Reliability Analysis Update

Subregional RTEP Committee

PJM West

June 30, 2017

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Baseline Reliability and Supplemental Project First Review

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TO Criteria Violations and Baseline Project Cost Change

Problem Statement:

B2414 (Presented on 11/4/2013 SRTEAC): Build the 2nd Summer Shade EKPC - Summer Shade TVA 161 kV circuit; Required IS Date: 6/1/2018

The original Cost: $4.6M ; The new cost: $15.9M - with further evaluation, a new station will need to be built.

Overload of the Summer Shade 161-69 kV transformer for the loss of the Barren County 161-69 kV transformer in 6/1/2020, which will be solved by baseline project B2710 (Presented 11/5/2015 TEAC): Upgrade the Summer Shade bus and CT associated with the 161/69 kV transformer #1. The Original Cost: $0.075M

However, the transformer will show up again in 2022 winter. Further upgrades will be needed which include Upgrade CT associated with Summershade 161-69kv transformer to at least 190 MVA Winter LTE; upgrade 1 1/4" IPS bus associated with Summershade 161/69kv transformer to 2" or larger (Estimated Cost of $0.35M); In 2023 winter, the transformer will be overloaded again. The solution will be to add a second 161-69 kV Tansformer at Summer Shade. Estimated Cost - $1.68 Million

Overload of the Barren county 161-69 kV transformer for the loss of the Summershade - Summershade Jct. 69 kV Line is first identified for 2018 summer. The least cost fix is to replace the Barren County 161-69 kV Xfmr- (Estimated Cost of $1.6 Million); The transformer will be further overloaded in 12/1/2020, and the fix will be to Increase overcurrent relay at Barren Co 161-69kv transformer to at least 145 MVA Winter LTE (Estimated Cost of $0). In 2024 winter, the transformer will be overloaded again and the fix will be to upgrade Barren Co 69kv CT associated with 161/69kv transformer from 800/5 CT to 1200/5 CT. (Estimated Cost $0.01M)

Overload of the Summer Shade Jct. - Summer Shade 69 kV Line for the loss of the Barren County - Summer Shade 161 kV Line is first identified for 2018 summer. The fix is to increase the Maximum Operating Tempearture of the Summer Shade Jct. - Summer Shade 69 kV Line to 302˚F (Estimated Cost of $0.1M). The line is further overloaded in 2020 winter and the fix will be to upgrade the Summer Shade 69kV bus and Jumpers Associated with the Summer Shade-Summer Shade Jct 69 KV line section and reconductor the Summer Shade - Summer Shade Jct.69 KV line section (0.15 miles) using 795 MCM ACSR (Estimated Cost of $0.35M).

Low voltage at Seymour 69KV for the loss of the Barren County 161-69 kV transformer in 2024 winter. The fix is to Install a 20MVAR cap bank at Fox Hollow 69 kV (Estimated Cost -$0.365M)

Rebuild 9.55 mi Temple Hill - Summershade Jct. 69kV line section 9.55 miles) using 556.6 MCM ACTW. Estimated Cost - $6M

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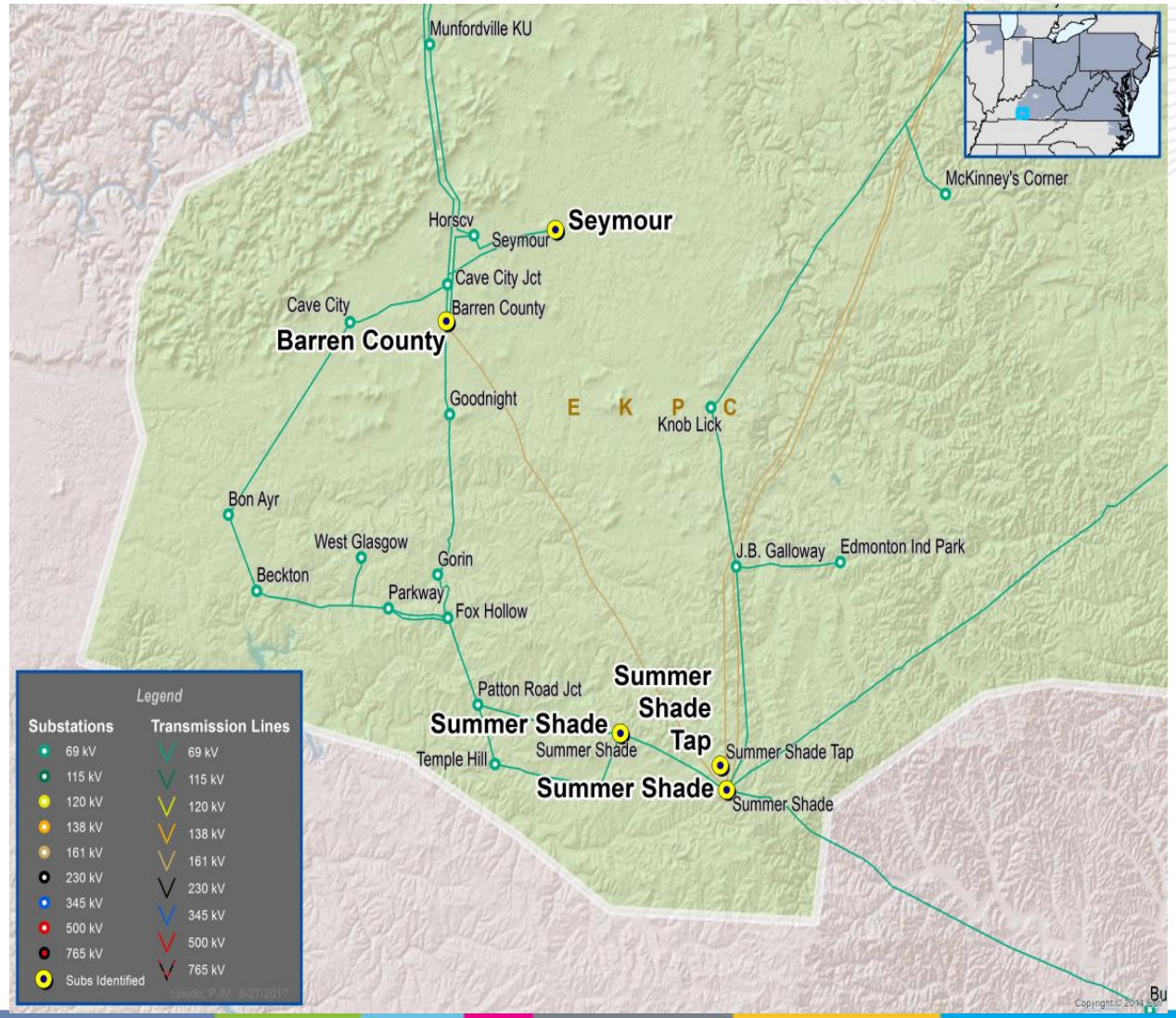
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Barren County
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Bon Ayr
West Glasgow
Gorin
Beckton
Parkway
Fox Hollow
J.B. Galloway
Edmonton Ind Park
Patton Road Jct
Summer Shade
Summer Shade Tap
Temple Hill
Summer Shade
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Substations
Transmission Lines
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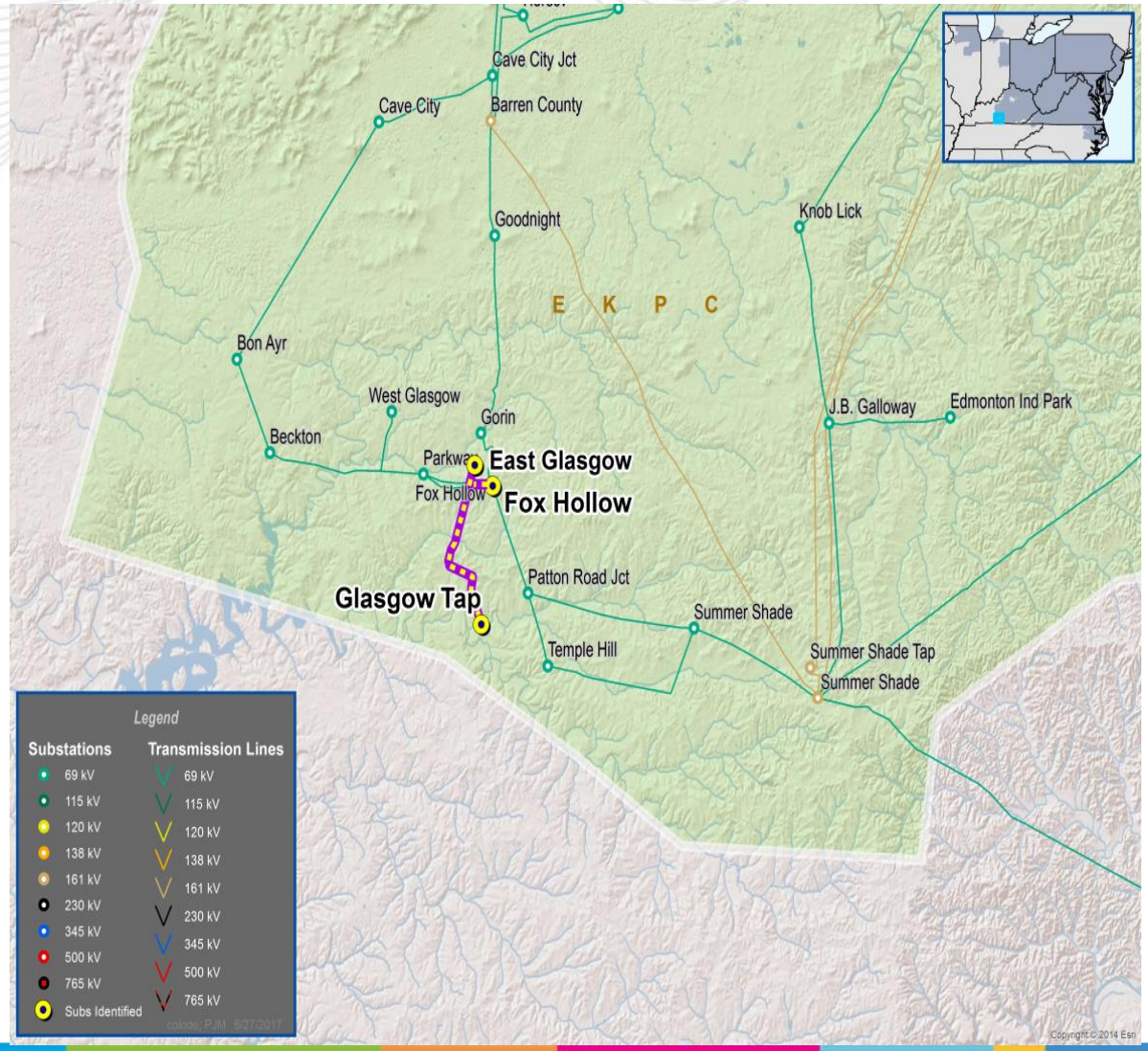
Subs Identified


Cave City Jct
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Fox Hollow
J.B. Galloway
Edmonton Ind Park
Glasgow Tap
Patton Road Jct
Summer Shade
Temple Hill
Summer Shade Tap
Summer Shade
Legend
Substations
Transmission Lines
69 kV
115 kV
120 kV
138 kV
161 kV
230 kV
345 kV
500 kV
765 kV
Subs Identified

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TO Criteria Violations and Baseline Project Cost Change

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Alternative considered:

Continue B2414 with new estimated cost of $15.9M

Continue B2710 with estimated Cost: $0.075M

In 2022 winter. upgrade CT associated with Summershade 161-69kv transformer to at least 190 MVA Winter LTE; upgrade 1 1/4" IPS bus associated with Summershade 161/69kv transformer to 2" or larger - Estimated Cost of $0.35M

In 2023 winter, add a second 161-69 kV Transformer at Summer Shade. Estimated Cost - $1.68 Million;

In 2018 summer, replace the Barren County 161-69 kV Xfmr- Estimated Cost of $1.6 Million;

In 2020 winter, increase overcurrent relay at Barren Co 161-69kv transformer to at least 145 MVA Winter LTE. Estimated Cost of $0;

In 2024 winter, upgrade Barren Co 69kv CT associated with 161/69kv transformer from 800/5 CT to 1200/5 CT. Estimated Cost $0.01M;

In 2018 summer, Increase the Maximum Operating Temperature of the Summer Shade Jct. - Summer Shade 69 kV Line to 302˚F. Estimated Cost of $0.1M; T

In 2020 winter, upgrade the Summer Shade 69kV bus and Jumpers Associated with the Summer Shade-Summer Shade Jct 69 KV line section and reconductor the Summer Shade - Summer Shade Jct.69 KV line section (0.15 miles) using 795 MCM ACSR. Estimated Cost of $0.35M;

In 2024 winter, install a 20MVAR cap bank at Fox Hollow 69 kV. Estimated Cost -$0.365M. And rebuild 9.55 mi Temple Hill - Summershade Jct. 69kV line section 9.55 miles) using 556.6 MCM ACTW. Estimated Cost - $6M

Preliminary Solution:

New TVA 161kV Interconnection to TVA's East Glasgow Tap-East Glasgow 161 KV line section (~1 mile due West of Fox Hollow). Add Fox Hollow 161/69 KV 150 MVA transformer. Construct new Fox Hollow-Fox Hollow Jct 161 KV line section using 795 MCM ACSR (~1 mile) and new 161kV switching station at point of interconnection with TVA.

Cancel B2414 and B2710

Estimated Cost: $18.1M

Required IS Data: 6/1/2018

Status: Scoping

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- **Baseline Cost Change (B2753.1-10)**

Original Scope and Cost (was presented in 7/26/2016 and 3/9/2017SRTEAC, 12/15/2016 TEAC):

George Washington Station – Replace existing 138kV yard with GIS 138kV breaker and a half yard in existing station footprint. Install 138kV revenue metering for new IPP connection. (N5076.1/B2753.1) --AEP

Dilles Bottom Station – Replace Dilles Bottom 69/4kV Distribution station as breaker and a half 138kV yard design including AEP Distribution facilities but initial configuration will constitute a 3 breaker ring bus. (N5076.2/B2753.2) --AEP

Holloway Station – Connect two 138kV 6-wired ckts from "Point A" (currently de-energized and owned by First Energy) in ckt positions previously designated Burger #1 & Burger #2. Install interconnection settlement metering on both circuits exiting Holloway station.

(N5076.3/B2753.3) --AEP

Holloway-"Point A" FE "Burger-Cloverdale No.2" 138kV Line – 6 wire "Burger-Cloverdale No. 2" 138kV Line for double capacity and connect at Holloway and "Point A" (N5076.4/B2753.4)--FE

Holloway -"Point A" FE "Burger-Longview" 138kV Line – 6 wire "Burger-Longview" 138kV Line for double capacity and connect at Holloway and "Point A" (N5076.5/B2753.5)--FE

Dilles Bottom -"Point A"138kV Line - Build dbl ckt 138kV line from Dilles Bottom to "Point A". Tie each new AEP ckt in with a 6 wired line at Point A. This will create a Dilles Bottom-Holloway 138kV ckt and a George Washington-Holloway circuit. (N5076.6/B2753.6) --AEP

Dilles Bottom-Bellaire and Moundsville-Dilles Bottom 69kV Lines - Retire line sections south of First Energy 138kV line corridor, near "Point A". Tie George Washington-Moundsville 69kV ckt to George Washington-West Bellaire 69kV ckt (N5076.7/B2753.7) –AEP

Washington-Dilles Bottom 69kV Line – Rebuild existing line as dbl ckt 138kV from George Washington to Dilles Bottom. One circuit will cut into Dilles Bottom initially and the other will go past with future plans to cut in. (N5076.8/B2753.8) –AEP

Remove/Open Kammer 345/138 kV transformer #301 (b2753.9/N5076.9)

Complete sag study mitigation on the Muskingum – Natrium 138 kV line(b2753.10/N5076.10)

Fixed Project Cost: $24.5614M (N5076.1-10)

Estimated Project Cost: $27.8M (B2753.1-10)

Required IS Date: 1/1/2019

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Split cost:

B2753.1: $0M; N5076.1: $24M
B2753.2: $9M; B2753.2: $0M
B2753.3: $2M; B2753.3: $0M
B2753.4: $0.25M; B2753.4: $0M
B2753.5: $0.25M; B2753.5: $0M
B2753.6: $5M; B2753.6: $0M
B2753.7: $4.96M; B2753.7: $0.5614M
B2753.8: $3.56M; B2753.8: $0M
B2753.9: $0M; B2753.9: $0M
B2753.10: $2.8M; B2753.10: $0M

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Baseline Cost Change (B2753.1-10)
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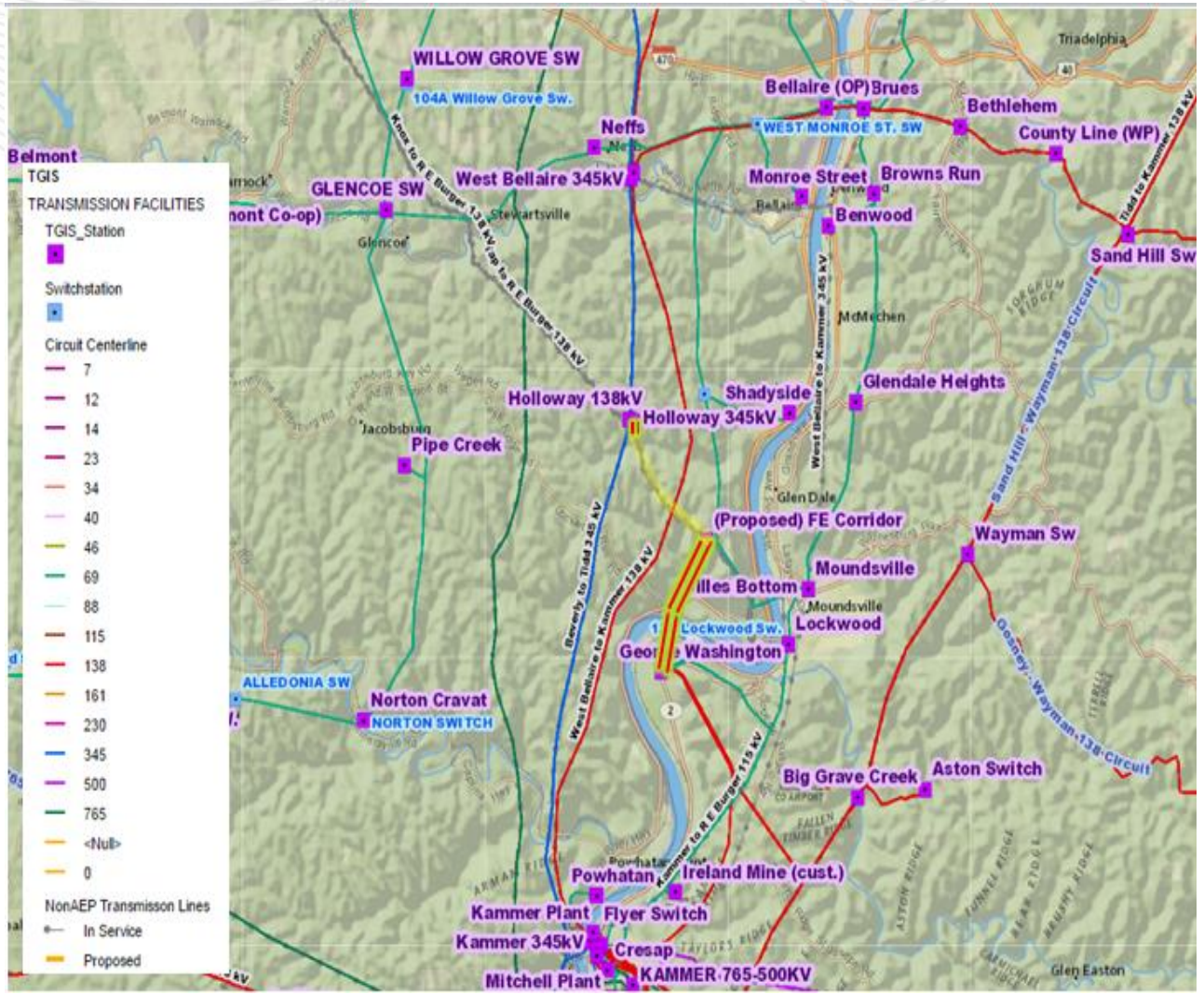
Reasons for the Cost Change:
Queue projects Y3-068 / Z2-048 have been withdrawn. The shared cost of $24.761M now is transferred to Baseline B2753.1-10.

