



Reliability Analysis Update

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Transmission Expansion Advisory Committee
January 6, 2021

Changes to Existing Projects

Baseline Reliability Projects

B2832 : Presented in 1/12/2017 and 5/4/2017 TEAC

In 2016 RTEP window #3, Winter Generation Deliverability (FG# 84) :

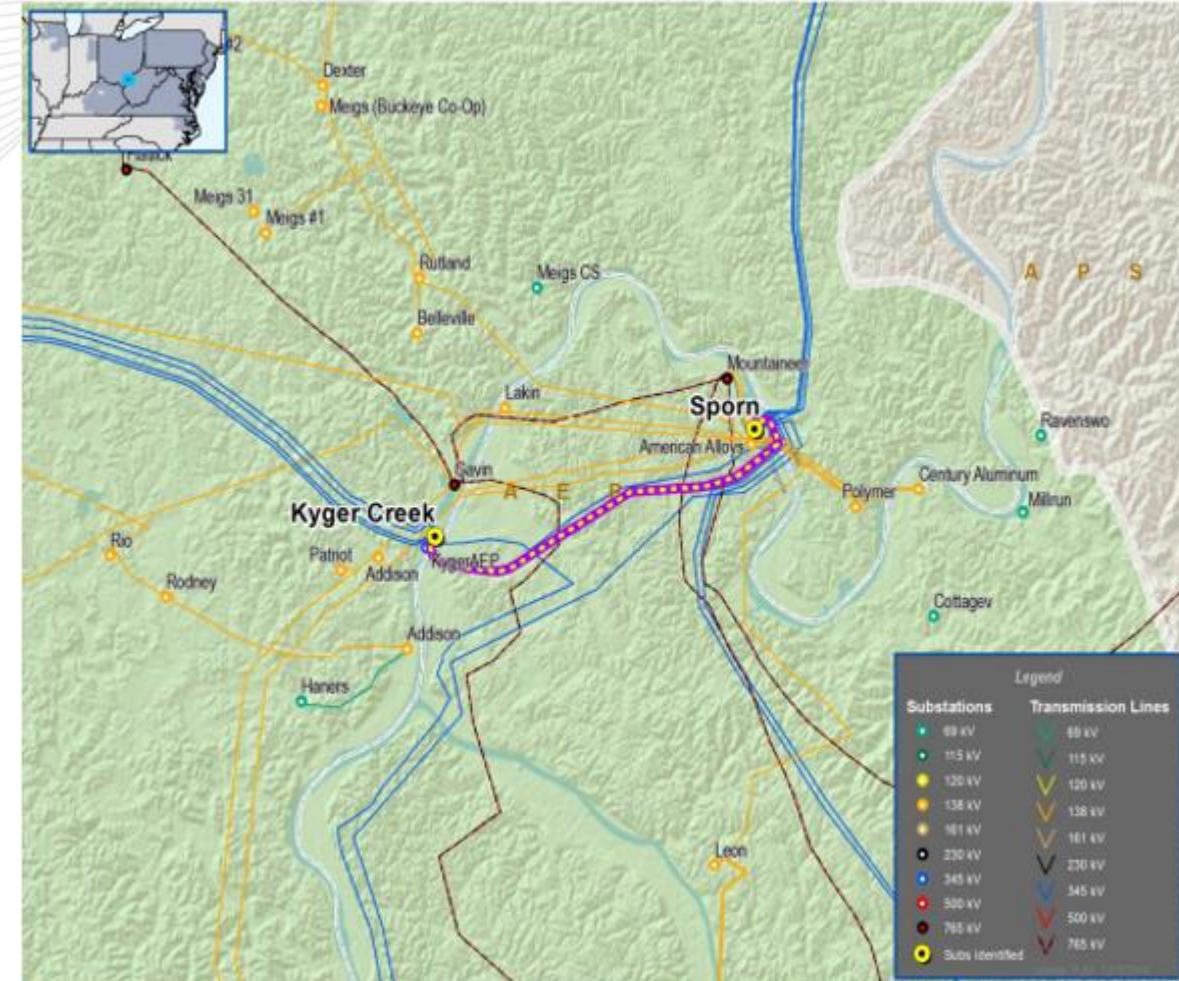
- Kyger Creek to Sporn 345 kV circuit #2 is overloaded for single contingency loss of the Kyger Creek – Sporn 345 kV circuit #1.
- **Alternatives considered:**
 - 2016_3-4B (\$ 15.5 M)
 - 2016_3-4C (~~\$ 0.3 M~~ \$3.0M)
 - 2016_3-5E (\$ 19.8 M)
- **Recommended Solution (old scope):** – Six wire the Kyger Creek to Sporn 345 kV circuits #1 and #2 and convert them to one circuit . (2016_3-4C) (B2832) (Presented in 1/2/2017 TEAC)
- **Estimated Project Cost: \$ 0.3 M**
- **Original Required IS Date: 12/1/2021**
- **Deactivation of Stuart and Killen generators changed the Required IS date to 6/1/2018 (Presented in 5/4/2017 TEAC)**

New Scope: Six wire the Kyger Creek to Sporn 345 kV circuits #1 and #2 and convert them to one circuit **and replace structures outside of the station to complete the six-wire scope.**

Reason for the additional scope: Original scope of work proposed the 6-wire solution to all be done within the station. After engineering work was completed, it was determined that work would be required outside of the station to replace structures to complete the six-wire scope. This additional work is reflected in the revised cost below.

