



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

PJM Staff White Paper

PJM Interconnection

December 2020

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I. Executive Summary

On September 23, 2020, the PJM Board of Managers approved changes to the Regional Transmission Expansion Plan (RTEP), totaling \$5.8 million, primarily for baseline project scope changes.

Since then, PJM has identified additional baseline reliability criteria violations and the transmission system enhancements needed to solve them, at an estimated cost of \$44.08 million. Scope changes to existing projects will result in a net increase of \$5.18 million, and project cancellations will result in a decrease of \$11.48 million. This yields an overall RTEP net increase of \$37.78 million, for which PJM is recommended Board approval. PJM is also providing the annual update of RTEP generation and merchant transmission network upgrades in this white paper. PJM has identified over \$101.2 million in new network upgrades and an approximately \$17.7 million decrease due to scope changes for projects with an Interconnection Service Agreement (ISA). Additionally, PJM is recommending the cancellation of over \$656.5 million in previously identified network upgrades as a result of updates to analysis performed for project withdrawals in the New Services Queue. Finally, it should also be noted that the costs associated with the Interregional Market Efficiency Michigan City-Trail Creek-Bosserman 138 kV line were previously included in the RTEP costs reported to the Board. The requests for full approval of the Michigan City-Trail Creek-Bosserman 138 kV line do not increase the costs of the RTEP, though filing of the required cost allocations will now occur following approval by the full Board. With these changes, RTEP projects will total approximately \$37,819.3 million since the first Board approvals in 2000.

PJM sought Reliability and Security Committee consideration and full Board approval of the additional RTEP baseline projects summarized in this white paper. On December 9, 2020, the Board approved the addition of RTEP baseline projects as well as other changes to the RTEP as summarized in this paper.

II. Baseline Reliability Recommendations

A key dimension of PJM's RTEP process is baseline reliability evaluation, necessary before subsequent interconnection requests can be analyzed. Baseline analysis identifies system violations to reliability criteria and standards. PJM then develops transmission system enhancements to solve identified violations and reviews them with stakeholders through the Transmission Expansion Advisory Committee (TEAC) and Subregional RTEP committees prior to recommendation to the Board. Baseline reliability transmission enhancement costs are allocated to PJM load.

III. Baseline Reliability Projects Summary

A summary of baseline projects with estimated costs equal to or greater than \$5 million is provided below. A complete listing of all recommended projects and their associated cost allocations is included in Attachment A (for allocation to a single zone) and Attachment B (for allocation to multiple zones). Projects with estimated costs less than \$5 million typically include transformer replacements, line reconductoring, breaker replacements and upgrades to terminal equipment, including relay and wave trap replacements.

1. Dominion Transmission Zone

- Replace Dominion's portion of the Doubs-Goose Creek 500 kV line: \$7.6 million
- Install second Lenexa-Northern Neck 230 kV circuit: \$23 million

2. AEP Transmission Zone

- Install 1.7 miles of 138 kV conductor along the other side of Dragoon Tap 138 kV line, a second 138/34.5 kV transformer and a high-side circuit switcher at Dragoon station, and two circuit breakers on the Dragoon-Jackson and Dragoon-Twin Branch 138 kV lines: \$6.89 million

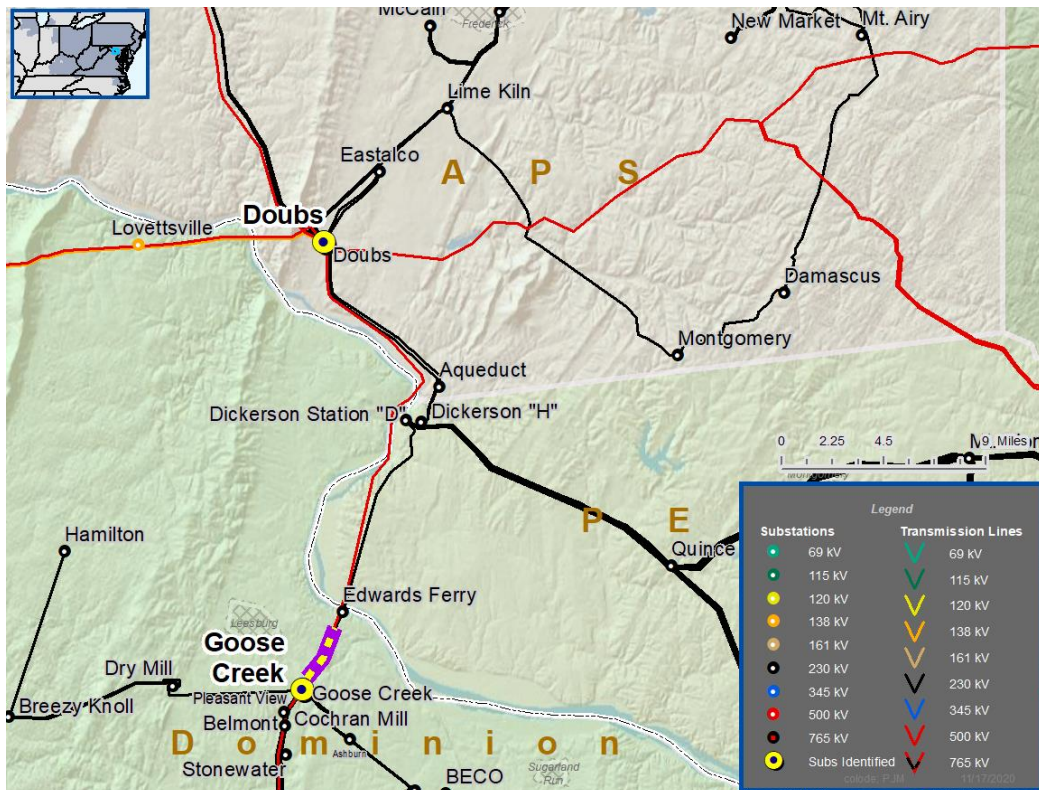
PJM also recommended projects totaling \$6.59 million that include the installation of capacitor banks, circuit switchers and circuit breakers, along with replacement of terminal equipment, whose individual cost estimates were less than \$5 million. A more detailed description of the larger-scope projects that PJM recommended to the Board is provided below:

Baseline Project b3247: Doubs-Goose Creek 500 kV Rebuild

Dominion Transmission Zone

The First Energy to Dominion tie line, Doubs-Goose Creek 500 kV, is an approximately 18-mile long line, 3 miles of which is Dominion owned. The line is primarily constructed on weathering COR-TEN® steel lattice structures. Third-party assessment has determined that the towers have corroded to a point where they exhibit premature thinning of structure members and packout at joints. If left unaddressed, these issues could result in failure of the structures and potentially collapse for the line. This issue was identified through Dominion’s end of life criteria (Dominion FERC Form 715 Transmission Owner Planning Criteria). The remainder of the line rebuild is a solution identified by APS through the M-3 process.

Map 1. Doubs-Goose Creek 500 kV



The recommended solution, solicited through the 2020 Window 2, is to replace Dominion’s portion of the Doubs-Goose Creek 500 kV line, consisting of 13 COR-TEN® towers, with galvanized steel towers, to reconductor the 3-mile section with 3-1351.5 ACSR 45/7 and upgrade the line terminal equipment at Goose Creek substation to support the 500 kV line rebuild. The estimated cost for this project is \$7.6 million, with a required and projected in-service date of June 2025. The local transmission owner, Dominion, will be designated to complete this work. While not a baseline upgrade requiring Board approval, it should be noted that through the Attachment M-3 process, Allegheny Power has also introduced a need for the remainder of the Doubs-Goose Creek line, not covered in the work to be performed under this baseline upgrade, to address the similar issues associated with the equipment structures and line for the Allegheny Power portion of the Doubs-Goose Creek 500 kV line.

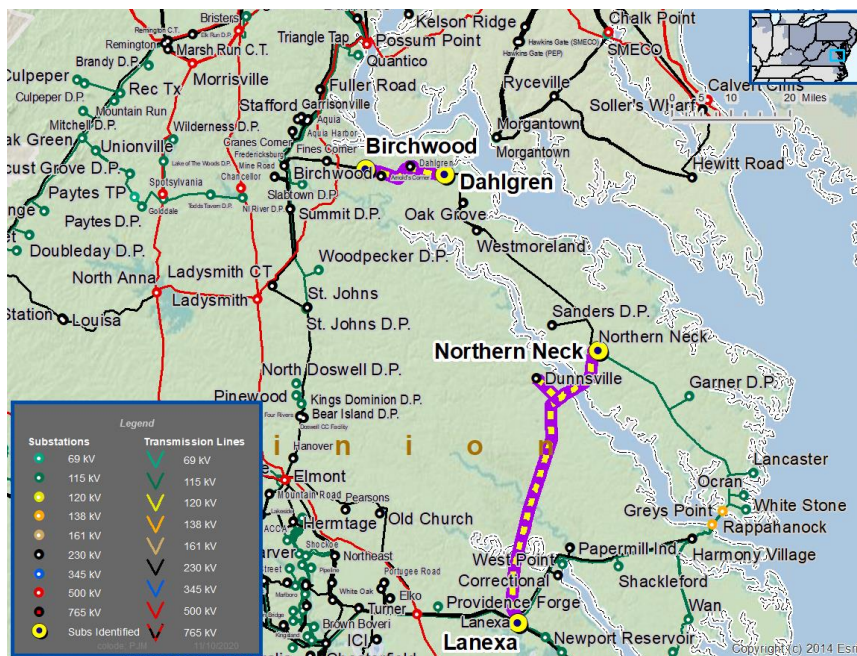
Baseline Project b3223: Northern Neck Area

Dominion Transmission Zone

There are various N-1-1 voltage magnitude and drop violations in the Northern Neck area for the loss of the Lanexa-Northern Neck and Birchwood-Dahlgren 230 kV circuits. Also, the Rappahannock-Whitstone and Harmony Village-Greys Point 115 kV circuits are overloaded for the N-1-1 loss of Lanexa-Northern Neck and Birchwood-Dahlgren 230 kV circuits. Both the voltage and thermal violations were identified in the 2025 RTEP winter case.

