Reliability Analysis Update

Transmission Expansion Advisory Committee

March 8, 2018

2018 RTEP Analysis Update

RTEP Next Steps

- Finalize 2018 Models
- Begin 2018 RTEP Analysis

2017 RTEP Load Deliverability Study

“As Left” CETLs

As Left Study Assumptions

- 2017 RTEP load deliverability study assumptions
  - 2021 summer peak model created from 2022 summer peak RTEP base case
    - Same model used for 2021/22 RPM planning parameters development
  - Updated PJM loads based on January 2018 PJM Load Forecast Report
  - Updated transmission based on upgrades approved by PJM Board through December 2017
  - Updated generation model through December 2017
    - Deactivations
    - Interconnection Projects
  - Updated transmission service through December 2017
- Limiting facilities identified for LDAs with less than 150% margin or those that are to be modelled in the 2021/22 RPM auction

2017 RTEP Load Deliverability Study Of Summer 2021

LDA	CETO (MW)	CETL (MW)	Margin	Limiting Facilities	Violation Type
AE	510	> 765	> 150%		None
AEP	-580	> 0	> 150%		None
APS	1480	> 2220	> 150%		None
ATSI	4060	9705	239%	South Canton - Harmon 345 kV for loss of the Sammis - Star 345 kV circuit	Thermal
BGE	4470	6005	134%	Voltage drop at multiple BES buses for the loss of the Waugh Chapel 230 kV capacitor	Voltage
CLEV	3490	5346	153%	South Canton - Harmon 345 kV for loss of the Sammis - Star 345 kV circuit	Thermal
COMED	-640	5574	*	Dumont - Stillwell 345 kV line for the loss of Dumont - Wilton 765 kV circuit	Thermal
DAYTON	2480	3502	141%	O.H. Hutchings - Sugarcreek 138 kV line for the loss of Sugarcreek - Centerville & Sugarcreek - Normandy 138 kV lines	Thermal
DLCO	1470	> 2205	> 150%		None
DPL	700	> 1050	> 150%		None
DPL SOUTH	1080	1624	150%	Cedar Creek - Sliver Run 230 kV for loss of Cartanza - Milford 230 kV circuit	Thermal
DEOK	3110	4959	159%	Pierce 345/138 kV transformer for loss of the Pierce - Foster 345 kV circuit Greendale - Miami Forte 138 kV for loss of the Tanners Creek - Miami Forte 345 kV circuit	Thermal Thermal
EKPC	530	> 795	> 150%		None
EMAAC	2150	9150	426%	Voltage drop at Cochranville 230 kV for loss of Keeney - Rock Springs 500 kV circuit	Voltage
JCPL	3400	> 5100	> 150%		None
MAAC	-9220	4019	*	High Ridge - Sandy Springs 230 kV for the loss of the parallel High Ridge - Sandy Springs - Burtonsville 230 kV circuit	Thermal
METED	1210	> 1815	> 150%		None
PECO	2460	> 3690	> 150%		None
PENELEC	-330	> 0	> 150%		None
PEPCO	1550	6915	446%	Voltage drop at multiple BES buses for the loss of the Burchess Hill - Possum Point 500 kV circuit	Voltage
PJM WEST	-1100	> 0	> 150%		None
PLGRP	-850	6609	*	Wescosville 500/138 kV transformer pre-contingency	Thermal
PSEG	5620	6902	123%	Roseland - Cedar Grove 230 kV for the loss of the Roseland - Williams Pipeline 230 kV circuit McCarter - Essex 230 kV pre-contingency	Thermal
PSEG NORTH	2410	3180	132%	Roseland - Cedar Grove 230 kV for the loss of the Roseland - Williams Pipeline 230 kV circuit McCarter - Essex 230 kV pre-contingency	Thermal
SWMAAC	2870	9082	316%	Voltage drop at multiple BES buses for the loss of the Burchess Hill - Possum Point 500 kV circuit	Voltage
VAP	-2760	> 0	> 150%		None
WMAAC	-10440	> 0	> 150%		None

* LDA has adequate internal resources to meet the reliability criterion.

Supplemental Projects
First Review

AEP Transmission Zone: Supplemental Darwin Bypass

Problem Statement:

Equipment Material/Condition/Performance/Risk:

Darwin station (NIPSCO) was built to connect Sugar Creek IPP (Mirant station) into the PJM market. Sugar Creek IPP no longer has the rights or intention to sell power into PJM. In December 2016, the electrical connection between Mirant and Darwin stations was removed. This reduces Darwin into a mere switching station between Sullivan and Eugene. There are no grid needs to have Darwin station present between Sullivan and Eugene. Therefore, bypass and retirement of AEP owned assets at Darwin station is proposed. AEP owned assets at Darwin include 345 kV relays and metering. This project will assist to reduce AEP O&M costs and responsibilities.

Potential Solution:

Station Description

Disconnect Darwin station from the Eugene – Sullivan line and retire all AEP owned equipment at Darwin.

Total Estimated Trans Cost: $0.9M

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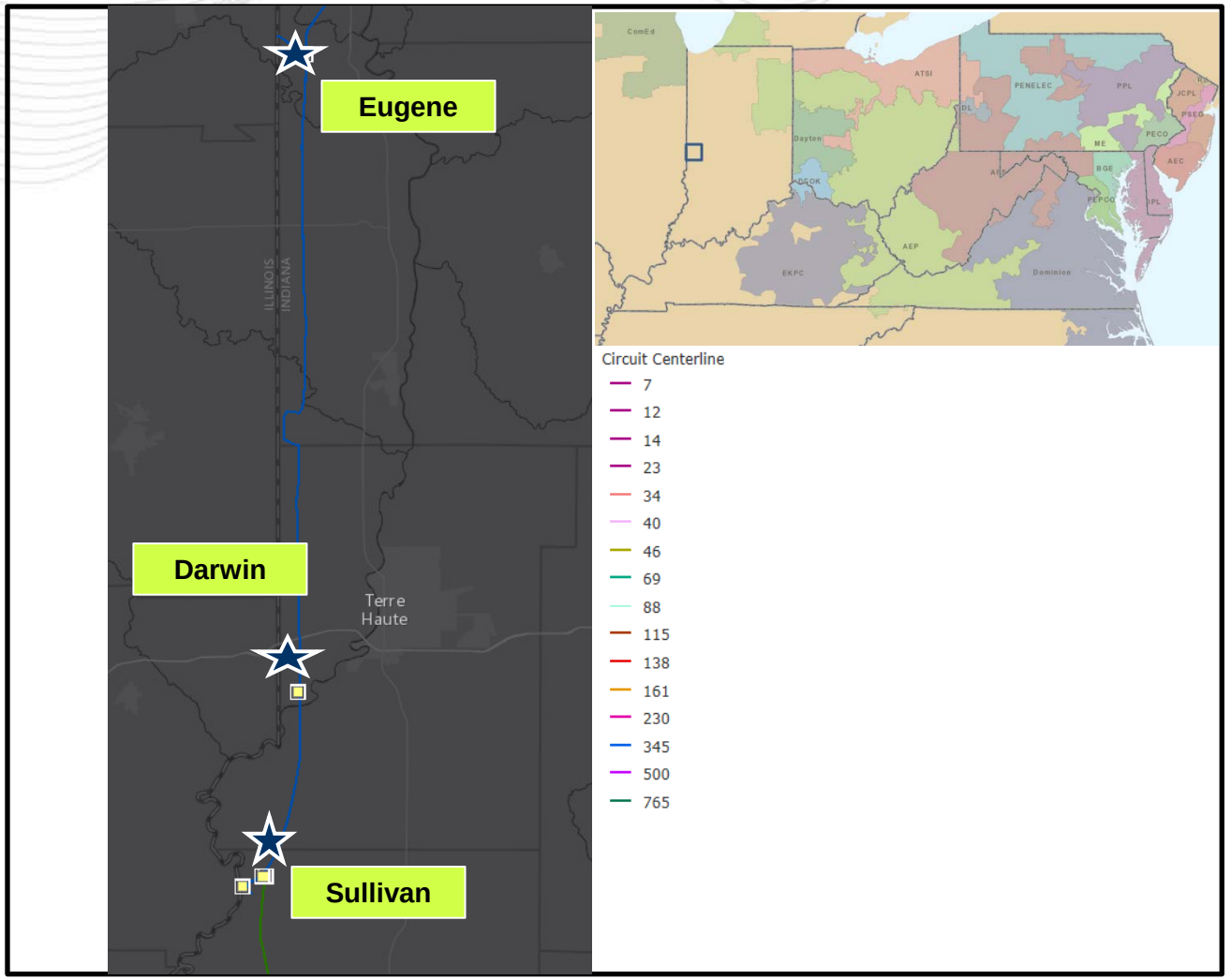

AEP Transmission Zone: Supplemental Darwin Bypass

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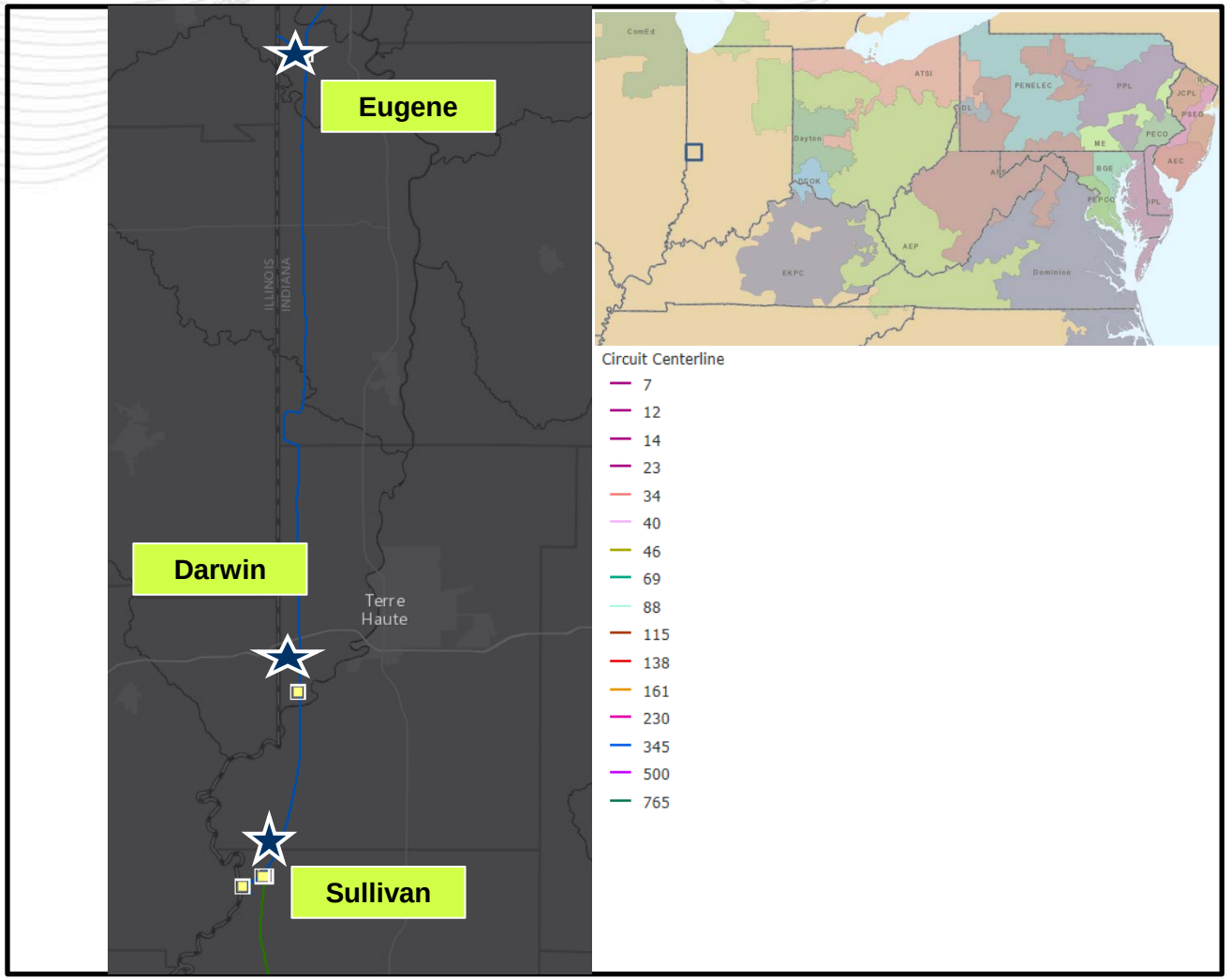
Alternatives:
Perform proactive rehab on AEP owned assets at Darwin (345 kV relays and metering). Darwin will continue to function as a switching station between Sullivan and Eugene and will not be connected to any other stations on the grid. From a grid stability/reliability perspective, Darwin's existence as a switching station bears no justifiable benefits after disconnection of the Darwin-Sugar Creek (Mirant) tie. Retirement of AEP owned assets at Darwin and electrical bypass will also assist in reducing AEP O&M costs and responsibilities.
Estimated Cost: $0.7M

