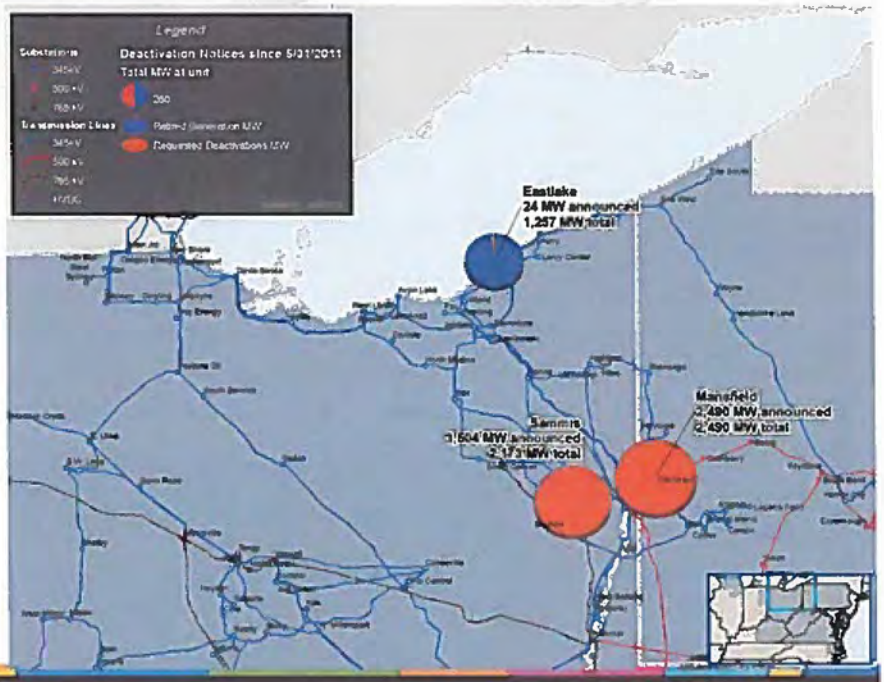


Generation Deactivation

ATSI Transmission Zones

- Bruce Mansfield 1, 2, and 3 (6/01/2021 – 2490 MW)
- Eastlake 6 (6/01/2021 – 24 MW)
- Sammis Diesel (6/01/2021 – 13 MW)
- Sammis 5, 6, 7 (06/01/2022 – 1491 MW)

- Previously announced Sammis 1, 2, 3, and 4 (06/01/2022 – 669 MW)



Deactivation Status

Unit(s)	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Kimberly Clark (9.4 MW)	PECO	08/01/2019	Reliability analysis complete
Bruce Mansfield 1, 2 & 3 (2490 MW)	ATSI	6/01/2021	Reliability analysis complete. New and existing baselines resolve identified impacts. Units can retire as scheduled.
Eastlake 6 (24 MW)	ATSI	6/01/2021	
Sammis Diesel (13 MW)	ATSI	6/01/2021	
Sammis 5, 6 & 7 (1491 MW)	ATSI	6/01/2022	

APS/ DLCO Transmission Zone

Problem Statement: Generation Deliverability
Mitchell - Elrama 138 kV and Route 51 – Charleroi 138 kV #1 and #2 lines are overloaded for multiple contingencies:

- Tower contingency for loss of Wycoff tap 138 kV bus and Elrama – Bethel Park 138 kV line.
- Tower contingency for Wycoff tap and Wycoff 138 kV buses and Route 51 – Elrama 138 kV #2 line.

Recommended Solution:
- Modify the scope of baseline **b3012** – Build two tie lines by using two separate structures.

Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021

Original Estimated Project Cost: $9.2M

Original Required IS Date: 06/01/2021
Original TEAC Date: 06/07/2018

ATSI Transmission Zone

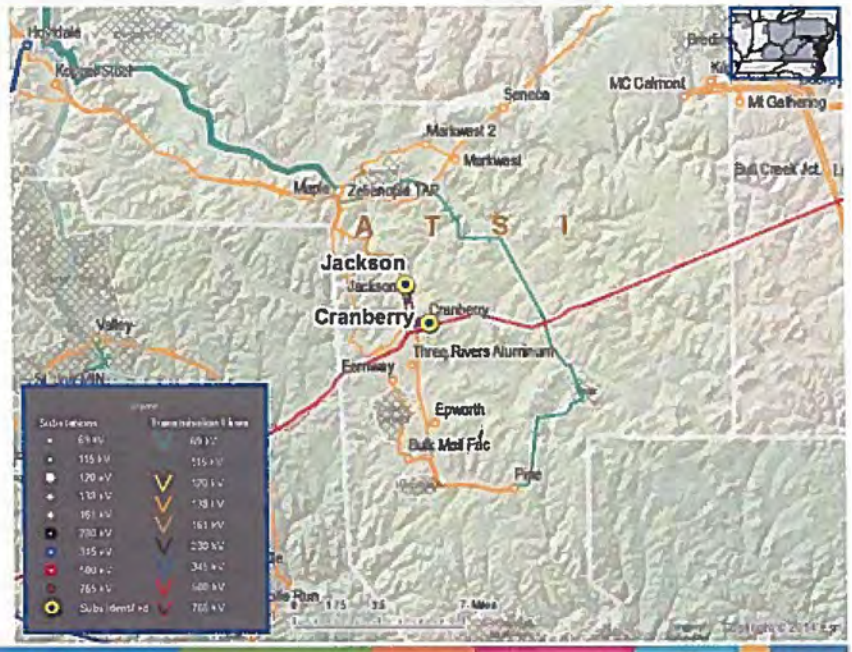
Problem Statement: Generation Deliverability
Jackson - Cranberry 138 kV line is overloaded for multiple contingencies:

