Submission of Supplemental Projects for Inclusion in the Local Plan

AEP Transmission Zone M-3 Process
Columbia and Gateway Breakers

Need Number: AEP-2018-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:
Needs Meeting 10/26/2018
Solution Meeting 9/11/2020

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

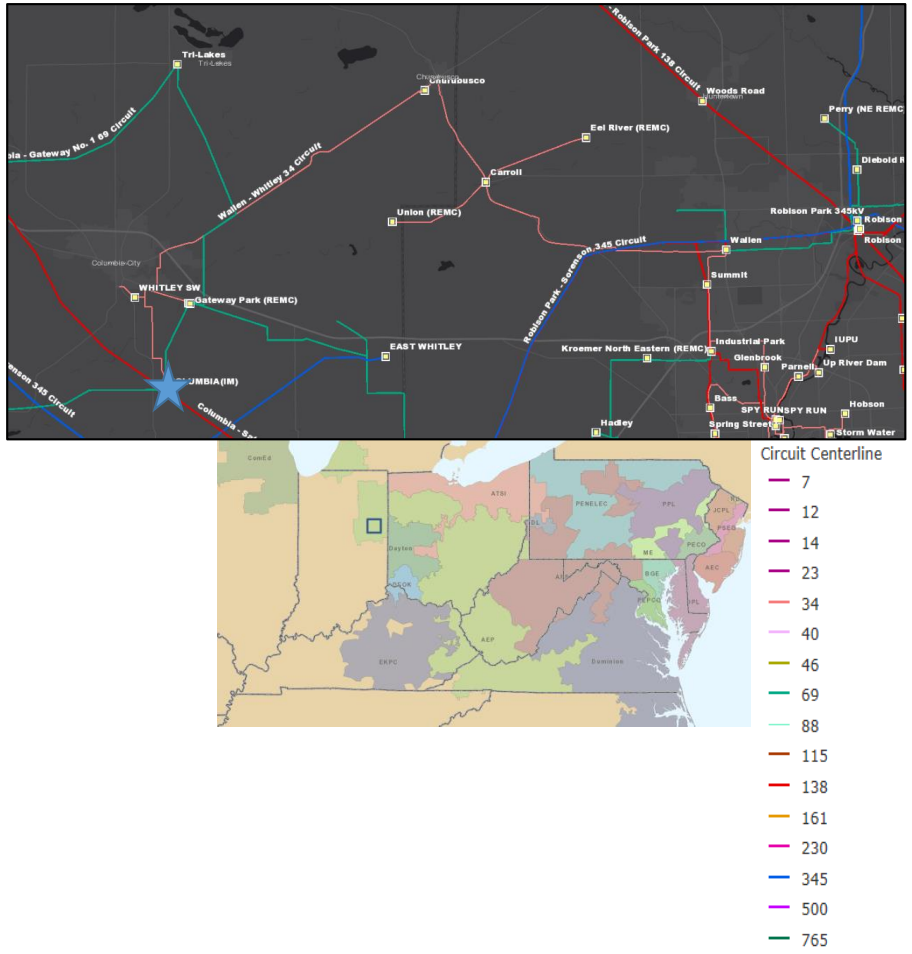
Problem Statement:

Columbia Station

- Circuit Breakers J 69kV
  - Vintage 1968
  - GE FKA type oil-filled breakers – without oil containment
  - Fault operations: CB A(95) – Recommended (10)
  - Trip coil failure
  - Spring charging motor failure

Gateway Station

- Circuit Breaker E 69kV
  - 1975 vintage
  - GE FKA type oil-filled breakers – without oil containment
  - Fault operations: CB E(49) – Recommended (10)
  - Three documented instances of breaker failing to close



AEP Transmission Zone M-3 Process
Columbia and Gateway Breakers

Need Number: AEP-2018-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution:
Replace 69kV CB "E" at Gateway station with a 3000A 40kA CB (**S2391.1**)
Estimated Cost: $0.9M

Replace 69kV CB "J" at Columbia station with a 3000A 40kA CB (**S2391.2**)
Estimated Cost: $0.9M

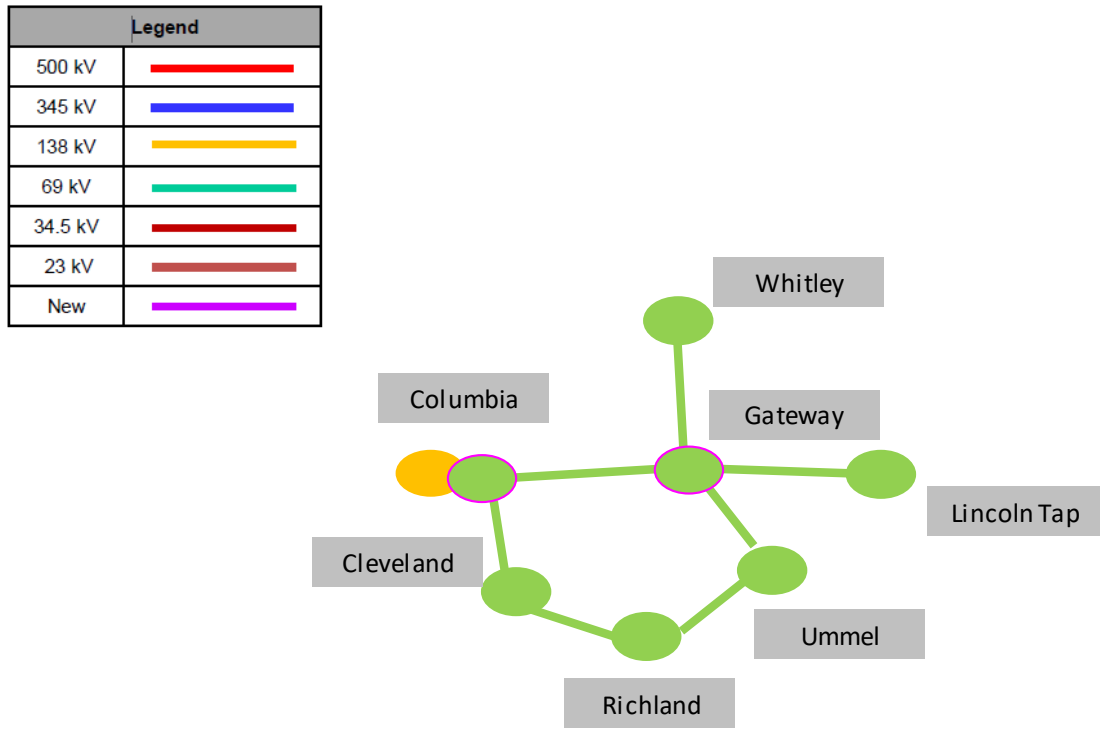
Estimated Cost: $1.8M

Projected In-Service: 4/3/2023

Supplemental Project ID: S2391.1-.2

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Rob Park – S.Hicksville 69kV Line Rebuild

