



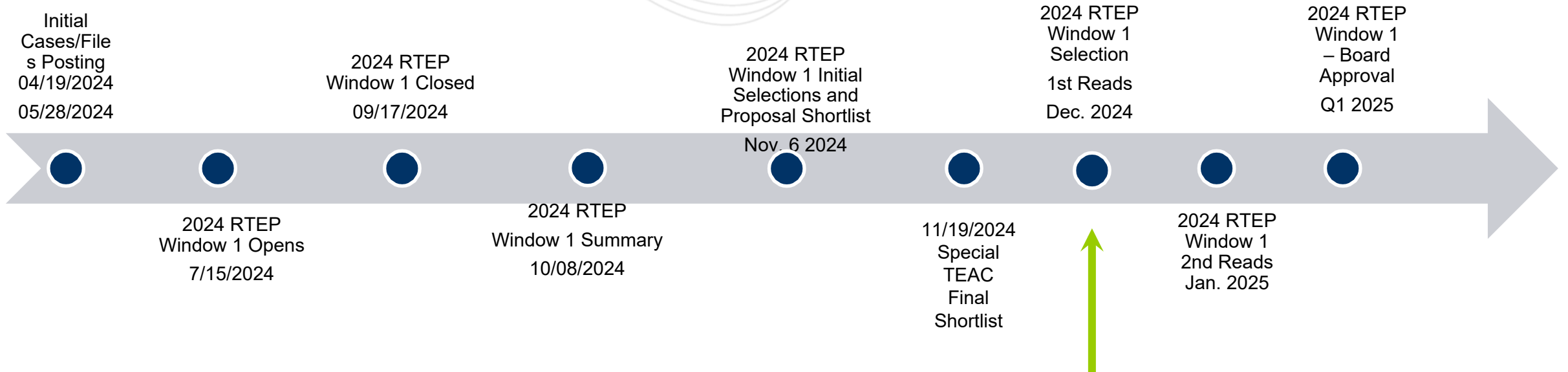
# Reliability Analysis Update

Sami Abdulsalam, Director  
PJM Transmission Planning

Transmission Expansion Advisory  
Committee  
December 3, 2024

- Window Timeline and Status
- Needs Summary, Proposals and Evaluation Criteria
- Recommended Solutions – Summary and Rationale
  - 15 Year Analysis
- 2024 RTEP W1 - Second Read (Local projects/clusters)
- 2024 RTEP W1 – First Read (Local projects/clusters)
- 2024 RTEP W1 – First Read( Regional cluster)
- 2024 RTEP W1 – First Read Short Circuit Evaluation
- Next Steps

# 2024 RTEP Window 1 Updates



**Heavy transmission interface flows west to east driven by load increase in Dominion/East. PJM earlier identified need for additional west-east reinforcement is materializing earlier – higher forecasted load in MAAC/Dominion/APS.**

- 10 GW and 15 GW of load increase for 2029 and 2032 respectively between the 2022 LF and 2024 LF
- The load growth is attributed primarily to data centers and some electrification/EV loads.

**Proposed reinforcements through 2022 RTEP Window 3 and 2023 RTEP Windows 1 and 2 are performing well.**

No major transmission upgrades identified east of DOM/APS.

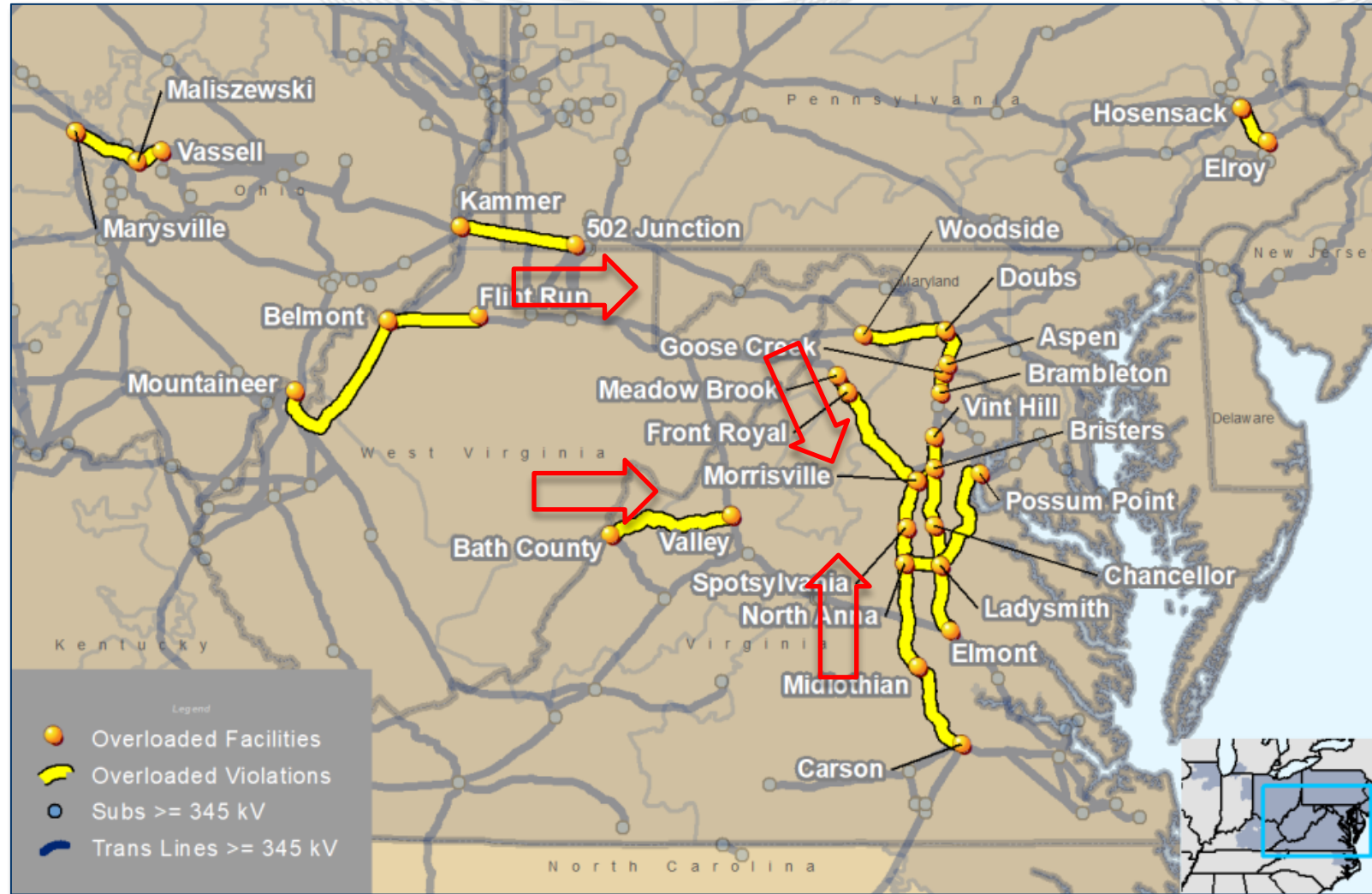
**In addition to regional transfer requirements, there are load pockets that need to be addressed in AEP, ATSI, Dominion, PECO, BGE and PPL transmission zones.**

Primarily due to shift in generation flow as a result of overall system load increase and +2 GW of generation deactivations.

**The eight-year RTEP (2032) scenarios mainly focus on right-sizing solutions.**

- Long-lead transmission needs (capture long-lead items).
- Check/confirm impact of “forecast” generation on transmission needs identified in the five-year model.
- PJM will also be considering robustness of the solutions in view of the anticipated 2025 PJM Load Forecast.

# 2024 RTEP Window 1 Needs: 500 kV & 765 kV



Window **opened**  
July 15, 2024

*60-Day Window*

Window **closed**  
Sept. 17, 2024

**94 total proposals** submitted from 16 different entities  
(10 incumbent and 6 non-incumbent).

**40** Greenfield Projects  
and **48** Upgrades

**6** Joint Proposals  
(Parent Projects – representing  
combinations of select projects from above  
group)

**~\$50 B** Total Proposals  
Value – Only a fraction of it  
will be selected.

- Several proposals have cost containment commitments – mostly minor (e.g., engineering).
- Proposals range from simple upgrades to facilities, to new extra-high-voltage transmission lines and facilities.
- Targeting Q1 2025 Board approval – December and January for TEAC first and second reads

### All proposals submitted to address west-east regional flows recommended 765 kV solutions:

A number of proposals attempt to address in-zone N-1-1 conditions that were found to be alleviated with the selected regional solutions. These needs will then be eliminated accordingly (Primarily in PPL zone).

- Multiple proposals recommend variants of Joshua Falls/Axton-Morrisville area 765 kV development.
  - Transource (Dominion, FirstEnergy, and Transource)
  - LS Power
  - NextEra
- The Joint Planning Proposals (by DOM/FE/Transource) recommend a northern, John Amos-Northern Virginia 765 kV development.
- West-east regional solutions will include at least one variant of these proposals for a 765 kV development, plus accompanying 500 kV and 765 kV upgrades.

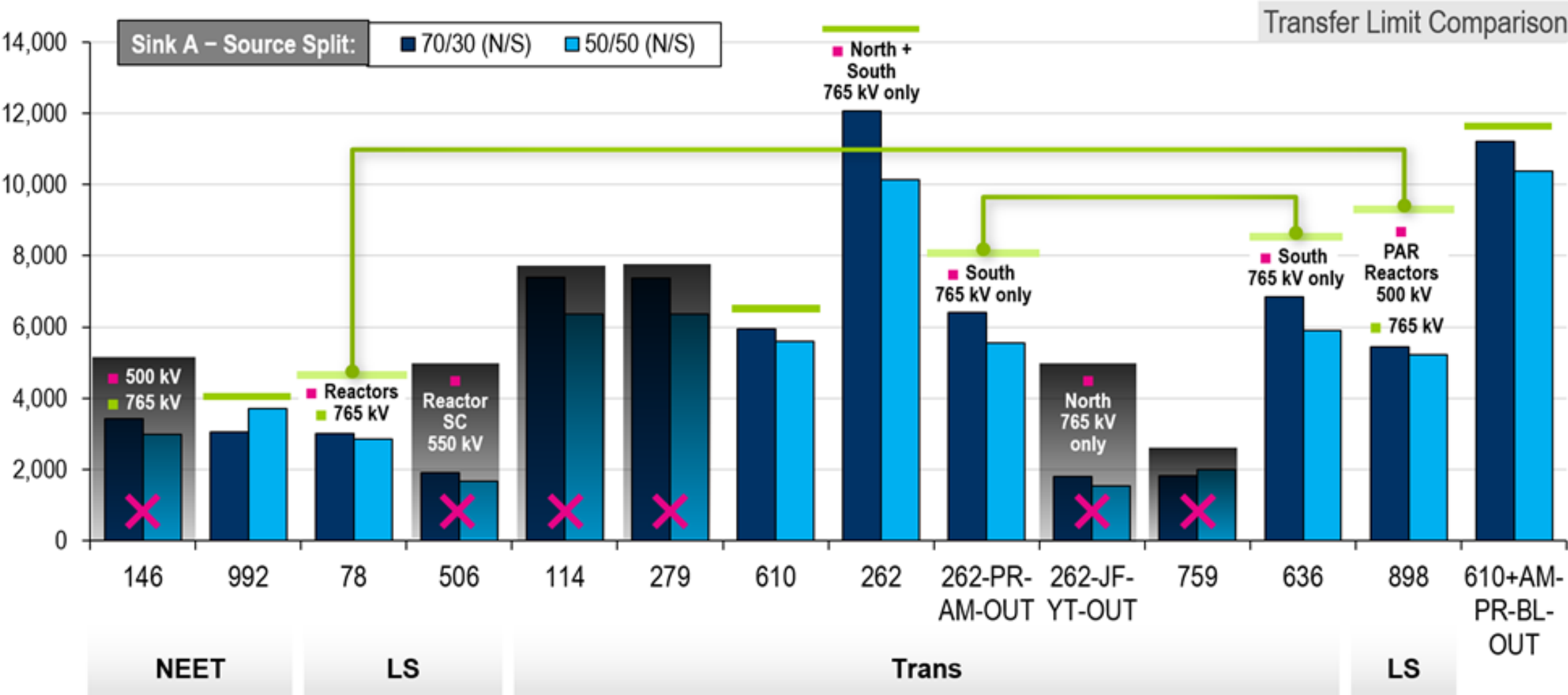
|                                                |                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Individual Proposal Screening                  | Complete                                                                                                                                                                                                                                                                                                                                                                                 |
| Baseline Scenarios Were Developed and Analyzed | <ul style="list-style-type: none"> <li>Preliminary analysis shows good performance of a number of holistic proposals (joint proposals and those submitted to cover both regional transfer and local needs combined).</li> <li>PJM developed scenarios incorporating (or eliminating) components to identify an optimal combination yielding better performance.</li> </ul>               |
| Transfer Capability Analysis                   | PJM conducted Transfer Capability analysis for key proposals — regional west-east needs. More than 16 Source-Sink scenarios analyzed (for all preliminarily shortlisted proposals)                                                                                                                                                                                                       |
| Scenario Analysis                              | <ul style="list-style-type: none"> <li>PJM scenario analysis considered variants to where both future generation (west-north and west-south) may materialize and ratio of future load growth split (DOM, PPL and PSEG “Eastern MAAC”).</li> <li>Full scenario details and evaluation results were shared at the November 19<sup>th</sup> TEAC together with a final shortlist</li> </ul> |

### Scenarios with their associated proposed developments will be ranked based on:

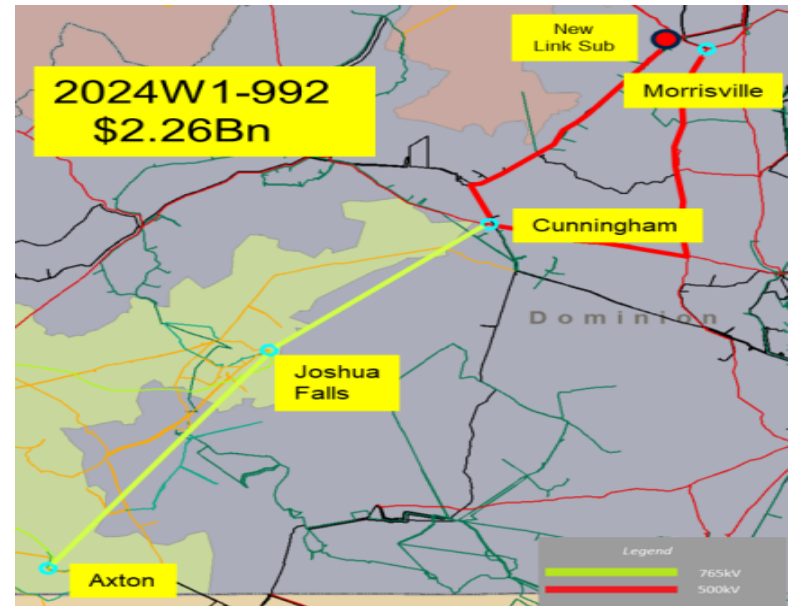
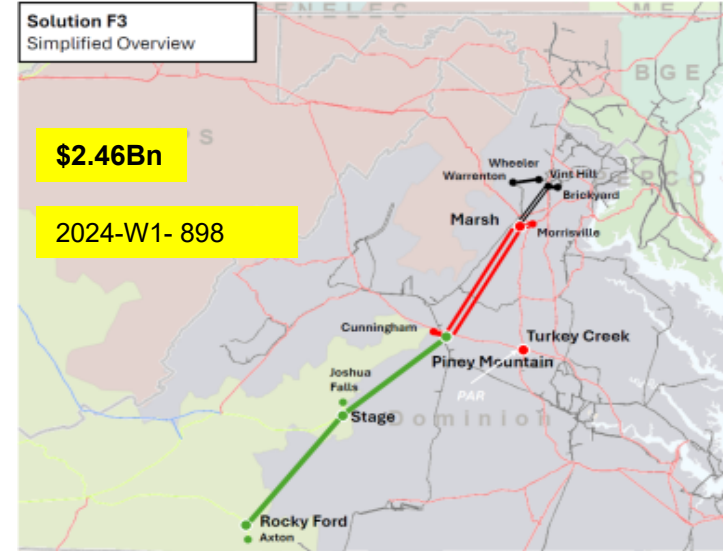
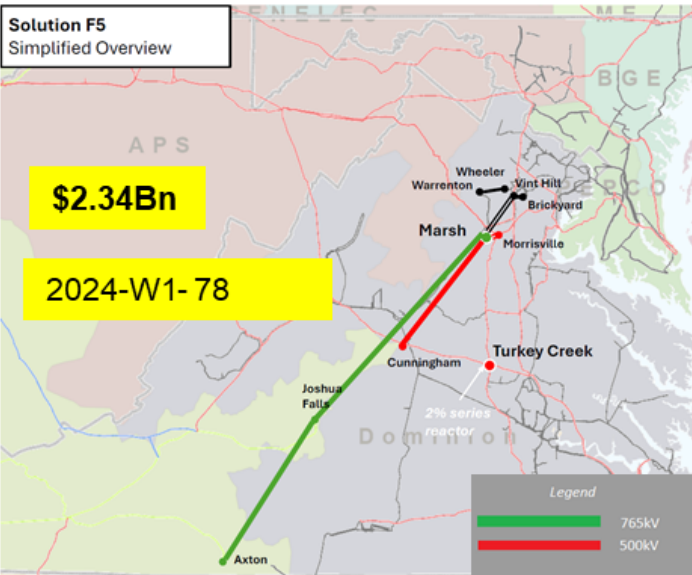
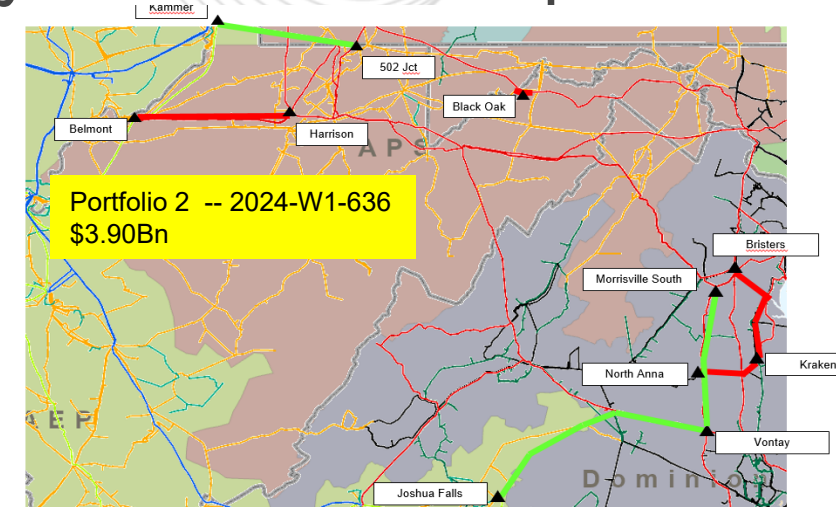
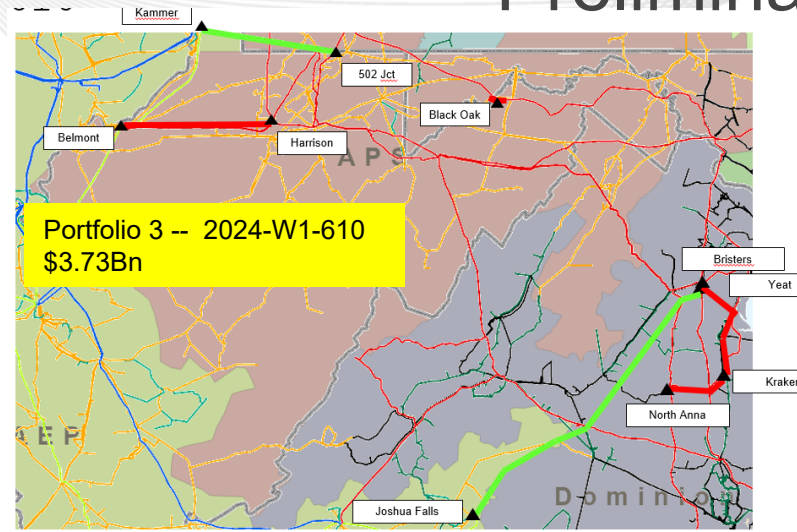
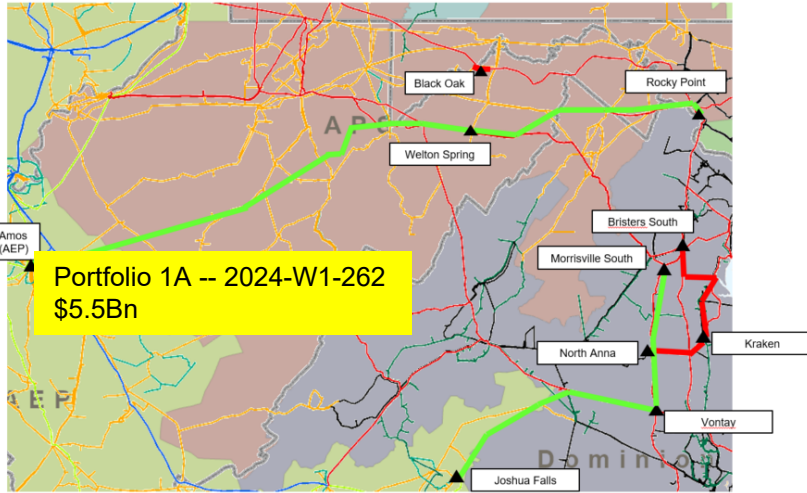
|                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Meeting the system needs of 2029 (all kV levels) and 2032 (long-lead reinforcements)                                                                                                                                                                                                                                                                                                         | Being scalable/flexible to address forecasted needs going forward (for right-sizing and limiting disruption)<br><br>Anticipated load growth to be included in the PJM 2025 Load Forecast (Eastern PJM/MAAC), which will further increase west-east flow requirements from modeled 2024W1 base models. |
| Utilization of existing ROWs and brownfield development/expansion (where possible and efficient)<br><br><ul style="list-style-type: none"> <li>Greenfield developments will be required, particularly along all proposed 765 kV solutions – Varying degrees.</li> <li>Expansion to existing 500 kV ROWs instead of wreck and rebuild due to outage and scheduling considerations.</li> </ul> | Cost evaluation using third-party cost benchmarking metrics – weak cost containment provisions                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                              | Proposing entity experience in developing and operating 765 kV facilities                                                                                                                                                                                                                             |

# Regional Transfer Performance – Key Proposals

Bulk Transfer Capability (DC) and Preliminary Shortlist



# Common Merits among Preliminary Shortlisted Proposals



# Common merits among Preliminary Shortlisted Proposals

- All shortlisted proposals offer a Joshua Falls/Axton 765kV greenfield line “towards” the Morrisville 500 kV Station
- While all preliminary short listed proposals meet the posted need (at varying degrees), some offer more complete and even additional benefits / robustness merits such as;
  - Stronger 765 kV support to the heart of the Dominion system vs 500kV
  - Covering and encompassing a wider geographic area where load is growing
  - Providing flexibility, softening operational risk of outages (to upgrade existing transmission) and relief to existing constraints on the system (Stability)
- One proposal offers considerably higher transfer capability (2 x 765 kV lines – South and North);
  - Allows for more flexibility between north and south transfers in near term
  - Enhanced resilience and reliability levels
  - Supports future load growth in Eastern PJM and other longer term needs.

- Sink Definitions

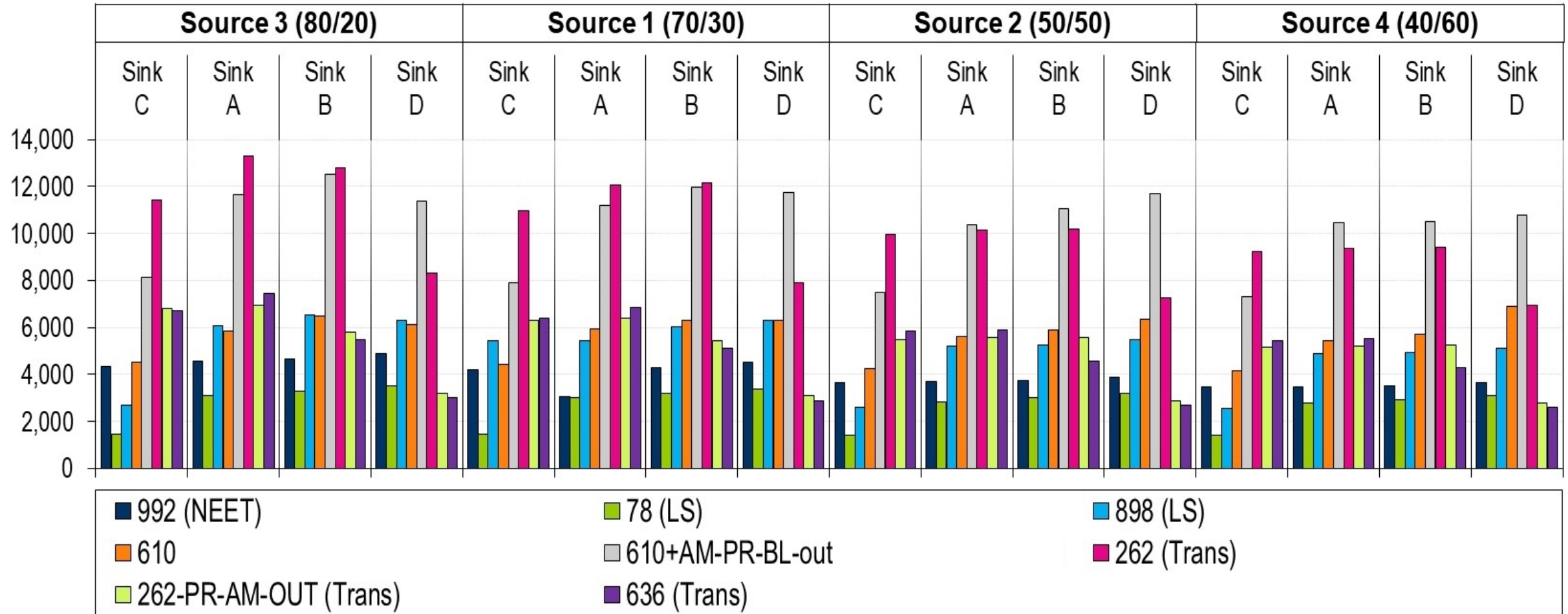
| Sub System | Sink A | Sink B | Sink C | Sink D |
|------------|--------|--------|--------|--------|
| PSEG       | 5.8%   | 5.5%   | 5.8%   | 0.0%   |
| PPL1       | 23.0%  | 26.0%  | 17.2%  | 40.0%  |
| PPL2       | 34.5%  | 39.0%  | 23.0%  | 60.0%  |
| DOM1       | 23.0%  | 13.0%  | 20.1%  | 0.0%   |
| DOM2       | 0.0%   | 0.0%   | 20.1%  | 0.0%   |
| APS        | 13.8%  | 15.6%  | 13.8%  | 0.0%   |

- Source Definitions (North/South (Western PJM) %age surplus gen)

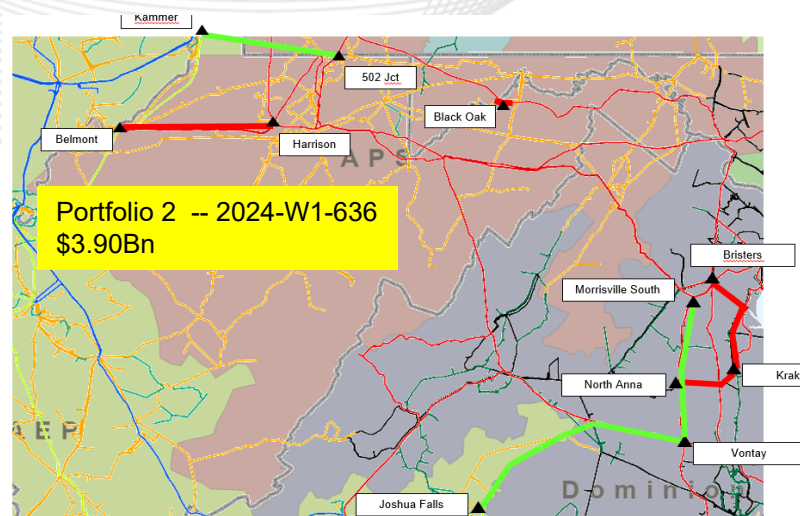
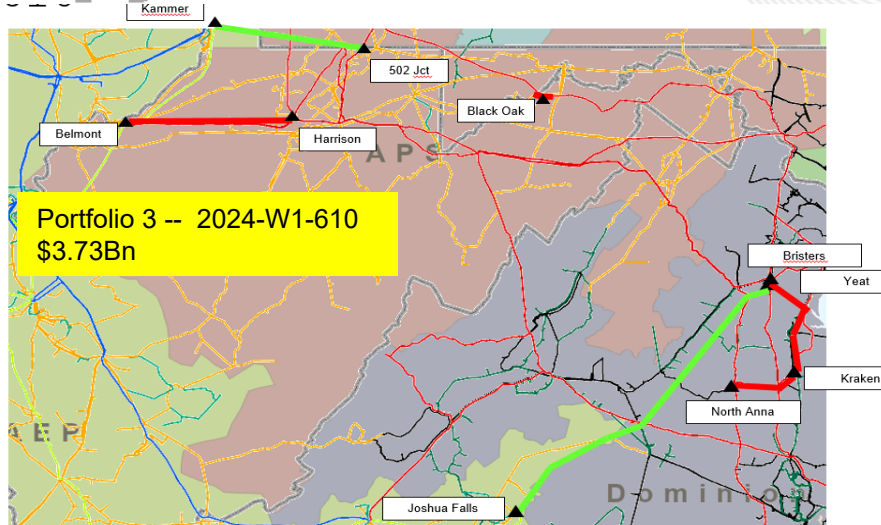
| Source 3 | Source 1 | Source 2 | Source 4 |
|----------|----------|----------|----------|
| 80/20    | 70/30    | 50/50    | 40/60    |

# Regional Transfer Performance – Key Proposals

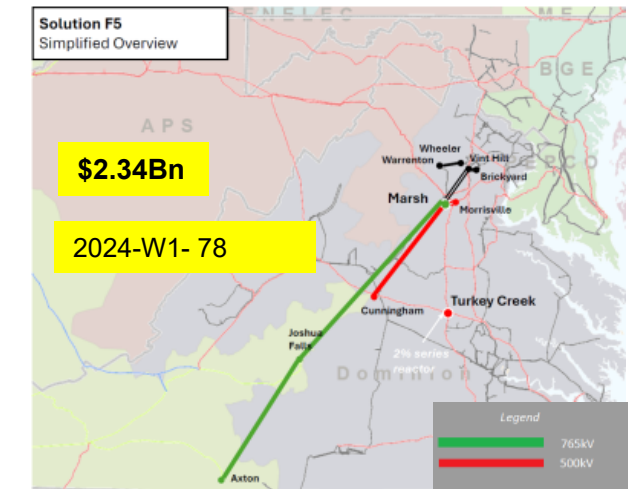
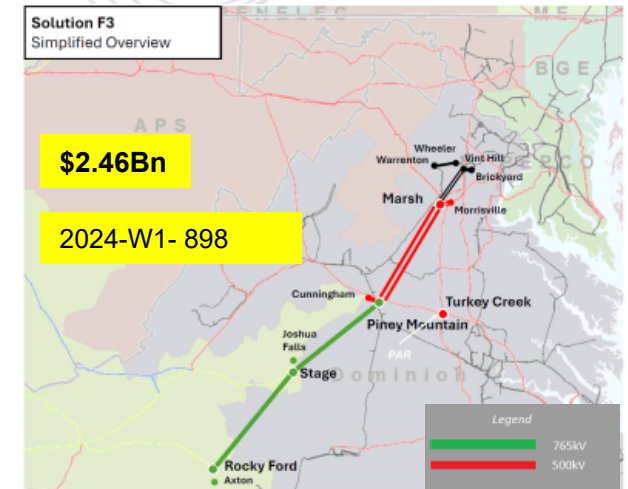
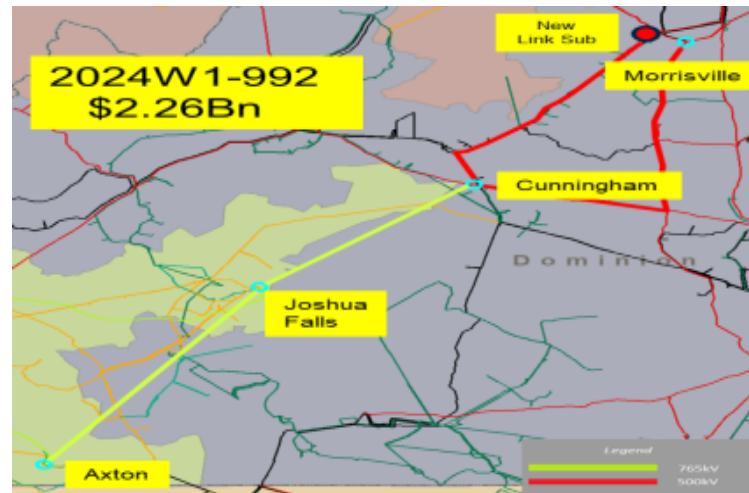
Bulk Transfer Capability (DC) and Preliminary Shortlist



# Focusing on Short-listed proposals offering “similar” merits

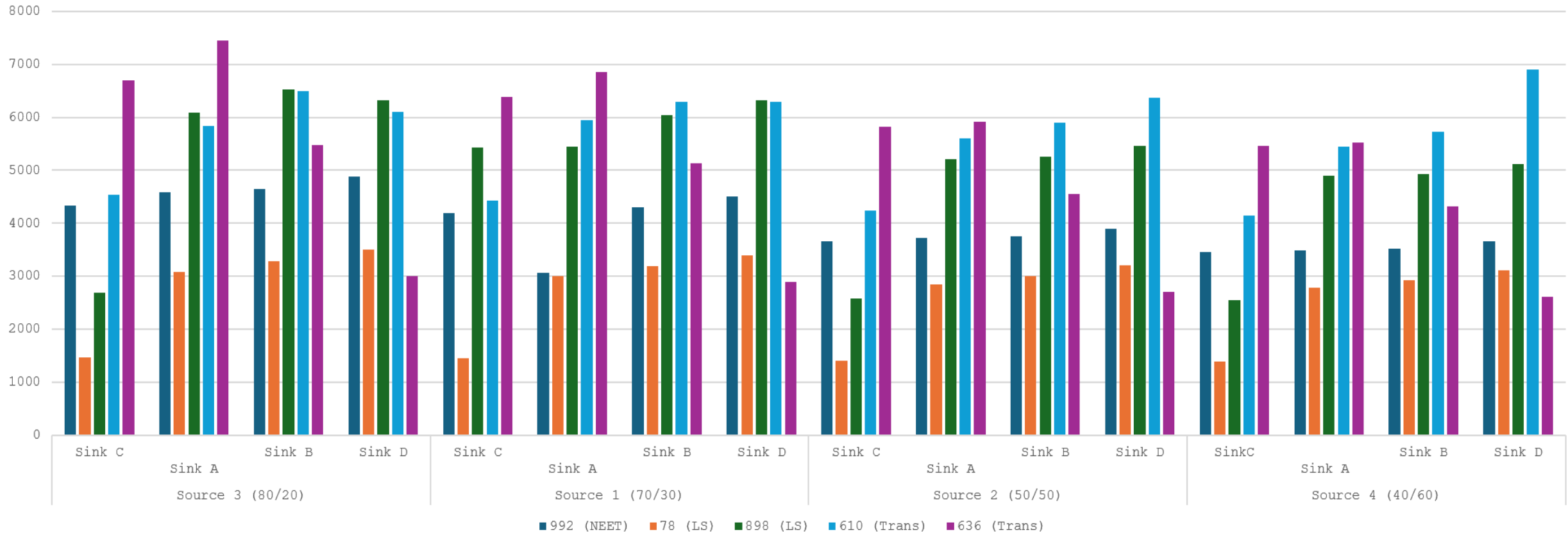


- All proposals offer similar concepts providing a new 765 kV source from Joshua Falls or Axton towards the Morrisville area
- Proposals 636 and 610 offer a 500kV reinforcement along the Dominion N-S 500kV corridor and through a load growth area as well as 500 or 765 kV reinforcement along the northern 500kV transfer corridor. Proposals 636 and 610 could be staged as needs arise and unfold
- Proposal 78 and 898 offer a direct, 765 kV greenfield line between Axton and Morrisville (through Joshua Falls) and a greenfield 500 kV line between Cunningham and Morrisville, and various 230kV reinforcement (Marsh-Vint Hill and Wheeler-Warrenton)
- Proposal 992, 78 and 898 do not address all needs inside the Dominion system of more “regional / Dominion Internal nature”
- Proposals 78, 898 and 992 introduce an additional 765kV segment (compared to 636 and 610) between Joshua Falls and Axton ~ 60 Miles long



# Incremental Transfer Capability

## Preliminary Short-listed proposals offering “similar” merits





# Preliminary Short-listed proposals offering “similar” merits

## Proposals 636, 610, 78, 898 and 992

- Proposals 610 and 636 (could be staged as need materializes)
  - Offer the highest incremental transfer capability among preliminary short list proposals.
- Regardless of (Source/Sink Combination), either 610 or 636 offer the highest transfer capability.
- Proposals 636 and 610 do not require the additional 78 Miles of 765 kV line (Joshua Falls – Axton)
- Proposals 636 and 610 offer expandability and staging while also extends service reach to the eastern side of the constrained area where load is growing rapidly.

## Incremental Transfer Capability (including Proposal 262 and its variants)

- It is clear that Proposal 262 and its variants (adds 1x765kV path in the north), offers a much higher incremental transfer capability compared to all other proposals.
- This is an added benefit on top of what is offered by the other smaller group of projects (610, 636, 78, 898 and 992)
- Proposal 262 offers a strong incremental transmission capability addition, regardless of the sink / source combination studied.
  - Offers additional needed support for load growth and transfer requirements towards MAAC.

- The Following Proposals are selected for further evaluation (Short-Listed):
  - Proposal # 636
  - Proposal # 610
  - Proposal # 262
- All other proposals part of the preliminary shortlist are not subject to further consideration.



