

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

PJM Staff Whitepaper
February 2015



EXECUTIVE SUMMARY

The PJM Board of Managers previously approved changes to the Regional Transmission Expansion Plan (RTEP) on November 5, 2014. Those changes totaled \$510 million, and were primarily to resolve identified baseline reliability criteria violations.

Since that time PJM identified additional baseline reliability criteria violations within the planning horizon as part of the 2014 RTEP. Transmission upgrades were identified to resolve these reliability criteria violations. The total increase to the RTEP to include these baseline project additions is \$474.43 million. In addition, there were a number of changes to previously approved baseline projects. The cost and scope of some projects changed and in some instances the upgrades are no longer needed and their removal from the RTEP was recommended. The total increase to the RTEP associated with these changes to previously approved baseline projects is \$76.99 million. The net change to the RTEP to include the new baseline upgrades and changes to previously approved baseline projects is an increase of \$551.42 million.

With these changes, the RTEP includes over \$26,210 million of transmission additions and upgrades since the first plan was approved by the Board in 2000.

On February 17, 2015, the elements of the 2014 RTEP for the additional baseline upgrades were presented for the Board Reliability Committee's (BRC) consideration and for recommendation to the PJM Board for approval and inclusion in the RTEP. The Board approved the changes as summarized below.



SUMMARY OF UPGRADES

2014 Baseline Transmission Upgrades Changes and Additions

One aspect of the development of the Regional Transmission Expansion Planning Process is an evaluation of the “baseline” system, i.e. the transmission system without any of the generation interconnection requests included in the current planning cycle. This baseline analysis determines the compliance of the existing system with reliability criteria and standards. Transmission upgrades required to maintain a reliable system are identified and reviewed with the Transmission Expansion Advisory Committee (TEAC). The cost of transmission upgrades to mitigate such criteria violations are the responsibility of the PJM transmission owners.

In 2012 PJM filed proposed changes to the Operating Agreement in compliance with FERC Order 1000. Those changes were approved by the FERC and are being implemented for the first time as part of the 2014 RTEP. Consistent with the changes to the Operating Agreement, PJM administered two 30 day near-term proposal windows.

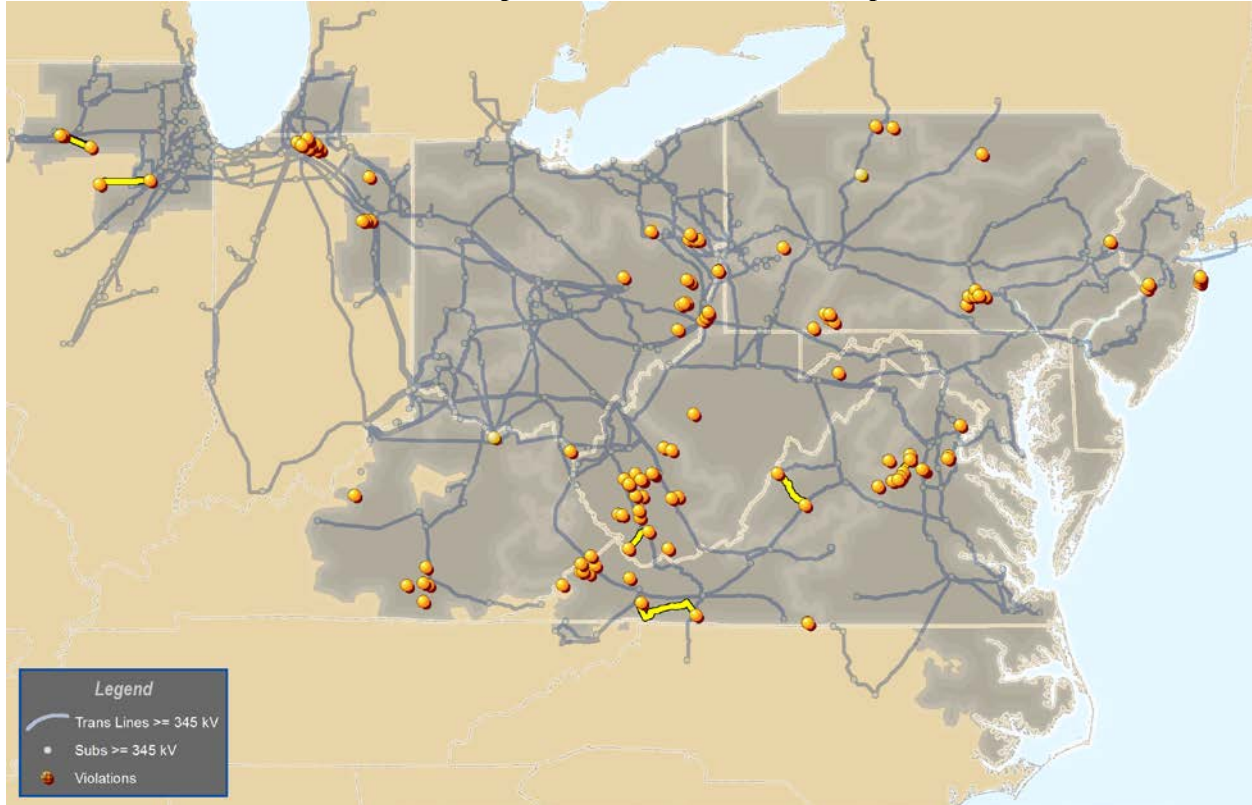
The first 2014 RTEP Window #1 was opened from Friday, June 27, 2014, through Monday, July 28, 2014, to solicit solutions to reliability criteria violations that were identified as part of the 2014 RTEP. This window was the first of its kind in that PJM requested solutions for near term (years 3-5) reliability criteria violations that were identified for several criteria. The reliability criteria that were included in Window #1 included baseline N-1 thermal, Generator Deliverability thermal, load deliverability thermal and voltage, Common Mode Outage thermal, and N-1-1 thermal. Many of the projects approved by the Board at the November 2014 meeting were from this first 2014 RTEP window.

The second 2014 RTEP Window #2 was opened from Friday, October 17, 2014 through Monday, November 17, 2014 to solicit solutions to additional reliability criteria violations that were not in the scope of Window #1. The reliability criteria that were included in Window #2 included baseline N-1 voltage, N-1-1 voltage, Light Load Reliability Criteria (thermal & voltage), and local Transmission Owner criteria.

For Window #2, PJM staff identified potential reliability criteria violations associated with 332 flowgates (transmission facility and contingency/outage pairs). Thermal reliability criteria violations were identified for approximately 50 individual transmission facilities due to one or more test procedures. Voltage reliability criteria violations were identified for approximately 80 facilities. PJM received 79 baseline upgrade proposals during Window #2 to address the reliability criteria violations. The Window produced a wide range of proposals, from 14 different entities including incumbent transmission owners and their affiliates as well as non-incumbent transmission developers. Notably, several affiliates of PJM Transmission Owners proposed “Greenfield Projects” (i.e. new facilities that are not upgrades to existing facilities) in other PJM Transmission Owner zones. The non-incumbent transmission developers included Ameren, ITC Mid-Atlantic, NextEra Energy Transmission, Northern Indiana Public Service Company (NIPSCO) and Northeast Transmission Development/LS Power. Of the 79 proposals, 45 were Transmission Owner

Upgrades and 34 were Greenfield Projects. The locations of the various proposals are shown on the map below.

2014 RTEP Proposal Window #2 Submitted Proposals



PJM staff reviewed all of the proposals and discussed the evaluation of the effectiveness of each of the proposals with stakeholders through the Transmission Expansion Advisory Committee (TEAC). PJM staff recommended 33 of the 79 proposals to resolve reliability criteria violations. The 33 recommendations included several line reconductor projects, replacement of existing transformers with larger transformers, upgrades to terminal equipment on existing facilities, reactor installations, capacitor installations, and relay upgrades. Of the 33 recommended projects 29 were Transmission Owner Upgrades, and 4 were greenfield projects. Additional information about the recommended projects is included in this white paper.

