Transmission Expansion Advisory Committee (TEAC) Recommendations to the PJM Board

PJM Staff White Paper

PJM Interconnection
October 2022

For Public Use

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Contents

I. Executive Summary

On July 13, 2022, the PJM Board of Managers approved changes to the Regional Transmission Expansion Plan (RTEP), totaling a net increase of $82.09 million for baseline projects, to resolve baseline reliability criteria violations and address changes to existing projects.

Since then, PJM has identified additional baseline reliability criteria violations, and the transmission system enhancements needed to solve them, at an estimated cost of $651.62 million. Cancellation to an existing project will result in a net decrease of $8.79 million. This yields an overall RTEP net increase of $642.83 million, for which PJM recommended Board approval. With these changes, RTEP projects will total approximately $40,174 million since the first Board approvals in 2000.

PJM sought Reliability and Security Committee consideration and full Board approval of the RTEP baseline projects summarized in this white paper. On October 4, 2022, the Board approved the addition of RTEP baseline projects as well as other changes to the RTEP as summarized in this paper.

II. Baseline Project Recommendations

A key dimension of PJM's RTEP process is baseline reliability evaluation, which is necessary before subsequent interconnection requests can be analyzed. Baseline analysis identifies system violations to reliability criteria and standards, determines the potential to improve the market efficiency and operational performance of the system, and incorporates any public policy requirements. PJM then develops transmission system enhancements to solve identified violations and reviews them with stakeholders through the Transmission Expansion Advisory Committee (TEAC) and Subregional RTEP Committees prior to submitting its recommendation to the Board. Baseline reliability transmission enhancement costs are allocated to PJM responsible customers.

III. Baseline Reliability Projects Summary

A summary of baseline projects with estimated costs equal to or greater than $10 million is provided below. A complete listing of all recommended projects and their associated cost allocations is included in Attachment A (allocations to a single zone) and Attachment B (allocations to multiple zones). Projects with estimated costs less than $10 million typically include, by way of example, transformer replacements, line reconductoring, breaker replacements and upgrades to terminal equipment, including relay and wave trap replacements.

A. DL Transmission Zone

Baseline project b3717 – Cheswick 1 Deactivation Reinforcements: $24 million

B. Dominion Transmission Zone

Baseline project b3718 – Data Center Alley Area Improvements: $627.62 million

A more detailed description of the larger-scope projects that PJM recommended to the Board is provided below.