B2753.1 New Scope: George Washington Station – Replace existing 138kV yard with GIS 138kV breaker and a half yard in existing station footprint. (No need for the revenue metering for new IPP connection)

New Estimated Cost: $50.7M

New Required IS Date: 5/31/2020



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Previously Presented Baseline and Supplemental Projects Second Review

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DEOK Transmission Zone Supplemental Project

Supplemental Project S0905

Scope Update

Previously Presented: 5/31/2017 SRTEAC

Problem Statement: Circuits 3885 (Port Union - Provident – Hall 138 kV) and 3886 (Port Union – Mulhauser 138 kV) are on the same towers through the project area; 3885 is on the northwest side of the towers, 3886 is on the southeast side of the towers. The project site was originally to the southeast of the circuit path so 3886 was to be used to add the new substation between Port Union and Mulhauser. The property eventually purchased is to the northwest of the circuit path so it is more practical to now use 3885. The new plan is to interrupt circuit 3885 between Port Union and Hall.

Original Scope : Build a new 22.4 MVA 138/12 kV substation at East Provident Drive

Original Estimated Cost: $3.72M

Original Project IS Date: 6/1/2018

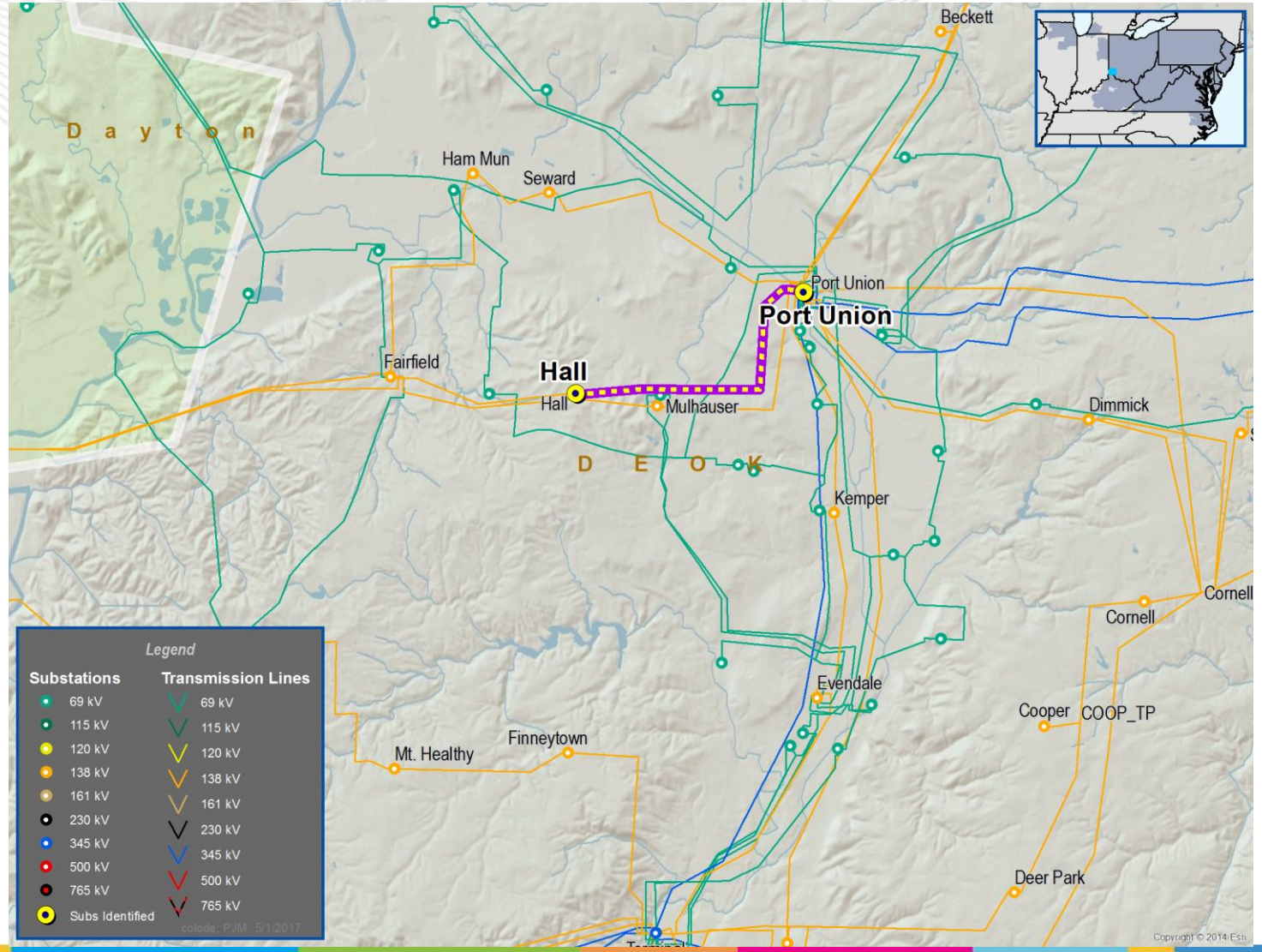
Original Presented Date: 3/5/2015 PJM West SRTEAC

New Scope: Build a new 22.4 MVA 138/12 kV substation at Provident Drive

New Estimated Cost: $3.72M

New Projected IS Data: 6/1/2018

Status: Engineering



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DEOK Transmission Zone Baseline Reliability

Baseline Reliability - N-1-1 Violation
Project Replacement
Previously Presented: 5/31/2017 SRTEAC

Problem Statement:

Due to the scope change of S0905, The Port Union – Mulhauser 138kV line is overloaded for the loss of the Port Union –Seward 138kV line and the loss of the Port Union- Provident 138kV line.

Due to the scope change of S0905, The driver for B2829 as presented at 1/12/2017 TEAC, the N-1-1overload on the Port Union- East Provident 138kV line, doesn't exist any more

Cancel B2829: Reconductor the feeder from Port Union to East Provident 138 kV line for 300MVA

Estimated Project Cost: $2.19M

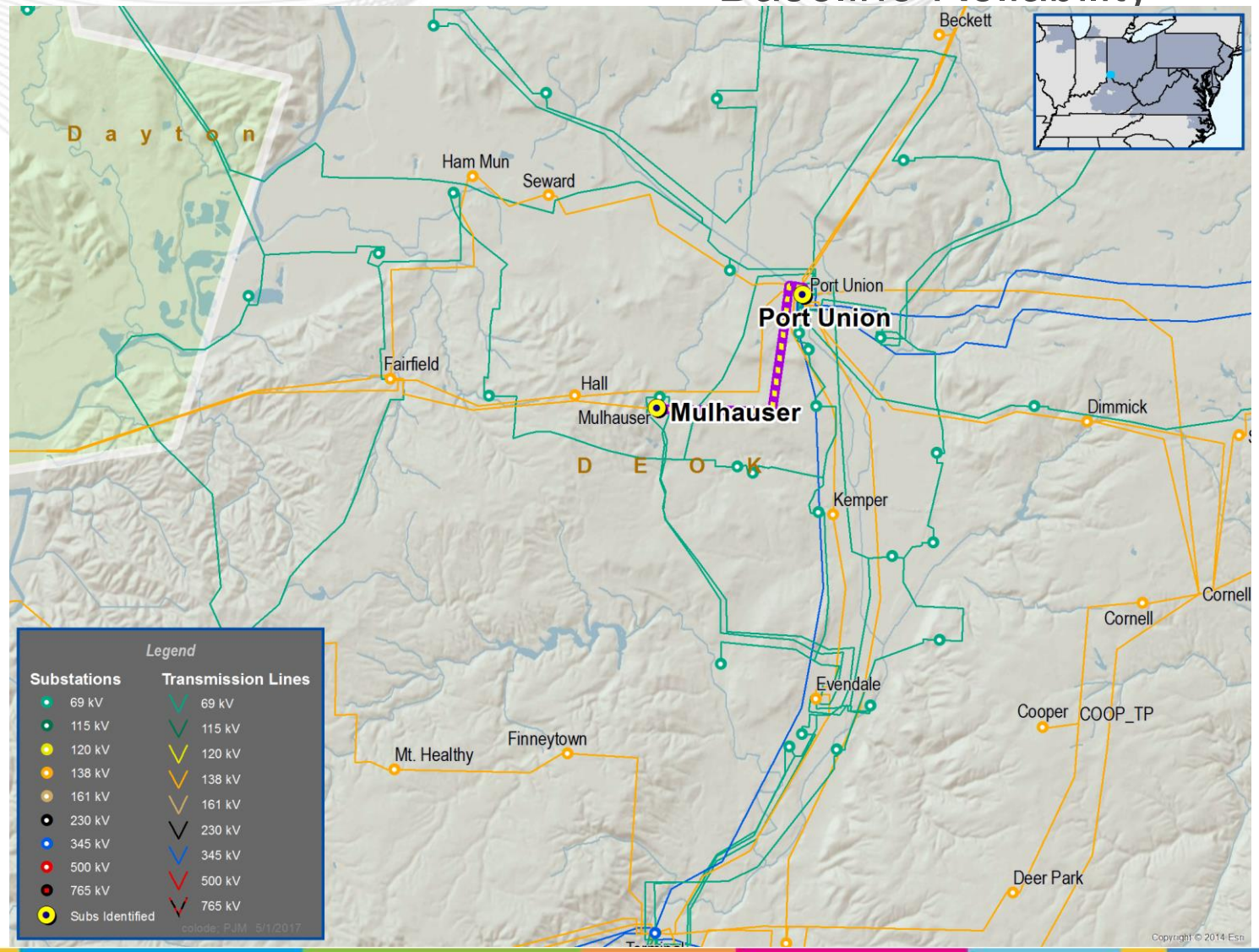
Required IS date: 6/1/2021

Recommended Solution:

Reconductor the Port Union – Mulhauser 138kV line with 954ASCR bringing the summer ratings to A/B/C=300/300/300 MVA. (B2901)

Estimated Project Cost: $4.4M

Required IS date: 6/1/2021



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EKPC Transmission Zone Baseline Reliability

Baseline Reliability - Project Replacement (B2785)

Previously Presented: 5/31/2017 SRTEAC

Problem Statement:

Potential industrial load continues to grow (2.5MW – 7MW) over the next couple of years at will cause low voltage violations at Asahi, Shopville, and Woodstock substations for the loss of the Norwood-Shopville 69kV line section. The original scope provides only a short term solution to the voltage issues in an area overly reliant on capacitor banks for voltage support. A new scope has been created to better serve voltage in the area, as well as serve as a buffer for the future industrial load growth

This low voltage issues now occurs in the 2018/19W, based on new load forecast data.

Cancel Existing Baseline Project:

B2785 (Presented on 12/1/2016 SRTEAC): Install a 13.776 MVAR 69 kV Capacitor Bank at Three Links Jct.

Project Cost Estimate: $0.35M

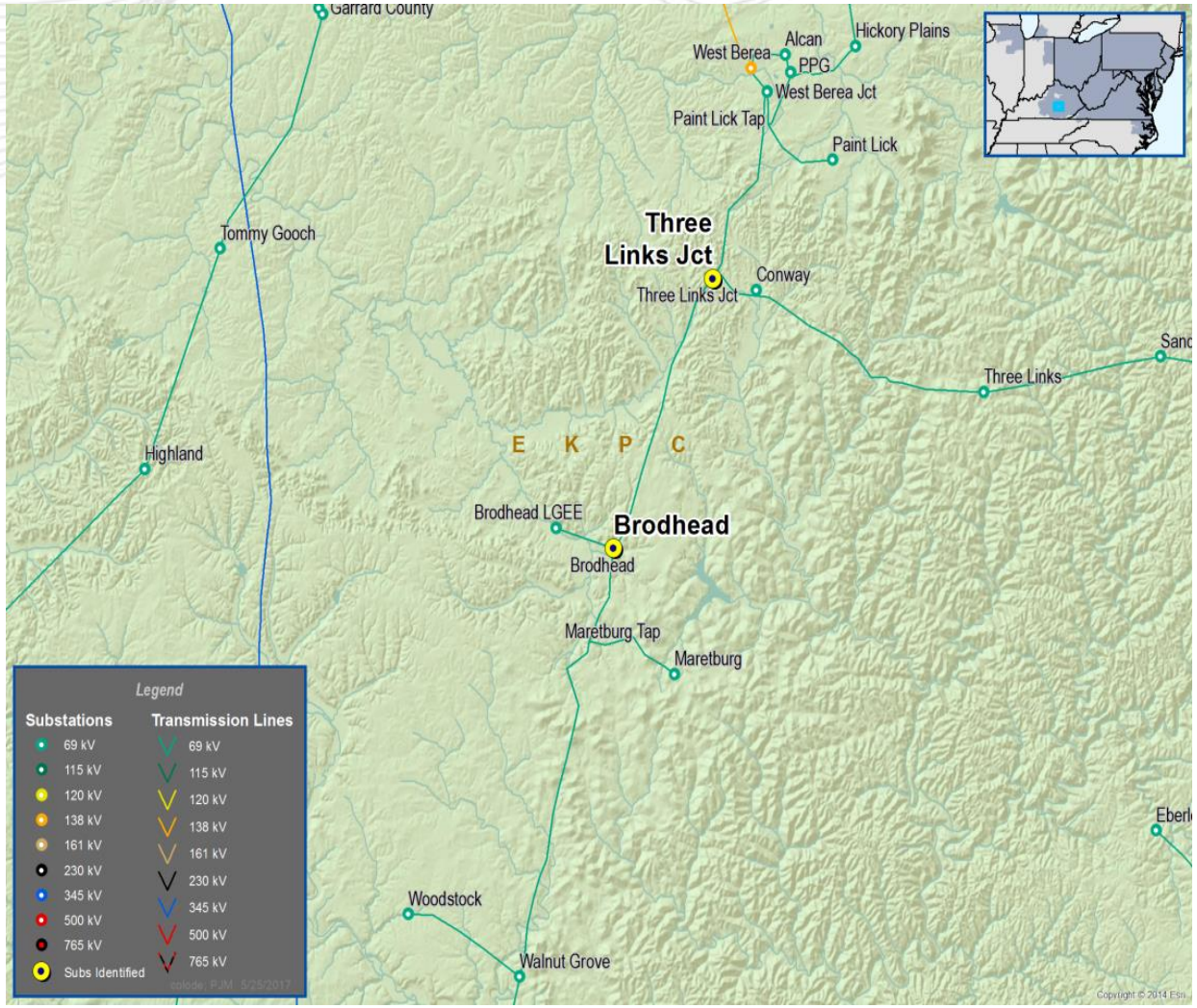
Required IS date: 12/1/2017

Replace existing project with the following preliminary solution:

Rebuild the Brodhead - Three Links Jct. 69 kV line section (8.2 miles) using 556.5 MCM ACTW wire. (B2902)

Project Cost Estimate: $4.715M

Required IS date: 12/1/2018



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

Problem Statement:

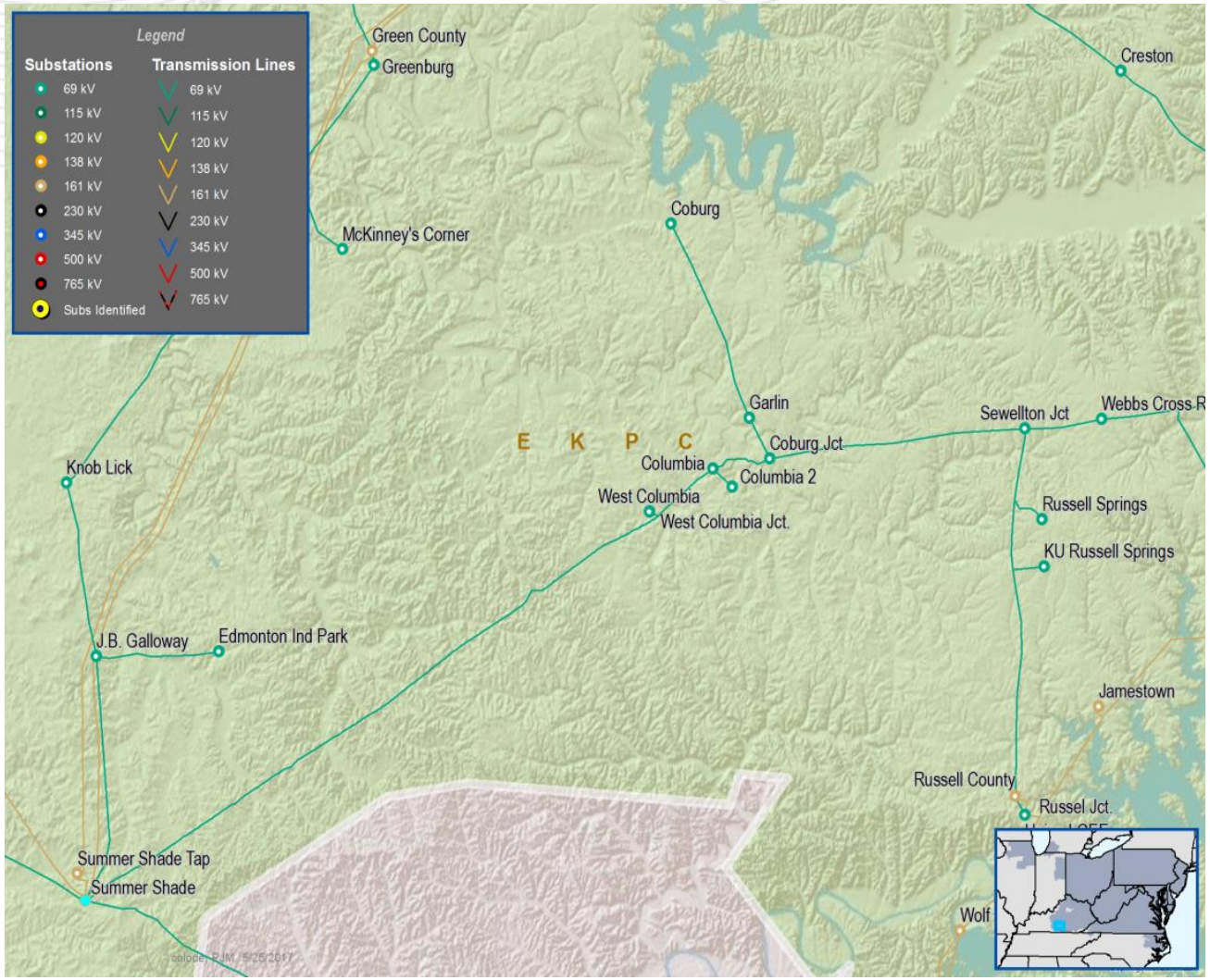
Low voltage at the Coburg 69 kV station during an outage of the Coburg to Sewellton Jct. 69 kV line section.