- Single contingency for loss of Wylie Ridge - Toronto 345 kV line.
- Breaker failure contingency for loss of Wylie Ridge – Cranberry 500kV line and Wylie Ridge 500/345 kV transformer #7 and #8.

Recommended Solution:
- Reconductor line (~2.1 miles), replace bus conductor at Cranberry, and replace line switches at Jackson 138 kV bus (b3066).
- Current rating: SN 278 MVA / SE 339 MVA
- New rating: SN 435 MVA / SE 500 MVA

Estimated Project Cost: $3.44M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



ATSI Transmission Zone

Problem Statement: Generation Deliverability
Jackson – Maple 138 kV line is overloaded for multiple contingencies:

- Single contingency for loss of Wylie Ridge - Toronto 345 kV line.
- Breaker failure contingency for loss of Wylie Ridge – Cranberry 500kV line and Wylie Ridge 500/345 kV transformer #7 and #8.

Recommended Solution:
- Reconductor line (~4.7 miles), replace line switches at Jackson, and replace the line traps and relays at Maple 138 kV bus (b3067).
- Current rating: SN 256 MVA /SE 316 MVA
- New rating: SN 435 MVA/SE 500 MVA

Estimated Project Cost: $7.86M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022

ATSI Transmission Zone

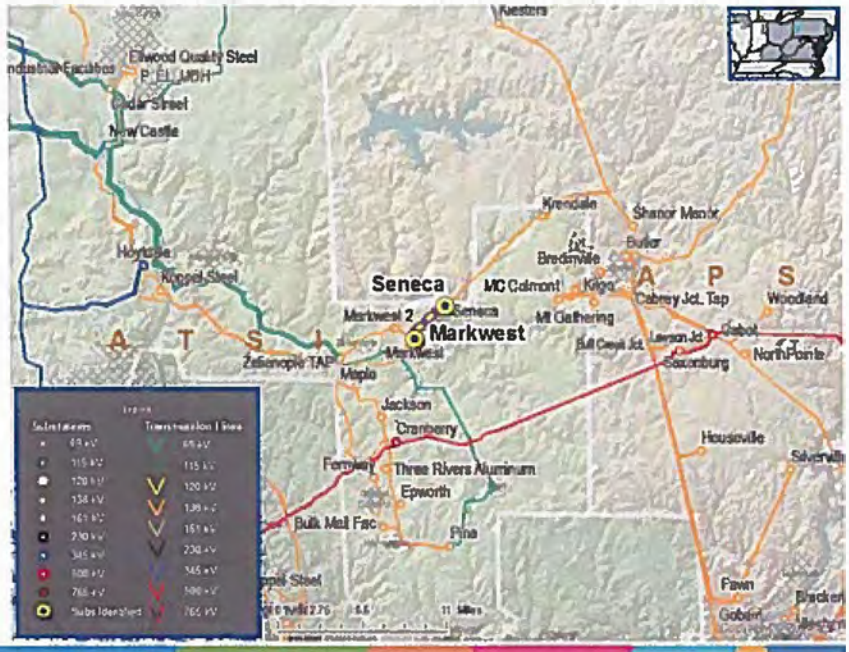
Problem Statement: Generation Deliverability
Seneca - Markwest 138 kV line is overloaded for multiple contingencies:

- Breaker failure contingency for loss of Cranberry - Cabot 500kV line and Cranberry 500/138 kV transformer.
- Breaker failure contingency for loss of Cranberry - Cabot 500kV line and Cranberry #2 500/138 kV transformer.

Recommended Solution:
- Replace bus conductor at Seneca 138 kV bus (b3080)
- Current rating: SN 294 MVA / SE 350 MVA
- New rating: SN 312 MVA / SE 380 MVA

Estimated Project Cost: $0.07M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



ATSI / APS Transmission Zone

Problem Statement: Generation Deliverability
Seneca - Krendale 138 kV line is overloaded for multiple contingencies:

- Breaker failure contingency for loss of Cranberry - Cabot 500kV line and Cranberry 500/138 kV transformer.

- Breaker failure contingency for loss of Cranberry - Cabot 500kV line and Cranberry #2 500/138 kV transformer.

Recommended Solution:
- Replace breaker and bus conductor at Krendale 138 kV bus (b3081).

- Current rating: SN 267 MVA / SE 352 MVA
- New rating: SN 312 MVA / SE 380 MVA

Estimated Project Cost: $1M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022

APS Transmission Zone

Problem Statement: Generation Deliverability
Yukon – Westraver 138 kV line is overloaded for multiple contingencies:

- Tower contingency for loss of Yukon - Route 51 #1 and #2 138 kV lines.