There is currently an operating procedure in the Northern Neck area, which opens the Northern Neck-Harmony Village 115 kV circuit on the Northern Neck end to accommodate outages on one of the two 230 kV feeds into Northern Neck to mitigate thermal overloads on the Neck-Harmony Village 115 kV circuit. The operating procedure also helps to control and mitigate voltage issues when either of the Northern Neck 230 kV feeds into the area are out-of-service. However, continued use of the operating procedure results in a PJM planning criteria violation of dropping over 300 MW in the 2022/2023 time frame based on the 2020 PJM load forecast.

Map 2. Northern Neck Area



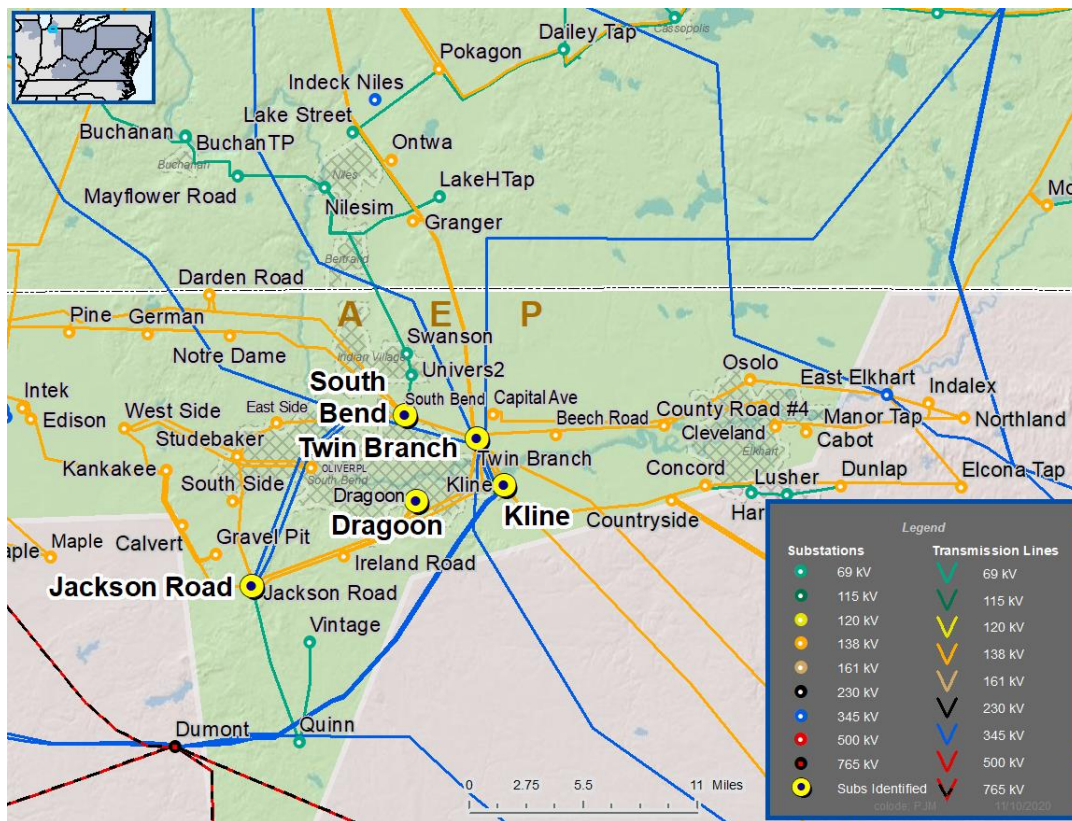
The recommended solution is to install a second Lanexa-Northern Neck 230 kV circuit, expand the Northern Neck 230 kV terminal from a four-breaker ring bus to a six-breaker ring bus, and expand the Lanexa 230 kV terminal from a six-breaker ring bus to a breaker-and-a-half arrangement. Increases in load and a shift in the load profile in Dominion to better match the winter peaking condition in Dominion has resulted in the increase in the magnitude of the load in this area of Dominion at an accelerated rate, leading to exceeding 300 MW load loss in a timeframe requiring that this project be designated as immediate-need. This project has an estimated cost of \$23 million and a required and projected in-service date of June 2023. Given the configuration of the facilities in the area, and the need to serve load from these facilities, the local transmission owner, Dominion, will be designated to complete this work.

Baseline Project b3270: Dragoon 138 kV

AEP Transmission Zone

For 2020 Window 1, the following facilities were overloaded under multiple N-1-1 contingency pairs for AEP’s FERC Form 715 Transmission Owner Planning Criteria: AM General #2-AM General #1, AM General #2-Twin Branch 2, Beiger-Virgil S, Beiger-Kline, CAP AV-AM General #1, Dodge SS-12th St, 12th ST-Virgil, Dragoon-Railroad, Grape Rd-South Bend 34.5 kV lines and Kline and South Bend 138/69/34.5 kV transformers. The overloads were identified in both the 2025 RTEP summer and winter cases.

Map 3. Dragoon 138 kV



The recommended solution, solicited through the competitive proposal window, is to install 1.7 miles of 795 ASCR 138 kV conductor along the other side of Dragoon Tap 138 kV line, which is currently a double circuit tower with one position open. Additionally, the recommended solution will install a second 138/34.5 kV transformer and a high-side

circuit switcher on the current transformer at Dragoon station, along with two 138 kV line breakers on the Dragoon-Jackson and Dragoon-Twin Branch 138 kV lines. The solution drives the Dragoon 34.5 kV circuit breakers B, C and D into an overdutied condition, so the breakers will be replaced with 40 kA breakers. The estimated cost for this project is \$6.89 million, with a required and projected in-service date of June 2025. The local transmission owner, AEP, will be designated to complete this work.

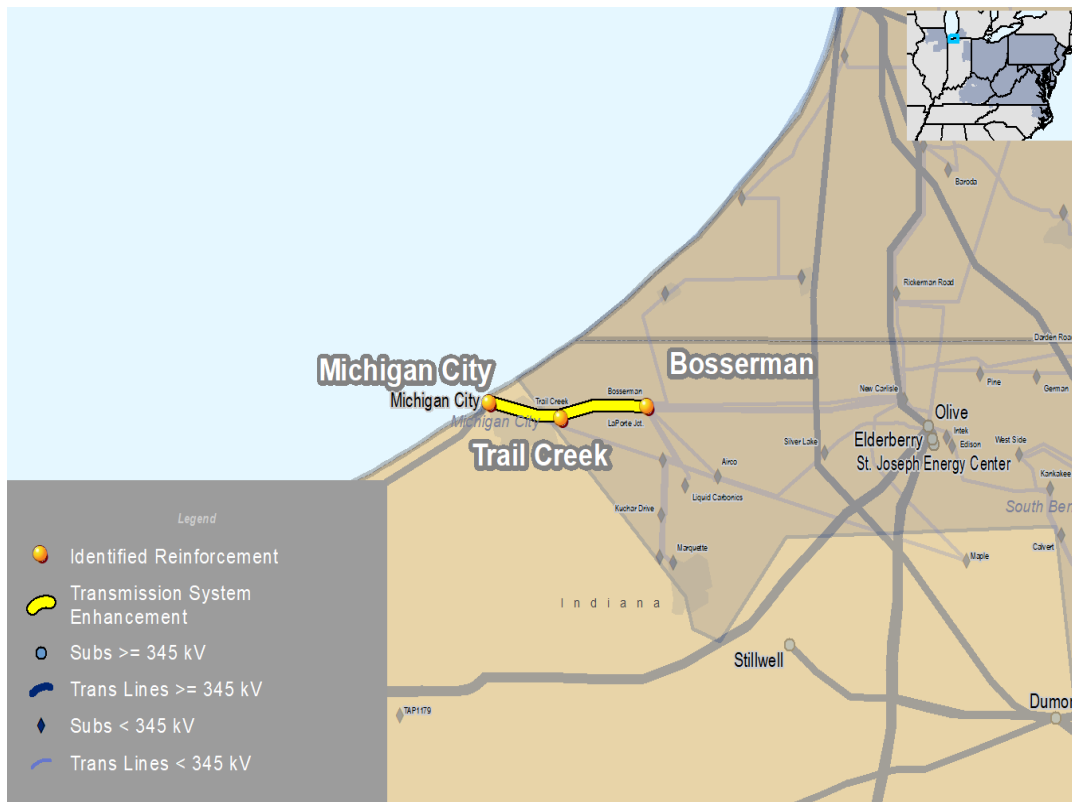
IV. Transmission Owner Criteria Projects

Of the \$44.08 million of the new recommended baseline transmission system enhancements, approximately \$19.74 million is driven by transmission owner planning criteria, which makes up 44.8 percent of the new project cost estimates.

