

**BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Application Of NextEra Energy : Docket No. A-2026-\_\_\_\_\_  
Transmission MidAtlantic, Inc., for All of :  
the Necessary Authority, Approvals, and :  
Certificates of Public Convenience (1) to :  
Begin to Furnish and Supply Electric :  
Transmission Service in Greene County and :  
Fayette County, Pennsylvania; (2) for :  
Certain Affiliated Interest Agreements; and :  
(3) for any Other Approvals Necessary to :  
Complete the Contemplated Transactions :

**and**

Application of NextEra Energy : Docket No. A-2026-\_\_\_\_\_  
Transmission MidAtlantic, Inc., Filed :  
Pursuant to 52 Pa. Code Chapter 57 : A-2026-3060856-AEL-3/4/26  
Subchapter G, for Approval to Site and :  
Construct a 500 kV Transmission Line :  
Associated with the MidAtlantic Resiliency :  
Link Project Located in Portions of Greene :  
County and Fayette County, Pennsylvania :

**NextEra Energy Transmission MidAtlantic, Inc.**

**Statement No. 2**

**Direct Testimony of  
Matt Pawlowski**

**Vice President, Development – NextEra Energy Transmission, LLC**

**Topics Addressed:**

**Need for the MidAtlantic Resiliency Link Project  
NEET MA’s Participation in the PJM  
Competitive Solicitation**

**Dated: March 3, 2026**

1 **I. INTRODUCTION AND BACKGROUND OF WITNESS**

2 **Q. Please state your name and business address.**

3 A. My name is Matt Pawlowski. My business address is 700 Universe Boulevard, Juno Beach,  
4 Florida 33408.

5

6 **Q. By whom are you employed and what is your position?**

7 A. I am employed by NextEra Energy Transmission, LLC (“NEET”) as a Vice President,  
8 Development. NEET is an indirect, wholly owned subsidiary of NextEra Energy, Inc.  
9 (“NextEra Energy”) and is the upstream parent company of the applicant in this  
10 proceeding, NextEra Energy Transmission MidAtlantic, Inc. (“NEET MA” or  
11 “Applicant”).

12

13 **Q. Please provide an overview of your responsibilities as a Vice President, Development  
14 with NEET.**

15 A. In my current role, I am responsible for the national execution of transmission projects,  
16 transmission planning, land acquisition, siting, and GIS teams with the goal of growing the  
17 transmission portfolio with strategic opportunities throughout North America.

18

19 **Q. On whose behalf are you submitting this testimony?**

20 A. I am submitting this testimony on behalf of NEET MA, the Applicant in this proceeding.  
21 NEET MA is requesting all necessary authority, approvals, and Certificates of Public  
22 Convenience (“CPC”) from the Pennsylvania Public Utility Commission (“PAPUC” or  
23 “Commission”): (1) to begin to furnish and supply electric transmission service in Greene  
24 County, Pennsylvania; (2) for certain affiliated interest agreements; and (3) for any other

1 approvals necessary or required. In addition, NEET MA is requesting PAPUC approval to  
2 site and construct a new 500 kilovolt (“kV”) high-voltage (“HV”) transmission line  
3 associated with the MidAtlantic Resiliency Link Project (“MARL Project” or the  
4 “Project”) located in portions of Greene County and Fayette County, Pennsylvania.

5  
6 **Q. Please describe your educational and professional background.**

7 A. I have been Vice President, Development for NEET since May 2023. Prior to this position  
8 and in my 18 years with NextEra Energy, I have held multiple positions at NEET MA’s  
9 affiliates, NextEra Energy Resources, LLC and Florida Power & Light Company, focused  
10 on transmission planning and operations, energy marketing and trading, business  
11 management, and regulatory affairs.

12 I hold a Bachelor of Science degree in public accounting, minor in legal and ethical  
13 studies and an interdisciplinary specialization in international business from Fordham  
14 University. I also hold an Executive MBA in finance from Florida Atlantic University and  
15 a Master’s Degree of Legal Studies in Energy and Natural Resources Law from University  
16 of Oklahoma.

17  
18 **Q. Have you previously provided written testimony before the PAPUC or any other  
19 regulatory Commission?**

20 A. No.

21  
22 **Q. What is the purpose of your direct testimony?**

1 A. The purpose of my direct testimony is to support NEET MA’s “*Application of NextEra*  
2 *Energy Transmission MidAtlantic, Inc., Filed Pursuant to 52 Pa. Code Chapter 57*  
3 *Subchapter G, for Approval to Site and Construct a 500 kV Transmission Line Associated*  
4 *with the MidAtlantic Resiliency Link Project Located in Portions Of Greene County and*  
5 *Fayette County, Pennsylvania*” (hereinafter, “Siting Application”). The Siting Application  
6 specifically requests all necessary PAPUC approvals for NEET MA to site and construct  
7 approximately 10.5 miles of the new 500 kV transmission line associated with the MARL  
8 Project. This new portion of the transmission line will be located within Greene County  
9 and Fayette County, Pennsylvania, and, specifically, extends from the FirstEnergy Corp.  
10 (“FirstEnergy”) 502 Junction Substation to the West Virginia border for approximately 2.5  
11 miles, and then re-enters Pennsylvania into Fayette County for approximately 8 miles, and  
12 then proceeds back to the West Virginia border (the “Pennsylvania Portions”). I also  
13 support NEET MA’s “*Application Of NextEra Energy Transmission MidAtlantic, Inc., for*  
14 *All of the Necessary Authority, Approvals, and Certificates of Public Convenience (1) to*  
15 *Begin to Furnish and Supply Electric Transmission Service in Greene County and Fayette*  
16 *County, Pennsylvania; (2) for Certain Affiliated Interest Agreements; and (3) for any Other*  
17 *Approvals Necessary to Complete the Contemplated Transactions*” (hereinafter, the “CPC  
18 Application”).

19 More specifically, the purpose of my testimony is to provide information on NEET  
20 MA’s development of the MARL Project, a new approximately 107.5-mile, 500 kV  
21 transmission line that will traverse portions of Pennsylvania, West Virginia, Maryland, and  
22 Virginia, as well as the new 500/138 kV Woodside Substation to be located in Frederick  
23 County, Virginia. I will also describe NEET MA’s participation in PJM Interconnection,

1 L.L.C.’s (“PJM”) Regional Transmission Expansion Plan (“RTEP”) planning process, the  
2 alternatives that NEET MA has considered to the MARL Project, and the consequences of  
3 not constructing the MARL Project.

4  
5 **Q. Are you sponsoring any exhibits as a part of your direct testimony?**

6 A. Yes, I am sponsoring NEET MA Exhibits MP-1 through MP-5:

- 7 • Exhibit MP-1 – PJM Reliability Analysis Update (dated October 31, 2023)
- 8 • Exhibit MP-2 – Summary of NEET MA Proposals to PJM 2022 RTEP Window 3
- 9 • Exhibit MP-3 – PJM Reliability Analysis Update (dated December 5, 2023)
- 10 • Exhibit MP-4 – PJM Reliability Analysis Update (dated January 7, 2025)
- 11 • Exhibit MP-5 – PJM Reliability Analysis Update (dated June 5, 2025)

12  
13 **II. NEET’S PARTICIPATION IN PJM’S 2022 WINDOW 3 COMPETITIVE**  
14 **SOLICITATION**

15 **Q. Please describe PJM.**

16 A. PJM is a Federal Energy Regulatory Commission (“FERC”)-approved Regional  
17 Transmission Organization (“RTO”) charged with ensuring the reliable and efficient  
18 operation of the electric transmission system under its functional control and coordinating  
19 the transmission of electricity throughout the PJM Region, a region that includes  
20 approximately 67 million people in all or part of 13 states and the District of Columbia.<sup>1</sup>  
21 PJM coordinates the movement of electricity, maintains the reliability of the transmission  
22 grid, and plans the enhancement and expansion of the PJM transmission system. PJM

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<sup>1</sup> The region includes all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.

1 Witnesses Dr. Sami Abdulsalam and Mr. Andrew Gledhill provide a further description of  
2 PJM in their direct testimonies. (*See* NEET MA St. Nos. 3-4.)  
3

4 **Q. Please summarize the PJM planning process and how it resulted in PJM directing**  
5 **NEET MA to construct the MARL Project.**

6 A. As described in the direct testimony of Dr. Abdulsalam, PJM’s annual FERC-approved  
7 RTEP process seeks to maintain the reliable flow of electric power to Pennsylvania  
8 customers and those throughout the PJM footprint consistent with the reliability criteria  
9 specified by the North American Electric Reliability Corporation (“NERC”), PJM, and  
10 Transmission Owners such as NEET MA. (NEET MA St. No. 3, pp. 15-17.) The RTEP  
11 process integrates transmission, load, generation (existing, deactivated, and planned), and  
12 demand response resources when evaluating future transmission system conditions to  
13 identify reliability criteria violations. This integrated process is detailed in PJM Manual  
14 14B.<sup>2</sup>

15 PJM’s baseline reliability analysis is a key part of maintaining the security and  
16 adequacy of the Bulk Electric System to serve all existing and projected long-term firm  
17 transmission use including existing and projected load growth, as well as long-term firm  
18 transmission service. As a part of a 15-year planning horizon, PJM’s RTEP process  
19 includes a five-year-out study which entails multiple analytical steps subject to the specific  
20 criteria mentioned above and specified system test conditions. The reliability criteria  
21 violations which those studies yield, and the proposed solutions developed by PJM are

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<sup>2</sup> The PJM RTEP process and reliability criteria used for this process are described in the PJM Manual 14B, which is provided as Exhibit SA-3 to Dr. Abdulsalam’s testimony.

1 reviewed with the PJM Transmission Expansion Advisory Committee (“TEAC”) and  
2 approved by the PJM Board of Managers (“PJM Board”).

3  
4 **Q. What conditions or criteria does the RTEP Process analyze?**

5 A. The RTEP baseline analyses assess thermal and voltage conditions in the context of load  
6 deliverability and generation deliverability test conditions, N-1-1 contingencies, common  
7 mode contingencies, light load criteria, and winter criteria, as well as short circuit duty and  
8 system stability studies. These tests entail single and multiple contingency testing for  
9 violations of reliability criteria established by NERC regarding stability, thermal line  
10 loadings, and voltage limits. These standards require PJM to identify the system conditions  
11 that sufficiently stress the transmission system and evaluate changes to these system  
12 conditions to ensure that the thermal and voltage performance criteria specified in the  
13 NERC standards are met.<sup>3</sup> Dr. Abdulsalam’s Direct Testimony describes the RTEP process  
14 in more detail. (NEET MA St. No. 3, pp. 15-17.)

15  
16 **Q. Please provide a brief overview of PJM’s competitive solicitation process.**

17 A. PJM’s competitive solicitation process is discussed in detail in Dr. Abdulsalam’s Direct  
18 Testimony, but, by way of brief explanation, each year PJM commences an annual RTEP  
19 cycle to determine the needs of the transmission system. (NEET MA St. No. 3, pp. 34-39.)  
20 PJM develops an RTEP baseline power flow model which incorporates, among other  
21 things, the load forecast report for the calendar year in which PJM is commencing the

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<sup>3</sup> NERC penalties for violation of a standard can be as high as \$1 million per violation, per day. PJM also adheres to reliability criteria set forth by SERC Reliability Corporation, ReliabilityFirst Corporation, PJM, and individual Transmission Owner planning criteria as filed in the Transmission Owner’s respective FERC Form No. 715.

1 RTEP cycle The January 2022 PJM load forecast that PJM used to develop the baseline  
2 power flow model for the 2022 annual RTEP cycle included forecast data for the 2022  
3 through 2037 planning horizon, and indicated high load growth activity, particularly in  
4 Maryland and northern Virginia.

5 Throughout 2022, PJM facilitated several competitive windows as part of the 2022  
6 RTEP cycle to address reliability criteria violations and market efficiency congestion needs  
7 resulting from several factors, all of which are discussed at length in Dr. Abdulsalam’s and  
8 Mr. Gledhill’s testimonies. From February 24, 2023 through May 31, 2023, PJM opened  
9 and solicited proposals for “2022 Window 3” to seek solutions to address additional  
10 thermal and voltage reliability criteria violations that were not addressed as part of PJM  
11 RTEP 2022 Windows 1 and 2.

12  
13 **Q. What was the scope of PJM’s 2022 REP Window 3 in which the NEET MA Project**  
14 **was selected?**

15 A. In its 2022 Window 3, PJM identified extensive voltage and thermal reliability constraints  
16 on the regional transmission system infrastructure in the Southwest Mid-Atlantic Area  
17 Council (“SWMAAC”) Locational Deliverability Area (“LDA”)<sup>4</sup> the northern Virginia  
18 area of the Dominion zone, the Doubs, Maryland area of the Allegheny Power System  
19 (“APS”) zone, as well the broader surrounding area. As Dr. Abdulsalam discusses,  
20 significant load increases and generator deactivations in these areas – and other factors –

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<sup>4</sup> SWMAAC refers to the “Southwest Mid-Atlantic Area Council,” an LDA within the PJM Region. Essentially, PJM divides service territory into different LDAs to help maintain grid reliability within specific geographic regions, especially considering transmission grid constraints. SWMAAC is one of these sub-regions within the larger Mid-Atlantic Area Council (“MAAC”) LDA. The SWMAAC LDA includes the Potomac Electric Power Company, Southern Maryland Electric Cooperative, and Baltimore Gas & Electric zones in Maryland.

1 are driving the need for 500 kV transmission solutions such as the MARL Project. (NEET  
2 MA St. No. 3, pp. 35-38.)

3

4 **Q. If left unaddressed, what would be the result?**

5 A. These thermal overload violations and non-convergence violations are so severe and  
6 widespread that if left unaddressed, the consequences could compromise the overall system  
7 reliability for customers in Pennsylvania and throughout the PJM Region.

8

9 **Q. How many solutions did the Company propose to PJM in the 2022 Window 3?**

10 A. NEET MA<sup>5</sup> submitted 26 total proposals to solve the severe thermal and voltage violations  
11 and non-convergent contingencies that PJM had identified across all four regional PJM  
12 clusters.<sup>6</sup> Fourteen<sup>7</sup> of these proposals focused on solving reliability violations in the  
13 western cluster. Table 1 below shows the 14 proposals that NEET MA submitted to address  
14 various reliability issues throughout the PJM region, and a copy of this table is provided as  
15 Exhibit MP-2 to my testimony.

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<sup>5</sup> The bids were submitted to PJM by a separate affiliate of NEET MA, NextEra Energy Transmission MidAtlantic Holdings, LLC. For ease of reference, in this Siting Application, NEET MA refers to these bids as being submitted by NEET MA. In PJM documents, these bids are also referred to as the “NextEra” bids.

<sup>6</sup> As explained in the Direct Testimony of Dr. Abdulsalam, PJM divided the 2022 Window 3 study area into four geographic regions (or regional clusters) so that PJM could evaluate proposed solutions. The four regional clusters were: East, West, South, and Northern Virginia/Doubs (MD).

<sup>7</sup> See Exhibit MP-1, PJM Reliability Analysis Update (Oct. 31, 2023), slides 75-78, available at: <https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2023/20231031/20231031-item-15---reliability-analysis-update.pdf>.

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**Table 1: NEET MA Options in West Cluster**

Option #	PJM ID	Options Description	Overhead (Miles)	Underground (Miles)	Total (Miles)	Overhead (Miles)	Power Source
			500 kV*			230 kV**	
1	951	Build a new 500 kV line from Black Oak – Gore – Goose Creek	100	-	100		West
2	279	Build a new 500 kV line from Black Oak – Stonewall – Goose Creek	100		100		West
3	676	Build a new 500 kV line from Black Oak – Stonewall – new Gant 500-230 kV Build a new 230 kV line from new Gant substation to Farmwell substation Build a new 230 kV line from Cochran Tap to Roundtable substation	99		99	22	West
4	347	Build a new 500 kV line from Black Oak – Stonewall – new Gant 500 kV	99		99		West
5	719	Build a new 500 kV line from Fort Martin to Black Oak to Gore to Goose Creek	161		161		West
6	685	Build a new 500 kV line from Fort Martin to Black Oak to Stone Wall to Goose Creek	161		161		West
7	642	Build a new 500 kV line from 502 Junction to Black Oak to Stonewall to new Gant 500-230 kV Build a new 230 kV line from new Gant substation to Farmwell substation Build a new 230 kV line from Cochran Tap to Roundtable substation.	166		166	22	West
8	853 MARL	Build a new 500 kV line from 502 Junction to Black Oak to Stonewall to new Belmont 500 kV	166		166		West
9	255	Build a new 500 kV line from Hunterstown to new Gant 500 kV	84	-	84		East
10	116	Build a new 500 kV line from Hunterstown to new Gant 500-230 kV sub Build two new 230 kV lines from new Gant sub to Farmwell and Roundtable substation to feed data center alley	84	-	84	22	East
11	419	Build new 500 kV line from Hunterstown to Doubs to Goose Creek to new Audobon New 230kV lines from Audobon to Nimbus and Beaumeade to Paragon Park	87	7	94	2	East
12	728	Build new 500kV line from new Barnhart to Bartholow to Goose Creek Build new Barnhart 500kV switchyard along the Hunterstown to Conastone 500kV line	65	4	69		East
13	28	Build a new 500 kV line from Black Oak – Gore – Goose Creek Build new 500 kV line from Hunterstown-Doubs-Goose Creek	172	4	176		West/East
14	846	Build a new 500 kV line from Black Oak – Stonewall – Goose Creek Build new 500 kV line from Hunterstown-Doubs-Goose Creek	172	4	176		West/East

\* Mileage is based on the desktop analysis performed at the time of proposal submission.

\*\* There was no underground work proposed for 230 kV line segments

2

3

These proposals can be divided into three buckets:

4

**(1) Options to transfer power from the west:**

5

NEET MA proposed the first eight options in Table 1 above, shown in green, in

6

order to transfer power from the 502 Junction and Black Oak 500 kV Substations in the

7

west to the Doubs, Goose Creek, and Gant Substations in northern Virginia. NEET MA

1 Proposal Number 8, labeled as PJM ID No. 853, is the MARL Project that PJM ultimately  
2 selected, subject to some further modifications that I will describe below. All proposals in  
3 this category were variations or partial versions of the ultimate MARL Project.

4 **(2) Options to transfer power from the east:**

5 The next four proposals that NEET MA submitted, shown in orange in Table 1,  
6 consisted of solutions that primarily would have transferred power from the Hunterstown  
7 or new Barnhart 500 kV Substations in the east to the Doubs, Goose Creek, and Gant  
8 Substations.

9 **(3) Combined options to transfer power from the west and east:**

10 The last two proposals that NEET MA submitted, shown in yellow in Table 1,  
11 consisted of options that combined elements from the first two categories and that would  
12 have provided more power into the Goose Creek area from both the west and the east.

13  
14 **Q. How did NEET MA determine which projects to propose to PJM?**

15 A. NEET MA's transmission planning team evaluated the needs identified by PJM in order to  
16 create and evaluate different possible solutions. During the three-month competitive  
17 solicitation window (from February 24, 2023 to May 31, 2023), NEET MA's transmission  
18 planning team ran more than 1,000 power flow simulations and developed the 14 solutions  
19 identified in Table 1 above to solve the reliability criteria violations in the West cluster.

20  
21 **Q. Out of NEET MA's 14 proposed solutions, please describe NEET MA's proposal that  
22 ultimately became the MARL Project.**

23 A. NEET MA's Proposal Number 8 (PJM ID No. 853) consisted of the following components:

- 1 • New Woodside 500/138 kV Substation, including Statistic Synchronous
- 2 Compensator (“STATCOM”) and capacitor banks;
- 3 • New Gant 500 kV Substation;
- 4 • New 502 Junction – Black Oak – Woodside – Gant 500 kV transmission line; and
- 5 • Various modifications to existing lines and substations.

6

7 **Q. Is PJM’s process open to stakeholder input?**

8 A. Yes. PJM’s planning process is collaborative and provides an open forum for participation

9 by interested stakeholders and members of the public, as required by the FERC. The

10 proposals submitted to PJM are published on PJM’s website. The TEAC conducts multiple

11 meetings where PJM’s evaluation of submitted proposals is discussed publicly.

12 Stakeholders can and do provide feedback and ask questions during the TEAC meetings.

13 This is documented in PJM Manual 14B, PJM Regional Transmission Planning Process.

14 Pursuant to Schedule 6 of the Amended and Restated Operating Agreement, “The

15 Transmission Expansion Advisory Committee shall be open to participation by: (i) all

16 Transmission Customers and applicants for transmission service; (ii) any other entity

17 proposing to provide Transmission Facilities to be integrated into the PJM Region; (iii) all

18 Members; (iv) the electric utility regulatory agencies within the States in the PJM Region,

19 the Independent State Agencies Committee, and the State Consumer Advocates; and (v)

20 any other interested entities or persons.”

21 Similarly, “The Subregional RTEP Committees shall be open to participation by:

22 (i) all Transmission Customers and applicants for transmission service; (ii) any other entity

23 proposing to provide Transmission Facilities to be integrated into the PJM Region; (iii) all

24 Members; (iv) the electric utility regulatory agencies within the States in the PJM Region,

1 the Independent State Agencies Committee, and the State Consumer Advocates and (v) any  
2 other interested entities or persons.”

3  
4 **Q. In addition to NEET MA’s analysis of its proposal prior to submitting to PJM, was  
5 the MARL Project subject to stakeholder review during the RTEP process?**

6 A. Yes. Consistent with PJM’s RTEP process, PJM provided regular updates to its  
7 stakeholders throughout the selection process. At the TEAC meeting on July 11, 2023, PJM  
8 provided an overview of various proposals received in the Window. After that, PJM  
9 provided regular updates on its evaluation of submitted proposals at monthly TEAC  
10 meetings. Specifically, at the October 31, 2023 TEAC meeting,<sup>8</sup> PJM did a first read of  
11 the comprehensive reliability analysis update and its selection approach of the 2022  
12 Window 3 proposals, including MARL. At the December 5, 2023 TEAC meeting,<sup>9</sup> PJM  
13 provided the second read of the 2022 Window 3 solutions. At each monthly TEAC  
14 meeting, PJM provided updates on its reliability analysis and constructability review and  
15 on the proposals’ performance as compared to other proposed solutions. PJM answered  
16 numerous questions from stakeholders and members of the public. NEET MA participated  
17 in these meetings and provided responses to PJM and stakeholder questions throughout the  
18 process.

19  
20 **Q. How did NEET MA respond to stakeholder feedback it received during the TEAC  
21 meeting?**

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<sup>8</sup> See Exhibit MP-1, PJM Reliability Analysis Update (Oct. 31, 2023).

<sup>9</sup> See Exhibit MP-3, PJM Reliability Analysis Update (Dec. 5, 2023), available at: <https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2023/20231205/20231205-item-15---reliability-analysis-update-2022-window-3.pdf>.

1 A. NEET MA released a statement to the PJM board in response to the stakeholder feedback  
2 it received during the TEAC meeting. NEET MA noted in its statement that the initial  
3 route was preliminary, that local stakeholder engagement would begin in January 2024,  
4 and that NEET MA was engaged in the development of a routing study to evaluate route  
5 alternatives.<sup>10</sup>

6

7 **Q. When PJM identified its 2022 Window 3 solutions, did it revise NEET MA’s original**  
8 **Proposal Number 8 (PJM ID No. 853)?**

9 A. Yes, PJM modified NEET MA’s Proposal Number 8 (PJM ID No. 853) into what eventually  
10 became the MARL Project in a few ways. First, instead of terminating the new 500 kV  
11 line from the 502 Junction Substation into NEET MA’s proposed new Gant Substation,  
12 PJM determined that the new 500 kV line should terminate into the new Aspen Substation  
13 that had been proposed by Dominion.<sup>11</sup> PJM also identified that both NEET MA and  
14 FirstEnergy would construct the new 500 kV line between 502 Junction and the new  
15 Woodside Substation, with an identified hand-off point between NEET MA’s scope and  
16 FirstEnergy’s scope in northern Virginia. Finally, in NEET MA’s Proposal Number 8 (PJM  
17 ID No. 853), NEET MA had originally proposed to interconnect the new 500 kV line  
18 through the FirstEnergy-owned Black Oak Substation in Allegany County, Maryland, but  
19 PJM directed that the new line bypass the Black Oak Substation.

20

21 **Q. Was the MARL Project approved by the PJM Board?**

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<sup>10</sup> See Letter from Matt Valle, President, NextEra Energy Transmission (Dec. 8, 2023), <https://www.pjm.com/-/media/about-pjm/who-we-are/public-disclosures/20231208-nextera-letter-re-neetma-marl.ashx>.

<sup>11</sup> See Exhibit MP-1, PJM Reliability Analysis Update (Oct. 31, 2023) at 61.

1 A. Yes. The projects recommended by PJM, including the MARL Project, were submitted to  
2 the PJM Board. On December 11, 2023, the PJM Board approved the recommended  
3 package of solutions that included the MARL Project in the West region.  
4

5 **Q. Was the scope of the MARL Project further revised following PJM Board approval**  
6 **in December 2023?**

7 A. Yes. The scope of the MARL Project was revised twice following the PJM Board's initial  
8 approval.

9 First, as NEET MA witness Kaitlin McCormick testifies, following the PJM  
10 Board's initial approval of the MARL Project in December 2023, NEET MA initiated  
11 collaborative discussions with the incumbent transmission owners along the eastern  
12 portions of the original NEET's Proposal Number 8 (PJM ID No. 853) (between NEET  
13 MA's new Woodside Substation and the new Aspen Substation) to investigate alternatives  
14 that would minimize impacts from certain new "greenfield" segments of the line.  
15 Following these discussions, the entities agreed to propose a change in scope for a portion  
16 of the MARL Project located in Virginia to take better advantage of existing transmission  
17 line rights of way ("ROW"). The PJM Board approved this revised scope in August 2024.

18 Second, during the 2024 RTEP assessment, PJM determined the need to terminate  
19 MARL transmission line at APS's Black Oak substation. PJM assigned baseline

1 b4000.11<sup>12</sup> to APS for Black Oak substation expansion and baseline b4000.14<sup>13</sup> to NEET  
2 MA for line termination work. The PJM Board approved these projects in February 2025.

3  
4 **Q. Please describe the change in scope to interconnect the MARL Project to the Black  
5 Oak Substation in Allegany County in more detail.**

6 A. As discussed above, when PJM originally awarded the MARL Project, it did not approve  
7 NEET MA's proposal to cutover the line into the Black Oak Substation, concluding it was  
8 not needed to address the 2022 Window 3 identified needs. However, in 2024 RTEP  
9 window, PJM identified several reliability issues on the APS 138 kV system within  
10 Maryland due to the loss of the Hatfield-Black Oak 500 kV line. PJM assigned a project  
11 to both APS and NEET MA in 2024 RTEP window to terminate the MARL 500 kV line at  
12 Black Oak substation as discussed above.

13  
14 **Q. Is NEET MA obligated to construct the MARL Project?**

15 A. Yes. Under Schedule 6 of PJM's Amended and Restated Operating Agreement and the  
16 terms of the DEA executed between PJM and NEET MA, NEET MA is obligated to  
17 complete the MARL Project and place the project into service by December 31, 2031. On  
18 November 21, 2025, NEET MA, NEET VA, and PJM executed an amendment to the DEA,  
19 which PJM filed with FERC in Docket No. ER26-860-000 on December 22, 2025. A copy  
20 of the DEA is provided as Exhibit KM-2 to Ms. McCormick's testimony.

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<sup>12</sup> See Exhibit MP-4, PJM Reliability Analysis Update, slide 64 (Jan. 7, 2025), available at: <https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2025/20250107/20250107-item-12---reliability-analysis-update.pdf>.

<sup>13</sup> See Exhibit MP-5, PJM Reliability Analysis Update, slide 50 (June 5, 2025), available at: <https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2025/20250605/20250605-item-09---reliability-analysis-update.pdf>.

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**Q. Please describe the components of the MARL Project as identified in the DEA.**

A. The different components of the MARL Project that PJM has directed NEET MA to build are provided in the table below:

**Table 2: Components of the MARL Project**

PJM Baseline Upgrade IDs	Description of Projects
<b>b3800.102</b>	New 500 kV line from existing 502 Junction substation to Woodside 500 kV substation (NEET MA portion)
<b>b3800.106</b>	Woodside 500 kV substation (Except terminations, Transformer, Cap Bank, and STATCOM)
<b>b3800.107</b>	Line Termination cost at Woodside 500 kV for 502 Junction to Woodside 500 kV line
<b>b3800.108</b>	Line Termination cost at Woodside 500 kV for Woodside to Aspen 500 kV line.
<b>b3800.109</b>	Termination work for two 500/138 kV transformers at Woodside 500 kV substation
<b>b3800.110</b>	Two 500/138 kV transformers at Woodside 500 kV substation
<b>b3800.113</b>	Two 150 Megavolt-Amperes Reactive (“MVAR”) Cap banks and one +500/-500 MVAR STATCOM at Woodside 500 kV substation
<b>b3800.115</b>	Line work for terminating Doubs to Bismark line for Doubs side at Woodside 500 kV substation (NEET VA portion)
<b>b3800.117</b>	Line work for terminating Doubs to Bismark line for Bismark side at Woodside 500 kV substation (NEET VA portion)
<b>b4000.14</b>	Install two new 500 kV dead-end structures near Black Oak Substation to interconnect the 502 Junction – Woodside 500 kV transmission line; adjust Woodside protection scheme for Black Oak loop-in and remove 502 Junction tie

**III. ALTERNATIVES TO THE MARL PROJECT**

**Q. What alternatives to the construction of a new transmission line did NEET MA consider?**

A. As I described above, during the submission of proposals and after the award of MARL by PJM, NEET MA explored several potential alternative transmission solutions. Among the 26 total proposals that NEET MA submitted to PJM, including the 14 proposals that NEET

1 MA submitted within the West cluster, NEET MA proposed different solutions that  
2 included the use of existing ROW, rebuilding or upgrading existing transmission facilities  
3 with new 500/138 kV double circuit transmission towers, creating new ROW for a new  
4 transmission corridor, and utilizing grid-enhancing or advanced transmission technologies.  
5 NEET MA's planning team determined that optimal solutions would likely include a  
6 combination of these alternatives, considering the needs identified in PJM's 2022 Window  
7 3 that NEET MA was trying to solve.

8 Specifically, ten of NEET MA's 14 submitted proposals in the West cluster included  
9 GETs in the form of the 500 MVAR STATCOM to provide dynamic reactive support to the  
10 500 kV lines that transfer power from west to east into Goose Creek and other areas of  
11 Virginia and Maryland. The STATCOM at Woodside Substation was a unique feature of  
12 NEET MA's proposal that no other entities proposed. The Woodside Substation will be a  
13 central key substation in the area that will electrically connect three other 500 kV  
14 substations (Black Oak, Bismark, and Doubs) in the region. The STATCOM at Woodside  
15 will provide dynamic reactive "VAR" (volt-ampere reactive, a measurement of reactive  
16 power) to support these three other substations and all of the 500 kV lines forming part of  
17 the west-east transfer path passing through these stations, and thus will improve the voltage  
18 profile and overall transfer capability of 500 kV lines terminating at Woodside and these  
19 three other stations.

20  
21 **Q. How did NEET's Proposal Number 8 (PJM ID No. 853) utilize existing ROWs or**  
22 **existing facilities?**

1 A. NEET MA's Proposal Number 8 (PJM ID No. 853) proposed a transmission line to parallel  
2 several existing transmission lines' ROWs, including the APS Black Oak-Bedington 500  
3 kV transmission line, the APS Hampshire-Ridgeley 138 kV transmission line, the APS  
4 Hampshire-Gore 138 kV transmission line, the APS and Dominion Doubs-Bismark 500  
5 kV transmission line, and the APS Gore-Stonewall 138 kV transmission line.

6

7 **Q. Did NEET MA discuss the use of these other utilities' ROWs or rebuilding of other**  
8 **utilities' existing transmission lines with these utilities?**

9 A. No, not before submitting NEET MA submitted its proposals to PJM in the Competitive  
10 Proposal Window. PJM's 2022 Window 3 was open for approximately three months,  
11 during which time developers proposed solutions to complex reliability needs in a highly  
12 competitive process. As a result, time limitations and the competitive nature of the PJM  
13 process did not allow NEET MA to discuss potential ROW sharing or rebuilding of existing  
14 facilities with other utilities before submitting its proposals to PJM. However, as I  
15 described previously, following PJM's selection of the MARL Project, NEET MA did  
16 initiate discussions with other utilities to better address PJM's identified needs through the  
17 efficient use of other utilities' existing ROWs and facilities.

18

19 **Q. How did PJM evaluate the alternative bids submitted during Window 3?**

20 A. As Dr. Abdulsalam describes in his testimony, PJM analyzed project components  
21 submitted by NEET MA and other developers, which were evaluated in combinations that  
22 yielded the more efficient and cost-effective solution. (NEET MA St. No. 3, pp. 32-33 and  
23 66-71.)

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**Q. Do you discuss other transmission planning alternatives to the MARL Project?**

A. Yes. I will discuss several alternatives below, including: (1) reconductoring of existing transmission infrastructure; (2) rebuilding existing infrastructure; (3) using grid-enhancing or advanced transmission technologies; and (4) using Non-Wires Alternatives (“NWA”). NEET MA witness Philip Givens also describes in his testimony engineering alternatives to the MARL Project that NEET MA has reviewed. (NEET MA St. No. 6, pp. 23-26.) Ultimately, NEET MA determined that the proposed project best meets PJM’s reliability needs, and PJM ultimately selected NEET MA’s proposal.

**Q. Why is the Company not upgrading (reconductoring) existing transmission infrastructure for the MARL Project?**

A. Ultimately, PJM determined that the reliability criteria violations identified in 2022 Window 3 could only be addressed through construction of a new, greenfield 500 kV transmission line. As I described above, the needs that the MARL Project solves include thermal overload, low voltage, and voltage collapse reliability criteria violations caused by the loss of existing 500 kV lines. As Dr. Abdulsalam testifies, these needs cannot be addressed by simply upgrading (or reconductoring) existing infrastructure. (NEET MA St. No. 3, pp. 73-74.) Importantly, these reliability problems are primarily due to the need for an additional west-to-east transmission path to increase transfer capability, which non-convergent power flow runs demonstrated. Thus, the MARL Project primarily consists of a new 500 kV transmission line between the existing 502 Junction Substation, the Black Oak Substation, and a new Woodside Substation.

1           The proposals NEET MA submitted to PJM included upgrades to existing  
2 infrastructure wherever possible. For example, NEET MA included the scope to upgrade  
3 the rating of American Electric Power’s (“AEP”) Kammer to 502 Junction 500 kV line as  
4 a part of NEET MA’s Proposal Number 8 (PJM ID No. 853). NEET MA’s planning team  
5 identified that this line was overloaded given that the MARL Project pulls more power  
6 from west to east. As a result, NEET MA’s planners identified that the thermal loading  
7 issue on this line could simply be addressed by increasing the line rating and that there  
8 was no need to build another line from Kammer to 502 Junction. To address this need,  
9 PJM assigned project b3800.121 to AEP (the owner of Kammer to 502 Junction line) to  
10 conduct the LIDAR Sag study to assess whether the line rating can be increased.<sup>14</sup>

11  
12 **Q. Can the existing infrastructure be rebuilt in order to accommodate the MARL Project**  
13 **along with existing facilities and planned upgrades?**

14 A. Generally speaking, the time that would be required to take existing infrastructure out of  
15 service in order to rebuild or decommission existing transmission lines would take key  
16 transmission paths out of service, at a time when PJM critically needs all available  
17 transmission paths. Thus, rebuilding existing infrastructure to accommodate the MARL  
18 Project would, from a transmission planning perspective, require these existing  
19 transmission lines to be taken out of service for extended periods and result in violations  
20 of NERC Reliability Standards or otherwise exacerbate the existing thermal and voltage  
21 violations that PJM is trying to solve. It is also to be noted that with multiple non-  
22 convergence conditions under the loss of existing facilities along the west-east transfer

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<sup>14</sup> See Exhibit MP-3, PJM Reliability Analysis Update (Dec. 5, 2023), slide 66.

1 path, upgrading such facilities cannot resolve the transfer capability deficiency issue  
2 (demonstrated by the non-convergence condition). The analysis simply shows the need for  
3 additional elements rather than just upgrading existing facilities.  
4

5 **Q. Could the need for the MARL Project be met using NWAs?**

6 A. No. NWAs such as distributed energy resources, energy efficiency, load flexibility, storage  
7 or battery resources, or dynamic line ratings would not address the serious reliability issues  
8 identified by PJM for various reasons. As Dr. Abdulsalam explains in detail in his  
9 testimony, reliability issues in the western region are caused by redundancy problems. The  
10 loss of any bulk 500 kV line that carries power from west to east causes severe voltage  
11 drops and voltage collapse problems. (NEET MA St. No. 3, pp. 44-46.) The solution to  
12 address these problems is to provide a new 500 kV path that can provide typical thermal  
13 rating of a 500 kV line (4,300 MVA or more). NWAs would not be able to provide the  
14 redundancy, operational control, reactive support, and reliability provided by the new 500  
15 kV line.  
16

17 **IV. THE MARL PROJECT IS A COST-EFFECTIVE SOLUTION TO PJM'S**  
18 **RELIABILITY NEEDS**

19 **Q. What is NEET MA's estimated cost to construct the MARL Project along the**  
20 **Proposed Route?**

21 A. The cost estimate for the Proposed Route for the entire MARL Project in 2031 dollars is  
22 approximately \$1,167,200,000. The Pennsylvania Portions of the Proposed Route are  
23 estimated to cost \$87,690,000. This cost estimate includes siting, engineering,  
24 procurement, construction, financing, administrative, development, and legal costs. This

1 estimate is based upon an initial planning level estimate (\$844.8 million in 2023 dollars),  
2 contingency (\$115.4 million in 2023 dollars), and taxes and escalation to the latest in-  
3 service date of 2031 (\$207 million), for a total of \$1.167 billion. The estimate also reflects  
4 30% design and engineering, refinements from the project route following the bid, and  
5 vendor quotes received.<sup>15</sup>

6  
7 **Q. How will the costs of the MARL Project be recovered?**

8 A. As NEET MA witness Matthew Boykin testifies in NEET MA Statement No. 7, and as  
9 explained below, that the costs of the MARL Project will be recovered solely through  
10 NEET MA's and NEET VA's transmission rates under the PJM Tariff, following  
11 acceptance by FERC, pursuant to FERC's exclusive jurisdiction over rates for wholesale  
12 interstate transmission service.<sup>16</sup> (NEET MA St. No. 7, p. 8.)

13  
14 **Q. How will the costs of the MARL Project be allocated?**

15 A. As described by Mr. Boykin in NEET MA Statement No. 7, the costs for the MARL  
16 Project will be recovered through transmission rates subject to FERC's jurisdiction and  
17 will be allocated by PJM to Load Serving Entities under the terms of PJM's FERC-  
18 approved Open Access Transmission Tariff. (NEET MA St. No. 7, p. 8.) These costs will  
19 be allocated by PJM to Load-Serving Entities under the terms of PJM's FERC-approved  
20 Open Access Transmission Tariff.

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<sup>15</sup> NEET MA notes that this cost estimate is subject to change as the constructability of the MARL Project, sequence of construction, and other factors that may affect cost are identified and analyzed as the Project progresses.

<sup>16</sup> It is well-established that FERC has exclusive jurisdiction over interstate transmission rates, 16 U.S.C. § 824(b), and is authorized to determine whether such rates are just and reasonable. 16 U.S.C. §§ 824d, 824e. *See also, Nantahala Power & Light Co. v. Thornburg*, 476 U.S. 953, 956-957 and 966 (1986) (states must give effect to FERC-approved rates and agreements affecting those rates).

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**Q. Is the MARL Project a cost-effective way to meet PJM’s identified needs?**

A. Yes. Consistent with FERC Order No. 1000, PJM’s competitive planning process ensures PJM’s selection of the more efficient or cost-effective transmission solutions.<sup>17</sup> After analyzing numerous proposed solutions, PJM selected the MARL Project, in part because of its cost-effectiveness in addressing these reliability criteria violations and NEET MA’s cost containment provisions included within the DEA. Dr. Abdulsalam testifies in NEET MA Statement No. 3 that NEET MA’s MARL Project was the more efficient or cost-effective solution to address PJM’s identified needs. (NEET MA St. No. 3, pp. 32-33.)

**Q. Did PJM evaluate the cost-effectiveness of the MARL Project in evaluating it as a potential 2022 RTEP window 3 solution?**

A. Yes. In selecting the projects to address the reliability violations identified by the 2022 RTEP Window 3, PJM undertakes a constructability and financial evaluation of the proposed projects in order to identify the more efficient or cost-effective solution. As part of its detailed constructability analysis for the MARL Project, PJM and its consultants prepared a high-level conceptual independent cost estimate for the components of the MARL Project. This estimate was based on a high-level assessment of probable costs for the current conceptual design and is reflective of recent supplier quotes and previous experience with substation engineering, transmission line engineering and construction. The base cost of the MARL Project is in line with PJM’s Independent Estimate and also

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<sup>17</sup> See PJM Manual 14F: Competitive Planning Process, at 11; *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities*, Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 148 (2011).

1 includes a 30% contingency to cover risk-based costs, including any potential significant  
2 route changes and market uncertainty.<sup>18</sup> PJM’s evaluation and selection of the MARL  
3 Project is more fully described by Dr. Abdulsalam in NEET MA Statement No. 3. (NEET  
4 MA St. No. 3, pp. 56-80.)

5  
6 **Q. Does the MARL Project contain cost-effective measures and cost benefits to**  
7 **customers?**

8 A. Yes. As provided in Schedule E of the DEA, attached to Ms. McCormick’s testimony as  
9 NEET MA Exhibit KM-2, the MARL Project includes various cost containment measures  
10 intended to incentivize cost-efficient and timely completion of the project and reduce  
11 potential cost overruns and project delays. Specifically, NEET MA committed in the DEA  
12 to a cap on its Return on Equity (“ROE”) for the MARL Project from initial operation to  
13 de-energization and retirement at the lower of 9.8% (inclusive of all ROE  
14 adders/incentives) or the FERC-approved ROE for NEET MA. NEET MA also committed  
15 to a capital structure of no greater than 45% equity for the life of the project.

16 In addition, NEET MA committed that project costs associated with the  
17 development, construction, and commissioning of the project, apart from certain excluded  
18 costs, that fall above a specified cost cap (approximately \$441 million) will earn 0% ROE  
19 for the life of the project. However, NEET MA will still recover all depreciation expense  
20 and debt costs associated with the incremental capital spend. Finally, NEET MA  
21 committed to a schedule guarantee that will reduce the overall project ROE by 2.5 basis

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<sup>18</sup> See PJM Constructability & Financial Analysis Report, 2022 RTEP Window 3 (Nov. 17, 2023), which is available at: <https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2023/20231205/20231205-2022-rtep-window-3-constructability--financial-analysis-report.ashx>.

1 points, incrementally on a month-by-month basis, up to a maximum of 30 basis points, for  
2 every month that the project is delayed beyond the DEA's in-service date. Regardless of  
3 other cost containment measures, the total earned ROE cannot be lower than 7.5%. These  
4 cost containment measures provide significant cost certainty and benefits to customers.

5

6 **V. CONCLUSION**

7 **Q. Does this conclude your direct testimony?**

8 **A.** Yes, it does.

# Reliability Analysis Update

Sami Abdulsalam, Senior Manager  
PJM Transmission Planning

Transmission Expansion Advisory Committee  
October 31, 2023

# 2023 Transmission Owners Local Plans

- The 2023 Local Plans for the Transmission Owners listed below, are posted as information only under this TEAC meeting material.
- Board review planned for December 2023.

JCPL	ACE
MetEd	AMPT
PECO	APS
Penelec	ATSI
PEPCO	BGE
PPL	ComEd
PSEG	DLCO
Dayton	DPL
DEOK	EKPC
AEP	Dominion

# First Read – 2023 Window 1

## Baseline Reliability Projects

**Process Stage:** First Read

**Criteria:** Short Circuit

**Assumption Reference:** 2023 RTEP assumptions

**Model Used for Analysis:** 2028 RTEP Short Circuit base case

**Proposal Window Exclusion:** None

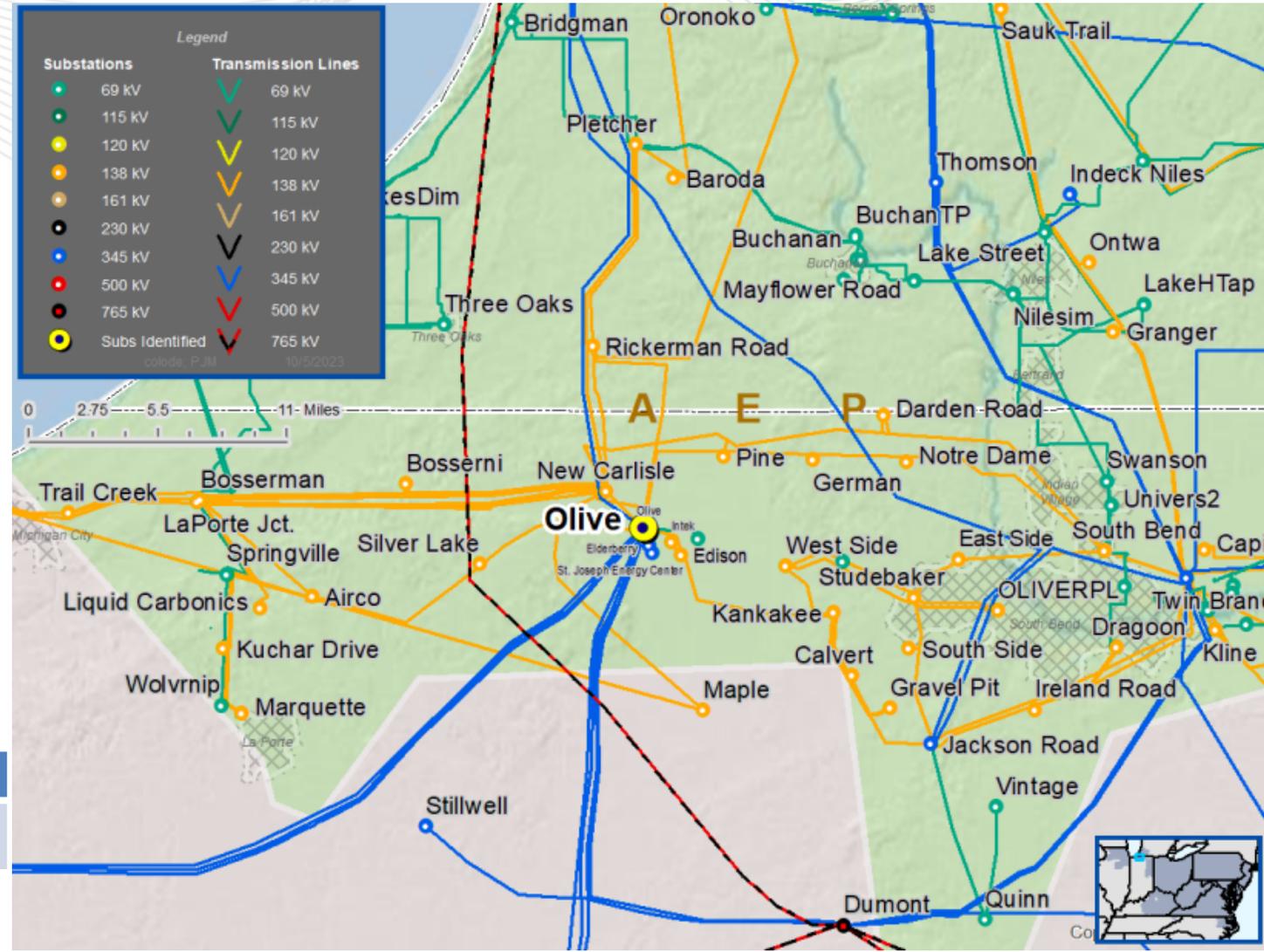
**Problem Statement:**

2023W1-SC-4

In the 2028 RTEP Short Circuit base case, the Olive 345 kV breaker "D" is identified as over duty.

**Existing Facility Rating:**

Circuit Breaker	Interrupting Rating (kA)
Olive 345kV breaker "D"	50





# AEP Transmission Zone: Baseline Olive 345kV Breaker “D” Replacement

NEET MA Exhibit MP-1  
Page 5 of 132

As part of the 2023 RTEP Window #1, the project listed in the table below is proposed to address the following violations: 2023W1-SC-4

Proposal ID	Proposing Entity	Upgrade Description	Upgrade Cost (\$M)
384	AEP	Replace the overdutied Olive 345kV circuit breaker "D" with a 5000A 63 kA circuit breaker.	1.083

**Proposed Solution:** Proposal #2023\_W1-384

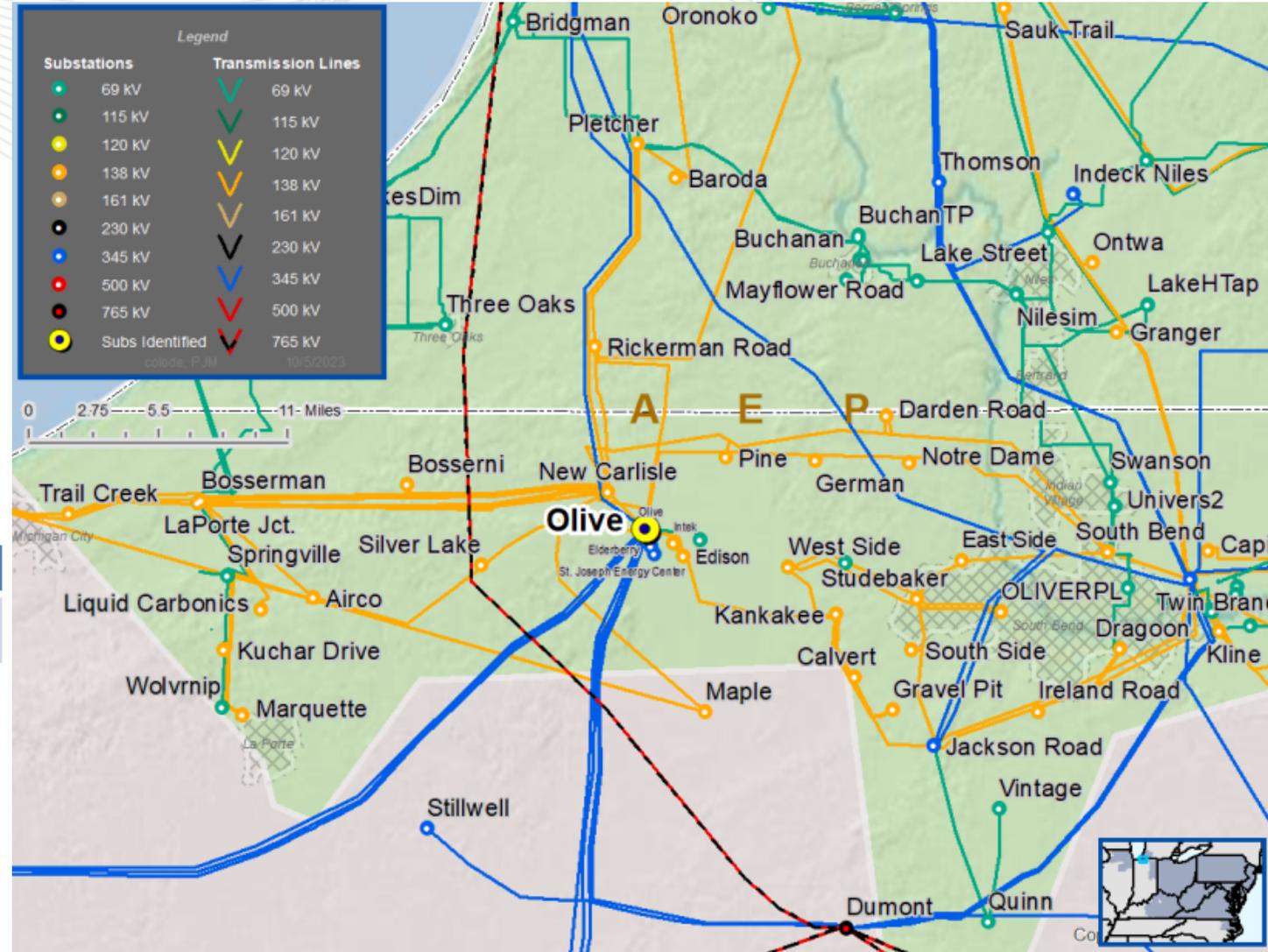
- 1) Replace the overdutied Olive 345kV circuit breaker "D" with a 5000A 63 kA circuit breaker.
- 2) Re-use existing cables and a splice box to support the CB install.

**Estimated Cost:** \$1.083M

**Preliminary Facility Rating:**

Circuit Breaker	Interrupting Rating (kA)
Olive 345kV breaker "D"	63

**Required IS Date:** 6/1/2028  
**Projected IS Date:** 9/1/2027



# AEP Transmission Zone: Baseline Mountaineer 765 kV Wavetrapped Replacement

**Process Stage:** First Read

**Criteria:** Summer Gen Deliv

**Assumption Reference:** 2023 RTEP assumption

**Model Used for Analysis:** 2028 RTEP cases

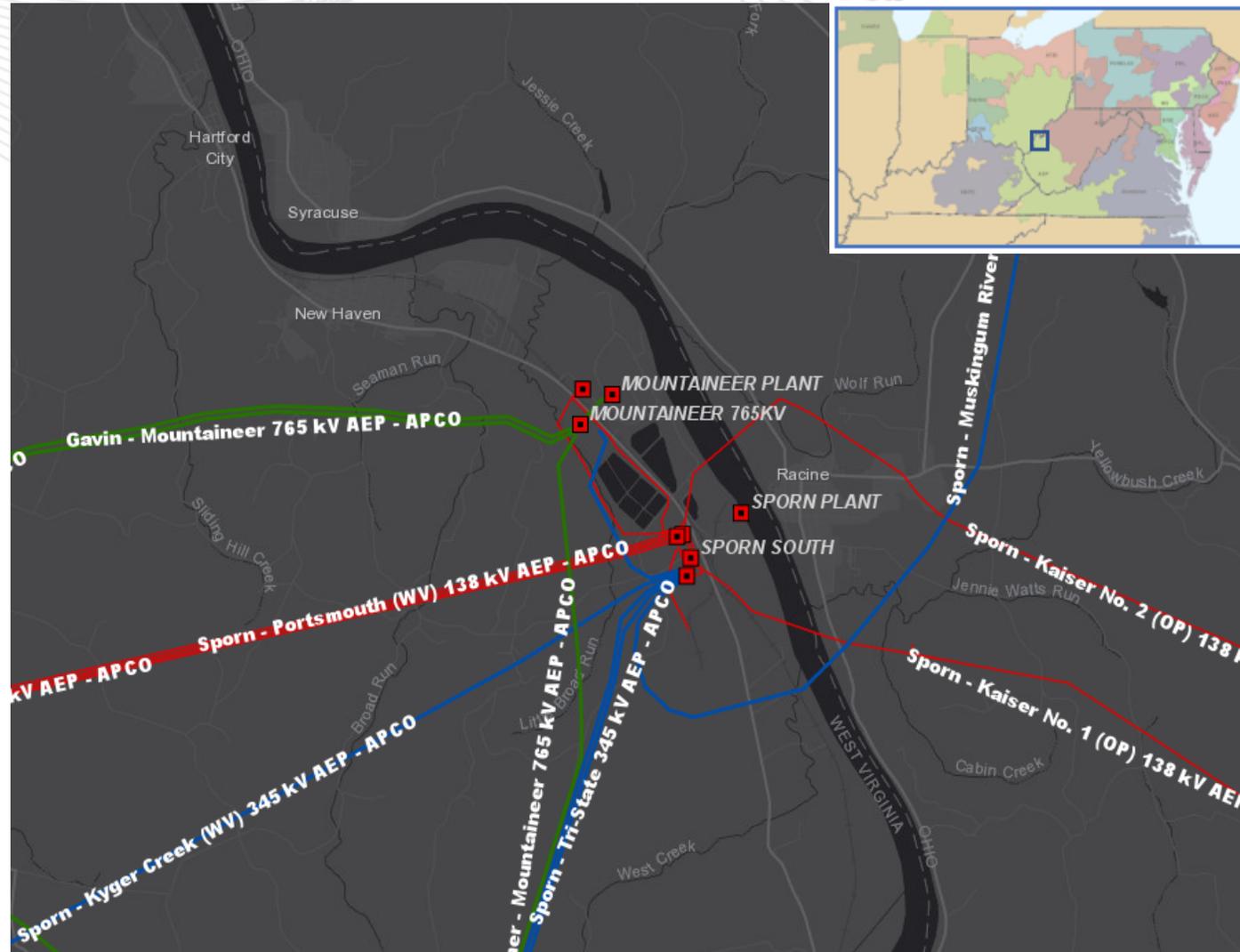
**Proposal Window Exclusion:** Substation Equipment Exclusion

**Problem Statement:** FG: 2023-W1-GD-S1286, 2023-W1-GD-S595, 2023-W1-GD-S671, 2023-W1-GD-S726, 2023-W1-GD-S820, 2023-W1-GD-S834

In 2028 RTEP Summer case, the Belmont - Mountaineer-765 kV is overloaded in generator deliverability test for multiple common mode contingencies.

## Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Mountaineer - Belmont 765kV line	4047/4571/4484/4961





# AEP Transmission Zone: Baseline Mountaineer 765 kV Wavetrapped Replacement

**Proposed Solution:** Replace existing 3000 A wavetrapped at Mountaineer 765 kV, on the Belmont - Mountaineer 765 kV line, with a new 5000 A wavetrapped.

**Estimated Cost:** \$0.46M

### Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Mountaineer - Belmont 765kV line (Existing)	4047/4571/4484/4961
Mountaineer - Belmont (765) (Post Upgrade)	4558/5523/5992/6845

**Alternatives:** A fiber path for relaying between Mountaineer and Kammer may be possible to allow for retirement of the wavetrapped instead of replacing. However, roughly 120 miles of fiber path would need to be installed based on a preliminary engineering look for a much higher cost. Therefore, this option was not pursued. Cost: \$120M

**Ancillary Benefits:** N/A

**Required IS Date:** 6/1/2028

**Projected IS Date:** 6/1/2028

### Proposed:



Legend	
765 kV	
500 kV	
345 kV	
138 kV	
69 kV	
46 kV	
New	

**Process Stage:** First Read

**Criteria:** Summer Gen Deliv

**Assumption Reference:** 2023 RTEP assumption

**Model Used for Analysis:** 2028 RTEP cases

**Proposal Window Exclusion:** Substation Equipment Exclusion

**Problem Statement:** FG: 2023-W1-GD-S582, 2023-W1-GD-S584, 2023-W1-GD-S590, 2023-W1-GD-S646, 2023-W1-GD-S650

In 2028 RTEP Summer case, the Kyger Creek-Sporn 345 kV line is overloaded under gen deliv analysis for multiple common mode contingencies.

**Existing Facility Rating:**

Branch	SN/SE/WN/WE (MVA)
Kyger Creek - Sporn (345)	1025/1204/1298/1512



### Proposed Solution:

Replace AEP owned station takeoff riser and breaker BB risers at OVEC owned Kyger Creek station. **Estimated Cost: 0.41M**

Replace OVEC owned breaker AA risers, bus work, and breaker AA disconnect switches at OVEC owned Kyger Creek station.

**Estimated Cost: 0.75M**

**Total Estimated Cost: \$1.16 M**

### Preliminary Facility Rating:

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

Alternatives: N/A

Ancillary Benefits: N/A

Required IS Date: 6/1/2028

Projected IS Date: 6/1/2028

### Existing:



### Proposed:



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

# DPL Transmission Zone: Baseline

**Process Stage:** First Review

**Criteria:** Summer Generation Deliverability

**Assumption Reference:** 2028 RTEP assumption

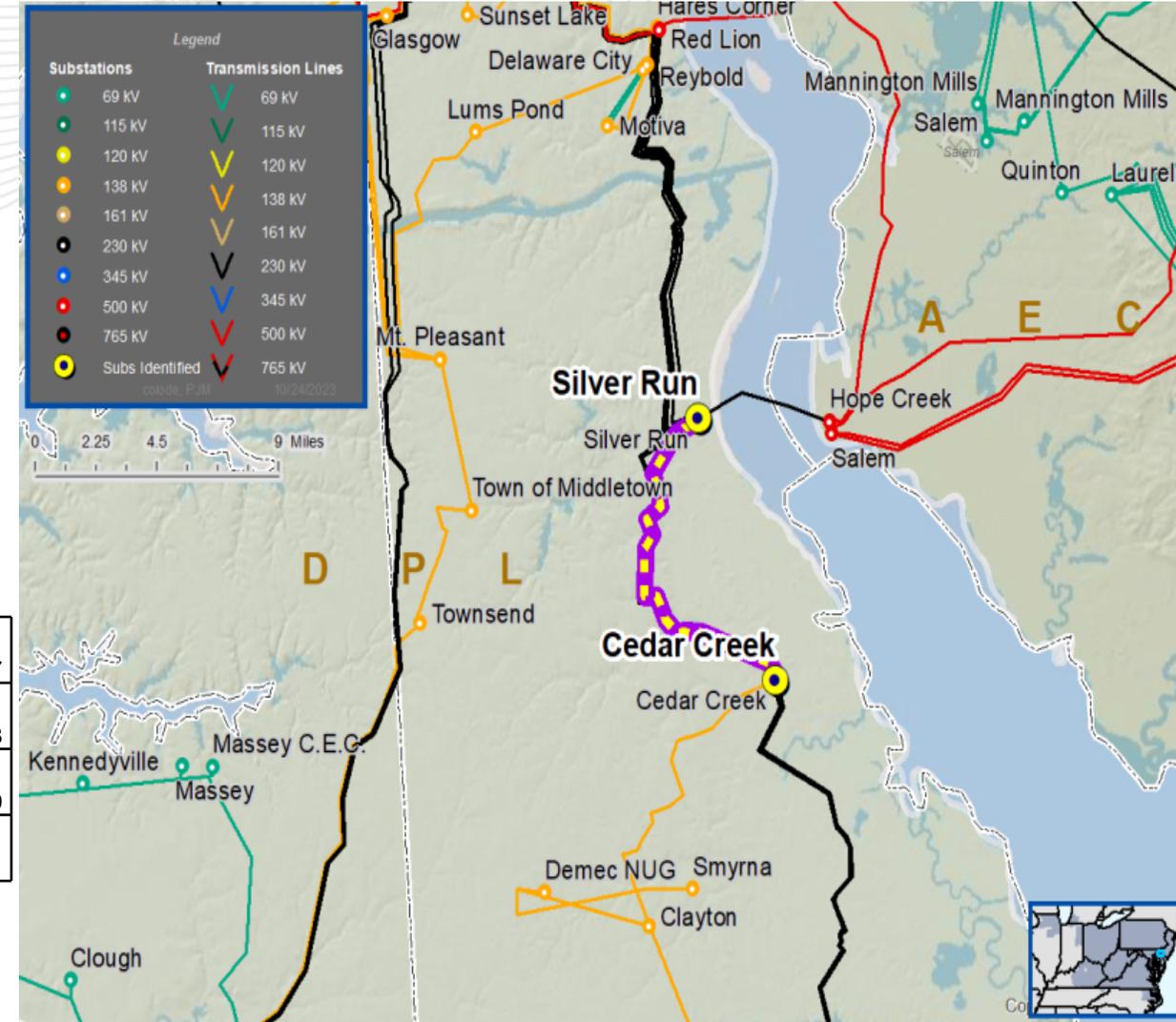
**Model Used for Analysis:** 2028 RTEP Summer case

**Proposal Window Exclusion:** No

**Problem Statement:** The Silver Run – Cedar Creek 230 kV circuit overloaded for several contingencies

Violations were posted as part of the 2023 Window 1: FG#s

2023W1-IPD-S1	2023W1-IPD-S5	2023W1-IPD-S9	2023W1-IPD-S13	2023W1-IPD-S17	2023W1-IPD-S27
2023W1-IPD-S2	2023W1-IPD-S6	2023W1-IPD-S10	2023W1-IPD-S14	2023W1-IPD-S18	2023W1-IPD-S28
2023W1-IPD-S3	2023W1-IPD-S7	2023W1-IPD-S11	2023W1-IPD-S15	2023W1-IPD-S19	2023W1-IPD-S29
2023W1-IPD-S4	2023W1-IPD-S8	2023W1-IPD-S12	2023W1-IPD-S16	2023W1-IPD-S26	



Continued on the next slide.....

# DPL Transmission Zone: Baseline

## Proposed Solution: Proposal #2023-W1-573

- Reconductor Silver Run - Cedar Creek 230kV line. Upgrade bushing, disconnect, stranded bus, and rigid bus at Cedar Creek substation. Upgrade 1590 ACSR "Lapwing" jumper and disconnect at Silver Run substation
- **Silver Run** – Replace three (3) standalone CTs, disconnect switch, stranded bus, and rigid bus to achieve higher rating.
- **Silver Run** - Replace three(3) 1-1590 ACSR Jumpers and one(1) air disconnect switch.

**Existing Facility Rating:** 653SN/808SE, 753WN/911WE MVA

**Proposed Facility Rating:** 996SN/1146SE , 1060WN/1209WE MVA

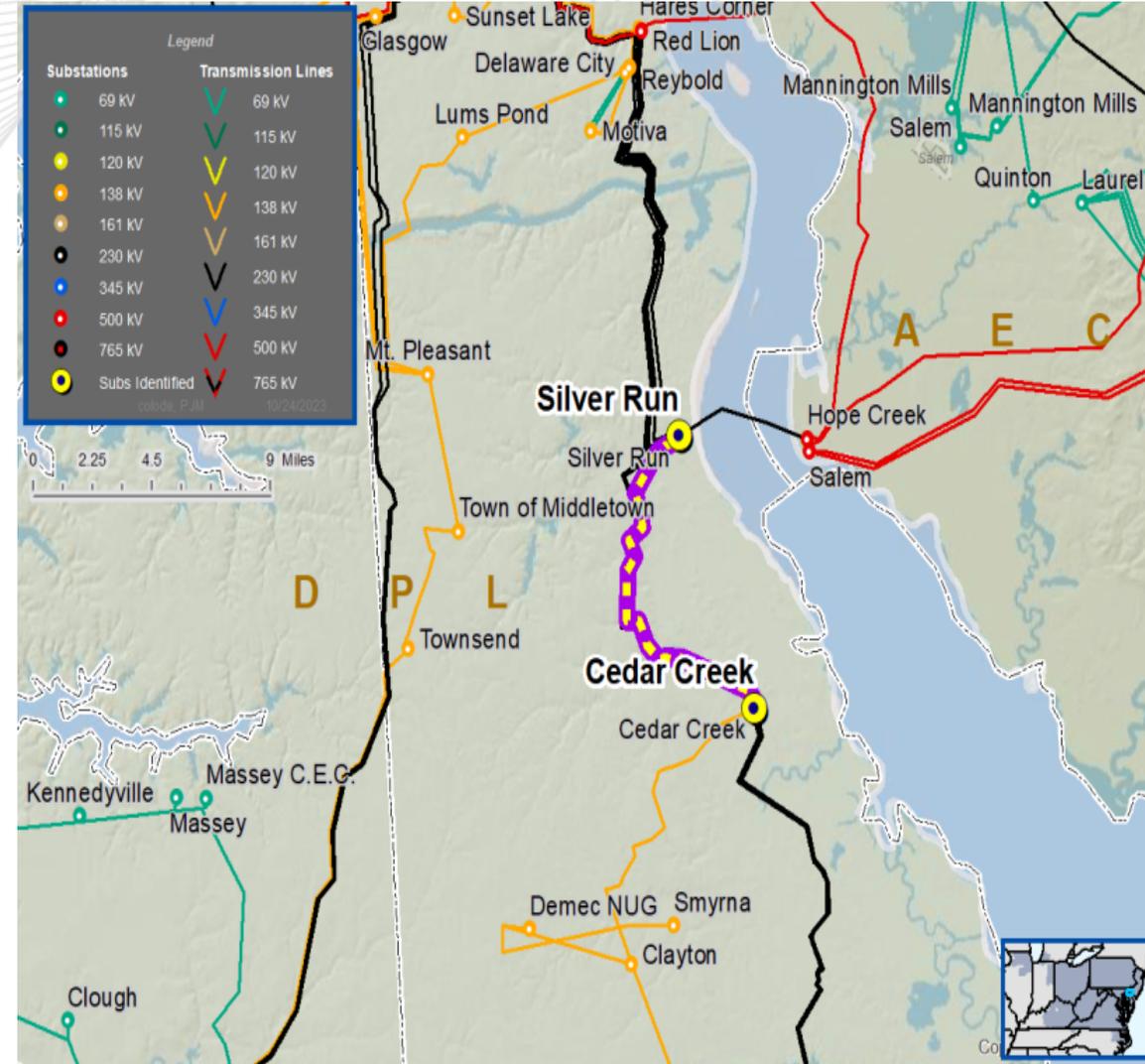
**Estimated Cost:** \$8.7 M

### Alternatives

- None

**Required In-Service:** 6/1/2028

**Projected In-Service:** 6/1/2028



# PECO Transmission Zone: Baseline

**Process Stage:** First Review

**Criteria:** Summer Generation Deliverability

**Assumption Reference:** 2028 RTEP assumption

**Model Used for Analysis:** 2028 RTEP Summer case

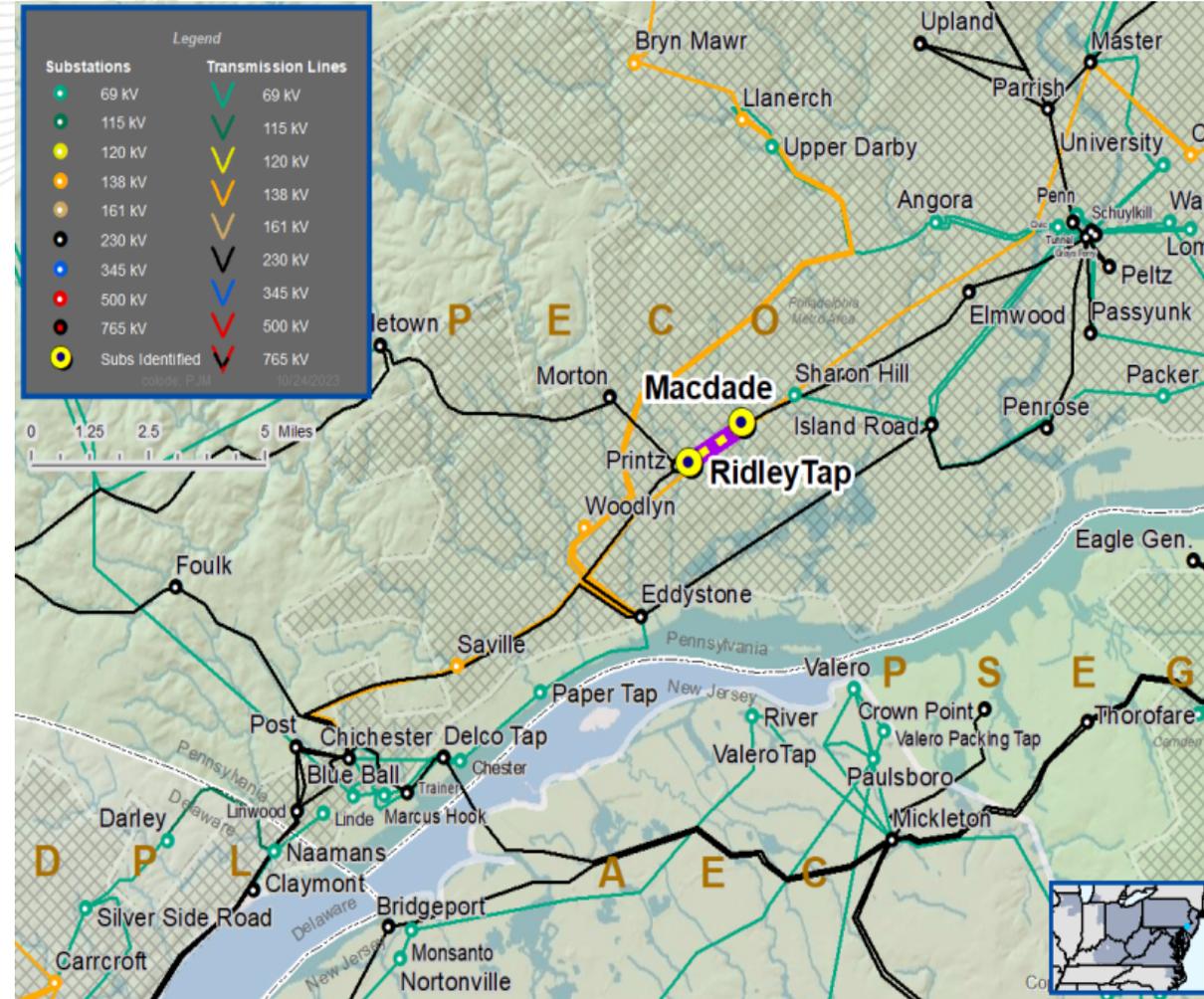
**Proposal Window Exclusion:** Substation equipment Exclusion

**Problem Statement:** The Ridley – Macdade 230 kV circuit overloaded for several contingencies

Violations were posted as part of the 2023 Window 1: FG#s

2023W1-GD-S108	2023W1-GD-S1267	2023W1-GD-S1276
2023W1-GD-S693	2023W1-GD-S1397	2023W1-GD-S833
2023W1-GD-S704	2023W1-GD-S134	2023W1-GD-S845
2023W1-GD-S705		

Continued on the next slide.....



# PECO Transmission Zone: Baseline

## Proposed Solution:

- Replace relays at Macdade, Printz, and Morton 230 kV station to increase rating limits of transmission. Line protection relays will be upgraded with latest standard relays used across the PECO system

**Existing Facility Rating:** 927SN/927SE, 927WN/927WE MVA

**Proposed Facility Rating:** 1079SN/1260SE, 1301WN/1455WE MVA

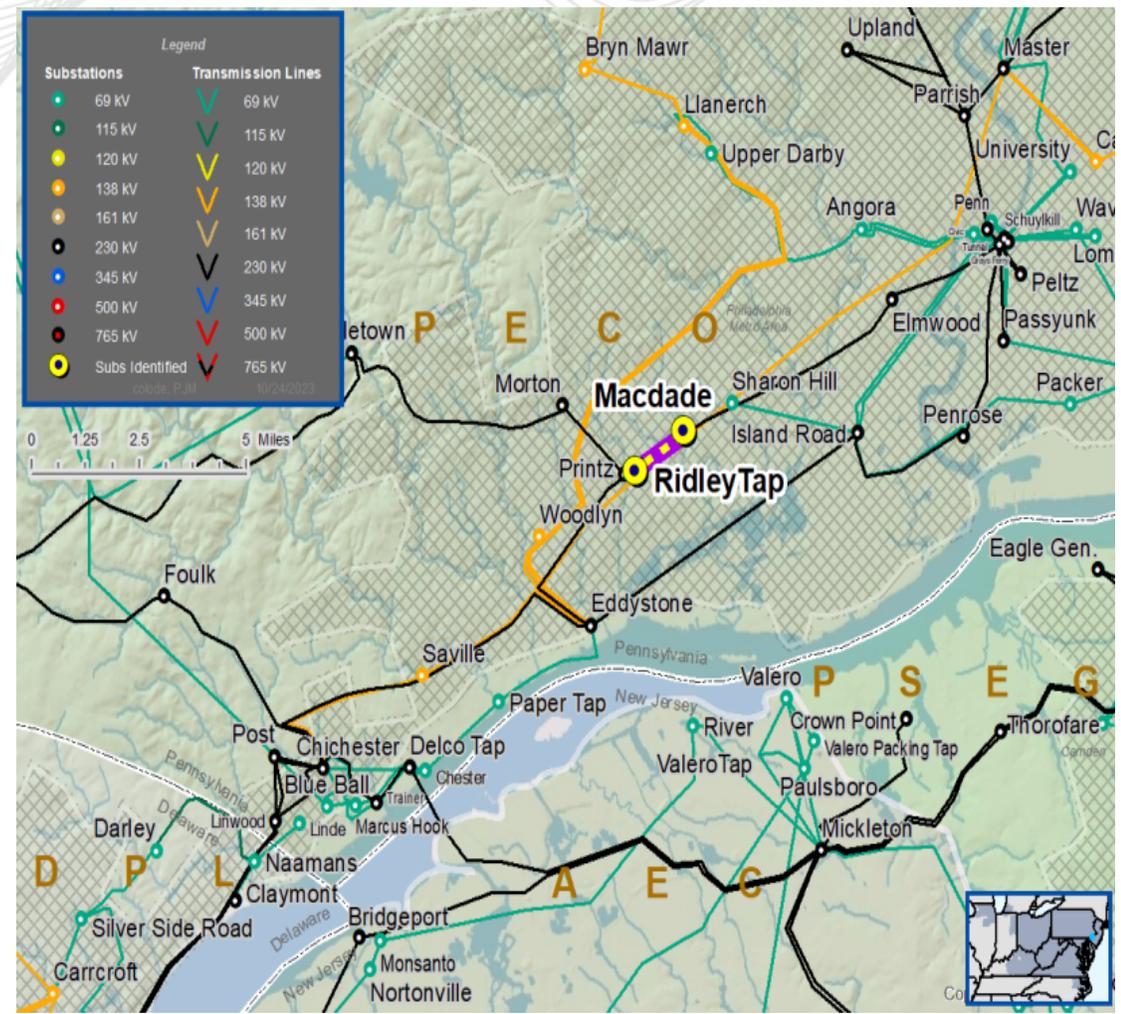
**Estimated Cost:** \$1.4 M

## Alternatives

- None

**Required In-Service:** 6/1/2028

**Projected In-Service:** 6/1/2028



# PSEG Transmission Zone: Baseline

**Process Stage:** First Review

**Criteria:** Light Load Baseline Voltage

**Assumption Reference:** 2028 RTEP assumption

**Model Used for Analysis:** 2028 RTEP Summer case

**Proposal Window Exclusion:** No

**Problem Statement:** High voltage issue on multiple stations around Waldwick vicinity for several contingencies.

Violations were posted as part of the 2023 Window 1: FG#s

2023W1-N1-LLVM13	2023W1-N1-LLVM17	2023W1-N1-LLVM21	2023W1-N1-LLVM25	2023W1-N1-LLVM29	2023W1-N1-LLVM33
2023W1-N1-LLVM14	2023W1-N1-LLVM18	2023W1-N1-LLVM22	2023W1-N1-LLVM26	2023W1-N1-LLVM30	2023W1-N1-LLVM34
2023W1-N1-LLVM15	2023W1-N1-LLVM19	2023W1-N1-LLVM23	2023W1-N1-LLVM27	2023W1-N1-LLVM31	2023W1-N1-LLVM35
2023W1-N1-LLVM16	2023W1-N1-LLVM20	2023W1-N1-LLVM24	2023W1-N1-LLVM28	2023W1-N1-LLVM32	2023W1-N1-LLVM36
2023W1-N1-LLVM37	2023W1-N1-LLVM38				

**Proposed Solution:**

Replace existing 230kV 50MVAR fixed shunt reactor with a 230kV 150MVAR variable shunt reactor.

Replace existing 345kV 100MVAR fixed shunt reactor with a 345kV 150MVAR variable shunt reactor.

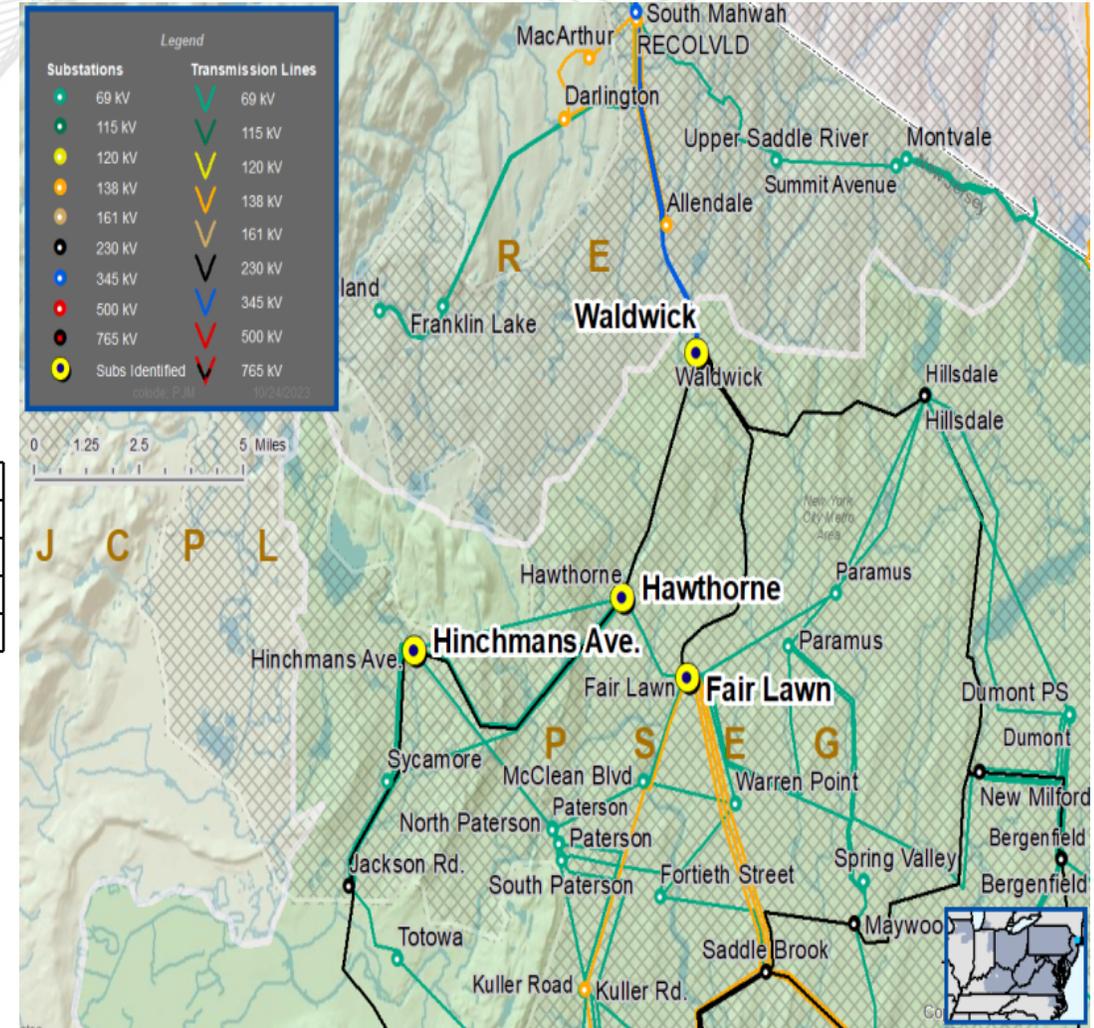
**Estimated Cost:** \$29.6 M

**Alternatives**

- None

**Required In-Service:** 6/1/2028

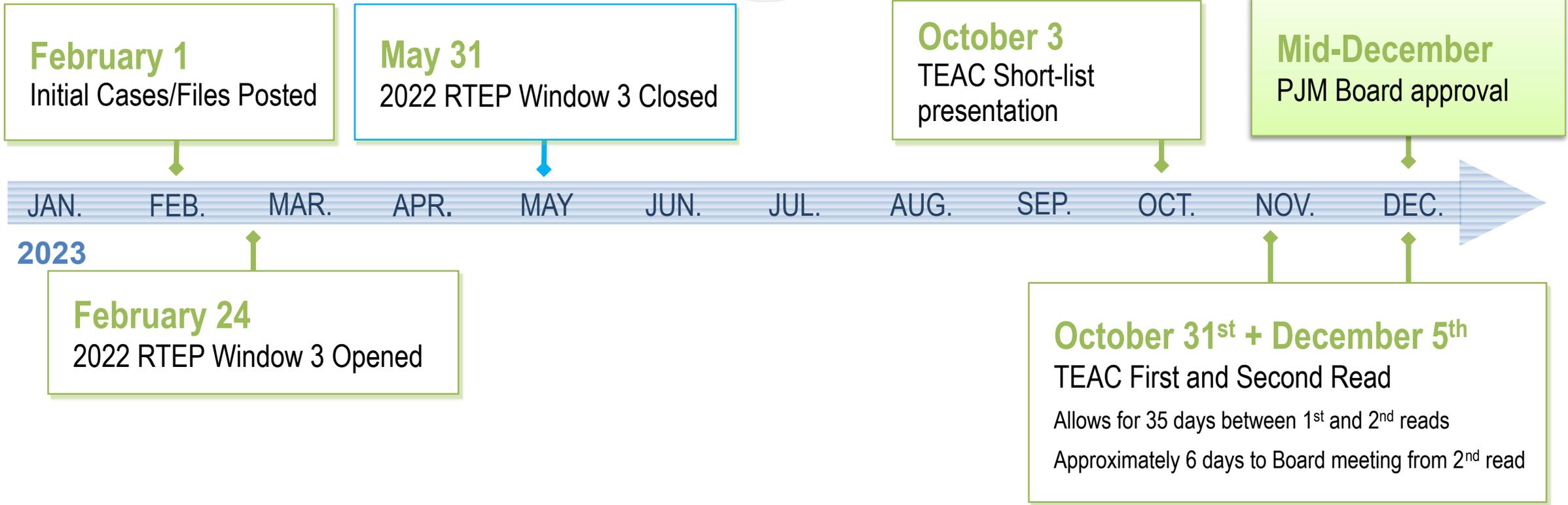
**Projected In-service:** 6/1/2028



# First Read – 2022 Window 3

## Baseline Reliability Projects

# 2022 RTEP Window 3 - Timeline



## 2022 RTEP Window 3 – Objective & Evaluation

- Develop robust, holistic and expandable solutions that address the 2027-28 baseline violations associated with:
  - Local constraints: resulting from directly serving data center loads in APS / Dominion
  - Regional constraints resulting from imports into load center areas (500 kV primarily):
  - Needed reactive power VAR reinforcements, both static and dynamic as necessary.
  - Address reliability impacts due to the deactivation of 11GWs of generation.
- Adhere to all applicable planning criteria, including PJM, NERC, SERC, RFC and Local Transmission Owner Criteria.
- Evaluation on both 2027 and 2028 RTEP cases
  - Generation deliverability analysis
  - Load deliverability analysis
  - N-1-1 analysis
  - Baseline contingency analysis
  - Short circuit analysis
  - Dynamic analysis
  - Critical Substation Planning Analysis-CSPA

## 2022 RTEP Window 3 - Requirements

- Holistic solutions are to be designed such that they are robust and expandable as the load grows within the area.
- A scalable solution ensures, at a minimum, near-term reliability needs are addressed while also enabling future expansion (beyond the 2027-28 baseline levels).
  - Consider flexibility, robustness and scalability of 2027-28-baseline solutions against the Interim 2027-28 Summer, Winter and Light Load basecases.
  - Evaluate proposals for their effectiveness towards existing reactive interfaces in the area, particularly those supporting the Dominion and APS zones.
  - Evaluate the effectiveness of the proposed solutions towards the transmission system load deliverability into the Dominion and APS zones (CETL).

## Two Rounds of PJM Meetings With Proposing Entities:

- Discussions to clarify details of proposed developments, assumptions, rationale of proposed alternatives/variatioins
- First round was conducted in June/July 2023.
- Second round was initiated in late July and concluded mid-August:
  - Focus on outage scheduling, routing, risk and cost assumptions/considerations

### Scenario Development and Analysis

To date, PJM developed and analyzed:

- >30 scenarios for the 2027 model (Combination of proposals and components from different proposals)
- >80 scenarios for the 2028 model

### Scenarios Were Built Based On:

- Full combination scenarios by proposing entities (Incumbents, Nextera, LS Power and Transource)
- Optimized scenarios using components from incumbent and non-incumbent proposing entities

## Scenarios With Their Associated Proposed Developments Will Be Evaluated Based On the Following Principles:

<p><u>Performance</u></p> <p>Meeting the system needs of 2027 and being flexible to address 2028 needs</p>	<p><u>Scalability</u></p> <p>Scenario/development longevity – system robustness and utilization</p>	<p><u>Impact</u></p> <p>Utilization of existing ROWs where possible and efficient.</p>	<p><u>Validated Cost</u></p> <p>Cost evaluation using third-party benchmarking metrics</p>
<p><u>Risks</u></p> <ul style="list-style-type: none"> <li>• Triggering additional costs:             <ul style="list-style-type: none"> <li>– Substation rebuilds due to extreme short-circuit levels</li> <li>– Avoid extended critical outages (Peach Bottom / Conastone rebuilds)</li> </ul> </li> <li>• Imposing high permitting</li> <li>• Inability to meeting in-service date</li> </ul>		<p><u>Efficiencies</u></p> <ul style="list-style-type: none"> <li>• Avoidance of redundant capital investment including recognizing synergies with EOL facilities and overlaps of previously approved (or imminent) supplemental/baseline upgrades.</li> </ul>	

# Brandon Shores Deactivation Assumptions

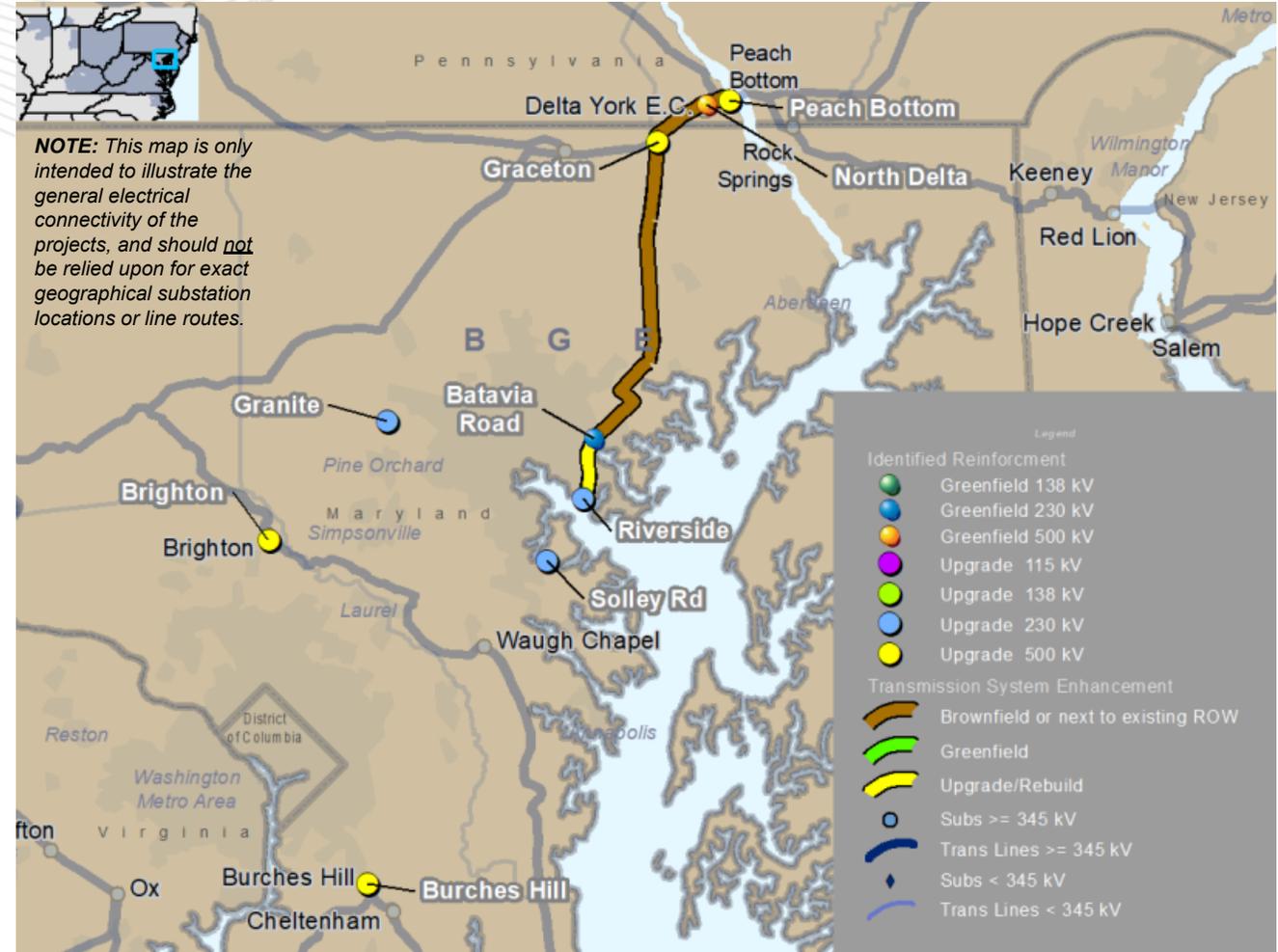
- Initial 2022 Window 3 (2027 basecase) has Brandon Shores generators modeled and dispatched
- The 2022 Window 3 (2028 basecase) has Brandon Shores generators removed as per the deactivation notice
- As will be shown, PJM received proposals from PSEG, NextEra, and Exelon addressing the Brandon Shores deactivation covering 2028 robustness test
- All proposals submitted to address only 2027 base case needs do not consider Brandon Shores deactivation
- PJM evaluated effectiveness of all submitted proposals to address Brandon Shores deactivation against the PJM Board approved project.

# Board Approved Brandon Shores Deactivation Projects

**Exelon:2022-W3-344/660**

**B3780 - Substation Projects: (Approved components under Brandon Shores Deactivation Immediate Need)**

- **B3780 – (assigned to Transource) Substation Projects**
  - Modify the planned North Delta 500/230 kV substation (cut into Peach Bottom – Delta/Calpine 500 kV line)
    - Three breaker ring bus configuration
    - Install one 500/230 kV transformer
    - This scope will amend the approved B3737.47
- **B3780 – Exelon Scope -Substation Projects**
  - Expand Peach Bottom North yard to accommodate additional 500kV circuits to BGE (Graceton).
  - Build Graceton 500 kV substation – adjacent to the existing Graceton 230kV yard
    - Three bay breaker and half configuration
    - Two 500/230 kV transformers
  - Build new Batavia Rd. 230 kV switching station (cut in to the existing Northeast – Riverside 230 kV circuits)
    - Four bay 8-position GIS BAAH switching station
- **Cancel B3780.3** (Build 500/230 kV West Cooper substation) (Cost Estimate: \$60M)



B3780 Continue on next slide ...

# Board Approved Brandon Shores Deactivation Projects

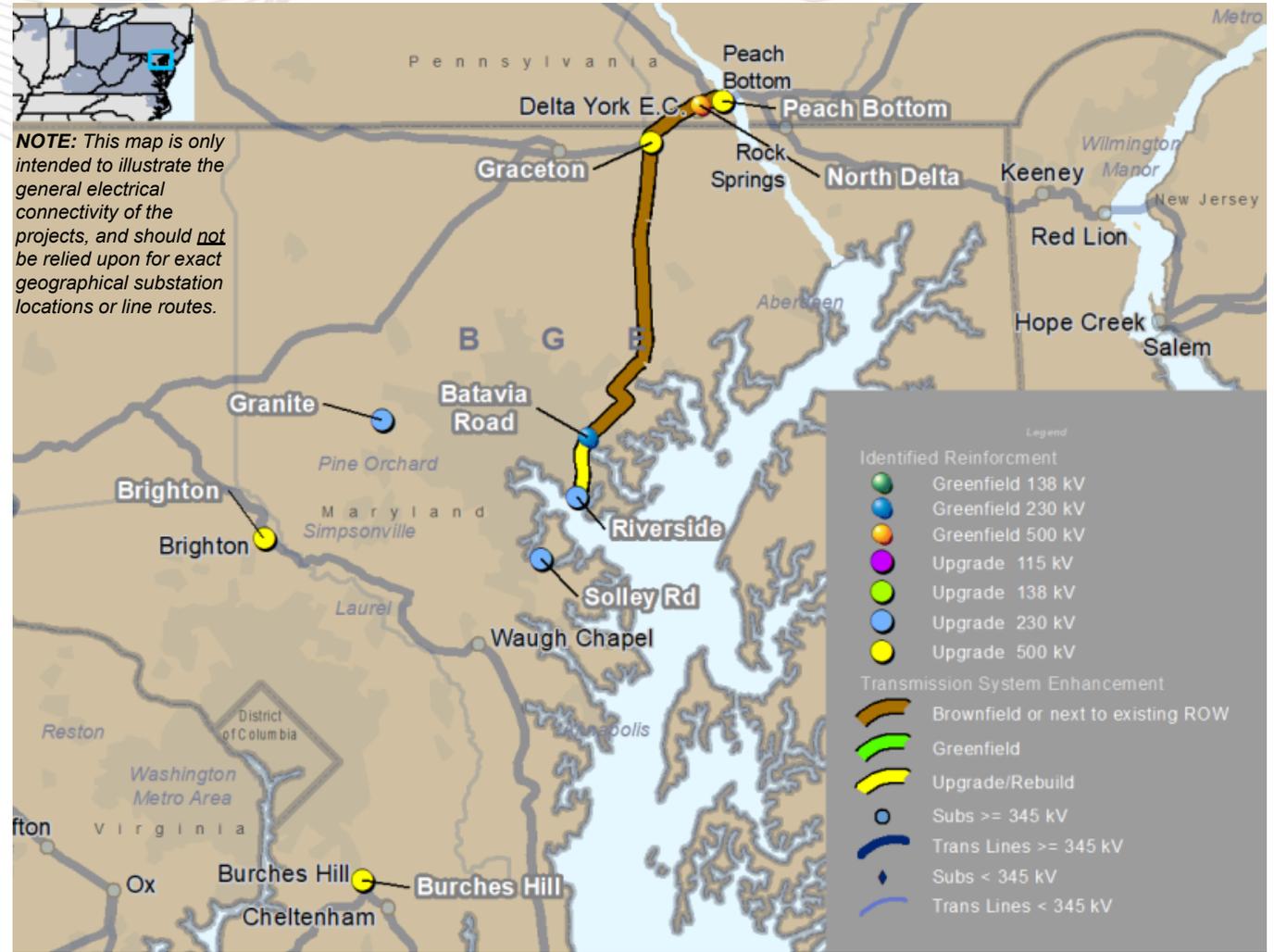
Exelon:2022-W3-344/660

**B3780 - Transmission Projects: (Approved components under Brandon Shores Deactivation Immediate Need)**

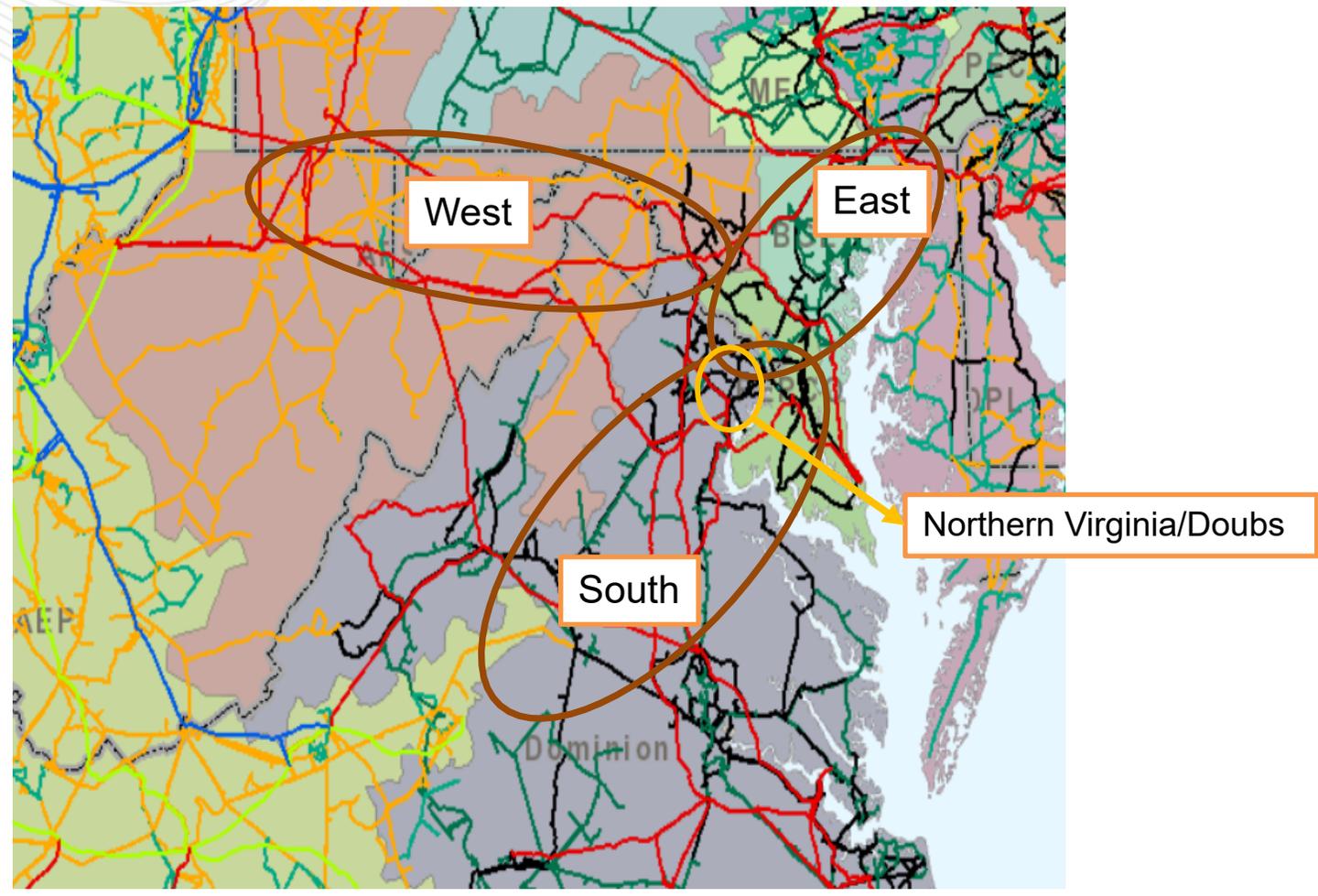
- Build new Peach Bottom North - Graceton 500kV Line - (~10 miles)
  - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
- Build new 230 kV double circuit from Graceton to Batavia Road with 2 x 1590kcm 54/19 ACSR (~29 miles)
  - New Rating – 1331SN/1594SE/1534WN/1795WE MVA
- Reconductor 230 kV double circuit from Batavia Road to Riverside with bundled 1622kcm 38/19 ACCR/TW (~6 miles)
  - New Rating – 1941SN/2181SE/WN2065/WE2302 MVA
- Install Statcom at Granite 230 kV (+/- 350MVAR) and Solley 230kV (+/- 350 MVAR), and 250 MVAR capacitor at Graceton 230 kV
- Install Statcom at Brighton 500 kV (+/- 350MVAR), Capacitors - 350 MVAR at Brighton 500 kV, 250 MVAR at Burchess Hill 500 kV and 350 MVAR at Conastone 500 kV

**Required In-Service Date : June 2025**

**Projected In-Service Date: 2026-2028**



- Proposals were grouped in 4 main clusters (East, West, South and Dominion)
- Each cluster included proposals by different entities in the same need area and/or addressing the same local/regional needs
- Scenarios were developed and tested:
  - First; address regional needs
  - Next; scenarios were refined (building new scenarios) to cover local needs
  - Scenarios were further refined using more effective proposal components as demonstrated through performance

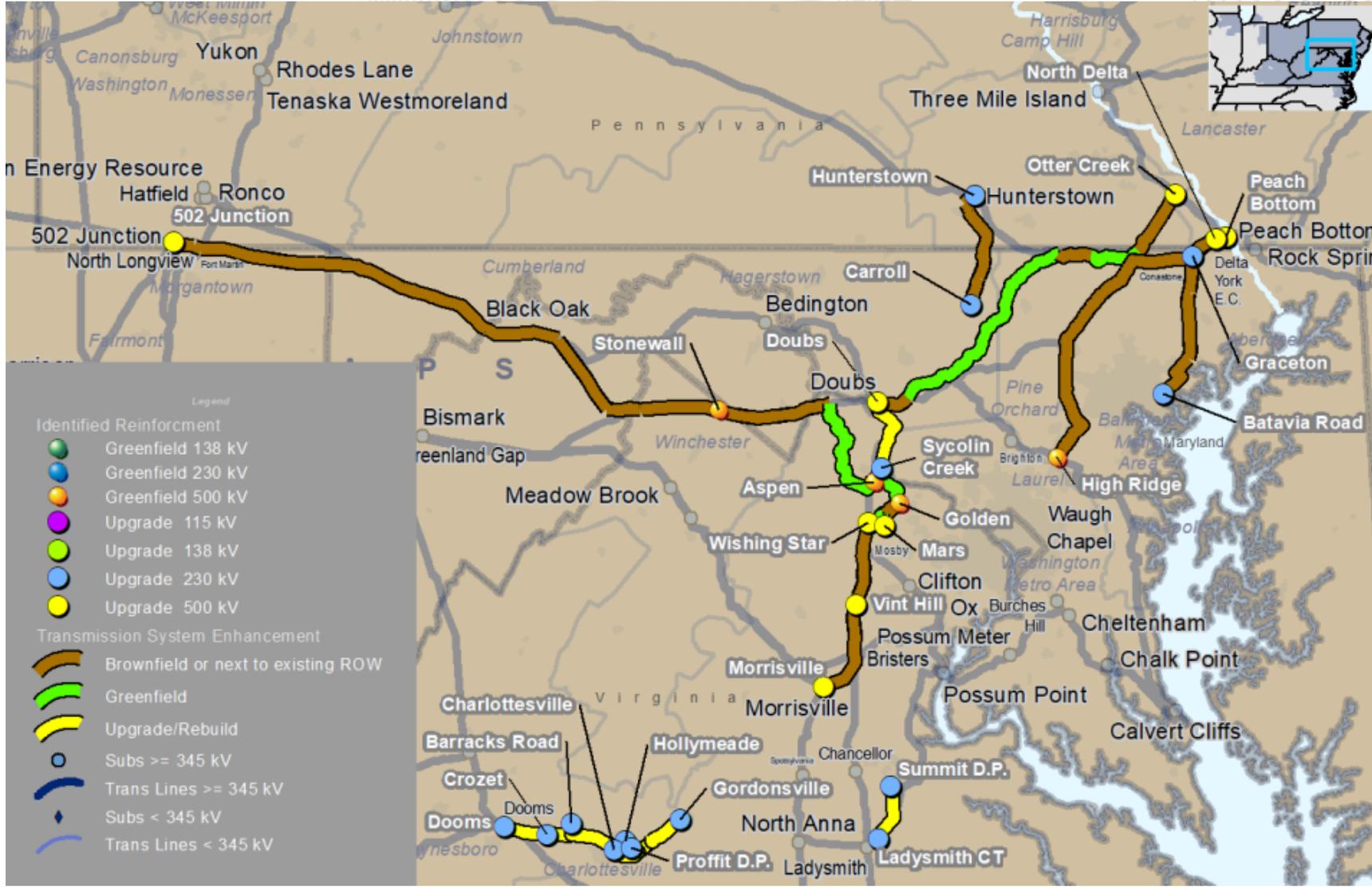


## 2022 RTEP W3 – Selected Proposals

- Proposals selected are for the most part those presented at the Oct 3<sup>rd</sup> TEAC under the PJM – 500kV Short List Scenario
- The selected proposals are robust and expandable while also being the more effective or cost efficient solutions to address the bulk transfer, regional and local transmission needs in the study area.
- Main Changes from Oct 3<sup>rd</sup> TEAC:
  - Hunterstown to Carrol 230kV development is selected instead of the Transource 487 Rice – Ringgold development due to cost and constructability advantages given comparable performance. .
  - PJM selected the full closure of the Aspen-Golden-Mars 500kV loop to mitigate 230kV network overloads
  - PJM proposes to proceed with the expansion of the Transource North Delta 500/230 kV Substation providing access to the Calpine-PB 500kV lead line and allowing utilization of existing Exelon ROW. The proposed West Cooper 500kV substation, part of the Brandon Shores deactivation proposal, will be canceled.
  - PJM is postponing its decision on the Joshua Falls-Yeat 765kV line proposal until further load and/or generation developments materialize in the study area (LTRTP analysis).

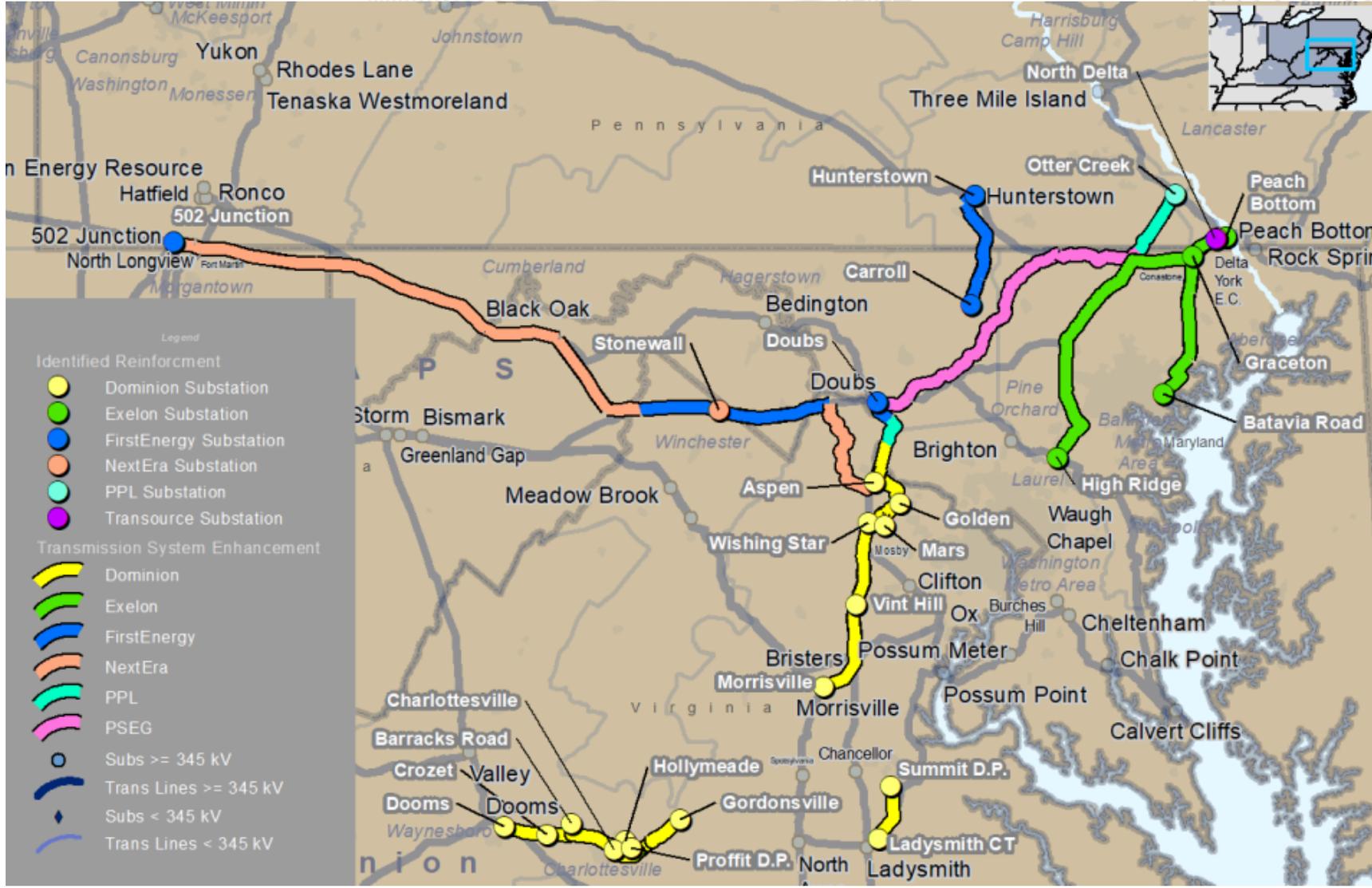
- In the slides to follow, PJM will walk through the selected proposals in each cluster (South, Northern Virginia/Doubs, East, and West)
- Changes to earlier approved projects (either expansions, adjustments or cancellations)
- Proposals selected proposals of the 2022 RTEP W3
- PJM identified additional upgrades for each cluster

# Major Proposals Selected in 2022 Window 3



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

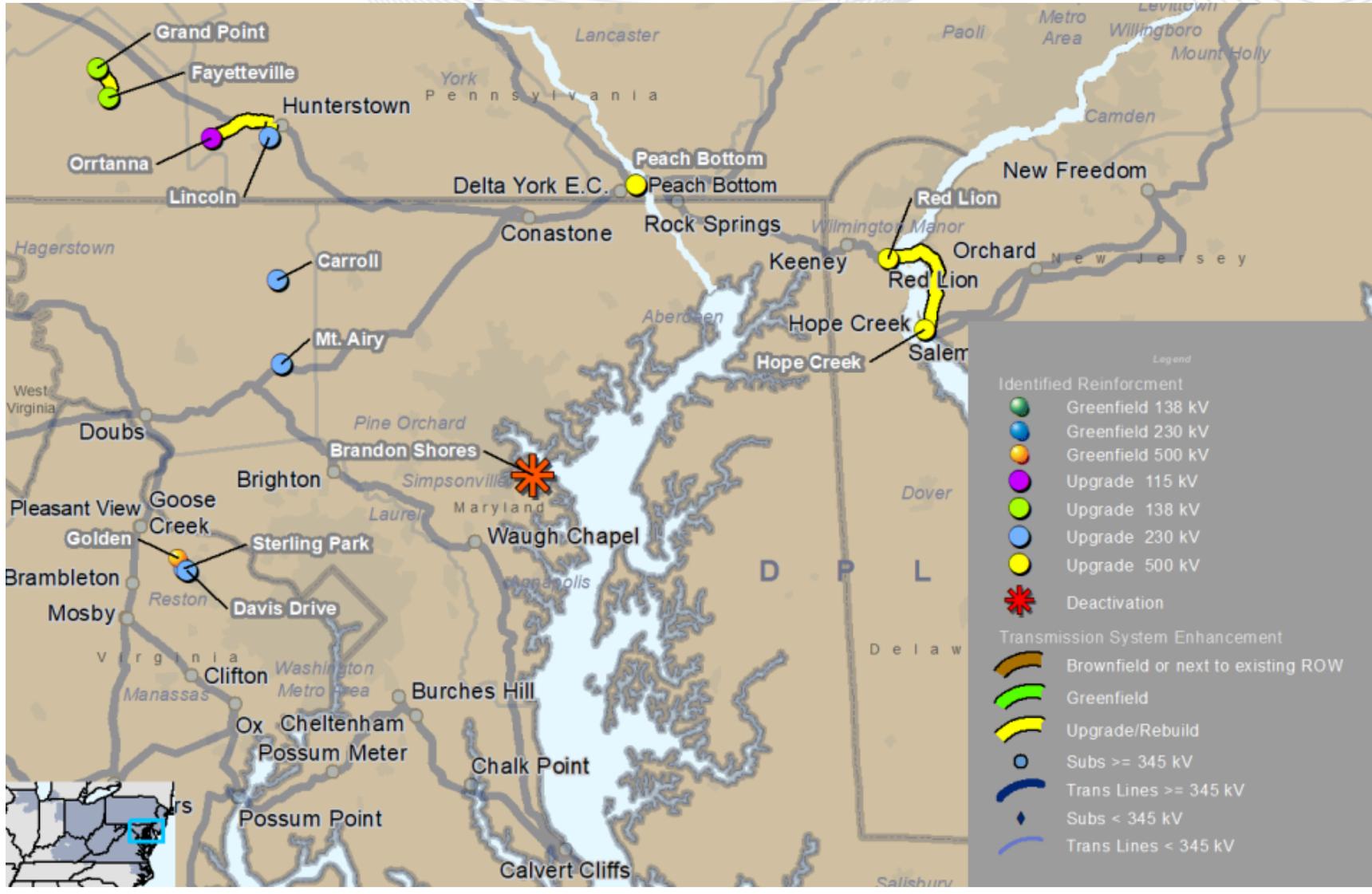
# Major Proposals Selected in 2022 Window 3 - by Designated Entity



R3:corrected designated entity for 500kV west and East of Stonewall

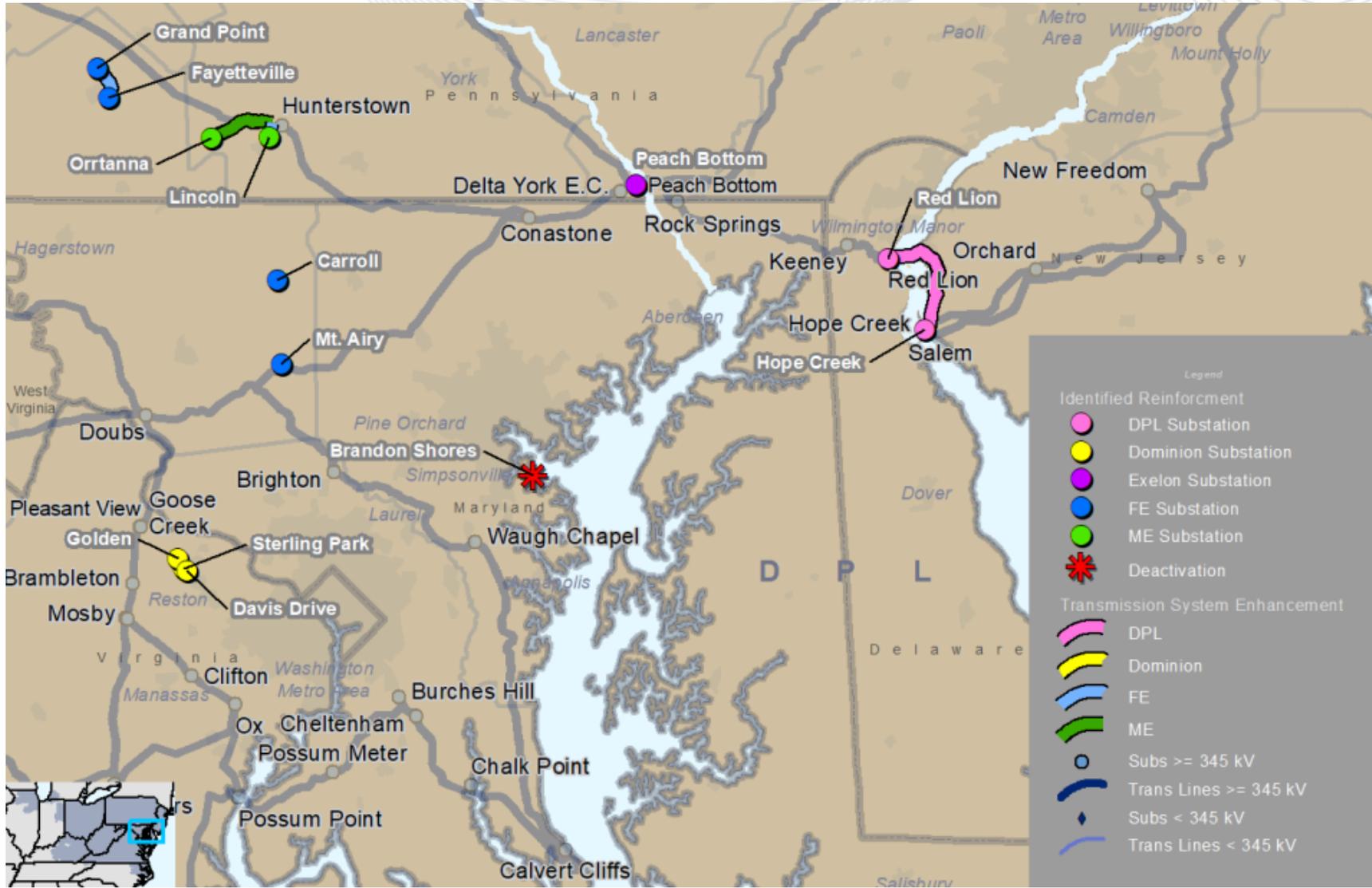
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Additional upgrades needed in 2022 Window 3



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Additional upgrades needed in 2022 Window 3 – by TO



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Preferred Solutions: AEP Local

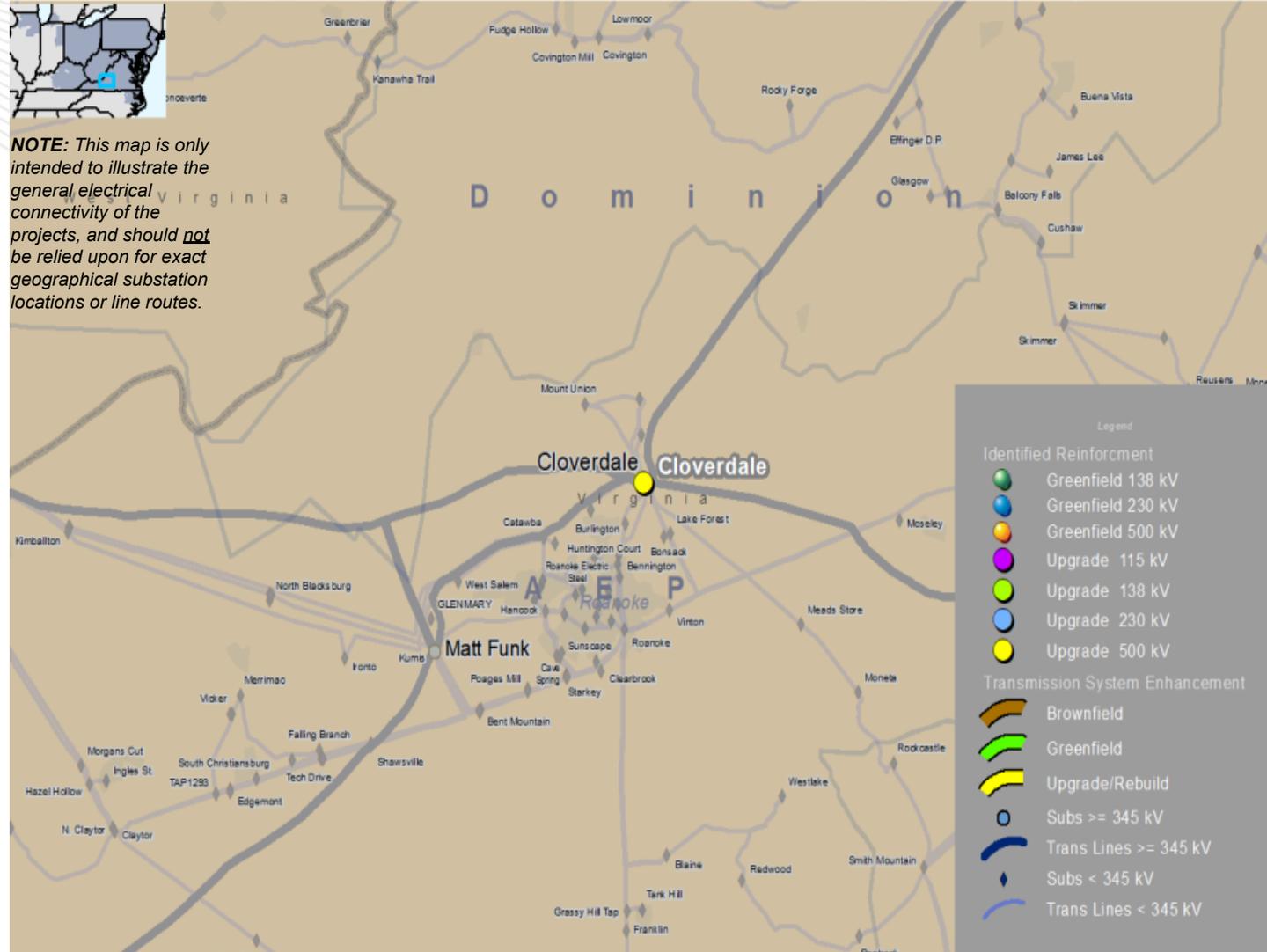
AEP: 2022-W3-410

- Establish a new 500 kV breaker position for the low-side of the existing 765/500 kV transformer at Cloverdale Station. The new position will be between two new 500 kV circuit breakers located in a new breaker string, electrically converting the 500 kV yard to "double-bus double-breaker" configuration.

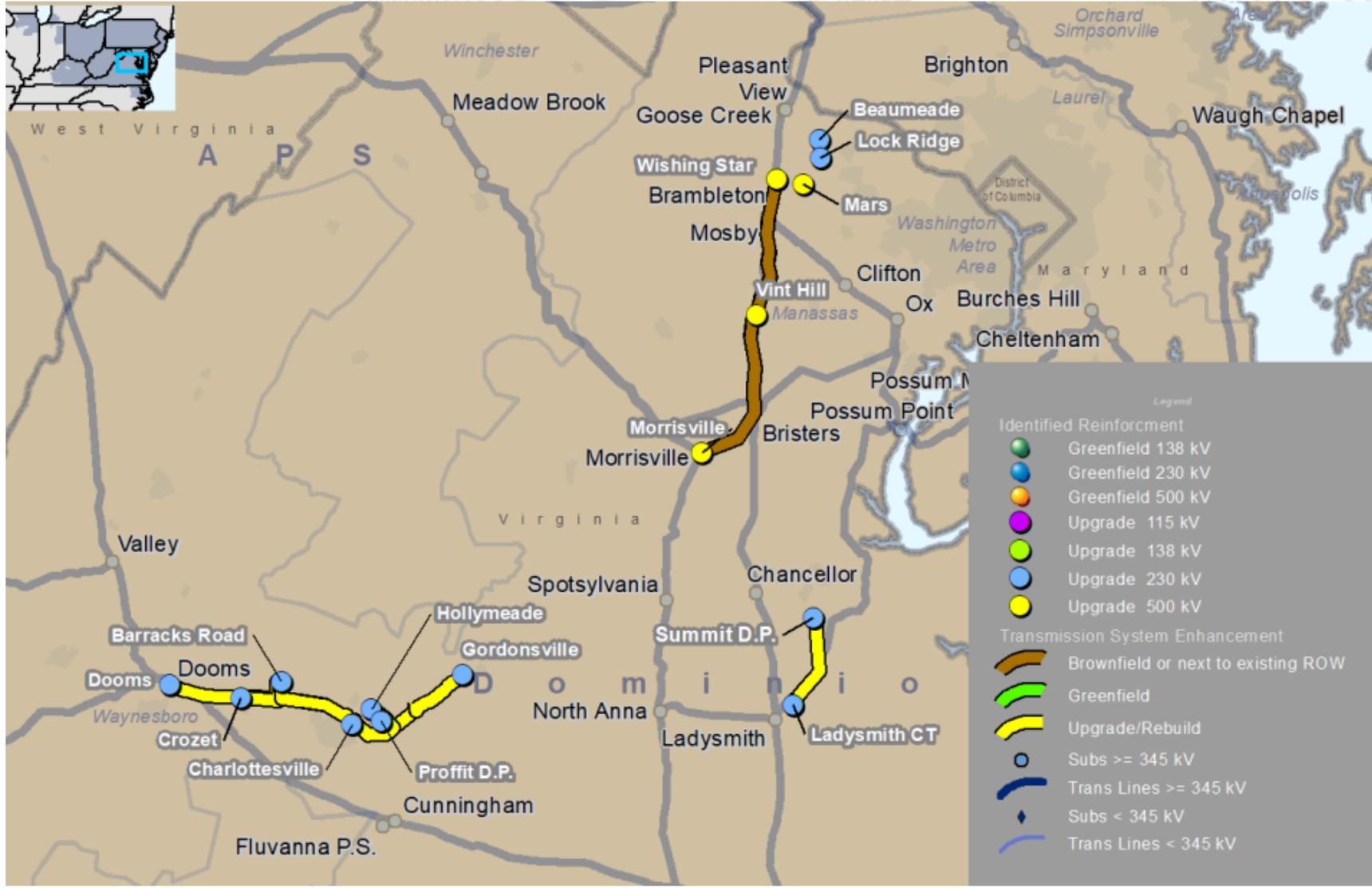
**Estimated Cost: \$11.59 M**

**Required IS Date: 6/1/2027**

**Projected IS Date: 10/31/2026**

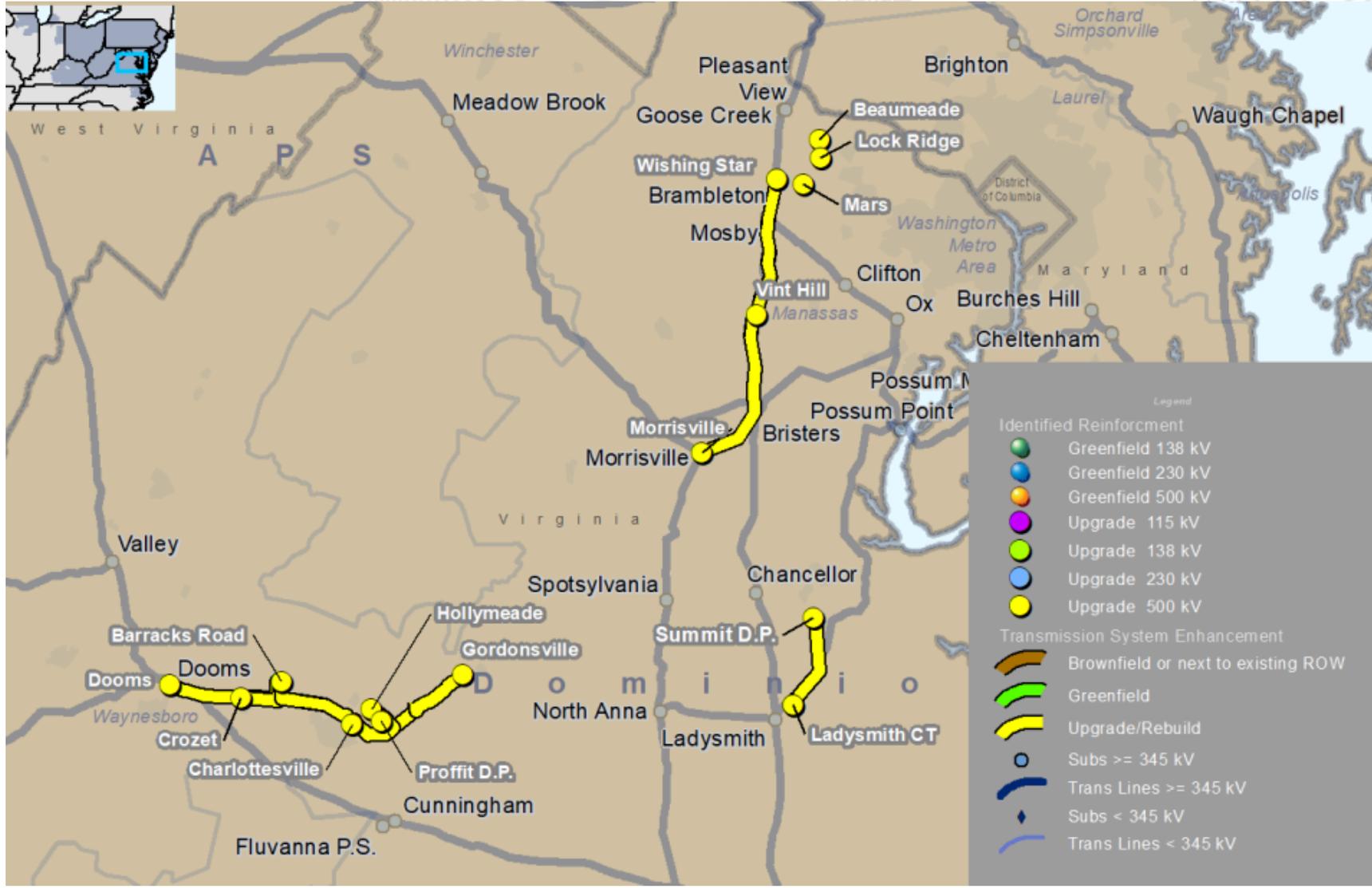


# 2022W3 – Preferred Solutions: South Cluster



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Preferred Solutions: South Cluster by Designated Entity

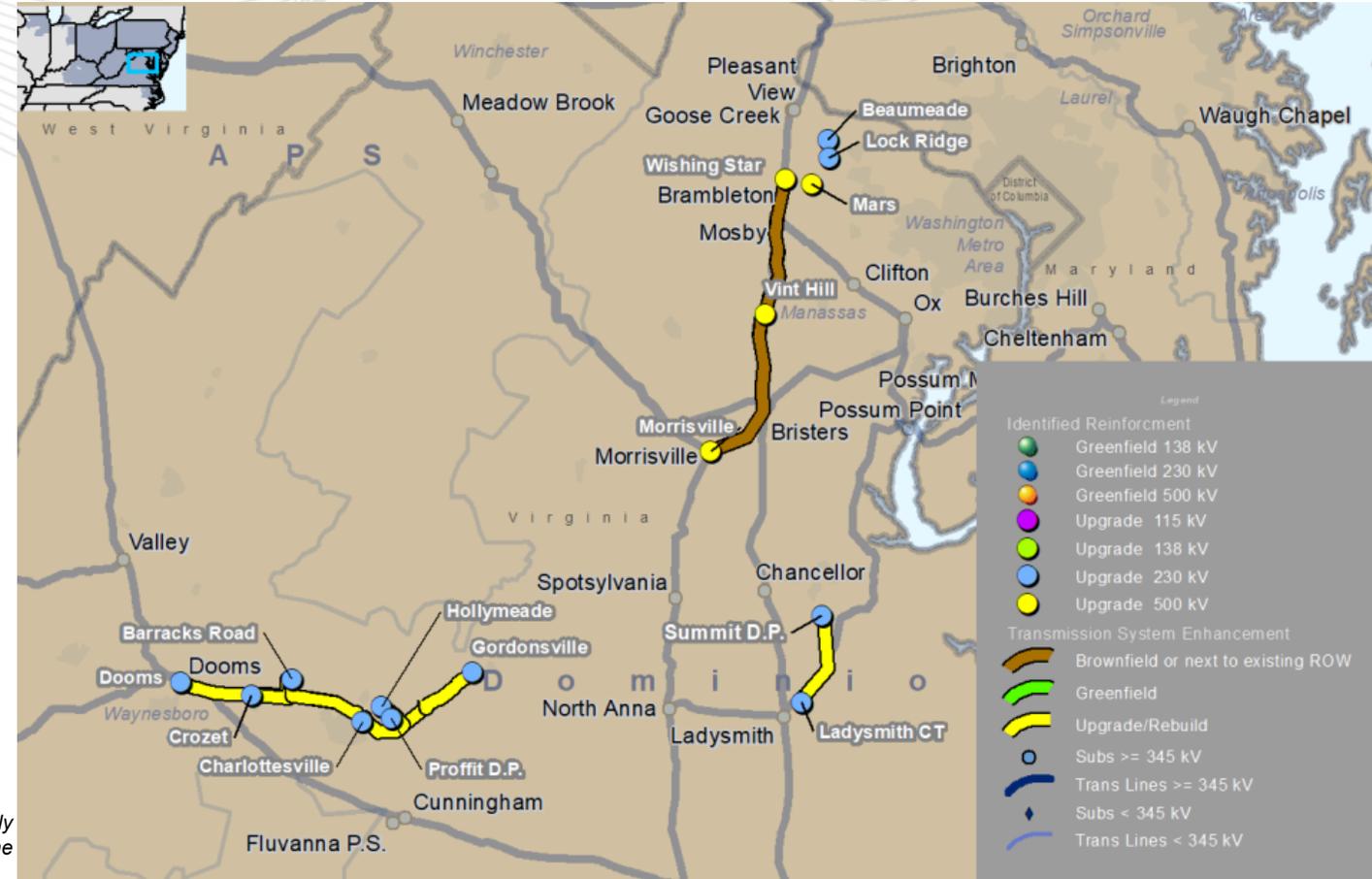


**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Preferred Solutions: South Cluster

## Proposed Solution: 2022-W3-711 Revised

- Build a new 500kV line from Morrisville – Vint Hill – Wishing Star (approximately 36.3 miles) while maximizing the use of existing ROW within this corridor.
- Wrecking and rebuilding both the 5-2 towers in the Morrisville-Loudoun-Brambleton corridor to free up space for the new single-500kV monopole within the same corridor.
  - Line #545 (Bristers - Morrisville) Rebuild
  - Line #569 (Loudoun to Morrisville) Rebuild
  - Line #535 (Vint Hill- Loudoun) Resag/Rebuild
  - Line #546 (Mosby - Wishing Star) Rebuild
  - Line #590 (Mosby - Wishing Star) Rebuild
  - Line #2030 (Gainesville - Loudoun) Rebuild
  - Line #2045 (Loudoun - Brambleton) Rebuild
  - Line #2094 & 2227 (Brambleton - Racefield - Loudoun) Rebuild
  - Line #2101 (Bristers - Vint Hill) Rebuild
  - Line #2114 (Remington CT - Rollin Ford) Rebuild



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

Continued on next slide...

