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

PJM Staff White Paper

PJM Interconnection

April 2020

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Contents

I. Executive Summary

On February 10, 2020, the PJM Board of Managers approved changes to the Regional Transmission Expansion Plan (RTEP), totaling $233.97 million, primarily to resolve baseline reliability criteria violations.

Since then, PJM has identified additional baseline reliability criteria violations and the transmission system enhancements needed to solve them, at an estimated cost of $63.85 million. Scope changes to existing projects will result in a net increase of $0.7 million. This yields an overall RTEP net increase of $64.55 million, for which PJM is recommending Board approval. With these changes, RTEP projects will total $38,235.69 million since the first Board approvals in 2000.

PJM seeks Board Reliability Committee consideration and full Board approval of the additional RTEP baseline projects summarized in this whitepaper.

II. Baseline Reliability Recommendations

A key dimension of PJM's RTEP process is baseline reliability evaluation, necessary before subsequent interconnection requests can be analyzed. Baseline analysis identifies system violations to reliability criteria and standards. 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 recommendation to the Board. Baseline reliability transmission enhancement costs are allocated to PJM load.

III. Baseline Reliability Projects Summary

A summary of baseline projects with estimated costs equal to or greater than $5 million is provided below. A complete listing of all recommended projects and their associated cost allocations is included in Attachment A (for allocation to a single zone) and Attachment B (for allocation to multiple zones). Projects with estimated costs less than $5 million typically include line rebuilds, new Greenfield stations, reconductoring and replacement of terminal equipment.

A. *FERC Form No. 715 Transmission Owner Criteria-Driven Enhancements*

1. Dominion Transmission Zone

- Split Chesterfield-Plaza 115 kV line by rebuilding the Brown Boveri tap line as double-circuit loop, and install a 115 kV breaker at Brown Boveri: $5.3 million
- Acquire land and build a new 230 kV switching station (Stevensburg) with a 224 MVA, 230/115 kV transformer. Cut and connect Gordonsville-Remington 230 kV, Remington-Mt. Run 115 kV and Mt. Run-Oak Green 115 kV to the new station: $22 million

2. AEP Transmission Zone

Niles area improvements, including construction of double-circuit 138 kV extension to connect Lakehead to the 138 kV network, construction of a new 138/69 kV drop-down station to feed Lakehead, and rebuild of Pletcher-Buchanan Hydro 69 kV and Buchanan South 69 kV radial tap: $36.2 million

PJM is also recommending a project totaling $0.35 million that includes a breaker replacement whose individual cost estimate is less than $5 million. A more detailed description of the larger-scope projects that PJM is recommending to the Board is provided below:

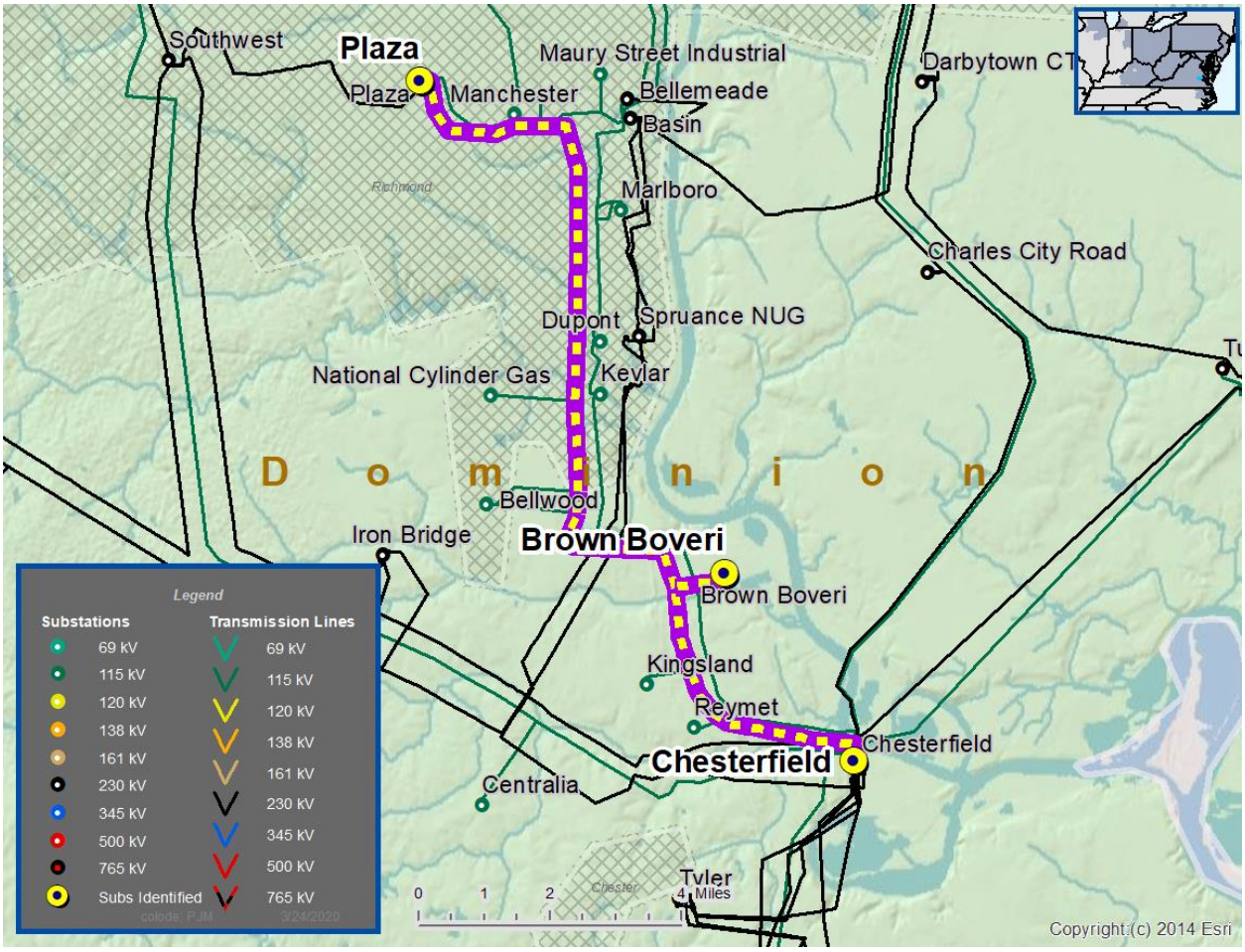
Baseline Project b3161: Chesterfield-Plaza Transmission Line

Dominion Transmission Zone

Dominion FERC 715 Transmission Owner Planning Criteria limits the number of direct-connect loads (tapped facilities) to four facilities. The Chesterfield-Plaza line exceeds this limit, as the line currently serves five tap stations: National Cylinder Gas, Bellwood, Brown Boveri, Kingsland and Reymet.

Additionally, the Brown Boveri tap line, with a length of 1.1 miles, exceeds Dominion's requirement of a terminal station for tap lines longer than one mile.

Map 1. **Chesterfield-Plaza 115 kV**



The recommended solution is to split the Chesterfield-Plaza 115 kV by rebuilding the Brown Boveri tap line as a double-circuit loop in-and-out of the station, and install a 115 kV breaker at Brown Boveri. Site expansion is also required for the project in order to accommodate the new site layout.

