Reliability Analysis Update

Aaron Berner, Manager

Transmission Expansion Advisory Committee

December 1, 2020

Update for Existing Projects

Baseline Reliability Projects

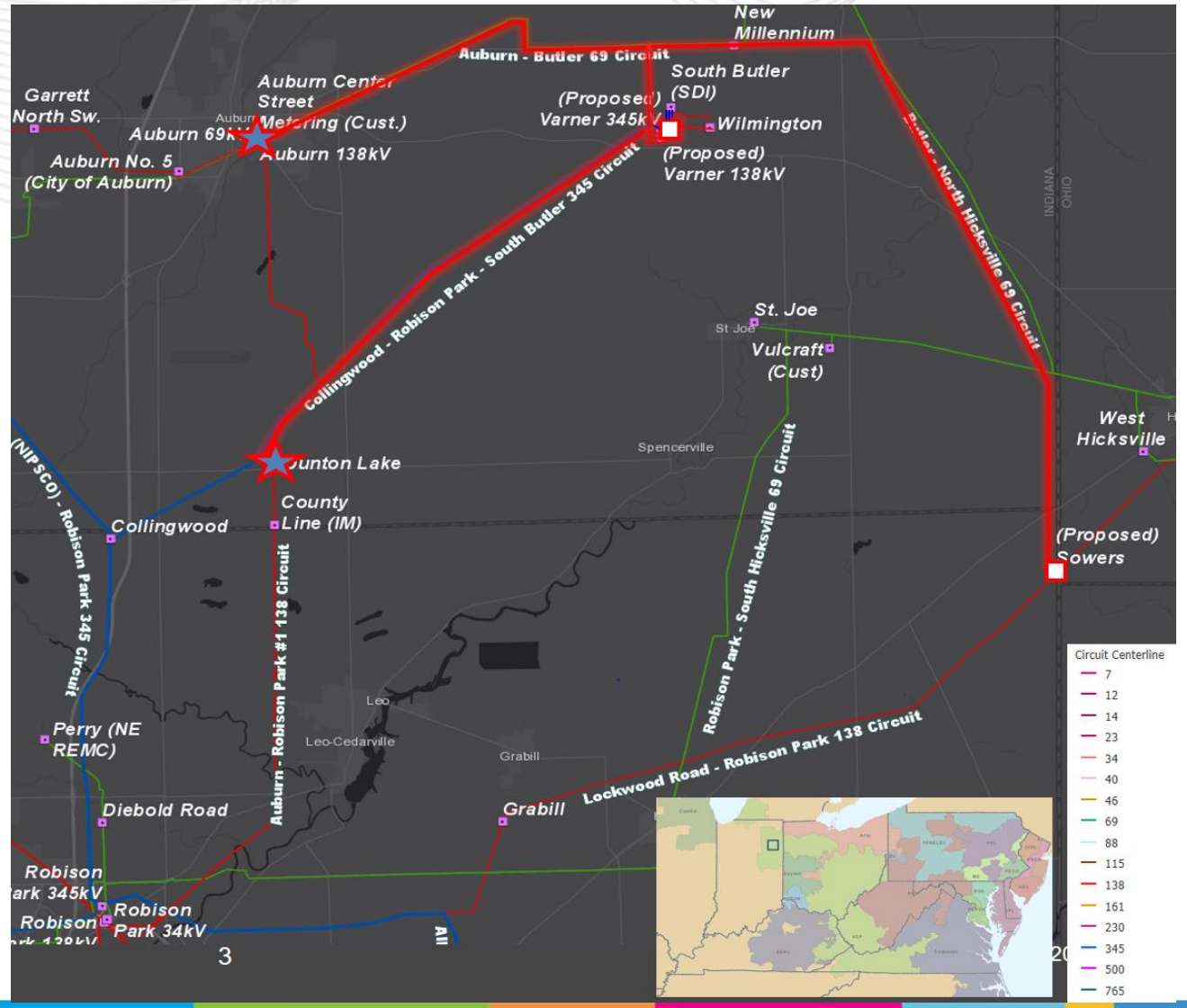
AEP Transmission Zone
B2779 Scope/Cost change

Scope/Cost change for B2779.1 -.5

Original Project Scope: (Previous presented on 1/12/2017 TEAC)

- Construct a new 138 kV station, Sowers (Originally named Campbell Road), tapping into the Grabill – South Hicksville138kV line (**B2779.1**)
- Reconstruct sections of the Butler-N.Hicksville and Auburn-Butler 69kV circuits as 138kV double circuit and extend 138kV from Sowers station (**B2779.2**)
- Construct a new 345/138kV SDI Varner (Originally named Willington) Station which will be sourced from Collingwood 345kV and serve the SDI load at 345kV and 138 kV respectively (**B2779.3**)
- 138kV circuits will be looped in-out of the new SDI Varner station resulting in a direct circuit to Auburn and Rob Park via Dunton Lake, and a circuit to Sowers; Reconductor 138kV line section between Dunton Lake – SDI Wilmington (**B2779.4**)
- Expand 138kV bus at Auburn (**B2779.5**)

Original Total Estimated Cost: $107.7M



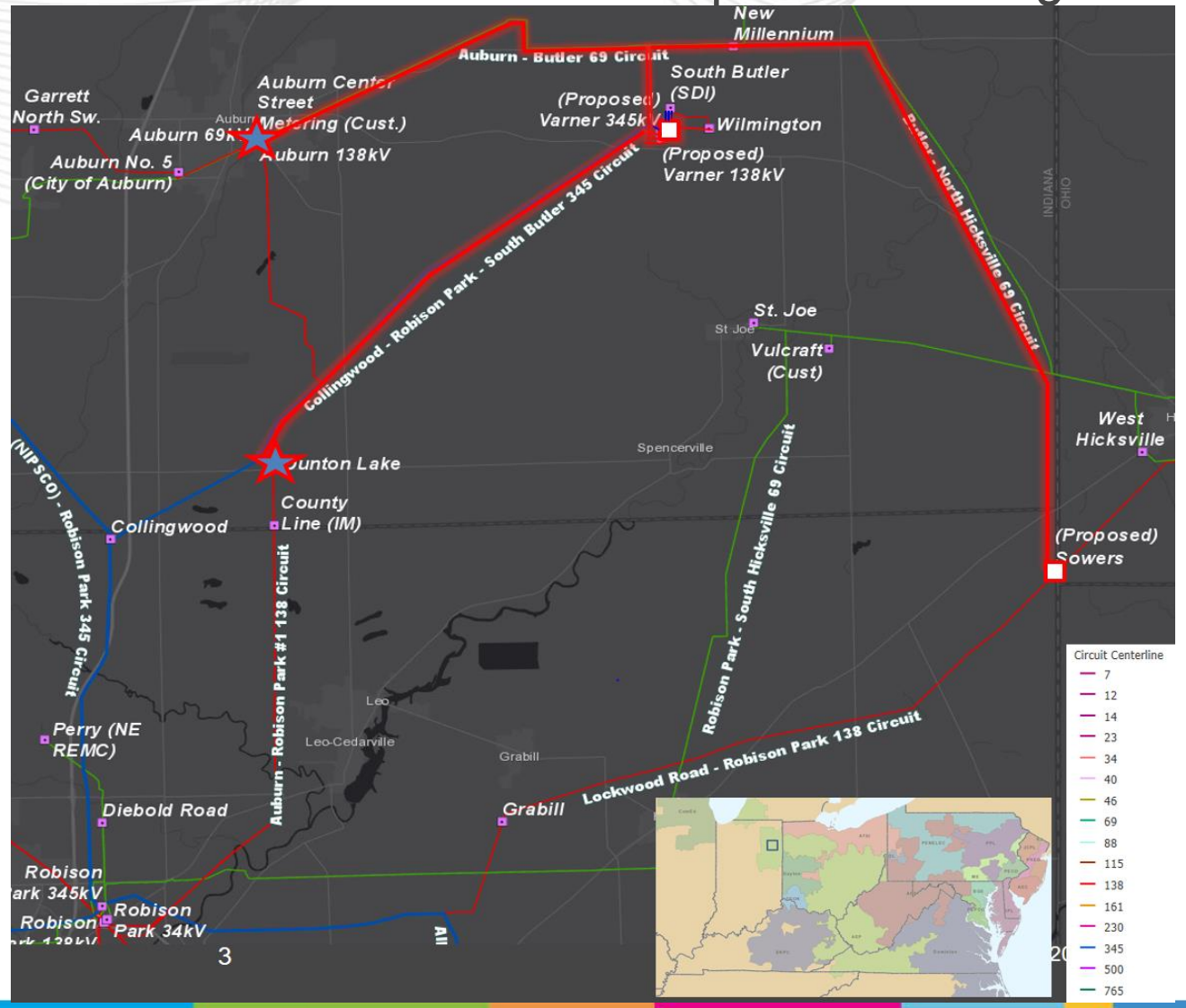
AEP Transmission Zone
B2779 Scope/Cost change

Major Cost Drivers:

- Varner & South Butler cost increase due to circuit breaker additions to ensure segregation of customer and AEP facilities in accordance with AEP connection requirements*: $6.7 M
- Flicker reduction for local customers requiring an expanded 345kV yard with reactors and capacitor banks: $20.3 M
- Collingwood cost increase due to security enhancements and space constraints: $14M
- Cost increase from functional to detail scope: $6.9M
- Wilmington Tap relocation work**: $2.4M
- Cost of (3) 345kV feeds from Varner to South Butler: $6M

Cost at Submittal: $107.7M
Updated Cost: : $164.2M

- *AEP's interconnection requirements require a circuit breaker at the customer end for lines longer than 2 spans. Additional 345kV CB's at South Butler station are required due to supplying three feeds to the load. This configuration also would have required AEP to purchase the through path at South Butler station.
- **To accommodate (3) 345kV lines from Varner to South Butler, the Wilmington Tap had to be rerouted and rebuilt.



Additional Considerations

- The proposed construction plan would require a prolonged outage of the Collingwood 345kV line, which is the only line that currently serves 300+ MW demand at SDI.
- SDI cannot afford to take a prolonged outage.
- The resolution would involve building of the 138 kV infrastructure before the 345 kV outages can be taken resulting in prolonged flicker exposure to local customers.
- Additionally, the future expansion at SDI would risk increased flicker levels to other customers.
- To arrest cost increases and avoid flicker exposure, AEP is recommending modifications to the project scope in consultation with SDI.

AEP Transmission Zone
B2779 Scope/Cost change

New Project Scope:

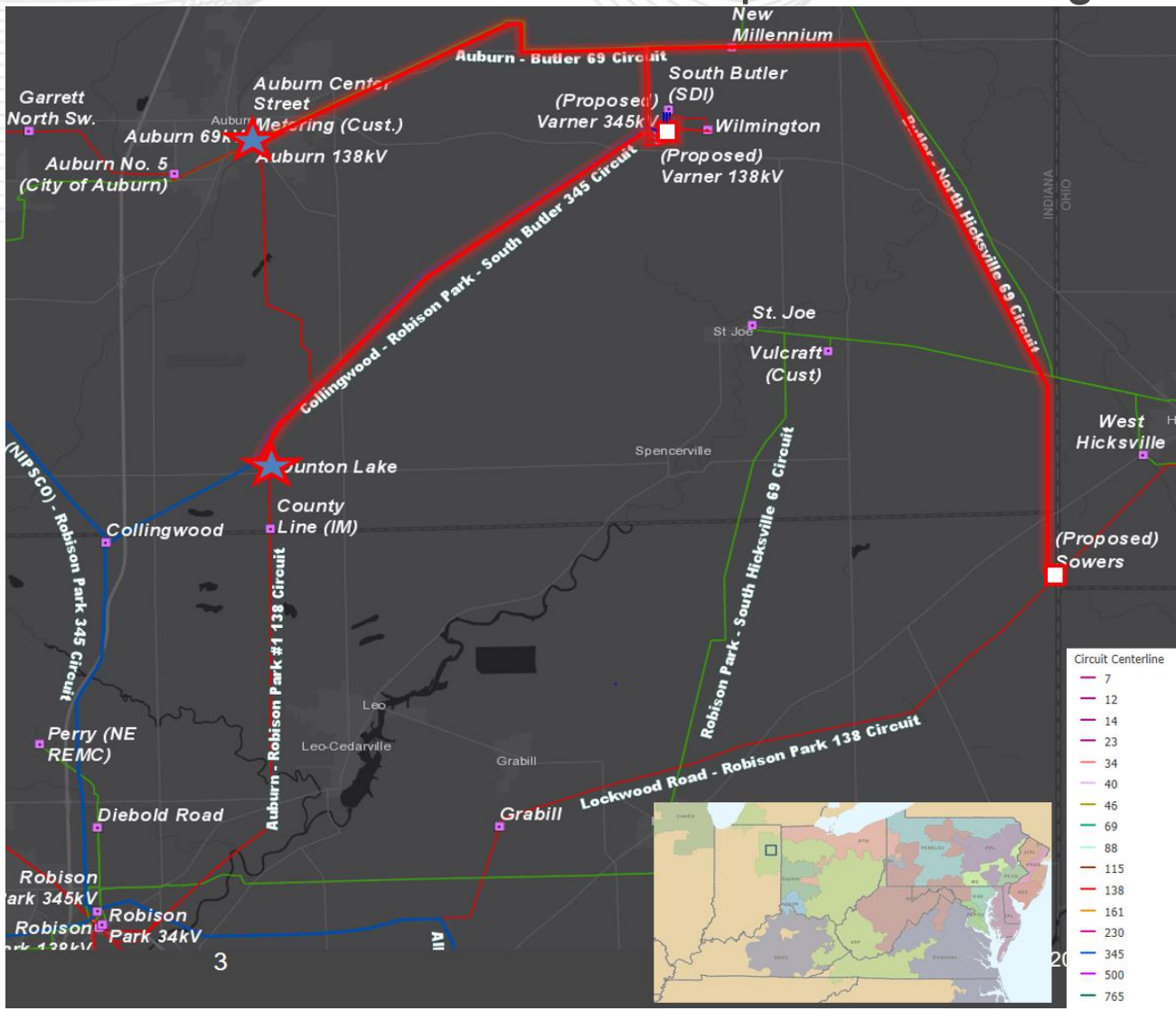
- Construction a new 138 kV station, Sowers, tapping into the Grabill – South Hicksville138kV line (**B2779.1**) **Estimated Cost: $10.1M**
- Reconstruct sections of the Butler-N.Hicksville (9.6miles) and Auburn-Butler (9 miles) 69kV circuits as 138kV double circuit and extend 138kV from Sowers station (3.5miles); (**B2779.2**) **Estimated Cost: $45.1M**
- Construct a new 345/138kV SDI Varner Station which will ~~be sourced from Collingwood 345kV and~~ serve a portion of the SDI load from the ~~345kV and~~ 138 kV system; ~~respectively~~ Serve Wilmington Tap from new Varner 138 kV station. Add additional breakers at South Butler station to comply with AEP Interconnection Guidelines. (**B2779.3**) **Estimated Cost: $37.6M**
- 138kV circuits will be looped in-out of the new SDI Varner station resulting in a direct circuit to to Auburn ~~and Rob Park via Dunton Lake, and a circuit to~~ Sowers and Wilmington. String approximately 3 miles of the open side of circuit between Collingwood and Dunton Lake with new conductor thus establishing a second 345 kV feed (utilizing 9 miles of existing 138 kV feed constructed as 345 kV) (**B2779.4**) **Estimated Cost: $14.8M**
- Expand 138kV bus at Auburn (**B2779.5**) **Estimated Cost: $2.6M**
- Construct a 345kV ring bus at Dunton Lake to serve load at SDI at 345 kV via two circuits (**B2779.6**) **Estimated Cost: $23.4M**
- Retire Collingwood station (**B2779.7**) **Estimated Cost: $1.4M**

New Total Estimated Total Cost: $135M

Projected IS Date: 12/31/2021

Notes:

The new configuration splits the load at SDI to serve the furnaces via the 345 kV lines from Dunton Lake and the segregated load via the 138 kV lines from Auburn and Sowers. This configuration eliminates the prolonged outage concerns and also improves power quality by keeping the arc furnaces on the 345 kV. Additionally, the updated configuration allows for future maintenance on any feed to SDI. The total estimated cost is $29.2M less than the original solution.



First Review

Baseline Reliability Projects

APS Transmission Zone: Baseline

Process Stage: First Review

Criteria: APS N-1-1 Voltage Drop Criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP Winter

Problem Statement: In the 2020 RTEP 2025 Winter N-1-1 analysis the loss of the Milesburg - Moshannon 230 kV line followed by the loss of the Shingletown #82 230-4 kV transformer results in a voltage drop violation at the Shingeltown 230 kV bus of 12.5%.

Violations were posted as part of the 2020 Window 1: FG# APS-VD45, APS-VD46

Existing/Proposed Facility Ratings:

(SN/SE/WN/WE)	Dale Summit - Shingletown	Lewistown-Shingletown	Shawville-Shingletown
Before	489/554/558/612	520/621/619/710	489/554/558/612
After	617/754/699/894	546/666/619/790	546/666/618/790

Proposed Solution:
At Shingletown Substation (APS Zone) convert the 230 kV station to a six breaker ring bus. Re-use and re-install the existing capacitor. Install SCADA control. Install new wave traps on Shawville and Dale Summit line exits.