# 2022W3 – Preferred Solutions: South Cluster

## Proposed Solution: 2022-W3-711 Revised

- Line #2140 (Loudoun - Heathcote) Rebuild
- Line #2151 (Railroad DP - Gainesville) Rebuild
- Line #2163 (Vint Hill - Liberty) Rebuild
- Line #2176 (Heathcote - Gainesville) Rebuild
- Line #2222 (Rollins Ford - Gainesville) Rebuild
- Line #183 (Bristers - Ox) Rebuild
- Line #37 (Spotsylvania - Wilderness D.P.) Rebuild
- Substation upgrades at:
  - Bristers, Brambleton, Dawkins Branch, Gainesville, Heathcote, Loudoun, Mint Springs, Morrisville, Mosby, North Star, Racefield, Railroad, Spotsylvania, Vint Hill, Wishing Star, Youngs Branch
- Breaker upgrades at the following substations:
  - Loudoun 230kV, Ox 500kV, North Anna 500kV

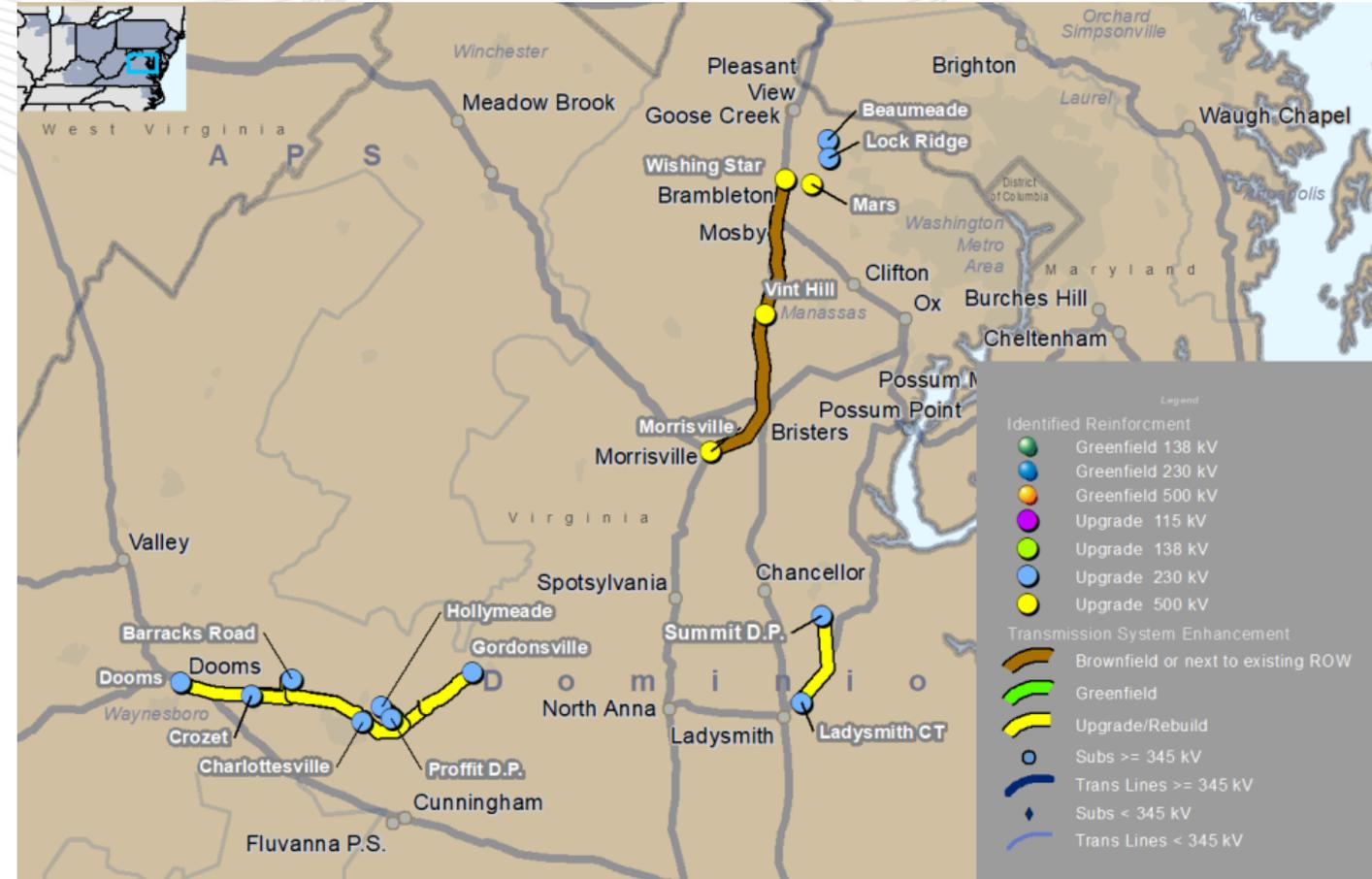
**Estimated Cost: \$953.71 M**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2028**

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should **not** be relied upon for exact geographical substation locations or line routes.*



# 2022W3 – Preferred Solutions: South Cluster

Dominion: 2022-W3-967 Partial

- Rebuild 230kV Line #2054 Charlottesville – Proffit DP using double-circuit capable 500/230 kV poles (the 500kV circuit will not be wired as part of this project).
- Rebuild 230kV Line #233 segment from Barracks Road – Crozet
- Rebuild 230kV Line #291 Charlottesville – Barracks Road – Crozet – Dooms
- Relay resets/revisions at the following substations:
  - Hollymeade, Proffit, Barracks Road, Crozet
- Terminal equipment upgrades at the following substations:
  - Charlottesville for Line #2054 rebuild & Dooms for Line #291 rebuild

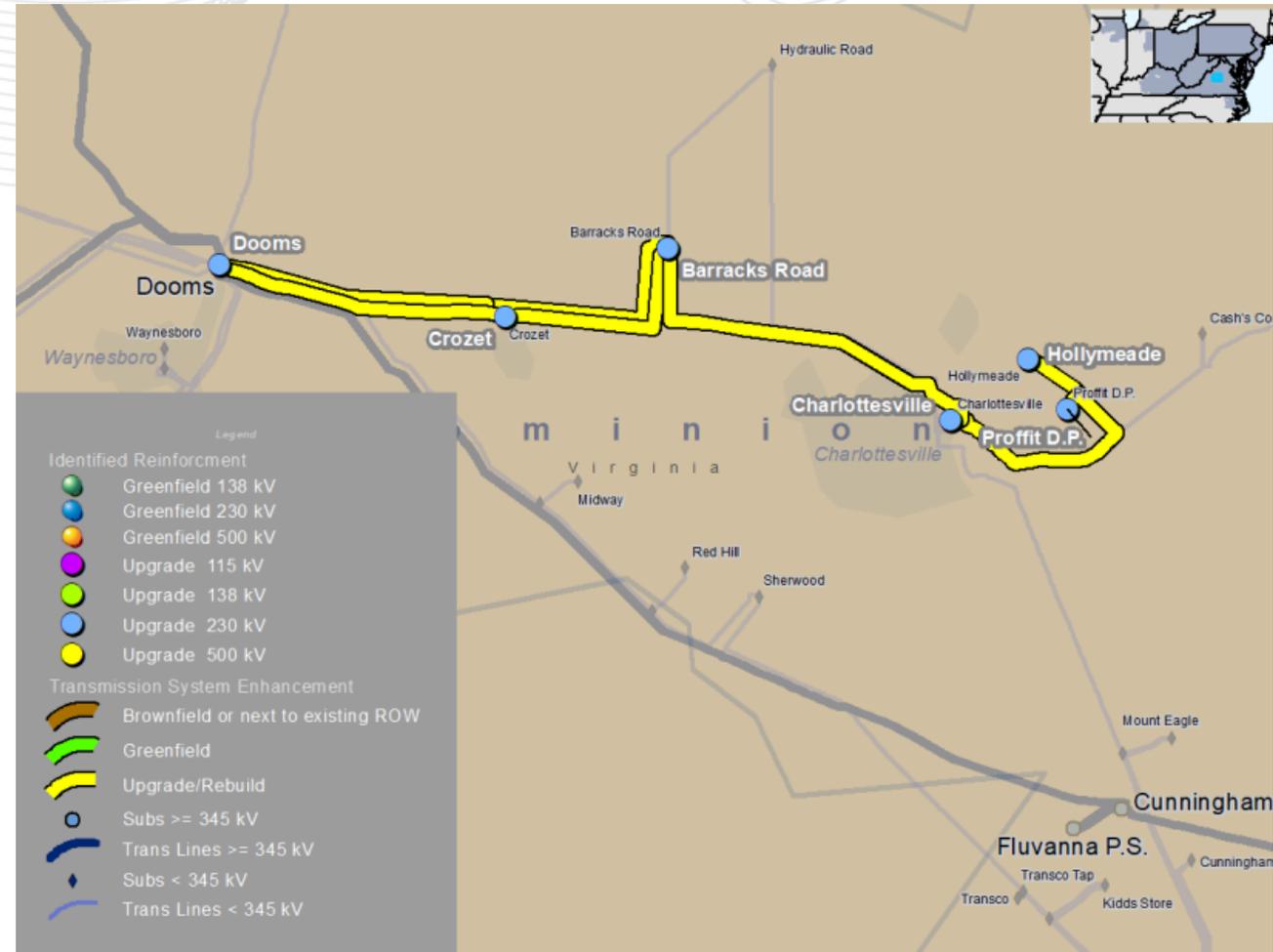
**Estimated Cost: \$183.48 M**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2028**

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**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.



# 2022W3 – Preferred Solutions: South Cluster

## Proposed Solution: 2022-W3-211

- Rebuild 230kV Line #2135 Hollymeade – Gordonsville using double-circuit capable 500/230 kV poles (the 500kV circuit will not be wired as part of this project).
- Terminal equipment upgrades at the following substations:
  - Hollymeade, Gordonsville, Cash’s Corner

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2135 Cash’s Corner - Gordonsville	586/586/741/741
230kV Line #2135 Cash’s Corner - Hollymeade	586/586/741/741

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2135 Cash’s Corner - Gordonsville	1573/1573/1648/1648
230kV Line #2135 Cash’s Corner - Hollymeade	1047/1047/1160/1160

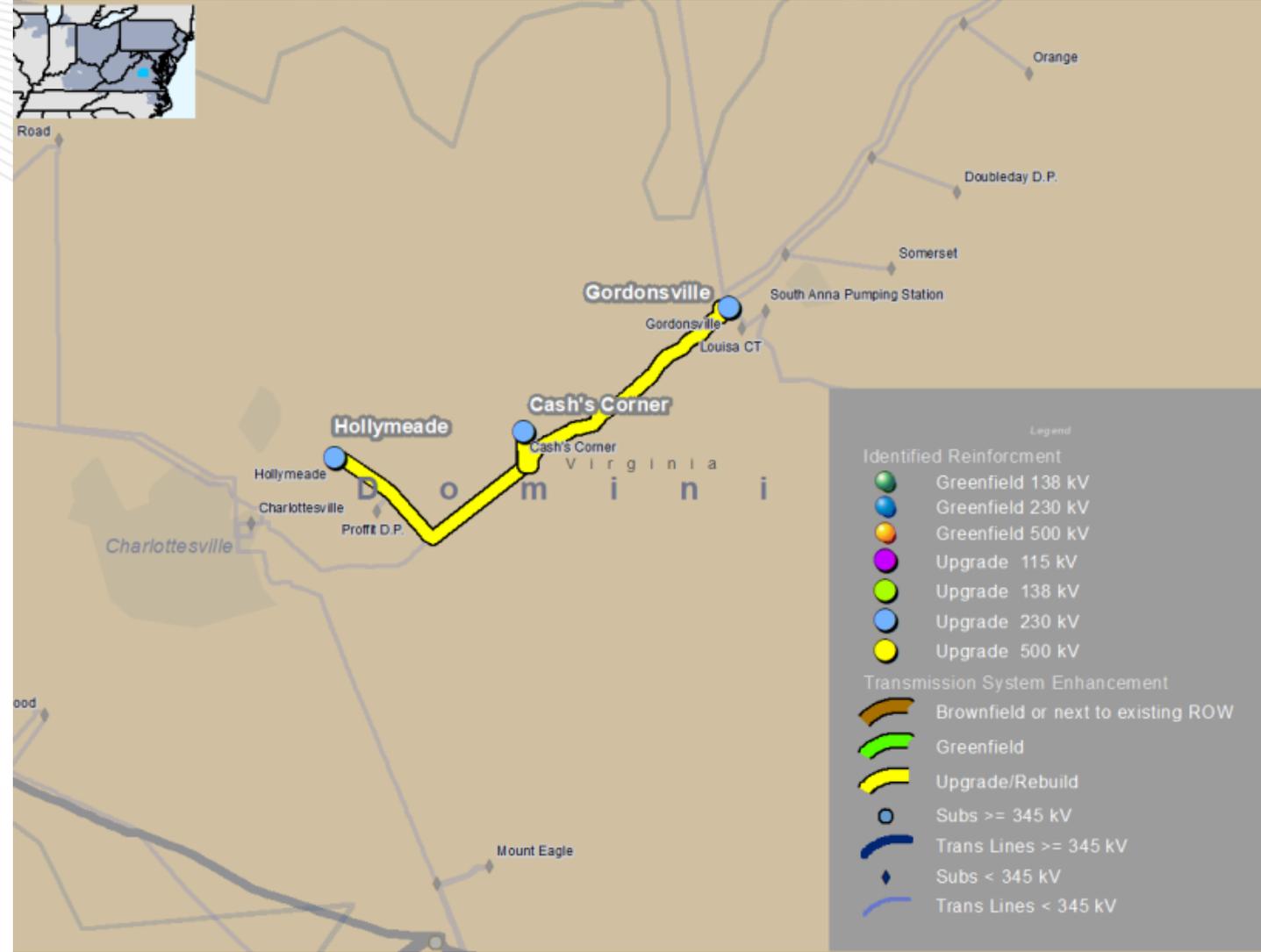
Estimated Cost: \$54.85 M

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2028

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# 2022W3 – Preferred Solutions: South Cluster

## Proposed Solution: 2022-W3-731

- Replace single unit Locks 230/115 kV 168MVA transformer TX #7 with new single unit transformer with a rating of 224 MVA.
- Lead lines at the 115 kV level will be upgraded to 2000 A.

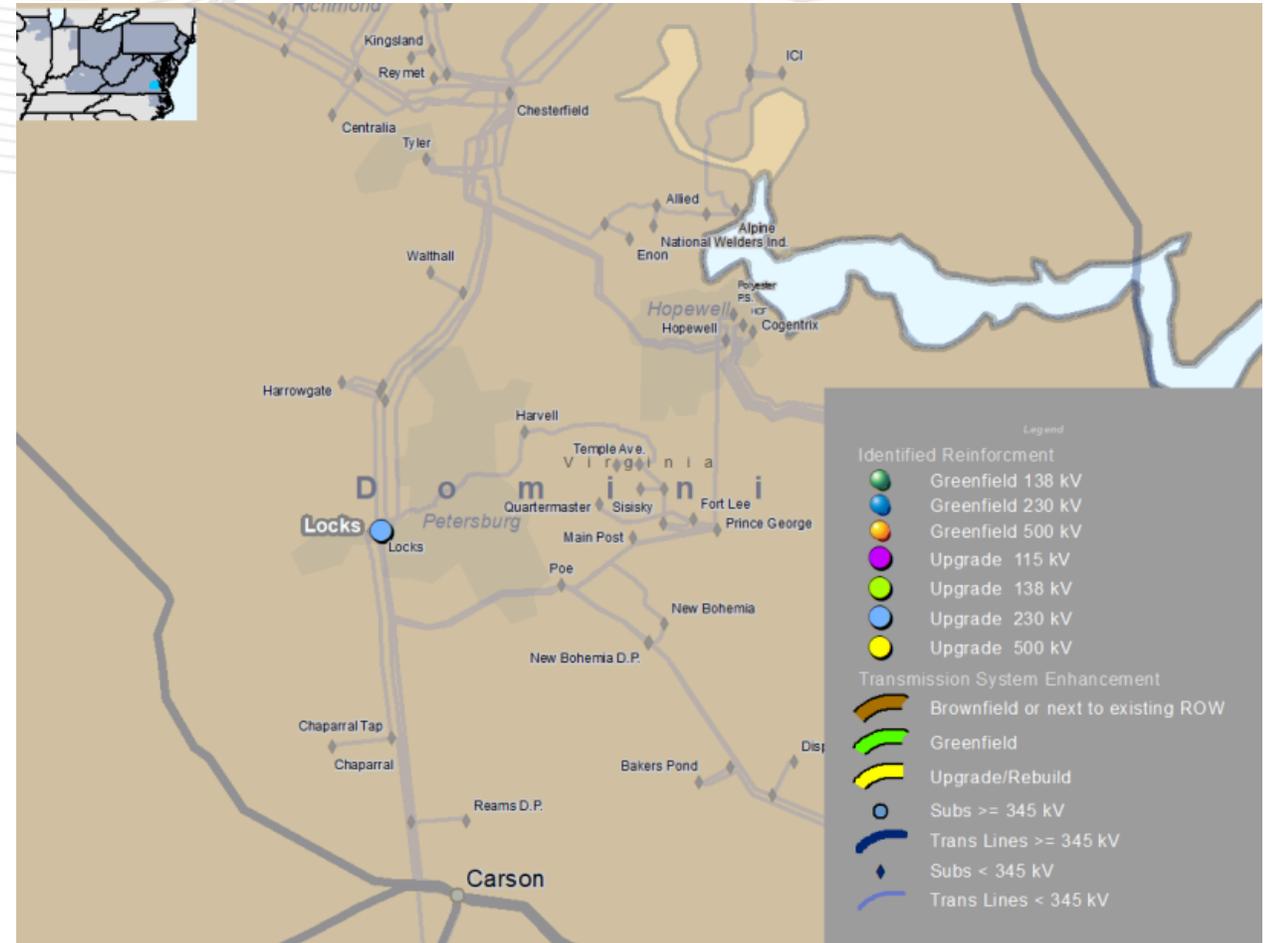
**Estimated Cost: \$7.14 M**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2028**

Continued on next slide...

*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# 2022W3 – Preferred Solutions: South Cluster

## Proposed Solution: 2022-W3-74 Partial

- Wreck and rebuild Line #2090 Ladysmith CT – Summit D.P. segment as a double circuit 230kV line. Only one circuit will be wired at this stage.
- Upgrade circuit breaker leads, switches and line leads at Ladysmith CT.

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2090 Ladysmith CT – Summit D.P	1225/1225/1358/1358

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2090 Ladysmith CT – Summit D.P	1573/1573/1648/1648

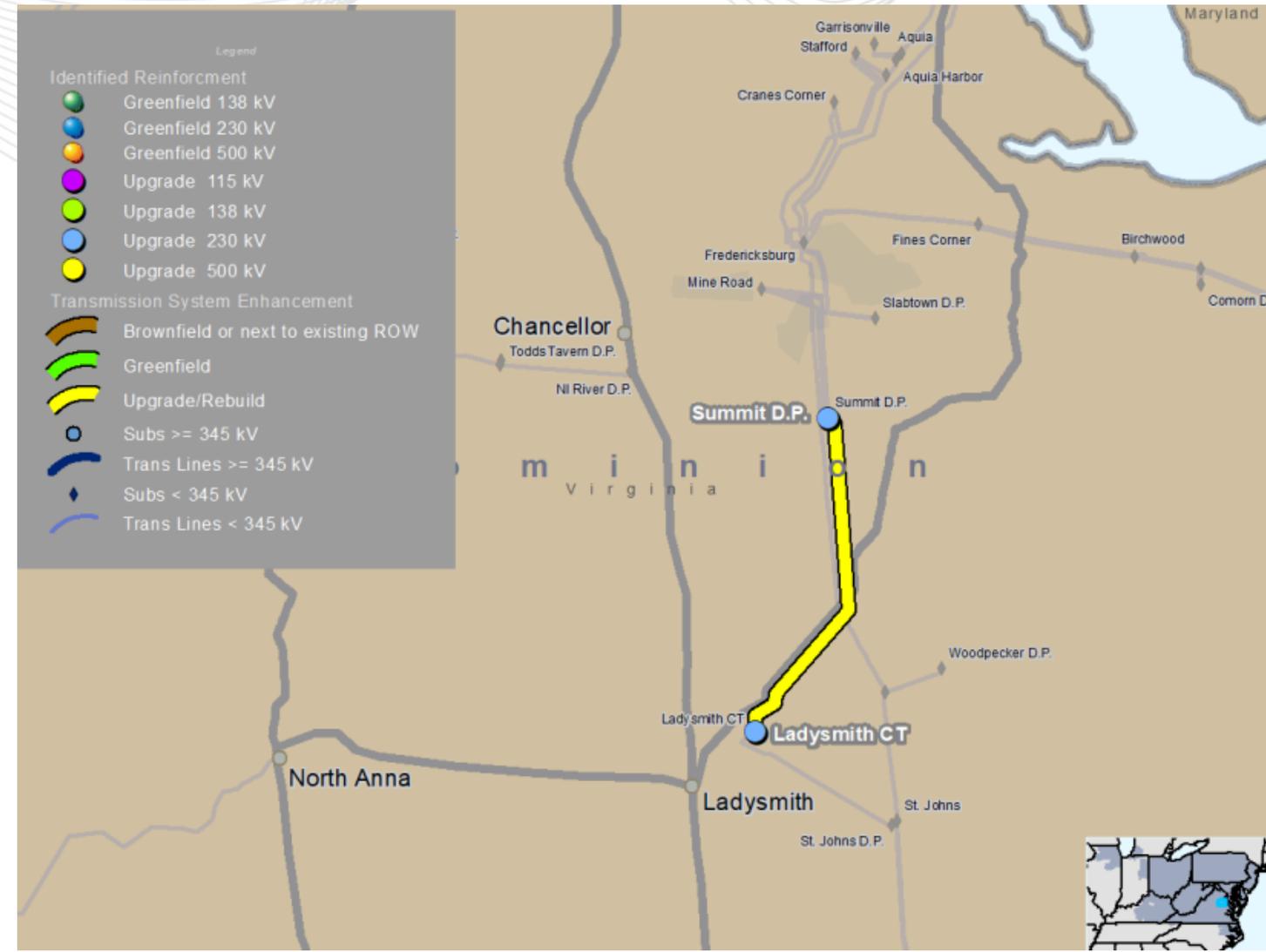
Estimated Cost: \$57.34 M

Required IS Date: 6/1/2027

Projected IS Date: 12/1/2027

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# 2022W3 – Preferred Solutions: South Cluster

## Proposed Solution: 2022-W3-231

- Install 230kV, 500kV shunt cap banks (static devices) as well as STATCOMs (dynamic devices) and associated equipment to address the reactive power needs of the system
  - (1) 500kV, 150 MVar Shunt Capacitor Bank & associated equipment at Morrisville substation
  - (1) 230kV, 150 MVar Shunt Capacitor Bank and (1) 500kV, 293.8MVar Shunt Capacitor Bank & associated equipment at Wishing Star substation
  - (1) 500kV, 300 MVar Static synchronous Compensator (STATCOM) and (1) 230kV, 150MVar Shunt Capacitor Bank & associated equipment at Mars substation
  - (1) 230kV, 300 MVar Static synchronous Compensator (STATCOM) & associated equipment at Beaumeade substation

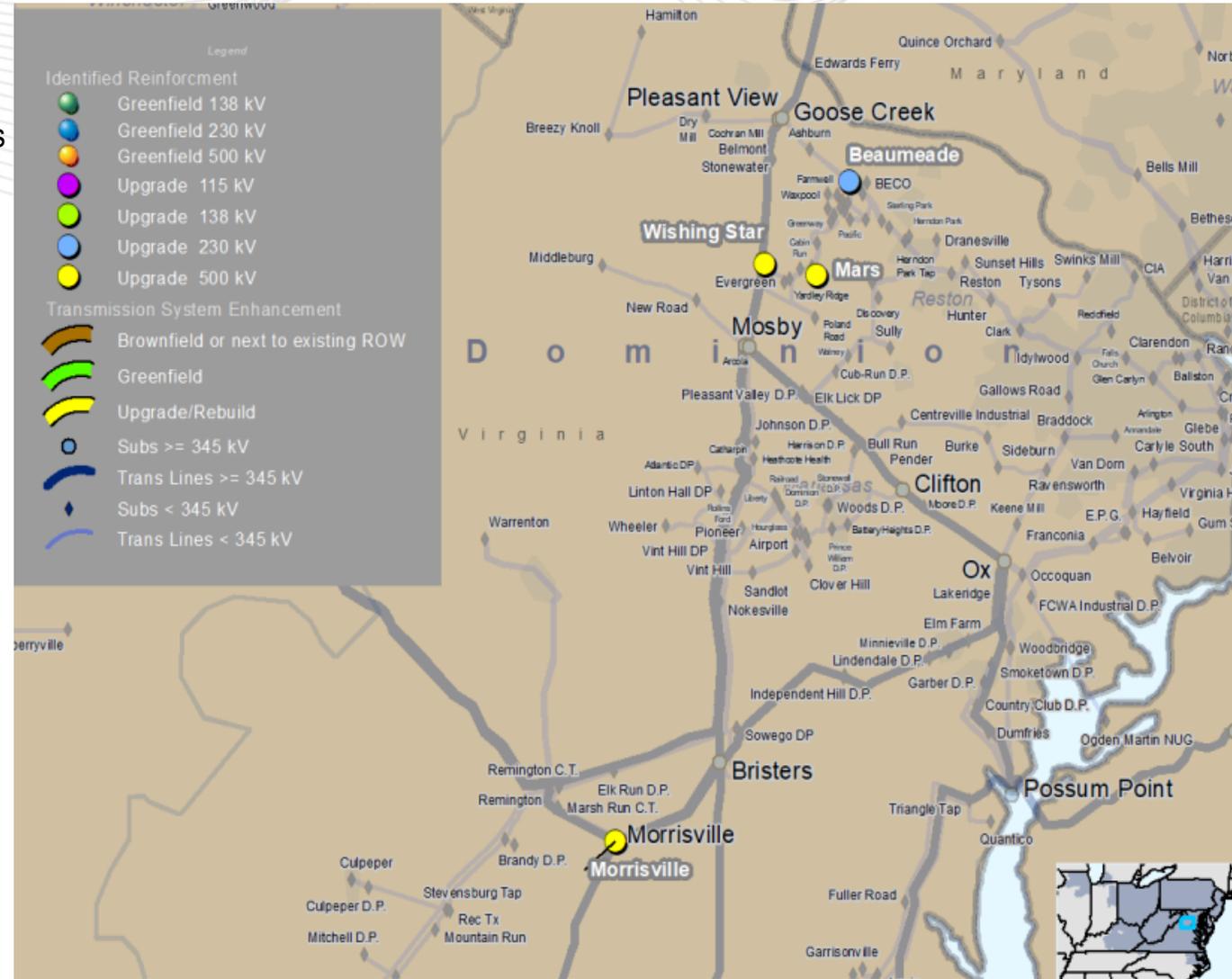
Estimated Cost: \$103.80 M

Required IS Date: 6/1/2027

Projected IS Date: 12/1/2027

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# 2022W3 – Preferred Solutions: South Cluster

## Proposed Solution: Additional upgrades

- Uprate 12.44 miles of 230kV circuit 256 from St. Johns to Ladysmith CT
- Approximately 7.14 miles of the line from St Johns Substation to 256/108 is supported by a mix of single circuit wood and steel H-frames installed in 1991. This portion of the line will be rebuilt with a mix of light duty steel DOM pole tangent H-frames and engineered steel 3-pole deadend angle structures. The proposed conductor for the rebuilt line will be 2-768 ACSS “Maumee” with dual 48 fiber DNO-11410 for shielding.
- The remaining 5.30 miles of the line from structure 256/107 to Ladysmith CT is supported on double circuit lattice towers installed in 2010-2011. This portion of the line will be reconducted with proposed 2-768 ACSS “Maumee” conductor and the existing structures and shield wire will remain.
- Transmission line switch 25666 will be upgraded to 4000A at St. Johns Substation. Terminal equipment at remote end substations will be upgraded to 4000A continuous current rating to support new conductor ratings.

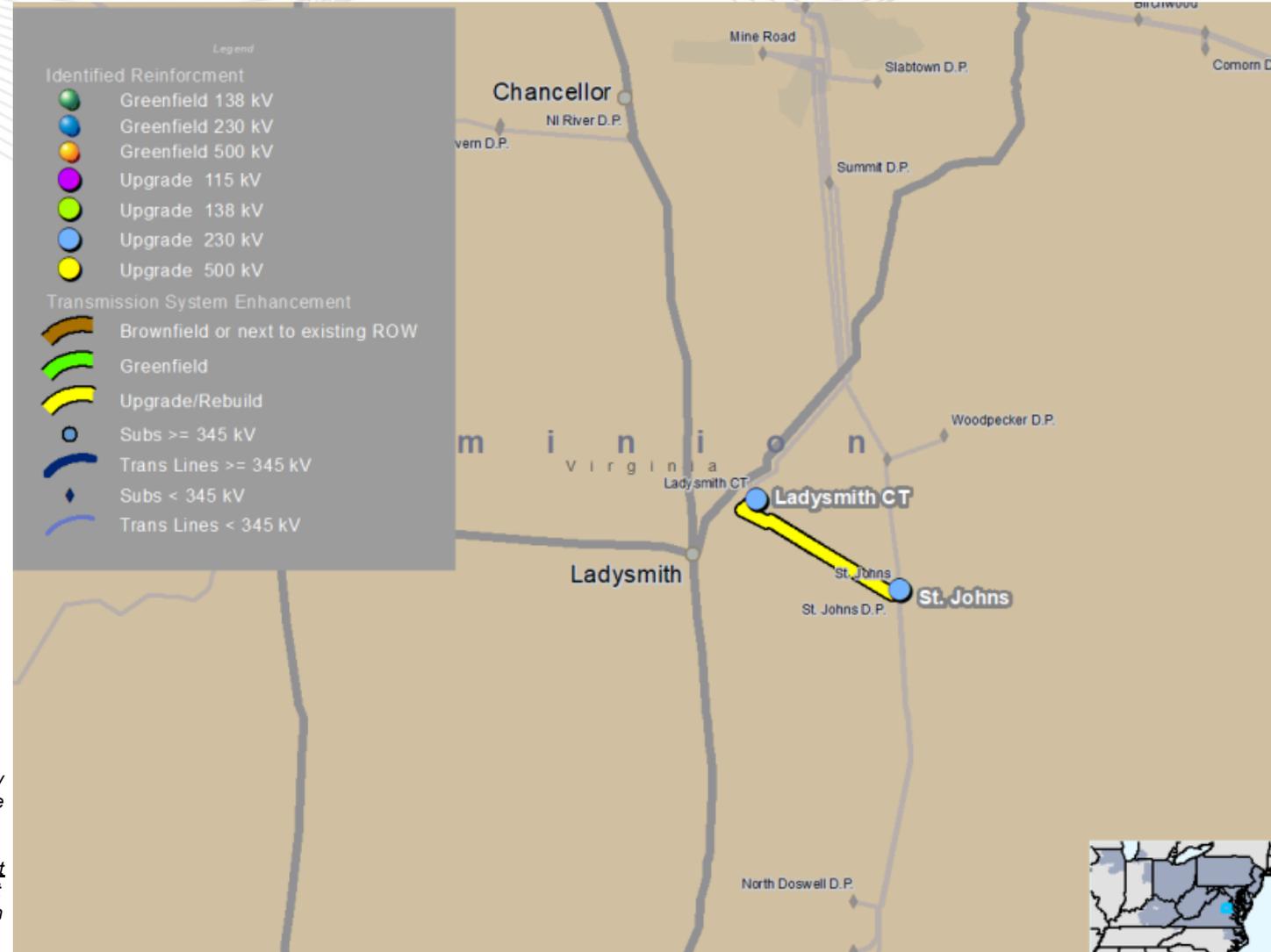
**Estimated Cost: \$37.89 M**

**Total Estimated South Cluster Cost: \$1398.21 M**

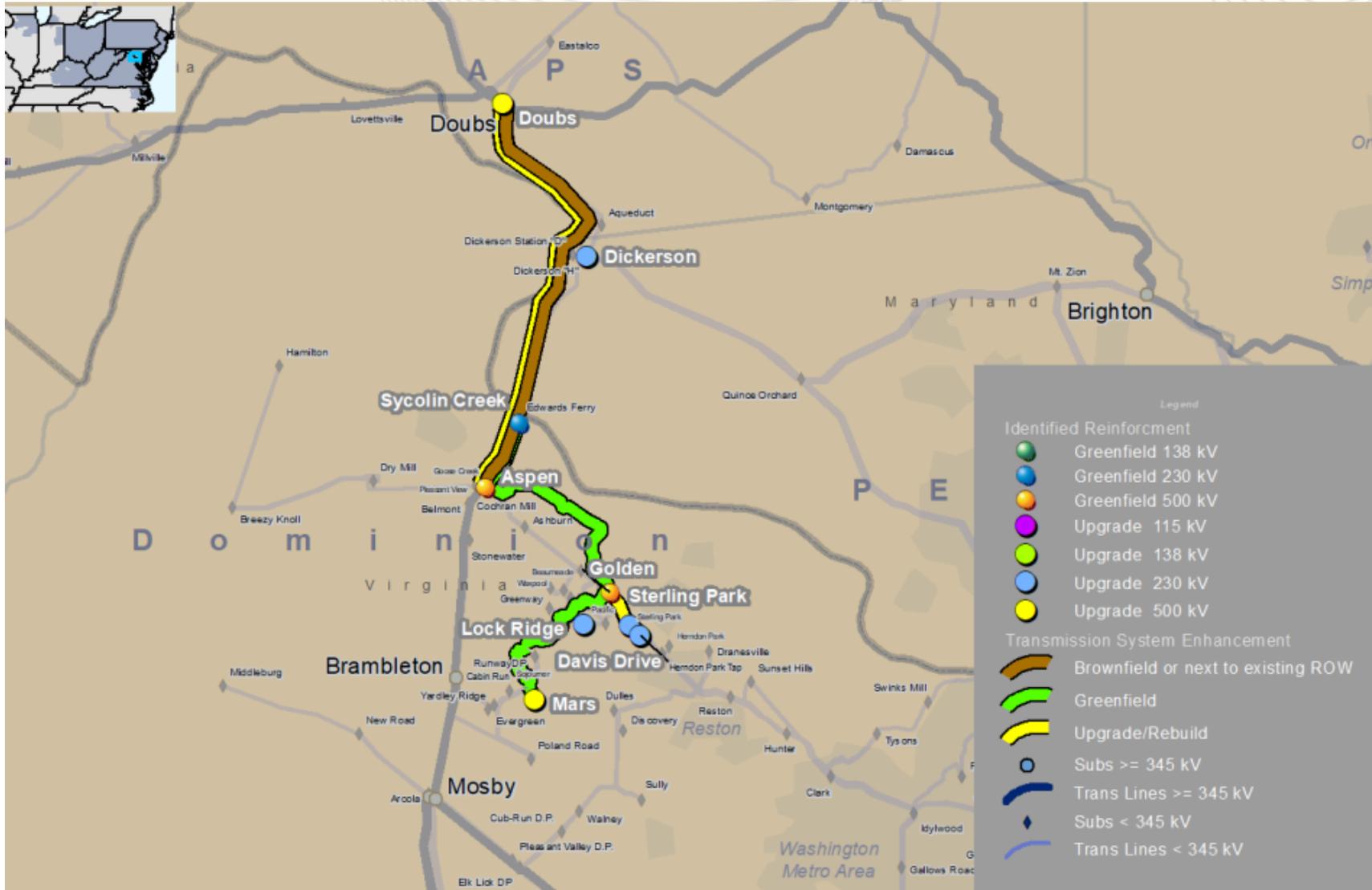
**Required IS Date: 6/1/2028**

**Projected IS Date: 6/1/2028**

***NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

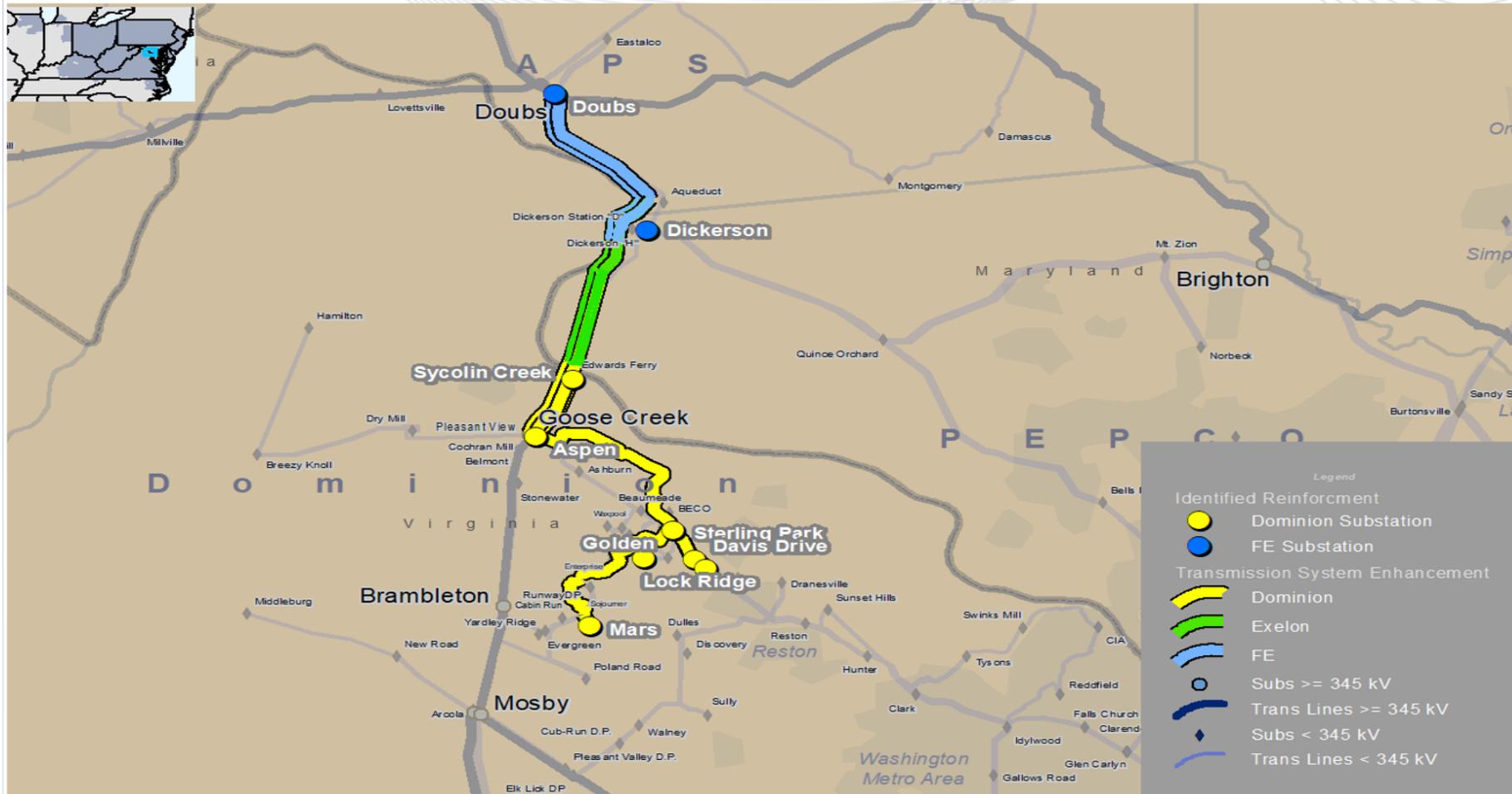


# 2022W3 – Preferred Solutions: North Virginia/Doubs Cluster



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Preferred Solutions: North Virginia/Doubs Cluster by Designated Entity

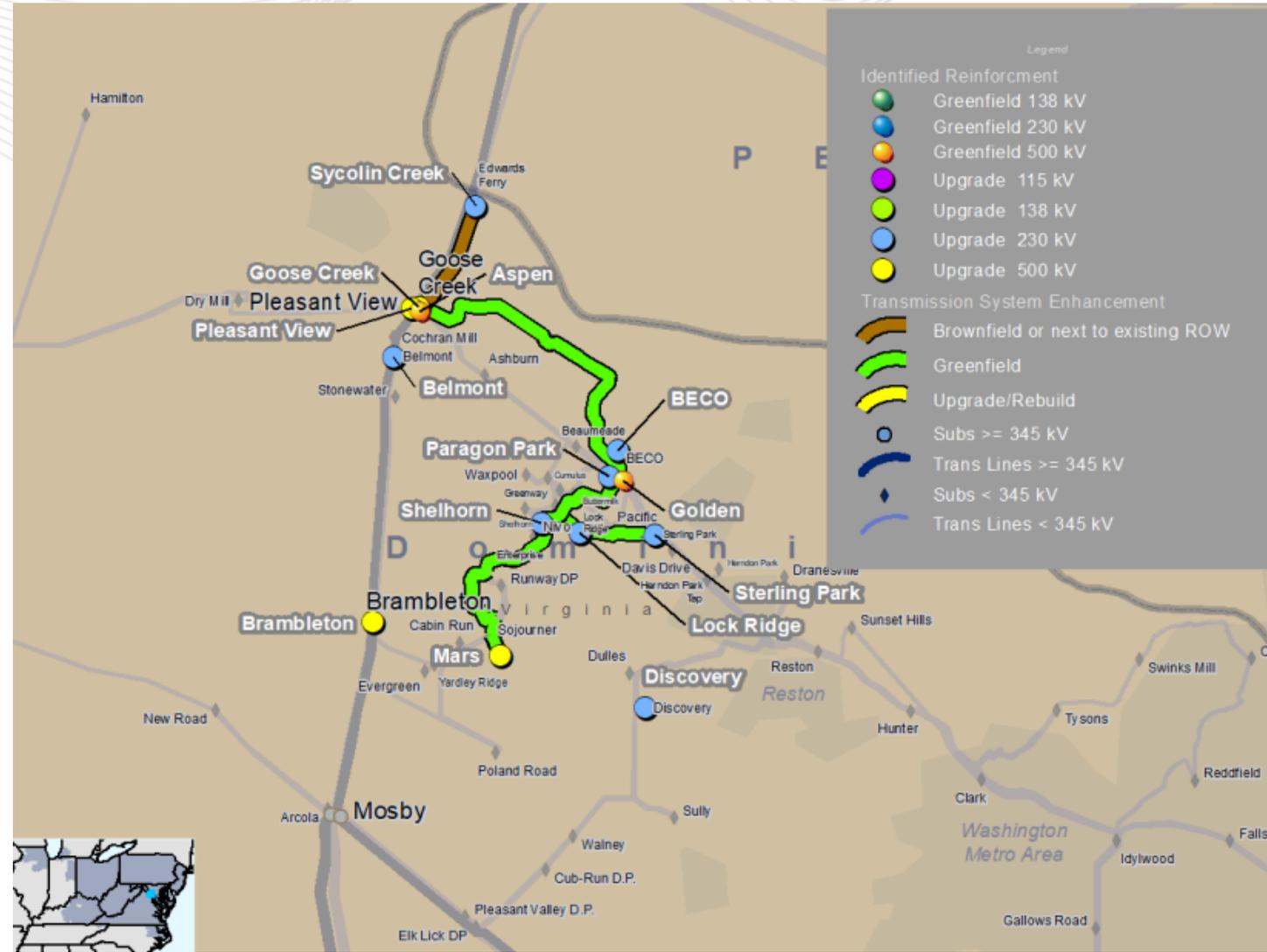


R3: Correction to the designated entity portions of the lines between Doubs and Goose Creek

**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

## Proposed Solution: 2022-W3-692

- Construct new double-circuit 500/230 kV lines from Aspen substation to Golden substation
  - 230kV Line will connect Aspen – Sycolin Creek – Golden
- Construct new double-circuit 500/230 kV lines from Golden substation to Mars substation
  - 230kV Line will connect Golden – Lockridge – Mars
- Construct a new 500kV Line from Aspen to Goose Creek
- Install the 2<sup>nd</sup> 500-230 kV 1440 MVA transformer at Mars Substation
- Construct a new Aspen 500/230kV substation by tapping 500kV Line #558
- Construct a new Golden 500/230kV substation
- Upgrade existing double-circuit 230 kV lines from Golden substation to Paragon Park substation (Lines # 2150 & 2081)
- Upgrade existing single circuit 230 kV line from Paragon Park substation to BECO Substation (Line # 2207) to a minimum normal summer rating of 1573 MVA. Equipment at each substation will be upgraded to support the new conductor rating of 4000A
- Equipment upgrades at the following substations:
  - Paragon Park, BECO
- Golden relay setting reset
- Replace overduited breakers at Belmont, BECO, Beaumeade, Pleasant View, Shellhorn, and Discovery.



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should *not* be relied upon for exact geographical substation locations or line routes.



**Estimated Cost: \$1058.45 M**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2028**

Continued on next slide...

# 2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

## Proposed Solution: Additional upgrades

- Reconductor 1.47 miles of 230kV circuits 2081 and 2150 from Sterling Park to Golden substation
- Reconductor 0.67 miles of 230kV circuits 2194 and 9231 from Davis Drive to Sterling Park substation

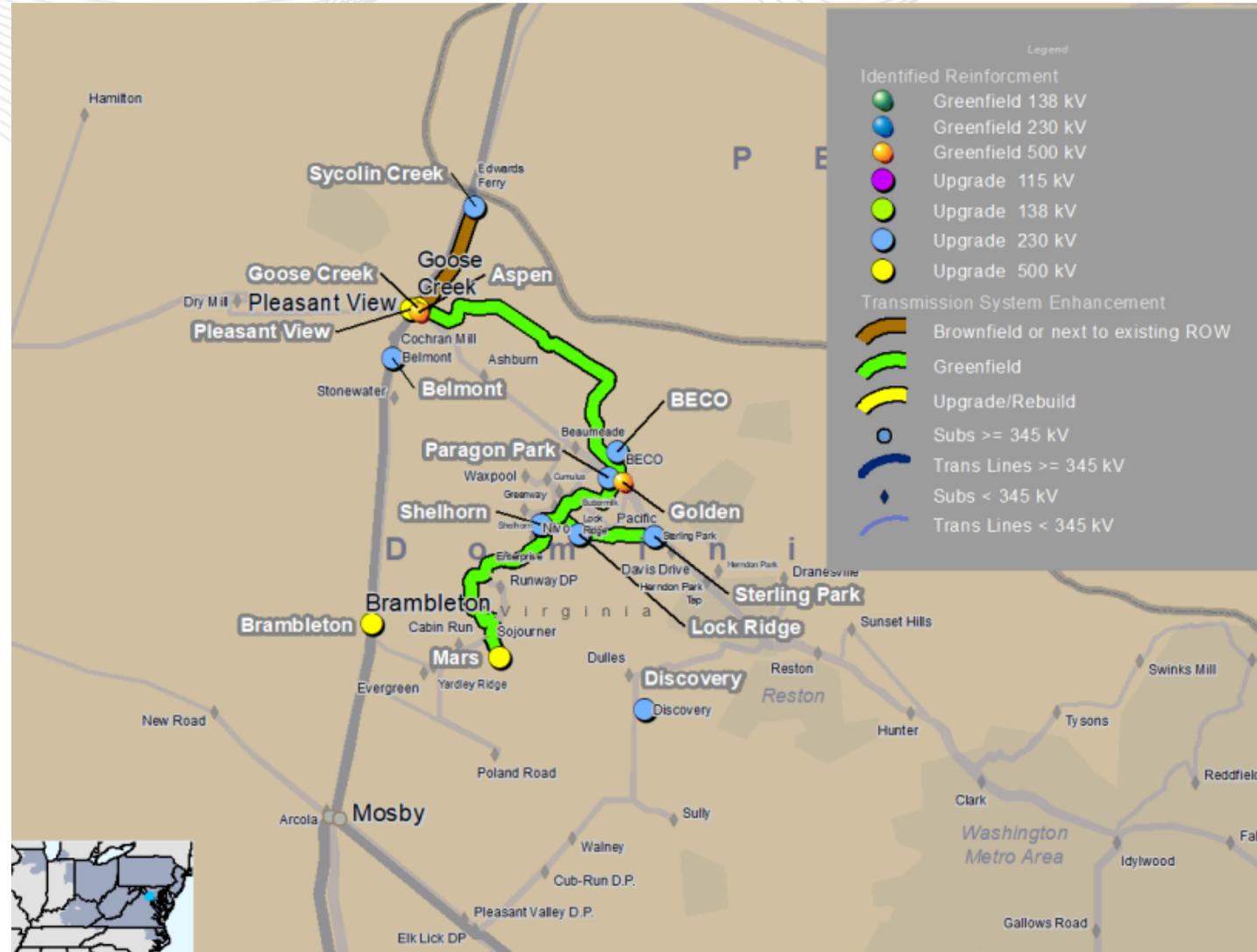
Estimated Cost: \$13.50 M

Total Estimated Northern Virginia/Doubs Cluster Cost: \$1435.07 M

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2028

**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.



# 2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

## Proposed Solution: 2022-W3-516 (Dominion)

- Rebuild 500kV Line #514 Doubs – Goose Creek using double circuit 500kV/230kV towers on foundations. Scope covers line construction between Goose Creek and the Doubs Interconnection point, which is south of the Potomac River.
- Construct a new 500kV Line between Doubs and a new substation called Aspen. Scope covers line construction between Aspen and the Doubs Interconnection point, which is south of the Potomac River.
- Rebuild 230kV Line #203 Pleasant View – Dickerson (from Pleasant View substation and structure 203/15 within the existing ROW using double circuit 500kV/230kV towers on foundations.
- Wreck and rebuild approximately 1 mile of 230kV Line #2098 between Pleasant View and Structure 2098/9, where Line 2098 turn towards Hamilton Substation. The 1 mile portion will share the new double circuit 500/230kV towers with Line 514, which is being rebuilt as part of this project.
- Relay resets/revisions at the following substations:
  - Breezy Knoll, Dry Mill, Hamilton
- Terminal equipment upgrades at the following substations:
  - Goose Creek, Pleasant View, Edwards Ferry
- Replace overdutied breakers at Loudoun, Ox, Pleasant View.

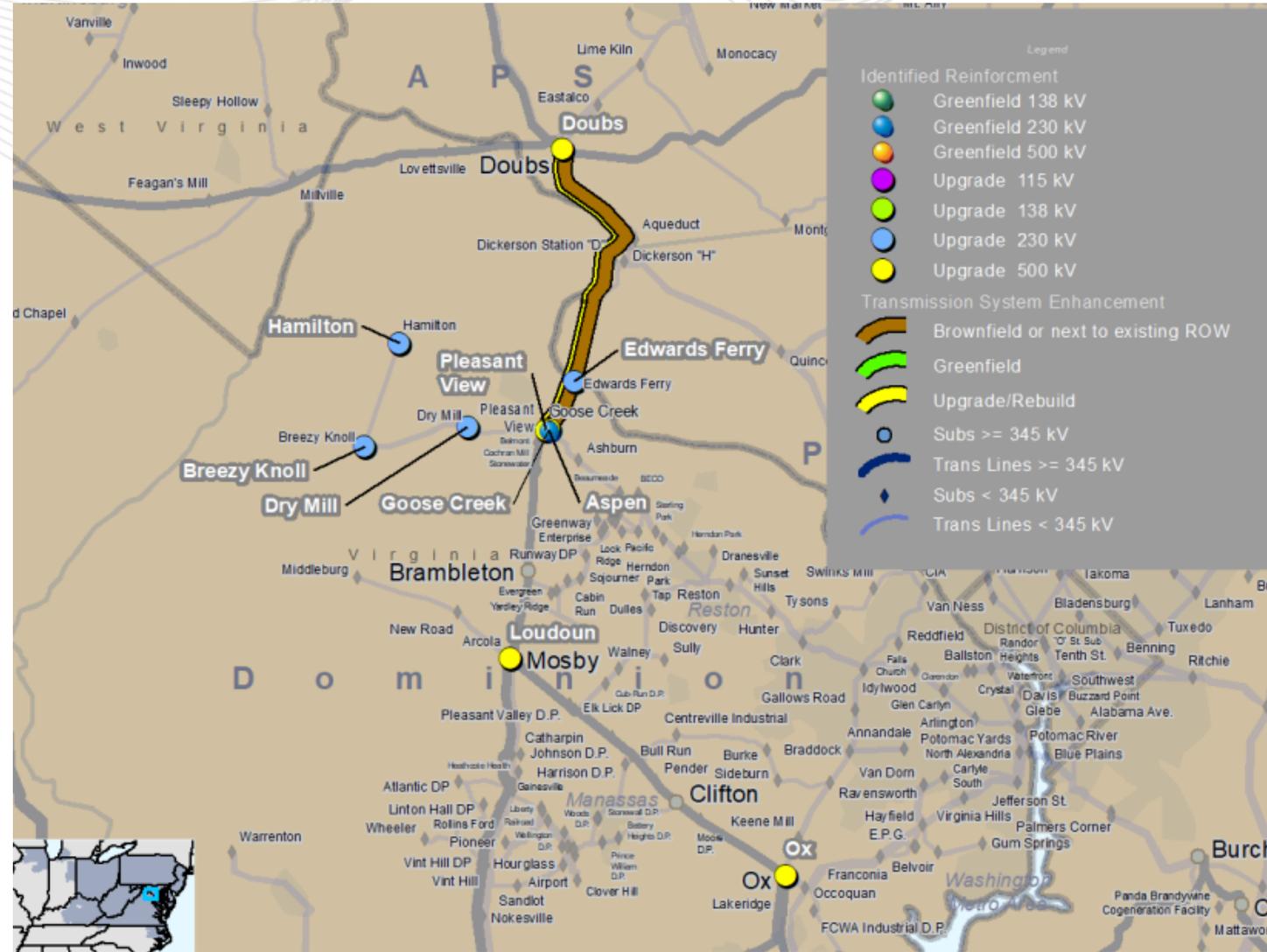
Estimated Cost: \$61.72 M

Required IS Date: 6/1/2027

Projected IS Date: 12/1/2027

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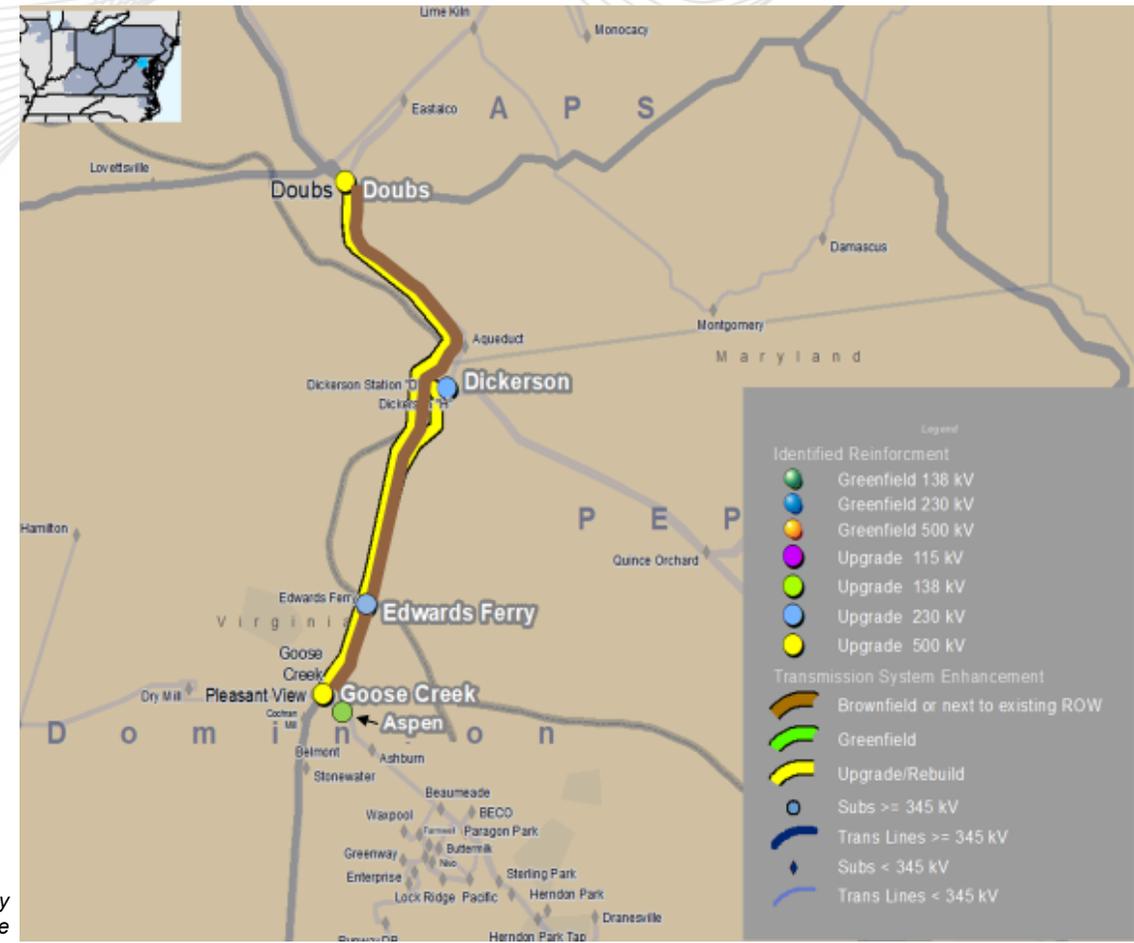
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should *not* be relied upon for exact geographical substation locations or line routes.



# 2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

## Exelon:2022-W3-344/660

- Exelon portion of the New 500 kV Doubs to Goose Creek utilizing Existing Exelon ROW
  - Rebuild 7.26 miles of existing 230 kV circuit from Dickerson Station H to Ed's Ferry area to accommodate the new 500 kV circuit between Doubs and Goose Creek. The new structure will carry both 500 kV and the 230 kV from Dickerson Station H to Ed's Ferry circuits. **(Exelon)**
    - 500 kV New Rating 4357SN/4357SE/WN5155/2155WE MVA
    - 230 kV New Rating 1618SN/1867SE/WN1702/1951WE MVA
  - Reconfigure Dickerson H 230 kV Substation and upgrade terminal equipment. **(Exelon)**



*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

**Proposed Cost Estimate: \$66.4 M**  
**Required In-Service Date : 6/1/2027**  
**Projected In-Service Date : 2028-2030**

# 2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

- **FirstEnergy:2022-W3-837 (Existing Doubs to Goose Creek 500 kV rebuild and New Doubs to Aspen 500 kV line)**
  - **Rebuild 500kV Line #514 from Doubs – Goose Creek 500 kV line.** The Doubs – Goose Creek 500 kV Line will be rebuilt and the Doubs - Dickerson 230 kV will be relocated and underbuilt on the same structure - **(FE Cost Estimate: \$87.7M)**
  - **New Doubs to Aspen 500 kV line** - Aspen Substation is not yet constructed but is a component in Dominion's proposal 2022-W3-692. The Doubs - Aqueduct and Aqueduct - Dickerson 230 kV lines will be rebuilt and attached on the same structures. - **(FE Cost Estimate: \$115.6M)**
  - **Doubs Substation work** - Re-terminate the rebuilt Doubs – Goose Creek 500 kV line in its existing bay, Terminate the new Doubs – Aspen 500 kV line in the open bay at Doubs, Replace three 500 kV breakers, Replace 500 kV terminal equipment including disconnect switches, CTs and substation conductor & Replace relaying - **(FE Cost Estimate: \$31.7M)**

**Preliminary Facility Ratings:**

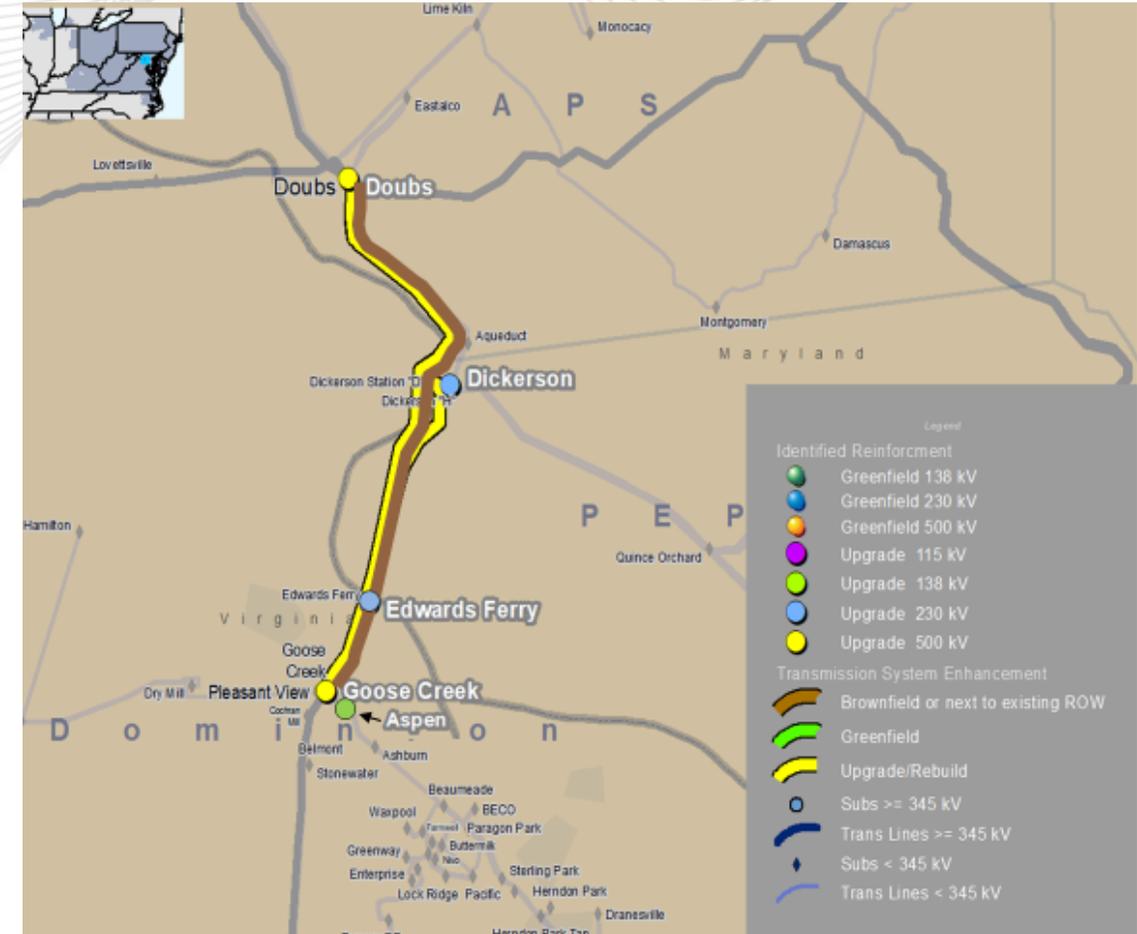
Branch	SN/SE/WN/WE (MVA)
Doubs – Goose Creek 500 kV Rebuild	4357/4357/5155/5155
Doubs – ASPEN 500 kV	

Estimated Cost: \$235M

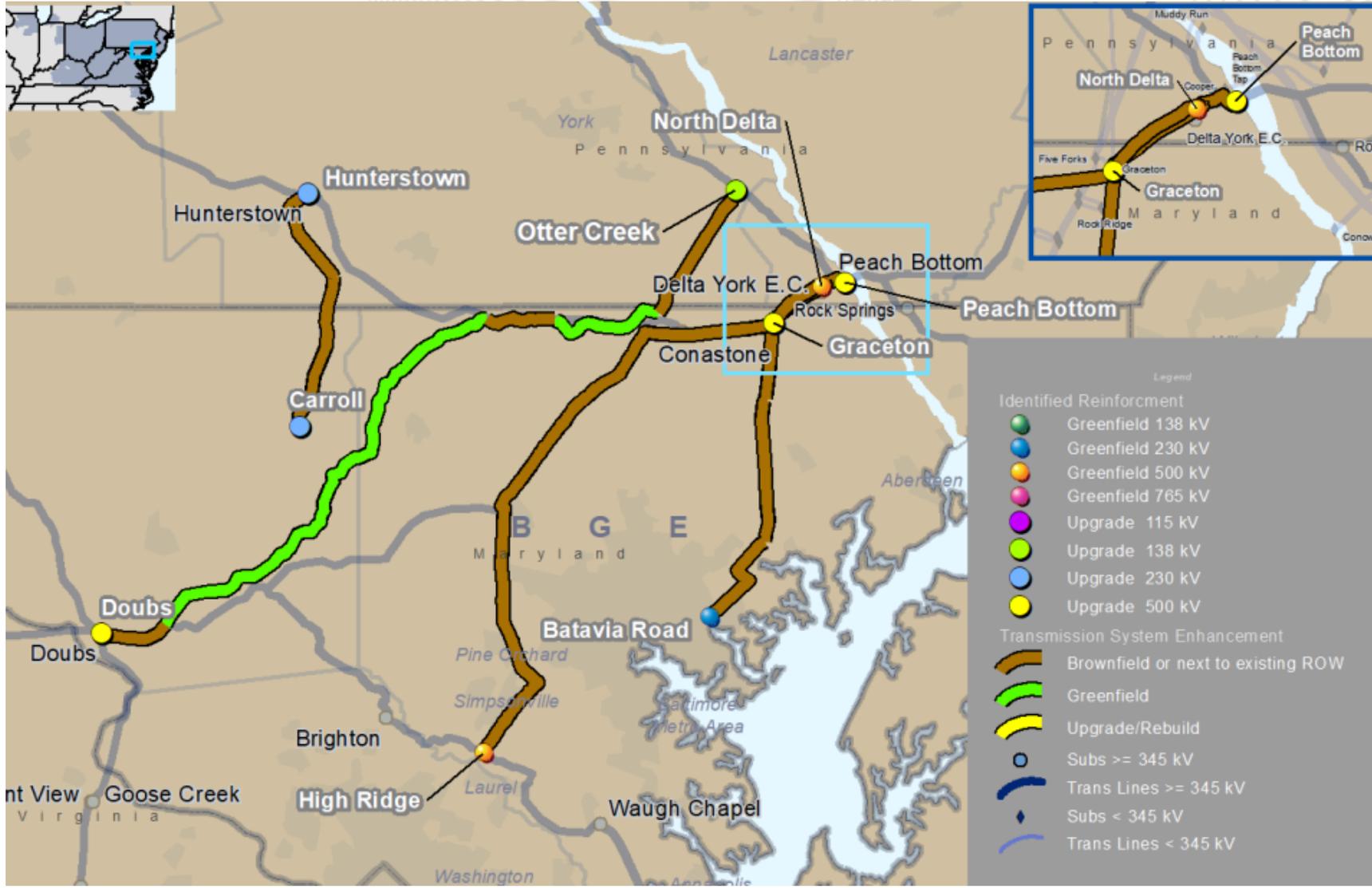
Required IS Date: 6/1/2027

Projected IS Date: 6/1/2030

*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

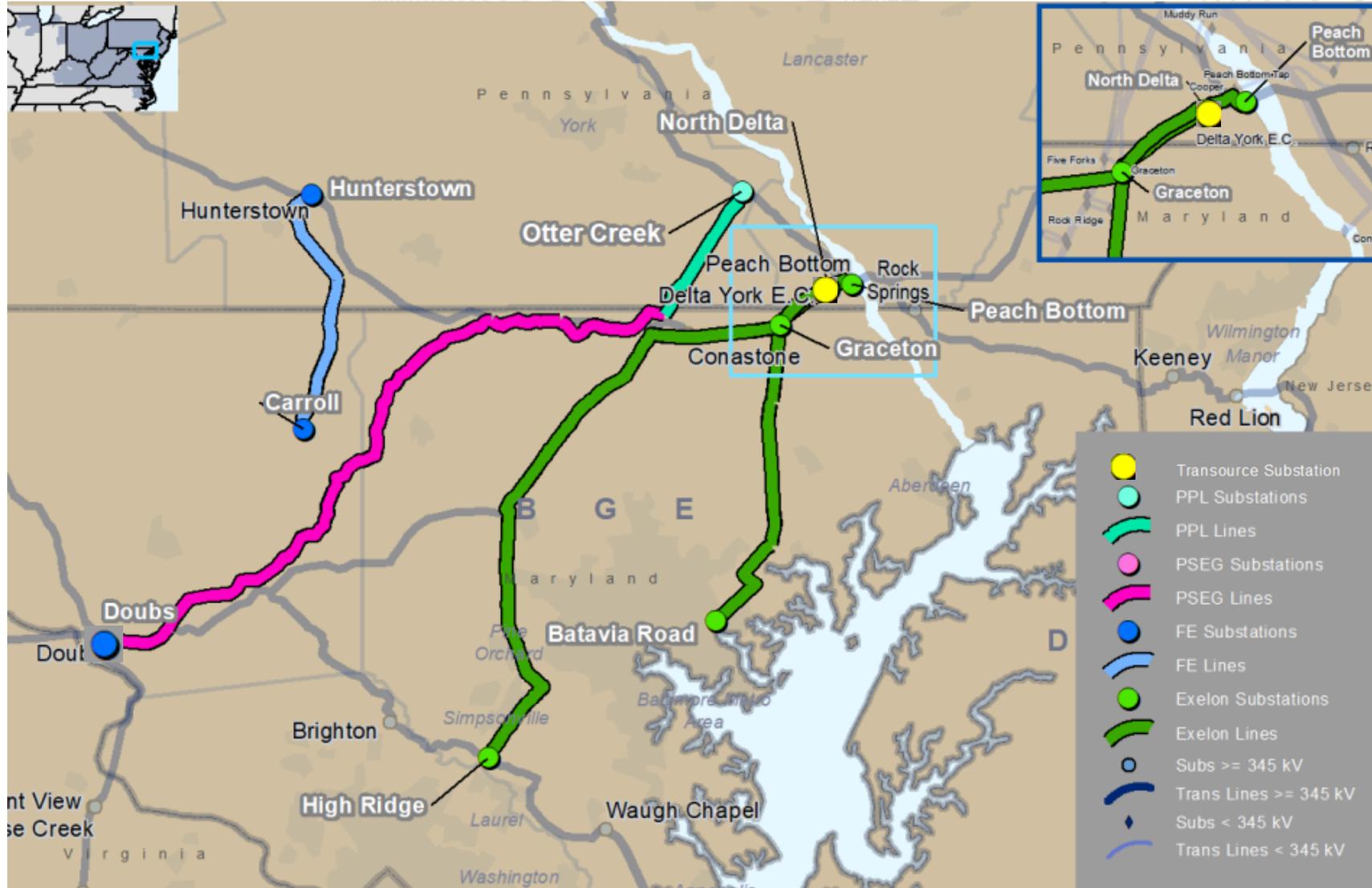


# 2022W3 – Preferred Solutions: East Cluster



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Preferred Solutions: East Cluster by Designated Entity



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

## Summary of Proposal Clusters - East

- Seven entities submitted several proposals to address the East cluster violations including the Hunterstown area
- PJM evaluated various combinations of the proposals/components.
- PJM finalized the study and identified the most effective solution
- The solution consists of Regional and local projects including:
  - Three new 500 kV substations and one new 230 kV switching station
  - Three new 500 kV transmission lines
  - Rebuilding of one 500 kV transmission line
  - Three new 230 kV transmission lines

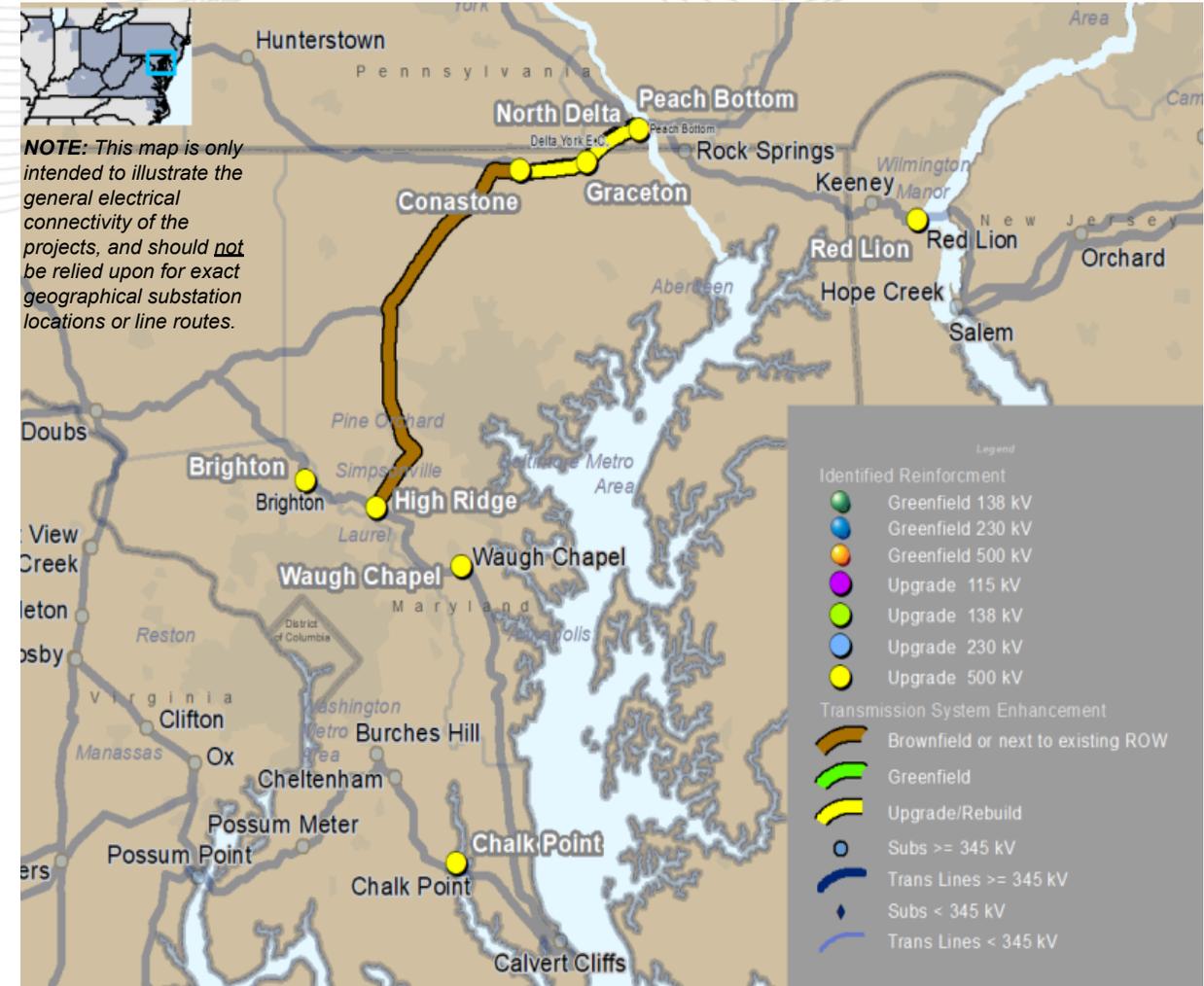
# Preferred Proposals to Address Clusters - East

## Exelon:2022-W3-344/660

### Regional Substation Projects

- Expand North Delta 500 kV substation (**scope beyond that proposed under BS De-Activation**)
  - The 2022 W3 RTEP requires an expansion of the North Delta 500 kV substation to accommodate the termination of the new 500 kV lines as well as reconfiguration of the Peach Bottom substation
  - Expand the North Delta 500 substation to include four bay breaker and half configuration
- Build High Ridge 500 kV substation (cut into Brighton – Waugh Chapel 500 kV line)
  - Three bay breaker and half configuration
  - Two 500/230 kV transformers
  - Replace terminal equipment at both Brighton and Waugh Chapel

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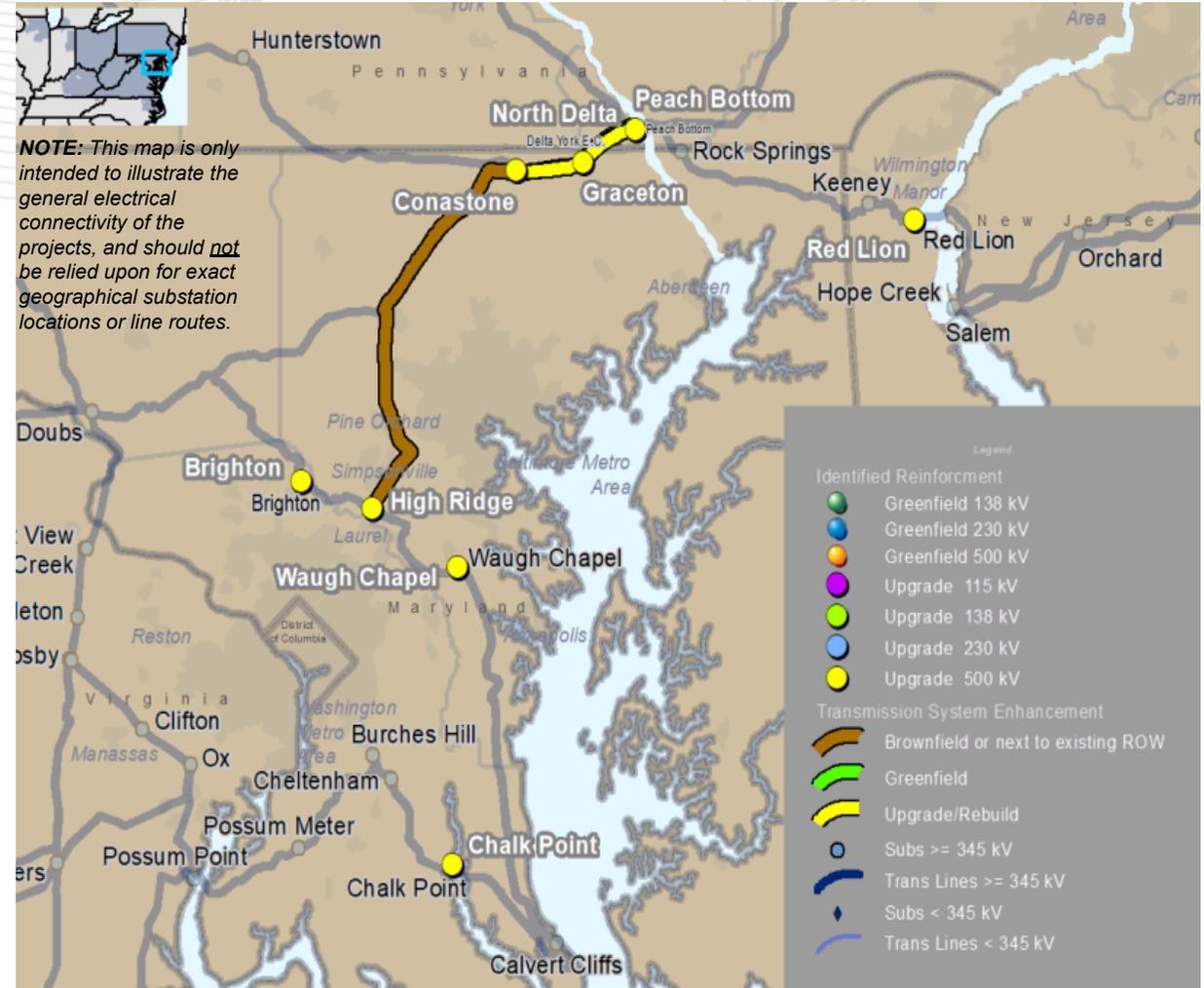
# Preferred Proposals to Address Clusters - East

## Exelon:2022-W3-344/660

### Regional Transmission Projects

- Build new 500 kV lines from Peach Bottom area to BGE utilizing existing ROW
  - Build new Peach Bottom South - North Delta 500kV line – cut in to Peach Bottom tie #1 and extending line to North Delta (~1.25 miles new ROW)
    - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
  - Rebuild 5012L (existing Peach Bottom – Conastone) 500 kV line on single circuit structures within existing ROW and cut into North Delta 500 kV and Gracetone 500 kV stations.
    - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
  - Build new North Delta – High Ridge 500 kV line. (~65 miles)
    - New Rating - 4503SN/5022SE/5206WN/5802WE MVA

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# Preferred Proposals to Address Clusters - East

## Exelon:2022-W3-344/660

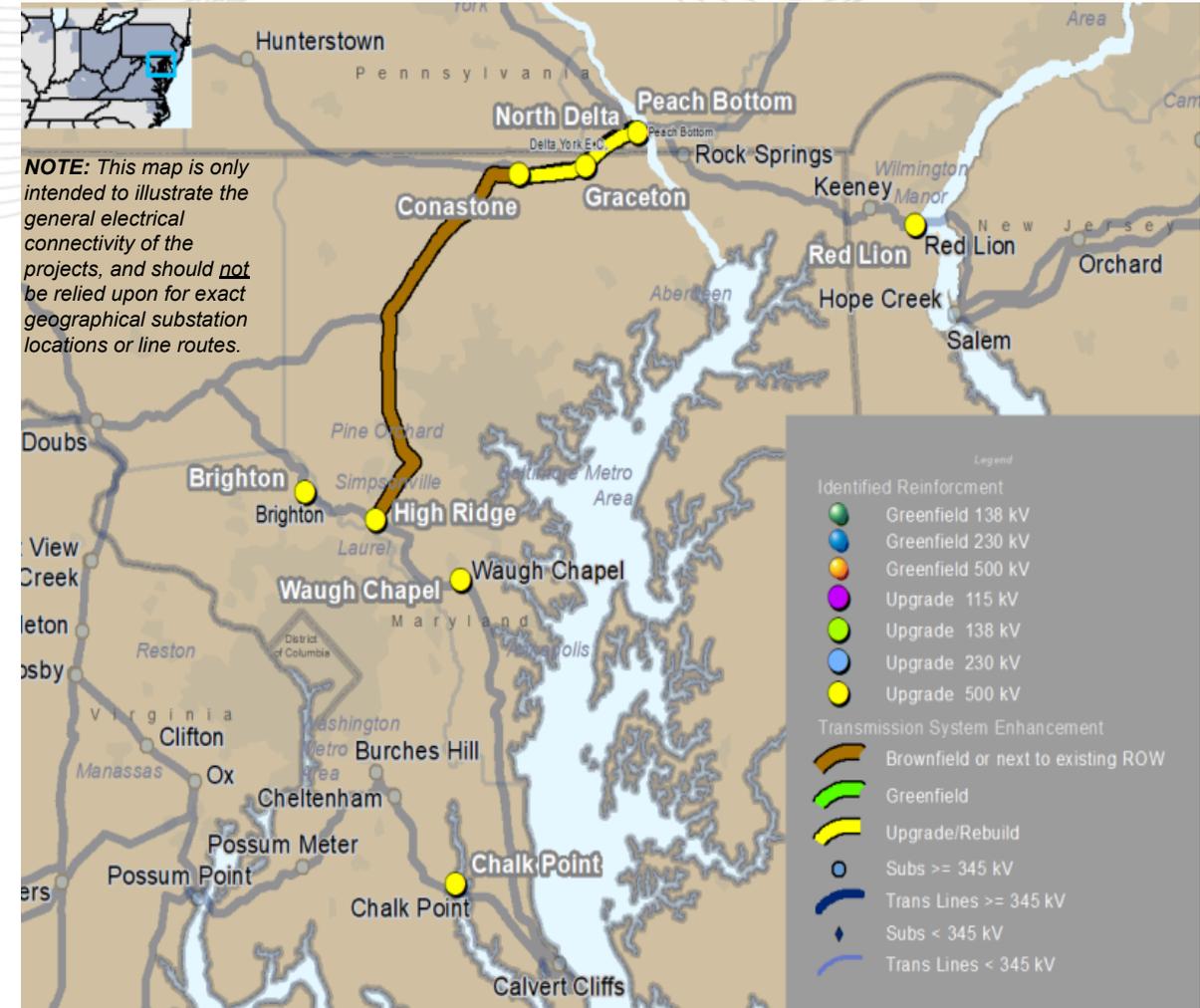
Additional Exelon Upgrades to address the East Cluster

- Conastone - Brighton 500 kV (5011 circuit) - Replace terminal equipment limitations at both Conastone and Brighton 500 kV –(New Rating 2920SN/3598SE/3594WN/4264WE)
- Brighton - Waugh Chapel 500kV (5053) - Replace terminal equipment limitations at Brighton 500kV –(New Rating 3498SN/4070SE/4014WN/4010WE MVA)
- Chalk Point - Cheltenham 500 kV (5073) - Replace relay at Chalk Point 500 kV –(New Rating – 2670SN/3099SE/3064WN/3567WE MVA)
- Conastone - Peach Bottom 500 kV (5012 circuit)- Upgrade (2) existing 500 kV breakers at Conastone from 4000A to 5000A. (New Rating - 4503SN/5022SE/5206WN/5802WE MVA )
- Peach Bottom 500 kV – Reconfigure and upgrade several terminal/substation equipment at both North and South Peach Bottom 500 kV substations
- Red Lion - Hope Creek 500 kV - Replace terminal equipment at Red Lion (New Rating – 2598SWN/SWE MVA)
- Install 250 MVAR at Graceton 230 kV

**Proposed Cost Estimate: \$781 M**

**Required In-Service Date : 6/1/2027**

**Projected In-Service Date : 2028-2030**



# Preferred Proposals to Address Clusters - East

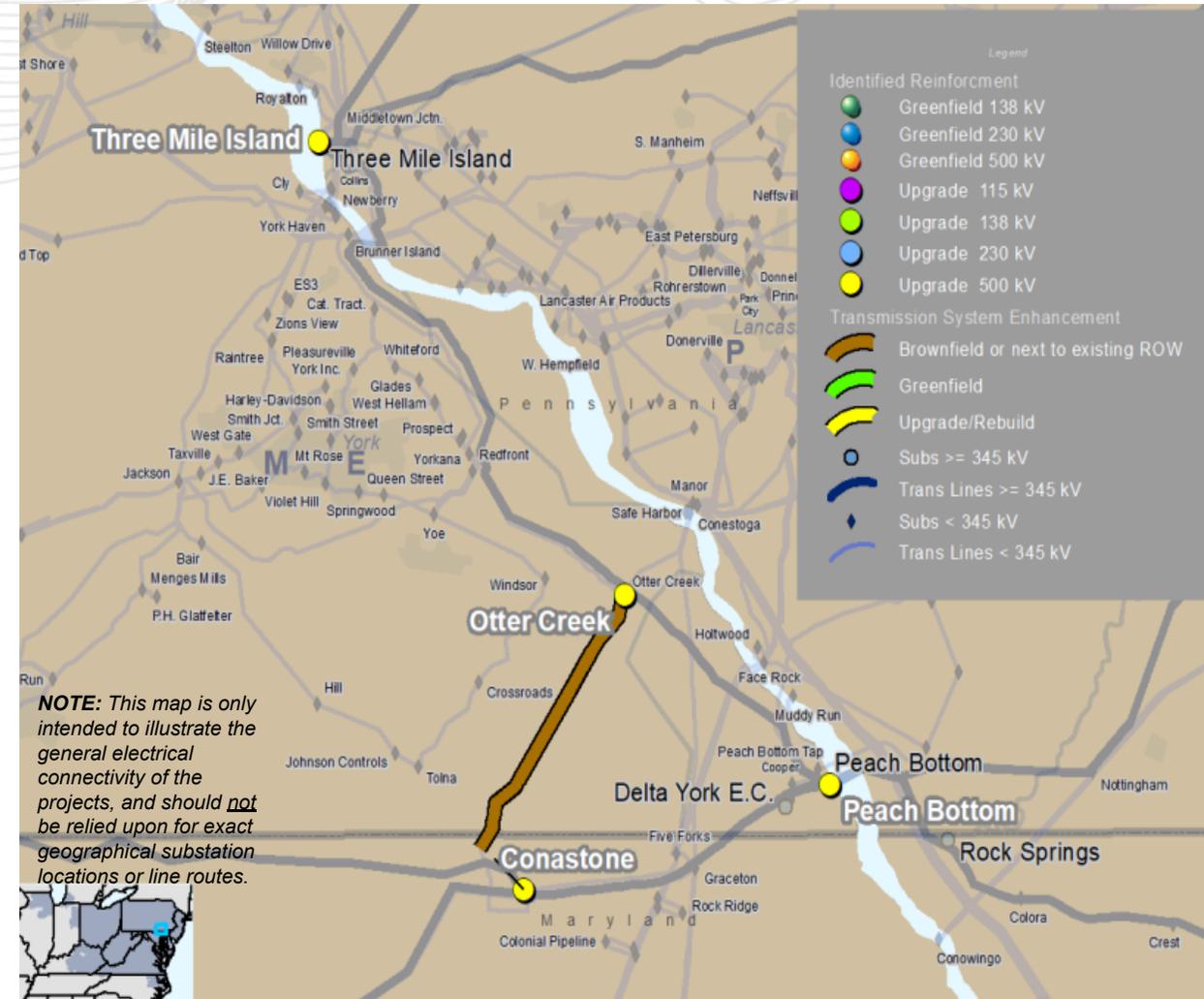
## PPL:2022-W3-374

- Build New Otter Creek 500 kV switching station – cut into Peach Bottom – TMI 500 kV line
  - Two bay three breaker configuration
- Build New 500kV AC line from the new Otter Creek substation – towards Conastone station fence – Conastone demarcation point (~17 miles)
  - Rebuild the existing Otter Creek - Conastone 230 kV line to become a double-circuit 500 and 230 kV line. The existing line is owned by PPL and BGE will share responsibility.
    - New Rating - 4398SN/5237SE/4762WN/5609WE MVA
- Upgrade terminal equipment at Peach Bottom and TMI substations
  - 2644SN/3016SE/2917WN/3250WE MVA

**Proposed Cost Estimate: \$145M**

**Required In-Service Date : 6/1/2027**

**Projected In-Service Date : 6/1/2027**

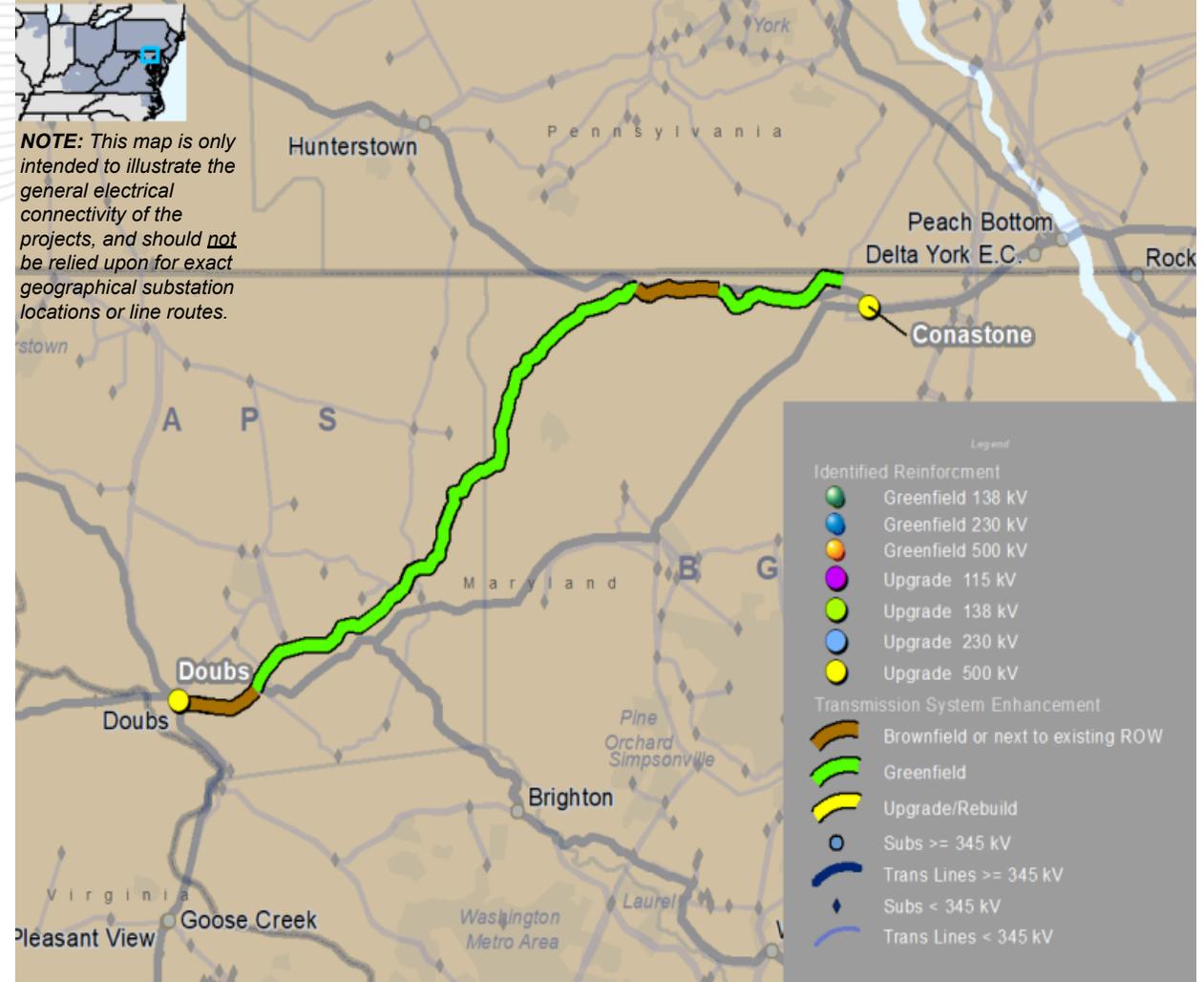


# Preferred Proposals to Address Clusters - East

## PSEG: 2022-W3-637

- Build new 500kV AC line from the Conastone demarcation point with PPL Otter Creek line to – Doubs station (~40 miles)
  - Construct a 500kV overhead AC line between the Conastone demarcation point and the Doubs Substations
    - New Rating - 3341SN/4156SE/3759WN/4595WE MVA
  - The 500 kV line will tie into the PPL proposed Otter Creek – Conastone, bypassing the Conastone station
  - Reconfigure Doubs 500 kV station and upgrade terminal equipment to terminate new line

**Proposed Cost Estimate: \$447 M**  
**Required In-Service Date : 6/1/2027**  
**Projected In-Service Date : 6/1/2027**



# Preferred Proposals to Address Clusters - East

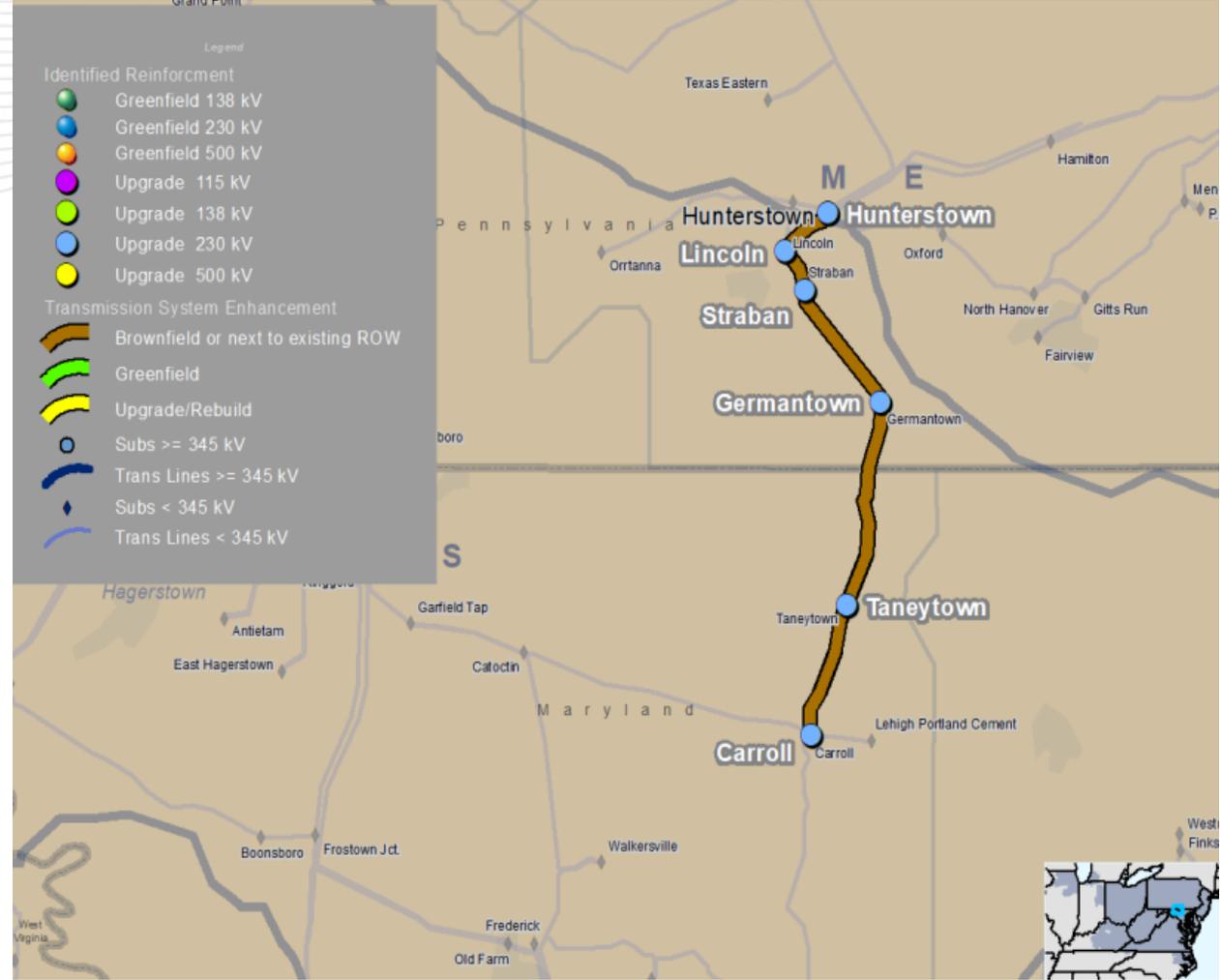
## FE: 2022-W3-837

Build new 230 kV AC circuit from Hunterstown - Carroll

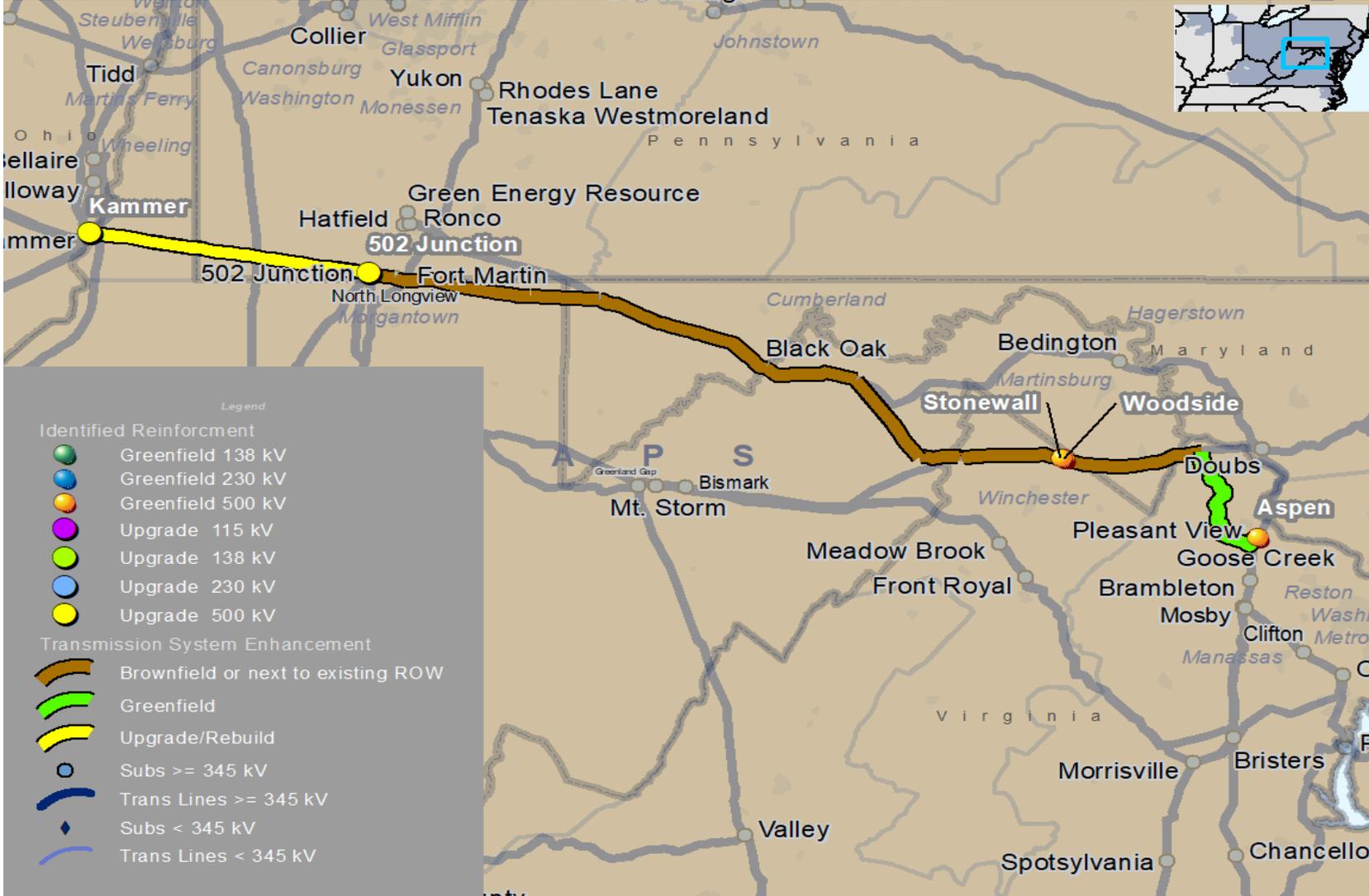
- Rebuild the existing Hunterstown – Carroll 115/138 kV Corridor as Double Circuit using 230kV construction standards
  - 230kV New Rating – 726SN/890SE/824WN/1056WE MVA
  - 115kV New Rating – 363SN/445SE/412WN/528WE MVA
- Reconductor Lincoln – Orrtanna 115 kV Line
  - New Rating- 232SN/282SE/263WN/334WE MVA
- Fayetteville – Grand Point 138 kV - Replace line trap at Grand Point 138 kV
  - New Rating – 195SN/258SE/280WN/368WE MVA
- Reid - Ringgold 138 kV - Replace line trap, substation conductor, breaker at Ringgold, relaying and CTs
  - New Rating – 308SN/376SE/349WN/445WE MVA
- Cancel b3768 (Rebuild/Reconductor the Germantown - Lincoln 115 kV Line.) (Cost: \$17.36M)

**Proposed Cost Estimate: \$137M**  
**Required In-Service Date : 6/1/2027**  
**Projected In-Service Date : 2028-2030**

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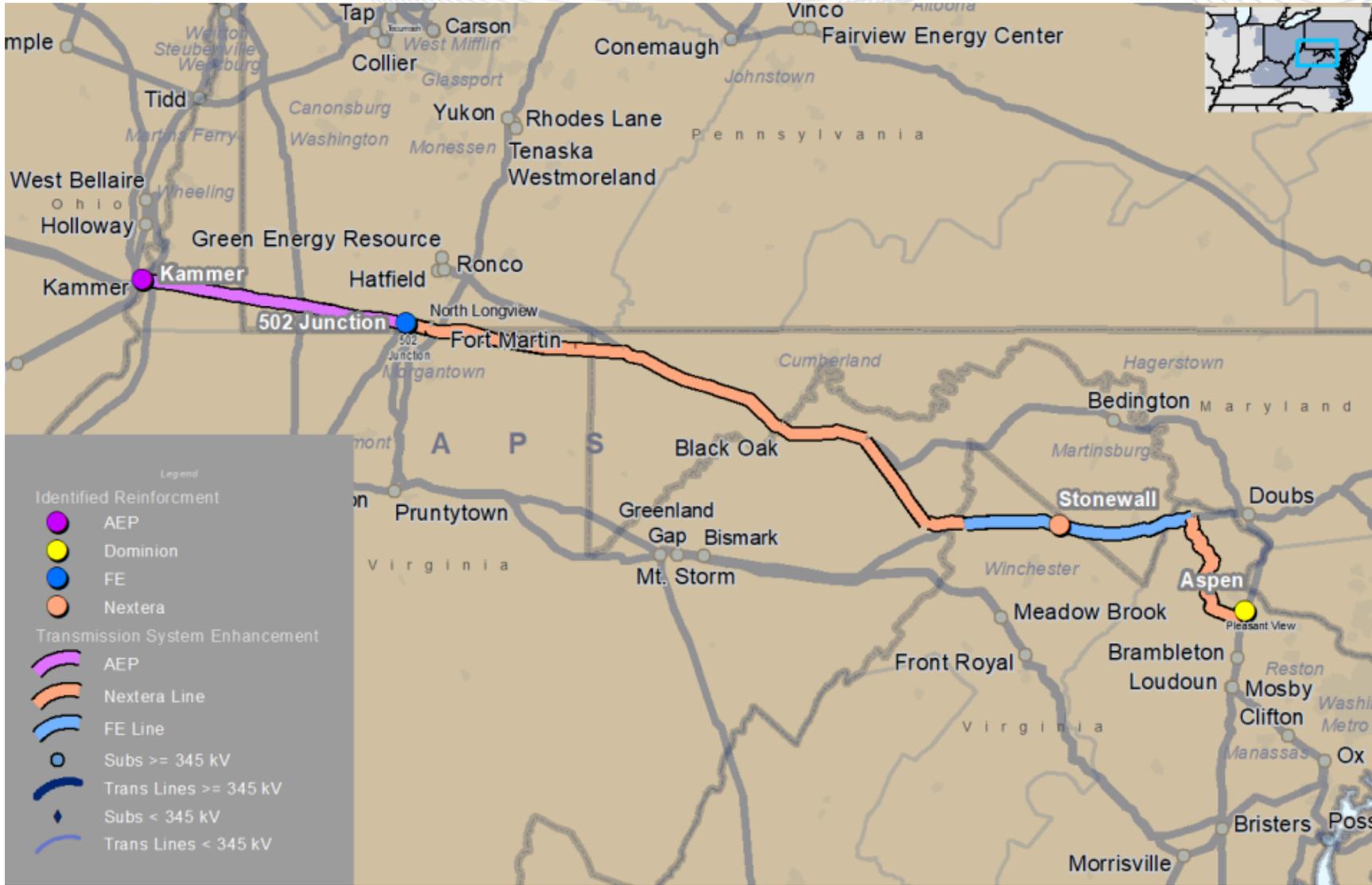


# 2022W3 – Preferred Solutions: West Cluster



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# 2022W3 – Preferred Solutions: West Cluster By Designated Entity



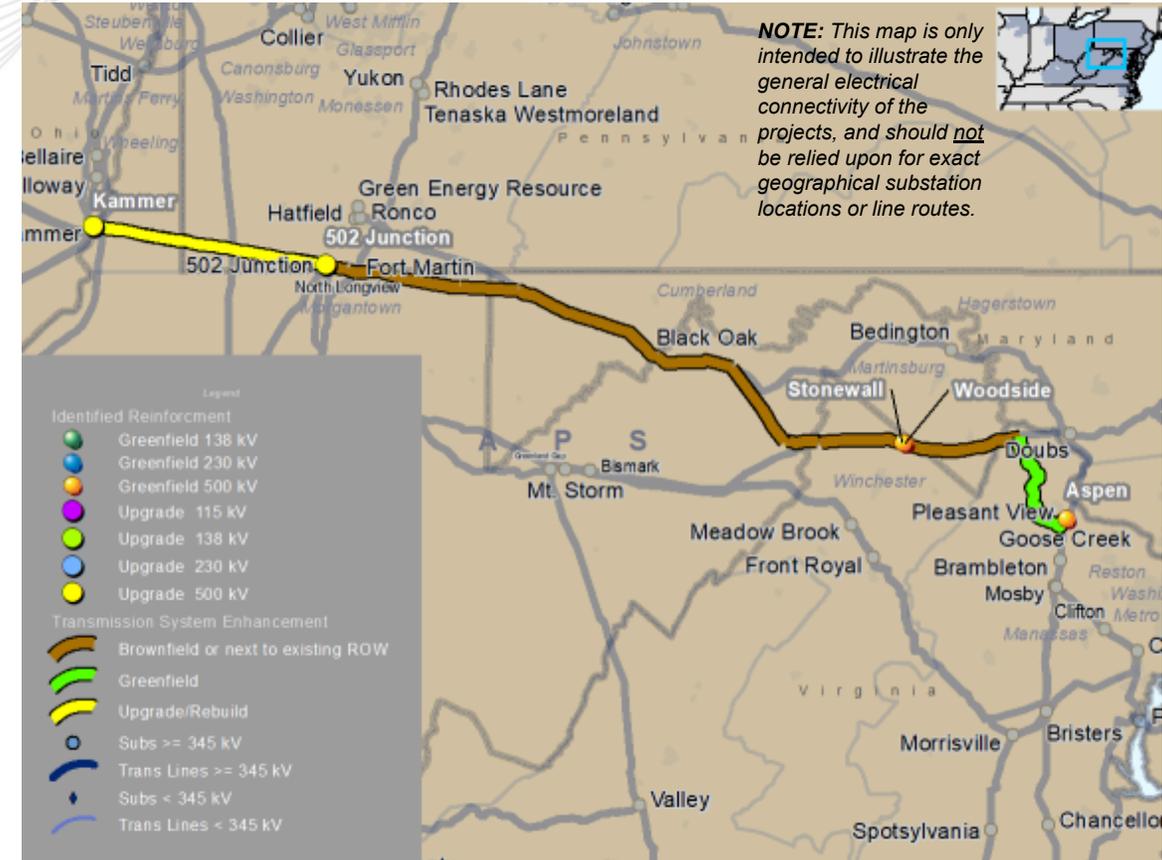
R3: Map updated to highlight scope of FE west and east of Stonewall

**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Preferred Proposals to Address Clusters - West

- **NextEra:2022-W3-853** (bypass Black Oak, terminate at Aspen instead of Gant)
  - New 500kV line from existing 502 Junction substation to New Stonewall/Woodside substation (**bypass Black Oak**) (**NextEra & FE**) - (Cost Estimate: \$345.40M)
  - New Stonewall/Woodside substation adjacent to existing Stonewall 138 kV substation. (NextEra) (Cost Estimate: \$125.30M)
    - Loop in Bismark to Doubs 500 kV line.
    - Two 500/138 kV transformers
    - Two 150 MVAR Cap banks and one +500/-300 MVAR STATCOM
  - New 500kV transmission line from new Woodside substation to Aspen substation – (NextEra & FE)(Cost Estimate: \$123.17M)
  - Aspen substation work to terminate new NextEra 500 kV line (Dominion) (Cost Estimate : \$13.82M)
  - **Combined FE transmission line cost is approximately \$341M**

**R3: highlighted scope for FE part of the NEET 853 proposal**



**Preliminary Facility Ratings:**

Branch	SN/SE/WN/WE (MVA)
502 Jct – New Stonewall –ASPEN 500 kV	4295/4357/5066/5196

# Preferred Projects to Address Clusters – West

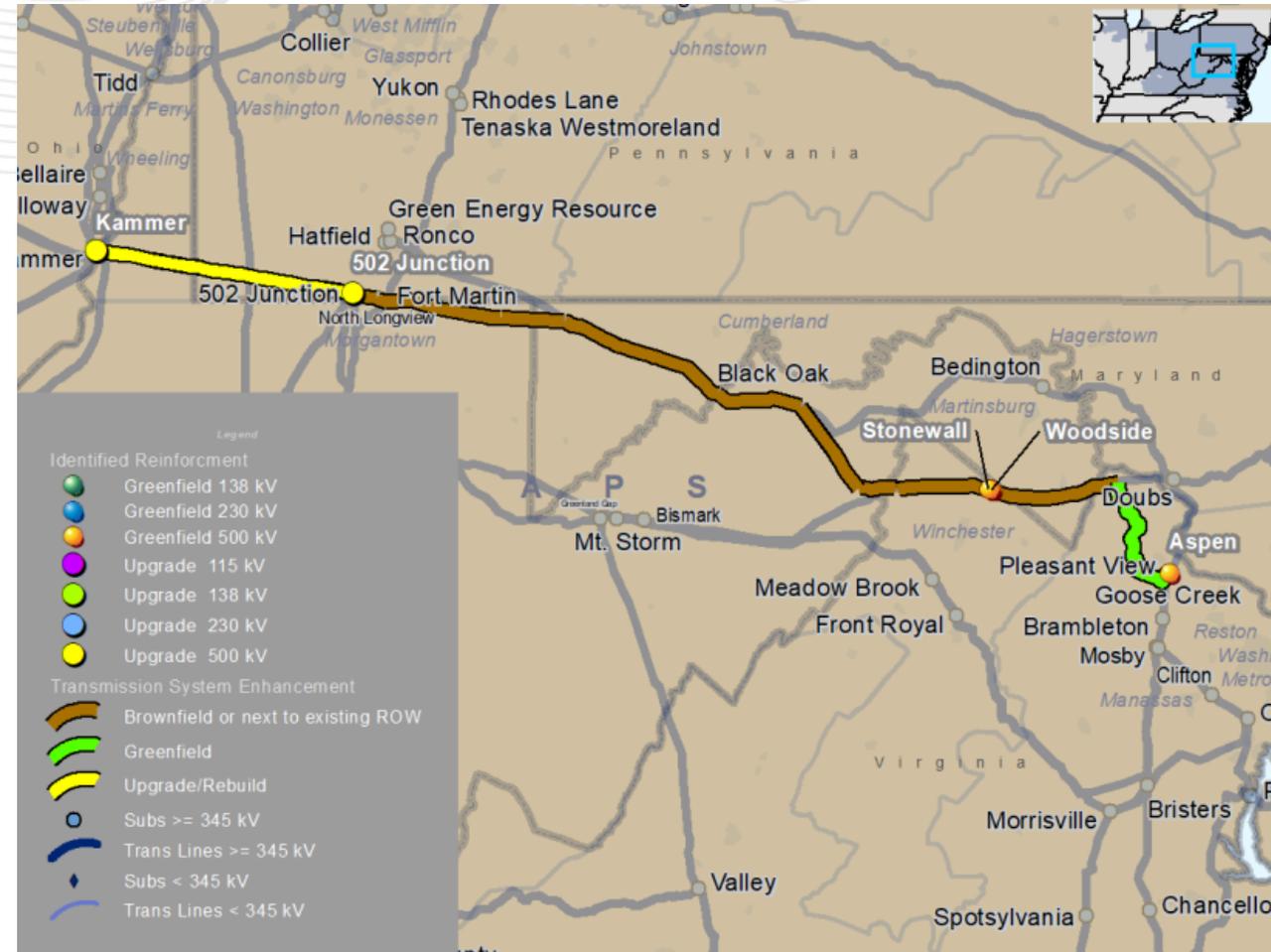
- Kammer to 502 Junction 500kV line: Conduct LIDAR Sag Study to assess SE rating and needed upgrades (**AEP**) (**Cost Estimate: \$0.1M**)

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
502 Jct – Kammer	3173/3173/3928/4030

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
502 Jct – Kammer	3204/3729/3928/4140



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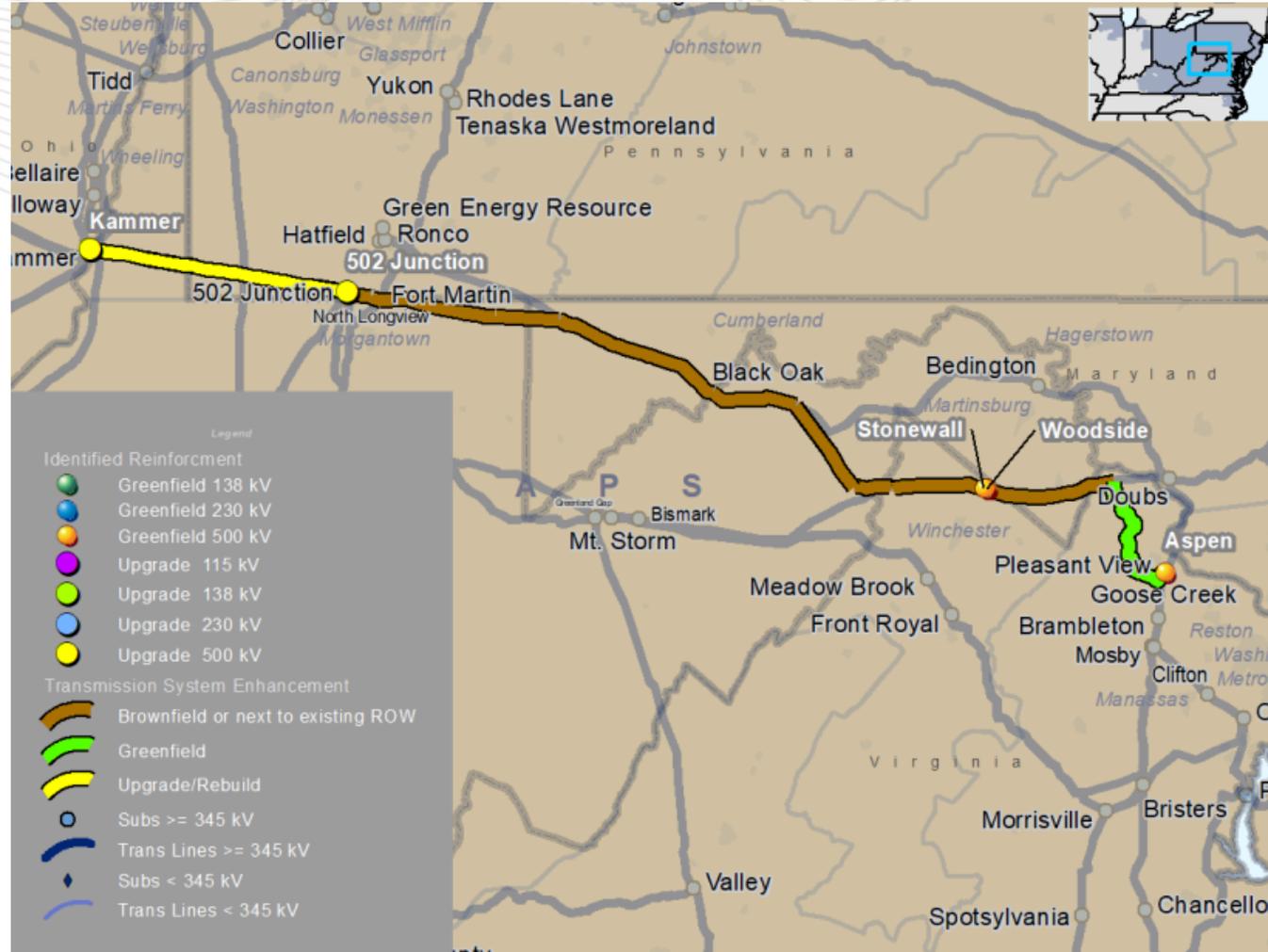
# Preferred Projects to Address Clusters - West

- **NextEra:2022-W3-853 (PJM Modified)**
  - Stonewall 138 kV substation two 138kV breaker expansion - **(FE Cost Estimate: \$8.3M) (Incumbent)**
  - 502 Junction substation two 500 kV circuit breaker expansion - **(FE Cost Estimate: \$30.6M) (Incumbent)**

**Estimated Cost: \$646.69 M**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2027**



***NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

- Posted window case based on 2027 topology
- Considered impacts to existing breakers in 11 TO areas

Scenario Description	Over Duty Bus (Qty)						Over Duty CBs	Maximum Fault Duty (kA)						Comment
	115 kV	138 kV	230 kV	345 kV	500 kV	765 kV	Total	765 kV	500 kV	345 kV	230 kV	138 kV	115 kV	
PJM Final Selection	1	1	14	0	5	0	80	38.3	61.9	59.7	76.1	74.4	59.1	Conastone 500kV bus operating below the 52kA rated capability Peachbottom 500kV bus operating below the 63kA rated capability



# APS Area - Short Circuit Upgrades

Item	BUS	BREAKER	Existing Rating (kA)	Proposed Rating (kA)	Cost
1	DOUBL TG 138.kV	MDT 138 OCB	19.7	40	\$3.0M
2	DOUBS 500.kV	DL-55 522LIN	40	63	\$10.01M
3	STONEWAL 138.kV	OPS	40	63	\$3.0M
					<b>\$16.01M</b>



# Dominion Area - Short Circuit Upgrades

Item	BUS	BREAKER	Existing Rating (kA)	Proposed Rating (kA)	Cost
1	ASHBURN 2 230.kV	SC432	50	80	\$0.5M
2	BEAUMEADE 230.kV	227T2152	63	80	\$0.5M
3	BECO 230.kV	215012	50	80	\$0.5M
4	BECO 230.kV	H12T2150	50	80	\$0.5M
5	BELMONT 230.kV	227T2180	63	80	\$0.5M
6	BRAMBLETON 230.kV	20102	63	80	\$0.5M
7	BRAMBLETON 230.kV	20602	63	80	\$0.5M
8	BRAMBLETON 230.kV	204502	63	80	\$0.5M
9	BRAMBLETON 230.kV	209402	63	80	\$0.5M
10	BRAMBLETON 230.kV	201T2045	63	80	\$0.5M
11	BRAMBLETON 230.kV	206T2094	63	80	\$0.5M
12	BRAMBLETON 230.kV	2172T2183	63	80	\$0.5M
13	GAINESVILLE 230.kV	216192	40	80	\$0.5M
14	IDYLWOOD 230.kV	20212	40	80	\$0.5M
15	IDYLWOOD 230.kV	20712	40	80	\$0.5M
16	LOUDOUN 230.kV	204552	63	80	\$0.5M
17	LOUDOUN 230.kV	217352	63	80	\$0.5M
18	OX 230.kV	22042	63	80	\$0.5M
19	OX 230.kV	24342	63	80	\$0.5M
20	OX 230.kV	24842	63	80	\$0.5M

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# Dominion Area - Short Circuit Upgrades

Item	BUS	BREAKER	Existing Rating (kA)	Proposed Rating (kA)	Cost
21	OX 230.kV	220T2063	63	80	\$0.5M
22	OX 230.kV	243T2097	63	80	\$0.5M
23	OX 230.kV	248T2013	63	80	\$0.5M
24	OX 230.kV	H342	63	80	\$0.5M
25	PARAGON PARK 230.kV	208132	63	80	\$0.5M
26	PARAGON PARK 230.kV	215032	63	80	\$0.5M
27	PARAGON PARK 230.kV	2081T2206	63	80	\$0.5M
28	PARAGON PARK 230.kV	2150T2207	63	80	\$0.5M
29	RESTON 230.kV	264T2015	40	80	\$0.5M
30	STONEWATER 230.kV	20662-1	63	80	\$0.5M
31	STONEWATER 230.kV	20662-2	63	80	\$0.5M
32	STONEWATER 230.kV	217862-1	63	80	\$0.5M
33	STONEWATER 230.kV	217862-2	63	80	\$0.5M
34	WAXPOOL 230.kV	214922-5	50	80	\$0.5M
35	WAXPOOL 230.kV	214922-6	50	80	\$0.5M
36	WAXPOOL 230.kV	216622-5	50	80	\$0.5M
37	WAXPOOL 230.kV	216622-6	50	80	\$0.5M
					<b>\$18.5M</b>

# Summary of Selected Projects and Rationale

Project Area	Proposal ID	Entity	Key Facilities Included	Reason for Selection
East	344	PECO	New Peach Bottom - Graceton 500 kV (PECO) New Peach Bottom - North Delta - Highridge 500 kV (PECO) Rebuild 5012: Peach Bottom - North Delta - Graceton - Conastone (PECO) New North Delta - Cooper 230 kV	Addresses both 2027 and 2027/28 needs and offers robust transmission solution by debottlenecking the Peach Bottom-Conastone 500kV path Efficiently utilizes existing (incumbent owned ROW) North Delta expansion allows for utilization of Calpine-PB 500kV line and use of existing 230kV ROW for 500kV development and offers equipment and cost efficiencies Limits the number of additional transmission line ROWs Provides needed transmission capability to both the Northern Virginia and BGE Systems Cost effective
	660	PEPCO	Graceton 500 kV Expansion New Peach Bottom - Graceton 500 kV (BGE) Rebuild 5012: Peach Bottom - North Delta - Graceton - Conastone (BGE)	
	b3780.6	BGE	Build Granite substation + Statcom. New STATCOM rating: 350 MVAR Add 4x 230 kV breaker bays	
	374	PPL	New Otter Creek 500 kV (tie-in to TMI - Peach Bottom 500 kV) New Otter Creek - Conastone 500/230 kV DCT	Addresses both 2027 and 2027/28 needs and offers robust transmission solution by debottlenecking the Peach Bottom-Conastone 500kV path Efficiently utilizes existing (incumbent owned ROW) Provides needed transmission capability to Northern Virginia and helps clear capacity across the PB - Conastone - BGE corridor Offers a strong supply source towards Doubs Does not require intermediate new Substations along route to Doubs and limits the number of lines to be constructed along the corridor Cost effective
	637	PSEG	New Conastone - Doubs 500 kV line	Addresses both 2027 and 2027/28 needs and offers robust transmission solution by debottlenecking the Peach Bottom-Conastone 500kV path Strong Cost-Cap provisions Provides needed transmission capability to Northern Virginia, helps clear capacity across the Peach Bottom - Conastone - BGE corridor and prevents voltage collapse conditions in BGE under outage conditions Offers a strong supply source towards Doubs Does not require intermediate new Substations along route to Doubs and limits the number of lines to be constructed along the corridor Cost effective

# Summary of Selected Projects and Rationale

Project Area	Proposal ID	Entity	Key Facilities Included	Reason for Selection
<b>West</b>	853	Nextera	<p>New Woodside 500 kV substation with 500 MVAR STATCOM &amp; Capbanks</p> <p>New Gant 500 KV substation</p> <p>Black Oak 500 kV Expansion</p> <p>New 502 Junction - Black Oak - Woodside - Gant 500 kV line</p>	<p>Superior solution addressing West to Northern Virginia transfer capability needs and provide one additional 500kV supply line directly into the Northern Virginia load center</p> <p>Avoids terminating additional lines at the existing Doubs Substation</p> <p>Cost effective</p>
<b>Dominion Data Center Alley</b>	692	Dominion	<p>New Aspen and Golden 500/230 kV Substation</p> <p>New Mars 500/230 Transformer</p> <p>New Aspen - Golden 500 kV and 230 kV lines</p> <p>New Golden - Mars 500 kV and 230 kV lines</p>	<p>Offers robust transmission solution in the area that adds one new 500kV circuit along the existing 500kV corridor and encompasses the load center</p> <p>Introduces one additional 500kV source substation at the heart of the load center</p> <p>Does not bottleneck the existing 500kV infrastructure in the area due to higher overhead line ratings</p> <p>Offers direct accessibility to the transmission infrastructure</p> <p>Offers a prallel 500kV path to the current 500kV circuit between Brambleton/Loudon and Goose Creek area.</p>



# Summary of Selected Projects and Rationale

Project Area	Proposal ID	Entity	Key Facilities Included	Reason for Selection
South	837	FirstEnergy	Doubs - Goose Creek 500 kV Rebuild (FE) New Doubs - Aspen 500 kV Line (FE)	Debottlenecks the existing transmission corridor between the APS and Dominion systems and allows for 2X500 kV high capacity lines Utilizes existing ROW
	516	Dominion	Doubs - Goose Creek 500 kV Rebuild (DOM) New Doubs - Aspen 500 kV Line (DOM) New Aspen Substation upgrade	This development enables the First Energy scope above (south of the Potomac River) Allows for a new substation in the area as the existing Goose Creek and Pleasant View substations are congested
	711	Dominion	Morrisville - Vint Hill - Wishing Star 500 kV Bristers - Morrisville 500 kV Rebuild Loudoun - Morrisville 500 kV Rebuild Mosby - Wishing Star 500 kV Rebuild	Needed development to provide supply to the Dominion Data Center loads under both the 2027 and 2027/28 needs  Efficiently utilizes existing (incumbent owned ROW)
	231	Dominion	Morrisville Substation (230 kV 150 MVAR Cap) Wishing Star Substation (230 kV 150 MVAR Cap, 500 kV 293.8 MVAR Cap) Mars Substation (230 kV 150 MVAR Cap, 500 kV 300 MVAR STATCOM) Beaumeade Substation (230 kV 300 MVAR STATCOM)	Provides needed local VAR support to reliably serve the forecasted load in the study area (Load Center)
	74, 211, 731, 967	Dominion	Charlottesville to Hollymead 230 kV Reconductor Ladysmith CT - Fredericksburg 230 kV Rebuild Hollymead - Gordonsville 230 kV Rebuild Locks 230 kV Substation Transformer upgrade	Needed local 230kV upgrades to provide transmission system capability to serve local load on existing infrastructure (upgrades) Cost Effective Minimal new disturbances
	PJM Identified Upgrades	Dominion	Line #256 Rebuild St. Johns - Ladysmith CT 230 kV Sterling Park – Golden 230 kV Reconductor Davis Drive – Sterling Park 230 kV Reconductor	Maximizes utilization of existing transmission system capability Cost effective



# 2022 Window 3 Recommended Solution

Project Area	Proposal ID	Key Facilities Included	Entity	Proposal Cost (\$M)	Independent Cost (\$M)	Proposed In-Service Date	Greenfield/Brownfield
East	344	New Peach Bottom - North Delta - Highridge 500 kV (PECO) Rebuild 5012: Peach Bottom - North Delta - Gracetone -Conastone (PECO)	PECO	60.90	67.55	12/1/2029	Brownfield routes
	b3780.3	Cancel West Cooper Substation scope from Brandon Shores Immediate Need Approved Projects	PECO	(60.00)	(60.00)	N/A	N/A
	b3737.47*	Enhanced North Delta 500/230 kV Substation (NJ SAA Project)	Transource	104.11	93.88	12/1/2027	Greenfield substation
	660	High Ridge 500 kV Expansion New Peach Bottom - North Delta - Highridge 500 kV (BGE) Rebuild 5012: Peach Bottom - North Delta - Gracetone -Conastone (BGE)	PEPCO	653.42	479.99	12/1/2030	Brownfield routes, substation expansion
	374	New Otter Creek 500 kV (tie-in to TMI - Peach Bottom 500 kV) New Otter Creek - Conastone 500/230 kV DCT (Conastone Bypass for 500 kV)	PPL	144.12	152.70	5/1/2027	Brownfield route, Greenfield substation
	637	New Conastone - Doubs 500 kV line	PSEG	447.28	492.50	6/1/2027	Greenfield route
	837	New Carroll - Hunterstown 230 kV line	FirstEnergy	137.45	202.30	6/1/2030	Brownfield routes
	b3768	Cancel Rebuild/Reconductor Germatown - Lincoln 115 kV project from 2022 RTEP Window Approved Projects	FirstEnergy	(17.36)	(17.36)	N/A	N/A
West	853	New Woodside 500 kV substation with 500 MVAR STATCOM & Capbanks (NextEra) New 502 Junction - Woodside - Aspen 500 kV line (NextEra/FE) Aspen 500 kV line Termination (Dominion)	Nextera FirstEnergy Dominion	646.69	1,038.75	6/1/2027	Mostly Greenfield parallel to existing ROW, Part Brownfield, Part Greenfield
South	837 516 660	Doubs - Goose Creek 500 kV Rebuild New Doubs - Aspen 500 kV Line	FirstEnergy Dominion PEPCO	336.20	378.51	12/1/2027	Brownfield routes
	711	New Morrisville - Vint Hill - Wishing Star 500 kV	Dominion	953.71	1,010.48	12/1/2027	Brownfield routes
	231	Morrisville, Wishing Star, Mars and Beaumeade Substation Reactive Upgrades	Dominion	103.80	103.80	12/1/2027	Substation upgrades
	74, 211, 731, 967	Proposed Dominion 230 kV Upgrades	Dominion	302.82	302.82	12/1/2027	Brownfield upgrades
	PJM Identified Upgrades	Line #256 Rebuild St. Johns - Ladysmith CT 230 kV Sterling Park – Golden 230 kV Reconductor Davis Drive – Sterling Park 230 kV Reconductor	Dominion	51.39	51.39	12/1/2027	Brownfield upgrades
Dominion Data Center Alley	692	New Aspen and Golden 500/230 kV Substation & Mars Station Upgrade New Aspen - Golden - Mars 500 kV and 230 kV lines	Dominion	1,058.45	1,098.96	12/1/2027	Greenfield routes & greenfield substation
Local	410	Cloverdale Breaker Reconfiguration	AEP	11.59	11.59	10/1/2026	Substation upgrades
* NJ SAA Project b3737.47 accelerated from 6/1/2029 ISD to 12/1/2027 ISD and scope updated to address 2022W3 needs				<b>TOTAL</b>	<b>4,934.56</b>	<b>5,407.86</b>	

# Appendix

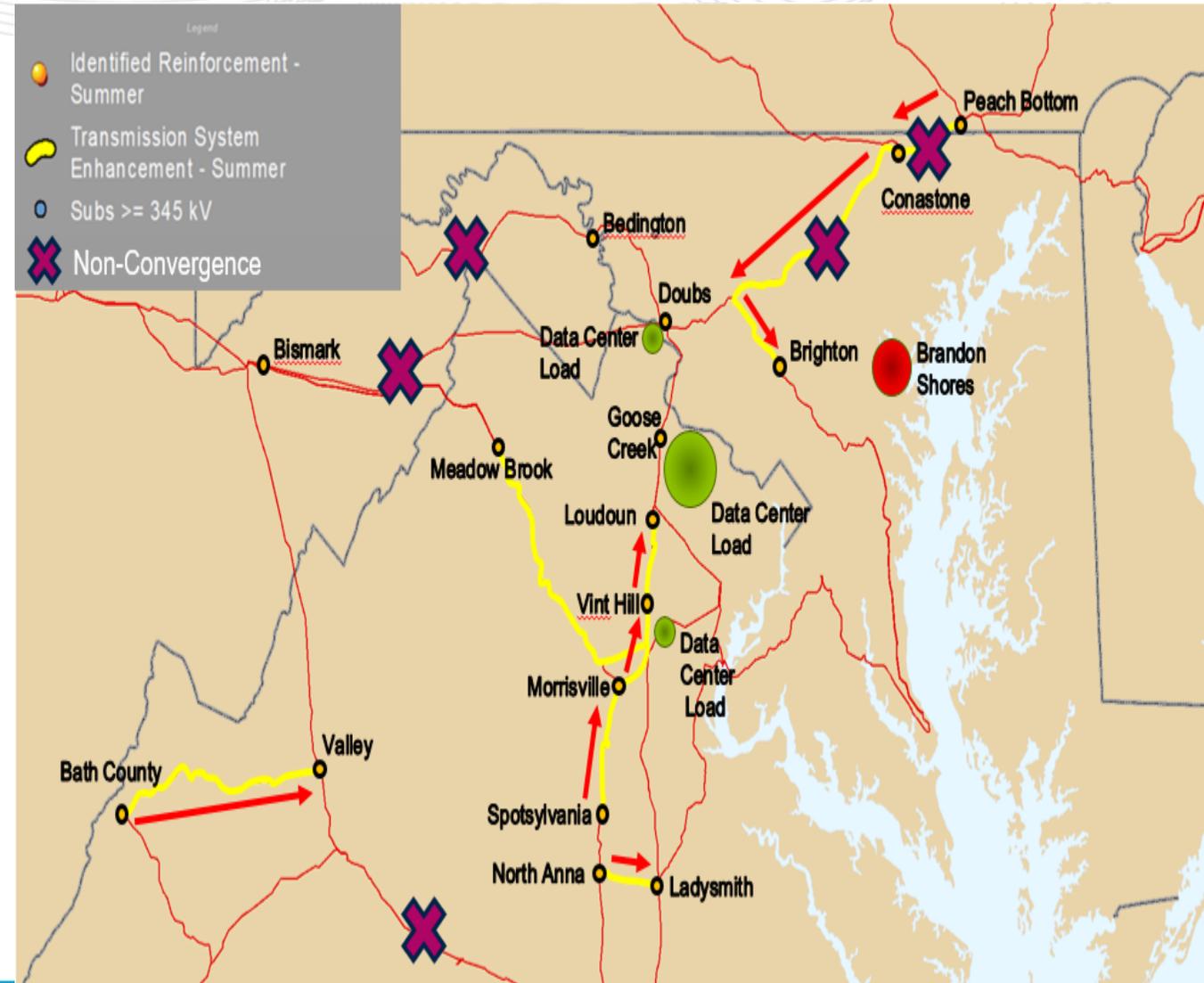
# 2022 RTEP W3

## List of Proposal

# 2022W3 RTEP- High Level Summary of Drivers/Needs

- Local constraints resulting from directly serving the data center loads in APS and Dominion zones through the respective 230 kV networks and into the points of delivery:
  - Goose Creek- Ashburn – Mars - Wishing Star and Brambleton
- Regional constraints resulting from imports into load center areas (500 kV primarily):
  - Front Royal - Morrisville – Vint Hill – Loudoun/Mosby
  - Meadow Brook - Vint Hill
  - Morrisville – Bristers - Ox
  - Peach Bottom – Conastone – Brighton – Doubs
- Needed reactive power VAR reinforcements, both static and dynamic as deemed necessary, to address the reactive power needs of the system for the 2027-28 baseline scenario
- Other Local constraints result from the transfers
  - Local AEP violations
  - Local PPL violations

\*\* The detailed flowgates are posted in [PJM - Competitive Planning Process](#) webpage





# 2022 RTEP W3 Submitted Proposals

#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost (\$M)
1	9	AEP	Local AEP	Scottsville-Bremo Sag Study	\$1.27
2	55	AEP	Local AEP	Boxwood-Scottsville 138 kV Rebuild	\$104.88
3	181	AEP	Local AEP	Boxwood-Scottsville 138 kV Sag Study	\$4.26
4	196	AEP	Local AEP	Glen Lyn-Peters Mountain Rebuild	\$21.89
5	202	AEP	Local AEP	Cloverdale Transformer Addition	\$57.29
6	234	AEP	Local AEP	Glen Lyn-Peters Mountain Sag Study	\$0.80
7	410	AEP	Local AEP	Cloverdale Breaker Reconfiguration	\$11.59
8	477	AEP	Local AEP	Fieldale-Franklin Rebuild	\$74.89
9	524	AEP	Local AEP	Opossum Creek and New London Reactors	\$8.86
10	537	AEP	Local AEP	Fieldale-Franklin Sag Study	\$30.19
11	629	AEP	Local AEP	Scottsville-Bremo Rebuild	\$31.31
12	856	AEP	Local AEP	Leesville-Altavista Rebuild	\$28.85
13	487	AEP - Transource	East/West	Maryland & Pennsylvania Baseline Reliability Solution	\$492.75
14	858	AEP - Transource	South	Stork - Flys 500kV Greenfield Line and Substations	\$510.44
15	904	AEP - Transource	West/South/Northern Virginia/Doubs	Joshua Falls - Yeat 765kV Greenfield Line and Substation	\$1,048.10
16	977	AEP - Transource	South	Yeat 500/230kV Greenfield Station	\$232.14
17	30	Dominion	Local DOM	Charlottesville - Hollymead Line # 2054 Rebuild	\$159.87
18	74	Dominion	Local DOM	Line #2090 (Ladysmith CT - Fredericksburg) Rebuild	\$57.34
19	129	Dominion	South	Dominion Aggregate 500kV Proposal	\$3,035.05
20	211	Dominion	Local DOM	Hollymead - Gordonsville Line # 2135 Rebuild	\$54.85



# 2022 RTEP W3 Submitted Proposals

#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost (\$M)
21	231	Dominion	Local DOM	Reactive Power VAR Reinforcements	\$155.82
22	516	Dominion	East	Interregional solution- Aspen-Doubs Second 500 kV Line	\$61.72
23	671	Dominion	Local DOM	Lines #541 (Front Royal to Morrisville) Rebuild	\$299.03
24	692	Dominion	South	Data Center Alley Local solution - New 500 kV/230 kV Aspen-Golden & Golden-Mars lines	\$1,058.45
25	704	Dominion	Local DOM	Hollymead - Gordonsville Line # 2135 Rebuild	\$36.89
26	711	Dominion	South	Regional Solution - 500 kV North Anna-Wishing Star Upgrades	\$1,227.84
27	731	Dominion	Local DOM	Locks Substation 230/115 kV Transformer Upgrade	\$7.14
28	923	Dominion	South	Second 500 kV line from Lexington to Dooms	\$232.18
29	967	Dominion	Local DOM	Charlottesville - Hollymead Line # 2054 Rebuild	\$183.48
30	548	LSPower	Scenario	RTEP Window 3 Solution	\$2,404.48
31	28	NextEra	East/West	Hunterstown - Doubs - Goose Creek, Black Oak - Pike - Goose Creek, Pike SVC + Cap Banks	\$884.05
32	116	NextEra	West	Hunterstown - Doubs - Gant Solution	\$478.87
33	175	NextEra	Scenario	Combination of PEBO 215A + WOP 1F + SOP 8E	\$6,265.95
34	217	NextEra	East	North Delta - Conastone Solution	\$155.99
35	255	NextEra	East/West	Hunterstown - Doubs - Gant Solution	\$411.61
36	279	NextEra	West	Black Oak - Woodside - Goose Creek, Woodside SVC + Cap Banks Solution	\$429.18
37	347	NextEra	West	Black Oak - Woodside - Gant, Woodside SVC + Cap Banks	\$483.83
38	385	NextEra	East	New 500/230kV Bartholow substation, new 500/230kV North Delta substation, new 230kV Grisham switchyard, new 500/230kV Goram substation	\$1,140.73
39	419	NextEra	East/West	Hunterstown - Doubs - Audobon - Goose Creek	\$548.75
40	445	NextEra	East	Muddy Creek / Delta - Conastone / Hunterstown - Doubs - Goose Creek Solution	\$637.80



# 2022 RTEP W3 Submitted Proposals

#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost (\$M)
41	530	NextEra	East	Muddy Creek / North Delta - Conastone Solution	\$166.74
42	564	NextEra	East	New 500/230kV Bartholow substation, new 500/230kV North Delta substation, new 230kV Grisham switchyard, new 500/230kV Goram substation	\$876.88
43	577	NextEra	South	Front Royal - Racefield, Warrenton - Wheeler, North Anna - Lady Smith	\$258.38
44	598	NextEra	Scenario	Combination of PEBO 220 + WOP 1F + SOP 8E	\$2,036.47
45	631	NextEra	East	Muddy Creek / North Delta - Conastone Solution	\$184.47
46	642	NextEra	West	502 Junction - Black Oak - Woodside - Gant, Woodside SVC + Cap Banks, Gant - Farmwell, Cochran Tap - Round Table	\$747.31
47	663	NextEra	South	Front Royal - Racefield, Warrenton - Rixlew, Warrenton - Hourglass, Mars - Ocean Court - Davis Drive	\$284.17
48	676	NextEra	West	Black Oak - Stonewall - Gant, Stonewall SVC + Cap Banks, Gant - Farmwell, Cochran Tap - Round Table Solution	\$552.49
49	685	NextEra	West	Ft. Martin - Black Oak - Woodside, Woodside SVC + Cap Banks Solution	\$609.78
50	719	NextEra	West	Ft. Martin - Black Oak - Pike, Pike SVC + Cap Banks Solution	\$600.90
51	728	NextEra	West	Barnhart Substation, Bartholow Substation, Barnhart - Bartholow - Goose Creek solution	\$385.36
52	766	NextEra	South	Front Royal - Racefield, Warrenton - Wheeler	\$239.59
53	846	NextEra	East/West	Hunterstown - Doubs - Goose Creek, Black Oak - Woodside - Goose Creek, Stonewall SVC + Cap Banks	\$892.94
54	853	NextEra	West	502 Junction - Black Oak - Woodside - Gant, Woodside SVC + Cap Banks	\$683.55
55	948	NextEra	East	New 500/230kV Bartholow substation, new 500/230kV North Delta substation, new 230kV Grisham switchyard, new 500/230kV Goram substation, and Keeney to Waugh Chapel tie-in.	\$5,381.25
56	951	NextEra	West	Black Oak - Gore - Goose Creek, Pike SVC + Cap Bank Solution	\$419.86



# 2022 RTEP W3 Submitted Proposals

#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost (\$M)
56	951	NextEra	West	Black Oak - Gore - Goose Creek, Pike SVC + Cap Bank Solution	\$419.86
57	344	PECO	East	PECO Expansion Plan for DOM Window 2023	\$302.86
58	600	PECO	Local Other	Exelon Replacement Upgrades	\$423.79
59	660	PEPCO	East	West Cooper BGE-PEPCO	\$1,105.62
60	691	PEPCO	East	Mid-Atlantic Power Pathway (MAPP)	\$1,990.28
61	23	POTOED - FirstEnergy	East/West	Data Center Reinforcement Proposal #2	\$3,503.86
62	837	POTOED - FirstEnergy	East/West	Data Center Reinforcement Proposal #1	\$2,991.77
63	374	PPL	East	Otter Creek - Conastone 500 and 230 kV DCT Line	\$154.21
64	606	PPL	Local Other	Juniata - Lewistown 230 kV # 2 line	\$141.16
65	24	PSEG	East	Proposal A - North Delta - New Raphael - Waugh Chapel 500kV	\$739.40
66	125	PSEG	Local Other	Proposal B - North Delta-Northeast 230kV	\$313.34
67	229	PSEG	East	Proposal C - Hunterstown-New Green Valley 500kV	\$529.11
68	325	PSEG	West/South/Northern Virginia/Doubs	Proposal E - Brambleton-Hinsons Ford Rd 500kV	\$944.05
69	637	PSEG	East	Proposal D-Conastone-Doubs 500kV	\$684.22
70	741	PSEG	East	Proposal G - Peach Bottom-New Brandon Shores 500kV; Peach Bottom-Doubs 500kV	\$1,065.32
71	808	PSEG	East	Proposal F - Peach Bottom-New Raphael-Waugh Chapel 500kV; Peach Bottom-Doubs 500kV	\$1,150.80
72	962	PSEG	East	Proposal H - Peach Bottom-Doubs 500kV (Circuits #1 and #2)	\$977.71

# Risk Assessment Criteria

PJM Risk Assessment Criteria						
Risk Assessment	Cost Estimate Risks	Cost Containment Risk	Schedule Risks	Constructability Risks	Use of Existing ROW/Brownfield	Outage Coordination Risks
Low	Greater than or within 0-10% of Independent Estimate	Hard cost cap	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.	Rebuild/Reconductor Upgrades or Pure Brownfield	Minimal existing facility outages required, beyond short outages to cut-in to existing facilities
Medium	Within 10-20% of Independent Estimate	Soft cost containment (e.g ROE caps)			Mostly Brownfield (i.e. Uses/Overlaps existing ROW but requires expansion)	Significant existing facility outages required, with reasonable outage coordination plan proposed
Medium-High	Within 20-30% of Independent Estimate	Minimal cost containment/Excessive Exclusions			Greenfield paralleling existing ROW	Significant existing facility outages required, with no coordination plan proposed
High	Less than 30% of Independent Estimate	No cost containment			Pure Greenfield	Significant existing facility outages required, with known operational concerns and no coordination plan proposed.