New Estimated Project Cost: \$3.0M

Required IS Date: 6/1/2018



Second Review

Baseline Reliability Projects

Process Stage: Recommended Solution

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 #82 230-46 kV transformer results in a voltage drop violation at the Shingletown 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

Recommended 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. **(B3229.1)**

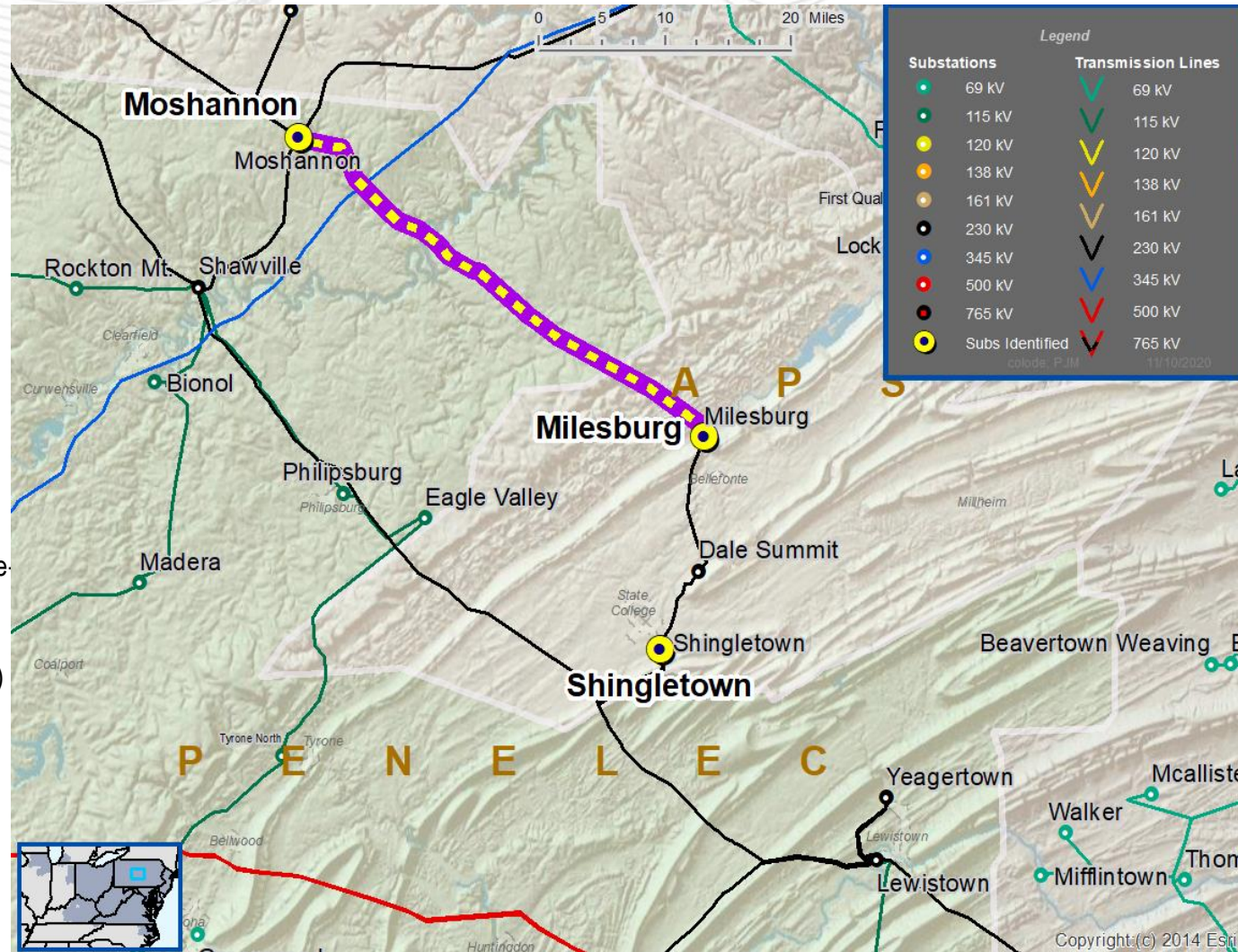
At Shawville Substation (PN Zone) replace the wave trap and substation conductor. **(B3229.2)**

At Lewistown Substation (PN Zone) install direct transfer trip relaying to be compatible with the new Shingletown ring bus relaying. **(B3229.3)**

