Troutman Pepper Locke LLP
Troutman Pepper Building, 1001 Haxall Point, 15th Floor
Richmond, VA 23219

troutman.com

Andrew J. Flavin
andy.flavin@troutman.com

March 5, 2026

BY ELECTRONIC FILING **PUBLIC VERSION**

Hon. Bernard J. Logan, Clerk
State Corporation Commission
Document Control Center
Tyler Building, 1st Floor
1300 East Main Street
Richmond, VA 23219

Re: Application of NextEra Energy Transmission Virginia, Inc. for Approval and Certification of Electric Facilities: 500 kV Line and Woodside Substation – Case No. PUR-2026-00018

Dear Mr. Logan:

Please find enclosed for electronic filing the **PUBLIC VERSION** of NextEra Transmission Virginia, Inc.'s Application in the above-referenced case. A confidential version is being filed under seal under a separate cover.

If you have any questions or need further information, please feel free to contact me.

Sincerely,

Andrew J. Flavin



Enclosures

cc: William H. Chambliss, Esq.
John E. Farmer, Esq.

COMMONWEALTH OF VIRGINIA

BEFORE THE

STATE CORPORATION COMMISSION

APPLICATION OF NEXTERA ENERGY TRANSMISSION VIRGINIA, INC. FOR APPROVAL AND CERTIFICATION OF ELECTRIC FACILITIES FOR THE CONSTRUCTION OF A 500 KV TRANSMISSION LINE AND THE WOODSIDE SUBSTATION

Case No. PUR-2026-00018

March 5, 2026

COMMONWEALTH OF VIRGINIA

BEFORE THE

STATE CORPORATION COMMISSION

Application of NextEra Energy Transmission Virginia, Inc. for approval and certification of electric transmission facilities under Va. Code § 56-46.1 and the Utility Facilities Act, Va. Code §§ 56-265.1, *et. seq*.	))))))	Case No. PUR-2026-00018

APPLICATION OF NEXTERA ENERGY TRANSMISSION VIRGINIA, INC. FOR APPROVAL AND CERTIFICATION OF ELECTRIC FACILITIES FOR THE CONSTRUCTION OF A 500 KV TRANSMISSION LINE AND THE WOODSIDE SUBSTATION

Pursuant to § 56-46.1 of the Code of Virginia ("Va. Code") and the Utility Facilities Act, Va. Code §§ 56-265.1, *et seq.,* NextEra Energy Transmission Virginia, Inc. ("NEET VA"), by counsel, files with the State Corporation Commission of Virginia (the "Commission") this application for approval and certification of electric transmission facilities (the "Application"). In support of its Application, NEET VA respectfully shows as follows:

1. NEET VA is a public service corporation organized under the laws of the Commonwealth of Virginia that, together with certain affiliates,[1] will finance, construct, own, operate, and maintain electric transmission facilities in Virginia to serve the public. Upon issuance of a certificate of public convenience and necessity ("CPCN") for the proposed facilities, NEET VA will become a "public utility" within the scope of the Utility Facilities Act, Va. Code §§ 56-265.1, *et seq.*, as a company that owns and operates facilities for the transmission of electric energy

[1] NEET VA also will submit a petition for Commission approval and authority to enter into affiliate agreements under Chapter 4 of Title 56 of the Code of Virginia.

within the Commonwealth of Virginia. NEET VA has its principal office at 700 Universe Boulevard, Juno Beach, FL 33408.

2. NEET VA proposes to construct, own, operate, and maintain the Virginia portions of a new approximately 107.5-mile, 500 kilovolt ("kV") transmission line, collectively known as the MidAtlantic Resiliency Link Project (the "MARL Project" or "Project").[2] In its entirety, the MARL Project will traverse portions of Pennsylvania, West Virginia, Maryland, and Virginia and will include the new 500/138 kV Woodside Substation to be located in Frederick County, Virginia. In Virginia, the MARL Project will consist of approximately 2.4 miles of 500 kV transmission line, the Woodside Substation, and related facilities in Frederick County (the "Virginia Portions"); the Project will enter Virginia in Frederick County, traversing approximately 2.4 miles and terminating at a handoff point connecting to new 500 kV transmission lines to be constructed by FirstEnergy Corp. ("FirstEnergy") and Virginia Electric and Power Company ("Dominion Energy"). Maps showing the Virginia Portions that NEET VA proposes to build and the new Woodside Substation are included in the enclosed Routing Study. This Application only addresses the Virginia Portions of MARL that will be constructed, owned, operated, and maintained by NEET VA.[3] The Project

[2] The Woodside Substation is subject to local siting jurisdiction. *BASF Corp. v. State Corp. Comm'n*, 289 Va. 375 (2015). The portions of the Project outside of Virginia will be constructed, owned, and operated by NEET VA's affiliate, NextEra Energy Transmission, MidAtlantic, Inc. ("NEET MA").

[3] NEET VA and NEET MA also will perform additional work as part of the Virginia Portions of the MARL Project. The 138 kV Woodside-Stonewall Circuits 1 & 2 will exit the new Woodside Substation and extend to a new approximately 75-foot double-circuit steel monopole dead-end turning structure installed on a reinforced concrete pier foundation. These 138 kV circuits will then proceed to a new approximately 75-foot double-circuit steel monopole tangent structure installed on a reinforced concrete pier foundation. The 138 kV circuits will change ownership with FirstEnergy (Potomac Edison) on a new third structure outside of Woodside Substation. NEET VA and NEET MA's portion of the 138 kV Woodside-Stonewall Circuits 1 & 2 will be approximately 1,150 feet (0.22 miles) in length. These circuits will support the existing 138 kV electrical network by providing additional sources via the new 500/138 kV transformer at Woodside Substation. NEET VA and NEET MA believe the work described for their portion of 138 kV Woodside-Stonewall Circuits 1 & 2 in this footnote qualifies as an "ordinary extension[] or improvement[] in the usual course of business" (*i.e.*, "ordinary course") pursuant to § 56-265.2(A)(1) of the Code of Virginia and, therefore, does not require approval pursuant to Va. Code § 56-46.1(B) or a CPCN from the Commission. This approach is consistent with the Commission's July 6, 2017 guidance, available at

is currently being developed to be in service by December 31, 2031; however, PJM has informed NEET MA that the need for reinforcements to the existing bulk electric system ("BES") is so substantial that PJM is asking NextEra Energy Transmission, LLC ("NEET") to accelerate the in-service date to December 2029 or earlier.

Description of NEET VA

3. NEET VA is a Virginia public service corporation formed in 2024 and qualified to do business in the Commonwealth of Virginia.

4. NEET VA is an indirect, wholly owned subsidiary of NEET and is an indirect, wholly owned subsidiary of NextEra Energy, Inc. ("NextEra Energy").

5. Collectively, NextEra Energy subsidiaries own approximately 80 GW of net generation and storage capacity from a diverse portfolio of assets, primarily including natural gas, wind, solar, and nuclear generation facilities and battery storage facilities, with approximately $120 billion of planned investments in American infrastructure through 2028. NextEra Energy owns Florida Power & Light Company ("FPL"), which serves more than 12 million homes and businesses in Florida through 6 million customer accounts and operates and maintains approximately 93,000 circuit miles of transmission and distribution lines and over 900 substations. NextEra Energy also owns a competitive energy generation business, NextEra Energy Resources, LLC ("NextEra Energy Resources"), which, together with its affiliated entities, owns and operates approximately 37 GW of generation resources across the United States and Canada.

6. NEET is a limited liability company organized and existing under the laws of the State of Delaware and is an indirect, wholly owned subsidiary of NextEra Energy. Through various

---

https://www.scc.virginia.gov/media/sccvirginiagov-home/regulated-industries/utility-regulation/responsibilities/guidance-documents/staffguidanceordvsnonord.pdf.

subsidiaries, NEET develops, finances, constructs, and maintains transmission assets across the United States and Canada. NEET operates through its regional subsidiaries to integrate renewable energy and strengthen the electric grid. NEET's portfolio includes approximately 2,100 circuit miles in 10 states and one province and eight regional transmission organizations ("RTO"), and numerous projects under development and construction in the United States and Canada.

7. NextEra Energy and its wholly owned subsidiaries, NEET and NEET VA, have their principal business offices in Juno Beach, Florida.

Overview and Description of MidAtlantic Resiliency Link Project and Its Electrical Need

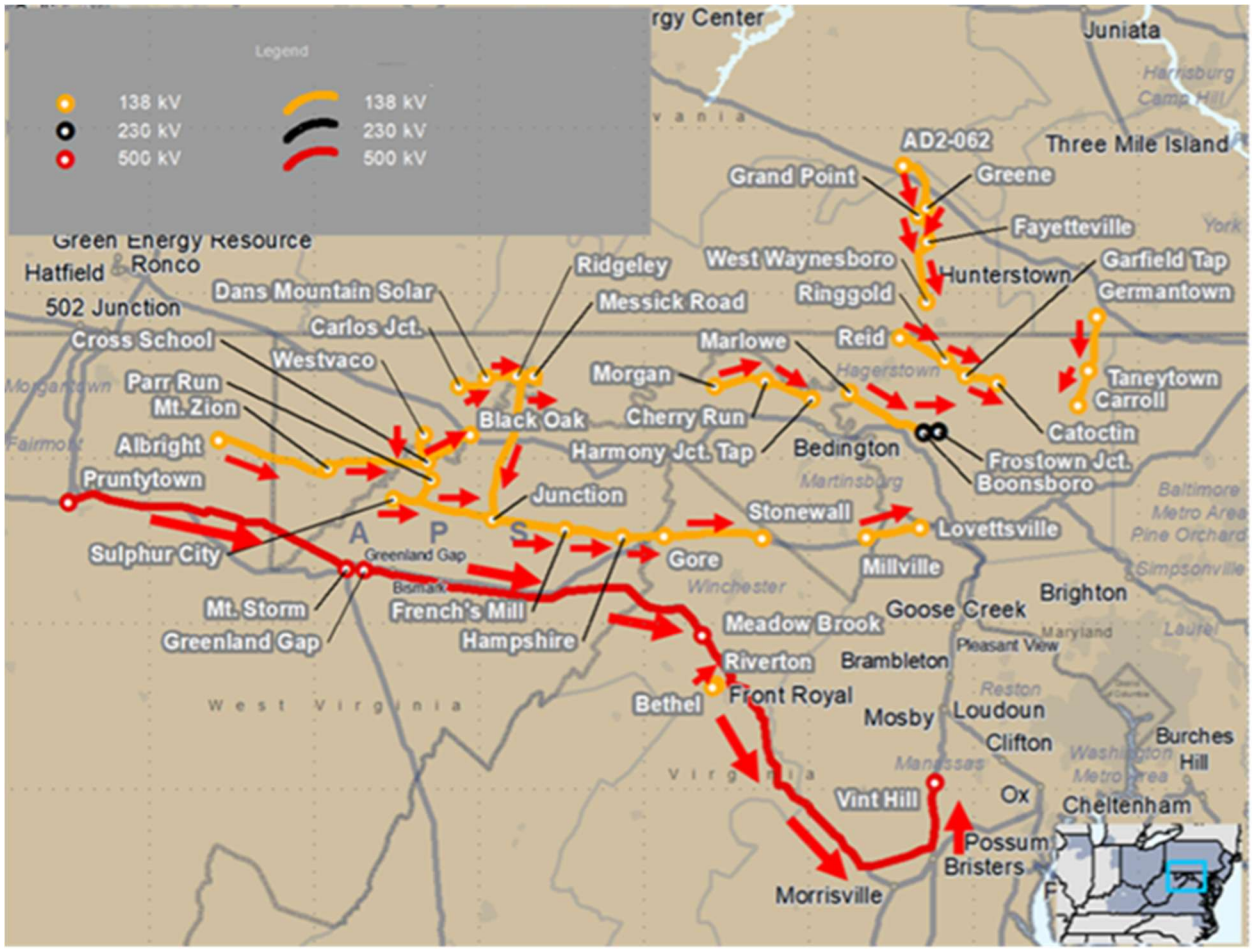
8. PJM Interconnection, L.L.C. ("PJM") has determined that the MARL Project is critically needed to meet the demands for electric service in Virginia and is necessary for the continued safe and reliable operation of the 500 kV transmission system serving Virginia and surrounding states.

9. Specifically, the PJM Board of Managers ("PJM Board") approved the MARL Project in December 2023 through PJM's Regional Transmission Expansion Plan ("RTEP") 2022 Window 3 competitive solicitation process that sought from qualified transmission developers more efficient or cost-effective solutions to prevent extensive, severe, and widespread reliability criteria violations forecasted to occur on the BES that serves the PJM region,[4] including in Virginia. PJM's extensive reliability testing has revealed that the BES that serves Virginia customers and the greater PJM interconnection requires new transmission pathways to reliably move power across the region due to significant electric generation retirements and electric load growth. If left unaddressed, these system conditions are so severe and widespread that they would

[4] The region served by PJM 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 ("PJM Region").

lead to thermal overloads of existing high voltage transmission lines and potential voltage collapse, leading to electric system failure and blackouts throughout the larger PJM Region, including for Virginia residents and businesses. Figure 1 below depicts the forecasted generator 138 kV, 230 kV, and 500 kV thermal overloads along west to east transfer corridors within PJM.

Figure 1: 2028 Study Year Generator Deliverability (Thermal) Analyses 138 kV, 230 kV, and 500 kV Thermal Overloads (Along the West to East Transfer Corridor; Red Arrows Indicate Direction of Flow Through Overloaded Facilities)[5]



[5] 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.

10. As discussed in the attached Direct Testimony of Dr. Sami Abdulsalam and the Direct Testimony of Andrew Gledhill, these reliability needs[6] are driven by significant changes on the PJM system, including those caused by the proposed deactivation of numerous generation facilities, as well as data center loads projected within Virginia (DOM zone) and Maryland near the Doubs substation (APS zone). Importantly, PJM's thorough and extensive RTEP analysis—informed by its modeling, testing, load forecasting, as well as the application of transmission reliability planning criteria—concludes that if the MARL Project is not constructed, the bulk 500 kV transmission system currently serving Virginia and the surrounding PJM Region is at risk of becoming severely overloaded. Moreover, these conditions unless addressed could lead to widespread and extreme conditions, such as system collapse and blackouts, as early as 2027.

11. After its extensive evaluation of a variety of alternative proposals submitted by numerous transmission developers, PJM selected a comprehensive set of transmission enhancements or expansions, which includes the MARL Project, as the more efficient or cost-effective solution to these extensive reliability criteria violations. A description of the steps involved in and the different scenarios analyzed by PJM for the 2022 RTEP Window 3 is described in the Direct Testimony of Dr. Abdulsalam.

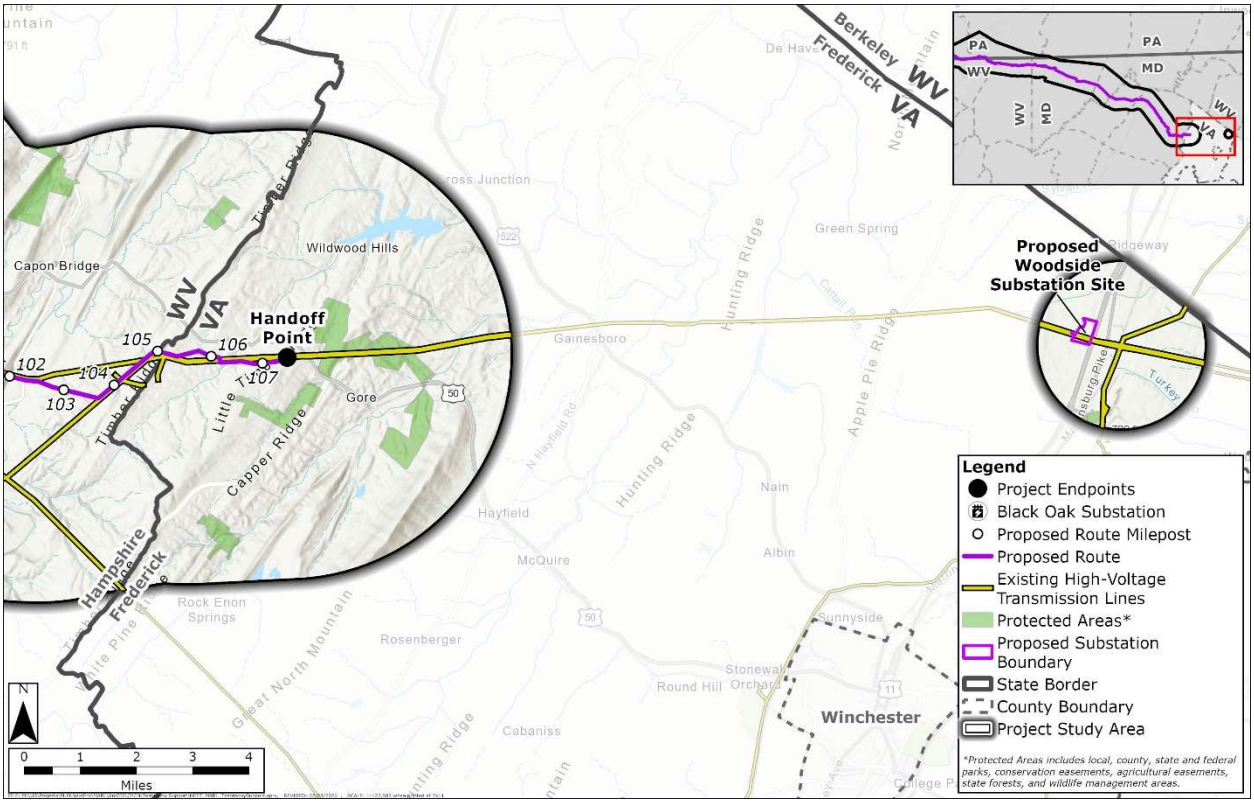
12. On February 21, 2025, PJM and NEET MA executed a DEA for the MARL Project. FERC accepted the DEA on May 8, 2025, in Docket No. ER25-1736-000. On November 21, 2025, NEET MA, NEET VA, and PJM executed an amendment to the DEA, which was filed with FERC in Docket No. ER26-860-000 on December 22, 2025 and accepted by FERC on February 18, 2026.

[6] *See* Direct Testimony of Dr. Sami Abdulsalam, Ex. SA-6 at 4-7. *See also* PJM, TEAC Reliability Analysis Update at Slide 9 (June 6, 2023), *available at* https://www.pjm.com/-/media/DotCom/committeesgroups/committees/teac/2023/20230606/20230606-item-11---reliability-analysis-update.pdf.

Under the DEA, NEET VA and NEET MA are obligated to complete the MARL Project and place it into service.

13. As described above, the entire MARL Project is 107.5 miles long, which includes 2.4 miles in Virginia, 35.4 miles in Maryland, 58.9 miles in West Virginia, 35.4 miles in Maryland, and 10.7 miles in Pennsylvania, and requires 2,669.0 acres of new right of way ("ROW"). In Virginia, the Proposed Route is approximately 2.4 miles in length in Frederick County and will terminate at a handoff point with FirstEnergy, where the Project will interconnect with new transmission lines to be constructed by FirstEnergy approximately 1.5 miles east of Gore, Virginia. NEET VA also identified a viable Alternative Route in Virginia, approximately 2.4 miles long, that it is identifying for notice. As part of the MARL Project, NEET VA is also constructing the new Woodside Substation in Frederick County, Virginia that will interconnect with four existing and new transmission lines owned by Dominion Energy and FirstEnergy. A high-level overview map of the MARL Project is provided in Figure 2 below, and a more detailed map of the proposed project is provided in the Routing Study filed with this Application. The Project is further described in the Application Appendix.

Figure 2: **MARL Project Overview Map (Virginia Portions)**



14. NEET VA is proposing a transmission ROW that is typically 200-feet-wide, based upon NEET VA's project design, design standards, anticipated structure types, number of structures, span distances, terrain, and soil conditions. This proposed ROW width may vary at some locations to accommodate topographic features and crossing requirements and to provide flexibility in final structure placement. At all times, the width of the ROW will be sufficient to ensure the safe and reliable operation of the MARL Project. The objective was to establish a width that would satisfy all required clearances to features existing at the very edge of the ROW, including NESC clearances, and to satisfy the NERC FAC-003 vegetation management requirements.

15. As described in the Appendix and the Routing Study, NEET VA is requesting that the Commission grant it the flexibility to adjust the location of its ROW within a 200- to 500-foot siting corridor (referred to as the "Siting Corridor" in the Routing Study). Flexibility in the location of the ROW and structure locations may be necessary for a number of reasons, including to address landowner requests and conditions and constraints identified by on-the-ground surveys, utility engineering, and title searches.

16. NEET VA will utilize primarily single circuit self-supported lattice tower structures with a horizontal phase configuration and may utilize other structure types as necessary based on line deflection angles and topography. On the Virginia Portions of the Proposed Route of the MARL Project, NEET VA anticipates that it will install a total of 13 structures, with typical structure heights ranging from 115 to 190 feet tall, with an average height of approximately 150 feet. The average span length between transmission structures will be approximately 1,015 feet for the Virginia Portions of the Proposed Route. Details regarding the proposed transmission structures and NEET VA's structure selection process are described in more detail in the Appendix.

17. The entire 2.4 miles of ROW for the proposed Virginia Portions of the MARL Project will require new property rights for new-build transmission line. Along the ROW for the Virginia Portions of the Proposed Route, NEET VA will require new easements on 17 parcels.

18. Once constructed and placed into service, functional control of the MARL Project will be turned over to PJM. Thereafter, NEET VA's affiliate, NextEra Energy Transmission New York, Inc. ("NEETNY") will monitor, operate and maintain the MARL Project on a 24/7 basis.

Construction Schedule and Projected In-Service Date

19. As described above, the MARL Project is needed to address critical reliability needs in Virginia and the PJM region more broadly. Under the DEA, NEET VA is obligated by the DEA

to complete the Woodside Substation by December 31, 2028 and NEET VA and NEET MA are obligated to complete the overall MARL Project and place it into service by December 31, 2031. Due to the need for reinforcements to the BES that the MARL Project will provide, PJM has requested that NEET VA and NEET MA take all reasonable actions to obtain necessary approvals and complete construction of the transmission line as soon as is practicable and closer to the identified need date (2027/2028). NEET VA and NEET MA are working to provide a pathway to accelerate the in-service date to December 2029 or earlier, pending regulatory approvals.

20. The estimated construction time for the MARL Project transmission line is approximately two years. The estimated construction time for the Woodside Substation is approximately 18 months to two years.

21. Construction must begin promptly after state commission approvals and applicable permits have been received and necessary ROW has been obtained. Based upon the December 31, 2031 in-service date in the current DEA, an estimated schedule for the MARL Project is provided below.

Activity	**Estimated Start**	**Estimated Completion**
Permitting and Regulatory Approvals	January 2026	October 2028
Begin ROW negotiations	August 2025	April 2029
Line Construction	November 2029 or as soon as applicable permits and approvals are obtained	December 2031
In-Service Date		December 31, 2031

Estimated Project Cost

22. The current cost estimate for the entire MARL Project is $1,167,200,000 (in 2031 dollars). Within Virginia, the cost estimate for the transmission line is approximately $19,000,000, while the cost estimate for the Woodside Substation is approximately $286,000,000. This cost estimate includes siting, engineering, construction, procurement, financing, administrative, development, and legal costs. The estimate also reflects 30% design and engineering, refinements to the project route from the bid, and vendor quotes received.[7] The estimated project cost of MARL and Virginia Portions is discussed further in the Appendix.

23. Consistent with FERC Order No. 1000, PJM's competitive planning process ensures PJM's selection of the more efficient or more cost-effective transmission solutions.[8] 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 strong cost containment provisions. In selecting the MARL Project over other 500 kV solutions, PJM noted that the MARL Project has a lower estimated cost and stronger cost containment provisions.[9] As approved by PJM, the MARL Project includes various cost containment measures intended to incentivize cost-efficient completion of the project and reduce potential cost overruns and project

[7] 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 MARL Project progresses.

[8] *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).

[9] See PJM Reliability Analysis Report, 2022 RTEP Window 3 (Dec. 8, 2023), which is available at: https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2023/20231205/20231205-2022-rtep-window-3-reliability-analysis-report.ashx.

delays.[10] Information regarding the cost-effectiveness of the MARL Project is discussed more fully in the Appendix.

Rates and Rate Recovery

24. NEET VA's rates are subject to the exclusive jurisdiction of FERC for rate recovery purposes. The costs for the MARL Project will be recovered through transmission rates subject to FERC's exclusive jurisdiction and will be allocated by PJM to Load Serving Entities under the terms of PJM's FERC-approved Open Access Transmission Tariff.[11] The MARL Project is classified as a baseline reliability project. Certain components of the MARL Project are allocated to a single PJM zone, while the cost allocation methodology for all other components is 50% Non-Load Ratio Share (or DFAX) and 50% Load Ratio Share.

Other Permits, Authorizations, and Certificates

25. This Application addresses the Virginia Portions of the MARL Project that will be constructed, owned, operated, and maintained by NEET VA. In addition to the certificate sought from the Commission, franchises, licenses, permits, or authorizations in respect of MARL, in its entirety, are to be obtained from the West Virginia Public Service Commission ("WVPSC"), the Pennsylvania Public Utility Commission ("PaPUC"), the Maryland Public Service Commission ("MPSC"), and various other governmental entities with jurisdiction over matters related to the

[10] The MARL Project includes a return on equity ("ROE") cap of 9.8% and a binding equity percentage cap of 45%. For any capital expenditures that exceed their original cost estimate, the ROE on that incremental capital would be reduced from 9.8% to 0%, but NEET VA and NEET MA will still recover all depreciation expense and debt costs associated with the incremental capital spend. Regardless of other cost containment measures, the total earned ROE cannot be lower than 7.5%. The DEA also provides a schedule guarantee where the total project ROE would be reduced by 2.5 basis points for each month delay past the guaranteed completion date up to a maximum of 30 basis points.

[11] 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).

construction and operation of MARL. The WVPSC, PaPUC, and MPSC will conduct parallel proceedings for the purpose of considering MARL's applications for approval of the construction and location of the portions of MARL located in West Virginia, Pennsylvania, and Maryland respectively.

26. A list of federal, state, and local agencies that may be expected to have an interest in the proposed Virginia transmission facilities, and to which a copy of this Application has been sent, is set forth in the accompanying Application Appendix. All applicable permits and approvals required for the construction and operation of the Virginia Portions of the MARL Project will be obtained from these agencies. However, because the applications for certain of these permits and approvals require precise technical information regarding facility locations and detailed engineering design, applications to all of these agencies have not been submitted prior to the filing of this Application. As described in the Application Appendix, NEET VA will update the Commission on the status of its permit applications.

Siting of the Proposed Virginia Portions of the MARL Project

27. NEET VA is seeking authority in this Application to build the Virginia Portions of the proposed MARL Project, as discussed in greater detail in the attached Appendix and Routing Study. The Proposed Route reasonably minimizes adverse impacts on the scenic, environmental, and historic features of the area through which the Virginia Portions of the MARL Project will run. The detailed discussion of the route selection, including possible alternatives, is set forth in the Appendix and Routing Study.

28. Submitted with this Application in the Appendix is a copy of the Virginia Department of Transportation General Highway Map for Frederick County. The map shows the Proposed Route of the Virginia Portions. Because NEET VA has no previously approved or

certificated facilities in Virginia, no such facilities are shown on the maps. The Virginia Portions will be located entirely within the certificated service area of Shenandoah Valley Electric Cooperative ("SVEC") in Frederick County. An officer of SVEC has indicated by his signature that SVEC is not opposed to the proposed construction of the Virginia Portions.

NEET VA Witnesses and Supporting Evidence

29. In addition to the information provided in the Application Appendix, the Department of Environmental Quality ("DEQ") Supplement, and the Routing Study, this Application is supported by the pre-filed direct testimony of witnesses Kaitlin McCormick, Matt Pawlowski, Dr. Sami Abdulsalam, Ph.D., Andrew Gledhill, Heather Heater, Phillip Givens, Sarah Powers, Dr. A. Fletcher Mangum, Ph.D., Dr. Mark A. Israel, MD, and Dr. Nancy C. Lee, MD. NEET VA has attached to and made part of this Application these direct testimonies and supporting exhibits.

Conclusion and Request for Approval

30. Wherefore, NEET VA respectfully requires that the Commission:

a. Direct that notice of this Application be given as required by § 56-46.1 of the Code of Virginia;

b. Approve, pursuant to § 56-46.1 of the Code of Virginia the construction of the Virginia Portions of the MARL Project; and

c. Grant a CPCN for the Virginia Portions of the MARL Project under the Utility Facilities Act and such other relief as may be necessary for the construction and operation of the Virginia Portions by March 1, 2027, if possible.

[SIGNATURE PAGE FOLLOWS]

Respectfully Submitted,

NextEra Energy Transmission Virginia, Inc.

By: /s/ Andrew J. Flavin

Tracy C. Davis, Managing Attorney*
NextEra Energy Transmission Virginia, Inc.
5290 W. William Cannon Drive, Bldg. 2
Austin, TX 78749
(512) 236-3141
tracy.c.davis@nexteraenergy.com

Anna Galanis, Principal Attorney*
NextEra Energy Transmission Virginia, Inc.
700 Universe Blvd.
(561) 691-2542
anna.galanis@nexteraenergy.com

Andrew J. Flavin
Viktoriia De Las Casas
Troutman Pepper Locke LLP
1001 Haxall Point
Richmond, VA 23219
(804) 697-1368 (AJF)
(804) 697-1205 (VDLC)
andy.flavin@troutman.com
viktoriia.delascasas@troutman.com

** Not admitted to practice in Virginia*

Counsel for NextEra Energy Transmission Virginia, Inc.

CERTIFICATE OF SERVICE

I certify that on this 5th day of March 2026, a true copy of the foregoing Application was emailed to the following:

William H. Chambliss, Esq.
State Corporation Commission
Office of General Counsel
Tyler Building – 10th Floor
1300 East Main Street
Richmond, VA 23219
william.chambliss@scc.virginia.gov

John E. Farmer, Esq.[12]
Office of the Attorney General
Division of Consumer Counsel
202 N. 9th Street, 8th Floor
Richmond, Virginia 23219
jfarmer@oag.state.va.us

[12] Only a copy of the public version of the Application was delivered to the Office of the Attorney General's Division of Consumer Counsel.

COMMONWEALTH OF VIRGINIA
BEFORE THE
STATE CORPORATION COMMISSION

APPLICATION OF

NEXTERA ENERGY TRANSMISSION VIRGINIA, INC.

FOR APPROVAL AND CERTIFICATION
OF ELECTRIC FACILITIES

500 KV LINE AND WOODSIDE SUBSTATION

Appendix

Containing Information in Response to
"Guidelines for Transmission Line Applications Filed Under title 56 of the Code of Virginia"

CASE NO. PUR-2026-00018

Filed: March 5, 2026

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

I. NECESSITY FOR THE PROPOSED PROJECT.....3

II. DESCRIPTION OF THE PROPOSED PROJECT 443

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES 492

IV. HEALTH ASPECTS OF ELECTROMAGNETIC FIELDS ("EMF") 539

V. NOTICE 542

EXECUTIVE SUMMARY

As directed by PJM Interconnection, L.L.C. ("PJM"), NextEra Energy Transmission Virginia, Inc. ("NEET VA" or the "Company") and its affiliate, NextEra Energy Transmission MidAtlantic, Inc. ("NEET MA"), propose to construct, own, and operate the MidAtlantic Resiliency Link ("MARL Project"), which is a new, approximately 107.5-mile, 500 kilovolt ("kV") transmission line that will traverse portions of Pennsylvania, West Virginia, Maryland, and Virginia and will include the new 500/138 kV Woodside Substation to be located in Frederick County, Virginia. Specifically, NEET VA proposes in Frederick County, Virginia to:

- Construct a new 2.4-mile, 500 kV single circuit transmission line that will interconnect with a new 500 kV transmission line to be constructed by FirstEnergy Corp. ("FirstEnergy"); and

- Construct a new 500/138 kV substation ("Woodside Substation") that will interconnect to the new 500 kV line being constructed by FirstEnergy, as well as an existing 500 kV line owned by Virginia Electric and Power Company ("Dominion Energy"), and two new 138 kV transmission lines that will connect to the existing FirstEnergy Stonewall high-voltage station.[1]

The approximately 2.4-mile 500 kV transmission line and Woodside Substation that NEET VA plans to construct in Frederick County are collectively referred to as the "Virginia Portions" of the MARL Project.[2]

The MARL Project is necessary to prevent extensive, severe, and widespread reliability criteria violations on the Bulk Electric System ("BES") that serves Virginia and the rest of the PJM Region. These system conditions are so extensive and widespread that, if left unsolved, they could lead to thermal overloads of existing high voltage transmission lines and potential voltage collapse, leading to electric system failure and blackouts affecting Virginia residents and businesses. These

[1] NEET MA will construct, own, and operate the portions of the MARL Project that traverse Pennsylvania, West Virginia, and Maryland.

[2] The siting of the Woodside Substation is subject to the jurisdiction of Frederick County. *See BASF Corp. v. State Corp. Comm'n*, 289 Va. 375 (2015). NEET VA and NEET MA also will perform additional work as part of the Virginia Portions of the MARL Project. The 138 kV Woodside-Stonewall Circuits 1 & 2 will exit the new Woodside Substation and extend to a new approximately 75-foot-tall double circuit steel monopole deadend turning structure installed on a reinforced concrete pier foundation. These 138 kV circuits will then proceed to a new approximately 75-foot-tall double circuit steel monopole tangent structure installed on a reinforced concrete pier foundation. The 138 kV circuits will change ownership with FirstEnergy (Potomac Edison) on a new third structure outside of Woodside Substation. NEET VA and NEET MA's portion of the 138 kV Woodside-Stonewall Circuits 1 & 2 will be approximately 1,150 feet (0.22 miles) in length. These circuits will support the existing 138 kV electrical network by providing additional sources via the new 500/138 kV transformer at Woodside Substation. NEET VA and NEET MA believe the work described for their portion of 138 kV Woodside-Stonewall Circuits 1 & 2 in this footnote qualifies as an "ordinary extension[] or improvement[] in the usual course of business" (*i.e.*, "ordinary course") pursuant to § 56-265.2(A)(1) of the Code of Virginia and, therefore, does not require approval pursuant to Va. Code § 56-46.1(B) or a CPCN from the Commission. This approach is consistent with the Commission's July 6, 2017 guidance, available at https://www.scc.virginia.gov/media/sccvirginiagov-home/regulated-industries/utility-regulation/responsibilities/guidance-documents/staffguidanceordvsnonord.pdf.

reliability needs are driven by significant changes on the PJM system, including those caused by load growth projected within Virginia (in the Dominion Energy or "DOM" zone) and in Maryland near the Doubs Substation (in the Allegheny Power System/FirstEnergy or "APS" zone), as well as by the planned deactivation of generation facilities and changes to reliability criteria. Furthermore, in the 2024 Regional Transmission Expansion Plan ("RTEP") Window 1 process, PJM identified the need to interconnect the MARL Project with the Black Oak Substation in Maryland to resolve baseline reliability criteria violations.

NEET VA is proposing two distinct routes for State Corporation Commission ("Commission") consideration and notice. Discussion of the NEET VA's proposed route ("Proposed Route") and Alternative Routes, as well as other routes NEET VA studied but ultimately rejected, are provided in Section II of the Appendix and discussed in more detail in the Routing Study.

The total estimated cost of the MARL Project along the Proposed Route is approximately $1,167,200,000 (in 2031 dollars), consisting of approximately $881 million for transmission-related work and $286 million for the Woodside Substation. Within Virginia, the estimated cost of the transmission line for the Virgina Portions of the Proposed Route is approximately $19 million. The estimated costs for the transmission-related work associated with the Alternative Routes are provided in Section II.A.9.

NEET VA and NEET MA have executed a Designated Entity Agreement ("DEA") with PJM for the Project. The DEA obligates NEET VA to complete the Woodside Substation and place it into service by December 31, 2028 and obligates NEET VA and NEET MA to complete the MARL Project transmission line, including the 2.4-mile 500 kV transmission line in Virginia, and place it into service by December 31, 2031. However, because the need for reinforcements to the existing BES is so substantial, PJM has requested that NEET to take all reasonable actions to obtain necessary approvals and complete construction of the MARL Project as soon as practicable and closer to the identified need date (2027/2028), and NEET VA and NEET MA are working to accelerate the in-service date for the transmission line to December 2029 or earlier, pending regulatory approvals. Accordingly, to support NEET VA's and NEET MA's estimated construction timeline and plan for the overall MARL Project, NEET VA requests a final order from the Commission within one year of the filing of this Application.

Any adjustments to the schedule resulting from these or similar challenges could necessitate a delay in the targeted in-service date. Accordingly, for purposes of judicial economy, the Company requests that the Commission issue a final order approving both a desired in-service date and an authorization sunset date for energization of the Virginia Portions of the MARL Project.

I. NECESSITY FOR THE PROPOSED PROJECT

A. State the primary justification for the proposed project (for example, the most critical contingency violation including the first year and season in which the violation occurs). In addition, identify each transmission planning standard(s) (of the Applicant, regional transmission organization ("RTO"), or North American Electric Reliability Corporation) projected to be violated absent construction of the facility.

Response: The MARL Project is critically needed to meet the demands for service in Virginia and, in particular, is necessary for the continued safe and reliable operation of the 500 kV transmission system serving Virginia and surrounding states. PJM identified these needs as part of its 2022 RTEP cycle for study years 2027 and 2028. Through its competitive transmission process, PJM identified transmission enhancements and expansions – including the MARL Project – to solve identified thermal and voltage NERC reliability criteria violations in the region, including within the Commonwealth of Virginia.

Please see the Direct Testimony Dr. Sami Abdulsalam ("Abdulsalam Testimony"), responses to Question 30 through Question 38 and Question 53. *See also* Exhibit Nos. SA-4; SA-5; SA-6; SA-7; SA-8; and SA-9.

To meet the critical reliability needs identified by PJM, NEET VA and its affiliate, NEET MA,[3] propose to construct the following facilities:

- An approximately 107.5-mile, 500 kV transmission line that will traverse portions of Pennsylvania, West Virginia, Maryland, and Virginia. The western end of the line will connect to the existing FirstEnergy 502 Junction Substation in Greene County, Pennsylvania, will traverse portions of West Virginia and Maryland, and ultimately enter Virginia in Frederick County, Virginia. The Virginia Portions of the line that NEET VA will construct consist of approximately 2.4 miles of 500 kV transmission line and related facilities in Frederick County, entering Virginia parallel to existing transmission lines and roughly 0.6 miles south of Northwestern Pike and connecting to a handoff point with FirstEnergy approximately 1.5 miles east of Gore, Virginia. FirstEnergy will construct their segment which will interconnect into the Woodside Substation; and

- The new 500/138 kV Woodside Substation to be located in Frederick County, Virginia, which includes a Static Synchronous Compensator ("STATCOM") and two capacitor banks, and which will interconnect to the new 500 kV line being constructed by FirstEnergy, as well as an existing

[3] NEET MA is a corporation, incorporated in the state of Indiana, and will be responsible for the Pennsylvania, Maryland, and West Virginia portions of MARL that are assigned to NextEra Energy MidAtlantic Holdings, LLC by PJM.

500 kV line owned by Dominion Energy, and two new 138 kV transmission lines that will connect to the existing FirstEnergy Stonewall substation.

NEET VA and NEET MA have executed a DEA with PJM, a copy of which is provided in Attachment I.A.1. The DEA obligates NEET VA to complete the Woodside Substation and place it into service by December 31, 2028, and obligates NEET VA and NEET MA to complete the transmission line and place it into service by December 31, 2031. However, as noted above, because the need for reinforcements to the existing BES is so substantial, PJM has requested that asking NEET VA and NEET MA take all reasonable actions to obtain necessary approvals and complete construction of the MARL Project as soon as practicable, and NEET VA is working to accelerate the in-service date of the transmission line to December 2029 or earlier, pending regulatory approvals.[4]

[4] PJM, NEET MA, and NEET VA will negotiate further amendments to the DEA to reflect the accelerated in-service date.

Service Agreement No. 7601

AMENDED DESIGNATED ENTITY AGREEMENT

Among

PJM Interconnection, L.L.C.,

NextEra Energy Transmission MidAtlantic, Inc.

And

NextEra Energy Transmission Virginia, Inc.

PJM RTEP Projects b3800.102, b3800.106 to b3800.110, b3800.113, b3800.115, b3800.117, and b4000.14

PJM 2022 Window 3 and 2024 Window 1 Recommended Solutions

Service Agreement No. 7601

DESIGNATED ENTITY AGREEMENT

Among

PJM Interconnection, L.L.C.,

NextEra Energy Transmission MidAtlantic, Inc.

And

NextEra Energy Transmission Virginia, Inc.

This Designated Entity Agreement, including the Schedules attached hereto and incorporated herein (collectively, "Agreement") is made and entered into as of the Effective Date among PJM Interconnection, L.L.C. ("Transmission Provider" or "PJM"), and NextEra Energy Transmission MidAtlantic, Inc. (NEET MidAtlantic") and NextEra Energy Transmission Virginia, Inc. ("NEET Virginia" and, together with NEET MidAtlantic, "Designated Entity"), referred to herein individually as "Party" and collectively as "the Parties."

WITNESSETH

WHEREAS, in accordance with FERC Order No. 1000 and Schedule 6 of the Amended and Restated Operating Agreement of PJM Interconnection, L.L.C. ("Operating Agreement"), Transmission Provider is required to designate among candidates, pursuant to a FERC-approved process, an entity to develop and construct a specified project to expand, replace and/or reinforce the Transmission System operated by Transmission Provider;

WHEREAS, pursuant to Section 1.5.8(i) of Schedule 6 of the Operating Agreement, the Transmission Provider notified Designated Entity that it was designated as the Designated Entity for the Project (described in Schedule A to this Agreement) to be included in the Regional Transmission Expansion Plan;

WHEREAS, pursuant to Section 1.5.8(j) of Schedule 6 of the Operating Agreement, Designated Entity accepted the designation as the Designated Entity for the Project and therefore has the obligation to construct the Project; and

WHEREAS, NEET MidAtlantic and NEET Virginia are each the Designated Entity under this Agreement for the transmission enhancement or expansion assigned to such entity as specified in Attachment A and are severally responsible to fulfill the rights and obligations under this Agreement for such assigned transmission enhancement or expansion.

NOW, THEREFORE, in consideration of the mutual covenants herein contained, together with other good and valuable consideration, the receipt and sufficiency is hereby mutually acknowledged by each Party, the Parties mutually covenant and agree as follows:

Article 1 – Definitions

1.0 Defined Terms.

All capitalized terms used in this Agreement shall have the meanings ascribed to them in Part I of the Tariff or in definitions either in the body of this Agreement or its attached Schedules. In the event of any conflict between defined terms set forth in the Tariff or defined terms in this Agreement, including the Schedules, such conflict will be resolved in favor of the terms as defined in this Agreement.

1.1 Confidential Information.

Any confidential, proprietary, or trade secret information of a plan, specification, pattern, procedure, design, device, list, concept, policy, or compilation relating to the Project or Transmission Owner facilities to which the Project will interconnect, which is designated as confidential by the party supplying the information, whether conveyed verbally, electronically, in writing, through inspection, or otherwise, and shall include, but may not be limited to, information relating to the producing party's technology, research and development, business affairs and pricing, land acquisition and vendor contracts relating to the Project.

1.2 Designated Entity Letter of Credit.

Designated Entity Letter of Credit shall mean the letter of credit provided by the Designated Entity pursuant to Section 1.5.8(j) of Schedule 6 of the Operating Agreement and Section 3.0 of this Agreement as security associated with the Project.

1.3 Development Schedule.

Development Schedule shall mean the schedule of milestones set forth in Schedule C of this Agreement.

1.4 Effective Date.

Effective Date shall mean the date this Agreement becomes effective pursuant to Section 2.0 of this Agreement.

1.5 Initial Operation.

Initial Operation shall mean the date the Project is (i) energized and (ii) under Transmission Provider operational dispatch.

1.6 Project.

Project shall mean the enhancement or expansion included in the PJM Regional Transmission Expansion Plan described in Schedule A of this Agreement.

1.7 Project Finance Entity.

Project Finance Entity shall mean holder, trustee or agent for holders, of any component of Project Financing.

1.8 Project Financing.

Project Financing shall mean: (a) one or more loans, leases, equity and/or debt financings, together with all modifications, renewals, supplements, substitutions and replacements thereof, the proceeds of which are used to finance or refinance the costs of the Project, any alteration, expansion or improvement to the Project, or the operation of the Project; or (b) loans and/or debt issues secured by the Project.

1.9 Reasonable Efforts.

Reasonable Efforts shall mean such efforts as are consistent with ensuring the timely and effective design and construction of the Project in a manner, which ensures that the Project, once placed in service, meets the requirements of the Project as described in Schedule B and are consistent with Good Utility Practice.

1.10 Required Project In-Service Date.

Required Project In-Service Date shall mean the date the Project is required to: (i) be completed in accordance with the Scope of Work in Schedules B this Agreement, (ii) meet the criteria outlined in Schedule D of this Agreement and (iii) be under Transmission Provider operational dispatch.

Article 2 – Effective Date and Term

2.0 Effective Date.

Subject to regulatory acceptance, this Agreement shall become effective on the date the Agreement has been executed by all Parties, or if this Agreement is filed with FERC for acceptance, rather than reported only in PJM's Electric Quarterly Report, upon the date specified by FERC.

2.1 Term.

This Agreement shall continue in full force and effect from the Effective Date until: (i) the Designated Entity executes the Consolidated Transmission Owners Agreement; and (ii) the Project (a) has been completed in accordance with the terms and conditions of this Agreement, (b) meets all relevant required planning criteria, and (c) is under Transmission Provider's operational dispatch; or (iii) the Agreement is terminated pursuant to Article 8 of this Agreement.

Article 3 – Security

3.0 Obligation to Provide Security.

In accordance with Section 1.5.8(j) of Schedule 6 of the Operating Agreement, Designated Entity shall provide Transmission Provider a letter of credit as acceptable to Transmission Provider (Designated Entity Letter of Credit) or cash security in the amount of $25,500,000. Designated Entity is required provide and maintain the Designated Entity Letter of Credit, as required by Section 1.5.8(j) of Schedule 6 of the Operating Agreement and Section 3.0 of this Agreement. The Designated Entity Letter of Credit shall remain in full force and effect for the term of this Agreement and for the duration of the obligations arising therefrom in accordance with Article 17.0. Notwithstanding the foregoing, the Designated Entity is not required to provide a letter of credit or cash security to the extent (i) the Designated Entity is a Transmission Owner and (ii) the Project was selected (A) pursuant to Operating Agreement, Schedule 6, sections 1.5.8(g), 1.5.8(h), or 1.5.8(m)(1); or (B) through a proposal window conducted pursuant to Operating Agreement, Schedule 6, section 1.5.8(c) in which no Nonincumbent Developer submitted a competing proposal to address the need identified by the Transmission Provider.

3.1 Distribution of Designated Entity Letter of Credit or Cash Security.

In the event that Transmission Provider draws upon the Designated Entity Letter of Credit or retains the cash security in accordance with Sections 7.5, 8.0, or 8.1, Transmission Provider shall distribute such funds as determined by FERC.

Article 4 – Project Construction

4.0 Construction of Project by Designated Entity.

Designated Entity shall design, engineer, procure, install and construct the Project, including any modifications thereto, in accordance with: (i) the terms of this Agreement, including but not limited to the Scope of Work in Schedule B and the Development Schedule in Schedule C; (ii) applicable reliability principles, guidelines, and standards of the Applicable Regional Reliability Council and NERC; (iii) the Operating Agreement; (iv) the PJM Manuals; and (v) Good Utility Practice.

4.1 Milestones.

4.1.0 Milestone Dates.

Designated Entity shall meet the milestone dates set forth in the Development Schedule in Schedule C of this Agreement. Milestone dates set forth in Schedule C only may be extended by Transmission Provider in writing. Failure to meet any of the milestone dates specified in Schedule C, or as extended as described in this Section 4.1.0 or Section 4.3.0 of this Agreement, shall constitute a Breach of this Agreement. Transmission Provider reasonably may extend any

such milestone date, in the event of delays not caused by the Designated Entity that could not be remedied by the Designated Entity through the exercise of due diligence, or if an extension will not delay the Required Project In-Service Date specified in Schedule C of this Agreement; provided that a corporate officer of the Designated Entity submits a revised Development Schedule containing revised milestones and showing the Project in full operation no later than the Required Project In-Service Date specified in Schedule C of this Agreement.

4.1.1 Right to Inspect.

Upon reasonable notice, Transmission Provider shall have the right to inspect the Project for the purposes of assessing the progress of the Project and satisfaction of milestones. Such inspection shall not be deemed as review or approval by Transmission Provider of any design or construction practices or standards used by the Designated Entity.

4.2 Applicable Technical Requirements and Standards.

For the purposes of this Agreement, applicable technical requirements and standards of the Transmission Owner(s) to whose facilities the Project will interconnect shall apply to the design, engineering, procurement, construction and installation of the Project to the extent that the provisions thereof relate to the interconnection of the Project to the Transmission Owner(s) facilities.

4.3 Project Modification.

4.3.0 Project Modification Process.

The Scope of Work and Development Schedule, including the milestones therein, may be revised, as required, in accordance with Transmission Provider's project modification process set forth in the PJM Manuals, or otherwise by Transmission Provider in writing. Such modifications may include alterations as necessary and directed by Transmission Provider to meet the system condition for which the Project was included in the Regional Transmission Expansion Plan.

4.3.1 Consent of Transmission Provider to Project Modifications.

Designated Entity may not modify the Project without prior written consent of Transmission Provider, including but not limited to, modifications necessary to obtain siting approval or necessary permits, which consent shall not be unreasonably withheld, conditioned, or delayed.

4.3.2 Customer Facility Interconnections And Transmission Service Requests.

Designated Entity shall perform or permit the engineering and construction necessary to accommodate the interconnection of Customer Facilities to the Project and transmission service requests that are determined necessary for such interconnections and transmission service requests in accordance with Parts IV and VI, and Parts II and III, respectively, of the Tariff.

4.4 Project Tracking.

The Designated Entity shall provide regular, quarterly construction status reports in writing to Transmission Provider. The reports shall contain, but not be limited to, updates and information specified in the PJM Manuals regarding: (i) current engineering and construction status of the Project; (ii) Project completion percentage, including milestone completion; (iii) current target Project or phase completion date(s); (iv) applicable outage information; and (v) cost expenditures to date and revised projected cost estimates for completion of the Project. Transmission Provider shall use such status reports to post updates regarding the progress of the Project.

4.5 Exclusive Responsibility of Designated Entity.

Designated Entity shall be solely responsible for all planning, design, engineering, procurement, construction, installation, management, operations, safety, and compliance with applicable laws and regulations associated with the Project, including but not limited to obtaining all necessary permits, siting, and other regulatory approvals. Transmission Provider shall have no responsibility to manage, supervise, or ensure compliance or adequacy of same.

Article 5 – Coordination with Third-Parties

5.0 Interconnection Coordination Agreement with Transmission Owner(s).

By the dates specified in the Development Schedule in Schedule C of this Agreement, Designated Entity shall execute or request to file unexecuted with the Commission: (a) an Interconnection Coordination Agreement; and (b) an interconnection agreement among and between Designated Entity, Transmission Provider, and the Transmission Owner(s) to whose facilities the Project will interconnect.

5.1 Connection with Entities Not a Party to the Consolidated Transmission Owners Agreement.

Designated Entity shall not permit any part of the Project facilities to be connected with the facilities of any entity which is not: (i) a party to Consolidated Transmission Owners Agreement without an interconnection agreement that contains provisions for the safe and reliable interconnection and operation of such interconnection in accordance with Good Utility Practice, and principles, guidelines and standards of the Applicable Regional Reliability Council and NERC or comparable requirements of an applicable retail tariff or agreement approved by appropriate regulatory authority; or (ii) a party to a separate Designated Entity Agreement.

Article 6 – Insurance

6.0 Designated Entity Insurance Requirements.

Designated Entity shall obtain and maintain in full force and effect such insurance as is consistent with Good Utility Practice. The Transmission Provider shall be included as an

Additional Insured in the Designated Entity's applicable liability insurance policies. The Designated Entity shall provide evidence of compliance with this requirement upon request by the Transmission Provider.

6.1 Subcontractor Insurance.

In accord with Good Utility Practice, Designated Entity shall require each of its subcontractors to maintain and, upon request, provide Designated Entity evidence of insurance coverage of types, and in amounts, commensurate with the risks associated with the services provided by the subcontractor. Bonding and hiring of contractors or subcontractors shall be the Designated Entity's discretion, but regardless of bonding or the existence or non-existence of insurance, the Designated Entity shall be responsible for the performance or non-performance of any contractor or subcontractor it hires.

Article 7 – Breach and Default

7.0 Breach.

Except as otherwise provided in Article 10, a Breach of this Agreement shall include:

(a) The failure to comply with any term or condition of this Agreement, including but not limited to, any Breach of a representation, warranty, or covenant made in this Agreement, and failure to provide and maintain security in accordance with Section 3.0 of this Agreement;

(b) The failure to meet a milestone or milestone date set forth in the Development Schedule in Schedule C of this Agreement, or as extended in writing as described in Sections 4.1.0 and 4.3.0 of this Agreement;

(c) Assignment of this Agreement in a manner inconsistent with the terms of this Agreement; or

(d) Failure of any Party to provide information or data required to be provided to another Party under this Agreement for such other Party to satisfy its obligations under this Agreement.

7.1 Notice of Breach.

In the event of a Breach, a Party not in Breach of this Agreement shall give written notice of such Breach to the breaching Party, and to any other persons, including a Project Finance Entity, if applicable, that the breaching Party identifies in writing prior to the Breach. Such notice shall set forth, in reasonable detail, the nature of the Breach, and where known and applicable, the steps necessary to cure such Breach.

7.2 Cure and Default.

A Party that commits a Breach and does not take steps to cure the Breach pursuant to Section 7.3 shall be in Default of this Agreement.

7.3 Cure of Breach.

The breaching Party may: (i) cure the Breach within thirty days from the receipt of the notice of Breach or other such date as determined by Transmission Provider to ensure that the Project meets its Required Project In-Service Date set forth in Schedule C; or, (ii) if the Breach cannot be cured within thirty days but may be cured in a manner that ensures that the Project meets the Required Project In-Service Date for the Project, within such thirty day time period, commences in good faith steps that are reasonable and appropriate to cure the Breach and thereafter diligently pursue such action to completion.

7.4 Re-evaluation if Breach Not Cured.

In the event that a breaching Party does not cure a Breach in accordance with Section 7.3 of this Agreement, Transmission Provider shall conduct a re-evaluation pursuant to Section 1.5.8(k) of Schedule 6 of the Operating Agreement. If based on such re-evaluation, the Project is retained in the Regional Transmission Expansion Plan and the Designated Entity's designation for the Project also is retained, the Parties shall modify this Agreement, including Schedules, as necessary. In all other events, Designated Entity shall be considered in Default of this Agreement, and this Agreement shall terminate in accordance with Section 8.1 of this Agreement.

7.5 Remedies.

Upon the occurrence of an event of Default, the non-Defaulting Party shall be entitled to: (i) commence an action to require the Defaulting Party to remedy such Default and specifically perform its duties and obligations hereunder in accordance with the terms and conditions hereof; (ii) suspend performance hereunder; and (iii) exercise such other rights and remedies as it may have in equity or at law. Upon Default by Designated Entity, Transmission Provider may draw upon the Designated Entity Letter of Credit. Nothing in this Section 7.5 is intended in any way to affect the rights of a third-party to seek any remedy it may have in equity or at law from the Designated Entity resulting from Designated Entity's Default of this Agreement.

7.6 Remedies Cumulative.

No remedy conferred by any provision of this Agreement is intended to be exclusive of any other remedy and each and every remedy shall be cumulative and shall be in addition to every other remedy given hereunder or now or hereafter existing at law or in equity or by statute or otherwise. The election of any one or more remedies shall not constitute a waiver of the right to pursue other available remedies.

7.7 Waiver.

Any waiver at any time by any Party of its rights with respect to a Breach or Default under this Agreement, or with respect to any other matters arising in connection with this Agreement, shall not be deemed a waiver or continuing waiver with respect to any other Breach or Default or other matter.

Article 8 – Early Termination

8.0 Termination by Transmission Provider.

In the event that: (i) pursuant to Section 1.5.8(k) of Schedule 6 of the Operating Agreement, Transmission Provider determines to remove the Project from the Regional Transmission Expansion Plan and/or not to retain Designated Entity's status for the Project; (ii) Transmission Provider otherwise determines pursuant to Regional Transmission Expansion Planning Protocol in Schedule 6 of the Operating Agreement that the Project is no longer required to address the specific need for which the Project was included in the Regional Transmission Expansion Plan; or (iii) an event of force majeure, as defined in section 10.0 of this Attachment KK, or other event outside of the Designated Entity's control that, with the exercise of Reasonable Efforts, Designated Entity cannot alleviate and which prevents the Designated Entity from satisfying its obligations under this Agreement, Transmission Provider may terminate this Agreement by providing written notice of termination to Designated Entity, which shall become effective the later of sixty calendar days after the Designated Entity receives such notice or other such date the FERC establishes for the termination. In the event termination pursuant to this Section 8.0 is based on (ii) or (iii) above, Transmission Provider shall not have the right to draw upon the Designated Entity Letter of Credit or retain the cash security and shall cancel the Designated Entity Letter of Credit or return the cash security within thirty days of the termination of this Agreement.

8.1 Termination by Default.

This Agreement shall terminate in the event a Party is in Default of this Agreement in accordance with Sections 7.2 or 7.4 of this Agreement. Upon Default by Designated Entity, Transmission Provider may draw upon the Designated Entity Letter of Credit or retain the cash security.

8.2 Filing at FERC.

Transmission Provider shall make the appropriate filing with FERC as required to effectuate the termination of this Agreement pursuant to this Article 8.

Article 9 – Liability and Indemnity

9.0 Liability.

For the purposes of this Agreement, Transmission Provider's liability to the Designated Entity, any third-party, or any other person arising or resulting from any acts or omissions associated in any way with performance under this Agreement shall be limited in the same manner and to the same extent that Transmission Provider's liability is limited to any Transmission Customer, third-party or other person under Section 10.2 of the Tariff arising or resulting from any act or omission in any way associated with service provided under the Tariff or any Service Agreement thereunder.

9.1 Indemnity.

For the purposes of this Agreement, Designated Entity shall at all times indemnify, defend, and save Transmission Provider and its directors, managers, members, shareholders, officers and employees harmless from, any and all damages, losses, claims, including claims and actions relating to injury to or death of any person or damage to property, demands, suits, recoveries, costs and expenses, court costs, attorney fees, and all other obligations by or to third-parties, arising out of or resulting from the Transmission Provider's acts or omissions associated with the performance of its obligations under this Agreement to the same extent and in the same manner that a Transmission Customer is required to indemnify, defend and save Transmission Provider and its directors, managers, members, shareholders, officers and employees harmless under Section 10.3 of the Tariff.

Article 10 – Force Majeure

10.0 Force Majeure.

For the purpose of this section, an event of force majeure shall mean any cause beyond the control of the affected Party, including but not restricted to, acts of God, flood, drought, earthquake, storm, fire, lightening, epidemic, war, riot, civil disturbance or disobedience, labor dispute, labor or material shortage, sabotage, acts of public enemy, explosions, orders, regulations or restrictions imposed by governmental, military, or lawfully established civilian authorities, which in any foregoing cases, by exercise of due diligence, it has been unable to overcome. An event of force majeure does not include: (i) a failure of performance that is due to an affected Party's own negligence or intentional wrongdoing; (ii) any removable or remedial causes (other than settlement of a strike or labor dispute) which an affected Party fails to remove or remedy within a reasonable time; or (iii) economic hardship of an affected Party.

10.1 Notice.

A Party that is unable to carry out an obligation imposed on it by this Agreement due to Force Majeure shall notify the other Party in writing within a reasonable time after the occurrence of the cause relied on.

10.2 Duration of Force Majeure.

A Party shall not be responsible for any non-performance or considered in Breach or Default under this Agreement, for any deficiency or failure to perform any obligation under this Agreement to the extent that such failure or deficiency is due to Force Majeure. A Party shall be excused from whatever performance is affected only for the duration of the Force Majeure and while the Party exercises Reasonable Efforts to alleviate such situation. As soon as the non-performing Party is able to resume performance of its obligations excused because of the occurrence of Force Majeure, such Party shall resume performance and give prompt notice thereof to the other Party. In the event that Designated Entity is unable to perform any of its obligations under this Agreement because of an occurrence of Force Majeure, Transmission Provider may terminate this Agreement in accordance with Section 8.0 of this Agreement.

10.3 Breach or Default of or Force Majeure under Interconnection Coordination Agreement

If either of the following events prevents Designated Entity from performing any of its obligations under this Agreement, such event shall be considered a Force Majeure event under this Agreement and the provisions of this Article 10 shall apply: (i) a breach or default of the Interconnection Coordination Agreement associated with the Project by a party to the Interconnection Coordination Agreement other than the Designated Entity; or (ii) an event of Force Majeure under the Interconnection Coordination Agreement associated with the Project.

Article 11 – Assignment

11.0 Assignment.

A Party may assign all of its rights, duties, and obligations under this Agreement in accordance with this Section 11.0. Except for assignments described in Section 11.1 of this Agreement that may not result in the assignment of all rights, duties, and obligations under this Agreement to a Project Finance Entity, no partial assignments will be permitted. No Party may assign any of its rights or delegate any of its duties or obligations under this Agreement without prior written consent of the other Party, which consent shall not be unreasonably withheld, conditioned, or delayed. Any such assignment or delegation made without such written consent shall be null and void. Assignment by the Designated Entity shall be contingent upon, prior to the effective date of the assignment: (i) the Designated Entity or assignee demonstrating to the satisfaction of Transmission Provider that the assignee has the technical competence and financial ability to comply with the requirements of this Agreement and to construct the Project consistent with the assignor's cost estimates for the Project; and (ii) the assignee is eligible to be a Designated Entity for the Project pursuant to Sections 1.5.8(a) and (f) of Schedule 6 of the Operating Agreement. Except as provided in an assignment to a Finance Project Entity to the contrary, for all assignments by any Party, the assignee must assume in a writing, to be provided to the other Party, all rights, duties, and obligations of the assignor arising under this Agreement. Any assignment described herein shall not relieve or discharge the assignor from any of its obligations hereunder absent the written consent of the other Party. In no circumstance, shall an assignment of this Agreement or any of the rights, duties, and obligations under this Agreement diminish the rights of the Transmission Provider under this Agreement, the Tariff, or

the Operating Agreement. Any assignees that will construct, maintain, or operate the Project shall be subject to, and comply with the terms of this Agreement, the Tariff and the Operating Agreement.

11.1 Project Finance Entity Assignments

11.1.1 Assignment to Project Finance Entity

If an arrangement between the Designated Entity and a Project Finance Entity provides that the Project Finance Entity may assume any of the rights, duties and obligations of the Designated Entity under this Agreement or otherwise provides that the Project Finance Entity may cure a Breach of this Agreement by the Designated Entity, the Project Finance Entity may be assigned this Agreement or any of the rights, duties, or obligations hereunder only upon written consent of the Transmission Provider, which consent shall not be unreasonably withheld, conditioned, or delayed. In no circumstance, shall an assignment of this Agreement or any of the rights, duties, and obligations under this Agreement diminish the rights of the Transmission Provider under this Agreement, the Tariff, or the Operating Agreement.

11.1.2 Assignment By Project Finance Entity

A Project Finance Entity that has been assigned this Agreement or any of the rights, duties or obligations under this Agreement or otherwise is permitted to cure a Breach of this Agreement, as described pursuant to Section 11.1.1 above, may assign this Agreement or any of the rights, duties or obligations under this Agreement to another entity not a Party to this Agreement only: (i) upon the Breach of this Agreement by the Designated Entity; and (ii) with the written consent of the Transmission Provider, which consent shall not be unreasonably withheld, conditioned, or delayed. In no circumstance, shall an assignment of this Agreement or any of the rights, duties, and obligations under this Agreement alter or diminish the rights of the Transmission Provider under this Agreement, the Tariff, or the Operating Agreement. Any assignees that will construct, maintain, or operate the Project shall be subject to, and comply with the Tariff and Operating Agreement.

Article 12 – Information Exchange

12.0 Information Access.

Subject to Applicable Laws and Regulations, each Party shall make available to the other Party information necessary to carry out each Party's obligations and responsibilities under this Agreement, the Operating Agreement, and the Tariff. Such information shall include but not be limited to, information reasonably requested by Transmission Provider to prepare the Regional Transmission Expansion Plan. The Parties shall not use such information for purposes other than to carry out their obligations or enforce their rights under this Agreement, the Operating Agreement, and the Tariff.

12.1 Reporting of Non-Force Majeure Events.

Each Party shall notify the other Party when it becomes aware of its inability to comply with the provisions of this Agreement for a reason other than Force Majeure. The Parties agree to cooperate with each other and provide necessary information regarding such inability to comply, including, but not limited to, the date, duration, reason for the inability to comply, and corrective actions taken or planned to be taken with respect to such inability to comply. Notwithstanding the foregoing, notification, cooperation or information provided under this Section 12.1 shall not entitle the receiving Party to allege a cause of action for anticipatory Breach of this Agreement.

Article 13 – Confidentiality

13.0 Confidentiality.

For the purposes of this Agreement, information will be considered and treated as Confidential Information only if it meets the definition of Confidential Information set forth in Section 1.1 of this Agreement and is clearly designated or marked in writing as "confidential" on the face of the document, or, if the information is conveyed orally or by inspection, if the Party providing the information orally informs the Party receiving the information that the information is "confidential." Confidential Information shall be treated consistent with Section 18.17 of the Operating Agreement. A Party shall be responsible for the costs associated with affording confidential treatment to its information.

Article 14 – Regulatory Requirements

14.0 Regulatory Approvals.

Designated Entity shall seek and obtain all required government authority authorizations or approvals as soon as reasonably practicable, and by the milestone dates set forth in the Development Schedule of Schedule C of this Agreement, as applicable.

Article 15 – Representations and Warranties

15.0 General.

Designated Entity hereby represents, warrants and covenants as follows, with these representations, warranties, and covenants effective as to the Designated Entity during the full time this Agreement is effective:

15.0.1 Good Standing

Designated Entity is duly organized or formed, as applicable, validly existing and in good standing under the laws of its State of organization or formation, and is in good standing under the laws of the respective State(s) in which it is incorporated.

15.0.2 Authority

Designated Entity has the right, power and authority to enter into this Agreement, to become a Party thereto and to perform its obligations hereunder. This Agreement is a legal, valid and binding obligation of Designated Entity, enforceable against Designated Entity in accordance with its terms, except as the enforceability thereof may be limited by applicable bankruptcy, insolvency, reorganization or other similar laws affecting creditors' rights generally and by general equitable principles (regardless of whether enforceability is sought in a proceeding in equity or at law).

15.0.3 No Conflict.

The execution, delivery and performance of this Agreement does not violate or conflict with the organizational or formation documents, or bylaws or operating agreement, of Designated Entity, or any judgment, license, permit, order, material agreement or instrument applicable to or binding upon Designated Entity or any of its assets.

Article 16 – Operation of Project

16.0 Initial Operation.

The following requirements shall be satisfied prior to Initial Operation of the Project:

16.0.1 Execution of the Consolidated Transmission Owners Agreement

Designated Entity has executed the Consolidated Transmission Owners Agreement and is able to meet all requirements therein.

16.0.2 Execution of an Interconnection Agreement

Designated Entity has executed an Interconnection Agreement with the Transmission Owner(s) to whose facilities the Project will interconnect, or such agreement has been filed unexecuted with the Commission.

16.0.3 Operational Requirements

The Project must meet all applicable operational requirements described in the PJM Manuals.

16.0.4 Parallel Operation

Designated Entity shall have all necessary systems and personnel in place to allow for parallel operation of its facilities with the facilities of the Transmission Owner(s) to which the Project is interconnected consistent with the Interconnection Coordination Agreement associated with the Project.

16.0.5 Synchronization

Designated Entity shall have received any necessary authorization from Transmission Provider and the Transmission Owner(s) to whose facilities the Project will interconnect to synchronize with the Transmission System or to energize, as applicable, per the determination of Transmission Provider, the Project.

16.1 Partial Operation.

If the Project is to be completed in phases, the completed part of the Project may operate prior to completion and Required Project In-Service Date set forth in Schedule C of this Agreement, provided that: (i) Designated Entity has notified Transmission Provider of the successful completion of the Project phase; (ii) Transmission Provider has determined that partial operation of the Project will not negatively impact the reliability of the Transmission System; (iii) Designated Entity has demonstrated that the requirements for Initial Operation set forth in Section 16.0 of this Agreement have been met for the Project phase; and (iv) partial operation of the Project is consistent with Applicable Laws and Regulations, Applicable Reliability Standards, and Good Utility Practice.

Article 17 – Survival

17.0 Survival of Rights.

The rights and obligations of the Parties in this Agreement shall survive the termination, expiration, or cancellation of this Agreement to the extent necessary to provide for the determination and enforcement of said obligations arising from acts or events that occurred while this Agreement was in effect. The Liability and Indemnity provisions in Article 9 also shall survive termination, expiration, or cancellation of this Agreement.

Article 18 – Non-Standard Terms and Conditions

18.0 Schedule E – Addendum of Non-Standard Terms and Conditions.

Subject to FERC acceptance or approval, the Parties agree that the terms and conditions set forth in the attached Schedule E are hereby incorporated by reference, and made a part of, this Agreement. In the event of any conflict between a provision of Schedule E that FERC has accepted and any provision of the standard terms and conditions set forth in this Agreement that relates to the same subject matter, the pertinent provision of Schedule E shall control.

Article 19 – Miscellaneous

19.0 Notices.

Any notice or request made to or by any Party regarding this Agreement shall be made by U.S. mail or reputable overnight courier to the addresses set forth below:

Transmission Provider:
PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19403
Attention: Augustine Caven, Senior Manager, Transmission Policy & Project Management

NEET MidAtlantic:
NextEra Energy Transmission MidAtlantic, Inc.
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408

Attention:
Matt Valle, President, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
Matt.Valle@NextEraEnergy.com

With copies to:

Matt Coates, Vice President, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
Matthew.Coates@nexteraenergy.com

Ryan Colley, Executive Director, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
Patrick.Colley@nexteraenergy.com

Matt Pawlowski, Vice President, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
matt.pawlowski@nexteraenergy.com

Kaitlin McCormick, Senior Director, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
kaitlin.mccormick@nexteraenergy.com

NEET Virginia:
NextEra Energy Transmission Virginia, Inc.
700 Universe Blvd, UST/JB.

Juno Beach, FL 33408

Attention:
Matt Valle, President, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
Matt.Valle@NextEraEnergy.com

With copies to:

Matt Coates, Vice President, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
Matthew.Coates@nexteraenergy.com

Ryan Colley, Executive Director, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
Patrick.Colley@nexteraenergy.com

Matt Pawlowski, Vice President, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
matt.pawlowski@nexteraenergy.com

Kaitlin McCormick, Senior Director, NextEra Energy Transmission
700 Universe Blvd, UST/JB.
Juno Beach, FL 33408
kaitlin.mccormick@nexteraenergy.com

19.1 No Transmission Service.

This Agreement does not entitle the Designated Entity to take Transmission Service under the Tariff.

19.2 No Rights.

Neither this Agreement nor the construction or the financing of the Project entitles Designated Entity to any rights related to Customer-Funded Upgrades set forth in Subpart C of Part VI of the Tariff.

19.3 Standard of Review.

Future modifications to this Agreement by the Parties or the FERC shall be subject to the just and reasonable standard and the Parties shall not be required to demonstrate that such modifications are required to meet the "public interest" standard of review as described in *United Gas Pipe Line Co. v. Mobile Gas Service Corp.*, 350 U.S. 332 (1956), and *Federal Power Commission v. Sierra Pacific Power Co.*, 350 U.S. 348 (1956).

19.4 No Partnership.

Notwithstanding any provision of this Agreement, the Parties do not intend to create hereby any joint venture, partnership, association taxable as a corporation, or other entity for the conduct of any business for profit.

19.5 Headings.

The Article and Section headings used in this Agreement are for convenience only and shall not affect the construction or interpretation of any of the provisions of this Agreement.

19.6 Interpretation.

Wherever the context may require, any noun or pronoun used herein shall include the corresponding masculine, feminine or neuter forms. The singular form of nouns, pronouns and verbs shall include the plural and vice versa.

19.7 Severability.

Each provision of this Agreement shall be considered severable and if for any reason any provision is determined by a court or regulatory authority of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions of this Agreement shall continue in full force and effect and shall in no way be affected, impaired or invalidated, and such invalid, void or unenforceable provision shall be replaced with valid and enforceable provision or provisions which otherwise give effect to the original intent of the invalid, void or unenforceable provision.

19.8 Further Assurances.

Each Party hereby agrees that it shall hereafter execute and deliver such further instruments, provide all information and take or forbear such further acts and things as may be reasonably required or useful to carry out the intent and purpose of this Agreement and as are not inconsistent with the terms hereof.

19.9 Counterparts.

This Agreement may be executed in multiple counterparts to be construed as one effective as of the Effective Date.

19.10 Governing Law

This Agreement shall be governed under the Federal Power Act and Delaware law, as applicable.

19.11 Incorporation of Other Documents.

The Tariff, the Operating Agreement, and the Reliability Assurance Agreement, as they may be amended from time to time, are hereby incorporated herein and made a part hereof.

[Signature Page Follows]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective authorized officials.

Transmission Provider: PJM Interconnection, L.L.C.

By: _____ Sr. Manager, TP&PM Nov 21, 2025
Name Title Date

Printed name of signer: Augustine Caven

Designated Entity: NextEra Energy Transmission MidAtlantic, Inc.

By: _____ Vice President November 14, 2025 12:12 ET
Name Title Date

Printed name of signer: **Matthew Valle**

Designated Entity: NextEra Energy Transmission Virginia, Inc.

By: _____ Vice President November 14, 2025 12:12 ET
Name Title Date

Printed name of signer: **Matthew Valle**

SCHEDULE A

Description of Project

PJM Baseline Upgrade IDs	Description of Projects	Designated Entity
b3800.102	New 500 kV line from existing 502 Junction substation to Woodside 500 KV substation (bypass Black Oak) (NEET Portion) .	NEET MidAtlantic; NEET Virginia
b3800.106	Woodside 500 kV substation (Except terminations, Transformer, Cap Banks and Statcom).	NEET Virginia
b3800.107	Line Termination cost at Woodside 500 kV for 502 Jct to Woodside 500 kV line.	NEET Virginia
b3800.108	Line Termination cost at Woodside 500 kV for Woodside to Aspen 500 kV line.	NEET Virginia
b3800.109	Termination work for two 500/138 kV transformer at Woodside 500 kV substation	NEET Virginia
b3800.110	Two 500/138 kV transformers at Woodside 500 kV substation.	NEET Virginia
b3800.113	Two 150 MVAR Cap banks and one +500/-300 MVAR STATCOM at Woodside 500 kV substation.	NEET Virginia
b3800.115	Line work for terminating Doubs to Bismark line for Doubs side for Woodside 500 kV substation.	NEET Virginia
b3800.117	Line work for terminating Doubs to Bismark line for Bismark side for Woodside 500 kV substation.	NEET Virginia
b4000.14	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 MidAtlantic

SCHEDULE B

Scope of Work

PJM Baseline Upgrade IDs	Description of Projects	Designated Entity
b3800.102	New 500 kV line from existing 502 Junction substation to Woodside 500 KV substation (bypass Black Oak) (NEET Portion) .	NEET MidAtlantic; NEET Virginia
b3800.106	Woodside 500 kV substation (Except terminations, Transformer, Cap Banks and Statcom).	NEET Virginia
b3800.107	Line Termination cost at Woodside 500 kV for 502 Jct to Woodside 500 kV line.	NEET Virginia
b3800.108	Line Termination cost at Woodside 500 kV for Woodside to Aspen 500 kV line.	NEET Virginia
b3800.109	Termination work for two 500/138 kV transformer at Woodside 500 kV substation	NEET Virginia
b3800.110	Two 500/138 kV transformers at Woodside 500 kV substation.	NEET Virginia
b3800.113	Two 150 MVAR Cap banks and one +500/-300 MVAR STATCOM at Woodside 500 kV substation.	NEET Virginia
b3800.115	Line work for terminating Doubs to Bismark line for Doubs side for Woodside 500 kV substation.	NEET Virginia
b3800.117	Line work for terminating Doubs to Bismark line for Bismark side for Woodside 500 kV substation.	NEET Virginia
b4000.14	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 MidAtlantic

SCHEDULE C

Development Schedule

Designated Entity shall ensure and demonstrate to the Transmission Provider that it timely has met the following milestones and milestone dates and that the milestones remain in good standing:

	Milestones			
PJM Baseline Upgrade ID	**Execute Interconnection Coordination Agreement:** On or before this date, Designated Entity must execute the Interconnection Coordination Agreement or request the agreement be filed unexecuted.	**Demonstrate Adequate Project Financing:** On or before this date, Designated Entity must demonstrate that adequate project financing has been secured. Project financing must be maintained for the term of this Agreement	**Acquisition of all necessary federal, state, county, and local site permits:** On or before this date, Designated Entity must demonstrate that all required federal, state, county and local site permits have been acquired.[1]	**Required Project In-Service Date:** On or before this date, Designated Entity must: (i) demonstrate that the Project is completed in accordance with the Scope of Work in Schedules B of this Agreement; (ii) meets the criteria outlined in Schedule D of this Agreement; and (iii) is under Transmission Provider operational dispatch.

[1] Designated Entity and Transmission Provider acknowledge that Dominion and FirstEnergy have been designated to construct non-competitive upgrades to existing facilities related to the Project. Specifically, Dominion has been assigned Project IDs b38000.118, b3800.120, and b3800.375 ("Dominion Scope"), while FirstEnergy has been assigned Project IDs b3800.103, b3800.104, b3800.105, b3800.111, b3800.112, b38000.114, b3800.116, b3800.128, b3800.129, and b3800.101 ("FirstEnergy Scope"). If Designated Entity obtains all necessary federal, state, county, and local site permits but Dominion and/or FirstEnergy have not obtained the necessary federal, state, county, and local site permits for, respectively, the Dominion Scope or the First Energy Scope, then Designated Entity and Transmission Provider agree to meet within 30 days of the date on which Designated Entity notifies Transmission Provider that it has obtained all necessary federal, state, county, and local site permits to construct the Project to discuss issues related to the Project, including, but not limited to, the status of the Dominion Scope and/or the First Energy Scope, customer costs, and other Designated Entity concerns. After such meeting, Transmission Provider, in its sole discretion, shall determine the appropriate next steps, and such determination by Transmission Provider shall be provided to Designated Entity in writing. Similarly, if Designated Entity fails to meet the milestone for the acquisition of all necessary federal, state, county, and local site permits and all other governmental approvals necessary for construction by the date set forth in this Schedule C, or at any time after such milestone date a governmental approval required for construction is stayed, remanded, vacated or otherwise revoked, in each case for reasons that could not have been remedied by Designated Entity through the exercise of due diligence, then Transmission Provider and Designated Entity shall meet within 30 days to discuss issues, including, but not limited to, the status of the Project,

b3800.102	3/31/2025	5/1/2025	10/31/2029	12/31/2031
b3800.106	3/31/2025	5/1/2025	6/1/2027	12/31/2028
b3800.107	3/31/2025	5/1/2025	10/31/2029	12/31/2031
b3800.108	3/31/2025	5/1/2025	10/31/2029	12/31/2031
b3800.109	3/31/2025	5/1/2025	6/1/2027	12/31/2028
b3800.110	3/31/2025	5/1/2025	6/1/2027	12/31/2028
b3800.113	3/31/2025	5/1/2025	6/1/2027	12/31/2028
b3800.115	3/31/2025	5/1/2025	6/1/2027	12/31/2028
b3800.117	3/31/2025	5/1/2025	6/1/2027	12/31/2028
b4000.14	12/31/2025	12/31/2025	10/31/2029	12/31/2031

customer costs, and other Designated Entity concerns. After such meeting, Transmission Provider, in its sole discretion, shall determine the appropriate next steps, and such determination by Transmission Provider shall be provided to Designated Entity in writing. For the avoidance of doubt, the aforementioned requirements to meet and confer shall not apply to Project IDs b3800.106, b3800.109, b3800.110, b3800.113, b3800.115, and b3800.117, which Transmission Provider has asked Designated Entity to accelerate because such Project IDs correspond to components of the Project that can be energized at an earlier date, independently from the rest of the Project, including the non-competitive Dominion and First Energy scope of work.

5

SCHEDULE D

PJM Planning Requirements and Criteria and Required Ratings

PJM Baseline Upgrade ID	Required Ratings(MVA): Summer Normal/Summer Emergency/Winter Normal/Winter Emergency	Planning Criteria
b3800.102	4295/4357/5066/5196 SN/SE/WN/WE (MVA)	Projects that comprise 2022 RTEP Window 3 Recommended Solution collectively address the 2027/28 baseline local and regional constraints associated with Data Center load additions in APS and Dominion zones, reactive power needs, and the cumulative impact of over 11,000 MW of generation changes and deactivations. These projects all adhere to all applicable planning criteria, including PJM, NERC, SERC, RFC and local Transmission Owner FERC 715 criteria.
b3800.106	N/A	
b3800.107	N/A	
b3800.108	N/A	
b3800.109	N/A	
b3800.110	485/619/569/654 SN/SE/WN/WE (MVA)	
b3800.113	N/A	
b3800.115	N/A	
b3800.117	N/A	
b4000.14	N/A	

SCHEDULE E

Non-Standard Terms and Conditions

Designated Entity is subject to the cost cap and cost containment commitments set forth in this Appendix.[2] Designated Entity shall make all filings to applicable regulators necessary to reflect these commitments in rates. PJM shall provide reasonable cooperation and assistance to the Designated Entity in the submission of such filings.

Inclusion of the cost commitment in this Designated Entity Agreement is not intended to preempt the right of any party to seek modifications to be ordered by FERC or otherwise challenge the recovery of costs through the FERC ratemaking process.

The Designated Entity shall notify PJM in writing within a reasonable time after the Designated Entity becomes aware of a condition that would result in (i) the cost commitment being exceeded or (ii) triggering any exclusions to the cost commitment. PJM, in turn, will communicate such information to stakeholders via notice posted on PJM's website and to FERC by written notice.

A. COST OF CAPITAL COMMITMENTS

1. Return on Equity ("ROE") Cap

Designated Entity agrees to cap its return on equity for the Project at the lower of: (i) 9.80% (inclusive of all ROE adders/incentives) or (ii) the ROE approved by FERC for use in the formula rate of the Designated Entity (inclusive of all ROE adders/incentives) ("ROE Cap"). The ROE Cap shall apply to the Project Costs, as defined below, less any retirements, for the life of the Project (i.e, from the date of Initial Operation until the Project is retired and de-energized), subject to the Project Cost Containment described below.

For cost containment provisions below, the "Minimum ROE" will be defined as 7.50%.

---

[2] The cost containment commitments stipulated in this Schedule E represent reductions to the revenue requirement determined pursuant to Designated Entity's formula rate on file at FERC. Any revenue requirement components not expressly subject to cost containment commitments set forth in this Schedule E shall be determined using the formula rate on file at FERC. For the avoidance of doubt, the cost containment commitments stipulated in this Schedule E shall not apply to Project ID b4000.14.

2. Allowance for Funds Used During Construction and Construction Work in Progress in Ratebase

Designated Entity will charge an Allowance for Funds Used During Construction ("AFUDC") to Project Costs during the construction period. During the period when the Project or any phase of the Project is under construction, and for one year after Project completion if the Project or completed phase of the Project is not yet energized, ("Project Construction Period"), Designated Entity agrees to request from FERC the ability to use a hypothetical 55% debt capital structure for purposes of accruing an allowance for funds used during construction ("AFUDC").

Consistent with FERC precedent, the Designated Entity will not concurrently accrue AFUDC during any period when CWIP is included in ratebase.

3. Equity Capitalization Cap

Following the Project Construction Period, Designated Entity commits to a capital structure of no greater than 45% equity for the life of the Project ("Equity Capitalization Cap").

B. PROJECT COST CAP

1. Cost Containment with Respect to Project Costs that Exceed the Project Cost Cap

Project Costs above the Project Cost Cap, defined below, less depreciation, will earn a 0% equity return for the life of the Project (i.e., from the date of Initial Operation until the Project is retired and de-energized). Designated Entity will be allowed to recover the associated depreciation and debt cost.

2. Definitions Applicable to Project Cost Cap

As used herein, the following terms have the following meanings:

a. "Excluded Costs" means any costs and expenses incurred as a result of an Uncontrollable Force, inclusive of AFUDC or CWIP (but, in each case, only if and to the extent such costs and expenses are in excess of the costs and expenses that would have been incurred but for such an Uncontrollable Force) and AFUDC during construction.

b. "Project Costs" means any and all costs and expenses directly or indirectly incurred by Designated Entity after execution of the Designated Entity Agreement to develop, construct, complete, start-up and commission the Project and place the Project In Service in accordance with the Scope of Work, including without limitation any costs and expenses incurred by

Designated Entity in connection with the following: (i) any taxes, (ii) obtaining permits and other governmental approvals for the Project, (iii) acquiring land and land rights for the Project, (iv) performing any environmental assessments or environmental mitigation/remediation activities in connection with the Project, (v) designing and engineering the Project, (vi) procuring any equipment, supplies and other materials required to complete construction of the Project and place the Project In Service, and (vii) otherwise performing or completing any and all development- and construction-related activities required in connection with the Project as part of the Scope of Work, including but not limited to all site clearing, equipment assembly and erection, testing and commissioning activities contemplated by the Scope of Work, whether performed directly by Designated Entity or by one or more third parties retained by Designated Entity (without regard to whether such third parties are affiliated or nonaffiliated), but excluding in all cases Excluded Costs.

c. "Scope of Work" means the approved scope of work for the Project, as more particularly described in this Designated Entity Agreement.

d. "Project Cost Cap" is defined in Table 1 below by PJM Project ID in 2023 dollars and only includes the greenfield substation and greenfield transmission components that is the Designated Entity's responsibility.

e. "Uncontrollable Force" means (i) any destruction of or damage to any portion of the Project, or any interruption, suspension or interference with Designated Entity's (or any contractor's or subcontractor's) performance of activities required to complete the Project, which destruction, damage, interruption, suspension or interference is caused by landslides; lightning; earthquakes; hurricanes; tornadoes; typhoons; severe weather; fires or explosions; floods; epidemic; pandemic; acts of a public enemy; acts or threats of terrorism; wars; blockades; riots; rebellions; sabotage; vandalism; insurrections; environmental contamination or damage not caused by Designated Entity (or any contractor or subcontractor); strike or labor disruption or civil disturbances (or governmental actions arising from any of the foregoing), (ii) the issuance or enactment on or after the Effective Date of any Applicable Laws and Regulations or any change in any Applicable Laws and Regulations existing as of the Effective Date that impacts the Project, (iii) any Breach or Default by Transmission Provider of its obligations under this Agreement or any request or action by Transmission Provider to delay or suspend any activities associated with the Project, or (iv) any change in scope of work or delays caused by action or inactions by Transmission Provider, government agencies, or interconnecting or otherwise affected Transmission Owners.

Table 1: Project Cost Cap by PJM Project ID

PJM Project ID	Project Cost Cap (2023 dollars)
b3800.102	$315,646,814
b3800.106	$43,967,308
b3800.107	$517,923
b3800.108	$517,923
b3800.109	$1,353,575
b3800.110	$33,683,170
b3800.113	$44,222,857
b3800.115	$517,923
b3800.117	$517,923
TOTAL PROJECT COST CAP	**$440,945,414**

C. SCHEDULE GUARANTEE

Designated Entity confirms that it can meet an in-service date as designated in Table 1 (as permissibly adjusted, the "Guaranteed Completion Date"). Designated Entity agrees to a reduction in the Project-specific ROE recovered in rates according to the following table (the "Schedule Guarantee"):

Months of Delay	Total Reduction in ROE
1	2.5 basis points
2	5 basis points
3	7.5 basis points
4	10 basis points
5	12.5 basis points
6	15 basis points
7	17.5 basis points
8	20 basis points
9	22.5 basis points
10	25 basis points
11	27.5 basis points
12 or more	30 basis points

The Schedule Guarantee is subject to a maximum reduction in the ROE of thirty (30) basis

5

points. The Guaranteed Completion Date is subject to extension due to (1) an Uncontrollable Force as described herein, or (2) a Force Majeure Event under Article 10 of the Designated Entity Agreement (collectively, "Guaranteed Completion Date Extension Events") (regardless of whether such events could have been reasonably foreseen by the Designated Entity), if Designated Entity is unable to complete construction of the Project as a result of such Guaranteed Completion Date Extension Events. In the event the Scope of Work is negatively impacted by a Guaranteed Completion Date Extension Event, Designated Entity shall use commercially reasonable efforts to mitigate such impact. Designated Entity shall notify PJM within a reasonable time after the occurrence of a Guaranteed Completion Date Extension Event, which notice shall describe, in reasonable detail, the nature of the event and the actions Designated Entity plans to take to mitigate the impact of the same. Once Designated Entity determines the length of any delay to the critical path progress of the Scope of Work, it shall notify PJM of the same, and the Parties shall reasonably agree on an extension of the Guaranteed Completion Date to reflect the Guaranteed Completion Date Extension Event.

D. EARNED ROE FLOOR

Notwithstanding the foregoing cost containment commitments, Designated Entity's earned equity return on Project Rate Base shall be no lower than the lower of (i) the Minimum ROE; or (ii) Designated Entity's FERC-accepted ROE ("ROE Floor"). Designated Entity's earned ROE for purposes of this section includes its equity return for the year, in dollars ($), as recovered through the formula rate, including any ROE reductions associated with the Project Cost Cap, Equity Percentage Cap, and Schedule Guarantee stipulated above. If the Earned ROE is less than the ROE Floor, Designated Entity shall recover a revenue requirement adjustment through its formula rate sufficient to produce an Earned ROE equal to the ROE Floor.

E. RELATIONSHIP BETWEEN PROJECT COST CAP AMOUNT AND SECURITY

1. On December 11, 2023, the PJM Board approved the 2022 RTEP Window 3 Projects, including baseline upgrades with an estimated overall RTEP net increase of approximately $5,085.85 million, including an estimated $440,945,414 for projects b3800.102, b3800.106, b3800.107, b3800.108, b.3800.109, b3800.110, b3800.113, b3800.115, and b3800.117, which is equal to the Project Cost Cap for the Project. As set forth in Section 3.0 of this Agreement, the Parties agree to a security amount of $25,500,000, which is three percent of PJM's current estimated cost for the Project and is greater than three percent of the Project Cost Cap ("Increased Security"). The Parties agree that the Increased Security is intended to mitigate the risk of the difference between the Project Cost Cap and PJM's current estimated cost of the Project. The

Increased Security amount is unrelated to and does not affect the foregoing cost containment provisions.

2. For clarity, the sole purpose of the Project Cost Cap is to define the level of Project Costs above which the Designated Entity will earn a 0% ROE, as set forth in Part B.1 of this Schedule E. In accordance with Operating Agreement, Schedule 6, section 1.5.8(e), nothing in this Agreement is determinative as to whether the aggregate costs incurred on the Project are prudent and reasonable.

I. NECESSITY FOR THE PROPOSED PROJECT

B. Detail the engineering justifications for the proposed project (for example, provide narrative to support whether the proposed project is necessary to upgrade or replace an existing facility, to significantly increase system reliability, to connect a new generating station to the Applicant's system, etc.). Describe any known future project(s), including but not limited to generation, transmission, delivery point or retail customer projects, that require the proposed project to be constructed. Verify that the planning studies used to justify the need for the proposed project considered all other generation and transmission facilities impacting the affected load area, including generation and transmission facilities that have not yet been placed into service. Provide a list of those facilities that are not yet in service.

Response: **(1) Engineering Justification for Project**

See Section I.A. of the Appendix, as well as the Abdulsalam Testimony and the Direct Testimony of Mr. Andrew Gledhill ("Gledhill Testimony").

(2) Known Future Projects

The MARL Project provides needed support to maintain reliable operation of the overall PJM transmission system. There are no singular or specific known future projects, including generation, transmission, delivery point, or retail customer projects, that require the MARL Project to be constructed have been identified at the time of filing. However, the MARL Project supports the overall PJM transmission system reliability through addressing the aggregate impact of three main drivers: (1) additional load in Virginia and Maryland driven by extensive new data centers; (2) deactivation of generation resources; and (3) the need for an additional 500 kV path to deliver power west-to-east within the PJM region.

PJM has identified several transmission projects through its annual RTEP process for study years 2027 and 2028 that require the construction of the MARL Project, including two new 138 kV transmission lines between the Woodside Substation and the existing Stonewall 138 kV Station, the connection of the existing Bismark-Doubs 500 kV line to the Woodside Substation, and the connection of the future Gore-Doubs-Goose Creek 500 kV line to the Woodside Substation.

(3) Planning Studies

As described in Section I.A. above and in the Abdulsalam and Gledhill Testimonies, PJM conducted its RTEP planning studies that identified the need for the MARL Project.[5] PJM's planning studies that identified the need for the

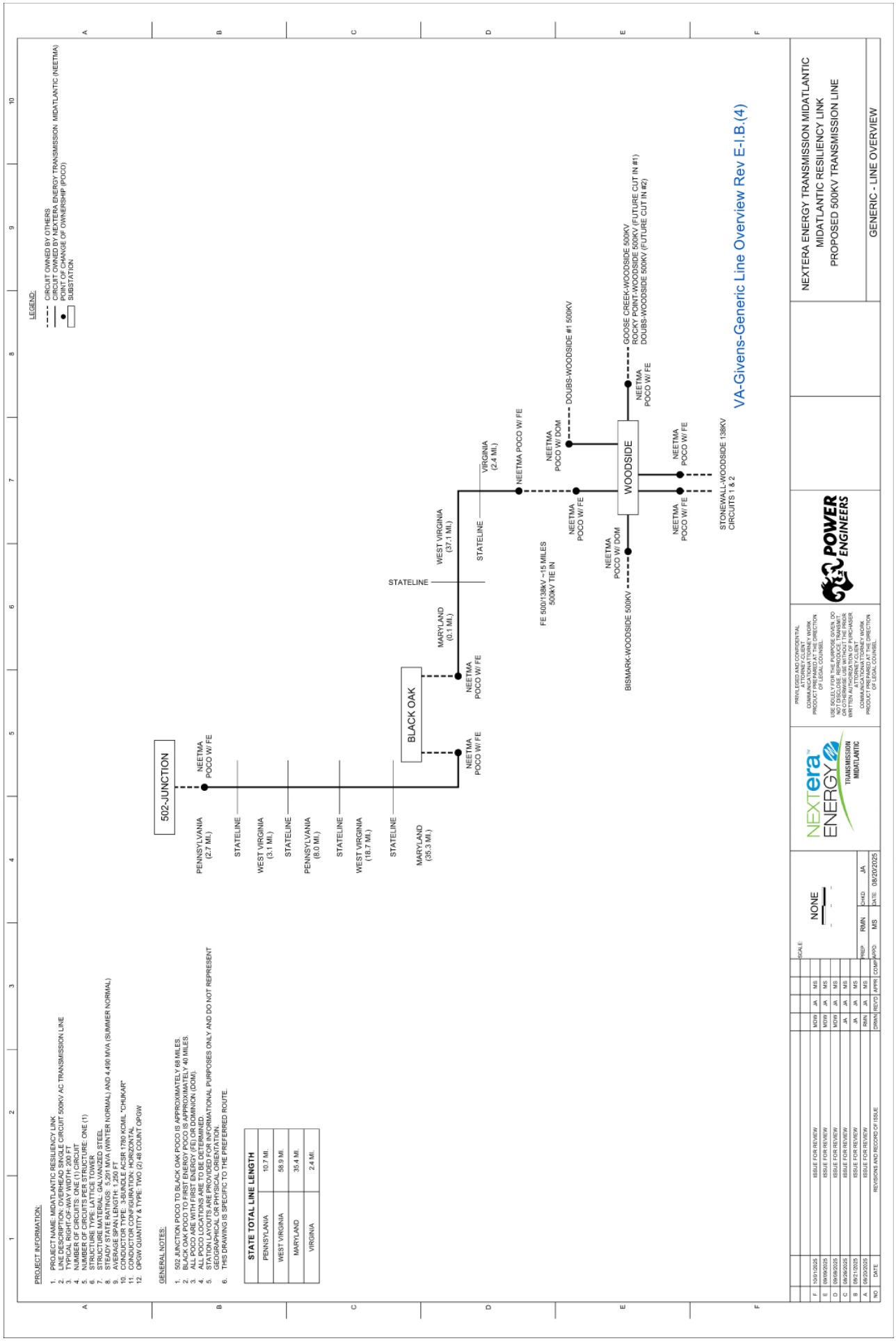
[5] Copies of the PJM RTEP reports are available at https://www.pjm.com/-/media/DotCom/library/reports-notices/2023-rtep/2023-rtep-report.pdf (2023 RTEP Report) and https://www.pjm.com/-/media/DotCom/library/reports-notices/2024-rtep/2024-rtep-report.pdf (2024 RTEP Report), and Dr. Abdulsalam discusses PJM's RTEP planning and study process in detail in his Direct Testimony and Exhibits.

MARL Project considered all generation and transmission facilities impacting Virginia and the rest of PJM region, including planned generation in the PJM new services queue and transmission facilities that have been approved by the PJM Board but have not yet been placed in service.

(4) Facilities List

See Attachment I.B.4.a for a list of existing and future transmission facilities, which include transmission lines and substations, in the affected area of Frederick County, Virginia.

Attachment I.B.4.b includes a one-line diagram of facilities that will be in service once the Virginia Portions of the MARL Project are completed.


PROJECT INFORMATION:
1. PROJECT NAME: MIDATLANTIC RESILIENCY LINK
2. LINE DESCRIPTION: OVERHEAD SINGLE CIRCUIT 500KV AC TRANSMISSION LINE
3. TYPICAL RIGHT-OF-WAY WIDTH: 200 FT
4. NUMBER OF CIRCUITS: (1) CIRCUIT
5. NUMBER OF CIRCUITS PER STRUCTURE: ONE (1)
6. STRUCTURE TYPE: LATTICE TOWER
7. STRUCTURE MATERIAL: GALVANIZED STEEL
8. STEADY STATE RATINGS: 5,291 MVA (WINTER NORMAL) AND 4,490 MVA (SUMMER NORMAL)
9. AVERAGE SPAN LENGTH: 1,445 FT
10. CONDUCTOR TYPE: (3) BUNDLE ACSR 1780 KCMIL "CHUKAR"
11. CONDUCTOR CONFIGURATION: HORIZONTAL
12. OPGW QUANTITY & TYPE: TWO (2) 48 COUNT OPGW
GENERAL NOTES:
1. 502 JUNCTION POCO TO BLACK OAK POCO IS APPROXIMATELY 88 MILES.
2. BLACK OAK POCO TO FIRST ENERGY POCO IS APPROXIMATELY 40 MILES.
3. ALL POCO LOCATIONS ARE TO BE DETERMINED.
4. ALL POCO LOCATIONS ARE TO BE DETERMINED.
5. STATION LAYOUTS ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND DO NOT REPRESENT GEOGRAPHICAL OR PHYSICAL ORIENTATION.
6. THIS DRAWING IS SPECIFIC TO THE PREFERRED ROUTE.
STATE TOTAL LINE LENGTH
PENNSYLVANIA 10.7 MI.
WEST VIRGINIA 58.9 MI.
MARYLAND 35.4 MI.
VIRGINIA 2.4 MI.
LEGEND:
CIRCUIT OWNED BY OTHERS
CIRCUIT OWNED BY NEXTERA ENERGY TRANSMISSION MIDATLANTIC (NEETMA)
POINT OF CHANGE OF OWNERSHIP (POCO)
SUBSTATION
502-JUNCTION
NEETMA POCO W/ FE
PENNSYLVANIA (2.7 MI.)
STATELINE
WEST VIRGINIA (3.1 MI.)
STATELINE
PENNSYLVANIA (8.0 MI.)
STATELINE
WEST VIRGINIA (16.7 MI.)
STATELINE
MARYLAND (35.3 MI.)
NEETMA POCO W/ FE
BLACK OAK
NEETMA POCO W/ FE
MARYLAND (0.1 MI.)
NEETMA POCO W/ FE
STATELINE
WEST VIRGINIA (37.1 MI.)
STATELINE
VIRGINIA (2.4 MI.)
NEETMA POCO W/ FE
FE 500/138KV ~15 MILES 500KV TIE IN
NEETMA POCO W/ DOM
DOUBS-WOODSIDE #1 500KV
NEETMA POCO W/ FE
NEETMA POCO W/ DOM
BISMARK-WOODSIDE 500KV
WOODSIDE
NEETMA POCO W/ FE
GOOSE CREEK-WOODSIDE 500KV
ROCKY POINT-WOODSIDE 500KV (FUTURE CUT IN #1)
DOUBS-WOODSIDE 500KV (FUTURE CUT IN #2)
NEETMA POCO W/ FE
NEETMA POCO W/ FE
STONEWALL-WOODSIDE 138KV CIRCUITS 1 & 2
VA-Givens-Generic Line Overview Rev E-I.B.(4)
NEXTERA ENERGY TRANSMISSION MIDATLANTIC
MIDATLANTIC RESILIENCY LINK
PROPOSED 500KV TRANSMISSION LINE
GENERIC - LINE OVERVIEW
NEXTera ENERGY
TRANSMISSION MIDATLANTIC
POWER ENGINEERS
NONE
F 10/01/2025 ISSUE FOR REVIEW MDW JA MS
E 09/08/2025 ISSUE FOR REVIEW MDW JA MS
D 08/08/2025 ISSUE FOR REVIEW MDW JA MS
C 08/04/2025 ISSUE FOR REVIEW JA JA MS
B 08/21/2025 ISSUE FOR REVIEW JA JA MS PREP RMN CHKD JA
A 08/20/2025 ISSUE FOR REVIEW RMN JA MS APPR MS DATE 08/20/2025
NO DATE REVISIONS AND RECORD OF ISSUE DRWN REVD APPR COMP APVD

I. NECESSITY FOR THE PROPOSED PROJECT

C. Describe the present system and detail how the proposed project will effectively satisfy present and projected future electrical load demand requirements. Provide pertinent load growth data (at least five years of historical summer and winter peak demands and ten years of projected summer and winter peak loads where applicable). Provide all assumptions inherent within the projected data and describe why the existing system cannot adequately serve the needs of the Applicant (if that is the case). Indicate the date by which the existing system is projected to be inadequate.

Response: Please see: (i) Gledhill Testimony, responses to Questions 15 through 26, and (ii) Abdulsalam Testimony, responses to Question 8, 30 through Question 38. *See also* Exhibit Nos. AG-4; AG-5; AG-6; AG-7; SA-4; SA-5; SA-6; SA-7; SA-8; and SA-9.

PJM operates and coordinates an extensive BES that is owned by multiple utilities through 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. The 765 kV and 500 kV transmission lines are considered the backbone of PJM's BES system that moves bulk power across the region.

In February 2023, PJM opened a competitive solicitation window ("2022 Window 3") with an objective to develop robust, holistic, and expandable transmission improvements that solve the 2027/28 baseline reliability criteria violations identified in the RTEP associated with power transfers driven by: (1) the need to serve new data center loads in APS (FirstEnergy) and DOM (Dominion Energy) zones across existing, constrained 500 kV and 230 kV transmission lines in the area; and (2) the cumulative impact of generation changes and deactivations that Dr. Abdulsalam also discusses in his Direct Testimony.

Notably, in addition to the extensive thermal reliability constraints on existing facilities, PJM also identified extensive reactive reliability criteria violations, which if left unsolved would lead to cascading voltage collapse and widespread blackouts. As a result, in addition to new transmission lines, the MARL Project will also include specific Mega volt-amperes reactive ("MVAR") reinforcements, both static and dynamic. Importantly, the thermal and reactive reliability criteria violations identified by PJM RTEP studies ensure compliance with all applicable planning criteria set forth by the North American Electric Reliability Corporation ("NERC"), SERC Reliability Corporation, ReliabilityFirst Corporation, PJM, and individual Transmission Owner planning criteria (collectively, the "Planning Criteria").[6]

PJM Witness Andrew Gledhill provides pertinent load growth data and describes assumptions within that data in his Direct Testimony. Please see the Gledhill Direct

[6] Exhibit SA-6 (PJM Reliability Analysis Report) to Abdulsalam Direct Testimony at 7 (Dec. 2023).

Testimony, responses to Questions 16 through 26 and Exhibits AG-1 through AG-8. As Mr. Gledhill describes, the PJM 2022 Load Forecast Reports show that electricity demand in the PJM Region is expected to steadily increase over the next 10 to 15 years. Several zones, including the DOM zone in Virginia, as well as the APS zone, ATSI, and COMED zones, are forecast to have large, unanticipated load changes.

Dr. Abdulsalam describes in his testimony why the existing system cannot adequately serve the identified needs. PJM RTEP studies identified extensive and widespread reliability violations in study years 2027 and 2028. Thus, the existing system is projected to be inadequate by 2027. See Abdulsalam Direct Testimony, response to Question No. 8.

I. NECESSITY FOR THE PROPOSED PROJECT

D. If power flow modeling indicates that the existing system is, or will at some future time be, inadequate under certain contingency situations, provide a list of all these contingencies and the associated violations. Describe the critical contingencies including the affected elements and the year and season when the violation(s) is first noted in the planning studies. Provide the applicable computer screenshots of single-line diagrams from power flow simulations depicting the circuits and substations experiencing thermal overloads and voltage violations during the critical contingencies described above.

Response: Please see the Abdulsalam Testimony, responses to Question 30 through Question 38; and response to Question 53. *See also* Exhibit Nos. SA-4; SA-5; SA-6; SA-7; SA-8; and SA-9. Additionally, please note that certain information requested in the question is considered by PJM to be Critical Energy Infrastructure Information ("CEII"). Individuals must submit a CEII request via the PJM website before PJM can provide CEII information. *See* https://www.pjm.com/library/request-access/form-ceii-request-new.

I. NECESSITY FOR THE PROPOSED PROJECT

E. Describe the feasible project alternatives, if any, considered for meeting the identified need including any associated studies conducted by the Applicant or analysis provided to the RTO. Explain why each alternative was rejected.

Response: As described more fully in Dr. Abdulsalam's Testimony, the MARL Project – proposed by NEET, and designated to its affiliates NEET MA and NEET VA – is one component of a set transmission facilities selected by PJM in its competitive solicitation process (specifically, in 2022 Window 3) as the more efficient or cost-effective solution to address reliability violations being driven by high demand for west-to-east power flow towards the Maryland and Northern Virginia load centers. *See* Abdulsalam Direct Testimony in response to Question 8. The transmission solutions, including the MARL Project, were initially approved for inclusion in the PJM RTEP by the PJM Board of Managers ("PJM Board") in December 2023. The PJM Board approved a scope change to the MARL Project in August 2024. Below is a summary of the alternatives to the MARL Project that NEET and other transmission developers considered.

Distribution Voltage Level Electrical Alternatives

Distribution voltage level alternatives to the proposed MARL Project were not considered because the MARL Project is needed to respond primarily to PJM-identified extra-high voltage bulk power thermal and voltage reliability criteria violations on the 500 kV and 230 kV transmission system in Virginia and throughout the region. Distribution voltage level alternatives would not solve these criteria violations, given the substantial level of power transfers now needed.

Demand-Side Management

NEET VA does not provide electric service to retail customers in Virginia or any other state. Accordingly, demand-side management is not a viable alternative to the MARL Project.

PJM considers demand-side management as part of its assessment of need, as these loads are already removed from the forecasted and modeled load level.

Transmission Voltage Level Electrical Alternatives

NEET[7] submitted 26 alternative proposals to PJM to solve the severe thermal and voltage violations and non-convergent contingencies that PJM had identified across

[7] The bids were submitted to PJM by a separate affiliate of NEET VA, NextEra Energy Transmission MidAtlantic Holdings, LLC. For ease of reference, in its Application, NEET VA refers to these bids as being submitted by "NEET." In PJM documents, these bids are also referred to as the "NextEra" bids.

all four regional PJM clusters.[8] NEET's proposals to PJM targeted the Dominion, East, West, and South clusters to solve the extensive, widespread NERC and regional thermal and voltage reliability criteria violations identified by PJM. Fourteen of these proposals focused on addressing reliability criteria violations in the West cluster.[9] A list of these proposals is provided in Attachment I.E.1.

Participants in PJM's 2022 Window 3 identified several potential alternative transmission solutions that were ultimately found by PJM to be less effective, efficient, cost-effective, or feasible than the MARL Project. Many of these alternatives proposed using existing right of way ("ROW"), rebuilding or upgrading existing transmission facilities, creating new ROW for a new transmission corridor, and utilizing grid-enhancing technologies ("GET"). Dr. Abdulsalam's testimony describes PJM's evaluation of these proposals, as well as other proposals submitted in 2022 Window 3. *See* Abdulsalam Direct Testimony at responses to Questions 39 through 50.

PJM evaluated all 2022 Window 3 proposals and reviewed results with stakeholders through the Transmission Expansion Advisory Committee ("TEAC"). *See* Abdulsalam Direct Testimony at response to Question 52; Exhibit Nos. SA-4; SA-5; SA-6; SA-7; SA-8; and SA-9. PJM's constructability and financial analysis compared the alternative proposals on environmental impacts, routing, project scheduling, project cost, as well as such factors as its performance, scalability, impacts, costs, risk, and efficiencies.[10] PJM analyzed project components submitted by NEET and other developers in various combinations and individually to identify the more efficient or cost-effective solutions to the posted reliability needs. PJM determined that, with adequate reinforcements in the East and South, only one 500 kV or 765 kV line with dedicated dynamic VAR support would be the more efficient or cost-effective solution.

During submission of NEET's proposals and after selection and designation of the MARL Project by PJM, NEET explored several potential alternative transmission voltage level solutions. Among the 26 total proposals that NEET submitted to PJM, including the 14 proposals that NEET submitted within the West cluster, NEET proposed different solutions that included the use of existing ROW, rebuilding or upgrading existing transmission facilities with new 500/138 kV double circuit transmission towers, creating new ROW for a new transmission corridor, and utilizing GETs or ATTs. NEET's planning team determined that optimal solutions

[8] 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).

[9] *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.

[10] *See* Exhibit SA-8 (PJM Constructability & Financial Analysis Report for 2022 Window 3).

would likely include a combination of these alternatives, considering the needs identified in PJM's 2022 Window 3 that NEET was trying to solve.

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

There are other transmission planning and engineering alternatives to the MARL Project that NEET VA considered. These include: (1) reconductoring of existing transmission infrastructure; (2) rebuilding existing infrastructure; (3) using GETs or ATTs; (4) using Non-Wires Alternatives ("NWA"); (5) adding new transmission structures to existing ROWs; (6) building the transmission line underground (or "undergrounding" the Project); and (7) design alternatives. For various reasons, these alternatives would not solve PJM's identified needs.

As described in Dr. Abdulsalam's testimony, after the PJM Board initially approved the MARL Project and other 2022 Window 3 solutions for inclusion in the RTEP, part of its continued evaluation, NEET MA and NEET VA identified an opportunity to more efficiently utilize existing ROW on the eastern end of the MARL Project. *See* Abdulsalam Direct Testimony in response to Question 8. As a result of these discussions, PJM canceled approximately 26 miles of a proposed greenfield 500 kV transmission line designated to NEET VA, and instead the incumbent Transmission Owners agreed to use their own existing ROWs and expand their existing transmission corridors to accommodate the revised proposed route from the demarcation point to a point of interconnection around the Gore Substation west of Doubs along the Millville – Doubs Corridor through the Doubs – Goose Creek Corridor. *See id*.

Beyond this, PJM determined that the reliability criteria violations identified in 2022 Window 3 could only be solved through construction of a new, greenfield 500 kV transmission line. The needs that the MARL Project as a part of the 2022 RTEP Window 3 package 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 solved by simply upgrading (or reconductoring) existing infrastructure. *See id.* in response to Question 51. Importantly, these reliability problems are primarily due to the need for an

additional west-to-east transmission path to increase transfer capability as Dr. Abdusalam also discusses. 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.

The proposals NEET submitted to PJM included upgrades to existing infrastructure wherever possible. For example, NEET included the scope to upgrade the rating of the Kammer to 502 Junction 500 kV line co-owned by American Electric Power Company ("AEP") as a part of NEET MA's Proposal Number 8 (PJM ID No. 853). NEET's planning team identified that this line was overloaded given that the MARL Project pulls more power from west to east. As a result, NEET's planners identified that the thermal loading issue on this line could be solved by increasing the line rating and that there was no need to build another line from Kammer to 502 Junction. As a result, PJM assigned project b3800.121 to AEP to conduct the LIDAR Sag study to assess whether the line rating can be increased.[11]

NEET VA is not proposing to rebuild existing infrastructure due to the nature of the demonstrated west-to-east transfer need. The MARL Project is needed to address the reliability violations caused by the loss of existing 500 kV lines that run from West to East. Rebuilding the existing lines will not solve the problem. Generally speaking, the time that would be required to take existing infrastructure out of service in order to rebuild or decommission existing transmission lines would take key transmission paths out of service, at a time when PJM critically needs all available transmission paths. Thus, rebuilding existing infrastructure to accommodate the MARL Project would, from a transmission planning perspective, require these existing transmission lines to be taken out of service for extended periods and result in violations of NERC Reliability Standards or otherwise exacerbate the existing thermal and voltage violations that PJM is trying to solve. With multiple non-convergence conditions under the loss of existing facilities along the west-to-east transfer path, upgrading such facilities cannot resolve the transfer capability deficiency issue (demonstrated by the non-convergence condition). The analysis shows the need for additional elements rather than just upgrading existing facilities.

Many of NEET's proposals to PJM included a GET in the form of STATCOM technology, and in fact, the selected MARL Project utilizes a STATCOM at the new Woodside Substation. *See* Abdulsalam Direct Testimony in response to Questions 44 and 45.

[11] *See PJM Reliability Analysis Update* at 218 (Dec. 5, 2023), slide 66 (available at https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2023/20231205/20231205-item-15---reliability-analysis-update-2022-window-3.pdf).

NWAs such as distributed energy resources, energy efficiency, load flexibility, storage or battery resources, or dynamic line ratings are not viable long-term solutions to the extensive and widespread reliability criteria violations identified by PJM, for various reasons. As Dr. Abdulsalam explains in detail in his testimony, reliability issues in the western region are caused by the lack of additional transmission paths to ensure reliability upon the loss of any bulk 500 kV line that carries power from west to east that otherwise would cause severe voltage drops and voltage collapse. The solution to solve these problems is to provide a new 500 kV path that can provide typical thermal rating of a 500 kV line (4,300 MVA or greater).

New towers cannot be constructed in the existing transmission ROWs, as the existing ROWs (owned by other transmission utilities) already contain existing 500 kV and 138 kV transmission lines. In order to maintain proper clearances to the edge of the ROW and to adjacent transmission lines complying with the National Electrical Safety Code ("NESC"), NERC reliability standards, and operational standards, NEET MA could not build new transmission structures within the existing ROWs. Rather, NEET MA would need to expand these existing ROWs. By paralleling existing transmission ROW to the greatest extent possible, NEET MA is essentially expanding the ROW of existing transmission corridors. However, in many areas, the existing ROWs are now abutting homes, businesses, or other sensitive areas, and so expanding these existing ROWs would not be feasible across the entire length of the Project.

NEET VA is not proposing to construct the MARL Project underground, for several reasons. First and foremost, undergrounding a 500 kV AC transmission line is cost-prohibitive, at least 10 to 20 times more expensive than building 500 kV AC overhead transmission lines. Thus, an underground solution would not cost-effectively meet PJM's need for service in this instance.

From an engineering perspective, transmitting large amounts of power for 500 kV AC over distances of more than a few miles presents its own set of difficulties. In order to match the summer normal rating of the overhead MARL 500 kV AC transmission line, three or four underground cables would be needed per phase. The more cables per phase, the more capacitive reactive power is generated. The generation of excessive capacitive reactive power ("MVARs") reduces the ability to transmit real power ("MW") as it consumes the current carrying capability of the underground cables. Thus, transmitting significant amounts of power on an underground 500 kV transmission line would require significant additional reactive compensation equipment. Engineering experience has shown that long-haul underground extra high-voltage installations are high-voltage direct current ("HVDC") installations, requiring converter stations. HVDC lines are typically more expensive to build and have longer construction schedules due to the converter stations required to convert the AC power to DC power.

Building a 500 kV AC line underground also would require excavating multiple continuous trenches where practical and permissible, and multiple large-diameter horizontal directional drills per crossing, separated by significant distance to minimize the potential for overheating. This would result in significantly greater and more prolonged disruptions to properties, farms, roads, and natural areas than the construction of an overhead transmission line.

Undergrounding a 500 kV AC transmission line also would require more extensive maintenance and repair time (cost and time) in the event of a failure compared to overhead line solutions, which could result in the need for lengthier transmission outages and impact reliability when maintenance or repairs are needed. Finally, underground cable also takes a significantly longer time to manufacture than overhead conductor, meaning it takes much longer to obtain cable. Due to its size, underground cable can only be delivered terrestrially in reel lengths of approximately 2,000 to 2,200 feet, compared to around 9,000 feet for the overhead conductor we are using. For underground cable, splices must be made in large manholes, so multiple manholes are required about every 2,000 feet for underground. All of these facts create additional costs, schedule issues, and landowner and environmental impacts.

Reliability Analysis Update

Sami Abdulsalam, Senior Manager
PJM Transmission Planning

Transmission Expansion Advisory Committee
October 31, 2023

PJM©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

PJM©2023

First Read – 2023 Window 1

Baseline Reliability Projects

PJM©2023

AEP Transmission Zone: Baseline
Olive 345kV Breaker "D" Replacement

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

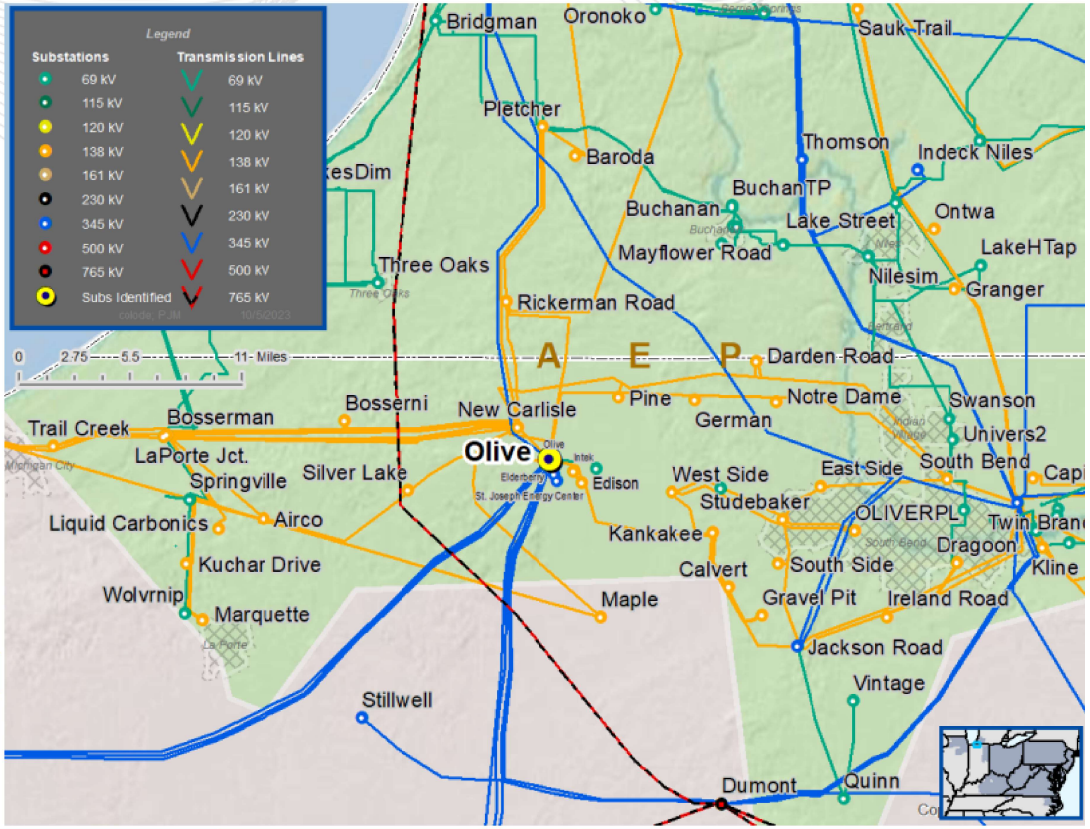
Problem Statement:

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

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

PJM©2023

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

Proposed Solution: Proposal #2023_W1-384

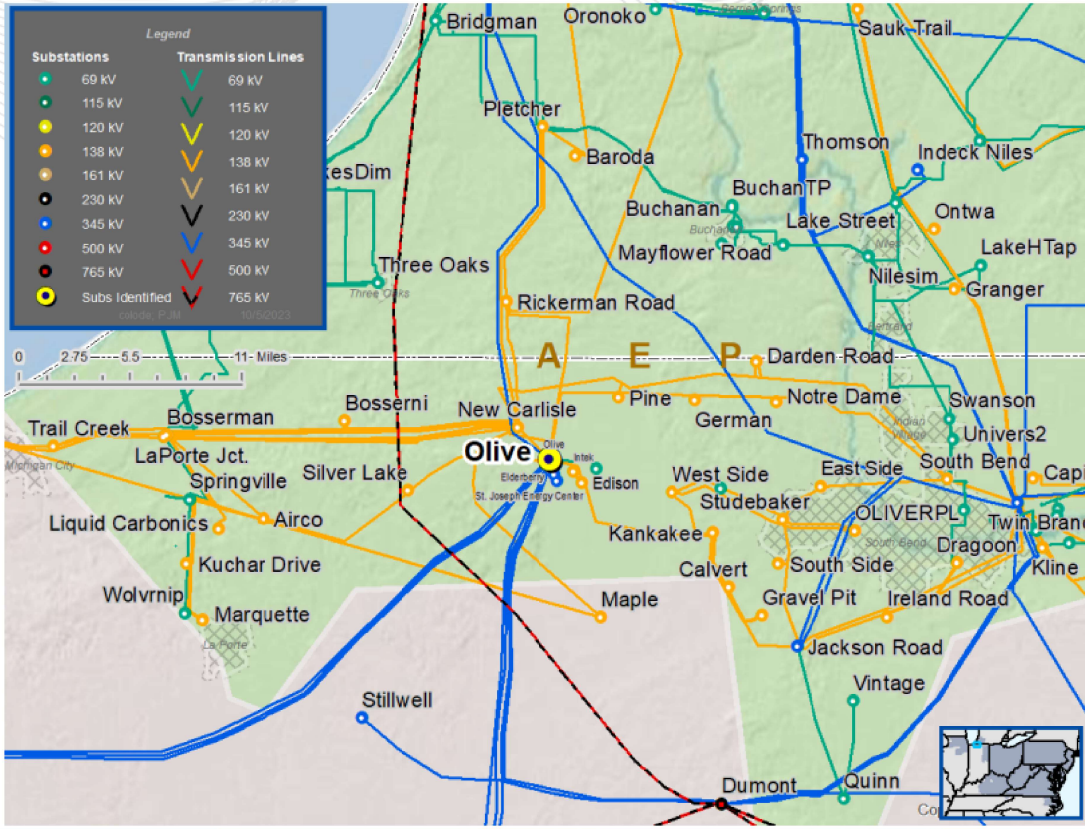
1) Replace the overdutied Olive 345kV circuit breaker "D" with a 5000A 63 kA circuit breaker.
2) Re-use existing cables and a splice box to support the CB install.

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



PJM©2023

AEP Transmission Zone: Baseline Mountaineer 765 kV Wavetrap Replacement

Process Stage: First Read

Criteria: Summer Gen Deliv

Assumption Reference: 2023 RTEP assumption

Model Used for Analysis: 2028 RTEP cases

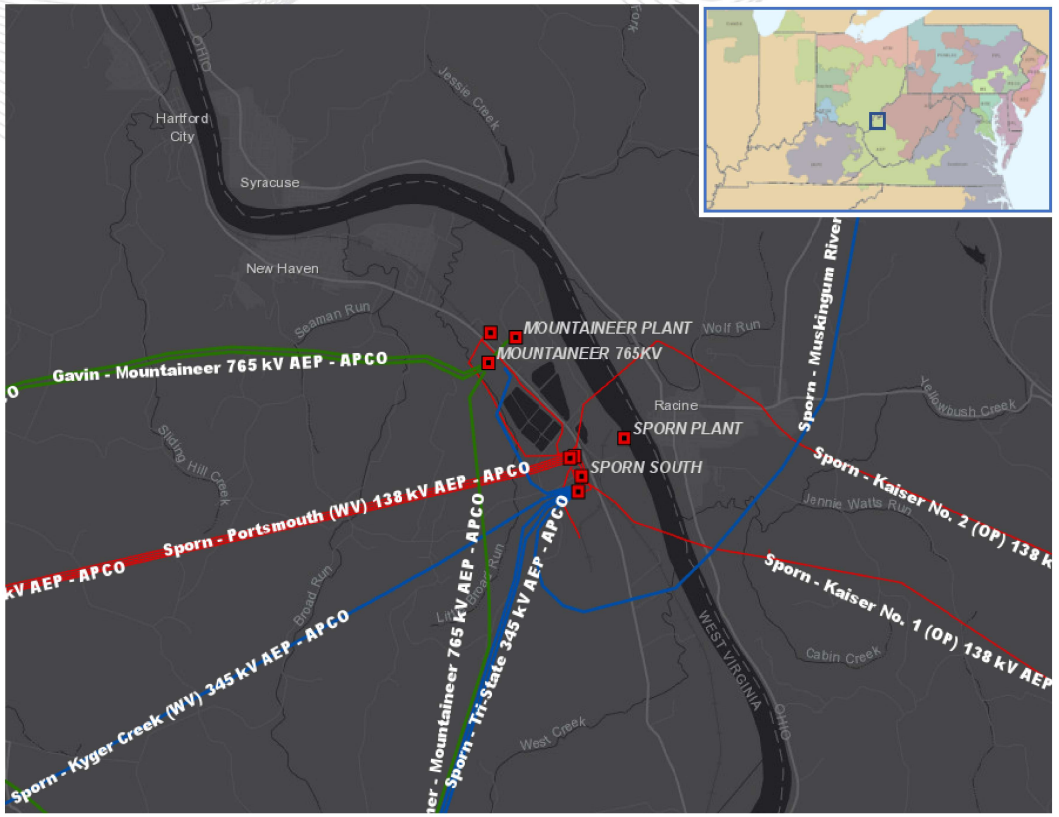
Proposal Window Exclusion: Substation Equipment Exclusion

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 Wavetrap Replacement

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

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 wavetrap 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

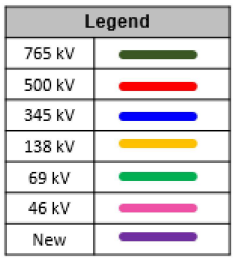
Ancillary Benefits: N/A

Required IS Date: 6/1/2028

Projected IS Date: 6/1/2028

Proposed:





PJM©2023

AEP & OVEC Transmission Zone: Baseline Kyger Creek Station Equipment 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-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



AEP & OVEC Transmission Zone: Baseline
Kyger Creek Station Equipment Replacement

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

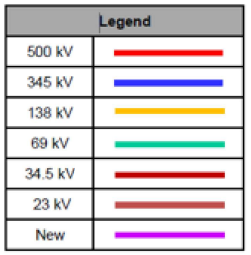
Preliminary Facility Rating:

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

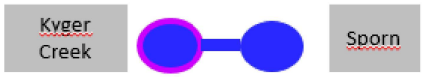
Alternatives: N/A
Ancillary Benefits: N/A
Required IS Date: 6/1/2028
Projected IS Date: 6/1/2028

Existing:





Proposed:



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

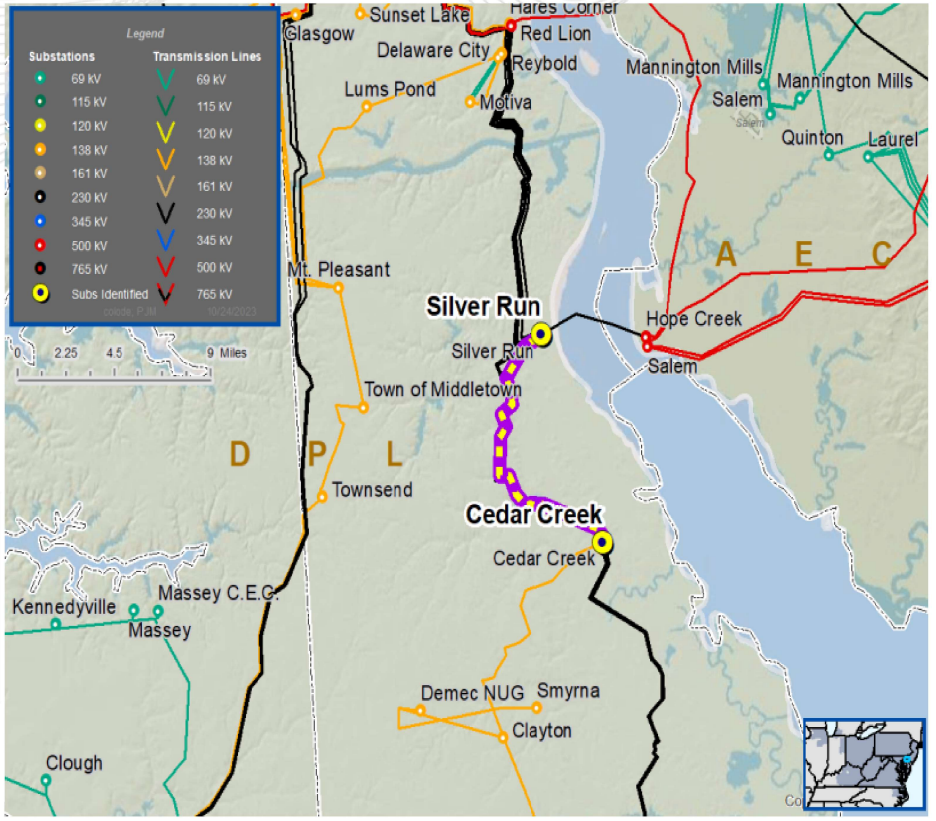
Proposal Window Exclusion: No

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……



PJM©2023

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

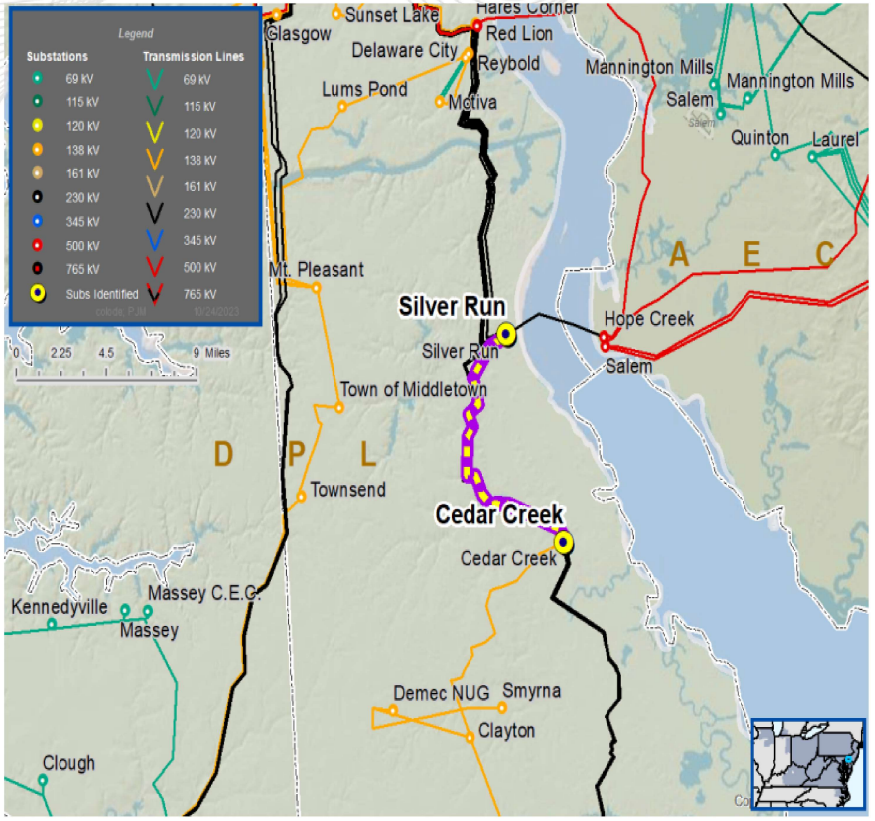
Estimated Cost: $8.7 M

Alternatives

- None

Required In-Service: 6/1/2028

Projected In-Service: 6/1/2028



PJM©2023

PECO Transmission Zone: Baseline

Process Stage: First Review

Criteria: Summer Generation Deliverability

Assumption Reference: 2028 RTEP assumption

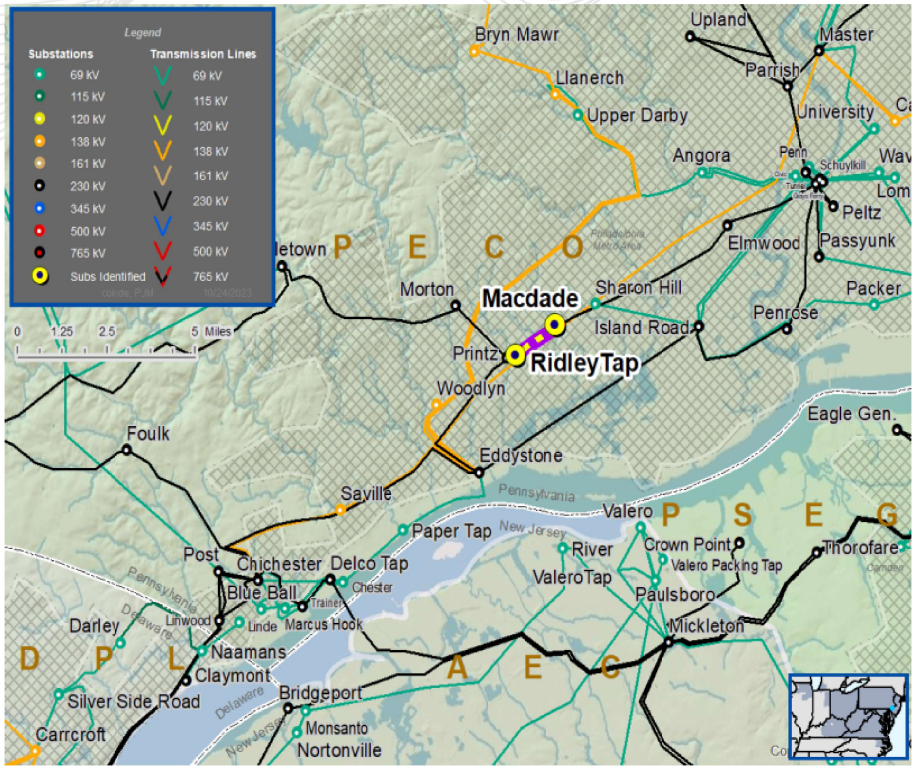
Model Used for Analysis: 2028 RTEP Summer case

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……

PJM©2023

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

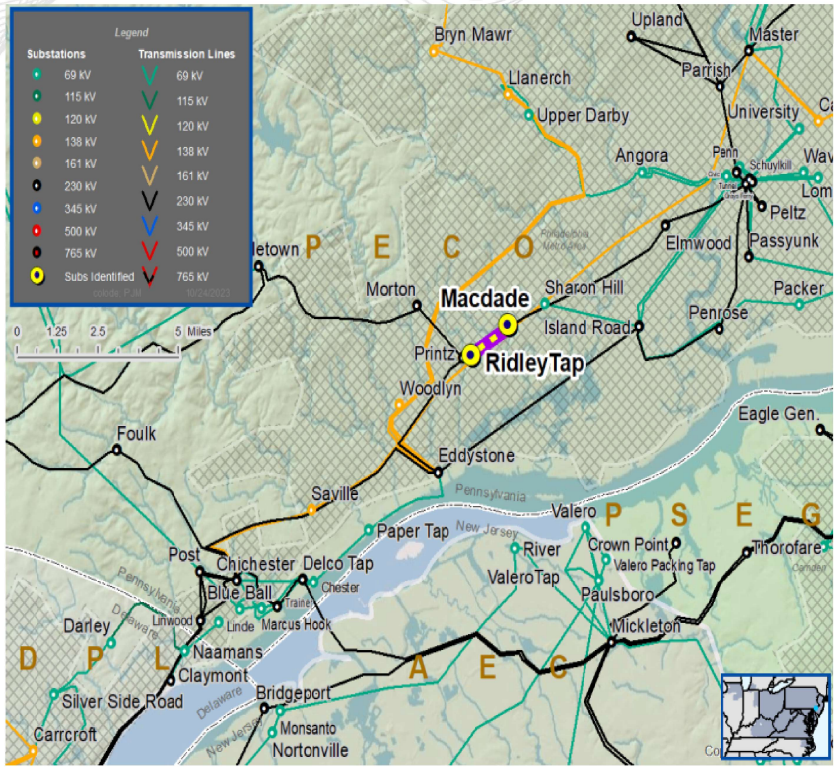
Estimated Cost: $1.4 M

Alternatives

- None

Required In-Service: 6/1/2028

Projected In-Service: 6/1/2028



PJM©2023

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.