**NOTE:**

- PJM conducted its constructability evaluation of the project data submitted by proposers, and engaged expert consultants to evaluate the constructability, cost estimation, and cost containment risks of the projects.
- PJM also reached out to key regulatory agencies for their insight on certain projects to help clarify permitting risks.
- This risk assessment is not intended as a pass/fail or quantitative test, but rather as qualitative information on potential risks PJM has considered along with the reliability performance in selection of the finalist scenarios, and ultimately the recommended solution.



# East Cluster Constructability Matrix

## East Cluster Projects – Selected for Detailed Evaluation

PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs (\$M)	Independent Costs (\$M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
344	Exelon	PECO Expansion Plan for DOM Window 2023	12/1/2029	\$ 168.63	\$ 186.06	Low	Medium-High	Low	Low	Low	Medium
660	Exelon	West Cooper BGE-PEPCO	12/1/2030	\$ 1,105.62	\$ 1,060.63	Low	Medium-High	Low	Low	Low	Medium
548	LS Power	RTEP Window 3 Solution (East)	6/1/2030	\$ 495.83	\$ 609.44	Medium	Medium	Low	Medium	Medium-High	Medium-High
637	PSEG	Proposal D-Conastone-Doubs 500kV	6/1/2027	\$ 684.22	\$ 676.36	Low	Low	Medium	Medium	High	Low
741	PSEG	Proposal G - Peach Bottom-New Brandon Shores 500kV; Peach Bottom-Doubs 500kV	6/1/2028	\$ 1,065.32	\$ 1,178.75	Medium	Low	Medium-High	High	High	Low
487	Transource	Maryland & Pennsylvania Baseline Reliability Solution	3/1/2027	\$ 492.75	\$ 503.43	Low	Medium	Low	Low	Medium	Medium
374	PPL	Otter Creek - Conastone 500 and 230 kV DCT Line	5/1/2027	\$ 154.21	\$ 162.69	Low	Medium-High	Low	Low	Medium	Medium
948	NextEra	New 500/230kV Bartholow substation, new 500/230kV North Delta substation, new 230kV Grisham switchyard, new 500/230kV Goram substation, and Keeney to Waugh Chapel tie-in	6/1/2028	\$ 5,381.25	\$ 6,265.88	Medium	Medium	High	High	High	Low



# West Cluster Constructability Matrix

## West Cluster Projects – Selected for Detailed Evaluation

PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs (\$M)	Independent Costs (\$M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
837	POTOED - FirstEnergy	Data Center Reinforcement Proposal #1 (West)	6/1/2030	\$ 2,788.40	\$ 2,642.05	Low	High	Medium	Medium-High	High	Low
548	LS Power	RTEP Window 3 Solution (West)	6/1/2030	\$ 972.71	\$ 876.03	Low	Medium	Medium	Medium-High	Medium-High	Medium
853	NextEra	502 Junction - Black Oak - Woodside - Gant, Woodside SVC + Cap Banks	6/1/2027	\$ 683.55	\$ 1,195.24	High	Medium	Medium-High	Medium-High	High	Medium
904	AEP - Transource	Joshua Falls - Yeat 765kV Greenfield Line and Substation	12/1/2029	\$ 1,048.10	\$ 1,122.40	Low	Medium	Medium-High	Medium	High	Low



# South Cluster Constructability Matrix

## South Cluster Projects – Selected for Detailed Evaluation

PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs (\$M)	Independent Costs (\$M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
516	Dominion	Interregional solution- Aspen-Doubs Second 500 kV Line	12/1/2027	\$ 61.72	\$ 77.95	Medium-High	High	Low	Low	Low	Medium
711	Dominion	Regional Solution - 500 kV North Anna-Wishing Star Upgrades	12/1/2027	\$ 1,227.84	\$ 1,284.62	Low	High	Medium	Low	Low	Medium
548	LS Power	RTEP Window 3 Solution (South Components)	6/1/2030	\$ 628.56	\$ 617.00	Low	Medium	Medium-High	Medium-High	Medium-High	Medium
325	PSEG	Proposal E - Brambleton-Hinsons Ford Rd 500kV	6/1/2027	\$ 267.38	\$ 275.56	Low	Low	High	High	High	Low
837	POTOED - FirstEnergy	Data Center Reinforcement Proposal #1 (South)	6/1/2030	\$ 203.38	\$ 209.16	Low	High	Low	Low	Low	Medium
663	NextEra	Front Royal - Racefield, Warrenton - Rixlew, Warrenton - Hourglass, Mars - Ocean Court - Davis Drive	6/1/2027	\$ 284.17	\$ 514.17	High	Medium	High	High	High	Low

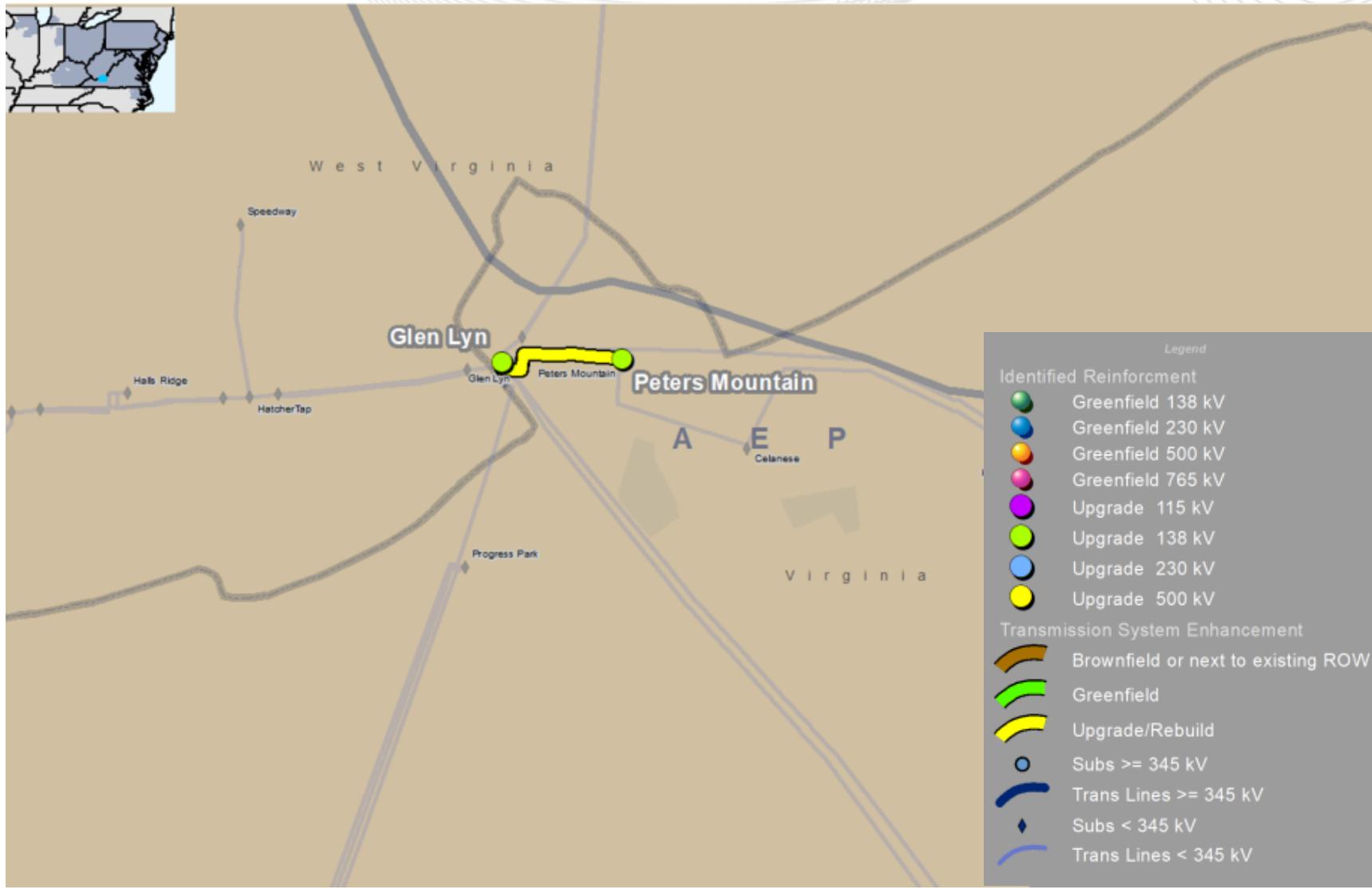


# Dominion Cluster Constructability Matrix

## Dominion Cluster Projects – Selected for Detailed Evaluation

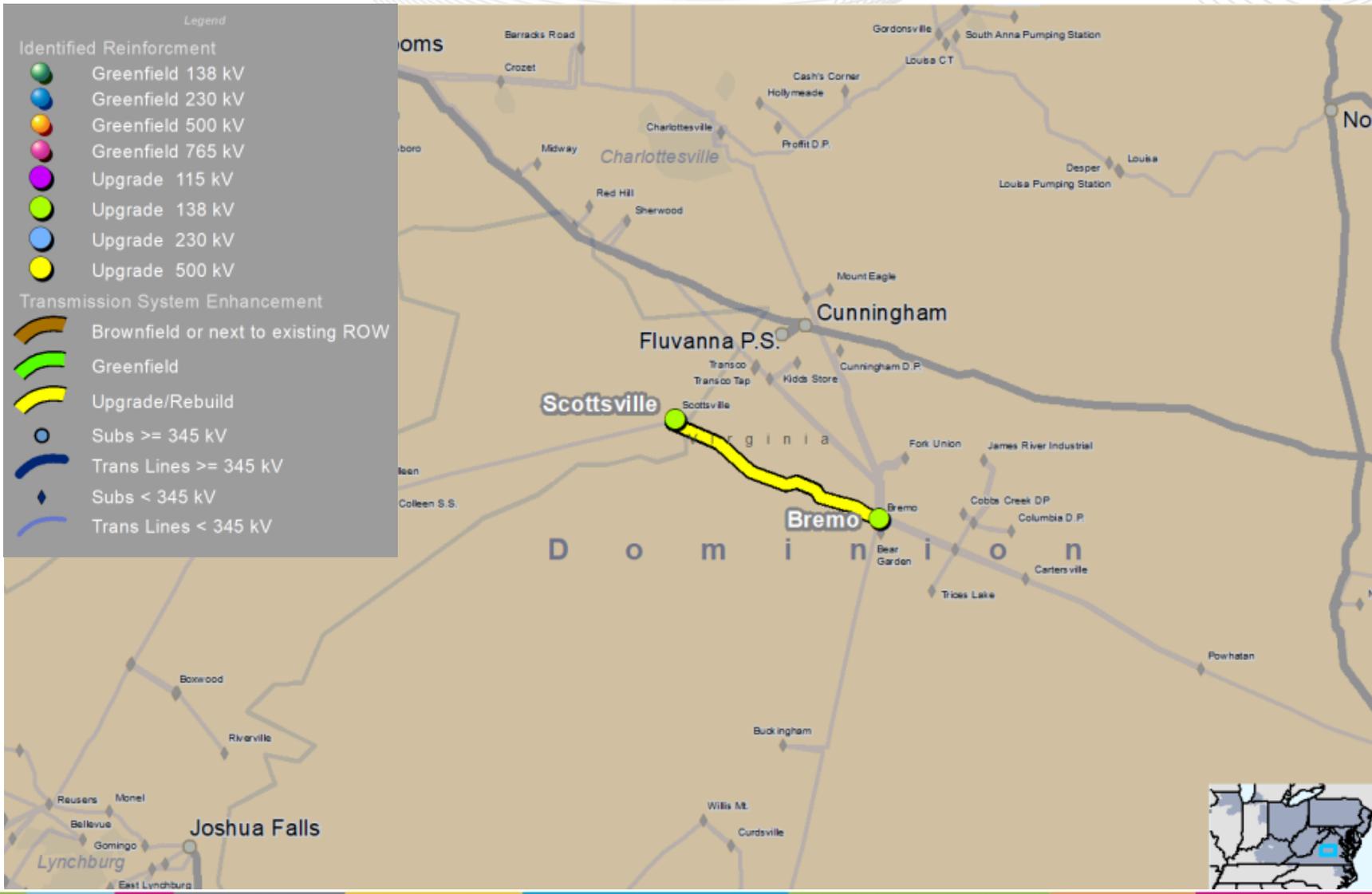
PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs (\$M)	Independent Costs (\$M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
692	Dominion	Data Center Alley Local solution - New 500 kV/230 kV Aspen-Golden & Golden-Mars lines	12/1/2027	\$ 1,058.45	\$ 1,098.96	Low	High	Medium	Medium	High	Low
858	AEP - Transource	Stork - Flys 500kV Greenfield Line and Substations	12/1/2027	\$ 510.44	\$ 516.60	Low	Medium	Medium-High	High	High	Low
548	LS Power	RTEP Window 3 Solution (Dominion Components)	6/1/2030	\$ 283.78	\$ 307.52	Low	Medium	Medium-High	High	Medium-High	Low

# 2022 Window 3 proposals – AEP – 196 & 234



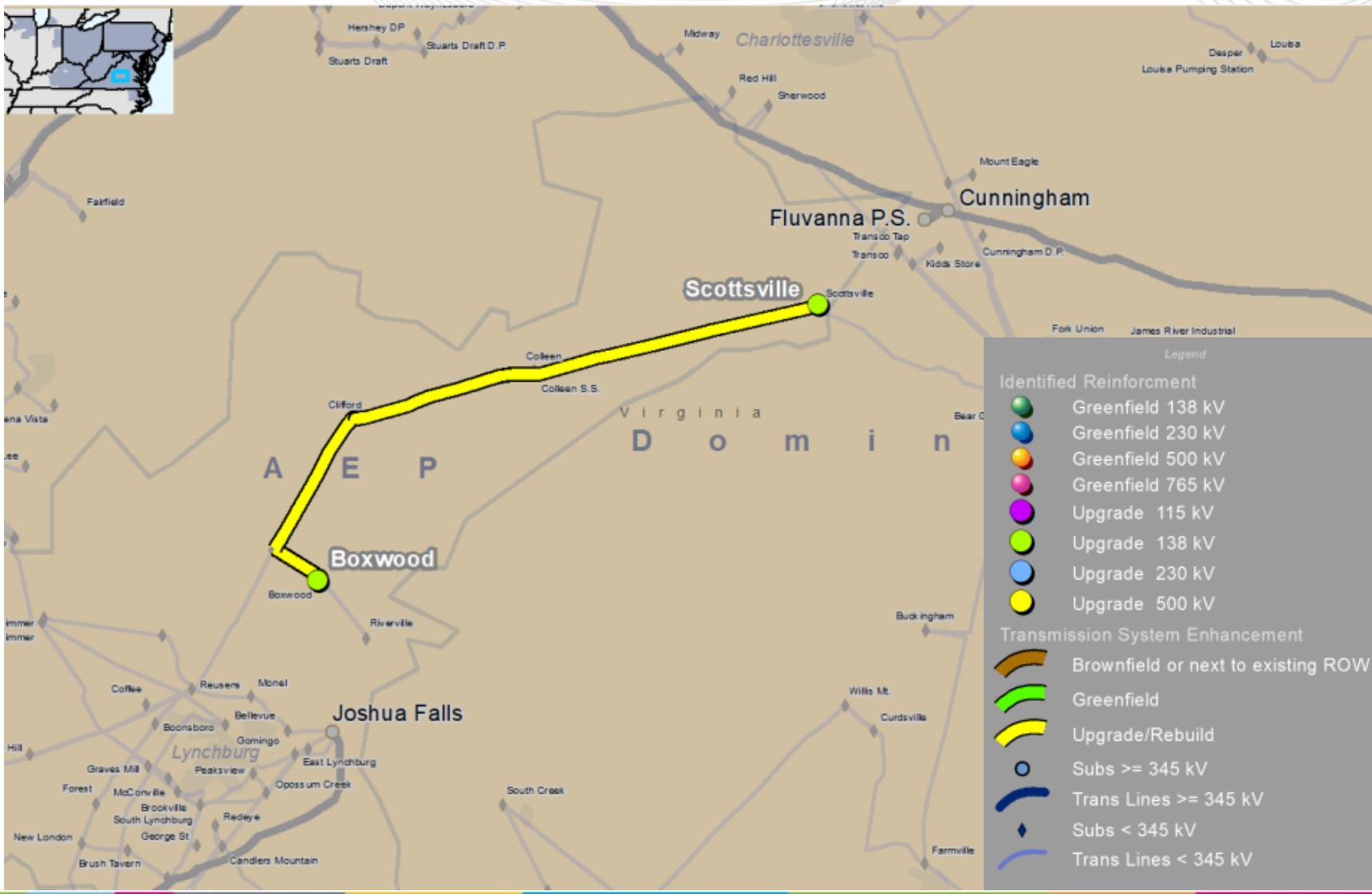
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – AEP - 9 & 629



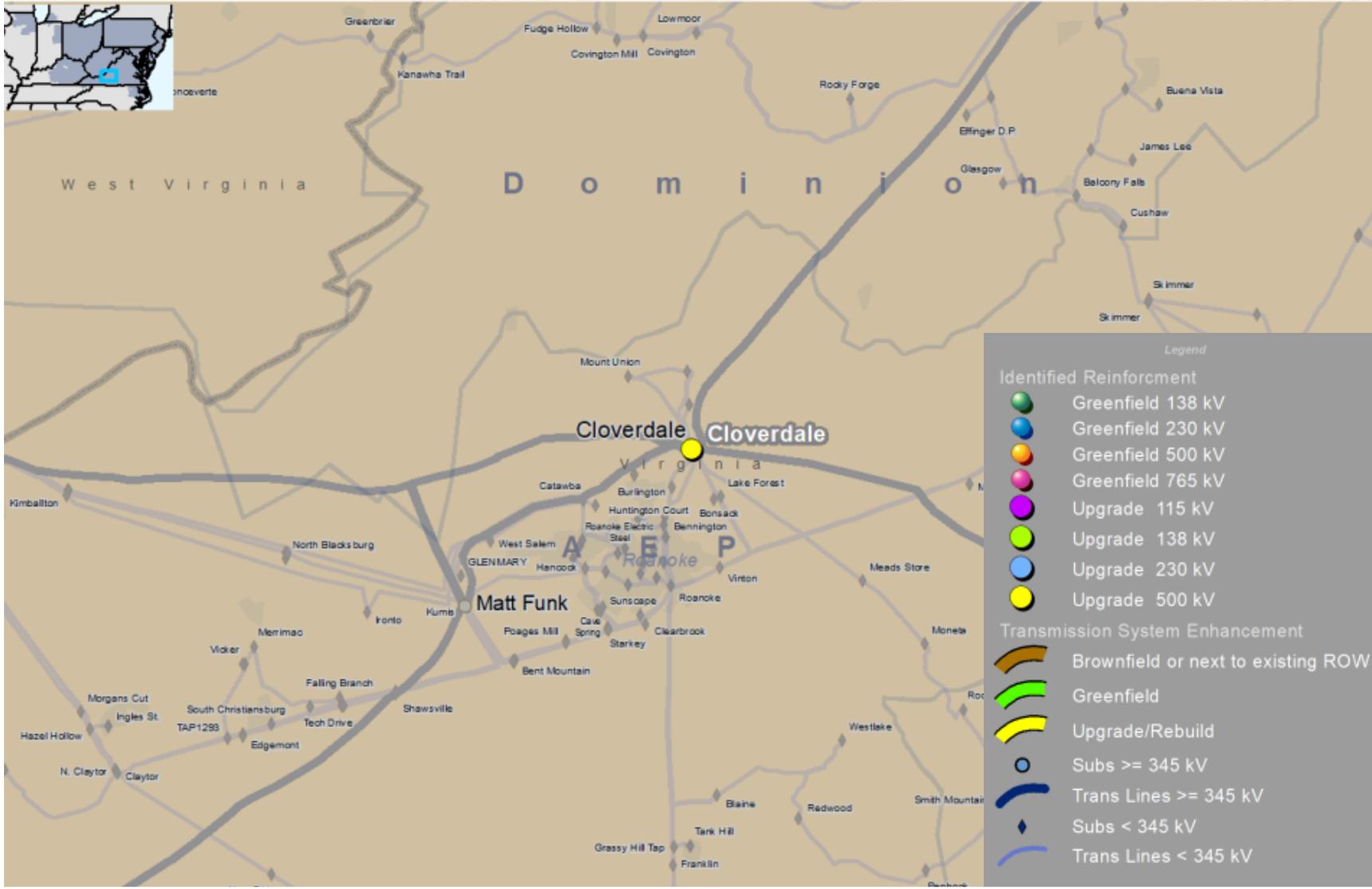
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – AEP – 55 & 181



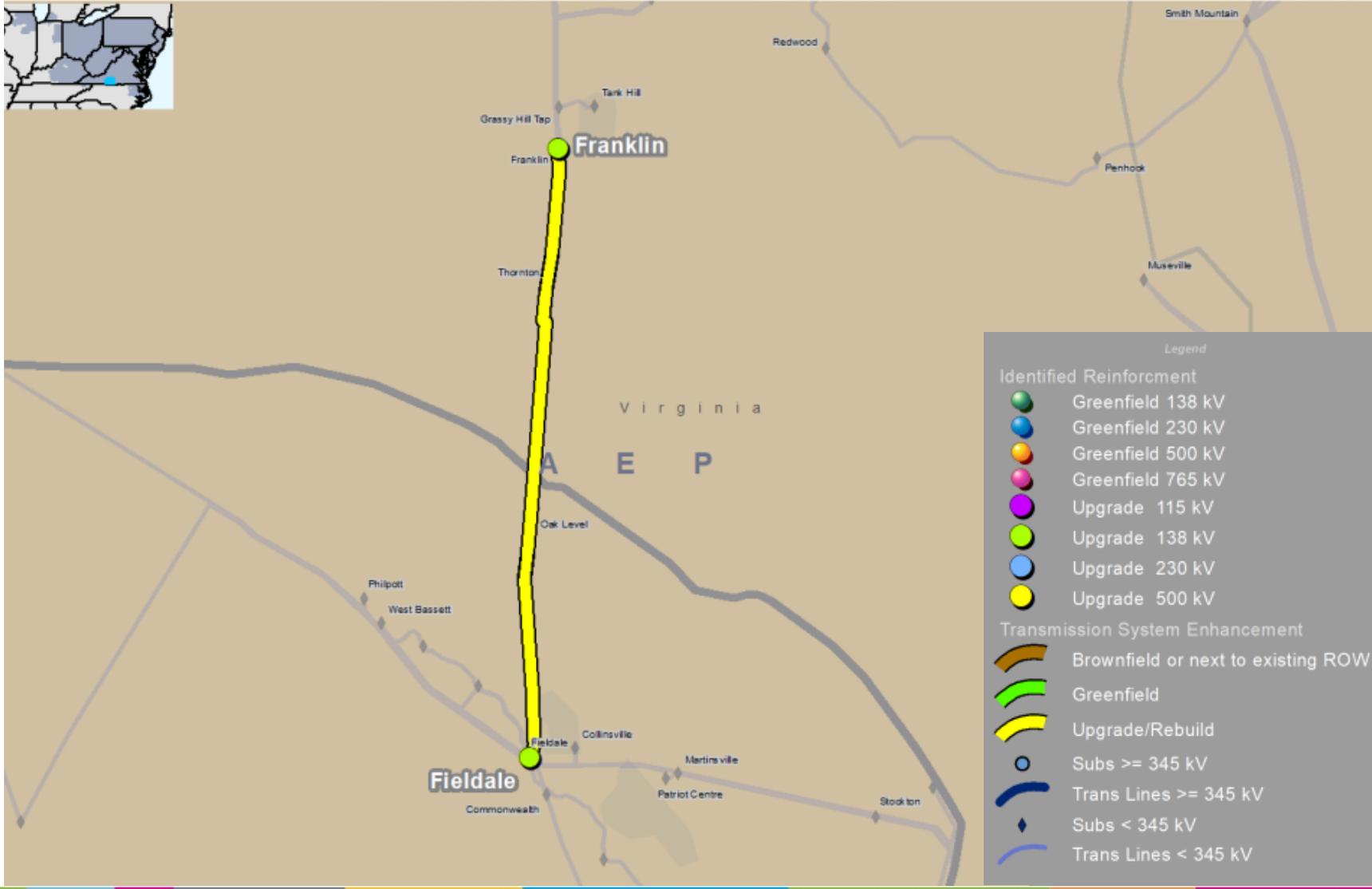
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – AEP - 202 & 410



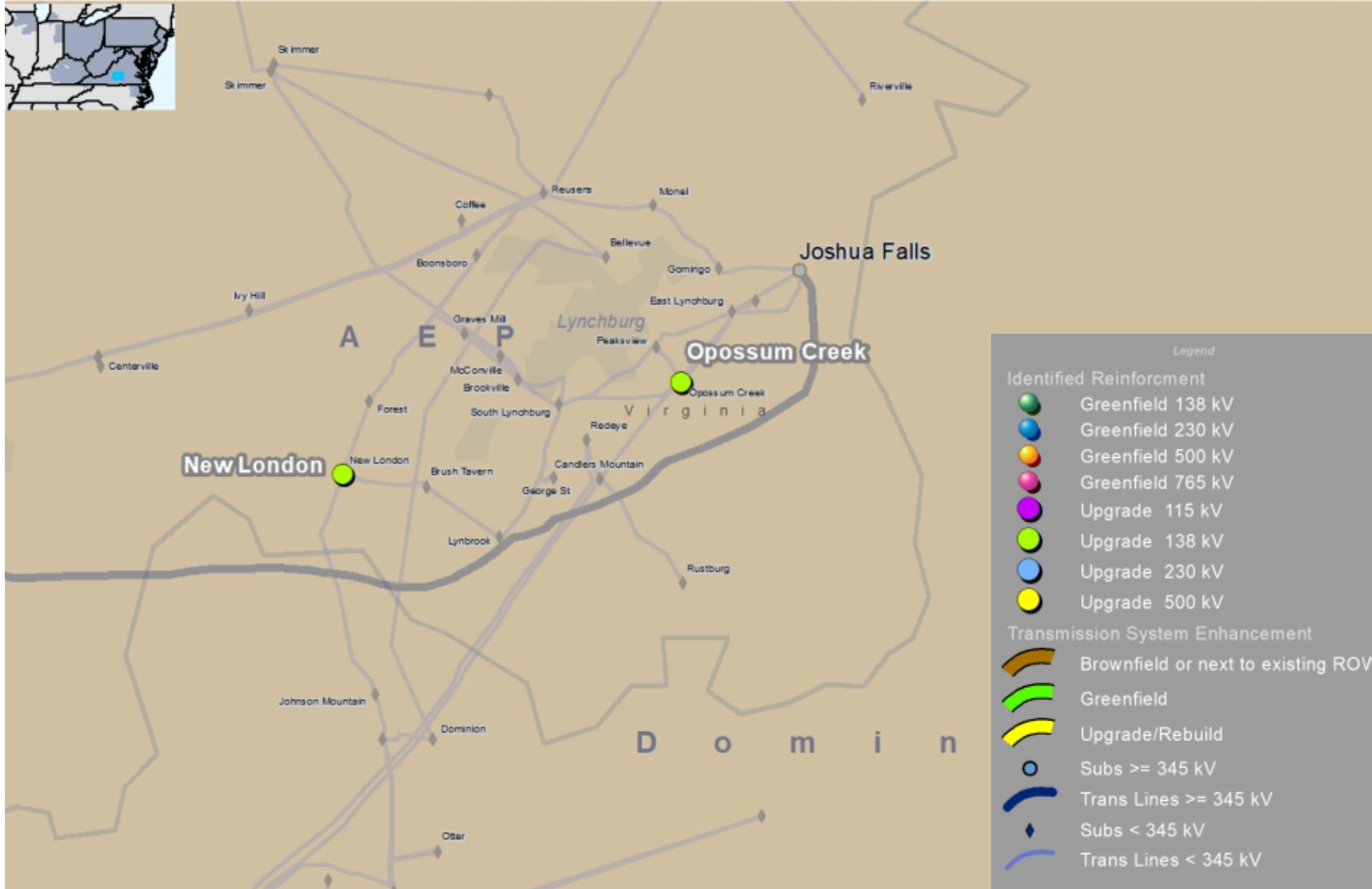
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – AEP - 477 & 537



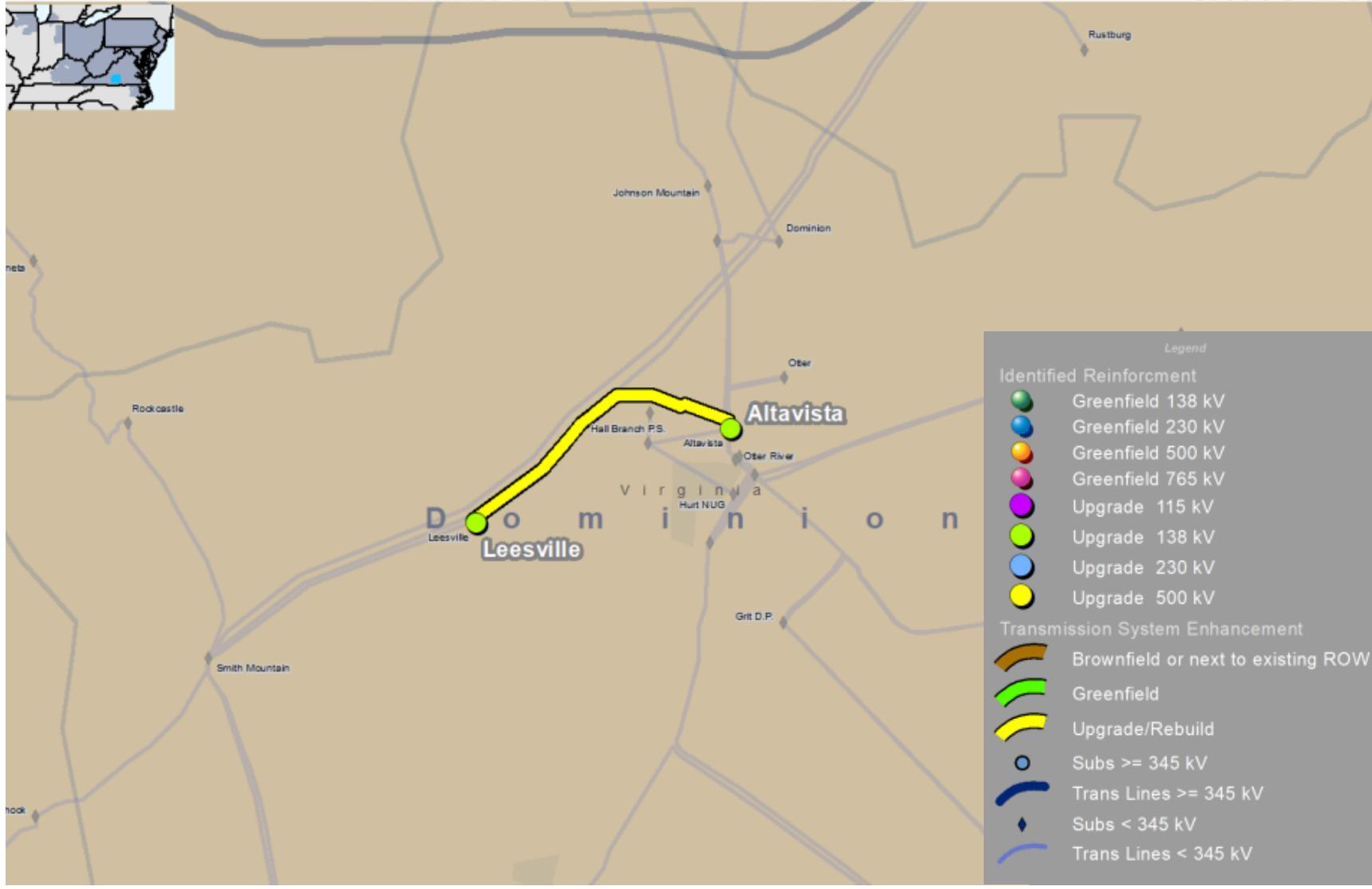
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – AEP - 524



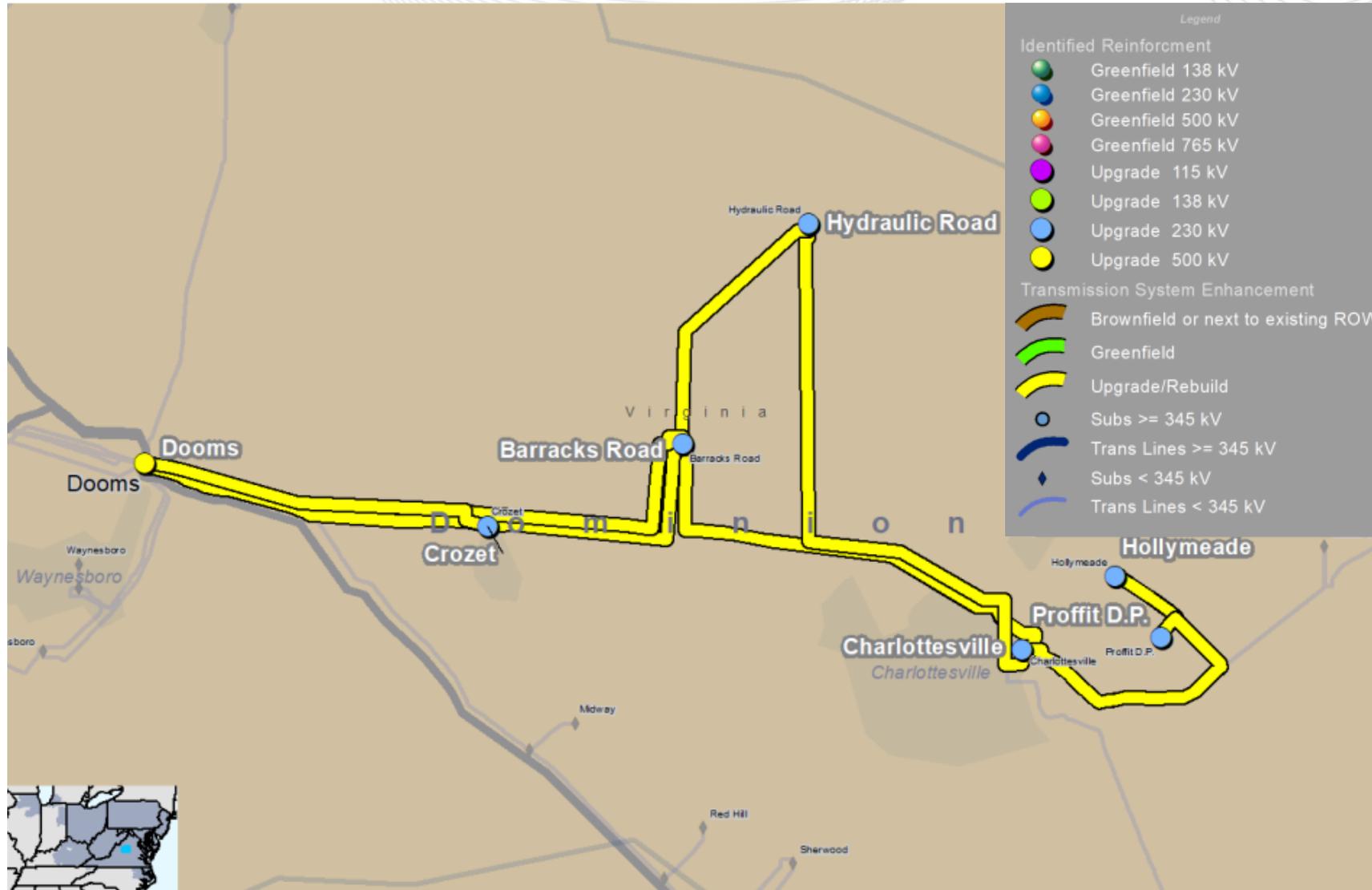
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – AEP - 856



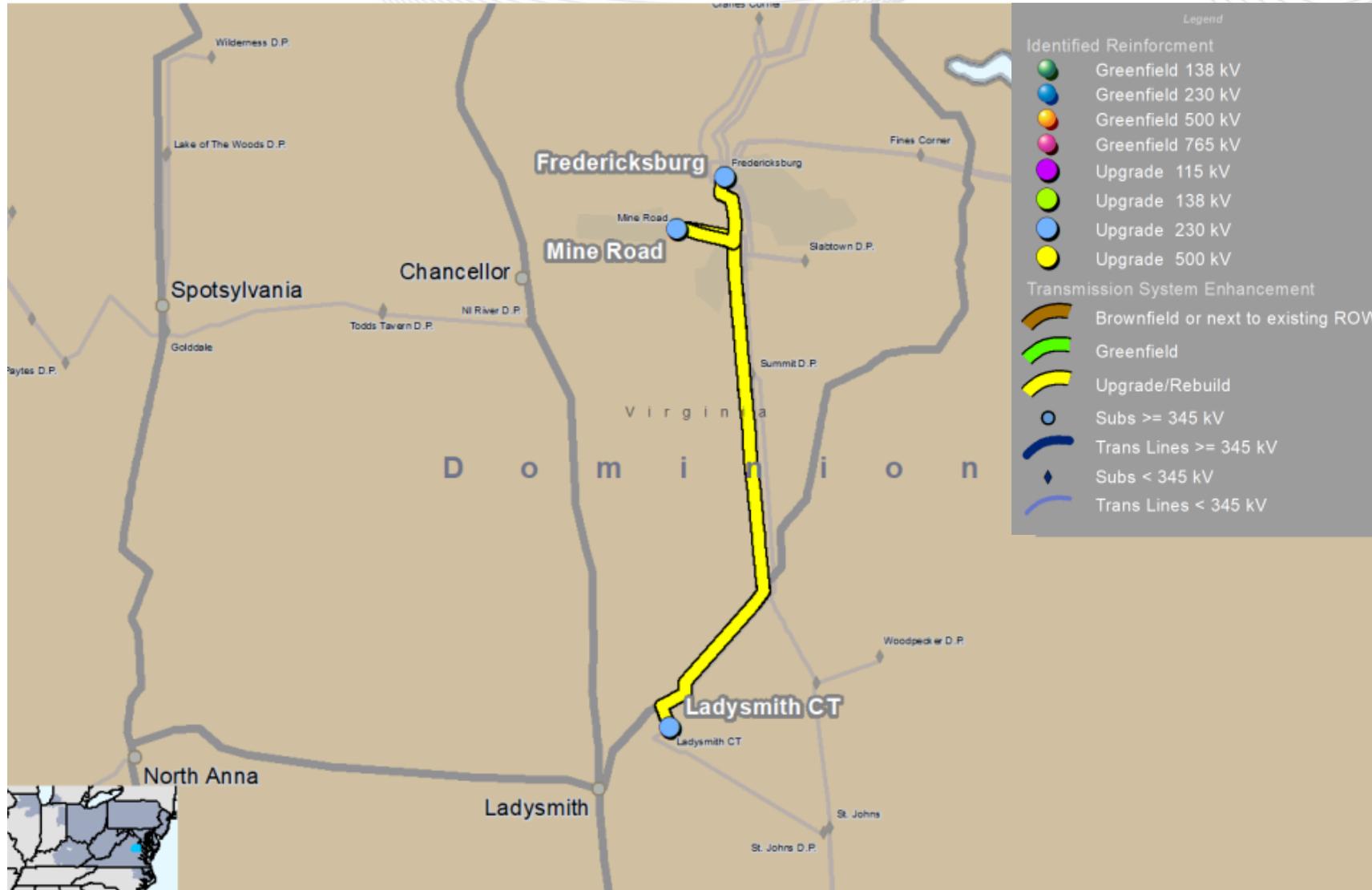
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 30



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 74

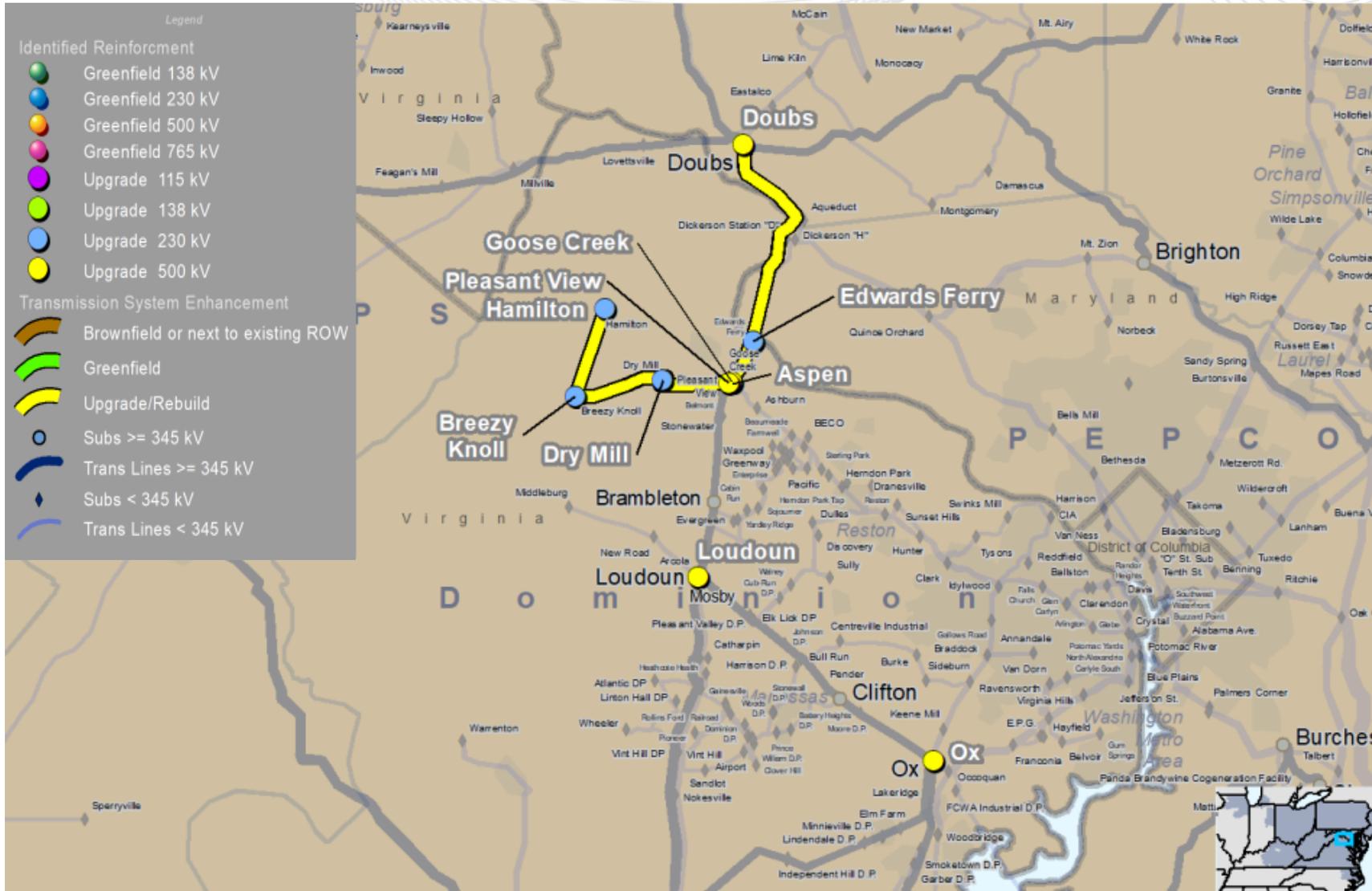


**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.



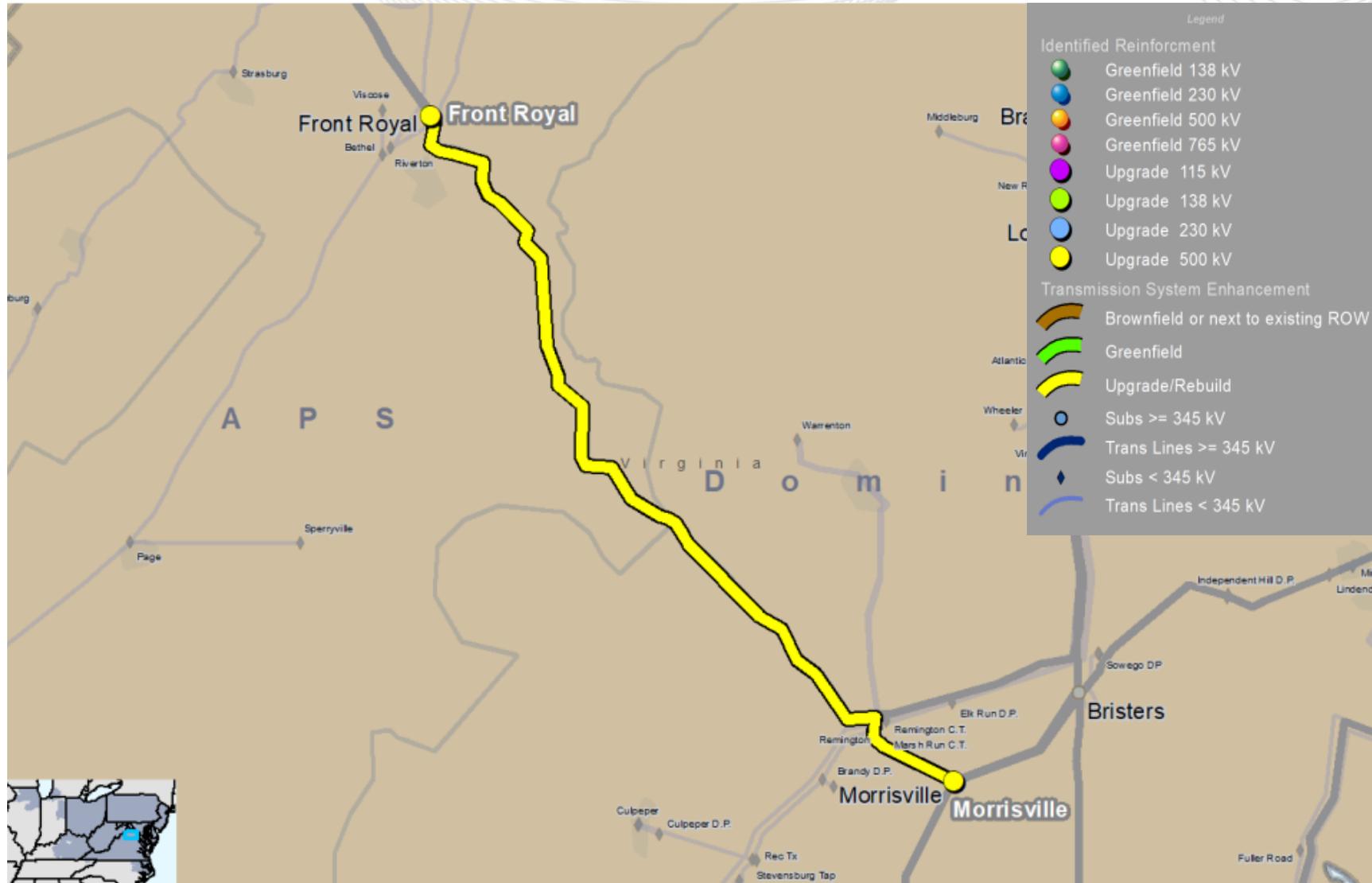


# 2022 Window 3 proposals – Dominion - 516



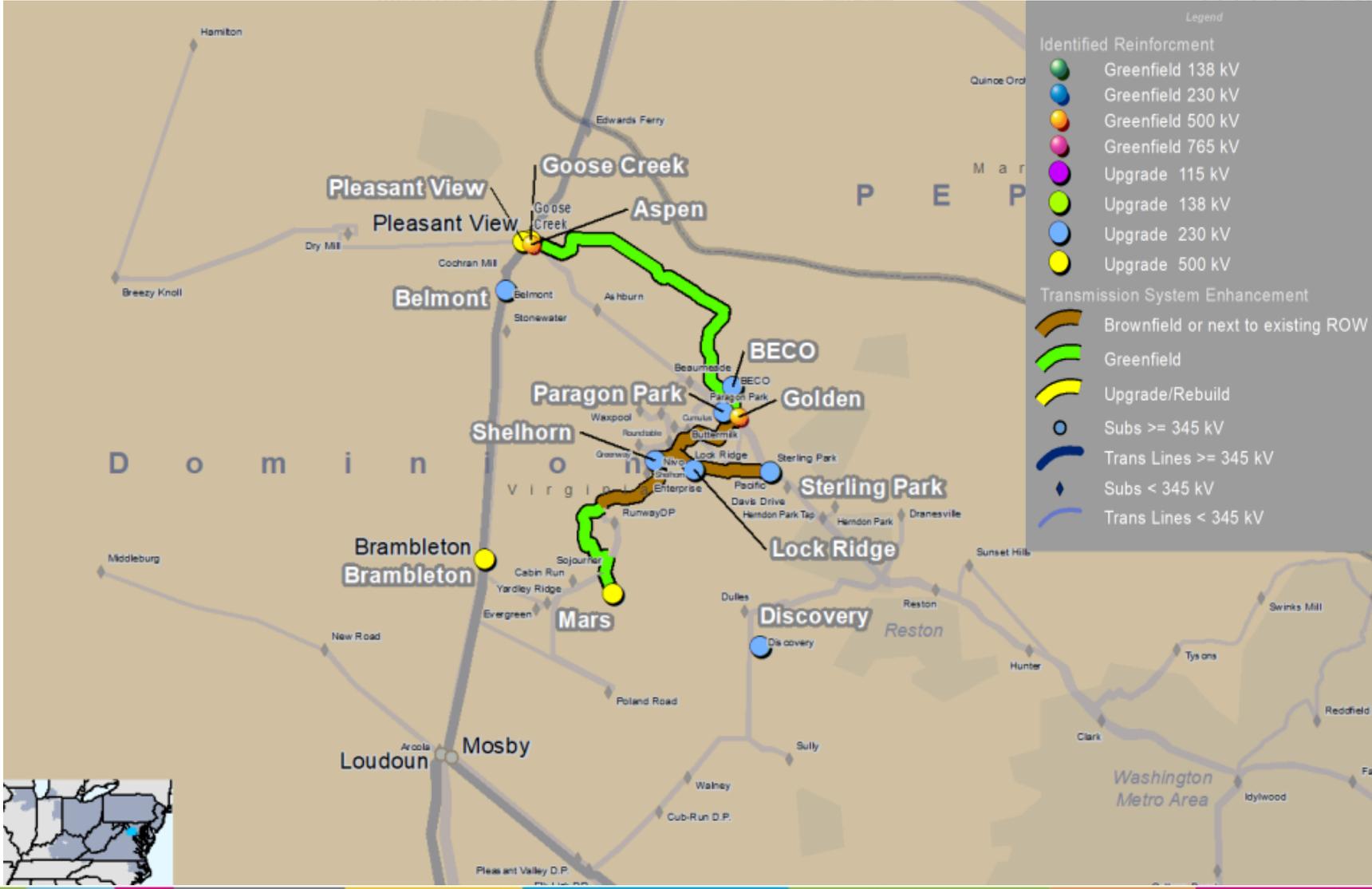
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 671



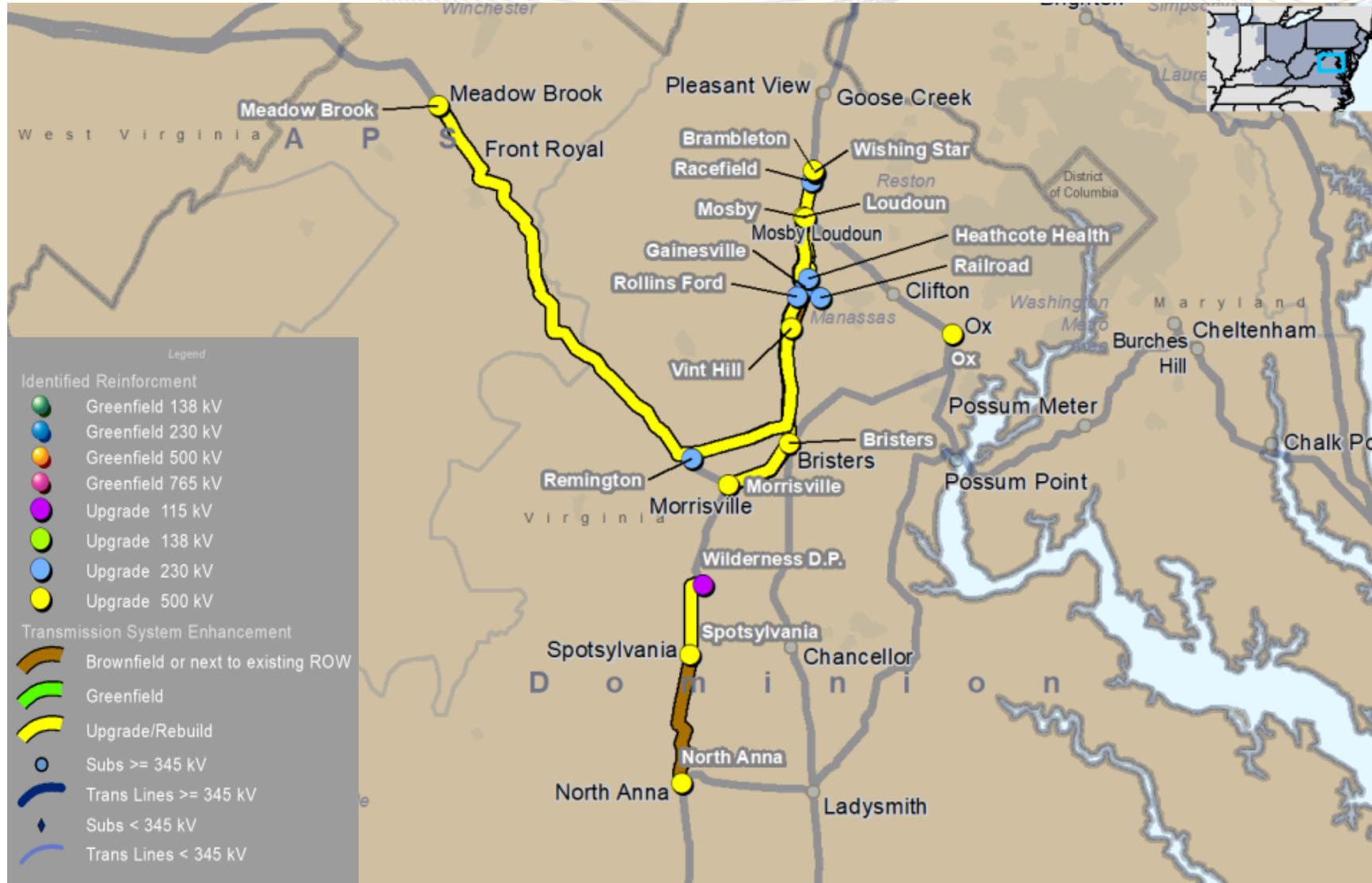
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 692



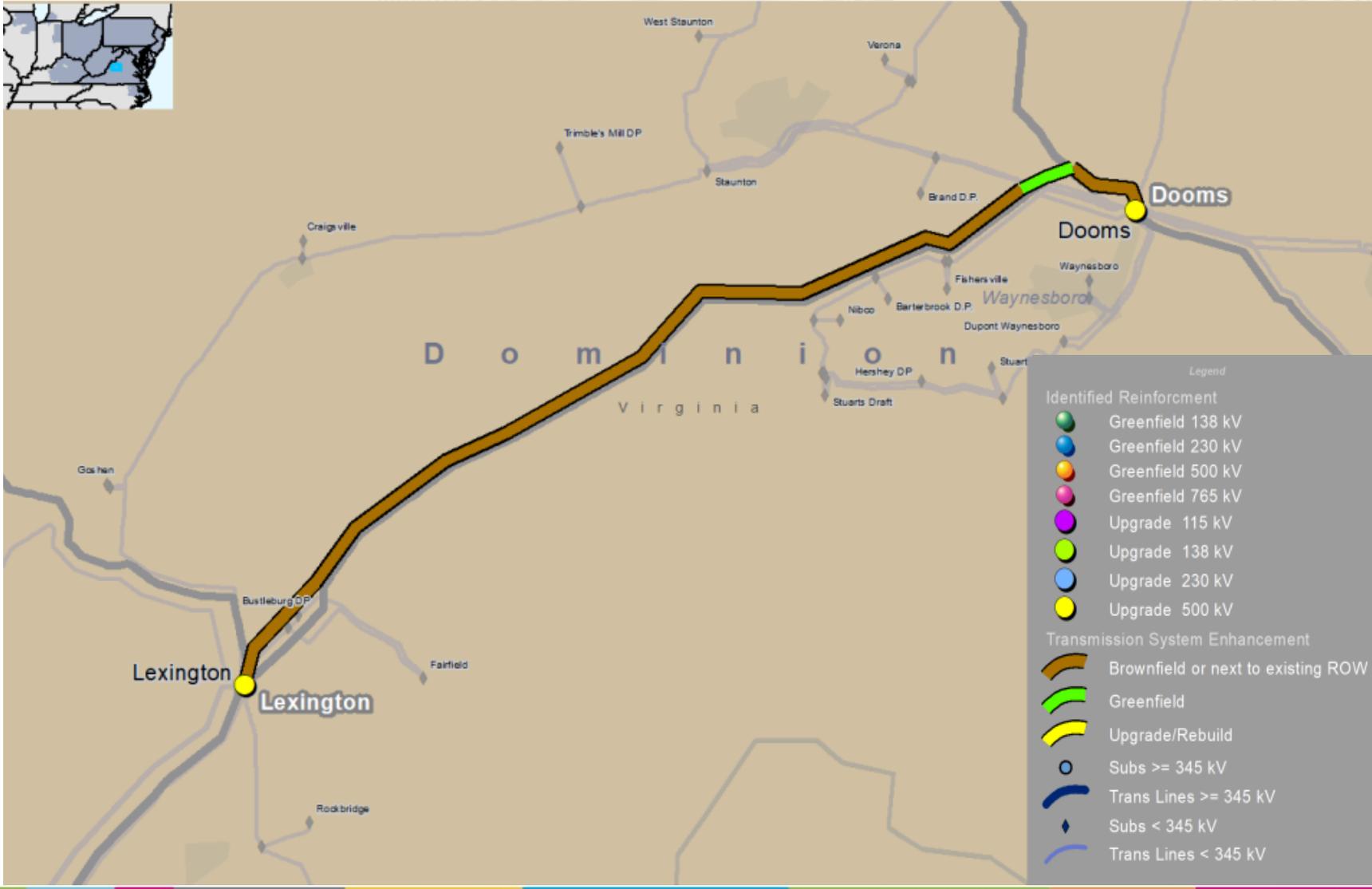
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 711



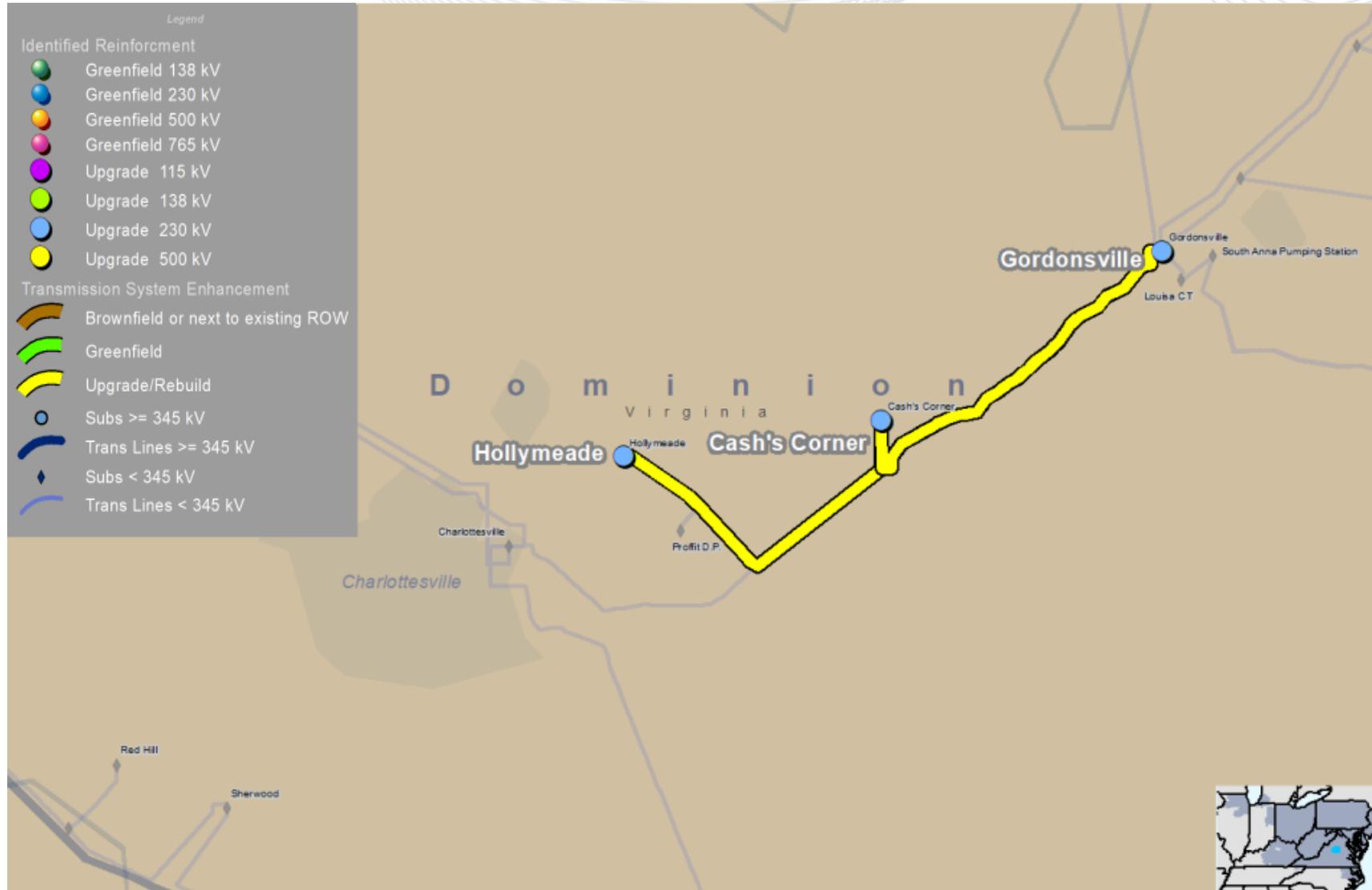
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 923



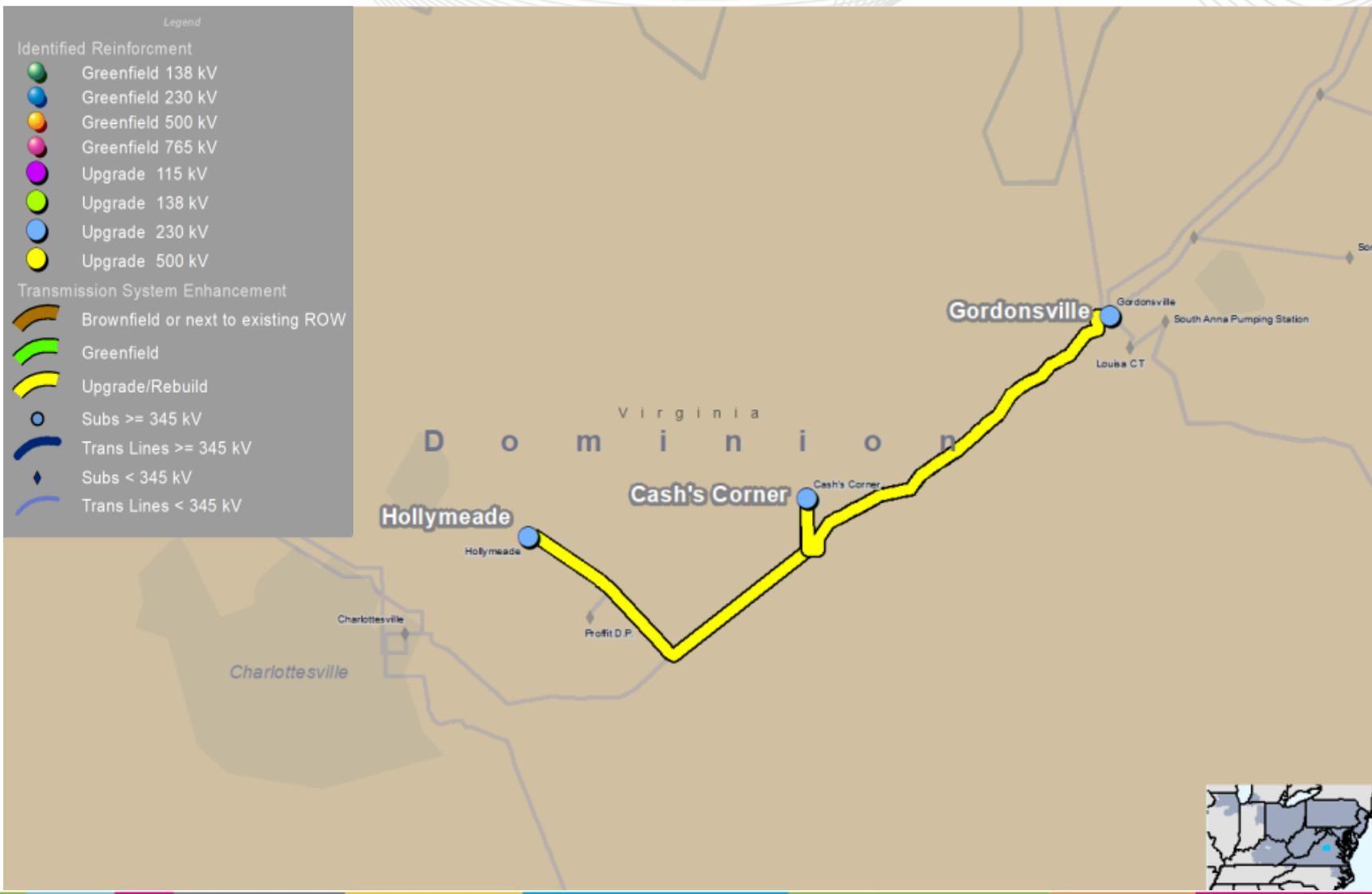
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 211



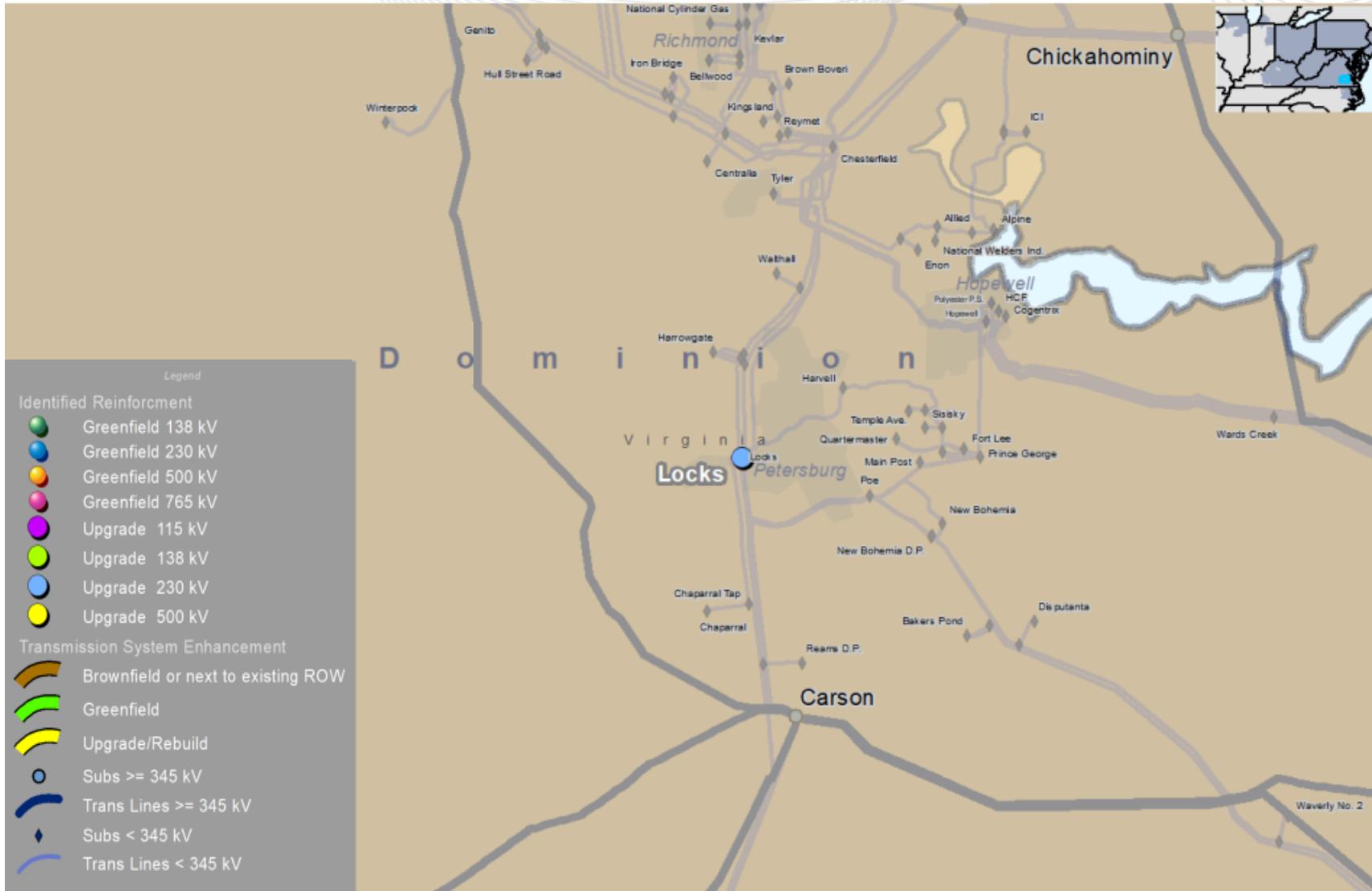
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 704



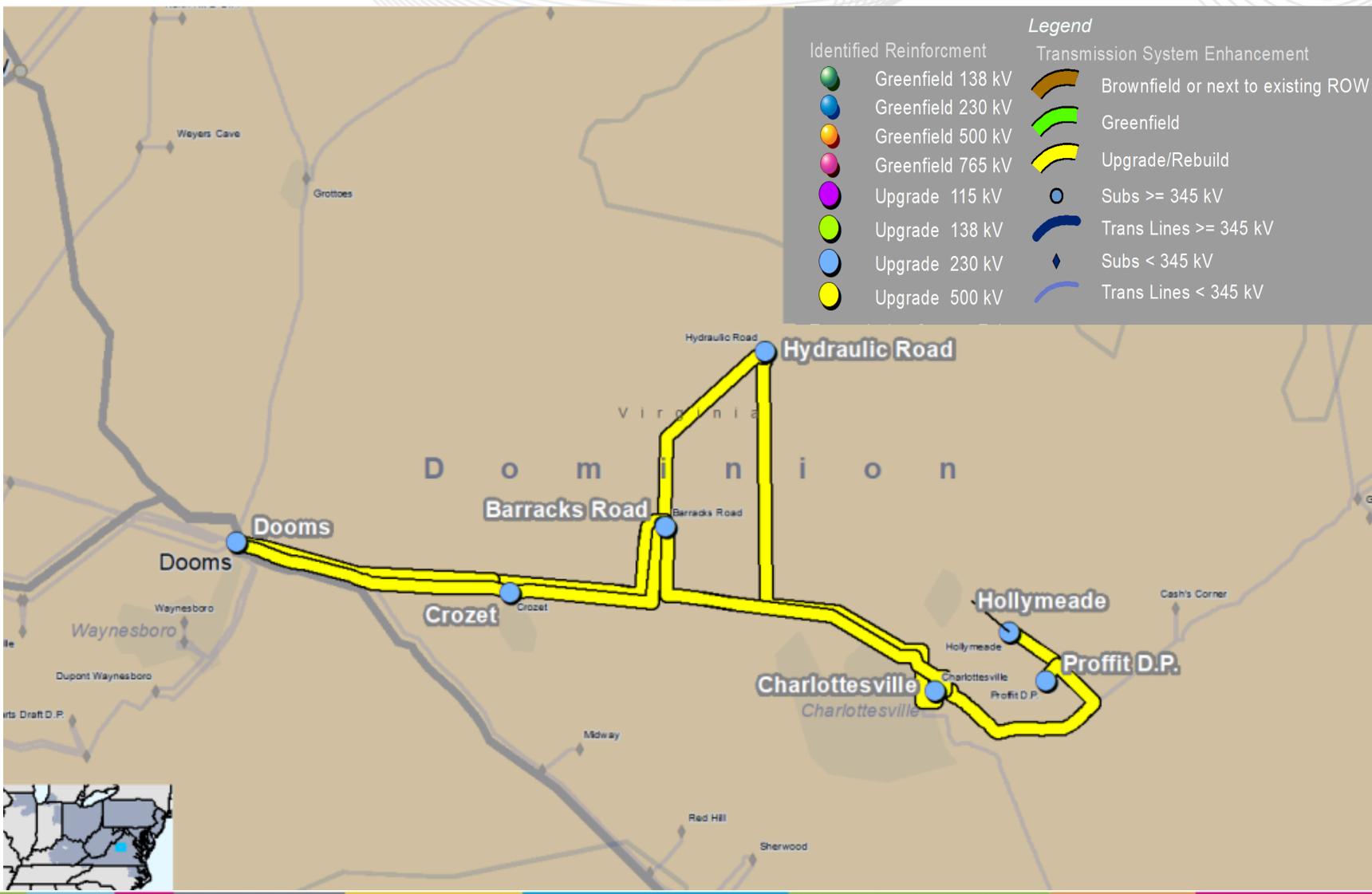
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion – 731



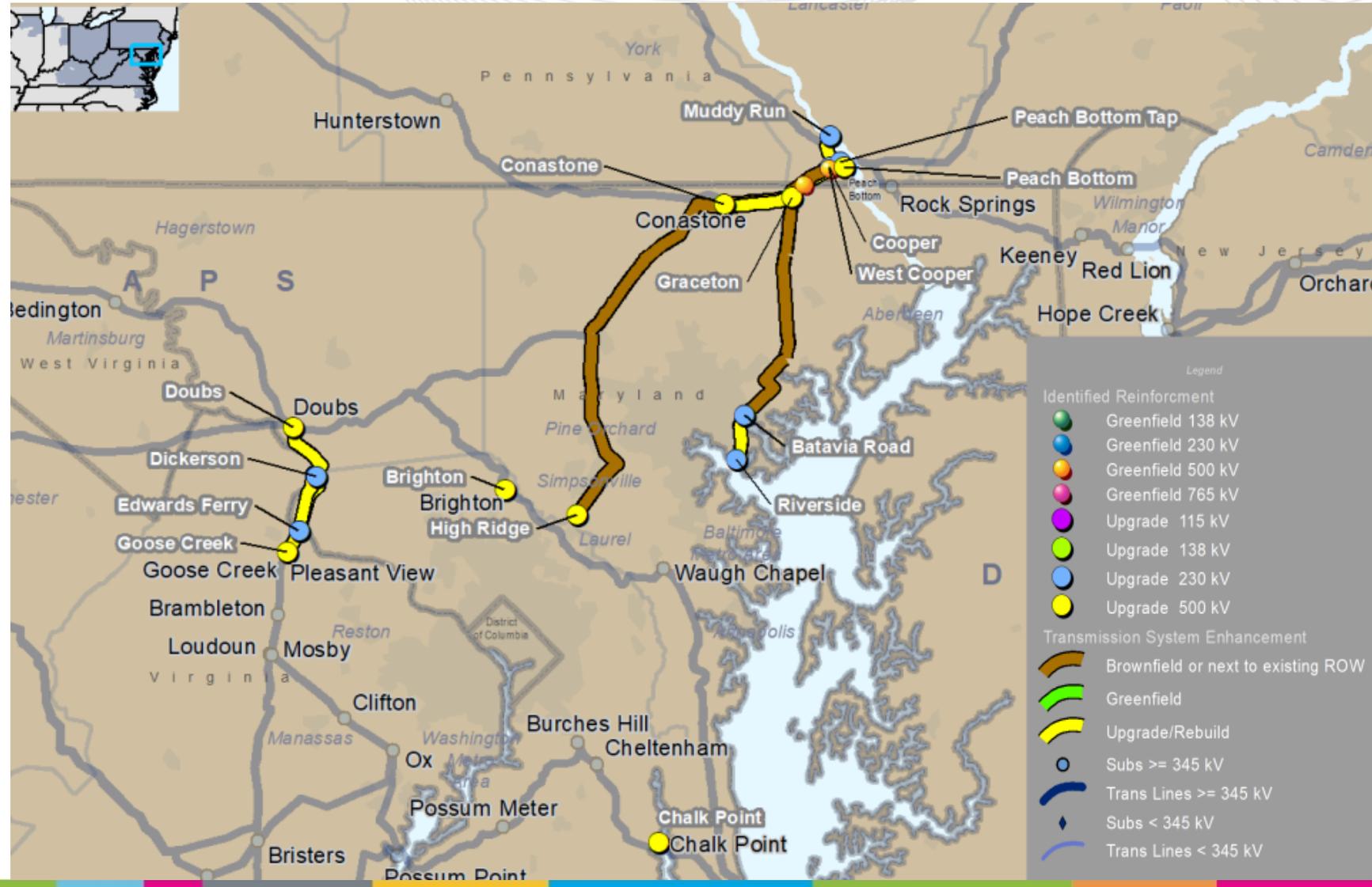
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Dominion - 967



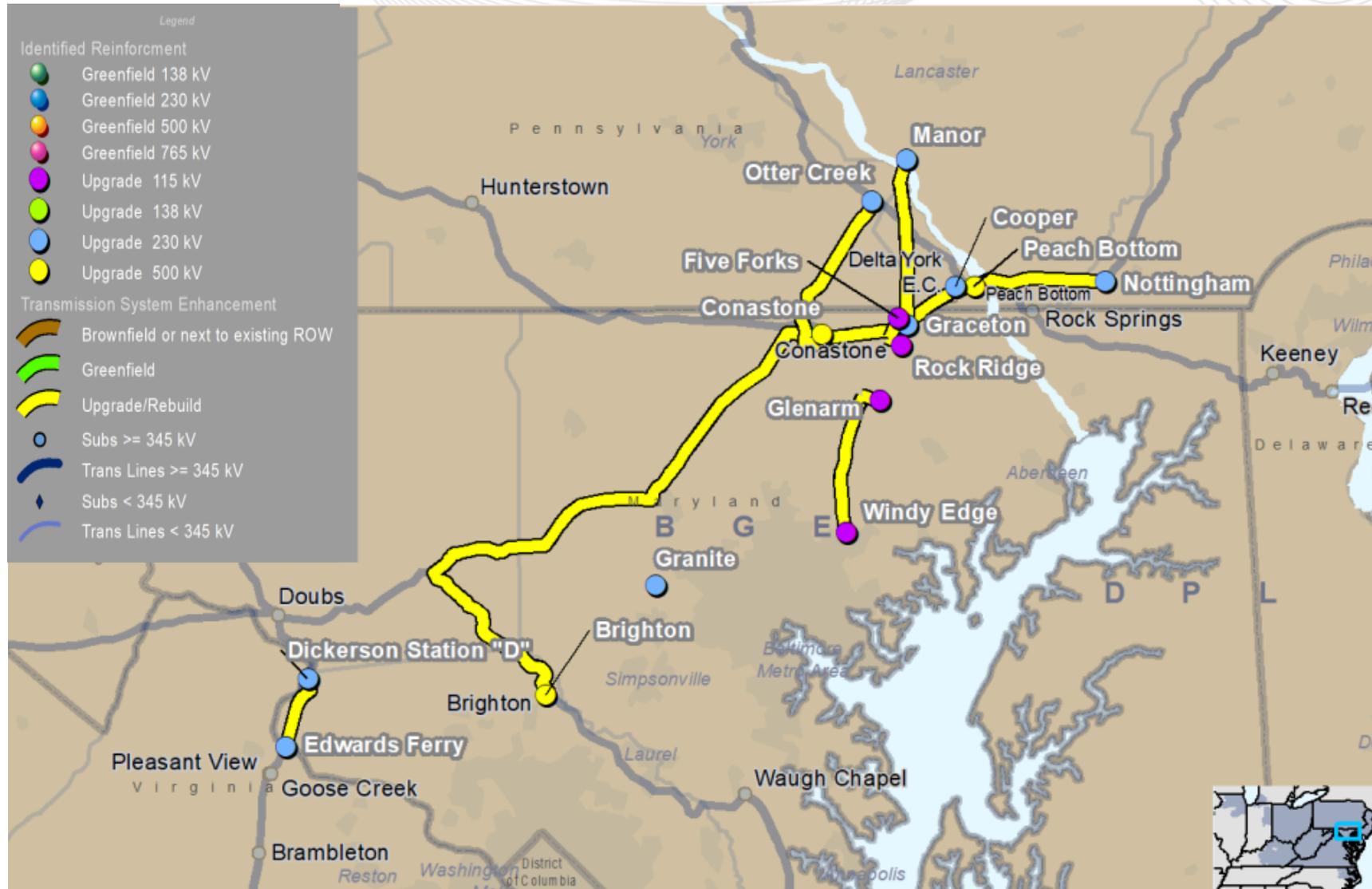
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Exelon – 344 & 660



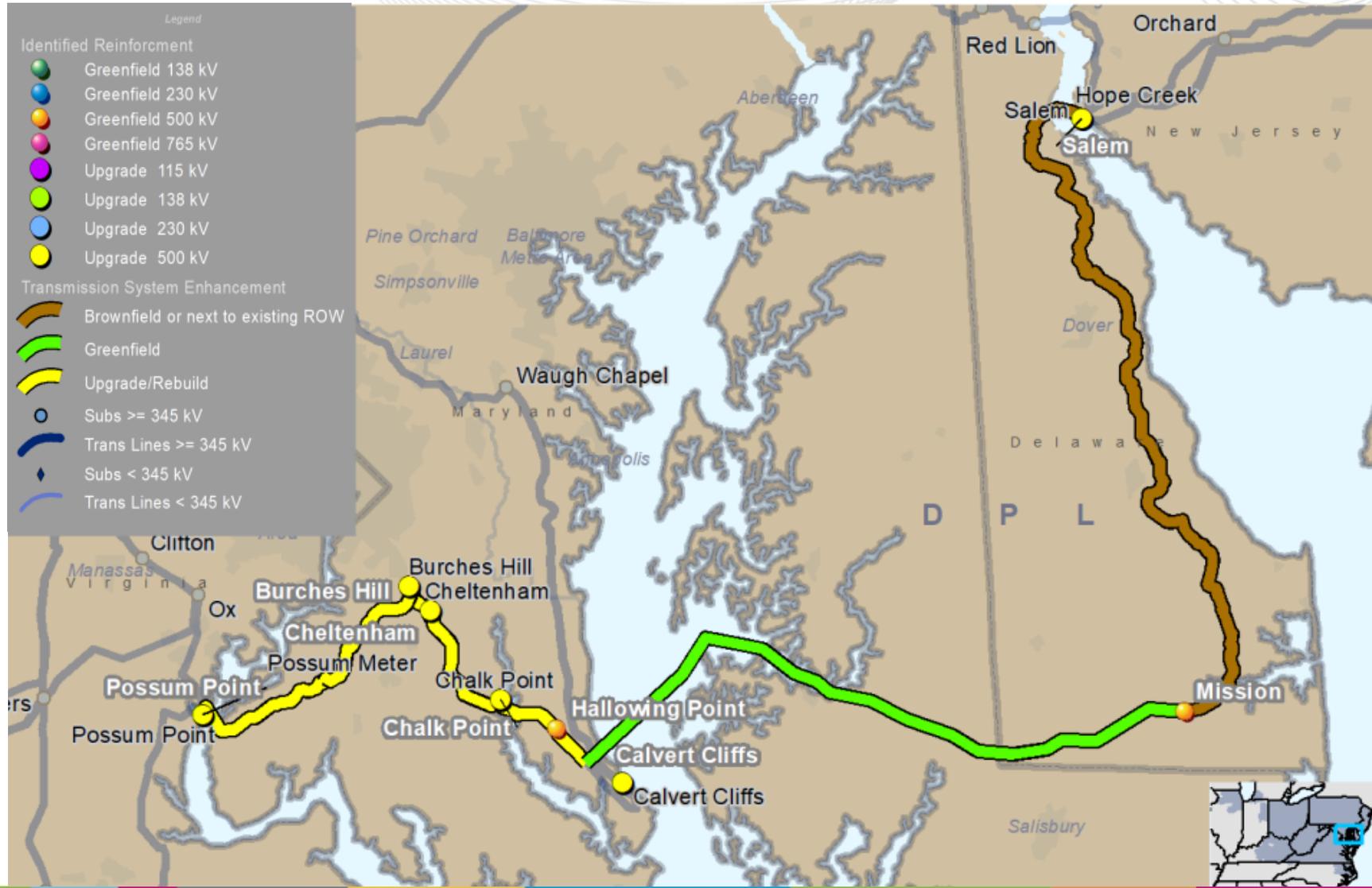
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Exelon - 600



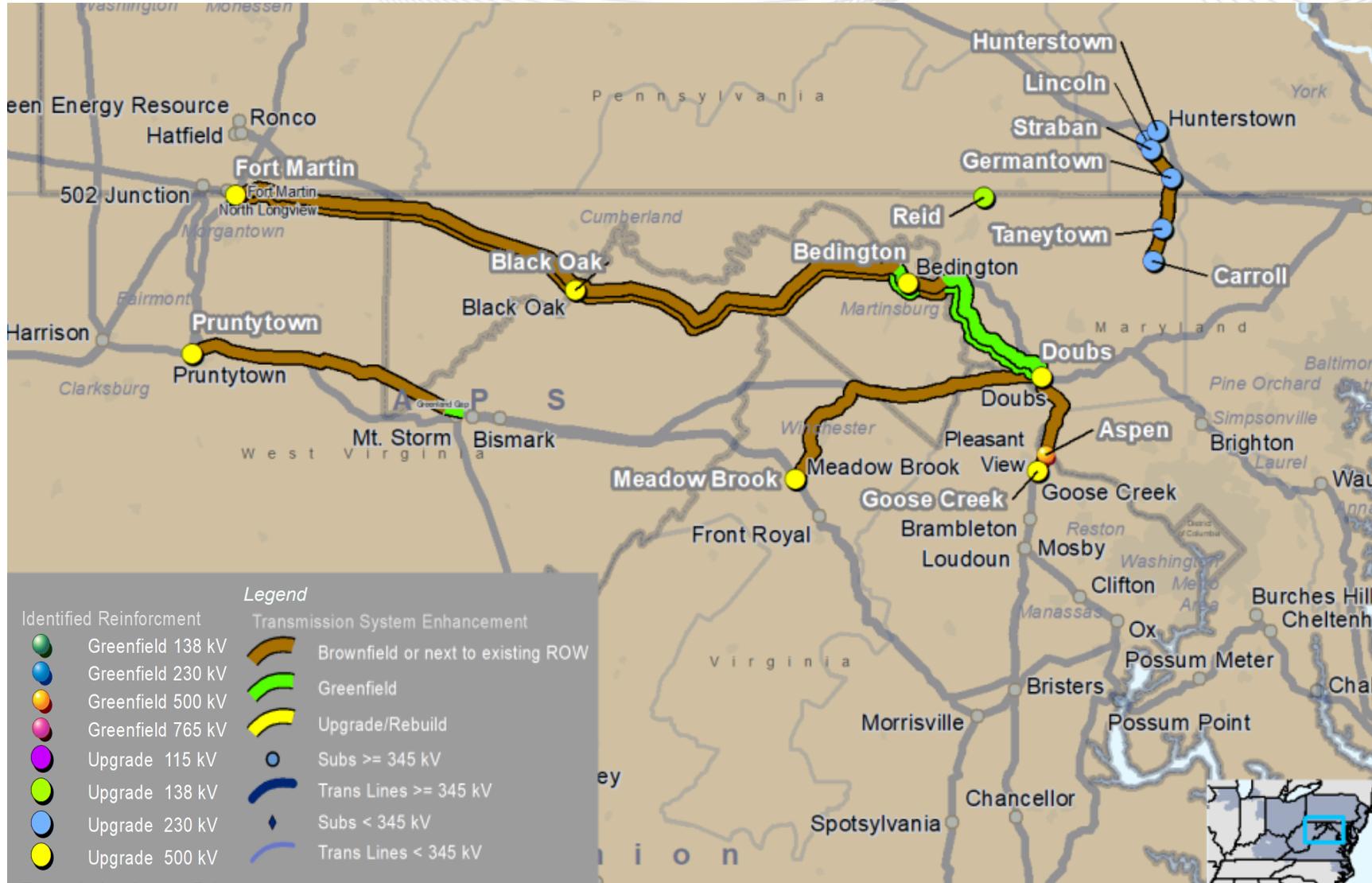
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Exelon - 691



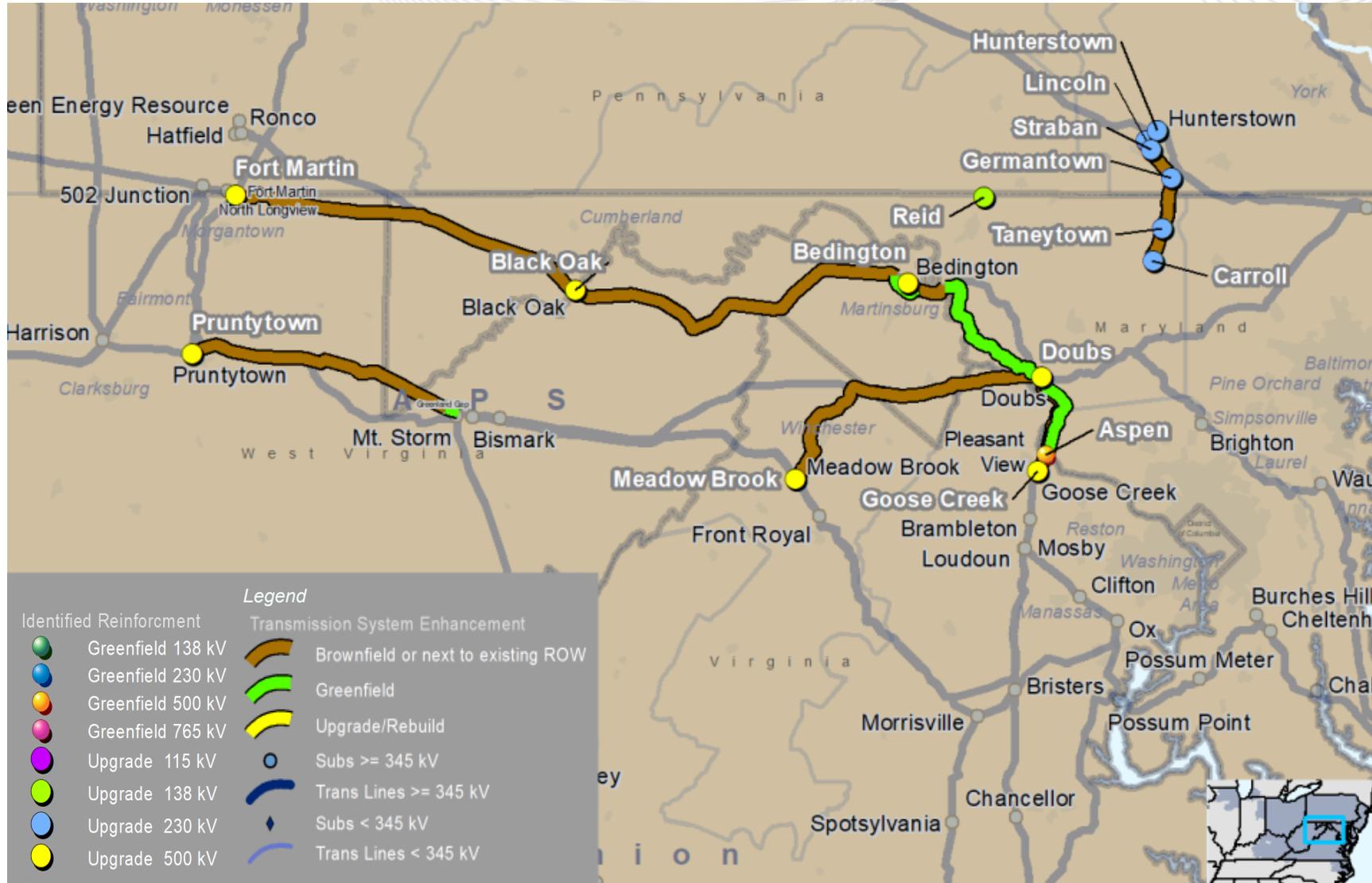
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – FE – 23



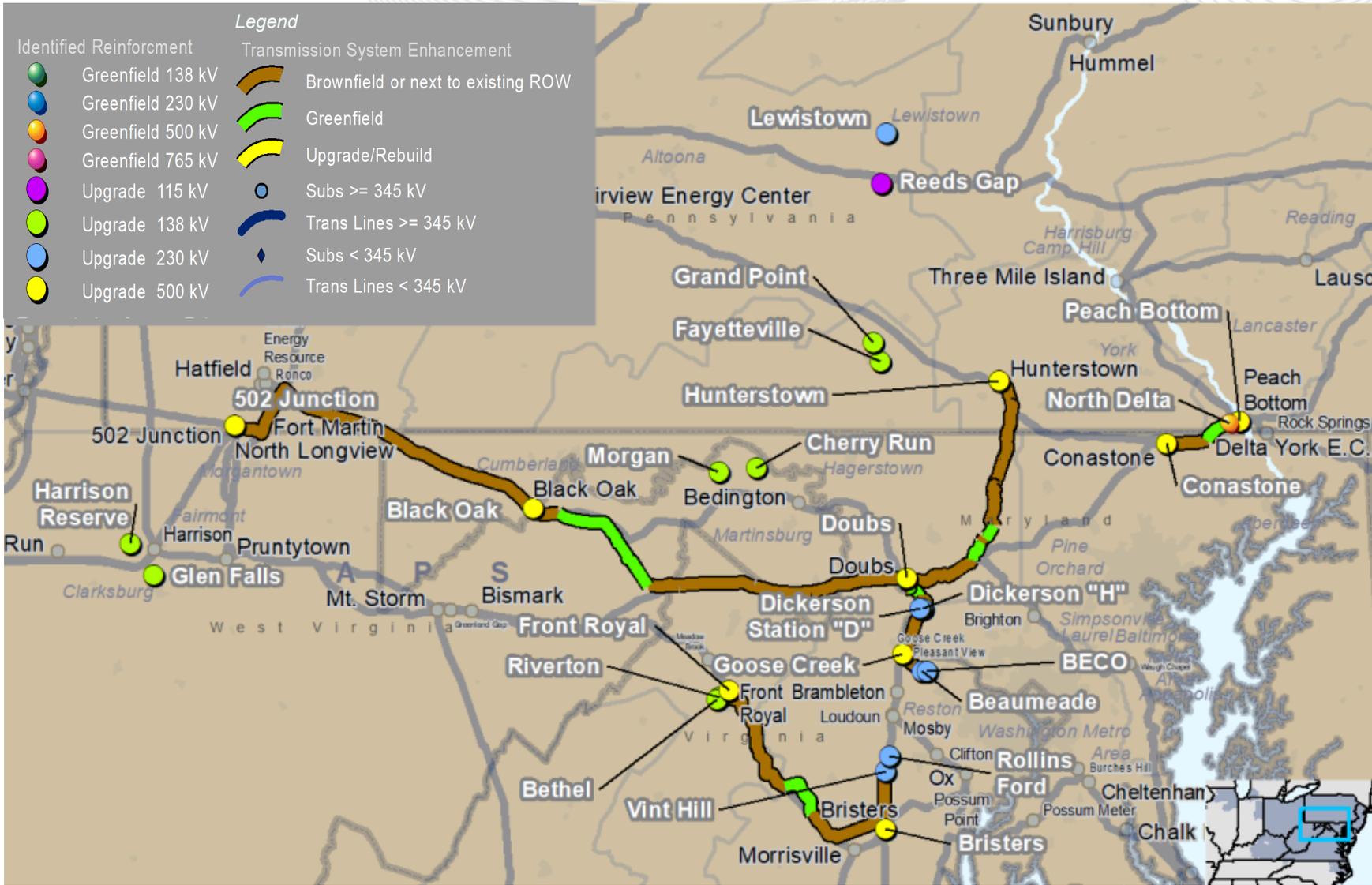
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – FE – 837



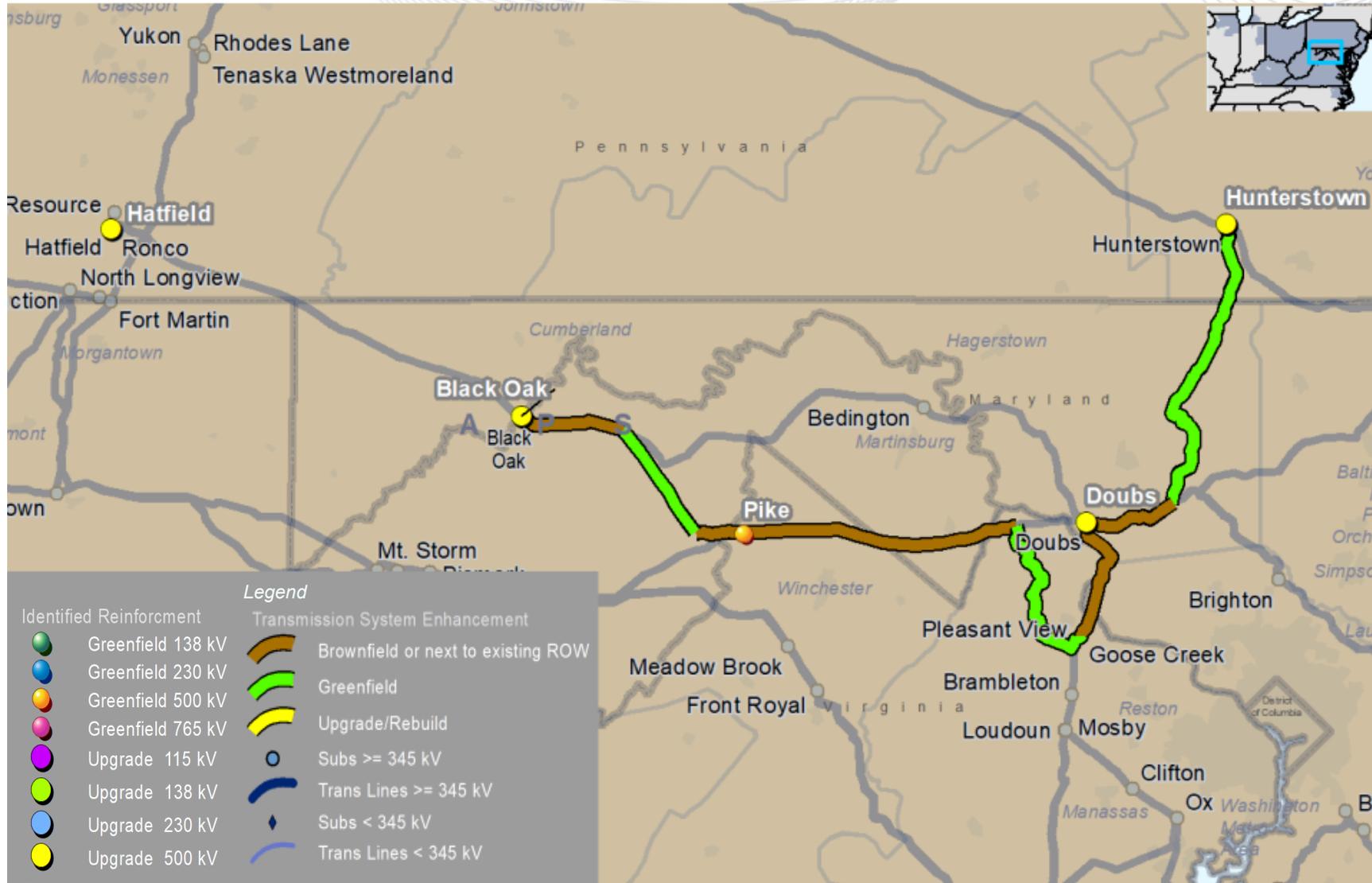
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – LS Power - 548



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera- 28



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

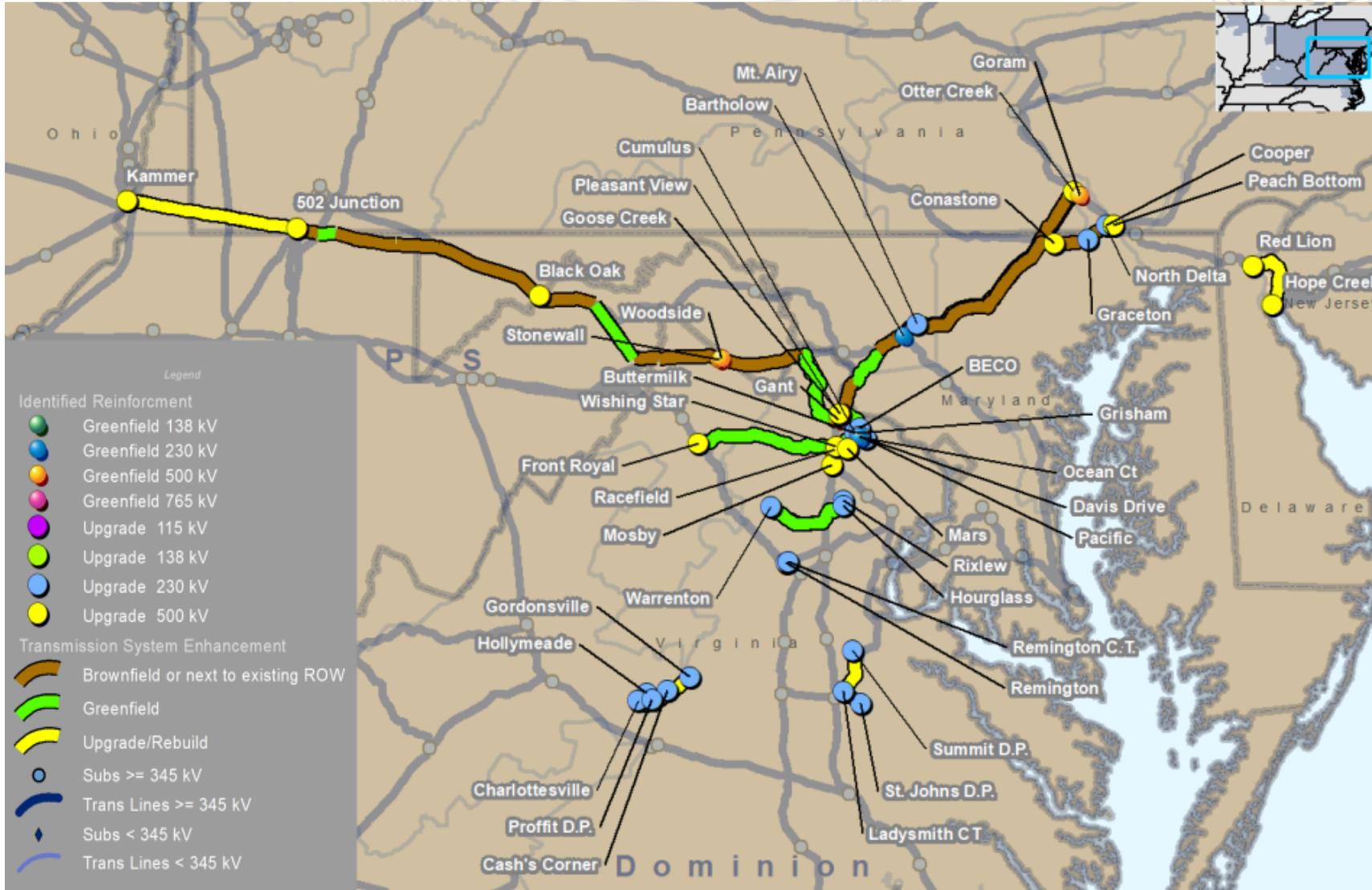
# 2022 Window 3 proposals – Nextera - 116



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

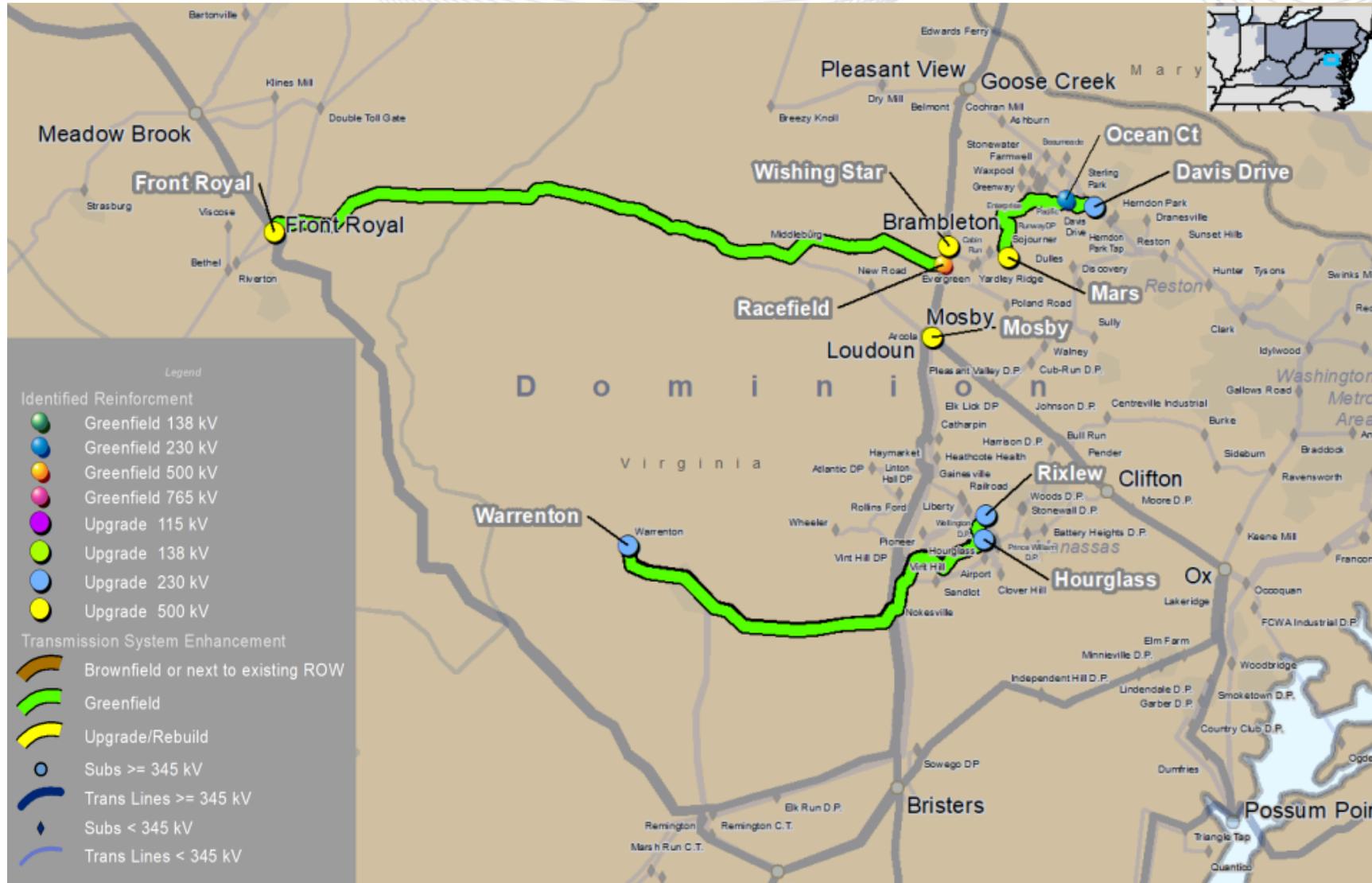


# 2022 Window 3 proposals – Nextera - 598 with 663, 853, 385



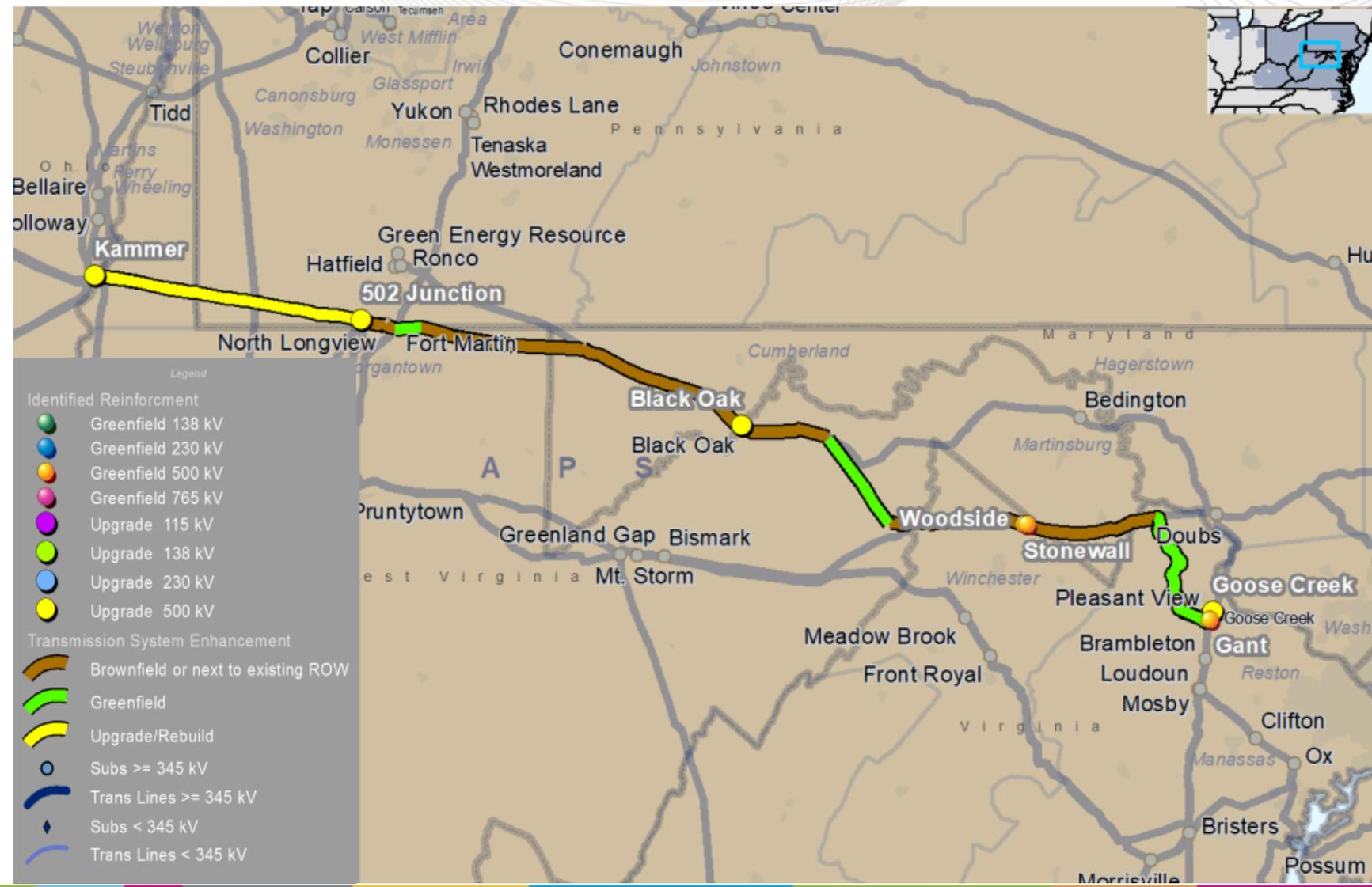
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 663