A summary of the more significant baseline projects with expected costs greater than \$5 million are detailed below. A complete listing of all of the new recommended projects is attached at the end of this white paper. The projects that cost less than \$5 million include circuit breaker upgrades or replacements to address short circuit problems, terminal equipment upgrades and conductor replacements to increase the ratings of transmission lines to address thermal violations.



Mid-Atlantic Region System Upgrade

- JCPL Transmission Zone
 - Upgrade the V74 34.5 kV transmission line between Allenhurst and Elberon Substations - \$14.76 M
- PENELEC Transmission Zone
 - Reconfigure Pierce Brook 345 kV station to a ring bus and install a 125 MVAR shunt reactor at the station- \$5.53 M
- PSE&G Transmission Zone
 - Install a 100 MVAR 230 kV shunt reactor at Mercer station- \$7.2 M
 - Install two 75 MVAR 230 kV capacitors at Sewaren station - \$8.4 M

Western Region System Upgrades

- AEP Transmission Zone
 - Construct a new 69 kV line approximately 2.5 miles from Colfax to Drewry's. Construct a new Drewry's station and install a new circuit breaker at Colfax station - \$7.92 M
 - Rebuild the East Coshocton – North Coshocton double circuit line - \$5.09 M
 - Rebuild the existing West Bellaire - Glencoe 69 kV line with 138 kV & 69 kV circuits and install 138/69 kV transformer at Glencoe Switch- \$30 M
 - Rebuild 7.82 mile Elkhorn City - Haysi S.S 69 kV line built to 138 kV standards- \$31.86 M
 - Rebuild the Fremont - Pound line as 138 kV - \$14.5 M
 - Install 138 kV breaker E2 at North Proctorville and build a 2.5 mile 138 kV line between East Huntingdon and Darrah stations - \$12.56 M
 - Boone Area Improvements - \$43.18 M
 - Bellefonte Transformer Addition - \$31.65 M
 - Rebuild and reconductor Kammer - George Washington 69 kV circuit and George Washington - Moundsville Ckt #1, designed for 138kV. Upgrade limiting terminal equipment - \$26 M
 - Convert Bane - Hammondsville from 23kV to 69kV operation - \$9.3 M
 - Thorofare – Goff Run – Powell Mountain 138 kV build - \$53 M
 - Rebuild Pax Branch - Scaraboro as 138 kV - \$11.3 M
 - Skin Fork Area Improvements - \$25.98

Southern Region System Upgrades

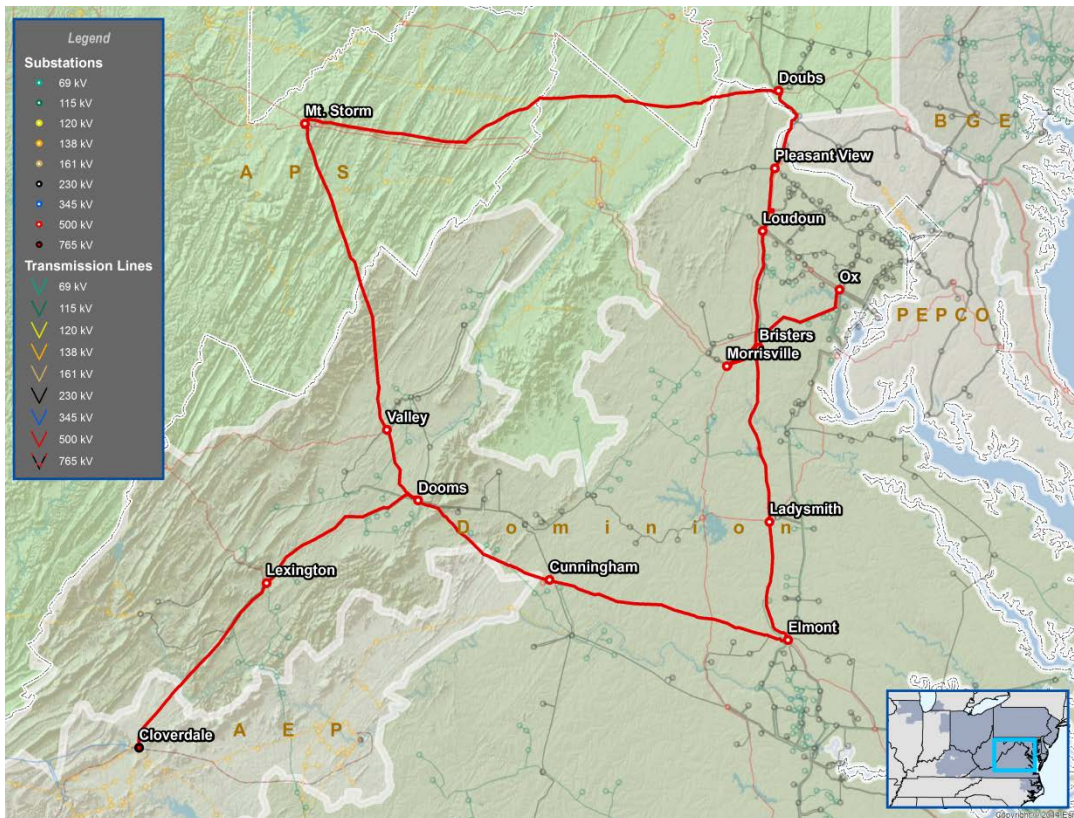
- Dominion Transmission Zone
 - Rebuild the Elmont - Cunningham 500 kV line - \$106.1 M
 - Reconductor 7.63 miles of line between Cranes and Stafford substations and upgrade associated line switches at Stafford- \$7.12 M

Following is a more detailed description of the larger scope upgrades that were recommended to the PJM Board in February 2015. A description of the criteria driving the need for the upgrade as well as the required in-service date is provided.

Baseline Project B2582 – Rebuild the Cunningham – Elmont 500 kV line

The PJM Operating Agreement specifies that Transmission Owner planning criteria shall be evaluated as part of the RTEP. In 2014, Dominion added an end-of-life / aging infrastructure criteria to their Transmission Owner criteria. The criterion includes among other things a condition assessment of the equipment and an evaluation of the impact of retiring and permanently removing the facility.