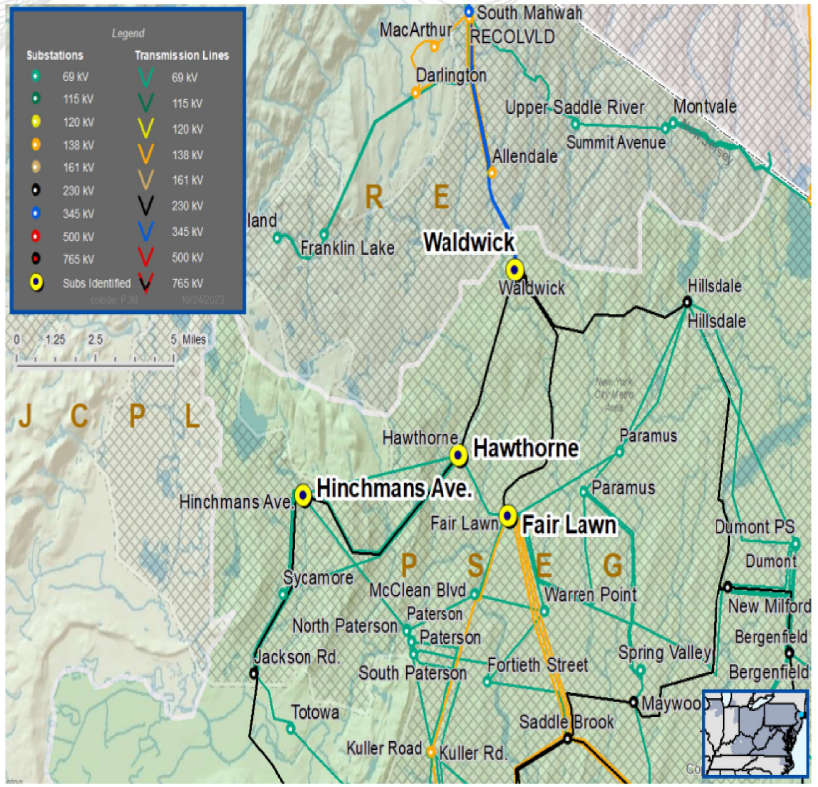
Violations were posted as part of the 2023 Window 1: FG#s

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



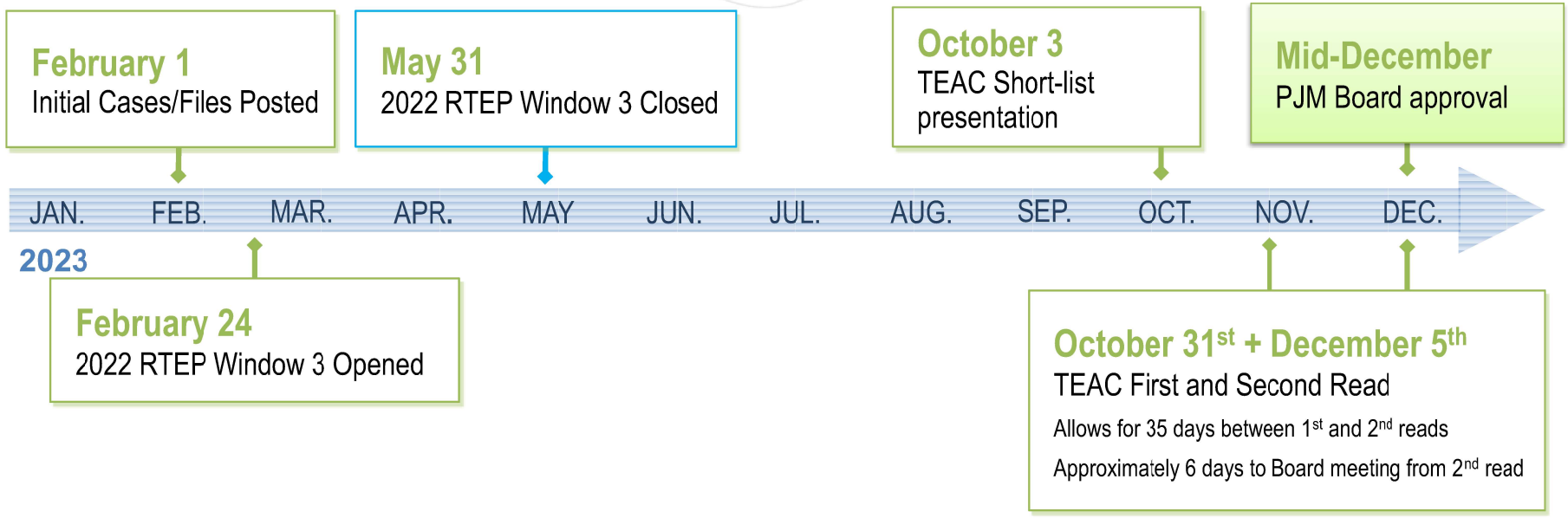
PJM©2023

First Read – 2022 Window 3

Baseline Reliability Projects

PJM©2023

2022 RTEP Window 3 - Timeline



PJM©2023

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

PJM©2023

- 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).

67

PJM©2023

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

PJM©2023

2022W3 – Window Evaluation Criteria

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

Performance	Scalability	Impact	Validated Cost
Meeting the system needs of 2027 and being flexible to address 2028 needs	Scenario/development longevity – system robustness and utilization	Utilization of existing ROWs where possible and efficient.	Cost evaluation using third-party benchmarking metrics

Risks

- Triggering additional costs:
  - Substation rebuilds due to extreme short-circuit levels
  - Avoid extended critical outages (Peach Bottom / Conastone rebuilds)
- Imposing high permitting
- Inability to meeting in-service date

Efficiencies

- Avoidance of redundant capital investment including recognizing synergies with EOL facilities and overlaps of previously approved (or imminent) supplemental/baseline upgrades.

PJM©2023

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.

PJM©2023

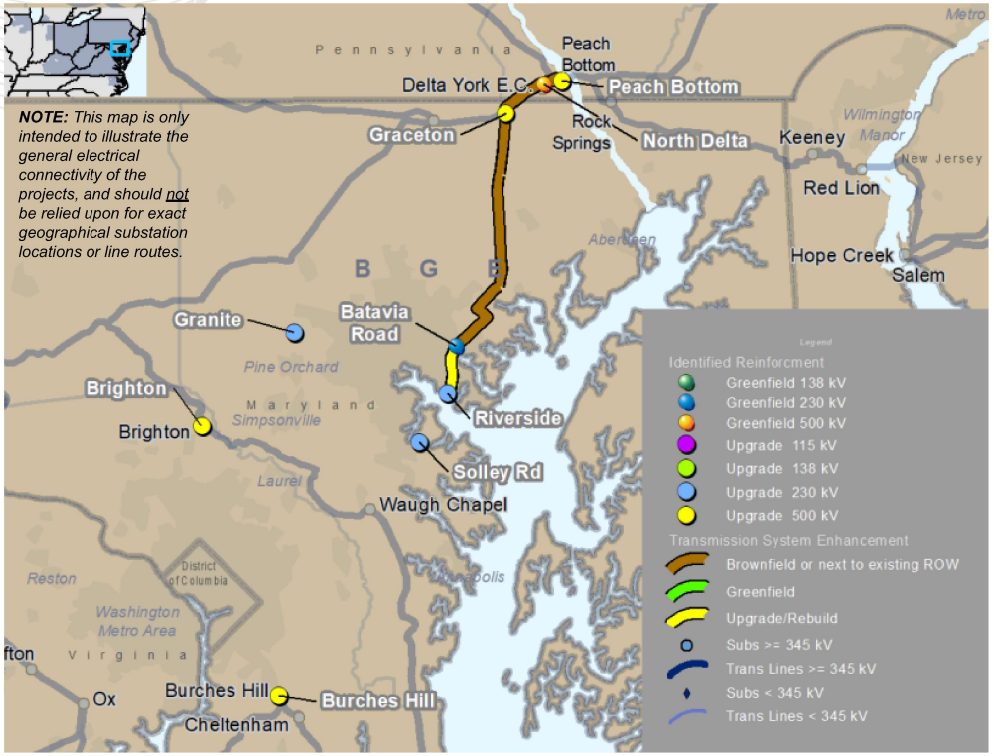
Board Approved Brandon Shores Deactivation Projects

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 …



PJM©2023

Board Approved Brandon Shores Deactivation Projects

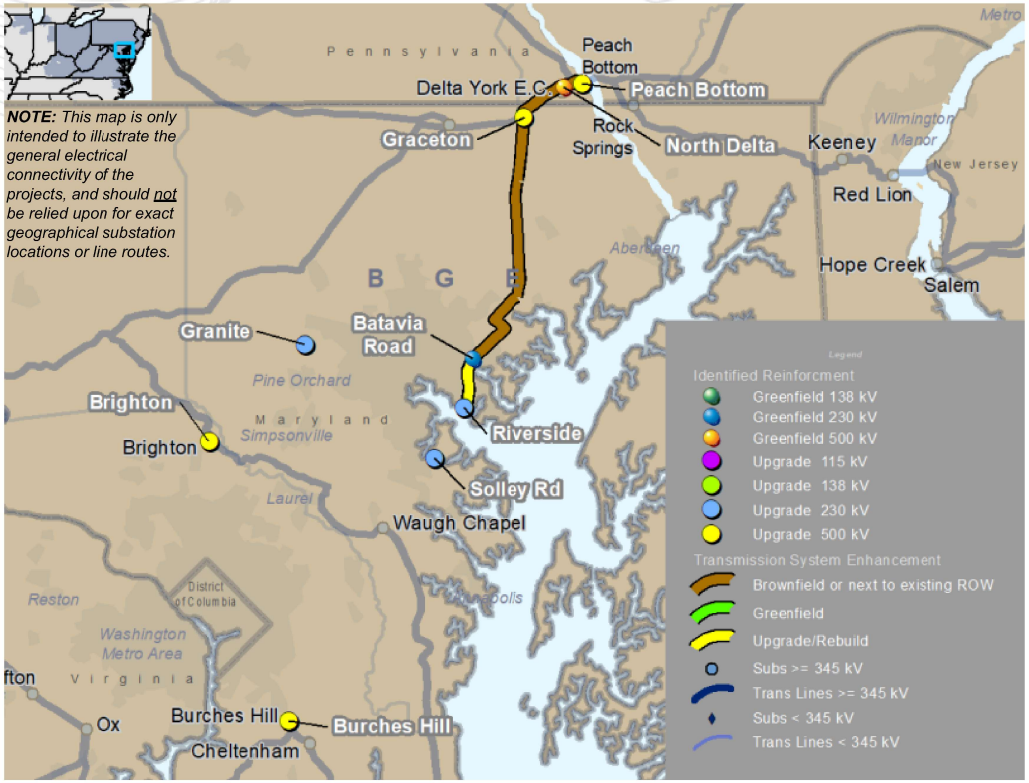
Exelon:2022-W3-344/660

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

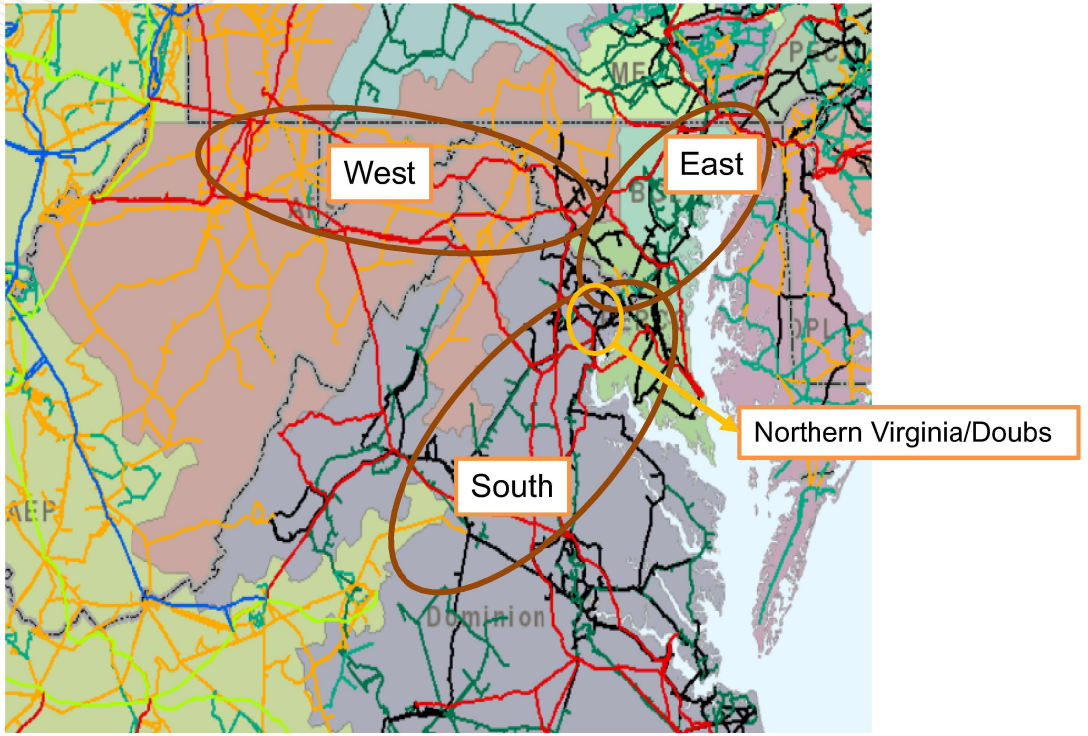
Projected In-Service Date: 2026-2028



PJM©2023

Study Clusters

- 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 3rd 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 3rd 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).

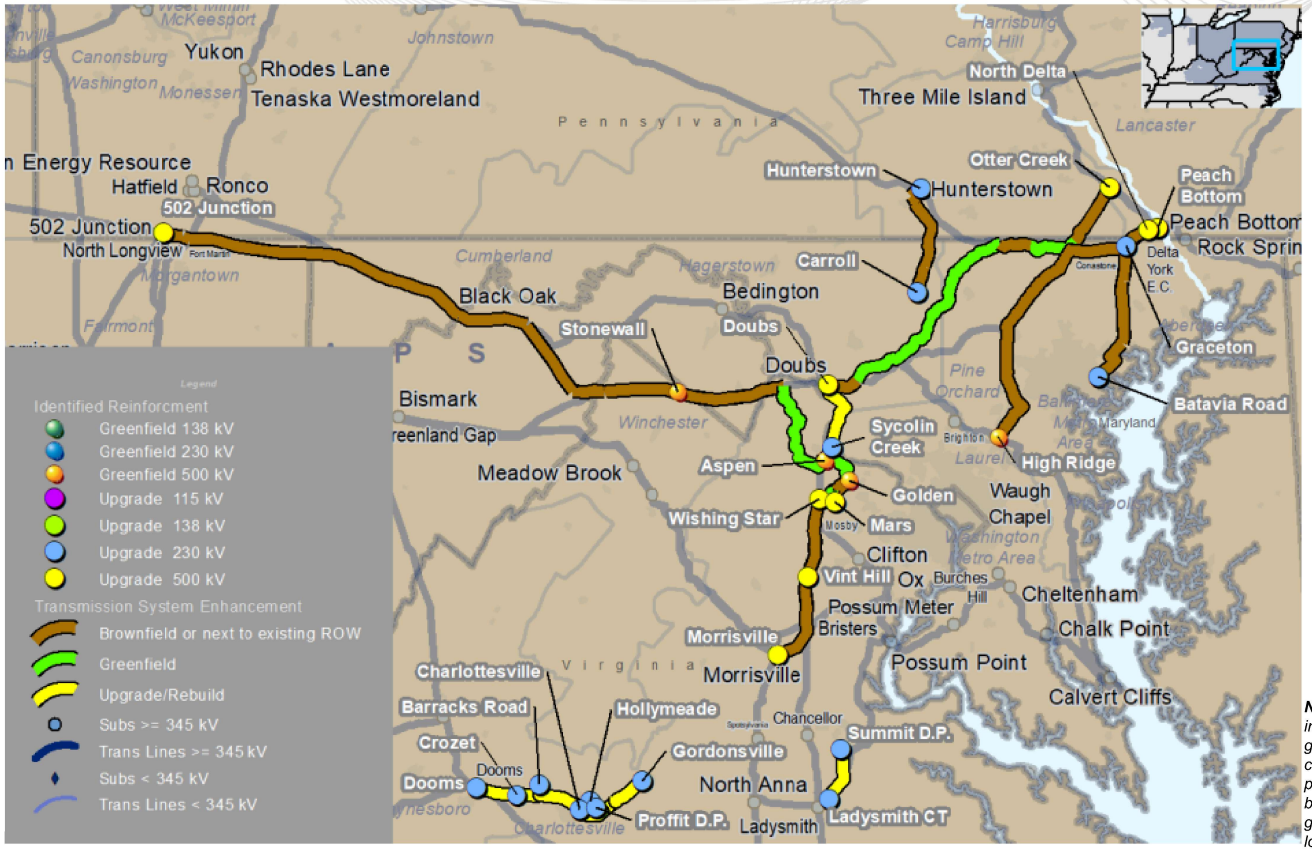
PJM©2023

2022 RTEP W3 – Selected Proposals

- 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

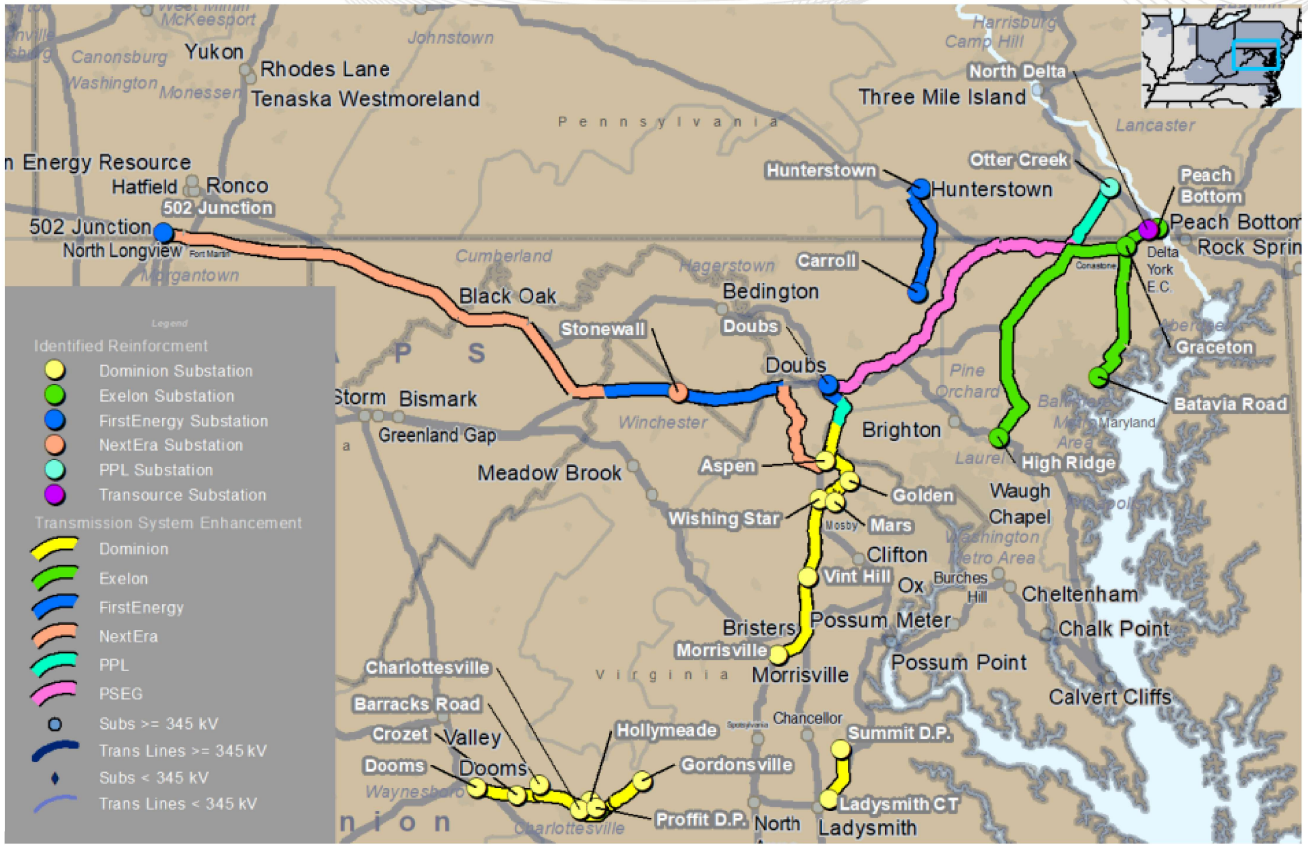
PJM©2023

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.*

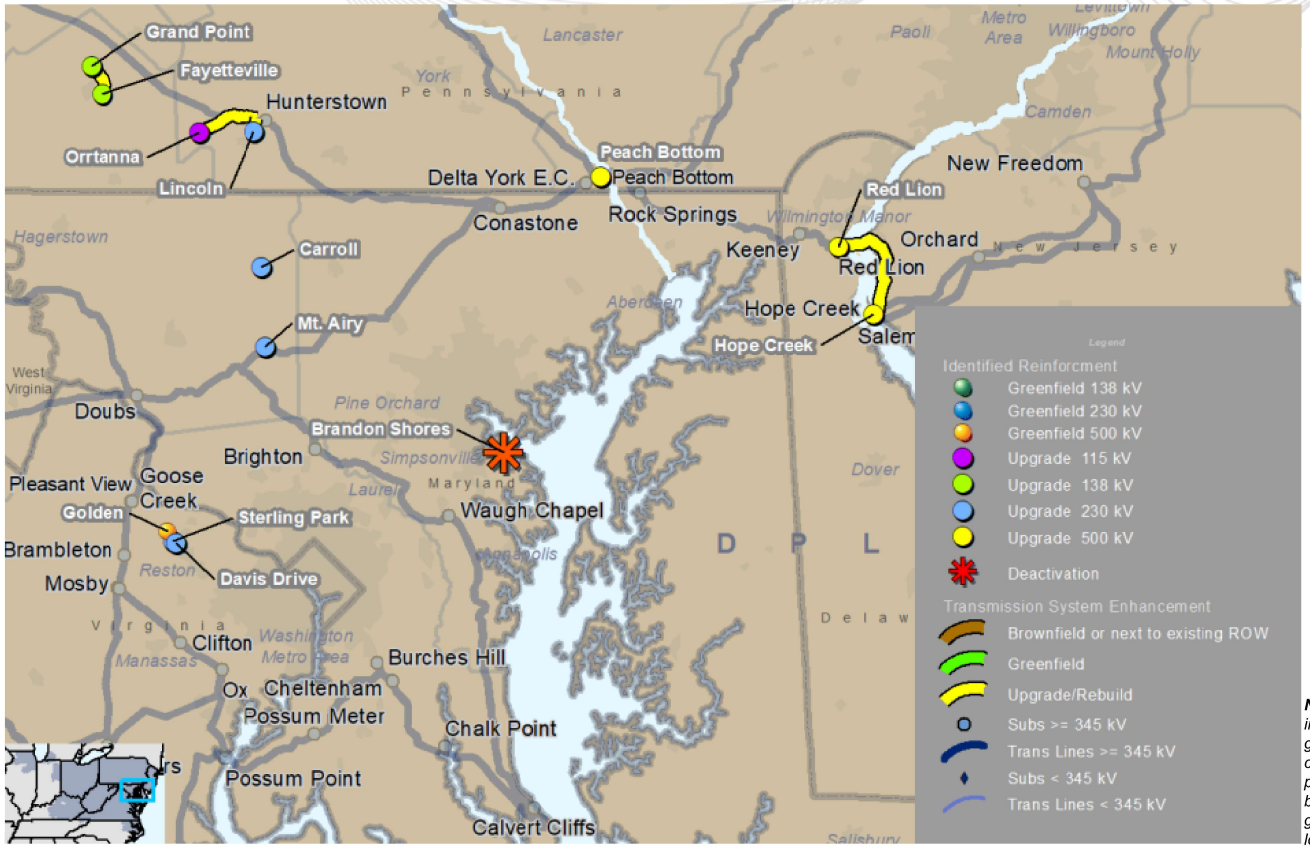
Major Proposals Selected in 2022 Window 3 - by Designated Entity



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

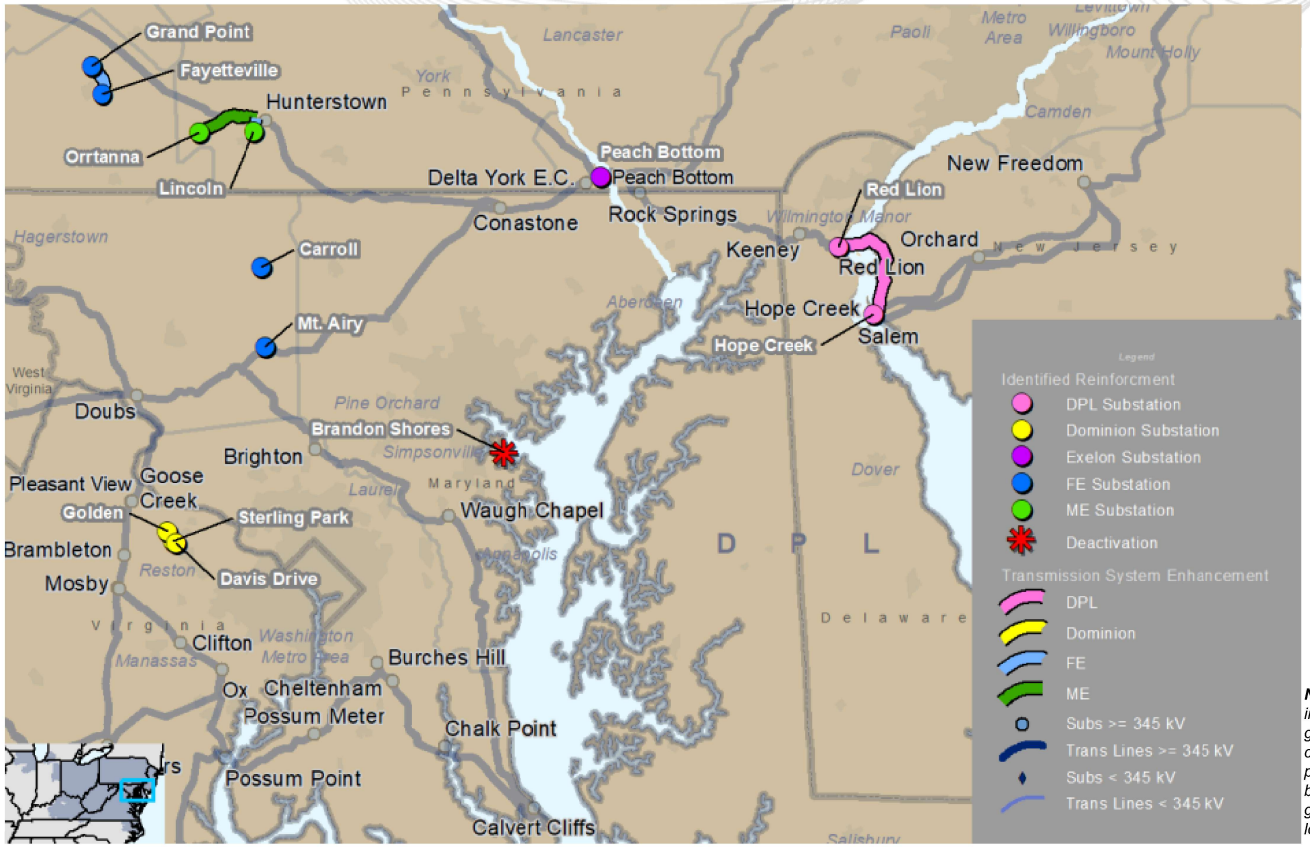
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

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.*

PJM©2023

2022W3 – Preferred Solutions: AEP Local

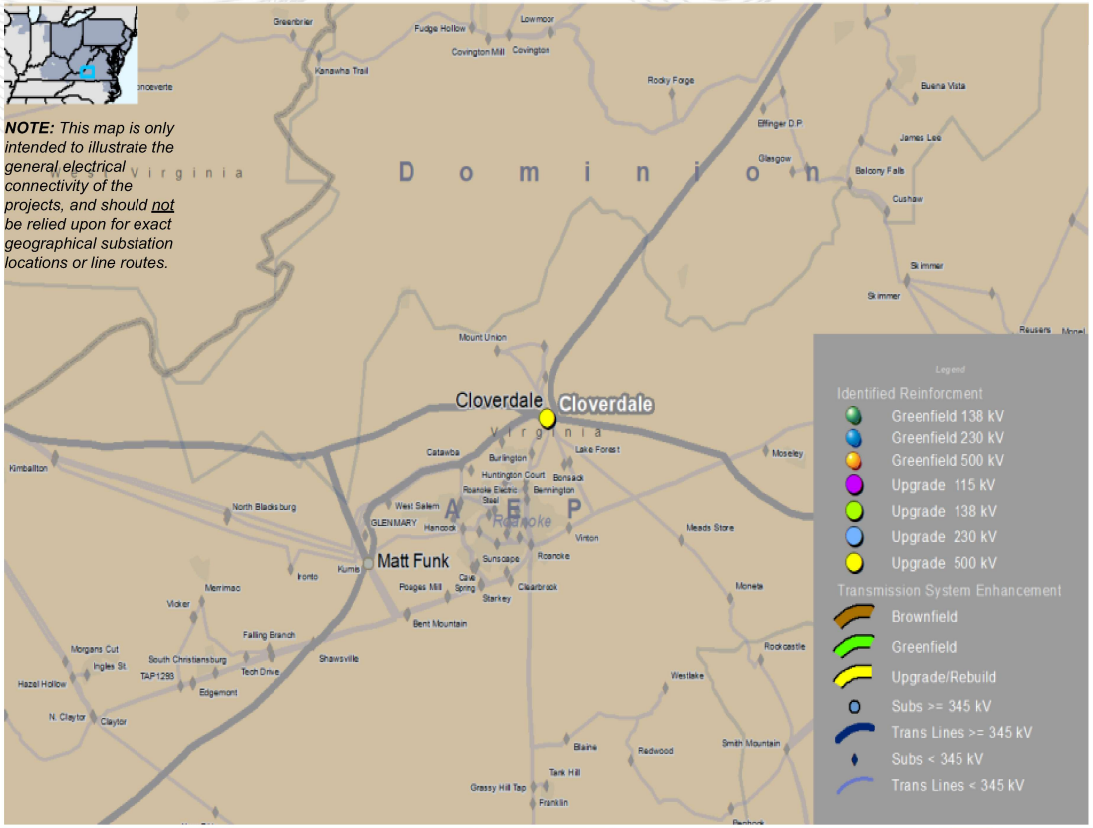
AEP: 2022-W3-410

- 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.

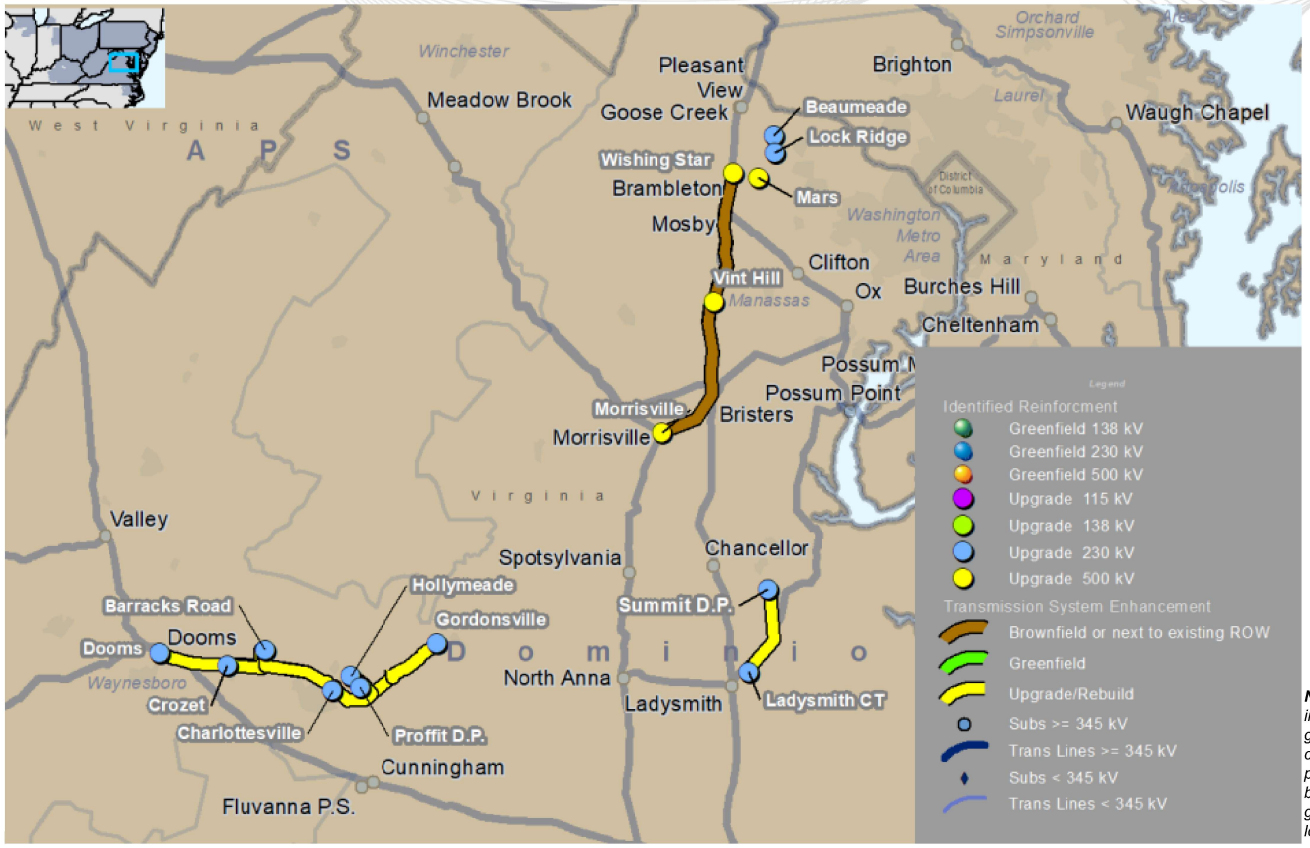
Estimated Cost: $11.59 M

Required IS Date: 6/1/2027

Projected IS Date: 10/31/2026

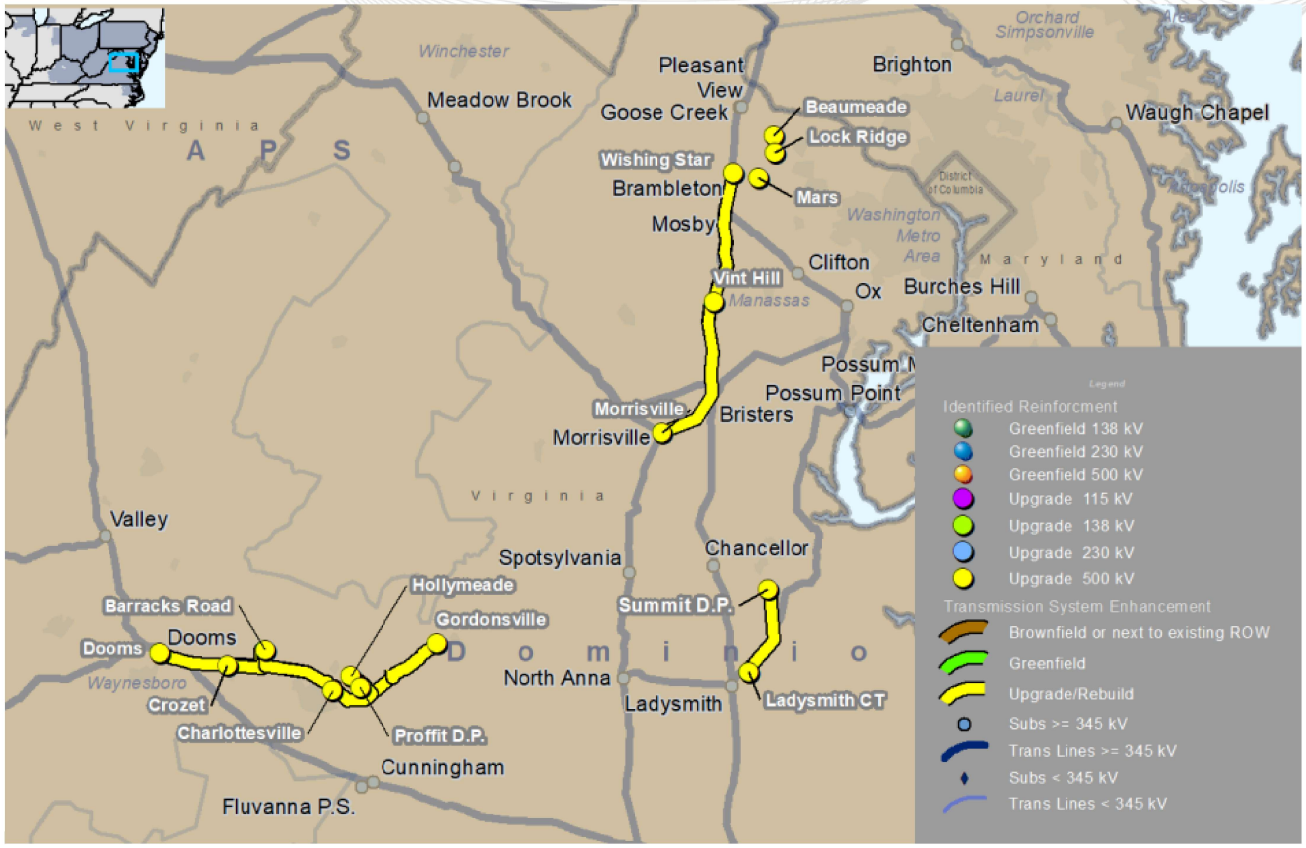


2022W3 – Preferred Solutions: South Cluster



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

2022W3 – Preferred Solutions: South Cluster by Designated Entity

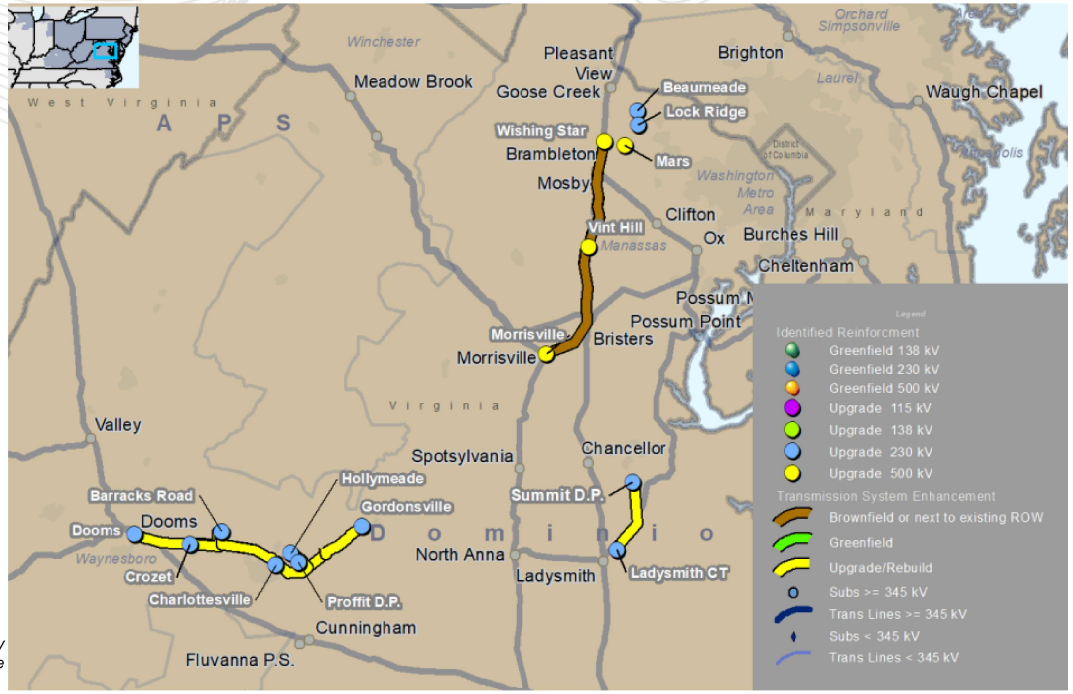


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

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

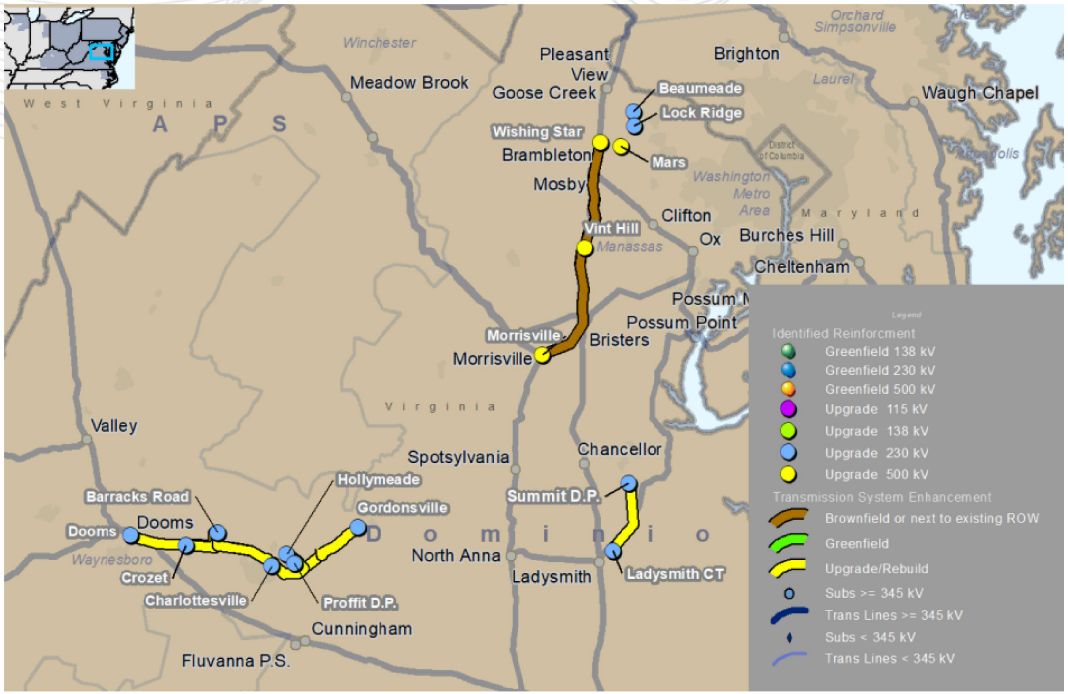
- Line #2140 (Loudoun - Heathcote) Rebuild
- Line #2151 (Railroad DP - Gainesville) Rebuild
- Line #2163 (Vint Hill - Liberty) Rebuild
- Line #2176 (Heathcote - Gainesville) Rebuild
- Line #2222 (Rollins Ford - Gainesville) Rebuild
- Line #183 (Bristers - Ox) Rebuild
- Line #37 (Spotsylvania - Wilderness 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

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.*

PJM©2023

2022W3 – Preferred Solutions: South Cluster

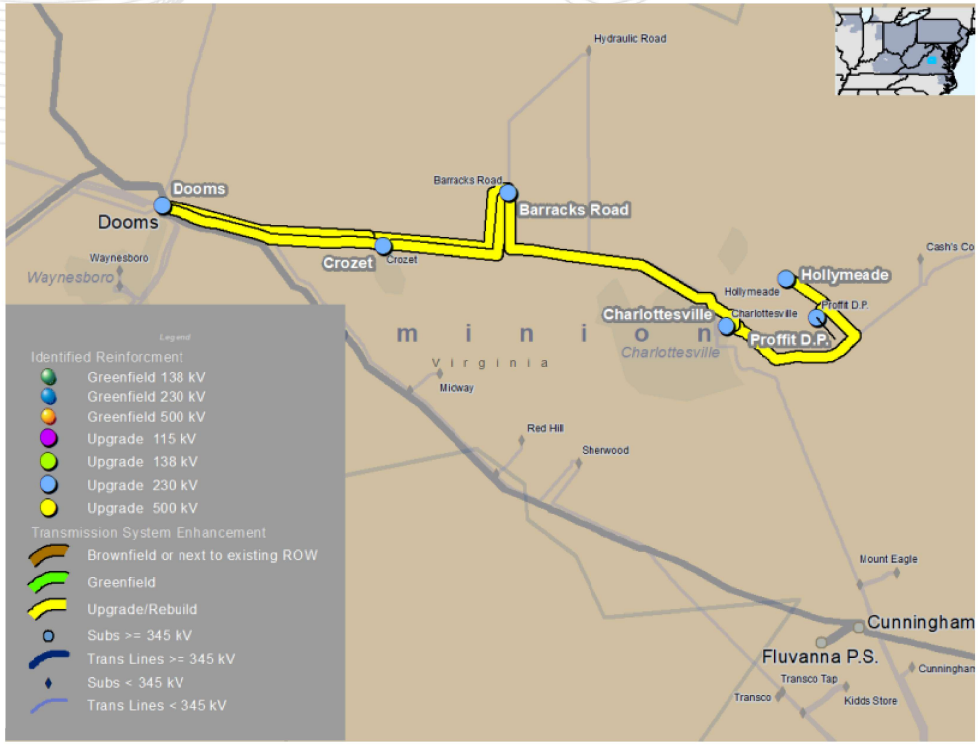
Dominion: 2022-W3-967 Partial

- 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

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-W3-211

- 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:

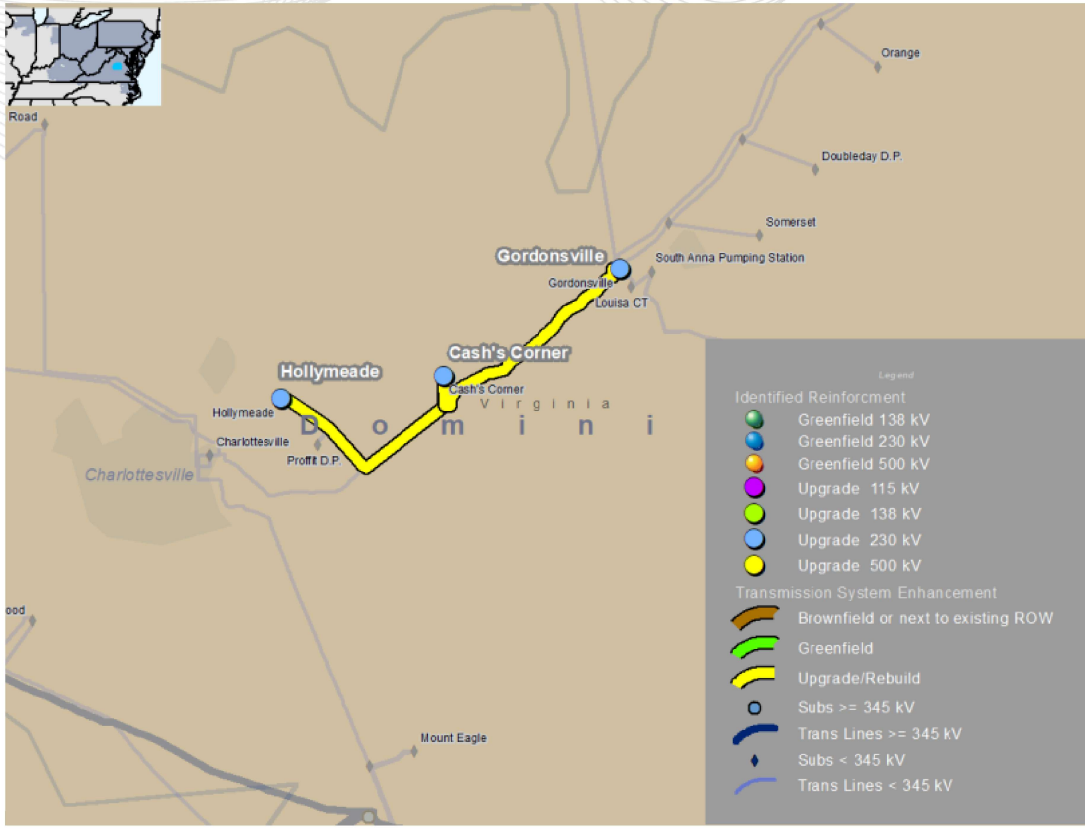
Branch	SN/SE/WN/WE (MVA)
230kV Line #2135 Cash's Corner - Gordonsville	586/586/741/741
230kV Line #2135 Cash's Corner - Hollymeade	586/586/741/741

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
Continued on next slide...



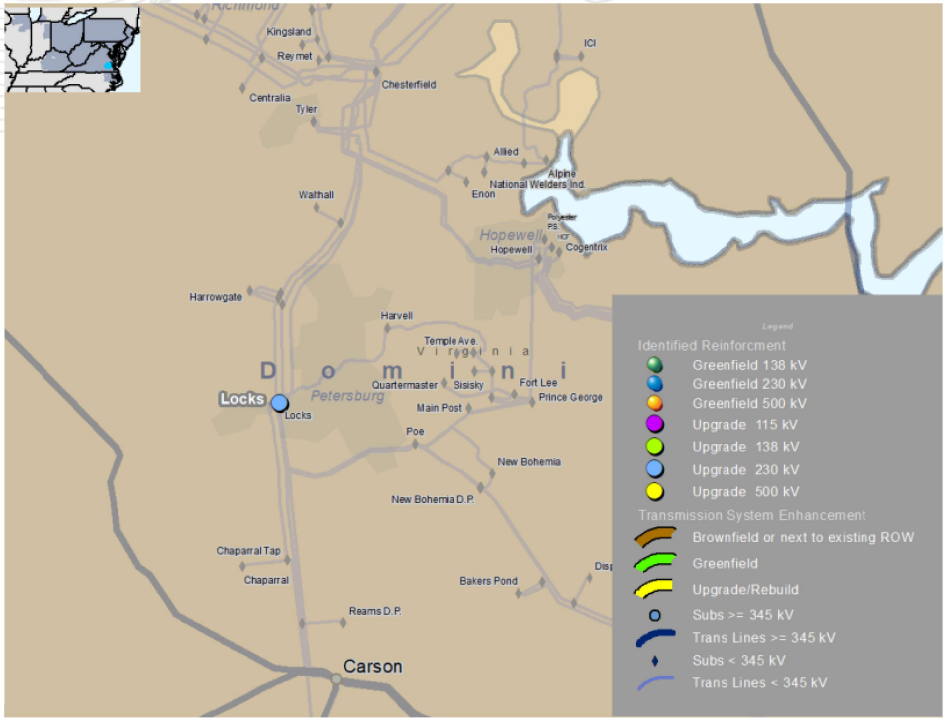
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

PJM©2023

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.



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

Estimated Cost: $7.14 M

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

Continued on next slide…

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:

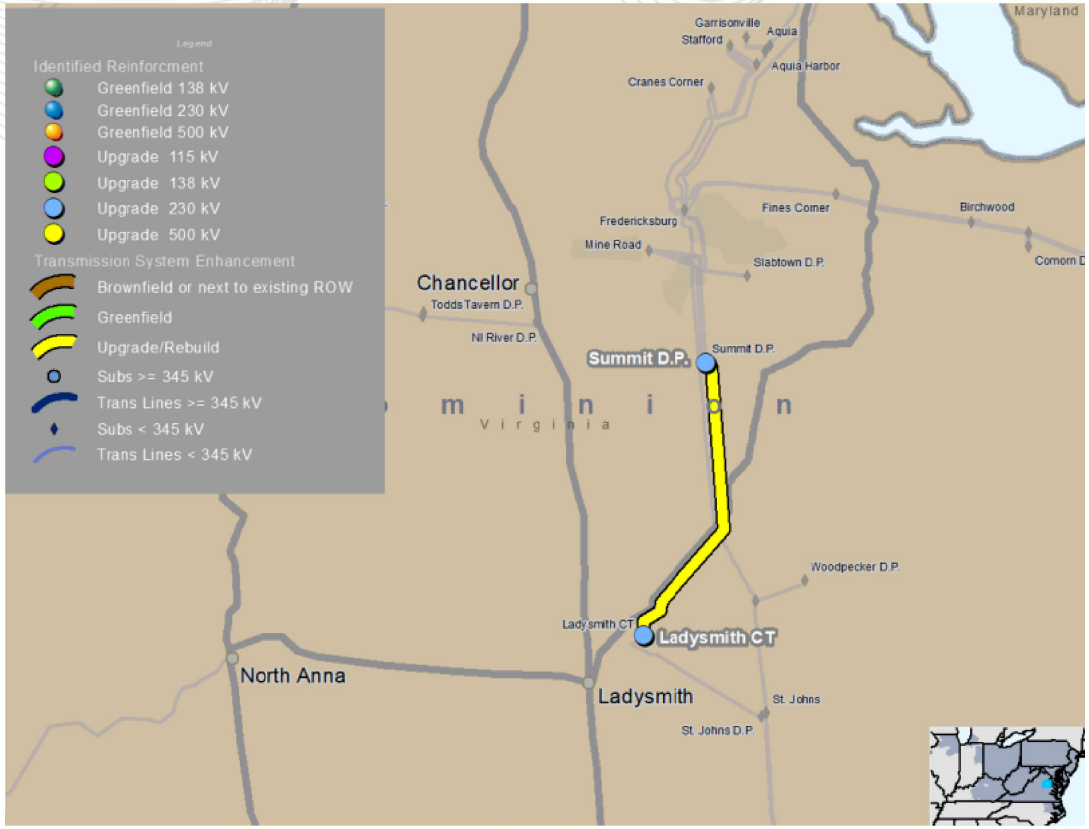
Branch	SN/SE/WN/WE (MVA)
230kV Line #2090 Ladysmith CT – Summit D.P	1573/1573/1648/1648

Estimated Cost: $57.34 M

Required IS Date: 6/1/2027
Projected IS Date: 12/1/2027

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

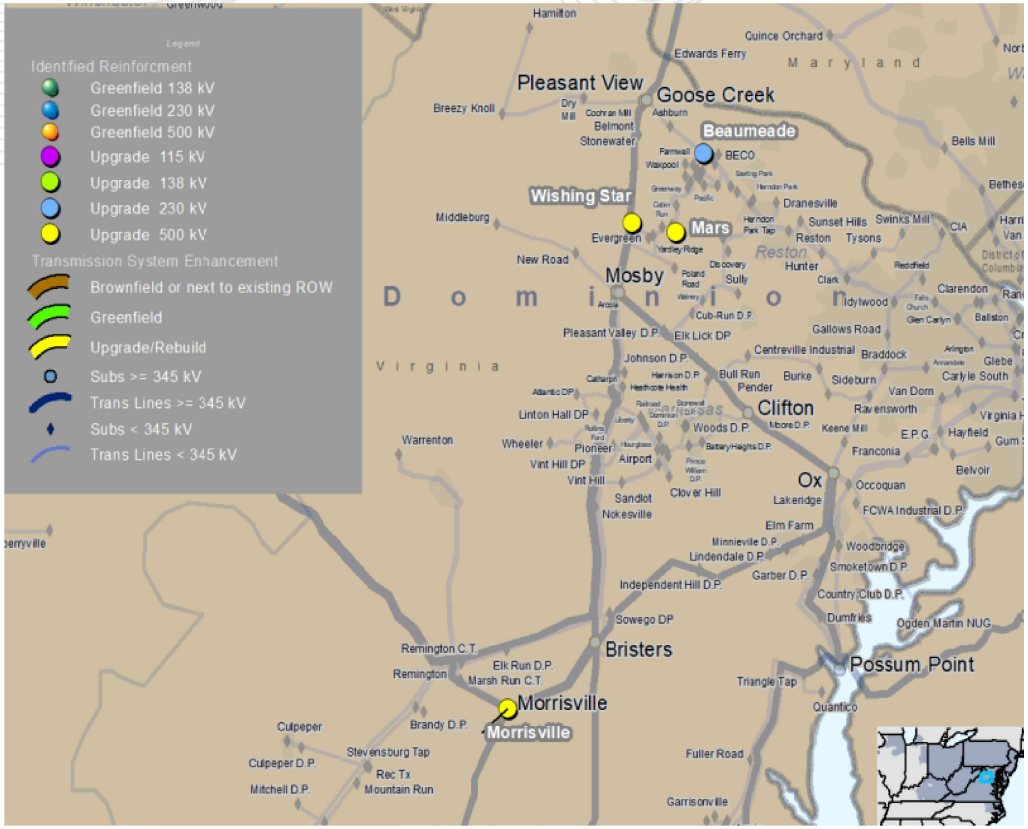
Proposed Solution: 2022-W3-231

- 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

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.*

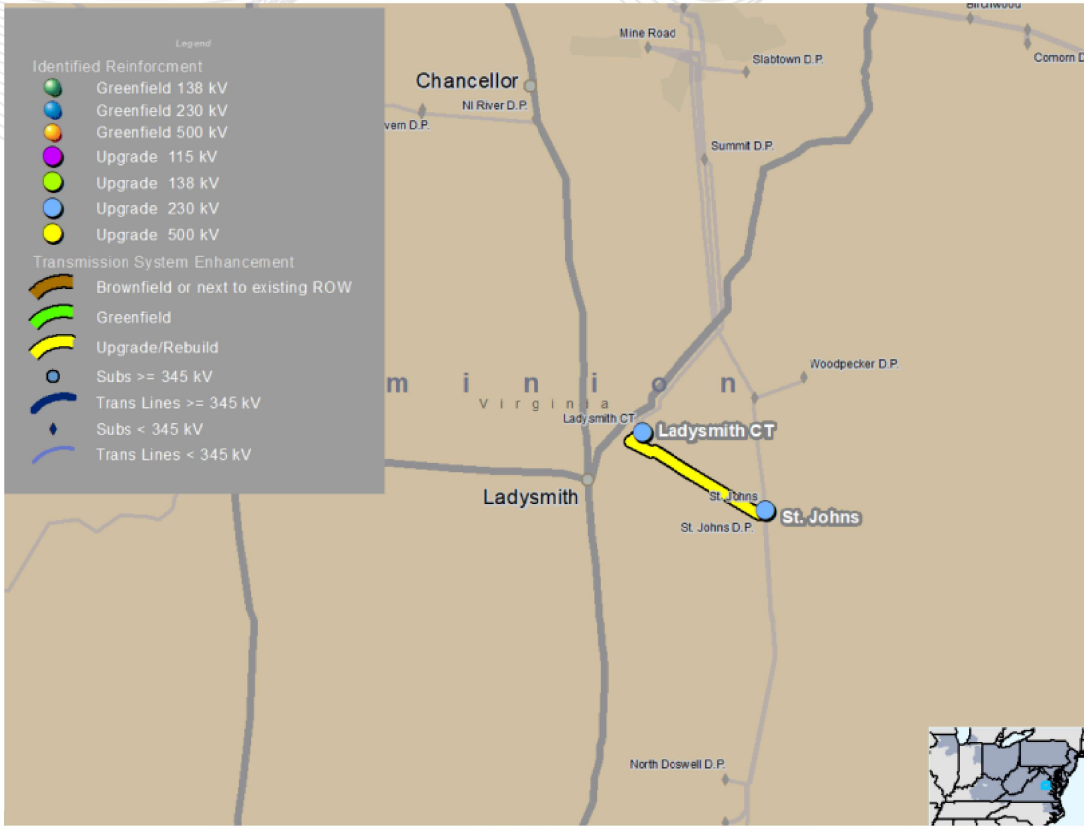
2022W3 – Preferred Solutions: South Cluster

Proposed Solution: 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 reconductored 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.

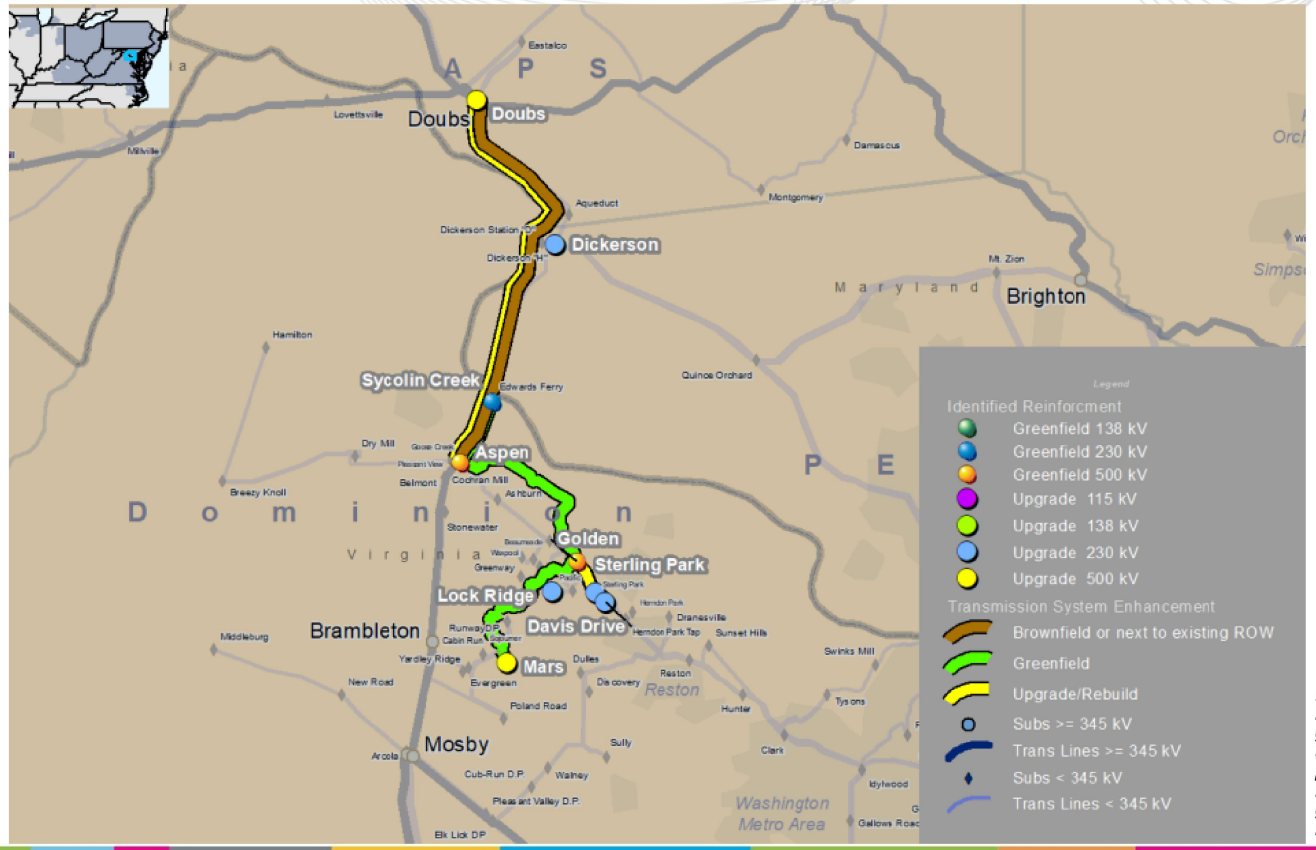
Estimated Cost: $37.89 M
Total Estimated South Cluster Cost: $1398.21 M

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.*

2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

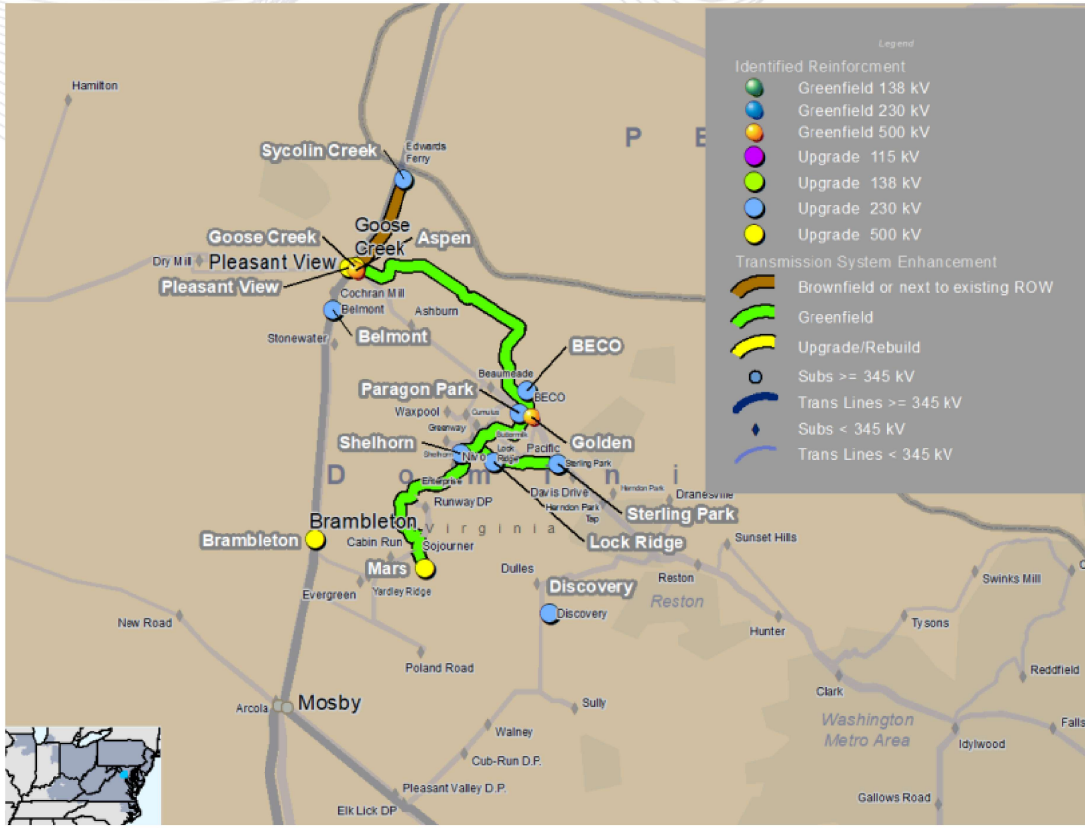
Proposed Solution: 2022-W3-692

- 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 2nd 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.

Estimated Cost: $1058.45 M
Required IS Date: 6/1/2027
Projected IS Date: 6/1/2028

Continued on next slide…

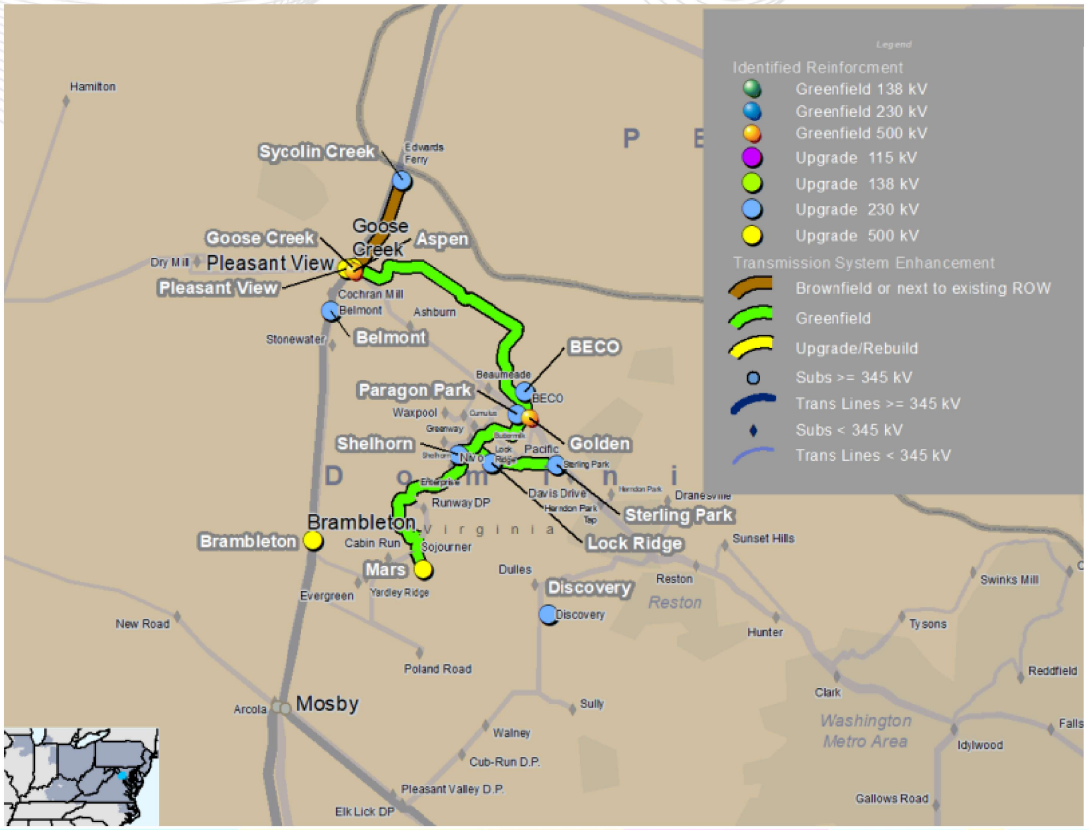
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



2022W3 – Preferred Solutions: 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.*

PJM©2023

2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

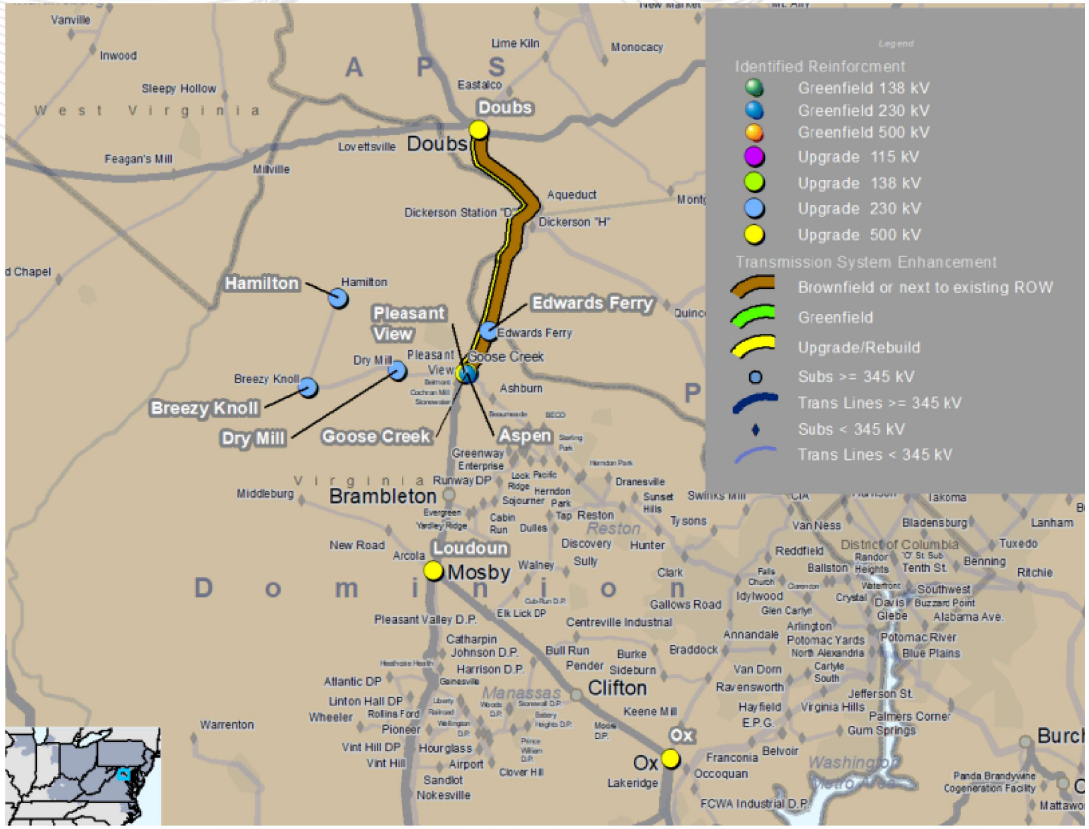
Proposed Solution: 2022-W3-516 **(Dominion)**

- 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

Continued on next slide…

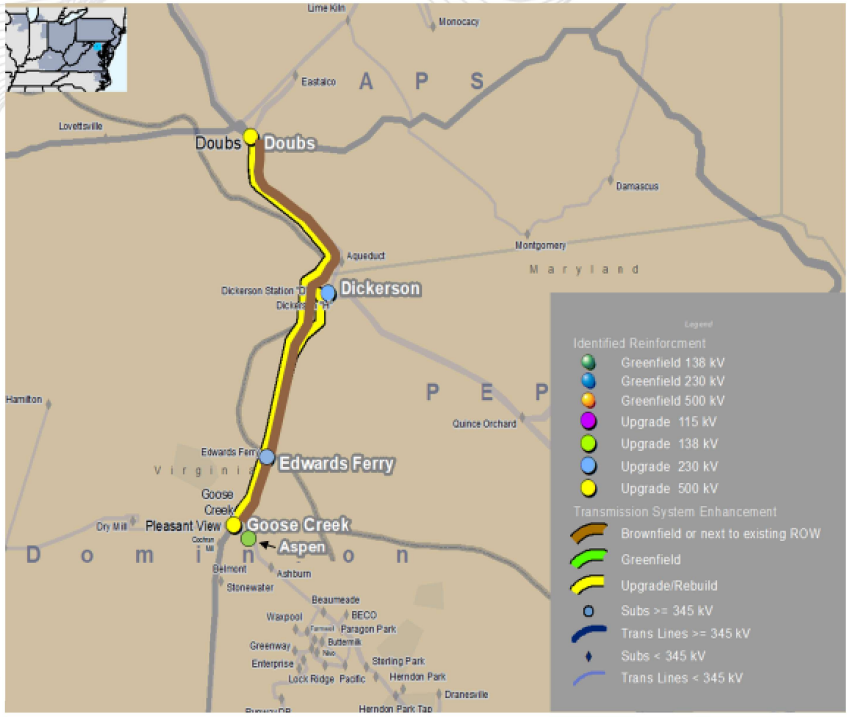


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022W3 – Preferred Solutions: 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

PJM©2023

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)**

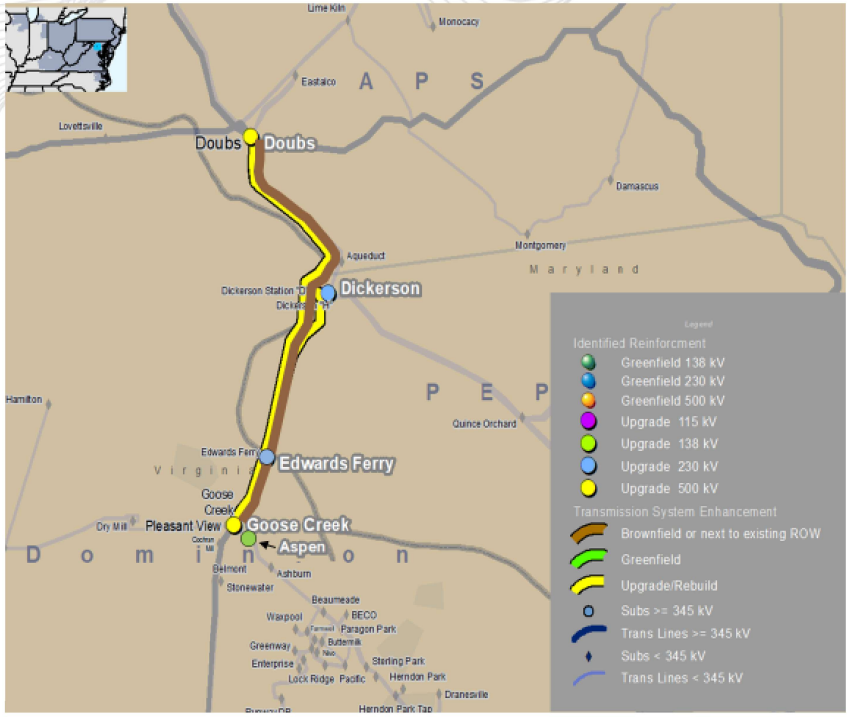
Preliminary Facility Ratings:

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

Estimated Cost: $235M

Required IS Date: 6/1/2027

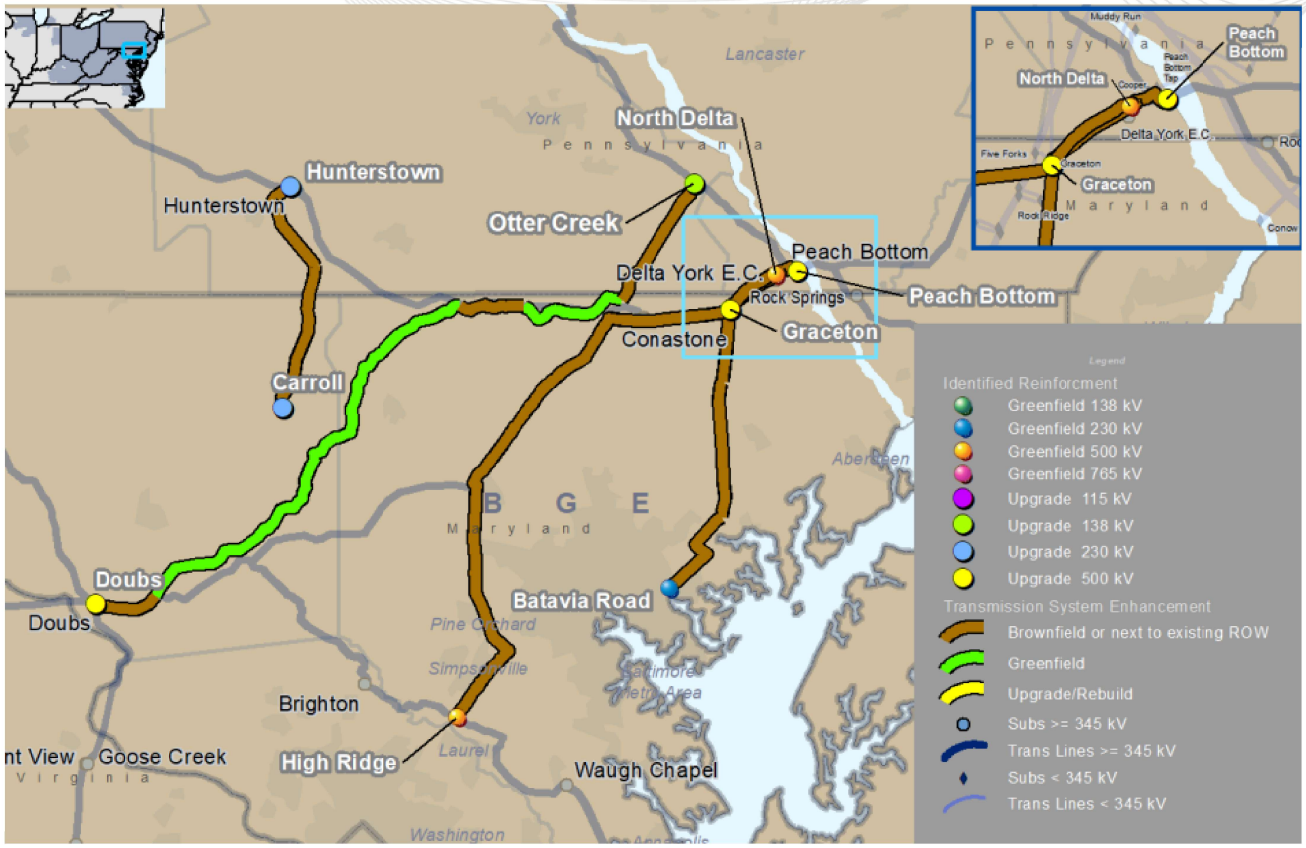
Projected IS Date: 6/1/2030



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.*

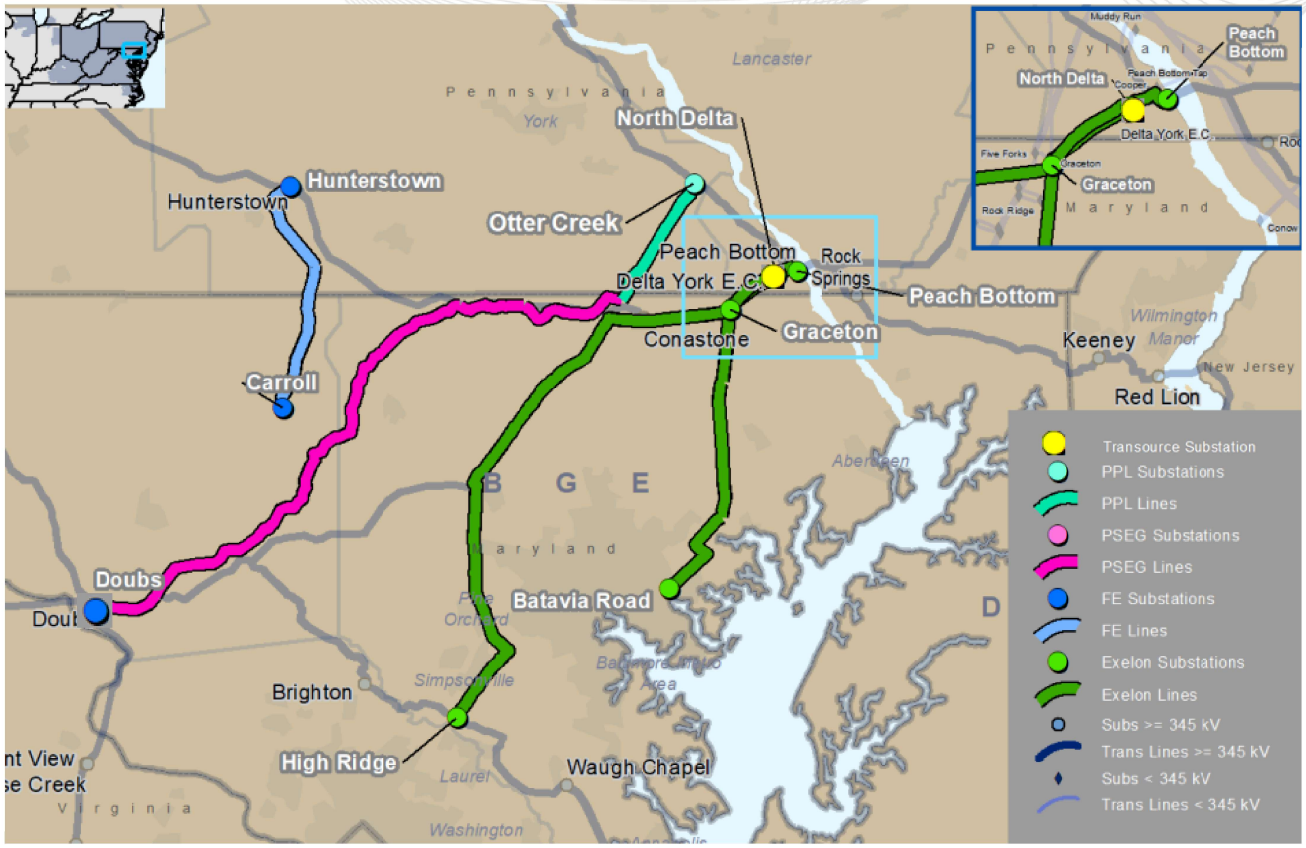
PJM©2023

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

PJM©2023

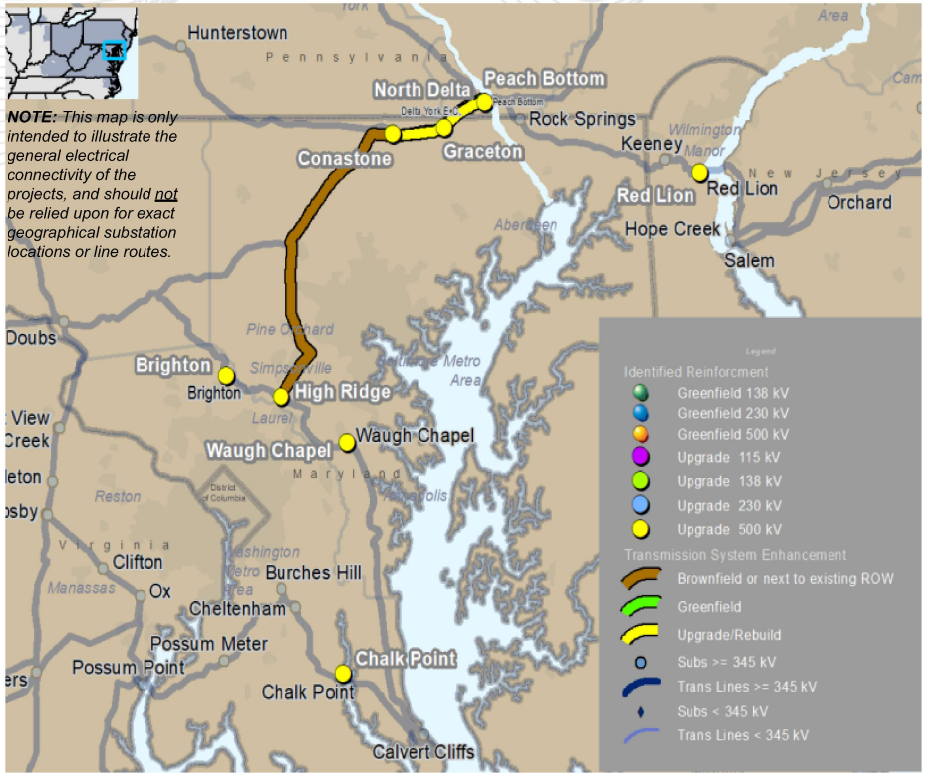
Preferred Proposals to Address Clusters - East

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

Continued on next slide …



PJM©2023

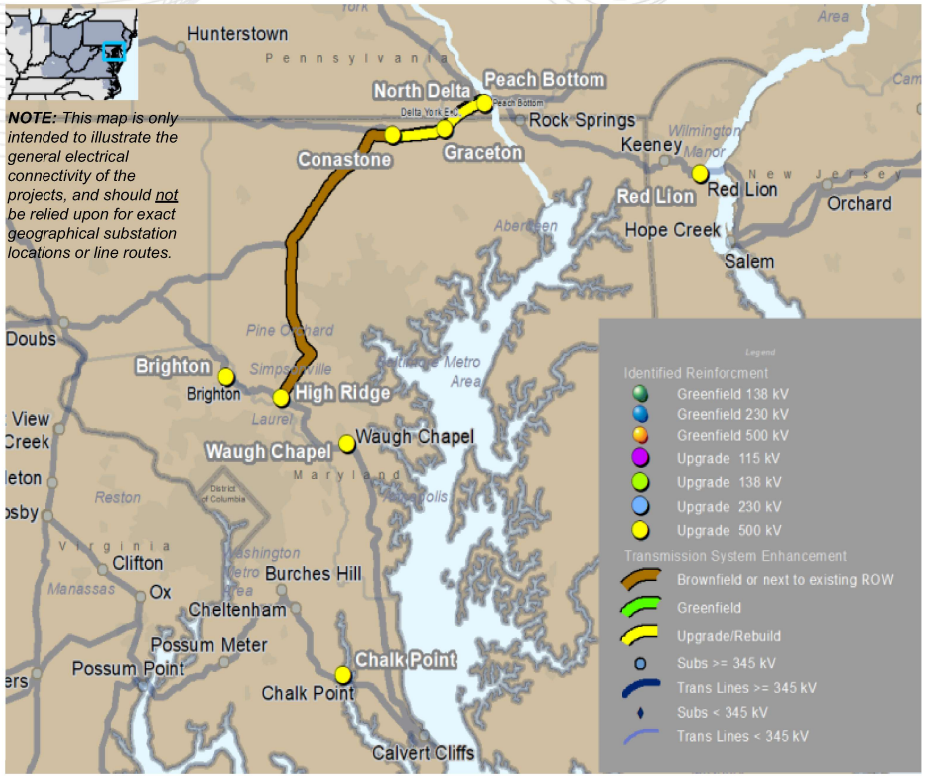
Preferred Proposals to Address Clusters - East

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

Continued on next slide …



PJM©2023

Preferred Proposals to Address Clusters - East

Exelon:2022-W3-344/660

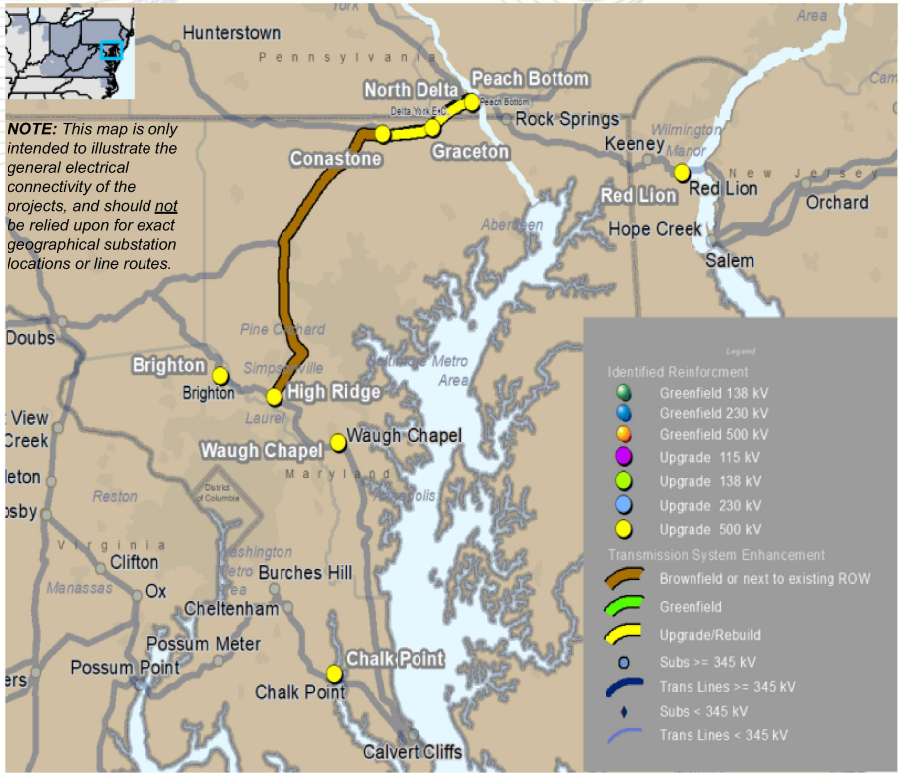
Additional Exelon Upgrades to address the East Cluster

- 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 - Cheltanham 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



PJM©2023

Preferred Proposals to Address Clusters - East

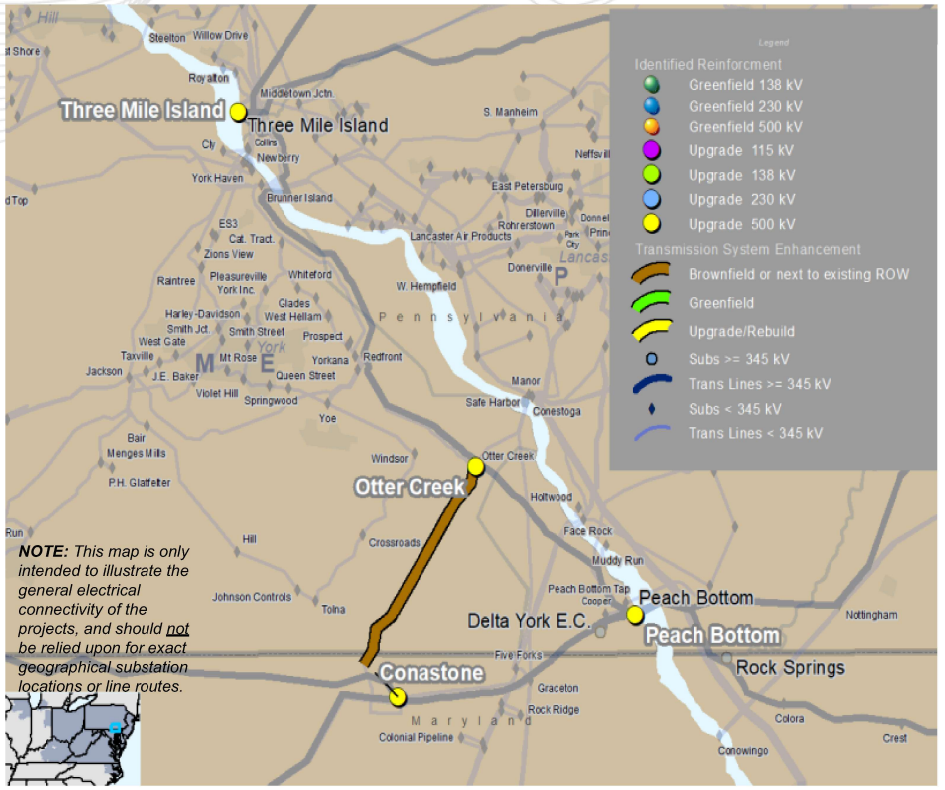
PPL:2022-W3-374

- 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



PJM©2023

Preferred Proposals to Address Clusters - East

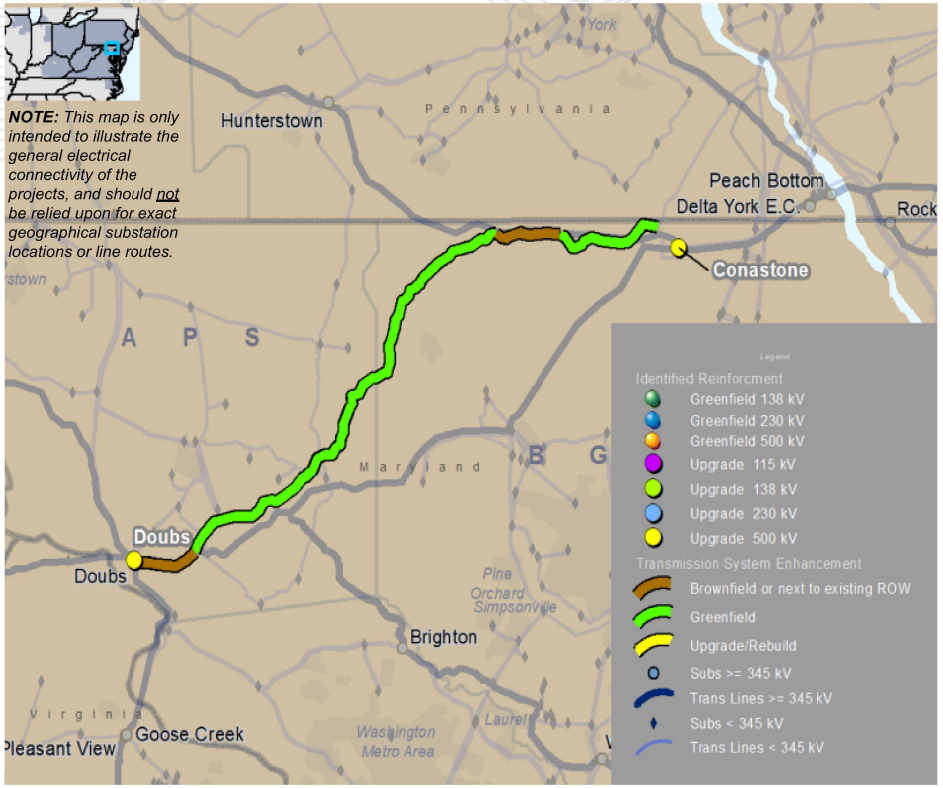
PSEG: 2022-W3-637

- 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



PJM©2023

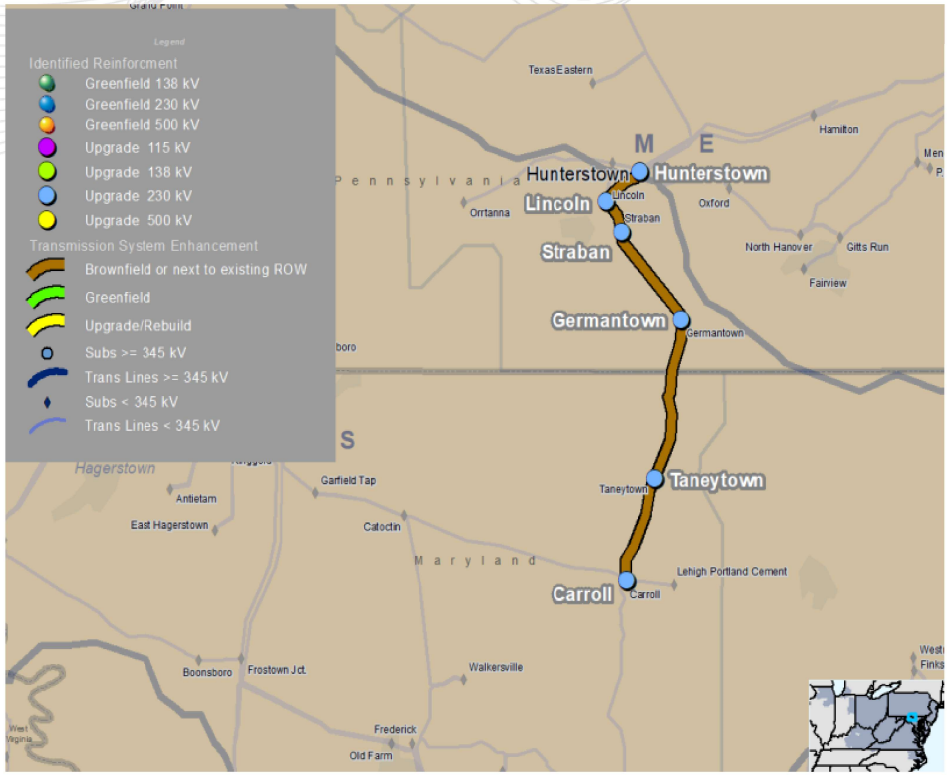
Preferred Proposals to Address Clusters - East

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)

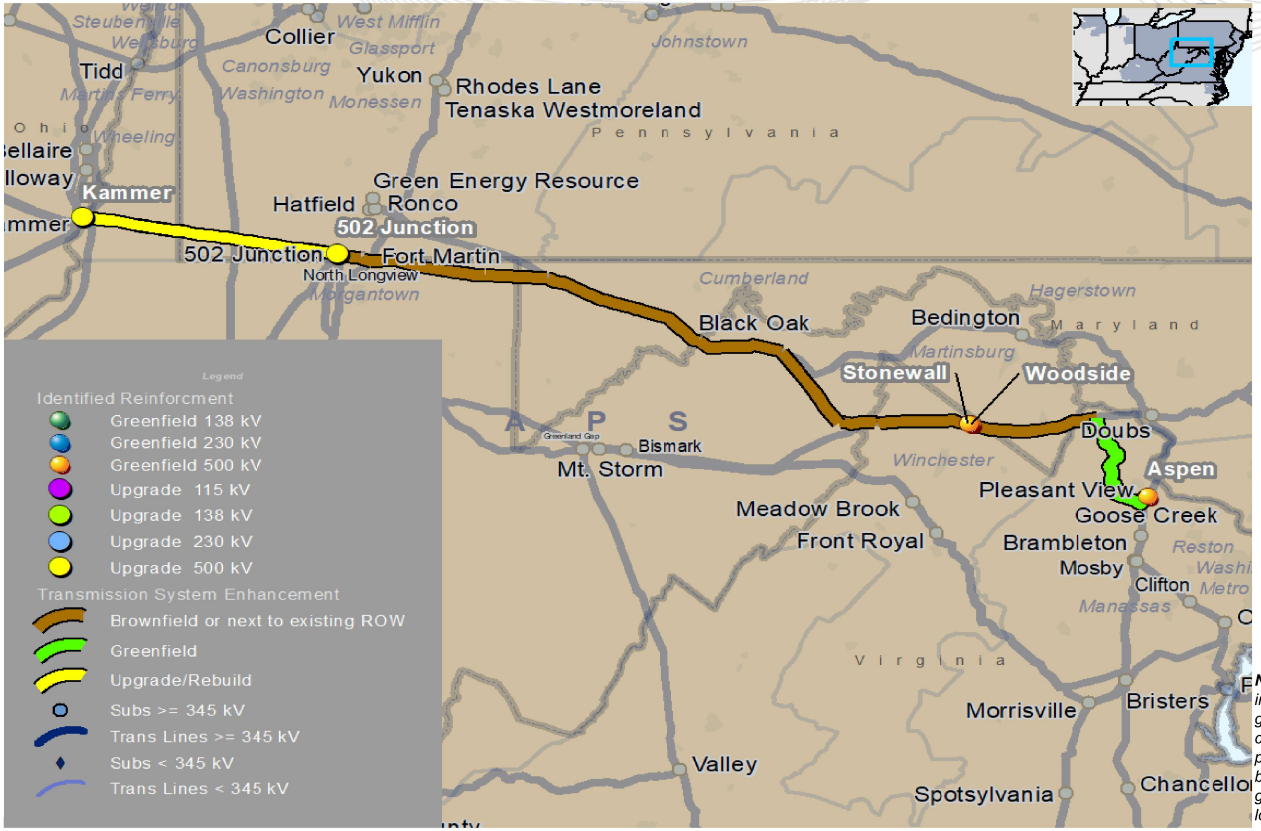
Proposed Cost Estimate: $137M
Required In-Service Date : **6/1/2027**
Projected In-Service Date : 2028-2030



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.*

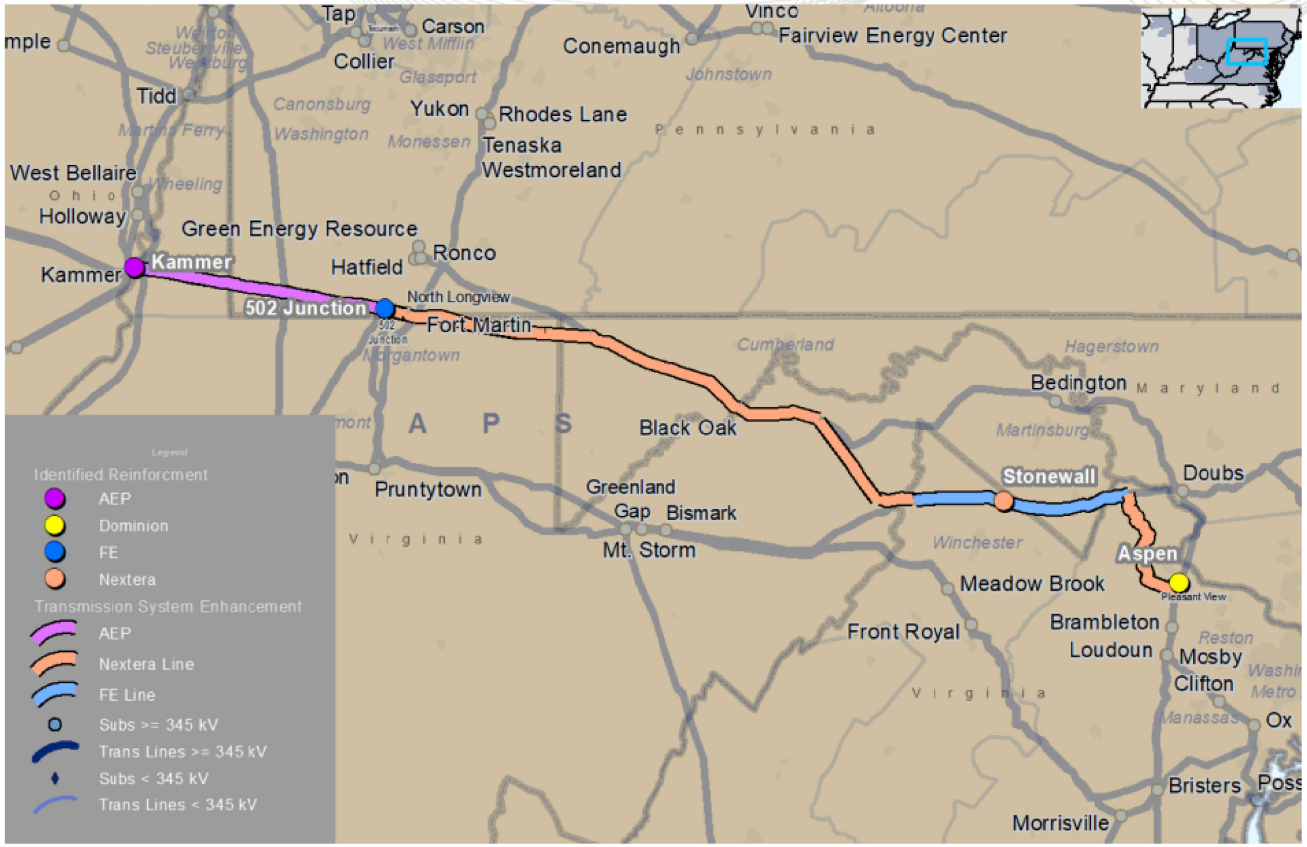
PJM©2023

2022W3 – Preferred Solutions: West Cluster



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

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.*

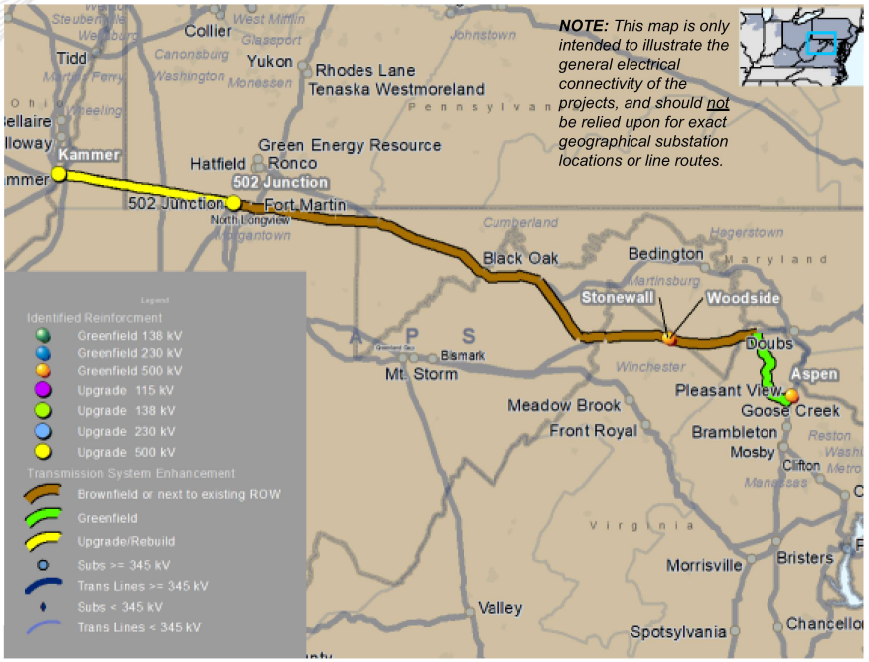
Preferred Proposals to Address Clusters - West

- **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

Preliminary Facility Ratings:

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

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



PJM©2023

Preferred Projects to Address Clusters – West

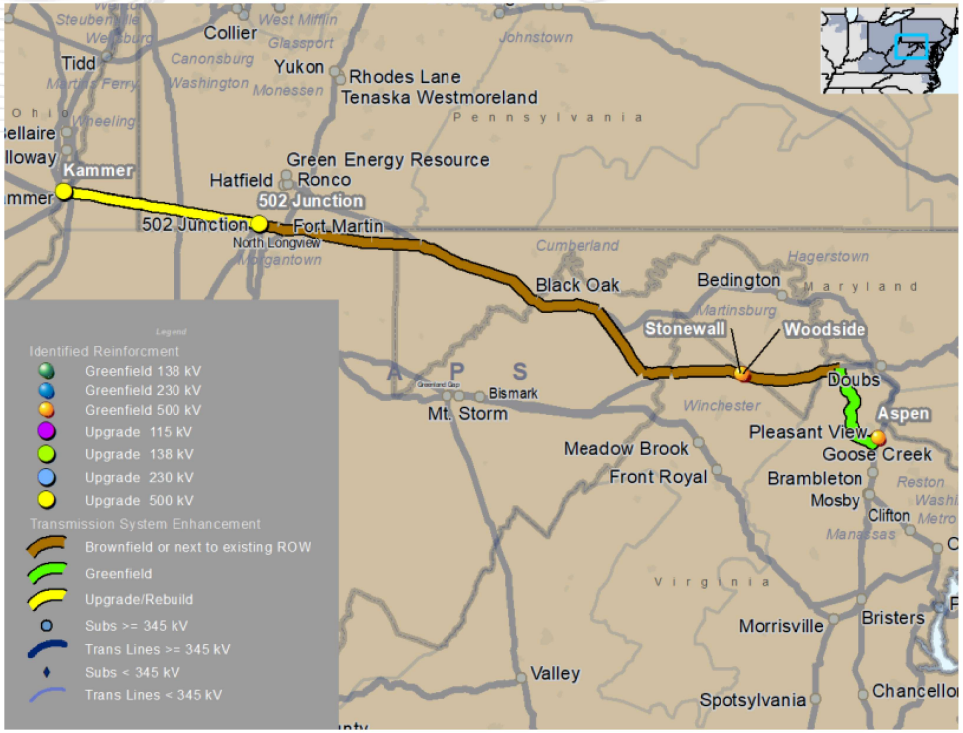
- Kammer to 502 Junction 500kV line: Conduct LIDAR Sag Study to assess SE rating and needed upgrades (**AEP) (Cost Estimate: $0.1M)**

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

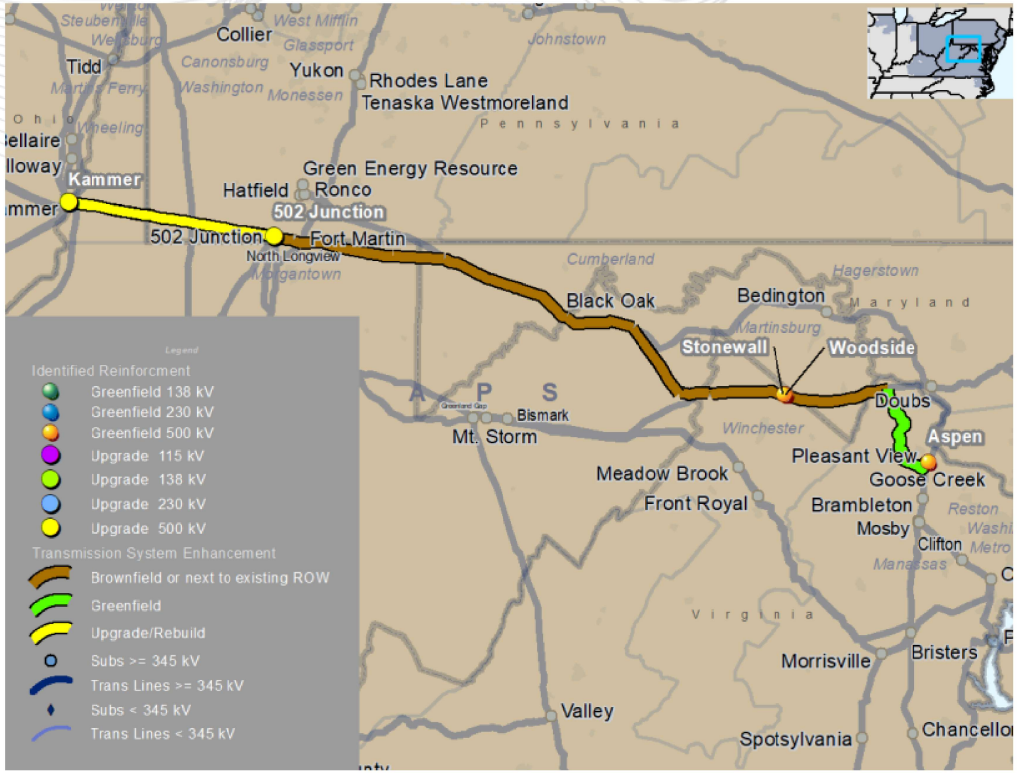


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

PJM©2023

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.*

PJM©2023

Short Circuit Evaluation

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

	Over Duty Bus (Qty)						Over Duty CBs	Maximum Fault Duty (kA)						
Scenario Description	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	Comment
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

PJM©2023

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
					$16.01M

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

Continued on next slide

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
					$18.5M

PJM©2023

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

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	Dominon	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 utliziation 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 - Graceton -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			TOTAL	4,934.56	5,407.86		

PJM©2023

Appendix

PJM©2023

2022 RTEP W3

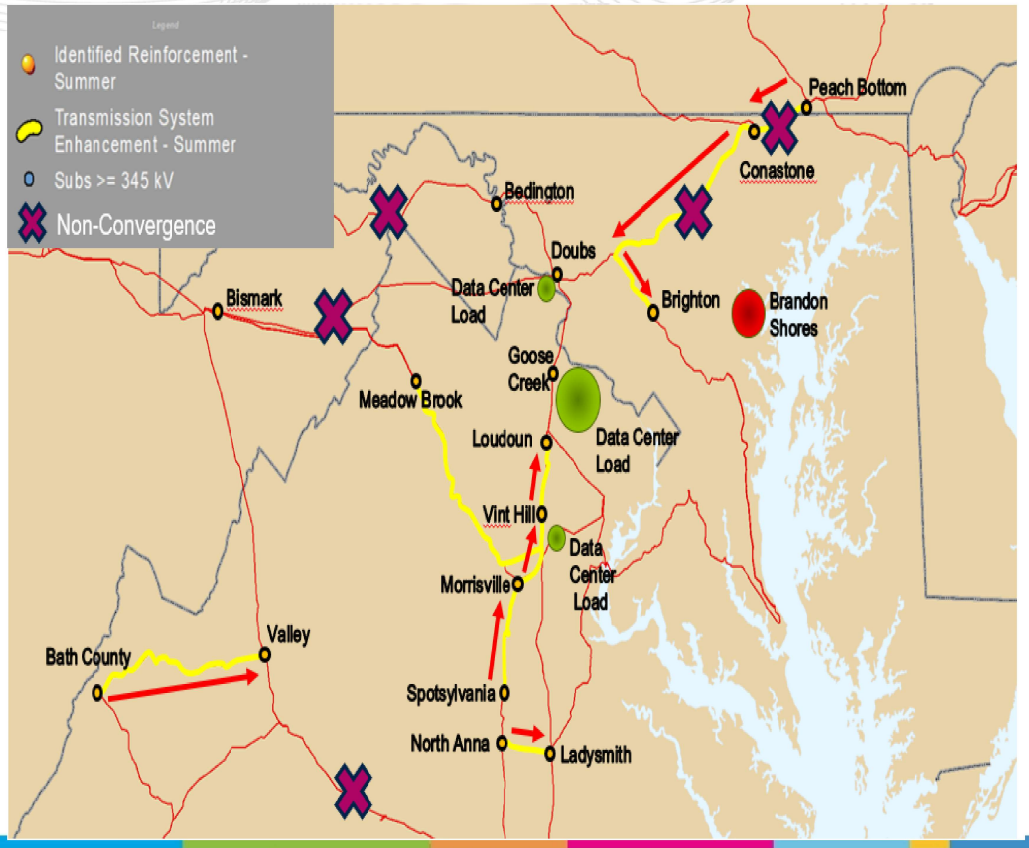
List of Proposal

PJM©2023

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 form the transfers
  - Local AEP violations
  - Local PPL violations

** The detailed flowgates are posted in PJM - Competitive Planning Process webpage



PJM©2023

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

PJM©2023

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

PJM©2023

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

PJM©2023

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

PJM©2023

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 quantitive 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.