Projected In-service: 05/01/2018

Project Status: Engineering



AEP Transmission Zone: Supplemental Wyoming 765 XFR Replacement

Supplemental Project

Problem Statement:

Equipment Material/Condition/Performance/Risk:

Transformer #2/Phase 3 unit and three sister units at Wyoming Station (Transf #1/Phase 1, Transf #2/Phase 1, and Transf #2/Phase 2) are all showing similar signs of accelerated aging from through fault events resulting in gassing, overheating, carbonization of insulating paper, decreased interfacial oil tension, and/or elevated bushing power factor levels. Bushing replacements on legacy units are difficult because matching the connecting point with a spare is complicated and would require an outage to take the measurements of the existing bushings. Also, spares of the same era are not readily available and newer bushings do not follow the same design standards of the legacy units. Transformer #1/Phases 2 & 3 also have accelerated aging from through fault events resulting in gassing, overheating, and/or carbonization of insulating paper. There have been cooling control issues reported to and repaired by field personnel as a stop-gap measure to enable continued operation until these units can be replaced. Due to the deteriorated conditions, AEP Equipment Standards indicates that these units can no longer be loaded to their full nameplate capability. By replacing these transformers with new units, loading capability will be able to meet daily system operation. When a similar unit failed at Joshua Falls Substation in APCo – Virginia, Transformer #1/Phase 1 was removed and taken to serve as the replacement transformer. Since that time, the only spare for 1 BANK and 2 BANK has been in service for this removed phase.

The 765 kV shunt reactor on the Wyoming – Culloden line is showing dielectric strength breakdown and elevated operating temperatures.

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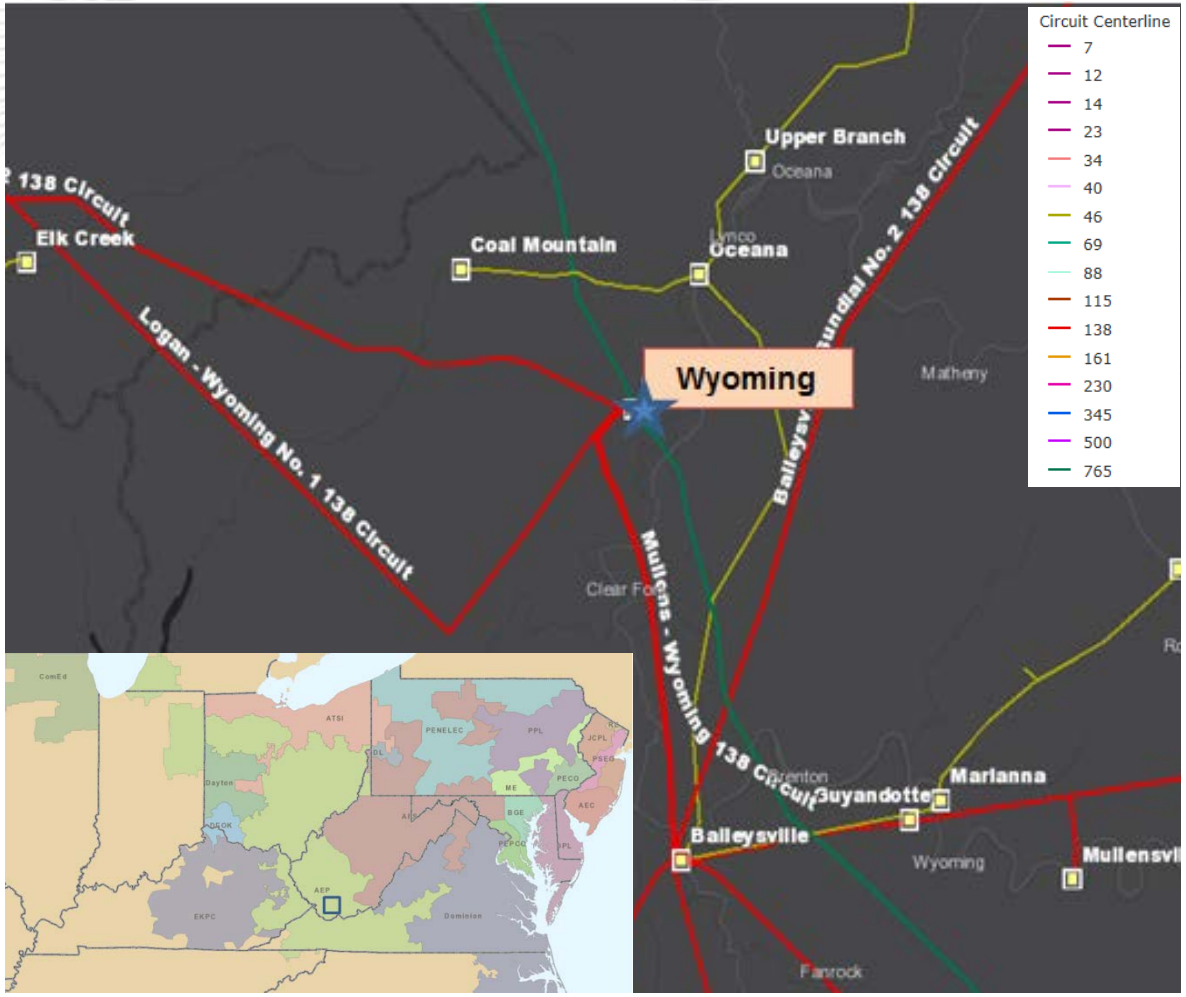

AEP Transmission Zone: Supplemental
Wyoming 765 XFR Replacement

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Potential Solution:

Wyoming 765 kV Yard: Replace existing 765/138 kV 750 MVA XF #1 with a new 765/138 kV 750 MVA XF. Replace existing 765/138 kV 750 MVA XF #2 with a new 765/138 kV 750 MVA XF. Install a new switchable spare 250 MVA XF. Replace existing 300 MVAR reactor bank on the Wyoming – Culloden 765 kV line and 40 kA switcher with a new 300 MVAR reactor bank and 50 kA switcher. Make the spare reactor switchable.

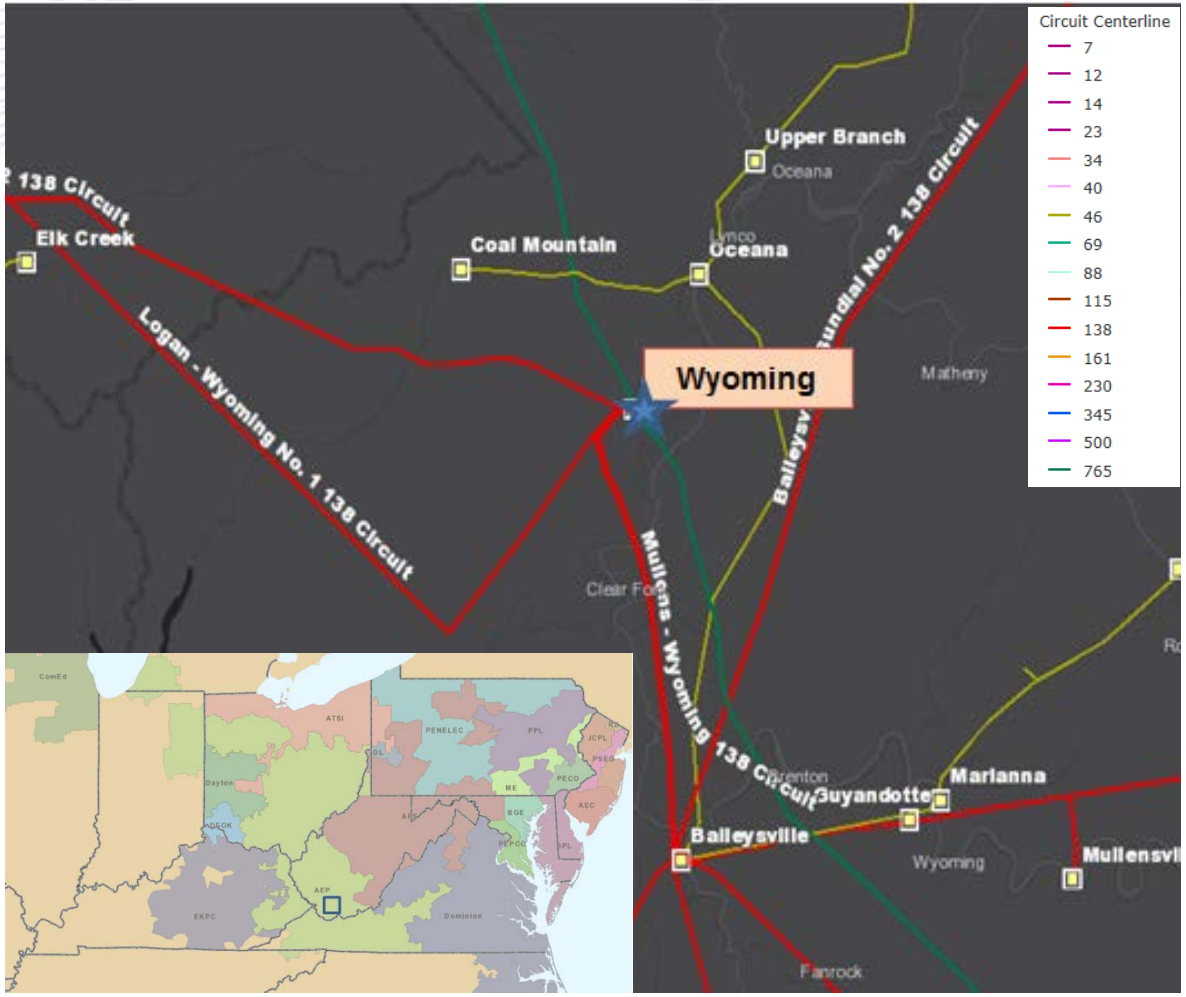
Estimated Cost: $53M

Alternatives:

No viable cost-effective alternatives could be identified.

Projected In-service: 12/31/2020

Project Status: Engineering



AEP Transmission Zone: Supplemental Cloverdale Area Improvements

Supplemental Project

Problem Statement:

Equipment Material/Condition/Performance/Risk:

Cloverdale 765/345 kV Transformer #10, 1968 vintage, is currently in a poor physical and operational condition. Transformer #10 phase 1 is showing short circuit strength breakdown caused by the amount of thermal through fault events, mostly in the 300°C to 700°C range, this has lead to an increased gassing of the unit. Transformer #10 phase 2 is showing short circuit strength breakdown caused by the amount of thermal through fault events, mostly under 300°C but some in excess of 700°C, has lead to minor gassing of the unit. In addition, the high side, low side, and tertiary Y2 bushing power factor ratings have been trending in excess of 0.5 which indicates a possible issue with the bushing. Transformer #10 phase 3 has an upward trending of oil moisture content resulting in downward trending to the oil dielectric strength. Increasing moisture content is a resultant of water ingress and/or break down of paper insulation of TF windings. Numerous thermal through faults of under 300°C has lead to an major and upward trending gassing of the unit, and significant carbonization of the insulating paper. This unit has experienced significant degradation of its internal materials. Transformer #10 spare has an upward trending of oil moisture content resulting in relatively stagnant trending to the oil dielectric strength. Increasing moisture content is a resultant of water ingress and/or break down of paper insulation of TF windings. More recently, the moisture content has decreased, yet the dielectric strength has responded with a more severe drop in value. Short circuit strength breakdown caused by the amount of thermal through fault events has lead to consistent gassing of the unit, and significant overheating events in excess of 250°C. The CO/CO2 ratio has consistently been above the warning level.