# 15 Year Analysis Result – 2024 RTEP

## Current PJM Planning Manual M14B Process

- Objective:
  - Identify long lead needs for 230 kV or above circuit to support load growth in years 6 through 15
- Study Result:
  - Identified 30 potential overloads at 230 kV or 345 kV in years 6 through 12
  - Identified 21 potential overloads at 500 kV or 765 kV in years 6 through 15
- Assessed Proposal 262 Performance ONLY:
  - Large number of violations addressed or pushed over
  - Analysis will be further refined and finalized by the January TEAC

| Season           | Contingency  | Fr Bus | Fr Name      | To Bus | To Name      | CKT | KV  | Areas   | 100% Year      | 100% Year Proposal 262 |
|------------------|--------------|--------|--------------|--------|--------------|-----|-----|---------|----------------|------------------------|
| Summer           | Single       | 207930 | BUSH         | 206242 | 28KITATINY   | 1   | 230 | 229/228 | 2033           | 2034                   |
| Summer           | Single       | 207950 | CUMB         | 208141 | WIGR         | 1   | 230 | 229/229 | 2033           |                        |
| LL               | Tower        | 207968 | ELIM         | 208109 | SUNB         | 1   | 230 | 229/229 | 2032           | 2032                   |
| Summer           | Single/Tower | 208004 | JUNI         | 207950 | CUMB         | 1   | 230 | 229/229 | 2031/2036      |                        |
| Summer           | Single       | 208012 | LMBE         | 208025 | MACR         | 1   | 230 | 229/229 | 2032           | 2032                   |
| Summer           | Single       | 213520 | CONOWG03     | 214218 | NOTTINGH2    | 1   | 230 | 230/230 | 2034           | 2034                   |
| Summer           | Single       | 213519 | CONOWG01     | 231006 | COLOR_PE     | 1   | 230 | 230/235 | 2031           | 2031                   |
| Winter           | Tower        | 227955 | CEDAR        | 206302 | 28OYSTER C   | 1   | 230 | 234/228 | 2033           | 2033                   |
| Summer/Winter    | Single       | 304070 | 6PERSON230 T | 316281 | AC2-100 TAP  | 1   | 230 | 340/345 | 2031/2033      |                        |
| Summer           | Single/Tower | 313046 | 6LOUISA PUMP | 314766 | 6LOUISA      | 1   | 230 | 345/345 | 2032/2035      |                        |
| Summer           | Single/Tower | 313052 | 6DESPER      | 313046 | 6LOUISA PUMP | 1   | 230 | 345/345 | 2032/2035      |                        |
| Summer           | Single       | 313714 | 6PERQUIMANS  | 314662 | 6S HERTFORD  | 1   | 230 | 345/345 | 2034           |                        |
| Summer           | Single       | 313818 | 6BENCHRCH    | 313866 | 6COPELAND    | 1   | 230 | 345/345 | 2032           | 2034                   |
| Summer/Winter    | Single       | 313868 | 6CARTERV     | 316335 | AC2-165 TAP  | 1   | 230 | 345/345 | 2030/2031      |                        |
| Summer           | Single       | 313994 | 6OTTERDAM    | 313178 | 6ENCLAVE     | 1   | 230 | 345/345 | 2031           |                        |
| Summer           | Single       | 314282 | 6CARSON      | 314331 | 6POE         | 1   | 230 | 345/345 | 2031           |                        |
| Summer           | Single       | 314285 | 6CHAPARRAL T | 314316 | 6LOCKS       | 1   | 230 | 345/345 | 2030           |                        |
| Summer           | Single       | 314522 | 6CHCKTUK     | 313818 | 6BENCHRCH    | 1   | 230 | 345/345 | 2030           | 2032                   |
| Summer           | Single       | 314662 | 6S HERTFORD  | 314651 | 6WINFALL     | 1   | 230 | 345/345 | 2034           |                        |
| Summer           | Single       | 314690 | 6BLACK WALNU | 314686 | 6CLOVER      | 1   | 230 | 345/345 | 2031           |                        |
| Summer/Winter    | Single       | 314697 | 6SEEDGE HILL | 315684 | 6EDMONSON    | 1   | 230 | 345/345 | 2030/2032      |                        |
| Summer/Winter    | Single       | 314747 | 6BREMO       | 313868 | 6CARTERV     | 1   | 230 | 345/345 | 2030/2031      |                        |
| Winter           | Single       | 314749 | 6CHARLV      | 314772 | 6PROFFIT     | 1   | 230 | 345/345 | 2032           |                        |
| Winter           | Single       | 314772 | 6PROFFIT     | 314759 | 6HOLLYMD     | 1   | 230 | 345/345 | 2034           |                        |
| Summer/Winter    | Single       | 315684 | 6EDMONSON    | 314690 | 6BLACK WALNU | 1   | 230 | 345/345 | 2030/2032      |                        |
| Summer/Winter    | Single       | 316218 | AC1-221 TAP  | 314697 | 6SEEDGE HILL | 1   | 230 | 345/345 | 2030/2031      |                        |
| Summer/Winter    | Single       | 316281 | AC2-100 TAP  | 316218 | AC1-221 TAP  | 1   | 230 | 345/345 | 2030/2032      |                        |
| Winter           | Single       | 316335 | AC2-165 TAP  | 314333 | 6POWHATN     | 1   | 230 | 345/345 | 2031           |                        |
| LL               | Single       | 290984 | 05BOKESCRK   | 242939 | 05MARYSV     | 1   | 345 | 205/205 | 2033           | 2032                   |
| Winter           | Single       | 242865 | 05JEFRSO     | 248000 | 06CLIFTY     | 1   | 345 | 205/206 | 2034           | 2033                   |
| Summer/Winter    | Single/Tower | 235098 | WOODSIDE     | 235105 | 01DOUBS      | 1   | 500 | 201/201 | 2030/2031/2038 | 2038                   |
| Summer           | Single       | 235102 | 01BELMNT     | 235235 | 01FLINTRUN   | 1   | 500 | 201/201 | 2037           |                        |
| Summer           | Single       | 235117 | 01KAMMER     | 235111 | 01 502 J     | 1   | 500 | 201/201 | 2035           |                        |
| Summer           | Single       | 235098 | WOODSIDE     | 314939 | 8GOOSE CREEK | 1   | 500 | 201/345 | 2035           |                        |
| Summer/Winter/LL | Tower        | 235105 | 01DOUBS      | 314939 | 8GOOSE CREEK | 1   | 500 | 201/345 | 2032/2033/2037 |                        |
| Summer           | Single       | 235110 | 01MDWBRK     | 313440 | 8VINTHIL     | 1   | 500 | 201/345 | 2037           |                        |
| Summer           | Single/Tower | 314941 | 8BISMARK     | 235098 | WOODSIDE     | 1   | 500 | 345/201 | 2039           |                        |
| Winter           | Single       | 313403 | 8ASPEN       | 314933 | 8BRAMBLETON  | 1   | 500 | 345/345 | 2037           |                        |
| Summer           | Single       | 314901 | 8BATH CO     | 314987 | 8LEXINGTN SC | 1   | 500 | 345/345 | 2036           | 2038                   |
| Winter           | Single/Tower | 314901 | 8BATH CO     | 314991 | 8VALLEY SC   | 1   | 500 | 345/345 | 2035/2038      | 2038                   |
| Summer           | Single       | 314910 | 8CUNINGHAM   | 314908 | 8ELMONT      | 1   | 500 | 345/345 | 2038           |                        |
| Summer           | Single       | 314912 | 8LEXNGTN     | 314907 | 8DOOMS       | 1   | 500 | 345/345 | 2033           |                        |
| Winter           | Single       | 314929 | 8FRONT ROYAL | 314916 | 8MORRSVL     | 1   | 500 | 345/345 | 2034           | 2037                   |
| Summer/Winter    | Single       | 314935 | 8HERITAGE    | 314936 | 8RAWLINGS    | 1   | 500 | 345/345 | 2035/2038      |                        |
| Summer/Winter    | Single       | 314936 | 8RAWLINGS    | 314902 | 8CARSON      | 1   | 500 | 345/345 | 2030/2034      | 2036                   |
| Summer           | Single       | 314937 | 8MT STORM2   | 314941 | 8BISMARK     | 1   | 500 | 345/345 | 2037           |                        |
| Summer/Winter    | Single       | 314940 | 8ROGERS RD   | 314902 | 8CARSON      | 1   | 500 | 345/345 | 2030/2035      | 2037                   |
| Winter           | Single/Tower | 314991 | 8VALLEY SC   | 314926 | 8VALLEY      | 1   | 500 | 345/345 | 2035/2038      | 2038                   |
| Summer           | Single       | 242928 | 05MARYSV     | 290620 | 05MARYSVL_RM | Z1  | 765 | 205/205 | 2035           |                        |
| Summer/Winter    | Single/Tower | 290608 | 05MARYSVL_RS | 242928 | 05MARYSV     | Z1  | 765 | 205/205 | 2033/2035/2039 |                        |
| Summer           | Single       | 290623 | 05KAMMER RG  | 242925 | 05KAMMER     | Z1  | 765 | 205/205 | 2038           |                        |



# 15 Year Analysis Result – Proposal 262 ONLY

## Current PJM Planning Manual M14B Process

| Season        | Contingency  | Fr Bus | Fr Name      | To Bus | To Name      | CKT | KV  | Areas   | 100% Year      | 100% Year<br>Proposal 262 | Proposal 262 | 100% Year |
|---------------|--------------|--------|--------------|--------|--------------|-----|-----|---------|----------------|---------------------------|--------------|-----------|
| Summer        | Single       | 207930 | BUSH         | 206242 | 28KITATINY   | 1   | 230 | 229/228 | 2033           | 2034                      | Remain       | 2034      |
| Summer        | Single       | 207950 | CUMB         | 208141 | WIGR         | 1   | 230 | 229/229 | 2033           |                           | Solved       |           |
| LL            | Tower        | 207968 | ELIM         | 208109 | SUNB         | 1   | 230 | 229/229 | 2032           | 2032                      | Remain       | 2032      |
| Summer        | Single/Tower | 208004 | JUNI         | 207950 | CUMB         | 1   | 230 | 229/229 | 2031/2036      |                           | Solved       |           |
| Summer        | Single       | 208012 | LMBE         | 208025 | MACR         | 1   | 230 | 229/229 | 2032           | 2032                      | Remain       | 2032      |
| Summer        | Single       | 213520 | CONOWG03     | 214218 | NOTTNGH2     | 1   | 230 | 230/230 | 2034           | 2034                      | Remain       | 2034      |
| Summer        | Single       | 213519 | CONOWG01     | 231006 | COLOR PE     | 1   | 230 | 230/235 | 2031           | 2031                      | Remain       | 2031      |
| Winter        | Tower        | 227955 | CEDAR        | 206302 | 28OYSTER C   | 1   | 230 | 234/228 | 2033           | 2033                      | Remain       | 2033      |
| Summer/Winter | Single       | 304070 | 6PERSON230 T | 316281 | AC2-100 TAP  | 1   | 230 | 340/345 | 2031/2033      |                           | Solved       |           |
| Summer        | Single/Tower | 313046 | 6LOUISA PUMP | 314766 | 6LOUISA      | 1   | 230 | 345/345 | 2032/2035      |                           | Solved       |           |
| Summer        | Single/Tower | 313052 | 6DESPER      | 313046 | 6LOUISA PUMP | 1   | 230 | 345/345 | 2032/2035      |                           | Solved       |           |
| Summer        | Single       | 313714 | 6PERQUIMANS  | 314662 | 6S HERTFORD  | 1   | 230 | 345/345 | 2034           |                           | Solved       |           |
| Summer        | Single       | 313818 | 6BENCHRCH    | 313866 | 6COPELAND    | 1   | 230 | 345/345 | 2032           | 2034                      | Remain       | 2034      |
| Summer/Winter | Single       | 313868 | 6CARTERV     | 316335 | AC2-165 TAP  | 1   | 230 | 345/345 | 2030/2031      |                           | Solved       |           |
| Summer        | Single       | 313994 | 6OTTERDAM    | 313178 | 6ENCLAVE     | 1   | 230 | 345/345 | 2031           |                           | Solved       |           |
| Summer        | Single       | 314282 | 6CARSON      | 314331 | 6POE         | 1   | 230 | 345/345 | 2031           |                           | Solved       |           |
| Summer        | Single       | 314285 | 6CHAPARRAL T | 314316 | 6LOCKS       | 1   | 230 | 345/345 | 2030           |                           | Solved       |           |
| Summer        | Single       | 314522 | 6CHCKTUK     | 313818 | 6BENCHRCH    | 1   | 230 | 345/345 | 2030           | 2032                      | Remain       | 2032      |
| Summer        | Single       | 314662 | 6S HERTFORD  | 314651 | 6WINFALL     | 1   | 230 | 345/345 | 2034           |                           | Solved       |           |
| Summer        | Single       | 314690 | 6BLACK WALNU | 314686 | 6CLOVER      | 1   | 230 | 345/345 | 2031           |                           | Solved       |           |
| Summer/Winter | Single       | 314697 | 6SEDGE HILL  | 315684 | 6EDMONSON    | 1   | 230 | 345/345 | 2030/2032      |                           | Solved       |           |
| Summer/Winter | Single       | 314747 | 6BREMO       | 313868 | 6CARTERV     | 1   | 230 | 345/345 | 2030/2031      |                           | Solved       |           |
| Winter        | Single       | 314749 | 6CHARLV      | 314772 | 6PROFFIT     | 1   | 230 | 345/345 | 2032           |                           | Solved       |           |
| Winter        | Single       | 314772 | 6PROFFIT     | 314759 | 6HOLLYMD     | 1   | 230 | 345/345 | 2034           |                           | Solved       |           |
| Summer/Winter | Single       | 315684 | 6EDMONSON    | 314690 | 6BLACK WALNU | 1   | 230 | 345/345 | 2030/2032      |                           | Solved       |           |
| Summer/Winter | Single       | 316218 | AC1-221 TAP  | 314697 | 6SEDGE HILL  | 1   | 230 | 345/345 | 2030/2031      |                           | Solved       |           |
| Summer/Winter | Single       | 316281 | AC2-100 TAP  | 316218 | AC1-221 TAP  | 1   | 230 | 345/345 | 2030/2032      |                           | Solved       |           |
| Winter        | Single       | 316335 | AC2-165 TAP  | 314333 | 6POWHATN     | 1   | 230 | 345/345 | 2031           |                           | Solved       |           |
| LL            | Single       | 290984 | 05BOKESCRK   | 242939 | 05MARYSV     | 1   | 345 | 205/205 | 2033           | 2032                      | Remain       | 2032      |
| Winter        | Single       | 242865 | 05JEFRSO     | 248000 | 06CLIFTY     | 1   | 345 | 205/206 | 2034           | 2033                      | Remain       | 2033      |
| Summer/Winter | Single/Tower | 235098 | WOODSIDE     | 235105 | 01DOUBS      | 1   | 500 | 201/201 | 2030/2031/2038 | 2038                      | Margin       | 2038      |
| Summer        | Single       | 235102 | 01BELMNT     | 235235 | 01FLINTRUN   | 1   | 500 | 201/201 | 2037           |                           | Solved       |           |
| Summer        | Single       | 235117 | 01KAMMER     | 235111 | 01 502 J     | 1   | 500 | 201/201 | 2035           |                           | Solved       |           |



# 15 Year Analysis Result – Proposal 262 ONLY

## Current PJM Planning Manual M14B Process

| Season        | Contingency  | Fr Bus | Fr Name      | To Bus | To Name      | CKT | KV  | Areas   | 100% Year      | 100% Year<br>Proposal 262 | Proposal 262                                                                    | 100% Year |
|---------------|--------------|--------|--------------|--------|--------------|-----|-----|---------|----------------|---------------------------|---------------------------------------------------------------------------------|-----------|
| Summer        | Single       | 235098 | WOODSIDE     | 314939 | 8GOOSE CREEK | 1   | 500 | 201/345 | 2035           |                           | Solved                                                                          |           |
| Summer/Winter | Tower        | 235105 | 01DOUBS      | 314939 | 8GOOSE CREEK | 1   | 500 | 201/345 | 2032/2033/2037 |                           | Solved                                                                          |           |
| Summer        | Single       | 235110 | 01MDWBRK     | 313440 | 8VINTHIL     | 1   | 500 | 201/345 | 2037           |                           | Solved                                                                          |           |
| Summer        | Single/Tower | 314941 | 8BISMARK     | 235098 | WOODSIDE     | 1   | 500 | 345/201 | 2039           |                           | Solved                                                                          |           |
| Winter        | Single       | 313403 | 8ASPEN       | 314933 | 8BRAMBLETON  | 1   | 500 | 345/345 | 2037           |                           | Solved                                                                          |           |
| Summer        | Single       | 314901 | 8BATH CO     | 314987 | 8LEXINGTN SC | 1   | 500 | 345/345 | 2036           | 2038                      | Remain, but<br>push overload<br>year from 2036<br>to 2038                       | 2038      |
| Winter        | Single/Tower | 314901 | 8BATH CO     | 314991 | 8VALLEY SC   | 1   | 500 | 345/345 | 2035/2038      | 2038                      | Remain, solved<br>winter, summer<br>overload push<br>from year 11 to<br>year 14 | 2038      |
| Summer        | Single       | 314910 | 8CUNINGHAM   | 314908 | 8ELMONT      | 1   | 500 | 345/345 | 2038           |                           | Solved                                                                          |           |
| Summer        | Single       | 314912 | 8LEXNGTN     | 314907 | 8DOOMS       | 1   | 500 | 345/345 | 2033           |                           | Solved                                                                          |           |
| Winter        | Single       | 314929 | 8FRONT ROYAL | 314916 | 8MORRSVL     | 1   | 500 | 345/345 | 2034           | 2037                      | Remain, solved<br>winter, summer<br>overload push<br>from year 5 to<br>year 13  | 2037      |
| Summer/Winter | Single       | 314935 | 8HERITAGE    | 314936 | 8RAWLINGS    | 1   | 500 | 345/345 | 2035/2038      |                           | Solved                                                                          |           |
| Summer/Winter | Single       | 314936 | 8RAWLINGS    | 314902 | 8CARSON      | 1   | 500 | 345/345 | 2030/2034      | 2036                      | Remain, but<br>push overload<br>year from 2030<br>to 2036                       | 2036      |
| Summer        | Single       | 314937 | 8MT STORM2   | 314941 | 8BISMARK     | 1   | 500 | 345/345 | 2037           |                           | Solved                                                                          |           |
| Summer/Winter | Single       | 314940 | 8ROGERS RD   | 314902 | 8CARSON      | 1   | 500 | 345/345 | 2030/2035      | 2037                      | Remain, but<br>push overload<br>year from 2030<br>to 2037                       | 2037      |
| Winter        | Single/Tower | 314991 | 8VALLEY SC   | 314926 | 8VALLEY      | 1   | 500 | 345/345 | 2035/2038      | 2038                      | Remain, solved<br>winter, summer<br>overload push<br>from year 5 to<br>year 14  | 2038      |
| Summer        | Single       | 242928 | 05MARYSV     | 290620 | 05MARYSVL_RM | Z1  | 765 | 205/205 | 2035           |                           | Solved                                                                          |           |
| Summer/Winter | Single/Tower | 290608 | 05MARYSVL_RS | 242928 | 05MARYSV     | Z1  | 765 | 205/205 | 2033/2035/2039 |                           | Will be<br>addressed by<br>Non Comp                                             |           |
| Summer        | Single       | 290623 | 05KAMMER_RG  | 242925 | 05KAMMER     | Z1  | 765 | 205/205 | 2038           |                           | Solved                                                                          |           |

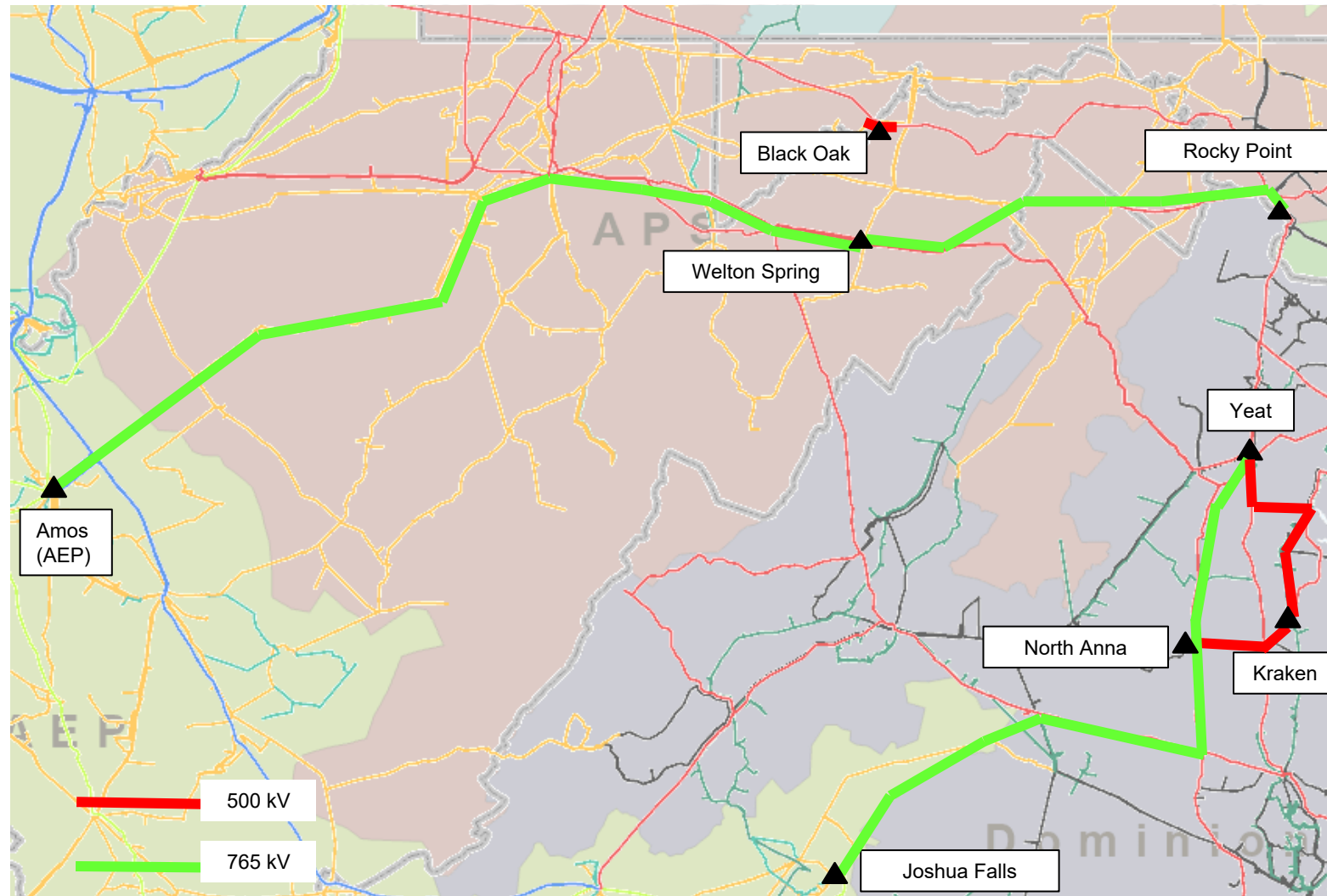


# Selected Proposals

## Regional Transfers and Dominion Area - Summary

- PJM Recommends proposals 636 for development with the following adjustments:
  - The Vontay 765/500 kV Substation could be delayed and triggered as load materializes
  - The Yeat, South Morrisville and South Bristers substations in the North could all be consolidated into one 765/500kV substation, Yeat.
    - Other substations will be developed as additional outlets and tie-ins between the 765 kV and 500 kV networks materialize
- The proposed Kraken 500kV loop and the Kraken 500/230kV substation is recommended;
  - The loop will terminate at the proposed Yeat 765 kV substation.
  - The loop provides additional North-South 500kV backbone reinforcement
  - Expands the 500kV backbone further to the east in the area to where load is growing
  - Alleviates the stability and operational constraints in the area (Generation and load serving constraints)
  - The 230 kV tie-ins from Kraken substation to the existing 230kV will be deferred and triggered through the supplemental process.
- The Amos-Welton Springs-Rocky Point 765kV line (out of proposal 262) is recommended.
  - This additional 765 kV line is needed to provide additional west-east transfer capability and allow for more flexibility towards load and generation development scenarios.
- PJM Recommended Solutions Cost (2024 RTEP W1) **Total: \$5.80B** (PJM-Wide and as submitted cost – approximately) – **3<sup>rd</sup> Party Cost estimate of \$6.15B.**

# Final – PJM Recommended Proposals Regional Cluster – Summary



# Final – PJM Recommended Proposals Regional Cluster – Summary

| PJM Proposal ID      | Project Title/Description                                                                                                                                                                              | Project Submittal Responsibility |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>967 Modified</b>  | <i>Kraken Loop</i> <ul style="list-style-type: none"> <li>Termination at Yeat (not Bristers South/Town Run)</li> <li>Refinements (reduction/deferral) of some proposed 230 kV developments.</li> </ul> | Dominion                         |
| <b>820 Modified</b>  | <i>Joshua Falls-Yeat 765 kV (Southern Corridor)</i> <ul style="list-style-type: none"> <li>Route to follow Joshua Falls-Vontay-Morrisville South</li> </ul>                                            | Transource                       |
| <b>708</b>           | John Amos-Welton Springs-Rocky Point 765 kV (Northern Corridor)                                                                                                                                        | First Energy                     |
| <b>551</b>           | Woodside/Chanceford 500 kV terminal swap at Doubs                                                                                                                                                      | First Energy                     |
| <b>81</b>            | AEP incumbent upgrades for Portfolio #1, 2 and 3                                                                                                                                                       | Transource                       |
| <b>24 Modified</b>   | <i>Dominion reinforcements (230 kV and 115 kV solutions)</i> <ul style="list-style-type: none"> <li>Exclusion of 230 kV line #238 (Carson-Clubhouse) rebuild</li> </ul>                                | Dominion                         |
| <b>781 Modified</b>  | <i>Dominion Reinforcements (500 kV solutions)</i> <ul style="list-style-type: none"> <li>Exclusion of 500 kV North Anna-Vontay uprate</li> </ul>                                                       | Dominion                         |
| <b>617 Component</b> | <ul style="list-style-type: none"> <li>Replace the wave trap and upgrade the relay at Cloverdale 765 kV</li> <li>Replace the wave trap and upgrade the relay at Joshua Falls 765 kV</li> </ul>         | Transource                       |

Regional and Dominion/APS selected proposal costs (approximate):

As submitted: ~ \$5,500.0 M

Optimized: ~ \$4,679.0 M

| Region                  | Comp (\$M)    | Non-Comp (\$M) | Independent Cost (\$M) |
|-------------------------|---------------|----------------|------------------------|
| Regional Transfers      | 4563.7        |                | 4921.9                 |
| Regional –Short Circuit |               | 88.1           |                        |
| DOM                     | 216.8         | 71.7           | 216.8                  |
| MAAC                    | 187.5         | 107.2          | 187.5                  |
| AMPT                    |               | 12             |                        |
| AEP                     | 225.3         | 39.7           | 225.3                  |
| DLCO                    |               | 8              |                        |
| APS                     |               | 0.691          |                        |
| ATSI                    | 217.3         |                | 210.2                  |
| ComEd                   | 30.6          | 5.95           | 30.6                   |
| OVEC                    |               | 0.8            |                        |
| Dayton                  |               | 25             |                        |
| <b>Total (\$M)</b>      | <b>5441.0</b> | <b>359.1</b>   | <b>5792.3</b>          |

## Total 2024 RTEP W1 Costs:

As-submitted (Comp + Non-Com) = \$5441.0 + \$359.1 = \$5,800.1 M

Independent Cost Estimate = \$5792.3 + \$359.1 = \$6151.4 M

# Recommended Solutions



**Existing Facility Rating:**

| Breakers        | Capacity (KA) |
|-----------------|---------------|
| Adkins 345kV A  | 50            |
| Adkins 345kV A1 | 50            |



# AEP Transmission Zone: Baseline Beatty – Adkins 345kV Station Upgrades

## Recommended Solution:

Replace station conductor and switches in the 345 kV yard at Beatty that are currently limiting the 345 kV lines to Adkins and Chenoweth.

(B3877.1) **Estimated Cost: 0.50M**

Upgrade 345 kV circuit breakers 'A' and 'A1' to 4000A 63 kA breakers at Adkins station along with some station conductor that is currently limiting the 345 kV line to Beatty.(B3877.2) **Estimated Cost: 4.50M**

**Total Estimated Cost: \$5M**

## Preliminary Facility Rating:

| Branch                   | SN/SE/WN/WE (MVA)   |
|--------------------------|---------------------|
| Beatty - Adkins (345)    | 1269/1385/1604/1737 |
| Beatty - Chenoweth (345) | 1442/1635/1822/1943 |

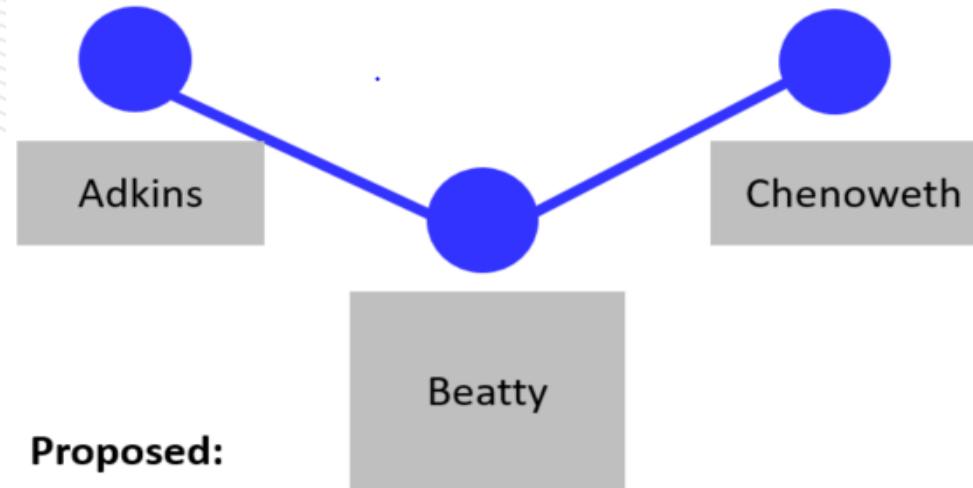
| Breakers        | Capacity (KA) |
|-----------------|---------------|
| Adkins 345kV A  | 63            |
| Adkins 345kV A1 | 63            |

**Required IS Date: 6/1/2029**

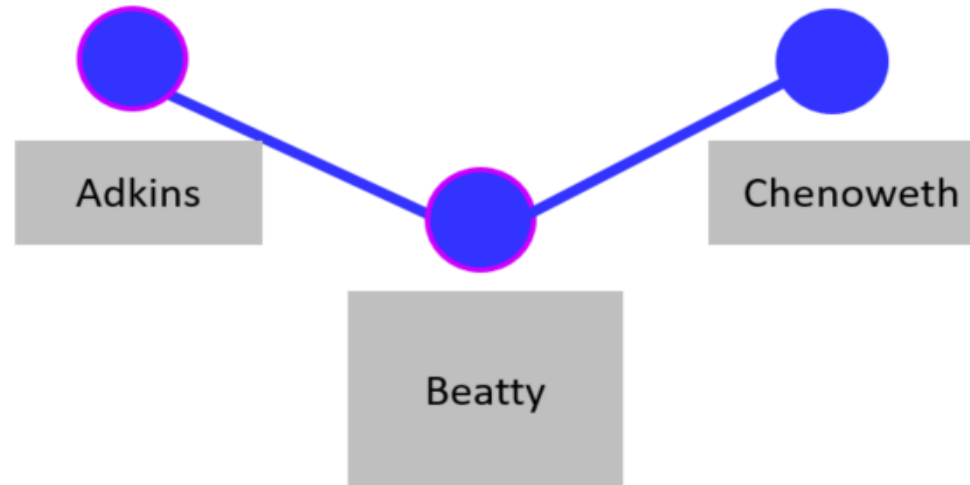
**Projected IS Date: 4/1/2029**

**Previously Presented: 11/6/2024**

## Existing:



## Proposed:



| Legend                                                                                |         |
|---------------------------------------------------------------------------------------|---------|
|   | 200 KA  |
|  | 345 KA  |
|  | 138 KA  |
|  | 69 KA   |
|  | 34.5 KA |
|  | 53 KA   |
|  | New     |

# AEP Transmission Zone: Baseline Canal – Gay St. 138kV Rebuild

**Process Stage:** Recommended Solution

**Criteria:** Summer N-1-1

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Summer base case

**Proposal Window Exclusion:** None

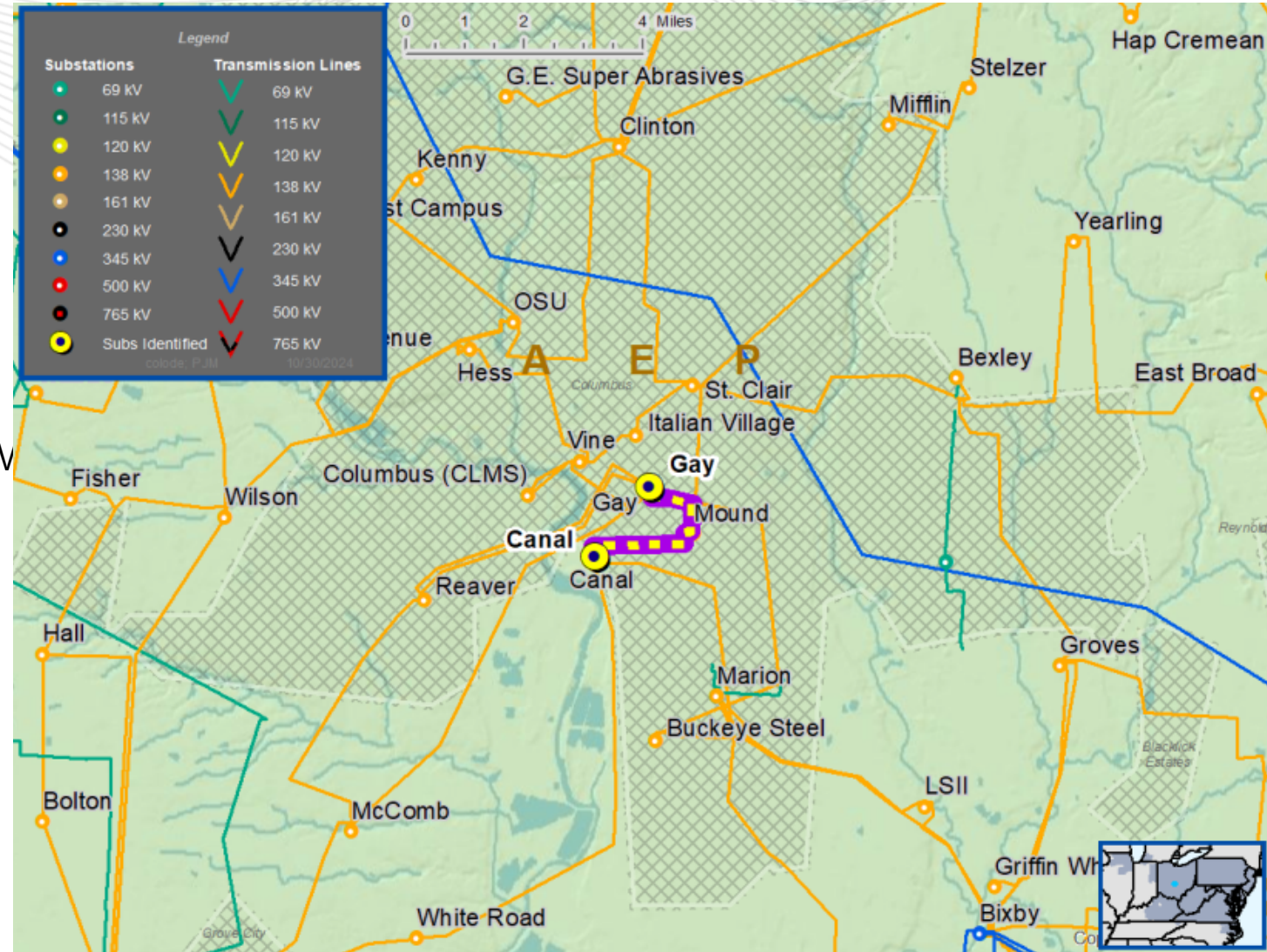
**Problem Statement:**

Flowgate: 2024-W1-N22-ST14

In the 5-year 2029 RTEP summer case, the Canal – Gay 138kV line is overloaded in N-1-1 test.

**Existing Facility Rating:**

| Branch                     | SN/SE/WN/WE (MVA) |
|----------------------------|-------------------|
| Canal – Gay St. 138kV line | 170/233/179/242   |



# AEP Transmission Zone: Baseline Canal – Gay St. 138kV Rebuild

**Recommended Solution:** Proposal No. 2024-W1-940

Rebuild the existing 1.1 mile Canal - Gay 138 kV oil filled pipe-type underground line to address overloads on the existing cable utilizing 5000 MCM XLPE cable. **(B3911.1)**

**Estimated Cost:** \$15.595 M

**Preliminary Facility Rating:**

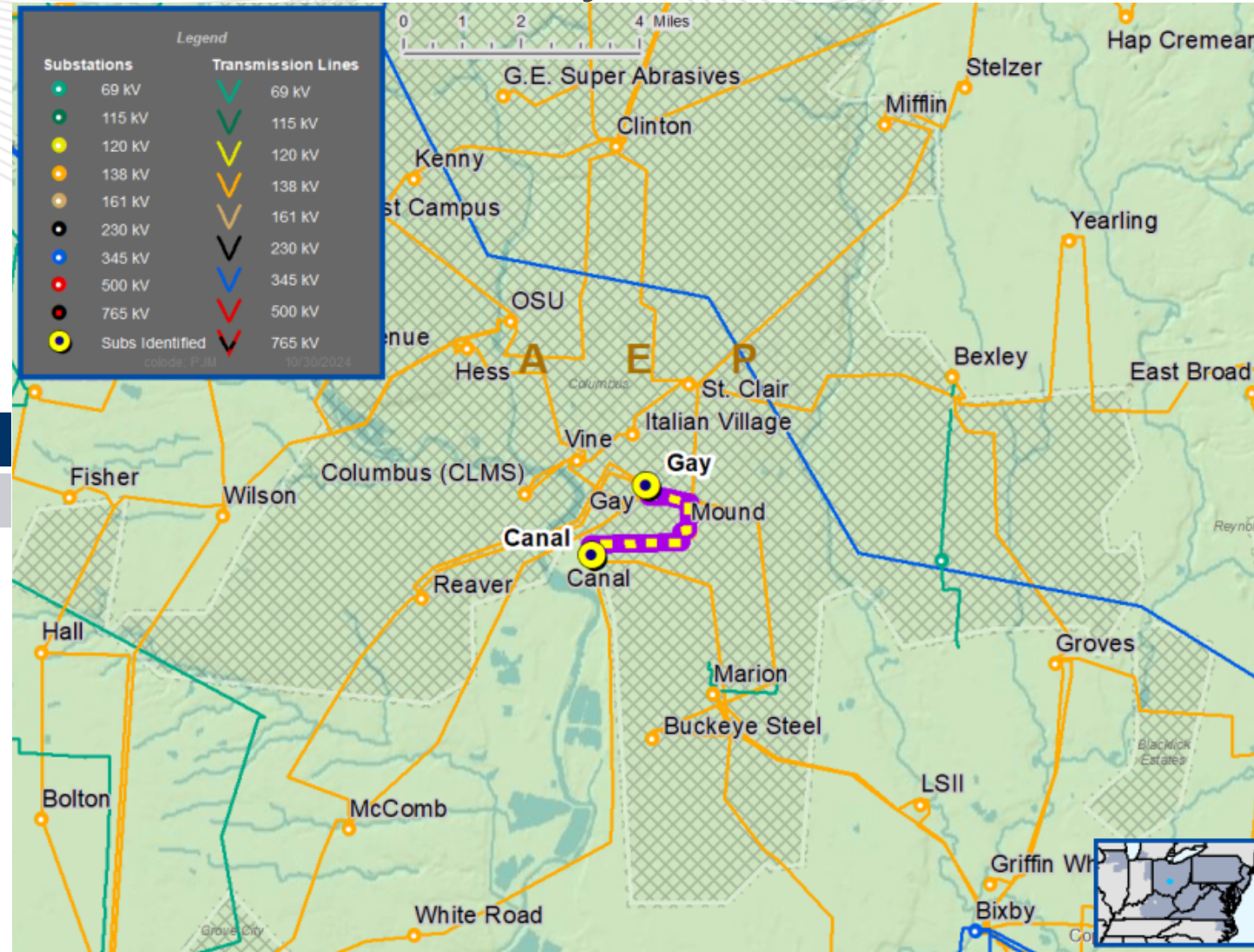
| Branch                     | SN/SE/WN/WE (MVA) |
|----------------------------|-------------------|
| Canal – Gay St. 138kV line | 296/369/369/369   |

**Ancillary Benefits:** The Canal - Gay line is a 1970's vintage oil-filled pipe type cable design and the concerns on this line was described in AEP-2023-OH024, presented in 3/17/2023 SRTEP.

**Required IS Date:** 6/1/2029

**Projected IS Date:** 12/31/2027

**Previously Presented:** 11/6/2024



**Process Stage:** Recommended Solution

**Criteria:** Summer Gen Deliv, Basecase Analysis, N-1-1

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Summer base case

**Proposal Window Exclusion:** None

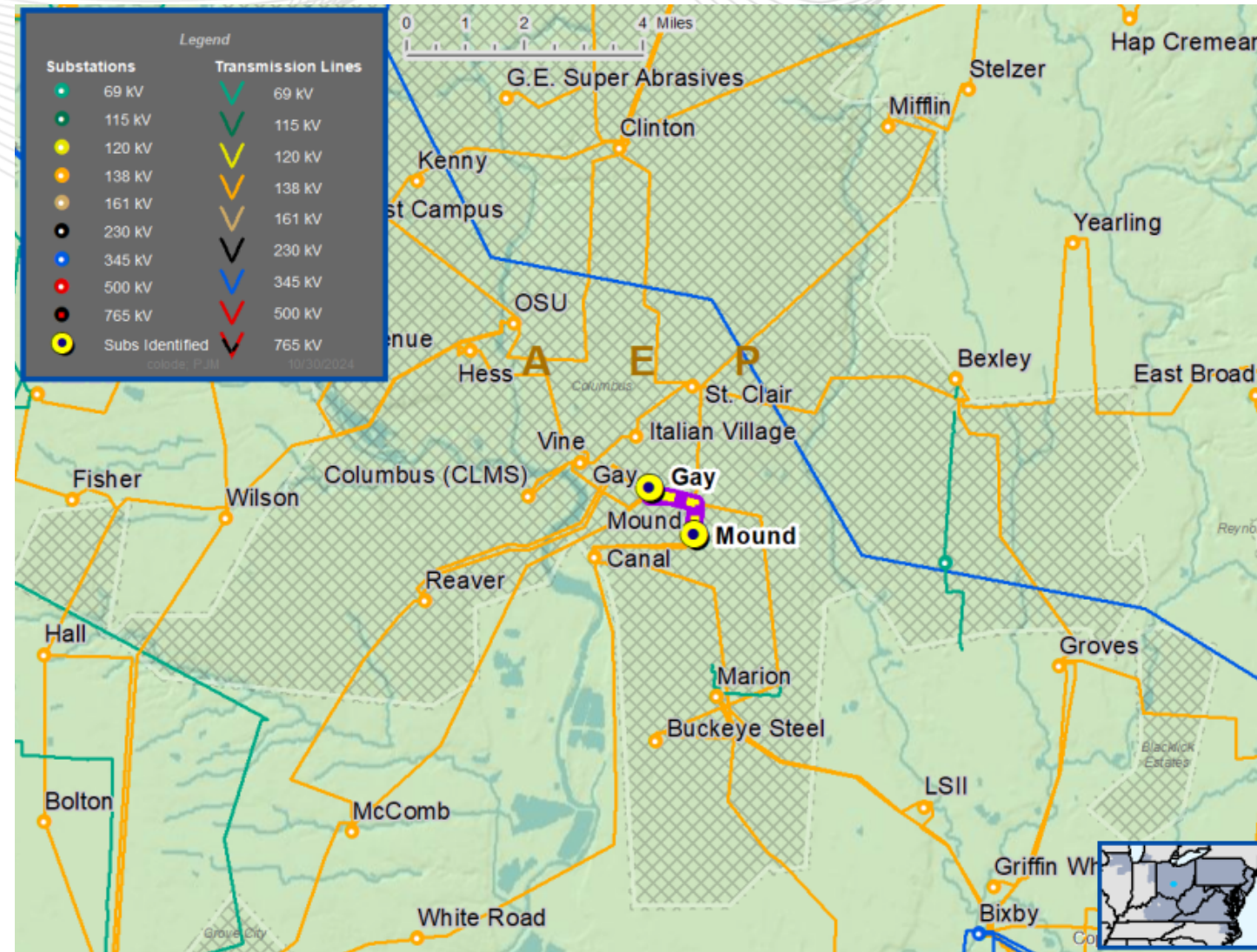
## Problem Statement:

Flowgates: 2024W1-GD-S870, 2024W1-N1-ST43, 2024W1-N11-ST10, 2024W1-N11-ST11, 2024W1-N11-ST7, 2024W1-N11-ST8

In the 5-year 2029 RTEP summer case, the Canal – Mound Street 138kV line is overloaded in Gen Deliv test, Basecase Analysis, N-1-1 test.