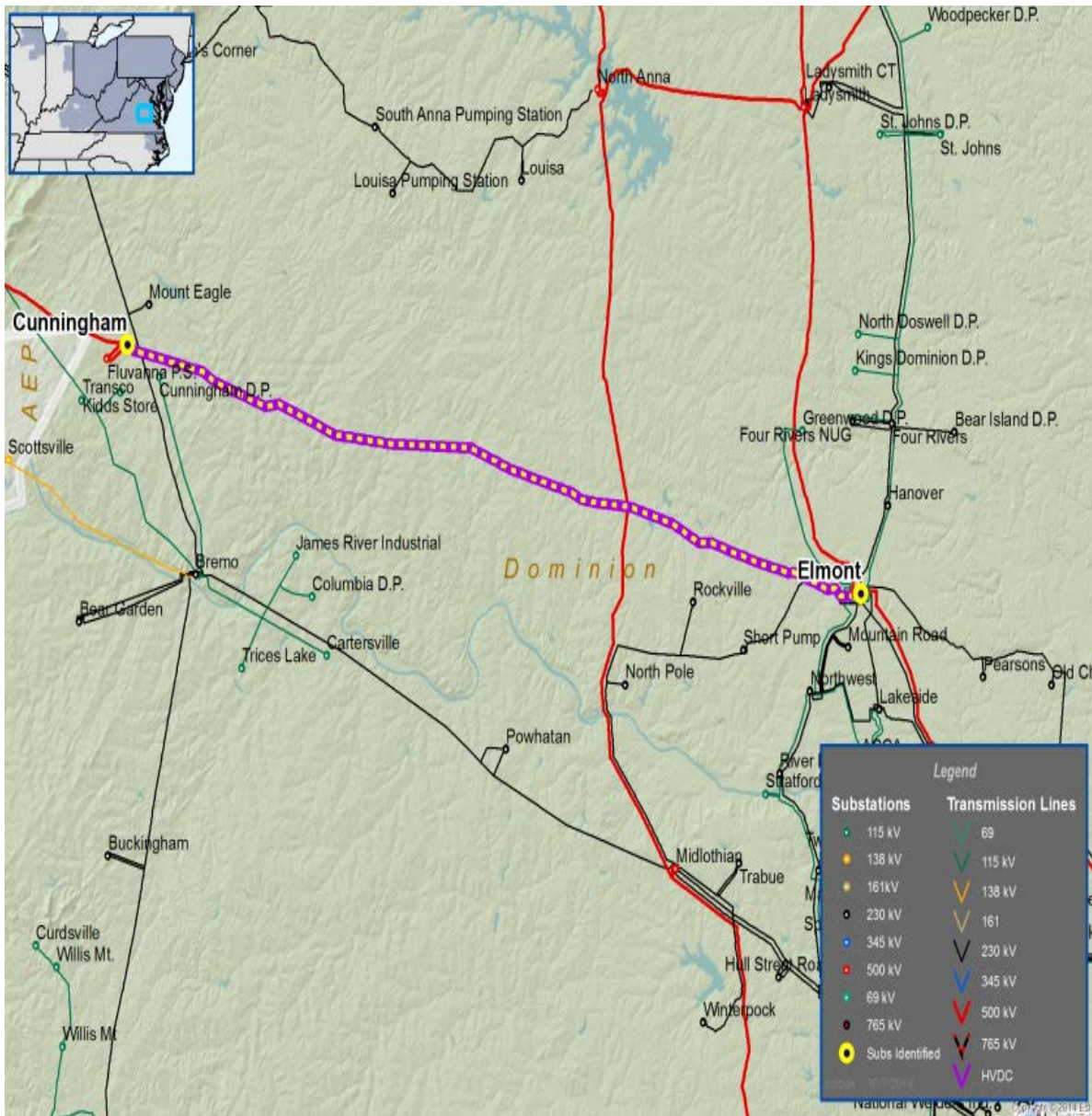
As part of their condition assessment, Dominion had a consultant evaluate the 500 kV loop within Dominion. Many of these facilities noted in the map below were installed in the mid to late 60s and are built to similar design standards including the use of Corten steel lattice structures. The Corten steel was originally developed to eliminate the need for painting by forming a rust-like appearance after being exposed to weather for several years. However, over time, the joints and individual members of the lattice structure have weakened to the point that the structures are at risk of failing. Recall that a complete rebuild of the Mt Storm to Doubs 500 kV line was added to the RTEP a number of years ago to address thermal issues identified within the planning horizon as well as concerns that the facility had reached its end-of-life.



Dominion's assessment of the 500kV loop included an evaluation of historical data, and a field sampling and inspection. In addition, a power flow simulation was also conducted. One of the outputs of the

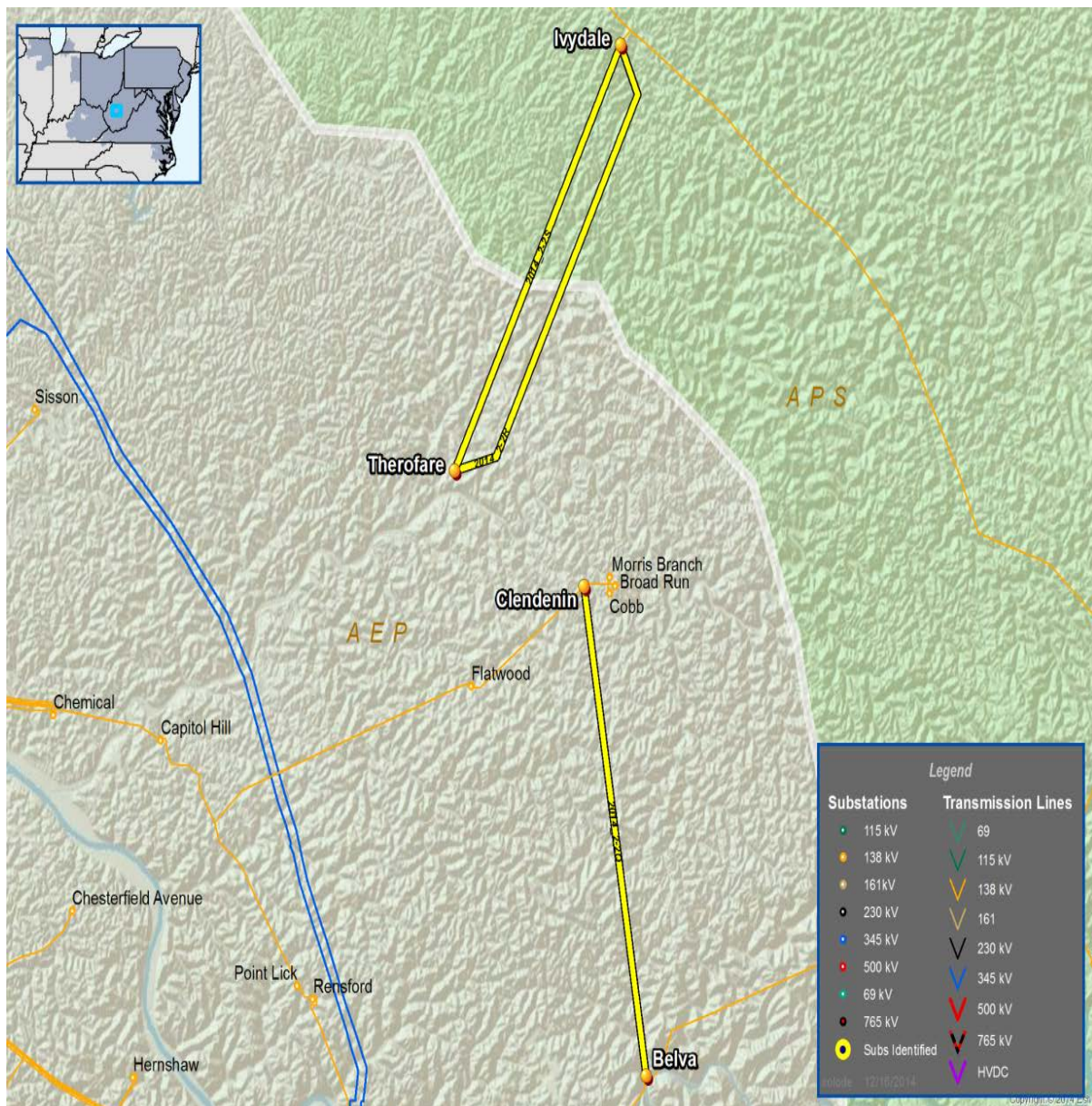
assessment was a vulnerability assessment of the 500kV loop facilities. This vulnerability assessment identified Cunningham – Elmont 500kV as being the most critical. In addition, PJM staff completed power flow studies to evaluate the impact of removing the Cunningham – Elmont line from service. Numerous reliability criteria violations were identified without the line in service.

Given the condition assessment, the Cunningham – Elmont 500kV facility has already passed its end of life and continued operation risks negative impact to the transmission system. The recommended solution to address this condition is to rebuild the Cunningham – Elmont 500kV transmission line. The estimated cost for this work is approximately \$106 million.