PJM©2023

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

PJM©2023

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

PJM©2023

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

PJM©2023

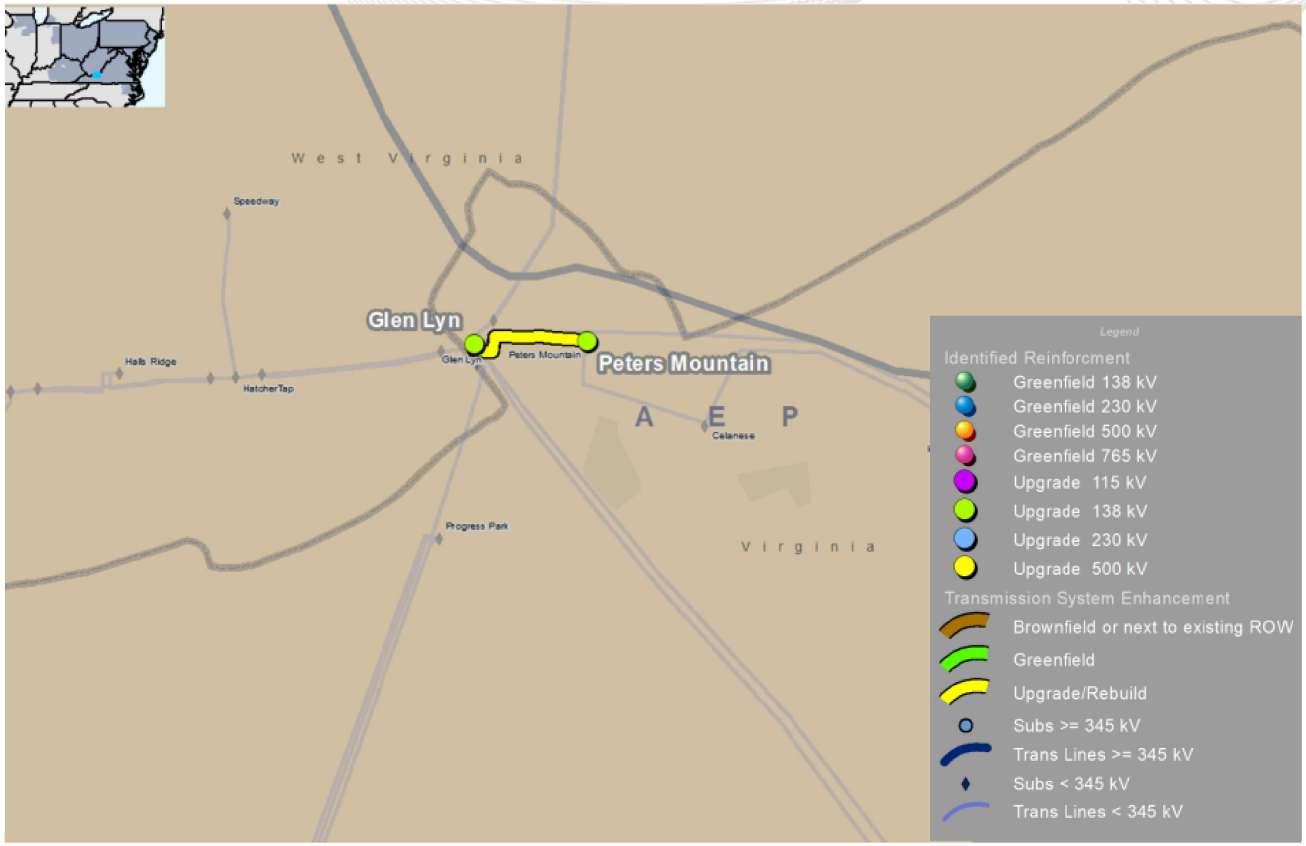
Dominion Cluster Constructability Matrix

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

PJM©2023

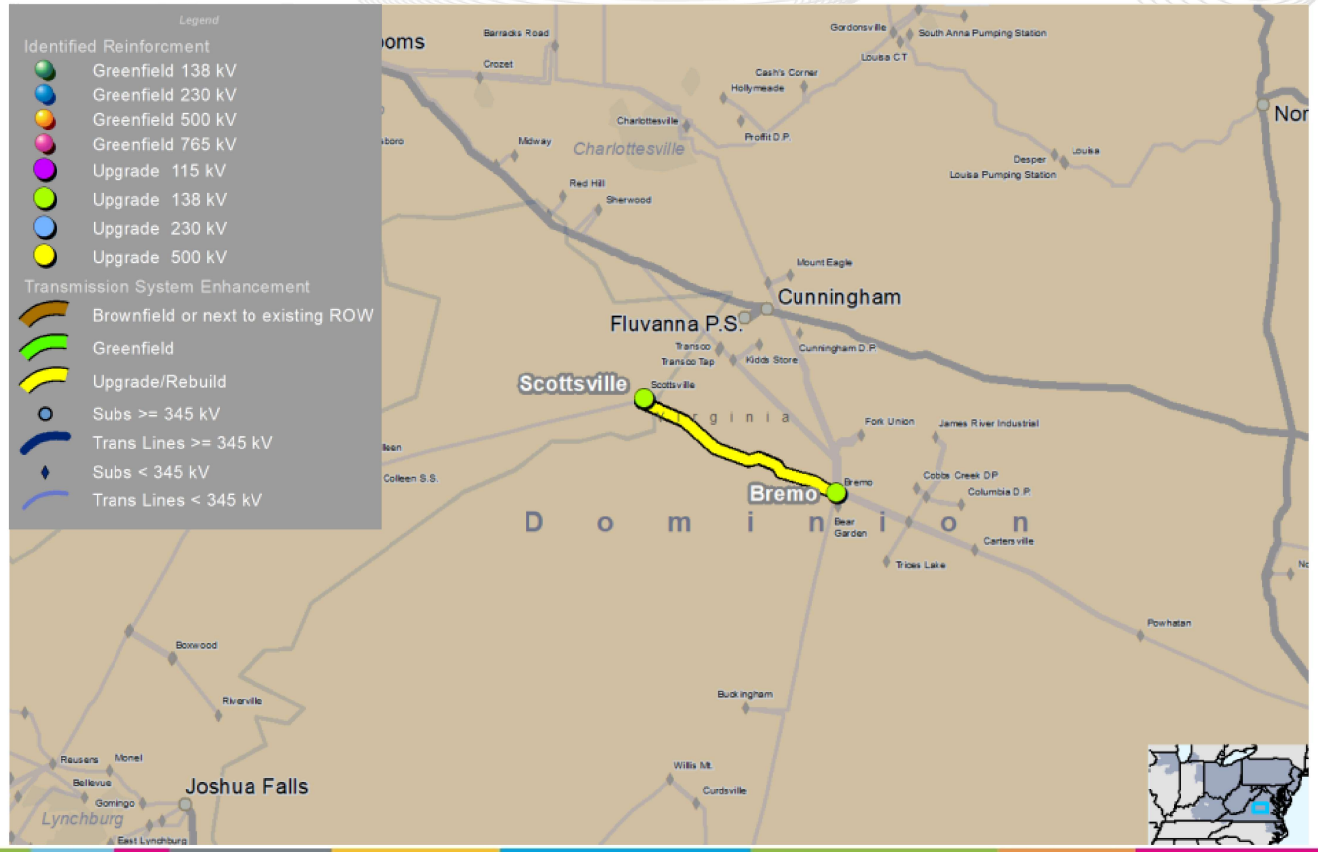
2022 Window 3 proposals – AEP – 196 & 234



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

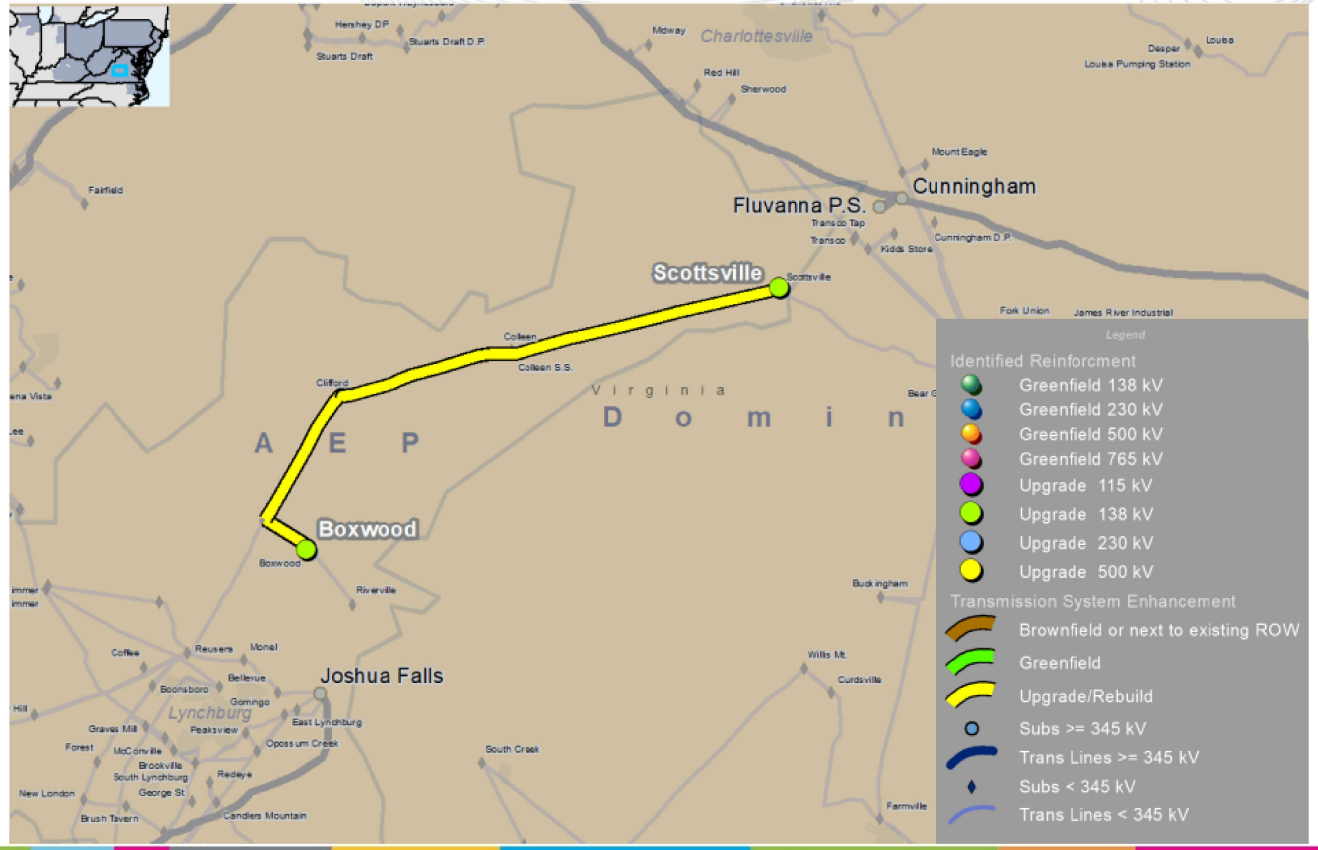
PJM©2023

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.*

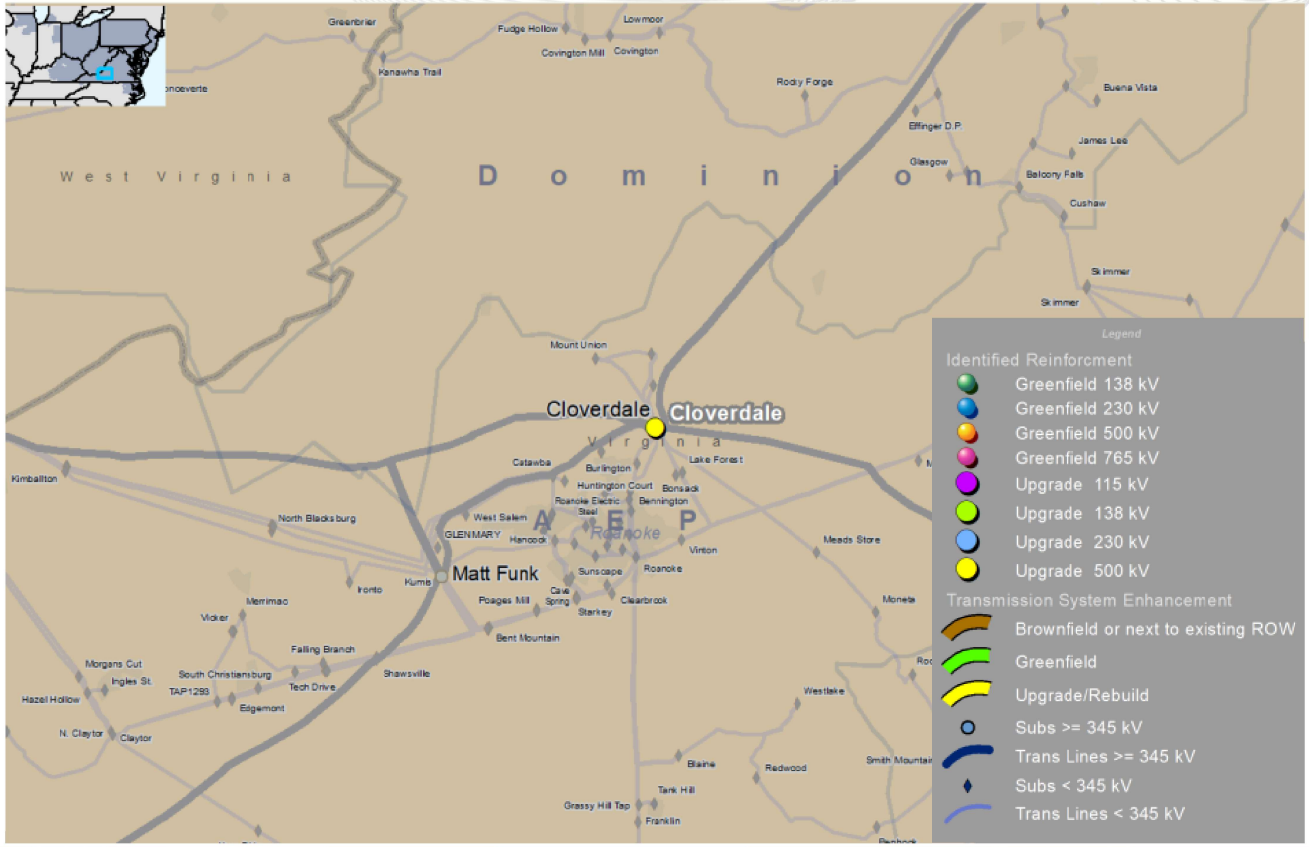
2022 Window 3 proposals – AEP – 55 & 181



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

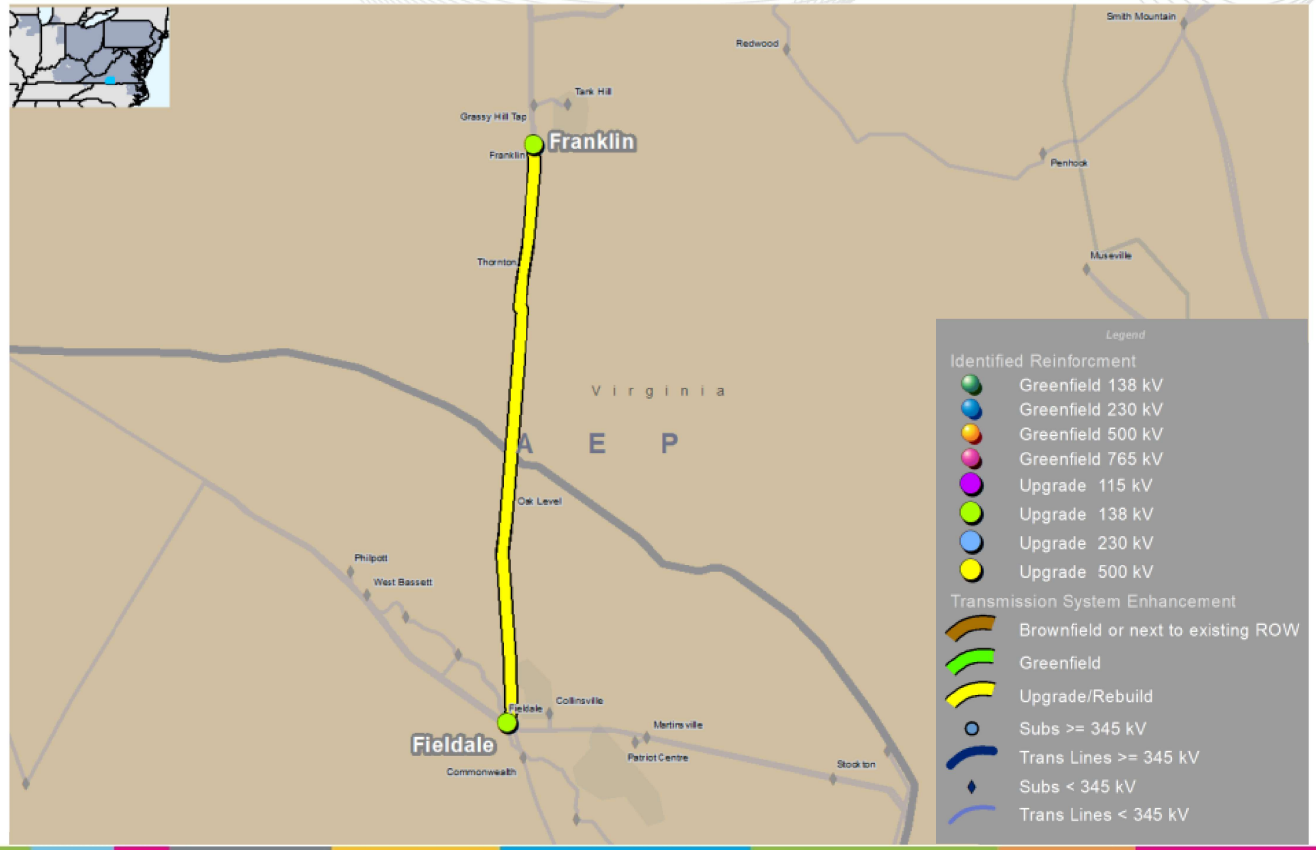
PJM©2023

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.*

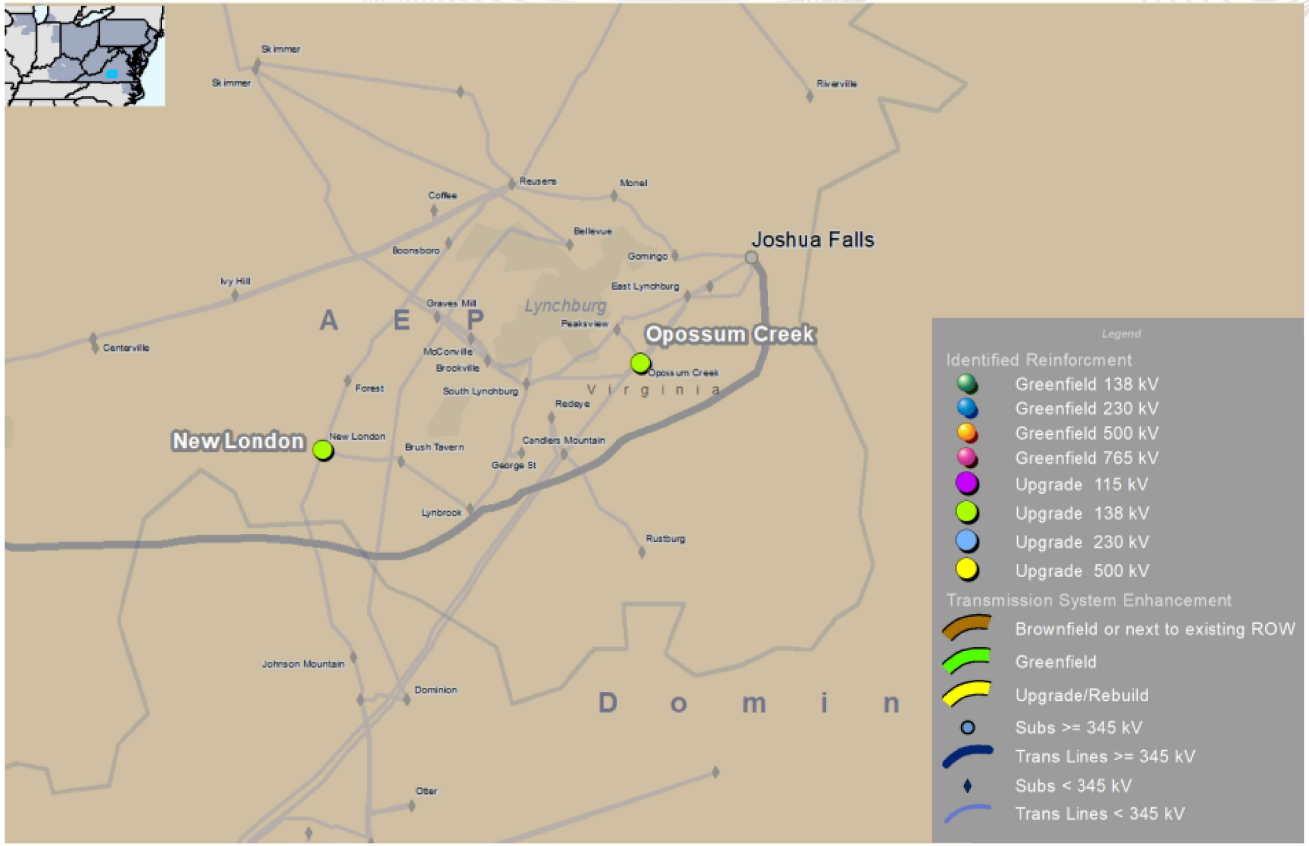
2022 Window 3 proposals – AEP - 477 & 537



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

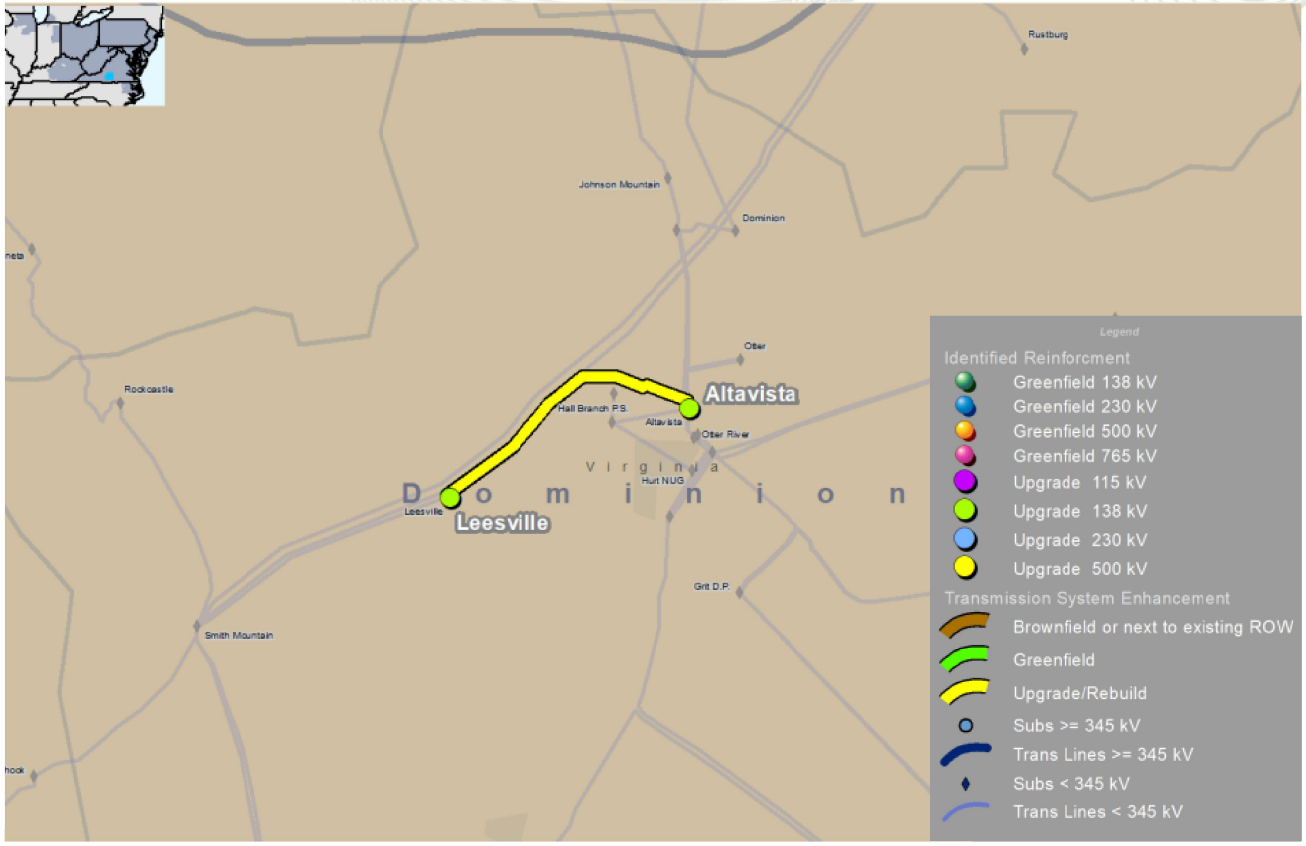
PJM©2023

2022 Window 3 proposals – AEP - 524



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

2022 Window 3 proposals – AEP - 856



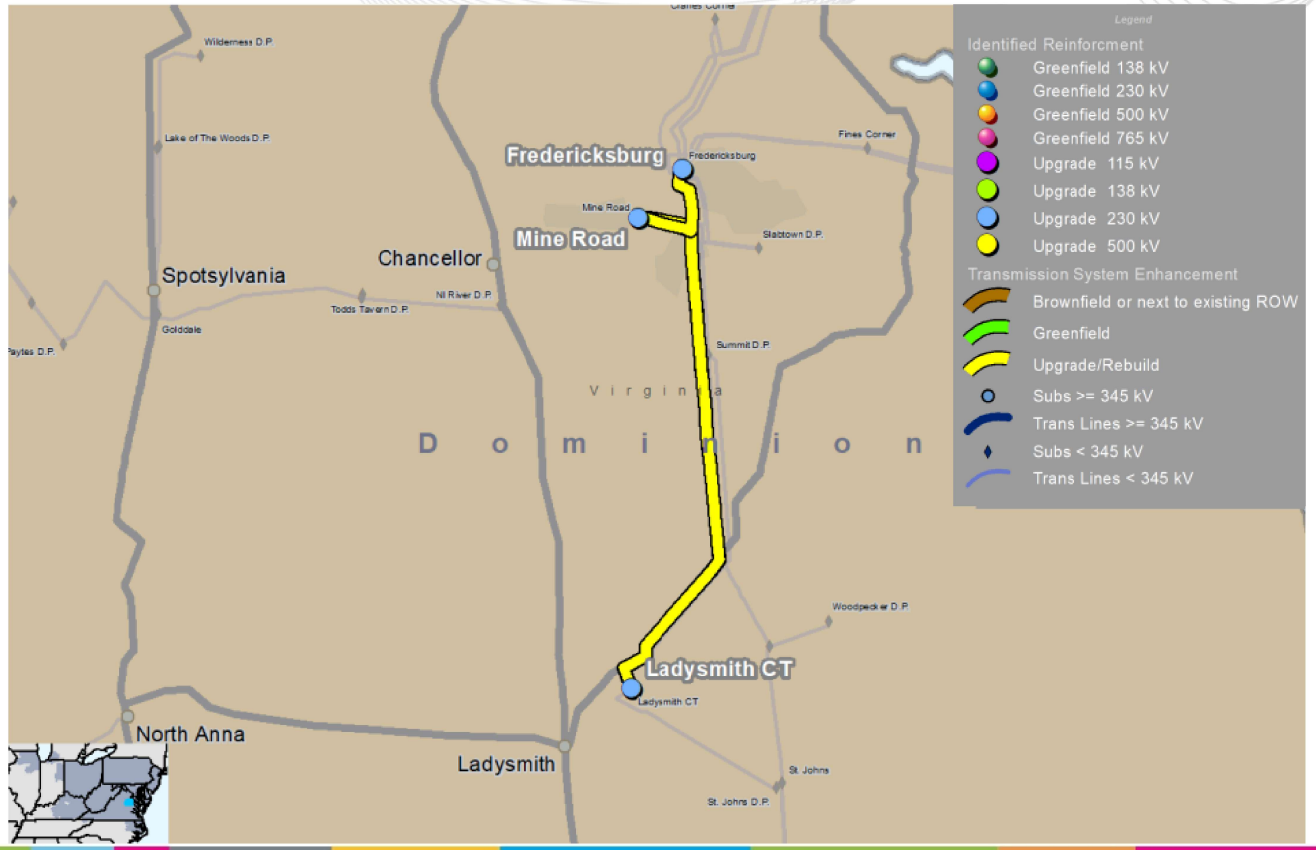
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Dominion - 30



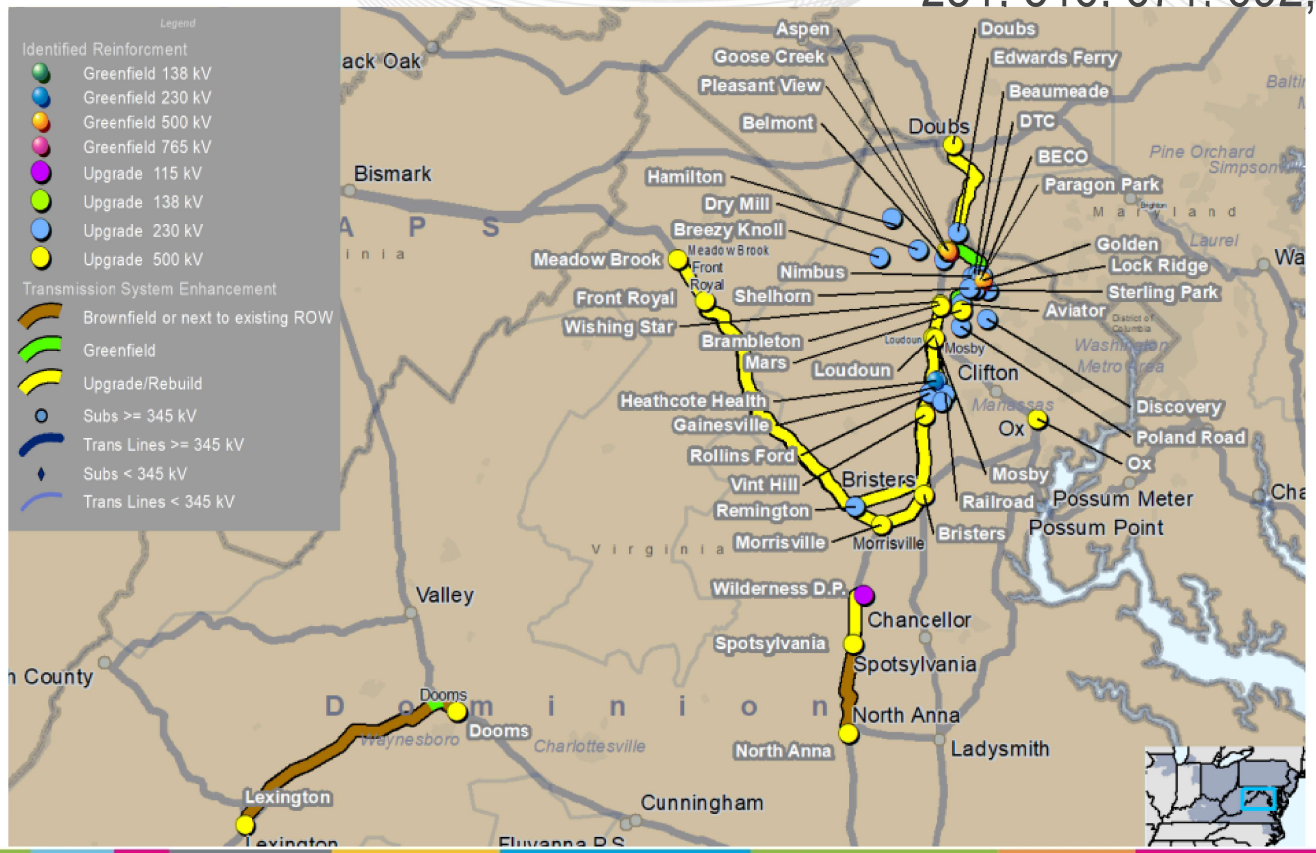
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Dominion - 74



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

2022 Window 3 proposals – Dominion – 129
231, 516, 671, 692, 711, 923



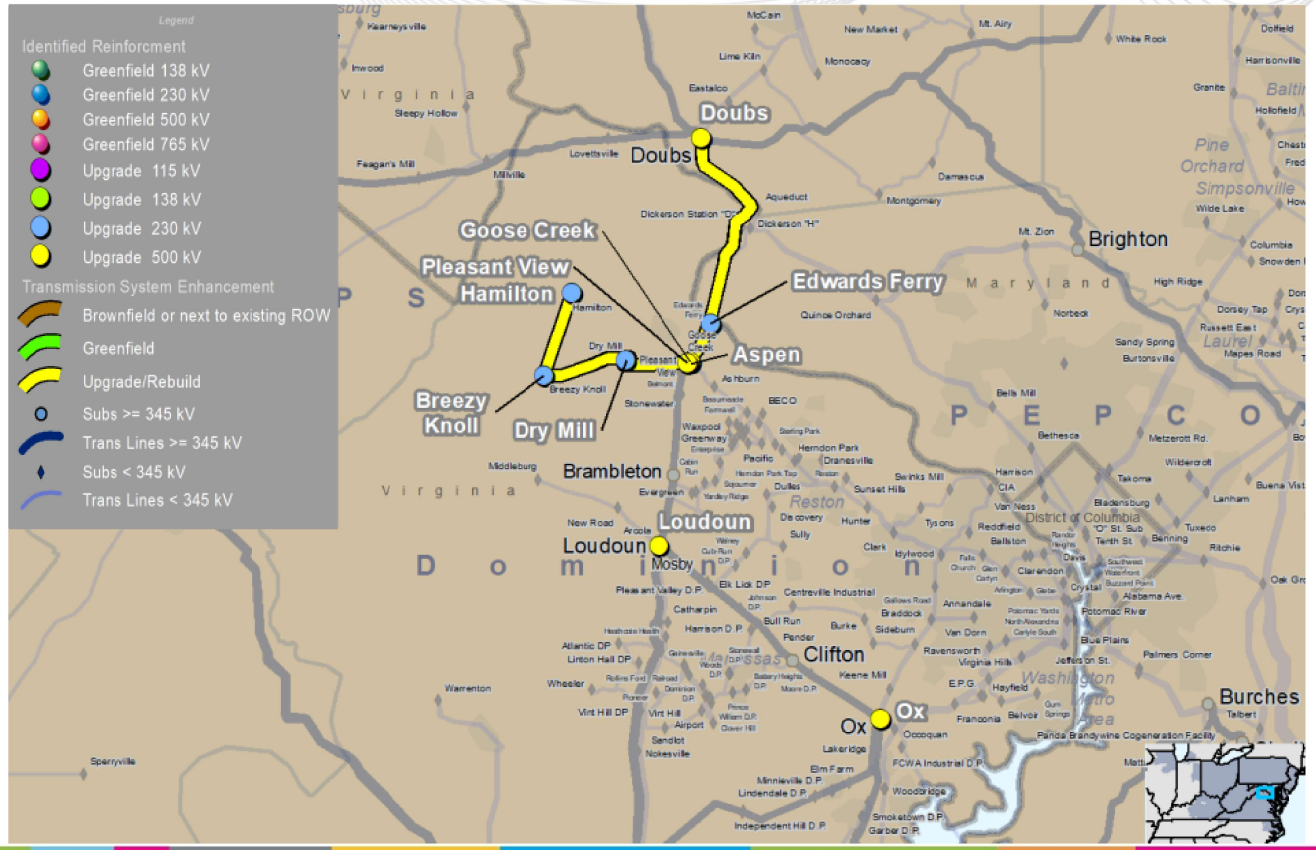
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Dominion - 231



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.*

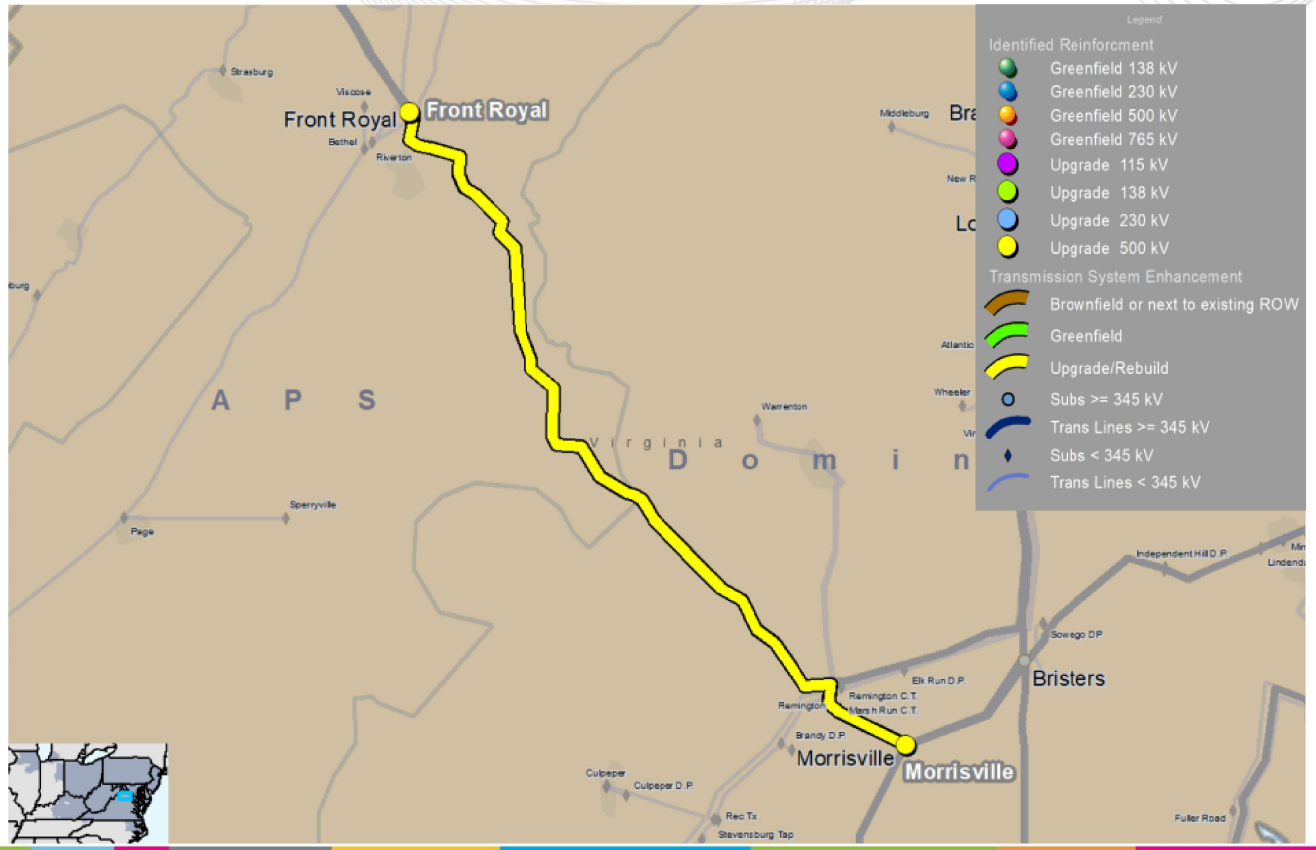
2022 Window 3 proposals – Dominion - 516



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.*

PJM©2023

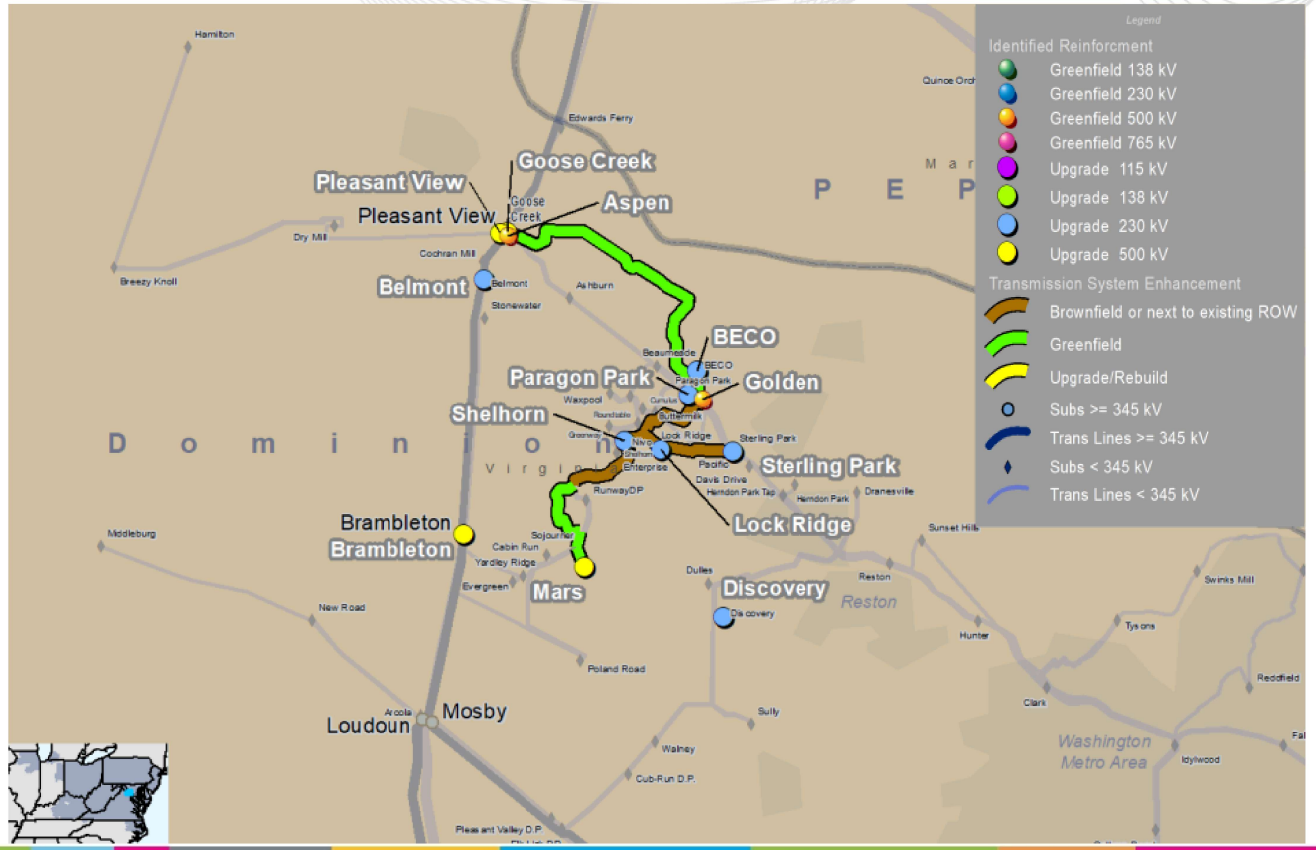
2022 Window 3 proposals – Dominion - 671



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

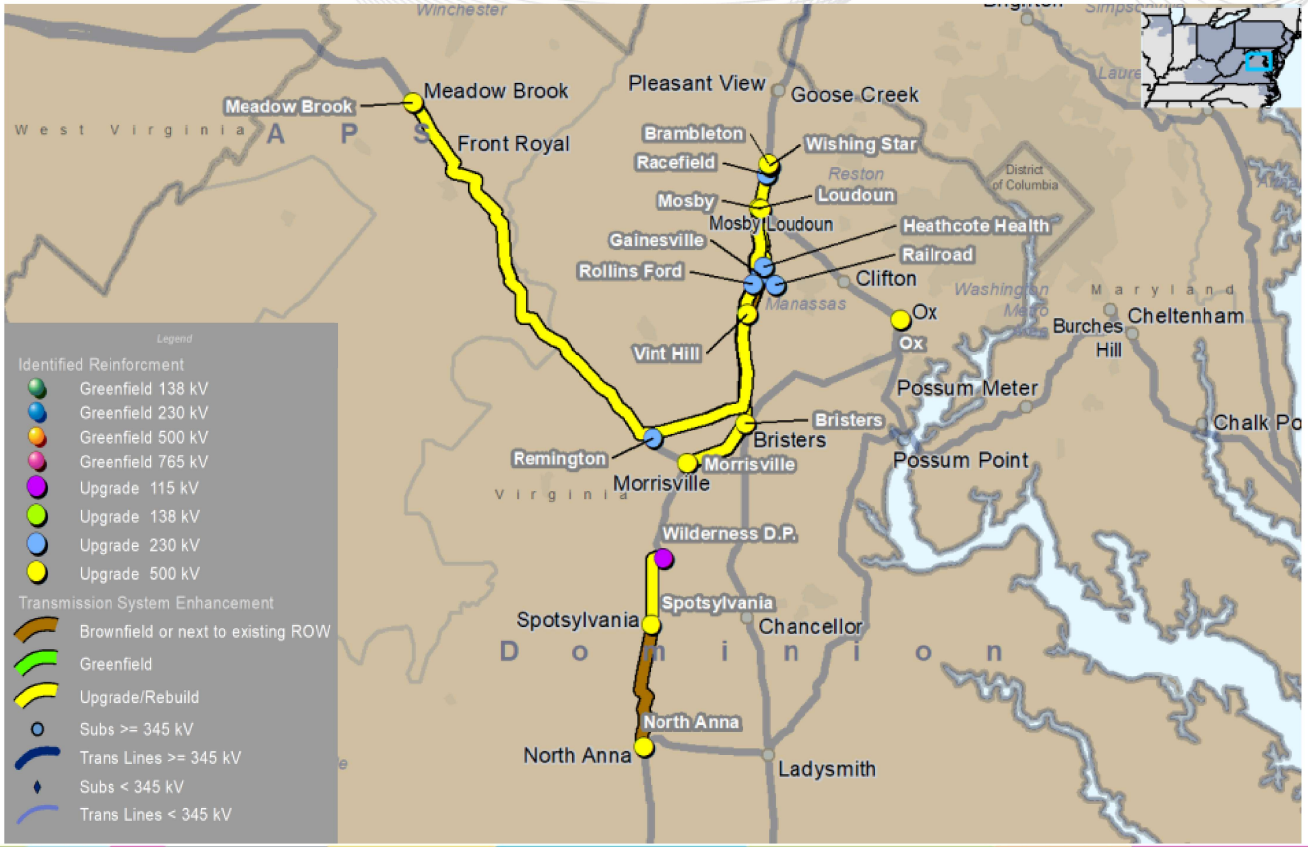
PJM©2023

2022 Window 3 proposals – Dominion - 692



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

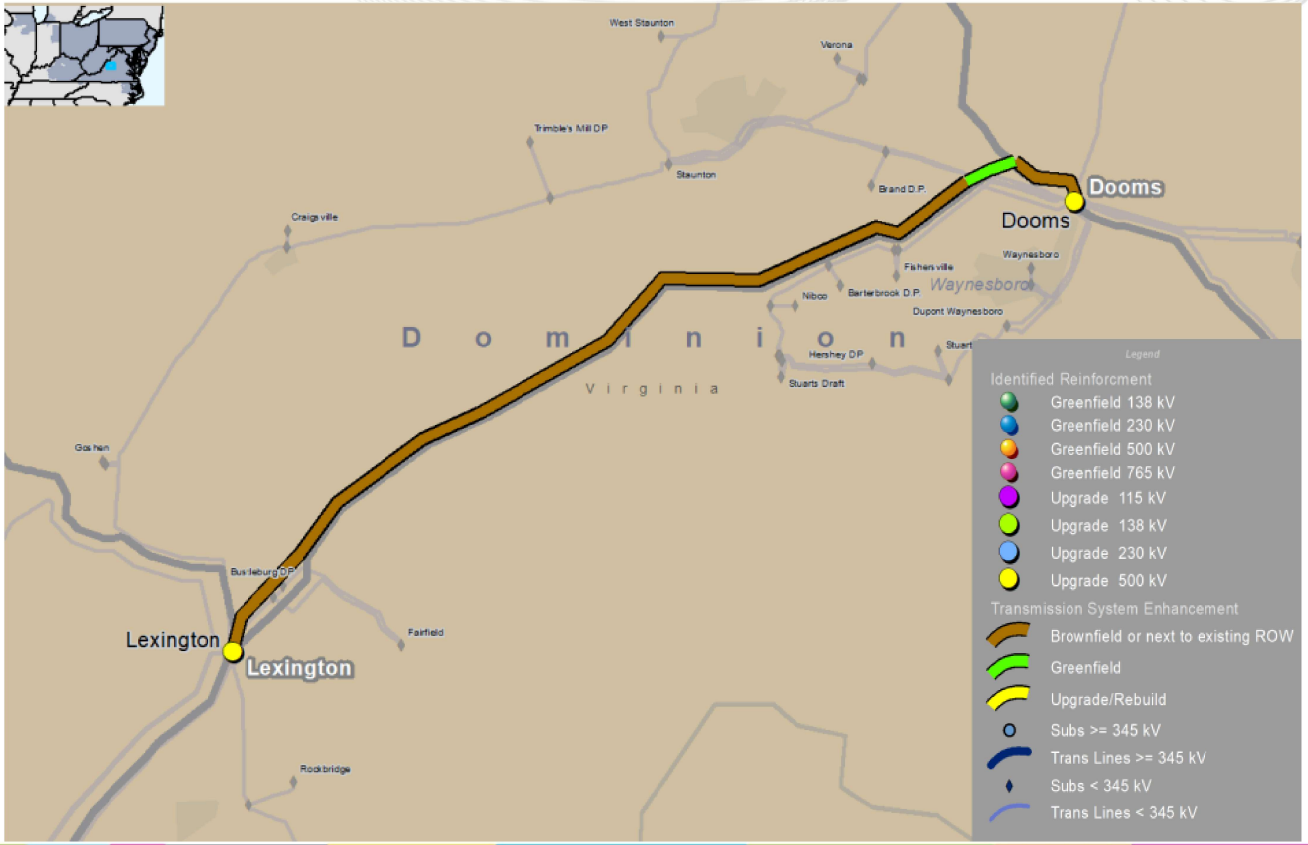
2022 Window 3 proposals – Dominion - 711



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.*

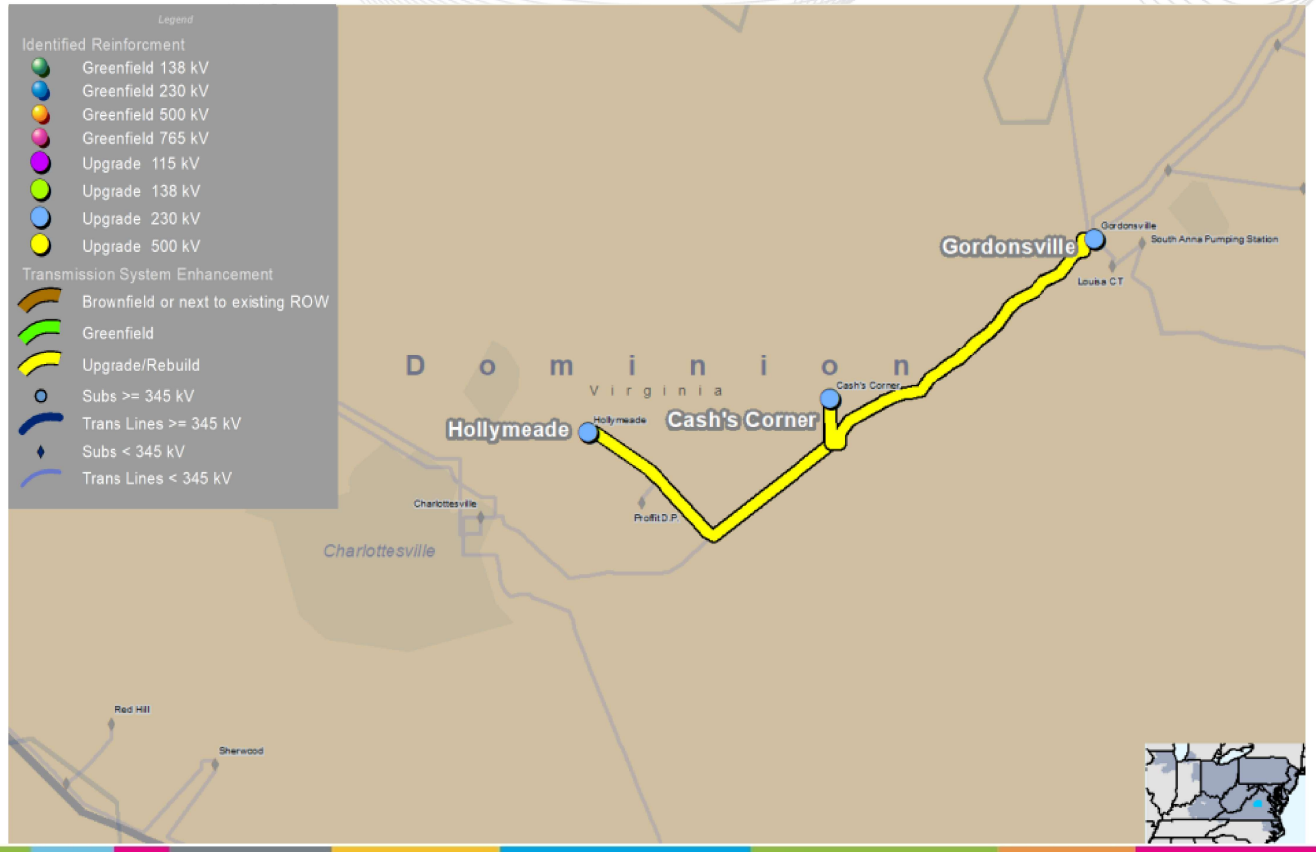
PJM©2023

2022 Window 3 proposals – Dominion - 923



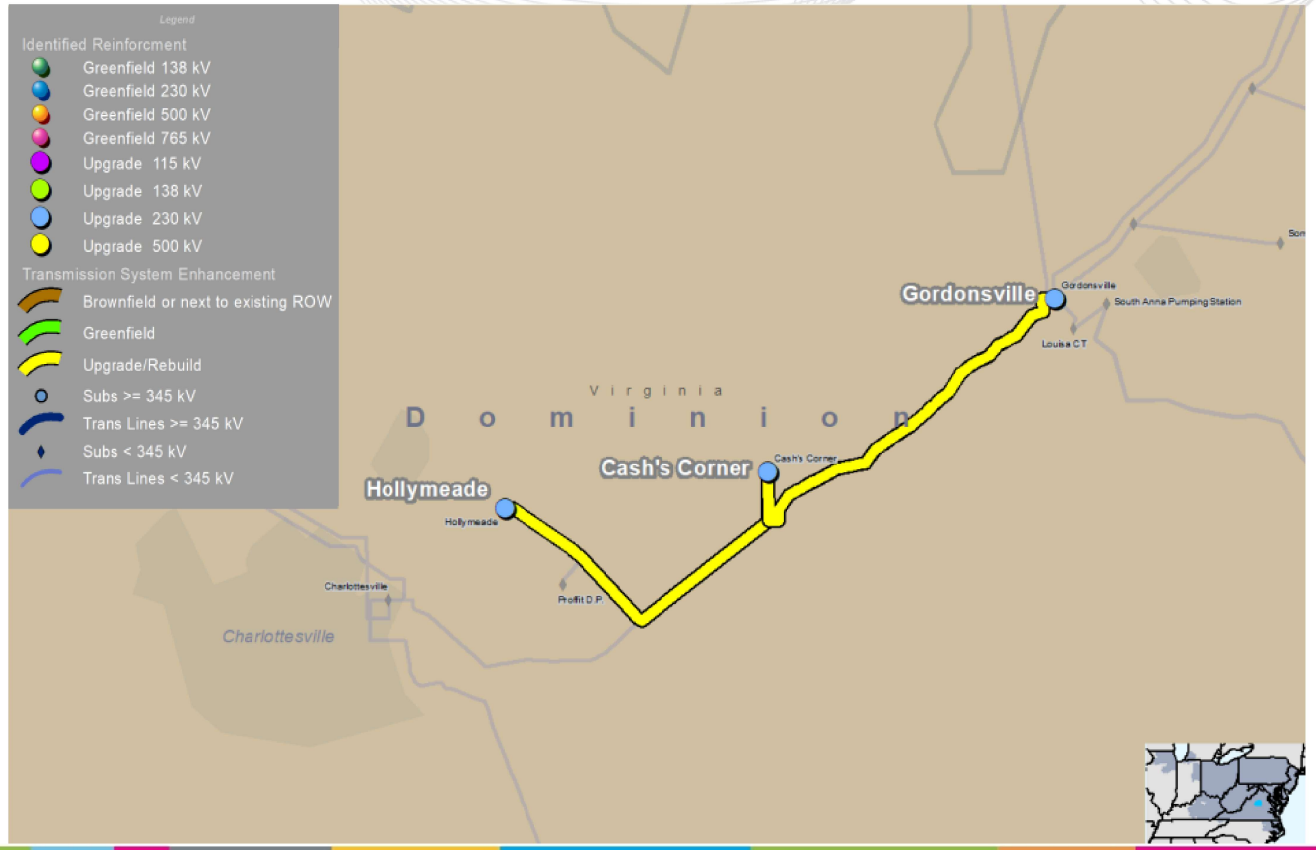
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Dominion - 211



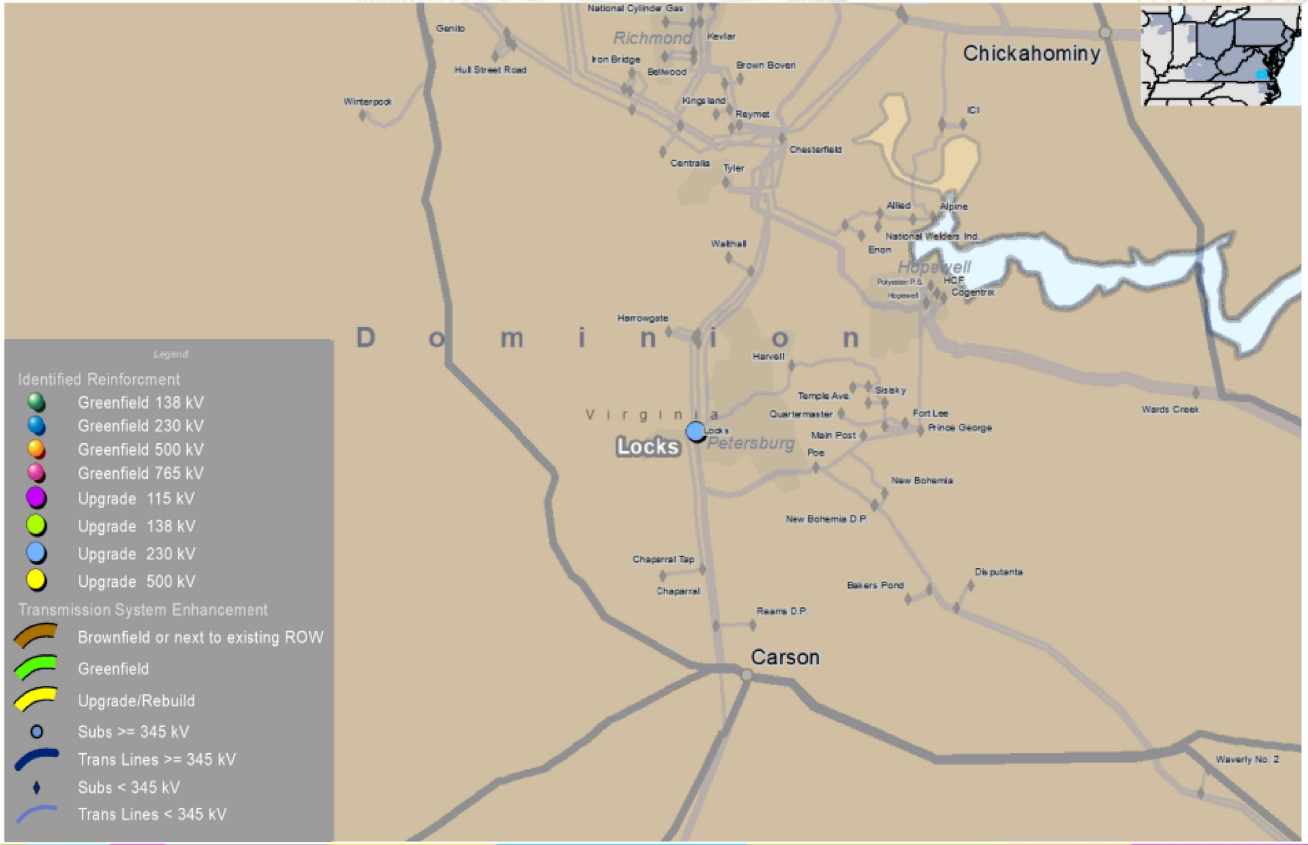
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Dominion - 704



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

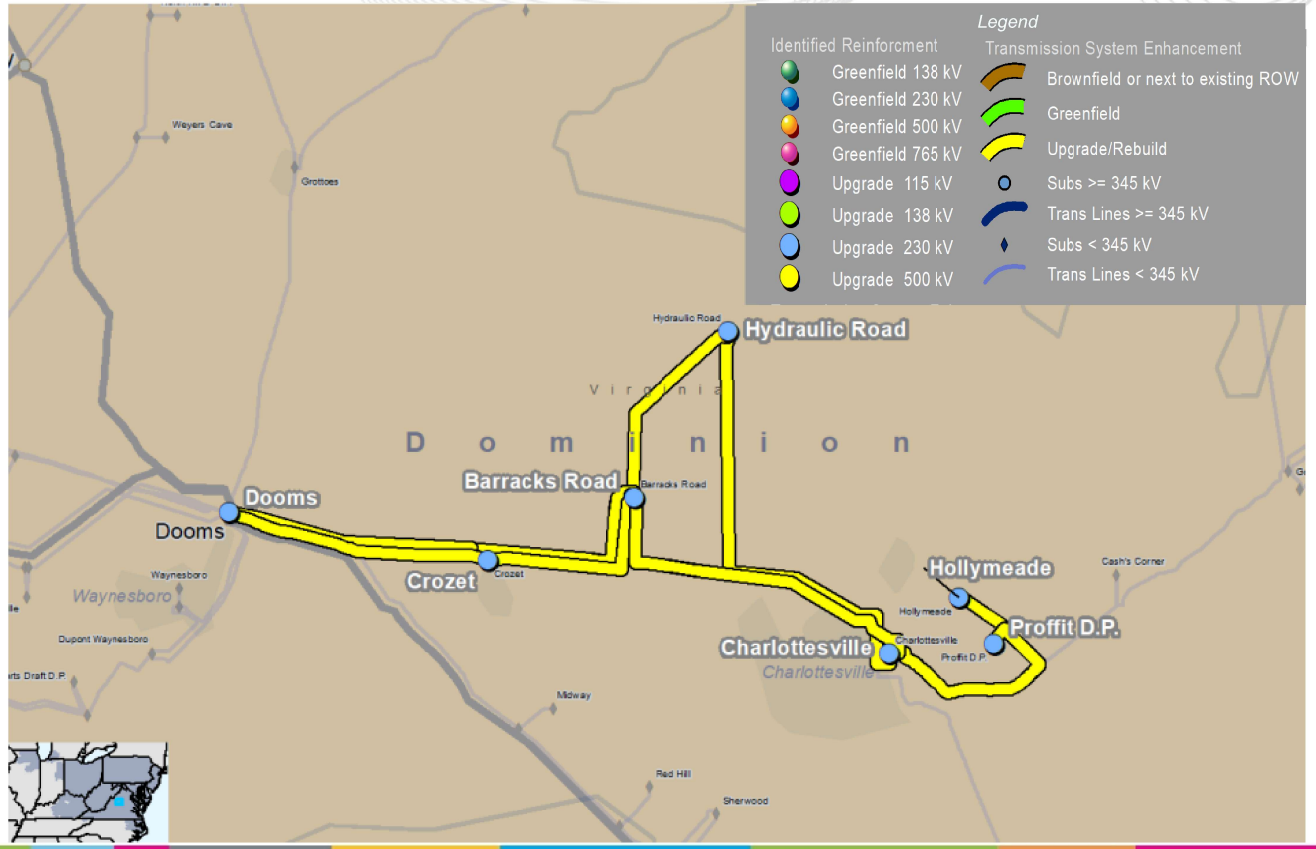
2022 Window 3 proposals – Dominion – 731



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.*

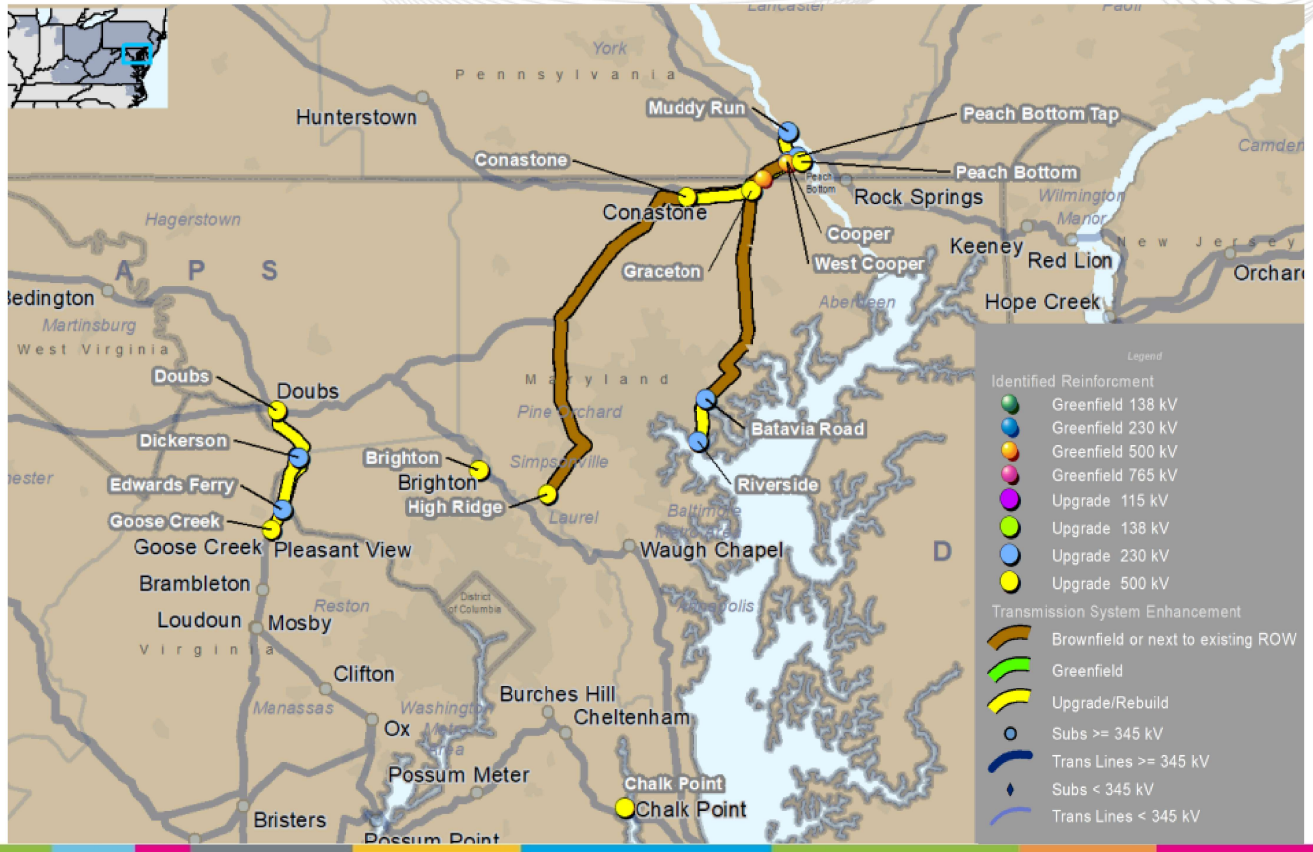
PJM©2023

2022 Window 3 proposals – Dominion - 967



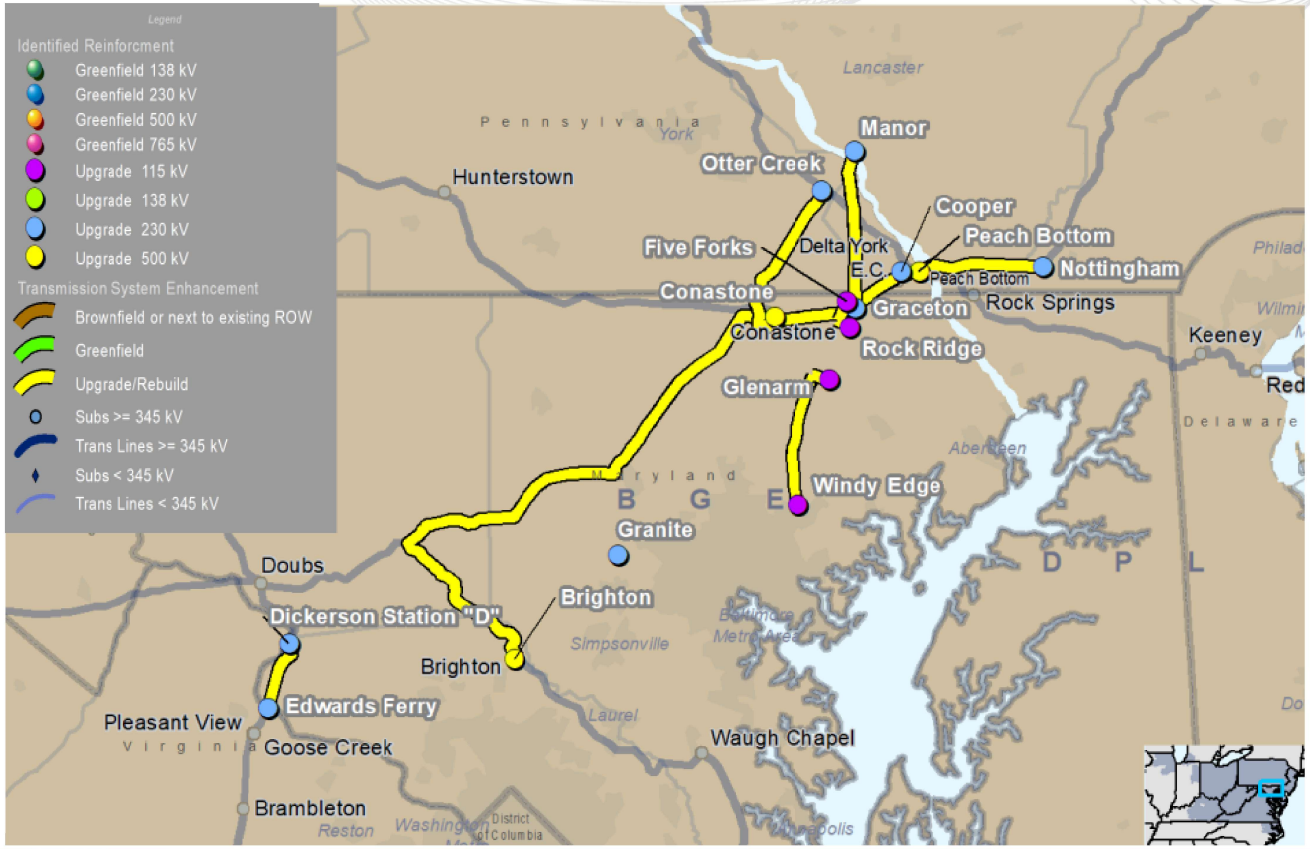
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Exelon – 344 & 660



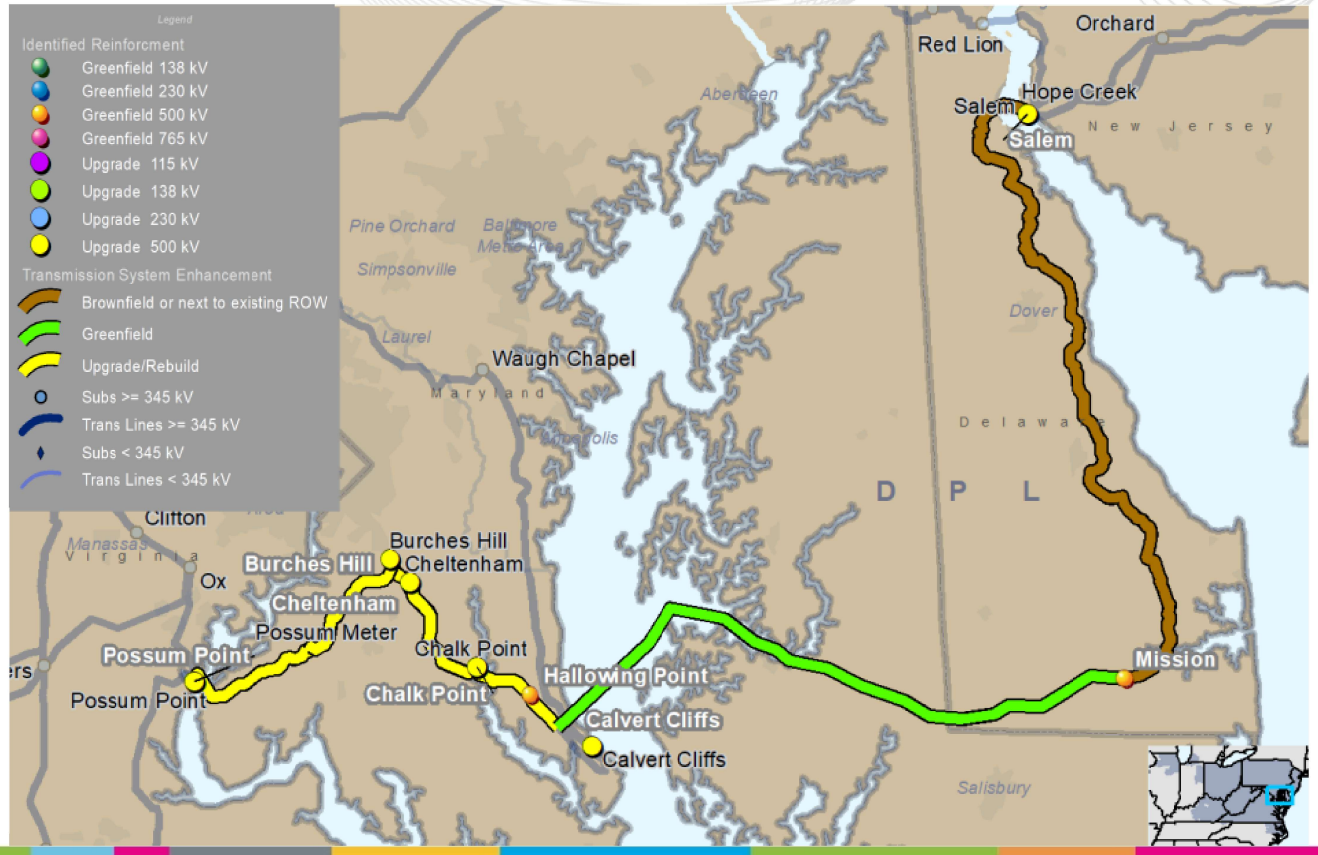
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Exelon - 600



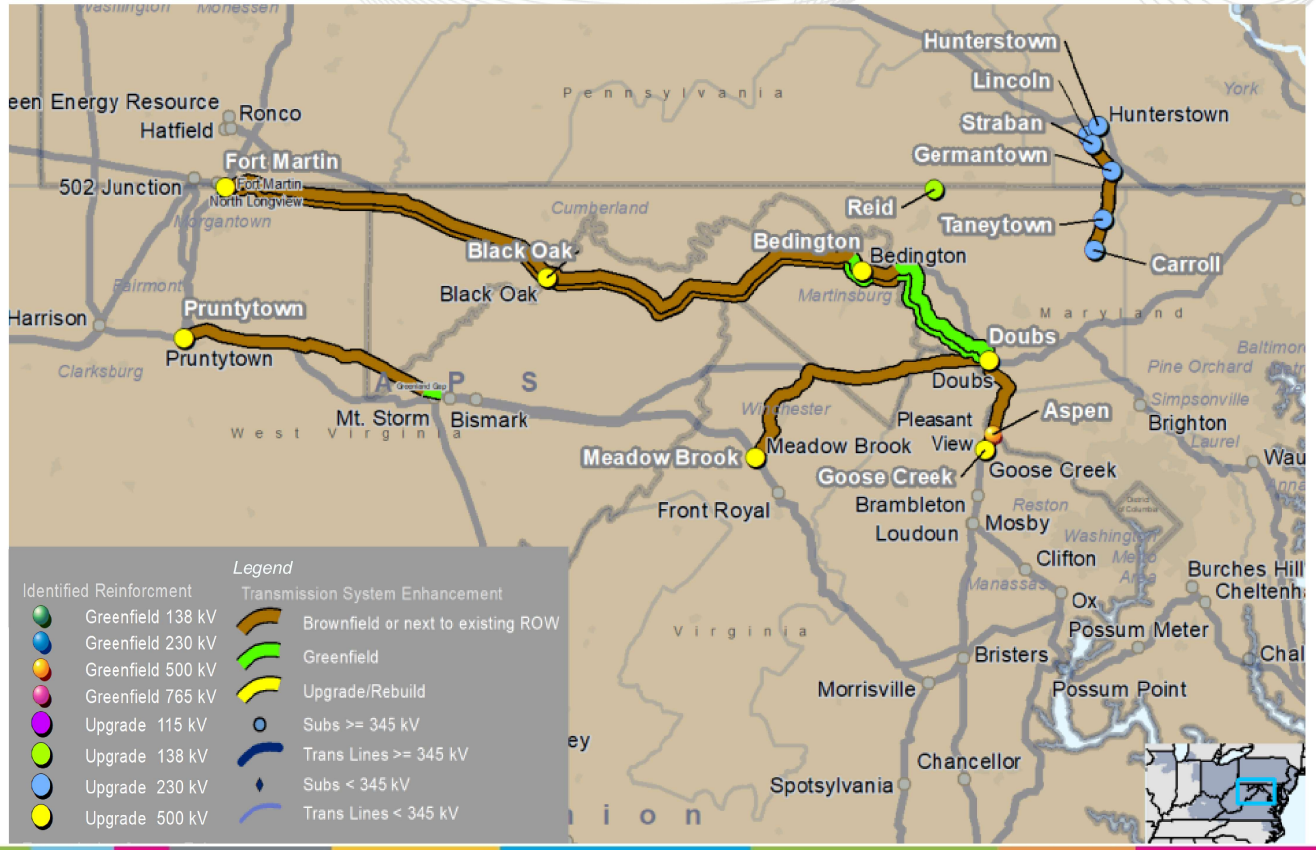
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

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.*

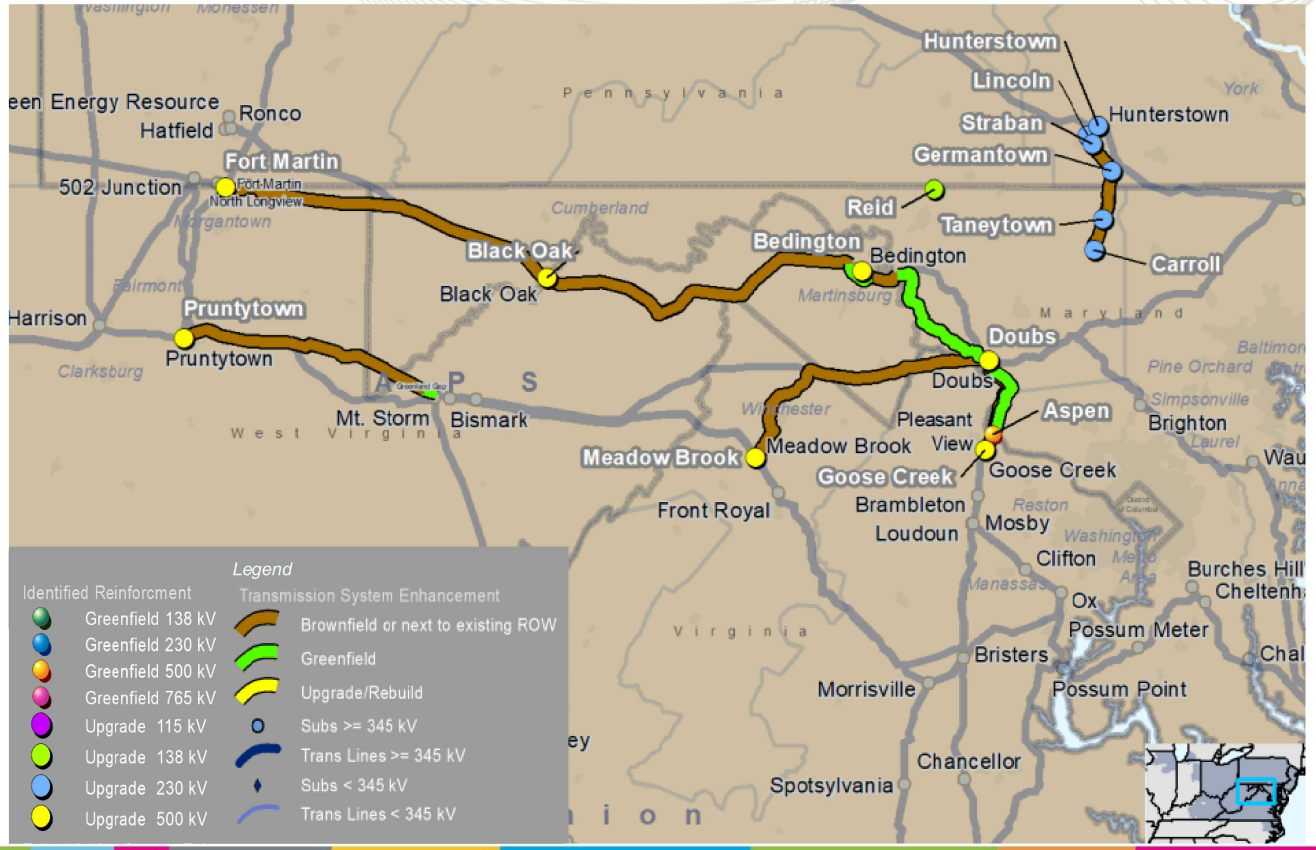
2022 Window 3 proposals – FE – 23



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

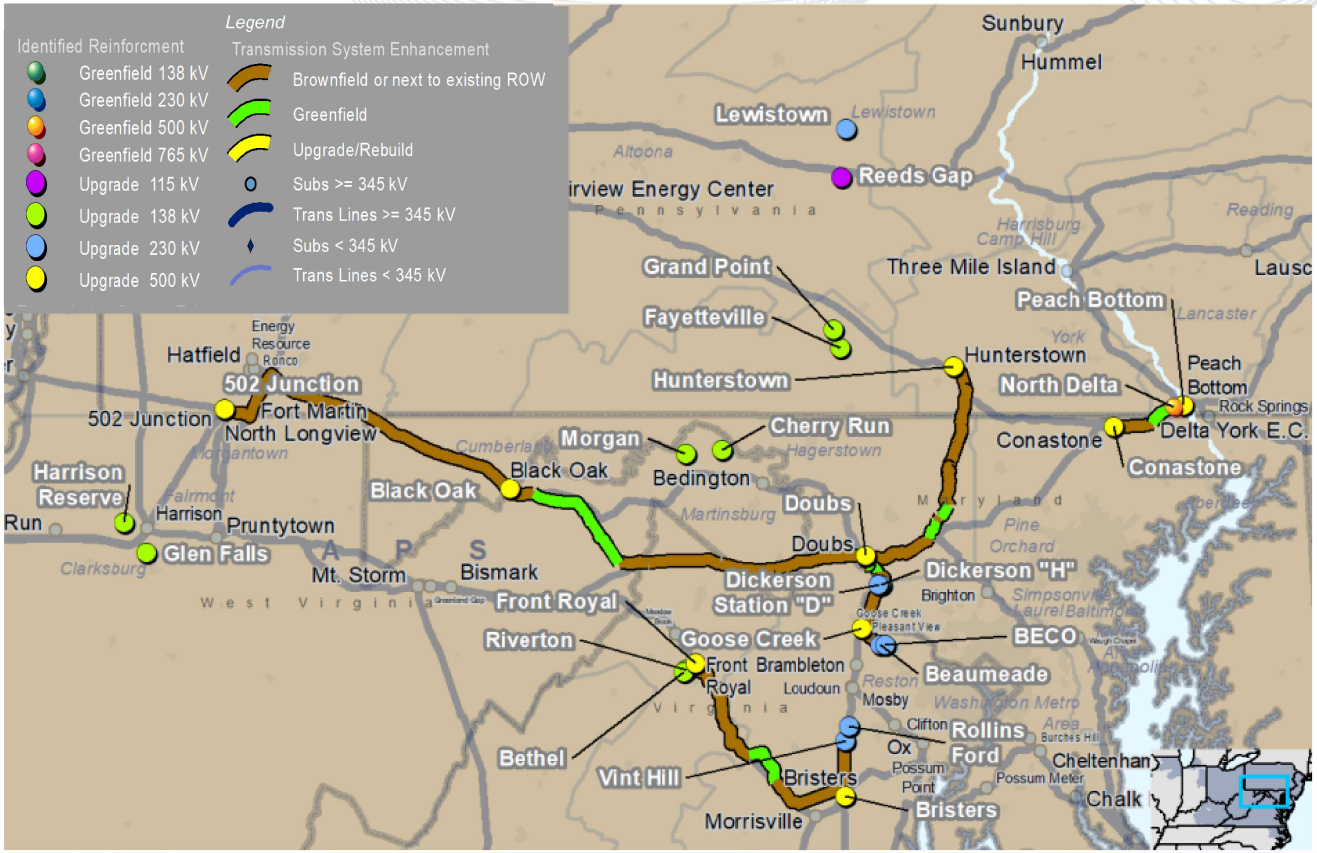
PJM©2023

2022 Window 3 proposals – FE – 837



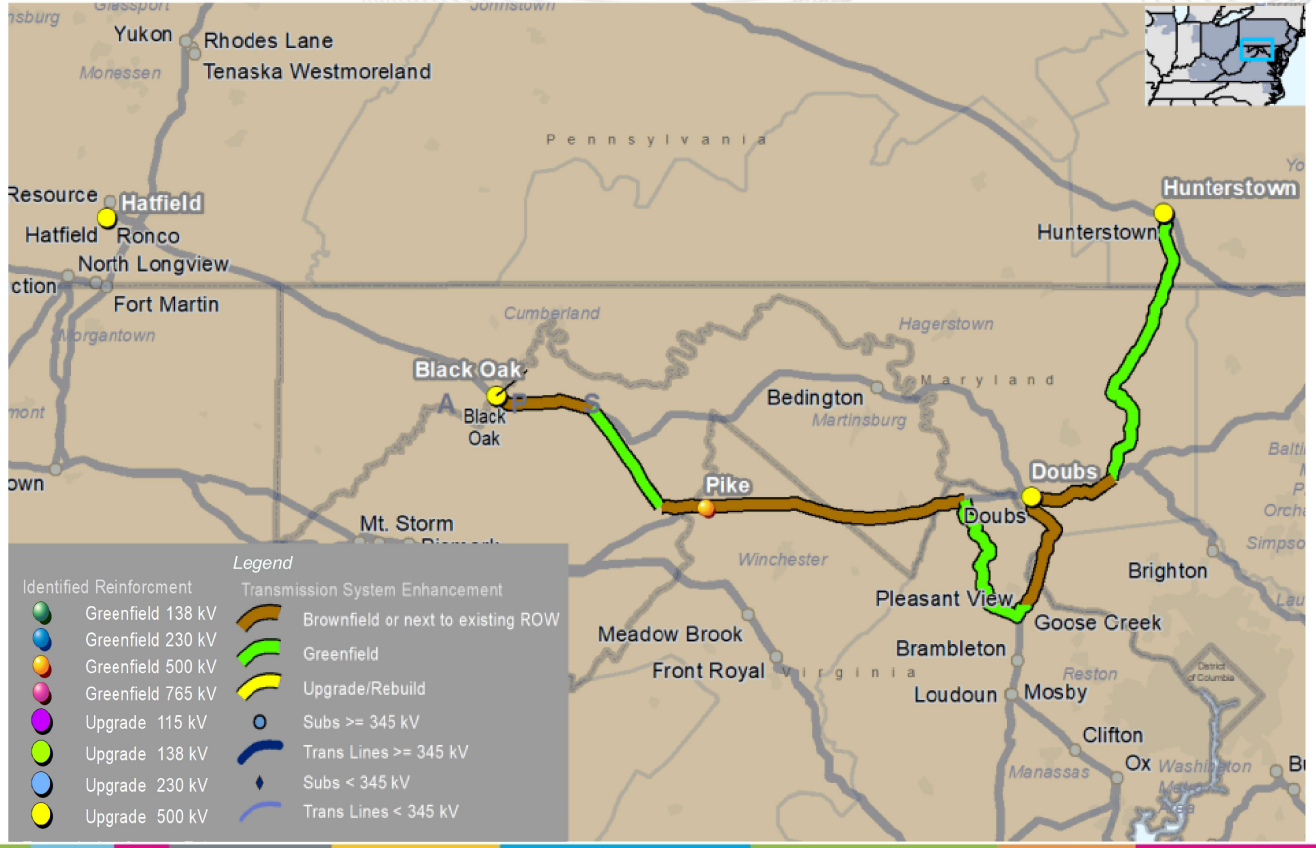
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

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.*

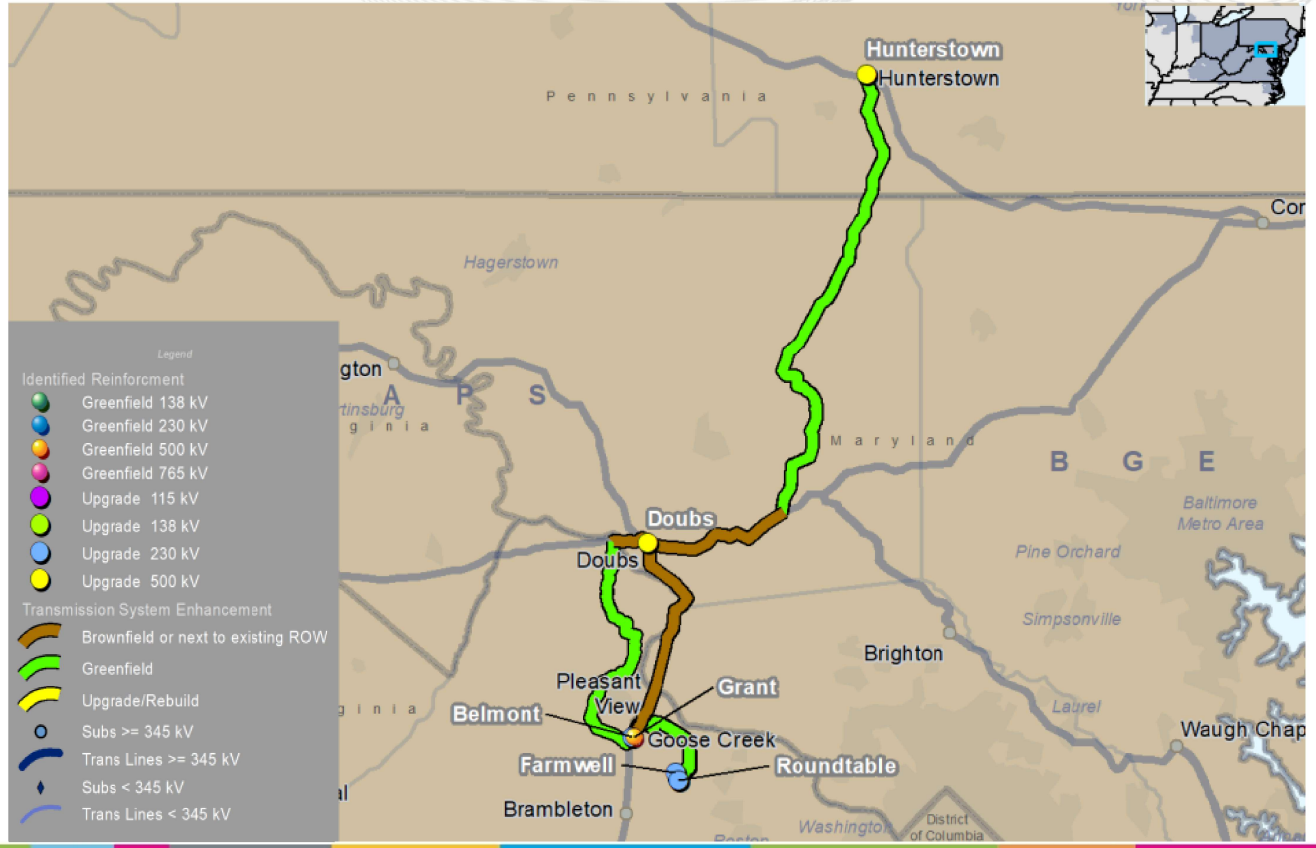
2022 Window 3 proposals – Nextera- 28



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

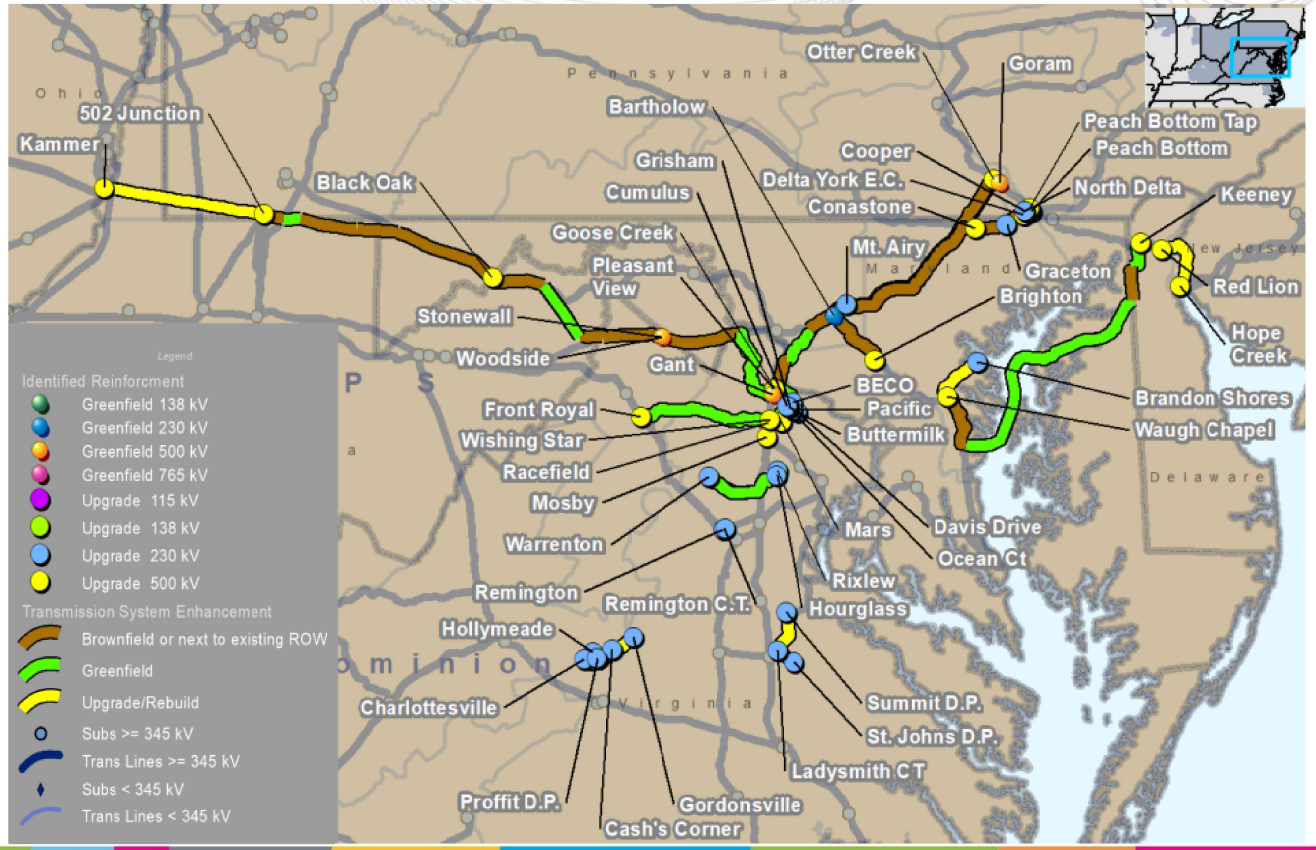
PJM©2023

2022 Window 3 proposals – Nextera - 116



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

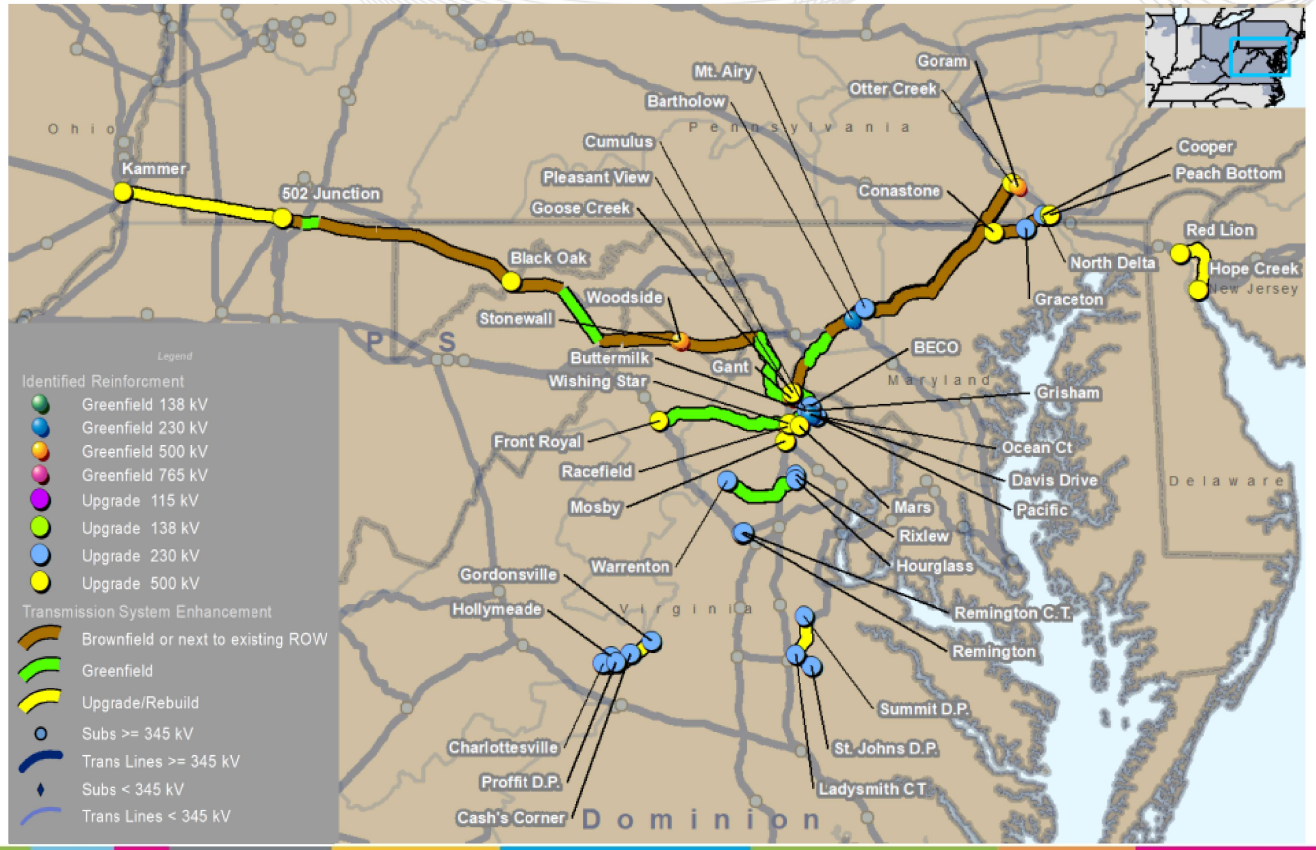
2022 Window 3 proposals – Nextera - 175 with 663, 853, 948



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.*

PJM©2023

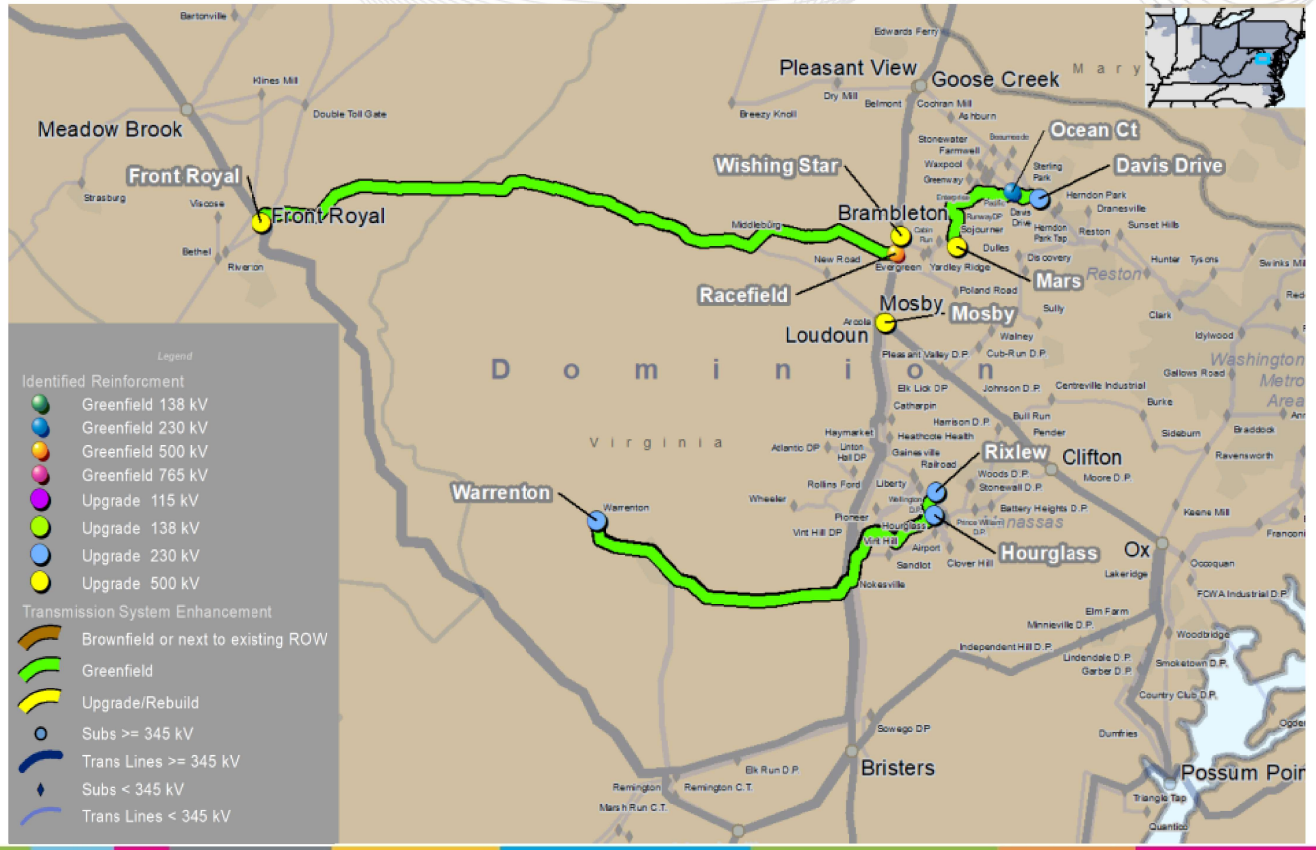
2022 Window 3 proposals – Nextera - 598 with 663, 853, 385



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.*

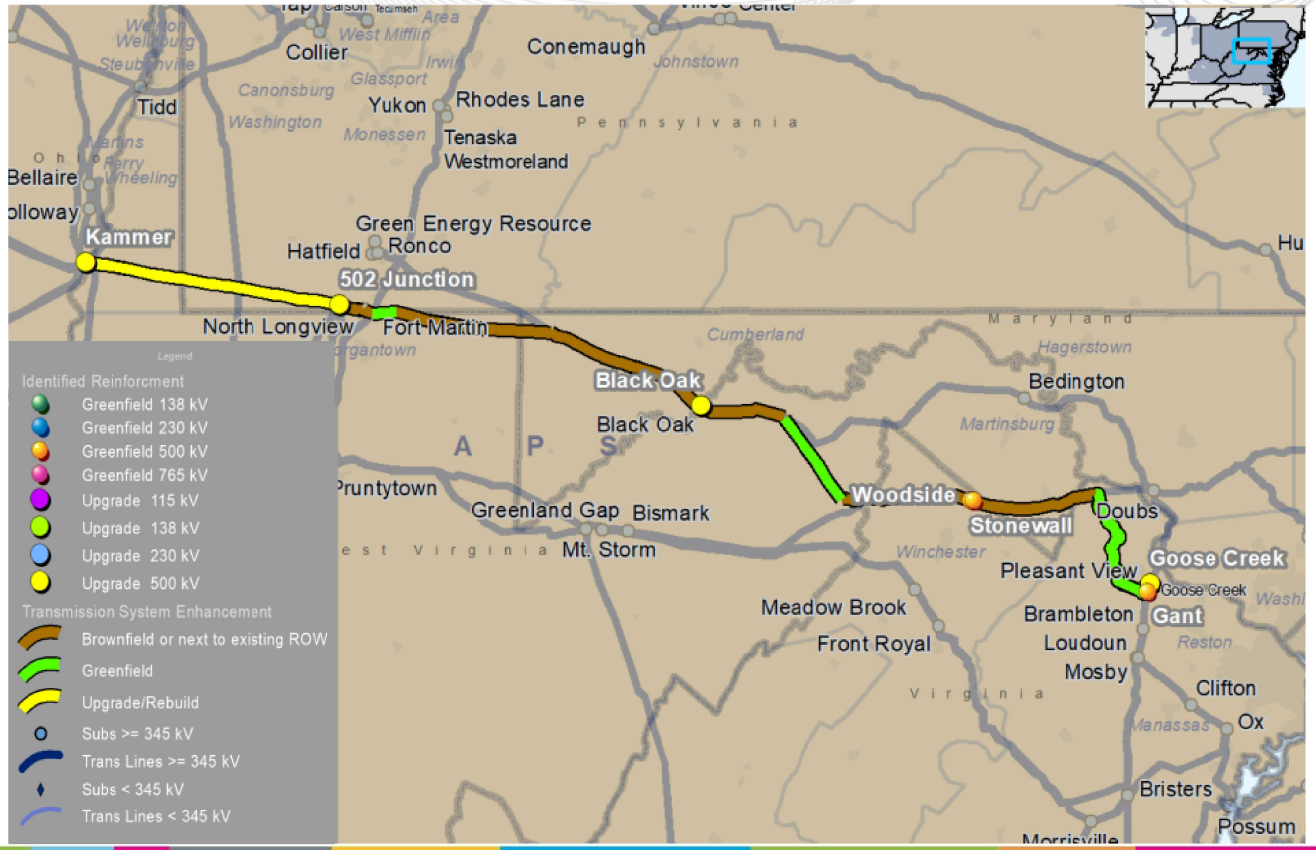
PJM©2023

2022 Window 3 proposals – Nextera - 663



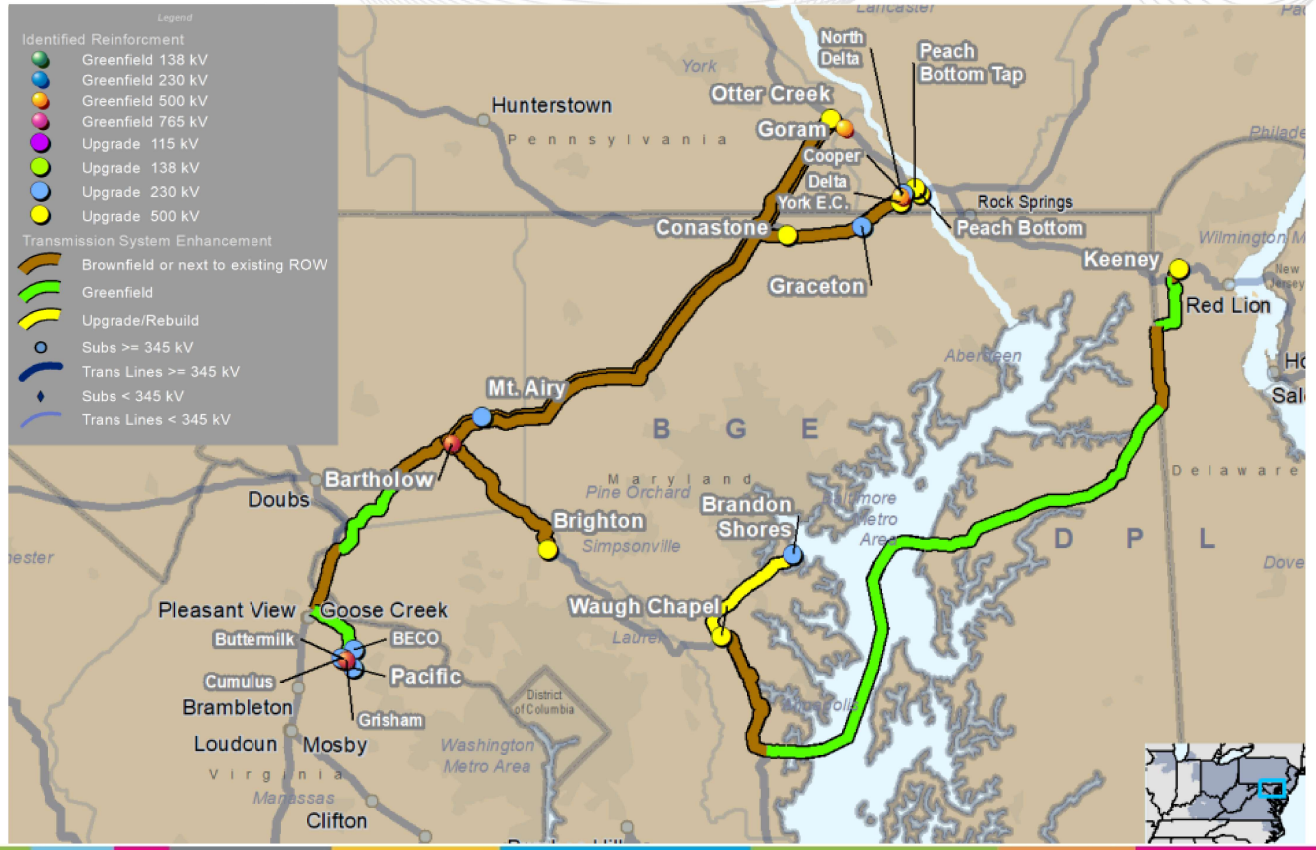
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Nextera - 853



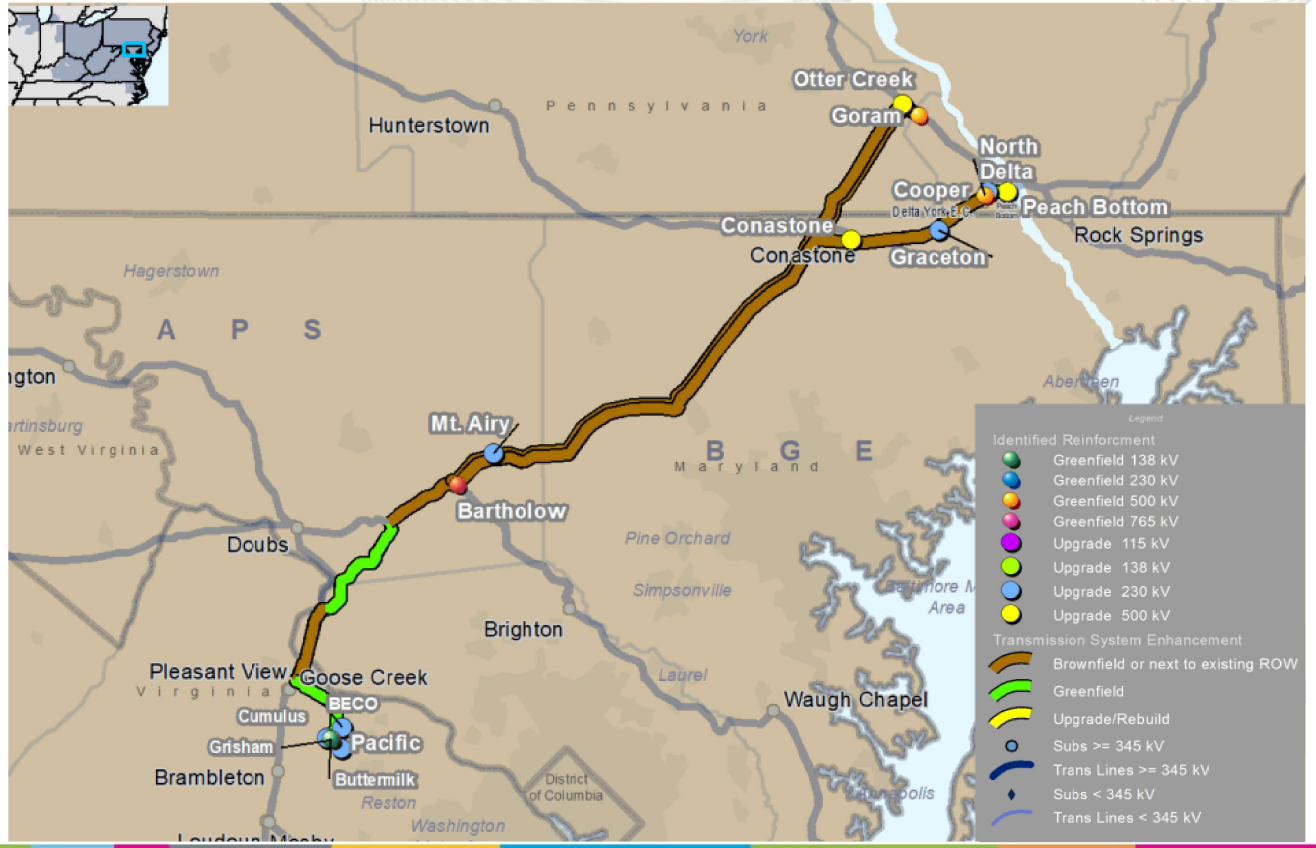
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

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.*

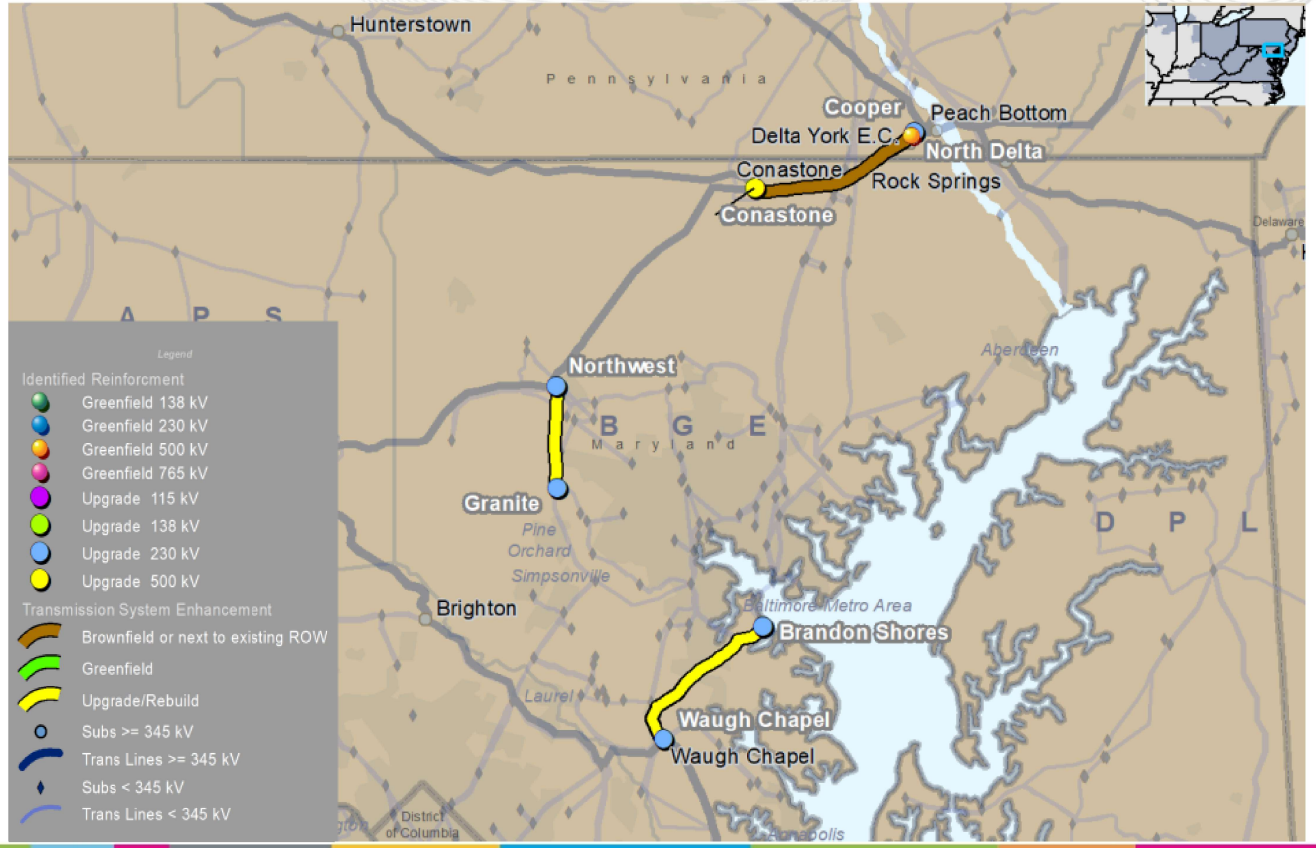
2022 Window 3 proposals – Nextera 385



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

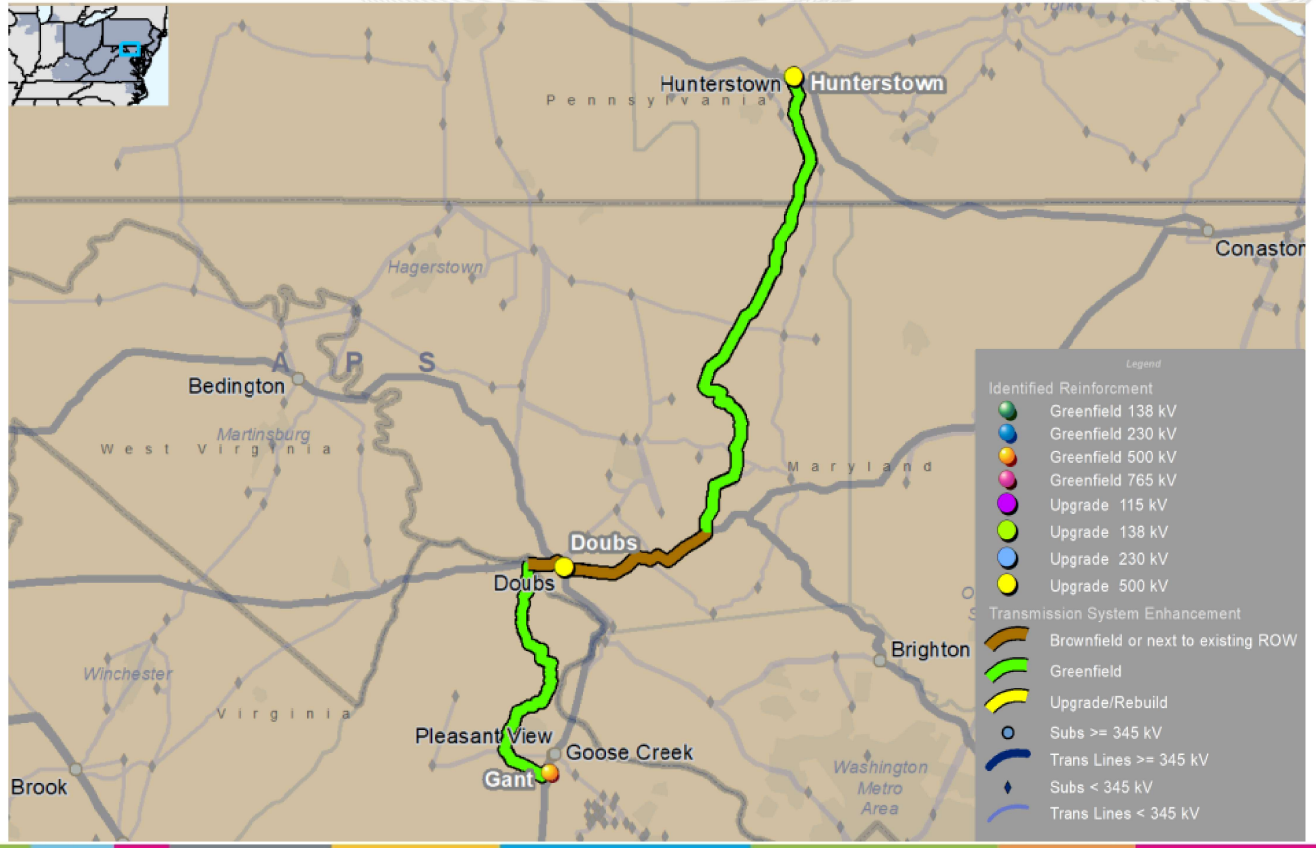
PJM©2023

2022 Window 3 proposals – Nextera - 217



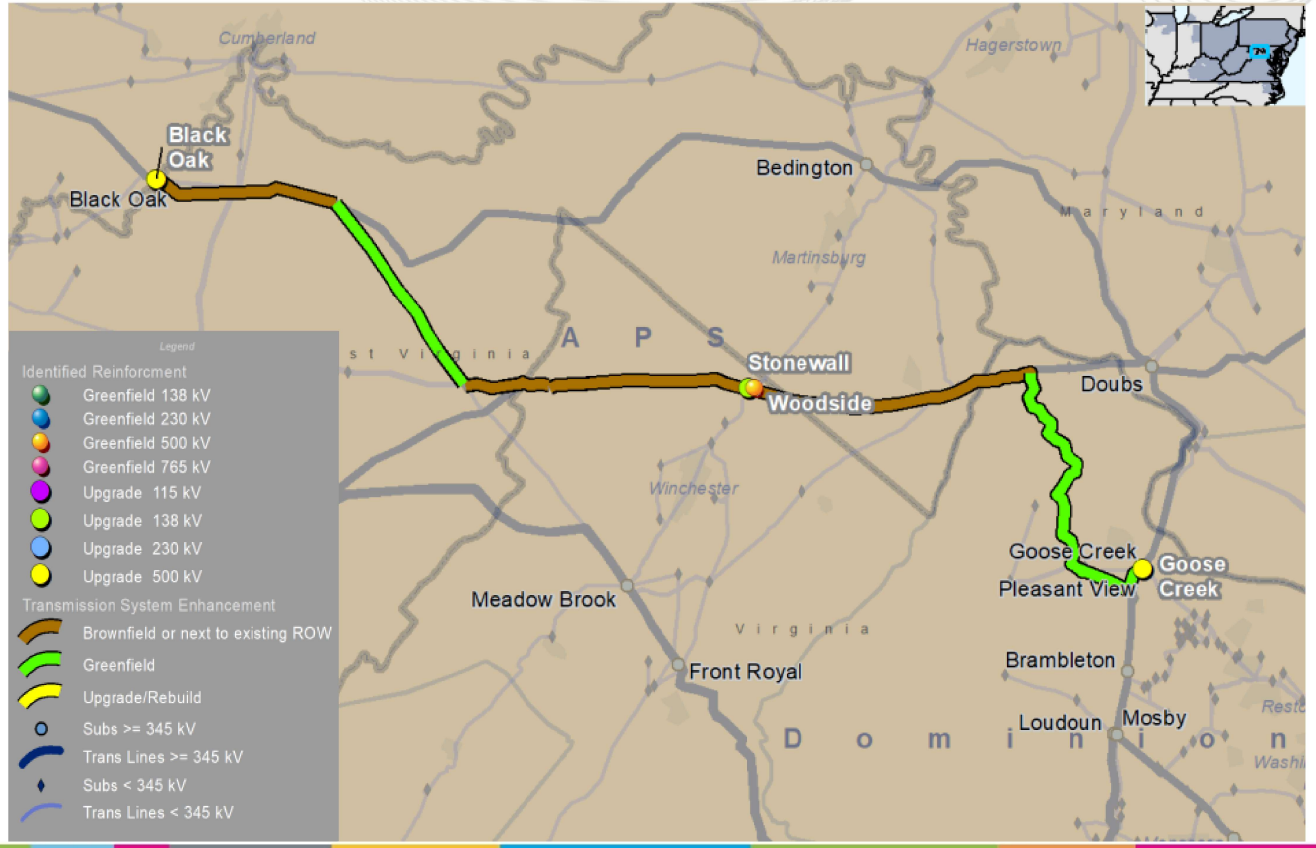
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Nextera - 255



