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

PJM Staff White Paper

PJM Interconnection
April 2021

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Contents

I. Executive Summary

On Feb. 10, 2021, the PJM Board of Managers approved changes to the Regional Transmission Expansion Plan (RTEP), totaling an overall net increase of $349.84 million, to resolve baseline reliability criteria violations and address scope 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 $257.19 million. Scope changes to existing projects will result in a net increase of $103.53 million, and a cancellation to an existing project will result in a net decrease of $30 million. This yields an overall RTEP net increase of $330.72 million, for which PJM recommended Board approval. With these changes, RTEP projects will total approximately $38,499.9 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 April 22, 2021, the Board approved the addition of RTEP baseline projects as well as other changes to the RTEP as summarized in this paper.

II. Baseline Reliability 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 Committee 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. AEP Transmission Zone

- Rebuild the double circuit section of the existing Cabin Creek-Kelly Creek 46 kV line: $17.9 million
- Install a second 138 kV circuit on the open position of the existing double circuit towers from East Huntington-North Proctorville. Remove the existing 34.5 kV line from East Huntington-North Chesapeake and rebuild the section to 138 kV: $10.4 million

- Retire the existing Fleming 138/69 kV substation, and rebuild the station in the clear as a new Jackhorn 138/69 kV substation: $21.1 million
- Rebuild 10.5 miles of the Howard-Willard 69 kV line: $19.46 million
- Rebuild approximately 5.44 miles of 69 kV line from Lock Lane to Point Pleasant: $13.5 million
- Replace the Meigs 69 kV 4/0 Cu station riser towards Gavin and rebuild a section of the Meigs-Hemlock 69 kV circuit (approximately 4 miles): $12.14 million
- Construct approximately 2.75 mi Orinoco-Stone 69 kV and approximately 3.25 mi Orinoco-New Camp 69 kV transmission lines in the clear: $21.47 million
- Rebuild of Sawmill-Lazelle (4.23 miles) and Westerville-Genoa (1.94 miles) 69 kV lines: $19.8 million
- Build 9.4 miles of single circuit 69 kV line from Roselms to near East Ottoville 69 kV Switch and rebuild 7.5 miles of double circuit 69 kV line between East Ottoville Switch and Kalida Station: $38.9 million
- Rebuild the Chatfield-Melmore 138 kV line (approximately 10 miles): $27.2 million

B. Dominion Transmission Zone

- Build a new 230 kV switching station called Walnut Creek and operate it at 115 kV at the junction where both Fork Union-Sherwood and Dooms-Sherwood 115 kV lines start to share a common structure: $12 million

PJM also recommended projects totaling $43.32 million that include circuit breaker, motor-operated air-break (MOAB) switch, disconnect switch, capacitor bank, transformer and circuit switcher installations and/or replacements, a modification to a 115 kV line, 34.5 kV and 69 kV transmission line rebuilds, 69 kV transmission line reconductoring and other station equipment replacement and upgrades, whose individual cost estimates are less than $10 million.

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

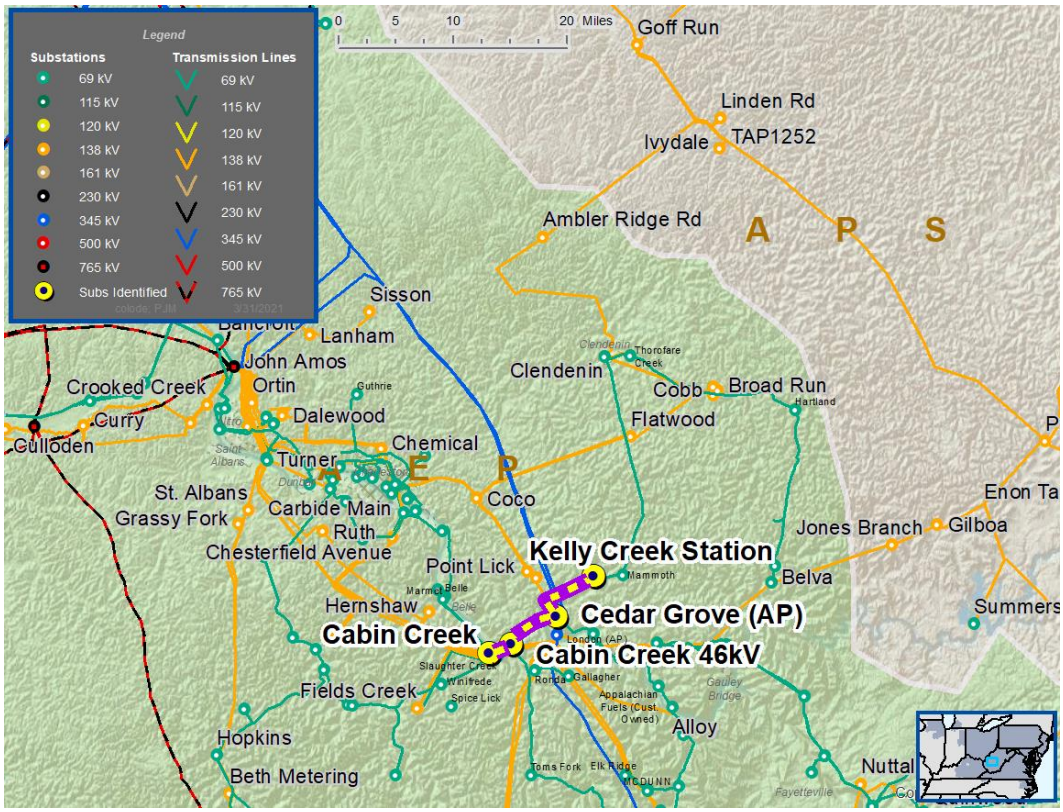
C. Baseline Reliability Project Details

Baseline Project b3280: Cabin Creek-Kelly Creek Rebuild

AEP Transmission Zone

In the summer 2025 RTEP case, the Cabin Creek-Kelly Creek 46 kV line is overloaded for an N-1-1 138 kV contingency pair. These issues were identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 1. b3280: Cabin Creek-Kelly Creek Rebuild



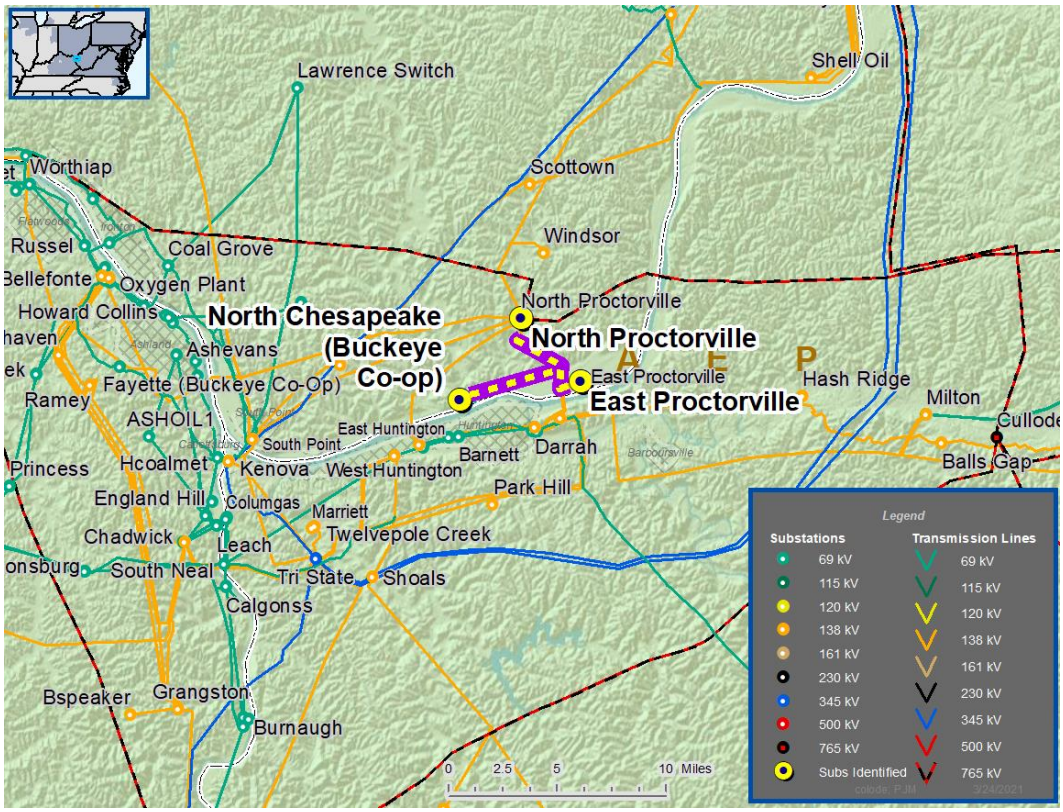
The recommended solution is to rebuild the existing Cabin Creek-Kelly Creek 46 kV line (approximately 4.4 miles to structure 366-44). The section is double circuit with the existing Cabin Creek-London 46 kV line so a double-circuit rebuild would be required. The estimated cost for this project is $17.9 million, with a required and projected in-service date of June 2025. The local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3282: East Huntington-North Proctorville 138 kV