## Existing Facility Rating:

| Branch                       | SN/SE/WN/WE (MVA) |
|------------------------------|-------------------|
| Canal – Mound St. 138kV line | 122/145/134/175   |



- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster AEP-2

| Proposal ID # | Project Type | Entity | Project Title                               | Project Description                                                                                                                                                 | kV Level | Estimated Cost (\$M) |
|---------------|--------------|--------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|
| 856           | UPGRADE      | AEP    | Canal - Mound Street 138 kV Rebuild         | rebuild the existing 2.2-mile Canal-Mound St 138 kV oil filled pipe-type underground line to address overloads on the existing cable utilizing 5000 MCM XLPE cable. | 138      | 31.090               |
| 276           | GREENFIELD   | AEP    | Bixby – Buckeye Steel 138kV Reconfiguration | Reconfigure the Bixby - Buckeye Steel 138 kV line to tie in to the nearby Marion Road Station.                                                                      | 138      | 4.080                |

- The Canal – Mound Street 138kV line is a 1926 vintage oil-filled pipe type cable design and the Equipment Material/Conditional/Performance/Risk concerns on this line were earlier presented part of AEP-2023-OH024 at the 3/17/2023 SRRTEP.

# AEP Transmission Zone: Baseline Cluster AEP-2

**Recommended Solution:** Proposal No. 2024-W1-856

Rebuild the existing 2.2-mile Canal-Mound St 138 kV oil filled pipe-type underground line to address overloads on the existing cable utilizing 5000 MCM XLPE cable. (B3912.1)

**Estimated Cost:** \$31.090 M

**Preliminary Facility Rating:**

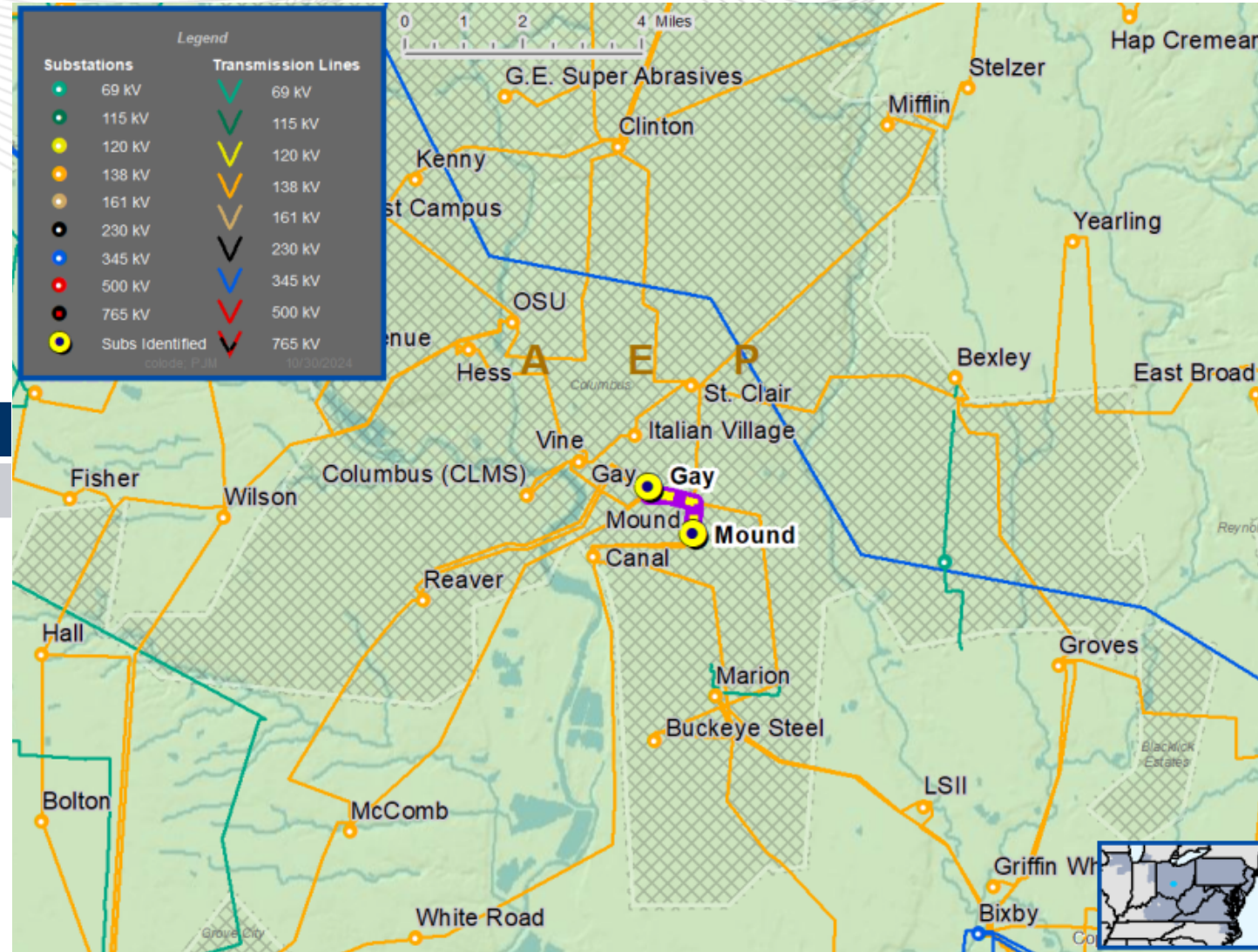
| Branch                     | SN/SE/WN/WE (MVA) |
|----------------------------|-------------------|
| Canal – Gay St. 138kV line | 219/255/277/303   |

**Ancillary Benefits:** The Canal – Mound St. 138KV line is a 1970's vintage oil-filled pipe type cable design and the concerns on this line was described in AEP-2023-OH024, presented in 3/17/2023 SRTEP. This proposed solution addresses the part of supplemental need on this line.

**Required IS Date:** 6/1/2029

**Projected IS Date:** 12/31/2028

**Previously Presented:** 11/6/2024



**Process Stage:** Recommended Solution

**Criteria:** Summer Gen Deliv/IPD, Basecase Analysis, N-1-1

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Summer base case

**Proposal Window Exclusion:** None

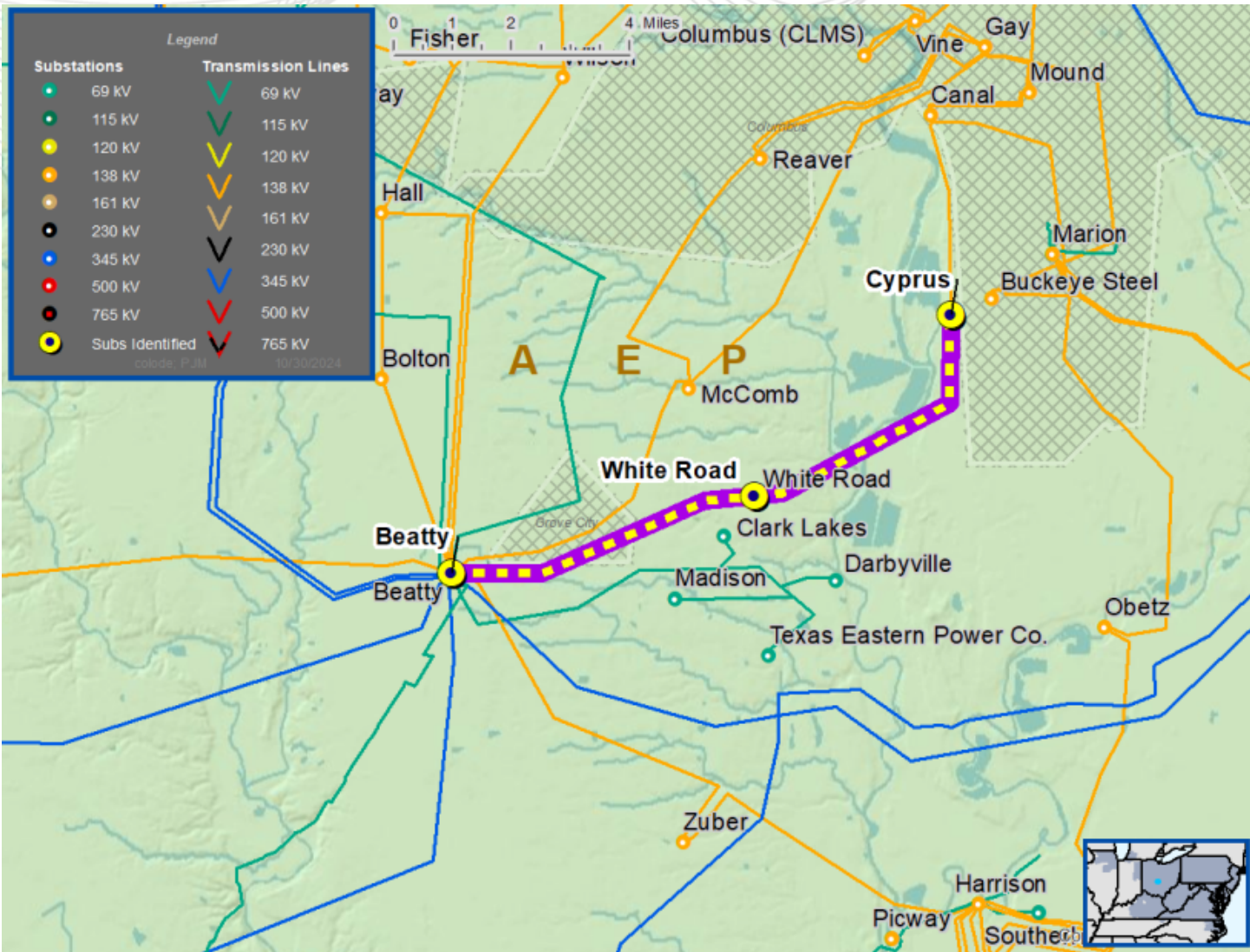
**Problem Statement:**

Flowgates: 2024W1-GD-S854, 2024W1-GD-S873, 2024W1-IPD-S15, 2024W1-IPD-S42, 2024W1-N1-ST19, 2024W1-N1-ST57, 2024W1-N11-ST1, 2024W1-N11-ST2, 2024W1-N11-ST31, 2024W1-N11-ST32, 2024W1-N11-ST5, 2024W1-N11-ST6

In the 2029 RTEP summer cases, the Beatty – White Road - Cyprus 138kV line is overloaded in Gen Deliv test, IPD test, Basecase Analysis, and N-1-1 test.

**Existing Facility Rating:**

| Branch                         | SN/SE/WN/WE (MVA) |
|--------------------------------|-------------------|
| Beatty – White Road 138kV line | 216/243/272/289   |
| White Road – Cyprus 138kV line | 216/243/272/289   |
| Beatty – McComb 138kV line     | 216/243/272/277   |



- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster AEP-6

| Proposal ID # | Project Type | Entity | Project Title                  | Project Description                                                                                           | kV Level | Estimated Cost (\$M) |
|---------------|--------------|--------|--------------------------------|---------------------------------------------------------------------------------------------------------------|----------|----------------------|
| 769           | UPGRADE      | AEP    | Beatty – Cyprus 138 kV Rebuild | Rebuild approximately 7.9 miles of the Beatty-White Road-Cyprus 138 kV line.                                  | 138      | 33.113               |
| 756           | UPGRADE      | AEP    | Cyprus Station Reconfiguration | Reconfigure the 138 kV lines into Cyprus station to separate the station from the 138 kV network in the area. | 138      | 1.745                |

- Beatty – Cyprus line is in the AEP EOL list. The existing overhead sections between Beatty Road and Cyprus stations are mostly comprised of wood poles. More than half of the structures date back to the 1960's. The vast majority of the conductor on the line was originally installed in 1967. Proposal 769 addresses the EOL issue of this line while also solving the posted violations.

# AEP Transmission Zone: Baseline Cluster AEP-6

**Recommended Solution:** Proposal No. 2024-W1-769

Rebuild two overhead sections of the 138 kV line between Beatty Road and Cyprus stations (approximately 7.84 miles). Update remote end relay settings as needed. (B3913.1)

**Estimated Cost:** \$33.113 M

**Preliminary Facility Rating:**

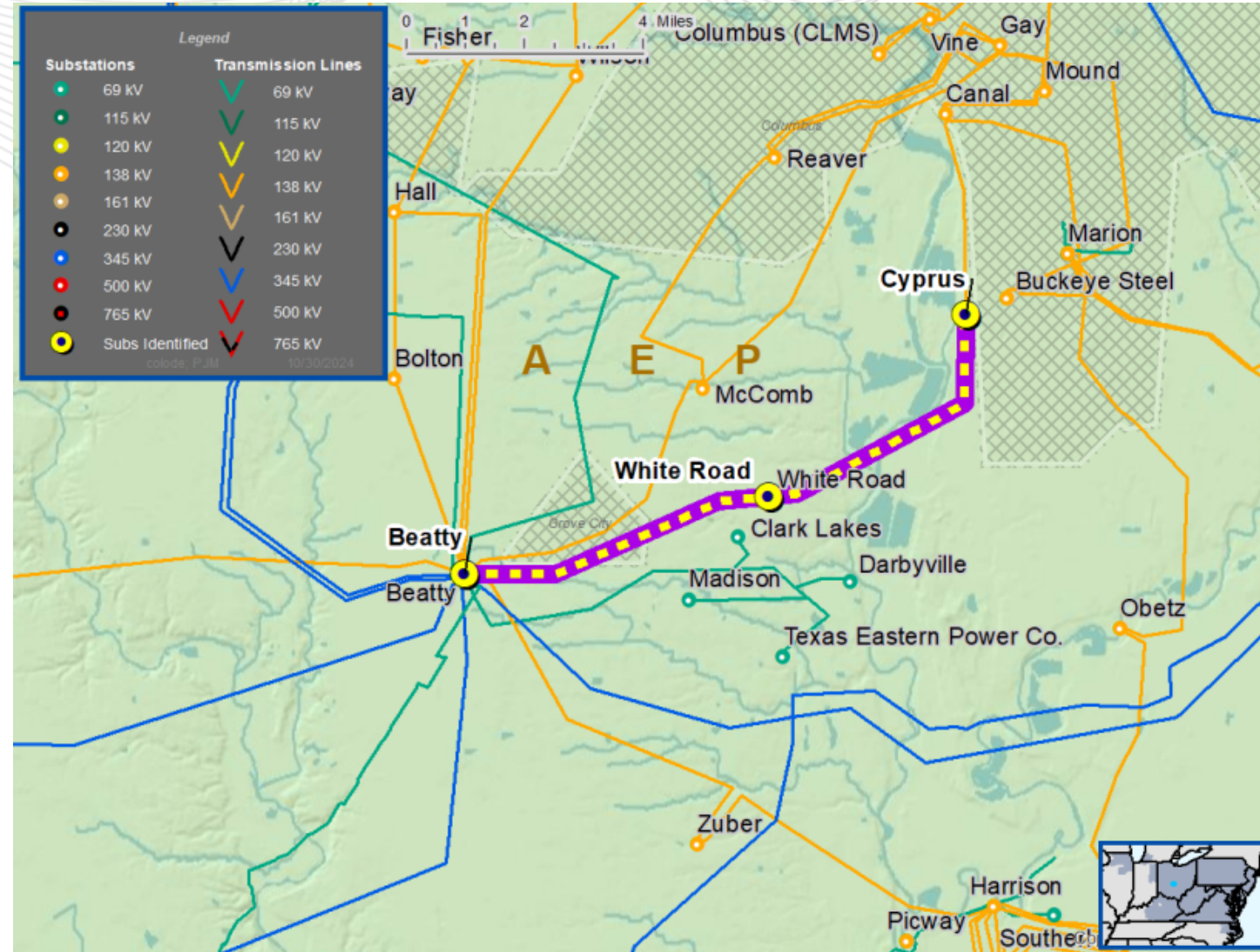
| Branch                         | SN/SE/WN/WE (MVA) |
|--------------------------------|-------------------|
| Beatty – White Road 138kV line | 329/361/424/453   |
| White Road – Cyprus 138kV line | 492/492/519/519   |
| Beatty – McComb 138kV line     | 216/251/272/295   |

**Ancillary Benefits:** Addresses the EOL issues on the Beatty – White Road - Cyprus line.

**Required IS Date:** 6/1/2029

**Projected IS Date:** 4/30/2028

**Previously Presented:** 11/6/2024



# ACE Transmission Zone: Baseline Delco Tap – Mickleton Facility Upgrades

**Process Stage:** Second Review

**Criteria:** Summer Generation Deliverability

**Assumption Reference:** 2029 RTEP assumption

**Model Used for Analysis:** 2029 RTEP Summer

**Proposal Window Exclusion:** Substation Equipment

**Problem Statement:** The Delco Tap – Mickleton facility is overloaded for multiple contingencies.

Violations were posted as part of the 2024 Window 1: FG# - 2024-W1-GD-S769, FG# -2024-W1-GD-S84N, FG# -2024-W1-GD-S85N, FG# -2024-W1-GD-S86N

**Existing Facility Rating:** 637SN/733SE, 637WN/733WE

**Recommended Solution:**

1. Upgrade a circuit switcher at the Mickleton (Mickleton – Delco Tap line) Substation (b3867.1)

**Proposed Facility Rating:** 800SN/900SE, 715WN/835WE

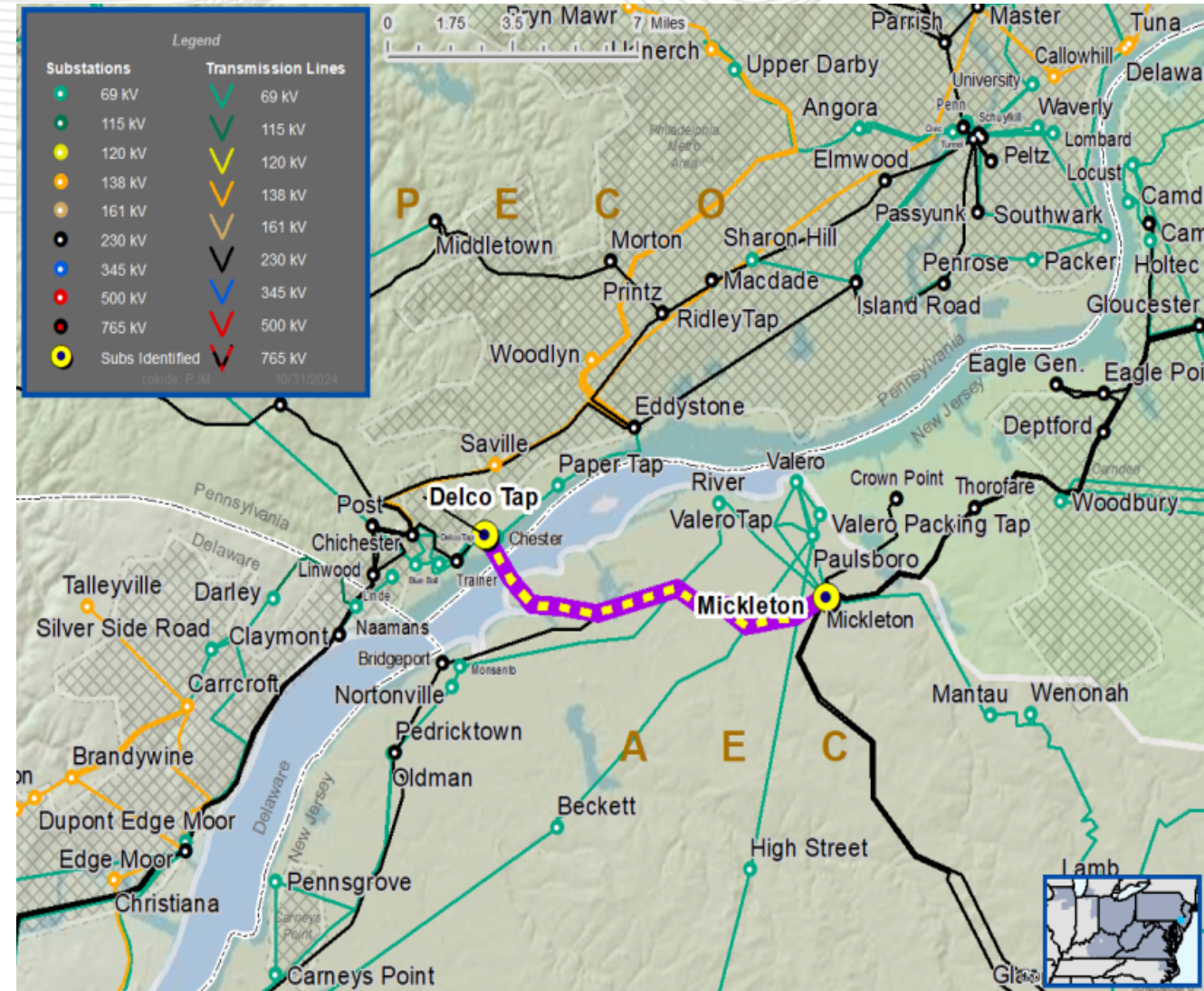
**Estimated Cost:** \$1.03M

**Alternatives**

- N/A

**Required In-Service:** 06/01/2029

**Projected In-Service:** 06/01/2029



# DPL Transmission Zone: Baseline Milford and Cedar Creek Facility Upgrades

**Process Stage:** Second Review

**Criteria:** Winter Generation Deliverability / Winter Thermal

**Assumption Reference:** 2029 RTEP assumption

**Model Used for Analysis:** 2029 RTEP Winter

**Proposal Window Exclusion:** Substation Equipment

**Problem Statement:** The Cedar Creek – Milford facility is overloaded for a stuck breaker contingency.

Violations were posted as part of the 2024 Window 1: FG# - 2024-W1-GD-W121, FG# -2024-W1-N1-WT6

**Existing Facility Rating:** 654SN/738SE, 738WN/775WE

## Recommended Solution:

1. Adjust relay setting at Cedar Creek (Cedar Creek – Milford) Substation (**b3866.1**)
2. Adjust relay setting at Milford (Cedar Creek – Milford) Substation (**b3866.2**)

**Proposed Facility Rating:** 800SN/900SE, 752WN/910WE

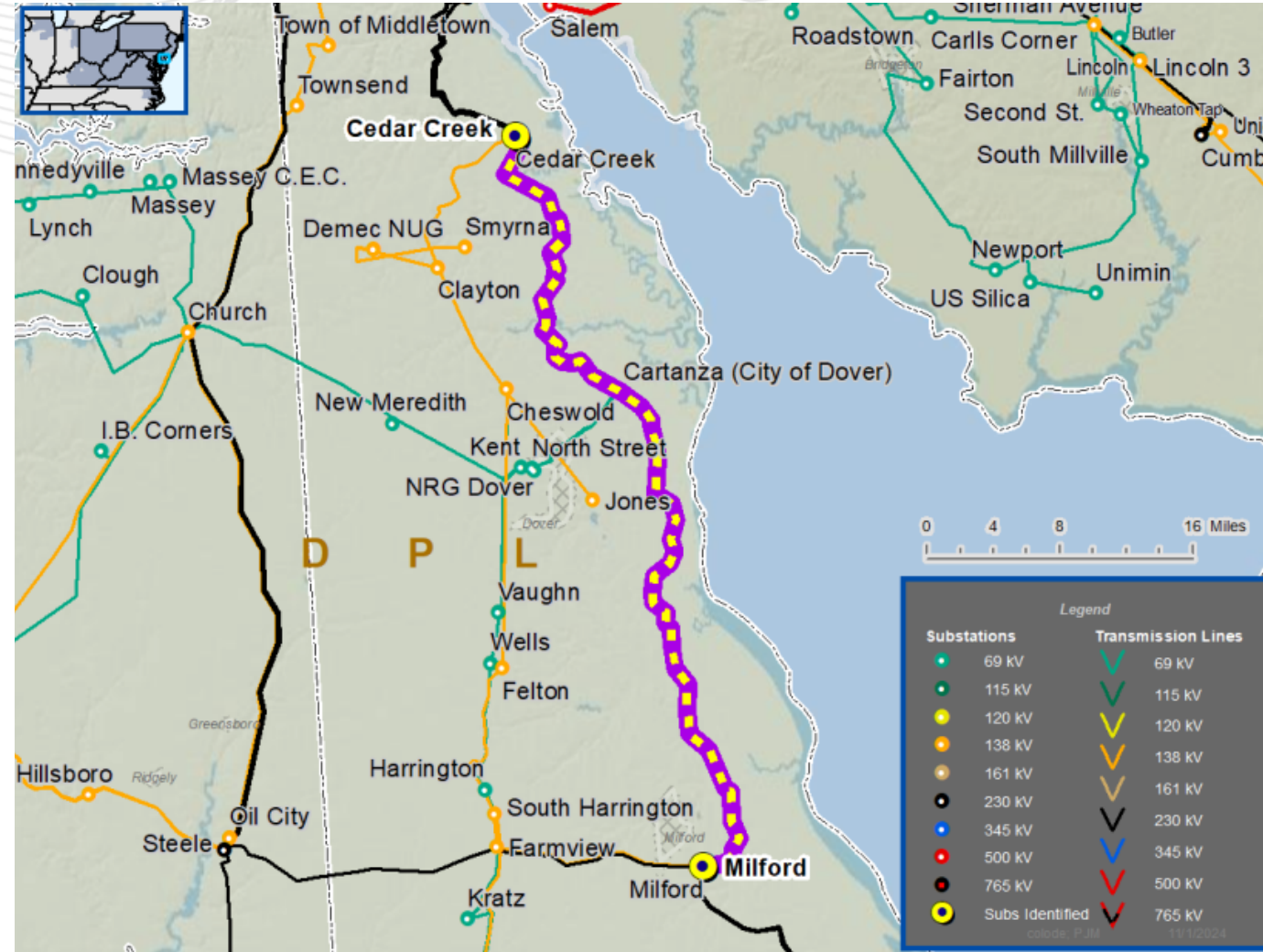
**Estimated Cost:** \$0.200M

## Alternatives

- N/A

**Required In-Service:** 12/31/2029

**Projected In-Service:** 12/31/2029



# PECO Transmission Zone: Baseline Elroy – Hosensack Facility Upgrades

**Process Stage:** Second Review

**Criteria:** Summer Generation Deliverability

**Assumption Reference:** 2029 RTEP assumption

**Model Used for Analysis:** 2029 RTEP Summer

**Proposal Window Exclusion:** Substation Equipment

**Problem Statement:** The Elroy – Hosensack facility is overloaded for multiple stuck breaker contingencies

Violations were posted as part of the 2024 Window 1: FG# - 2024-W1-IPD-S105, FG# - 2024-W1-IPD-S106, FG# - 2024-W1-IPD-S107, FG# - 2024-W1-IPD-S108, FG# - 2024-W1-GD-S85, FG# - 2024-W1-GD-S427, FG# - 2024-W1-GD-S429, FG# - 2024-W1-GD-S431

**Existing Facility Rating:** 2477SN/2860SE, 2948WN/3277WE

## Recommended Solution:

1. Upgrade two (2) 500kV free standing CTs, one (1) disconnect switch, and four (4) sections of tube bus at Elroy 500kV Substation (Elroy – Hosensack). **(b3862.1)**

**Proposed Facility Rating:** 2920SN/3707SE, 3593WN/4403WE

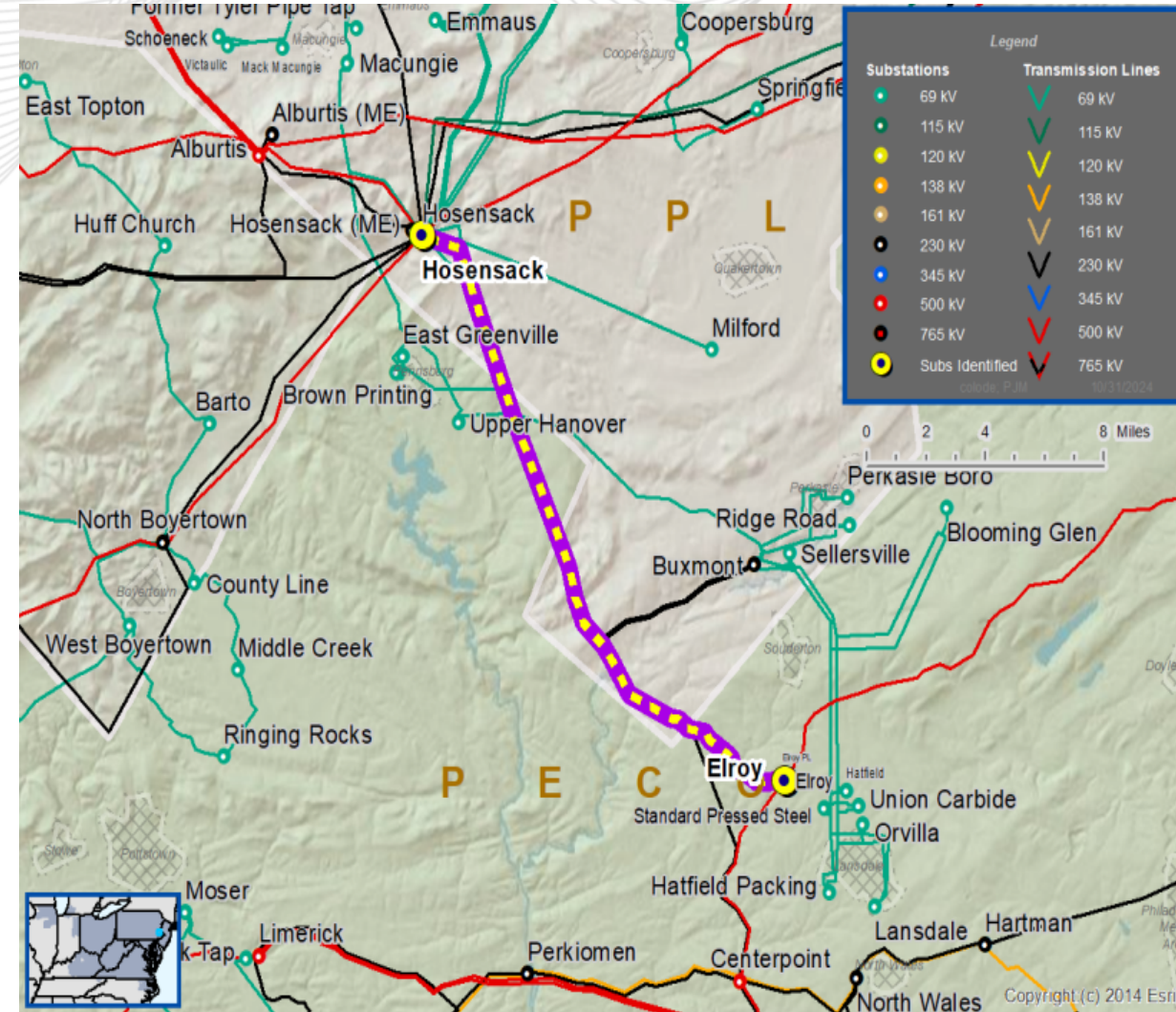
**Estimated Cost:** \$1.5M

## Alternatives

- N/A

**Required In-Service:** 06/01/2029

**Projected In-Service:** 06/01/2029:



**Process Stage:** Second Review

**Criteria:** Summer N-1-1 Thermal

**Assumption Reference:** 2029 RTEP assumption

**Model Used for Analysis:** 2029 RTEP Summer

**Proposal Window Exclusion:** No

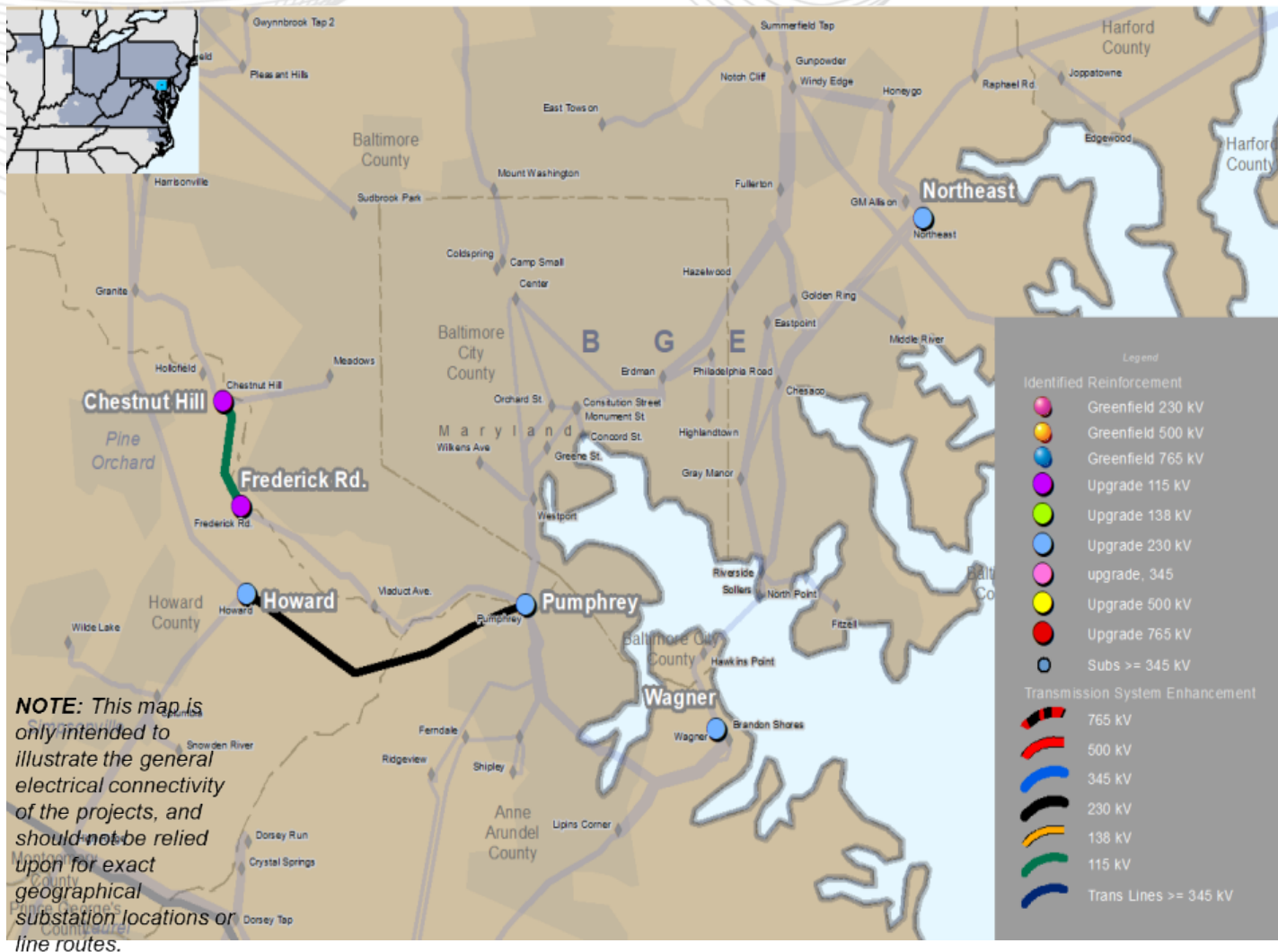
**Problem Statement:** The following facilities are overloaded for summer N-1-1 in the BGE area

- Chestnut Hill – Frederick Rd. 115 kV ckt #527
- Chestnut Hill – Frederick Rd. 115 kV ckt #528
- North East 230/115 kV transformer #1
- North East 230/115 kV transformer #2
- Wagner 230/115 kV transformer #1
- Wagner 230/115 kV transformer #2
- Howard – Pumphrey 230 kV

Violations were posted as part of the 2024 Window 1:

|                 |                 |                 |
|-----------------|-----------------|-----------------|
| 2024W1-N11-ST9  | 2024W1-N11-ST22 | 2024W1-N11-ST26 |
| 2024W1-N11-ST12 | 2024W1-N11-ST23 | 2024W1-N11-ST27 |
| 2024W1-N11-ST17 | 2024W1-N11-ST24 | 2024W1-N11-ST28 |
| 2024W1-N11-ST18 | 2024W1-N11-ST25 | 2024W1-N11-ST29 |

Continued in the next slide...



**Process Stage:** Second Review

**Recommended Solution:** 2024-W1-295

- Construct new Marley Neck 115 kV substation. Marley Neck 115kV portion will accommodate 10 breaker-and-a-half bays, with only 6 bays planned for initial service while accommodating 4 future bays. Two Standard 230/115kV transformers will be connected between the 230 and 115 kV equipment with appropriate isolation methods. (b3906.1)

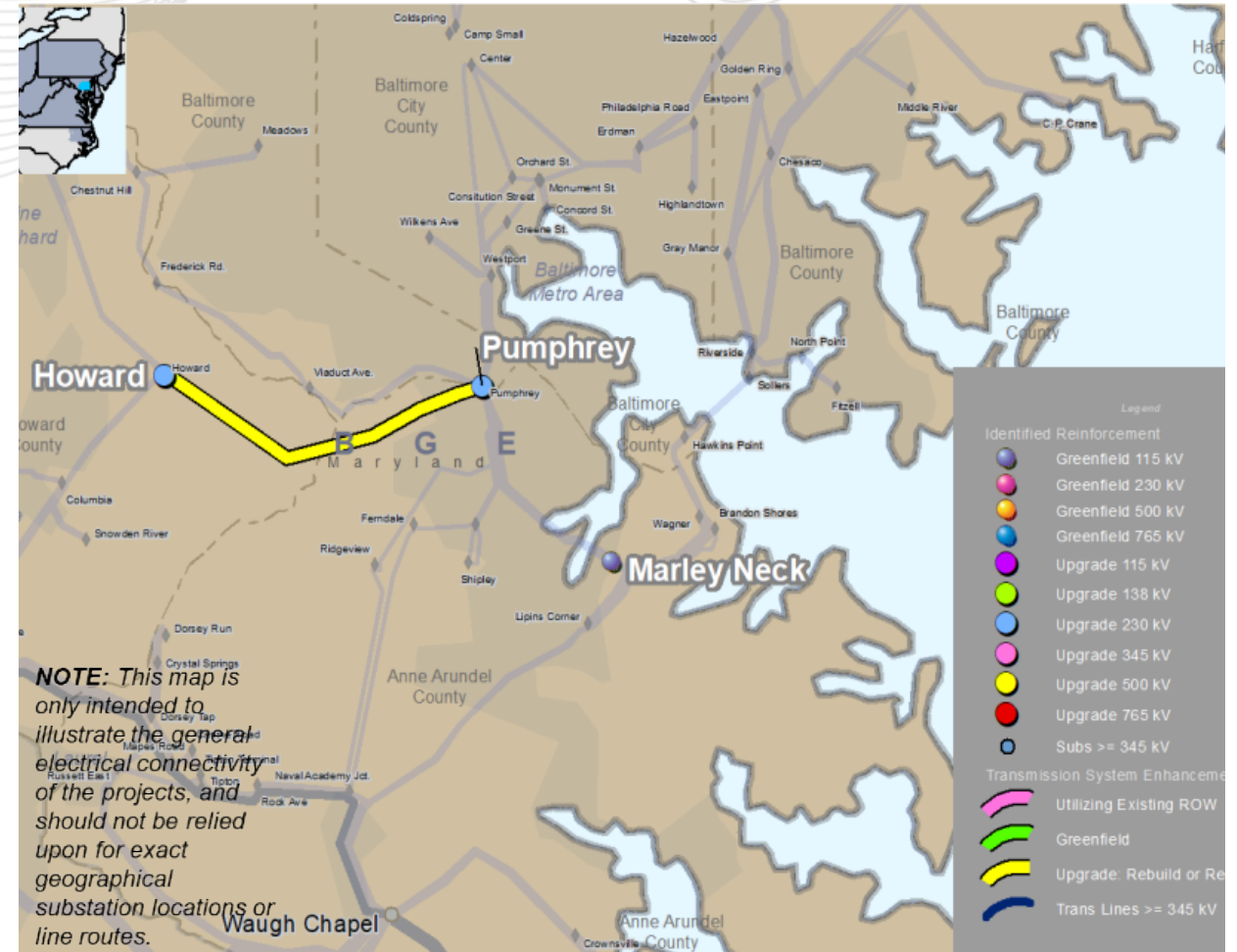
**Estimated Cost:** \$107.62M

### Alternatives:

- Replace the existing 556.5 kcm ACSR conductor drops from the 110527-A & 110528-A transmission lines to the line switches at Frederick Rd with 2-bundle 556.5 kcm ACSR per phase
- 2024-W1-470 - Replace existing Graceton 230-1 highimpedance transformer with standard 230/115 kV transformer. • Howard to Pumphrey 230 kV Transmission Line Rebuild approximate distance 8.7Miles.