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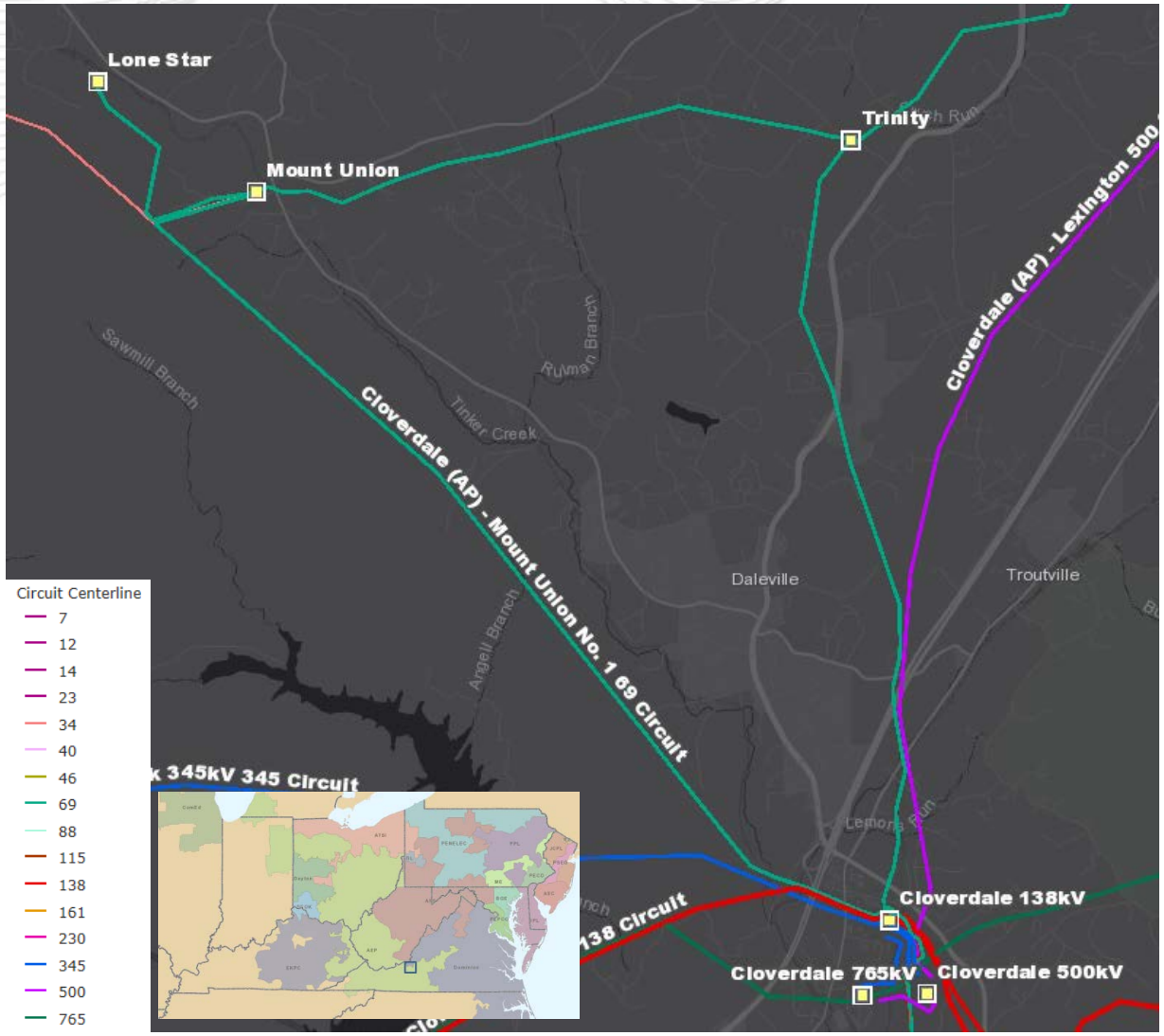

AEP Transmission Zone: Supplemental Cloverdale Area Improvements

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The 765kV CB's "AA1" &"AA2" are air blast breakers, which have a tendency to fail catastrophically. During failures, sharps pieces of porcelain from their bushings are typically expelled, which, can be a potential safety hazard to field personnel. In addition, the ability to get spare parts for these breakers is becoming increasingly difficult. The Manufacturers recommended number of fault operations is 10. CB "AA1" has experienced 34 operations and CB "AA2" has experienced 21 operations.

138/69/34 kV transformer #4 (will be retired) at Cloverdale is a 1959 vintage which has seen short circuit strength breakdown caused by the amount of thermal through fault events, mostly in the 300°C to 700°C range, minor gassing of the unit, numerous overheating events, and carbonization of the insulating paper. 138/69/34 kV transformer #1 (will be replaced) is showing short circuit strength breakdown caused by the amount of thermal through fault events, mostly in the 300°C to 700°C range, has lead to an increased gassing of the unit. In addition, the tertiary Y2 bushing power factor rating has been trending well in excess of 0.5 which indicates possible issues with the bushing. The 69 kV CB"F" is an oil type breaker without oil containment. These are oil breakers that have come more difficult to maintain due to the required oil handling. In general, oil spills occur often during routine maintenance and failures with these types of breakers. Other drivers include PCB content, damage to bushings. CB "F" has experienced 29 operations.

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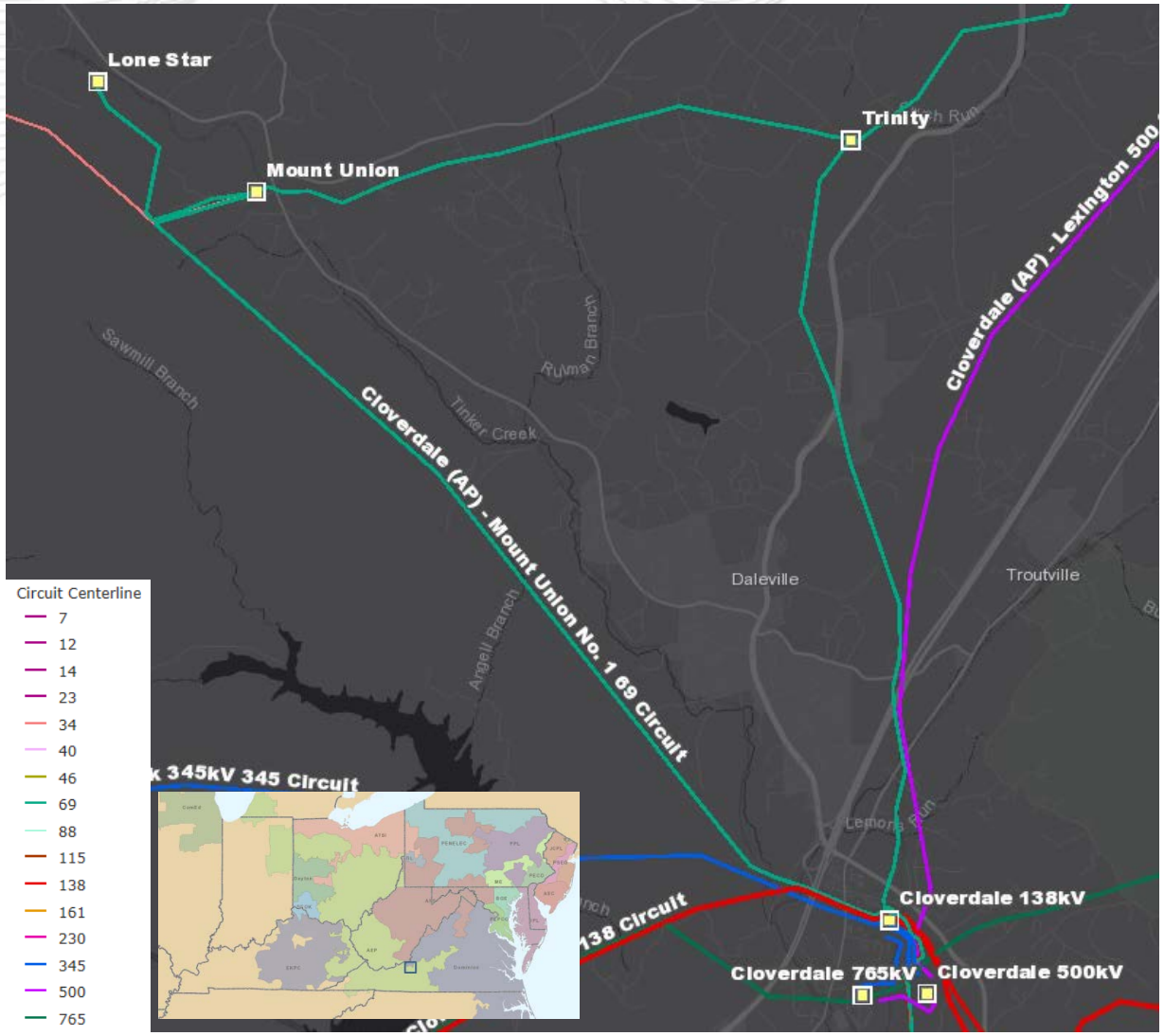

AEP Transmission Zone: Supplemental Cloverdale Area Improvements

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Operational Flexibility and Efficiency

Two new 765 kV circuit breakers "DD" & "DD2" will be installed to bring the 765/345kV transformer #10 into a breaker and a half position. This configuration allows for separation of two dissimilar zones of projection on the 765 kV system (transformer and bus), which can lead to mis-operations/over tripping. Two new 138kV kV, 3000 A/63 kA circuit breakers "G" & "G2" will be installed to bring the 138/69 kV transformer # 1 into a breaker and a half position. This configuration allows for separation of two dissimilar zones of projection on the 138 kV system (transformer and bus). Install 138 kV, 3000 A/63 kA circuit breaker "E" on the Reusens line. This will provide operations with another source on the Reusens line when maintenance/outages occur on existing breaker E2.

The Cloverdale – Mt. Union line (7.41 miles) is built to 138kV standards which allow us to replace the transformer at Mt. Union and energize the line to 138kV. Energizing the line to 138 kV standards allows up to fully utilize the line to full capacity as intended.

The 34.5kV tertiary feeds to Huntington Court from 138/69/34 kV transformer #1 and #4 have been de-energized because the load at Blue Ridge is being served at distribution level from Lake Forest Station. Because of this the 34.5 kV system at Cloverdale will be retired.

Customer Service:

Mt. Union serves CBEC (wholesale customer) and Roanoke Cement Co. (retail customer). Both customers will see improvement in voltage regulation with new 138kV source. Increase in transformer MVA is due to expected increase load in the area with a new industrial park being served from the 69 kV network.

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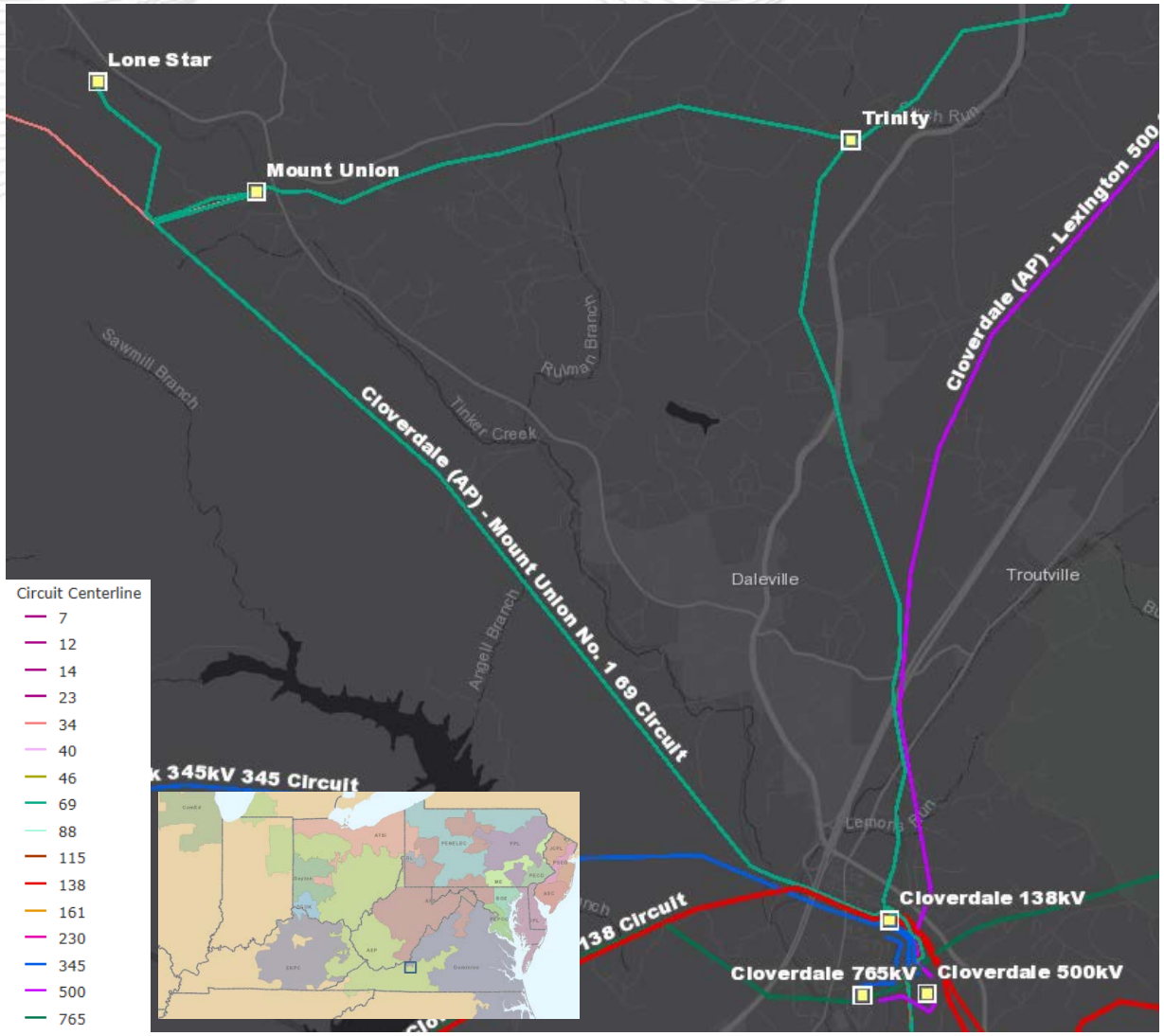