Recommended Solution:

Raise the V-low setting for Summer Shade 69 kV cap bank to 1.01 pu. (B2903)

Estimated Project Cost: $0

Required IS Date: 12/1/2027



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

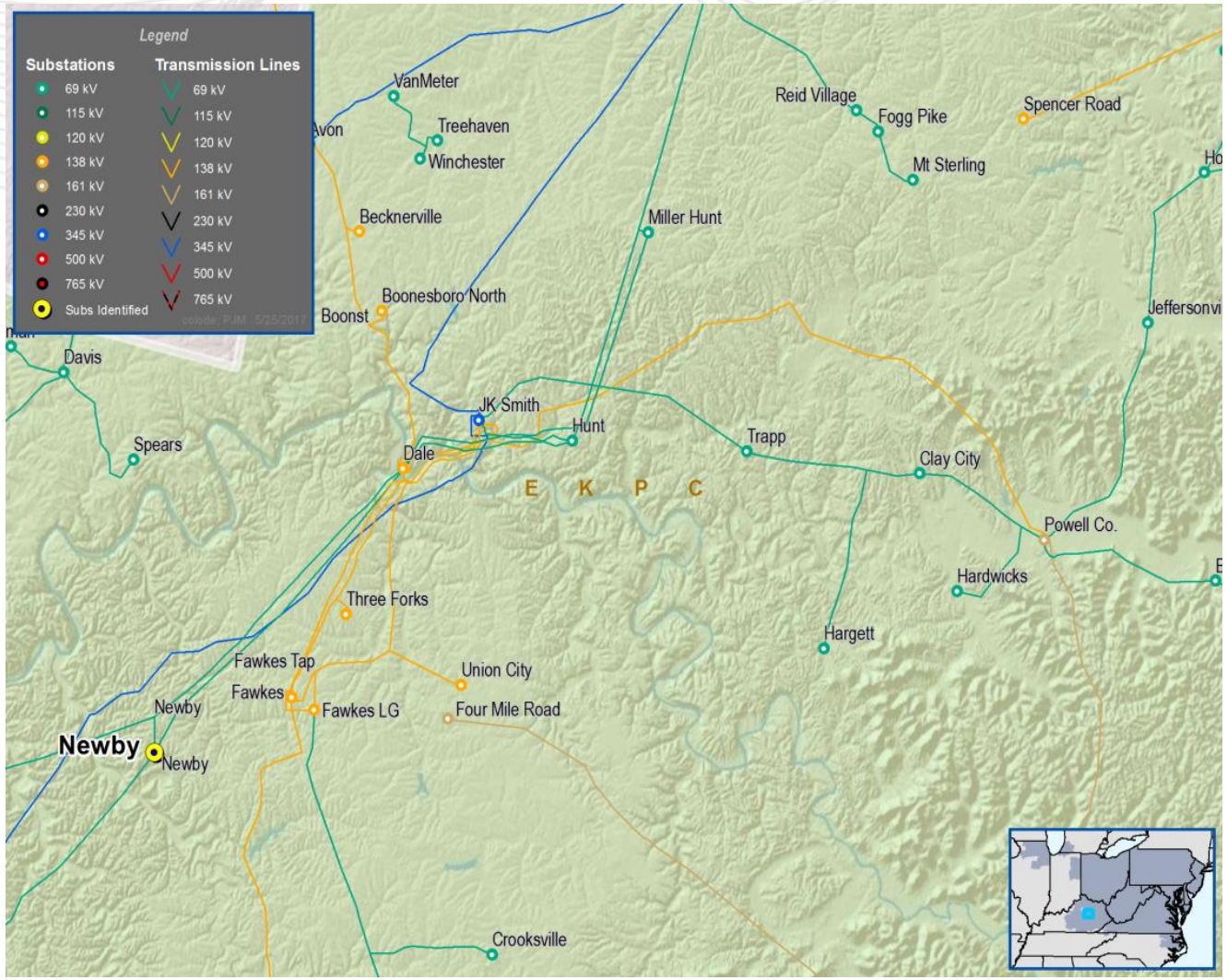
Low voltage at the Mt. Sterling 69 kV station during the loss of the Dale 138-69 kV transformer.

Recommended Solution:

Raise the V-low setting for Newby 69 kV cap bank to 0.955 pu (B2904)

Estimated Project Cost: $0

Required IS Date: 12/1/2026



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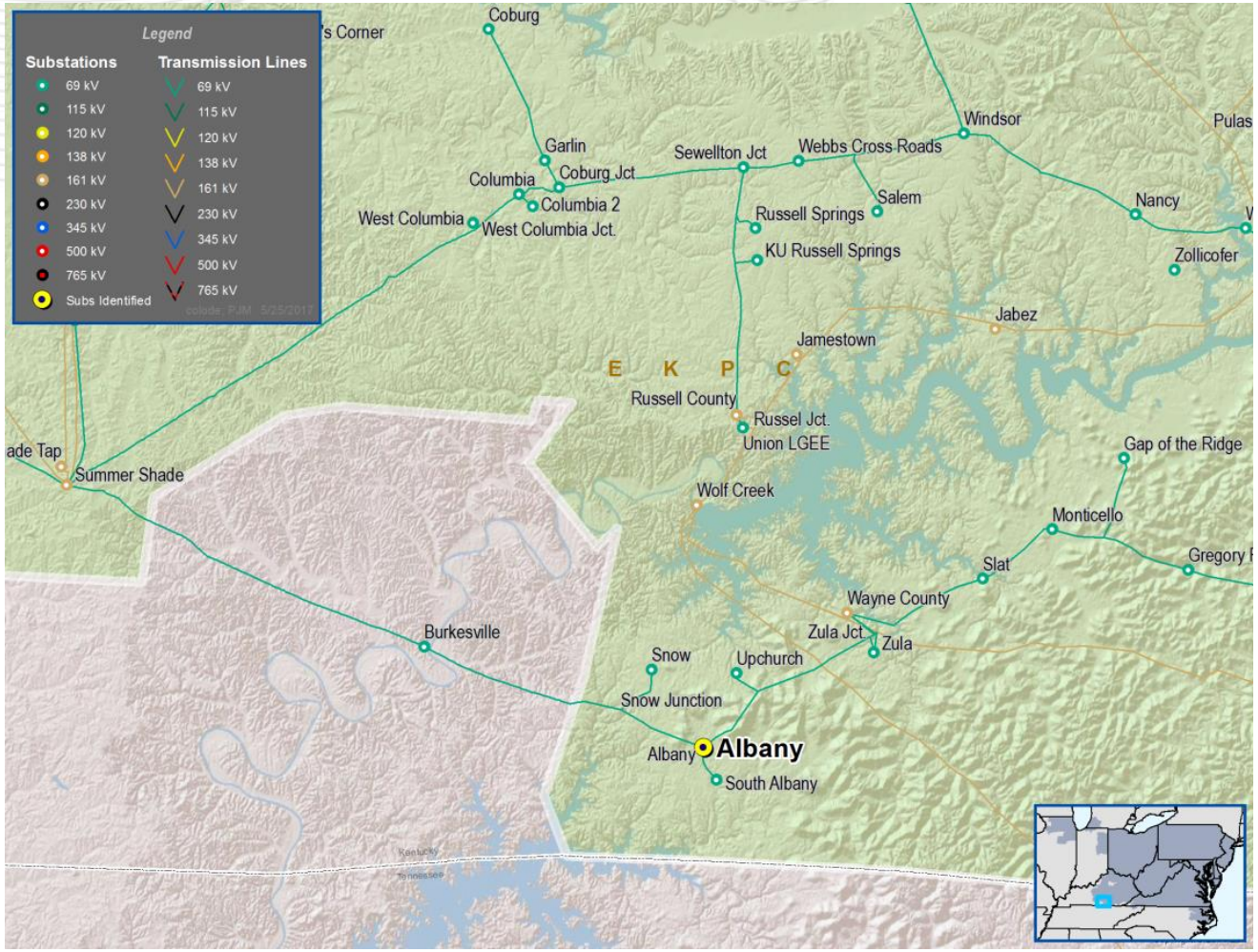
Baseline Reliability - TO Criteria Violation
Previously Presented: 5/31/2017 SRTEAC

Low voltage at the Upchurch 69 kV station during the loss of the Zula Jct. – Upchurch Tap 69 kV line section.

Recommended Solution:
Resize the Albany 69 KV capacitor bank from 8.4 to 13.776 MVAR. (B2905)

Estimated Project Cost: $0.09M

Required IS Date: 6/1/2026



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

Overload of the Baker Lane-Holloway Jct 69 kV line section during the loss of the Avon - Fayette 138 kV line.

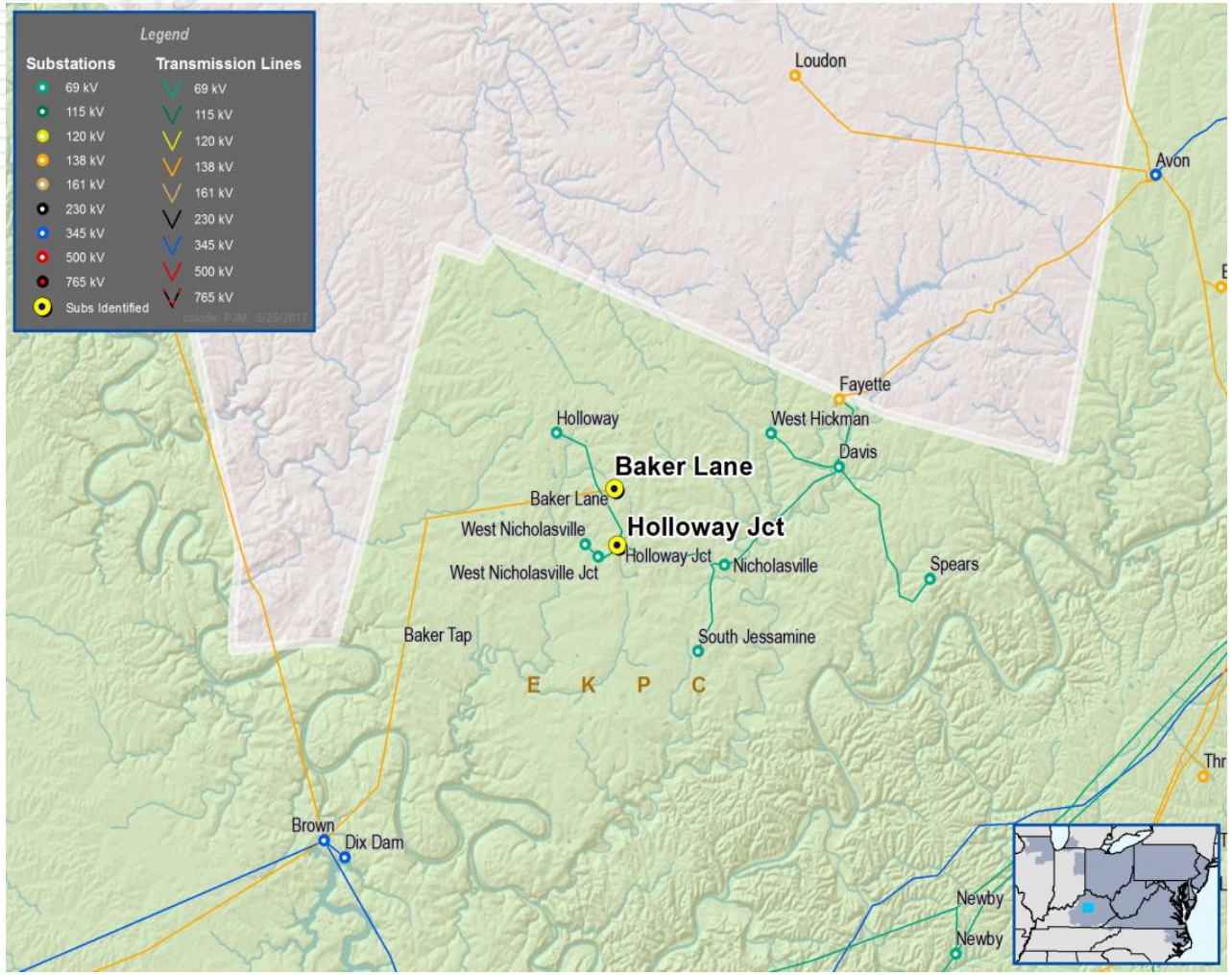
Recommended Solution: Increase the Zone 3 distance relay setting at Baker Lane associated with the Baker Lane-Holloway Jct. 69 kV line to at least 142 MVA LTE Winter. (B2906)

Alternatives Considered:

No other alternatives considered.

Estimated Project Cost: $0

Required IS Date: 12/1/2018



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EKPC Transmission Zone Baseline Reliability

Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

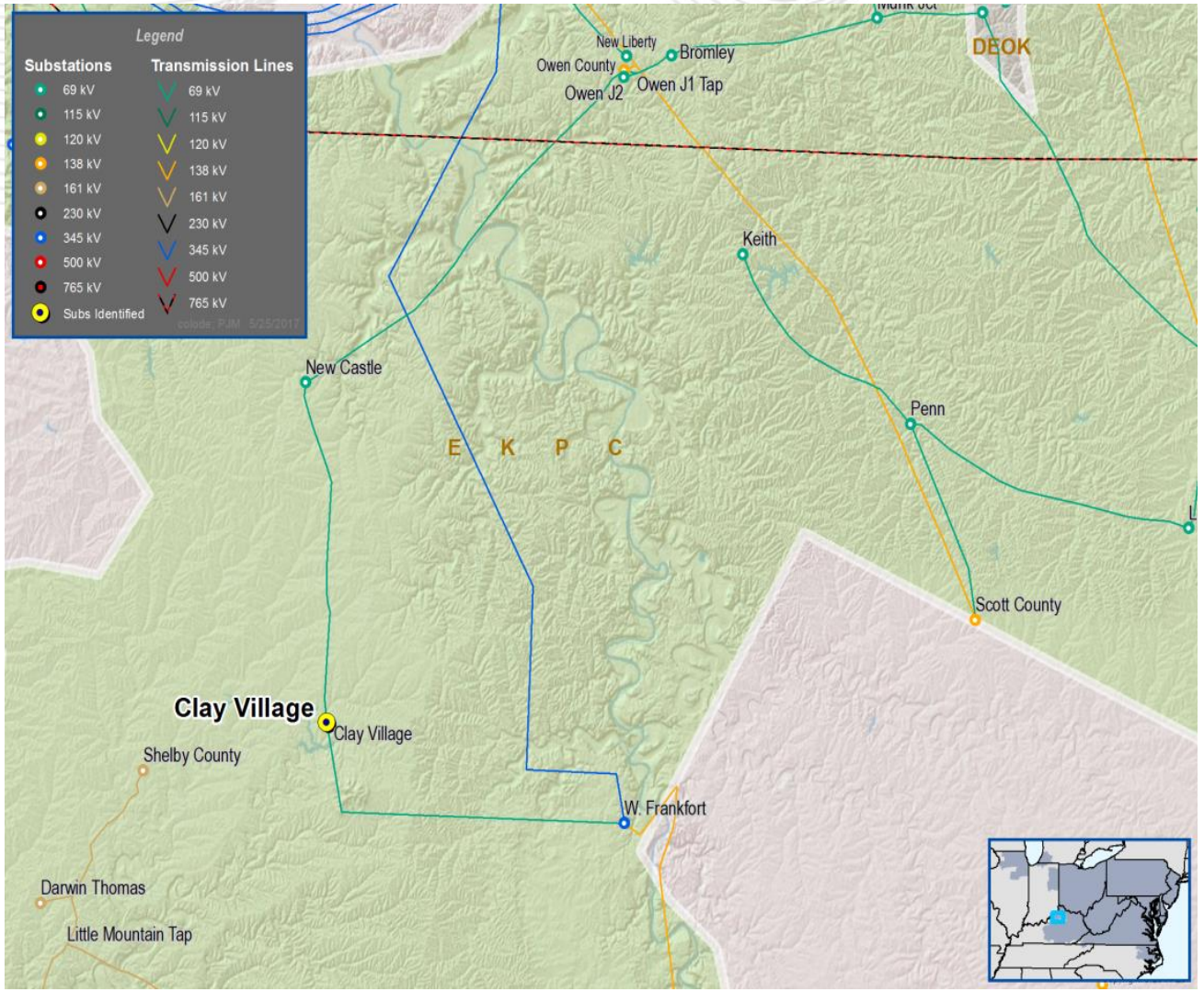
Overload of Clay Village - KU Clay Village 69 kV Tap during an outage of the KU Ghent – Owen Co- Scott Co 138 kV line section.

Recommended Solution:

Upgrade the metering CT associated with the Clay Village - KU Clay Village 69 kV Tap line section to 600 A; at least 64 MVA Winter LTE; Upgrade the distance relay associated with the Clay Village - KU Clay Village 69 kV Tap line section to at least 64 MVA Winter LTE. (B2907)

Estimated Project Cost: $0.125M

Required IS Date: 12/1/2024



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

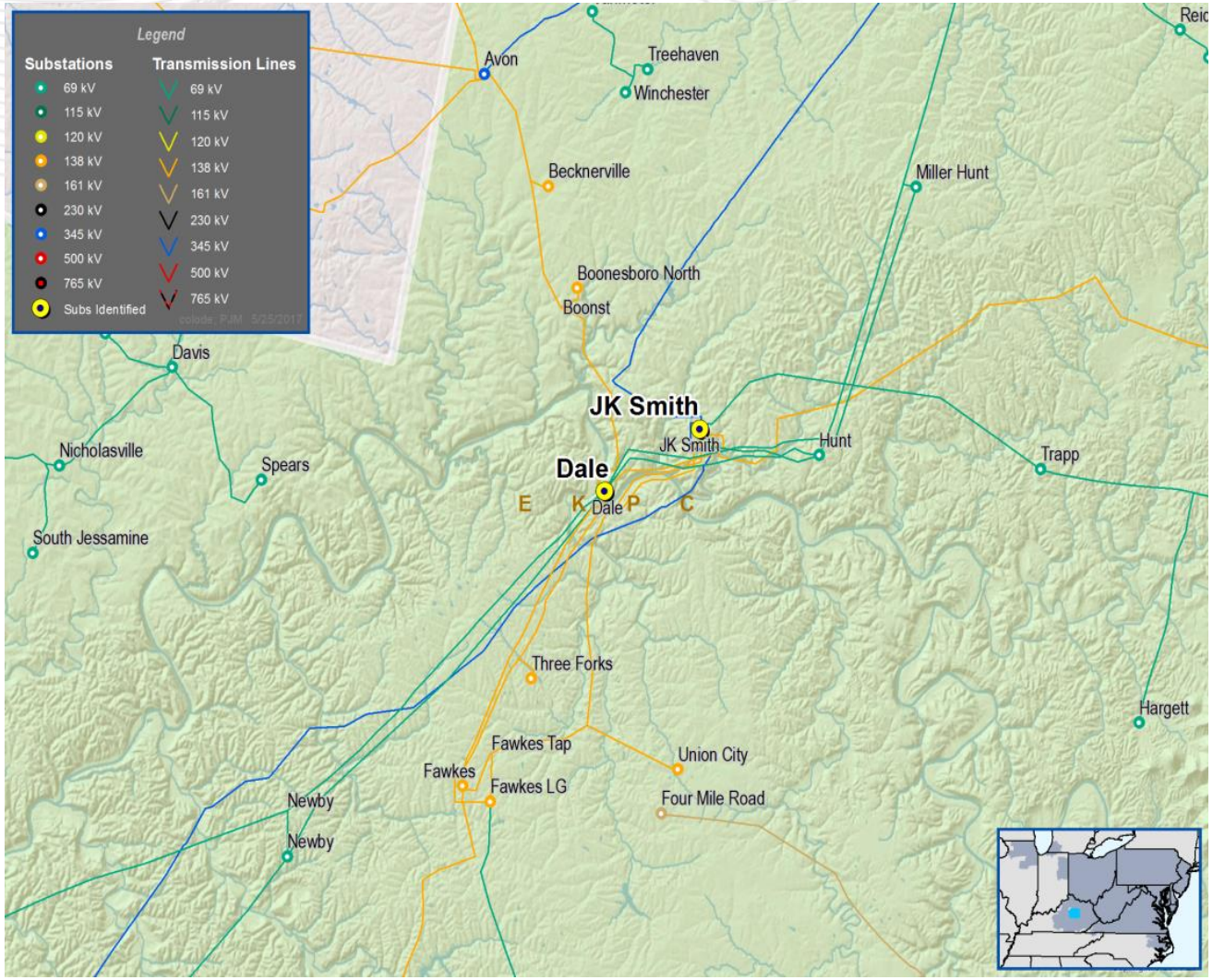
Overload of the Dale - JK Smith 138 kV line section.