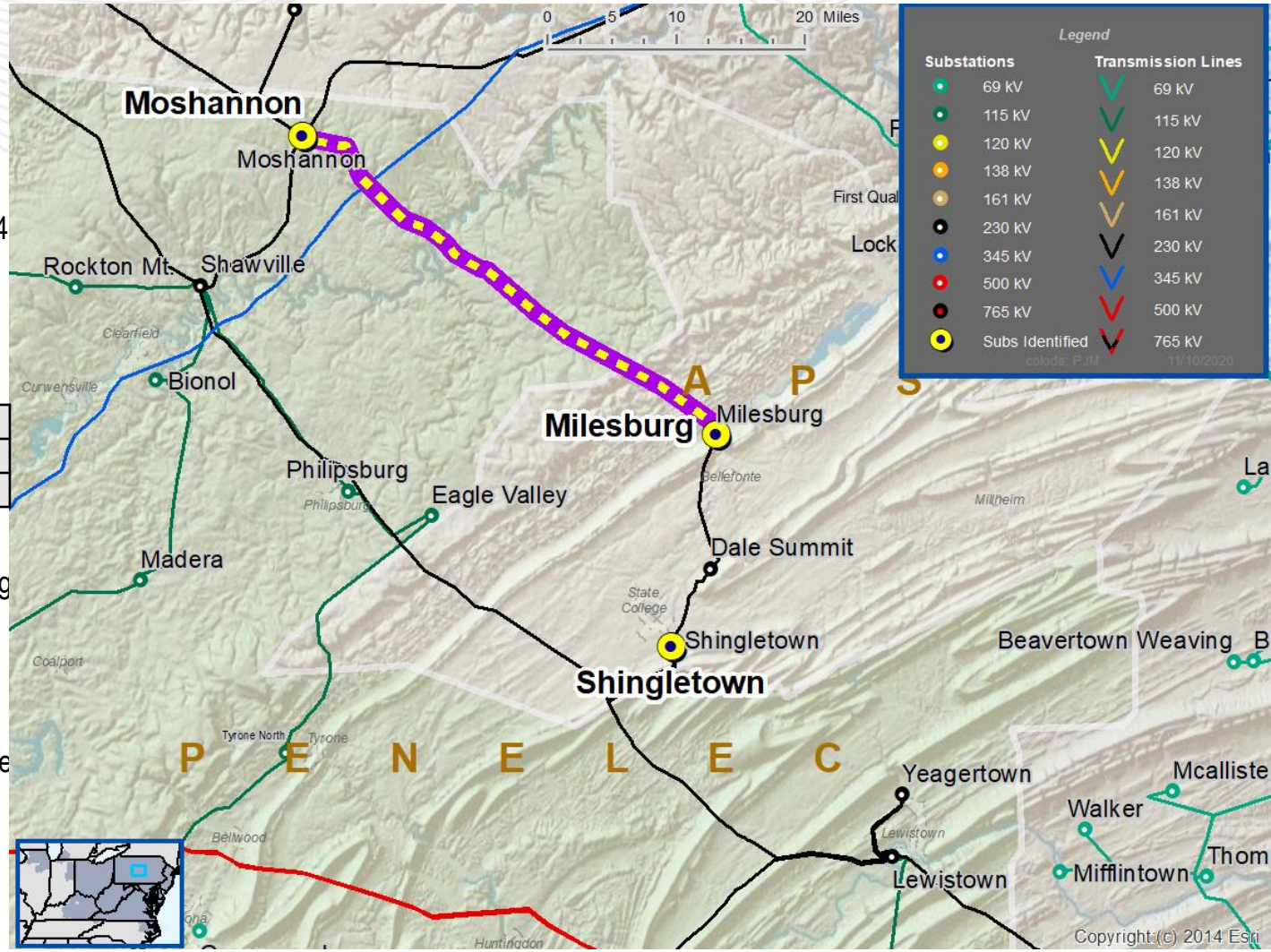
At Shawville Substation (PN Zone) replace the wave trap and substation conductor.

At Lewistown Substation (PN Zone) install direct transfer trip relaying to be compatible with the new Shingletown ring bus relaying.

Estimated Cost: $12.2 M

Alternatives: N/A

Required In-Service: 12/31/2025



SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

Dominion Transmission Zone: Baseline Brambleton – Evergreen Mills

Process Stage: First Review

Criteria: N-1, GenDeliv, N-1-1, Dominion FERC 715 Criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: None

Problem Statement:

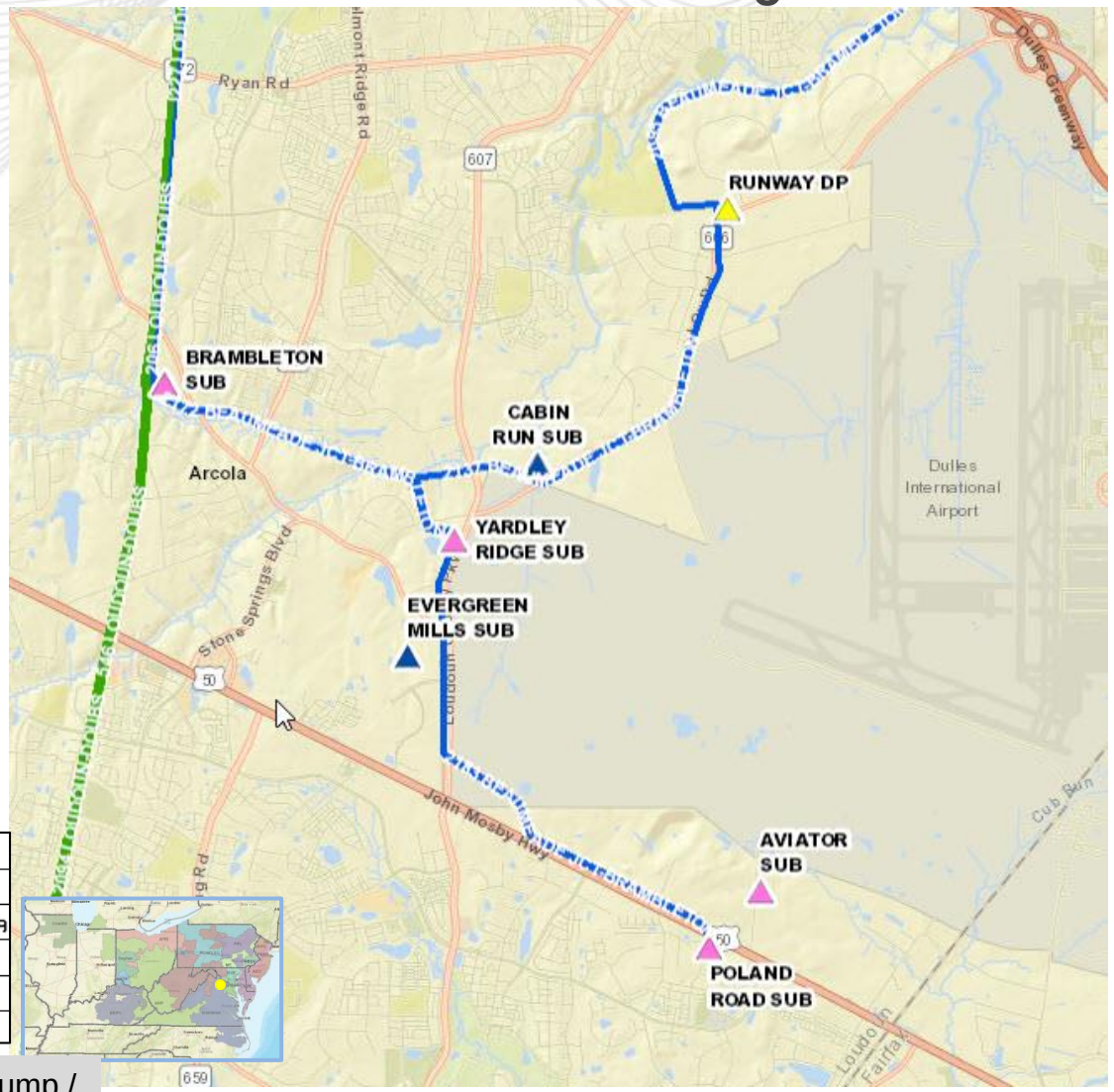
N1-ST33, GD-S12, N2-ST2, N2-ST4, N2-ST5, N2-ST6, N2-ST7, N2-ST9, N2-ST11, N2-WT2, N2-WT3, DOM-T2

230kV Line #2172 Brambleton – Evergreen Mills is overloaded under various contingency scenarios including N-1, GenDeliv, N-1-1 & Dominion FERC 715 Criteria

Existing Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6EVERGR MILL - 6BRAMBL - 1 230kV	1047/1047/1204/1160/1160/1334

Continued on next slide….



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

SN / SE / SLD/ WN / WE / WLD: Summer Normal / Summer Emergency / Summer Load Dump / Winter Normal / Winter Emergency / Winter Load Dump

Dominion Transmission Zone: Baseline Brambleton – Evergreen Mills

As part of the 2020 RTEP Window #1, the following projects were proposed to address violations on 230kV Line #2172:

Proposal ID	Proposing Entity	Upgrade Description	Upgrade Cost ($M)
479	Dominion	Line #2172 Reconductor - Brambleton to Evergreen Mills – Partial Reconductor (1.56 Miles) and upgrading the line leads at Brambleton	1.846
26	Dominion	Line #2172 Reconductor - Brambleton to Evergreen Mills – Full Reconductor (1.93 Miles) and upgrading the line leads at Brambleton	2.316
721	LS Power	Stonewater - Waxpool 230kV Transmission Project	29.25*

*Proposal 721 also addresses N-1-1 load drop violations N2-SLD8 and N2-WLD4

Proposed Solution:

Proposal #2020_W1-26: Rebuild approximately 1.93 miles of 230kV Line #2172 Brambleton to Evergreen Mills to achieve a summer rating of 1574 MVA by fully reconductoring the line and upgrading the line leads at Brambleton.

Proposed Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6EVERGR MILL - 6BRAMBL - 1 230kV	1574/1574/1801/1650/1650/1897

Continued on next slide….

SN / SE / SLD/ WN / WE / WLD: Summer Normal / Summer Emergency / Summer Load Dump / Winter Normal / Winter Emergency / Winter Load Dump

Dominion Transmission Zone: Baseline Brambleton – Evergreen Mills

Estimated Cost: $2.316 M

Required IS Date: 6/1/2025

Alternatives:

- Proposal #2020_1-479: Rebuild approximately 1.56 miles of 230kV Line #2172 Brambleton to Evergreen Mills to achieve a summer rating of 1225 MVA by partially reconductoring the line and upgrading the line leads at Brambleton. **Estimated Cost: $1.846 M**
- Proposal #2020_1-721: Build a new single-circuit 230kV overhead/underground transmission line between Stonewater and Waxpool substations. The proposed project will include substation upgrades at both Stonewater and Waxpool to accommodate the new transmission line. The proposed project will require new right-of-way. This project also solves summer and winter N-1-1 load drop violations N2-SLD8 and N2-WLD4 respectively. **Estimated Cost: $ 29.25 M**

Dominion Transmission Zone: Baseline Brambleton – Evergreen Mills

Process Stage: First Review

Criteria: N-1, GenDeliv, N-1-1, Dominion FERC 715 Criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: None

Problem Statement:

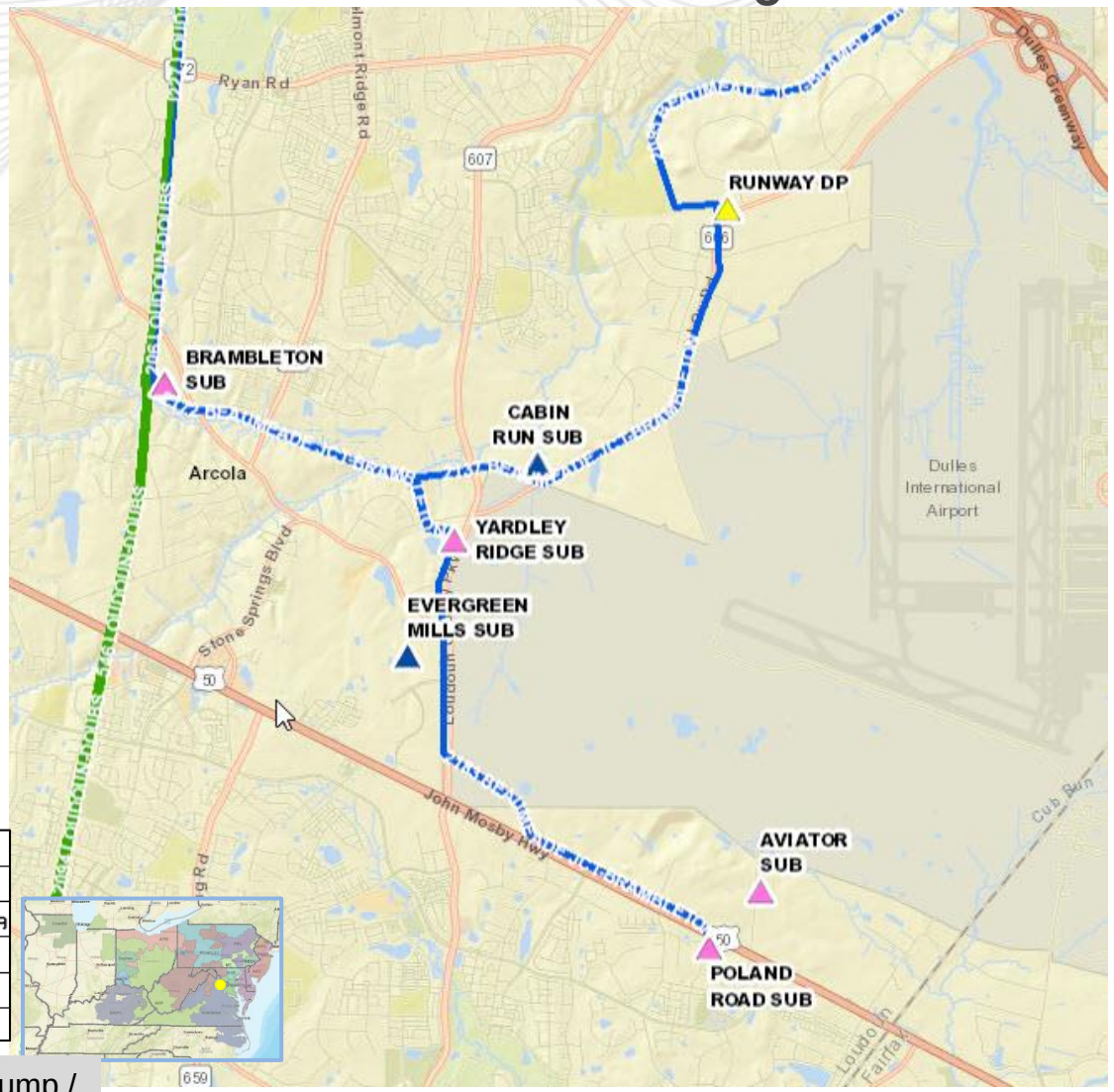
N1-ST32, GD-S11, N2-ST1, N2-ST3, N2-ST8, N2-ST10, N2-ST13, N2-ST14, N2-ST15, N2-WT1, N2-WT8, DOM-T1

230kV Line #2210 Brambleton – Evergreen Mills is overloaded under various contingency scenarios including N-1, GenDeliv, N-1-1 & Dominion FERC 715 Criteria

Existing Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6EVERGR MILL - 6BRAMBL - 2 230kV	1047/1047/1204/1160/1160/1334

Continued on next slide….



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

SN / SE / SLD/ WN / WE / WLD: Summer Normal / Summer Emergency / Summer Load Dump / Winter Normal / Winter Emergency / Winter Load Dump

Dominion Transmission Zone: Baseline Brambleton – Evergreen Mills

As part of the 2020 RTEP Window #1, the following projects were proposed to address violations on 230kV Line #2210:

Proposal ID	Proposing Entity	Upgrade Description	Upgrade Cost ($M)
740	Dominion	Line #2210 Reconductor - Brambleton to Evergreen Mills – Partial Reconductor (1.62 Miles) and upgrading the line leads at Brambleton	2.014
735	Dominion	Line #2210 Reconductor - Brambleton to Evergreen Mills – Full Reconductor (1.91 Miles) and upgrading the line leads at Brambleton	2.257
721	LS Power	Stonewater - Waxpool 230kV Transmission Project	29.25*

*Proposal 721 also addresses N-1-1 load drop violations N2-SLD8 and N2-WLD4

Proposed Solution:

Proposal #2020-W1-735: Rebuild approximately 1.91 miles of 230kV Line #2210 Brambleton to Evergreen Mills to achieve a summer rating of 1574 MVA by fully reconductoring the line and upgrading the line leads at Brambleton.

Proposed Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6EVERGR MILL - 6BRAMBL - 2 230kV	1574/1574/1801/1650/1650/1897

Continued on next slide….