AEP Transmission Zone: Supplemental Cloverdale Area Improvements

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Potential Solution:

At Cloverdale station, replace all four single phase 500 MVA 765/345 kV TR #10 units with new AEP standard 750 MVA/phase units (switchable spare). TR #10 will be moved from the 765 kV bus #1 position into a new string between CB's "DD" & CB "DD2" (4000 A, 63 kA). Replace 90 MVA 138/69/34 kV TR #1 with a 130 MVA unit relocated from bus #2 position into a new string between CB's "G"& "G2" (3000 A 63 kA). Retire 138/69/34kV TR #4 (New 138/69 kV TR will be installed at Mt Union Station). Retire 34 kV CB "H", the Huntington Court 34.5 kV line, and associated 34 kV bus equipment. Add 138 kV CB's "D" & "D2" (3000 A, 63 kA) in order to bring the newly energized 138 kV Mt Union #1 line (already built to 138 kV standards) into a new string position. Replace 1800 A 27 kA 69 kV CB "F" with new CB (3000 A, 40 kA). Replace the Cloverdale – Huntington Court 138 kV line relays. Replace the Cloverdale – Roanoke 138 kV line relays. Replace Cloverdale – Mount Union #2 69 kV line relays. Replace 138kV Station Service Transformer. Replace 3000 A 41 kA 765 kV CB "AA2" with new 4000 A, 63 kA breaker. Retire 765 kV CB's "AA1" & CB "CC1".

Estimated Cost: $49.9M

Install new 138/69 kV 130 MVA transformer at Mount Union station and retire 138/69/34kV 75 MVA transformer #4 at Cloverdale Station. The Cloverdale – Mount Union #1 69 kV line is built to 138 kV standards and will be energized to 138 kV after the transformer installation. Replace Cloverdale – Mount Union #2 69 kV line relays.

Estimated Cost: $4.8M

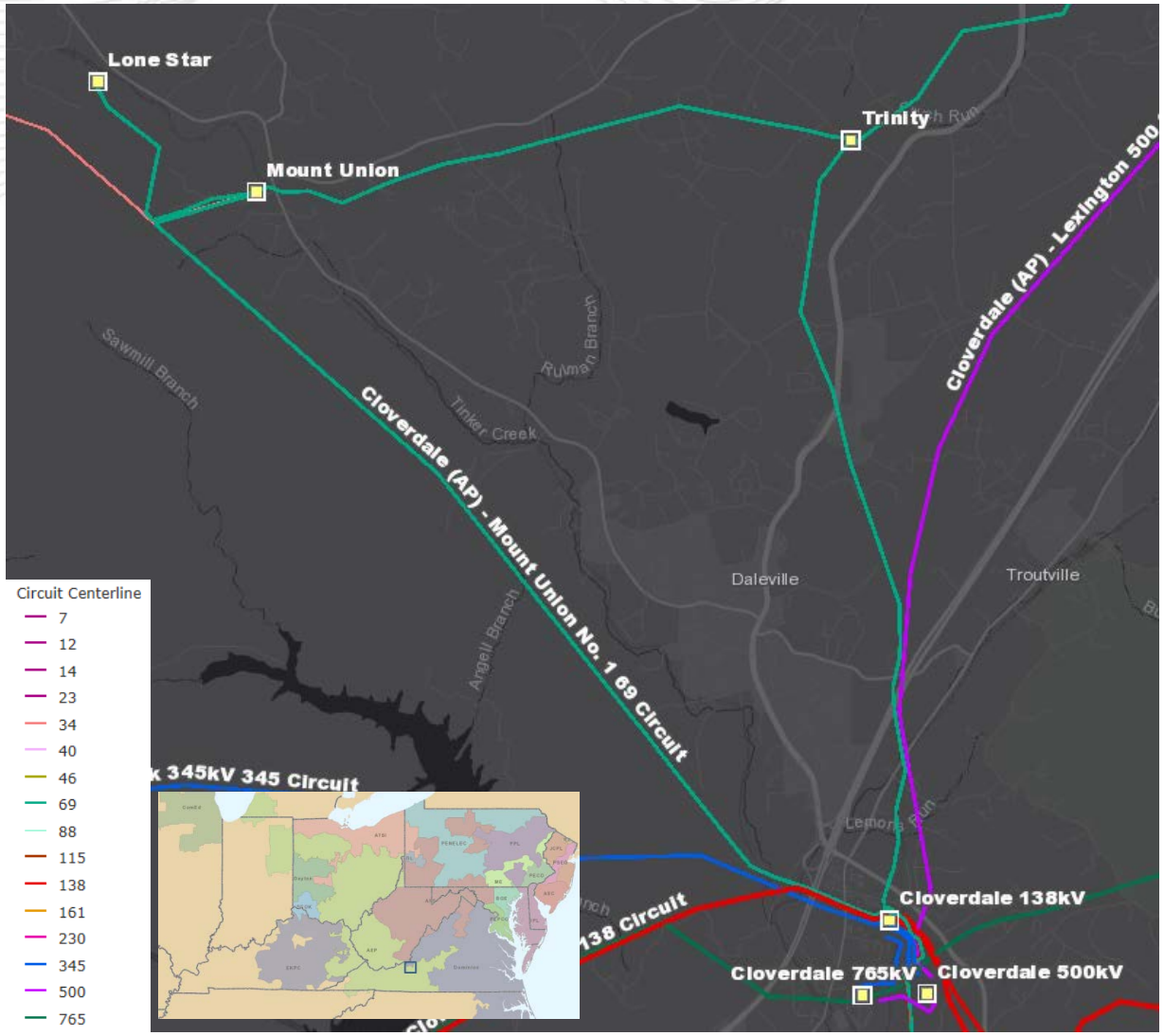
Total Estimated Cost: $54.7 M

Alternatives:

No viable cost-effective alternatives could be identified.

Projected In-service: 12/18/2020

Project Status: Engineering



Supplemental Project

Problem Statement:

Equipment Material/Condition/Performance/Risk:

The 138kV Circuit Breakers B, B1, B2, C, C2, C1 at Jackson Road Station are 3000A 50kA PK type air blast breakers manufactured in 1972, that has fault operations exceeding the manufacturer recommendation of 10 (26, 31, 18, 54, and 29 respectively). Air breakers tend to fail violently and their porcelain bushings usually blow up, dispersing particles in the surrounding area which is a safety concern. Drivers for replacement include age, number of fault operations, and a lack of available repair parts.

Transformer #3 345/138 kV at Jackson Road manufactured in 1972 is showing signs of deterioration. Drivers for replacement include dielectric strength breakdown (winding insulation), short circuit strength breakdown (due to the amount of through fault events), accessory damage (bushings), and high temperature (winding thermal condition). It also has high levels of Ethylene, Ethane, and Carbon Dioxide dissolved in the gas.

Operational Flexibility and Efficiency

When more than 4 breakers are required to operate to clear a line fault significantly increases the chances of a misoperation and increases the complexity of the protection circuits. Currently a line fault on the 138kV Twin Branch 2 line or a line fault on either of the 345kV lines requires 6 breakers to operate to clear the fault. In addition to this, the 345kV bus relay zone is combined with the two line relay zones and a transformer relay zone. Having three dissimilar relay zones joined together is an unacceptable arrangement, reducing the reliability of the protection equipment and increasing the chance of misoperations. The 345kV EHV lines are currently sectionalized with MOABS. Due to the higher required operation speed that goes along with EHV systems, MOABS can cause misoperations and result in failed sectionalizing.

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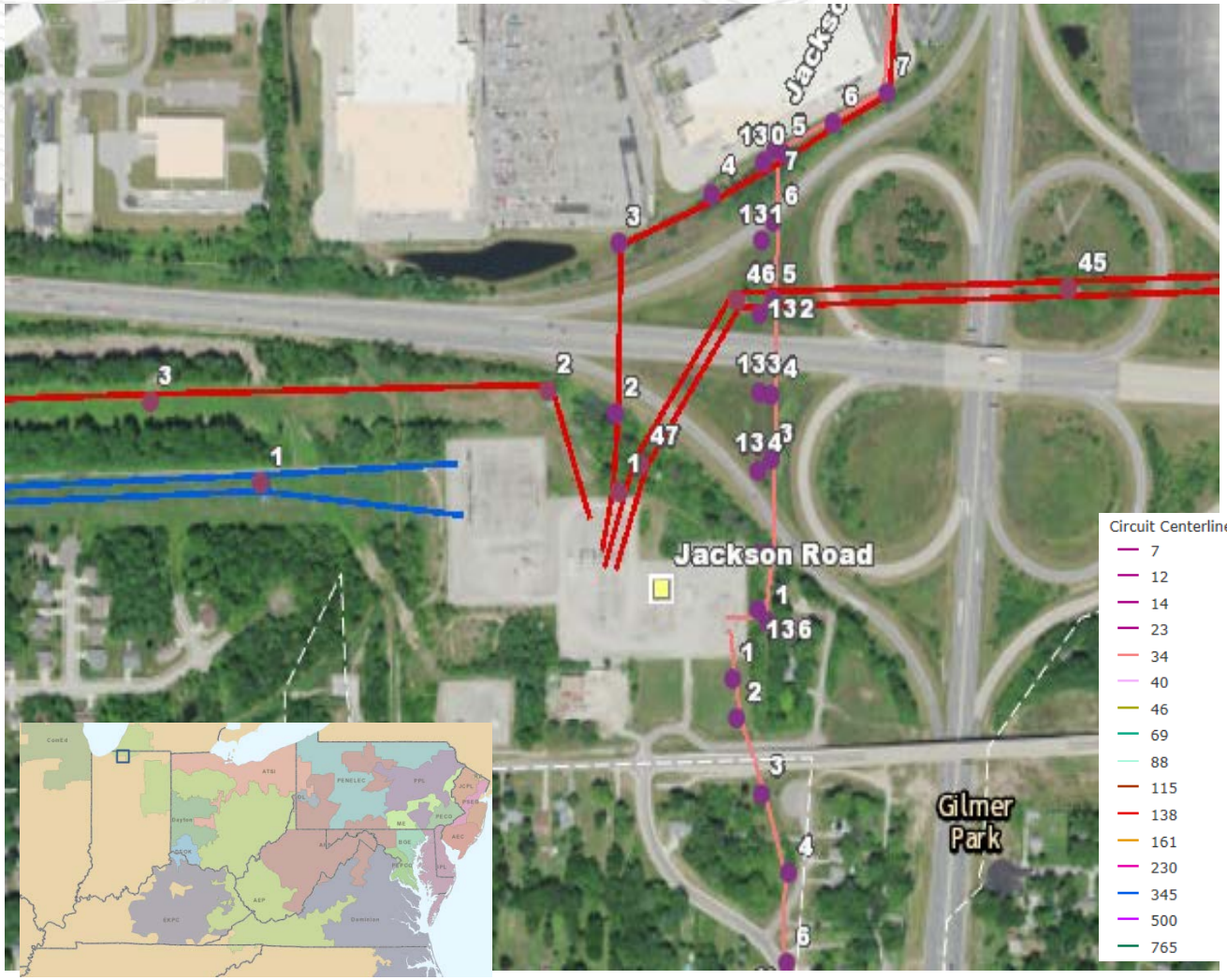

AEP Transmission Zone: Supplemental
Jackson Road Improvements

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Potential Solution

Replace 138kV CB B, B1, B2, C, C1, C2 PK type air blast breakers with new 3000A 63kA circuit breakers. Install five new 3000A 63 kA 138kV breakers J1, J2, M, M1, M2. Install three new 345kV CB A, A1, A2 with 5000A 63kA model. Replace 345/138/34.5kV TR#3 with a 675 MVA unit.

