DRAFT

Reliability Analysis Report

2024 RTEP Window 1

December 2nd, 2024 – R1

For Public Use

The information contained herein is based on information provided in project proposals submitted to PJM by third parties through its 2024 RTEP Window 1. PJM analyzed such information for the purpose of identifying potential solutions for the 2024 RTEP Window 1. Any decision made using this information should be based upon independent review and analysis and shall not form the basis of any claim against PJM.

This maps contained in this report are only intended to illustrate the general electrical connectivity of the projects and should not be relied upon for exact geographical substation locations or line routes.

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2024 RTEP Window 1 Reliability Analysis

Background

PJM presented the 2024 Regional Transmission Expansion Plan (RTEP) assumptions at the January and February 2024 Transmission Expansion Advisory Committee (TEAC) meetings where the modeling and analysis criteria, along with the anticipated timeline of the RTEP, was discussed. PJM developed a 5-year (2029) and 8-year (2032) base case suite in order to observe the effects of high-impact projects on the system and to ensure any long-lead reliability issues can be identified and addressed in a timely manner.

Notable high-impact projects include, but are not limited to, the New Jersey State Agreement Approach (SAA) 1.0 project, for which the 7,500 MW of offshore wind injection capacity is planned in stages, with the ultimate generation slated to be in service by 2032. Additionally, substantial data center load additions in the AEP, APS and Dominion zones were modeled, consistent with the 2024 Load Forecast released in February 2024. Solutions identified in the 2023 Window 1 and 2, along with 2022 Window 3 scope changes that did not meet the initial 2024 RTEP modeling cutoff date, were also modeled in the case. PJM determined in preliminary analysis during the window preparation that these additional baseline projects have sufficient impact to warrant inclusion.

2029 and 2032 Case Development and Comparison

The purpose of the 8-year 2032 model is to ensure right sizing of solutions for the 5-year 2029 RTEP needs and to capture any potential long-lead items. The load in the 8-year model was increased to align with the 2032 load forecast, resulting in approximately a 4.5 GW increase in Dominion, a 1.4 GW increase in MAAC and a 650 MW increase in the West compared to the 5-year model. PJM included additional generation in the 8-year model to accommodate the significant load increase, specifically, the Coastal Virginia Offshore Wind (CVOW) and Chesterfield projects in the Dominion zone, totaling approximately 3.7 GW of maximum facility output. The 2032 cases also include the remainder of the New Jersey SAA offshore wind generation, an additional 3.7 GW to what is already modeled in the 5-year model, and associated upgrades that were recommended from the SAA window evaluation. The 8-year model also took into account the Elwood and Elgin generator deactivations in the ComEd zone.

Window Objective

PJM sought proposals to resolve identified reliability criteria violations as demonstrated in the 2029 RTEP model suite and to also resolve a select set of needs demonstrated in the 2032 RTEP model suite requiring long-lead solutions. The objective is to develop complete solutions to address the identified criteria violations. The large number of violations seen in the 2024 RTEP were driven by a number of factors. Significant load increase in the south and east, along with higher forecasted load in the MAAC, Dominion and APS zones, caused heavy transmission interface flows west to east. There is a 10 GW and 15 GW load increase for 2029 and 2032 between the load forecasts used for the 2022 and 2024 RTEPs, respectively. The significant load growth is attributed to data centers and some electrification and electric vehicle developments.

While the proposed reinforcements recommended through the 2022 RTEP Window 3 and the 2023 RTEP Windows 1 and 2 are performing well, there are additional load pockets in the AEP, ATSI, Dominion, PECO, BGE and PPL transmission zones that have emerged and are requiring additional regional transfer improvement as shown by the high loading levels and number of 500 kV and 765 kV thermal overloads in **Table 1** and **Map 1**. There are also 70 contingencies that did not converge, many of which were 500 kV contingencies. The magnitude

of violations in the 2024 RTEP analysis is primarily due to a shift in generation flow as a result of overall system load increase and over 2 GW of generator deactivations across the transmission system.

Table 1. 2024 RTEP Window 1 Number of Overloaded Lines

kV Level	Number of Lines
69	2
115	8
138	70
230	48
345	14
500	25
765	6
Total	**173**

Table 2. 2024 RTEP Window 1 Maximum Line AC Percent Loading by kV Level

	Highest AC Loading (%)
69	115.52
115	**146.05**
138	**172.67**
230	**159.29**
345	**130.09**
500	**171.72**
765	109.86

Note: Loadings > 120% are marked in **orange**

Table 3. 2024 RTEP Window 1 Number of Overloaded Transformers

kV Level	Number of Transformers
69/138	1
115/138	1
115/230	5
138/230	1
138/500	7
230/500	6
500/765	1
Total	**22**

Table 4. 2024 RTEP Window 1 Maximum Transformer AC Percent Loading by kV Level

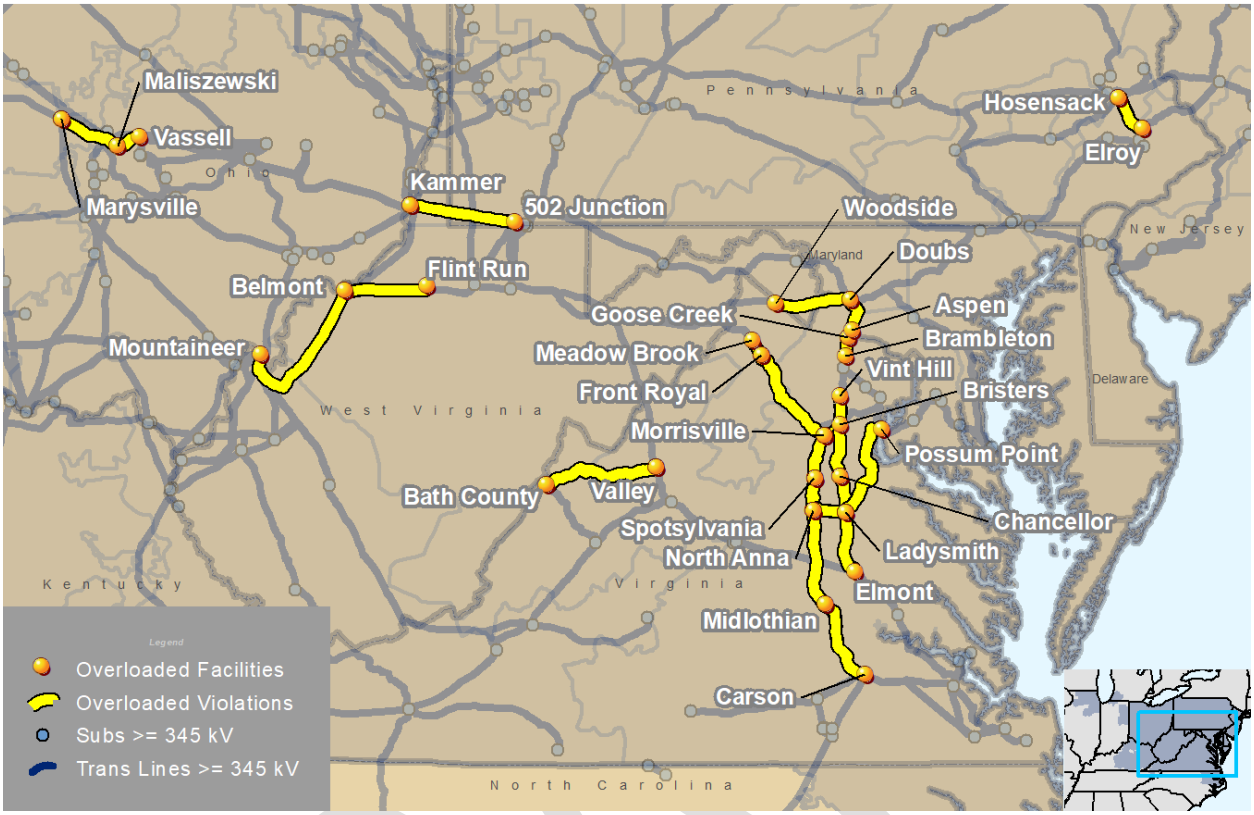
	Highest AC Loading (%)
69/138	105.18
115/138	106.17
115/230	106.58
138/230	102.47
138/500	113.48
230/500	**123.04**
500/765	**120.05**

Note: Loadings > 120% are marked in **orange**

Table 5. 2024 RTEP Window 1 Voltage Issues by kV Level

Area Name	kV Level	Number of Facilities with Voltage Issues
APS	115	1
	138	110
	230	20
	500	11
ComEd	138	84
PENELEC	115	5
	230	3
METED	115	17
PPL	115	1
	230	6
BGE	230	2
	500	2
PEPCO	230	60
	500	6
Dominion	69	13
	115	79
	138	1
	230	359
	500	54
	Total	**834**

Map 1. 2024 RTEP Window 1 500 kV and 765 kV Violations



Reliability Solutions and Clusters

The 2024 RTEP Window 1 opened on July 15, 2024, and closed on Sept. 17, 2024. PJM received 94 proposals from 16 different entities as part of this window. PJM received 48 upgrade proposals, 40 greenfield proposals and six joint proposals. Proposals range from simple facility upgrades to new extra-high-voltage transmission lines and facilities.

The proposals submitted to target west-east regional flows recommended 765 kV solutions. Multiple proposals recommend variations of a Joshua Falls/Axton to Morrisville area 765 kV line. Some of the proposals recommended a northern John Amos-Northern Virginia 765 kV development. The west-east regional solution(s) requires at least one variant of the 765 kV development, with accompanying 500 kV and 765 kV upgrades.

A number of the proposals targeting more of the local needs may not be required depending on the robustness of the selected regional solution.

A number of the proposals submitted through the window were full-scale solutions that address the majority of posted reliability violations. As preliminary analysis shows that these holistic proposals perform well, PJM is considering their performance individually. Based on the individual proposal performance, PJM may develop scenarios with components from various proposals to determine a more efficient or cost-effective solution.

Proposal Clusters/Groupings

The below **Table 6** shows the magnitude of proposals, concentrating in a number of focus areas including those that focus on the regional need, along with more targeted proposals to address local violations. The focus areas were named, and numbered where appropriate, based on the TO zone in which the targeted flowgates reside. Where the focus area indicates "No Cluster," this indicates that the proposal was the only one submitted in order to address the targeted flowgates. In other words, no competing proposals were submitted. Focus area "0" (zero) was assigned to indicate that the proposal includes components that are regional in nature, typically including 500 kV and 765 kV solutions that improve regional transfer. Furthermore, the focus area "0 & DOM - 1" indicates scenario proposals, where the proposal could be evaluated on its own to address not only the regional need but also the Dominion zone flowgates. While there are flowgates in other TO zones that would be influenced by whatever regional solution is to be selected, the flowgates in the Dominion zone are so heavily intertwined with the regional solution due to the sheer magnitude of data center load driving the need for improved transfer capability. This is why the proposals assigned to "0 & DOM - 1" are considered scenario proposals, as they are holistic solutions that address the majority of the posted violations.

Table 6. 2024 RTEP Window 1 Submitted Proposals

#	ID	Proposing Entity	Focus Area	Project Title	Submitted Cost ($M)
1	408	AEPSCT	AEP - 3/4/5	Maliszewski 765/345 kV upgrades	$145.49
2	459		No Cluster	Mountaineer and Belmont station upgades	$10.52
3	738		AEP - 1	Boxwood-Bremo 138 kV rebuild	$140.36
4	949		AEP - 1	Boxwood-Bremo 138 kV sag study and partial rebuild	$10.58
5	117		No Cluster	Tidd-Mahans Lane 138 kV rebuild	$15.05
6	574		No Cluster	Tiltonsville-West Bellaire 138 kV rebuild	$28.57
7	863		AEP - 3/4	Maliszewski series reactor upgrades	$2.33
8	167		No Cluster	Leesville station conductor replacement	$0.12
9	756		AEP - 6	Cyprus station reconfiguration	$1.75
10	769		AEP - 6	Rebuild Beatty-Cyprus 138 kV line	$33.11
11	276		AEP - 2	Bixby-Buckeye Steel 138 kV reconfiguration	$4.08
12	856		AEP - 2	Canal-Mound Street 138 kV rebuild	$31.09
13	744		AEP - 4	Maliszewski-Polaris rebuild	$8.88
14	940		No Cluster	Canal-Gay 138 kV rebuild	$15.59
15	338		AEP - 3	Genoa-Westar rebuild	$8.79
16	464		AEP - 3	Genoa-Westar sag remediation	$2.81
17	605	ATSI	ATSI	ATSI 138 kV rebuild + substation terminal upgrades	$265.16
18	843			Lemoyne-Lake Ave 345 kV line	$455.04
19	78	CNTLTM	0 & DOM - 1	F5 Solution	$1,897.05
20	124			F4 Solution	$1,810.83
21	200			Common Components	$439.75
22	317			F7 Solution	$1,896.76
23	506			F6 Solution	$1,732.11
24	622			F2 Solution	$1,848.14
25	839			F8 Solution	$1,808.09

#	ID	Proposing Entity	Focus Area	Project Title	Submitted Cost ($M)
26	898	CNTLTM	0 & DOM - 1	F3 Solution	$2,015.63
27	904			F1 Solution	$1,864.62
28	135	COMED	COMED - 1	Reconductor 345 kV lines 1202 & 1227 Dresden to Mulberry	$16.27
29	447			Cut 345 kV L8014 Pontiac to Dresden into Mulberry	$23.59
30	532			345 kV Shunt Inductor at Mulberry	$28.23
31	816		COMED - 2	Autotransformer at Itasca	$14.31
32	888			Reconductor Des Plaines to Busse	$7.21
33	727	KEYATC	0	Kammer-502 Junction 765 kV line	$292.46
34	502	MATLIT	METED	Hunterstown #2 500/230 kV transformer	$43.09
35	146	NEETMH	0 & DOM - 1	Axton-Joshua Falls 765 kV + Joshua Falls-Mt Ida 500 kV	$2,263.76
36	294		ATSI	Bay Shore-Davis-Besse-Lake Ave	$257.30
37	357			Bay Shore-Davis-Besse-Lake Ave + Lemoyne-Lake Ave 345 kV	$344.12
38	533			Lemoyne-Lake Ave 345 kV	$202.08
39	768		0 & DOM - 1	Axton-Joshua Falls-Mt Ida	$2,191.01
40	944		No Cluster	Upgrades to AEP 138 kV and Dominion 230 kV transmission lines	$69.14
41	992		0 & DOM - 1	Axton-Joshua Falls-Mt Ida 765 kV transmission lines + Link 500/230 kV substation	$2,256.23
42	12	PE	PECO	PECO competitive window upgrades	$43.22
43	132	PEPCO	No Cluster	Dickerson H 230 kV caps	$12.42
44	295		BGE	Marley Neck 115 kV substation	$107.62
45	470			BGE local mitigation alternative	$71.96
46	232	POTOED	No Cluster	FirstEnergy upgrades to support portfolio proposals	$97.47
47	551		0	Chanceford-Goose Creek 500 kV line	$13.97
48	17	PPLTO	PPL - 2	Bushkill-Kittatinny 230 kV line reconductor	$35.00
49	72			Juniata-Cumberland-Williams Grove 230 kV upgrade project	$78.59
50	312			Acahela 500/230 kV substation expansion project	$116.33
51	330			Juniata-Hunterstown 500 kV line	$356.70
52	386			Juniata-TMIS 500 kV DCT line	$353.71
53	479			Lackawanna-Paupack 230 kV line reconductor	$47.70
54	526			Jenkins-Pocono 230 kV line	$60.03
55	549			Susquehanna T10 station line reconfiguration	$9.50
56	850			Pocono 80 MVAr 230 kV capacitor bank	$4.93
57	860			Face Rock T1 and T2 transformer replacement	$9.51
58	876			Siegfried 500/230 kV Substation expansion project	$106.93
59	922			Lackawanna-Siegfried-Drakestown 500 kV line project	$618.38
60	926			Wescosville 2nd 500/138 kV transformer	$36.83
61	935			Juniata 500 kV Substation yard reconfiguration	$22.24
62	994			Juniata-Dauphin 230 kV line reconductor	$2.26
63	955	PSEGRT	PECO	230 kV Eagle Point-Penrose	$390.99

#	ID	Proposing Entity	Focus Area	Project Title	Submitted Cost ($M)
64	708	TRAIL	0	John Amos-Welton Springs-Rocky Point 765 kV line	$1,944.99
65	883			John Amos-Welton Spring 765 kV line	$1,274.42
66	885			FirstEnergy components for proposals 2024-W1-636, 610, 279 and 114	$52.67
67	907			500 kV expansion plan	$2,838.90
68	977			Belmont-Harrison 500 kV line	$277.41
69	546	TRNSLK	PPL - 1	Pennsylvania Border-Drakestown 500 kV line (greenfield route)	$246.05
70	900			Pennsylvania Border-Drakestown 500 kV line (brownfield route)	$277.00
71	81	TRNSRC	0	AEP incumbent upgrades for Portfolio #1, 2 & 3	$137.02
72	114		0 & DOM - 1	Portfolio #4B	~$3,300.00
73	262			Portfolio #1A	$5,497.68
74	279			Portfolio #4A	~$2,400.00
75	286		0	Joshua Falls-Durandal	$350.25
76	300			Yeat-Vontay	$381.73
77	350		AEP - 3/4	Jester-Hayden	$229.41
78	610		0 & DOM - 1	Portfolio #3	~$3,700.00
79	617		0	AEP incumbent upgrades for Portfolio #4	$167.35
80	636		0 & DOM - 1	Portfolio #2	~$3,900.00
81	665		0	Joshua Falls-Vontay-Morrisville South	$1,188.51
82	694		ATSI	Fostoria Central-Lake Ave. 345 kV DC	$328.37
83	759		0 & DOM - 1	Portfolio #1B	$4,827.12
84	820		0	765 kV Joshua Falls-Yeat	$1,016.90
85	24	VEPCO	DOM - 1	230 kV and 115 kV solutions for portfolios	$861.74
86	261			Overdutied breaker replacement	$70.78
87	390			230 kV Safety Solutions (Optional reinforcements depending on selected proposals)	$1,008.58
88	527			500 kV and 230 kV Cap Bank and STATCOM Installation (Required/discretionary depending on selected proposals)	$322.00
89	761			138/115 kV safety solutions (Optional reinforcements depending on selected proposals)	$104.07
90	781			500 kV Solutions for Portfolios	$161.68
91	873		AEP - 1	Line 8 Rebuild-Bremo to Scottsville Interconnection (APCO)	$42.10
92	967		DOM - 1	DVP central area improvement for portfolios	$1,189.78
93	980			500 kV line #579 EOL rebuild Septa-Yadkin	$216.78
94	983			500 kV safety solutions (Optional reinforcements depending on selected proposals)	$2,839.36

Regional Proposal Components

Of the 94 proposals received, 31 proposals (or 33%) included components that would address the regional need(s) and were assigned to focus areas "0" or "0 & DOM - 1." Furthermore, of those 31 proposals, 18 of the proposals (almost 20% of the total number of proposals submitted) were what PJM considers scenarios, assigned to focus area "0 & DOM - 1," intended to address the majority of regional violations. The scenario proposals were proposed by CNTLTM (LS Power), NEETMH (NextEra) and TRNSRC (Transource). The Transource scenario proposals represent a collaborative effort by the incumbent TOs (Dominion, FirstEnergy and Transource) and are portfolios including several incumbent TO proposals along with Transource's greenfield component proposals. **Table 7** and **Table 8** organize the backbone proposal components into regional clusters.

Table 7. Regional "0" Cluster

Proposal ID	Proposing Entity	Major Components
727	**KEYATC**	Kammer-502 Junction 765 kV line
551	**POTOED**	Chanceford-Goose Creek 500 kV line
708	**TRAIL**	John Amos-Welton Springs-Rocky Point 765 kV line
883		John Amos-Welton Spring 765 kV line
885		FirstEnergy Components for Proposals 2024-W1-636, 610, 279 and 114
907		500 kV expansion plan
977		Belmont-Harrison 500 kV line
81	**TRNSRC**	AEP incumbent upgrades for Portfolio #1, 2 and 3
286		Joshua Falls-Durandal 765 kV
300		Yeat-Vontay 765 kV
617		AEP incumbent upgrades for Portfolio #4
665		Joshua Falls-Vontay-Morrisville South 765 kV
820		Joshua Falls-Yeat 765 kV

Table 8. Scenario Cluster

Proposal ID	Proposing Entity	Major Components
78	**CNTLTM**	• Marsh 765/500/230 kV substation • Cunningham 500 kV substation expansion • Axton 765 kV substation expansion • Joshua Falls 765 kV substation expansions • Axton-Joshua Falls 765 kV line (~75 mi) • Joshua Falls-Marsh 765 kV line (~122 mi) • Cunningham-Marsh 500 kV line (~69 mi) • Marsh-Morrisville double circuit 500/230 kV line (~3 mi each) • Turkey Creek 500 kV series reactor
124		• Rocky Ford 765 KV substation • Stage 765 kV substation • Marsh 765/500/230 kV substation • Piney Mountain 765/500 kV substation • Cunningham 500 kV substation expansion • Focky Ford-Stage 765 kV line (~71 mi) • Stage-Piney Mountain 765 kV line (~56 mi) • Piney Mountain-Marsh 765 kV line (~66 mi) • Piney Mountain-Cunningham 500 kV line (~3 mi) • Marsh-Morrisville double circuit 500/230 kV line (~3 mi each) • Turkey Creek 500 kV PAR
200		• Common components that are intended to be included in the rest of the LS Power proposals

Proposal ID	Proposing Entity	Major Components
317	CNTLTM	• Piney Mountain 765/500 kV substation • Cunningham 500 kV substation expansion • Axton 765 kV substation expansion • Joshua Falls 765 kV substation expansions • Axton-Joshua Falls 765 kV line (~75 mi) • Joshua Falls-Piney Mountain 765 kV line (~56 mi) • Piney Mountain-Cunningham 500 kV line (~3 mi) • Piney Mountain-Morrisville double circuit 500 kV line (72 mi each) • Turkey Creek 500 kV PAR
506		• Rocky Ford 765/500 kV substation • Stage 765/500 kV substation • Cunningham 500 kV substation expansion • Rocky Ford-Stage 500 kV line (~71 mi) • Stage-Cunningham 500 kV line (~60 mi) • Cunningham-Morrisville double circuit 500 kV line (72 mi each)
622		• Rocky Ford 765/500 kV substation • Stage 765/500 kV substation • Marsh 500/230 kV substation • Piney Mountain 500 kV substation • Cunningham 500 kV substation expansion • Rocky Ford-Stage 500 kV line (~71 mi) • Stage-Piney Mountain 500 kV line (~60 mi) • Piney Mountain-Cunningham 500 kV line (~3 mi) • Piney Mountain-Marsh double circuit 500 kV line (~66 mi each) • Marsh-Morrisville double circuit 500/230 kV line (~3 mi each)
839	CNTLTM	• Piney Mountain 765/500 kV substation • Marsh 765/500/230 kV substation • Cunningham 500 kV substation expansion • Axton 765 kV substation expansion • Joshua Falls 765 kV substation expansion • Axton-Joshua Falls 765 kV line (~75 mi) • Joshua Falls-Piney Mountain 765 kV line (~56 mi) • Piney Mountain-Marsh 765 kV line (~66 mi) • Piney Mountain-Cunningham 500 kV line (~3 mi) • Marsh-Morrisville double circuit 500/230 kV line (~3 mi each) • Turkey Creek 500 kV PAR
898		• Rocky Ford 765 KV substation • Stage 765 kV substation • Marsh 500/230 kV substation • Piney Mountain 765/500 kV substation • Cunningham 500 kV substation expansion • Rocky Ford-Stage 765 kV line (~71 mi) • Stage-Piney Mountain 765 kV line (~56 mi) • Piney Mountain-Cunningham 500 kV line (~3 mi) • Piney Mountain-Marsh double circuit 500 kV line (~66 mi each) • Marsh-Morrisville double circuit 500/230 kV line (~3 mi each) • Turkey Creek 500 kV PAR
904		• Rocky Ford 765 KV substation • Stage 765 kV substation • Marsh 765/500/230 kV substation • Cunningham 500 kV substation sxpansion • Rocky Ford-Stage 765 kV line (~71 mi) • Stage-Marsh 765 kV line (~122 mi) • Marsh-Morrisville double circuit 500/230 kV line (~3 mi each) • Cunningham-Marsh 500 kV line (~69 mi) • Turkey Creek 500 kV PAR

Proposal ID	Proposing Entity	Major Components
146	NEETMH	• Axton to Joshua Falls 765 (~76 mi) • Joshua Falls to Mt Ida double circuit 500 kV(~69 mi) • Mt Ida to Morrisville 500 kV #1 (~71 mi) • Mt Ida to Morrisville 500 kV #2 (~89 mi) • North Anna-Chancellor 500 kV (~29 mi) • Joshua Falls 765/500 expansion • Mt Ida 500 kV substation
768		• Axton to Joshua Falls 765 (~76 mi) • Joshua Falls to Mt Ida 765 kV (~69 mi) • Mt Ida to Morrisville 500 kV #1 (~71 mi) • Mt Ida to Morrisville 500 kV #2 (~89 mi) • North Anna-Chancellor 500 kV (~29 mi) • Joshua Falls 765 kV expansion • Mt Ida 765/500 kV substation
992		• Axton to Joshua Falls 765 (~76 mi) • Joshua Falls to Mt Ida 765 kV (~69 mi) • New Mt Ida-Link 500 kV (~69 mi) • Mt Ida to Morrisville 500 kV #2 (~89 mi) • North Anna-Chancellor 500 kV (~29 mi) • Joshua Falls 765 kV expansion • Mt Ida 765/500 kV Substation
114	TRNSRC	• Durandal-Joshua Falls 765 kV line (~45 mi) • Joshua Falls-Yeat 765 kV line (~110 mi) • Yeat-Vontay 500 kV line (~66 mi) • Ladysmith Substation Reconfiguration
262		• John Amos-Welton Spring-Rocky Point 765 kV line (~259 mi) • Joshua Falls-Vontay-Morrisville South 765 kV line (~160 mi) • North Anna-Kraken-Bristers 500 kV line (~66 mi)
279		• Durandal-Joshua Falls 765 kV line (~45 mi) • Joshua Falls-Yeat 765 kV line (~110 mi) • Yeat-Vontay 500 kV line (~66 mi) • Ladysmith substation reconfiguration
610		• Joshua Falls-Yeat 765 kV line (~110 mi) • North Anna-Kraken-Bristers 500 kV line (~66 mi) • Ladysmith substation reconfiguration
636		• Joshua Falls-Vontay-Morrisville South 765 kV line (~160 mi) • North Anna-Kraken-Bristers 500 kV line (~66 mi)
759		• John Amos-Welton Spring 765 kV line (~175 mi) • Welton Spring 765/500 kV transformation • Joshua Falls-Vontay-Morrisville South 765 kV line (~160 mi) • North Anna-Kraken-Bristers 500 kV line (~66 mi)

Window 1 Evaluations Process – Regional

Consultation Meetings With Proposing Entities

PJM held at least two rounds of meetings with each of the proposing entities, and the discussions focused on gaining clarity on proposed developments, assumptions and rationale of proposed alternatives and variations. The first round of meetings were held shortly after the window closed, in late September 2024, and the second round commenced in early October 2024. The latter half of the discussions focused on outage scheduling, routing, risk and cost assumptions and considerations.