**Estimated Cost:** \$71.96

**Required In-Service:** 06/01/2029



**Process Stage:** Second Review

**Criteria:** Summer and Winter Generation Deliverability

**Assumption Reference:** 2029 RTEP assumption

**Model Used for Analysis:** 2029/2032 RTEP Summer and Winter

**Proposal Window Exclusion:** No

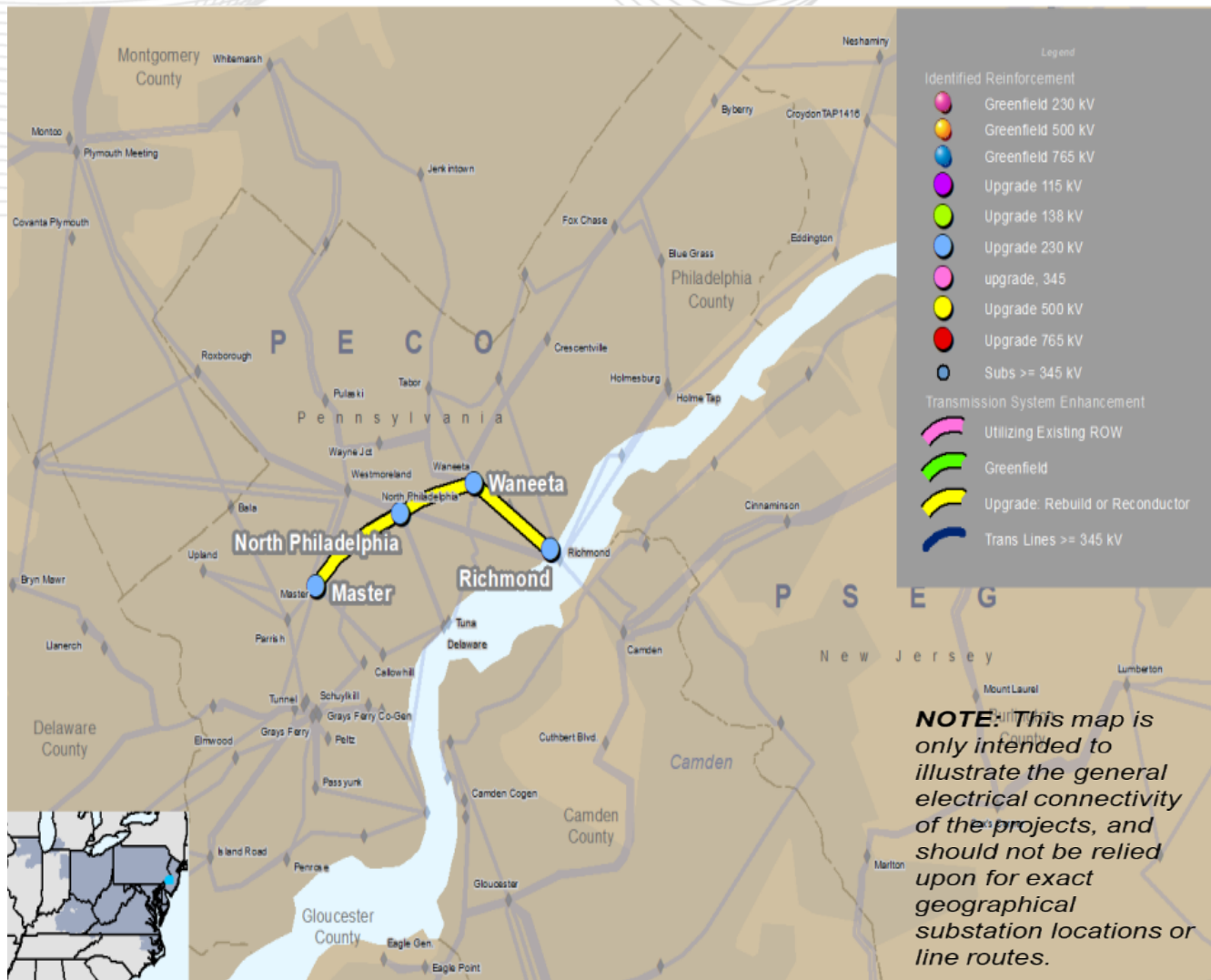
**Problem Statement:** The following facilities in PECO are overloaded for Summer and Winter Generation Deliverability

- Richmond – Waneeta 230 kV
- Waneeta – North Philadelphia 230 kV
- North Philadelphia – Master 230 kV

Violations were posted as part of the 2024 Window 1:

|                 |                  |                  |                 |
|-----------------|------------------|------------------|-----------------|
| 2024W1-GD-S89N  | 2024W1-GD-W21N   | 2024W1-32GD-S143 | 2024W1-32GD-W14 |
| 2024W1-GD-S770  | 2024W1-GD-W22N   | 2024W1-32GD-S144 | 2024W1-32GD-W15 |
| 2024W1-GD-S90N  | 2024W1-32GD-S135 | 2024W1-32GD-S145 | 2024W1-32GD-W16 |
| 2024W1-GD-S91N  | 2024W1-32GD-S136 | 2024W1-32GD-S146 | 2024W1-32GD-W17 |
| 2024W1-GD-S201N | 2024W1-32GD-S137 | 2024W1-32GD-W2   | 2024W1-32GD-W18 |
| 2024W1-GD-S791  | 2024W1-32GD-S138 | 2024W1-32GD-W3   | 2024W1-32GD-W19 |
| 2024W1-GD-S202N | 2024W1-32GD-S139 | 2024W1-32GD-W4   | 2024W1-32GD-W20 |
| 2024W1-GD-S203N | 2024W1-32GD-S140 | 2024W1-32GD-W5   | 2024W1-32GD-W21 |
| 2024W1-GD-W238  | 2024W1-32GD-S141 | 2024W1-32GD-W6   |                 |
| 2024W1-GD-W20N  | 2024W1-32GD-S142 | 2024W1-32GD-W8   |                 |

Continue in the next slide...



**Process Stage:** Second Review

**Recommended Solution:** #2024-W1-12

- Reconductor entire 2.5 miles of North Philadelphia to Master 230 kV line including terminal equipment (**b3907.1**)
- Richmond to Waneeta Line: Rebuild entire 0.95 miles of existing UGT, and rebuild entire 2.23 miles of existing OHT including terminal equipment (**b3907.2**)
- Reconductor 2.12 miles of North Philadelphia to Waneeta 230 kV line including terminal equipment (**b3907.3**)

|                               | Existing Rating<br>SN/SE/WN/WE (MVA) | Proposed Rating<br>SN/SE/WN/WE (MVA) |
|-------------------------------|--------------------------------------|--------------------------------------|
| North Philadelphia to Master  | 456/572/513/632                      | 647/756/781/873                      |
| North Philadelphia to Waneeta | 505/621/556/674                      | 731/885/822/978                      |
| Richmond to Waneeta Line      | 760/1180/803/1201                    | 1245/1543/1535/1754                  |

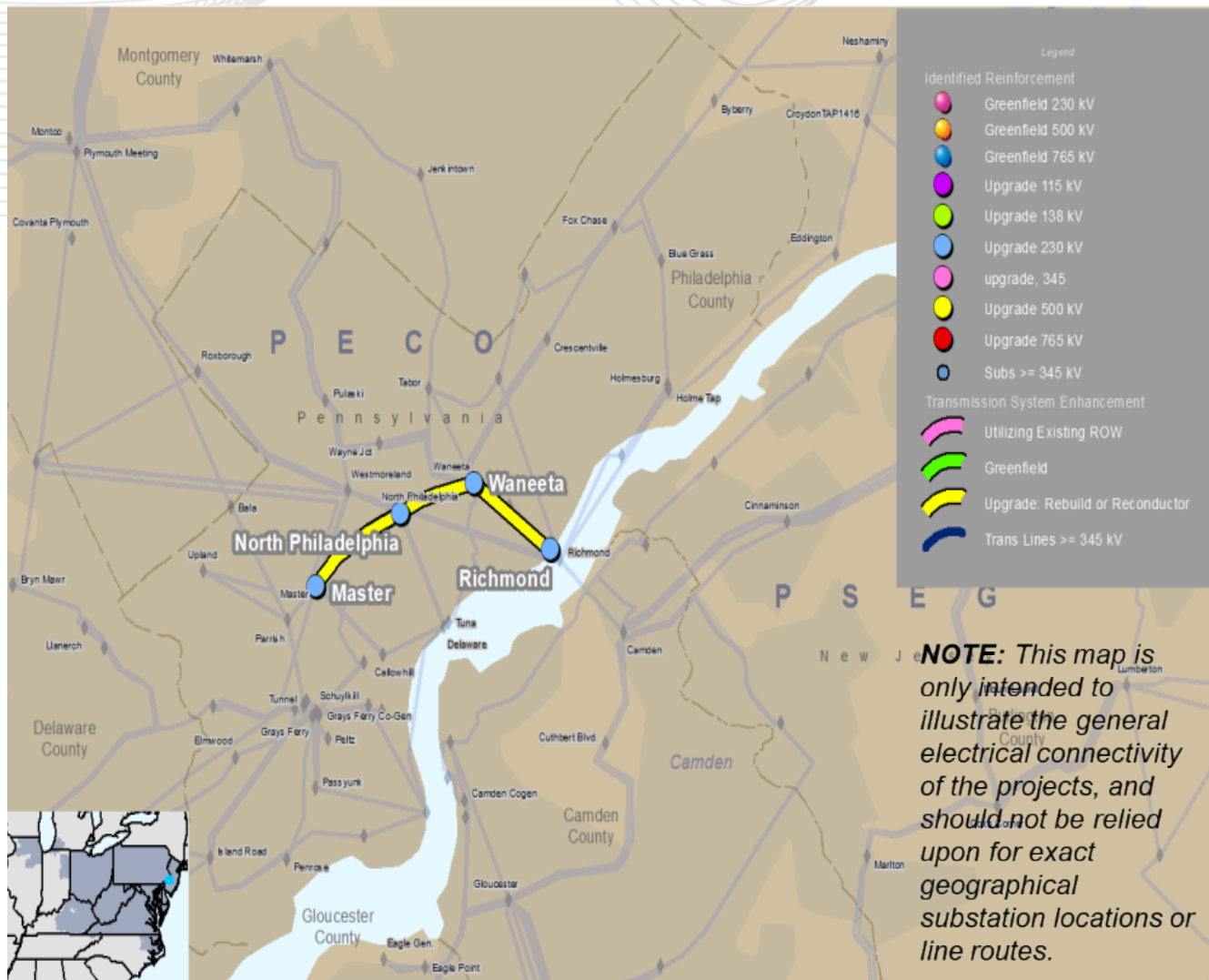
**Estimated Cost:** \$43.22 M

**Projected In-Service:** 6/1/2029

**Required In-Service:** 6/1/2029

**Alternatives:** 2024-W1-955

- Build new 230kV circuit from Eagle Point - Penrose line and several substations upgrade. This new transmission line consists of approximately 1.5 miles of 230kV overhead transmission and approximately 3.6 miles underground 230kV XLPE transmission. Estimated Cost: \$390.9M



**Process Stage:** Second Review

**Criteria:** Winter N-1-1 Voltage

**Assumption Reference:** 2029 RTEP assumption

**Model Used for Analysis:** 2029 RTEP Winter

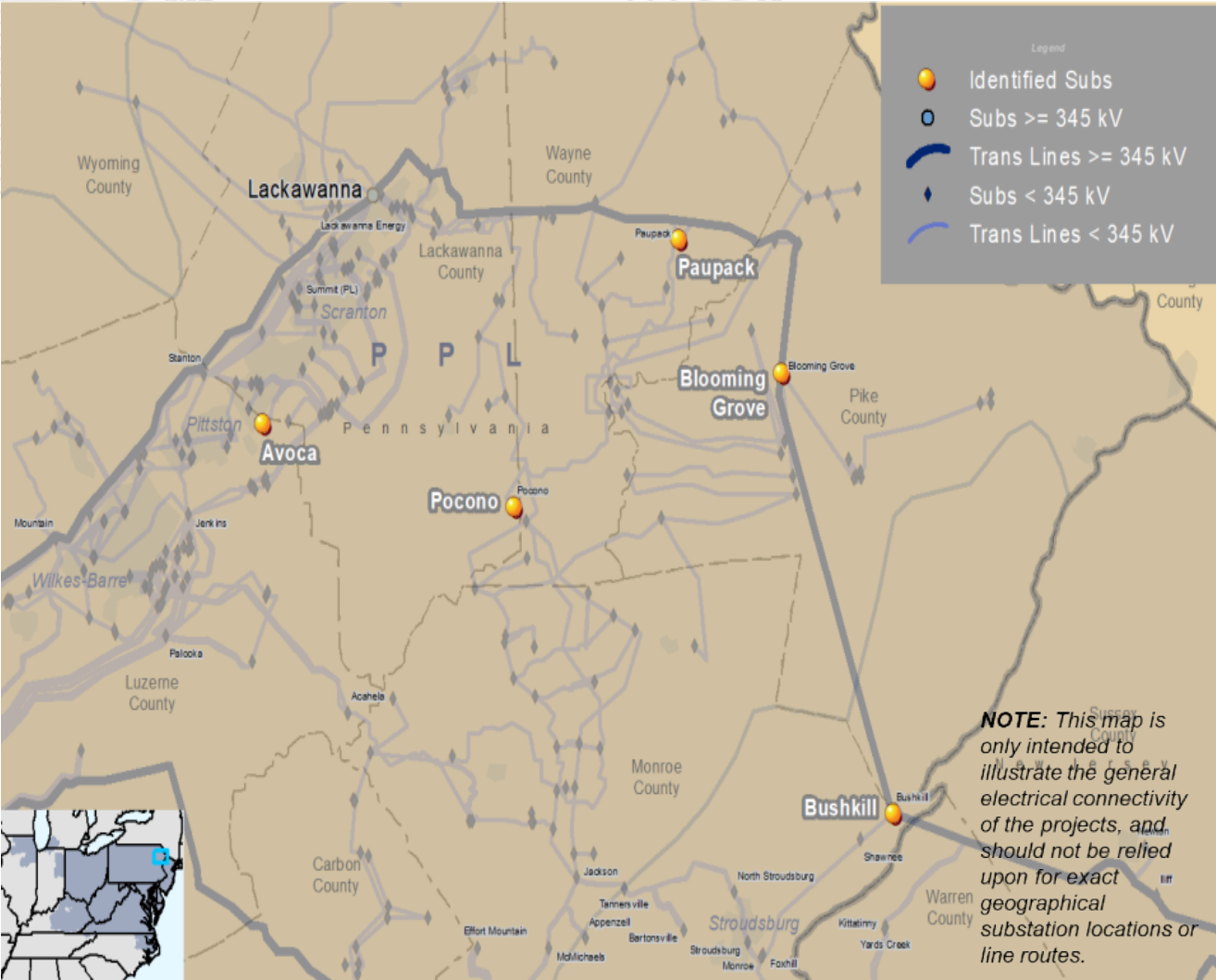
**Proposal Window Exclusion:** No

**Problem Statement:** Voltage magnitude and drop violation on the PPL 230 kV system in the Pocono vicinity for the loss of multiple contingencies

Violations were posted as part of the 2024 Window 1:

|                 |                  |                  |                  |
|-----------------|------------------|------------------|------------------|
| 2024W1-N11-WVM1 | 2024W1-N11-WVM10 | 2024W1-N11-WVM19 | 2024W1-N11-WVD9  |
| 2024W1-N11-WVM2 | 2024W1-N11-WVM11 | 2024W1-N11-WVD1  | 2024W1-N11-WVD10 |
| 2024W1-N11-WVM3 | 2024W1-N11-WVM12 | 2024W1-N11-WVD2  | 2024W1-N11-WVD11 |
| 2024W1-N11-WVM4 | 2024W1-N11-WVM13 | 2024W1-N11-WVD3  | 2024W1-N11-WVD12 |
| 2024W1-N11-WVM5 | 2024W1-N11-WVM14 | 2024W1-N11-WVD4  | 2024W1-N11-WVD13 |
| 2024W1-N11-WVM6 | 2024W1-N11-WVM15 | 2024W1-N11-WVD5  | 2024W1-N11-WVD14 |
| 2024W1-N11-WVM7 | 2024W1-N11-WVM16 | 2024W1-N11-WVD6  | 2024W1-N11-WVD15 |
| 2024W1-N11-WVM8 | 2024W1-N11-WVM17 | 2024W1-N11-WVD7  | 2024W1-N11-WVD16 |
| 2024W1-N11-WVM9 | 2024W1-N11-WVM18 | 2024W1-N11-WVD8  | 2024W1-N11-WVD17 |

Continue in the next slide...



**Process Stage:** Second Review

**Recommended Solution:** 2024-W1-850

- Install one 80 MVar 230 kV capacitor bank at Pocono 230kV Substation (**b3908.1**)

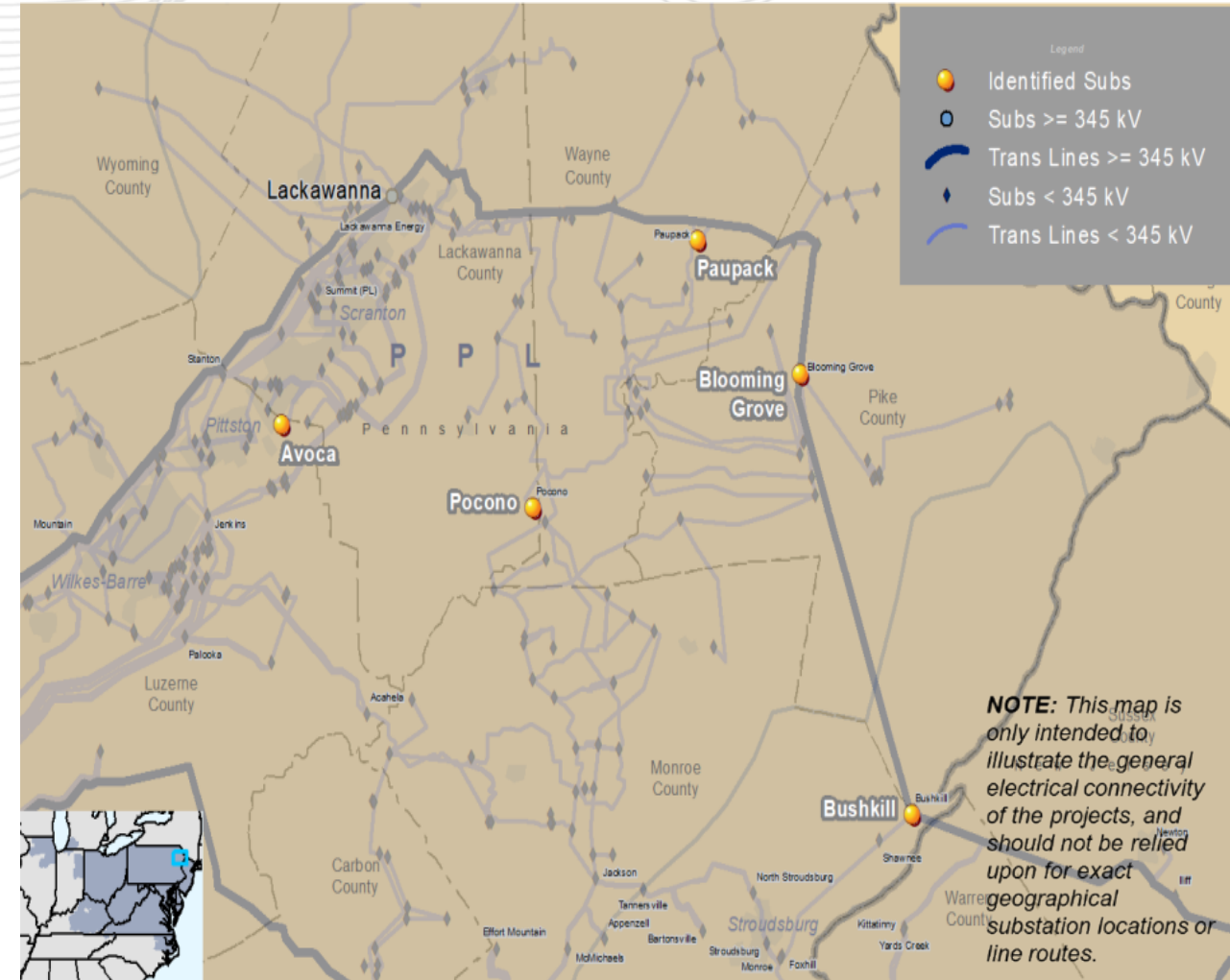
**Estimated Cost:** \$4.93M

**Projected In-Service:** 10/30/2027

**Required In-Service:** 6/1/2029

## Alternatives:

- Build new 230 kV circuit from Jenkins - Pocono (2024-W1-526)  
Estimated Cost: \$60.03M
- Acahela 500/230/69 kV Substation Expansion and Lackawanna - Siegfried 500 kV line taps in and out of Acahela (2024-W1-312) Estimated Cost: \$116.33M



**Process Stage:** Second Review

**Criteria:** Summer and Winter Generation Deliverability

**Assumption Reference:** 2029 RTEP assumption

**Model Used for Analysis:** 2029 RTEP Summer and Winter

**Proposal Window Exclusion:** No

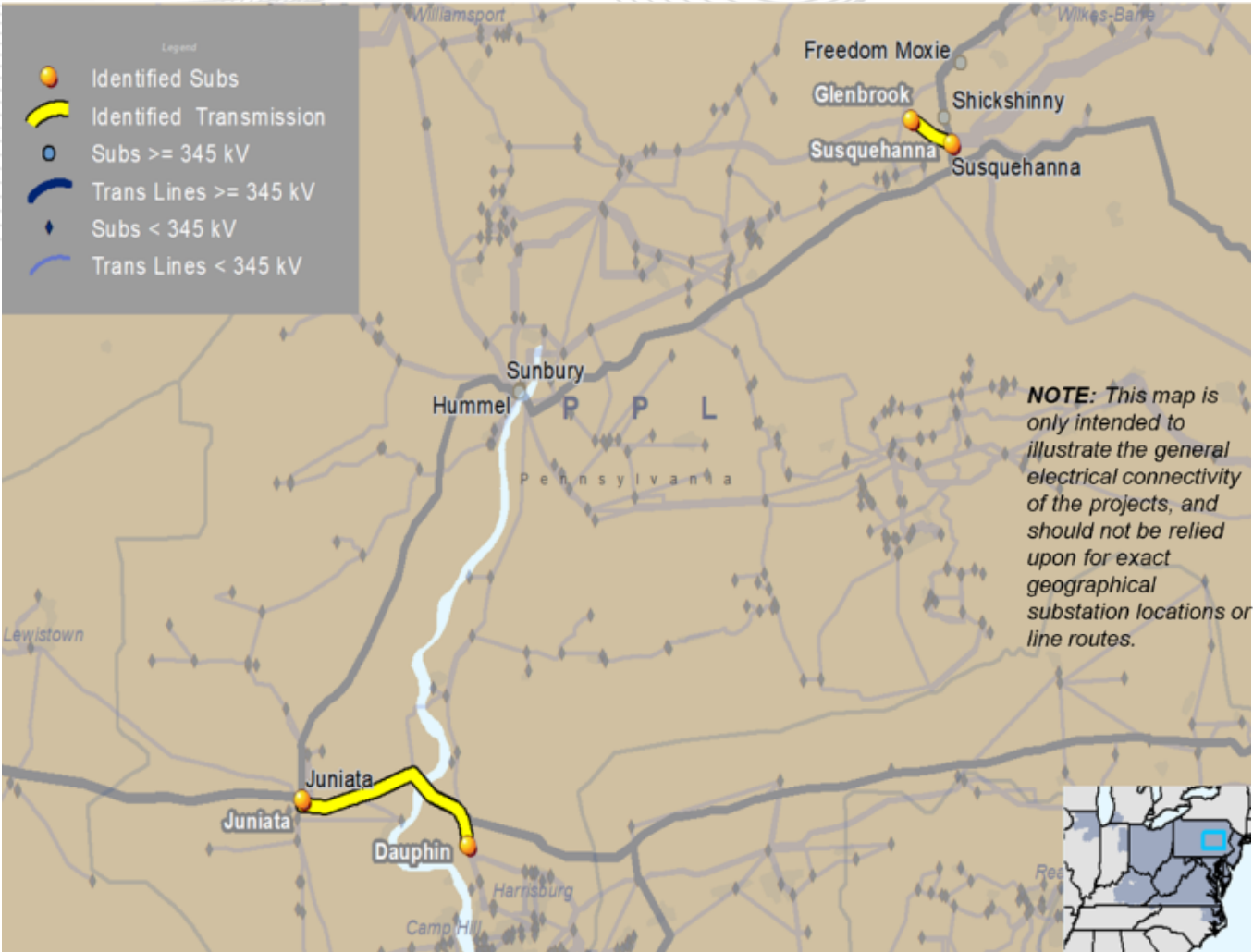
**Problem Statement:**

- The Juniata 500/230 kV transformer is overloaded for multiple line fault stuck breaker contingencies.
- Susquehanna – Glenbrook 230 kV is overloaded for tower line contingency.

Violations were posted as part of the 2024 Window 1: FG#

|                 |                |                |
|-----------------|----------------|----------------|
| 2024W1-GD-S390  | 2024W1-GD-W106 | 2024W1-GD-S896 |
| 2024W1-IPD-S104 | 2024W1-IPD-W2  |                |

**Required In-Service:** 6/1/2029



## Process Stage: Second Review

### Recommended Solution: 2024-W1-935 & 2024-W1-549

Proposal ID 2024-W1-935

- Juniata 500 kV yard expansion/reconfiguration to include one new bay and eliminate the line fault stuck breaker **(b3909.1)**

**Estimated Cost:** \$22.2 M

**Projected In-Service:** 3/30/2029

Proposal ID 2024-W1-549

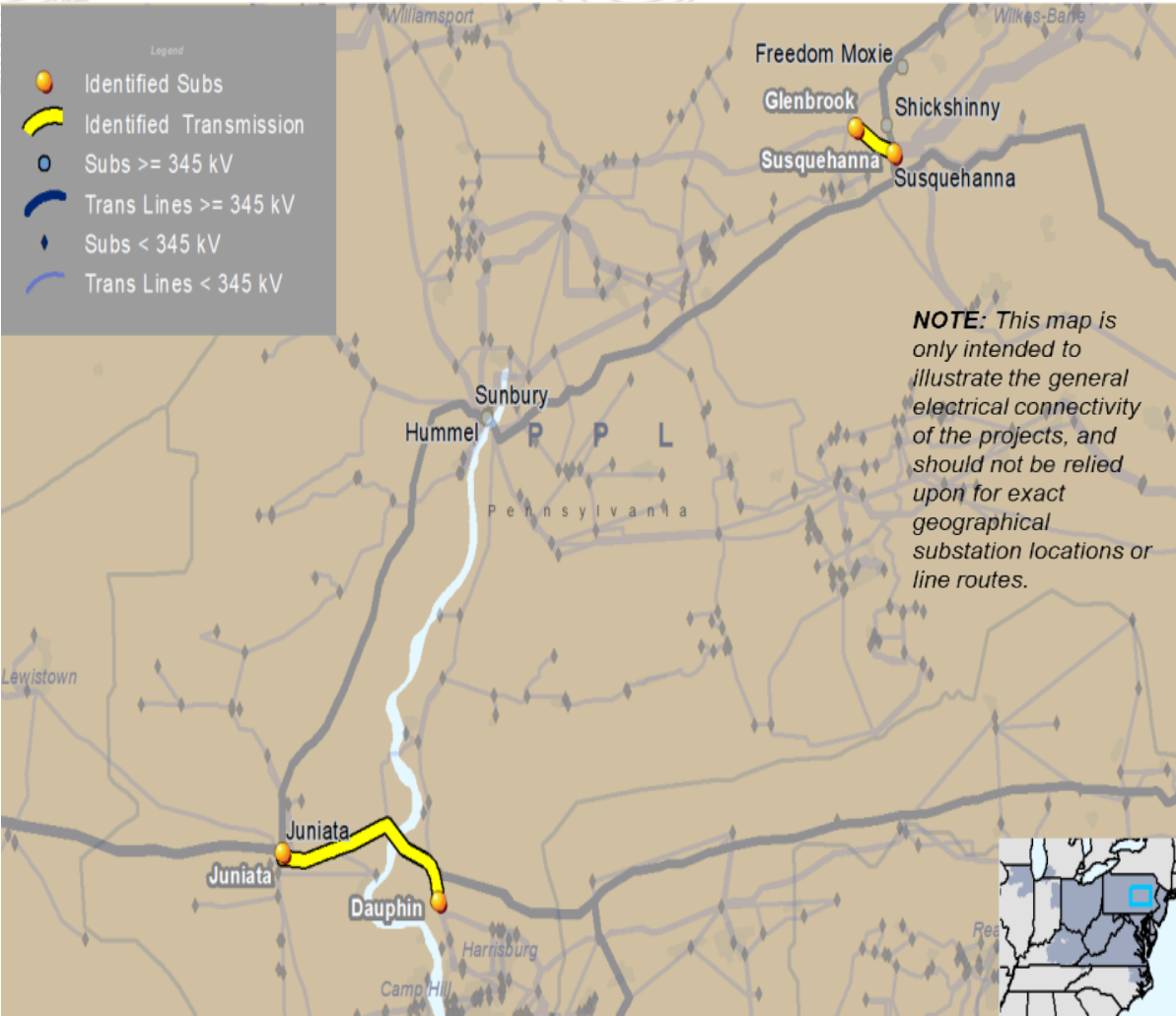
- Susquehanna T10 230 kV Station Reconfiguration. Break the existing Susquehanna - Glen Brook 230 kV line and loop it 0.2 miles in and out of the Susquehanna T10 230 kV Station. **(b3910.1)**

**Estimated Cost:** \$9.5 M

**Projected In-Service:** 12/31/2028

### Alternatives:

| Proposal ID | Proposing Entity | Upgrade Description                                                                         | Cost (\$M) |
|-------------|------------------|---------------------------------------------------------------------------------------------|------------|
| 72          | PPL              | Cumberland - Williams Grove 230 kV line reconductor<br>Juniata - Cumberland 230 kV DCT line | \$78.59    |
| 330         | PPL              | Build new Juniata - Hunterstown 500 kV line                                                 | \$329.03   |
| 386         | PPL              | Buildd new Juniata - Three Mile Island 500 kV                                               | \$334.61   |





# ComEd Transmission Zone: Baseline Wilton Center BT 4-5 CB

**Process Stage:** Recommended Solution

**Criteria:** Generator Deliverability

**TEAC/SRRTEP assumptions:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Winter base case

**Proposal Window Exclusion:** Substation Equipment Exclusion

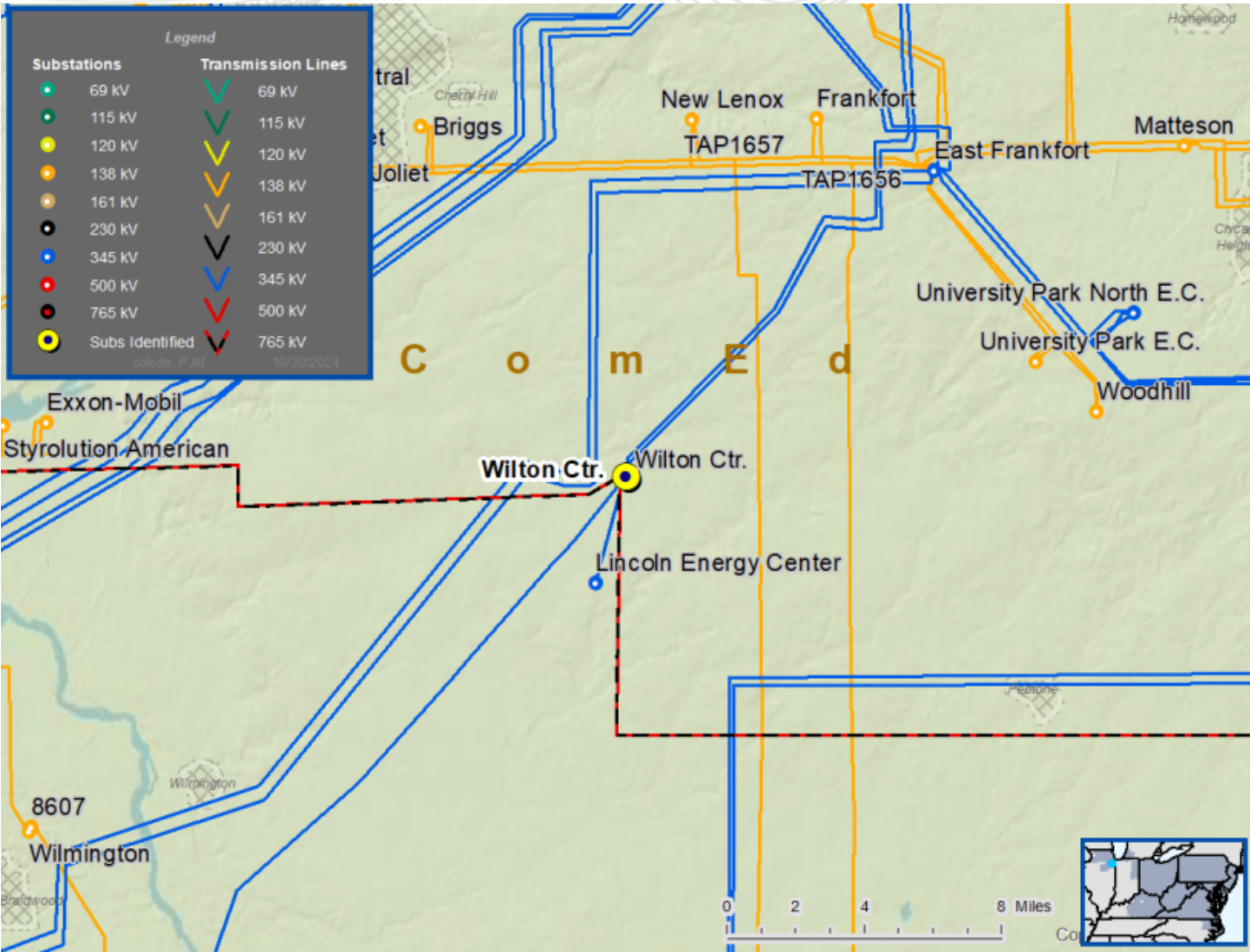
**Problem Statement:**

FG: 2024-W1-GD-W107, 2024-W1-GD-W108, 2024-W1-GD-W109, 2024-W1-GD-W5

In the 2029 RTEP Winter case, the Wilton Center-AD1-100 tap 345 kV line is overloaded for a N-1 and N-2 outages.

**Existing Facility Rating:**

| Branch                 |               | SN/SE/WN/WE (MVA)   |
|------------------------|---------------|---------------------|
| Wilton - AD1-100 (345) |               | 1364/1528/1590/1781 |
| Breaker                | Capacity (kA) |                     |
| Wilton BT 4-5          | 50            |                     |





# ComEd Transmission Zone: Baseline Wilton Center BT 4-5 CB

**Recommended Solution:** Replace the Wilton Center 345 kV BT 4-5 circuit breaker. (b3902.1)

**Estimated Cost:** \$2.7 M

**Preliminary Facility Rating:**

| Branch                 | SN/SE/WN/WE (MVA)   |
|------------------------|---------------------|
| Wilton - AD1-100 (345) | 1679/2058/2091/2340 |

| Breaker       | Capacity (kA) |
|---------------|---------------|
| Wilton BT 4-5 | 63            |

**Alternatives:**

N/A

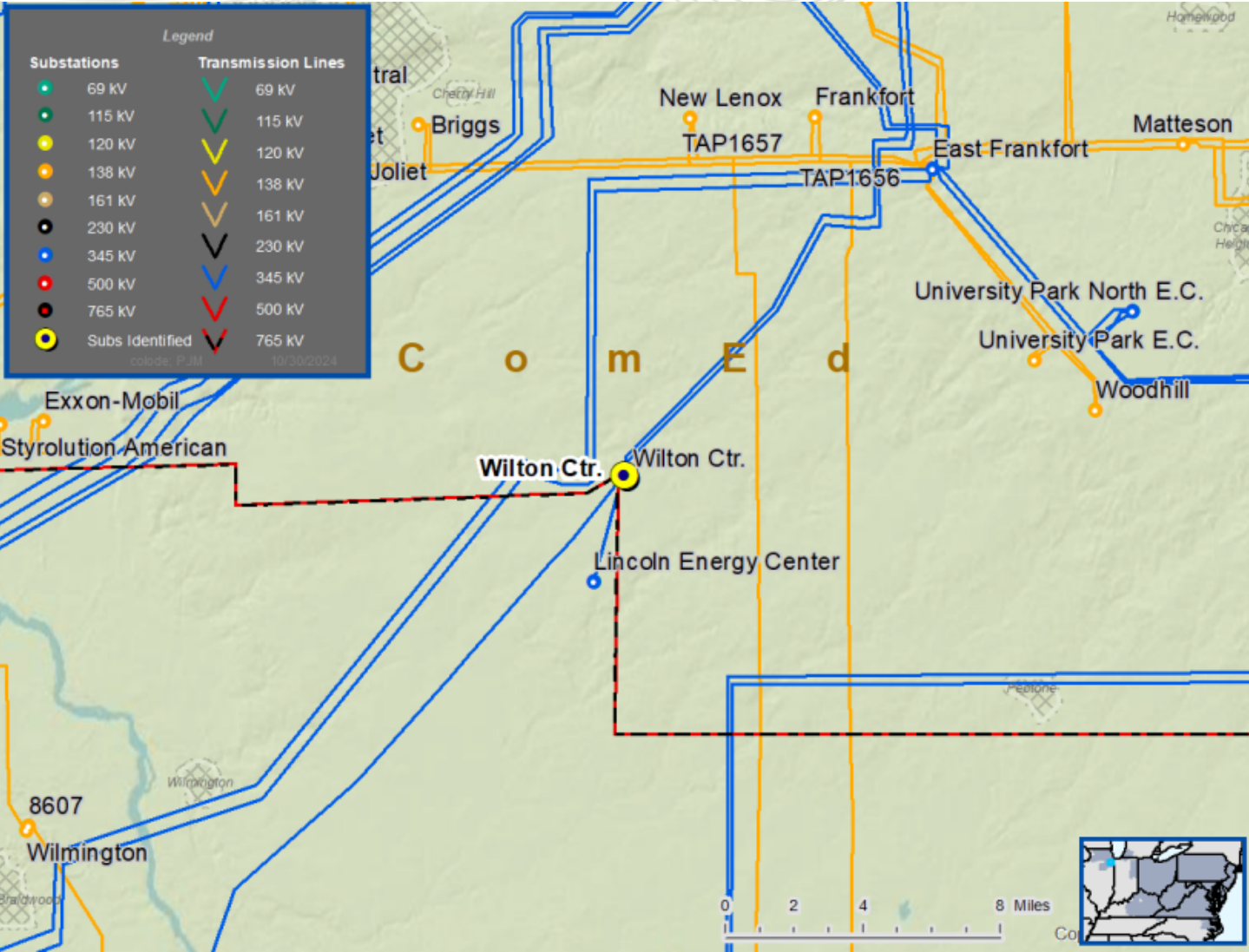
**Ancillary Benefits:**

N/A

**Required In-Service:** 12/1/2029

**Projected IS Date:** 12/1/2029

**Previously Presented:** 11/6/2024



**Process Stage:** Recommended Solution

**Criteria:** Baseline & Generator Deliverability

**TEAC/SRRTEP assumptions:** 2024 RTEP assumptions

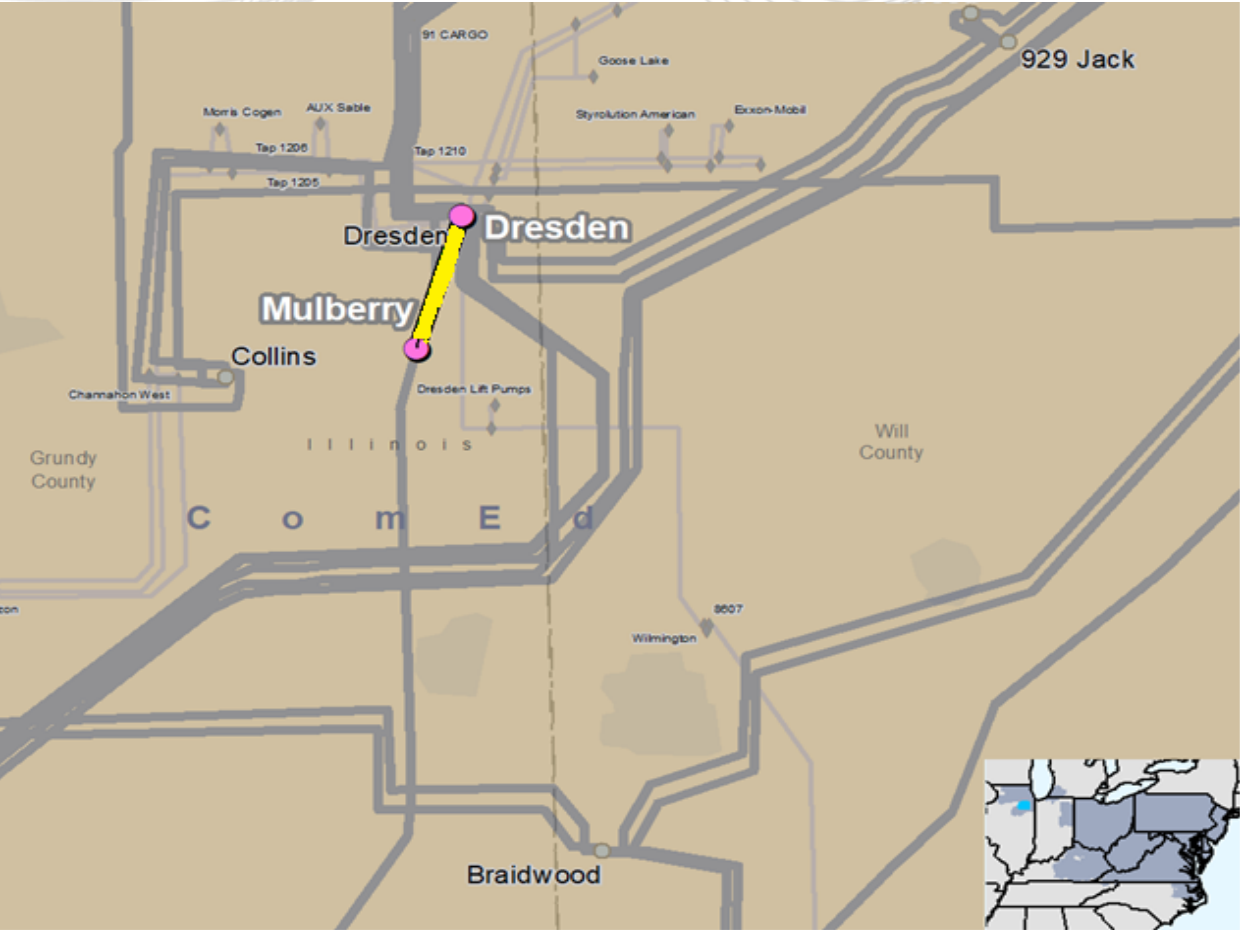
**Model Used for Analysis:** 2029 RTEP Summer and Winter base cases

**Proposal Window Exclusion:** None

**Problem Statement:**

FG: 2024W1-N1-ST51, 2024W1-N1-ST54, 2024W1-GD-S307, 2024W1-GD-S19, 2024W1-GD-S376, 2024W1-IPD-S109, 2024W1-IPD-S110, 2024W1-IPD-S111, 2024W1-IPD-S112, 2024W1-IPD-S113, 2024W1-IPD-S114, 2024W1-IPD-S115, 2024W1-IPD-S116, 2024W1-IPD-S117, 2024W1-IPD-S118, 2024W1-IPD-S119, 2024W1-IPD-S120, 2024W1-IPD-S121, 2024W1-IPD-S122, 2024W1-IPD-S123, 2024W1-IPD-S124, 2024W1-IPD-S125, 2024W1-IPD-S126, 2024W1-IPD-S127, 2024W1-IPD-S128, 2024W1-IPD-S129, 2024W1-IPD-S130, 2024W1-IPD-S131, 2024W1-IPD-S132, 2024W1-IPD-S133, 2024W1-IPD-S134, 2024W1-IPD-S135, 2024W1-IPD-S136, 2024W1-IPD-S137, 2024W1-IPD-S138, 2024W1-IPD-S139, 2024W1-IPD-S140, 2024W1-IPD-S141, 2024W1-IPD-S142, 2024W1-IPD-S143, 2024W1-N1-WT2, 2024W1-GD-W101, 2024W1-GD-W2, 2024W1-GD-W4, 2024W1-GD-W105, 2024W1-IPD-W3, 2024W1-IPD-W4, 2024W1-IPD-W5, 2024W1-IPD-W6, 2024W1-IPD-W7, 2024W1-IPD-W8, 2024W1-IPD-W9, 2024W1-IPD-W10, 2024W1-IPD-W11, 2024W1-IPD-W12, 2024W1-IPD-W13, 2024W1-IPD-W14, 2024W1-IPD-W15, 2024W1-IPD-W16, 2024W1-IPD-W17, 2024W1-IPD-W18, 2024W1-IPD-W19, 2024W1-IPD-W20, 2024W1-IPD-W21, 2024W1-IPD-W22, 2024W1-IPD-W23

In the 2029 RTEP Summer and Winter base cases, the Dresden-Mulberry 345 kV double circuit is overloaded for N-1 and N-2 outages.