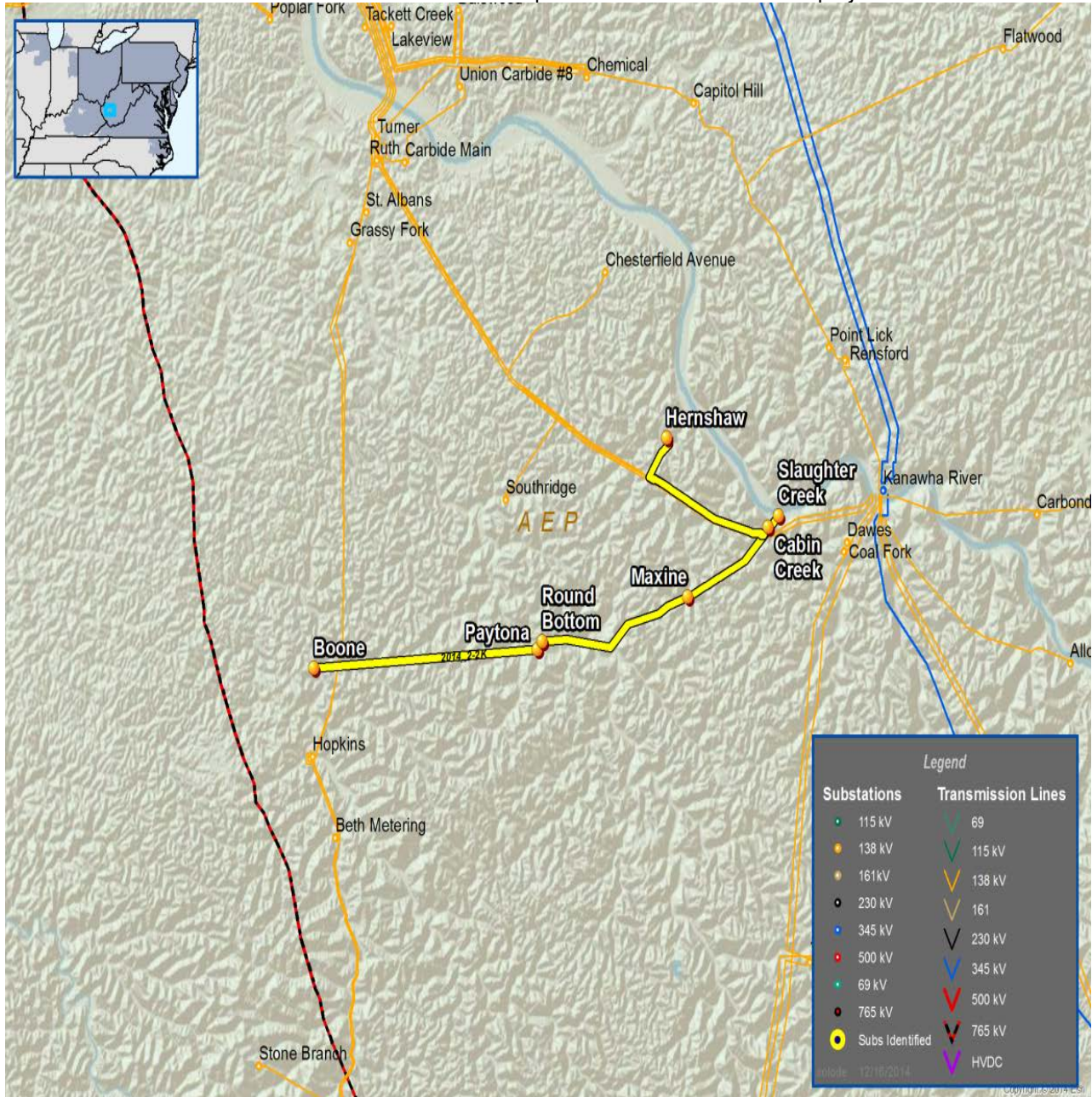
Baseline Project B2609 – Thorofare – Goff Run – Powell Mountain 138 kV Build

In 2019, the Clendenin – Hartland 46KV line in AEP is overloaded for the loss of the Belva – Carbondale 138kV line. This violation and several solution alternatives were reviewed as part of the 2014 RTEP Window #2. The recommended solution is to install two 138kV motor operated air break (MOAB) switches at Thorofare Creek substation, establish a Rutledge 138kV station, and terminate the Flatwood, Kanawha and Capitol Hill lines into the new Rutledge station. Establish a new 138kV tap station on Powell Mountain – Goff Run and construct 15 miles of new 138kV line from Thorofare Creek to the new 138kV tap station. The estimated cost for this work is \$53 million and the project will have a required in-service date of June 1, 2019.



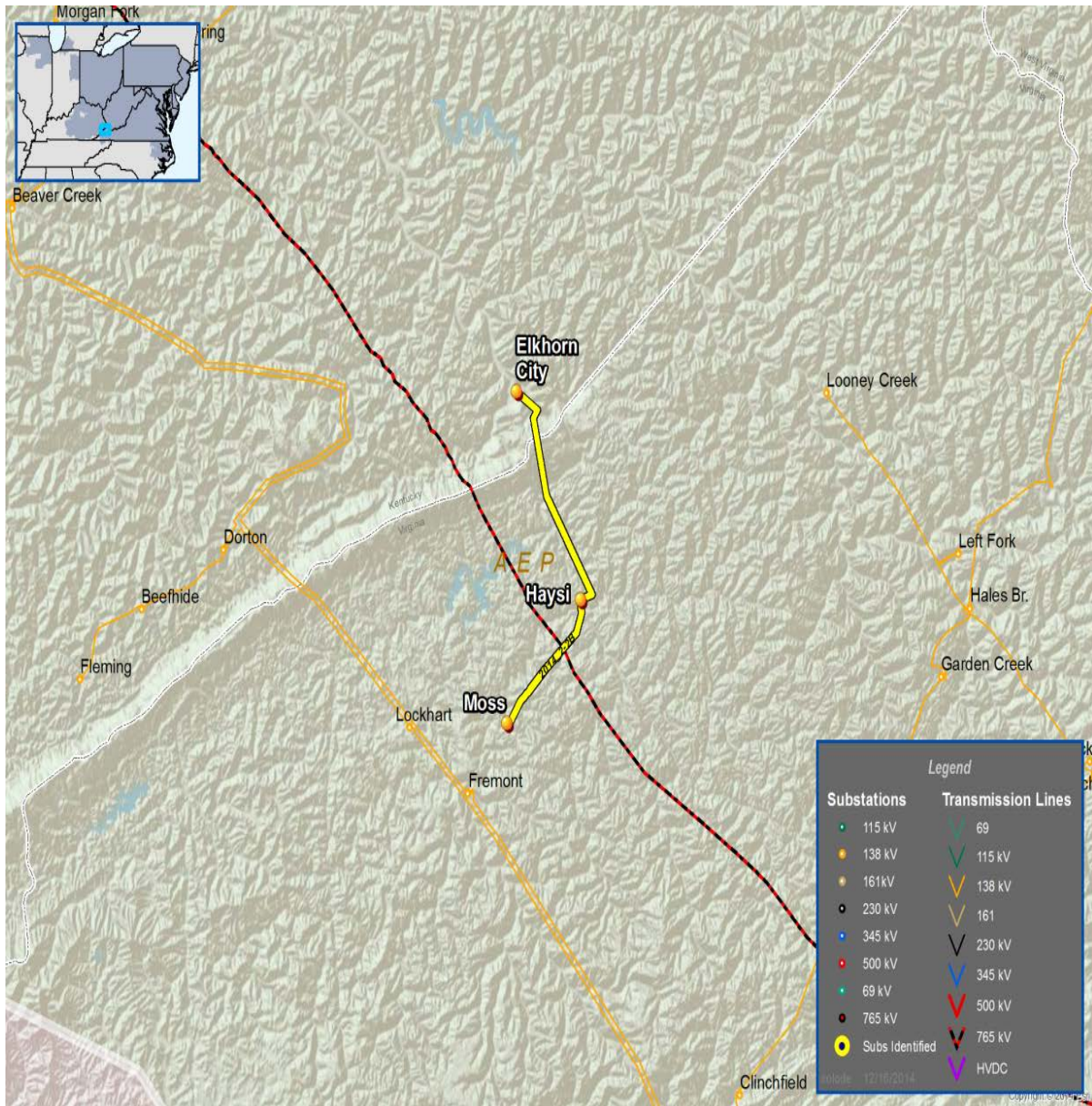
Baseline Project B2603 – Boone Area Improvements

In 2019, the AEP system experiences low voltage magnitude at the Emmons, Roundbottom, Peytona, Penn VA Coal, Mikes Run, Shabdue, Hopkins Fork, Boone, Maxine S. S. and Camp Creek 46kV buses for a variety of contingencies. In addition, the Slaughter Creek – Winifrede 46kV line is overloaded for multiple contingencies. These violations were reviewed as part of the 2014 RTEP Window #2. The recommended solution is to improve the Boone area including a new station (Wilbur) near Slaughter Creek 46 kV, a new Cabin Creek to Hernshaw 138 kV circuit and a new Wilbur to Boone 138kV and 46 kV double circuit. The estimated cost for this work is \$43.18 million. The required in-service date for the project is June 1, 2019.