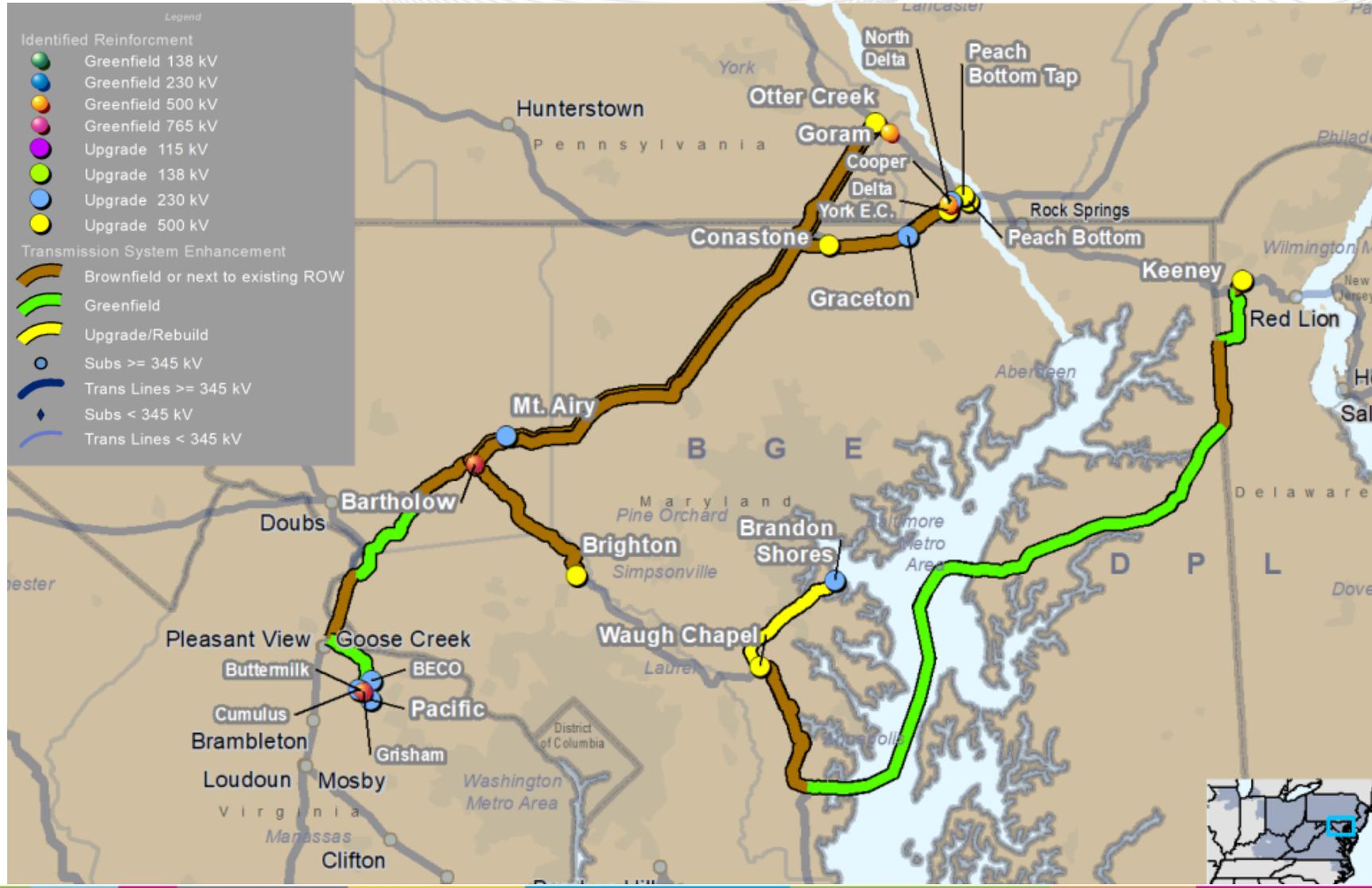
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 853



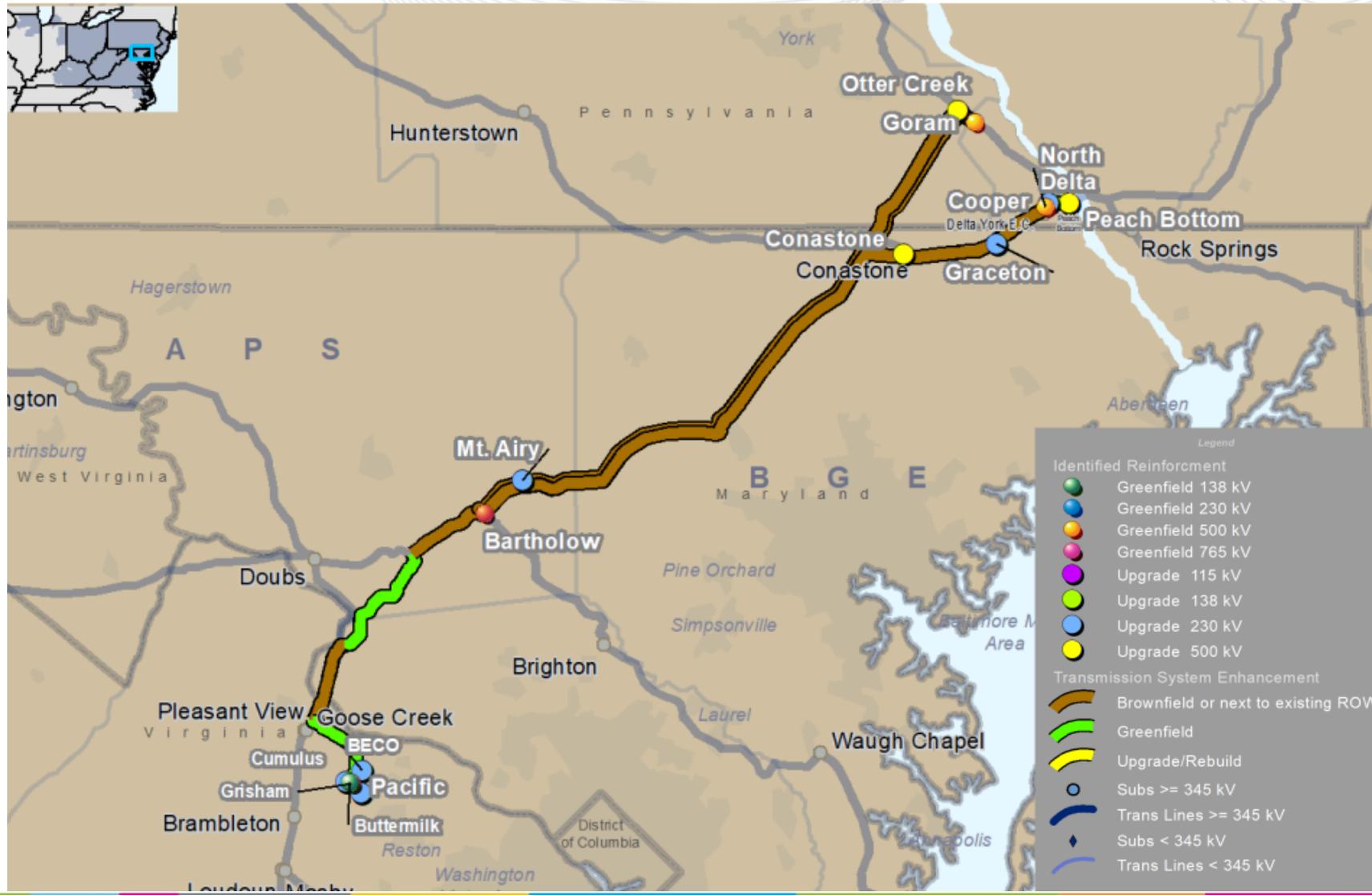
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 948



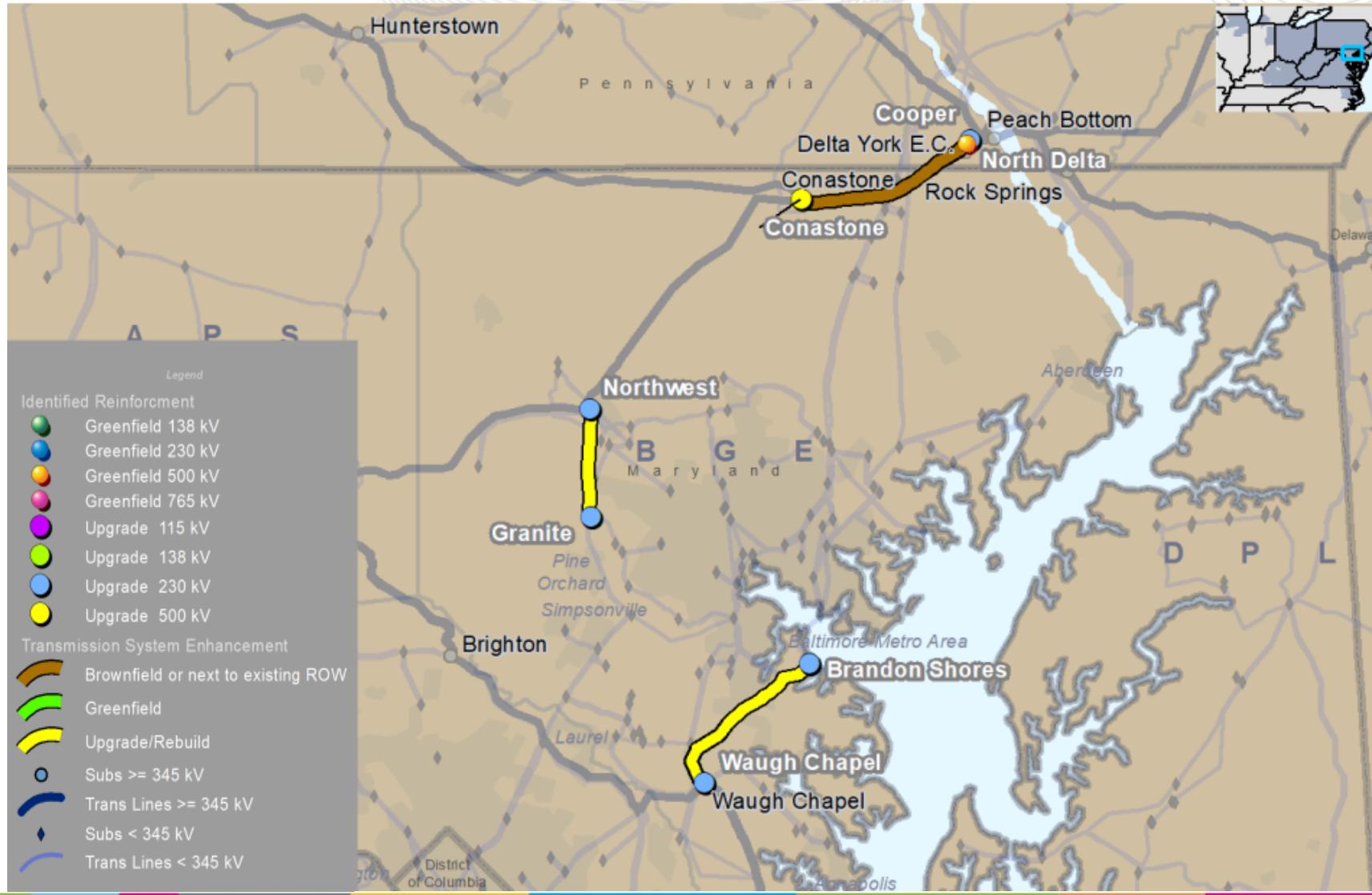
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera 385



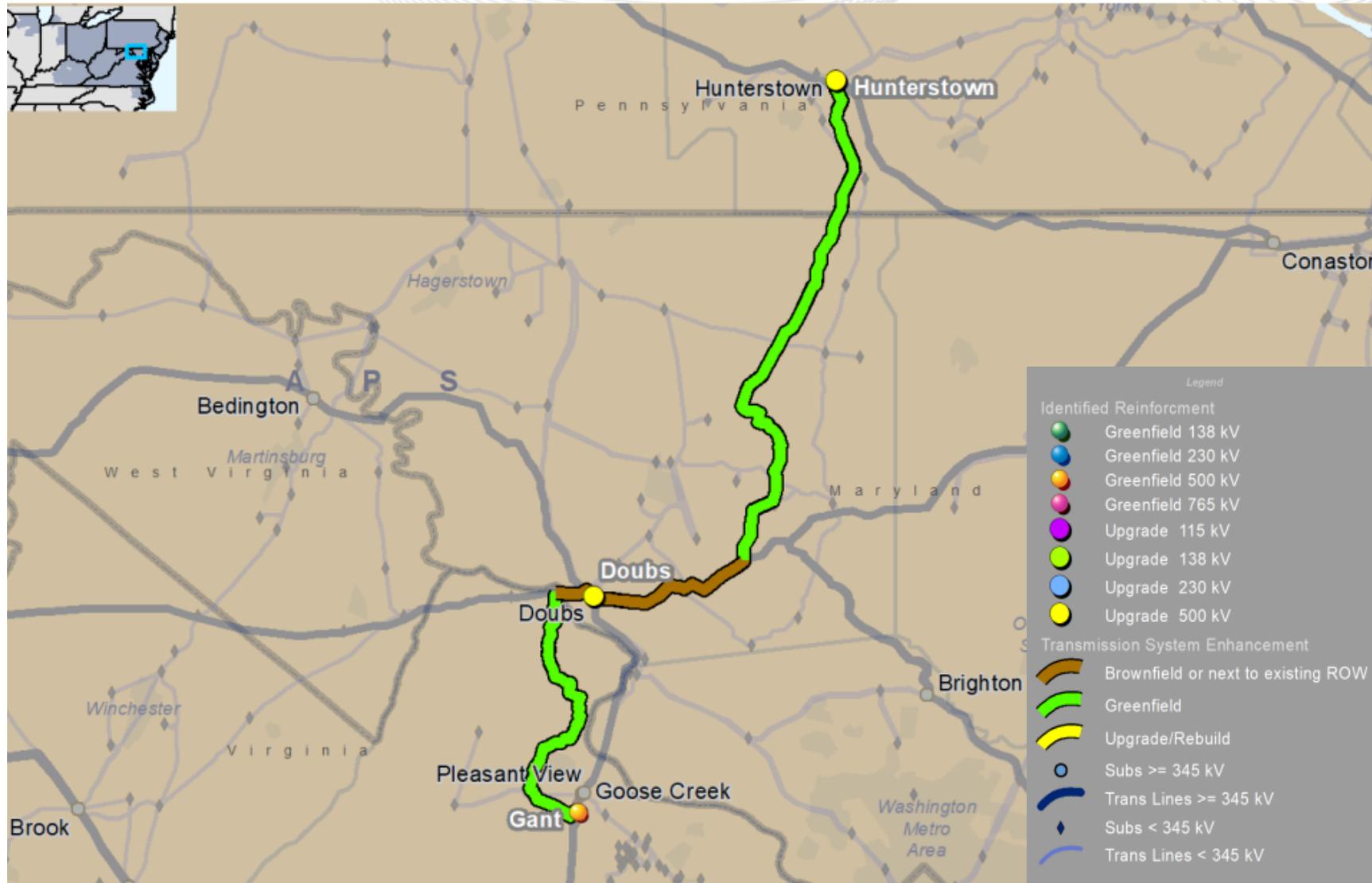
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 217



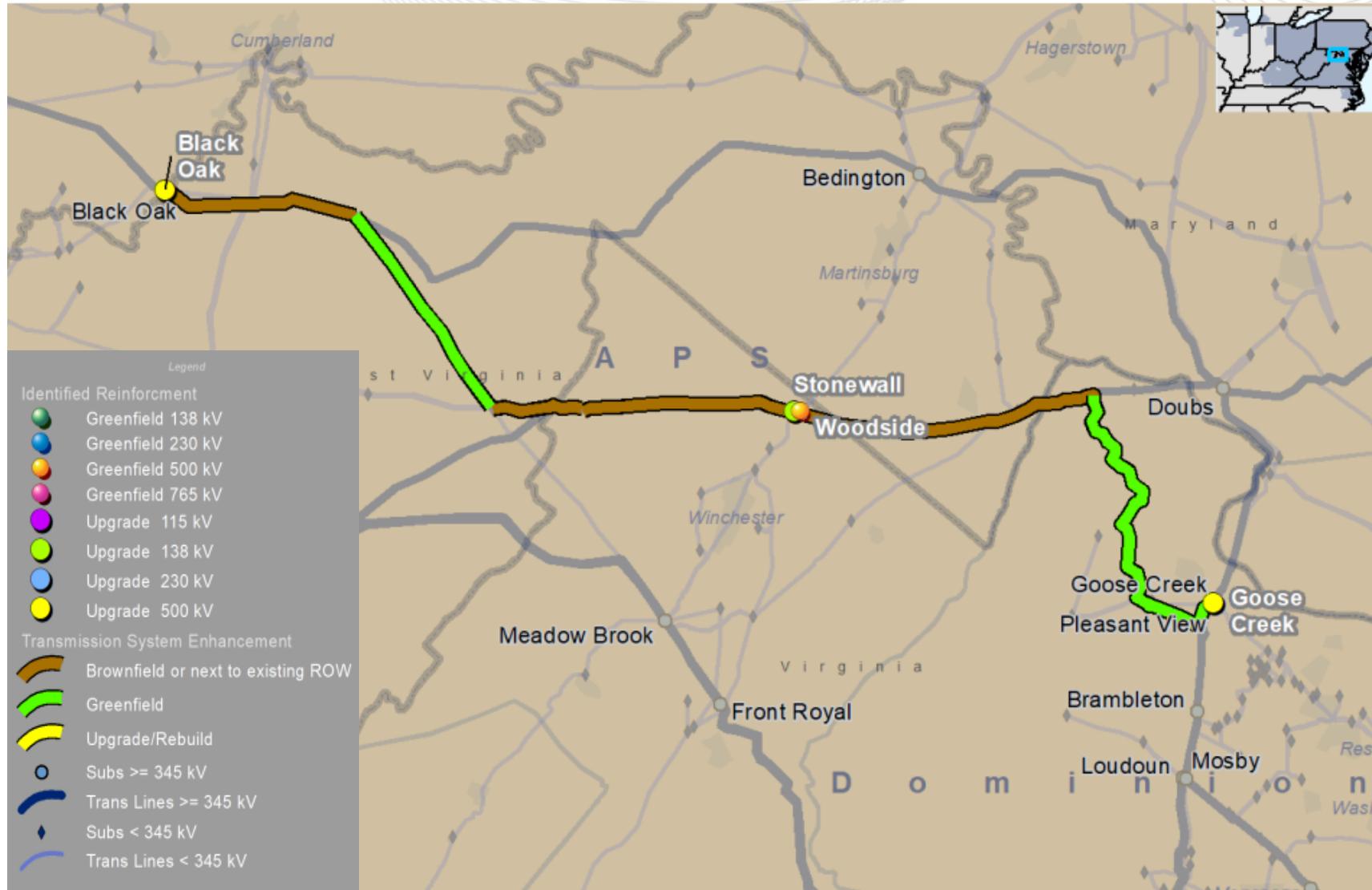
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 255



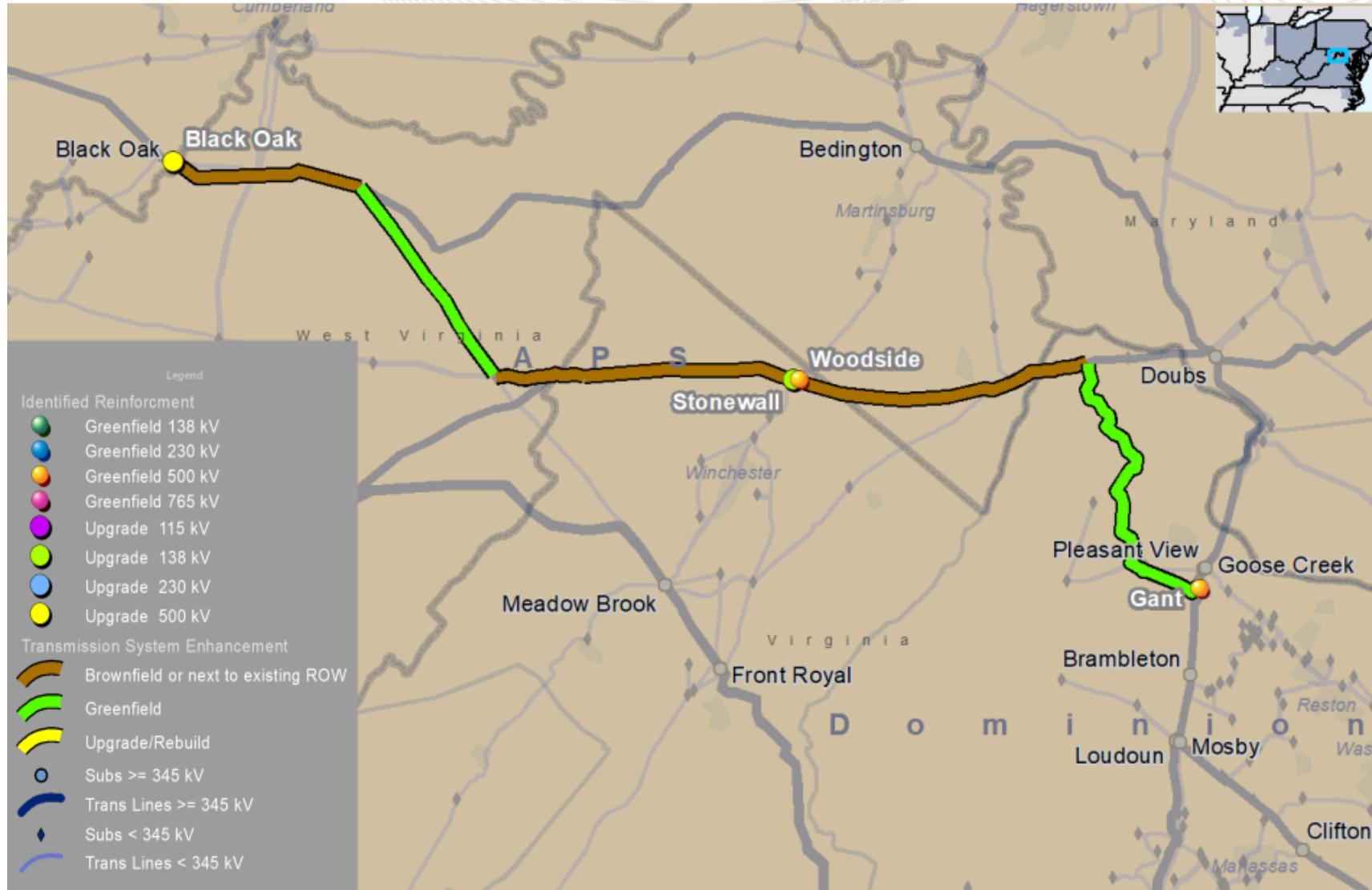
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 279



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 347



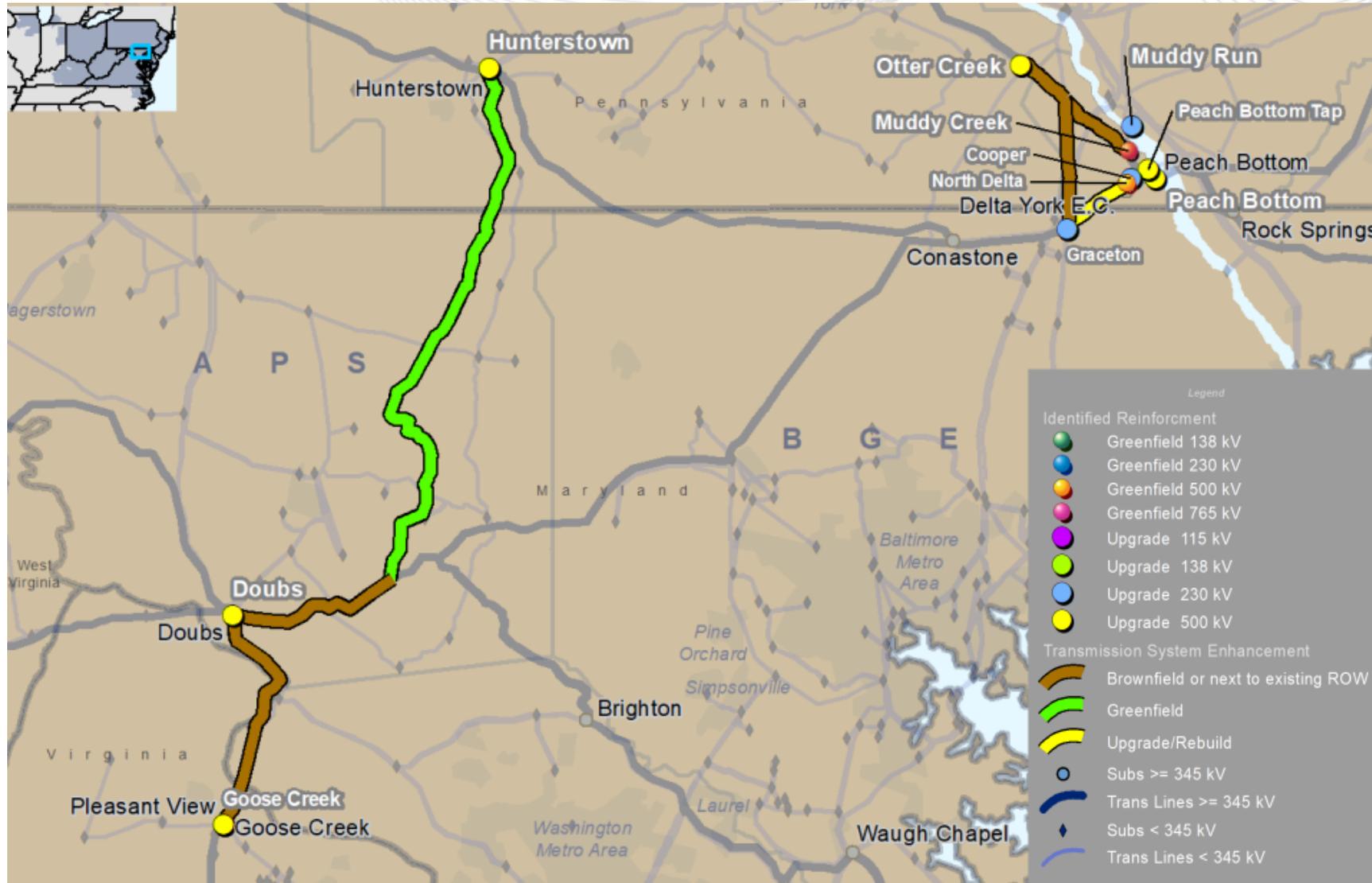
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera – 419



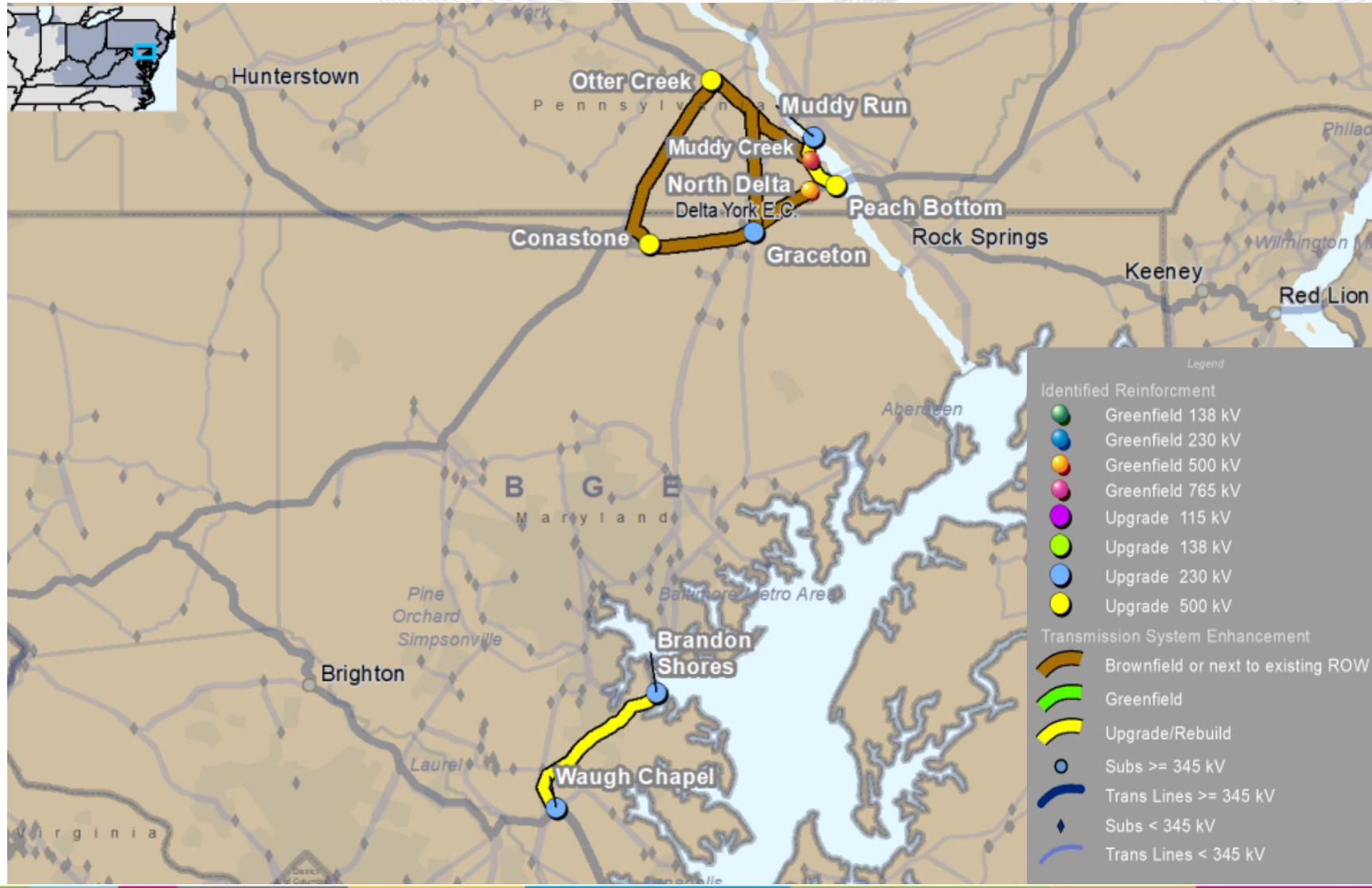
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 445



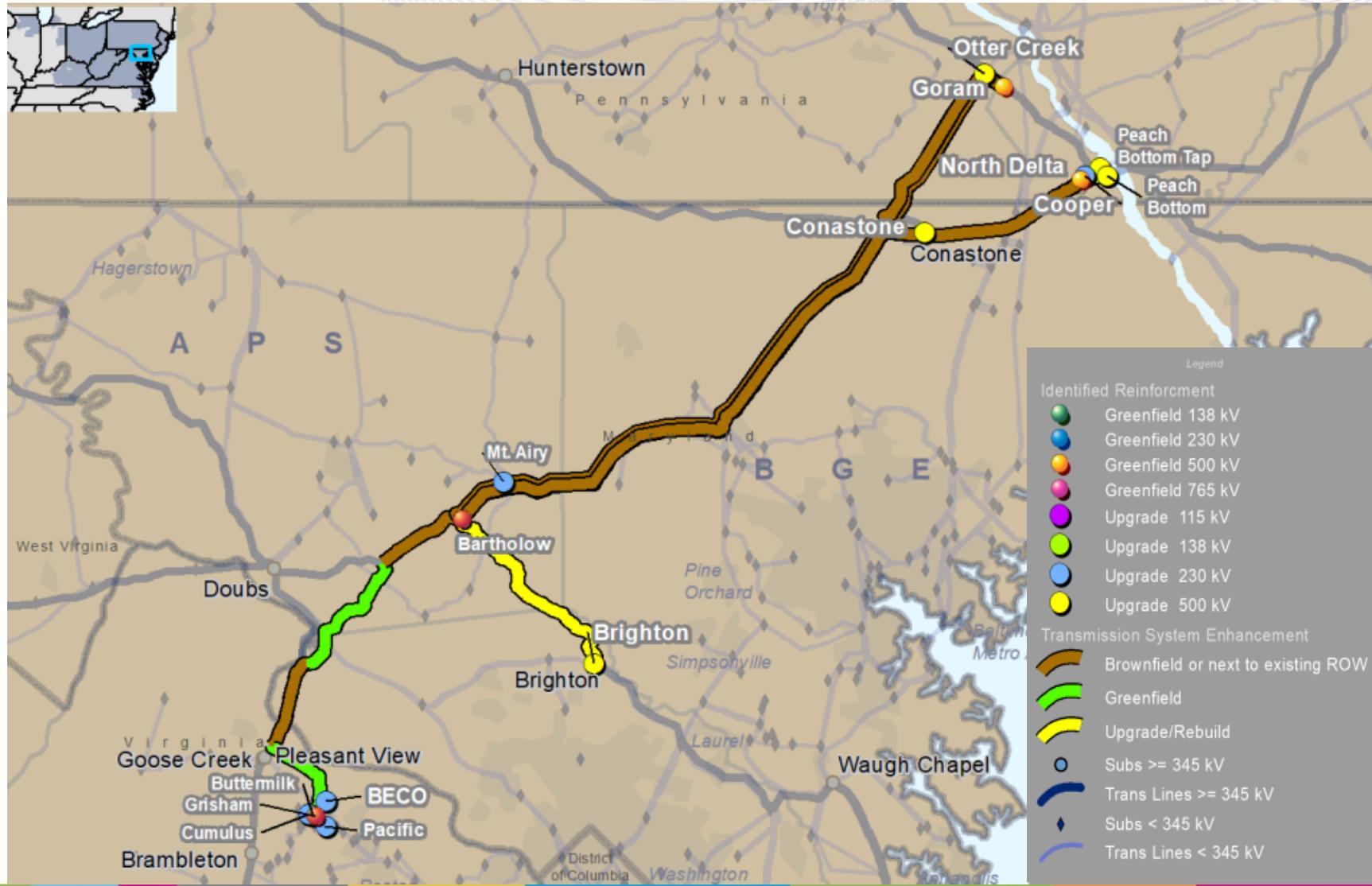
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 530



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 564



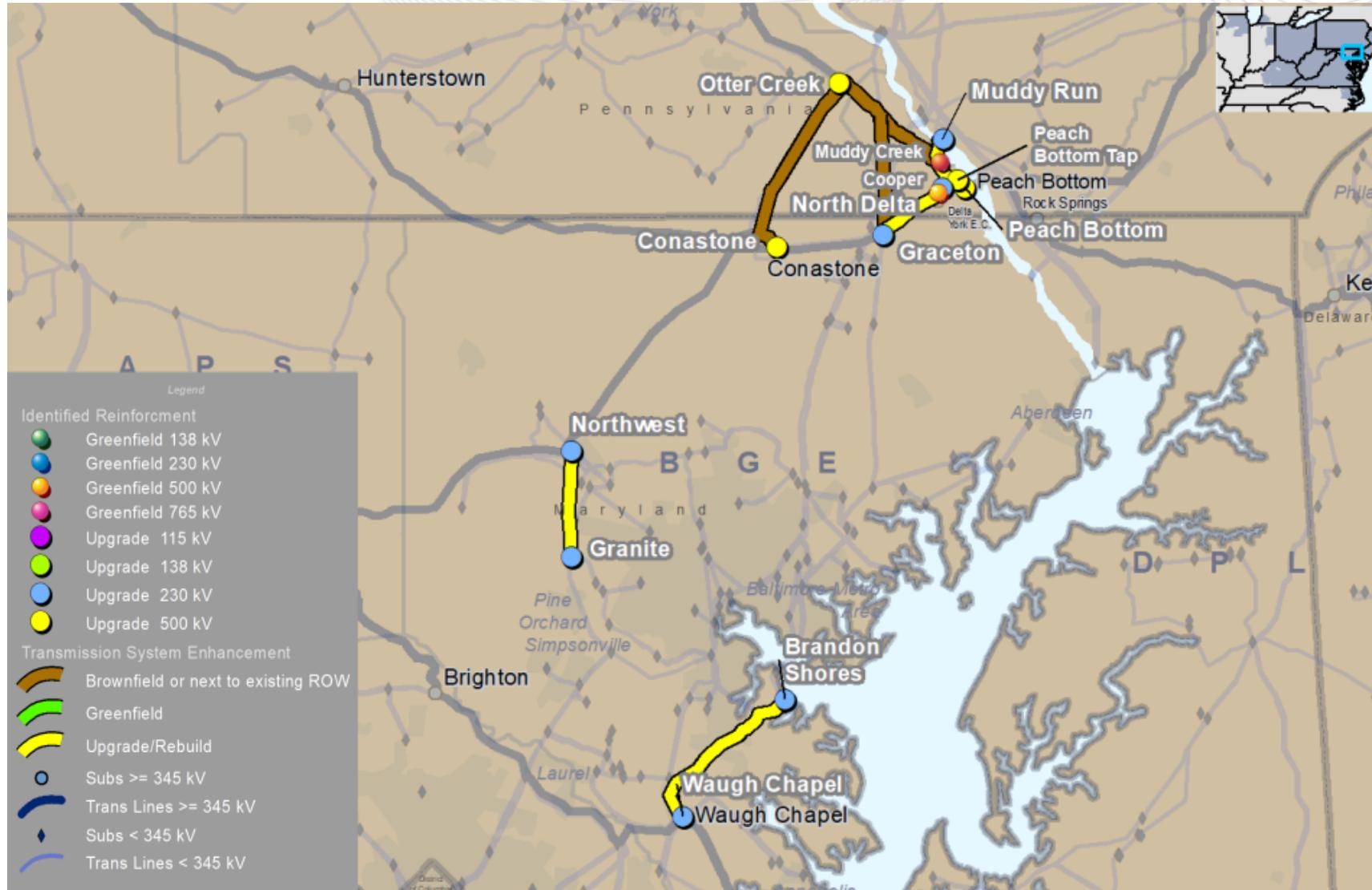
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 577



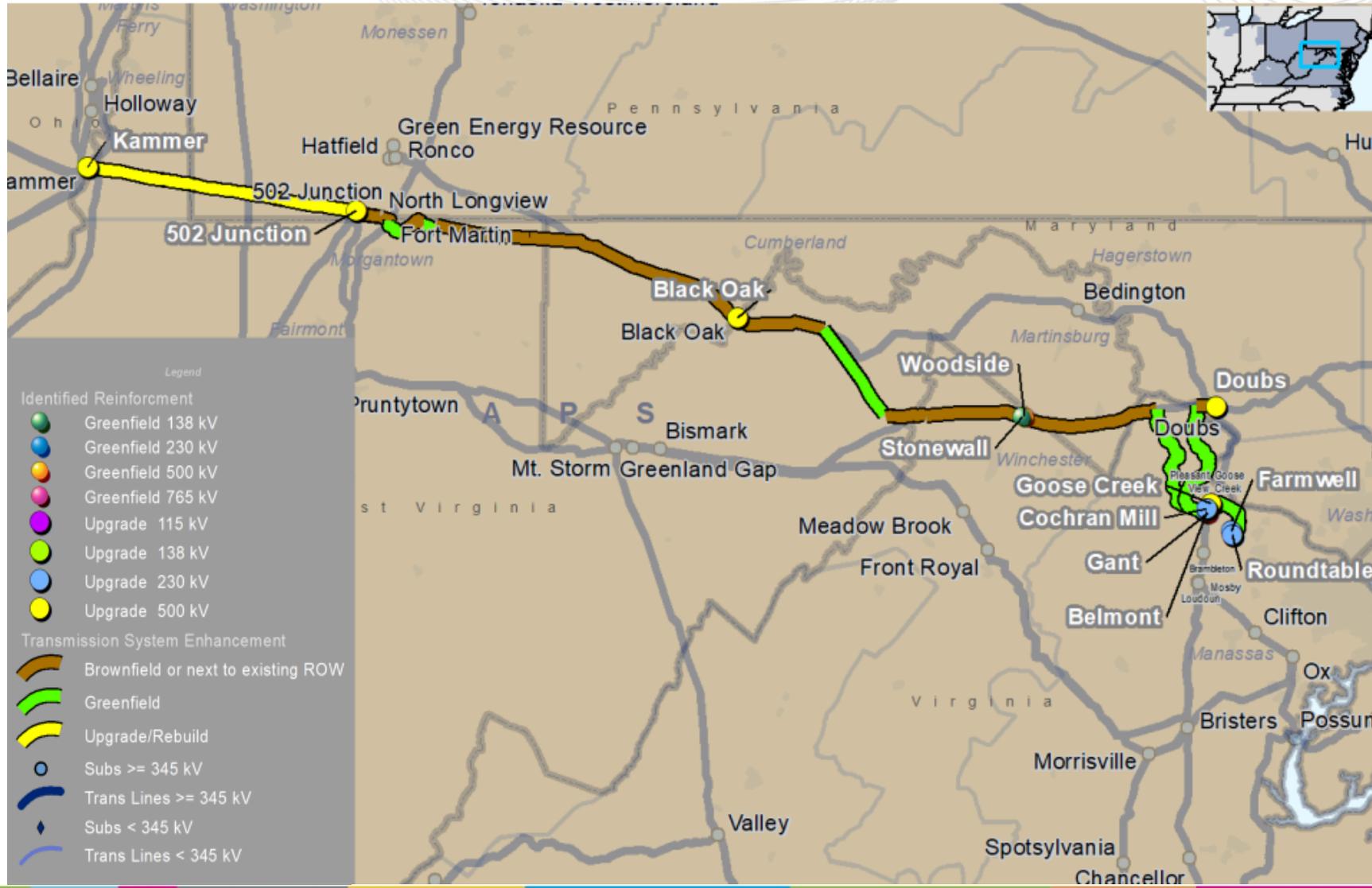
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 631



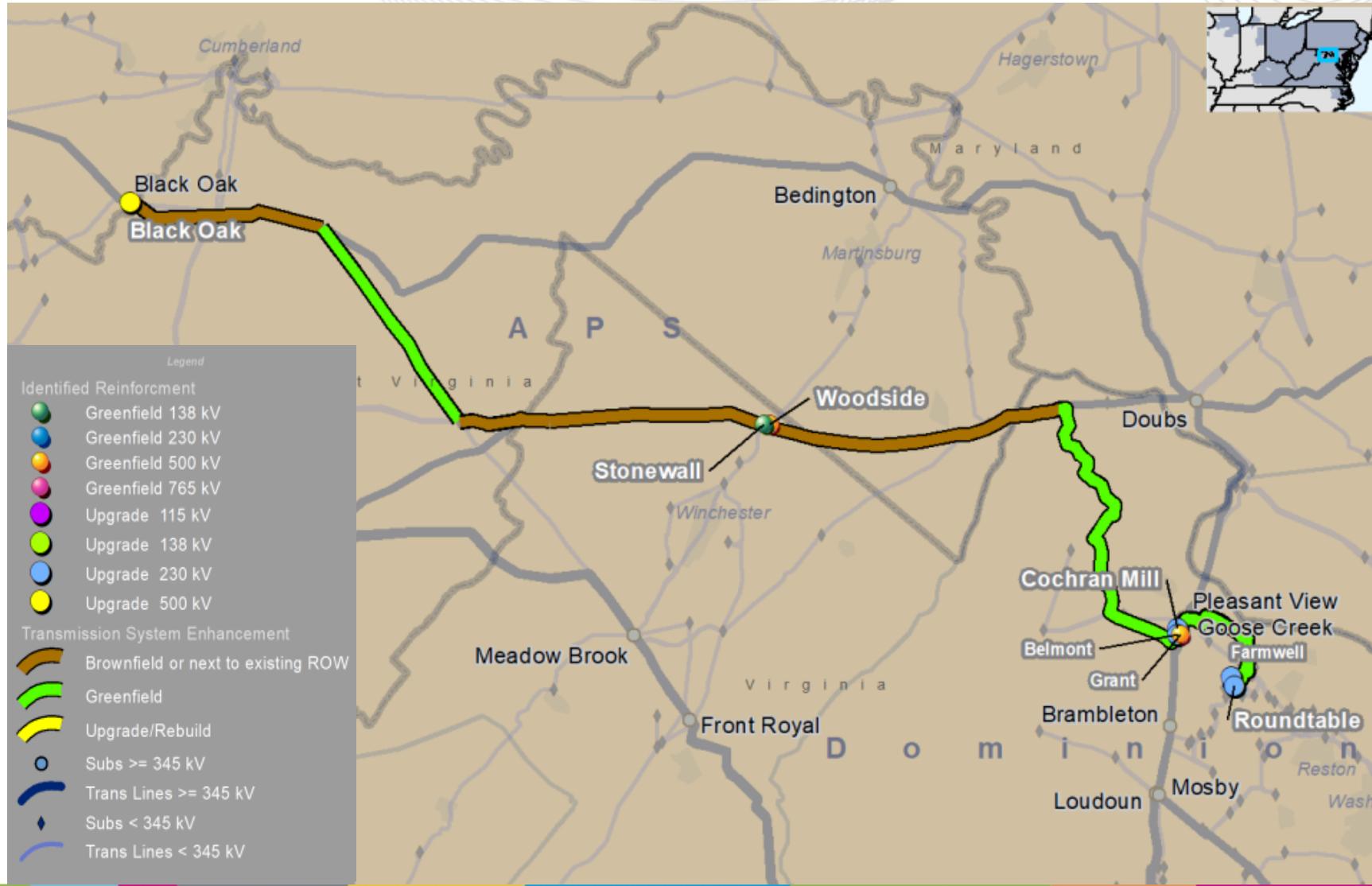
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 642



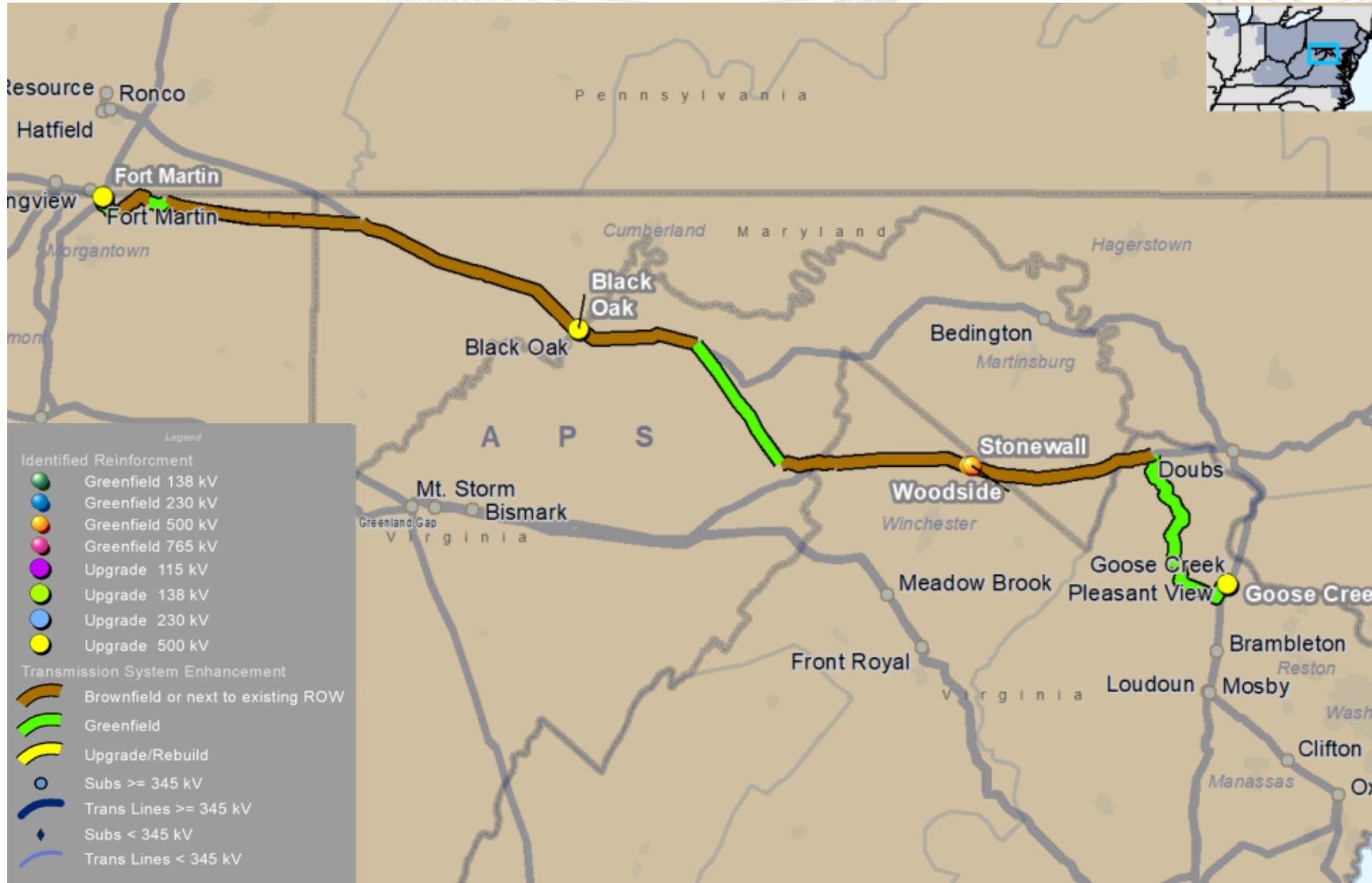
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 676



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 685



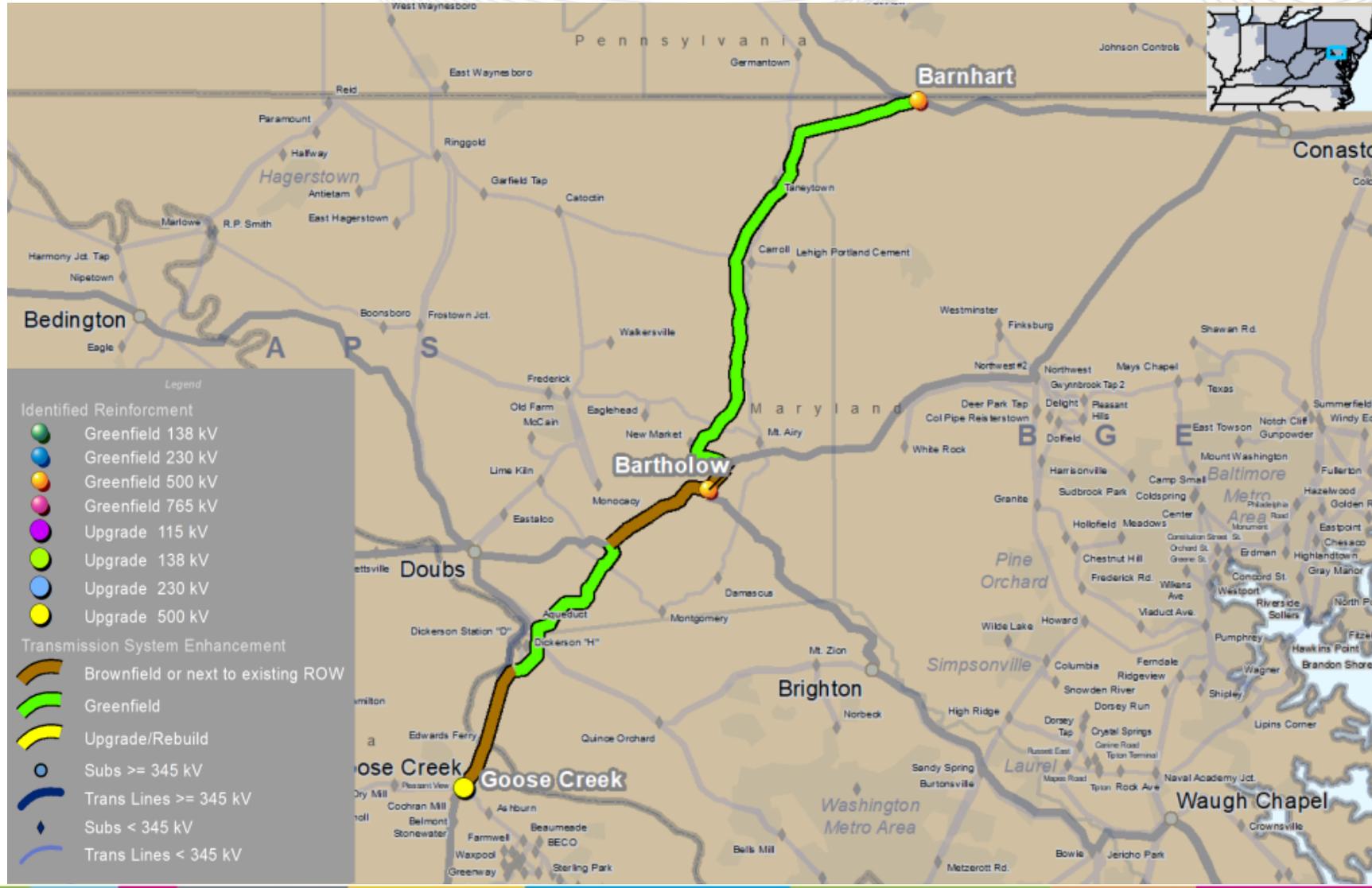
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 719



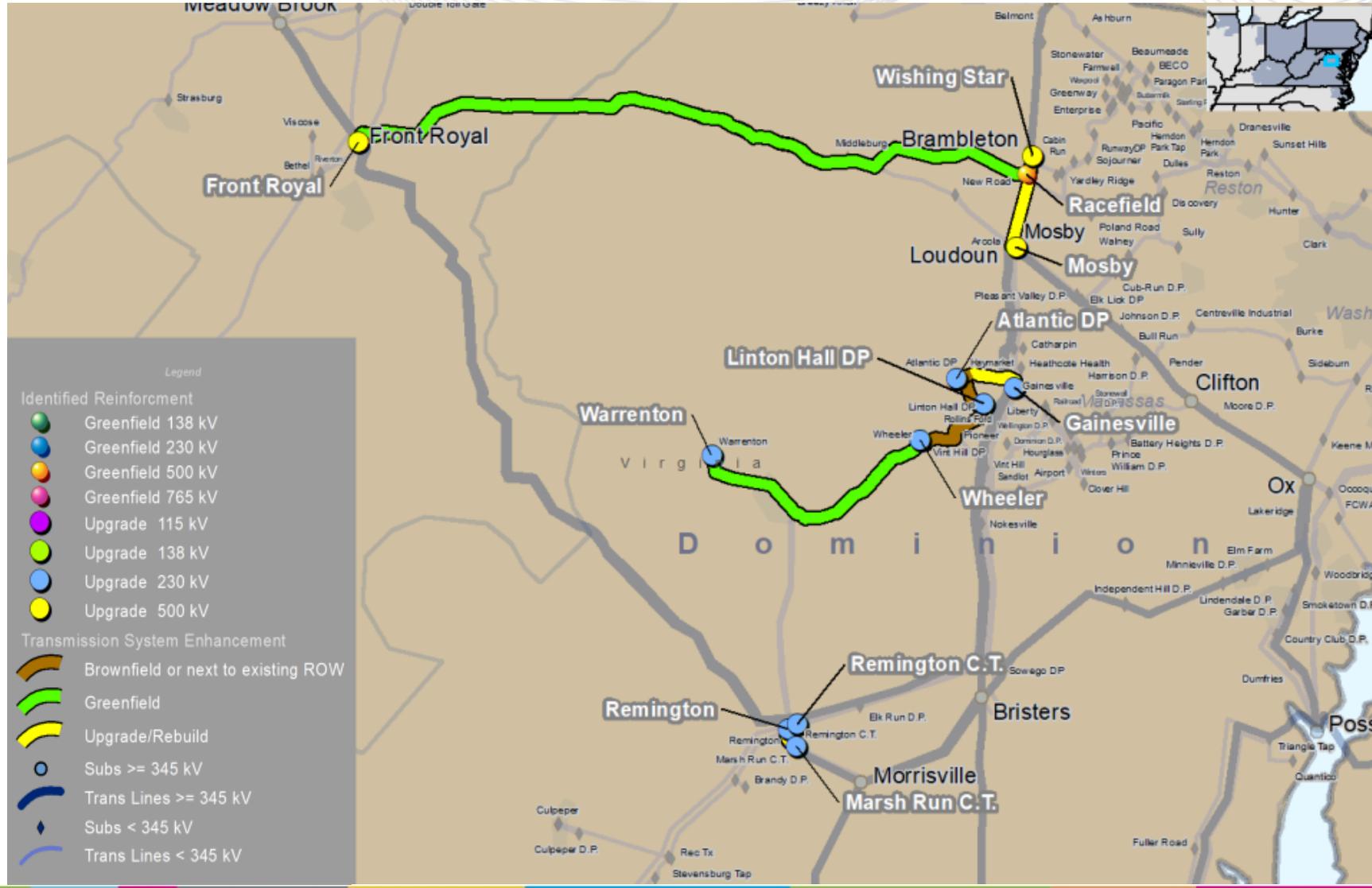
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 728



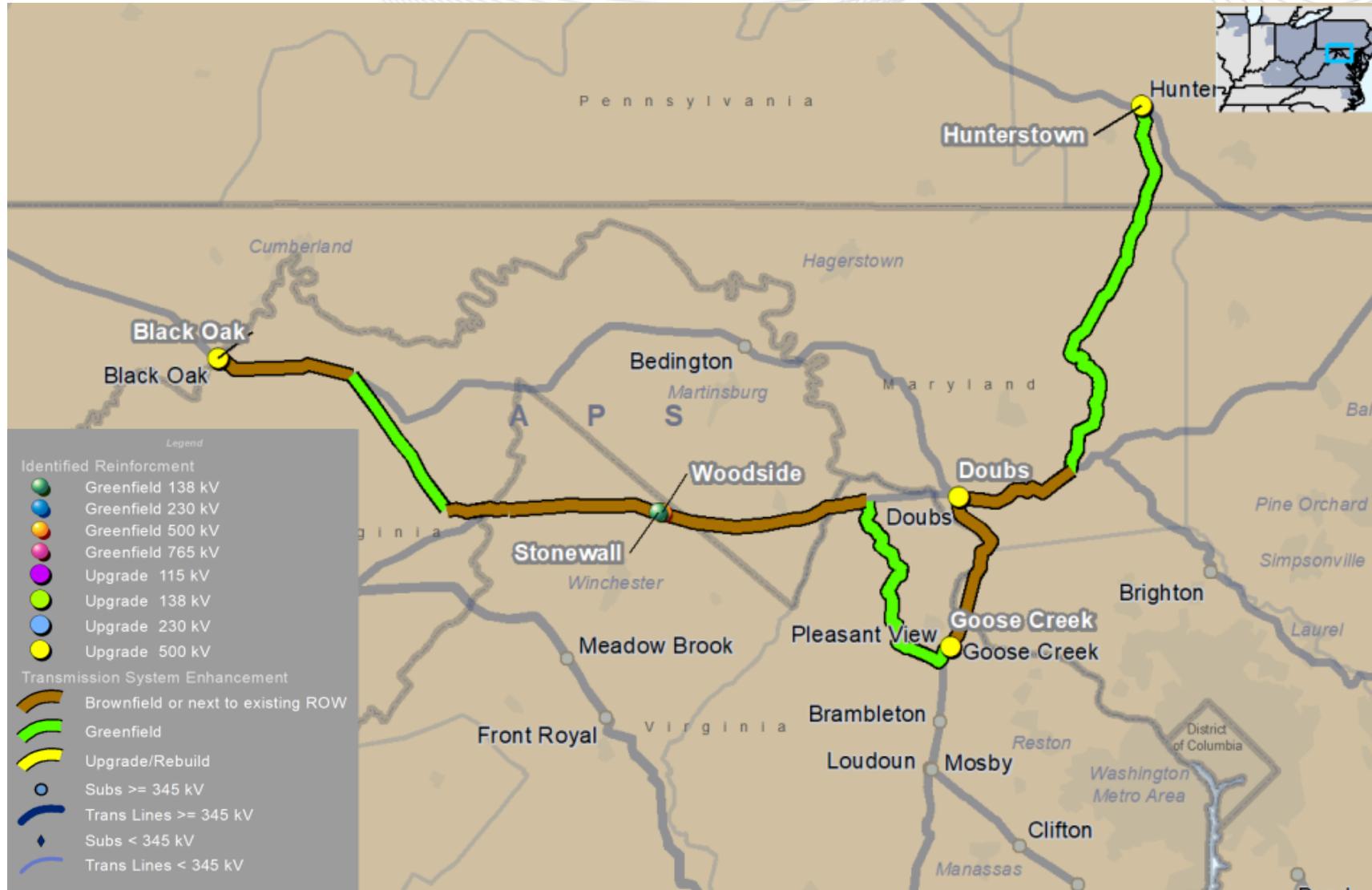
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 766



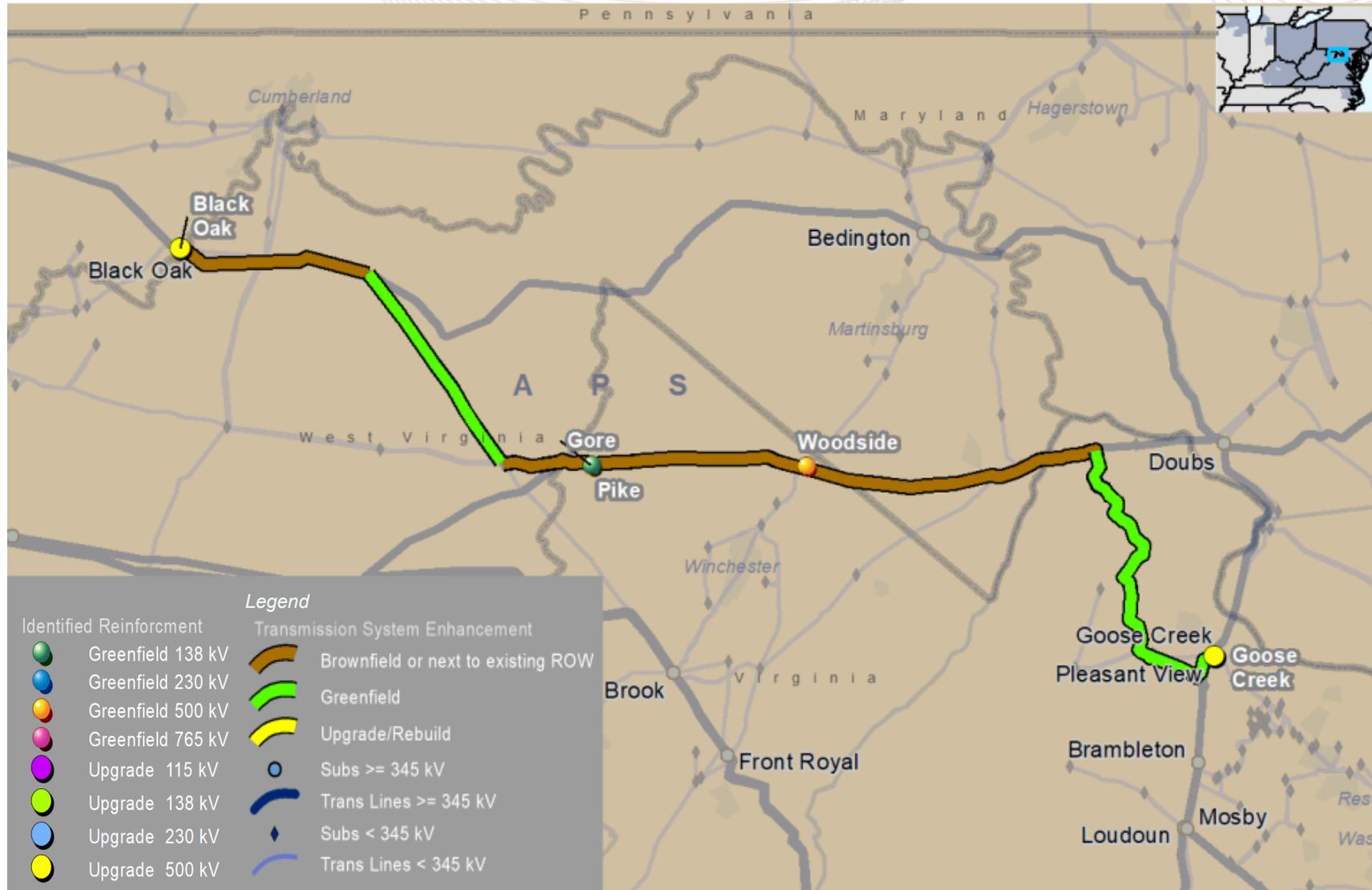
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 846



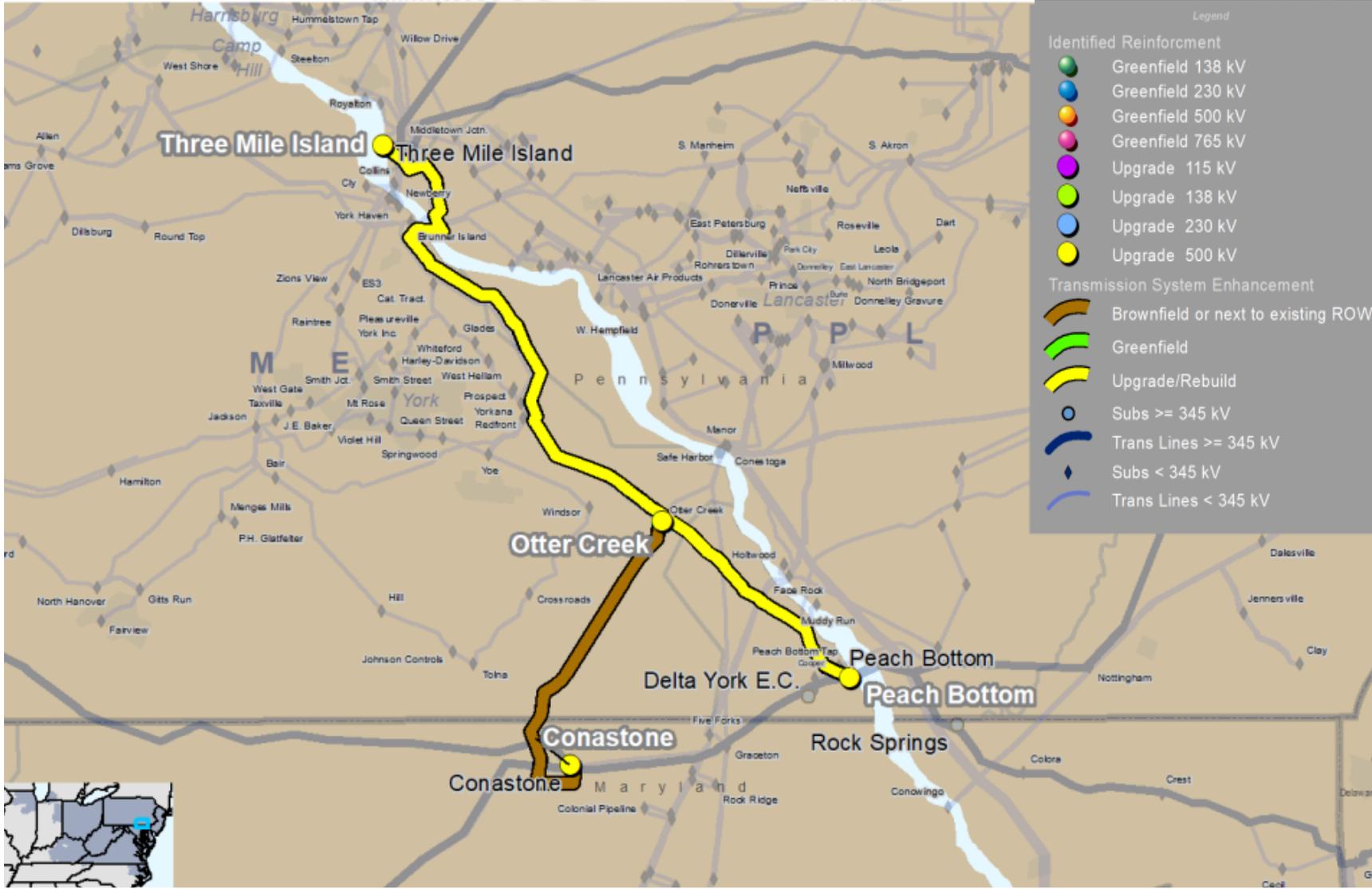
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Nextera - 951



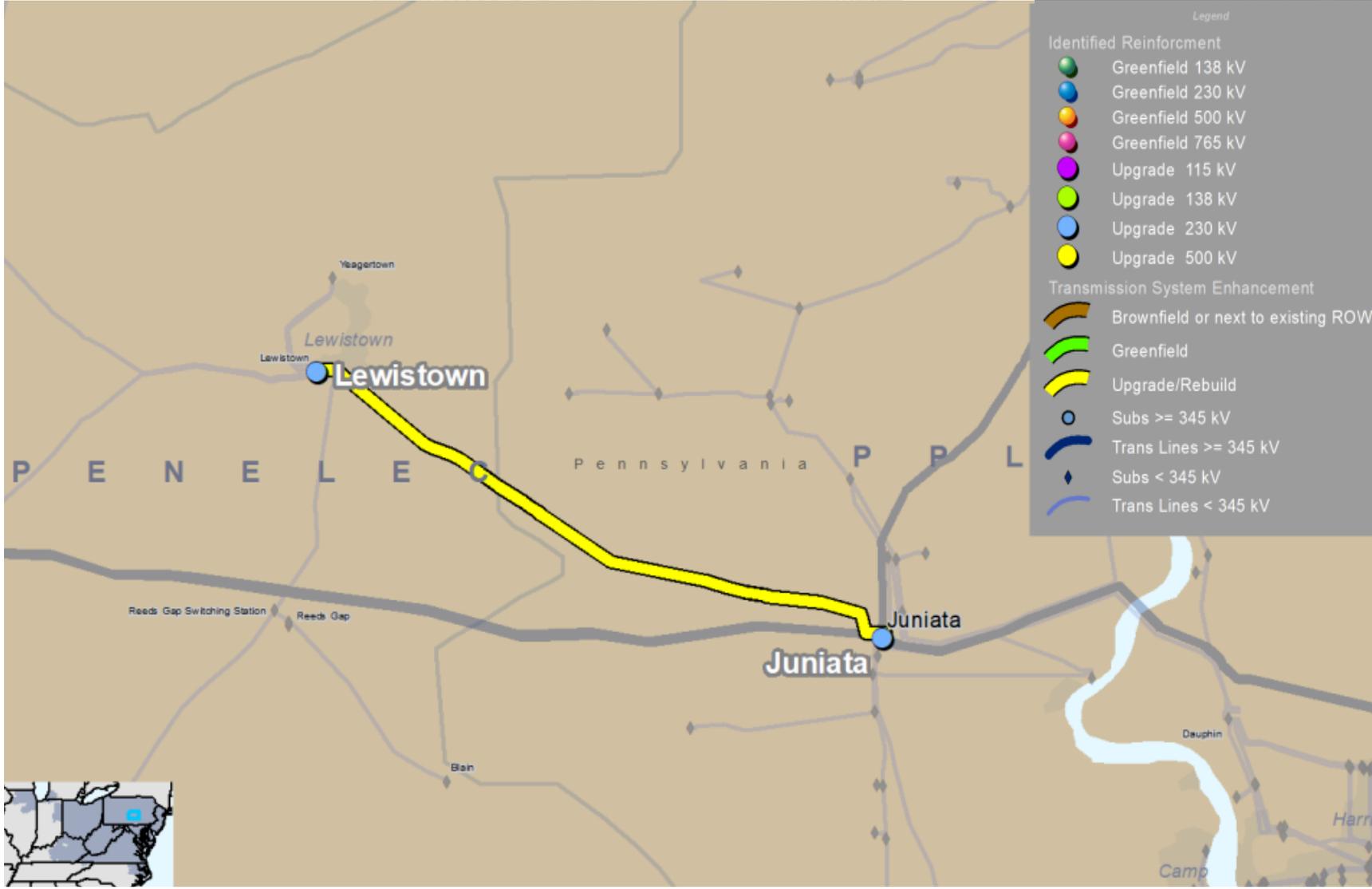
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PPL - 374



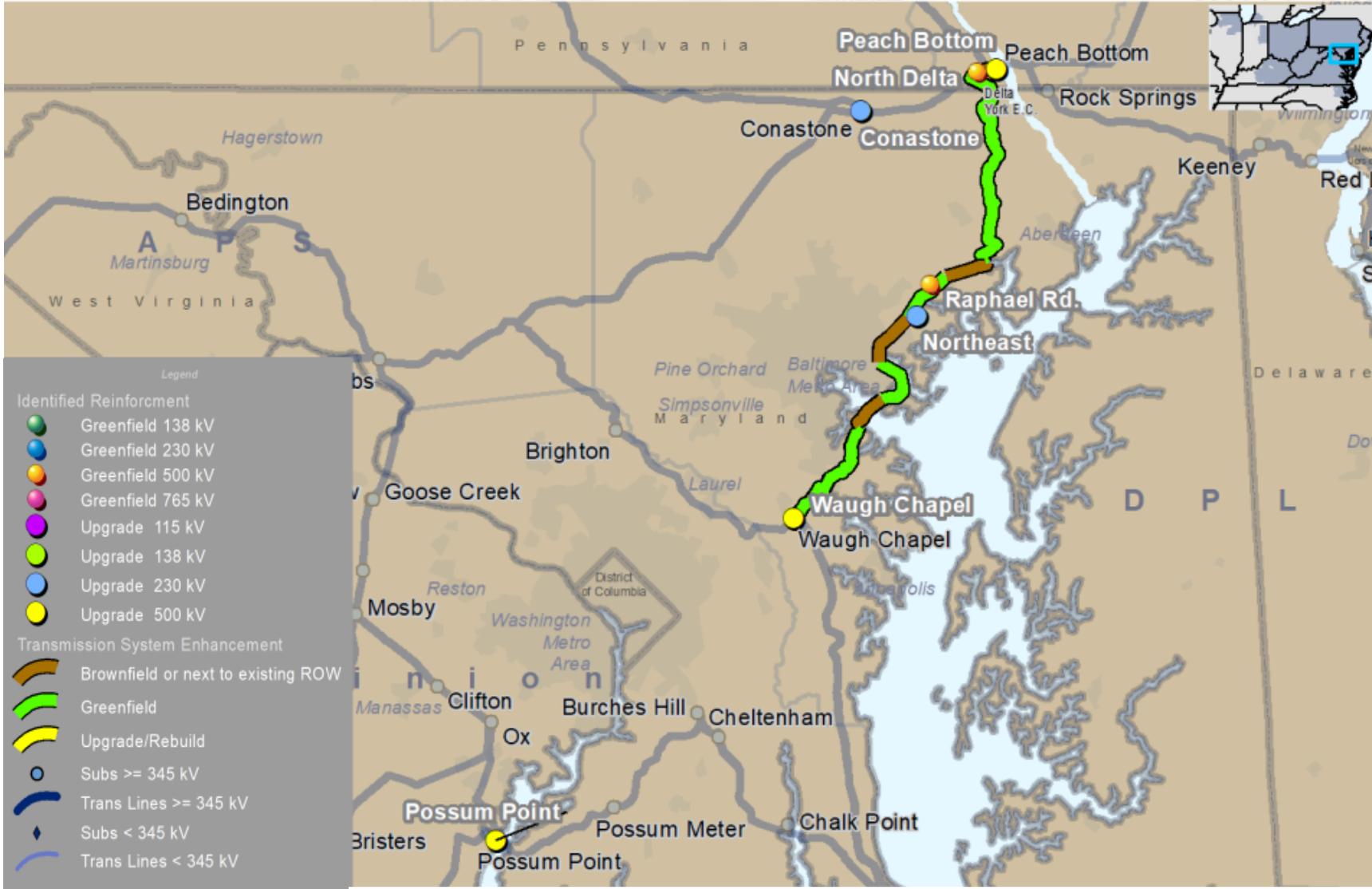
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PPL - 606



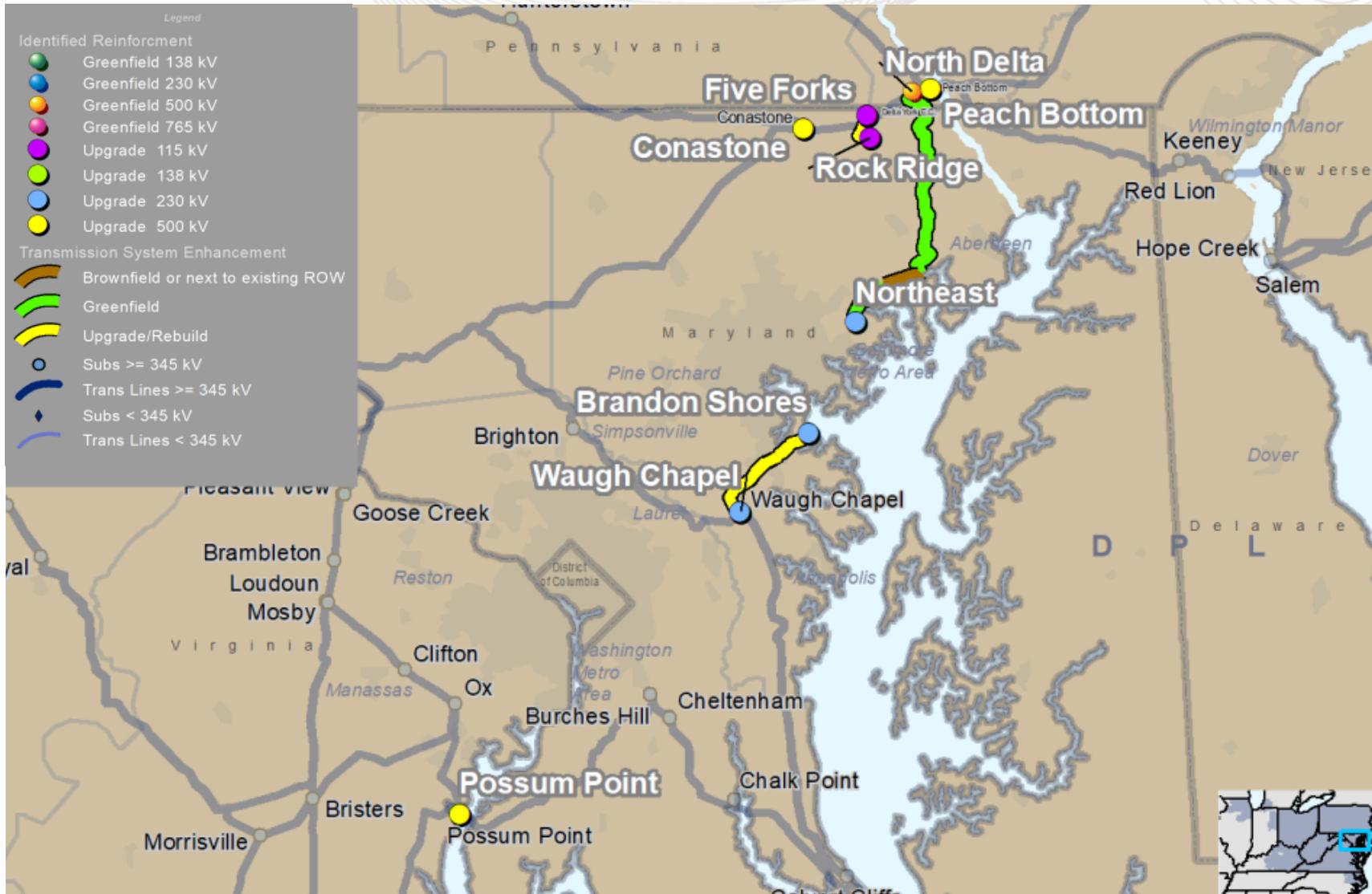
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PSEG - 24



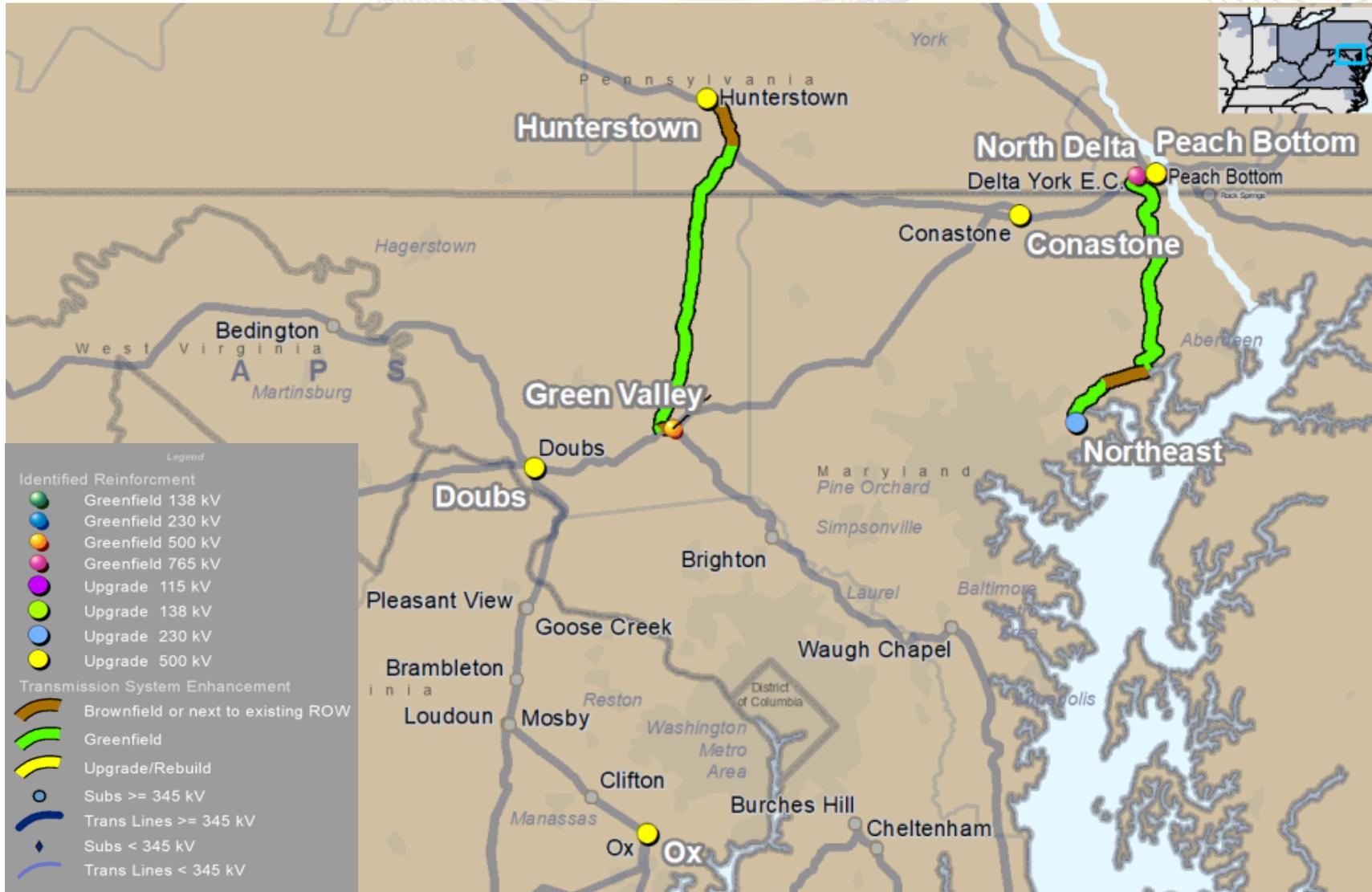
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PSEG - 125



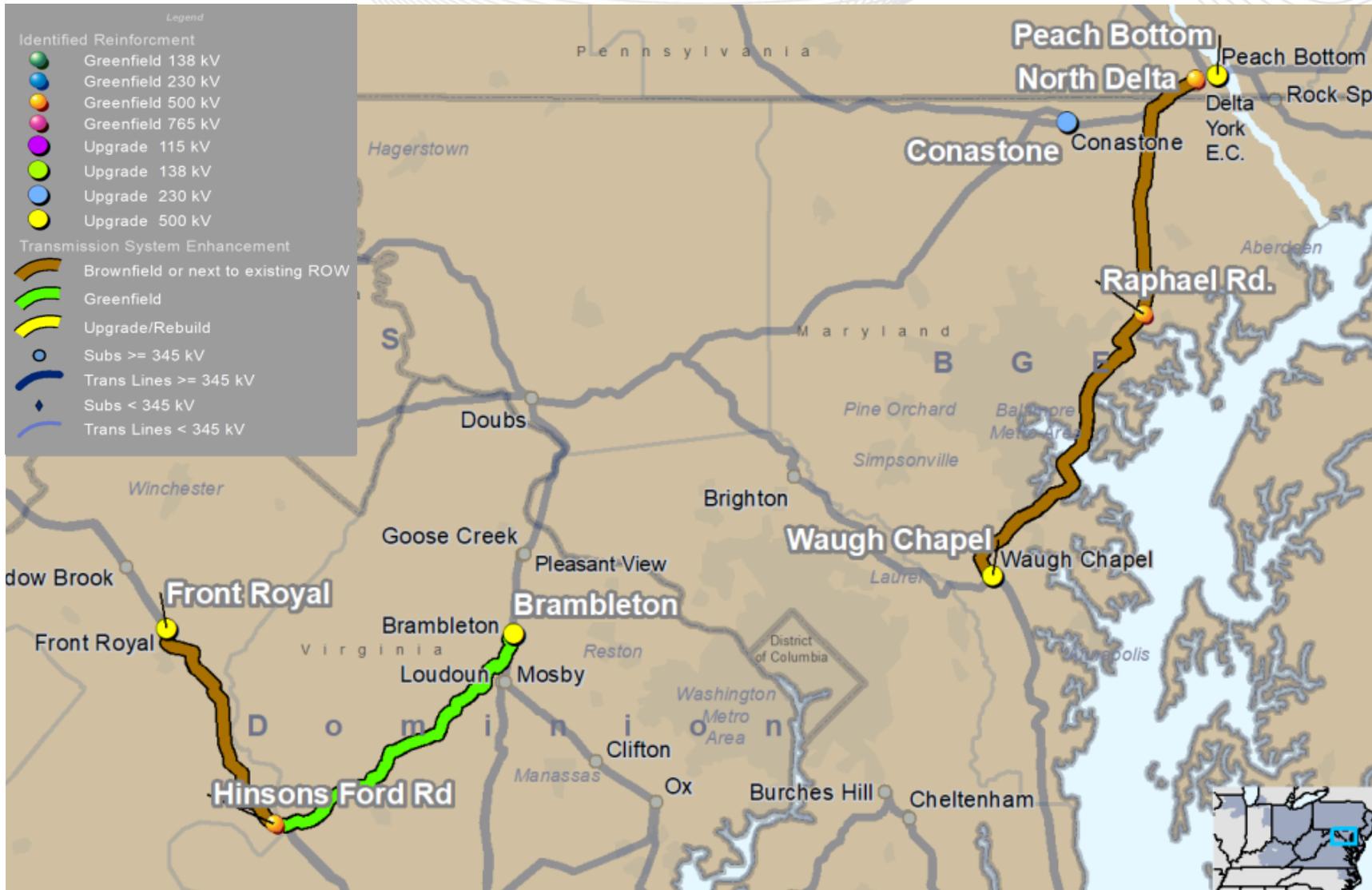
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PSEG - 229



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PSEG - 325



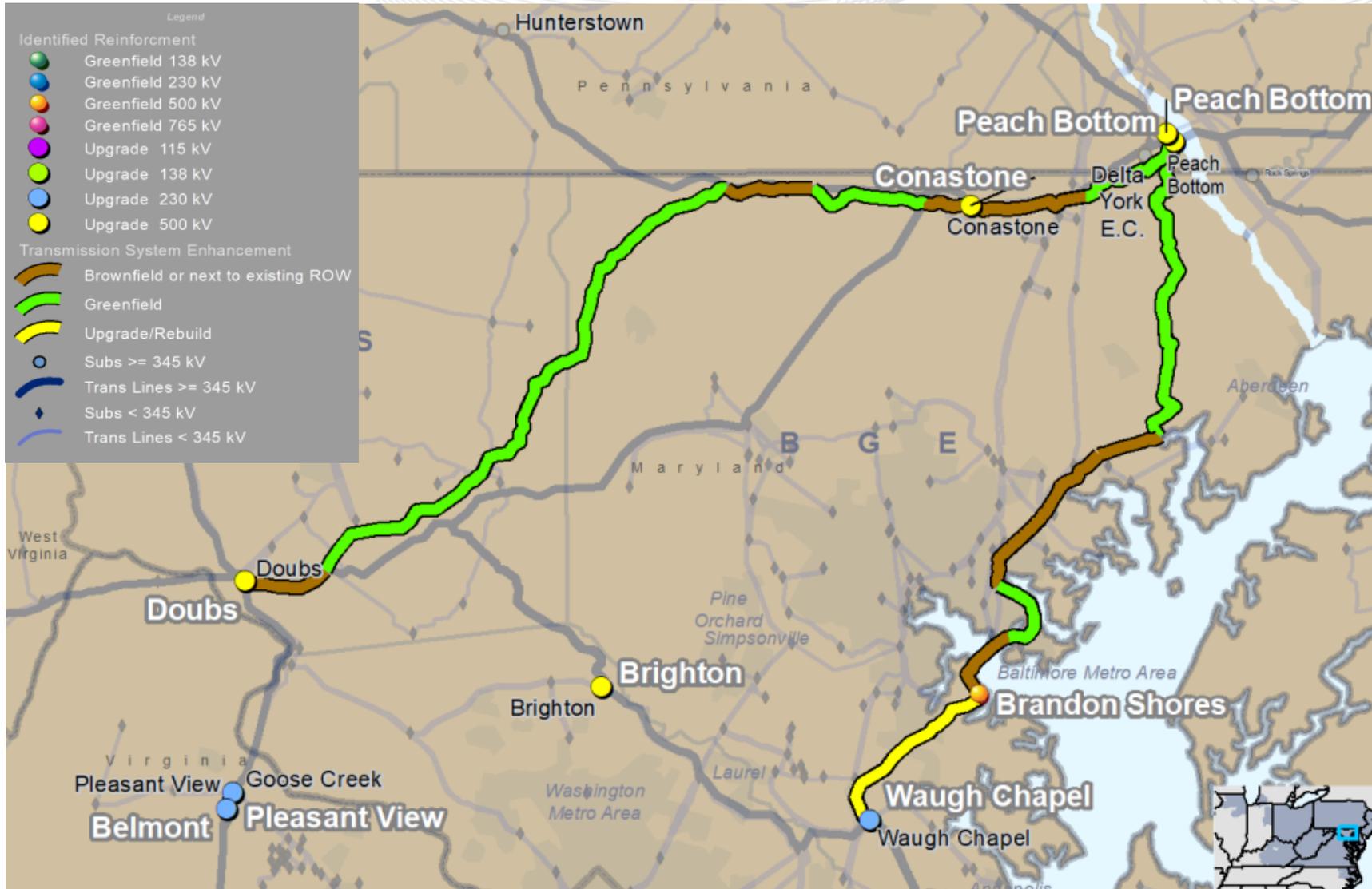
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PSEG - 637



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PSEG - 741



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – PSEG - 808



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

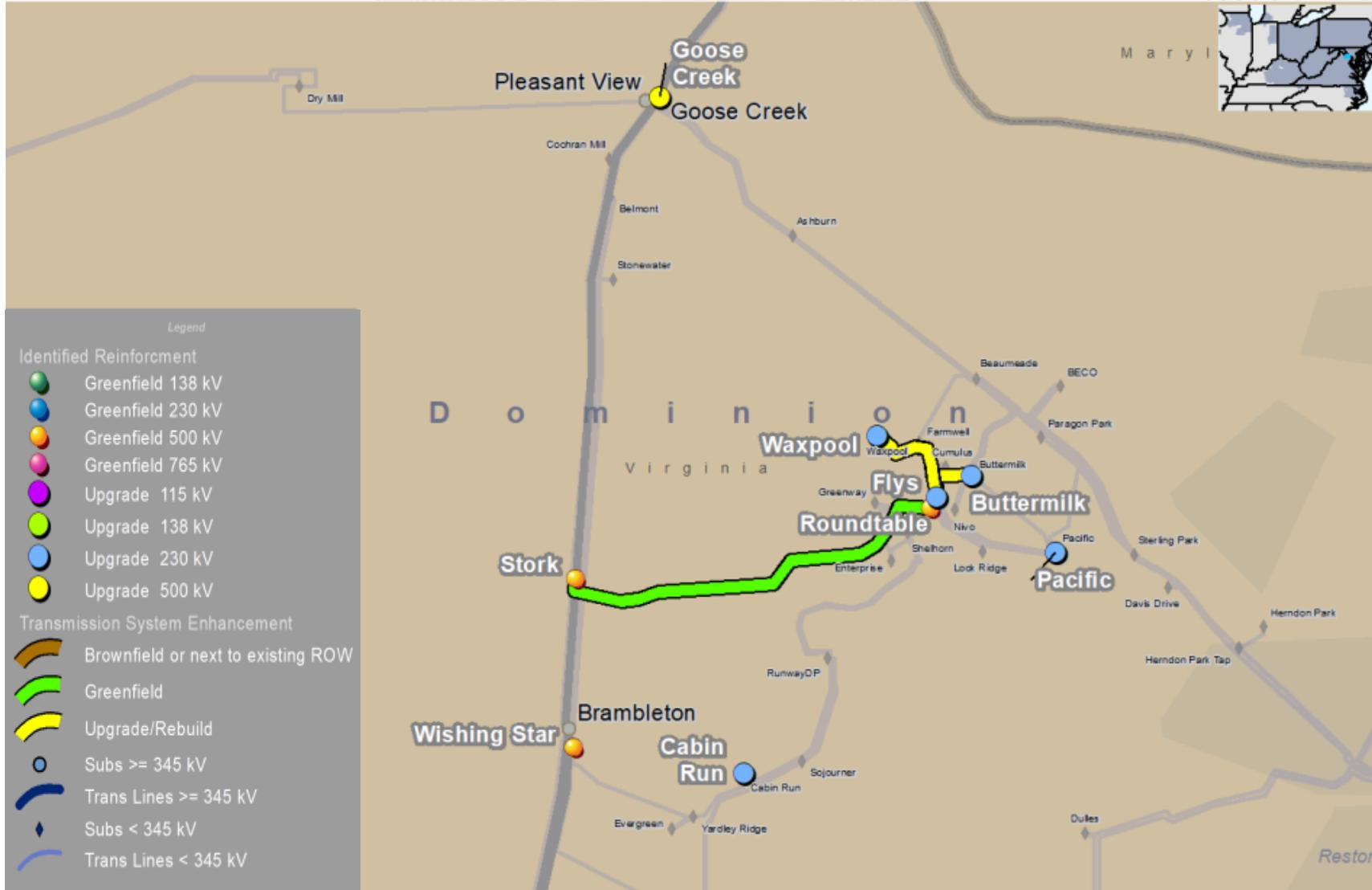
# 2022 Window 3 proposals – PSEG – 962



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

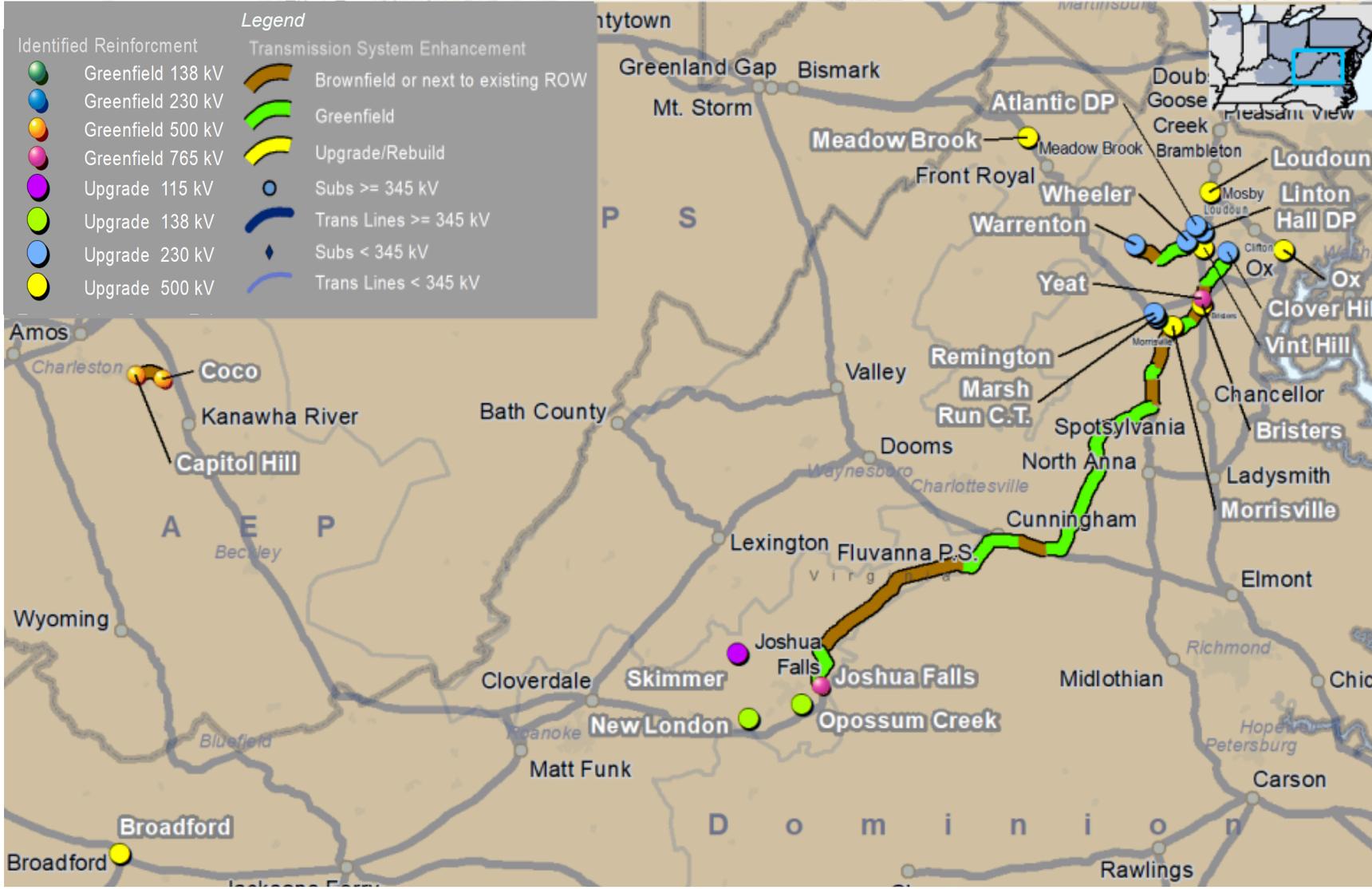


# 2022 Window 3 proposals – Transsource - 858



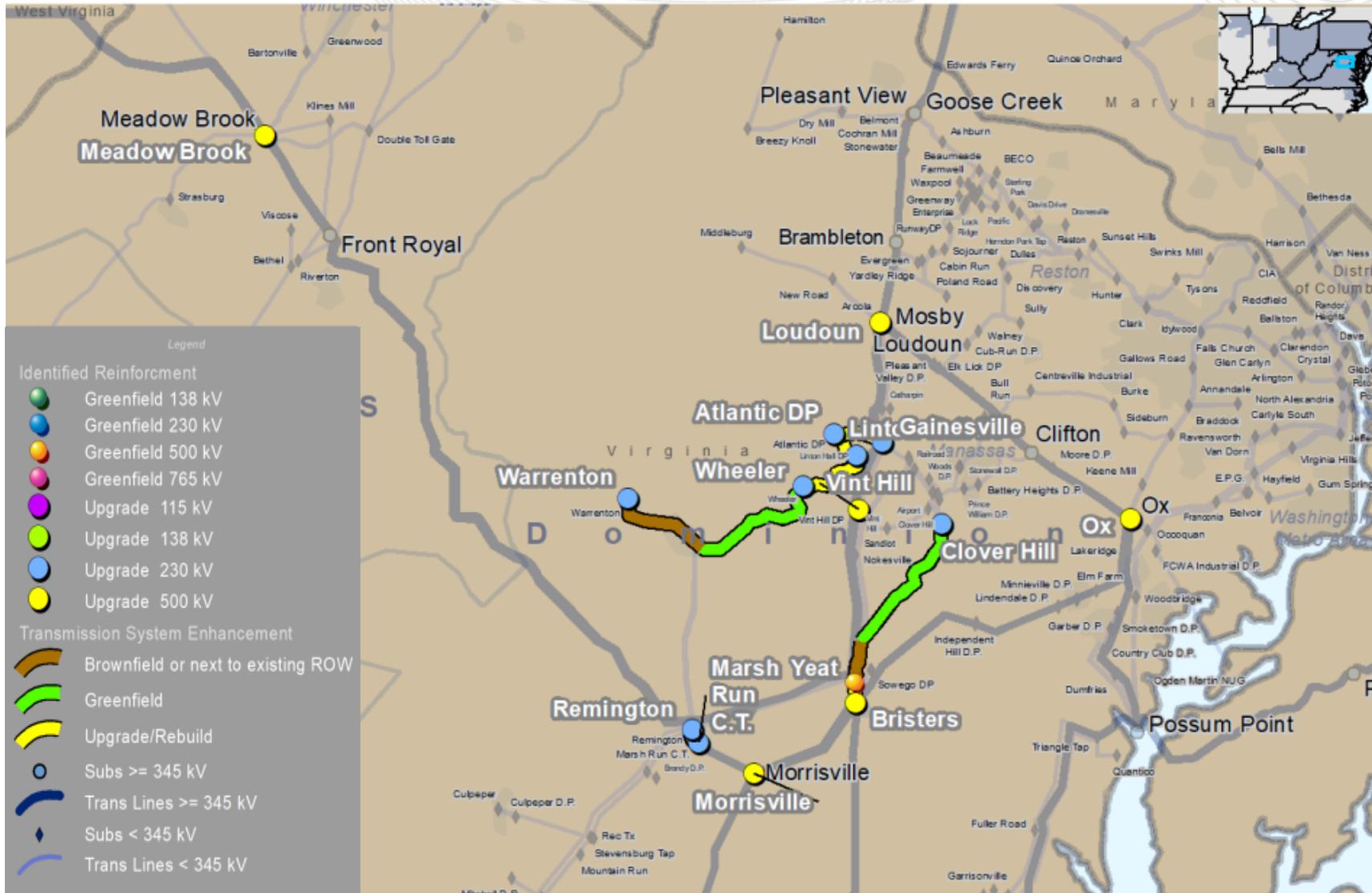
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Transsource - 904



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022 Window 3 proposals – Transource - 977



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

Facilitator:  
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## Reliability Analysis Update



### Member Hotline

(610) 666 – 8980

(866) 400 – 8980

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

# Revision History

Version No.	Date	Description
1	Oct 26 <sup>th</sup> 2023	<ul style="list-style-type: none"><li>• Original slides posted</li></ul>
2	Oct 27 <sup>th</sup> 2023	<ul style="list-style-type: none"><li>• Minor addition to slide #18</li></ul>
3	Oct 30 <sup>th</sup> 2023	<ul style="list-style-type: none"><li>• Minor adjustments and corrections as marked with the R3 red text</li></ul>
4	Oct 31 <sup>st</sup> 2023	<ul style="list-style-type: none"><li>• Minor update on slides #13, 14 and 55</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)



Option #	PJM ID	Options Description	Overhead (Miles)	Underground (Miles)	Total (Miles)	Overhead (Miles)	Power Source
			500 kV*			230 kV**	
1	951	Build a new 500 kV line from Black Oak – Gore – Goose Creek	100	-	100		West
2	279	Build a new 500 kV line from Black Oak – Stonewall – Goose Creek	100		100		West
3	676	Build a new 500 kV line from Black Oak – Stonewall – new Gant 500-230 kV Build a new 230 kV line from new Gant substation to Farmwell substation Build a new 230 kV line from Cochran Tap to Roundtable substation	99		99	22	West
4	347	Build a new 500 kV line from Black Oak – Stonewall – new Gant 500 kV	99		99		West
5	719	Build a new 500 kV line from Fort Martin to Black Oak to Gore to Goose Creek	161		161		West
6	685	Build a new 500 kV line from Fort Martin to Black Oak to Stone Wall to Goose Creek	161		161		West
7	642	Build a new 500 kV line from 502 Junction to Black Oak to Stonewall to new Gant 500-230 kV Build a new 230 kV line from new Gant substation to Farmwell substation Build a new 230 kV line from Cochran Tap to Roundtable substation.	166		166	22	West
8	853 MARL	Build a new 500 kV line from 502 Junction to Black Oak to Stonewall to new Belmont 500 kV	166		166		West
9	255	Build a new 500 kV line from Hunterstown to new Gant 500 kV	84	-	84		East
10	116	Build a new 500 kV line from Hunterstown to new Gant 500-230 kV sub Build two new 230 kV lines from new Gant sub to Farmwell and Roundtable substation to feed data center alley	84	-	84	22	East
11	419	Build new 500 kV line from Hunterstown to Doubs to Goose Creek to new Audobon New 230kV lines from Audobon to Nimbus and Beaumeade to Paragon Park	87	7	94	2	East
12	728	Build new 500kV line from new Barnhart to Bartholow to Goose Creek Build new Barnhart 500kV switchyard along the Hunterstown to Conastone 500kV line	65	4	69		East
13	28	Build a new 500 kV line from Black Oak – Gore – Goose Creek Build new 500 kV line from Hunterstown-Doubs-Goose Creek	172	4	176		West/East
14	846	Build a new 500 kV line from Black Oak – Stonewall – Goose Creek Build new 500 kV line from Hunterstown-Doubs-Goose Creek	172	4	176		West/East

\* Mileage is based on the desktop analysis performed at the time of proposal submission.

\*\* There was no underground work proposed for 230 kV line segments

# Reliability Analysis Update

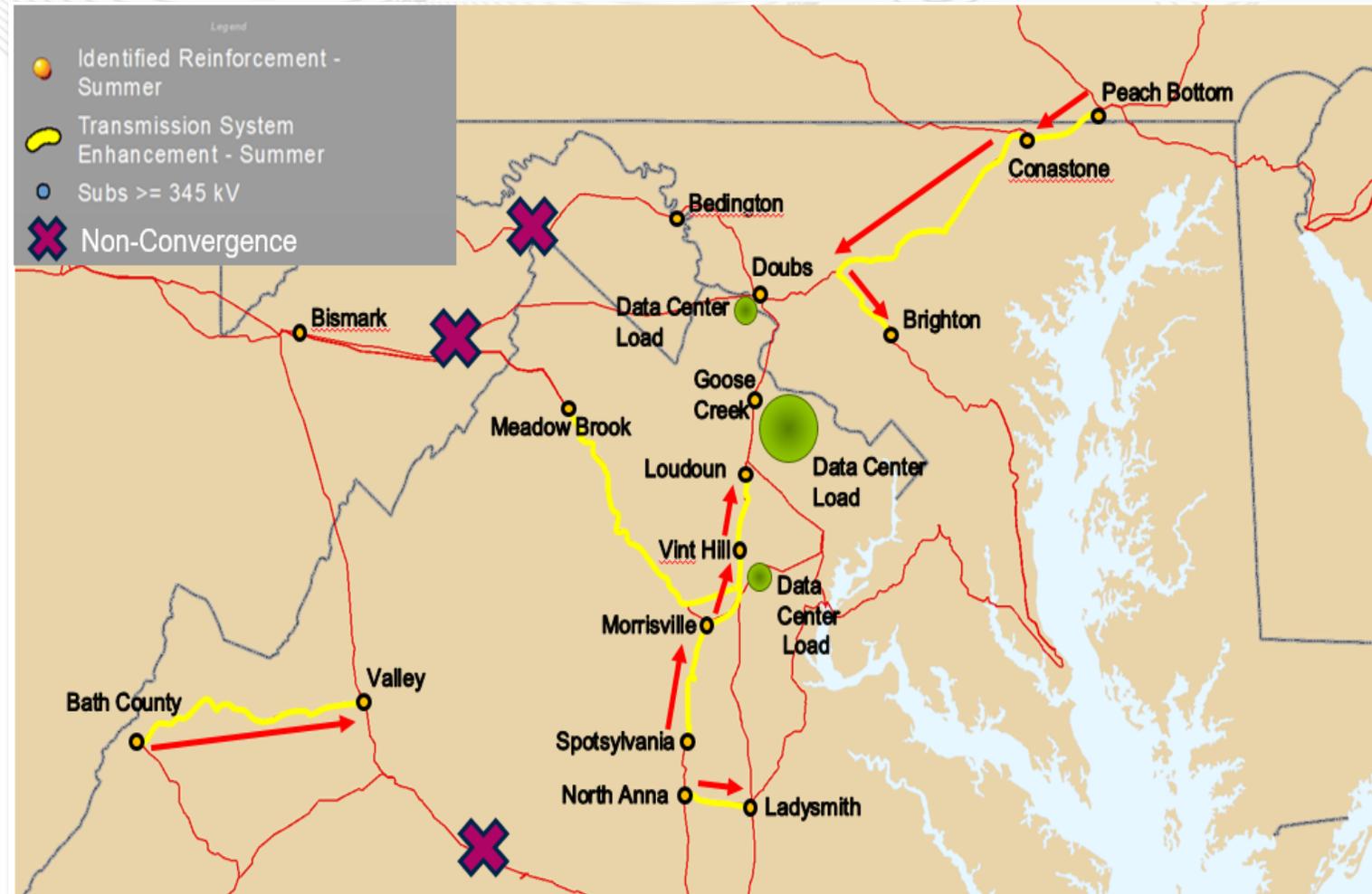
Sami Abdulsalam, Senior Manager  
PJM Transmission Planning

Transmission Expansion Advisory Committee  
December 5, 2023

# Purpose of 2022 RTEP Window 3

## Changes from 2021 to 2022

- PJM has had unprecedented data center load growth (~7,500 MW) currently forecast by 2027- 28 in Dominion (Northern Virginia) and APS (Doubs)
- 11,100 MW deactivation announced
  - ~ 5,300 MW of retirements occurred after the 2022 RTEP case was created
- The vast majority of the new generation with signed ISAs has been solar
  - Solar has low availability during the winter period
- Replacement generation is coming from the region to the east of Peach Bottom as well as west of Doubs to meet projected load growth.
- PJM has implemented a new block dispatch procedure
  - The old dispatch procedure maintained historical intraregional transfers, dispatching most of the generators in the Dominion zone at 100% or higher.
- Market Efficiency 9A project was suspended



- PJM’s mandatory analysis criteria and obligations are developed and monitored by multiple national and regional regulatory agencies:
  - Federal Energy Regulatory Commission
  - North American Electric Reliability Corporation
  - ReliabilityFirst
  - SERC Electric Reliability Corporation
- PJM also includes criteria designed to meet the needs of the PJM markets and operating principals.
- Finally, member Transmission Owners develop criteria design to meet the needs of the local system, including any provisions imposed by state regulatory bodies

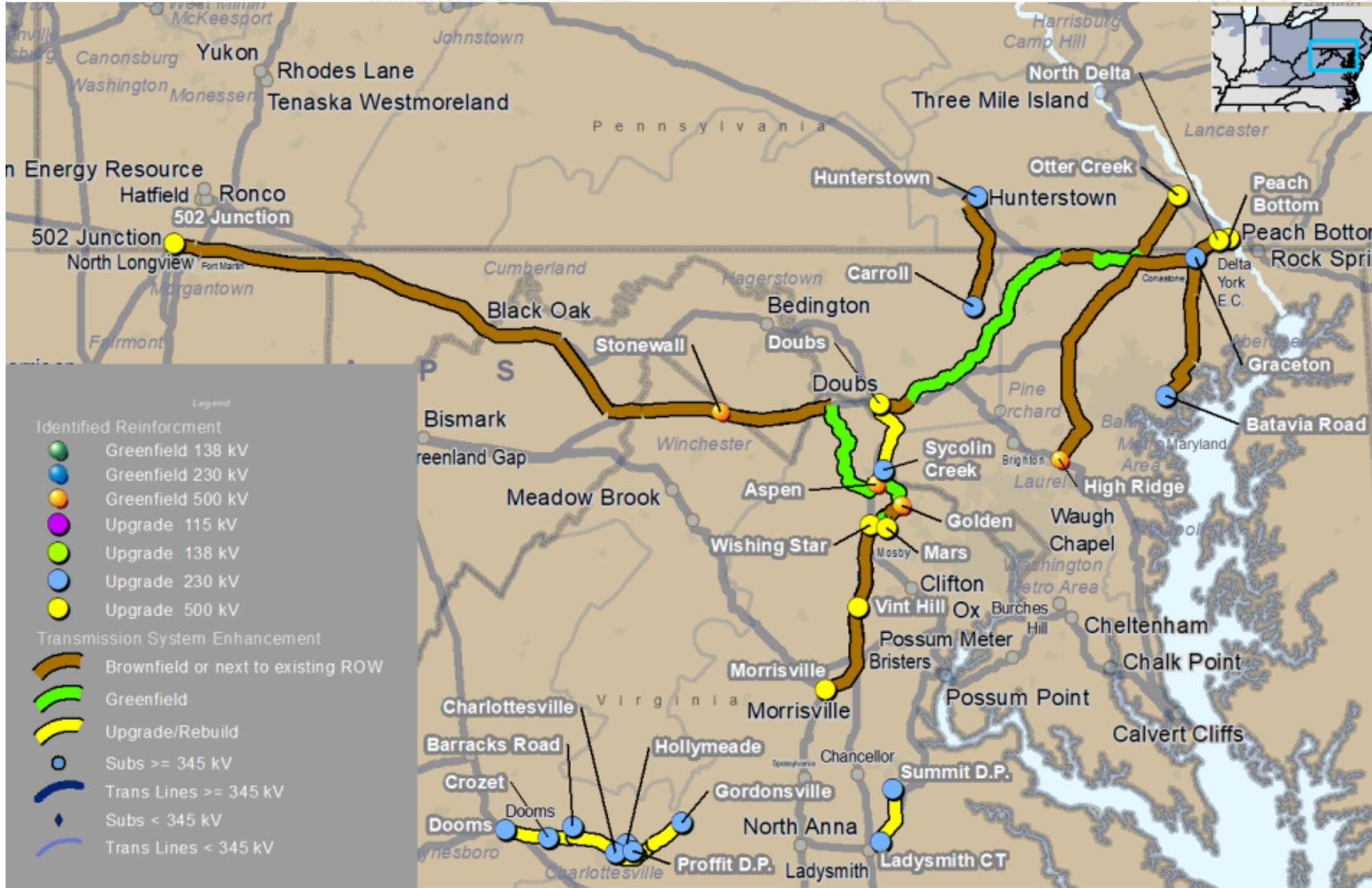
## 72 Proposals Were Received From 10 Entities

6 incumbent, 4 non-incident	22 projects are upgrades, while 50 are greenfield	Total ~\$48.5B (sum of all proposal costs – not all are required)	Anticipated Cost for Recommended Solution ~\$5 B
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### Proposals include:

- 230 kV, 500 kV and 765 kV developments
- 500 kV GIS substations
- UG 500 kV AC cable developments
- Double circuit 500 kV proposals
- HVDC developments

# Overview of Selected Proposals

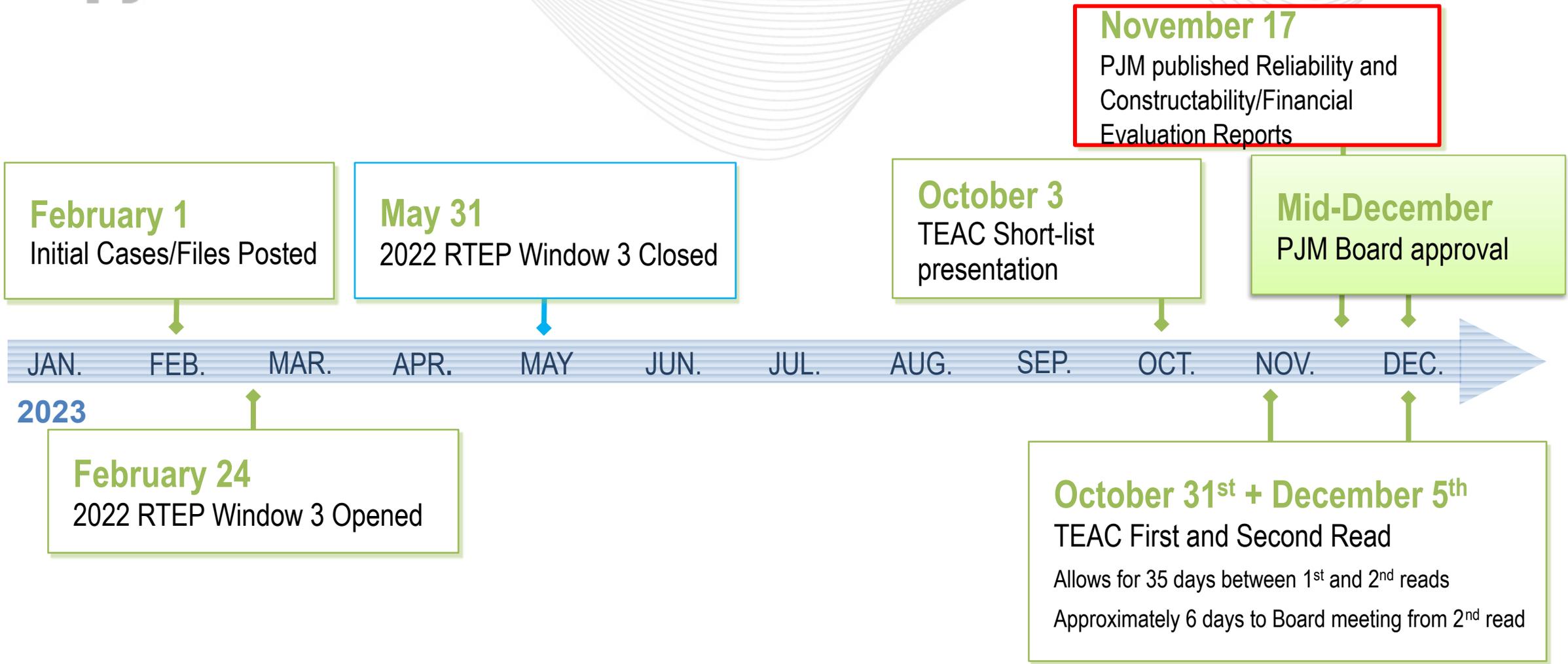


**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Overview of Selected Proposals

Cluster	Overview	Proposal Cost (\$M)
East	New and upgrade 500 kV lines New and expanded 500 kV stations	\$1,443.12
West	New 500 kV line New 500 kV station New voltage support devices	\$940.85
Northern VA	New 500 kV and 230 kV lines New 500 kV station	\$1,418.3
South	New and upgraded 500 kV and 230 kV lines New voltage support devices	\$1,265.85
Local	Station reconfiguration	\$11.59
Short Circuit	500kV and 230KV Breaker replacement	\$63.27
<b>Total</b>		<b>\$5,142.98</b>

# 2022 RTEP Window 3 - Timeline



# Recommended Solution – 2022 Window 3 Second Read Baseline Reliability Projects

## 2022 RTEP Window 3 – Objective & Evaluation

- Develop robust, holistic and expandable solutions that address the 2027-28 baseline violations associated with:
  - Local constraints: resulting from directly serving data center loads in APS / Dominion
  - Regional constraints resulting from imports into load center areas (500 kV primarily):
  - Needed reactive power VAR reinforcements, both static and dynamic as necessary.
  - Address reliability impacts due to the deactivation of 11GWs of generation.
- Adhere to all applicable planning criteria, including PJM, NERC, SERC, RFC and Local Transmission Owner Criteria.
- Evaluation on both 2027 and 2028 RTEP cases
  - Generation deliverability analysis
  - Load deliverability analysis
  - N-1-1 analysis
  - Baseline contingency analysis
  - Short circuit analysis
  - Dynamic analysis
  - Critical Substation Planning Analysis-CSPA

- Holistic solutions are to be designed such that they are robust and expandable as the load grows within the study area.
  
- A scalable solution ensures, at a minimum, near-term reliability needs are addressed while also enabling future expansion (beyond the 2027-28 baseline levels).
  - Consider flexibility, robustness and scalability of 2027-28-baseline solutions against the Interim 2027-28 Summer, Winter and Light Load basecases.
  - Evaluate proposals for their effectiveness towards existing reactive interfaces in the area, particularly those supporting the Dominion and APS zones.
  - Evaluate the effectiveness of the proposed solutions towards the transmission system load deliverability into the Dominion and APS zones (CETL).

## Two Rounds of PJM Meetings With Proposing Entities:

- Discussions to clarify details of proposed developments, assumptions, rationale of proposed alternatives/variations
- First round was conducted in June/July 2023.
- Second round was initiated in late July and concluded mid-August:
  - Focus on outage scheduling, routing, risk and cost assumptions/considerations

### Scenario Development and Analysis

To date, PJM developed and analyzed:

- >30 scenarios for the 2027 model (Combination of proposals and components from different proposals)
- >80 scenarios for the 2028 model

### Scenarios Were Built Based On:

- Full combination scenarios by proposing entities (Incumbents, Nextera, LS Power and Transource)
- Optimized scenarios using components from incumbent and non-incumbent proposing entities

## Scenarios With Their Associated Proposed Developments Will Be Evaluated Based On the Following Principles:

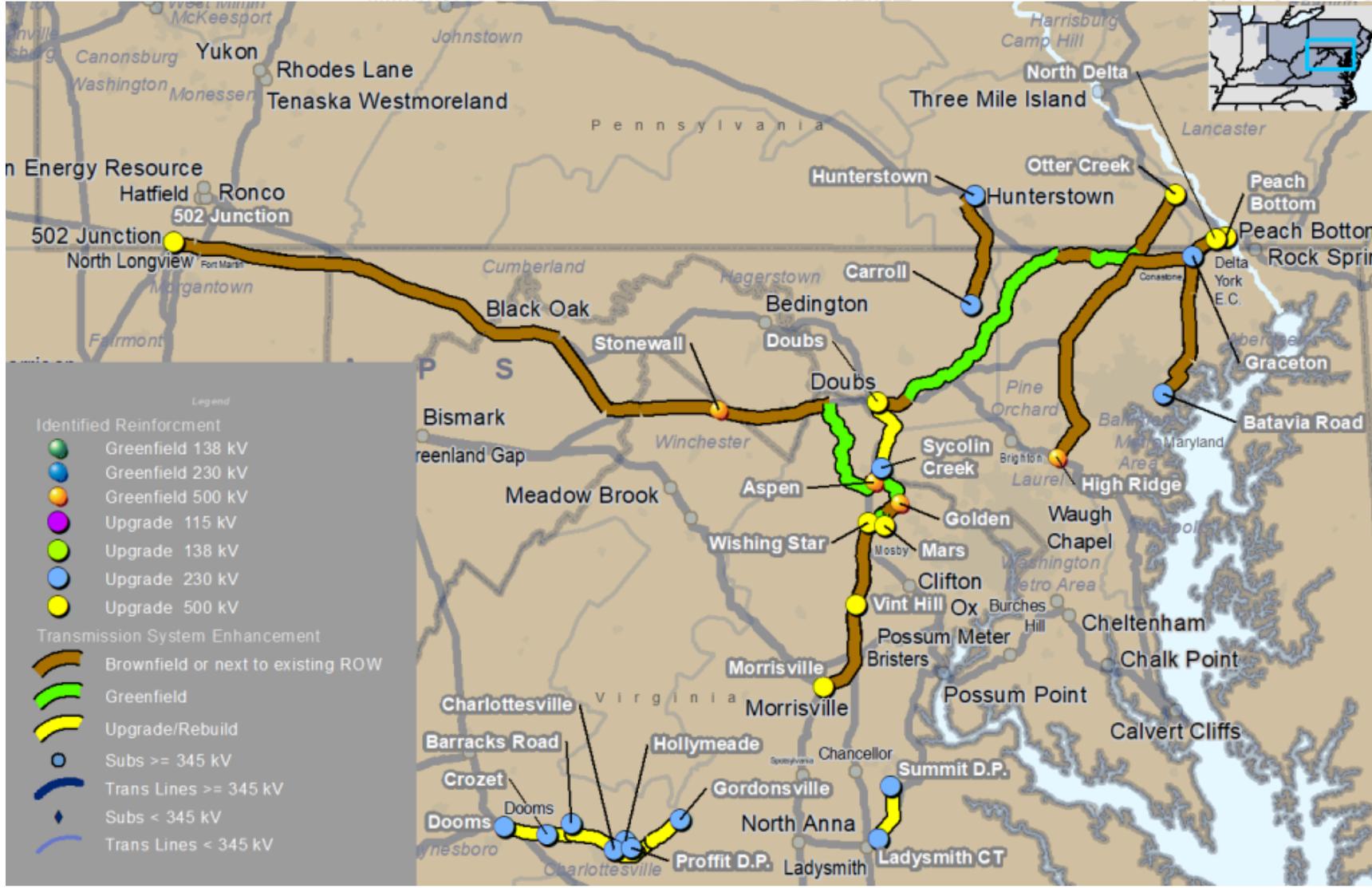
<u>Performance</u> Meeting the system needs of 2027 and being flexible to address 2028 needs	<u>Scalability</u> Scenario/development longevity – system robustness and utilization	<u>Impact</u> Utilization of existing ROWs where possible and efficient.	<u>Validated Cost</u> Cost evaluation using third-party benchmarking metrics
<u>Risks</u> <ul style="list-style-type: none"> <li>Triggering additional costs:                             <ul style="list-style-type: none"> <li>Substation rebuilds due to extreme short-circuit levels</li> <li>Avoid extended critical outages (Peach Bottom / Conastone rebuilds)</li> </ul> </li> <li>Imposing high permitting</li> <li>Inability to meeting in-service date</li> </ul>		<u>Efficiencies</u> <ul style="list-style-type: none"> <li>Avoidance of redundant capital investment including recognizing synergies with EOL facilities and overlaps of previously approved (or imminent) supplemental/baseline upgrades.</li> </ul>	

# Brandon Shores Deactivation Assumptions

- Initial 2022 Window 3 (2027 basecase) has Brandon Shores generators modeled and dispatched
- The 2022 Window 3 (2028 basecase) has Brandon Shores generators removed as per the deactivation notice
- As will be shown, PJM received proposals from PSEG, NextEra, and Exelon addressing the Brandon Shores deactivation covering 2028 robustness test
- All proposals submitted to address only 2027 base case needs do not consider Brandon Shores deactivation
- PJM evaluated effectiveness of all submitted proposals to address Brandon Shores deactivation against the PJM Board approved project.
- Later in 2023, Wagner submitted its deactivation notice and PJM is currently evaluating its reliability impact in 2025 considering both the Brandon Shores deactivation reliability upgrades and the 2022W3 proposed solutions.
  - Reliability evaluations currently ongoing

- Selected proposals were previously presented at the Oct 31<sup>st</sup> TEAC
- The selected proposals are robust and expandable while also being the more effective or cost efficient solutions to address the bulk transfer, regional and local transmission needs in the study area.
- In the slides to follow, PJM will walk through the selected proposals in each cluster (South, Northern Virginia/Doubs, East, and West)
- PJM recommended changes to earlier approved projects (either expansions, adjustments or cancellations)
- PJM identified additional upgrades for each cluster

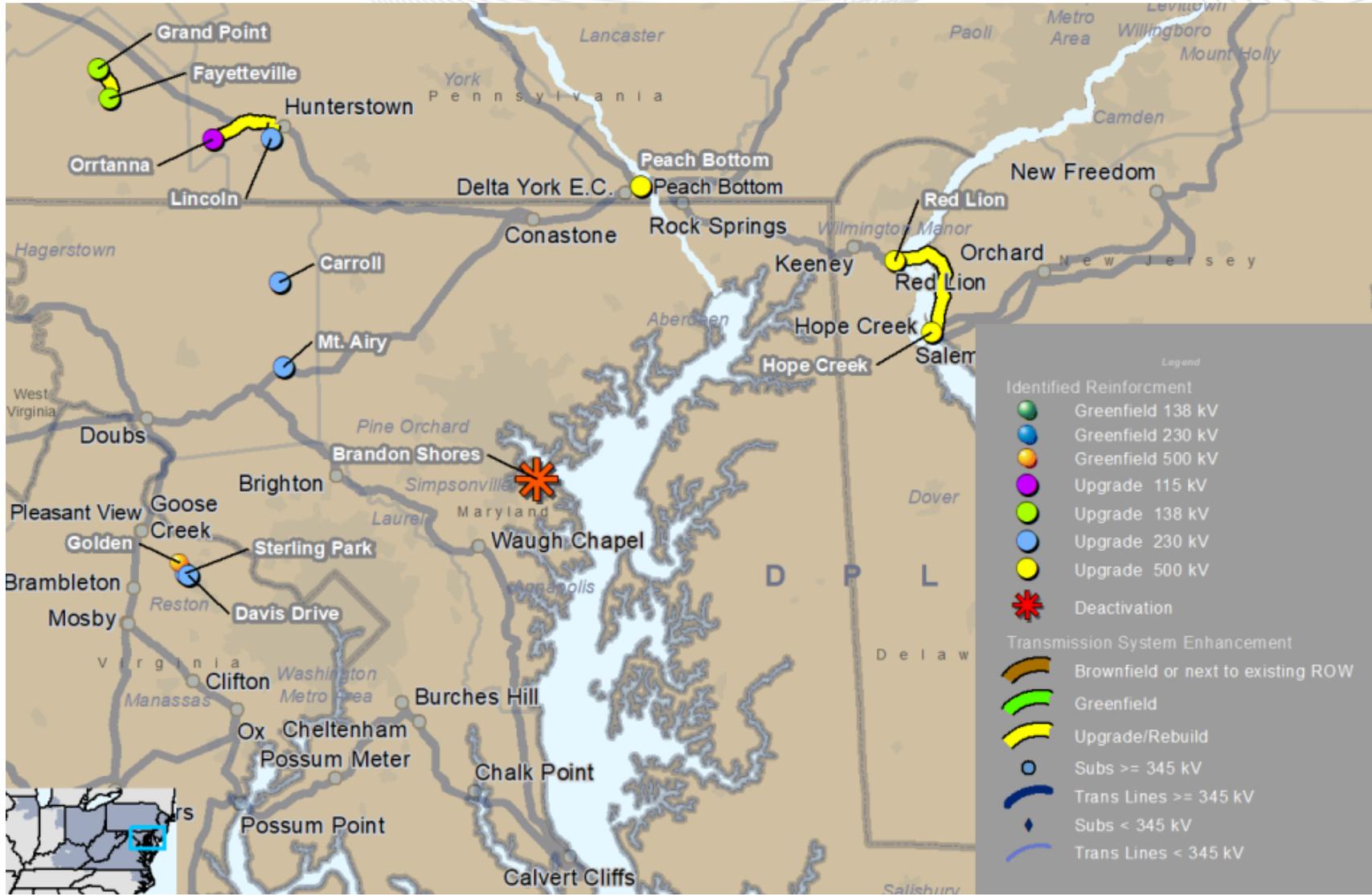
# Major Proposals Selected in 2022 Window 3



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

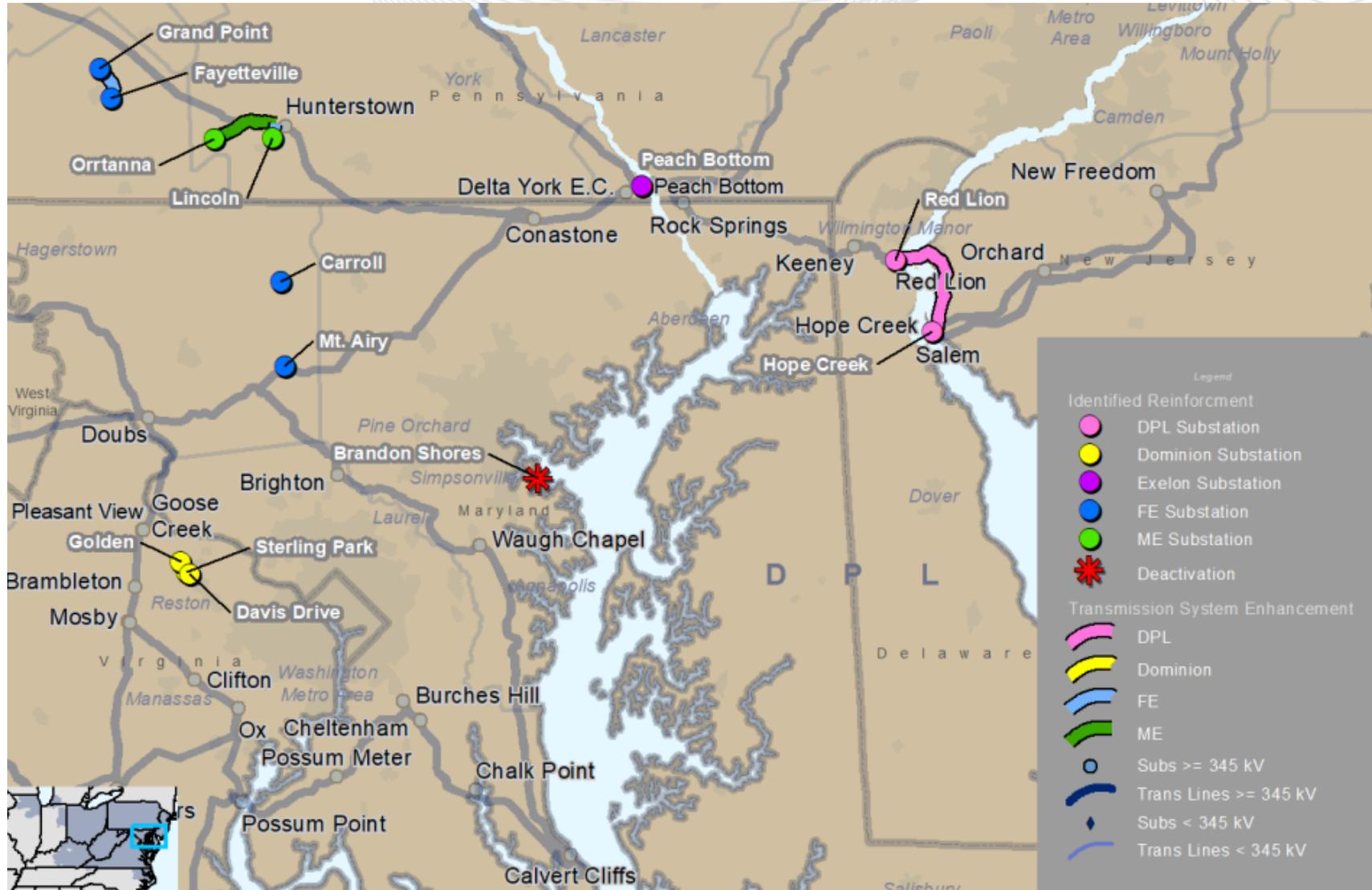


# Additional upgrades needed in 2022 Window 3



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Additional upgrades needed in 2022 Window 3 – by TO



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Adjustments to Earlier Approved Projects

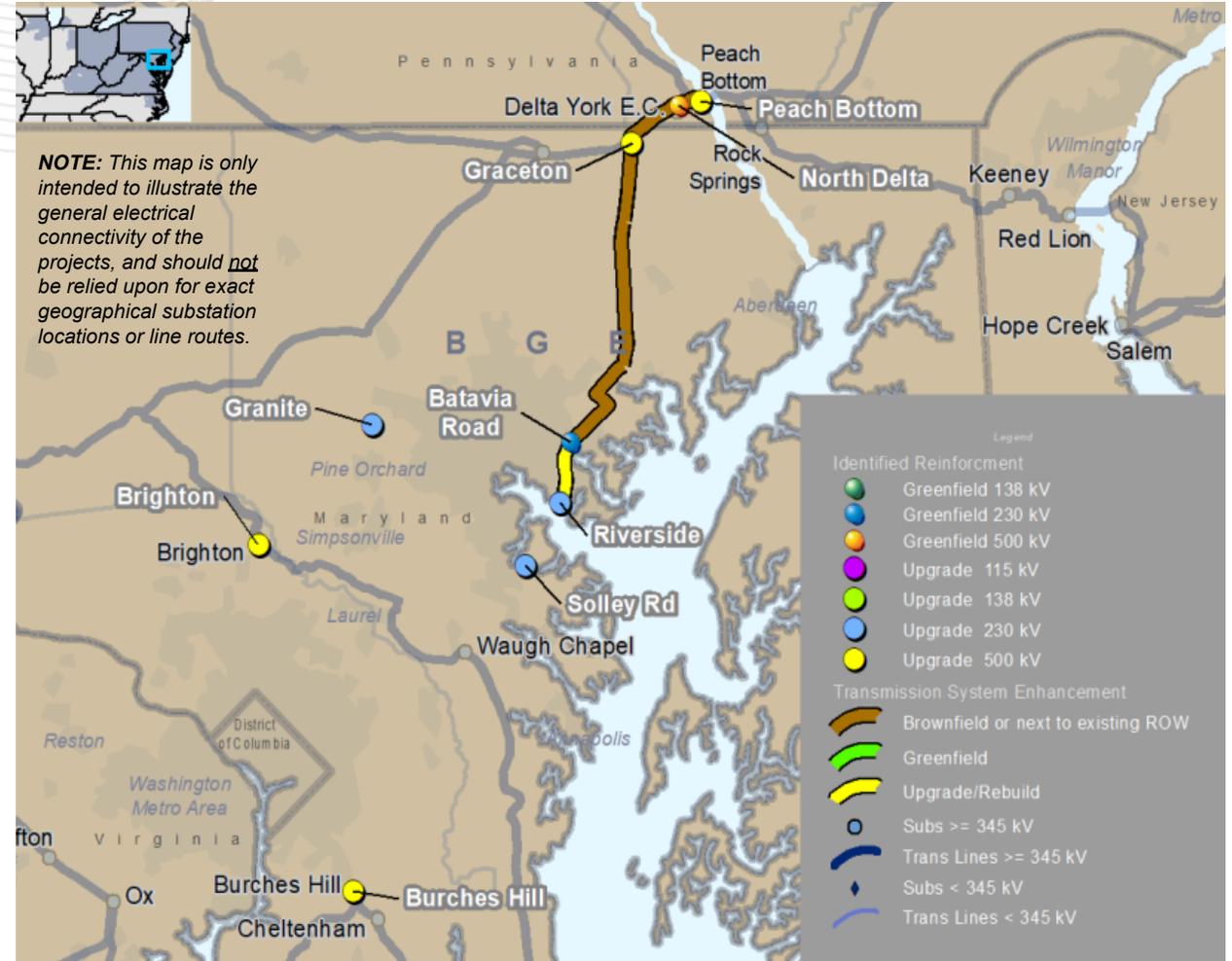
## Baseline Reliability Projects

# PJM recommended adjustments to Earlier Approved Brandon Shores De-Activation Scope

## B3780 - Substation Projects: (Approved components under Brandon Shores Deactivation Immediate Need)

- **B3780 – (assigned by PJM to Transource) Substation Projects**
  - Modify the planned North Delta 500/230 kV substation (cut into Peach Bottom – Delta/Calpine 500 kV line)
    - Cut into Peach Bottom – Conastone 500 kV (5012) line
    - Three breaker ring bus configuration
    - Install one 500/230 kV transformer
    - This scope will amend the approved B3737.47 (NJOSW-SAA 1.0)
- **B3780 – Exelon Scope -Substation Projects**
  - Expand Peach Bottom North yard to accommodate additional 500kV circuits to BGE (Graceton).
  - Build Graceton 500 kV substation – adjacent to the existing Graceton 230kV yard
    - Three bay breaker and half configuration
    - Two 500/230 kV transformers
  - Build new Batavia Rd. 230 kV switching station (cut in to the existing Northeast – Riverside 230 kV circuits)
    - Four bay 8-position GIS BAAH switching station
- **Cancel B3780.3** (Build 500/230 kV West Cooper substation) (Cost Estimate: \$60M)

B3780 Continue on next slide ...