V. Interregional Market Efficiency

On December 3, 2019, the PJM Board of Managers provided provisional approval of the PJM-MISO interregional baseline project b3142, the rebuild of the Michigan City-Trail Creek-Bosserman 138 kV line. The project was the first interregional proposal submitted during the long-term proposal window. The Bosserman-Trail Creek 138 kV line in NIPSCO was identified as an interregional targeted congestion facility, and simulations performed in advance of the 2018/2019 long-term proposal window identified over \$1.4 million in market congestion on this facility based on 2023 input assumptions and simulation results.

Map 4. Michigan City-Trail Creek-Bosserman 138 kV



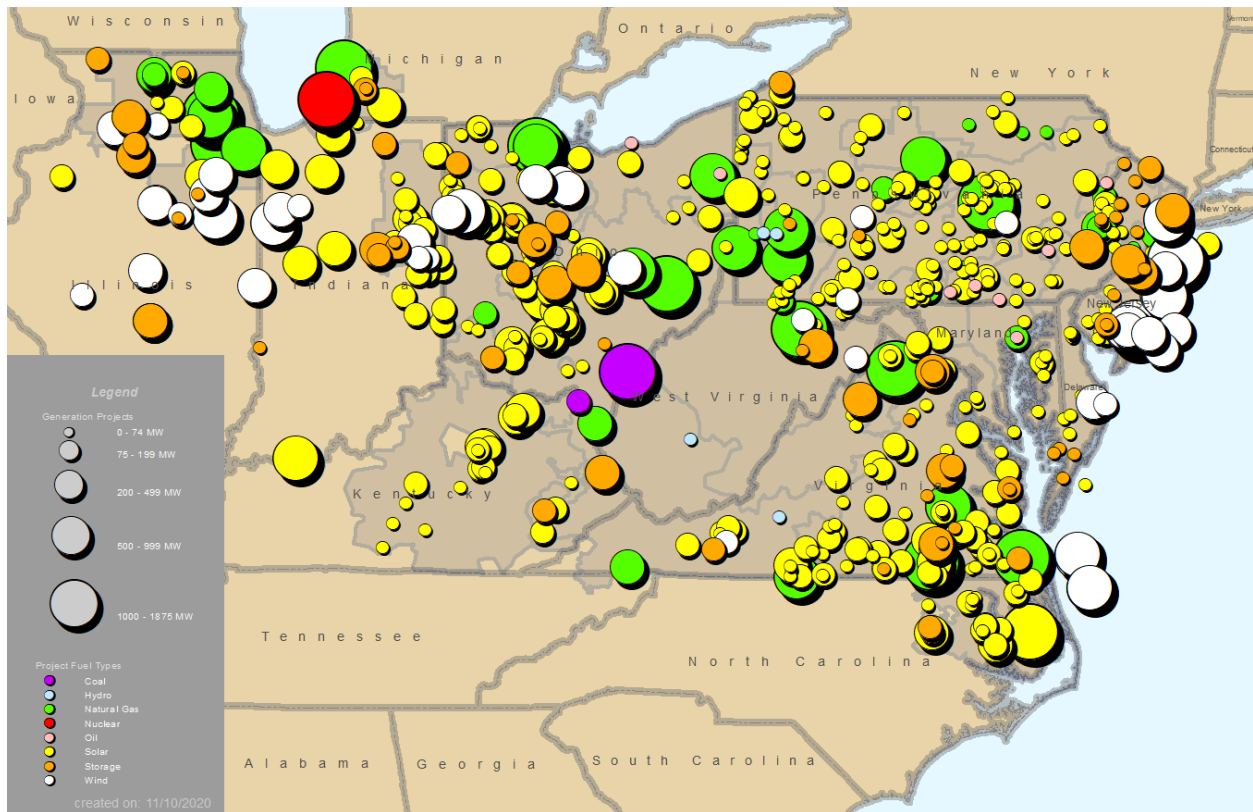
Since the provisional approval last year, FERC approved MISO's cost allocation compliance filing on July 28, 2020, allowing for MISO's board to approve the project on September 17, 2020. PJM now seeks full Board approval of the project to be included in PJM's RTEP. The estimated cost for this project is \$24.69 million (\$22 million of which is allocated to PJM), with a required and projected in-service date of January 2023. The local transmission owners, AEP and NIPSCO, will be designated to complete this work.

VI. Interconnection Queue Projects

Throughout 2020, PJM has continued to study new service customer requests that are submitted into our interconnection queue. These studies evaluate the impact of the new service request and include an evaluation of new generation interconnections, increases in generation at existing stations, long-term firm transmission service requests and merchant transmission interconnection requests.

These studies were last reviewed with the Board Reliability Committee in December of 2019. Since that time, PJM has completed 678 new System Impact Studies and 352 service requests have withdrawn. New projects with signed ISAs, project scope changes and project cancellations have resulted in a net decrease of \$573 million for network upgrades. The map below shows the locations of the new units associated with the completed interconnection System Impact Studies along with the fuel type and relative size. A listing of the projects with recently completed impact studies is provided in Attachment C to this white paper. A listing of the network upgrades associated with these projects is shown in Attachment D to this report. The cost for the network upgrades associated with these interconnection projects is the responsibility of the developer.

Map 5. **Completed Interconnection System Impact Studies**



VII. Changes to Previously Approved Projects

PJM recommended the cancellation of the following projects:

- Baseline b2666.1-b2666.14 (replace Yukon 138 kV breakers Y-11, Y-13, Y-18, Y-19, Y-4, Y-5, Y-8, Y-9, Y10, Y12, Y14, Y2, Y21 and Y22 with 80 kA breakers) is recommended for cancellation. The First Energy generator deactivation reinstatement study determined the scope of work is no longer needed.

These changes yield a net RTEP decrease of \$11.48 million.

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

- Baseline b3110 (rebuild Loudoun-Dulles Junction 230 kV, retire Loudoun-Bull Run 115 kV, cut and loop Clifton-Sully 230 kV into Bull Run substation and add three 230 kV breakers at Bull Run) requires additional scope. The additional scope is to replace the Clifton 230 kV 201182 and XT2011 breakers as they are driven overdutied by the project. The additional scope has increased the total cost of the project from \$14.54 million to \$15.47 million. This change yields a net RTEP increase of \$0.93 million.
- Baseline b1570.4 (add a 345 kV breaker at Marysville 345 kV station and a 0.1 mile 345 kV line extension from Marysville to the new 345/69 kV Dayton transformer) has undergone a scope change. The original scope to add a breaker to an existing string was found to be very complex and costly during the detailed scoping stage. In addition, outage durations would have increased, custom T-Line poles needed to be installed in the drive path, and the 765/345 kV Transformer #2 would have to be relocated along with all the control cables. The revised scope is to add a new 345 kV string with two new 5000 A, 63 kV circuit breakers at AEP's Marysville 345 kV station and a 0.1 mile 345 kV line extension from Marysville to the new 345/69 kV Dayton transformer. The scope change has increased the total cost of the project from \$20.1 million to \$22.45 million. This change yields a net RTEP increase of \$2.35 million.
- Baseline b2697 (mitigate violations identified by sag study to operate Fieldale-Thornton-Franklin 138 kV overhead line conductor at its maximum operating temperature, and replace terminal equipment at Danville and East Danville 138 kV substations) has undergone a cost increase. The initial cost was to perform the sag study, and the updated cost includes the mitigation work required to observe the emergency line rating. Also, detailed engineering revealed more bus replacement work than originally expected at the Danville and East Danville stations. The total cost of the project has increased from \$0.8 million to \$2.7 million. This change yields a net RTEP increase of \$1.9 million.

These changes yield a net RTEP increase of \$5.18 million.

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

Project needs and recommended solutions as discussed in this report were reviewed with stakeholders during 2020, most recently at the November 2020 TEAC and October Subregional RTEP Committee meetings. Written comments were requested to be submitted to PJM to communicate any concerns with project recommendations. No comments have been received as of this white paper publication date.

IX. Cost Allocation

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

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

X. Board Approval

The PJM Reliability and Security Committee was requested to endorse the new baseline reliability projects and associated cost allocations, and recommend to the full Board, approval of the projects in this white paper to be included in PJM's RTEP. On December 9, 2020, the Board approved the addition of RTEP baseline projects as well as other changes to the RTEP as summarized in this paper. The RTEP will be published on PJM's website.