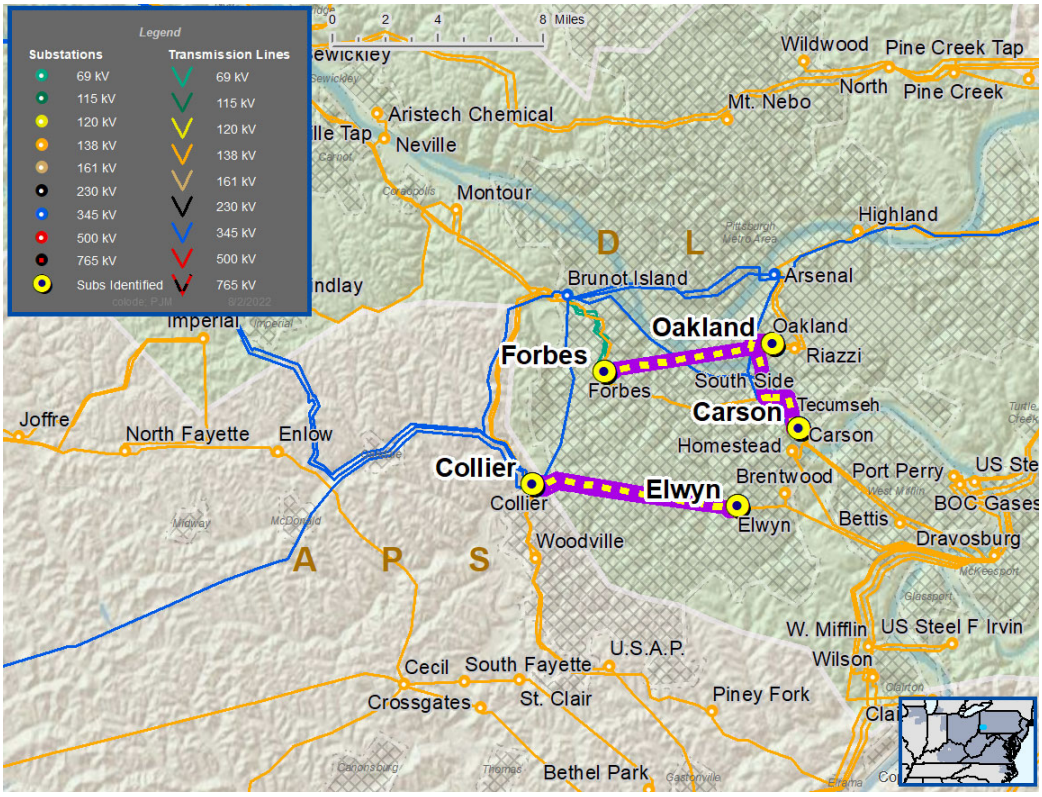
C. Baseline Reliability Project Details

Baseline Project b3717: Cheswick 1 Deactivation Reinforcements

DL Transmission Zone

Cheswick 1 deactivated in March 2022; however, additional overloads were identified in the 2023 RTEP summer case. The Collier-Elwyn No. 1 and No. 2, Forbes-Oakland, and Carson-Oakland 138 kV transmission lines are overloaded for multiple N-1 outage combinations.

Map 1. b3717: Cheswick 1 Deactivation



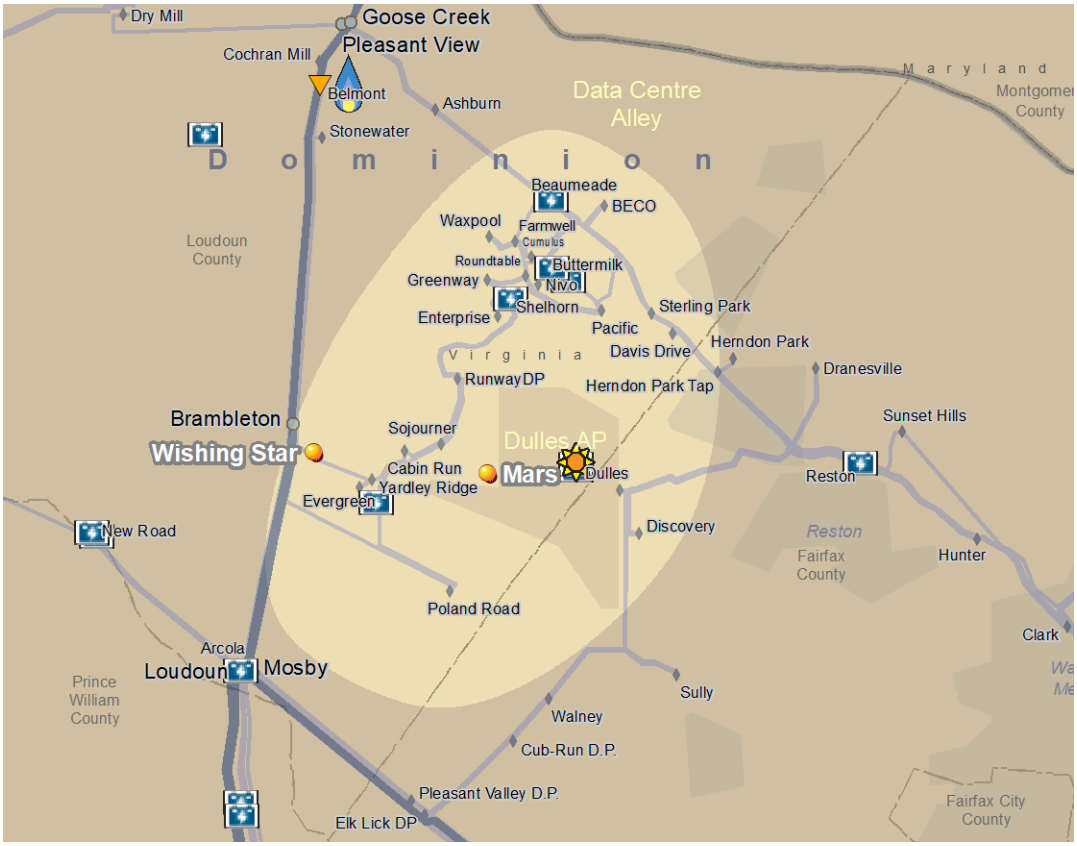
The recommended solution is to install a series reactor on Cheswick-Springdale 138 kV line, replace four structures and reconductor Duquesne Light Company's portion of Plum-Springdale 138 kV line. Associated communication and relay setting changes are also needed at Plum and Cheswick. The estimated cost for this project is $24 million, with a projected in-service date of December 2024. This project is identified as immediate need, and operating measures have been identified to mitigate reliability impacts in the interim. The local transmission owner, DL, will be designated to complete this work.