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: Circuit 1

Process Stage: Recommended Solution

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

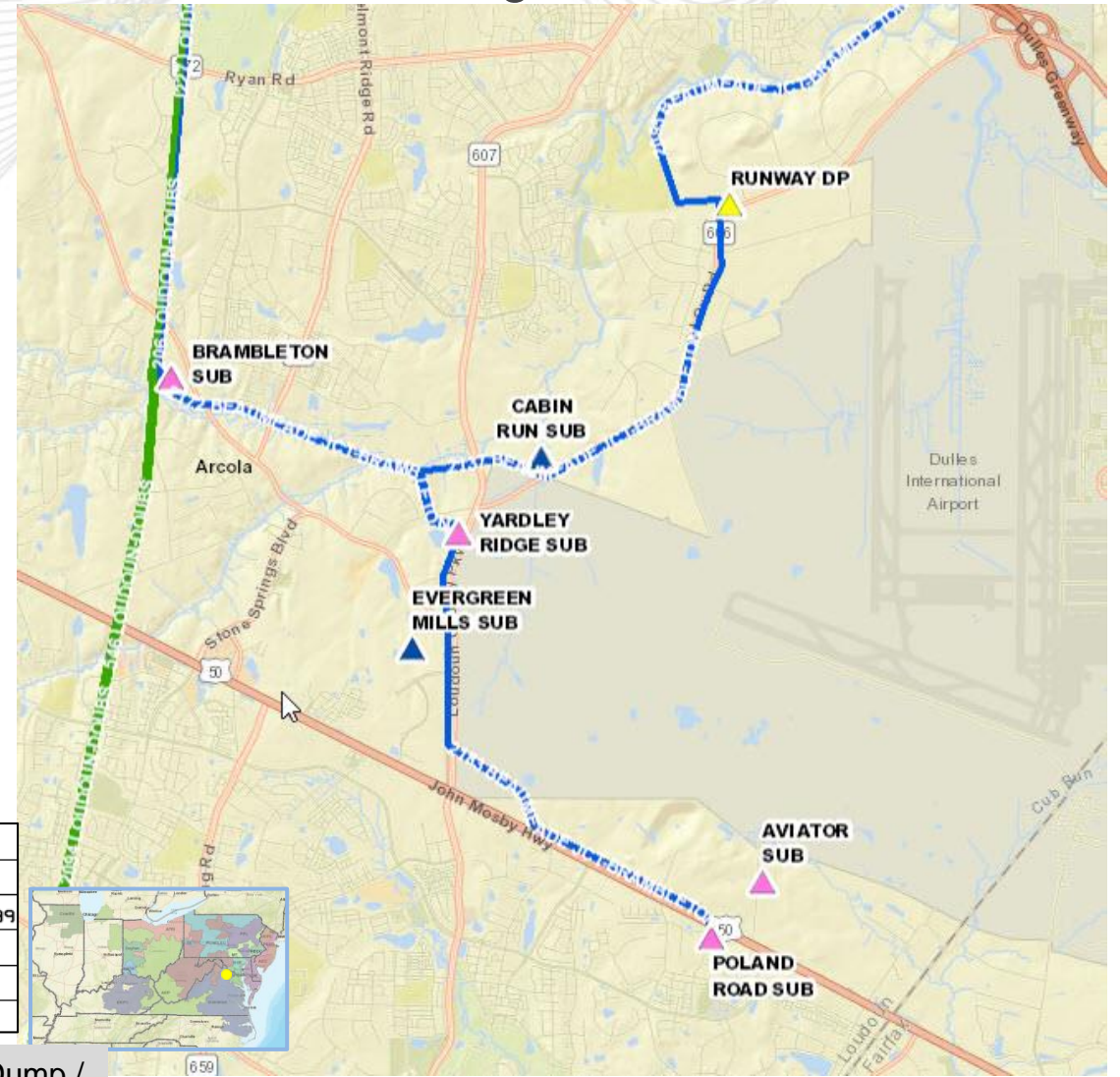
230kV Line #2172 Brambleton – Evergreen Mills is overloaded under various contingency scenarios including N-1, GenDeliv, N-1-1 & Dominion FERC 715 Criteria

Existing Facility Rating:

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

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COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
Green	500 KV.	500 thru 599
Blue	230 KV.	200 thru 299 & 2000 thru 2099
Red	115 KV.	1 thru 199
Orange	138 KV.	AS NOTED
Cyan	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: Circuit 1

Recommended 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. **(B3300)**

Proposed Facility Rating:

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

Estimated Cost: \$2.316 M

Required IS Date: 6/1/2025

Projected IS Date: 6/1/2025

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: Circuit 2

Process Stage: Recommended Solution

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

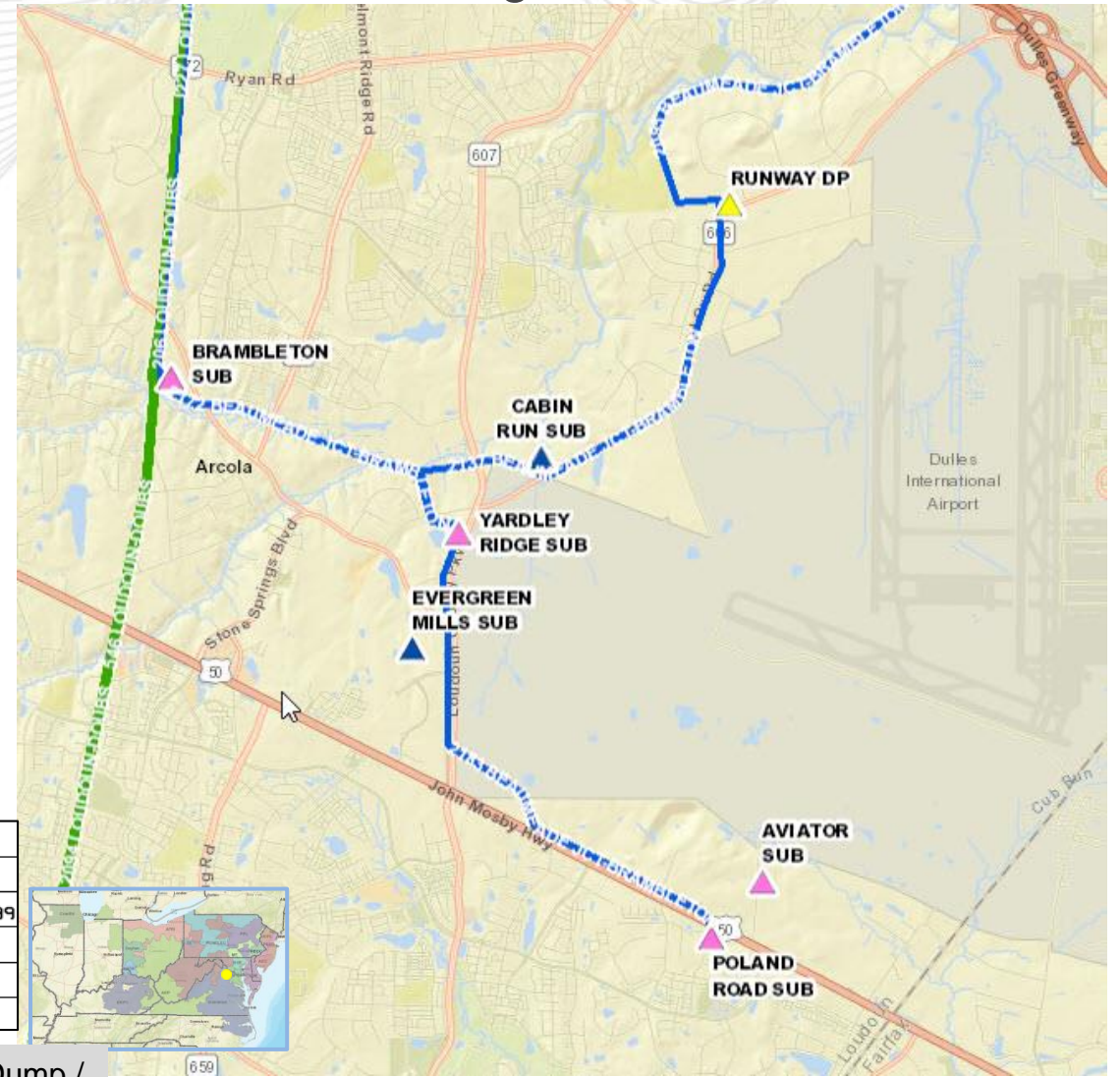
230kV Line #2210 Brambleton – Evergreen Mills is overloaded under various contingency scenarios including N-1, GenDeliv, N-1-1 & Dominion FERC 715 Criteria

Existing Facility Rating:

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

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COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
Green	500 KV.	500 thru 599
Blue	230 KV.	200 thru 299 & 2000 thru 2099
Red	115 KV.	1 thru 199
Orange	138 KV.	AS NOTED
Cyan	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: Circuit 2

Recommended 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. **(B3301)**

Proposed Facility Rating:

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

Estimated Cost: \$2.257 M

Required IS Date: 6/1/2025

Projected IS Date: 6/1/2025

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

Process Stage: Recommended Solution

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

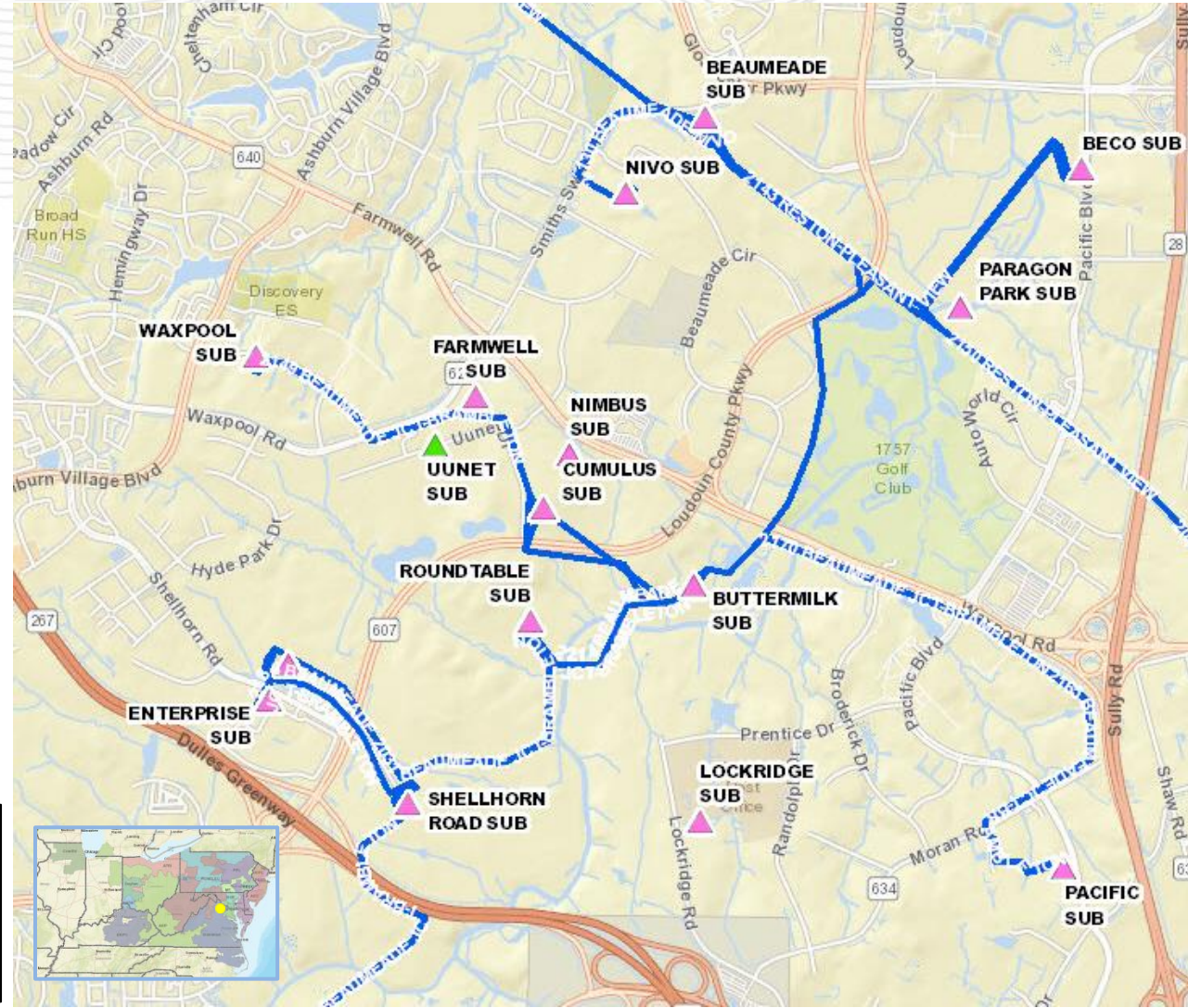
More than 300MW of load is dropped due to the loss of 230kV Line #2149 and 230kV Line #9167 under N-1-1.

Existing Facility Rating:

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

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

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Recommended 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 **(B3303.1)**
Remove Beaumeade 230kV Line #2152 line switch **(B3303.2)**

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

Estimated Cost: \$5.703 M

Required IS Date: 6/1/2025

Projected IS Date: 6/1/2025

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

Process Stage: Recommended Solution

Criteria: N-1-1

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: None

Problem Statement:

N2-ST12

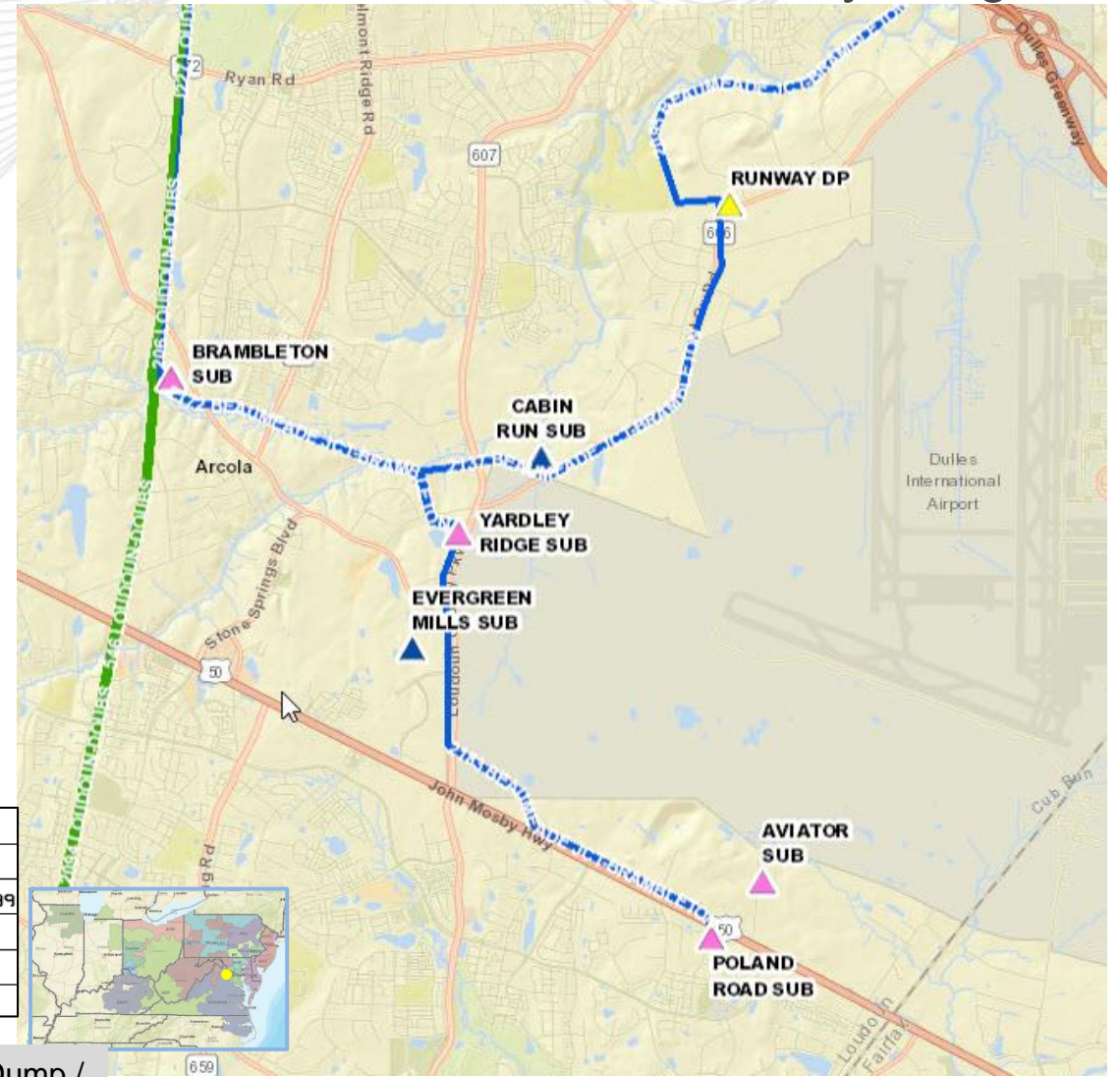
230kV Line #2213 Cabin Run – Yardley Ridge is overloaded for the loss 230kV Line #227 and 230kV Line #274 under N-1-1.

Existing Facility Rating:

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

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COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
Green	500 KV.	500 thru 599
Blue	230 KV.	200 thru 299 & 2000 thru 2099
Red	115 KV.	1 thru 199
Orange	138 KV.	AS NOTED
Cyan	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