Recommended Solution:

Upgrade the distance relay associated with Dale-JK Smith 138 kV line section to 362 MVA normal rating. (B2908)

Estimated Project Cost: $0

Required IS Date: 12/1/2027



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EKPC Transmission Zone Baseline Reliability

Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

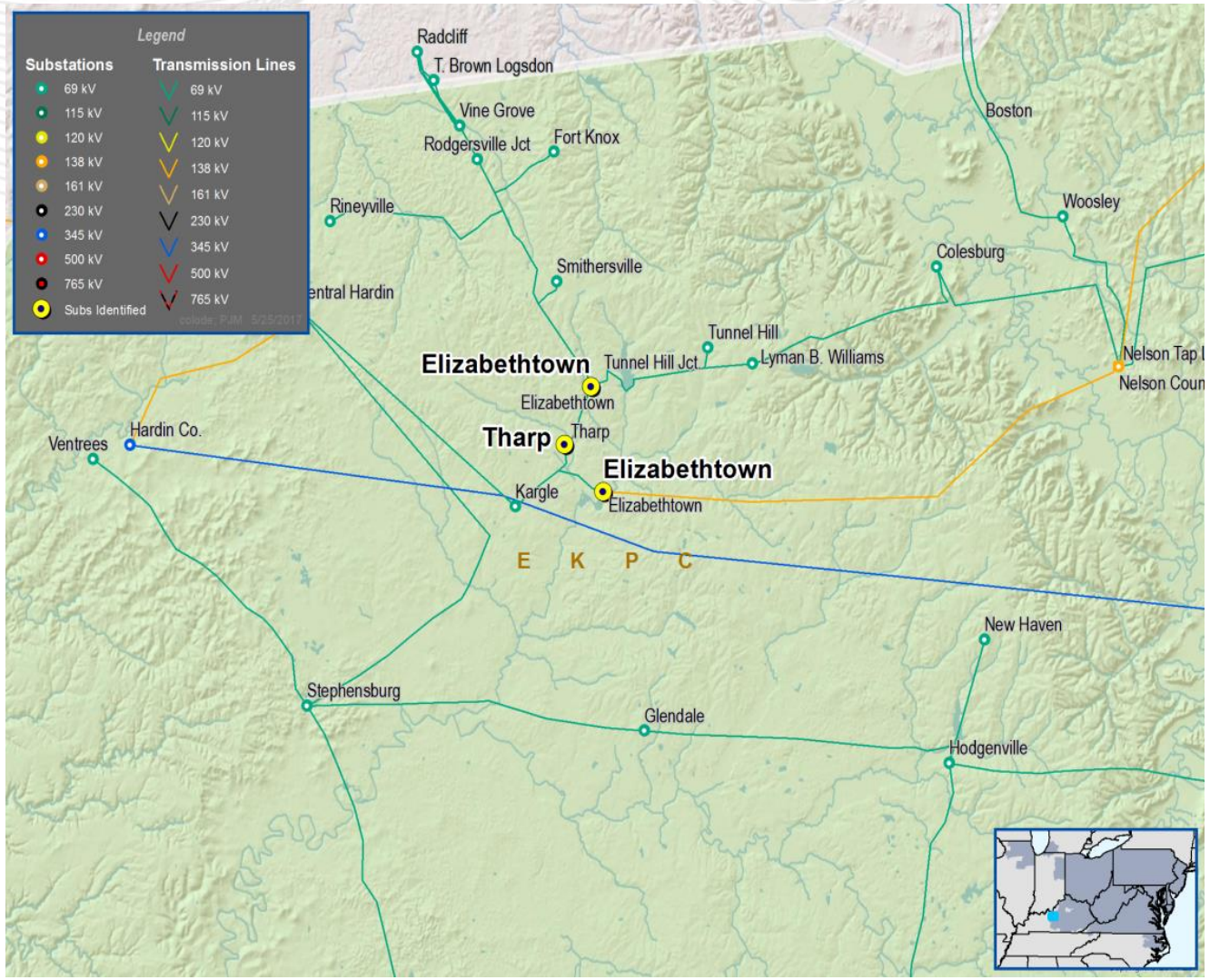
Overload of Elizabethtown #2 - Tharp 69 kV Tap line section during the loss of KU Rogersville - Rogersville Junction 69 kV line.

Recommended Solution:

Increase the MOT of the EKPC Elizabethtown - Tharp Tap 69 kV line section (1.7 miles) to 302°F. (LTE at 284°F) (B2909)

Estimated Project Cost: $0.2M

Required IS Date: 12/1/2026



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EKPC Transmission Zone
Baseline Reliability

Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

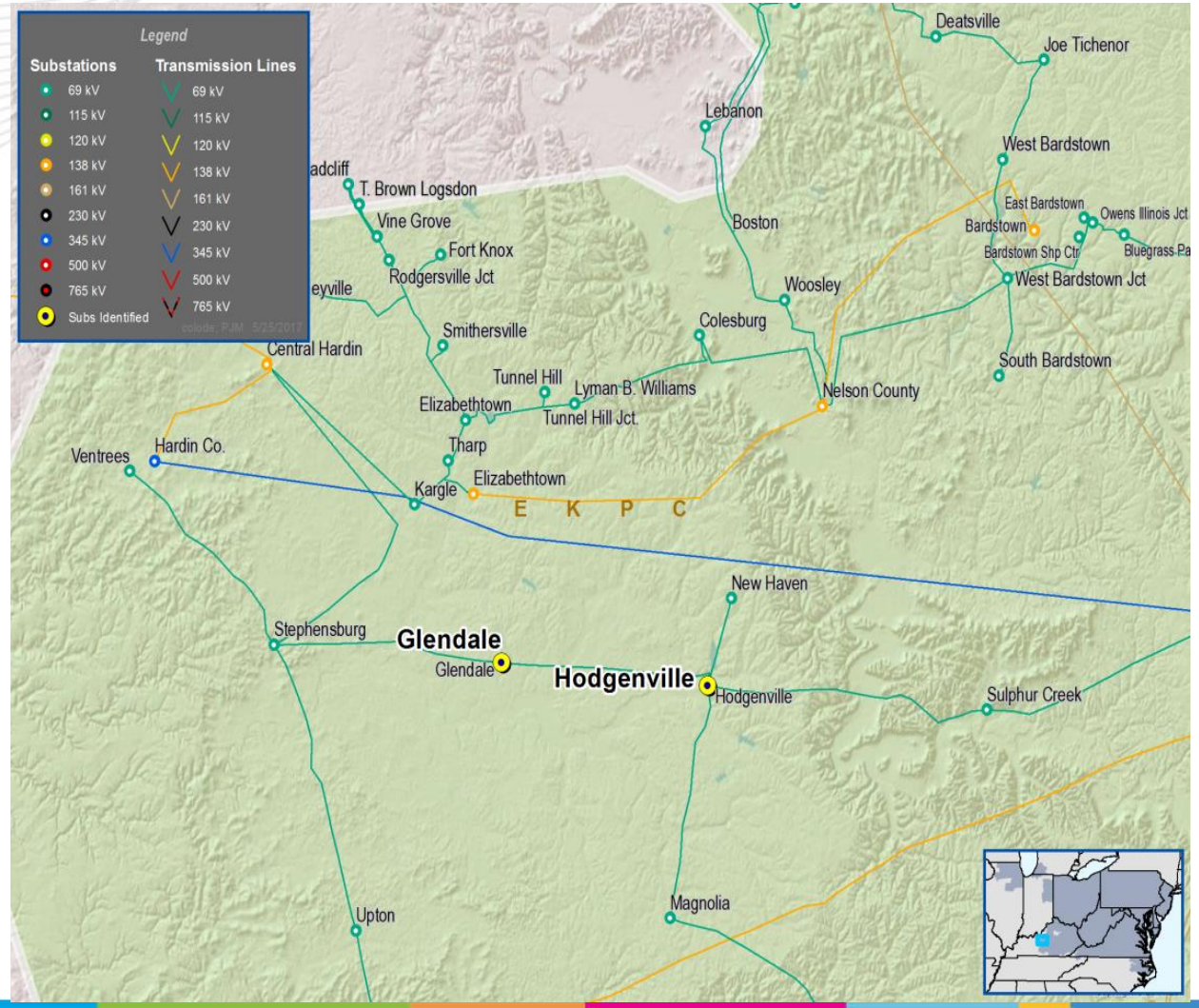
Overload of the Glendale - Hodgenville 69 kV line section during the loss of KU Elizabethtown - KU Elizabethtown #4 69 kV line section.

Recommended Solution:

Upgrade the distance relay at the Hodgenville station associated with the Glendale - Hodgenville 69 kV line section to at least 90 MVA Winter LTE. (B2910)

Estimated Project Cost: $0

Required IS Date: 12/1/2026



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EKPC Transmission Zone
Baseline Reliability

Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

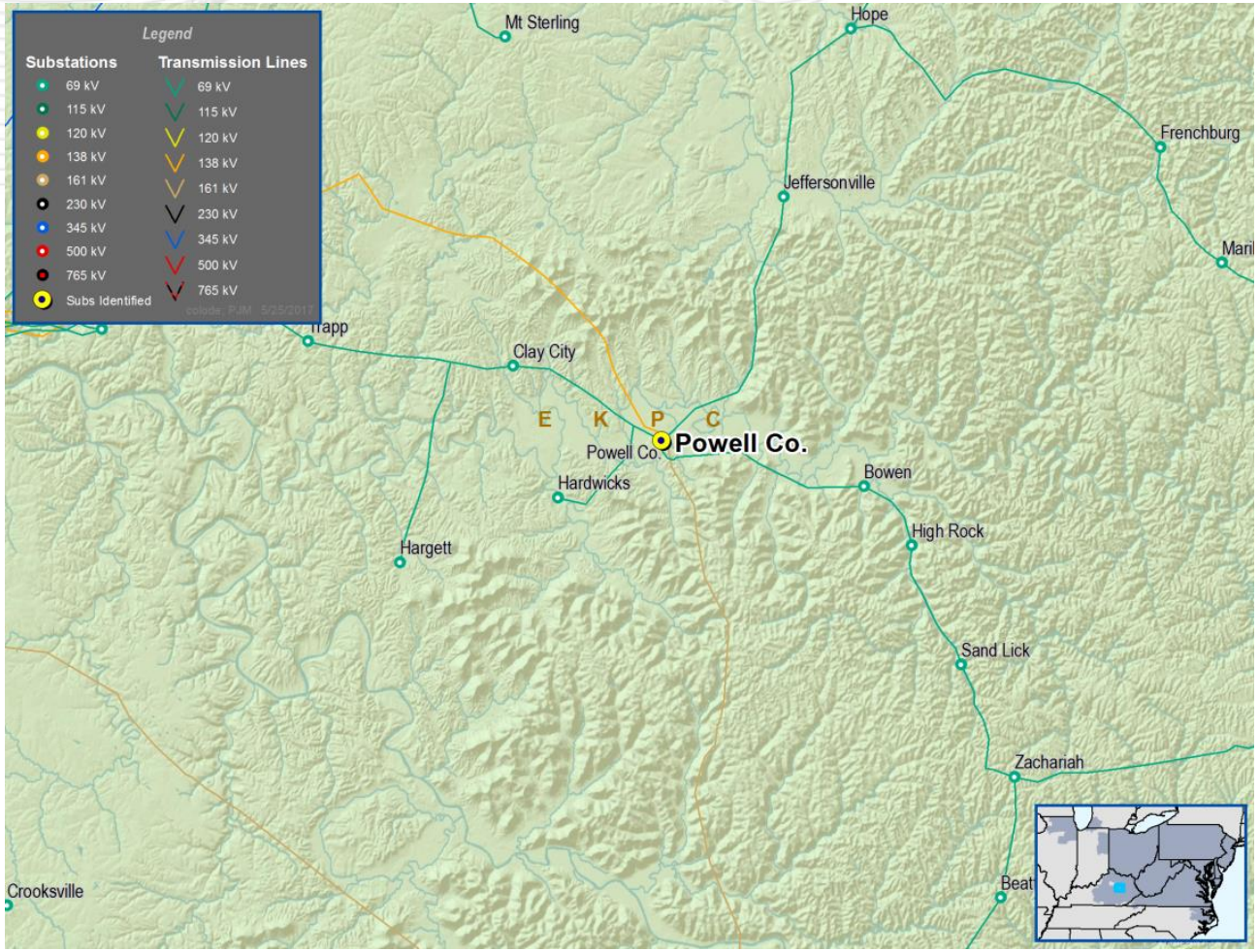
Overload of the Powell County 138-69 kV transformer during the loss of the Powell County – Beattyville 161 kV line section.

Recommended Solution:

Upgrade the overcurrent relay setting associated with Powell County 138-69 kV transformer to at least 139 MVA Winter LTE. (B2911)

Estimated Project Cost: $0

Required IS Date: 12/1/2025



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EKPC Transmission Zone
Baseline Reliability

Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

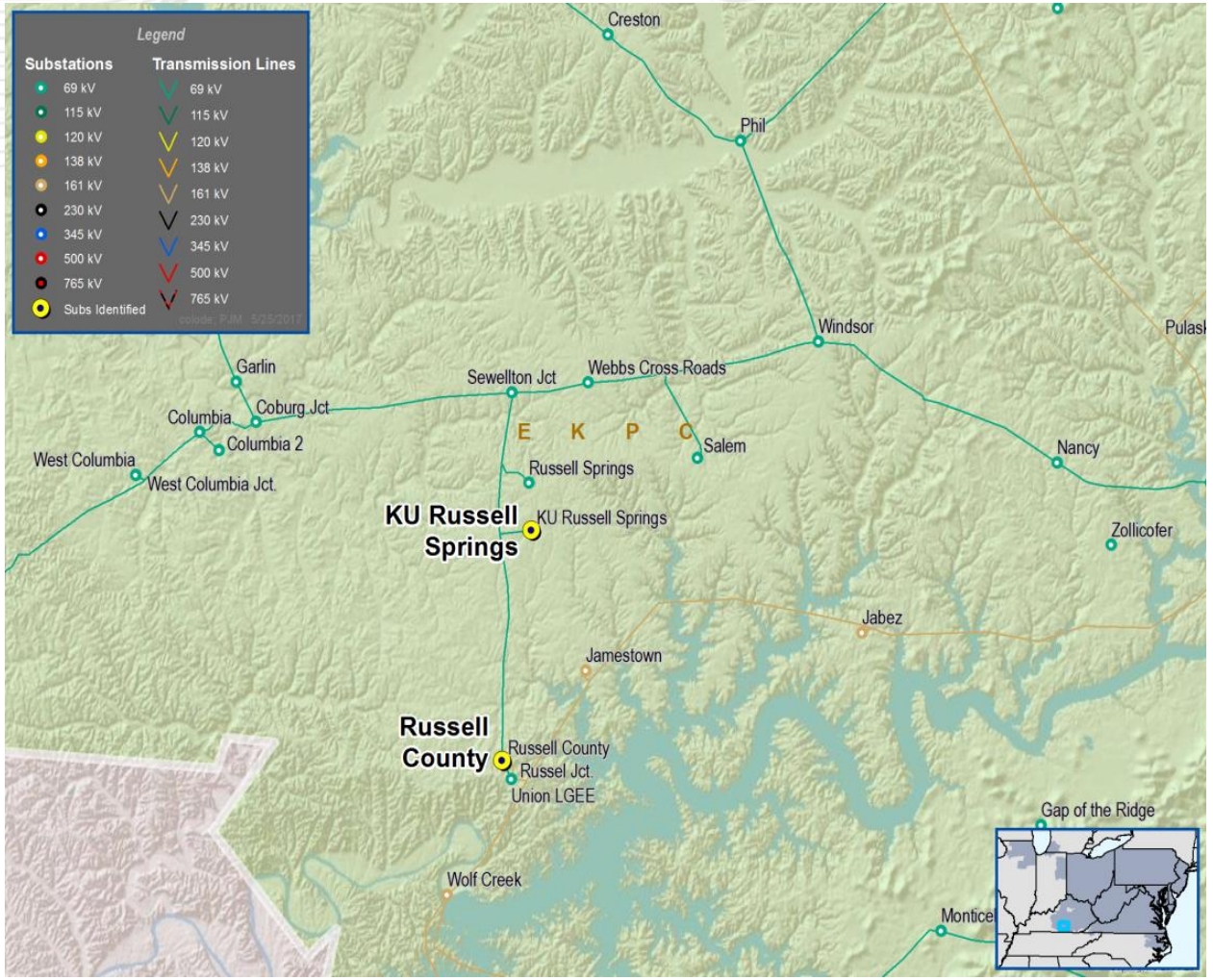
Overload of the KU Russell Springs-Russell Co 69 kV line section during the loss of the Summer Shade - West Columbia 69 kV line.

Recommended Solution:

Upgrade the existing S408-605, 600 A KU Russell Springs Tap -Russell County 69 kV disconnect switch to 1200 A. (B2912)

Estimated Project Cost: $0.15M

Required IS Date: 12/1/2025



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EKPC Transmission Zone Baseline Reliability

Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

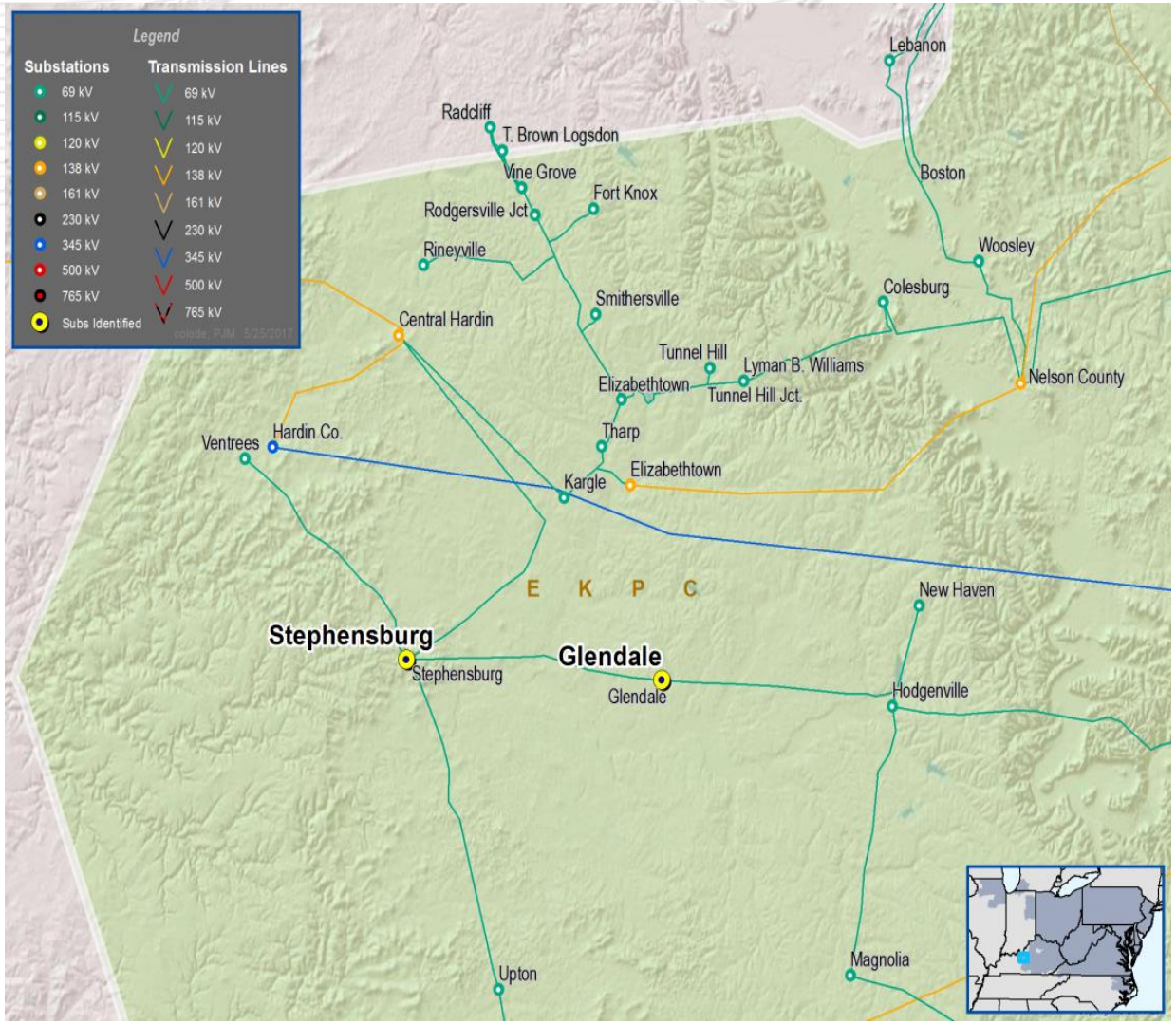
Overload of the Stephensburg-Glendale 69 kV line section during an outage of the KU Elizabethtown - KU Elizabethtown #4 69 kV line section.