- Breaker failure contingency for loss of Yukon - Route 51 #2 and #3 138 kV line.

Recommended Solution:
- Reconductor line (~2.8 miles), replace the line drops and relays at Yukon, and replace switches at Westraver 138 kV bus (b3068).

- Current rating: SN 308 MVA / SE 376 MVA
- New rating: SN 491 MVA / SE 556 MVA

Estimated Project Cost: $2.5M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022

APS Transmission Zone

Problem Statement: Generation Deliverability
Westraver – Route 51 138 kV line is overloaded for multiple contingencies:

- Tower contingency for loss of Yukon - Route 51 #1 and #2 138 kV lines.
- Breaker failure contingency for loss of Yukon - Route 51 #2 and #3 138 kV line.

Recommended Solution:
- Reconductor line (~5.63 miles), replace line switches at Westraver 138 kV bus (b3069).
- Current rating: SN 308 MVA / SE 376 MVA
- New rating: SN 491 MVA / SE 556 MVA

Estimated Project Cost: $7.5M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022

APS Transmission Zone

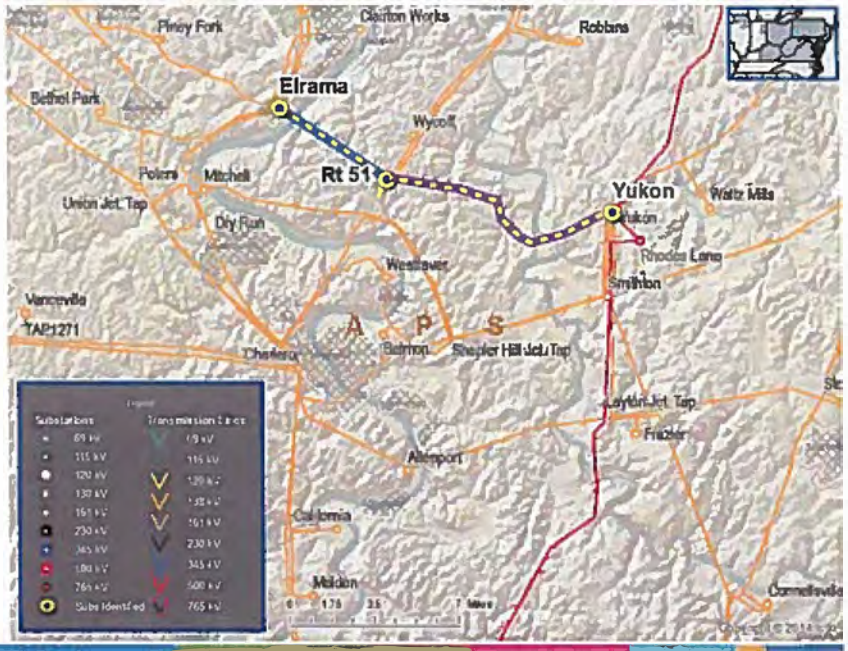
Problem Statement: Generation Deliverability
Yukon – Route 51 #1 138 kV line is overloaded for multiple contingencies:

- Breaker failure contingency for loss of Yukon - Route 51 #2 and #3 138 kV line.
- Tower contingency for loss of Route 51 - Yukon #3 138 kV line and Westraver 138 kV bus.

Recommended Solution:
- Reconductor line (~8 miles), replace line drops, relays, and line disconnect switch at Yukon 138 kV bus (b3070).
- Current rating: SN 297 MVA / SE 365 MVA
- New rating: SN 491 MVA / SE 566 MVA

Estimated Project Cost: $10M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



APS Transmission Zone

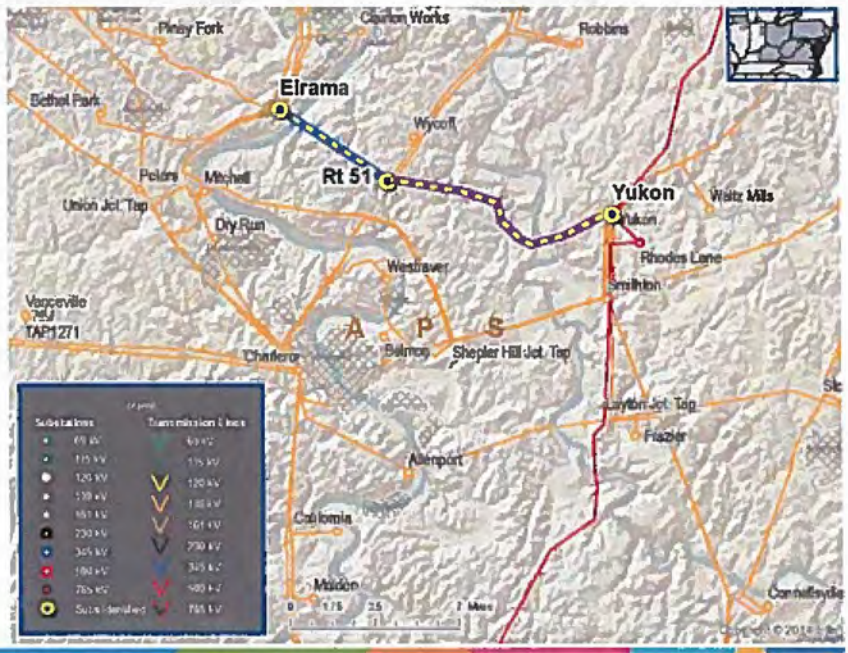
Problem Statement: Generation Deliverability
Yukon – Route 51 #2 138 kV line is overloaded for multiple contingencies:

- Tower contingency for loss of Route 51 - Yukon #3 138 kV line and Westraver 138 kV bus.
- Single contingency for loss of Keystone - Cabot 500 kV line.
- Breaker failure contingency for loss of Keystone - Cabot 500kV, Keystone #4 500/230 kV transformer, and capacitor bank at Keystone 500 kV bus.

Recommended Solution:
- Reconductor line (~8 miles) and replace relays at Yukon 138 kV bus (b3071).
- Current rating: SN 297 MVA / SE 365 MVA
- New rating: SN 491 MVA / SE 566 MVA

Estimated Project Cost: $10M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



APS Transmission Zone

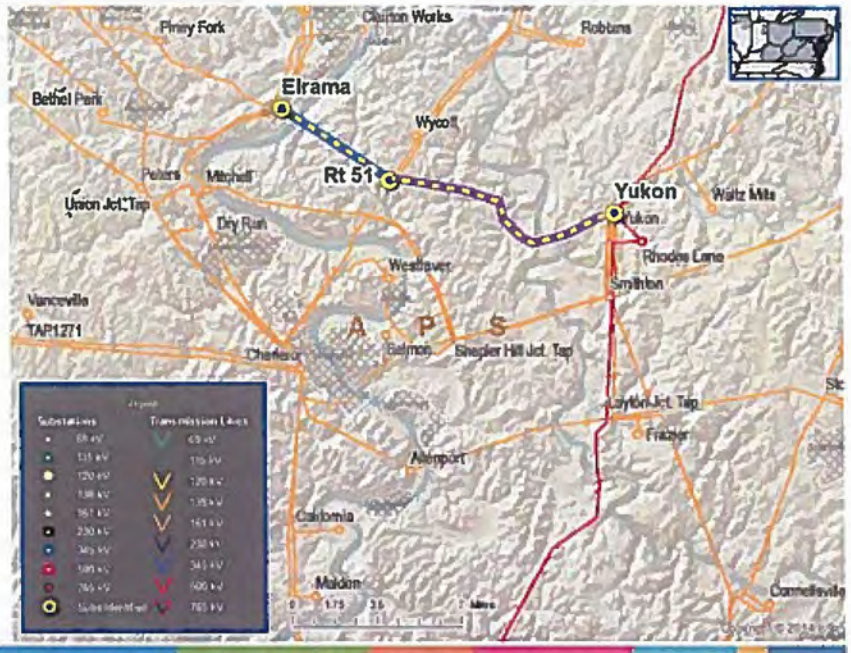
Problem Statement: Generation Deliverability
Yukon – Route 51 #3 138 kV line is overloaded for tower contingency for loss of Yukon - Route 51 #1 and #2 138 kV lines.

Recommended Solution:
- Reconductor line (~8 miles) and replace relays at Yukon 138 kV bus (b3072).

- Current rating: SN 308 MVA / SE 376 MVA
- New rating: SN 491 MVA / SE 566 MVA

Estimated Project Cost: $10M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



APS Transmission Zone

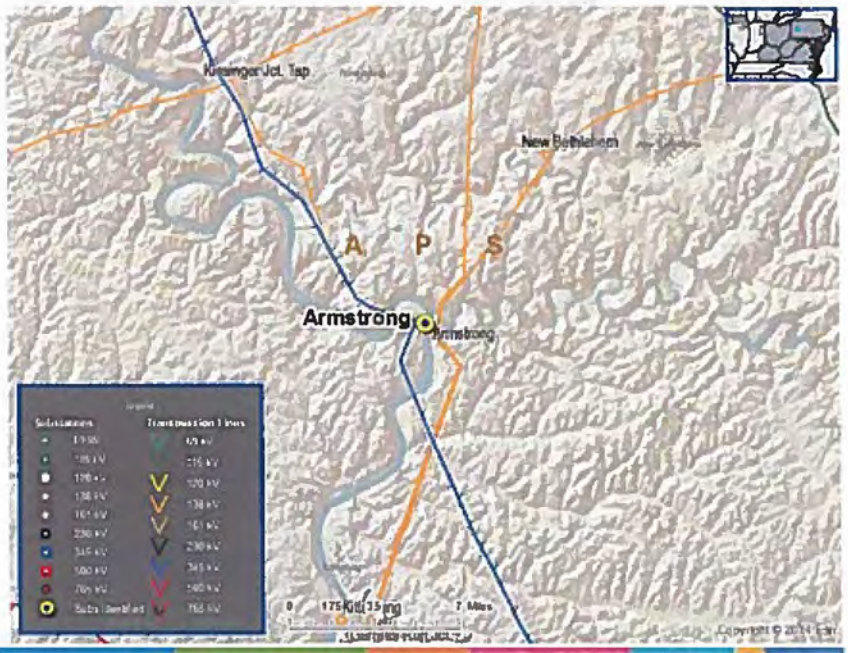
Problem Statement: Generation Deliverability
Armstrong #3 345/138 kV transformer is overloaded for single contingency loss of Handsome Lake – Wayne 345 kV line.