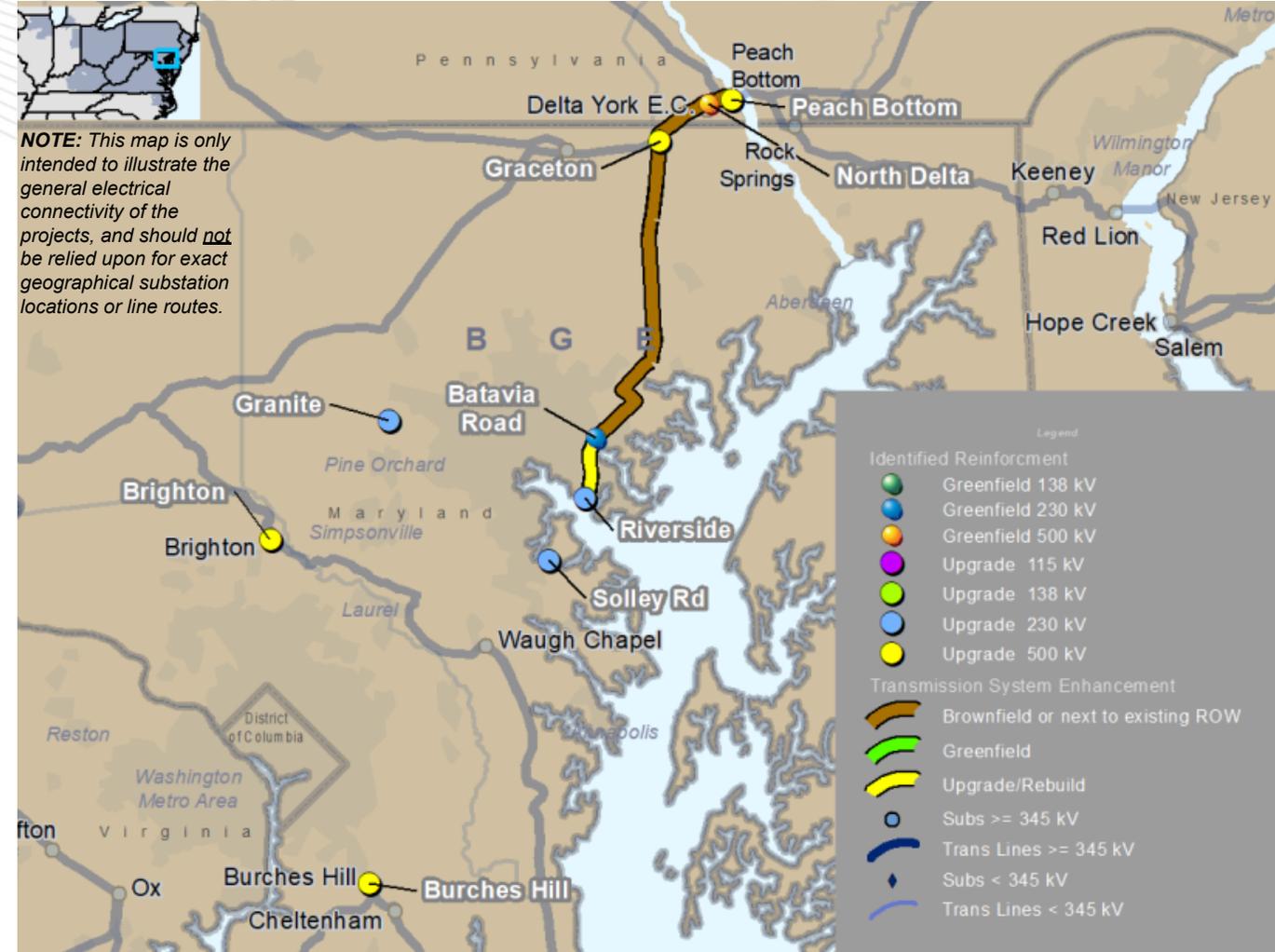
# PJM recommended adjustments to Earlier Approved Brandon Shores De-Activation Scope

## B3780 - Transmission Projects: (Approved components under Brandon Shores Deactivation Immediate Need)

- Build new Peach Bottom North - Graceton 500kV Line - (~10 miles)
  - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
- Build new 230 kV double circuit from Graceton to Batavia Road with 2 x 1590kcm 54/19 ACSR (~29 miles)
  - New Rating – 1331SN/1594SE/1534WN/1795WE MVA
- Reconductor 230 kV double circuit from Batavia Road to Riverside with bundled 1622kcm 38/19 ACCR/TW (~6 miles)
  - New Rating – 1941SN/2181SE/WN2065/WE2302 MVA
- Install Statcom at Granite 230 kV (+/- 350MVAR) and Solley 230kV (+/- 350 MVAR), and 250 MVAR capacitor at Graceton 230 kV
- Install Statcom at Brighton 500 kV (+/- 350MVAR), Capacitors - 350 MVAR at Brighton 500 kV, 250 MVAR at Burchess Hill 500 kV, and 350 MVAR at Conastone 500 kV

**Required In-Service Date : June 2025**

**Projected In-Service Date: 2026-2028**



# AEP Local - Selected Proposals

## Baseline Reliability Projects

# 2022W3 – Preferred Solutions: AEP Local

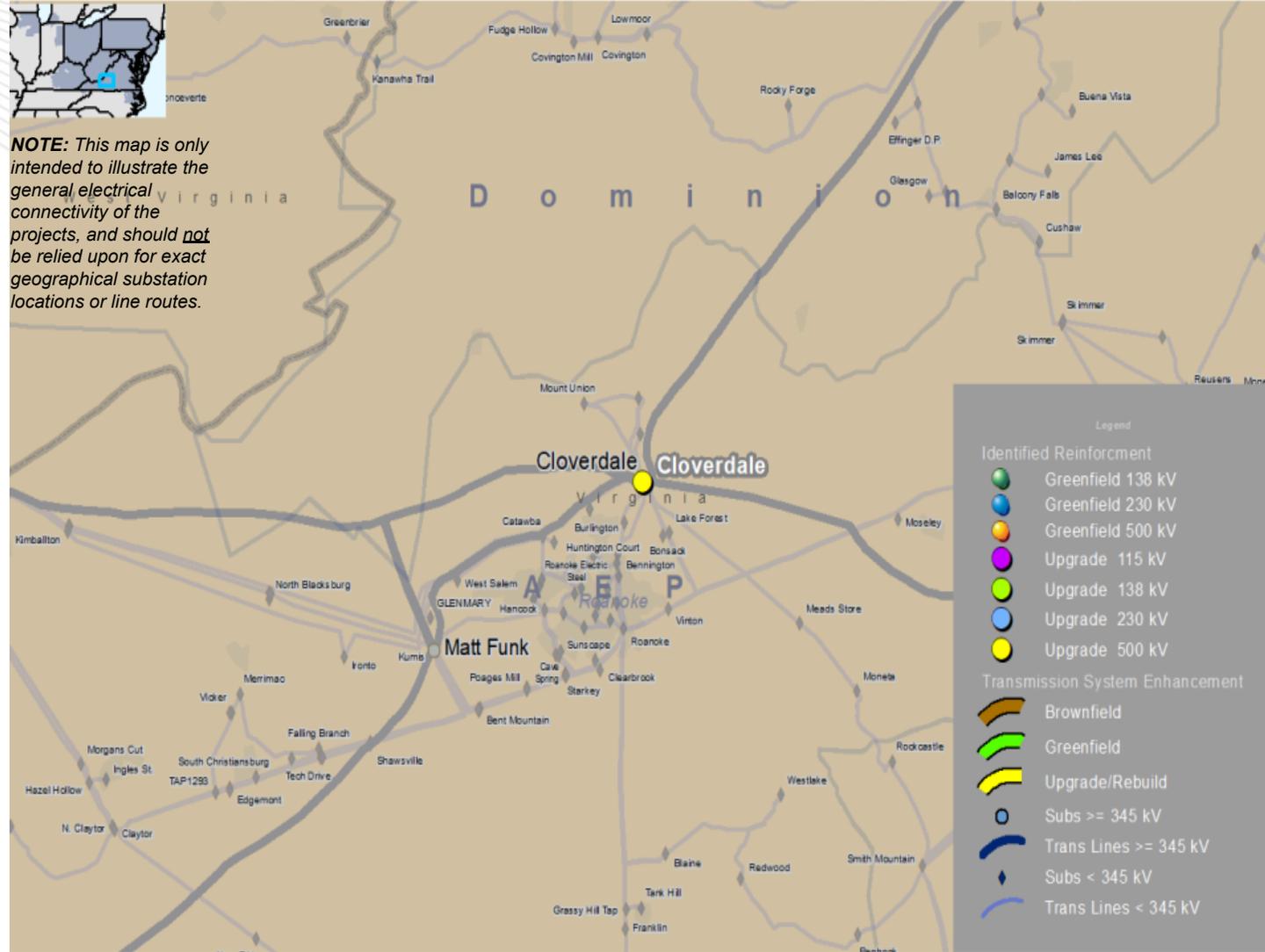
AEP: 2022-W3-410

- Establish a new 500 kV breaker position for the low-side of the existing 765/500 kV transformer at Cloverdale Station. The new position will be between two new 500 kV circuit breakers located in a new breaker string, electrically converting the 500 kV yard to "double-bus double-breaker" configuration. (B3800.100)

**Estimated Cost: \$11.59 M**

**Required IS Date: 6/1/2027**

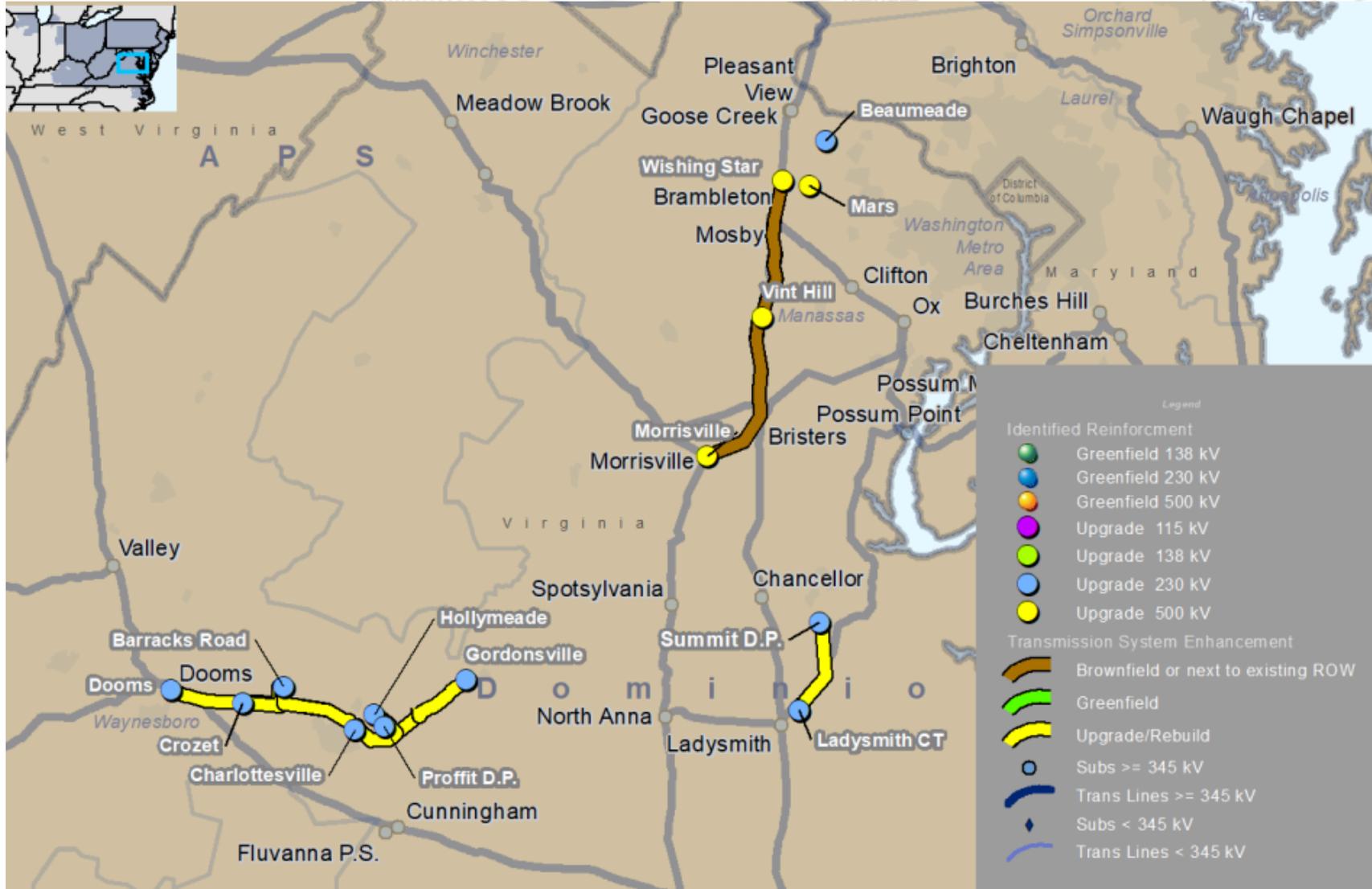
**Projected IS Date: 10/31/2026**



# South Cluster - Selected Proposals

## Baseline Reliability Projects

# 2022W3 – Recommended Solutions: South Cluster



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Recommended Solutions: South Cluster by Designated Entity

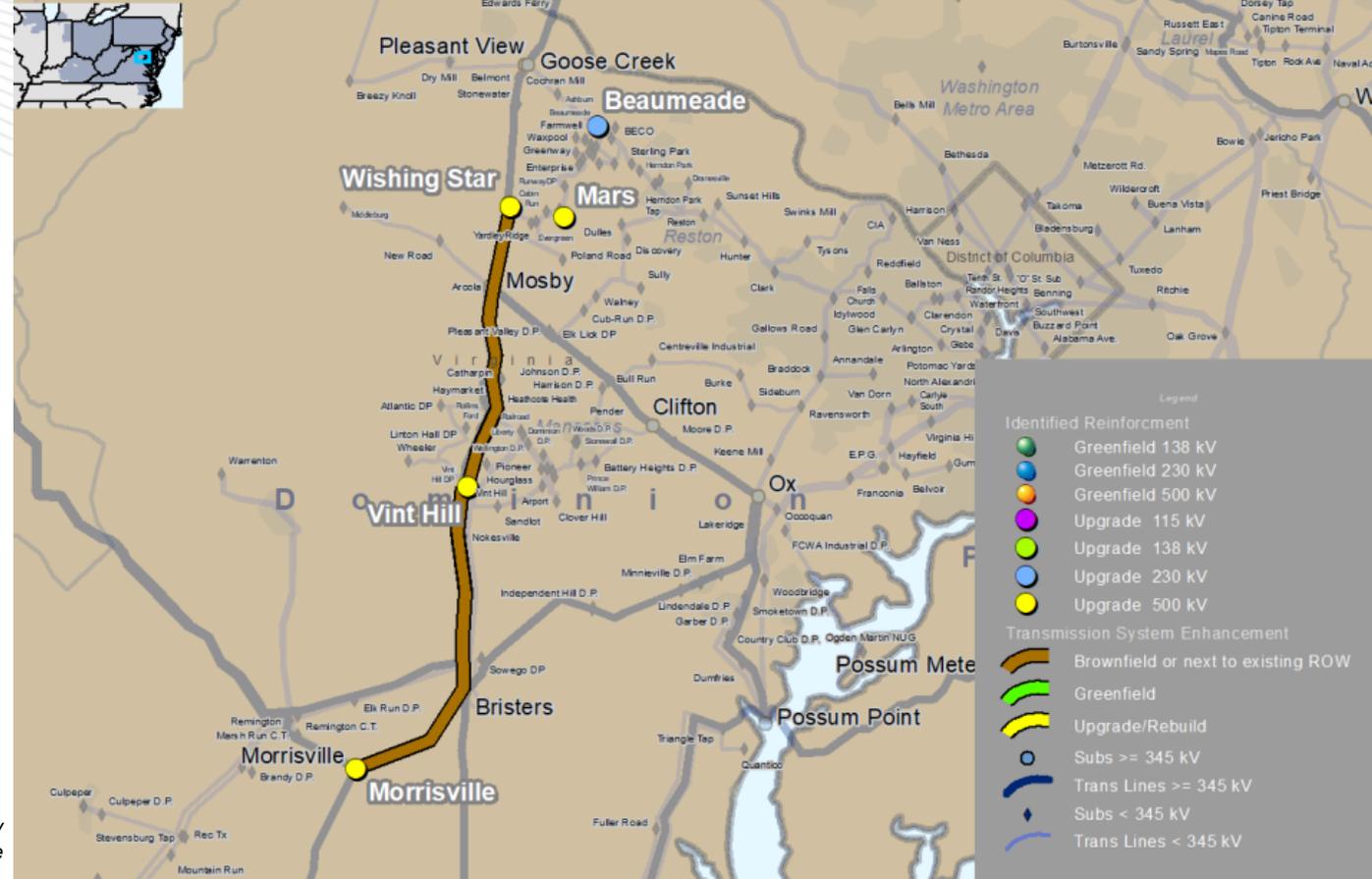


**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Recommended Solutions: South Cluster

## Recommended Solution: 2022-W3-711 (Partial)

- Build a new 500kV line from Morrisville – Vint Hill – Wishing Star (approximately 36.3 miles) while maximizing the use of existing ROW within this corridor.
- Wrecking and rebuilding both the 5-2 towers in the Morrisville-Loudoun-Brambleton corridor to free up space for the new single-500kV monopole within the same corridor.
  - 500kV Line #545 Bristers - Morrisville rebuild
  - 500kV Line #569 Loudoun to Morrisville rebuild
  - 500kV Line #535 Meadowbrook - Loudoun rebuild
  - 500kV Line #546 Mosby - Wishing Star rebuild
  - 500kV Line #590 Mosby - Wishing Star rebuild
  - 230kV Line #2030 Gainesville - Loudoun rebuild
  - 230kV Line #2045 Loudoun - Brambleton rebuild
  - 230kV Line #2094 & 2227 Brambleton - Racefield - Loudoun rebuild
  - 230kV Line #2101 Bristers - Vint Hill rebuild
  - 230kV Line #2114 Remington CT - Rollins Ford rebuild



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

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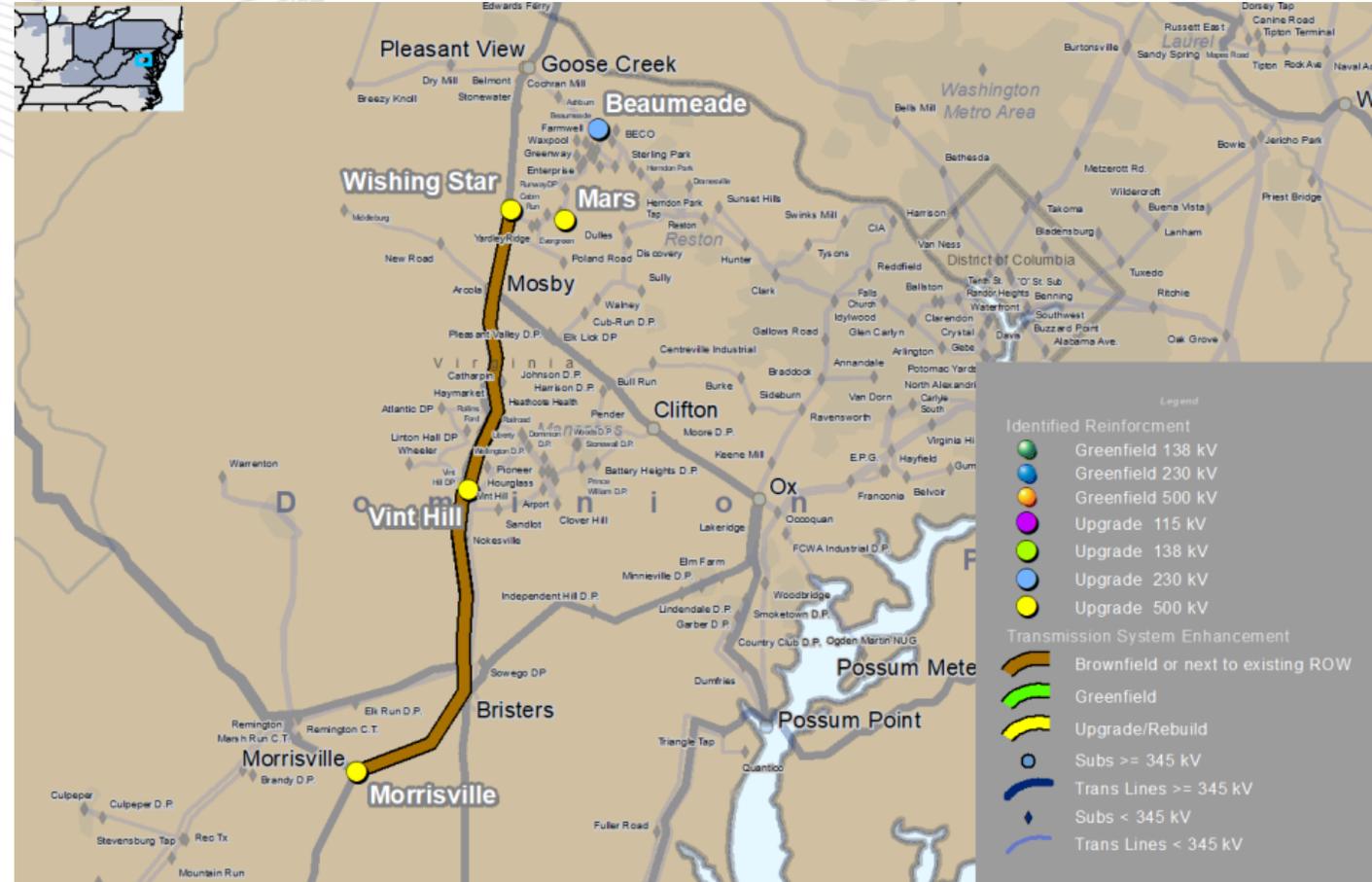
# 2022W3 – Recommended Solutions: South Cluster

## Recommended Solution: 2022-W3-711 (Partial)

- 230kV Line #2140 Loudoun - Heathcote rebuild
- 230kV Line #2151 Railroad DP - Gainesville rebuild
- 230kV Line #2163 Vint Hill - Liberty rebuild
- 230kV Line #2176 Heathcote - Gainesville rebuild
- 230kV Line #2222 Rollins Ford - Gainesville rebuild
- 115kV Line #183 Bristers - Ox rebuild
- Substation upgrades at:
  - Bristers, Brambleton, Dawkins Branch, Gainesville, Heathcote, Loudoun, Mint Springs, Morrisville, Mosby, North Star, Racefield, Railroad, Vint Hill, Wishing Star, Youngs Branch
- Breaker upgrades at the following substations:
  - Loudoun 230kV, Ox 500kV

## Baseline # B3800.311 – B3800.357

**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should *not* be relied upon for exact geographical substation locations or line routes.

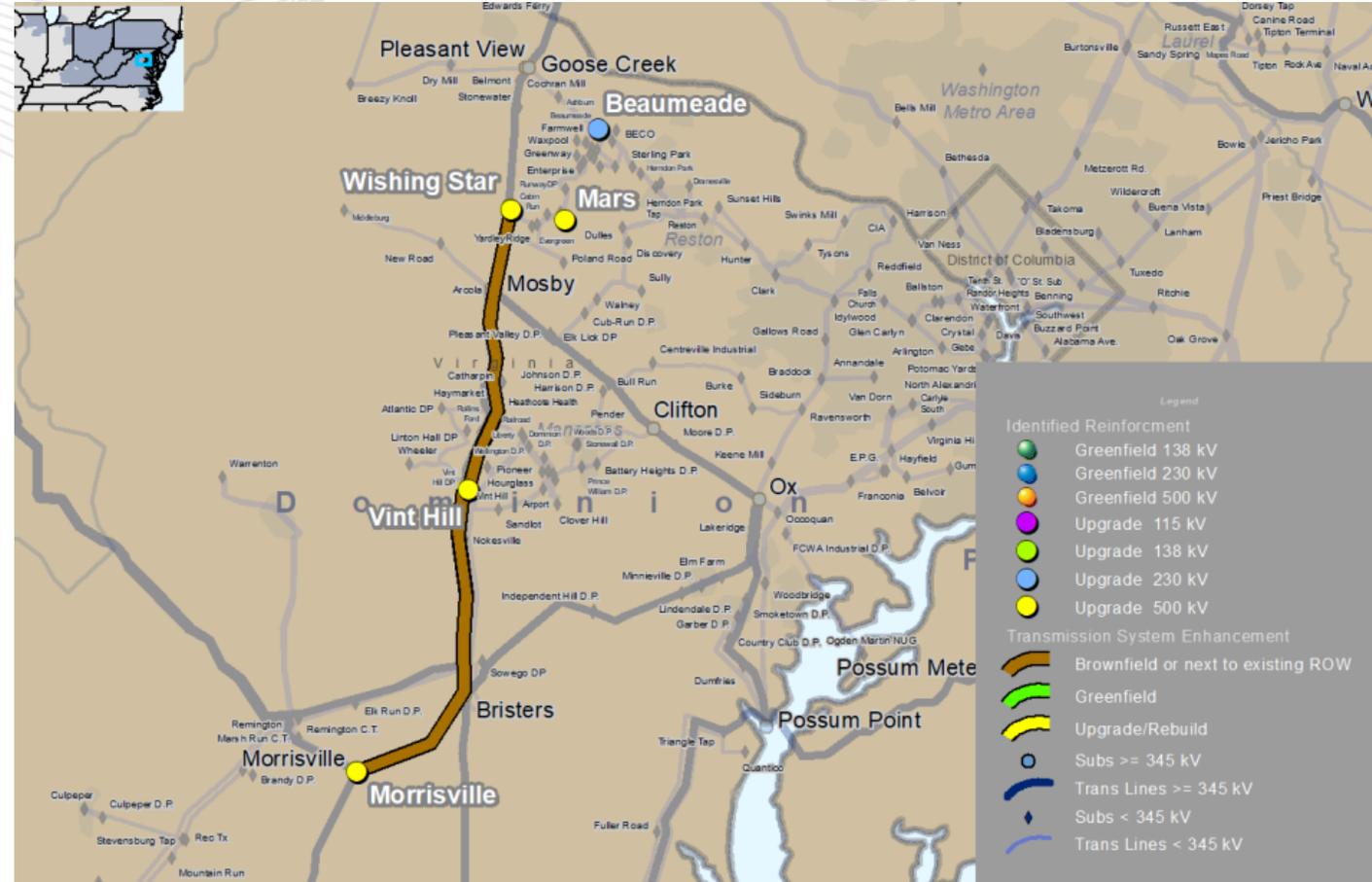


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# 2022W3 – Recommended Solutions: South Cluster

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
500kV Line #545 Bristers – Morrisville	3426/3426/4375/4375
500kV Line #569 Loudoun - Morrisville	3426/3426/3464/3464
500kV Line #535 Vint Hill – Loudoun	3572/3622/4560/4599
500kV Line #546 Mosby - Wishing Star	4295/4357/5155/5155
500kV Line #590 Mosby - Wishing Star	3464/3464/3984/4018
230kV Line #2030 Gainesville – Loudoun	1047/1047/1160/1160
230kV Line #2045 Loudoun – Brambleton	1047/1047/1160/1160
230kV Line #2094 & 2227 Brambleton - Racefield - Loudoun	1047/1047/1160/1160
230kV Line #2101 Bristers - Vint Hill	1047/1047/1160/1160
230kV Line #2114 Remington CT - Rollin Ford	1573/1573/1648/1648
230kV Line #2140 Loudoun – Heathcote	1047/1047/1160/1160
230kV Line #2151 Railroad DP – Gainesville	1573/1573/1648/1648
230kV Line #2163 Vint Hill – Liberty	1573/1573/1648/1648
230kV Line #2176 Heathcote – Gainesville	1047/1047/1160/1160
230kV Line #2222 Rollins Ford – Gainesville	1573/1573/1648/1648
115kV Line #183 Bristers – Ox	1573/1573/1648/1648 (@230kV)
500kV Line Vint Hill to Wishing Star	NA
500kV Line Morrisville - Vint Hill	NA



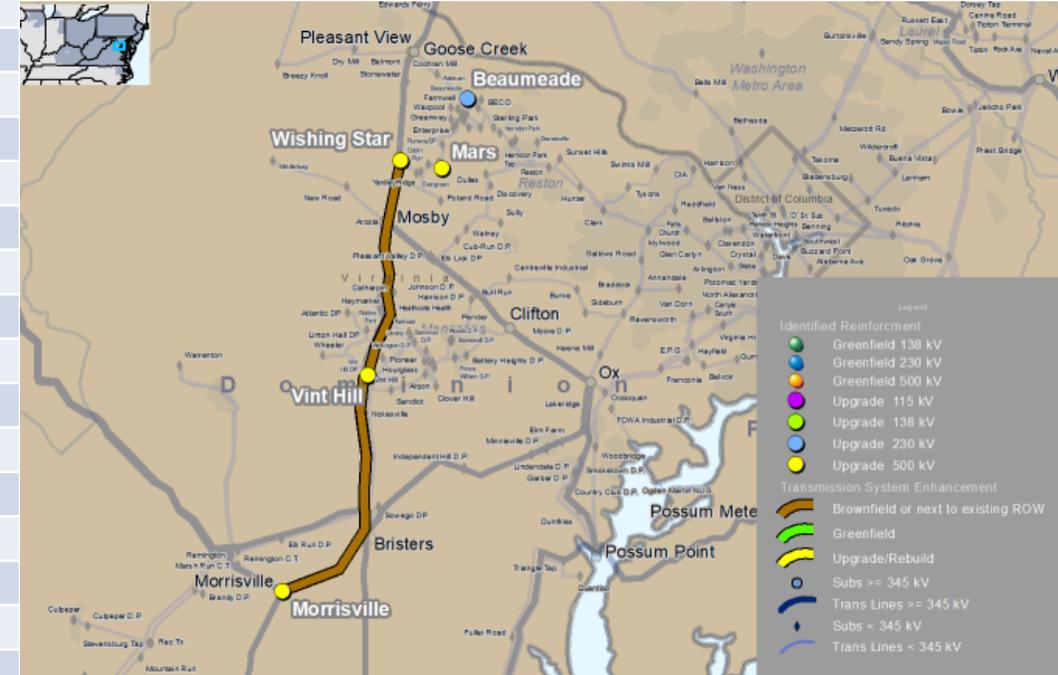
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

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# 2022W3 – Recommended Solutions: South Cluster

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
500kV Line #545 Bristers – Morrisville	4357/4357/5155/5155
500kV Line #569 Loudoun - Morrisville	4357/4357/5155/5155
500kV Line #535 Vint Hill – Loudoun	4357/4357/5155/5155
500kV Line #546 Mosby - Wishing Star	4357/4357/5155/5155
500kV Line #590 Mosby - Wishing Star	4357/4357/5155/5155
230kV Line #2030 Gainesville – Loudoun	1573/1573/1648/1648
230kV Line #2045 Loudoun – Brambleton	1573/1573/1648/1648
230kV Line #2094 & 2227 Brambleton - Racefield - Loudoun	1573/1573/1648/1648
230kV Line #2101 Bristers - Vint Hill	1573/1573/1648/1648
230kV Line #2114 Remington CT - Rollin Ford	1573/1573/1648/1648
230kV Line #2140 Loudoun – Heathcote	1573/1573/1648/1648
230kV Line #2151 Railroad DP – Gainesville	1573/1573/1648/1648
230kV Line #2163 Vint Hill – Liberty	1573/1573/1648/1648
230kV Line #2176 Heathcote – Gainesville	1047/1047/1160/1160
230kV Line #2222 Rollins Ford – Gainesville	1573/1573/1648/1648
115kV Line #183 Bristers – Ox	1573/1573/1648/1648 (@230kV)
500kV Line Vint Hill to Wishing Star	4357/4357/5155/5155
500kV Line Morrisville - Vint Hill	4357/4357/5155/5155



**Estimated Cost: \$842.19 M**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2028**

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**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

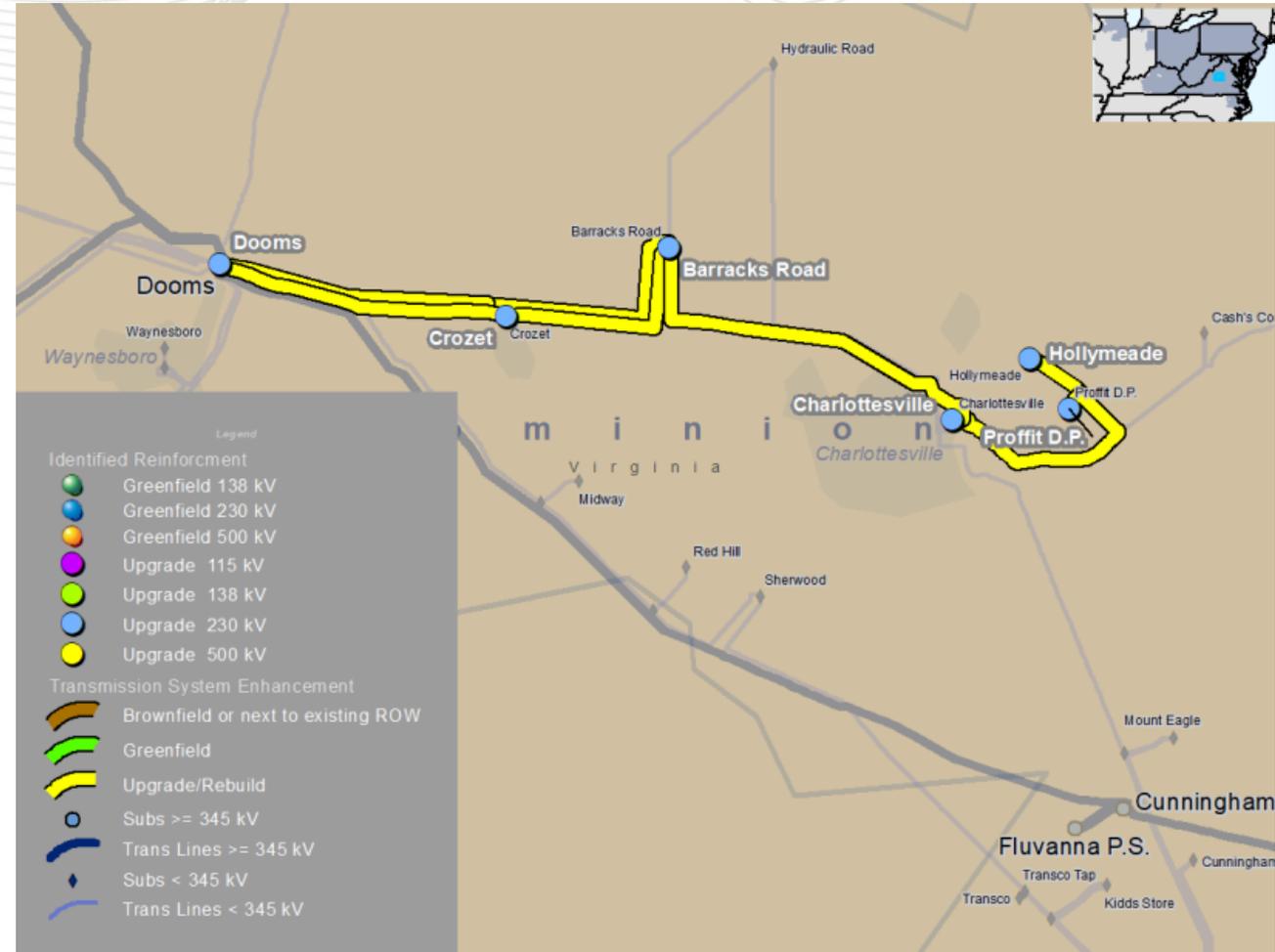
# 2022W3 – Recommended Solutions: South Cluster

## Recommended Solution: 2022-W3-967

- Rebuild 230kV Line #2054 Charlottesville – Proffit DP using double-circuit capable 500/230 kV poles (the 500kV circuit will not be wired as part of this project).
- Rebuild 230kV Line #233 Charlottesville – Hydraulic Rd – Barracks Road – Crozet – Dooms
- Rebuild 230kV Line #291 Charlottesville – Barracks Road – Crozet – Dooms
- Relay resets/revisions at the following substations:
  - Hollymeade, Proffit, Barracks Road, Crozet
- Terminal equipment upgrades at the following substations:
  - Charlottesville for Lines #2054, #233 & #291 rebuilds
  - Hydraulic Rd for #233 & #291 rebuilds
  - Dooms for #233 & #291 rebuilds

## Baseline # B3800.360 – B3800.372

**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.



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# 2022W3 – Recommended Solutions: South Cluster

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2054 Charlottesville – Proffit D.P.	586/586/741/741
230kV Line #233 Barracks Road – Crozet	608/608/769/769
230kV Line #291 Charlottesville – Barracks Road – Crozet – Dooms	595/595/757/757

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2054 Charlottesville – Proffit D.P.	1047/1047/1160/1160
230kV Line #233 Charlottesville – Hydraulic Rd – Barracks Road – Crozet – Dooms	1573/1573/1648/1648
230kV Line #291 Charlottesville – Barracks Road – Crozet – Dooms	1573/1573/1648/1648

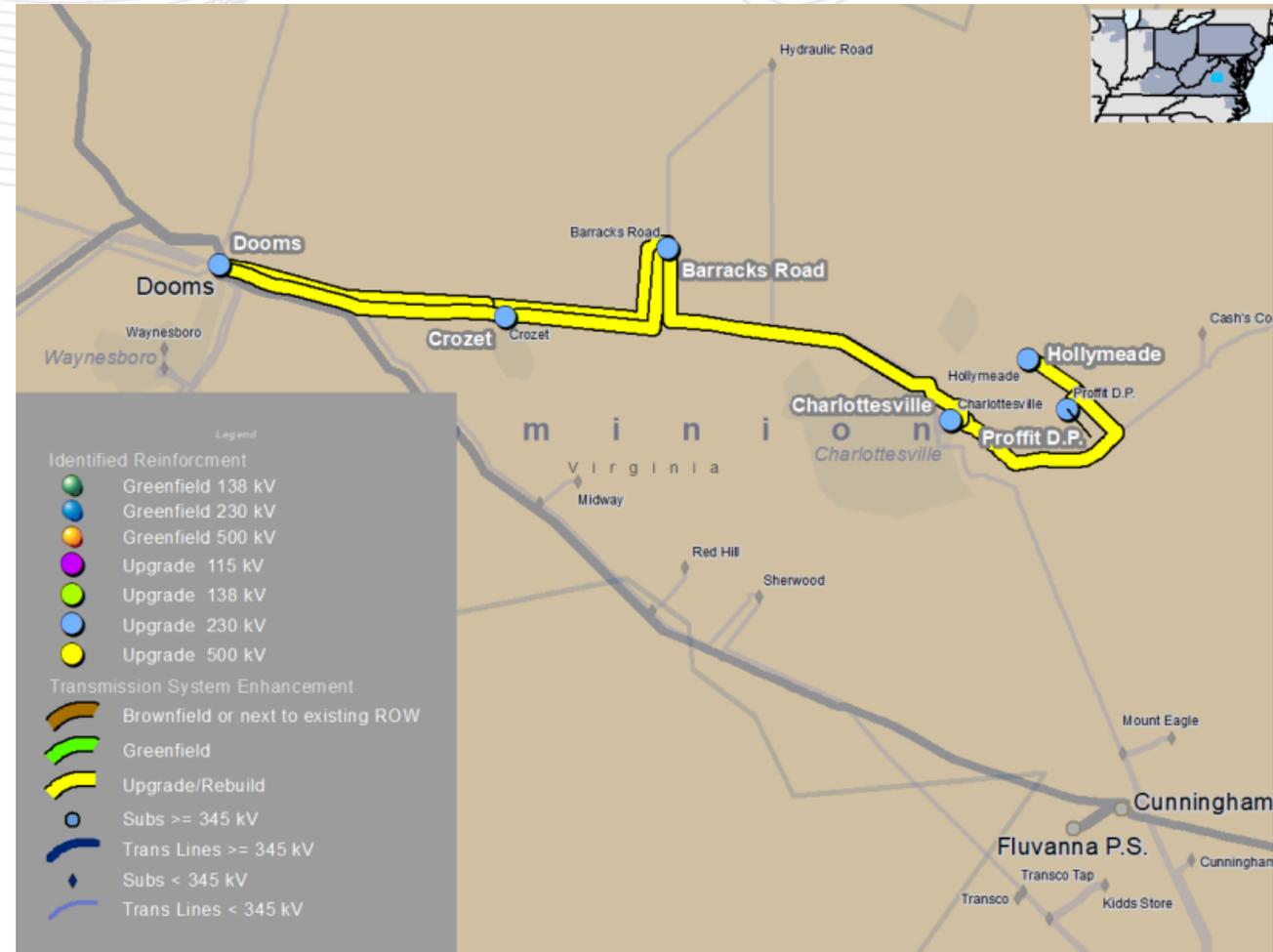
**Estimated Cost: \$183.49 M**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2028**

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# 2022W3 – Recommended Solutions: South Cluster

## Recommended Solution: 2022-W3-211

- Rebuild 230kV Line #2135 Hollymeade – Gordonsville using double-circuit capable 500/230 kV poles (the 500kV circuit will not be wired as part of this project).
- Terminal equipment upgrades at the following substations:
  - Hollymeade, Gordonsville, Cash’s Corner

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2135 Cash’s Corner - Gordonsville	586/586/741/741
230kV Line #2135 Cash’s Corner - Hollymeade	586/586/741/741

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2135 Cash’s Corner - Gordonsville	1573/1573/1648/1648
230kV Line #2135 Cash’s Corner - Hollymeade	1047/1047/1160/1160

Baseline # B3800.300 – B3800.304

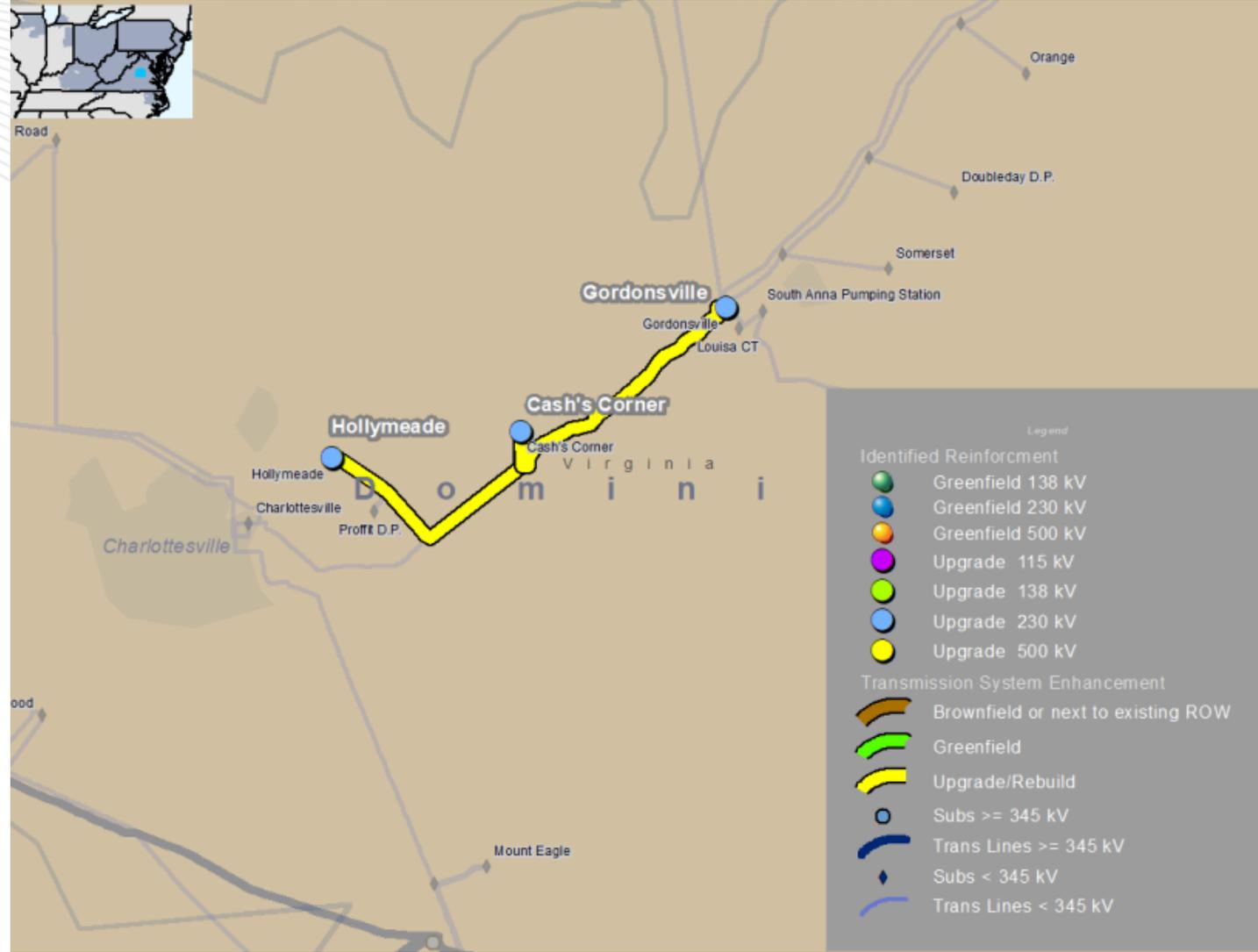
Estimated Cost: \$54.85 M

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2028

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# 2022W3 – Recommended Solutions: South Cluster

## Recommended Solution: 2022-W3-731

- Replace single unit Locks 230/115 kV 168MVA transformer #7 with a new single unit transformer with a rating of 224 MVA.
- Lead lines at the 115 kV level will be upgraded to 2000 A.

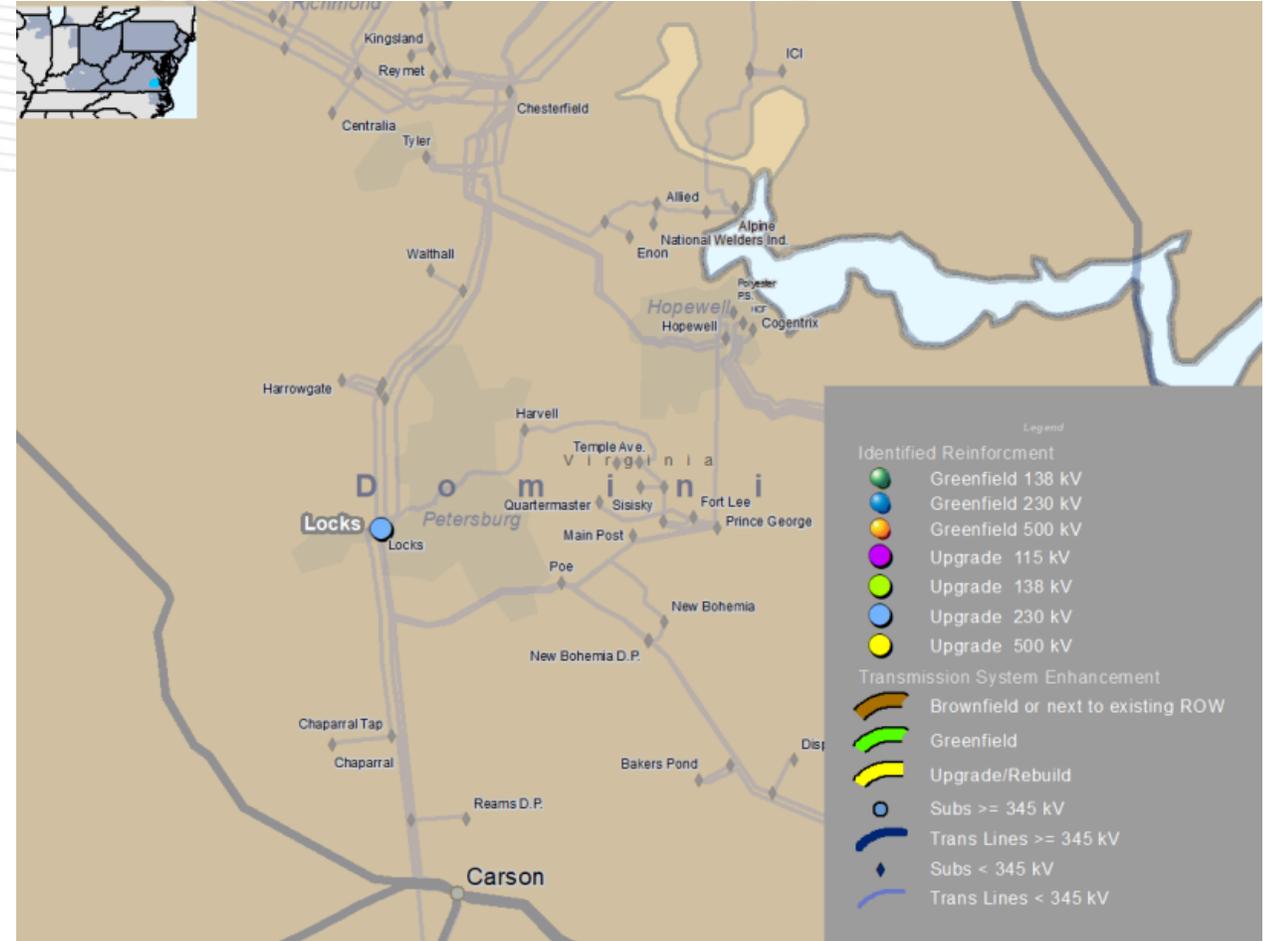
Baseline # B3800.358

Estimated Cost: \$7.14 M

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2028

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**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Recommended Solutions: South Cluster

## Recommended Solution: 2022-W3-74 (Partial)

- Wreck and rebuild Line #2090 Ladysmith CT – Summit D.P. segment as a double circuit 230kV line. Only one circuit will be wired at this stage.
- Upgrade circuit breaker leads, switches and line leads at Ladysmith CT.

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2090 Ladysmith CT – Summit D.P.	1225/1225/1358/1358

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2090 Ladysmith CT – Summit D.P.	1573/1573/1648/1648

Baseline # B3800.359

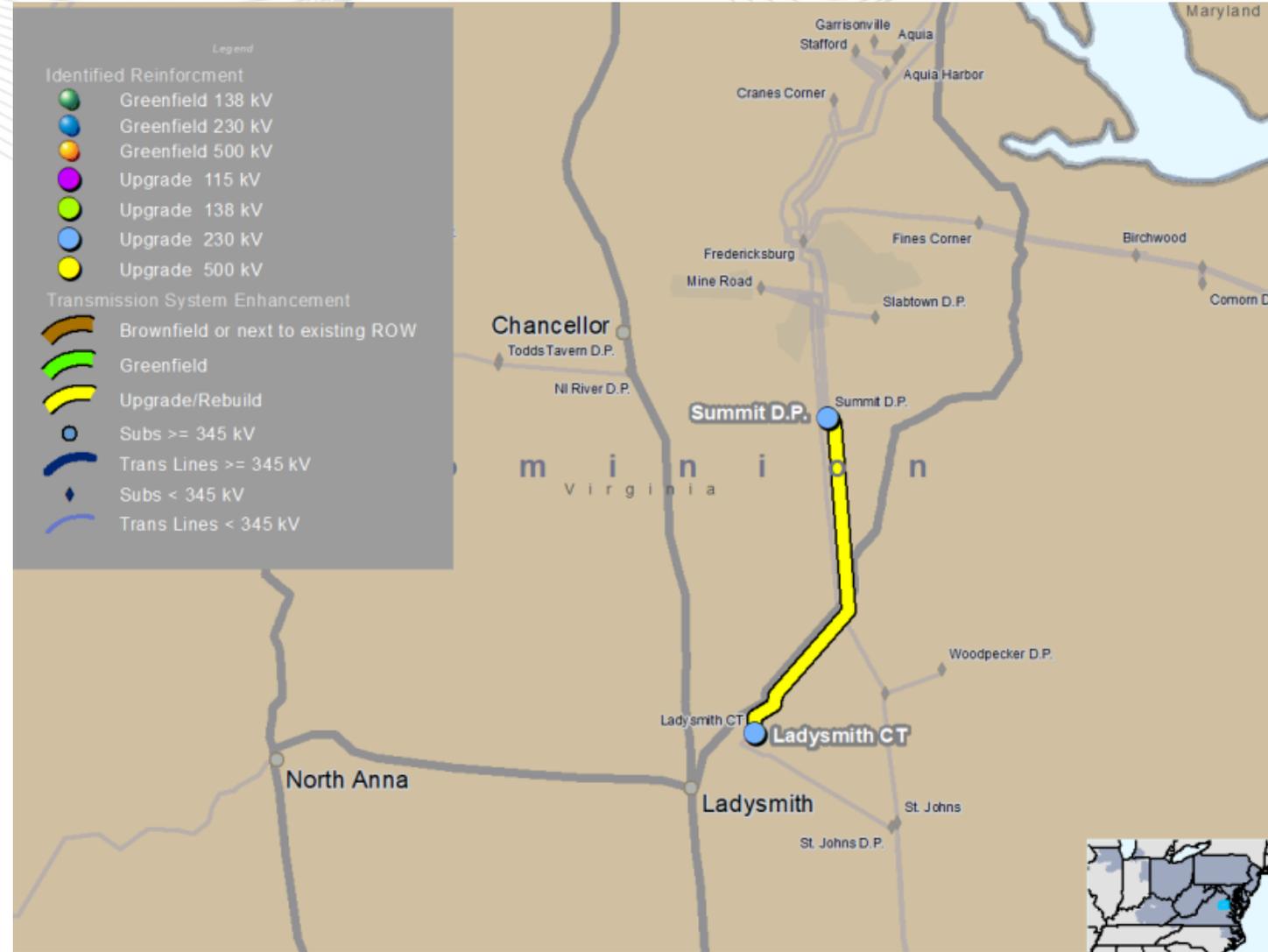
Estimated Cost: \$36.50 M

Required IS Date: 6/1/2027

Projected IS Date: 12/1/2027

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**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.



# 2022W3 – Recommended Solutions: South Cluster

## Recommended Solution: 2022-W3-231 (Partial)

- Install 230kV, 500kV shunt capacitor banks and STATCOMs and associated equipment to address the reactive power needs of the system
  - Morrisville Substation
    - (1) 500kV, 150 MVAR Shunt Capacitor Bank & associated equipment
  - Wishing Star Substation
    - (1) 230kV, 150 MVAR Shunt Capacitor Bank and (1) 500kV, 293.8MVAR Shunt Capacitor Bank & associated equipment
  - Mars Substation
    - (1) 500kV, 300 MVAR STATCOM and (1) 230kV, 150MVAR Shunt Capacitor Bank & associated equipment
  - Beaumeade Substation
    - (1) 230kV, 300 MVAR STATCOM & associated equipment

Baseline # B3800.305 – B3800.310

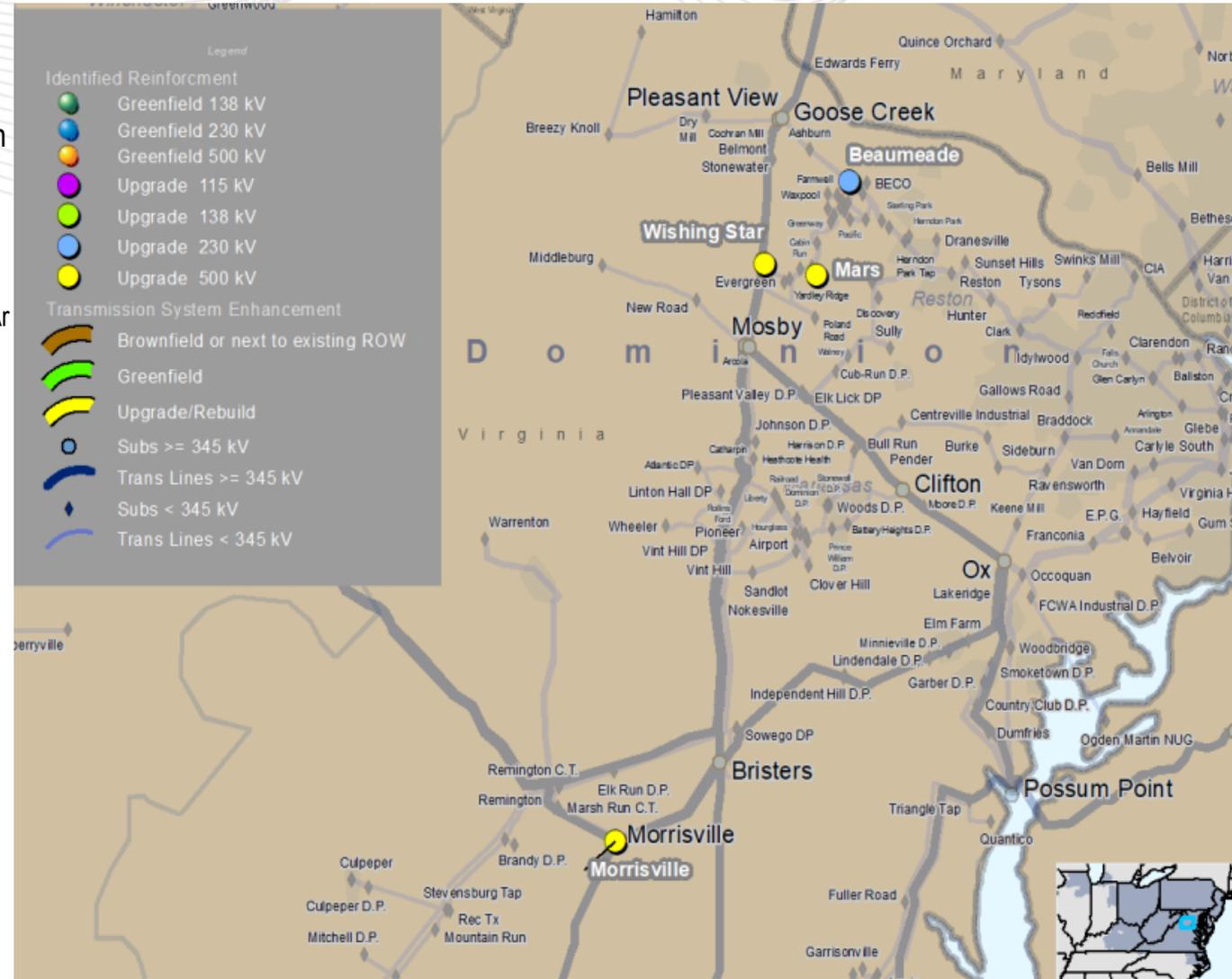
Estimated Cost: \$103.79 M

Required IS Date: 6/1/2027

Projected IS Date: 12/1/2027

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# 2022W3 – Recommended Solutions: South Cluster

## Recommended Solution: Additional 230kV upgrades (Dominion)

- Uprate 12.44 miles of 230kV circuit 256 from St. Johns to Ladysmith CT
  - Approximately 7.14 miles of the line from St Johns Substation to 256/108 will be rebuilt with a mix of light duty steel DOM pole tangent H-frames and engineered steel 3-pole deadend angle structures. The proposed conductor for the rebuilt line will be 2-768 ACSS “Maumee” with dual 48 fiber DNO-11410 for shielding.
  - The remaining 5.30 miles of the line from structure 256/107 to Ladysmith CT will be reconducted with proposed 2-768 ACSS “Maumee” conductor and the existing structures and shield wire will remain.
- Transmission line switch 25666 will be upgraded to 4000A at St. Johns Substation. Terminal equipment at remote end substations will be upgraded to 4000A continuous current rating to support new conductor ratings.

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #256 Ladysmith CT – St. Johns	876/956/876/956

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #256 Ladysmith CT – St. Johns	1573/1573/1648/1648

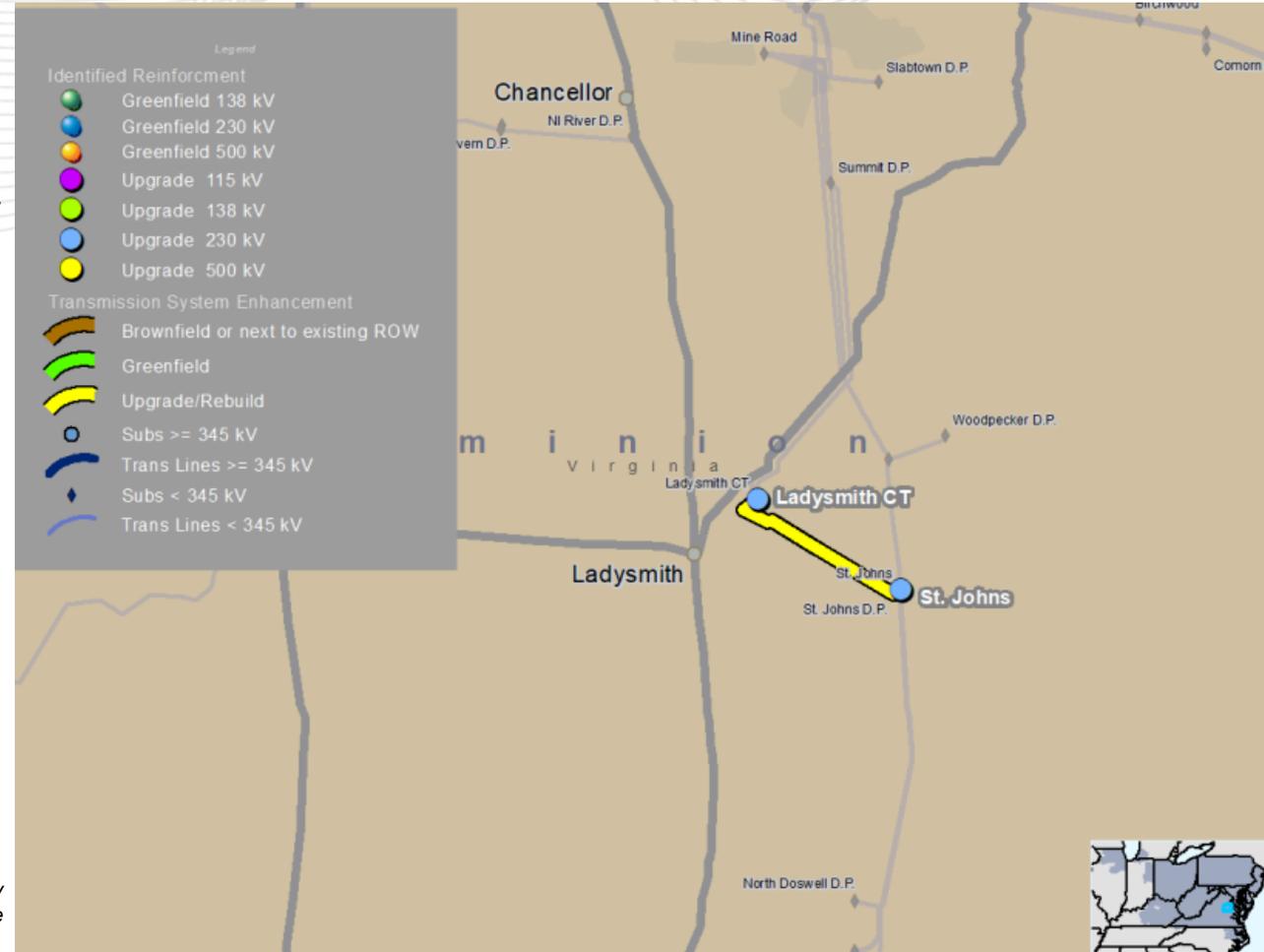
Baseline # B3800.373 – B3800.374

Estimated Cost: \$37.89 M

Required IS Date: 6/1/2028

Projected IS Date: 6/1/2028

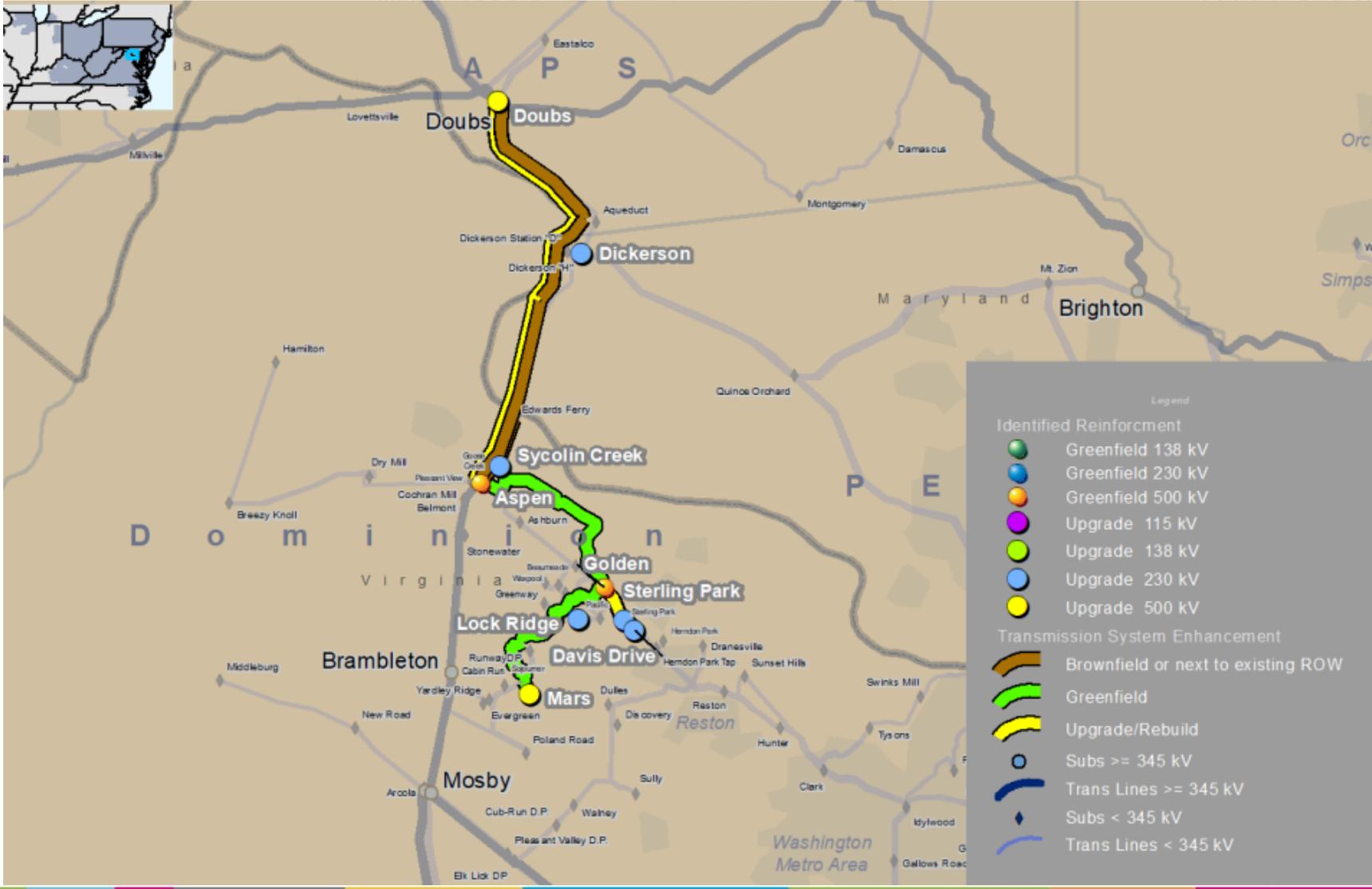
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# Northern Virginia/Doubs- Selected Proposals

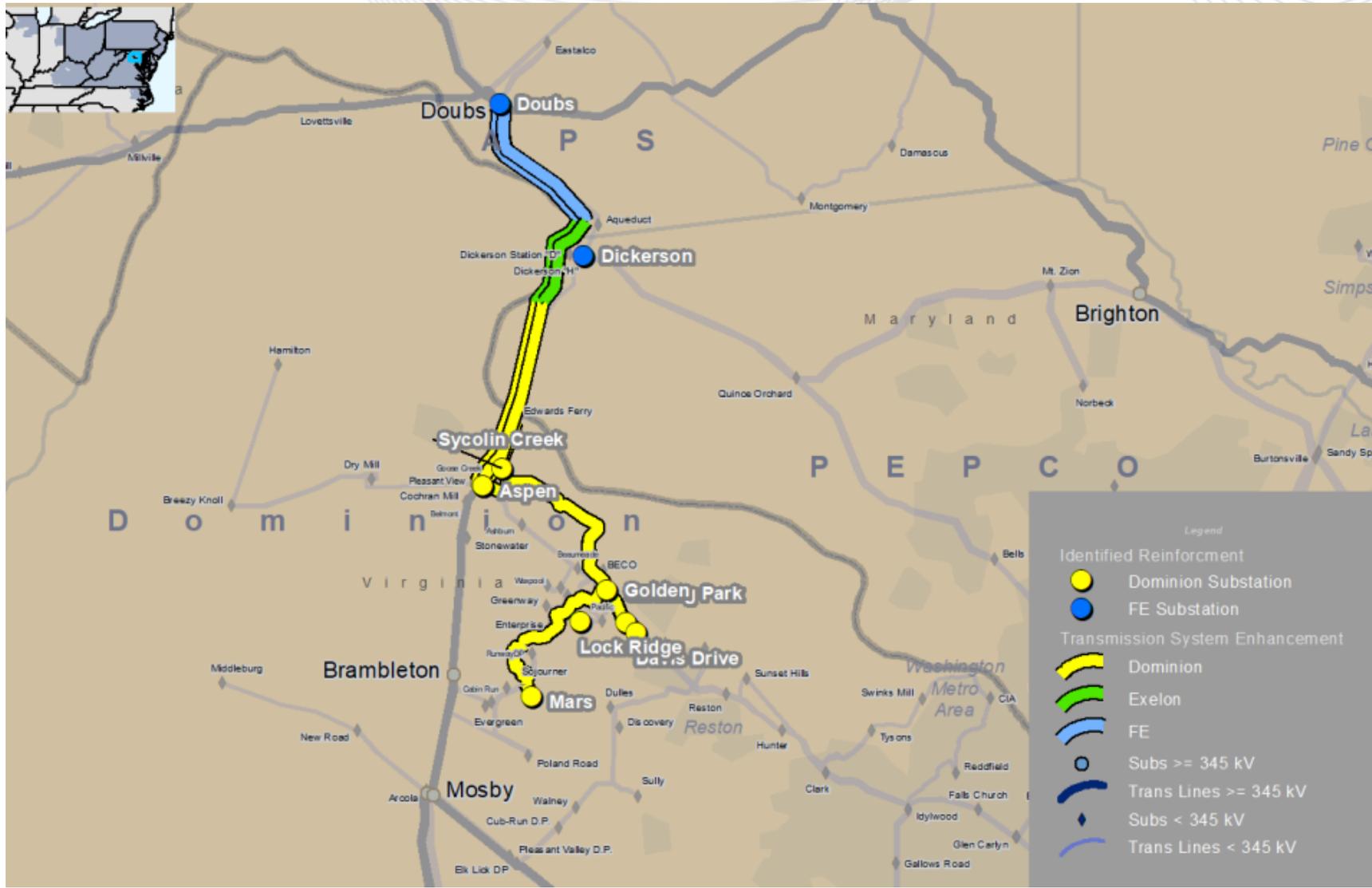
## Baseline Reliability Projects

# 2022W3 – Recommended Solutions: North Virginia/Doubs Cluster



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

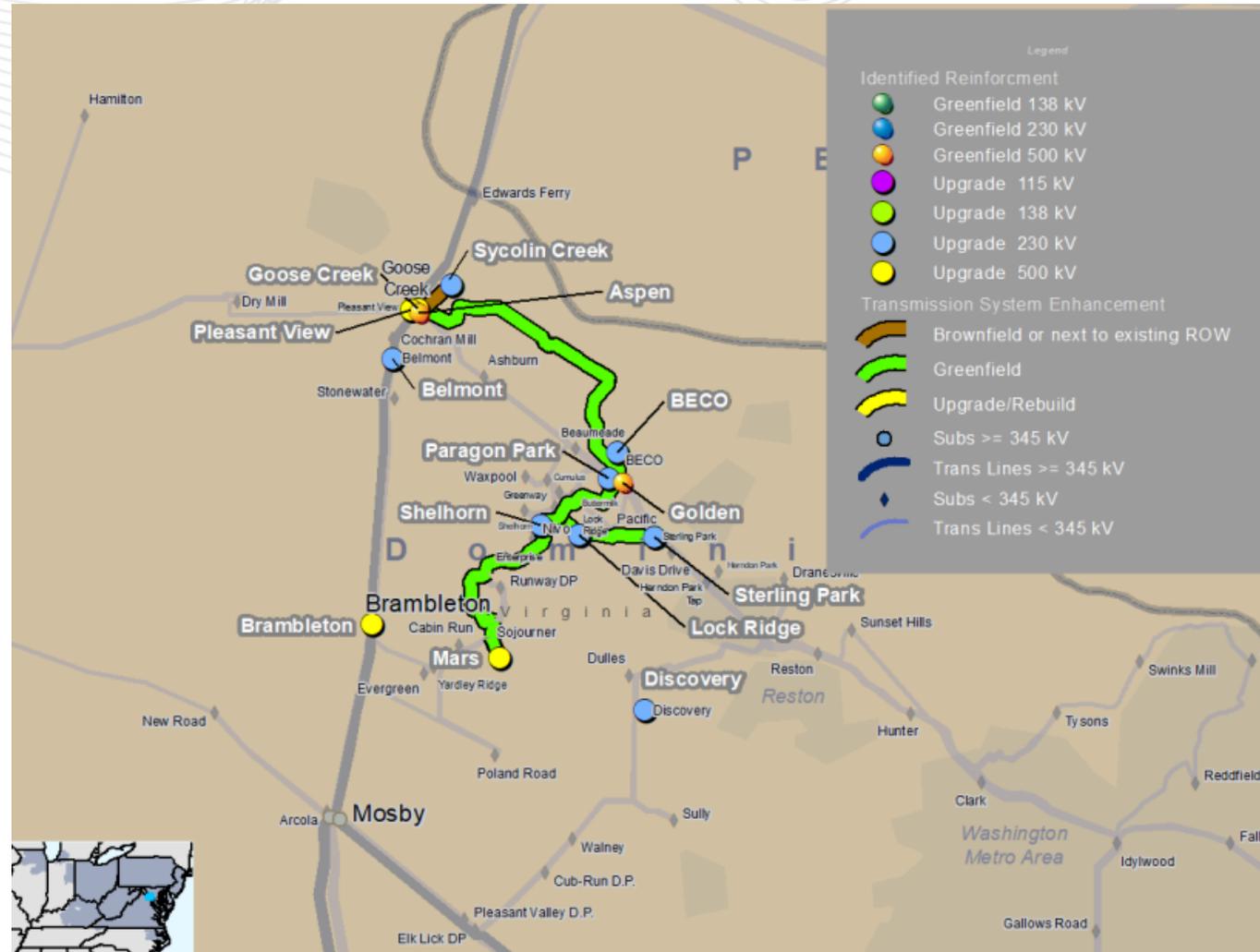
# 2022W3 – Recommended Solutions: North Virginia/Doubs Cluster by Designated Entity



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

## Recommended Solution: 2022-W3-692

- Construct new double-circuit 500/230 kV lines from Aspen substation to Golden substation
  - 230kV Line will connect Aspen – Sycolin Creek – Golden
- Construct new double-circuit 500/230 kV lines from Golden substation to Mars substation
  - 230kV Line will connect Golden – Lockridge – Mars
- Construct a new 500kV Line from Aspen to Goose Creek
- Install the 2<sup>nd</sup> 500-230 kV 1440 MVA transformer at Mars Substation
- Construct a new Aspen 500/230kV substation by tapping 500kV Line #558
- Construct a new Golden 500/230kV substation
- Upgrade existing double-circuit 230 kV lines from Golden substation to Paragon Park substation (Lines # 2150 & 2081)
- Upgrade existing single circuit 230 kV line from Paragon Park substation to BECO Substation (Line # 2207) to a minimum normal summer rating of 1573 MVA. Equipment at each substation will be upgraded to support the new conductor rating of 4000A
- Equipment upgrades at the following substations:
  - Paragon Park, BECO
- Golden relay setting reset
- Replace overdutied breakers at Belmont, BECO, Beaumeade, Pleasant View, Shellhorn, and Discovery.



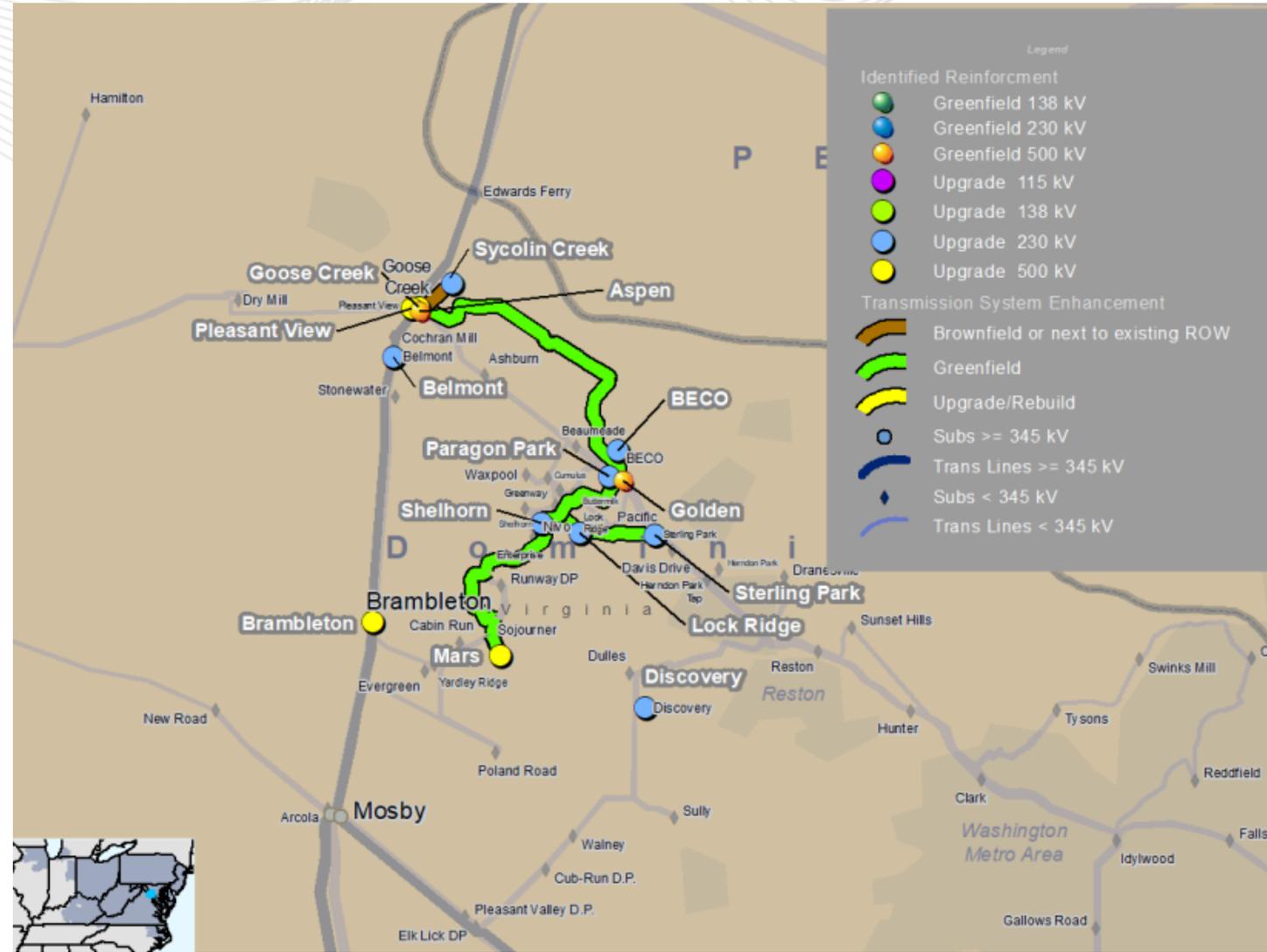
**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should *not* be relied upon for exact geographical substation locations or line routes.

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# 2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
500kV Line Aspen – Goose Creek 2	NA
500kV Line Golden – Mars	NA
230kV Line Aspen – Sycolin Creek – Golden	NA
230kV Line Golden – Lockridge – Mars	NA
230kV Line #2150 Golden – Paragon Park 1	762/762/849/849
230kV Line #2081 Golden – Paragon Park 2	765/765/852/852
230kV Line #2207 Paragon Park – BECO	762/762/849/849

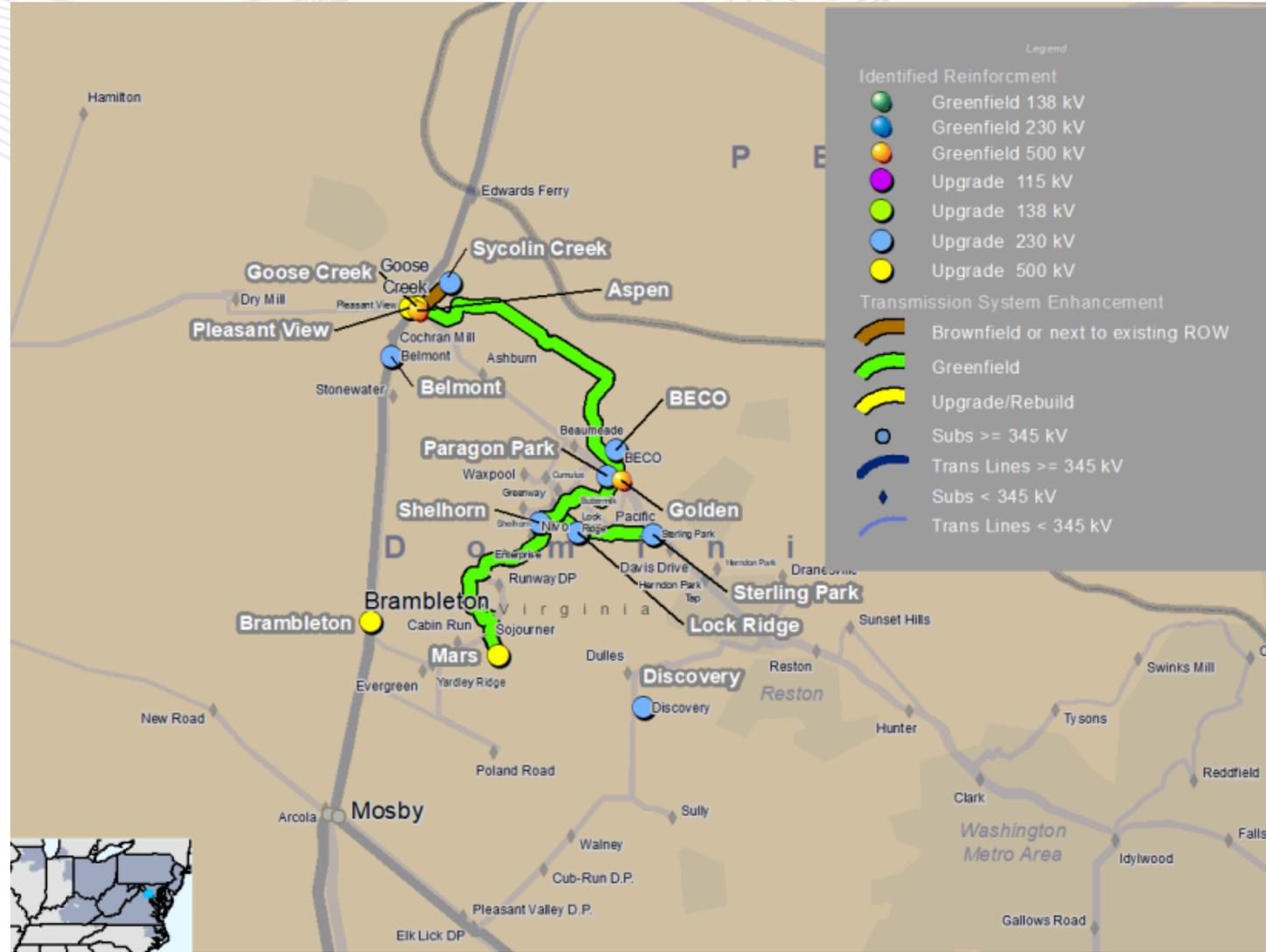


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# 2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
500kV Line Aspen – Goose Creek	4357/4357/5155/5155
500kV Line Golden – Mars	4357/4357/5155/5155
230kV Line Aspen – Sycolin Creek – Golden	1573/1573/1648/1648
230kV Line Golden – Lockridge – Mars	1573/1573/1648/1648
230kV Line #2150 Golden – Paragon Park 1	1573/1573/1648/1648
230kV Line #2081 Golden – Paragon Park 2	1573/1573/1648/1648
230kV Line #2207 Paragon Park – BECO	1573/1573/1648/1648



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should *not* be relied upon for exact geographical substation locations or line routes.

Baseline # B3800.200 – B3800.227

Estimated Cost: \$1025.06 M

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2028

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# 2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

**Recommended Solution: Additional upgrades (Dominion)**

- Reconductor 1.47 miles of 230kV circuits 2081 and 2150 from Sterling Park to Golden substation
- Reconductor 0.67 miles of 230kV circuits 2194 and 9231 from Davis Drive to Sterling Park substation

**Existing Facility Ratings:**

Branch	SN/SE/WN/WE (MVA)
230kV Line #2150 Golden – Sterling A	762/762/849/849
230kV Line #2081 Golden – Sterling B	765/765/852/852
230kV Line #2194 Davis Drive – Sterling A	762/762/849/849
230kV Line #9231 Davis Drive – Sterling B	629/629/721/721

**Preliminary Facility Ratings:**

Branch	SN/SE/WN/WE (MVA)
230kV Line #2150 Golden – Sterling A	1573/1573/1648/1648
230kV Line #2081 Golden – Sterling B	1573/1573/1648/1648
230kV Line #2194 Davis Drive – Sterling A	1573/1573/1648/1648
230kV Line #9231 Davis Drive – Sterling B	1573/1573/1648/1648

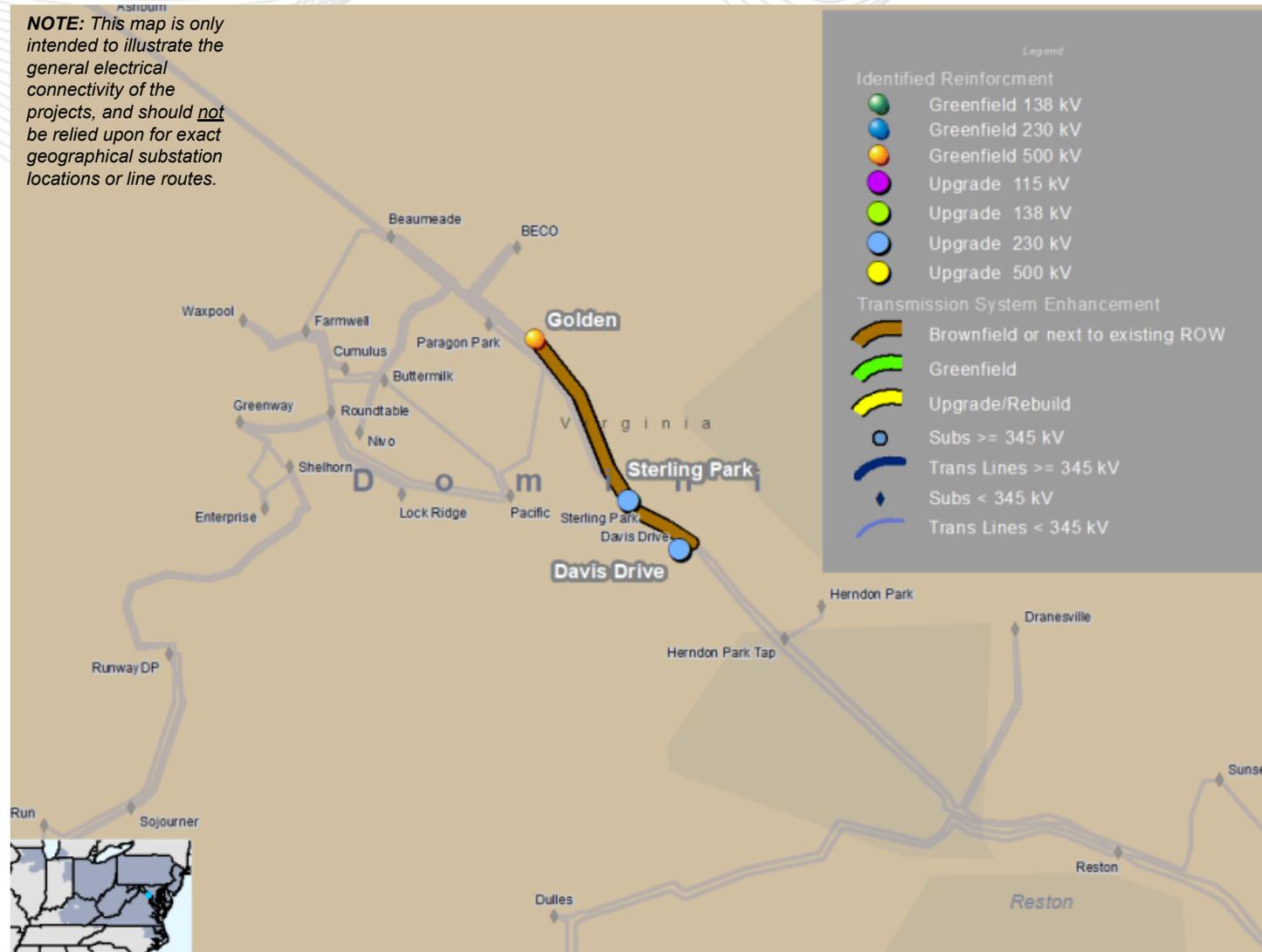
Baseline # B3800.228 – B3800.229

Estimated Cost: \$13.50 M

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2028

*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

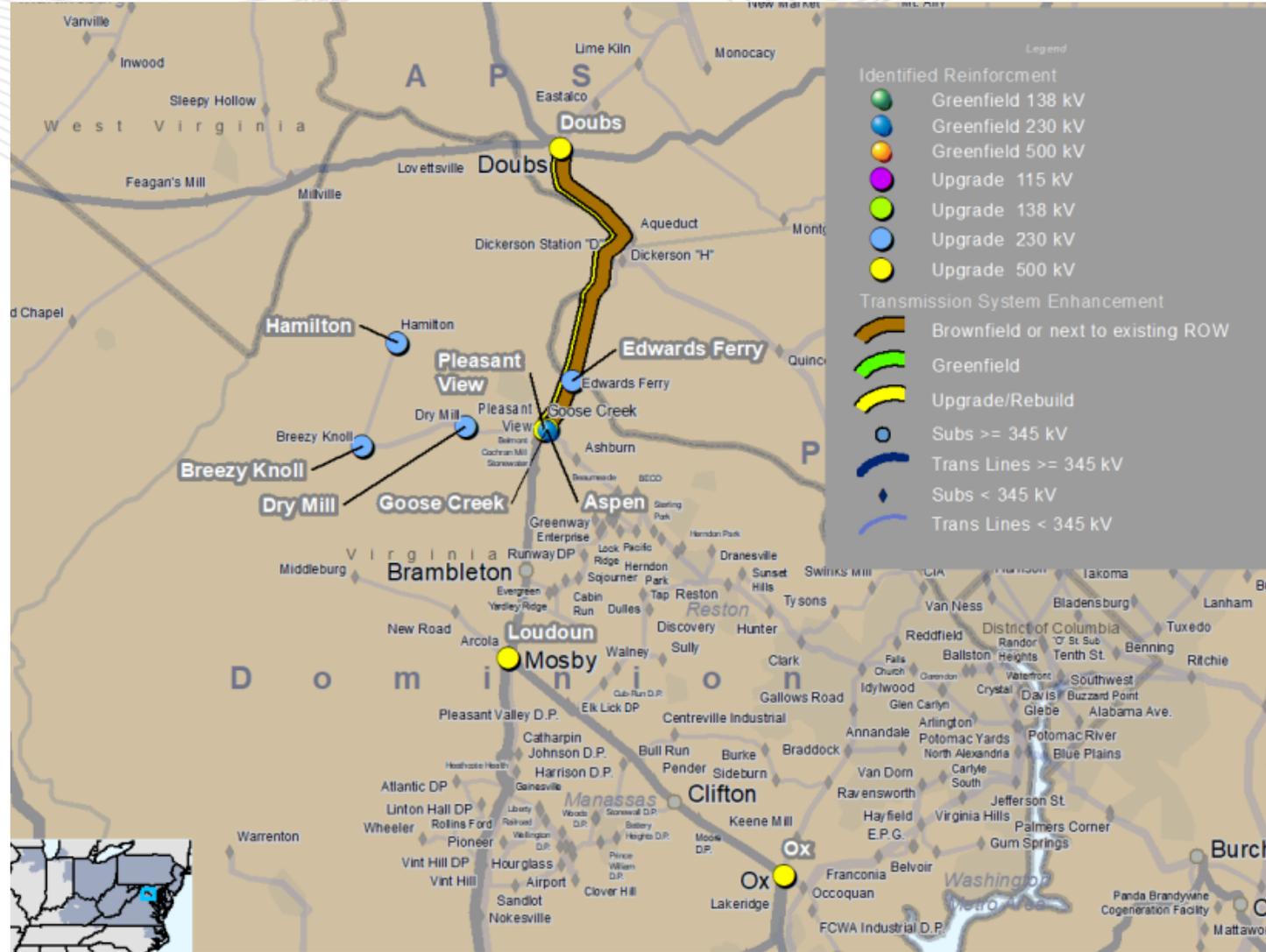


# 2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

## Recommended Solution: 2022-W3-516 (Dominion)

- Rebuild 500kV Line #514 Doubs – Goose Creek using double circuit 500kV/230kV towers on foundations. Scope covers line construction between Goose Creek and the Doubs Interconnection point, which is south of the Potomac River.
- Construct a new 500kV Line between Doubs and a new substation called Aspen. Scope covers line construction between Aspen and the Doubs Interconnection point, which is south of the Potomac River.
- Rebuild 230kV Line #203 Pleasant View – Dickerson (from Pleasant View substation and structure 203/15 within the existing ROW using double circuit 500kV/230kV towers on foundations.
- Wreck and rebuild approximately 1 mile of 230kV Line #2098 between Pleasant View and Structure 2098/9, where Line 2098 turn towards Hamilton Substation. The 1 mile portion will share the new double circuit 500/230kV towers with Line 514, which is being rebuilt as part of this project.
- Relay resets/revisions at the following substations:
  - Breezy Knoll, Dry Mill, Hamilton
- Terminal equipment upgrades at the following substations:
  - Goose Creek, Pleasant View, Edwards Ferry
- Replace over-dutied breakers at Loudoun, Ox, Pleasant View.
- Earlier approved EOL baseline B3247 (DOM) and supplemental S2386 (FE) will be cancelled

**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should *not* be relied upon for exact geographical substation locations or line routes.



Continued on next slide...

# 2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

## Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
500kV Line #514 Doubs – Goose Creek	4224/4357/5155/5155
500kV Line #5XX Doubs – Aspen	NA
230kV Line #203 Pleasant View – Twin Creeks	1315/1412/1564/1564
230kV Line #9303 Twin Creeks – Edwards Ferry	1315/1412/1564/1564

## Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
500kV Line #514 Doubs – Goose Creek	4357/4357/5155/5155
500kV Line #5XX Doubs – Aspen	4357/4357/5155/5155
230kV Line #203 Pleasant View – Twin Creeks	1573/1573/1648/1648
230kV Line #9303 Twin Creeks – Edwards Ferry	1573/1573/1648/1648

Baseline # B3800.230 – B3800.242

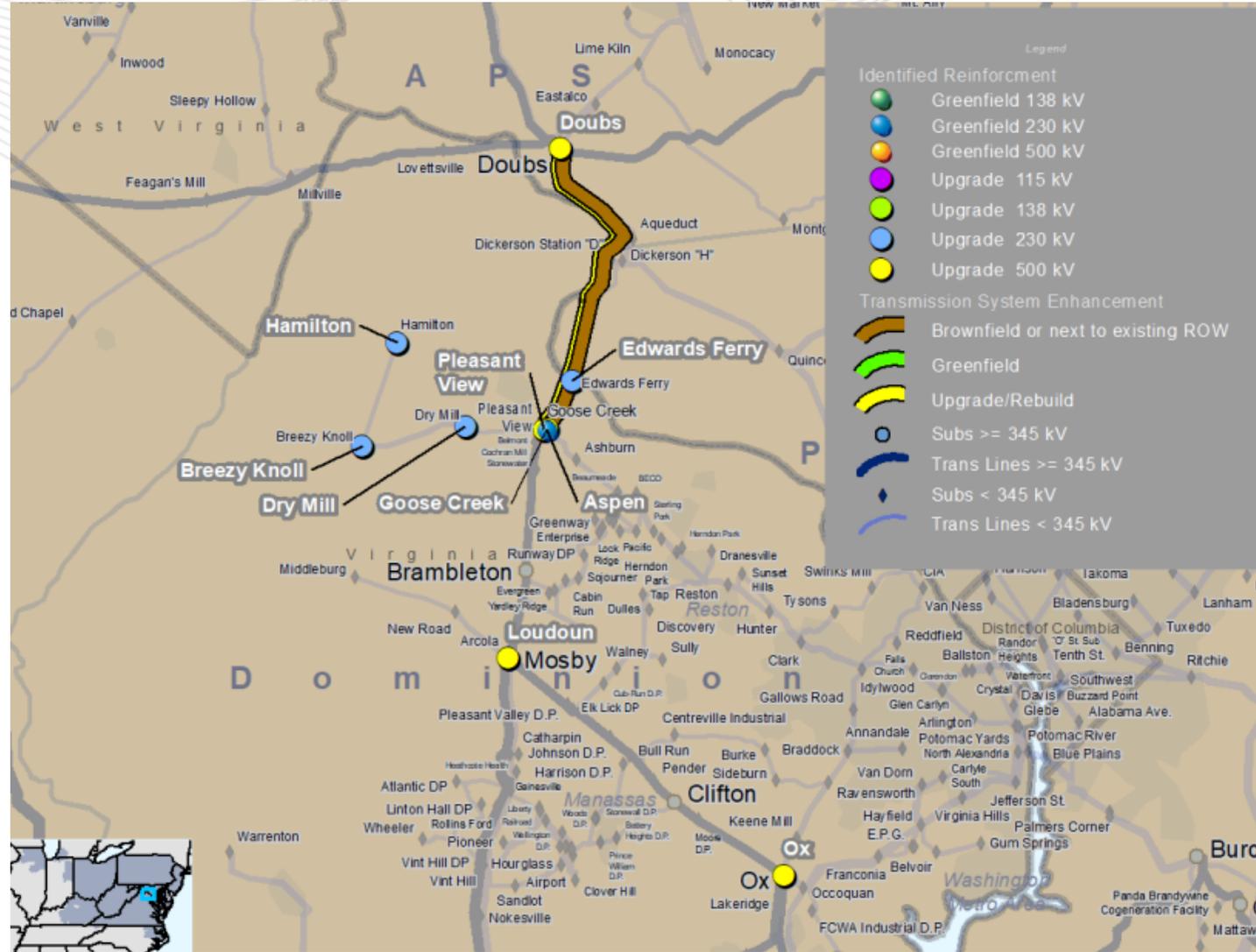
Estimated Cost: \$78.4 M

Required IS Date: 6/1/2027

Projected IS Date: 12/1/2027

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



## Recommended Solution: 2022-W3-344/660 (Exelon)

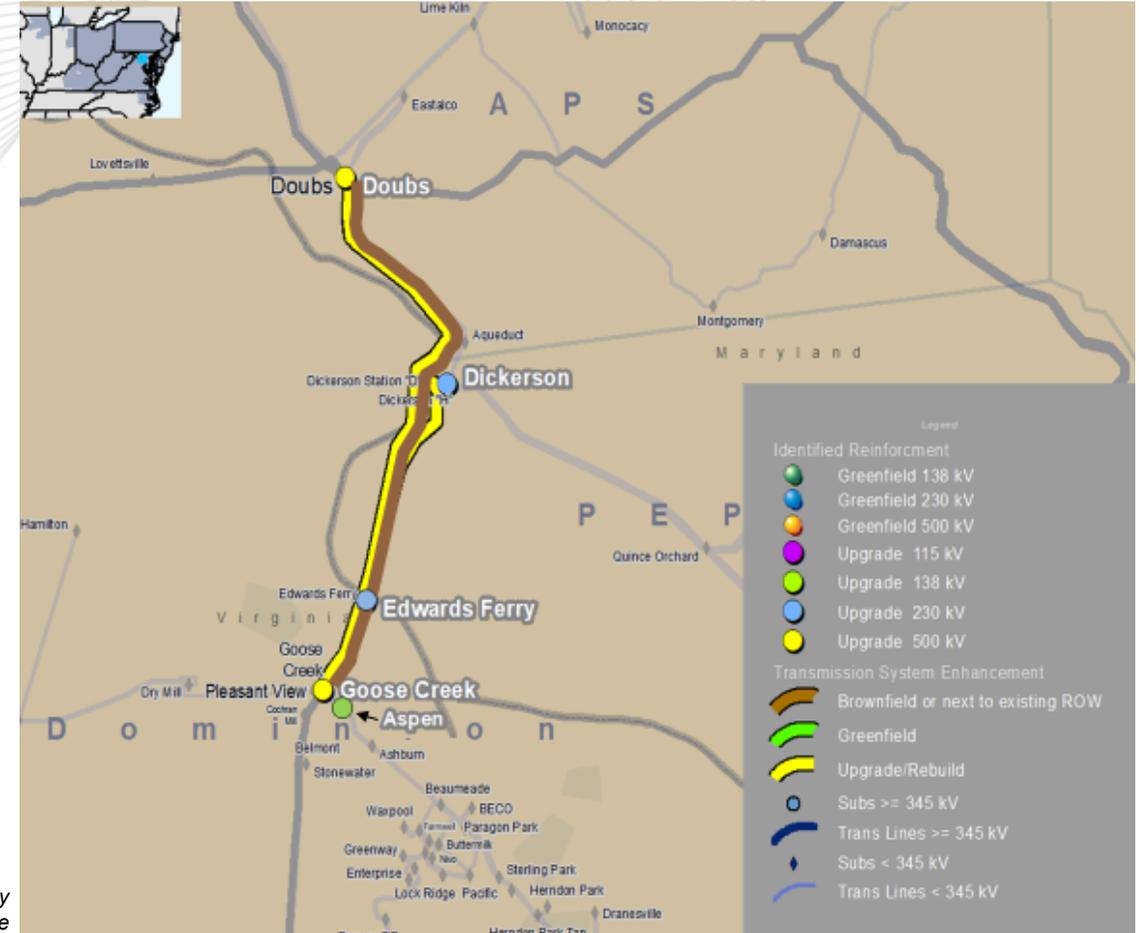
- Exelon portion of the New 500 kV Doubs to Goose Creek utilizing Existing Exelon ROW
  - Rebuild 7.26 miles of existing 230 kV circuit from Dickerson Station H to Ed's Ferry area to accommodate the new 500 kV circuit between Doubs and Goose Creek. The new structure will carry both 500 kV and the 230 kV from Dickerson Station H to Ed's Ferry circuits. **(Exelon)**
    - 500 kV New Rating 4357SN/4357SE/WN5155/5155WE MVA
    - 230 kV New Rating 1618SN/1867SE/WN1702/1951WE MVA
  - Reconfigure Dickerson H 230 kV Substation and upgrade terminal equipment. **(Exelon)**

Baseline # B3800.243 – B3800.245

Proposed Cost Estimate: \$66.38 M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 2028-2030

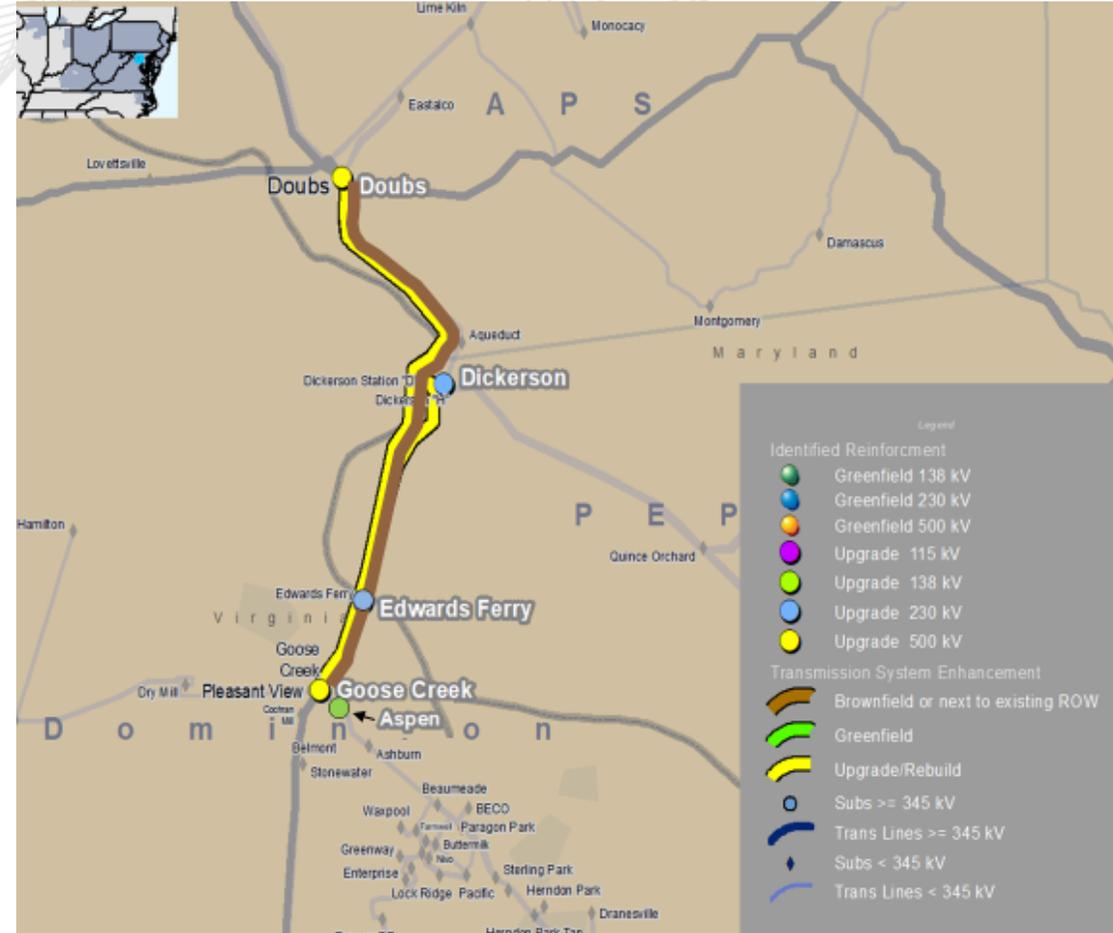


*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

# 2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

## Recommended Solution: 2022-W3-837 (FirstEnergy)

- Existing Doubs to Goose Creek 500 kV rebuild and New Doubs to Aspen 500 kV line
  - **Rebuild 500kV Line #514 from Doubs – Goose Creek 500 kV line.** The Doubs – Goose Creek 500 kV Line will be rebuilt and the Doubs - Dickerson 230 kV will be relocated and underbuilt on the same structure - **(FE Cost Estimate: \$103.27M)**
  - **New Doubs to Aspen 500 kV line** - Aspen Substation is not yet constructed but is a component in Dominion's proposal 2022-W3-692. - **(FE Cost Estimate: \$68.8M)**
  - **Doubs Substation work** - Re-terminate the rebuilt Doubs – Goose Creek 500 kV line in its existing bay, Terminate the new Doubs – Aspen 500 kV line in the open bay at Doubs, Replace three 500 kV breakers, Replace 500 kV terminal equipment including disconnect switches, CTs and substation conductor & Replace relaying - **(FE Cost Estimate: \$31.7M)**
  - Rebuild the Doubs - Dickerson 230 kV Line, Rebuild the Doubs - Aqueduct 230 kV Line and Rebuild the Dickerson - Aqueduct 230 kV Line. This will be underbuilt on the new Doubs - Aspen 500 kV Line - **(FE Cost Estimate: \$31.19M)**



*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

# 2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

**Existing Facility Ratings:**

Branch	SN/SE/WN/WE (MVA)
Doubs – Goose Creek 500 kV Rebuild	4224/4357/5155/5155
Doubs - Aqueduct 230 kV	1106/1290/1121/1357
Aqueduct - Dickerson H 230 kV	1104/1195/1121/1195
Doubs - Dickerson H 230 kV	1104/1195/1121/1195

**Preliminary Facility Ratings:**

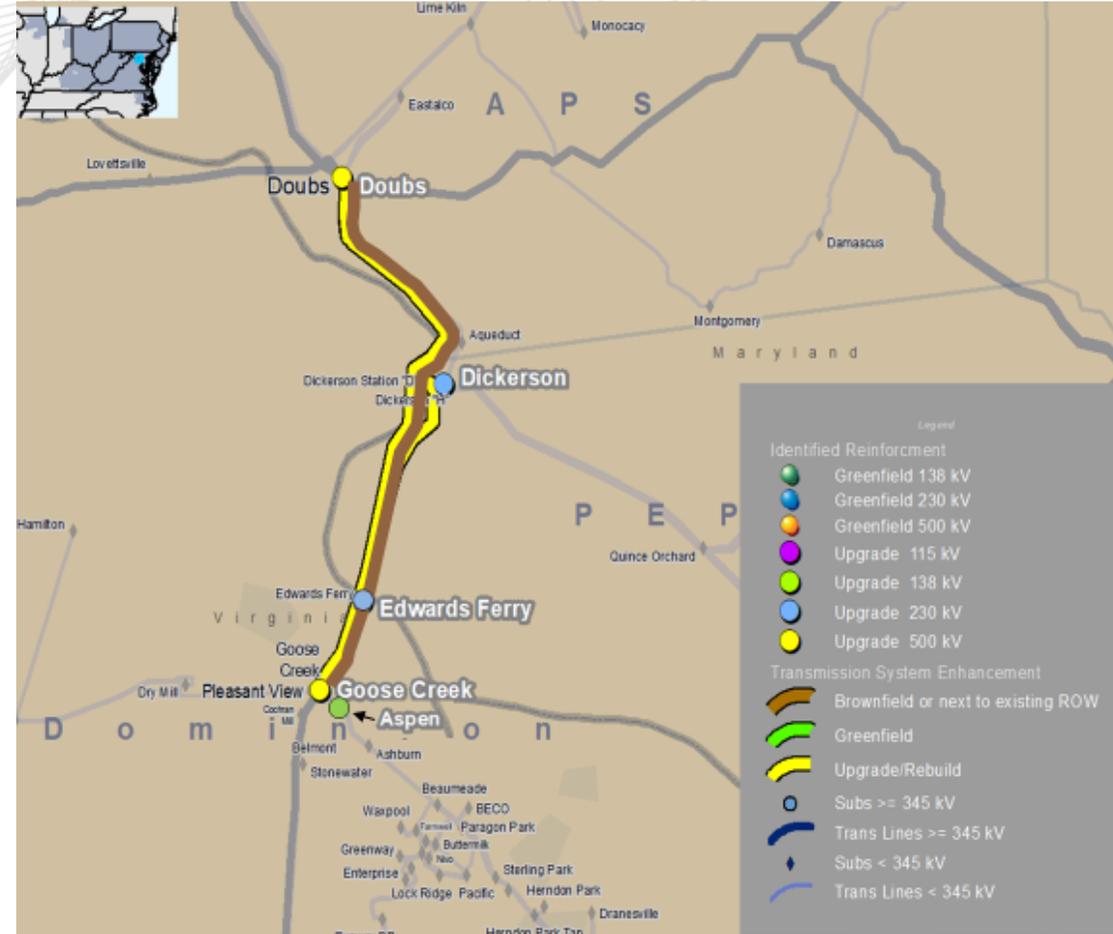
Branch	SN/SE/WN/WE (MVA)
Doubs – Goose Creek 500 kV Rebuild	4357/4357/5155/5155
Doubs – ASPEN 500 kV (New)	
Doubs - Aqueduct 230 kV	1106/1323/1360/1512
Aqueduct - Dickerson H 230 kV	1104/1195/1195/1195
Doubs - Dickerson H 230 kV	1104/1195/1195/1195

**Estimated Cost: \$234.96M**

**Baseline ID's: b3800.122 – b3800.127**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2030**



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Eastern Cluster - Selected Proposals

## Baseline Reliability Projects

# Recommended Solutions to Address Clusters - East

## Transource – North Delta substation Expansion

### Recommended Solution:

- Expand North Delta 500 kV substation
  - Expand the North Delta 500 substation to include four bay breaker and half configuration
  - Expansion will allow termination of six 500 kV lines and one 500/230 kV transformer

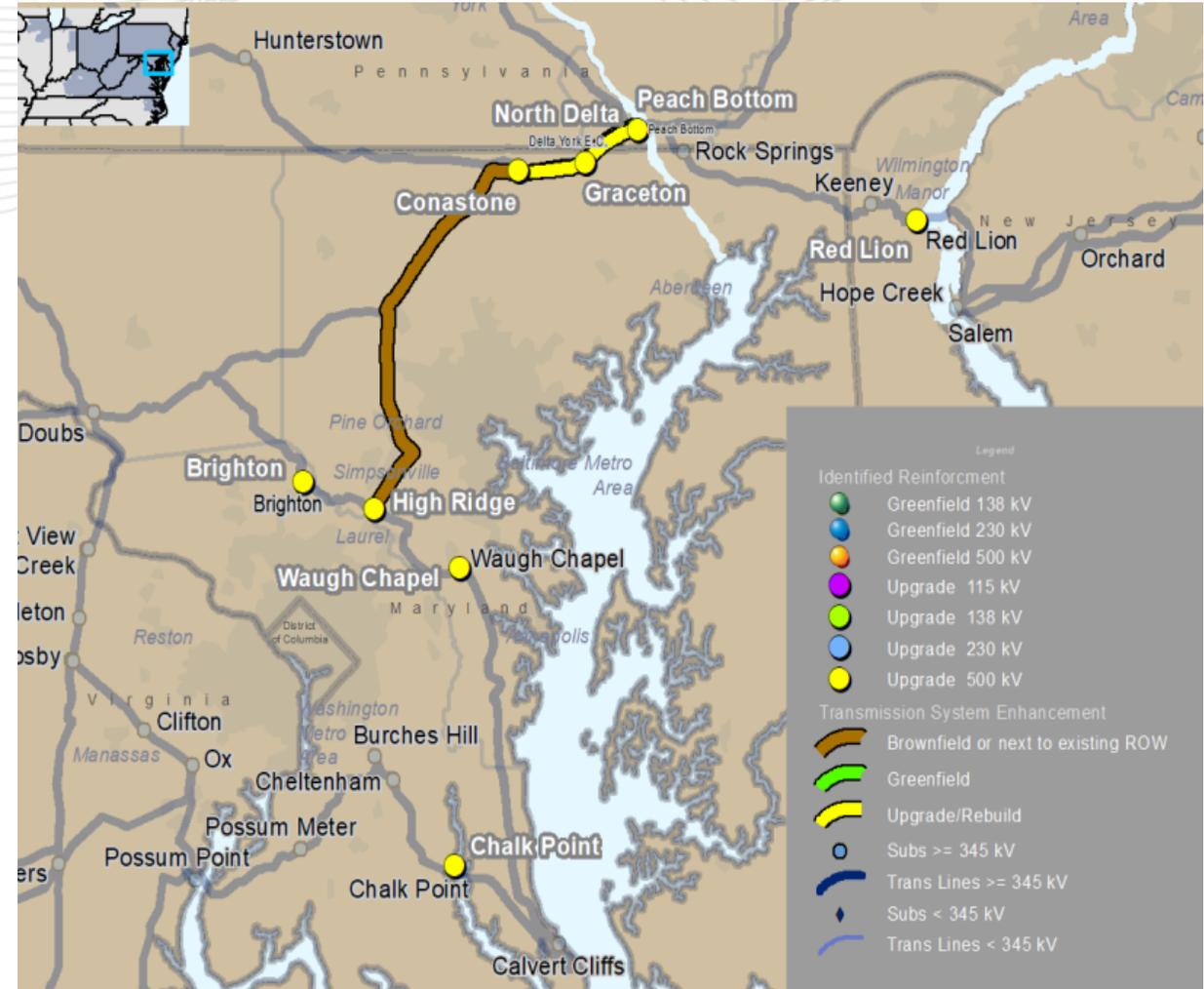
Baseline # B3737.47 (NJOSW – SAA 1.0)

Proposed Cost Estimate: \$104.1 M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 12/31/2027

*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# Recommended Solutions to Address Clusters - East

Exelon:2022-W3-344/660

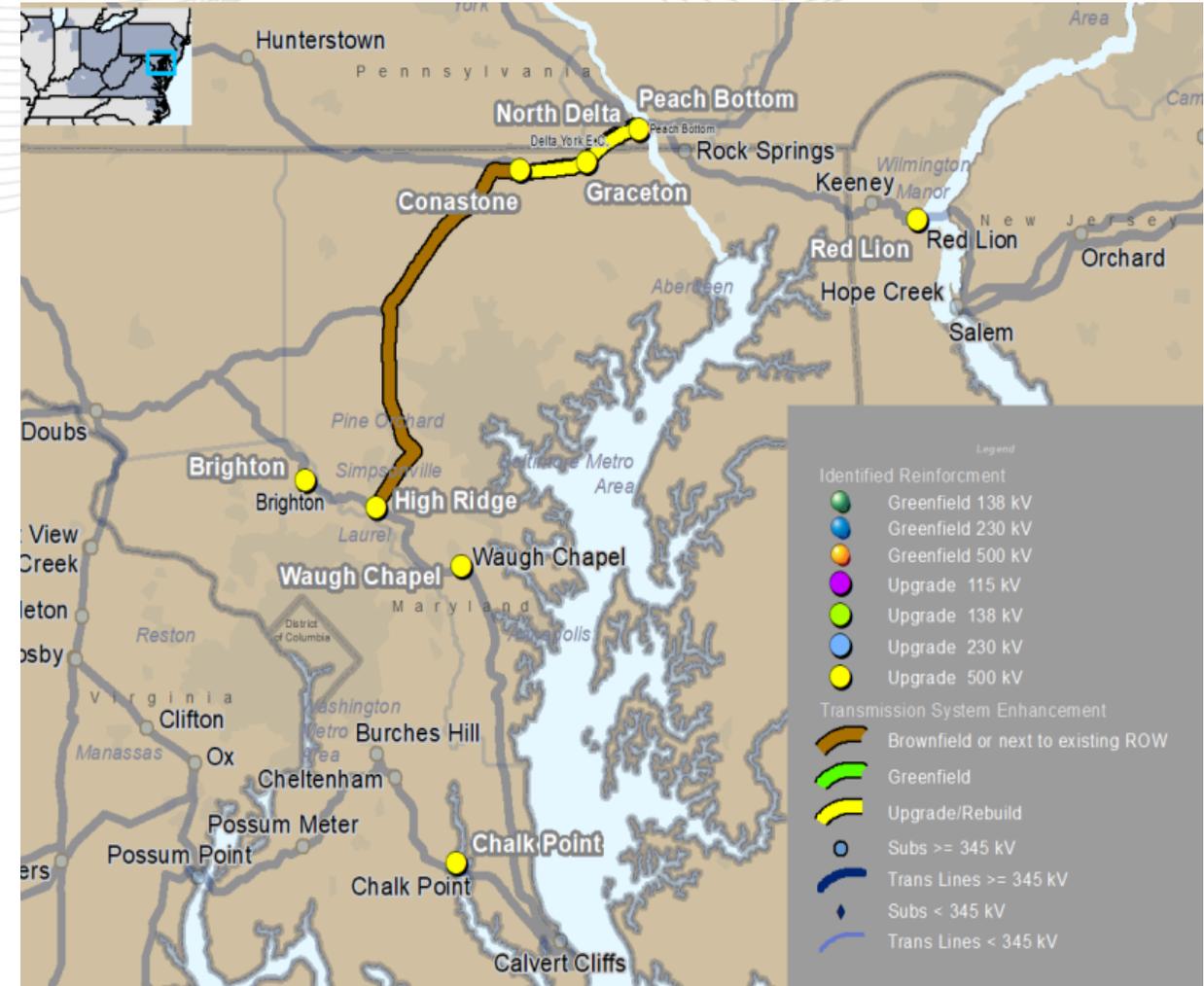
## Recommended Solution:

- Build new Peach Bottom South - North Delta 500kV line – cut in to Peach Bottom tie #1 and extending line to North Delta (~1.25 miles new ROW)
  - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
- North Delta termination for the North Delta - High Ridge 500 line
- North Delta 500 kV termination for the Rock Springs 500 kV line (5034/5014 line)
- North Delta 500 kV termination for the new Peach Bottom - North Delta 500 kV line
- North Delta 500 kV termination for the Calpine generator

Baseline # B3800.44 –B3800.51

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# Recommended Solutions to Address Clusters - East

Exelon:2022-W3-344/660

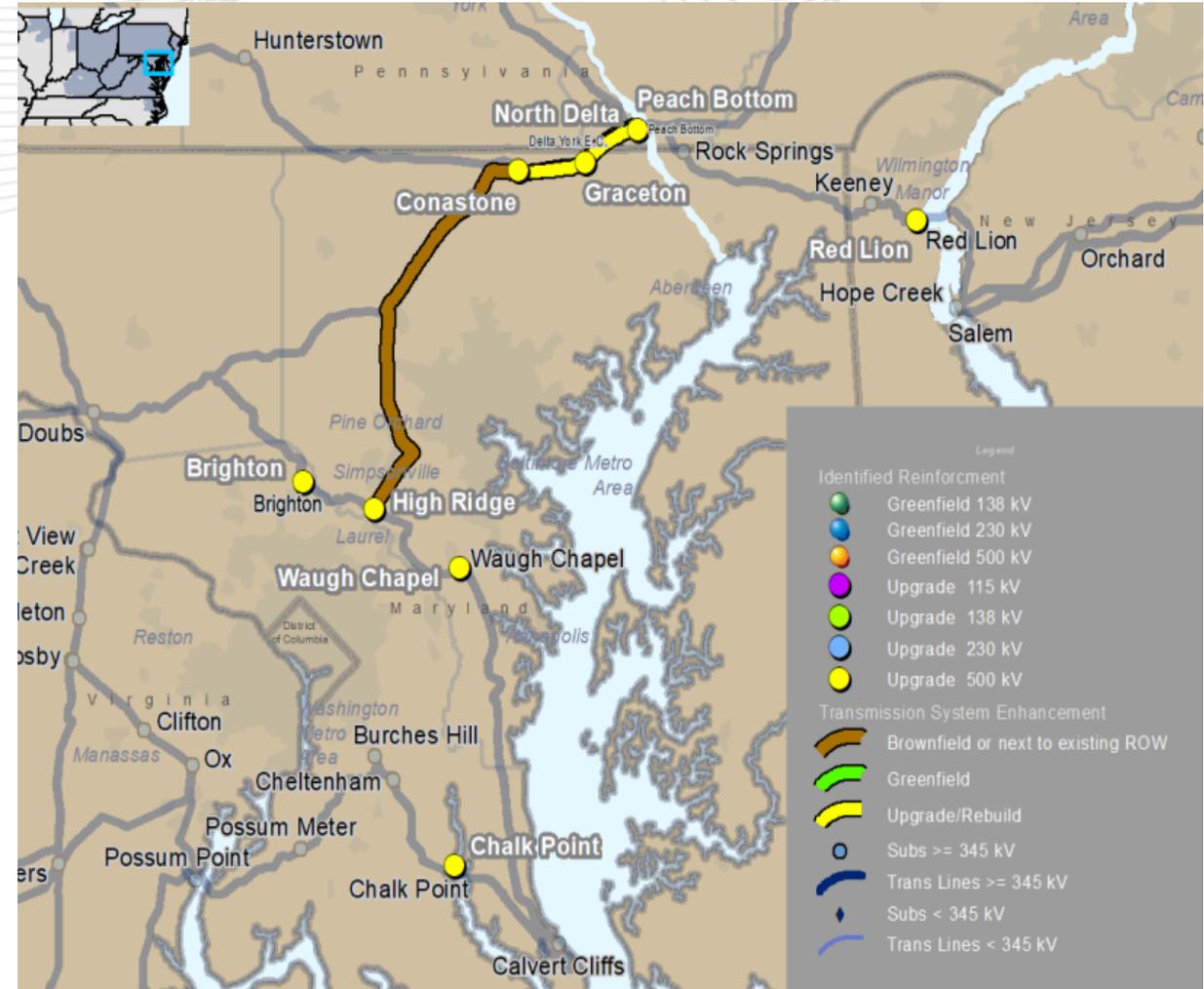
## Recommended Solution:

- Build High Ridge 500 kV substation (cut into Brighton – Waugh Chapel 500 kV line)
  - Three bay breaker and half configuration
  - Two 500/230 kV transformers
  - Replace terminal equipment at both Brighton and Waugh Chapel