SN / SE / SLD/ WN / WE / WLD: Summer Normal / Summer Emergency / Summer Load Dump / Winter Normal / Winter Emergency / Winter Load Dump

Dominion Transmission Zone: Baseline Brambleton – Evergreen Mills

Estimated Cost: $2.257 M

Required IS Date: 6/1/2025

Alternatives:

- Proposal #2020_1-740: Rebuild approximately 1.62 miles of 230kV Line #2210 Brambleton to Evergreen Mills to achieve a summer rating of 1225 MVA by partially reconductoring the line and upgrading the line leads at Brambleton. **Estimated Cost: $2.014 M**
- Proposal #2020_1-721: Build a new single-circuit 230kV overhead/underground transmission line between Stonewater and Waxpool substations. The proposed project will include substation upgrades at both Stonewater and Waxpool to accommodate the new transmission line. The proposed project will require new right-of-way. This project also solves summer and winter N-1-1 load drop violations N2-SLD8 and N2-WLD4 respectively. **Estimated Cost: $ 29.25 M**

Dominion Transmission Zone: Baseline Waxpool Area

Process Stage: First Review

Criteria: >300MW Load Loss

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: None

Problem Statement:

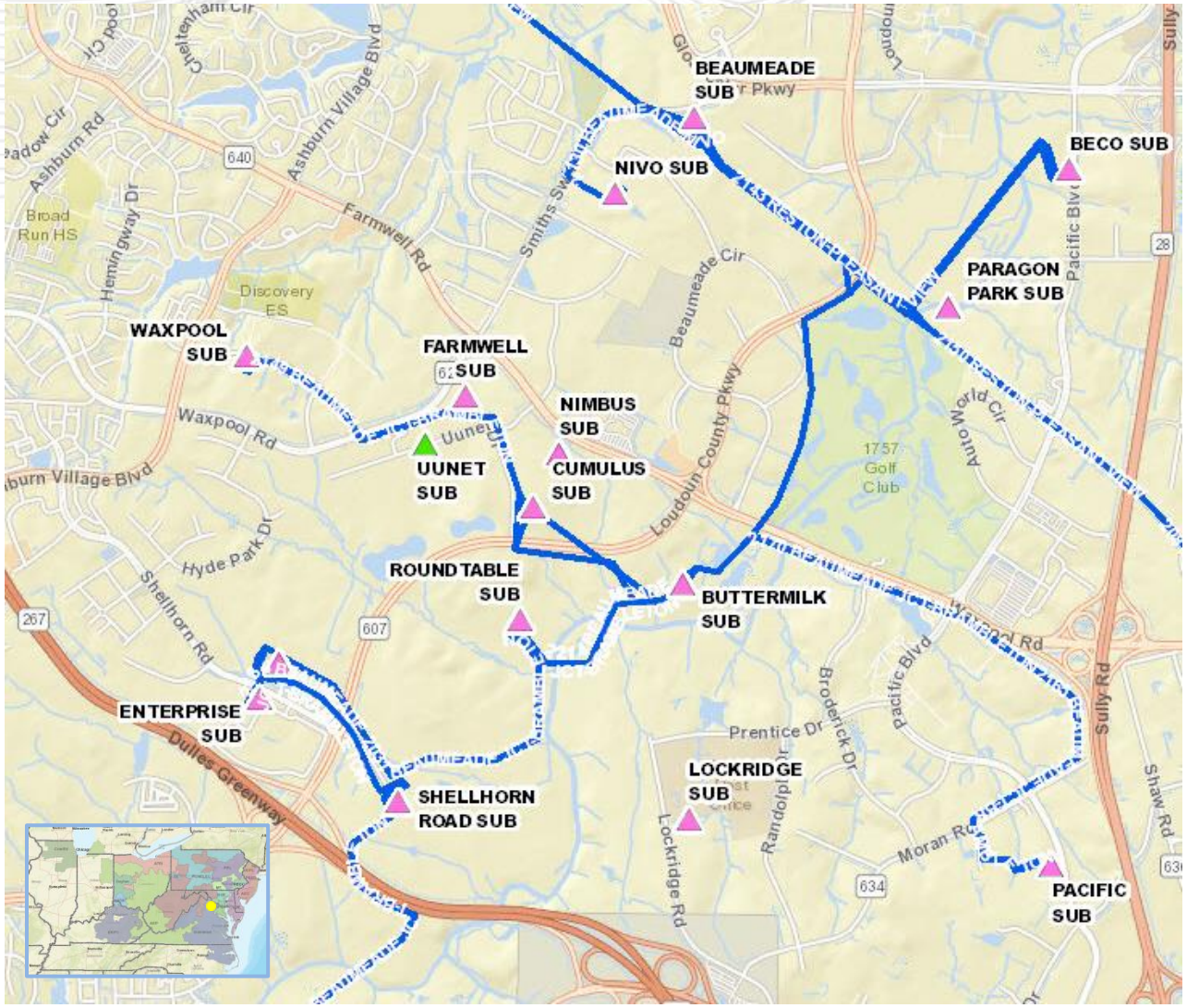
N2-SLD8, N2-WLD4

More than 300MW of load is dropped due to the loss of 230kV Line #2149 and 230kV Line #9167 under N-1-1.

Existing Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6NIMBUS - 6BEAMEAD 230kV	876/956/1163/1068/1123/1334

Continued on next slide….



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

Dominion Transmission Zone: Baseline Waxpool Area

As part of the 2020 RTEP Window #1, the following projects were proposed to address a load loss violation greater than 300MW in the Waxpool area:

Proposal ID	Proposing Entity	Upgrade Description	Upgrade Cost ($M)
704	Dominion	Waxpool Loop - Nimbus to Farmwell Line Extension	5.703
376	Dominion	Waxpool Loop - Loop Line #2031 Option	17.698
721	LS Power	Stonewater - Waxpool 230kV Transmission Project	29.25*
883	Dominion	Waxpool Loop - Shellhorn Option	41.203

*Proposal 721 also addresses N-1-1 thermal and GenDeliv violations N2-WT1,N2-WT2,N2-WT3,N2-WT8, GD-S11 and GD-S12

Proposed Solution:

Proposal #2020_W1-704: Extend a new 230kV single circuit line (#9250) approximately 0.4 miles of new ROW between Farmwell Substation and Nimbus Substation and remove Beaumeade 230kV Line #2152 line switch.

Proposed Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6NIMBUS - 6FARMWELL 230kV (NEW)	1574/1574/1801/1650/1650/1897
6NIMBUS - 6BEAMEAD 230kV	1047/1047/1204/1160/1160/1334

Continued on next slide….

SN / SE / SLD/ WN / WE / WLD: Summer Normal / Summer Emergency / Summer Load Dump / Winter Normal / Winter Emergency / Winter Load Dump

Dominion Transmission Zone: Baseline Waxpool Area

Estimated Cost: $5.703 M

Required IS Date: 6/1/2025

Alternatives:

- Proposal #2020_1-376: Cut 230kV line #2031 (Enterprise to Roundtable) and extend double circuit 230kV line and cut into 230kV line #2149 (Roundtable to Waxpool). Rearrange 230kV terminations into Farmwell Substation to create new 230kV Line #2031 (Enterprise-Waxpool), 230kV Line #9247(Farmwell-Roundtable), 230kV Line #2149 (Farmwell-Roundtable), and 230kV Line #2190 (Cumulus-Farmwell). The proposed project will require new right-of-way. **Estimated Cost: $17.698 M**
- Proposal #2020_1-721: Build a new single-circuit 230kV overhead/underground transmission line between Stonewater and Waxpool substations. The proposed project will include substation upgrades at both Stonewater and Waxpool to accommodate the new transmission line. The proposed project will require new right-of-way. This project also solves summer and winter N-1-1 load drop violations N2-SLD8 and N2-WLD4 respectively. **Estimated Cost: $ 29.25 M**
- Proposal #2020_1-883: Extend a new 230kV line from Shellhorn Substation to a structure near Farmwell Substation and cut into existing 230kV Line #2149 (Roundtable-Waxpool) creating a new 230kV Line #9251 (Shellhorn to Waxpool) on new right of way. Terminate existing 230kV Line #2149 (Roundtable-Waxpool) into Farmwell Substation creating 230kV Line #2149 (Farmwell-Roundtable). Relocate the termination of existing 230kV Line #2190 (Cumulus-Farmwell) to a new terminal location within Farmwell Substation. The proposed project will require new right-of-way. **Estimated Cost: $ 41.203 M**

Dominion Transmission Zone: Baseline Cabin Run – Yardley Ridge

Process Stage: First Review

Criteria: N-1-1

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: None

Problem Statement:

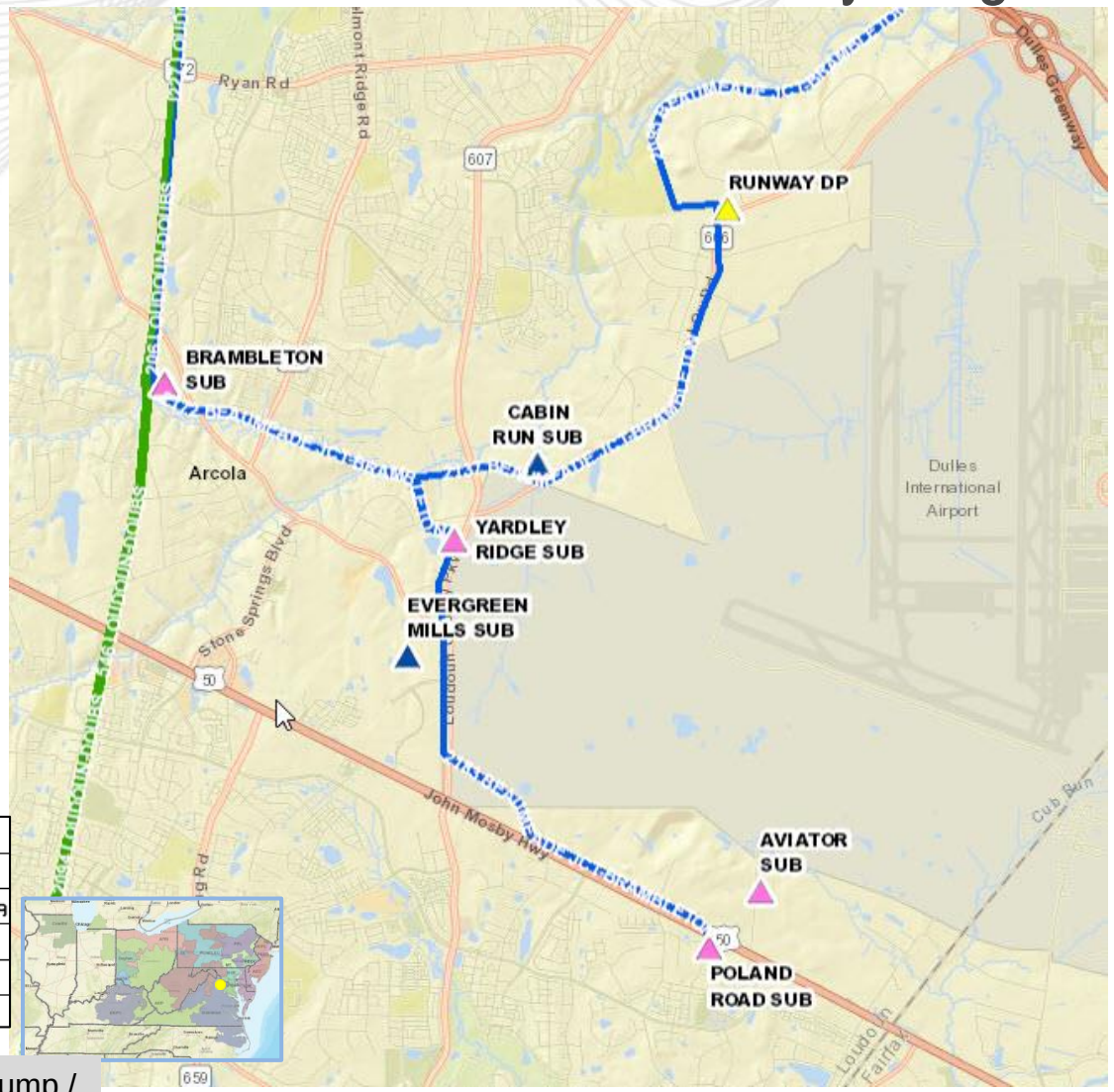
N2-ST12

230kV Line #2213 Cabin Run – Yardley Ridge is overloaded for the loss 230kV Line #227 and 230kV Line #274 under N-1-1.

Existing Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6CABIN_RUN - 6YARDLEY 230kV	1047/1047/1204/1160/1160/1334

Continued on next slide….



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

SN / SE / SLD/ WN / WE / WLD: Summer Normal / Summer Emergency / Summer Load Dump / Winter Normal / Winter Emergency / Winter Load Dump

Dominion Transmission Zone: Baseline Cabin Run – Yardley Ridge

As part of the 2020 RTEP Window #1, the following projects were proposed to address violations on 230kV Line #2213:

Proposal ID	Proposing Entity	Upgrade Description	Upgrade Cost ($M)
493	Dominion	Line #2213 Reconductor – Cabin Run to Yardley Ridge – Partial Reconductor (0.84 Miles)	1.112
134	Dominion	Line #2213 Reconductor – Cabin Run to Yardley Ridge – Full Reconductor (1.36 Miles)	1.747

Proposed Solution:

Proposal #2020-W1-134: Rebuild approximately 1.36 miles of 230kV Line #2213 Cabin Run to Yardley Ridge to achieve a summer rating of 1574 MVA by fully reconductoring the line.

Proposed Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6CABIN_RUN - 6YARDLEY 230kV	1574/1574/1801/1650/1650/1897

Estimated Cost: $1.747 M

Required IS Date: 6/1/2025

Alternatives:

- Proposal #2020_1-493: Rebuild approximately 0.84 miles of 230kV Line #2213 Cabin Run to Yardley Ridge to achieve a summer rating of 1225 MVA by partially

SN / SE / SLD/ WN / WE / WLD: Summer Normal / Summer Emergency / Summer Load Dump / Winter Normal / Winter Emergency / Winter Load Dump

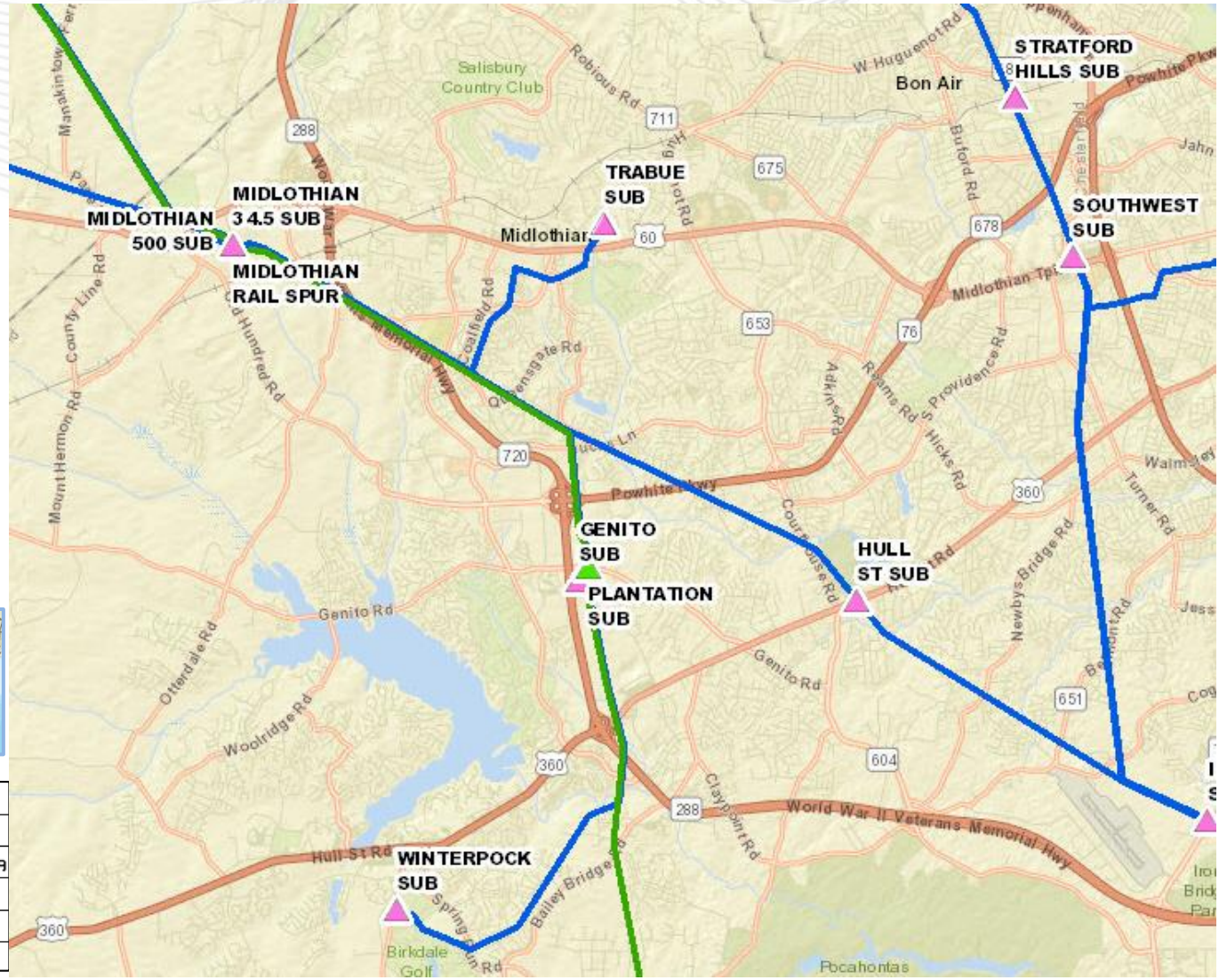
Dominion Transmission Zone: Baseline Midlothian Area

Process Stage: First Review
Criteria: >300MW Load Loss
Assumption Reference: 2025 RTEP assumption
Model Used for Analysis: 2025 RTEP cases
Proposal Window Exclusion: None
Problem Statement:
N1-WLD-1, N1-WLD-2, N2-WLD5
More than 300MW of load is dropped under the following scenarios:

- Tower outage of 230kV Line #219 & 230kV Line #2066
- Line fault stuck breaker associated with 219T2066
- Loss of 230kV Line #219 and 230kV Line #2066 under N-1-1.

Existing Facility Rating: N/A

Continued on next slide….



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

Dominion Transmission Zone: Baseline Midlothian Area

As part of the 2020 RTEP Window #1, the following project was proposed to address a load loss violation greater than 300MW around the Midlothian area:

Proposal ID	Proposing Entity	Upgrade Description	Upgrade Cost ($M)
860	Dominion	Relieve 300 MW Load Drop on Line#219 and Line#2066 (winter N-1-1, Tower, and FB)	6.219

Proposed Solution:

Proposal #2020_W1-860:

1. Cut 230kV Line #2066 at Trabue junction
2. Reconductor idle 230kV Line #242 (radial from Midlothian to Trabue junction) to allow a minimum summer rating of 1047 MVA and connect to the section of 230kV Line #2066 between Trabue junction and Winterpock; re-number 230kV Line #242 structures to #2066;
3. Use the section of idle 115kV Line #153, between Midlothian and Trabue junction to connect to the section of (former) 230kV Line #2066 between Trabue junction and Trabue to create new Midlothian-Trabue lines with new line numbers #2218 and #2219
4. Create new line terminations at Midlothian for the new Midlothian-Trabue lines.