Need Number: AEP-2019-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:
Needs Meeting 4/23/2019
Solution Meeting 9/11/2020

Project Driver:

Equipment Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Robison Park – South Hicksville 69kV Line (~27 Miles)

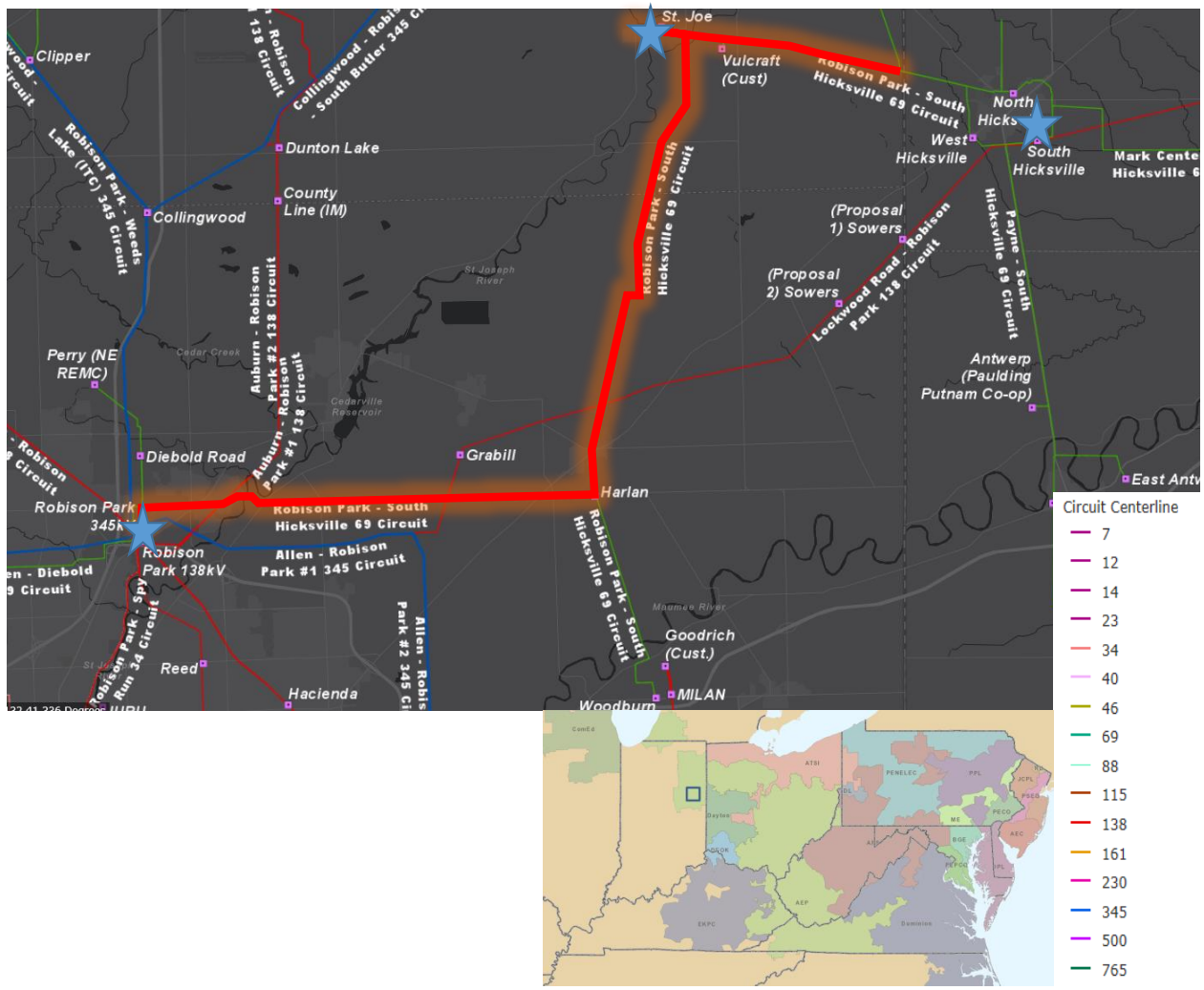
- 1967 vintage wood cross arm construction.
- There are currently 56 open conditions on this line with majority (94%) being structure issues. The O&M cost of the line is expected to increase as the age of the line increases.
- 4/0 ASCR conductor with horizontal post type porcelain insulators.
- CMI: 526,269
- Forced Momentary Outages: 6
- Forced Permanent Outages: 5

St Joe Tap 69kV Line (~0.6 Miles)

- 1967 vintage wood cross arm construction
- There are currently 3 open conditions on this line. The O&M cost of the line is expected to increase as the age of the line increases.
- St. Joe is radially served out of Robison Park – South Hicksville 69kV Line and it is susceptible to single event outages.
- It occasional encounter floodwaters of Bear Creek that leave some of the existing poles inaccessible.

St. Joe Tap Switch

- The Switch has accessibility challenges due to St. Joseph River floodwaters.



AEP Transmission Zone M-3 Process
Rob Park – S.Hicksville 69kV Line Rebuild

Need Number: AEP-2020-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:
Needs Meeting 2/21/2020
Solution Meeting 9/11/2020

Project Driver:

Equipment Condition/Performance/Risk

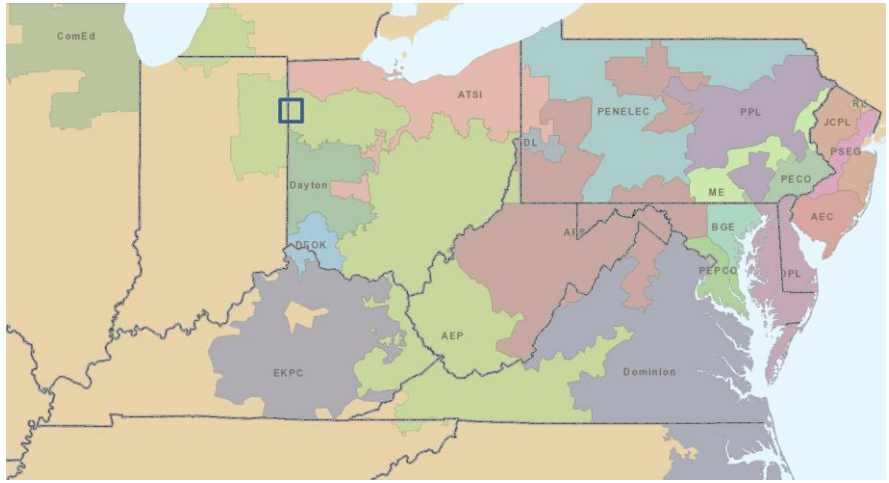
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Rob Park – South Hicksville (OH) 34kV (~4.6 Miles)

- 1956 & 1962 vintage wood pole construction with 32 open conditions on 17 unique structures, approximately 17% of the line. These conditions include but not limited to damaged poles, broken insulators, broken shield wire, rot top and broken Knee/Vee braces
- The circuits on this line have had the following outages across the last 5 years.
  Rob Park – South Hicksville: 9 momentary and 6 permanent
  CMI: 526,269
  North Hicksville – Butler: 5 Momentary and 2 Permanent.
  CMI: 120 over the last 5 years.
- Related to previously shared need AEP-2019-IM014.