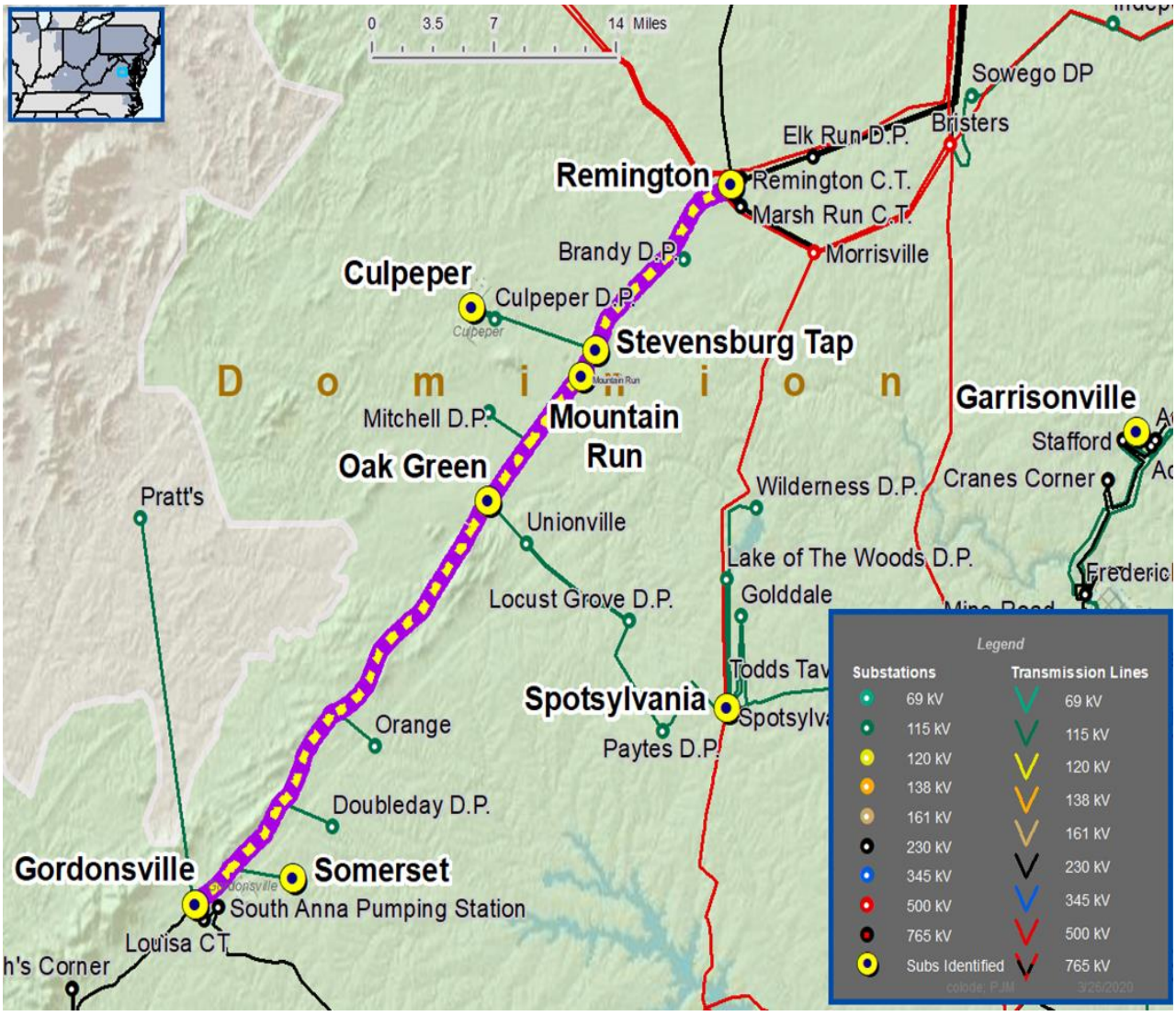
The estimated cost for this project is $5.3 million, with a required in-service date of June 2024, and the projected in-service date is December 2023. The local transmission owner, Dominion, will be designated to complete this work.

Baseline Project b3162: Spotsylvania-Oak Green and Culpeper 115 kV Delivery

Dominion Transmission Zone

Dominion FERC 715 Transmission Owner Planning Criteria violations were identified at Spotsylvania-Oak Green 115 kV for the N-1-1 loss of Gordonsville-Somerset and Remington-Mt. Run 115 kV. The voltage at Culpeper also drops below 85 percent at Culpeper for the N-1-1 loss of Spotsylvania-Oak Green and Remington-Mt. Run 115 kV.

Map 2. **Spotsylvania-Oak Green and Culpeper 115 kV**



The recommended solution is to acquire land and build a new 230 kV switching station (Stevensburg) with a 224 MVA, 230/115 kV transformer. The Gordonsville-Remington, Remington-Mt. Run and Mt. Run-Oak Green 115 kV lines will be cut and connected to the new Stevensburg station.