Scenario Development

The scenarios were evaluated based on the following principles:

- **Performance**
  Meeting the system needs of 2029 and 2032
- **Scalability**
  Scenario/development longevity – system robustness and utilization
- **Cost Validation**
  Cost evaluation using third-party benchmarking metrics

- **Risks**
  - Triggering additional costs:
    - Substation rebuilds due to extreme short-circuit levels
  - Avoid extended critical outages (Major transmission 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

Further information regarding aspects related to the above bulleted impact, cost validation, risks and efficiencies are detailed in the 2024 RTEP Window 1 Constructability & Financial Analysis Report.

The proposals and scenarios were tested to first address the regional transfer needs and then were refined through new scenarios to address regional local needs. Scenarios were further refined using the more effective proposal components as demonstrated through their performance in the analysis.

2029 Reliability Evaluation Summary

Regional Cluster (For Regional Transfers)

All proposals submitted to address the west-east regional transfer flows included 765 kV solutions. In addition, a number of proposals alleviated in-zone N-1-1 conditions, primarily in PPL zone, resulting in the local N-1-1 needs to be eliminated. Multiple proposals recommend variants of Joshua Falls/Axton-Morrisville are 765 kV development as shown in the "0 & DOM - 1" scenario clusters. The joint planning proposals in this cluster (by Dominion, FirstEnergy and Transource) also propose a northern John Amos-Northern Virginia 765 kV development. PJM seeks to select a west-east regional solution that includes at least one variant of these 765 kV proposals, accompanied by 500 kV and 765 kV upgrades.

The initial, preliminary analysis showed good performance of a number of the holistic scenario proposals, and PJM developed additional variations of these scenarios incorporating or eliminating different components to further optimize performance.

In order to assist with further evaluation and ranking of submitted proposals, PJM conducted a large number of transfer analyses assessing the west-east transfer capability offered by each major scenario proposal. Proposals were evaluated as submitted and with modifications to specific components in order to lower overall impact and maximize transfer capability, efficiency and cost-effectiveness.

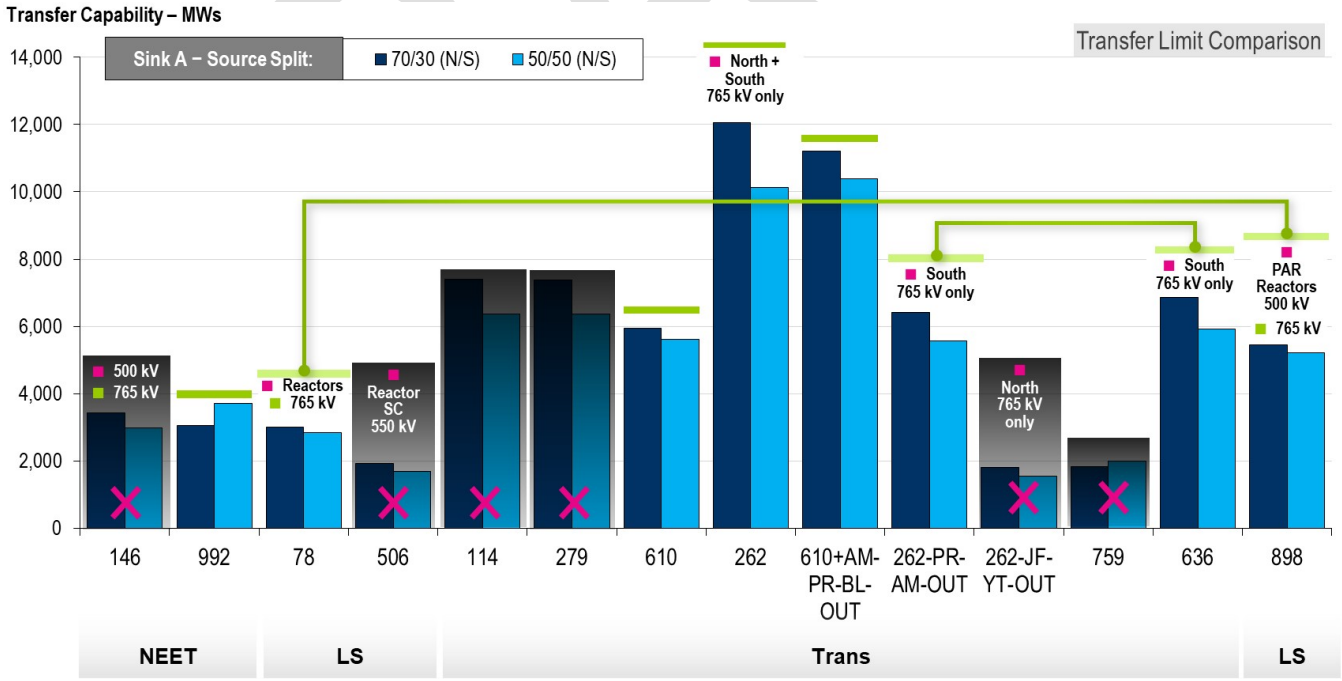
All proposals with 765 kV regional transfer components performed significantly better than the 500 kV transfer path reinforcements. PJM took into consideration that 500 kV reinforcements will require additional ROW that is similar to 765 kV developments. The 765 kV based options would also offer higher transfer capability and more robustness in addressing various load/generation development patterns or operational conditions. Extending the 765 kV backbone

transmission network closer to load centers will enable a more reliable system where power could be transferred to where it is needed more reliably. Therefore, 765 kV options are preferable given the high transfer capability requirements. The studies show that while 765 kV developments in southern PJM offer the highest "initial" incremental transfer capability, northern 765 kV reinforcements will consequently offer considerable additional transfer capability once the southern 765 kV reinforcements are in place. A number of proposals offer similar transfer capability while covering a wider geographic footprint, allowing for more flexibility for future utilization by load and further reinforcements. PJM also reviewed the mileage of the proposed circuits, as a number of the proposals offered similar transfer capability.

The preliminary study consisted of a DC bulk transfer study using various sources of "Western PJM" and sink of "Eastern PJM" pairs. Actual AC incremental transfer levels will be lower but generally enabled through more localized reactive power compensation and smaller upgrades. Based on the future generation outlook, as informed by the PJM New Services Requests Process, PJM anticipates that the majority of the future surplus generation will be sourced from western PJM. The source was set at two major 765 kV nodes in western PJM (northern AEP and southern AEP). Two surplus generation split ratios were also selected: (70% north – 30% south) and (50% north – 50% south). The sink was set to multiple locations in eastern PJM, including Dominion, APS and MAAC. PJM further analyzed and filtered constraints and eliminated those that are terminal limited, short upgrades, etc. In **Figure 1,** PJM marked in green the proposals from each proposing entity that showed superior transfer capability for further consideration. The green line shows pairs of proposals that appear comparable.

Based on all of the above considerations, PJM narrowed down the selection to a short list, described in the subsequent section.

Figure 1. Regional West-East Incremental Transfers



Selection of Short-Listed Scenarios and Proposal Components

Scenarios listed below represent the initial short list of scenarios presented at the Nov. 6, 2024, TEAC. All short-listed proposals offer a Joshua Falls/Axton 765 kV greenfield line toward 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 the following:

- Stronger 765 kV support to the heart of the Dominion system vs. 500 kV
- 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 from a stability perspective

The majority of short-listed proposals offer comparable merits and benefits to the reliability of the PJM transmission system. The one option that provides superior transfer capability compared to the others on the short list is proposal 262. Transource's proposal 262 offers considerably higher transfer capability as a result of not only one, but two, 765 kV corridors, one in the southern and one in the northern region of the PJM footprint. Having two 765 kV lines allows for more flexibility between the north and south transfers in the near term and enhances reliability and resilience. The proposal also supports future load growth in the eastern PJM system and other longer-term needs.

The merits and shortcomings of each are further detailed along with a very high-level, point-to-point illustration of the project components on the associated maps.

Transource Proposal 262

The simplified map illustration below in **Map 2** summarizes the high-level scope of the Transource proposal 262 designed to address 2029 and 2032 needs. The proposal comprises seven major building blocks, which are listed in **Table 9**. Together, they are meant to address both the regional needs in and around Dominion but also to address local needs as well. Of the seven major building blocks, two components offer 765 kV solutions – one in the north: John Amos-Welton Spring-Rocky Point 765 kV, and one in the south: Joshua Fall-Vontay-Morrisville South 765 kV. In addition to the 765 kV solutions, another major regional component is the 500 kV Kraken Loop. The Kraken Loop is meant to address three fundamental drivers:

1. The North Anna stability restriction when one of the outlets to the nuclear facility is outaged
2. Reliability violations at the 500 kV and 230 kV levels in Dominion
3. Projected significant load growth in the Fredericksburg corridor due primarily to data centers

Additional components within the proposal are meant to address more localized needs in the Dominion and AEP zones.

From a performance standpoint, proposal 262 offers the best incremental transmission capability among the short-listed proposals and allows for more flexibility between north and south transfers in the near term. It also provides enhanced resilience and reliability levels and supports future load growth in eastern PJM and other longer-term needs. However, it carries a higher risk profile due to the addition of an approximately 260 mile 765 kV line in the north.

Map 2. Transource Proposal 262

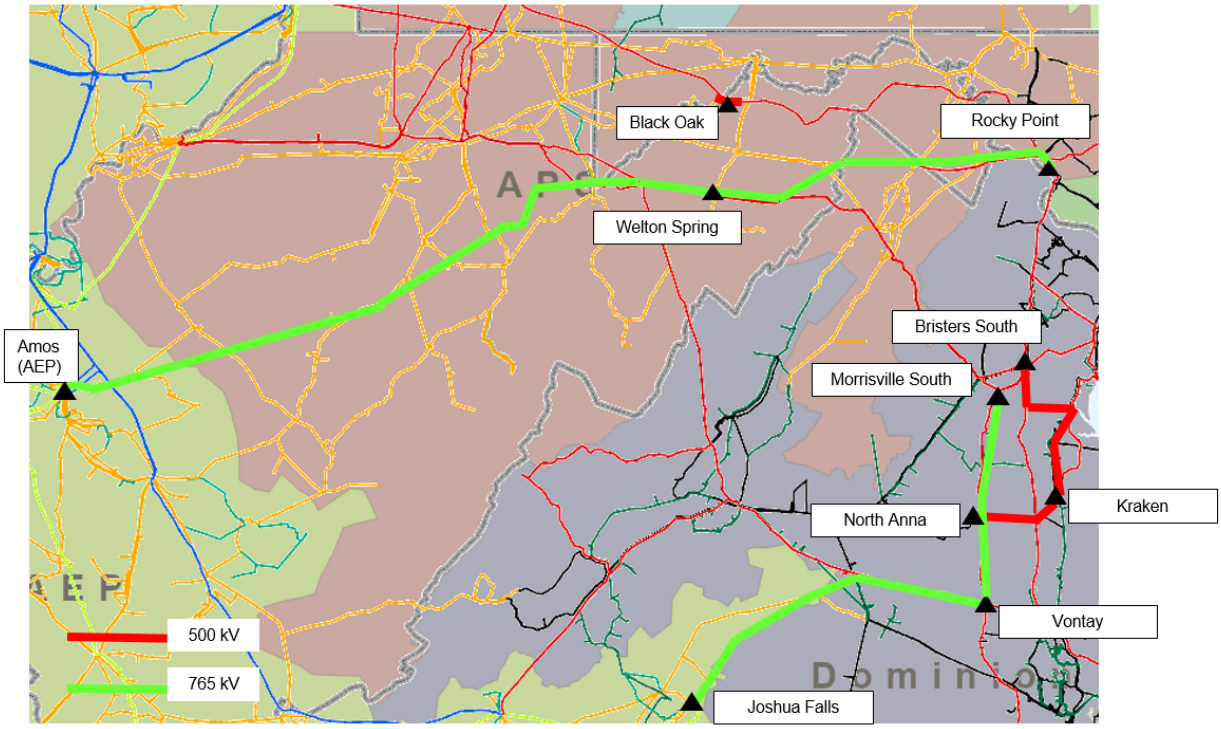


Table 9. Proposal 262 Components

Parent Proposal ID	Sub Component Proposal ID#	Project Description
262	967	Kraken Loop
	665	Joshua Falls-Vontay-Morrisville South
	708	John Amos-Welton Springs-Rocky Point
	551	Woodside/Chanceford 500 kV terminal swap at Doubs
	81	AEP incumbent upgrades
	24	Dominion reinforcements (230 kV and 115 kV solutions)
	781	Dominion reinforcements (500 kV solutions)

Transource Proposal 636

The simplified map illustration below in **Map 3** summarizes the high-level scope of the Transource proposal 636 designed to address 2029 and 2032 needs. The proposal comprises eight major building blocks, which are listed in **Table 10**. Together, they are meant to address both the regional needs in and around Dominion but also to address local needs as well. One major differentiator between proposal 262 and 636 is the lack of a northern 765 kV line.

Proposal 636 also includes the 500 kV Kraken Loop, as detailed in proposal 262 above, along with additional local reinforcements in the FirstEnergy, AEP and Dominion areas.

Map 3. Transource Proposal 636

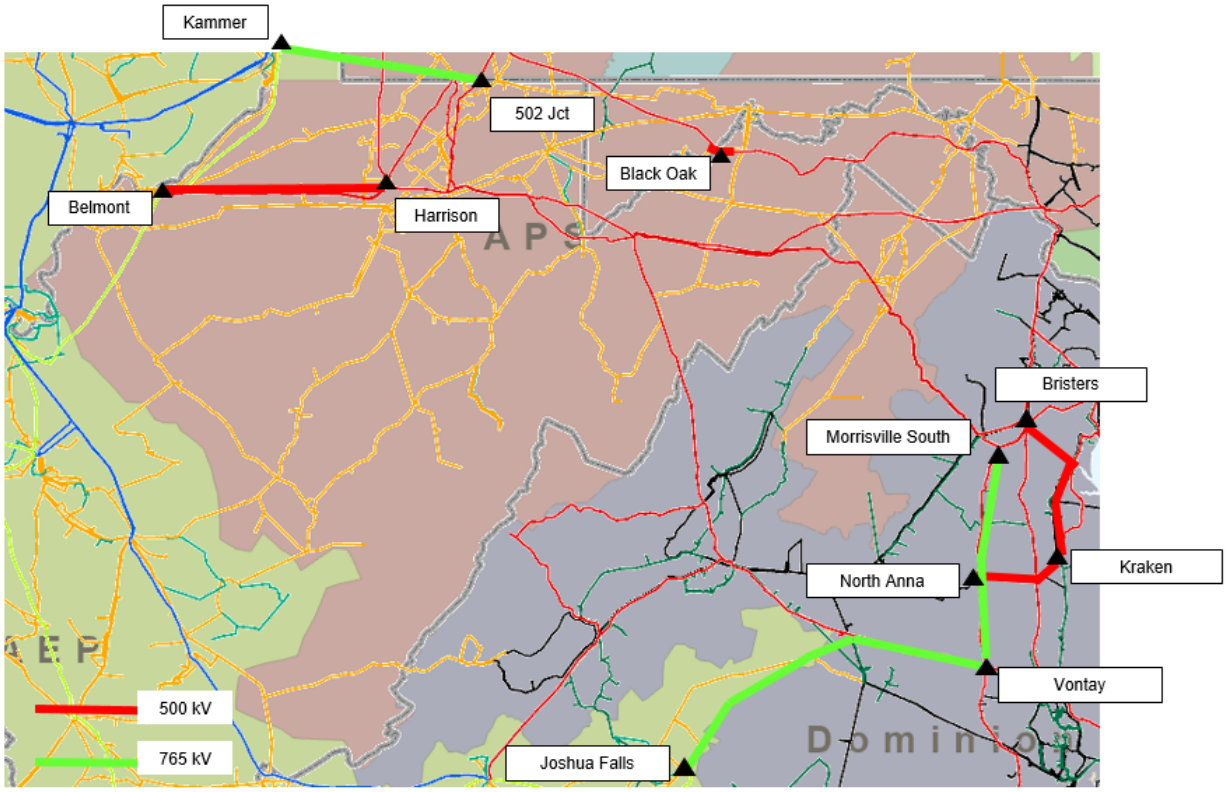


Table 10. Proposal 636 Components

Parent Proposal ID	Sub Component Proposal ID#	Project Description
636	967	Kraken Loop
	665	Joshua Falls-Vontay-Morrisville South
	81	AEP upgrades
	885	FirstEnergy upgrades
	977 or 727	Belmont-Harrison 500 kV line or Kammer-502Jct 765 kV line
	551	Woodside/Chanceford 500 kV terminal swap at Doubs
	24	Dominion reinforcements (230 kV and 115 kV Solutions)
	781	Dominion reinforcements (500 kV Solutions)

Transource Proposal 610

The simplified map illustration below in **Map 4** summarizes the high-level scope of the Transource proposal 610 designed to address 2029 and 2032 needs. The proposal comprises eight major building blocks, which are listed in **Table 11**. Together, they are meant to address both the regional needs in and around Dominion but also to address local needs as well. The primary differentiator between proposals 636 and 610 is the termination of the 765 kV line at Yeat instead of Bristers South (Town Run) substation.

Proposal 610 also includes the 500 kV Kraken Loop, as detailed in proposals 262 and 636 above along with additional local reinforcements in the FirstEnergy, AEP and Dominion areas.

From a performance standpoint, proposals 610 and 636 offer the highest incremental transfer capability among the preliminary short-listed proposals excluding proposal 262. Also, proposals 636 and 610 could be staged as needs arise and unfold and do not require the additional 78 miles of 765 kV line from Joshua Falls to Axton substations.

Map 4. Transource Proposal 610

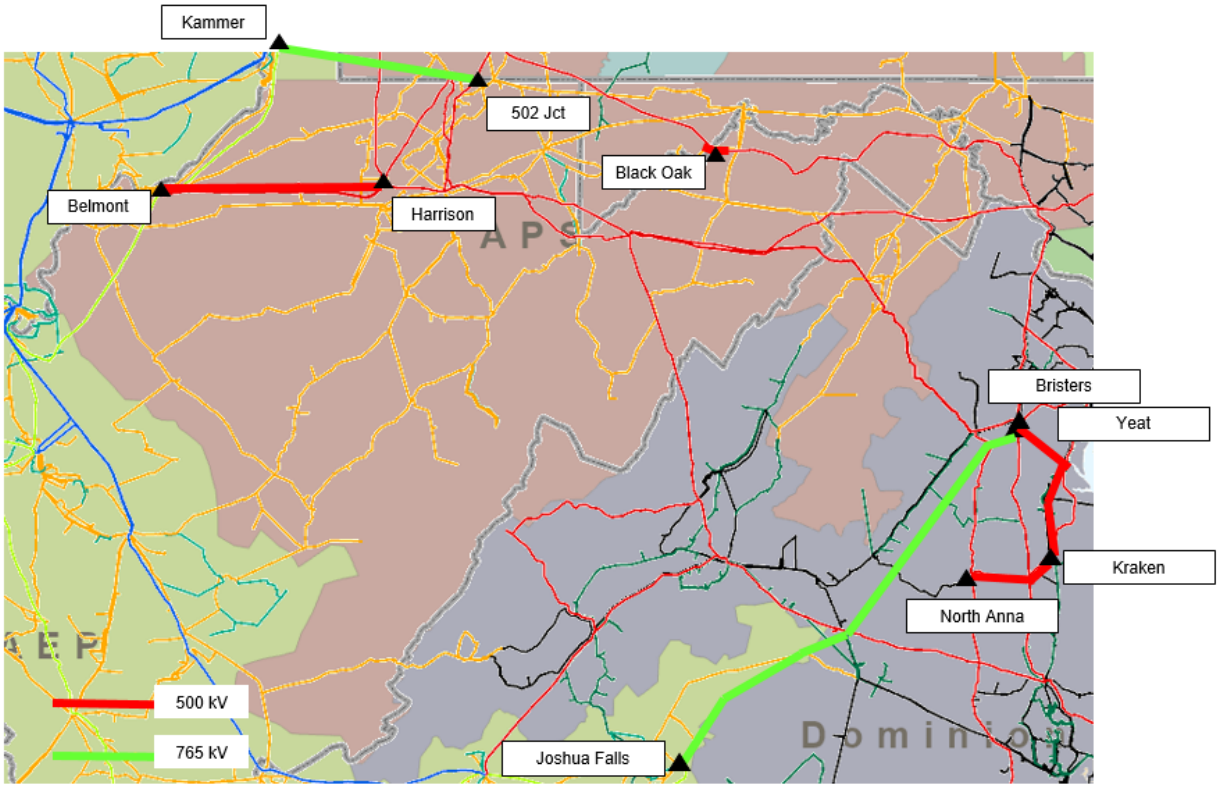


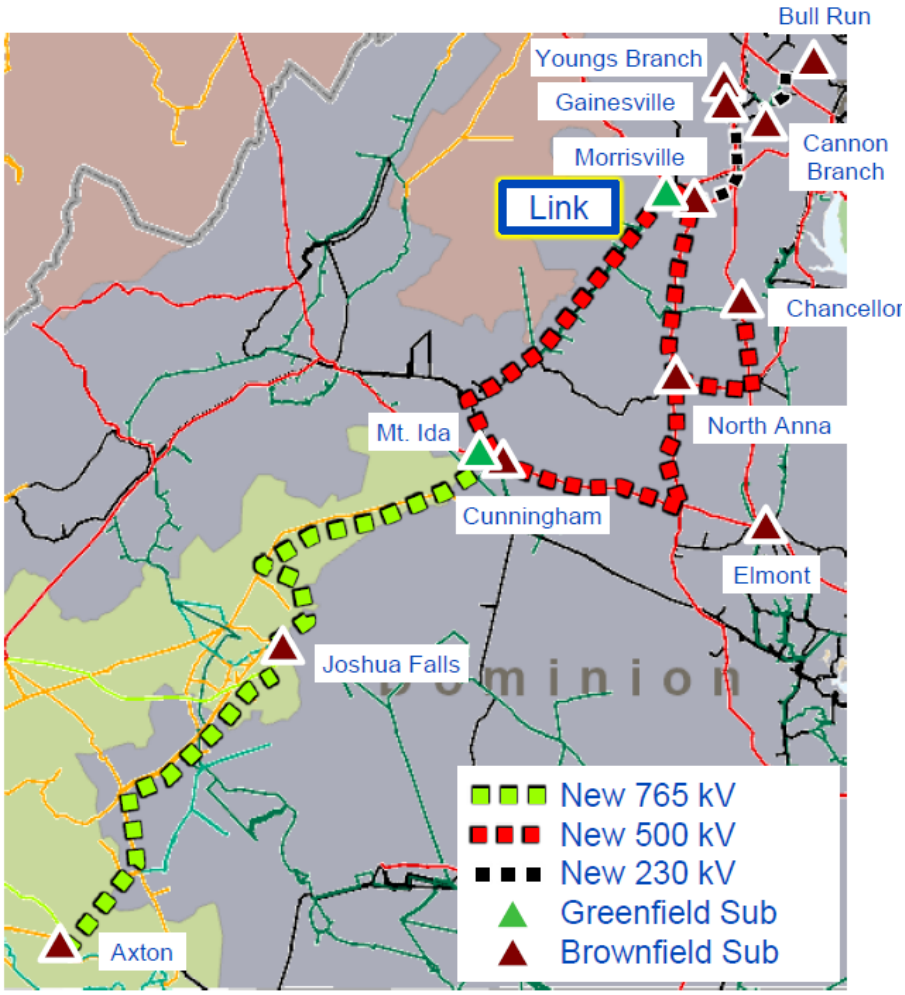
Table 11. Proposal 610 Components

Parent Proposal ID	Sub Component Proposal ID#	Project Description
610	967	Kraken Loop
	820	Joshua Falls-Yeat
	81	AEP upgrades
	885	FirstEnergy upgrades
	977 or 727	Belmont-Harrison 500 kV line or Kammer-502Jct 765 kV line
	551	Woodside/Chanceford 500 kV Terminal Swap at Doubs
	24	Dominion reinforcements (230 kV and 115 kV solutions)
	781	Dominion reinforcements (500 kV solutions)

NextEra Proposal 992

The simplified map illustration below in **Map 5** summarizes the high-level scope of the NextEra proposal 992 designed to address 2029 and 2032 needs. The major components of the proposal include a 765 kV line from Axton-Joshua Falls-Mt. Ida along with two new 500 kV lines. One of the 500 kV lines terminates at a new 500/230 kV substation called Link, and the second 500 kV line terminates at the existing Dominion substation called Morrisville. In addition, there is also a new 500 kV line from North Anna to Chancellor thereby eliminating the stability restriction at North Anna substation. All 500 kV reinforcements occur within Dominion's existing ROW. Per NextEra, the new Link 500/230 kV substation provides a key tap point into the Meadowbrook-Vint Hill 500 kV circuit, on the back side of the AP-South reactive interface.