Recommended Solution:

Upgrade distance relay at the Stephensburg station associated with Stephensburg - Glendale 69kV line section to at least winter LTE 100 MVA. (B2913)

Estimated Project Cost: $0

Required IS Date: 12/1/2024



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

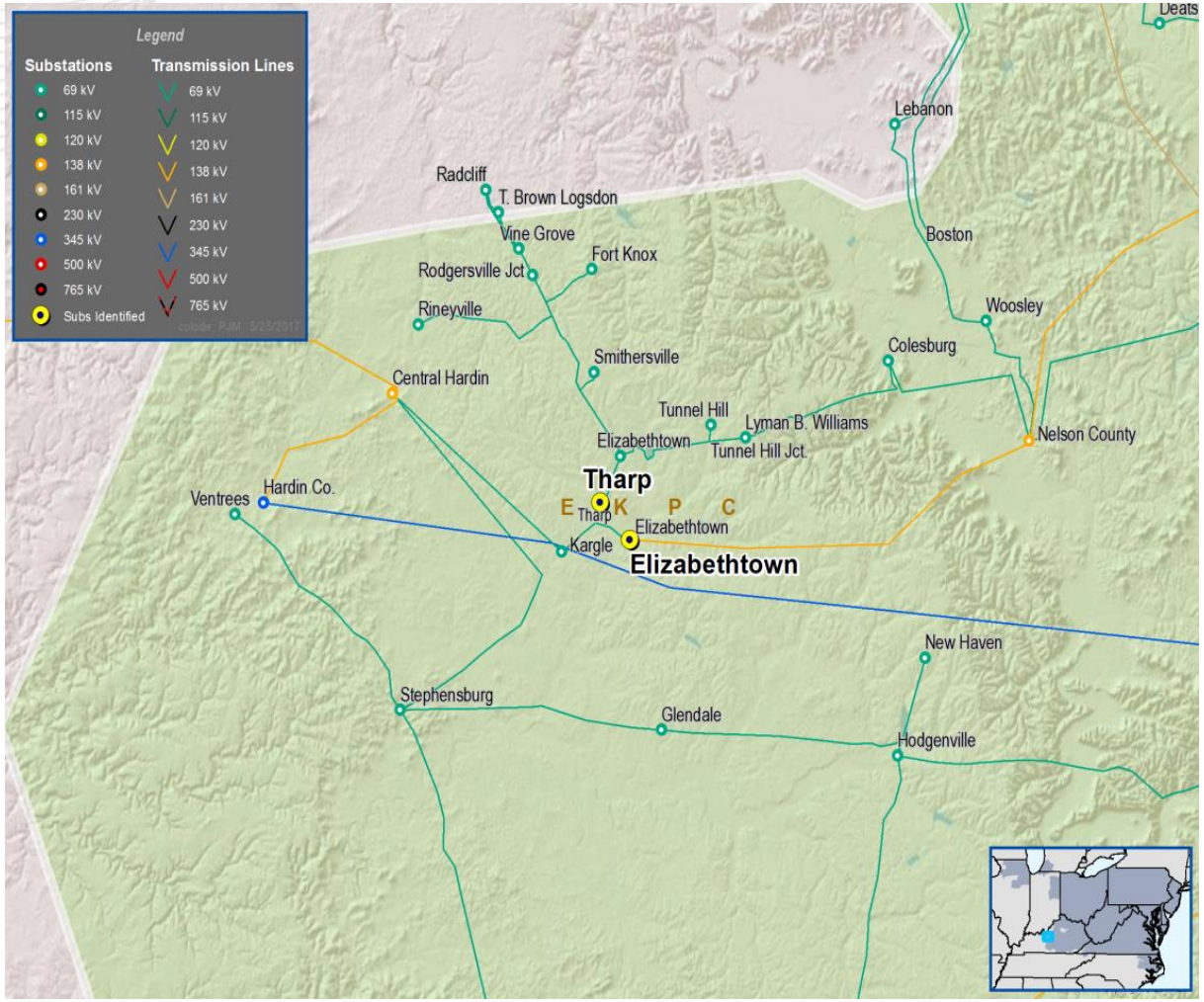
Overload of the Tharp Tap - KU Elizabethtown 69 kV line section during the loss of the Rogersville – Rogersville Jct. 69 kV line section.

Recommended Solution:

Rebuild Tharp Tap-KU Elizabethtown 69kV line section to 795 MCM (2.11 miles). (B2914)

Estimated Project Cost: $1.22M

Required IS Date: 12/1/2024



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

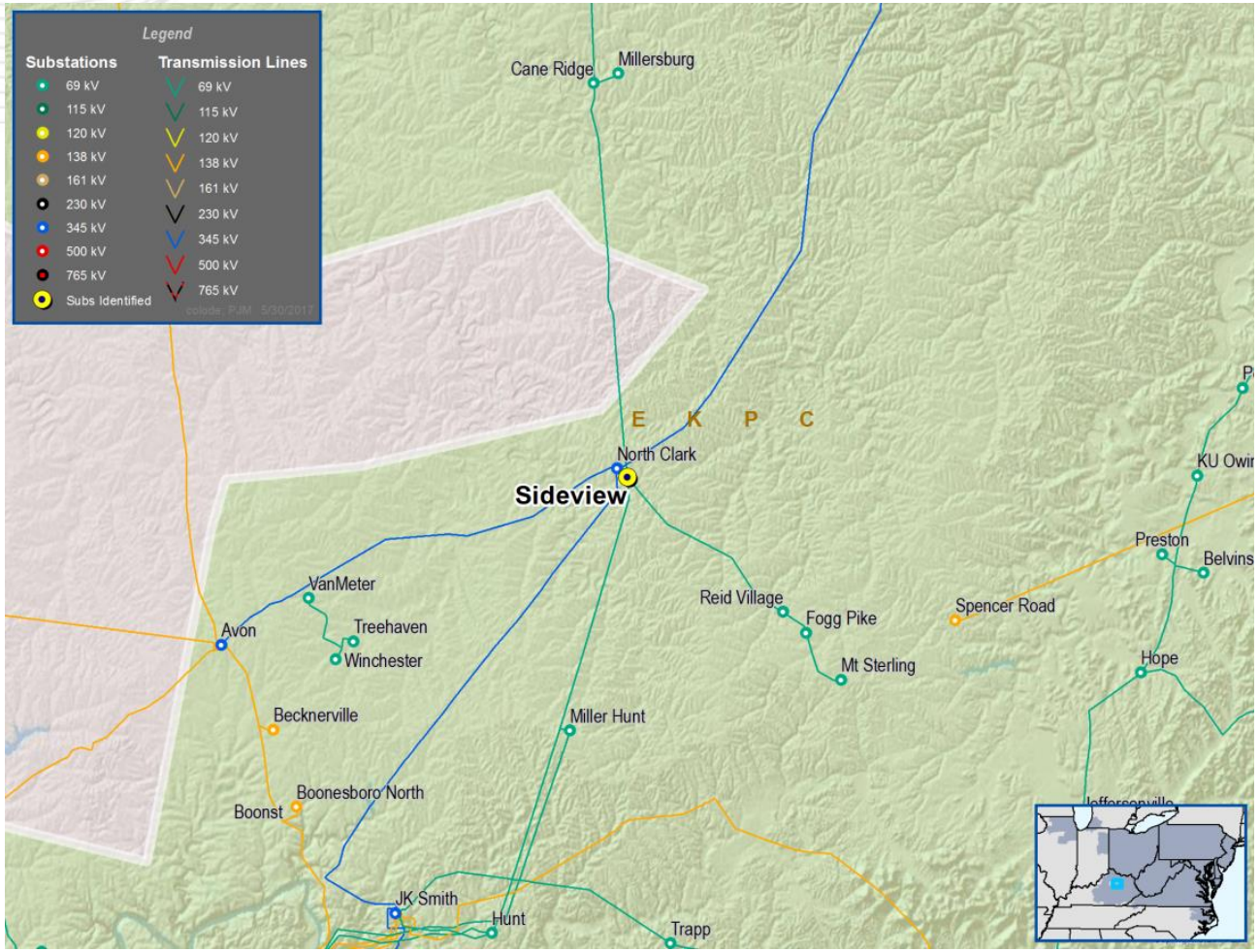
Low voltage at the Mt. Sterling substation for the loss of the Dale 138-69 kV transformer.

Recommended Solution:

Resize the Sideview 69 kV capacitor bank from 6.12 MVAR to 9.18 MVAR. (B2915)

Estimated Project Cost: $0.07M

Required IS Date: 12/1/2023



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

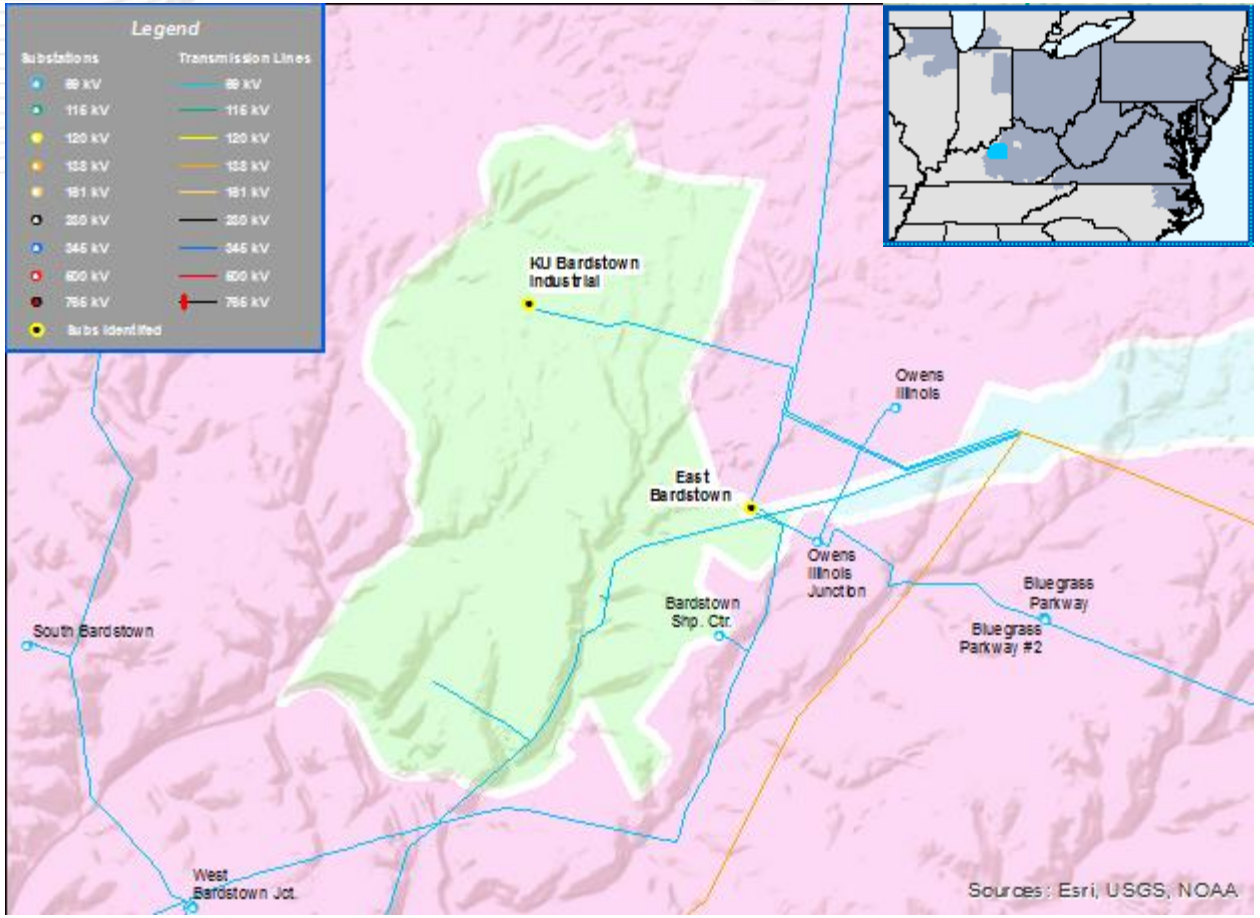
Overload of the East Bardstown - KU Bardstown Industrial 69 kV line section during the loss of the Blue Lick 345-161 kV transformer and associated operating guide

Recommended Solution:

Upgrade the existing metering CTs (Quantity of 2) associated with the East Bardstown - KU Bardstown Industrial Tap 69 kV line section to 1200 A, at least 100 MVA Winter LTE; and upgrade the existing East Bardstown bus and jumpers from 4/0 to 500 MCM Copper (B2916)

Estimated Project Cost: $0.25M

Required IS Date: 12/1/2023



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

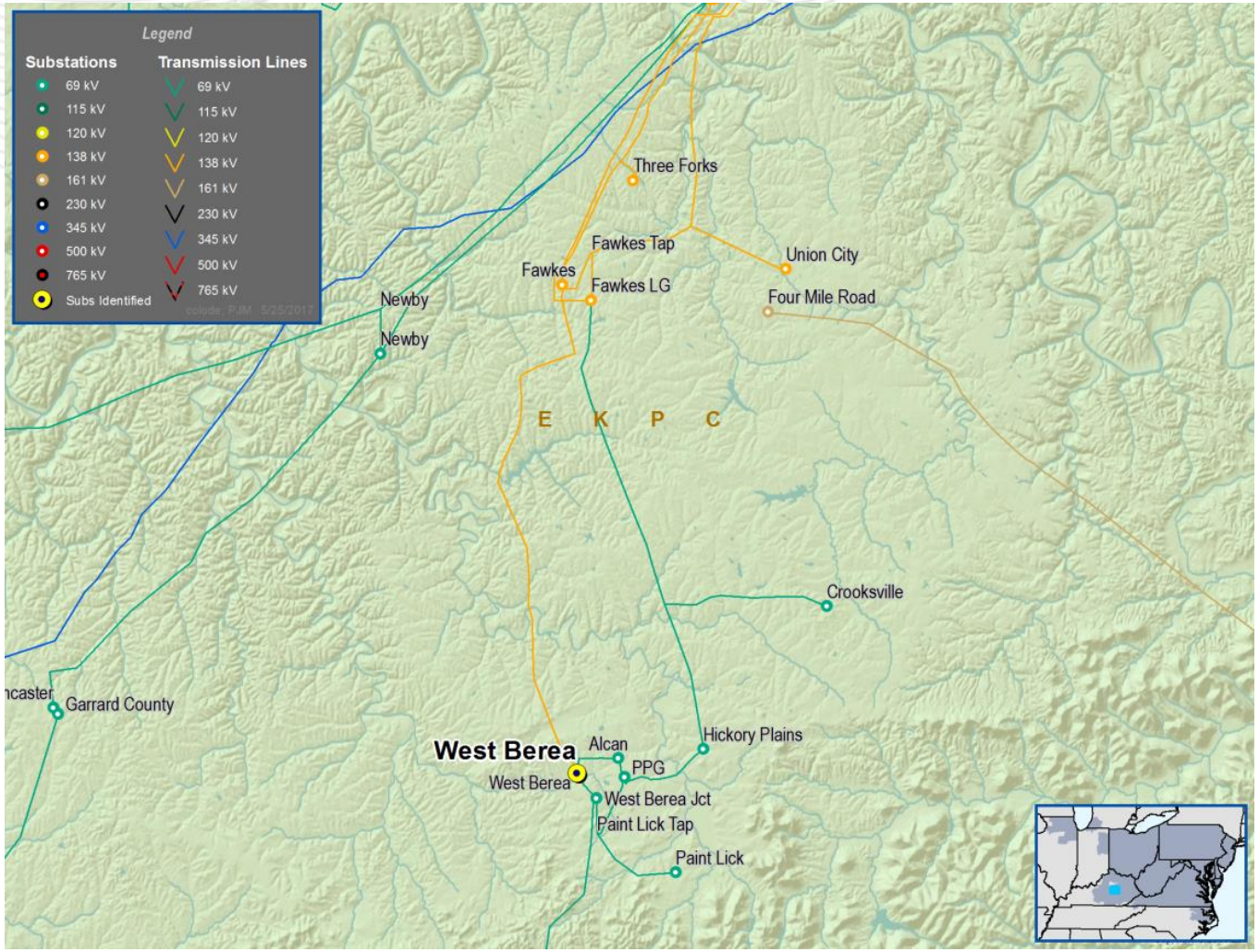
Overload of the West Berea 138-69 kV transformer during the loss of the Crookesville-Fawkes 69kV line.

Recommended Solution:

Replace the existing 100 MVA 138-69 kV transformer bank at the West Berea substation with a 150 MVA transformer. (B2917)

Estimated Project Cost: $1.725M

Required IS Date: 12/1/2026



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

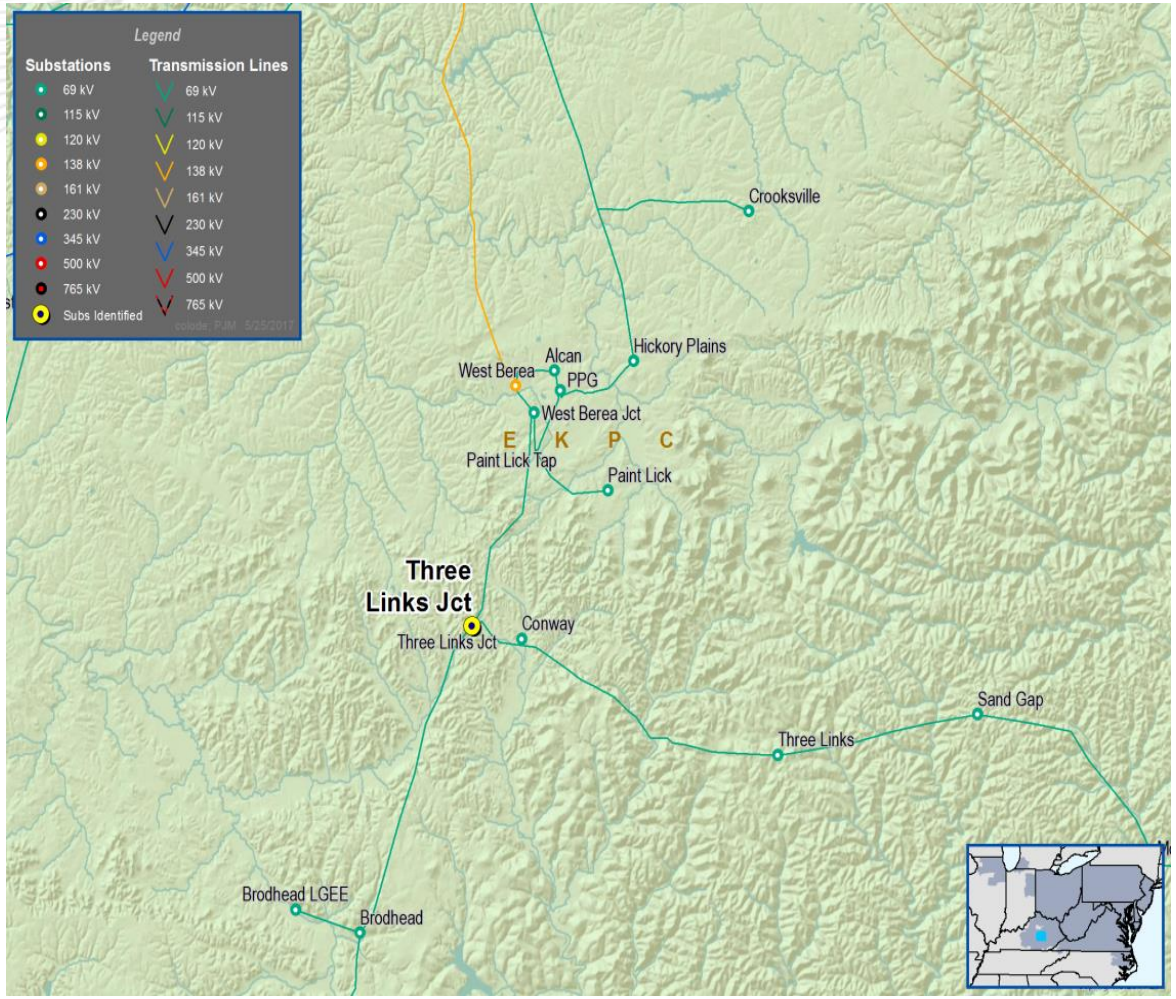
Overload of the Three Links Jct-West Berea 69 kV line section during the loss of the KU Brown North-Alcalde-Pineville 345kV line section.