AEP Transmission Zone

In the summer 2025 RTEP case, the Fulks-Johnson Lane 34.5 kV line is overloaded and in the summer and winter 2025 RTEP cases, there are voltage violations at East Huntington 138 kV buses, 23rd Street, 24th Street, 26th Street, BASF, East Huntington, Johnson Lane, Fulks, Connor Street, Inco Fur and Connor F 34.5 kV buses due to an N-1-1 scenario. These issues were identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below 200 kV and substation equipment exemptions.

Map 2. b3282: East Huntington-North Proctorville 138 kV



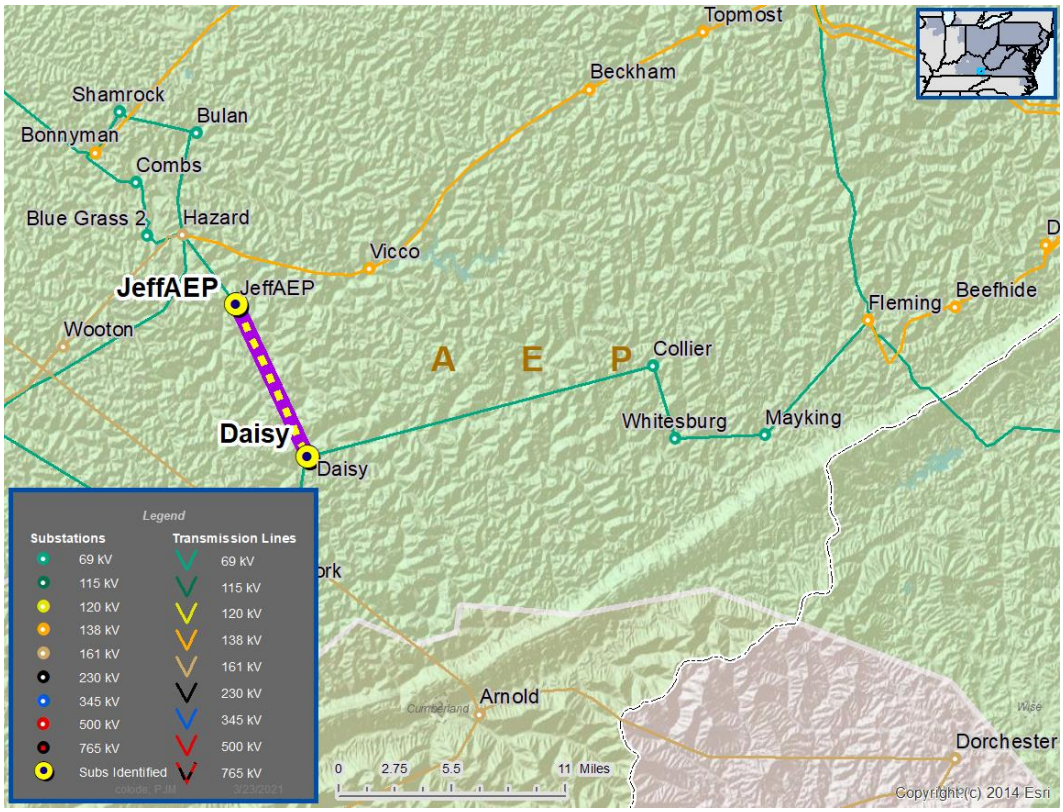
The recommended solution is to install a second 138 kV circuit utilizing 795 ACSR conductor on the open position of the existing double circuit towers from East Huntington-North Proctorville. Remove the existing 34.5 kV line from East Huntington-North Chesapeake and rebuild this section to 138 kV served from a new phase-over-phase switch off the new East Huntington-North Proctorville 138 kV No. 2 line. Additionally, 40 kA 138 kV breakers will be installed at North Proctorville and East Huntington. The existing 34/12 kV North Chesapeake station will be converted to a 138/12 kV station. The estimated cost for this project is $10.4 million, with a required and projected in-service date of June 2025. The local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3307: Fleming Station Ring Bus

AEP Transmission Zone

In the winter 2025 RTEP case, the Jeff-Daisy 69 kV line is overloaded and there are voltage violations at Weeksbury, Reedy Coal, Mayking, Daisy, Fleming, Collier, Golden Oaks, Slemp and Whitesburg 69 kV buses for the loss of multiple N-1-1 contingency pairs. These issues were identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 3. b3307: Fleming Station Ring Bus



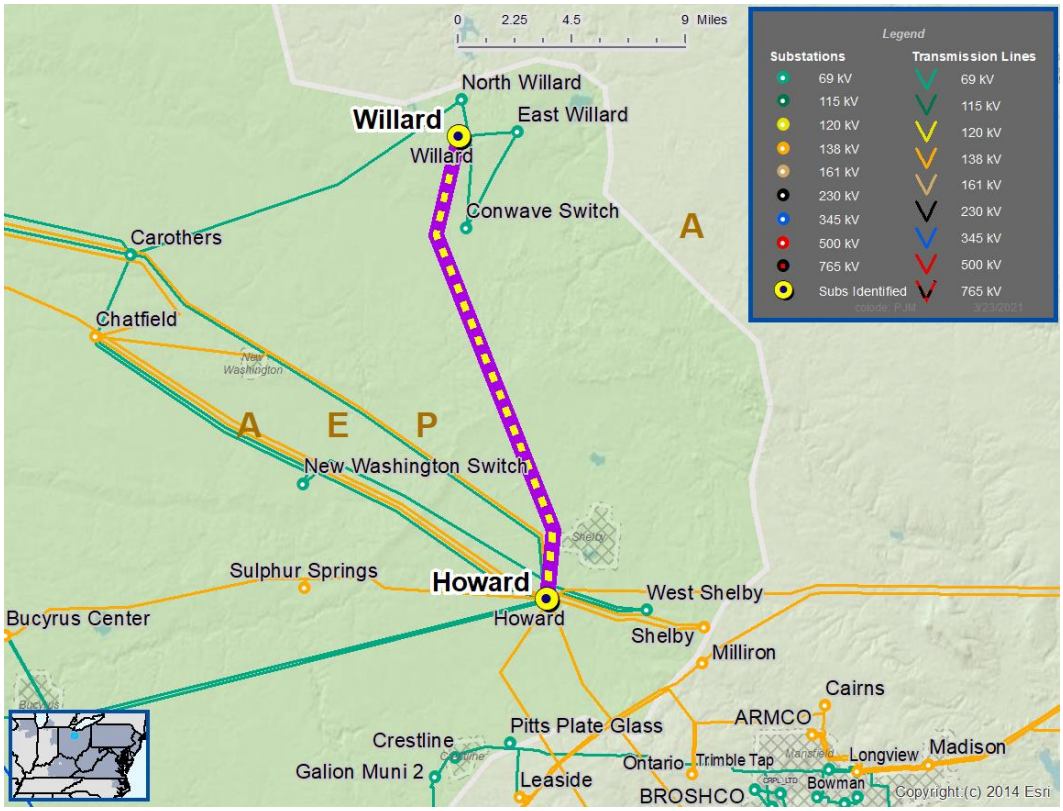
The recommended solution is to retire the existing Fleming substation and rebuild the station in the clear as new Jackhorn 138/69 kV substation. The project will include the replacement of the 138/69 kV Fleming Transformer No. 1 with a 130 MVA transformer with high side 138 kV circuit breaker. Additionally, a 5-breaker 69 kV ring bus will be installed on the low side of the transformer, and the 69 kV circuit switcher AA, the 69/12 kV transformer No. 3 and 12 kV circuit breakers A and D will be replaced. The estimated cost for this project is $21.1 million, with a required and projected in-service date of December 2025. The local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3310: Howard-Willard 69 kV Rebuild