Recommended 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. (B3302)

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

Projected IS Date: 6/1/2025

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: Recommended Solution

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:

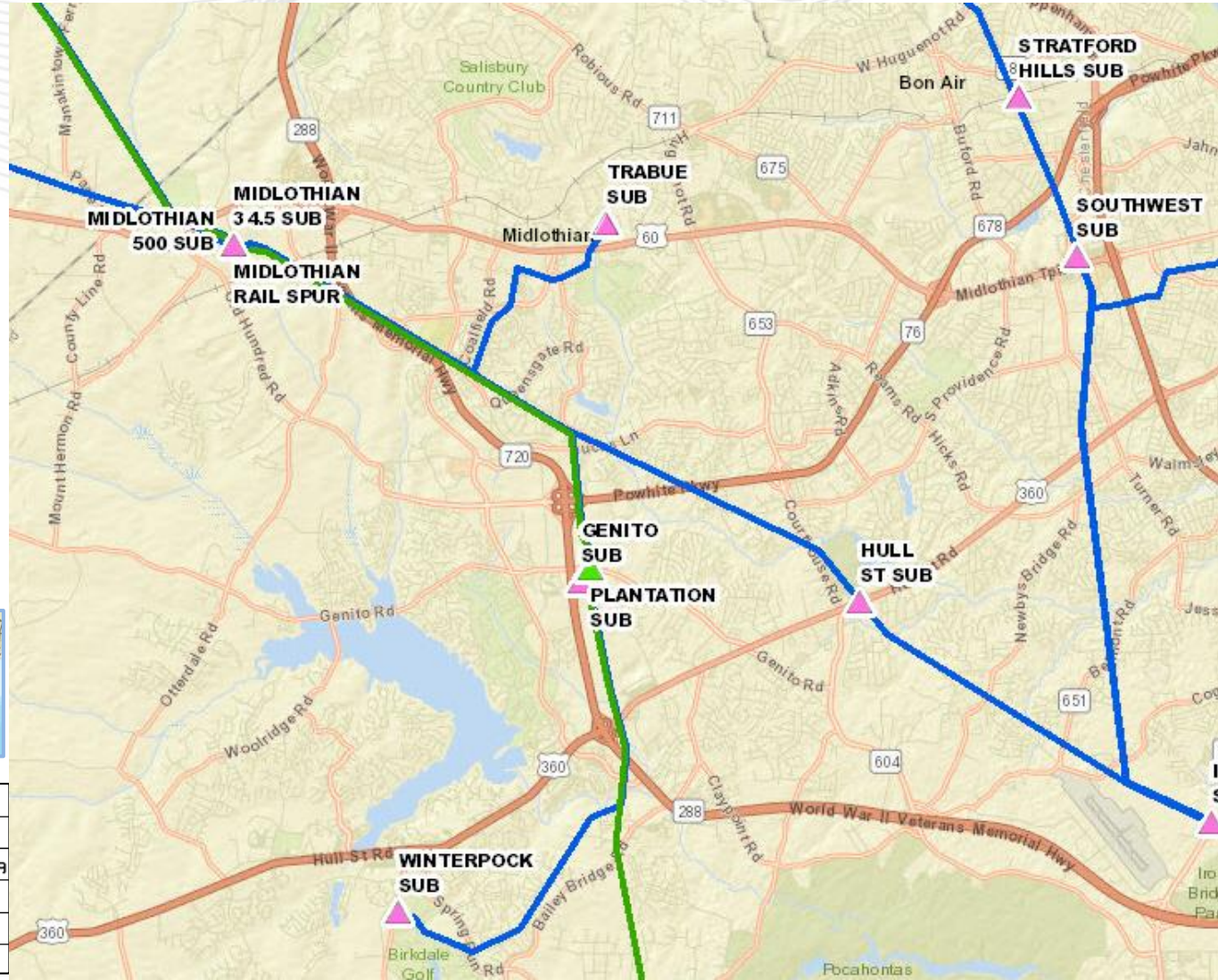
- Tower outage of 230kV Line #219 & 230kV Line #2066
- Line fault stuck breaker associated with 219T2066
- Loss of 230kV Line #219 and 230kV Line #2066 under N-1-1.