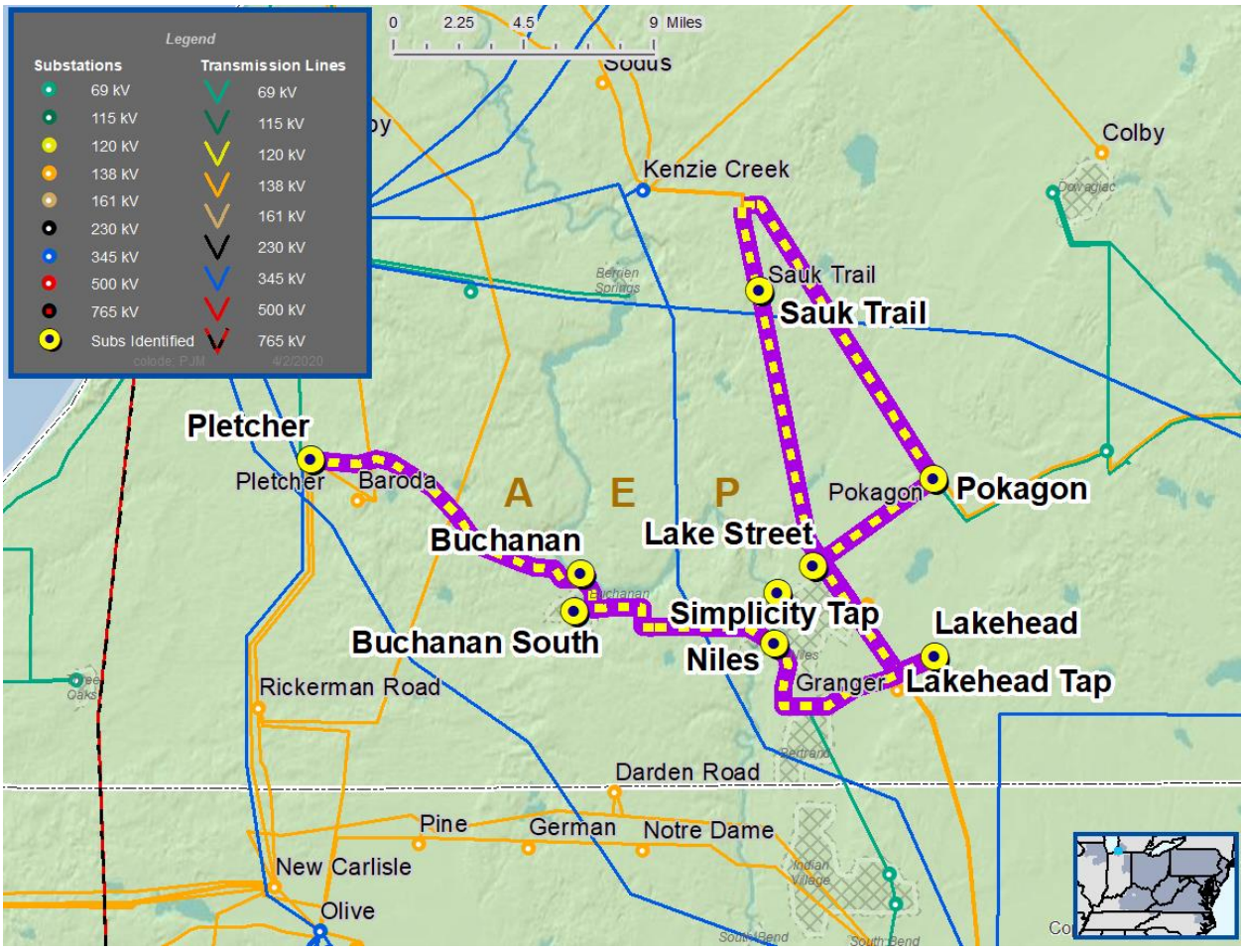
The estimated cost for this project is $22 million, with a required in-service date of June 2024, and the projected in-service date is December 2023. The local transmission owner, Dominion, will be designated to complete this work.

Baseline Project b3160: Niles Area Improvements

AEP Transmission Zone

AEP FERC 715 Transmission Owner Planning Criteria violations were identified in the Niles area. Niles-Simplicity 34.5 kV is overloaded for the N-1 loss of the Niles 69/34 kV transformer, Niles 69 kV bus, or any of the Niles 69 kV breakers. There are multiple identified N-1-1 thermal and voltage issues in the Niles area.

Map 3. **Niles Area Improvements**



The recommended solution is to construct approximately 2.4 miles of a new double-circuit 138 kV extension, using 1033 ACSR, which will connect Lake Head to the 138 kV network. The solution will also retire approximately 2.5 miles of Niles-Simplicity 34.5 kV and approximately 4.6 miles of Lakehead 69 kV tap lines, and build a new 138/69 kV drop-down station to feed Lakehead with a 138 kV breaker, 138 kV switcher, 138/69 kV transformer and a 138 kV MOAB. Approximately 8.4 miles of Pletcher-Buchanan Hydro 69 kV line will be rebuilt as the 9 mile Pletcher-Buchanan South 69 kV line using 795 ACSR, and approximately 1.2 miles of Buchanan South 69 kV radial tap will be

rebuilt using 795 ACSR. The solution will also install a phase-over-phase switch at Buchanan South station with two line MOABs.

The total estimated cost for this project is $36.2 million, with a required in-service date of June 2024, and a projected in-service date is June 2022. The local transmission owner, AEP, will be designated to complete this work.

IV. Transmission Owner Criteria Projects

Of the $63.85 million of the new recommended baseline transmission system enhancements, approximately $63.5 million is driven by transmission owner planning criteria, which makes up 99.5 percent of the new project cost estimates.