AEP Transmission Zone

In the summer 2025 RTEP case, the Howard-Willard 69 kV line is overloaded for multiple N-1 and N-1-1 contingencies in the Willard area. These issues were identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 4. b3310: Howard-Willard 69 kV Rebuild



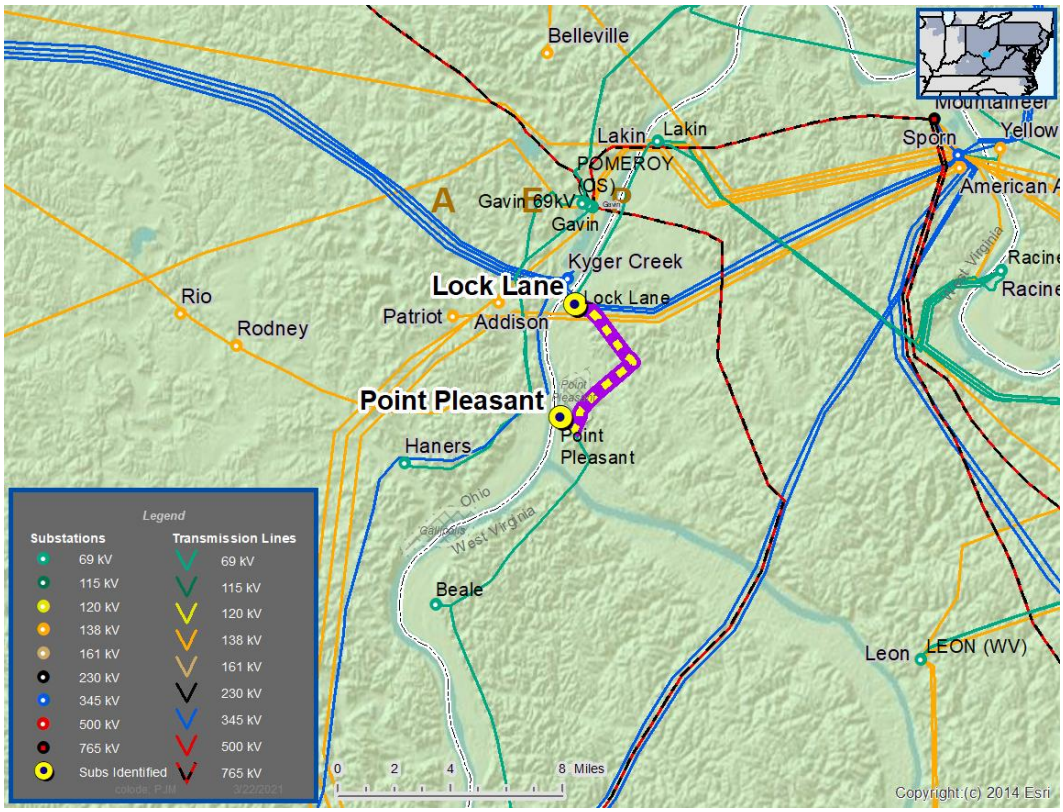
The recommended solution is to rebuild 10.5 miles of the Howard-Willard 69 kV line with 556 ACSR conductor. Additionally, the relays at Howard and Willard 69 kV substations will be upgraded. The estimated cost for this project is $19.46 million, with a required and projected in-service date of June 2025. The local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3284: Lock Lane-Point Pleasant Rebuild

AEP Transmission Zone

In the summer and winter 2025 RTEP cases, the Lock Lane-Point Pleasant 69 kV line is overloaded in the event of an N-1-1 scenario. This issue was identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 5. b3284: Lock Lane-Point Pleasant Rebuild



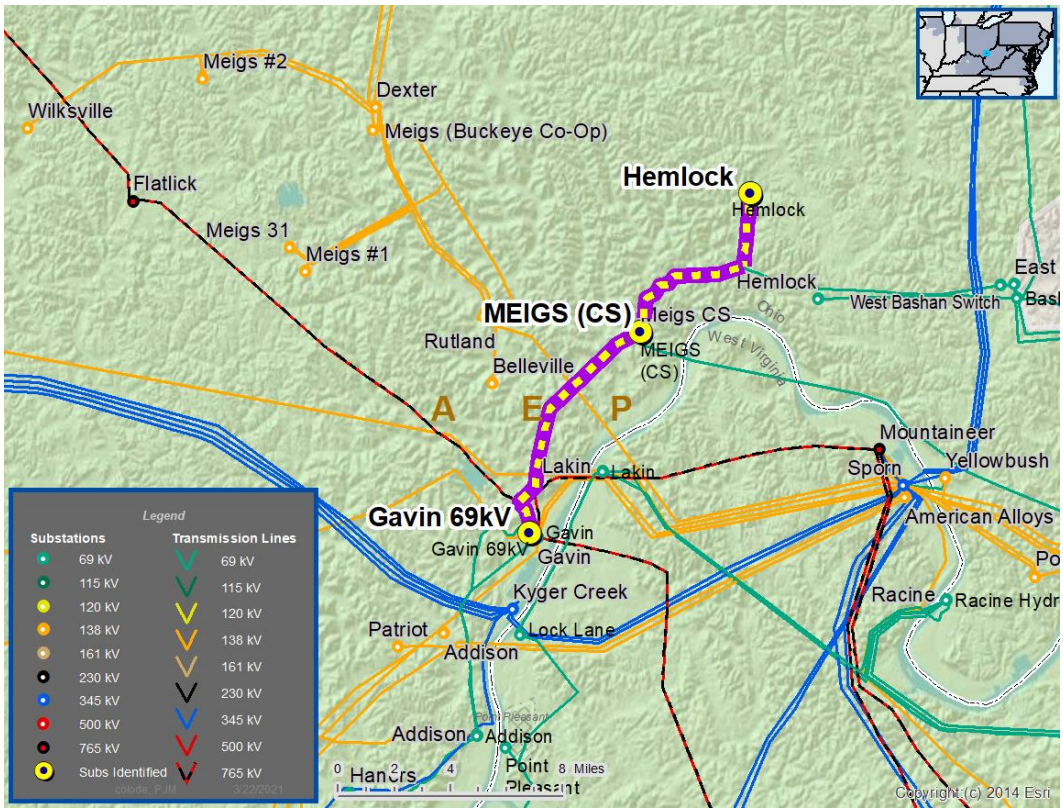
The recommended solution is to rebuild approximately 5.44 miles of 69 kV line from Lock Lane to Point Pleasant. The estimated cost for this project is $13.5 million, with a required and projected in-service date of June 2025. The local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3285: Meigs Area Upgrades