Baseline Project b3718: Data Center Alley Improvements

Dominion Transmission Zone

The Dominion zone has been experiencing load growth in the Data Center Alley area around Dulles airport. Forecasted data center additions for the 2022 Load Forecast provided by Dominion and NOVEC were noticeably higher than in the prior year. Due to the highly concentrated load growth in the Data Center Alley Area, numerous reliability violations (thermal overloads and load loss) were observed in the 2024 and 2025 time frames despite planned supplemental and baseline upgrades.

Map 2. b3718 – Data Center Alley



The recommended solution is to build a new 500/230 kV substation called Wishing Star near Brambleton substation and install one 500/230 kV 1440 MVA transformer at the substation. A new 500/230 kV substation called Mars will be built near Dulles International Airport, and one 500/230 kV 1440 MVA transformer will be installed at the substation. The 500 kV line No. 546 (Brambleton-Mosby) and 500 kV line No. 590 (Brambleton-Mosby) will be cut and extended to the proposed Wishing Star substation, and lines will terminate in a 500 kV breaker and a half configuration. The project will reconductor the approximate mileage of the following lines: 0.62 miles of 230 kV line No. 2214 (Buttermilk-Roundtable), 1.52 miles of 230 kV line No. 2031 (Enterprise-Greenway-Roundtable), 0.64 miles of 230 kV line No. 2186 (Enterprise-Shellhorn), 2.17 miles of 230 kV line No. 2188 (Lockridge-Greenway-Shellhorn), 0.84 miles of 230 kV line No. 2223 (Lockridge-Roundtable), 3.98 miles of 230 kV line No. 2218 (Sojourner-Runway-Shellhorn), and 1.61 miles of 230 kV line No. 9349 (Sojourner-Mars). The project will also upgrade four 500 kV breakers to 63 kA on either

end of 500 kV line No. 584 (Loudoun-Mosby circuit No. 1) and four 500 kV breakers to 63 kA on either end of 500 kV line No. 502 (Loudoun-Mosby circuit No. 2), cut and loop the 230 kV line No. 2079 (Sterling Park-Dranesville) into the Davis Drive substation and install two GIS 230 kV breakers. The estimated cost for this project is $627.62 million. This project is identified as immediate need, with a required and projected in-service date of June 2025. The local transmission owner, Dominion, will be designated to complete this work.

IV. Changes to Previously Approved Projects

D. Cancellations

The following cancellation was recommended:

METED Transmission Zone North Boyertown-West Boyertown 69 kV Rebuild

The following baseline project was identified as part of the 2021 RTEP Window 1 to resolve FirstEnergy's FERC 715 Planning Criteria. However, the North Boyertown-West Boyertown 69 kV line overload was addressed by a supplemental project (s2566) that went into service in April 2022. As a result, the below baseline project will be cancelled:

- Baseline project b3671: Rebuild approximately 3.6 miles of North Boyertown-West Boyertown 69 kV line No. 875 with 795 ACSR. Upgrade terminal equipment (circuit breaker, disconnect switches and substation conductor) and relays at North Boyertown and West Boyertown substations. The project had an estimated cost of $8.79 million.

This change yields a net RTEP decrease of $8.79 million.

V. Review by the Transmission Expansion Advisory Committee (TEAC)

Project needs and recommended solutions as discussed in this report were reviewed with stakeholders during 2022, most recently at the September 2022 TEAC meeting. Written comments were requested to be submitted to PJM to communicate any concerns with project recommendations. No comments have been received as of this white paper publication date.

VI. Cost Allocation

Cost allocations for recommended projects are shown in Attachment A (for allocation to a single zone) and Attachment B (for allocation to multiple zones).

Cost allocations are calculated in accordance with Schedule 12 of the Open Access Transmission Tariff (OATT). Baseline reliability project allocations are calculated using a distribution factor methodology that allocates cost to the load zones that contribute to the loading on the new facility. The allocations will be filed at FERC 30 days following approval by the Board.

VII. Board Approval

The PJM Reliability and Security Committee is requested to endorse the changes to the RTEP proposed in this white paper and recommended to the full Board for approval the changes to existing RTEP projects as detailed in this white

paper to be included in PJM's RTEP. On October 4, 2022, the Board approved the addition of RTEP baseline projects as well as other changes to the RTEP as summarized in this paper. The RTEP is published annually on PJM's website.