Map 5. NextEra Proposal 992



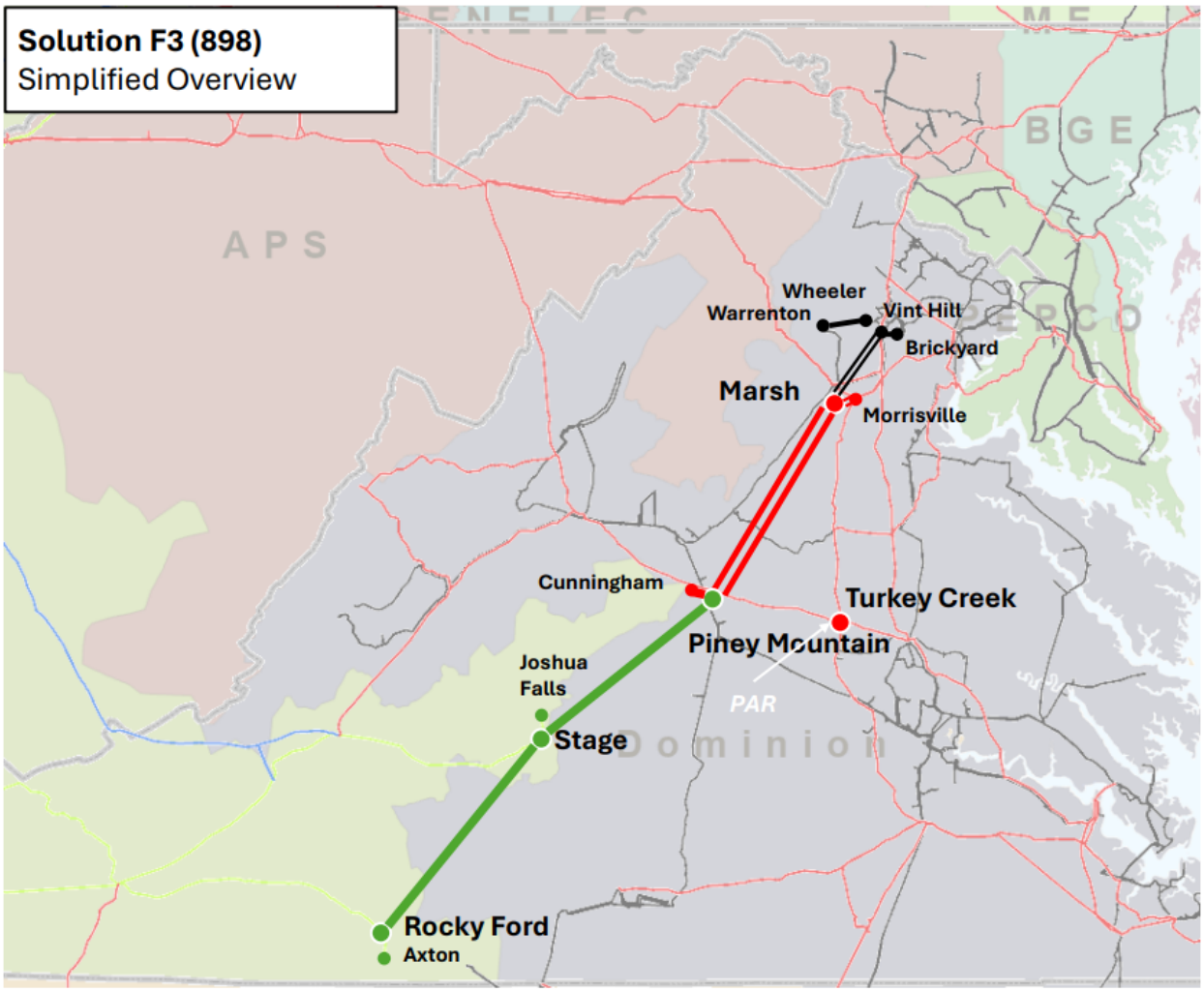
LS Power Proposal 898

The simplified map illustration below in **Map 6** summarizes the high-level scope of the LS Power proposal 898 designed to address 2029 and 2032 needs. The major components to the proposal include a 765 kV line from new substations called Rocky Ford, Stage and Piney Mountain, along with two new greenfield 500 kV lines. Both 500 kV lines terminate at a new 500/230 kV substation called Marsh around the Morrisville area of Dominion. There is also a double circuit 500/230 kV transmission line from Marsh to Morrisville and a Marsh to Vint Hill substations. In addition to these major components, all LS Power "Solution F-type" proposals are meant to be paired with proposal 200,

which consists of various system reinforcements. These system reinforcements include, among other things, a new 500 kV substation called Turkey Creek, terminal upgrades, series compensation at various substation locations, and a couple of new 230 kV lines (Warrenton-Wheeler and Vint Hill-Brickyard) within the Dominion footprint.

Proposal 898 does not address all 500 kV violations within the Dominion area in 2032, leaving a few remaining.

Map 6. LS Power Proposal 898

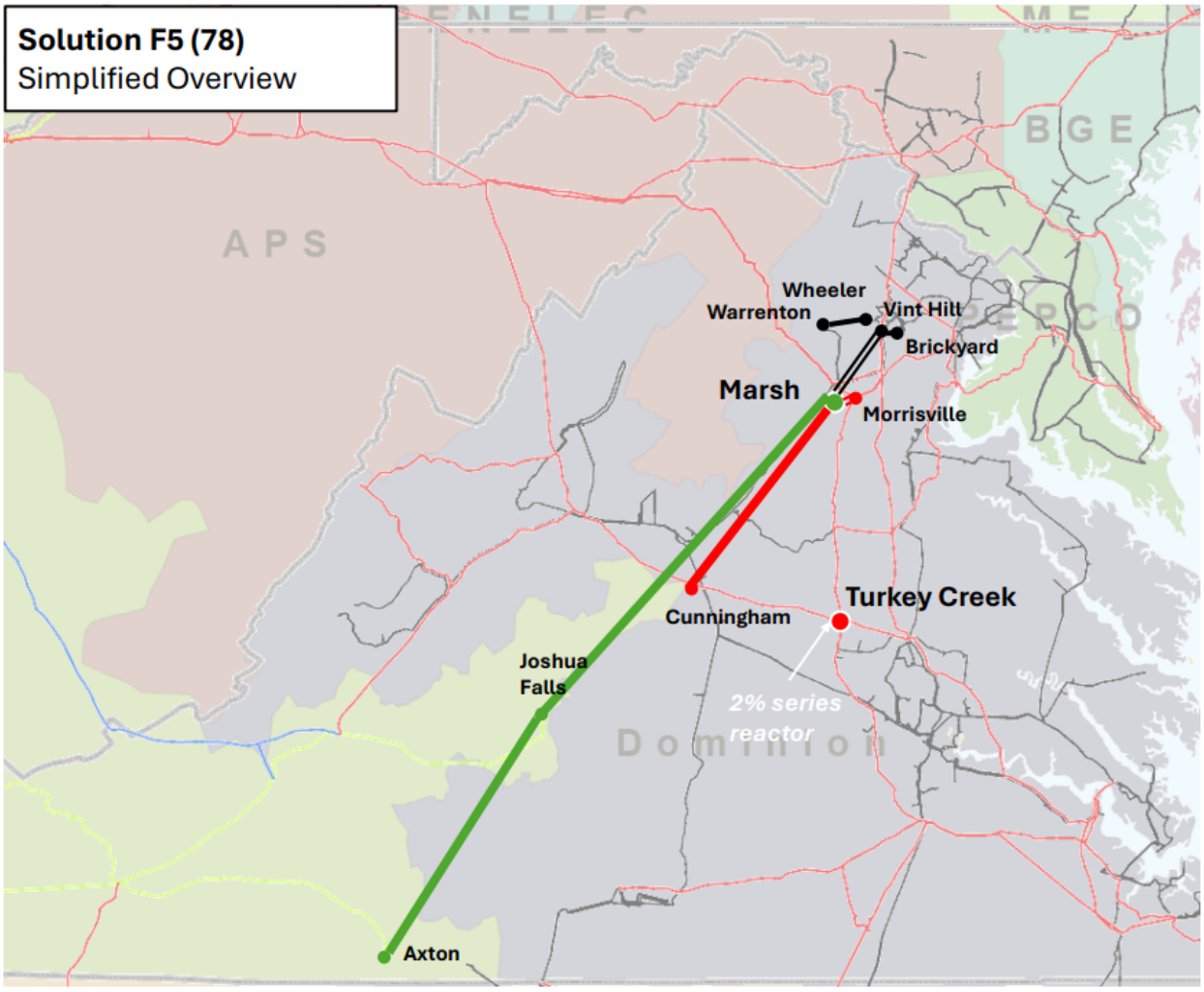


LS Power Proposal 78

The simplified map illustration below in **Map 7** summarizes the high-level scope of the LS Power proposal 78 designed to address 2029 and 2032 needs. The major components to the proposal include a 765 kV line from Axton-Joshua Falls-Marsh. Other components include a 500 kV transmission line from Marsh to Cunningham, two 500/230 kV double circuits from Marsh to Morrisville, and a 230 kV double circuit from Marsh to Vint Hill substations. Similar to the LS Power proposal 898 above, proposal 78 is meant to be paired with proposal 200.

Proposal 78 does not address all 500 kV violations within the Dominion area in 2032, leaving a couple remaining.

Map 7. LS Power Proposal 78



Proposal 262 - PJM Variant

The simplified map illustration below in **Map 8** summarizes the high-level scope of PJM's variant to Transource proposal 262. The PJM variant stages the development of key 765 kV and 500 kV developments. The 262 variant comprises eight major building blocks, which are listed in **Table 12**. Together, they are meant to address both the regional needs in and around Dominion and also to address local needs as well. The main differentiators include replacing the Joshua Falls-Vontay-Morrisville South 765 kV line with the Joshua Falls-Yeat 765 kV line (delaying construction of the Vontay 765/500 kV station), consolidating the two 765 kV substations near Morrisville into one 765 kV substation, terminating the Kraken 500 kV loop into the new Yeat 765 kV substation and a reduction in scope of the Kraken Loop 230 kV developments.

Choosing the Joshua Falls-Yeat 765 kV line, while routing it in the same manner as Joshua Fall-Vontay-Morrisville South 765 kV, would eliminate the need for two substations (Morrisville South and Vontay 765 kV) but also allow for a future connection at Vontay as system conditions evolve in subsequent years.

Reducing the Kraken Loop to only the 500 kV portion and terminating it at Yeat would still provide an additional north-south 500 kV path but also eliminate another substation (Bristers South). The 500 kV portion would include cutting the new Kraken substation into 500 kV line #568 Ladysmith-Possum Point, building a new 500 kV line from North

Anna to Kraken and building a new 500 kV line from Kraken to Yeat. The station would also include 2-500/230 kV transformers. The remaining 230 kV reinforcements that are part of the Kraken Loop can be developed as load materializes in the Fredericksburg corridor.

Map 8. PJM Proposal 262 Variant

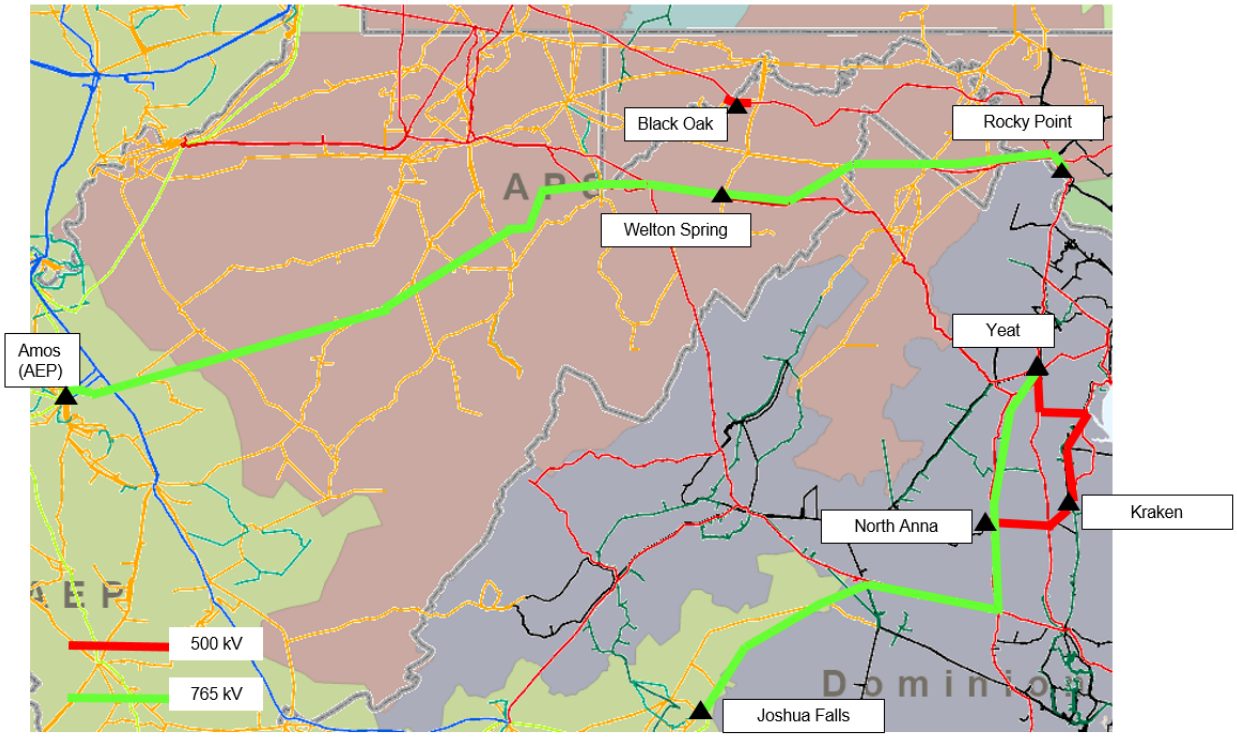


Table 12. Proposal 262 - PJM Variant Components

Parent Proposal ID	Sub Component Proposal ID#	Project Description
262 Variant	967 Modified	*Kraken Loop* • Termination at Yeat (not Bristers South/Town Run) • Optimize (reduction) 230 kV scope and stage development – trigger as need materializes.
	820 Modified	*Joshua Falls-Yeat* • Route to follow Joshua Falls-Vontay-Morrisville South
	708	John Amos-Welton Springs-Rocky Point
	551	Woodside/Chanceford 500 kV terminal swap at Doubs
	81	AEP incumbent upgrades
	24 Modified	*Dominion reinforcements (230 kV and 115 kV solutions)* • Exclusion of 230 kV line #238 (Carson-Clubhouse) rebuild
	781 Modified	*Dominion Reinforcements (500 kV solutions)* • Exclusion of 500 kV North Anna-Vontay uprate
	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

Similar to proposal 262, the 262 variant offers the best incremental transmission capability among the short-listed proposals and allows for more flexibility between north and south transfers in the near term. It also provides enhanced resilience and reliability levels and supports future load growth in eastern PJM and other longer-term needs. However, it carries a higher risk profile due to the addition of an approximately 260 mile 765 kV line in the north. This constructability risk could be managed by allowing a 2032 in-service date for the Amos-Welton Springs-Rocky Point 765 kV segment as much as practically possible. It is to be noted that with the anticipated 2025 Load Forecast in eastern PJM/MAAC area there will be higher demand on the west-east transfer capability, and hence could again push for an earlier in-service-date for this critical development component.

Short-Circuit Analysis

Drivers for the 2024 RTEP Window 1 are reliability violations primarily stemming from load flow analysis instead of short-circuit analysis. Short-circuit analysis followed a screening process to support the 2024 RTEP Window 1 evaluation of proposals. The short-circuit screening identified potential additional scope attributed to overduty breakers, and potential switchyard rebuilds. Short-circuit analysis was applied holistically, where the scenario under study comprised one or more proposals, designed to address all Window violations at once, which ensures accounting for all short-circuit contributions by all proposed solution facilities of each scenario.

The screening process considered all TO breaker sets within the PJM footprint using the posted 2029 baseline case, then analyzed the proposals and scenarios using a single Aspen OSF (Options Settings File) based on Dominion's study parameters. Short-circuit screening was performed on all scenarios deemed promising based on power flow analysis results and on the base case containing the final recommended solution.

As part of the scenario screening process, breakers identified as overduty attributed to the scenario under study were reviewed. For proposals that included breaker replacements, those breakers were reviewed for adequacy of their proposed interrupting capability. The study also identified breakers that became overdutied as a consequence of the scenario under study, but were not addressed in the individual proposals received by PJM. If replacing the consequential overduty breaker with a breaker having a greater interrupting capability could remediate the overduty condition, then the cost of the breaker replacement was factored into the overall scenario cost.

However, in some scenarios, the identified fault level increase was quite high, approaching the ratings of the substation ground grid and other fault-sensitive facilities within the substation. In these situations, PJM reviewed in detail the calculated fault duties to ensure they did not exceed limits imposed by the substation ground grid, nor the maximum interrupting capability of standard circuit breakers commonly available on the market. For example, at the Brambleton 230 kV yard, excessively high fault level would require the entire substation to be rebuilt.

The 2024 RTEP Window 1 recommended scenario underwent a subsequent short-circuit analysis that was more rigorous than the short-circuit screening. An Aspen Breaker Duty Report, using the native TO Option Settings File, was generated for each TO area where overduty breakers were identified in the initial screening. Results were shared with the impacted TOs for validation and breaker replacement cost estimation.

Objectives of the short-circuit analysis were achieved with the 2024 Window 1 selected scenario. The Brambleton substation was not impacted for excessively high fault levels that exceed the existing short-circuit capability reported by the transmission owner. However, as shown in **Table 13**, there were an additional 107 breakers identified as overdutied, which were not included in the submitted proposals. These breakers are located in APS and Dominion substations at nominal voltages of 230 kV and 500 kV. Costs to remediate these overduty breakers are incorporated into the recommended scenario cost estimate.

Table 13. Additional Circuit Breaker Identified for Upgrades/Replacements (beyond those proposed by proposing entities)

TO Area	Substation	kV	Breaker (Qty)
APS	Doubs	500	1
DOM	Ashburn	230	1
	Beaumeade	230	1
	Braddock	230	4
	Brambleton	230	4
	Bristers	230	3
DOM	Bull Run	230	1
	Buttermilk	230	5
	Cabin Run	230	3
	Evergreen Mills	230	2
	Goose Creek	500	1
	Ladysmith	230	11
	Ladysmith	500	1
	Lockridge	230	2
	Loudoun	230	4
	Loudoun	500	6
	Marsh Run	230	4
	Morrisville	230	4
	Morrisville	500	5
	Mosby	500	11
	North Anna	500	6
	OX	230	4
	OX	500	3
	Paragon Park	230	2
	Pleasantview	230	2
	Pleasantview	500	1
	Remington	230	5
	Roundtable	230	6
	Yardley	230	4

Window 1 Evaluations Process – Local

While many of the flowgates associated with 2024 RTEP Window 1 are associated with the regional need, there are also those that are more local in nature. PJM received proposals from both the incumbent and nonincumbent entities for the local clusters. PJM has completed an initial review and screening of the proposals in each cluster based on data and information provided by the project sponsors as part of their submitted proposals. This review and screening included the following preliminary analytical quality assessment:

- ***Initial Performance Review –*** PJM evaluated whether or not the project proposal solved the required reliability criteria violation drivers posted as part of the open solicitation process.
- ***Initial Planning-Level Cost Review –*** PJM reviewed the estimated project cost submitted by the project sponsor and any relevant cost-containment mechanisms submitted as well.
- ***Initial Feasibility Review –*** PJM reviewed the overall proposed implementation plan to determine if the project, as proposed, can feasibly be constructed.

- ***Additional Benefits Review –*** PJM reviewed information provided by the proposing entity to determine if the project, as proposed, provides additional benefits, such as the elimination of other needs on the system.

Additionally, in order to ensure that PJM develops more efficient or cost-effective transmission solutions to identified regional needs, RTEP Process consideration must be given to the additional benefits a proposal window-submitted project may provide beyond those required to solve identified reliability criteria violations. As discussed in Section 1.1 and Section 1.4.2 of PJM Manual 14B, Transmission Owner Attachment M-3 needs and projects must be reviewed to determine any overlap with solutions proposed to solve the violations identified as part of opening an RTEP proposal window.

PJM's initial planning-level cost review and initial feasibility review suggests that further constructability review and financial analysis would not materially contribute to the analysis of the other proposals submitted for this cluster. Further detail regarding PJM's evaluation for the local clusters are included in the subsequent sections:

East Local Clusters

BGE Zone

The BGE cluster includes those flowgates listed in **Table 14**. During the window, several entities submitted proposals through PJM's Competitive Planner Tool. The proposals submitted in the BGE cluster are summarized in **Table 15**.

Table 14. 2024 RTEP Proposal Window 1 – BGE Cluster List of Flowgates

Flowgate	kV Level	Driver
2024W1-N11-ST9, 2024W1-N11-ST22, 2024W1-N11-ST26, 2024W1-N11-ST12, 2024W1-N11-ST23, 2024W1-N11-ST27, 2024W1-N11-ST17, 2024W1-N11-ST24, 2024W1-N11-ST28, 2024W1-N11-ST18, 2024W1-N11-ST25, 2024W1-N11-ST29	**115 kV/230 kV**	Thermal N-1-1

Table 15. 2024 RTEP Proposal Window 1 – BGE Cluster List of Received Proposals

Proposal ID	Project Type	Project Description	Total Construction Cost ($M)	Cost Capping Provisions (Y/N)
295	Upgrade	Construct new Marley Neck 115 kV substation. Marley Neck 115 kV portion will accommodate 10 breaker-and-a-half bays, with only 6 bays planned for initial service while accommodating 4 future bays. Two standard 230/115 kV transformers will be connected between the 230 and 115 kV equipment with appropriate isolation methods.	$107.62	N
470	Upgrade	Replace existing Graceton 230-1 high impedance transformer with standard 230/115 kV transformer. Howard to Pumphrey 230 kV transmission line Rebuild approximate distance 8.7 miles.	$71.96	N
Non Competitive Submittal	Upgrade	Replace the existing 556.5 kcm ACSR conductor drops from the 110527-A & 110528-A transmission lines to the line switches at Frederick Rd with 2-bundle 556.5 kcm ACSR per phase	$0.74	N

Initial performance reviews yielded the following results:

1. **Proposal 295**
    a. Addresses the intended flowgates
    b. Does not require lengthy outages, and the majority of the construction can be done without interrupting the system.
    c. Proposal 295 provides operational flexibility and increases the resiliency of the currently tapped 115 kV circuits as well as increasing reactive support to downtown 115 kV system.
2. **Proposal 470**
    a. Addresses the intended flowgates but causes one new violation at the Rock Ridge-Five Forks 115 kV line.
    b. The ISD for 470 will be delayed until 2031 to coordinate with other planned outages in the area.
    c. In addition to the proposal 470, terminal equipment will be replaced at Frederick Rd. on the 110527-A and 110528-A transmission lines.

Based on this information, proposal 295 appears to be the more efficient or cost-effective solution in the BGE cluster.

PECO Zone

The PECO cluster includes those flowgates listed in **Table 16**. During the window, several entities submitted proposals through PJM's Competitive Planner Tool. The proposals are summarized in **Table 17**.