AEP Transmission Zone

In the summer and winter 2025 RTEP cases, the Meigs-Gavin and Meigs-Hemlock 69 kV lines are overloaded for the loss of multiple N-1-1 contingency pairs. These issues were identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 6. b3285: Meigs Area Upgrades



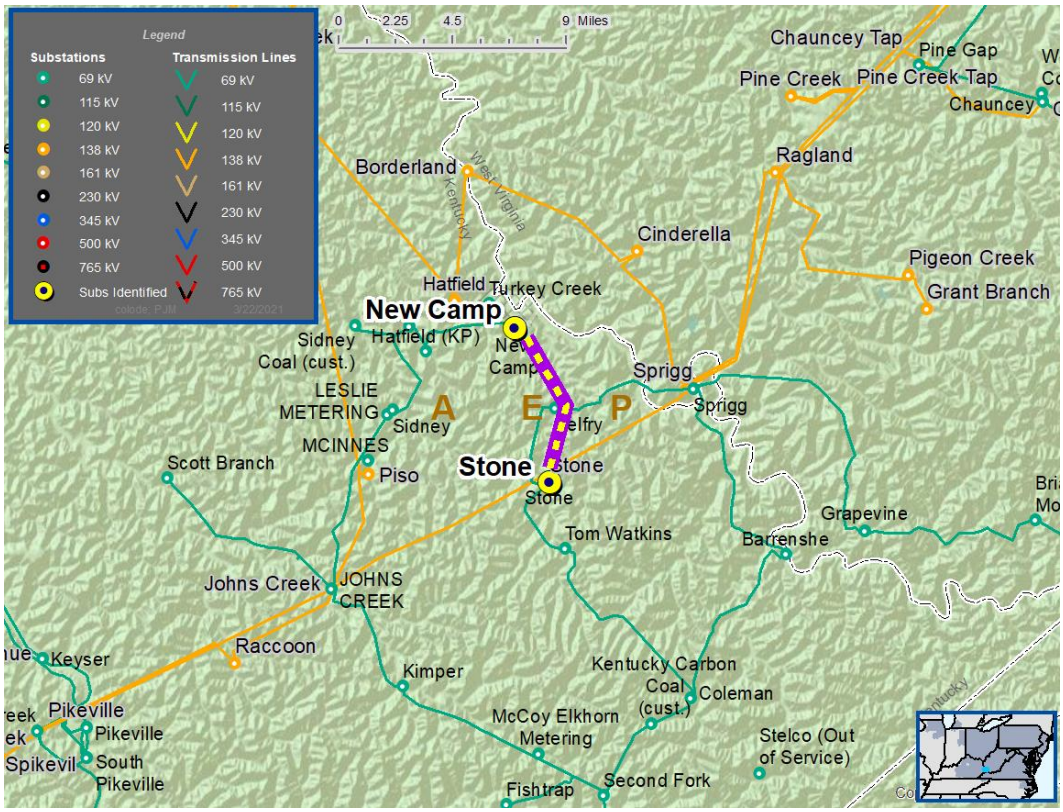
The recommended solution is to replace the Meigs 69 kV 4/0 Cu station riser towards Gavin and rebuild a section of the Meigs- Hemlock 69 kV circuit (approximately 4 miles) replacing the line conductor 4/0 ACSR with the line conductor size 556.5 ACSR. The estimated cost for this project is $12.14 million, with a required in-service date of June 2025. The projected in-service date is September 2024, and the local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3288: New Camp-Stone 69 kV

AEP Transmission Zone

In the winter 2025 RTEP case, voltage drop violations at New Camp 69 kV were identified in the event of an N-1-1 scenario. These issues were identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 7. b3288: New Camp-Stone 69 kV



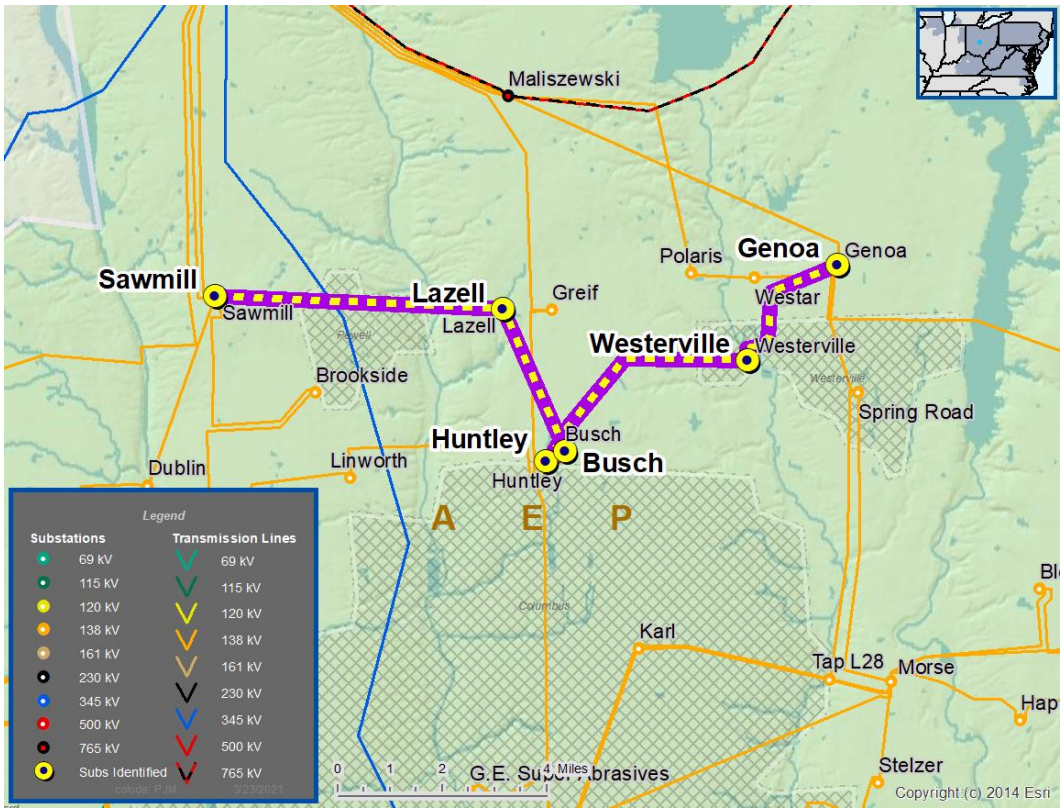
The recommended solution is to construct two new greenfield lines (approximately 2.75 miles of 69 kV transmission line between the Orinoco and Stone stations, and approximately 3.25 mi of 69 kV transmission line between the Orinoco and New Camp stations). At the Stone substation, circuit breaker A will remain in place and be utilized as the transformer T1 low side breaker, and circuit breaker B will remain in place and be utilized as new Hatfield (via Orinoco and New Camp) 69 kV line breaker. The project will add a new 40 kA 69 kV circuit breaker E for the Coleman line exit. The project includes the reconfiguration of the New Camp tap which includes access road improvements/installation, temporary wire and permanent wire work along with installation of dead end structures. At the New Camp substation, the project will rebuild the 69 kV bus, add 69 kV MOAB W and replace the 69 kV ground switch Z1 with a 69 kV circuit switcher on the New Camp transformer. The estimated cost for this project is $21.47 million, with a required and projected in-service date of December 2025. The local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3297: North Columbus 69 kV line Rebuilds

AEP Transmission Zone

In the summer 2025 RTEP case, the Sawmill-Lazelle and Westerville-Genoa 69 kV lines along with station equipment at Lazelle, Westerville and Genoa are overloaded for multiple N-1-1 contingency scenarios. These issues were identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV and substation equipment exemptions.