Attachment A – Reliability Project Single-Zone Allocations

Upgrade ID	Description	Cost Estimate (\$M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3110.3	Replace the Clifton 230kV breakers “201182” and “XT2011” with 63kA breakers	\$0.93	Dominion	Dominion	12/31/2021
b3220	Install 14.4 MVAR Capacitor Bank at Whitewood 138 KV	\$1.20	AEP	AEP	6/1/2023
b3221	Replace terminal equipment (bus conductor) on the 230 kV side of the Steel City 500/230 kV transformer #1	\$0.09	PPL	PPL	6/1/2025
b3223.1	Install a 2nd 230kV circuit with a minimum summer emergency rating of 1047 MVA between Lanexa and Northern Neck Substations. The 2nd circuit will utilize the vacant arms on the double-circuit structures that are being installed on the Line #224 (Lanexa-Northern Neck) End-of-Life rebuild project (b3089).	\$14.00	Dominion	Dominion	6/1/2023
b3223.2	Expand the Northern Neck terminal from a 230kV, 4-breaker ring bus to a 6-breaker ring bus.	\$5.00	Dominion	Dominion	6/1/2023
b3223.3	Expand the Lanexa terminal from a 6-breaker ring bus to a breaker-and-a-half arrangement.	\$4.00	Dominion	Dominion	6/1/2023
b3261	Upgrade Circuit breaker 'R1' at Tanners Creek 345kV-Install TRV capacitor to increase the rating from 50kA to 63kA	\$0.05	AEP	AEP	12/31/2020
b3269	Proposal #2020_1-179: At West New Philadelphia station, add a high side 138 kV breaker on the 138/69 kV transformer #2 along with a 138 kV breaker on the line towards Newcomerstown.	\$2.02	AEP	AEP	6/1/2025

Upgrade ID	Description	Cost Estimate (\$M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3270	Proposal #2020_1-308: Install 1.7 miles of 795 ASCR 138kV conductor along the other side of Dragoon Tap 138 kV line, which is currently double circuit tower with one position open. Additionally, install a 2nd 138/34.5kV transformer at Dragoon, install a high side circuit switcher on the current transformer at Dragoon Station, and install 2-138kV line breakers on the Dragoon-Jackson 138kV and Dragoon-Twin Branch 138kV lines.	\$4.89	AEP	AEP	6/1/2025
b3270.1	In PJM's DNH study, Dragoon 34.5kV Breakers B, C, D (22KA) are identified to overdutied due to B3270. Additional scope is added: Replace Dragoon 34.5kV Breakers B, C, D with 40kA breakers	\$2.00	AEP	AEP	6/1/2025
b3271	Proposal #2020_1-503: Install a 138 kV circuit breaker at Fremont station on line towards Fremont Center and install a 9.6 MVAR 69 kV capacitor bank at Bloom Road station	\$1.76	AEP	AEP	6/1/2025
b3272	Proposal #2020_1-848: Install two 138 kV circuit switchers on the high side of 138/34.5 kV transformers #1 & #2 at Rockhill station.	\$1.47	AEP	AEP	6/1/2025

Attachment B – Reliability Project Multi-Zone Allocations

Upgrade ID	Description	Cost Estimate (\$M)	Transmission Owner	Cost Responsibility	Required In-Service Date
b3142	Rebuild Michigan City-Trail Creek-Bosserman 138 kV	\$24.69	NIPSCO	ComEd (89.10%) / MISO (10.90%)	1/1/2023
b3247	Rebuild Dominion portion of 500kV Line #514 Doubs to Goose Creek - 3 miles long	\$7.60	Dominion	AEC (0.86 %) / AEP (7.09 %) / APS (3.03 %) / ATSI (3.96 %) / BGE (2.11 %) / ComEd (6.60 %) / Dayton (1.02 %) / DEOK (1.59 %) / DL (0.84 %) / DPL (1.29 %) / Dominion (56.28 %) / EKPC (0.97 %) / JCPL (1.91 %) / ME (0.94 %) / NEPTUNE (0.21 %) / OVEC (0.04 %) / PECO (2.66 %) / PENELEC (0.95 %) / PEPCO (1.95 %) / PPL (2.50 %) / PSEG (3.08 %) / RE (0.12 %)	6/1/2025

Attachment C – Interconnection Queue Projects

Auction Revenue Rights Requests

Queue Position	Path Name	Rights Requested	Transmission Owner
AD2-080	Dumont-Stillwell 345 kV	309 MW	AEP
AE1-077	Sandy Springs – High Ridge 230 kV	100 MW	BGE
AE2-009	Nottingham – Peach Bottom Tap 230 kV	11 MW	PECO
AF1-025	Cedar Creek – Silver Run 230 kV	50 MW	DPL

Generation Interconnection Requests

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AC1-053	ComEd	Wind	200	26
AC1-091	DPL	Solar	19.8	7.5
AC1-092	DPL	Solar	19.8	7.5
AC1-093	DPL	Solar	18.8	7.1
AC1-094	DPL	Solar	15.9	6
AC1-100	AEP	Natural Gas	98	43.4
AC1-109	ComEd	Natural Gas	30	30
AC1-110	ComEd	Natural Gas	30	30
AC1-111	ComEd	Natural Gas	36	36
AC1-113	ComEd	Natural Gas	20	20
AC1-114	ComEd	Natural Gas	20	20
AC1-142A	ComEd	Natural Gas	64	64
AC1-171	ComEd	Wind	79.1	10.3
AC2-055	AEP	Solar	47.5	18.05
AC2-059	AEP	Solar	127	62.5
AC2-060	AEP	Solar	100	64
AC2-061	AEP	Solar	117	58.1
AC2-087	AEP	Solar	85	47.4
AC2-090	AEP	Solar	100	38
AC2-104	AEP	Wind	500.25	65.03
AC2-115	ComEd	Natural Gas	40	40
AC2-116	ComEd	Natural Gas	7	7
AC2-117	ComEd	Natural Gas	46	46
AC2-140	AEP	Nuclear	28	38
AC2-184	DPL	Solar	20	7.6

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AC2-185	DPL	Solar	20	7.6
AD1-015	AEP	Solar	150	57
AD1-017	AEP	Solar	20	7.6
AD1-022	Dominion	Solar	80	51.8
AD1-023	Dominion	Solar	40	25.9
AD1-043	AEP	Solar	120	45.6
AD1-047	Dominion	Solar	80	48
AD1-056	Dominion	Solar	60	38.9
AD1-057	Dominion	Solar	34	22.4
AD1-068	APS	Wind	80	11.76
AD1-070	AEP	Wind	205	36
AD1-072	AEP	Solar	20	13.7
AD1-073	AEP	Solar	20	13.2
AD1-074	Dominion	Solar	300	198.8
AD1-075	Dominion	Solar	75	49.7
AD1-076	Dominion	Solar	109	72.2
AD1-098	ComEd	Solar	100	57.8
AD1-100	ComEd	Wind	850	150
AD1-101	AEP	Solar	49.9	18.96
AD1-102	AEP	Wind	180.01	23.4
AD1-104	AEP	Wind	403.2	52.42
AD1-106	AEP	Solar	60	22.8
AD1-118	ATSI	Natural Gas	70	70
AD1-119	AEP	Solar	49.9	18.96
AD1-125	APS	Wind	80	11.76
AD1-128	AEP	Solar	150	57
AD1-133	ComEd	Solar	300	180
AD1-137	AEP	Wind	500	65
AD1-141	AEP	Solar	50	30
AD1-161	AEP	Solar	55	30.2
AD2-001	AEP	Natural Gas	18	18
AD2-014	AEP	Solar	53.325	22.4
AD2-016	AEP	Solar	127	62.5
AD2-020	AEP	Solar	100	61.9
AD2-022	AEP	Solar	96	60
AD2-023	AEP	Solar	54	35

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AD2-025	PSEG	Storage	2	0
AD2-031	Dayton	Solar	50	19
AD2-046	Dominion	Solar	80	54.8
AD2-051	Dominion	Solar	74.9	52.4
AD2-055	Penelec	Natural Gas	44	35
AD2-062	Penelec	Solar	80.3	53.4
AD2-067	AEP	Solar	150	57
AD2-071	AEP	Solar	100	67
AD2-075	AEP	Natural Gas	285	145
AD2-077	PPL	Storage	200	100
AD2-078	AEP	Coal	20	40
AD2-079	AEP	Solar	20	12
AD2-086	AEP	Solar	230	138
AD2-090	Dominion	Solar	70	42
AD2-091	AEP	Storage	50	50
AD2-092	AEP	Solar	175	105
AD2-093	AEP	Solar	225	135
AD2-096	AEP	Storage	50	50
AD2-103	BGE	Oil	14	14
AD2-104	BGE	Natural Gas	144.6	144.6
AD2-105	AEP	Solar	100	40.6
AD2-106	AEP	Solar	80	33.6
AD2-107	AEP	Solar	55	23.1
AD2-110	APS	Natural Gas	12	12
AD2-134	ComEd	Wind	117.5	22.9
AD2-136	AEP	Wind	360	46.8
AD2-138	AEP	Wind	200	35.2
AD2-147	Dayton	Solar	100	42
AD2-162	AEP	Solar	110	73.81
AD2-169	Dominion	Solar	100	60
AD2-172	ComEd	Solar	50	21
AD2-178	AEP	Solar	120	72
AD2-179	AEP	Solar	100	60
AD2-189	AEP	Natural Gas	225	186
AD2-191	AEP	Wind	170	22.1
AD2-202	Dominion	Solar	18.8	12.8