Recommended Solution:
- Replace bus conductor at 138 kV side of Armstrong substation (b3074).

- Current rating: SN 552 MVA / SE 659 MVA
- New rating: SN 627 MVA / SE 710 MVA

Estimated Project Cost: $0.5M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



APS Transmission Zone

Problem Statement: Generation Deliverability
Cabot 500/138 kV transformer is overloaded for breaker failure contingency for loss of Cabot - Cranberry 500kV line and Cabot #2 and #4 500/138 kV

Recommended Solution:
- Replace transformer breaker and bus conductor at 138 kV side of Cabot substation (b3075).

- Current rating: SN 390 MVA / SE 525 MVA
- New rating: SN 481 MVA / SE 609 MVA

Estimated Project Cost: $0.5M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022

APS Transmission Zone

Problem Statement: Generation Deliverability
Edgewater - Loyalhanna 138 kV line is overloaded for single contingency loss of South Bend – Yukon 500 kV line

Recommended Solution:
- Reconductor the Edgewater – Loyalhanna 138 kV line (~0.67 miles) (b3076).

- Current rating: SN 160 MVA /SE 192 MVA
- New rating: SN 256 MVA / SE 294 MVA

Estimated Project Cost: $2M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022

APS Transmission Zone

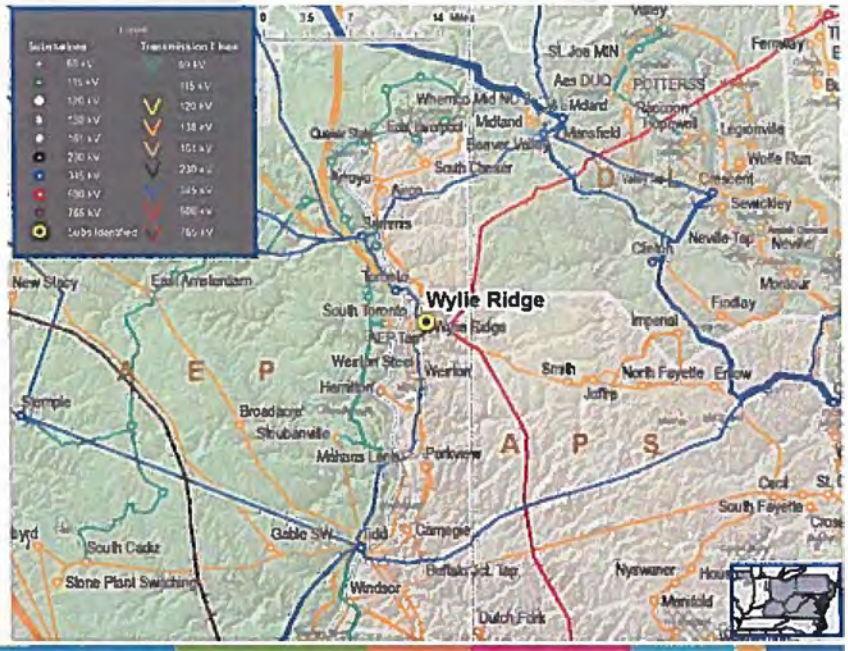
Problem Statement: Generation Deliverability
Wylie Ridge #7 500/345 kV transformer is overloaded for breaker failure contingency for loss of Wylie Ridge – AA2-121 Tap 345 kV, and Wylie Ridge #7 & #8 transformers.

Recommended Solution:
- Replace Wylie Ridge #7 500/345 kV transformer (b3079).

- Current rating: SN 866 MVA / SE 883 MVA
- New rating: SN 1157 MVA / SE 1444 MVA

Estimated Project Cost: $6.37M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