Map 8. b3297: North Columbus 69 kV Line Rebuilds



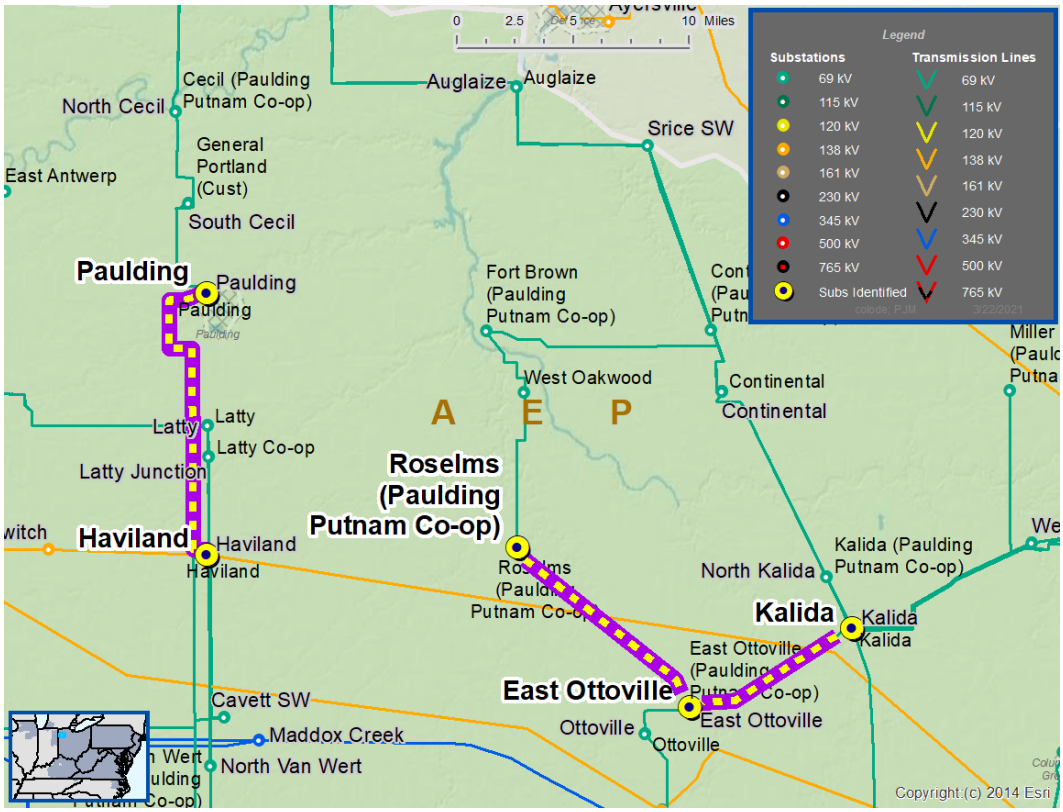
The recommended solution is to rebuild 4.23 miles of 69 kV line between Sawmill and Lazelle stations and 1.94 miles of 69kV line between Westerville and Genoa stations using 795 ACSR 26/7 conductor. The project will also replace risers and switchers at Lazelle, Westerville and Genoa 69 kV stations, and upgrade associated relaying accordingly. The estimated cost for this project is $19.8 million, with a required and projected in-service date of June 2025. The local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3290: Roselms-Kalida 69 kV

AEP Transmission Zone

In the summer 2025 RTEP case, the Haviland-Paulding 69 kV circuit is overloaded for the loss of multiple N-1-1 contingency pairs. In the summer and winter 2025 RTEP cases, the same N-1-1 contingency pair causes voltage drop violations at Roselms, West Oakwood, Fort Brown, Continental, Auglaize, Sherwood and Mark Center 69 kV buses. These issues were identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 9. b3290: Roselms-Kalida 69 kV



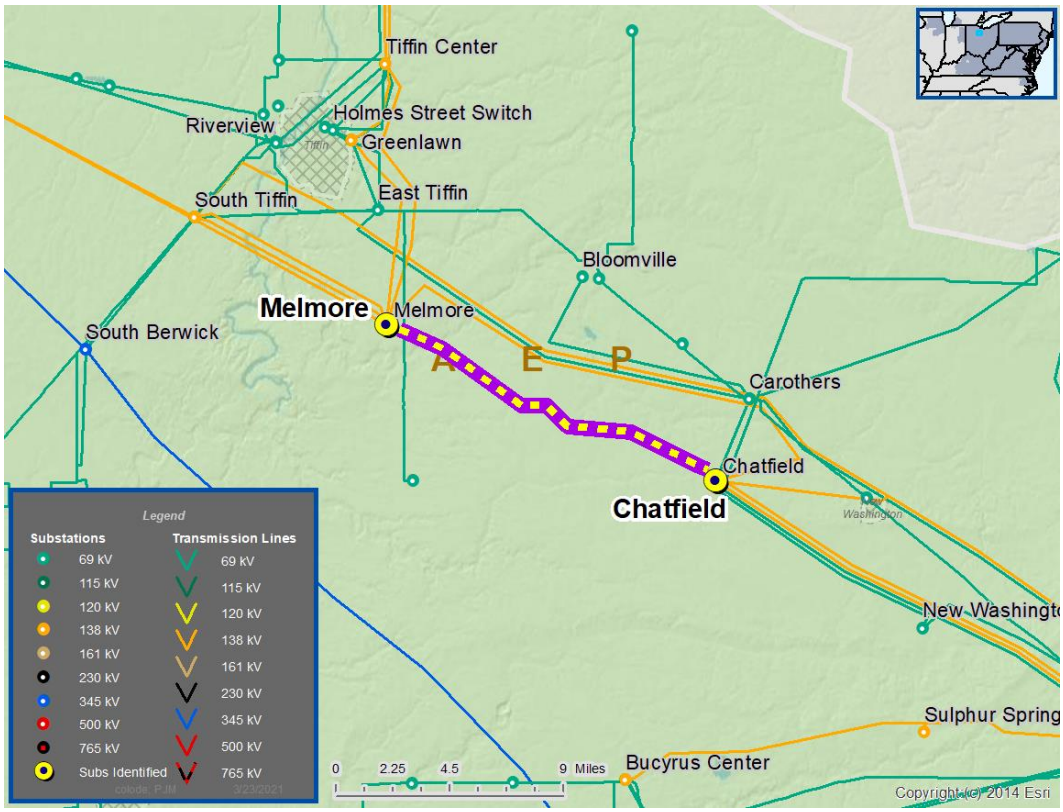
The recommended solution is to build 9.4 miles of single circuit 69 kV line from Roselms to near East Ottoville 69 kV Switch. The project also includes rebuilding 7.5 miles of the double circuit 69 kV line between East Ottoville Switch and Kalida Station, which will be combined with the new Roselms to Kalida 69 kV circuit. At the Roselms Switch, a new three-way 69 kV, 1200 A phase-over-phase switch with sectionalizing capability will be installed. At Kalida station, the new line from Roselms Switch will be terminated, and the CS XT2 will be moved from the high side of the T2 transformer to the high side of the T1 transformer. Additionally, the existing T2 transformer will be removed. The estimated cost for this project is $38.9 million, with a required and in-service date of June 2025. The projected in-service date is October 2024, and the local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3249: Chatfield-Melmore 138 kV Rebuild

AEP Transmission Zone

In the summer 2025 RTEP case, the Chatfield-Melmore 138 kV line is overloaded due to a line with stuck breaker contingency. This issue was identified through AEP's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 10. b3249: Chatfield-Melmore 138 kV Rebuild