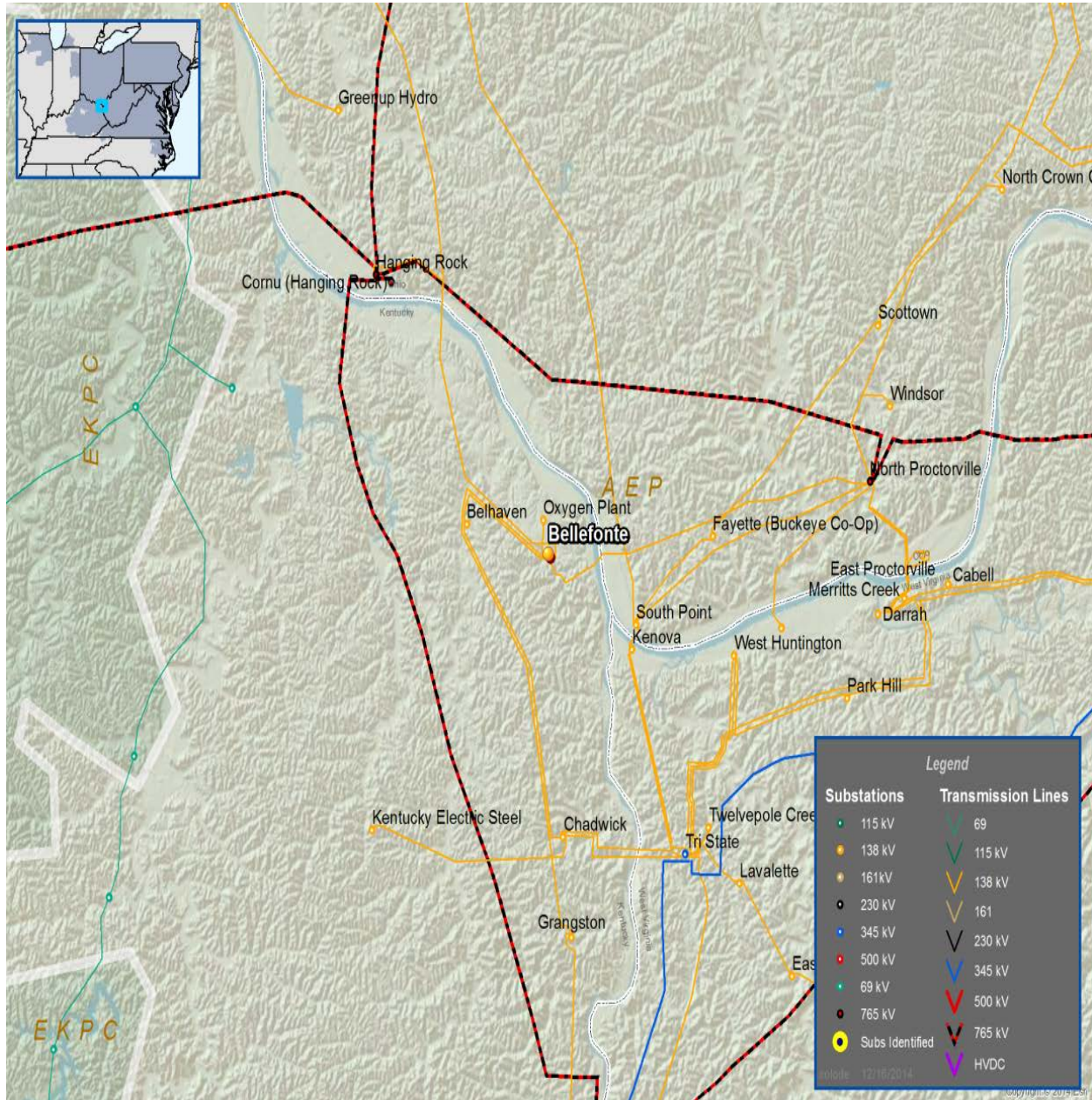
Baseline Project B2595 – Rebuild Elkhorn City – Haysi 69kV

In 2019, the Haysi – Moss 69kV line in AEP is overloaded for the loss of the Fletch – Skeggb – Gardec 138kV line. In addition, the Elkhorn – Haysi 69kV line is overloaded for the loss of the Big Sandy – Inez 138 kV circuits. These violations were reviewed as part of the 2014 RTEP Window #2. The recommended solution to address these violations is to rebuild the 7.82 mile Elkhorn City - Haysi S.S 69 kV line utilizing 1033 ACSR built to 138 kV standards and rebuild the 5.18 mile Moss - Haysi SS 69 kV line utilizing 1033 ACSR built to 138 kV standards. The estimated cost for this work is \$31.86 million and the required in-service date for the project is June 1, 2019.



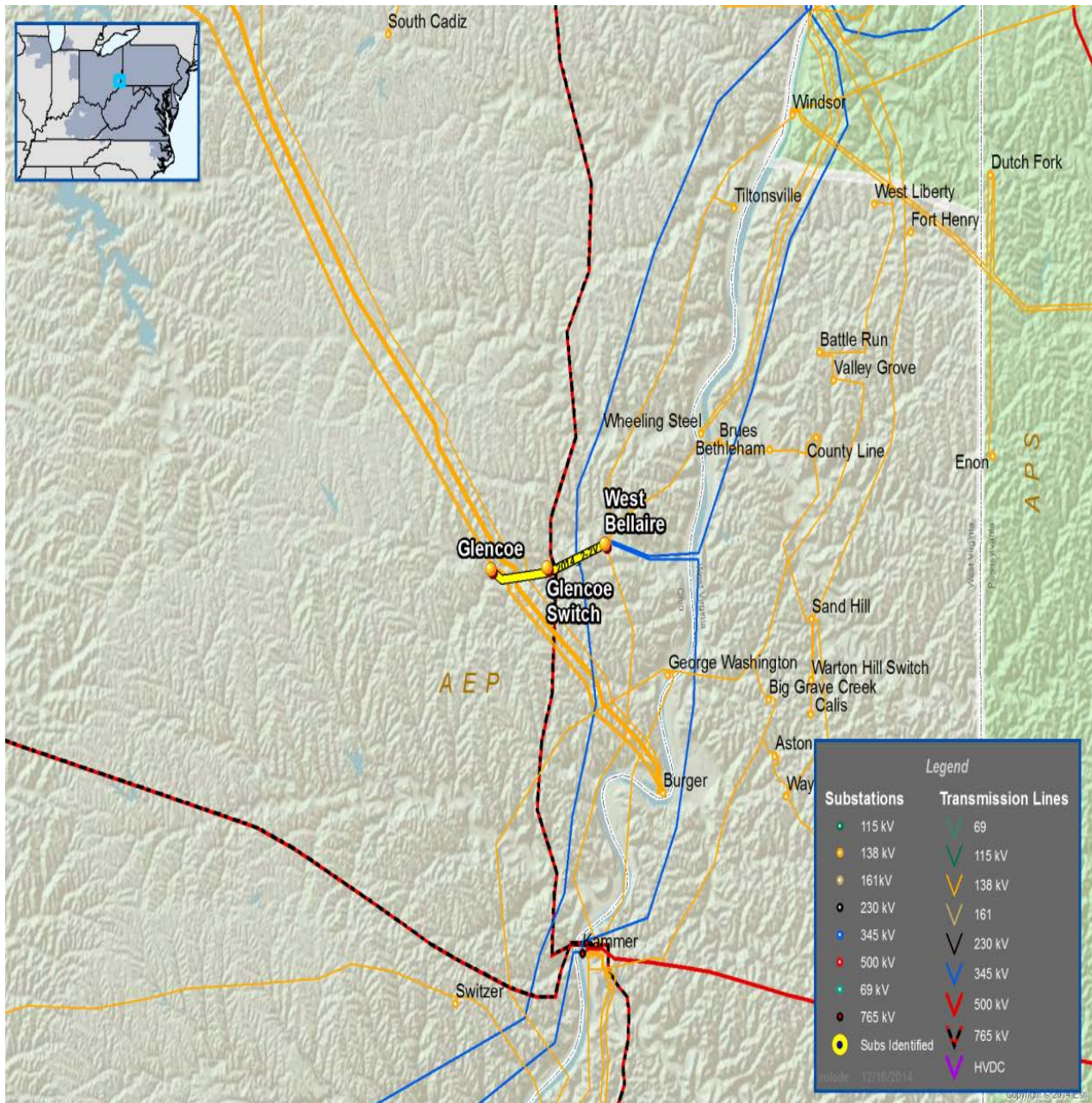
Baseline Project B2604 – Bellefonte Transformer Addition