APS Transmission Zone

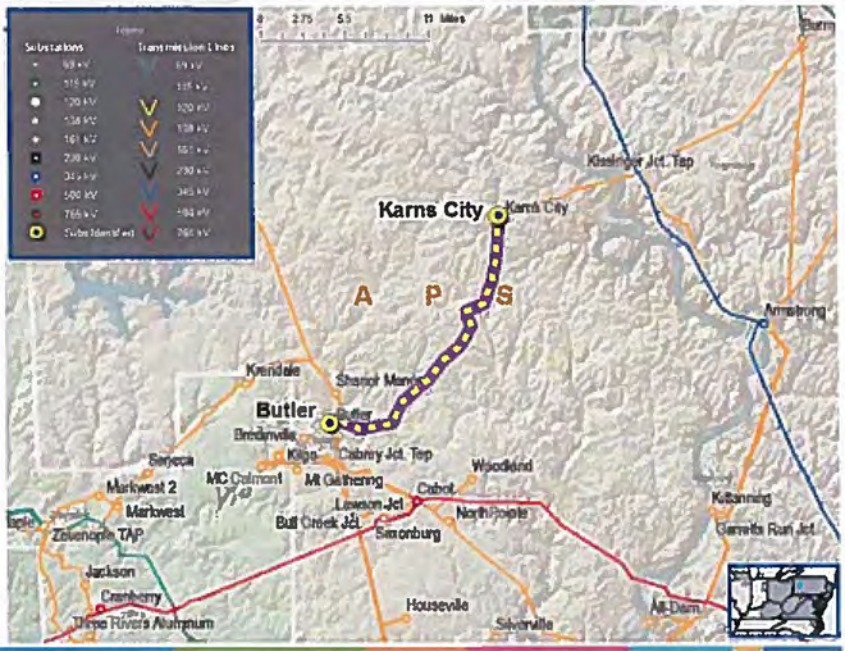
Problem Statement: Generation Deliverability
Karns City – Butler 138 kV line is overloaded for single contingency loss of Erie West – Wayne 345 kV line.

Recommended Solution:
- Replace bus conductor at Butler 138 kV bus, and replace bus conductor and line trap at Karns City 138 kV bus (b3083).

- Current rating: SN 160 MVA / SE 192 MVA
- New rating: SN 256 MVA / SE 294 MVA

Estimated Project Cost: $2M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



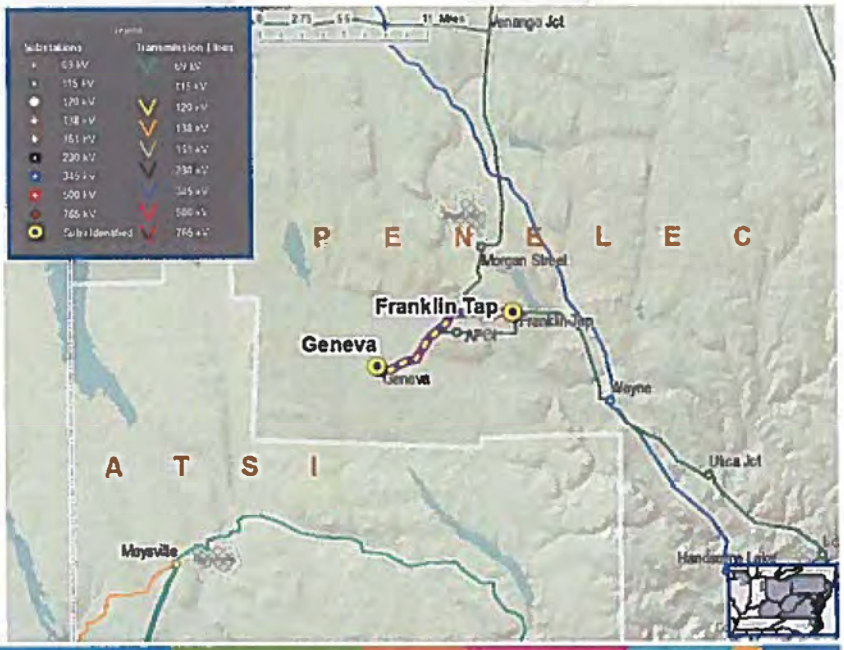
PENELEC Transmission Zone

Problem Statement: Generation Deliverability
Geneva - Franklin Pike 115 kV line is overloaded for single contingency loss of Erie West – Wayne 345 kV line.

Recommended Solution:
- Construct 4-breaker ring bus at Franklin Tap 115 kV to loop in Morgan Street - Geneva 115 kV, Wayne – Geneva 115 kV (b3082).

Estimated Project Cost: $7M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



PENELEC Transmission Zone

Problem Statement: Generation Deliverability

Franklin Tap - Wayne 115 kV is overloaded for single contingency loss of Erie West – Wayne 345 kV line.

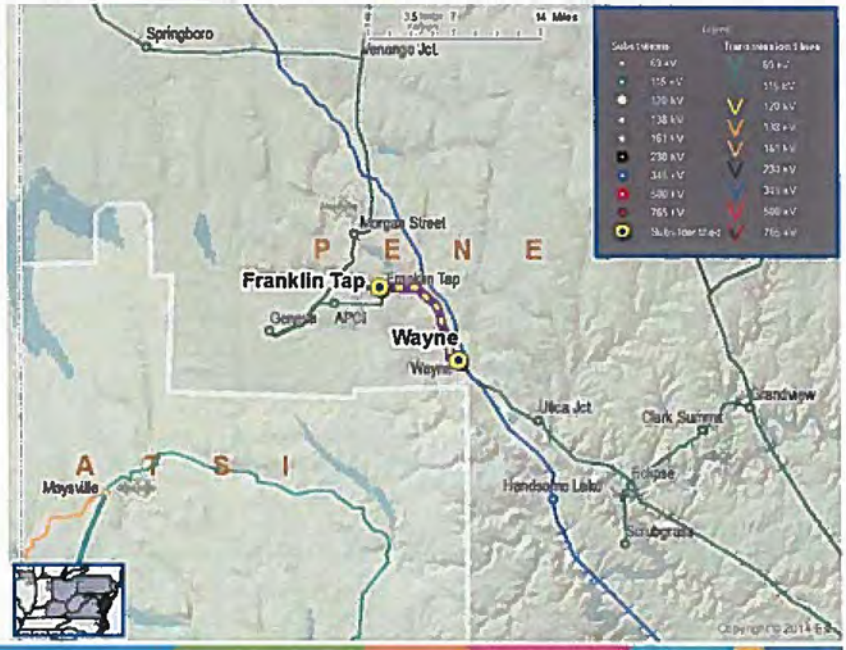
Recommended Solution:

- Reconductor Franklin Tap - Wayne 115 kV line (~6.78 miles) (b3077).

- Current rating: SN 232 MVA / SE 282 MVA
- New rating: SN 373 MVA / SE 430 MVA.

Estimated Project Cost: $15M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



PENELEC Transmission Zone

Problem Statement: Generation Deliverability

Morgan Street - Venango Jct. 115 kV is overloaded for single contingency loss of Erie West – Wayne 345 kV line.

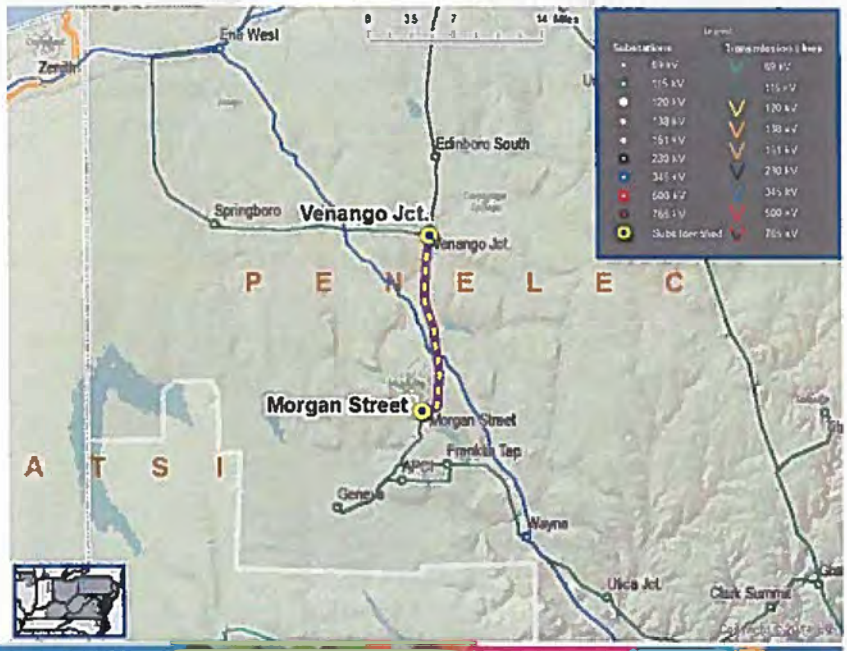
Recommended Solution:

- Replace the line trap, relays, and bus conductor at Morgan Street 115 kV bus. Also replace bus conductor at Venango Jct. 115 kV bus (b3078).

- Current rating: SN 149 MVA / SE 149 MVA
- New rating: SN 232 MVA / SE 282 MVA

Estimated Project Cost: $1M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



PENELEC Transmission Zone

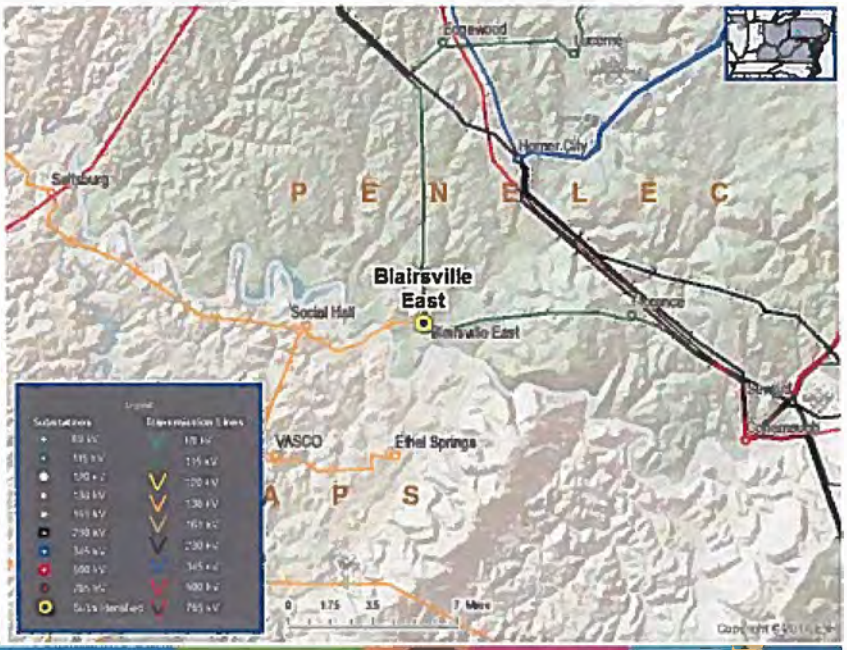
Problem Statement: Generation Deliverability
Blairsville East 138/115 kV transformer is overloaded for single contingency loss of Keystone – Cabot 500 kV line

Recommended Solution:
- Replace 138/115 kV transformer and associated equipment such as breaker disconnects and bus conductor (b3073).