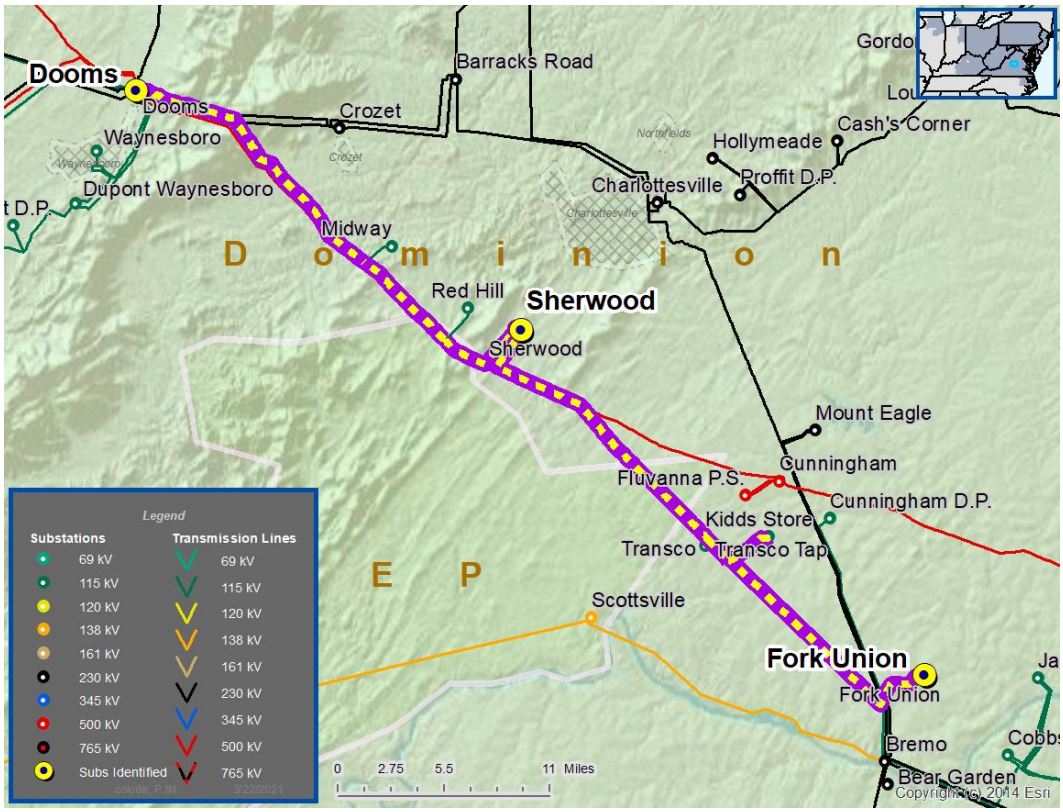
The recommended solution is to rebuild the Chatfield-Melmore 138 kV line (approximately 10 miles) to 1033 ACSR conductor. The estimated cost for this project is $27.2 million, with a required and projected in-service date of June 2025. The local transmission owner, AEP, will be designated to complete this work.

Baseline Project b3268: Midway and Red Hill Area

Dominion Transmission Zone

In the winter 2025 RTEP cases, the Midway-Red Hill area is experiencing voltage drop violations in the event of a bus or breaker failure. These issues were identified through Dominion's FERC 715 Planning Criteria, and excluded from the competitive proposal window through the below-200 kV exemption.

Map 11. b3268: Midway & Red Hill Area



The recommended solution is to build a 230 kV switching station called Walnut Creek and operate it at 115 kV at the junction where both Fork Union-Sherwood line No. 91 and Dooms-Sherwood line No. 39 115 kV lines start to share a common structure. The station arrangement will be a new 115 kV four-breaker ring bus station with an additional 115 kV 33.67 MVAR capacitor bank. The estimated cost for this project is $12 million, with a required and projected in-service date of December 2025. The local transmission owner, Dominion, will be designated to complete this work.

IV. Transmission Owner Criteria Projects

Of the $257.19 million of new recommended baseline transmission system enhancements, approximately $225.29 million is driven by transmission owner planning criteria, which makes up 87.6 percent of the new project cost estimates.

V. Changes to Previously Approved Projects

The following cancellation was recommended:

- Moseley-Roanoke 138 kV baseline b1880 project (Moseley-Roanoke 138 kV line rebuild) is no longer needed due to the rating increase resulting from a rating methodology update that occurred in 2014. The project was put on hold back in 2014 and no reliability violations have been identified in any RTEP cycle since then.

This change yields a net RTEP decrease of $30 million.

The following scope/cost modifications were recommended:

- The Idylwood to Tysons & Tysons substation baseline b2361 (construct a 230 kV UG line approximately 4.5 miles from Idylwood to Tysons, and rebuild Tysons substation within its existing footprint, with a six-breaker ring bus using GIS equipment) has undergone a cost increase. The cost increase is due to issues identified and remediated during construction, including but not limited to: additional engineering, material and construction costs, higher construction bids, delay changes due to permits, local approvals and communications, nighttime work required by permitting requirements, re-routing of trails, additional substation work at Idylwood and Reston. The additional work during construction has resulted the total cost of the project to increase from $111.7 million to $181.8 million, yielding an RTEP increase of $70.1 million.
- The East Lima-Haviland 138 kV baseline b3131 project (at East Lima and Haviland 138 kV stations, replace line relays and wave trap on the East Lima-Haviland 138 kV facility) requires additional scope. The additional scope is to rebuild approximately 12.3 miles of remaining Lark conductor on the double circuit line between Haviland and East Lima with 1033 54/7 ACSR conductor. The original scope incorrectly included ratings that indicated the ground clearances on the line conductors between Haviland and East Lima stations would allow for the line to operate at its maximum operating temperature. As the detailed design and engineering effort for the supplemental line rebuild was underway, it was determined that the assumed sag clearances were not available and therefore the emergency ratings could only match the normal ratings of the line conductor. The scope addition converts part of an existing supplemental project (s1563) into this baseline project, and has increased the total cost of the baseline project from $1.5 million to $27.4 million, yielding a net RTEP increase of $25.9 million. The supplemental project cost has decreased accordingly.

- The Millbrook Park-Franklin Furnace baseline b2604 project (rebuild 69 kV line between Millbrook Park and Franklin Furnace to 138 kV standards) has undergone a scope change. A portion of the original scope, to install a new 138/69/34.5 kV 200 MVA transformer, circuit switcher and 34.5 breaker on the high side and low side of transformer No. 5 at Bellefonte station, has been placed in-service. However, through detailed engineering on the original solution, significant siting and right-of-way encroachment concerns were identified that made the proposed rebuild of the existing 69 kV line between Millbrook and Franklin Furnace infeasible from a constructability perspective. Expanded easements for the line rebuild along the river and through New Boston, Sciotoville and Wheelersburg were not possible to obtain, at which point AEP began investigating other alternatives. The revised scope includes the removal of approximately 11.32 miles of the 69 kV line between Millbrook Park and Franklin Furnace, and a new 138/69 kV transformer No. 2 (90 MVA) with 3000 A 40 kA breakers on the high and low side at Millbrook Part station. The 600 A MOAB Switch at Millbrook Park station will be replaced, and a 3000 A circuit switcher will be added on the high side of transformer No. 1. The revised scope will replace the Sciotoville station with a new 138/12kV in-out station (Cottrell) with 2000 A line MOABs facing Millbrook Park and East Wheelersburg, and tie the new Cottrell switch into the Millbrook Park-East Wheelersburg 138 kV circuit. The new scope will replace the Wheelersburg 69 kV station with a new 138/12kV in-out station (Sweetgum) with a 3000 A 40 kA breaker facing Sadiq Switch and a 2000 A 138 kV MOAB facing Althea. Approximately 1.4 miles of new 138 kV line between the new Sadiq switch and the new Sweetgum station will be built, and the existing 69 kV Hayport Road Switch will be removed. Approximately 2.3 miles along existing right-of-way from Sweetgum to the Hayport Road switch will be rebuilt as 138 kV single circuit and approximately two miles from the Hayport Road switch to Althea will be rebuilt with double circuit 138 kV construction (one side operated at 69 kV to continue service to K.O. Wheelersburg). A new station (Althea) with a 138/69 kV, 90 MVA transformer will be built, and remote end work will be performed at Hanging Rock, East Wheelersburg and North Haverhill 138 kV stations. The scope change has increased the total cost of the project from $31.65 million to $39.18 million, yielding an RTEP increase of $7.53 million.