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

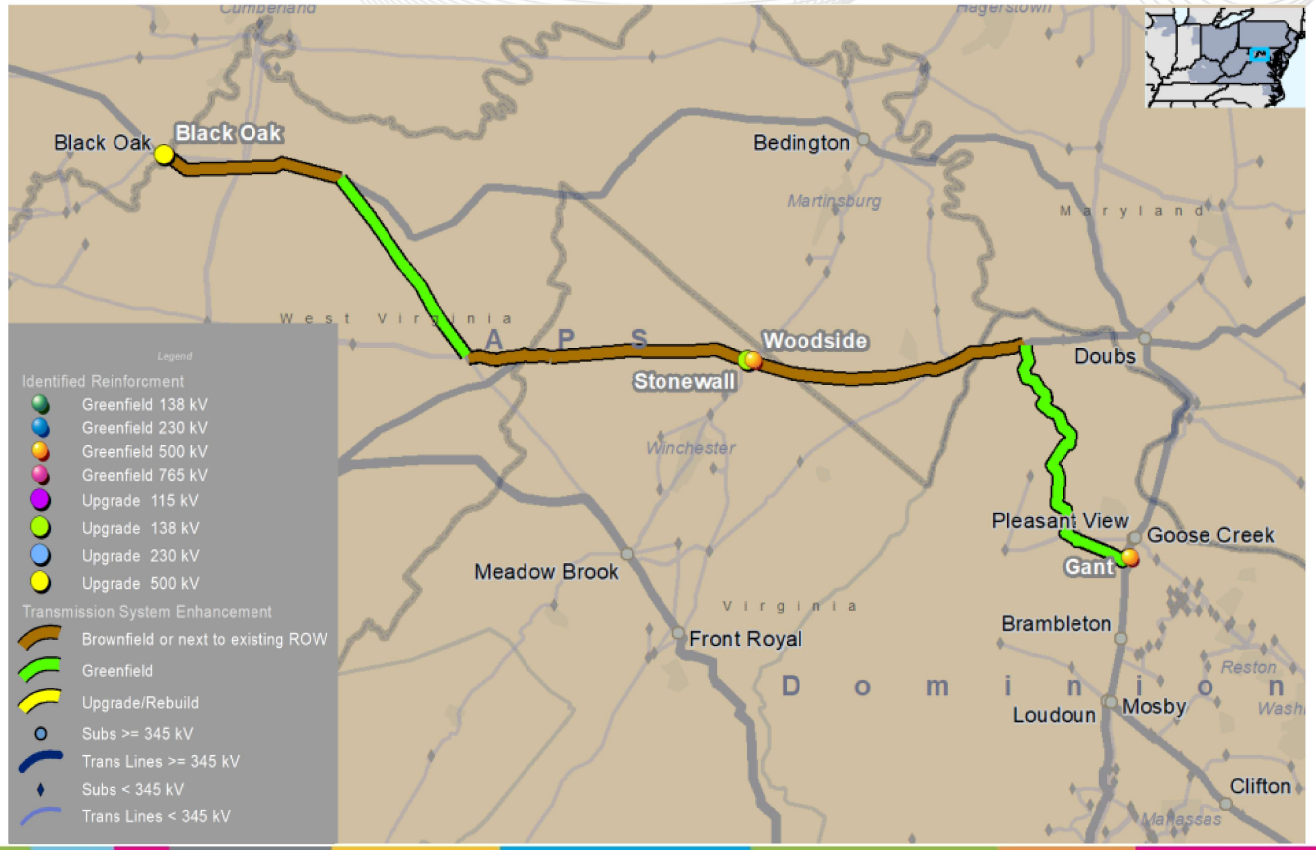
2022 Window 3 proposals – Nextera - 279



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.*

PJM©2023

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.*

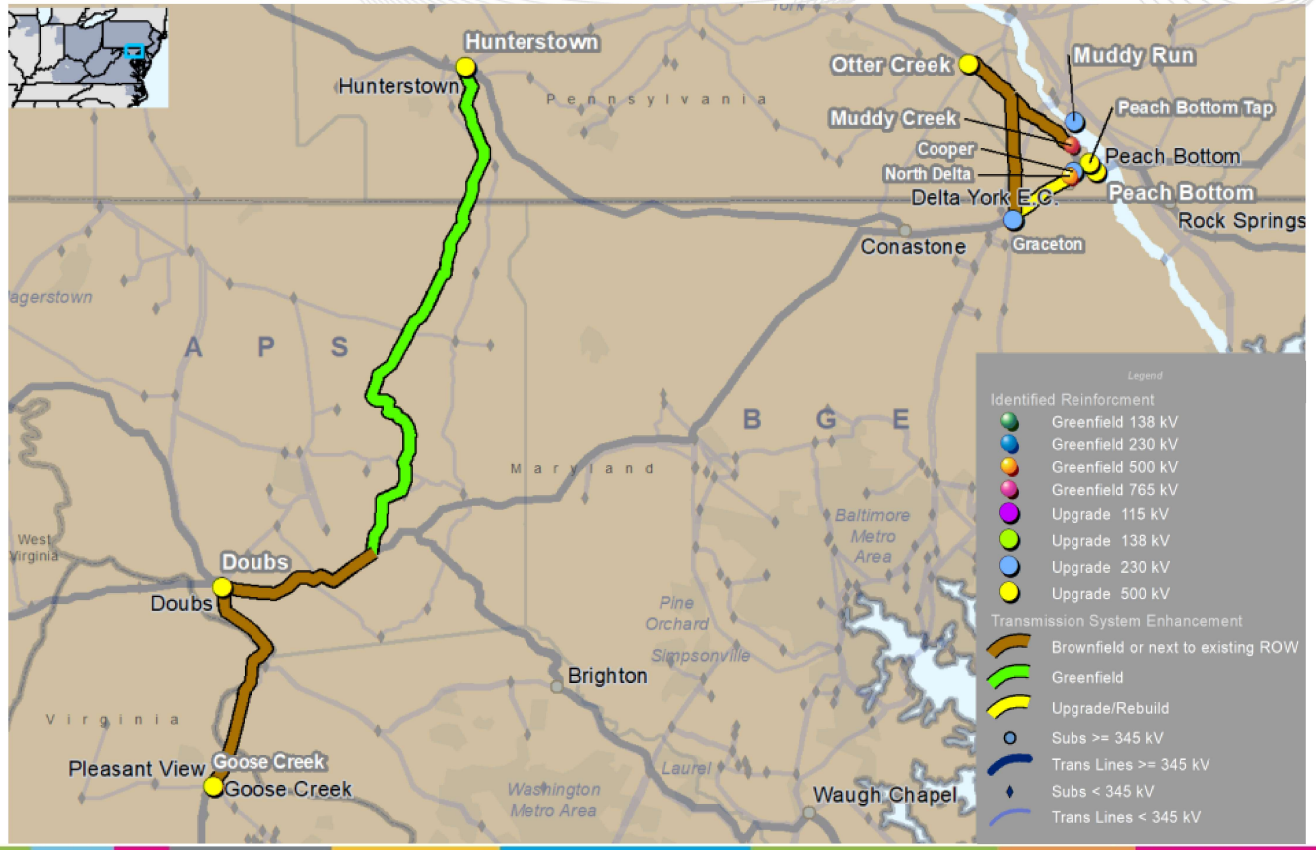
PJM©2023

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.*

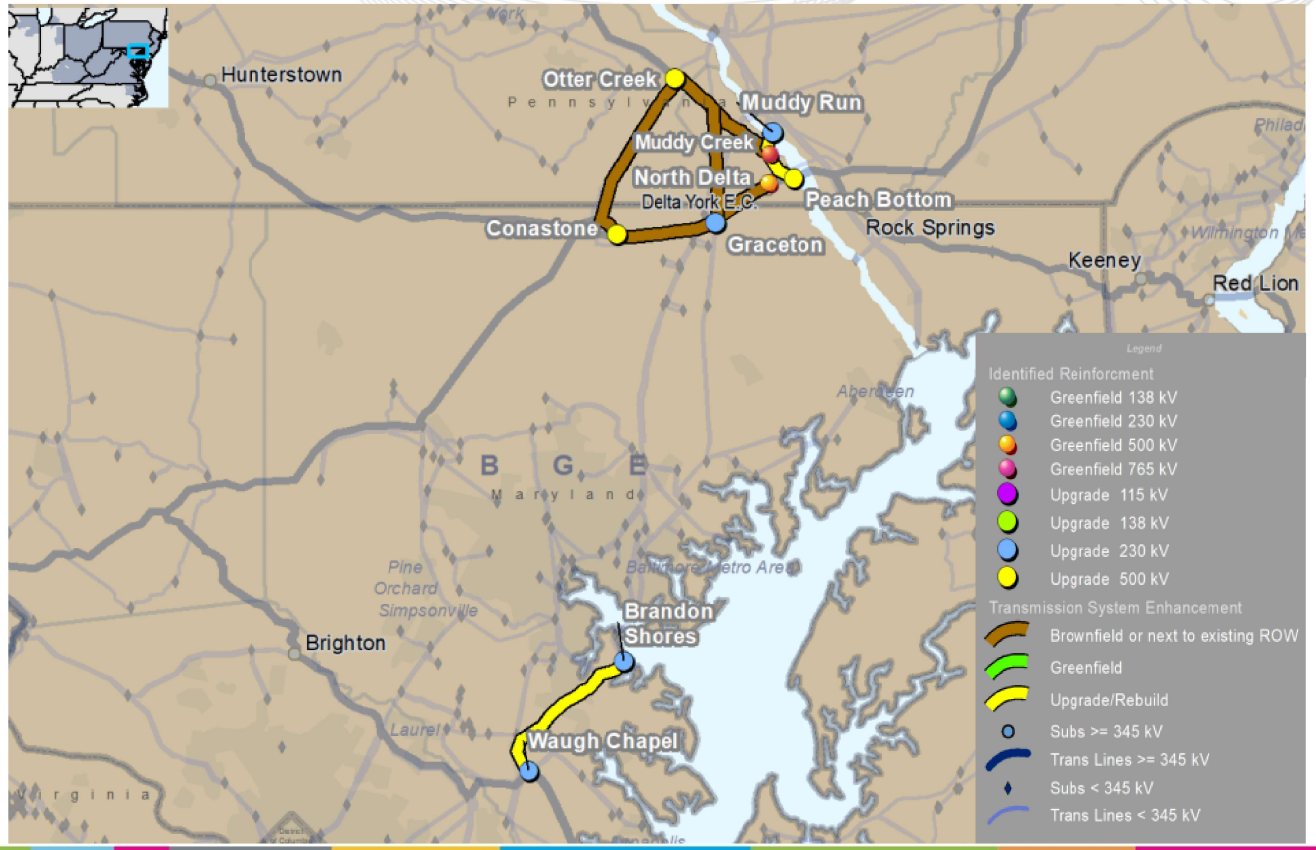
2022 Window 3 proposals – Nextera - 445



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

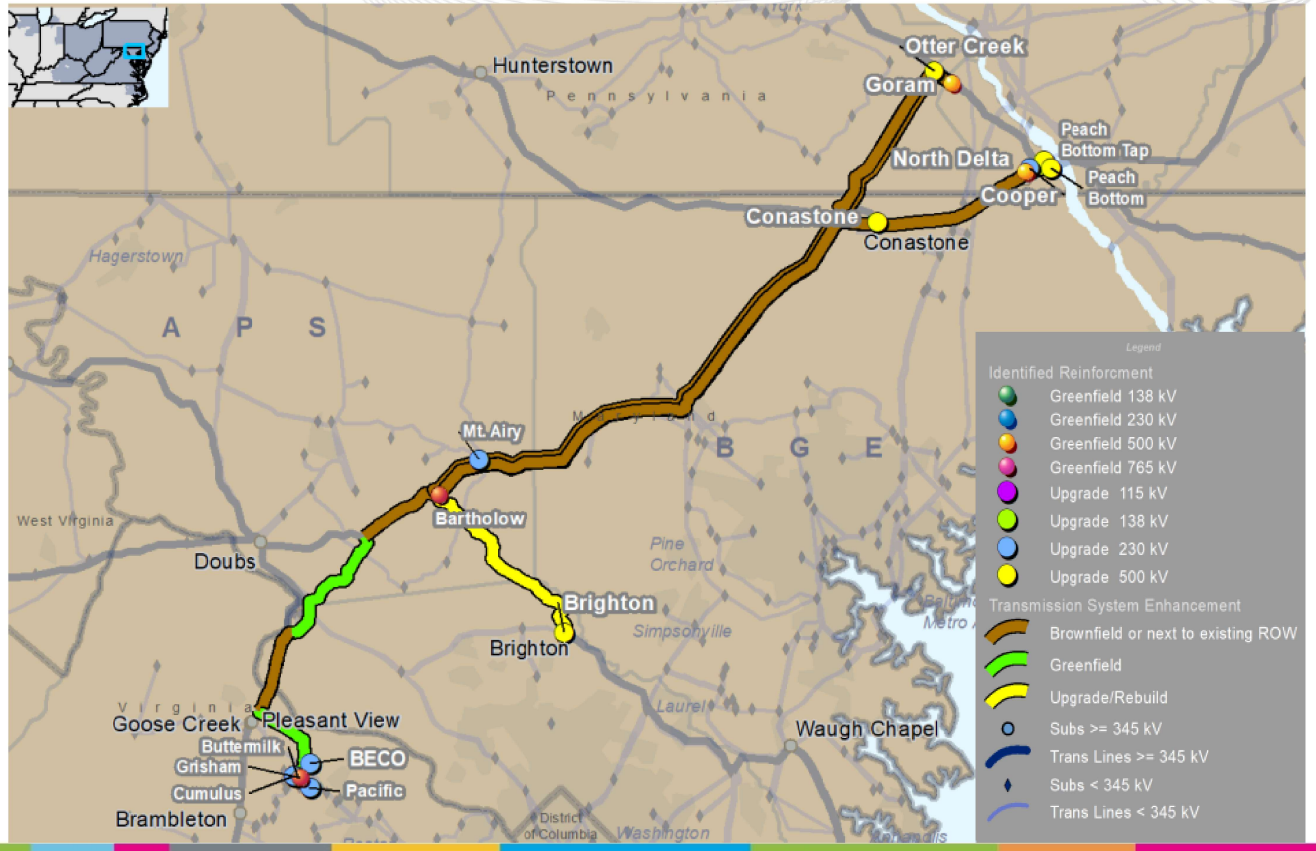
PJM©2023

2022 Window 3 proposals – Nextera - 530



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

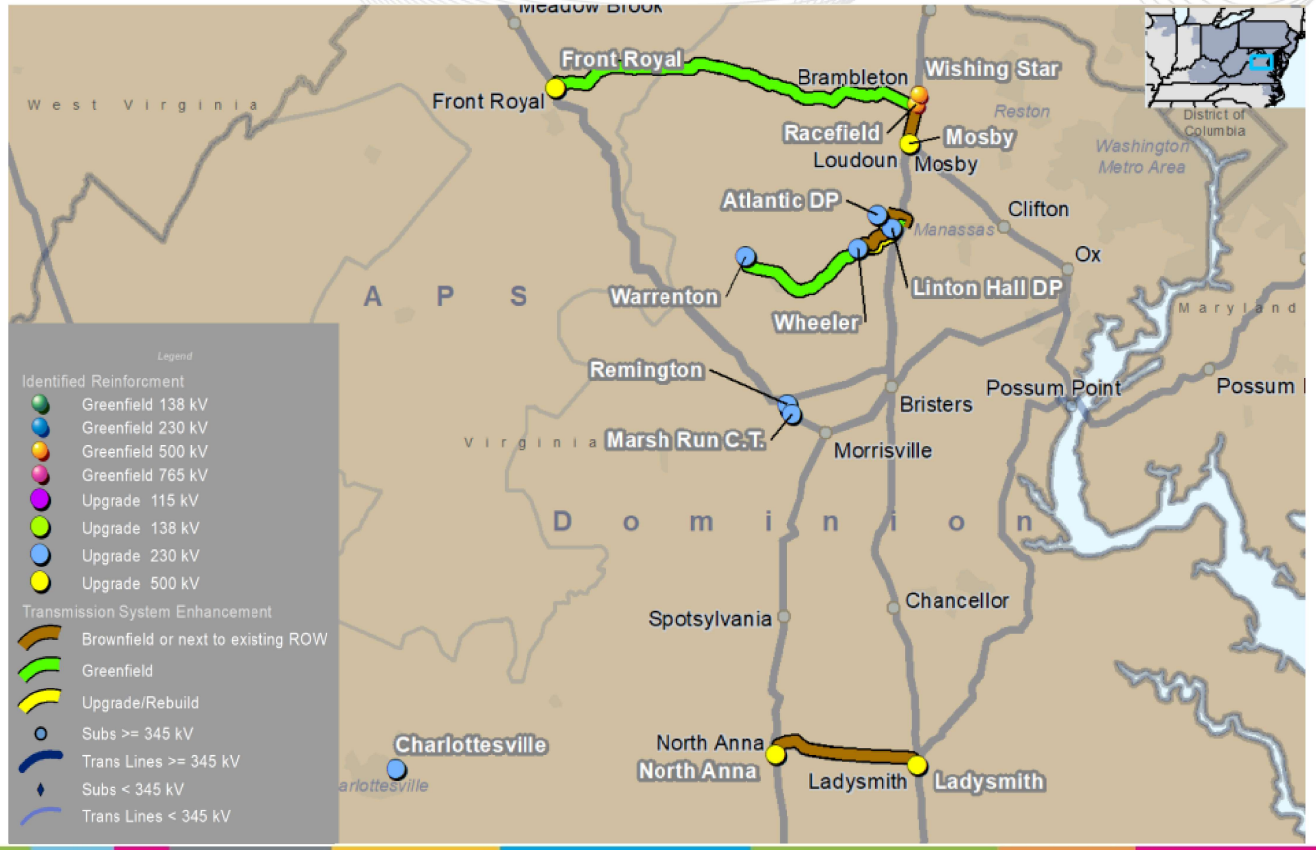
2022 Window 3 proposals – Nextera - 564



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

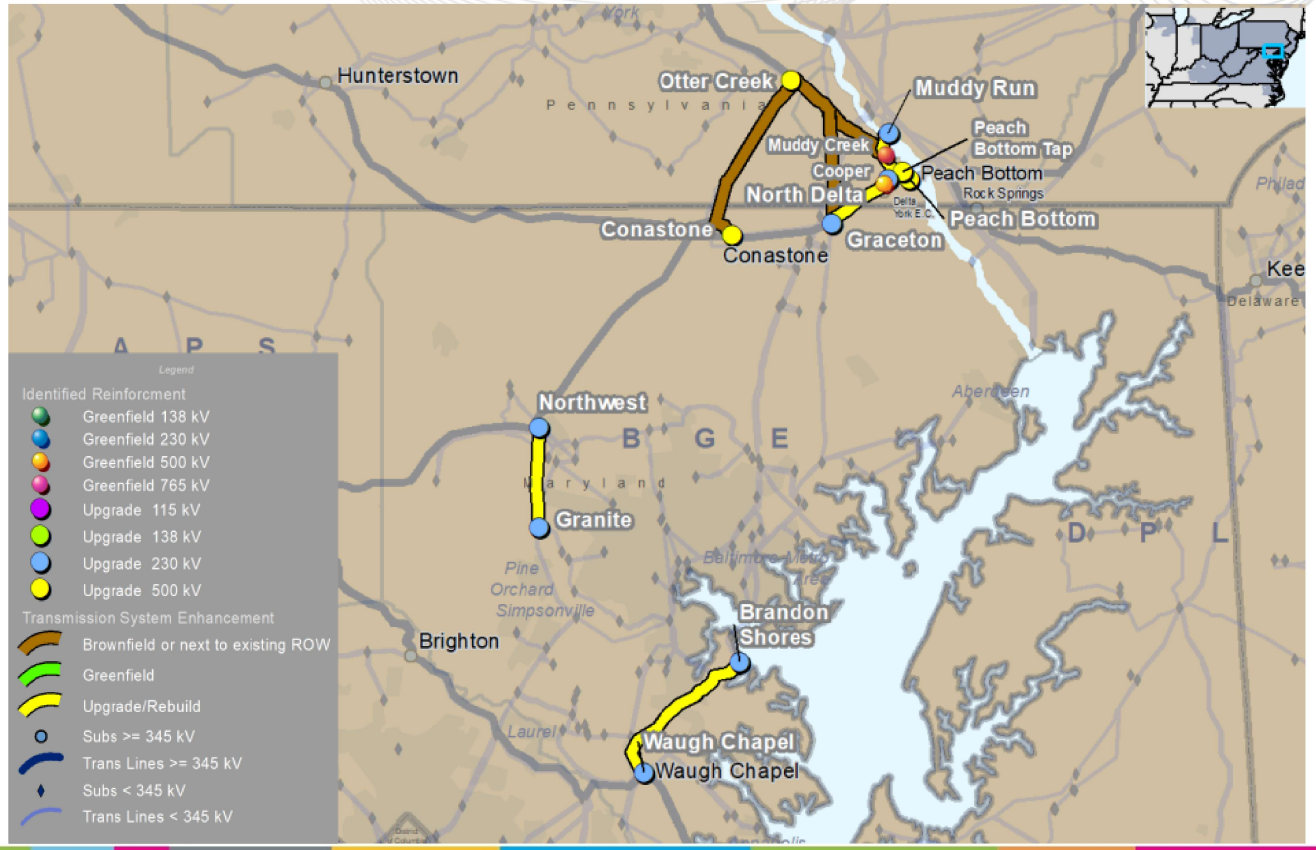
PJM©2023

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.*

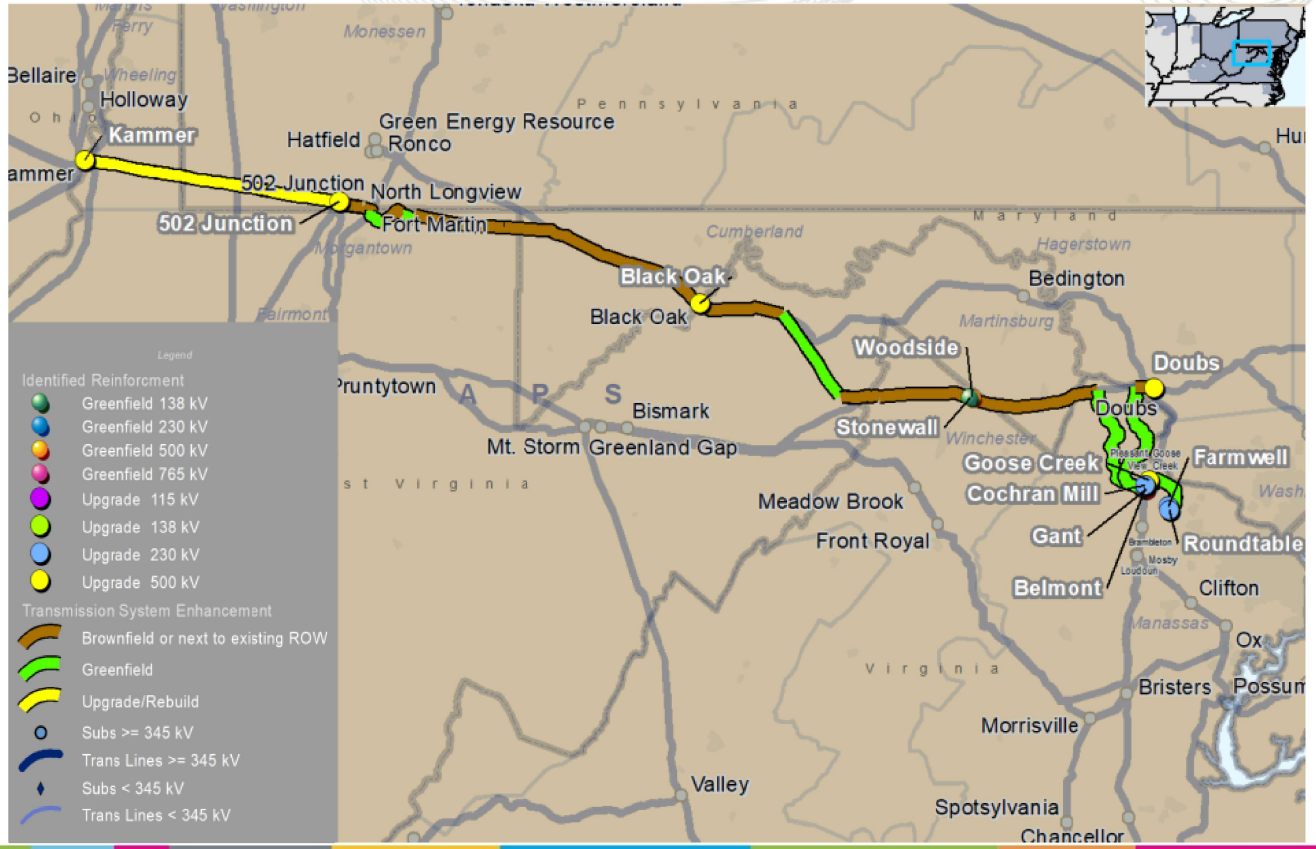
2022 Window 3 proposals – Nextera - 631



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

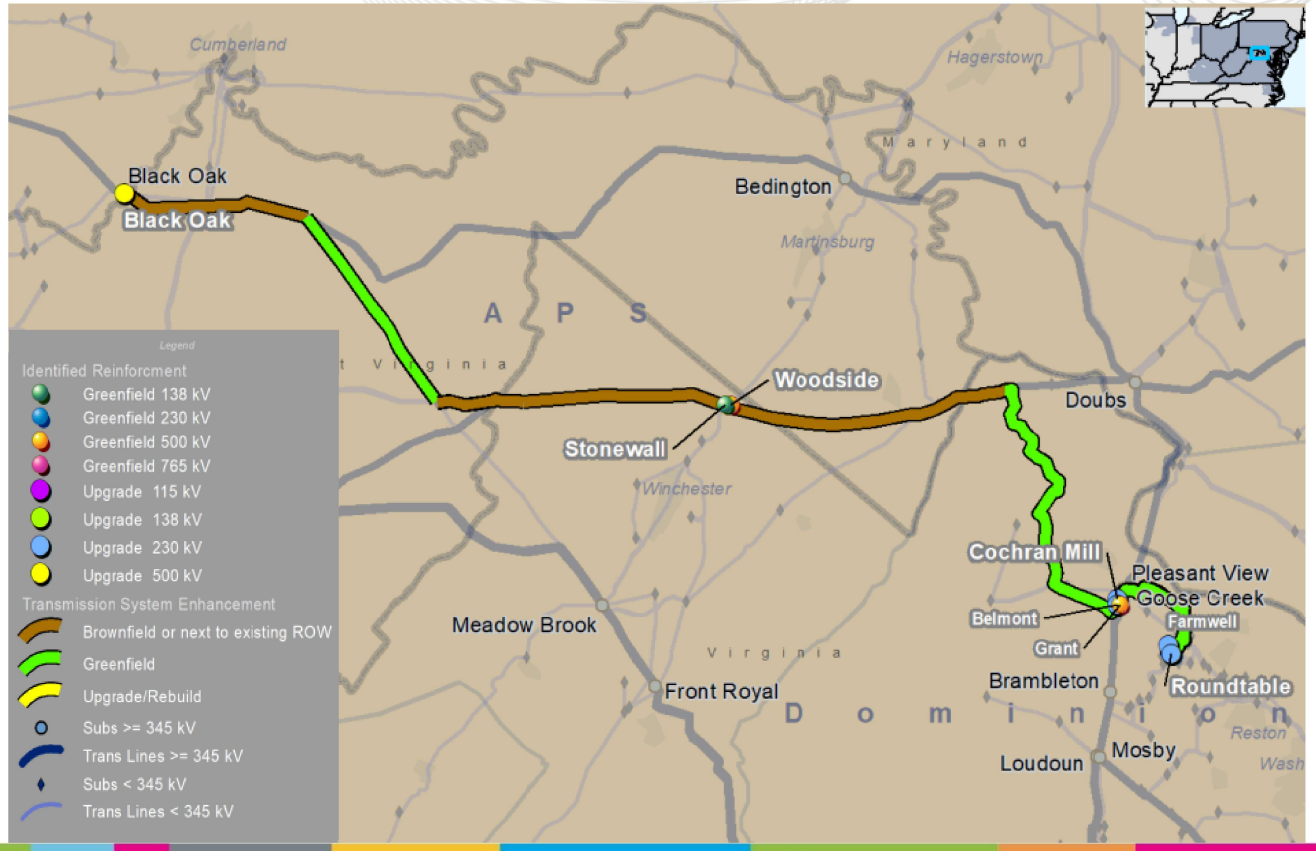
PJM©2023

2022 Window 3 proposals – Nextera - 642



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

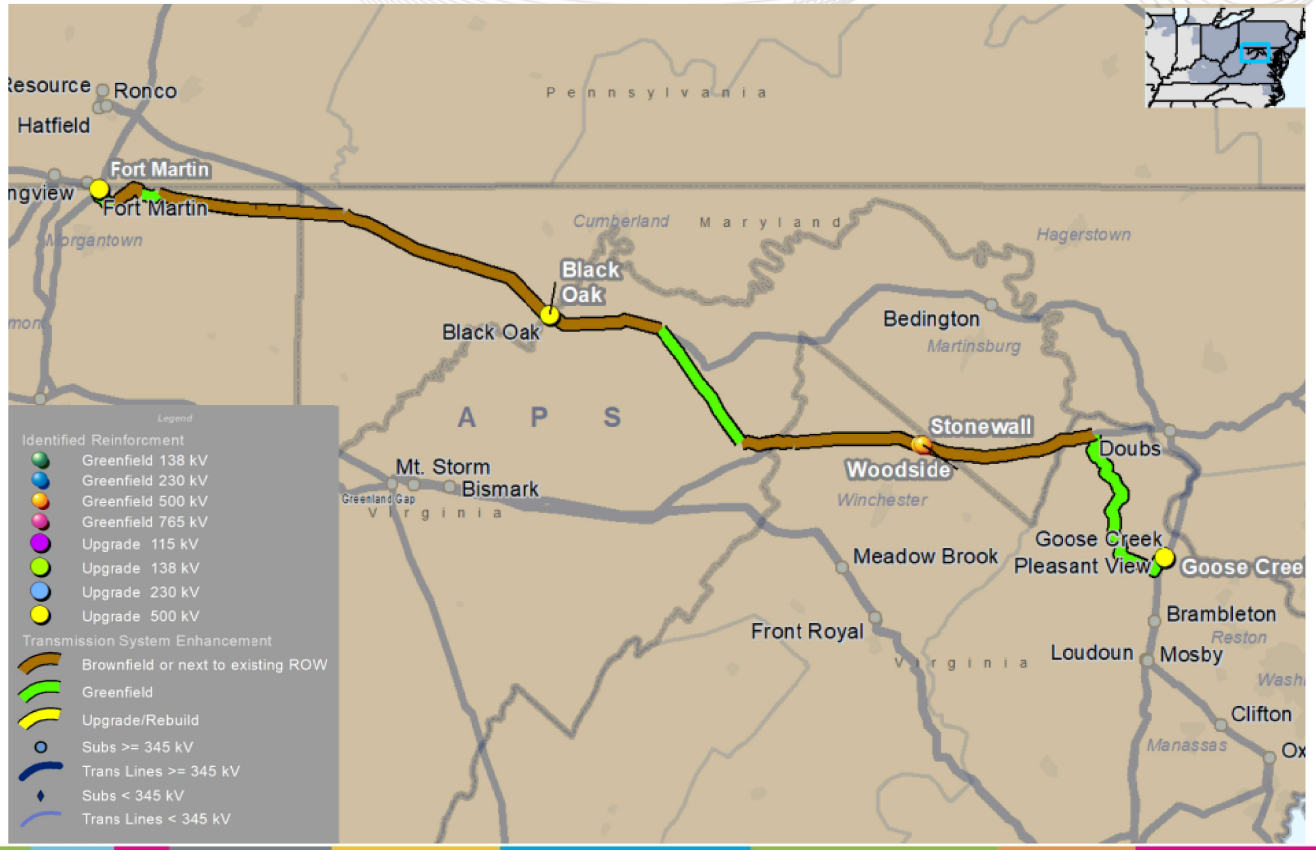
2022 Window 3 proposals – Nextera - 676



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.*

PJM©2023

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.*

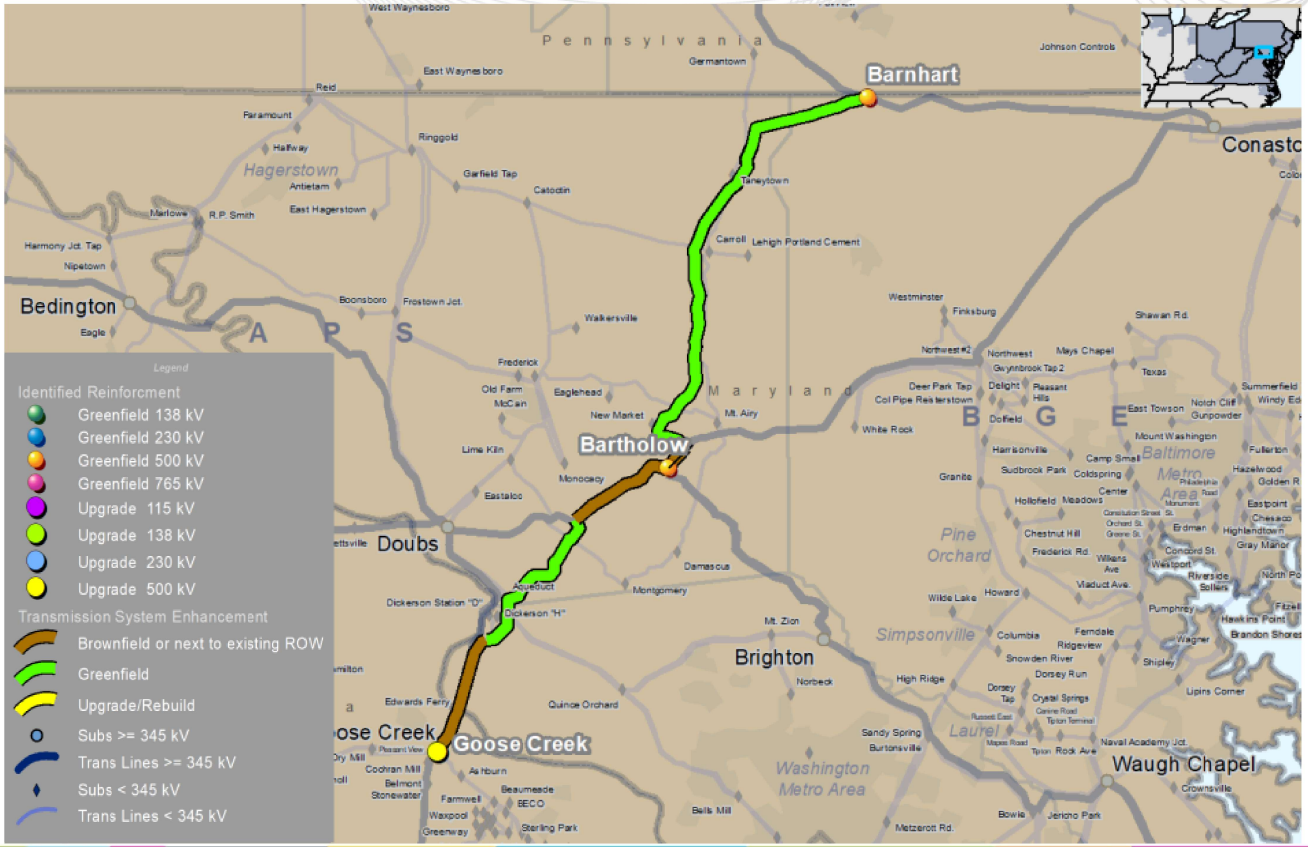
PJM©2023

2022 Window 3 proposals – Nextera - 719



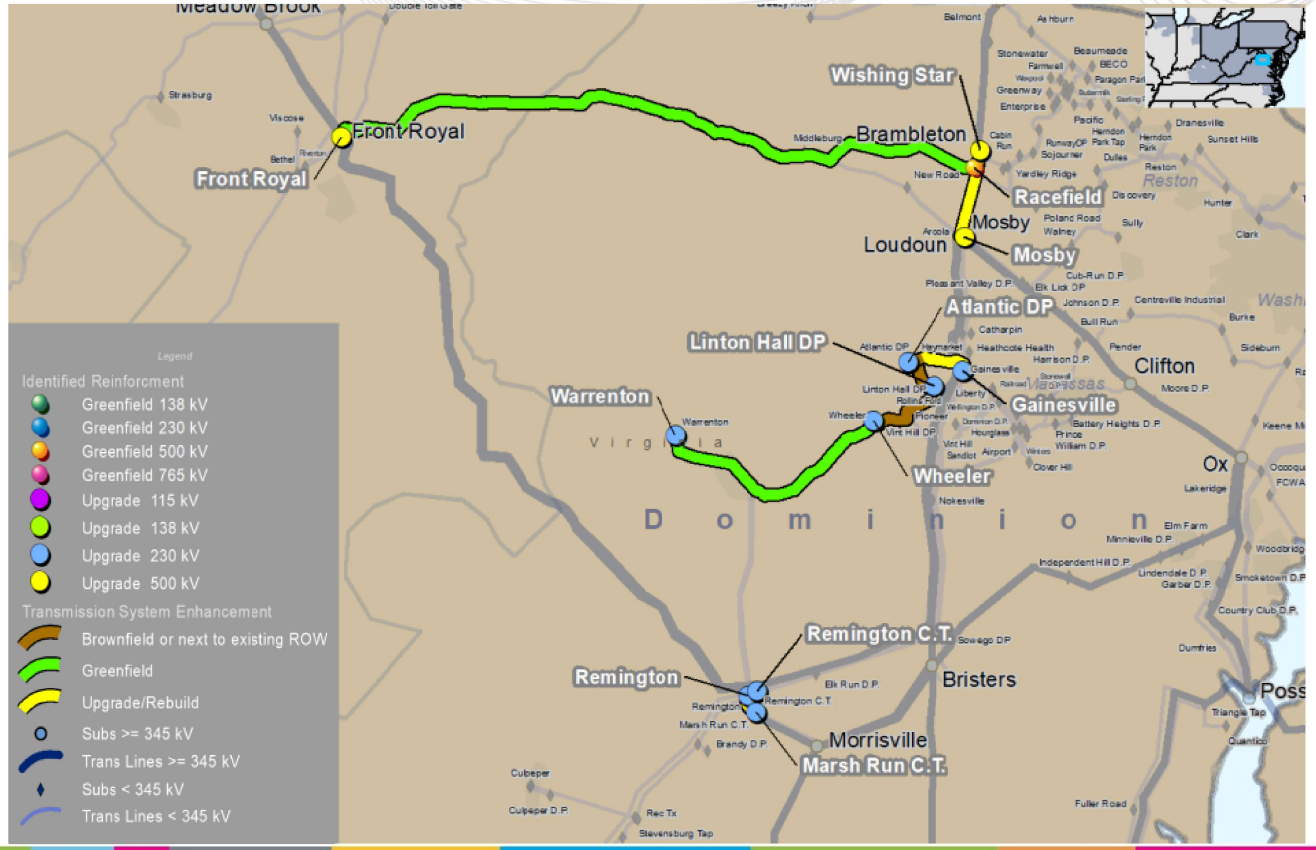
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Nextera - 728



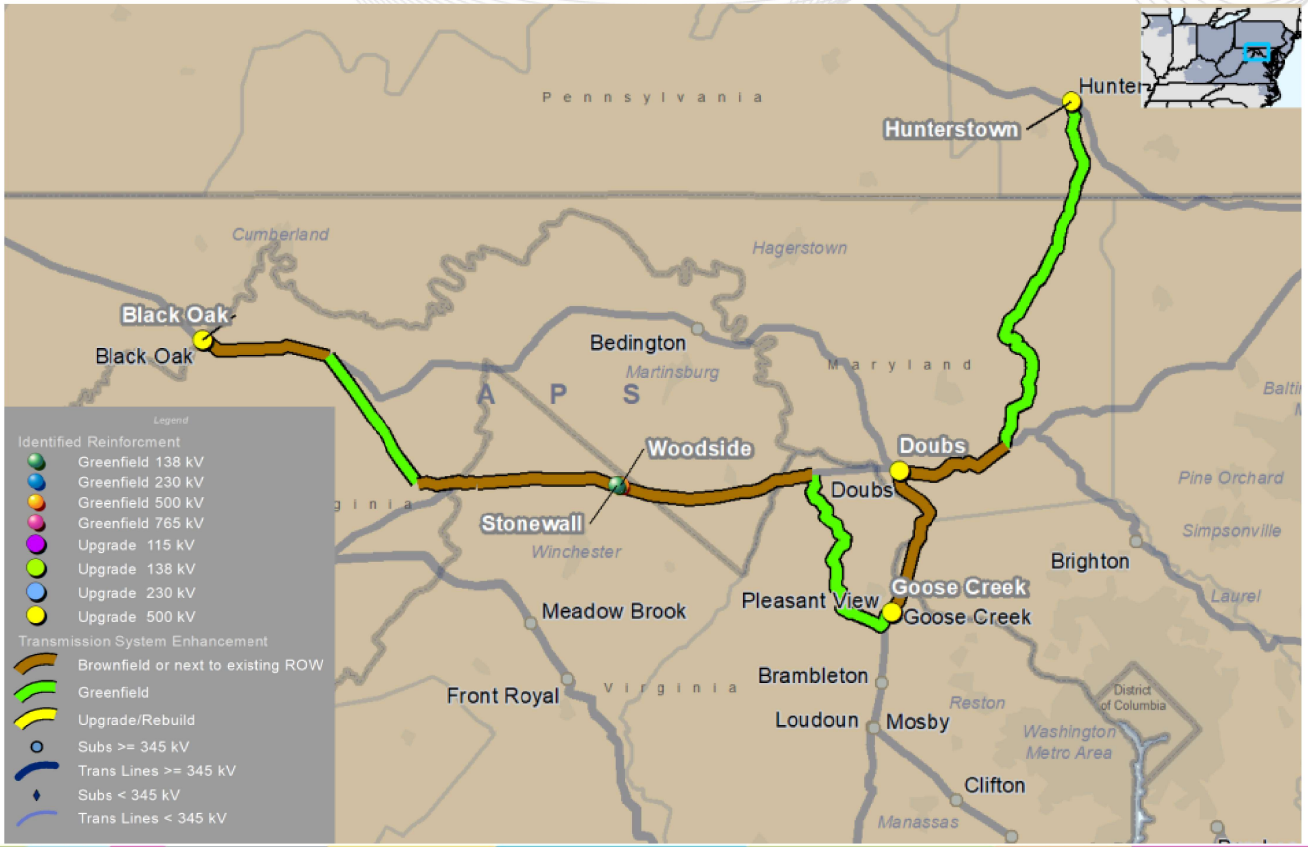
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Nextera - 766



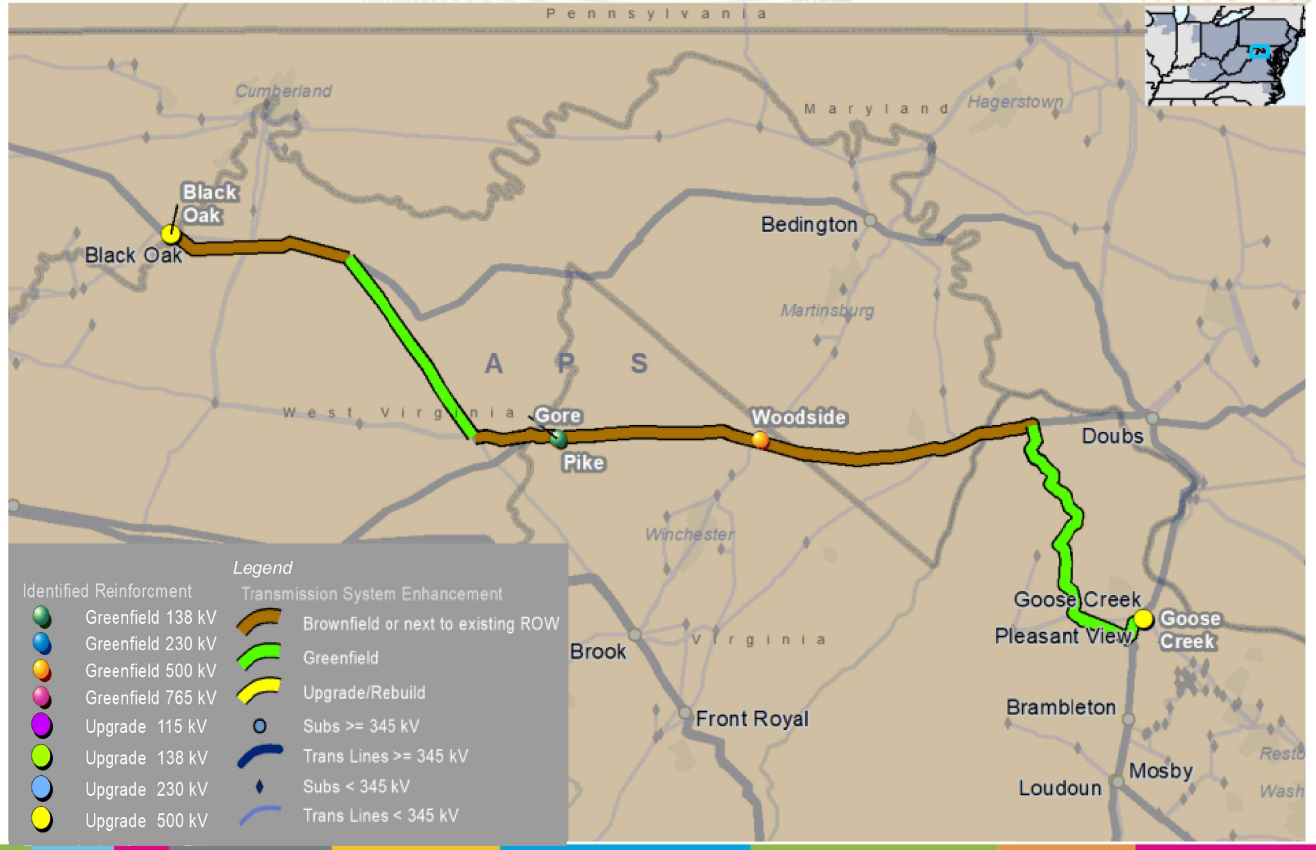
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Nextera - 846



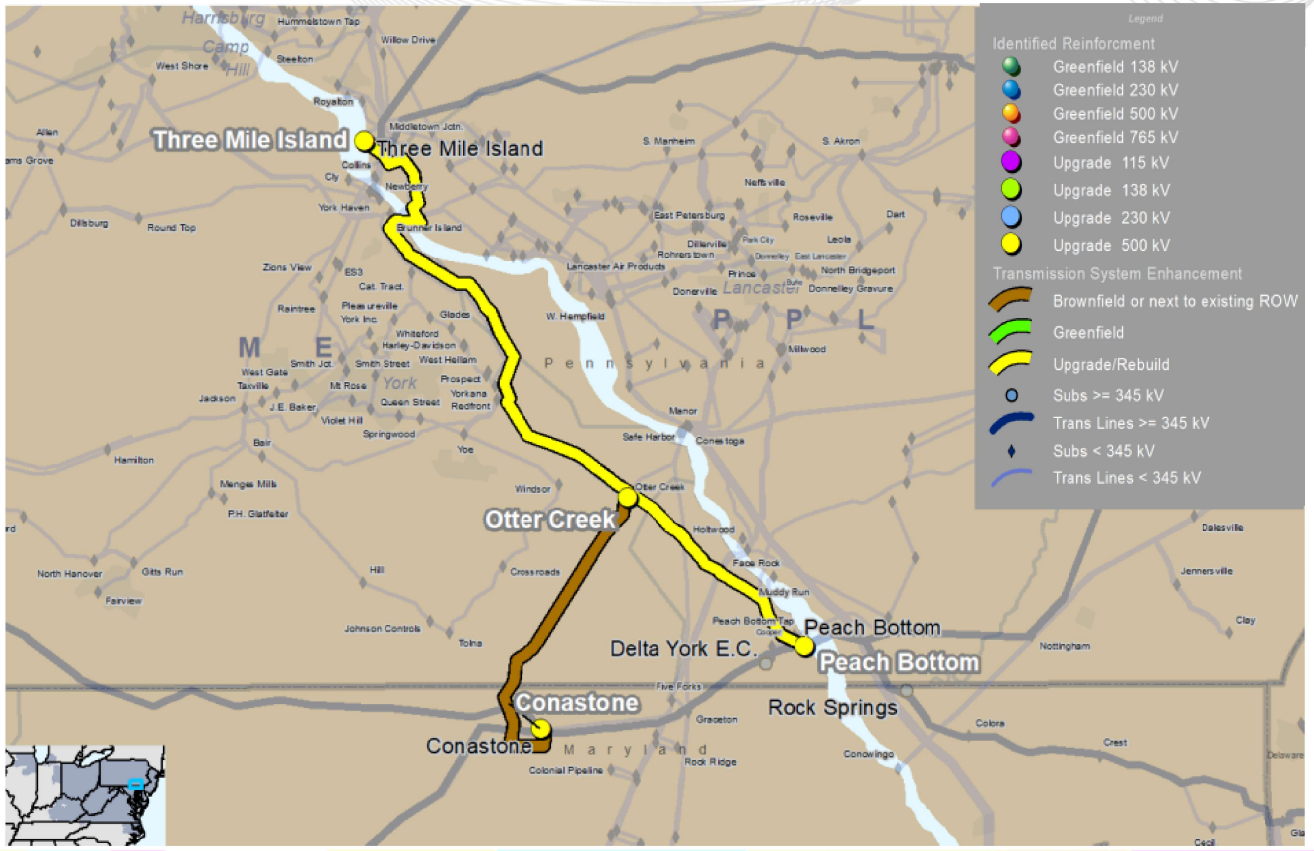
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Nextera - 951



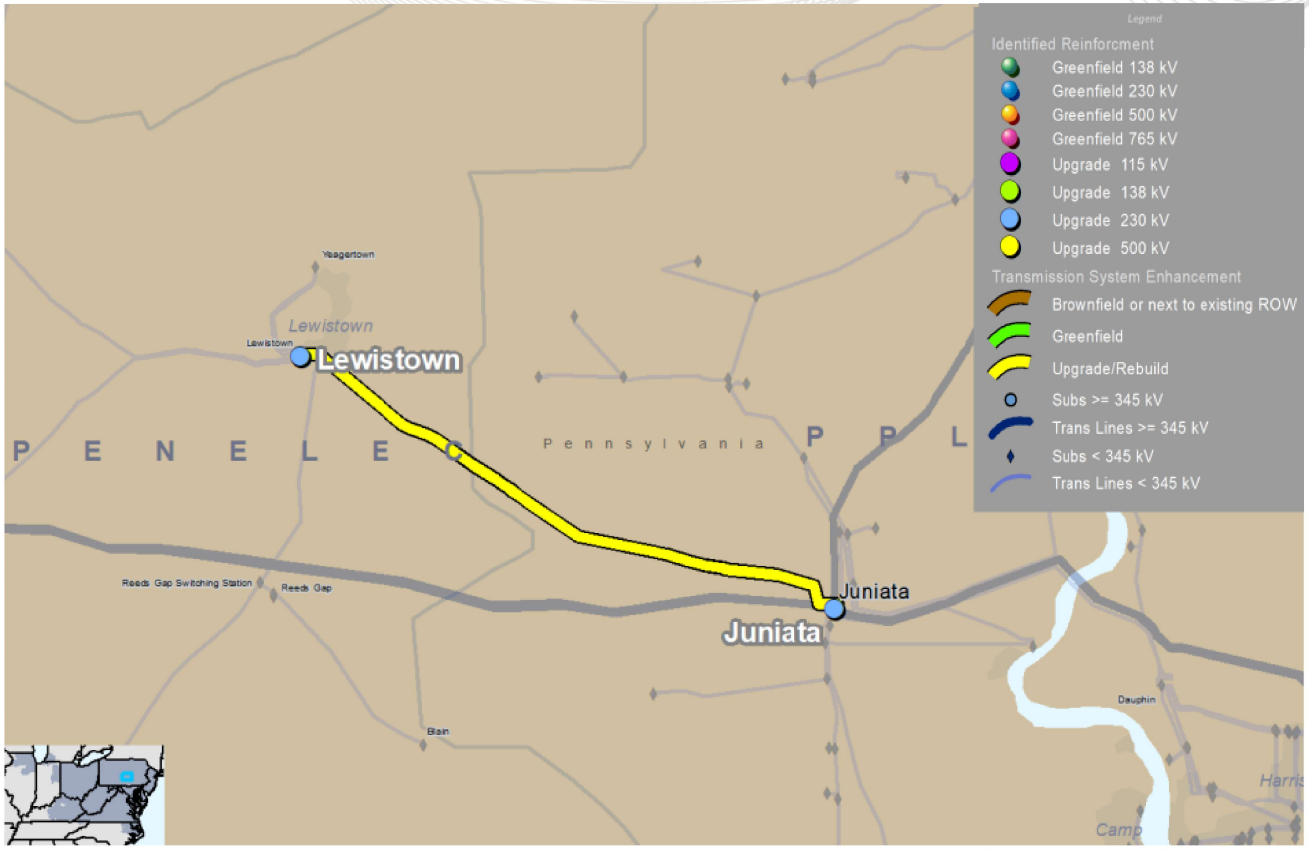
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – PPL - 374



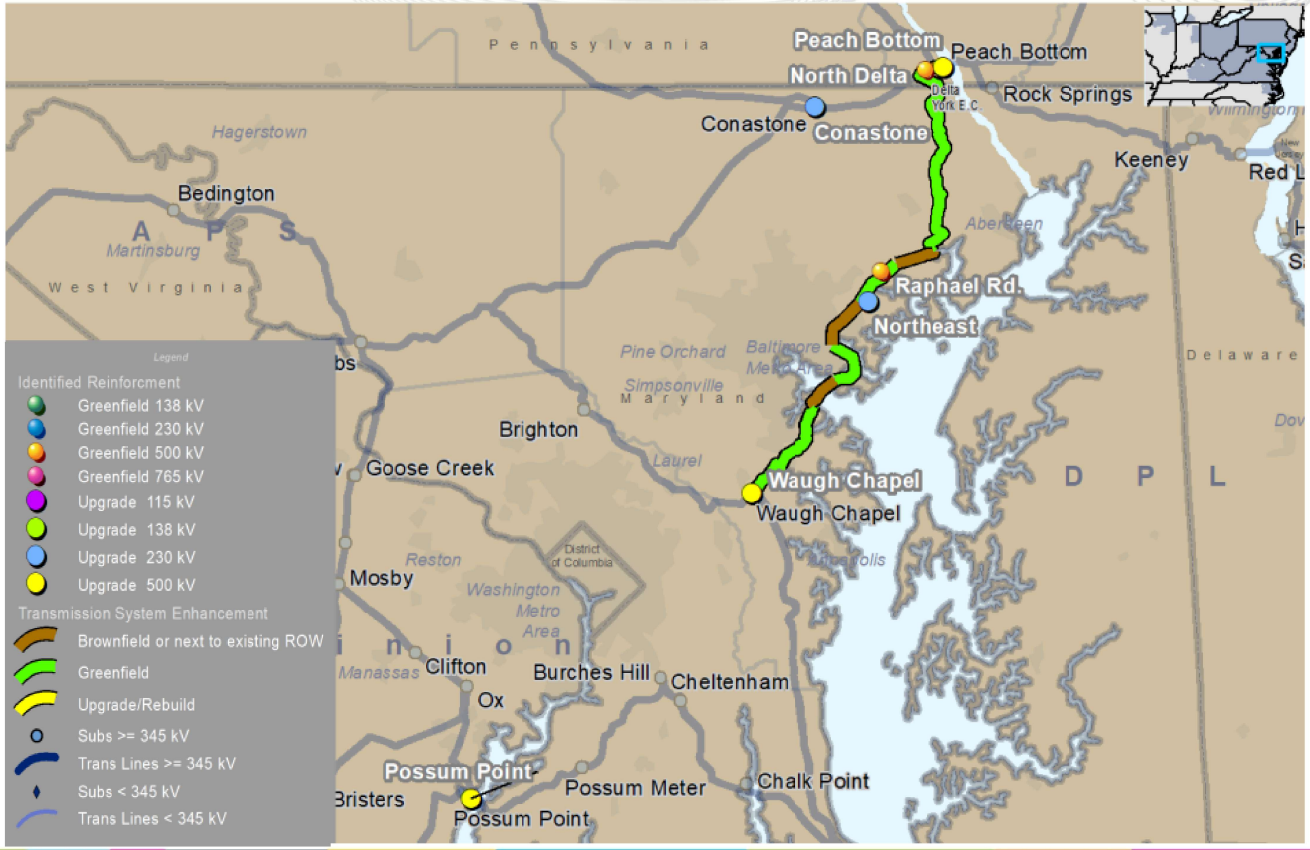
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

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.*

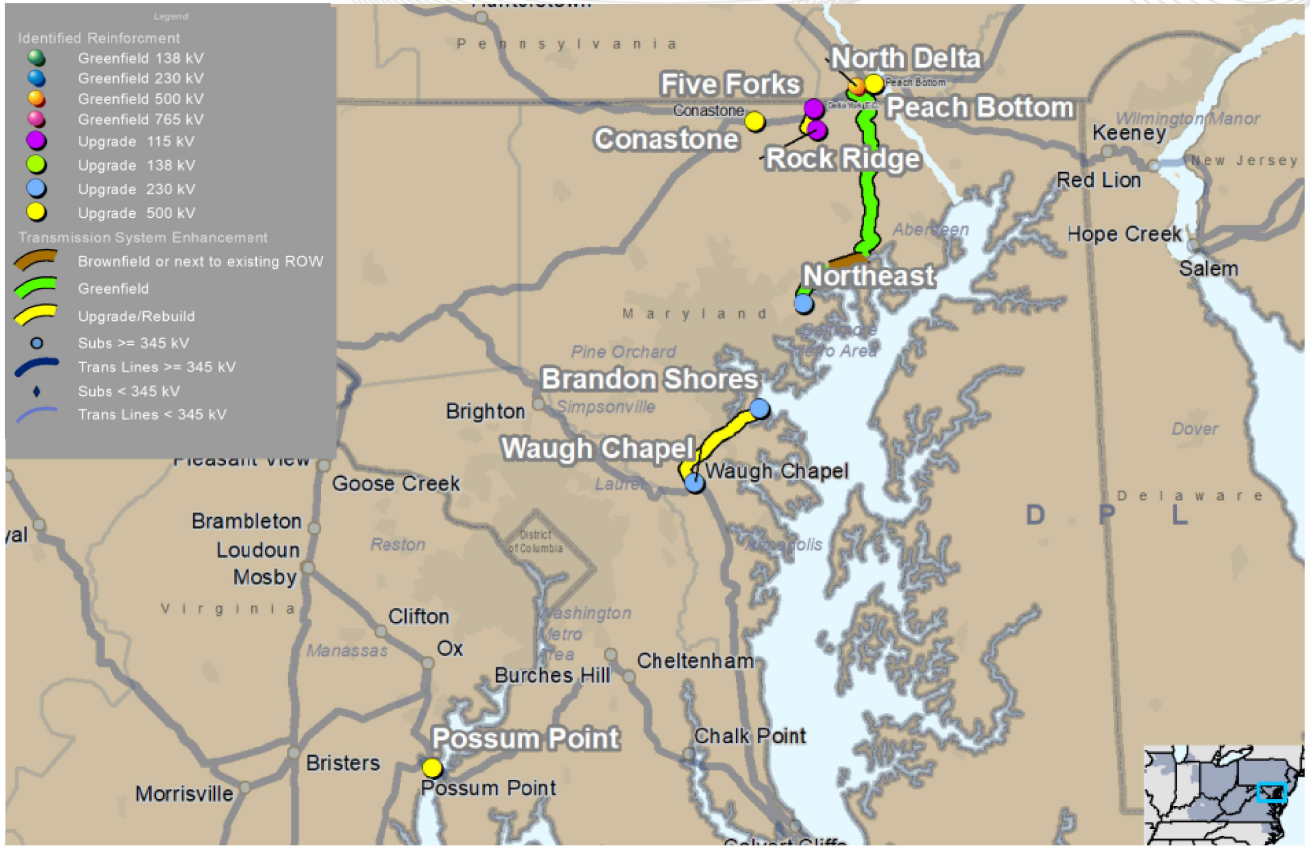
2022 Window 3 proposals – PSEG - 24



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

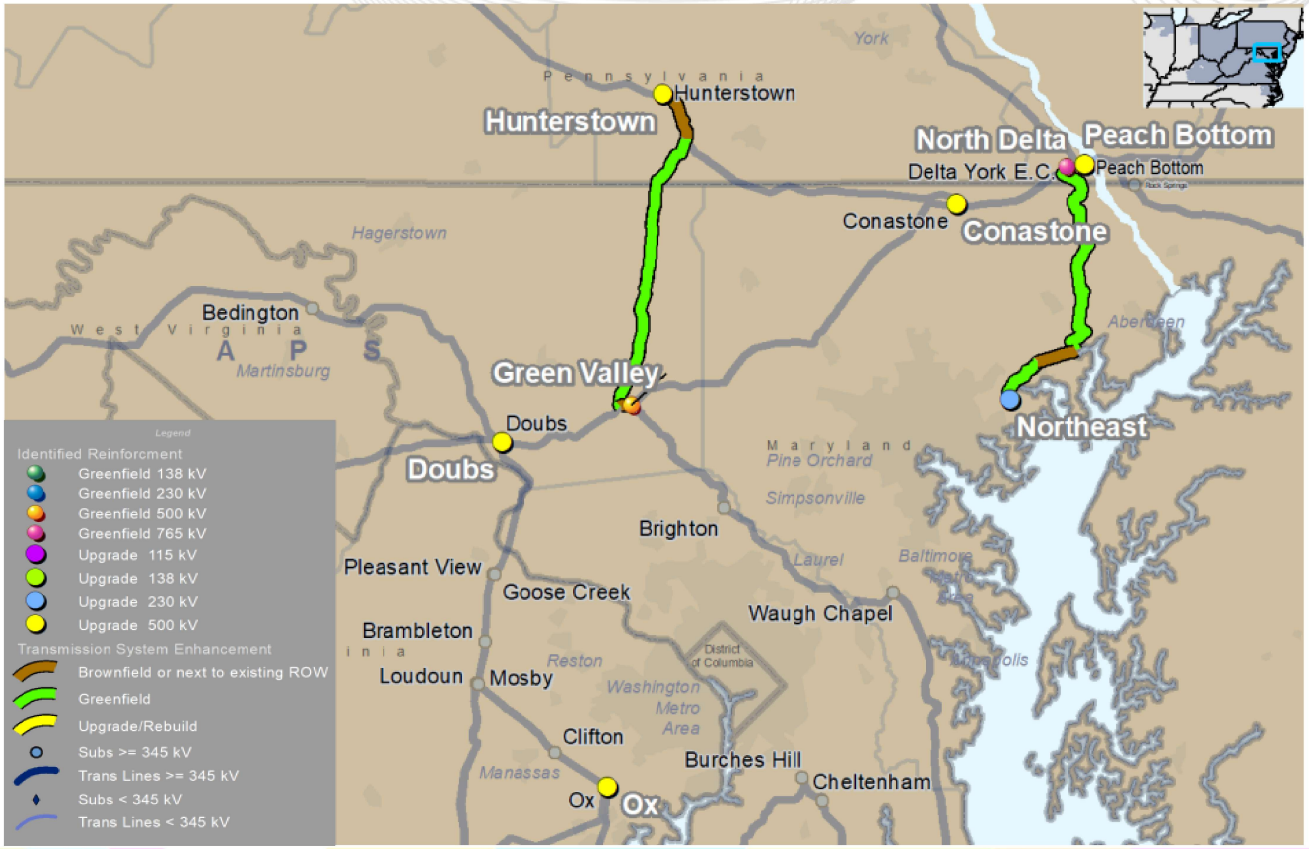
PJM©2023

2022 Window 3 proposals – PSEG - 125



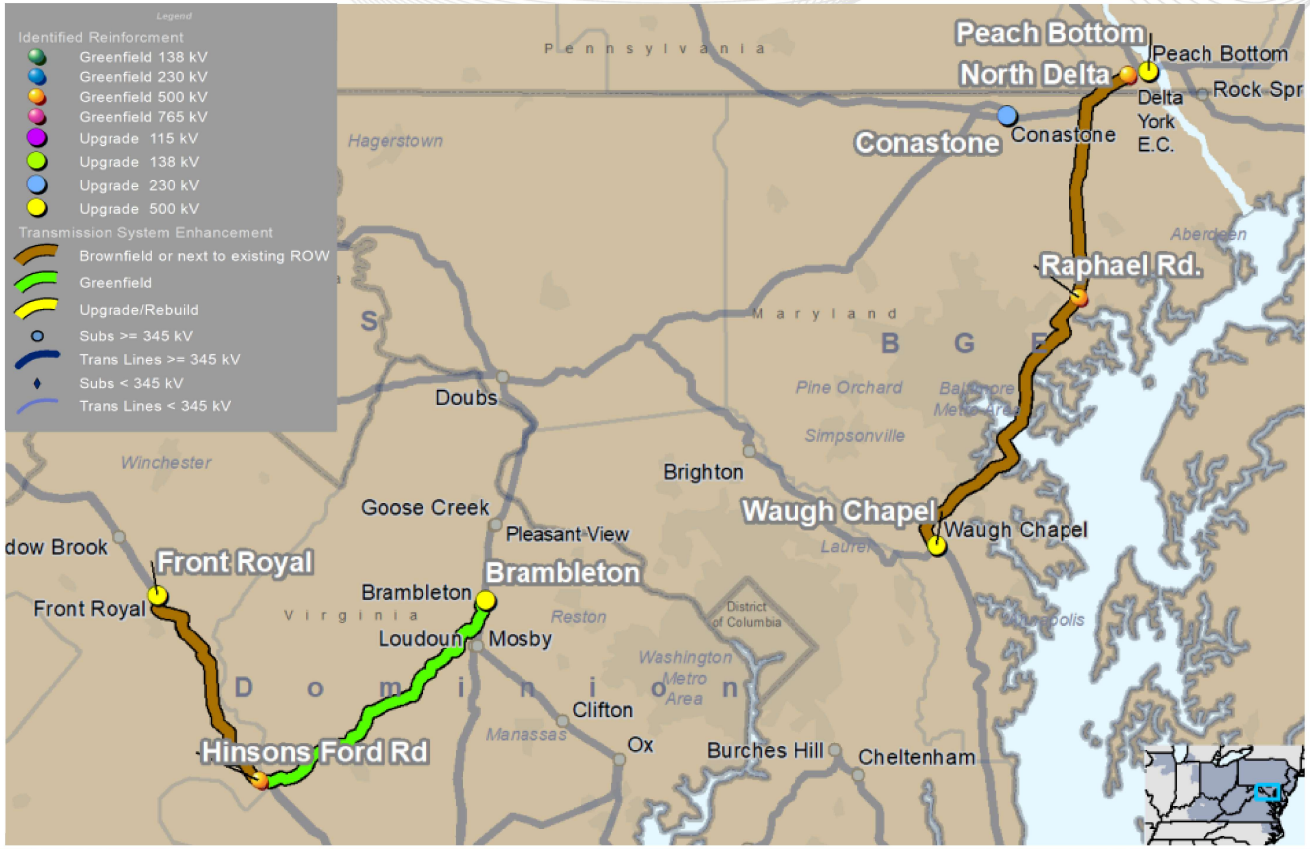
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – PSEG - 229



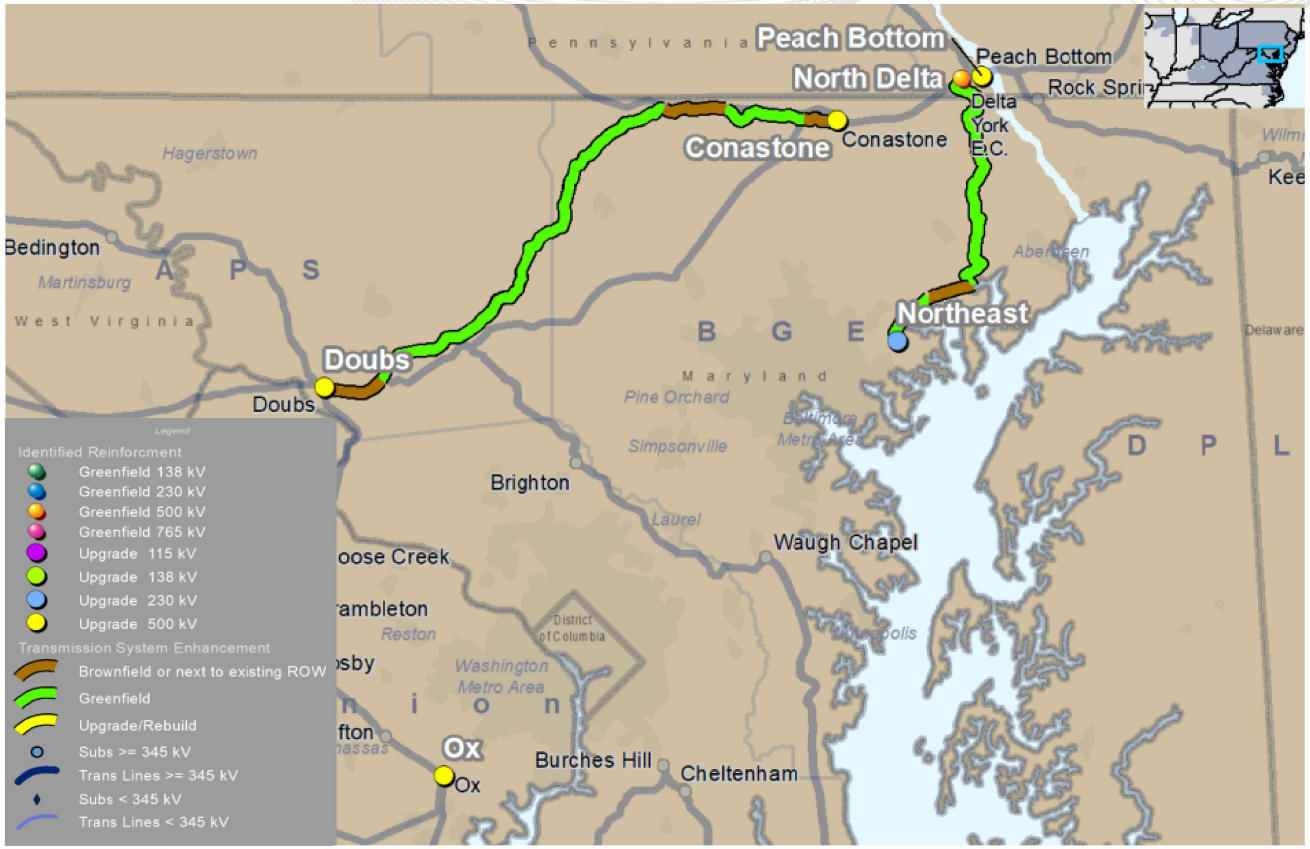
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – PSEG - 325



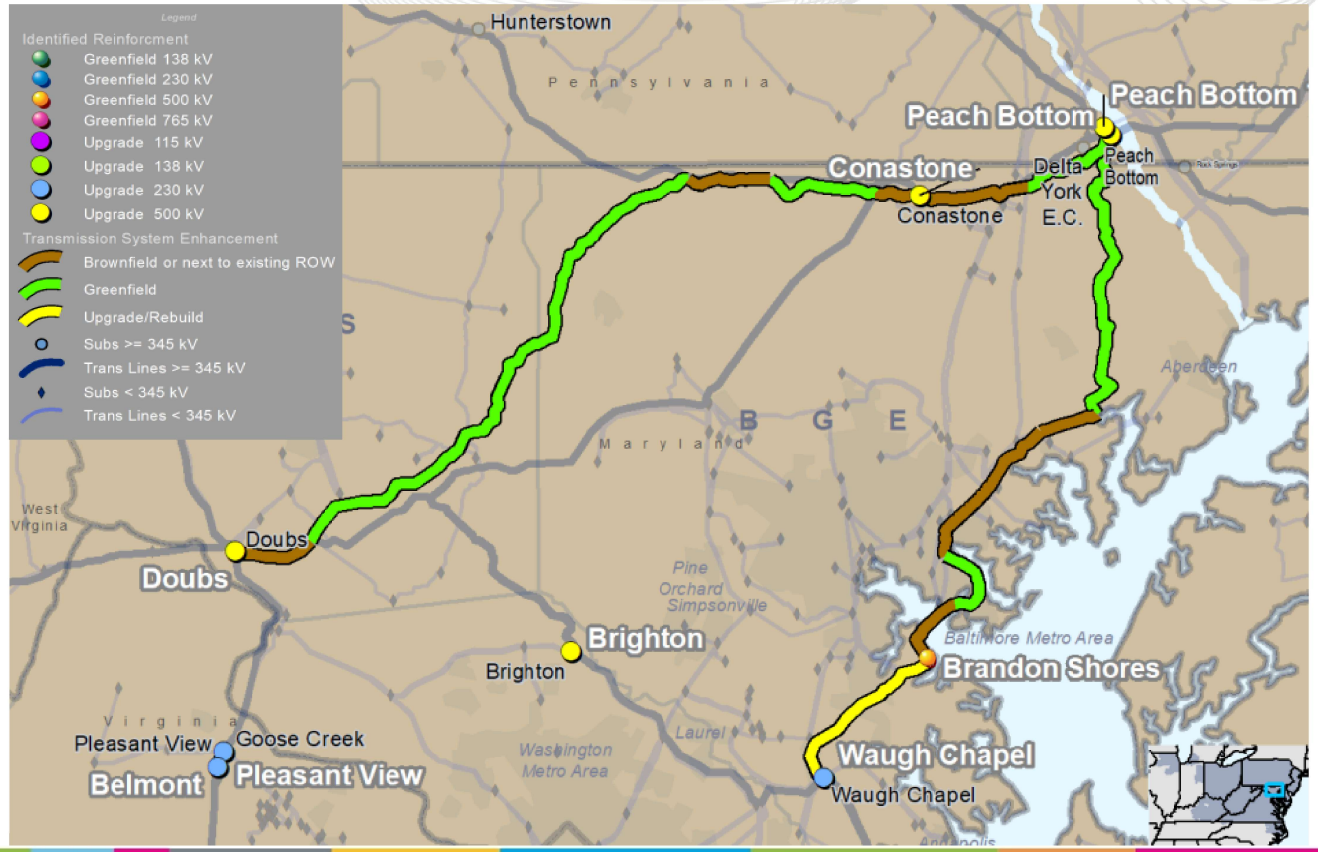
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – PSEG - 637



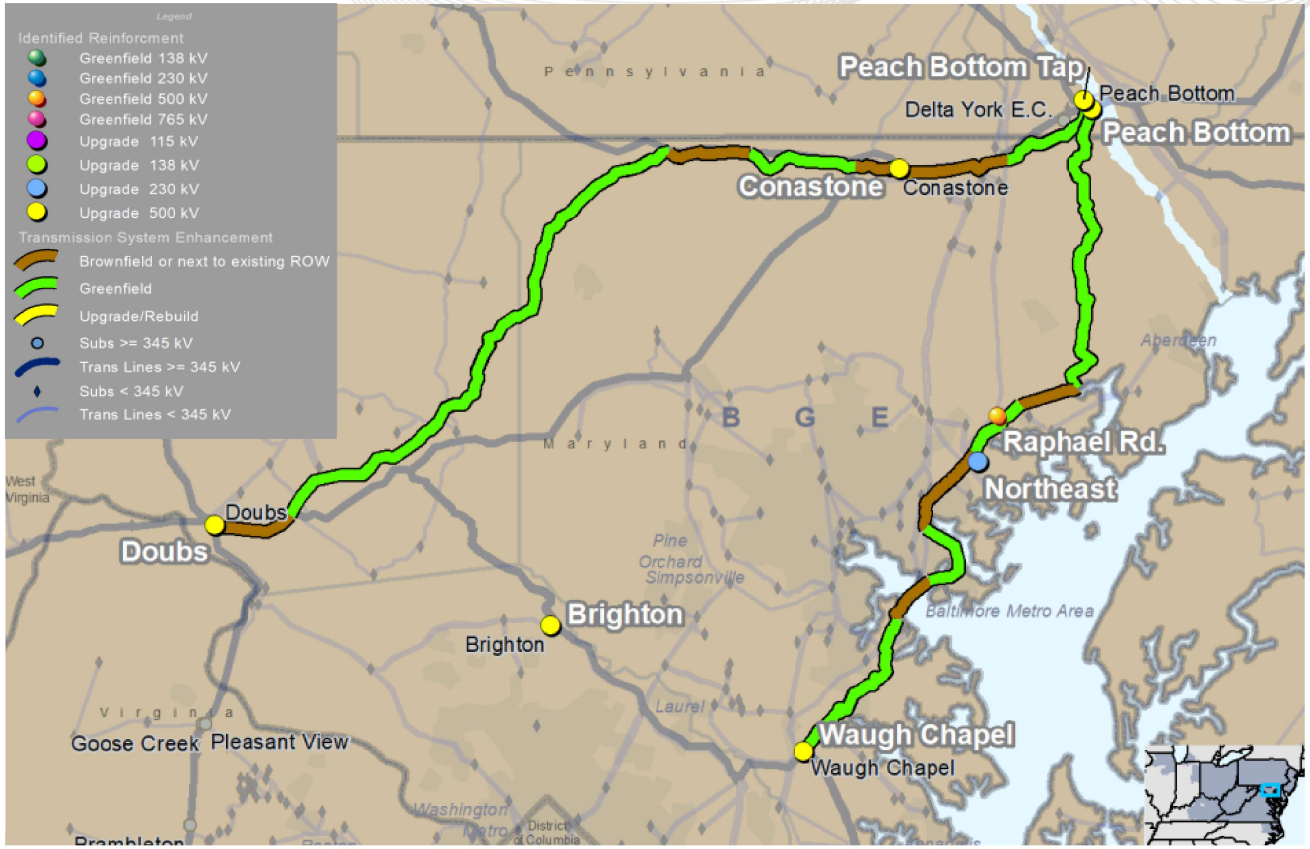
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – PSEG - 741



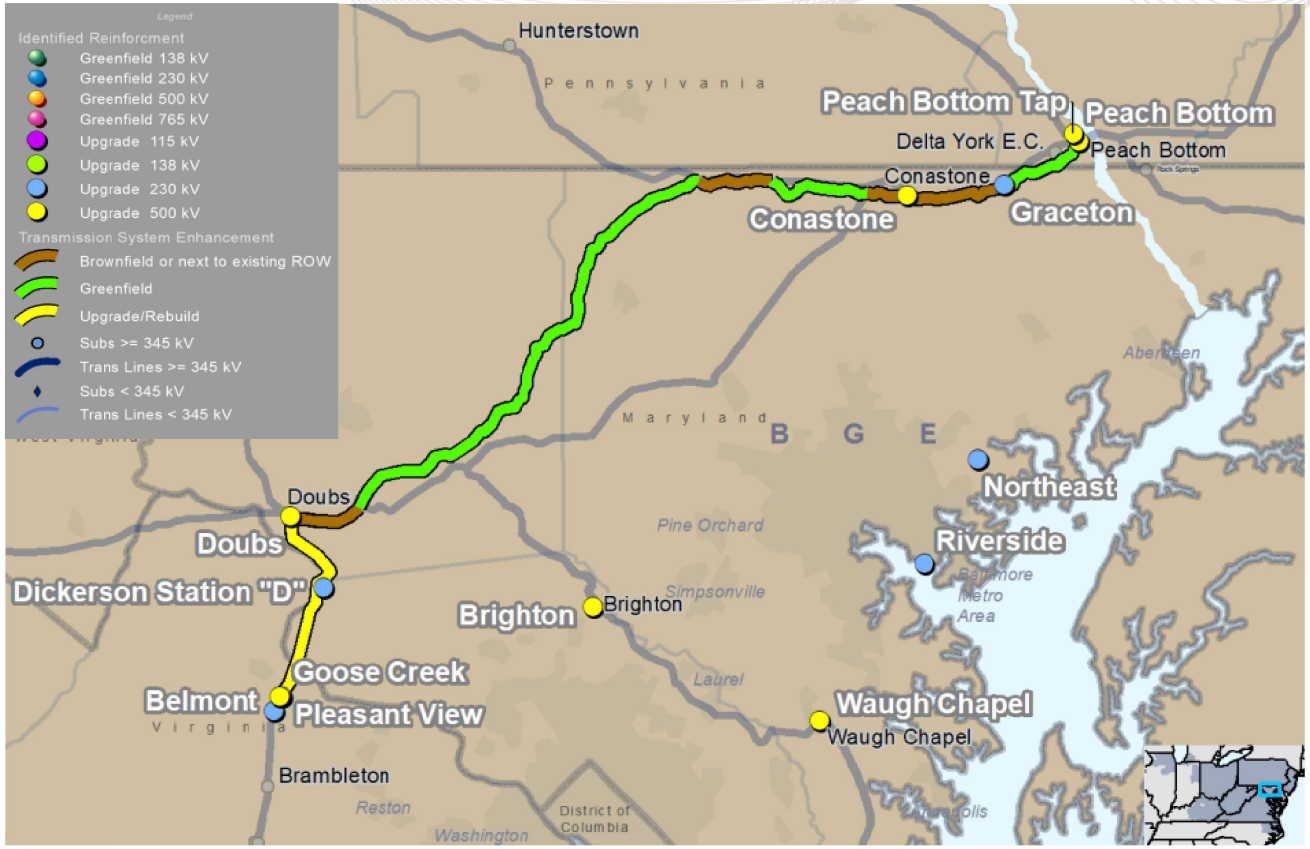
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – PSEG - 808



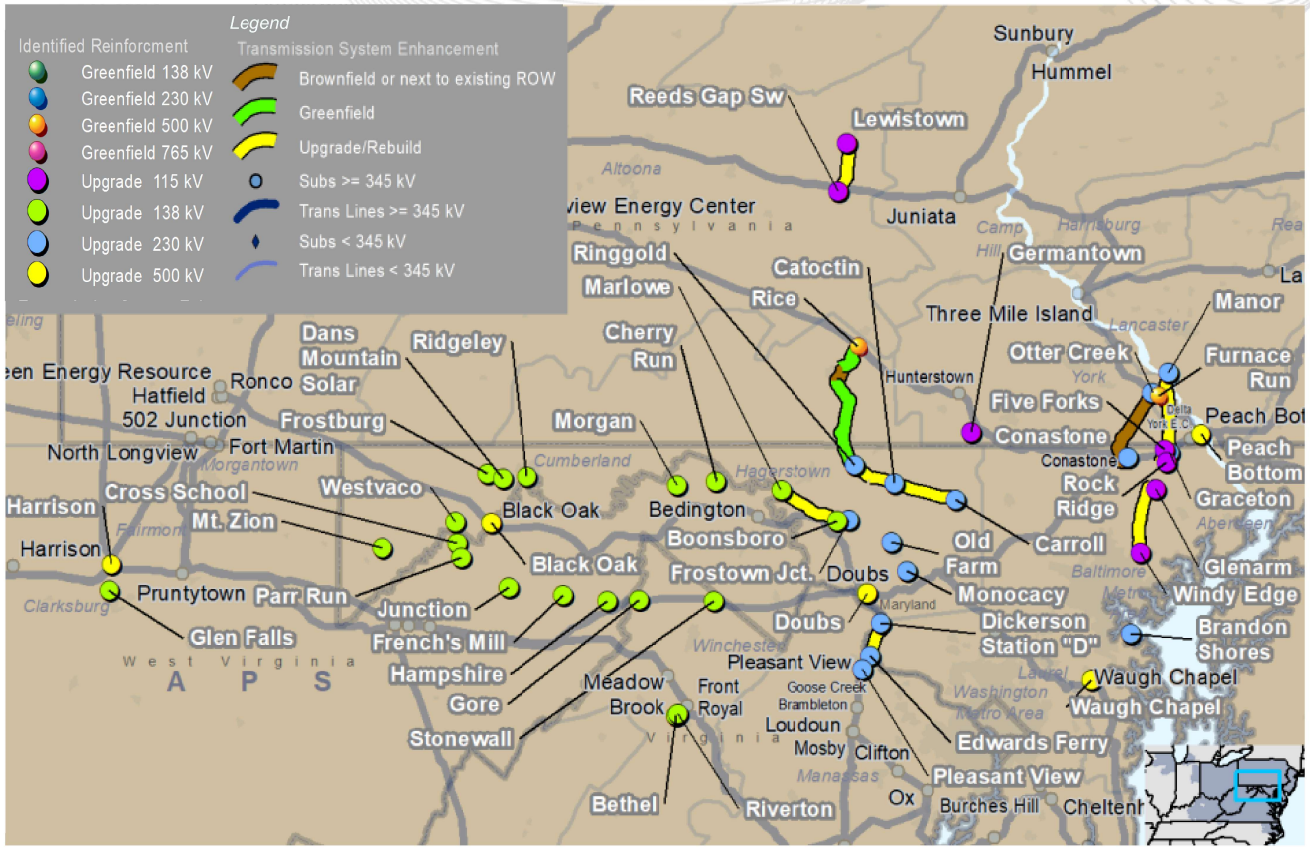
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – PSEG – 962



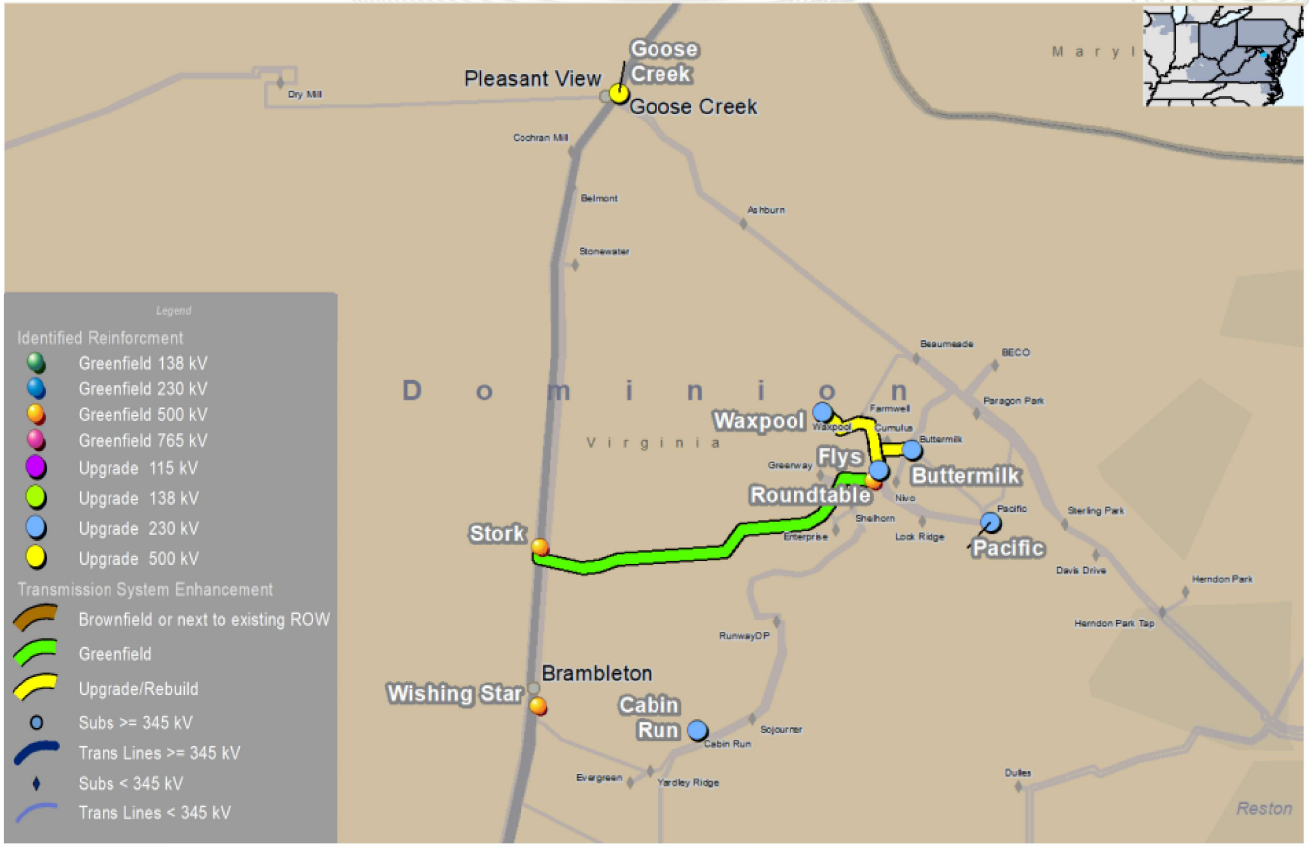
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should <u>not</u> be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Transource - 487



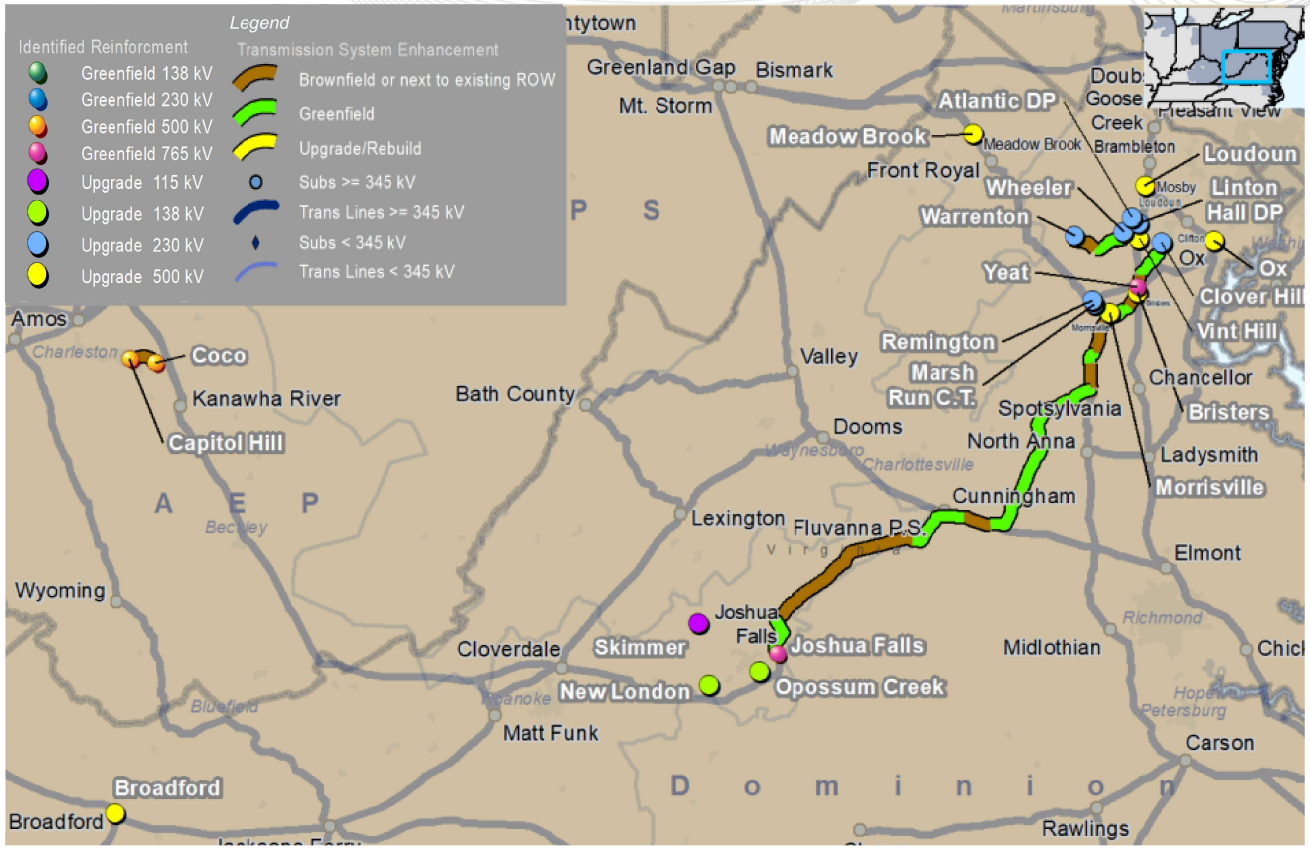
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Transource - 858



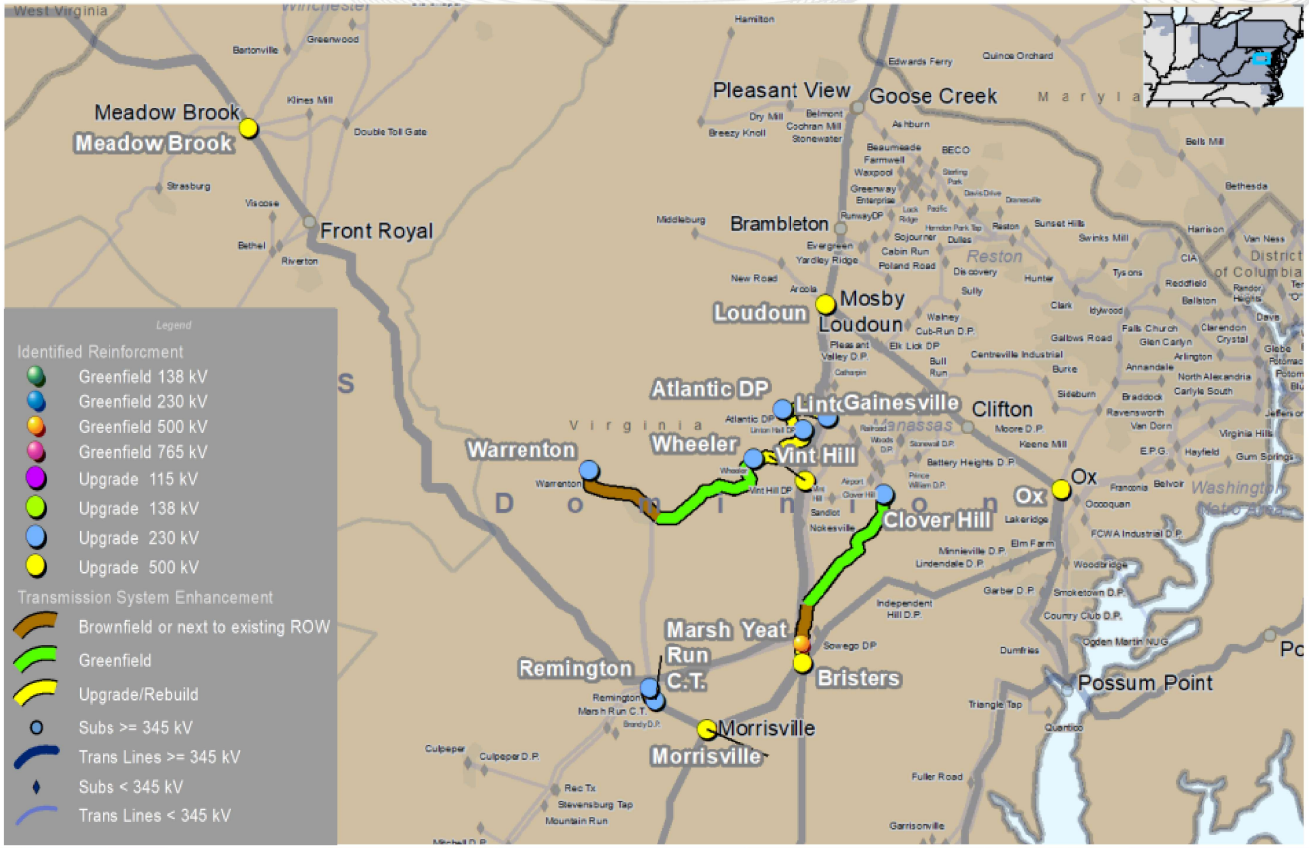
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022 Window 3 proposals – Transource - 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 <u>not</u> be relied upon for exact geographical substation locations or line routes.*

Contact

Facilitator:
Dave Souder,
Dave.Souder@pjm.com

Secretary:
Tarik Bensala,
Tarik Bensala@pjm.com

SME/Presenter:
Sami Abdulsalam,
Sami.Abdulsalam@pjm.com

Reliability Analysis Update



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

Revision History

Version No.	Date	Description
1	Oct 26th 2023	• Original slides posted
2	Oct 27th 2023	• Minor addition to slide #18
3	Oct 30th 2023	• Minor adjustments and corrections as marked with the R3 red text
4	Oct 31st 2023	• Minor update on slides #13, 14 and 55

PROTECT THE POWER GRID
THINK BEFORE YOU CLICK!
Be alert to malicious phishing emails.
pjm
Report suspicious email activity to PJM.
(610) 666-2244 / it_ops_ctr_shift@pjm.com

Reliability Analysis Update

Sami Abdulsalam, Senior Manager
PJM Transmission Planning

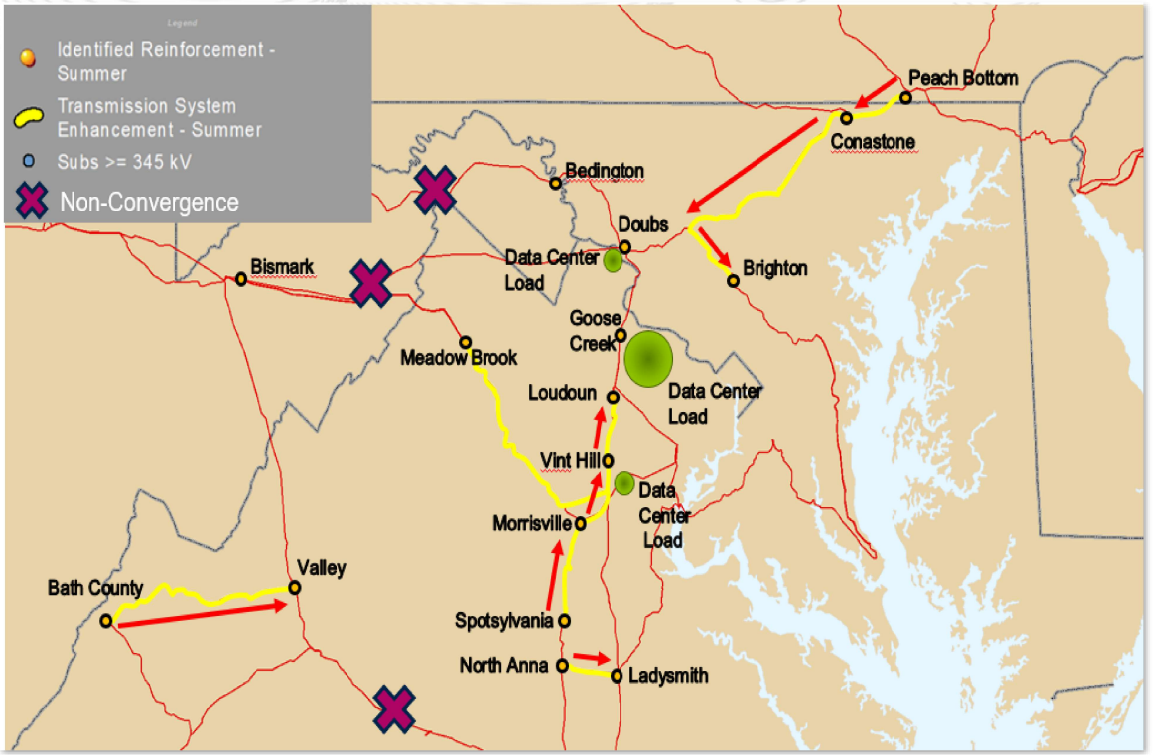
Transmission Expansion Advisory Committee
December 5, 2023

PJM©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©2023

Evaluation Criteria

- 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

PJM©2023

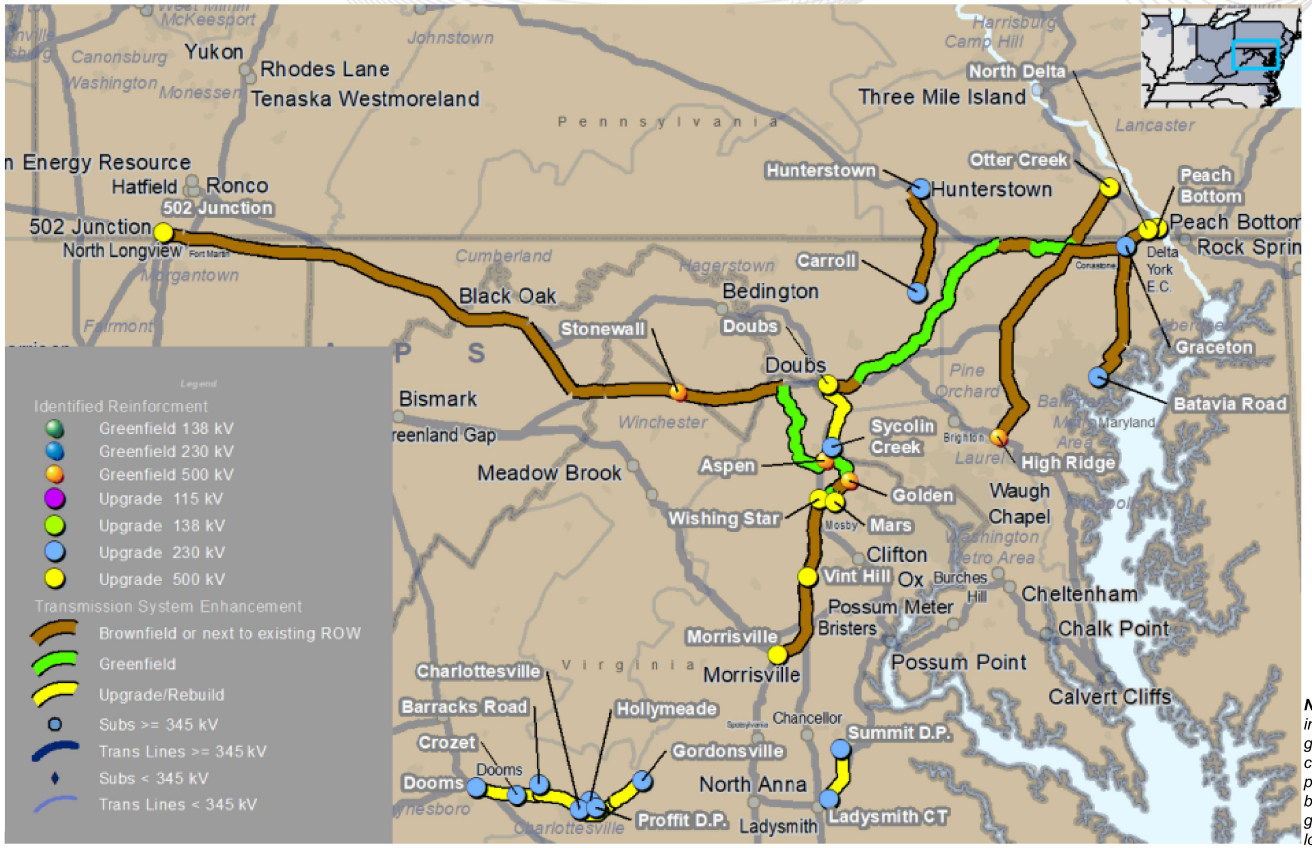
72 Proposals Were Received From 10 Entities

6 incumbent, 4 non-incumbent	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

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



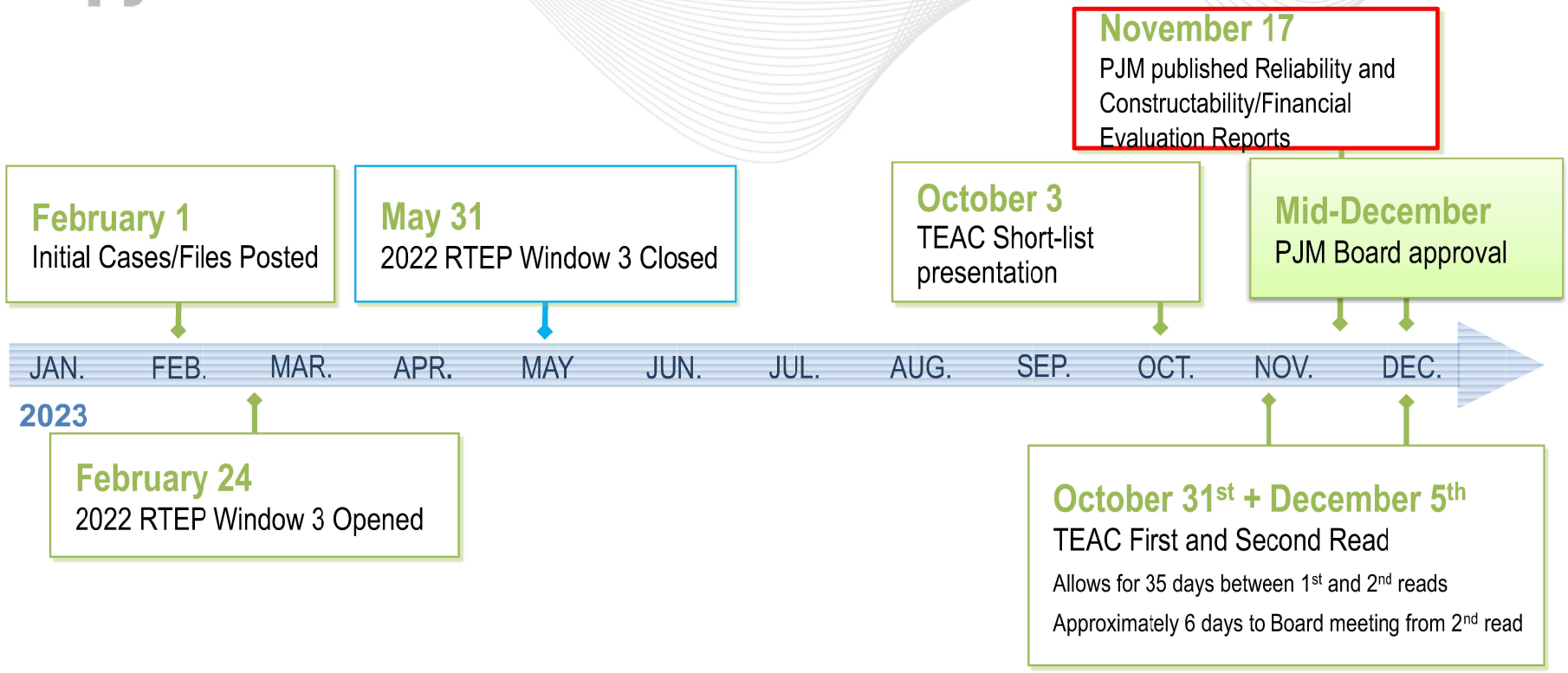
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

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
	Total	**$5,142.98**

PJM©2023

2022 RTEP Window 3 - Timeline



PJM©2023

Recommended Solution – 2022 Window 3
Second Read
Baseline Reliability Projects

PJM©2023

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

PJM©2023

2022 RTEP Window 3 - Requirements

- 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).

PJM©2023

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

PJM©2023

2022W3 – Window Evaluation Criteria

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

Performance	Scalability	Impact	Validated Cost
Meeting the system needs of 2027 and being flexible to address 2028 needs	Scenario/development longevity – system robustness and utilization	Utilization of existing ROWs where possible and efficient.	Cost evaluation using third-party benchmarking metrics

Risks

- Triggering additional costs:
  - Substation rebuilds due to extreme short-circuit levels
  - Avoid extended critical outages (Peach Bottom / Conastone rebuilds)
- Imposing high permitting
- Inability to meeting in-service date

Efficiencies

- Avoidance of redundant capital investment including recognizing synergies with EOL facilities and overlaps of previously approved (or imminent) supplemental/baseline upgrades.

PJM©2023

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

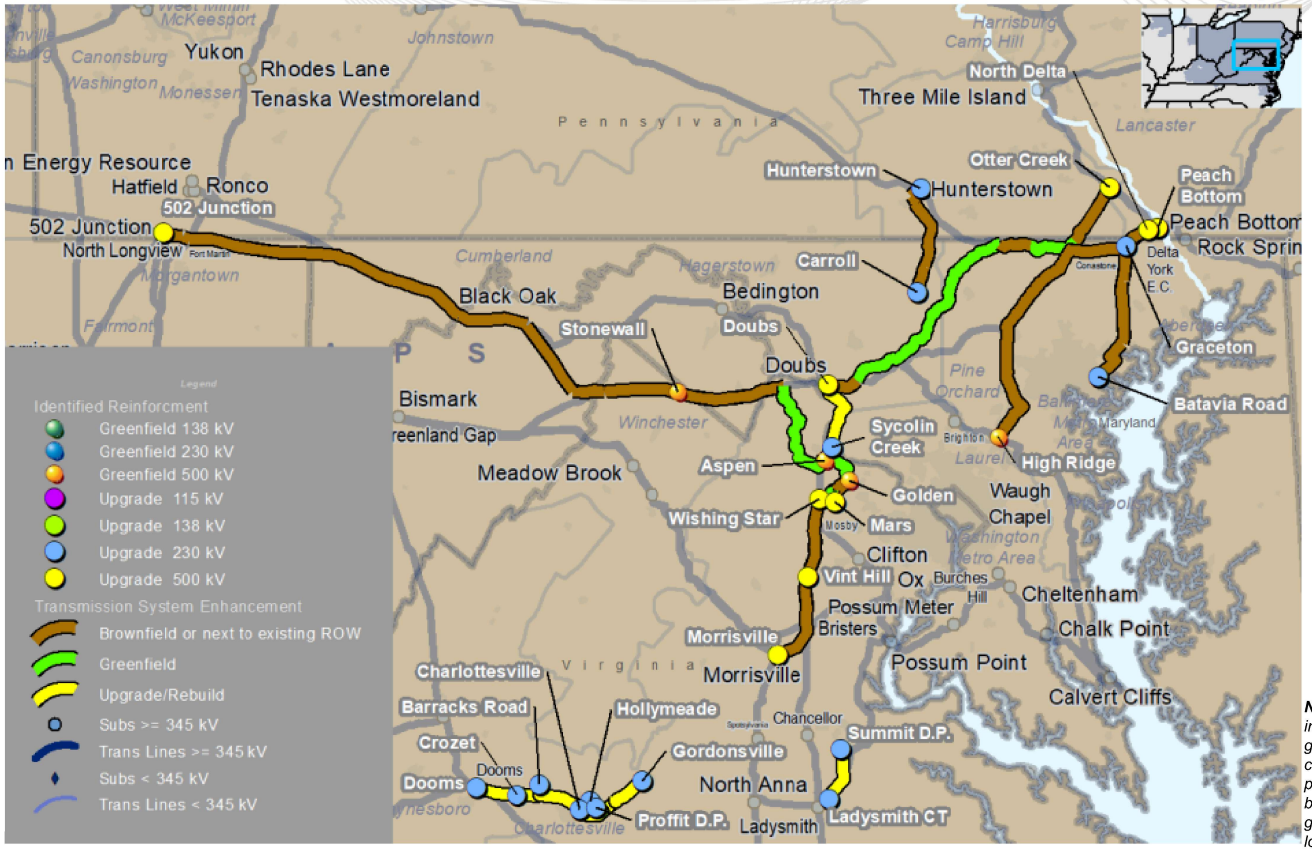
PJM©2023

2022 RTEP W3 – Selected Proposals

- Selected proposals were previously presented at the Oct 31st 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

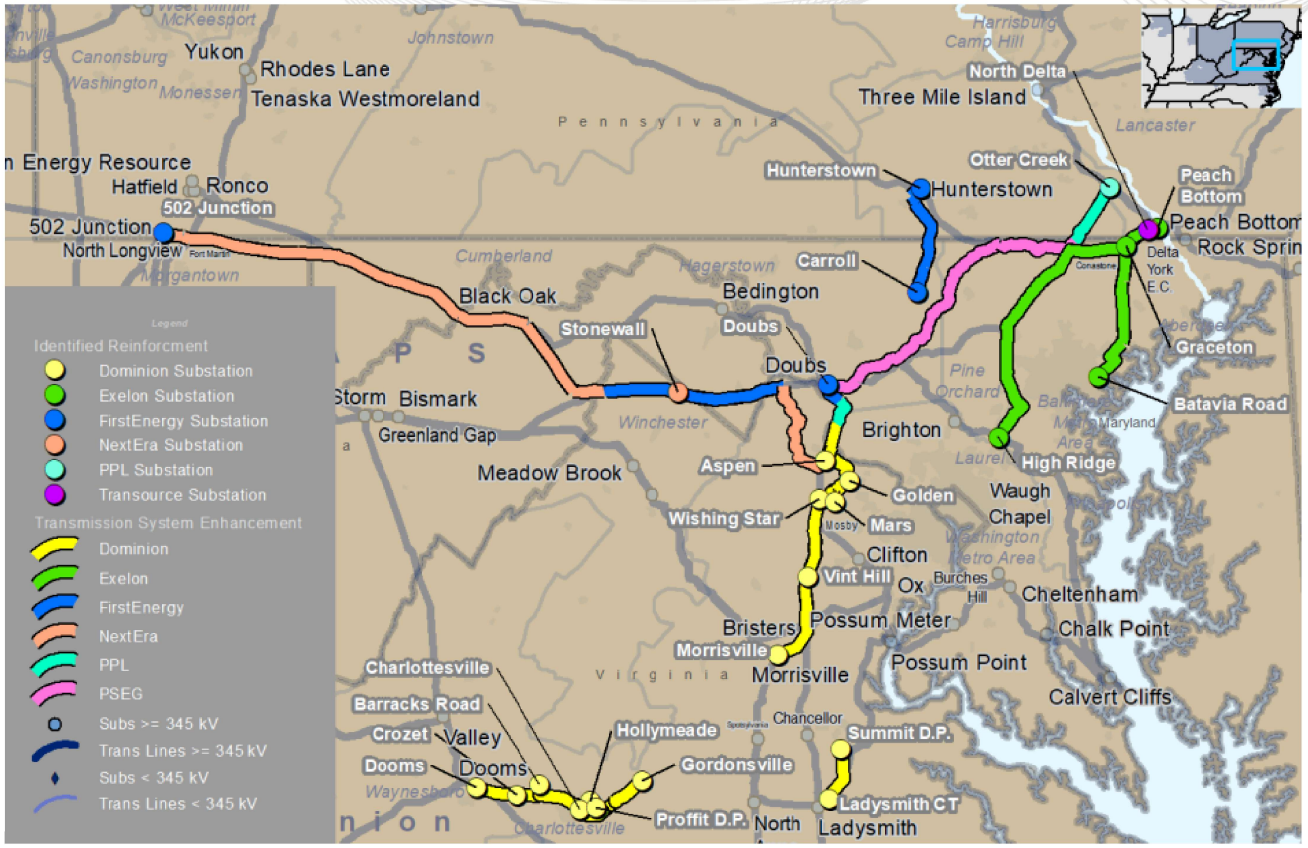
PJM©2023

Major Proposals Selected in 2022 Window 3



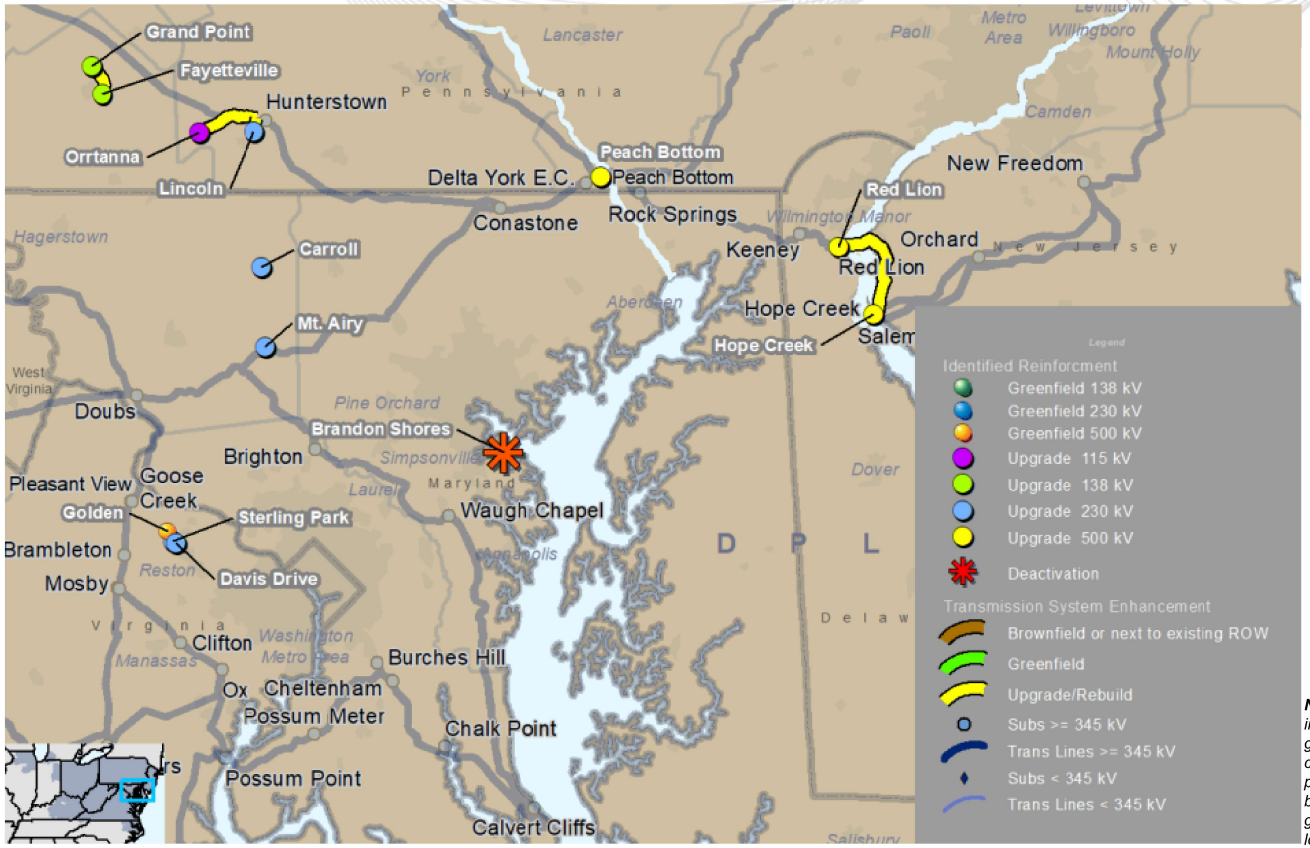
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

Major Proposals Selected in 2022 Window 3 - by Designated Entity



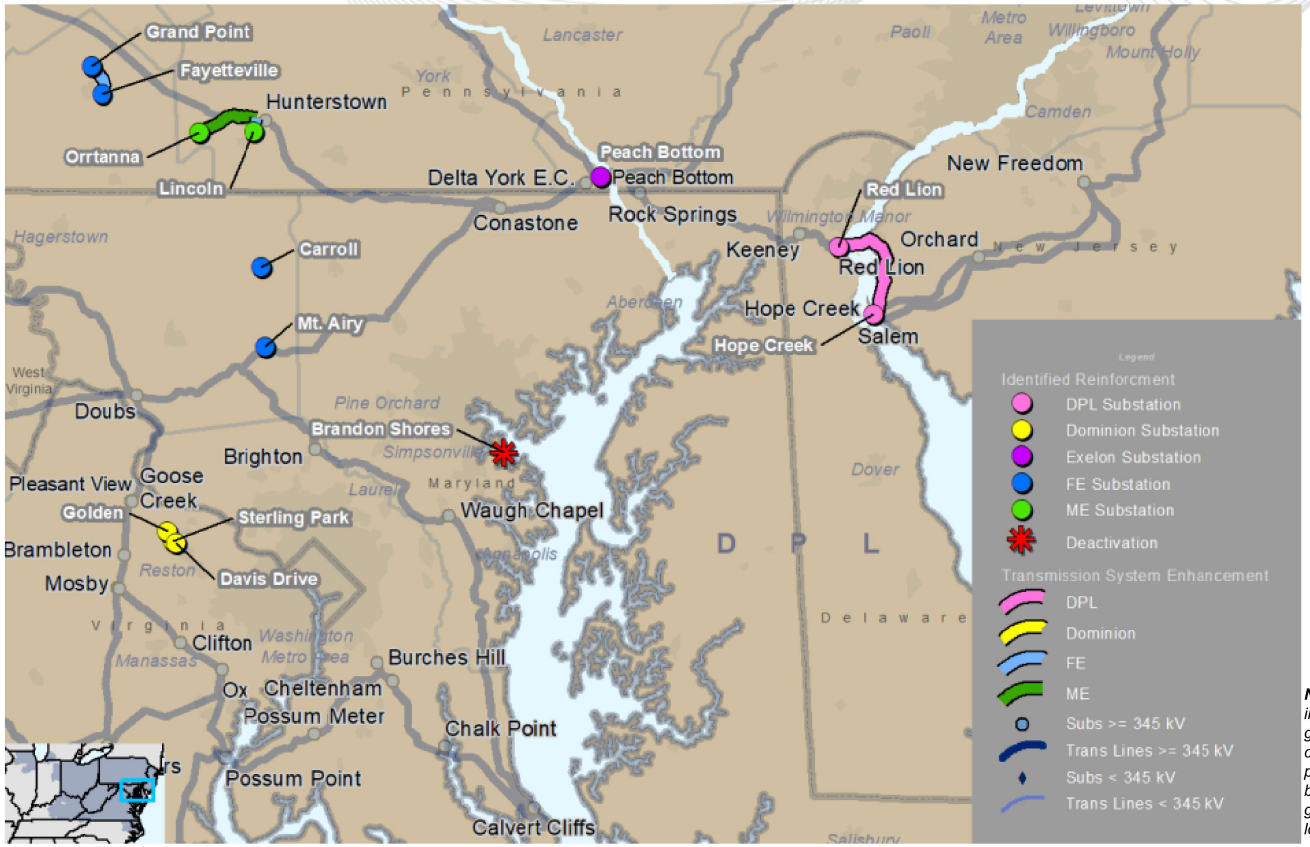
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

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

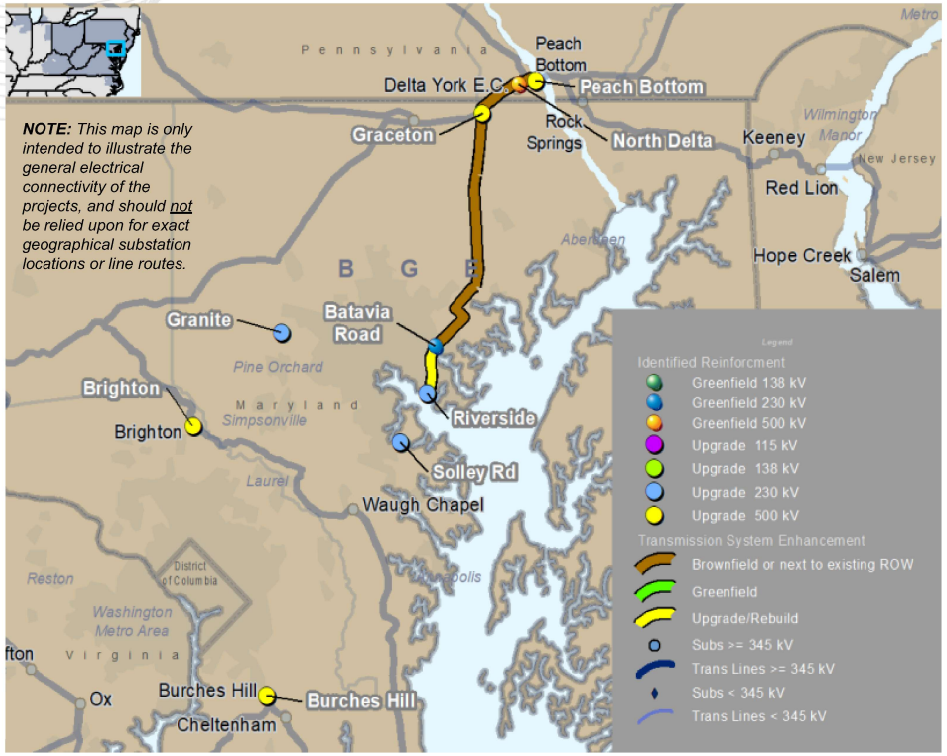
Baseline Reliability Projects

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 ...



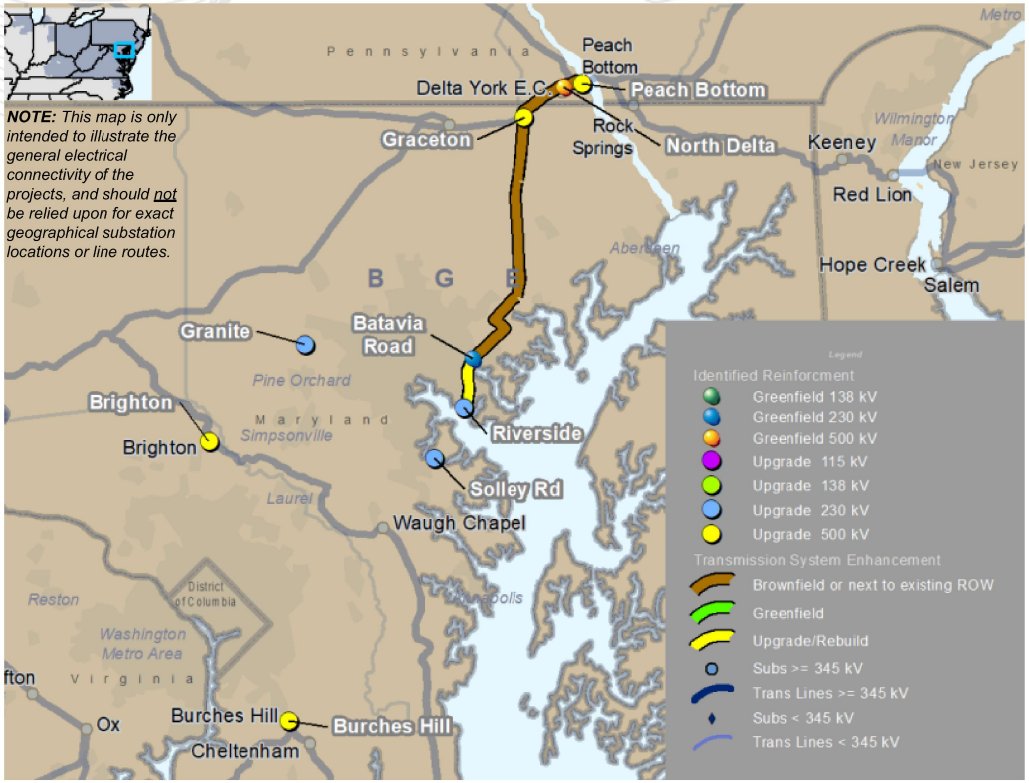
PJM recommended adjustments to Earlier Approved Brandon Shores De-Activation Scope

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



PJM©2023

AEP Local - Selected Proposals

Baseline Reliability Projects

2022W3 – Preferred Solutions: AEP Local

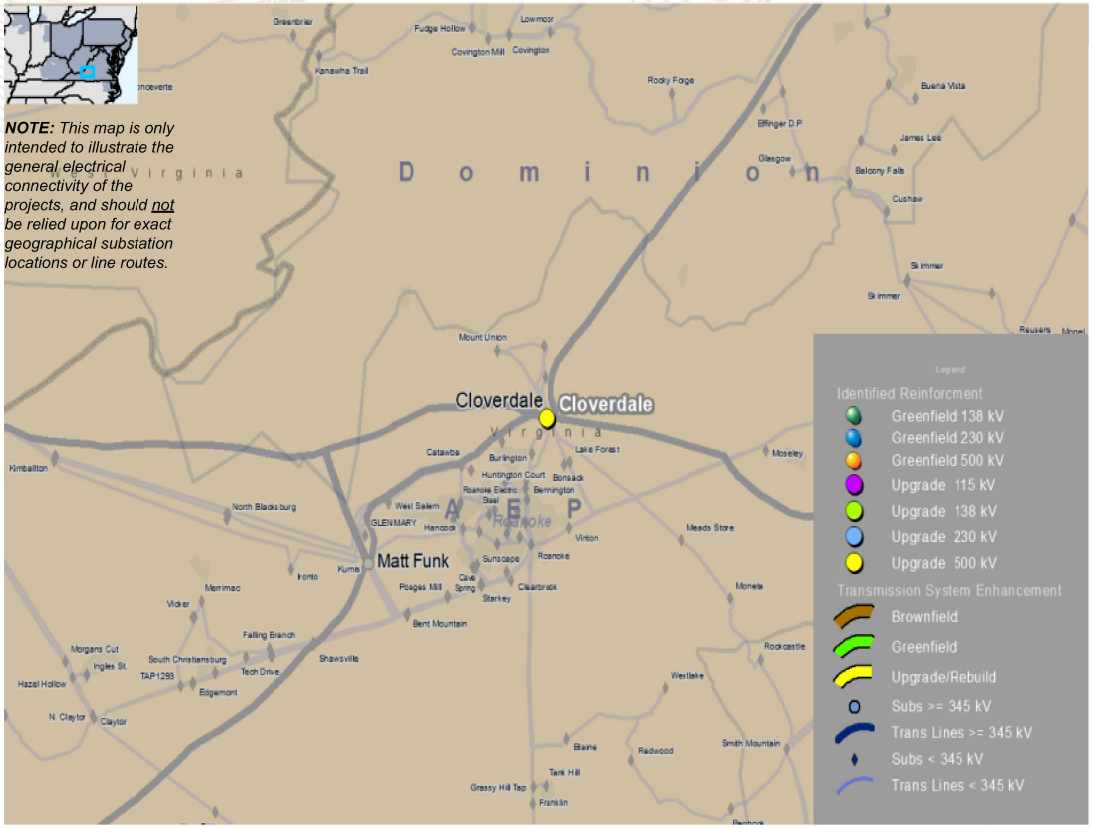
AEP: 2022-W3-410

- 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

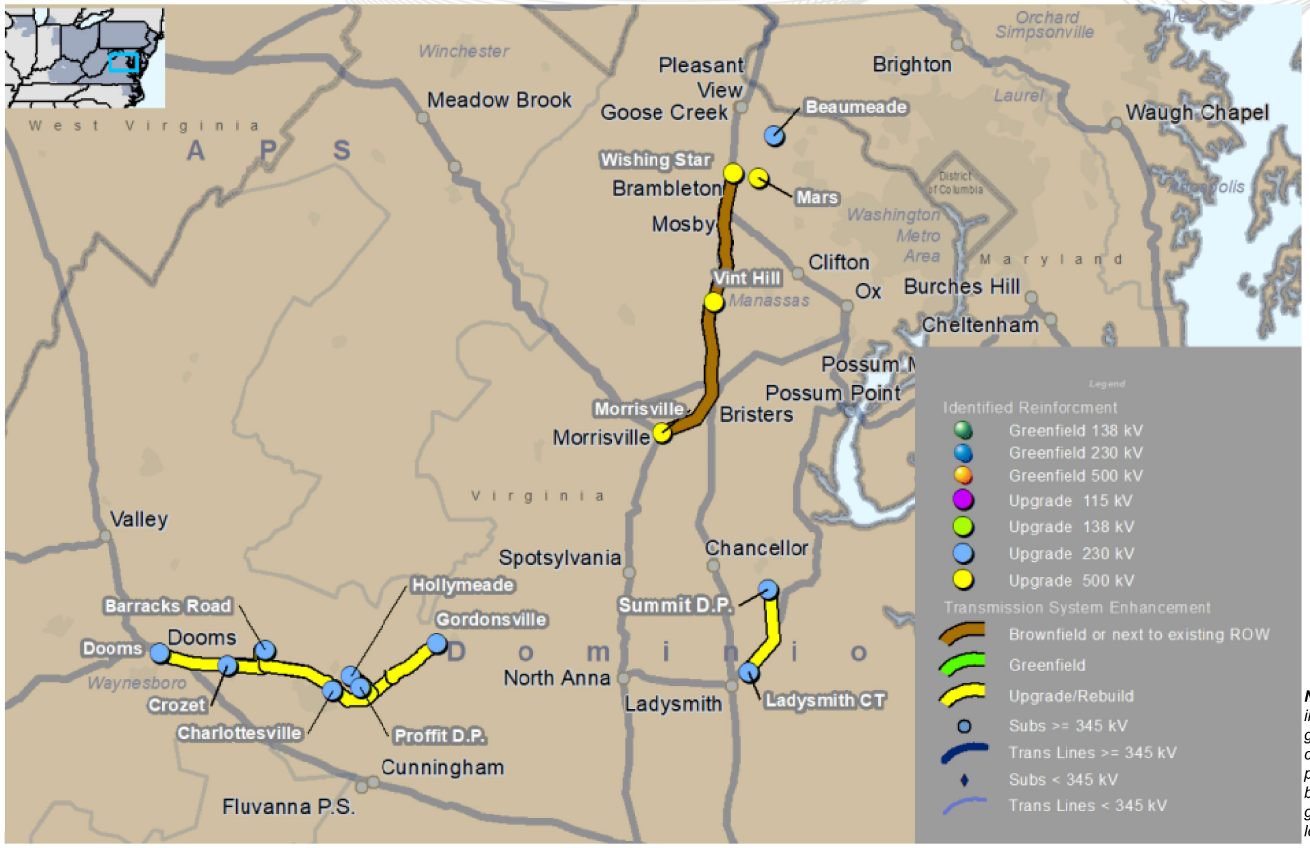
Projected IS Date: 10/31/2026



South Cluster - Selected Proposals

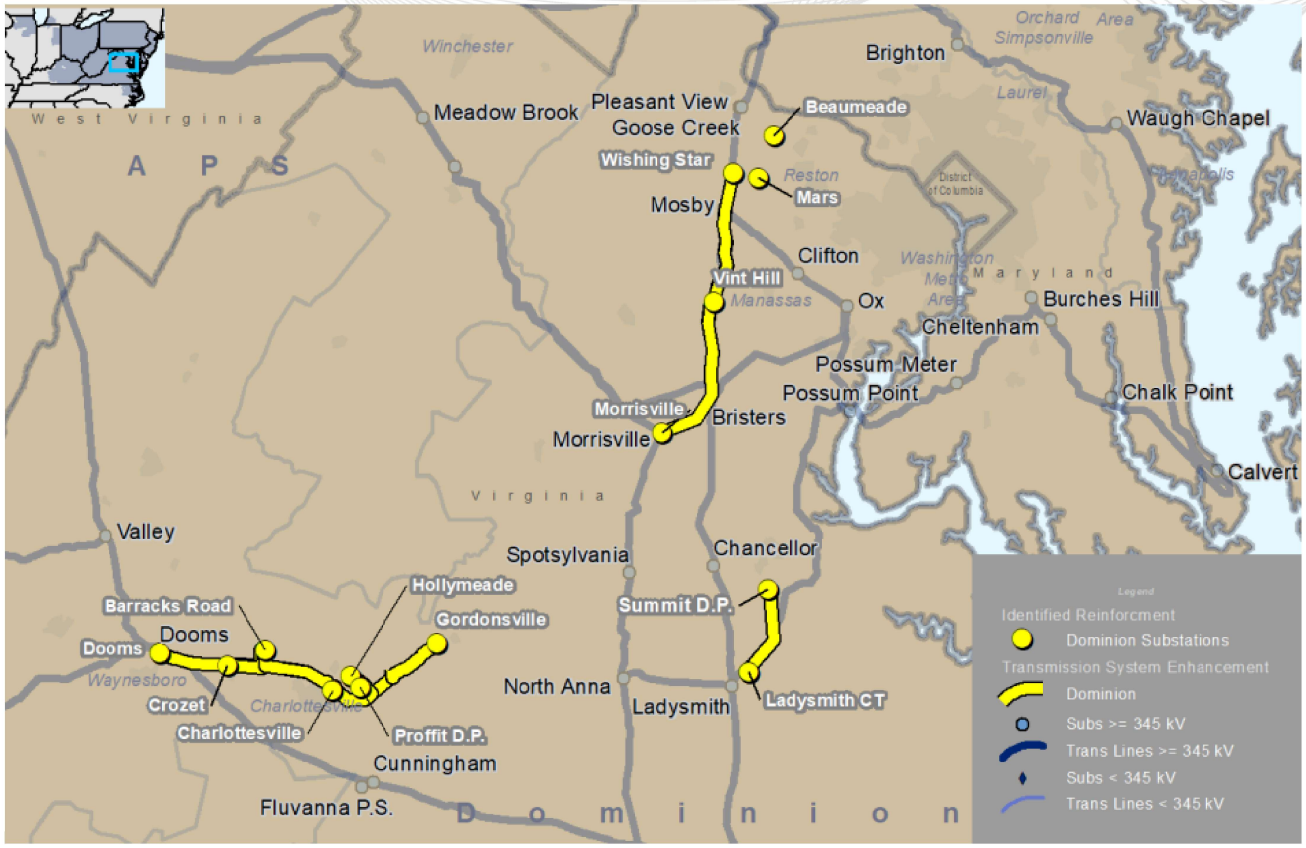
Baseline Reliability Projects

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

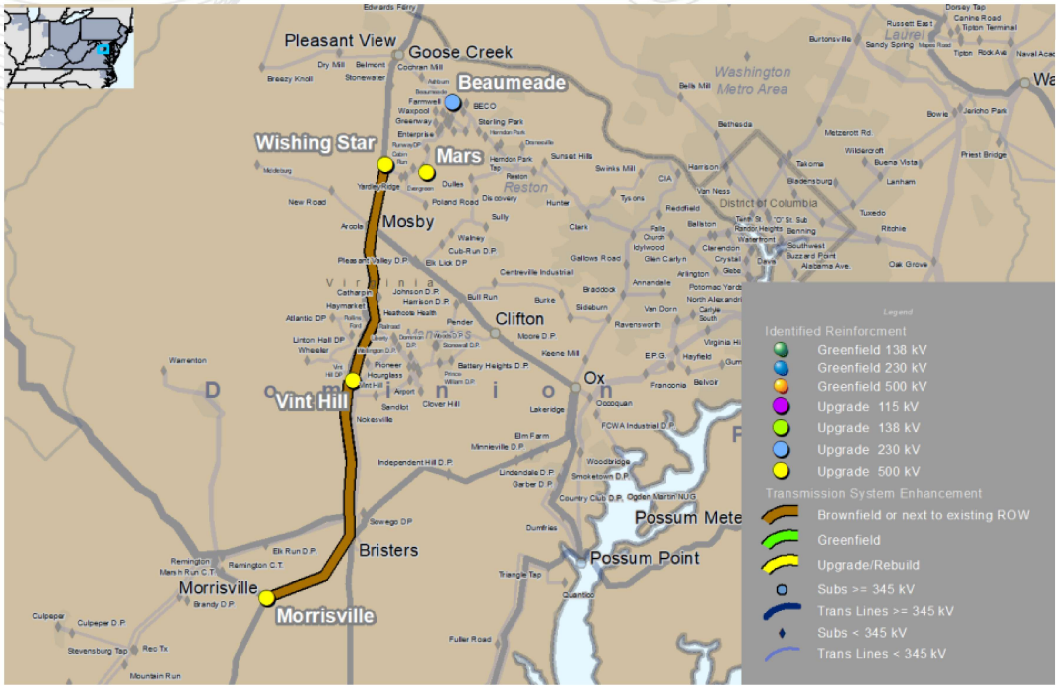


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

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.*

Continued on next slide…

2022W3 – Recommended Solutions: South Cluster

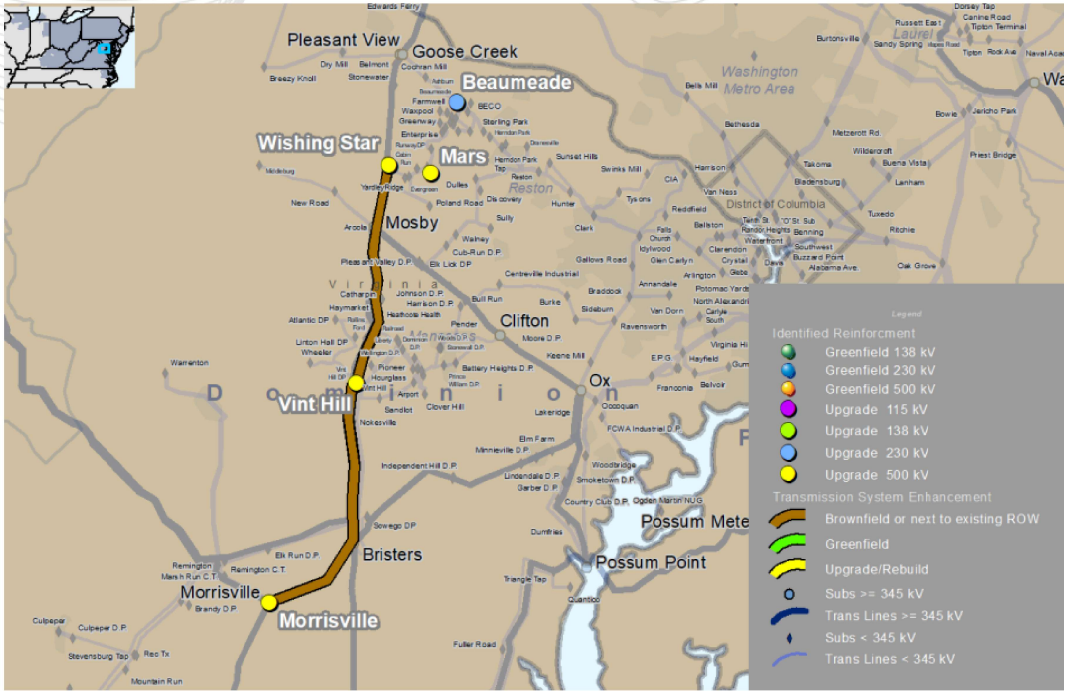
Recommended Solution: 2022-W3-711 (**Partial**)

- 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



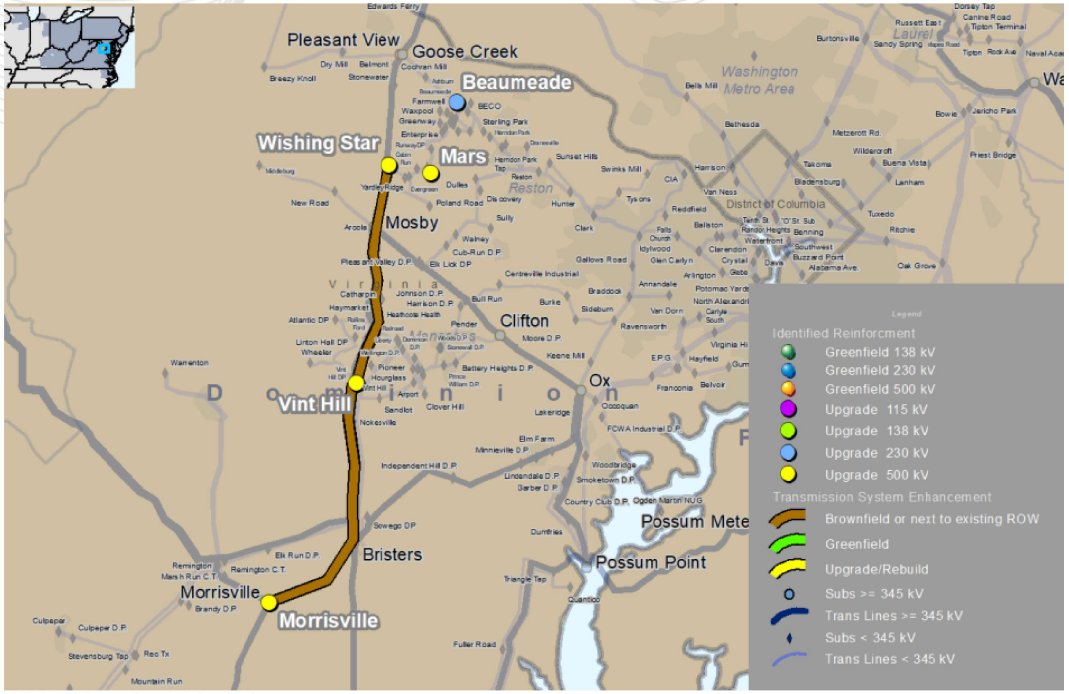
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

Continued on next slide…

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



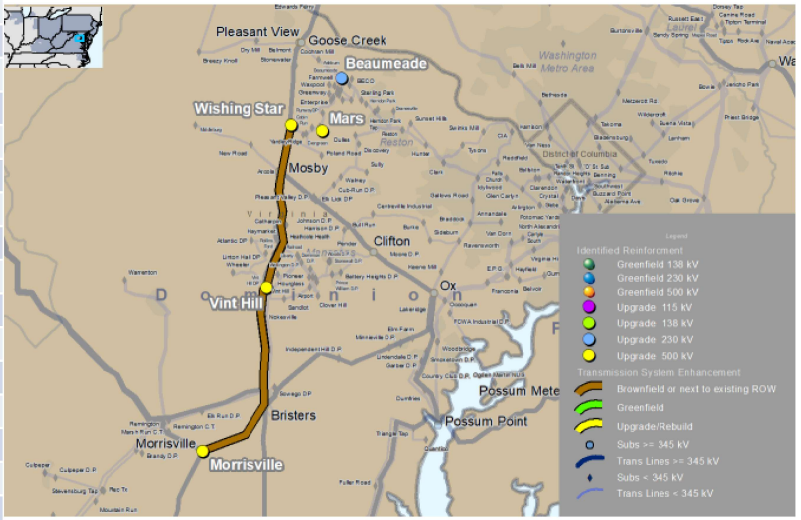
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

Continued on next slide…

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



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: $842.19 M

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

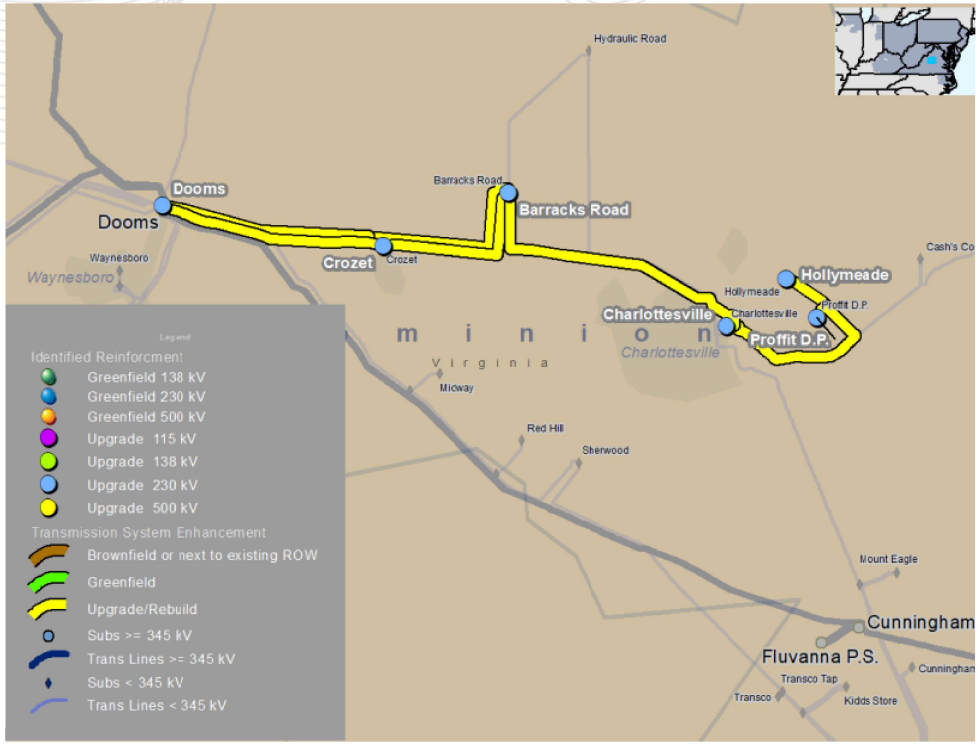
Continued on next slide…

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.*

Continued on next slide…

2022W3 – Recommended Solutions: South Cluster

Existing Facility Ratings:

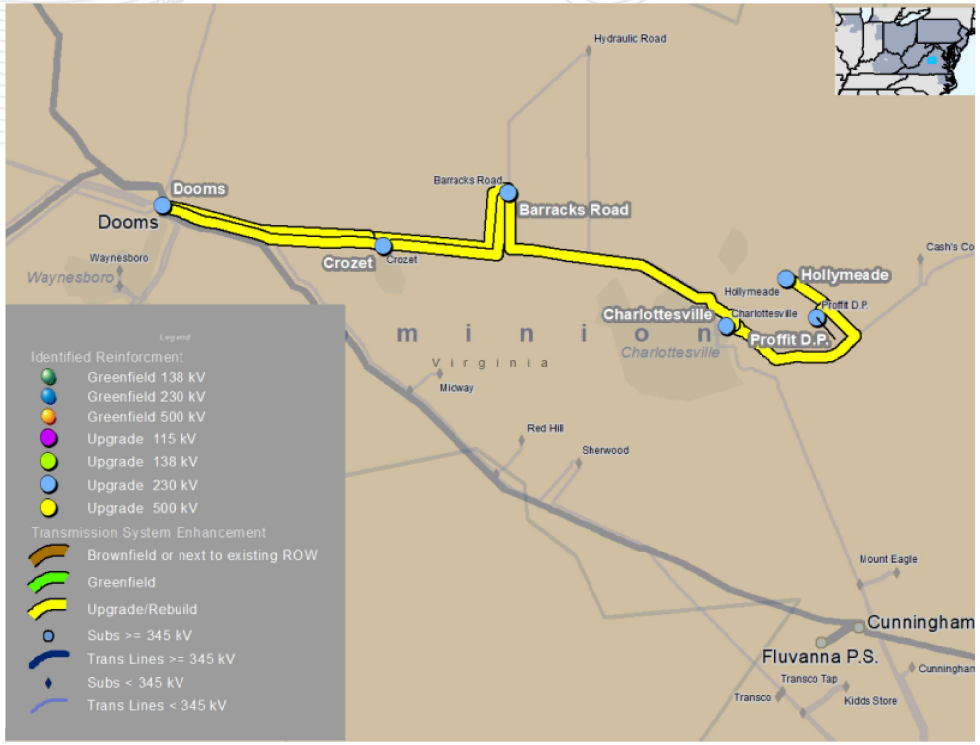
Branch	SN/SE/WN/WE (MVA)
230kV Line #2054 Charlottesvillle – Proffit D.P.	586/586/741/741
230kV Line #233 Barracks Road – Crozet	608/608/769/769
230kV Line #291 Charlottesville – Barracks Road – Crozet – Dooms	595/595/757/757

Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2054 Charlottesvillle – 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

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.*

PJM©2023

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:

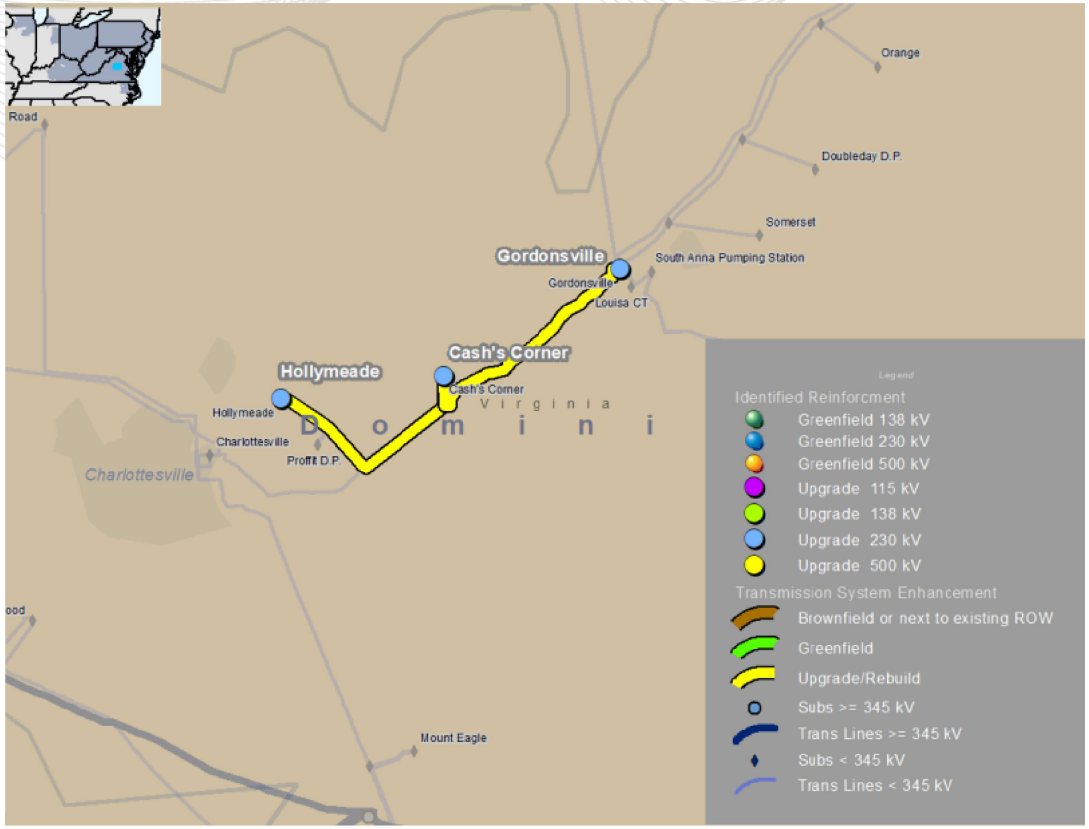
Branch	SN/SE/WN/WE (MVA)
230kV Line #2135 Cash's Corner - Gordonsville	586/586/741/741
230kV Line #2135 Cash's Corner - Hollymeade	586/586/741/741

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

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 – Recommended Solutions: South Cluster

Recommended Solution: 2022-W3-731

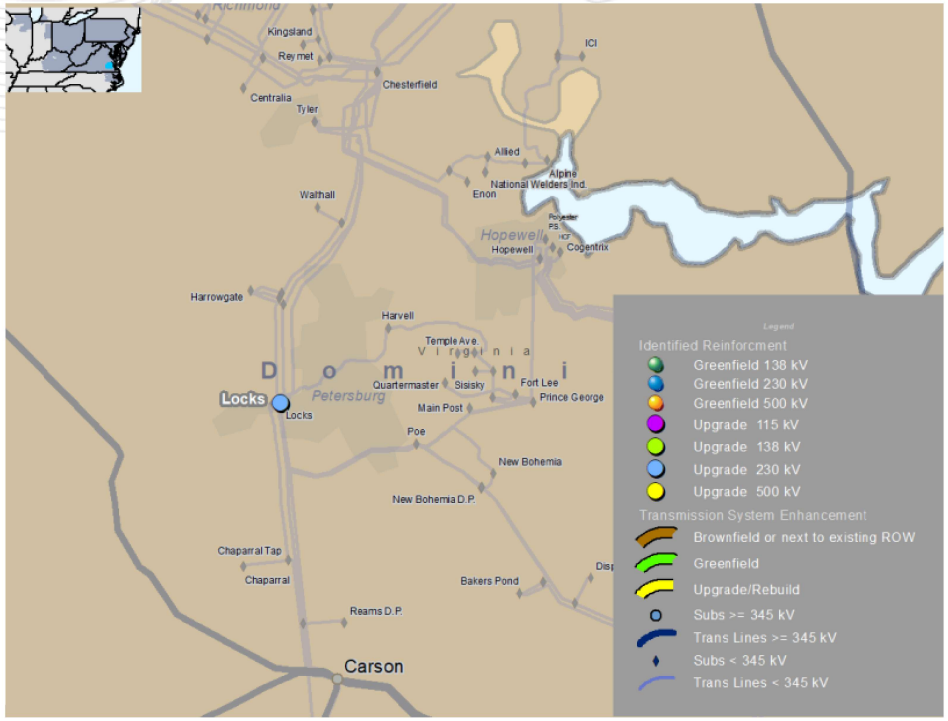
- Replace single unit Locks 230/115 kV 168MVA transformer #7 with a new single unit transformer with a rating of 224 MVA.
- Lead lines at the 115 kV level will be upgraded to 2000 A.