**Existing Facility Rating:**

| Branch                 | SN/SE/WN/WE (MVA)   |
|------------------------|---------------------|
| Dresden-Mulberry (345) | 1201/1479/1497/1710 |

# ComEd Transmission Zone: Baseline Cluster 1

- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address ComEd Cluster 1
- Proposal 135 is an upgrade, with least cost, and addresses the posted violation well

| Proposal ID # | Project Type | Entity | Project Title                                            | Project Description                                                                                                                                                                                                                      | kV Level | Estimated Cost (\$M) |
|---------------|--------------|--------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|
| 135           | UPGRADE      | COMED  | Reconductor 345 kV lines 1202 & 1227 Dresden to Mulberry | Reconductor 1.5 miles of 345 kV lines 1202 & 1227 from Dresden to Mulberry with two conductor bundled 1033.5 ACSS conductor. Modify and replace towers as necessary to accommodate the higher mechanical loads of the bundled conductor. | 345      | 16.27                |
| 447           | GREENFIELD   | COMED  | Cut 345 kV L8014 Pontiac to Dresden into Mulberry        | Cut 345 kV L8014 Pontiac to Dresden into Mulberry                                                                                                                                                                                        | 345      | 23.60                |
| 532           | UPGRADE      | COMED  | 345kV Shunt Inductor at Mulberry                         | Install new 345 kV shunt inductor at Mulberry                                                                                                                                                                                            | 345      | 28.23                |

# ComEd Transmission Zone: Baseline Cluster 1

## Recommended Solution: 2024-W1-135

- Reconductor 1.5 miles of 345 kV lines 1202 & 1227 from Dresden to Mulberry with two conductor bundled 1033.5 ACSS conductor. Modify and replace towers as necessary to accommodate the higher mechanical loads of the bundled conductor. (\$12.33 M) (b3915.1)
- Install 345 kV circuit breaker on line 1202 (Dresden-Mulberry 345 kV) and upgrade siscnects and associated equipment at Dresden 345 kV. (\$3.77 M) (b3915.2)
- Upgrade disconnects and associated equipment at Mulberry 345 kV. (\$0.17 M) (b3915.3)

**Total Estimated Cost:** \$16.27 M

## Preliminary Facility Rating:

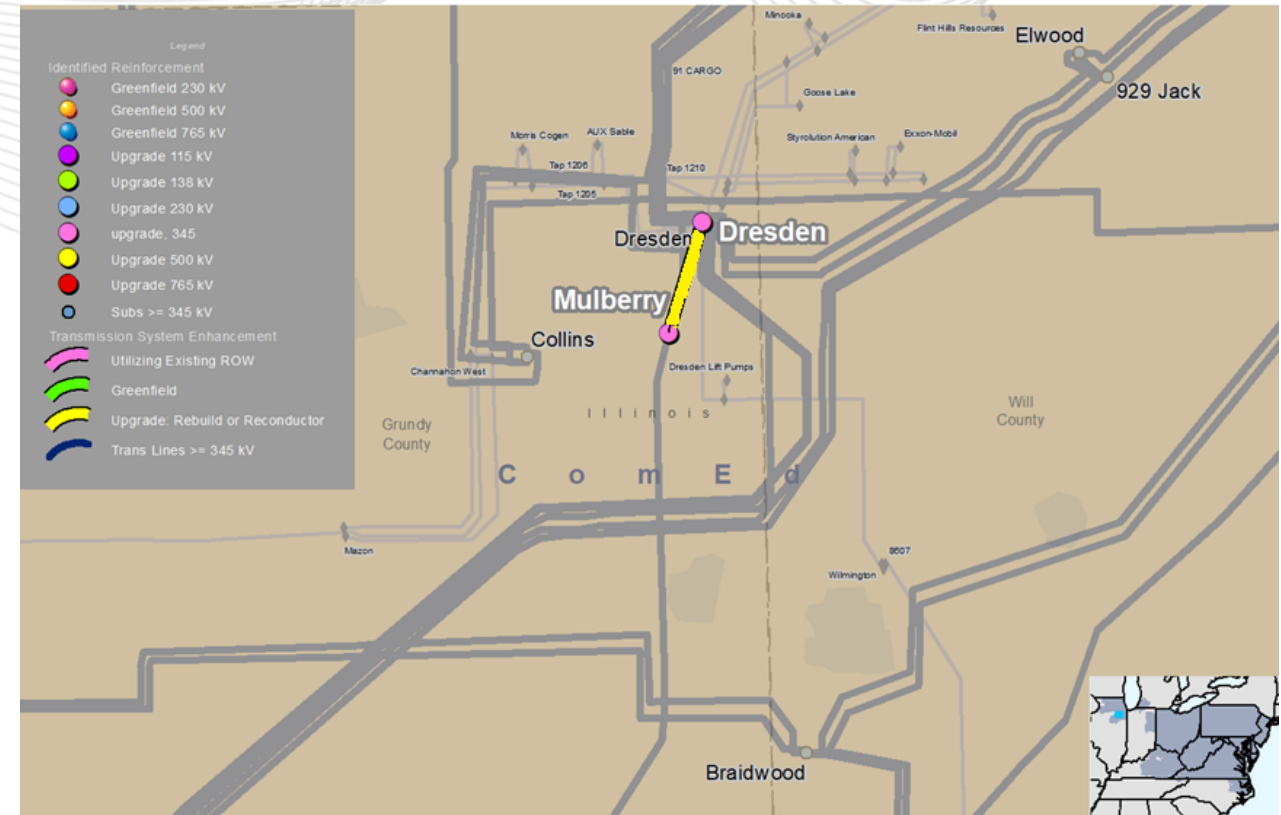
| Branch                 | SN/SE/WN/WE (MVA)   |
|------------------------|---------------------|
| Dresden-Mulberry (345) | 1961/2112/2324/2457 |

**Ancillary Benefits:** Includes replacement of several existing structures that are 52 year old.

**Required In-Service:** 6/1/2029

**Projected IS Date:** 6/1/2029

**Previously Presented:** 11/6/2024





# ComEd Transmission Zone: Baseline Cluster 2

**Process Stage:** Recommended Solution

**Criteria:** Baseline N-1-1

**TEAC/SRRTEP assumptions:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Summer base case

**Proposal Window Exclusion:** None

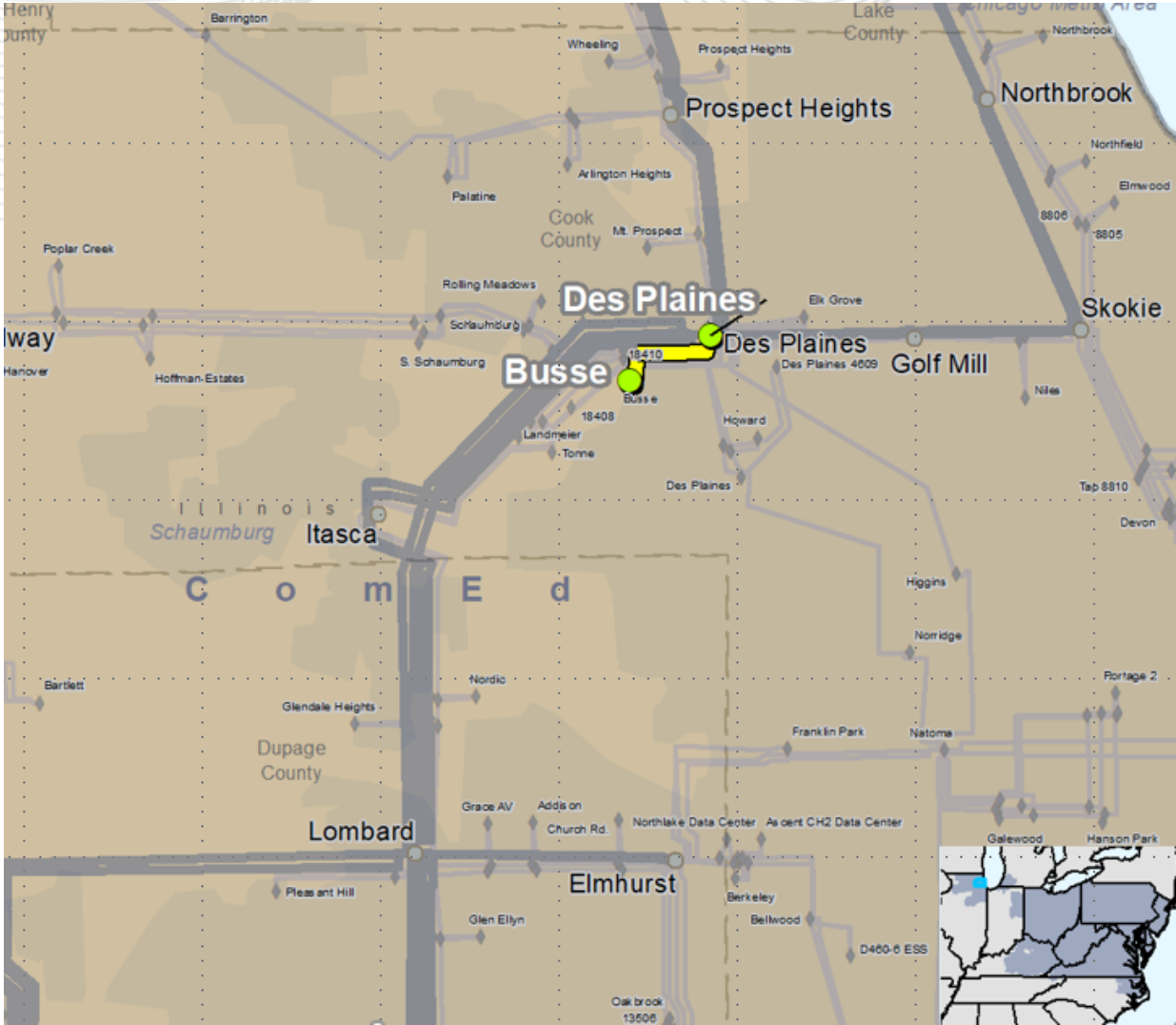
**Problem Statement:**

FG: 2024W1-N11-ST37, 2024W1-N11-ST34

In the 2029 RTEP Summer base case, the Busse-Des Plaines 138 kV line is overloaded for N-1 contingency pairs.

**Existing Facility Rating:**

| Branch                  | SN/SE/WN/WE (MVA) |
|-------------------------|-------------------|
| Busse-Des Plaines (138) | 351/449/421/500   |



- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster 2
- Proposal 816 addresses the posted violations, is an upgrade and represents a portion of an M-3 solution presented at August TEAC (Need ID ComEd-2024-004)

| Proposal ID # | Project Type | Entity | Project Title                    | Project Description                    | kV Level | Estimated Cost (\$M) |
|---------------|--------------|--------|----------------------------------|----------------------------------------|----------|----------------------|
| 816           | UPGRADE      | COMED  | Autotransformer at Itasca        | Autotransformer at Itasca              | 345/138  | 14.31                |
| 888           | UPGRADE      | COMED  | Reconductor Des Plaines to Busse | Reconductor Des Plaines to Busse L4605 | 138      | 7.21                 |



# ComEd Transmission Zone: Baseline Cluster 2

**Recommended Solution:** 2024-W1-816

Install a new 420 MVA 345/138 kV autotransformer and associated 345 kV and 138 kV circuit breakers at Itasca substation. **(b3916.1)**

**Estimated Cost:** \$14.31 M

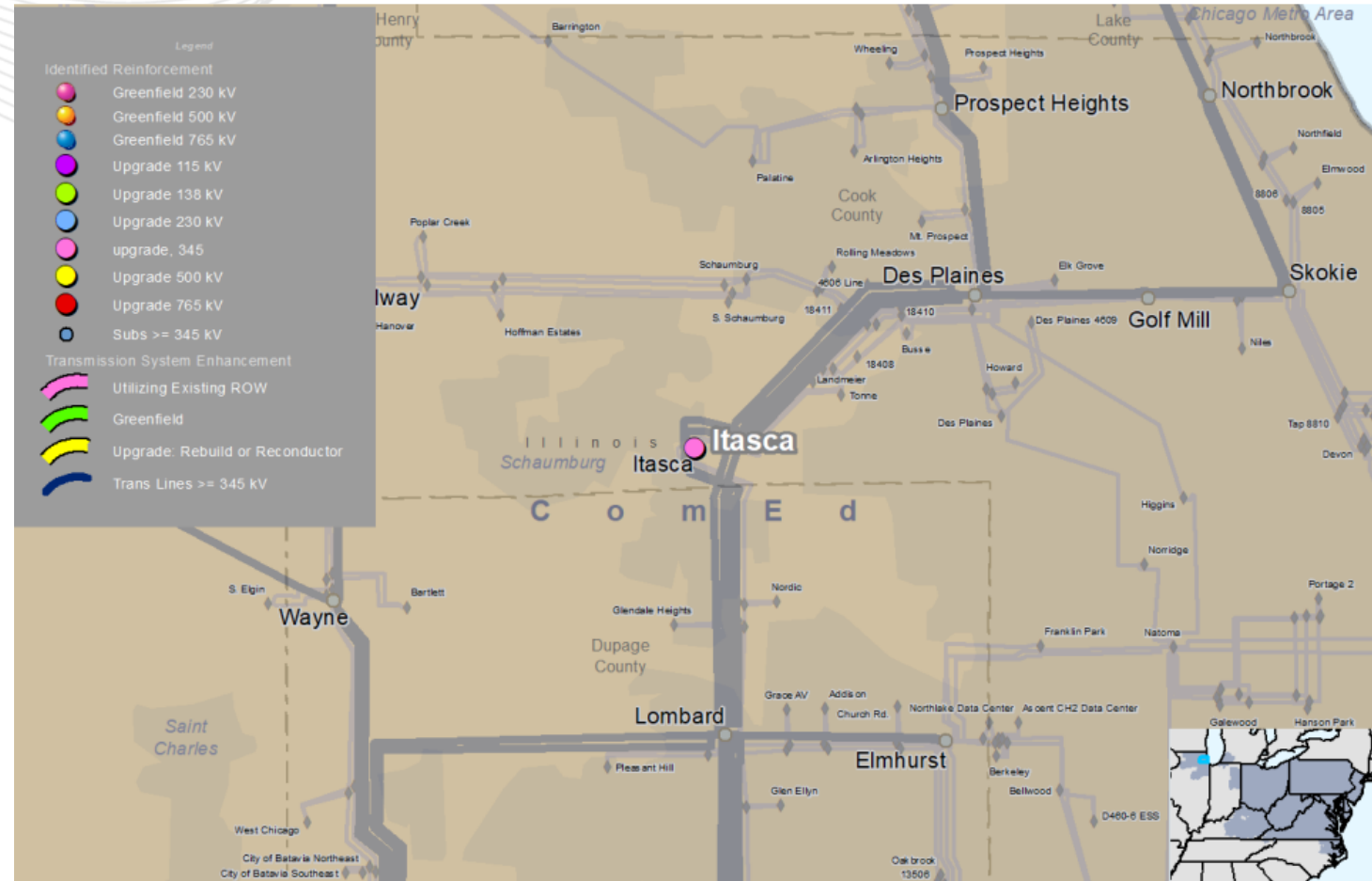
**Preliminary Facility Rating:**

| Branch                          | SN/SE/WN/WE (MVA) |
|---------------------------------|-------------------|
| Itasca 84 Transformer (345/138) | 420/480/420/480   |

**Required In-Service:** 6/1/2029

**Projected IS Date:** 6/1/2029

**Previously Presented:** 11/6/2024



## First Read (Local Projects)



# OVEC Transmission Zone: Baseline Kyger Creek Upgrades

**Process Stage:** First Read

**Criteria:** Summer Gen Deliv

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Summer base case

**Proposal Window Exclusion:** Substation Equipment Exclusion

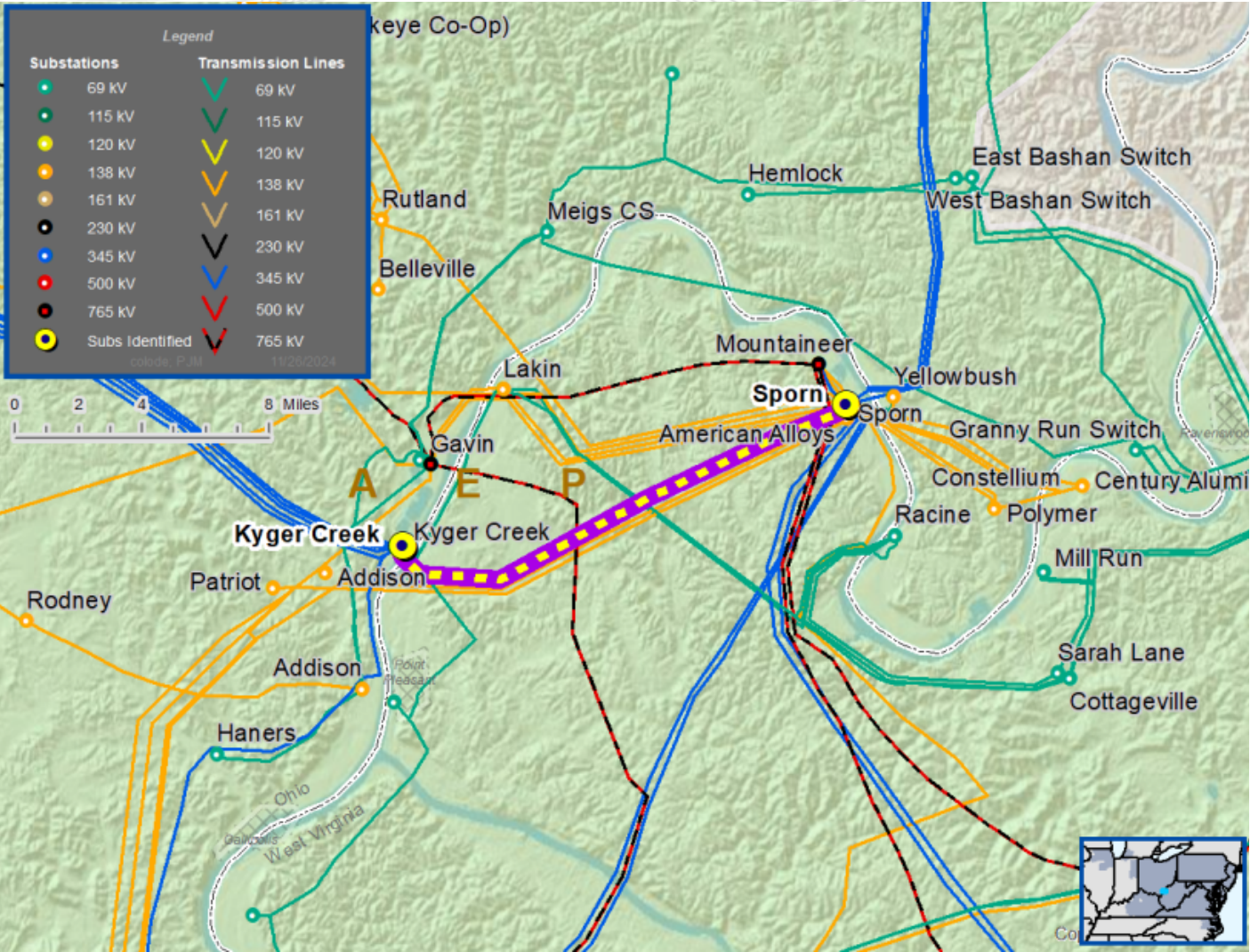
**Problem Statement:**

Flowgates: 2024-W1-GD-S418, 2024-W1-GD-S430

In the 2029 RTEP summer case, the Kyger – Sporn 345V line is overloaded for multiple contingencies in Gen Deliv test.

**Existing Facility Rating:**

| Branch                    | SN/SE/WN/WE (MVA)   |
|---------------------------|---------------------|
| Kyger Creek - Sporn (345) | 1189/1540/1507/1778 |





# OVEC Transmission Zone: Baseline Kyger Creek Upgrades

**Proposed Solution:**

Replace OVEC owned station equipment, the station conductor and the wavetrap at Kyger Creek 345 substation.

**Estimated Cost:** \$0.8 M

**Preliminary Facility Rating:**

| Branch                    | SN/SE/WN/WE (MVA)   |
|---------------------------|---------------------|
| Kyger Creek - Sporn (345) | 1800/1800/2022/2237 |

**Alternatives:** Considering the limited station scope and cost of the upgrade, no viable transmission alternates were identified.

**Required In-Service:** 6/1/2029

**Projected IS Date:** 4/1/2029

**Existing:**



**Proposed:**



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



# AEP Transmission Zone: Baseline Marysville Substation Upgrades

**Process Stage:** First Read

**Criteria:** Summer Gen Deliv

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Summer base case

**Proposal Window Exclusion:** Substation Equipment Exclusion

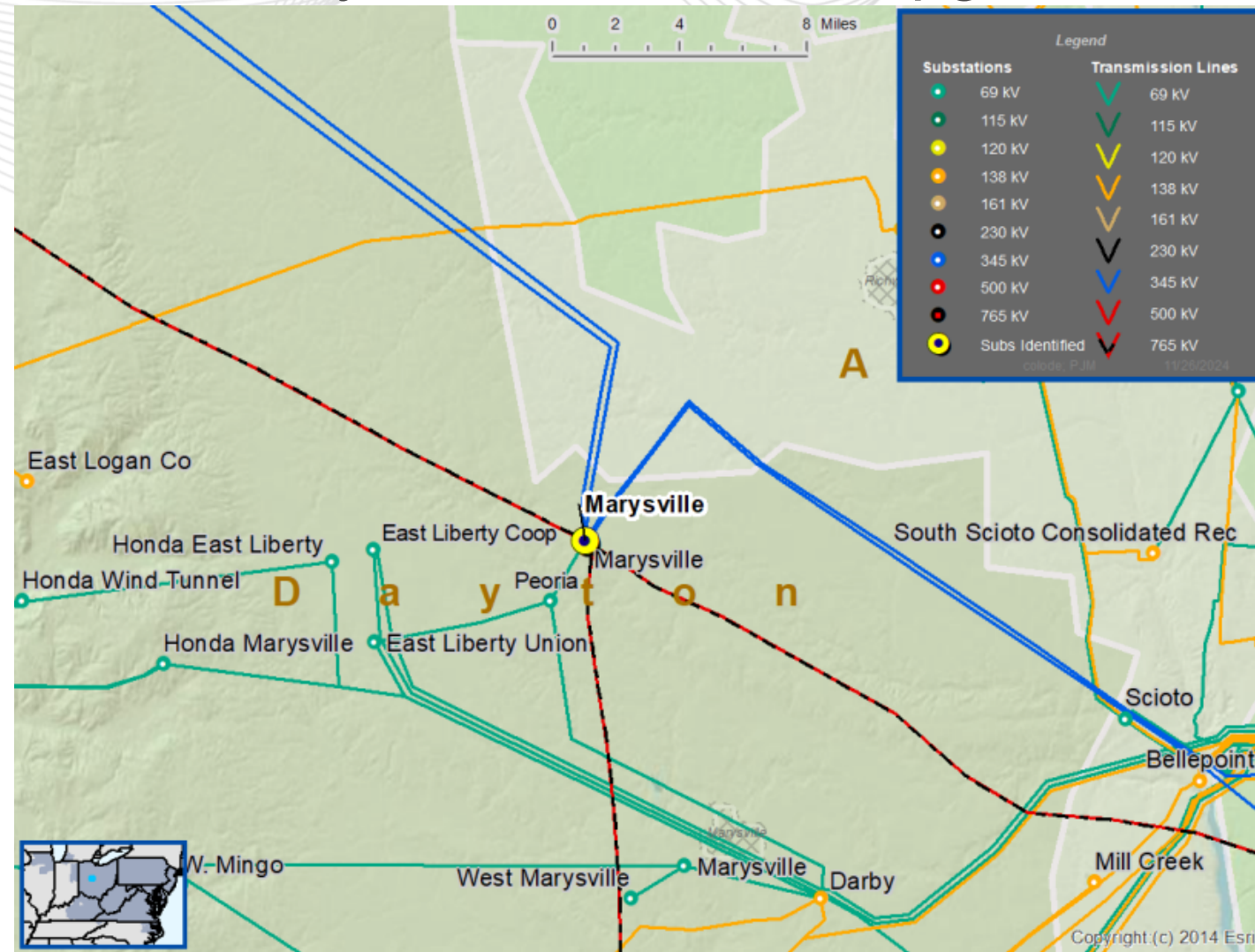
**Problem Statement:**

Flowgates: 2024-W1-GD-S386, 2024-W1-GD-S503

In the 2029 RTEP summer case, the Marysville 765kV reactor lead towards Sorenson is overloaded for multiple contingencies in Gen Deliv test.

**Existing Facility Rating:**

| Branch                           | SN/SE/WN/WE (MVA)   |
|----------------------------------|---------------------|
| Marysville_RS - Marysivlle (765) | 4047/4142/4484/4961 |





# AEP Transmission Zone: Baseline Marysville Substation Upgrades

**Proposed Solution:**

Replace Marysville 765kV breakers B2 and B with 5000A 50KA breakers and upgrade the existing wave trap towards Sorenson at Marysville substation.

**Estimated Cost:** \$10M

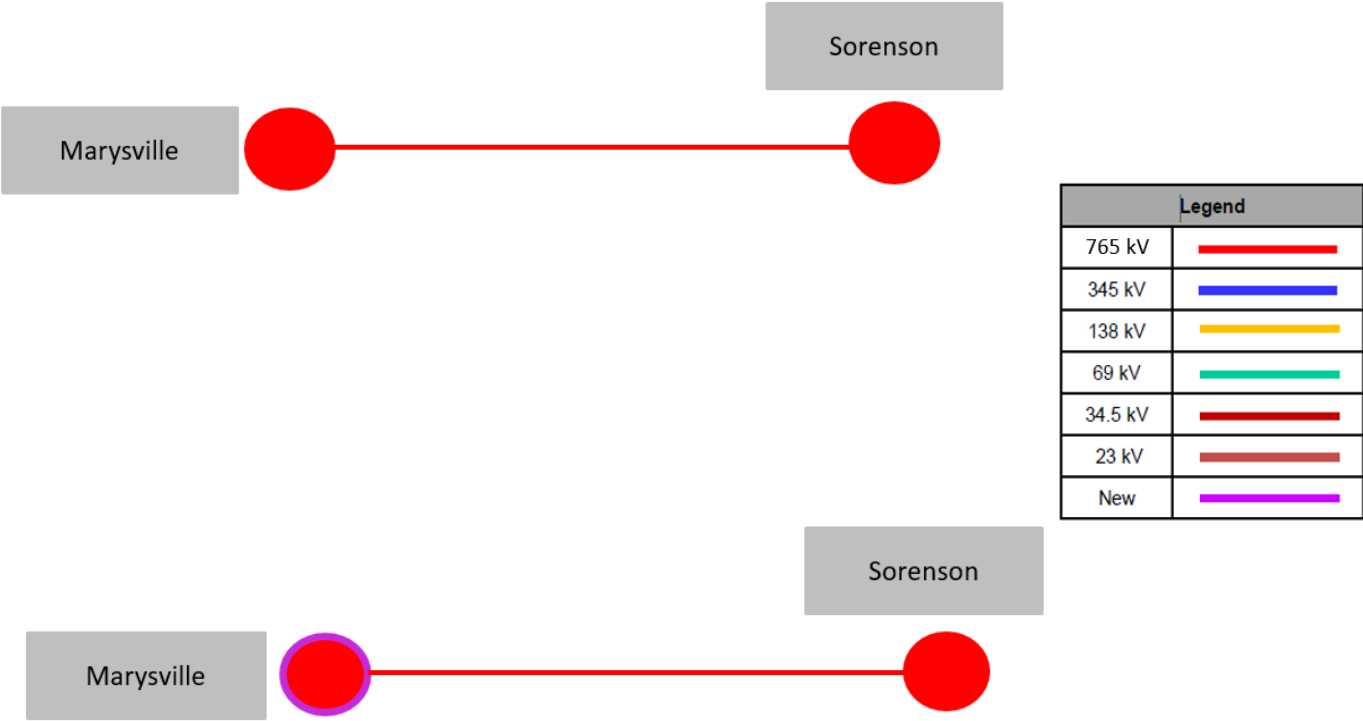
**Preliminary Facility Rating:**

| Branch                           | SN/SE/WN/WE (MVA)   |
|----------------------------------|---------------------|
| Marysville_RS - Marysville (765) | 5351/5351/5351/5351 |

**Alternatives:** Considering the limited station scope and cost of the upgrade, no viable transmission alternates were identified.

**Required In-Service:** 6/1/2029

**Projected IS Date:** 4/1/2029





# AEP Transmission Zone: Baseline

## Clusters AEP- 3, 4, 5

**Process Stage:** First Read

**Criteria:** Summer Gen Deliv, N-1-1

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Summer base case

**Proposal Window Exclusion:** None

**Problem Statement:**

Cluster 3: Flowgates 2024W1-N11-ST33, 2024W1-N11-ST39

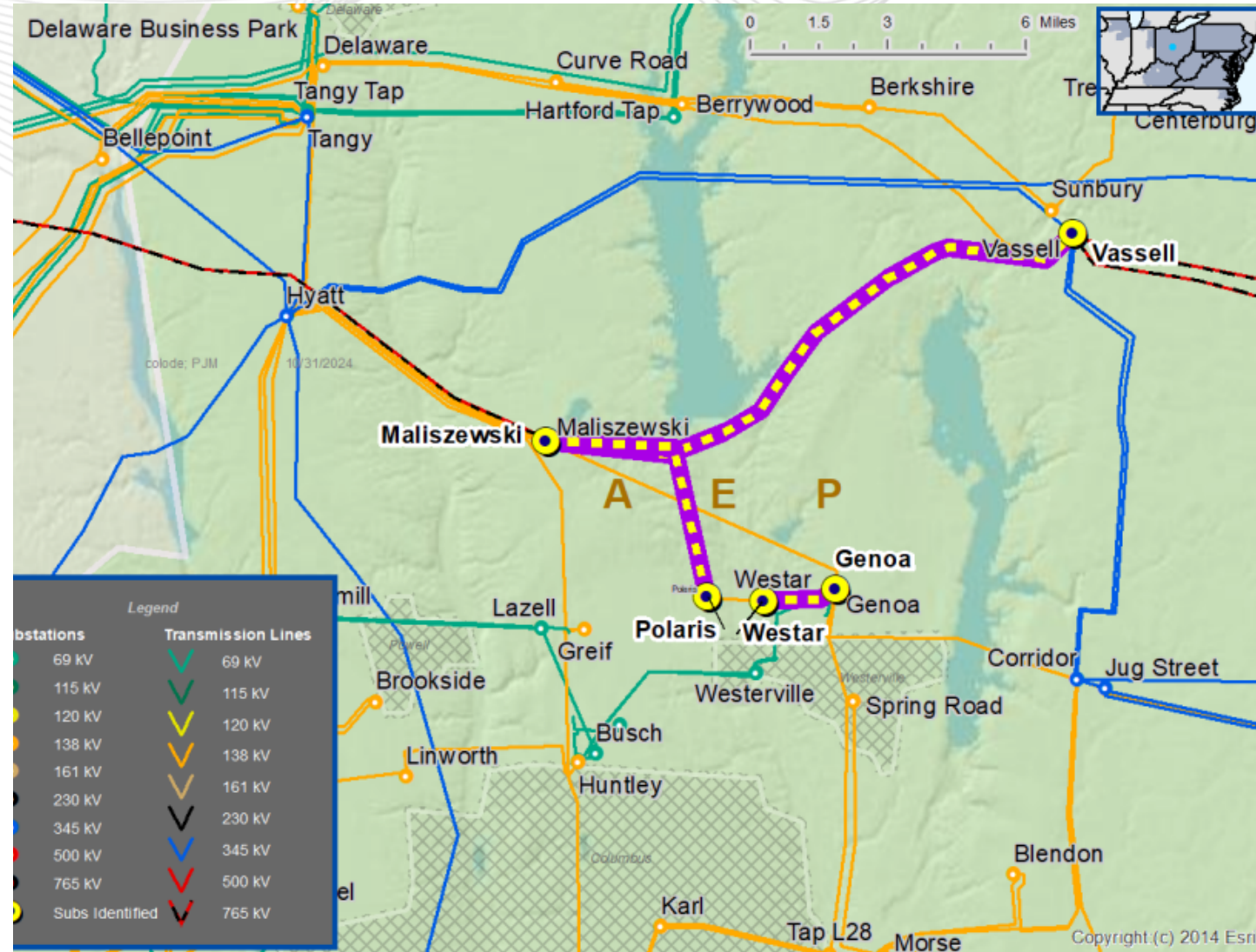
In 2029 RTEP summer case, the Genoa – Westar 138kV line is overloaded for multiple N-1-1 contingency pairs.

Cluster 4: Flowgates 2024W1-N11-ST13, 2024W1-N11-ST15, 2024W1-N11-ST20, 2024W1-N11-ST21

In 2029 RTEP summer case, the Maliszewski – Polaris 138kV line is overloaded for multiple N-1-1 contingency pairs.

Cluster 5: Non-competitive Flowgates 2024W1-GD-S395, 2024W1-GD-S437, 2024W1-GD-S438, 2024W1-GD-S439, 2024W1-32GD-S28, 2024W1-32GD-S29, 2024W1-32GD-S30, 2024W1-32GD-S31

In the 2029 and 2032 RTEP summer cases, the Maliszewski – Vassell 765V line is overloaded in Gen Deliv test.



# AEP Transmission Zone: Baseline

## Cluster AEP-3,4,5

- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster AEP-3, 4, 5

| Proposal ID # | Project Type | Entity | Cluster     | Project Title                       | Project Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | kV Level | Estimated Cost (\$M) |
|---------------|--------------|--------|-------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|
| 408           | GREENFIELD   | AEPSCT | AEP - 3/4/5 | Maliszewski 765/345 kV Upgrades     | Establish a 345 kV yard at the existing Maliszewski station and upgrade the 765 kV portion of the station to accommodate and install a 765/345 kV transformer and cut in the existing Hyatt - West Millersport 345 kV; Hyatt - West Millersport 345 kV Cut In at Corridor 345KV station; Station work at Corridor 345 kV station, Hyatt 35kV station and Marysville 345kV station; Relaying Upgrades at West Millersport 345 kV ; Maliszewski - Corridor 345 kV Reconductoring; Bokes Creek - Marysville 345kV Reconductoring; Marysville - Hyatt 345 kV Rebuild | 765/345  | 145.494              |
| 350           | GREENFIELD   | TRNSRC | AEP - 3/4/5 | Jester - Hayden                     | - Jester greenfield 765/345kV station<br>- Approx. 12 miles of greenfield 345kV double circuit transmission line between Jester greenfield 765/345kV Station and Hayden 345kV stations.                                                                                                                                                                                                                                                                                                                                                                          | 765/345  | 229.411              |
| 863           | UPGRADE      | AEPSCT | AEP - 3/4   | Maliszewski Series Reactor Upgrades | Replace the existing 138 kV series reactor at Maliszewski station with a 4% reactor with a higher continuous current rating. In addition, the proposal will upgrade limiting station equipment on the reactor bypass.                                                                                                                                                                                                                                                                                                                                            | 138      | 2.328                |
| 744           | UPGRADE      | AEPSCT | AEP - 4     | Maliszewski-Polaris Rebuild         | Rebuild the 2.8 mile 138 kV line between Maliszewski and Polaris stations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 138      | 8.884                |
| 338           | UPGRADE      | AEPSCT | AEP - 3     | Genoa-Westar Rebuild                | Rebuild the approximately 2 mile long 138 kV line between Westar and Genoa stations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 138      | 8.789                |
| 464           | UPGRADE      | AEPSCT | AEP - 3     | Genoa-Westar Sag Remediation        | Perform a sag study and mitigate clearance issues on Westar - Genoa 138 kV line to allow line to operate to conductor's designed rating                                                                                                                                                                                                                                                                                                                                                                                                                          | 138      | 2.815                |

- Additionally, in the non-competitive solution, AEP submitted a solution to upgrade 765 kV circuit breaker 'B' to a 5000A / 50 kA breaker at Maliszewski station . In addition, the project will replace disconnect switches on breakers 'B' and 'D', upgrade the existing wavetrap towards Marysville, and upgrades relays on the 765 kV lines towards Marysville and Vassell. **Estimated cost: \$6.9M;**

Short List presented at the 11/6/2024 TEAC. With the selected regional transfer solution, the Maliszewski – Vassell 765V line overload /Cluster 5 is solved, therefore, the Non-Comp part is not needed anymore, the two options are updated as follows:

|          | Proposal                  | Estimate Cost (\$M)    |
|----------|---------------------------|------------------------|
| Option 1 | 408                       | 145.494                |
| Option 2 | 863 <del>+ Non-comp</del> | 2.328 <del>9.228</del> |

Based on most recent forecast information, the Columbus area will have up to 1.4GW load increase and majority of the load will be in service by year 2028 (+3 year need). PJM, confirmed the 2025 LF will include this load for AEP by the identified timeline and modeled the additional 1115MW load in this area and performed the sensitivity study on 2029 RTEP case.

With the additional 1115MW load, Multiple facilities are overloaded in Gen Deliv test and/or N-1-1 test:

- Bokes Creaek – Marysville 345kV line
- Maliszewski 765/138kV transformer
- Hyatt – Vassell 345kV line
- Genoa – Spring Road 138kV line
- Maliszewski – Polaris 138KV line
- Maliszewski reactor 138kV bypass
- Westar –Genoa 138kV line
- Polaris – Westar 138kV line

Proposal 863 couldn't solve these issues, while proposal 408 (primarily brown field) addresses all of them.