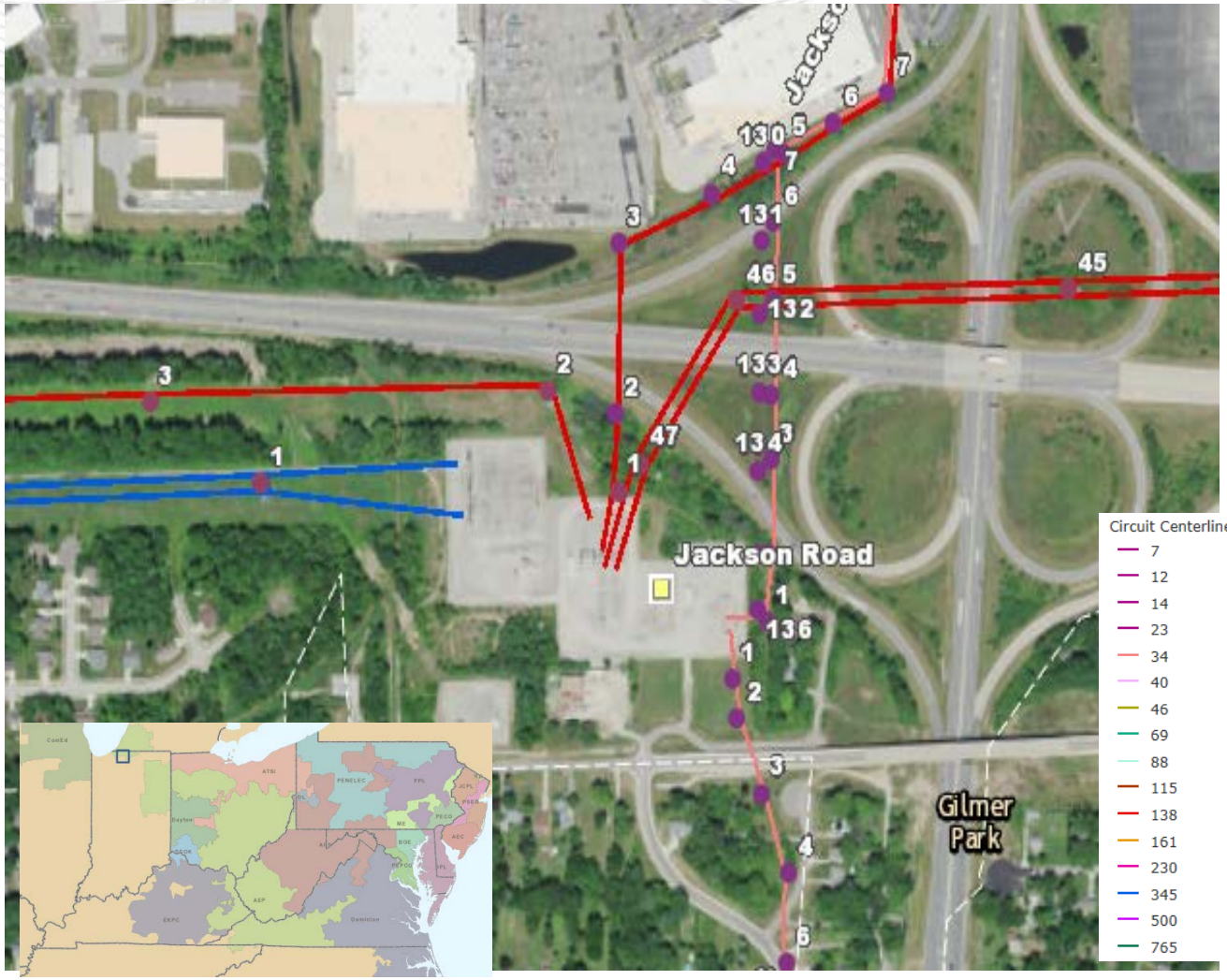
Estimated Cost: $25.4M

Alternatives:

No viable cost-effective alternatives could be identified.

Projected In-service: 12/31/2018

Project Status: Under Construction



Supplemental Project

Problem Statement:

Equipment Material/Condition/Performance/Risk:
Breakers “Q”, “Q2”, and “P2” at Baker are Air Blast type breakers. Air blast breakers are being replaced across the AEP system due to reliability concerns, intensive maintenance, and their tendency to catastrophically fail. During failures, sharps pieces of porcelain from their bushings are typically expelled, which, can be a potential safety hazard to field personnel. In addition, the ability to get spare parts for these breakers is becoming increasingly difficult. Circuit breakers “Q”, “Q2”, and “P2” have experienced 50, 40, and 114 fault operations compared to the manufacturer recommendation of 10.

The 345/138 kV transformer #200 (1974 vintage) is also being replaced due to dielectric breakdown (insulation), accessory damage (bushings/windings) and short circuit breakdown (due to amount of through faults).

Operational Flexibility and Efficiency
The additional 345 kV breaker is being installed to complete the “J” string and break up dissimilar zones of protection (bus and transformer), which could cause misoperations and over tripping.

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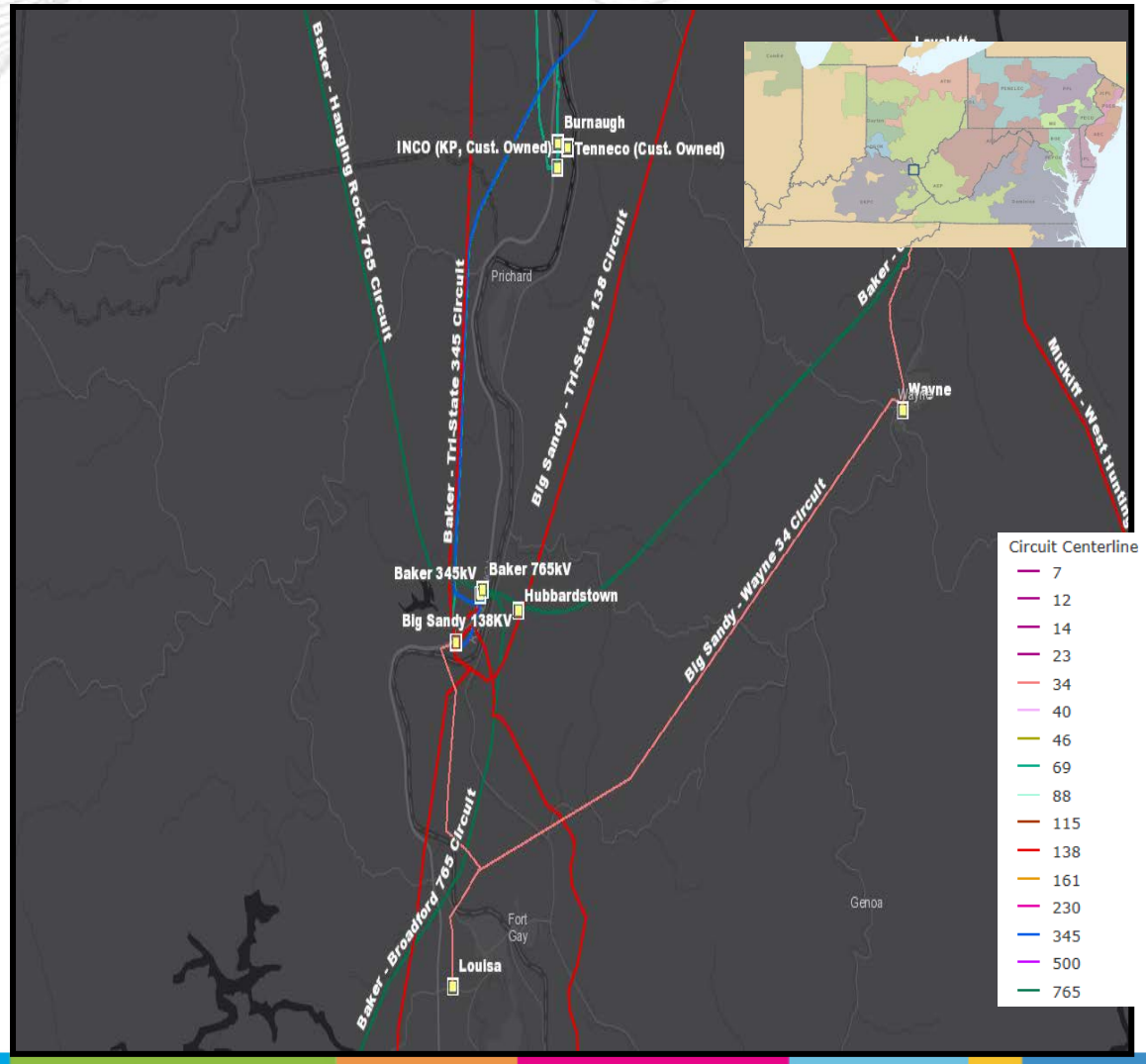

AEP Transmission Zone: Supplemental
Baker Station

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Potential Solution

Replace the existing 765 kV 3000 A 50 kA circuit breakers “Q”, “Q2”, and “P2” with new 765 kV 4000 A 63 kA breakers. Install a new 345 kV 3000 A 63 kA breaker to complete the “J” string. Replace the existing 600 MVA transformer #200 with a new 345/138 kV 675 MVA unit that will be relocated from the 345 kV bus #2 position to the newly created position between the existing breakers “J” and the newly installed breaker “J1”.