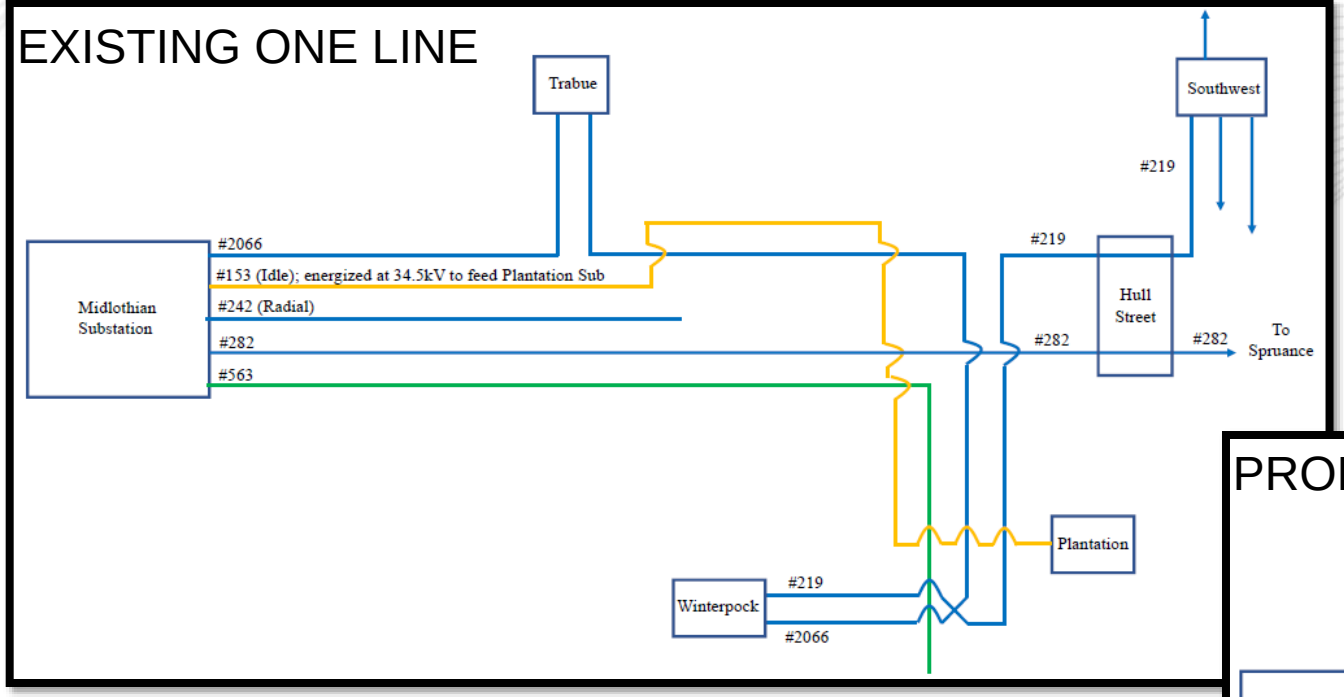
Proposed Facility Rating:

Branch	SN/SE/SLD/WN/WE/WLD (MVA)
6MDLTHAN - 6TRABUE - 1 230kV	876/956/1163/1068/1123/1334
6MDLTHAN - 6TRABUE - 2 230kV	876/956/1163/1068/1123/1334
6MDLTHAN - 6GENITO 230kV	797/797/1115/916/924/1171

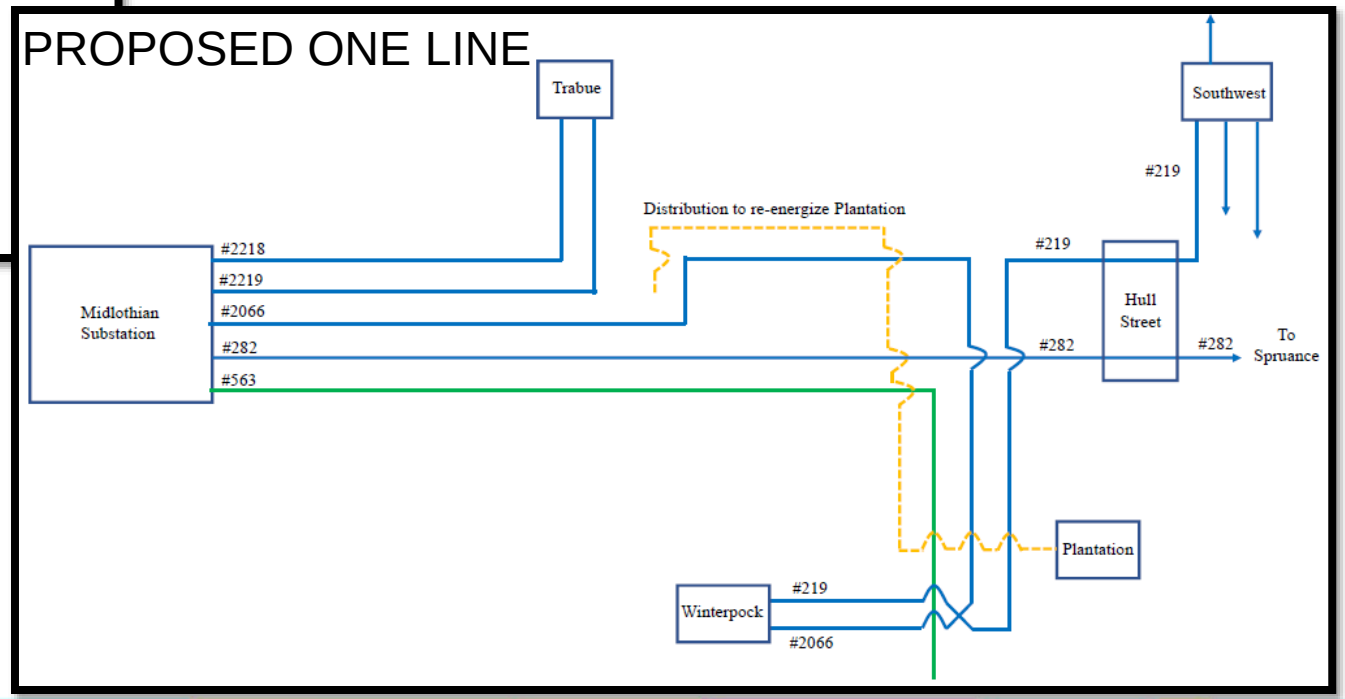
Continued on next slide….

Dominion Transmission Zone: Baseline Midlothian Area

EXISTING ONE LINE



PROPOSED ONE LINE



AEP Transmission Zone: Baseline
Mount Vernon area

Process Stage: First Review

Criteria: AEP FERC 715 Criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: None

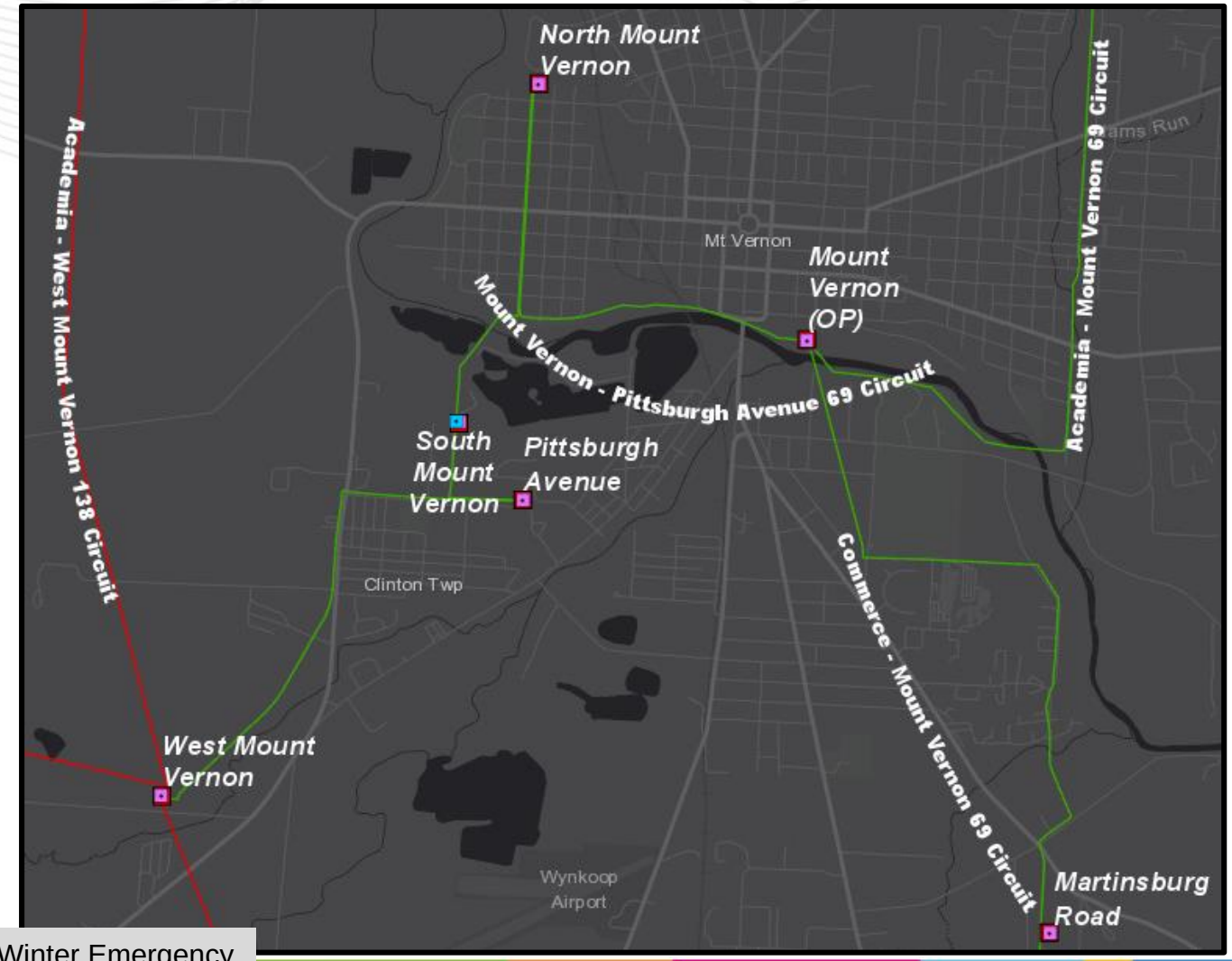
Problem Statement:

AEP-T424, AEP-T429, AEP-T430, AEP-T431, AEP-T464, AEP-T466, AEP-T467, AEP-T469 through AEP-T485

The West Mount Vernon 138/69kV transformer, North Mount Vernon – Mount Vernon 69kV line, South Mount Vernon- North Mount Vernon 69kV line,, and West Mount Vernon – Pittsburg 69kV line are overloaded for multiple N-1-1 contingency pairs.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05N MT VER – 05MT VERNO 69KV	46/46/65/65
05PITTSBUR – 05W MT VER 69KV	46/46/65/65
05PITTSBUR – 05S MT VER 69KV	46/46/65/65
05S MT VER – 05N MT VER 69KV	46/46/65/65
05WMTVER – 05W MT VER 138/69kV	39/46/49/51



SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline

Mount Vernon area

As part of the 2020 RTEP Window #1, the projects listed in the table below are proposed to address the following violations: AEP-T424, AEP-T429, AEP-T430, AEP-T431, AEP-T464, AEP-T466, AEP-T467, AEP-T469 through AEP-T485

Proposal ID	Proposing Entity	Upgrade Description	Upgrade Cost ($M)
697	AEP	Reconfigure lines in Mount Vernon area	1.286
860	AEP	Rebuild West Mount Vernon and Mount Vernon 69kV line	12.926
533	LS Power	Build a new 3-position substation interconnecting the Galion - Ohio Central 345kV transmission line.	21.129

Proposed Solution:

Proposal #2020_3-860: rebuild approximately 4.0 miles of existing 69 kV line between West Mount Vernon and Mount Vernon stations. Replace the existing 138/69 kV transformer at West Mount Vernon with a larger 90 MVA unit along with existing 69 kV breaker 'C'.

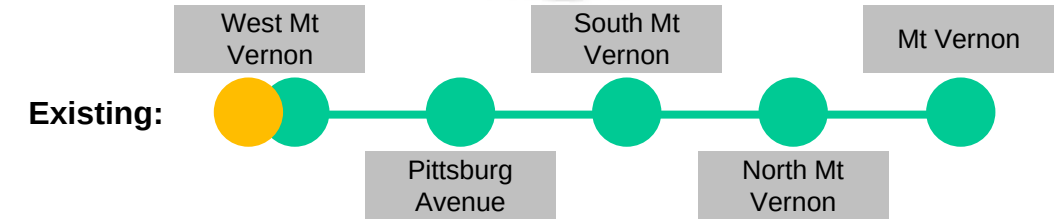
Estimated Cost: $12.926M

Preliminary Facility Rating:

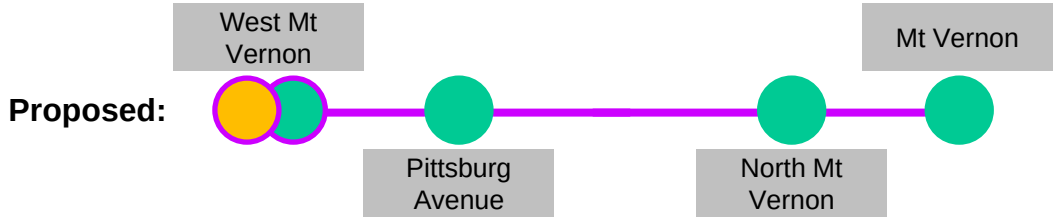
Branch	SN/SE/WN/WE (MVA)
05N MT VER – 05MT VERNO 69KV	68/76/90/98
05PITTSBUR – 05W MT VER 69KV	82/90/103/113
05PITTSBUR – 05S MT VER 69KV	82/90/103/113
05S MT VER – 05N MT VER 69KV	82/90/103/113
05WMTVER – 05W MT VER 138/69kV	90/90/90/90

SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline
Mount Vernon area



Legend	
500 kV	
345 kV	
138 kV	
69 kV	
34.5 kV	
23 kV	
New	



AEP Transmission Zone: Baseline
Mount Vernon area

Additional Benefits:

Project will replace a 1950's wood pole line that utilizes copper conductor. Proposal will also replace a 1952 vintage 138/69 kV transformer along with a 1951 oil breaker at West Mount Vernon station.

- Mount Vernon-West Mount Vernon 69 kV Circuit (4.68 miles)
  - From 2015 – 2020 this circuit has experienced 2 momentary and 5 permanent outages resulting in approximately 21k CMI.
  - The circuit currently has 45 open conditions on 38 structures (49% of the total structures), including pole damage, rot top, rot heart, and missing ground lead wires.
  - Structures are made up of wood poles from the 1950s (50 structures). Some structures have been replaced since the 1980s (28 structures).
  - The circuit conductor was installed in 1952 consisting of 3/0 Copper.
  - The baseline proposal is rebuilding the overloaded 3/0 Copper sections of line between West Mount Vernon, Pittsburgh Avenue, South Mount Vernon, North Mount Vernon, and Mount Vernon stations, approximately 4 miles. The baseline proposal is also replacing the West Mount Vernon transformer manufactured in 1952 and an oil circuit breaker manufactured in 1951. NOTE: South Mount Vernon Switch no longer has a load connected and is proposed to be removed as part of the baseline project.

Required IS Date: 6/1/2025

Alternatives:

- Proposal #2020_1-697: Close in the normally open Switch at North Liberty, which is on the Mount Vernon - Howard 69 kV line. Reconfigure Commerce – Kokosing Switch 69 kV line section to connect to Utica via Hunt Switch (new circuit Commerce – Utica 69 kV) and reconfigure Mt. Vernon –Martinsburg switch section to connect to Sharp Road (new circuit Mt. Vernon – Sharp Road 69 kV) by swapping the 69 kV line connections on the double circuit lines (Sharp Road – Utica and Commerce – Mt Vernon). **Estimated Cost: $1.286 M**
- Proposal #2020_3-533: Build a new 3-position substation interconnecting the Galion - Ohio Central 345kV transmission line. The proposed substation will include a new 345/69kV transformer that will connect to the Gambier 69kV substation via a new 69kV transmission line. The proposed project will also connect the Gambier 69kV substation with the Martinsburg 69kV substation. The proposed project will require new right-of-way. **Estimated Cost: $ 21.129M**

Short Circuit Project

Dominion Transmission Zone: Baseline Chickahominy 230kV Breaker “SC122”, “205022”, 209122”, 210222-2”, “28722”, “H222”, “21922”, “287T2129” Replacements

Process Stage: Recommended Solution

Criteria: Over Duty Breaker

Assumption Reference: none

Model Used for Analysis: 2025 short circuit model

Proposal Window Exclusion: Station Equipment

Problem Statement:

Eight (8) Chickahominy 230kV breakers are over duty:
“SC122”, “205022”, 209122”, 210222-2”, “28722”, “H222”, “21922”, “287T2129”

Significant Driver:
b3213: Install 2nd Chickahominy 500/230 kV transformer. (Generator Deactivation of Chesterfield 5 and 6).