Table 16. 2024 RTEP Proposal Window 1 – PECO Cluster List of Flowgates

Flowgates	kV Level	Driver
2024W1-32GD-LL15, 2024W1-32GD-LL16, 2024W1-32GD-LL17, 2024W1-32GD-LL18, 2024W1-32GD-LL19, 2024W1-32GD-LL20, 2024W1-32GD-LL21, 2024W1-32GD-LL22, 2024W1-32GD-LL23, 2024W1-32GD-LL24, 2024W1-32GD-LL25, 2024W1-32GD-S135, 2024W1-32GD-S136, 2024W1-32GD-S137, 2024W1-32GD-S138, 2024W1-32GD-S139, 2024W1-32GD-S140, 2024W1-32GD-S141, 2024W1-32GD-S142, 2024W1-32GD-S143, 2024W1-32GD-S144, 2024W1-32GD-S145, 2024W1-32GD-S146, 2024W1-32GD-W14, 2024W1-32GD-W15, 2024W1-32GD-W16, 2024W1-32GD-W17, 2024W1-32GD-W18, 2024W1-32GD-W19, 2024W1-32GD-W2, 2024W1-32GD-W20, 2024W1-32GD-W21, 2024W1-32GD-W24, 2024W1-32GD-W3, 2024W1-32GD-W4, 2024W1-32GD-W5, 2024W1-32GD-W6, 2024W1-32GD-W8, 2024W1-GD-S201N, 2024W1-GD-S202N, 2024W1-GD-S203N, 2024W1-GD-S770, 2024W1-GD-S791, 2024W1-GD-S89N, 2024W1-GD-S90N, 2024W1-GD-S91N, 2024W1-GD-W238	**230 kV**	Generation Deliverability

Table 17. 2024 RTEP Proposal Window 1 – Cluster PECO List of Received Proposals

Proposal ID	Project Type	Project Description	Total Construction Cost M$	Cost Capping Provisions (Y/N)
12	Upgrade	Reconductor/Rebuild: North Philadelphia-Master 230 kV North Philadelphia-Waneeta 230 kV Richomond-Waneeta 230 kV	$43.2	N
995	Greenfield	New 230 kV Eagle Point-Penrose	$390.9	N

Initial performance reviews yielded the following results:

Proposal 12

- Address the intended flowgates, including in 2032.
- The project is an upgrade to existing facilities, and the cost is much less than proposal ID 955.

Proposal 955

- Creates a new flow path for northern Philadelphia, an area historically known to have import limitations
- Addresses additional thermal violations to be considered in the future, i.e., Camden to Richmond 230 kV circuit, Richmond (PECO) 230 kV station, and Waneeta (PECO) 230 kV station inside plant terminal equipment thermal violations, which eliminates the need to address them in the 2025 RTEP
- Design provides headroom for future load growth.
- The project will require greenfield, and the cost is 10 times than proposal ID 12.

Based on the all the above information regarding this cluster, proposal 12 appears to be the more efficient or cost-effective solution in the PECO cluster.

PPL Zone

The PPL cluster includes those flowgates listed in **Table 18**. During the window, several entities submitted 96 proposals through PJM's Competitive Planner Tool. The proposals are summarized in **Table 19**.

Table 18. 2024 RTEP Proposal Window 1 – PPL Cluster List of Flowgates

Flowgate	kV Level	Driver
2024W1-N11-WVM1, 2024W1-N11-WVM10, 2024W1-N11-WVM19, 2024W1-N11-WVD9, 2024W1-N11-WVM2 ,2024W1-N11-WVM11, 2024W1-N11-WVD1 ,2024W1-N11-WVD10, 2024W1-N11-WVM3 ,2024W1-N11-WVM12, 2024W1-N11-WVD2, 2024W1-N11-WVD11, 2024W1-N11-WVM4, 2024W1-N11-WVM13, 2024W1-N11-WVD3, 2024W1-N11-WVD12, 2024W1-N11-WVM5, 2024W1-N11-WVM14, 2024W1-N11-WVD4, 2024W1-N11-WVD13, 2024W1-N11-WVM6, 2024W1-N11-WVM15, 2024W1-N11-WVD5, 2024W1-N11-WVD14, 2024W1-N11-WVM7 , 2024W1-N11-WVM16, 2024W1-N11-WVD6, 2024W1-N11-WVD15, 2024W1-N11-WVM8, 2024W1-N11-WVM17, 2024W1-N11-WVD7, 2024W1-N11-WVD16, 2024W1-N11-WVM9, 2024W1-N11-WVM18, 2024W1-N11-WVD8, 2024W1-N11-WVD17	**230 kV**	Winter N-1-1 Voltage

Table 19. 2024 RTEP Proposal Window 1 – PPL Cluster List of Received Proposals

Proposal ID	Project Type	Project Description	Total Construction Cost ($M)	Cost Capping Provisions (Y/N)
850	Upgrade	Install one 80 MVAr 230 kV capacitor bank at Pocono 230 kV substation	$4.93	Y
526	Upgrade	Biuld new 230 kV circuit from Jenkins-Pocono	$60.03	Y
312	Greenfield	Acahela 500/230/69 kV substation expansion • Lackawanna-Siegfried 500 kV	$116.33	Y

Initial performance reviews yielded the following results:

1. All three proposals address the violations identified in the Pocono vicinity.
2. Proposal 526 will require a new circuit and provides operational flexibility.
3. Proposal 312 is greenfield and is depends on other greenfield project.
4. Both proposal 526 and 312 are significantly higher in cost than proposal 850.

Based on the all the above information regarding this cluster, 850 appears to be the more efficient or cost-effective solution in the PPL cluster.

MetEd/PPL Seam

The following facilities are overloaded in the MetEd and PPL area that overlap with the regional caused violations:

- The Juniata 500/230 kV transformer #2 is overloaded. Posted FG# (2024W1-GD-S390, 2024W1-GD-W106, 2024W1-N1-WT1, 2024W1-IPD-S104 and 2024W1-IPD-W2).
- Hunterstown 500/230 kV transformer
- Juniata-Dauphin 230 kV
- In addition, there were several N-1-1 violations identified in PPL area related to regional issues.

PPL

Proposed project ID 2024-W1-935 – Juniata 500 kV yard expansion/reconfiguration to include one new bay and eliminate the line fault stuck breaker, for an estimated cost of $22.2 million. The proposal ID 2024-W1-935 is selected to address the Juniata 500/230 kV violation.

MAIT

Proposed project ID 2024-W1-502 – Install Hunterstown 500/230 kV #2 transformer, for an estimated cost of $43.03 million. The proposal ID 2024-W1-502 is not needed, as the violation the project is attempting to mitigate will be addressed by the selected regional solutions.

PPL and TRNSLK proposed several projects to address the Hunterstown 500/230 kV transformer and Juniata-Dauphin 230 kV, plus the N-1-1 violations related to the regional issues, see **Table 20.** The violations are all addressed by the selected local or regional solutions, and these proposals are not needed.

Table 20. 2024 RTEP Proposal Window 1 – **PPL/TRANSLK Proposed Projects**

Proposal ID	Proposing Entity	Upgrade Description	Cost ($M)
72	PPL	Cumberland-Williams Grove 230 kV line reconductor Juniata-Cumberland 230 kV DCT line	$78.59
330		Build new Juniata-Hunterstown 500 kV line	$329.03
386		Build new Juniata-Three Mile Island 500 kV	$334.61
994		Juniata-Dauphin 230 kV line reconductor (PPL side)	$2.26
926		Addition of a Wescosville 500/138 T2 transformer (2nd 500/138 kV transformer)	$36.83
479		Lackawanna-Paupack 230 kV line reconductor	$47.70
876		Siegfried 500/230 kV substation expansion Susquehanna-Wescosville 500 kV line taps into new Siegfried 500 kV yard	$106.93
922		Siegfried 500 kV switchyard: Susquehanna-Wescosville 500 kV line taps into new Siegfried 500 kV yard	$613.87
		Siegfried-Drakestown 500 kV line (PA segment)	
		Lackawanna-Siegfried 500 kV line	
546	TRNSLK	Hopatcong-Branchburg 500 kV line taps into new Drakestown 500 kV yard Pennsylvania Border-Drakestown 500 kV line (greenfield alternative) Drakestown 500 kV switchyard	$2,460.47
900		Pennsylvania border-Drakestown 500 kV line (brownfield alternative) Hopatcong-Branchburg 500 kV line taps into new Drakestown 500 kV yard	$277.00
		Drakestown 500 kV switchyard	

West Local Clusters

AEP Zone (AEP - 2)

The AEP - 2 cluster includes those flowgates listed in **Table 21**. During the window, one proposing entity submitted two proposals through PJM's Competitive Planner Tool. The proposals are summarized in **Table 22**.

Table 21. 2024 RTEP Proposal Window 1 – AEP - 2 Cluster List of Flowgates

Flowgate	kV Level	Driver
2024W1-GD-S870, 2024W1-N1-ST43, 2024W1-N11-ST10, 2024W1-N11-ST11, 2024W1-N11-ST7, 2024W1-N11-ST8	138	Summer Gen Deliv, Summer Basecase Analysis, Summer N-1-1

Table 22. 2024 RTEP Proposal Window 1 – AEP - 2 Cluster List of Received Proposals

Proposal ID	Project Type	Project Description	Total Construction Cost ($M)	Cost Capping Provisions (Y/N)
276	Upgrade	Reconfigure the Bixby-Buckeye Steel 138 kV line to tie in to the nearby Marion Road station.	$4.080	N
856	Upgrade	Rebuild 2.2-mile Canal-Mound St 138 kV oil filled pipe-type underground line on the existing cable utilizing 5000 MCM XLPE cable.	$31.090	N

Initial performance reviews yielded the following results:

- **Proposal 276**: Resolves the posted violations on the Canal-Mound St. 138 kV circuit at the least cost. The project has greenfield component – the 0.15 miles of 138 kV double line.
- **Proposal 856**: Resolves the posted violations on the Canal-Mound St. 138 kV circuit. It is $27 million higher in cost compared to proposal 276.

Initial cost reviews provide no significant factors to consider other than the differences in apparent costs. A high-level review of the plans identified in the proposals does not reveal any concerns at this stage of review.

A review of M-3 need overlaps as part of PJM's 2024 RTEP Proposal Window 1 screening has identified potential benefits beyond solving identified reliability criteria violations. Based on the information provided by the sponsor, proposal 856 will address part of the need AEP-2023-OH024 (presented at March 17, 2023, W-SRRTEP) on the Canal-Mound St. 138 kV circuit associated with asset renewal concerns following a review of the information provided by the sponsor of the proposal. These needs are outlined below.

- The Canal-Mound line is a 1956 vintage oil-filled pipe-type cable design that was highlighted a priority as part of the AEP-2023-OH024 need presentation.
- The oil-filled pipe-type cables carry many concerns, including long lead times and availability concerns due to only a single vendor still supplying replacement parts.

- When replacing these cables, there is a high level of difficulty locating pipe breaches and faults, and extended construction timelines for even minor repairs can contribute to high-impact, extended outages. In many cases, it is expected that repair or replacement of critical underground circuits could take as long as six months to a year from the time a fault is identified.

Given the additional benefits associated with the proposal 856 that indicate it will address the asset renewal concerns on the Canal-Mound St. 138 kV underground cable, part of the supplemental need AEP-2023-OH024 warrants consideration. PJM understands that the supplemental need, which would be resolved through proposal 856, would not be resolved by proposal 276, leaving the RTEP exposed to increased costs as then the scopes of work for both proposals would need to be pursued and costs for both scopes of work would be incurred. PJM will conduct a final review with stakeholders for proposal 856 and make a final determination as to which project to recommend for PJM Board approval.

AEP Zone (AEP - 6)

The AEP - 6 cluster includes those flowgates listed in **Table 23**. During the window, one proposing entity submitted two proposals through PJM's Competitive Planner Tool. The proposals are summarized in **Table 24**.

Table 23. 2024 RTEP Proposal Window 1 – AEP - 6 Cluster List of Flowgates

Flowgate	kV Level	Driver
2024W1-GD-S854, 2024W1-GD-S873, 2024W1-IPD-S15, 2024W1-IPD-S42, 2024W1-N1-ST19, 2024W1-N1-ST57, 2024W1-N11-ST1, 2024W1-N11-ST2, 2024W1-N11-ST31, 2024W1-N11-ST32, 2024W1-N11-ST5, 2024W1-N11-ST6	138	Summer Gen Deliv/IPD, Summer Basecase Analysis, Summer N-1-1

Table 24. 2024 RTEP Proposal Window 1 – AEP - 6 Cluster List of Received Proposals

Proposal ID	Project Type	Project Description	Total Construction Cost ($M)	Cost Capping Provisions (Y/N)
756	Upgrade	Reconfigure the 138 kV lines into Cyprus station to separate the station from the 138 kV network in the area.	$1.745	N
769	Upgrade	Rebuild approximately 7.9 miles of the Beatty-White Road-Cyprus 138 kV line.	$33.113	N

Initial performance reviews yielded the following results:

- **Proposal 756**: Resolves the posted violations on the Beatty – White Road-Cyprus 138 kV circuit at the least cost
- **Proposal 769**: Resolves the posted violations on the Beatty – White Road-Cyprus 138 kV circuit. It is ~$31 million higher in cost compared to proposal 276.

Initial cost reviews provide no significant factors to consider other than the differences in apparent costs. A high-level review of the plans identified in the proposals does not reveal any concerns at this stage of review.

Based on the information provided by the sponsor, proposal 769 will address needs associated with aging infrastructure following a review of the information provided by the sponsor of the proposal. These needs are outlined below:

- The existing overhead sections between Beatty Road and Cyprus stations comprise mostly wood poles. More than half of the structures date back to the 1960s. The vast majority of the conductor on the line was originally installed in 1967. Rebuilding the line would replace these deteriorating assets.

The additional benefits associated with proposal 769 indicate it will address these aging infrastructure concerns and warrants consideration. PJM understands that the aging infrastructure issues identified, which would be resolved through proposal 769, would not be resolved by proposal 756. This would leave the RTEP exposed to increased costs, as then the scope of work for both proposals would need to be pursued and costs for both scopes of work would be incurred. PJM will conduct a final review with stakeholders for proposal 769 and make a final determination as to which project to recommend for PJM Board approval.

AEP Zone (AEP - 3/4/5)

AEP-3, 4, 5 includes those flowgates listed in **Table 25**.

Table 25. 2024 RTEP Proposal Window 1 – Cluster AEP - 3/4/5 List of Flowgates

Cluster	Flowgate	kV Level	Driver
3	2024W1-N11-ST33, 2024W1-N11-ST39	138	Summer N-1-1
4	2024W1-N11-ST13, 2024W1-N11-ST15, 2024W1-N11-ST20, 2024W1-N11-ST21	138	Summer N-1-1
5*	2024W1-GD-S395, 2024W1-GD-S437, 2024W1-GD-S438, 2024W1-GD-S439, 2024W1-32GD-S28, 2024W1-32GD-S29, 2024W1-32GD-S30, 2024W1-32GD-S31	765	Summer Gen Deliv

**Cluster 5 flowgates are non-competitive flowgates.*

Table 26. 2024 RTEP Proposal Window 1 – Cluster AEP – 3/4/5 List of Received Proposals

Proposal ID#	Cluster	Project Type	Project Description	Total Construction Cost M$	Cost Capping Provisions (Y/N)
408	AEP - 3/4/5	GREENFIELD	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 345 kV station; Station work at Corridor 345 kV station, Hyatt 35 kV station and Marysiville 345 kV station; Relaying upgrades at West Millersport 345 kV; Maliszewski-Corridor 345 kV Reconductoring: Bokes Creek-Marysville 345 kV Reconductoring: Marysville-Hyatt 345 kV rebuild	145.494	N
350	AEP - 3/4/5	GREENFIELD	Jester greenfield 765/345 kV station Approx. 12 miles of greenfield 345 kV double circuit transmission line between Jester greenfield 765/345 kV Station and Hayden 345 kV stations.	229.411	Y

Proposal ID#	Cluster	Project Type	Project Description	Total Construction Cost M$	Cost Capping Provisions (Y/N)
863	AEP - 3/4	UPGRADE	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.	2.328	N
744	AEP - 4	UPGRADE	Rebuild the 2.8 mile 138 kV line between Maliszewski and Polaris stations.	8.884	N
338	AEP - 3	UPGRADE	Rebuild the approximately 2-mile long 138 kV line between Westar and Genoa stations.	8.789	N
464	AEP - 3	UPGRADE	Perform a sag study and mitigate clearance issues on Westar-Genoa 138 kV line to allow line to operate to conductor's designed rating	2.815	N

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 wave trap toward Marysville, and upgrade relays on the 765 kV lines toward Marysville and Vassell. Estimated cost: $6.9 million.

Initial performance reviews yielded the following results:

With the regional cluster solution selected, cluster 5 issues are solved. Only cluster 3 and cluster 4 need to be solved. The Non-Comp solution will not be considered.

- **Proposal 350**: Resolves the posted violations on both cluster 3 & 4
- **Proposal 408**: Resolves the posted violations on both cluster 3 & 4
- **Proposal 863**: Resolves the posted violations on both cluster 3 & 4
- **Proposal 744**: Resolves the posted violations on both cluster 4
- **Proposal 338**: Resolves the posted violations on both cluster 3
- **Proposal 464**: Resolves the posted violations on both cluster 3

There has been 1.4 GWs of additional, near-term load, in the Columbus area that progressed following the development of the 2024 RTEP W1 models. The majority of the load will be in service by the year 2028. PJM modeled 1,115 MW load in this area and performed the sensitivity study on 2029 RTEP case. With the additional 1,115 MW load, multiple facilities are overloaded in Gen Deliv test and/or N-1-1 test:

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

None of the proposals 863, 744, 338 and 464 or their combination could solve all the overloads listed above. Therefore, they are eliminated from further consideration.

Initial cost reviews provide no significant factors to consider other than the differences in apparent costs. A high-level review of the plans identified in the proposals does not reveal any concerns at this stage of review.

A review of these overlaps as part of PJM's 2024 RTEP Proposal Window No. 1 screening has identified potential benefits beyond solving identified reliability criteria violations. Based on the information provided by the sponsor, proposal 408 will address the Maliszewski-Corridor 345 kV line, Bokes Creek-Marysville 345 kV line and Hyatt-Marysville 345 kV line associated with asset renewal concerns following a review of the information provided by the sponsor of the proposal.

Proposal 408 solves the reliability issues due to the additional load increase in the area within the next 4 years, which cannot be addressed by any of the proposals 863, 744, 338 and 464 or their combination. Not pursuing proposal 408 would leave the RTEP exposed to increased costs, as the scope of work for 408 or 350 would need to be pursued and costs for both scopes of work would be incurred.

Proposal 408 has a much lower cost compared to proposal 350 and a much smaller greenfield scope, 0.18 mile double circuit 345 kV line, compared to proposal 350, and it has the additional benefits to address the asset renewal concerns on the Maliszewski-Corridor 345 kV line, Bokes Creek-Marysville 345 kV line and Hyatt-Marysville 345 kV line. These warrant the consideration of proposal 408. PJM will conduct a fina**l** review with stakeholders for proposal 408 and make a final determination as to which project to recommend for PJM Board approval.

ATSI Zone

The ATSI cluster includes those flowgates listed in **Table 27**. During the window, several entities submitted six proposals through PJM's Competitive Planner Tool. The proposals are summarized in **Table 28**.

Table 27. 2024 RTEP Proposal Window 1 – ATSI Cluster of Flowgates

Flowgate	kV Level	Driver
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-S852 2024W1-GD-S897	**138**	Summer Generation Deliverability
2024W1-GD-S400 2024W1-GD-S353	**345**	

Flowgate	kV Level	Driver
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	**138**	Summer N-1 Baseline
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	**138**	Light Load N-1 Baseline

Table 28. 2024 RTEP Proposal Window 1 – ATSI Cluster List of Received Proposals

Proposal ID#	Project Type	Project Description	Total Construction Cost ($M)	Cost Capping Provisions (Y/N)
605	Upgrade	Rebuild/reconductor existing 138 kV lines Terminal upgrades at 345 kV substations	$265.1	N
843	Greenfield	New 345 kV line between Lemoyne to Lake Ave	$455.0	N
694	Greenfield	New double circuit 345 kV line between Fostoria Central and Lake Ave	$328.3	Y
533	Greenfield	New 345 kV line between Lemoyne to Lake Ave	$202.0	Y
294	Greenfield	New 345 kV line between Bayshore to Davis Besse to Lake Ave	$257.3	Y
357	Greenfield	New 345 kV line between Bayshore to Davis Besse to Lake Ave New 345 kV line between Lemoyne to Lake Ave	$344.1	Y

Initial performance reviews yielded the following results:

- **Proposal 605**: Resolves the posted violations on ten 138 kV lines and two 345 kV lines and provides a brownfield option
- **Proposal 843:** Resolves the posted violations on ten 138 kV lines and two 345 kV lines. The proposed line will leverage existing ROW to minimize impacts to communities. Proposal 843 cost has the highest cost proposed between all submitted proposals.
- **Proposal 694:** Resolves the posted violations on ten 138 kV lines and two 345 kV lines. The proposed line will parallel existing ROW but not use existing ROW characterizing the project as pure greenfield. Proposal 694 has the third-highest proposed cost.
- **Proposal 533:** Resolves the posted violations on ten 138 kV lines and two 345 kV lines. The proposed line will be an expansion of existing transmission corridor for approximately 41% of the route length, and the remainder will be greenfield. Proposal 533 also has the lowest proposed cost.
- **Proposal 294:** Resolves the posted violations on ten 138 kV lines and two 345 kV lines. The proposed line will leverage open tower position where deemed feasible and greenfield for the remaining section of the line. Proposal 294 is approximately $50 million higher than proposal 533.
- **Proposal 357:** Resolves the posted violations on ten 138 kV lines and two 345 kV lines. The proposed line will leverage open tower position where deemed feasible and greenfield for the remaining section of the line. Proposal 357 is approximately $140 million more than proposal 533.

Initial cost reviews provide no significant factors to consider other than the differences in apparent costs. A high-level review of the plans identified in the proposals does not reveal any concerns at this stage of review.

Initial cost reviews show a cost commitment provision was included in proposals 694, 533, 294 and 357. Proposals 605 and 843 did not include cost commitment provisions.

PJM also notes that proposals 843, 694, 533, 294 and 357 incorporate partial or pure greenfield construction, which may impact the ability to timely complete the project.

Below are additional benefits provided by the proposals:

- Proposal 605 provides sufficient headroom on overloaded facilities by rebuilding/reconductoring existing 138 kV lines that were originally constructed over 60–100 years ago. Additionally, upgrading terminal equipment at 345 kV substation enhances transmission capability on EHV lines.
- Proposal 843 provides enhanced transmission system reliability into the Cleveland area and provides capacity for potential future load growth to support west to east flow in the ATSI transmission area. Proposal 843 also provides thermal relief on the 345 EHV facilities along with underlying 138 kV system.
- Proposal 694 provides a double circuit 345 kV option to support the west to east flow from AEP 345 kV system into the Cleveland area.
- Proposal 533 reduces flows on several EHV facilities and underlying 138 kV thermal facilities while promoting potential load growth in the Cleveland area.

- Proposal 294 further reduces flow on several EHV and underlying 138 kV thermal facilities and proposes additional EHV transmission miles compared to proposal 533 to improve system reliability.
- Proposal 357 significantly reduces flow on several EHV and underlying 138 kV thermal facilities and provides additional transmission input from the western Toledo area into the Cleveland area.

Proposal 605 solves the identified reliability violations for the ATSI cluster and doesn't cause new reliability criteria violations. Proposals 843, 694, 533, 294 and 357 also resolve the reliability criteria violations and are partially or fully greenfield. Additionally, the solution recommended from the regional cluster will further reduce thermal loadings on the overloaded facilities in ATSI requiring fewer upgrades within proposal 605, further reducing the overall cost.

Based on the summary above, PJM identified the following components of proposal 605 to be the more efficient or cost-effective solution in the ATSI cluster:

- Rebuild the 7.46 miles of Avery-Shinrock 138 kV line with 795 kcmil 26/7 ACSS (7.46 miles) (**$15.2 million**).
- 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 (**$59.68 million**).
- Rebuild the 6.5 miles of Avery-Hayes 138 kV line with 795 kcmil 26/7 ACSS conductor (**$11.01 million**).
- 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 (**$131.43 million).**

The above components of proposal 605 have a total estimated cost of $217.32 million and a projected and required in-service date of June 1, 2029.

ComEd Zone (ComEd - 1)

The ComEd - 1 cluster includes those flowgates listed in **Table 29** to address the Dresden-Mulberry 345 kV double circuit overload identified in the 2029 summer and winter cases for N-1 and N-2 outages. During the window, the incumbent transmission owner submitted three proposals through PJM's Competitive Planner Tool to address the flowgates from the ComEd - 1 cluster. The proposals are summarized in **Table 30**.