Existing Facility Rating: N/A

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





Recommended Solution:

Proposal #2020_W1-860:

1. Cut 230kV Line #2066 at Trabue junction **(B3304.1)**
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; **(B3304.2)**
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 **(B3304.3)**
4. Create new line terminations at Midlothian for the new Midlothian-Trabue lines. **(B3304.4)**

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

Estimated Cost: \$6.219 M

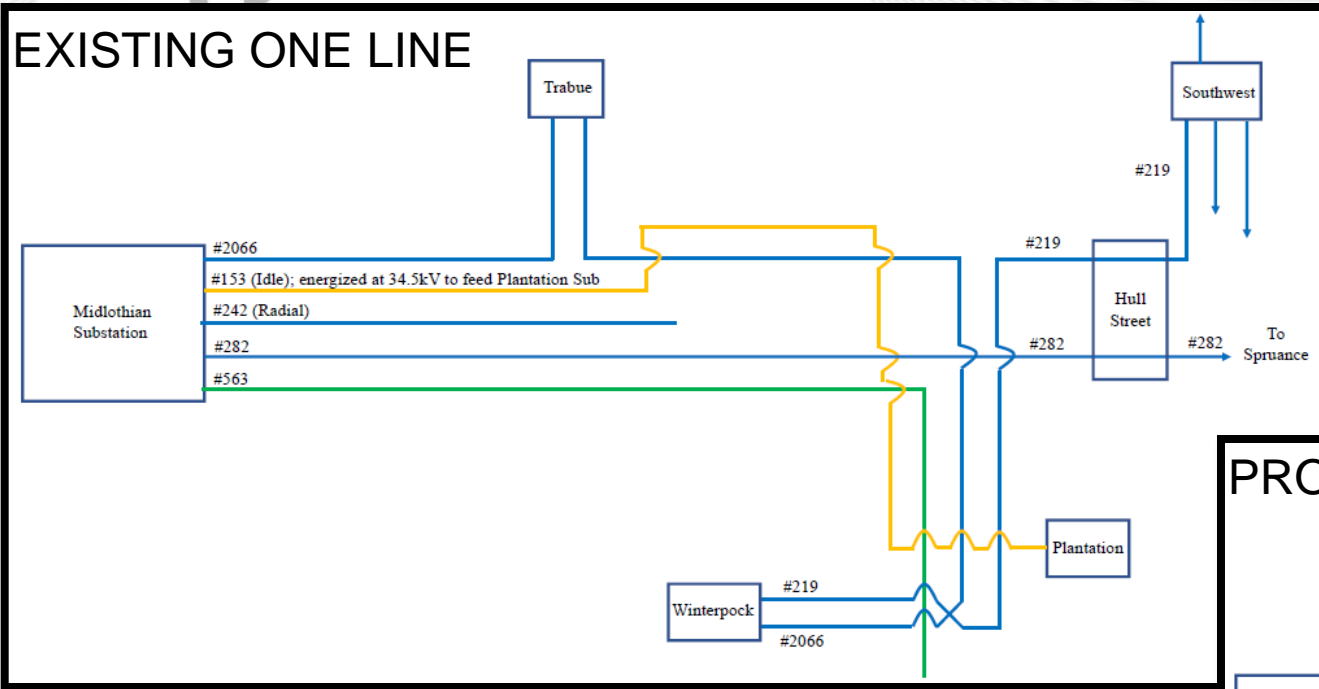
Required IS Date: 6/1/2025

Projected IS Date: 6/1/2025

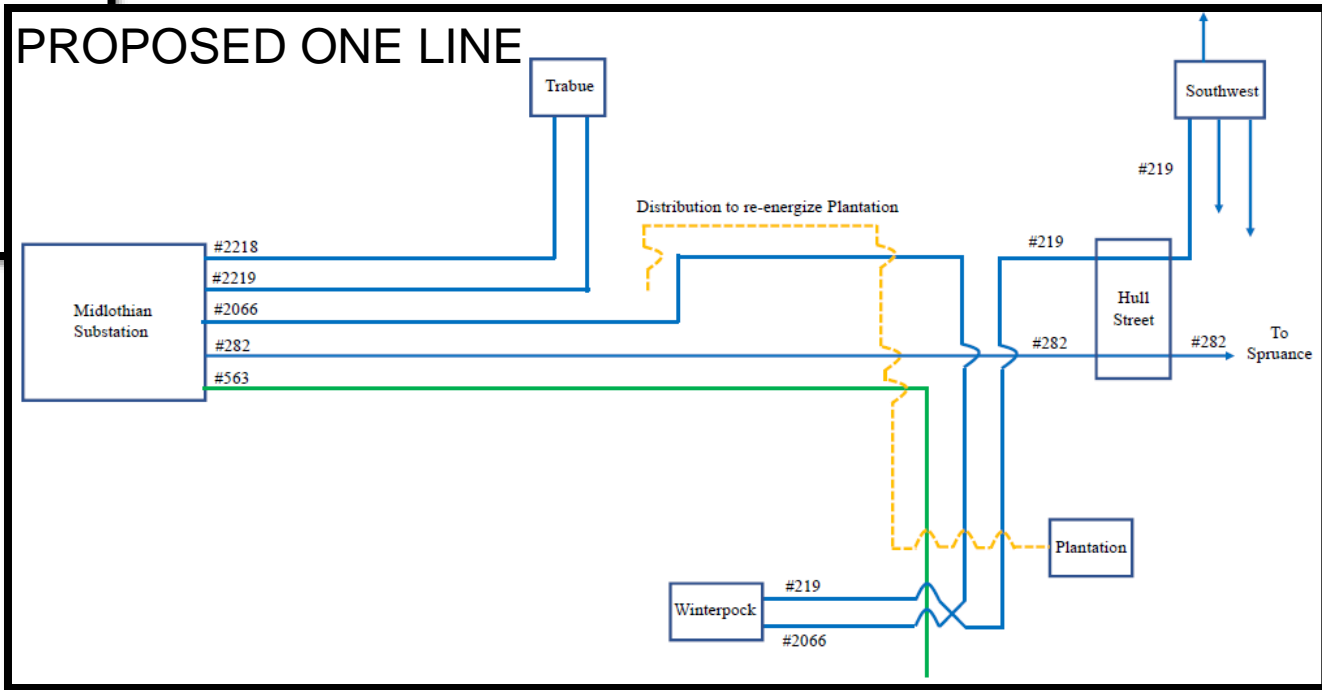
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EXISTING ONE LINE



PROPOSED ONE LINE





AEP Transmission Zone: Baseline Mount Vernon area

Process Stage: Recommended Solution

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

Recommended 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'. (B3312)

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

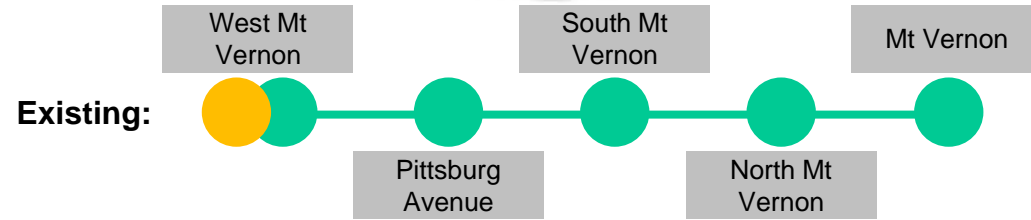
Estimated Cost: \$12.926M

Required IS Date: 6/1/2025

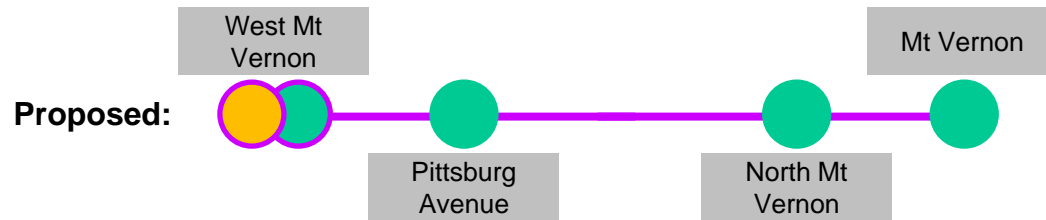
Projected IS Date: 6/1/2025

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



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



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Reliability Analysis Update



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Version No.	Date	Description
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