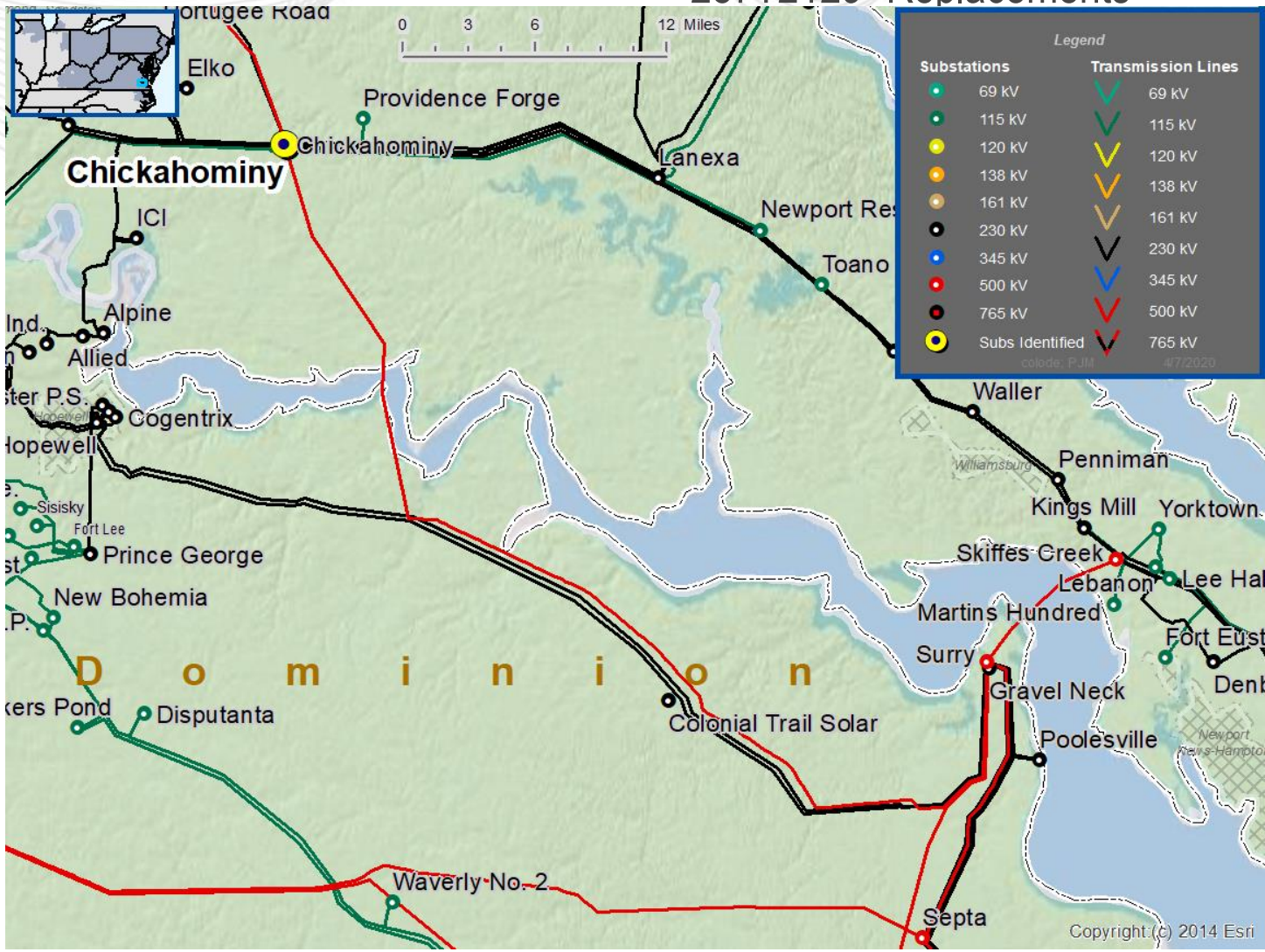
Existing Facility Rating: 50kA interrupting rating

Recommended Solution:
b3213.1: Replace the eight (8) Chickahominy 230kV breakers with 63kA breakers:
“SC122”, “205022”, 209122”, 210222-2”, “28722”, “H222”, “21922”, “287T2129”

- **Estimated Cost:** $3.76M Replace the eight breakers with 63kA breakers ($0.47M each)

Required In-Service: 6/1/2023

Previously Presented: 11/4/2020



Second Review

Baseline Reliability Projects

AEP Transmission Zone: Baseline
Leipsic area

Process Stage: Second Review

Criteria: AEP FERC 715 Criteria

Assumption Reference: 2025 RTEP assumption

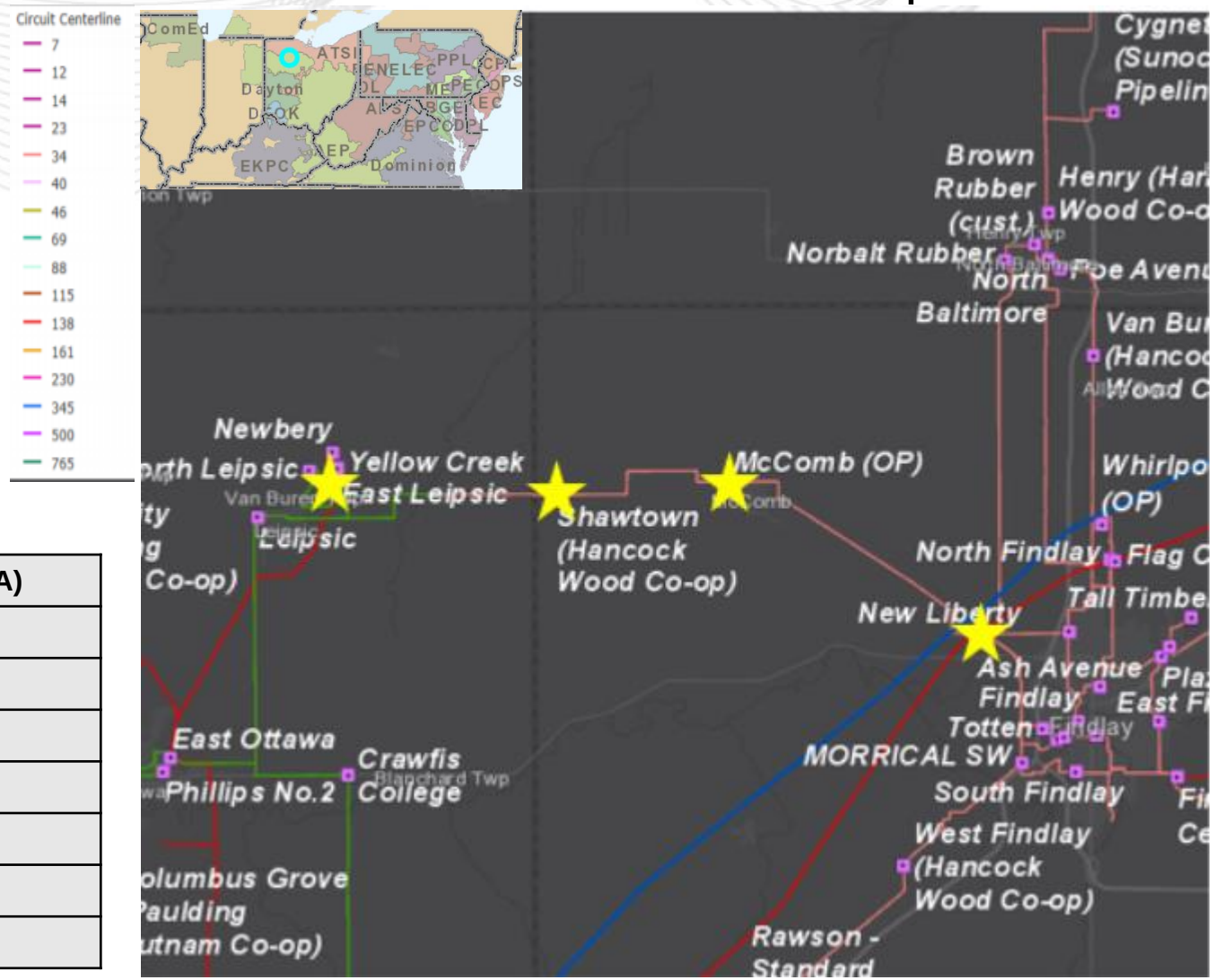
Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: None

Problem Statement:

AEP-T63,AEP-T64,AEP-T65,AEP-T66,AEP-T67,AEP-T68,AEP-T69,AEP-T70,AEP-T71,AEP-T72,AEP-T73

The East Ottawa – Leipsic – Deshler Tap 69kV line, East Leipsic - North Leipsic 69KV line, East Leipsic 138/69kV transformer, Cairo – East Lima 69kV line, and McComb OP – New Liberty 34.5kV line are overloaded for a tower contingency and multiple N-1-1 contingency pairs.



Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05E OTTAWA -05LEIPSIC 69KV	68/73/90/91
05LEIPSIC – 05DSCHLERT 69KV	73/73/91/91
05DSCHLERT – 05NLEIP SW 69KV	73/73/91/91
05E.LEIPSC – 05NLEIP SW 69KV	73/73/91/91
05MCCOMB OP – 05NEW LIBR 34.5kV	20/20/28/28
05CAIRO – 05E LIMA 69kV	50/50/63/63
05E.LEIPSIC2 -05E.LEIPSC 138/69kV	59/69/69/75

SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline
Leipsic area

Recommended Solution: Proposal #2020_1-957

Rebuild and convert the existing 17.6 miles East Leipsic – New Liberty 34.5 kV circuit to 138 kV using 795 ACSR (**B3273.1**) **Estimated Cost: $31.351M**

Convert the existing 34.5kV equipment to 138kV and Expanded the existing McComb station to the north and east to allow for new equipment to be installed. Install two new 138kV box bays to allow for line positions and two new 138-12kV XFs. (**B3273.2**) **Estimated Cost: $0.868M**

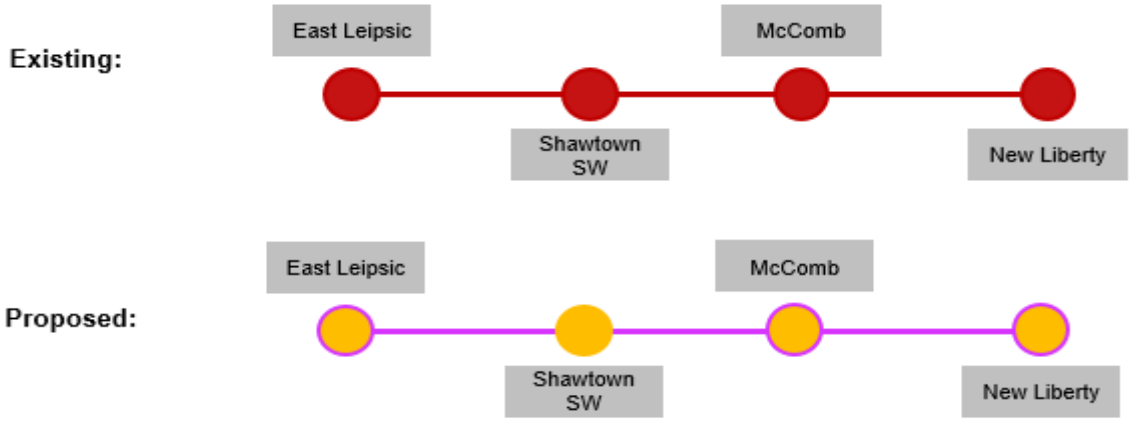
Expand the existing East Leipsic station to the north to allow for another 138kV line exit to be installed. New line exit will involve installing a new 138kV CB, disconnect switches and new dead end structure along with extending existing 138kV bus work. (**B3273.3**) **Estimated Cost: $1.3M**

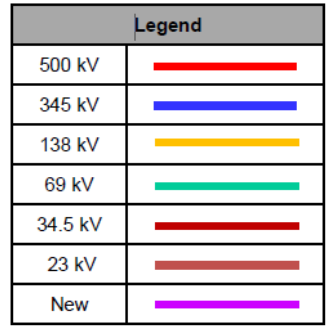
Add one 138kV circuit breaker and disconnect switches in order to add an additional line position at New Liberty station. Install line relaying potential devices and retire 34.5 kV breaker F. (**B3273.4**) **Estimated Cost: $0.899M**

Total Estimated Cost: $34.418M

Preliminary Facility Rating: :

Branch	SN/SE/WN/WE (MVA)
New Liberty to McComb OP 138kV	257/360/325/404
McComb OP to Shawtown 138kV	257/360/325/404
East Leipsic to Shawtown 138kV	257/360/325/404





SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline
Leipsic area

Additional Benefits:

- This project completely addresses the needs reviewed with stakeholders under need number AEP-2020-OH020 in the March 19, 2020 SRRTEP Western meeting.
  - Considering the two loads served from the line at Shawtown and McComb stations, retirement of the facilities is not an option for the line reviewed as need AEP-2020-OH020. In order to address the need, the same solution proposed as proposal No. 2020_1-957 would be the proposed supplemental solution. If a proposal other than proposal No. 957 is chosen, AEP will move forward with to propose this as a supplemental solution in addition to whichever baseline proposal is selected.

AEP-2020-OH020 Attachment M-3 need

AEP no longer maintains 34.5kV installations as part of their standards. The rebuild of the facility for the need would require the use of their 69KV standard or 138kV standard. A rebuild of the facilities for the need using the138kV standard is estimated by the transmission owner to cost $34M

There is no 69 kV established on the New Liberty side of the system. If 69 kV construction is used, there would also be the need to establish a new 69 kV yard at New Liberty with a 138/69 kV transformer at some point in the future. The downtown Findlay area (served partially from New Liberty) is all currently constructed using 34.5 kV requirements with 138 kV sources. So rebuilding at 138 kV reduces the need for additional transformation in the future as additional 34.5 kV facilities reach the end of their life.

AEP Transmission Zone: Baseline
Leipsic area

Additional Benefits: (continued)

This project also solves FG# AEP-VM137,AEP-VM138,AEP-VM139,AEP-VM140,AEP-VM141,AEP-VM142,AEP-VM143,AEP-VM144,AEP-VM145,AEP-VM146,AEP-VM147,AEP-VM148,AEP-VM149,AEP-VM150,AEP-VM151,AEP-VM152,AEP-VM153,AEP-VM154,AEP-VM155,AEP-VM156,AEP-VM157,AEP-VM158,AEP-VM159,AEP-VM160,AEP-VM161,AEP-VM162,AEP-VM163,AEP-VM164,AEP-VM165,AEP-VM166,AEP-VM167,AEP-VM168,AEP-VM169,AEP-VM170,AEP-VM171,AEP-VM172,AEP-VM173,AEP-VM174,AEP-VM175,AEP-VM176,AEP-VM177,AEP-VM178,AEP-VM179,AEP-VM180,AEP-VM181,AEP-VM182,AEP-VM183,AEP-VM184,AEP-VM185,AEP-VM186,AEP-VM187,AEP-VM188,AEP-VM189,AEP-VM190,AEP-VM191,AEP-VM192,AEP-VM193,AEP-VM194,AEP-VM195,AEP-VM196,AEP-VM197,AEP-VM198,AEP-VM199,AEP-VM200,AEP-VM201,AEP-VM202,AEP-VM203,AEP-VM204,AEP-VM205,AEP-VM206,AEP-VM207,AEP-VM208,AEP-VM209,AEP-VM210,AEP-VM211,AEP-VM212,AEP-VM213,AEP-VM214,AEP-VM215,AEP-VM216,AEP-VM217,AEP-VM218,AEP-VM219,AEP-VM220,AEP-VM221,AEP-VM222,AEP-VM223,AEP-VM224,AEP-VD114,AEP-VD115,AEP-VD116,AEP-VD117,AEP-VD118,AEP-VD119,AEP-VD120,AEP-VD121,AEP-VD122,AEP-VD123,AEP-VD124,AEP-VD125,AEP-VD126,AEP-VD127,AEP-VD128,AEP-VD129,AEP-VD130,AEP-VD131,AEP-VD132,AEP-VD133,AEP-VD134,AEP-VD135,AEP-VD136,AEP-VD137,AEP-VD138,AEP-VD139,AEP-VD140,AEP-VD141,AEP-VD142,AEP-VD143,AEP-VD144,AEP-VD145,AEP-VD146,AEP-VD147,AEP-VD148,AEP-VD149,AEP-VD150,AEP-VD151,AEP-VD152,AEP-VD153,AEP-VD154,AEP-VD155,AEP-VD156,AEP-VD157,AEP-VD158,AEP-VD159,AEP-VD160,AEP-VD161,AEP-VD162,AEP-VD163,AEP-VD164,AEP-VD165,AEP-VD166,AEP-VD167,AEP-VD168,AEP-VD169,AEP-VD170,AEP-VD171,AEP-VD172,AEP-VD173,AEP-VD174,AEP-VD175,AEP-VD176,AEP-VD177,AEP-VD178,AEP-VD179,AEP-VD180,AEP-VD181,AEP-VD182,AEP-VD183,AEP-VD184,AEP-VD185,AEP-VD186,AEP-VD187,AEP-VD188,AEP-VD189,AEP-VD190,AEP-VD191,AEP-VD192,AEP-VD193,AEP-VD194,AEP-VD195,AEP-VD196,AEP-VD197,AEP-VD198,AEP-VD199,AEP-VD357,AEP-VD374, which are low voltage magnitude and voltage drop violations at buses COLGRVE 69KV, GLANDORF 69KV, Philips 69KV, East Ottawa 69KV, Leipsic 69KV, East Leipsic 69KV, North Leipsic 69KV, Deshler Tap 69KV, Miller 69KV, Crawfish College 69KV, Cairo 69KV, Shawtown 34.5KV, McComb 34.5kV, East Leipsic 138kV, Rockport 138kV, Newbery 138kV, Yellow Creek 138kV, and Baseline 138kV

Proposal Window Exclusion: Below 200kV Exclusion

Required In-Service: 6/1/2025

Projected In-Service: 1/31/2024

Previously Presented: 11/4/2020

AEP Transmission Zone: Baseline
Newcomerstown –Salt Fork Rebuild

Process Stage: Second Review

Criteria: AEP FERC 715 Criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 Summer case