Baseline # B3800.358

Estimated Cost: $7.14 M

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

Continued on next slide…



NOTE: *This map is only intended to illustrate the general elecirical 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:

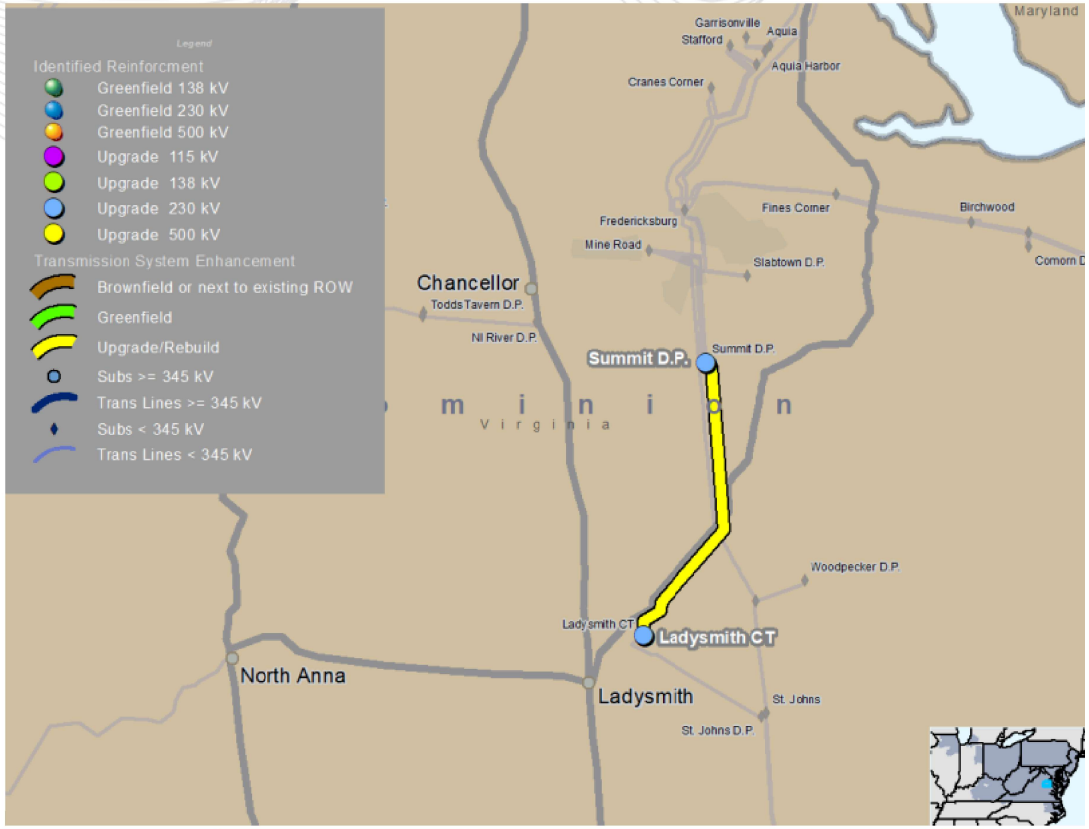
Branch	SN/SE/WN/WE (MVA)
230kV Line #2090 Ladysmith CT – Summit D.P	1225/1225/1358/1358

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

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.*

PJM©2023

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

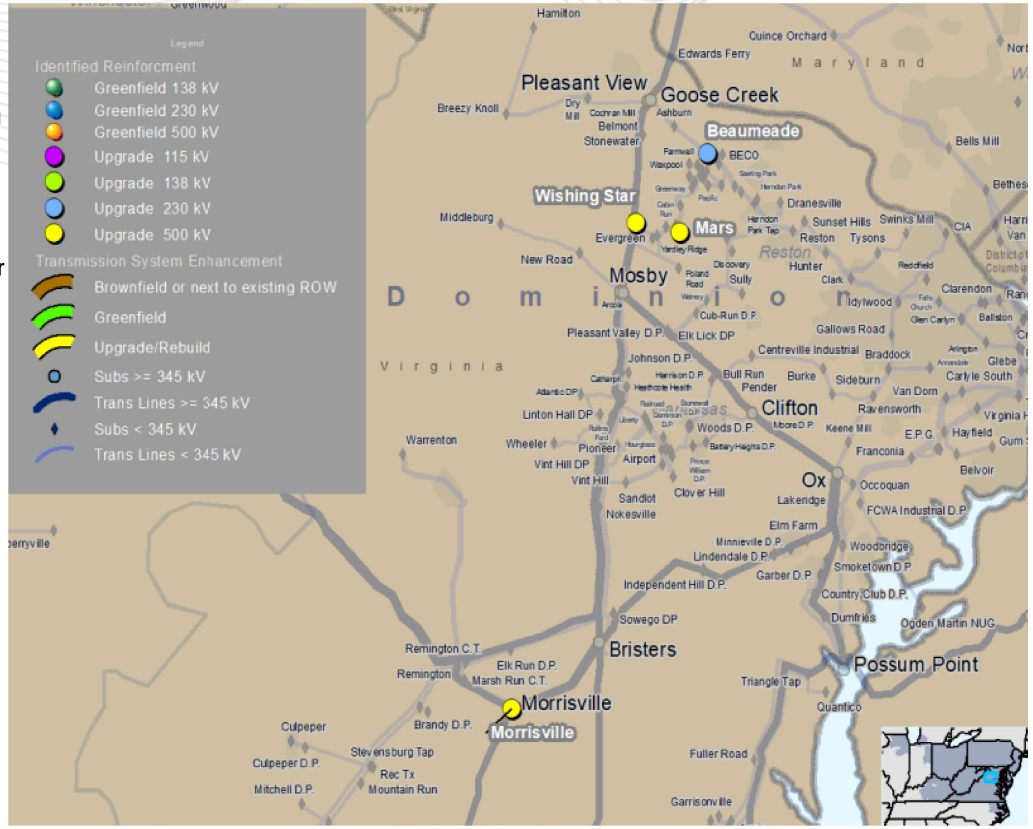
Baseline # B3800.305 – B3800.310

Estimated Cost: $103.79 M

Required IS Date: 6/1/2027

Projected IS Date: 12/1/2027

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.*

PJM©2023

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 reconductored 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

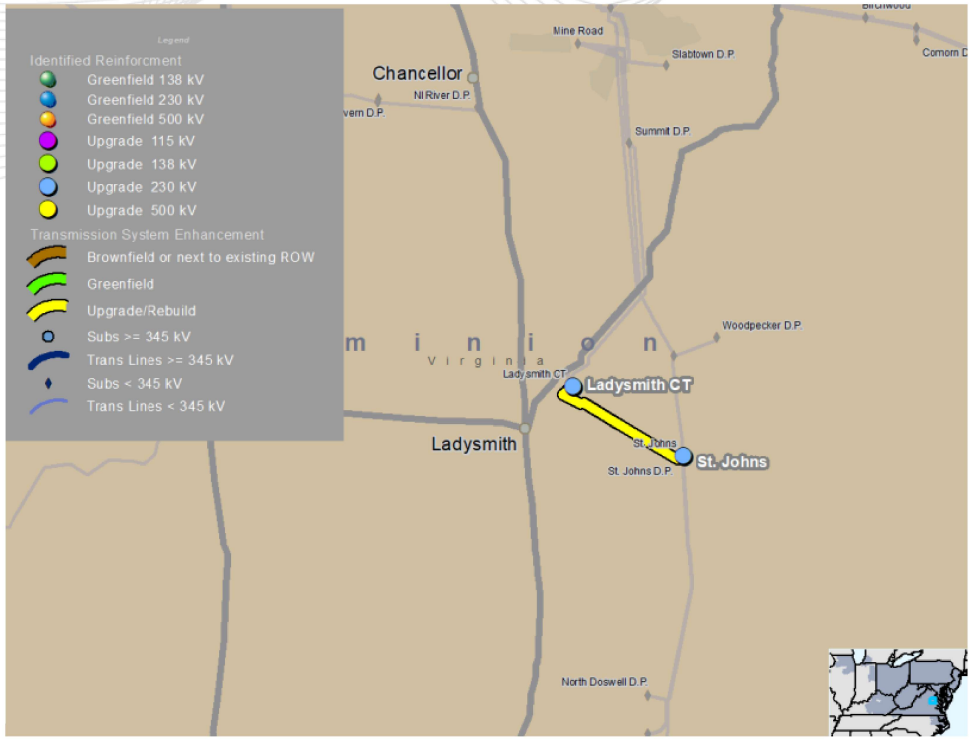
Baseline # B3800.373 – B3800.374

Estimated Cost: $37.89 M

Required IS Date: 6/1/2028

Projected IS Date: 6/1/2028

Continued on next slide…



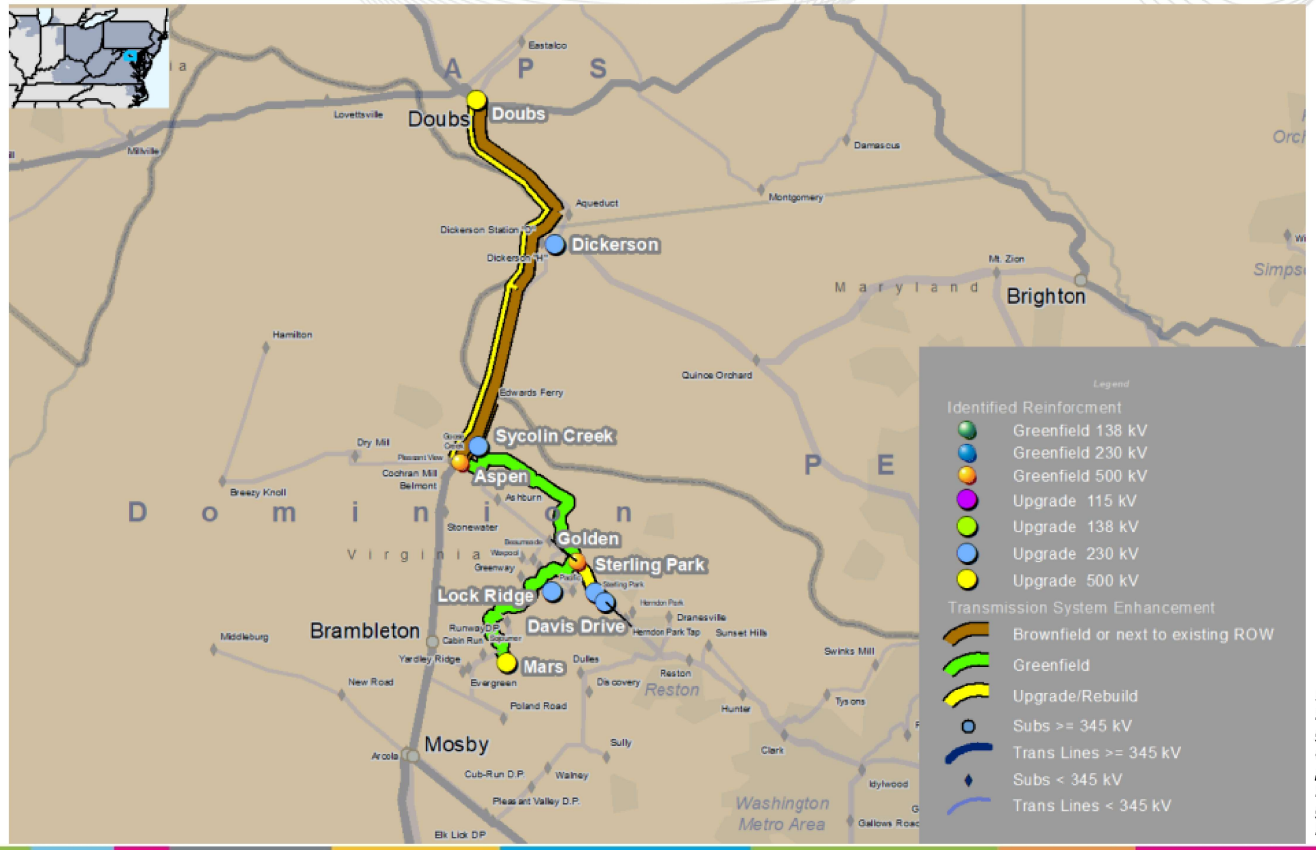
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

PJM©2023

Northern Virginia/Doubs- Selected Proposals

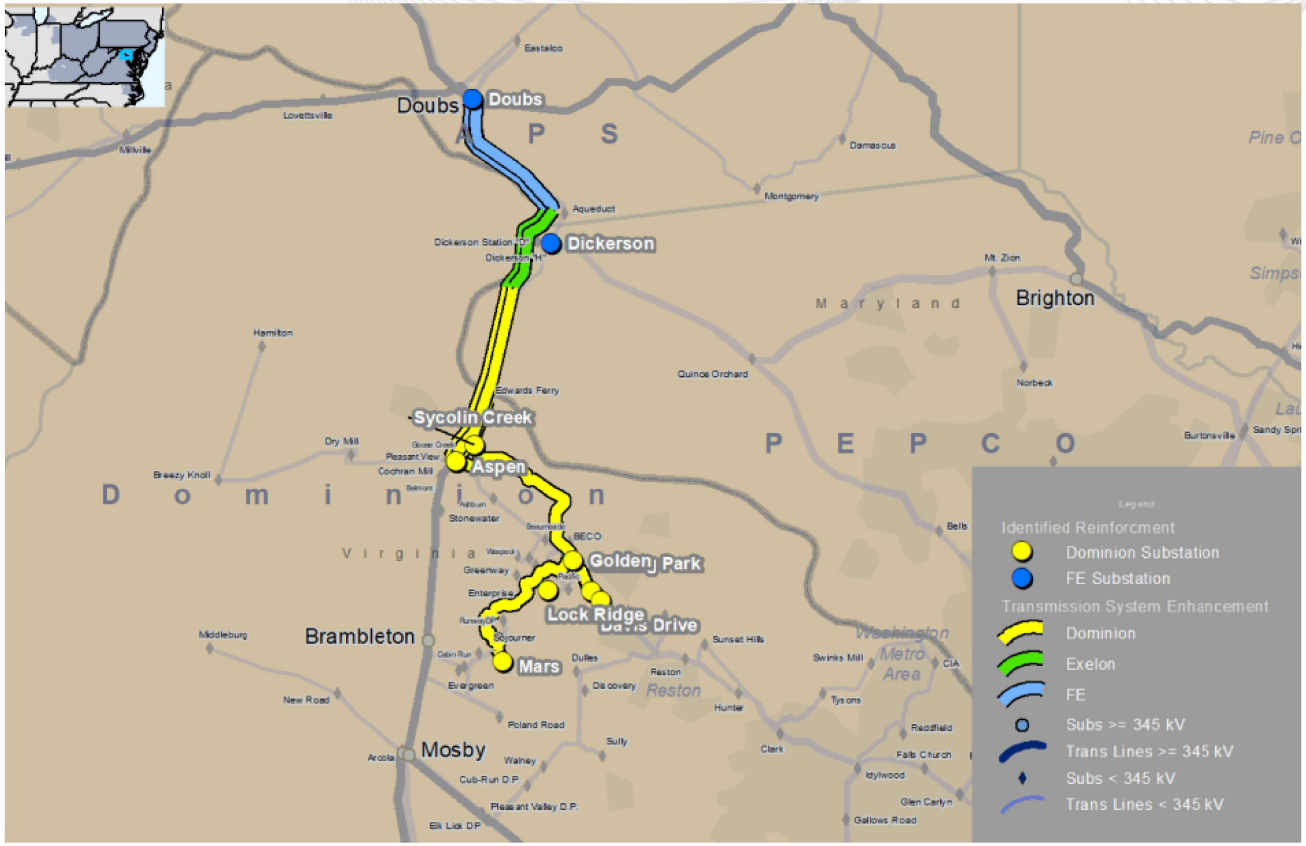
Baseline Reliability Projects

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



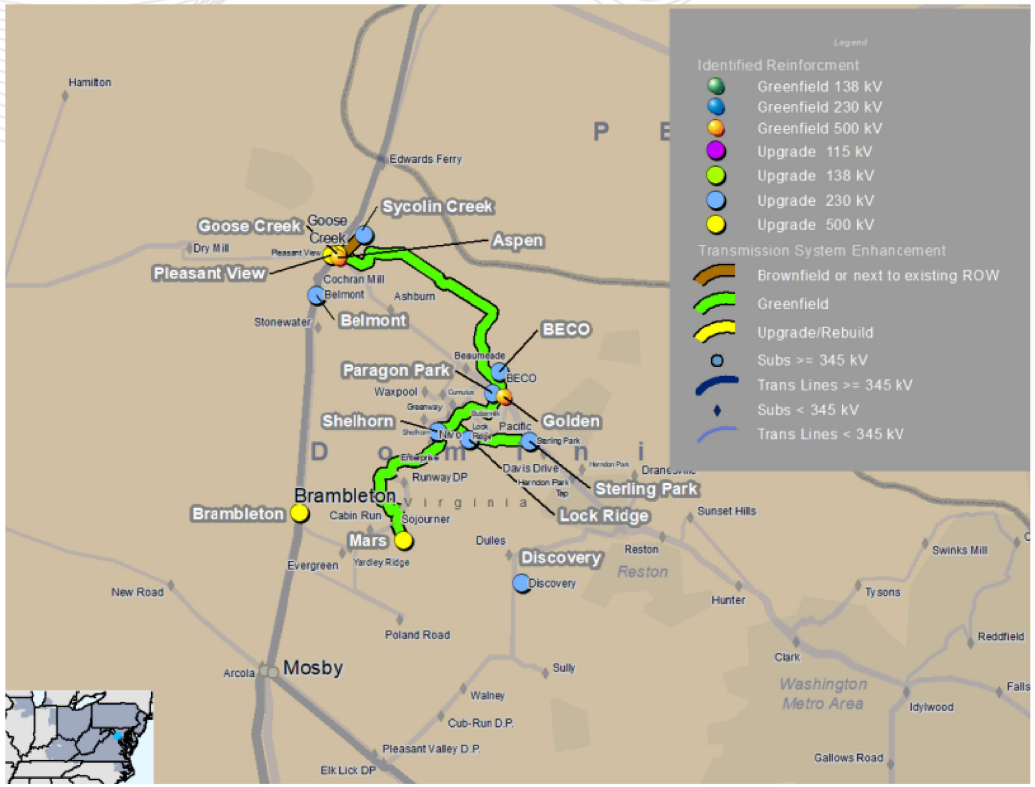
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

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 2nd 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.

Continued on next slide…

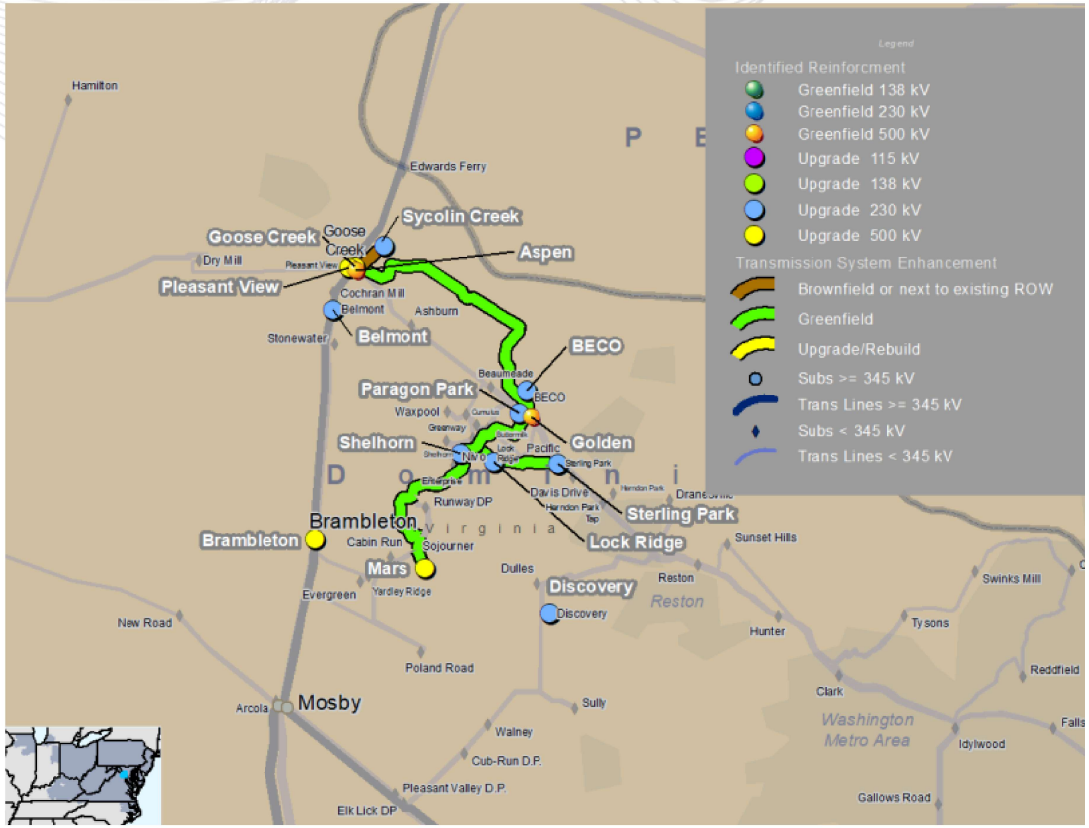


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022W3 – 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



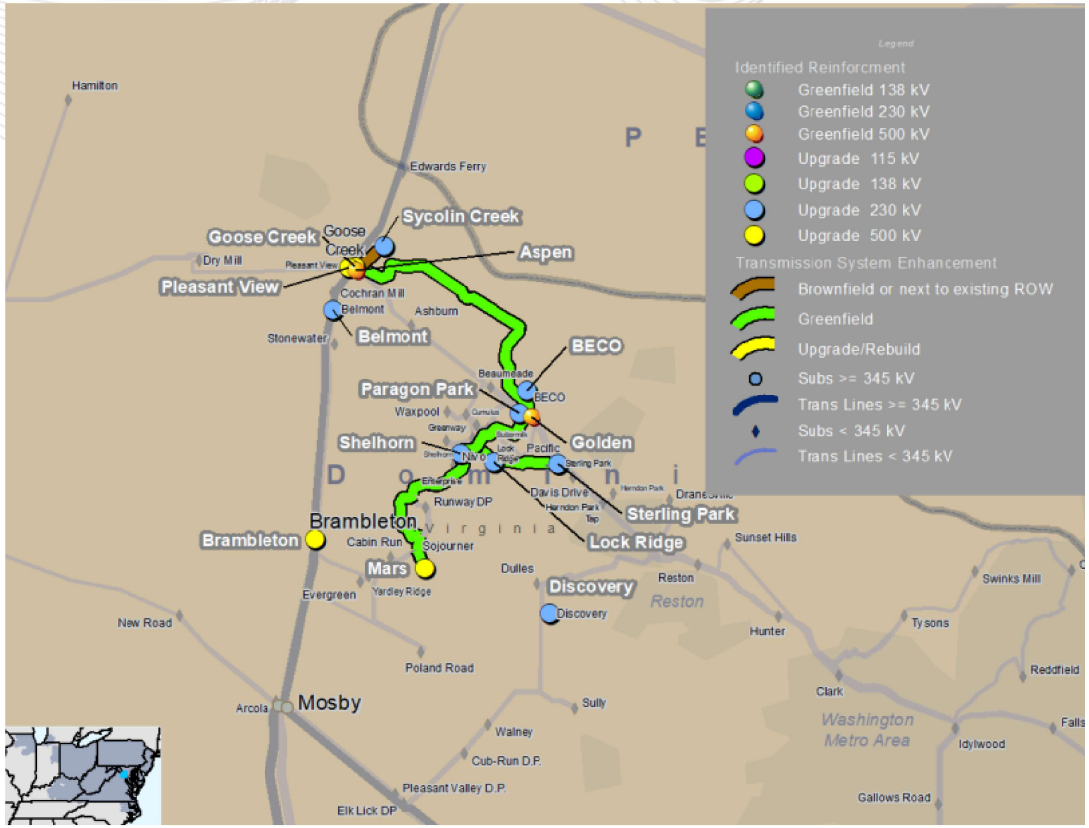
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

Continued on next slide…

2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

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



Baseline # B3800.200 – B3800.227
Estimated Cost: $1025.06 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 – 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

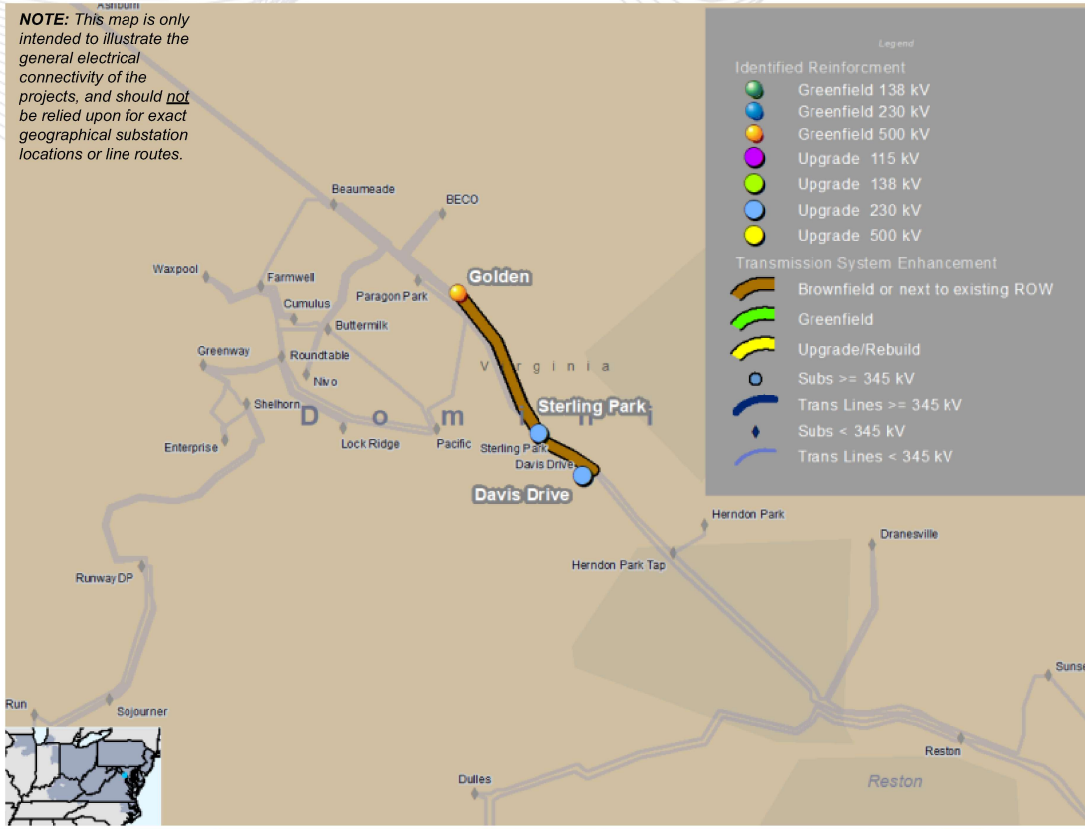
Existing Facility Ratings:

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



PJM©2023

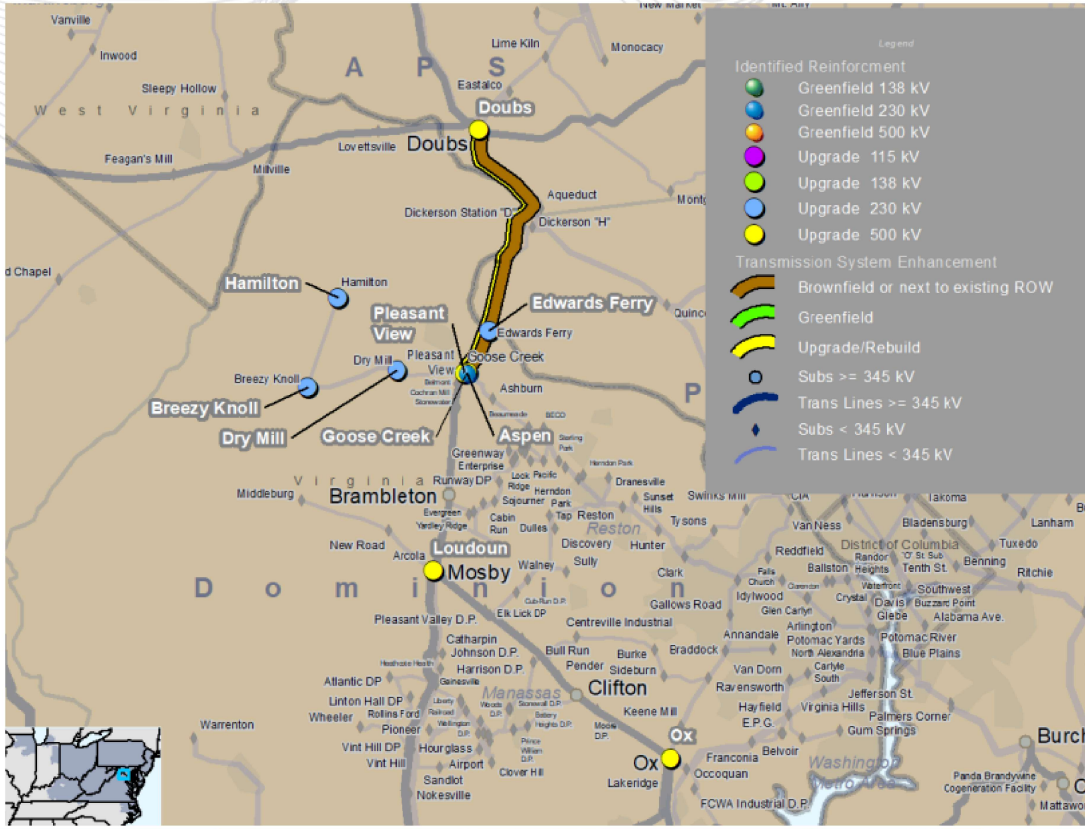
2022W3 – Recommended Solutions: Northern Virginia/Doubs Cluster

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 overdutied breakers at Loudoun, Ox, Pleasant View.

- Earlier approved EOL baseline B3247 (DOM) and supplemental S2386 (FE) will be cancelled

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 – Recommended Solutions: Northern Virginia/Doubs Cluster

Existing Facility Ratings:

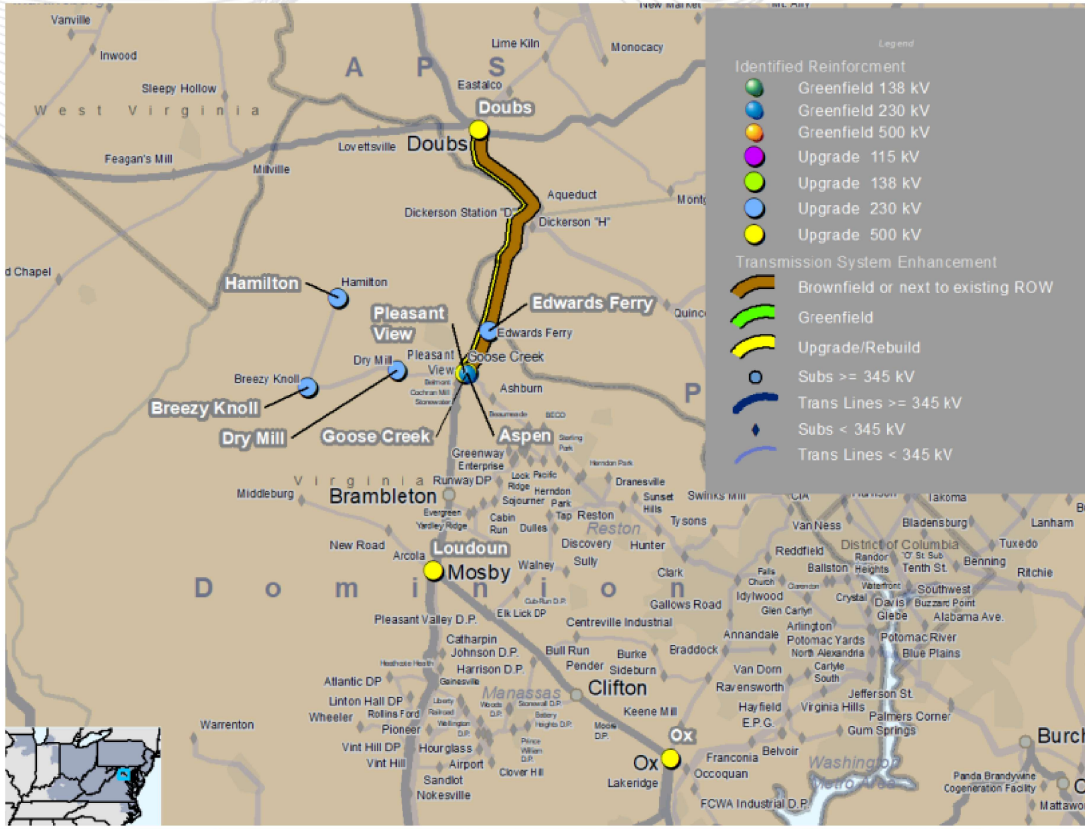
Branch	SN/SE/WN/WE (MVA)
500kV Line #514 Doubs – Goose Creek	4224/4357/5155/5155
500kV Line #5XX Doubs – Aspen	NA
230kV Line #203 Pleasant View – Twin Creeks	1315/1412/1564/1564
230kV Line #9303 Twin Creeks – Edwards Ferry	1315/1412/1564/1564

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

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 – Recommended Solutions: Northern Virginia/Doubs Cluster

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

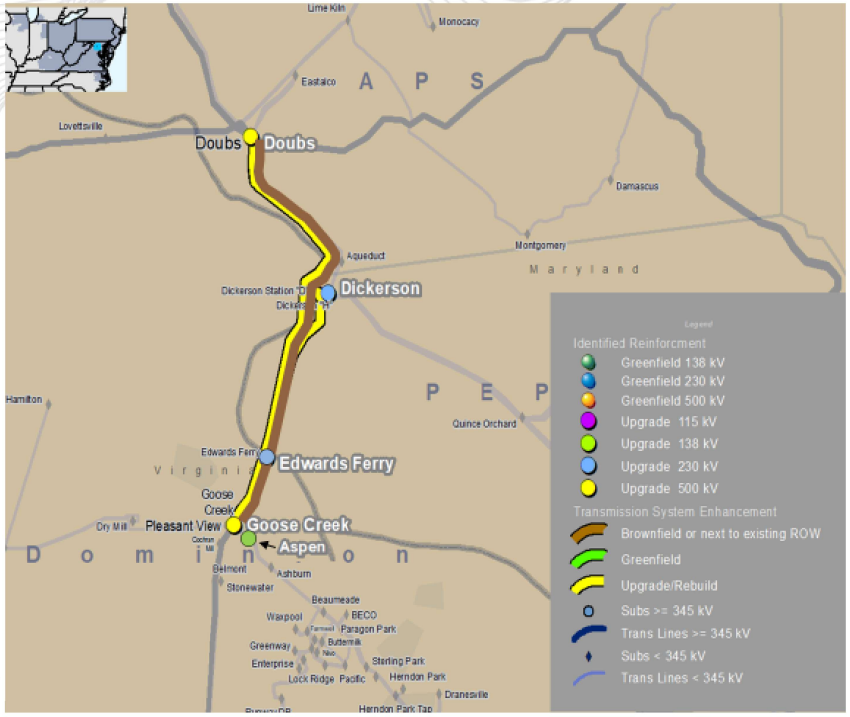
- Exelon portion of the New 500 kV Doubs to Goose Creek utilizing Existing Exelon ROW
  - Rebuild 7.26 miles of existing 230 kV circuit from Dickerson Station H to Ed's Ferry area to accommodate the new 500 kV circuit between Doubs and Goose Creek. The new structure will carry both 500 kV and the 230 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



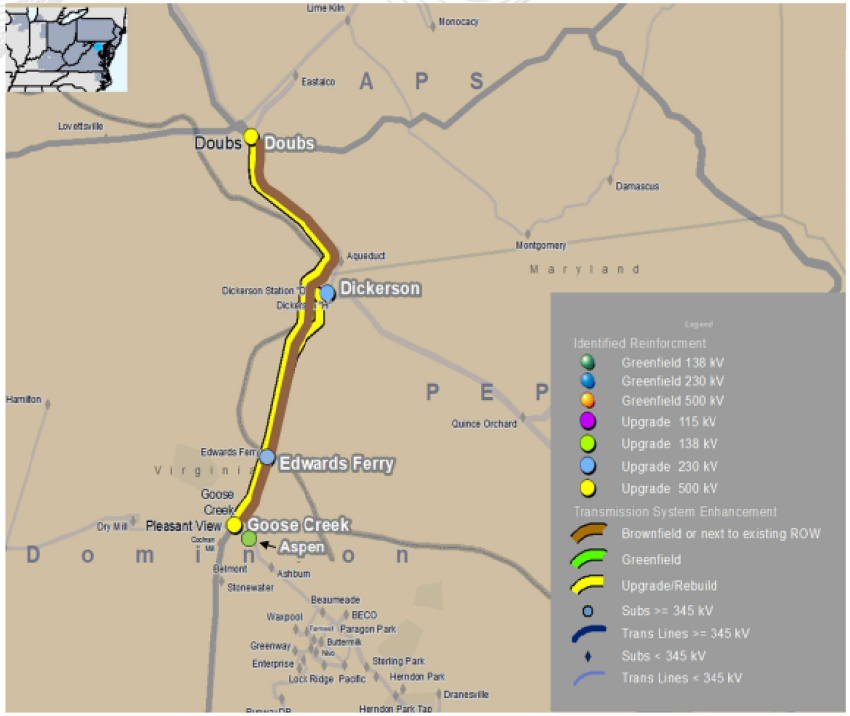
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

PJM©2023

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.*

PJM©2023

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:

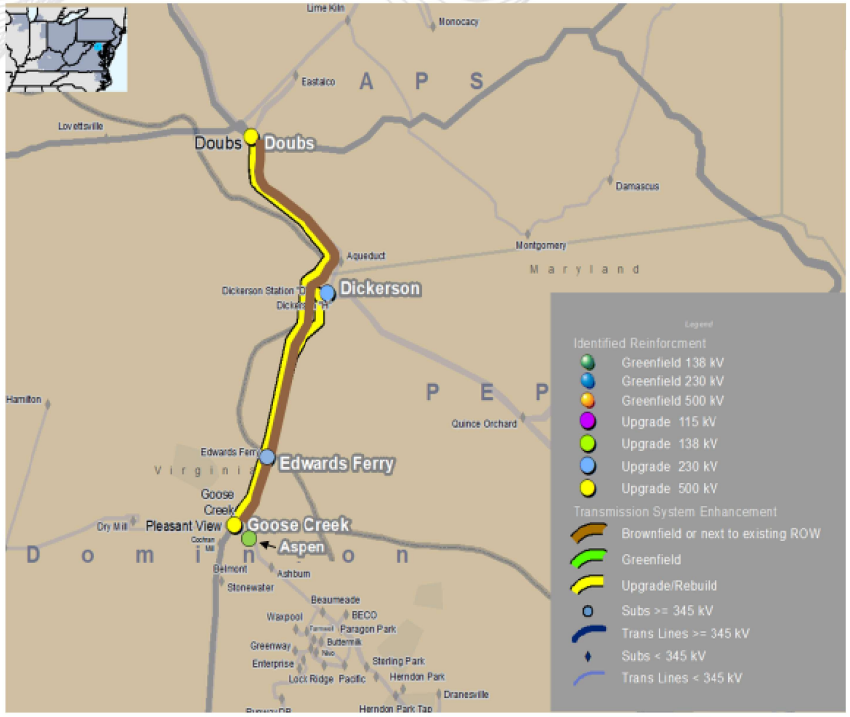
Branch	SN/SE/WN/WE (MVA)
Doubs – Goose Creek 500 kV Rebuild Doubs – ASPEN 500 kV (New)	4357/4357/5155/5155
Doubs - Aqueduct 230 kV	1106/1323/1360/1512
Aqueduct - Dickerson H 230 kV	1104/1195/1195/1195
Doubs - Dickerson H 230 kV	1104/1195/1195/1195

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.*

PJM©2023

Eastern Cluster - Selected Proposals

Baseline Reliability Projects

PJM©2023

Recommended Solutions to Address Clusters - East

Transource – North Delta substation Expansion

Recommended Solution:

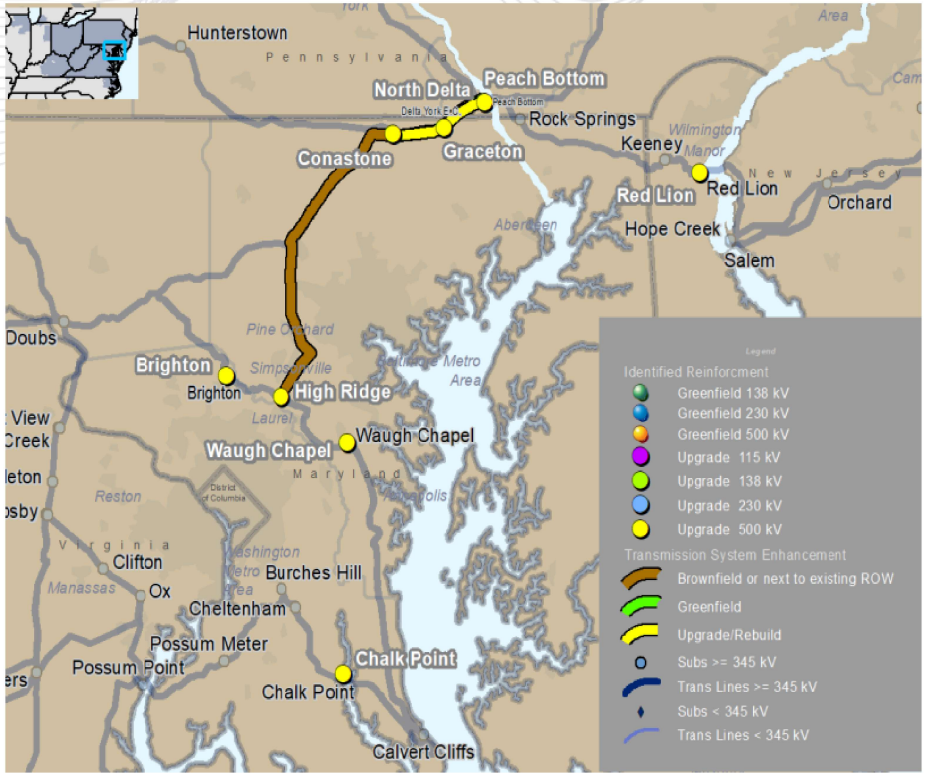
- Expand North Delta 500 kV substation
  - Expand the North Delta 500 substation to include four bay breaker and half configuration
  - Expansion will allow termination of six 500 kV lines and one 500/230 kV transformer

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.*

PJM©2023

Recommended Solutions to Address Clusters - East

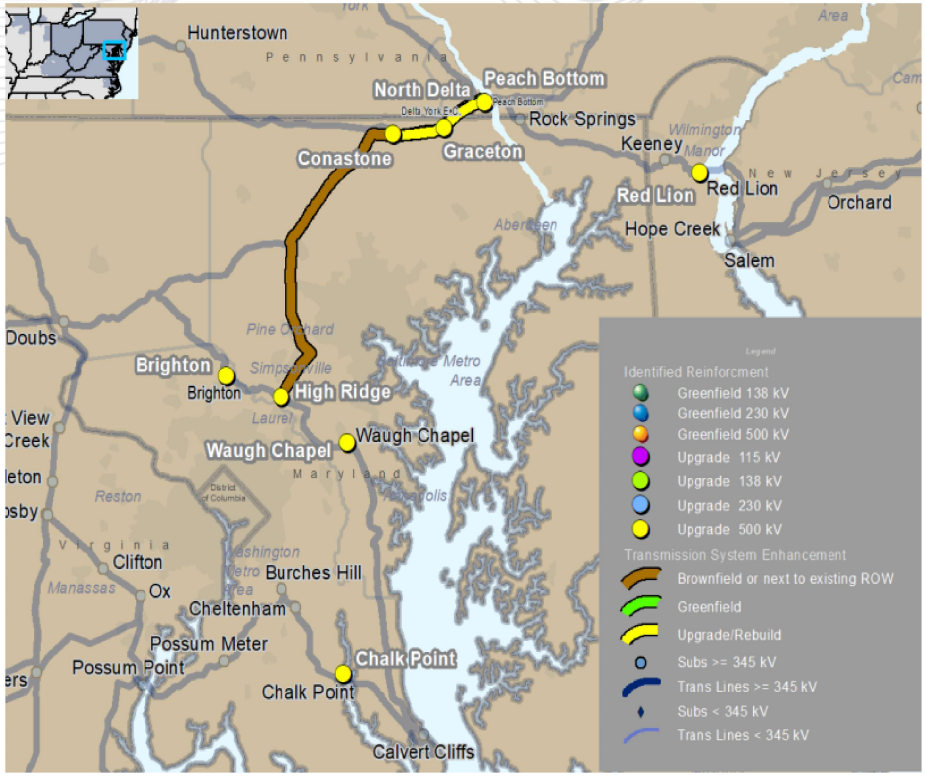
Exelon:2022-W3-344/660

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

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.*

Recommended Solutions to Address Clusters - East

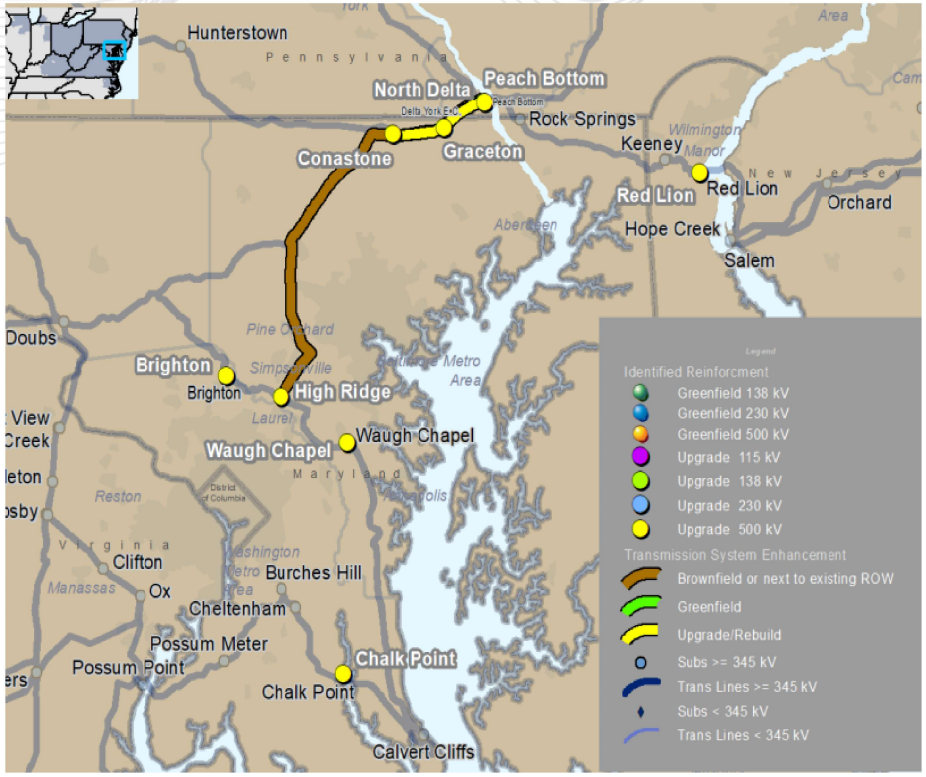
Exelon:2022-W3-344/660

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

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.*

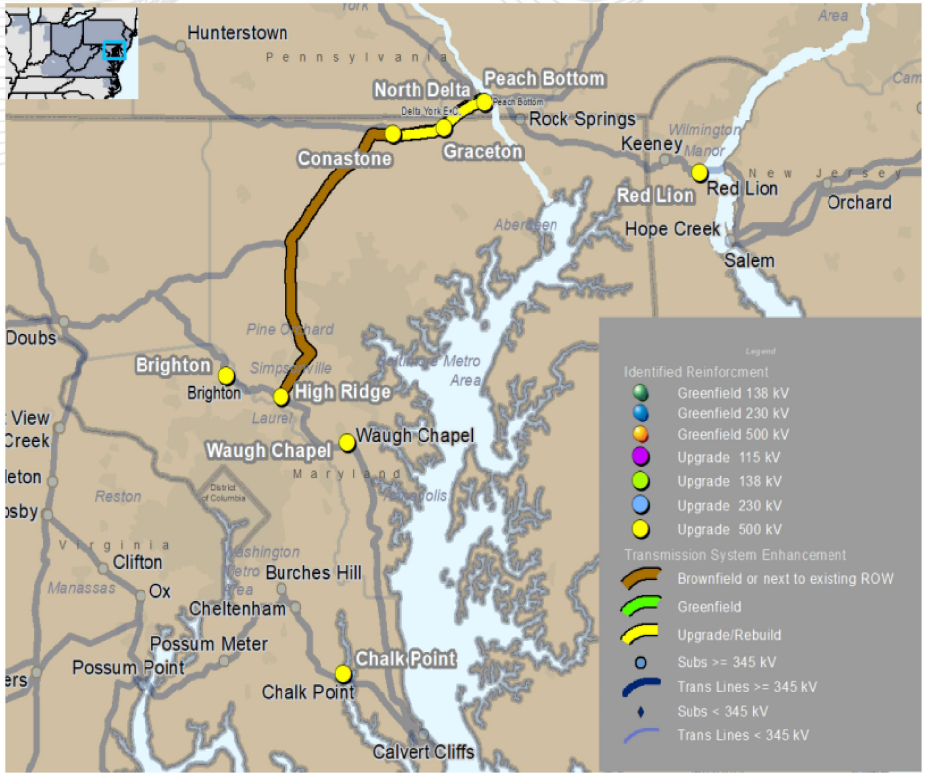
Recommended Solutions to Address Clusters - East

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

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.*

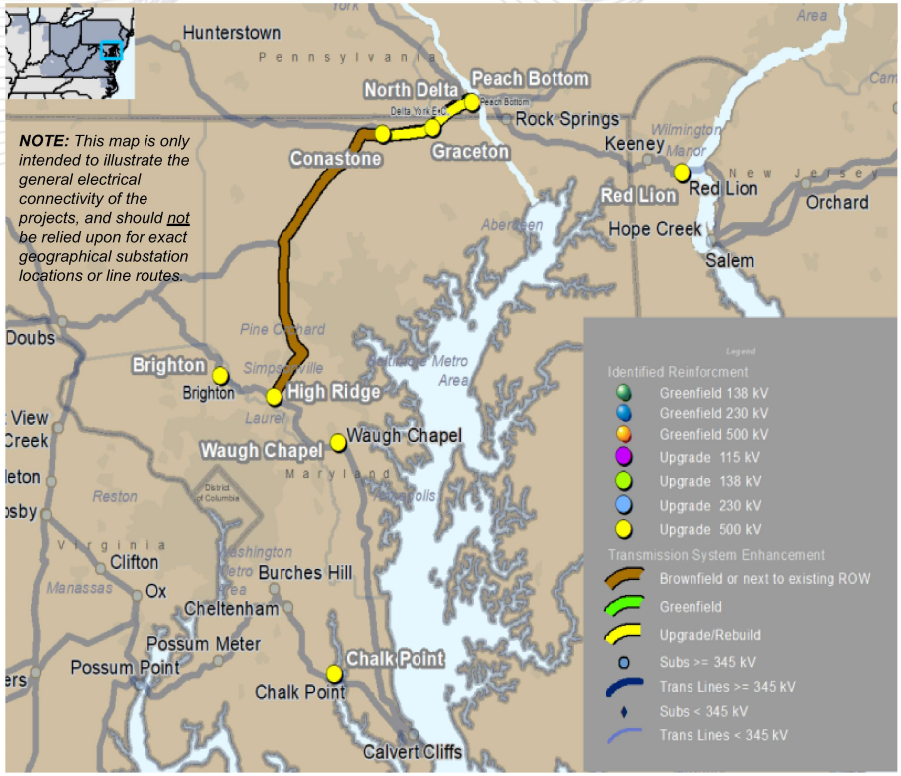
Recommended Solutions to Address Clusters - East

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 - Cheltanham 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)

Continued on next slide ...

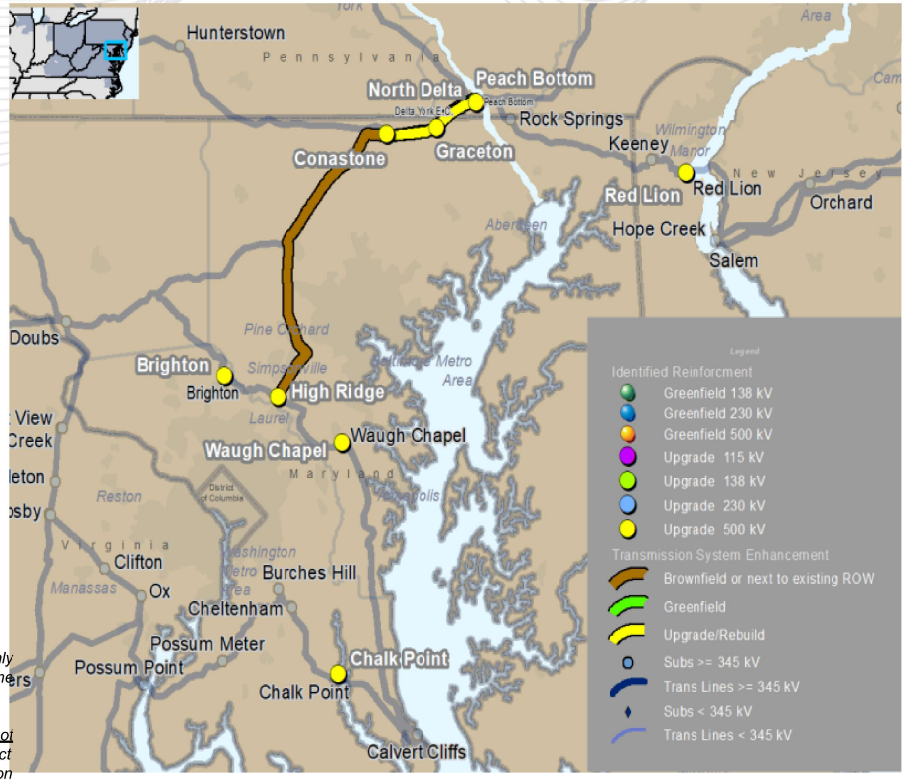


Recommended Solutions to Address Clusters - East

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)



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: $708.77 M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 2028-2030

Recommended Solutions to Address Clusters - East

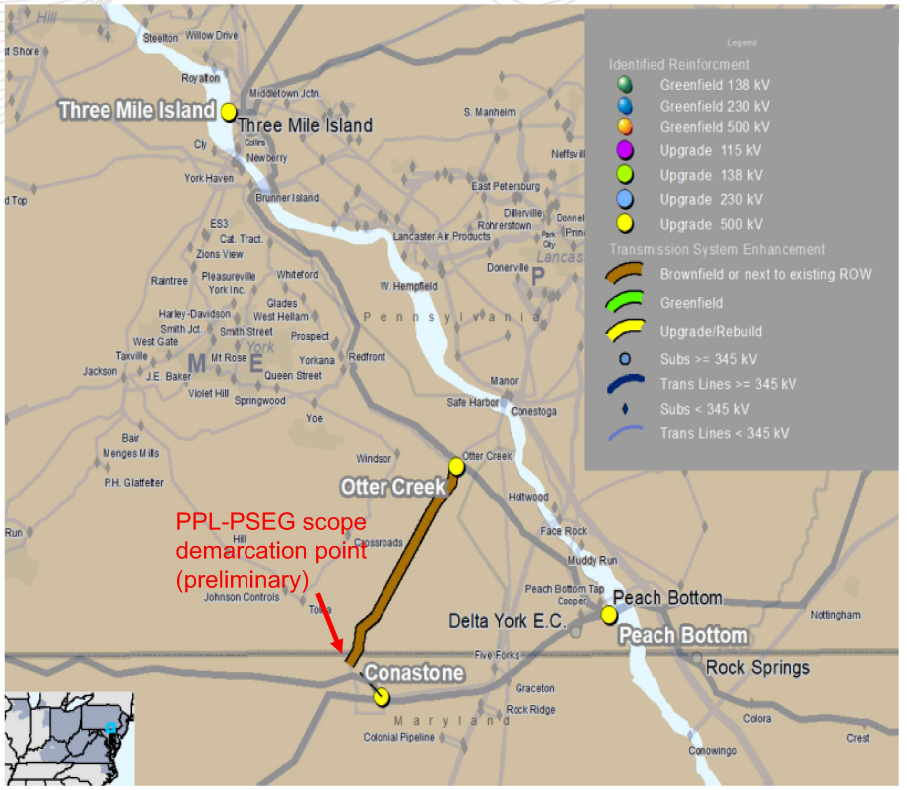
PPL:2022-W3-374

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.*

PJM©2023

Recommended Solutions to Address Clusters - East

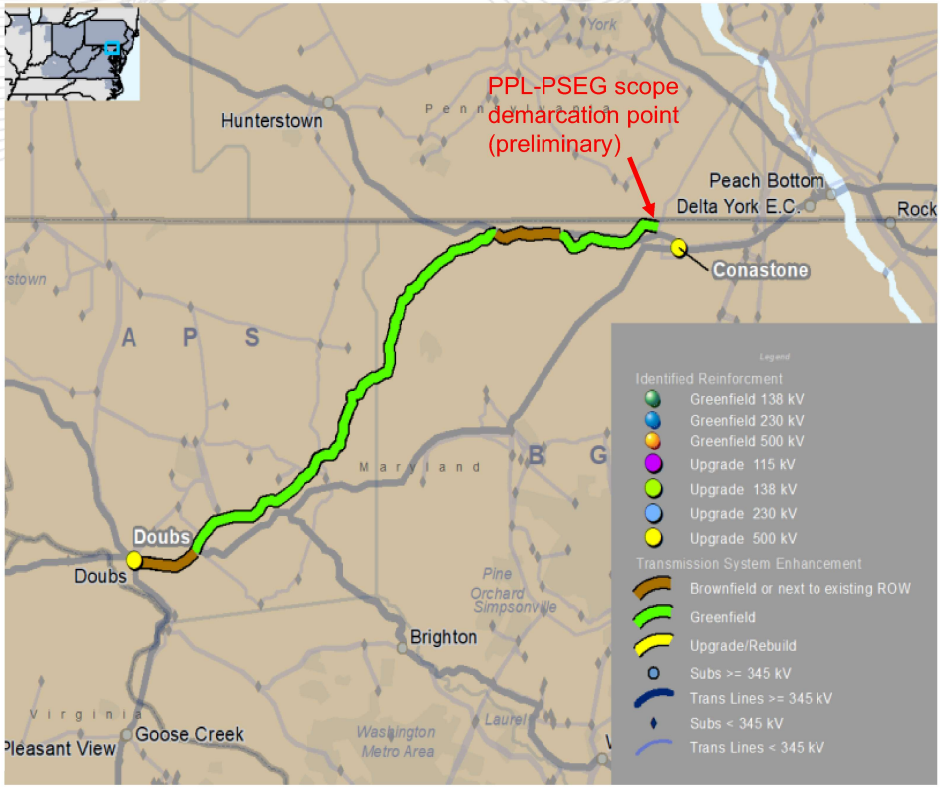
PSEG: 2022-W3-637

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 kVline

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:

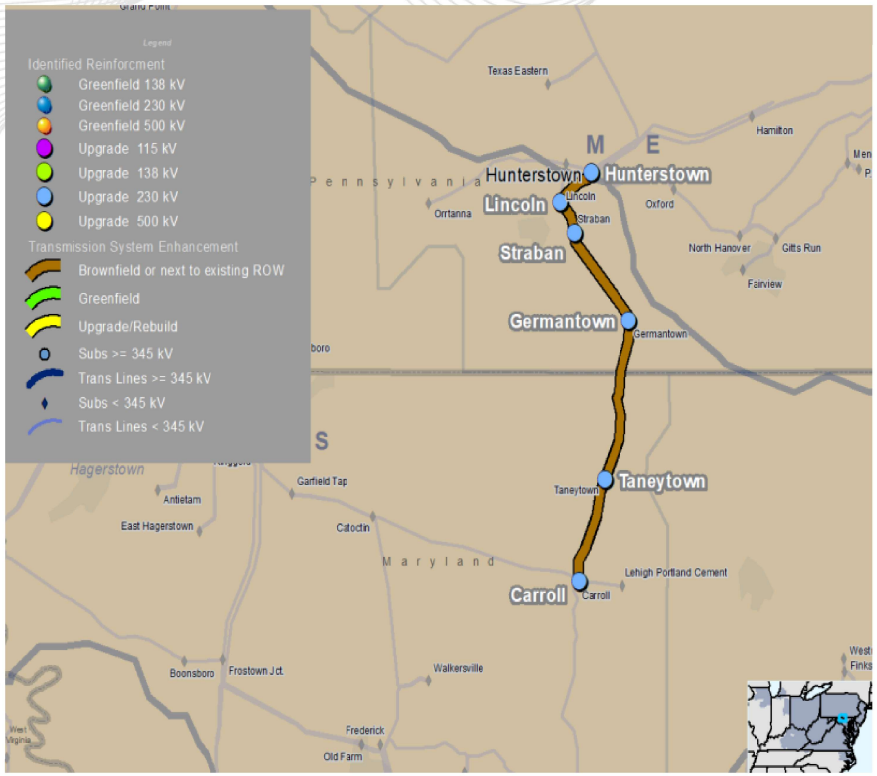
- Reconductor Lincoln – Orrtanna 115 kV Line
  - New Rating- 232SN/282SE/263WN/334WE MVA
- Fayetteville – Grand Point 138 kV - Replace line trap at Grand Point 138 kV
  - New Rating – 195SN/258SE/280WN/368WE MVA
- Reid - Ringgold 138 kV - Replace line trap, substation conductor, breaker at Ringgold, 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.*

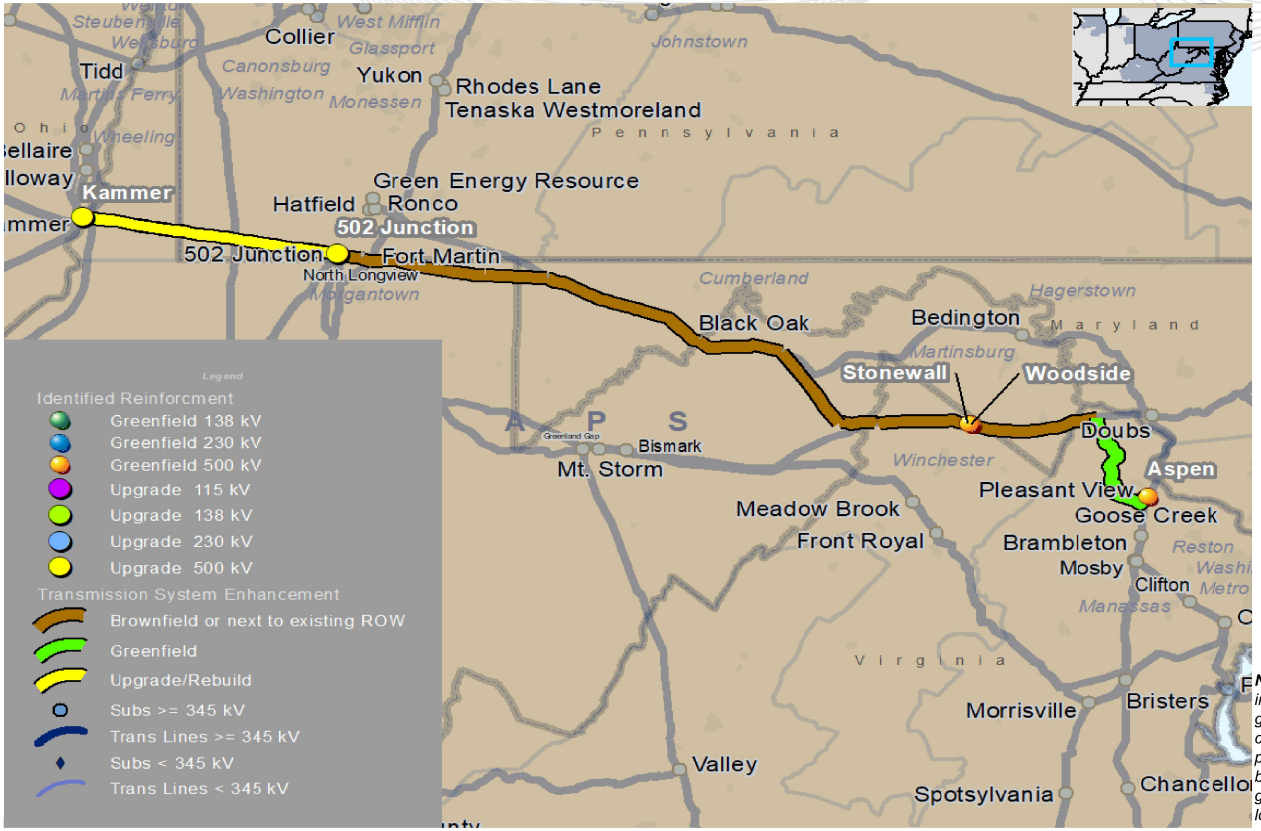
PJM©2023

Western Cluster - Selected Proposals

Baseline Reliability Projects

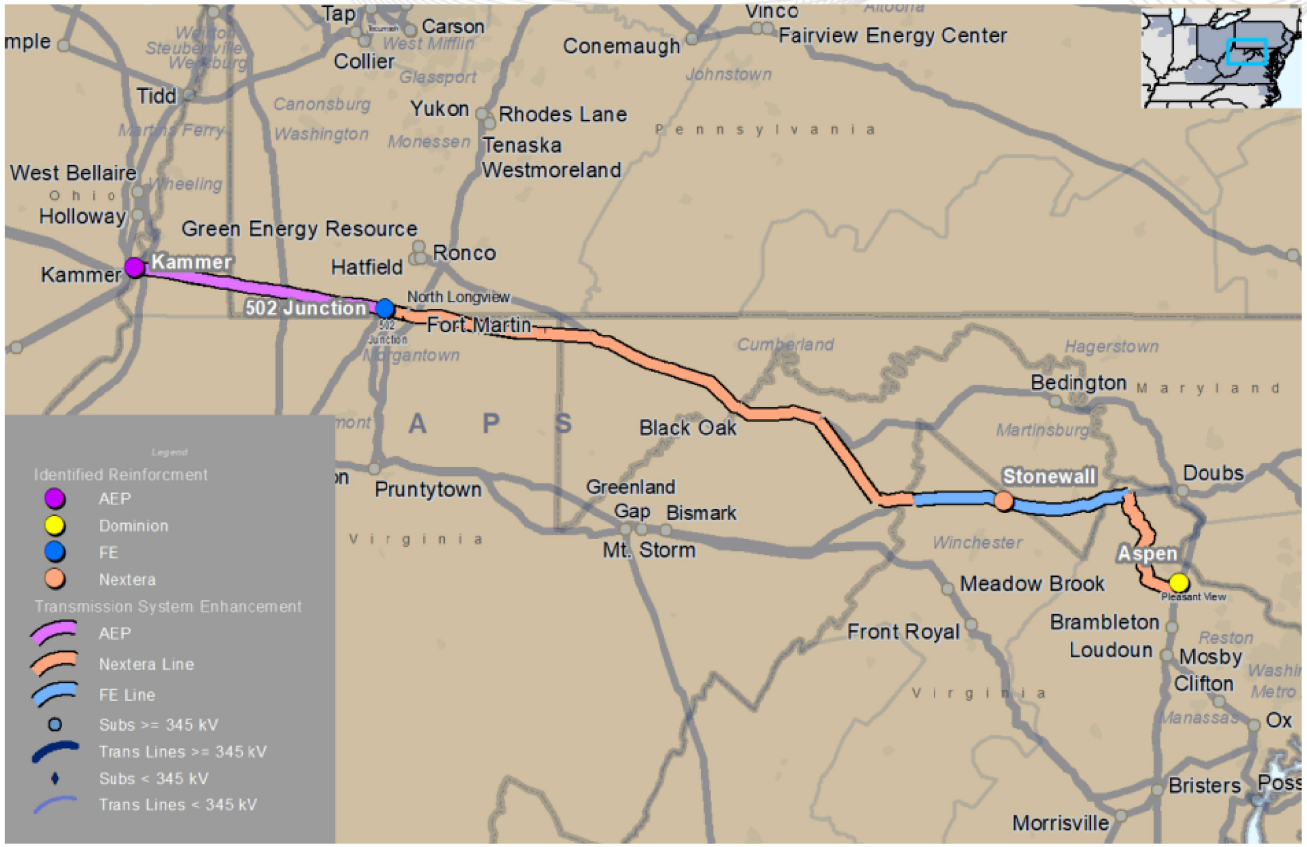
PJM©2023

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:

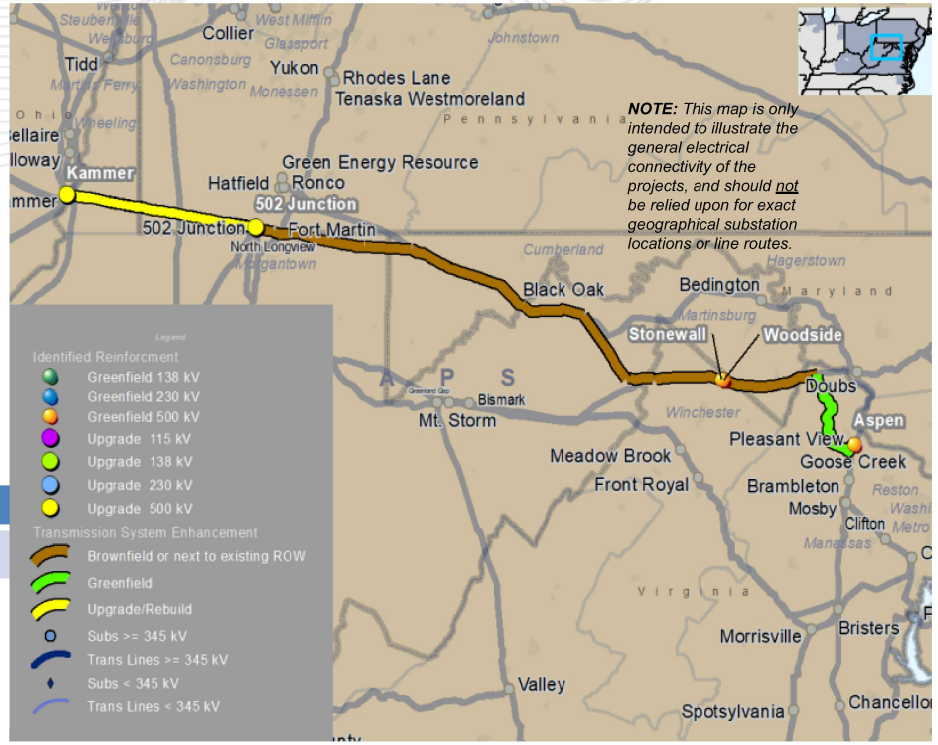
Branch	SN/SE/WN/WE (MVA)
502 Jct – Woodside –ASPEN 500 kV	4295/4357/5066/5196

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



PJM©2023

Preferred Projects to Address Clusters - West

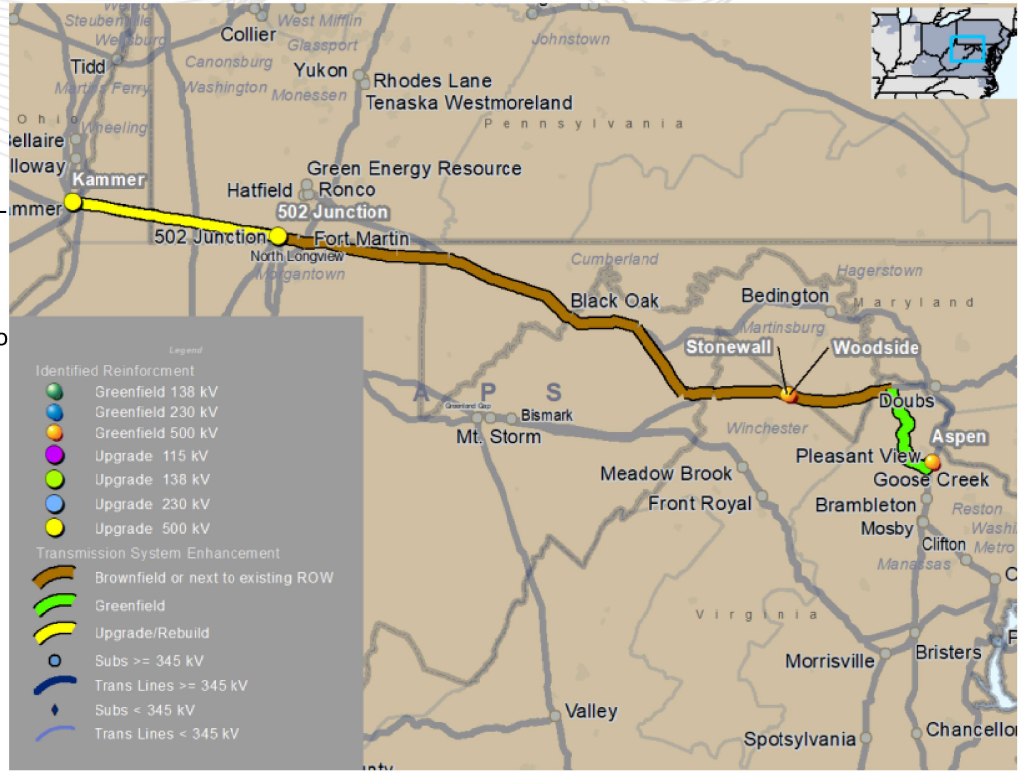
- **NextEra:2022-W3-853 (FE Scope)**
  - Rebuild ~16 miles of the Gore - Stonewall 138 kV Line with 500 kV overbuild, rebuild ~15 miles of the Stonewall - Millville 138 kV Line with 500 kV overbuild & rebuild ~6 miles of the Millville - Doubs 138 kV Line with 500 kV overbuild - **(FE Cost Estimate: $341M) (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.*

PJM©2023

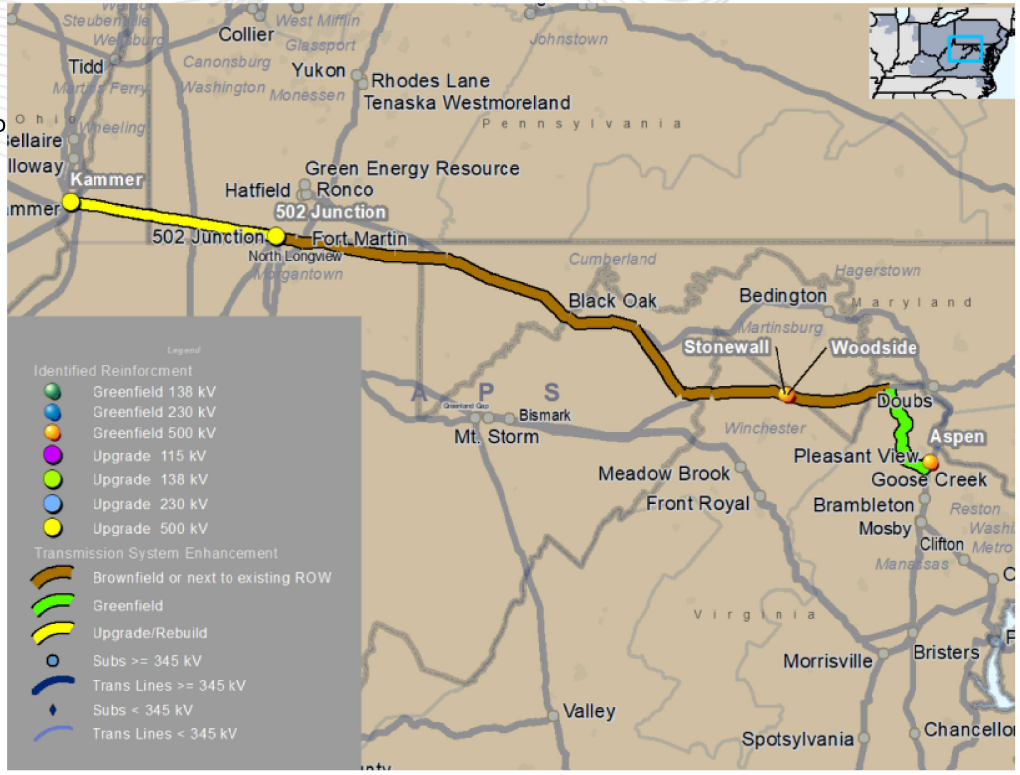
Preferred Projects to Address Clusters - West

- **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.*

PJM©2023

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

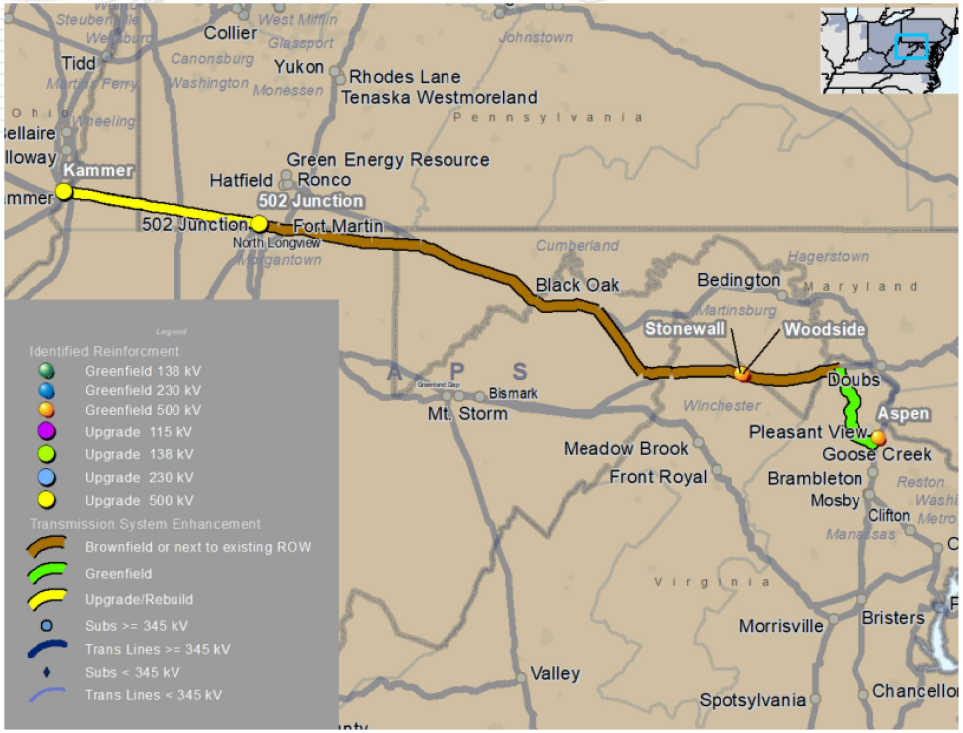
Preliminary Facility Ratings:

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.*

PJM©2023

Short Circuit Evaluation and Associated Upgrades

2022 Window 3

PJM©2023

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

	Over Duty Bus (Qty)						Over Duty CBs	Maximum Fault Duty (kA)						
Scenario Description	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	Comment
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

PJM©2023

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						
TOTAL	**$63.27M**				**36**							

PJM©2023

2022 Window 3 Recommended Solution

See link for Detail upgrade components:

https://www.pjm.com/-/media/committees-groups/committees/teac/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
				TOTAL	5142.98		

PJM©2023

Summary of Scope Change and Cancelations

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

Cancelations			
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
		TOTAL	84.96

Contact

Facilitator:
Dave Souder,
Dave.Souder@pjm.com

Secretary:
Tarik Bensala,
Tarik Bensala@pjm.com

SME/Presenter:
Sami Abdulsalam,
Sami.Abdulsalam@pjm.com

Reliability Analysis Update



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

Revision History

Version No.	Date	Description
1	Nov 30th 2023	• Original slides posted
2	Dec 1st 2023	• Added slide # 71 and updated slide #70
3	Dec 6th 2023	• Updated tables in slide #70 and #6 • Updated slide #59 • Updated slide #2 to correct year

PROTECT THE POWER GRID
THINK BEFORE YOU CLICK!
Be alert to malicious phishing emails.
pjm
Report suspicious email activity to PJM.
(610) 666-2244 / it_ops_ctr_shift@pjm.com

Reliability Analysis Update

Sami Abdulsalam, Director
PJM Transmission Planning

Transmission Expansion Advisory Committee
January 7, 2025

PJM © 2025

Resources Available to PJM Stakeholders

(Transmission Planning)

Reference Resources

- 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)

PJM © 2025

Reference Resources

- 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)

PJM © 2025

Reference Resources

- 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

PJM © 2025

2024 RTEP Window 1 Updates

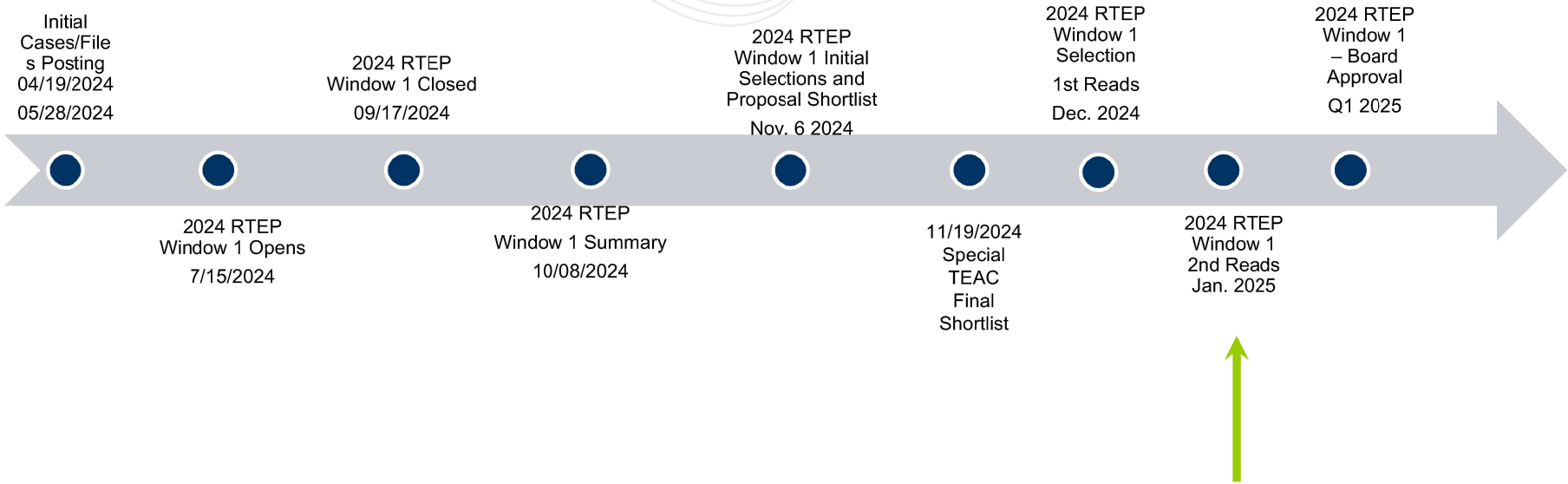
PJM © 2025

Outline
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

PJM © 2025

2024 RTEP Window 1 – Timeline



PJM © 2025

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.

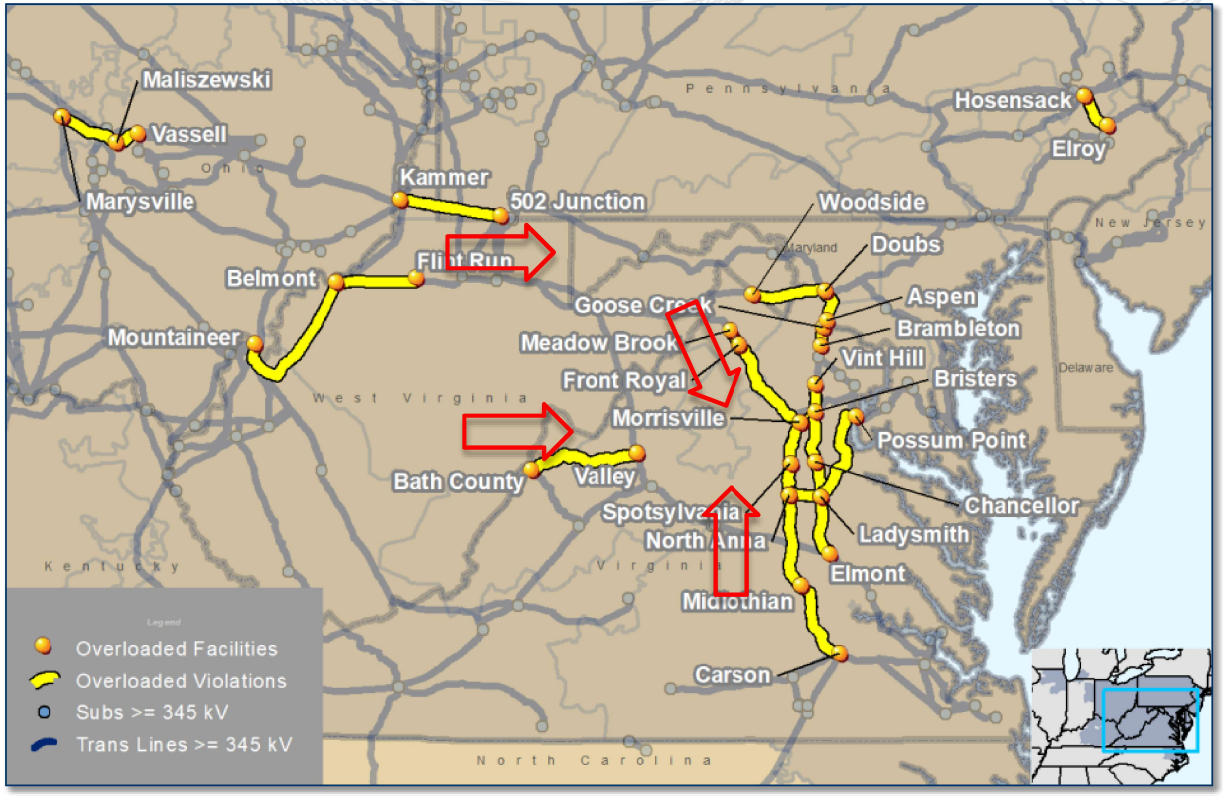
Primarily due to shift in generation flow as a result of overall system load increase and +2 GW of generation deactivations.

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.

PJM © 2025

2024 RTEP Window 1 Needs: 500 kV & 765 kV



PJM © 2025

2024 RTEP Window 1
Proposals Overview

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

PJM © 2025

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.

PJM © 2025

2024 RTEP Window 1
Evaluation Progress

Individual Proposal Screening	Complete	
Baseline Scenarios Were Developed and Analyzed	• 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).	• PJM developed scenarios incorporating (or eliminating) components to identify an optimal combination yielding better performance.
Transfer Capability Analysis	PJM conducted Transfer Capability analysis for key proposals – regional west-east needs. More than 16 Source-Sink scenarios analyzed (for all preliminarily shortlisted proposals)	
Scenario Analysis	• 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").	• Full scenario details and evaluation results were shared at the November 19th TEAC together with a final shortlist

PJM © 2025

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

Meeting the system needs of 2029 (all kV levels) and 2032 (long-lead reinforcements)

Being scalable/flexible to address forecasted needs going forward (for right-sizing and limiting disruption)

Anticipated load growth to be included in the PJM 2025 Load Forecast (Eastern PJM/MAAC), which will further increase west-east flow requirements from modeled 2024W1 base models.

Utilization of existing ROWs and brownfield development/expansion (where possible and efficient)

- Greenfield developments will be required, particularly along all proposed 765 kV solutions – Varying degrees.
- Expansion to existing 500 kV ROWs instead of wreck and rebuild due to outage and scheduling considerations.

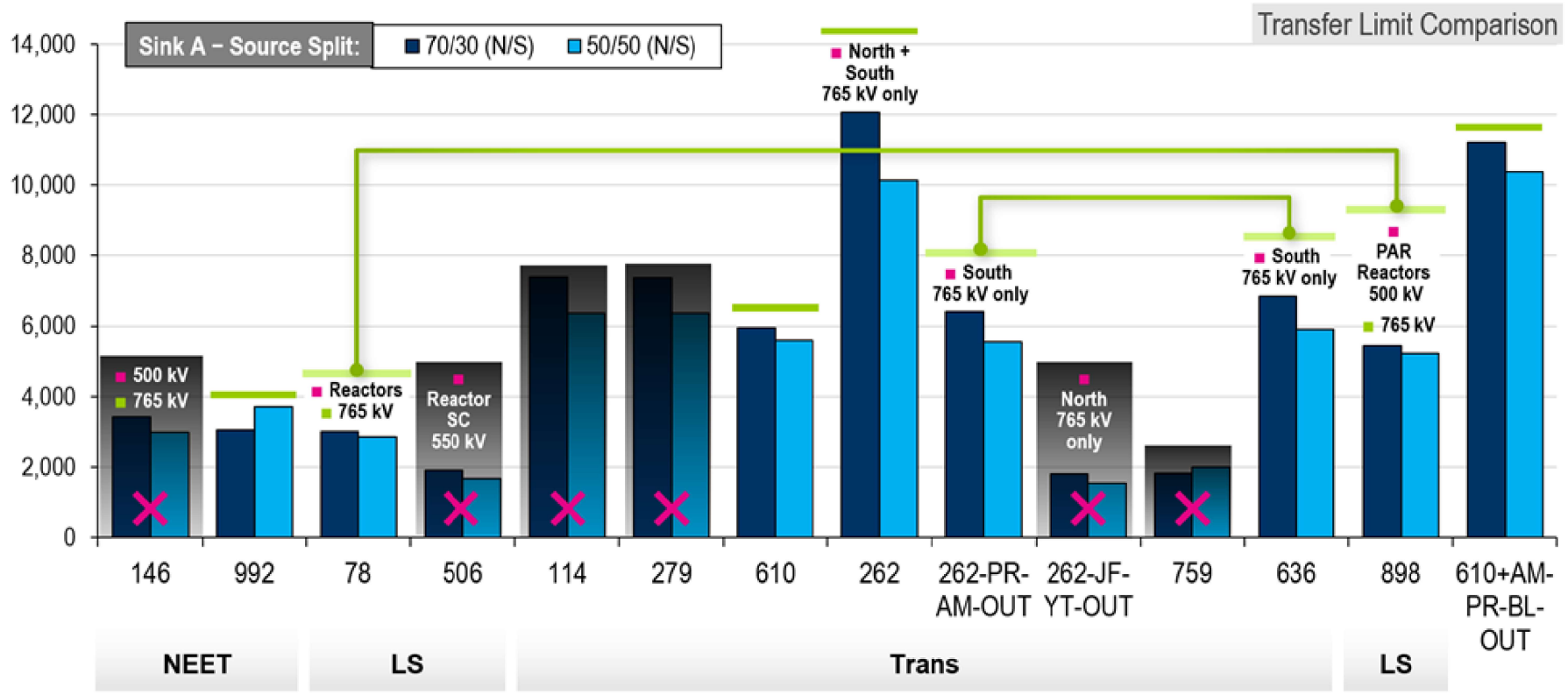
Cost evaluation using third-party cost benchmarking metrics – weak cost containment provisions

Proposing entity experience in developing and operating 765 kV facilities

PJM © 2025

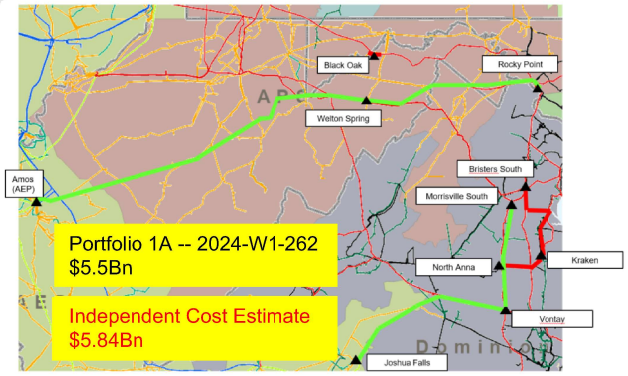
Regional Transfer Performance – Key Proposals

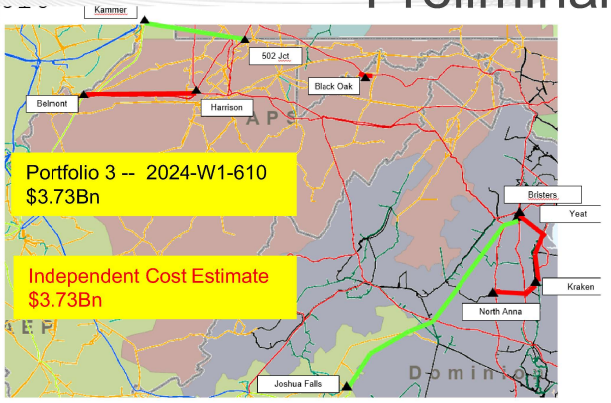
Bulk Transfer Capability (DC) and Preliminary Shortlist

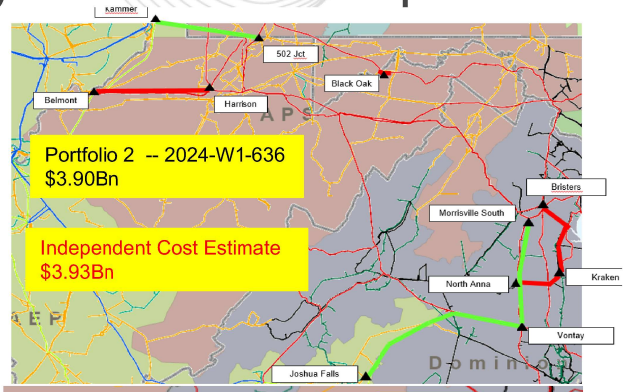


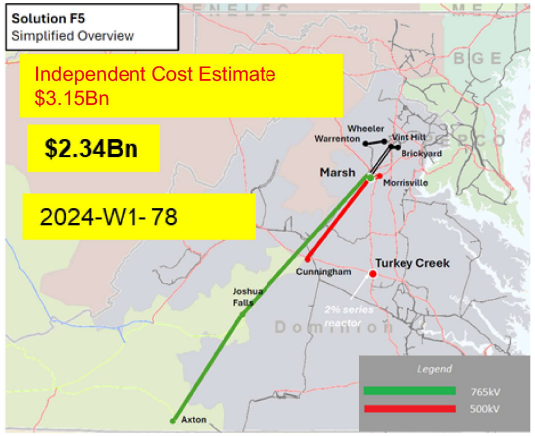
PJM © 2025

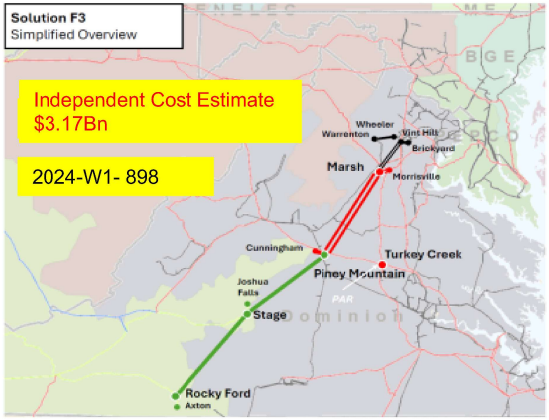
Common Merits among Preliminary Shortlisted Proposals

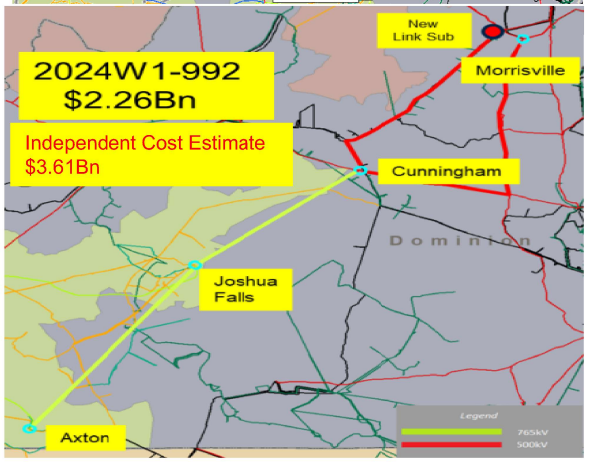












Common merits among Preliminary Shortlisted Proposals

- All shortlisted proposals offer a Joshua Falls/Axton 765kV greenfield line “towards” the Morrisville 500 kV Station
- While all preliminary short listed proposals meet the posted need (at varying degrees), some offer more complete and even additional benefits / robustness merits such as;
  - Stronger 765 kV support to the heart of the Dominion system vs 500kV
  - Covering and encompassing a wider geographic area where load is growing
  - Providing flexibility, softening operational risk of outages (to upgrade existing transmission) and relief to existing constraints on the system (Stability)
- <u>One proposal offers considerably higher transfer capability (2 x 765 kV lines – South and North);</u>
  - 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.

PJM © 2025

Incremental Transfer Capability Scenarios
Detailed and Sensitivity Analysis

- 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%

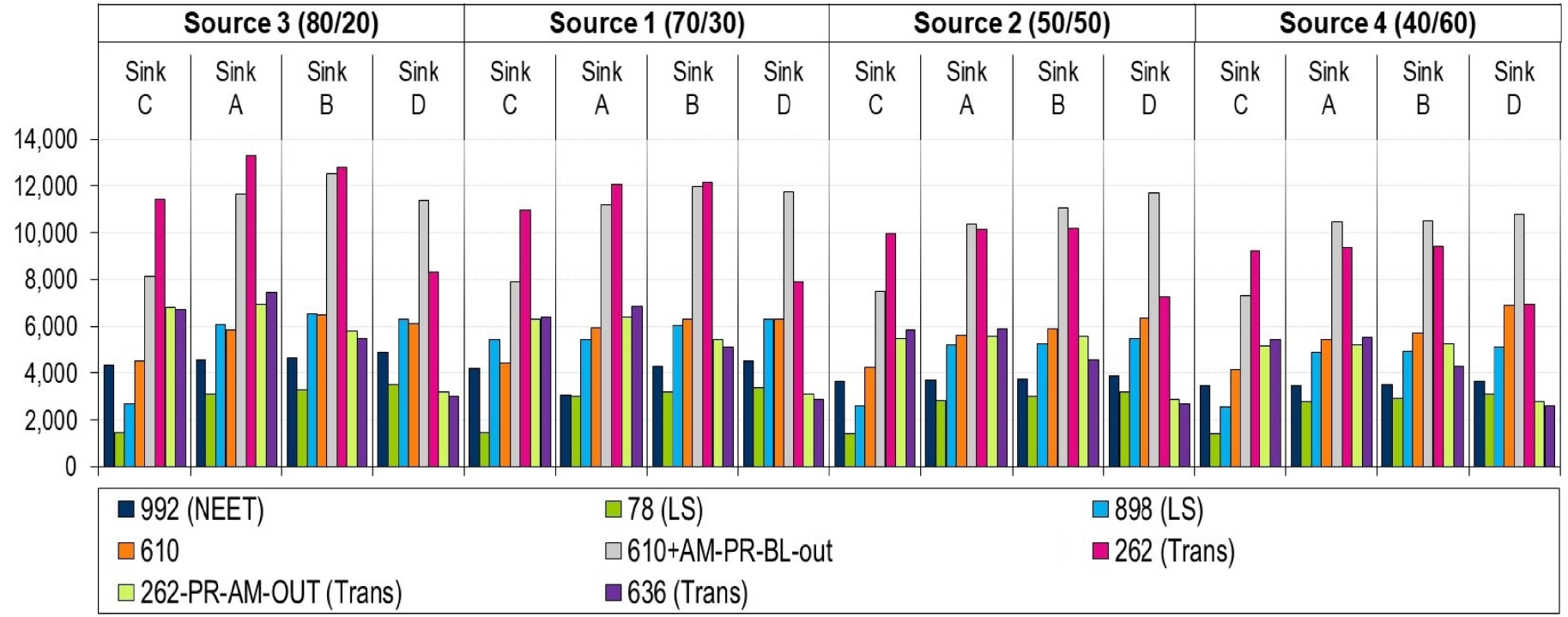
- Source Definitions (North/South (Western PJM) %age surplus gen)

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

PJM © 2025

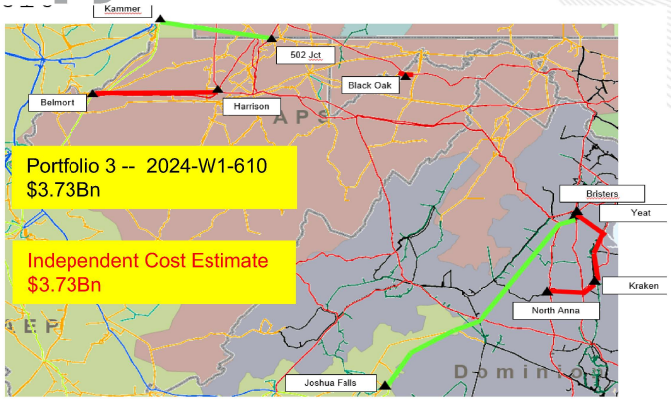
Regional Transfer Performance – Key Proposals

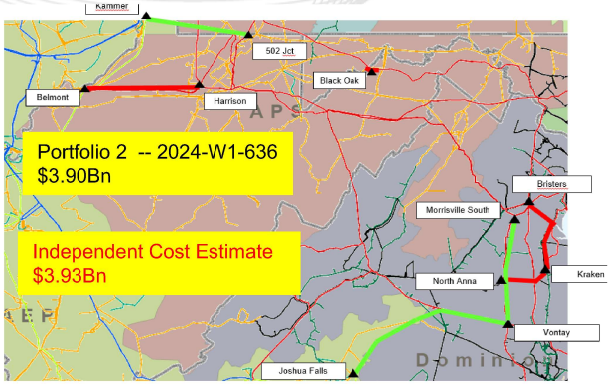
Bulk Transfer Capability (DC) and Preliminary Shortlist

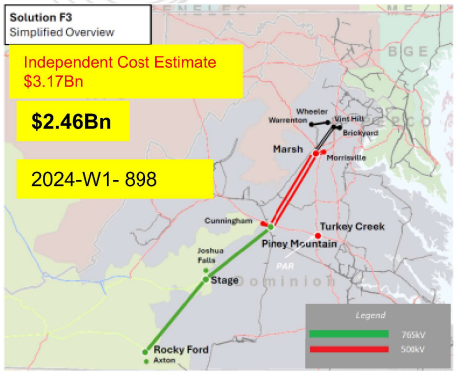


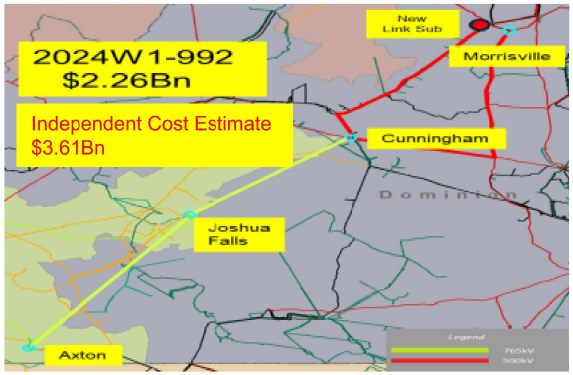
PJM © 2025

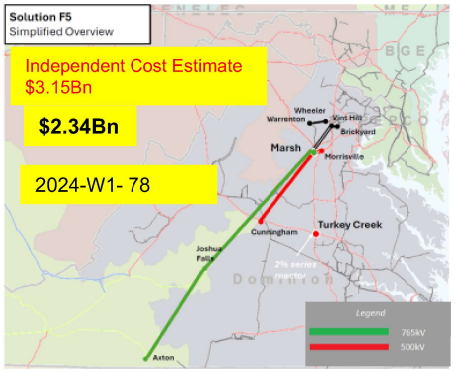
Focusing on Short-listed proposals offering “similar” merits







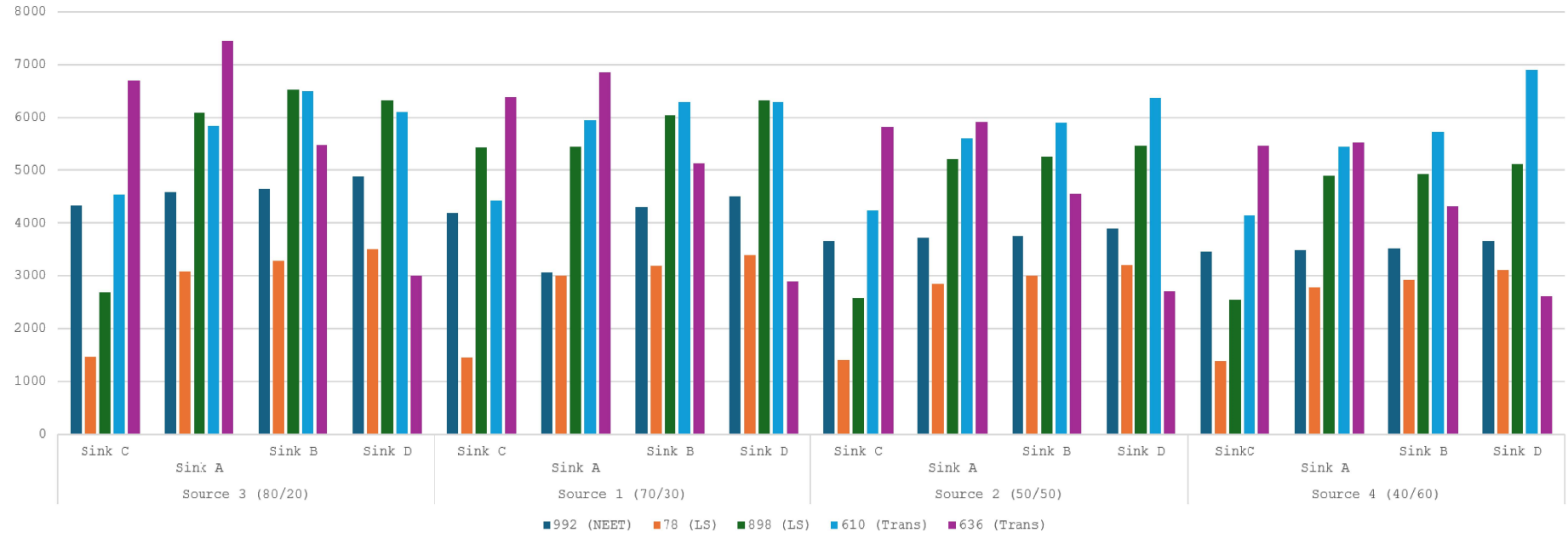




- All proposals offer similar concepts providing a new 765 kV source from Joshua Falls or Axton towards the Morrisville area
- Proposals 636 and 610 offer a 500kV reinforcement along the Dominion N-S 500kV corridor and through a load growth area as well as 500 or 765 kV reinforcement along the northern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

PJM © 2025

Incremental Transfer Capability
Preliminary Short-listed proposals offering “similar” merits



PJM © 2025

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.

PJM © 2025

Incremental Transfer Capability (including Proposal 262 and its variants)

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

PJM © 2025

2024 RTEP W1
Regional Transfers and Dominion / APS
Shortlist (from Nov 19th 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.

PJM © 2025

15 Year Analysis Result – 2024 RTEP

Current PJM Planning Manual M14B Process

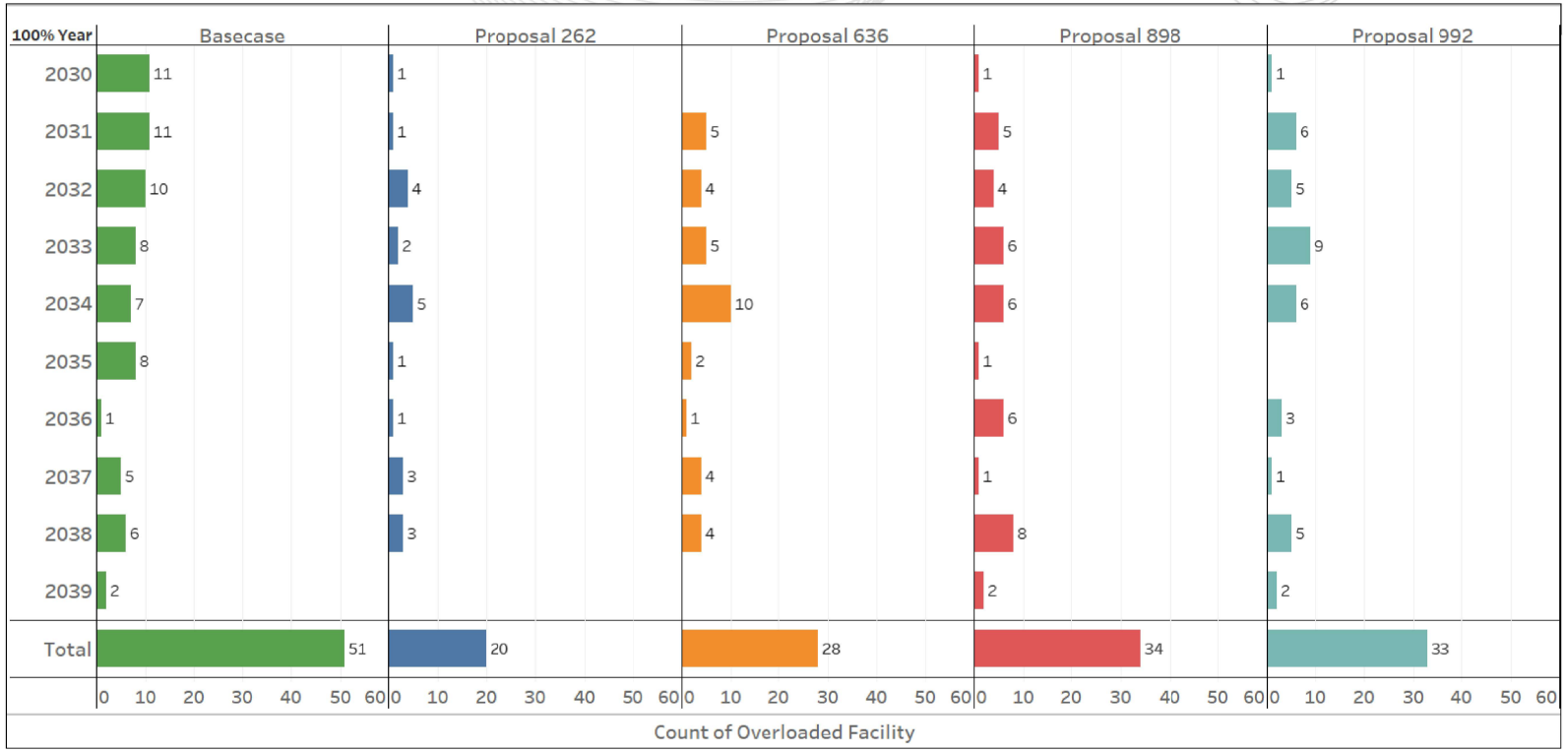
- Objective:
  - Identify long lead needs for 230 kV or above circuit to support load growth in years 6 through 15
- Basecase result:
  - Identified 30 potential overloads at 230 kV or 345 kV in years 6 through 12
  - Identified 21 potential overloads at 500 kV or 765 kV in years 6 through 15
- Proposal 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	NOTTNGH2	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	05BCKESCRK	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	WOCDSIDE	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	WOCDSIDE	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	

PJM © 2025

15 Year Analysis – Key Proposals

Current PJM Planning Manual M14B Process



PJM © 2025

15 Year Analysis – Key Proposals Details

Current PJM Planning Manual M14B Process

From Bus	From Name	To Bus	To Name	CKT	KVs	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	6CHARLVL	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	KVs	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	6SEDGE HILL	315684	6EDMONSON	1	230/230	345/345	Summer	Single	2030				
314697	6SEDGE HILL	315684	6EDMONSON	1	230/230	345/345	Winter	Single	2032				
316218	AC1-221 TAP	314697	6SEDGE HILL	1	230/230	345/345	Summer	Single	2031				
316218	AC1-221 TAP	314697	6SEDGE 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	KVs	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	8VINTHIL	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	8LEXNGTN	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	KVs	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

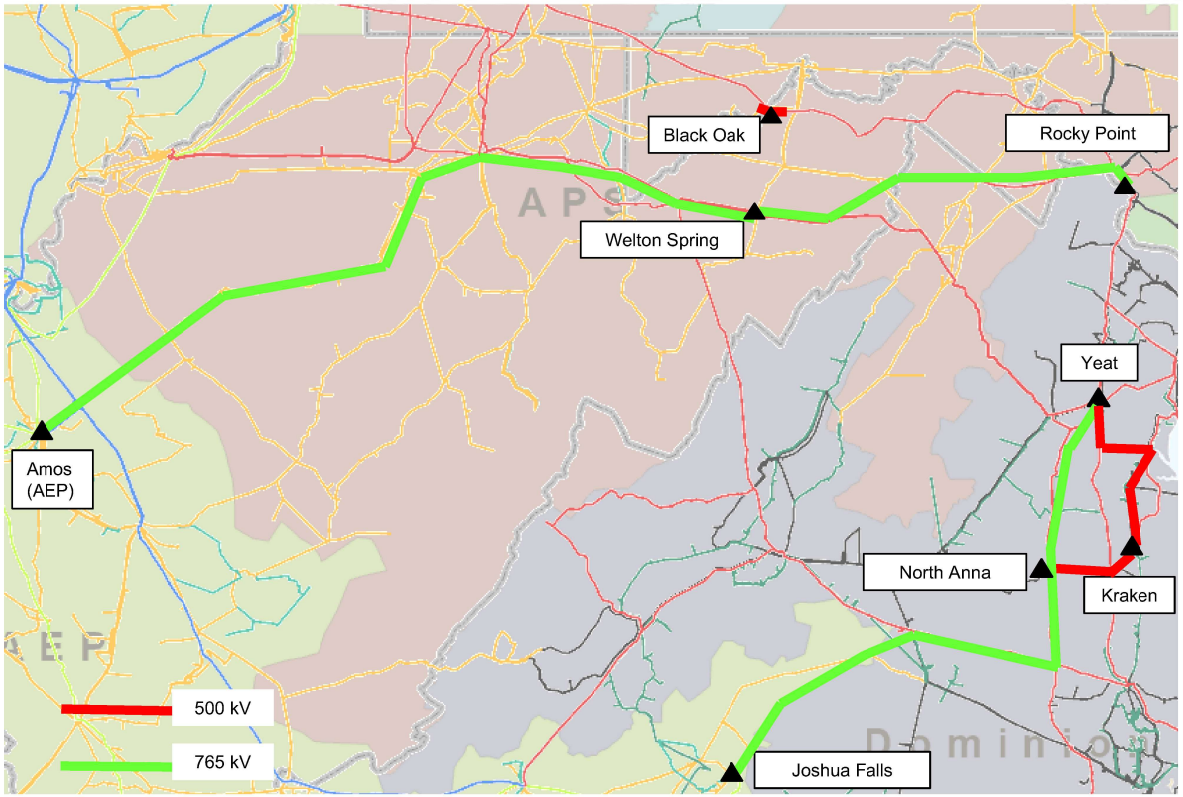
Resolved | Remain | New

Selected Proposals
Regional Transfers and Dominion Area - Summary

- PJM Recommends proposals 636 for development with the following adjustments:
  - The Vontay 765/500 kV Substation could be delayed and triggered as load materializes
  - The Yeat, South Morrisville and South Bristers substations in the North could all be consolidated into one 765/500kV substation, Yeat.
    - Other substations will be developed as additional outlets and tie-ins between the 765 kV and 500 kV networks materialize
- The proposed Kraken 500kV loop and the Kraken 500/230kV substation is recommended;
  - The loop will terminate at the proposed Yeat 765 kV substation.
  - The loop provides additional North-South 500kV backbone reinforcement
  - Expands the 500kV backbone further to the east in the area to where load is growing
  - Alleviates the stability and operational constraints in the area (Generation and load serving constraints)
  - The 230 kV tie-ins from Kraken substation to the existing 230kV will be deferred and triggered through the supplemental process.
- The Amos-Welton 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) –**3rd Party Cost estimate of $6.29B.**

PJM © 2025

Final – PJM Recommended Proposals
Regional Cluster – Summary



Final – PJM Recommended Proposals
Regional Cluster – Summary

PJM Proposal ID	Project Title/Description	Project Submittal Responsibility
967 Modified	*Kraken Loop* • Termination at Yeat (not Bristers South/Town Run) • Refinements (reduction/deferral) of some proposed 230 kV developments.	Dominion
820 Modified	*Joshua Falls-Yeat 765 kV (Southern Corridor)* • Route to follow Joshua Falls-Vontay-Morrisville South	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	*Dominion reinforcements (230 kV and 115 kV solutions)* • Exclusion of 230 kV line #238 (Carson-Clubhouse) rebuild	Dominion
781 Modified	*Dominion Reinforcements (500 kV solutions)* • Exclusion of 500 kV North Anna-Vontay uprate	Dominion
617 Component	• Replace the wave trap and upgrade the relay at Cloverdale 765 kV • Replace the wave trap and upgrade the relay at Joshua Falls 765 kV	Transource

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

As submitted: ~ $5,500.0 M

Optimized: ~ $4,647.0 M

PJM © 2025

2024 RTEP Window 1 – Total Cost

Region	Comp ($M)	Non-Comp ($M)	Independent Cost ($M)
Regional Transfers	4545.7		4921.9
Regional –Short Circuit		100.8	
DOM	216.8	74.7	216.8
MAAC	187.5	107.2	187.5
AMPT		12	
AEP	342.0	44.7	225.3
DLCO		8	
APS		0.691	
ATSI	217.3		210.2
ComEd	30.6	5.95	30.6
OVEC		0.8	
Dayton		25	
Total ($M)	**5539.8**	**379.8**	**5792.3**

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

PJM © 2025

Required In Service Date Adjustments

PJM © 2025

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

PJM © 2025

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

PJM © 2025

Recommended Solutions
2nd Read for Local Solutions

PJM © 2025

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

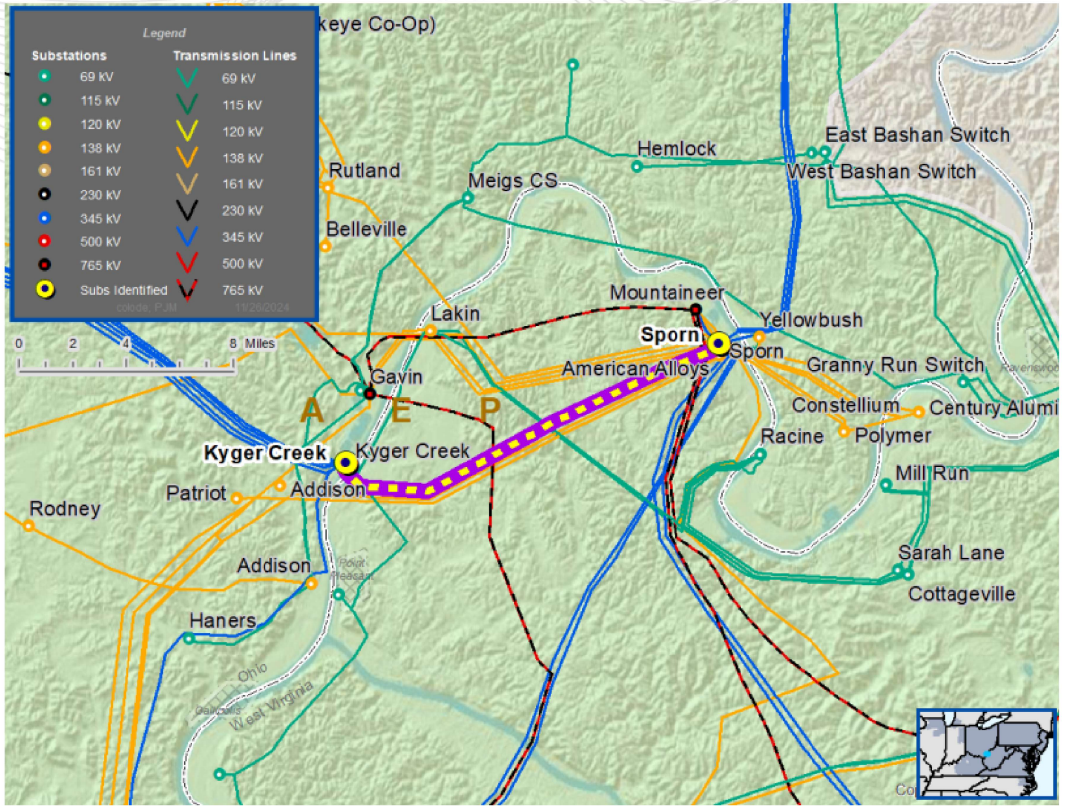
Problem Statement:

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.