**Proposed Solution: 2024-W1-408**

Reconfigure Maliszewski 765 kV station from 2 breakers to a 6 breaker ring bus. Install a new 765/345 kV transformer. Establish new 345 kV breaker yard with 3 string breaker and a half to include a line exit to Hyatt and a line exit to Corridor. **Estimated Cost: \$79.736M**

Loop the existing Hyatt - West Millersport 345 kV line into the new established 345 kV yard at the Maliszewski station. **Estimated Cost: \$ 0M**

Establish a 0.18 mile double circuit 345 kV line extension to cut the existing Hyatt – West Millersport 345 kV line in and out of Corridor station. **Estimated Cost: \$3.101M**

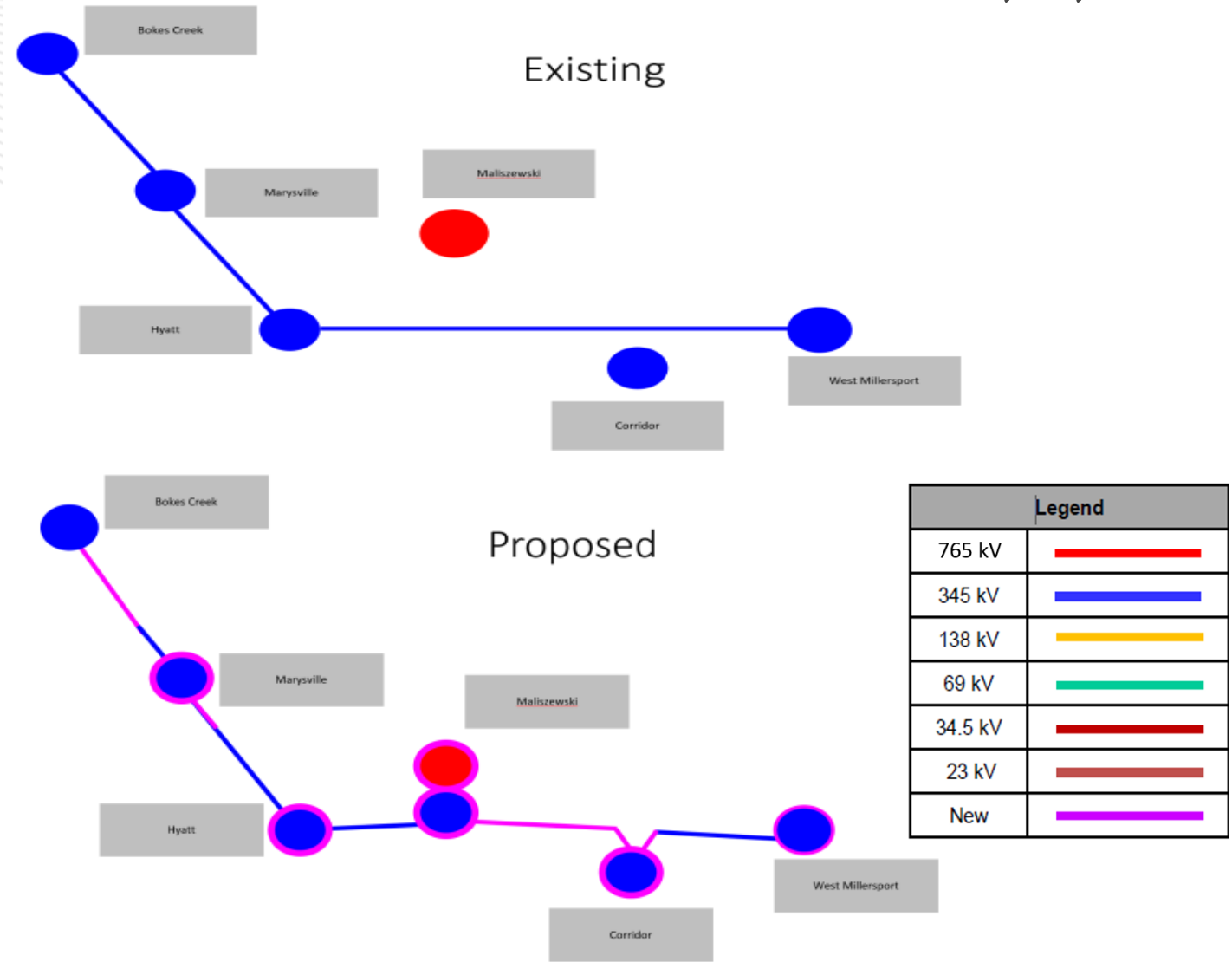
Install three new 345 kV breakers at Corridor station in order to accommodate the cut in of the Hyatt- West Millersport 345 kV line. **Estimated Cost: \$ 5.521M**

Reconductor 10.2-mile of Maliszewski-Corridor 345 kV line. **Estimated Cost: \$18.301M**

Reconductor 4.75-miles of the existing Bokes Creek-Marysville 345 kV circuit. Update the associated relay settings. **Estimated Cost: \$6.668M**

Rebuild 4.4-miles of the existing Marysville - Hyatt 345 kV double circuit line where it extends into Marysville station. **Estimated Cost: \$26.256**

# AEP Transmission Zone: Baseline Clusters AEP- 3, 4, 5





# AEP Transmission Zone: Baseline Clusters AEP- 3, 4, 5

## Proposed Solution: 2024-W1-408

Upgrade 345 kV breakers K & K1 along with associated switches and conductor to 5000A at Hyatt Station. **Estimated Cost: \$2.944M**

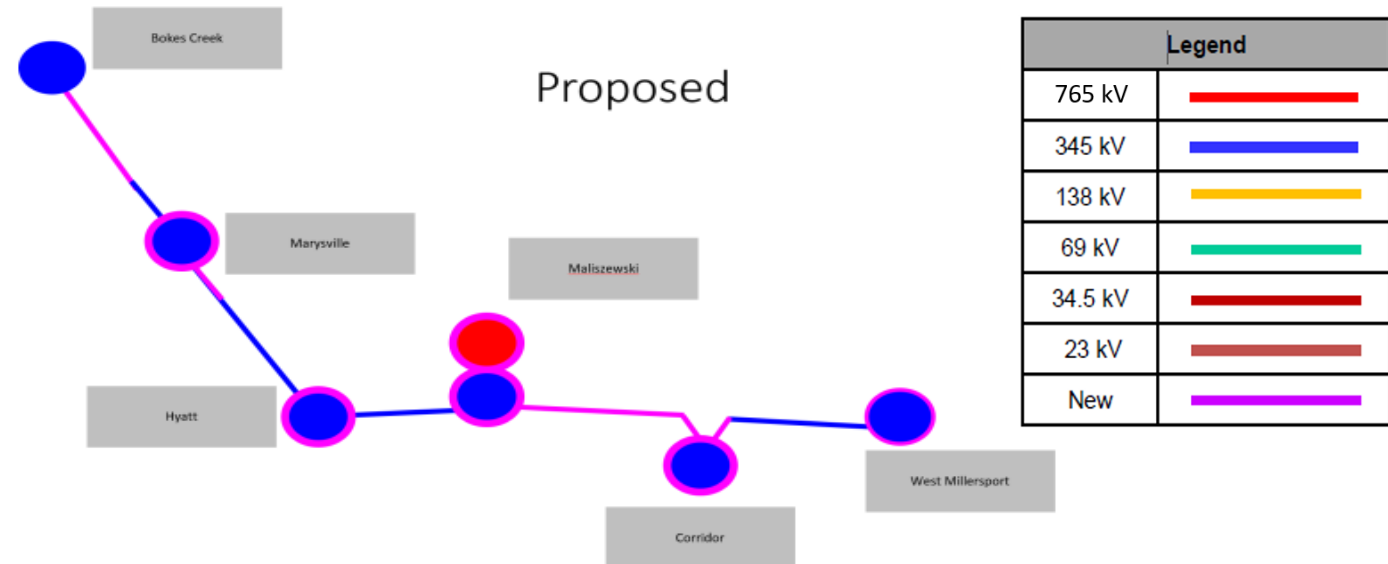
Upgrade the relaying and associated equipment at West Millersport station to coordinate with the cut in work to Corridor station. **Estimated Cost: \$0.410M**

Upgrade 3000A 345 kV breaker 'L2' along with associated terminal elements to 5000A at Marysville. **Estimated Cost: \$2.558M**

**Total Estimated Cost: \$145.494**

**Required IS Date: 6/1/2029**

**Projected IS Date: 12/31/2028**





# AEP Transmission Zone: Baseline Clusters AEP- 3, 4, 5

Proposed Solution: 2024-W1-408

Existing/Preliminary Facility Ratings:

| Facility Name                      | Existing Ratings (SN/SE/WN/WE) | Preliminary Ratings (SN/SE/WN/WE) |
|------------------------------------|--------------------------------|-----------------------------------|
| Maliszewski 765/345 kV Transformer | N/A                            | 2742/3097/2742/3097               |
| Maliszewski - Hyatt 345 kV         | 971/1335/1722/1722             | 971/1419/1234/1585                |
| Maliszewski - Corridor 345 kV      | N/A                            | 1478/2056/1867/2307               |
| Corridor - West Millersort 345kV   | N/A                            | 971/1335/1234/1585                |
| Maliszewski - Marysville 765 kV    | 4047/4571/4484/4961            | 5138/5138/5138/5138               |
| Maliszewski - Vassell 765 kV       | 4142/4142/5133/5133            | 5138/5138/5138/5138               |
| Marysville - Hyatt 345 kV          | 1409/1868/1781/2144            | 1740/2034/2022/2237               |
| Marysville - Bokes Creek 345 kV    | 897/1302/1138/1451             | 1385/1841/1750/2092               |
| Hyatt - West Millersport 345kV     | 971/1335/1234/1585             | N/A                               |

# ATSI Transmission Zone: Baseline Cluster 2 (ATSI)

**Process Stage:** First Read

**Criteria:** Summer & LL Gen Deliv and N-1

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Summer and Light load base case

**Proposal Window Exclusion:** None

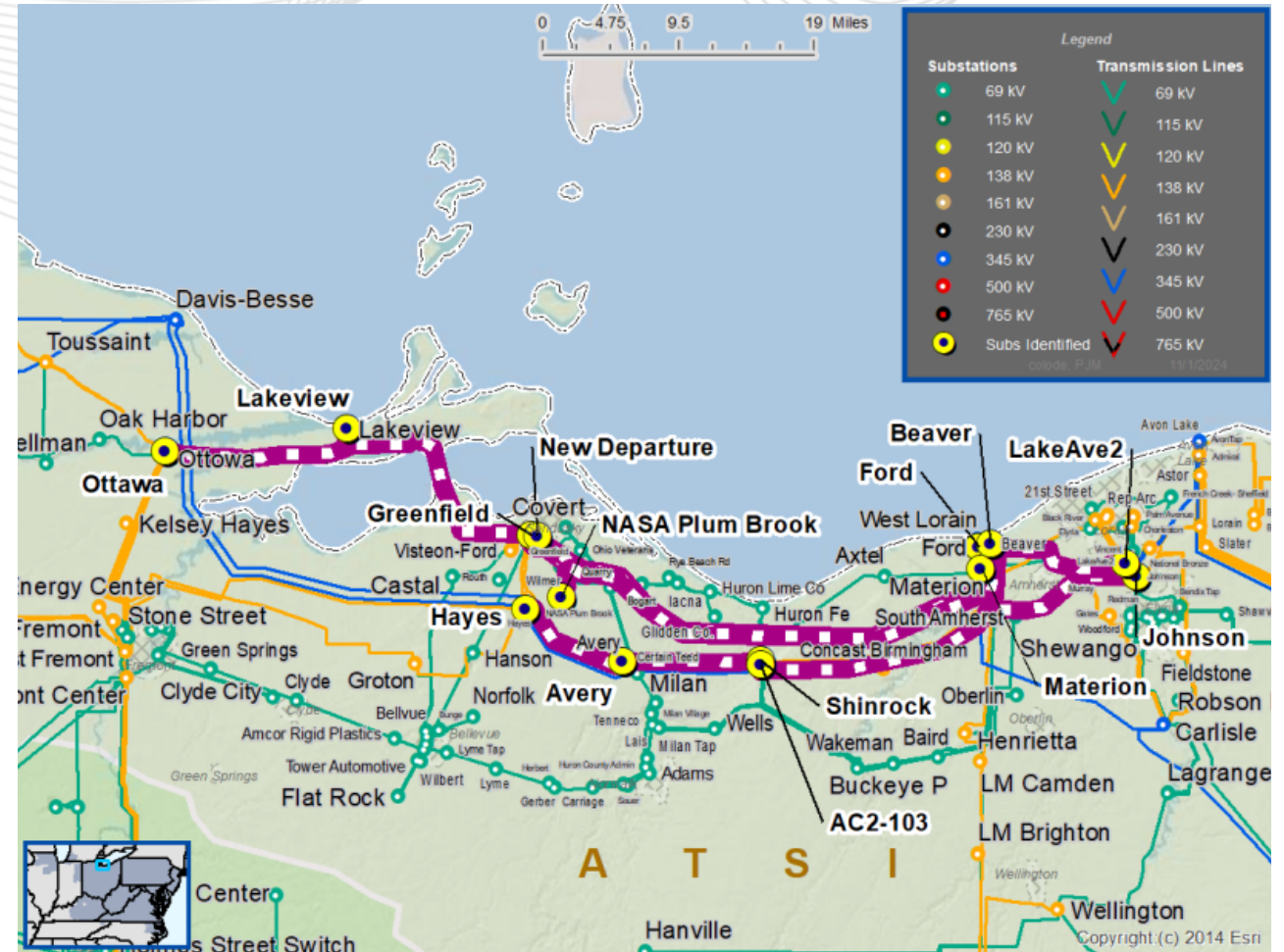
## Problem Statement:

2024W1-GD-S865, 2024W1-GD-S866, 2024W1-GD-S885, 2024W1-GD-S353, 2024W1-GD-S855, 2024W1-GD-S858, 2024W1-GD-S861, 2024W1-GD-S864, 2024W1-GD-S848, 2024W1-GD-S849, 2024W1-GD-S868, 2024W1-GD-S872, 2024W1-GD-S850, 2024W1-GD-S853, 2024W1-GD-S856, 2024W1-GD-S851, 2024W1-GD-S85, 2024W1-GD-S897, 2024W1-GD-S400, 2024W1-N1-ST100, 2024W1-N1-ST101, 2024W1-N1-ST103, 2024W1-N1-ST104, 2024W1-N1-ST33, 2024W1-N1-ST34, 2024W1-N1-ST37, 2024W1-N1-ST38, 2024W1-N1-ST39, 2024W1-N1-ST48, 2024W1-N1-ST49, 2024W1-N1-ST55, 2024W1-N1-ST56, 2024W1-N1-ST73, 2024W1-N1-ST76

In 2029 RTEP summer case, multiple 138 kV lines are overloaded for N-2 contingency pairs. In addition, two 345 kV lines are overloaded for N-2 contingency pairs.

2024W1-GD-LL93, 2024W1-GD-LL94, 2024W1-GD-LL96, 2024W1-GD-LL97, 2024W1-GD-LL98, 2024W1-GD-LL99, 2024W1-GD-LL103, 2024W1-GD-LL104, 2024W1-GD-LL105, 2024W1-GD-LL106, 2024W1-GD-LL107, 2024W1-GD-LL108

In 2029 RTEP Light Load case, multiple 138 kV lines are overloaded for N-2 contingency pairs.



- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster 2 in ATSI zone

| Proposal ID # | Project Type | Proposing Entity | Project Title                                                                                              | Project Description                                                                                                                                                                                                                                                                                                                                                                                                 | kV Level | Estimated Cost (\$M) |
|---------------|--------------|------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|
| 605           | UPGRADE      | ATSI             | Rebuild/Reconductor existing 138 kV lines/Terminal upgrades at 345 kV substations                          | Rebuild Beaver to Johnson, Greenfield to Lakeview, Avery to Shinkrock, Avery to Hayes and Greenfield to Beaver Corridor. Reconductor 1 span from Ottawa substation. Upgrade terminal equipment at Beaver, Davis Besse & Bayshore 345 kV substation. Swap 345 kV line terminals at Beaver 345 kV substation                                                                                                          | 138/345  | 265.1                |
| 843           | GREENFIELD   | ATSI             | New 345 kV line between Lemoyne to Lake Ave                                                                | Build a new approximately 88 miles Lemoyne - Lake Avenue 345 kV line by leveraging existing 138 kV corridors. Associated yard work at Lemoyne and Lake Ave 345 kV substations                                                                                                                                                                                                                                       | 345      | 455.0                |
| 694           | GREENFIELD   | TRNSRC           | New double circuit 345 kV line between Fostoria Central and Lake Ave                                       | Build a new 79 mile 345kV double circuit line from Fostoria Central to Lake Avenue 345kV station. - Lake Ave 345kV station. Associated Substation work at Fostoria Central and Lake Ave 345 kV substations                                                                                                                                                                                                          | 345      | 328.3                |
| 533           | GREENFIELD   | NEXTERA          | New 345 kV line between Lemoyne - Lake Ave                                                                 | Construct a single circuit 345kV line from ATSI's Lemoyne substation to ATSI's Lake Ave substation. Associated yard work at Lemoyne and Lake Ave 345 kV substations                                                                                                                                                                                                                                                 | 345      | 202.0                |
| 294           | GREENFIELD   | NEXTERA          | New 345 kV line between Bayshore to Davis Besse to Lake Ave                                                | Install second circuit on open tower position along the existing Bayshore - Davis-Besse 345 kV line. Utilize spare tower position on the Davis-Besse to Lemoyne line to string a new 345kV circuit from Davis-Besse to Lake Ave. Associated yardwork at existing Bay Shore, Davis Besse and Lake Ave 345 kV substations                                                                                             | 345      | 257.3                |
| 357           | GREENFIELD   | NEXTERA          | New 345 kV line between Bayshore to Davis Besse to Lake Ave<br>New 345 kV line between Lemoyne to Lake Ave | Install second circuit on open tower position along the existing Bayshore - Davis-Besse line. Utilize spare tower position on the Davis-Besse to Lemoyne line to string a new 345kV circuit from Davis-Besse to Lake Ave. Install new circuit on empty tower position on portion of Lemoyne - Davis Besse corridor. Associated yardwork at existing Bay Shore, Davis Besse, Lemoyne and Lake Ave 345 kV substations | 345      | 344.1                |

# ATSI Transmission Zone: Baseline Cluster 2 (ATSI)

## Proposed Solution: Proposal #605 (Modified)

Rebuild the 7.46 miles of Avery - Shinrock 138 kV Line with 795 kcmil 26/7 ACSS (7.46 miles) (\$15.2M).

Rebuild the 13.45 miles of Greenfield - Lakeview 138 kV Line from 2 x 336.4 kcmil 26/7 ACSR to 1 x 795 kcmil 26/7 ACSS (\$59.68M).

Rebuild the 6.5 miles of Avery-Hayes 138 kV Line with 795 kcmil 26/7 ACSS conductor (\$11.01M)

Rebuild the Greenfield - Beaver 138 kV corridor (32 miles) with 795 kcmil 26/7 ACSS. This corridor encompasses multiple 138 kV lines that are constructed on common towers (\$131.43M)

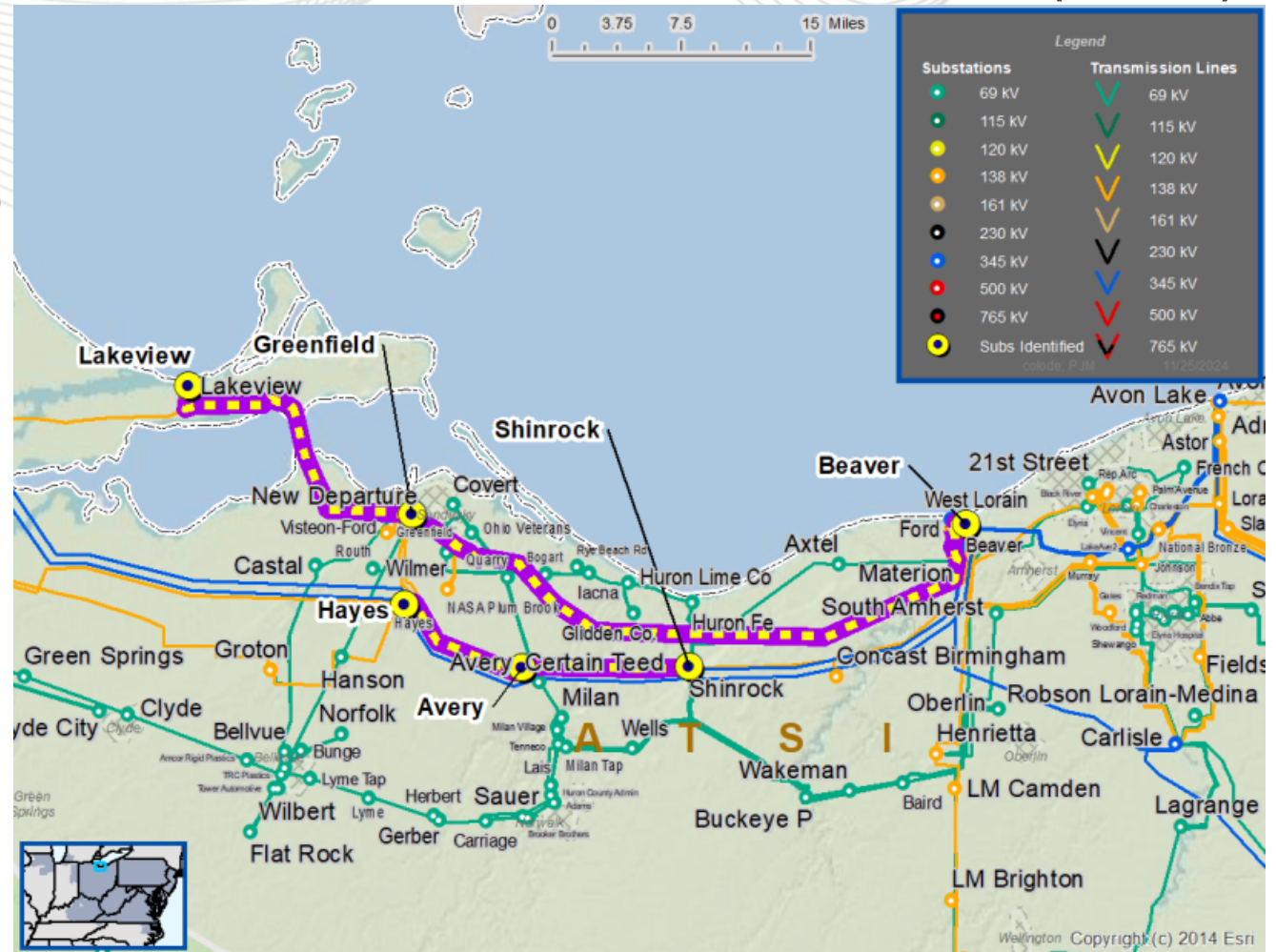
**Total Estimated Cost: \$217.32M**

### Additional Benefits:

- Brownfield options provides sufficient headroom on overloaded facilities, regional solution further lowers loadings on existing HV and 138 kV facilities and upgrading lines that are build 100-70 years ago

**Required In-service date: 6/1/2029**

**Projected in-service date: 6/1/2029**



# Dominion Transmission Zone: Baseline 500kV Line #579 Rebuild (End of Life Criteria)

**Process Stage:** First Review

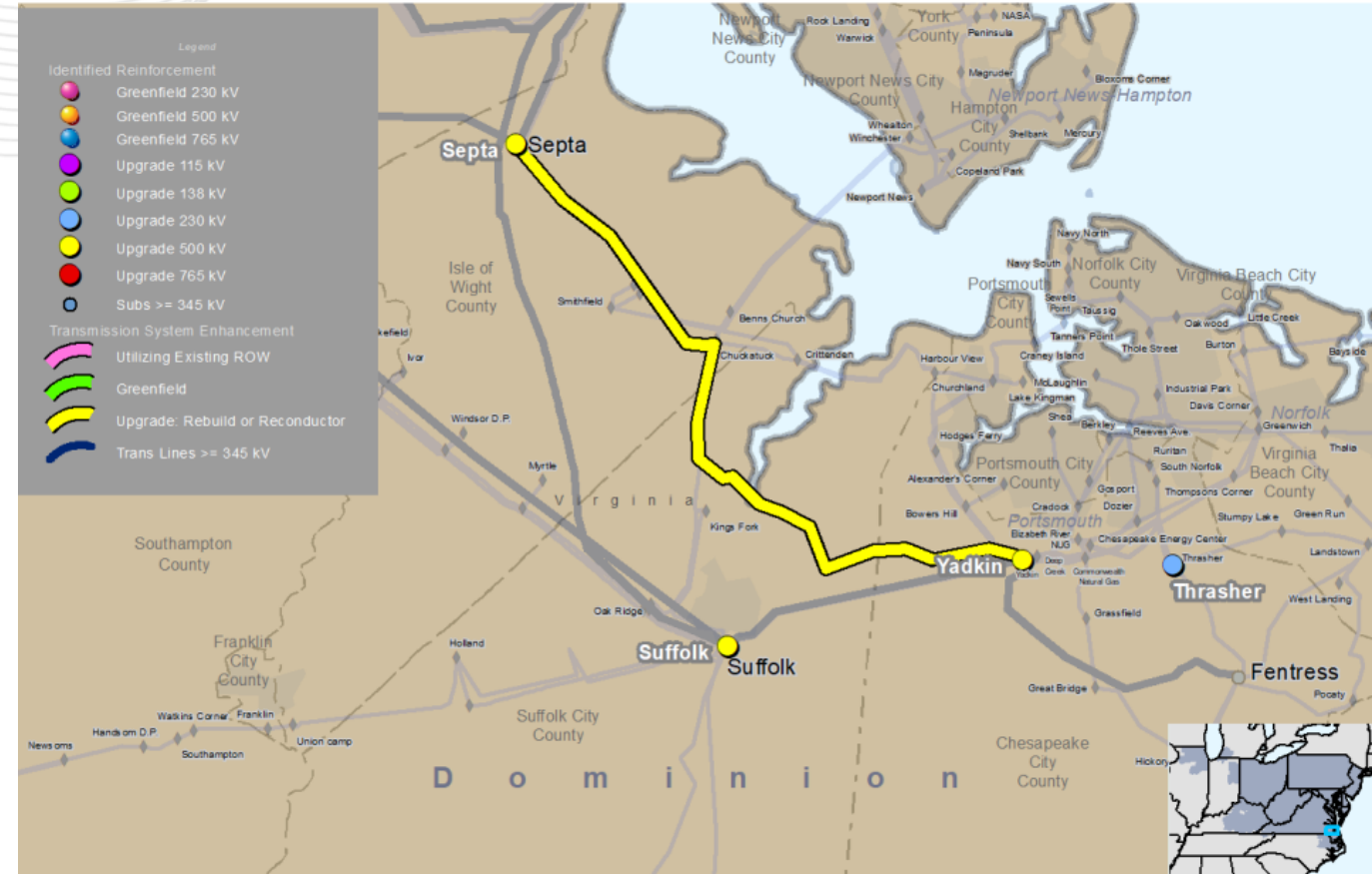
**Criteria:** Dominion's FERC 715 Planning Criteria (C.2.9 – End of Life Criteria)

**Assumption Reference:** FERC 715 Planning Criteria

**Model Used for Analysis:** 2024 Series 2029 RTEP cases

## Problem Statement:

- Line #579 is approximately 33.1 miles of 500kV transmission line from Septa to Yadkin. Most of the line is Corten 5 Series, but approximately 8.4 miles of the line has 230 kV Line #2110 line underbuilt on 5-2 Corten towers. These structures were installed in 1985 and are approaching the end of service life.
- Corten Series 5 towers have been problematic for many years and fallen into a pattern where Dominion can expect to return for future maintenance if the line is not rebuilt by the requested target date.
- Third party assessment has determined that the towers have corroded to a point where they exhibit pre-mature thinning of structure members and pack-out at joints. If left unaddressed these issues could result in failure of structures and potentially the collapse for the line. (DOM-O1)



Continued on next slide....

# Dominion Transmission Zone: Baseline 500kV Line #579 Rebuild (End of Life Criteria)

## Existing Facility Rating:

| Branch                              | SN/SE/WN/WE (MVA)   |
|-------------------------------------|---------------------|
| 230kV Line #2110 Thrasher – Suffolk | 940/940/1193/1193   |
| 500kV Line #579 Septa – Yadkin      | 3426/3426/3984/4018 |

## Preliminary Facility Rating:

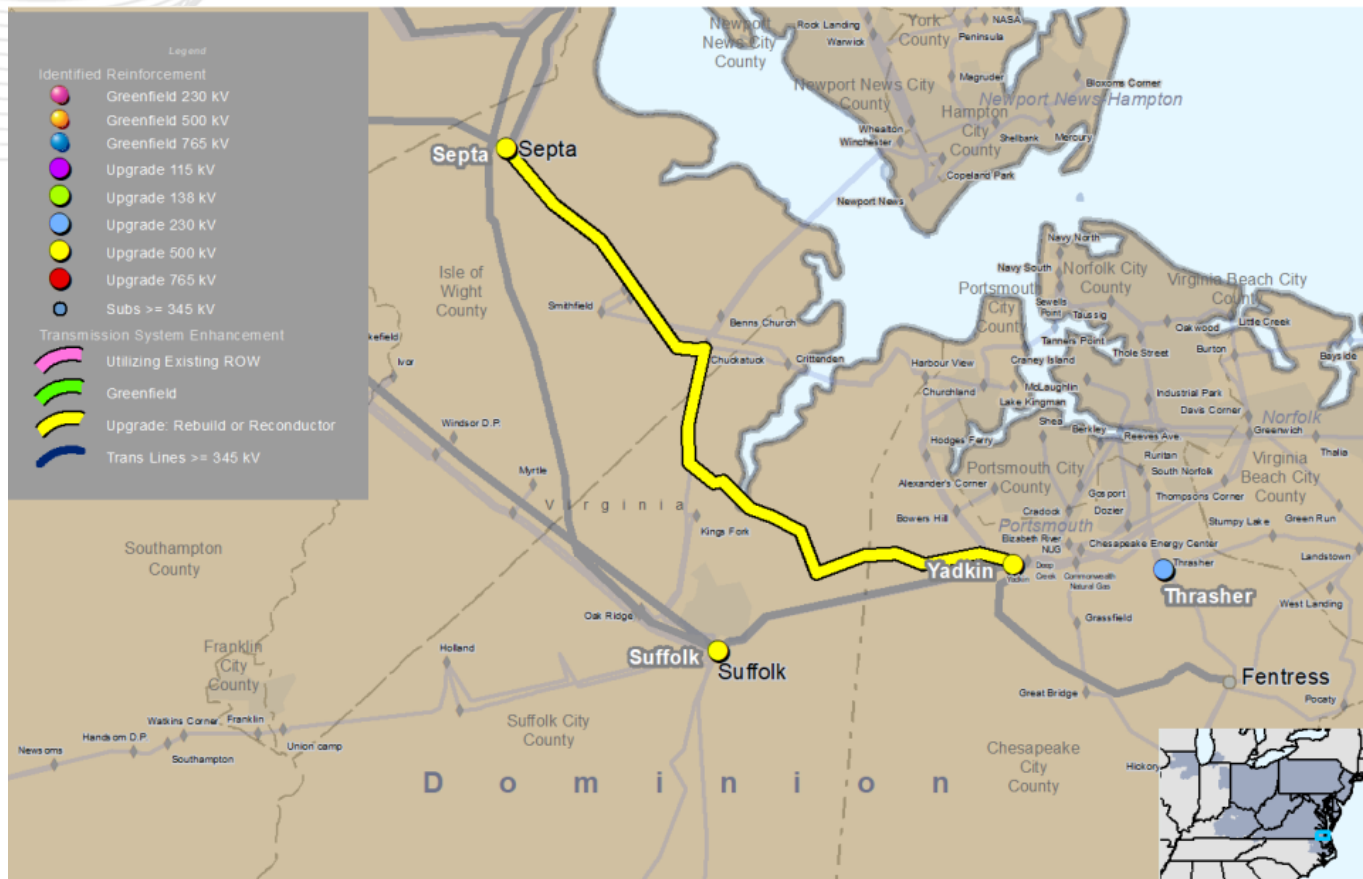
| Branch                              | SN/SE/WN/WE (MVA)   |
|-------------------------------------|---------------------|
| 230kV Line #2110 Thrasher – Suffolk | 940/940/1193/1193   |
| 500kV Line #579 Septa – Yadkin      | 4357/4357/5155/5155 |

## Proposed Solution: Proposal 2024-W1-980:

- Rebuild approximately 33.09 miles of 500 kV line #579 from structure 579/1 inside Septa substation to structure 579/193 inside Yadkin substation.
- Rebuild approximately 7.7 miles of 230kV Line #2110 Suffolk – Thrasher that share the double circuit towers under Line #579.
- At Septa substation, upgrade CB (579T586), breaker switches (56288, 57985, 58688 & 57988), and line leads to 5000A rating to support Line #579 rebuild.
- At Yadkin substation, upgrade line leads to 5000A rating to support Line #579 rebuild.

**Estimated Cost: \$216.78 M**

**Required In-Service: 6/1/2029**



## First Read (Regional Cluster)

### Proposed Solution: 2024-W1-967 (Revised)

- Build a new 500kV line: North Anna – Kraken – Yeat
  - Tie in 500kV line Kraken into Yeat substation
- Build a new 500/230kV Kraken substation
  - Tie in 500kV line #568 Ladysmith – Possum Point
  - Tie in new 500kV line North Anna – Kraken – Yeat
  - Install (2) 1440MVA 500/230kV transformers
- Upgrade substation equipment at North Anna
- Expand Ladysmith substation
- Upgrade terminal equipment at Elmont substation

### Existing Facility Rating:

| # | Branch                         | SN/SE/WN/WE (MVA) |
|---|--------------------------------|-------------------|
| 1 | 500kV Line North Anna – Kraken | NA                |
| 2 | 500kV Line Kraken – Yeat       | NA                |

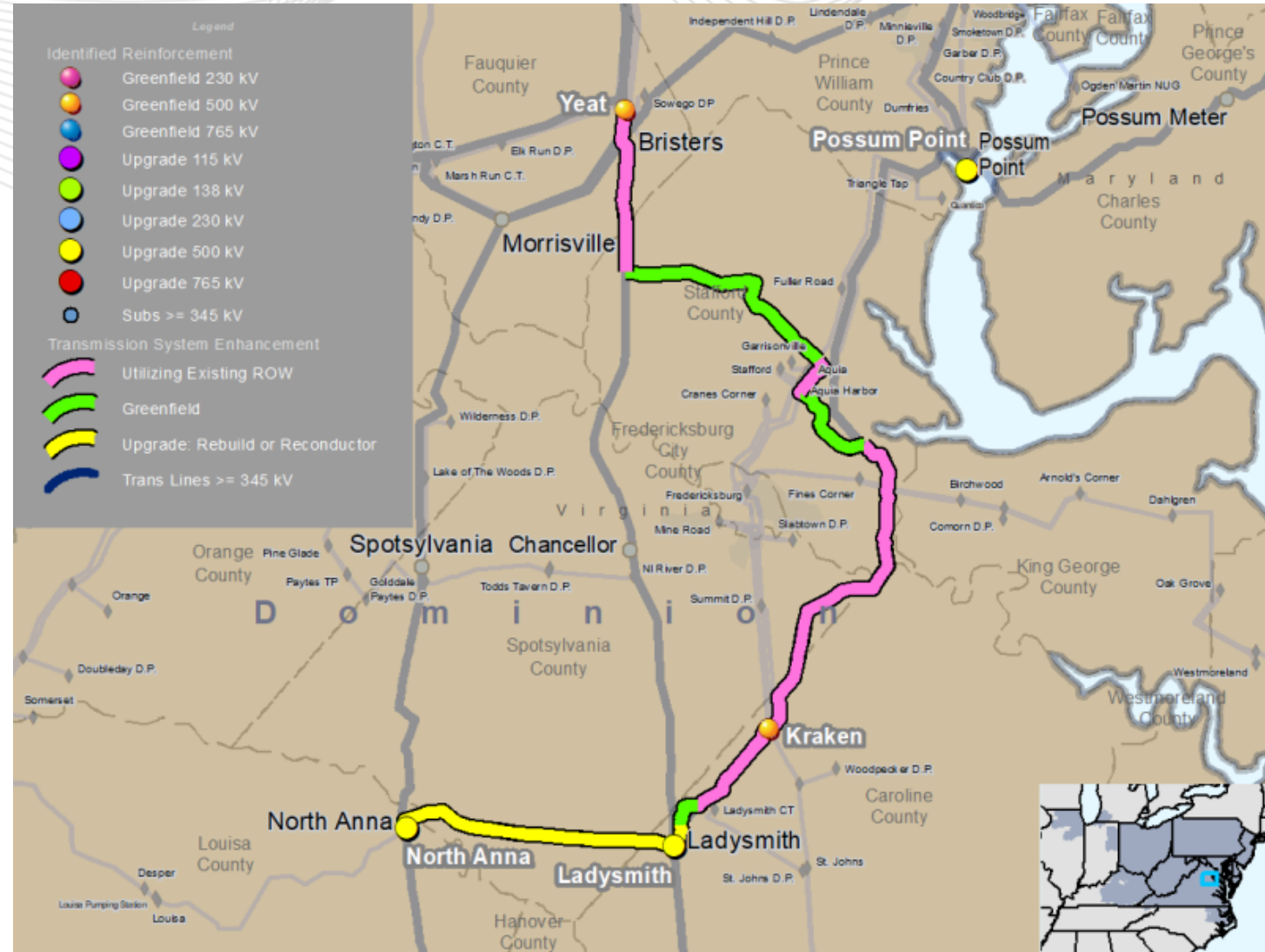
### Preliminary Facility Rating:

| # | Branch                         | SN/SE/WN/WE (MVA)   |
|---|--------------------------------|---------------------|
| 1 | 500kV Line North Anna – Kraken | 4357/4357/5155/5155 |
| 2 | 500kV Line Kraken – Yeat       | 4357/4357/5155/5155 |

Estimated Cost: \$704.25 M

Required IS Date: 6/1/2029

Projected IS Date: 6/1/2029



### Proposed Solution: 2024-W1-820 (Revised)

- Build a new 765kV line from Joshua Falls – Yeat
  - Substation upgrades at Joshua Falls
- Build a new 765/500/230kV Yeat substation
  - Cut into 500kV line Bristers – Ox and 500kV line Meadowbrook – Vint Hill
  - Cut into 230kV line Vint Hill – Elk Run

### Existing Facility Rating:

| # | Branch                         | SN/SE/WN/WE (MVA) |
|---|--------------------------------|-------------------|
| 1 | 765kV Line Joshua Falls - Yeat | NA                |

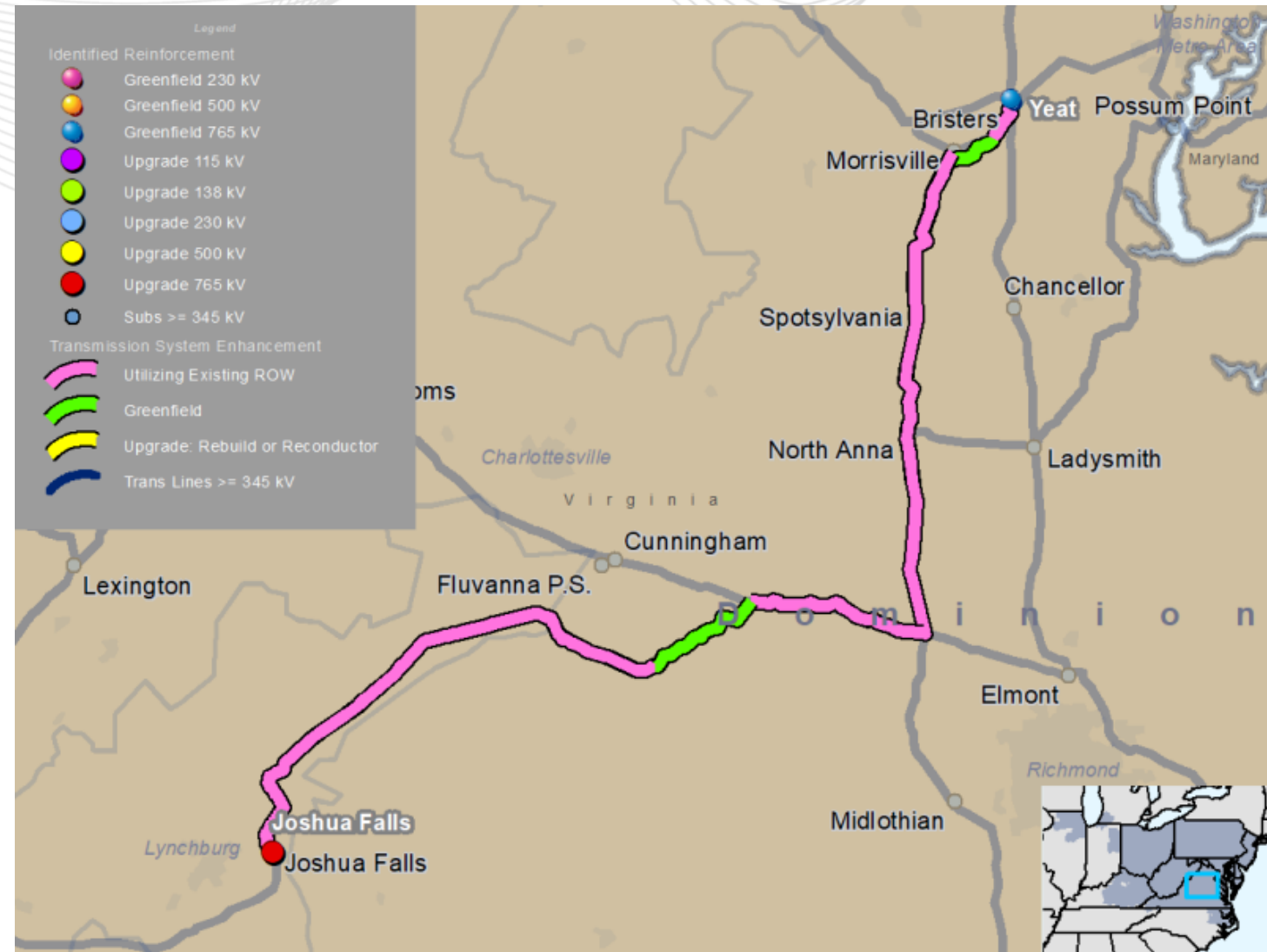
### Preliminary Facility Rating:

| # | Branch                         | SN/SE/WN/WE (MVA)   |
|---|--------------------------------|---------------------|
| 1 | 765kV Line Joshua Falls - Yeat | 5523/5523/6845/6845 |

Estimated Cost: \$1,055.3 M

Required IS Date: 6/1/2029

Projected IS Date: 6/1/2029



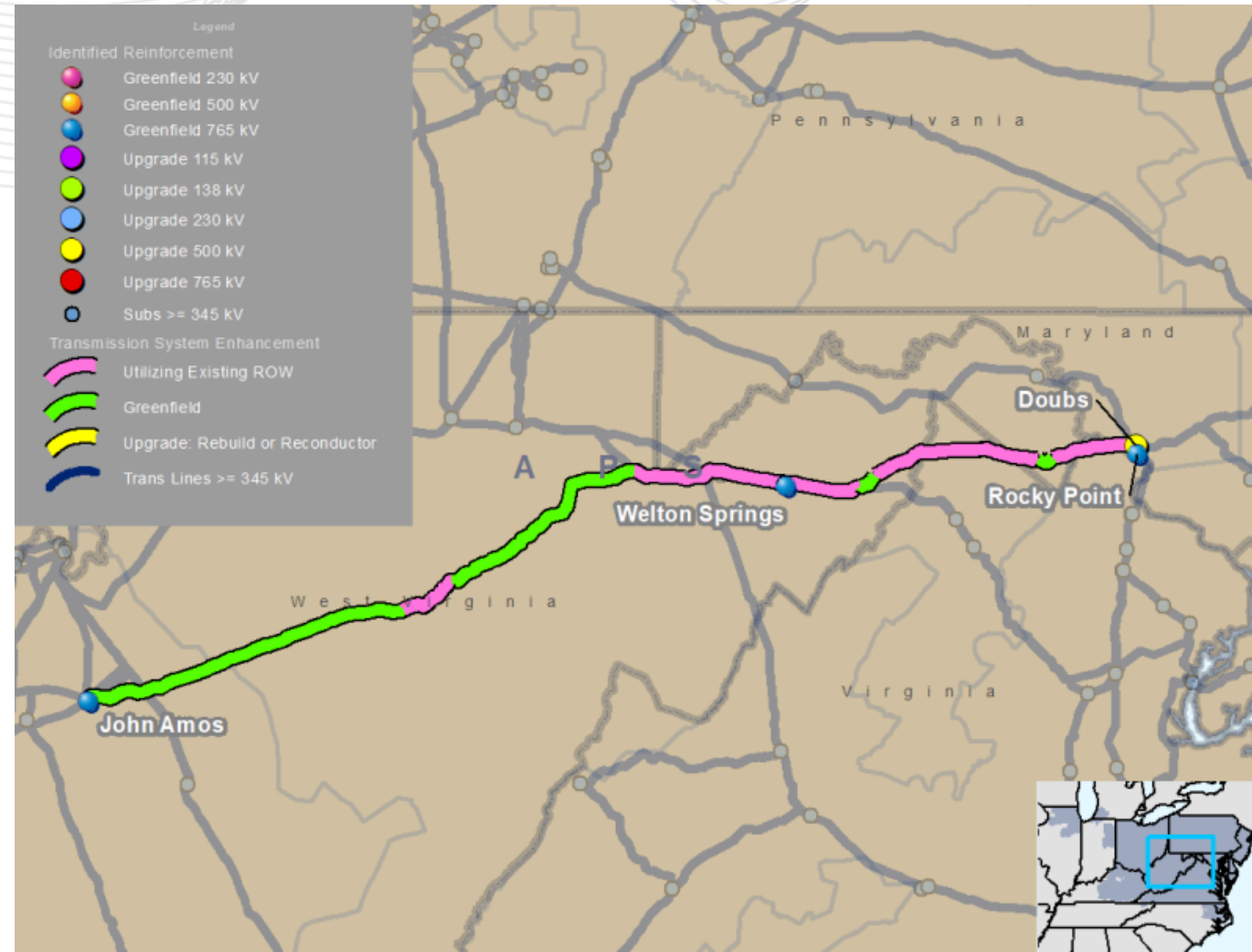
### Proposed Solution: 2024-W1-708

- Construct a new 175 miles Amos to Welton Springs 765 kV line. Add one 765 kV breaker at Amos Substation to expand the breaker and a half scheme to accommodate the new Amos - Welton Springs 765 kV Line.
- Construct a new switchyard (Welton Springs) with 765 kV bus, two 250 MVAR shunt capacitors, and a +/-500 MVAR STATCOM.
- Construct a new 86 miles Welton Springs to Rocky Point 765 kV line.
- Construct a new substation called Rocky Point with a 765 kV and a 500 kV yard. Loop in the Doubs - Goose Creek 500 kV line, the Doubs - Aspen 500 kV line, and the Woodside – Goose Creek 500 kV line.
- Expand Black Oak Substation to accommodate the connection of the 502 Jct - Woodside 500 kV line and loop the 502 Jct – Woodside 500 kV line into the Black Oak substation by constructing ~0.85 miles of new 500 kV line into and out of Black Oak 500 kV substation.
- Upgrade the terminal equipment on the Doubs No. 1 500/230 kV Transformer.