V. Changes to Previously Approved Projects

PJM recommends modifying the scope/cost of the following projects:

- Supplemental project s1563.2 (rebuild 15.4 miles of double circuit North Delphos-Rockhill 138 kV line utilizing 1033 ACSR conductor) was previously converted into baseline b3036. However, this was an administrative error, as the supplemental scope that should have been converted to a baseline was s1563.1, not s1563.2. The supplemental project s1563.1 (rebuild 15.6 miles of double-circuit Haviland-North Delphos 138 kV line utilizing 1033 ACSR conductor) is now converted into baseline project b3036. The scope change of the project has decreased the total cost of this project from $24.5 million to $24.3 million. This change yields a net RTEP decrease of $0.2 million.
- Baseline project b3011 (construct new Route 51 substation and connect ten 138 kV lines to the new substation) is driving the Dravosburg 138 kV breaker "Z-78 Logans Ferry" overdutied. The Dravosburg 138 kV breaker will be replaced with a 63 kA breaker. The corresponding work has increased the total cost of the project from $28.5 million to $29.4 million. This change yields a net RTEP increase of $0.9 million.

These changes yield a net RTEP increase of $0.7 million.

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

Project needs and recommended solutions as discussed in this report were reviewed with stakeholders during 2019, most recently at the December 2019 TEAC and Subregional RTEP Committee meetings. 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.

VII. 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 were 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.

VIII. Board Approval

The PJM Board Reliability Committee was requested to endorse the new baseline reliability projects and associated cost allocations, and recommend to the full Board, approval of the projects in this white paper to be included in PJM's RTEP. The baseline projects will be incorporated into the published RTEP after approval by the PJM Board. The RTEP will be published on PJM's website.

Attachment A – Reliability Project Single-Zone Allocations

Upgrade ID	Description	Cost Estimate ($M)	TO	Cost Responsibility	Required In-Service Date
b3011.8	Upgrade 138 kV breaker "Z-78 Logans" at Dravosburg.	$0.90	DL	DL	6/1/2021
b3036	Haviland-North Delphos 138 kV: rebuild 15.6 miles of double-circuit 138 kV line utilizing 1033 ACSR conductor (296 MVA rating).	$24.30	AEP	AEP	12/1/2023
b3160.1	Construct a ~2.4 mile double-circuit 138 kV extension using 1033 ACSR to connect Lake Head to the 138 kV network.	$6.00	AEP	AEP	6/1/2024
b3160.2	Retire the ~2.5 mile 34.5 kV Niles-Simplicity tap line.	$1.20	AEP	AEP	6/1/2024
b3160.3	Retire the ~4.6 mile Lakehead 69 kV tap.	$1.40	AEP	AEP	6/1/2024
b3160.4	Build new 138/69 kV drop-down station to feed Lakehead with a 138 kV breaker, 138 kV switcher, 138/69 kV transformer and a 138 kV MOAB.	$4.00	AEP	AEP	6/1/2024
b3160.5	Rebuild the ~1.2 mile Buchanan South 69 kV radial tap using 795 ACSR.	$3.00	AEP	AEP	6/1/2024
b3160.6	Rebuild the ~8.4 mile 69 kV Pletcher-Buchanan Hydro line as the ~9 mile Pletcher-Buchanan South 69 kV line using 795 ACSR.	$20.00	AEP	AEP	6/1/2024
b3160.7	Install a PoP switch at Buchanan South station with 2 line Moabs.	$0.60	AEP	AEP	6/1/2024
b3161.1	Split 115kV Line #72 by rebuilding the Brown Boveri tap line as double-circuit loop in-and-out of the Brown Boveri breaker station.	$3.00	Dominion	Dominion	6/1/2024
b3161.2	Install a 115kV breaker at the Brown Boveri breaker station. Site expansion is required to accommodate the new layout.	$2.30	Dominion	Dominion	6/1/2024
b3162	Acquire land and build a new 230 kV switching station (Stevensburg) with a 224 MVA, 230-115 kV transformer. 230 kV line #2199 (Gordonsville-Remington) will be cut and connected to the new station. 115 kV line #70 (Remington-Mt. Run) and 115 kV line #2 (Mt. Run-Oak Green) will also be cut and connected to the new station.	$22.00	Dominion	Dominion	6/1/2024
b3212	The Crescent 138 kV oil-type breaker "2-5 TIE" is found to be over duty following a model review and correction to short-circuit base case.	$0.35	DL	DL	1/31/2020

Attachment B – Reliability Project Multi-Zone Allocations

None