Baseline # B3800.26 –B3800.30

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*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

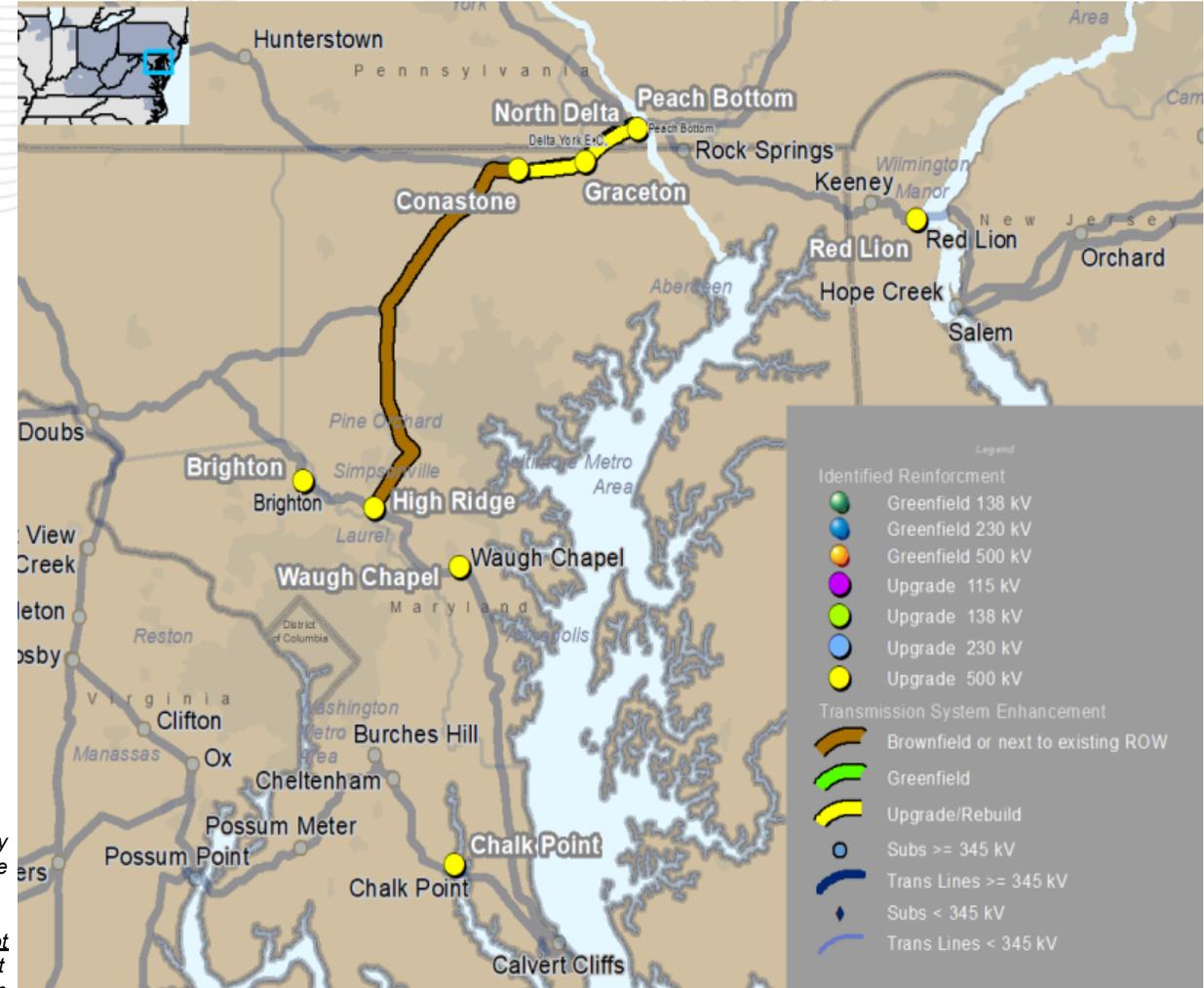


# Recommended Solutions to Address Clusters - East

Exelon:2022-W3-344/660

## Recommended Solution:

- Rebuild 5012 (existing Peach Bottom – Conastone) 500 kV line on single circuit structures within existing ROW and cut into North Delta 500 kV and Gracetone 500 kV stations. (B3800.34- B3800.36)
  - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
- Build new North Delta – High Ridge 500 kV line. (~65 miles). (B3800.31&B3800.32)
  - New Rating - 4503SN/5022SE/5206WN/5802WE MVA



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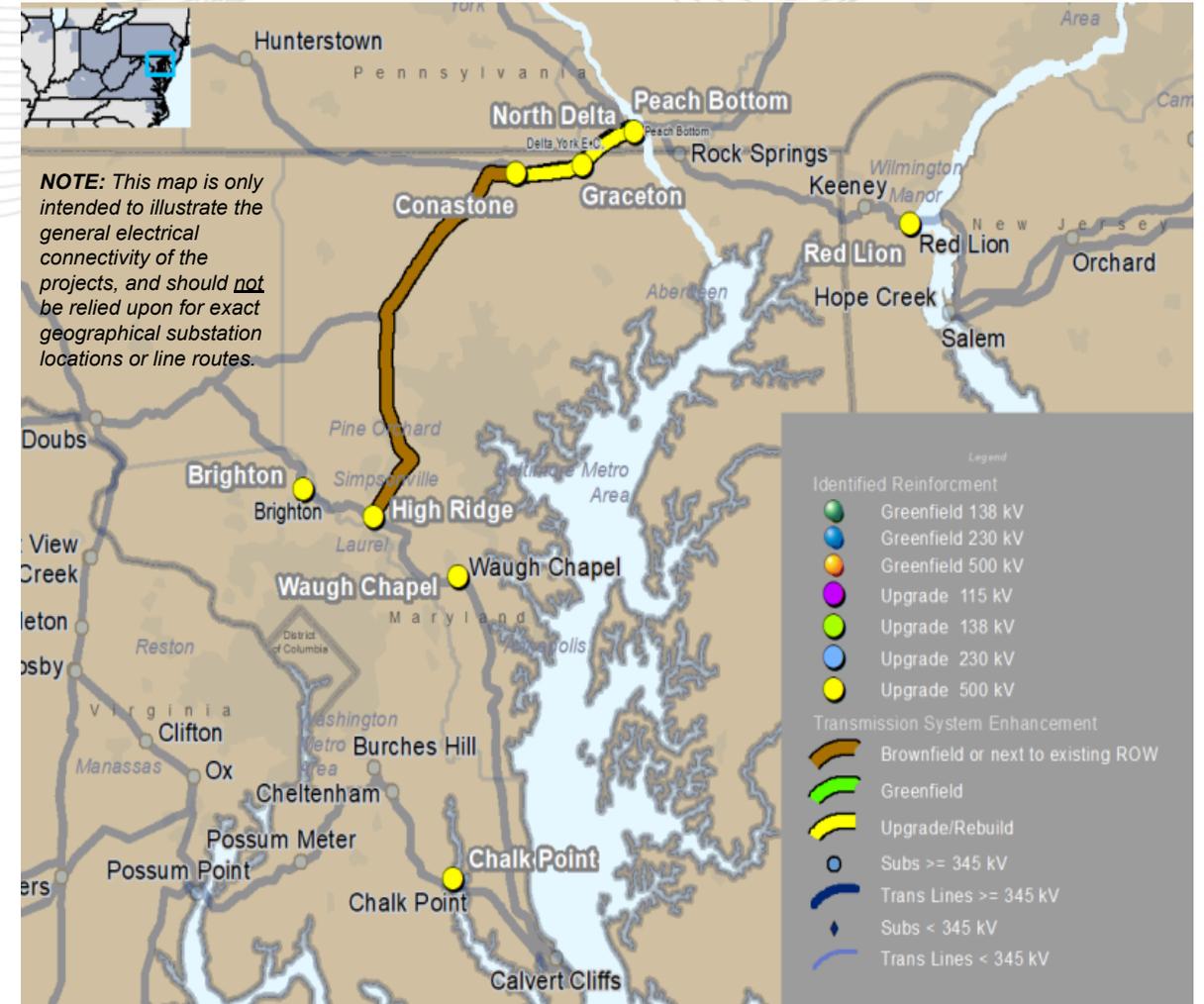
*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

# Recommended Solutions to Address Clusters - East

Exelon:2022-W3-344/660

## Recommended Solution:

- Conastone - Brighton 500 kV (5011 circuit) - Replace terminal equipment limitations at both Conastone and Brighton 500 kV (B3800.40& B3800.41)
  - (New Rating 2920SN/3598SE/3594WN/4264WE)
- Brighton - Waugh Chapel 500kV (5053) - Replace terminal equipment limitations at Brighton 500kV (B3800.33)
  - (New Rating 3498SN/4070SE/4014WN/4010WE MVA)
- Chalk Point - Cheltenham 500 kV (5073) - Replace relay at Chalk Point 500 kV (B3800.38)
  - (New Rating – 2670SN/3099SE/3064WN/3567WE MVA)
- Conastone - Peach Bottom 500 kV (5012 circuit)- Upgrade (2) existing 500 kV breakers at Conastone from 4000A to 5000A. (B3800.37)
  - (New Rating - 4503SN/5022SE/5206WN/5802WE MVA )



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# Recommended Solutions to Address Clusters - East

Exelon:2022-W3-344/660

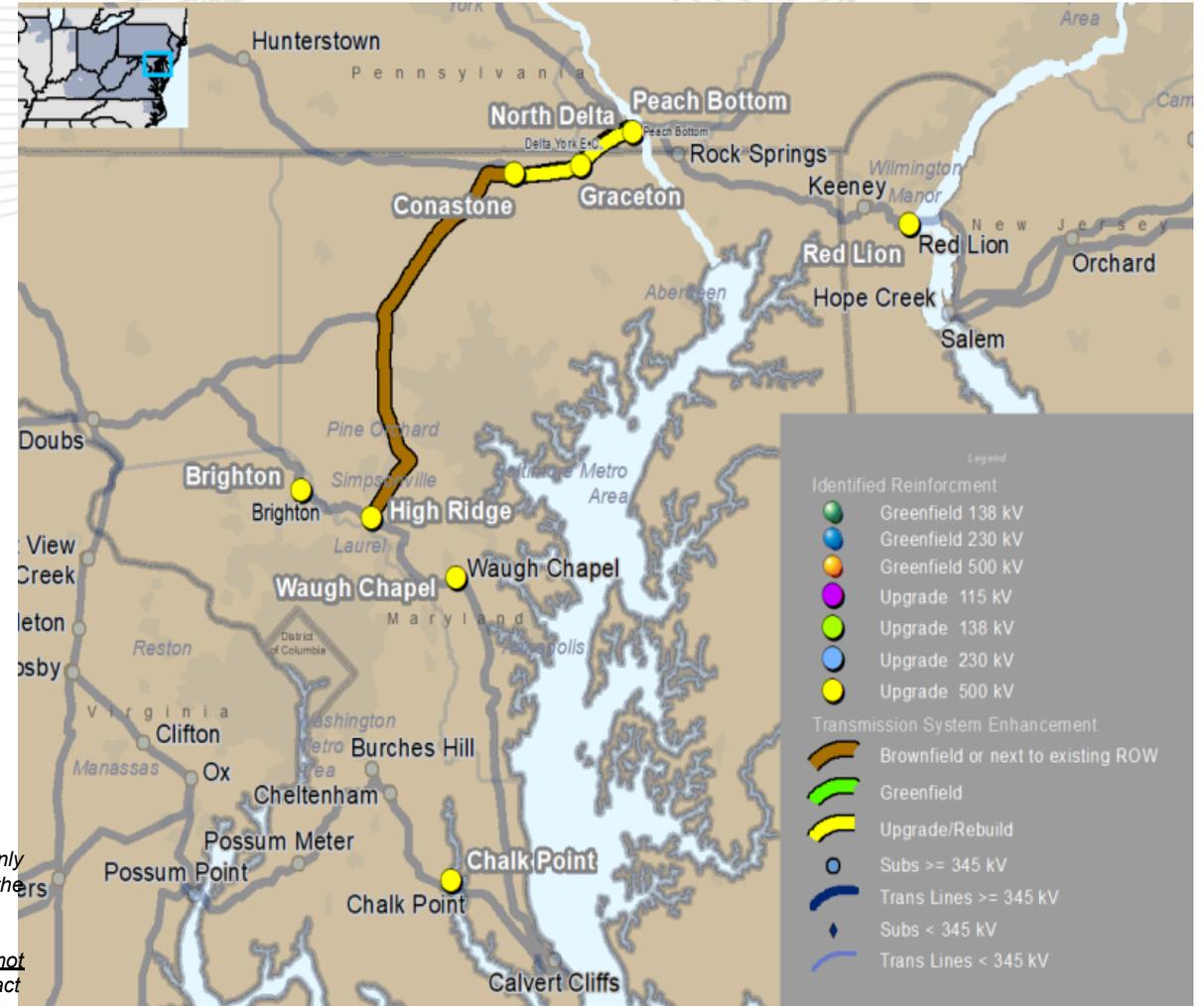
## Recommended Solution:

- Peach Bottom 500 kV – Reconfigure and upgrade several terminal/substation equipment at both North and South Peach Bottom 500 kV substations (B3800.42)
- Red Lion - Hope Creek 500 kV - Replace terminal equipment at Red Lion (B3800.39)
  - (New Rating – 2598SWN/2598SWE MVA)

Proposed Cost Estimate: \$708.77 M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 2028-2030



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# Recommended Solutions to Address Clusters - East

## PPL:2022-W3-374

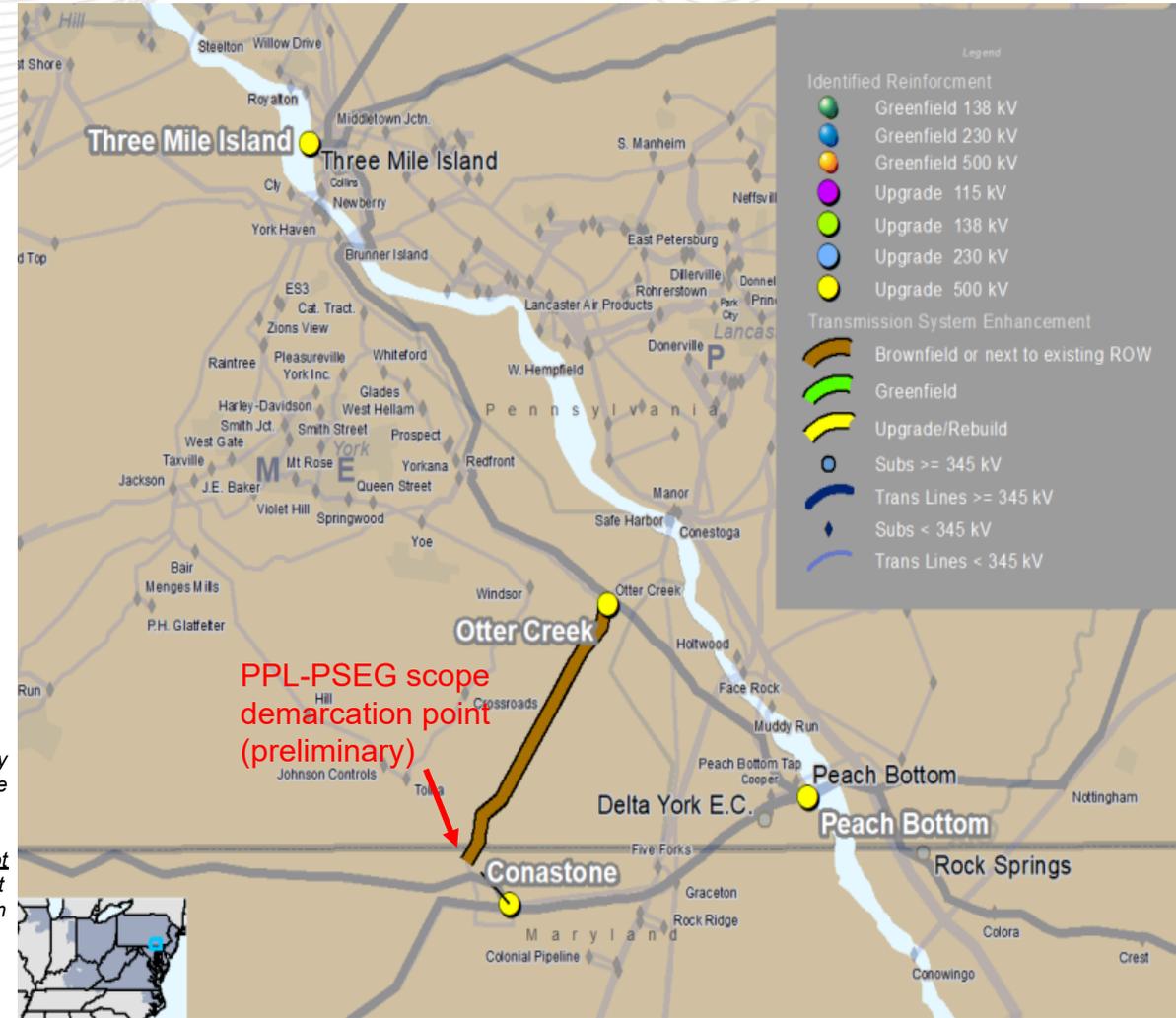
### Recommended Solution:

- Build New Otter Creek 500 kV switching station – cut into Peach Bottom – TMI 500 kV line
  - Two bay three breaker configuration
- Build New 500kV AC line from the new Otter Creek substation – towards Conastone station fence – Conastone demarcation point (~17 miles)
  - Rebuild the existing Otter Creek - Conastone 230 kV line to become a double-circuit 500 and 230 kV line. The existing line is owned by PPL and BGE, and both will share responsibility.
    - New Rating - 4398SN/5237SE/4762WN/5609WE MVA
- Upgrade relay/terminal equipment at Peach Bottom and TMI substations
  - New Rating - 2644SN/3016SE/2917WN/3250WE MVA

Baseline # B3800.1 –B3800.6

**Proposed Cost Estimate: \$134.2 M**  
**Required In-Service Date : 6/1/2027**  
**Projected In-Service Date : 6/1/2027**

*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# Recommended Solutions to Address Clusters - East

## PSEG: 2022-W3-637

### Recommended Solution:

- Build new 500kV AC line from the Conastone demarcation point with PPL Otter Creek line to – Doubs station (~70 miles)
  - Construct a 500kV overhead AC line between the Conastone demarcation point and the Doubs Substations
    - New Rating - 3341SN/4156SE/3759WN/4595WE MVA
  - The 500 kV line will tie into the PPL proposed Otter Creek – Conastone, bypassing the Conastone station
  - Reconfigure Doubs 500 kV station and upgrade terminal equipment to terminate new Otter Creek – Doubs 500 kV line

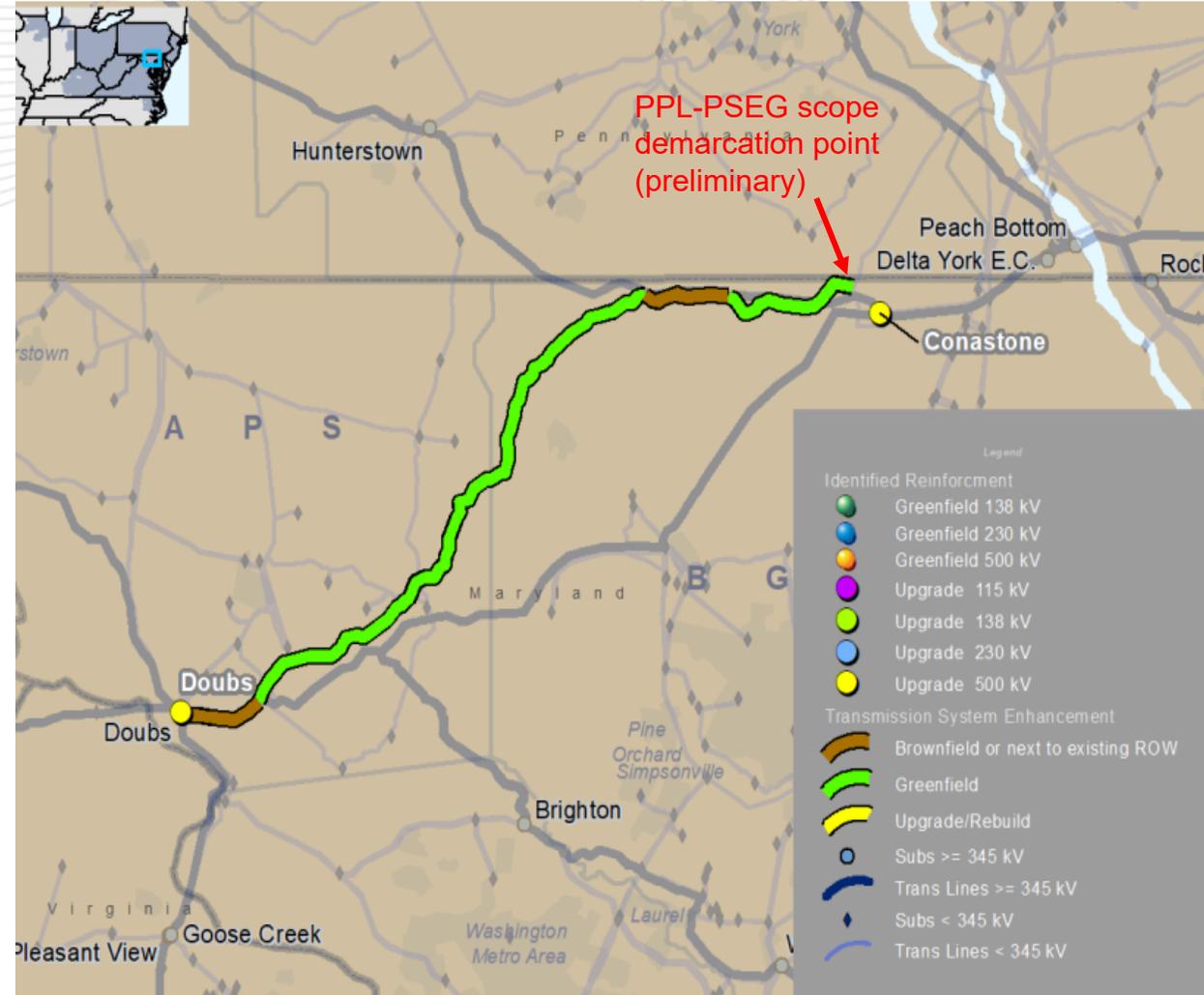
Baseline # B3800.7 –B3800.8 and B3800.43

Proposed Cost Estimate: \$447.5 M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 6/1/2027

*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# Recommended Solutions to Address Clusters - East

## Recommended Solution:

**FE: 2022-W3-837**

Build new 230 kV AC circuit from Hunterstown - Carroll

- Rebuild the existing Hunterstown – Carroll 115/138 kV Corridor as Double Circuit using 230kV construction standards
  - 230kV New Rating – 726SN/890SE/824WN/1056WE MVA
  - 115kV New Rating – 363SN/445SE/412WN/528WE MVA

## PJM Identified upgrades:

- Reconductor Lincoln – Orrtanna 115 kV Line
  - New Rating- 232SN/282SE/263WN/334WE MVA
- Fayetteville – Grand Point 138 kV - Replace line trap at Grand Point 138 kV
  - New Rating – 195SN/258SE/280WN/368WE MVA
- Reid - Ringgold 138 kV - Replace line trap, substation conductor, breaker at Ringgold, relaying and CTs
  - New Rating – 308SN/376SE/349WN/445WE MVA
- Cancel b3768 (Rebuild/Reconductor the Germantown - Lincoln 115 kV Line.) (Cost: \$17.36M)

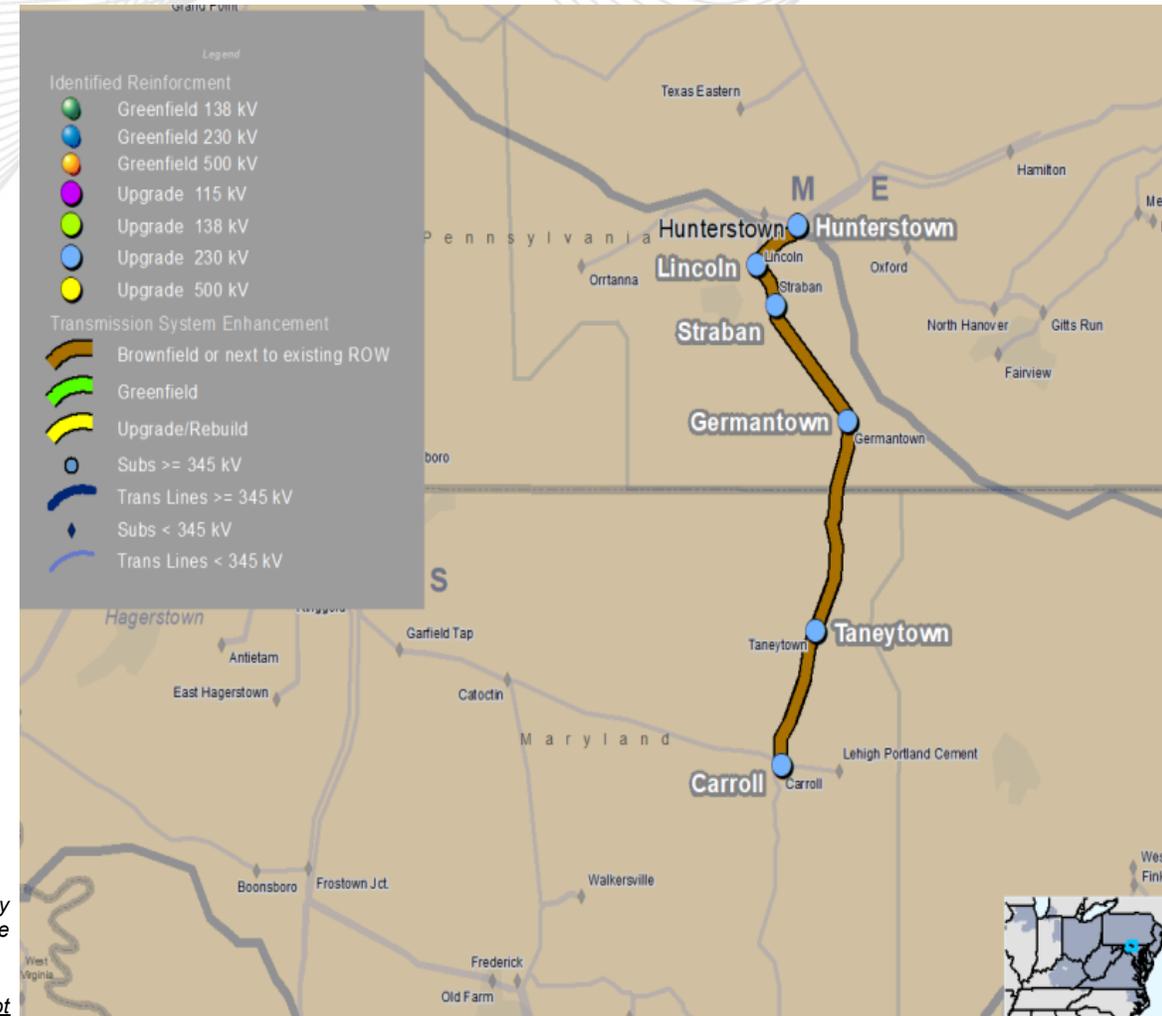
Baseline # B3800.9 –B3800.25

**Proposed Cost Estimate: \$152.65 M – \$17.36 M = \$135.3 M**

**Required In-Service Date : 6/1/2027**

**Projected In-Service Date : 6/1/2028**

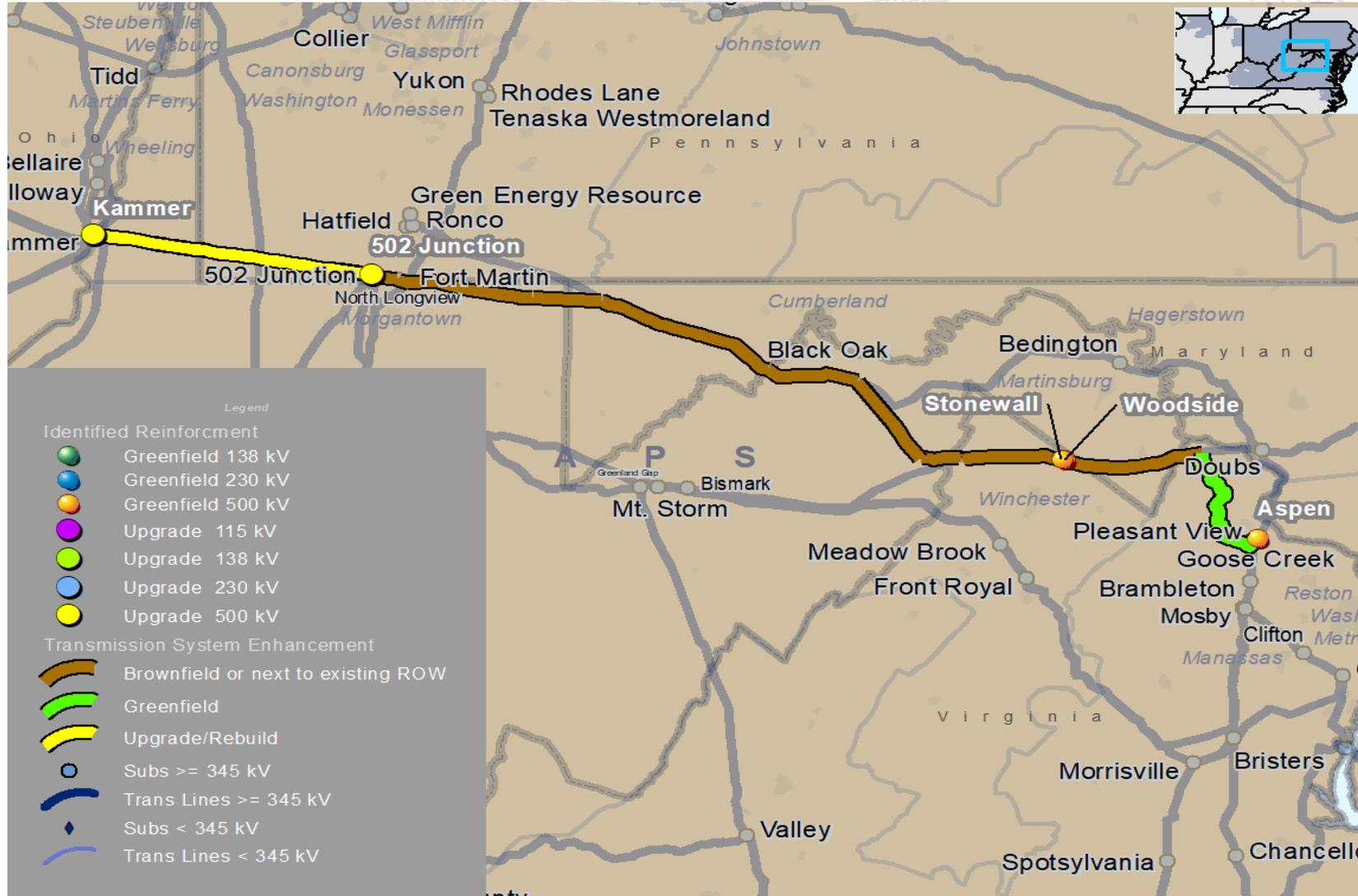
*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# Western Cluster - Selected Proposals

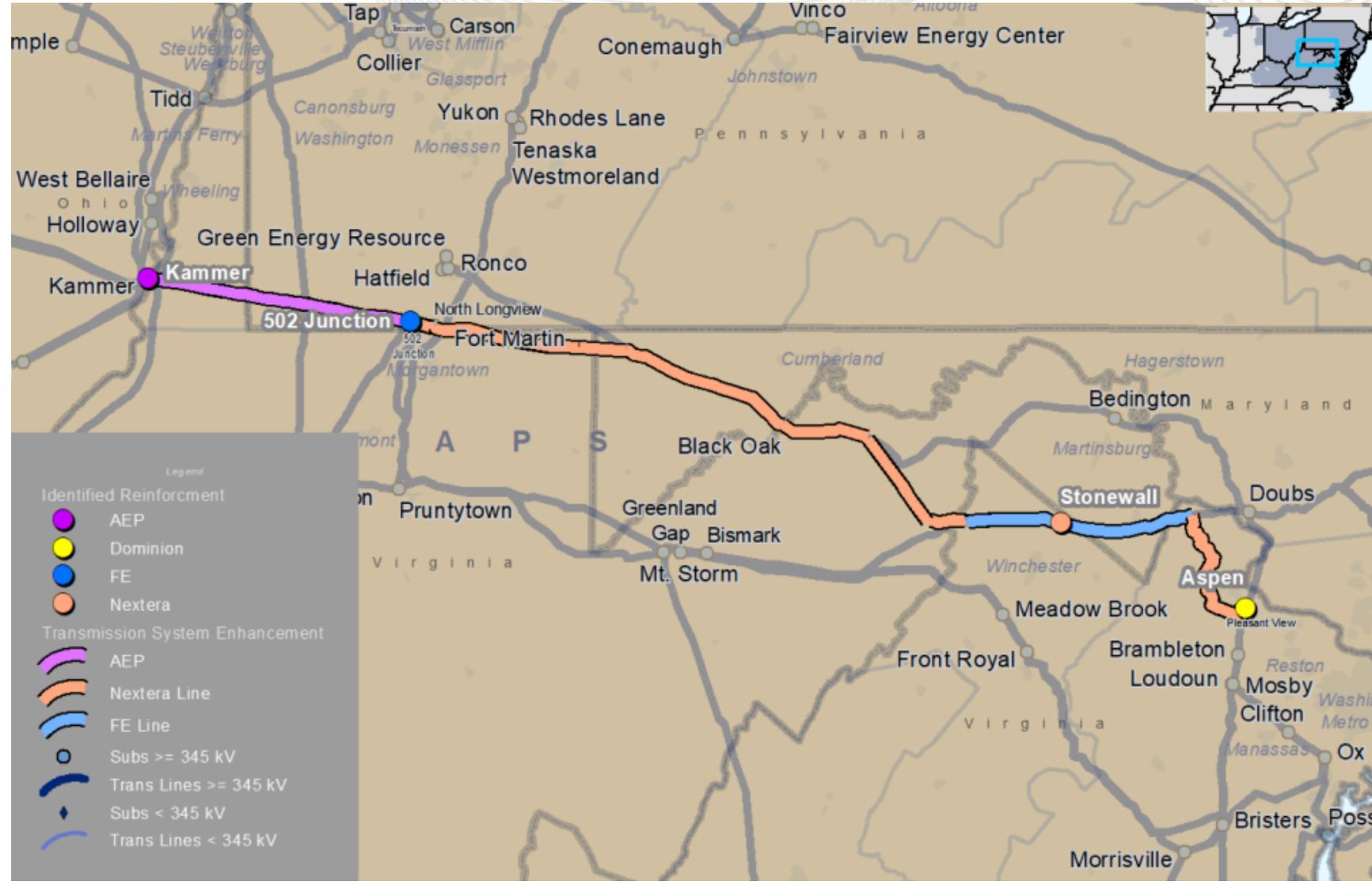
## Baseline Reliability Projects

# 2022W3 – Preferred Solutions: West Cluster



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# 2022W3 – Preferred Solutions: West Cluster By Designated Entity



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Preferred Proposals to Address Clusters - West

- **NextEra:2022-W3-853** (bypass Black Oak, terminate at Aspen instead of Gant) – **NextEra Scope**
  - New 500kV line from existing 502 Junction substation to New Stonewall/Woodside substation (**bypass Black Oak**) (**NextEra**) - (**Cost Estimate: \$315.64M**)
  - Woodside substation adjacent to existing Stonewall 138 kV substation. (**NextEra**) (**Cost Estimate: \$125.25M**)
    - Loop in Bismark to Doubs 500 kV line.
    - Two 500/138 kV transformers
    - Two 150 MVAR Cap banks and one +500/-300 MVAR STATCOM
    - Line termination scope for Doubs to Bismark 500 kV line
  - New 500kV transmission line from new Woodside substation to Aspen substation – (**NextEra**)(**Cost Estimate: \$71.72M**)

**Preliminary Facility Ratings:**

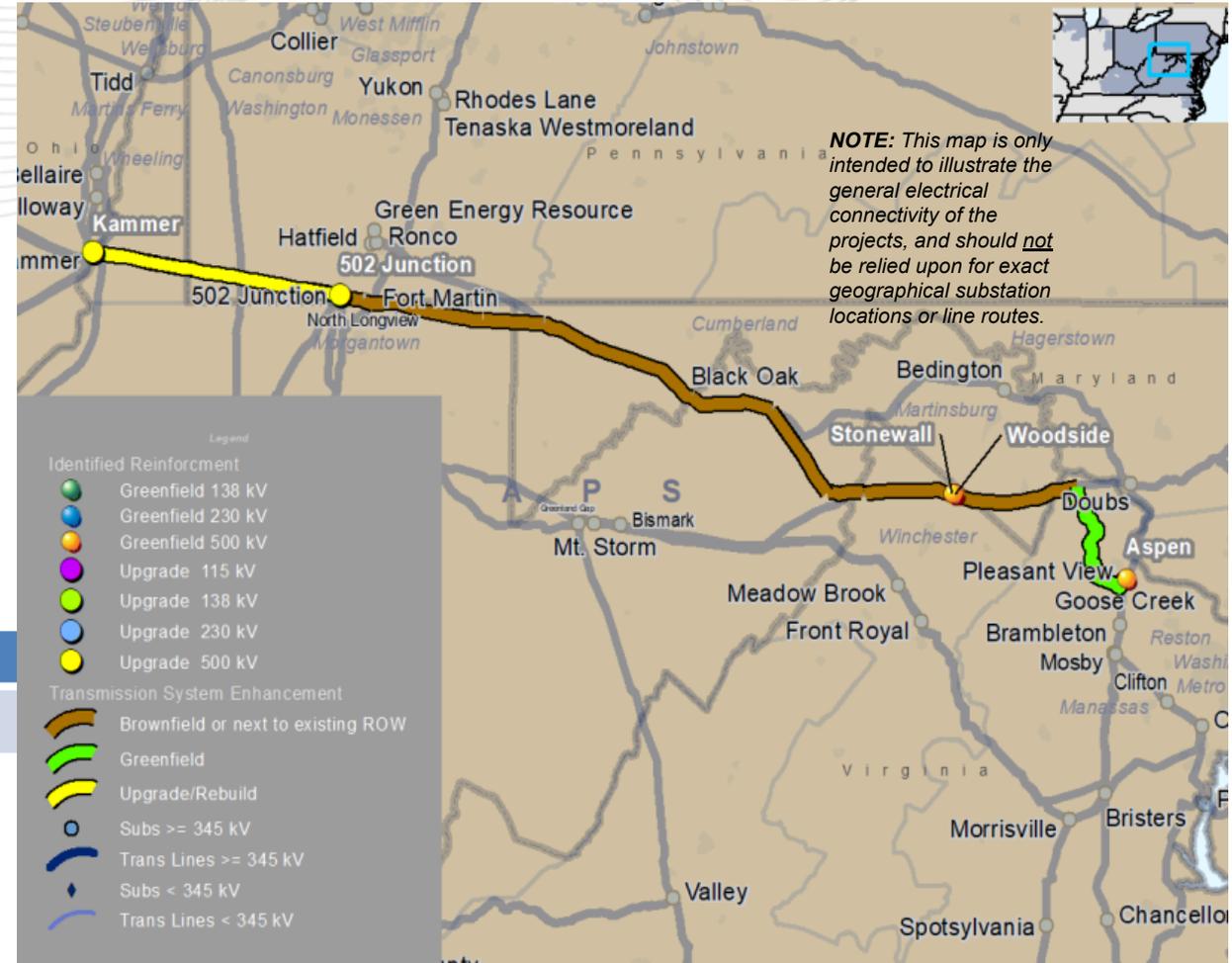
Branch	SN/SE/WN/WE (MVA)
502 Jct – Woodside –ASPEN 500 kV	4295/4357/5066/5196

Estimated Cost: \$512.61M

Baseline numbers: b3800.102, b3800.106 - b3800.110, b3800.113, b3800.115, b3800.117 & b3800.119

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2027



# Preferred Projects to Address Clusters - West

- **NextEra:2022-W3-853 (FE Scope)**
  - Rebuild ~16 miles of the Gore - Stonewall 138 kV Line with 500 kV overbuild, rebuild ~15 miles of the Stonewall - Millville 138 kV Line with 500 kV overbuild & rebuild ~6 miles of the Millville - Doubs 138 kV Line with 500 kV overbuild - **(FE Cost Estimate: \$341M) (Incumbent)**
  - Stonewall 138 kV substation two 138kV breaker expansion - **(FE Cost Estimate: \$8.3M) (Incumbent)**
  - 502 Junction substation two 500 kV circuit breaker expansion - **(FE Cost Estimate: \$30.6M) (Incumbent)**
  - Line termination scope associated with terminating Doubs to Bismark line for Doubs end into the Woodside 500 kV substation - **(FE Cost Estimate: \$0.06M) (Incumbent)**
  - Line scope associated with two 138 kV line from Woodside 500 kV substation to FE Stonewall 138 kV substation - **(FE Cost Estimate: \$12.59M) (Incumbent)**

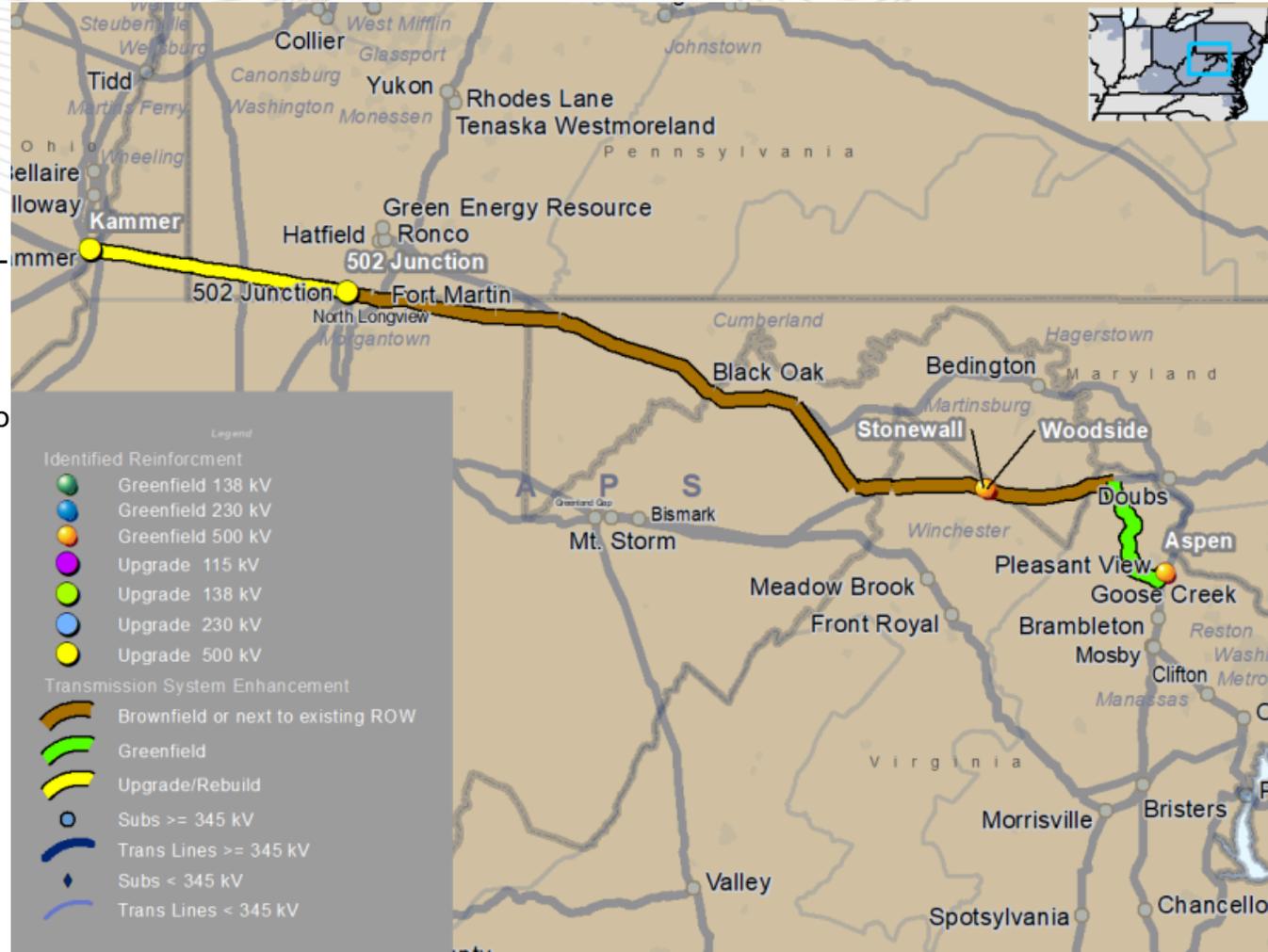
**Estimated Cost: \$392.55M**

**Baseline ID's: b3800.101, b3800.103 – b3200.105, b3800.111, b3800.112, b3800.114 & b3800.116**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2027 – 6/1/2030**

*NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



# Preferred Projects to Address Clusters - West

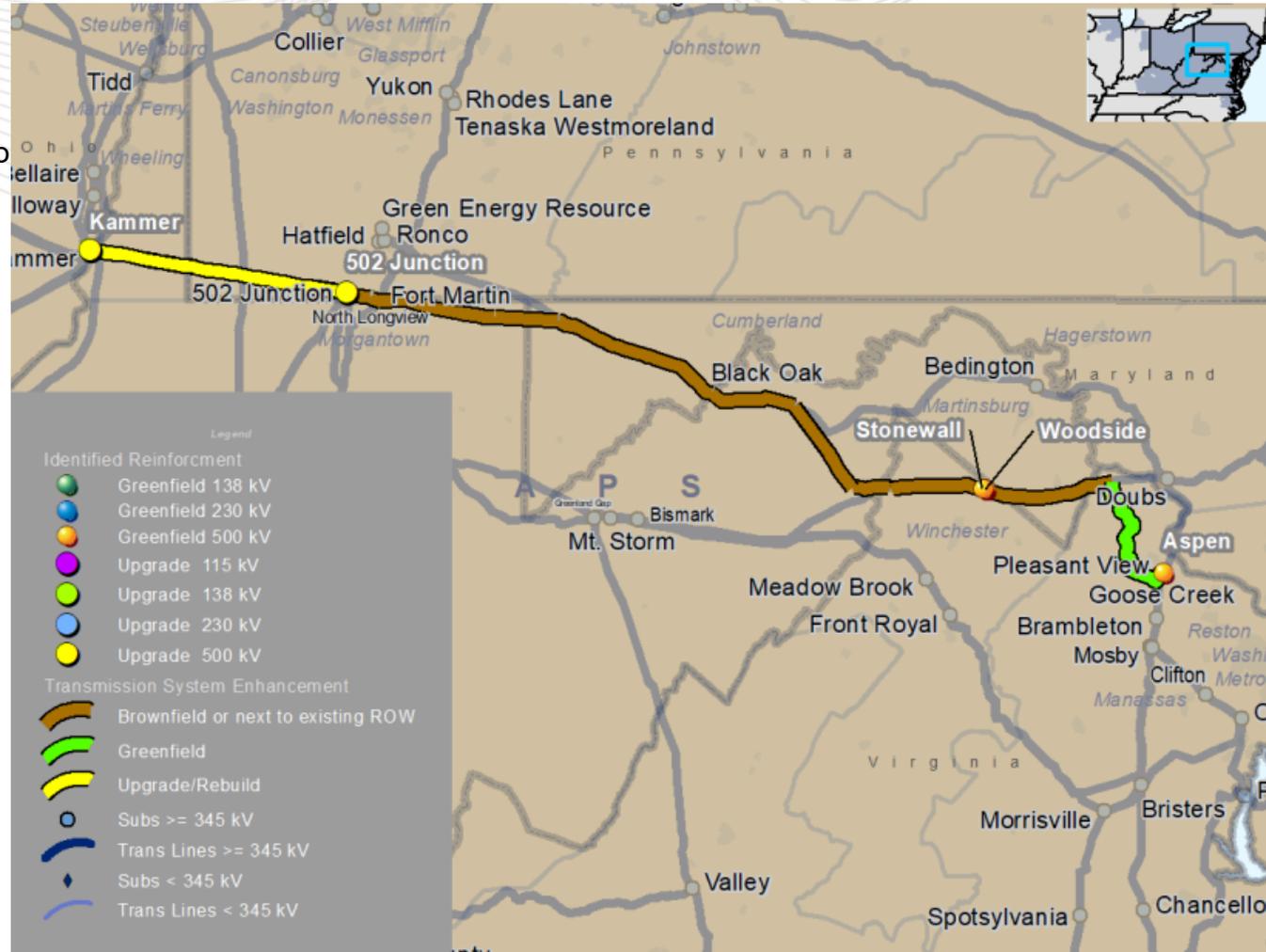
- **NextEra:2022-W3-853 (Dominion Scope)**
  - Aspen substation work to terminate new NextEra 500 kV line (**Dominion**) (**Cost Estimate : \$30.49M**) (**Incumbent**)
  - Line termination scope associated with terminating Doubs to Bismark line into the Woodside 500 kV substation - (**Dominion**) (**Cost Estimate: \$5.1M**) (**Incumbent**)

**Estimated Cost: \$35.59M**

**Baseline ID's: b3800.118 & b3800.120**

**Required IS Date: 6/1/2027**

**Projected IS Date: 6/1/2027**



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Preferred Projects to Address Clusters – West

- NextEra:2022-W3-853 (AEP Scope)
  - Kammer to 502 Junction 500kV line: Conduct LIDAR Sag Study to assess SE rating and needed upgrades (AEP Scope) (Cost Estimate: \$0.1M)

**Existing Facility Ratings:**

Branch	SN/SE/WN/WE (MVA)
502 Jct – Kammer	3173/3173/3928/4030

**Preliminary Facility Ratings:**

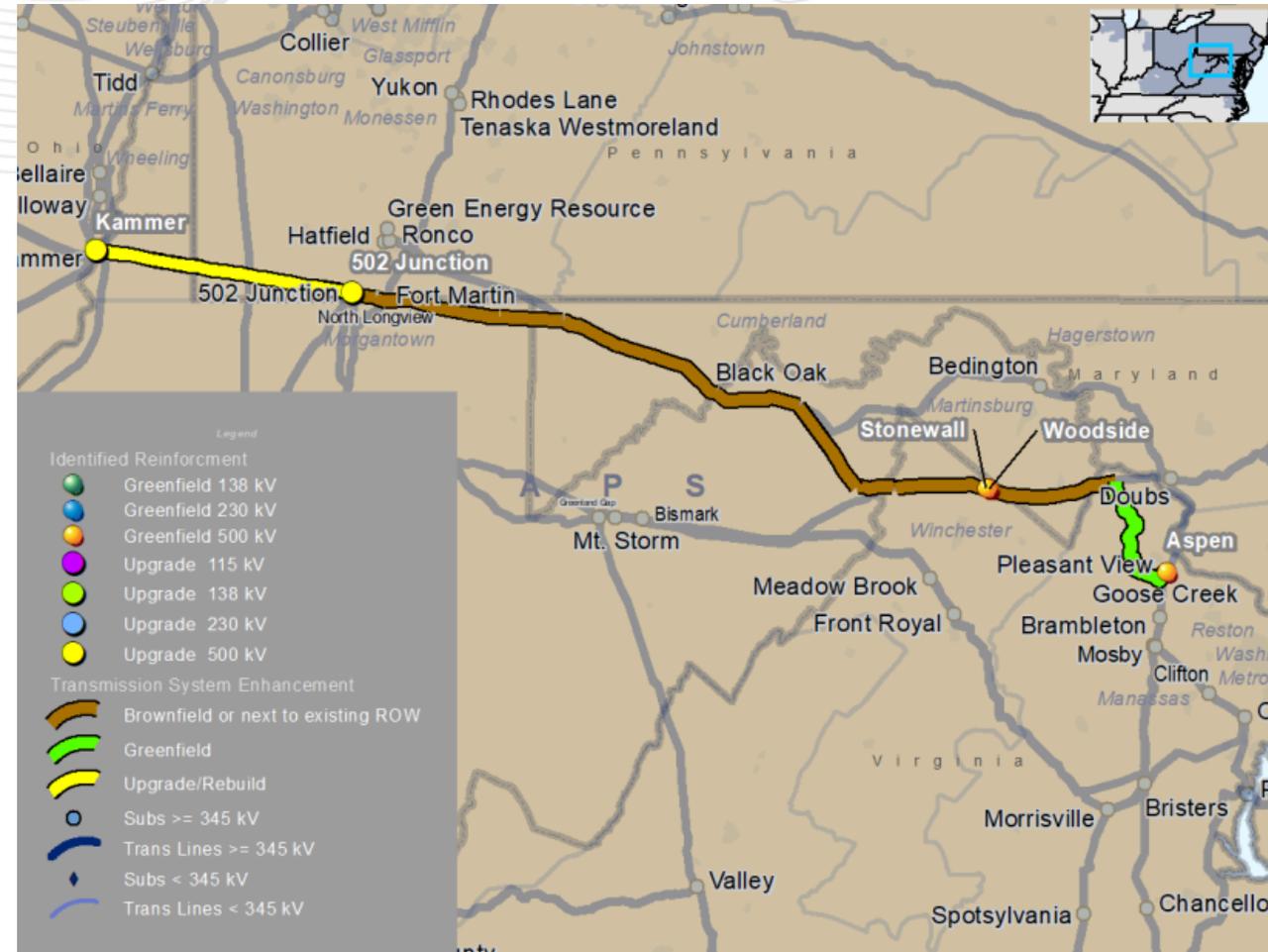
Branch	SN/SE/WN/WE (MVA)
502 Jct – Kammer	3204/3729/3928/4140

Estimated Cost: \$0.1M

Baseline ID's: b3800.121

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2027



**NOTE:** This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

# Short Circuit Evaluation and Associated Upgrades

2022 Window 3

- Posted window case based on 2027 topology
- Considered impacts to existing breakers in 11 TO areas

Scenario Description	Over Duty Bus (Qty)						Over Duty CBs	Maximum Fault Duty (kA)						Comment
	115 kV	138 kV	230 kV	345 kV	500 kV	765 kV	Total	765 kV	500 kV	345 kV	230 kV	138 kV	115 kV	
2022 Window 3 Recommended Solution	1	1	14	0	5	0	80	38.3	61.9	59.7	76.1	74.4	59.1	Conastone 500kV bus operating below the 52kA rated capability Peachbottom 500kV bus operating below the 63kA rated capability



# APS Area and Dominion Area - Short Circuit Upgrades

RTEP ID	Cost	TO Area	Substation	kV	BREAKER (Qty)	BREAKER NAME						
B3800.401	\$0.79M	DOM	ASHBURN	230	1	SC432						
B3800.402	\$2.31M	DOM	BEAUMEADE	230	1	227T2152						
B3800.403	\$4.21M	DOM	BECO	230	2	215012	H12T2150					
B3800.404	\$2.24M	DOM	BELMONT	230	1	227T2180						
B3800.405	\$9.38M	DOM	BRAMBLETON	230	6	20102	20602	204502	209402	201T2045	206T2094	
B3800.406	\$3.11M	DOM	GAINESVILLE	230	1	216192						
B3800.407	\$5.57M	DOM	LOUDON	230	2	204552	217352					
B3800.408	\$9.02M	DOM	OX	230	7	22042	24342	24842	220T2063	243T2097	248T2013	H342
B3800.409	\$4.96M	DOM	PARAGON PARK	230	4	208132	215032	2081T2206	2150T2207			
B3800.410	\$0.79M	DOM	RESTON	230	1	264T2015						
B3800.411	\$4.95M	DOM	STONEWATER	230	4	20662-1	20662-2	217862-1	217862-2			
B3800.412	\$2.93M	DOM	WAXPOOL	230	4	214922-5	214922-6	216622-5	216622-6			
B3800.413	\$3.00M	APS	DOUBLE TOLL GATE	138	1	MDT 138 OCB						
B3800.414	\$10.01M	APS	DOUBS	500	1	DL-55 522LIN						
<b>TOTAL</b>	<b>\$63.27M</b>				<b>36</b>							



# 2022 Window 3 Recommended Solution

See link for Detail upgrade components:

<https://www.pjm.com/-/media/committees-groups/committees/ta-c/2023/20231205/20231205-informational-only---2022-window-3-baseline-project-b3800-components.ashx>

Project Area	Proposal ID	RTEP Upgrade IDs	Key Facilities Included	Designated Entity	Current Year (2023) Estimated Cost (\$M)	Required In-Service Date	Projected In-Service Date
East	344	b3800.31, 35, 39, 42, 44-51	New Peach Bottom South - North Delta 500 kV & North Delta - High Ridge 500 kV (PECO scope) Rebuild 5012: North Delta - Graceton 500 kV (PECO scope) Red Lion terminal upgrade North Delta 500 kV Terminations (Transource scope)	PECO DPL Transource	77.41	6/1/2027	12/1/2030
	660	b3800.26-30, 32-34, 36-38, 40, 41	High Ridge 500 kV station expansion New North Delta - Highridge 500 kV (BGE scope) Rebuild 5012: North Delta - Gracetone - Conastone (BGE scope)	BGE PEPCO	631.36	6/1/2027	12/1/2030
	374	b3800.1-6	New Otter Creek 500 kV station (tie-in to TMI - Peach Bottom 500 kV) New Otter Creek - Doubs 500/230 kV DCT (PPL and BGE scope) Peach Bottom and TMI Terminal upgrades	PPL BGE ME/PECO	134.20	6/1/2027	6/1/2027
	637	b3800.7, 8, 43	New Otter Creek - Doubs 500 kV (PSEG scope) Doubs 500 kV Termination (APS scope)	PSEG APS	447.50	6/1/2027	6/1/2027
	837	b3800.9-18, 22-25	New Carroll - Hunterstown 230 kV line	APS ME	137.47	6/1/2027	6/1/2028
	PJM Identified Upgrades	b3800.19-21	Reconductor Lincoln-Ortanna 115 kV Grand Point 138 kV line trap replacement Reid-Ringgold 138 kV upgrades	APS ME	15.18	6/1/2027	6/1/2028
West	853	b3800.101-121	New Woodside 500 kV substation (tie-in to Stonewall 138 kV station & loop in Doubs-Bismark 500 kV) New 502 Junction - Woodside - Aspen 500 kV line (NEET and APS scope) Aspen 500 kV line Termination (Dominion) Kammer - 502 Jct 500 kV Sag Study	NEET APS Dominion AEP	940.85	6/1/2027	6/1/2027 thru 6/1/2030
South	711	b3800.311-357	New Morrisville - Vint Hill - Wishing Star 500 kV Rebuild both 500 /230 kV lines in the existing Morrisville-Loudoun-Brambleton corridor	Dominion	842.19	6/1/2027	6/1/2028
	231	b3800.305-310	Morrisville, Wishing Star, Mars and Beaumeade Substation Reactive Upgrades	Dominion	103.79	6/1/2027	12/1/2027
	74, 211, 731, 967	b3800.300-304, 358-372	Proposed Dominion 230 kV Upgrades	Dominion	281.98	6/1/2027	12/1/2027 thru 6/1/2028
	PJM Identified Upgrades	b3800.373, 374	Line #256 Rebuild St. Johns - Ladysmith CT 230 kV	Dominion	37.89	6/1/2027	6/1/2028
Northern VA Data Center and Doubs Area	692	b3800.200-227	New Aspen and Golden 500/230 kV Substation & Mars Station Upgrade New Aspen - Golden - Mars 500 kV and 230 kV lines	Dominion	1025.06	6/1/2027	6/1/2028
	837, 516, 660	b3800.122-127, 230-245	Doubs - Goose Creek '514' 500 kV Rebuild (APS and Dominion scope) New Doubs - Aspen 500/230 kV DCT (APS, PEPCO, Dominion scope)	APS Dominion PEPCO	379.74	6/1/2027	12/1/2027 thru 6/1/2030
	PJM Identified Upgrades	b3800.228, 229,	Sterling Park – Golden 230 kV Reconductor Davis Drive – Sterling Park 230 kV Reconductor	Dominion	13.50	6/1/2027	6/1/2028
Local AEP	410	b3800.100	Cloverdale Breaker Reconfiguration	AEP	11.59	6/1/2027	10/1/2026
Short Circuit	PJM Identified Upgrades	b3800.401-414	Short Circuit Upgrades	Dominion APS	63.27	6/1/2027	6/1/2027
				<b>TOTAL</b>	<b>5142.98</b>		

# Summary of Scope Change and Cancellations

Scope Change							
RTEP Upgrade ID	Original Project Description	New Project Description	Designated Entity	Original Cost (\$M)	Updated Cost (\$M)	Original In-Service Date	New In-Service Date
b3737.47	Build a new greenfield North Delta station with two 500/230 kV 1500 MVA transformers and nine 63 kA breakers (four high side and five low side breakers in ring bus configuration).	Build New North Delta 500 kV substation (four bay breaker and half configuration ) - the substation will include 12 - 500kV breakers and one 500/230 kV transformer, will allow the termination of six - 500 kV lines	Transource	76.27	104.11	6/1/2029	12/31/2027

Cancellations			
RTEP Upgrade ID	Project Description	Designated Entity	Project Cost (\$M)
b3780.3	West Cooper substation (3 breaker ring + transformer, control house + substation build, reconfigure Cooper distribution station feed)New transformer rating: 1559 MVA SN/ 1940 MVA SE	PECO	60.00
b3768	Rebuild/Reconductor the Germantown - Lincoln 115 kV Line. Approximately 7.6 miles. Upgrade limiting terminal equipment at Lincoln, Germantown and Straban	ME	17.36
b3247	Replace 13 towers with galvanized steel towers on Doubs - Goose Creek 500 kV. Reconductor 3 mile section with 3-1351.5 ACSR 45/7. Upgrade line terminal equipment at Goose Creek substation to support the 500 kV line rebuild.	Dominion	7.60
		<b>TOTAL</b>	<b>84.96</b>

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SME/Presenter:

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**Reliability Analysis Update**



Member Hotline

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(866) 400 – 8980

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

# Revision History

Version No.	Date	Description
1	Nov 30 <sup>th</sup> 2023	<ul style="list-style-type: none"><li>• Original slides posted</li></ul>
2	Dec 1 <sup>st</sup> 2023	<ul style="list-style-type: none"><li>• Added slide # 71 and updated slide #70</li></ul>
3	Dec 6 <sup>th</sup> 2023	<ul style="list-style-type: none"><li>• Updated tables in slide #70 and #6</li><li>• Updated slide #59</li><li>• Updated slide #2 to correct year</li></ul>

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YOU CLICK!**

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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)



# Reliability Analysis Update

Sami Abdulsalam, Director  
PJM Transmission Planning

Transmission Expansion Advisory  
Committee  
January 7, 2025

# Resources Available to PJM Stakeholders

## (Transmission Planning)

- [PJM Learning Center](#) – Overviews on PJM’s priorities and responsibilities, including Planning responsibilities
- [Process to build a new facility](#) – Overview of the steps and parties involved in the process to build a new facility from the need to completion.
- PJM Manual 14B – Details on how PJM conducts analysis ([web](#) or [pdf](#))
- PJM Manual 14F – Overview of the competitive process ([web](#) or [pdf](#))

- Generation interconnection queue – List of all projects for proposed generation. PJM does not solicit these requests, but PJM will ensure each project can operate reliably.
  - [Serial process](#) – Historic view of all projects submitted prior to 2022
  - [Cluster process](#) – Progress of all projects processed with the reformed interconnection process
- PJM Manual 14H – Overview of the generation interconnection process ([web](#) or [pdf](#))

- [General PJM training](#) – A variety of training resources on various aspects of PJM, including overviews such as [PJM Introduction](#) and [PJM 101: The Basics](#).
- [2022 RTEP Window 3 FAQ](#) – A lot of great background that applies to the current body of work.
- PJM’s Client Management team – Single point of contact for any questions about PJM.
  - Phone: (610) 666-8980 or (866) 400-8980
  - E-mail: [custsvc@pjm.com](mailto:custsvc@pjm.com)

# 2024 RTEP Window 1 Updates

# 2024 RTEP Window 1 Update

- Window Timeline and Status
- Needs Summary, Proposals and Evaluation Criteria
- Recommended Solutions – Summary and Rationale
  - 15 Year Analysis
  - Total cost summary
- Required In Service Date Adjustments
- 2024 RTEP W1 – 2nd Read (Local projects/Clusters)
- 2024 RTEP W1 – 2nd Read( Regional Cluster)
- 2024 RTEP W1 – 2nd Read (Short Circuit Evaluation)
- 2024 RTEP W1 – Regional Cluster Shortlist Cost Review

# 2024 RTEP Window 1 – Timeline



# Major Need Drivers Behind 2024 RTEP

**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.

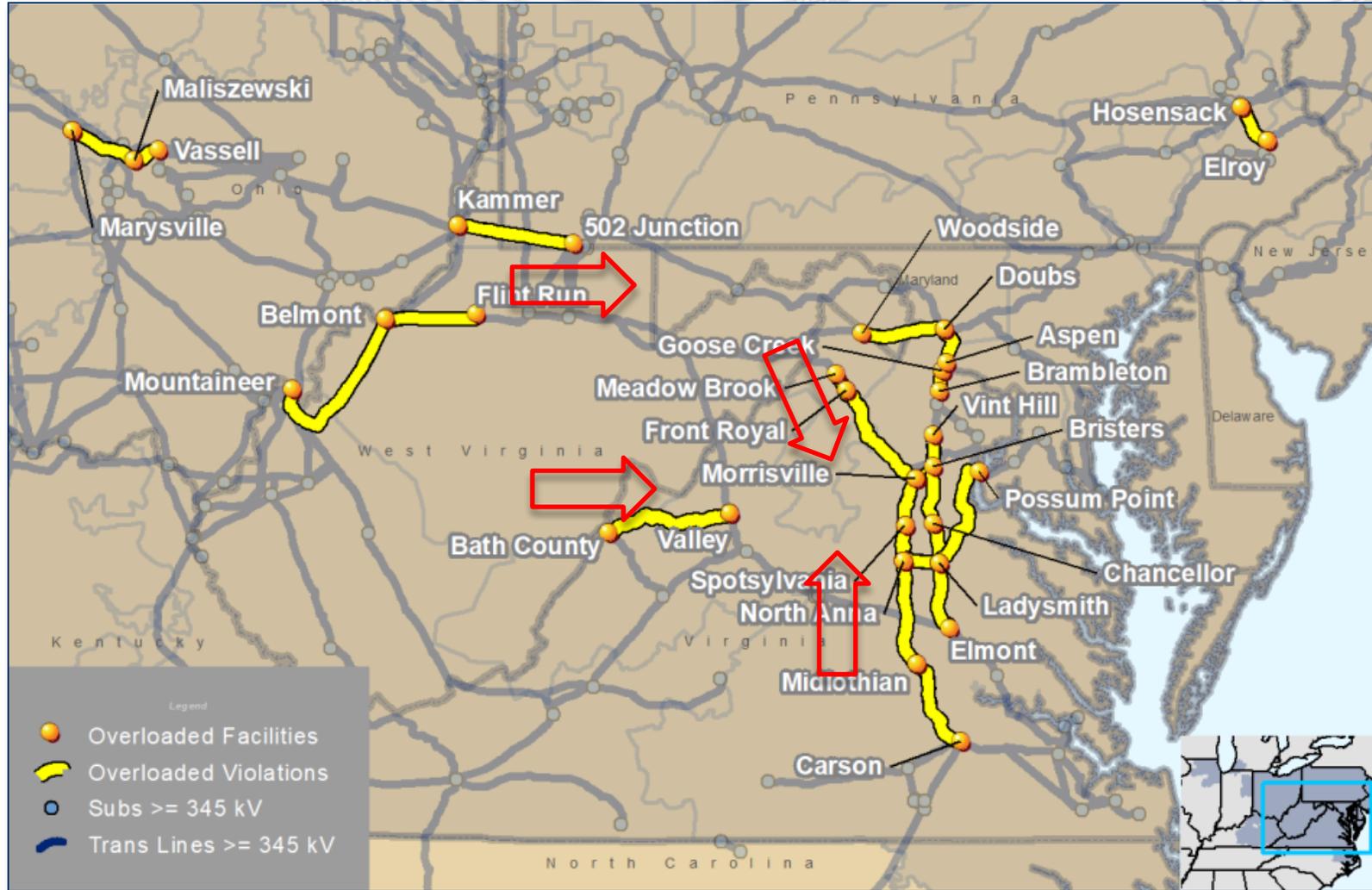
**In addition to regional transfer requirements, there are load pockets that need to be addressed in AEP, ATSI, Dominion, PECO, BGE and PPL transmission zones.**

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.

<p><b>Individual Proposal Screening</b></p>	<p>Complete</p>	
<p><b>Baseline Scenarios Were Developed and Analyzed</b></p>	<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> </ul>	<ul style="list-style-type: none"> <li>• PJM developed scenarios incorporating (or eliminating) components to identify an optimal combination yielding better performance.</li> </ul>
<p><b>Transfer Capability Analysis</b></p>	<p>PJM conducted Transfer Capability analysis for key proposals – regional west-east needs. More than 16 Source-Sink scenarios analyzed (for all preliminarily shortlisted proposals)</p>	
<p><b>Scenario Analysis</b></p>	<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> </ul>	<ul style="list-style-type: none"> <li>• Full scenario details and evaluation results were shared at the November 19<sup>th</sup> TEAC together with a final shortlist</li> </ul>

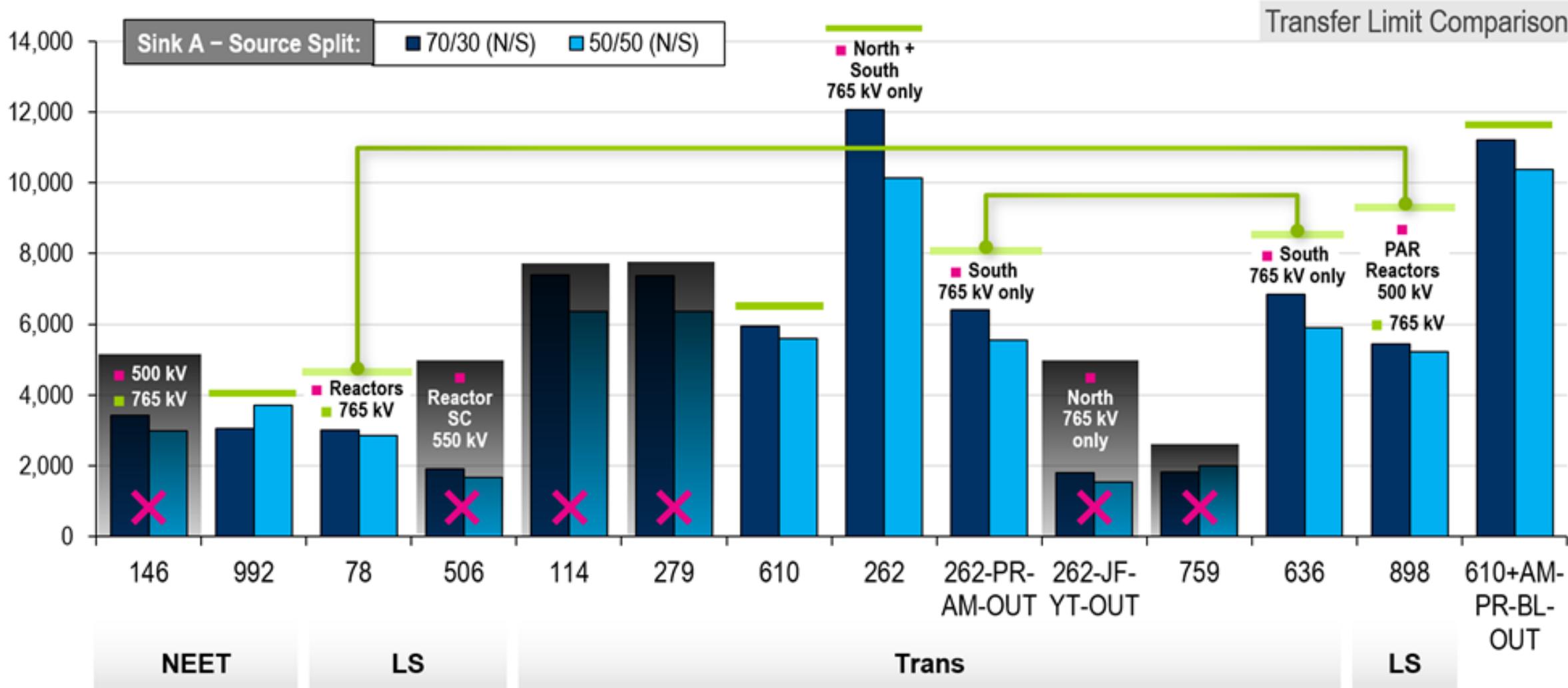
**Scenarios with their associated proposed developments will be ranked based on:**

<p>Meeting the system needs of 2029 (all kV levels) and 2032 (long-lead reinforcements)</p>	<p>Being scalable/flexible to address forecasted needs going forward (for right-sizing and limiting disruption)</p> <p>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.</p>	
<p>Utilization of existing ROWs and brownfield development/expansion (where possible and efficient)</p> <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>	<p>Cost evaluation using third-party cost benchmarking metrics – weak cost containment provisions</p>	<p>Proposing entity experience in developing and operating 765 kV facilities</p>

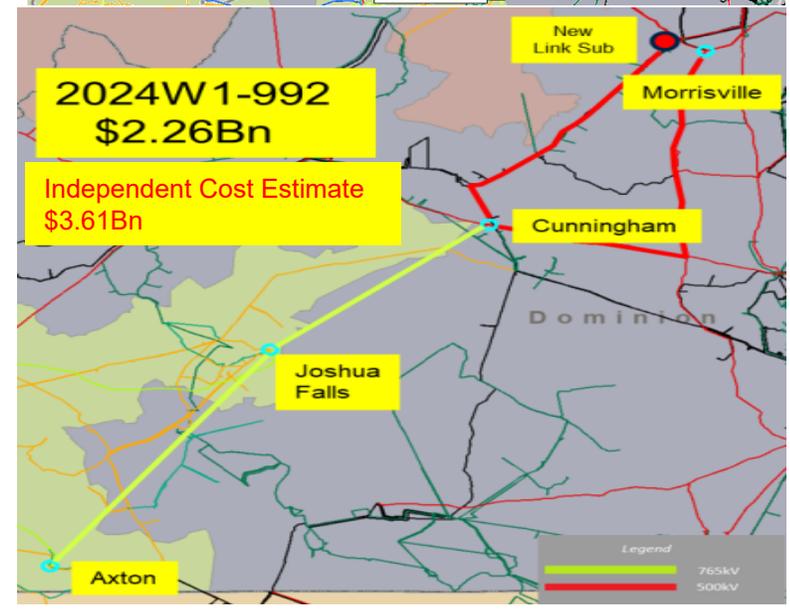
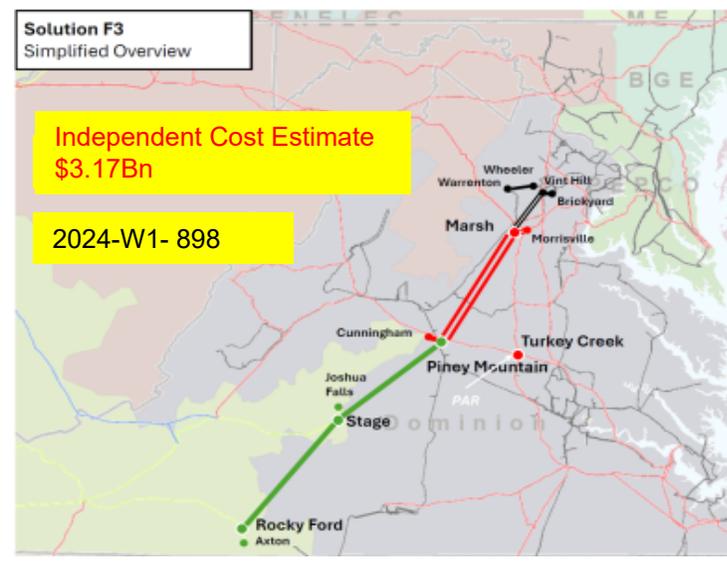
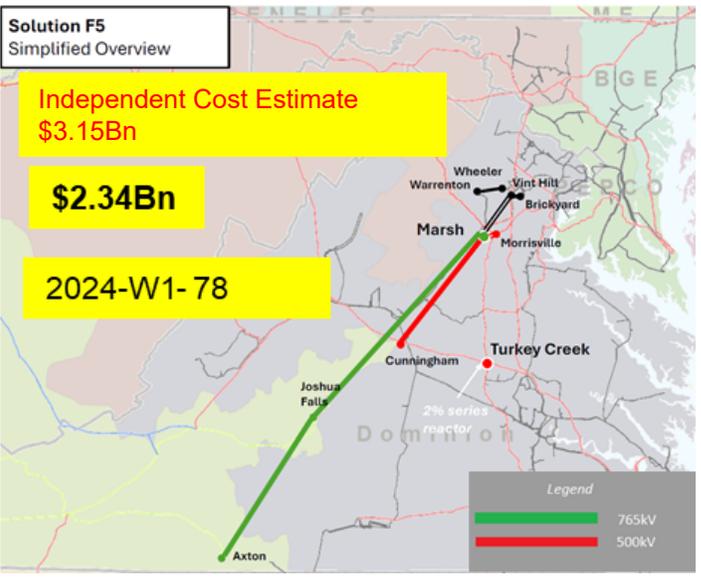
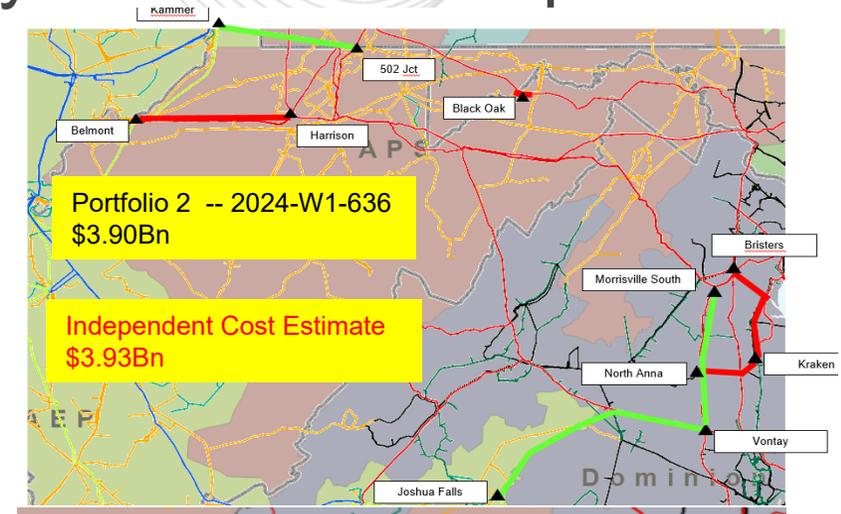
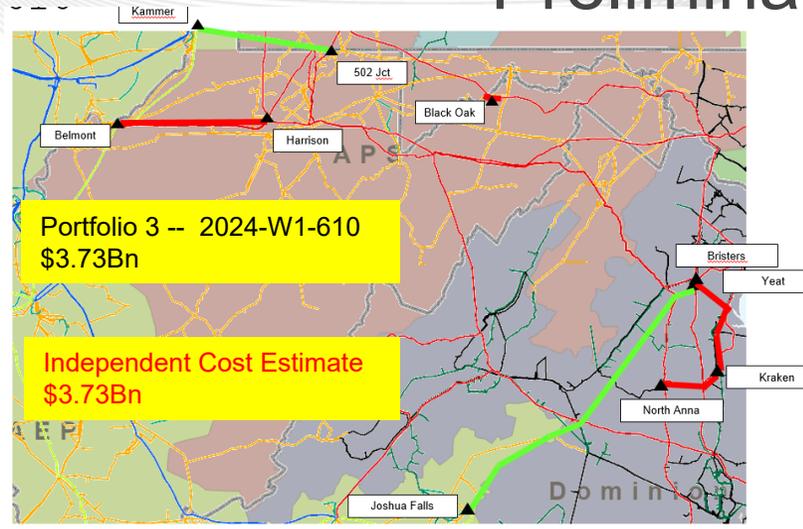
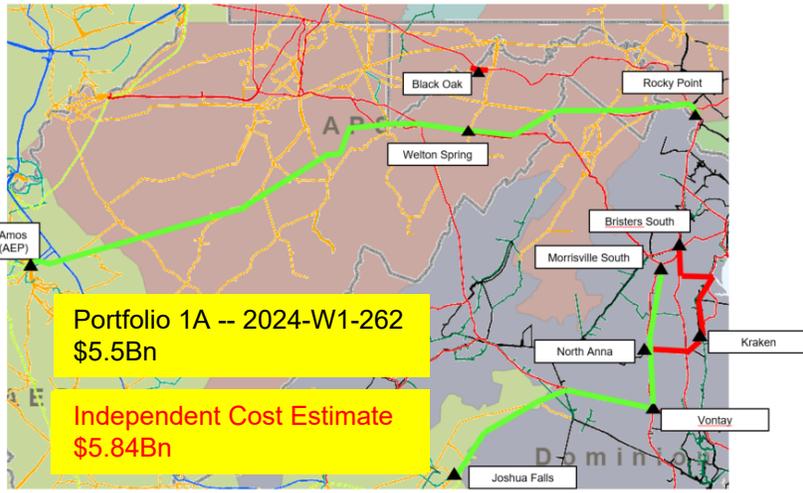


# Regional Transfer Performance – Key Proposals

## Bulk Transfer Capability (DC) and Preliminary Shortlist



# 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%

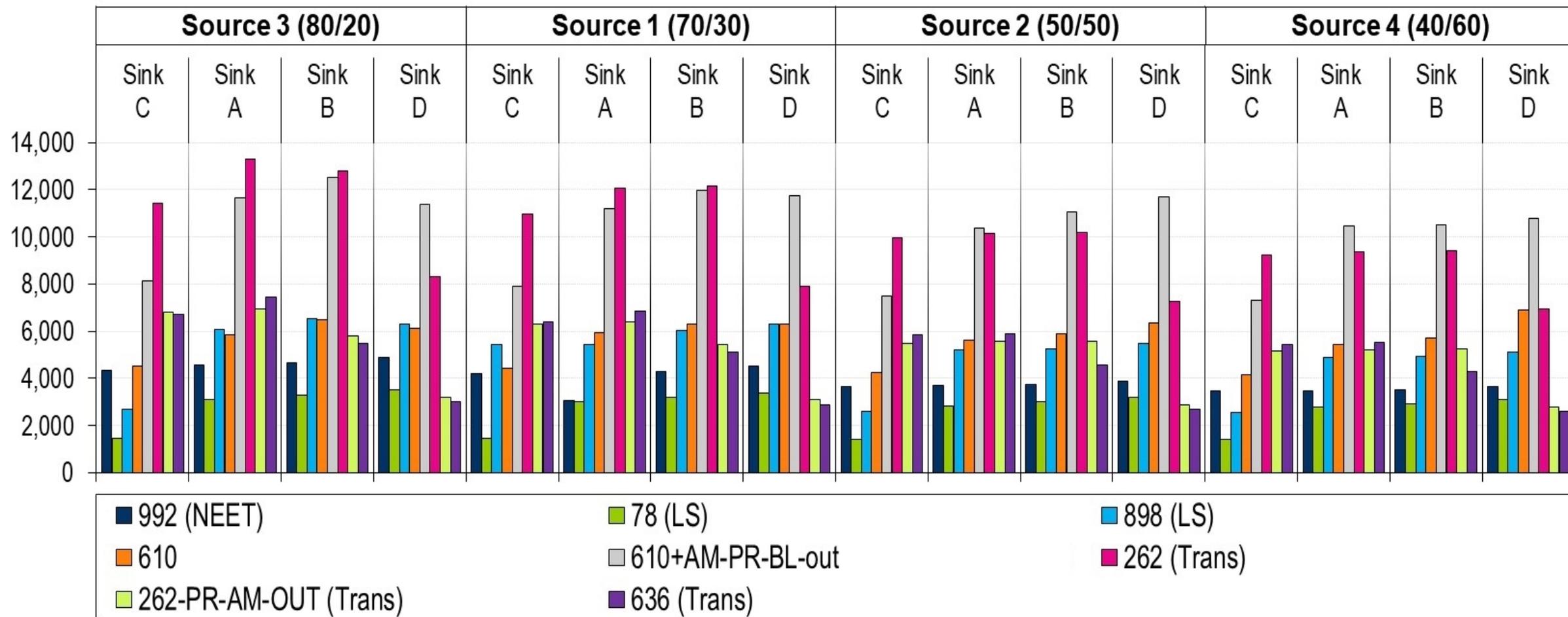
- Source Definitions (North/South (Western PJM) %age surplus gen)

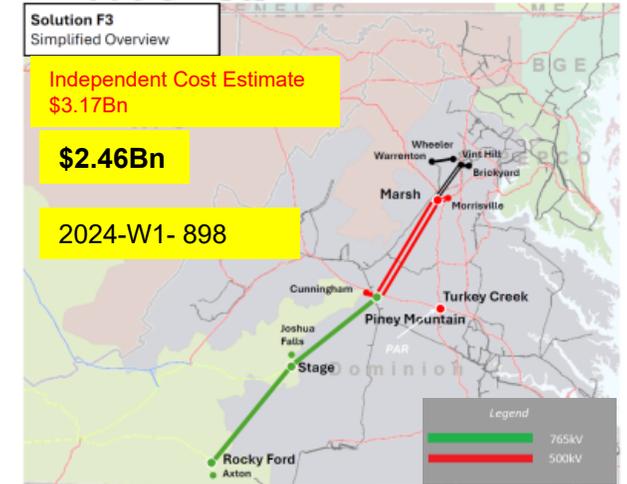
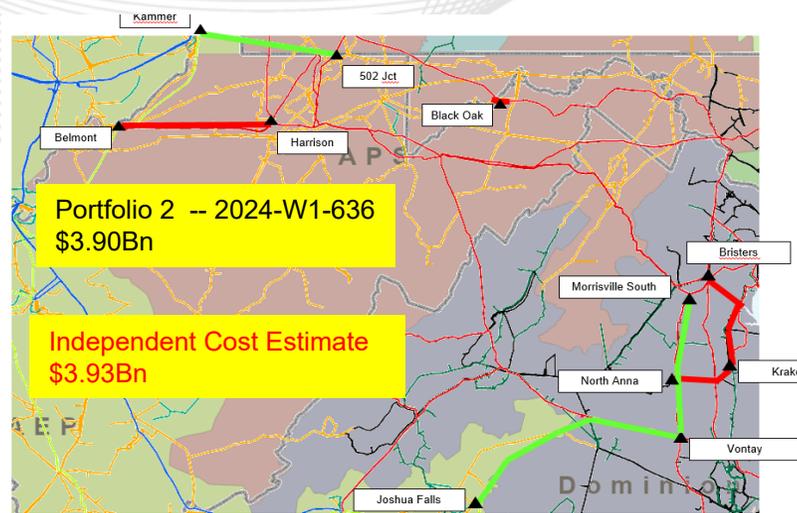
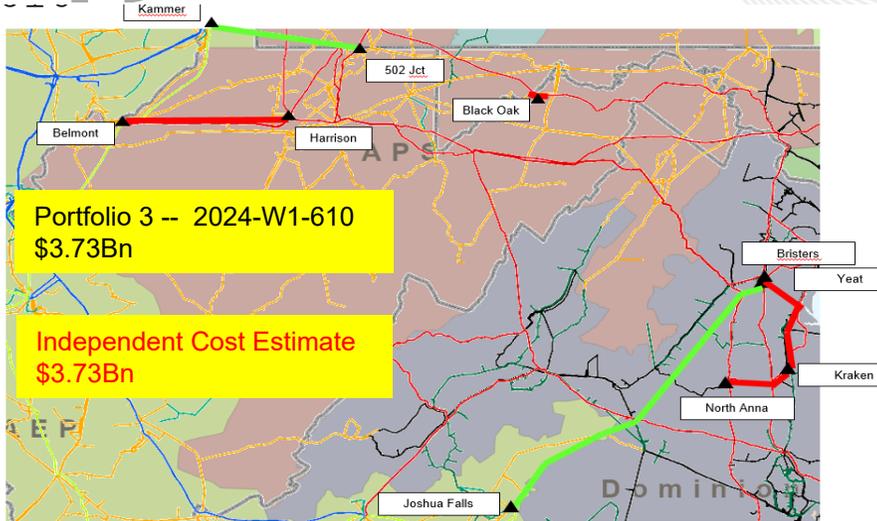
Source 3	Source 1	Source 2	Source 4
80/20	70/30	50/50	40/60



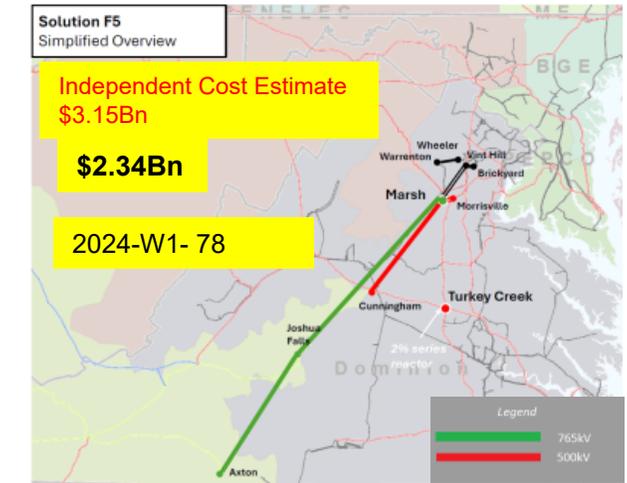
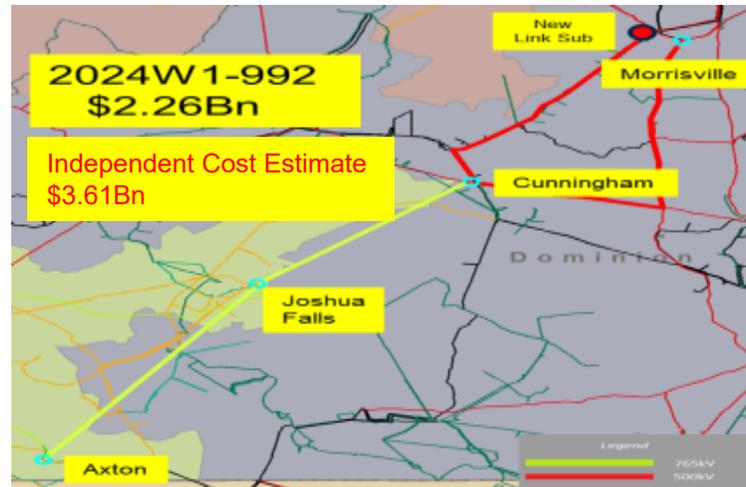
# Regional Transfer Performance – Key Proposals

## Bulk Transfer Capability (DC) and Preliminary Shortlist





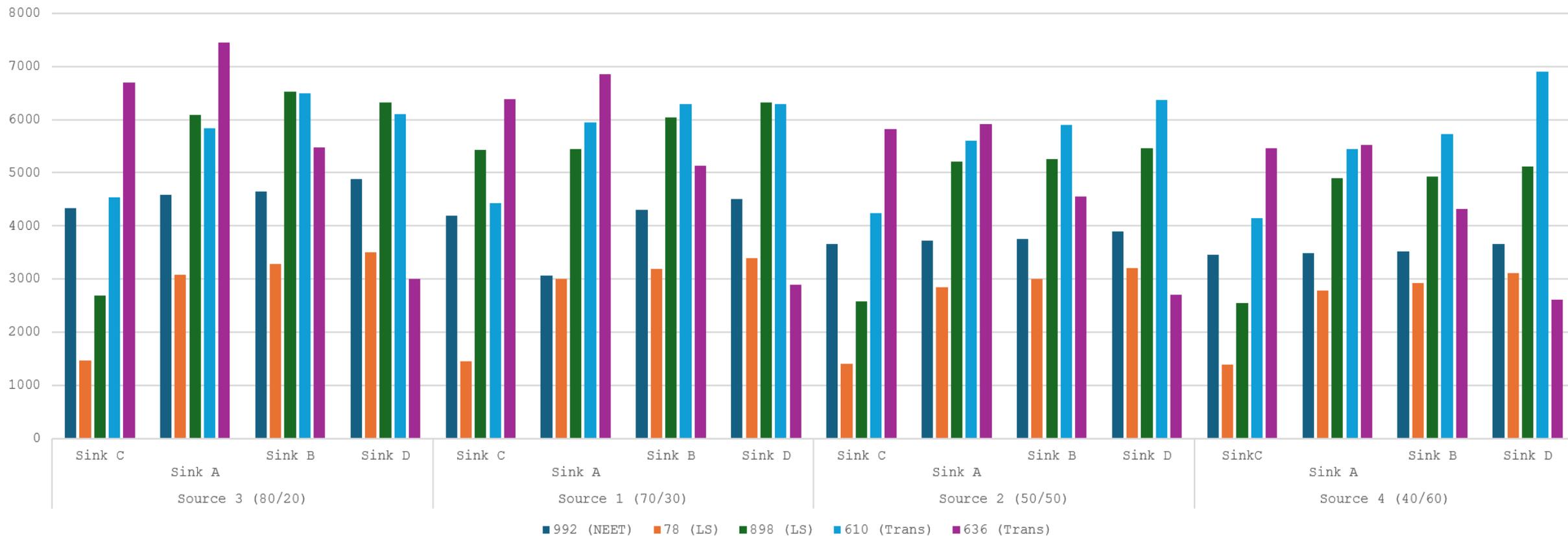
- All proposals offer similar concepts providing a new 765 kV source from Joshua Falls or Axton towards the Morrisville area
- Proposals 636 and 610 offer a 500kV reinforcement along the Dominion N-S 500kV corridor and through a load growth area as well as 500 or 765 kV reinforcement along the northern 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.

- 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.

## Regional Transfers and Dominion / APS Shortlist (from Nov 19<sup>th</sup> TEAC)

- 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.

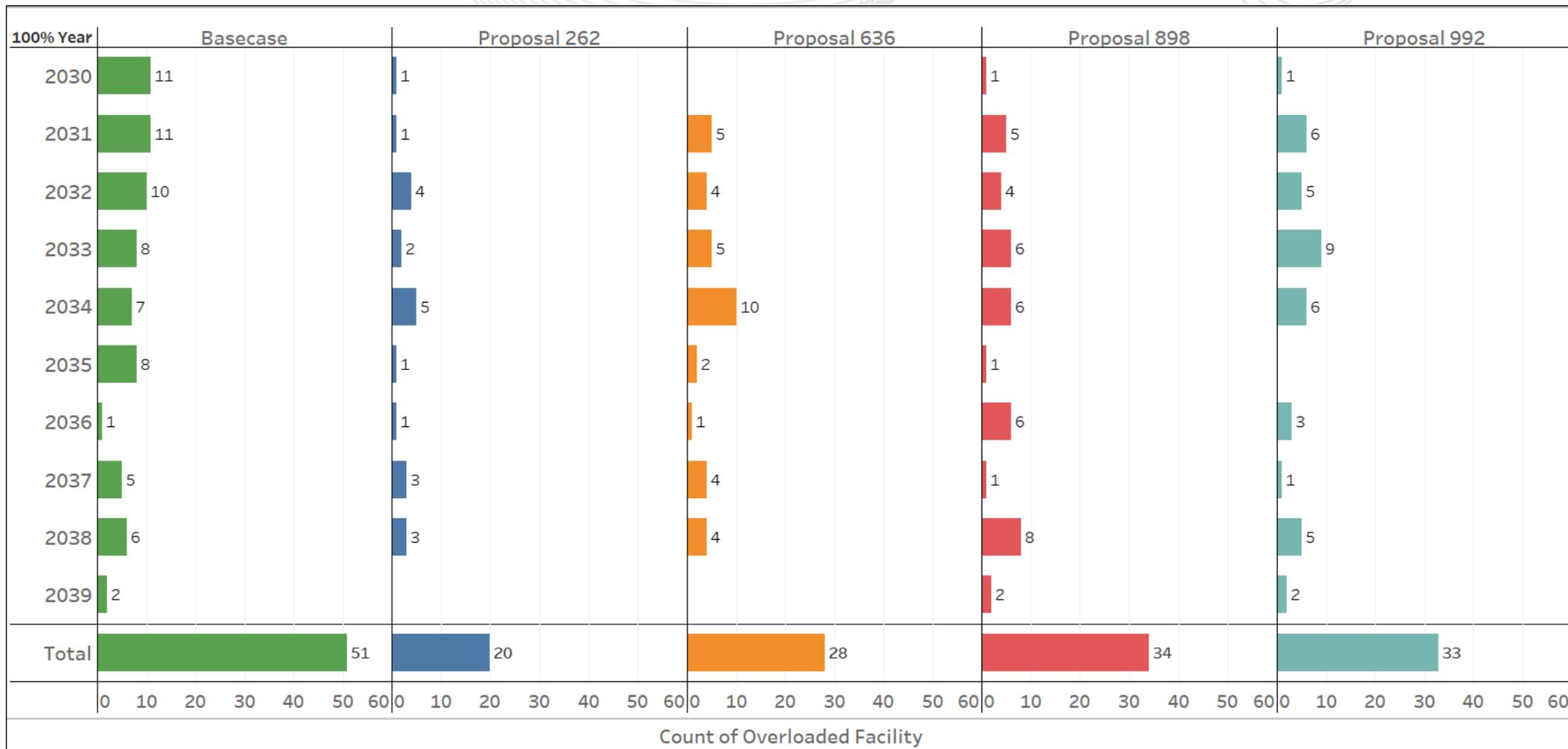


# 15 Year Analysis Result – 2024 RTEP

## 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
- Basecase 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
- Proposal assessment:
  - Key proposals: 262, 636, 898, and 992

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	6SEDGE 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	6CHARLVL	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	6SEDGE 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 – Key Proposals Details

## Current PJM Planning Manual M14B Process

From Bus	From Name	To Bus	To Name	CKT	KV's	Areas	Season	Contingency	100% Year				
									Basecase	262	636	898	992
206302	28OYSTER C	227955	CEDAR	1	230/230	228/234	Winter	Tower			2033	2033	2033
313818	6BENCHRCH	313866	6COPELAND	1	230/230	345/345	Summer	Single	2032	2034	2033	2033	2033
314690	6BLACK WALNU	314686	6CLOVER	1	230/230	345/345	Summer	Single	2031				
314747	6BREMO	313868	6CARTERV	1	230/230	345/345	Summer	Single	2030				
314747	6BREMO	313868	6CARTERV	1	230/230	345/345	Winter	Single	2031				
314282	6CARSON	314331	6POE	1	230/230	345/345	Summer	Single	2031			2033	
313868	6CARTERV	316335	AC2-165 TAP	1	230/230	345/345	Summer	Single	2030				
313868	6CARTERV	316335	AC2-165 TAP	1	230/230	345/345	Winter	Single	2031				
314285	6CHAPARRAL T	314316	6LOCKS	1	230/230	345/345	Summer	Single	2030				
314749	6CHARLV	314772	6PROFFIT	1	230/230	345/345	Winter	Single	2032				
314522	6CHCKTUK	313818	6BENCHRCH	1	230/230	345/345	Summer	Single	2030	2032	2031	2031	2031
314563	6CLUBHSE	313994	6OTTERDAM	1	230/230	345/345	Summer	Single				2031	2031
313052	6DESPER	313046	6LOUISA PUMP	1	230/230	345/345	Summer	Single	2032				
315684	6EDMONSON	314690	6BLACK WALNU	1	230/230	345/345	Summer	Single	2030				
315684	6EDMONSON	314690	6BLACK WALNU	1	230/230	345/345	Winter	Single	2032				
313178	6ENCLAVE	314435	6SAPONY	1	230/230	345/345	Summer	Single				2032	2032
314099	6GI1MRUN	314063	6MORRSVL	1	230/230	345/345	Summer	Tower					2030
314099	6GI1MRUN	314063	6MORRSVL	2	230/230	345/345	Summer	Tower					2033
314197	6LDYSMITH CT	313837	6SUMMIT	1	230/230	345/345	Summer	Single					2031
313046	6LOUISA PUMP	314766	6LOUISA	1	230/230	345/345	Summer	Single	2032				
313994	6OTTERDAM	313178	6ENCLAVE	1	230/230	345/345	Summer	Single	2031				
313714	6PERQUIMANS	314662	6S HERTFORD	1	230/230	345/345	Summer	Single	2034				
304070	6PERSON230 T	316281	AC2-100 TAP	1	230/230	340/345	Summer	Single	2033				
304070	6PERSON230 T	316281	AC2-100 TAP	1	230/230	340/345	Winter	Single	2031				
313727	6PIONEER	313728	6SANDLOT	2	230/230	345/345	Summer	Single					2032
314331	6POE	314263	6TYLER1	1	230/230	345/345	Summer	Single				2031	2032
314772	6PROFFIT	314759	6HOLLYMD	1	230/230	345/345	Winter	Single	2034				

From Bus	From Name	To Bus	To Name	CKT	KV's	Areas	Season	Contingency	100% Year					
									Basecase	262	636	898	992	
314662	6S HERTFORD	314651	6WINFALL	1	230/230	345/345	Summer	Single	2034					
314435	6SAPONY	314282	6CARSON	1	230/230	345/345	Summer	Single				2030	2031	
314697	6SEEDGE HILL	315684	6EDMONSON	1	230/230	345/345	Summer	Single	2030					
314697	6SEEDGE HILL	315684	6EDMONSON	1	230/230	345/345	Winter	Single	2032					
316218	AC1-221 TAP	314697	6SEEDGE HILL	1	230/230	345/345	Summer	Single	2031					
316218	AC1-221 TAP	314697	6SEEDGE HILL	1	230/230	345/345	Winter	Single	2030			2034		
316281	AC2-100 TAP	316218	AC1-221 TAP	1	230/230	345/345	Summer	Single	2032					
316281	AC2-100 TAP	316218	AC1-221 TAP	1	230/230	345/345	Winter	Single	2030			2034		
316335	AC2-165 TAP	314333	6POWHATN	1	230/230	345/345	Winter	Single	2031					
207930	BUSH	206242	28KITATINY	1	230/230	229/228	Summer	Single	2033	2034	2033	2033	2033	
227955	CEDAR	206302	28OYSTER C	1	230/230	234/228	Winter	Tower	2033	2033				
213519	CONOWG01	231006	COLOR_PE	1	230/230	230/235	Summer	Single	2031	2031	2031	2031	2031	
213520	CONOWG03	214218	NOTTNGH2	1	230/230	230/230	Summer	Single	2034	2034	2034	2034	2034	
207950	CUMB	208141	WIGR	1	230/230	229/229	Summer	Single	2033					
207968	ELIM	208109	SUNB	1	230/230	229/229	LL	Tower	2032	2032	2032	2032	2032	
207915	GLBR	208120	SU10	1	230/230	229/229	Summer	Tower		2030				
208004	JUNI	207950	CUMB	1	230/230	229/229	Summer	Single	2031					
208004	JUNI	207955	DAUP TR2	1	230/230	229/229	Summer	Single			2034	2031	2031	2031
208012	LMBE	208025	MACR	1	230/230	229/229	Summer	Single	2032	2032	2032	2032	2032	
290984	05BOKESCRK	242939	05MARYSV	1	345/345	205/205	LL	Single	2033	2032	2032	2032	2033	
242865	05JEFRSO	248000	06CLIFTY	1	345/345	205/206	Winter	Single	2034	2033	2034	2034	2034	
242527	05M FUNK	242524	05CLOVRD	1	345/345	205/205	LL	Single			2034			
242527	05M FUNK	242524	05CLOVRD	1	345/345	205/205	Summer	Single			2031			
235111	01 502 J	235103	01BLACKO	1	500/500	201/201	Summer	Single				2038	2039	2038
235102	01BELMNT	235235	01FLINTRUN	1	500/500	201/201	Summer	Single	2037					
235103	01BLACKO	235098	WOODSIDE	1	500/500	201/201	Summer	Single				2037	2039	2039
235105	01DOUBS	314939	8GOOSE CREEK	1	500/500	201/345	LL	Tower	2032				2036	

Resolved Remain New



# 15 Year Analysis – Key Proposals Details

## Current PJM Planning Manual M14B Process

From Bus	From Name	To Bus	To Name	CKT	KV	Areas	Season	Contingency	100% Year				
									Basecase	262	636	898	992
235105	01DOUBS	314939	8GOOSE CREEK	1	500/500	201/345	Summer	Tower	2033				
235105	01DOUBS	314939	8GOOSE CREEK	1	500/500	201/345	Winter	Tower	2037				
235107	01HARRSN	235112	01PRNTY	1	500/500	201/201	Summer	Single			2037		
235108	01HATFLD	235103	01BLACKO	1	500/500	201/201	Winter	Single				2038	
235117	01KAMMER	235111	01 502 J	1	500/500	201/201	Summer	Single	2035				
235110	01MDWBRK	313440	8VINHIL	1	500/500	201/345	Summer	Single	2037				
313403	8ASPEN	314933	8BRAMBLETON	1	500/500	345/345	Winter	Single	2037				
314901	8BATH CO	314987	8LEXINGTN SC	1	500/500	345/345	Summer	Single	2036	2038	2038	2038	2038
314901	8BATH CO	314991	8VALLEY SC	1	500/500	345/345	Summer	Single		2038	2038	2038	2033
314901	8BATH CO	314991	8VALLEY SC	1	500/500	345/345	Summer	Tower					2038
314901	8BATH CO	314991	8VALLEY SC	1	500/500	345/345	Winter	Single	2035				
314901	8BATH CO	314991	8VALLEY SC	1	500/500	345/345	Winter	Tower	2038				
314941	8BISMARK	235098	WOODSIDE	1	500/500	345/201	Summer	Single	2039				
314941	8BISMARK	235098	WOODSIDE	1	500/500	345/201	Summer	Tower	2039				
314910	8CUNINGHAM	314908	8ELMONT	1	500/500	345/345	Summer	Single	2038				
314910	8CUNINGHAM	313378	8VONTAY	1	500/500	345/345	Summer	Single			2037		
314907	8DOOMS	55047	MTIDA500	1	500/500	345/205	Summer	Single					2039
314929	8FRONT ROYAL	314916	8MORRSVL	1	500/500	345/345	Summer	Single		2037	2034	2034	2033
314929	8FRONT ROYAL	314916	8MORRSVL	1	500/500	345/345	Winter	Single	2034				
314935	8HERITAGE	314936	8RAWLINGS	1	500/500	345/345	Summer	Single	2035				
314935	8HERITAGE	314936	8RAWLINGS	1	500/500	345/345	Winter	Single	2038				
314912	8LEXINGTN	314907	8DOOMS	1	500/500	345/345	Summer	Single	2033				
314937	8MT STORM2	314941	8BISMARK	1	500/500	345/345	Summer	Single	2037				
314936	8RAWLINGS	314902	8CARSON	1	500/500	345/345	Summer	Single	2030	2036	2033	2033	2033
314936	8RAWLINGS	314902	8CARSON	1	500/500	345/345	Winter	Single	2034			2037	
314940	8ROGERS RD	314902	8CARSON	1	500/500	345/345	Summer	Single	2030	2037	2034	2033	2034
314940	8ROGERS RD	314902	8CARSON	1	500/500	345/345	Winter	Single	2035				

From Bus	From Name	To Bus	To Name	CKT	KV	Areas	Season	Contingency	100% Year				
									Basecase	262	636	898	992
314991	8VALLEY SC	314926	8VALLEY	1	500/500	345/345	Summer	Single		2038	2038	2038	2033
314991	8VALLEY SC	314926	8VALLEY	1	500/500	345/345	Summer	Tower					2038
314991	8VALLEY SC	314926	8VALLEY	1	500/500	345/345	Winter	Single	2035				
314991	8VALLEY SC	314926	8VALLEY	1	500/500	345/345	Winter	Tower	2038				
703500	MARSH500	314916	8MORRSVL	1	500/500	345/345	Summer	Single				2036	
703500	MARSH500	314916	8MORRSVL	1	500/500	345/345	Summer	Tower				2038	
703500	MARSH500	314916	8MORRSVL	2	500/500	345/345	Summer	Single				2036	
703500	MARSH500	314916	8MORRSVL	2	500/500	345/345	Summer	Tower				2038	
235098	WOODSIDE	235105	01DOUBS	1	500/500	201/201	Summer	Single	2031		2035	2036	2036
235098	WOODSIDE	235105	01DOUBS	1	500/500	201/201	Summer	Tower	2030		2034	2035	2034
235098	WOODSIDE	235105	01DOUBS	1	500/500	201/201	Winter	Tower	2038				
235098	WOODSIDE	235105	01DOUBS	2	500/500	201/201	Summer	Single			2034		2034
235098	WOODSIDE	314939	8GOOSE CREEK	1	500/500	201/345	Summer	Single	2035				
242512	05CLOVRD	290614	05CLOVRD_RJO	Z1	765/765	205/205	Summer	Single			2031		
242512	05CLOVRD	290614	05CLOVRD_RJO	Z1	765/765	205/205	Summer	Tower			2033		
242512	05CLOVRD	290614	05CLOVRD_RJO	Z1	765/765	205/205	Winter	Single			2031		
242512	05CLOVRD	290614	05CLOVRD_RJO	Z1	765/765	205/205	Winter	Tower			2034		
290610	05CLOVRD_RJA	242512	05CLOVRD	Z1	765/765	205/205	Summer	Single		2037	2034	2038	2037
290610	05CLOVRD_RJA	242512	05CLOVRD	Z1	765/765	205/205	Summer	Tower			2032		
242514	05J.FERR	290610	05CLOVRD_RJA	1	765/765	205/205	Summer	Single			2037		
242514	05J.FERR	290610	05CLOVRD_RJA	1	765/765	205/205	Summer	Tower			2035		
290623	05KAMMER_RG	242925	05KAMMER	Z1	765/765	205/205	Summer	Single	2038				
242928	05MARYSV	290620	05MARYSVL_RM	Z1	765/765	205/205	Summer	Single	2035				
290608	05MARYSVL_RS	242928	05MARYSV	Z1	765/765	205/205	Summer	Single	2039				
290608	05MARYSVL_RS	242928	05MARYSV	Z1	765/765	205/205	Summer	Tower	2033	2034	2034	2034	2034
290608	05MARYSVL_RS	242928	05MARYSV	Z1	765/765	205/205	Winter	Single	2035	2035	2036	2036	2036
290616	05WYOMING_RC	242517	05WYOMIN	Z1	765/765	205/205	Summer	Single				2036	2036
290616	05WYOMING_RC	242517	05WYOMIN	Z1	765/765	205/205	Winter	Single				2038	2038

Resolved Remain New

# 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 Spring-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: \$5.92B (PJM-Wide and as submitted cost – approximately) – 3<sup>rd</sup> Party Cost estimate of \$6.29B.



PJM Proposal ID	Project Title/Description	Project Submittal Responsibility
967 Modified	<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
820 Modified	<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
708	John Amos-Welton Springs-Rocky Point 765 kV (Northern Corridor)	First Energy
551	Woodside/Chanceford 500 kV terminal swap at Doubs	First Energy
81	AEP incumbent upgrades for Portfolio #1, 2 and 3	Transource
24 Modified	<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
781 Modified	<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
617 Component	<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: ~ \$4,647.0 M



# 2024 RTEP Window 1 – Total Cost

Region	Comp (\$M)	Non-Comp (\$M)	Independent Cost (\$M)
Regional Transfers	4545.7		4921.9
Regional –Short Circuit		100.8	
DOM	216.8	74.7	216.8
MAAC	187.5	107.2	187.5
AMPT		12	
AEP	342.0	44.7	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>5539.8</b>	<b>379.8</b>	<b>5792.3</b>

Total 2024 RTEP W1 Costs:

As-submitted (Comp + Non-Com) = \$5,539.8 + \$379.8 = \$5,919.6 M

Independent Cost Estimate = \$5,909.0 + \$379.8 = \$6,288.8 M

# Required In Service Date Adjustments

# Required IS Date Change

- The Required In-Service Date for the listed projects below must be advanced by one year to address the reliability requirements outlined in the 2028 Regional Transmission Expansion Plan (RTEP).
  - Juniata 500 kV Expansion/Reconfiguration 2024-W1-935 (b3909.1)
    - Current Required In-Service: 6/1/2029
    - Revised In-Service: 6/1/2028
  - Yorkana & Windsor 115kV Reconfiguration (b3858.1-.2)
    - Current Required In-Service: 6/1/2029
    - Revised In-Service: 6/1/2028
  - North Philadelphia – Waneeta 230kV & Richmond – Waneeta 230kV (b3907.2-.3)
    - Current Required In- Service: 6/1/2029
    - Revised In-Service: 6/1/2028

## Required IS Date Change (Cont.)

- Federal Street - Springdale 138 kV Line Terminal Upgrades (b3870.1)
  - Current Required In-Service: 6/1/2029
  - Revised In-Service: 6/1/2028

# Recommended Solutions 2<sup>nd</sup> Read for Local Solutions



# OVEC Transmission Zone: Baseline Kyger Creek Upgrades

**Process Stage:** Recommended Solution

**Criteria:** Summer Gen Deliv

**Assumption Reference:** 2024 RTEP assumptions

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

**Proposal Window Exclusion:** Substation Equipment Exclusion

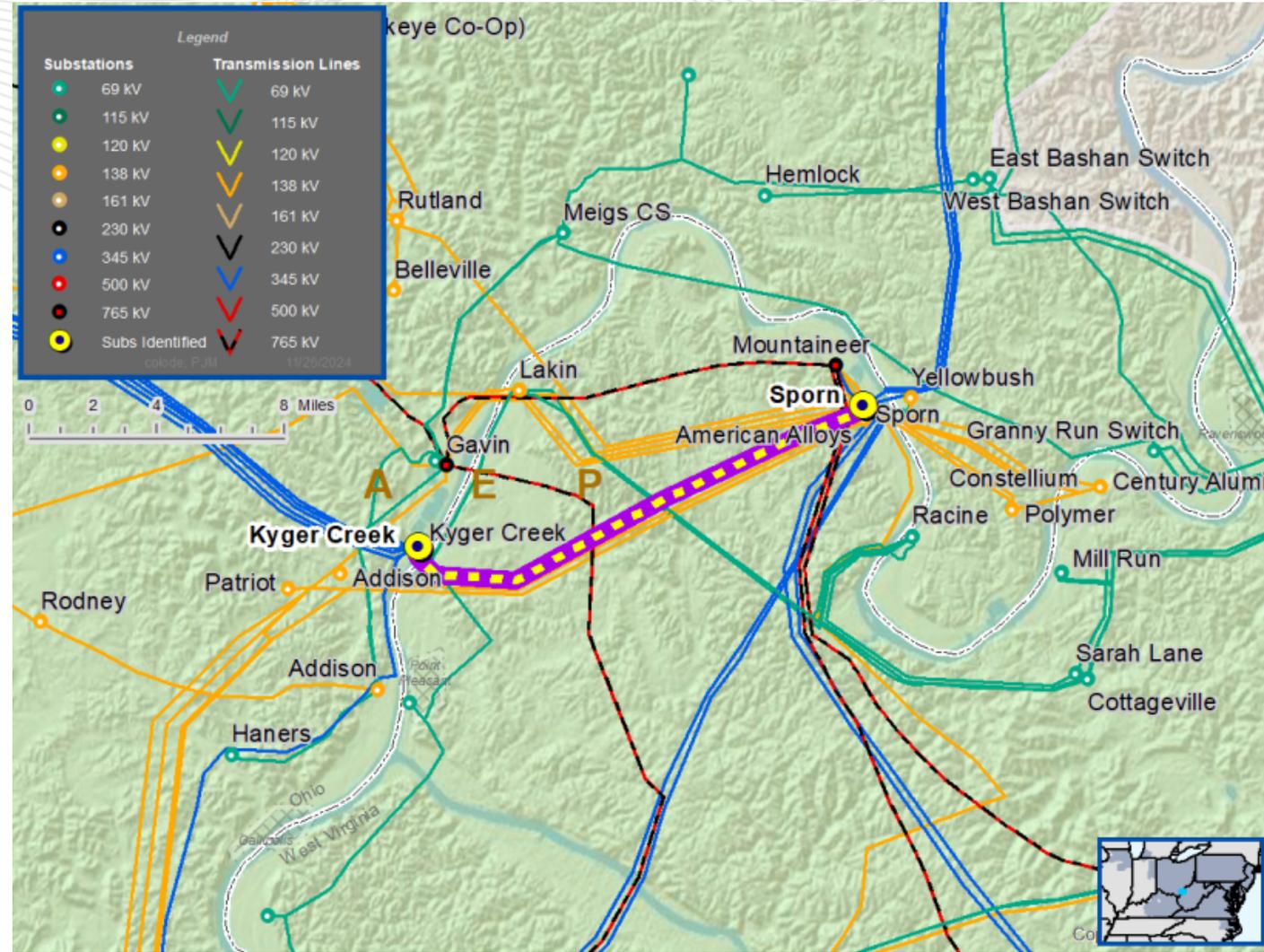
**Problem Statement:**

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. (B3899.1)

**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

**Previously Presented:** 12/3/2024

**Existing:**



**Proposed:**



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



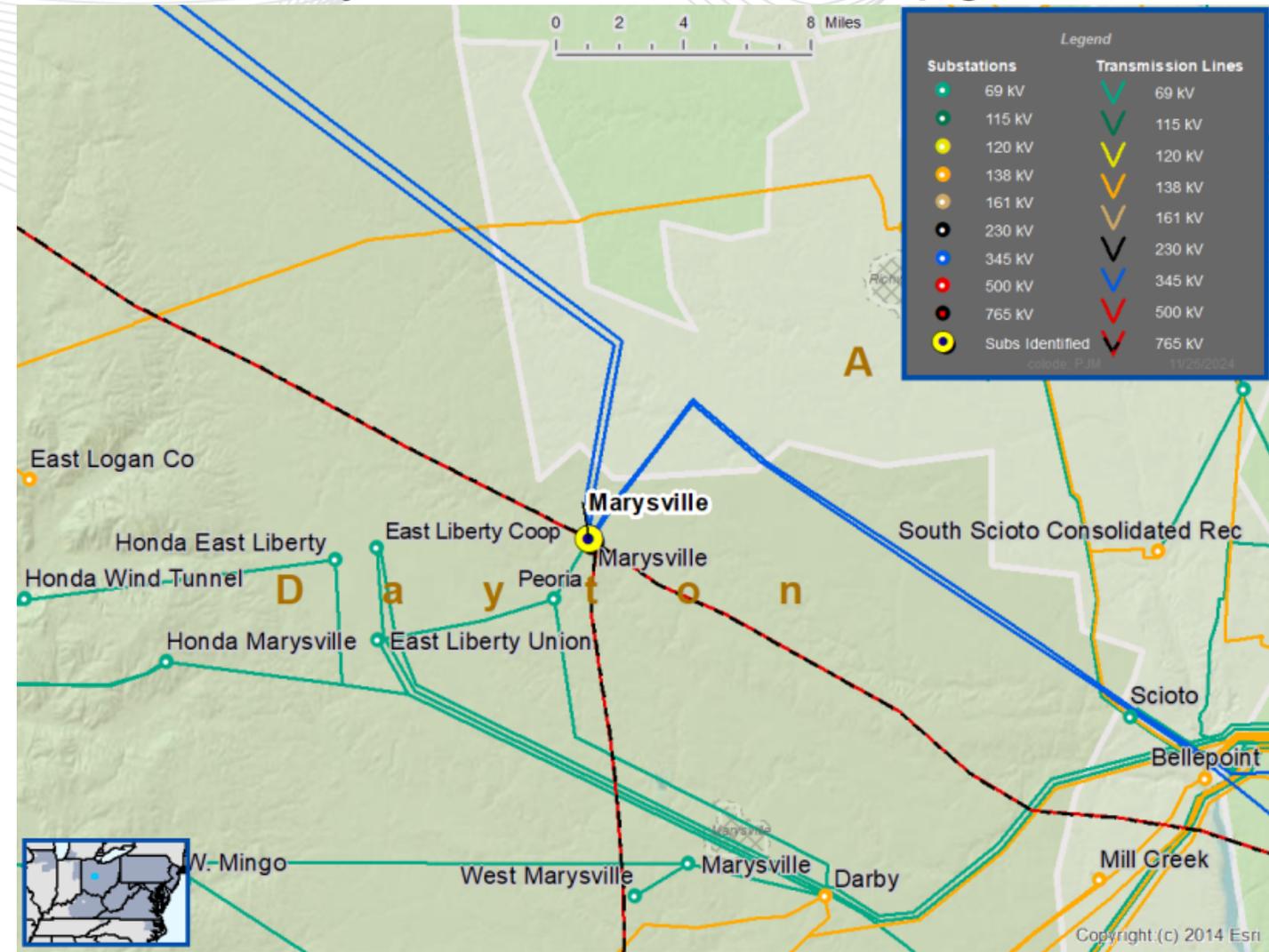
# AEP Transmission Zone: Baseline Marysville Substation Upgrades

**Process Stage:** Recommended Solution  
**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 - Marysville (765)	4047/4142/4484/4961





# AEP Transmission Zone: Baseline Marysville Substation Upgrades

## Recommended Solution:

Replace Marysville 765kV breakers B2 and B with 5000A 50KA breakers and upgrade the existing wave trap towards Sorenson at Marysville substation. (B3878.1)

**Estimated Cost:** \$10M

**Preliminary Facility Rating:**

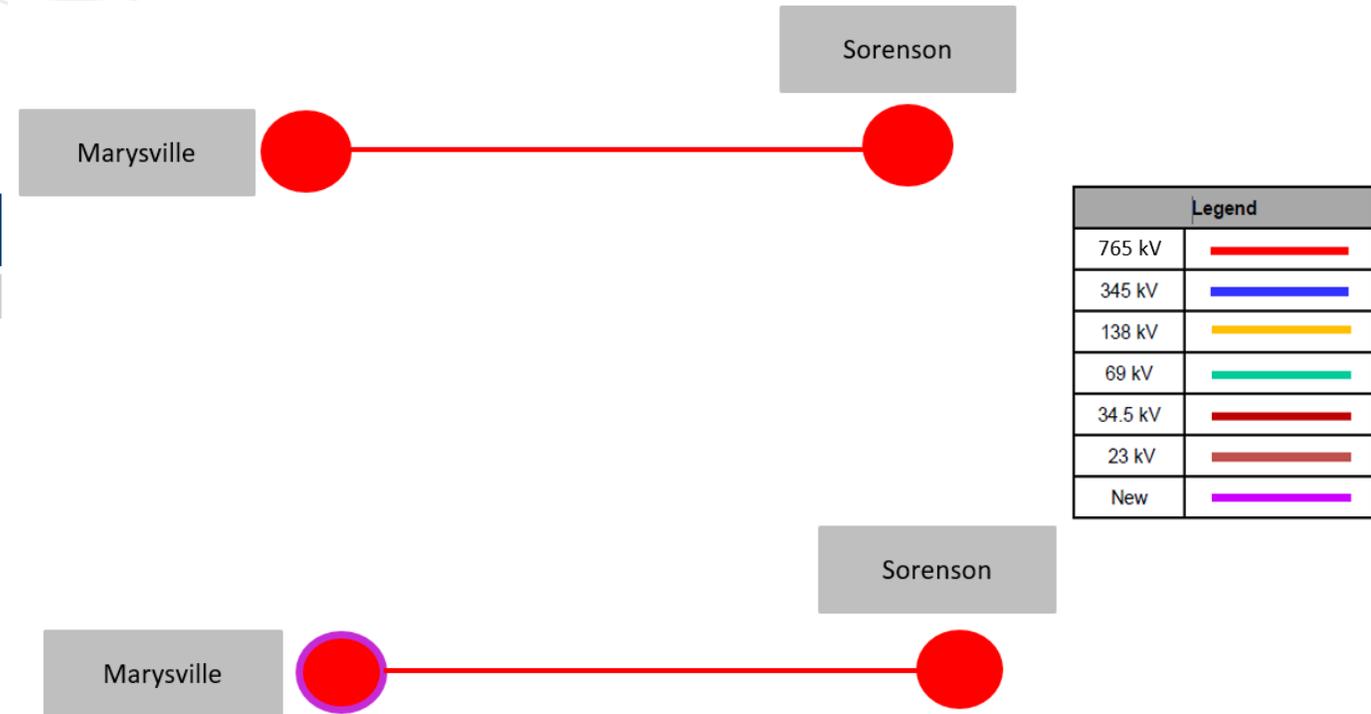
Branch	SN/SE/WN/WE (MVA)
Marysville_RS - Marysville (765)	5351/5351/5351/5351

**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

**Previously Presented:** 12/3/2024





# AEP Transmission Zone: Baseline

## Clusters AEP- 3, 4, 5

**Process Stage:** Recommended Solution

**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

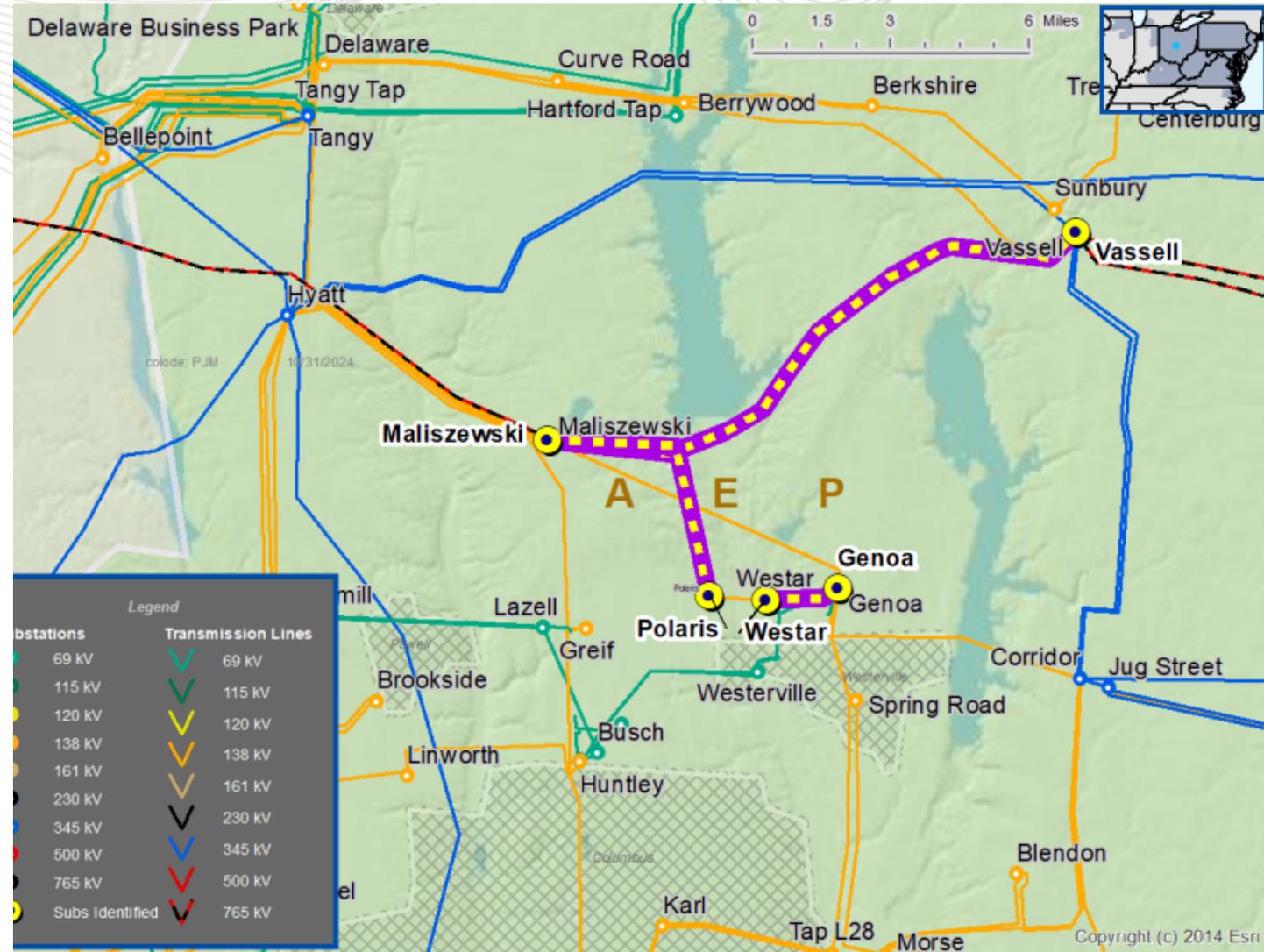
In 2029 RTEP summer case, the Genoa – Westar 138kV line is overloaded for multiple N-1-1 contingency pairs.

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 - 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:**

	<b>Proposal</b>	<b>Estimate Cost (\$M)</b>
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 Creak – 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 (All upgrades except the 0.18 mile double circuit line extension at Corridor is green field) addresses all of them.