**Estimated Cost: \$1,944.98 M**

**Required IS Date: 6/1/2029**

**Projected IS Date: 12/1/2029**



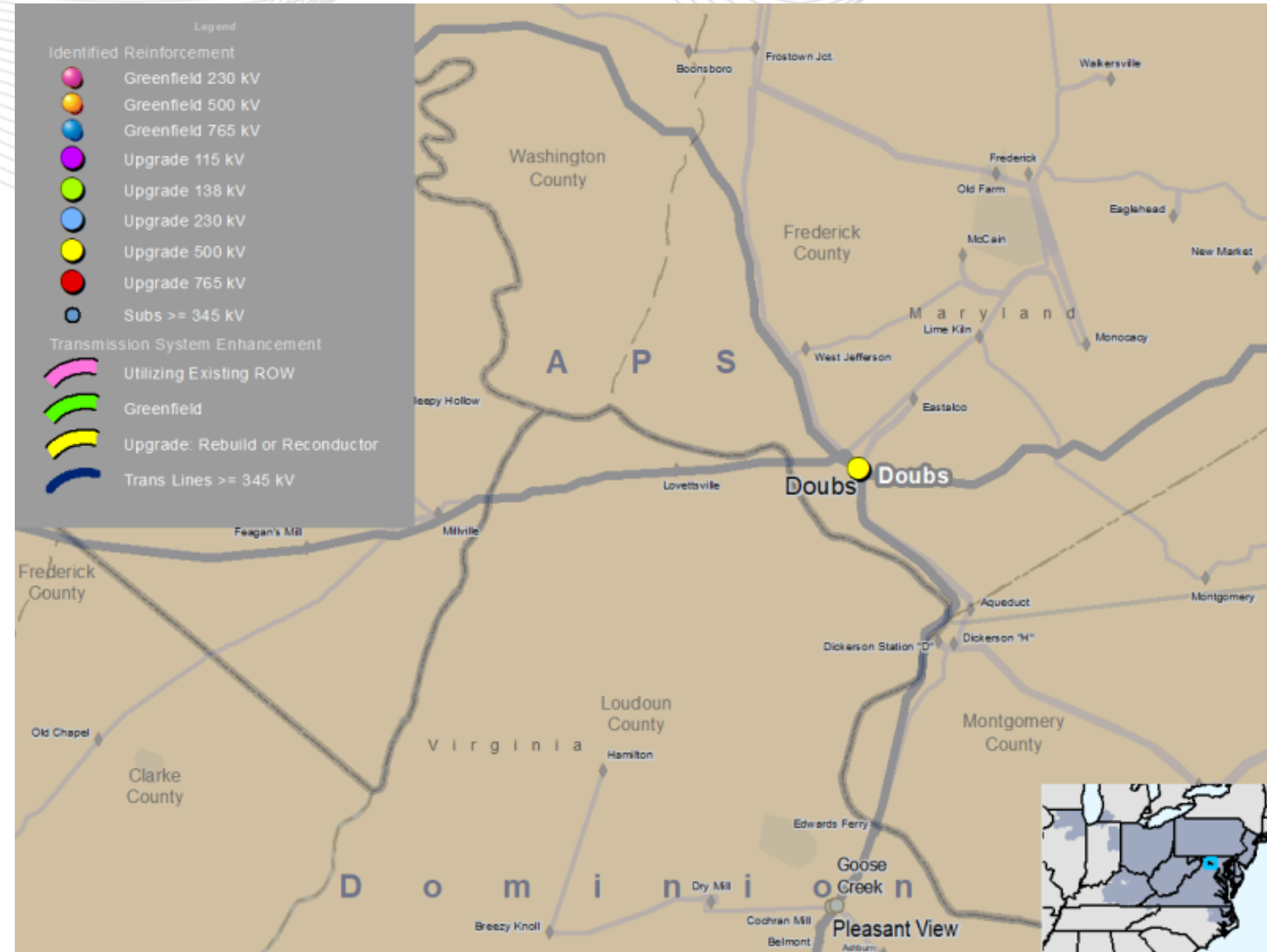
### Proposed Solution: 2024-W1-551

- Terminate the Woodside - Goose Creek 500 kV Line into Doubs Substation, creating the Woodside - Doubs #2 500 kV Line.
- Re-route the Chanceford - Doubs 500 kV Line into the Doubs - Goose Creek corridor, creating the Chanceford - Goose Creek 500 kV Line. This will require ~0.6 miles of new 500 kV line from Doubs Substation into the Doubs - Goose Creek corridor.

**Estimated Cost: \$13.97 M**

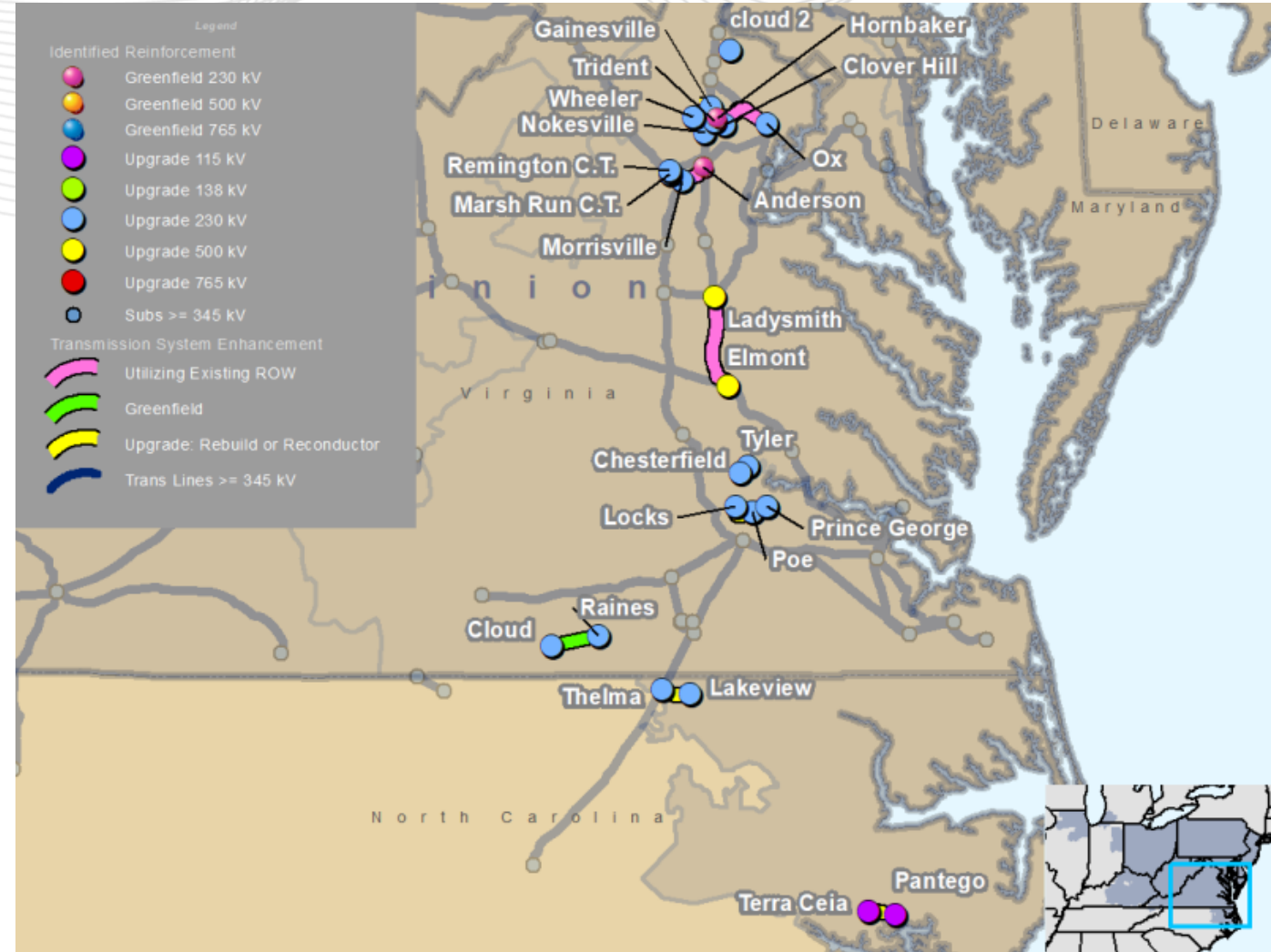
**Required IS Date: 6/1/2029**

**Projected IS Date: 12/1/2029**



### Proposed Solution: 2024-W1-24 Revised

- Rebuild 230kV Line #280 and #299 Marsh Run - Remington CT
  - Terminal equipment upgrades at Marsh Run & Remington
- Partial reconductor/partial wreck & rebuild of 230kV Line #2161 Gainesville
  - Wheeler
  - Terminal equipment upgrades at Gainesville & Wheeler
  - Relay resets at Trident substation
- Rebuild 230kV Line #213 and #225 from Thelma – Lakeview
  - Terminal equipment upgrades at Thelma & Lakeview
- Reconductor 230kV Line #2003 Chesterfield – Tyler – Locks – Poe
  - Terminal equipment upgrades at Poe & Tyler
  - Relay resets at Chesterfield
- Reconductor 230kV Line #2002 Carson – Poe
  - Terminal equipment upgrades at Carson & Poe
- Build a new 230kV Line from Nokesville – Hornbaker using the vacant arms of the double circuit monopole structures installed as part of a previous project
  - Terminal equipment upgrades at Nokesville & Hornbaker



Continued on next slide...

### Proposed Solution: 2024-W1-24 Revised

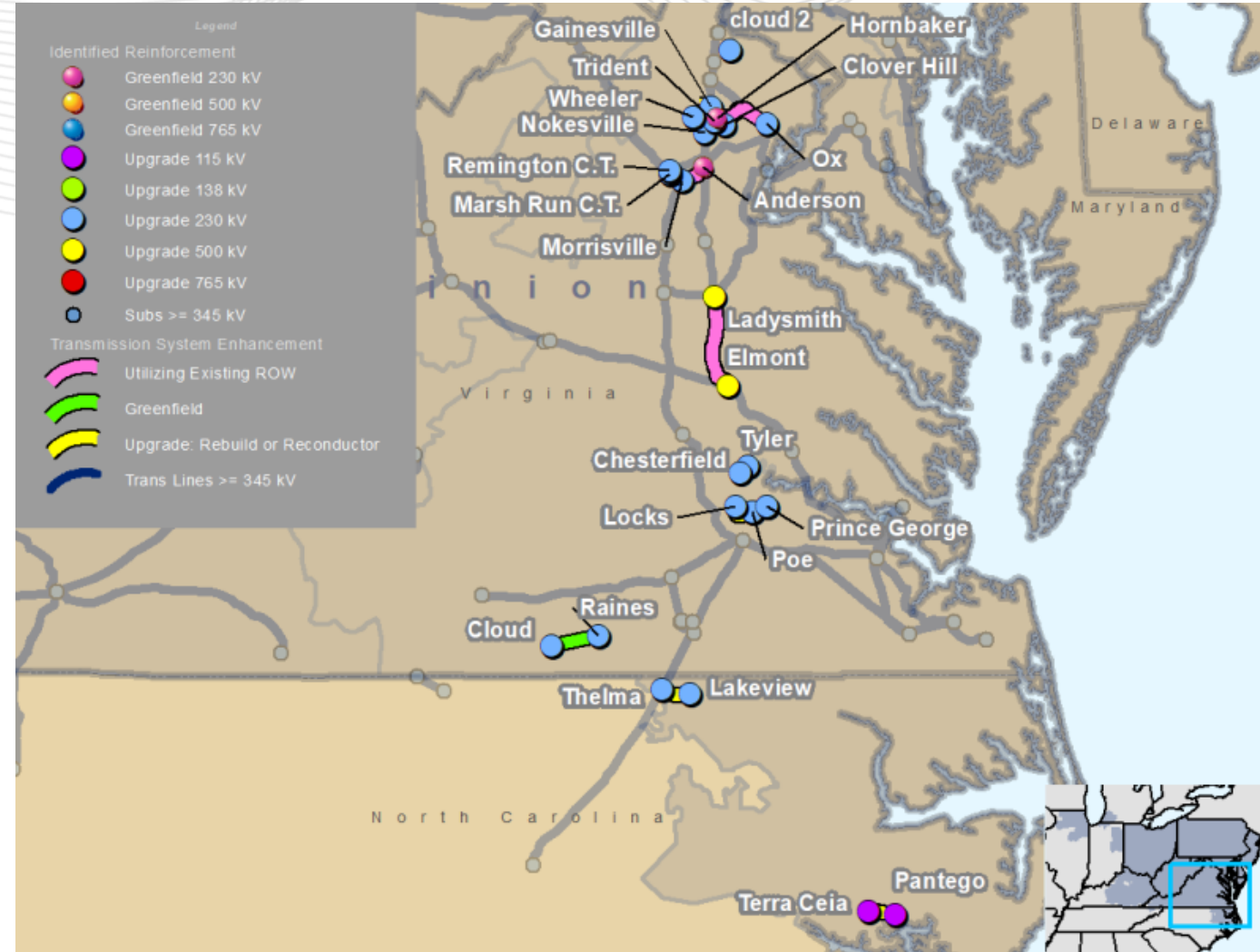
- Build a new 230kV Line from Elmont – Ladysmith on the existing 5-2 structures between the two stations
  - Terminal equipment upgrades at Elmont & Ladysmith
- Build a new 230kV Line from Cloverhill – Ox
  - Terminal equipment upgrades at Ox and Cloverhill
- Build a new 230kV Line from Raines – Cloud
  - Terminal equipment upgrades at Cloud and Raines
- Reconductor and convert 115kV Line #121 to 230kV between Poe – Prince George
  - Terminal equipment upgrades at Poe & Prince George
- Build a new 230kV Line #9491 from Morrisville – Anderson using existing tower structures supporting 500kV Line #545 Bristers – Morrisville
  - Terminal equipment upgrades at Morrisville and Anderson Branch

**Estimated Cost: \$672.43 M**

**Required IS Date: 6/1/2029**

**Projected IS Date: 6/1/2029**

Continued on next slide...



### Existing Facility Rating:

| #  | Branch                                                                            | SN/SE/WN/WE (MVA)                      |
|----|-----------------------------------------------------------------------------------|----------------------------------------|
| 1  | 230kV Line #280 Marsh Run – Remington<br>230kV Line #299 Marsh Run - Remington CT | 1202/1202/1332/1332<br>608/608/769/769 |
| 2  | 230kV Line #2161 Gainesville – Wheeler                                            | 808/808/895/895                        |
| 3  | 230kV Line #213 Thelma – Lakeview<br>230kV Line #225 Thelma – Lakeview            | 470/470/596/596<br>470/470/550/555     |
| 4  | 230kV Line #2003 Chesterfield – Tyler<br>230kV Line #2003 Tyler – Locks – Poe     | 1047/1047/1160/1160<br>470/470/596/596 |
| 5  | 230kV Line #2002 Carson – Poe                                                     | 722/722/914/914                        |
| 6  | 230kV Line from Nokesville – Hornbaker                                            | NA                                     |
| 7  | 230kV Line from Elmont – Ladysmith                                                | NA                                     |
| 8  | 230kV Line from Cloverhill – Ox                                                   | NA                                     |
| 19 | 230kV Line from Raines – Cloud                                                    | NA                                     |
| 10 | 115kV Line #121 to 230kV between Poe – Prince George                              | 262/262/290/290                        |
| 11 | 230kV Line #9491 from Morrisville – Anderson                                      | NA                                     |

### Preliminary Facility Rating:

| #  | Branch                                               | SN/SE/WN/WE (MVA)   |
|----|------------------------------------------------------|---------------------|
| 1  | 230kV Line #280 and #299 Marsh Run - Remington CT    | 1573/1573/1648/1648 |
| 2  | 230kV Line #2161 Gainesville – Wheeler               | 1573/1573/1648/1648 |
| 3  | 230kV Line #213 and #225 from Thelma – Lakeview      | 1573/1573/1648/1648 |
| 4  | 230kV Line #2003 Chesterfield – Tyler – Locks – Poe  | 1573/1573/1648/1648 |
| 5  | 230kV Line #2002 Carson – Poe                        | 1573/1573/1648/1648 |
| 6  | 230kV Line from Nokesville – Hornbaker               | 1573/1573/1648/1648 |
| 7  | 230kV Line from Elmont – Ladysmith                   | 1573/1573/1648/1648 |
| 8  | 230kV Line from Cloverhill – Ox                      | 1573/1573/1648/1648 |
| 9  | 230kV Line from Raines – Cloud                       | 1573/1573/1648/1648 |
| 10 | 115kV Line #121 to 230kV between Poe – Prince George | 1573/1573/1648/1648 |
| 11 | 230kV Line #9491 from Morrisville – Anderson         | 1573/1573/1648/1648 |

### Proposed Solution: 2024-W1-781

- Upgrade 500/230kV transformer at Goose Creek substation
- Upgrade bus at Brambleton to support 500kV LN #558 Aspen – Brambleton upgrade
- Remove Vint Hill substation terminal from Wishing Star – Vint Hill – Morrisville 500kV Line
- Remove terminal equipment from Vint Hill 500kV substation

### Existing Facility Rating:

| # | Branch                            | SN/SE/WN/WE (MVA)   |
|---|-----------------------------------|---------------------|
| 1 | 500kV LN #558 Aspen – Brambleton  | 3464/3464/3984/4018 |
| 2 | 500/230kV Goose Creek Transformer | 900/954/1159/1213   |

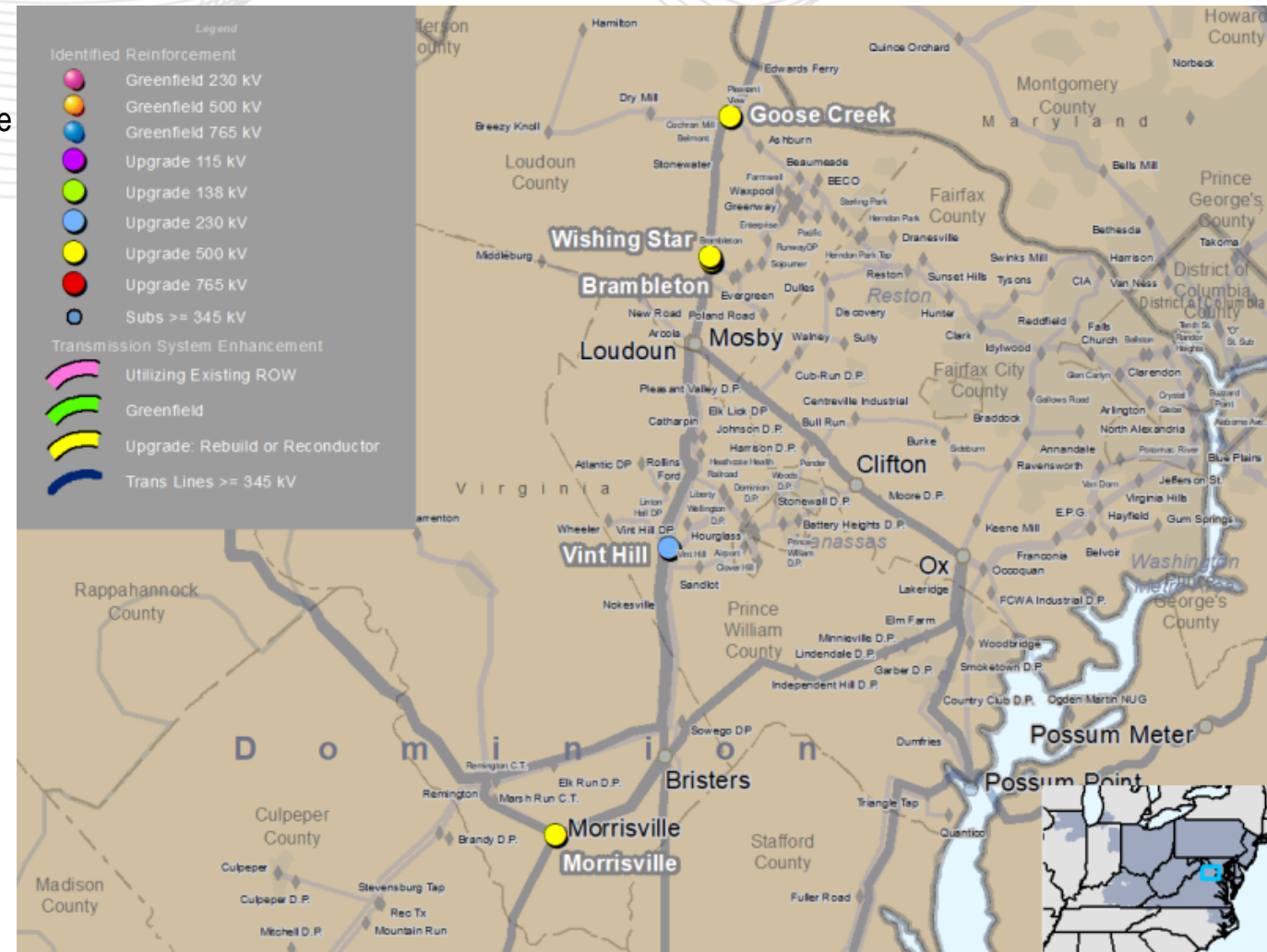
### Preliminary Facility Rating:

| # | Branch                            | SN/SE/WN/WE (MVA)   |
|---|-----------------------------------|---------------------|
| 1 | 500kV LN #558 Aspen – Brambleton  | 4357/4357/5155/5155 |
| 2 | 500/230kV Goose Creek Transformer | 1440/1440/1440/1440 |

Estimated Cost: \$34.03 M

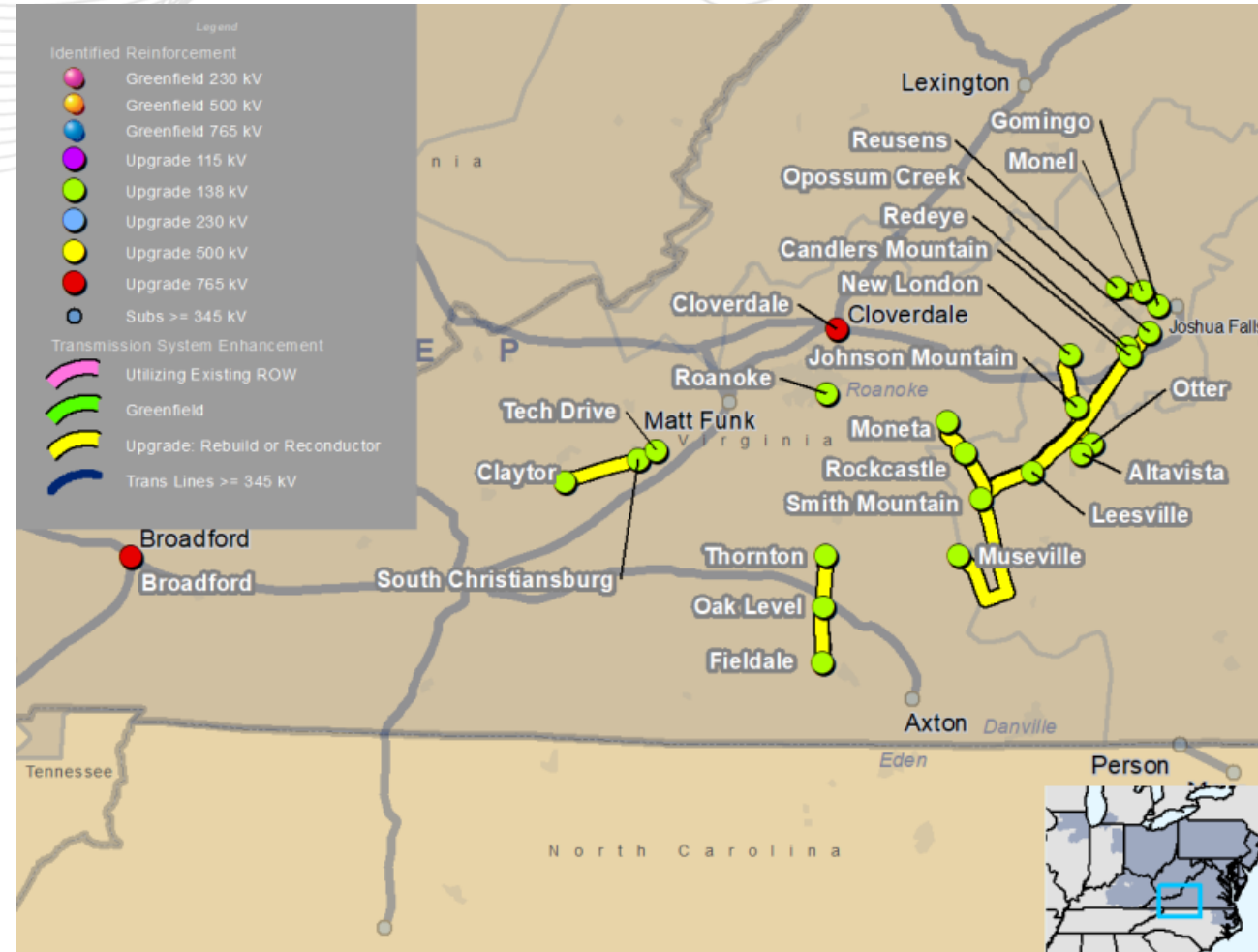
Required IS Date: 6/1/2029

Projected IS Date: 6/1/2029



### Proposed Solution: 2024-W1-81

- Broadford 765 kV Upgrade **Estimated Cost: \$4.5 M**
- Cloverdale 765 Upgrade **Estimated Cost: \$0.2 M**
- Museville - Smith Mountain 138 Sag Study **Estimated Cost: \$1.75 M**
- Smith Mountain – Rock Castle - Moneta 138kV Sag Study **Estimated Cost: \$1.6 M**
- Smith Mountain 138 kV Upgrade **Estimated Cost: \$0.4 M**
- Smith Mountain - Redeye - Candler's Mountain - Opossum Creek 138 kV Reconductor **Estimated Cost: \$40.8 M**
- Candler's Mountain 138 kV **Estimated Cost: \$0.2 M**
- Opossum Creek 138 kV **Estimated Cost: \$0.1 M**
- Claytor Station Upgrade **Estimated Cost: \$0.2 M**
- Claytor - S Christiansburg - Tech Drive 138 kV Sag Study **Estimated Cost: \$1.725 M**
- Roanoke 138 kV Station Upgrade **Estimated Cost: \$0.1 M**
- Reusens – Monel – Gomingo 138kV Sag Study **Estimated Cost: \$0.25 M**
- Leesville Station Upgrade 138 kV **Estimated Cost: \$0.6 M**
- Otter 138 kV Station Upgrade **Estimated Cost: \$0.1 M**
- Altavista - Otter - Johnson Mountain - New London 138 kV Reconductor **Estimated Cost: \$17.28 M**



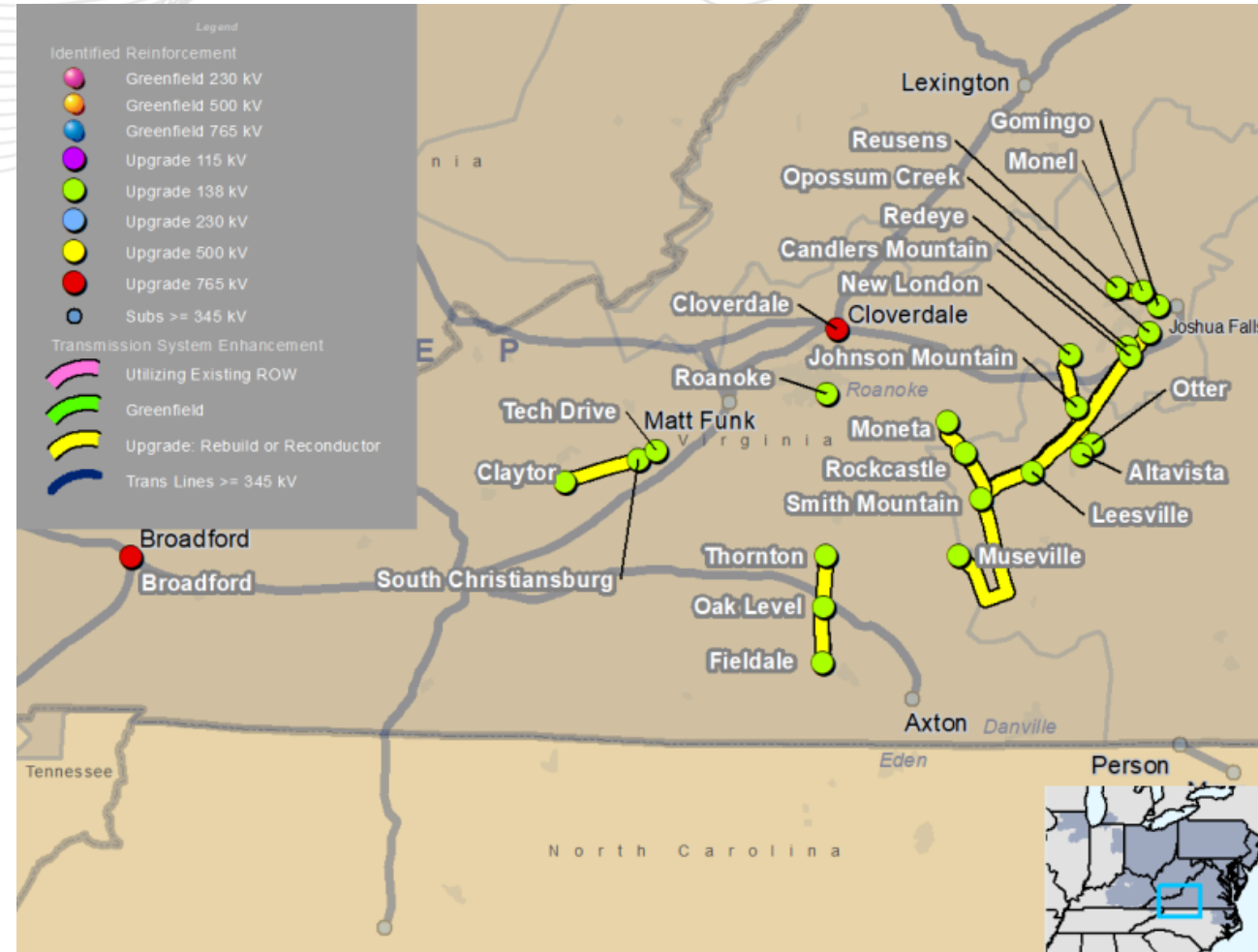
### Proposed Solution: 2024-W1-81

- Replace the station equipment and install 2nd 765/138 transformer at Joshua Falls 138kV Station. **Estimated Cost: \$40 M**
- Reconductor the Fieldale – Thornton 138kV line. **Estimated Cost: \$24.6 M**
- Perform the sag study for the Fieldale – Oak Level – Grassy Hill 138 kV line. **Estimated Cost: \$2.615 M**

**Total Estimated Cost: \$137.02 M**

**Required IS Date: 6/1/2029**

**Projected IS Date: 12/31/2029**



### Existing/Preliminary Facility Ratings:

| Facility Name                             | Existing Ratings (SN/SE/WN/WE) | Preliminary Ratings (SN/SE/WN/WE) |
|-------------------------------------------|--------------------------------|-----------------------------------|
| Broadford - Jacksons Ferry 765 kV         | 4142/4142/4484/4961            | 4249/4801/4708/5209               |
| Jacksons Ferry - Cloverdale 765 kV        | 4047/4571/4484/4961            | 5523/5523/6845/6845               |
| Smith Mountain - Museville 138 kV         | 296/361/375/453                | 329/361/427/427                   |
| Smith Mountain - Rock Castle 138 kV       | 358/409/453/501                | 438/481/519/604                   |
| Rock Castle - Moneta 138 kV               | 409/409/516/516                | 409/481/516/604                   |
| Smith Mountain - Leesville 138 kV         | 205/255/258/303                | 287/337/363/381                   |
| Candler's Mountain - Redeye 138 kV        | 205/255/258/320                | 257/360/368/441                   |
| Candler's Mountain - Opossum Creek 138 kV | 205/284/258/320                | 257/360/325/404                   |
| Smith Mountain - Redeye 138 kV            | 205/255/258/303                | 257/360/325/404                   |
| S Christiansburg - Tech Drive 138 kV      | 158/167/200/210                | 158/183/200/218                   |
| Claytor - S Christiansburg 138 kV         | 164/167/210/210                | 187/240/247/285                   |
| Moseley - Reusens 138 kV                  | 219/255/277/303                | 251/335/317/381                   |
| Moseley - Roanoke 138 kV                  | 219/255/277/303                | 251/335/317/381                   |
| Reusens – Monel 138kV                     | 388/409/492/516                | 388/499/576/576                   |
| Monel – Gomingo 138kV                     | 388/409/492/516                | 388/499/576/576                   |
| Leesville - Altavista 138 kV              | 287/337/363/400                | 295/411/617/617                   |
| Altavista - Otter 138 kV                  | 167/245/257/287                | 329/361/427/453                   |
| Otter - Johnson Mountain 138 kV           | 167/245/210/271                | 329/361/427/453                   |
| Johnson Mountain - New London 138 kV      | 167/245/210/271                | 205/285/258/320                   |
|                                           |                                | Winding 1: 765/867/867/867        |
|                                           |                                | Winding 2: 758/897/965/1047       |
|                                           |                                | Winding 3: N/A                    |
| Joshua Falls 765/138/14 kV Transformer    | N/A                            |                                   |
| Fieldale – Thornton 138kV                 | 150/204/189/229                | 251/335/317/381                   |
| Fieldale – Oak Level 138 kV               | 223/223/281/281                | 251/251/317/317                   |
| Oak Level – Grassy Hill 138 kV            | 219/223/277/281                | 251/251/317/317                   |

### Proposed Solution: 2024-W1-617 Component

- Replace the wave trap and upgrade the relay at Cloverdale 765kV substation
- Replace the wave trap and upgrade the relay at Joshua Falls 765kV substation

**Estimated Cost:** \$2.0 M

### Existing Facility Rating:

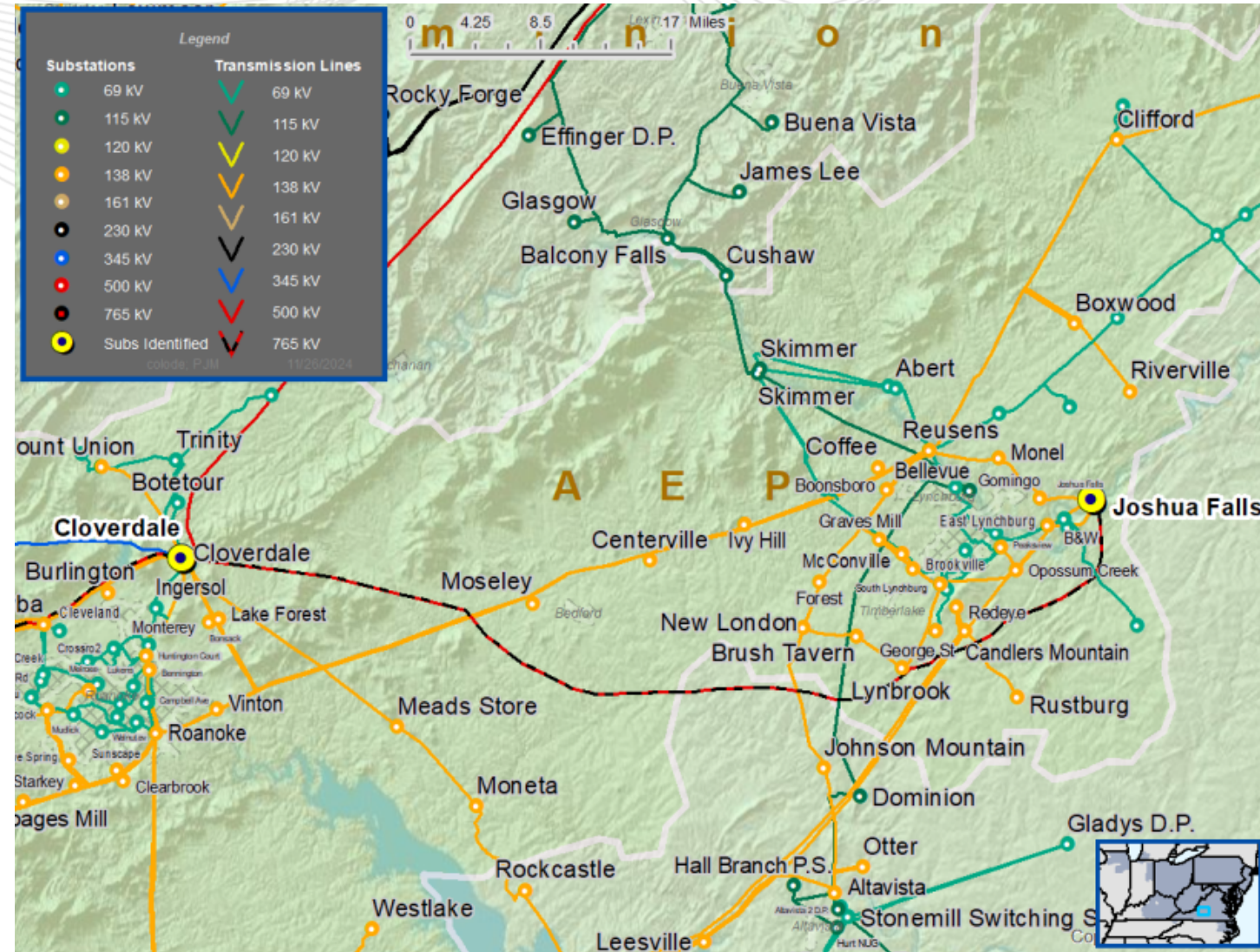
| Branch                          | SN/SE/WN/WE (MVA)   |
|---------------------------------|---------------------|
| Joshua Falls – Cloverdale 765kV | 1180/1180/1180/1180 |