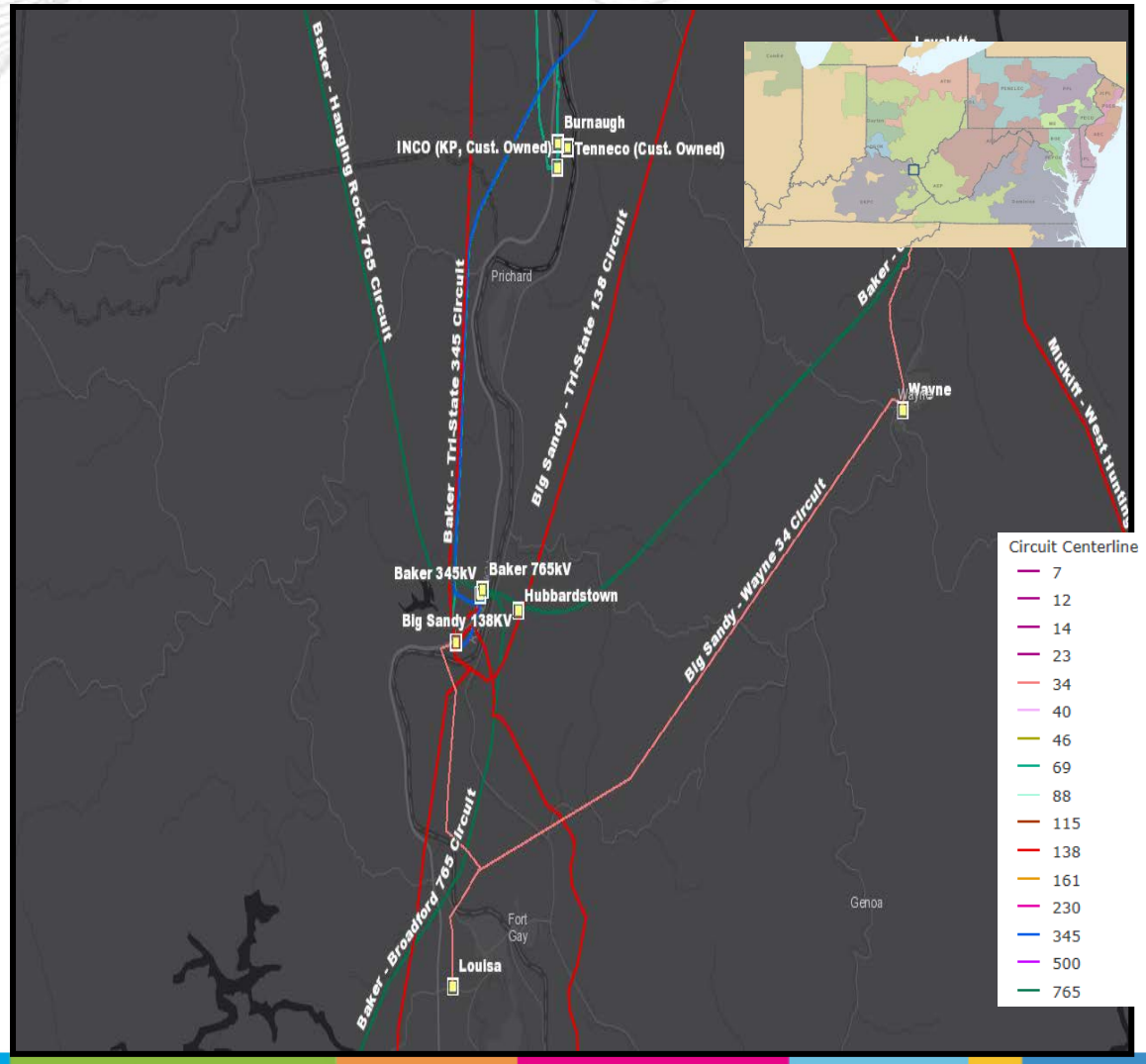
Estimated Cost: $26.9M

Alternatives:

No viable cost-effective alternatives could be identified.

Projected In-service: 12/1/2018

Project Status: Engineering



AEP Transmission Zone: Supplemental Dumont Breaker Addition

Supplemental Project

Problem Statement:

Equipment Material/Condition/Performance/Risk:
Due to the critical nature of EHV buses to AEP's system, having a 345kV line hard tapped on a bus is not acceptable. In addition to this, due to the high speed protections schemes associated with EHV systems and the challenges associated with keeping all three phases of the EHV MOAB's aligned, AEP standard is to use breakers for sectionalization in EHV voltage classes. For these reasons, two breakers will be installed at Dumont station.

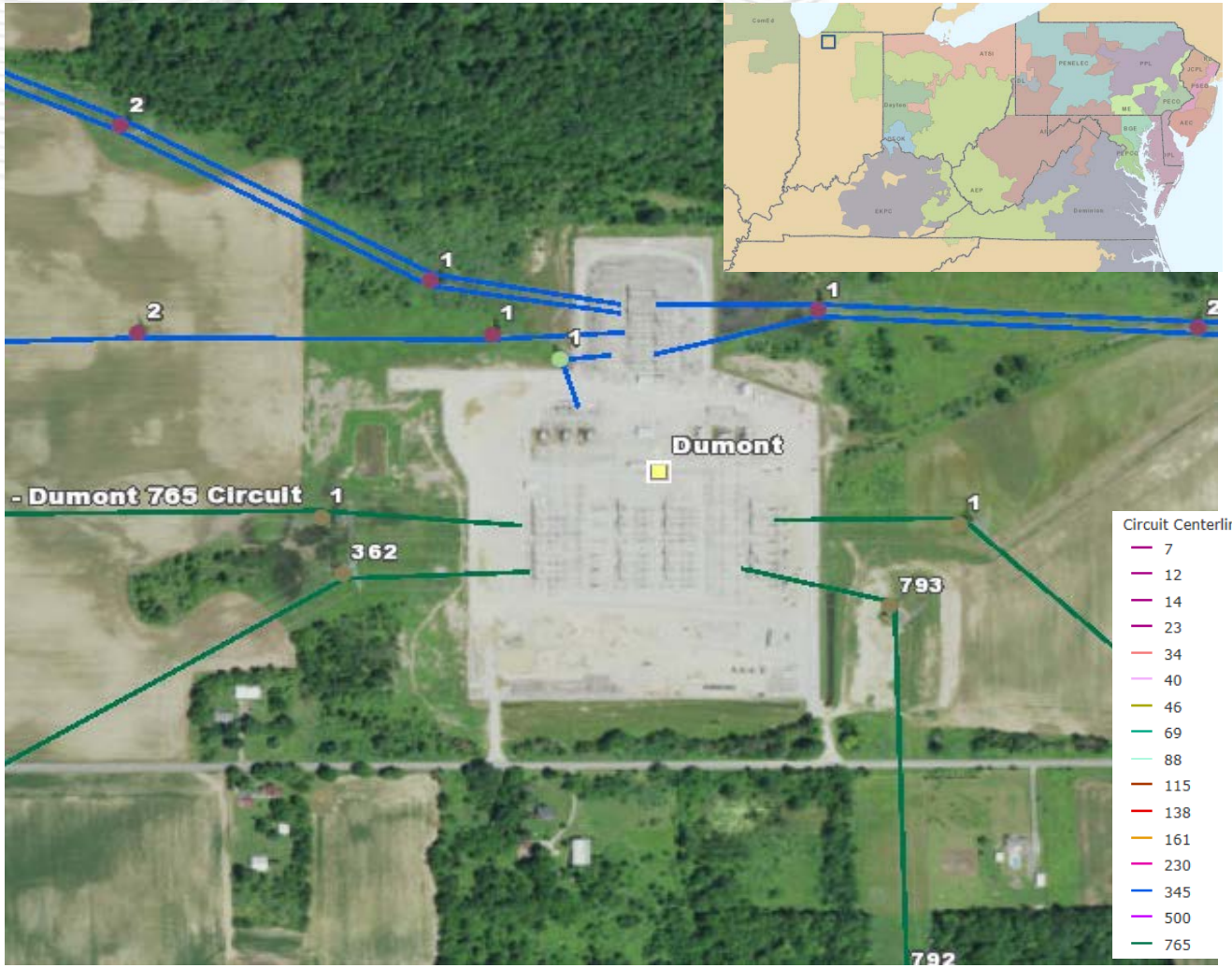
Potential Solution
Install 2-345kV Type HVB 5000A 63kA breakers G and G1 at Dumont Station.
Estimated Cost: $2.5M

Alternatives:

No viable cost-effective alternatives could be identified.

Projected In-service: 12/31/2020

Project Status: Engineering



Dominion Transmission Zone: Supplemental
National Welders Substation – Switch Replacement

Problem Statement:

- National Welders substation 230kV Line #2049 switches have been identified for replacement based on age and operating issues.

Potential Solution:

- Replace two 230kV Line #2049 2000A switches with 3000A switches. National Welders – Allied segment summer emergency ratings will be increased from 956MVA to 1047MVA.

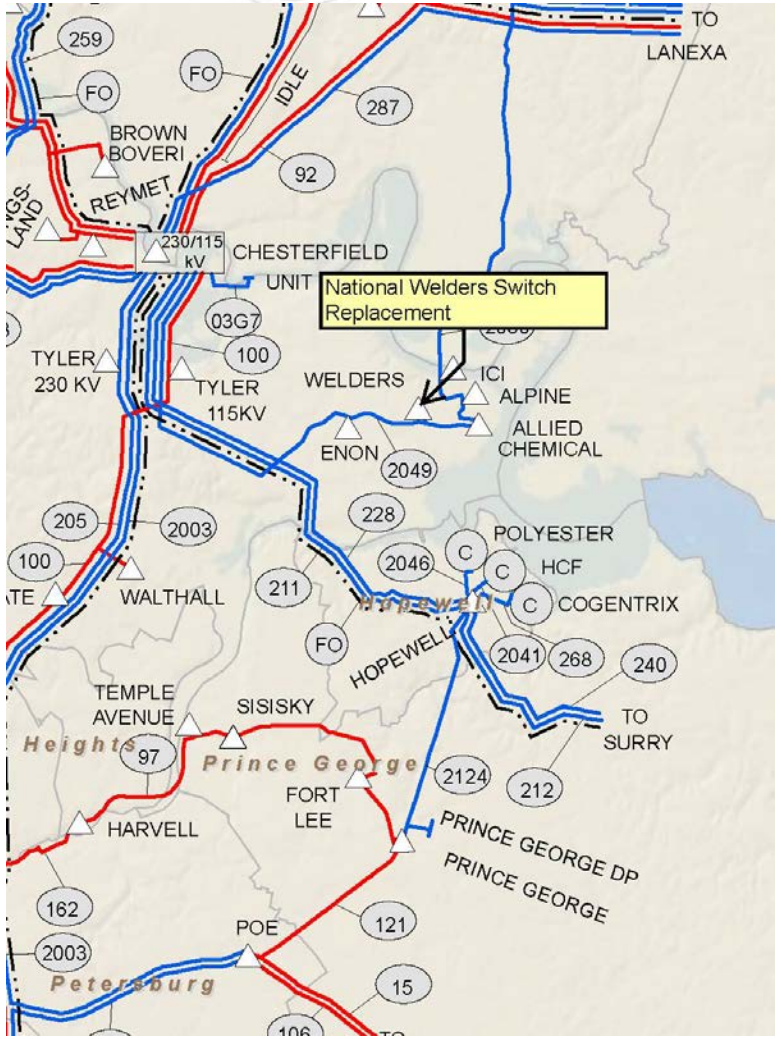
Alternatives: No feasible alternatives

Estimated Project Cost: $360 K

Possible In-service Date: 10/30/2018

Project Status: Engineering

COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED



Dominion Transmission Zone: Supplemental
Reeves Ave Substation – New 230kV Circuit Switcher

Problem Statement:

- Dominion Distribution has identified the need to replace the existing 84MVA 115/34.5kV transformer #2 at Reeves Ave substation. The existing transformer's proximity to the Elizabeth River causes environmental risks that should be addressed. The location also inhibits maintenance activities. To resolve these issues Dominion Distribution proposes to move the load to the 230 kV within the existing station and install a 84MVA 230/34.5kV transformer.

Potential Solution:

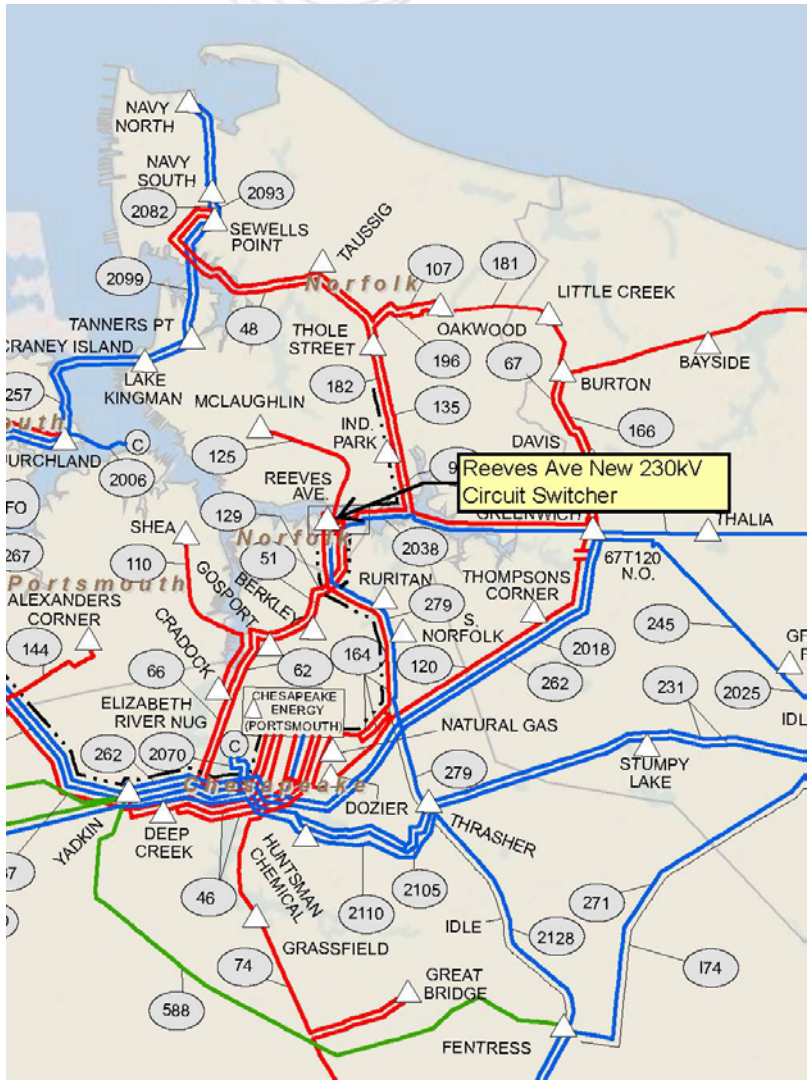
- Install a 230kV circuit switcher, high side switch and perform necessary bus work for the new transformer.