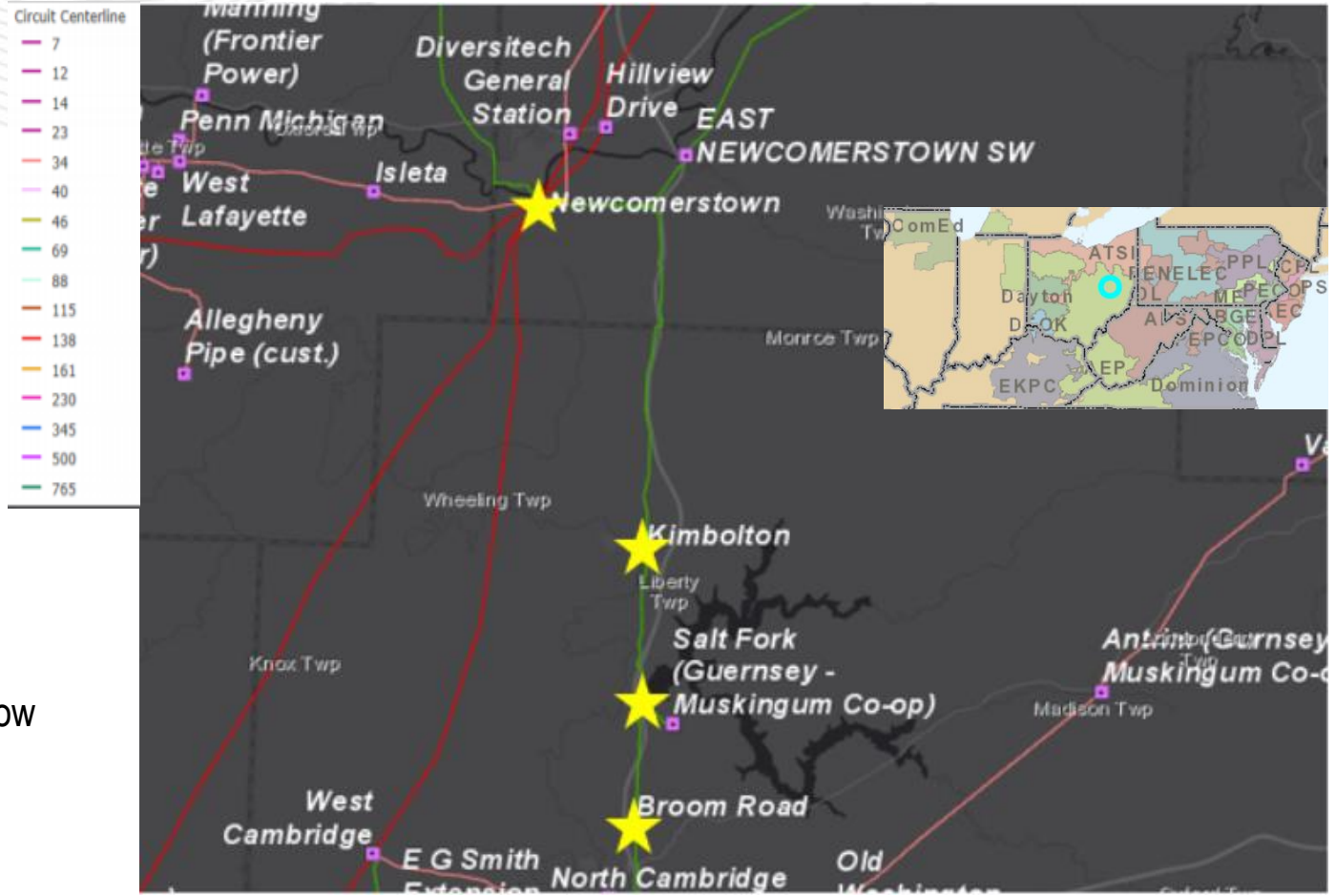
Proposal Window Exclusion: None

Problem Statement:

AEP-T366,AEP-T367,AEP-T368,AEP-T373

The West Newcomerstown – KimBLTN – SaltFork 69kV line are overloaded for the N-1-1 contingency pair of the loss of the West Cambridge – East New Concord -PHILO 138kV line, West Cambridge138/69 transformer and West Cambridge –Cassell JSS 69kV line, and the loss of the West Byesville – Derwent 69kV line.

As part of the 2020 RTEP Window #1, the projects listed in the table below are proposed to address the above violations.



AEP Transmission Zone: Baseline
Newcomerstown –Salt Fork Rebuild

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05NEWCOMTW - 05KIMBLTN 69kV	46/46/65/65
05KIMBLTN – 05SALTFRKZ 69kV	46/46/65/65

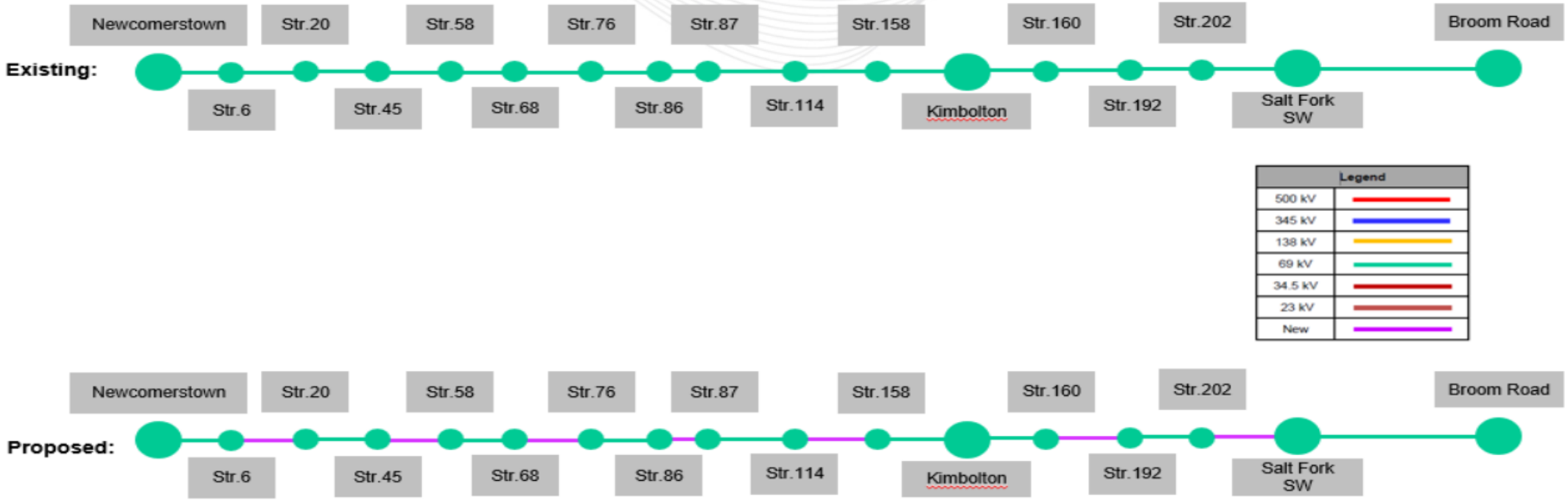
Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05NEWCOMTW - 05KIMBLTN 69kV	73/73/91/91
05KIMBLTN – 05SALTFRKZ 69kV	73/73/91/91

Recommended Solution:

Proposal #2020_1-182: Rebuild approximately 8.9 miles of 69 kV line between Newcomerstown and Salt Fork Switch with 556 ACSR conductor. (**B3274**)

Estimated Cost: $15.89M



SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline
Newcomerstown –Salt Fork Rebuild

Additional Benefits:

Newcomerstown-Broom Road 69 kV Circuit (17.62 miles)

- From 2015 – 2020 this circuit has experienced 11 momentary and 5 permanent outages resulting in approximately 750k CMI.
- The circuit currently has 53 open conditions on 49 structures (23% of the total structures), including pole damage, rot top, rot heart, rotted/split poles, burnt insulators, and missing ground lead wires.
- Structures are made up of 1926 steel lattice towers (5 structures) and wood poles from the 1960s (88 structures) and the 1980s (120 structures).
- The circuit conductor was primarily installed in 1926 consisting of 3/0 Copper (9.76 miles) and 336 ACSR (4.3 miles) from the 1960s.
- Proposal #2020_1-182 is rebuilding the overloaded 3/0 Copper sections of line between Newcomerstown, Kimbolton, and Salt Fork stations, approximately 8.9 miles.

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 11/4/2020

AEP Transmission Zone: Baseline
Kammer – Natrium 69kV Rebuild

Process Stage: Second Review

Criteria: AEP FERC 715 Criteria

Assumption Reference: 2025 RTEP assumption

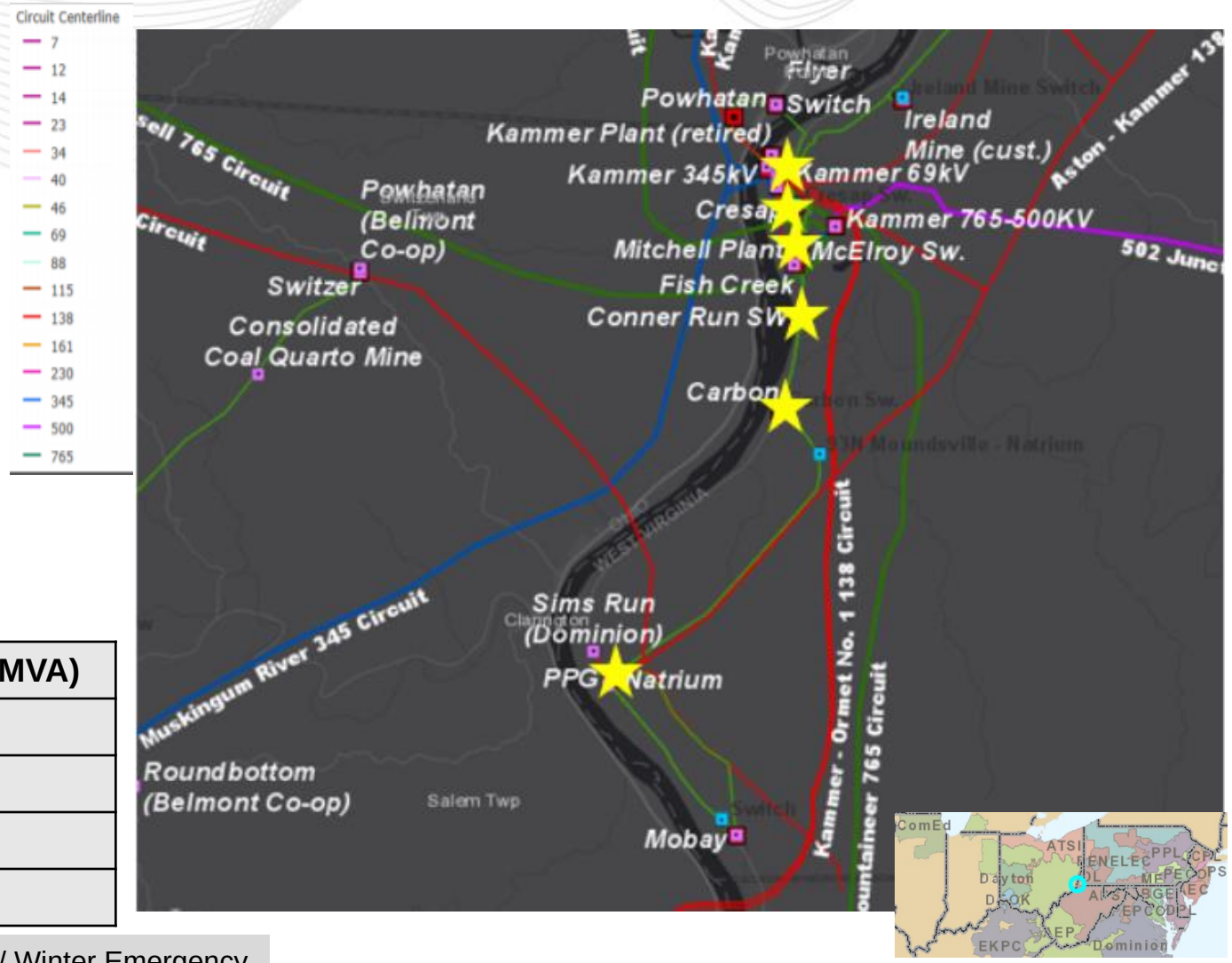
Model Used for Analysis: 2025 Summer case

Proposal Window Exclusion: None

Problem Statement:

AEP-T219, AEP-T221,AEP-T222,AEP-T223,AEP-T225,AEP-T226,AEP-T227,AEP-T228,AEP-T229,AEP-T230,AEP-T231,AEP-T232,AEP-T233,AEP-T234,AEP-T237,AEP-T238,AEP-T239,AEP-T240,AEP-T243,AEP-T244, and AEP-T250

The Conner RN – Columbi - Natrium 69kV line and Kammer – Cresaps – McElroy 69KV line are overloaded for a tower contingency and multiple N-1-1 contingency pairs.



Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05COLOMBI - 05CONNERRN 69KV	50/50/63/63
05COLOMBI - 05NATRIUM 69KV	50/50/63/63
05CRESAPS – 05KAMMER 69KV	82/90/107/113
05CRESAPS – 05MCELROY 69kV	75/75/94/94

SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline
Kammer – Natrium 69kV Rebuild

Recommended Solution: Proposal #2020_1-804

Rebuild from Kammer Station to Cresaps Switch 69KV, approximately 0.5 miles.. (**B3275.1**) **Estimated Cost: $0.933M**

Rebuild Cresaps Switch to McElroy Station 69kV, approximately 0.67 miles. (**B3275.2**) **Estimated Cost: $1.25M**

Replace a single span of 4/0 ACSR from Moundsville - Natrium str 93L to Carbon Tap switch 69kV located between Colombia Carbon and Conner Run stations. Remainder of line is 336 ACSR. (**B3275.3**) **Estimated Cost: $0.012M**

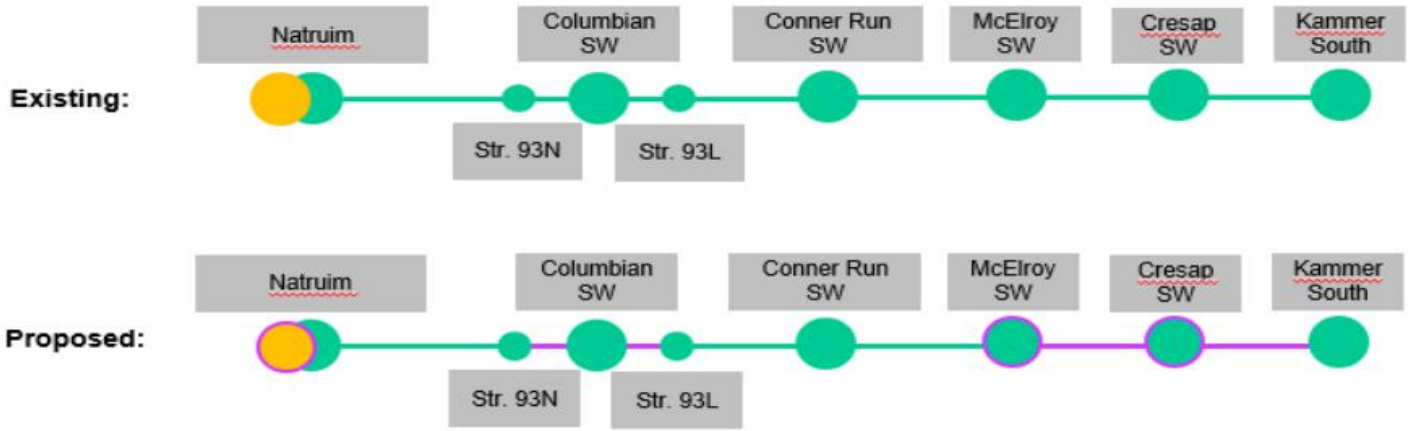
Rebuild from Colombia Carbon to Columbia Carbon Tap str 93N 69KV, approximately 0.72 miles. The remainder of the line between Colombia Carbon Tap structure 93N and Natrium station is 336 ACSR and will remain. (**B3275.4**) **Estimated Cost: $1.082M**

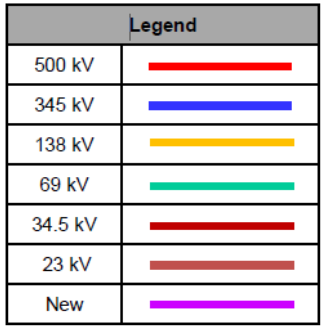
Replace the Cresaps 69kV 3-Way Phase-Over-Phase Switch and structure with a new 1200A 3-Way Switch and Steel Pole. (**B3275.5**) **Estimated Cost: $0.706M**

Replace 477 MCM Alum bus and risers at McElroy 69 kV station (**B3275.6**) **Estimated Cost: $0.325M**

Replace Natrium138kV bus existing between CB-BT1 and along the 138kV Main Bus # 1 dropping to CBH1 from the 500MCM conductors to a 1272 KCM AAC conductor. Replace the dead end clamp and strain insulators (**B3275.7**) **Estimated Cost: $0.291**

Total Estimated Cost: $4.599M





AEP Transmission Zone: Baseline
Kammer – Natrium 69kV Rebuild

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Natrium12 – Natrium34 138KV	383/449/485/534
Cresaps – Kammer 69KV	129/180/162/202
Cresaps – McElroy 69kV	129/180/162/202
Cresaps – Conner Run 69kV	102/102/129/129
Columbi to Conner Run 69kV	82/90/107/113
Columbi to Natrium 69kV	75/75/94/94

Additional Benefits: This project also solves N1-ST41,N1-ST42,GD-S298,GD-S446 and GD-S315, which are overloads on Natrium12 – Natrium34 branch for multiple common mode contingencies in summer generation deliverability test and basecase analysis.

Additionally, Kammer-Natrium 69 kV Circuit (7.6 miles) has supplemental needs. From 2015 – 2020 this circuit has experienced 6 momentary and 2 permanent outages resulting in approximately 100k CMI. The circuit currently has 41 open conditions on 19 structures (20% of the total structures), including pole damage, rot top, rot heart, rotted/split poles, burnt insulators, and missing ground lead wires. 55 structures have been replaced in the 2000s; remaining are wood poles from 1950s and 1960s with two steel lattice towers from 1927. The circuit conductor was primarily installed in 1927 consisting of 336 ACSR (3.73 miles) and 556 ACSR (0.5 miles), and 4/0 ACSR (0.8 miles) from 1971. The remainder was replaced in the 2000s with 556 ACSR (2.6 miles).