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AE1-003	APS	Storage	59	0
AE1-017	AEP	Solar	20	11
AE1-020	JCPL	Offshore Wind	816	229.3
AE1-024	Dominion	Solar/Storage	80	63.8
AE1-025	Dominion	Solar/Storage	80	63.8
AE1-026	Dominion	Solar/Storage	80	63.8
AE1-052	APS	Storage	0	10
AE1-089	AEP	Solar	310	130.65
AE1-093	AEP	Storage	42	42
AE1-100	AEP	Solar	66	41.9
AE1-105	APS	Natural Gas	1270	1235
AE1-119	ATSI	Natural Gas	550	550
AE1-121	AEP	Natural Gas	529.5	483
AE1-146	AEP	Solar	120	81.8
AE1-148	Dominion	Solar	90	54
AE1-168	Dominion	Solar	150	90
AE1-169	Penelec	Solar	85	51
AE1-172	ComEd	Wind	255	44.88
AE1-176	AEP	Hydro	2.4	2.4
AE1-178	AEP	Natural Gas	19	19
AE1-192	ODEC	Solar	70	47
AE1-207	AEP	Solar	160	67.2
AE1-208	AEP	Solar	130	55
AE1-209	AEP	Wind	100	13
AE1-210	AEP	Wind	100	13
AE1-217	AEP	Solar	200	84
AE1-227	AEP	Solar	49.5	30.69
AE1-230	Dominion	Solar/Storage	20	7.2
AE1-248	Dominion	Solar/Storage	100	60
AE2-001	APS	Solar	20	12
AE2-005	Dominion	Solar	20	7.6
AE2-007	Dominion	Natural Gas	967.6	967.6
AE2-017	SMECO	Solar	20	10.3
AE2-019	Dominion	Storage	120	120
AE2-020	AEC	Offshore Wind	604.8	106.44
AE2-021	AEC	Offshore Wind	604.8	106.44

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AE2-022	AEC	Offshore Wind	300	62.09
AE2-023	AEC	Offshore Wind	445.2	78.36
AE2-024	JCPL	Offshore Wind	882	155.23
AE2-025	JCPL	Offshore Wind	445.2	78.36
AE2-027	Dominion	Solar	120	72
AE2-028	JCPL	Solar	0.75	0.4
AE2-029	Dominion	Solar	50	30
AE2-030	APS	Solar	18	7.56
AE2-031	Dominion	Solar	290	174
AE2-033	Dominion	Solar	149	89
AE2-034	Dominion	Solar	60	42
AE2-035	ComEd	Solar	50	21
AE2-037	Dominion	Solar	71.5	48.2
AE2-038	EKPC	Solar/Storage	80	53.5
AE2-040	Dominion	Storage	17.64	15.7
AE2-041	Dominion	Storage	40	40
AE2-042	PPL	Solar	70	46.8
AE2-044	Dominion	Solar	40	28
AE2-045	AEP	Solar	200	84.28
AE2-046	PPL	Solar/Storage	50	24
AE2-047	AEP	Solar	50	32.4
AE2-048	AEP	Solar/Storage	220	147.7
AE2-051	Dominion	Solar	150	90
AE2-052	Dominion	Storage	20	20
AE2-053	Dominion	Storage	20	20
AE2-054	APS	Solar	20	12
AE2-055	APS	Solar	20	12
AE2-059	PPL	Solar	20	8.4
AE2-060	PPL	Solar	20	8.4
AE2-071	EKPC	Solar	35	21
AE2-072	AEP	Solar	150	90
AE2-073	AEP	Solar	50	21
AE2-074	APS	Solar	35	15.11
AE2-078	Dominion	Solar	20	13.2
AE2-079	Dominion	Solar	20	13.2
AE2-080	Dominion	Solar	20	13.2

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AE2-082	JCPL	Solar	7	3.4
AE2-084	PPL	Solar	20	8.4
AE2-089	AEP	Solar	155	93
AE2-090	AEP	Solar	144	86.4
AE2-091	AEC	Solar	35	23
AE2-092	Dominion	Solar	138	82.8
AE2-093	DPL	Solar	44	16.72
AE2-094	Dominion	Solar/Storage	300	207.2
AE2-104	Dominion	Solar	49	18.92
AE2-107	ComEd	Solar	90	54
AE2-108	Dominion	Solar	20	8.4
AE2-109	Dominion	Solar	7	2.94
AE2-110	PPL	Solar	20	8.4
AE2-111	PPL	Solar	20	8.4
AE2-112	DPL	Solar	17	6.46
AE2-113	APS	Solar	130	62.6
AE2-117	Penelec	Solar	20	12
AE2-118	Penelec	Solar	20	12
AE2-120	APS	Solar	20	12
AE2-121	APS	Solar	10.64	6.384
AE2-122	Dominion	Offshore Wind	800.1	158.9
AE2-123	Dominion	Offshore Wind	800.1	163.3
AE2-124	Dominion	Offshore Wind	800.1	148.5
AE2-126	Penelec	Solar	20	12
AE2-129	Penelec	Solar	20	12
AE2-130	AEP	Solar/Storage	800	480
AE2-131	Penelec	Solar	20	12
AE2-133	PPL	Solar	20	8.4
AE2-136	AEP	Solar/Storage	114	83.2
AE2-137	APS	Natural Gas	84	87
AE2-138	EKPC	Solar/Storage	260	189.8
AE2-139	Penelec	Solar	100.5	60.3
AE2-140	AEP	Solar	201.1	120.66
AE2-147	Dominion	Solar	150	90
AE2-148	AEP	Solar/Storage	577	397.3
AE2-149	AEP	Solar/Storage	400	291.4

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AE2-150	Dominion	Solar/Storage	0	0
AE2-151	Dominion	Solar/Storage	10	6.5
AE2-153	ComEd	Wind	200	35.2
AE2-154	AEP	Wind	250	32.5
AE2-156	Dominion	Storage	100	100
AE2-157	Dominion	Solar	100	60
AE2-160	AEP	Hydro	51	30
AE2-166	AEP	Solar	90	54
AE2-169	AEP	Storage	33	33
AE2-171	AEP	Storage	30	30
AE2-172	AEP	Storage	40	40
AE2-173	ComEd	Storage	50	50
AE2-175	PPL	Solar	80	48
AE2-176	ATSI	Solar	125	75
AE2-181	ATSI	Solar	49	29.4
AE2-182	Dominion	Solar	17	11.6
AE2-183	Dominion	Natural Gas	75	0
AE2-184	Dominion	Natural Gas	15	0
AE2-185	Dominion	Solar/Storage	60	36
AE2-187	Dominion	Solar/Storage	60	36
AE2-188	Dominion	Storage	40	40
AE2-190	Dominion	Solar	70	27.02
AE2-191	APS	Solar	52	21.84
AE2-192	MetEd	Solar	65	39
AE2-193	ATSI	Solar	120	50.4
AE2-194	ATSI	Solar	145	84
AE2-195	AEP	Solar	19.7	9
AE2-196	AEP	Solar	94.6	56
AE2-204	AEP	Solar	19.3	9.3
AE2-205	AEC	Solar	78	46.8
AE2-206	Dayton	Solar	99	41.58
AE2-208	AEP	Storage	25	25
AE2-209	DPL	Solar	56	33
AE2-210	EKPC	Solar/Storage	90	65.4
AE2-211	MetEd	Solar	55	23.1
AE2-212	Dominion	Solar	20	12

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AE2-214	AEP	Solar	200	120
AE2-215	Penelec	Solar	60	36
AE2-216	AEP	Storage	55	55
AE2-217	ATSI	Solar	180	108
AE2-218	Dayton	Solar	178	106
AE2-219	AEP	Solar	100	42
AE2-220	AEP	Solar	125	52.5
AE2-221	Dayton	Solar	300	180
AE2-222	AEC	Offshore Wind	300	85.424
AE2-223	ComEd	Wind	150	19.5
AE2-224	Penelec	Solar	100	60
AE2-226	APS	Solar	99	59.4
AE2-227	Dominion	Solar	20	12
AE2-228	Dominion	Solar	20	12
AE2-230	APS	Solar	70	42
AE2-231	Dominion	Solar	44	26.4
AE2-232	JCPL	Wind	400	112.4
AE2-234	AEP	Solar	35	24.1
AE2-236	AEP	Solar	55	38.5
AE2-237	JCPL	Storage	107	21.4
AE2-241	PPL	Solar	20	8.4
AE2-245	AEP	Solar	0	5.3
AE2-247	Dominion	Solar	20	8.4
AE2-248	APS	Solar	16	9.6
AE2-249	Penelec	Solar	13.5	8.1
AE2-250	Dominion	Solar	82.5	54
AE2-251	AEC	Offshore Wind	1200	337.2
AE2-252	MetEd	Solar	20	12
AE2-253	Dominion	Solar	50	34.5
AE2-254	EKPC	Solar	50	30
AE2-255	ComEd	Wind	100	25
AE2-256	MetEd	Solar	70	29.4
AE2-257	DPL	Offshore Wind	120	33
AE2-258	Dominion	Solar	0	14.1
AE2-259	Dominion	Solar	100	60
AE2-260	Dominion	Solar/Storage	200	82.7