### Preliminary Facility Rating:

| Branch                          | SN/SE/WN/WE (MVA)   |
|---------------------------------|---------------------|
| Joshua Falls – Cloverdale 765kV | 5523/5523/6845/6845 |

**Required IS Date:** 6/1/2029

**Projected IS Date:** 6/1/2029



### Proposed Solution: 2024-W1-527

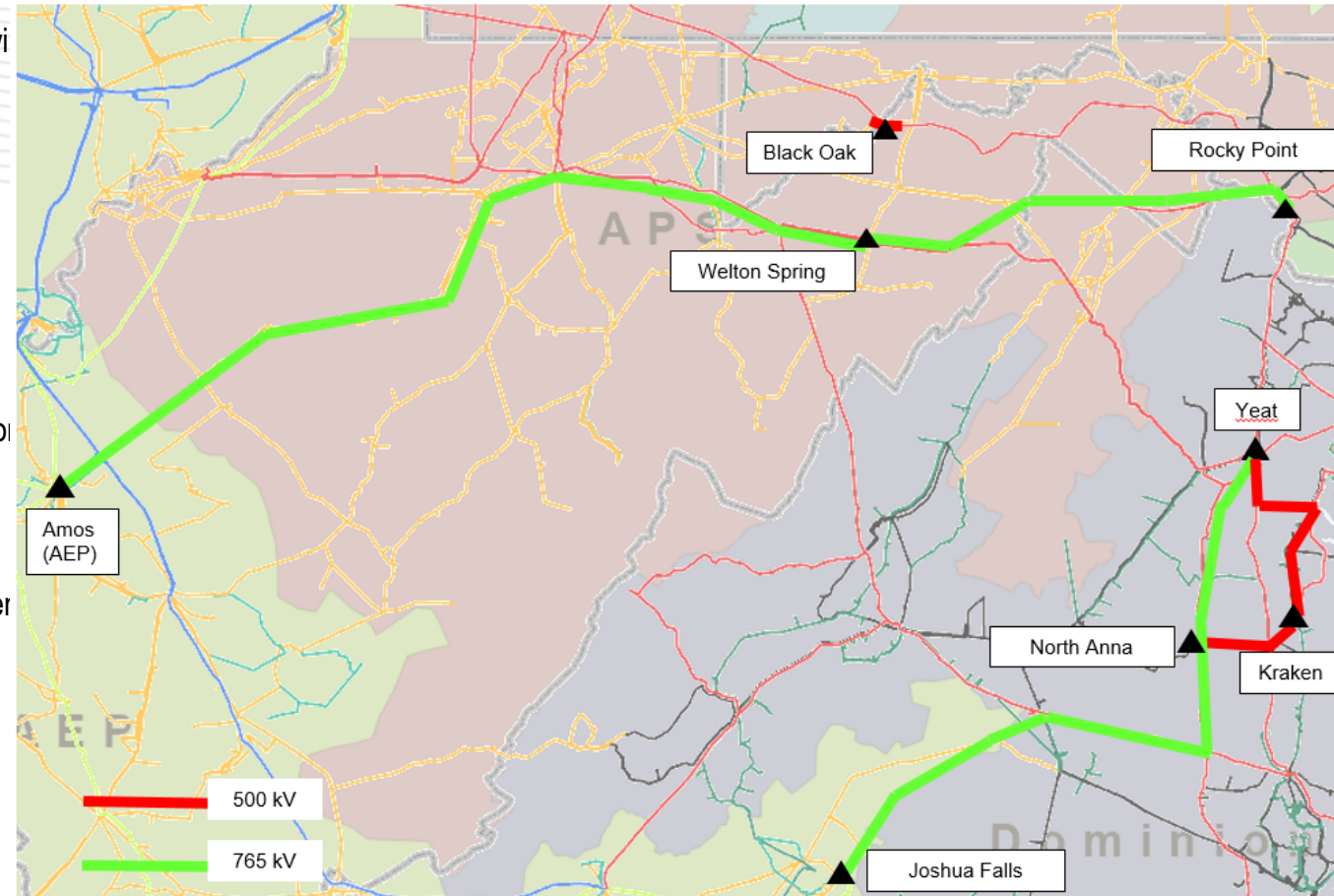
- Install (1) 230kV 150 MVar shunt capacitor bank & associated equipment at the following locations:
  - Brickyard
  - Cloverhill
  - Dawkins Branch
  - Hornbaker
  - Remington CT
  - Rixlew
  - Dave's Store
- Install (1) 500kV 300 MVar STATCOM & associated equipment at the following location:
  - Ladysmith
  - Spotsylvania\*
  - Valley
- \*Alternative: Install (1) 500kV 293.8 MVar shunt capacitor bank & associated equipment

**Note:** Final selection of reactive reinforcements will be adjusted based on analysis results of the final selected solution. To be finalized by the Jan 2025 TEAC

**Total Estimated Cost: \$159.5 M**

**Required IS Date: 6/1/2029**

**Projected IS Date: 6/1/2029**



**Process Stage:** First Read

**Criteria:** Short Circuit

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Short Circuit base case + Preliminary preferred solution

**Proposal Window Exclusion:** None

**Problem Statement:**

In the 2029 RTEP Short Circuit base case that includes the preliminary case for preferred solution, a total of 107 breakers were identified to be over duty, 1 in APS & 106 in Dominion.

**Proposed Solution:**

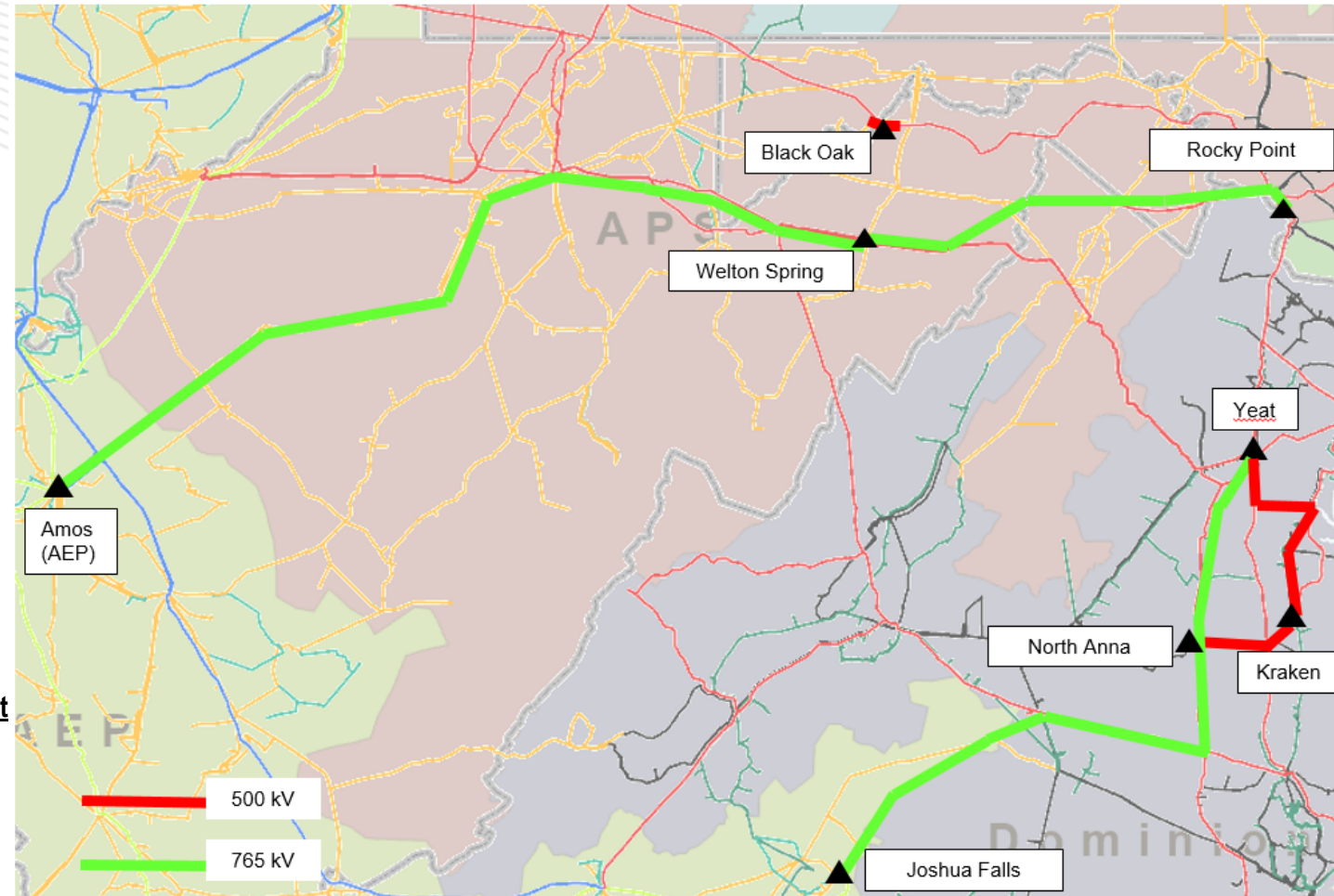
Replace all over duty breakers with higher capacity breakers as outlined on the next set of slides.

**Note:** Final selection of circuit breaker upgrades will be adjusted based on short circuit analysis results of the final selected solution.

**Estimated Cost:** \$88.09 M

**Required IS Date:** 6/1/2029

**Projected IS Date:** 6/1/2029



- Posted window case based on 2029 topology
- Considered impacts to existing breakers in entire PJM footprint

| Scenario Description | Over Duty Bus (Qty) |        |        |        |        |        | Over Duty<br>CBs | Maximum Fault Duty (kA) |        |        |        |        |        | Comment                                                        |
|----------------------|---------------------|--------|--------|--------|--------|--------|------------------|-------------------------|--------|--------|--------|--------|--------|----------------------------------------------------------------|
|                      | 115 kV              | 138 kV | 230 kV | 345 kV | 500 kV | 765 kV | Total            | 115 kV                  | 138 kV | 230 kV | 345 kV | 500 kV | 765 kV |                                                                |
| <b>Proposal 262</b>  | 0                   | 0      | 72     | 0      | 35     | 0      | 107              | NA                      | NA     | 77.6   | NA     | 51.8   | NA     | Brambleton 230kV bus operating below the 80kA rated capability |

| TO       | Breaker Qty | Cost (\$M) |
|----------|-------------|------------|
| APS      | 1           | 11.5       |
| Dominion | 106         | 76.59      |
| Total    | 107         | 88.09      |

| Item | BUS          | Breaker Qty | Existing Rating (kA) | Proposed Rating (kA) | Cost (\$M) |
|------|--------------|-------------|----------------------|----------------------|------------|
| 1    | DOUBS 500.kV | 1           | 50                   | 63                   | 11.5       |
|      |              |             |                      |                      | 11.5       |

| Item | BUS                        | Breaker Qty | Existing Rating (kA) | Proposed Rating (kA) | Cost (\$M) |
|------|----------------------------|-------------|----------------------|----------------------|------------|
| 1    | Ashburn Sub 230.kV         | 1           | 50kA                 | 63kA                 | 0.5        |
| 2    | Beaumeade Sub 230.kV       | 1           | 63kA                 | 80kA                 | 0.66       |
| 3    | Braddock Sub 230.kV        | 4           | 40kA                 | 63kA                 | 2          |
| 4    | Brambleton Sub 230.kV      | 4           | 63kA                 | 80kA                 | 2.64       |
| 5    | Bristers Sub 230.kV        | 3           | 50kA                 | 63kA                 | 1.5        |
| 6    | Bull Run Sub 230.kV        | 1           | 50kA                 | 63kA                 | 0.5        |
| 7    | Buttermilk Sub 230.kV      | 5           | 63kA                 | 80kA                 | 3.3        |
| 8    | Cabin Run Sub 230.kV       | 3           | 63kA                 | 80kA                 | 1.98       |
| 9    | Evergreen Mills Sub 230.kV | 2           | 63kA                 | 80kA                 | 1.32       |
| 10   | Goose Creek Sub 500.kV     | 1           | 50kA                 | 63kA                 | 1.015      |
| 11   | Ladysmith Sub 230.kV       | 11          | 40kA                 | 63kA                 | 5.5        |
| 12   | Ladysmith Sub 500.kV       | 1           | 40kA                 | 63kA                 | 1.015      |
| 13   | Lockridge Sub 230.kV       | 2           | 63kA                 | 80kA                 | 1.32       |
| 14   | Loudoun Sub 230.kV         | 3           | 63kA                 | 80kA                 | 1.98       |
| 15   | Loudoun Sub 230.kV         | 1           | 50kA                 | 63kA                 | 0.5        |
| 16   | Loudoun Sub 500.kV         | 6           | 50kA                 | 63kA                 | 6.09       |
| 17   | Marsh Run Sub 230.kV       | 4           | 50kA                 | 63kA                 | 2          |
| 18   | Morrisville Sub 230.kV     | 4           | 50kA                 | 63kA                 | 2          |
| 19   | Morrisville Sub 500.kV     | 5           | 50kA                 | 63kA                 | 5.075      |
| 20   | Mosby Sub 500.kV           | 11          | 50kA                 | 63kA                 | 11.165     |

Continued on next slide

# Dominion Area - Short Circuit Upgrades (con't)

| Item | BUS                     | Breaker Qty | Existing Rating (kA) | Proposed Rating (kA) | Cost (\$M)   |
|------|-------------------------|-------------|----------------------|----------------------|--------------|
| 21   | North Anna Sub 500.kV   | 6           | 40kA                 | 63kA                 | 6.09         |
| 22   | Ox Sub 230.kV           | 4           | 63kA                 | 80kA                 | 2.64         |
| 23   | Ox Sub 500.kV           | 3           | 40kA                 | 63kA                 | 3.045        |
| 24   | Paragon Park Sub 230.kV | 2           | 63kA                 | 80kA                 | 1.32         |
| 25   | Pleasantview Sub 230.kV | 2           | 63kA                 | 80kA                 | 1.32         |
| 26   | Pleasantview Sub 500.kV | 1           | 40kA                 | 63kA                 | 1.015        |
| 27   | Remington Sub 230.kV    | 5           | 40kA                 | 63kA                 | 2.5          |
| 28   | Roundtable 230.kV       | 6           | 63kA                 | 80kA                 | 3.96         |
| 29   | Yardley Sub 230.kV      | 4           | 63kA                 | 80kA                 | 2.64         |
|      |                         |             |                      |                      | <b>76.59</b> |



# PJM 2024 Window 1 Regional Cluster Shortlist: Cost Review

# Shortlisted Regional Solutions Cost Review

| Entity            | Proposal | Proposed Cost (\$B) | Independent Cost (\$B) |
|-------------------|----------|---------------------|------------------------|
| DOM-FE-Transource | 610      | \$ 3.726            | \$ 3.729               |
|                   | 636      | \$ 3.898            | \$ 3.932               |
|                   | 262      | \$ 5.498            | \$ 5.841               |
| LS Power          | 898      | \$ 2.455            | \$ 3.166               |
|                   | 78       | \$ 2.337            | \$ 3.150               |
| NextEra           | 992      | \$ 2.325            | \$ 3.608               |
|                   | 768      | \$ 2.260            | \$ 3.297               |

| Dominion, FirstEnergy Transource Shortlisted 765 kV Proposals |             |                                                                | Proposed Cost       | Independent Cost    |
|---------------------------------------------------------------|-------------|----------------------------------------------------------------|---------------------|---------------------|
| Joint Proposal 610                                            | 2024-W1-967 | DVP Central Area Improvement for Portfolios                    | \$ 1,189,775,296.32 | \$ 1,059,225,544.02 |
|                                                               | 2024-W1-820 | Joshua Falls - Yeat                                            | \$ 1,016,895,559.00 | \$ 1,244,013,049.00 |
|                                                               | 2024-W1-81  | AEP incumbent upgrades for Portfolio #1, 2 & 3                 | \$ 137,020,000.00   | \$ 164,206,000.00   |
|                                                               | 2024-W1-885 | FirstEnergy Components for Joint Venture Portfolios 2,3, and 4 | \$ 52,665,514.17    | \$ 52,665,514.17    |
|                                                               | 2024-W1-727 | Kammer - 502Jct 765 kV line                                    | \$ 292,459,887.36   | \$ 328,069,112.56   |
|                                                               | 2024-W1-551 | Woodside/Chanceford 500 kV Terminal Swap at Doubs              | \$ 13,970,889.79    | \$ 13,970,889.79    |
|                                                               | 2024-W1-24  | Dominion Reinforcements                                        | \$ 861,735,703.39   | \$ 717,863,315.00   |
|                                                               | 2024-W1-781 | Dominion Reinforcements                                        | \$ 161,680,709.90   | \$ 148,845,694.89   |
|                                                               | Total       |                                                                | \$ 3,726,203,559.93 | \$ 3,728,859,119.43 |
| Joint Proposal 636                                            | 2024-W1-967 | DVP Central Area Improvement for Portfolios                    | \$ 1,189,775,296.32 | \$ 1,059,225,544.02 |
|                                                               | 2024-W1-665 | Joshua Falls - Vontay - Morrisville South                      | \$ 1,188,512,351.00 | \$ 1,447,464,979.70 |
|                                                               | 2024-W1-81  | AEP incumbent upgrades for Portfolio #1, 2 & 3                 | \$ 137,020,000.00   | \$ 164,206,000.00   |
|                                                               | 2024-W1-885 | FirstEnergy Components for Joint Venture Portfolios 2,3, and 4 | \$ 52,665,514.17    | \$ 52,665,514.17    |
|                                                               | 2024-W1-727 | Kammer - 502Jct 765 kV line                                    | \$ 292,459,887.36   | \$ 328,069,112.56   |
|                                                               | 2024-W1-551 | Woodside/Chanceford 500 kV Terminal Swap at Doubs              | \$ 13,970,889.79    | \$ 14,000,000.00    |
|                                                               | 2024-W1-24  | Dominion Reinforcements                                        | \$ 861,735,703.39   | \$ 717,863,315.00   |
|                                                               | 2024-W1-781 | Dominion Reinforcements                                        | \$ 161,680,709.90   | \$ 148,845,694.89   |
|                                                               | Total       |                                                                | \$ 3,897,820,351.93 | \$ 3,932,340,160.34 |
| Joint Proposal 262                                            | 2024-W1-967 | DVP Central Area Improvement for Portfolios                    | \$ 1,189,775,296.32 | \$ 1,059,225,544.02 |
|                                                               | 2024-W1-665 | Joshua Falls - Vontay - Morrisville South                      | \$ 1,188,512,351.00 | \$ 1,447,464,979.70 |
|                                                               | 2024-W1-708 | Amos - Welton Springs - Rocky Point                            | \$ 1,944,988,294.77 | \$ 2,288,969,942.14 |
|                                                               | 2024-W1-551 | Woodside/Chanceford 500 kV Terminal Swap at Doubs              | \$ 13,970,889.79    | \$ 14,000,000.00    |
|                                                               | 2024-W1-81  | AEP incumbent upgrades for Portfolio #1, 2 & 3                 | \$ 137,020,000.00   | \$ 164,206,000.00   |
|                                                               | 2024-W1-24  | Dominion Reinforcements                                        | \$ 861,735,703.39   | \$ 717,863,315.00   |
|                                                               | 2024-W1-781 | Dominion Reinforcements                                        | \$ 161,680,709.90   | \$ 148,845,694.89   |
|                                                               | Total       |                                                                | \$ 5,497,683,245.17 | \$ 5,840,575,475.75 |

| LS Power Shortlisted 765 kV Proposals |             |                   | Proposed Cost       | Independent Cost    |
|---------------------------------------|-------------|-------------------|---------------------|---------------------|
| F3 Solution                           | 2024-W1-898 | F3 Solution       | \$ 2,015,627,111.00 | \$ 2,463,579,545.00 |
|                                       | 2024-W1-200 | Common Components | \$ 439,753,860.00   | \$ 702,234,455.29   |
|                                       | Total       |                   | \$ 2,455,380,971.00 | \$ 3,165,814,000.29 |
| F5 Solution                           | 2024-W1-78  | F5 Solution       | \$ 1,897,054,166.00 | \$ 2,447,816,821.00 |
|                                       | 2024-W1-200 | Common Components | \$ 439,753,860.00   | \$ 702,234,455.29   |
|                                       | Total       |                   | \$ 2,336,808,026.00 | \$ 3,150,051,276.29 |

| NextEra Shortlisted 765 kV Proposals |             |                                                                                    | Proposed Cost       | Independent Cost    |
|--------------------------------------|-------------|------------------------------------------------------------------------------------|---------------------|---------------------|
| Proposal 992                         | 2024-W1-992 | Axton - Joshua Falls - Mt Ida 765kV transmission lines + Link 500/230kV substation | \$ 2,256,234,092.60 | \$ 3,190,599,997.01 |
|                                      | 2024-W1-944 | Upgrades to AEP 138kV and Dominion 230kV transmission lines                        | \$ 69,139,000.00    | \$ 417,160,000.00   |
|                                      | Total       |                                                                                    | \$ 2,325,373,092.60 | \$ 3,607,759,997.01 |
| Proposal 768                         | 2024-W1-768 | Axton - Joshua Falls - Mt Ida                                                      | \$ 2,191,007,184.00 | \$ 2,879,718,285.80 |
|                                      | 2024-W1-944 | Upgrades to AEP 138kV and Dominion 230kV transmission lines                        | \$ 69,139,000.00    | \$ 417,160,000.00   |
|                                      | Total       |                                                                                    | \$ 2,260,146,184.00 | \$ 3,296,878,285.80 |

| PJM Risk Assessment Criteria |                                                      |                                                                                                                           |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                             |                                                                                                                                                                                         |                                                                                                                                                                                   |                                                                                                                                   |
|------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Risk Assessment              | Cost Estimate Risks                                  | Cost Containment Risk                                                                                                     | Schedule Risks                                                                                                                                                                                                                                                   | Constructability Risks                                                                                                                                                                                                                      | ROW/Land Acquisition Risk                                                                                                                                                               | Outage Coordination Risk Score                                                                                                                                                    | Proposing Entity Experience & Capability Risks                                                                                    |
| Low                          | Proposal is within 0-10% of Independent Estimate     | Hard Cost Cap (Project cost capped with no cost recovery above binding cost cap) with minimal exclusions.                 | Ratings assessed based on independent assessment of proposed in-service dates, and assessment of significant schedule risks such as such as permitting and constraint mitigation, long-lead material procurement, land/ROW acquisition, construction complexity. | Ratings assessed based on independent assessment of the number and severity of constructability risks assessed for the proposed project scope, such as permitting and constraint mitigation, land/ROW acquisition, construction complexity. | Pure Brownfield Rebuild/Reconductor/New Build within existing ROW (or property already owned by entity)                                                                                 | Ratings assessed based on PJM's assessment of complexity, impact and duration of outages required for development, including consideration of outage coordination plans proposed. | Entity has demonstrated significant experience & capability of developing and operating proposed facilities                       |
| Low-Medium                   | Proposal is within 11-20% of Independent Estimate    | Mix of Hard/Soft caps on Project components                                                                               |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                             | Mostly brownfield with some greenfield (i.e. Uses/Overlaps existing ROW but requires expansion or some new greenfield)                                                                  |                                                                                                                                                                                   | Entity has demonstrated limited experience & capability of developing and operating proposed facilities                           |
| Medium                       | Proposal is within 21-30% of Independent Estimate    | Soft Caps (No direct cap on Project costs, but indirect caps via reductions to ROE, and/or incentives for cost overruns). |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                             | Moderate Mix of Green and Brownfield (i.e. Uses/Overlaps existing ROW but requires expansion or some new greenfield)                                                                    |                                                                                                                                                                                   | Entity has no experience operating proposed facilities, but has demonstrated some experience with developing proposed facilities. |
| Medium-High                  | Proposal is within 31-40% of Independent Estimate    | Minimal cost caps and/or excessive exclusions                                                                             |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                             | Mostly Greenfield with some Brownfield (i.e. Uses/Overlaps existing ROW but requires expansion or some new greenfield) OR Parallels existing ROW for entire alignment with no overlaps. |                                                                                                                                                                                   | Entity has no experience developing and operating proposed facilities, but has provided a detailed & effective plan               |
| High                         | Proposal is greater than 40% of Independent Estimate | No cost containment                                                                                                       |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                             | Pure Greenfield                                                                                                                                                                         |                                                                                                                                                                                   | Entity has no experience developing and operating proposed facilities and has not provided a detailed & effective plan            |



# Constructability Matrix – Regional Projects

## Dominion, FirstEnergy & Transource Joint Proposals

| 2024 RTEP W1 Proposal Risk Assessments      |             |                  |                                                 |                        |                           |                     |                        |                |                        |                            |                           |                                               |              |                   |                   |                |
|---------------------------------------------|-------------|------------------|-------------------------------------------------|------------------------|---------------------------|---------------------|------------------------|----------------|------------------------|----------------------------|---------------------------|-----------------------------------------------|--------------|-------------------|-------------------|----------------|
| Applicable Proposal IDs for Joint Proposals | Proposal ID | Proposing Entity | Proposal Description                            | Proposal Cost Estimate | Independent Cost Estimate | Cost Estimate Risks | Cost Containment Risks | Schedule Risks | Constructability Risks | ROW/Land Acquisition Risks | Outage Coordination Risks | Proposing Entity Experience & Capability Risk | Proposed ISD | 765 kV Ckt. Miles | 500 kV Ckt. Miles | EHV Ckt. Total |
| 262                                         | 708         | TRAIL            | Amos - Welton Springs - Rocky Point 765 kV Line | \$ 1,944,988,294.77    | \$ 2,288,969,942.14       | Low-Medium          | Medium-High            | High           | High                   | Medium-High                | Low                       | Low                                           | 12/1/2029    | 261               | 0                 | 261            |
| 759                                         | 883         | TRAIL            | Amos - Welton Spring 765 kV Line                | \$ 1,274,423,041.56    | \$ 1,481,832,613.63       | Low-Medium          | Medium-High            | Medium-High    | Medium-High            | Medium-High                | Low                       | Low                                           | 12/1/2029    | 175               | 0                 | 175            |
| 279                                         | 286         | TRNSRC           | Joshua Falls - Durandal                         | \$ 350,251,158.00      | \$ 444,166,943.40         | Medium              | Medium-High            | Medium         | Medium                 | Medium                     | Low                       | Low                                           | 12/1/2029    | 64                | 0                 | 64             |
| 279, 114                                    | 300         | TRNSRC           | Yeat - Vontay                                   | \$ 381,728,557.00      | \$ 462,017,489.30         | Low-Medium          | Medium-High            | Medium         | Medium                 | Low-Medium                 | Medium                    | Low                                           | 12/1/2030    | 0                 | 64                | 64             |
| 262, 636, 759                               | 665         | TRNSRC           | Joshua Falls - Vontay - Morrisville South       | \$ 1,188,512,351.00    | \$ 1,447,464,979.70       | Low-Medium          | Medium-High            | Medium-High    | Medium                 | Medium                     | Low                       | Low                                           | 12/1/2029    | 146               | 0                 | 146            |
| 279, 610, 114                               | 820         | TRNSRC           | Joshua Falls - Yeat                             | \$ 1,016,895,559.00    | \$ 1,244,013,049.00       | Low-Medium          | Medium-High            | Medium-High    | Medium-High            | Medium-High                | Low                       | Low                                           | 12/1/2029    | 138               | 0                 | 138            |
| 262, 759, 636, 610                          | 967         | VEPCO            | DVP Central Area Improvement for Portfolios     | \$ 1,189,775,296.32    | \$ 1,059,225,544.02       | Low                 | Medium-High            | Medium         | Medium                 | Low-Medium                 | Medium                    | Low                                           | 12/1/2029    | 0                 | 67                | 67             |
|                                             | 907         | TRAIL            | 500 kV Expansion Plan                           | \$ 2,838,900,776.05    | \$ 2,863,332,668.37       | Low                 | Medium-High            | High           | High                   | Medium-High                | Medium-High               | Low                                           | 12/1/2029    | 0                 | 395.8             | 395.8          |
| 610, 636, 279, 114                          | 977         | TRAIL            | Belmont - Harrison 500 kV Line                  | \$ 277,408,474.00      | \$ 300,964,888.00         | Low                 | Medium-High            | Medium         | Medium                 | Medium                     | Low                       | Low                                           | 12/1/2029    | 0                 | 56                | 56             |
| 610, 636, 279, 114                          | 727         | KEYATC           | Kammer - 502 Junction 765 kV Line               | \$ 292,459,887.36      | \$ 328,069,112.56         | Low-Medium          | High                   | Medium         | Low-Medium             | Low                        | Medium-High               | Low                                           | 12/1/2029    | 41.9              | 0                 | 41.9           |
| 279, 114                                    | 617         | TRNSRC           | AEP incumbent upgrades for Portfolio #4         | \$ 167,351,119.00      | \$ 180,439,693.65         | Low                 | High                   | Medium-High    | Medium-High            | Medium                     | Medium                    | Low                                           | 12/1/2029    | 0                 | 0                 | 0              |
| 262, 759, 636, 610, 279, 114                | 781         | VEPCO            | 500kV Solutions for Portfolios                  | \$ 161,680,709.90      | \$ 148,845,694.89         | Low                 | High                   | Low-Medium     | Low-Medium             | Low                        | Medium                    | Low                                           | 12/1/2029    | 0                 | 0                 | 0              |
|                                             | 983         | VEPCO            | 500kV Safety Solutions                          | \$ 2,839,364,040.68    | \$ 2,467,872,667.37       | Low                 | High                   | Medium         | Medium                 | Medium                     | Medium                    | Low                                           | 6/1/2029     | 0                 | 0                 | 0              |



# Constructability Matrix – Regional Projects

## LS Power and Nextera Proposals

| 2024 RTEP W1 Proposal Risk Assessments |                  |                                                                                    |                        |                           |                     |                        |                |                        |                            |                           |                                               |              |                   |                   |               |
|----------------------------------------|------------------|------------------------------------------------------------------------------------|------------------------|---------------------------|---------------------|------------------------|----------------|------------------------|----------------------------|---------------------------|-----------------------------------------------|--------------|-------------------|-------------------|---------------|
| Proposal ID                            | Proposing Entity | Proposal Description                                                               | Proposal Cost Estimate | Independent Cost Estimate | Cost Estimate Risks | Cost Containment Risks | Schedule Risks | Constructability Risks | ROW/Land Acquisition Risks | Outage Coordination Risks | Proposing Entity Experience & Capability Risk | Proposed ISD | 765 kV Ckt. Miles | 500 kV Ckt. Miles | EHV Ckt Total |
| 78                                     | CNTLTM           | F5 Solution                                                                        | \$ 1,897,054,166.00    | \$ 2,447,816,821.00       | Medium              | Medium                 | Medium-High    | Medium-High            | High                       | Low                       | Medium-High                                   | 6/1/2029     | 196.8             | 74.6              | 271.4         |
| 124                                    | CNTLTM           | F4 Solution                                                                        | \$ 1,810,831,815.00    | \$ 2,429,369,174.00       | Medium              | Medium                 | Medium-High    | Medium-High            | High                       | Low                       | Medium-High                                   | 6/1/2029     | 192.7             | 9.4               | 202.1         |
| 317                                    | CNTLTM           | F7 Solution                                                                        | \$ 1,896,758,766.00    | \$ 2,282,237,119.00       | Low-Medium          | Medium                 | Medium-High    | Medium-High            | High                       | Low                       | Medium-High                                   | 6/1/2029     | 130.9             | 147.4             | 278.3         |
| 506                                    | CNTLTM           | F6 Solution                                                                        | \$ 1,732,107,945.00    | \$ 2,133,496,643.00       | Low-Medium          | Medium                 | Medium-High    | Medium-High            | High                       | Low                       | Low                                           | 6/1/2029     | 0                 | 273.7             | 273.7         |
| 622                                    | CNTLTM           | F2 Solution                                                                        | \$ 1,848,138,486.00    | \$ 2,309,384,160.00       | Low-Medium          | Medium                 | Medium-High    | Medium-High            | High                       | Low                       | Low                                           | 6/1/2029     | 0                 | 268.3             | 268.3         |
| 839                                    | CNTLTM           | F8 Solution                                                                        | \$ 1,808,086,862.00    | \$ 2,415,299,238.00       | Medium              | Medium                 | Medium-High    | Medium-High            | High                       | Low                       | Medium-High                                   | 6/1/2029     | 196.5             | 9.4               | 205.9         |
| 898                                    | CNTLTM           | F3 Solution                                                                        | \$ 2,015,627,111.00    | \$ 2,463,579,545.00       | Low-Medium          | Medium                 | Medium-High    | Medium-High            | High                       | Low                       | Medium-High                                   | 6/1/2029     | 127.1             | 140.6             | 267.7         |
| 904                                    | CNTLTM           | F1 Solution                                                                        | \$ 1,864,623,351.00    | \$ 2,459,622,230.00       | Medium              | Medium                 | Medium-High    | Medium-High            | High                       | Low                       | Medium-High                                   | 6/1/2029     | 192.6             | 74.6              | 267.2         |
| 200                                    | CNTLTM           | Common Components                                                                  | \$ 439,753,860.00      | \$ 702,234,455.29         | Medium-High         | Medium-High            | Medium-High    | High                   | Medium                     | Medium                    | Low                                           | 6/1/2029     | 0                 | 0                 | 0             |
| 146                                    | NEETMH           | Axton - Joshua Falls 765kV + Joshua Falls - Mt Ida 500kV                           | \$ 2,263,756,064.81    | \$ 2,822,691,098.80       | Low-Medium          | Medium                 | Medium-High    | Medium-High            | Medium-High                | Medium-High               | Medium-High                                   | 6/1/2030     | 76                | 230.5             | 306.5         |
| 768                                    | NEETMH           | Axton - Joshua Falls - Mt Ida                                                      | \$ 2,191,007,184.00    | \$ 2,879,718,285.80       | Medium              | Medium                 | Medium-High    | Medium-High            | Medium-High                | Medium-High               | Medium-High                                   | 6/1/2030     | 145               | 161.5             | 306.5         |
| 992                                    | NEETMH           | Axton - Joshua Falls - Mt Ida 765kV transmission lines + Link 500/230kV substation | \$ 2,256,234,092.60    | \$ 3,190,599,997.01       | Medium              | Medium                 | Medium-High    | Medium-High            | Medium-High                | Medium-High               | Medium-High                                   | 6/1/2030     | 145               | 156.93            | 301.93        |
| 944                                    | NEETMH           | Upgrades to AEP 138kV and Dominion 230kV transmission lines                        | \$ 69,139,000.00       | \$ 417,160,000.00         | High                | High                   | Low            | Low-Medium             | Low                        | Medium                    | Low                                           | 6/1/2029     | 0                 | 0                 | 0             |



# Constructability Matrix – Ohio (ATSI Zone) Projects

## All Entity Proposals

2024 RTEP W1 Proposal Risk Assessments

| Proposal ID | Proposing Entity | Proposal Description                                          | Proposal Cost Estimate | Independent Cost Estimate | Cost Estimate Risks | Cost Containment Risks | Schedule Risks | Constructability Risks | ROW/Land Acquisition Risks | Outage Coordination Risks | Proposing Entity Experience & Capability Risk | Proposed ISD | 765 kV Ckt. Miles | 500 kV Ckt. Miles | EHV Ckt. Total |
|-------------|------------------|---------------------------------------------------------------|------------------------|---------------------------|---------------------|------------------------|----------------|------------------------|----------------------------|---------------------------|-----------------------------------------------|--------------|-------------------|-------------------|----------------|
| 694         | TRNSRC           | Fostoria Central - Lake Ave. 345 kV DC                        | \$ 328,369,046.00      | \$ 448,294,086.49         | Medium              | Medium-High            | Medium         | Medium                 | High                       | Low                       | Low                                           | 12/1/2029    | 0                 | 0                 | 0              |
| 843         | ATSI             | Lemoyne - Lake Ave 345 kV Line                                | \$ 455,038,571.00      | \$ 468,122,679.45         | Low                 | High                   | Medium         | Medium                 | Medium                     | Medium                    | Low                                           | 6/1/2029     | 0                 | 0                 | 0              |
| 605         | ATSI             | ATSI 138kV Rebuild                                            | \$ 265,156,487.00      | \$ 266,273,438.00         | Low                 | High                   | Low            | Low                    | Low                        | Medium                    | Low                                           | 6/1/2029     | 0                 | 0                 | 0              |
| 294         | NEETMH           | Bay Shore - Davis-Besse - Lake Ave                            | \$ 257,300,886.58      | \$ 369,256,820.42         | Medium-High         | Medium                 | Medium         | Medium                 | Medium-High                | Medium                    | Low                                           | 6/1/2030     | 0                 | 0                 | 0              |
| 357         | NEETMH           | Bay Shore - Davis-Besse - Lake Ave + Lemoyne - Lake Ave 345kV | \$ 344,117,143.00      | \$ 451,938,163.29         | Medium              | Medium                 | Medium         | Medium                 | Medium-High                | Medium                    | Low                                           | 6/1/2030     | 0                 | 0                 | 0              |
| 533         | NEETMH           | Lemoyne - Lake Ave 345kV                                      | \$ 202,084,415.75      | \$ 344,156,240.59         | High                | Medium                 | Medium         | Medium                 | Medium-High                | Low                       | Low                                           | 6/1/2030     | 0                 | 0                 | 0              |

- PJM will finalize / fine –tune the smaller components of the 2024 RTEP W1 by the Jan 7<sup>th</sup> TEAC – (small cost/scope adjustments)
- Second Read at TEAC for all proposals at the Jan 7<sup>th</sup> TEAC
- PJM will finalize the Reliability Analysis and Constructability and Financial Analysis reports before the Jan 7<sup>th</sup> TEA
- Once approved by the board, project proponents may start working on revising their proposed routes/designs part of the facility application/approval process

# Questions?

# Appendix

# Incremental Transfer Study: Source/Sink Definition

| Source     | Bus Name            |
|------------|---------------------|
| West North | Sorensen 765KV      |
|            | Vassell 765KV       |
| West South | Jackson Ferry 765KV |

| Sink | Bus Name          |
|------|-------------------|
| PSEG | New Freedom 500kV |
| PPL1 | Juniata 500kV     |
| PPL2 | Susquahanna 500kV |
| DOM1 | Bristers 500kV    |
| DOM2 | Ladysmith 500kV   |
| APS  | Woodside 500kV    |

Facilitator:

Jason Connell,  
[Jason.Connell@pjm.com](mailto:Jason.Connell@pjm.com)

Secretary:

Joshua Stephenson,  
[Joshua.Stephenson@pjm.com](mailto:Joshua.Stephenson@pjm.com)

SME/Presenter:

Sami Abdulsalam,  
[Sami.Abdulsalam@pjm.com](mailto:Sami.Abdulsalam@pjm.com)

**Reliability Analysis Update**

A green speech bubble containing a white question mark, positioned above a blue speech bubble with three horizontal lines, indicating a question or contact point.

Member Hotline

(610) 666-8980

(866) 400-8980

[custsvc@pjm.com](mailto:custsvc@pjm.com)

| Version No. | Date       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1           | 11/27/2024 | <ul style="list-style-type: none"> <li>Initial slides posted</li> </ul>                                                                                                                                                                                                                                                                                                                                                                           |
| 2           | 12/3/2024  | <ul style="list-style-type: none"> <li>Slide #2, Updated Outline</li> <li>Slide #26, Corrected Project Submittal Responsibility for proposal 551 to FE</li> <li>Slide #57, added the slide</li> <li>Slide #61, Corrected process stage</li> <li>Added slide #88 for Proposal 527</li> <li>Corrected references from Point of Rocks to Rocky Point throughout slide deck</li> <li>Added slide #103</li> <li>Added slide #27, total cost</li> </ul> |
| 3           | 12/6/2024  | <ul style="list-style-type: none"> <li>Added slides #105,106, Appendix</li> <li>Corrected the baseline ID for Wilton Center BT 4-5 CB project</li> </ul>                                                                                                                                                                                                                                                                                          |
|             |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**PROTECT THE  
POWER GRID  
THINK BEFORE  
YOU CLICK!**



Be alert to  
malicious  
phishing emails.

**Report suspicious email activity to PJM.**  
(610) 666-2244 / [it\\_ops\\_ctr\\_shift@pjm.com](mailto:it_ops_ctr_shift@pjm.com)