AEP Transmission Zone M-3 Process
Rob Park – S.Hicksville 69kV Line Rebuild

Need Number: AEP-2020-OH008 & AEP-2019-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution:
On the South Hicksville – Rob Park 69kV line. Rebuild the 21.6 miles as currently constructed, including ~2.4 miles of 69kV double circuit and ~19.2 miles of 69kV single circuit (**S2393.1**)
Estimated Cost: $50.8M

Rebuild the through path of St Joe 69kV station. Install a breaker on the Harlan line exit to eliminate four MOABs in series. (**S2393.2**) **Estimated Cost: $1.3M**

At Harlan 69kV (FERC-Distribution) station, replace a switch and line riser in order to accommodate the new line entrance. (**S2393.3**) **Estimated Cost: $0M**

Replace the West Hicksville 69kV PoP switch to accommodate the new line height, route and structure/conductor type. (**S2393.4**) **Estimated Cost: $1.0M**

In order to rebuild the line, the in-line switch at Vulcraft 69kV needs to be replaced. The switch replacement will be a 3-way switch with a MOAB toward West Hicksville 69kV . (**S2393.5**) **Estimated Cost: $1.0M**

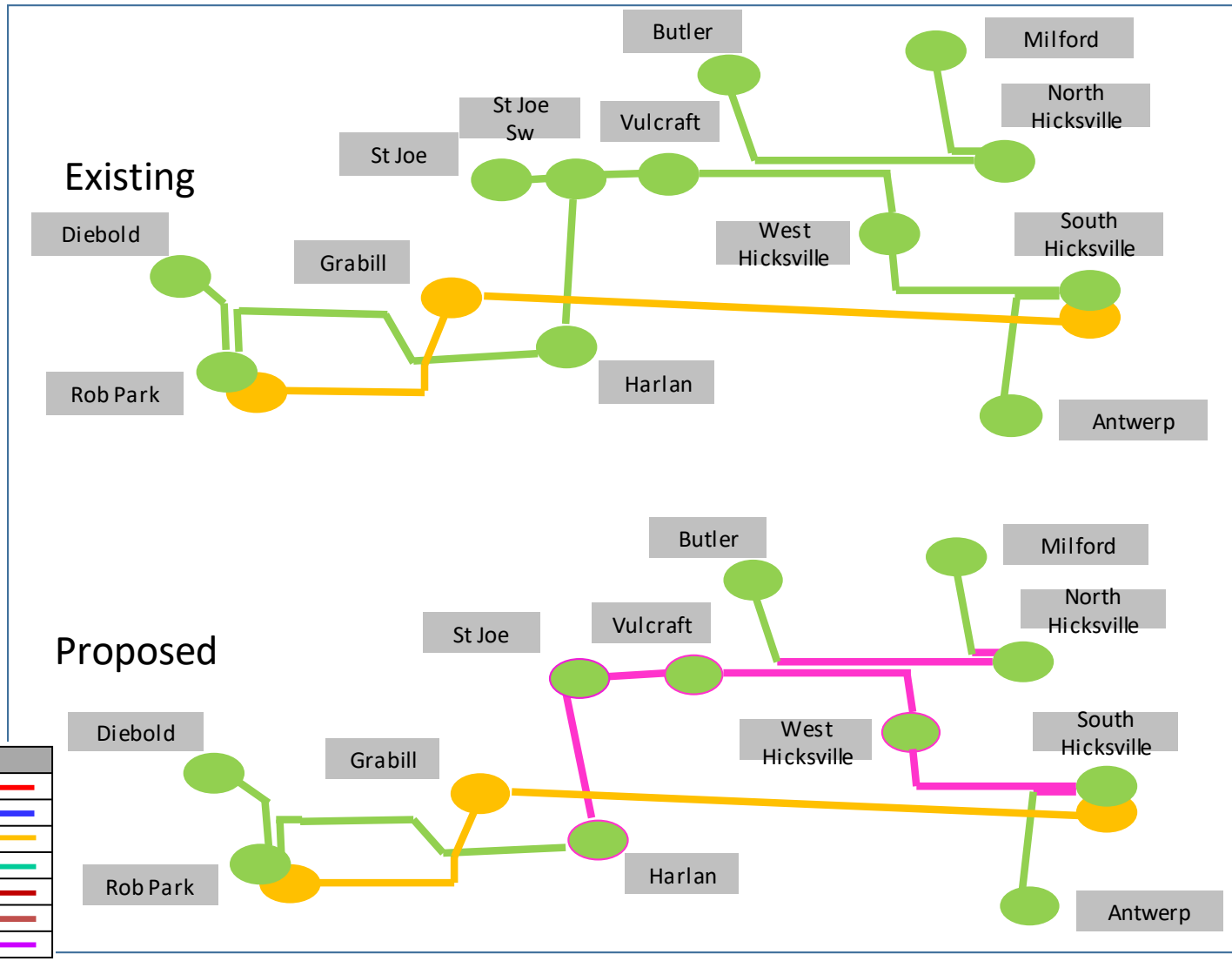
Estimated Cost: $54.1M

Projected In-Service: 6/2/2023

Supplemental Project ID: S2393.1-.5

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Rob Park – Lincoln 138kV Line Rebuild

Need Number: AEP-2020-IM016

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:

Needs Meeting 4/20/2020

Solution Meeting 9/11/2020

Project Driver:

Equipment Material/Condition/Performance/Risk & Operational Flexibility

Specific Assumption Reference:

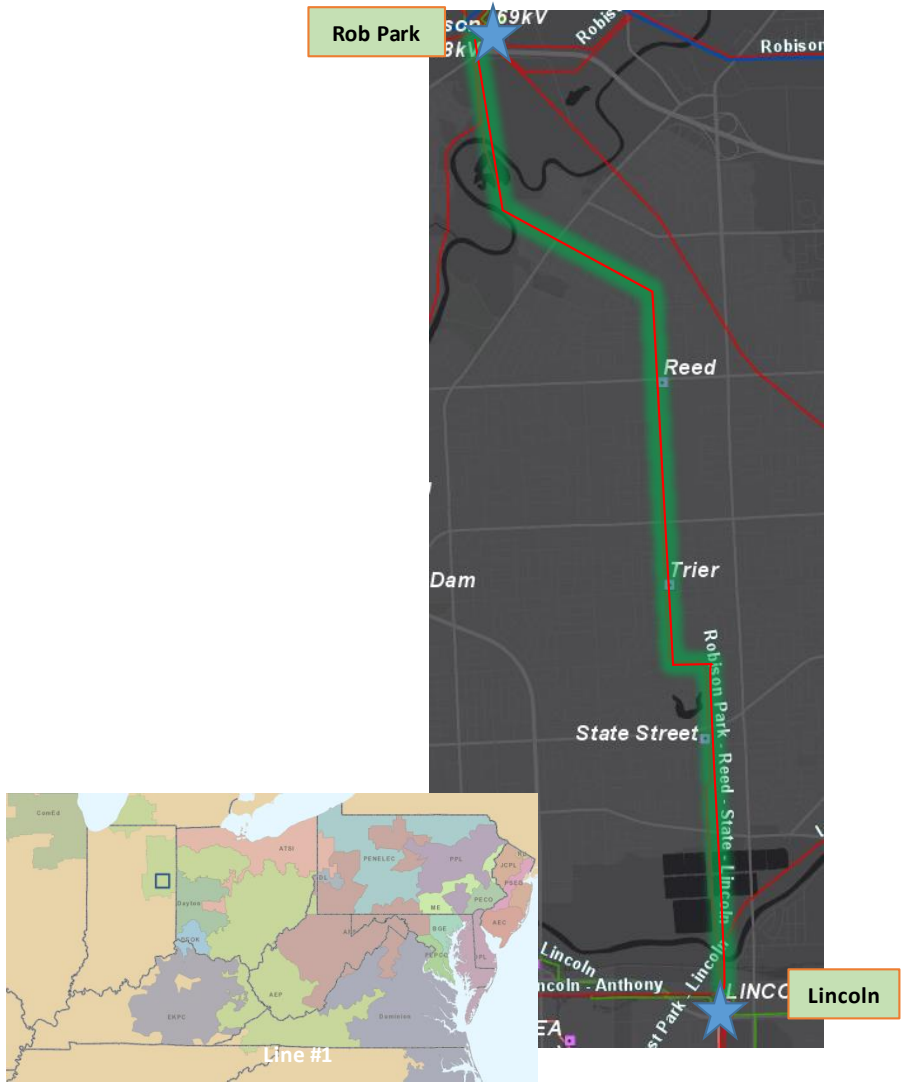
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Robison Park – Lincoln 138kV (~~10.9~~ 7.8 mi)

- 44 structures with an open condition (~67%) with most revolving around rusted legs, broken/chipped insulators and rusted shield wire
- Fails to meet current AEP structural strength requirements
- Fails to meet AEP shield angle requirements
- Top half of towers were replaced and re-conductored in 1968 to allow for 138kV voltage operation, but the bottom half and foundations are original 1928 installation
- 4 MOABS in series currently which is over the AEP max of 3.

Note: the remaining 3.1 miles of line is covered under need AEP-2019-IM038 and will be addressed with a future solution.



AEP Transmission Zone M-3 Process
Rob Park – Lincoln 138kV Line Rebuild

Need Number: AEP-2020-IM016

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution:
Rebuild the ~7.8 mile 138kV Rob Park – Lincoln line using Drake 795 ACSR (SN/SE/WN/WE: 257/360/325/404MVA). (**S2392.1**)
Estimated Cost: $25.1M

Add a 3000A bus tie CB at 138kV Trier station to separate the 4 MOAB's in series. (**S2392.2**) **Estimated Cost: $1.2M**

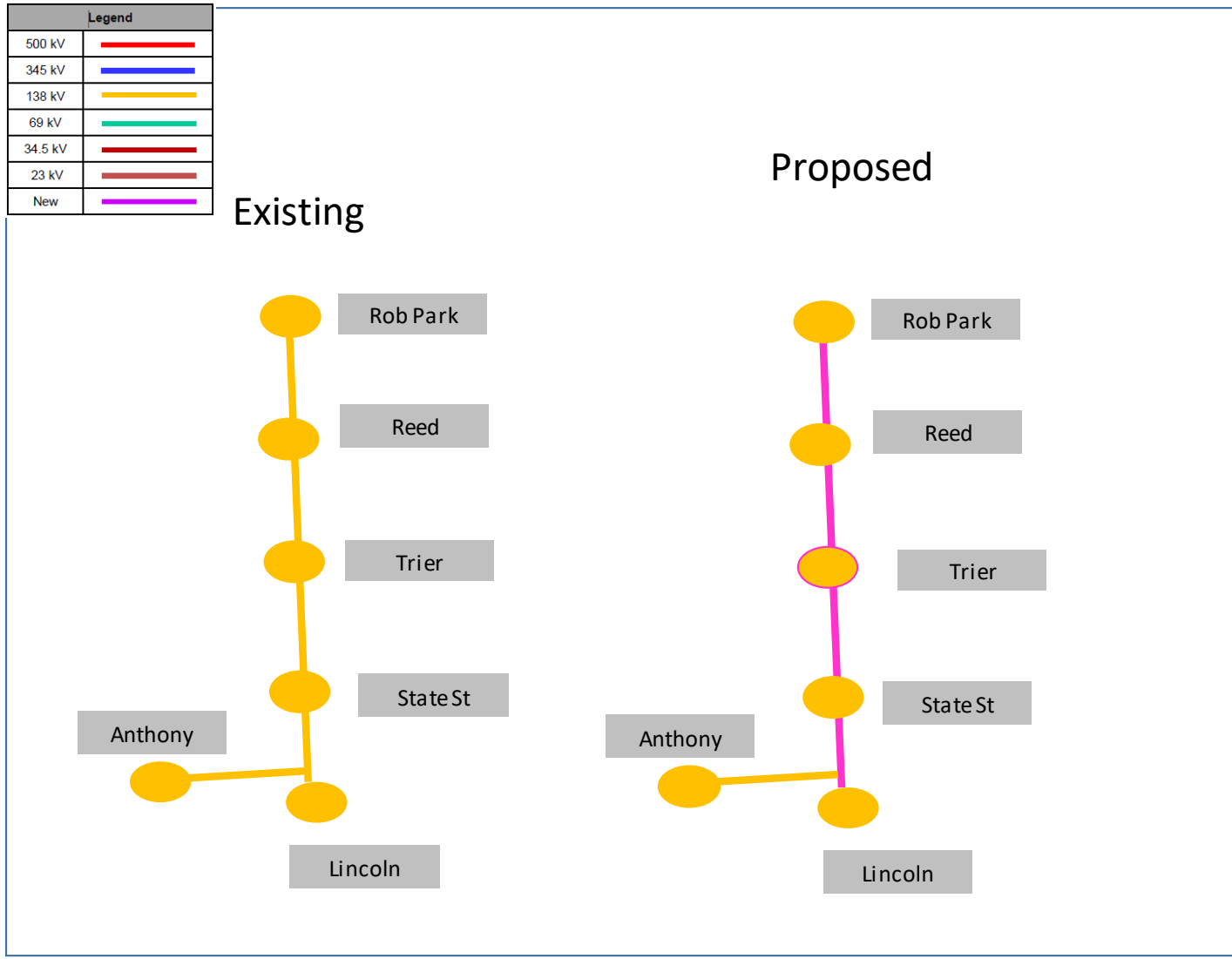
Total Estimated Cost: $26.3M

Projected In-Service: 4/3/2023

Supplemental Project ID: S2392.1 - .2

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
DC Cook Breaker Failure

Need Number: AEP-2020-IM017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:

Needs Meeting 5/12/2020

Solution meeting 9/11/2020

Project Driver:

Equipment Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

DC Cook 765/345 Station

- 345kV CB N1 Failure
  - The 345kV CB failed internally on phase 2 in March 2020
  - The DC Cook 345kV CB N1 is an HVB362 type SF6 breaker
  - Manufactured in 2002
  - Breaker N1 had 2 fault interruptions since install date of 2003

Need Number: AEP-2020-IM017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution:

DC Cook 765/345 Station

Replace the failed 345kV Breaker N1. (**S2390**)

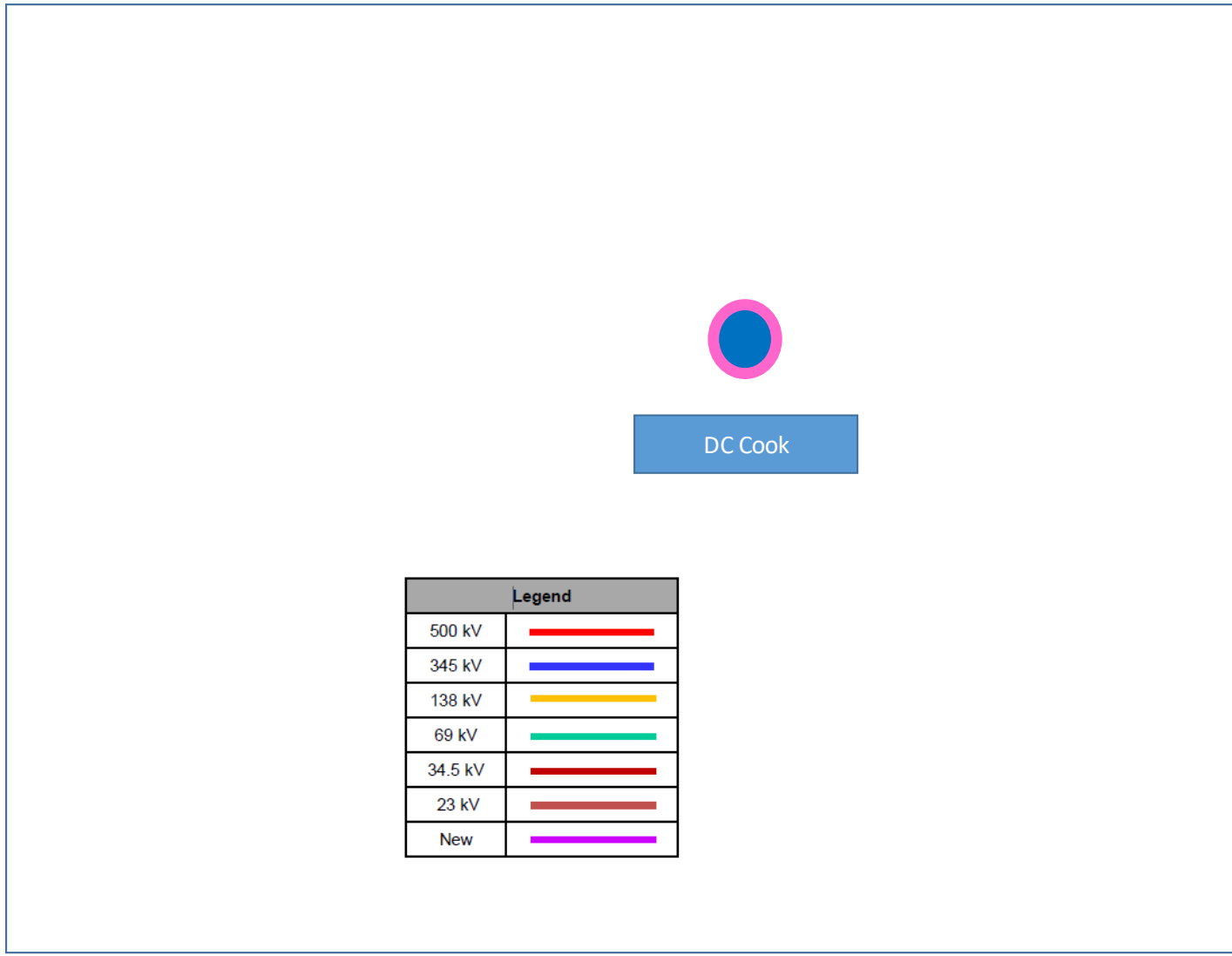
Estimated Cost: $300k

Projected In-Service: 10/17/2020

Supplemental Project ID: S2390

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Upper Sandusky

Need Number: AEP-2018-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:

Needs Meeting 10/26/2018

Solution Meeting 9/11/2020

Project Driver:

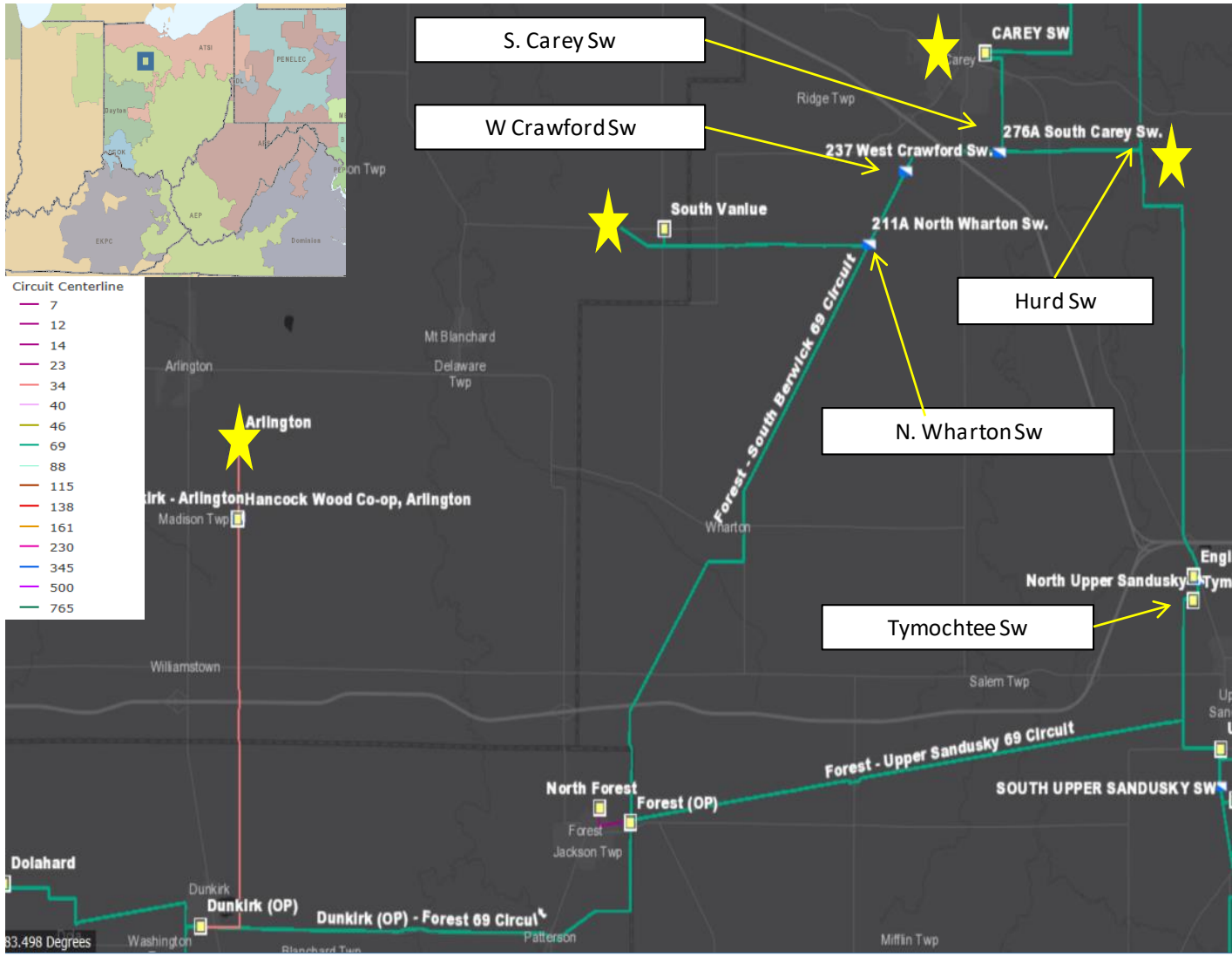
Equipment Condition/Performance/Risk, Operational Flexibility and Efficiency, and Customer Service.

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- There is 1.27 miles of 1/0 Copper and 2.58 miles of 1/0 ACSR conductor on the 69 kV system in the Upper Sandusky area.
- There are 10 open conditions on the Arlington – Dunkirk 34.5 kV line (~ 7.29 miles) & 29 open conditions on the Forest – South Berwick 69 kV line (~27.6 miles).
- There is a three-terminal hard tap just west of Hurd Switch.
- South Carey Switch and North Wharton Switch are both three-terminal lines.
- West Crawford Switch and Hurd Switch are set in an N.O. position to prevent thermal overloads.
- The City of Carey has reliability concerns, where both feeds to the city can be lost for a single outage.
- Hancock-Wood Co-op has reliability and maintenance concerns due to radial loads at Arlington and Blanchard Stations.
- Arlington – Dunkirk Circuit:
  - Peak Load Impact: 6.57 MW
  - CMI (2015 – 2018): 162,840
- Forest – South Berwick Circuit:
  - Peak Load Impact: 7.68 MW
  - CMI (2015 – 2018): 1,713



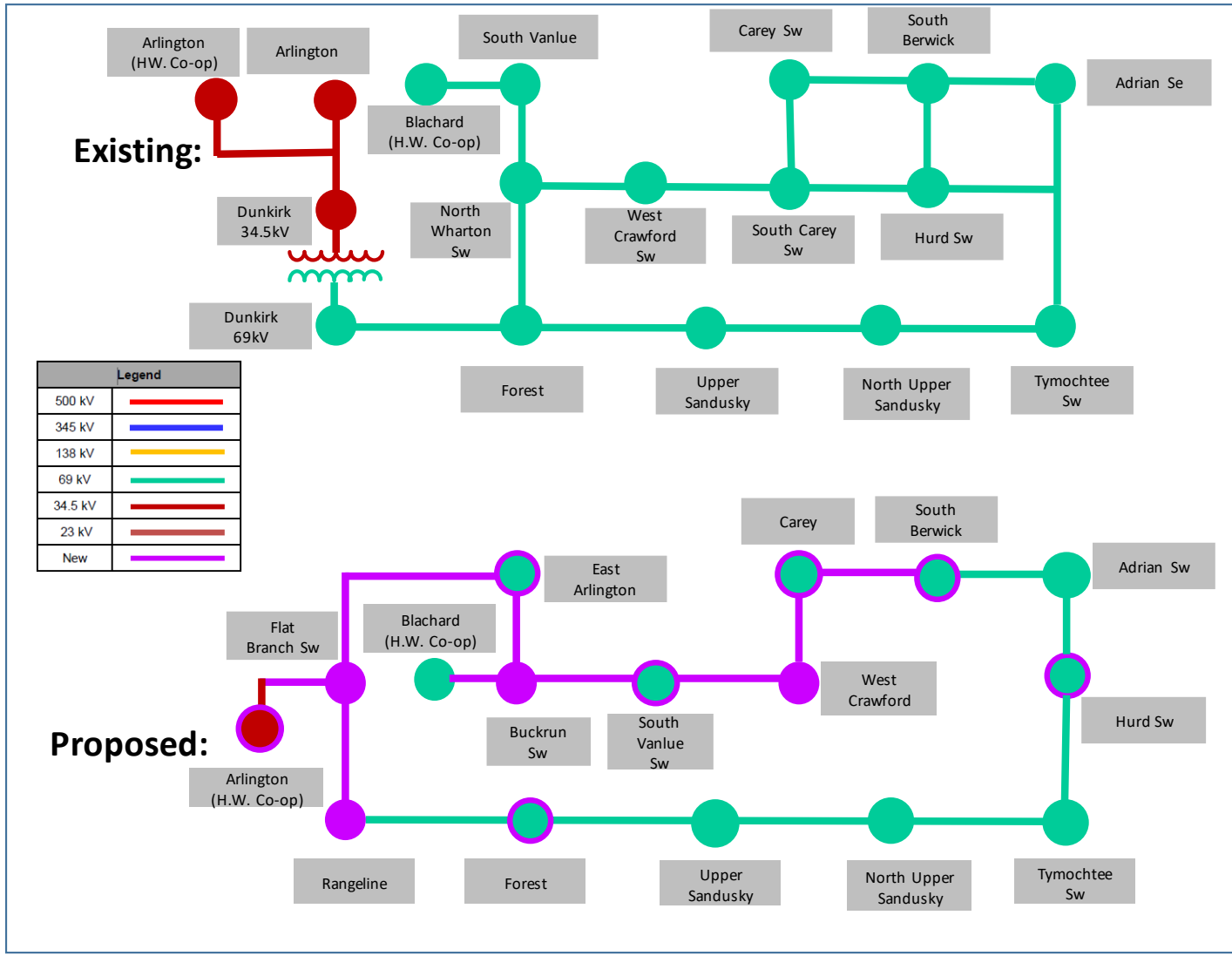
AEP Transmission Zone M-3 Process
Upper Sandusky