These changes yield a net RTEP increase of $103.53 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 2021, most recently at the March 2021 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 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.

VIII. Board Approval

The PJM Reliability and Security Committee is requested to endorse the changes to the RTEP proposed in this white paper, and recommend to the full Board for approval of the changes to existing RTEP projects as detailed in this white paper to be included in PJM's RTEP. On April 22, 2021, 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)	Transmission Owner	Cost Responsibility	Required In-Service Date
b2604.1	Remove approximately 11.32 miles of the 69 kV line between Millbrook Park and Franklin Furnace.	$1.13	AEP	AEP	6/1/2019
b2604.2	At Millbrook Park station, add a new 138/69 kV transformer #2 (90 MVA) with 3000 A 40 kA breakers on the high and low side. Replace the 600 A MOAB Switch and add a 3000 A circuit switcher on the high side of transformer #1.	$3.05	AEP	AEP	6/1/2019
b2604.3	Replace Sciotoville 69 kV station with a new 138/12 kV in-out station (Cottrell) with 2000A line MOABs facing Millbrook Park and East Wheelersburg 138 kV.	$1.40	AEP	AEP	6/1/2019
b2604.4	Tie Cottrell switch into the Millbrook Park-East Wheelersburg 138 kV circuit by constructing 0.50 miles of line using 795 ACSR 26/7 Drake (SE 359 MVA).	$1.96	AEP	AEP	6/1/2019
b2604.5	Install a new 2000 A 3-way POP Switch outside of Texas Eastern 138 kV substation (Sadiq Switch).	$1.08	AEP	AEP	6/1/2019
b2604.6	Replace the Wheelersburg 69 kV station with a new 138/12 kV in-out station (Sweetgum) with a 3000 A 40 kA breaker facing Sadiq Switch and a 2000 A 138 kV MOAB facing Althea.	$2.16	AEP	AEP	6/1/2019
b2604.7	Build approximately 1.4 miles of new 138 kV line using 795 ACSR 26/7 Drake (SE 359 MVA) between the new Sadiq Switch and the new Sweetgum 138 kV stations.	$3.41	AEP	AEP	6/1/2019
b2604.8	Remove the existing 69 kV Hayport Road Switch.	$0.10	AEP	AEP	6/1/2019

Upgrade ID	Description	Cost Estimate ($M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b2604.9	Rebuild approximately 2.3 miles along existing ROW from Sweetgum to the Hayport Rd switch 69 kV location as 138 kV single circuit and rebuild approximately 2.0 miles from the Hayport Road switch to Althea 69 kV with double circuit 138 kV construction, one side operated at 69 kV to continue service to K.O. Wheelersburg, using 795 ACSR 26/7 Drake (SE 359 MVA).	$10.76	AEP	AEP	6/1/2019
b2604.10	Build a new station (Althea) with a 138/69 kV, 90 MVA transformer. The 138 kV side will have a single 2000 A 40 kA circuit breaker and the 69 kV side will be a 2000 A 40 kA three breaker ring bus.	$11.07	AEP	AEP	6/1/2019
b2604.11	Remote end work at Hanging Rock, East Wheelersburg and North Haverhill 138 kV.	$0.06	AEP	AEP	6/1/2019
b3131.1	Rebuild approximately 12.3 miles of remaining Lark conductor on the double circuit line between Haviland and East Lima with 1033 54/7 ACSR conductor.	$25.90	AEP	AEP	12/1/2024
b3249	Rebuild the Chatfield-Melmore 138kV line (~ 10 miles) to 1033 ACSR conductor.	$27.20	AEP	AEP	6/1/2025
b3260	Replace the existing breaker 501-B-251 with a new 69 kV breaker with a higher (40 kA) interrupting capability	$0.86	ATSI	ATSI	12/1/2021
b3262	Install a second 115kV 33.67MVar cap bank at Harrisonburg substation along with a 115kV breaker.	$1.25	Dominion	Dominion	12/1/2025
b3263	Cut existing 115kV Line#5 between Bremo and Cunningham substations and loop in and out of Fork Union Substation.	$2.50	Dominion	Dominion	12/1/2025

Upgrade ID	Description	Cost Estimate ($M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3264	Install a 40 kA breaker at Stuarts Draft 115 kV station and sectionalize the Dooms to Dupont-Waynesboro 115 kV line No. 117 into two 115 kV lines	$5.00	Dominion	Dominion	6/1/2025
b3268	Build a switching station at the junction of 115kV line #39 and 115kV line #91 with a 115kV capacitor bank. The switching station will built with 230kV structures but will operate at 115kV.	$12.00	Dominion	Dominion	12/1/2025
b3278.1	Saltville Station: Replace H.S. MOAB Switches on the high side of the 138/69/34.5 kV T1 with a H.S. Circuit Switcher.	$0.72	AEP	AEP	12/1/2025
b3278.2	Meadowview Station: Replace existing 138/69/34.5 kV transformer T2 with a new 130 MVA 138/69/13 kV transformer.	$3.14	AEP	AEP	12/1/2025
b3279	Install a new 138 kV, 21.6 MVAR cap bank and circuit switcher at Apple Grove Station.	$1.00	AEP	AEP	6/1/2025
b3280	Rebuild the existing Cabin Creek - Kelly Creek 46 kV line (to structure 366-44), approximately 4.4 miles. This section is double circuit with the existing Cabin Creek - London 46 kV line so a double circuit rebuild would be required.	$17.90	AEP	AEP	6/1/2025
b3281	Install 138 kV circuit switcher on the 138/69 kV transformer #1 and 138/34.5 kV transformer #2 at Dewey. Install 138 kV 2000 A 40 kA breaker on Stanville line at Dewey 138 kV substation.	$1.40	AEP	AEP	12/1/2025

Upgrade ID	Description	Cost Estimate ($M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3282.1	Install a second 138 kV circuit utilizing 795 ACSR conductor on the open position of the existing double circuit towers from East Huntington-North Proctorville. Remove the existing 34.5 kV line from East Huntington-North Chesapeake and rebuild this section to 138 kV served from a new PoP switch off the new East Huntington-North Proctorville 138 kV #2 line.	$7.10	AEP	AEP	6/1/2025
b3282.2	Install a 138 kV 40 kA circuit breaker at North Proctorville.	$1.40	AEP	AEP	6/1/2025
b3282.3	Install a 138 kV 40 kA circuit breaker at East Huntington.	$1.10	AEP	AEP	6/1/2025
b3282.4	Convert the existing 34/12 kV North Chesapeake to a 138/12 kV station.	$0.80	AEP	AEP	6/1/2025
b3283	Replace the existing Inez 138/69 kV 50 MVA autotransformer with a 138/69 kV 90 MVA autotransformer.	$2.96	AEP	AEP	12/1/2025
b3284	Rebuild ~5.44 miles of 69 kV line from Lock Lane to Point Pleasant.	$13.50	AEP	AEP	6/1/2025
b3285	Replace the Meigs 69 kV 4/0 Cu station riser towards Gavin and rebuild the section of the Meigs – Hemlock 69 kV circuit from Meigs to approximately structure #40 (~4 miles) replacing the line conductor 4/0 ACSR with the line conductor size 556.5 ACSR.	$12.14	AEP	AEP	6/1/2025
b3286	Reconductor the first 3 spans from Merrimac station to Str. 464-3 of 3/0 ACSR conductor utilizing 336 ACSR on the existing Merrimac – Midway 69 kV circuit.	$0.45	AEP	AEP	6/1/2025
b3287	Upgrade 69 kV risers at Moundsville station towards George Washington.	$0.05	AEP	AEP	6/1/2025
b3288.1	Construct ~ 2.75 mi Orinoco - Stone 69 kV transmission line in the clear between Orinoco station and Stone station.	$9.23	AEP	AEP	12/1/2025