The baseline proposal is rebuilding overloaded sections of line that consist of the 1927 era 556 and 336 ACSR (1.17 miles) between Kammer and McElroy stations and the 4/0 ACSR sections (0.72 miles) between Connor Run and Natrium stations.

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2025

Previously Presented: 11/4/2020

SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline South Lancaster – Lancaster - Ralston 69kV Rebuild

Process Stage: Second Review

Criteria: AEP FERC 715 Criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 Summer case

Proposal Window Exclusion: None

Problem Statement:

AEP-T376,AEP-T377,AEP-T384,AEP-T385,AEP-T388,AEP-T389

The East Lancaster – Lancaster 69kV line and Lancaster – South Lancaster 69kV line, Ralston – Lancaster Junction 69kV line are overloaded for multiple N-1-1 contingency pairs.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05E.LANCAST2 -05LANCASTE 69KV	40/40/56/56
05LANCASTE – 05S.LANCAST1 69KV	40/40/56/56
05RALSTON – 05LANCAS JTZ 69KV	35/35/48/48

Recommended Solution: Proposal #2020_1-915

Rebuild the 2/0 Copper section of line between Lancaster and South Lancaster, approximately 2.9 miles of the 3.2 mile total length. The remaining section has 336 ACSR conductor with 556 ACSR conductor. (**B3276.1**) **Estimated Cost: $5.37M**

Rebuild the 1/0 Copper section of the line between Lancaster Junction and Ralston station, approximately 2.3 miles of the 3.1 mile total length. (**B3276.2**) **Estimated Cost: $4.582M**

Rebuild the 2/0 Copper portion of the line between East Lancaster Tap and Lancaster, approximately 0.81 miles. (**B3276.3**) **Estimated Cost: $1.195M**

Total Estimated Cost: $11.147M

SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline
South Lancaster – Lancaster - Ralston 69kV Rebuild

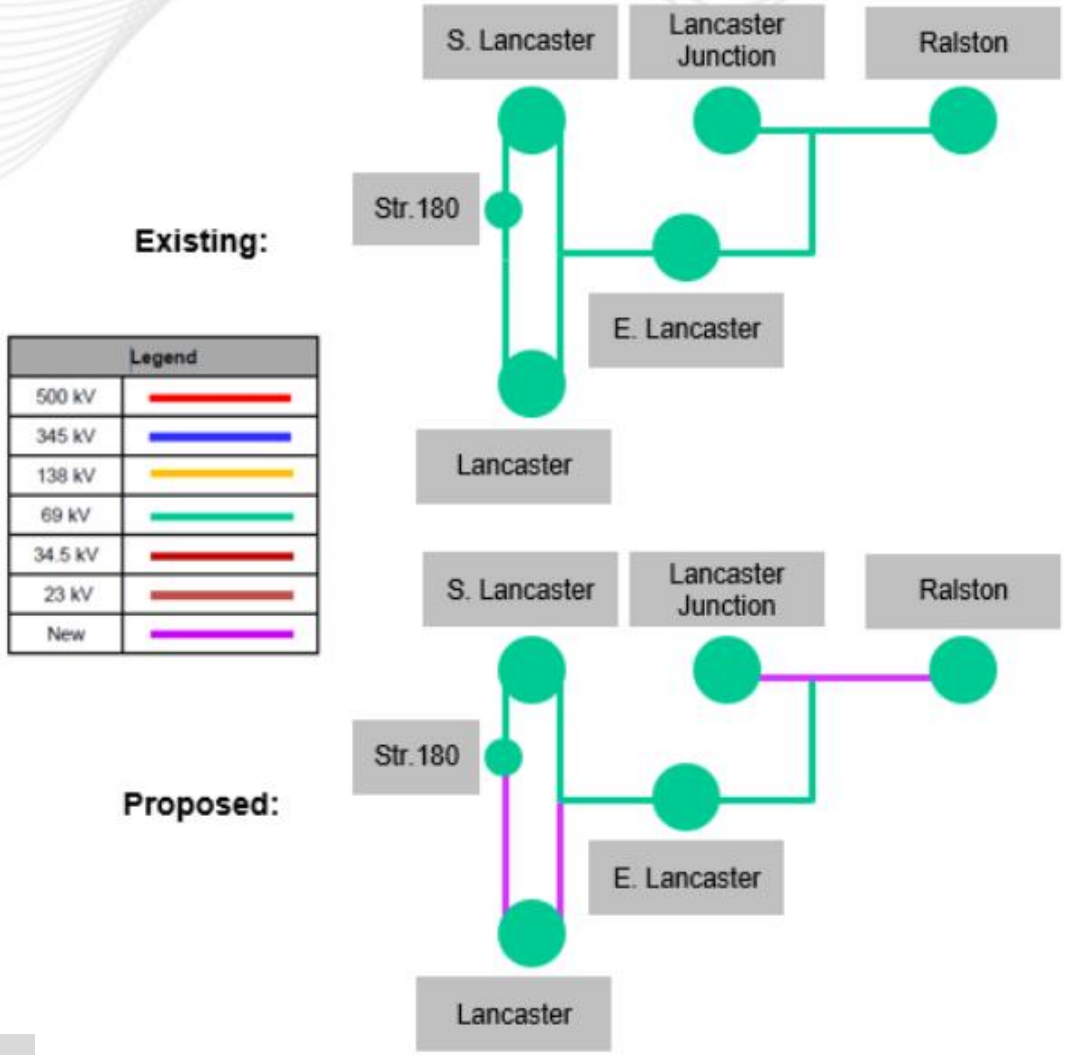
Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
05LANCAS JTZ – 05LANCAST JT 69KV	82/90/107/113
05E.LANCASTZ – 05LANCASTE 69KV	68/86/90/103
05S.LANCAST1 – 05LANCASTE 69kV	82/90/107/113
05RALSTON – 05LANCAS JTZ 69kV	82/90/107/113

Additional Benefits:

Lancaster-East Lancaster-South Lancaster 69 kV Circuit (3.35 miles)

- From 2015 – 2020 this circuit has experienced 8 momentary and 2 permanent outages. Since the line does not directly serve customers, there were no CMI.
- The circuit currently has 49 open conditions on 27 structures (47% of the total structures), including bent tower legs, cracked poles, burnt and broken insulators, and heavy rusting.
- Structures are made up of 1923 steel lattice towers (17 structures) and wood poles (41 structures) from the 1950s and 1960s.
- The circuit conductor was primarily installed in 1923 consisting of 2/0 Copper (1.84 miles) and 556 ACSR (1.5 miles) from 1965.
- The baseline proposal is rebuilding the 2/0 Copper single circuit section of line between Lancaster and East Lancaster, approximately 0.8 miles. Approximately 1 mile is a double circuit section that's common to the Lancaster-South Lancaster circuit .



SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

AEP Transmission Zone: Baseline South Lancaster – Lancaster - Ralston 69kV Rebuild

Additional Benefits: (continued)

Lancaster-South Lancaster 69 kV Circuit (3.3 miles)

- From 2015 – 2020 this circuit has experienced 3 momentary and 2 permanent outages resulting in approximately 1M CMI.
- The circuit currently has 56 open conditions on 30 structures (77% of the total structures), including bent tower legs, cracked poles, burnt and broken insulators, and heavy rusting.
- Structures are made up of 1923 steel lattice towers (25 structures) and wood poles (14 structures) from the 1970s.
- The circuit conductor was primarily installed in 1923 consisting of 2/0 Copper (2.79 miles) and 556 ACSR (0.5 miles) from 1978.
- The baseline proposal is rebuilding the 2/0 Copper sections of line between Lancaster and South Lancaster, approximately 2.8 miles. Approximately 1 mile is a double circuit section that's common to the Lancaster-East Lancaster circuit.

Lancaster Junction-Ralston 69 kV Line (3.08 miles)

- From 2015 – 2020 the entire circuit has experienced 12 momentary and 4 permanent outages resulting in approximately 3.1M CMI.
- The line currently has 33 open conditions on 27 structures (36% of the total structures), including damaged braces, rot top, rot heart, burnt insulators, and broken ground lead wires.
- Structures are made up of wood poles from the 1940s (16 structures) and the 1960s (27). Some structures have been replaced since the 1980s (27 structures).
- The circuit conductor was installed in 1955 consisting of 1/0 Copper (1.9 miles), 1/0 ACSR (0.44 miles), and 556 ACSR (0.74 miles).
- The baseline proposal is rebuilding the 1/0 conductor sections of line between Lancaster and South Lancaster, approximately 2.3 miles.

Required In-Service: 6/1/2025

Projected In-Service: 4/30/2025

Previously Presented: 11/4/2020

Dominion Transmission Zone: Baseline Manassas Area

Process Stage: Second Review

Criteria: N-1-1 Load Drop (Summer and Winter), 300 MW Load Loss

Assumption Reference: 2025 RTEP assumption

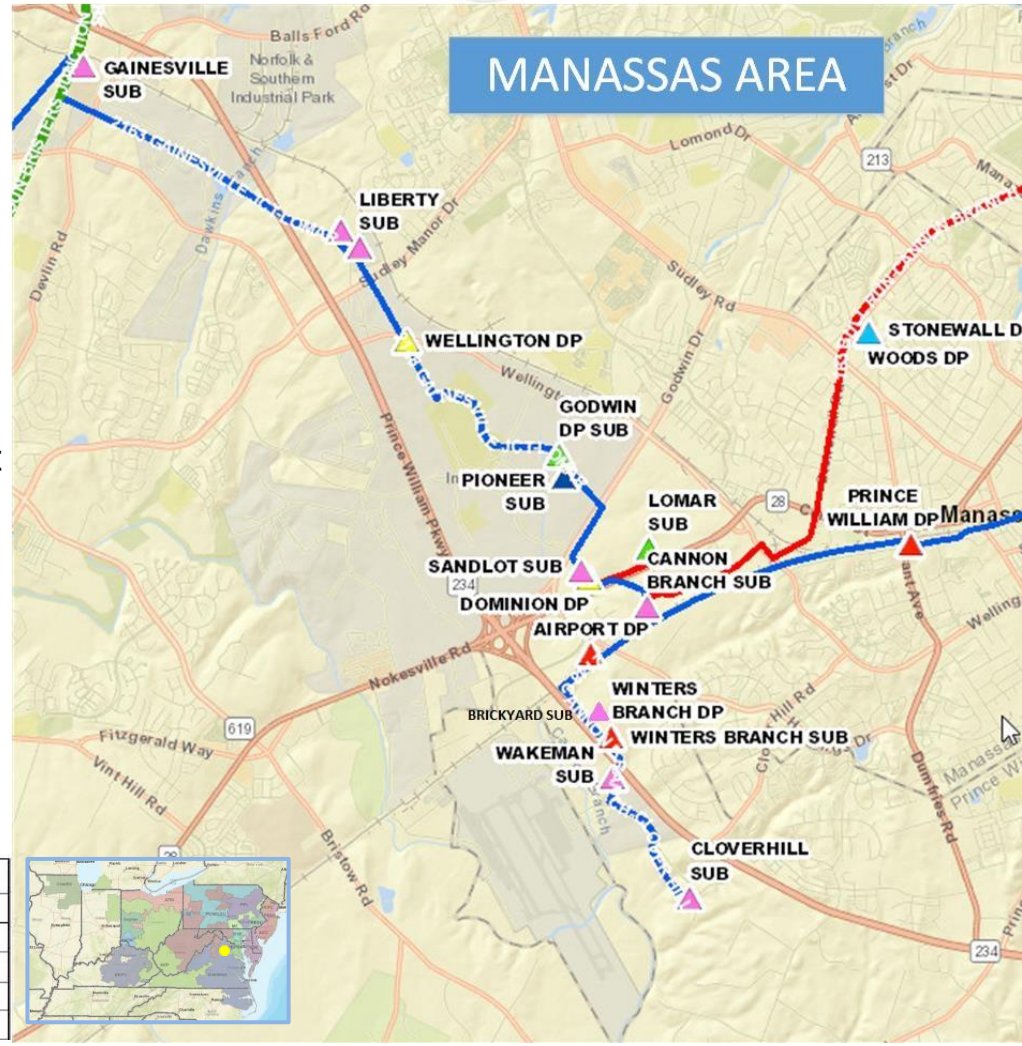
Model Used for Analysis: 2025 RTEP Summer & Winter cases

Proposal Window Exclusion: Immediate Need

Problem Statement:

- Various load drop violations in the Manassas area greater than 300 MW:
  - The loss of 230kV Line #2195 Cannon Branch-Winters Branch and 230kV Line #2196 Pioneer-Sandlot (N2-SLD5, N2-WLD2).
  - The loss of 230kV Line # 2195 Cannon Branch-Winters Branch and 230kV Line #2148 Cloverhill-Sandlot (N2-SLD6, N2-WLD3).
  - The loss of 230kV Line #2195 Cannon Branch-Winters Branch and 230kV Line #2187 Liberty-Pioneer (N2-SLD7 , N2-WLD1).
  - The loss of 230kV Line#2011 Cannon Branch-Liberty and 230kV Line #2187 Liberty-Pioneer (N2-SLD10, N2-WLD6).

Continued on next slide…



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

Dominion Transmission Zone: Baseline Manassas Area

Recommended Solution:
Convert 115kV Line #172 Liberty-Lomar and Line#197 Cannon Branch-Lomar to 230kV to provide a new 230kV source between Cannon Branch and Liberty. The majority of Line #172 Liberty-Lomar and Line #197 Cannon Branch-Lomar is adequate for 230kV operation. A wreck and rebuild will be required on 0.36 mile segment of line between Lomar and Cannon Branch junction. Substation work will be required at Liberty, Wellington, Godwin, Pioneer, Sandlot, Cannon Branch, Brickyard, and Winters Branch.

Extend Line #2011 Cannon Branch – Clifton to Winters Branch by removing the existing Line #2011 termination at Cannon Branch and extending the line to Brickyard creating Line #2011 Brickyard-Clifton and extending a new line between Brickyard and Winters Branch. Substation work will be required at Cannon Branch, Brickyard, and Winters Branch.

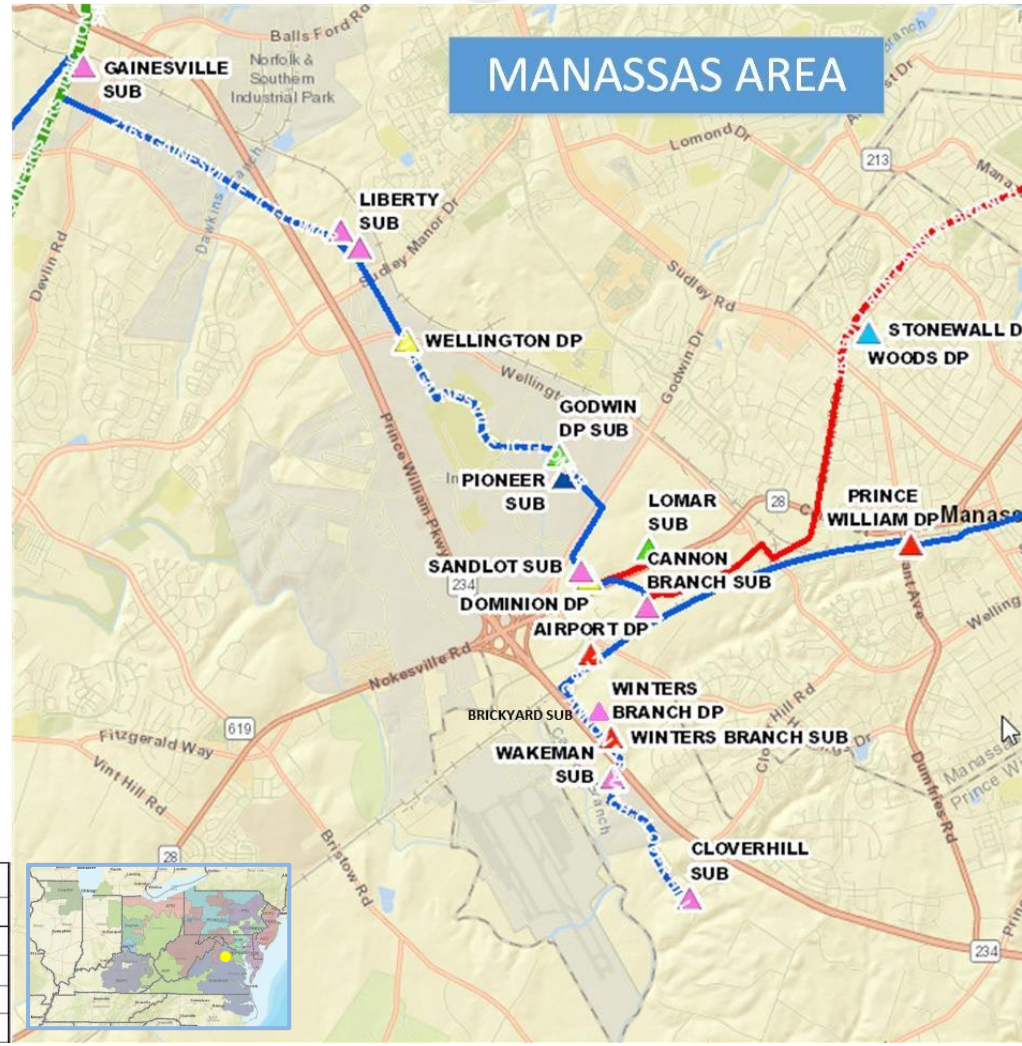
Replace the Gainesville 230kV 40kA breaker "216192" with a 50kA breaker.