Recommended Solution:

Upgrade the 4/0 bus and jumpers associated with the West Berea Jct. – Three Links Jct 69 kV line to 500 MCM copper or equivalent equipment at the Three Links Jct. substation. (B2918)

Estimated Project Cost: $0.15M

Required IS Date: 12/1/2026



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

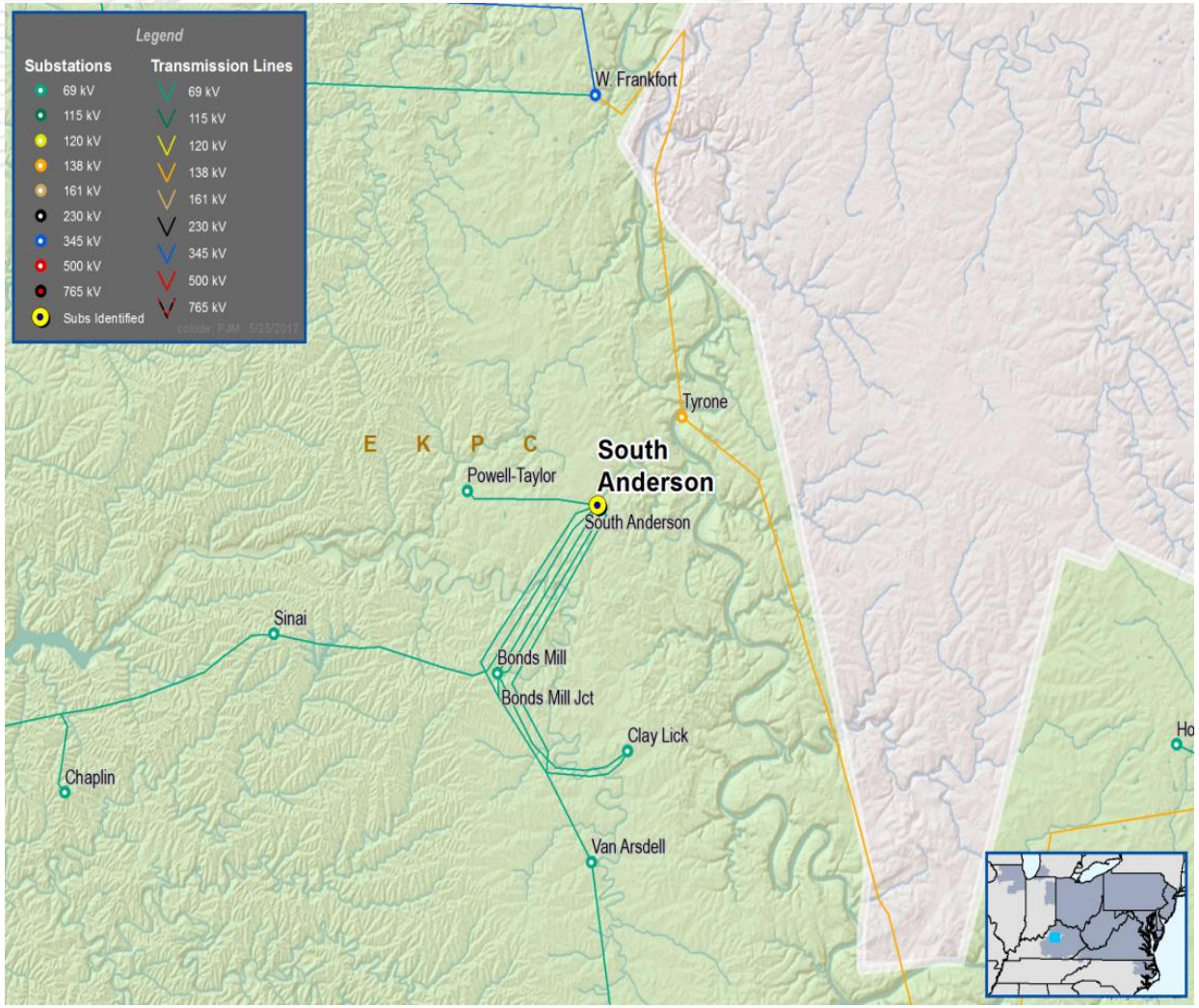
Low voltage at the Powell Taylor 69 kV station during the loss of the KU Florida Tile Tap-Lawrenceburg 69kV line section.

Recommended Solution:

Install a 69 kV, 15.31 MVAR capacitor bank at South Anderson substation. (B2919)

Estimated Project Cost: $0.365M

Required IS Date: 12/1/2026



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Baseline Reliability - TO Criteria Violation

Previously Presented: 5/31/2017 SRTEAC

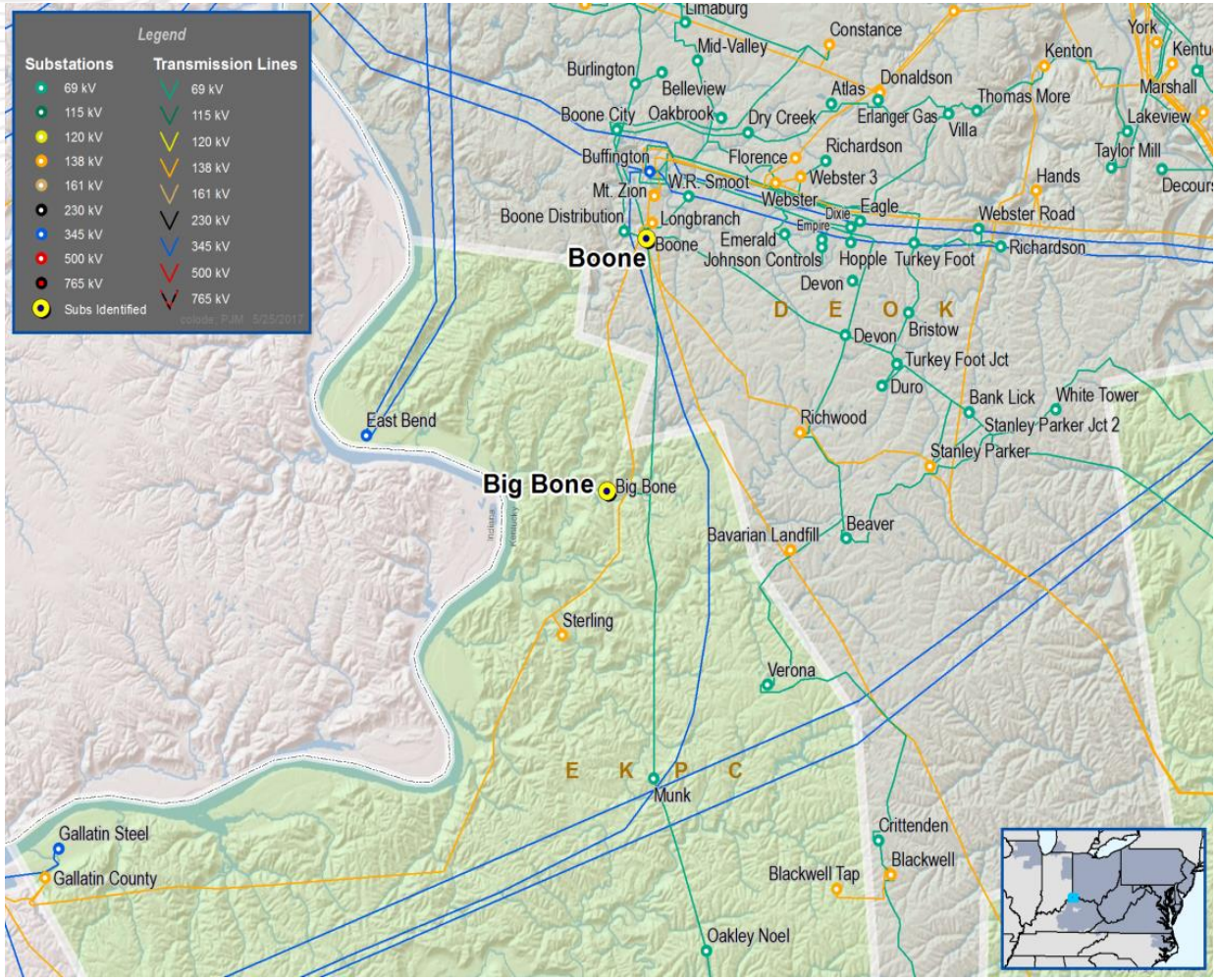
Low voltage on the EK Bromley 69 kV bus during the loss of the Owen County Jct 1 – EK Bromley 69 kV line section.

Recommended Solution:

Rebuild Boone - Big Bone Tap 69 kV line section using 556.5 MCM ACTW conductor (6.3 miles). (B2920)

Estimated Project Cost: $3.625M

Required IS Date: 12/1/2025



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EKPC Transmission Zone Supplemental Project

Project Scope Change: S1167 (Previously presented at 7/26/2016 SRRTEP - West)

Previously Presented: 5/31/2017 SRTEAC

Original Scope: Rebuild the existing 266.8 MCM ACSR Dale-Hunt 69 kV line section using 556.5 MCM ACSR/TW conductor

Original Estimated Project: $3.84M

Original Projected IS Date: 12/1/2018

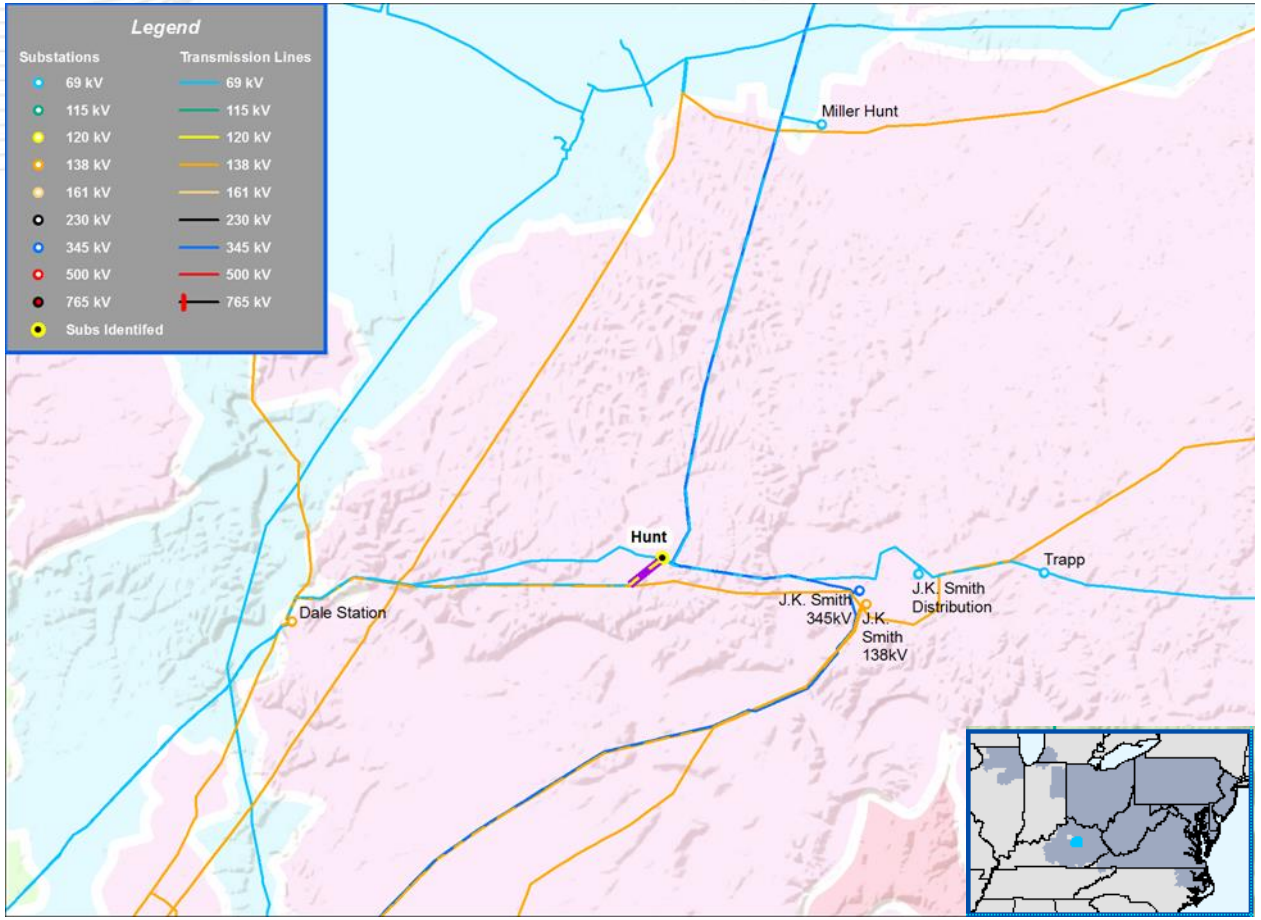
Selected New Scope: Construct a new 138-69 kV station at Hunt, including the loop in the existing Dale-JK Smith 138 KV line section. This solution includes the retirement of both of the existing Dale – Hunt 69 kV line sections.

New Estimated Project: $7.01M

New Projected IS Date:12/1/2020

Problem Statement:

Operational Flexibility and Efficiency -- EKPC's Reliability Team assessed the conductor condition on several older line sections across the system. The Dale - Hunt 69 kV Line section (~6.9 miles) is 63 years old, and the evaluation of this line section resulted in the recommendation to address it because of age and conductor condition. 6.4 miles of this line section is double circuit, and both circuits need to be addressed. When identifying a solution to address the conductor condition, EKPC also looked for alternatives that addressed other system issues in this areas. These other issues considered were: provide operational flexibility (maintenance outages, switching options), minimize transmission losses, reduce risk of simultaneous outages, make it easier to expand the system when needed in the future, and improve the condition of the Hunt distribution substation (built in 1955).



Status: Scoping

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EKPC Transmission Zone Supplemental Project

Supplemental Project

Previously Presented: 5/31/2017 SRTEAC

Problem Statement (Scope and Need/Drivers):

Customer Service -- New 5 MW load addition to a nearby Industrial Park

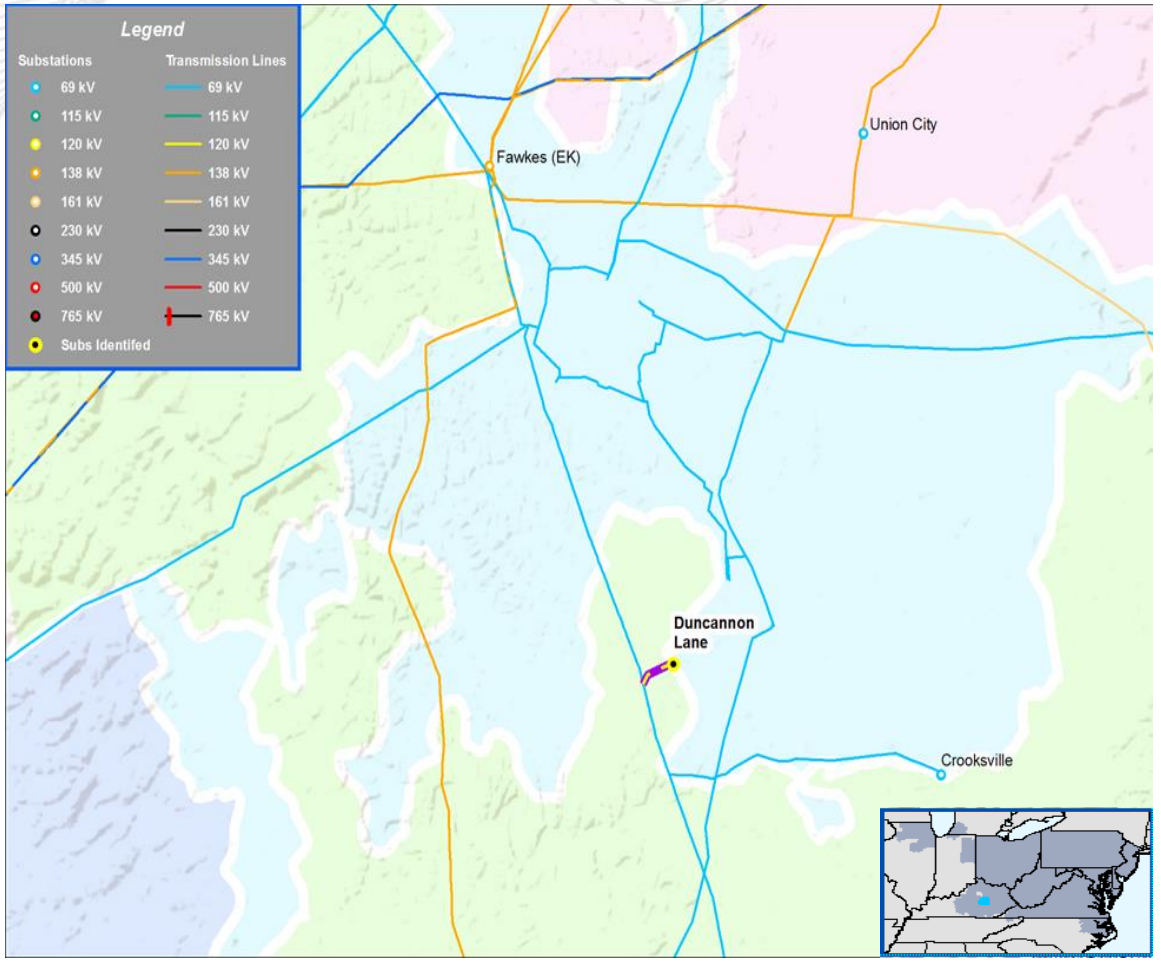
Selected Solution:

Construct a new Duncannon Lane 69-13.2 kV 12/16/20 MVA base substation between KU Fawkes-Crooksville. Tap point 7.5 mile from KU Fawkes towards Crooksville and associated 69 KV tap line (1.0 miles). (S1358)

Estimated Project Cost: $2.45M

Projected IS Date (Expected IS Date): 6/1/2018

Status: Engineering



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Supplemental Project

Problem Statement (Scope and Need/Drivers):

Equipment Material Condition, Performance and Risk --The Boone County station contains switches with cap and pin insulators, which have been known to become brittle and break. The bus and jumpers will also be replaced during this work because of age and condition related concerns. This station was built in 1956.

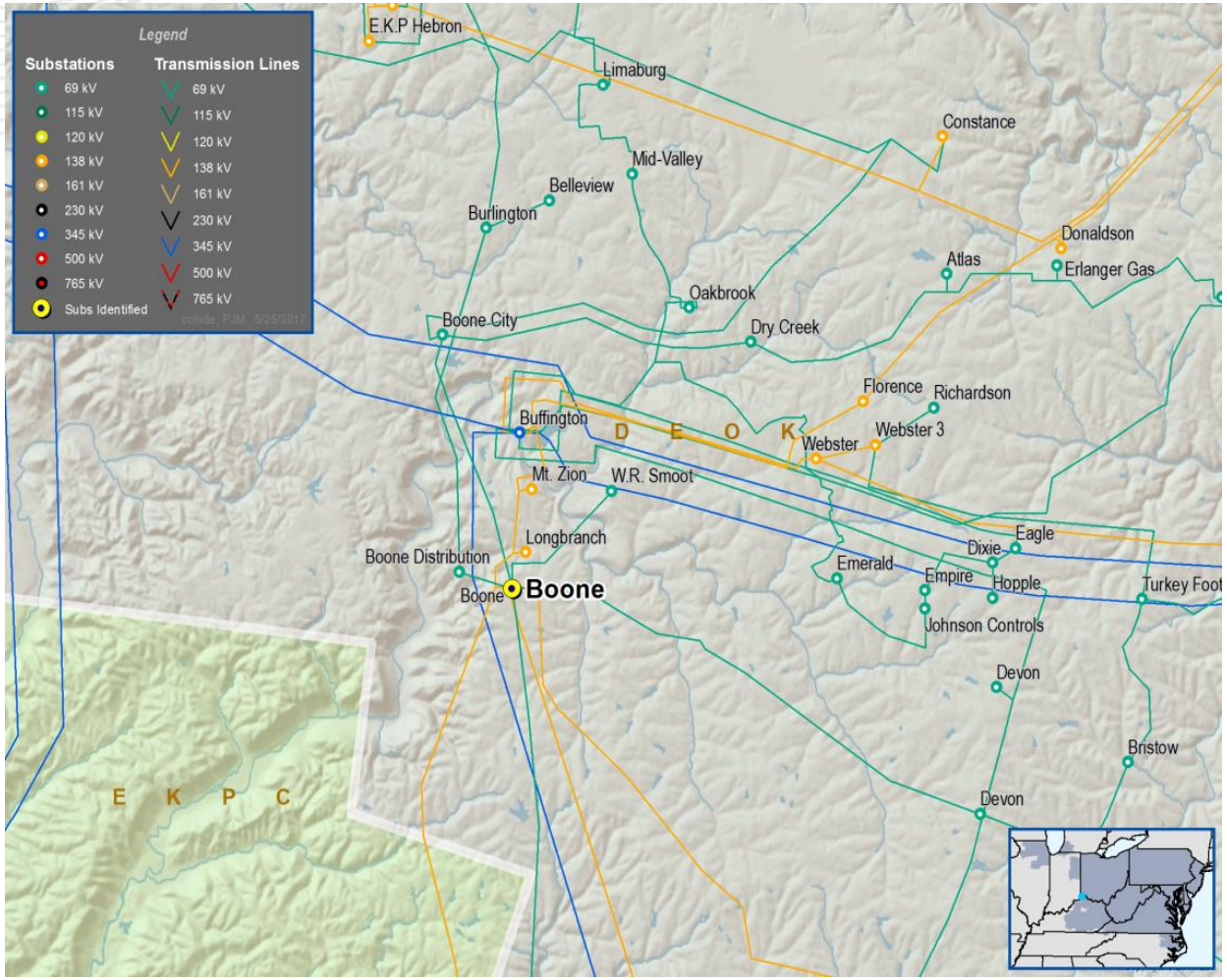
Selected Solution:

Replace all of the cap and pin insulators, switches, bus, and jumpers on the 69 kV portion of the Boone County station. (S1359)

Estimated Project Cost: $0.548M

Projected IS Date (Expected IS Date): 12/1/2017

Status: Engineering



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EKPC Transmission Zone Supplemental Project

Supplemental Project

Previously Presented: 5/31/2017 SRTEAC

Problem Statement (Scope and Need/Drivers):

Customer Service -- Overload of the Tommy Gooch 69/25KV transformer, and number of customers served from a single EKPC distribution station criteria.