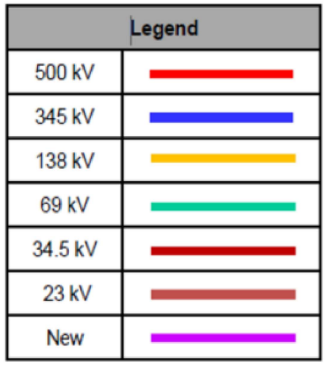
Required In-Service: 6/1/2029

Projected IS Date: 4/1/2029

Previously Presented: 12/3/2024

Existing:





Proposed:



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

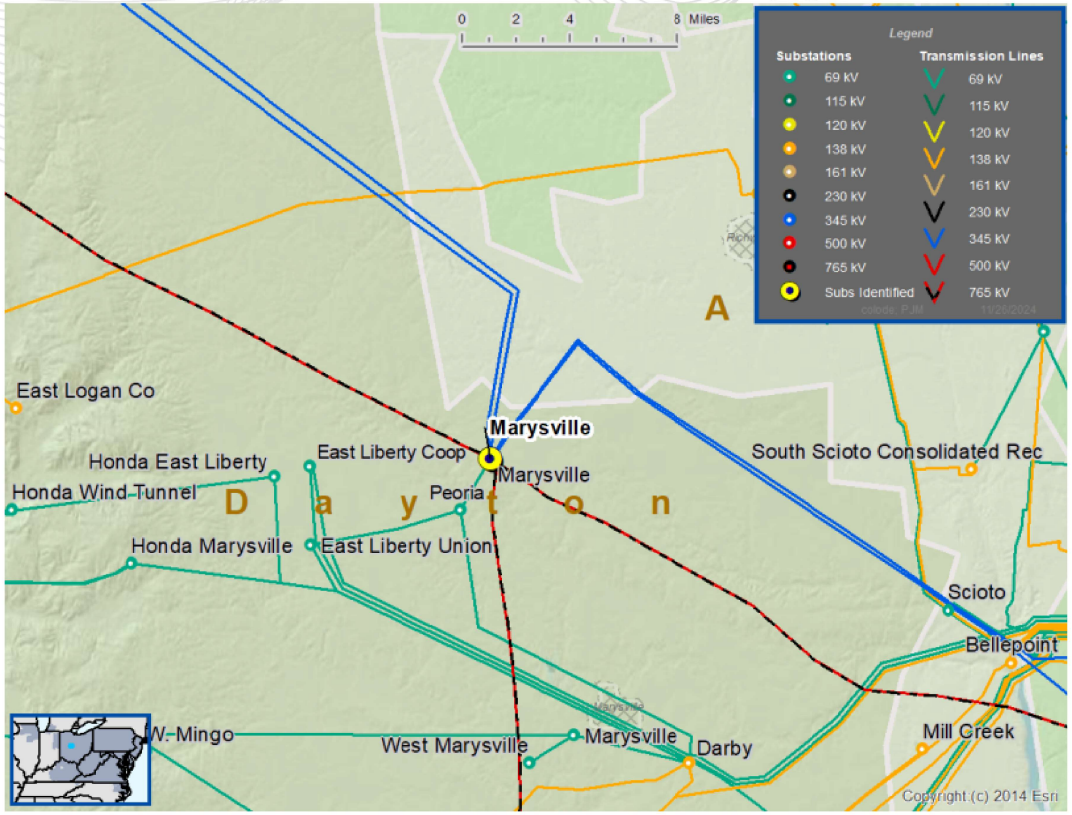
Problem Statement:

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 - Marysivlle (765)	4047/4142/4484/4961



PJM © 2025

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:

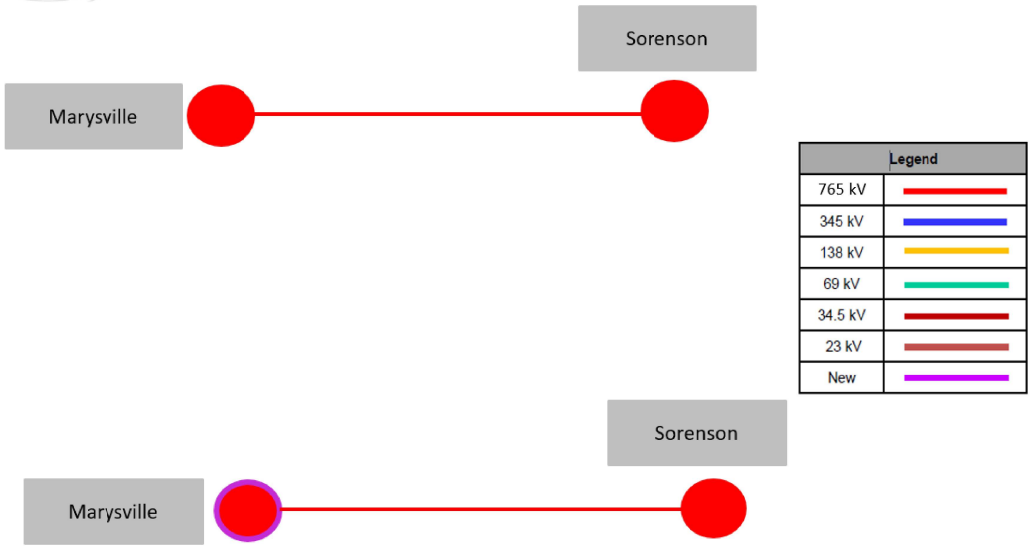
Branch	SN/SE/WN/WE (MVA)
Marysville_RS - Marysivlle (765)	5351/5351/5351/5351

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

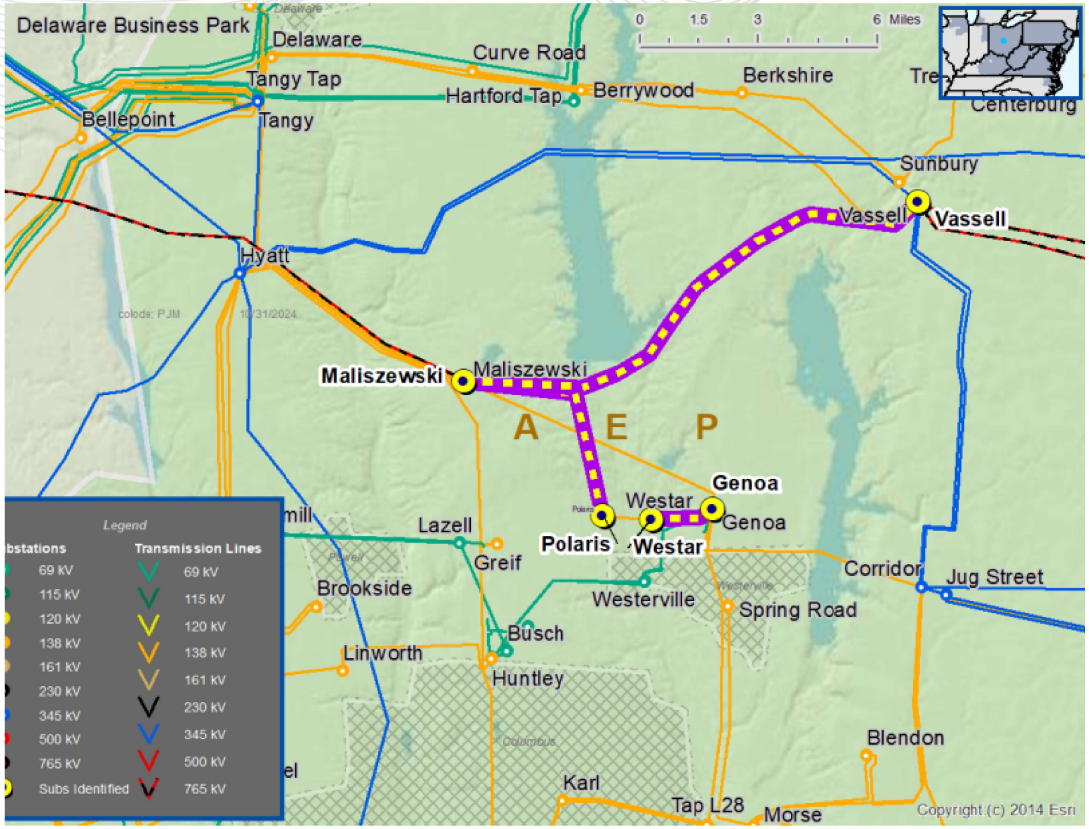
In 2029 RTEP summer case, the Genoa – Westar 138kV line is overloaded for multiple N-1-1 contingency pairs.

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 Marysiville 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;**

PJM © 2025

AEP Transmission Zone: Baseline Cluster AEP-3,4,5

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

	Proposal	Estimate Cost ($M)
Option 1	408	145.494
Option 2	863 ~~+ Non comp~~	2.328 ~~9.228~~

AEP Transmission Zone: Baseline Cluster AEP-3,4,5

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

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

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

Proposal 863 couldn't solve these issues, while proposal 408 (All upgrades except the 0.18 mile double circuit line extension at Corridor is green field) addresses all of them.

PJM © 2025

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**

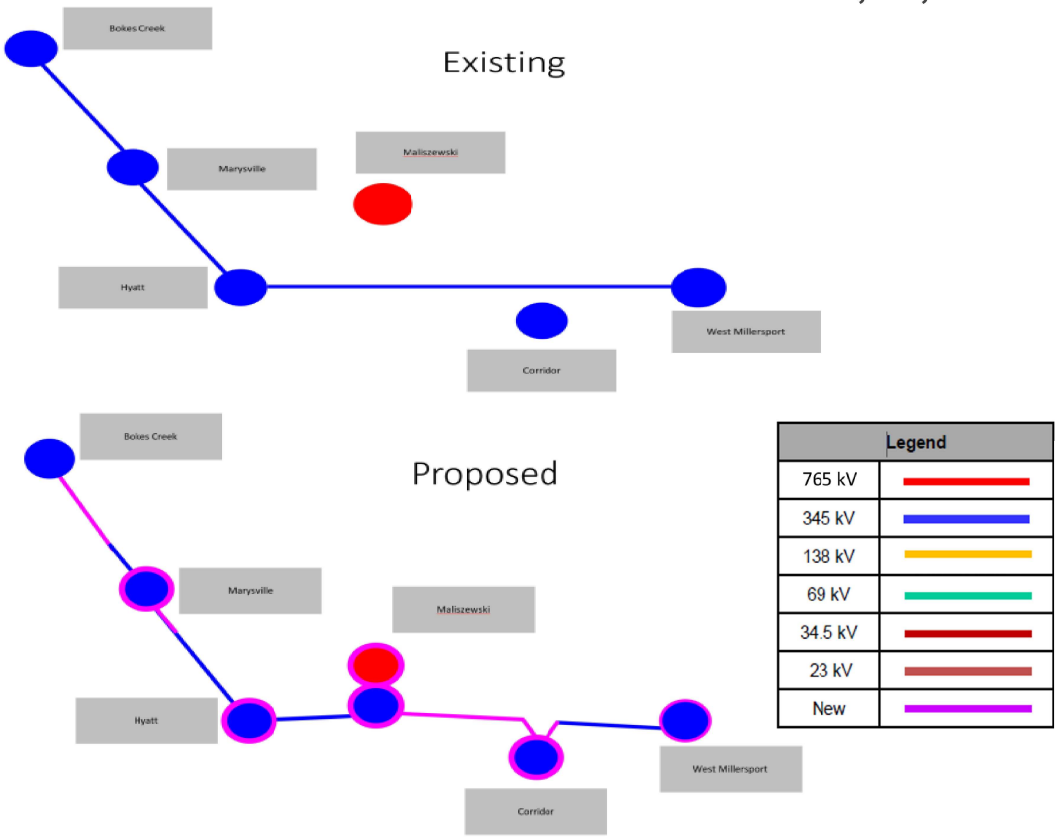
Establish a 0.18 mile double circuit 345 kV line extension to cut the existing Hyatt – West Millersport 345 kV line in and out of Corridor station. (**B3919.2**) **Estimated Cost: $3.101M**

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: $26.256**



PJM © 2025

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**

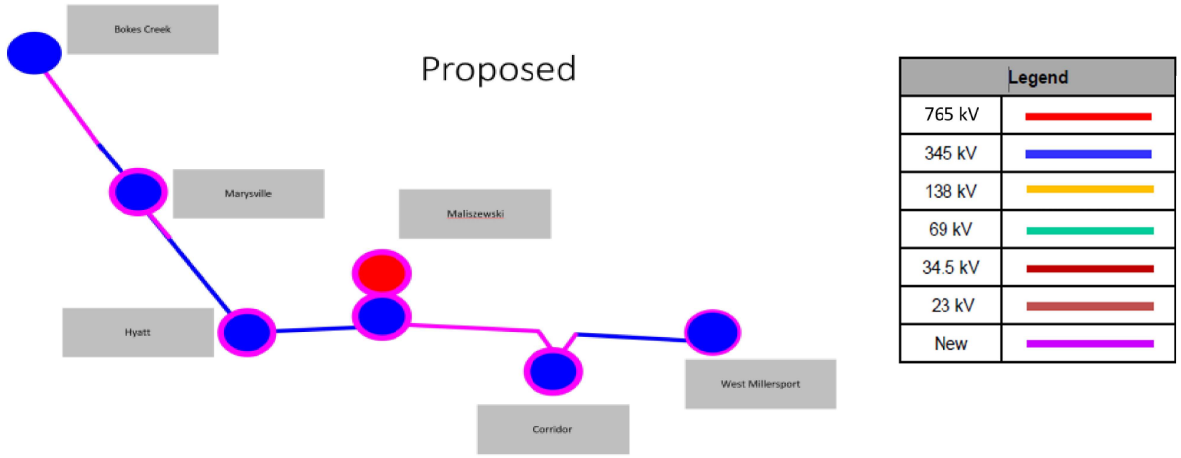
Upgrade 3000A 345 kV breaker 'L2' along with associated terminal elements to 5000A at Marysville. (**B3919.9**) **Estimated Cost: $2.558M**

Total Estimated Cost: $145.494 M

Required IS Date: 6/1/2029

Projected IS Date:12/31/2028

Previously Presented: 12/3/2024



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

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

AMERICAN ELECTRIC POWER

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

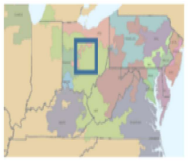
- Marysville-Hyatt is a 345kV double circuit line. The majority of structures (78%) are 1955 vintage lattice steel type. Conductors on the Marysville-Tangy-Hyatt 345kV line:
  - 14.05 miles of 1,275,000 CM ACSR/PE Conductor
  - 5.14 miles of 1,414,000 CM ACSR/PE Conductor
  - 0.04 miles of 1,414,000 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.

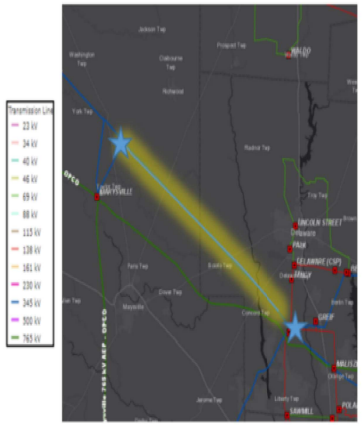
1.4.2 Coordination of Baseline Upgrades, Supplemental Projects and Customer-Funded Upgrades

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

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

Proposed Solution: 2024-W1-408

Existing/Preliminary Facility Ratings:

Facility Name	Existing Ratings (SN/SE/WN/WE)	Preliminary Ratings (SN/SE/WN/WE)
Maliszewski 765/345 kV Transformer	N/A	2742/3097/2742/3097
Maliszewski - Hyatt 345 kV	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

PJM © 2025

ATSI Transmission Zone: Baseline Cluster 2 (ATSI)

Process Stage: Second Read

Criteria: Summer & LL Gen Deliv and N-1

Assumption Reference: 2024 RTEP assumptions

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

Proposal Window Exclusion: None

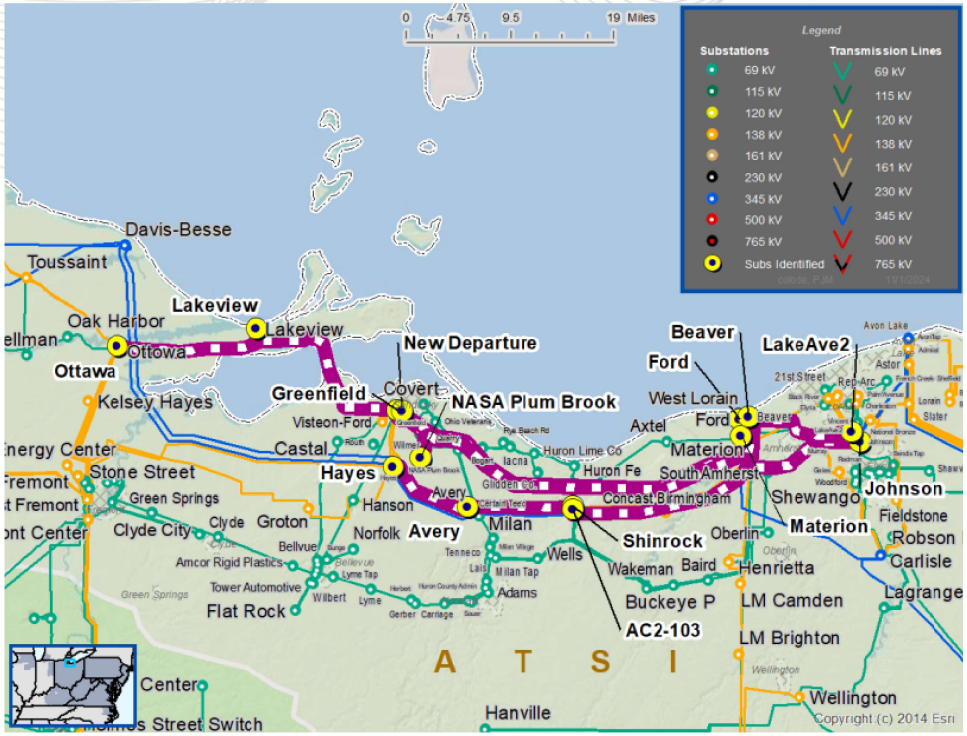
Problem Statement:

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

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

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

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



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

PJM © 2025

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)**.

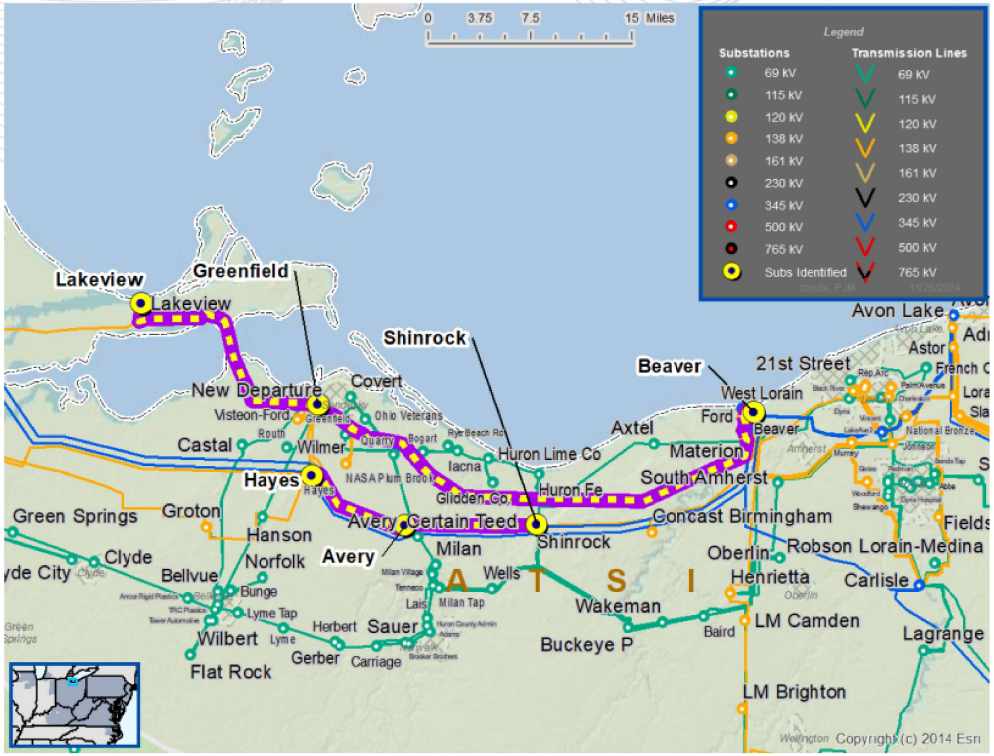
Rebuild the 6.5 miles of Avery-Hayes 138 kV Line with 795 kcmil 26/7 ACSS conductor (**$11.01M**) **(b3925.3).**

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 Cooridor	
-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



ATSI Transmission Zone: Baseline Cluster 2 (ATSI)

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

Preliminary Facility Rating:

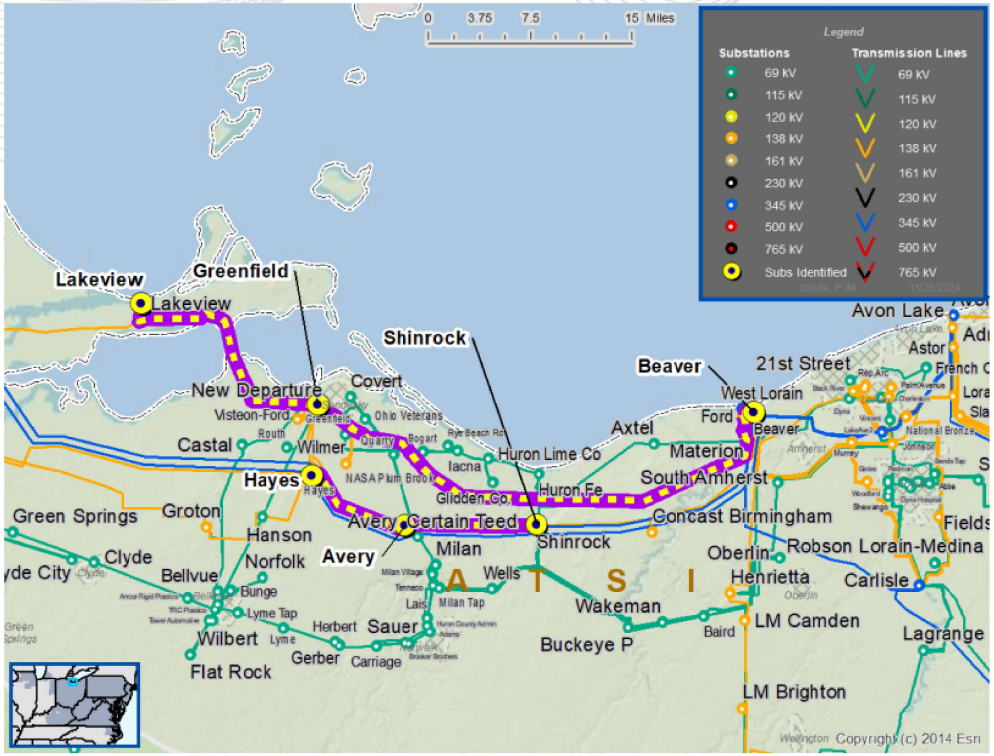
Branch	SN/SE/WN/WE (MVA)
Avery to Shinkrock 138 kV	448/516/448/543
Greenfield to Lakeview 138 kV	448/516/448/543
Hayes to Avery 138 kV	448/516/448/543
Greenfield to Beaver 138 kV Cooridor -Greenfield – New Departure -New Departure – BrightWell - Brightwell – Ford - Greenfield – NASA - NASA – Beaver -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

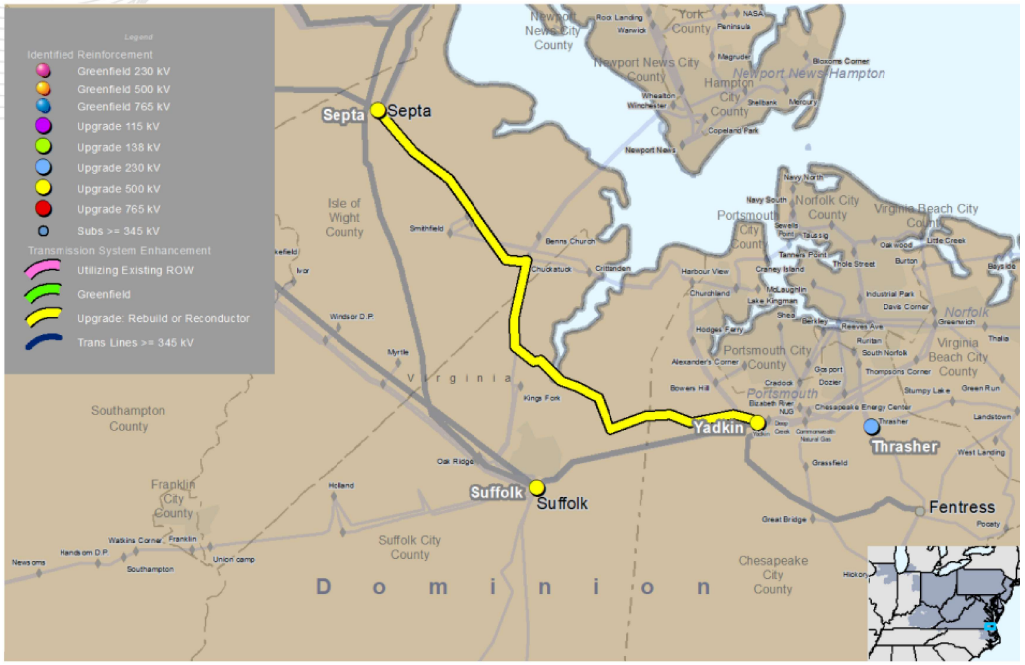
Criteria: Dominion's FERC 715 Planning Criteria (C.2.9 – End of Life Criteria)

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

Continued on next slide….

PJM © 2025

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

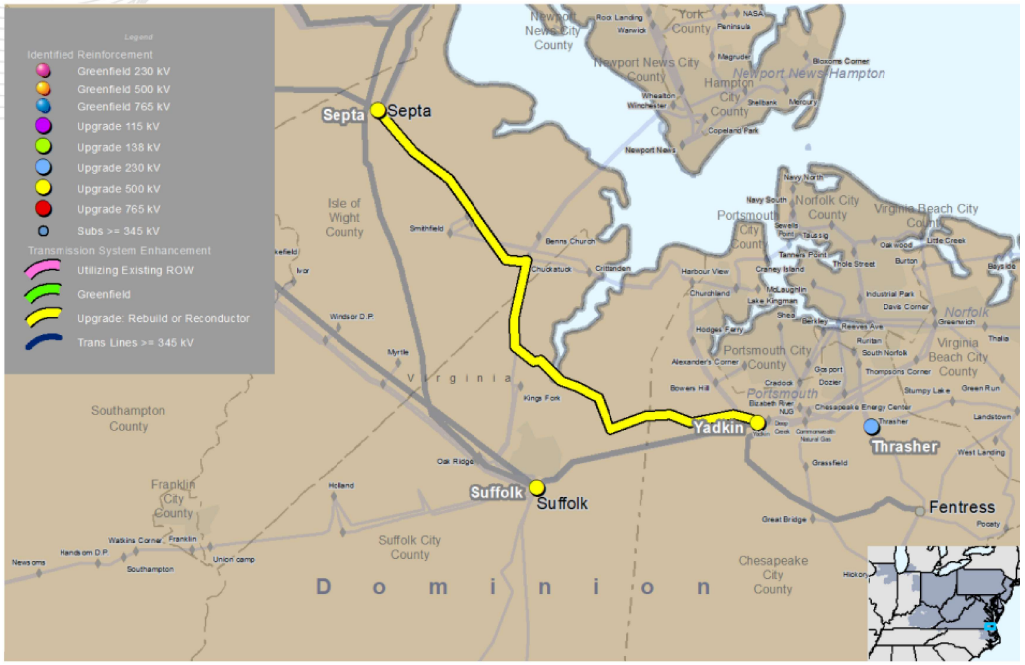
Recommended Solution: Proposal 2024-W1-980:

- 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



PJM © 2025

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

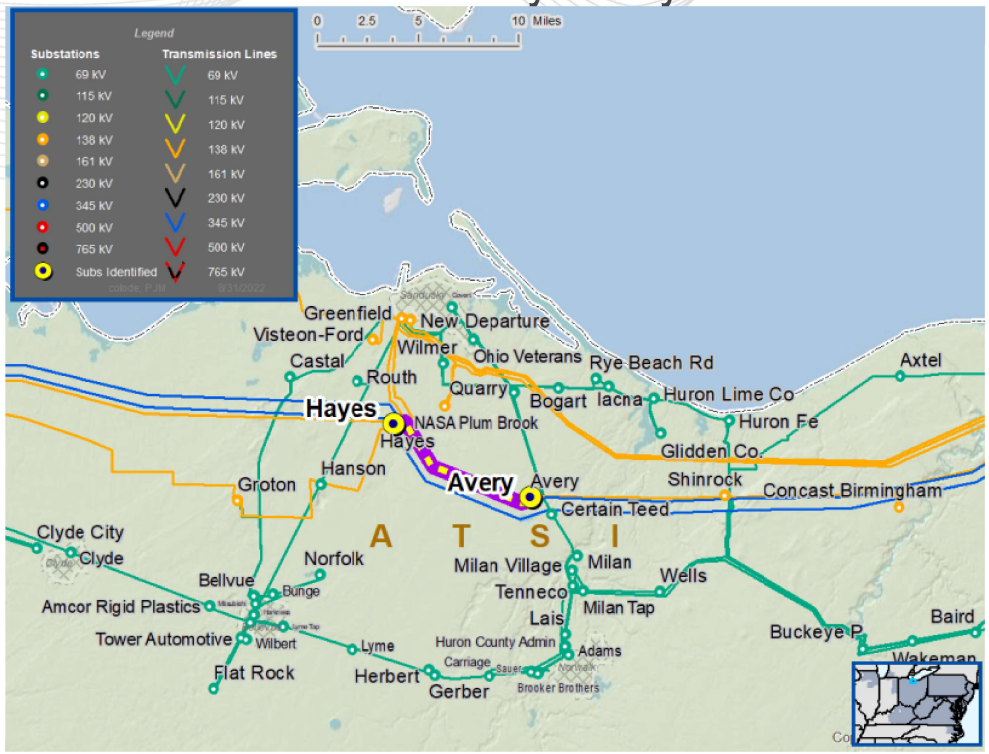
Recommended Solution:

Rebuild and reconductor 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



PJM © 2025

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

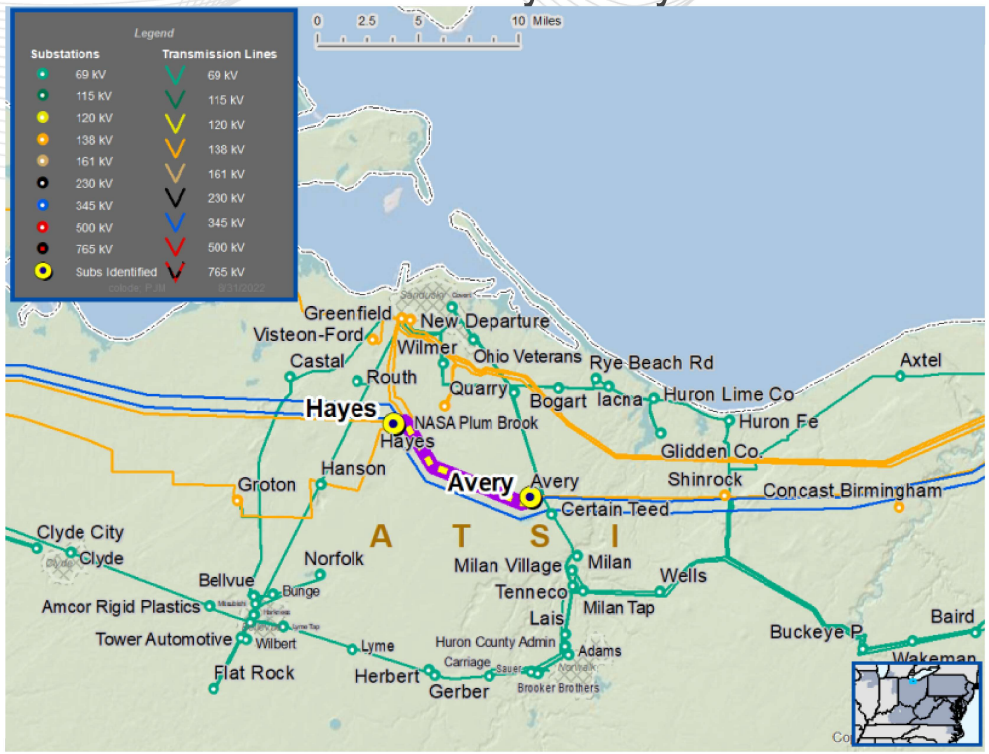
Facility Ratings:

	Branch	SN/SE/WN/WE (MVA)
Existing Ratings	Hayes to Avery 138 kV	233/282/263/333
Ratings Upon Completion of b3721		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



PJM © 2025

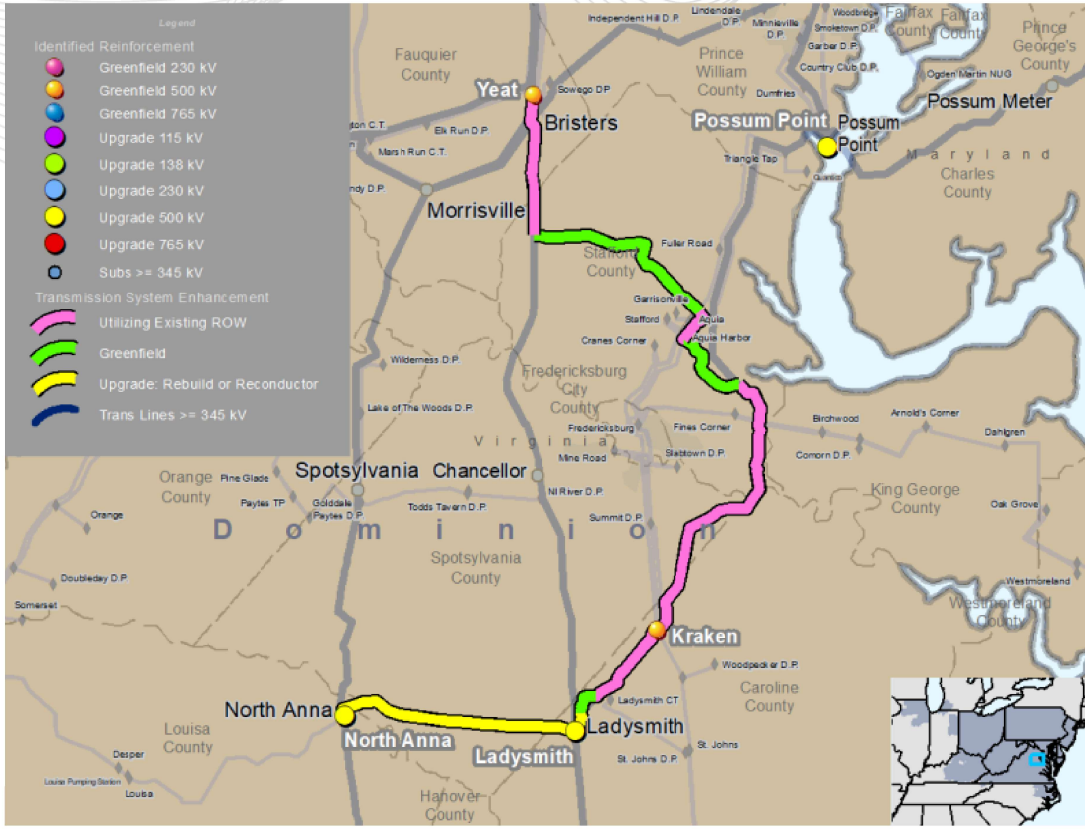
Recommended Solution (Regional Cluster)

2024W1 – 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 substaiton 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…

Continued on next slide…



2024W1 – Regional Cluster
Recommended Solution: 2024-W1-967

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 a 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

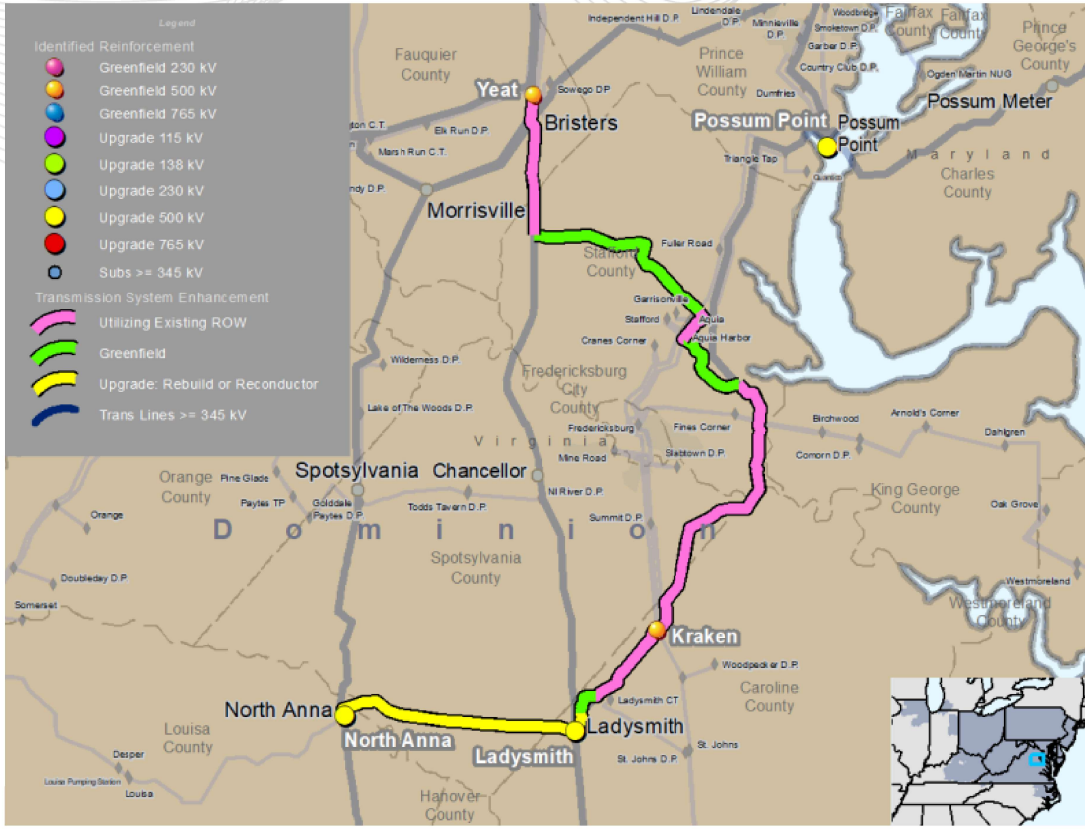
Preliminary Facility Rating:

#	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

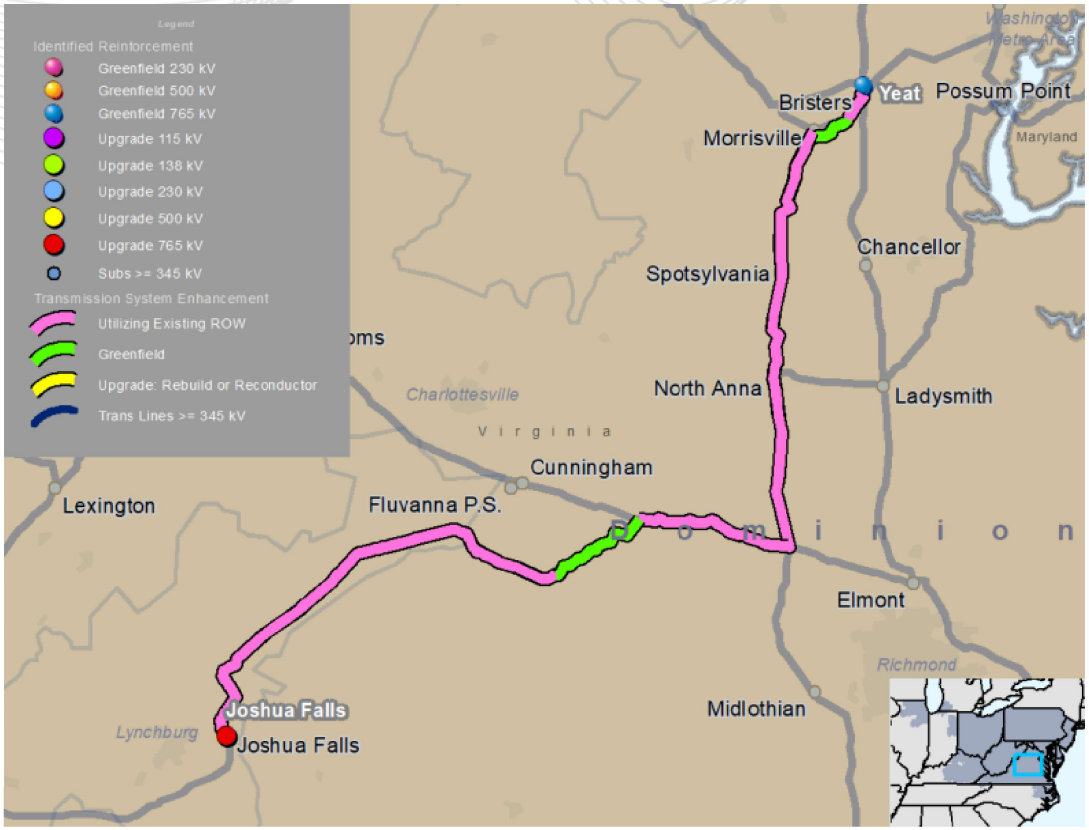


PJM © 2025

2024W1 – Regional Cluster
Recommended Solution: 2024-W1-820

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)**



Continued on next slide…

2024W1 – Regional Cluster
Recommended Solution: 2024-W1-820

Existing Facility Rating:

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

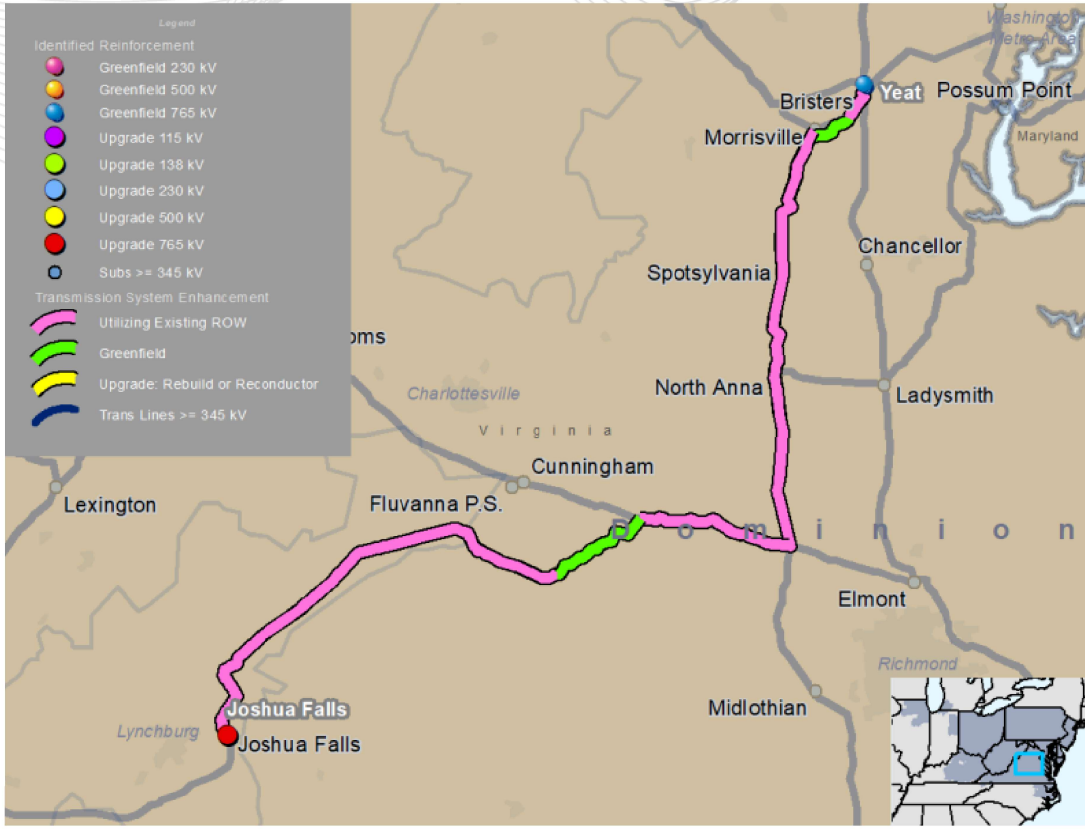
Preliminary Facility Rating:

#	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

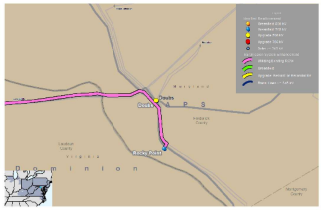
Projected IS Date: 6/1/2029

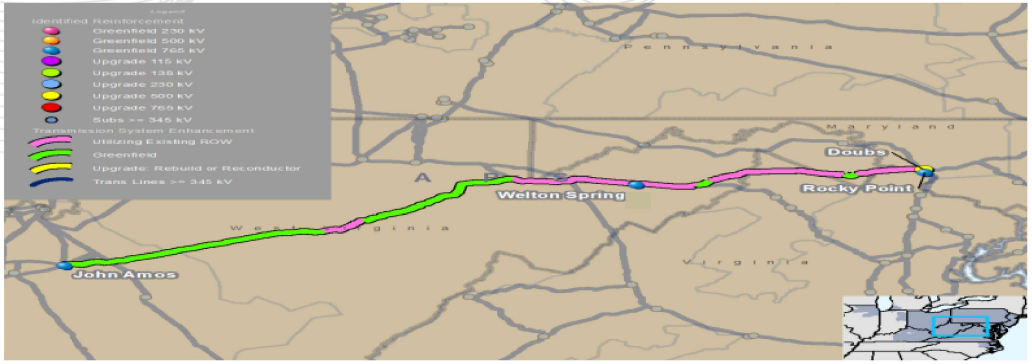


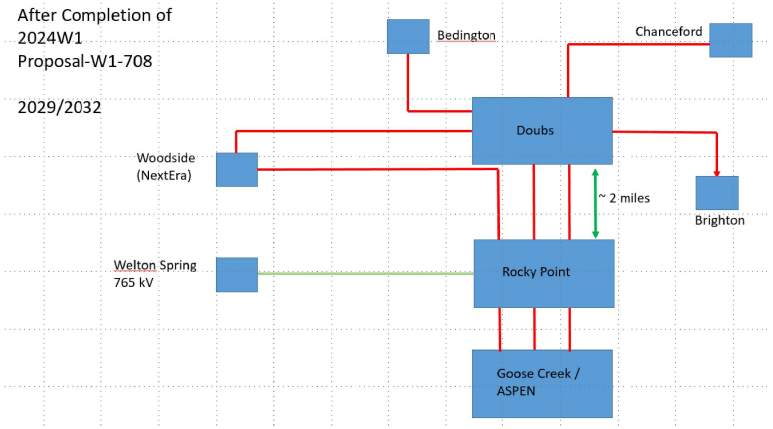
2024W1 – Regional Cluster
Recommended Solution: 2024-W1-708

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)**





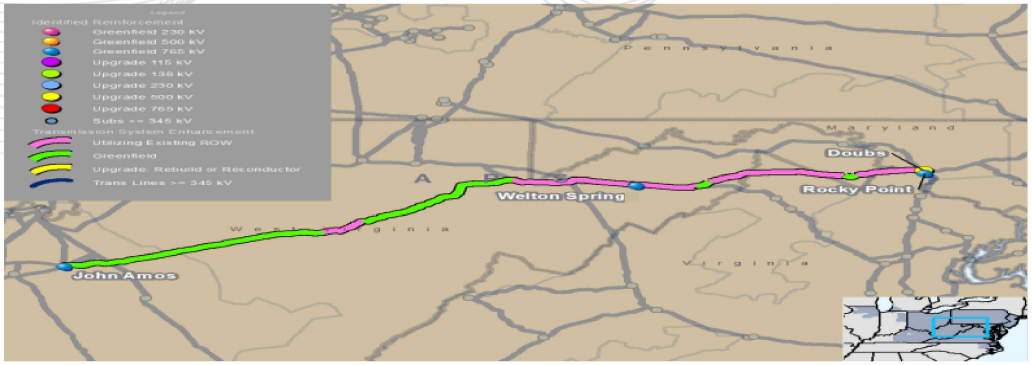


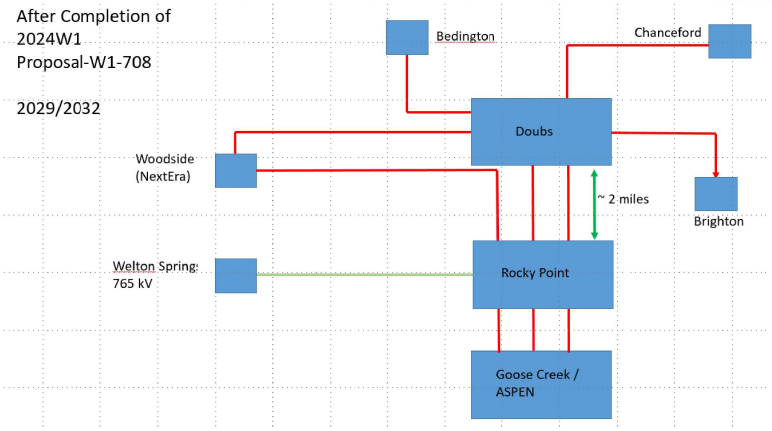
PJM © 2025

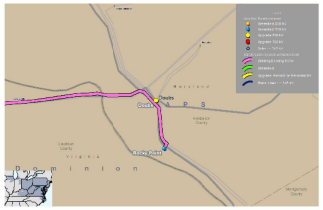
2024W1 – Regional Cluster
Recommended Solution: 2024-W1-708

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 andout of Black Oak 500 kV substation **$19.23M (b4000.11)**







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

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

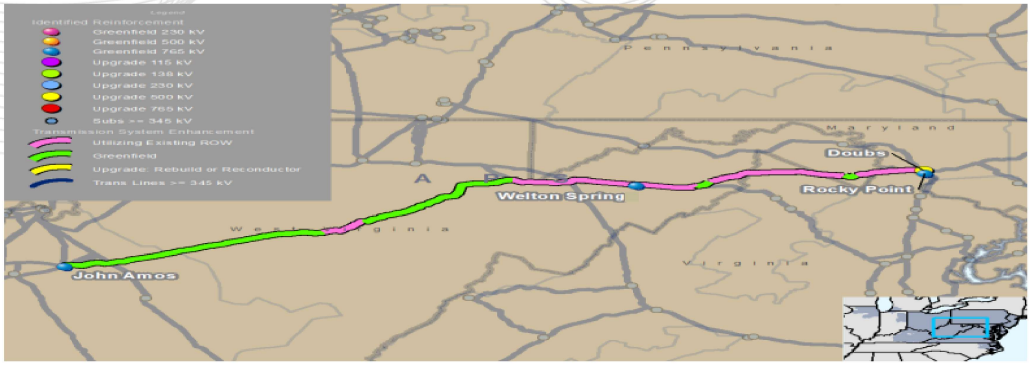
Preliminary Facility Rating:

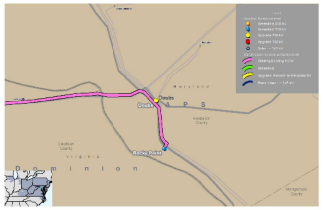
Branch	SN/SE/WN/WE (MVA)
John Amos – Welton Spring – Rocky Point	6743/7253/7512/7918

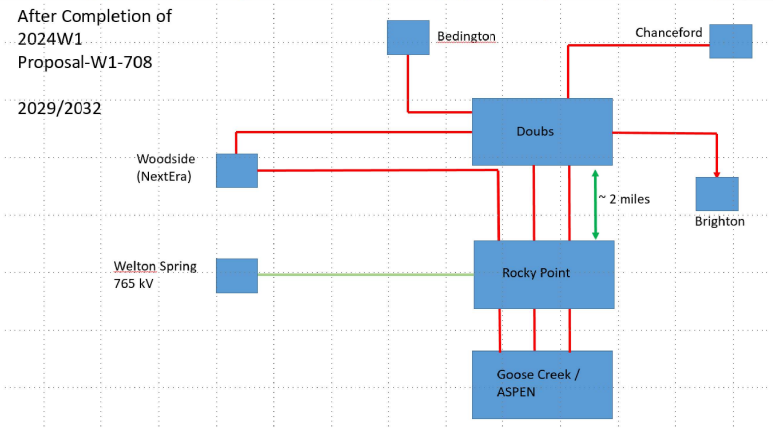
Estimated Cost: $1,945.05 M

Required IS Date: 6/1/2029

Projected IS Date: 12/1/2029







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

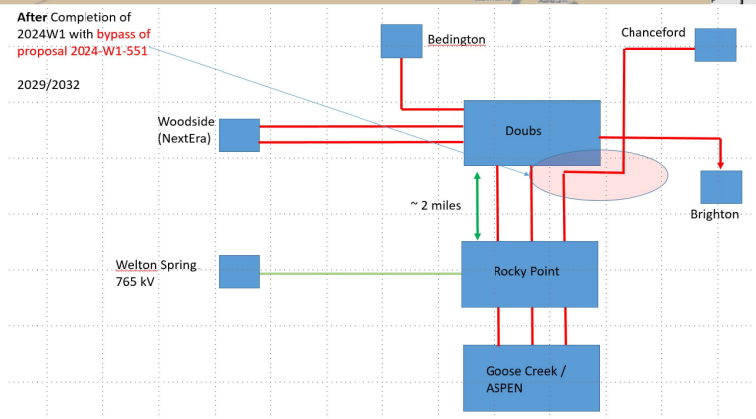
Recommended Solution: 2024-W1-551

- 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



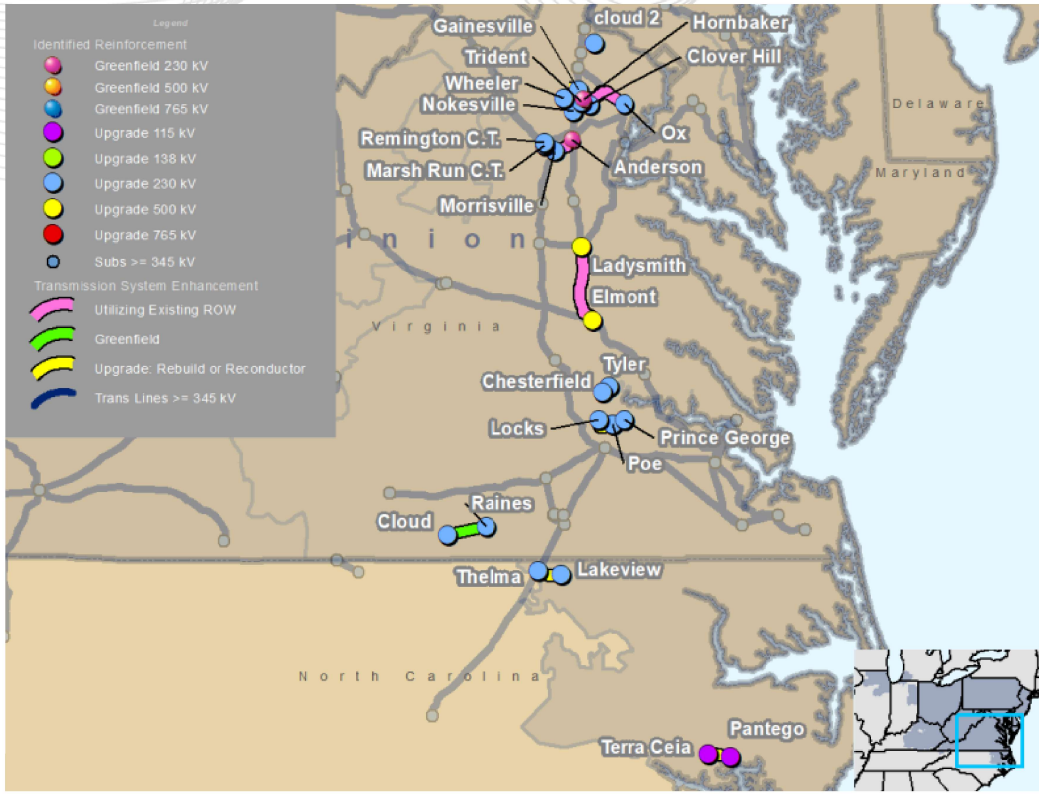


PJM © 2025

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



Continued on next slide…

2024W1 – Regional Cluster
Recommended Solution: 2024-W1-24

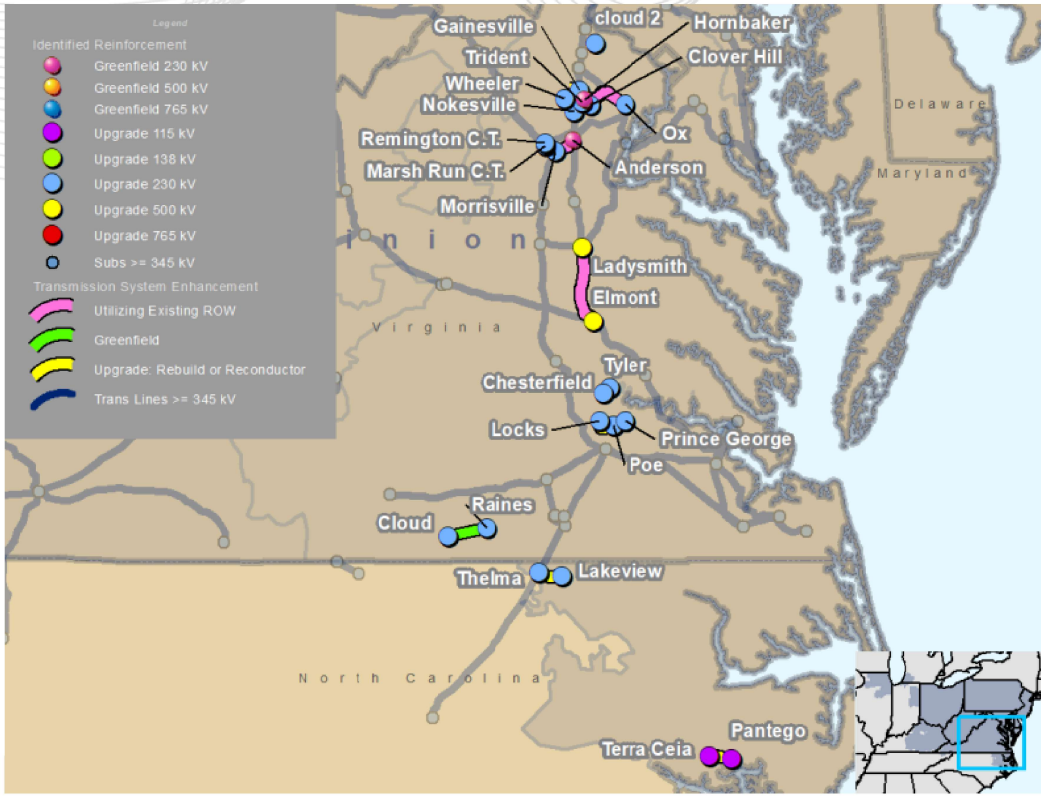
Recommended Solution: 2024-W1-24 **Revised**

- 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

Continued on next slide…



2024W1 – Regional Cluster
Recommended Solution: 2024-W1-24

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 :erminal equipment, line leads, and bus at Marsh Run substation to be rated to 4000A.	$2.53
b4000.303	Uprate line #299 :erminal 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 subsat on, 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
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 subsation 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

Continued on next slide…

2024W1 – Regional Cluster
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

PJM © 2025

2024W1 – Regional Cluster
Recommended Solution: 2024-W1-781

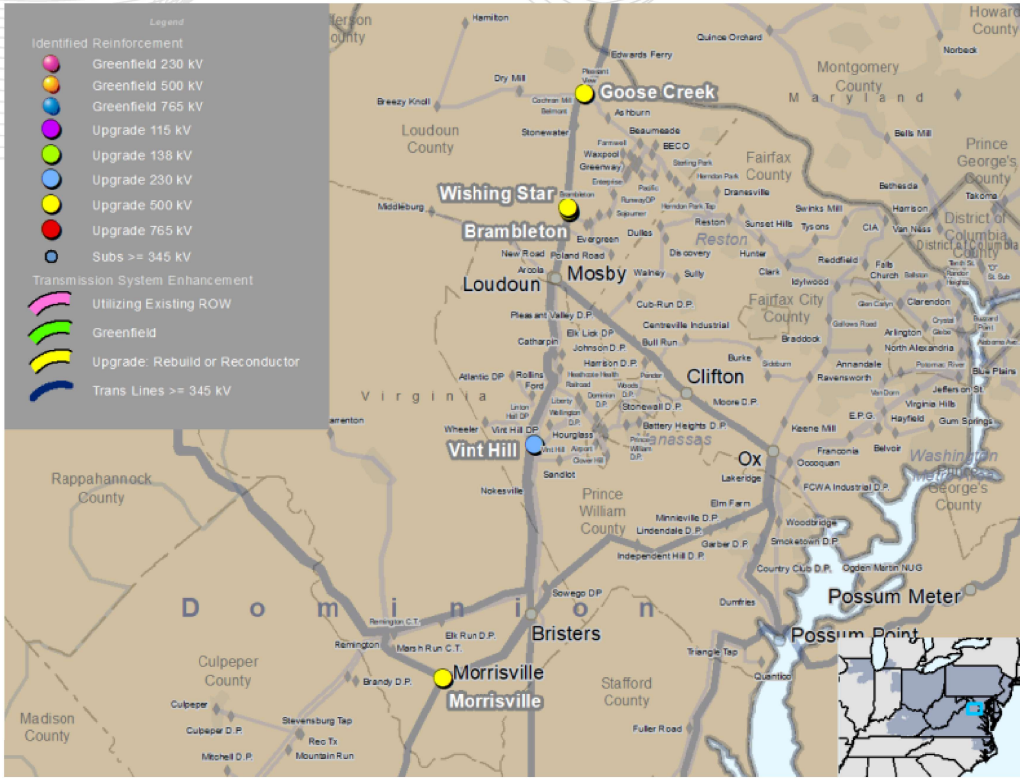
Recommended Solution: 2024-W1-781

- Upgrade 500/230kV transformer at Goose Creek substation.
  Estimated Cost: $34.01M (b4000.340)
- Uprate bus at Brambleton to support 500kV LN #558 Aspen – Brambleton uprate.
  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

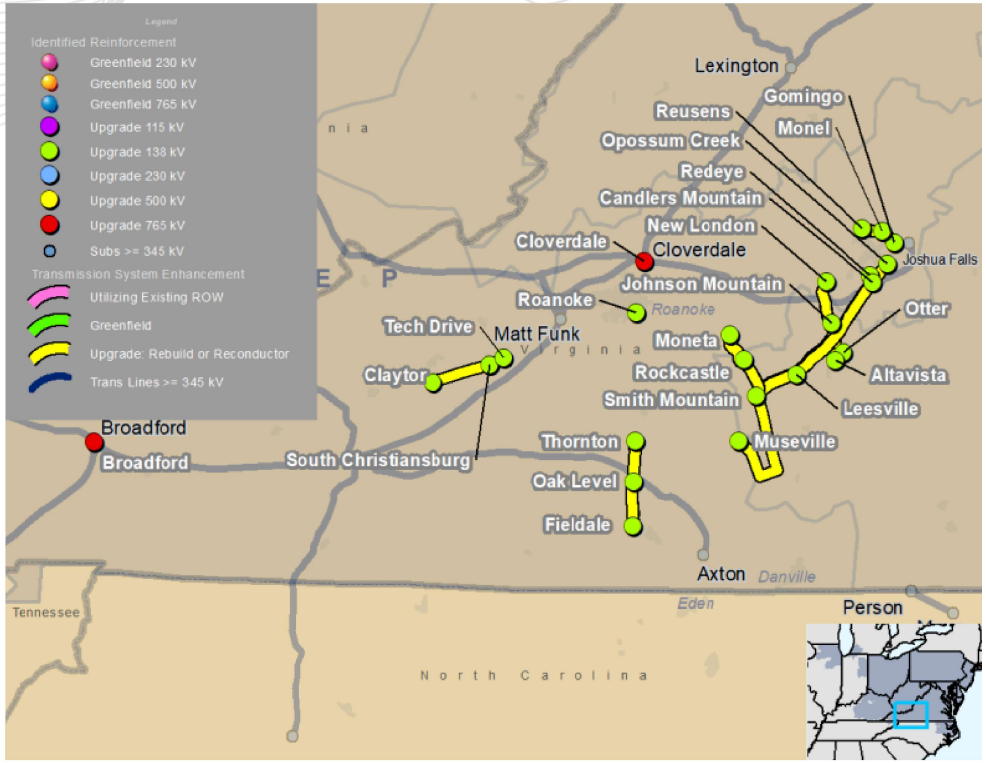


2024W1 – Regional Cluster
Recommended Solution: 2024-W1-81

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**
- Opposum 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…



PJM © 2025

2024W1 – Regional Cluster
Recommended Solution: 2024-W1-81

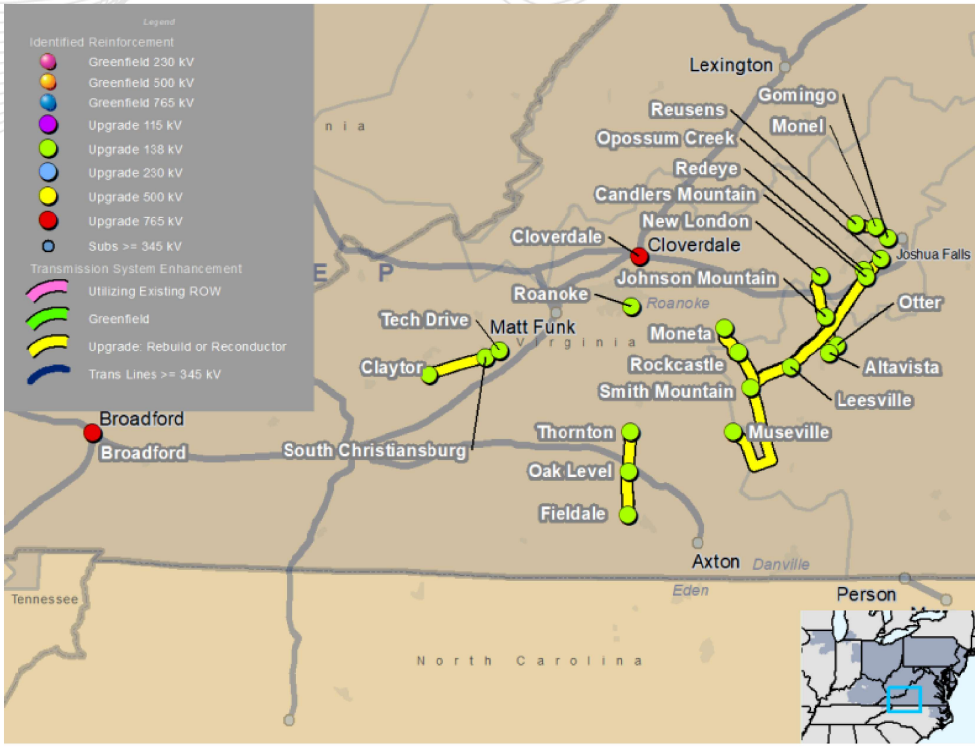
Recommended Solution: 2024-W1-81

- ~~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 Wavetrap (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



PJM © 2025

Existing/Preliminary Facility Ratings:

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

PJM © 2025

2024W1 – Regional Cluster
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:

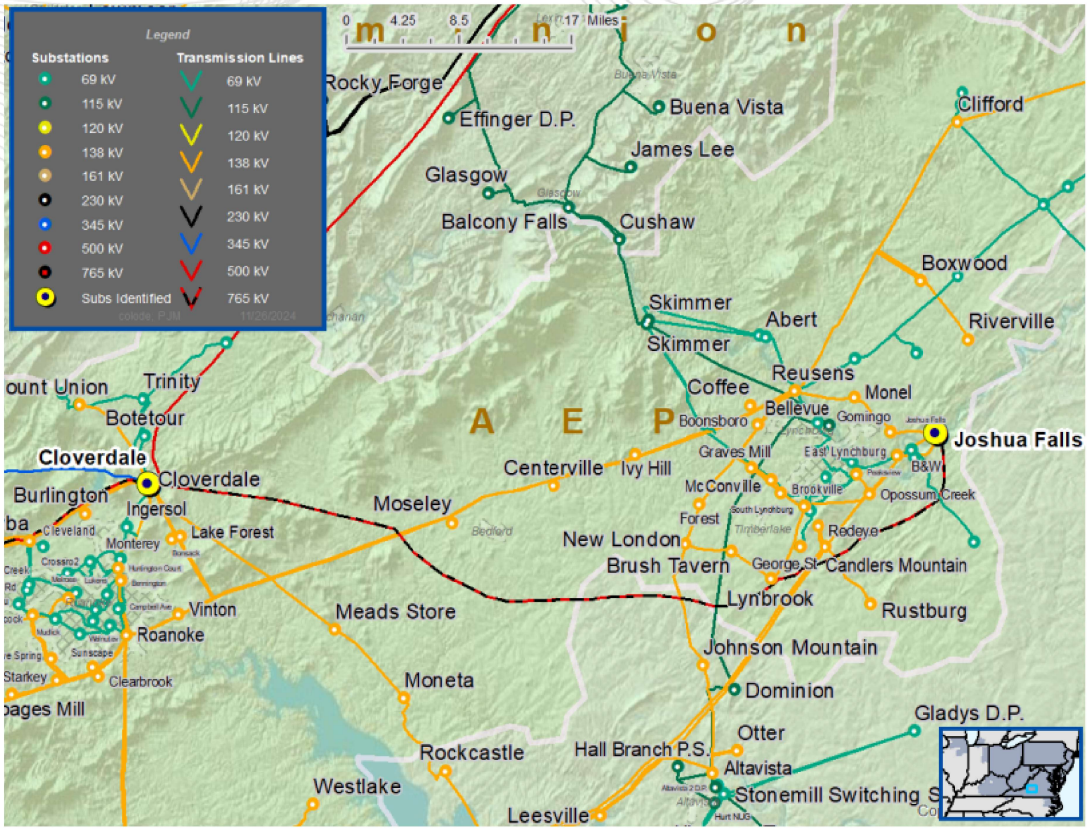
Branch	SN/SE/WN/WE (MVA)
Joshua Falls – Cloverdale 765kV	1180/1180/1180/1180

Preliminary Facility Rating:

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

Required IS Date: 6/1/2029

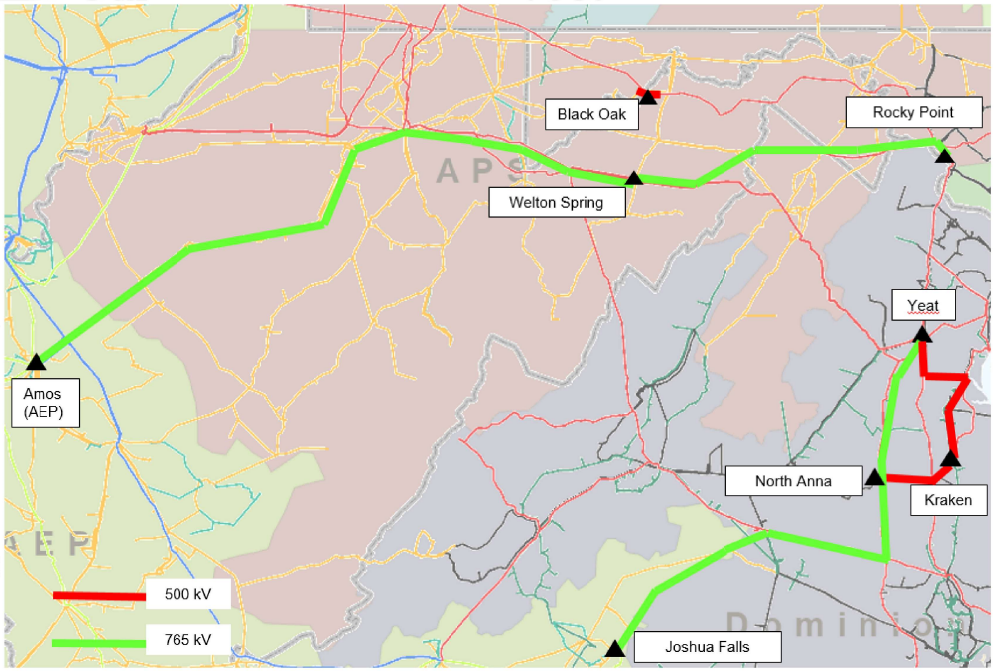
Projected IS Date: 6/1/2029



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:

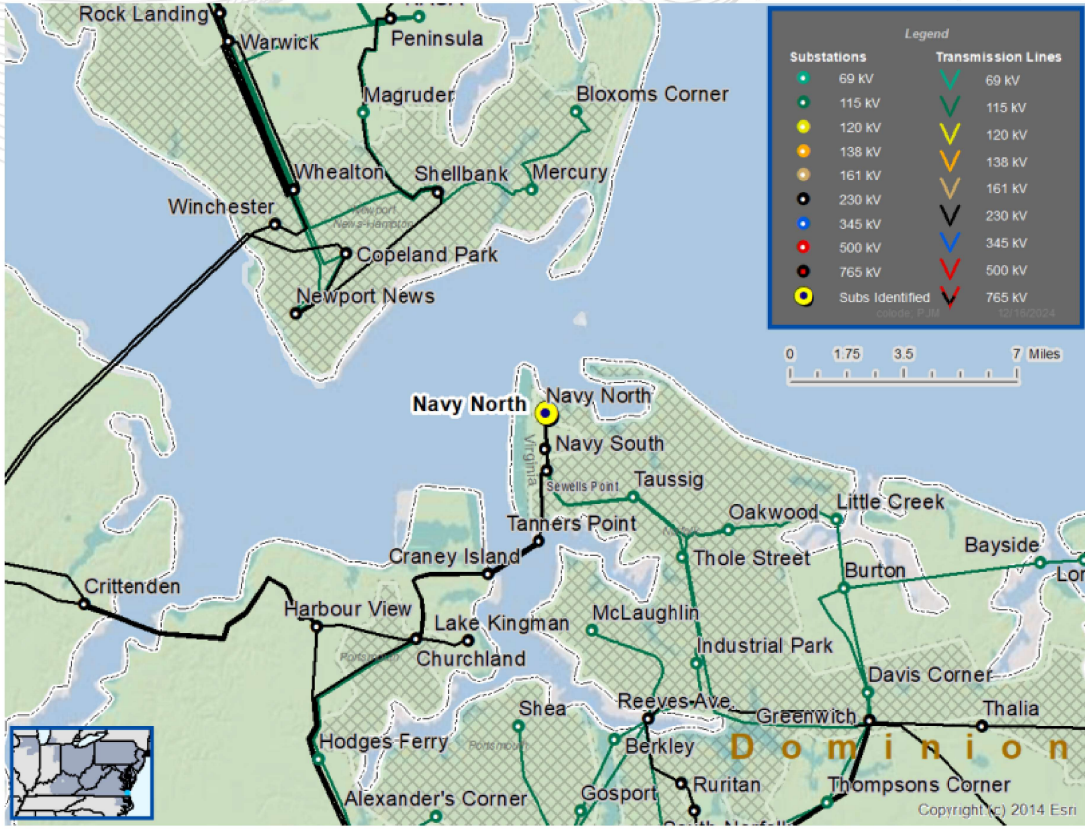
Install (1) 230kV 50 MVAr shunt capacitor bank & associated equipment at Navy North. **(b3928.1)**

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



2024W1 – Regional Cluster
PJM Selected Solution: Breaker Upgrades

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.

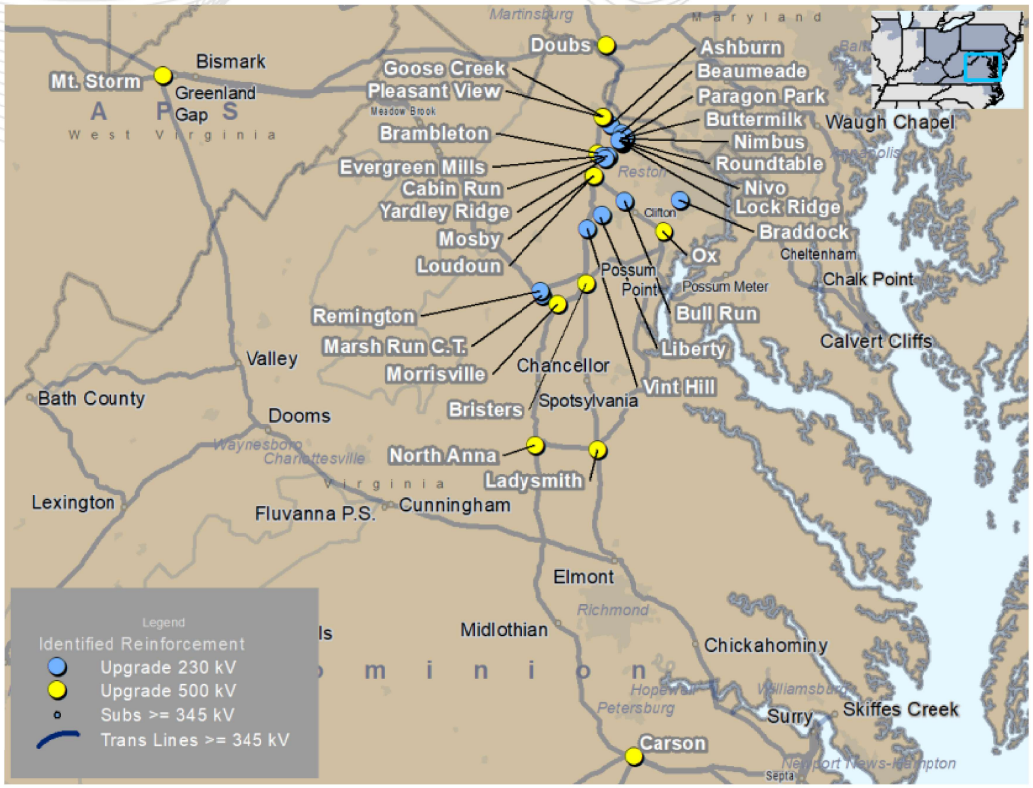
Proposed Solution:

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



PJM © 2025

PJM Selected Solution
Short Circuit Evaluation

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

	Over Duty Bus (Qty)						Over Duty CBs	Maximum Fault Duty (kA)						
Scenario Description	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	Comment
PJM Selected Solution	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
Total	127	100.85

PJM © 2025

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
					11.5

PJM © 2025

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
		126			**89.345**

PJM 2024 Window 1 Regional Cluster Shortlist: Cost Review

PJM © 2025

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 - FE - Transource Proposals

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

LS Power Proposals

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**

360

PJM © 2025

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
	Total		**$ 2,325,373,092.60**	**$ 3,607,759,997.01**
Proposal 768	2024-W1-768	Axton - Joshua Falls - Mt Ida	$ 2,191,007,184.00	$ 2,879,718,285.80
	2024-W1-944	Upgrades to AEP 138kV and Dominion 230kV transmission lines	$ 69,139,000.00	$ 417,160,000.00
	Total		**$ 2,260,146,184.00**	**$ 3,296,878,285.80**

PJM © 2025

Constructability Matrix – PJM Risk Assessment Criteria

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

Constructability Matrix – Regional Projects
Dominion, FirstEnergy & Transource Joint Proposals

2024 RTEP W1 Proposal Risk Assessments																
Applicable Proposal IDs for Joint Proposals	Proposal ID	Proposing Entity	Proposal Description	Proposal Cost Estimate	Independent Cost Estimate	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	ROW/Land Acquistion 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

PJM © 2025

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 Acquistion 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

PJM © 2025

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 Acquistion 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 © 2025

Next Steps

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

PJM © 2025

Questions?

Contact

Facilitator:
Jason Connell,
Jason.Connell@pjm.com

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

PJM © 2025

Revision History

Version No.	Date	Description
1	1/2/2025	• Initial slides posted
2	1/6/2025	• Slides #29, #63-65, #78 and #89, Corrected typo from “Welton Springs” to “Welton Spring” • Slides #16 and #20, Added the Independent Cost Estimate • Slide #78, Added map
3	3/5/2025	• Slide #48, Maliszewski –Hyatt 345kV Existing ratings is corrected to ‘N/A’
4	6/19/2025	• Slide #74, Rating correction as redlined • Slide #63, Correction as redlined
5	7/17/2025	• Slide #73, Typo correction as redlined • Slide #74, Typo correction as purple-lined

PROTECT THE POWER GRID
THINK BEFORE YOU CLICK!
Be alert to malicious phishing emails.
pjm
Report suspicious email activity to PJM.
(610) 666-2244 / it_ops_ctr_shift@pjm.com

Reliability Analysis Update

Sami Abdulsalam
Director, Transmission Planning

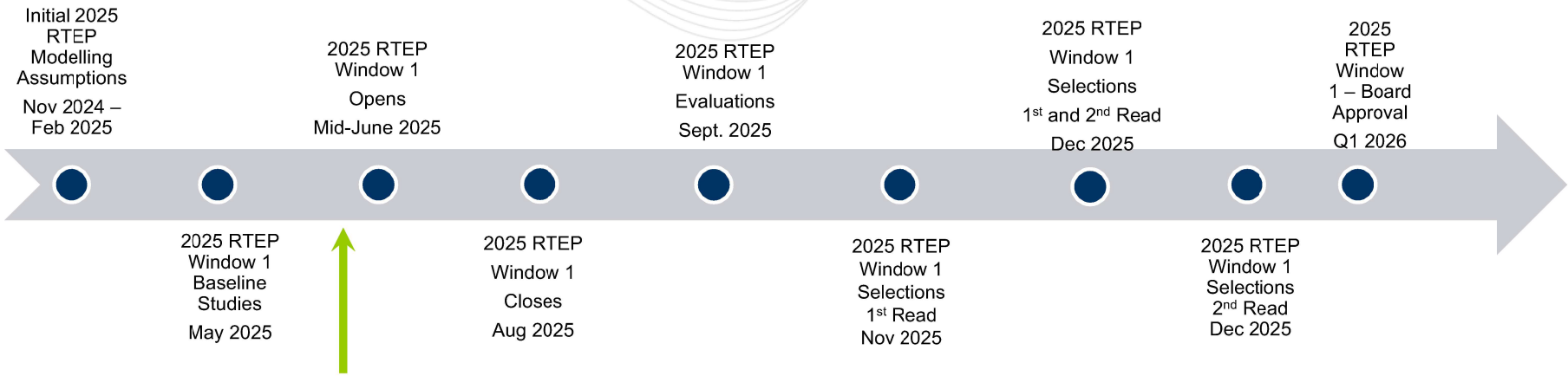
Transmission Expansion Advisory Committee
June 5, 2025

PJM © 2025

2025 RTEP Window 1 Update

PJM © 2025

2025 RTEP Window 1 – Timeline



PJM © 2025

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

PJM © 2025

2025 RTEP Preliminary Results

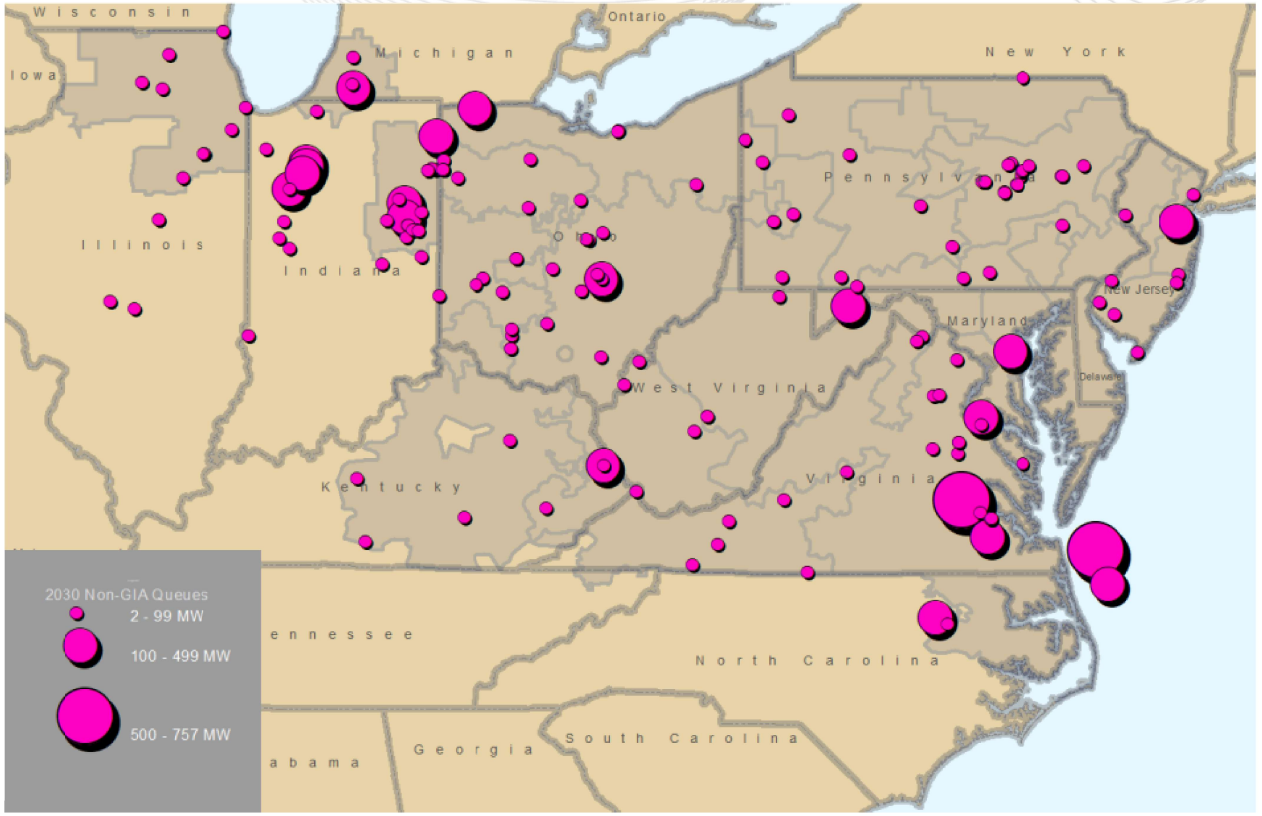
To be finalized by Window Opening mid-June 2025

PJM © 2025

Forecasted/Future Generation Added (Non-GIA Queue)

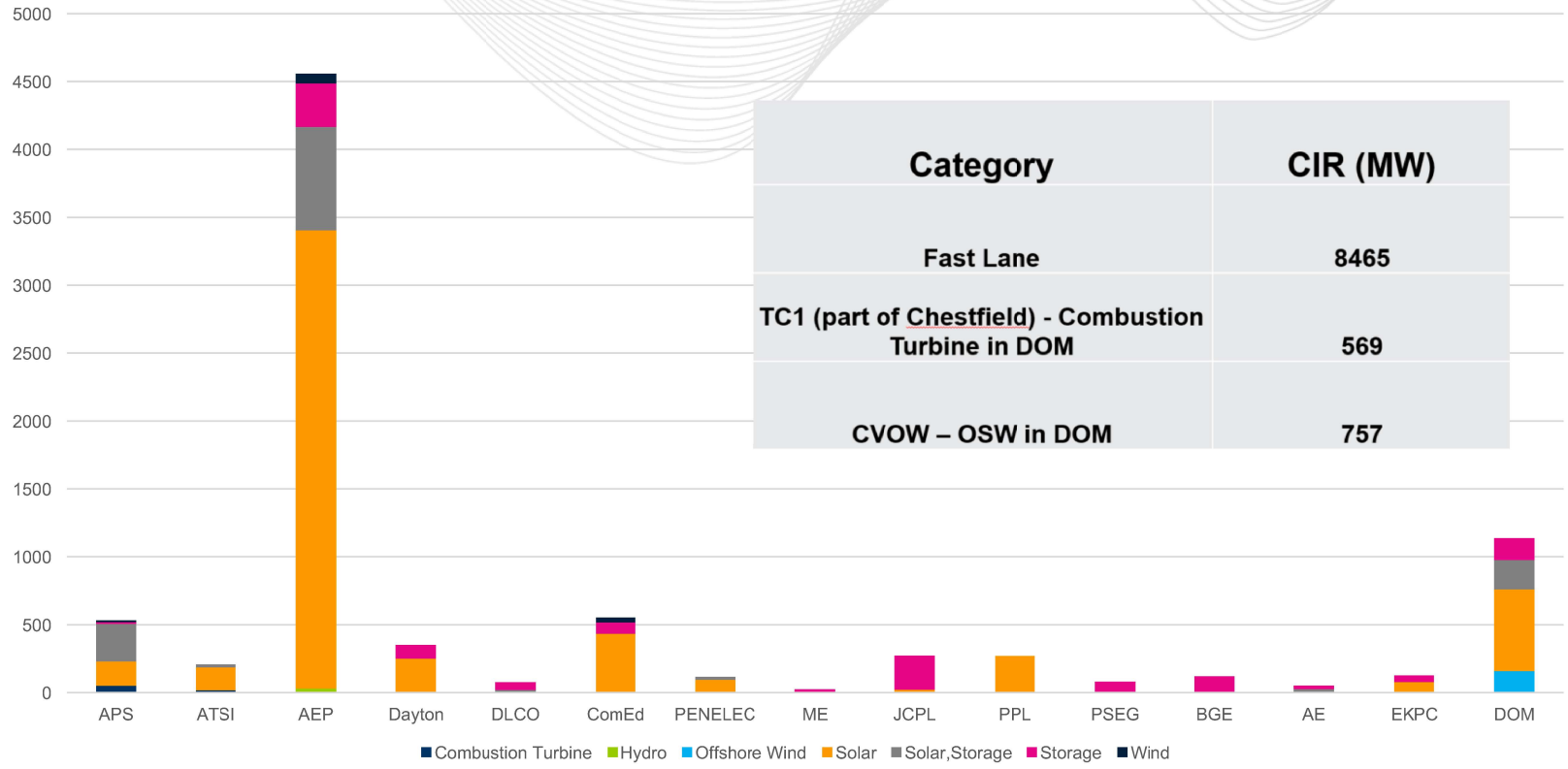
PJM © 2025

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



PJM © 2025

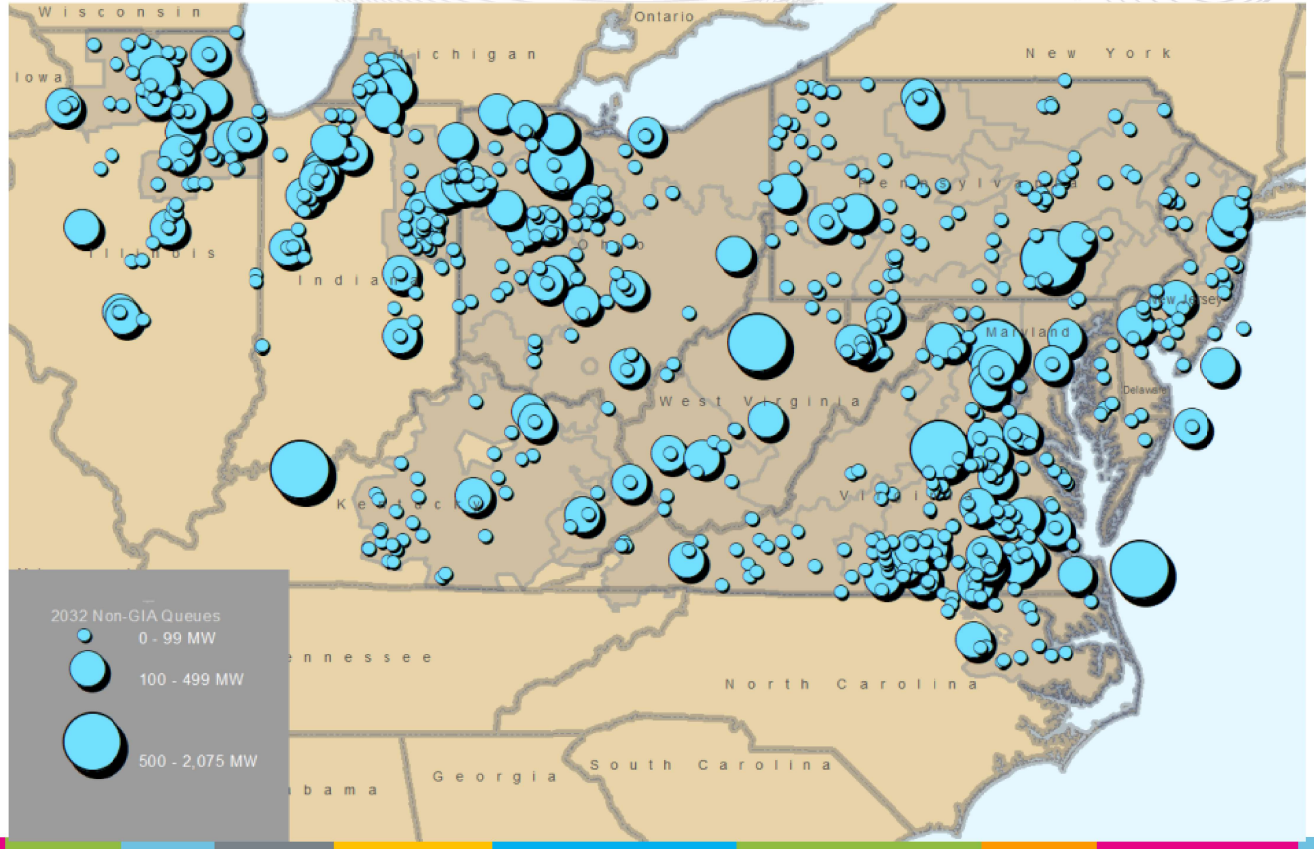
2030 - Forecasted/Future Generation Added (Non-GIA Queue - Fast Lane – All is signed Now)



Category	CIR (MW)
Fast Lane	8465
TC1 (part of Chestfield) - Combustion Turbine in DOM	569
CVOW – OSW in DOM	757

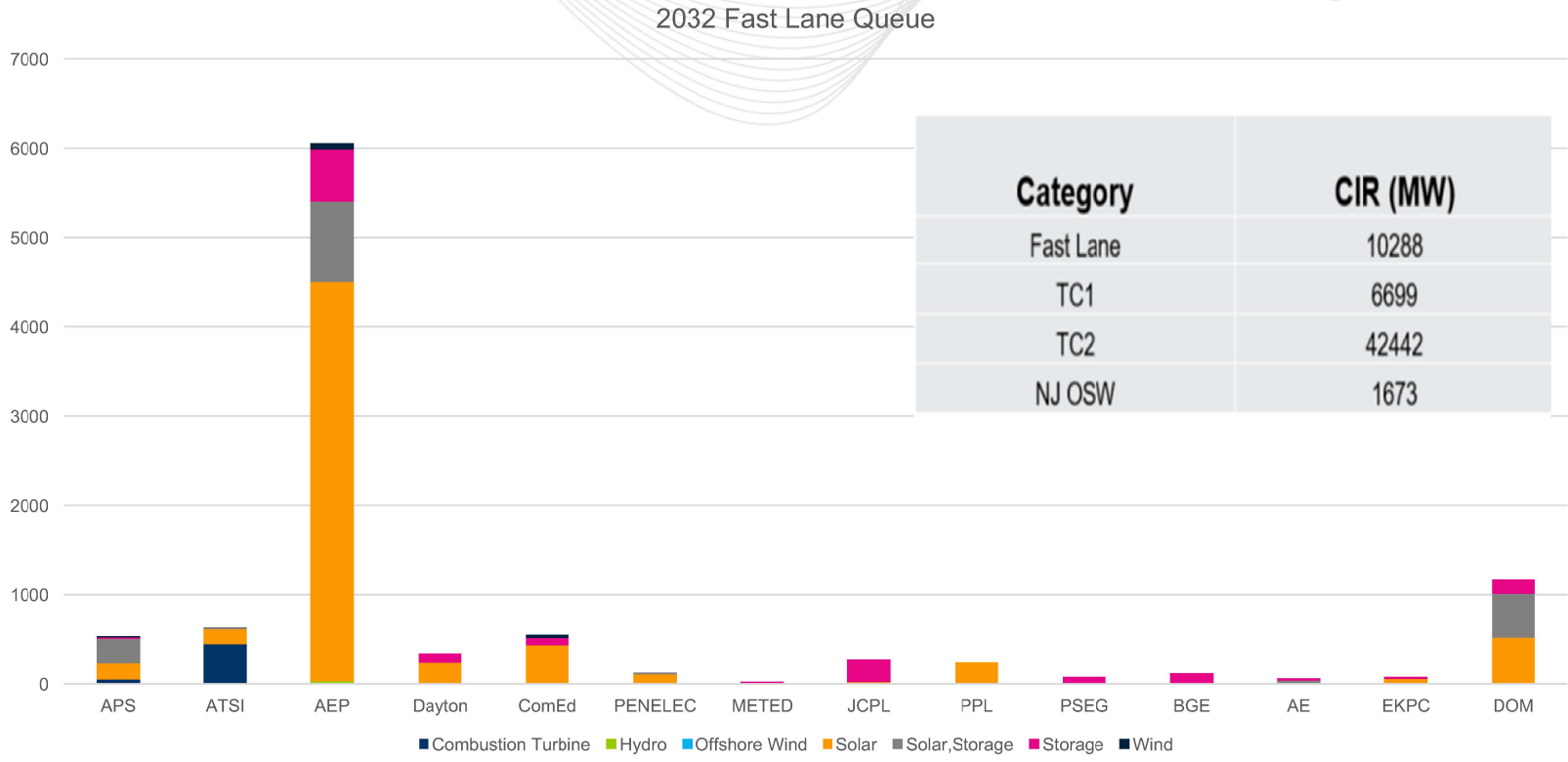
PJM © 2025

2032 - Forecasted/Future Generation Added (Non-GIA Queue)



PJM © 2025

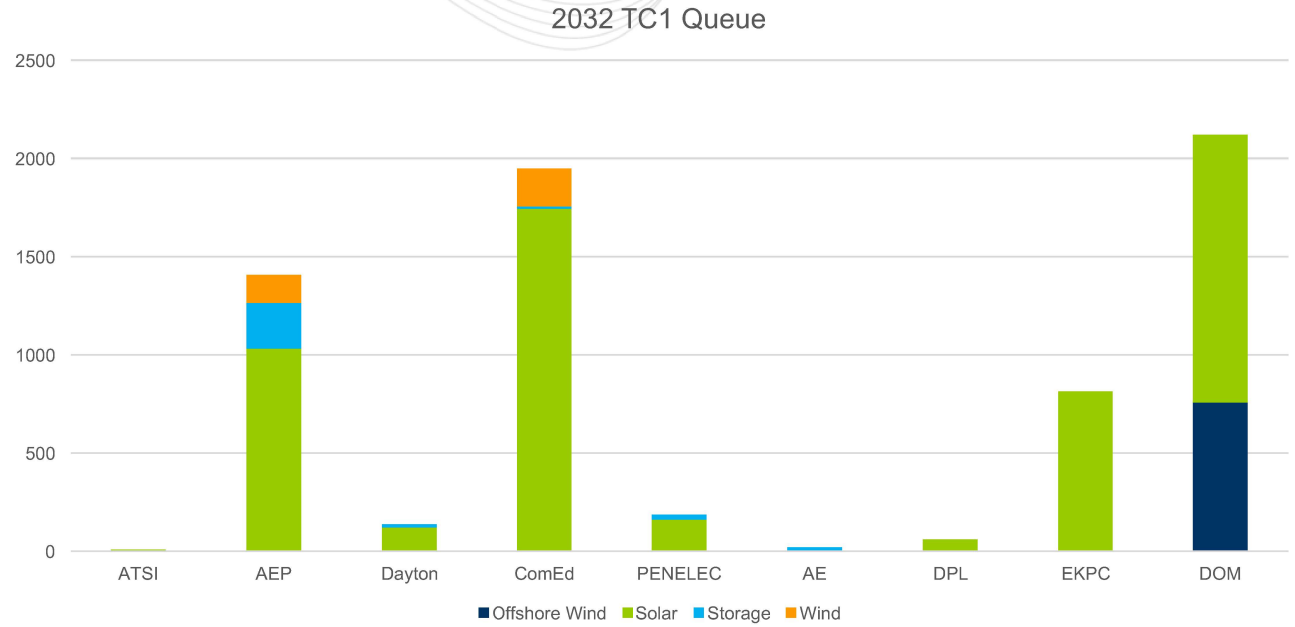
2032 - Forecasted/Future Generation Added (Non-GIA Queue – Fast Lane)



Category	CIR (MW)
Fast Lane	10288
TC1	6699
TC2	42442
NJ OSW	1673

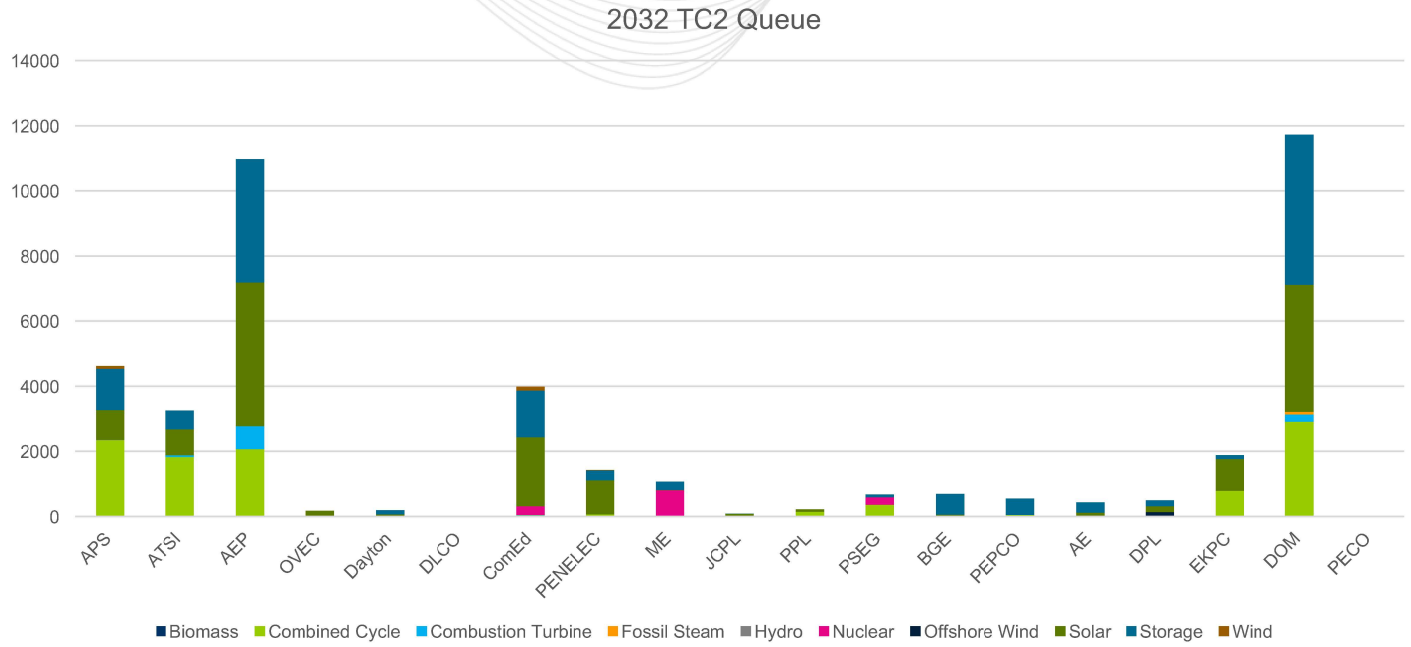
PJM © 2025

2032 - Forecasted/Future Generation Added (Non-GIA Queue – TC1)



PJM © 2025

2032 - Forecasted/Future Generation Added (Non-GIA Queue – TC2)



PJM © 2025

RTEP Case Comparison

383

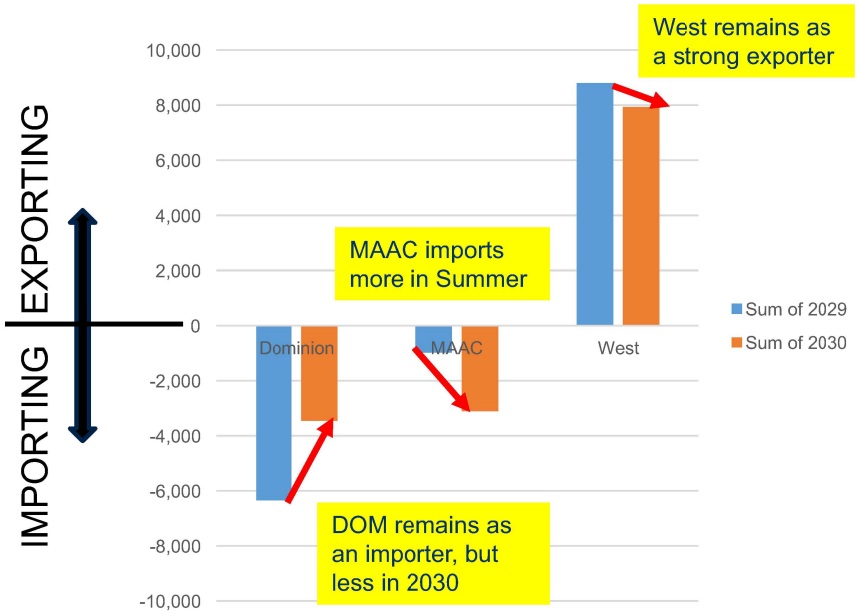
2029 vs 2030 (Subject to Refinements)

PJM © 2025

Area Interchange - Ties (2029 vs 2030)

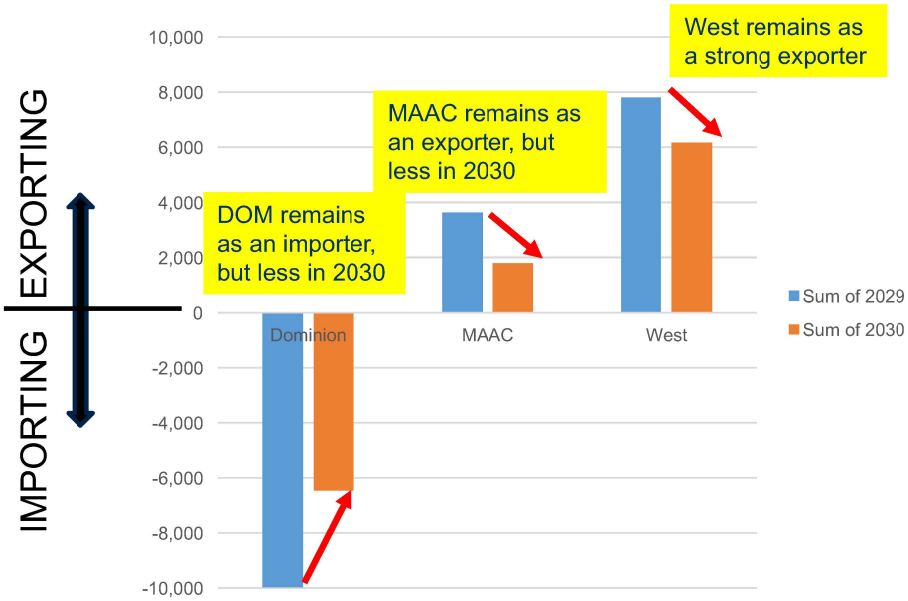
SUMMER

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

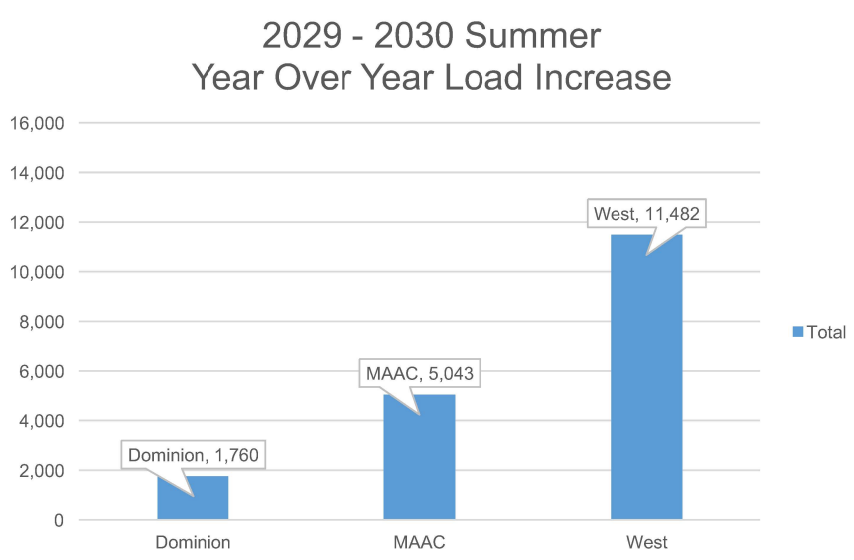


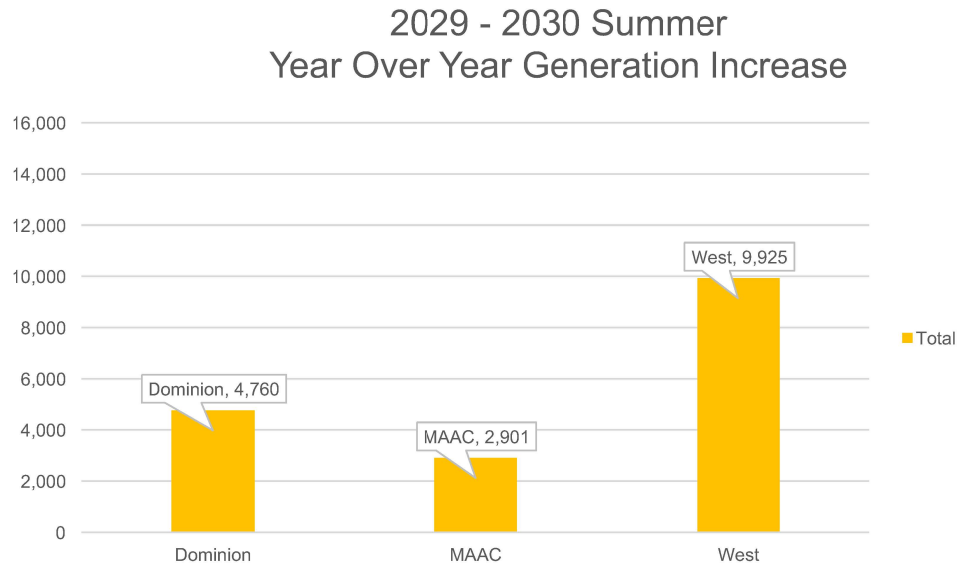
PJM © 2025

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

PJM	MW Increase LOAD
Dominion	1,760
MAAC	5,043
West	11,482
Grand Total	**18,285**

PJM	MW Increase GEN
Dominion	4,760
MAAC	2,901
West	9,925
Grand Total	**17,586**



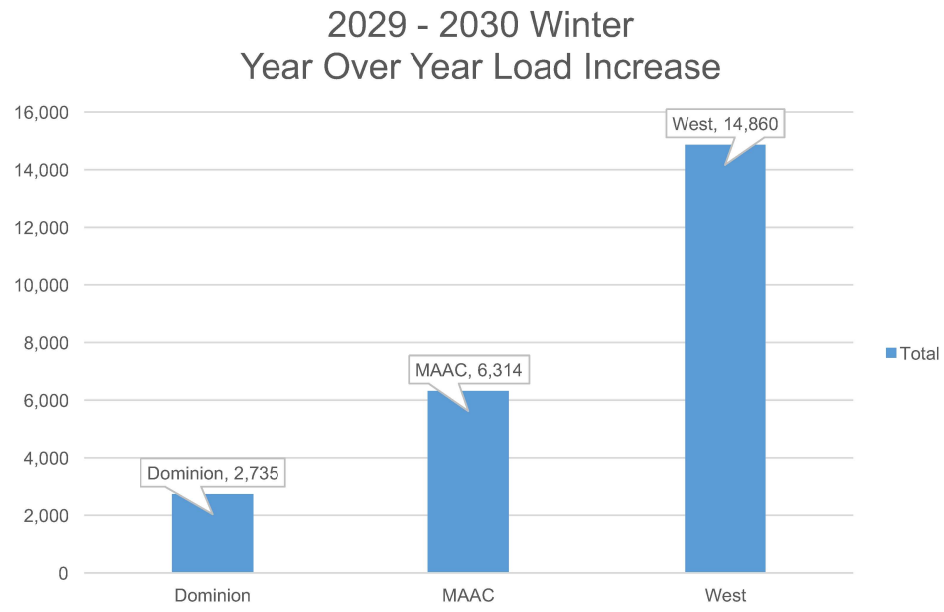


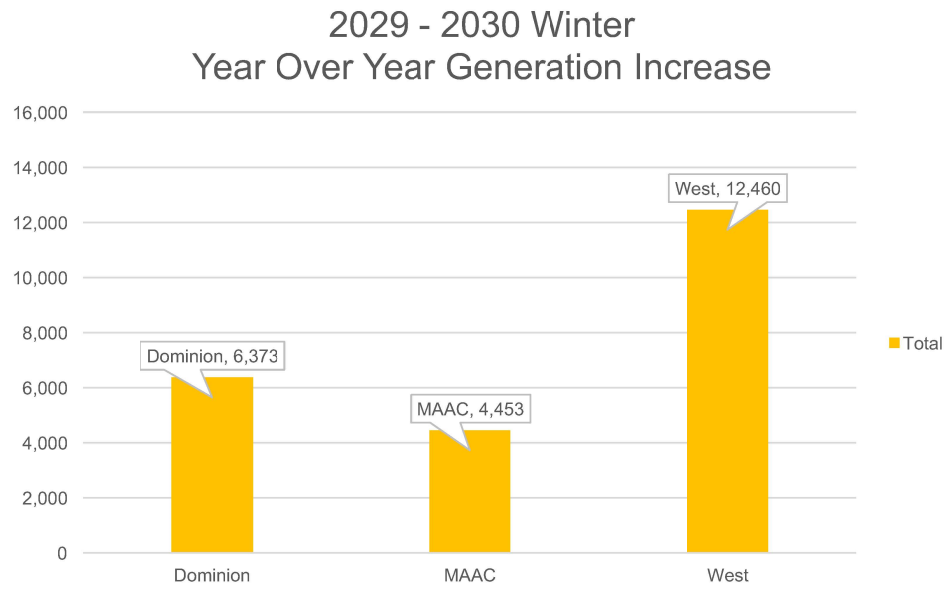
PJM © 2025

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

PJM	MW Increase LOAD
Dominion	2,735
MAAC	6,314
West	14,860
Grand Total	**23,909**

PJM	MW Increase GEN
Dominion	6,373
MAAC	4,453
West	12,460
Grand Total	**23,286**





PJM © 2025

RTEP Case Comparison

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

PJM © 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

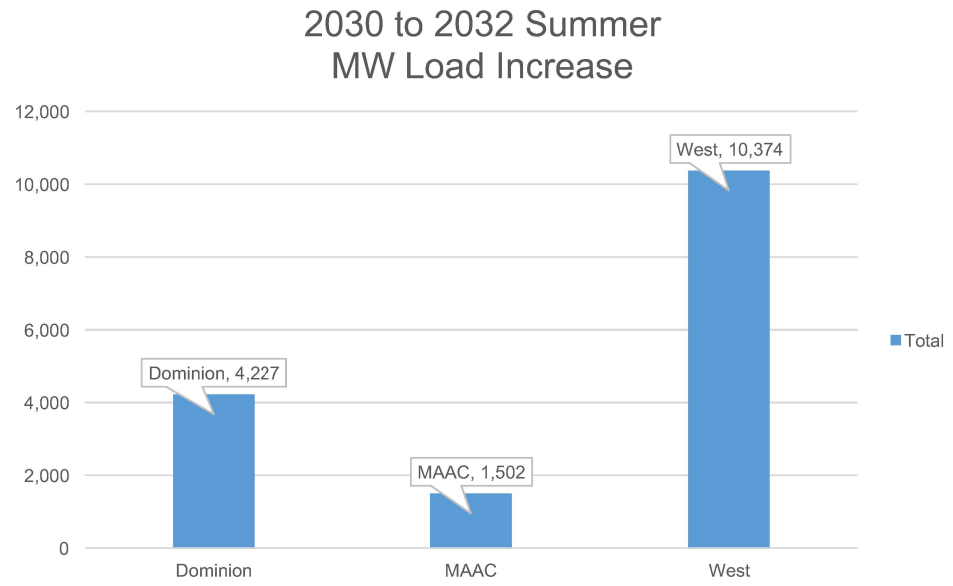
Row Labels	Sum of 2030	Sum of 2032	Sum of MW Increase
Dominion	-6,463	-7,604	-1,140
MAAC	1,786	4,746	2,960
West	6,169	4,349	-1,820

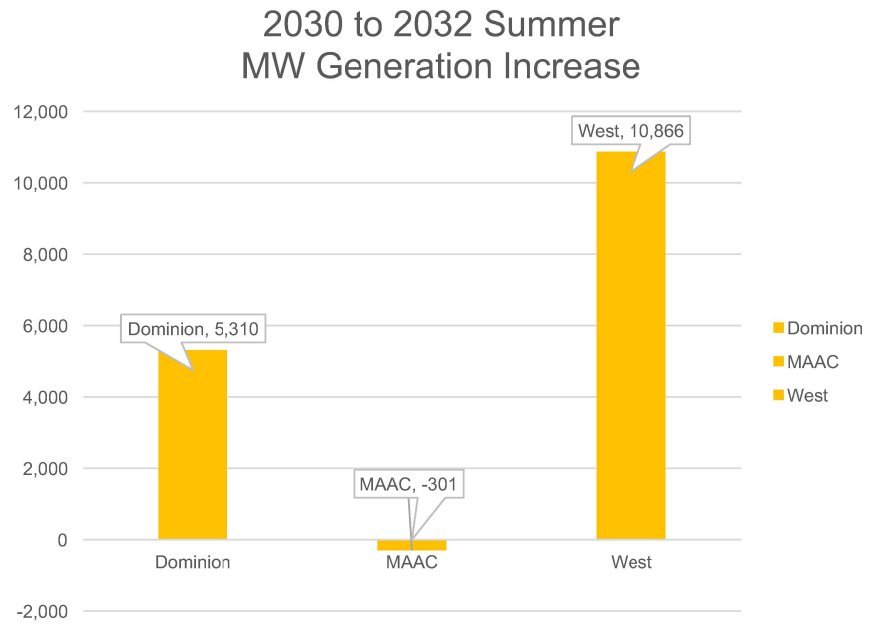


Load and Gen Dispatch MW change – **Summer** (2030 to 2032)

PJM	MW Increase LOAD
Dominion	4,227
MAAC	1,502
West	10,374
Grand Total	**16,103**

PJM	MW Increase GEN
Dominion	5,310
MAAC	-301
West	10,866
Grand Total	**15,874**





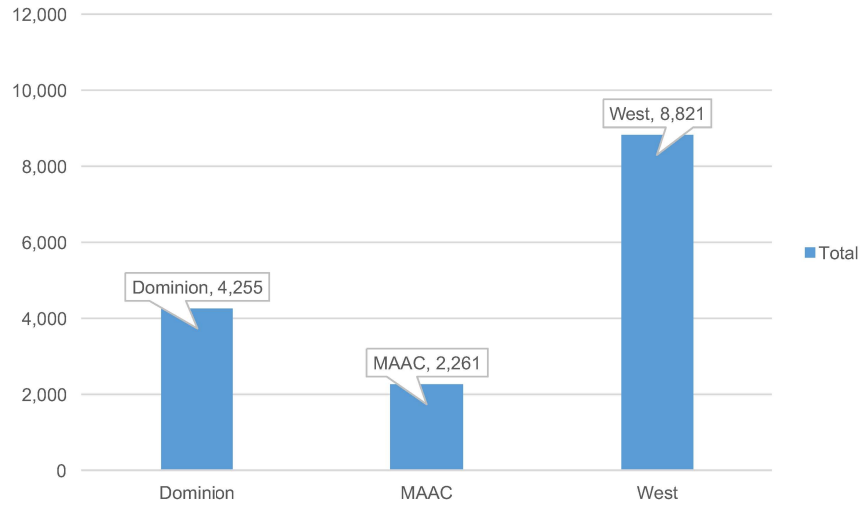
PJM © 2025

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

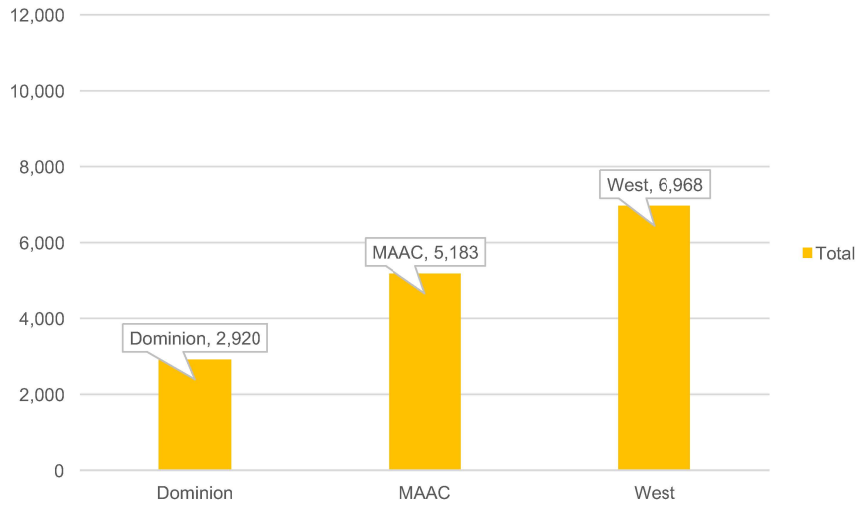
PJM	MW Increase LOAD
Dominion	4,255
MAAC	2,261
West	8,821
Grand Total	**15,336**

PJM	MW Increase GEN
Dominion	2,920
MAAC	5,183
West	6,968
Grand Total	**15,071**

2030 to 2032 Winter
MW Load Increase



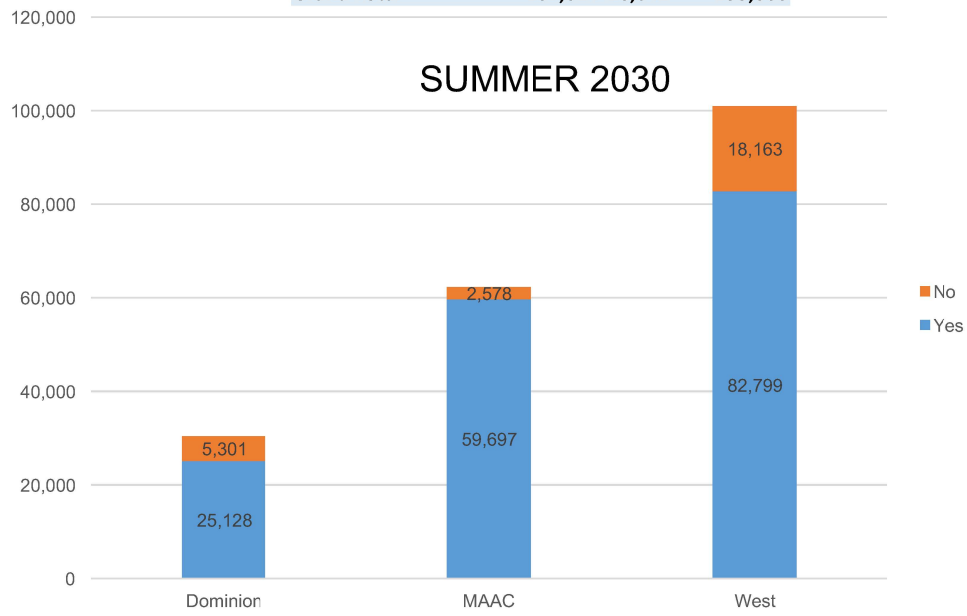
2030 to 2032 Winter
MW Generation Increase



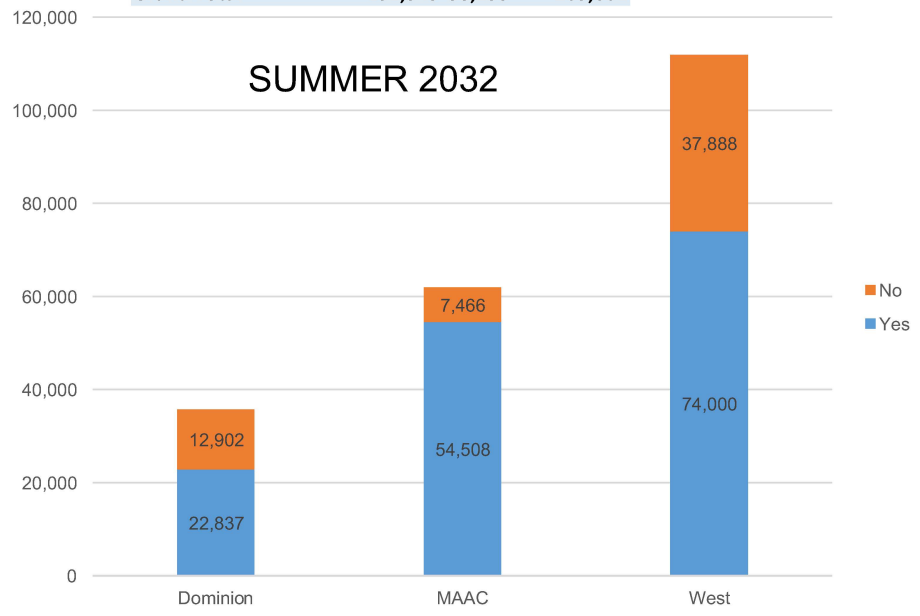
PJM © 2025

SUMMER Dispatched Gen Machines – Existing vs Future

Sum of Peff	Existing Gen MW		
Row Labels	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
Grand Total	**167,624**	**26,042**	**193,666**



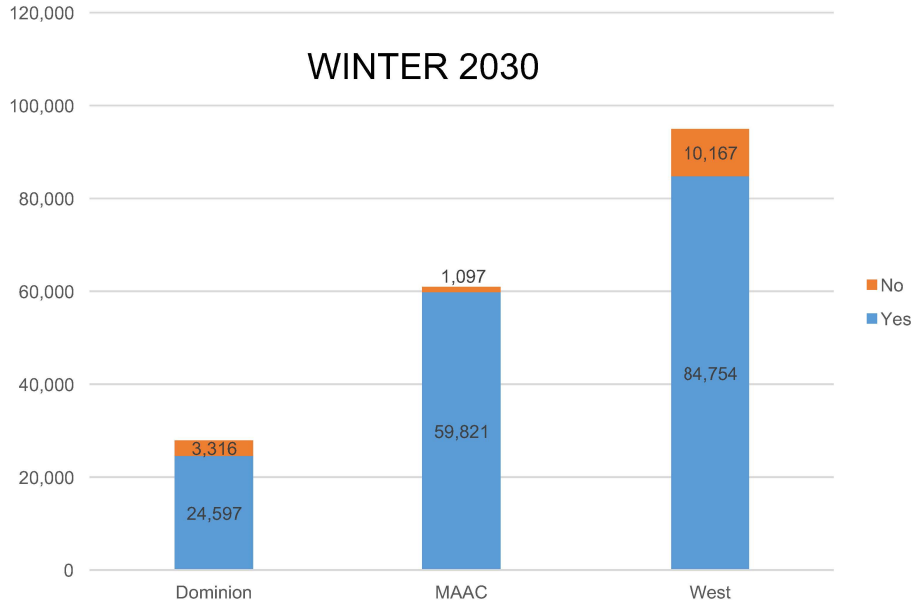
Sum of Peff	Existing Gen MW		
Row Labels	Yes	No	Grand Total
Dominion	22,837	12,902	35,739
MAAC	54,508	7,466	61,974
West	74,000	37,888	111,888
Grand Total	**151,345**	**58,255**	**209,601**



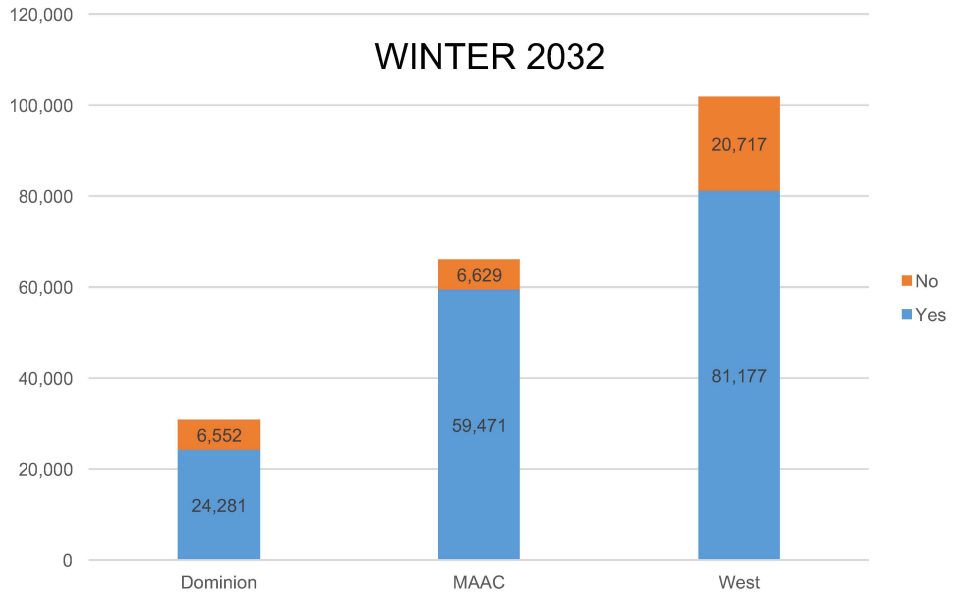
PJM © 2025

WINTER Dispatched Gen Machines – Existing vs Future

Sum of Peff	Existing Gen MW		
Row Labels	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
Grand Total	**169,172**	**14,580**	**183,751**



Sum of Peff	Existing Gen MW		
Row Labels	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
Grand Total	**164,929**	**33,898**	**198,827**