Table 29. 2024 RTEP Proposal Window 1 – Cluster ComEd - 1 List of Flowgates

Flowgate	kV Level	Driver
2024W1-N1-ST51, 2024W1-N1-ST54, 2024W1-GD-S307, 2024W1-GD-S19, 2024W1-GD-S376, 2024W1-IPD-S109, 2024W1-IPD-S110, 2024W1-IPD-S111, 2024W1-IPD-S112, 2024W1-IPD-S113, 2024W1-IPD-S114, 2024W1-IPD-S115, 2024W1-IPD-S116, 2024W1-IPD-S117, 2024W1-IPD-S118, 2024W1-IPD-S119, 2024W1-IPD-S120, 2024W1-IPD-S121, 2024W1-IPD-S122, 2024W1-IPD-S123, 2024W1-IPD-S124, 2024W1-IPD-S125, 2024W1-IPD-S126, 2024W1-IPD-S127, 2024W1-IPD-S128, 2024W1-IPD-S129, 2024W1-IPD-S130, 2024W1-IPD-S131, 2024W1-IPD-S132,	**345**	Summer and Winter N-1 and Generator Deliverability

Flowgate	kV Level	Driver
2024W1-IPD-S133, 2024W1-IPD-S134, 2024W1-IPD-S135, 2024W1-IPD-S136, 2024W1-IPD-S137, 2024W1-IPD-S138, 2024W1-IPD-S139, 2024W1-IPD-S140, 2024W1-IPD-S141, 2024W1-IPD-S142, 2024W1-IPD-S143, 2024W1-N1-WT2, 2024W1-GD-W101, 2024W1-GD-W2, 2024W1-GD-W4, 2024W1-GD-W105, 2024W1-IPD-W3,2024W1-IPD-W4,2024W1-IPD-W5, 2024W1-IPD-W6,2024W1-IPD-W7,2024W1-IPD-W8,2024W1-IPD-W9, 2024W1-IPD-W10,2024W1-IPD-W11,2024W1-IPD-W12,2024W1-IPD-W13, 2024W1-IPD-W14,2024W1-IPD-W15,2024W1-IPD-W16,2024W1-IPD-W17, 2024W1-IPD-W18,2024W1-IPD-W19,2024W1-IPD-W20,2024W1-IPD-W21, 2024W1-IPD-W22,2024W1-IPD-W23	**345**	Summer and Winter N-1 and Generator Deliverability

Table 30. 2024 RTEP Proposal Window 1 – Cluster ComEd - 1 List of Received Proposals

Proposal ID	Project Type	Project Description	Total Construction Cost ($M)	Cost Capping Provisions (Y/N)
135	Upgrade	Reconductor 1.5 miles of 345 kV lines 1202 & 1227 from Dresden to Mulberry with two conductor bundled 1033.5 ACSS conductor. Modify and replace towers as necessary to accommodate the higher mechanical loads of the bundled conductor.	$16.27	N
447	Greenfield	Cut 345 kV L8014 Pontiac to Dresden into Mulberry	$23.59	N
532	Upgrade	Install new 345 kV shunt inductor at Mulberry	$28.23	N

Initial performance reviews yielded the following results:

- **Proposal 135**: Resolves the posted violations on the Dresden-Mulberry 345 kV double circuit at the least cost
- **Proposal 447**: Resolves the posted violations on the Dresden-Mulberry 345 kV double circuit. It is a greenfield solution and is over $7 million higher in cost compared to proposal 135.
- **Proposal 532**: Resolves the posted violations on the Dresden-Mulberry 345 kV double circuit. Similar to proposal 135, it is an upgrade, but almost $12 million higher in cost.

Initial cost reviews provide no significant factors to consider other than the differences in apparent costs. A high-level review of the plans identified in the proposals does not reveal any concerns at this stage of review.

The submitted proposals provide the following additional benefits as identified by the proposing entity:

- **Proposal 135**: Existing towers are 52 years old. Increased capacity of lines affected by retirement of Elwood generation.
- **Proposal 447**: Provides additional stability to Mulberry

Based on this information, proposal 135 appears to be the more efficient or cost-effective solution in cluster ComEd - 1. PJM's initial planning-level cost review and initial feasibility review suggests that further constructability review and financial analysis would not materially contribute to the analysis of the other proposals submitted for this cluster.

ComEd Zone (ComEd - 2)

The ComEd - 2 cluster includes those flowgates listed in **Table 31** to address the Busse-Des Plaines 138 kV overload identified in the 2029 summer case under N-1-1 conditions. During the window, the incumbent transmission owner submitted 2 proposals through PJM's Competitive Planner Tool to address the FGs from the ComEd - 2 cluster. The proposals are summarized in **Table 32**.

Table 31. 2024 RTEP Proposal Window 1 – Cluster ComEd - 2 List of Flowgates

Flowgate	kV Level	Driver
2024W1-N11-ST37, 2024W1-N11-ST34	**138**	Summer N-1-1

Table 32. 2024 RTEP Proposal Window 1 - Cluster ComEd - 2 List of Received Proposals

Proposal ID	Project Type	Project Description	Total Construction Cost ($M)	Cost Capping Provisions (Y/N)
816	Upgrade	Autotransformer at Itasca	$14.31	N
888	Upgrade	Reconductor Des Plaines to Busse L4605	$7.21	N

Initial performance reviews yielded the following results:

- **Proposal 816**: Resolves the posted violations on the Busse-Des Plains 138 kV line. While it is not the least cost, the project scope is associated with the M-3 need ID ComEd-2024-004. ComEd presented a solution to install two new 345/138 kV transformers at Itasca substation to address the M-3 need at the August 2024 TEAC. Proposal 816 represents half of the M-3 solution scope, and by proceeding with this proposal, PJM could leverage the M-3 supplemental solution by converting the required scope into a baseline and avoid any additional cost on the transmission system.
- **Proposal 888**: Resolves the posted violations on the Busse-Des Plains 138 kV line. It is the least-cost solution, however would result in additional cost on the transmission system beyond what is required for M-3 need ID ComEd-2024-004.

Initial cost reviews provide no significant factors to consider other than the differences in apparent costs. A high-level review of the plans identified in the proposals does not reveal any concerns at this stage of review.

A review of the M-3 need overlaps as part of PJM's 2023 RTEP Proposal Window 1 screening has identified potential benefits beyond solving identified reliability criteria violations. Based on the information provided by the sponsor and as detailed above, proposal 816 will address needs associated with ComEd-2024-004.

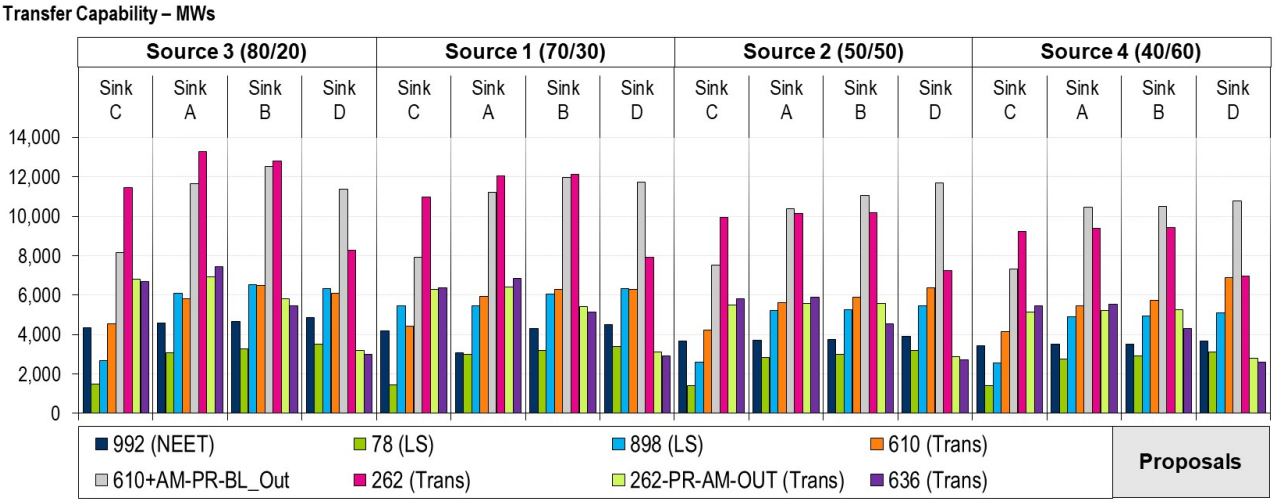
Proposal 816 solves the identified reliability criteria violations and offers additional benefits in the form of eliminating part of an Attachment M-3 need (not observed in the other proposals in this cluster), and it does so at a cost that is demonstrated in **Table 32** above based on current-year dollars and analysis to date. PJM's initial planning-level cost review and initial feasibility review suggests that further constructability review and financial analysis would not materially contribute to the analysis of the other proposals submitted for this cluster.

Final Reliability Analysis and Recommended Solution

Regional Transfer Performance – Key Proposals

While PJM provided a short list of scenarios for the regional solution at the Nov. 19, 2024, TEAC meeting, PJM since then further refined the incremental transfer capability analysis as shown in **Figure 2**. Excluding proposal 262, the remainder of the proposals offer similar merits, and of these, proposals 610 and 636 offer the highest incremental transfer capability. Proposals 636 and 610 also do not require the additional 78 mile of 765 kV line from Joshua Falls to Axton. Proposals 636 and 610 offer expandability and staging while also extending service reach to the eastern side of the constrained area on the PJM system where load is growing rapidly. It is however, apparent that proposal 262 and its variants, which add an additional 765 kV corridor in the north, offers a significantly higher incremental transfer capability compared to all other proposals. Proposal 262 offers a strong incremental transmission capability addition, regardless of the sink/source combination studied. For these reasons, PJM narrowed down the short-list even further to proposals 636, 610 and 262.

Figure 1. *Incremental Transfer Capability (including proposal 262 and its variants)*



15-Year Analysis

The objective of the 15-year analysis is to identify long-lead needs for 230 kV or above lines to support load growth in years 6 through 15. In order to evaluate the long-lead merit of proposal 262, PJM conducted 15-year analysis for proposal 262 and compared to the base case findings. In the base case, PJM initially identified 30 potential overloads at 230 kV or 345 kV in years 6 through 12, and 21 potential overloads at 500 kV or 765 kV in years 6 through 15. **0** below shows the potential base case overloads, and includes the anticipated year in which the line would become overloaded. The last column in the table shows the anticipated year of the overload with the inclusion of proposal 262. If a year is not shown in the last column, this indicates that the potential issue is remediated. Proposal 262 would address approximately 67% of the potential overloads in the 2024 RTEP 15-year analysis, indicating that it performs well as a long-lead solution. PJM seeks to use this information to further analyze and right size the near-term solutions and monitor longer term needs as they materialize.

Table 33. Ratio Potential Overloads Identified in 15-Year Analysis

Season	Cont. Type	From Bus	From Bus Name	To Bus	To Bus Name	CKT	KV	Areas	100% Year (Base Case)	100% Year (Proposal 262)	Proposal 262 Impact
Summer	Single	207930	BUSH	206242	28KITATINY	1	230	229/228	2033	2034	Remains
Summer	Single	207950	CUMB	208141	WIGR	1	230	229/229	2033		Solved
LL	Tower	207968	ELIM	208109	SUNB	1	230	229/229	2032	2032	Remains
Summer	Single /Tower	208004	JUNI	207950	CUMB	1	230	229/229	2031/2036		Solved
Summer	Single	208012	LMBE	208025	MACR	1	230	229/229	2032	2032	Remains
Summer	Single	213520	CONOWG03	214218	NOTTNGH2	1	230	230/230	2034	2034	Remains
Summer	Single	213519	CONOWG01	231006	COLOR_PE	1	230	230/235	2031	2031	Remains
Winter	Tower	227955	CEDAR	206302	28OYSTER C	1	230	234/228	2033	2033	Remains
Summer / Winter	Single	304070	6PERSON230 T	316281	AC2-100 TAP	1	230	340/345	2031/2033		Solved
Summer	Single /Tower	313046	6LOUISA PUMP	314766	6LOUISA	1	230	345/345	2032/2035		Solved
Summer	Single /Tower	313052	6DESPER	313046	6LOUISA PUMP	1	230	345/345	2032/2035		Solved
Summer	Single	313714	6PERQUIMANS	314662	6S HERTFORD	1	230	345/345	2034		Solved
Summer	Single	313818	6BENCHRCH	313866	6COPELAND	1	230	345/345	2032	2034	Remains
Summer / Winter	Single	313868	6CARTERV	316335	AC2-165 TAP	1	230	345/345	2030/2031		Solved
Summer	Single	313994	6OTTERDAM	313178	6ENCLAVE	1	230	345/345	2031		Solved
Summer	Single	314282	6CARSON	314331	6POE	1	230	345/345	2031		Solved
Summer	Single	314285	6CHAPARRAL T	314316	6LOCKS	1	230	345/345	2030		Solved
Summer	Single	314522	6CHCKTUK	313818	6BENCHRCH	1	230	345/345	2030	2032	Remains
Summer	Single	314662	6S HERTFORD	314651	6WINFALL	1	230	345/345	2034		Solved
Summer	Single	314690	6BLACK WALNU	314686	6CLOVER	1	230	345/345	2031		Solved
Summer / Winter	Single	314697	6SEDGE HILL	315684	6EDMONSON	1	230	345/345	2030/2032		Solved
Summer / Winter	Single	314747	6BREMO	313868	6CARTERV	1	230	345/345	2030/2031		Solved
Winter	Single	314749	6CHARLVL	314772	6PROFFIT	1	230	345/345	2032		Solved
Winter	Single	314772	6PROFFIT	314759	6HOLLYMD	1	230	345/345	2034		Solved

Season	Cont. Type	From Bus	From Bus Name	To Bus	To Bus Name	CKT	KV	Areas	100% Year (Base Case)	100% Year (Proposal 262)	Proposal 262 Impact
Summer /Winter	Single	315684	6EDMONSON	314690	6BLACK WALNU	1	230	345/345	2030/2032		Solved
Summer /Winter	Single	316218	AC1-221 TAP	314697	6SEDGE HILL	1	230	345/345	2030/2031		Solved
Summer /Winter	Single	316281	AC2-100 TAP	316218	AC1-221 TAP	1	230	345/345	2030/2032		Solved
Winter	Single	316335	AC2-165 TAP	314333	6POWHATN	1	230	345/345	2031		Solved
LL	Single	290984	05BOKESCRK	242939	05MARYSV	1	345	205/205	2033	2032	Remains
Winter	Single	242865	05JEFRSO	248000	06CLIFTY	1	345	205/206	2034	2033	Remains
Summer /Winter	Single /Tower	235098	WOODSIDE	235105	01DOUBS	1	500	201/201	2030/2031/2038	2038	Marginal
Summer	Single	235102	01BELMNT	235235	01FLINTRUN	1	500	201/201	2037		Solved
Summer	Single	235117	01KAMMER	235111	01 502 J	1	500	201/201	2035		Solved
Summer	Single	235098	WOODSIDE	314939	8GOOSE CREEK	1	500	201/345	2035		Solved
Summer /Winter/LL	Tower	235105	01DOUBS	314939	8GOOSE CREEK	1	500	201/345	2032/2033/2037		Solved
Summer	Single	235110	01MDWBRK	313440	8VINTHIL	1	500	201/345	2037		Solved
Summer	Single /Tower	314941	8BISMARK	235098	WOODSIDE	1	500	345/201	2039		Solved
Winter	Single	313403	8ASPEN	314933	8BRAMBLETON	1	500	345/345	2037		Solved
Summer	Single	314901	8BATH CO	314987	8LEXINGTN SC	1	500	345/345	2036	2038	Remains, but push overload year from 2036 to 2038
Winter	Single /Tower	314901	8BATH CO	314991	8VALLEY SC	1	500	345/345	2035/2038	2038	Remains, solved winter, summer overload push from year 11 to year 14
Summer	Single	314910	8CUNINGHAM	314908	8ELMONT	1	500	345/345	2038		Solved
Summer	Single	314912	8LEXNGTN	314907	8DOOMS	1	500	345/345	2033		Solved
Winter	Single	314929	8FRONT ROYAL	314916	8MORRSVL	1	500	345/345	2034	2037	Remains, solved winter, summer overload push from year 5 to year 13
Summer /Winter	Single	314935	8HERITAGE	314936	8RAWLINGS	1	500	345/345	2035/2038		Solved
Summer /Winter	Single	314936	8RAWLINGS	314902	8CARSON	1	500	345/345	2030/2034	2036	Remains, but push overload year from 2030 to 2036
Summer	Single	314937	8MT STORM2	314941	8BISMARK	1	500	345/345	2037		Solved

Season	Cont. Type	From Bus	From Bus Name	To Bus	To Bus Name	CKT	KV	Areas	100% Year (Base Case)	100% Year (Proposal 262)	Proposal 262 Impact
Summer /Winter	Single	314940	8ROGERS RD	314902	8CARSON	1	500	345/345	2030/2035	2037	Remains, but push overload year from 2030 to 2037
Winter	Single /Tower	314991	8VALLEY SC	314926	8VALLEY	1	500	345/345	2035/2038	2038	Remains, solved winter, summer overload push from year 5 to year 14
Summer	Single	242928	05MARYSV	290620	05MARYSVL_RM	Z1	765	205/205	2035		Solved
Summer /Winter	Single /Tower	290608	05MARYSVL_RS	242928	05MARYSV	Z1	765	205/205	2033/2035/2039		Will be addressed by non-competitive project
Summer	Single	290623	05KAMMER_RG	242925	05KAMMER	Z1	765	205/205	2038		Solved

Recommended Solution Summary

This section summarizes the selected set of proposals and associated rationale to address the reliability needs for the 2024 RTEP Window 1. **Table 35** and **Table 36** at the end of this section provide summaries of evaluation rationale, relevant study scenarios supporting the selection, as well as a high-level summary of the scenario build up and analysis.

The preliminary recommended solution to address the 2024 RTEP Window 1 violations are those summarized in the **Window 1 Evaluations Process – Local** section and the regional solution components described in this section.

PJM recommends proposal 636 with some adjustments. The Vontay 765/500 kV substation could be delayed and triggered as load materializes, and the Morrisville South and Bristers substations could be consolidated into one 765/500 kV substation by extending the northern leg of the 765 kV line to Yeat. The Morrisville South and Bristers substations could be developed as the need for additional outlets and tie-ins between the 765 kV and 500 kV networks materialize.

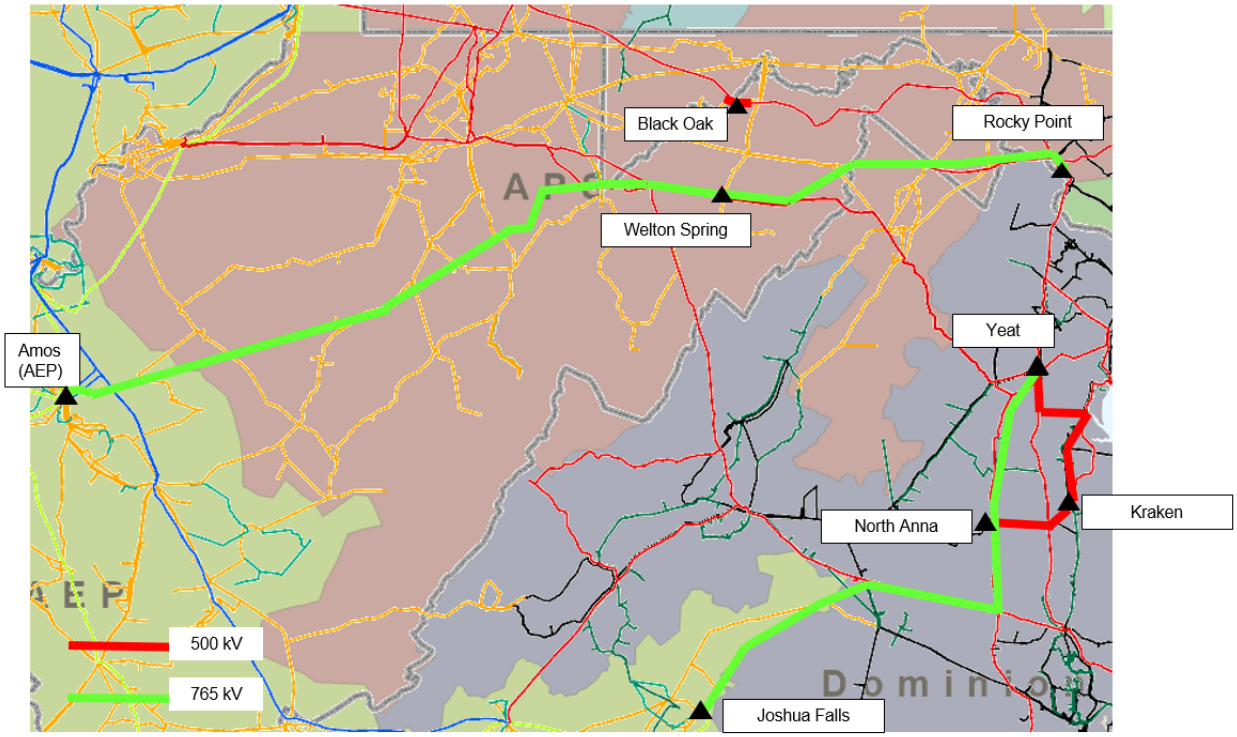
A modified scope of the proposed Kraken 500 kV loop and the Kraken 500/230 kV substation from proposal 967 is also recommended. With the modification to proposal 636 noted above, the Kraken loop will terminate at the recommended Yeat 765 kV substation. The loop provides additional north to south 500 kV backbone reinforcement, and expands the 500 kV backbone further to the east in an area where load growth is observed. This project also alleviates stability and operational constraints in the area. However, the 230 kV tie-ins from Kraken substation to the existing 230 kV system will be deferred and triggered through the M-3 supplemental process.

The John Amos-Welton Spring-Rocky Point 765 kV from proposal 262 is recommended as this northern corridor provides additional west to east transfer capability and allows for increased flexibility towards load and generation development scenarios. A high-level summary is shown in **Table 34** and **Map 9**.

Table 34. High-Level Summary of Preliminary Regional Recommended Solution

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

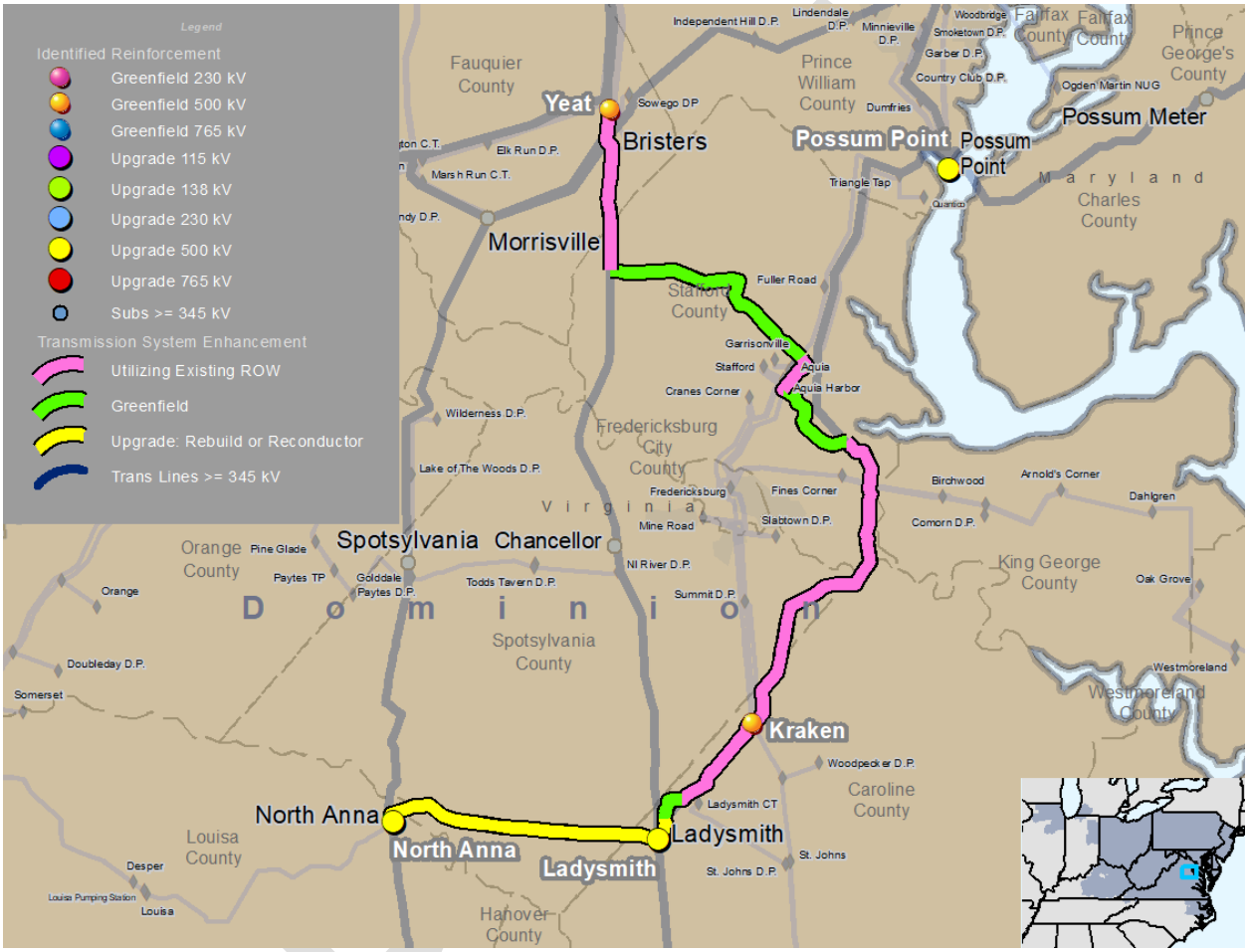
Map 9. High-Level PJM Recommended Solution



Revised Proposal 967 – Kraken Loop

The recommended revised proposal 967 from VEPCO (Dominion) includes a new North Anna-Kraken-Yeat 500 kV line, and a new 500/230 kV Kraken substation that ill tie in 500 kV line No. 568 (Ladysmith-Possum Point) and the new North Anna-Kraken-Yeat 500 kV line. Substation equipment will be upgraded at North Anna 500 kV substation, terminal equipment will be upgraded at Elmont 500 kV substation and the Ladysmith 500 kV substation will be expanded. The estimated cost for this project is $747.79 million. This project has a required and projected in-service date of June 2029, and the local transmission owner, Dominion, will be designated to complete this work.