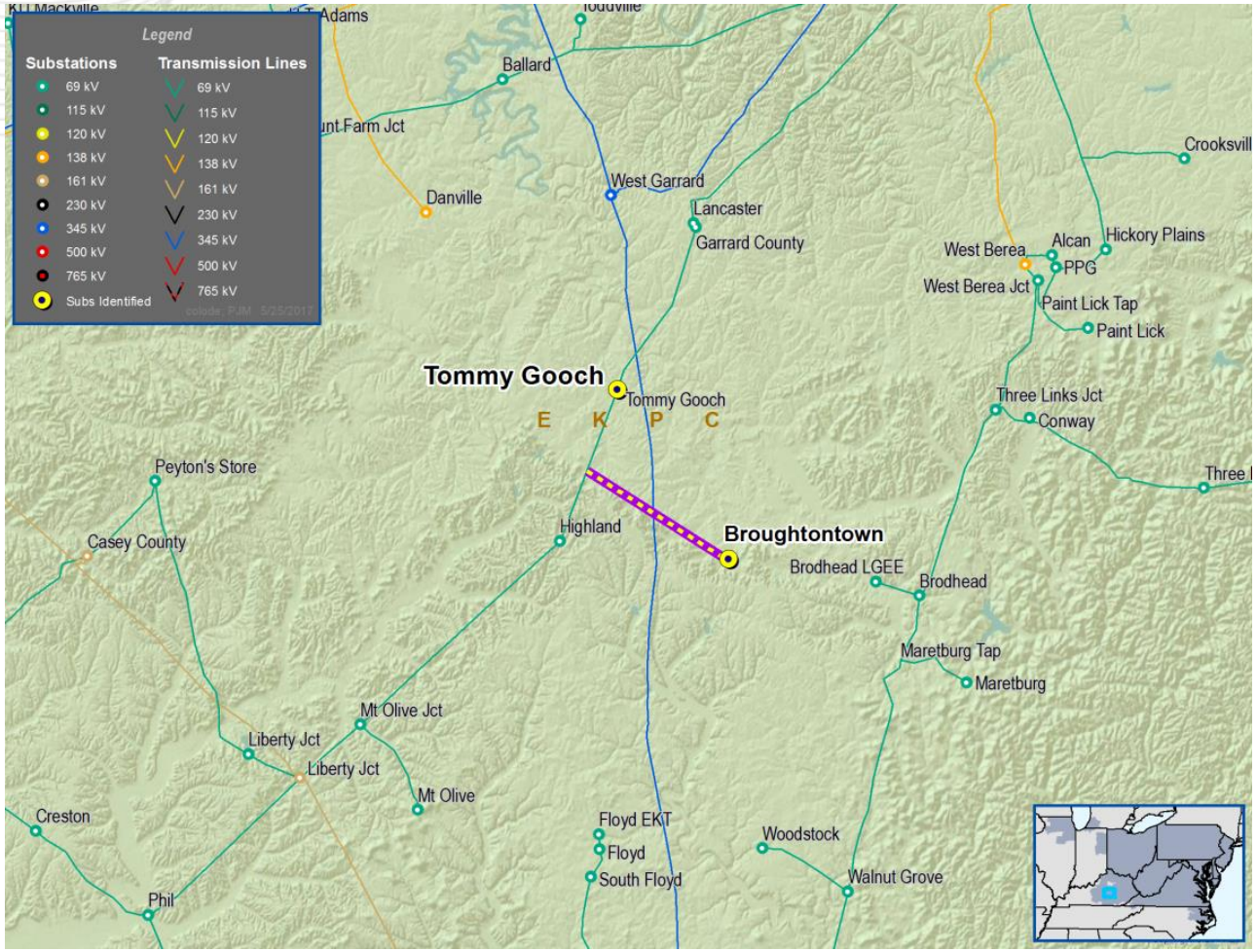
Selected Solution:

Construct a new Broughtontown 69-26.4 kV,12/16/20 MVA Distribution Substation and associated 69 KV tap line (7.4 miles). 30 Year NPV $20.4 Million (S1360)

Estimated Project Cost: $8.02M

Required IS Date: 12/1/2021

Status: Scoping



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EKPC Transmission Zone Supplemental Project

Supplemental Project

Previously Presented: 5/31/2017 SRTEAC

Problem Statement (Scope and Need/Drivers):

Customer Service -- Overload of the Holloway 69/12.4 KV distribution transformer, Overload of the West Nicholasville #1 distribution transformer, and Member System distribution reliability concerns.

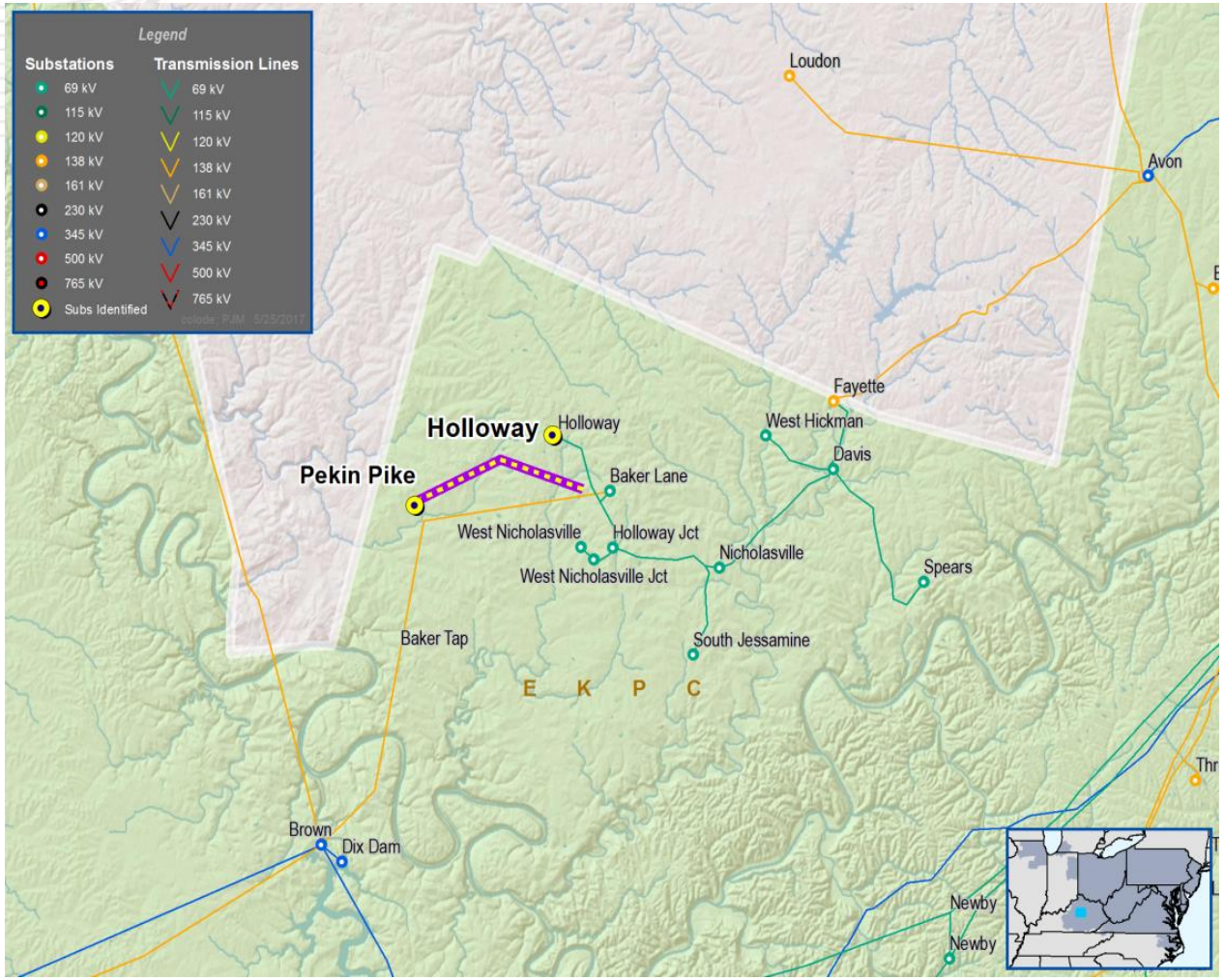
Selected Solution:

Construct a new Pekin Pike 69-13.2 kV, 12/16/20 MVA Distribution Substation & 6.4 Mile 69 kV Tap Line. 30 Year NPV $15.6 Million (S1361)

Estimated Project Cost: $8.21M

Required IS Date: 12/1/2019

Status: Scoping



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EKPC Transmission Zone Supplemental Project

Supplemental Project

Previously Presented: 5/31/2017 SRTEAC

Problem Statement (Scope and Need/Drivers):

Customer Service -- EKPC's Member System Cooperative is expecting a 1.5 MW load addition on the Phil substation in 2019. With this load addition, the Phil 69/25 KV transformer will be overloaded in the winter of 2019/2020.

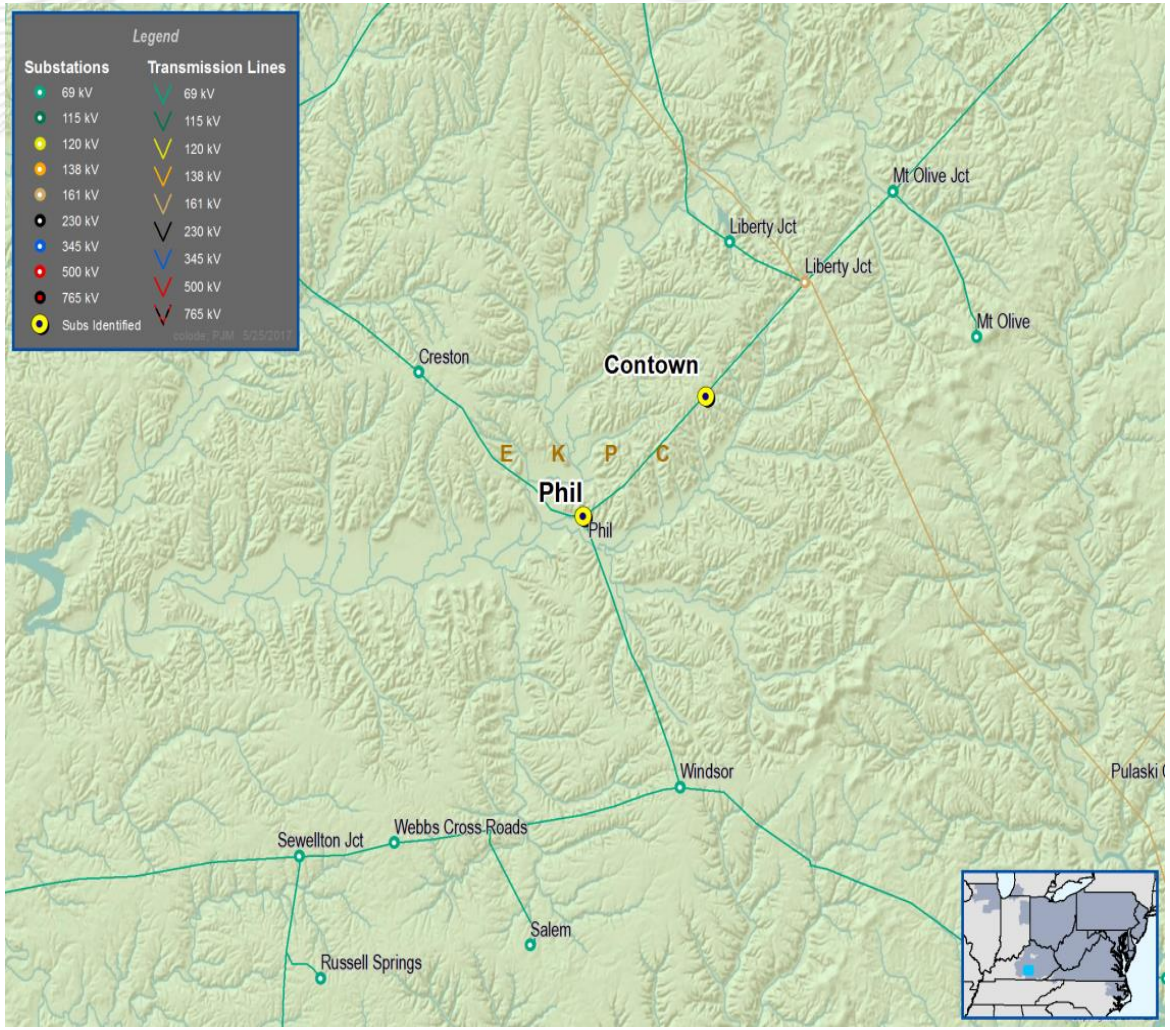
Selected Solution:

New Contown 69-13.2 kV 12/16/20 MVA substation and associated 69 kV tap line (0.2 Miles). (S1362)

Estimated Project Cost: $2.3M

Required IS Date: 12/1/2019

Status: Scoping



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EKPC Transmission Zone Supplemental Project

Supplemental Project

Previously Presented: 5/31/2017 SRTEAC

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency -- EKPC changed minimum operational requirements to require all transmission lines be capable of an operating temperature of at least 167˚F. A program was put in place to upgrade all line sections that did not meet this temperature requirement. This program has been in progress since 2010, and this line will be upgraded to 167˚F as part of this program.

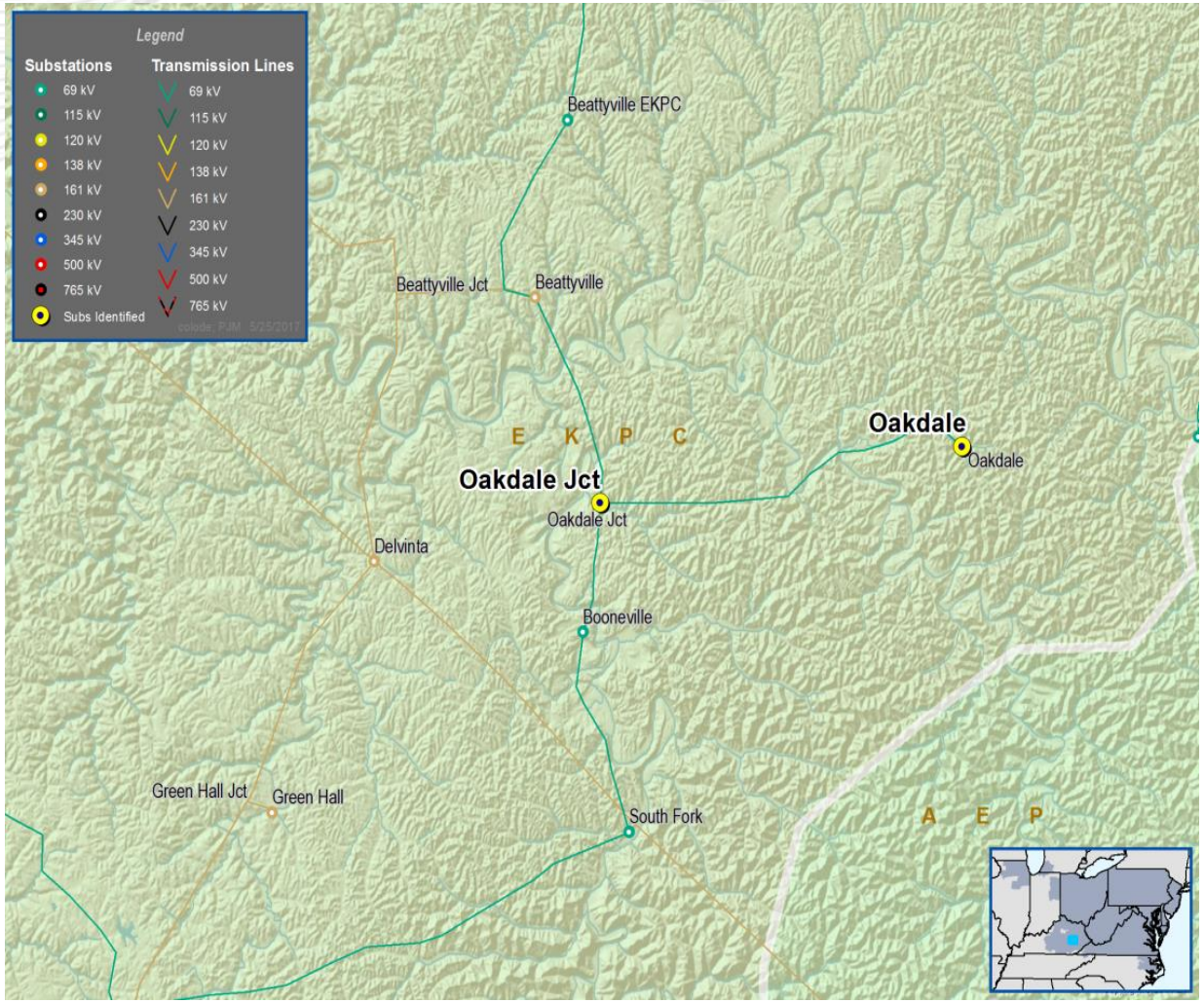
Selected Solution:

Increase the MOT of the Oakdale Jct.-Oakdale 69 kV line section (10.5 miles) to 167°F. (S1363)

Estimated Project Cost: $1.0M

Required IS Date: 6/1/2019

Status: Scoping



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Short Circuit

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AEP Transmission Zone

Short Circuit Violation
Previously Presented: 5/31/2017 SRTEAC

Problem Statement:
The South Canton 138 kV breaker 'K2' is overstressed for a fault at South Canton 138 kV.