In 2019, the Bellefonte 138/69/34kV XF5 transformer in AEP is overloaded for the loss of Bellefonte – Hanging Rock 138kV line. This violation was reviewed as part of the 2014 RTEP Window #2. The recommended solution is to add a second Bellefonte 138/69/34kV transformer. The estimated cost for this work is \$31.65 million and the required in-service date for the project is June 1, 2019.



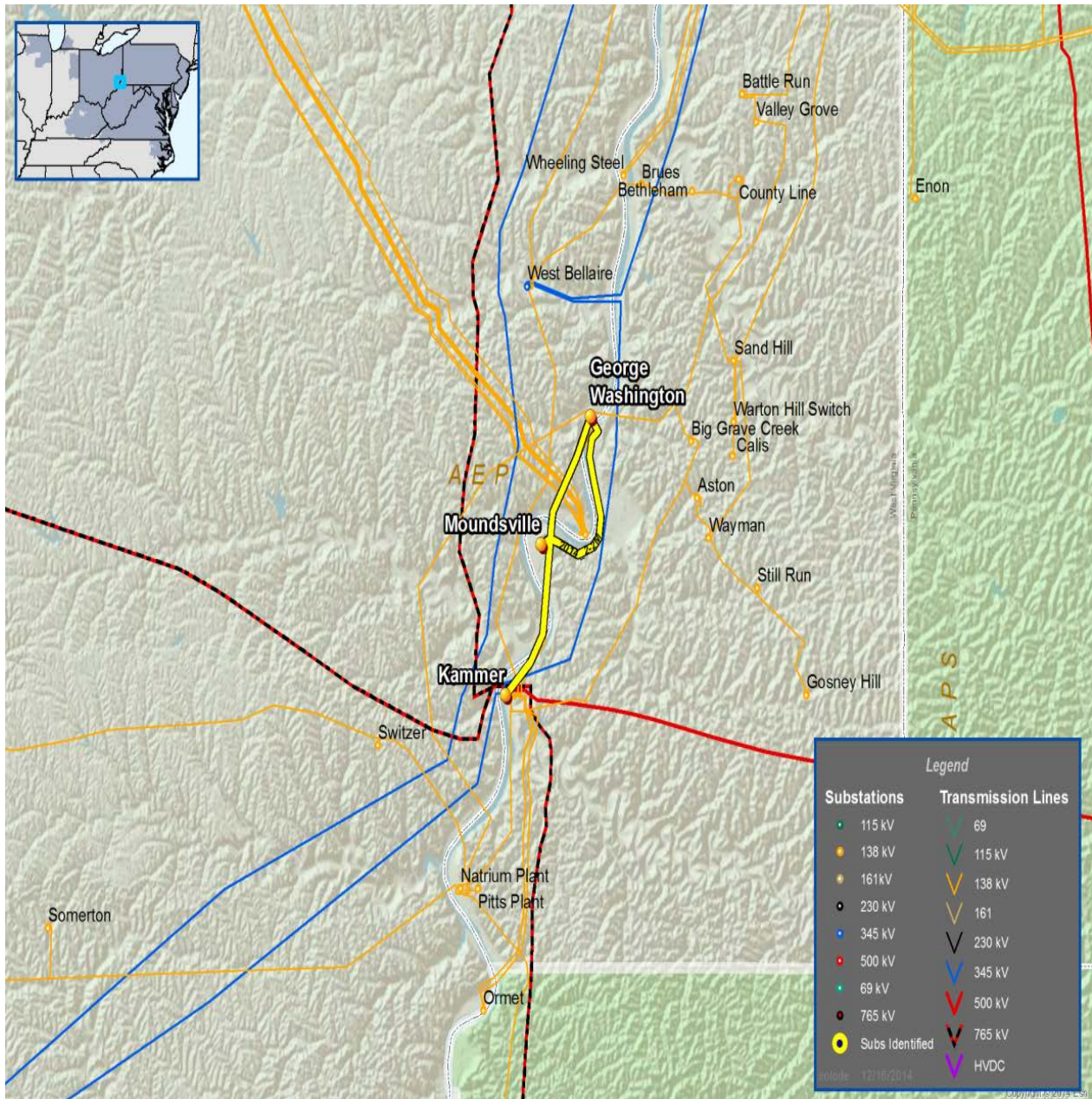
Baseline Project B2593 – Rebuild Existing West Bellaire – Glencoe 69kV and Install a 138/69kV Transformer at Glencoe Switch

In 2019, the Speidel – Glencoe 69kV line, DTE Coal – Robyville 69kV line and Somerton 139/69kV transformer in AEP is overloaded for the loss of Kammer – West Bellaire 138kV line. This violation and another submitted project alternative was evaluated as part of the 2014 RTEP Window #2. The recommended solution is to rebuild the existing West Bellaire - Glencoe 69 kV line with 138 kV & 69 kV circuits and install 138/69 kV transformer at Glencoe Switch. The estimated cost for this work is \$30 million and the project has a required in-service date of June 1, 2019.