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AE2-262	Penelec	Solar	83.6	50
AE2-263	Penelec	Solar	78.38	47
AE2-264	Penelec	Solar	80	48
AE2-267	DEOK	Solar	50	30.9
AE2-270	Dominion	Solar/Storage	150	150
AE2-271	PPL	Solar	101.6	61
AE2-275	EKPC	Solar/Storage	90	65.4
AE2-276	AEP	Storage	50	50
AE2-277	ATSI	Solar/Storage	38.2	16
AE2-278	Dayton	Solar	150.7	90.4
AE2-280	AEP	Solar	126.65	75.99
AE2-281	ComEd	Wind	50	7
AE2-282	ATSI	Solar	67	43.9
AE2-283	Dominion	Solar	60.4	39.6
AE2-285	ATSI	Solar	50	30
AE2-288	PPL	Natural Gas	90	206
AE2-289	APS	Wind	80	11.76
AE2-290	AEP	Solar	100	60
AE2-291	Dominion	Solar	102	61.2
AE2-292	Dominion	Solar	127	76.2
AE2-295	PPL	Wind	174.8	25.7
AE2-297	AEP	Solar	152.5	91.5
AE2-298	AEP	Solar	50	30
AE2-299	Penelec	Storage	160	32
AE2-301	DPL	Storage	5.5	2.2
AE2-302	AEP	Solar	63	37.8
AE2-303	Dayton	Solar	75	45
AE2-305	Dayton	Solar	78	46.8
AE2-306	AEP	Solar	30	18
AE2-308	EKPC	Solar/Storage	150	110
AE2-309	APS	Solar/Storage	19.84	16.66
AE2-313	Dominion	Solar	314	188.4
AE2-315	Dayton	Natural Gas	23.5	23.5
AE2-316	Penelec	Solar	100	41.22
AE2-317	JCPL	Solar	80	48
AE2-318	DEOK	Solar	100	67.2

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AE2-319	Dayton	Solar	100	66.9
AE2-320	Dayton	Solar	100	66.9
AE2-321	ComEd	Solar	100	67
AE2-322	AEP	Solar	60	40.3
AE2-323	AEP	Solar	100	67.1
AE2-324	ATSI	Storage	20.3	20.3
AE2-325	AEP	Storage	52.2	31.32
AE2-326	AEP	Storage	52.2	31.32
AE2-333	APS	Solar	100	60
AE2-334	AEC	Solar	44	28.7
AE2-335	AEC	Solar	60	41.5
AE2-339	EKPC	Solar	40	26.8
AE2-342	Dayton	Solar	40	26.8
AE2-343	ATSI	Solar/Storage	17.9	12.3
AE2-344	Penelec	Solar	116.5	69.9
AE2-345	MetEd	Solar	97.5	58.5
AE2-346	Dominion	Solar	12	8.4
AF1-001	APS	Solar	13.75	6.5
AF1-003	SMECO	Solar	20	9.5
AF1-004	SMECO	Solar	16.8	6.5
AF1-005	SMECO	Solar	20	9.9
AF1-006	Penelec	Solar	20	12.8
AF1-007	DPL	Offshore Wind	7.3	1.9
AF1-009	ComEd	Storage	25	5
AF1-011	ComEd	Storage	30	11.2
AF1-012	ComEd	Solar	175	105
AF1-014	Dominion	Solar	19.9	7.2
AF1-015	DPL	Solar	15	6.3
AF1-016	Dominion	Solar	20	7.72
AF1-017	Dominion	Solar	20	7.6
AF1-018	Dominion	Storage	40	40
AF1-019	JCPL	Storage	19.999	0
AF1-021	APS	Solar	14	8.4
AF1-022	APS	Solar	14	8.4
AF1-023	JCPL	Solar	0	8.4
AF1-026	JCPL	Storage	0	2

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF1-027	JCPL	Storage	0	2
AF1-028	Dominion	Storage	200	200
AF1-029	AEP	Solar	25	15
AF1-030	ComEd	Solar	100	66.9
AF1-031	Dominion	Storage	93.5	60.69
AF1-032	Dominion	Solar	15	9.8
AF1-033	Dominion	Solar	20	13.2
AF1-036	DPL	Solar	20	8.4
AF1-038	EKPC	Solar/Storage	60	36
AF1-039	Penelec	Solar	15	9
AF1-040	PPL	Storage	20	1
AF1-041	AEC	Solar	2.4	0
AF1-042	Dominion	Solar	45	17.1
AF1-045	DEOK	Storage	52.2	31.3
AF1-046	AEP	Storage	52.2	31.32
AF1-047	AEP	Storage	34.8	20.88
AF1-048	ComEd	Storage	52.2	31.32
AF1-049	AEP	Solar	125	75
AF1-050	EKPC	Solar/Storage	60	36
AF1-051	AEP	Coal	11	11
AF1-052	PSEG	Natural Gas/Solar/Storage	131.5	114.2
AF1-053	Dayton	Storage	40	16
AF1-054	Dayton	Solar	38.5	23.1
AF1-057	MetEd	Solar	20	8.4
AF1-058	Dominion	Solar	20	12
AF1-059	Dominion	Solar/Storage	99.2	99.2
AF1-060	ComEd	Storage	10.34	10.34
AF1-061	APS	Solar	4	1.2
AF1-062	AEP	Storage	200	80
AF1-063	AEP	Solar	30	19.3
AF1-064	ATSI	Solar	50	33.4
AF1-065	APS	Natural Gas	100	0
AF1-066	Dominion	Storage	130	130
AF1-067	Dominion	Solar/Storage	50	30

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF1-068	APS	Solar	20	12.8
AF1-069	Dominion	Solar/Storage	94	67.7
AF1-071	AEP	Solar	20	7.6
AF1-072	ComEd	Natural Gas	17.2	17.2
AF1-075	Dominion	Solar	73	45.5
AF1-076	AEP	Solar	100	61.6
AF1-077	AEP	Solar	100	61.6
AF1-078	Dayton	Solar	45	18.9
AF1-079	Dominion	Solar	44.8	19
AF1-080	AEP	Storage	20	20
AF1-082	Dominion	Storage	18	18
AF1-083	EKPC	Solar/Storage	55	33
AF1-084	AEP	Solar	85	54.1
AF1-085	AEP	Solar	77	32.34
AF1-086	Penelec	Wind	109.9	20.54
AF1-090	ComEd	Wind	200	35.2
AF1-091	AEP	Solar/Storage	180	138.4
AF1-092	AEP	Solar/Storage	150	115
AF1-093	ATSI	Solar	20	12
AF1-094	Penelec	Solar	20	12
AF1-096	Penelec	Solar	20	12
AF1-098	Penelec	Solar	80	48
AF1-101	JCPL	Offshore Wind	800	224.8
AF1-102	APS	Natural Gas	0	8
AF1-103	Penelec	Solar/Storage	20	20
AF1-104	Penelec	Solar/Storage	20	20
AF1-105	JCPL	Storage	20	20
AF1-106	Penelec	Solar/Storage	20	20
AF1-108	JCPL	Solar/Storage	20	20
AF1-109	PSEG	Solar/Storage	20	20
AF1-112	APS	Solar	20	12
AF1-113	AEP	Solar/Storage	180	137.3
AF1-114	Dominion	Solar	100	42
AF1-115	Dominion	Solar	60	40.2
AF1-116	EKPC	Solar	120	72
AF1-117	AEP	Solar/Storage	200	152.9

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF1-118	AEP	Solar/Storage	350	268.9
AF1-119	AEP	Solar/Storage	200	140
AF1-120	ATSI	Solar	40	26.6
AF1-122	ATSI	Solar	64	26.88
AF1-123	Dominion	Offshore Wind	880	267.5
AF1-124	Dominion	Offshore Wind	880	267.5
AF1-125	Dominion	Offshore Wind	880	267.5
AF1-126	JCPL	Storage	250	50
AF1-127	EKPC	Solar	80	53.6
AF1-128	Dominion	Natural Gas	569	569
AF1-129	Dominion	Natural Gas	569	569
AF1-130	AEP	Solar	200	133.9
AF1-131	APS	Solar	16.15	9.69
AF1-132	APS	Solar	20	12
AF1-133	MetEd	Solar	20	12
AF1-134	Penelec	Solar	20	12
AF1-136	APS	Solar	15.72	9.43
AF1-137	PECO	Solar	9.8	5.9
AF1-140	Penelec	Solar	16.3	9.78
AF1-141	AEP	Solar	96	62.8
AF1-143	Penelec	Solar	100	60
AF1-144	AEP	Solar	100	66.9
AF1-146	ATSI	Solar	201.95	121.17
AF1-147	Dominion	Solar	100	60
AF1-148	AEP	Solar/Storage	159	95.4
AF1-149	APS	Solar	20	12
AF1-150	DL	Natural Gas	14.4	4.28
AF1-152	Dominion	Solar	50	30
AF1-153	APS	Solar	20	12
AF1-155	APS	Solar	20	12
AF1-156	ComEd	Solar	150	90
AF1-157	DPL	Solar	25	15
AF1-158	AEP	Solar/Storage	150	90
AF1-159	Dayton	Solar	0	11
AF1-160	AEC	Storage	20	10
AF1-161	AEP	Storage	50	25