Estimated Cost: $45.5 M

- 115kV to 230kV Line Conversion: $ 10 M **(b3246.1)**
- Substation Work for 115kV to 230kV Line Conversion: $ 21 M **(b3246.2)**
- 230kV Line #2011 Extension: $ 10 M **(b3246.3)**
- 230kV Line #2011 Substation Work for Extension: $ 4 M **(b3246.4)**
- Gainesville 230kV "216192" breaker replacement: $ 0.5M **(b3246.5)**

Alternatives: N/A

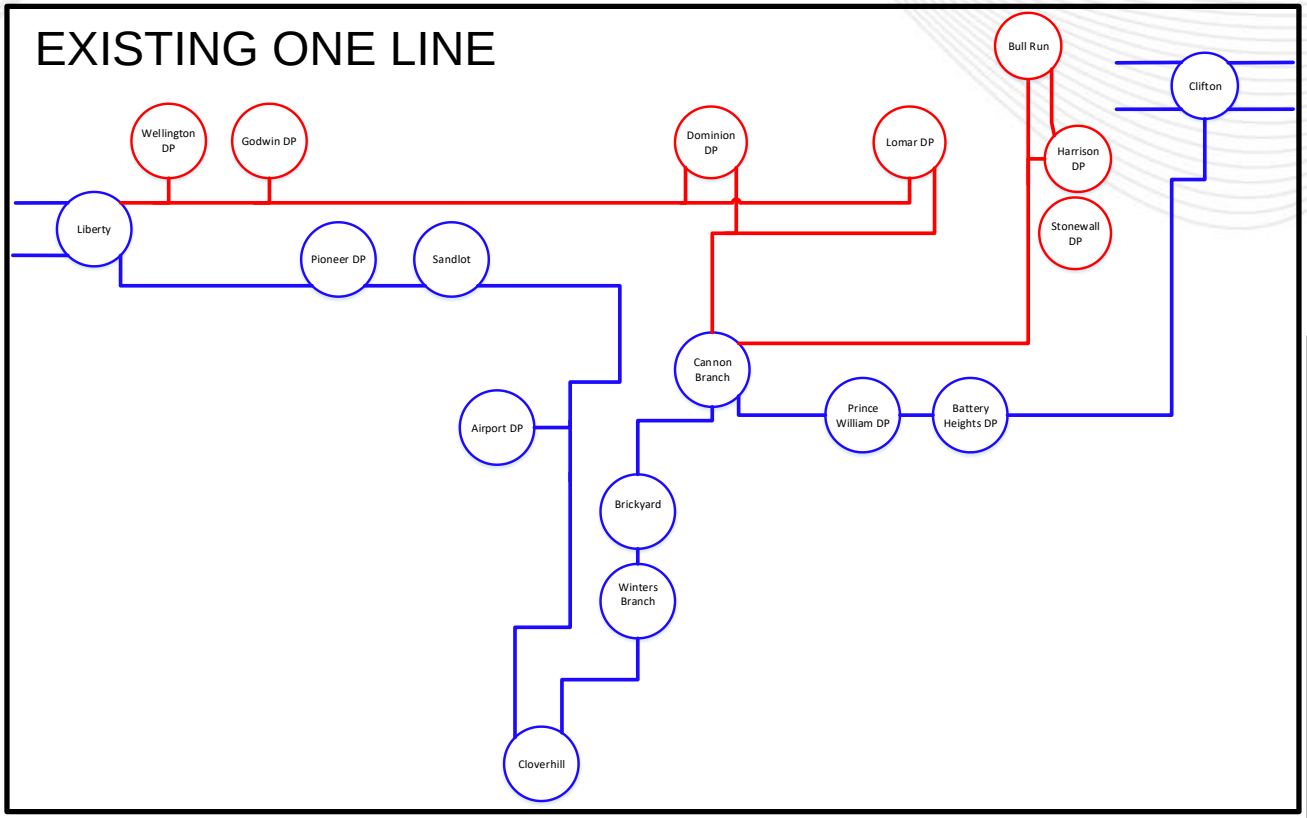
Required In-Service: 12/1/2023



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

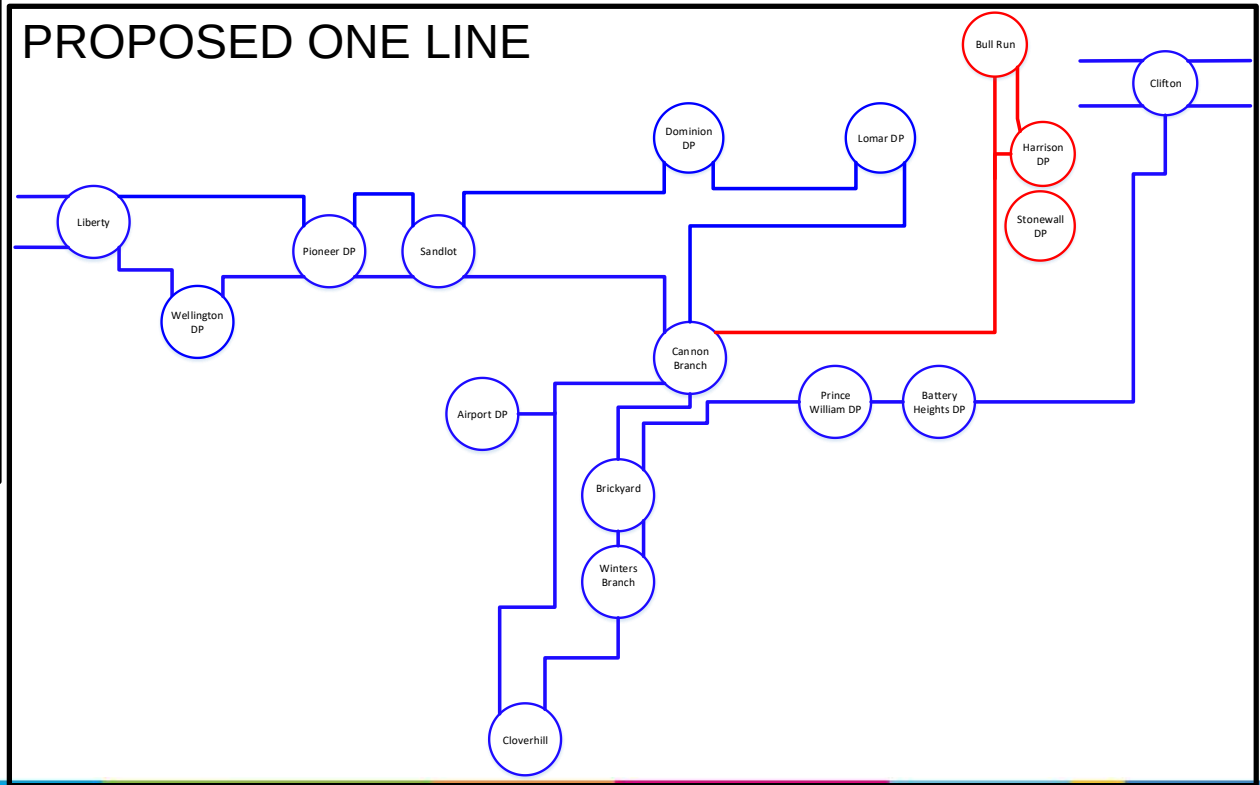
Dominion Transmission Zone: Baseline
Manassas Area

EXISTING ONE LINE



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

PROPOSED ONE LINE



BGE Transmission Zone: Baseline

Process Stage: Second Review

Criteria: Summer Generator Deliverability

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP Summer case

Proposal Window Exclusion: None

Problem Statement: The Constitution to Concord 115 kV circuits # 110567 and 110568 are overloaded for towerline outage loss of the Brandon Shore to Riverside 230 kV circuits #2344 & 2345. The circuits are overloaded in the Summer generation deliverability test.

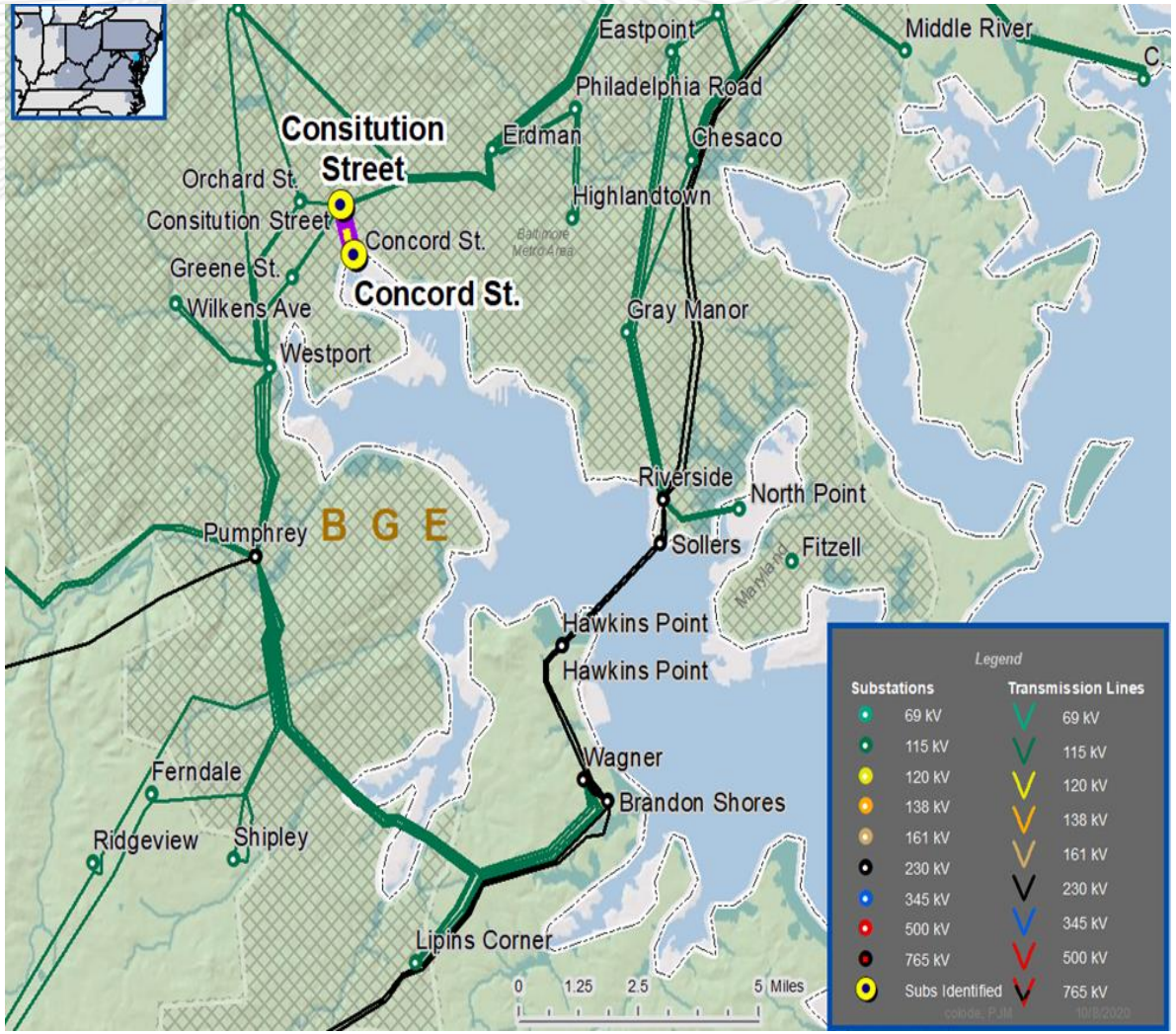
Violations were posted as part of the 2020 Window 1: (FG# GD-S480 and GD-S483)

Existing Facility Rating: 155SN/169SE, 166SN/183SE MVA

Recommended Solution: (Proposal # 2020-1-494)
Replace Pumphrey 230/115kV transformer. (B3305)

Estimated Cost: $4.692M

Required In-Service: 6/1/2025



Penelec Transmission Zone: Baseline

Process Stage: Second Review

Criteria: Summer and Winter N-1-1

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP Summer and Winter cases

Proposal Window Exclusion: None

Problem Statement: Post contingency high voltage violation on the Pierce Brook 345kV substation. The Pierce Brook 345kV bus has high voltage issue for N-1-1 contingency loss of the Pierce Brook – Five Mile 345 kV circuit plus Pierce Brook shunt reactor, and Pierce Brook – Five Mile 345 kV circuit plus Lewis Run - Pierce Brook 230 kV circuits in both summer and winter analysis results.

Violations were posted as part of the 2020 Window 1: FG# N2-SVM52 to N2-SVM55 and N2-WVM15 to N2-WVM19

Existing Facility Rating: N/A

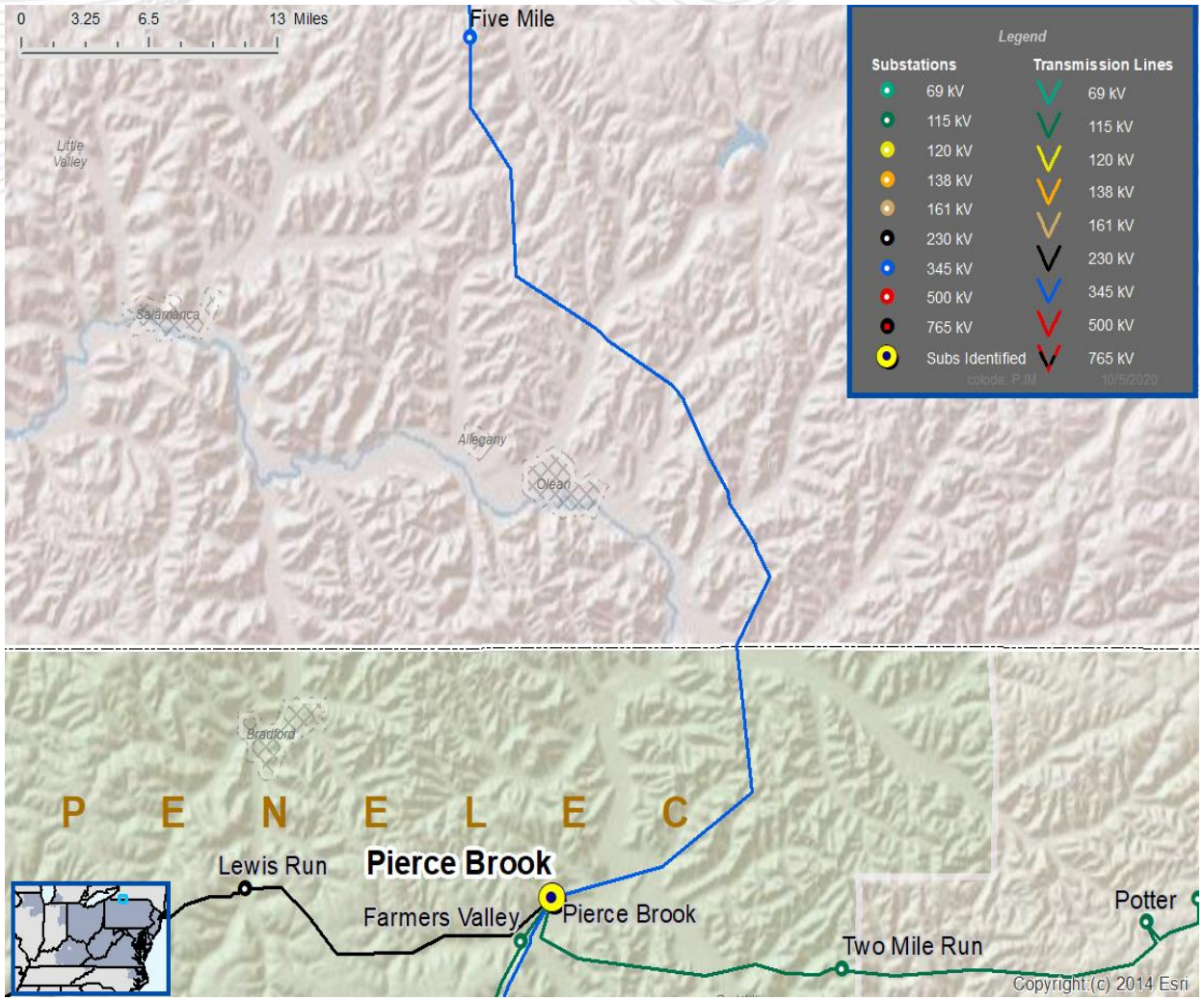
Proposed Facility Rating: N/A

Recommended Solution: (Proposal # 2020-1-855)
Install a second 125 MVAR 345 kV shunt reactor and associated equipment at Pierce Brook Substation. Install a 345 kV breaker on the high side of the #1 345/230 kV transformer.(B3306)

Estimated Cost: $8.08 M

Alternatives: N/A

Required In-Service: 6/1/2025



Competitive Planner Contact Information

- If you have any questions related to Competitive Planning Process and Competitive Planner Tool, please contact ProposalWindow-Admin@pjm.com
- If you need an assistance with registration to Competitive Planner Tool, please contact AccountManager@pjm.com
- PJM Competitive Planning Process Webpage
  https://www.pjm.com/planning/competitive-planning-process.aspx
- Access Competitive Planner tool through PJM Planning Center Webpage
  https://www.pjm.com/markets-and-operations/etools/planning-center.aspx
- Competitive Planner Tool Updates at Tech Change Forum
  https://www.pjm.com/committees-and-groups/tech-change-forum.aspx

Contact

Facilitator:
Sue Glatz,
Suzanne.Glatz@pjm.com

Secretary:
Ilyana Dropkin,
Ilyana.Dropkin@pjm.com

SME/Presenter:
Aaron Berner,
Aaron.Berner@pjm.com

Reliability Analysis Update

Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

Revision History

Version No.	Date	Description
1	11/20/2020	• Original slides posted
2	11/24/2020	• Insert new slides 3 through 21
3	11/25/2020	• Insert new slides 2 through 6 – B2779 update
4	12/2/2020	• Slide #6, Added split costs and miles information for some circuits as requested during TEAC
5	12/15/2020	• Slide #6, Corrected total estimated cost and added projected IS date
6	12/17/2020	• Slide #38, Updated bubble diagram and added location for B3257.7 • Slide #39, Correct the branch name in the preliminary facility rating table