Upgrade ID	Description	Cost Estimate ($M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3288.2	Construct ~ 3.25 mi Orinoco – New Camp 69 kV transmission line in the clear between Orinoco station and New Camp station.	$9.95	AEP	AEP	12/1/2025
b3288.3	At Stone substation, circuit breaker A to remain in place and be utilized as T1 low side breaker, circuit breaker B to remain in place and be utilized as new Hatfield (via Orinoco and New Camp) 69 kV line breaker. Add new 69 kV circuit breaker E for Coleman Line exit.	$0.66	AEP	AEP	12/1/2025
b3288.4	Reconfigure the New Camp 69 kV tap which includes access road improvements/installation, temporary wire and permanent wire work along with dead end structures installation.	$0.45	AEP	AEP	12/1/2025
b3288.5	At New Camp substation, rebuild the 69 kV bus, add 69 kV MOAB W and replace the 69 kV ground switch Z1 with a 69 kV circuit switcher on the New Camp transformer.	$1.18	AEP	AEP	12/1/2025
b3289.1	Roanoke Station: Install high-side circuit switcher on 138/69/12 kV T5	$1.10	AEP	AEP	6/1/2025
b3289.2	Huntington Court Station: Install high-side circuit switcher on 138/69/34.5 kV T1	$1.42	AEP	AEP	6/1/2025
b3290.1	Build 9.4 miles of single circuit 69 kV line from Roselms to near East Ottoville 69 kV Switch.	$13.70	AEP	AEP	6/1/2025
b3290.2	Rebuild 7.5 miles of double circuit 69kV line between East Ottoville Switch and Kalida Station (combining with the new Roselms to Kalida 69 kV circuit).	$23.60	AEP	AEP	6/1/2025
b3290.3	At Roselms Switch, install a new three way 69kV, 1200 A phase-over-phase switch, with sectionalizing capability.	$0.60	AEP	AEP	6/1/2025

Upgrade ID	Description	Cost Estimate ($M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3290.4	At Kalida 69 kV station, terminate the new line from Roselms Switch. Move the CS XT2 from high side of T2 to the high side of T1. Remove existing T2 transformer.	$1.00	AEP	AEP	6/1/2025
b3291	Replace the Russ St. 34.5 kV Switch	$1.50	AEP	AEP	6/1/2025
b3292	Replace existing 69 kV capacitor bank at Stuart Station with a 17.2 MVAr capacitor bank	$0.00	AEP	AEP	12/1/2025
b3293	Replace 2/0 Cu entrance span conductor on the South Upper Sandusky 69 kV line and 4/0 Cu Risers/Bus conductors on the Forest line at Upper Sandusky 69 kV station.	$0.54	AEP	AEP	6/1/2025
b3294	Replace existing 69 kV disconnect switches for circuit breaker "C" at Walnut Avenue station	$0.00	AEP	AEP	6/1/2025
b3295	Grundy 34.5 kV: Install a 34.5 kV 9.6 MVAR cap bank	$0.80	AEP	AEP	6/1/2025
b3296	Rebuild the overloaded portion of the Concord-Whitaker 34.5 kV line (1.13 miles). Rebuild is double circuit and will utilize 795 ACSR conductor.	$2.80	AEP	AEP	6/1/2025
b3297.1	Rebuild 4.23 miles of 69 kV line between Sawmill and Lazelle station, using 795 ACSR 26/7 conductor.	$12.00	AEP	AEP	6/1/2025
b3297.2	Rebuild 1.94 miles of 69 kV line between Westerville and Genoa stations, using 795 ACSR 26/7 conductor.	$5.90	AEP	AEP	6/1/2025
b3297.3	Replace risers and switchers at Lazelle, Westerville, and Genoa 69 kV stations. Upgrade associated relaying accordingly.	$1.90	AEP	AEP	6/1/2025
b3298	Rebuild 0.8 miles of double circuit 69 kV line between South Toronto and West Toronto. Replace 219 kcmil ACSR with 556 ACSR.	$2.83	AEP	AEP	6/1/2025

Upgrade ID	Description	Cost Estimate ($M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3298.1	Replace the 69 kV breaker D at South Toronto station with 40 kA breaker.	$0.70	AEP	AEP	6/1/2025
b3299	Rebuild 0.2 mile of the West End Fostoria - Lumberjack Switch 69 kV line with 556 ACSR (Dove) conductors. Replace jumpers on West End Fostoria line at Lumberjack Switch.	$0.47	AEP	AEP	6/1/2025
b3307	Rebuild Fleming station in the clear; Replace 138/69kV Fleming Transformer #1 with 138/69 kV 130 MVA transformer with high side 138 kV CB; Install a 5 breaker 69 kV ring bus on the low side of the transformer, replace 69 kV circuit switcher AA, replace 69/12kV transformer #3 with 69/12 kV 30 MVA transformer, replace 12 kV CB A and D. Retire existing Fleming substation.	$21.10	AEP	AEP	12/1/2025
b3308	Reconductor and rebuild 1 span of T-line on the Fort Steuben-Sunset Blvd 69 kV branch with 556 ACSR.	$0.73	AEP	AEP	6/1/2025
b3309	Rebuild 1.75 miles of the Greenlawn - East Tiffin line section of the Carrothers - Greenlawn 69 kV circuit containing 133 ACSR conductor with 556 ACSR conductor. Upgrade relaying as required.	$3.45	AEP	AEP	6/1/2025
b3310.1	Rebuild 10.5 miles of the Howard-Willard 69 kV line utilizing 556 ACSR conductor.	$19.00	AEP	AEP	6/1/2025
b3310.2	Upgrade relaying at Howard 69 kV station.	$0.23	AEP	AEP	6/1/2025
b3310.3	Upgrade relaying at Willard 69 kV station.	$0.23	AEP	AEP	6/1/2025
b3311	Install a 120.75 kV 79.4 MVAR capacitor bank at Yorkana 115 kV	$2.20	ME	ME	5/31/2022
b3313	Add 40 kA circuit breakers on the low and high side of East Lima 138/69 kV Transformer	$1.20	AEP	AEP	6/1/2025

Upgrade ID	Description	Cost Estimate ($M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3314.1	Install a new 138/69 kV 130 MVA transformer and associated protection at Elliot station.	$3.00	AEP	AEP	6/1/2025
b3314.2	Perform work at Strouds Run station to retire 138/69/13 kV 33.6 MVA transformer #1 and install a dedicated 138/13 KV distribution transformer.	$0.00	AEP	AEP	6/1/2025
b3315	Upgrade Relaying on Mark Center-South Hicksville 69 kV line and replace Mark Center cap bank with a 7.7 MVAR unit	$1.25	AEP	AEP	6/1/2025

Attachment B – Reliability Project Multi-Zone Allocations

None