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF1-162	AEP	Storage	100	60
AF1-164	AEP	Solar	300	195
AF1-165	MetEd	Solar	15	9
AF1-166	APS	Solar	16	9.6
AF1-167	APS	Solar	13.51	8.1
AF1-170	Penelec	Solar	77.5	46.5
AF1-171	ATSI	Solar	20	12
AF1-173	Dominion	Solar	0	13.95
AF1-174	PECO	Solar	20	12
AF1-176	AEP	Solar/Storage	300	155.684
AF1-177	Penelec	Natural Gas	5	5
AF1-178	MetEd	Oil	1.5	1.5
AF1-179	MetEd	Oil	1	1
AF1-180	MetEd	Oil	2	2
AF1-181	Penelec	Natural Gas	3	3
AF1-182	Penelec	Natural Gas	4	4
AF1-183	Penelec	Natural Gas	1	1
AF1-184	MetEd	Oil	1	1
AF1-185	JCPL	Natural Gas	0	5.5
AF1-186	MetEd	Natural Gas	6.5	6.5
AF1-187	MetEd	Natural Gas	2	2
AF1-188	MetEd	Oil	1	1
AF1-189	ATSI	Oil	1.5	1.5
AF1-190	ATSI	Natural Gas	1	1
AF1-191	ATSI	Natural Gas	4	4
AF1-192	MetEd	Natural Gas	1	1
AF1-193	MetEd	Natural Gas	4	4
AF1-194	MetEd	Oil	1	1
AF1-195	JCPL	Natural Gas	0	1
AF1-196	JCPL	Natural Gas	0	14.5
AF1-198	Penelec	Natural Gas	2.5	2.5
AF1-199	ATSI	Oil	4	4
AF1-201	Dominion	Solar/Storage	150	90
AF1-202	AEP	Wind	200	34
AF1-203	EKPC	Solar/Storage	20	12
AF1-204	AEP	Wind	255	63.75

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF1-205	ATSI	Solar	40	24
AF1-206	ATSI	Solar	199	119.4
AF1-207	AEP	Wind	180	34
AF1-208	AEC	Solar	45	27
AF1-209	APS	Solar	15.9	9.54
AF1-210	APS	Solar	15.9	9.54
AF1-211	MetEd	Solar	15	9
AF1-212	MetEd	Solar	15	9
AF1-214	APS	Solar	20	12
AF1-215	AEP	Solar	300	180
AF1-216	PPL	Solar	143.11	85.87
AF1-217	Penelec	Solar	20	12
AF1-219	EKPC	Solar/Storage	30	20.4
AF1-221	AEP	Solar	180	138.4
AF1-222	JCPL	Offshore Wind	510	140.25
AF1-223	AEP	Solar	150	90
AF1-224	APS	Solar	11.9	7.9
AF1-225	APS	Solar	20	8.4
AF1-226	PPL	Solar	35	14.7
AF1-227	AEP	Solar/Storage	425	295
AF1-228	AEP	Solar	155	93
AF1-229	AEP	Solar	120	72
AF1-231	DPL	Storage	19	7.6
AF1-232	Penelec	Solar/Storage	160	104
AF1-233	EKPC	Solar/Storage	225	150.6
AF1-237	PSEG	Storage	200	80
AF1-238	AEC	Storage	127.5	51
AF1-239	AEC	Storage	30	12
AF1-240	Penelec	Solar	20	12
AF1-243	ODEC	Storage	5	5
AF1-244	DPL	Storage	8	8
AF1-245	PSEG	Storage	200	80
AF1-246	Dominion	Solar	100	42
AF1-248	Dominion	Solar	0	2.1
AF1-249	DEOK	Solar	19.92	14
AF1-250	ATSI	Solar	18	10.8

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF1-251	EKPC	Solar/Storage	220	132
AF1-252	ComEd	Storage	62.4	62.4
AF1-253	ComEd	Storage	43.2	43.2
AF1-254	APS	Solar	20	12
AF1-256	EKPC	Solar	80	48
AF1-257	JCPL	Solar	0	0.2
AF1-258	DPL	Solar	0	3.2
AF1-259	DPL	Solar	0	0.8
AF1-260	JCPL	Solar	0	1
AF1-261	PSEG	Solar	0	0.9
AF1-262	AEC	Solar	0	0.9
AF1-263	JCPL	Solar	0	0.7
AF1-264	PSEG	Solar	0	1.3
AF1-265	Dominion	Storage	150	150
AF1-266	Dominion	Storage	74.5	74.5
AF1-267	EKPC	Solar	54	37
AF1-268	AEP	Solar	83	57.1
AF1-270	Dayton	Storage	50	50
AF1-271	APS	Solar	60	36
AF1-271A	PPL	Solar	17	10.2
AF1-272	Penelec	Solar	110	66
AF1-273	Penelec	Solar	85	51
AF1-275	AEP	Storage	50	50
AF1-279	ATSI	Solar/Storage	150	90
AF1-280	ComEd	Solar	200	137
AF1-281	ComEd	Storage	20	3
AF1-282	Dayton	Solar	100	60
AF1-283	Dayton	Solar	130	78
AF1-285	AEP	Solar/Storage	100	56
AF1-286	Penelec	Solar	13.6	8.1
AF1-287	Penelec	Solar	20	12
AF1-290	APS	Solar	80	40.4
AF1-291	Dominion	Solar	20	12
AF1-291A	APS	Solar	10	6
AF1-292	Dominion	Solar	14.9	8.94
AF1-293	Dominion	Solar/Storage	127.86	108.37

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF1-294	Dominion	Solar	41	24.6
AF1-297	APS	Solar	52.8	31.68
AF1-299	BGE	Solar	15	9
AF1-300	BGE	Solar	15	9
AF1-301	Dominion	Solar	127	76
AF1-302	APS	Solar	42	18
AF1-304	Penelec	Solar/Storage	100	60
AF1-305	ATSI	Solar/Storage	35	21
AF1-307	Penelec	Solar/Storage	66.5	39.9
AF1-309	MetEd	Solar	32	19.2
AF1-311	PPL	Solar	150	57
AF1-313	AEP	Solar	40	24
AF1-315	DEOK	Solar	60	36
AF1-317	ComEd	Storage	0	20
AF1-319	Dayton	Solar	58	38.4
AF1-320	JCPL	Solar/Storage	70	42
AF1-321	Penelec	Solar	20	12
AF1-322	AEP	Solar	200	84
AF1-323	AEP	Solar	55	33
AF1-324	JCPL	Storage	20	0
AF1-325	JCPL	Storage	20	0
AF1-326	JCPL	Storage	20	0
AF1-327	JCPL	Storage	20	0
AF1-328	JCPL	Storage	20	0
AF1-330	ComEd	Solar	20	16.4
AF1-331	ComEd	Solar	20	20
AF1-333	PPL	Solar	20	12
AF1-334	MetEd	Solar	20	12
AF1-335	MetEd	Solar	101.2	60.72
AF1-336	MetEd	Solar	20	12
AF1-337	PPL	Solar	20	12
AF1-338	PPL	Solar	20	12
AF1-339	PPL	Solar	20	12
AF2-043	Dominion	Solar	20	12
AF2-044	ATSI	Natural Gas	0	20
AF2-045	Penelec	Storage	20	2

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF2-085	Dominion	Storage	20	20
AF2-087	Penelec	Solar	7.25	3.05
AF2-093	PPL	Solar	3	1.8
AF2-097	Penelec	Solar	5	3
AF2-099	MetEd	Solar	3	1.8
AF2-100	MetEd	Solar	3	1.8
AF2-101	MetEd	Solar	3	1.8
AF2-103	AEP	Solar/Storage	3.15	1.32
AF2-118	JCPL	Storage	19.99	3.99
AF2-131	PECO	Solar	5	3
AF2-151	MetEd	Solar	3	1.8
AF2-161	PPL	Solar	3	1.8
AF2-163	Penelec	Solar	0	0
AF2-168	PSEG	Natural Gas/Solar	5	0
AF2-178	Penelec	Solar	0	3.9
AF2-179	APS	Solar	0	5.8
AF2-180	APS	Solar	0	5.8
AF2-184	APS	Solar	0	5.8
AF2-185	APS	Solar	0	4.4
AF2-192	JCPL	Solar	7	3.4
AF2-215	APS	Solar	5	3
AF2-230	PECO	Solar	4	2.4
AF2-231	Penelec	Solar	5	3
AF2-247	PSEG	Solar	5	2.1
AF2-250	DPL	Solar	1.95	1.1
AF2-254	JCPL	Solar	10	4.2
AF2-255	Dominion	Solar	5	3
AF2-256	Dominion	Solar	5	3
AF2-257	Dominion	Solar	5	3
AF2-258	Dominion	Solar	5	3
AF2-265	Penelec	Solar	15	8.6
AF2-268	MetEd	Solar/Storage	2	0
AF2-270	Penelec	Solar/Storage	3.72	0
AF2-271	Penelec	Solar/Storage	3	0
AF2-272	MetEd	Solar/Storage	3	0