Alternatives: No feasible alternatives

Estimated Project Cost: $500 K

Possible In-service Date: 09/30/2018

Project Status: Conceptual



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

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Dominion's Winter's Branch Supplemental Project undergoing a scoping change

Supplemental Projects
Second Review

AEP Transmission Zone: Supplemental Jefferson Breakers

Supplemental Project
Previously Reviewed at 2/8/2018 TEAC

Problem Statement:

Equipment Material/Condition/Performance/Risk:
Jefferson 765KV Breakers A and A2 are 1983 PK style Air Blast breakers which have a history of failing violently and are an AEP documented safety concern. Due to the age, fault operations and safety issues with these breakers replacement is required. Old breakers are PK-8D ACB 3000A 41kA models with 44 and 30 fault operations respectively.

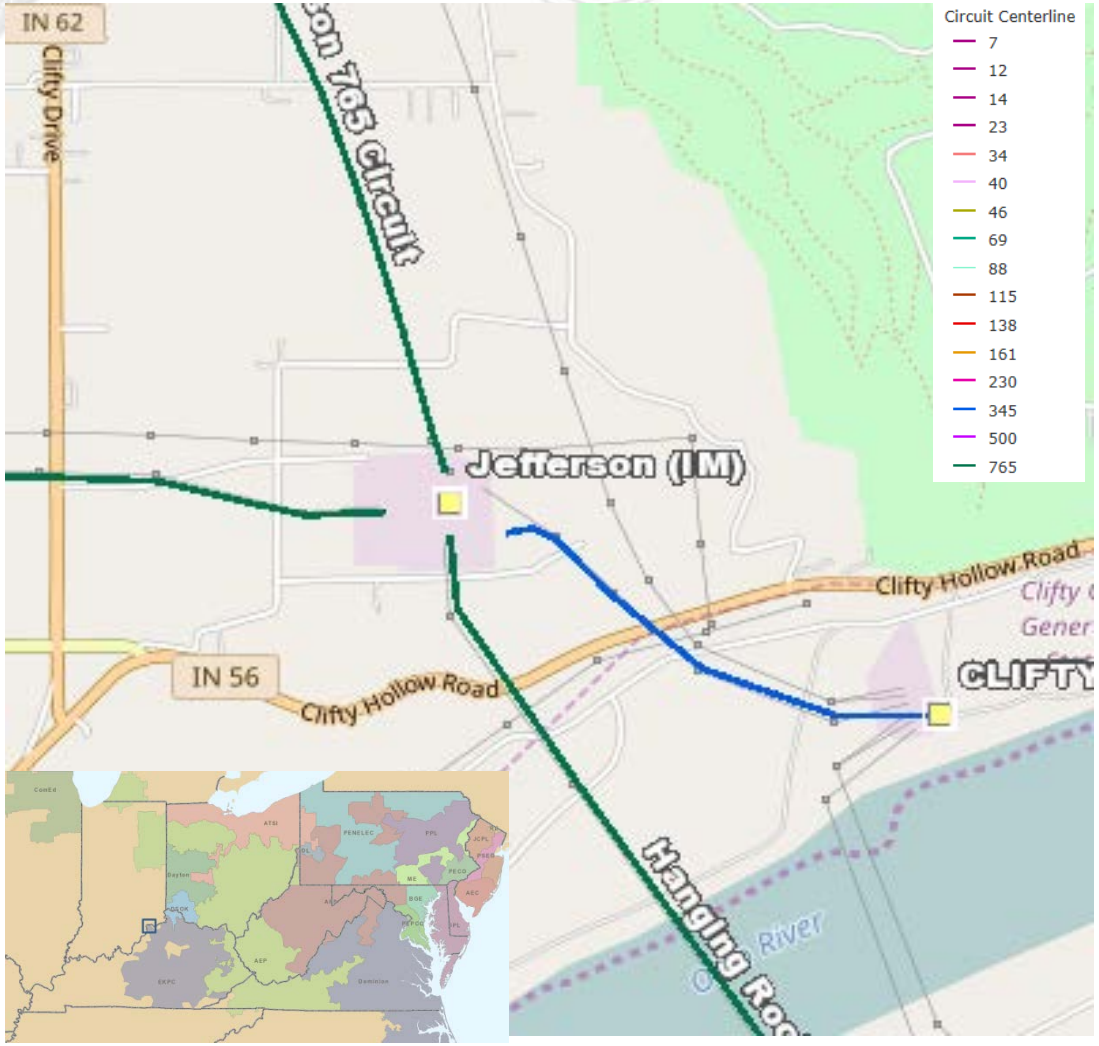
Selected Solution:
Remove and Replace Jefferson 765KV CB A and A2 with 4000A 50kA breakers. (S1528)

Estimated Cost: $5.7M

Alternatives:
No viable cost-effective alternatives could be identified.

Projected In-service: 5/1/2018

Project Status: Under Construction



BGE Transmission Zone: Supplemental Project
Howard and Jericho Park 230 kV Breaker Replacement

Previously Reviewed at 2/8/2018 TEAC

Problem Statement:

- Two 230 kV oil circuit breakers at Howard and two oil circuit breakers at Jericho Park are at risk of poor performance, environmental concerns, and parts availability issues.

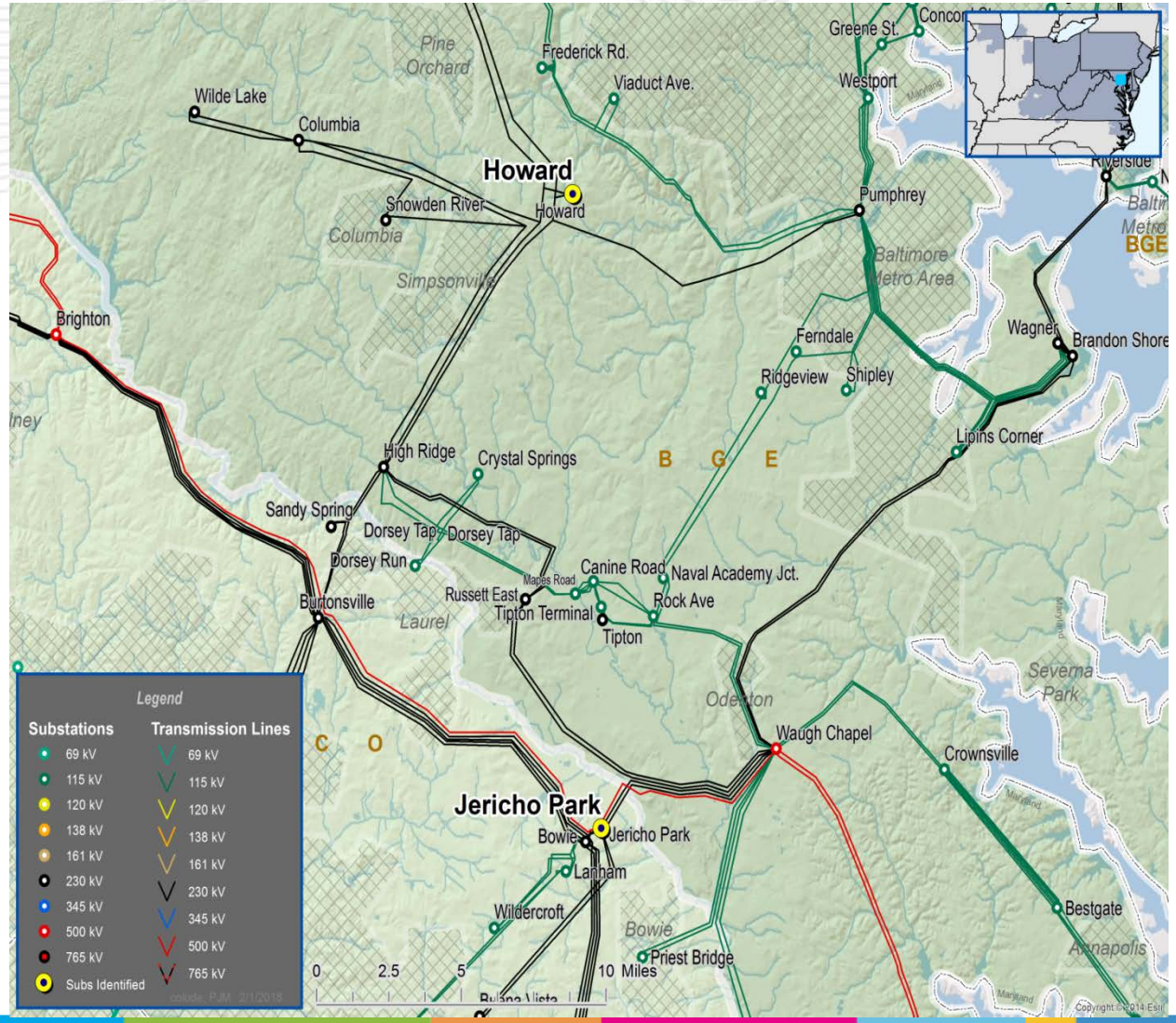
Selected Solution:

- Replace two breakers at Howard 230 kV and two breakers at Jericho Park 230 kV with new 63 kA rated gas circuit breakers. (S1531.1 & S1531.2)

Estimated Cost: $1.308 M

Expected In-Service: 12/1/2018

Status: Engineering



BGE Transmission Zone: Supplemental Project
Calvert Cliffs Nuclear Power Plant Swing Transformer Upgrade

Previously Reviewed at 2/8/2018 TEAC

Problem Statement:

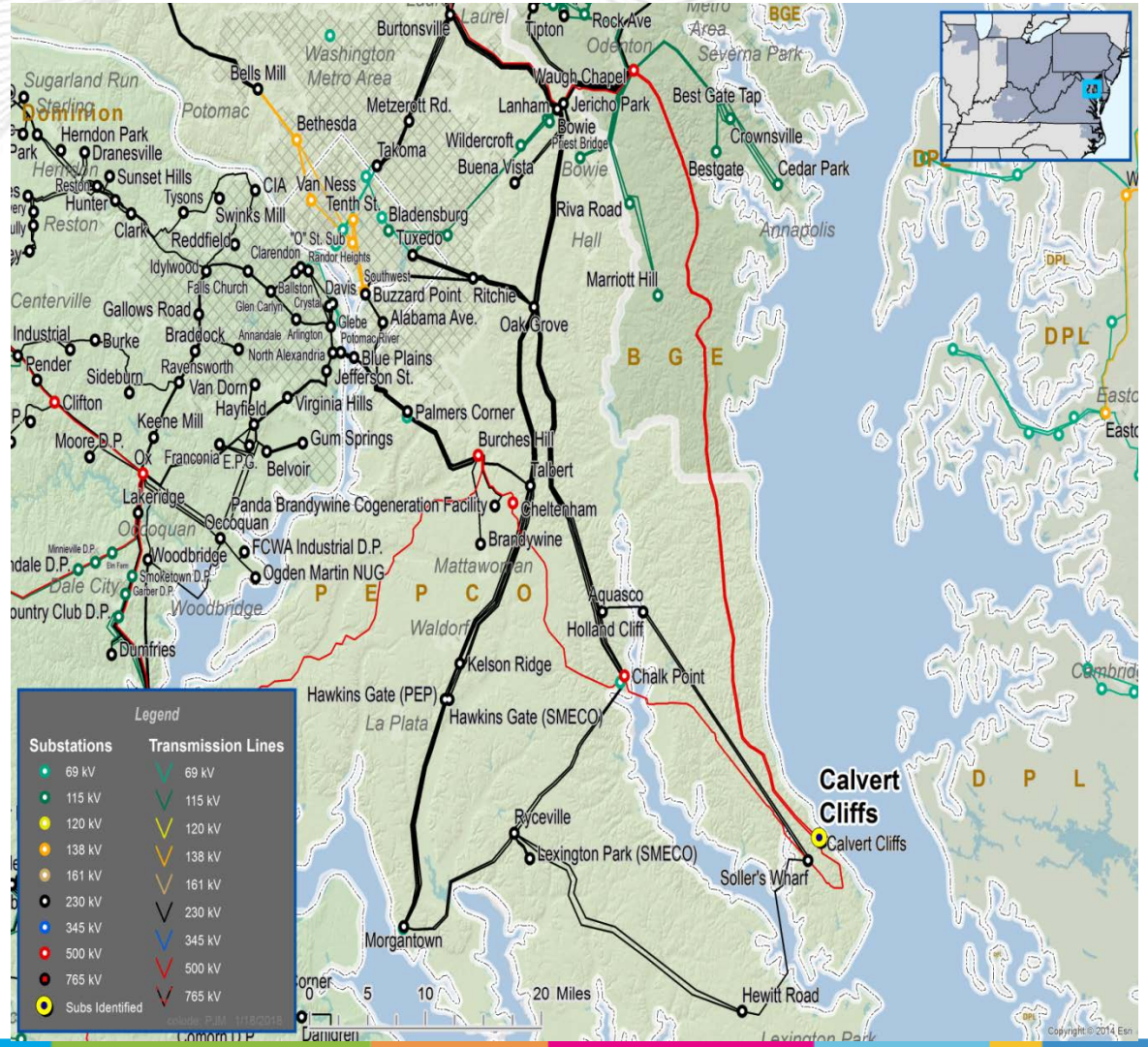
- Calvert Cliffs is planning to add an additional (third) plant service transformer to:
  - Improve reliability in case of a plant service transformer failure
  - Further protect against loss of offsite power sources
  - Improve operational flexibility during maintenance outages