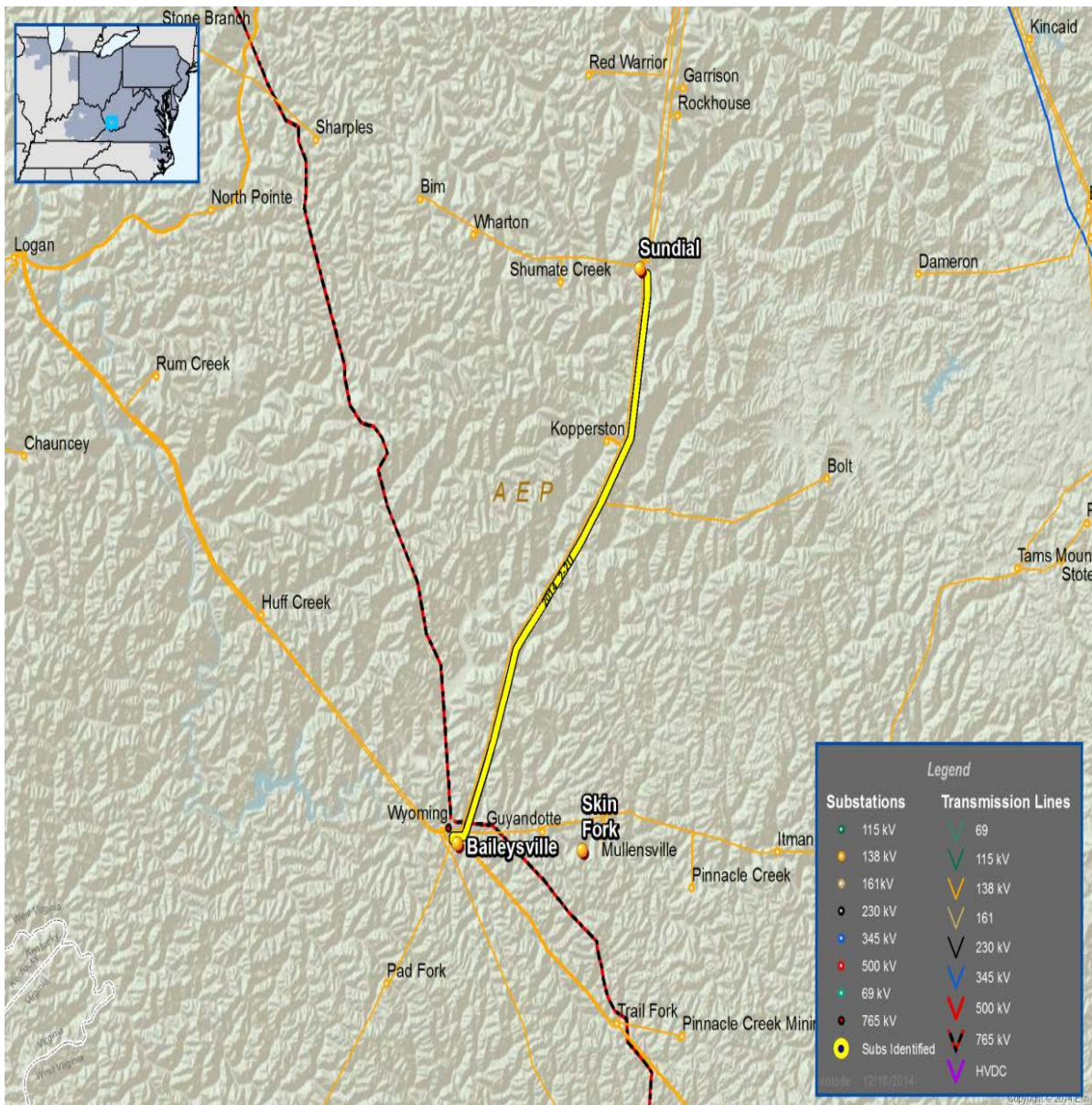
Baseline Project B2605 – Rebuild and Reconductor the Kammer – George Washington 69kV Circuit and the George Washington – Moundsville 69kV Circuit

In 2019, the AEP system experiences several thermal violations on the Lockwood– Moundsville 69KV line and Consol Coal IR – Kammer 69KV lines for several contingencies. These violations were reviewed as part of the 2014 RTEP Window #2. The recommended solution is to rebuild and reconductor the Kammer - George Washington 69kV circuit and George Washington - Moundsville Ckt #1. Also upgrade the limiting equipment at the remote ends and at the tapped stations. The estimated cost for this work is \$26 million and the project has a required in-service date of June 1, 2019.



Baseline Project B2611 – Skin Fork Area Improvements

In 2019, the Skin Fork area of the AEP system experiences several thermal and voltage violations. The Becco – Latrobe 46kV line is overloaded for multiple contingencies. The Skinfork – Three forks 46kV line is overloaded for the loss of the Braeholm – Becco –Latrobe 46kV line. In addition, low voltage magnitude violations exist at the Toney Fork, Cyclone, Latrobe, Craneco S. S. 1, Craneco S. S. 2, Pardee S.S., Three Forks 46kV and Chap 69kV bus for several contingencies. The recommended solution is to perform improvements in the Skinfork Area, including a new 138/46 kV station near Skin Fork and 3.2 miles of 1033 ACSR double circuit from the New Station to cut into Sundial - Baileysville 138kV line. The estimated cost for this work is \$25.98 million and the projects will have a required in-service date of June 1, 2019.





Changes to Previously Approved Projects

Cost and scope of a number of previously approved RTEP baseline projects have been updated. The scope of the existing RTEP project B2443 to Construct new underground 230 kV line from Glebe to Station C in the Pepco transmission zone was expanded to include a Phase Angle Regulator (PAR) at Station C. The estimated additional cost to include the PAR is \$10 million. In addition, the cost estimate for the Northeast Grid Reliability Project in the PSE&G transmission zone to convert the existing 'D1304' and 'G1307' 138 kV circuits between Roseland - Kearny- Hudson to 230 kV was increased by \$130M to \$780M. Also, a number of projects have been cancelled as they are no longer required. The net result to these changes to previously approved baseline projects is a net increase in the RTEP of \$76.99 million.



Review by the Transmission Expansion Advisory Committee (TEAC)

The results of the analyses summarized in this report were reviewed with the TEAC and Subregional RTEP Committees over several meetings throughout 2014 and 2015. The most recent analysis, along with recommended solutions, were reviewed at the January 7, 2015 meeting. Written comments were requested to be submitted to PJM communicating any concerns with the recommendation and any alternative transmission solutions for consideration. No comments were received on the projects presented to the TEAC.

Cost Allocation

Cost allocations for the projects are calculated in accordance with the OATT. The allocations have been filed at FERC 30 days following approval by the Board. Preliminary cost allocations for the recommended projects are shown in Attachment A for the projects that are allocated to a single transmission zone and in Attachment B for the projects that are allocated to multiple transmission zones.

Board Approval

The PJM Board Reliability Committee endorsed the new baseline reliability projects and associated cost allocations. The PJM Board Reliability Committee recommended to the Board the approval of the baseline upgrades to the 2014 RTEP. The PJM Board of Managers approved the changes to the RTEP.



Attachment A – New Baseline Reliability Single Zone Cost Allocations

Upgrade ID	Description	Cost Estimate (\$M)	Trans Owner	Cost Responsibility	Required IS Date
b1698.7	Replace Loudoun 230 kV breaker '203052' with 63kA rating	\$0.31	Dominion	Dominion	6/1/2016
b2362.1	Install a 230 kV breaker at Squab Hollow 230 kV substation	\$0.75	APS	APS	6/1/2015
b2542	Replace the Loudoun 500kV 'H2T502' breaker with a 50kA breaker	\$0.79	Dominion	Dominion	6/1/2019
b2543	Replace the Loudoun 500kV 'H2T584' breaker with a 50kA breaker	\$0.79	Dominion	Dominion	6/1/2019
b2572	Replace the Peach Bottom 500 kV '#225' breaker with a 63kA breaker	\$1.50	PECO	PECO	6/1/2019
b2573	Replace the Warren 115 kV 'B12' breaker with a 40kA breaker	\$0.25	PENELEC	PENELEC	6/1/2016
b2574	Replace the Sunbury 230 kV 'MONTOUR NORT' breaker with a 63kA breaker	\$0.75	PPL	PPL	6/1/2019
b2581	Open the Corner 138 kV circuit breaker 86 for an overload of the Corner - Washington MP 138 kV line. The tower contingency loss of Belmont - Trissler 138 kV and Belmont - Edgelawn 138 kV should be added to Operational contingency	\$0.00	AEP	AEP	6/1/2015
b2583	Install 500 kV breaker at Ox Substation to remove Ox Tx#1 from H1T561 breaker failure outage.	\$1.24	Dominion	Dominion	6/1/2019
b2584	Relocate the Bremono load (transformer #5) to #2028 (Bremono- Charlottesville 230 kV) line and Cartersville distribution station to #2027 (Bremono-Midlothian 230 kV) line	\$1.67	Dominion	Dominion	11/1/2018
b2585	Reconductor 7.63 miles of existing line between Cranes and Stafford, upgrade associated line switches at Stafford	\$7.12	Dominion	PEPCO	6/1/2019
b2586	Upgrade the V74 34.5 kV transmission line between Allenhurst and Elberon Substations	\$14.76	JCPL	JCPL	6/1/2018
b2587	Reconfigure Pierce Brook 345 kV station to a ring bus and install a 125 MVAR shunt reactor at the station	\$5.53	PENELEC	PENELEC	9/1/2018
b2588	Install a 36.6 MVAR 115 kV capacitor at North Bangor substation	\$0.98	ME	ME	6/1/2019
b2589	Install a 100 MVAR 230 kV shunt reactor at Mercer station	\$7.20	PSEG	PSEG	9/1/2018
b2590	Install two 75 MVAR 230 kV capacitors at Sewaren station	\$8.40	PSEG	PSEG	6/1/2019