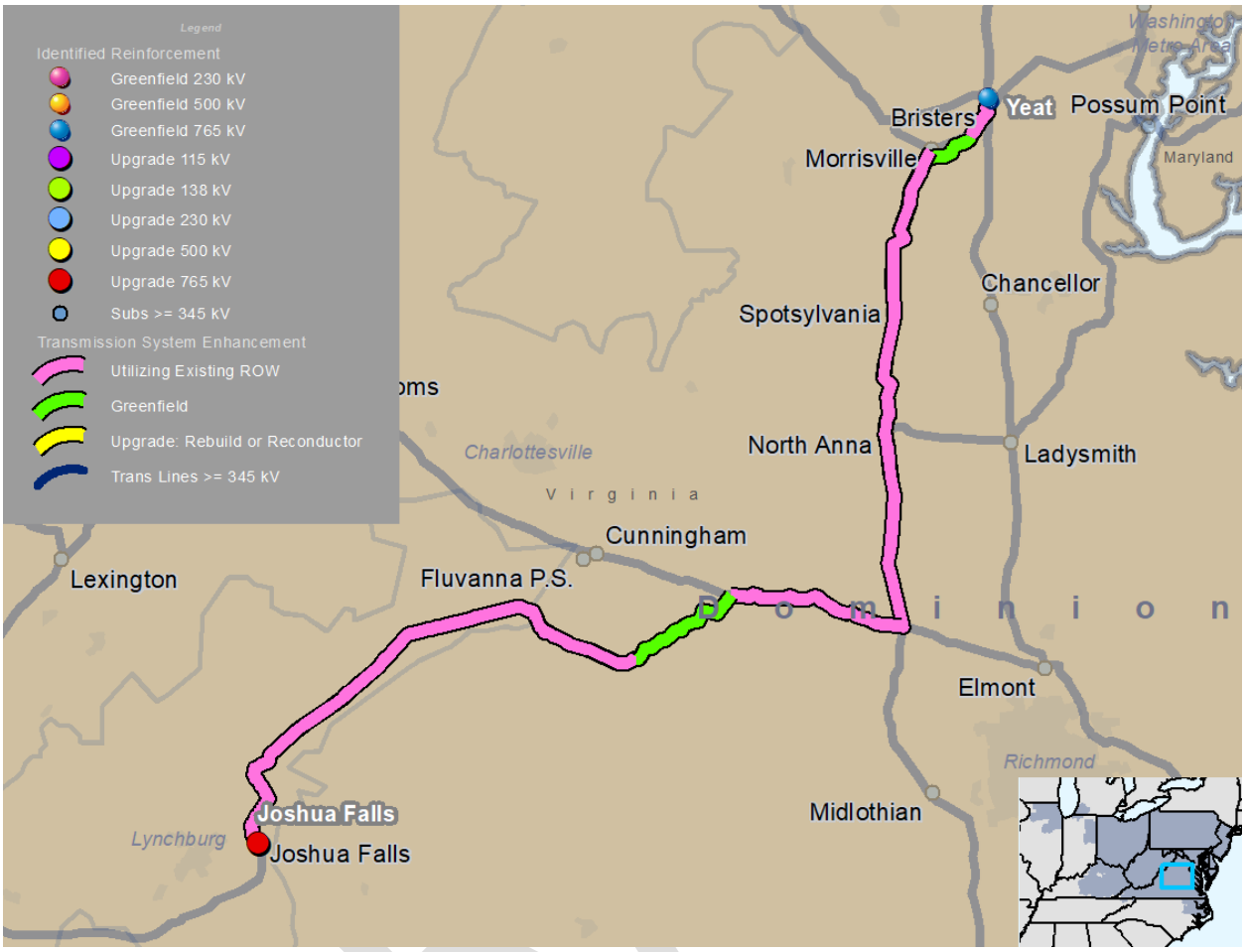
Map 10. Revised Proposal 967 – Kraken Loop



Revised Proposal 820 – Joshua Falls-Yeat 765 kV

The recommended revised proposal 820 from Transource includes a new Joshua Falls-Yeat 765 kV line, and a new 765/500/230 kV Yeat substation that will cut into the Bristers-Ox 500 kV, Meadowbrook-Vint Hill 500 kV and Vint Hill-Elk Run 230 kV lines. Substation equipment will be upgraded at Joshya Falls 765 kV substation. The estimated cost for this project is $1,055.3 million. This project has a required and projected in-service date of June 2029, and the local transmission owners, AEP and Dominion, and the proposing entity Transource will be designated to complete this work.

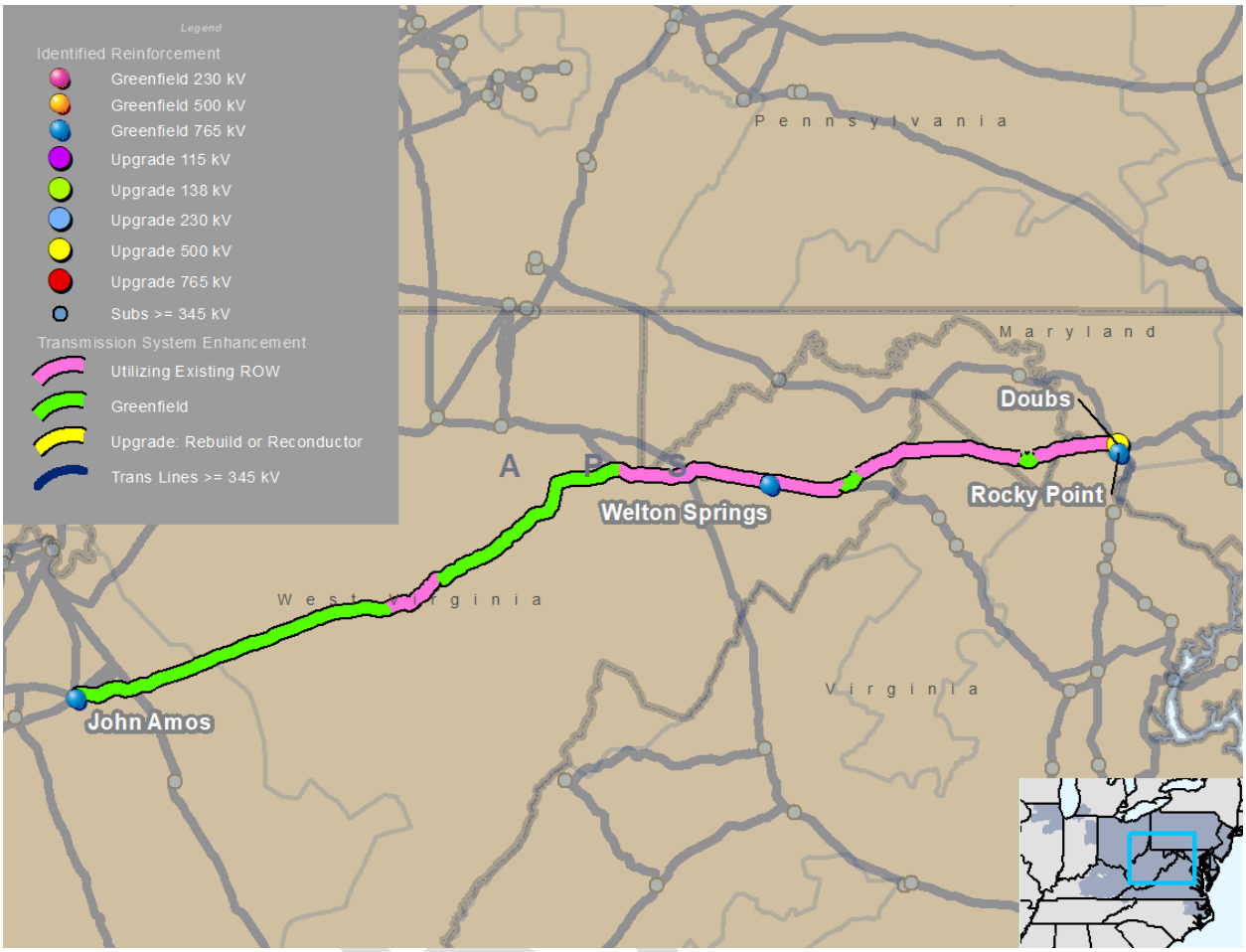
Map 11. Revised Proposal 820 – Joshua Falls-Yeat 765 kV



Proposal 708 – John Amos-Welton Springs-Rocky Point 765 kV

The recommended proposal 708 from TRAIL (FirstEnergy) includes a new mile John Amos-Welton Springs-Rocky Point 765 kV line. A 765 kV breaker will be added at John Amos substation, expanding the breaker and a half scheme to accommodate the new John Amos-Welton Springs 765 kV line. The project includes the construction of a new switchyard (Welton Springs) with a 765 kV bus, two 250 MVAR shunt capacitors, and a +/-500 MVAR STATCOM, and new Rocky Point substation with a 765 kV and a 500 kV yard. The Doubs-Goose Creek 500 kV, the Doubs-Aspen 500 kV and the Woodside-Goose Creek 500 kV lines will be looped into the Rocky Point substation. The Black Oak substation will be expanded to accommodate the connection of the 502 Jct-Woodside 500 kV line, and the 502 Jct-Woodsie 500 kV line will be looped into the Black Oak substation by constructing an approximately 0.85 miles of new 500 kV line into and out of Black Oak 500 kV substation. Additionally, terminal equipment will be upgraded on the Doubs No. 1 500/230 kV transformer. The estimated cost for this project is $1,944.98 million. This project has a required in-service date of June 2029, and a projected in-service date of December 2029. The local transmission owners, AEP and FirstEnergy, and the proposing entity TRAILCo will be designated to complete this work.

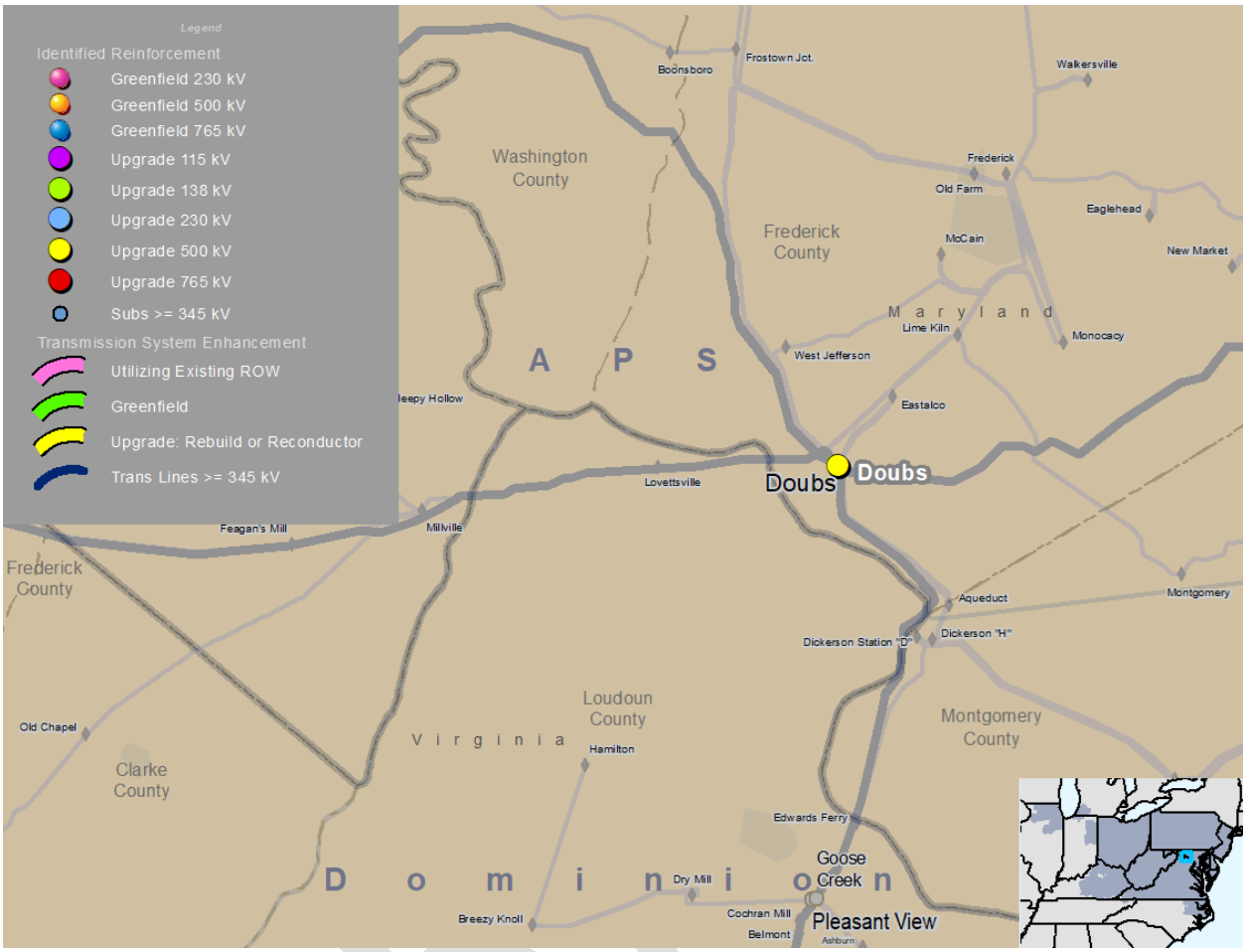
Map 12. Proposal 708 – John Amos-Welton Springs-Rocky Point 765 kV



Proposal 551 - Chanceford-Goose Creek 500 kV

The recommended proposal 551 from POTOED (FirstEnergy) terminates the Woodside-Goose Creek 500 kV line into the Doubs substation, creating the Woodside-Doubs No. 2 500 kV line. The Chanceford-Doubs 500 kV line will be re-routed into the Doubs-Goose Creek corridor, creating the Chanceford-Goose Creek 500 kV line. This will require approximately 0.6 miles of new 500 kV line from Doubs Substation into the Doubs-Goose Creek 500 kV corridor. The estimated cost for this project is $13.97 million. This project has a required in-service date of June 2029, and a projected in-service date of December 2029. The local transmission owner, FirstEnergy, will be designated to complete this work.

Map 13. Proposal 551 – Doubs 500 kV



Proposal 24 – Dominion 230 kV and 115 kV Reinforcements

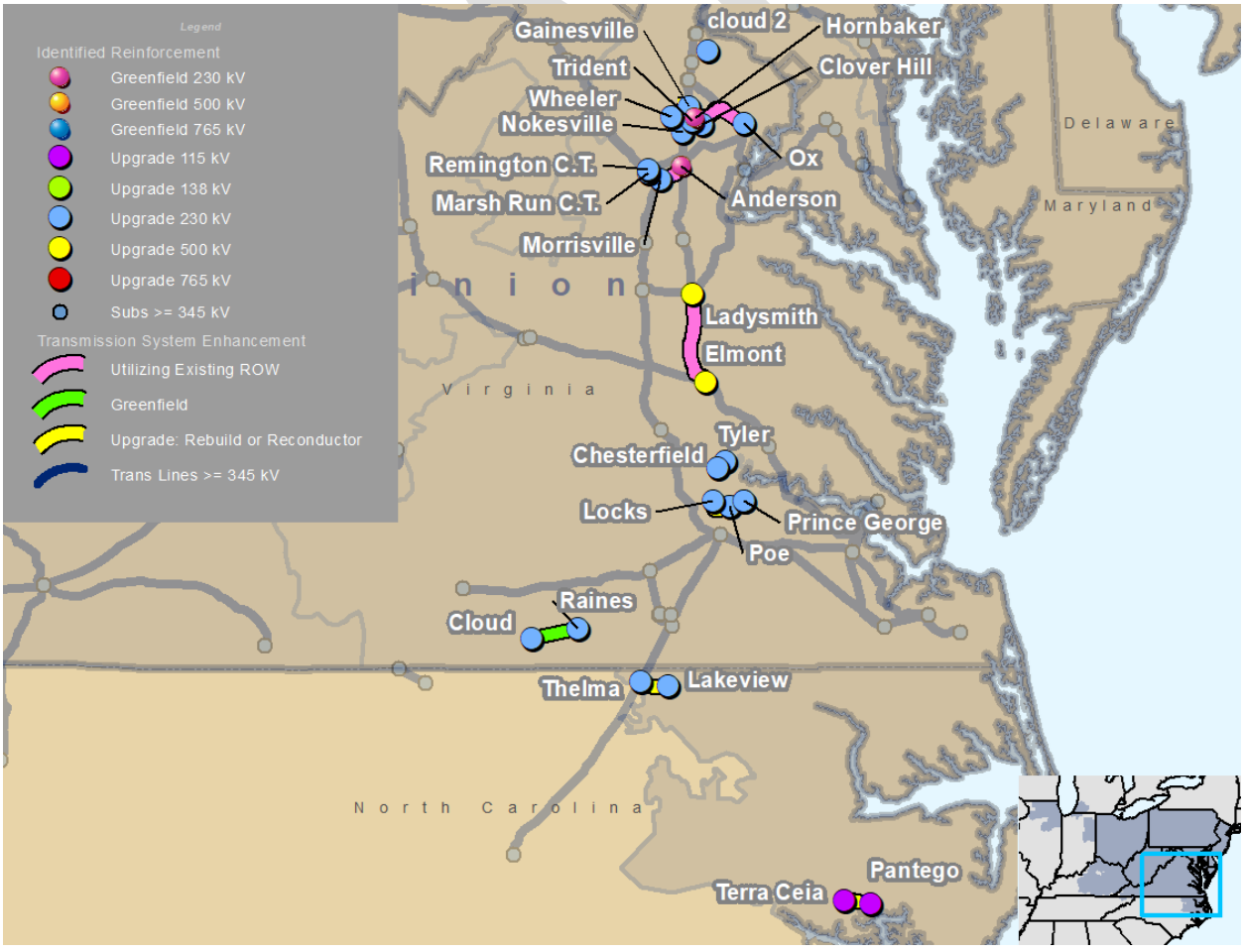
The recommended proposal 24 from VEPCO (Dominion) includes the 230 kV and 115 kV system reinforcements that are part of the Transource portfolio proposals, which were the collaborative TO scenario proposals. The scope of work includes the following components:

- Rebuild 230 kV lines No. 280 and No. 299 (Marsh Run-Remington CT)
  - Terminal equipment upgrades at Marsh Run and Remington substations
- Partial reconductor/partial wreck and rebuild of 230 kV line No. 2161 (Gainesville-Wheeler)
  - Terminal equipment upgrades at Gainesville and Wheeler substations
  - Relay resets at Trident substation
- Rebuild 230 kV line No. 213 and No. 225 (Thelma-Lakeview)
  - Terminal equipment upgrades at Thelma and Lakeview substations
- Reconductor 230 kV line No. 2003 (Chesterfield-Tyler-Locks-Poe)
  - Terminal equipment upgrades at Poe and Tyler substations
  - Relay resets at Chesterfield substation
- Reconductor 230 kV line No. 2002 (Carson-Poe)
  - Terminal equipment upgrades at Carson and Poe substations

- Build a new Nokesville-Hornbaker 230 kV line using the vacant arms of the double circuit monopole structures installed as part of a previous project
    - Terminal equipment upgrades at Nokesville and Hornbaker substations
- Build a new Elmont-Ladysmith 230 kV line on the existing 5-2 structures between the two stations
    - Terminal equipment upgrades at Elmont and Ladysmith substations
- Build a new Cloverhill-Ox 230 kV line
    - Terminal equipment upgrades at Ox and Cloverhill substations
- Build a new Raines-Cloud 230 kV line
    - Terminal equipment upgrades at Cloud and Raines substations
- Reconductor and convert 115 kV line No. 121 to 230 kV between Poe and Prince George substations
    - Terminal equipment upgrades at Poe and Prince George substations
- Build a new 230 kV line No. 9491 (Morrisville-Anderson) using existing tower structures supporting 500 kV line No. 545 (Bristers-Morrisville)
    - Terminal equipment upgrades at Morrisville and Anderson Branch substations

The estimated cost for this project is $672.43 million. This project has a required and projected in-service date of June 2029, and the local transmission owner, Dominion, will be designated to complete this work.

Map 14. Proposal 24 – Dominion 230 kV and 115 kV Reinforcements



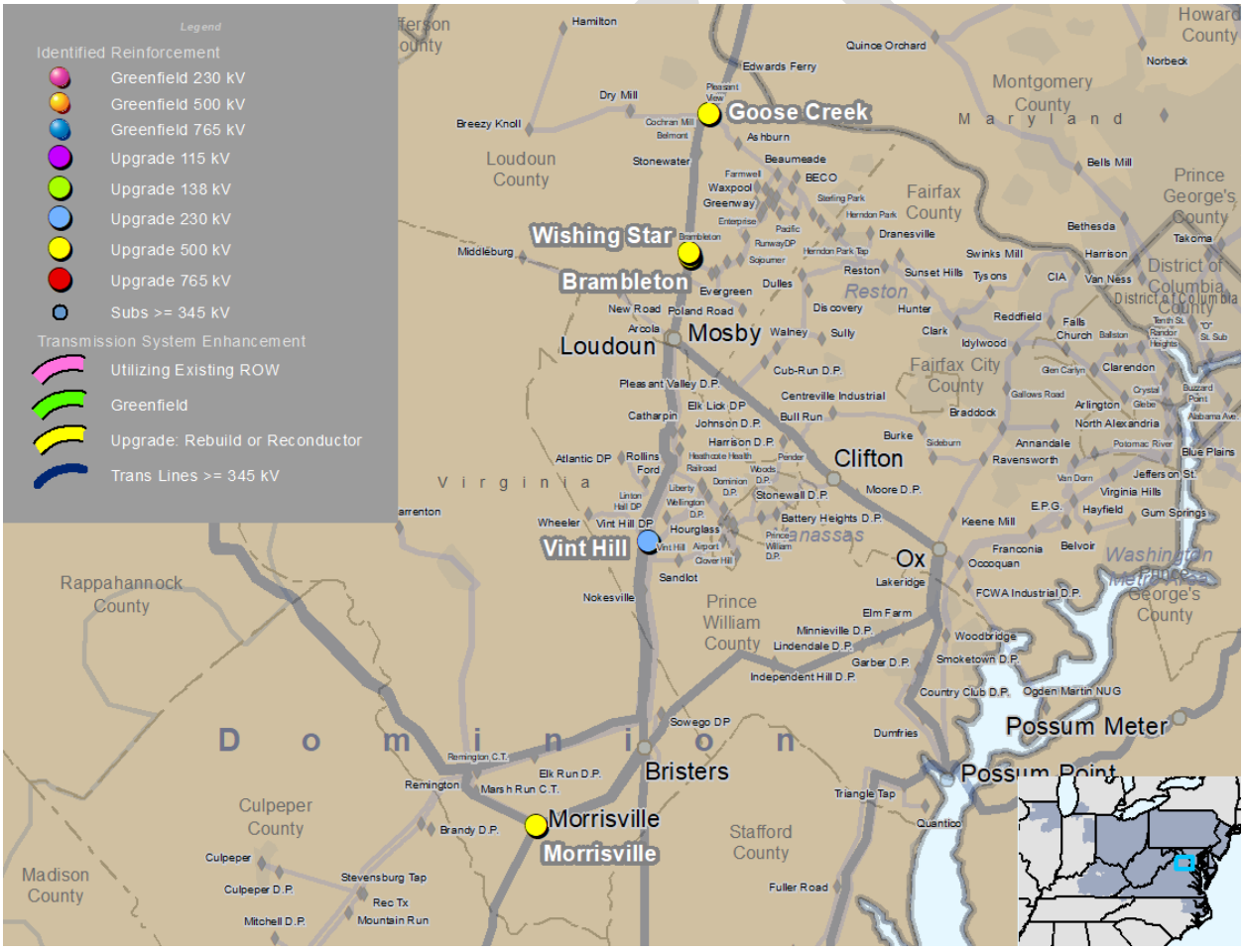
Proposal 781 – Dominion 500 kV Reinforcements

The recommended proposal 781 from VEPCO (Dominion) includes the 500 kV system reinforcements that are part of the Transource portfolio proposals, which were the collaborative TO scenario proposals. The scope of work includes the following components:

- Upgrade the 500/230 kV transformer at Goose Creek substation
- Uprate the bus at Brambleton substation to support the 500 kV line No. 558 (Aspen- Brambleton) uprate
- Remove Vint Hill substation terminal from the Wishing Star-Vint Hill-Morrisville 500 kV line
- Remove terminal equipment from Vint Hill 500 kV substation

The estimated cost for this project is $34.03 million. This project has a required and projected in-service date of June 2029, and the local transmission owner, Dominion, will be designated to complete this work.