Selected Solution:

- Connection of the new plant service transformer requires modification to the BGE 500 kV switchyard, including the addition of four breakers in a new 500 kV bay
- Two additional breakers will be installed for the current plant service transformers. (S1532)

Expected In-Service: 9/30/2020

Project Status: Engineering



ComEd Transmission Zone: Supplement
Lisle 345kV Ring

Previously Reviewed at 2/8/2018 TEAC

Problem Statement:

Lisle 345kV bus is currently configured as two separate straight buses with no line breakers and one transformer high side breakers

- A line fault will trip 345-138kV transformer on the same bus
- A transformer fault will trip the 345kV transmission line on the same bus for three of the four transformers

Selected Solution:

Install a 345kV red/blue bus tie and breaker at Lisle 345KV substation, Close the new and existing red/blue bus ties creating a large hybrid ring bus so each bus contains a transmission line and a transformers; Install four 345kV line breakers and two 345kV high side transformer breakers; Third transformer high side breaker will be installed with the transformer is replaced (S1529)

Estimated Cost: $30M

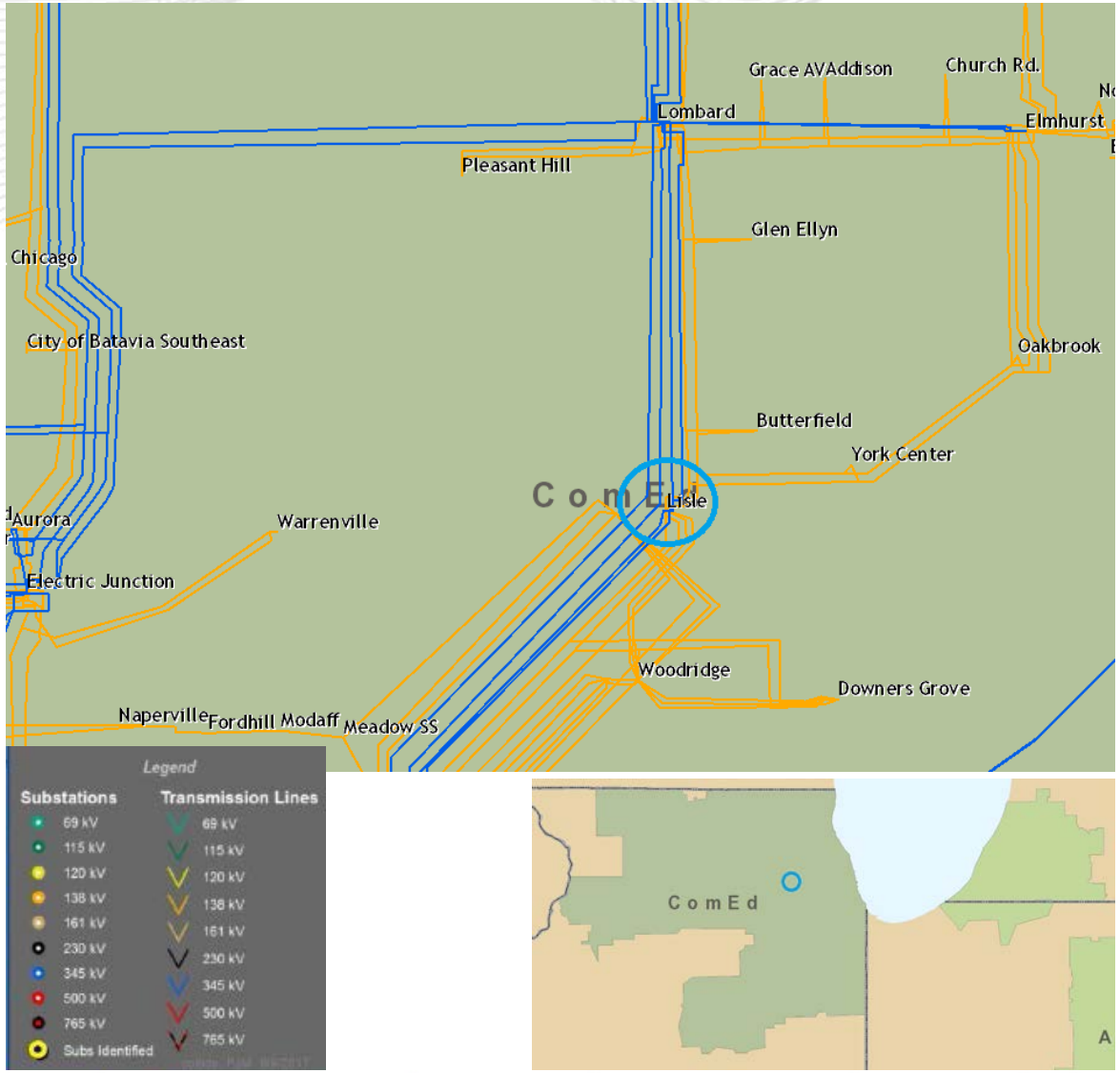
Alternatives:

- Rebuild Lisle 345kV as a breaker and a half using GIS equipment
  - Not enough land for open air construction

  Estimated Cost of $45M + land purchase

Projected In-service: 12/31/2019

Project Status: Engineering



ComEd Transmission Zone: Supplement
Wayne 345-138kV Transformer 84 Replacement

Previously Reviewed at 2/8/2018 TEAC

Problem Statement:

Wayne 345-138kV auto-transformer 84

- Westinghouse 7-million series shell form
- Susceptible to static electrification
- Cannot be re-blocked
- Acoustic testing show high vibration and sharp increases in frequencies associated with looseness in the core assembly.
- Low ability to withstand through fault

Transformer 84 shares a bus position with 345kV line 14419 (Wayne-Aurora E.C.)

Tertiary cap banks no longer allowed.

Tertiary cap bank failures stress the 345-138kV transformers and have caused transformer failures in the past.

Selected Solution:

Replace Wayne 345-138kV transformer; Finish ring bus on red 345kV bus - Install two 345kV breakers;;Retire Tertiary cap bank and Install 138kV cap bank (S1530)

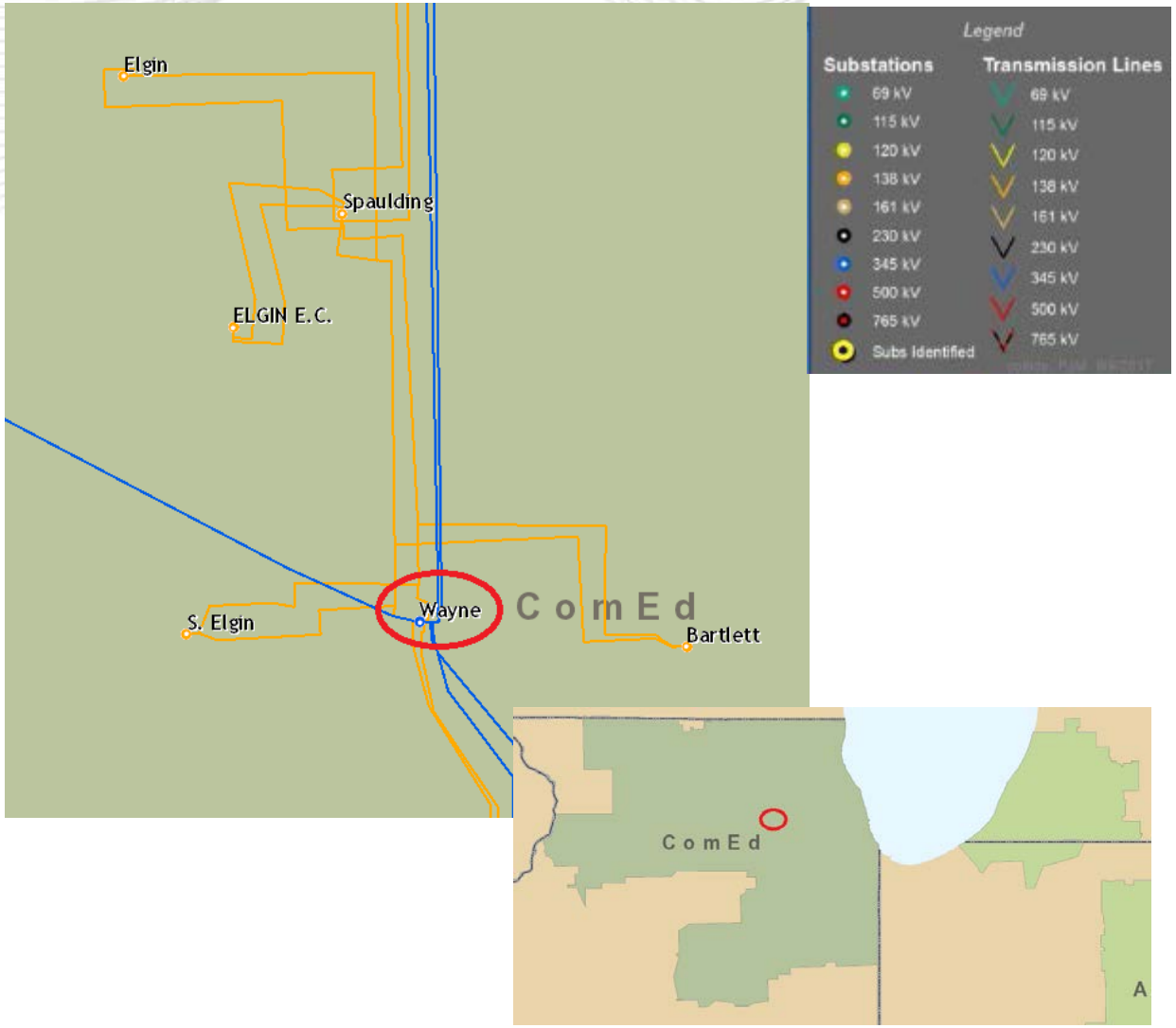
Estimated Cost: $15M

Alternatives:

- No feasible alternatives

Projected In-service: 12/31/2019

Project Status: Engineering



2018 Proposal Window

Upcoming TEAC Meetings

2018

- TEAC meetings are the following Thursdays in 2018
- 1/11, 2/8, 3/8, **4/5, 5/3, 6/7, 7/12, 8/9, 9/13, 10/11, 11/8, 12/13**

Questions?

Revision History

- V1 – 3/02/2018 – Original Slides Posted
- V2 – 3/07/2018 – Slide 23 removed. Dominion's Winter's Branch Supplemental Project undergoing a scoping change. Will be presented at a future TEAC meeting.
- V3 – 3/13/2018 – Slide 25: S1258 is a typo, should be S1528
- V4 – 3/28/2018 – Added supplemental upgrade # to slides 26 and 27.