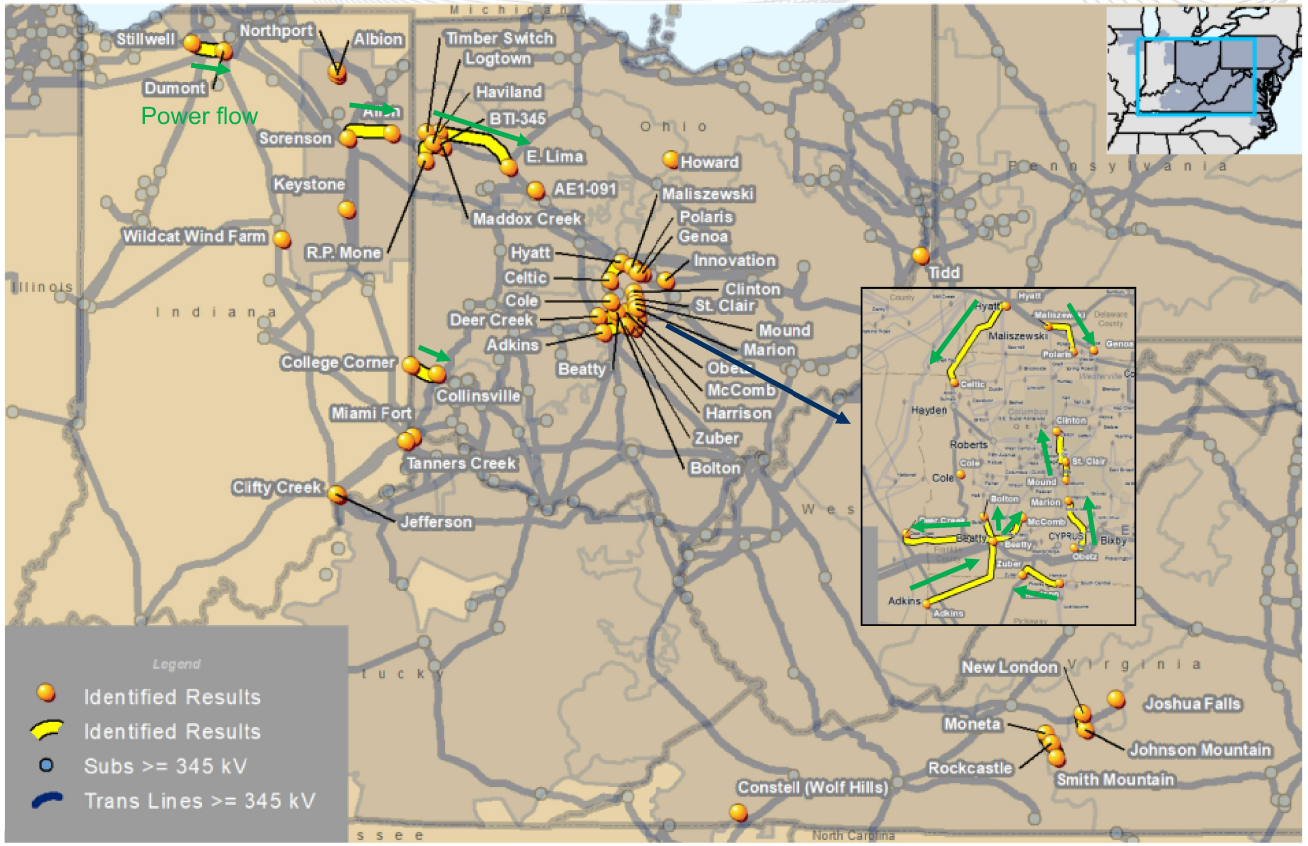
PJM © 2025

2025 RTEP Preliminary Results

Sample Transmission Needs
Preliminary and subject to refinements

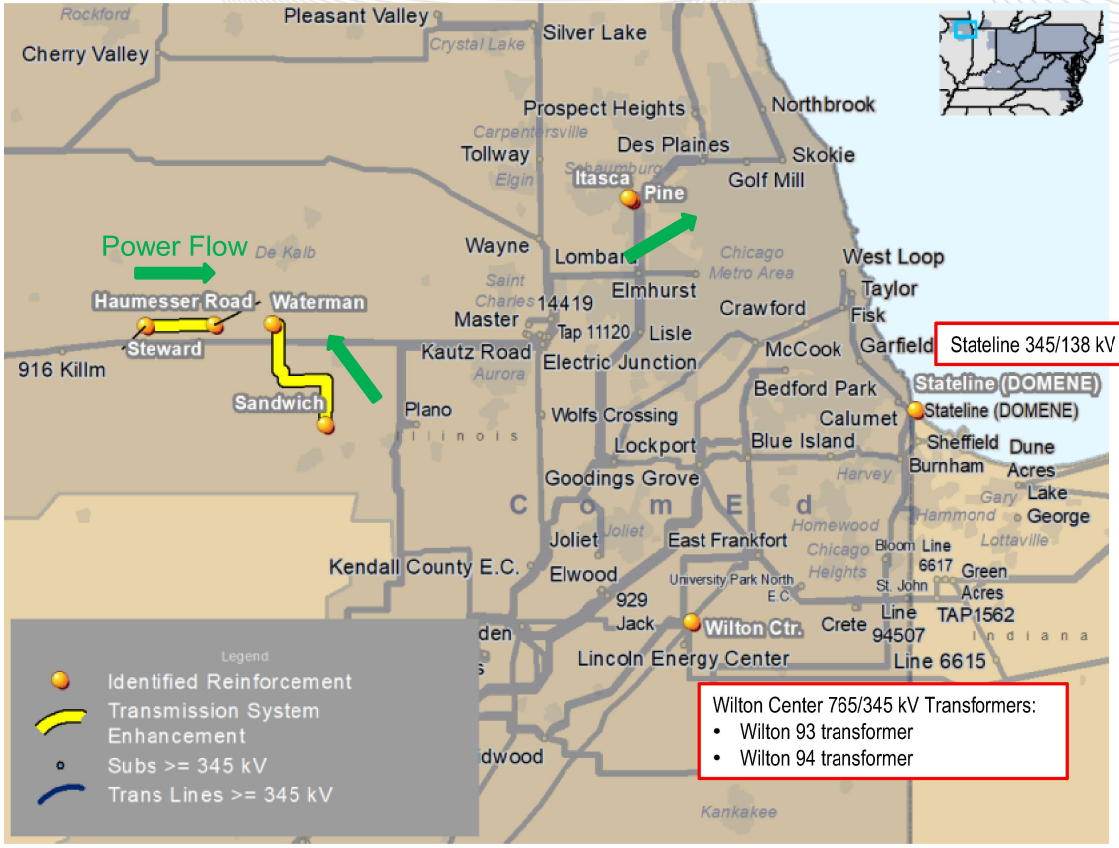
PJM © 2025

2030 Preliminary AEP Violations--Map



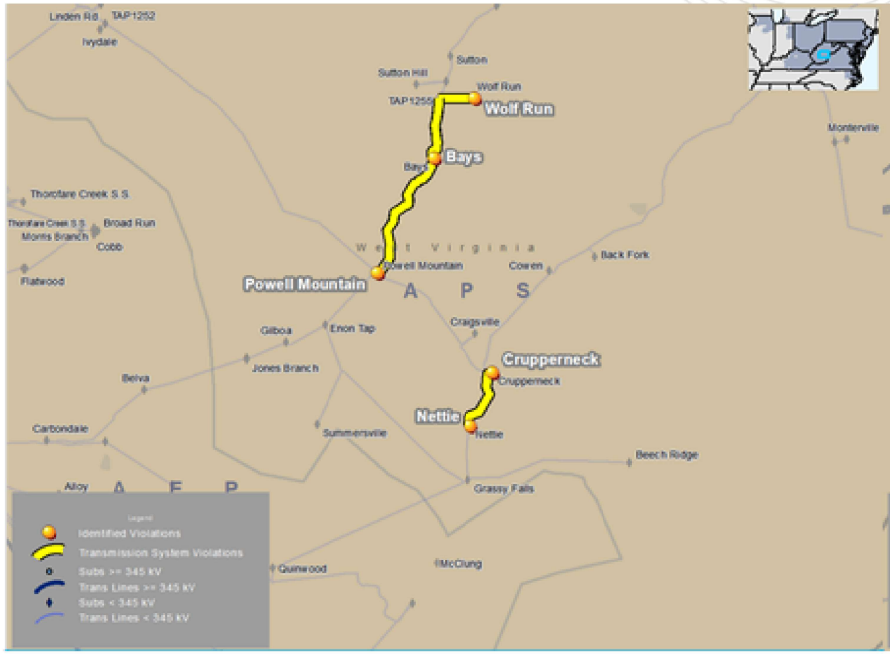
PJM © 2025

2030 ComEd Violations

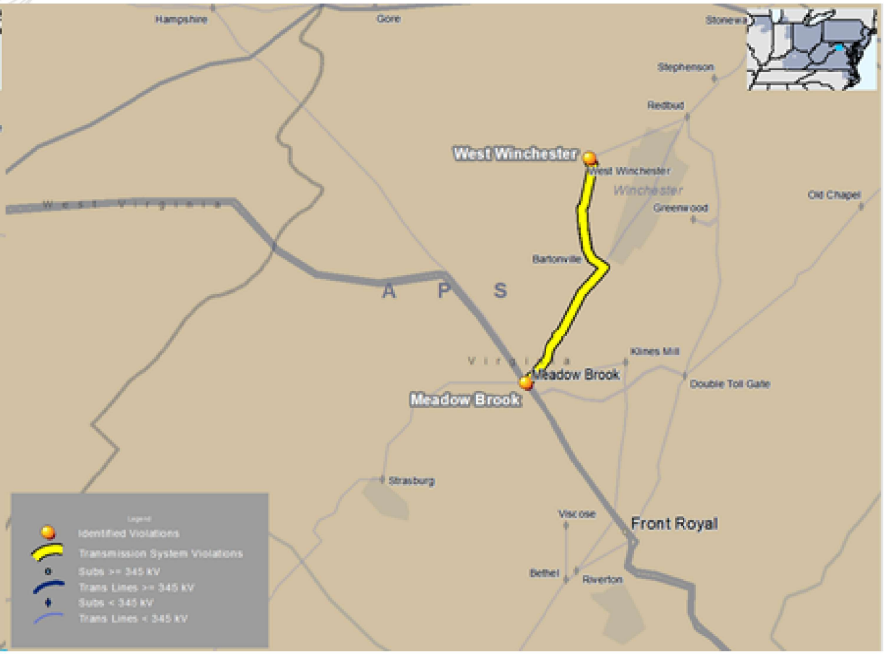


PJM © 2025

APS SUM GenDeliv



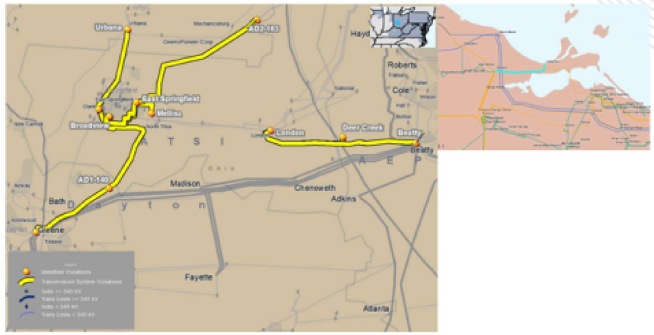
APS WIN GenDeliv & N-1



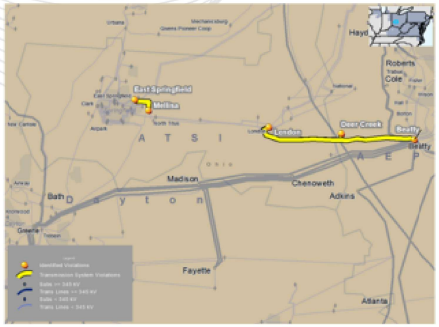
PJM © 2025

ATSI 2030 Preliminary Thermal Violations

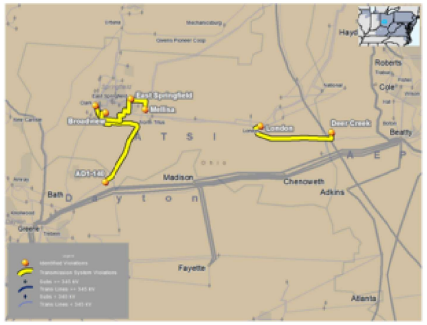
ATSI SUM **GenDeliv**



ATSI WIN **GenDeliv**



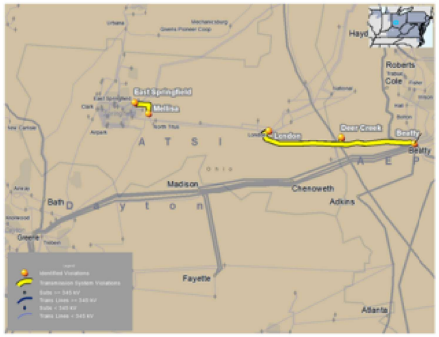
ATSI LL **GenDeliv**



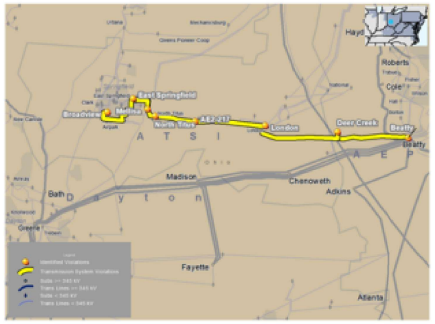
ATSI SUM **N-1**



ATSI WIN **N-1**

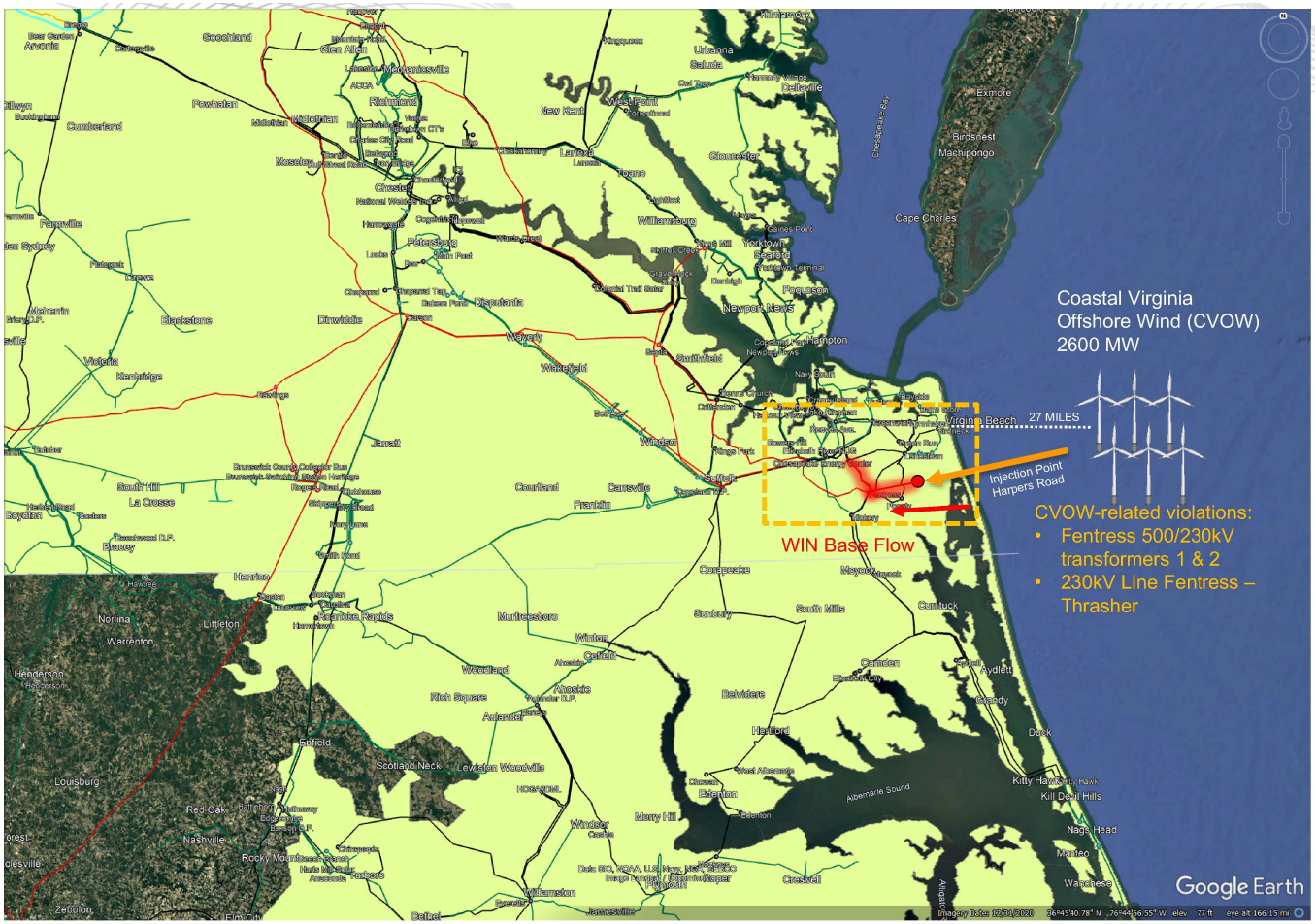


ATSI LL **N-1**



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

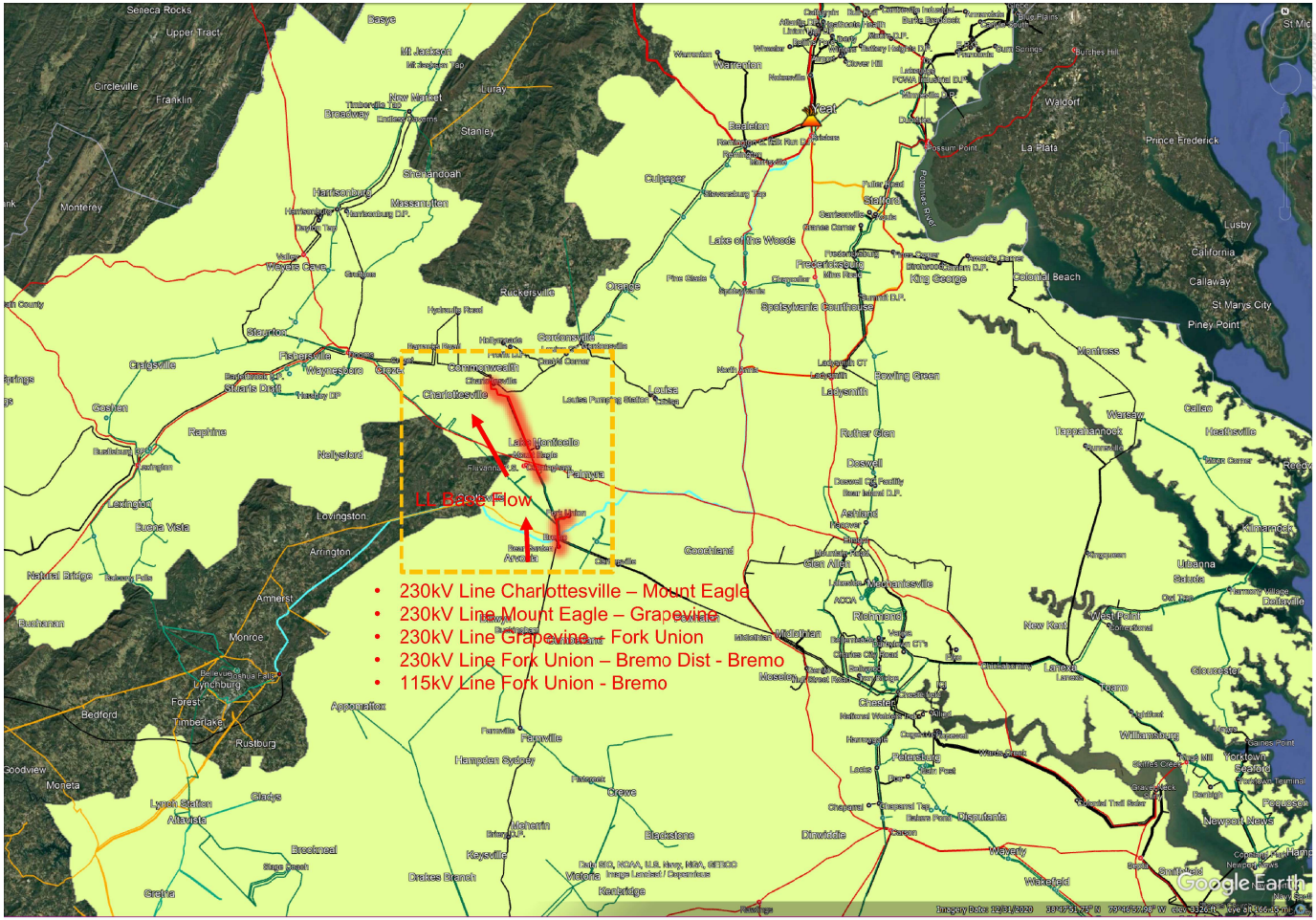
PJM © 2025



Locational Map

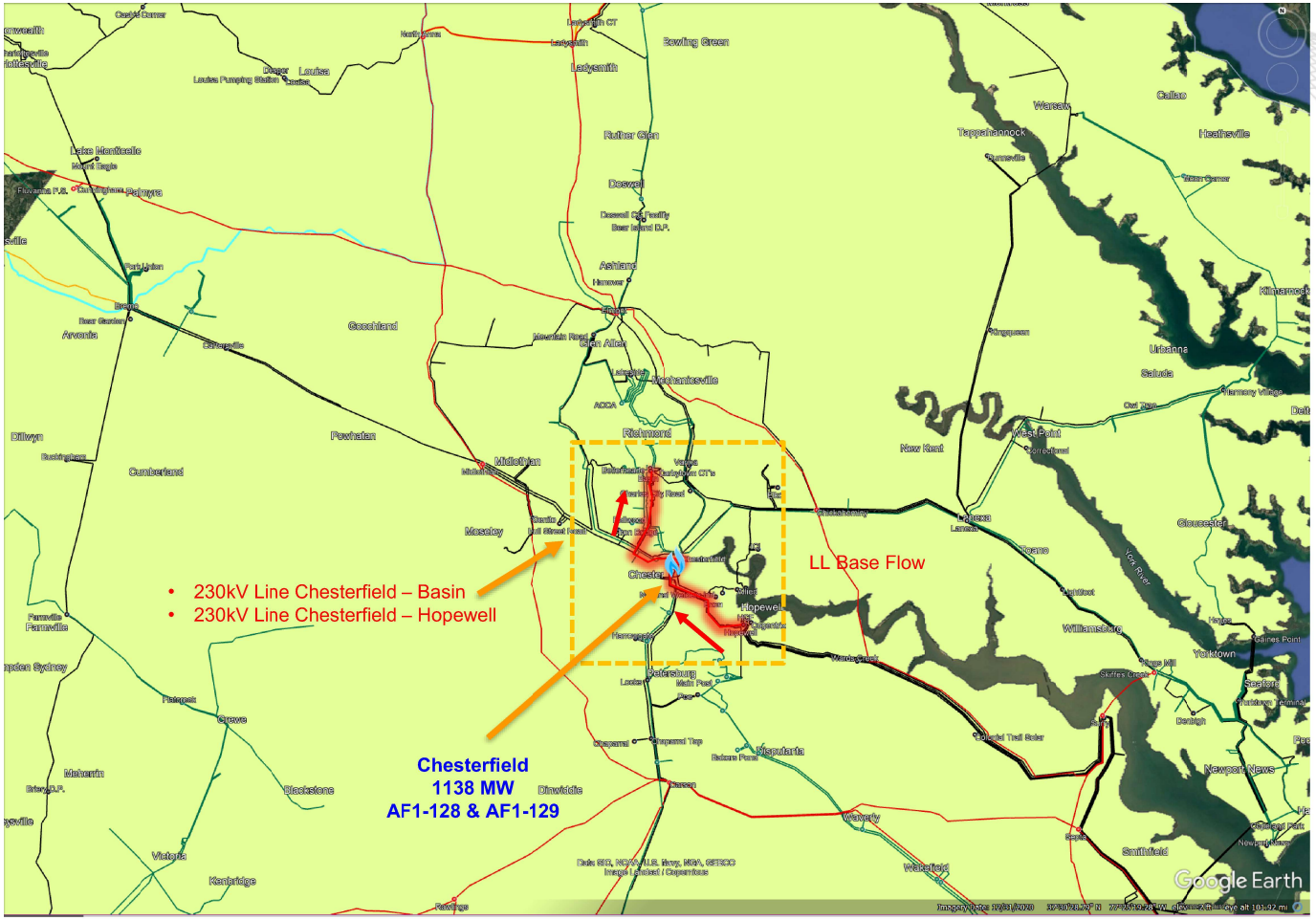


PJM © 2025



Locational Map





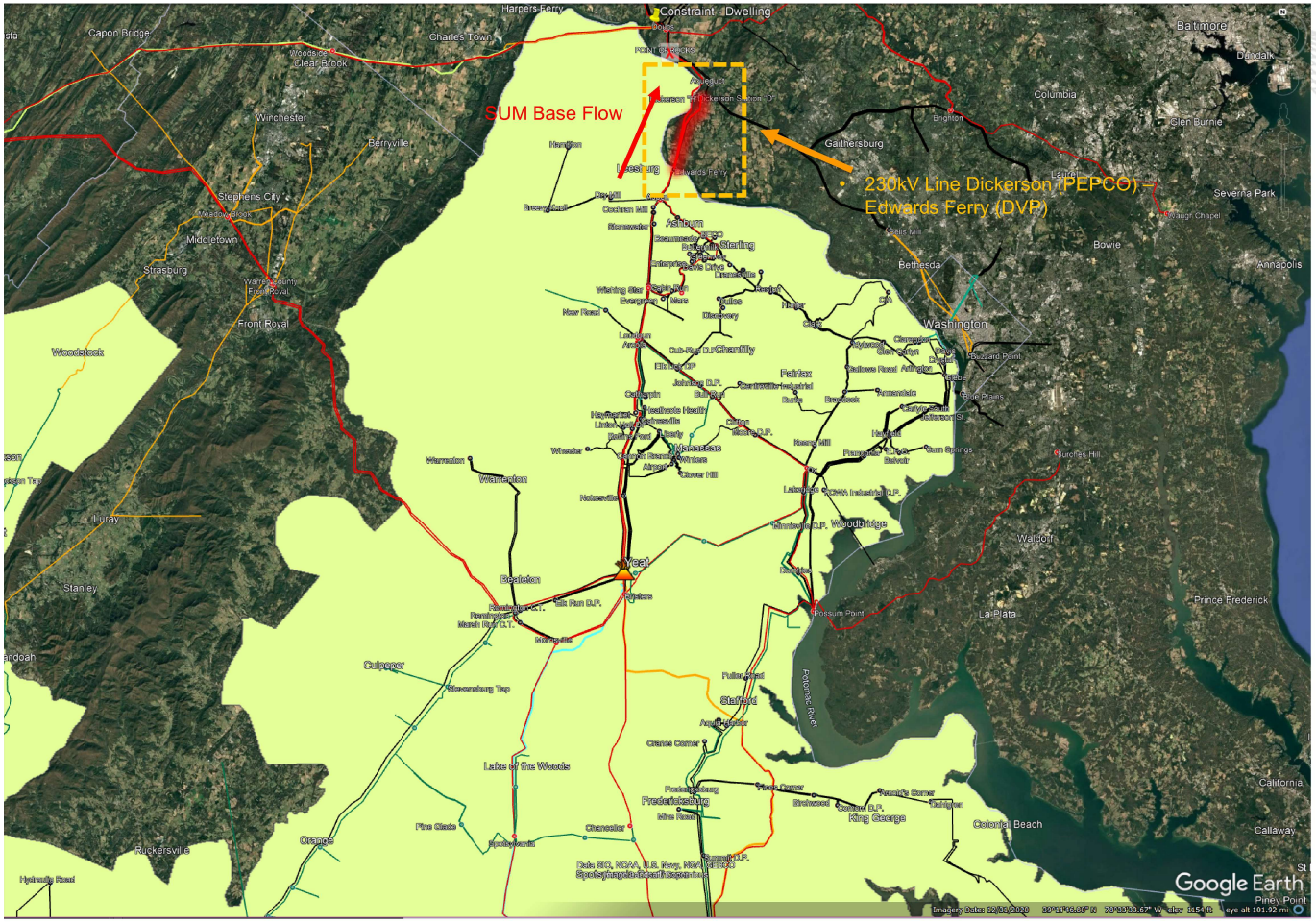
Locational Map



401

PJM © 2025

Attachment I.E.2

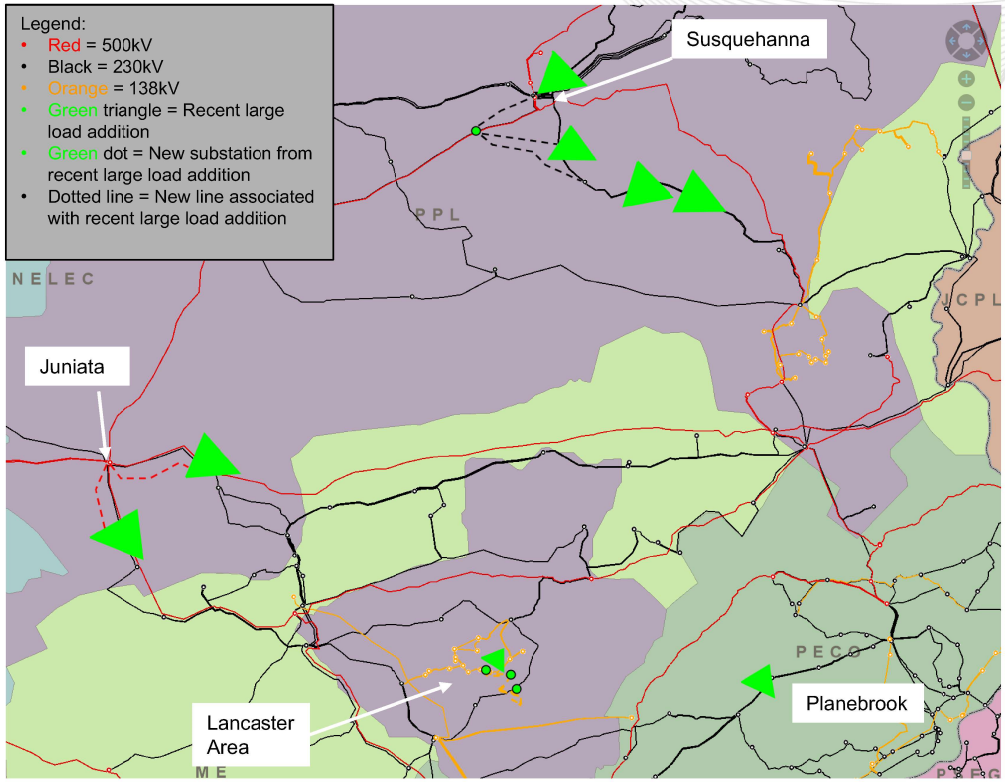


Locational Map



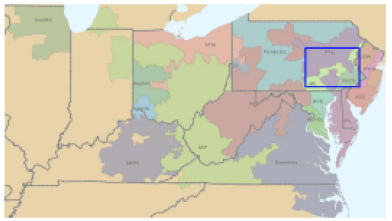
2025 Series RTEP 2030 Thermal Violations
MAAC Area

MAAC: Recent Large Load Additions



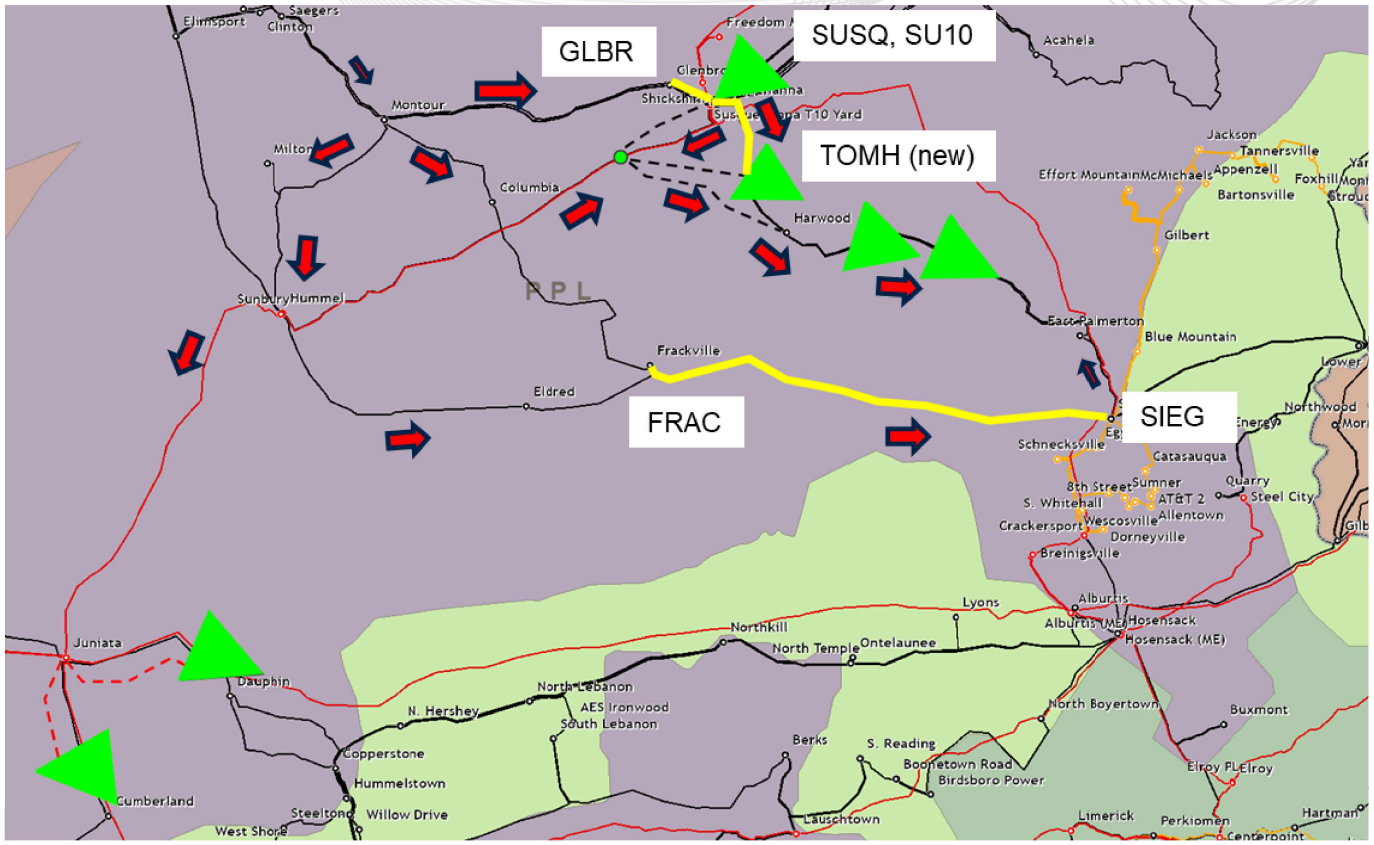
Summer Load Values

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



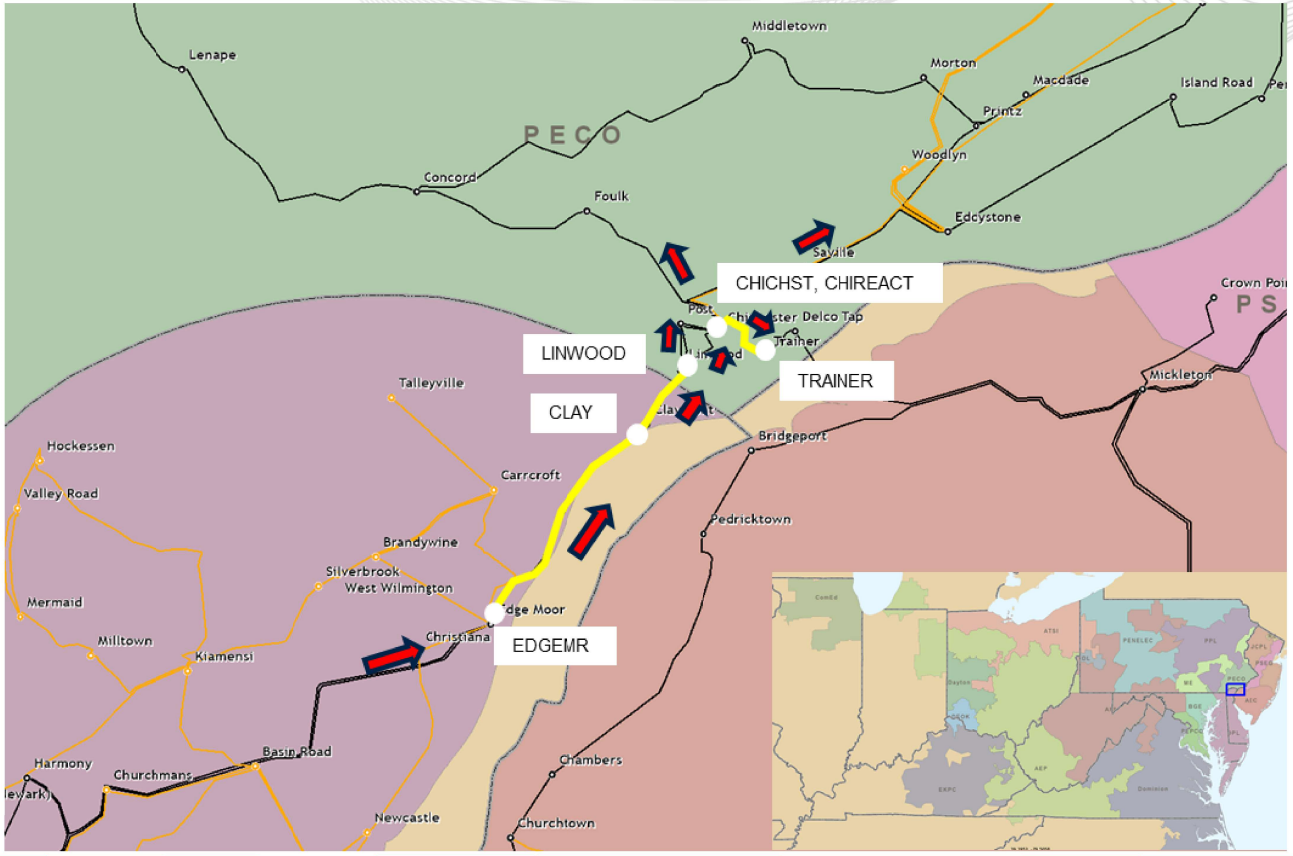
PJM © 2025

PPL: 2030 Susquehanna Cluster



PJM © 2025

PECO/Northern DPL -- 2030 Chichester Area



406

Attachment I.E.2

PJM © 2025

2025 Series RTEP 2030

General Summary of Results

2025 RTEP – 2030 Horizon Results Summary

- 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)

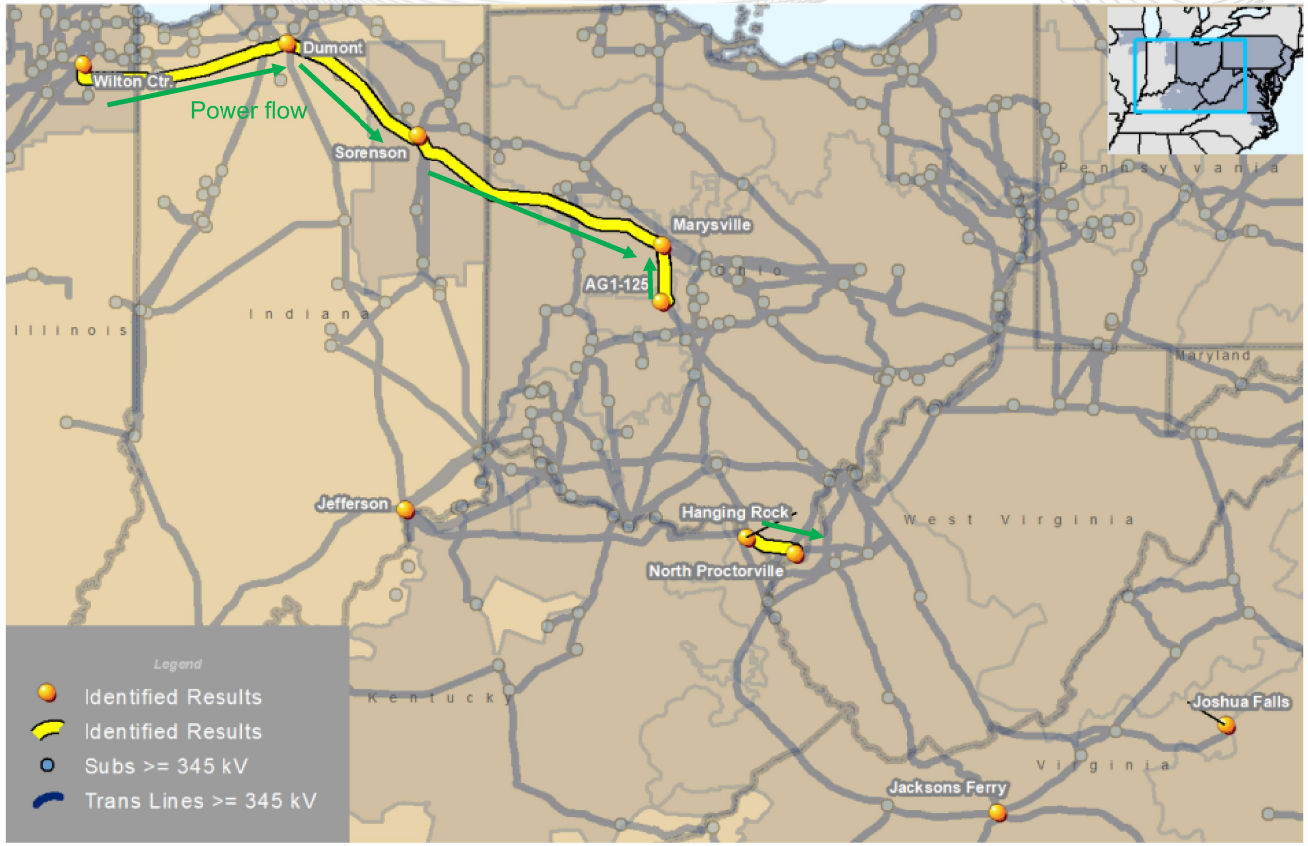
PJM © 2025

2025 Series RTEP 2032

Preliminary Results – Sample and Subject to Change

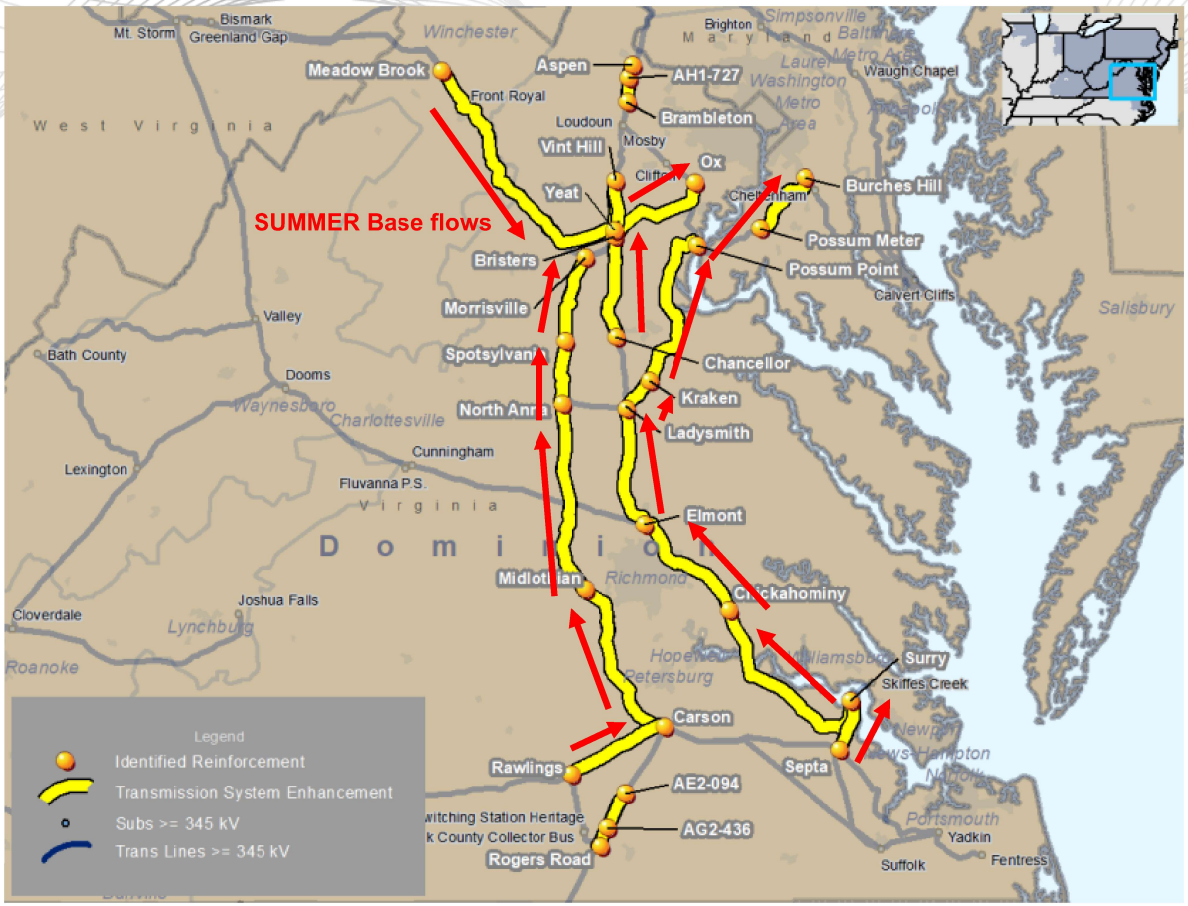
PJM © 2025

2032 Preliminary AEP Violations -- 765 kV



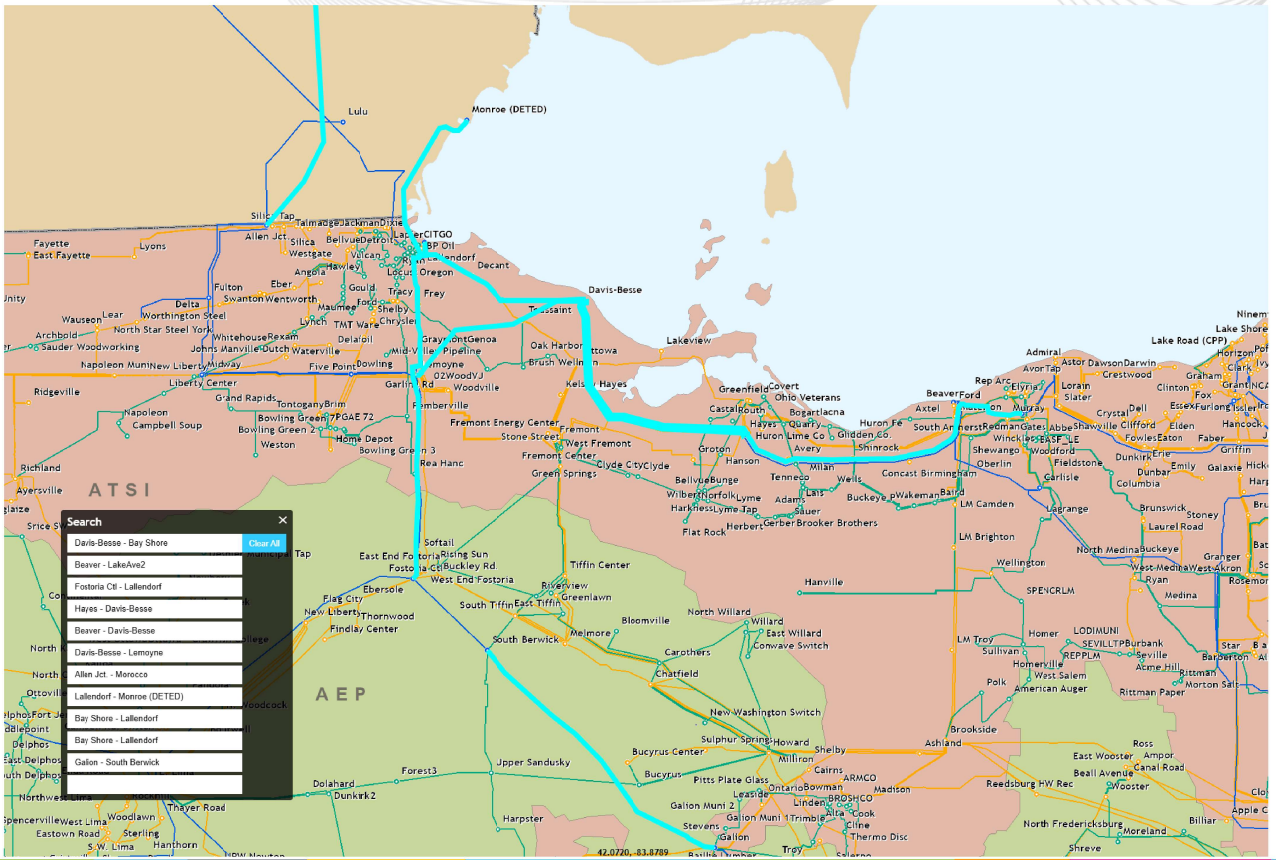
PJM © 2025

2032 Preliminary Dominion Violations – 500 kV



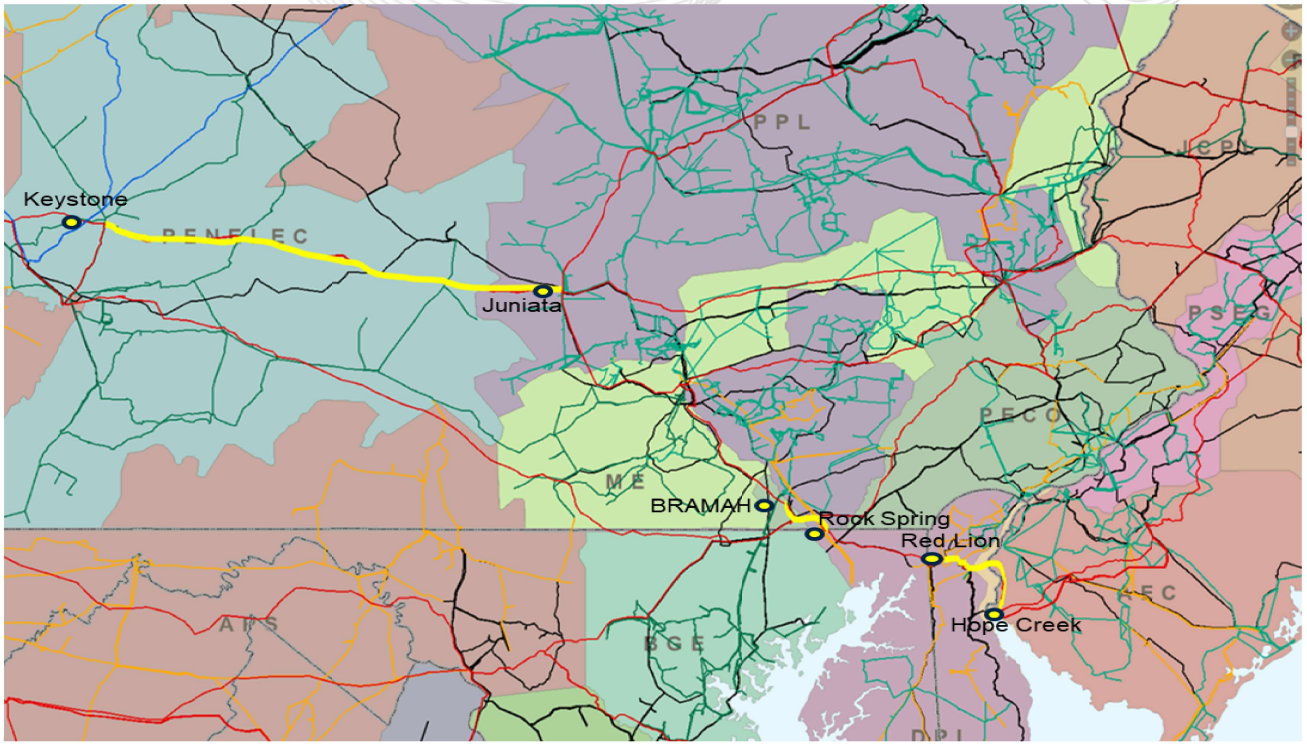
PJM © 2025

ATSI 2032 Gen Deliv Major Preliminary Violations

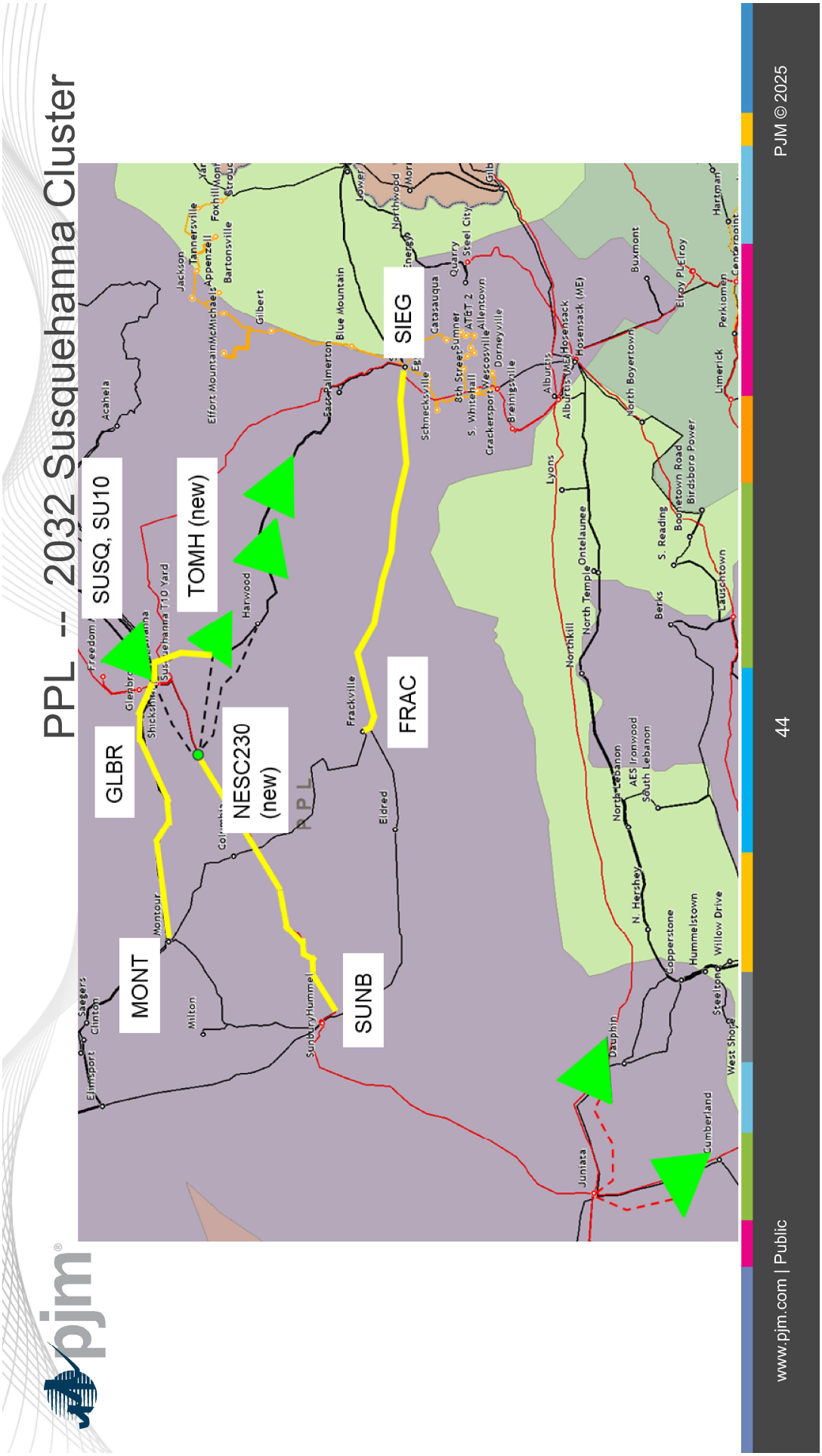


PJM © 2025

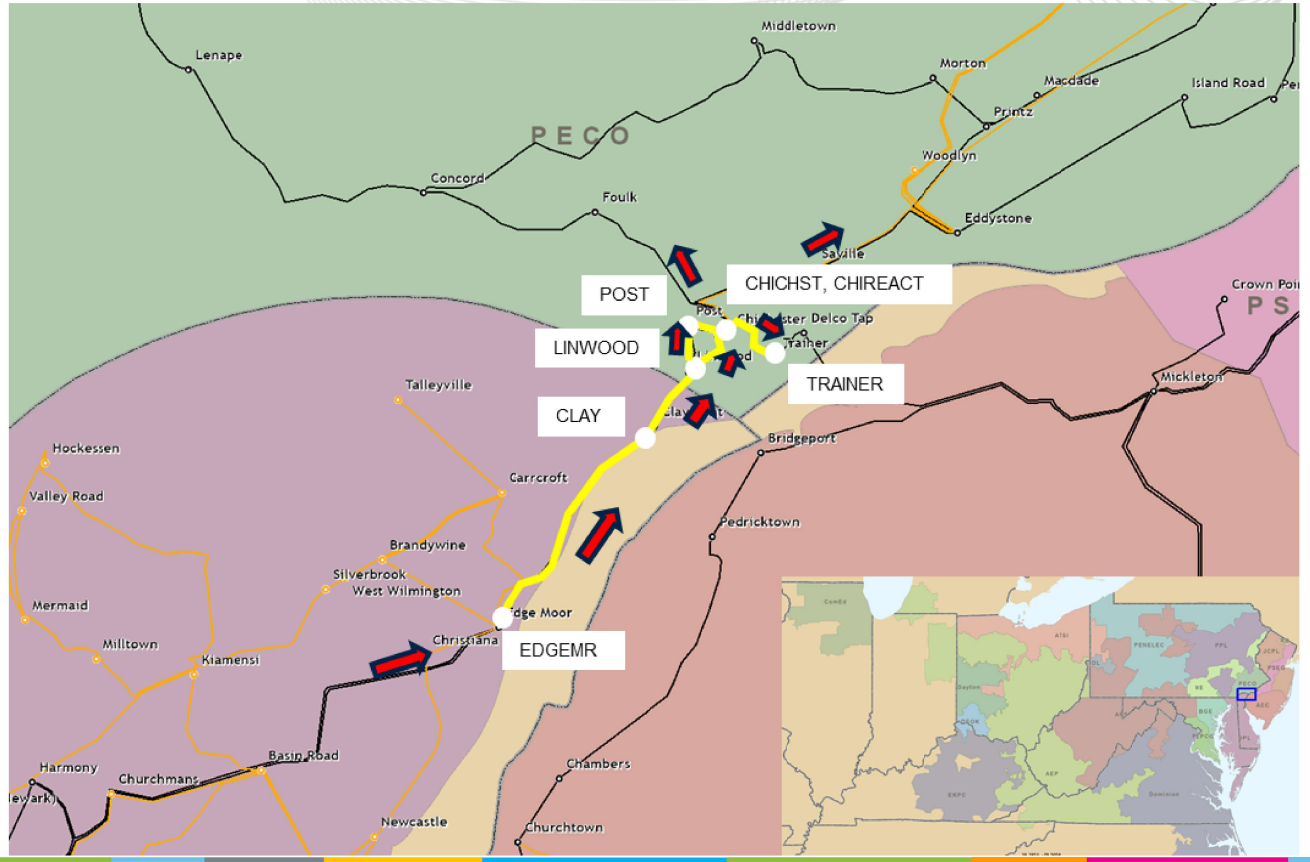
2032 MAAC Gen Deliv Preliminary Violations – 500KV



PJM © 2025


PPL -- 2032 Susquehanna Cluster
SUSQ, SU10
TOMH (new)
GLBR
NESC230 (new)
MONT
SUNB
FRAC
SIEG
PPL
Acahela
Tannersville
Bartonsville
Gilbert
Blue Mountain
Palmerton
Effort
Jackson
Harwood
Frackville
Eldred
Milton
Montour
Sunbury
Hummel
Elimsport
Clinton
Sayers
Schnecksville
Catasauqua
Quarry
Steel City
Sumner
ATT 2
Allentown
Dorneyville
Breinigsville
Wescosville
Crackersport
S. Whitehall
8th Street
Lyons
Northkill
North Temple
Ontelaunee
Albury
Hosensack
Hosensack (ME)
Buxmont
Elroy
Perkiomen
Limerick
North Boyertown
S. Reading
Birdsboro Power
Boyertown Road
Lauschtown
Berks
North Lebanon
AES Ironwood
South Lebanon
N. Hershey
Copperstone
Hummelstown
Willow Drive
Steelton
West Shore
Dauphin
Cumberland
Juniata
www.pjm.com | Public
44
PJM © 2025

PECO/Northern DPL -- 2032 Chichester Area



PJM © 2025

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 © 2025

Next Steps

- 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.

PJM © 2025

Baseline Reliability Projects
2024 Window 1 Project Updates

PJM © 2025

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)**

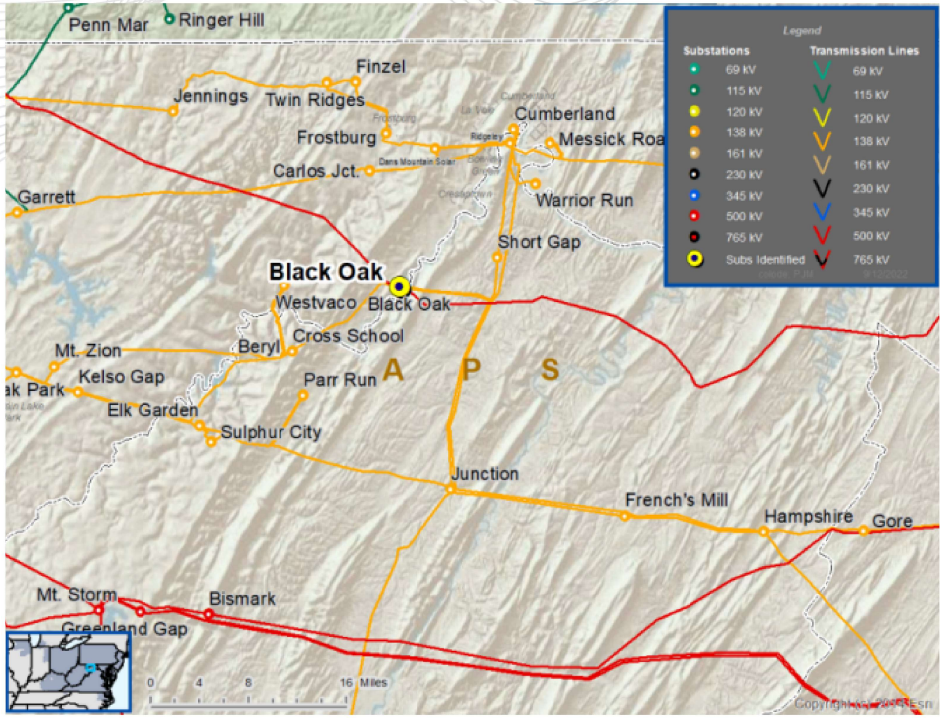
Estimated Cost: $3.0 M

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.



PJM © 2025

2024 W1 Regional Cluster: Baseline b4000.6 Project Update

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)**

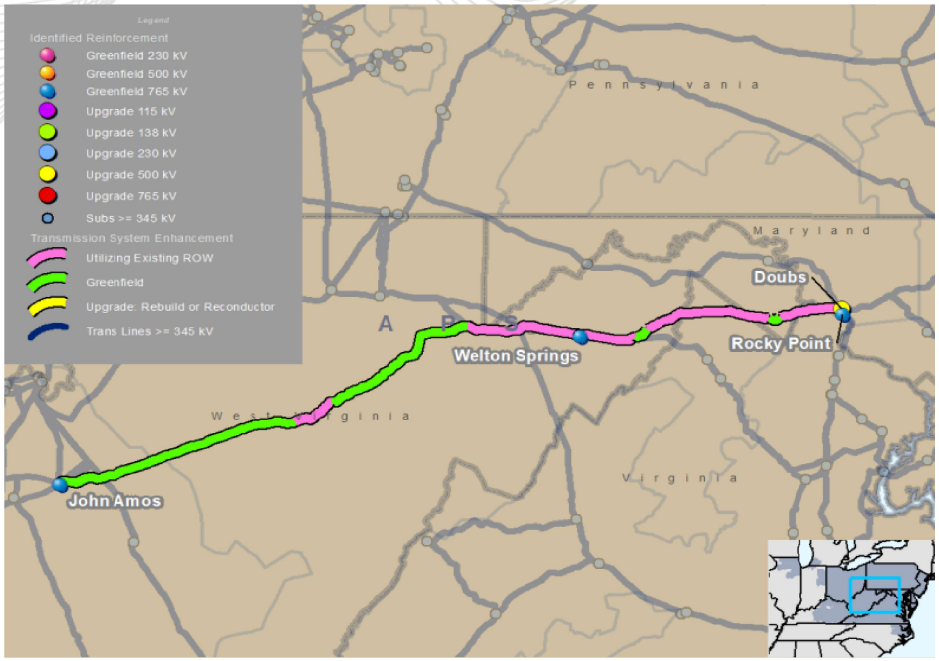
New b4000.15 Project Description

- 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

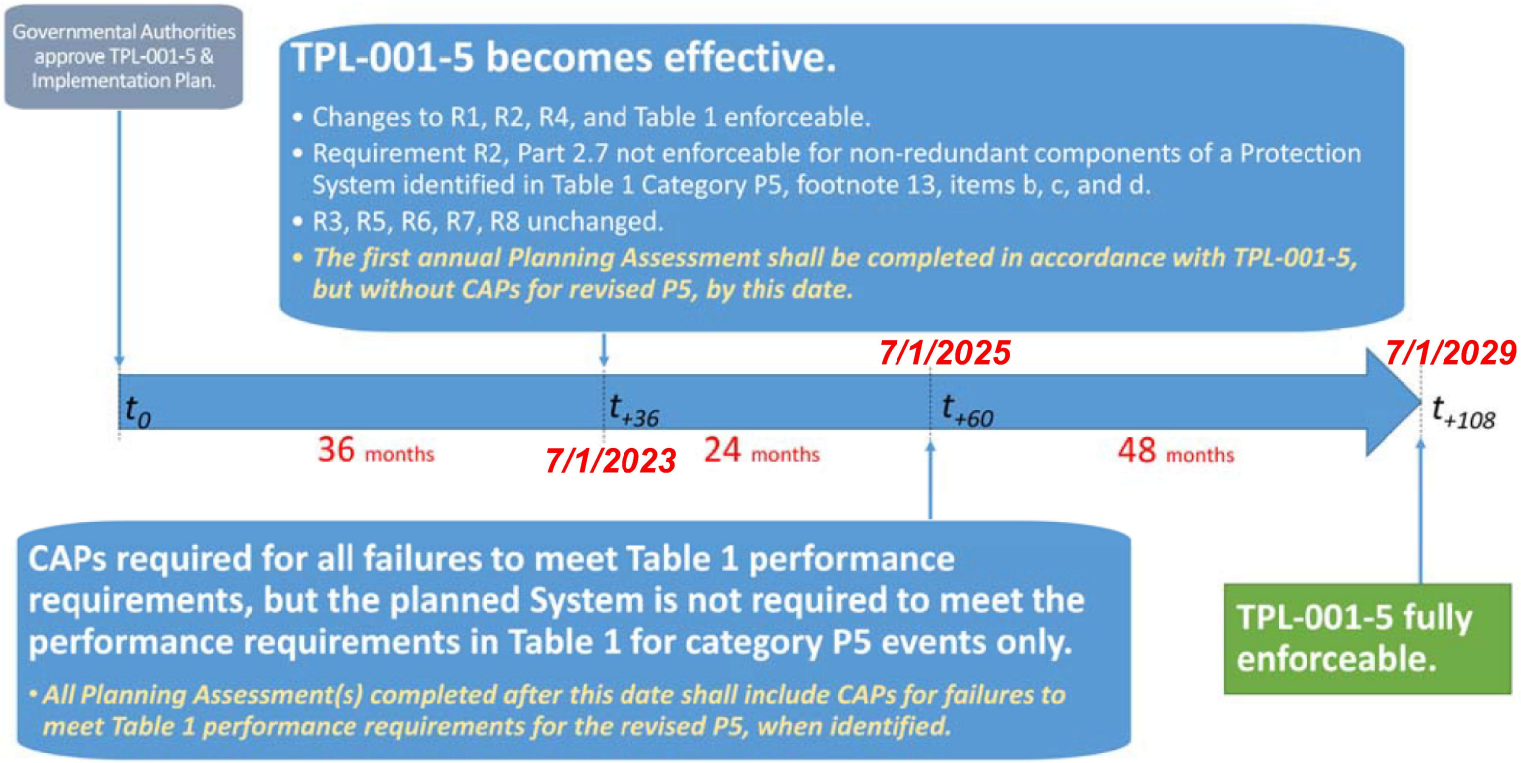
PJM © 2025

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.

PJM © 2025

TPL-001-5.1 Implementation Plan Timeline



PJM © 2025

DVP/AEP/PSEG
Transmission Zone: Baseline

Process Stage: First Review Solution

Criteria: Baseline Analysis

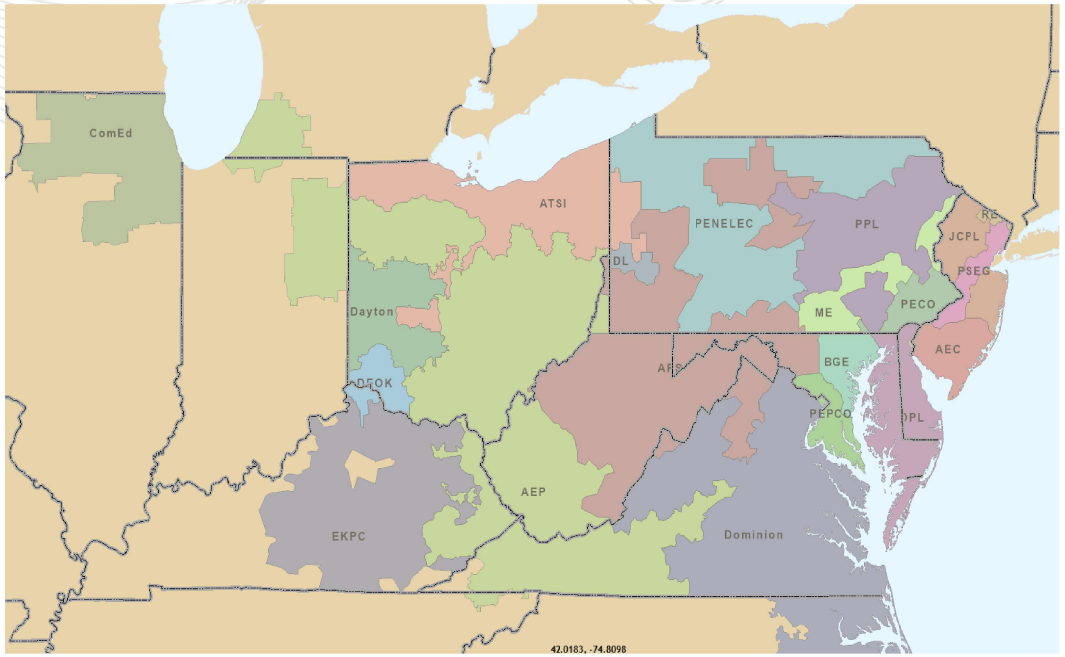
Assumption Reference: 2029 RTEP assumption

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.



425

Attachment I.E.2

PJM © 2025

DVP/AEP/PSEG
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

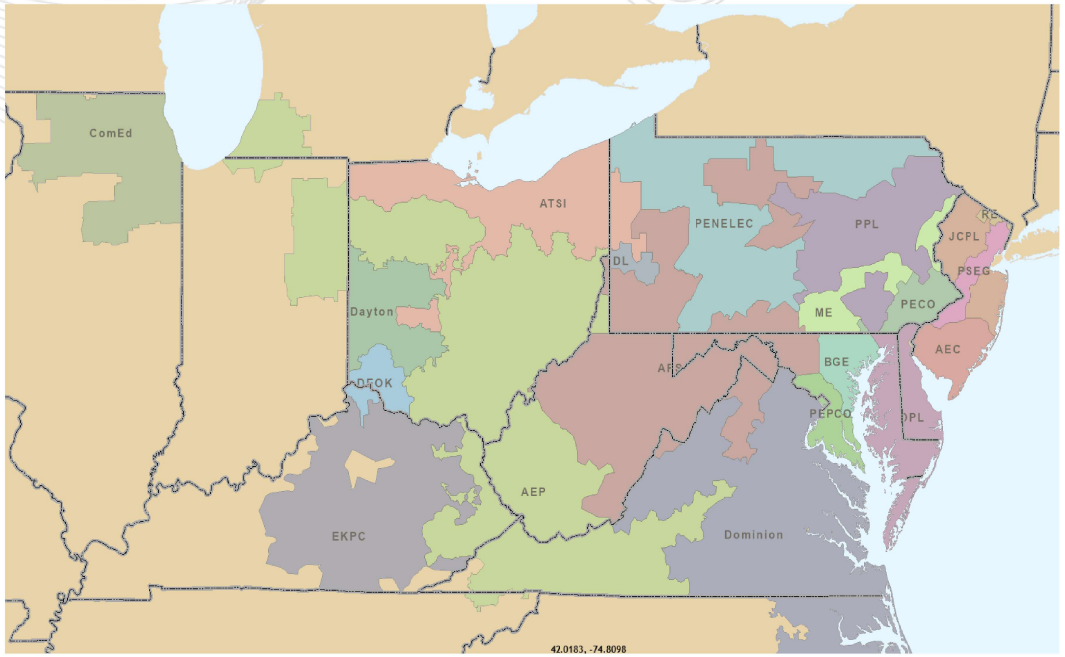
Ancillary Benefits: Installation of redundant equipment will prevent outage scenarios and improve reliability of the transmission system.

Alternatives: None

Preliminary Facility Rating: N/A

Required in-service date: 6/1/2029

Projected in-service date: 6/1/2029



DVP/AEP/PSEG
Transmission Zone: Baseline

Designated Entity	Total Cost ($M)	kV							Total Substations
		69	**115**	**138**	**230**	**345**	**500**	**765**	
AEP	0.62			3		3			6
Dominion	1.77	1			13		25		39
OVEC	0.58					1			1
PSEG	0.38				5				5
TOTAL	3.35	1	0	10	28	6	31	0	76

PJM © 2025

Revision History

Version No.	Date	Description
1	6/2/2025	• Initial slides posted
2	6/4/2025	• Slides #7 and #9, updated maps • Slide #8, combined original slides #8&9, updated the table • Slide #10, combined original slides #11&12 • Slide #38 and #47Added 2030 and 2032 Results Summary

PROTECT THE POWER GRID
THINK BEFORE YOU CLICK!
Be alert to malicious phishing emails.
pjm
Report suspicious email activity to PJM.
(610) 666-2244 / it_ops_ctr_shift@pjm.com

I. NECESSITY FOR THE PROPOSED PROJECT

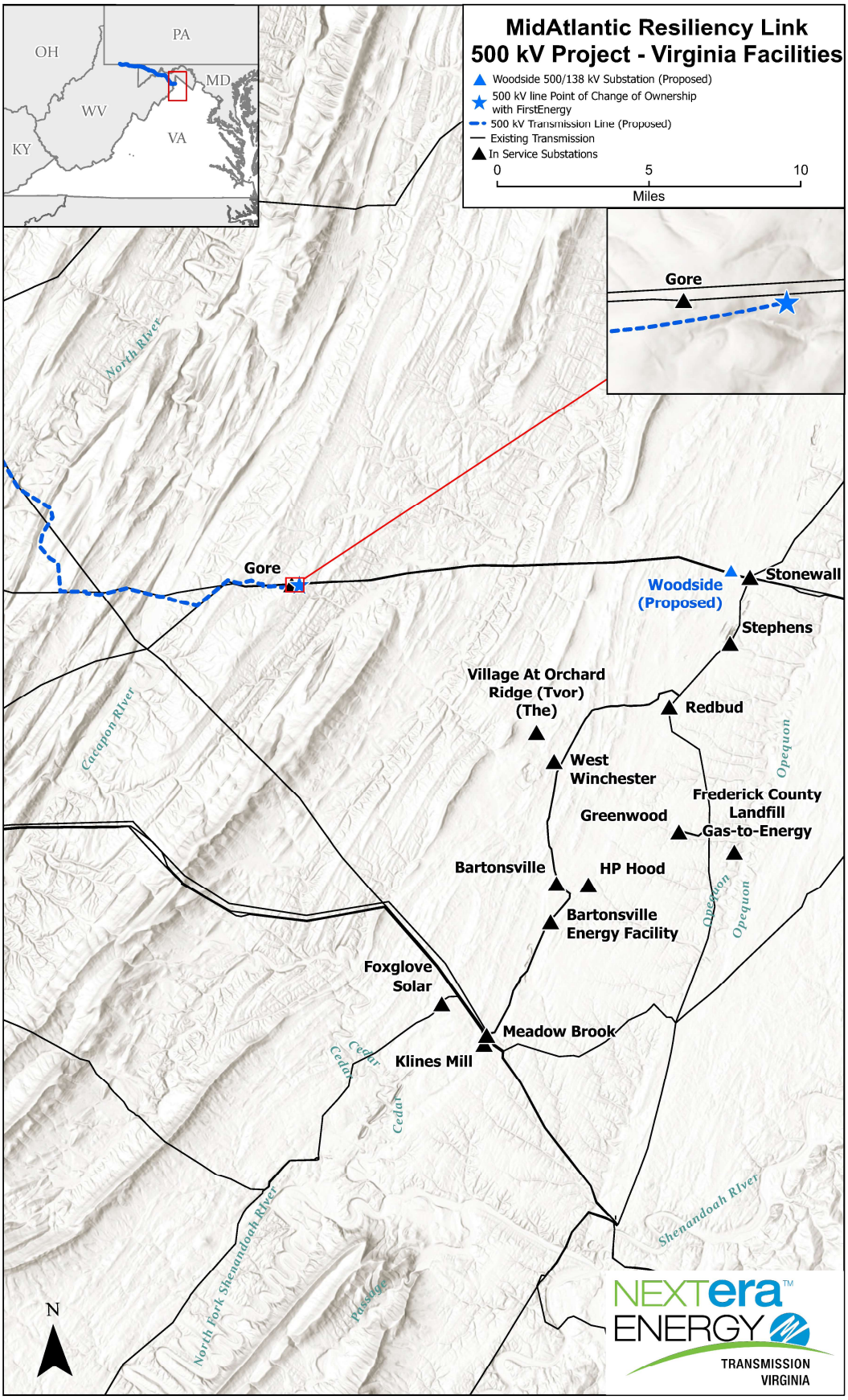
F. Describe any lines or facilities that will be removed, replaced, or taken out of service upon completion of the proposed project, including the number of circuits and normal and emergency ratings of the facilities.

Response: No lines or facilities will be removed, replaced, or taken out of service upon completion of the MARL Project.

I. NECESSITY FOR THE PROPOSED PROJECT

G. Provide a system map, in color and of suitable scale, showing the location and voltage of the Applicant's transmission lines, substations, generating facilities, etc., that would affect or be affected by the new transmission line and are relevant to the necessity for the proposed line. Clearly label on this map all points referenced in the necessity statement.

Response: See Attachment I.G.


MidAtlantic Resiliency Link
500 kV Project - Virginia Facilities
Woodside 500/138 kV Substation (Proposed)
500 kV line Point of Change of Ownership with FirstEnergy
500 kV Transmission Line (Proposed)
Existing Transmission
In Service Substations
0
5
10
Miles
PA
OH
MD
WV
VA
KY
Gore
North River
Cacapon River
Woodside (Proposed)
Stonewall
Stephens
Village At Orchard Ridge (Tvor) (The)
Redbud
Opequon
West Winchester
Frederick County Landfill Gas-to-Energy
Greenwood
Bartonsville
HP Hood
Bartonsville Energy Facility
Foxglove Solar
Meadow Brook
Klines Mill
Cedar
Shenandoah River
North Fork Shenandoah River
Passage
N
NEXTera ENERGY TRANSMISSION VIRGINIA

I. NECESSITY FOR THE PROPOSED PROJECT

H. Provide the desired in-service date of the proposed project and the estimated construction time.

Response: NEET VA is obligated by the DEA to complete the Woodside Substation and place it into service by December 31, 2028, and NEET VA and NEET MA are obligated by the DEA to complete the overall MARL Project and place it into service by December 31, 2031. Due to the need for reinforcements to the BES that the MARL Project will provide, PJM has requested that NEET VA and NEET MA take all reasonable actions to obtain necessary approvals and complete construction of the transmission line as soon as is practicable and closer to the identified need date (2027/2028). NEET VA and NEET MA are working to accelerate the in-service date to December 2029 or earlier, pending regulatory approvals. The estimated construction time for the MARL Project transmission line is approximately two years.

I. NECESSITY FOR THE PROPOSED PROJECT

I. Provide the estimated total cost of the project as well as total transmission-related costs and total substation-related costs. Provide the total estimated cost for each feasible alternative considered. Identify and describe the cost classification (*e.g.*, "conceptual cost," "detailed cost," etc.) for each cost provided.

Response: The current cost estimate for the entire MARL Project, including the Woodside Substation, is $1,167,200,000 (in 2031 dollars). Within Virginia, the cost estimate for the transmission line is approximately $19,000,000, while the cost estimate for the Woodside Substation is approximately $286,000,000. This cost estimate includes siting, engineering, construction, procurement, financing, administrative, development, and legal costs. The total estimate is based upon an initial planning level estimate ($844.8 million in 2023 dollars), contingency ($115.4 million in 2023 dollars), and taxes and escalation to the latest in-service date of 2031 ($207 million), for a total of $1.167 billion. The estimate also reflects 30% design and engineering, refinements to the project route from the bid, and vendor quotes received.[12]

The cost estimates for the Proposed Route and Alternatives B through F are provided in the table below:

Route	Estimated Costs for Virginia Transmission Line	Estimated Costs for Woodside Substation	Total Estimated Costs of the MARL Project
Proposed Route (Alternative Route A)	$19,000,000[13]	$286,000,000	$1,167,237,000
Alternative Route B	$19,000,000	$286,000,000	$1,175,521,000
Alternative Route C	$19,000,000	$286,000,000	$1,204,723,000
Alternative Route D	$19,000,000	$286,000,000	$1,241,099,000
Alternative Route E	$19,000,000	$286,000,000	$1,159,876,000
Alternative Route F	$19,000,000	$286,000,000	$1,256,130,000

[12] 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 MARL Project progresses.

[13] As described in Section II.A.1., Alternative Routes A, C, D, and E are the same in Virginia. Alternative Routes B and F differ from Alternative Route A slightly, taking an alternative path across different properties. All route options are 2.4 miles.

I. NECESSITY FOR THE PROPOSED PROJECT

J. If the proposed project has been approved by the RTO, provide the line number, regional transmission expansion plan number, cost responsibility assignments, and cost allocation methodology. State whether the proposed project is considered to be a baseline or supplemental project.

Response: The MARL Project is classified as a baseline reliability project (b3800) selected by PJM in 2023 to meet 2022 Window 3 needs. In the 2024 RTEP Window 1 process, PJM identified the need to interconnect the MARL Project with the Black Oak Substation in Maryland. The DEA executed by NEET VA, NEET MA, and PJM includes the Baseline Project IDs and line descriptions as shown in Attachment I.J.

Line numbers have not been assigned by PJM at the time of filing. b3800.109 and b3800.110 are allocated to a single zone. The cost allocation methodology for all other projects is 50% Non-Load Ratio Share (DFAX) and 50% Load Ratio Share. All project components are considered to be baseline. Cost responsibility assignments and cost allocation methodologies are detailed in Attachment I.J.

Regional Transmission Expansion Plan Number	Description	Cost Responsibility Assignments[1]			
		Non-Load Ratio Share (50%)	Load Ratio Share (50%)		
b3800.102	New 500 kV line from existing 502 Junction substation to Woodside 500 KV substation (bypass Black Oak) (NEET Portion).	APS (25.59%) BGE (9.79%) Dominion (51.94%) PEPCO (12.68%)	AEC (1.63%) AEP (14.27%) APS (5.89%) ATSI (7.62%) BGE (3.96%) ComEd (12.47%) Dayton (2.04%) DEOK (3.12%)	DL (1.62%) DPL (2.53%) Dominion (14.85%) EKPC (2.26%) JCPL (3.78%) ME (1.81%) NEPTUNE* (0.41%)	OVEC (0.07%) PECO (5.04%) PENELEC (1.75%) PEPCO (3.62%) PPL (4.85%) PSEG (6.16%) RE (0.25%)
b3800.106	Woodside 500 kV substation (Except terminations, Transformer, Cap Banks and Statcom).	APS (100%)	AEC (1.63%) AEP (14.27%) APS (5.89%) ATSI (7.62%) BGE (3.96%) ComEd (12.47%) Dayton (2.04%) DEOK (3.12%)	DL (1.62%) DPL (2.53%) Dominion (14.85%) EKPC (2.26%) JCPL (3.78%) ME (1.81%) NEPTUNE* (0.41%)	OVEC (0.07%) PECO (5.04%) PENELEC (1.75%) PEPCO (3.62%) PPL (4.85%) PSEG (6.16%) RE (0.25%)
b3800.107	Line Termination cost at Woodside 500 kV for 502 Jct to Woodside 500 kV line.	APS (25.59%) BGE (9.79%) Dominion (51.94%) PEPCO (12.68%)	AEC (1.63%) AEP (14.27%) APS (5.89%) ATSI (7.62%) BGE (3.96%) ComEd (12.47%) Dayton (2.04%) DEOK (3.12%)	DL (1.62%) DPL (2.53%) Dominion (14.85%) EKPC (2.26%) JCPL (3.78%) ME (1.81%) NEPTUNE* (0.41%)	OVEC (0.07%) PECO (5.04%) PENELEC (1.75%) PEPCO (3.62%) PPL (4.85%) PSEG (6.16%) RE (0.25%)
b3800.108	Line Termination cost at Woodside 500 kV for Woodside to Aspen 500 kV line.	APS (9.18%) BGE (7.21%) Dominion (72.52%) PEPCO (11.09%)	AEC (1.63%) AEP (14.27%) APS (5.89%) ATSI (7.62%) BGE (3.96%) ComEd (12.47%)	DL (1.62%) DPL (2.53%) Dominion (14.85%) EKPC (2.26%) JCPL (3.78%) ME (1.81%)	OVEC (0.07%) PECO (5.04%) PENELEC (1.75%) PEPCO (3.62%) PPL (4.85%) PSEG (6.16%)

[1] *PJM Interconnection, L.L.C.*, 194 FERC ¶ 61,152 (2026).

Regional Transmission Expansion Plan Number	Description	Cost Responsibility Assignments[1]			
		Non-Load Ratio Share (50%)	Load Ratio Share (50%)		
			Dayton (2.04%) DEOK (3.12%)	NEPTUNE* (0.41%)	RE (0.25%)
b3800.109	Termination work for two 500/138 kV transformer at Woodside 500 kV substation	APS (100%)			
b3800.110	Two 500/138 kV transformers at Woodside 500 kV substation.	APS (100%)			
b3800.113	Two 150 MVAR Cap banks and one +500/-300 MVAR STATCOM at Woodside 500 kV substation.	APS (100%)	AEC (1.63%) AEP (14.27%) APS (5.89%) ATSI (7.62%) BGE (3.96%) ComEd (12.47%) Dayton (2.04%) DEOK (3.12%)	DL (1.62%) DPL (2.53%) Dominion (14.85%) EKPC (2.26%) JCPL (3.78%) ME (1.81%) NEPTUNE* (0.41%)	OVEC (0.07%) PECO (5.04%) PENELEC (1.75%) PEPCO (3.62%) PPL (4.85%) PSEG (6.16%) RE (0.25%)
b3800.115	Line work for terminating Doubs to Bismark line for Doubs side for Woodside 500 kV substation.	APS (27.49%) BGE (9.83%) Dominion (53.78%) PEPCO (8.90%)	AEC (1.63%) AEP (14.27%) APS (5.89%) ATSI (7.62%) BGE (3.96%) ComEd (12.47%) Dayton (2.04%) DEOK (3.12%)	DL (1.62%) DPL (2.53%) Dominion (14.85%) EKPC (2.26%) JCPL (3.78%) ME (1.81%) NEPTUNE* (0.41%)	OVEC (0.07%) PECO (5.04%) PENELEC (1.75%) PEPCO (3.62%) PPL (4.85%) PSEG (6.16%) RE (0.25%)
b3800.117	Line work for terminating Doubs to Bismark line for Bismark side for Woodside 500 kV substation.	APS (21.09%) BGE (6.55%) Dominion (64.94%) PEPCO (7.42%)	AEC (1.63%) AEP (14.27%) APS (5.89%) ATSI (7.62%) BGE (3.96%) ComEd (12.47%) Dayton (2.04%) DEOK (3.12%)	DL (1.62%) DPL (2.53%) Dominion (14.85%) EKPC (2.26%) JCPL (3.78%) ME (1.81%) NEPTUNE* (0.41%)	OVEC (0.07%) PECO (5.04%) PENELEC (1.75%) PEPCO (3.62%) PPL (4.85%) PSEG (6.16%) RE (0.25%)

Regional Transmission Expansion Plan Number	Description	Cost Responsibility Assignments[1]			
		Non-Load Ratio Share (50%)	Load Ratio Share (50%)		
b4000.14	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.	APS (100%)			

I. NECESSITY FOR THE PROPOSED PROJECT

K. If the need for the proposed project is due in part to reliability issues and the proposed project is a rebuild of an existing transmission line(s), provide five years of outage history for the line(s), including for each outage the cause, duration and number of customers affected. Include a summary of the average annual number and duration of outages. Provide the average annual number and duration of outages on all Applicant circuits of the same voltage, as well as the total number of such circuits. In addition to outage history, provide five years of maintenance history on the line(s) to be rebuilt including a description of the work performed as well as the cost to complete the maintenance. Describe any system work already undertaken to address this outage history.

Response: Not applicable. The proposed MARL Project is not a rebuild of an existing transmission line(s).

I. NECESSITY FOR THE PROPOSED PROJECT

L. If the need for the proposed project is due in part to deterioration of structures and associated equipment, provide representative photographs and inspection records detailing their condition.

Response: Not applicable. The need for the proposed MARL Project is not due in part to deterioration of structures and associated equipment.

I. NECESSITY FOR THE PROPOSED PROJECT

M. In addition to the other information required by these guidelines, applications for approval to construct facilities and transmission lines interconnecting a Non-Utility Generator ("NUG") and a utility shall include the following information:

1. The full name of the NUG as it appears in its contract with the utility and the dates of initial contract and any amendments;

2. A description of the arrangements for financing the facilities, including information on the allocation of costs between the utility and the NUG;

3. a. For Qualifying Facilities ("QFs") certificated by Federal Energy Regulatory Commission ("FERC") order, provide the QF or docket number, the dates of all certification or recertification orders, and the citation to FERC Reports, if available;

b. For self-certificated QFs, provide a copy of the notice filed with FERC;

4. Provide the project number and project name used by FERC in licensing hydroelectric projects; also provide the dates of all orders and citations to FERC Reports, if available; and

5. If the name provided in 1 above differs from the name provided in 3 above, give a full explanation.

Response: Not applicable. The proposed MARL Project is not proposed to interconnect a NUG.

I. NECESSITY FOR THE PROPOSED PROJECT

N. Describe the proposed and existing generating sources, distribution circuits or load centers planned to be served by all new substations, switching stations and other ground facilities associated with the proposed project.

Response: The new Woodside Substation will connect with four existing and new transmission lines owned by Dominion Energy and FirstEnergy. More specifically, these connections include the new FirstEnergy 500 kV transmission line which proceeds from a handoff point near Gore, Virginia, to the Doubs Substation in Maryland, the existing Dominion Energy Bismark-Doubs 500 kV transmission line, and two new FirstEnergy 138 kV transmission lines that will connect the Woodside Substation with the nearby existing FirstEnergy Stonewall 138 kV Substation.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

1. Provide the length of the proposed corridor and viable alternatives.

Response: The approximate lengths of the Proposed Route and Alternative Routes for the Virginia Portions of the MARL Project are below:

Route	Approximate Length (in Virginia)
Proposed Route (Alternative Route A)	2.4 miles
Alternative Route B	2.4 miles
Alternative Route C	2.4 miles
Alternative Route D	2.4 miles
Alternative Route E	2.4 miles
Alternative Route F	2.4 miles

See Section II.A.9 for an explanation of NEET VA's route selection process, as well as the Routing Study. Alternative Route A (the Proposed Route) is the same as Alternative Routes C, D, and E in Virginia. Alternative Routes B and F differ from the Proposed Route slightly, taking an alternative path across different properties. Accordingly, even though NEET MA and NEET VA considered six different routes for the entire MARL Project, the Virginia Portions consist of two distinct routes. All route options in Virginia are 2.4 miles.

As described in more detail in the Routing Study, the preliminary draft route options that were shared publicly included route segments spanning approximately 310 total miles within the Study Area. Following public engagement efforts, the Routing Team conducted additional evaluations to refine the preliminary draft route options/route segments. As part of the route refinement process, route segments were combined, modified, or dismissed based on stakeholder concerns, engineering constructability, and natural environment, built environment, cultural, and social criteria. In total, 84 route segments were evaluated, each representing a potential part of the alternative routes.

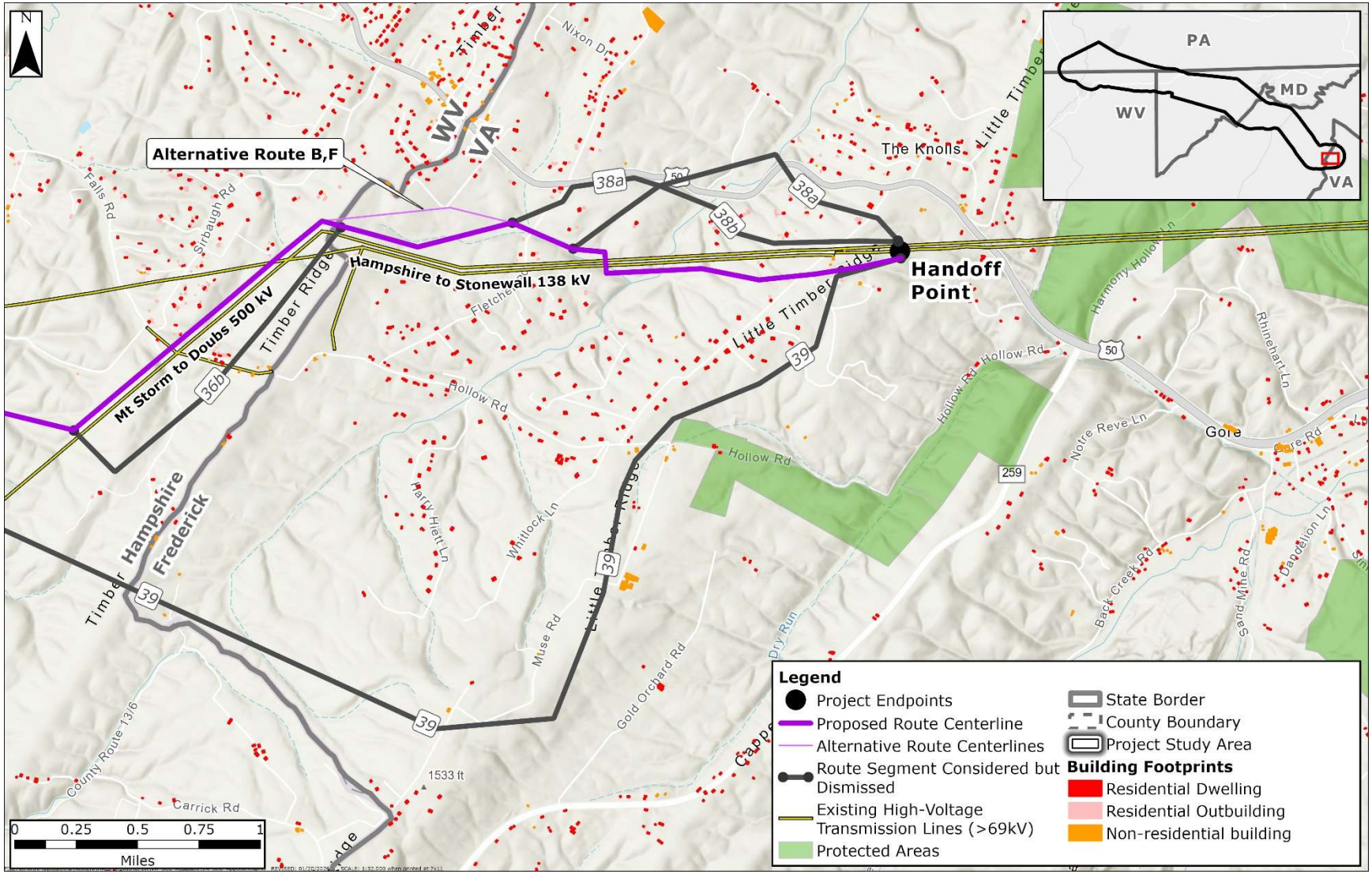
As a result, and for the overall MARL Project, 35 route segments were dismissed due to constraints identified through public and agency input; 49 segments were carried forward, and of these, 41 were refined—adjusted, shortened, or rerouted—to address community concerns and improve constructability. In Virginia specifically, six route segments were part of the refinement process with three route segments dismissed and three carried forward (*see* Table 4.4-1 of the Routing Study). These refinements for the MARL Project informed the development of six

full end-to-end route alternatives for regulatory review, representing both technical feasibility and responsiveness to public and stakeholder input. Table 4.4-1 of the Routing Study sets forth in detail the reason(s) each routing segment was refined (*i.e.*, shortened, rerouted, or adjusted), dismissed or added following these public engagement efforts. The route segments within Virginia were dismissed due to proximity to residential dwellings and/or the need for extensive greenfield development.

The Proposed Route, which extends through Virginia and three additional states, was selected because it avoids or reasonably minimizes adverse impacts to the greatest extent practicable, while also providing the highest level of engineering feasibility. As described in Section 4.4, Route Refinement and Route Segment Elimination, of the Routing Study and as shown Figure II.A.1 below, three route segments were considered but dismissed in Virginia, primarily due to their proximity to residential dwellings, additional greenfield sections, and longer route length. The goal in Virginia and the eastern portion of Hampshire County, West Virginia, was to parallel (to the extent feasible) the existing Mt. Storm to Doubs 500 kV transmission line and the Hampshire to Stonewall 138 kV transmission line. In Virginia, the heavily developed residential area south of the Mt. Storm to Doubs transmission line near Fletcher Road, Hollow Road, and Parishville Road, constrained potential routing options. Route segment 39 demonstrated a routing option that avoided this area of residential development; however, this segment was considered but dismissed due to its much larger line length (4.4 miles in Virginia) and lack of paralleling existing infrastructure (0 percent paralleling). North of the existing transmission line, residential developments surrounding the Northwestern Pike and Fairview Road limited potential routing options. Route segments 38a and 38b were considered but dismissed due to their longer route length, higher proximity to residential dwellings, and additional bifurcation of residential property. These segments also received negative feedback during stakeholder engagement activities; therefore, in Virginia, the Proposed Route and Alternative Routes C, D, and E overlap with Alternative Routes B and F for 1.7 miles due to the constraints present in the Virginia Portions of the MARL Project Study Area and because they more closely follow the existing transmission lines.

Of these two routing options, the Proposed Route and Alternative Routes C, D, and E have a significantly higher percentage of paralleling (41.8 percent in Virginia versus 28.3 percent for Alternative Routes B and F). Alternative Routes B and F bifurcate two additional parcels, as compared to the Proposed Route and Alternative Routes C, D, and E. Additionally, Alternative Routes B and F were less favorable during landowner outreach because the greenfield section of Alternative Routes B and F west of Fletcher Road is closer to the residential development on Border Lane (approximately 800 feet closer), which could present larger visual and land use impacts on this area. East of Fletcher Road, the Proposed Route and Alternative Routes C, D, and E overlap with Alternative Routes B and F until the handoff point.

Figure II.A.1 – The Proposed Route in Virginia and Route Segments Considered but Dismissed



II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

2. Provide color maps of suitable scale (including both general location mapping and more detailed GIS-based constraints mapping) showing the route of the proposed line and its relation to: the facilities of other public utilities that could influence the route selection, highways, streets, parks and recreational areas, scenic and historic areas, open space and conservation easements, schools, convalescent centers, churches, hospitals, burial grounds/cemeteries, airports and other notable structures close to the proposed project. Indicate the existing linear utility facilities that the line is proposed to parallel, such as electric transmission lines, natural gas transmission lines, pipelines, highways, and railroads. Indicate any existing transmission ROW sections that are to be quitclaimed or otherwise relinquished. Additionally, identify the manner in which the Applicant will make available to interested persons, including state and local governmental entities, the digital GIS shape file for the route of the proposed line.

Response: As part of the Routing Study, ERM developed Appendix D (Virginia Environmental Review Document ("ERD")) to consider state-specific requirements and data. Attachment 1 of the Virginia ERD includes color maps showing the Proposed Route and Alternative Routes in relation to the constraints that are near the routes.

The MARL Project will be built using new ROW. No existing transmission ROW sections will be quitclaimed or otherwise relinquished.

NEET VA will make the digital Geographic Information Systems ("GIS") shapefiles available to interested persons upon request to the Company's legal counsel as listed in the Application.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

3. Provide a separate color map of a suitable scale showing all the Applicant's transmission line ROWs, either existing or proposed, in the vicinity of the proposed project.

Response: NEET VA does not have any existing transmission line ROWs in Virginia for use for the MARL Project. As part of the Routing Study, ERM developed Appendix D (Virginia ERD) to consider state-specific requirements and data. Attachment 1 of the Virginia ERD includes color maps showing the Proposed Route and Alternative Routes for the MARL Project.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

4. To the extent the proposed route is not entirely within existing ROW, explain why existing ROW cannot adequately service the needs of the Applicant.

Response: There is no existing unused (or unoccupied) ROW that NEET VA can utilize for the Virginia Portions of the MARL Project. To the extent possible, the Proposed Route is sited parallel to existing transmission line ROW. Specifically, the Virgina Portions of the Proposed Route for the MARL Project parallel existing transmission line ROW for 1.0 out of 2.4 miles (or 41.8% of the Proposed Route within Virginia). See Section II.A.9 and the Routing Study for an explanation of NEET VA's route selection process.

As described above in Section I.E., NEET VA notes that, through collaboration with other incumbent transmission owners along portions of the MARL Project, a significant portion of the MARL Project that would have been greenfield transmission line through Loudoun County, Virginia was reassigned to FirstEnergy and Dominion Energy. Through this transfer of project scope, the incumbent utilities are able to utilize existing ROWs along the Doubs-Goose Creek Corridor, containing the rebuilt Doubs-Goose Creek and new Doubs-Aspen 500 kV lines in Frederick and Loudon counties. Through these efforts, NEET VA and NEET MA have sought to develop the MARL Project in a manner that minimizes the amount of new, greenfield transmission to the greatest extent possible.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

5. Provide drawings of the ROW cross section showing typical transmission line structure placements referenced to the edge of the ROW. These drawings should include:

a. ROW width for each cross section drawing;

b. Lateral distance between the conductors and edge of ROW;

c. Existing utility facilities on the ROW; and

d. For lines being rebuilt in existing ROW, provide all of the above (i) as it currently exists, and (ii) as it will exist at the conclusion of the proposed project.

Response: See Attachment II.A.5, showing the typical transmission line structures within the new 200-foot ROW, including the ROW width for each cross section drawing and lateral distance between the conductors and edge of the ROW. There are no existing facilities on the ROW and lines are not being rebuilt in existing ROW.

PROJECT INFORMATION:

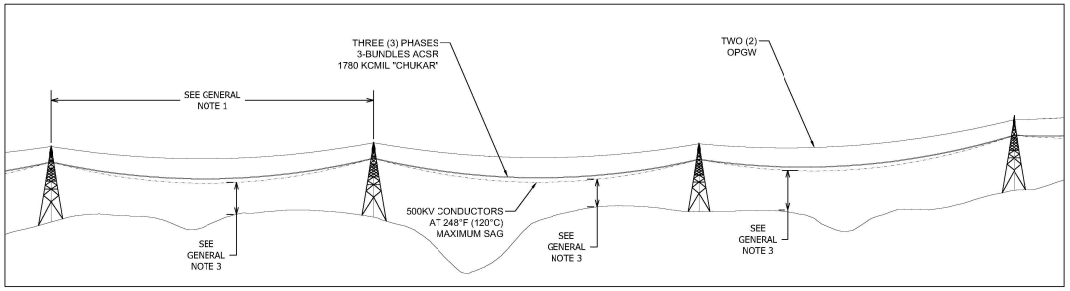
1. PROJECT NAME: MIDATLANTIC RESILIENCY LINK
2. LINE DESCRIPTION: OVERHEAD SINGLE CIRCUIT 500KV AC TRANSMISSION LINE
3. TYPICAL RIGHT-OF-WAY WIDTH: 200 FT
4. NUMBER OF CIRCUITS: ONE (1) CIRCUIT
5. NUMBER OF CIRCUITS PER STRUCTURE: ONE (1)
6. STRUCTURE TYPE: LATTICE TOWER
7. STRUCTURE MATERIAL: GALVANIZED STEEL
8. STEADY STATE RATINGS: 5,291 MVA (WINTER NORMAL) AND 4,490 MVA (SUMMER NORMAL)
9. AVERAGE SPAN LENGTH: 1,015 FT
10. CONDUCTOR TYPE: 3-BUNDLE ACSR 1780 KCMIL "CHUKAR"
11. CONDUCTOR CONFIGURATION: HORIZONTAL
12. OPGW QUANTITY & TYPE: TWO (2) 48 COUNT OPGW

GENERAL NOTES:

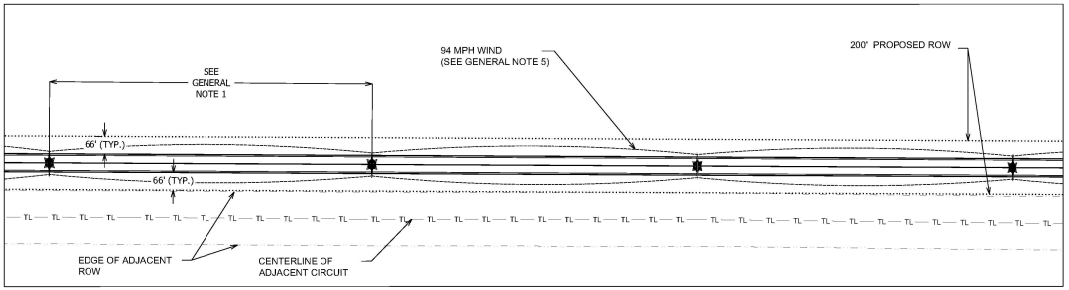
1. THE AVERAGE SPAN LENGTH IS APPROXIMATELY 1,015 FT.
2. THE MINIMUM, MAXIMUM, AND AVERAGE TOWER HEIGHTS ARE 115 FT, 190 FT, AND 150 FT, RESPECTIVELY.
3. THE MINIMUM DESIGN GROUND CLEARANCE WITH CONDUCTOR AT MAXIMUM SAG CONDITION IS 31.5 FT.
4. ALL THE DIMENSIONS ARE APPROXIMATE VALUES THAT ARE BASED ON PRELIMINARY DESIGN AND SUBJECT TO CHANGE.
5. CONDUCTOR POSITION AT MAXIMUM DESIGN WIND SPEED (94 MPH) AND MAINTAINED IN THE RIGHT-OF-WAY.

LEGEND:

- PROPOSED CONDUCTOR
- PROPOSED OPGW
- PROPOSED TRANSMISSION ROW
- EXTREME WIND WEATHER CASE (GENERAL NOTE 5)
- PROPOSED TOWER
- EDGE OF ADJACENT ROW, WHERE APPLICABLE
- TL CENTERLINE OF ADJACENT CIRCUIT, WHERE APPLICABLE



PROFILE VIEW (TYPICAL)



PLAN VIEW (TYPICAL)

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRWN	REVD	APPR	COMP
0	01/13/2026	ISSUE FOR PERMITTING	MDW	JA	BDB	

SCALE: AS NOTED

PREP: MDW CHKD: JA

APPD: BDB DATE: 01/13/2026

NEXTera ENERGY TRANSMISSION VIRGINIA

wsp

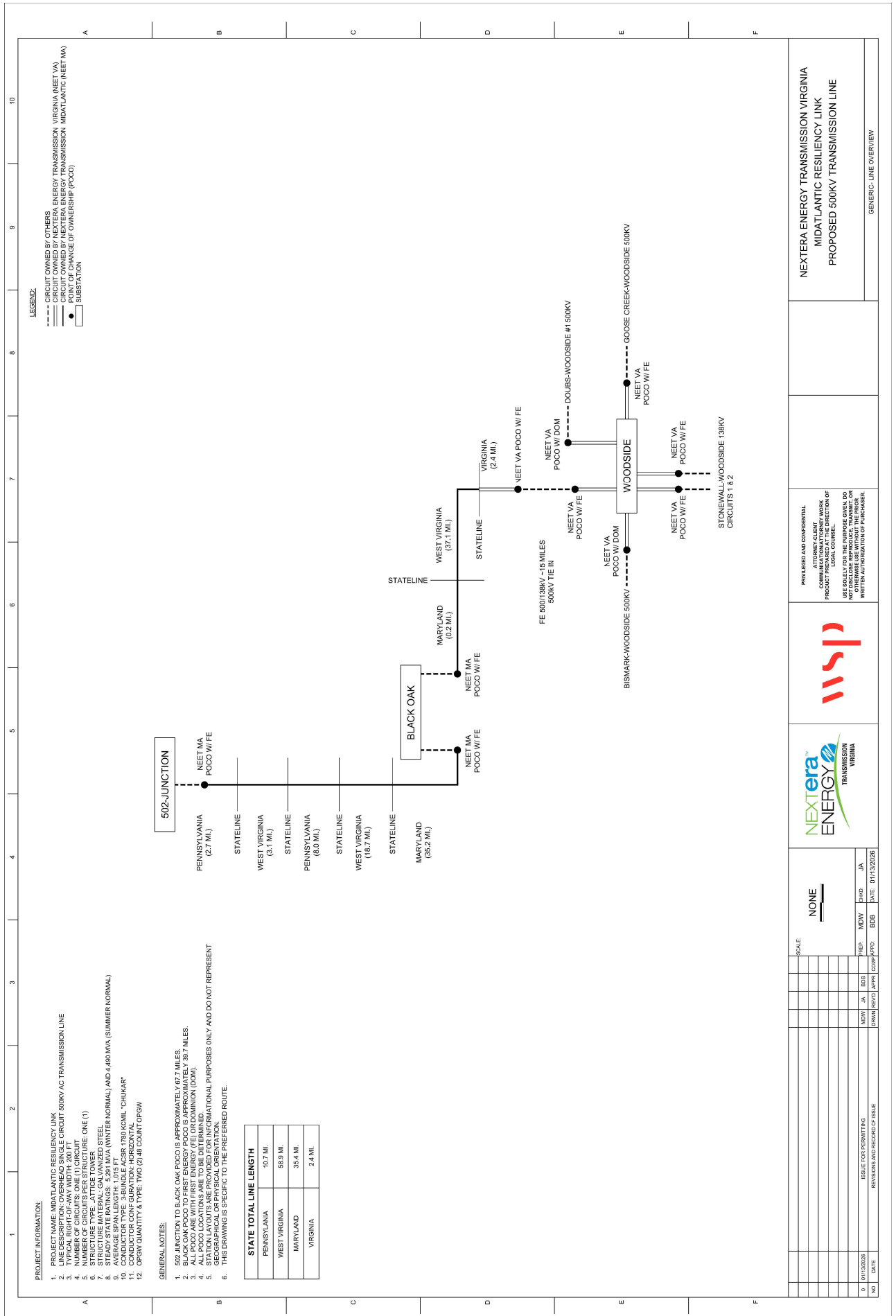
PRIVILEGED AND CONFIDENTIAL

ATTORNEY-CLIENT COMMUNICATION/ATTORNEY WORK PRODUCT PREPARED AT THE DIRECTION OF LEGAL COUNSEL.

USE SOLELY FOR THE PURPOSE GIVEN. DO NOT DISCLOSE, REPRODUCE, TRANSMIT, OR OTHERWISE USE WITHOUT THE PRIOR WRITTEN AUTHORIZATION OF PURCHASER.

NEXTERA ENERGY TRANSMISSION VIRGINIA
MIDATLANTIC RESILIENCY LINK
PROPOSED 500KV TRANSMISSION LINE

GENERIC- PLAN & PROFILE VIEW

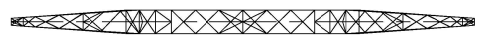

PROJECT INFORMATION:
1. PROJECT NAME: MIDATLANTIC RESILIENCY LINK
2. LINE DESCRIPTION: OVERHEAD SINGLE CIRCUIT 500KV AC TRANSMISSION LINE
3. TYPICAL RIGHT-OF-WAY WIDTH: 200 FT
4. NUMBER OF CIRCUITS PER STRUCTURE: ONE (1) CIRCUIT
5. NUMBER OF CIRCUITS PER STRUCTURE: ONE (1)
6. STRUCTURE TYPE: LATTICE TOWER
7. STRUCTURE MATERIAL: GALVANIZED STEEL
8. STEADY STATE RATINGS: 5,291 MVA (WINTER NORMAL) AND 4,490 MVA (SUMMER NORMAL)
9. AVERAGE SPAN LENGTH: 1,165 FT
10. CONDUCTOR TYPE: 3-BUNDLE ACSR 1780 KCMIL "CHUKAR"
11. CONDUCTOR CONFIGURATION: HORIZONTAL
12. OPGW QUANTITY & TYPE: TWO (2) 48 COUNT OPGW
GENERAL NOTES:
1. 502 JUNCTION TO BLACK OAK POCO IS APPROXIMATELY 67.7 MILES.
2. BLACK OAK POCO TO FIRST ENERGY POCO IS APPROXIMATELY 39.7 MILES.
3. ALL POCO LOCATIONS ARE WITH RESPECT TO DOMINION (DOM).
4. ALL POCO LOCATIONS ARE TO BE DETERMINED.
5. STATION LAYOUTS ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND DO NOT REPRESENT GEOGRAPHICAL OR PHYSICAL ORIENTATION.
6. THIS DRAWING IS SPECIFIC TO THE PREFERRED ROUTE.
STATE TOTAL LINE LENGTH
PENNSYLVANIA 10.7 MI.
WEST VIRGINIA 58.9 MI.
MARYLAND 35.4 MI.
VIRGINIA 2.4 MI.
LEGEND:
CIRCUIT OWNED BY OTHERS
CIRCUIT OWNED BY NEXTERA ENERGY TRANSMISSION VIRGINIA (NEET VA)
CIRCUIT OWNED BY NEXTERA ENERGY TRANSMISSION MIDATLANTIC (NEET MA)
POINT OF CHANGE OF OWNERSHIP (POCO)
SUBSTATION
502-JUNCTION
NEET MA POCO W/ FE
PENNSYLVANIA (2.7 MI.)
STATELINE
WEST VIRGINIA (3.1 MI.)
STATELINE
PENNSYLVANIA (8.0 MI.)
STATELINE
WEST VIRGINIA (18.7 MI.)
STATELINE
MARYLAND (35.2 MI.)
BLACK OAK
NEET MA POCO W/ FE
NEET MA POCO W/ FE
MARYLAND (0.2 MI.)
STATELINE
WEST VIRGINIA (37.1 MI.)
STATELINE
VIRGINIA (2.4 MI.)
NEET VA POCO W/ FE
FE 500/138KV ~15 MILES 500KV TIE IN
NEET VA POCO W/ DOM
DOUBS-WOODSIDE #1 500KV
NEET VA POCO W/ FE
NEET VA POCO W/ DOM
BISMARK-WOODSIDE 500KV
WOODSIDE
GOOSE CREEK-WOODSIDE 500KV
NEET VA POCO W/ FE
NEET VA POCO W/ FE
NEET VA POCO W/ FE
STONEWALL-WOODSIDE 138KV CIRCUITS 1 & 2
PRIVILEGED AND CONFIDENTIAL
ATTORNEY-CLIENT COMMUNICATION/ATTORNEY WORK PRODUCT PREPARED AT THE DIRECTION OF LEGAL COUNSEL
USE SOLELY FOR THE PURPOSES GIVEN. DO NOT DISCLOSE TO THIRD PARTIES OR OTHERWISE USE WITHOUT THE PRIOR WRITTEN AUTHORIZATION OF PURCHASER.
NEXTERA ENERGY TRANSMISSION VIRGINIA
MIDATLANTIC RESILIENCY LINK
PROPOSED 500KV TRANSMISSION LINE
GENERIC- LINE OVERVIEW
SCALE: NONE
PREP: MDW CHKD: JA
APPD: BDB DATE: 01/13/2026
NO DATE REVISIONS AND RECORD OF ISSUE DRWN REVD APPR COMP
0 01/13/2026 ISSUE FOR PERMITTING MDW JA BDB

PROJECT INFORMATION:

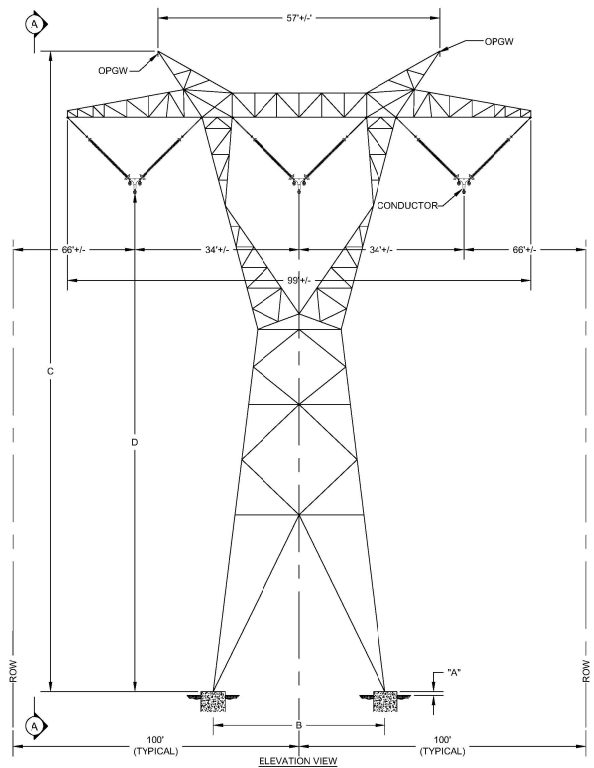
1. PROJECT NAME: MIDATLANTIC RESILIENCY LINK
2. LINE DESCRIPTION: OVERHEAD SINGLE CIRCUIT 500KV AC TRANSMISSION LINE
3. TYPICAL RIGHT-OF-WAY WIDTH: 200 FT
4. NUMBER OF CIRCUITS: ONE (1) CIRCUIT
5. NUMBER OF CIRCUITS PER STRUCTURE: ONE (1)
6. STRUCTURE TYPE: LATTICE TOWER
7. STRUCTURE MATERIAL: GALVANIZED STEEL
8. STEADY STATE RATINGS: 5,291 MVA (WINTER NORMAL) AND 4,490 MVA (SUMMER NORMAL)
9. AVERAGE SPAN LENGTH: 1,015 FT
10. CONDUCTOR TYPE: 3-BUNDLE ACSR 1780 KCMIL "CHUKAR"
11. CONDUCTOR CONFIGURATION: HORIZONTAL
12. OPGW QUANTITY & TYPE: TWO (2) 48 COUNT OPGW

GENERAL NOTES:

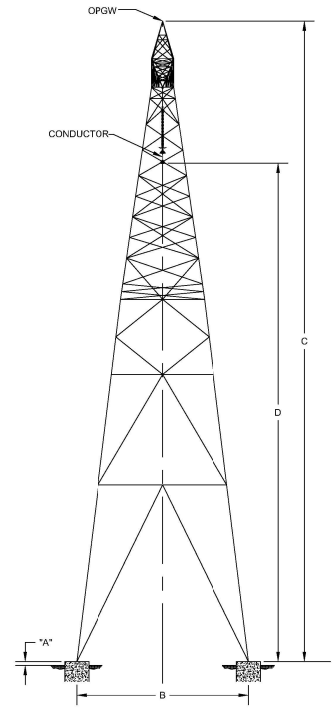
1. ALL DIMENSIONS ARE APPROXIMATE VALUES BASED ON PRELIMINARY DESIGN AND SUBJECT TO CHANGE.
2. OTHER ALTERNATIVE FOUNDATION TYPES INCLUDING, BUT NOT LIMITED TO, MICROPILE, GRILLAGE, HELICAL PILE, CAISSON, AND PAD AND PIER MAY BE USED IN PLACE OF DRILLED CONCRETE PIERS, BASED ON SITE SPECIFIC SOIL CONDITIONS.
3. REDUNDANT TOWER MEMBERS ARE NOT SHOWN.
4. DRAWING REPRESENTS TWO (2) TOWER TYPES WITH SIMILAR PHYSICAL CHARACTERISTICS:
   - LIGHT TANGENT TOWER 0°-1°
   - HEAVY TANGENT TOWER 0°-3°



PLAN VIEW



ELEVATION VIEW



SECTION A-A

PROPOSED TANGENT TOWER 0°-3° LINE ANGLE

PRIMARY FOUNDATION TYPE: CONCRETE PIER (SEE GENERAL NOTE 2)
FOUNDATION SIZE RANGE (DIA. X EMB.): 3 FT X 15 FT - 5 FT X 30 FT +/-
FOUNDATION REVEAL RANGE (A): 1 FT - 4 FT +/-
FOUNDATION SPACING RANGE (B): 35 FT - 45 FT +/-
TOWER HEIGHT RANGE (C): 130 FT - 170 FT +/-
CONDUCTOR ATTACHMENT HEIGHT (D): 100 FT - 140 FT +/-

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRWN	REV'D	APPR	COMP
0	01/13/2026	ISSUE FOR PERMITTING	MDW	JA	BDB	

SCALE: NONE

PREP: MDW CHKD: JA
APPD: BDB DATE: 01/13/2026

NEXTera ENERGY TRANSMISSION VIRGINIA

wsp

PRIVILEGED AND CONFIDENTIAL

ATTORNEY-CLIENT COMMUNICATION/ATTORNEY WORK PRODUCT PREPARED AT THE DIRECTION OF LEGAL COUNSEL.

USE SOLELY FOR THE PURPOSE GIVEN. DO NOT DISCLOSE, REPRODUCE, TRANSMIT, OR OTHERWISE USE WITHOUT THE PRIOR WRITTEN AUTHORIZATION OF PURCHASER.

NEXTERA ENERGY TRANSMISSION VIRGINIA
MIDATLANTIC RESILIENCY LINK
PROPOSED 500KV TRANSMISSION LINE
TANGENT TOWER 0°-3° LINE ANGLE

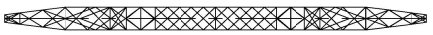
GENERIC- TANGENT TOWER ELEVATION

PROJECT INFORMATION:

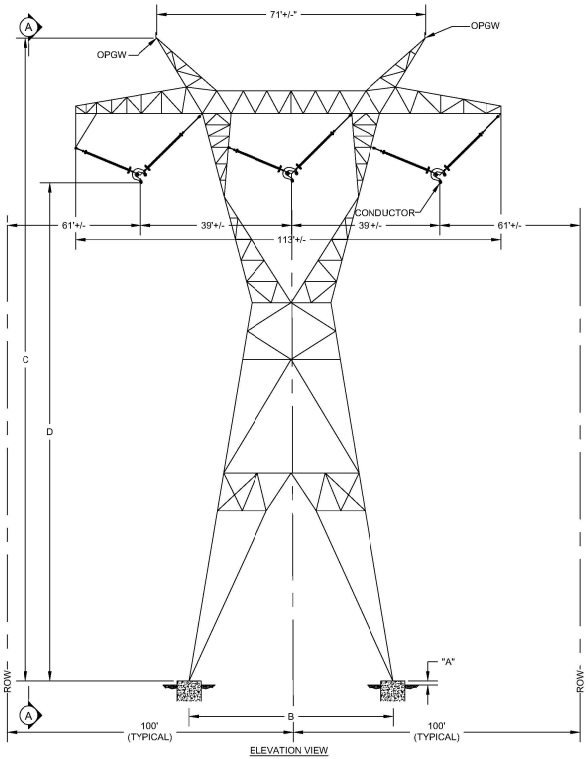
1. PROJECT NAME: MIDATLANTIC RESILIENCY LINK
2. LINE DESCRIPTION: OVERHEAD SINGLE CIRCUIT 500KV AC TRANSMISSION LINE
3. TYPICAL RIGHT-OF-WAY WIDTH: 200 FT
4. NUMBER OF CIRCUITS: ONE (1) CIRCUIT
5. NUMBER OF CIRCUITS PER STRUCTURE: ONE (1)
6. STRUCTURE TYPE: LATTICE TOWER
7. STRUCTURE MATERIAL: GALVANIZED STEEL
8. STEADY STATE RATINGS: 5,291 MVA (WINTER NORMAL) AND 4,490 MVA (SUMMER NORMAL)
9. AVERAGE SPAN LENGTH: 1,015 FT
10. CONDUCTOR TYPE: 3-BUNDLE ACSR 1780 KCMIL "CHUKAR"
11. CONDUCTOR CONFIGURATION: HORIZONTAL
12. OPGW QUANTITY & TYPE: TWO (2) 48 COUNT OPGW

GENERAL NOTES:

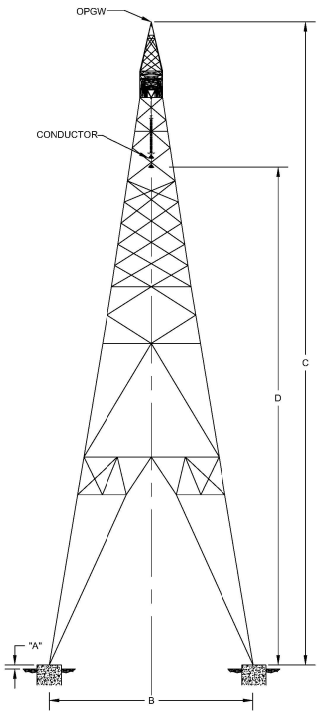
1. ALL DIMENSIONS ARE APPROXIMATE VALUES BASED ON PRELIMINARY DESIGN AND SUBJECT TO CHANGE.
2. OTHER ALTERNATIVE FOUNDATION TYPES INCLUDING, BUT NOT LIMITED TO, MICROPILE, GRILLAGE, HELICAL PILE, CAISSON, AND PAD AND PIER MAY BE USED IN PLACE OF DRILLED CONCRETE PIERS, BASED ON SITE SPECIFIC SOIL CONDITIONS.
3. REDUNDANT TOWER MEMBERS ARE NOT SHOWN.



PLAN VIEW



ELEVATION VIEW



SECTION A-A

PROPOSED RUNNING ANGLE TOWER 3°-20° LINE ANGLE

PRIMARY FOUNDATION TYPE: CONCRETE PIER (SEE GENERAL NOTE 2)
FOUNDATION SIZE RANGE (DIA. X EMB.): 3 FT X 15 FT - 6 FT X 40 FT +/-
FOUNDATION REVEAL RANGE (A): 1 FT - 4 FT +/-
FOUNDATION SPACING RANGE (B): 39 FT - 51 FT +/-
TOWER HEIGHT RANGE (C): 115 FT - 160 FT +/-
CONDUCTOR ATTACHMENT HEIGHT (D): 79 FT - 124 FT +/-

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRWN	REVD	APPR	COMP
0	01/13/2026	ISSUE FOR PERMITTING	MDW	JA	BDB	

SCALE: NONE

PREP: MDW CHKD: JA
APPD: BDB DATE: 01/13/2026

PRIVILEGED AND CONFIDENTIAL

ATTORNEY-CLIENT COMMUNICATION/ATTORNEY WORK PRODUCT PREPARED AT THE DIRECTION OF LEGAL COUNSEL.

USE SOLELY FOR THE PURPOSE GIVEN. DO NOT DISCLOSE, REPRODUCE, TRANSMIT, OR OTHERWISE USE WITHOUT THE PRIOR WRITTEN AUTHORIZATION OF PURCHASER.

NEXTERA ENERGY TRANSMISSION VIRGINIA
MIDATLANTIC RESILIENCY LINK
PROPOSED 500KV TRANSMISSION LINE
RUNNING ANGLE TOWER 3°-20° LINE ANGLE

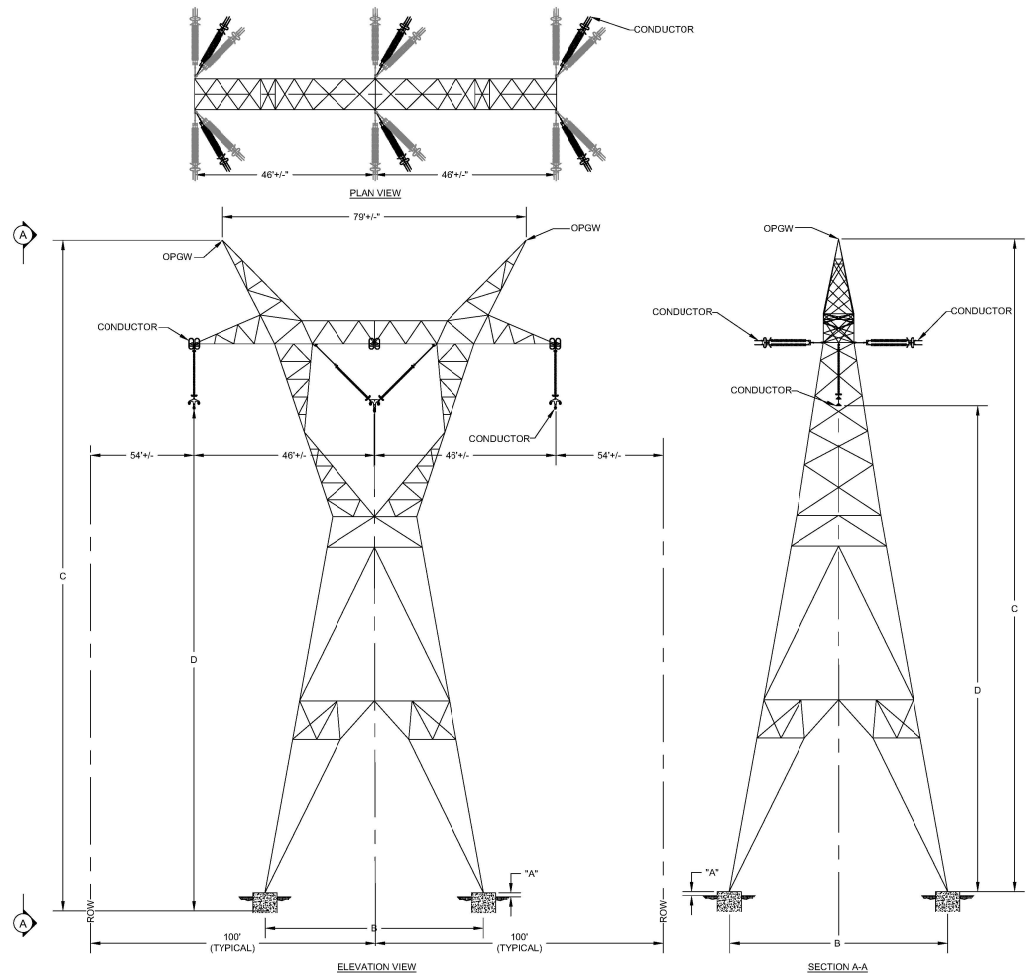
GENERIC- RUNNING ANGLE TOWER ELEVATION

PROJECT INFORMATION:

1. PROJECT NAME: MIDATLANTIC RESILIENCY LINK
2. LINE DESCRIPTION: OVERHEAD SINGLE CIRCUIT 500KV AC TRANSMISSION LINE
3. TYPICAL RIGHT-OF-WAY WIDTH: 200 FT
4. NUMBER OF CIRCUITS: ONE (1) CIRCUIT
5. NUMBER OF CIRCUITS PER STRUCTURE: ONE (1)
6. STRUCTURE TYPE: LATTICE TOWER
7. STRUCTURE MATERIAL: GALVANIZED STEEL
8. STEADY STATE RATINGS: 5,291 MVA (WINTER NORMAL) AND 4,490 MVA (SUMMER NORMAL)
9. AVERAGE SPAN LENGTH: 1,015 FT
10. CONDUCTOR TYPE: 3-BUNDLE ACSR 1780 KCMIL "CHUKAR"
11. CONDUCTOR CONFIGURATION: HORIZONTAL
12. OPGW QUANTITY & TYPE: TWO (2) 48 COUNT OPGW

GENERAL NOTES:

1. ALL DIMENSIONS ARE APPROXIMATE VALUES BASED ON PRELIMINARY DESIGN AND SUBJECT TO CHANGE.
2. OTHER ALTERNATIVE FOUNDATION TYPES INCLUDING, BUT NOT LIMITED TO, MICROPILE, GRILLAGE, HELICAL PILE, CAISSON, AND PAD AND PIER MAY BE USED IN PLACE OF DRILLED CONCRETE PIERS, BASED ON SITE SPECIFIC SOIL CONDITIONS.
3. REDUNDANT TOWER MEMBERS ARE NOT SHOWN.
4. DRAWING REPRESENTS THREE (3) TOWER TYPES WITH SIMILAR PHYSICAL CHARACTERISTICS:
   - STRAIN TOWER 0°-30°
   - DEADEND TOWER 0°-45°
   - DEADEND TOWER 45°-90°



PROPOSED STRAIN/DEADEND TOWER 0°-90° LINE ANGLE

PRIMARY FOUNDATION TYPE: CONCRETE PIER (SEE GENERAL NOTE 2)
FOUNDATION SIZE RANGE (DIA. X EMB.): 5 FT X 20 FT - 8 FT X 60 FT +/-
FOUNDATION REVEAL RANGE (A): 1 FT - 4 FT +/-
FOUNDATION SPACING RANGE (B): 41 FT - 68 FT +/-
TOWER HEIGHT RANGE (C): 125 FT - 190 FT +/-
CONDUCTOR ATTACHMENT HEIGHT (D): 98 FT - 163 FT +/-

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRWN	REV'D	APPR	COMP
0	01/13/2026	ISSUE FOR PERMITTING	MDW	JA	BDB	

SCALE: NONE

PREP: MDW CHKD: JA
APPD: BDB DATE: 01/13/2026

NEXTera ENERGY TRANSMISSION VIRGINIA

wsp

PRIVILEGED AND CONFIDENTIAL

ATTORNEY-CLIENT COMMUNICATION/ATTORNEY WORK PRODUCT PREPARED AT THE DIRECTION OF LEGAL COUNSEL.