Map 15. Proposal 781 – Dominion 500 kV Reinforcements



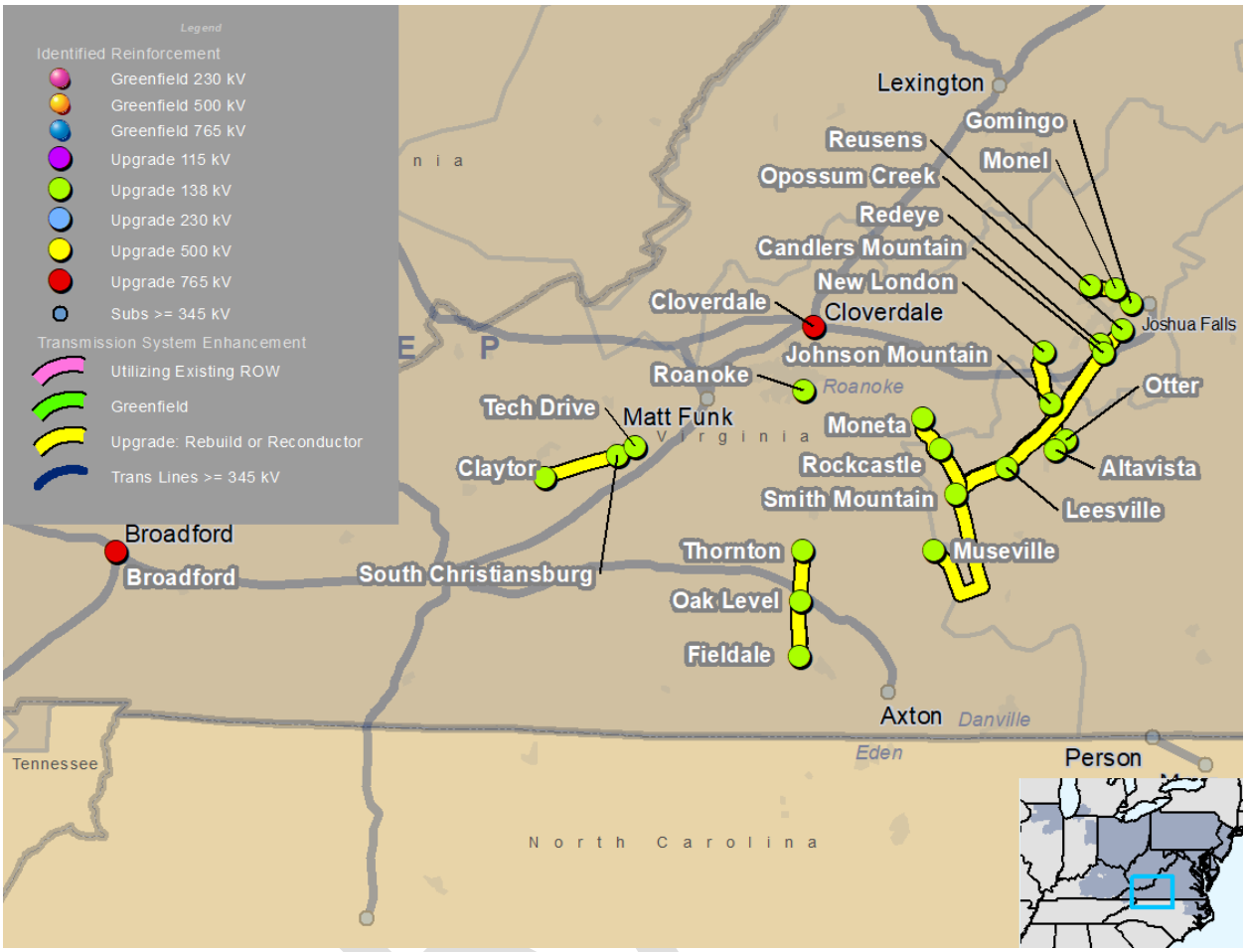
Proposal 81 – AEP Reinforcements

The recommended proposal 81 from Transource includes the AEP system reinforcements that are part of the Transource portfolio proposals, which were the collaborative TO scenario proposals. The scope of work includes the following components:

- Broadford 765 kV substation upgrade
- Cloverdale 765 kV substation upgrade
- Museville-Smith Mountain 138 kV sag study
- Smith Mountain-Rock Castle-Moneta 138 kV sag study
- Smith Mountain 138 kV substation upgrade
- Smith Mountain-Redeye-Candler's Mountain-Opossum Creek 138 kV reconductor
- Candler's Mountain 138 kV substation upgrade
- Opposum Creek 138 kV substation upgrade
- Claytor 138 kV substation upgrade
- Claytor-S Christiansburg-Tech Drive 138 kV sag study
- Roanoke 138 kV substation upgrade
- Reusens-Monel-Gomingo 138 kV sag study
- Leesville 138 kV substation upgrade
- Otter 138 kV substation upgrade
- Altavista-Otter-Johnson Mountain-New London 138 kV reconductor
- Replace the station equipment and install second 765/138 kV transformer at Joshua Falls 138 kV substation
- Reconductor the Fieldale-Thornton 138 kV line
- Fieldale-Oak Level-Grassy Hill 138 kV sag study

The estimated cost for this project is $137.02 million. This project has a required in-service date of June 2029, and projected in-service date of December 2029. The local transmission owner, AEP, will be designated to complete this work.

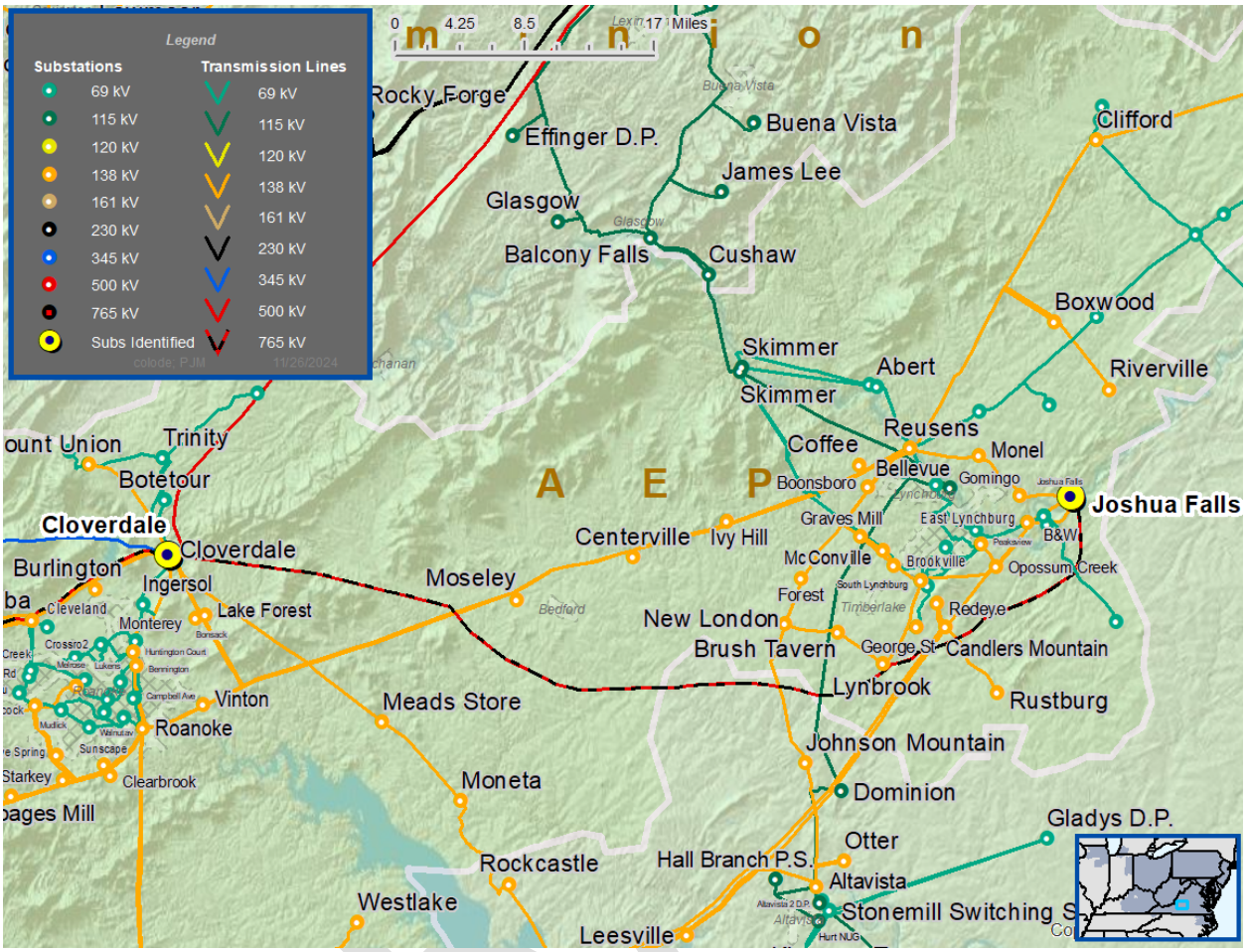
Map 16. Proposal 81 – AEP Reinforcements



Revised Proposal 617 – Cloverdale & Joshua Falls 765 kV Substation Upgrades

The recommended component proposal 617 from Transource includes the wave trap replacement and relay upgrades at Cloverdale and Joshua Falls 765 kV substations. The estimated cost for this project is $2 million. This project has a required and projected in-service date of June 2029, and the local transmission owner, AEP will be designated to complete this work.

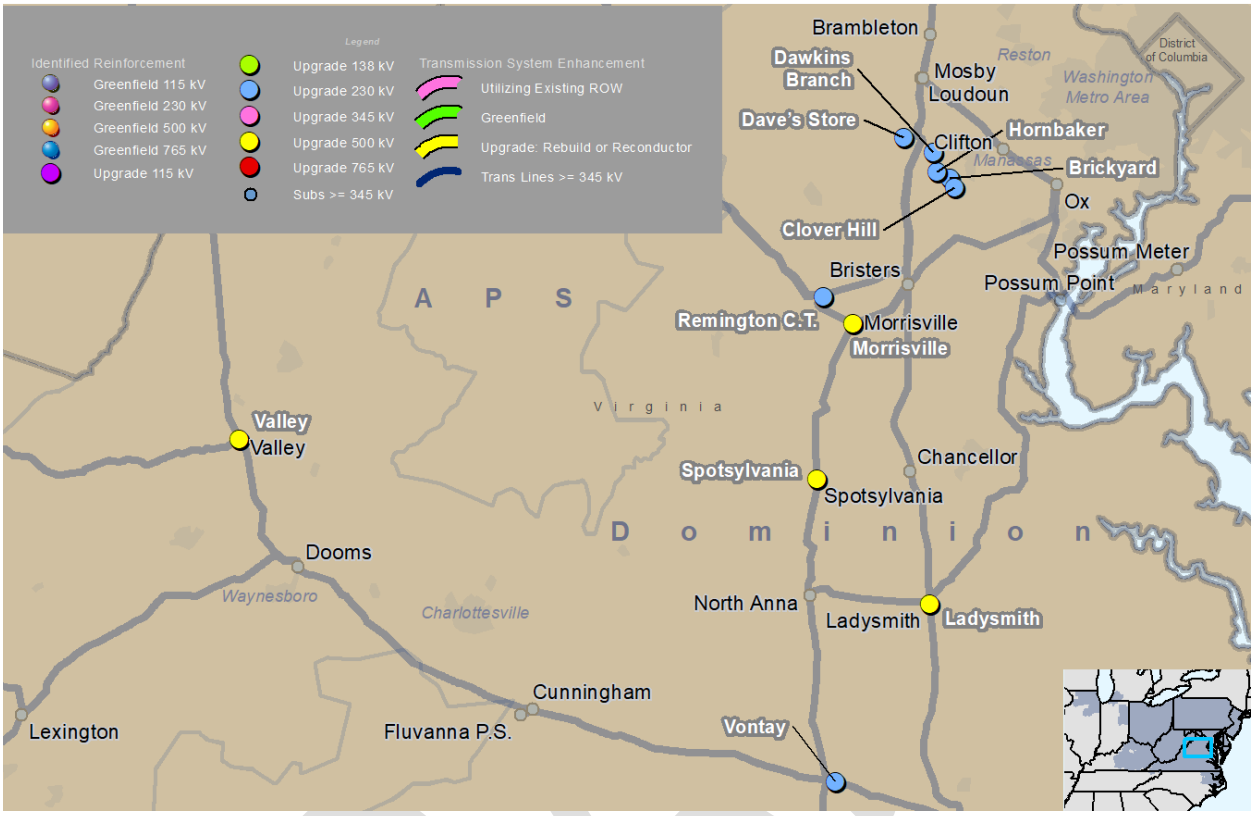
Map 17. Revised Proposal 617 – Cloverdale & Joshua Falls 765 kV Substation Upgrades



Proposal 527 – 230 kV and 500 kV Reactive Upgrades

The recommended proposal 527 from VEPCO (Dominion) includes the installation of one 230 kV 150 MVAR shunt capacitor bank and associated equipment at the following substations: Brickyard, Cloverhill, Dawkins Branch, Hornbaker, Remington CT, Remington CT and Dave's Store. The proposal also includes the installation of one 500 kV 300 MVAR STATCOM and associated equipment at the following substations: Ladysmith, Spotsylvania and Valley. For the Spotsylvania substation, an alternative is to install one 500 kV 293.8 MVAR shunt capacitor bank and associated equipment. The estimated cost for this project is $159.5 million. This project has a required and projected in-service date of June 2029, and the local transmission owner, Dominion will be designated to complete this work.

Map 18. Proposal 527 – 230 kV and 500 kV Reactive Upgrades



Additional Circuit Breaker Upgrades

In the 2029 RTEP short circuit base case that includes the preliminary preferred solution, a total of 107 breakers were identified to be over duty, one in APS and 106 in Dominion, detailed in **Table 13**. The estimated cost to replace all of the over duty breakers with higher capacity breakers is $88.09 million. This project has a required and projected in-service date of June 2029, and the local transmission owners, FirstEnergy and Dominion will be designated to complete this work.

Conclusion

PJM reviewed the performance and merits of all of the proposals submitted through the 2024 RTEP Window 1, and determined preferred regional solutions, along with local competitive and non-competitive projects. PJM is recommending a variant of the TO collaborative scenario proposals submitted by Transource. The total cost of the preliminary recommended regional solution, as proposed by the proposing entities and incumbent TOs, is approximately $4.86 billion.

Table 35. Rationale – Scenarios

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Number of New and/or Remaining Overloaded Facilities:		Selected Y/N	Rationale
					2029 Model	2032 Model		
78	CNTLTM	0 & DOM - 1	F5 Solution + Proposal 200	$2,336.80	35	73	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
124			F4 Solution + Proposal 200	$2,250.58	37	76	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
317			F7 Solution + Proposal 200	$2,336.51	37	77	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
506			F6 Solution + Proposal 200	$2,171.86	39	77	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
622			F2 Solution + Proposal 200	$2,287.89	37	77	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
839			F8 Solution + Proposal 200	$2,247.84	37	76	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
898			F3 Solution + Proposal 200	$2,455.38	38	77	N	Transfer capability is comparable with scenario proposals 610 and 636. However, constructability risk is taken into consideration (further detailed in Constructability Report)
904			F1 Solution + Proposal 200	$2,304.37	35	73	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
146	NEETMH	0 & DOM - 1	Axton-Joshua Falls 765 kV + Joshua Falls-Mt Ida 500 kV	$2,263.76	38	71	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
768			Axton-Joshua Falls-Mt Ida	$2,191.01	39	71	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
992			Axton-Joshua Falls-Mt Ida 765 kV transmission lines + Link 500/230 kV substation	$2,256.23	38	71	N	Transfer capability is limited compared to other scenarios and constructability risk is taken into consideration (further detailed in Constructability Report)
114	TRNSRC	0 & DOM - 1	Portfolio 4B	~$3,300.00	34	65	N	Kraken Loop is needed for reliability, and future anticipated load growth (to address future M-3 needs), and removes stability restrictions at North Anna.

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Number of New and/or Remaining Overloaded Facilities: 2029 Model	Number of New and/or Remaining Overloaded Facilities: 2032 Model	Selected Y/N	Rationale
								While performance is comparable scenario does not include this key component.
262	**TRNSRC**	0 & DOM - 1	Portfolio 1A	$5,497.68	**31**	**64**	N	Modified scope of scenario proposal 262 will be recommended based on PJM evaluation.
262 Variant	**PJM Scenario**	0 & DOM - 1	Proposals 967 (modified), 820 (modified), 708, 551, 81, 24 (modified), 781 (modified)	TBD	**33** (without local solutions) **4** (with local solutions)	**62** (without local solutions) **40** (with local solutions)	Y	Preliminary recommended solution.
279	**TRNSRC**	0 & DOM - 1	Portfolio 4A	~$2,400.00	**38**	**71**	N	Kraken Loop is needed for reliability, and future anticipated load growth (to address future M-3 needs), and removes stability restrictions at North Anna. While performance is comparable scenario does not include this key component.
610			Portfolio 3	~$3,700.00	**40**	**64**	N	Short-listed. However, the transfer capability is limited compared to proposal scenario 262 which includes the northern John Amos-Welton Springs-Rocky Point 765 kV line.
636			Portfolio 2	~$3,900.00	**42**	**69**	N	Short-listed. However, the transfer capability is limited compared to proposal scenario 262 which includes the northern John Amos-Welton Springs-Rocky Point 765 kV line.
759			Portfolio 1B	$4,827.12	**33**	**65**	N	Transfer capability is limited compared to other scenarios.
907	**TRAIL**	0	500 kV Expansion Plan	$2,838.90	**77**	**121**	N	The reliability performance is not comparable to the 765 kV scenarios.

Table 36. Rationale – Scenario Components and Local Cluster Proposals

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Meet Reliability Needs In: 2029 Model	Meet Reliability Needs In: 2032 Model	Selected Y/N	Rationale	Applicable Scenarios
408	AEPSCT	AEP - 3/4/5	Maliszewski 765/345 kV upgrades	$145.49	Y	Y	Y	Proposal resolves all the violations. It is robust to address the future load increase in the area. Proposal is more economic comparing to another robust solution for the area (proposal 350).	
459		No Cluster	Mountaineer and Belmont station upgrades	$10.52	Y	Y	N	Not Required - violation will be addressed by regional solution	
738		AEP - 1	Boxwood-Bremo 138 kV rebuild	$140.36	Y	N/A	N	Not Required - violation will be addressed by regional solution	
949		AEP - 1	Boxwood-Bremo 138 kV sag study and partial rebuild	$10.58	Y	N/A	N	Not Required - violation will be addressed by regional solution	
117		No Cluster	Tidd-Mahans Lane 138 kV rebuild	$15.05	Y	N/A	N	Not Required - violation will be addressed by regional solution	
574		No Cluster	Tiltonsville-West Bellaire 138 kV rebuild	$28.57	Y	N/A	N	Not Required - violation will be addressed by regional solution	
863		AEP - 3/4	Maliszewski series reactor upgrades	$2.33	Y	N/A	N	Proposal resolves the thermal violations. However, it is not robust enough to address additional load growth in the area, which will be shown in the 2025 load forecast.	
167		No Cluster	Leesville station conductor replacement	$0.12	Y	N/A	N	Not Required - violation will be addressed by regional solution	
756		AEP - 6	Cyprus station reconfiguration	$1.75	Y	N/A	N	Proposal resolves the thermal violations. However, proposal 769 is needed anyway to address the related supplemental needs. Therefore this project would be the unnecessary cost to the system.	
769		AEP - 6	Rebuild Beatty-Cyprus 138 kV line	$33.11	Y	N/A	Y	Proposal solves the violations and d address part of the EOL issues (supplemental need) on the Beatty-Cyprus 138 kV line.	

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Meet Reliability Needs In: 2029 Model	Meet Reliability Needs In: 2032 Model	Selected Y/N	Rationale	Applicable Scenarios
276		AEP - 2	Bixby-Buckeye Steel 138 kV reconfiguration	$4.08	Y	N/A	N	Proposal resolves the thermal violations. However, proposal 856 is needed anyway to address the related supplemental needs. Therefore this project would be the unnecessary cost to the system.	
856	AEPSCT	AEP - 2	Canal-Mound Street 138 kV rebuild	$31.09	Y	N/A	Y	Proposal solves the thermal violations and addresses part of the need AEP-2023-OH024 on the Canal – Mound St. 138 kV circuit	
744		AEP - 4	Maliszewski-Polaris rebuild	$8.88	Y	N/A	N	Proposal solves the thermal violation, not robust comparing to proposal 408	
940	AEPSCT	No Cluster	Canal-Gay 138 kV rebuild	$15.59	Y	N/A	Y	Proposal solves the thermal violations and addresses part of the need AEP-2023-OH024 on the Canal-Gay 138 kV circuit	
338		AEP - 3	Genoa-Westar rebuild	$8.79	Y	N/A	N	Proposal resolves the thermal violations. However, it is not robust enough to address additional load growth in the area, which will be shown in the 2025 load forecast.	
464		AEP - 3	Genoa-Westar Sag remediation	$2.81	Y	N/A	N	Proposal resolves the thermal violations. However, it is not robust enough to address additional load growth in the area, which will be shown in the 2025 load forecast.	
605	ATSI	ATSI	ATSI 138 kV rebuild + substation terminal upgrades	$265.16	Y	N/A	Y	Proposal resolves all thermal violations and provides a brownfield option. Furthermore, the regional solution in DVP/AEP/APS area lowers loading on existing 345/138 kV facilities in ATSI resulting in lesser components from proposal 605 needed to address the reliability violations.	
843			Lemoyne-Lake Ave 345 kV line	$455.04	Y	N/A	N	Proposal resolves all thermal violations and is partial greenfield option. Proposal 843 has the highest cost proposed for ATSI cluster and a greenfield options is not required at this point due to loadings on overloaded facilities shrinking due to the regional solution in DVP/AEP/APS.	
200	CNTLTM	0 & DOM - 1	Common components	$439.75	N/A	N/A	N	Please reference the scenario rationale table.	78, 124, 317, 506, 622, 839, 898, 904

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Meet Reliability Needs In: 2029 Model	Meet Reliability Needs In: 2032 Model	Selected Y/N	Rationale	Applicable Scenarios
135	**COMED**	COMED - 1	Reconductor 345 kV lines 1202 & 1227 Dresden to Mulberry	$16.27	**Y**	**Y**	Y	Resolves the posted violations on the Dresden-Mulberry 345 kV double circuit at the least cost.	N/A - Local Cluster
447	**COMED**	COMED - 1	Cut 345 kV L8014 Pontiac to Dresden into Mulberry	$23.59	**Y**	**Y**	N	Resolves the posted violations on the Dresden-Mulberry 345 kV double circuit. It is a greenfield solution, but is over $7 million higher in cost compared to proposal 135.	N/A - Local Cluster
532			345 kV Shunt Inductor at Mulberry	$28.23	**Y**	**Y**	N	Resolves the posted violations on the Dresden-Mulberry 345 kV double circuit. Similar to proposal 135 it is an upgrade, but almost $12 million higher in cost.	N/A - Local Cluster
816	**COMED**	COMED - 2	Autotransformer at Itasca	$14.31	**Y**	**N/A**	Y	Resolves the posted violations on the Busse-Des Plains 138 kV line. While it is not the least cost, the project scope is associated with the M-3 need ID ComEd-2024-004. ComEd presented a solution to install two new 345/138 kV transformers at Itasca substation to address the M-3 need at the August 2024 TEAC. Proposal 816 represents half of the M-3 solution scope, and by proceeding with this proposal, PJM could leverage the M-3 supplemental solution by converting the required scope into a baseline, and avoid any additional cost on the transmission system.	N/A - Local Cluster
888			Reconductor Des Plaines to Busse	$7.21	**Y**	**N/A**	N	Resolves the posted violations on the Busse-Des Plains 138 kV line. It is the least cost solution, however would results in additional cost on the transmission system beyond that which is required for M-3 need ID ComEd-2024-004.	N/A - Local Cluster
727	**KEYATC**	0	Kammer-502 Junction 765 kV line	$292.46	**N/A**	**N/A**	N	Please reference the scenario rationale table.	114, 279, 610, 636 (proposals 977 or 727 are applicable to these scenarios)
502	**MATLIT**	METED	Hunterstown #2 500/230 kV transformer	$43.09	**N/A**	**N/A**	N	Not Required - violation will be addressed by regional solution	
294	**NEETMH**	ATSI	Bay Shore-Davis-Besse-Lake Ave	$257.30	**Y**	**N/A**	N	Proposal resolves all thermal violations and provides a partial greenfield option. The proposed line will leverage open tower position where deemed feasible and greenfield for the remaining section of the line. A greenfield options is not required at this point	