# AEP Transmission Zone: Baseline

## Clusters AEP- 3, 4, 5

### Recommended 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. Loop the existing Hyatt - West Millersport 345 kV line into the new established 345 kV yard at the Maliszewski station. **(B3919.1) Estimated Cost: \$79.736M**

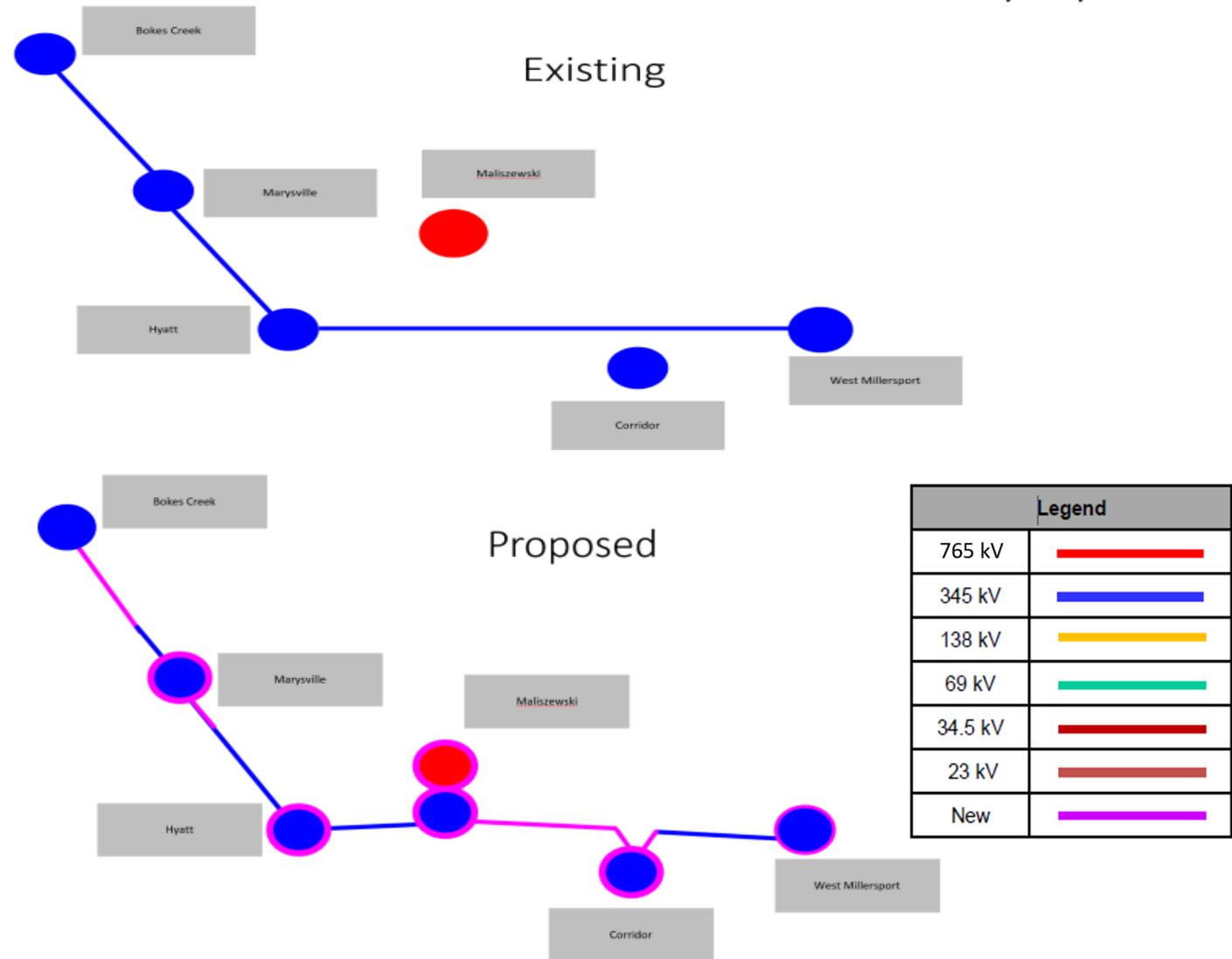
Establish a 0.18 mile double circuit 345 kV line extension to cut the existing Hyatt – West Millersport 345 kV line in and out of Corridor station. **(B3919.2) Estimated Cost: \$3.101M**

Install three new 345 kV breakers at Corridor station in order to accommodate the cut in of the Hyatt- West Millersport 345 kV line. **(B3919.3) Estimated Cost: \$ 5.521M**

Reconductor 10.2-mile of Maliszewski-Corridor 345 kV line. **(B3919.4) Estimated Cost: \$18.301M**

Reconductor 4.75-miles of the existing Bokes Creek-Marysville 345 kV circuit. Update the associated relay settings. **(B3919.5) Estimated Cost: \$6.668M**

Rebuild 4.4-miles of the existing Marysville - Hyatt 345 kV double circuit line where it extends into Marysville station. **(B3919.6) Estimated Cost: \$26.256M**





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

## Recommended Solution: 2024-W1-408

Upgrade 345 kV breakers K & K1 along with associated switches and conductor to 5000A at Hyatt Station. (B3919.7) **Estimated Cost: \$2.944M**

Upgrade the relaying and associated equipment at West Millersport station to coordinate with the cut in work to Corridor station. (B3919.8) **Estimated Cost: \$0.410M**

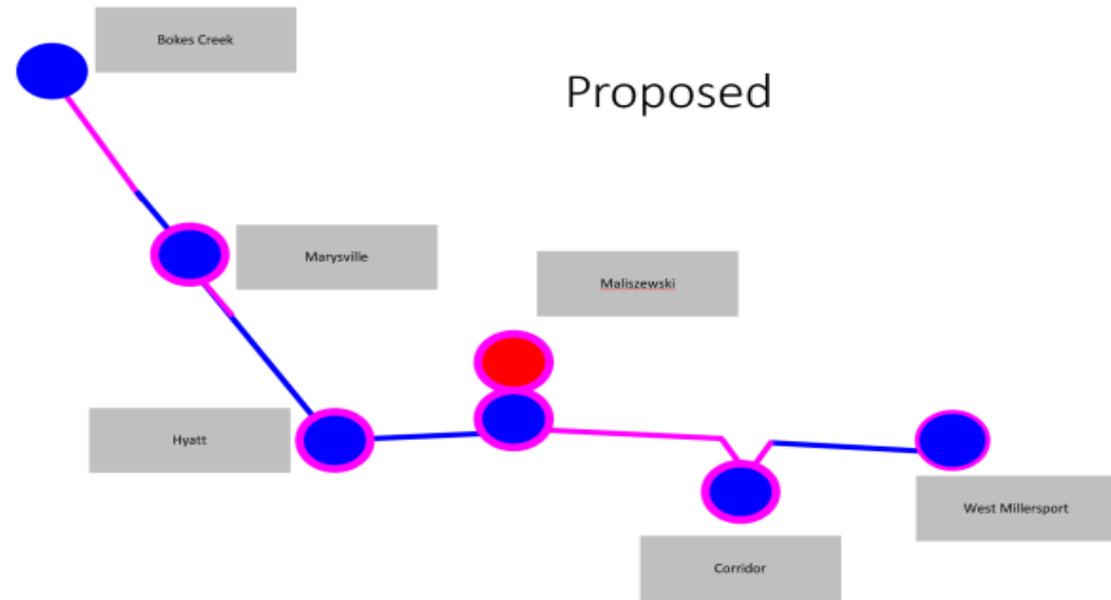
Upgrade 3000A 345 kV breaker 'L2' along with associated terminal elements to 5000A at Marysville. (B3919.9) **Estimated Cost: \$2.558M**

**Total Estimated Cost: \$145.494 M**

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

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

**Previously Presented: 12/3/2024**



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

### Convert S3006 into baseline (B3919.10) (Manual 14B section 1.4.2)

S3006: Need date – 5/9/2023, Solution Date -10-31-2023, included in 2023 2023 local plan

S3006 scope: Rebuild ~19.0 miles of Hyatt – Marysville 345kV line using 4-bundled 795 ACSR conductor Bold construction (**This is an EOL rebuild.**)

**Estimated Cost: \$116.7M**

2029 RTEP base case already have S3006 modeled (with higher rating). Without S3006, Hyatt – Marysville 345kV line would have been overloaded in the 2029 RTEP base case. Therefore, S3006 should be converted into Baseline.

**B3919.10:** Conversion of S3006, Rebuild ~19.0 miles of Hyatt – Marysville 345kV line using 4-bundled 795 ACSR conductor Bold construction

**Estimated Cost: \$116.7 M**

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

**Projected IS Date: 6/1/2027**



BOUNDLESS ENERGY

**Need Number:** AEP-2023-OH072

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 11/28/2023

**Previously Presented:**

Solutions Meeting 10/31/2023

Need Meeting 5/9/2023

**Supplemental Project Driver:** Equipment Material/Condition/Performance/Risk

**Specific Assumption Reference:** AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

**Problem Statement:** Paper Expanded/Air Expanded (PE/AE) Lines in AEP

#### Marysville- Hyatt 345kV Line PE Conductor Need

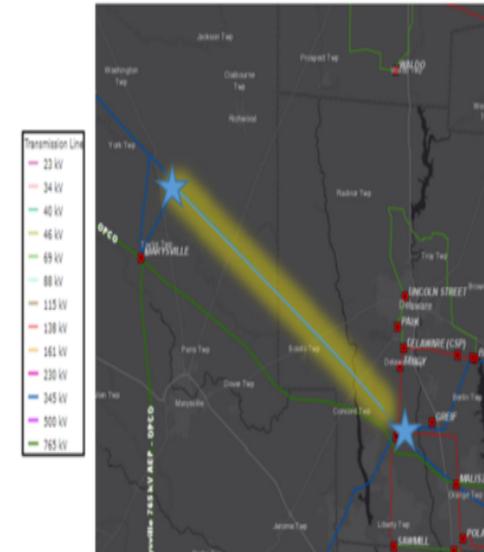
- Marysville-Hyatt is a 345kV double circuit line. The majority of structures (78%) are 1955 vintage lattice steel type. Conductors on the Marysville-Tangy-Hyatt 345kV line:
  - 14.05 miles of 1,275,000 CM ACSR/PE Conductor
  - 5.14 miles of 1,414,000 CM ACSR/PE Conductor
  - 0.04 miles of 1,414,000 CM ACSR/PE Conductor
- Since 2018, there have been 3 momentary and 2 permanent outages on the Marysville – Tangy 345kV circuit.
- Currently, there are 16 structures with at least one open hardware condition, which relates to 20% of the structures on the line segment. There are currently 18 open hardware conditions specifically affecting dead end insulators, suspension insulators, and a corona ring including burnt, broken, and chipped.

#### 1.4.2 Coordination of Baseline Upgrades, Supplemental Projects and Customer-Funded Upgrades

Changes to the transmission system are incorporated into the RTEP base case based on the process drivers outlined in section 1.4.1 above in the form of three different types of upgrades or projects: 1) baseline upgrades (see sections 1.4.1.1 – 1.4.1.4); 2) Supplemental Projects (see sections 1.4.1.5); and 3) Customer-Funded Upgrades (see sections 1.4.1.6).

During the course of reviewing any upgrade or project, PJM will work with stakeholders to identify any upgrades or projects, or portions thereof that interact electrically. By doing so, PJM is able to determine the proper classification of a project based on one or more types of drivers, as well as develop the more efficient or cost-effective solutions.

### AEP Transmission Zone M-3 Process Central Ohio



Central Ohio



**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	N/A	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)

- 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	Submitted 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 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)

**Recommended Solution: Proposal #605 (Revised)** Rebuild the 7.46 miles of Avery - Shinrock 138 kV Line with 795 kcmil 26/7 ACSS (7.46 miles) (\$15.2M) (b3925.1).

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) (b3925.2).

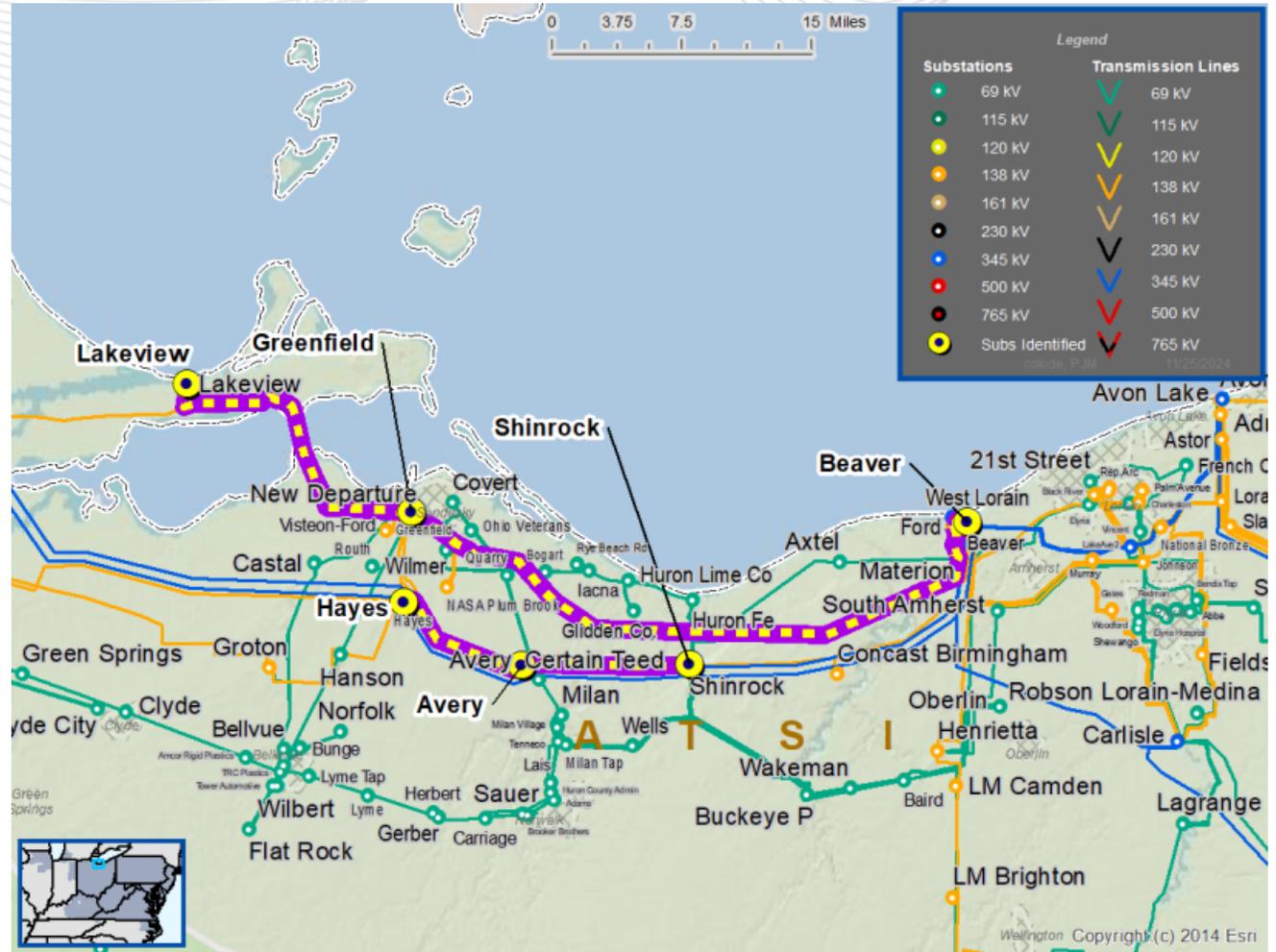
Rebuild the 6.5 miles of Avery-Hayes 138 kV Line with 795 kcmil 26/7 ACSS conductor (\$11.01M) (b3925.3).

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) (b3925.4).

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

**Existing Facility Rating:**

Branch	SN/SE/WN/WE (MVA)
Avery to Shinkrock 138 kV	233/282/263/333
Greenfield to Lakeview 138 kV	267/352/360/456
Hayes to Avery 138 kV	278/339/315/401
Greenfield to Beaver 138 kV Corridor	
-Greenfield – New Departure	200/242/226/286
-New Departure – BrightWell	189/230/226/249
- Brightwell – Ford	189/230/219/278
- Greenfield – NASA	160/192/180/228
- NASA – Beaver	160/192/180/228
- Oakpoint – Beaver	278/314/315/343
- Oakpoint - Ford	278/339/226/286



## Recommended Solution (Cont): Proposal #605 (Revised)

### Preliminary Facility Rating:

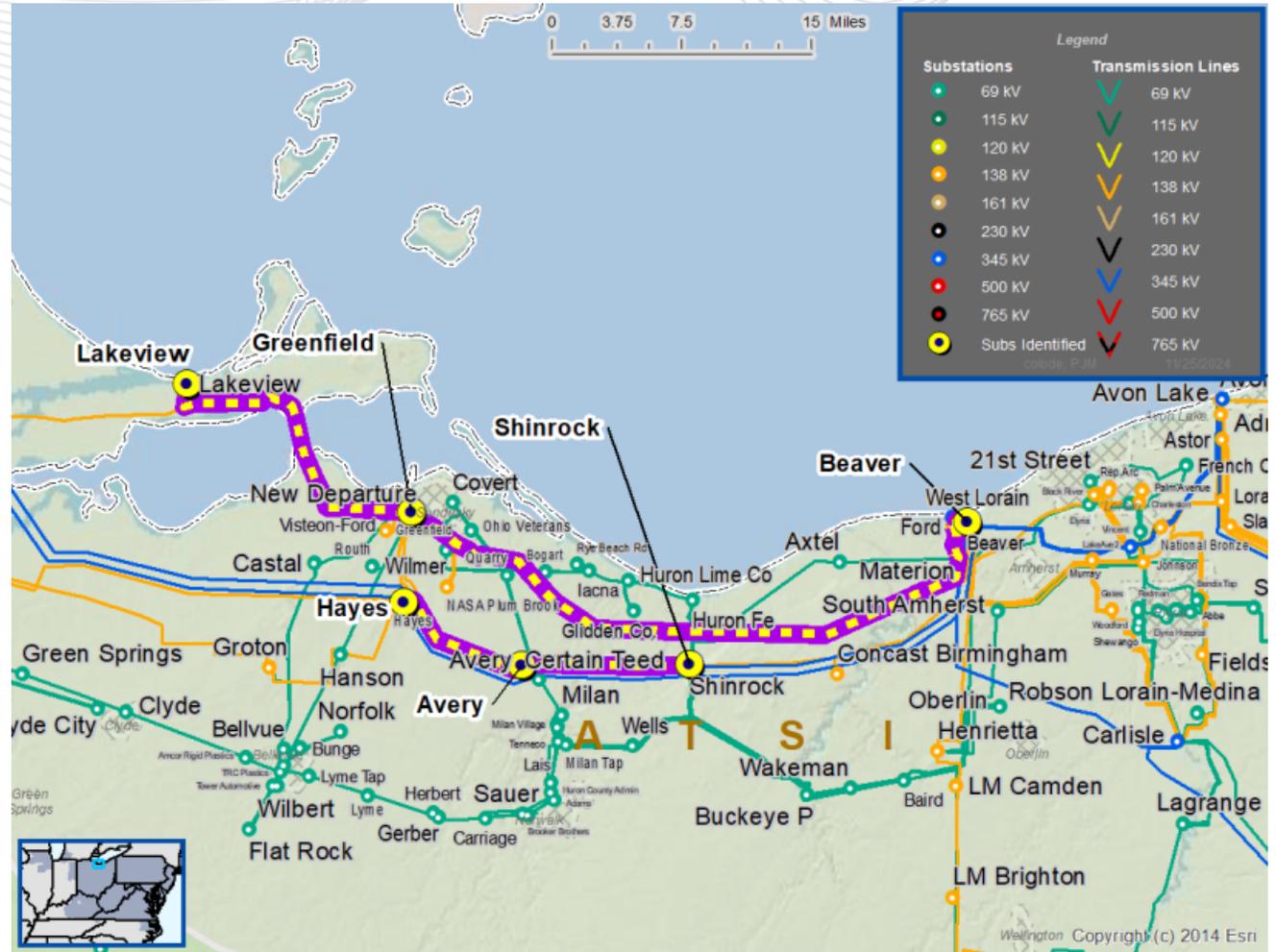
Branch	SN/SE/WN/WE (MVA)
Avery to Shinkrock 138 kV	448/516/448/543
Greenfield to Lakeview 138 kV	448/516/448/543
Hayes to Avery 138 kV	448/516/448/543
Greenfield to Beaver 138 kV Corridor -Greenfield – New Departure -New Departure – BrightWell - Brightwell – Ford  - Greenfield – NASA - NASA – Beaver  - Oakpoint – Beaver - Oakpoint - Ford	448/516/448/543

### 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 70-100 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:** Second Review

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

**Assumption Reference:** FERC 715 Planning Criteria

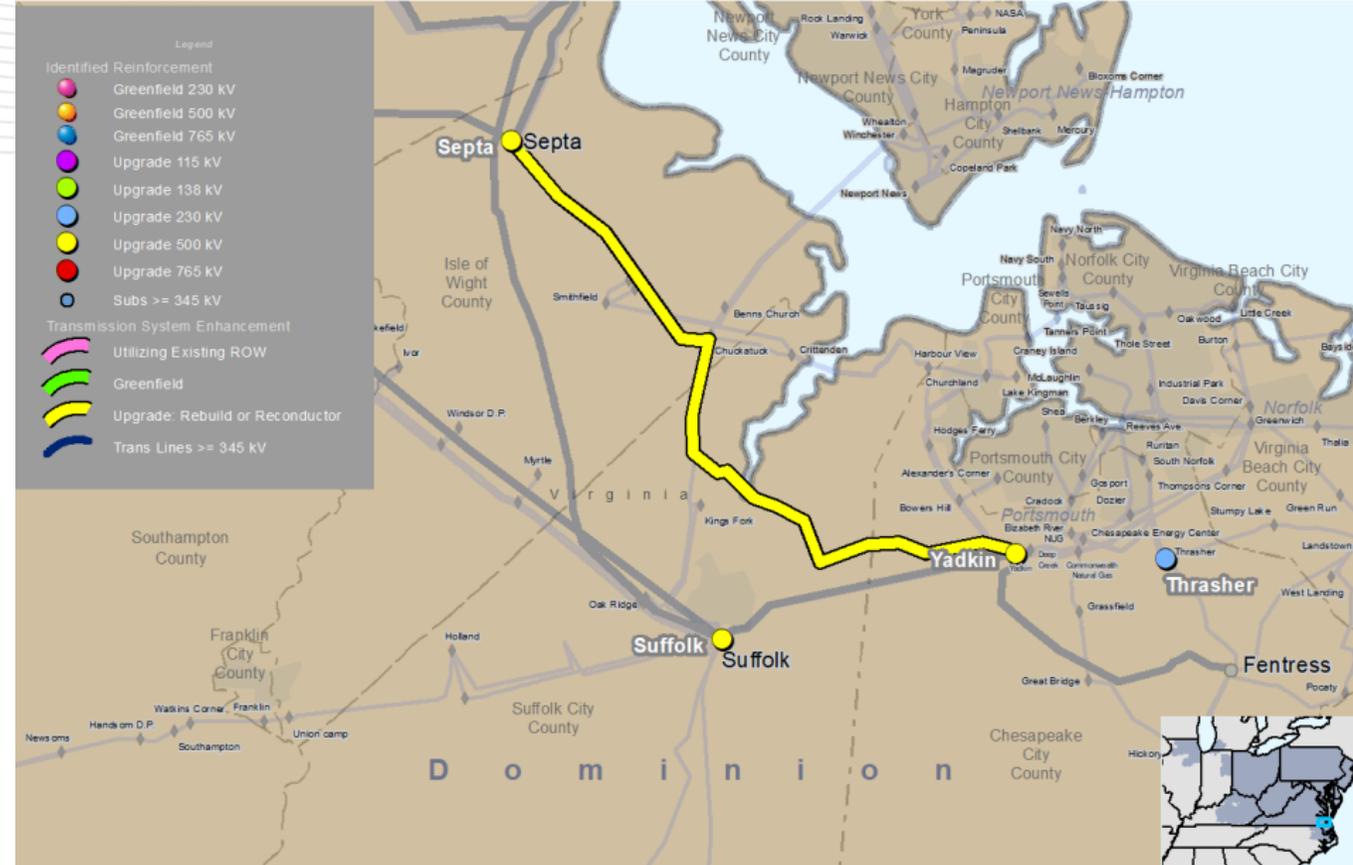
**Model Used for Analysis:** 2024 Series 2029 RTEP cases

**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)

**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



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

## 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

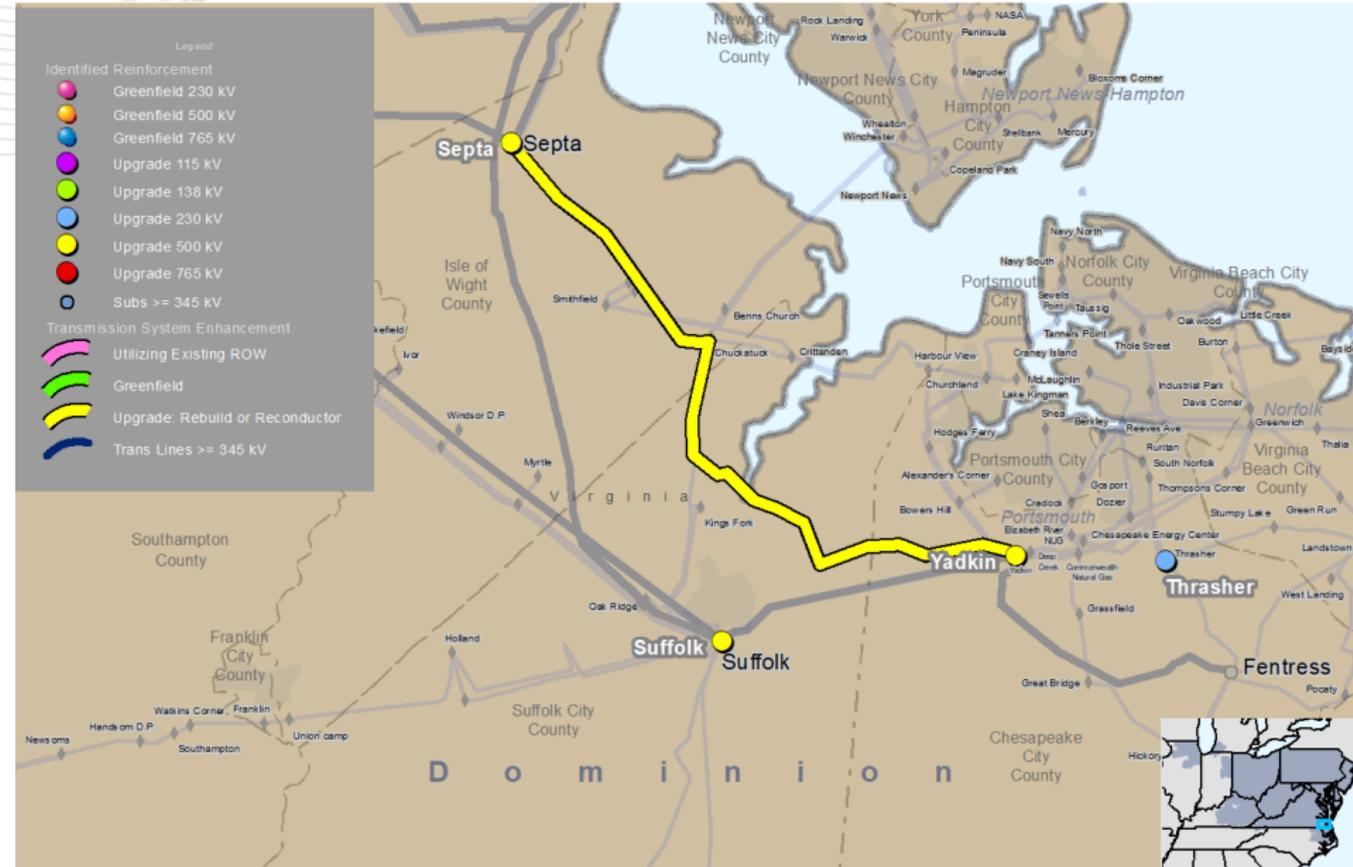
## Recommended Solution: Proposal 2024-W1-980:

- Rebuild approximately 33.09 miles of 500 kV line #579 from structure 579/1 inside Septa substation to structure 579/193 inside Yadkin substation.  
**Estimated Cost: \$191.25M (b3929.1)**
- Rebuild approximately 7.7 miles of 230kV Line #2110 Suffolk – Thrasher that share the double circuit towers under Line #579. **Estimated Cost: \$21.25M (b3929.4)**
- At Septa substation, upgrade CB (579T586), breaker switches (56288, 57985, 58688 & 57988), and line leads to 5000A rating to support Line #579 rebuild. **Estimated Cost: \$3.84M (b3929.2)**
- At Yadkin substation, upgrade line leads to 5000A rating to support Line #579 rebuild. **Estimated Cost: \$0.44M (b3929.3)**

**Estimated Cost: \$216.78 M**

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

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



# Cancellation

# ATSI Transmission Zone: Baseline b3721 Cancellation: Avery – Hayes 138 kV line

**B3721:** Previously presented on 10/14/2022 SRRTEP-W

**Problem Statement:** 2022W1-GD-S1030

In 2027 RTEP Summer case, Hayes to Avery 138 kV line is overloaded due to a tower contingency

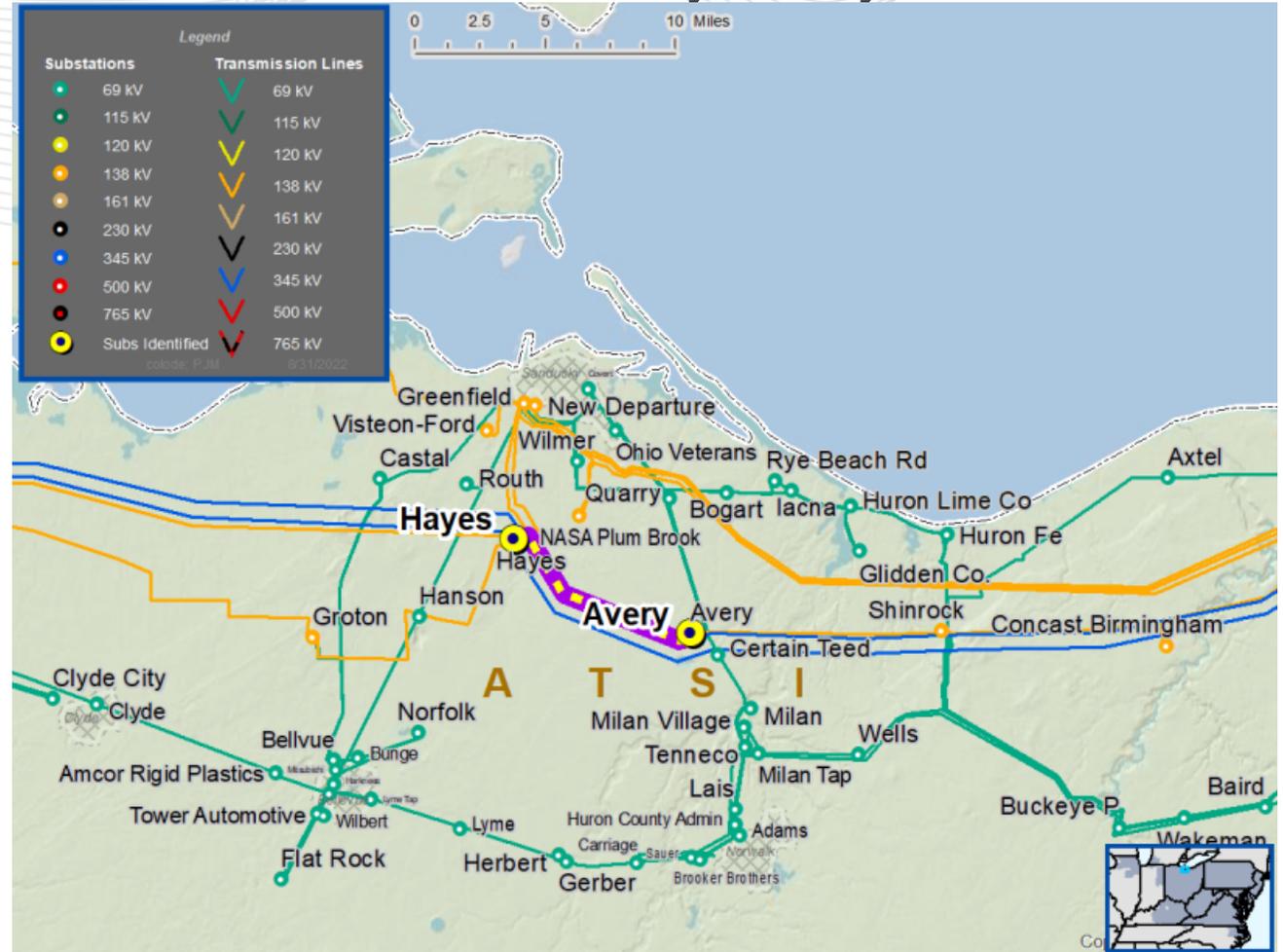
**Recommended Solution:**

Rebuild and re-conductor the Avery-Hayes 138 kV line (approx. 6.5 miles) with 795 KCMIL 26/7 ACSR (b3721)

**Transmission Estimated Cost:** \$10.4M

**Ancillary Benefits:** Capacity increase for future growth

**Alternatives:** None





# ATSI Transmission Zone: Baseline b3721 Cancellation: Avery – Hayes 138 kV line

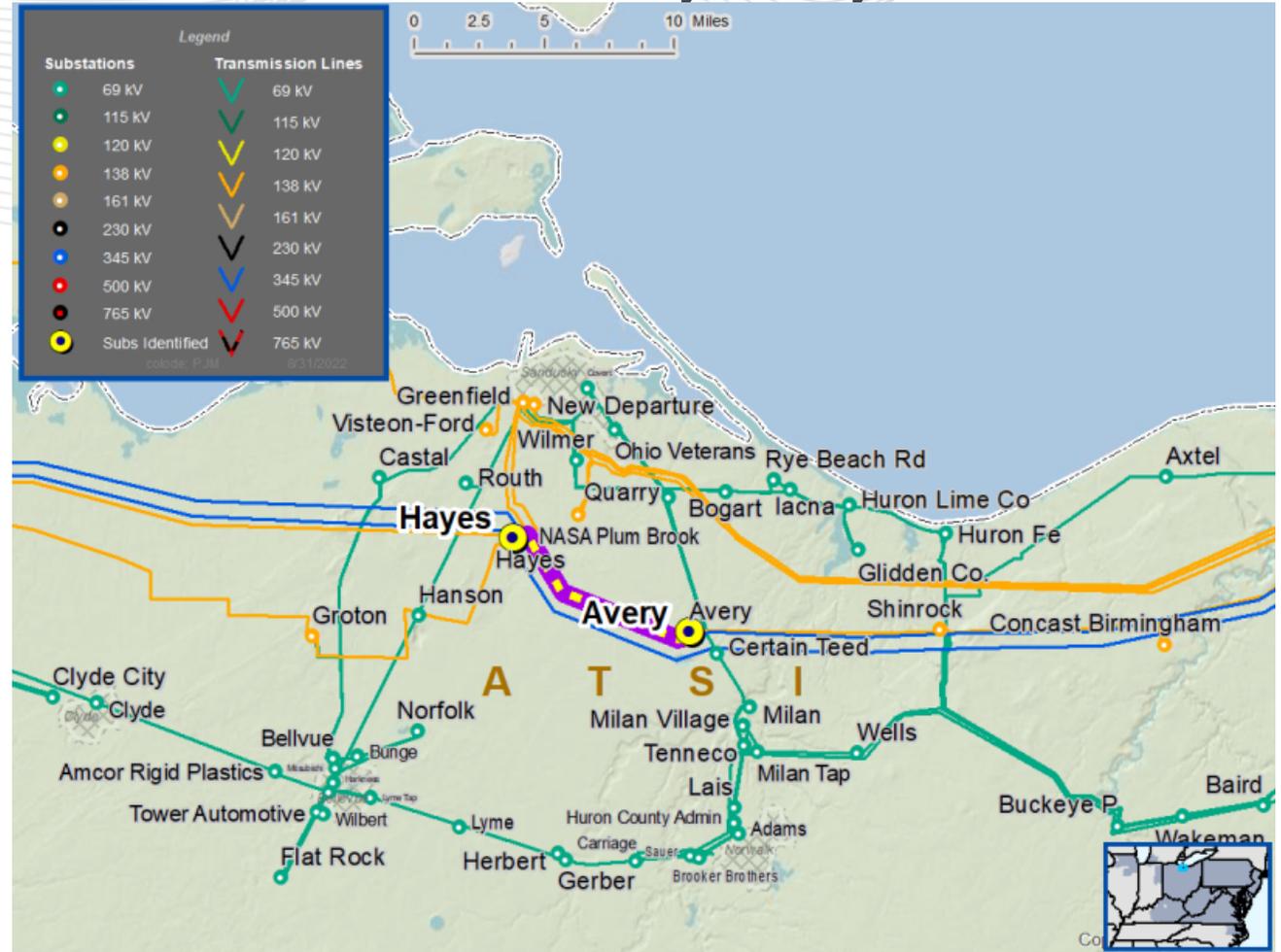
## Facility Ratings:

	Branch	SN/SE/WN/WE (MVA)
Existing Ratings		233/282/263/333
Ratings Upon Completion of b3721	Hayes to Avery 138 kV	278/339/315/401
Ratings Upon Completion of W1-605		448/516/448/543

Required in-service date: 6/1/2027

Projected in-service date: 6/1/2027

**Reason for Cancellation:** b3925.3 (2024 Window 1, proposal 605) will supersede b3721 with higher ratings. The projected and required in-service date will be 6/1/2027



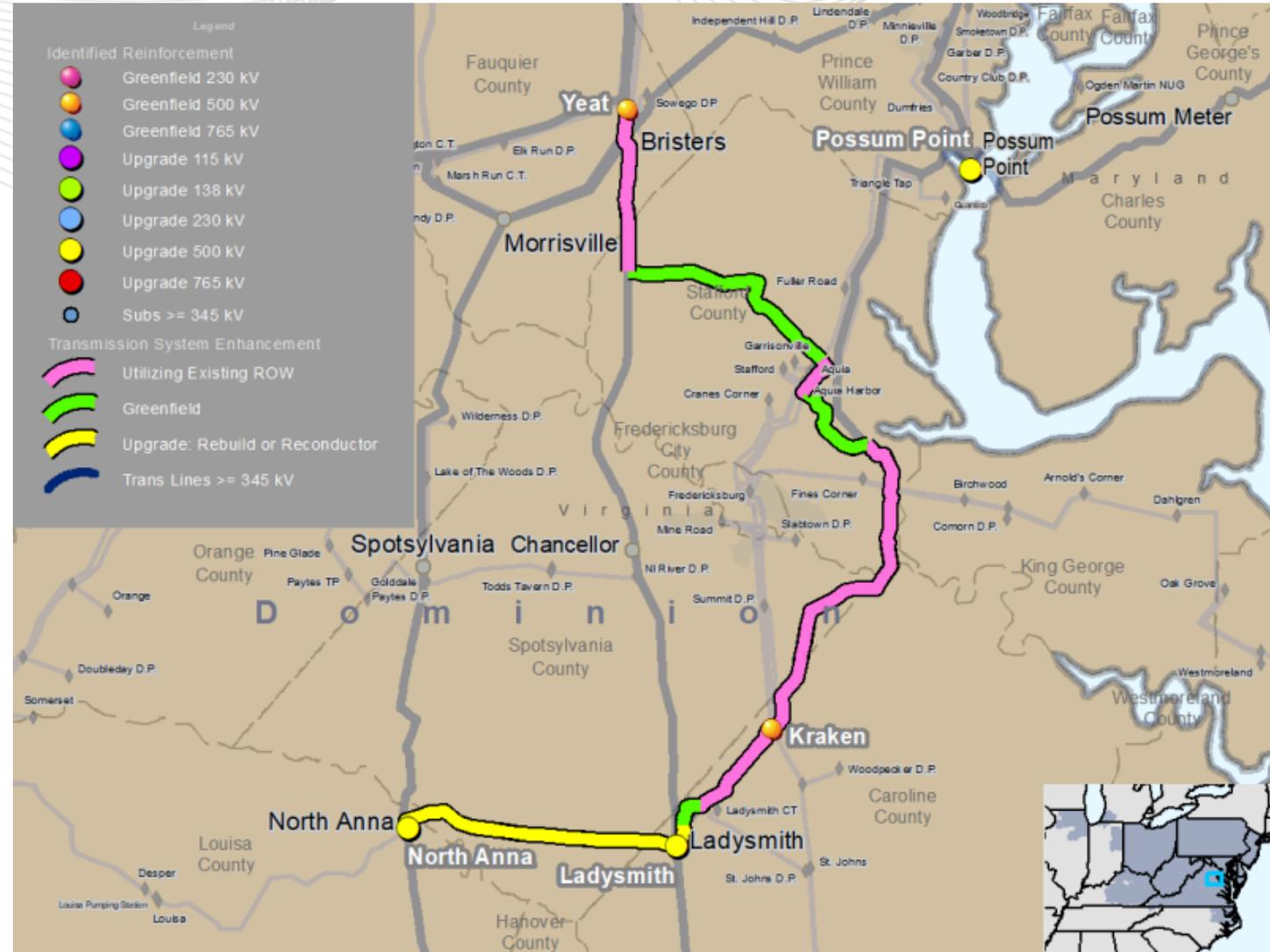
## Recommended Solution (Regional Cluster)

# Recommended Solution: 2024-W1-967

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

- Build a 500kV line from North Anna substation (bypassing Ladysmith Substation) to a new substation called Kraken. New conductor to have a minimum summer normal rating of 4357MVA. **Estimated Cost: \$186.67M (b4000.344)**
- Build a 500kV line from a new substation called Kraken to a new substation called Yeat. New conductor to have a minimum summer normal rating of 4357MVA. **Estimated Cost: \$394.71M (b4000.345)**
- Cut-in 500kV line from Kraken substation into Yeat substation. **Estimated Cost: \$5M (b4000.346)**
- Upgrade/install equipment at North Anna substation to 5000A to support the new conductor rating. **Estimated Cost: \$9.12M (b4000.347)**
- Build a new 500/230kV substation called Kraken. The 500kV, 5000A ring bus will be set up for a redundant breaker configuration. Install (2) 1400MVA 500/230 kV transformers. A new redundant breaker ring will be added at Kraken to accommodate the new 500kV line from North Anna to Kraken. **Estimated Cost: \$84.41M (b4000.348)**
- Update relay settings at Ladysmith to change the destination of 500kV line #568 from Possum Point to Kraken. **Estimated Cost: \$0.04M (b4000.349)**
- Update relay settings at Possum Point to change the destination of 500kV line #568 from Ladysmith to Kraken. **Estimated Cost: \$0.04M (b4000.350)** Continued on next slide...

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**Recommended Solution: 2024-W1-967 (Revised)**

- Cut in Line #568 Ladysmith - Possum Point into Kraken, creating Line #568 Ladysmith to Kraken. **Estimated Cost: \$3.6M (b4000.351)**
- Cut in Line #568 Ladysmith - Possum Point into Kraken, creating new Line #5XX Kraken to Possum Point. **Estimated Cost: \$3.6M (b4000.352)**
- Upgrade 500kV terminal equipment at Elmont substation. **Estimated Cost: \$8.9M (b4000.353)**
- Expand Ladysmith substation to add redundant circuit breakers to the middle breakers on both 500kV strings (574T575 and 568T581). The equipment including switches 57518, 57515, H115 will be replaced with 5000A equipment. **Estimated Cost: \$8.24M (b4000.354)**

**Existing Facility Rating:**

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

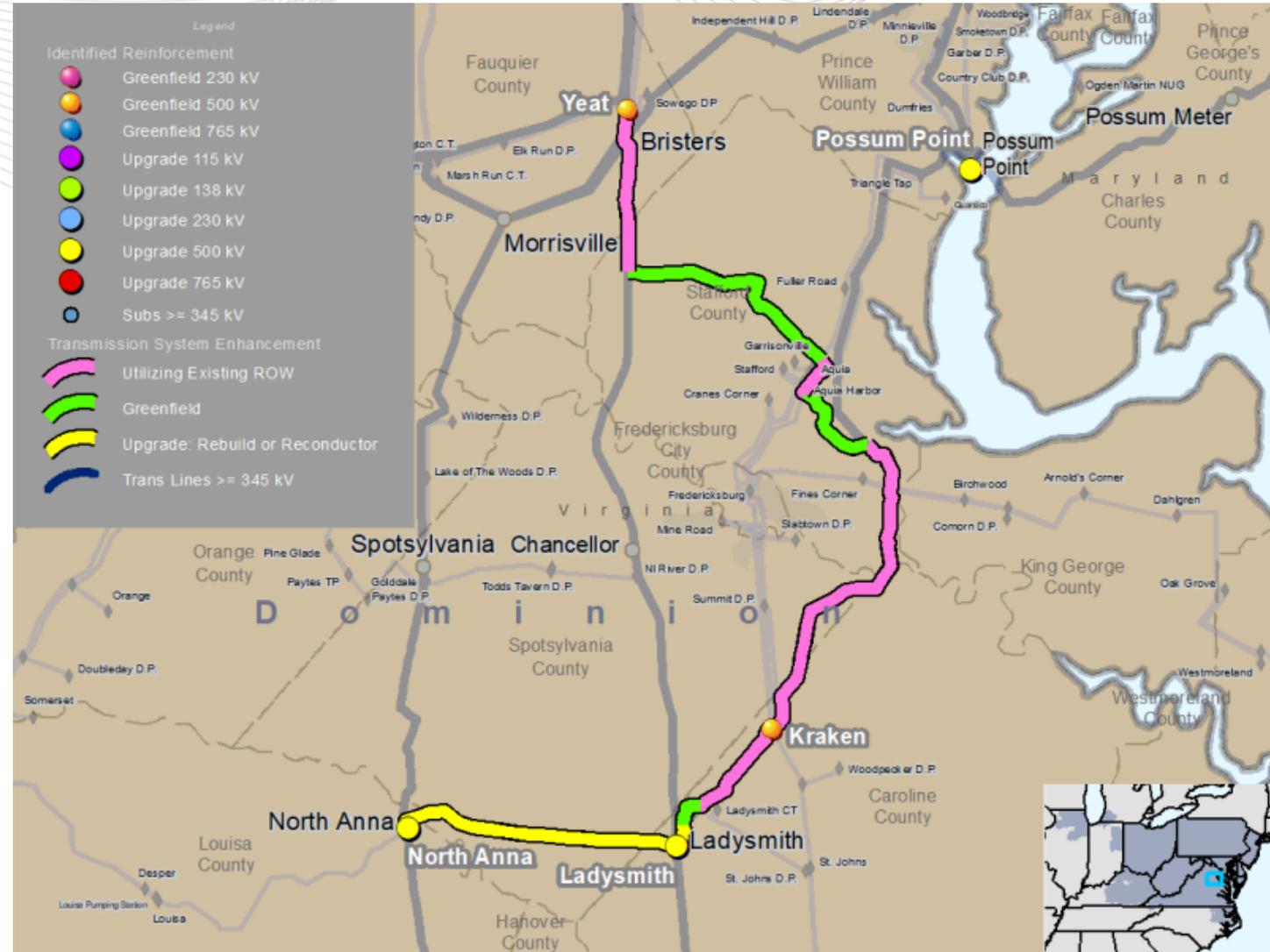
**Preliminary Facility Rating:**

#	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~~ \$704.33 M**

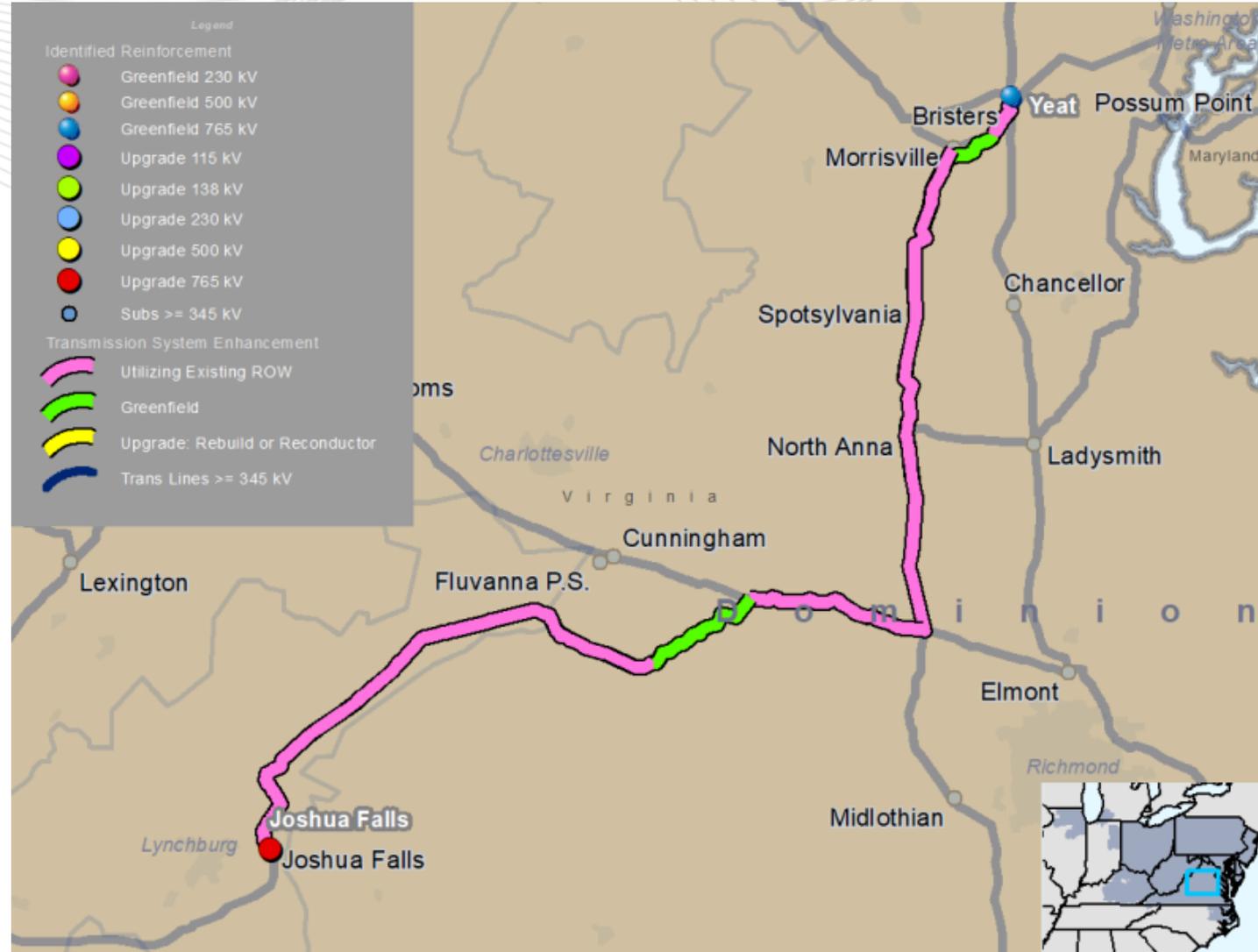
**Required IS Date: 6/1/2029**

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



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

- Build a new 156 mile 765kV line from Joshua Falls – Yeat. (Roughly 69.3 miles in AEP section). **Estimated Cost: \$341.17M (b4000.355)**
- Build a new 156 mile 765kV line from Joshua Falls – Yeat. (Roughly 86.7 miles in Dominion section). **Estimated Cost: \$426.83M (b4000.356)**
- Build a new 765/500/230kV substation called Yeat. Install (2) 765/500 kV transformers. Cut in 500kV line Bristers – Ox and 500kV line Meadowbrook – Vint Hill into Yeat. **Estimated Cost: \$197.1M (b4000.357)**
- At Yeat substation, install (1) 500/230kV transformer. Cut in 230kV line Vint Hill – Elk Run into Yeat substation. **Estimated Cost: \$45.6M (b4000.358)**
- Add (2) 765kV breakers at Joshua Falls substation. Substation expansion is required to add the additional breakers. **Estimated Cost: \$99.19M (b4000.359)**



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Existing Facility Rating:

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

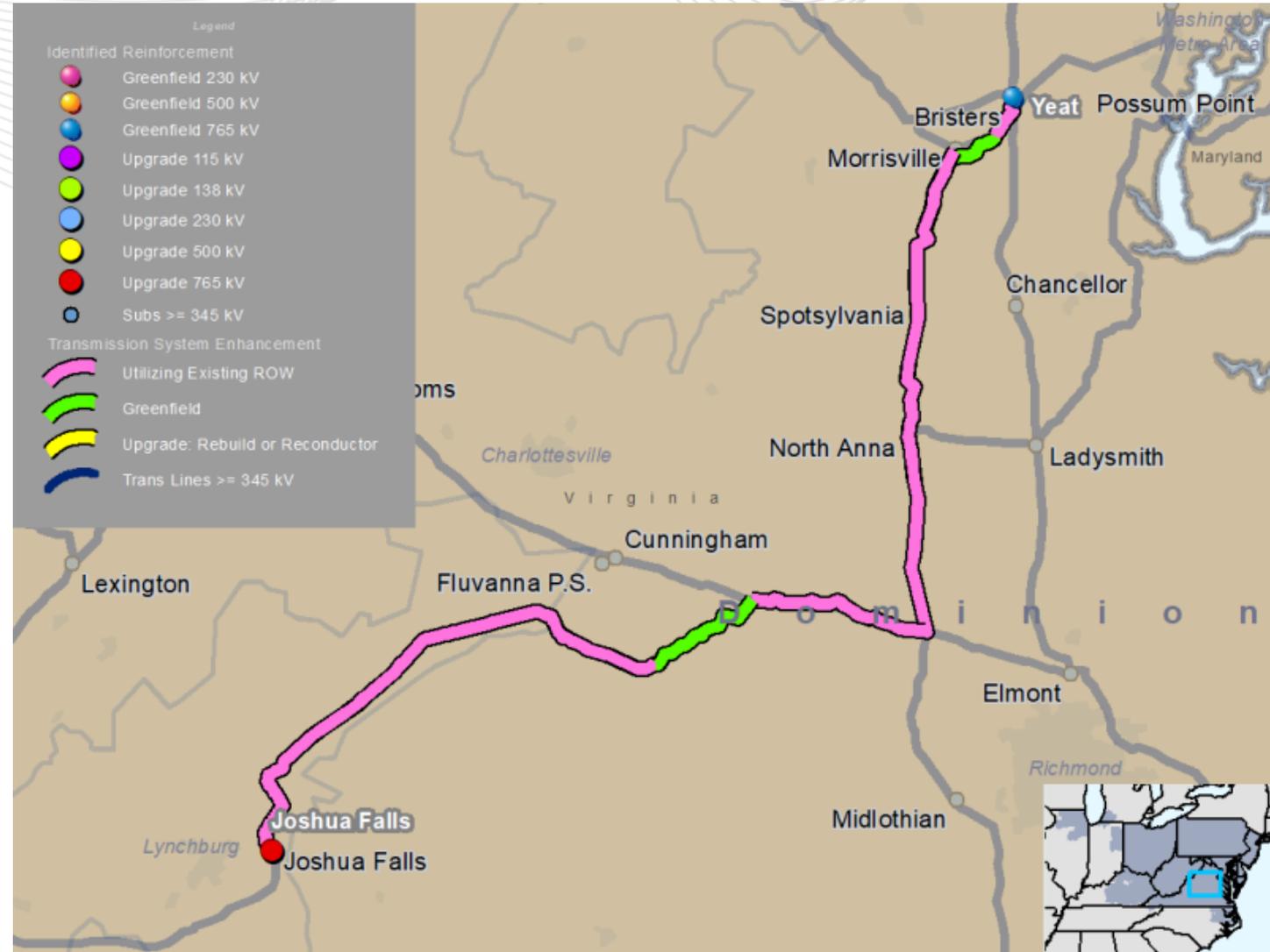
Preliminary Facility Rating:

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

Estimated Cost: ~~\$1,055.3 M~~ **\$1,109.89M**

Required IS Date: 6/1/2029

Projected IS Date: 6/1/2029



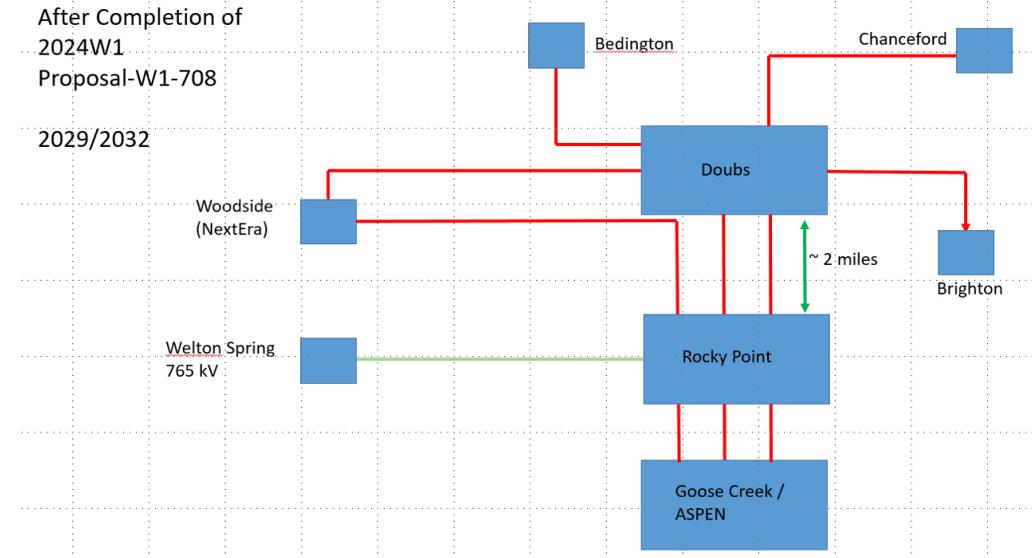
# 2024W1 – Regional Cluster Recommended Solution: 2024-W1-708

## Recommended Solution: 2024-W1-708

- Add ~~one~~ **two** 765 kV breakers at Amos Substation to expand the breaker and a half scheme to accommodate the new Amos - Welton Spring 765 kV Line **\$30.87M (b4000.1)**
- Construct a new 175 miles Amos to Welton Spring 765 kV line. (Roughly 30 miles in AEP Section) **\$150M (b4000.2)**
- Construct a new 175 miles Amos to Welton Spring 765 kV line. (Roughly 145 miles in APS/FE Section) **\$725M (b4000.3)**
- Construct a new 765 kV switchyard (Welton Spring) **\$92.28M (b4000.4)**
- Install four 250 MVAR shunt capacitors, and a +/-500 MVAR STATCOM at Welton Spring 765 kV substation **\$121.54M (b4000.5)**
- Construct a new 86 miles Welton Spring to Rocky Point 765 kV line (Welton Spring to DVP local area, roughly 70.7 miles) **\$353.5M (b4000.6)**
- Construct a new 86 miles Welton Spring to Rocky Point 765 kV line (in DVP local area/Millville to Lovettsville section, roughly 10.5 miles) **\$52.5M (b4000.7)**



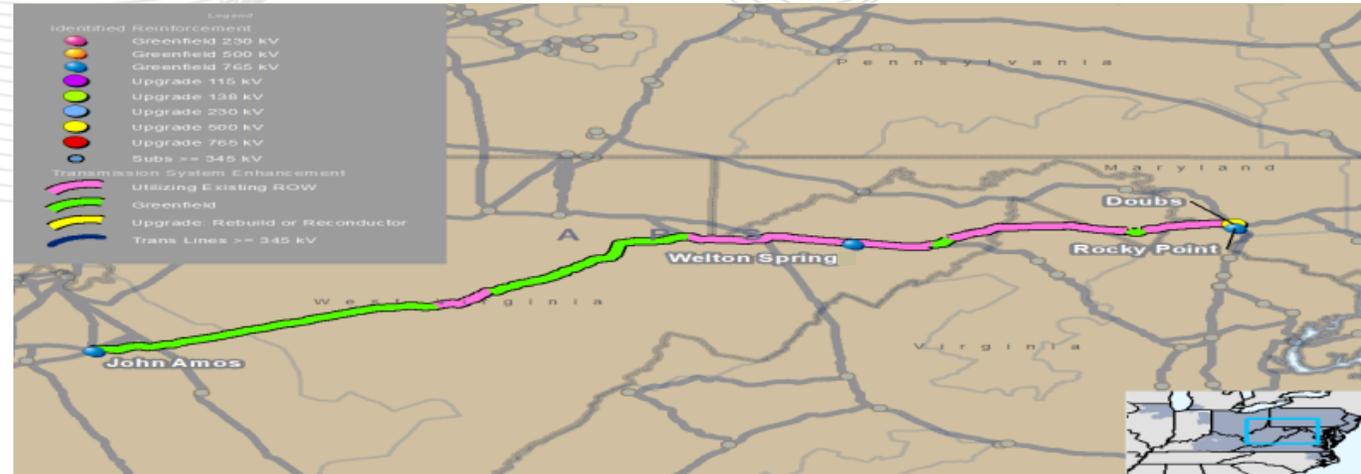
After Completion of  
2024W1  
Proposal-W1-708  
2029/2032



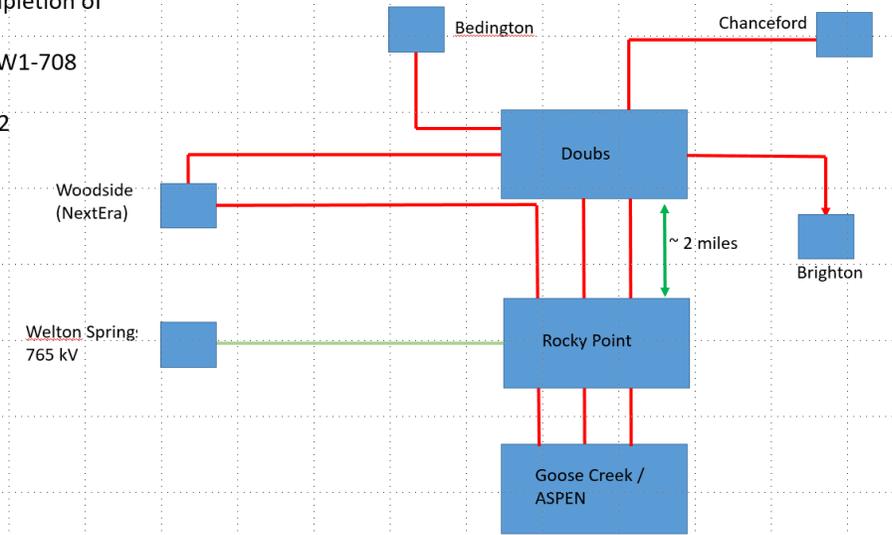
# 2024W1 – Regional Cluster Recommended Solution: 2024-W1-708

## Recommended Solution (Cont): 2024-W1-708

- Construct a new 86 miles Welton Spring to Rocky Point 765 kV line (DVP local area to Rocky Point, roughly 4.8 miles) **\$24M (b4000.8)**
- 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. Install two 765/500 kV transformer at Rocky Point substation **\$254.7M (b4000.9)**
- Install four 250 MVAR cap banks (two on 765 and two on 500 kV side) and a +/-500 MVAR STATCOM on the 765 kV Rocky Point yard **\$121M (b4000.10)**
- 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 **\$19.23M (b4000.11)**



After Completion of  
2024W1  
Proposal-W1-708  
2029/2032



**Recommended Solution (Cont): 2024-W1-708**

- Upgrade the terminal equipment on the Doubs No. 1 500/230 kV Transformer  
\$0.43M (b4000.12)

**Existing Facility Rating:**

Branch	SN/SE/WN/WE (MVA)
John Amos – Welton Spring – Rocky Point	N/A

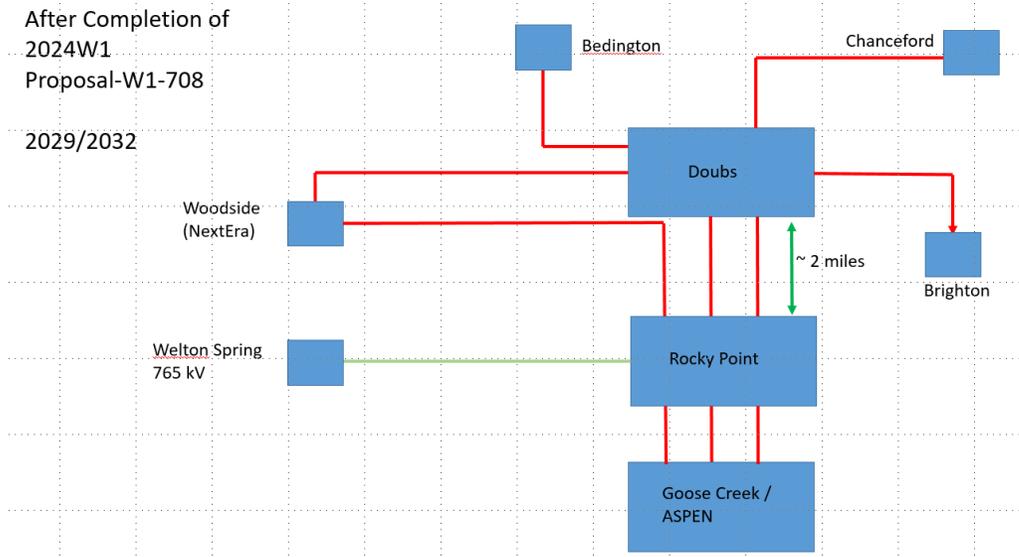
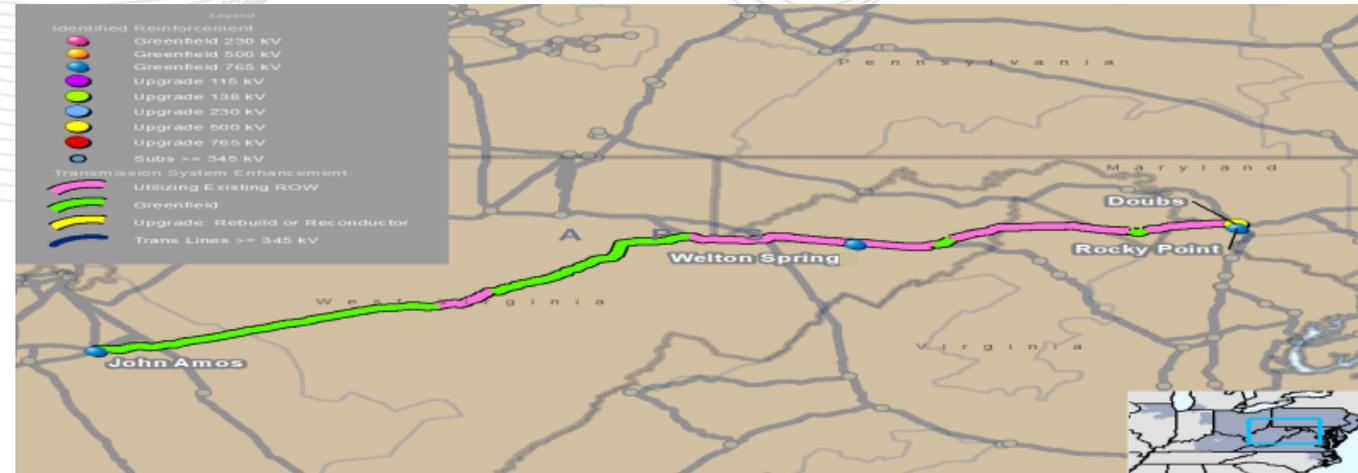
**Preliminary Facility Rating:**

Branch	SN/SE/WN/WE (MVA)
John Amos – Welton Spring – Rocky Point	6743/7253/7512/7918

**Estimated Cost: \$1,945.05 M**

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

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



# 2024W1 – Regional Cluster Recommended Solution: 2024-W1-551

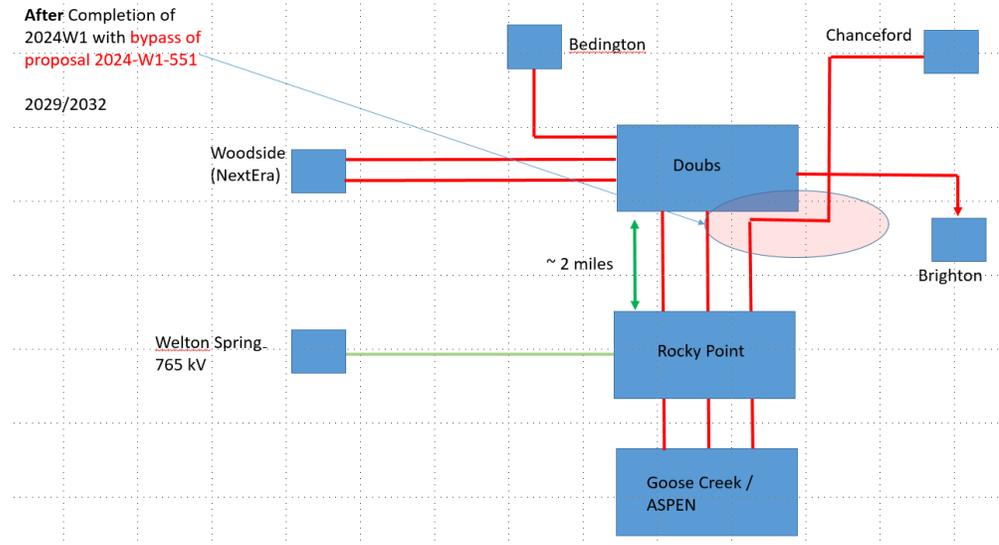
## Recommended Solution: 2024-W1-551

- Terminate the Woodside - Goose Creek 500 kV Line into Doubs Substation, creating the Woodside - Doubs #2 500 kV Line and remove the Chanceford-Doubs and Rocky Point-Doubs line terminations at the Doubs substation and connects the two lines through a 0.6 mile 500 kV bypass line around the Doubs substation **\$13.97M (b4000.13)**

Estimated Cost: \$13.97 M

Required IS Date: 6/1/2032

Projected IS Date: 6/1/2032

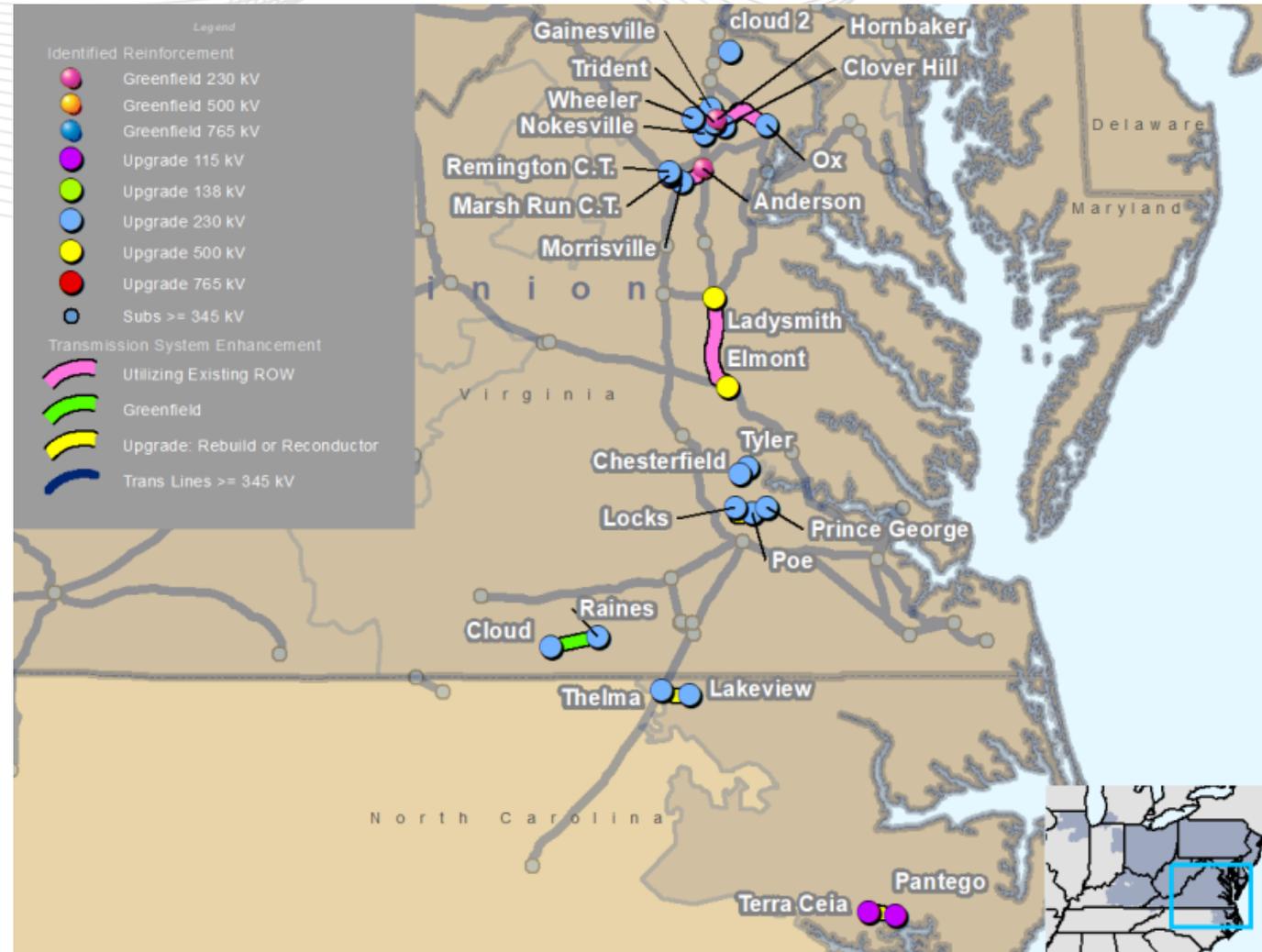


# 2024W1 – Regional Cluster

## Recommended Solution: 2024-W1-24

### Recommended 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



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# 2024W1 – Regional Cluster

## Recommended Solution: 2024-W1-24

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

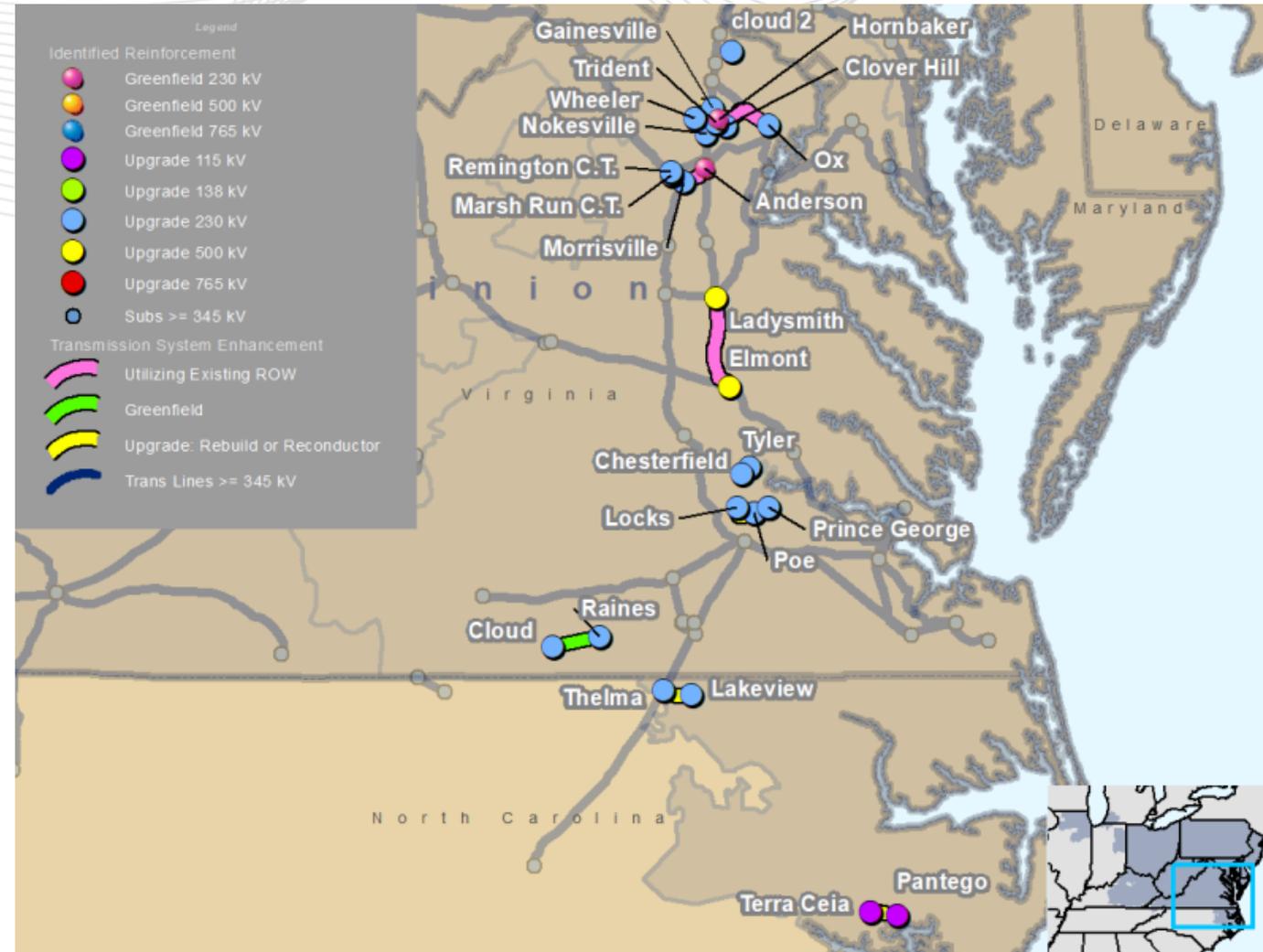
- Build a new 230kV Line from Elmont – Ladysmith on the existing 5-2 structures between the two stations
  - Terminal equipment upgrades at Elmont & Ladysmith
- Build a new 230kV Line from Cloverhill – Ox
  - Terminal equipment upgrades at Ox and Cloverhill
- Build a new 230kV Line from Raines – Cloud
  - 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**

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Upgrade Id	Description	Cost Estimate (\$M)
b4000.300	Rebuild approximately 1.71 miles of 230kV line 299 from the Marsh Run substation to the Remington CT substation. New conductor has a summer rating of 1573 MVA.	\$5.35
b4000.301	Reconductor approximately 1.24 miles of 230kV line 280 from Remington - the Marsh Run CT substation to the Remington substation. New conductor has a summer rating of 1573 MVA.	\$3.88
b4000.302	Uprate line #299 terminal equipment, line leads, and bus at Marsh Run substation to be rated to 4000A.	\$2.53
b4000.303	Uprate line #299 terminal equipment, line leads, and bus at Remington CT substation to be rated to 4000A.	\$2.44
b4000.304	Partial reconductor/partial wreck & rebuild of 230kV Line #2161 Gainesville – Wheeler. New conductor has a summer rating of 1573 MVA. (Wheeler - Linton Tap segment)	\$17.72
b4000.305	Partial reconductor/partial wreck & rebuild of 230kV Line #2161 Gainesville – Wheeler. New conductor has a summer rating of 1573 MVA. (Linton Tap - Atlantic segment)	\$3.49
b4000.306	Partial reconductor/partial wreck & rebuild of 230kV Line #2161 Gainesville – Wheeler. New conductor has a summer rating of 1573 MVA. (Atlantic - Trident segment)	\$1.72
b4000.307	Partial reconductor/partial wreck & rebuild of 230kV Line #2161 Gainesville – Wheeler. New conductor has a summer rating of 1573 MVA. (Trident - Gainesville segment)	\$6.16
b4000.308	Upgrade all line #2161 terminal equipment at Gainesville to 4000A. A CCVT will also be replaced due to aging.	\$1.78
b4000.309	Upgrade all line #2161 terminal equipment Wheeler substation to 4000A.	\$2.25
b4000.310	Revise relay settings at Trident substation.	\$0.03
b4000.311	Rebuild 230kV Line #213 and #225 from Thelma – Lakeview. New conductor has a summer rating of 1573 MVA.	\$44.69
b4000.312	At Thelma substation, upgrade line lead, wave traps (213WT & 225WT), circuit breaker leads to 4000A. CB switches 22535, 23235, 23238 and 21335 will also be upgrade to 4000A DEB switches. CCVTs 213P1, 213P2 and 213P3 will be replaced due to aging.	\$2.30
b4000.313	At Lakeview substation, upgrade wave traps 213WT and 225WT, line leads, and circuit breaker leads to 4000A. Upgrade CB switches 22565 and 22564 to 4000A double-end break switches. Replace CCVTs 225P1, 225P2, and 225P3 due to aging.	\$1.72
b4000.314	Reconductor 230kV Line #2003 Chesterfield – Tyler segment. New conductor has a summer rating of 1573 MVA.	\$3.16
b4000.315	Reconductor 230kV Line #2003 Tyler – Poe segment. New conductor has a summer rating of 1573 MVA.	\$20.61
b4000.316	At Poe substation, uprate all Line #2003 terminal equipment, line leads, and bus to be rated to 4000A.	\$1.79
b4000.317	At Tyler substation, upgrade the necessary line terminal equipment to maintain 4000A at Tyler substation.	\$0.54
b4000.318	Revise relay settings at Chesterfield substation.	\$0.02
b4000.319	Reconductor 230kV Line #2002 Carson – Poe. New conductor has a summer rating of 1573 MVA.	\$30.29

Upgrade Id	Description	Cost Estimate (\$M)
b4000.320	At Carson substation, upgrade all line #2002 terminal equipment at Carson to 4000A. CCVTs will also be replaced due to aging.	\$0.89
b4000.321	At Poe substation, upgrade all line #2002 terminal equipment at Carson to 4000A. CCVTs will also be replaced due to aging.	\$0.81
b4000.322	Build a new 230kV Line from Nokesville – Hornbaker using the vacant arms of the double circuit monopole structures installed as part of previous project 993027. New conductor has a summer rating of 1573 MVA.	\$15.28
b4000.323	Upgrade terminal equipment at Nokesville substation. The project adds one more line to Nokesville, including the installation of one 230kV breaker and two 230kV switches.	\$1.43
b4000.324	Upgrade terminal equipment at Hornbaker substation. This project provides for installing a new 230kV 4000A rated line terminal at Hornbaker to accommodate the new line to Nokesville.	\$1.43
b4000.325	Build a new 26.38mi 230kV Line from Elmont – Ladysmith on the existing 5-2 structures between the two stations. New conductor has a summer rating of 1573 MVA.	\$26.09
b4000.326	At Elmont substation, install/upgrade associated equipment to accommodate a 4000A line rating for the new 230kV line between Elmont - Ladysmith.	\$2.19
b4000.327	Upgrade/install equipment at Ladysmith substation to 4000A. Expansion will be required to accommodate a total of three (3) new 230kV strings of breaker and a half scheme.	\$8.72
b4000.328	Construct a new 24.5-mile 230 kV line 2XXX from Cloverhill substation to Ox substation.	\$287.54
b4000.329	At Ox substation, install the necessary associated equipment to accomdate the new line between Cloverhill - Ox. This project also includes expanding the substation with associated security level 1 fencing and super post structure needed.	\$6.37
b4000.330	At Cloverhill substation, install the necessary associated equipment to accomdate the new line between Cloverhill - Ox. This project also includes demolishing and reconstructing the existing bus system and roadway.	\$2.27
b4000.331	Construct a new 230kV single circuit line from Raines substation to Cloud substation to solve electrical violations cause by the significant load growth in South Hill, Virginia. The scope also includes an idle 230kV circuit being installed between these stations.	\$77.50
b4000.332	At Cloud substation, upgrade substation terminal equipment to 4000A.	\$1.43
b4000.333	At Raines substation, upgrade substation terminal equipment to 4000A.	\$1.32
b4000.334	Reconductor 115kV line #121 from Poe - Prince George. Specifically, line #121 will be reconductored and converted to 230kV from Poe substation to Prince George substation.	\$14.62
b4000.335	At Poe substation, install a new 230kV six breaker ultimate ring bus which will fit the station to current 230kV standards. The substation scope includes the installation of 230kV breaker and half GIS bus. Work at Poe substation is associated with line #121 reconductor.	\$38.28
b4000.336	Build a new 230-115kV Prince George substation along the existing 115 or 230kV corridor. The substation scope includes the installation of 230kV breakers & 1-115kV breaker along with its associated terminal equipment initially but will have provision for making it a 6-breaker ring (both 230 & 115kV) in future. The existing 230-115kV transformer at Prince George will be relocated to serve this new substation.	\$26.62
b4000.337	Extend a new 230 kV line approximately 7.85 miles between the existing Morrisville and Anderson Branch substations. The existing tower structures currently supporting the Bristers to Morrisville 500 kV Line #545 will be used to support this new line as shared tower structures.	\$5.26
b4000.338	At Morrisville substation, install/upgrade substation terminal equipment to 4000A.	\$0.95
b4000.339	At Anderson Branch substation, install/upgrade substation terminal equipment to 4000A.	\$0.95

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# Recommended Solution: 2024-W1-24

## Existing Facility Rating:

#	Branch	SN/SE/WN/WE (MVA)
1	230kV Line #280 Marsh Run – Remington 230kV Line #299 Marsh Run - Remington CT	1202/1202/1332/1332 608/608/769/769
2	230kV Line #2161 Gainesville – Wheeler	808/808/895/895
3	230kV Line #213 Thelma – Lakeview 230kV Line #225 Thelma – Lakeview	470/470/596/596 470/470/550/555
4	230kV Line #2003 Chesterfield – Tyler 230kV Line #2003 Tyler – Locks – Poe	1047/1047/1160/1160 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



**Recommended Solution: 2024-W1-781**

- Upgrade 500/230kV transformer at Goose Creek substation.  
**Estimated Cost: \$34.01M (b4000.340)**
- Upgrade bus at Brambleton to support 500kV LN #558 Aspen – Brambleton upgrade.  
**Estimated Cost: \$0M (b4000.343)**
- Remove Vint Hill substation terminal from Wishing Star – Vint Hill – Morrisville 500kV Line. **Estimated Cost: \$0M (b4000.341)**
- Remove terminal equipment from Vint Hill 500kV substation.  
**Estimated Cost: \$0M (b4000.342)**

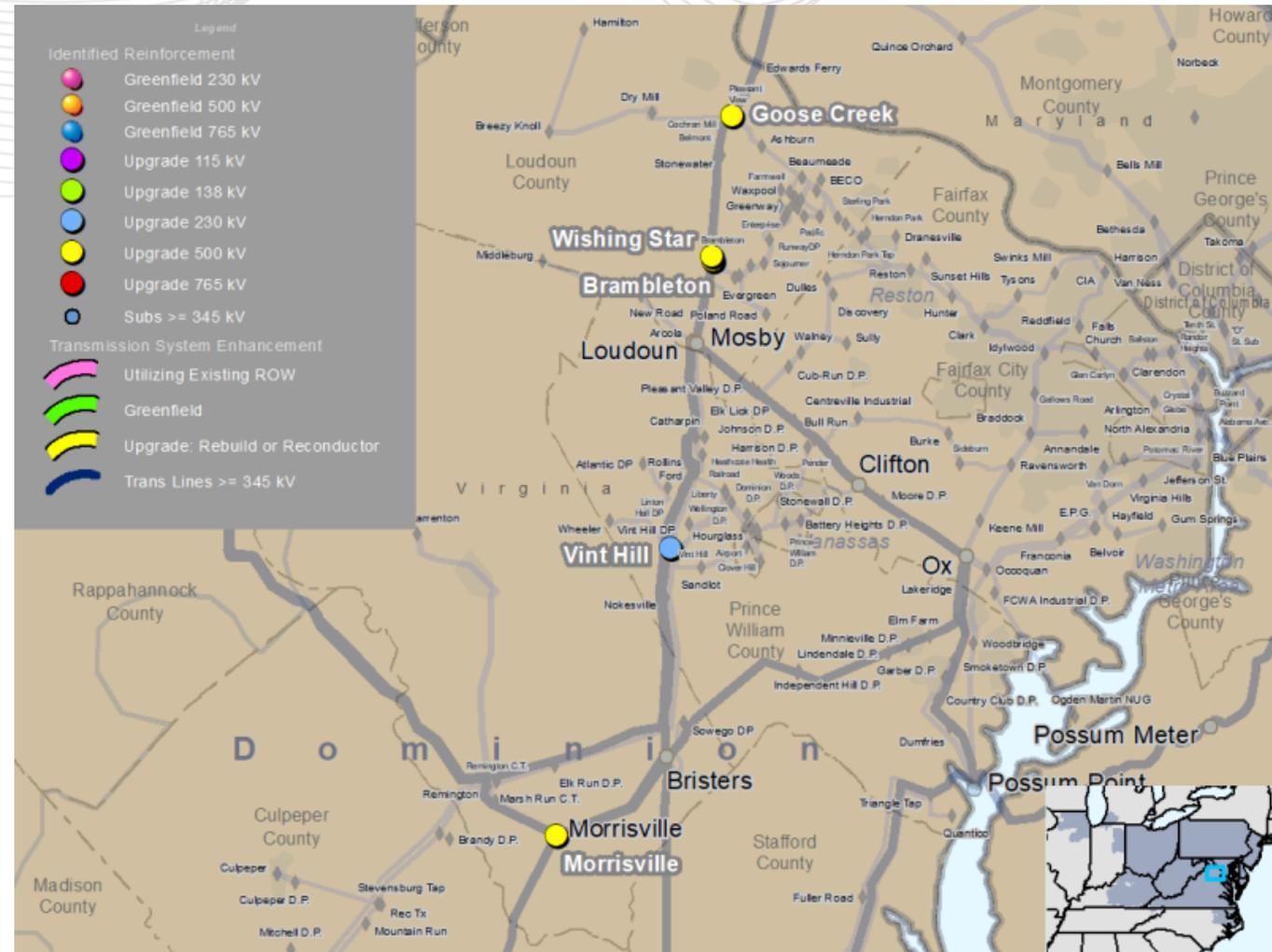
#	Branch	SN/SE/WN/WE (MVA)
1	500kV LN #558 Aspen – Brambleton	3464/3464/3984/4018
2	500/230kV Goose Creek Transformer	900/954/1159/1213

#	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~~ \$34.01 M**

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

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

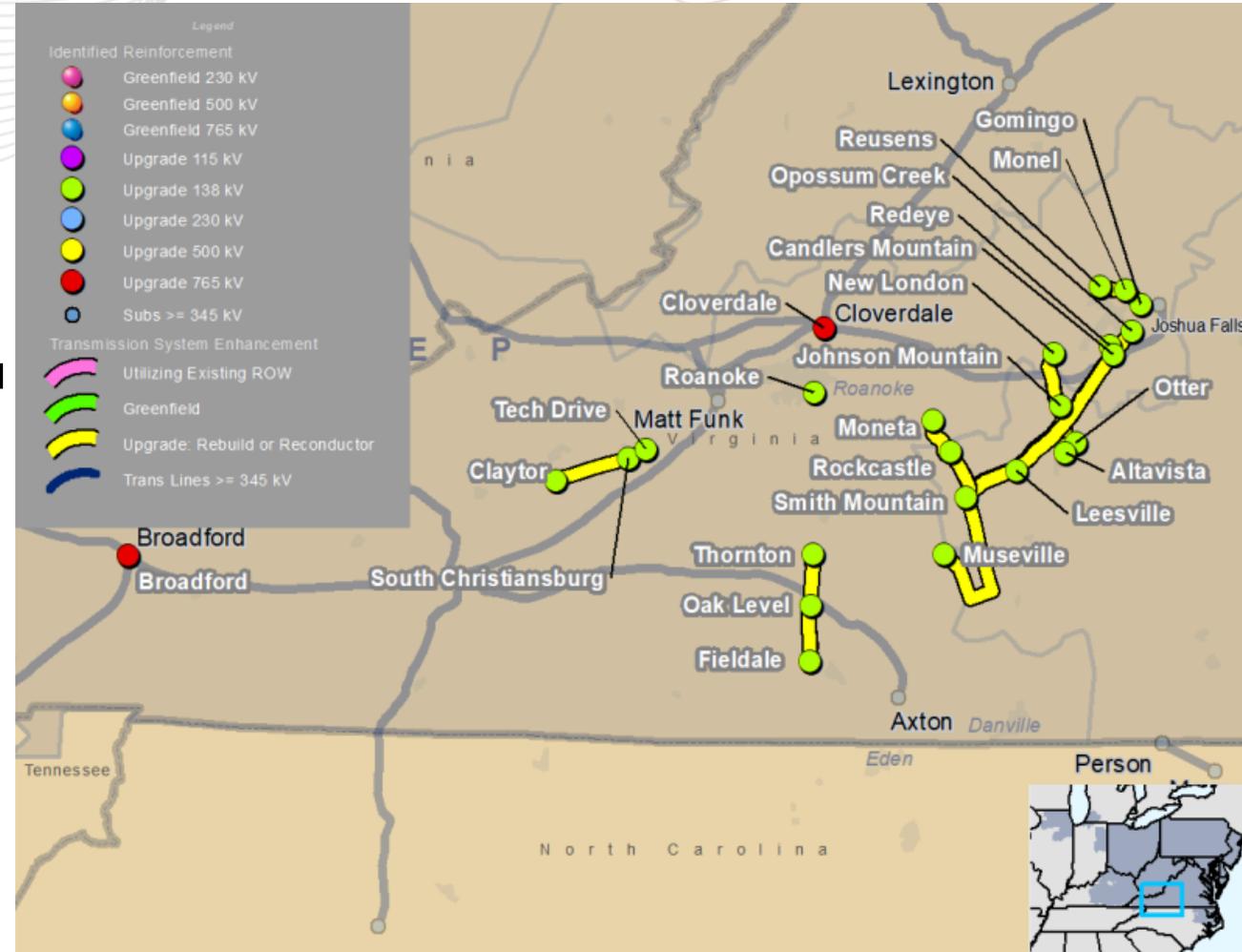


# 2024W1 – Regional Cluster

## Recommended Solution: 2024-W1-81

### Recommended Solution: 2024-W1-81

- Broadford 765 kV Upgrade: Replace Jackson's Ferry CB Q2 (B4000.200) **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: Replace 795 KCM AAC, 37-Str. 795 KCM AAC, 37-Str. PH A B2S1 B2S2 BS1 BS2 (B4000.201) **Estimated Cost: \$0.4 M**
- Smith Mountain - Redeye 138 kV Reconductor (B4000.202) **Estimated Cost: \$14.9 M**
- Redeye - Candler's Mountain 138 kV Reconductor (B4000.203) **Estimated Cost: \$21.0 M**
- Candler's Mountain - Opossum Creek 138 kV Reconductor (B4000.204) **Estimated Cost: \$4.9 M**
- Candler's Mountain 138 kV station: Replace 1590 KCM AAC, 61-Str. Replace MOAB "Y" SMITH MTN LINE (B4000.205) **Estimated Cost: \$0.2 M**
- Opossum Creek 138 kV station: Replace Opossum Creek Switch (B4000.206) **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**~~



Continued on next slide...

# Recommended Solution: 2024-W1-81

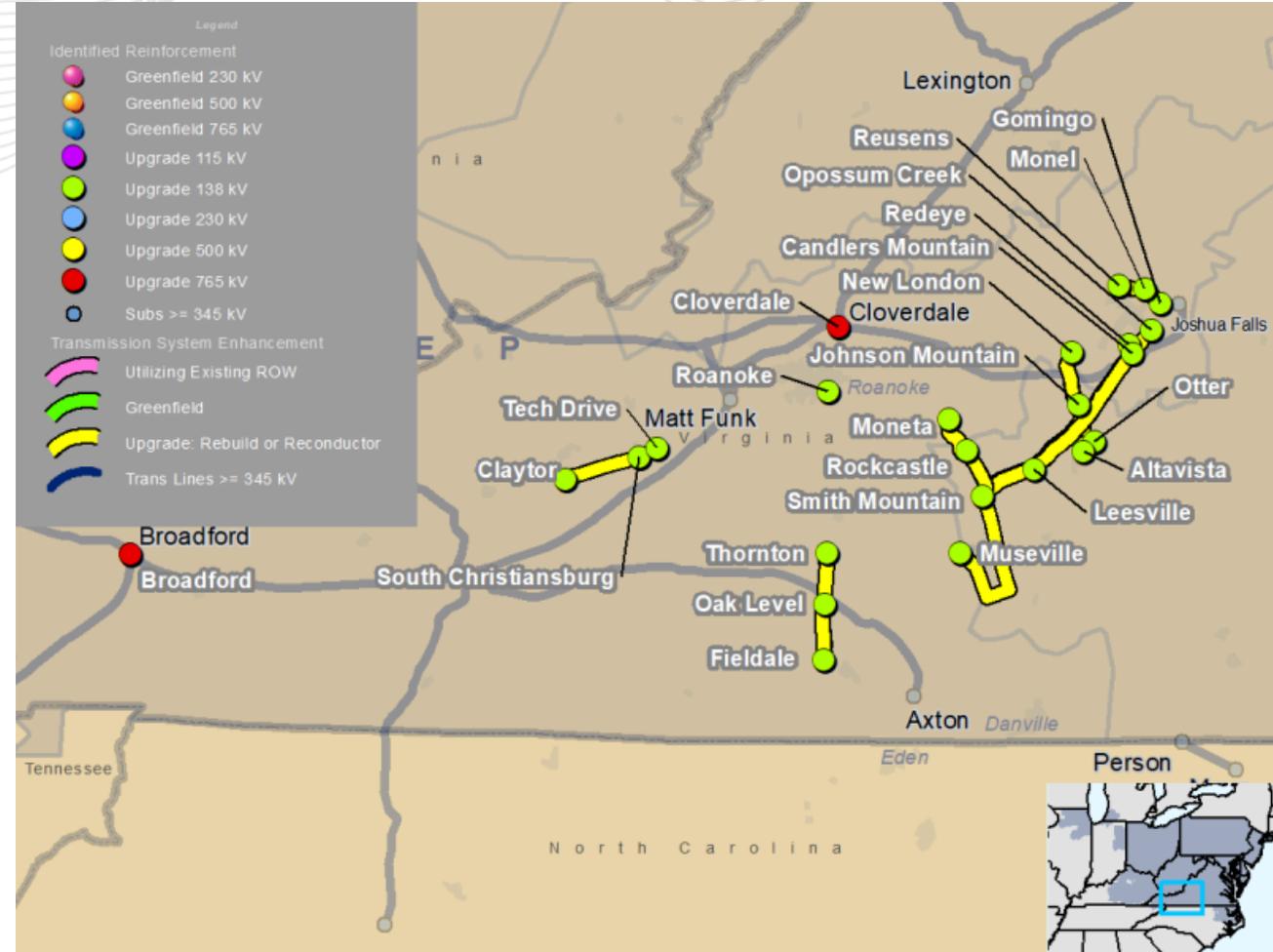
## Recommended Solution: 2024-W1-81

- ~~Roanoke 138 kV Station Upgrade~~ **Estimated Cost: \$0.1 M**
- ~~Reusens – Monel – Gomingo 138kV Sag Study~~ **Estimated Cost: \$0.25 M**
- Leesville 138KV Station Upgrade: Replace 795 KCM AAC, 37-Str. IPS Sch. 40 1272 KCM AAC, 61-Str. 1272 KCM AAC, 61-Str. PH A,B,C ALTA VISTA CB-A BUS DISC ALTA VISTA CB-A LINE DISC Wavetrapp (1200A) Relay Thermal Limit 1356 Amps (B4000.207) **Estimated Cost: \$0.6 M**
- Otter 138 kV Station Upgrade: Replace 795 KCM AAC, 37-Str. (B4000.208) **Estimated Cost: \$0.1 M**
- Altavista - Otter ~~Johnson Mountain~~ 138 kV Reconductor. (B4000.209) **Estimated Cost: \$1.2 M**
- ~~Altavista~~ - Otter - Johnson Mountain ~~New London~~ 138 kV Reconductor (B4000.210) **Estimated Cost: \$8.4 M**
- ~~Altavista~~ - Otter - Johnson Mountain - New London 138 kV Reconductor (B4000.211) **Estimated Cost: \$7.68 M**
- ~~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: \$137.02M 63.98 M**

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

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



## Recommended Solution: 2024-W1-81

### Existing/Preliminary Facility Ratings:

Facility Name	Existing Ratings (SN/SE/WN/WE)	Preliminary Ratings (SN/SE/WN/WE)
Broadford - <del>Jacksons Ferry</del> Broadford RJ 765 kV	4142/4142/4484/4961	4249/4801/4708/5209
Smith Mountain - Leesville 138 kV	205/255/258/303	<del>287/337/363/381</del> 205/284/258/320
Candler's Mountain - Redeye 138 kV	205/ <del>255</del> 284/258/320	<del>257/360</del> 291/388/368/441
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
Leesville - Altavista 138 kV	287/337/363/400	295/411/ <del>617/617</del> 373/461
Altavista - Otter 138 kV	167/245/257/287	329/361/427/ <del>453</del> 443
Otter - Johnson Mountain 138 kV	167/245/210/271	329/361/427/453
Johnson Mountain - New London 138 kV	167/245/210/271	<del>205/285/258/320</del> 297/330/375/465

# Recommended Solution: 2024-W1-617

## Recommended Solution: 2024-W1-617 Component

- Replace the wave trap and upgrade the relay at Cloverdale 765kV substation. (B4000.251) **Estimated Cost: \$1.0 M**
- Replace the wave trap and upgrade the relay at Joshua Falls 765kV substation. (B4000.252) **Estimated Cost: \$1.0 M**

**Estimated Cost: \$2.0 M**

## Existing Facility Rating:

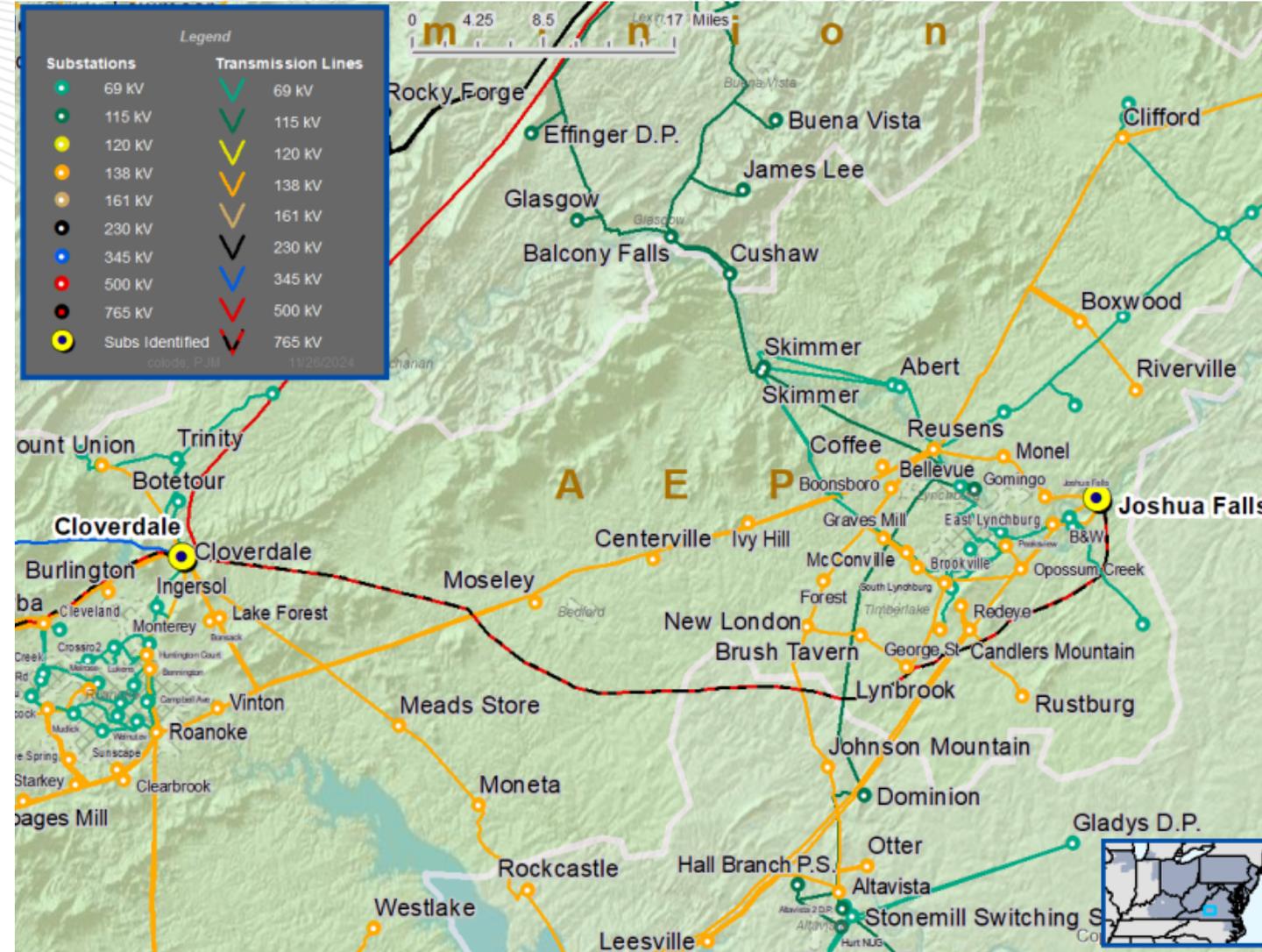
Branch	SN/SE/WN/WE (MVA)
Joshua Falls – Cloverdale 765kV	1180/1180/1180/1180

## 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**



# 2024W1 – Regional Cluster

## Recommended Solution: 2024-W1-527

### Recommended Solution: 2024-W1-527 (Future Re-evaluation)

- 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 locations:
  - Ladysmith
  - Spotsylvania\*
  - Valley
- \*Alternative: Install (1) 500kV 293.8 MVar shunt capacitor bank & associated equipment

**Note:** Reactive reinforcements deemed not necessary at this time. PJM will re-evaluate again in the 2025 Series RTEP.

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

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

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



# 2024W1 – Regional Cluster Additional Upgrade (Dominion)



**Process Stage:** Recommended Solution

**Criteria:** N-1 & N-1-1

**Assumption Reference:** 2024 RTEP assumptions

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

**Proposal Window Exclusion:** None

**Problem Statement:**

Flowgates: 2024W1-N1-SVM1789, 2024W1-N1-SVM1797, 2024W1-N1-SVM3732, 2024W1-N1-SVM3767, 2024W1-N1-SVM3768, 2024W1-N1-SVM3825

In the 2029 RTEP summer & winter base cases, there are various 230kV low voltage violations around the Navy North substation in the Dominion zone under the N-1 & N-1-1 tests.

**Recommended Solution:**

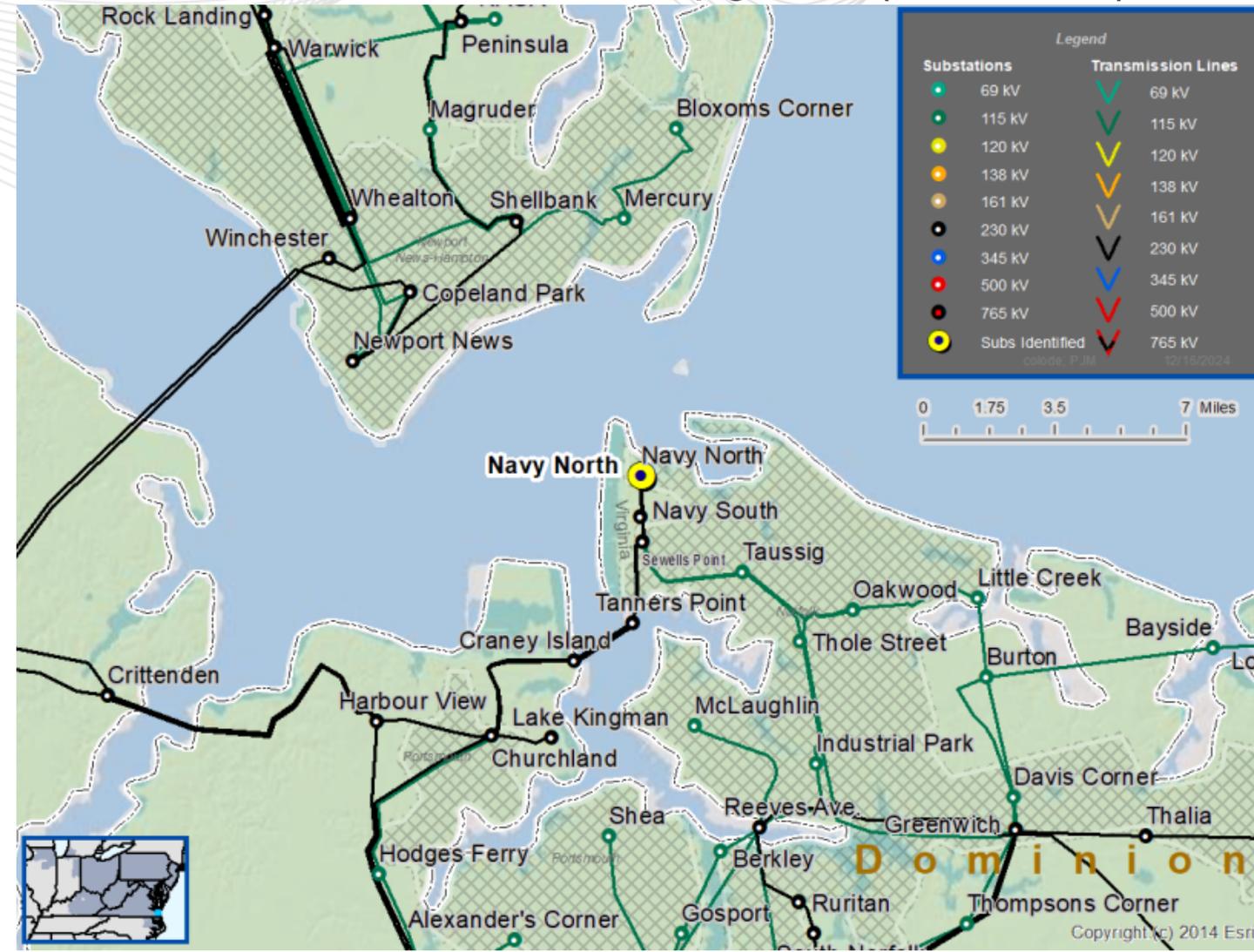
Install (1) 230kV 50 MVar shunt capacitor bank & associated equipment at Navy North. (b3928.1)

**Total Estimated Cost:** \$3 M

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

**Projected IS Date:** 3/31/2026

Note: Overlap with M-3 supplemental project DOM-2023-0006-DNH



**Process Stage:** Recommended Solution

**Criteria:** Short Circuit

**Assumption Reference:** 2024 RTEP assumptions

**Model Used for Analysis:** 2029 RTEP Short Circuit base case + PJM selected 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 127 breakers were identified to be over duty, 1 in APS & 126 in Dominion.

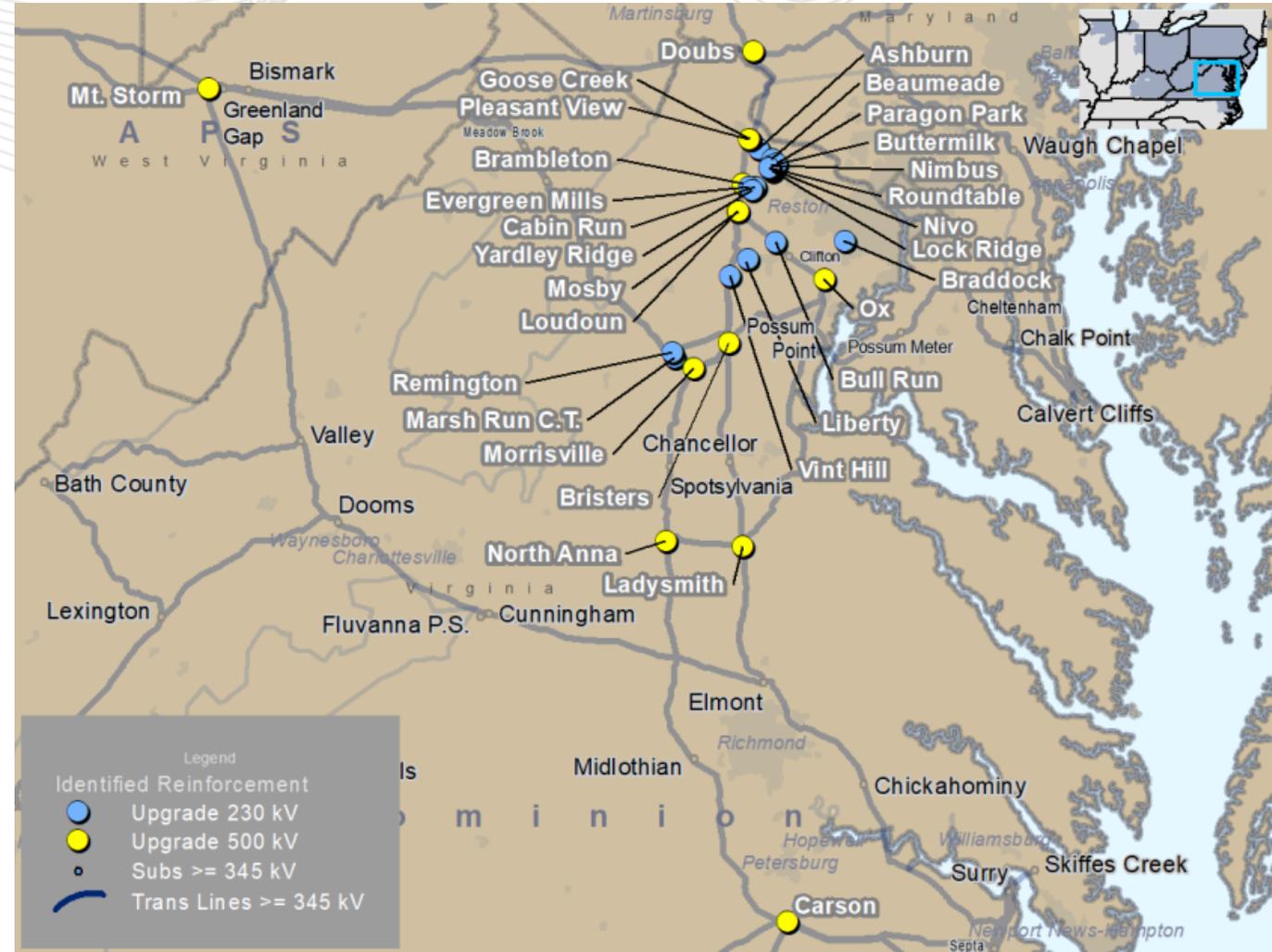
**Proposed Solution:**

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

**Estimated Cost:** \$100.85 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 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>PJM Selected Solution</b>	0	0	91	0	36	0	127	NA	NA	77.8	NA	51.8	NA	Brambleton 230kV bus operating below the 80kA rated capability

TO	Breaker Qty	Cost (\$M)
APS	1	11.50
Dominion	126	89.35
<b>Total</b>	<b>127</b>	<b>100.85</b>



# APS Area - Short Circuit Upgrades

Item	BUS	Breaker Qty	Existing Rating (kA)	Proposed Rating (kA)	Cost (\$M)
B4000.110	DOUBS 500.kV	1	50	63	11.5
					<b>11.5</b>



# Dominion Area - Short Circuit Upgrades

Item	BUS	Qty	Existing Rating (kA)	Proposed Rating (kA)	Cost (\$M)
B4000.100	Ashburn Sub 230.kV	1	50kA	63kA	0.5
B4000.101	Beaumeade Sub 230.kV	1	63kA	80kA	0.66
B4000.102	Braddock Sub 230.kV	4	40kA	63kA	2
B4000.103	Brambleton Sub 230.kV	4	63kA	80kA	2.64
B4000.104	Bristers Sub 230.kV	3	50kA	63kA	1.5
B4000.105	Bull Run Sub 230.kV	1	50kA	63kA	0.5
B4000.106	Buttermilk Sub 230.kV	5	63kA	80kA	3.3
B4000.107	Cabin Run Sub 230.kV	3	63kA	80kA	1.98
B4000.108	Carson Sub 230.kV	1	40kA	63kA	0.5
B4000.109	Clifton Sub 230.kV	3	63kA	80kA	1.98
B4000.111	Evergreen Mills Sub 230.kV	2	63kA	80kA	1.32
B4000.112	Goose Creek Sub 230.kV	1	63kA	80kA	0.66
B4000.113	Goose Creek Sub 500.kV	1	50kA	63kA	1.015
B4000.114	Ladysmith Sub 230.kV	8	40kA	63kA	4
B4000.115	Ladysmith Sub 500.kV	1	40kA	63kA	1.015
B4000.116	Liberty Sub 230.kV	1	50kA	63kA	0.5
B4000.117	Lockridge Sub 230.kV	4	63kA	80kA	2.64
B4000.118	Loudoun Sub 230.kV	3	63kA	80kA	1.98
B4000.119	Loudoun Sub 230.kV	1	50kA	63kA	0.5
B4000.120	Loudoun Sub 500.kV	6	50kA	63kA	6.09

Continued on next slide



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

Item	BUS	Qty	Existing Rating (kA)	Proposed Rating (kA)	Cost (\$M)
B4000.121	Marsh Run Sub 230.kV	6	50kA	63kA	3
B4000.122	Morrisville Sub 230.kV	4	50kA	63kA	2
B4000.123	Morrisville Sub 500.kV	5	50kA	63kA	5.075
B4000.124	Mosby Sub 500.kV	11	50kA	63kA	11.165
B4000.125	Mt Storm Sub 500.kV	1	40kA	63kA	1.015
B4000.126	Nimbus Sub 230kV	4	63kA	80kA	2.64
B4000.127	NIVO 1 Sub 230.kV	1	63kA	80kA	0.66
B4000.128	North Anna Sub 500.kV	6	40kA	63kA	6.09
B4000.129	Ox Sub 230.kV	4	63kA	80kA	2.64
B4000.130	Ox Sub 500.kV	3	40kA	63kA	3.045
B4000.131	Paragon Park Sub 230.kV	2	63kA	80kA	1.32
B4000.132	Pleasantview Sub 230.kV	2	63kA	80kA	1.32
B4000.133	Pleasantview Sub 500.kV	1	40kA	63kA	1.015
B4000.134	Remington Sub 230.kV	9	40kA	63kA	4.5
B4000.135	Roundtable 230.kV	6	63kA	80kA	3.96
B4000.136	Vint Hill Sub 230.kV	3	63kA	80kA	1.98
B4000.137	Yardley Sub 230.kV	4	63kA	80kA	2.64
<b>126</b>					<b>89.345</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
<b>Total</b>			<b>\$ 3,726,203,559.93</b>	<b>\$ 3,728,859,119.43</b>
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
<b>Total</b>			<b>\$ 3,897,820,351.93</b>	<b>\$ 3,932,340,160.34</b>
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 Spring - 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
<b>Total</b>			<b>\$ 5,497,683,245.17</b>	<b>\$ 5,840,575,475.75</b>



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 Proposals

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
	<b>Total</b>		<b>\$ 2,325,373,092.60</b>	<b>\$ 3,607,759,997.01</b>
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
	<b>Total</b>		<b>\$ 2,260,146,184.00</b>	<b>\$ 3,296,878,285.80</b>

## 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
<b>Low</b>	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
<b>Low-Medium</b>	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
<b>Medium</b>	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.
<b>Medium-High</b>	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
<b>High</b>	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 Spring - 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?