Attachment A – New Baseline Reliability Single Zone Cost Allocations

b2591	Construct a new line approximately 2.5 miles from Colfax to Drewry's. Construct a new Drewry's station and install a new circuit breaker at Colfax station.	\$7.92	AEP	AEP	6/1/2019
b2592	Rebuild existing East Coshocton – North Coshocton double circuit line which contains Newcomerstown - N. Coshocton 34.5 kV Circuit and Coshocton – North Coshocton 69 kV circuit	\$5.09	AEP	AEP	6/1/2019
b2593	Rebuild existing West Bellaire - Glencoe 69 kV line with 138 kV & 69 kV circuits and install 138/69 kV transformer at Glencoe Switch	\$30.00	AEP	AEP	6/1/2019
b2594	Rebuild 1.0 mile of Brantley - Bridge Street 69 kV Line with 1033 ACSR overhead conductor	\$1.50	AEP	AEP	6/1/2019
b2595.1	Rebuild 7.82 mile Elkhorn City - Haysi S.S 69 kV line utilizing 1033 ACSR built to 138 kV standards	\$31.86	AEP	AEP	6/1/2019
b2595.2	Rebuild 5.18 mile Moss - Haysi SS 69 kV line utilizing 1033 ACSR built to 138 kV standards		AEP	AEP	6/1/2019
b2596	Move load from the 34.5 kV bus to the 138 kV bus by installing a new 138/12 kV XF at New Carlisle station in Indiana	\$2.03	AEP	AEP	6/1/2019
b2597	Rebuild approximately 1 mi. section of Dragoon-Virgil Street 34.5 kV line between Dragoon and Dodge Tap switch and replace Dodge switch MOAB to increase thermal capability of Dragoon-Dodge Tap branch	\$2.15	AEP	AEP	6/1/2019
b2598	Rebuild approximately 1 mile section of the Kline-Virgil Street 34.5 kV line between Kline and Virgil Street tap. Replace MOAB switches at Beiger, risers at Kline, switches and bus at Virgil Street.	\$1.69	AEP	AEP	6/1/2019
b2599	Rebuild approximately 0.1 miles of 69 kV line between Albion and Albion tap	\$0.20	AEP	AEP	6/1/2019
b2600	Rebuild Fremont - Pound line as 138 kV	\$14.50	AEP	AEP	6/1/2019
b2601	Fremont Station Improvements	\$2.50	AEP	AEP	6/1/2019
b2601.1	Replace MOAB towards Beaver Creek with 138kV breaker		AEP	AEP	6/1/2019
b2601.2	Replace MOAB towards Clinch River with 138kV breaker		AEP	AEP	6/1/2019
b2601.3	Replace 138kV Breaker A with new bus-tie breaker		AEP	AEP	6/1/2019
b2601.4	Re-use Breaker A as highside protection on transformer #1		AEP	AEP	6/1/2019



Attachment A – New Baseline Reliability Single Zone Cost Allocations

b2601.5	Install two (2) circuit switchers on highside of transformers # 2 and 3 at Fremont Station		AEP	AEP	6/1/2019
b2602.1	Install 138 kV breaker E2 at North Proctorville	\$12.56	AEP	AEP	6/1/2019
b2602.2	Construct 2.5 Miles of 138 kV 1033 ACSR from East Huntington to Darrah 138 kV substations		AEP	AEP	6/1/2019
b2602.3	Install breaker on new line exit at Darrah towards East Huntington		AEP	AEP	6/1/2019
b2602.4	Install 138 kV breaker on new line at East Huntington towards Darrah		AEP	AEP	6/1/2019
b2602.5	Install 138 kV breaker at East Huntington towards North Proctorville		AEP	AEP	6/1/2019
b2603	Boone Area Improvements	\$43.18	AEP	AEP	6/1/2019
b2603.1	Purchase approximately a 200X300 station site near Slaughter Creek 46 kV station (Wilbur Station)		AEP	AEP	6/1/2019
b2603.2	Install 3 138 kV circuit breakers, Cabin Creek to Hernshaw 138 kV circuit		AEP	AEP	6/1/2019
b2603.3	Construct 1 mi. of double circuit 138 kV line on Wilbur - Boone 46 kV line with 1590 ACSS 54/19 conductor @ 482 Degree design temp. and 1-159 12/7 ACSR and one 86 Sq.MM. 0.646" OPGW Static wires		AEP	AEP	6/1/2019
b2604	Bellefonte Transformer Addition	\$31.65	AEP	AEP	6/1/2019
b2605	Rebuild and reconductor Kammer - George Washington 69 kV circuit and George Washington - Moundsville Ckt #1, designed for 138kV. Upgrade limiting equipment at remote ends and at tap stations	\$26.00	AEP	AEP	6/1/2019
b2606	Convert Bane - Hammondsville from 23kV to 69kV operation	\$9.30	AEP	AEP	6/1/2019
b2607	Pine Gap Relay Limit Increase	\$0.00	AEP	AEP	6/1/2019
b2608	Richlands Relay Upgrade	\$0.20	AEP	AEP	6/1/2019
b2609	Thorofare – Goff Run – Powell Mountain 138kV	\$53.00	AEP	AEP	6/1/2019
b2610	Rebuild Pax Branch - Scaraboro as 138 kV	\$11.30	AEP	AEP	6/1/2019
b2611	Skin Fork Area Improvements	\$25.98	AEP	AEP	6/1/2019
b2611.1	New 138/46 kV station near Skin Fork and other components		AEP	AEP	6/1/2019
b2611.2	Construct 3.2 miles of 1033 ACSR double circuit from new Station to cut into Sundial-Baileysville 138 kV line		AEP	AEP	6/1/2019
b2612.1	Relocate All Dam 6 138 kV line and the 138 kV line to AE units 1&2	\$0.93	APS	APS	6/1/2019



Attachment A – New Baseline Reliability Single Zone Cost Allocations

b2612.2	Install 138kV, 3000A bus-tie breaker in the open bus-tie position next to the Shaffers corner 138 kV line		APS	APS	6/1/2019
b2612.3	Install a 6-pole manual switch, foundation, control cable, and all associated facilities		APS	APS	6/1/2019
b2613	Replace relays at Mazon substation	\$0.70	ComEd	ComEd	6/1/2019
b2614	Decouple the double-circuited Spurlock - Maysville Industrial Tap 138-kV & Spurlock - Flemingsburg 138-kV line segments	\$0.76	EKPC	EKPC	6/1/2019
b2615	Upgrade the Bullitt County 161/69 kV transformer facility	\$1.29	EKPC	EKPC	6/1/2019
b2459	Install +260/-150 MVAR SVC at Lake Shore	\$34.70	ATSI	ATSI	6/1/2015



Attachment A – New Baseline Reliability Multiple Zone Cost Allocations

Upgrade ID	Description	Cost Estimate (\$M)	Trans Owner	Cost Responsibility	Required IS Date
b2443.3	Glebe - Station C PAR	\$10.00	Dominion	DVP - 22.57%, PEPCO - 77.43%	6/1/2018
b2582	Rebuild the Elmont - Cunningham 500 kV line	\$106.10	Dominion	AEC - 0.77%, AEP - 7.66%, APS - 2.94%, ATSI - 3.88%, BGE - 5.29%, ComEd - 6.19%, ConEd - 0.29%, Dayton - 1.01%, DEOK - 1.61%, DL - 0.85%, DVP - 47.03%, DPL - 1.22%, ECP - 0.1%, EKPC - 1.08%, O66 - 0.10%, JCPL - 1.77%, ME - 0.89%, NEPTUNE - 0.21%, PECO - 2.59%, PENELEC - 0.96%, PEPCO - 7.97%, PPL - 2.53%, PSEG - 2.99%, RE - 0.13%	6/1/2018