Attachment A – Reliability Project Single-Zone Allocations

Upgrade ID	Description	Cost Estimate ($M)	TO	Cost Responsibility	Required In-Service Date
b3717.1	Install a series reactor on Cheswick-Springdale 138 kV line	$9.00	DL	DL	12/31/2024
b3717.2	Transmission Line Rearrangement: • Replacement of four structures and reconductor DLCO portion of Plum-Springdale 138 kV line. • Associated communication and relay setting changes at Plum and Cheswick.	$15.00	DL	DL	12/31/2024
b3718.1	Install one 500/230kV 1440MVA transformer at a new substation called Wishing Star. Cut and extend 500 kV Line #546 (Brambleton-Mosby) and 500 kV Line #590 (Brambleton-Mosby) to the proposed Wishing Star substation. Lines to terminate in a 500 kV breaker and a half configuration.	$111.28	Dominion	Dominion	6/1/2025
b3718.2	Install one 500/230 kV 1440 MVA transformer at a new substation called Mars near Dulles International Airport.	$114.04	Dominion	Dominion	6/1/2025
b3718.4	Reconductor ~0.62 miles of 230 kV line #2214 (Buttermilk-Roundtable) to achieve a summer rating of 1574 MVA.	$4.79	Dominion	Dominion	6/1/2025
b3718.5	Reconductor ~1.52 miles of 230 kV line #2031 (Enterprise-Greenway-Roundtable) to achieve a summer rating of 1574 MVA.	$5.89	Dominion	Dominion	6/1/2025
b3718.6	Reconductor ~0.64 miles of 230 kV line #2186 (Enterprise-Shellhorn) to achieve a summer rating of 1574 MVA.	$3.96	Dominion	Dominion	6/1/2025
b3718.7	Reconductor ~2.17 miles of 230 kV line #2188 (Lockridge-Greenway-Shellhorn) to achieve a summer rating of 1574 MVA.	$3.80	Dominion	Dominion	6/1/2025
b3718.8	Reconductor ~0.84 miles of 230 kV line #2223 (Lockridge-Roundtable) to achieve a summer rating of 1574 MVA.	$2.59	Dominion	Dominion	6/1/2025
b3718.9	Reconductor ~3.98 miles of 230 kV line #2218 (Sojourner-Runway-Shellhorn) to achieve a summer rating of 1574 MVA.	$6.51	Dominion	Dominion	6/1/2025
b3718.10	Reconductor ~1.61 miles of 230 kV line #9349 (Sojourner-Mars) to achieve a summer rating of 1574 MVA.	$1.43	Dominion	Dominion	6/1/2025
b3718.11	Upgrade 4-500 kV breakers (total) to 63kA on either end of 500 kV Line #502 (Loudoun-Mosby)	$6.27	Dominion	Dominion	6/1/2025
b3718.12	Upgrade 4-500 kV breakers (total) to 63 kA on either end of 500 kV Line #584 (Loudoun-Mosby)	$6.38	Dominion	Dominion	6/1/2025
b3718.13	Cut and loop 230 kV Line #2079 (Sterling Park-Dranesville) into Davis Drive substation and install two GIS 230 kV breakers.	$15.00	Dominion	Dominion	6/1/2025
b3718.14	Construct a new 230 kV transmission line for ~3.5 miles along with substation upgrades at Wishing Star and Mars. New right-of-way will be needed and will share same structures with the 500 kV line. New conductor to have a minimum summer normal rating of 1573 MVA.	$78.68	Dominion	Dominion	6/1/2025

Attachment B – Reliability Project Multi-Zone Allocations

Upgrade ID	Description	Cost Estimate ($M)	TO	Cost Responsibility	Required In-Service Date
b3718.3	Construct a new 500 kV transmission line for ~ 3.5 miles along with substation upgrades at Wishing Star and Mars. New right-of-way will be needed and will share same structures with the 230 kV line. New conductor to have a minimum summer normal rating of 4357 MVA.	$267.00	Dominion	**Load-Ratio Share Allocation:** AEC (1.67%) / AEP (13.94%) / APS (5.64%) / ATSI (8.02%) / BGE (4.12%) / ComEd (13.46%) / Dayton (2.12%) / DEOK (3.37%) / DL (1.76%) / DPL (2.55%) / Dominion (12.97%) / EKPC (1.81%) / JCPL (3.92%) / ME (1.95%) / NEPTUNE* (0.24%) / OVEC (0.07%) / PECO (5.39%) / PENELEC (1.84%) / PEPCO (3.71%) / PPL (4.78%) / PSEG (6.40%) / RE (0.27%) **DFAX Allocation:** Dominion (100.00%)	6/1/2025