Queue Position	Transmission Owner	Fuel Type	MW Energy	MW Capacity
AF2-273	APS	Solar/Storage	3	0
AF2-277	PPL	Solar/Storage	2	0
AF2-278	PPL	Solar/Storage	3	0
AF2-279	PPL	Solar/Storage	3	0
AF2-280	PPL	Solar/Storage	3	0
AF2-281	MetEd	Solar/Storage	3	0
AF2-282	PPL	Solar/Storage	3	0
AF2-283	PPL	Solar/Storage	2	0
AF2-284	PPL	Solar/Storage	2	0
AF2-285	PPL	Solar/Storage	3	0
AF2-286	PPL	Solar/Storage	3	0
AF2-287	PPL	Solar/Storage	3	0
AF2-288	PPL	Solar/Storage	3	0
AF2-289	PPL	Solar/Storage	3	0
AF2-290	PPL	Solar/Storage	2	0
AF2-354	JCPL	Solar	11	4.62
AF2-367	DL	Hydro	12	12
AF2-368	DL	Hydro	9.5	9.5
AF2-379	DPL	Solar	3.9	1.638
AF2-400	Dominion	Solar	7.125	2.7075
AF2-401	Dominion	Solar	9.272	3.523
AF2-427	PPL	Solar/Storage	3	0
AF2-428	MetEd	Solar/Storage	3	0
AF2-429	MetEd	Solar/Storage	3.72	0
AF2-430	MetEd	Solar/Storage	3	0
AF2-431	MetEd	Solar/Storage	1.17	0
AF2-432	PPL	Solar/Storage	2	0
AF2-436	Penelec	Natural Gas	1.5	1.5
AF2-437	Penelec	Natural Gas	1.5	1.5

Merchant Transmission Requests

Queue Position	Project Name	Transmission Owner	MW Energy (nFTIR/nFTWR)	MW Capacity (FTIR/FTWR)
AB2-019	Erie West 345 kV	Penelec	28 MW Withdrawal	None

Attachment D – Interconnection Network Upgrades

Upgrade ID	Description	Cost Estimate (\$M)	Required In-Service Date
n5202	Build a three-breaker ring bus at Wards Creek substation.	\$5.987	6/30/2016
n5203	Split the existing line and connect new substation.	\$0.955	6/30/2016
n5204	Upgrade relay to accommodate new generation and interconnection substation.	\$0.063	6/30/2016
n5752	Modify relays at Raritan River 230 kV substation.	\$0.042	12/1/2018
n5753	Modify relays at Parlin 230 kV substation on Raritan River terminal.	\$0.042	12/1/2018
n5754	Modify relays at Red Oak 230 kV substation on Raritan River terminal.	\$0.042	12/1/2018
n5755	Modify relays at Werner 230 kV substation on Raritan River terminal	\$0.042	12/1/2018
n5807	Replace Transformer #1 with larger unit at Prince George substation.	\$3.440	6/3/2017
n5809	Build new three-breaker ring bus at the new AB2-160 substation.	\$5.283	6/1/2019
n5810	Install transmission structures to loop the Reams-Sapony line #69 and run fiber optic wire to Locks.	\$5.297	6/1/2019
n5811	Upgrade protection to accommodate AB2-160 generator and switching station.	\$0.300	6/1/2019
n5812	Build a new three-breaker at the new AB2-161 switching station.	\$4.892	6/1/2019
n5813	Install transmission structures to loop the Bakers Pond DP-Bell Ave. line #106.	\$0.776	6/1/2019
n5814	Upgrade protection at Bell Ave-Poe 115 kV to accommodate AB2-161 generator and switching station.	\$0.214	6/1/2019
n5817	Install Dequine 345 kV circuit breaker D.	\$1.167	11/5/2019
n5818	Update relay settings at Dequine substation.	\$0.040	11/15/2019
n5825	Remove the reactor at Erie East substation on S. Ripley 230 kV line. Increase size of the 230 kV capacitor to the original nameplate of 79.4 MVAR.	\$0.100	12/1/2017
n5838	Adjust remote relay and metering settings at West Flemington 34.5 kV substation.	\$0.014	12/31/2019
n5839	Adjust remote relay and metering settings at Baptistown 34.5 kV substation.	\$0.014	12/31/2019
n5840	Tap the Gilbert-Morris Park 34.5 kV line and install a span of overhead to interconnect the AD2-070 project including one 34.5 kV SCADA controlled switch.	\$0.210	6/30/2019
n5841	Revise relay settings on Morris Park line terminal at Gilbert substation.	\$0.014	6/30/2019
n5842	Revise relay settings on Gilbert line terminal Morris Park substation.	\$0.014	6/30/2019
n5843	Install two 34.5 kV SCADA-controlled switches on the Gilbert-Morris Park 34.5 kV line on either side of the tap to the AD2-070 project	\$0.387	6/30/2019

Upgrade ID	Description	Cost Estimate (\$M)	Required In-Service Date
n5995	Build a three (3) breaker AC1-054 115 kV switching station. The site is located adjacent to the Interconnected Transmission Owner's existing right of way for the Carolina – Kerr Dam 115 kV line # 22.	\$5.281	12/15/2020
n5996	New structures to cut and loop the line into AC1-054 switching station	\$1.011	12/15/2020
n5997	Protection and communication work to support interconnection of new AC1-054 generator	\$0.088	12/15/2020
n6025	Expansion of TSS 900 Elwood to accommodate AC1-204 attachment	\$35.764	6/1/2022
n6046	Build a three-breaker ring bus at the new AC1-145 substation.	\$5.063	10/1/2019
n6047	Build new structures to cut and loop the line into AC1-145 69 kV switching station.	\$1.693	10/1/2019
n6048	Modify protection and communication work to support interconnection of new AC1-145 generator.	\$0.123	10/1/2019
n6058	Replace GOODGRV B3 345 kV breaker 116 BT3-4 B3 from 40 kA to 63 kA. The preliminary estimate for the 345 kV circuit breaker upgrade is \$3 M with a 24-month construction timeline.	\$3.000	6/1/2022
n6063	Replace wave trap at both Ladysmith and Possum Point substations for the Ladysmith-Possum Pt 500 kV line #568. This will increase line rating by 12% to 2913 MVA. Estimated to take 14–16 months to engineer and construct	\$0.300	10/1/2019
n6064	Adjust remote relay and metering settings at the Glen Falls 138 kV substation.	\$0.006	6/1/2020
n6065	Oversight and review of relaying at TSS 929 Jackson.	\$0.178	6/1/2022
n6067	Build a new three-breaker 115 kV ring bus cutting the Lanexa-Harmony Village 115 kV line #85.	\$4.860	10/1/2019
n6068	Re-arrange Line #85 to loop into and out of the new three breaker AC1-065 115 kV switching station between Lanexa and Harmony Village substations.	\$1.576	10/1/2019
n6069	Protection and communication work to support interconnection of new AC1-065 generator.	\$0.151	10/1/2019
n6075	Expand the ring bus by installing circuit breaker at Chickahominy substation.	\$2.507	5/1/2020
n6097	Install line exit conductor at Lallendorf 345 kV – 345 kV steel take-off structure and disconnect switch. And FE engineering oversight of specification and design of new customer-owned revenue metering.	\$0.700	10/23/2020
n6098	Engineering, oversight, and commissions for the new 138 kV substation. Includes project management, construction management, commissioning, environmental reviews, real estate, SCADA and revenue metering equipment	\$ -	10/23/2020
n6099	Engineering, oversight, and commissions for the new 138 kV substation. Includes project management, construction management,	\$0.830	10/23/2020

Upgrade ID	Description	Cost Estimate (\$M)	Required In-Service Date
	commissioning, environmental reviews, real estate, SCADA and revenue metering equipment		
n6100	Install new 345 kV terminal and associated SCADA work to support new equipment installations at Lallendorf 345 kV.	\$1.570	10/23/2020
n6101	Loop the Bayshore-GM Powertrain 138 kV circuit into the proposed three-breaker ring bus between Bayshore-GM Powertrain 138 kV. Loop will originate near structure 10B.	\$2.040	10/23/2020
n6102	Upgrade line relaying for GM Powertrain 138 kV line exit and rename for new AB1-107 PJM station at Bayshore 138 kV substation.	\$0.260	10/23/2020
n6103	Upgrade line relaying for Bayshore 138 kV line exit and rename for new AB1-107 PJM station at GM Powertrain 138 kV substation.	\$0.250	10/23/2020
n6104	Install ADSS fiber for protection from Bayshore to GM Powertrain substations.	\$1.100	10/23/2020
n6107	Revise relay settings on South Bend terminal at Keystone substation.	\$0.031	5/31/2022
n6108	Revise relay settings on South Bend terminal at Yukon substation.	\$0.031	5/31/2022
n6122	Replace the Chickahominy 50 kA 230 kV breaker SC122 with a 63 kA breaker. Estimated time: 8 months.	\$0.430	5/1/2020
n6251	Install (6) new transmission structures for four (4) raises on two (2) existing 138 kV lines near the Jay 138 kV Substation, to accommodate Customer Facility line crossings of those existing lines	\$2.146	6/1/2020
n6293	Install AE1-142 revenue metering, engineering review of customer drawings, equipment nameplates and modification of FirstEnergy circuit diagrams.	\$0.500	7/31/2020
n6294	Adjust remote relay and metering settings at Manitou Substation.	\$0.050	7/31/2020
n6446	Modify protective Relaying at TSS 981 Crescent Ridge 138 kV.	\$0.200	12/30/2020
n6729	Install one (1) wave trap at between structure 22/2785D and Eatons Ferry DP.	\$0.068	6/30/2018
n6744	Drawing work, relay resets, and field support necessary to install a Transmission Islanding Panel at Boykins substation.	\$0.065	12/21/2018