USE SOLELY FOR THE PURPOSE GIVEN. DO NOT DISCLOSE, REPRODUCE, TRANSMIT, OR OTHERWISE USE WITHOUT THE PRIOR WRITTEN AUTHORIZATION OF PURCHASER.

NEXTERA ENERGY TRANSMISSION VIRGINIA
MIDATLANTIC RESILIENCY LINK
PROPOSED 500KV TRANSMISSION LINE
STRAIN/DEADEND TOWER 0°-90° LINE ANGLE

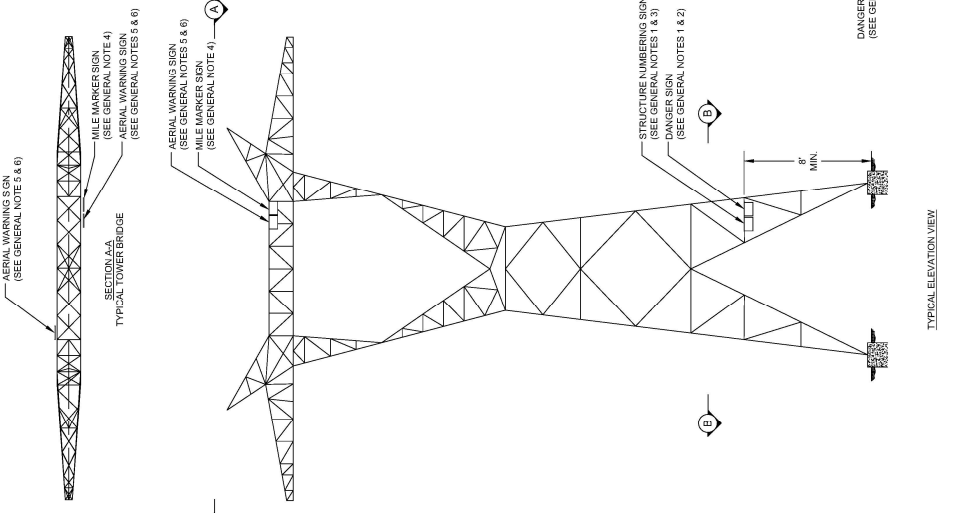
GENERIC- STRAIN/DEADEND TOWER ELEVATION

PROJECT INFORMATION:

1. PROJECT NAME: MIDATLANTIC RESILIENCY LINK
2. LINE DESCRIPTION: OVERHEAD SINGLE CIRCUIT 500KV AC TRANSMISSION LINE
3. TYPICAL RIGHT-OF-WAY WIDTH: 200 FT
4. NUMBER OF CIRCUITS: ONE (1) CIRCUIT
5. NUMBER OF CIRCUITS PER STRUCTURE: ONE (1)
6. STRUCTURE TYPE: LATTICE TOWER
7. STRUCTURE MATERIAL: GALVANIZED STEEL
8. STEADY STATE RATINGS: 5,291 MVA (WINTER NORMAL) AND 4,490 MVA (SUMMER NORMAL)
9. AVERAGE SPAN LENGTH: 1,165 FT
10. CONDUCTOR TYPE: 3-BUNDLE ACSR 1780 KCMIL "CHUKAR"
11. CONDUCTOR CONFIGURATION: HORIZONTAL
12. OPGW QUANTITY & TYPE: TWO (2) 48 COUNT OPGW

GENERAL NOTES:

1. SIGNS SHALL BE INSTALLED AT A MINIMUM HEIGHT OF 8 FEET ABOVE GROUND.
2. ONE (1) DANGER SIGN WILL BE INSTALLED ON EACH SIDE OF THE TOWER.
3. ONE (1) STRUCTURE NUMBERING SIGN WILL BE INSTALLED ON ONE SIDE OF THE TOWER. THE FORMAT WILL BE A COMBINATION OF THE MILE MARKER FOLLOWED BY THE STRUCTURE NUMBER WITHIN THAT MILE
4. ONE (1) MILE MARKER SIGN WILL BE INSTALLED ON THE FIRST STRUCTURE EACH MILE, WHERE APPLICABLE.
5. AT A MINIMUM, ONE (1) AERIAL WARNING SIGN WILL BE INSTALLED AT STRUCTURES ADJACENT TO CROSSING HAZARDS IN ORDER TO PROVIDE ADEQUATE SIGHT DISTANCE FOR AERIAL PATROL.
6. AERIAL WARNING SIGN WILL BE VISIBLE APPROACHING CROSSING HAZARD.





TYPICAL DANGER SIGN DETAILS

DIRECTION OF THE LINE

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRWN	REVD	APPR
0	01/13/2026	ISSUE FOR PERMITTING	MDW	JA	BDB

SCALE: NONE

PREP:	MDW
CHKD:	JA
APPD:	BDB
DATE:	01/13/2026

NEXTera ENERGY TRANSMISSION VIRGINIA

PRIVILEGED AND CONFIDENTIAL
ATTORNEY CLIENT
COMMUNICATION/ATTORNEY WORK
PRODUCT PREPARED AT THE DIRECTION OF
LEGAL COUNSEL.
USE SOLELY FOR THE PROJECT REVIEW. DO
NOT DISCLOSE TO THIRD PARTIES. DO NOT
OTHERWISE USE WITHOUT THE PRIOR
WRITTEN AUTHORIZATION OF PERCHASER

NEXTERA ENERGY TRANSMISSION VIRGINIA
MIDATLANTIC RESILIENCY LINK
PROPOSED 500KV TRANSMISSION LINE
TOWER WARNING AND NUMBERING SIGNS

GENERIC - TOWER WARNING AND NUMBERING SIGNS

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

6. Detail what portions of the ROW are subject to existing easements and over what portions new easements will be needed.

Response: As discussed in Section II.A.4, there is no existing electric transmission ROW that can be used to serve the proposed Virginia Portions of the MARL Project. Therefore, the entire 2.4 miles of ROW for the proposed Virginia Portions will require new property rights for a new-build transmission line. Along the ROW for the Virginia Portions of the Proposed Route, NEET VA will require new easements on 17 parcels.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

7. Detail the proposed ROW clearing methods to be used and the ROW restoration and maintenance practices planned for the proposed project.

Response: **Clearing of the ROW**

The basic permanent ROW width for the Proposed Route is approximately 200 feet. In general, the entire 200-foot-wide ROW will require clearing. Clearing may also be required for off-ROW access.

NEET VA's construction contractor ("Contractor") will begin with tree clearing within the ROW and off-ROW access. Heavy equipment will be used to grade the access paths and structure pads. This work will be done in compliance with the stormwater pollution prevention plan ("SWPPP"), erosion control, and silt fences, and will employ other best practices. Land agents will be directed to notify landowners of activity on their land, working closely with the on-site Execution Team to keep landowners aware of construction activities, and address any concerns.

NEET VA will require that its Contractor adhere to the requirements within its road use and maintenance agreements with affected local governments and with the requirements in any crossing agreements, as well as with NEET VA construction specifications, Engineering Issued for Construction drawings, Environmental Permit requirements, SWPPP, and landowner agreements.

Following ROW preparation and access road preparation, the Contractor will install foundations, structures, conductor and shield wires, in that order, followed by optical fiber splicing.

NEET VA intends to follow best management practices and anticipates using methods described below to prepare the ROW for construction:

- Where feasible, mechanized clearing will be utilized, and trees will be cut close to the ground line and mulched, or ground in place. In some sensitive areas in valleys where there is substantial conductor clearance over the tree canopy, trees may be left in place. Mulch will be spread within the ROW. Off-ROW trees that could impact the transmission line if they fell are cleared in a similar fashion.

- Where slopes are too steep for mechanized clearing, trees will be hand felled. Hand felled trees may be recovered by winching up the slope, pushing trees to the bottom of the slope, or flown out. Forestry mowing may be utilized to mow and or mulch smaller vegetation and immature trees.

- Grubbing will be required where cutting in roads on steep terrain.

- Access roads will be needed to access the ROW and structure locations. At structure locations and conductor pull locations, pads will be needed. Existing roads will be utilized where possible and improved as necessary and maintained during construction. If new access roads are required, they may be permanent or temporary. Where temporary access and pads are needed, they will be restored after construction is complete. The access roads and pads will be graded. Grading ensures that heavy equipment can safely traverse to the construction location and can be safely set up and operated at each location. The methods required to establish new access roads and pads will be dependent on the terrain.

- An SWPPP will be developed with erosion and sediment control measures, in accordance with NEET VA's best management practices and in compliance with applicable permits.

- Where possible, the access will be within the ROW. Where streams or other barriers are encountered, temporary or permanent crossings may be used in compliance with permits, or alternative access will be used to go around the barrier.

- When necessary, NEET VA will modify and/or amend standard specifications to comply with required permits, such as wetlands.

Restoration of the ROW

NEET VA's approach is to restore the property to its original condition to the extent possible with the exception of any permanent installations or other agreements with the landowner. Upon construction completion, the Contractor will provide all equipment, labor, and material to restore all temporarily disturbed land.

NEET VA will require its Contractor to de-compact all soils to pre-construction conditions. Other than in farmland, or as otherwise requested by a landowner, the Contractor will revegetate the areas with compatible native species and in accordance with Project permits and reclamation plans. Farmlands will be de-compacted and mulched for replanting by the owner. In highly erodible areas, the Contractor will install temporary and/or permanent stabilization measures to enhance vegetation re-growth. Prior to NEET VA's final acceptance of the Contractor's work, the Contractor will remove temporary erosion controls if and when vegetation reaches 70 percent re-growth in the particular location of the erosion control devices. Upon completion of revegetation and as a provision of final acceptance, NEET VA will require its Contractor to refurbish all remaining erosion control devices so that they comply with the SWPPP, at which time the maintenance and/or removal of the remaining erosion control devices will become

the responsibility of NEET VA.

Ongoing Maintenance of the ROW

Once testing is complete, the Project will be placed in service and turned over to the NEET VA Operations team, which has highly skilled personnel, including subject matter experts on ROW maintenance and vegetation management. ROW restoration may continue after placing the line in service.

A vegetation management prescription will be developed utilizing industry best practices that meet state and federal regulations. Vegetation control methods include hand and mechanized tree trimming within the ROW and removal of danger timber outside the ROW. Mowing, trimming, clearing, and spot treatment of herbicides for incompatible species will be used to control the vegetation. Inspections will be performed at specified intervals with a combination of aerial and ground inspections. Vegetation management work prescriptions will be identified and recorded during inspections and maintenance will be scheduled and carried out as required to meet the specifications of the work prescription. Any herbicides that are used in right of way maintenance will comply with United States Environmental Protection Agency label requirements and other requirements for ROW application. Maintenance personnel that apply herbicides will be adequately licensed. Generally speaking, some higher growth of compatible species may be allowed outside of the conductor zone. The standard vegetation maintenance cycle will be every three to five years. If necessary, the schedule can be adjusted based on data from inspections. A copy of NEET VA's standard Vegetation Management Plan is provided as Appendix F of the Routing Study.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

8. Indicate the permitted uses of the proposed ROW by the easement landowner and the Applicant.

Response: A non-transmission use will be permitted that:

- Is in accordance with the terms of the easement agreement for the ROW;
- Is consistent with the safe maintenance and operation of the transmission lines;
- Will not result in the violation of the minimum clearance requirements of the NESC and NEET VA clearance requirements;
- Does not undermine or otherwise adversely affect the stability and usability of the facilities;
- Does not violate environmental health or safety laws;
- Will not interfere with the operation or maintenance of the transmission lines;
- Will not permanently impair or restrict access to the easements; and
- Does not impact Applicant's present interest in the property.

Subject to the terms of the easement, examples of typical permitted uses include but are not limited to:

- Agriculture;
- Hiking trails;
- Fences;
- Perpendicular road crossings;
- Perpendicular utility crossings;
- Residential driveways;
- Wildlife / pollinator habitat; and
- Livestock grazing.

A copy of NEET VA's standard easement option agreement is provided in Attachment II.A.8.

Tax Map No[s].:_____ Consideration:_____

Prepared [outside of the Commonwealth of Virginia] by and when recorded return to:
Orin Shakerdge, Esq.
NextEra Energy Transmission Virginia, Inc.
700 Universe Blvd., LAW/JB
Juno Beach, FL 33408
(561) 694-4678

OPTION AND TRANSMISSION EASEMENT

THIS OPTION AND TRANSMISSION EASEMENT ("**Agreement**") is dated this _____ day of _____, [*insert year*] by and between [*insert Grantor's Name*[1]], with an address of [*insert Grantor's Address*] (collectively "**Grantor**"), and **NEXTERA ENERGY TRANSMISSION VIRGINIA, INC.**, a Virginia corporation, with an address of 700 Universe Blvd., Juno Beach, FL 33408, Attn: Land Services Administration ("**Grantee**"). Grantor and Grantee are sometimes individually referred to as a "**Party**" and collectively, as the "**Parties**".

RECITALS

WHEREAS, Grantor is the owner of a certain tract of real property located in [*insert County*], Virginia more particularly described on **Exhibit A** attached hereto and made a part hereof ("**Property**"); and

WHEREAS, Grantor desires to grant and convey to Grantee an option to acquire certain easements, including without limitation, an exclusive easement for the erection, installation and maintenance of certain facilities for the transmission of electric power over and across a certain portion of the Property on the terms and conditions contained in this Agreement.

NOW THEREFORE, in consideration of the good and valuable consideration set forth herein, the adequacy and receipt of which is hereby acknowledged, the parties hereto agree as follows:

1. **Option**. Grantor grants to Grantee an exclusive option ("**Option**") to acquire the Easements (defined in Section 2) in accordance with the following terms and conditions.

a. The initial term of the Option shall be for three (3) years, commencing on the Effective Date and expiring on the date immediately preceding the third (3rd) anniversary of the Effective Date ("**Initial Option Term**"). Grantee shall have the right to extend the Initial Option Term for one additional three (3) year term ("**Extended Option Term**") by sending written notice to Grantor at any time prior to the expiration of the Initial Option Term. References to the "**Option Term**" shall mean the Initial Option Term and, to the extent exercised by Grantee, also the Extended Option Term, unless the context otherwise expressly requires. The term "**Effective Date**" shall mean the last date upon which this Agreement has been fully executed by both Parties.

[1] Grantor name should be in BOLD/ALL CAPS, with surname underlined.

b. During the Option Term, Grantee and its employees, agents and contractors shall have a right to enter upon the Property and the right of ingress and egress over and across the Property for the purposes of (i) surveying the Property; and (ii) performing such other tests and studies as Grantee may desire in connection with the Option, including, without limitation, environmental, avian and cultural resource assessments, threatened and endangered species assessments and geotechnical, foundation and soil tests; provided that such activities do not unreasonably interfere with Grantor's use of the Property.

c. Grantee may exercise the Option by giving written notice to Grantor ("**Option Notice**") at any time during the Option Term. Grantee shall specify in the Option Notice the date on which the Easements will become effective ("**Commencement Date**"). Along with the Option Notice, Grantee shall deliver to Grantor a proposed plan showing the contemplated location and route of the Easements (as defined in Section 2) ("**Easement Area**") which shall serve as the **Exhibit B** to this Agreement. Grantee may record the Option Notice and the **Exhibit B** in the County where the Property is located.

d. If Grantee fails to exercise the Option within the Option Term, the Option and the rights of Grantee as provided herein shall automatically terminate.

2. **Easements**. On the Commencement Date, the Easements shall automatically become effective and the Parties shall be subject to all of the terms and conditions of this Agreement. As used herein, the Transmission and Telecommunication Easement, Access Easement, and Construction Easement shall collectively be referred to as "**Easements**". Grantor grants to Grantee the right to investigate, inspect, survey, and conduct tests on the Property relating to the Easements, including without limitation, environmental, avian and cultural resource assessments, threatened and endangered species assessments, archeological and geotechnical tests and studies.

a. Grantor grants to Grantee an irrevocable, exclusive easement for the construction, whether above or underground, installation, maintenance, use, operation, repair, replacement, relocation and removal of Transmission Facilities and Telecommunication Facilities ("**Transmission and Telecommunication Easement**"). "**Transmission Facilities**" shall mean all improvements whose purpose is to deliver electrical power to an electrical power grid or other system, including without limitation transformers, overhead and underground electrical transmission lines, interconnection facilities, guys, anchors, wires, poles, towers, foundations, footings, cross arms, handholes, meters, manholes and other structures related to the transmission of electrical power. "**Telecommunication Facilities**" shall mean all improvements whose purpose is to provide telecommunication services, including telephone, closed-circuit television, microwave, internet, computer data and other telecommunication services related to the operation of the Transmission Facilities. The Transmission Facilities and the Telecommunication Facilities are collectively and individually referred to as the "**Facilities**". The Easement Area of the Transmission and Telecommunication Easement shall not exceed 200 feet in width except in the area of a corner or turn in the Facilities, in which case the Easement Area may be extended to accommodate guys and other Facilities.

b. Grantor grants to Grantee an irrevocable, non-exclusive easement for vehicular and pedestrian ingress and egress over, across and along the Property by means of any existing roads or lanes thereon, or otherwise by such route or routes as Grantee or Grantor may construct from time to time for the purposes of constructing, maintaining, removing and operating the Facilities ("**Access Easement**"). Grantee agrees to maintain and repair all roadway improvements located on the Access Easement for the joint use thereof by the Parties for ingress and egress over, across, and along the Access Easement; provided, however, Grantor shall reimburse Grantee for any costs and expenses incurred by Grantee to repair any damage or perform any special maintenance of the roadway caused any person using the roadway with Grantor's permission. Grantee shall have the right to install on the Property an access gate with dual locks, at its expense, in order that it, together with its contractors, agents and appointees shall have the right to access the Property. Grantee shall be responsible, at its cost and expense for all maintenance and repair for any access gate installed by Grantee.

c. Grantor grants to Grantee a temporary easement on, over, along and under the Property for the following: (1) to construct and install Facilities and (2) to store material and equipment during construction of the Facilities ("**Construction Easement**").

d. During the final development and construction of the Facilities, Grantee may change the location and route of the Easements so long as the nature and extent of any such relocated or rerouted Easements are not materially different and impose no greater burden on the Property than the original locations or routes. In the event Grantee does relocate the Easements under this Section, Grantee shall provide to Grantor a revised **Exhibit B**, which shall show the location of the Easements and shall substitute for the **Exhibit B**, delivered with the Option Notice. Grantee shall have the right to record in the County where the Property is located a notice incorporating the revised **Exhibit B**.

3. **Ownership**. Grantor is the holder of fee simple title to all of the Property, and has the right, without the joinder of any other party, to enter into this Agreement and grant the Easements. Grantor agrees to warrant and defend its ownership of the Property and Grantee's interest in this Agreement against any other party claiming to have any ownership interest in the Property.

4. **Interference**. Grantor covenants and agrees that neither Grantor nor its agents, lessees, invitees, guests, licensees, successors or assigns will (i) interfere with, impair or prohibit the free and complete use and enjoyment by Grantee of its rights granted by this Agreement; (ii) take any action which will in any way interfere with or impair the transmission of electric, electromagnetic or other forms of energy to or from the Property; or (iii) take any action which will interfere with or impair Grantee's access to the Property for the purposes specified in this Agreement. Grantor shall not construct or place any buildings, structures, plants, or other obstructions on the Property which would result in the violation of the minimum clearance requirements of the National Electric Safety Code or would interfere with the operation and maintenance of the Facilities. Grantor shall not excavate so near the sides of or underneath the Facilities installed as to undermine or otherwise adversely affect their stability and usability. Grantee shall also have the right and privilege to trim, cut down, or control the growth of trees or

any other vegetation on the Property, as in the sole judgment of Grantee may interfere with maintenance or operation of the Facilities.

5. **Assignment & Sublease**. Grantee shall have the right, without Grantor's consent, to sell, convey, lease, transfer, or assign all or any portion of its interest in the Property, on either an exclusive or a non-exclusive basis, or to grant subeasements, co-easements, separate leases, easements, licenses or similar rights with respect to the Property (collectively, "**Assignment**"), to one or more persons or entities (collectively "**Assignee**"). Any such assignment by Grantee of its interests in this Agreement shall release Grantee from all obligations accruing after the date that liability for such obligations is assumed by the Assignee.

6. **Mortgage**. Grantee may, upon notice to Grantor, but without Grantor's consent or approval, mortgage, collaterally assign, or otherwise encumber and grant security interests in all or any part of its interest in the Property. These various security interests in all or a part of the Property are collectively referred to as a "**Mortgage**" and each holder of the Mortgage, is referred to as "**Mortgagee**". To the extent permitted by the Mortgage at issue, any Mortgagee shall be permitted to exercise or perform any and all of Grantee's rights and obligations hereunder and Grantor shall accept such exercise and performance thereby. Any Mortgagee under any Mortgage shall be entitled to assign its interest or enforce its rights thereunder, as permitted by applicable law, without notice to or approval of Grantor.

7. **Hazardous Materials**. Grantor represents and warrants that, to the best of Grantor's knowledge, the Property is not and has not been in violation of any federal, state or local environmental health or safety laws, statute, ordinance, rule, regulation or requirement ("**Environmental Laws**"), and Grantor has not received any notice or other communication from any governmental authorities alleging that the Property is in violation of any Environmental Laws. "**Hazardous Materials**" shall mean any asbestos containing materials, petroleum, explosives, toxic materials, or substances regulated as hazardous wastes, hazardous materials, hazardous substances, or toxic substances under any federal, state, or local law or regulation. Grantor represents and warrants that, except as disclosed to Grantee in writing, to the best of Grantor's knowledge, no underground storage tanks and no Hazardous Materials are or were located on the Property during or prior to Grantor's ownership of the Property. Grantor shall not violate in a material way any Environmental Law relating to the Property.

8. **Indemnity & Insurance**. Grantee acknowledges and agrees that it shall hold Grantor and its successors and assigns in interest harmless for any liability whether known or unknown that arises from Grantee exercising its rights under this Agreement including liability resulting in injuries to persons who enter onto the Property in the exercise of its rights or any failure of Grantee to maintain its Facilities except for liability arising from the gross negligence or willful misconduct of Grantor and its successors, assigns and invitees. Grantee acknowledges and agrees that it shall maintain sufficient liability insurance that is standard in the industry.

9. **Removal**. If this Agreement is terminated and after receiving a written request from Grantor, Grantee shall remove all Facilities on the Property and restore the Property to its approximate original condition that existed before Grantee constructed its Facilities all at Grantee's sole cost and expense. Such removal by Grantee shall be accomplished within one (1)

year after receiving a written request from Grantor and include any Facilities to a depth of forty-eight inches (48") beneath the surface of the Property.

10. **Notice**. All notices given or permitted to be given hereunder shall be in writing. Notice is considered given either (i) when delivered in person to the recipient named in the preamble; (ii) upon receipt after deposit in the United States mail in a sealed envelope or container, postage and postal charges prepaid, return receipt requested or certified mail, addressed by name and address to the party named in the preamble; or (iii) upon receipt after deposit with a nationally recognized courier service addressed by name and address to the party named in the preamble. Either Party may, by notice given at any time or from time to time, require subsequent notices to be given to another individual person, whether a party or an officer or representative, or to a different address, or both.

11. **Severability**. If any term or provision of this Agreement, or the application thereof to any person or circumstance shall, to any extent, be determined by judicial order or decision to be invalid or unenforceable, the remainder of this Agreement or the application of such term or provision to persons or circumstances other than those as to which it is held to be invalid, shall be enforced to the fullest extent permitted by law.

12. **Governing Law**. This Agreement shall be governed by and interpreted in accordance with the laws of the Commonwealth of Virginia. The Parties agree to first attempt to settle any dispute arising out of or in connection with this Agreement by good faith negotiation. If the Parties are unable to resolve amicably any dispute arising out of or in connection with this Agreement, each shall have all remedies available at law or in equity. **Each Party waives all right to trial by jury and specifically agrees that trial of suits or causes of action arising out of this agreement shall be to the court of competent jurisdiction**.

13. **Successors and Assigns**. The Easements and any restrictions of this Agreement shall run with the Property and land affected and shall be binding on the Parties, together with their mortgagees, assignees, and respective successors and assigns, heirs, personal representatives, tenants or persons claiming through them.

14. **Entire Agreement**. This Agreement constitutes the entire agreement between the Parties respecting the subject matter. Any agreement, understanding, or representation with respect to the subject matter of this Agreement not expressly set forth in this Agreement or later in a writing signed by both parties, is null and void. This Agreement and the easement shall not be modified or amended except for in writing signed by the parties or their successors in interest.

15. **Counterparts**. This Agreement may be executed in multiple counterparts, each of which shall be deemed the original, and all of which together shall constitute a single instrument.

16. **Compensation**. The compensation due by Grantee to Grantor for this Agreement is set forth in a separate Compensation Agreement between the Parties which the Parties agree shall not be recorded.

[*Signatures follow on next pages*]

EXECUTED effective the day and year first hereinabove written.

Grantor:

_____
[*insert Grantor's Name*]

ACKNOWLEDGEMENT

STATE OF [*INSERT STATE*])
) ss:
COUNTY OF _____)

On this _____ day of _____, [*insert year*], before me, the undersigned notary public, personally appeared _____, personally known to me or provided to me on the basis of satisfactory evidence to be the person who subscribed to the foregoing instrument on behalf of [*himself/herself*].

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

(notary seal)

_____
NOTARY PUBLIC, COMMONWEALTH OF VIRGINIA
Name: _____
My commission expires: _____
Notary Registration No.: _____

(*Signatures continue on following page*)

Grantee:

NextEra Energy Transmission Virginia, Inc.,
a Virginia corporation

By: _____
Matt Pawlowski
Assistant Vice President

ACKNOWLEDGEMENT

STATE OF FLORIDA)
) ss:
COUNTY OF PALM BEACH)

The foregoing instrument was acknowledged before me **by means of ☒ physical presence or ☐ online notarization**, this _____ day of _____, [*insert year*] by Matt Pawlowski, as Assistant Vice President of NextEra Energy Transmission Virginia, Inc., a Virginia corporation, on behalf of the company, who is personally known to me or has produced a driver's license as identification.

(notary seal)

_____
NOTARY PUBLIC, STATE OF FLORIDA

EXHIBIT A

Legal Description of Property

EXHIBIT B

Depiction of Easements

To be provided with Option Notice

[TO BE REMOVED BEFORE RECORDING]

COMPENSATION AGREEMENT

In consideration for entering into the Option and Transmission Easement ("**Agreement**") with NextEra Energy Transmission Virginia, Inc., a Virginia corporation ("**Grantee**"), [*insert Grantor's Name*] ("**Grantor**") shall receive the following compensation:

Option Payment. A $[*insert amount*] option payment per year on or before each anniversary of the Effective Date during the Option Term unless Grantee elects to discontinue the Option or Grantee exercises the Option. The first option payment shall be paid within sixty (60) days after the Effective Date (as defined in the Agreement).

One-Time Payments.

(a) A signing bonus of $_____ if Grantor executes the Agreement on or before the date which is fifteen (15) days from the date in which the original draft of this Agreement is tendered to Grantor or Grantor's representative or attorney. The signing bonus shall not be credited against other payments to be made to Grantor under this Agreement and shall be paid within sixty (60) days of the Effective Date of the Agreement.

(b) If Grantee exercises the Option, a one-time payment calculated by multiplying $_____ per acre for each acre of transmission line constructed on the Property which shall be paid within sixty (60) days after the Commencement Date. The acreage amount will be determined by a survey to be completed before the transmission line is constructed. Should the actual acreage amount increase on the Property after the entire transmission line has been constructed, Grantee will compensate Grantor for the additional acreage at the aforementioned per acre rate.

Crop Compensation. Each time Grantee exercises its rights under the Agreement it shall compensate Grantor or its tenants for all crops (including native or improved grass pasture) lost or destroyed by reason of the use, but in no case shall Grantee be required to pay more than a single, total crop loss in any one crop year. Damages will be calculated by the following formula: Unit Price x Unit Yield Per Acre x Acres Damaged = Damages. Prices for damaged or destroyed crops will be based on the average of the last previous March 1st and September 1st Chicago Board of Trade ("**CBOT**"), prices for that crop. If the crop is not traded on the CBOT, the price shall be based on the dominant trading exchange for that crop, but the formula shall remain the same. Yield will be the average of the previous three (3) years' yields according to Grantor's records for the smallest parcel of land that includes the damaged area. If Grantor does not have yield records available, the parties will use National Agricultural Statistic Services records or other commonly used yield information available for the area. The Parties shall try in good faith to agree to the extent of damage and acreage affected. If they cannot agree, they shall have the area measured and extent of damage assessed by an impartial party such as a crop insurance adjuster or extension agent. A crop compensation form shall be completed and delivered to Grantee within two hundred forty (240) days after the damage occurs. Payment shall be made within sixty (60) days after mutual execution of the crop compensation form.

Confidentiality. Any amounts paid to Grantor are to remain strictly, totally and completely confidential and any breach of the terms of this paragraph shall expose Grantor to, and entitle Grantee to seek, all equitable relief as well as monetary damages from Grantor.

Payment Allocation. Payment due under the Agreement shall be distributed as follows:

[*insert %*]% to [*insert Grantor's Name*]

Signed and completed W-9 form required from each payee before payment is due from Grantee.

Grantor:

_____ [*insert month*] _____, [*insert year*]
[*insert Grantor's Name*]

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

9. Describe the Applicant's route selection procedures. Detail the feasible alternative routes considered. For each such route, provide the estimated cost and identify and describe the cost classification (e.g., "conceptual cost," "detailed cost," etc.). Describe the Applicant's efforts in considering these feasible alternatives. Detail why the proposed route was selected and other feasible alternatives were rejected. In the event that the proposed route crosses, or one of the feasible routes was rejected in part due to the need to cross, land managed by federal, state, or local agencies or conservation easements or open space easements qualifying under §§ 10.1-1009 – 1016 or §§ 10.1-1700 – 1705 of the Code (or a comparable prior or subsequent provision of the Code), describe the Applicant's efforts to secure the necessary ROW.

Response: For the MARL Project, NEET VA assembled a cross-functional team of experienced internal subject-matter experts that have extensive experience in greenfield project development, including from its Development, Transmission Planning, Engineering & Construction, Environmental Services, Land, Regulatory, Legal, and Tribal teams, and retained an expert outside siting consultant, Environmental Resources Management, Inc. ("ERM", and collectively with these NEET VA subject matter experts, the "Routing Team"). The Routing Team worked to develop and ultimately select the Proposed Route for the MARL Project. ERM was retained by NEET VA to perform the detailed routing and siting analysis.

The objective of the Routing Study was to identify a Proposed Route and Alternative Routes that reasonably minimizes the potential impacts of the MARL Project on the natural and built environment, utilizes existing routing opportunities where available, reduces special engineering design requirements where feasible, and can be constructed and operated in a safe and reliable manner. Throughout this process, NEET VA sought to identify feasible, constructible, and permittable alternative routes that adhere to the route development criteria and guidelines established by the Routing Team for the MARL Project.

The goal of the routing process was to identify Alternative Routes that meet the technical and economic needs of the MARL Project while avoiding potential constraints (*e.g.*, sensitive environmental resources, residential dwellings) and taking advantage of opportunity areas (*e.g.*, existing linear infrastructure) to the greatest extent possible. Furthermore, the goal was to identify and evaluate opportunities and environmental constraints in the MARL Project Study Area to: (1) facilitate the development of feasible Alternative Routes; (2) evaluate potential impacts associated with the Alternative Routes; and (3) ultimately, identify a Proposed Route that meets the MARL Project need and that is constructable. The five main steps in this process include: (1) defining the study area; (2) identification

of constraints and opportunities; (3) identification and assessment of preliminary routes; (4) execution of field reconnaissance and stakeholder engagement including open houses; and (5) implementation of quantitative and qualitative analysis to identify the feasible route alternatives, including identifying the Proposed Route.

The first step in the routing process was to define a geographic study area in alignment with PJM's identified electric reliability requirements, which included two fixed endpoints, including the western terminus at the 502 Junction Substation in Greene County, Pennsylvania, and the eastern terminus at the PJM-designated handoff point in Frederick County, Virginia. The second step involved identifying and mapping constraints that consisted of natural environment, built environment, cultural resources, and social resources, engineering considerations, and existing opportunities (primarily including existing linear infrastructure corridors) within the study area. The third step included the identification of broad conceptual route corridors—swaths of the study area feasible for routing new transmission infrastructure—and the exclusion of areas where transmission line routing is impracticable due to land use or other constraints. The fourth step included conducting field reconnaissance and stakeholder/public engagement activities to gather local knowledge, identify sensitive resources, and help further inform routing and route selection. The fifth step then used the data collected during field reconnaissance and stakeholder outreach activities to refine the preliminary draft route options, develop end-to-end route alternatives, and conduct both quantitative and qualitative analyses of these alternatives. During all steps in the process, subject matter experts within the Routing Team were involved, making informed and necessary route adjustments, performing a route analysis, and selecting potential route options to move forward. The public and agency involvement included public outreach and obtaining feedback from members of the public and relevant federal, state, and local agencies who could have jurisdiction over required permits or authorizations necessary for project development and construction. Extensive feedback was solicited from members of the public, and the Routing Team engaged with a wide range of local, state, and federal agencies across the four states area, including within the four West Virginia counties through which the Project will pass. As described in Section 4.4 of the Routing Study, stakeholder feedback was used by the Routing Team to modify, combine or dismiss route segments.

The MARL Project will be constructed in a new ROW corridor measuring, on average, 200 feet wide. The MARL Project will require a wider ROW Corridor in some areas where additional aerial easement rights are necessary to comply with electrical standards and requirements. The full area of required MARL Project-specific ROW Corridor at any given point along the route is hereafter referred to as the "ROW Corridor." The ROW Corridor ranges from 200 feet to 426 feet.

NEET VA is requesting that the Commission grant NEET VA the flexibility to adjust the location of its ROW within a 200- to 500-foot siting corridor (referred to as the "Siting Corridor" in the Routing Study). Flexibility in the location of the ROW and structure locations is necessary for multiple reasons. First, landowners

may request that NEET VA adjust the location of the line or shift structure locations to minimize impact to their use of the land. In addition, once on-the-ground surveys can be conducted, there may be constraints identified that require a shift in the alignment or structure locations. Additionally, subsurface utility engineering and title searches may indicate underground facilities or encumbrances that were not known at the time of the Routing Study.

In general, the Study Area for the MARL Project encompassed 1,053 square miles, was 95 miles west to east (straight-line distance), and varied from 8 to 16 miles wide across the following states and counties: Pennsylvania: Greene and Fayette Counties; West Virginia: Hampshire, Mineral, Monongalia, and Preston Counties; Maryland: Garrett and Allegany Counties; and Virginia: Frederick County.

NEET VA considered the infrastructure for the Virginia Portions of the MARL Project, the amount of existing development in the area, the potential for environmental impacts and impacts on communities, and cost. After developing the study area, NEET VA identified a single electrical solution, the Virginia Portions, located entirely within Frederick County to meet the project need. The route development process for the Virginia Portions of the MARL Project is described in more detail in the Routing Study.

As discussed in more detail below and in the Routing Study, the Routing Team ultimately identified six end-to-end routing combinations with two distinct viable routes for the proposed Virginia Portions. Ultimately, NEET VA selected Alternative Routes A, C, D, and E as the Proposed Route, with Alternative Routes B and F serving as a viable Alternative Route that NEET VA intends to notice. Each route alternative is located entirely within Frederick County.

PROPOSED AND ALTERNATIVE ROUTES IN VIRGINIA

Proposed Route in Virginia (Alternative Route A, Alternative Route C, Alternative Route D, and Alternative Route E)

Within Virginia, the Proposed Route parallels existing transmission lines for 1.0 miles (41.8 percent of the Virginia total alignment) with 1.4 miles of a greenfield section (58.2 percent of the Virginia total alignment).

All parcels crossed by the Proposed Route in Virginia are privately owned. Land cover along the Proposed Route ROW corridor consists of 44.3 acres of deciduous forest, 8.6 acres of pasture/hay, 3.3 acres of mixed forest, 3.0 acres of open space, 0.2 acres of cultivated crops and <0.1 acres of evergreen forest.

Based on ERM's desktop wetland and waterbody analysis, there are no National Wetland Inventory ("NWI")-mapped Palustrine Emergent Wetland ("PEM"), Palustrine Scrub-Shrub ("PSS") or Palustrine Forested ("PFO") wetlands within the Proposed Route ROW Corridors, including ancillary facilities located outside of the ROW Corridors. Further, the modeled high probability wetlands ("MHPW")

predicted by the deep learning-based Wetland Identification Model ("WIM") analysis aligns with riverine and Palustrine Unconsolidated Bottom ("PUB") features, indicating only limited, if any, PEM, PSS, and PFO resources would be impacted by construction and operation of the Proposed Route. The Proposed Route has 10 single and complete centerline crossings of National Hydrography Dataset ("NHD")-mapped waterbodies, including 7 perennial waterbody crossings (Isaacs Creek, 5 crossings of Nixons Run, and 1 unnamed tributary to Nixons Run) and 3 unnamed intermittent tributaries to Isaacs Creek and Nixons Run.

Alternative Route in Virginia (Alternative Route B and Alternative Route F)

Within Virginia, the Alternative Route parallels existing transmission lines for 0.7 miles (28.3 percent of the Virginia total alignment) with 1.7 miles of a greenfield section (71.9 percent of the Virginia total alignment).

All parcels crossed by the Alternative Route in Virginia are privately owned. Land cover along the Alternative Route ROW Corridor consists of 41.3 acres of deciduous forest, 10.8 acres of pasture/hay, 3.1 acres of mixed forest, 3.1 acres of open space, 0.2 acres of cultivated crops and <0.1 acres of evergreen forest.

Based on ERM's desktop wetland and waterbody analysis, there are no NWI-mapped PEM, PSS, or PFO wetlands within the Alternative Route ROW Corridors, including ancillary facilities located outside of the ROW Corridors. Further, the MHPW predicted by the deep learning-based WIM analysis aligns with riverine and PUB features, indicating only limited, if any, PEM, PSS, and PFO resources would be impacted by construction and operation of the Alternative Route. The Alternative Route has the same 10 single and complete centerline crossings of NHD-mapped waterbodies as the Proposed Route, including 7 perennial waterbody crossings (Isaacs Creek, 5 crossings of Nixons Run, and 1 unnamed tributary to Nixons Run) and 3 unnamed intermittent tributaries to Isaacs Creek and Nixons Run.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

10. Describe the Applicant's construction plans for the project, including how the Applicant will minimize service disruption to the affected load area. Include requested and approved line outage schedules for affected lines as appropriate.

Response: NEET VA plans to construct the 500 kV transmission line in a manner that minimizes outage time on existing transmission facilities.

NEET VA and its Contractor will establish a local construction management office within the construction site and will staff the MARL Project with a team of experienced professionals. When unrestricted ROW access is obtained, permits are in hand, road use agreements are established, material ready to be delivered, and the project design package is finalized, NEET VA will authorize the Contractor to mobilize. Early in the construction process, material staging or laydown areas are developed. The Contractor will mobilize a small team to receive material and store it. NEET VA Execution Team Construction Managers are assigned to oversee the construction.

The Contractor will begin with tree clearing within the ROW and off-ROW access as described in the response to Section II.A.7, above. Following ROW preparation and access road preparation, the Contractor will install foundations, structures, conductor and shield wires, in that order, followed by optical fiber splicing. When construction is complete or nearing completion, a walkdown will be conducted as final verification that the line was constructed as designed. A punch list will be generated for items that the Contractor will need to fix. Any temporary ground impacts (roads, pads, crossings, and siltation and erosion control) will be restored to original condition. Final commissioning and testing of substation equipment will be coordinated with FirstEnergy. Once testing is complete, the Project will be placed in service.

NEET VA will undertake significant planning efforts to minimize potential service disruptions, including by coordinating planned outages with PJM and other impacted transmission owners and operators in accordance with PJM's transmission outage planning processes. NEET VA will request outage dates from PJM no less than one year prior to the planned outage to ensure continuity of grid operations for any transmission facility outages. NEET VA also will work with impacted transmission or distribution owners to execute necessary crossing agreements and coordinate any required outages associated with such crossings.

The DEA with PJM requires that the Woodside Substation be placed in service by December 31, 2028 and the entire MARL Project, including the Virginia Portions, be placed in service by December 31, 2031. As Dr. Abdulsalam describes in his testimony, PJM has identified a need date for this scope of work beginning in June

2027. *See* Abdulsalam Direct Testimony in response to Question No. 8. In coordination with PJM, NEET VA and NEET are working to provide a pathway to accelerate the in-service date to December 2029 or earlier, pending regulatory approvals. NEET VA expects that construction of the 500 kV transmission line associated with the MARL Project to take approximately two years once all permits and necessary ROW are obtained.

With respect to the Woodside Substation, the DEA obligates NEET VA to complete the Woodside Substation and place it into service by December 31, 2028. Construction of the Woodside Substation is currently estimated to begin in the spring of 2027. NEET VA is currently working through the Frederick County local siting process for the facility and will coordinate with transmission and distribution owners, including both Dominion Energy and FirstEnergy for their existing and planned infrastructure, to minimize service disruption when their respective lines are connected to the facility. Planned outages necessary for construction and energization of the Woodside Substation will be coordinated with PJM and other impacted transmission operators in accordance with PJM's transmission outage planning processes.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

11. Indicate how the construction of this transmission line follows the provisions discussed in Attachment 1 of these Guidelines.

Response**:** The construction of the proposed transmission line is consistent with the provisions of Attachment 1 of the Guidelines and demonstrates compliance through measures that minimize environmental and visual impacts while protecting natural resources during both construction and maintenance. The routing and construction of the MARL Project will consider the recommendations of Attachment 1 to the Commission Staff's Guidelines and implement them where practicable and not contrary to applicable law. Some examples of how the guidelines are being implemented are listed below.

Following Guideline No. 2, the MARL Project will avoid impacts to the maximum extent practicable on national historic places listed in the National Register of Historic Places ("NRHP"). The closest NRHP listed resource, Sunrise Historic Homestead, is located approximately 0.7 miles south of the Proposed Route. Additionally, a Stage I Pre-Application Analysis prepared by ERM on behalf of the NEET VA, is included as Attachment 4 of Appendix D (Virginia ERD).

The Routing Team followed Guideline No. 3 (ROWs should avoid prime or scenic timbered areas, steep slopes and proximity to main highways where practical) by siting the MARL Project's Proposed Route away from main highways. The Proposed Route avoids crossing or routing adjacent to main highways. Two route segments that were considered but dismissed in Virginia did cross and routed near the Northwestern Pike (U.S. Route 50) but were dismissed due to proximity to residential development and the highway crossing. The Proposed Route crosses two roads (Fletcher Road and Parishville Road) at nearly perpendicular angles to reduce visual impacts.

Following Guideline No. 5, the MARL Project is being designed and constructed in compliance with the NESC, NERC vegetation management required clearances, and good industry practice to ensure the safety and reliability of service.

Following Guideline Nos. 6 and 19 (limiting long tunnel views), the Proposed Route has included minor alignment changes during the two road crossings (Fletcher Road and Parishville Road). In addition, in Appendix J (Visual Impact Assessment) to the Routing Study, NEET VA has developed a photo simulation showing the Fletcher Road crossing (KOP 319) illustrating that the topography in the area will conceal potential visibility.

Following Guideline Nos. 9, 10, 12, 14 and 15: In mountainous and scenic areas where conventional ground access would require extensive grading, helicopters will be evaluated and used to the greatest extent practicable to reduce ground

disturbance, limit the creation of access roads, and preserve service reliability (Guideline No. 9). Vegetation cleared within rights-of-way that are visible to the public will be managed promptly, with trees neatly stacked along public ways and removed from the site in a timely manner, while shrubs, treetops, slash, and brush will be mulched on site and evenly distributed; trees will be cut as close to ground grade as practicable, and any burning activities will fully comply with applicable local fire and air quality regulations (Guideline No. 10). Clearing limits will be clearly delineated to protect adjacent trees, shrubs, grasses, and topsoil from unnecessary disturbance. Clearing to mineral soil will be avoided wherever feasible, and in areas where mineral soil is exposed, native topsoil will be respread and stabilized using native seed mixes and straw mulch. Excavated soils not immediately reused will be incorporated through balanced cut-and-fill grading, blended to conform with surrounding landforms, and temporarily stabilized with seeding and mulch (Guideline No. 12). Any surface scars resulting from construction will be repaired with replaced topsoil and appropriate vegetation, and erosion-prone slopes will be protected with erosion control blankets, filter socks, or similar practices (Guideline No. 14). Where steep slopes present an elevated erosion risk, terraces or other suitable erosion control measures will be installed to ensure long-term stability and compatibility with natural terrain conditions (Guideline No. 15).

Following Guideline Nos. 37, 41, and 44: The proposed galvanized steel lattice towers are appropriate for the 500 kV MARL Project. The structure will have a horizontal phase configurations to reduce height, and will utilize insulators that have a color compatible with the structure.

The construction means and methods will follow the environmental best practices defined in the environmental permit packages. The construction plan addresses erosion and siltation control, along with right of way restoration.

II. DESCRIPTION OF THE PROPOSED PROJECT

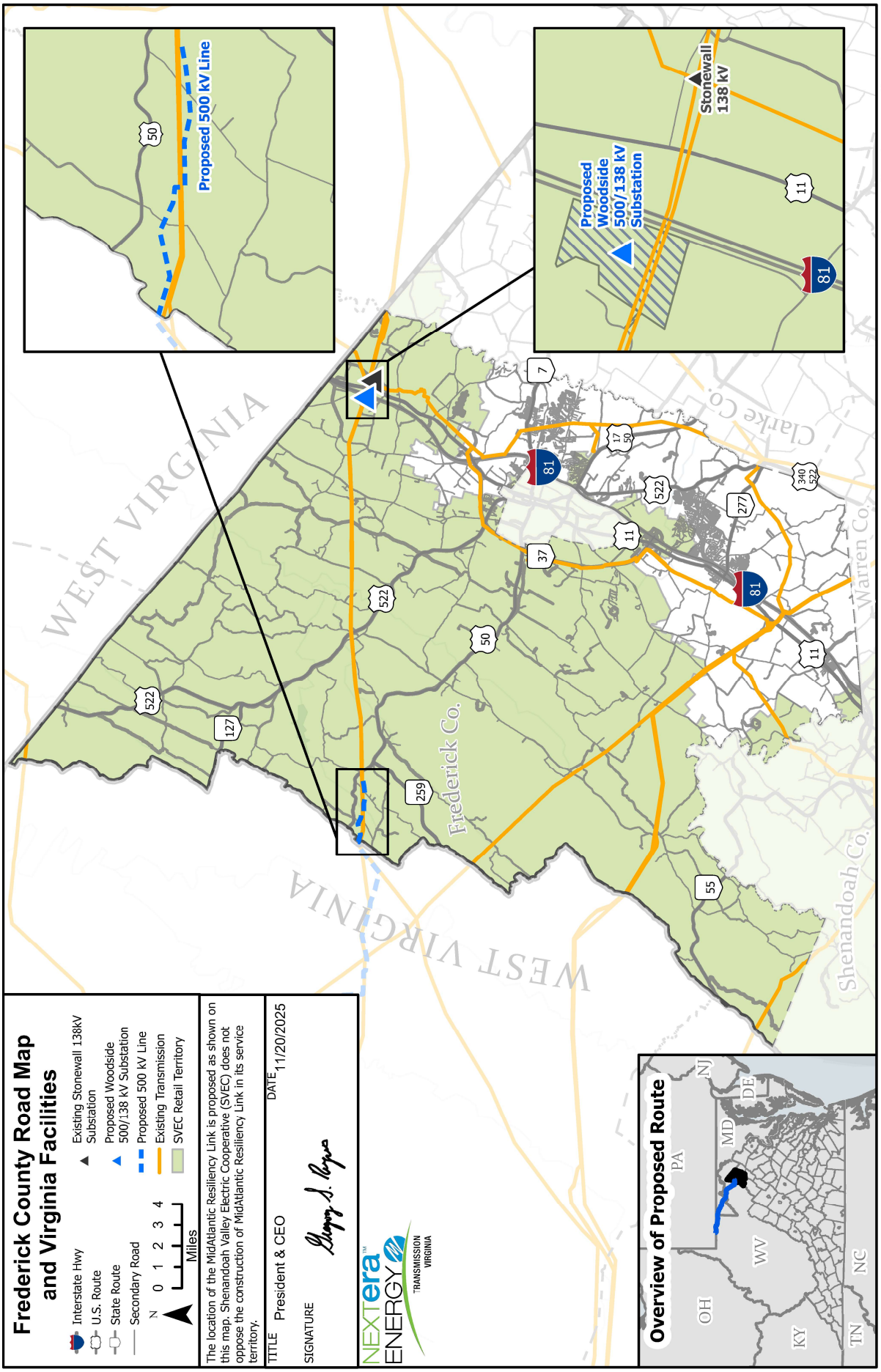
A. Right-of-way ("ROW")

12. a. Detail counties and localities through which the line will pass. If any portion of the line will be located outside of the Applicant's certificated service area: (1) identify each electric utility affected; (2) state whether any affected electric utility objects to such construction; and (3) identify the length of line(s) proposed to be located in the service area of an electric utility other than the Applicant; and

b. Provide three (3) color copies of the Virginia Department of Transportation "General Highway Map" for each county and city through which the line will pass. On the maps show the proposed line and all previously approved and certificated facilities of the Applicant. Also, where the line will be located outside of the Applicant's certificated service area, show the boundaries between the Applicant and each affected electric utility. On each map where the proposed line would be outside of the Applicant's certificated service area, the map must include a signature of an appropriate representative of the affected electric utility indicating that the affected utility is not opposed to the proposed construction within its service area.

Response: a. The proposed Virginia Portions of the MARL Project (consisting of approximately 2.4 miles of 500 kV transmission line and the new Woodside Substation) will be located entirely within Frederick County, Virginia and is located within Shenandoah Valley Electric Cooperative ("SVEC") service territory. NEET VA has confirmed that SVEC does not object to the Virginia Portions of the MARL Project.

b. An electronic copy of the VDOT "General Highway Map" for Frederick County has been marked as required and submitted with the Application. A reduced copy of the map is provided as Attachment II.A.12.b.


Frederick County Road Map and Virginia Facilities
Interstate Hwy
U.S. Route
State Route
Secondary Road
N
0 1 2 3 4
Miles
Existing Stonewall 138kV Substation
Proposed Woodside 500/138 kV Substation
Proposed 500 kV Line
Existing Transmission
SVEC Retail Territory
The location of the MidAtlantic Resiliency Link is proposed as shown on this map. Shenandoah Valley Electric Cooperative (SVEC) does not oppose the construction of MidAtlantic Resiliency Link in its service territory.
TITLE President & CEO
DATE 11/20/2025
SIGNATURE
NEXTera ENERGY TRANSMISSION VIRGINIA
Proposed 500 kV Line
Proposed Woodside 500/138 kV Substation
Stonewall 138 kV
WEST VIRGINIA
Frederick Co.
Clarke Co.
Warren Co.
Shenandoah Co.
Overview of Proposed Route
PA
NJ
DE
MD
WV
OH
KY
TN
NC

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

1. Detail the number of circuits and their design voltage, initial operational voltage, any anticipated voltage upgrade, and transfer capabilities.

Response: The MARL Project will be designed and operated at 500 kV within no anticipated voltage upgrade and will have the following transfer capabilities:

- Summer Normal: 4295 MVA
- Summer Emergency: 4357 MVA
- Winter Normal: 5066 MVA
- Winter Emergency: 5196 MVA

The line is a single circuit 500 kV AC line.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

2. Detail the number, size(s), type(s), coating and typical configurations of conductors. Provide the rationale for the type(s) of conductor(s) to be used.

Response: NEET VA's design will utilize triple-bundled 1780 kcmil 84/19 Chukar aluminum conductor steel-reinforced ("ACSR") conductor for each of the three phase positions (nine conductors for the circuit), along with two optical ground wires ("OPGW") to facilitate lightning shielding and provide the primary and secondary communication paths for line protection. A typical structure is shown in a cross-section view in Attachment II.A.5 and includes the conductor and shield wire configuration.

NEET VA and NEET MA selected the triple-bundled 1780 kcmil Chukar ACSR conductor bundle because it achieved the rating and lower impedances needed to address the violations identified by PJM I 2022 Window 3. With 500 kV AC lines, a three-conductor bundle option is common in order to ensure adequate thermal transfer capabilities, reactive margins, lower losses, and increased operational flexibility to manage the voltage fluctuations during high transfer periods across the transmission interfaces that the MARL Project is intended to address. Per PJM's interface limit data, the addition of the MARL 500 kV transmission line increases reactive transfer capabilities of the associated 500 kV interfaces by nearly 2,000 MW.

NEET VA selected the triple-bundled 1780 kcmil 84/19 Chukar ACSR conductor because it achieves the required rating and impedance necessary to address the violations identified by PJM in the 2022 Window 3 solicitation. This configuration ensures adequate thermal transfer capability, reactive margin, lower losses, and operational flexibility to manage voltage fluctuations during high transfer conditions across transmission interfaces. NEET VA does not believe that the ACSR conductors proposed herein meet the definition of "advanced conductors" as that term defined in Va. Code § 56-597 (hereinafter, "Advanced Conductors").

Although Advanced Conductors such as aluminum conductor steel supported ("ACSS") and composite core designs can provide higher standalone thermal ratings, the overall transmission line rating is constrained by series substation equipment, limiting the practical benefit of higher-temperature conductors for this project. The selected ACSR design satisfies PJM performance requirements and system needs without introducing additional cost, design complexity, or constructability considerations that are not required to meet the identified reliability objectives.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

3. With regard to the proposed supporting structures over each portion of the ROW for the preferred route, provide diagrams (including foundation reveal) and descriptions of all the structure types, to include:

a. mapping that identifies each portion of the preferred route;

b. the rationale for the selection of the structure type;

c. the number of each type of structure and the length of each portion of the ROW;

d. the structure material and rationale for the selection of such material;

e. the foundation material;

f. the average width at cross arms;

g. the average width at the base;

h. the maximum, minimum and average structure heights;

i. the average span length; and

j. the minimum conductor-to-ground clearances under maximum operating conditions.

Response:

a. As part of Routing Study, ERM developed Appendix D (Virginia ERD) to consider state-specific requirements and data. Attachment 1 of the Virginia ERD includes mapping of the Proposed Route and Alternative Route including the proposed structures, which are subject to change during final engineering design.

b. NEET VA will utilize primarily single circuit self-supported lattice tower structures with a horizontal phase configuration. NEET VA may utilize other structure types as necessary based on line deflection angles and topography.

NEET VA's engineers, aided by its professional estimators, determined that lattice tower structures are the most cost-effective and reliable solution for the MARL Project and are easier to construct in rough terrain with difficult access. NEET VA's affiliates have utilized both lattice and tubular steel 500 kV

structures. NEET VA affiliates have built more than 1,000 circuit miles of 500 kV lines, mostly in Florida, since 1980. These lines utilized both self-supported lattice structures and tubular steel H-frames and monopole structures. NEET VA's affiliates have also built 250 miles of 230 kV double-circuit line in Ontario, Canada using Guyed-Y lattice towers due to terrain, and are currently designing a double circuit 500 kV line in Nevada using self-supported lattice towers and tubular steel structures.

Based upon this experience, NEET VA selected lattice tower structures as the primary transmission structure for the MARL Project because they are the most cost-effective and suitable structure for the project. Lattice towers are light weight, and the foundations are smaller than those required for tubular steel H-frame structures. In addition, lattice towers can better accommodate changes in slope at the structure location through the use of leg extensions.

c. On the Virginia Portions of the Proposed Route of the MARL Project (2.4 miles in length), NEET VA anticipates that it will install a total of 13 structures, of which five will be tangent towers, three will be running angle structures, one will be a strain structure, and four will be dead-end structures. Additional structure data, including diagrams of the expected structure types, are provided in Attachment II.A.5.

d. NEET VA's proposed structures will be primarily made of galvanized steel. These structures were selected due to their proven structural performance, long-term durability, and versatility across environmental conditions. Galvanized steel components will have resistance to corrosion. Steel lattice structures have adequate strength to resist the loads that are the basis for structure designs, including extreme loading conditions caused by ice accumulation and high winds typical in the region.

e. The typical steel lattice tower structures will have four 3- to 5-foot diameter drilled pier concrete foundations, and the footprint of the typical lattice tangent towers will range from 24 feet x 24 feet to 50 feet x 50 feet. The foundations are expected to be predominantly drilled concrete pier foundations. Foundation diameter and depth, as well as foundation type, will depend on soil conditions. Alternative foundation types such as micro-pile or grillage type foundations may also be used in areas where accessibility is difficult or where soil profiles are unfavorable for pier foundations.

f. The average structure width at the cross arms of the typical lattice tower structures will be approximately 99 feet.

g. The average width at the base of the typical lattice tangent tower structures will range from 24 square feet to 50 square feet.

h. The typical structure heights on the Virginia Portions of the Proposed Route will range from 115 to 190 feet tall, with an average height of approximately 150 feet.

i. The average span length between transmission structures will be approximately 1,015 feet for the Virginia Portions of the Proposed Route and 1,258 feet for the Proposed Route across the entire MARL Project.

j. The basic minimum conductor-to-ground design clearance under maximum operating conditions will be 31.5 feet. NEET VA will design the line with adequate clearance to ground, linear facilities, and various features to ensure the safety of the public and utility employees, based primarily on the NESC, NERC Vegetation Management Clearances, crossing agreements, and good engineering practice.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

4. With regard to the proposed supporting structures for all feasible alternate routes, provide the maximum, minimum and average structure heights with respect to the whole route.

Response: The approximate structure heights located along the Virginia Portions of the Proposed and Alternative Route are provided in the table below, based on preliminary conceptual design, not including foundation reveal and subject to change based upon final engineering design.

Route	Minimum (ft.)	Maximum (ft.)	Average (ft.)
Proposed Route (Alternative Routes A, C, D, and E)	115	190	150
Alternative Route (Alternative Routes B and F)	115	190	150

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

5. For lines being rebuilt, provide mapping showing existing and proposed structure heights for each individual structure within the ROW, as proposed in the application.

Response: Not applicable. Lines are not being rebuilt.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

6. Provide photographs for [a] typical existing facilities to be removed, [b] comparable photographs or representations for proposed structures, and [c] visual simulations showing the appearance of all planned transmission structures at identified historic locations within one mile of the proposed centerline and in key locations identified by the Applicant.

Response: [a] Not applicable. No existing facilities are being removed.

[b] Representations of proposed structures are provided in Attachment II.A.5.

[c] Visual simulations showing the appearance of the proposed transmission structures at identified historic locations within 1.0 mile of the Proposed Route, Alternative Route, and Woodside Substation site of the MARL Project are provided. See Attachment 4 (Stage I Pre-Application Analysis Report) of Appendix D (Virginia ERD) for a map of the simulation locations, the existing views at the historic properties, and simulated proposed views from key observation points ("KOPs"). These simulations were created using GIS modeling to depict whether the proposed structures will be visible from the identified historic property. The historic properties evaluated are described below.

Proposed Route and Alternative Route

Historic Property	Viewpoint(s)	Comments
Robert Muse House/Sunrise (VDHR ID# 034-0486)	111-CR	The Proposed Route and Alternative Route would have no impact on 034-0486

Woodside Substation Site

Historic Property	Viewpoint(s)	Comments
Branson House/Greenwood (VDHR ID# 034-0137)	138-CR	The Woodside Substation site would have no more than a minimal impact on 034-0137.
Hugh Lupton House (VDHR ID# 034-0929)	137-CR	The Woodside Substation site would have no more than a minimal impact on 034-0929.

II. DESCRIPTION OF THE PROPOSED PROJECT

C. Describe and furnish plan drawings of all new substations, switching stations, and other ground facilities associated with the proposed project. Include size, acreage, and bus configurations. Describe substation expansion capability and plans. Provide one-line diagrams for each.

Response: The new Woodside Substation will be a 500/138 kV Substation, and includes a STATCOM, two 500/138 kV transformers, four 500 kV line terminals, two capacitor banks, and two 138 kV line terminals. The Woodside Substation will be constructed on two parcels totaling approximately 72 acres, of which approximately 36 acres will be utilized for new permanent infrastructure including the substation, roads, and acreage within fences. As a part of temporary activities to support site development and visual screening, there may be grading and earthwork throughout the parcel.[14]

Please see Attachment II.C. for the one-line diagrams and drawings for the proposed Woodside Substation.

[14] The siting of the Woodside Substation is subject to the jurisdiction of Frederick County. *See BASF Corp. v. State Corp. Comm'n*, 289 Va. 375 (2015).

CONFIDENTIAL ATTACHMENT II.C REDACTED

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

A. Describe the character of the area that will be traversed by this line, including land use, wetlands, etc. Provide the number of dwellings within 500 feet, 250 feet and 100 feet of the centerline, and within the ROW for each route considered. Provide the estimated amount of farmland and forestland within the ROW that the proposed project would impact.

Response: The character of the area that will be traversed by the Virginia Portions of the MARL Project is described in detail in Appendix D (Virginia ERD) to the Routing Study. For additional detail, see the Appendix D (Virginia ERD) specifically as to land use, forest, and agricultural lands (Section 2.2); wetlands and waterbodies (Section 2.3); natural resources (2.4); and historic resources (2.5). In addition, see the DEQ Supplement Section 2B (Water Sources), Section 2G (Natural Heritage, Threatened and Endangered Species) and Section 2L (Recreation, Agricultural, and Forest Resources) for additional details. Below is a summary of information for the two distinct routes, the Proposed Route and Alternative Route.

Frederick County follows the federal definition of important farmlands, which include Prime Farmland, Unique Farmland, and Farmland of Statewide or Local Importance, with these designations reported to and tracked by the United States Department of Agriculture ("USDA"). NEET VA determined from the USDA Natural Resources Conservation Service Soil Survey Geographic Database ("SSURGO") that neither the Proposed Route or the Alternative Route cross any Prime Farmland or Farmland of Local, Statewide, or Unique Importance.

Land cover along the Proposed Route ROW Corridor consists of 44.3 acres of deciduous forest, 8.6 acres of pasture/hay, 3.3 acres of mixed forest, 3.0 acres of open space, 0.2 acres of cultivated crops, and <0.1 acres of evergreen forest.

Land cover along the Alternative Route ROW Corridor consists of 41.3 acres of deciduous forest, 10.8 acres of pasture/hay, 3.1 acres of mixed forest, 3.1 acres of open space, 0.2 acres of cultivated crops and <0.1 acres of evergreen forest.

Proposed Route in Virginia (Alternative Route A, Alternative Route C, Alternative Route D, and Alternative Route E)

The Proposed Route is approximately 2.4 miles in length, and enters Virginia in Frederick County, paralleling an existing 500 kV transmission corridor. The route then deviates away from the existing 500 kV transmission corridor for 0.6 mile to avoid residential properties off of Fletcher Road. The Proposed Route continues in a southeasterly direction until reaching the existing transmission corridor. At this point the routes cross the corridor perpendicularly, crossing both a 500 kV and a 138 kV transmission lines. Once the routes cross the transmission line corridors, they immediately head east, parallelling the transmission line corridors on the south side and crossing over Isaacs Creek. Near MP 106.7 (as measured on the Proposed

Route), the routes deviate away from the existing transmission lines to avoid a substation and residential development, crossing Parishville Road and terminating at the handoff point.

Based on review of various digital datasets, maps, and recent (2025) digital aerial photography, there are no residential dwellings within the ROW Corridor or within 100 or within 250 feet of the centerline. There are 4 residential dwellings within 500 feet of the centerline of the Proposed Route.

Alternative Route in Virginia (Alternative Route B and Alternative Route F)

The Alternative Route is approximately 2.4 miles in length, and enters Virginia in Frederick County at MP 104.9 (as measured on Alternative Route B), less than 200 feet north of where the shared alignment of the Proposed Route enters Virginia. The Alternative Route continues northeasterly for 0.5 mile then turn southeasterly, meeting up with the Proposed Route then continuing in a southeasterly direction until reaching the existing transmission line corridor. At this point, the routes cross the corridor perpendicularly, crossing a 500 kV transmission line and a 138 kV transmission line near MP 106.0 (as measured on Alternative Route B). Once the routes cross the transmission line corridors, they immediately head east, parallelling the transmission line corridors on the south side. Near MP 106.5 (as measured on Alternative Route B), the routes deviate away from the existing transmission line corridors, crossing Parishville Road and terminating at Structure 107-2 near the handoff point.

Based on review of various digital datasets, maps, and recent (2025) digital aerial photography, there are no residences within the right-of-way or within 100 or within 250 feet of the centerline. There are 4 residential dwellings within 500 feet of the centerline of the Alternative Route.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

B. Describe any public meetings the Applicant has had with neighborhood associations and/or officials of local, state or federal governments that would have an interest or responsibility with respect to the affected area or areas.

Response: NEET VA has conducted outreach and held numerous meetings with a range of stakeholders – including local, state, and federal officials; environmental, cultural and Tribal agencies; PJM and other utilities; as well as neighborhood associations and other organizations – throughout the entire project region. NEET VA's meetings with local, state, or federal agencies and officials are provided in Section III.J. of this Appendix.

In addition to meetings with agencies and governmental officials, NEET VA held public meetings with Ridgeway Estates, a non-profit/neighborhood organization with potential interest in or responsibility with respect to the Virginia Portions of the MARL Project.

Public Outreach and Open House Meetings

NEET VA understands the importance of obtaining public feedback from a broad range of interested stakeholders. In order to ensure that it received broad public feedback, NEET VA and NEET MA have conducted a robust public outreach program that included several different means of outreach and collecting information from the project area.

In February 2025, NEET VA and NEET MA sent a total of 22,769 postcards to landowners within a two-mile buffer of the existing transmission line corridors in the Study Area, notifying them of the project and soliciting initial feedback. This included 541 postcards sent to landowners in Frederick County, Virginia. A copy of the postcard sent is provided in Attachment III.B.

Virtually, NEET VA and NEET MA also established a project website and Facebook page to inform the public about the MARL Project and obtain information from landowners within the Study Area about their comments regarding the proposed Project. The project website included a routing tool that allowed interested parties to review and provide specific comments and feedback on the Study Area, prior to the draft preliminary route options being made public. NEET VA and NEET MA also established a dedicated email inbox and telephone hotline to receive information about the project and answer questions.

In May 2025, NEET VA and NEET MA updated the project online mapping survey and conducted eight public open houses in total. These open houses included one held on May 20, 2025 in Gore, Virginia, in Frederick County near the Virginia Portions of the MARL Project. In preparation for these meetings, NEET VA and NEET MA sent a total of 10,398 postcards to landowners within a one-mile radius

of the draft route options presented at the open houses, the area most likely to be potentially affected by the MARL Project, notifying them of the upcoming open houses, including 312 postcards to Frederick County. NEET VA and NEET MA advertised the Open Houses with local news outlets and radio stations, sent out a digital newsletter informing recipients of the upcoming events, and announced them on the project's Facebook page. A copy of the postcard sent is provided in Attachment III.B.

NEET VA and NEET MA have received over 1,500 comments from residents and other interested parties, including about 60 comments from the Frederick County area, through online surveys, direct comment cards at open houses, and phone call or email inquiries. The first online survey which opened in February 2025 received 540 responses and the second online survey in May 2025 received 670 responses and 49 comments cards were received at the open houses. NEET VA and NEET MA also have received and responded to over 370 inbound inquiries received through the telephone and email hotlines. All of this feedback was reviewed and was instrumental in driving decisions in the route selection process.

Environmental Justice

Potential impacts on Environmental Justice ("EJ") communities crossed by the Proposed Route and Alternative Route would be limited to temporary construction impacts (*e.g.*, noise, dust, traffic, ground disturbance) and visual impacts. The ROW Corridors all cross the same census block group ("CBG"). Of the 17 CBGs in Virginia within 10 miles of the MARL Project facilities, ten CBGs meet at least one criterion for consideration as an EJ community or population. This includes the CBG that contains the Proposed Route and Alternative Route, which meets EJ criteria related to low-income populations.

Within CBGs that meet EJ criteria—particularly the CBGs that contain MARL Project facilities—the direct impacts described in Sections 2.1 through 2.5 of Appendix D (Virginia ERD) could potentially have disproportionately large and adverse impacts on residents, especially those who identify as a race and ethnicity other than non-Hispanic White, are linguistically isolated, and/or meet low-income criteria. Because the ROW Corridors affect the same CBGs, the Proposed Route and Alternative Route for the MARL Project would have the same impacts on EJ communities and populations. A detailed discussion is provided in Appendix D (Virginia ERD) of the Routing Study.

As discussed in this Section III.B, NEET VA has engaged extensively all communities within the Study Area, including people in the EJ communities discussed herein.

In addition to its evaluation of impacts, NEET VA has and will continue to engage the EJ Communities and others affected by the MARL Project in a manner that allows them to meaningfully participate in the MARL Project development and

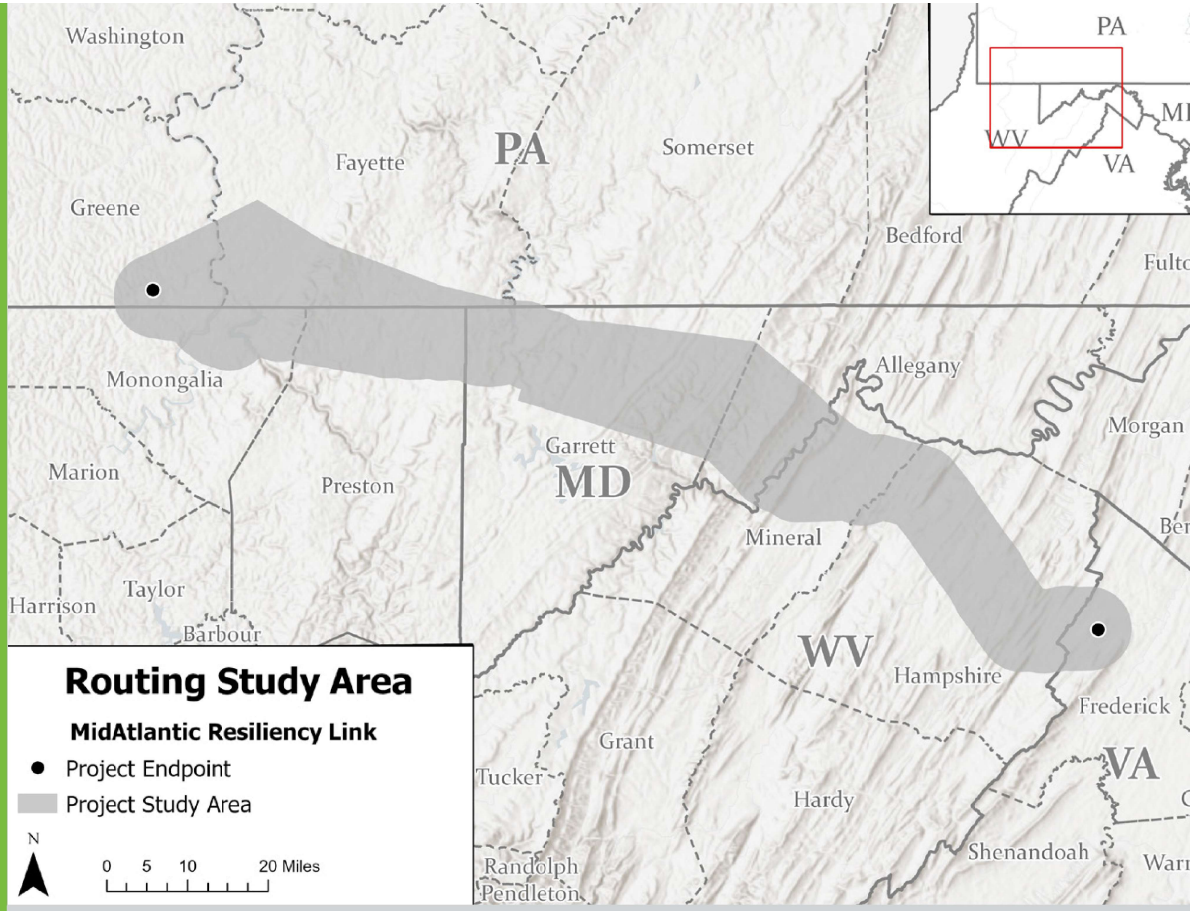
approval process so that NEET VA can take their views and input into consideration.

ONLINE SURVEY

NextEra Energy Transmission, LLC subsidiaries[1] invite you to **share your input** regarding the **MidAtlantic Resiliency Link,** a proposed electric transmission line project in the region.

Your feedback on this survey is very valuable to the process, but you will also have several opportunities to provide additional feedback as the planning process continues. We anticipate hosting in-person open houses in Spring 2025 and filing with the state commissions in Fall 2025.

[1]NextEra Energy Transmission MidAtlantic, Inc. and NextEra Energy Transmission Virginia, Inc. are subsidiaries of NextEra Energy Transmission, LLC.



At this time, no route has been selected. The map above demonstrates the study area for which the end points were determined by the regional grid operator. Once a route is selected, the total corridor is expected to be approximately 200-feet wide.

Please visit www.midatlanticresiliencylink.com or scan the **QR code** to learn more about the project.

122684

NEXTera™ ENERGY TRANSMISSION

About the MidAtlantic Resiliency Link

The MidAtlantic Resiliency Link is a proposed project selected by the regional grid operator to serve the **critical need for reliable electricity** in the region by building a new approximately 105-mile 500-kilovolt (kV) transmission line across Maryland, Pennsylvania, West Virginia and Virginia as well as a new 500/138-kV substation in Virginia. Beyond enhancing reliability, the project will spur job opportunities and investment in the local community while also generating additional opportunities for economic development.

About NextEra Energy Transmission, LLC

NextEra Energy Transmission, LLC, a subsidiary of NextEra Energy, Inc., LLC, is a leading competitive electric transmission company in North America. NextEra Energy Transmission, LLC's subsidiaries and affiliates own, develop, finance, construct, operate and maintain transmission assets across the continent.

www.midatlanticresiliencylink.com | MARL@nexteraenergy.com | 833-849-1461

The MidAtlantic Resiliency Link invites you to attend an open house to learn more about the project.

Please stop by any of the open houses as your schedule allows. There will not be a formal presentation. Project representatives will be available to answer questions and provide project-related information.

NEXTera™ ENERGY TRANSMISSION

OPEN HOUSES

All open houses are from 3 p.m. - 7 p.m.

May 5 Slanesville Volunteer Fire Company
6951 Bloomery Pike, Slanesville, WV 25444

May 6 Friendsville Volunteer Fire and Rescue Department
122 Walnut Street, Friendsville, MD 21531

May 7 Good Will Fire Company Armory
2 Advocate Court, Lonaconing, MD 21539

May 8 Greater Cumberland Regional Airport
165 Terminal Loop, Wiley Ford, WV 26767

May 12 Erickson Alumni Center
1 Alumni Drive, Morgantown, WV 26506

May 13 Fairchance Volunteer Fire Department
31 Pittsburgh Street, Fairchance, PA 15436

May 14 Bruceton Brandonville Volunteer Fire Department
142 Union Street, Bruceton Mills, WV 26525

May 20 Gore Volunteer Fire & Rescue Company
7184 Northwestern Turnpike, Gore, VA 22637

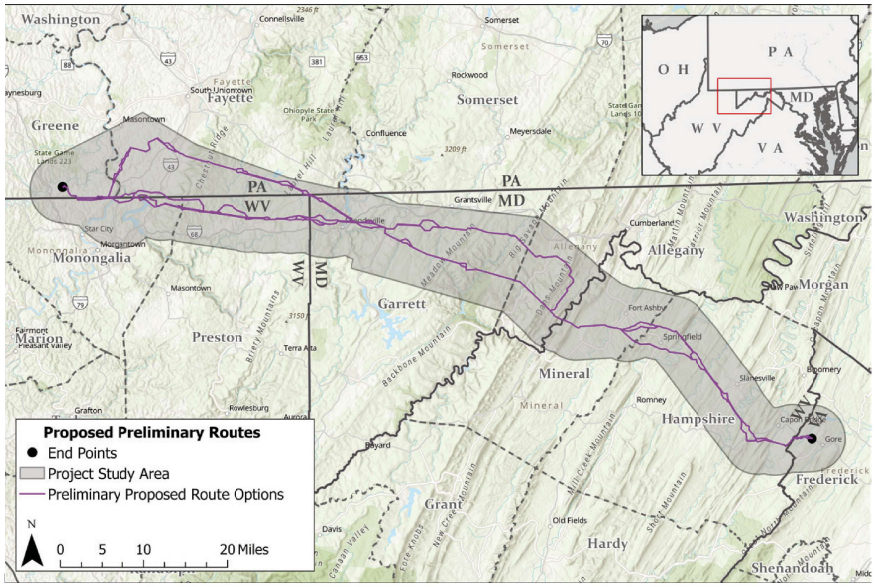
Contact Us | 833-849-1461 | MARL@nexteraenergy.com | www.midatlanticresiliencylink.com

[1]NextEra Energy Transmission MidAtlantic, Inc. and NextEra Energy Transmission Virginia, Inc. are subsidiaries of NextEra Energy Transmission, LLC.

125051

Join us for an open house

NextEra Energy Transmission subsidiaries[1] invite you to provide feedback on the MidAtlantic Resiliency Link, an approximately 105-mile 500-kV transmission line and 500/138-kV substation that's designed to improve the reliability of the electric grid. Attend the open houses to provide your input on the draft route options.



At this time, no route has been selected. The map above shows draft routes for the proposed transmission line that have been identified after field reviews, technical studies and public input. Once a route is determined, the total corridor is anticipated to be about 200-feet wide.

www.midatlanticresiliencylink.com
Pennsylvania I West Virginia I Maryland I Virginia

NEXTera ENERGY TRANSMISSION

BUILDING COMMUNITY CONNECTIONS

The MidAtlantic Resiliency Link invites you to attend an open house to learn more about the project.



Please stop by any of the open houses as your schedule allows. There will not be a formal presentation. Project representatives will be available to answer questions and provide project-related information

All open houses are from 3 p.m. - 7 p.m.

May 5, 2025 from 3 p.m. - 7 p.m.
Slanesville Volunteer Fire Company
6951 Bloomery Pike, Slanesville, WV 25444

May 6, 2025 from 3 p.m. - 7 p.m.
Friendsville Volunteer Fire and Rescue Department
122 Walnut Street, Friendsville, MD 21531

May 7, 2025 from 3 p.m. - 7 p.m.
Good Will Fire Company Armory
2 Advocate Court, Lonaconing, MD 21539

May 8, 2025 from 3 p.m. - 7 p.m.
Greater Cumberland Regional Airport
165 Terminal Loop, Wiley Ford, WV 26767

May 12, 2025 from 3 p.m. - 7 p.m.
Erickson Alumni Center
1 Alumni Drive, Morgantown, WV 26506

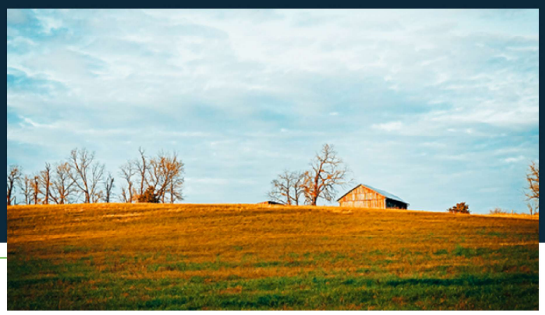
May 13, 2025 from 3 p.m. - 7 p.m.
Fairchance Volunteer Fire Department
31 Pittsburgh Street, Fairchance, PA 15436

May 14, 2025 from 3 p.m. - 7 p.m.
Bruceton Brandonville Volunteer Fire Department
142 Union Street, Bruceton Mills, WV 26525

May 20, 2025 from 3 p.m. - 7 p.m.
Gore Volunteer Fire & Rescue Company
7184 Northwestern Turnpike, Gore, VA 22637

CONNECT WITH US

We will regularly send out newsletters with updates on the MidAtlantic Resiliency Link, a new transmission line from Frederick County, Virginia, to Greene County, Pennsylvania.



First name*

Last name*

Email*

State/Province*

Please Select

Postal code*

By completing and submitting this form, you agree to receive future communications from NextEra Energy Transmission and/or subsidiaries. View our **Terms & Conditions** and **Privacy Policy**.

protected by reCAPTCHA
Privacy - Terms

Submit

Connect with the team

MARL@nexteraenergy.com

www.facebook.com/MidAtlanticResiliencyLink

833-849-1461

[1]NextEra Energy Transmission MidAtlantic, Inc. and NextEra Energy Transmission Virginia, Inc. are subsidiaries of NextEra Energy Transmission, LLC.

Copyright © 2025 NextEra Energy, Inc. All rights reserved.

View in browser



We're looking forward to continuing our conversation with the community

Thank you to everyone who participated in our recent survey about the proposed MidAtlantic Resiliency Link project. We've received hundreds of responses over the past month which we are currently reviewing.

Your feedback is invaluable to the routing study process as it helps us make informed decisions that reflect community needs and priorities.

We look forward to continuing this conversation at our open houses in May 2025, where you will be able to provide further feedback on the route study area, including the ability to comment on potential routing options. More details on the open houses will be shared in the next newsletter and added to the project website.

Thank you again for your feedback. For additional information, please visit our website.

Know anyone who would be interested in receiving this news?
Send them the sign-up form.

SIGN-UP FORM

NextEra Energy Transmission
700 Universe Blvd., Juno Beach, Florida, 33408

Terms & Conditions | Privacy Policy

This is an advertisement; you are receiving this email because you requested information from NextEra Energy Transmission.

You can unsubscribe at any time.

Copyright © 2025 All rights reserved.

View in browser



You're invited to our open houses

Come and learn about the proposed MidAtlantic Resiliency Link, an approximately 105-mile 500-kV transmission line and 500/138-kV substation, which are designed to improve the reliability of the electric grid. Project representatives will be available to answer your questions and provide project-related information so you can learn how this project could benefit your community. This is also an opportunity for you to provide your input on the draft route options. *Light refreshments will be served.*

When: Monday, May 5
Time: 3-7 p.m.
Where: Slanesville Volunteer Fire Company
6951 Bloomery Pike, Slanesville, WV 25444

When: Tuesday, May 6
Time: 3-7 p.m.
Where: Friendsville Volunteer Fire and Rescue Department
122 Walnut Street, Friendsville, MD 21531

When: Wednesday, May 7
Time: 3-7 p.m.
Where: Good Will Fire Company Armory
2 Advocate Court, Lonaconing, MD 21539

When: Thursday, May 8
Time: 3-7 p.m.
Where: Greater Cumberland Regional Airport
165 Terminal Loop, Wiley Ford, WV 26767

When: Monday, May 12
Time: 3-7 p.m.
Where: Erickson Alumni Center
1 Alumni Drive, Morgantown, WV 26506

When: Tuesday, May 13
Time: 3-7 p.m.
Where: Fairchance Volunteer Fire Department
31 Pittsburgh Street, Fairchance, PA 15436

When: Wednesday, May 14
Time: 3-7 p.m.
Where: Bruceton Brandonville Volunteer Fire Department
142 Union Street, Bruceton Mills, WV 26525

When: Tuesday, May 20
Time: 3-7 p.m.
Where: Gore Volunteer Fire & Rescue Company
7184 Northwestern Turnpike, Gore, VA 22637

We look forward to seeing you there,

The MidAtlantic Resiliency Link Team

LEARN MORE

NextEra Energy Transmission
700 Universe Blvd., Juno Beach, Florida, 33408

Terms & Conditions | Privacy Policy

This is an advertisement; you are receiving this email because you requested information from NextEra Energy Transmission.

You can unsubscribe at any time.

Copyright © 2025 All rights reserved.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

C. Detail the nature, location, and ownership of each building that would have to be demolished or relocated if the project is built as proposed.

Response: It is not anticipated that any buildings in Virginia would have to be demolished or relocated along the Proposed Route.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

D. Identify existing physical facilities that the line will parallel, if any, such as existing transmission lines, railroad tracks, highways, pipelines, etc. Describe the current use and physical appearance and characteristics of the existing ROW that would be paralleled, as well as the length of time the transmission ROW has been in use.

Response: In Frederick County, the Proposed Route will follow an existing electric transmission corridor 1.0 out of 2.4 miles. The existing corridor is comprised of a 500 kV line, the Bismark-Doubs 500 kV line, operated by Dominion Energy, and a 138 kV line, the Gore-Stonewall 138 kV line owned by FirstEnergy. The 138 kV line and the 500 kV line for multiple decades.

The new 500 kV line will require an approximately 200-foot-wide ROW. Where the new line is built parallel to the existing ROW, the new line would immediately abut the existing ROW. The Virginia Portions of the Proposed Route crosses the existing FirstEnergy and Dominion Energy 500/138 kV transmission corridors once. However, the Virginia Portions of the Proposed Route do not cross any railroads, highways, or pipelines.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

E. Indicate whether the Applicant has investigated land use plans in the areas of the proposed route and indicate how the building of the proposed line would affect any proposed land use.

Response: NEET VA has investigated the land use plans in the areas of the Virginia Portions of the Proposed Route. As discussed in the Appendix D (Virginia ERD) of the Routing Study, the MARL Project is generally consistent with the goals and strategies of the Frederick County comprehensive plan, which emphasizes maintaining agricultural and forested land uses in Rural Areas, while targeting new development to Urban Areas. The shared ROW Corridors for the Proposed Route and Alternative Route will not change the intended land use patterns within the county's Rural Areas. An improved regional electrical transmission system will also support comprehensive plan development and growth initiatives in Urban Areas by promoting reliability of electricity delivered to existing and future residences and businesses.

The Frederick County Planning Commission determined that the Woodside Substation is in substantial accord with the Frederick County comprehensive plan (see Attachment 3 (Virginia Agency Correspondence) of Appendix D (Virginia ERD). In addition, the Woodside Substation site is within the Rural Areas zoning district, where substations are permitted by-right.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

F. Government Bodies

1. Indicate if the Applicant determined from the governing bodies of each county, city and town in which the proposed facilities will be located whether those bodies have designated the important farmlands within their jurisdictions, as required by § 3.2-205 B of the Code.

2. If so, and if any portion of the proposed facilities will be located on any such important farmland:

a. Include maps and other evidence showing the nature and extent of the impact on such farmlands;

b. Describe what alternatives exist to locating the proposed facilities on the affected farmlands, and why those alternatives are not suitable; and

c. Describe the Applicant's proposals to minimize the impact of the facilities on the affected farmland.

Response: 1. Frederick County follows the federal definition of important farmlands, which include Prime Farmland, Unique Farmland, and Farmland of Statewide or Local Importance, with these designations reported to and tracked by the United States Department of Agriculture ("USDA"). NEET VA determined from the USDA Natural Resources Conservation Service Soil Survey Geographic Database ("SSURGO") that neither the Proposed Route nor the Alternative Route cross any Prime Farmland or Farmland of Local, Statewide, or Unique Importance. Based on publicly available data from Frederick County for the 2025-2030 Agricultural and Forestal Districts, one property has been identified within the South Timber Ridge District that will be crossed by the Proposed Route and Alternative Route. The South Timber Ridge Agricultural District includes 1,361.1 acres and was established in 2010. The Proposed Route and Alternative Route ROW Corridors would encompass 5.0 acres on this property.

2. No portion of the Proposed Route crosses Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance. Therefore, no alternatives were evaluated to minimize impacts to important farmlands, in Virginia.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

G. Identify the following that lie within or adjacent to the proposed ROW:

1. Any district, site, building, structure, or other object included in the National Register of Historic Places maintained by the U.S. Secretary of the Interior;

2. Any historic architectural, archeological, and cultural resources, such as historic landmarks, battlefields, sites, buildings, structures, districts or objects listed or determined eligible by the Virginia Department of Historic Resources ("DHR");

3. Any historic district designated by the governing body of any city or county;

4. Any state archaeological site or zone designated by the Director of the DHR, or its predecessor, and any site designated by a local archaeological commission, or similar body;

5. Any underwater historic assets designated by the DHR, or predecessor agency or board;

6. Any National Natural Landmark designated by the U.S. Secretary of the Interior;

7. Any area or feature included in the Virginia Registry of Natural Areas maintained by the Virginia Department of Conservation and Recreation ("DCR");

8. Any area accepted by the Director of the DCR for the Virginia Natural Area Preserves System;

9. Any conservation easement or open space easement qualifying under §§ 10.1-1009 – 1016, or §§ 10.1-1700 – 1705, of the Code (or a comparable prior or subsequent provision of the Code);

10. Any state scenic river;

11. Any lands owned by a municipality or school district; and

12. Any federal, state or local battlefield, park, forest, game or wildlife preserve, recreational area, or similar facility. Features, sites, and the like listed in 1 through 11 above need not be identified again.

Response:

1. No district, site, building, structure, or other object included in the NRHP are found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

2. No historic architectural, archeological, and cultural resources, such as historic landmarks, battlefields, sites, buildings, structures, districts or objects listed or determined eligible by the Virginia Department of Historic Resources ("DHR") are found within or adjacent to ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

3. No historic district designated by the governing body of any city or county is found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

4. There is one known archaeological site in the ROW Corridor for the Proposed Route and Alternative Route: 44FK0696. It was determined potentially eligible and the description of the site is lithic scatter (pre-contact).

5. No underwater historic properties designated by the DHR are found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

6. No National Natural Landmarks are found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

7. Virginia's Registry of Natural Areas is a voluntary program for landowners to be recognized for preservation of lands, and review of the MARL Project by Virginia Department of Conservation and Recreation ("VDCR") did not identify any of these areas within or adjacent to ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

   However, VDCR review of the Project did identify one parcel as a conservation site. Isaacs Creek PROW Conservation Site is described as "High Priority" by the VDCR because it contains habitat and buffer for one or more NHR (*i.e.*, rare plants, animals, animal assemblages, significant natural communities, or geologic features). The NHR within the conservation site is the Appalachian grizzled skipper (*Pyrgus centaureae wyandot*), a rare butterfly subspecies with a State Threatened conservation status. As a result, the Isaacs Creek PROW Conservation Site has a ranking of B3 (high significance). The existing conditions and impact assessment pertaining to the Appalachian grizzled skipper are detailed in Section 2.3.5

of Appendix D (Virginia ERD) of the Routing Study.

8. No area accepted by the Director of the DCR for the Virginia Natural Area Preserves System is found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virginia Portions of the MARL Project.

9. No conservation easements or open space easements are found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

10. No state scenic rivers are found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

11. No lands owned by a municipality or school district are found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

12. No federal, state or local battlefield, park, forest, game or wildlife preserve, recreational area, or similar features or sites are found within or adjacent to the ROW Corridor for the Proposed Route or the Alternative Route of the Virgina Portions of the MARL Project.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

H. List any registered aeronautical facilities (airports, helipads) where the proposed route would place a structure or conductor within the federally-defined airspace of the facilities. Advise of contacts, and results of contacts, made with appropriate officials regarding the effect on the facilities' operations.

Response: The Proposed Route of the MARL Project will not place a structure or conductor within the federally defined airspace of any aeronautical facilities. For additional discussion on public and private airports and helipads within the vicinity of the MARL Project, see Section 2.2.11 of Appendix D (Virginia ERD).

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

I. Advise of any scenic byways that are in close proximity to or that will be crossed by the proposed transmission line and describe what steps will be taken to mitigate any visual impacts on such byways. Describe typical mitigation techniques for other highways' crossings.

Response: No scenic byways or similar features are crossed by the Virginia Portions of the proposed MARL Project.

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

J. Identify coordination with appropriate municipal, state, and federal agencies.

Response: As described in detail in Sections III.B and V.D of the Appendix, NEET VA solicited feedback from Frederick County regarding the Virginia Portions of the MARL Project. Agency offices with potential jurisdiction over the Virginia Portions of the proposed Project that were consulted are provided in the list below.

Federal Agencies:

- U.S. Fish and Wildlife Service, Virginia Field Office
- United States Army Corps of Engineers, Norfolk District
- National Park Service, National Capital Region

Virginia State Agencies:

- Virginia Department of Conservation and Recreation
- Virginia Department of Historic Resources
- Virginia Department of Environmental Quality
- Virginia Department of Energy
- Virginia Department of Transportation

Virginia County/Local Agencies:

- Frederick County Planning Department
- Frederick County Fire Department
- Virginia Nature Conservancy
- Journey Through Hallowed Ground
- Frederick County, Virginia Economic Development Authority
- Stonewall District Planning Commission

Federally-recognized and/or State-recognized Tribes:

- Catawba Nation
- Cayuga Nation
- Cherokee Nation
- Chickahominy Tribe
- Chickahominy Tribe – Eastern Division
- Delaware Nation
- Delaware Tribe
- Eastern Band of Cherokee Indians
- Monacan Indian Nation
- Nansemond Indian Nation
- Onondaga Nation

- Pamunkey Indian Tribe
- Rappahannock Indian Tribe
- Seneca Nation
- Seneca-Cayuga Nation
- Stockbridge-Munsee Community
- The Muscogee (Creek) Nation
- The Osage Nation
- Tonawanda Seneca Nation
- Tuscarora Nation
- Upper Mattaponi Tribe

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

K. Identify coordination with any non-governmental organizations or private citizen groups.

Response: In addition to the public meetings with non-governmental organizations described in Section III.B. of this Appendix, NEET VA met with various community groups regarding the MARL Project, including:

- Top of Virginia Regional Chamber
- Frederick County Economic Development Authority
- Small Business Freedom Alliance
- Virginia Nature Conservancy
- Virginia Outdoors Foundation
- Frederick County Ruritan Club
- Laurel Ridge Community College
- Winchester Economic Development Authority, United Way of the Northern Shenandoah Valley
- Winchester Frederick County Convention and Visitor's Bureau
- Shenandoah Valley Partnership
- Top of Virginia Builder's Association
- Timber Ridge School
- 2 for 2 Foundation, a charitable organization in Clear Brook, Virginia supporting development and programs related to water and ice facilities
- Waterford Foundation
- Zephaniah Farm Vineyard
- Clarke County Historical Association
- America's Routes
- Virginia Outdoors Foundation
- Piedmont Environmental Council

III. IMPACT OF LINE ON SCENIC, ENVIRONMENTAL AND HISTORIC FEATURES

L. Identify any environmental permits or special permissions anticipated to be needed.

Response: The permits or special permissions in Virginia that are likely to be required for the proposed Project are listed below.

Potential Permits in Virginia

Activity	Potential Permit	Agency/Organization
Required for discharges of dredged or fill material into Waters of the United States (WOTUS)	Section 404 of the Clean Water Act (CWA) - Nationwide Permit 57	United States Army Corps of Engineers (USACE), Norfolk District
VDEQ provides a Section 401 WQC decision for USACE Nationwide permits (above) and Regional permits. DEQ can also provide a WQC decision by issuing a VWP permit (below).	Section 401 Virginia State Water Quality Certification	Virginia Department of Environmental Quality (VDEQ)
The VWP permit program follows state regulations and federal guidelines under the CWA. State law requires that a VWP permit be obtained before disturbing a wetland or stream	Virginia Water Protection (VWP) permit	Virginia Department of Environmental Quality (VDEQ)
Required for stormwater discharges associated with large construction activity over 1 acre	General VPDES Permit for Discharges of Stormwater from Construction Activities (VAR10)	Virginia Department of Environmental Quality (VDEQ)
Required for any activities on or near a VDOT road.	Land Use Permit	Virginia Department of Transportation (VDOT)
Required if withdrawing from non-groundwater sources.	Surface Water Withdrawal Permit	Virginia Department of Environmental Quality (VDEQ)
Required if impacting Flood Zone, including fill, new construction,	Frederick County Floodplain Permit	Frederick County Zoning Department – Floodplain Administrator

Activity	Potential Permit	Agency/Organization
substantial improvements, or other development.		
Required for all land-disturbing activities. Frederick County is designated as a Virginia Stormwater Management Program (VSMP) authority and review of stormwater is conducted at the local level.	Frederick County Land-Disturbing Permit	Frederick County Public Works Department

IV. HEALTH ASPECTS OF ELECTROMAGNETIC FIELDS ("EMF")

A. Provide the calculated maximum electric and magnetic field levels that are expected to occur at the edge of the ROW. If the new transmission line is to be constructed on an existing electric transmission line ROW, provide the present levels as well as the maximum levels calculated at the edge of ROW after the new line is operational.

Response: The electric and magnetic field levels provided below were calculated based on the average daily and five-year peak ratings for the conductor for the Virginia Portions of the Proposed Route.

Case	**Maximum Electric Field at Edge of ROW**	**Maximum Magnetic Field at Edge of ROW**
MARL 500 kV Line in proposed 200 ft ROW	1.69 kV/m both edges	Avg Daily 48 mg Five Year Peak 145 mg

IV. HEALTH ASPECTS OF ELECTROMAGNETIC FIELDS ("EMF")

B. If the Applicant is of the opinion that no significant health effects will result from the construction and operation of the line, describe in detail the reasons for that opinion and provide references or citations to supporting documentation.

Response: No significant health effects are expected to result from construction or operation of the MARL Project. With regard to EMF, this view is supported by the findings of public health agencies such as the U.S. National Cancer Institute ("NCI"), which has concluded that: "Most of the research has focused on leukemia and brain tumors, the two most common cancers in children. Studies have examined associations of these cancers with living near power lines, with magnetic fields in the home, and with exposure of parents to high levels of magnetic fields in the workplace. No consistent evidence for an association between any source of non-ionizing EMF and cancer has been found." (US NCI, https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet). Similarly, Health Canada concluded that: "The potential health effects of extremely low frequency EMF has been studied extensively. While some people are concerned that long term exposure to extremely low frequency EMF may cause cancer, the scientific evidence does not support such claims." (Health Canada, https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/everyday-things-emit-radiation/power-lines-electrical-appliances.html). The World Health Organization ("WHO") has found that "[d]espite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health." (WHO, https://www.who.int/news-room/questions-and-answers/item/radiation-electromagnetic-fields).

The independent expert reviews of EMF research conducted by Dr. Mark Israel and Dr. Nancy Lee, whose direct testimonies regarding EMF and health are being filed with this Application, find that there is no reliable scientific basis to conclude that EMF from the MARL Project will cause or contribute to adverse health effects in children or adults.

IV. HEALTH ASPECTS OF ELECTROMAGNETIC FIELDS ("EMF")

C. Describe and cite any research studies on EMF the Applicant is aware of that meet the following criteria:

1. Became available for consideration since the completion of the Virginia Department of Health's most recent review of studies on EMF and its subsequent report to the Virginia General Assembly in compliance with 1985 Senate Joint Resolution No. 126;

2. Include findings regarding EMF that have not been reported previously and/or provide substantial additional insight into findings; and

3. Have been subjected to peer review.

Response: There have been numerous peer-reviewed studies of EMF published since the Virginia Department of Health's last review of the research in October 2000. Since then, public health authorities such as the U.S. NCI, Health Canada and the WHO have evaluated the research on EMF and identified additional publications. Some additional recent peer-reviewed studies on EMF are identified in the direct testimony of Dr. Mark Israel and Dr. Nancy Lee submitted with this Application.

V. NOTICE

A. Furnish a proposed route description to be used for public notice purposes. Provide a map of suitable scale showing the route of the proposed project. For all routes that the Applicant proposed to be noticed, provide minimum, maximum and average structure heights.

Response: Please see Attachment V.A. for the map of suitable scale showing the Proposed Route and Alternative Route for the MARL Project.

Proposed Route (Alternative Routes A, C, D, and E)

The Proposed Route enters Virginia in Frederick County at MP 105.0 (as measured on the Proposed Route) approximately 0.2 miles southeast of Sirbaugh Road and 0.6 miles northwest of Hollow Road and Fletcher Road. The alignment continues southeast, paralleling an existing 500 kV transmission corridor for 0.3 mile. The Proposed Route then deviates away from the existing 500 kV transmission corridor for 0.6 mile to avoid residential properties on Fletcher Road. The Proposed Route then continues in a southeasterly direction, crossing Fletcher Road approximately 0.3 mile south of the intersect of Fletcher Road and the Northwestern Pike, until reaching the existing transmission corridor. At this point the routes cross the corridor perpendicularly, crossing both 500 kV and 138 kV transmission lines near MP 106.2 (as measured on Alternative Route A), approximately 0.2 mile north of the Isaacs Creek Dam. Once the Proposed Route crosses the transmission line corridors, they immediately head east, paralleling the transmission line corridors on the south side and crossing over Isaacs Creek at MP 106.5, approximately 0.3 mile northeast of the Isaacs Creek Dam. Near MP 106.7 (as measured on the Proposed Route), the Proposed Route deviates away from the existing transmission lines to avoid a substation and residential development, crossing Parishville Road approximately 0.3 mile northeast of Parishville Road and Anchorage Lane and terminating at the handoff point approximately 0.4 mile west from the where the existing transmission lines cross the Northwestern Pike, approximately 1.3 miles northwest of the Gore Volunteer Fire and Rescue Station.

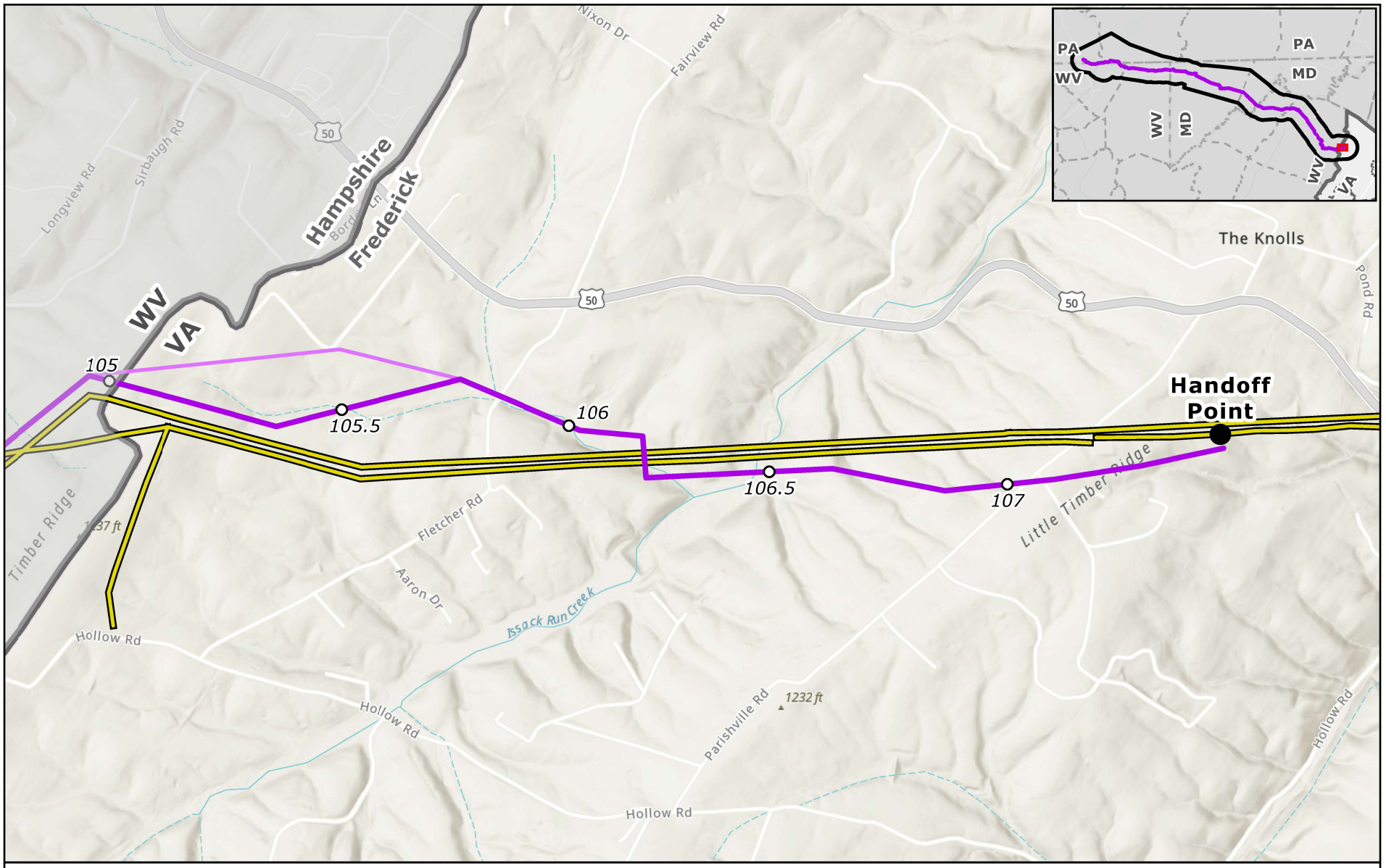
Within the Virginia Portions, the minimum structure height is 115 feet; maximum structure height is 190 feet; and the average structure height is 150 feet.

Alternative Route (Alternative Routes B and F)

The Alternative Route enters Virginia in Frederick County at MP 104.9, less than 200 feet north of where the shared alignment of the Proposed Route and Alternative Route enter Virginia, approximately 0.2 miles southeast of Sirbaugh Road and 0.6 miles northwest of Hollow Road and Fletcher Road. The Alternative Route continues northeasterly for 0.5 mile, crossing Evelyn Lee Lane approximately 0.3 miles southwest of the Northwest Pike, then turns southeasterly, meeting up with the Proposed Route near MP 105.6 and continues to follow the Proposed Route Alignment, continuing in a southeasterly direction, crossing Fletcher Road

approximately 0.3 mile south of the intersect of Fletcher Road and the Northwestern Pike, until reaching the existing transmission line corridor. At this point, the Alternative Route crosses the corridor perpendicularly, crossing a 500 kV transmission line and a 138 kV transmission line near MP 106.0 approximately 0.2 mile north of the Isaacs Creek Dam. Once the Alternative Route crosses the transmission line corridors, they immediately head east, paralleling the transmission line corridors on the south side and crossing over Isaacs Creek approximately 0.3 mile northeast of the Isaacs Creek Dam. Near MP 106.5, the Alternative Route deviates away from the existing transmission line corridors, crossing Parishville Road approximately 0.3 mile northeast of Parishville Road and Anchorage Lane and terminating at the handoff point approximately 0.4 mile west from the where the existing transmission lines cross the Northwestern Pike, approximately 1.3 miles northwest of the Gore Volunteer Fire and Rescue Station.

Within the Virginia Portions, the minimum structure height is 115 feet; maximum structure height is 190 feet; and the average structure height is 150 feet.



Legend

- Project Endpoints
- Proposed Route Milepost
- Proposed Route Centerline
- Alternative Route Centerline
- Existing High-Voltage Transmission Lines
- County Boundary
- State Border

N

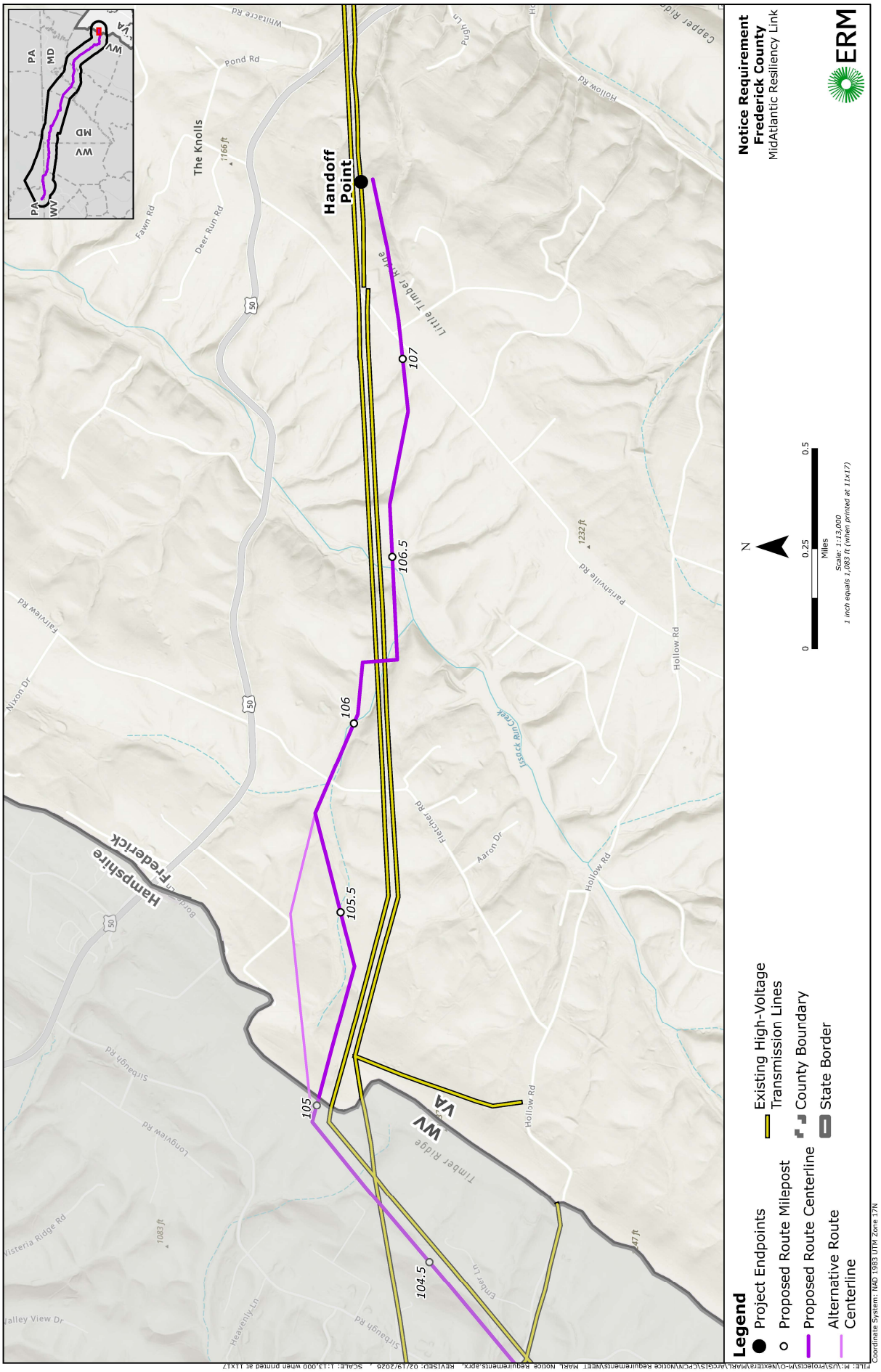
0 0.25 0.5

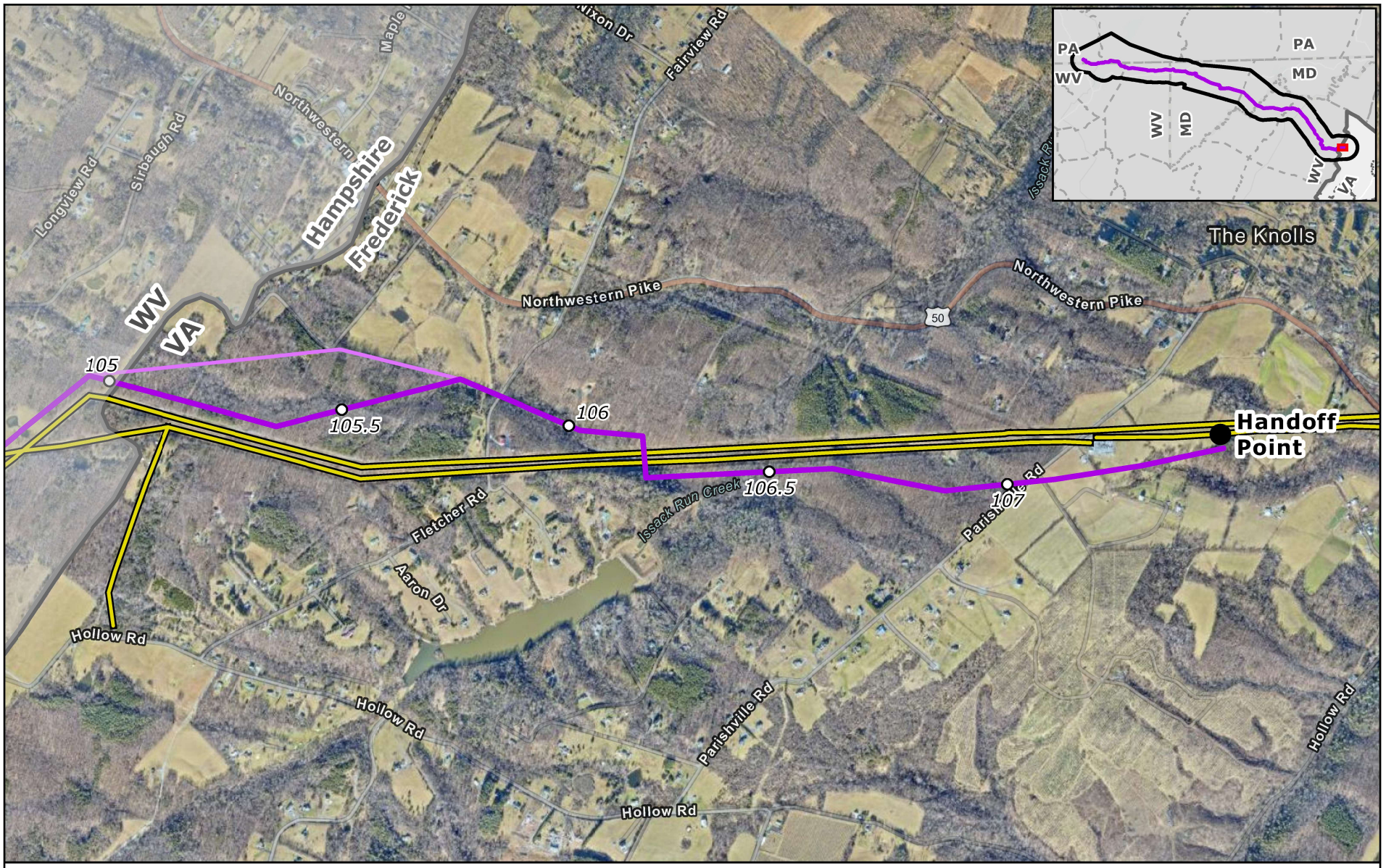
Miles

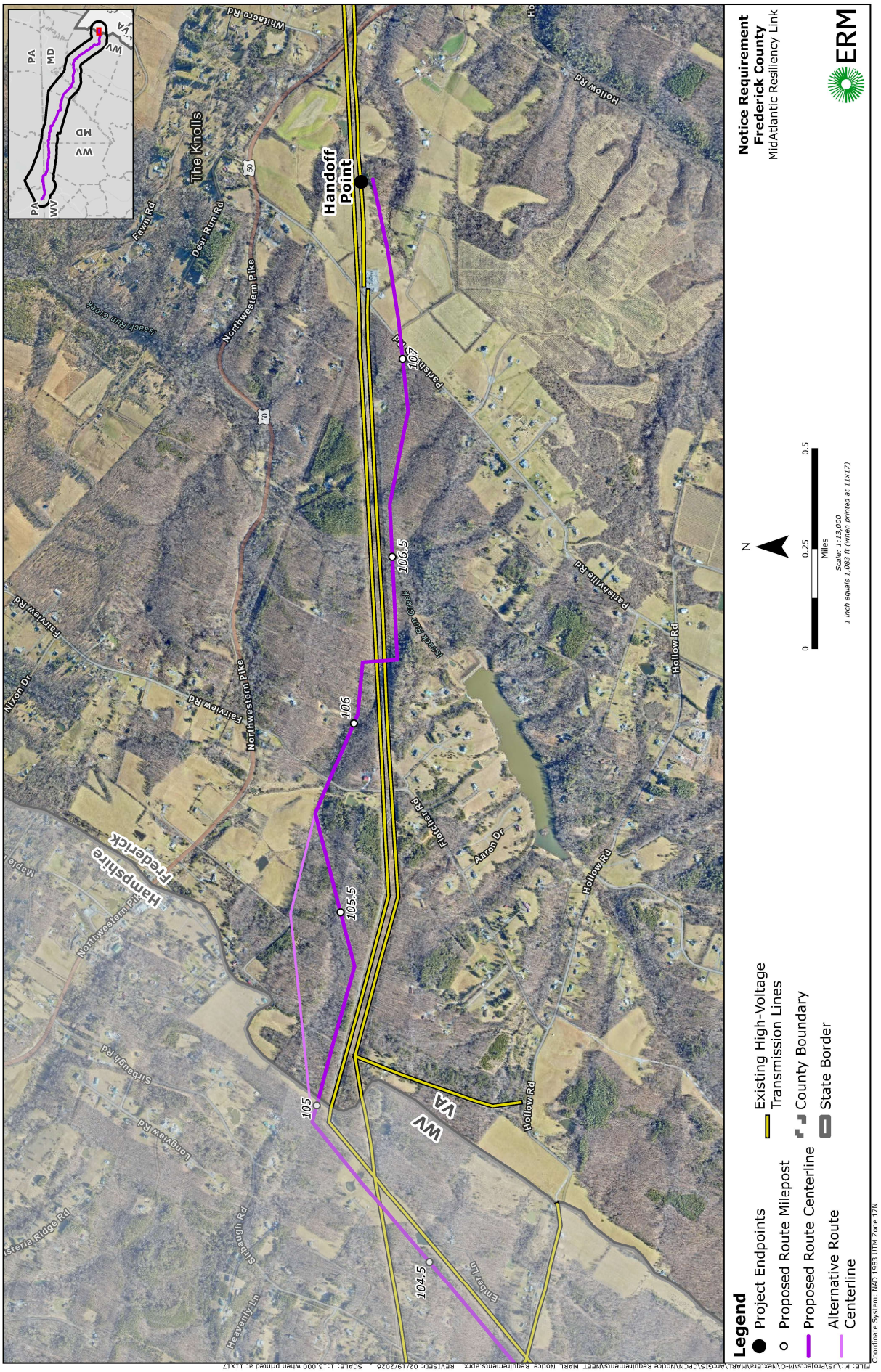
Notice Requirement
Frederick County
MidAtlantic Resiliency Link

ERM

Source: ESRI - World Topographic Map; NAD 1983 UTM Zone 17N


Notice Requirement
Frederick County
MidAtlantic Resiliency Link
ERM
Legend
Project Endpoints
Proposed Route Milepost
Proposed Route Centerline
Alternative Route Centerline
Existing High-Voltage Transmission Lines
County Boundary
State Border
Scale: 1:13,000
1 inch equals 1,083 ft (when printed at 11x17)
Miles
0
0.25
0.5
N
Handoff Point
Hampshire
Frederick
The Knolls
Little Timber Ridge
Timber Ridge
Issack Run Creek
Hollow Rd
Parishville Rd
Fletcher Rd
Aaron Dr
Fairview Rd
Nixon Dr
Deer Run Rd
Fawn Rd
Pond Rd
Whitacre Rd
Sirbaugh Rd
Longview Rd
Wisteria Ridge Rd
Valley View Dr
Heavenly Ln
Ember Ln
Pugh Ln
Capper Ridge
105
105.5
106
106.5
107
104.5
1166 ft
1232 ft
1083 ft
PA
MD
WV
VA
Coordinate System: NAD 1983 UTM Zone 17N


PA
WV
MD
VA
Hampshire
Frederick
WV
VA
Northwestern Pike
Northwestern Pike
50
The Knolls
Longview Rd
Sirbaugh Rd
Fairview Rd
105
105.5
106
106.5
107
Handoff Point
Issaac Run Creek
Fletcher Rd
Aaron Dr
Hollow Rd
Hollow Rd
Hollow Rd
Hollow Rd
Parishville Rd
Parishville Rd
Legend
Project Endpoints
Proposed Route Milepost
Proposed Route Centerline
Alternative Route Centerline
Existing High-Voltage Transmission Lines
County Boundary
State Border
N
0
0.25
0.5
Miles
Notice Requirement
Frederick County
MidAtlantic Resiliency Link
ERM
Source: ESRI - World Tcpographic Map; NAD 1983 UTM Zone 17N


Notice Requirement
Frederick County
MidAtlantic Resiliency Link
ERM
Legend
Project Endpoints
Proposed Route Milepost
Proposed Route Centerline
Alternative Route Centerline
Existing High-Voltage Transmission Lines
County Boundary
State Border
Handoff Point
The Knolls
Hampshire
Frederick
WV
VA
105
105.5
106
106.5
107
104.5
N
0
0.25
0.5
Miles
Scale: 1:13,000
1 inch equals 1,083 ft (when printed at 11x17)
Coordinate System: NAD 1983 UTM Zone 17N

V. NOTICE

B. List Applicant offices where members of the public may inspect the application. If applicable, provide a link to website(s) where the application may be found.

Response: A copy of the Application will be posted on NEET MA's project website for the MARL Project (https://www.nexteraenergytransmission.com/midatlantic-resiliency-link.html).

Physical copies of the Application will be available for the public to inspect at the following public locations:

Handley Regional Library
100 West Piccadilly Street
Winchester, VA 22601

Bowman Library
871 Tasker Rd
Stephens City, VA 22655

Paul Wolk Library at Laurel Ridge Community College
173 Skirmisher Lane
Middletown, VA 22645

Shenandoah University Libraries
1460 University Drive
Winchester, VA 22601

V. NOTICE

C. List all federal, state, and local agencies and/or officials that may reasonably be expected to have an interest in the proposed construction and to whom the Applicant has furnished or will furnish a copy of the application.

Response:

Ms. Bettina Rayfield
Virginia Department of Environmental Quality
Office of Environmental Impact Review
1111 East Main Street, Suite 1400
Richmond, Virginia 23219
bettina.rayfield@deq.virginia.gov

Ms. Michelle Henicheck
Department of Environmental Quality
Office of Wetlands and Streams
1111 East Main Street, Suite 1400
Richmond, Virginia 23219

Ms. Rene Hypes
Virginia Department of Conservation and Recreation
Division of Natural Heritage
600 East Main Street, 24th Floor
Richmond, Virginia 23219

Environmental Reviewer
Virginia Department of Conservation and Recreation
Planning & Recreation Division
600 East Main Street, 24th Floor
Richmond, Virginia 23219

Ms. Hannah Schul
Virginia Department of Wildlife Resources
Wildlife Information and Environmental Services
7870 Villa Park, Suite 400
Henrico, Virginia 23228

Mr. Keith Tignor
Virginia Department of Agriculture and Consumer Services
Office of Plant Industry Services
102 Governor Street
Richmond, Virginia 23219

Mr. Clint Folks
Virginia Department of Forestry
Forestland Conservation Division
900 Natural Resources Drive, Suite 800
Charlottesville, Virginia 22903

Scoping at VMRC
Virginia Marine Resources Commission
Habitat Management Division
Building 96, 380 Fenwick Road
Ft. Monroe, Virginia 23651

Mr. Troy Andersen
US Fish and Wildlife Service
Virginia Field Office, Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

Ms. Regena Bronson
U.S. Army Corps of Engineers
Fredericksburg Field Office
10300 Spotsylvania Parkway, Suite 230
Fredericksburg, Virginia 22408

Mr. Phil Skorupa
Virginia Department of Energy
1100 Bank Street
Washington Building, 8th Floor
Richmond, Virginia 23219

Ms. Arlene Fields Warren
Virginia Department of Health
Office of Drinking Water
109 Governor Street, 6th Floor
Richmond, Virginia 23219

Ms. Martha Little
Virginia Outdoors Foundation
P.O. Box 85073, PMB 38979
Richmond, Virginia 23285-5073

Mr. Roger Kirchen
Director, Review and Compliance Division
Department of Historic Resources
2801 Kensington Avenue
Richmond, Virginia 23221

Mr. Stephen Smiley
Mr. Bill LaManque
Airport Services Division
Virginia Department of Aviation
5702 Gulfstream Road
Richmond, Virginia 23250

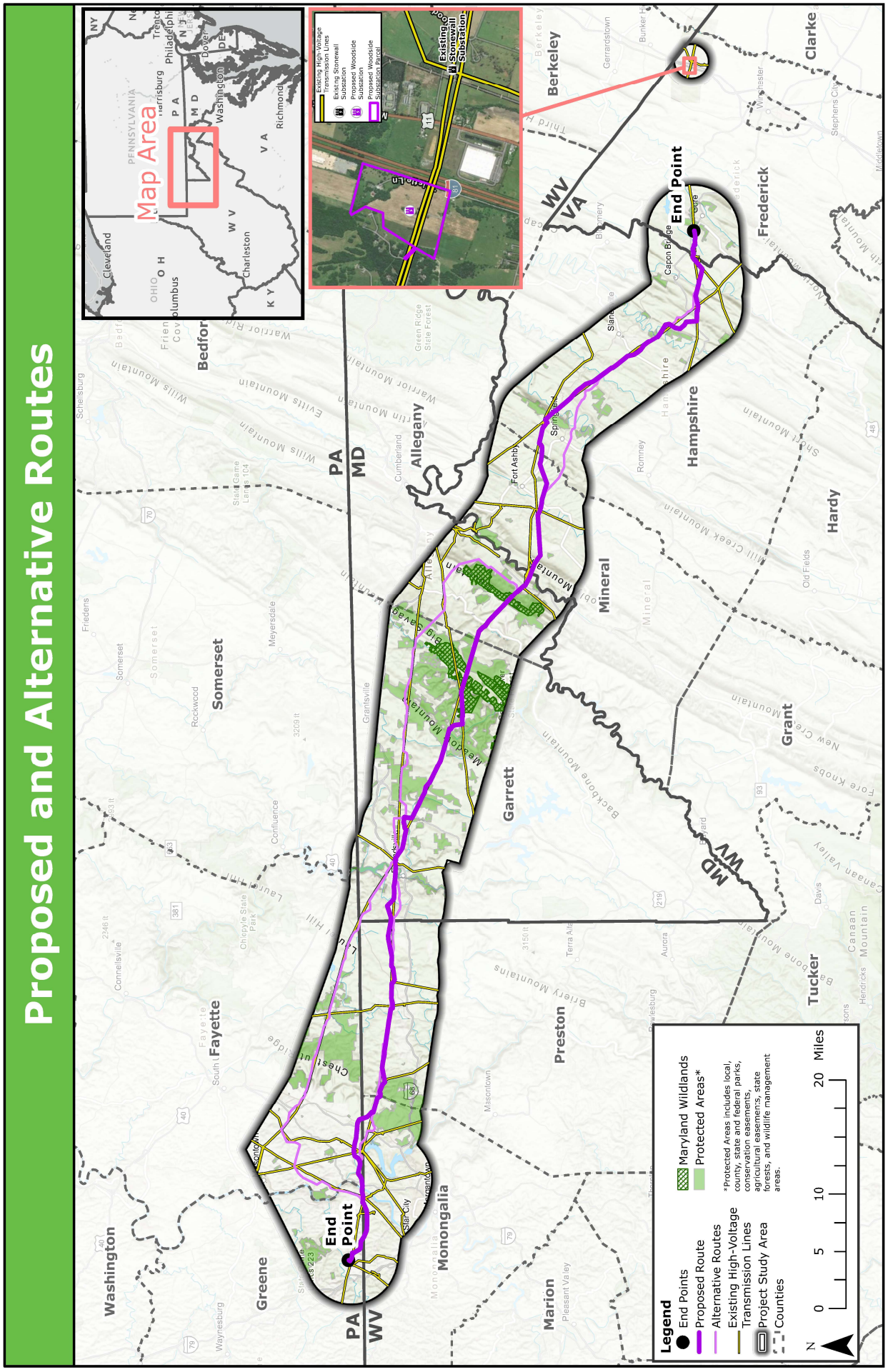
Mr. Mike Bollhoefer
County Administrator
Frederick County
107 North Kent Street
Winchester, Virginia 22601

Mr. John Jewell
Chairman At-Large, Board of Supervisors
Frederick County
226 Summerfield Drive
Winchester, Virginia 22602

V. NOTICE

D. If the application is for a transmission line with a voltage of 138 kV or greater, provide a statement and any associated correspondence indicating that prior to the filing of the application with the SCC the Applicant has notified the chief administrative officer of every locality in which it plans to undertake construction of the proposed line of its intention to file such an application, and that the Applicant gave the locality a reasonable opportunity for consultation about the proposed line (similar to the requirements of § 15.2-2202 of the Code for electric transmission lines of 150 kV or more).

Response: NEET VA has notified the chief administrative officer of Frederick County, Virginia in which it plans to undertake construction of the proposed MARL Project of its intention to file this Application and gave the County locality a reasonable opportunity for consultation about the proposed line. A copy of the notice sent to Frederick County is provided as Attachment V.D.


Proposed and Alternative Routes
Map Area
Existing High-Voltage Transmission Lines
Existing Stonewall Substation
Proposed Woodside Substation Parcel
Existing Stonewall Substation
Proposed Woodside Substation Parcel
End Point
End Point
Legend
End Points
Proposed Route
Alternative Routes
Existing High-Voltage Transmission Lines
Project Study Area
Counties
Maryland Wildlands
Protected Areas*
*Protected Areas includes local, county, state and federal parks, conservation easements, agricultural easements, state forests, and wildlife management areas.
0 5 10 20 Miles
N
Washington
Greene
Fayette
Somerset
Bedford
Allegany
Garrett
Preston
Monongalia
Marion
Tucker
Mineral
Hampshire
Frederick
Berkeley
Clarke
Hardy
Grant
PA
WV
MD
VA

From:	Christine Essick
To:	michael.bollhoefer@fcva.us
Cc:	Mccormick, Kaitlin; Winton, Julia; Rolfes, Bradley; Heather Heater; Alexandra Kenna; SharedMailbox, MARL; Galanis, Anna; Davis, Tracy C; Clingman, Brooks
Subject:	NextEra Energy Transmission"s MidAtlantic Resiliency Link Project Update
Date:	Thursday, November 6, 2025 1:35:34 PM
Attachments:	image001.png NEET_MARL_SepRouteRelease_Overview_ProposedAlternativeRoutes_ProtectedAreasOnly_11x17.pdf

Caution - External Email
This message is from someone outside of the organization.

Report Suspicious

Mike,

On behalf of NextEra Energy Transmission Virginia, Inc. (NEET VA), Environmental Resources Management, Inc. (ERM) is providing an update on the proposed MidAtlantic Resiliency Link (MARL) project, an approximately 107.5-mile, 500 kilovolt (kV) transmission line in Pennsylvania, West Virginia, Maryland, and Virginia, and a 500/138 kV substation (Woodside) in Frederick County, VA that is being proposed by NEET VA and its affiliate, NextEra Energy Transmission MidAtlantic, Inc (NEET MA). The MARL project was introduced to you via an email request for feedback in June 2025 to solicit feedback on draft route options to better inform project routing in advance of Certificate of Public Convenience and Necessity (CPCN) application submittal to the Virginia State Corporation Commission. Since that correspondence and following initial feedback, NEET MA and NEET VA have revised the route options, including the segment of the project in Virginia, and published the proposed route, along with five alternative route options that NEET VA and NEET MA evaluated across the length of the project. The Virginia segment of the proposed and alternative route options range from approximately 2.4-2.45 miles and is proposed to be entirely in Frederick County.

Attached is a project overview map showing the route options that will be presented in NEET VA's CPCN application. We respectfully request receiving any feedback that you have on the Virginia segment within 30 days if possible, so that NEETMA can consider your feedback prior to CPCN application submittal.

Thank you in advance for your time and assistance with the proposed MARL project. Should you have any questions or comments, our team can be contacted at MARL@NextEraEnergy.com and 833-849-1461.

Best Regards,
Christine

Christine Essick
Partner
She/Her/Hers



75 Valley Stream Parkway | Suite
200 Malvern, PA 19355
484-886-7418

erm.com

This e-mail and any attachments may contain proprietary, confidential and/or privileged information. No confidentiality or privilege is waived or lost by any transmission errors. This communication is intended solely for the intended recipient, and if you are not the intended recipient, please notify the sender immediately, delete it from your system and do not copy, distribute, disclose, or otherwise act upon any part of this email communication or its attachments. To find out how the ERM Group manages personal data please review our Privacy Policy