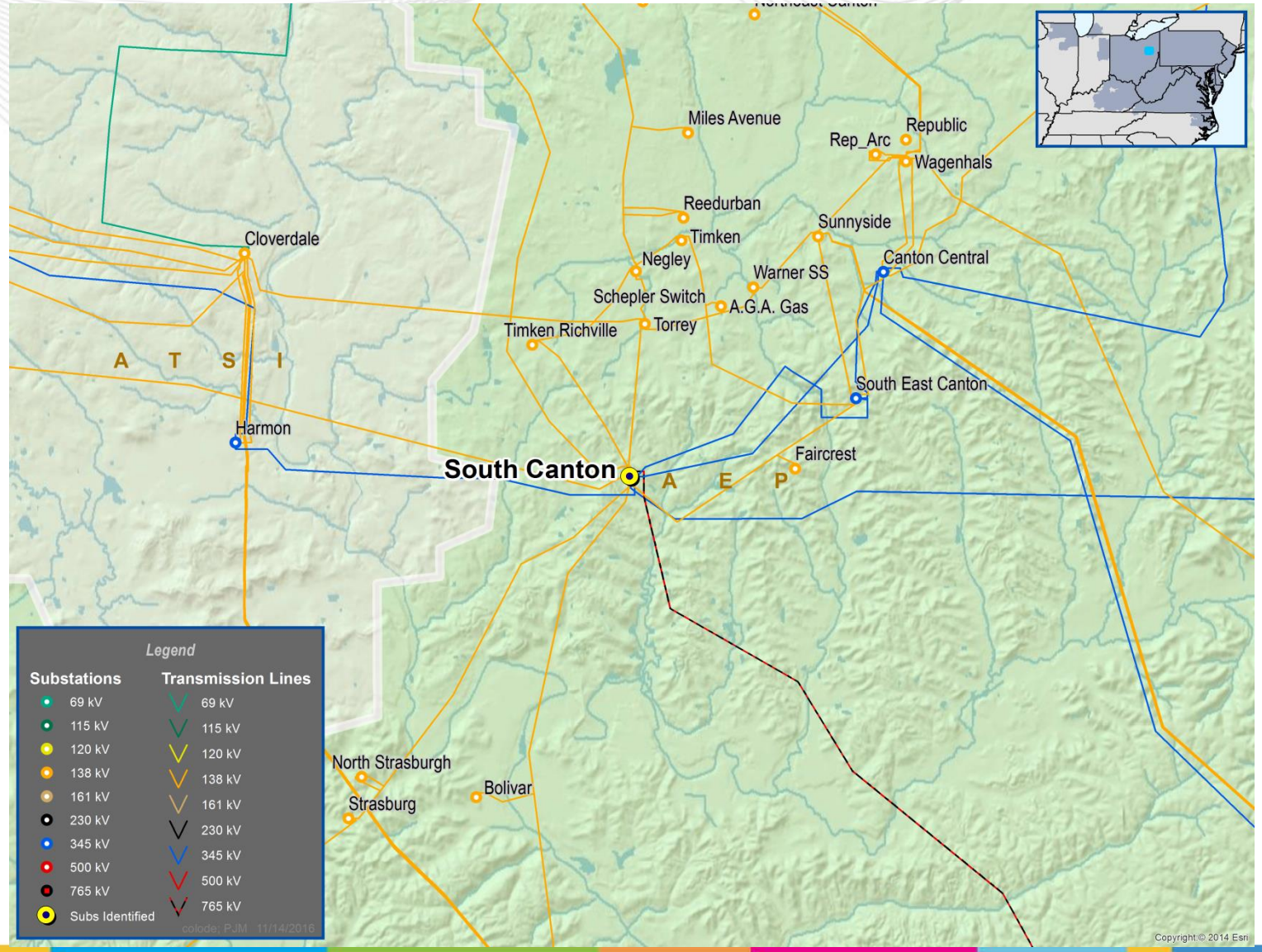
Immediate Need:
Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be the Designated Entity.

Potential Alternative Solution Considered:
Due to the immediate need of the project no alternatives were considered.

Recommended Solution:
Replace the South Canton 138 kV breaker 'K2' with an 80 kA breaker .

Estimated Project Cost: $600 K

Required IS Date: 6/1/2019



AEP Transmission Zone

Short Circuit Violation

Previously Presented: 5/31/2017 SRTEAC

Problem Statement:

The South Canton 138 kV breakers ‘M’ and ‘M2’ are overstressed for a fault at South Canton 138 kV.

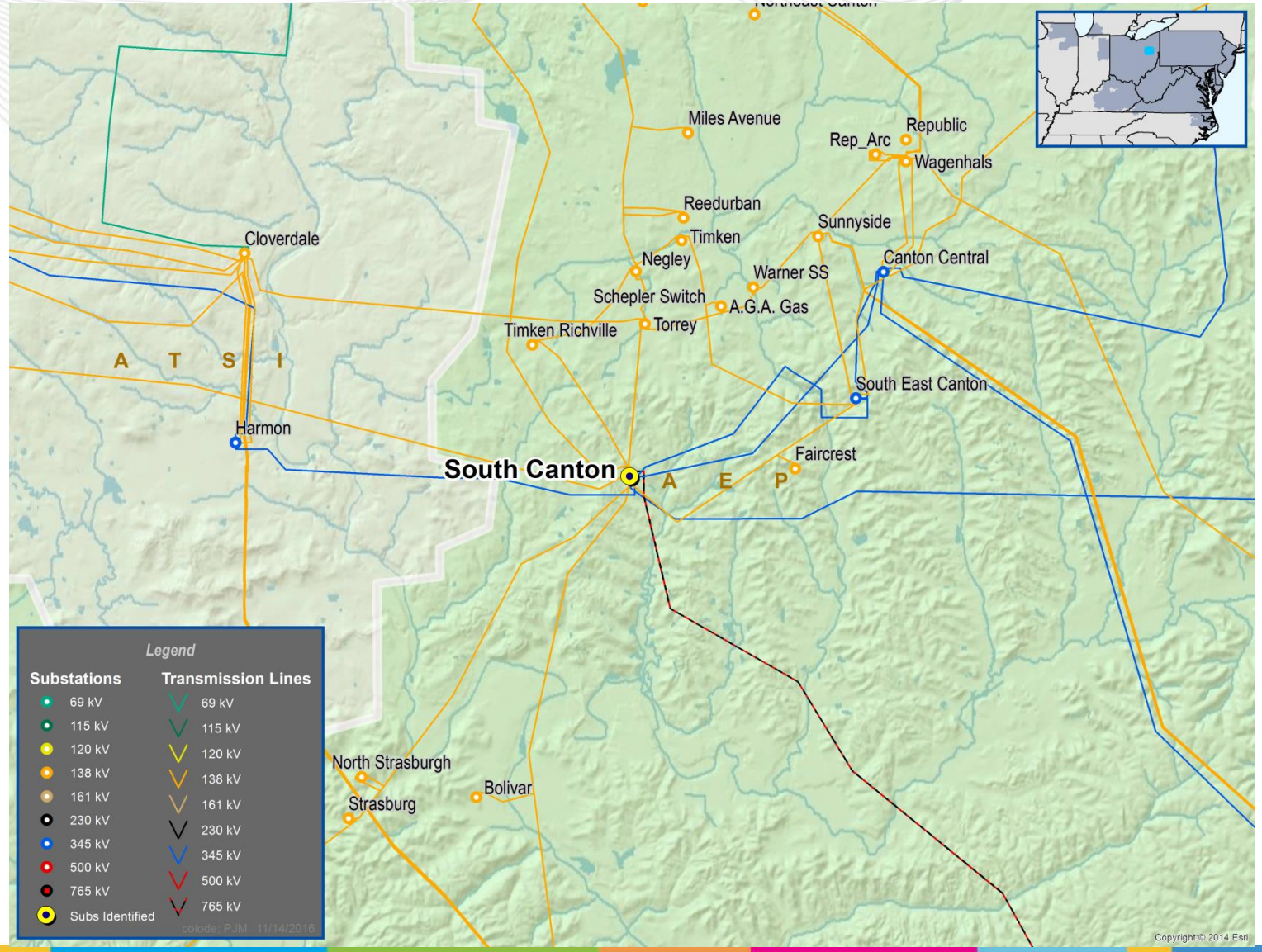
Recommended Solution:

Replace the South Canton 138 kV breakers ‘M’ and ‘M2’ with 80 kA breakers.

Estimated Project Cost: $600 K per breaker

Required IS Date: 6/1/2022

*Exempt from Proposal Window process per Operating Agreement, Schedule 6,1.5.8 (n).



DEOK Transmission Zone

Short Circuit Violation

Previously Presented: 5/31/2017 SRTEAC

Problem Statement:

The Todhunter 138 kV breakers '931', '919', and '913' are overstressed for a fault at Todhunter 138 kV.

Recommended Solution:

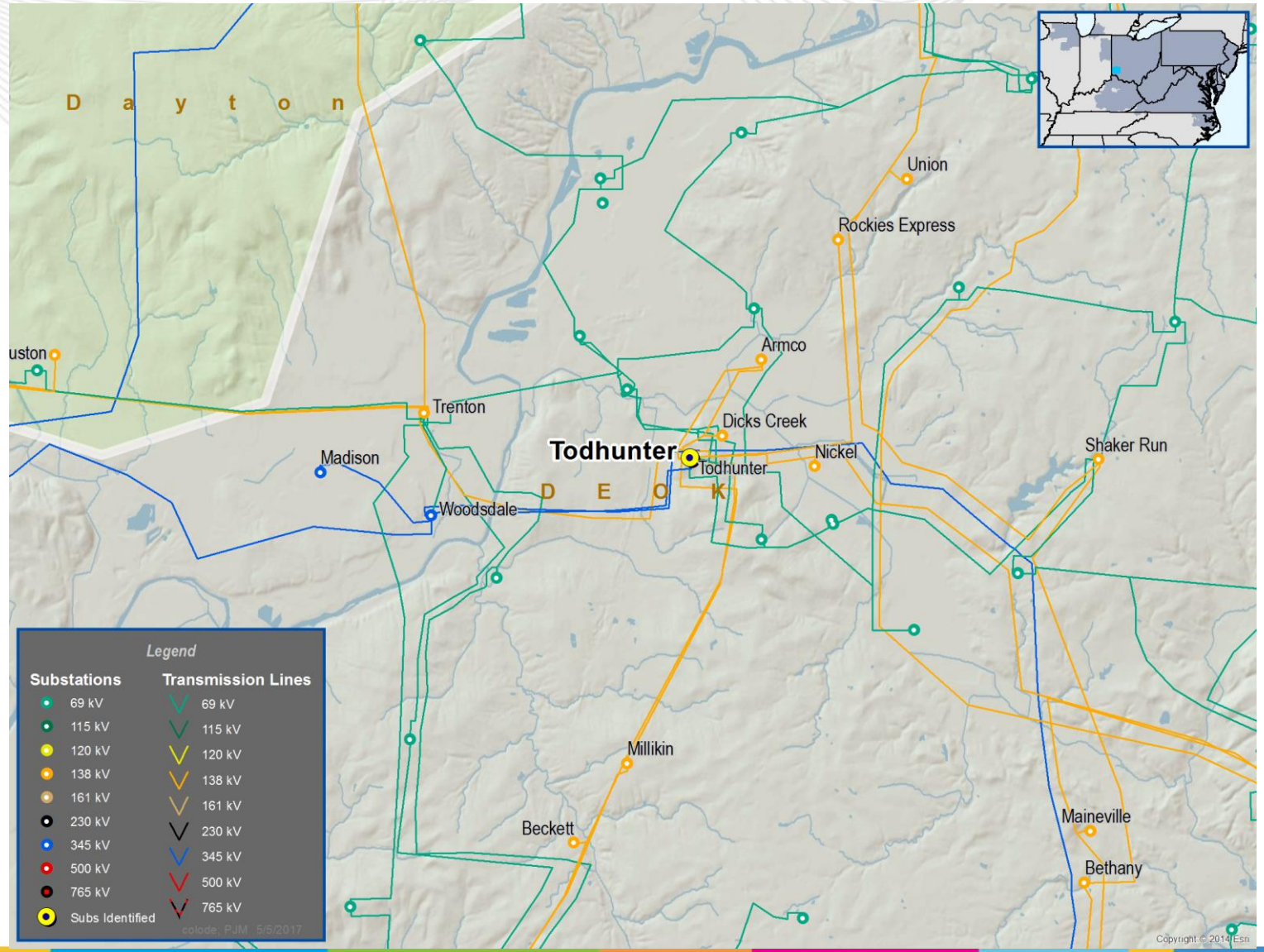
Replace Todhunter 138 kV breakers '931', '919', and '913' with 80 kA breakers (B2894)

Estimated Project Cost: $1.967 M (total)

Required IS Date: 6/1/2021

Projected IS Date: 6/1/2020

*Exempt from Proposal Window process per Operating Agreement, Schedule 6,1.5.8 (n).



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DEOK Transmission Zone

Supplemental Project – S1000 Scope Change
Previously Presented: 5/31/2017 SRTEAC

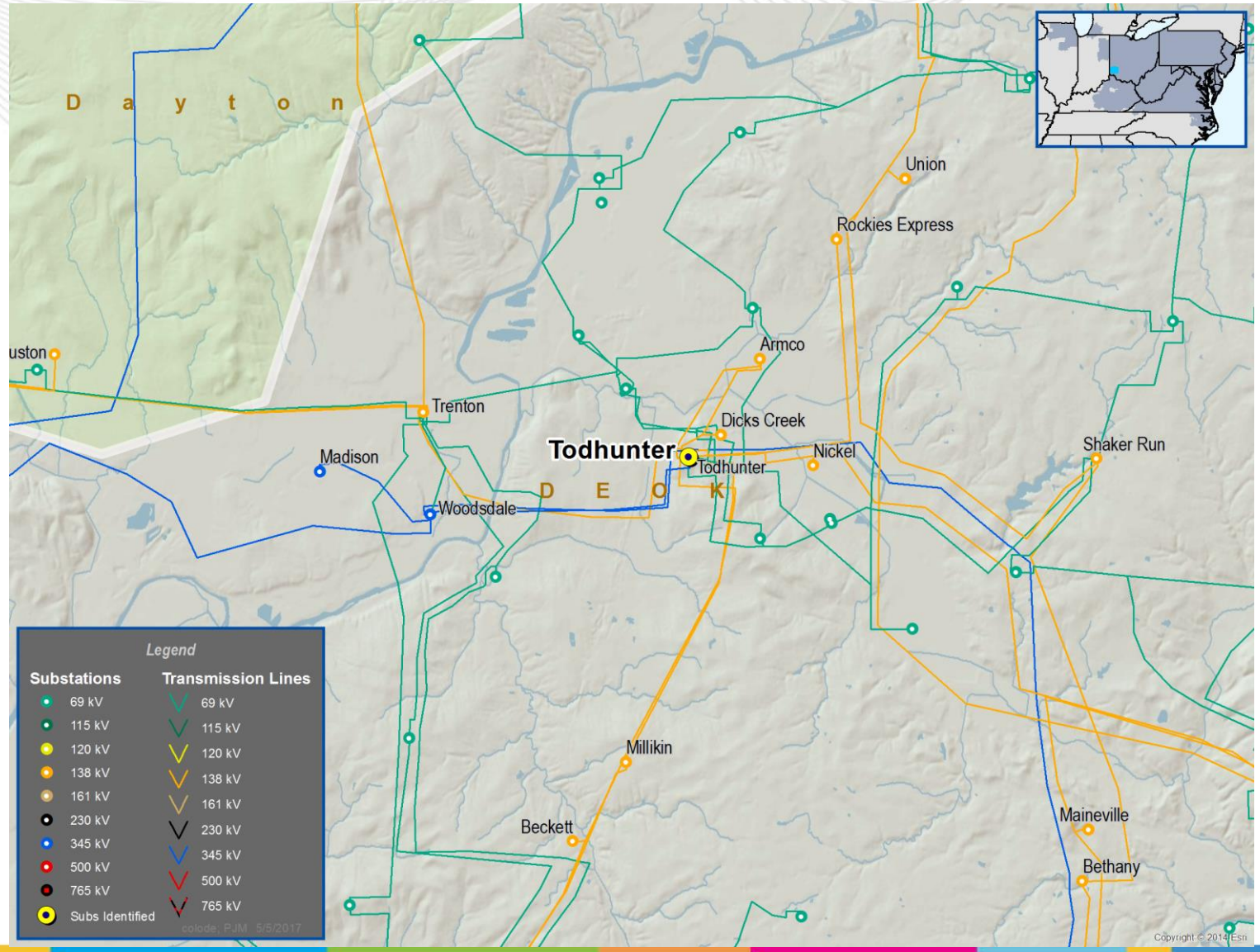
Old Scope:
Replace 138 kV circuit breakers '913', '919', '925', and '931' at Todhunter 138 kV with 80kA interrupting.

New Scope:
Replace Todhunter 138 kV breaker '925' with an 80 kA breaker.

Reason for scope change:
The Todhunter 138 kV breakers '913', '919', and '931' have been previously identified as overdutied in the 2021 short circuit case, and the replacements have been converted into baseline upgrades (see last slide). The 925 breaker replacement remains a supplemental project.

Old Estimated Project Cost: $2.626 M
New Estimated Project Cost: $659 K

Projected IS Date: 6/1/2020



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DEOK Transmission Area

Short Circuit Violation

Previously Presented: 5/31/2017 SRTEAC

Problem Statement:

The Dicks Creek 138kV breaker “963” is overstressed

Immediate Need:

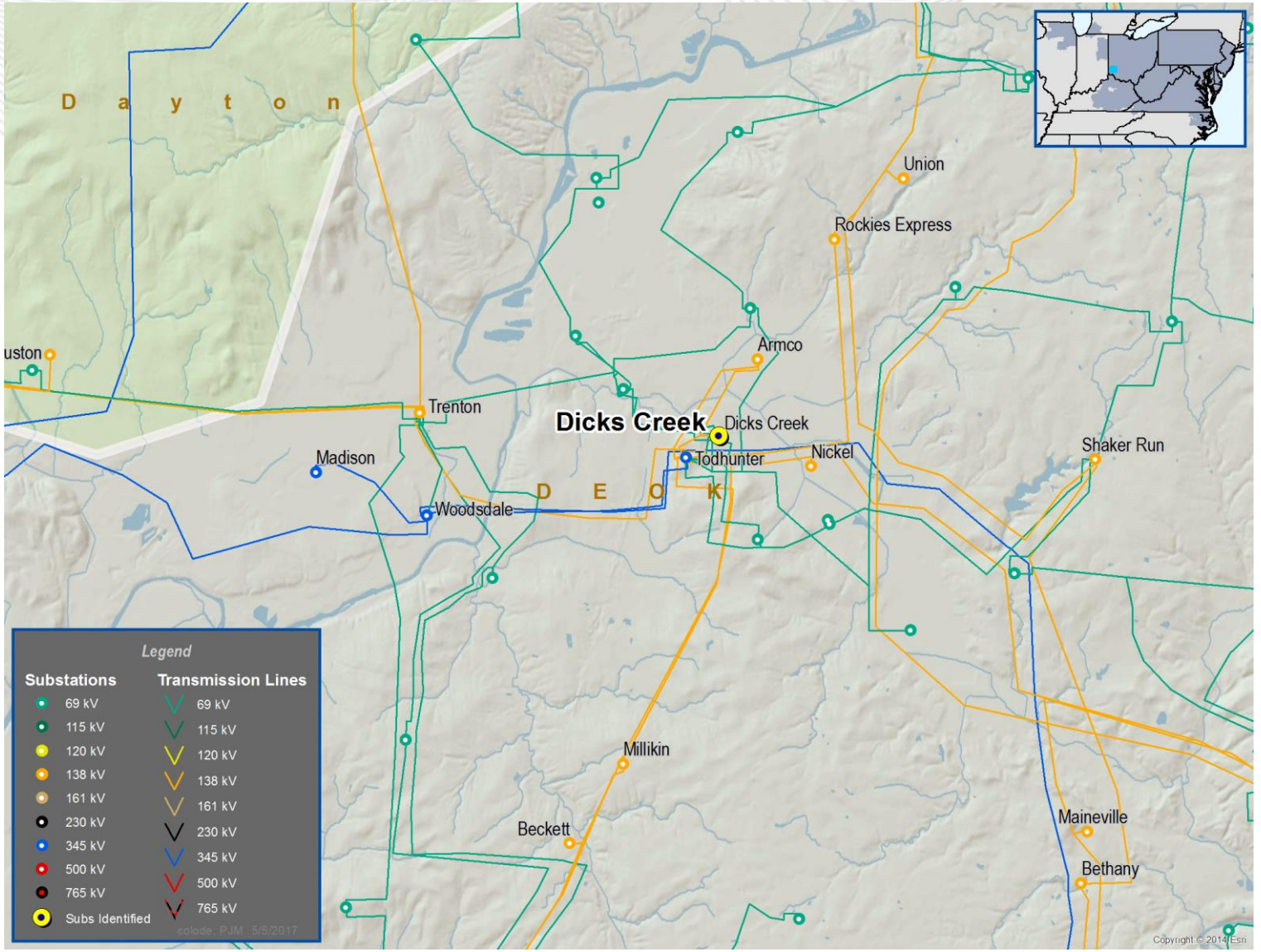
Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be the Designated Entity.

Recommended Solution:

Replace the Dicks Creek 138kV breaker “963” with 63kA breaker (B2895)

Estimated Project Cost: $300 K

Required IS Date: June 1, 2019



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Questions?

Email: RTEP@pjm.com

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Revision History

6/26/2017 – Original version posted to PJM.com

6/27/2017 – Add maps in Slide #4

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