- Current rating: SN 291 MVA / SE 364 MVA
- New rating: SN 406 MVA / SE 456 MVA

Estimated Project Cost: $5M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022



DLCO Transmission Zone

Problem Statement: Generation Deliverability
West Mifflin - Dravosburg 138 kV line is overloaded for multiple contingencies

- Breaker failure contingency for loss of Wilson - West Mifflin #2 138 kV line and Wilson - Dravosburg 138 kV line.
- Bus contingency for loss of Dravosburg - Bettis 138 kV line, Dravosburg - West Mifflin 138 kV line, and Dravosburg - Wilson 138 kV line.
- Single contingency for loss of Dravosburg - Wilson 138 kV line.

Recommended Solution:
- Reconductor West Mifflin – Dravosburg 138 kV and Dravosburg - Elrama 138 kV lines (~3 miles). (b3061)
- Add West Mifflin 138 kV tie breakers. (b3062)

- Current rating: SN 382 MVA / SE 382 MVA
- New rating: SN 439 MVA / SE 490 MVA

Estimated Project Cost: $5.7M –b3061, $4M –b3062

Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021

DLCO Transmission Zone

Problem Statement: Generation Deliverability

West Mifflin - Wilson 138 kV line is overloaded for multiple contingencies:

- Breaker failure contingency for loss of Wilson - West Mifflin #2 138 kV line and Wilson - Dravosburg 138 kV line.
- Bus contingency for loss of Dravosburg - Bettis 138 kV line, Dravosburg - West Mifflin 138 kV line, and Dravosburg - Wilson 138 kV line.
- Single contingency for loss of Dravosburg - Wilson 138 kV line.

DLCO Transmission Zone

Problem Statement: Generation Deliverability (continued from previous slide)

Elrama - Wilson 138 kV line is overloaded for tower contingency for loss of Elrama – Wilson 138 kV line and Elrama – Dravosburg 138 kV line.

Recommended Solution:

- Expand Elrama 138 kV substation to loop in US Steel Clairton - Piney Fork 138 kV. (b3064)
- Add Wilson tie breaker (b3065)

Estimated Project Cost: $8.75M – b3064, $4M – b3065

Required IS Date: 06/01/2021

Projected IS Date: 06/01/2021

DLCO Transmission Zone

Problem Statement: Generation Deliverability
Wilson - Dravosburg 138 kV line is overloaded for multiple contingencies:

- Tower contingency for loss of West Mifflin - Wilson 138 kV line and Dravosburg - Elrama 138 kV line.
- Bus contingency for loss of Dravosburg - USS Illinois 138 kV line, Dravosburg - Carson 138 kV line, Dravosburg - West Mifflin 138 kV line , Dravosburg - Wilmerding 138 kV line, Dravosburg - US Steel Clairton, and Dravosburg - Elrama 138 kV line.
- Single contingency loss of Wilson - West Mifflin 138 kV line.

Recommended Solution:
- Reconductor Wilson - Dravosburg 138 kV line (~5 miles) (b3063).
- Current rating: SN 439 MVA / SE 497 MVA
- New rating: SN 790 MVA / SE 838 MVA

Estimated Project Cost: $ 4.8M

Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021

DLCO Transmission Zone

Problem Statement: N-1-1 thermal
Oakland – Panther Hollow 138 kV line is overloaded for following scenarios:

- Single contingency loss of Cheswick #1 unit followed by single contingency loss of Arsenal 345/138 kV transformer.
- Single contingency loss of Arsenal 345/138 kV transformer followed by single contingency loss of Cheswick #1 unit.

Recommended Solution:
- Reconductor Oakland - Panther Hollow 138 kV line (~1 mile) (b3084).
- Current rating: SN 185 MVA / SE 247 MVA
- New rating: SN 217 MVA / SE 306 MVA

Estimated Project Cost: $ 2.75M

Required IS Date: 06/01/2021
Projected IS Date: 06/01/2021

AEP Transmission Zone

Problem Statement: Generation Deliverability

Kammer - George Washington 138 kV line is overloaded for tower contingency for loss of Beverly - Hollow 345 kV line and Kammer - Lamping 345 kV line.

Recommended Solution:

- Conductor Kammer – George Washington 138 kV line (~0.08 mile) and replace wavetrap at Kammer 138 kV bus (b3085).
- Current rating: SN 296 MVA / SE 398 MVA
- New rating: SN 389 MVA / SE 550 MVA

Estimated Project Cost: $0.5M

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022

Revision History

- V2 – 11/06/2018 – Formatting corrections and minor description clarifications. ISD and ratings corrections.
- V1 – 11/05/2018 – Original Slides Posted.