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Meet Reliability Needs In: 2029 Model	Meet Reliability Needs In: 2032 Model	Selected Y/N	Rationale	Applicable Scenarios
								due to loadings on overloaded facilities shrinking due to the regional solution in DVP/AEP/APS.	
357	NEETMH	ATSI	Bay Shore-Davis-Besse-Lake Ave + Lemoyne-Lake Ave 345 kV	$344.12	Y	N/A	N	Proposal resolves all thermal violations and provides a partial greenfield option. The proposed line will leverage open tower position where deemed feasible and greenfield for the remaining section of the line. A greenfield options is not required at this point due to loadings on overloaded facilities shrinking due to the regional solution in DVP/AEP/APS.	
533			Lemoyne-Lake Ave 345 kV	$202.08	Y	N/A	N	Proposal 533 resolves all thermal violations and is a partial greenfield option. The proposed line will be an expansion of existing Transmission corridor for approximately 41% of the route length and the remainder will be greenfield. Proposal 533 also has the lowest proposed cost. A greenfield options is not required at this point due to loadings on overloaded facilities shrinking due to the regional solution in DVP/AEP/APS.	
944		No Cluster	Upgrades to AEP 138 kV and Dominion 230 kV transmission lines	$69.14	N/A	N/A	N	Upgrades will come from the proposal components of the selected regional solution.	
12	PE	PECO	PECO competitive window upgrades	$43.22	Y	Y	Y	Resolves the violations identified, including in 2032. The project is an upgrade to existing facilities and the cost is much less than proposal ID 955.	
132	PEPCO	No Cluster	Dickerson H 230 kV caps	$12.42	N/A	N/A	N	This project is proposed to address violations caused by regional issue and will not be needed with the regional solution selection	
295		BGE	Marley Neck 115 kV substation	$107.62	Y	N/A	Y	Resolves the identified violations. Proposal 295 doesn't require lengthy outage. The project provides flexibility as well as increasing resiliency to the 115 kV system in the area.	
470			BGE local mitigation alternative	$71.96	N	N/A	N	Resolves the identified violations, however, It causes a new overload on the Five Rock-Rock Ridge 115 kV. The IS date to rebuild the Howard-Pumphry 230 kV is 2031 due to outage issue	

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Meet Reliability Needs In:		Selected Y/N	Rationale	Applicable Scenarios
					2029 Model	2032 Model			
232	POTOED	No Cluster	FirstEnergy upgrades to support portfolio proposals	$97.47	N/A	N/A	N	Proposal proposes terminal upgrades at several APS substations in addition to regional solution. No upgrades are required at this point after the final regional solution has been selected.	
551	POTOED	0	Chanceford-Goose Creek 500 kV line	$13.97	N/A	N/A	Y	Please reference the scenario rationale table.	114, 262, 262 Variant, 279, 610, 636, 759
17	PPLTO	PPL - 2	Bushkill-Kittatinny 230 kV line reconductor	$35	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
72			Juniata-Cumberland-Williams Grove 230 kV upgrade project	$78.59	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
312			Acahela 500/230 kV Substation expansion project	$116.33	Y	Y	N	Resolves the violations, however, the cost is significantly more than proposal ID 850, and the project is greenfield substation plus it relies on other Greenfield projects	
330			Juniata-Hunterstown 500 kV line	$356.70	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
386			Juniata-TMIS 500 kV DCT line	$353.71	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
479			Lackawanna-Paupack 230 kV line reconductor	$47.70	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
526			Jenkins-Pocono 230 kV line	$60.03	Y	Y	N	Resolves the violation, however, the cost is significantly more than proposal ID 850.	
549			Susquehanna T10 station line reconfiguration	$9.50	Y	Y	Y	Resolves the violation and there were no other projects proposed to address the violation	
850			Pocono 80 MVAr 230 kV capacitor bank	$4.93	Y	Y	Y	Resolves the violations in both 2029 and 2032 and therefore the capacitor bank will be sufficient and is most cost effective	

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Meet Reliability Needs In: 2029 Model	Meet Reliability Needs In: 2032 Model	Selected Y/N	Rationale	Applicable Scenarios
860			Face Rock T1 and T2 transformer replacement	$9.51	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
876	PPLTO	PPL - 2	Siegfried 500/230 kV Substation expansion project	$106.93	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
922			Lackawanna-Siegfried-Drakestown 500 kV line project	$618.38	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
926			Wescosville 2nd 500/138 kV transformer	$36.83	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
935			Juniata 500 kV substation yard reconfiguration	$22.24	Y	Y	Y	Resolves the intended violations. Upgrade existing facility and the cost is less expensive than proposal ID 330 and 386	
994			Juniata-Dauphin 230 kV line reconductor	$2.26	N/A	N/A	N	The proposal ID 994 is not needed, as the violations the project is intended to address will be resolved by the regional solution	
955	PSEGRT	PECO	230 kV Eagle Point-Penrose	$390.99	Y	Y	N	Resolves the violations identified, including in 2032. However, the project will require greenfield and the cost is 10 times than proposal ID 12.	
708	TRAIL	0	John Amos-Welton Springs-Rocky Point 765 kV line	$1,944.99	N/A	N/A	Y	Please reference the scenario rationale table.	262, 262 Variant
883			John Amos-Welton Spring 765 kV line	$1,274.42	N/A	N/A	N	Please reference the scenario rationale table.	759
885			FirstEnergy components for Proposals 2024-W1-636, 610, 279 and 114	$52.67	N/A	N/A	N	Please reference the scenario rationale table.	114, 279, 610, 636

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Meet Reliability Needs In: 2029 Model	Meet Reliability Needs In: 2032 Model	Selected Y/N	Rationale	Applicable Scenarios
977			Belmont-Harrison 500 kV line	$277.41	N/A	N/A	N	Please reference the scenario rationale table.	114, 279, 610, 636 (proposals 977 or 727 are applicable to these scenarios)
546	TRNSLK	PPL - 1	Pennsylvania Border-Drakestown 500 kV line (greenfield route)	$246.05	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
900			Pennsylvania Border-Drakestown 500 kV line (brownfield route)	$277	N/A	N/A	N	This project is proposed to address PPL violations caused by regional issue and will not be needed with the regional solution selection	
81	TRNSRC	0	AEP incumbent upgrades for Portfolio #1, 2 & 3	$137.02	N/A	N/A	Y	Please reference the scenario rationale table.	262, 262 Variant, 610, 636, 759
286			Joshua Falls-Durandal	$350.25	N/A	N/A	N	Please reference the scenario rationale table.	114, 279
300			Yeat-Vontay	$381.73	N/A	N/A	N	Please reference the scenario rationale table.	114, 279
350		AEP - 3/4	Jester-Hayden	$229.41	Y	N/A	N	Proposal has highest cost and is a greenfield option.	
617		0	AEP incumbent upgrades for Portfolio #4	$167.35	N/A	N/A	N	Please reference the scenario rationale table.	114, 279
665			Joshua Falls-Vontay-Morrisville South	$1,188.51	N/A	N/A	N	Please reference the scenario rationale table.	262, 636, 759
694		ATSI	Fostoria Central-Lake Ave. 345 kV DC	$328.37	Y	N/A	N	Proposal resolves all thermal violations and is a greenfield option. The proposed line will be an expansion of existing transmission corridor for approximately 41% of the route length and the remainder will be greenfield. A greenfield options is not required at this point due to loadings on overloaded facilities shrinking due to the regional solution in DVP/AEP/APS.	
820		0	Joshua Falls-Yeat	$1,016.90	N/A	N/A	Y	Please reference the scenario rationale table.	114, 262 Variant, 279, 610

Proposal ID	Proposing Entity	Focus Area (s)	Project Title	Submitted Cost ($M)	Meet Reliability Needs In: 2029 Model	Meet Reliability Needs In: 2032 Model	Selected Y/N	Rationale	Applicable Scenarios
24	VEPCO	DOM - 1	230 kV and 115 kV solutions for portfolios	$861.74	N/A	N/A	Y	Please reference the scenario rationale table.	114, 262, 262 Variant, 610, 636, 759
261			Overdutied breaker replacement	$70.78	TBD	TBD		Dependent of final selected solution	
390	VEPCO	DOM - 1	230 kV safety solutions	$1,008.58	N/A	N/A	N	Only for consideration when mixing and matching proposals. May not need with final proposal selection.	
527			Cap Bank and STATCOM Installation	$322	TBD	TBD		Required/discretionary depending on selected proposals	
761			138/115 kV safety solutions	$104.07	N/A	N/A	N	Not Required - violation will be addressed by regional solution	
781			500 kV solutions for portfolios	$161.68	N/A	N/A	Y	Please reference the scenario rationale table.	114, 262, 262 Variant, 279, 610, 636, 759
873		AEP - 1	Line 8 rebuild - Bremo to Scottsville Interconnection (APCO)	$42.10	N/A	N/A	N	Not Required - violation will be addressed by regional solution	
967		DOM - 1	DVP central area improvement for portfolios	$1,189.78	N/A	N/A	Y	Please reference the scenario rationale table.	262, 262 Variant, 610, 636, 759
980			Line #579 EOL Rebuild_Septa to Yadkin (99-2993)	$216.78	Y	Y	Y	Resolves End-Of-Life issue on 500 kV line #579 ion Dominion	
983			500 kV safety solutions	$2,839.36	N/A	N/A	N	Only for consideration when mixing and matching proposals. May not need with final proposal selection.	

Appendix A: Scope of Final Reliability Analysis

PJM seeks technical solutions, also called proposals, to resolve potential reliability criteria violations on facilities identified below in accordance with all applicable planning criteria (PJM, NERC, SERC, RFC and local transmission owner criteria).

Criterion Applied by PJM for This Proposal Window

- 2029 Summer Baseline Thermal and Voltage N-1 Contingency Analysis
- 2029 Summer Generator Deliverability/IPD Analysis
- 2029 Summer N-1-1 Thermal and Voltage Analysis
- 2029 Winter Baseline Thermal and Voltage N-1 Contingency Analysis
- 2029 Winter Generator Deliverability/IPD Analysis
- 2029 Winter N-1-1 Thermal and Voltage Analysis
- 2029 Light Load Baseline Thermal and Voltage N-1 Contingency Analysis
- 2029 Light Load Generator Deliverability/IPD Analysis
- 2029 Short Circuit Analysis
- AEP FERC Form 715
- AMPT FERC Form 715
- DOM FERC Form 715
- FE FERC Form 715
- PECO FERC Form 715
- PSEG FERC Form 715
- PPL FERC Form 715

PJM also seeks proposals to address long-lead and more regionally focused needs using:

- 2032 Summer Generator Deliverability
- 2032 Winter Generator Deliverability
- 2032 Light Load Generator Deliverability

Appendix B: Window 1 Scenarios and Screening Performance

Listed below are high-level descriptions and screening performance of some of the major scenarios. Please note, the total number of overloads includes both lines and transformers, while the subsequent overloads broken down by kV level represents the number of overloaded lines only.

Proposal #78 (CNTLTM)

Scenario Components

LS Power proposal including, but not limited to, the below major components:

- Marsh 765/500/230 kV substation
- Cunningham 500 kV substation expansion
- Axton 765 kV substation expansion
- Joshua Falls 765 kV substation expansions
- Axton-Joshua Falls 765 kV line (~75 mi)
- Joshua Falls-Marsh 765 kV line (~122 mi)
- Cunningham-Marsh 500 kV line (~69 mi)
- Marsh-Morrisville double circuit 500/230 kV line (~3 mi each)
- Turkey Creek 500 kV series reactor

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	35
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	5
138 kV Overloads	16
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	73
765 kV Overloads	1
500 kV Overloads	3
345 kV Overloads	5
230 kV Overloads	31
138 kV Overloads	16
115 kV Overloads	5

Proposal #114 (TRNSRC)

Scenario Components

Transource proposal including, but not limited to, the below major components:

- Durandal-Joshua Falls 765 kV line (~45 mi)
- Joshua Falls-Yeat 765 kV line (~110 mi)
- Yeat-Vontay 500 kV line (~66 mi)
- Ladysmith substation reconfiguration

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	34
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	6
138 kV Overloads	15
115 kV Overloads	1

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	65
765 kV Overloads	1
500 kV Overloads	2
345 kV Overloads	6
230 kV Overloads	27
138 kV Overloads	15
115 kV Overloads	4

Proposal #124 (CNTLTM)

Scenario Components

LS Power proposal including, but not limited to, the below major components:

- Rocky Ford 765 KV substation
- Stage 765 kV substation
- Marsh 765/500/230 kV substation
- Piney Mountain 765/500 kV substation
- Cunningham 500 kV substation expansion
- Focky Ford-Stage 765 kV line (~71 mi)
- Stage-Piney Mountain 765 kV line (~56 mi)
- Piney Mountain-Marsh 765 kV line (~66 mi)
- Piney Mountain-Cunningham 500 kV line (~3 mi)
- Marsh-Morrisville double circuit 500/230 kV line (~3 mi each)
- Turkey Creek 500 kV PAR

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	37
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	5
138 kV Overloads	18
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	76
765 kV Overloads	1
500 kV Overloads	4
345 kV Overloads	5
230 kV Overloads	31
138 kV Overloads	18
115 kV Overloads	5

Proposal #146 (NEETMH)

Scenario Components

NextEra proposal including, but not limited to, the below major components:

- Axton-Joshua Falls 765 kV (~76 mi)
- Joshua Falls-Mt Ida double circuit 500 kV(~69 mi)
- Mt Ida-Morrisville 500 kV #1 (~71 mi)
- Mt Ida-Morrisville 500 kV #2 (~89 mi)
- North Anna-Chancellor 500 kV (~29 mi)
- Joshua Falls 765/500 kV expansion
- Mt Ida 500 kV substation

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	38
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	7
138 kV Overloads	17
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	71
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	30
138 kV Overloads	16
115 kV Overloads	6

Proposal #262 (TRNSRC)

Scenario Components

Transource proposal including, but not limited to, the below major components:

- John Amos-Welton Spring-Rocky Point 765 kV line (~259 mi)
- Joshua Falls-Vontay-Morrisville South 765 kV line (~160 mi)
- North Anna-Kraken-Bristers 500 kV line (~66 mi)

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	30
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	5
230 kV Overloads	5
138 kV Overloads	14
115 kV Overloads	1

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	63
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	4
230 kV Overloads	27
138 kV Overloads	13
115 kV Overloads	4

Proposal #262 Variant (without local recommended solutions)

Scenario Components

PJM recommended regional solution including, but not limited to, the below major components (additional detail available in **Table 34)**:

- Modified Kraken Loop scope
- Joshua Falls-Yeat 765 kV line (~160 mi)
- John Amos-Welton Springs-Rocky Point 765 k (~ mi)
- Woodside/Chanceford 500 kV terminal swap at Doubs
- AEP incumbent upgrades for portfolio #1, 2 and 3
- Dominion reinforcements (230 kV and 115 kV solutions for portfolios) – Remove line 238 rebuild – Carson to Clubhouse (99-3415).
- Dominion reinforcements (500 kV solutions for portfolios) – remove North Anna-Vontay uprate.

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	33
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	5
230 kV Overloads	8
138 kV Overloads	14
115 kV Overloads	1

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	62
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	4
230 kV Overloads	29
138 kV Overloads	13
115 kV Overloads	4

Proposal #262 Variant (with local recommended solutions)

Scenario Components

PJM recommended regional solution including, but not limited to, the below major components (additional detail available in **Error! Reference source not found.**):

- Modified Kraken Loop scope
- Joshua Falls-Yeat 765 kV line (~160 mi)
- John Amos-Welton Springs-Rocky Point 765 k (~ mi)
- Woodside/Chanceford 500 kV terminal swap at Doubs
- AEP incumbent upgrades for portfolio #1, 2 and 3
- Local recommended solutions
- Dominion reinforcements (230 kV and 115 kV solutions for portfolios) – Remove Line 238 rebuild – Carson to Clubhouse (99-3415)
- Dominion reinforcements (500 kV solutions for portfolios) – remove North Anna-Vontay uprate.

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	4
765 kV Overloads	1
500 kV Overloads	0
345 kV Overloads	1
230 kV Overloads	0
138 kV Overloads	0
115 kV Overloads	1

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	40
765 kV Overloads	1
500 kV Overloads	2
345 kV Overloads	1
230 kV Overloads	26
138 kV Overloads	0
115 kV Overloads	1

Proposal #279 (TRNSRC)

Scenario Components

Transource proposal including, but not limited to, the below major components:

- Durandal-Joshua Falls 765 kV line (~45 mi)
- Joshua Falls-Yeat 765 kV line (~110 mi)
- Yeat-Vontay 500 kV line (~66 mi)
- Ladysmith substation reconfiguration

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	38
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	8
138 kV Overloads	15
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	71
765 kV Overloads	1
500 kV Overloads	2
345 kV Overloads	6
230 kV Overloads	30
138 kV Overloads	15
115 kV Overloads	5

Proposal #317 (CNTLTM)

Scenario Components

LS Power proposal including, but not limited to, the below major components:

- Piney Mountain 765/500 kV substation
- Cunningham 500 kV substation expansion
- Axton 765 kV substation expansion
- Joshua Falls 765 kV substation expansions
- Axton-Joshua Falls 765 kV line (~75 mi)
- Joshua Falls-Piney Mountain 765 kV line (~56 mi)
- Piney Mountain-Cunningham 500 kV line (~3 mi)
- Piney Mountain-Morrisville double circuit 500 kV line (72 mi each)
- Turkey Creek 500 kV PAR

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	37
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	5
138 kV Overloads	18
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	77
765 kV Overloads	1
500 kV Overloads	4
345 kV Overloads	6
230 kV Overloads	31
138 kV Overloads	18
115 kV Overloads	5

Proposal #506 (CNTLTM)

Scenario Components

LS Power proposal including, but not limited to, the below major components:

- Rocky Ford 765/500 kV substation
- Stage 765/500 kV substation
- Cunningham 500 kV substation expansion
- Rocky Ford-Stage 500 kV line (~71 mi)
- Stage-Cunningham 500 kV line (~60 mi)
- Cunningham-Morrisville double circuit 500 kV line (72 mi each)

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	39
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	5
138 kV Overloads	18
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	77
765 kV Overloads	1
500 kV Overloads	3
345 kV Overloads	6
230 kV Overloads	31
138 kV Overloads	18
115 kV Overloads	6

Proposal #610 (TRNSRC)

Scenario Components

Transource proposal including, but not limited to, the below major components:

- Joshua Falls-Yeat 765 kV line (~110 mi)
- North Anna-Kraken-Bristers 500 kV line (~66 mi)
- Ladysmith substation reconfiguration

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	40
765 kV Overloads	2
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	6
138 kV Overloads	20
115 kV Overloads	1

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	64
765 kV Overloads	2
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	24
138 kV Overloads	18
115 kV Overloads	4

Proposal #622 (CNTLTM)

Scenario Components

LS Power proposal including, but not limited to, the below major components:

- Rocky Ford 765/500 kV substation
- Stage 765/500 kV substation
- Marsh 500/230 kV substation
- Piney Mountain 500 kV substation
- Cunningham 500 kV substation expansion
- Rocky Ford-Stage 500 kV line (~71 mi)
- Stage-Piney Mountain 500 kV line (~60 mi)
- Piney Mountain-Cunningham 500 kV line (~3 mi)
- Piney Mountain-Marsh double circuit 500 kV line (~66 mi each)
- Marsh-Morrisville double circuit 500/230 kV line (~3 mi each)

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	37
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	5
138 kV Overloads	18
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	77
765 kV Overloads	1
500 kV Overloads	3
345 kV Overloads	6
230 kV Overloads	31
138 kV Overloads	18
115 kV Overloads	6

Proposal #636 (TRNSRC)

Scenario Components

Transource proposal including, but not limited to, the below major components:

- Joshua Falls-Vontay-Morrisville South 765 kV line (~160 mi)
- North Anna-Kraken-Bristers 500 kV line (~66 mi)

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	41
765 kV Overloads	2
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	5
138 kV Overloads	22
115 kV Overloads	1

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	68
765 kV Overloads	3
500 kV Overloads	2
345 kV Overloads	6
230 kV Overloads	23
138 kV Overloads	19
115 kV Overloads	4

Proposal #759 (TRNSRC)

Scenario Components

Transource proposal including, but not limited to, the below major components:

- John Amos-Welton Spring 765 kV line (~175 mi)
- Welton Spring 765/500 kV transformation
- Joshua Falls-Vontay-Morrisville South 765 kV line (~160 mi)
- North Anna-Kraken-Bristers 500 kV line (~66 mi)

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	32
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	5
230 kV Overloads	5
138 kV Overloads	15
115 kV Overloads	1

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	64
765 kV Overloads	2
500 kV Overloads	2
345 kV Overloads	4
230 kV Overloads	26
138 kV Overloads	14
115 kV Overloads	4

Proposal #768 (NEETMH)

Scenario Components

NextEra proposal including, but not limited to, the below major components:

- Axton-Joshua Falls 765 (~76 mi)
- Joshua Falls-Mt Ida 765 kV (~69 mi)
- Mt Ida-Morrisville 500 kV #1 (~71 mi)
- Mt Ida-Morrisville 500 kV #2 (~89 mi)
- North Anna-Chancellor 500 kV (~29 mi)
- Joshua Falls 765 kV expansion
- Mt Ida 765/500 kV substation

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	39
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	8
138 kV Overloads	17
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	71
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	30
138 kV Overloads	16
115 kV Overloads	6

Proposal #839 (CNTLTM)

Scenario Components

LS Power proposal including, but not limited to, the below major components:

- Piney Mountain 765/500 kV substation
- Marsh 765/500/230 kV substation
- Cunningham 500 kV substation expansion
- Axton 765 kV substation expansion
- Joshua Falls 765 kV substation expansion
- Axton-Joshua Falls 765 kV line (~75 mi)
- Joshua Falls-Piney Mountain 765 kV line (~56 mi)
- Piney Mountain-Marsh 765 kV line (~66 mi)
- Piney Mountain-Cunningham 500 kV line (~3 mi)
- Marsh-Morrisville double circuit 500/230 kV line (~3 mi each)
- Turkey Creek 500 kV PAR

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	37
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	5
138 kV Overloads	18
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	76
765 kV Overloads	1
500 kV Overloads	4
345 kV Overloads	5
230 kV Overloads	31
138 kV Overloads	18
115 kV Overloads	5

Proposal #898 (CNTLTM)

Scenario Components

LS Power proposal including, but not limited to, the below major components:

- Rocky Ford 765 KV substation
- Stage 765 kV substation
- Marsh 500/230 kV substation
- Piney Mountain 765/500 kV substation
- Cunningham 500 kV substation expansion
- Rocky Ford-Stage 765 kV line (~71 mi)
- Stage-Piney Mountain 765 kV line (~56 mi)
- Piney Mountain-Cunningham 500 kV line (~3 mi)
- Piney Mountain-Marsh double circuit 500 kV line (~66 mi each)
- Marsh-Morrisville double circuit 500/230 kV line (~3 mi each)
- Turkey Creek 500 kV PAR

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	38
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	6
138 kV Overloads	18
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	77
765 kV Overloads	1
500 kV Overloads	4
345 kV Overloads	6
230 kV Overloads	31
138 kV Overloads	18
115 kV Overloads	5

Proposal #904 (CNTLTM)

Scenario Components

LS Power proposal including, but not limited to, the below major components:

- Rocky Ford 765 KV substation
- Stage 765 kV substation
- Marsh 765/500/230 kV substation
- Cunningham 500 kV substation expansion
- Rocky Ford-Stage 765 kV line (~71 mi)
- Stage-Marsh 765 kV line (~122 mi)
- Marsh-Morrisville double circuit 500/230 kV line (~3 mi each)
- Cunningham-Marsh 500 kV line (~69 mi)
- Turkey Creek 500 kV PAR

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	35
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	5
138 kV Overloads	16
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	73
765 kV Overloads	1
500 kV Overloads	3
345 kV Overloads	5
230 kV Overloads	31
138 kV Overloads	16
115 kV Overloads	5

Proposal #992 (NEETMH)

Scenario Components

NextEra proposal including, but not limited to, the below major components:

- Axton-Joshua Falls 765 (~76 mi)
- Joshua Falls-Mt Ida 765 kV (~69 mi)
- New Mt Ida-Link 500 kV (~69 mi)
- Mt Ida-Morrisville 500 kV #2 (~89 mi)
- North Anna-Chancellor 500 kV (~29 mi)
- Joshua Falls 765 kV expansion
- Mt Ida 765/500 kV substation

2029 Screening Performance

Overload	Number of Overloads
Total Overloads	38
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	7
138 kV Overloads	17
115 kV Overloads	2

2032 Screening Performance

Overload	Number of Overloads
Total Overloads	71
765 kV Overloads	1
500 kV Overloads	1
345 kV Overloads	6
230 kV Overloads	30
138 kV Overloads	16
115 kV Overloads	6

Document Revision History

11/27/2024 – R1: original version posted

12/2/2024 – R2: Additional detail added to the Final Reliability Analysis and Recommended Solution section