Facilitator:

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Secretary:

Joshua Stephenson,  
Joshua.Stephenson@pjm.com

SME/Presenter:

Sami Abdulsalam,  
Sami.Abdulsalam@pjm.com

**Reliability Analysis Update**



Member Hotline

(610) 666-8980

(866) 400-8980

custsvc@pjm.com

Version No.	Date	Description
1	1/2/2025	<ul style="list-style-type: none"> <li>Initial slides posted</li> </ul>
2	1/6/2025	<ul style="list-style-type: none"> <li>Slides #29, #63-65, #78 and #89, Corrected typo from “Welton Springs” to “Welton Spring”</li> <li>Slides #16 and #20, Added the Independent Cost Estimate</li> <li>Slide #78, Added map</li> </ul>
3	3/5/2025	<ul style="list-style-type: none"> <li>Slide #48, Maliszewski –Hyatt 345kV Existing ratings is corrected to ‘N/A’</li> </ul>
4	6/19/2025	<ul style="list-style-type: none"> <li>Slide #74, Rating correction as redlined</li> <li>Slide #63, Correction as redlined</li> </ul>
5	7/17/2025	<ul style="list-style-type: none"> <li>Slide #73, Typo correction as redlined</li> <li>Slide #74, Typo correction as purple-lined</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)



# Reliability Analysis Update

Sami Abdulsalam  
Director, Transmission Planning

Transmission Expansion Advisory Committee  
June 5, 2025

# 2025 RTEP Window 1 Update

# 2025 RTEP Window 1 – Timeline



# 2025 RTEP - Scenarios Considered

- 5 Year (2030) Analysis

- Scenario 1 (2030 Base case): Existing generation, GIA/ISA generation, Suspended ISA generation, Fast Lane Queue, CVOW and Chesterfield plants
- Scenario 2: 2030 Base case + TC1 queue + Q1 deactivations + withdrawn queues + without NJ/DE OSW

- 7 Year (2032) Analysis

- Scenario 3 (2032 Base case): Existing generation, GIA/ISA generation, Suspended ISA generation, Fast Lane Queue, TC1 queue, TC2 queue (with RRI), 7500MW NJ OSW, Q1 deactivations, withdrawn queues
- Scenario 4: 2032 Base case + Removing NJ/DE OSW **Pending**
- Scenario 5: 2032 Base case + Policy deactivations (may be combined with Scenario 6)
- Scenario 6: 2032 base case with Battery dispatched

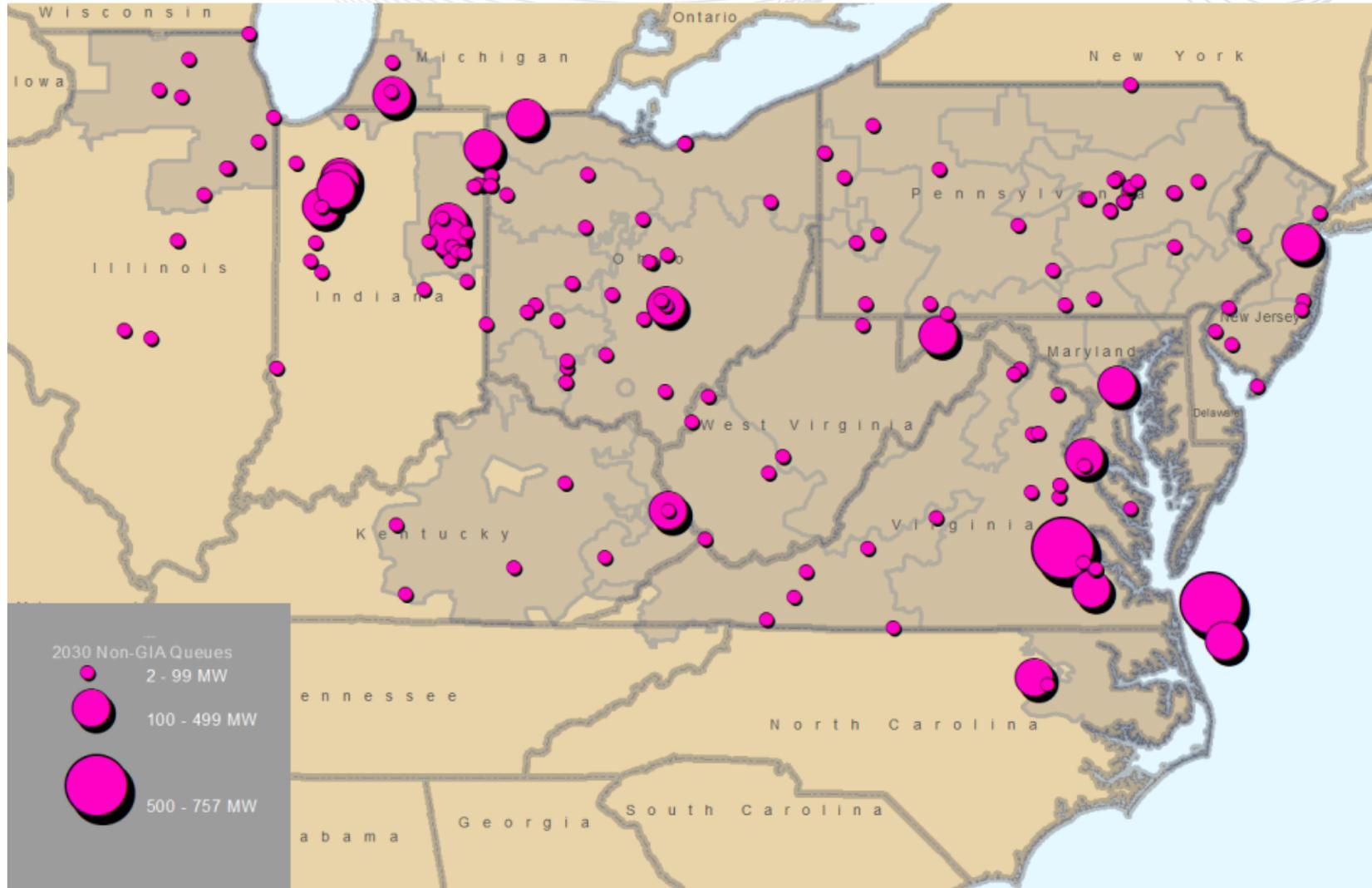
A number of the 7-Year scenarios above will be evaluated by PJM internally

# 2025 RTEP Preliminary Results

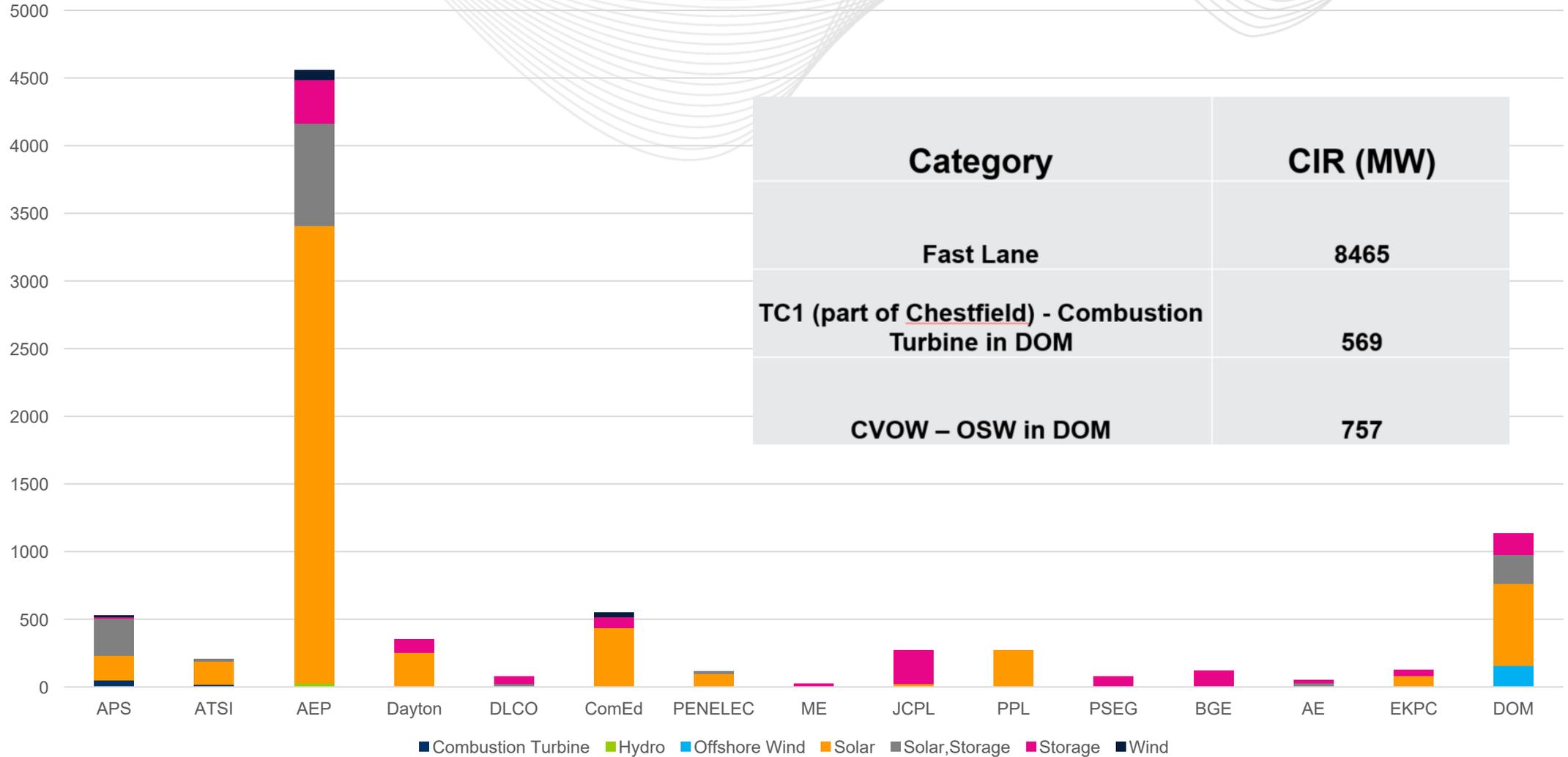
To be finalized by Window Opening mid-June 2025

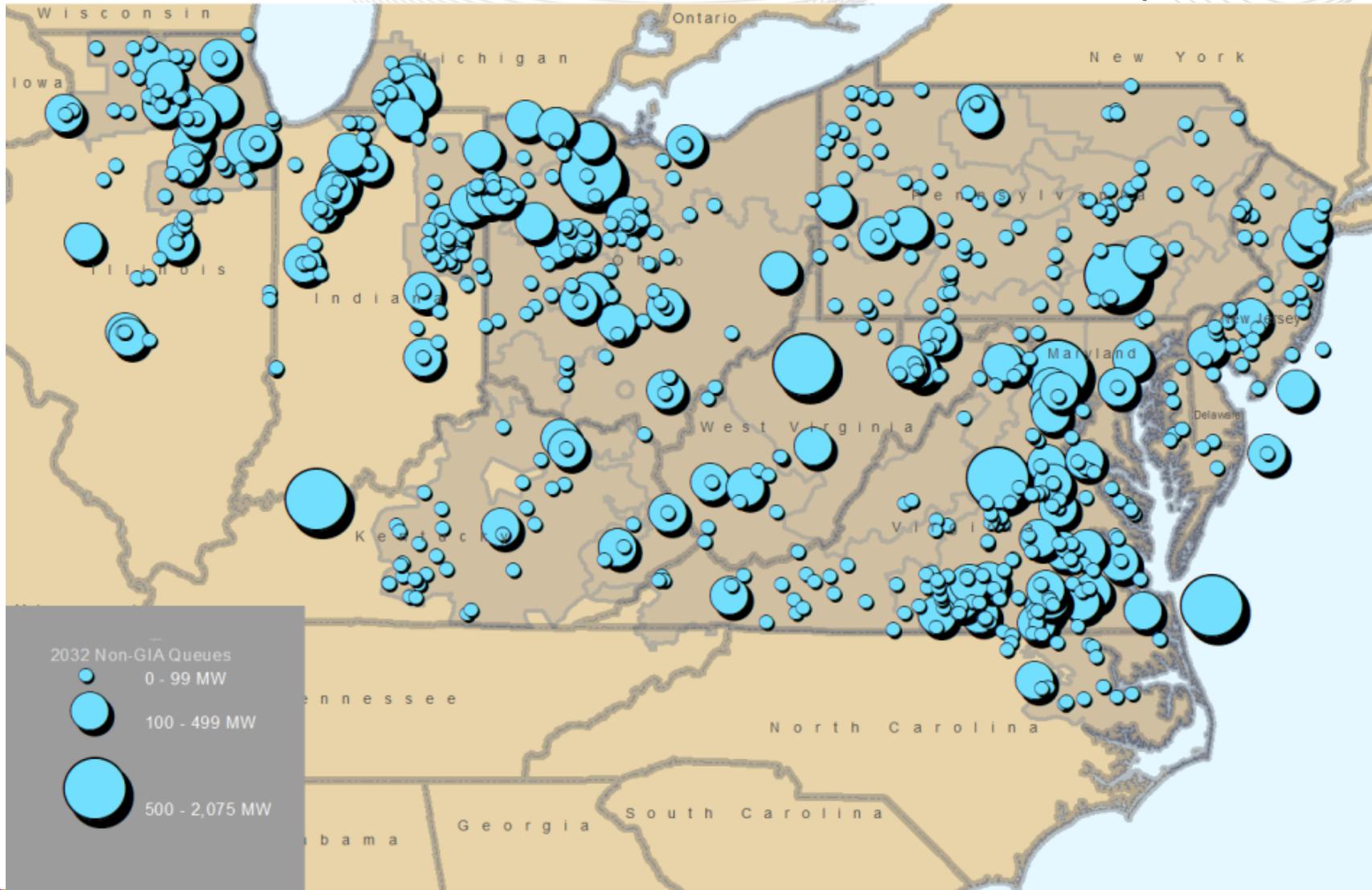
# Forecasted/Future Generation Added (Non-GIA Queue)

# 2030 - Forecasted/Future Generation Added (Non-GIA Queue)

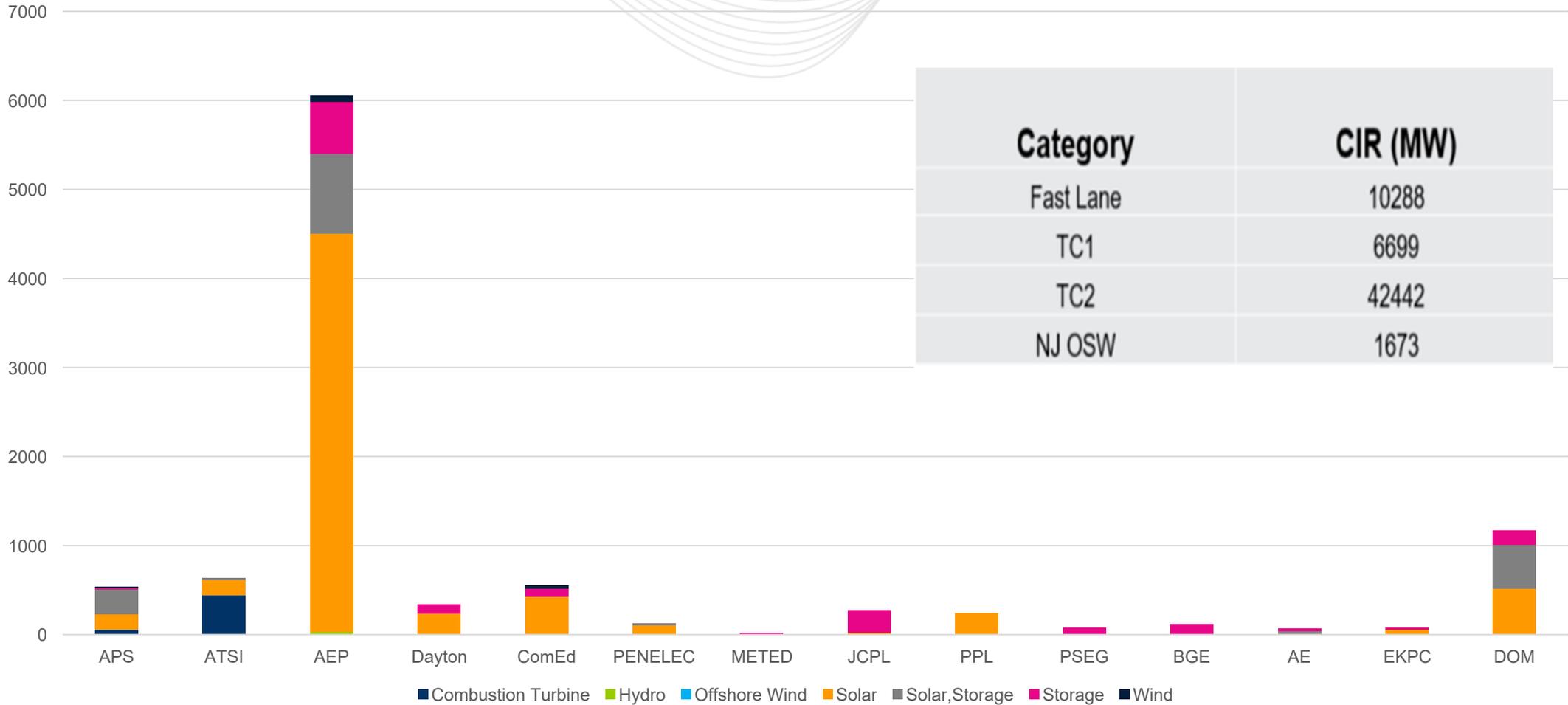


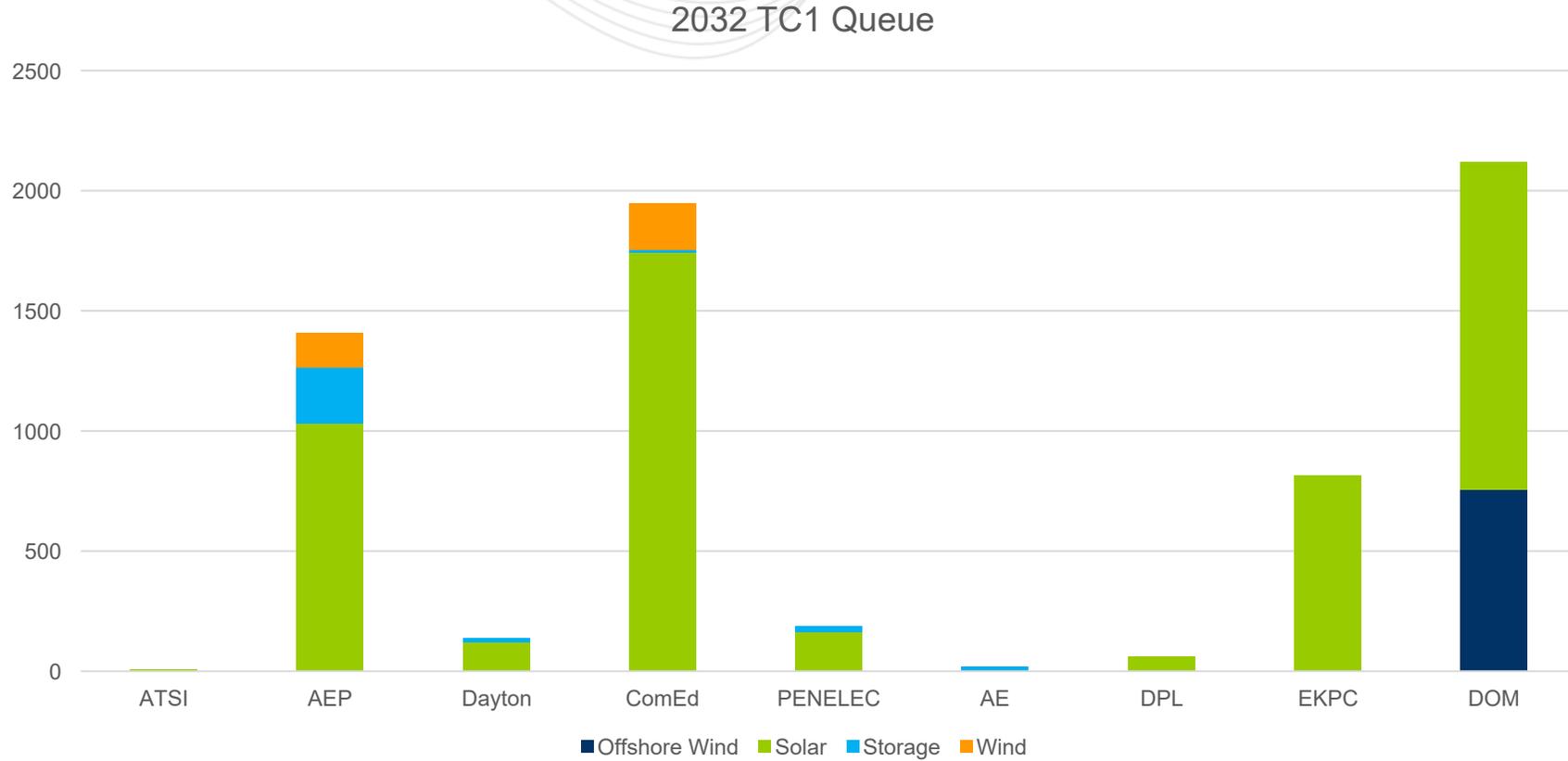
# 2030 - Forecasted/Future Generation Added (Non-GIA Queue - Fast Lane – All is signed Now)



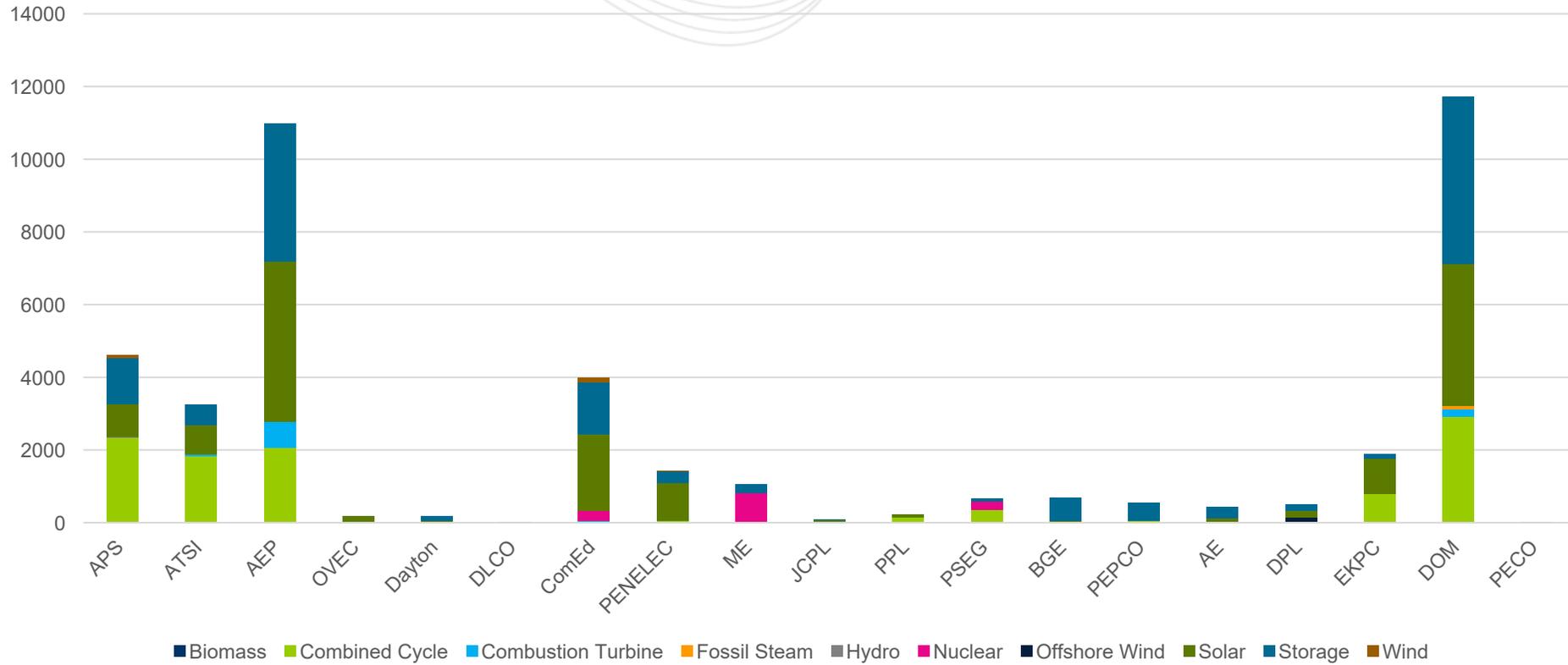


2032 Fast Lane Queue





2032 TC2 Queue



# RTEP Case Comparison

2029 vs 2030 (Subject to Refinements)

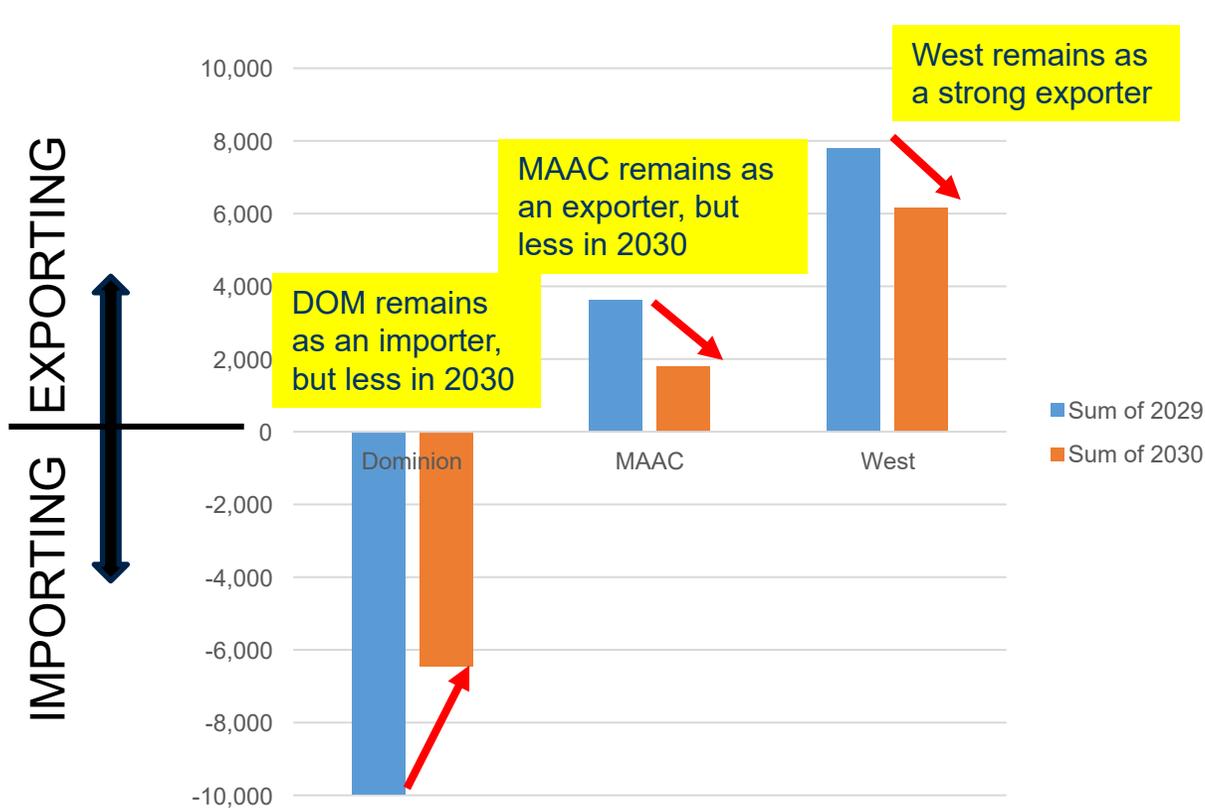
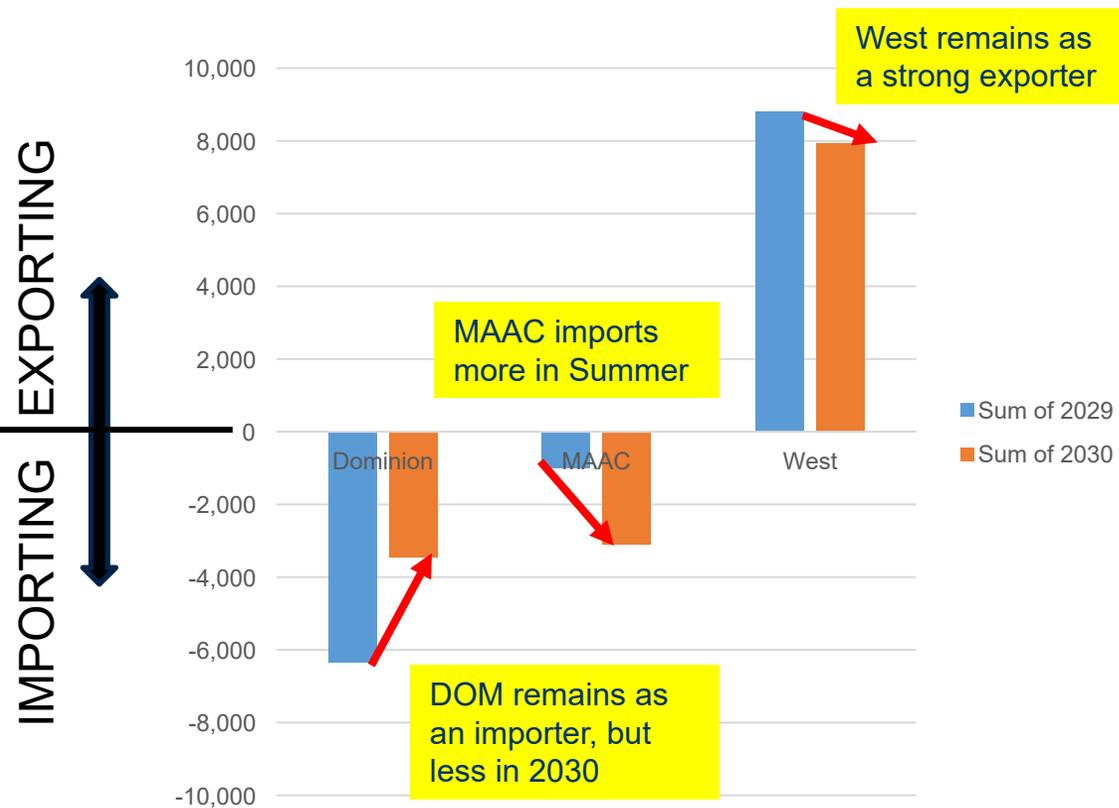
# Area Interchange - Ties (2029 vs 2030)

## SUMMER

Row Labels	Sum of 2029	Sum of 2030	Sum of MW Increase
Dominion	-6,348	-3,457	2,891
MAAC	-985	-3,106	-2,121
West	8,805	7,930	-875

## WINTER

Row Labels	Sum of 2029	Sum of 2030	Sum of MW Increase
Dominion	-9,977	-6,463	3,513
MAAC	3,626	1,786	-1,840
West	7,807	6,169	-1,638



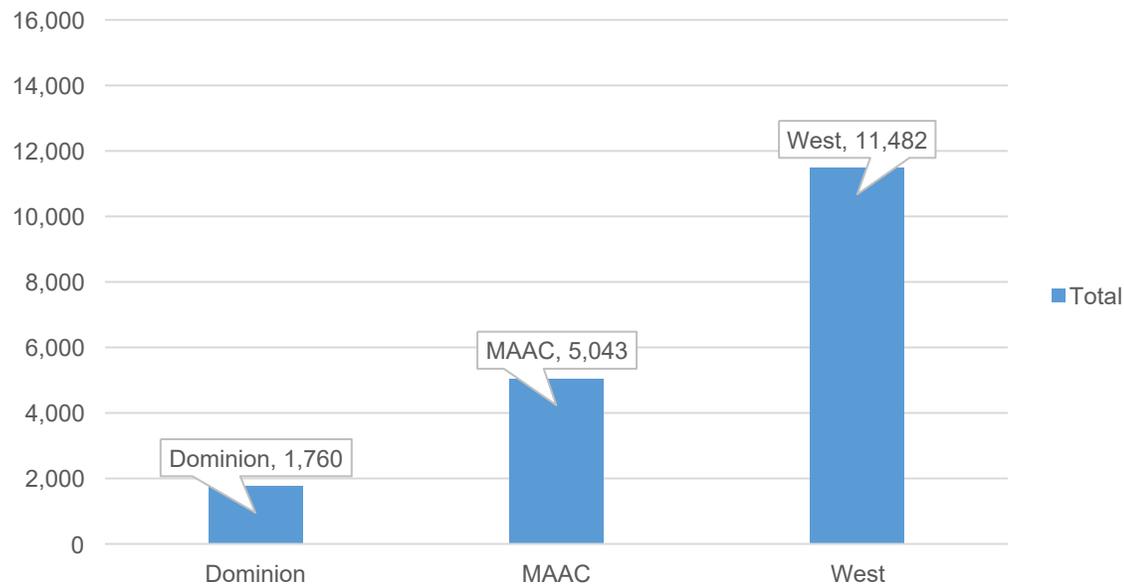


# Load and Gen Dispatch Increase – Summer (2029 to 2030)

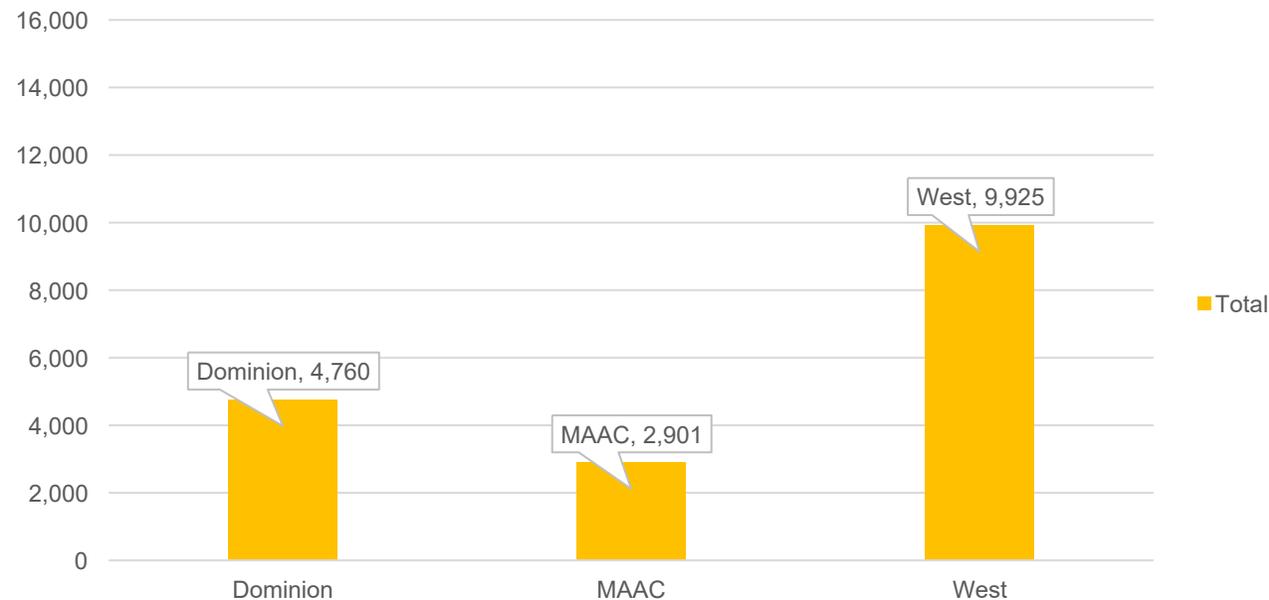
PJM	MW Increase LOAD
Dominion	1,760
MAAC	5,043
West	11,482
<b>Grand Total</b>	<b>18,285</b>

PJM	MW Increase GEN
Dominion	4,760
MAAC	2,901
West	9,925
<b>Grand Total</b>	<b>17,586</b>

### 2029 - 2030 Summer Year Over Year Load Increase



### 2029 - 2030 Summer Year Over Year Generation Increase





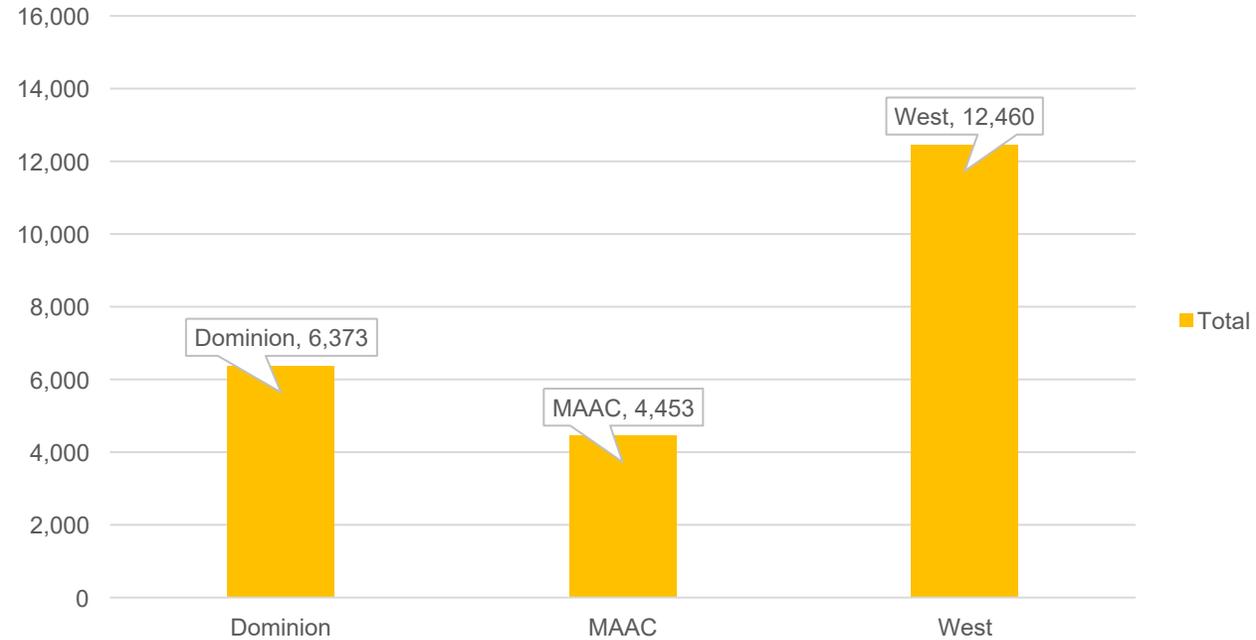
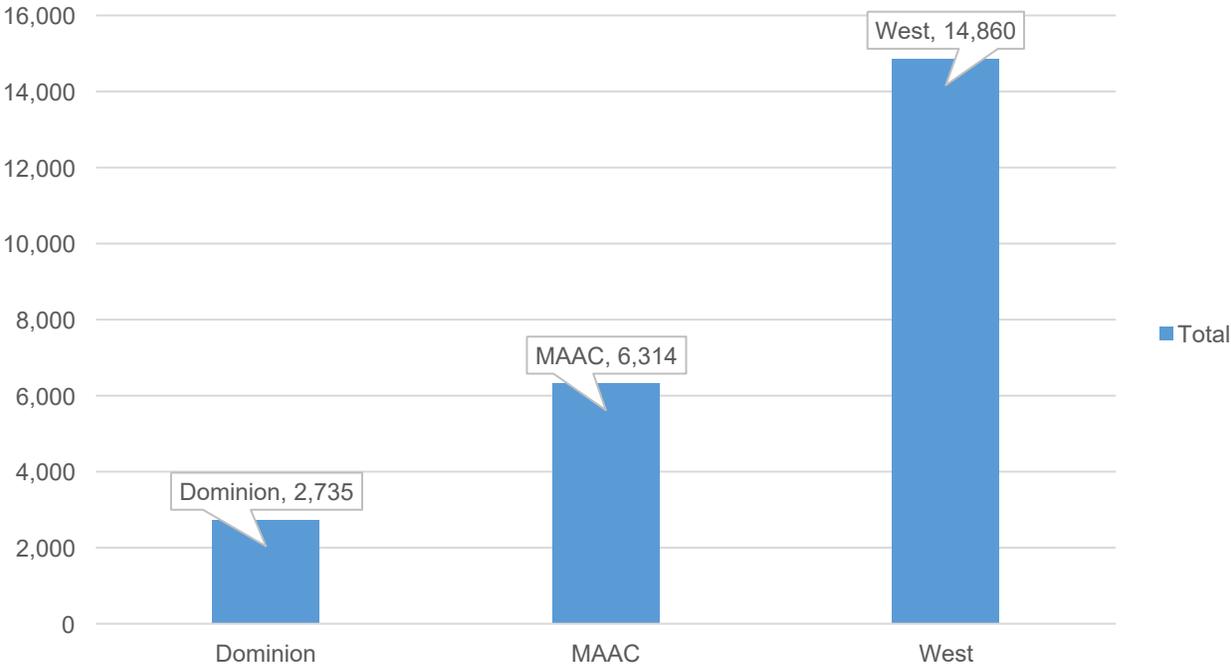
# Load and Gen Dispatch Increase – Winter (2029 to 2030)

PJM	MW Increase LOAD
Dominion	2,735
MAAC	6,314
West	14,860
<b>Grand Total</b>	<b>23,909</b>

PJM	MW Increase GEN
Dominion	6,373
MAAC	4,453
West	12,460
<b>Grand Total</b>	<b>23,286</b>

### 2029 - 2030 Winter Year Over Year Load Increase

### 2029 - 2030 Winter Year Over Year Generation Increase



# RTEP Case Comparison

2030 (draft 5/29/2025) vs 2032 (5/30/2025)

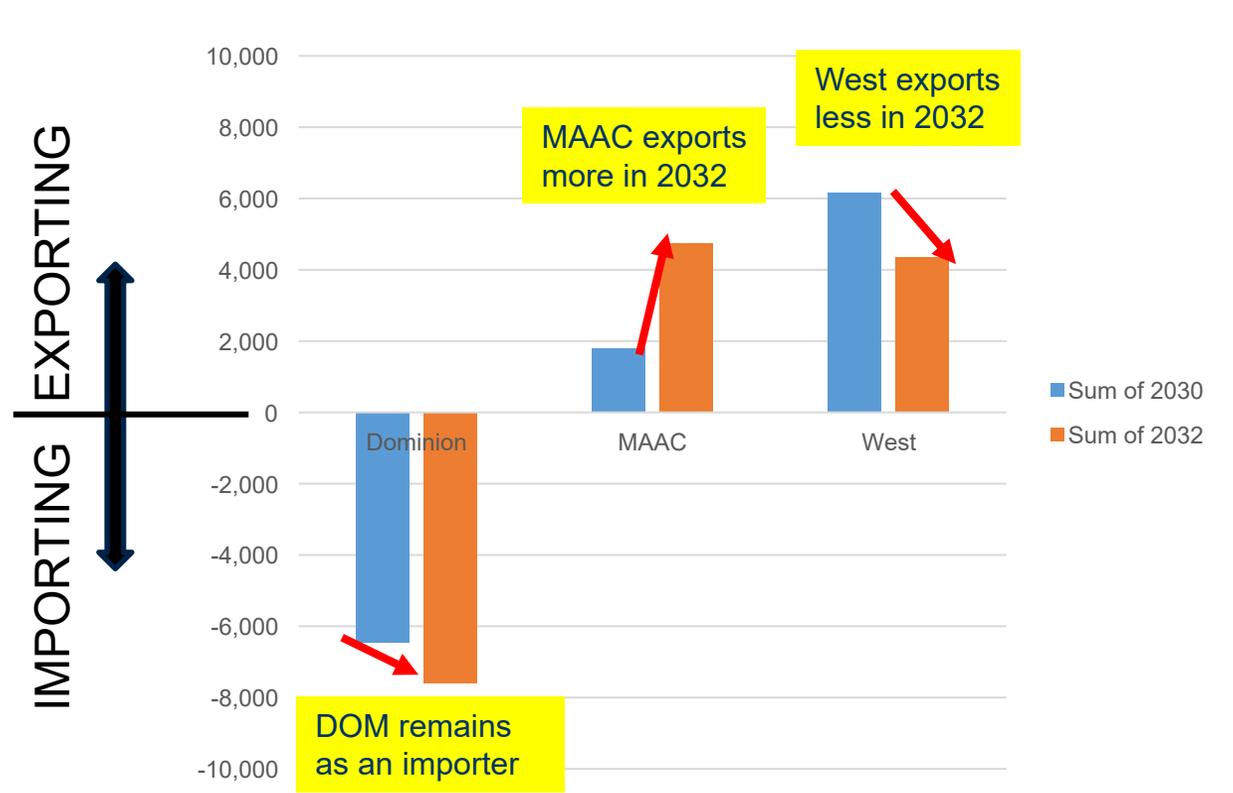
# Area Interchange - Ties (2030 vs 2032)

## SUMMER

Row Labels	Sum of 2030	Sum of 2032	Sum of MW Increase
Dominion	-3,457	-2,202	1,255
MAAC	-3,106	-4,904	-1,797
West	7,930	8,430	500

## WINTER

Row Labels	Sum of 2030	Sum of 2032	Sum of MW Increase
Dominion	-6,463	-7,604	-1,140
MAAC	1,786	4,746	2,960
West	6,169	4,349	-1,820



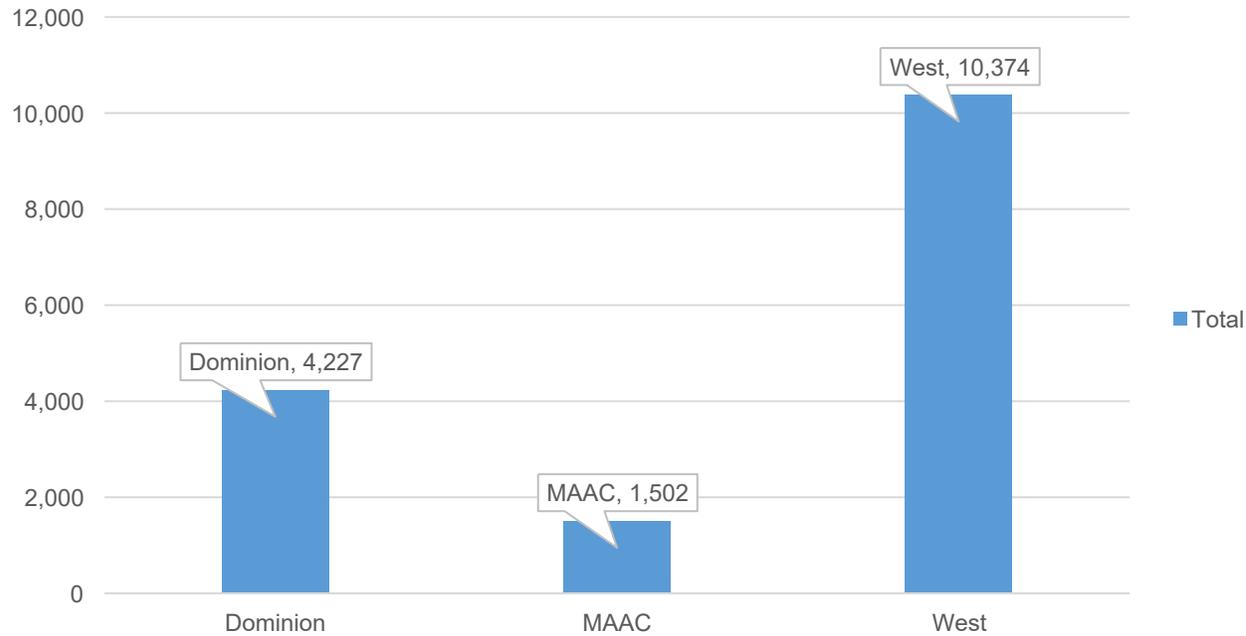


# Load and Gen Dispatch MW change – Summer (2030 to 2032)

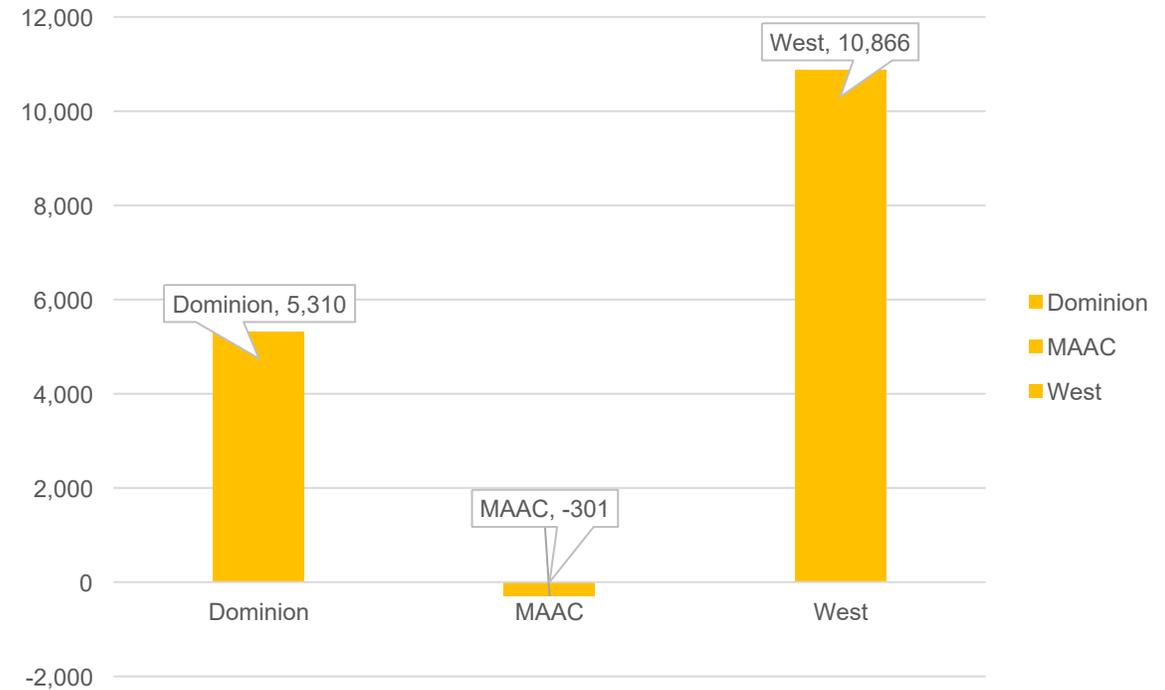
PJM	MW Increase LOAD
Dominion	4,227
MAAC	1,502
West	10,374
<b>Grand Total</b>	<b>16,103</b>

PJM	MW Increase GEN
Dominion	5,310
MAAC	-301
West	10,866
<b>Grand Total</b>	<b>15,874</b>

### 2030 to 2032 Summer MW Load Increase



### 2030 to 2032 Summer MW Generation Increase

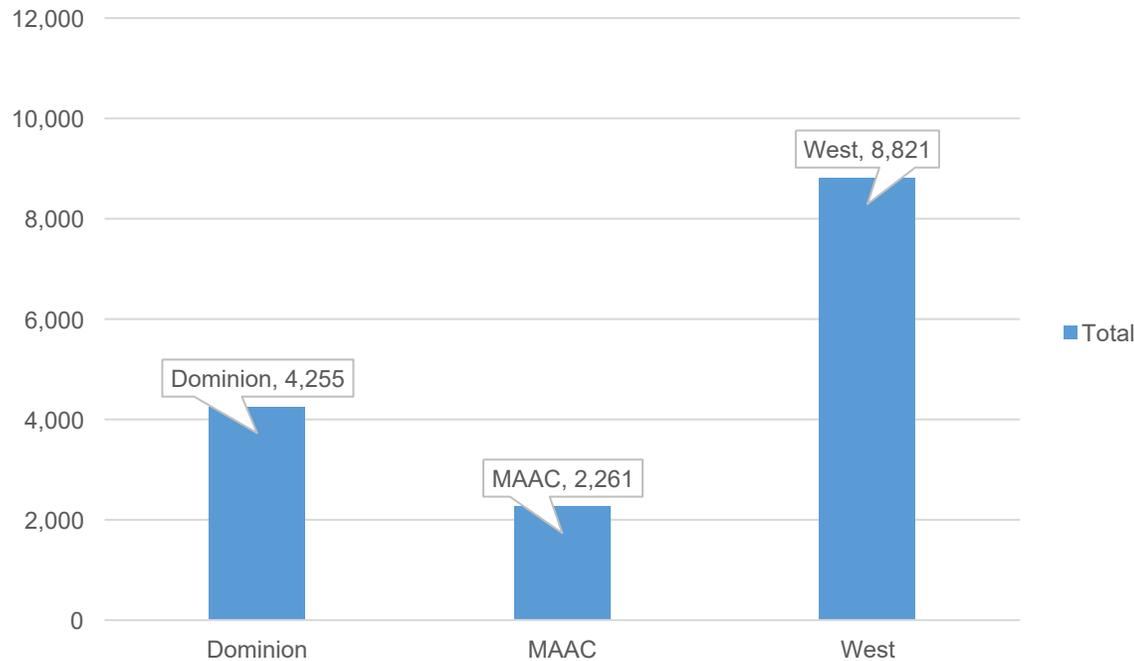




# Load and Gen Dispatch MW change – Winter (2030 to 2032)

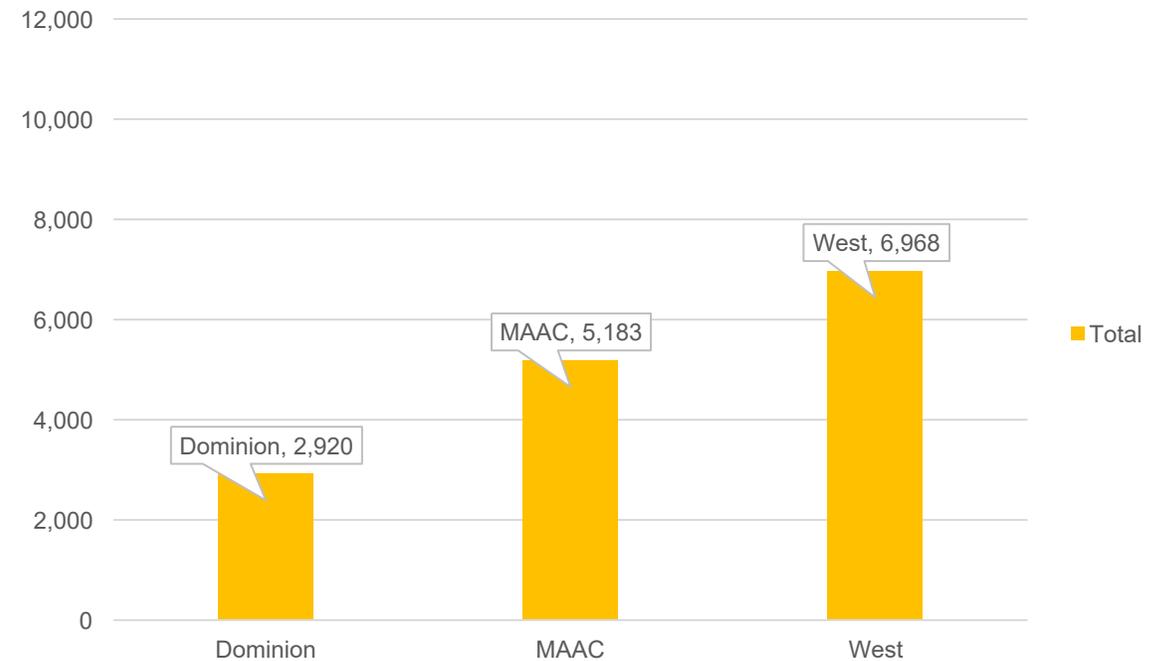
PJM	MW Increase LOAD
Dominion	4,255
MAAC	2,261
West	8,821
<b>Grand Total</b>	<b>15,336</b>

### 2030 to 2032 Winter MW Load Increase



PJM	MW Increase GEN
Dominion	2,920
MAAC	5,183
West	6,968
<b>Grand Total</b>	<b>15,071</b>

### 2030 to 2032 Winter MW Generation Increase

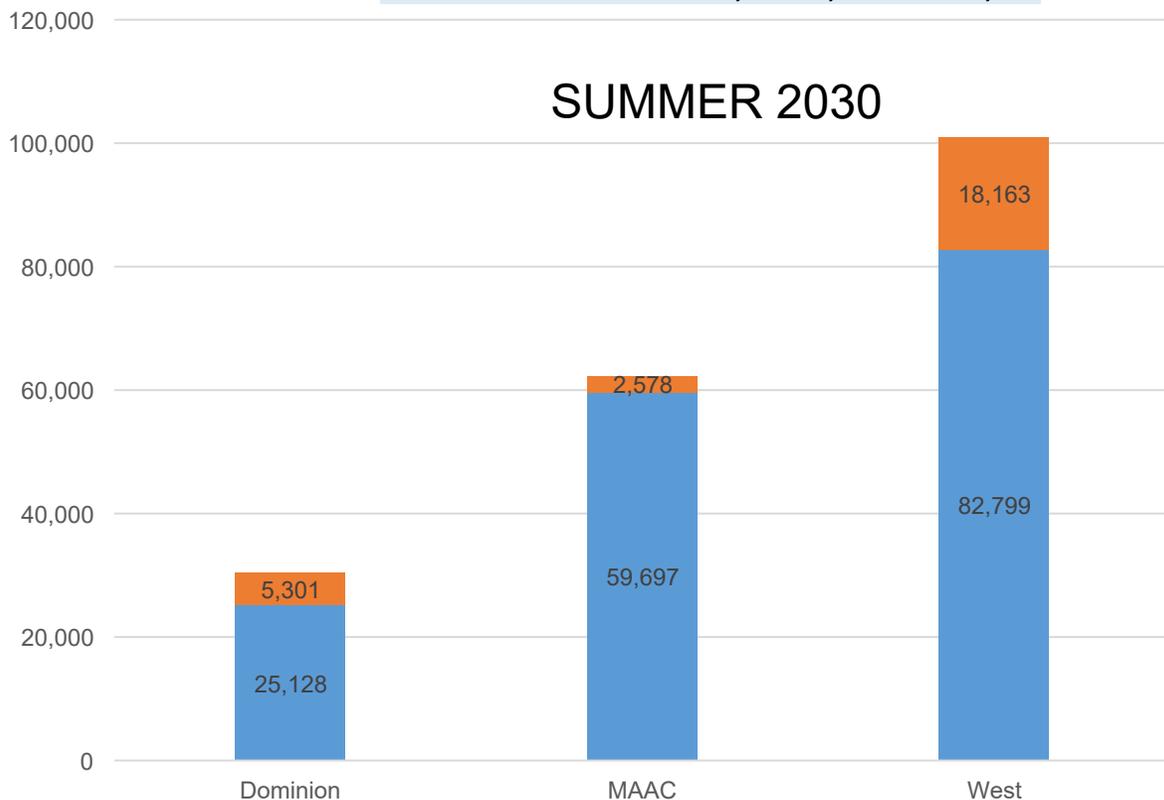




# SUMMER Dispatched Gen Machines – Existing vs Future

Sum of Peff Row Labels	Existing Gen MW		
	Yes	No	Grand Total
Dominion	25,128	5,301	30,429
MAAC	59,697	2,578	62,275
West	82,799	18,163	100,962
<b>Grand Total</b>	<b>167,624</b>	<b>26,042</b>	<b>193,666</b>

Sum of Peff Row Labels	Existing Gen MW		
	Yes	No	Grand Total
Dominion	22,837	12,902	35,739
MAAC	54,508	7,466	61,974
West	74,000	37,888	111,888
<b>Grand Total</b>	<b>151,345</b>	<b>58,255</b>	<b>209,601</b>





# WINTER Dispatched Gen Machines – Existing vs Future

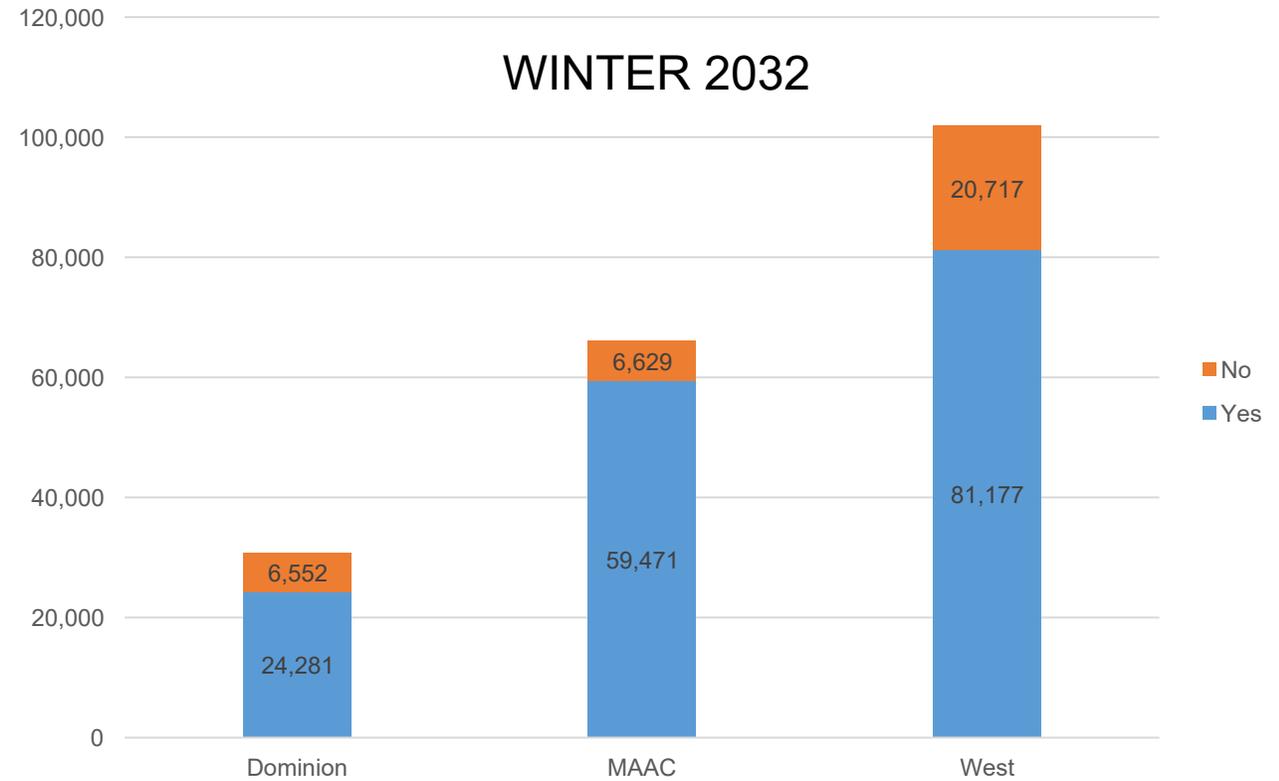
Sum of Peff Row Labels	Existing Gen MW		
	Yes	No	Grand Total
Dominion	24,597	3,316	27,913
MAAC	59,821	1,097	60,917
West	84,754	10,167	94,921
<b>Grand Total</b>	<b>169,172</b>	<b>14,580</b>	<b>183,751</b>

Sum of Peff Row Labels	Existing Gen MW		
	Yes	No	Grand Total
Dominion	24,281	6,552	30,833
MAAC	59,471	6,629	66,100
West	81,177	20,717	101,894
<b>Grand Total</b>	<b>164,929</b>	<b>33,898</b>	<b>198,827</b>

WINTER 2030



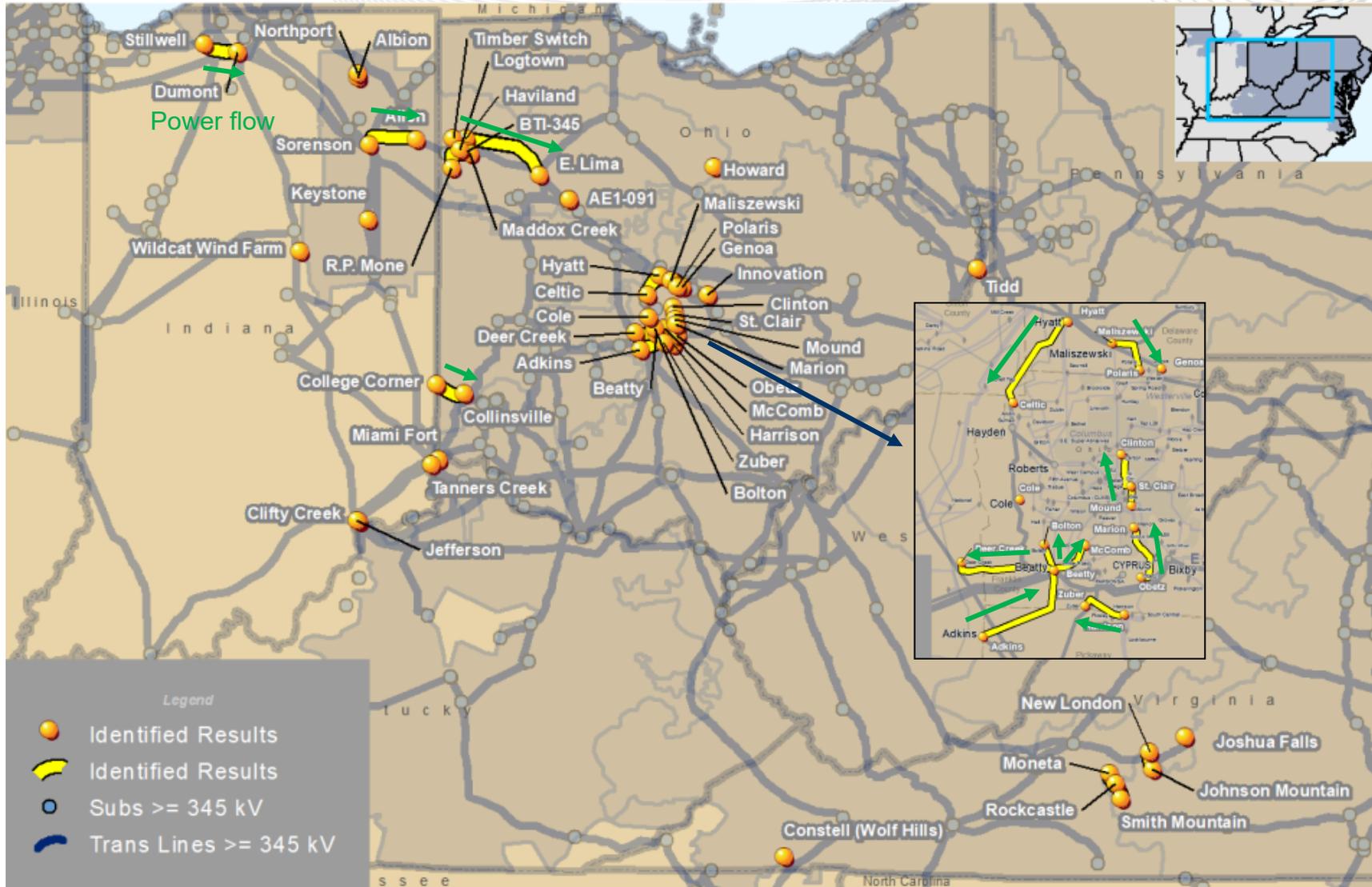
WINTER 2032



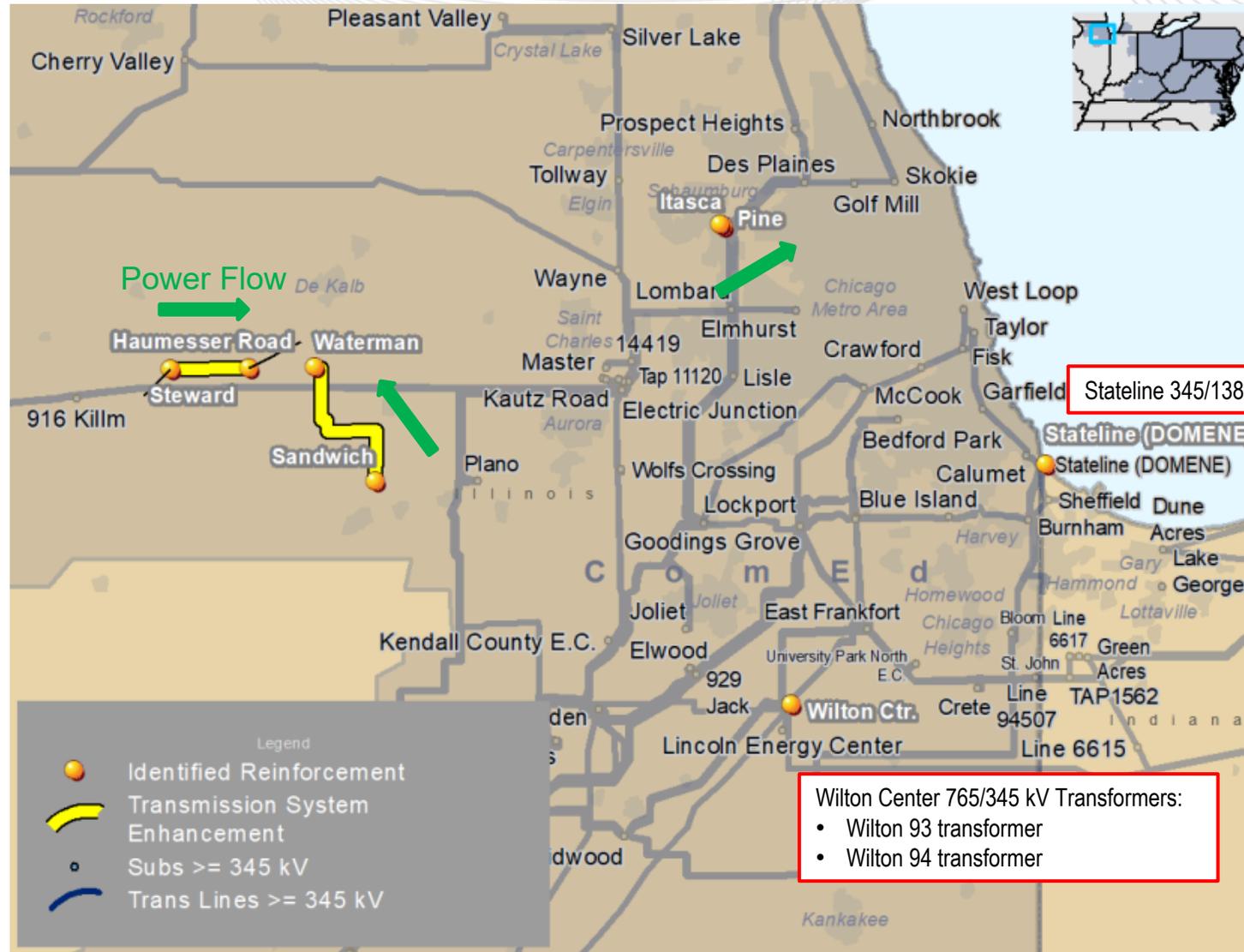
# 2025 RTEP Preliminary Results

Sample Transmission Needs  
Preliminary and subject to refinements

# 2030 Preliminary AEP Violations--Map



# 2030 ComEd Violations



Stateline 345/138 kV transformer

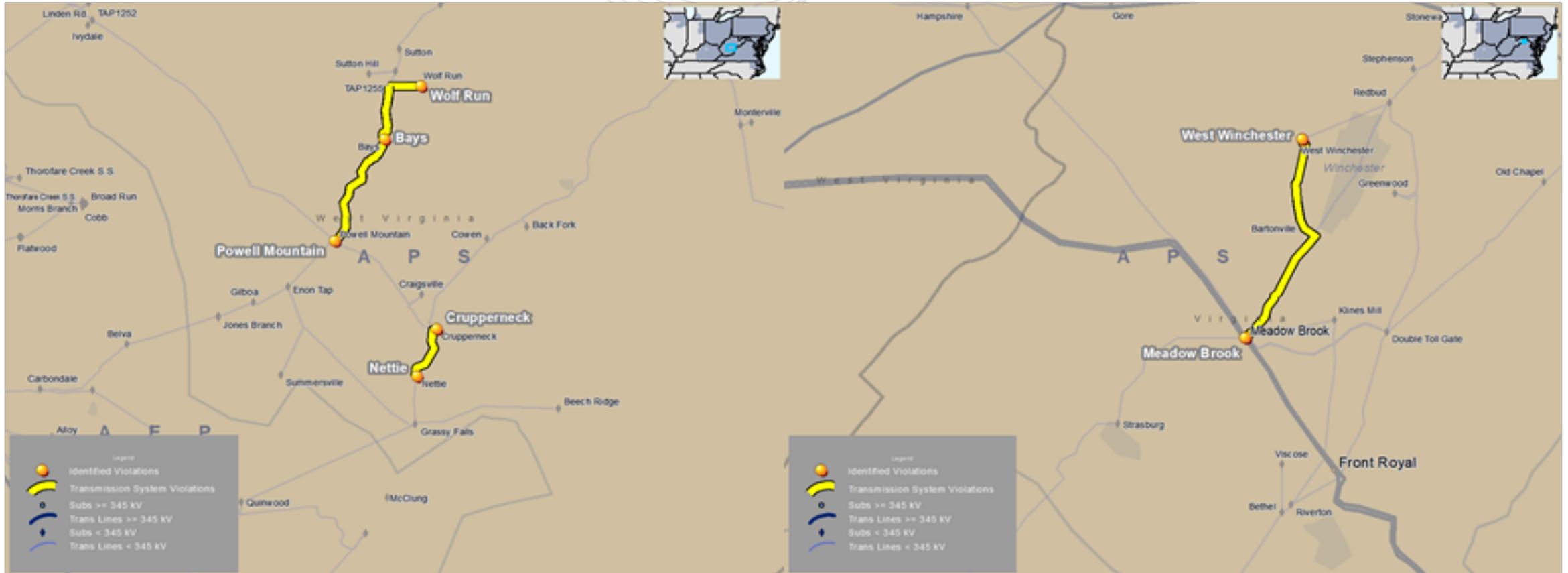
Wilton Center 765/345 kV Transformers:

- Wilton 93 transformer
- Wilton 94 transformer

# APS 2030 Preliminary Violations

## APS SUM GenDeliv

## APS WIN GenDeliv & N-1



# ATSI 2030 Preliminary Thermal Violations

**ATSI SUM GenDeliv**



**ATSI WIN GenDeliv**



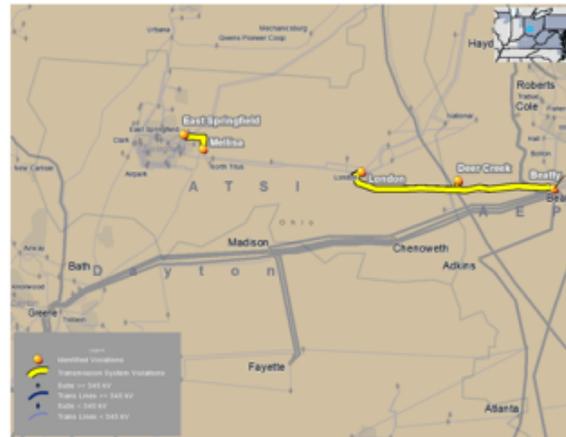
**ATSI LL GenDeliv**



**ATSI SUM N-1**



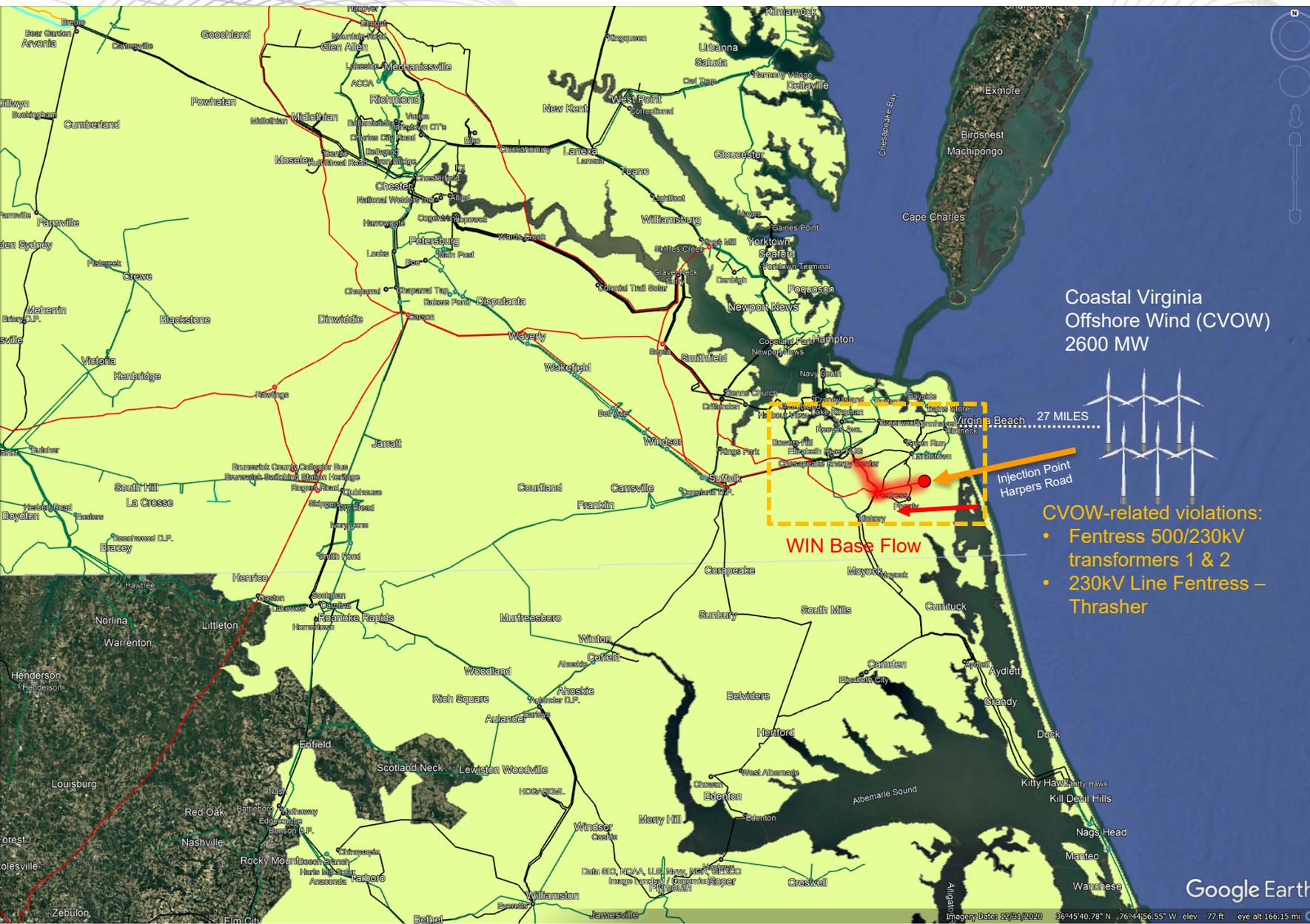
**ATSI WIN N-1**



**ATSI LL N-1**

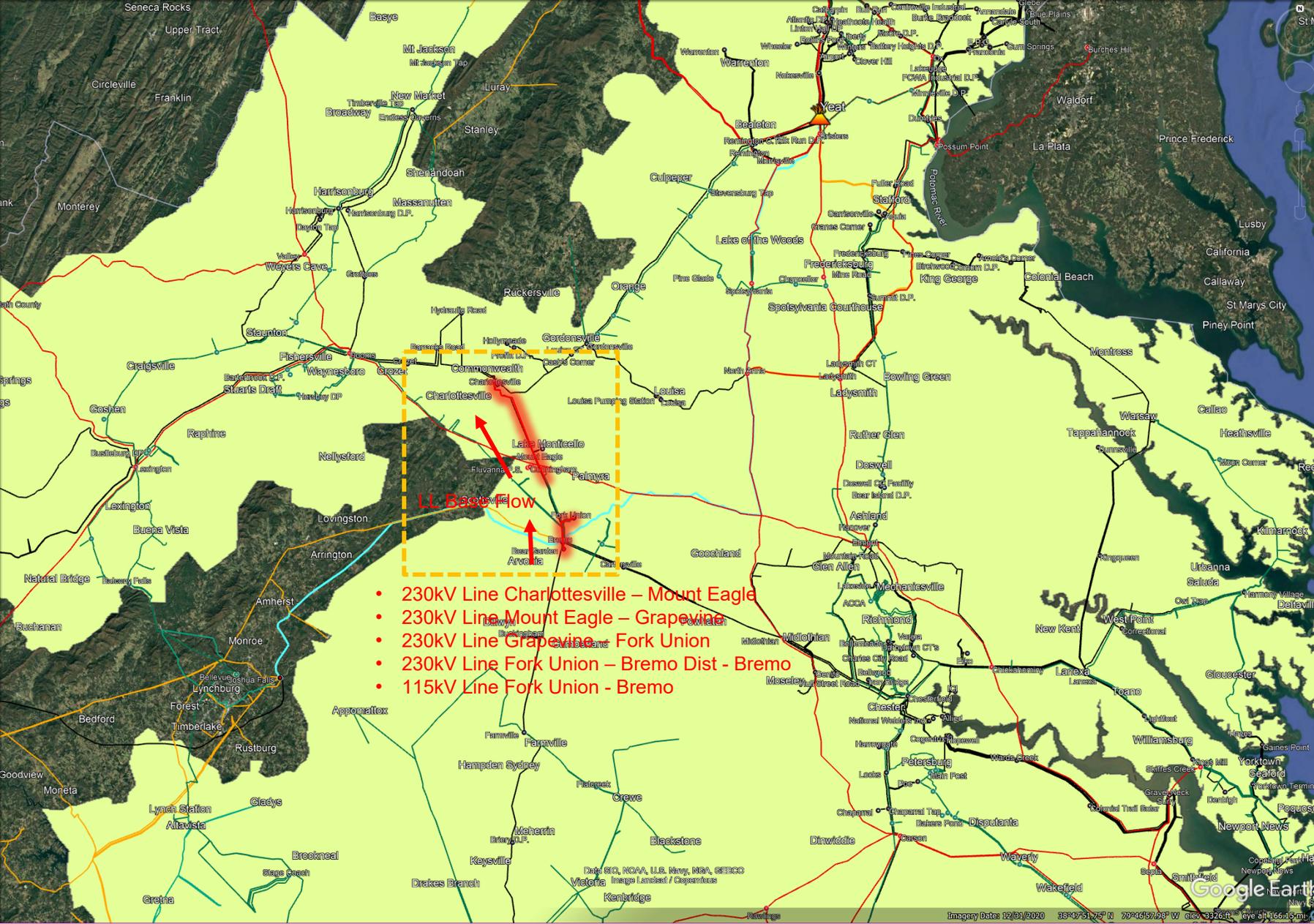


# 2025 Series RTEP 2030 Thermal Violations N-1/GenDeliv/IPD Dominion Area



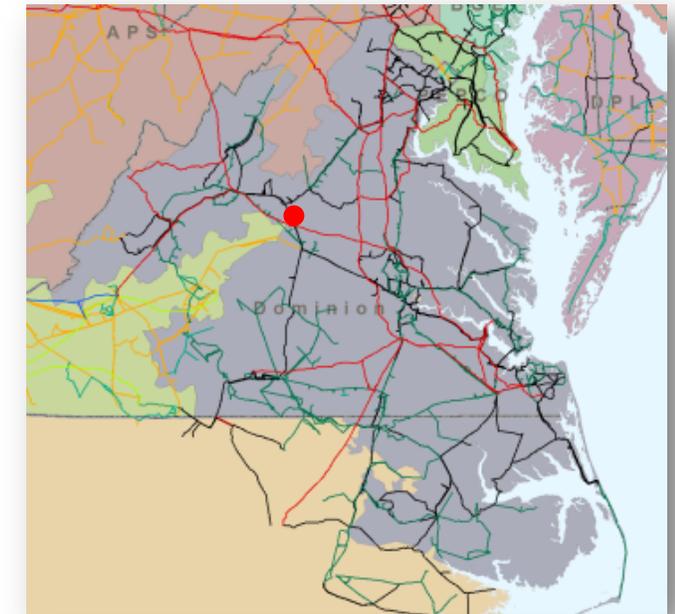
### Locational Map

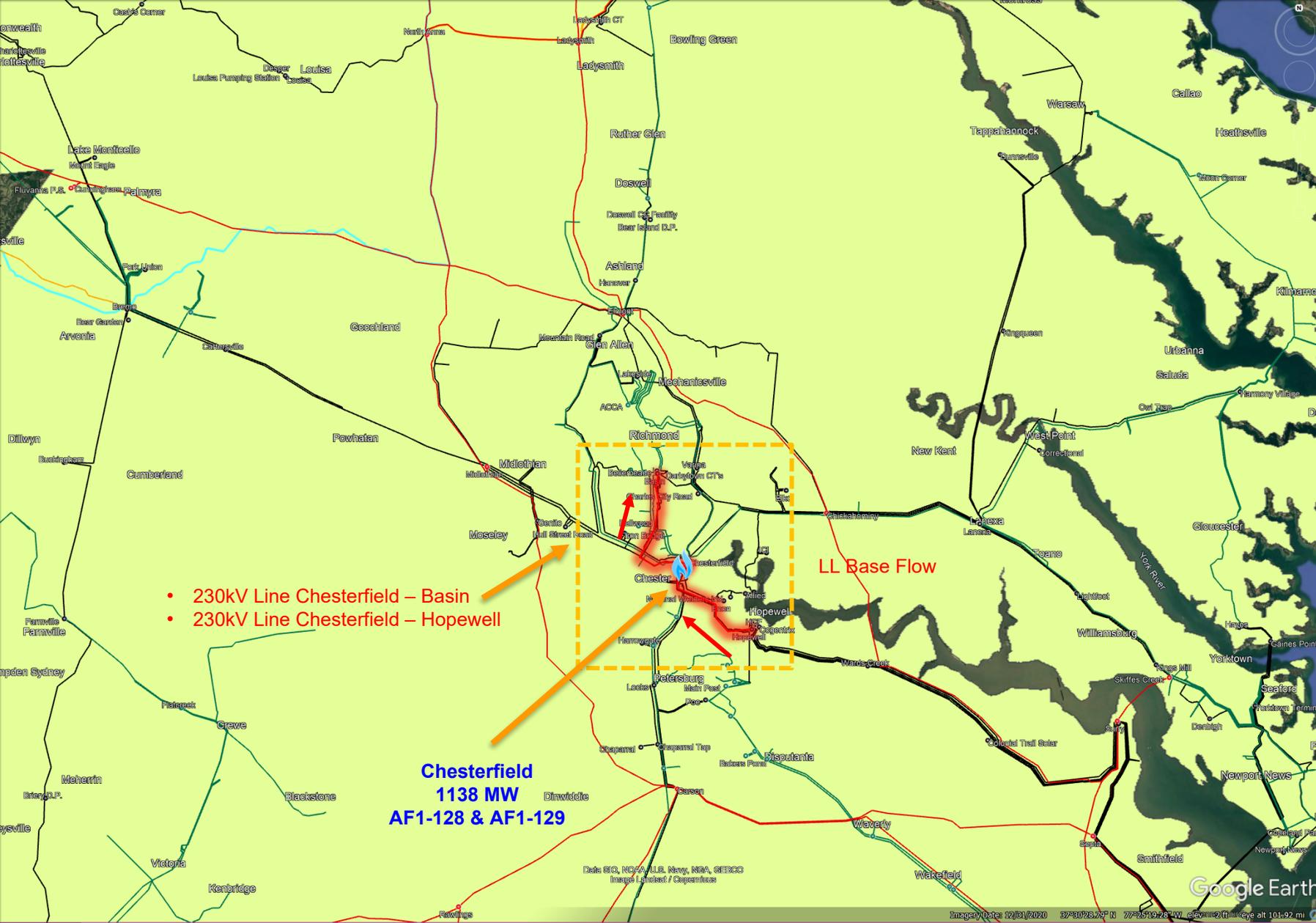




- 230kV Line Charlottesville – Mount Eagle
- 230kV Line Mount Eagle – Grapevine
- 230kV Line Grapevine – Fork Union
- 230kV Line Fork Union – Bremsel Dist - Bremsel
- 115kV Line Fork Union - Bremsel

### Locational Map





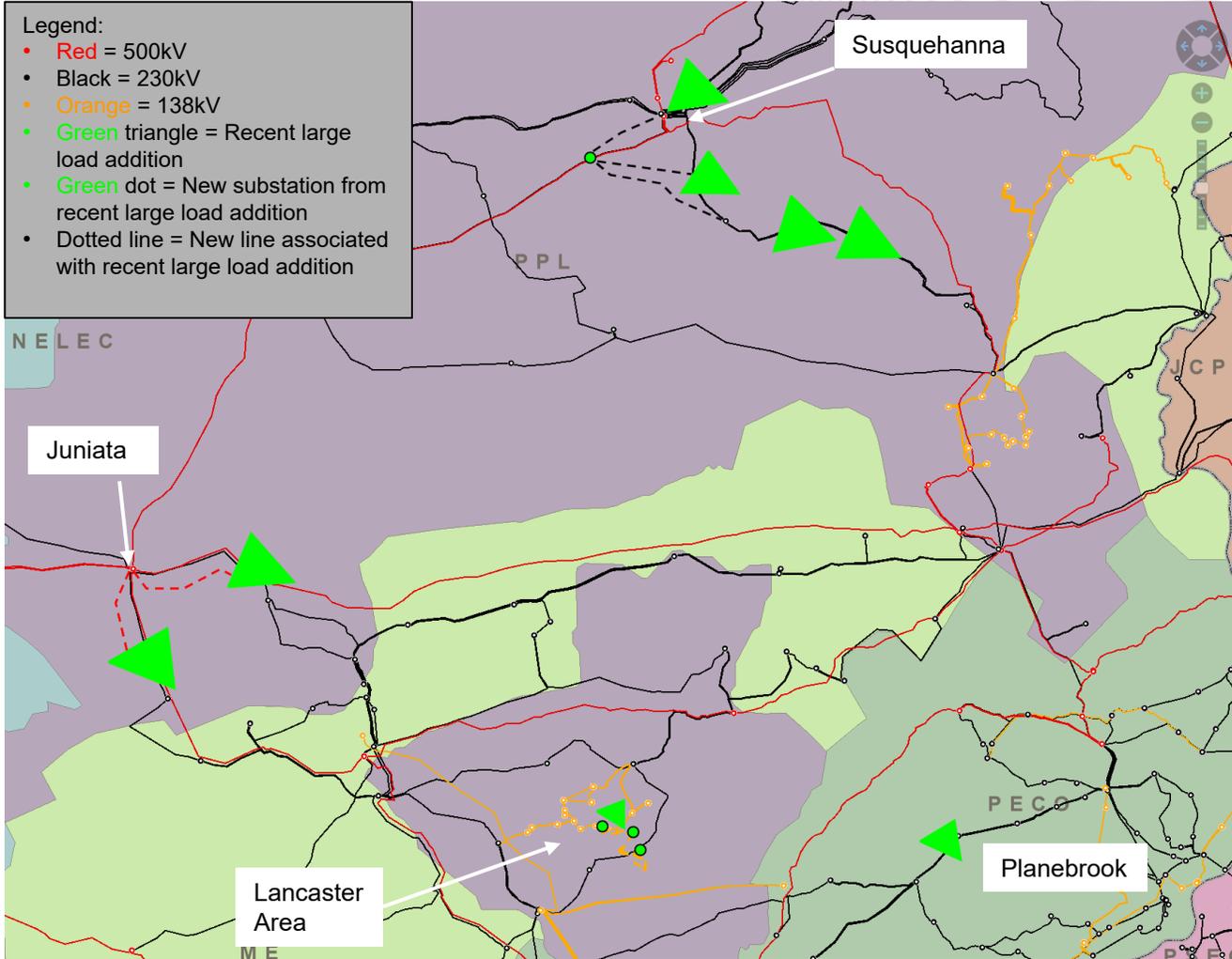
### Locational Map





# 2025 Series RTEP 2030 Thermal Violations MAAC Area

# MAAC: Recent Large Load Additions

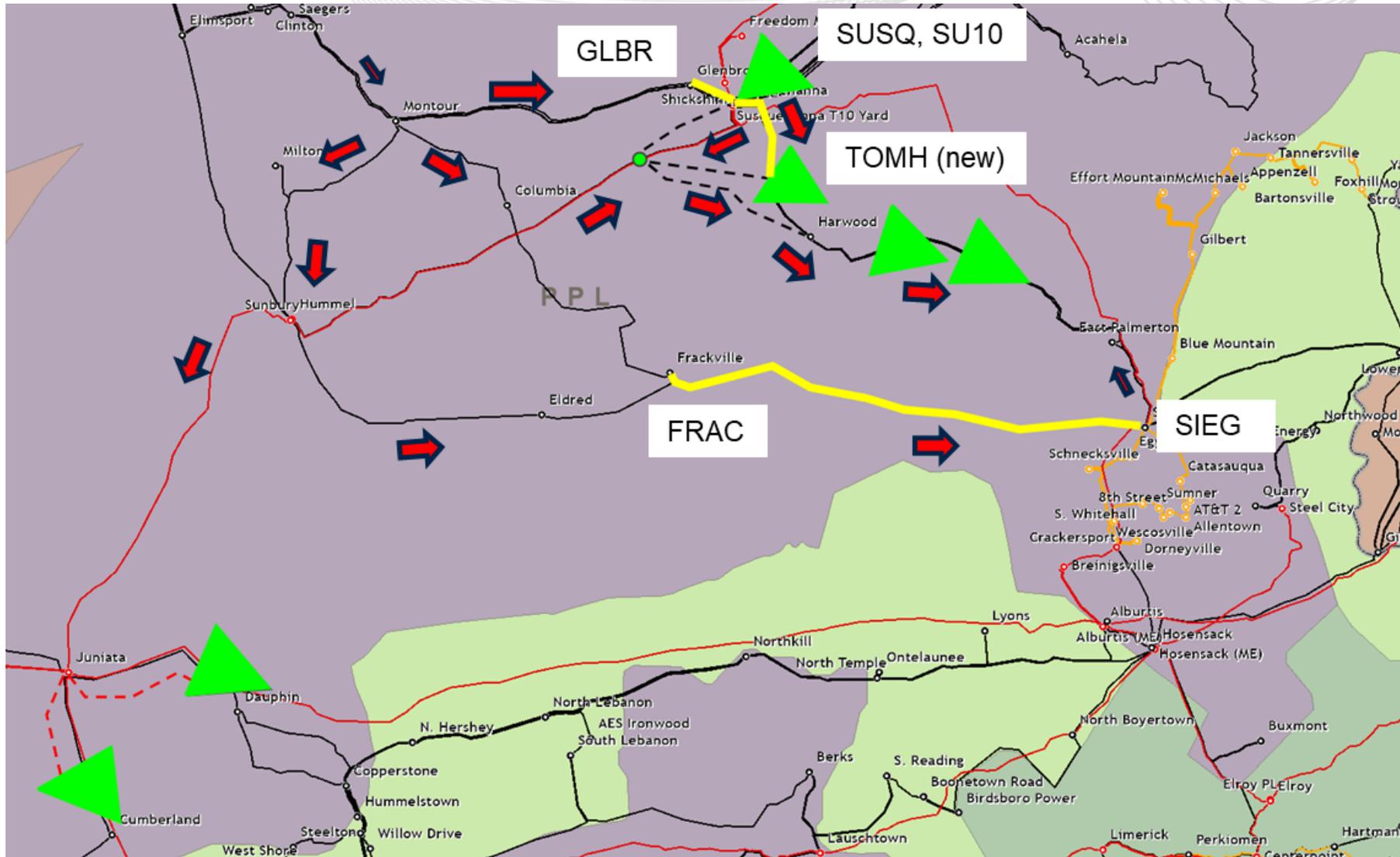


## Summer Load Values

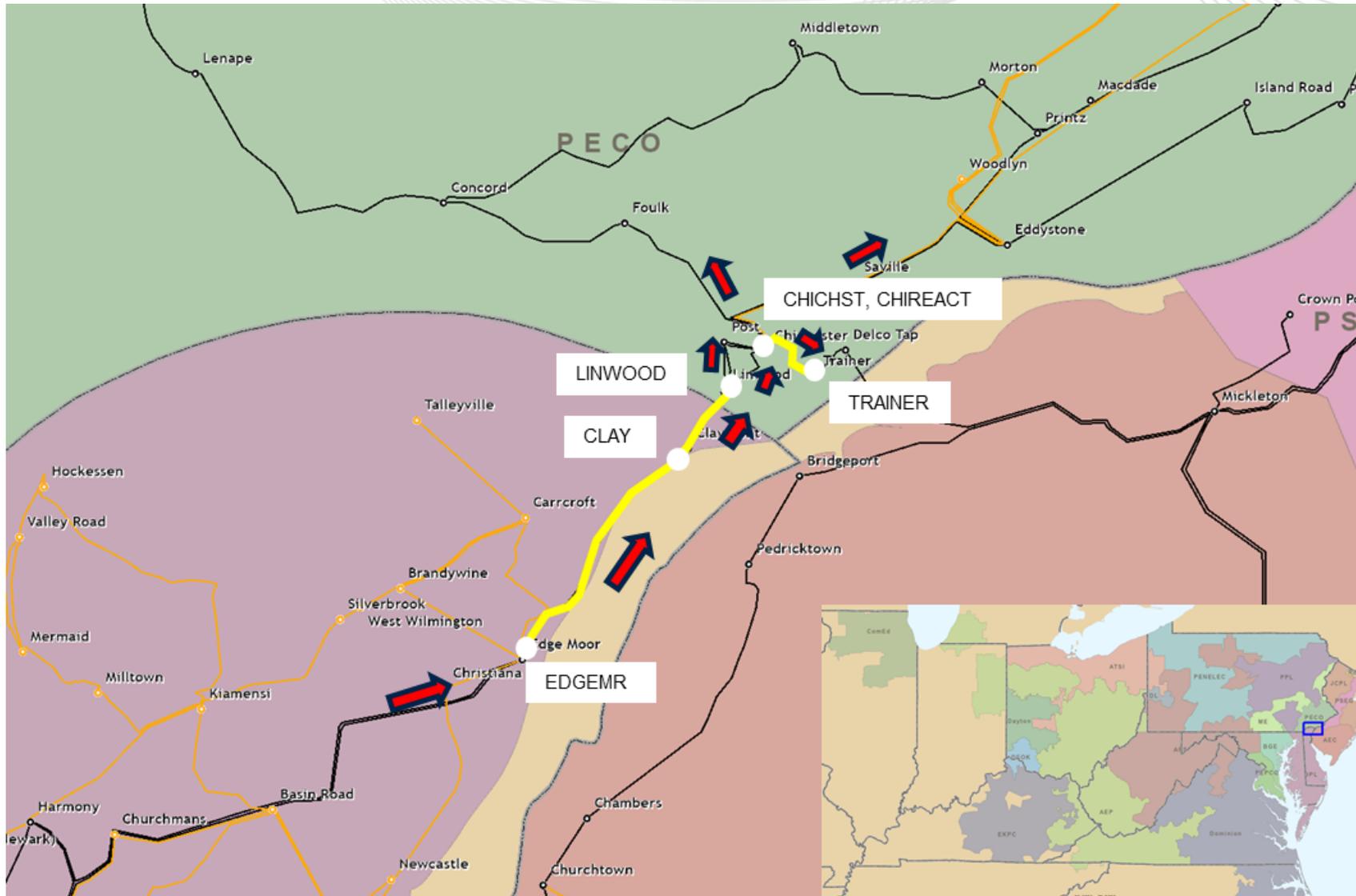
Area	2029 Load	2030 Load	2032 Load
Susquehanna	317.446	2736.9999	3248
Juniata	0	1364	1543.5
Lancaster	0	490	490
Planebrook	269.67	524.284	534.935



# PPL: 2030 Susquehanna Cluster



# PECO/Northern DPL -- 2030 Chichester Area



# 2025 Series RTEP 2030

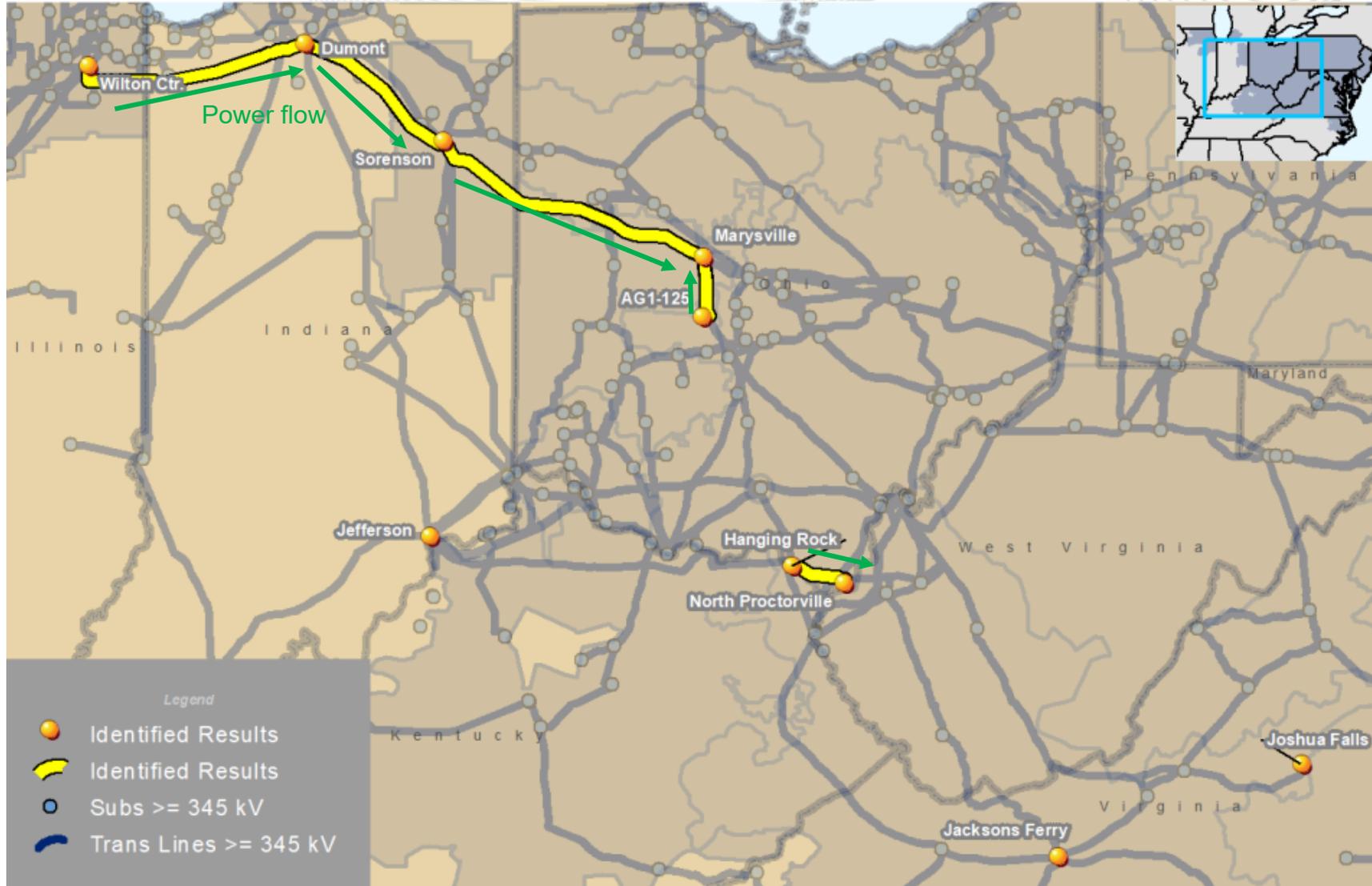
## General Summary of Results

- All previously planned backbone transmission enhancements continue to perform well up to and including 2030.
- The forecasted queued generation (up to Fast Lane + CVOW and Chesterfield) do not drive major regional transfer needs;
  - Generation developing in these areas efficiently serves the zonal load needs
- PPL which has relatively small amount of new generation added, will require additional transfer capability (enhance the import capability into PPL).
  - The details on how the western generation may materialize will have minimal impact on this need given the level of generation forecasted in the west.
- The 2025 RTEP provides guidance to not only how the load reliability needs will be met, but also to where generation could materialize most efficiently (which is the case for Fast Lane projects requiring minimal transmission upgrades)

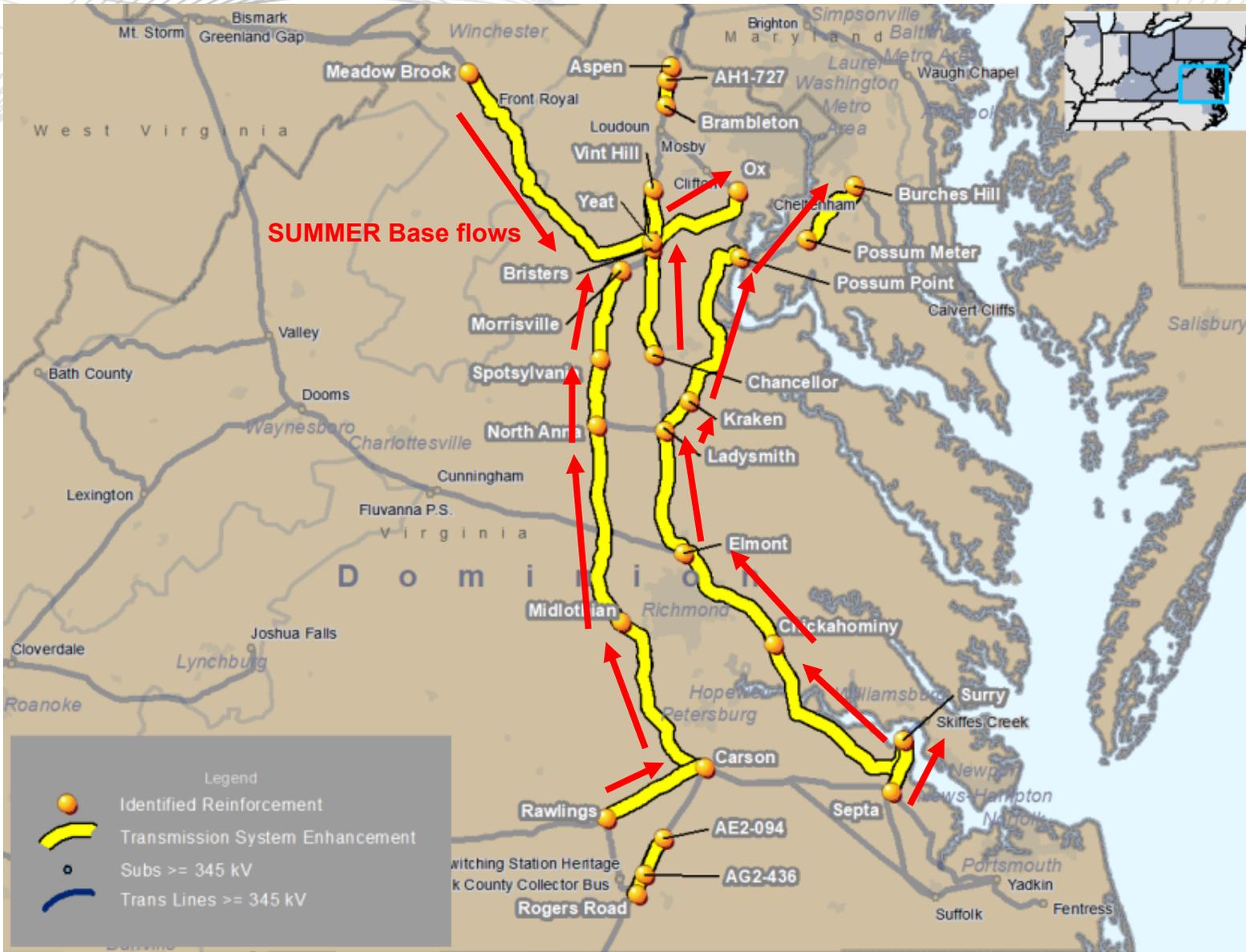
## 2025 Series RTEP 2032

### Preliminary Results – Sample and Subject to Change

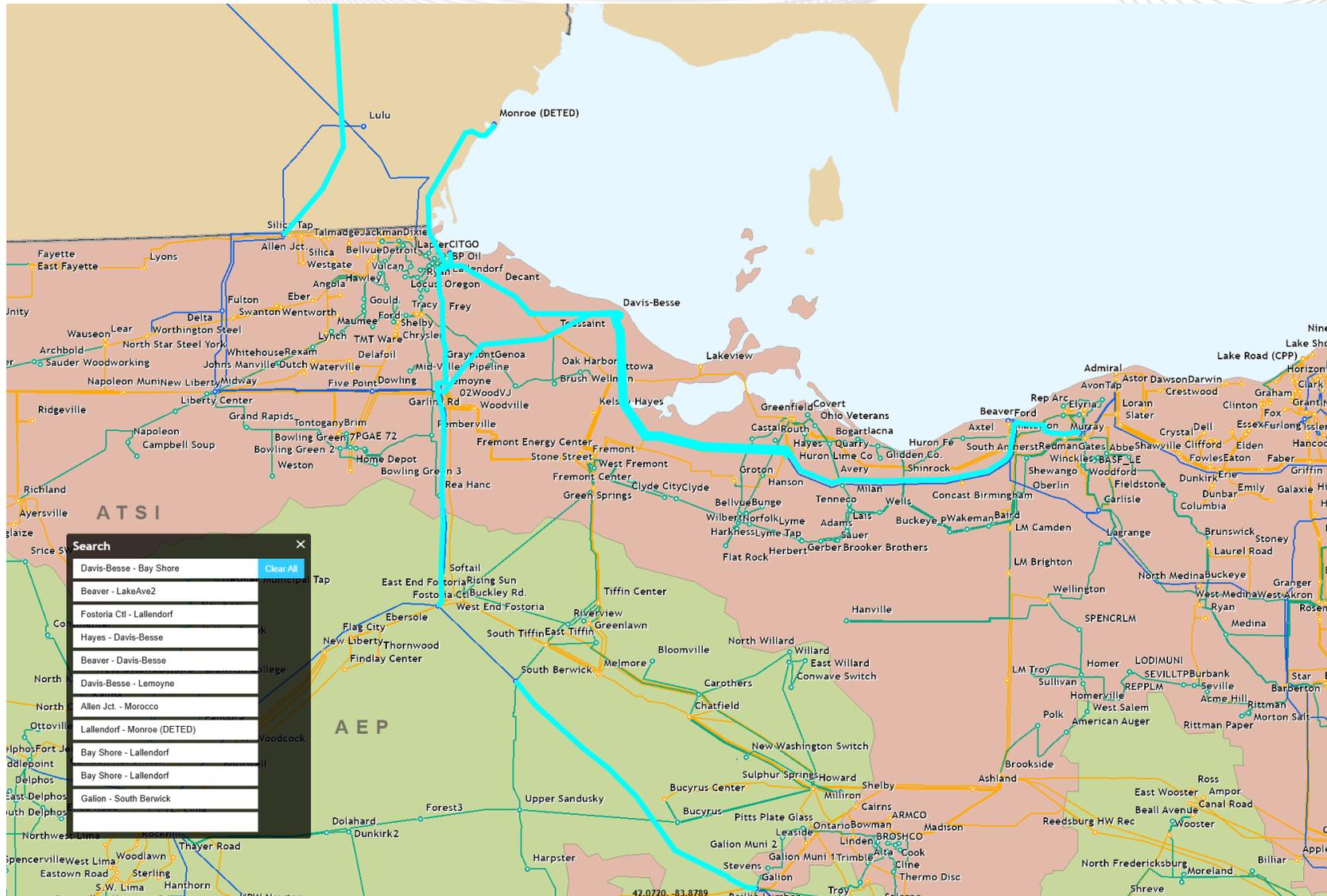
# 2032 Preliminary AEP Violations -- 765 kV

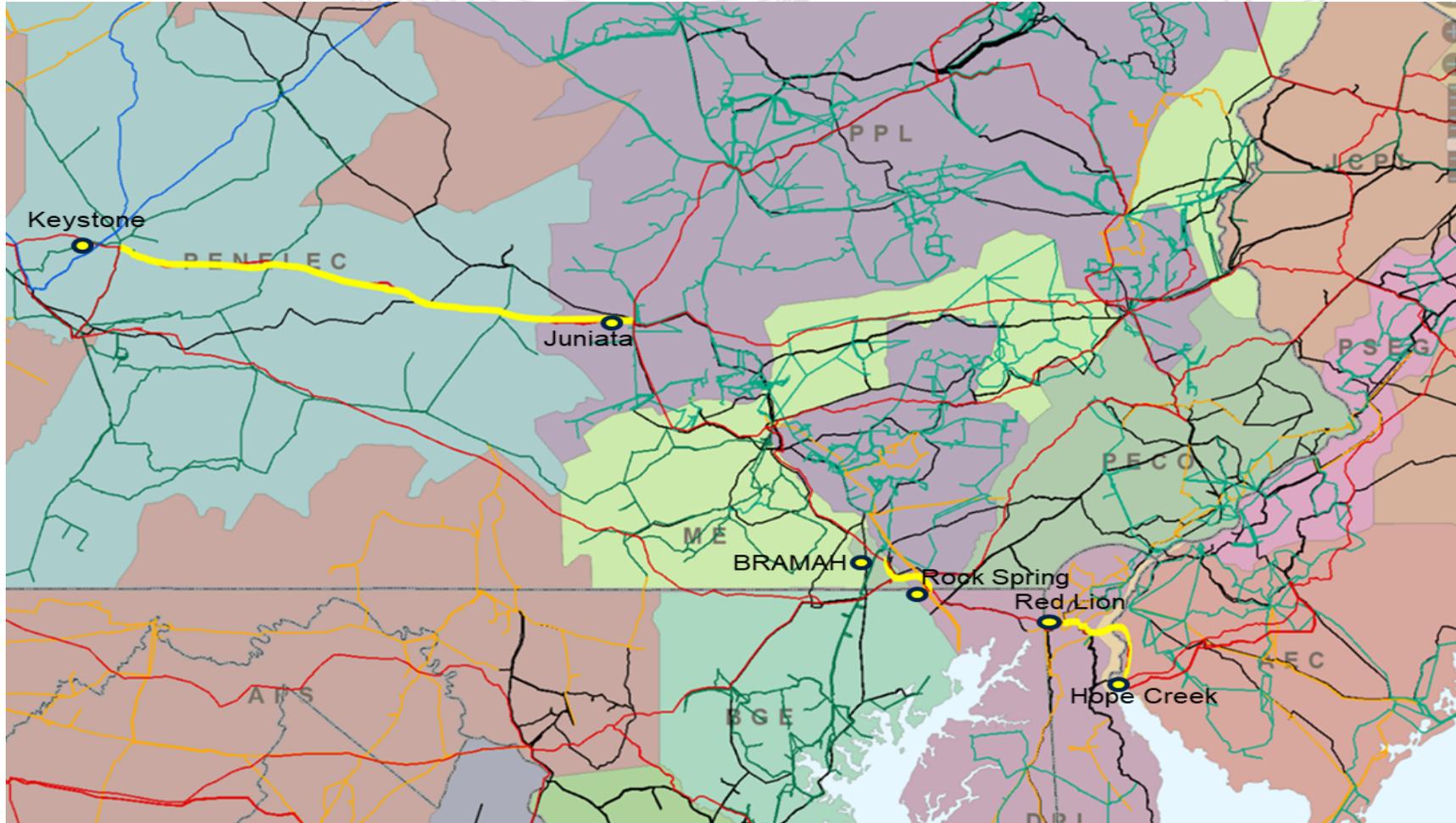


# 2032 Preliminary Dominion Violations – 500 kV



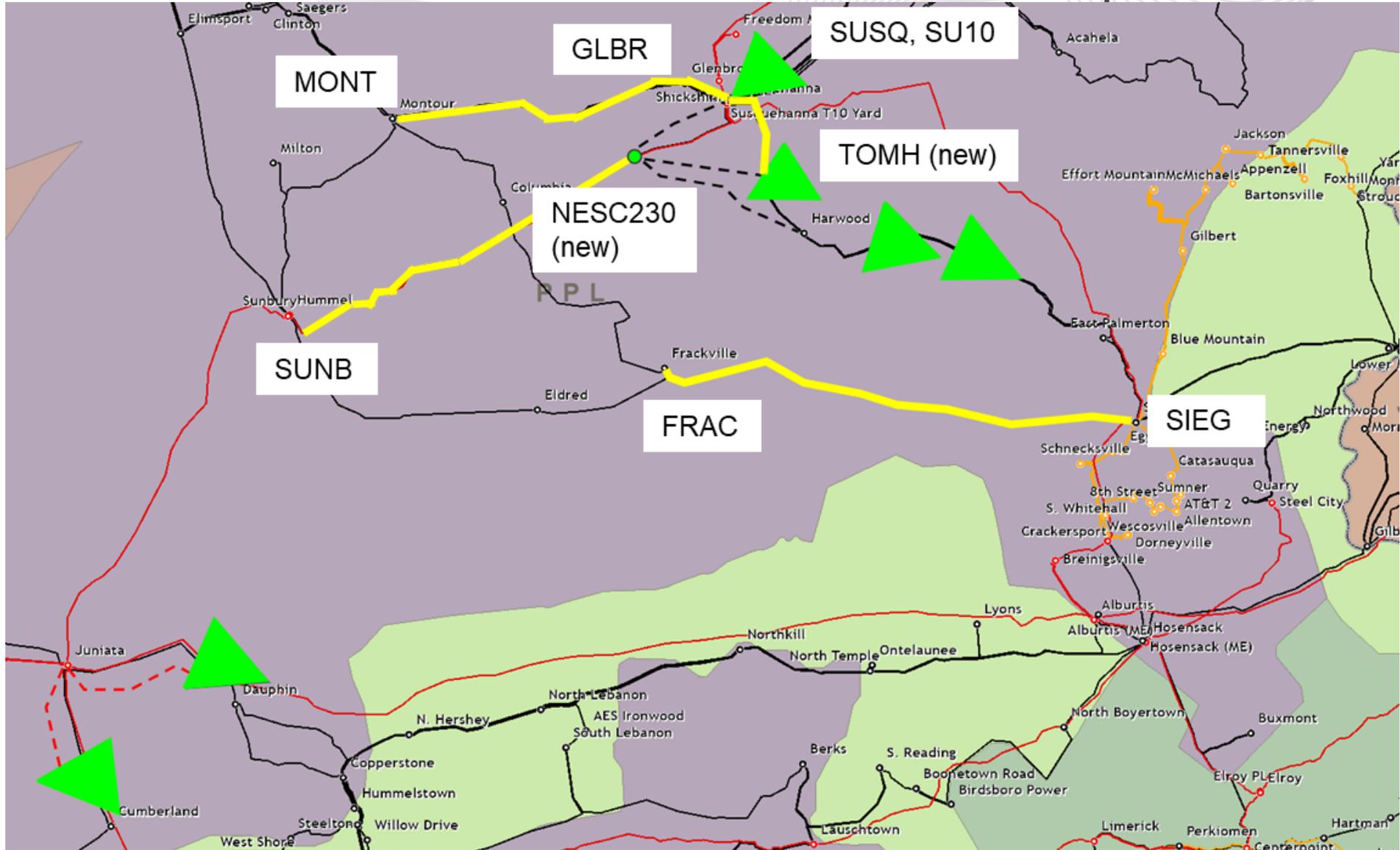
# ATSI 2032 Gen Deliv Major Preliminary Violations



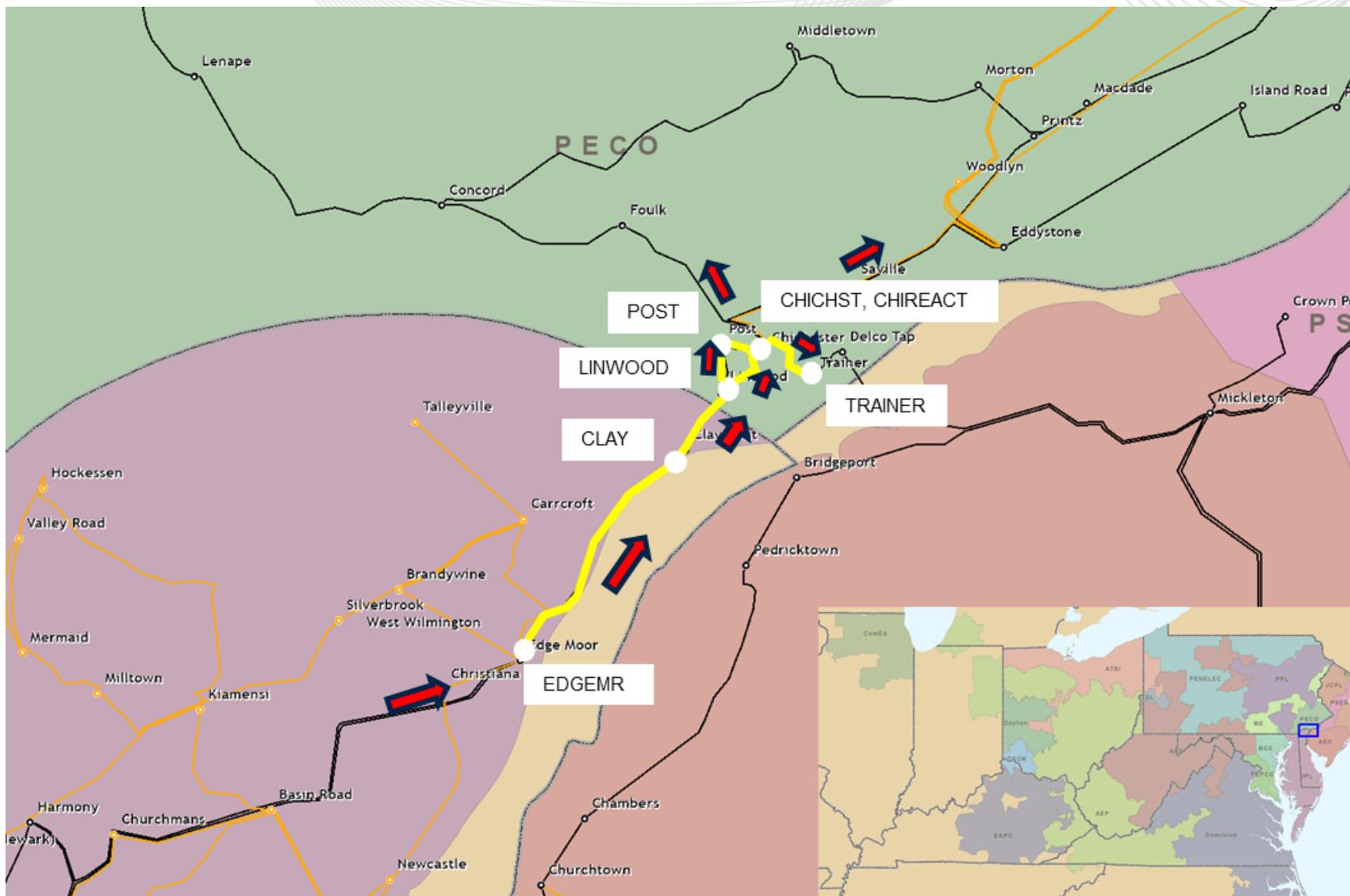




# PPL -- 2032 Susquehanna Cluster



# PECO/Northern DPL -- 2032 Chichester Area



# 2025 Series RTEP 2032

## General Summary of Results

# 2025 RTEP – 2032 Horizon Results Summary

- All previously planned backbone transmission enhancements continue to perform well up to and including 2032.
- There could be need to reinforce the NW – AEP 765 kV transfer path
  - This need will depend on how generation in ComEd and NW PJM materializes.
- With the strong generation interconnection interest in Southern Dominion, and to enable this generation to serve load (mainly in Summer Months);
  - There will be a need to reinforce the Dominion 500kV backbone in Southern Dominion.
- Earlier approved needs in northern ATSI may need further review (right sizing)
- The 2032 results affirm the need to enhance PPL/MAAC West-East transfer path.
- PJM will continue to assess the needs above and will provide more information part of the 2025 W1 RTEP Problem Statement.

- PJM Will provide a more comprehensive summary of all needs and results when the window opens
- 2025 RTEP W1 will focus on addressing near term (5 year needs);
  - 2032 (longer-term) results will only be used to right-size needs already showing up in 2030.
  - Special cases may arise if longer term needs are confirmed and require long lead development.

# Baseline Reliability Projects 2024 Window 1 Project Updates

# 2024 W1 Regional Cluster Additional Scope

## Recommended Solution (2024-W1 Additional Scope):

Install two new 500 kV dead-end structures near Black Oak substation to interconnect the 502 Junction – Woodside 500 kV transmission line.

Adjust Woodside protection scheme for Black Oak loop-in and remove 502 Junction tie. (NEET Scope) (b4000.14)

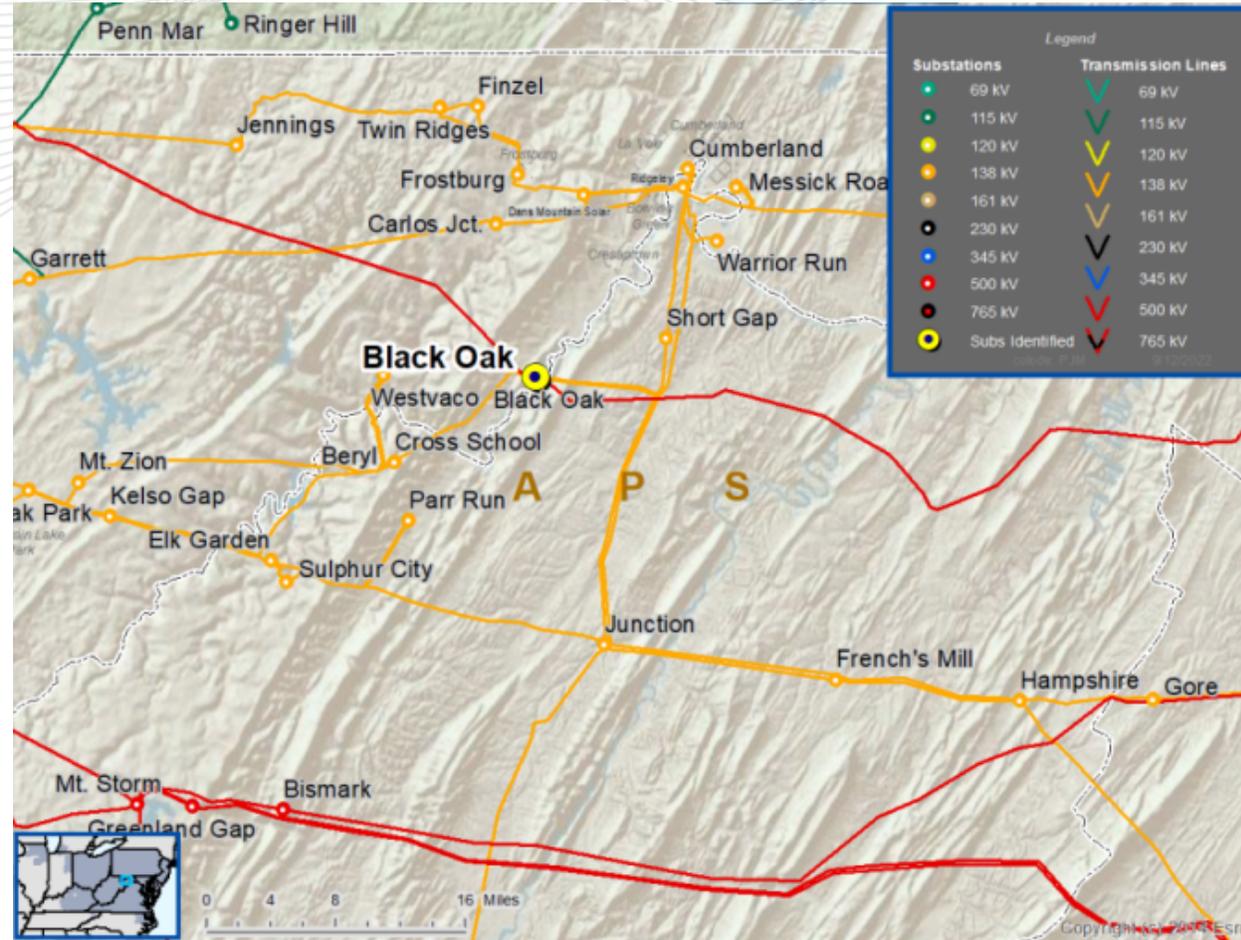
**Estimated Cost:** \$3.0 M

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

**Projected IS Date:** 12/31/2031

## Reason for Additional Scope:

b4000.11 (FE Scope) was identified as part of 2024W1- Regional Cluster to expand the Black Oak substation. The future 502 Jct – Woodside 500 kV line segment that will loop into to Black Oak is designated to NextEra and as a result, b4000.14 is designated to NextEra to support the Black Oak loop-in.



## Original b4000.6 Project Description – Recommended Solution (2024-W1-708)

- Construct a new 86 miles Welton Spring to Rocky Point 765 kV line (Welton Spring to DVP local area, roughly 70.7 miles) **\$353.5M (b4000.6)**

## Updated b4000.6 Project Description

- Construct a new 86 miles Welton Spring to Rocky Point 765 kV line (Virginia portion of the Welton Spring to DVP local area segment, roughly 21 miles) **\$105M (b4000.6)**

## New b4000.15 Project Description

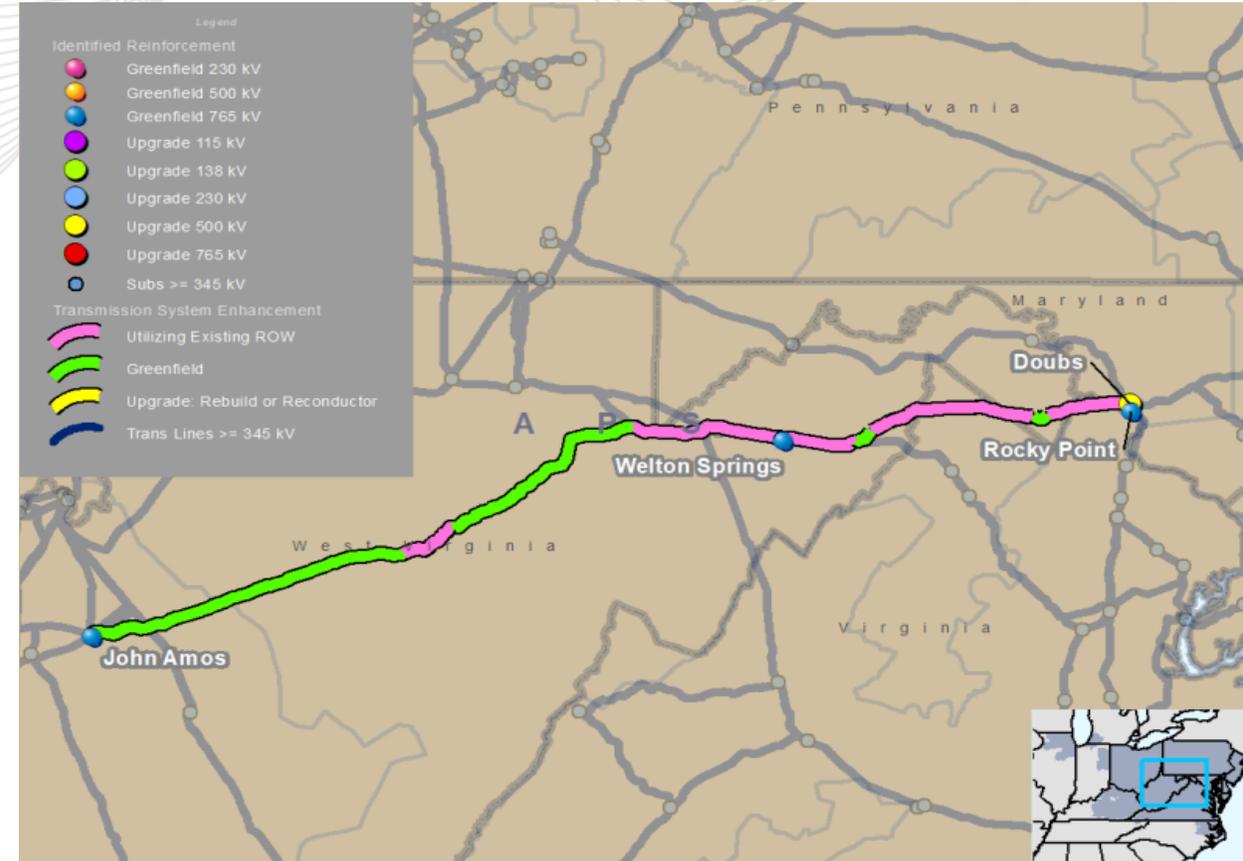
- Construct a new 86 miles Welton Spring to Rocky Point 765 kV line (West Virginia portion of the Welton Spring to DVP local area segment, roughly 50 miles) **\$248.5M (b4000.15)**

**Required IS Date :** 6/1/2029 (Unchanged)

**Total Estimated Cost :** \$353.5 M (Unchanged)

## Reason for Project Update:

b4000.6 was identified as part of the 2024W1- Regional Cluster Recommended Solution to build the Amos - Welton Spring - Rocky Point 765 kV line designated to Valley Link Transmission (VLT). VLT 2024W1 projects will be split between its respective VLT state affiliates (VLT-MD, VLT-VA and VLT-WV). Splitting the original b4000.6 into updated b4000.6 and new b4000.15 baseline projects, will accommodate the assignment of VA scope associated with b4000.6 to VLT-VA (updated b4000.6), and WV scope to VLT-WV (b4000.15).

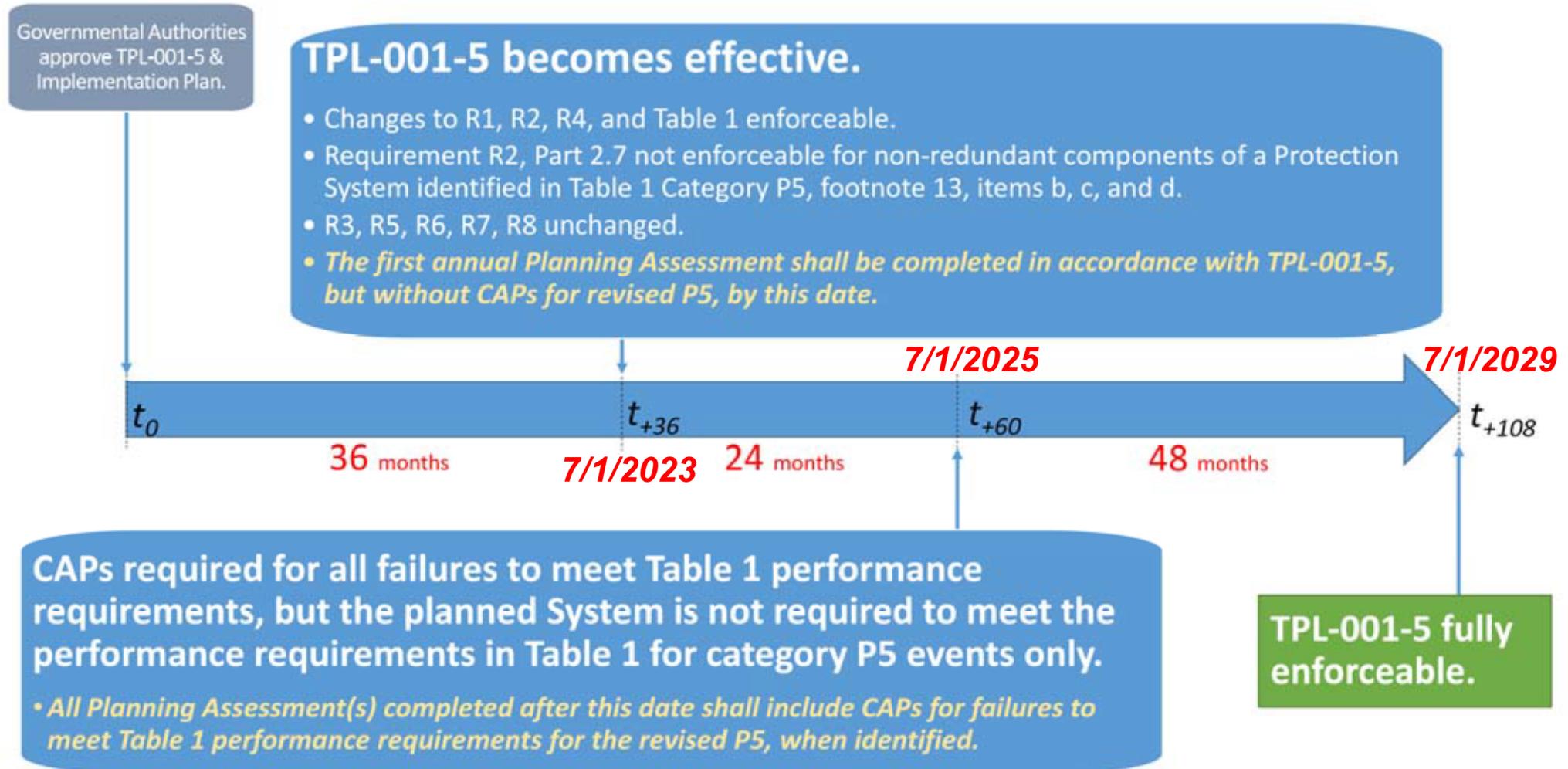


# TPL-001.5 P5: Submitted CAPs First Read

# TPL-001-5.1 P5 Contingencies

- As previously presented during the August 2024 TEAC, PJM has determined that the P5 CAPs will be exempted as reliability violations on transmission substation equipment (OA, Schedule 6, section 1.5.8(p)). The construction responsibility for and ownership of each project shall be designated to the respective incumbent Transmission Owner.
- The solution to the violations resulting from lack of redundancy, lack of alarming, or DC supply issues including monitoring and alarming, is to incorporate local redundancy or implement needed alarms/protection/DC supply enhancements within existing substation equipment.
- PJM is presenting here a summary of P5 CAPs which were identified by TOs to mitigate violations from the 2024 Series RTEP (2029 SUM/WIN/LL cases).
  - PJM does not intend to post detailed contingency or substation information regarding the violations and CAPs due to CEII/CIP-014 considerations.
- PJM is currently working with Transmission Owners to finalize the CAPs by July of 2025.
  - The NERC Implementation Plan involving the development of CAPs for Category P5 planning events is provided on the following slide.

# TPL-001-5.1 Implementation Plan Timeline



# Transmission Zone: Baseline

**Process Stage:** First Review Solution

**Criteria:** Baseline Analysis

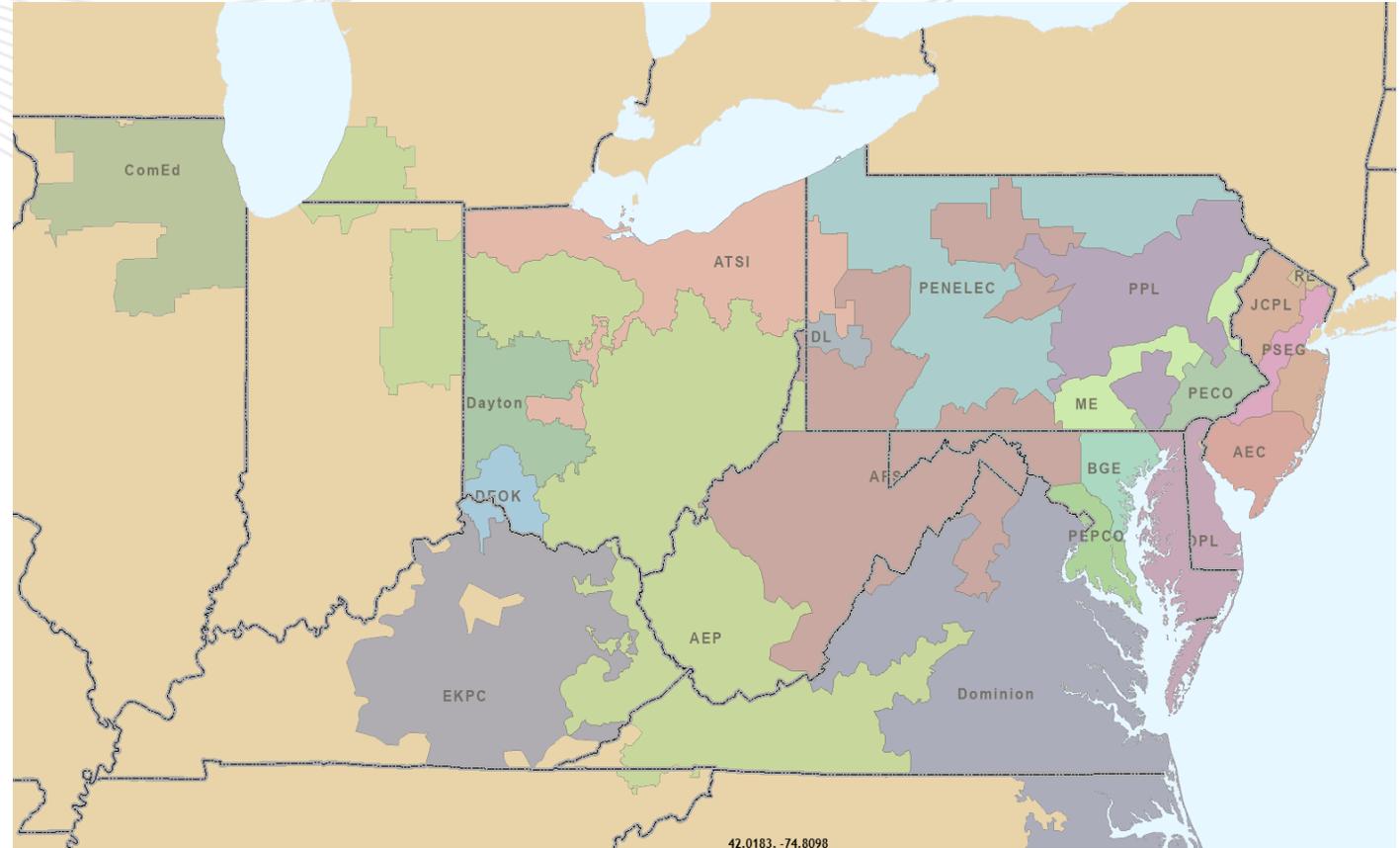
**Assumption Reference:** 2029 RTEP assumption

**Model Used for Analysis:** 2029 Summer, Winter & LL RTEP case

**Proposal Window Exclusion:** Substation Exclusion

**Problem Statement:**

In 2029 RTEP Summer, Winter & LL cases, multiple thermal and voltage violations are observed due to multiple P5 contingencies.



# Transmission Zone: Baseline

**Proposed Solution:**

- TOs have submitted P5 mitigation projects that include upgrades listed below designed to eliminate the P5 contingency:
  - Battery Monitoring
  - Relay Upgrades

**Transmission Estimated Cost:** \$3.35M

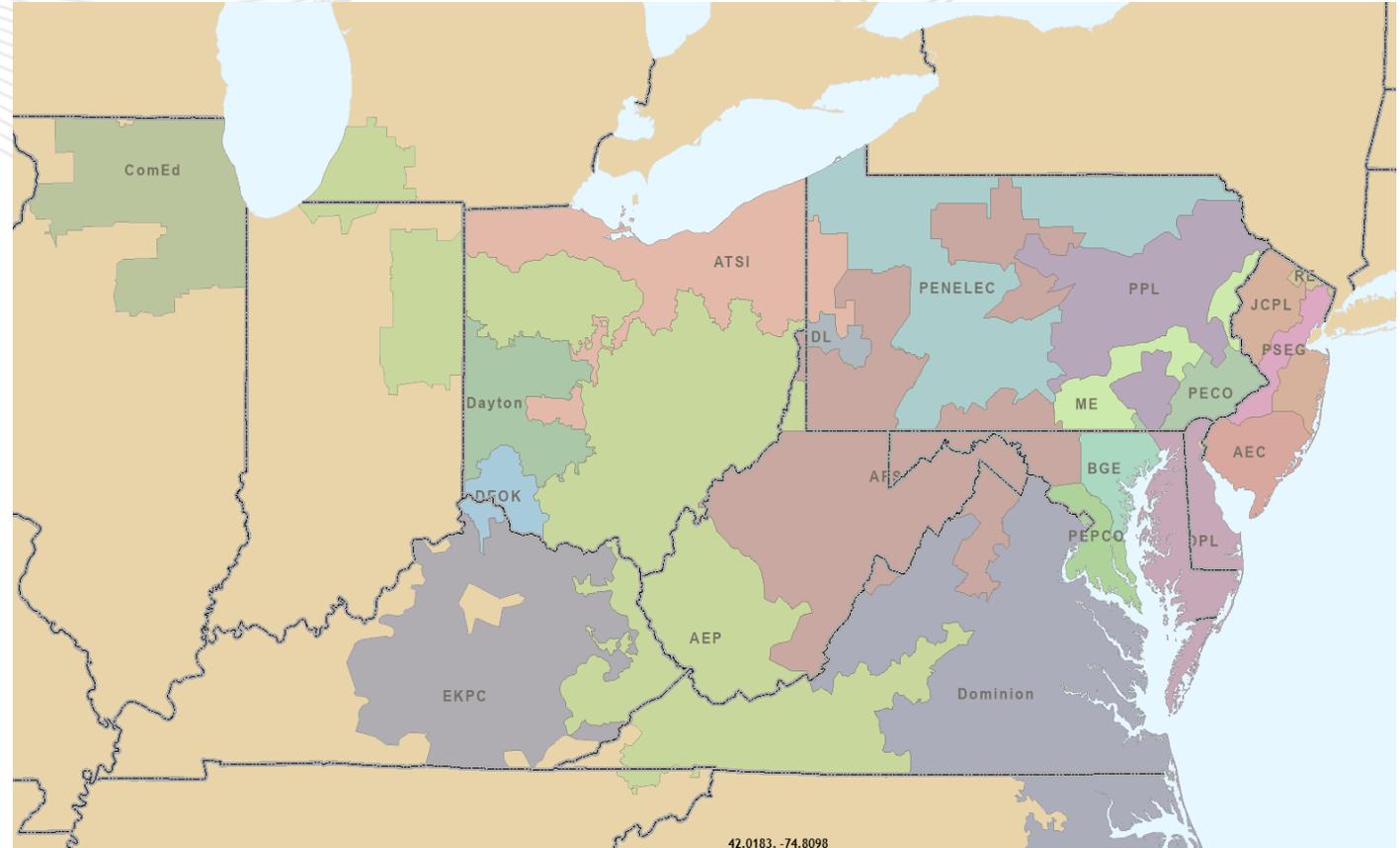
**Ancillary Benefits:** Installation of redundant equipment will prevent outage scenarios and improve reliability of the transmission system.

**Alternatives:** None

**Preliminary Facility Rating:** N/A

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

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





# Transmission Zone: Baseline

Designated Entity	Total Cost (\$M)	kV							Total Substations
		69	115	138	230	345	500	765	
<b>AEP</b>	0.62			3		3			6
<b>Dominion</b>	1.77	1			13		25		39
<b>OVEC</b>	0.58					1			1
<b>PSEG</b>	0.38				5				5
<b>TOTAL</b>	3.35	1	0	10	28	6	31	0	76

Version No.	Date	Description
1	6/2/2025	<ul style="list-style-type: none"> <li>Initial slides posted</li> </ul>
2	6/4/2025	<ul style="list-style-type: none"> <li>Slides #7 and #9, updated maps</li> <li>Slide #8, combined original slides #8&amp;9, updated the table</li> <li>Slide #10, combined original slides #11&amp;12</li> <li>Slide #38 and #47 Added 2030 and 2032 Results Summary</li> </ul>

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