Need Number: AEP-2018-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution:

- Rebuild existing double circuit portion of the Dunkirk – Forest line asset from existing Str 194 to the greenfield Rangeline station (1.35 miles). Rebuild existing ~6.5 mi Arlington – Dunkirk 34.5 kV as Rangeline – East Arlington single 69 circuit from Str 194 to the greenfield East Arlington (formerly Arlington) . (**S2395.1**) **Estimated Cost $21.0M**
- Reconfigure ~0.05mi Dunkirk – Kenton 69kV line to terminate into Rangeline station. (**S2395.2**) **Estimated Cost $0.1M**
- Reconfigure ~0.05mi Dunkirk – Ada 69kV line to terminate into Rangeline station. (**S2395.3**) **Estimated Cost $0.1M**
- Build ~10.1 mi 69kV line section between greenfield Buckrun Sw and East Arlington as single circuit 69kV. (**S2395.4**) **Estimated Cost $22.0M**
- Rebuild ~5.75 mi 69kV line section between greenfield West Crawford Station and Buckrun Switch (outside of Blanchard Station) as single circuit 69kV. (**S2395.5**) **Estimated Cost $13.0M**
- Rebuild ~0.22 mi South Vanlue Extension to tie into East Arlington – West Crawford 69kV ckt. (**S2395.6**) **Estimated Cost $0.1M**
- Rebuild ~11.5 mi 69kV line between West Crawford and South Berwick Stations. (**S2395.7**) **Estimated Cost $28.9M**



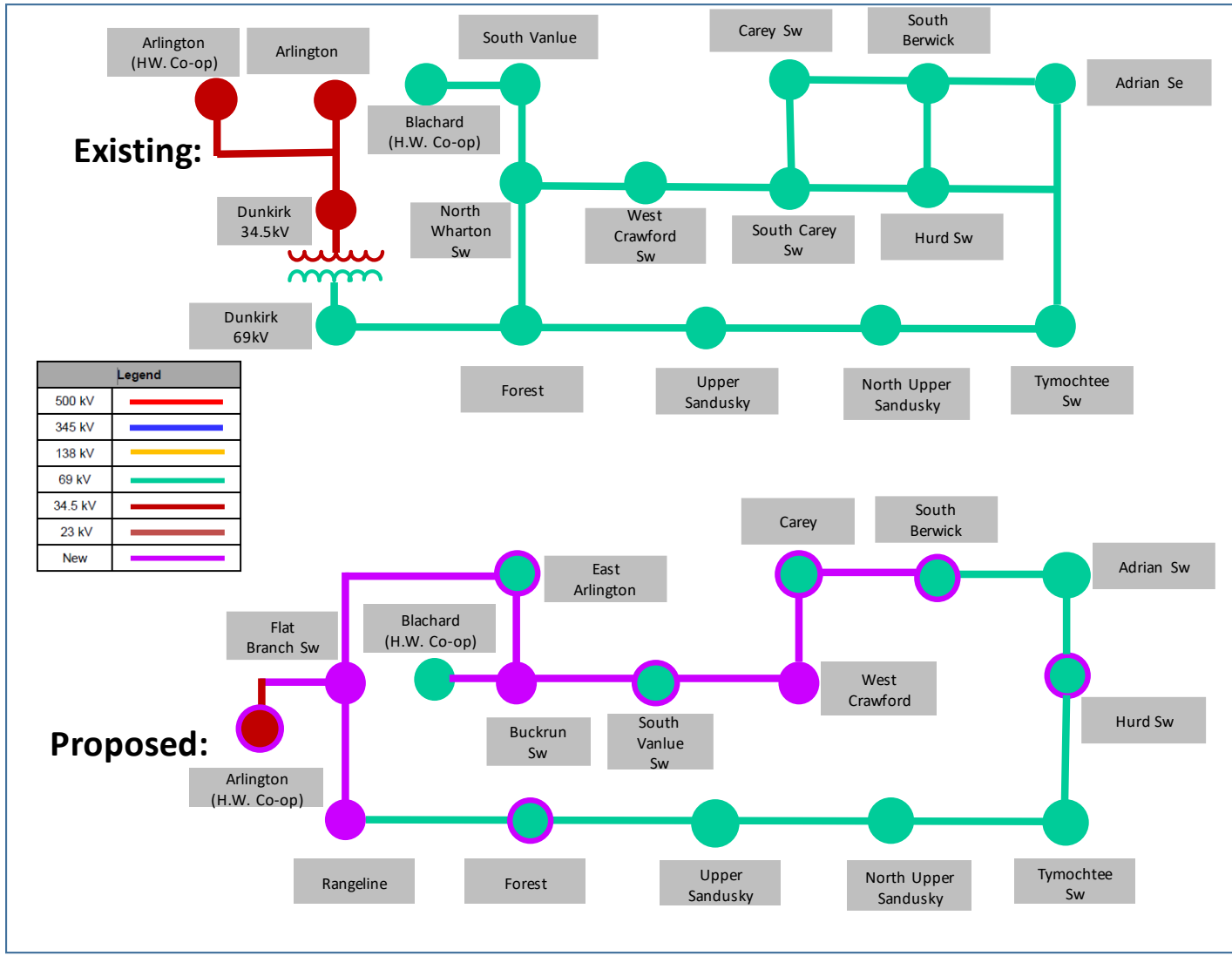
AEP Transmission Zone M-3 Process
Upper Sandusky

Need Number: AEP-2018-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution Continued:

- Remove/retire ~10 mi of 69 kv line from Forest to North Wharton Switch. (**S2395.8**) **Estimated Cost $8.3M**
- Reconfigure North Upper Sandusky – South Berwick 69kV line to tie into Hurd Switch (**S2395.9**) **Estimated Cost $0.1M**
- Remove/Retire ~2.58 mi South Carey – Hurd Switch 69kV line. (**S2395.10**) **Estimated Cost $1.9M**
- **Carey 69kV:** Install 69kV Box Bay with 2000A, 40kA MOABs with sectionalizing capability. Remove existing Carey Sw. (**S2395.11**) **Estimated cost $1.5M**
- **West Crawford 69kV** (Rebuild): Install a new 69kV ring bus with three 3000A, 40kA circuit breakers to replace West Crawford Sw. Replace Cap switcher "AA" and relocate Cap bank from Carey Sw to West Crawford 69 kV bus. (**S2395.12**) **Estimated cost: $5.6M**
- **South Carey Sw 69kV**: Remove South Carey Sw 69kV. (**S2395.13**) **Estimated Cost $0.1M**
- **North Wharton Sw 69kV:** Remove North Wharton Sw 69kV. (**S2395.14**) **Estimated Cost $0.1M**
- **South Vanlue 69kV:** Replace 69kV bus and existing switches with 2000A, 40kA line MOABs with sectionalizing capability. (**S2395.15**) **Estimated Cost: $0.5M**



AEP Transmission Zone M-3 Process
Upper Sandusky

Need Number: AEP-2018-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution Continued:

- **Buckrun Sw 69kV**: Install a new 69 kV, 2000A, 40kA, 3-way Phase-over-Phase Switch with sectionalizing capability. (**S2395.16**) **Estimated cost $0.6M**
- **East Arlington 69kV**: Install a new 69kV ring bus with three 3000A, 40kA circuit breakers to replace existing Arlington station. (**S2395.17**) **Estimated cost $8.6M**
- **Flat Branch Sw 69kV:** Install 69 kV, 2000A, 40kA, 3-way Phase-over-Phase Switch with sectionalizing capability. (**S2395.18**) **Estimated Cost $0.7M**
- **South Berwick 69kV:** Remote end work. (**S2395.19**) **Estimated cost: $0.4M**
- **Rangeline 69kV:** Install a 5-breaker(3000A, 40kA) 69 kV ring bus to replace Dunkirk station. (**S2395.20**) **Estimated cost: $10.6M**
- **Forest 69kV:** Remove 69kV CB-H towards South Berwick. (**S2395.21**) **Estimated Cost $0.1M**
- **Dunkirk 69kV:** Retire Dunkirk 69kV station. (**S2395.22**) **Estimated Cost $1.0M**

Ancillary Benefits:

- The project will eliminate multiple hard-taps on the system. It will improve reliability and operational flexibility for all of the delivery points served from the lines.
- It will also improve overall reliability by rebuilding multiple line sections that have asset renewal needs

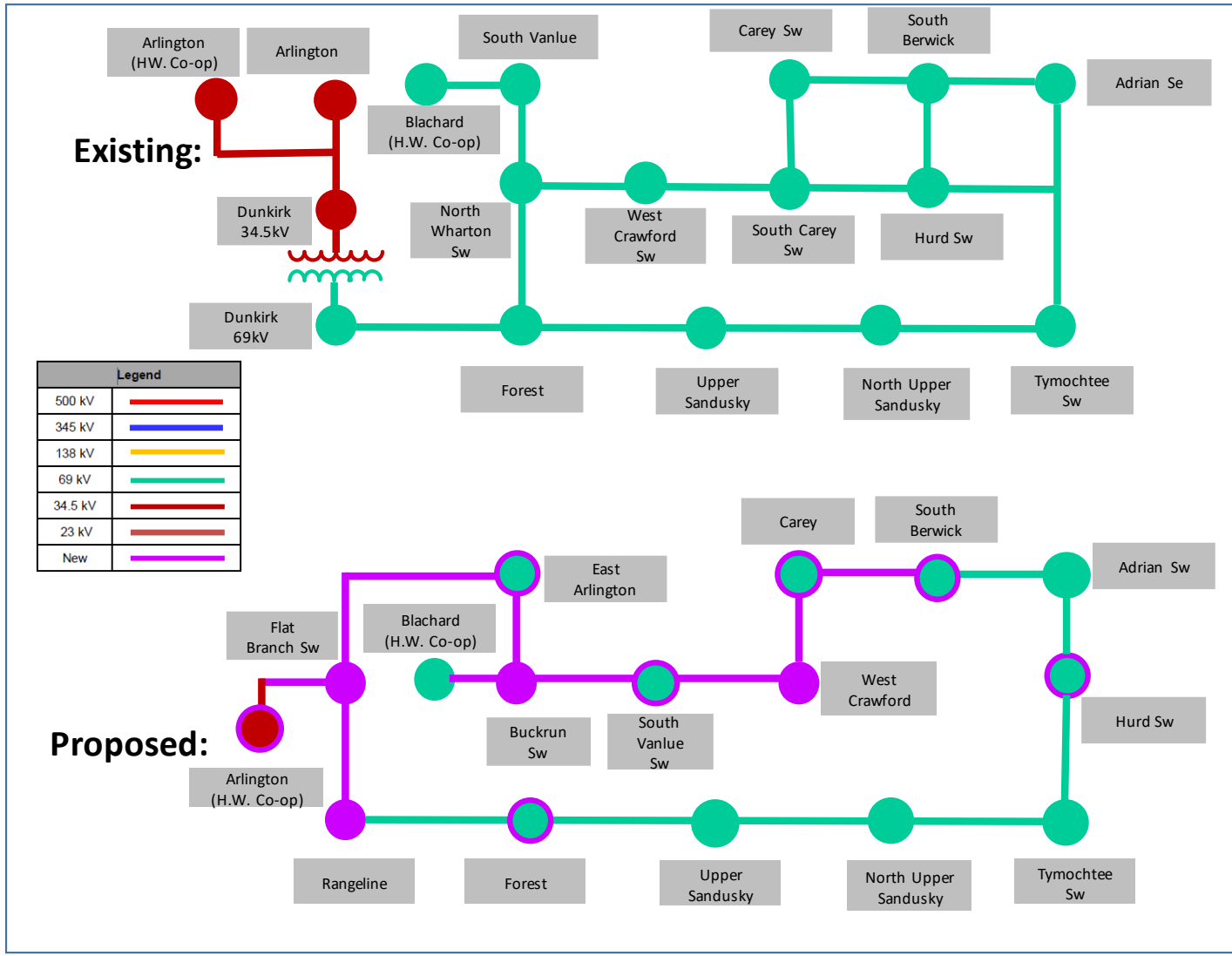
Estimated Cost: $125.3M

Projected In-Service: 6/1/2025

Supplemental Project ID: S2395.1-.21

Project Status: Scoping

Model: 2023 RTEP



AEP Transmission Zone M-3 Process
Haviland – South Hicksville

Need Number: AEP-2020-OH015

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:
Needs Meeting 4/20/2020
Solutions Meeting 9/11/2020

Project Driver:
Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs

Problem Statement:

Line

Haviland – South Hicksville 69kV

Original Install Date: 1927

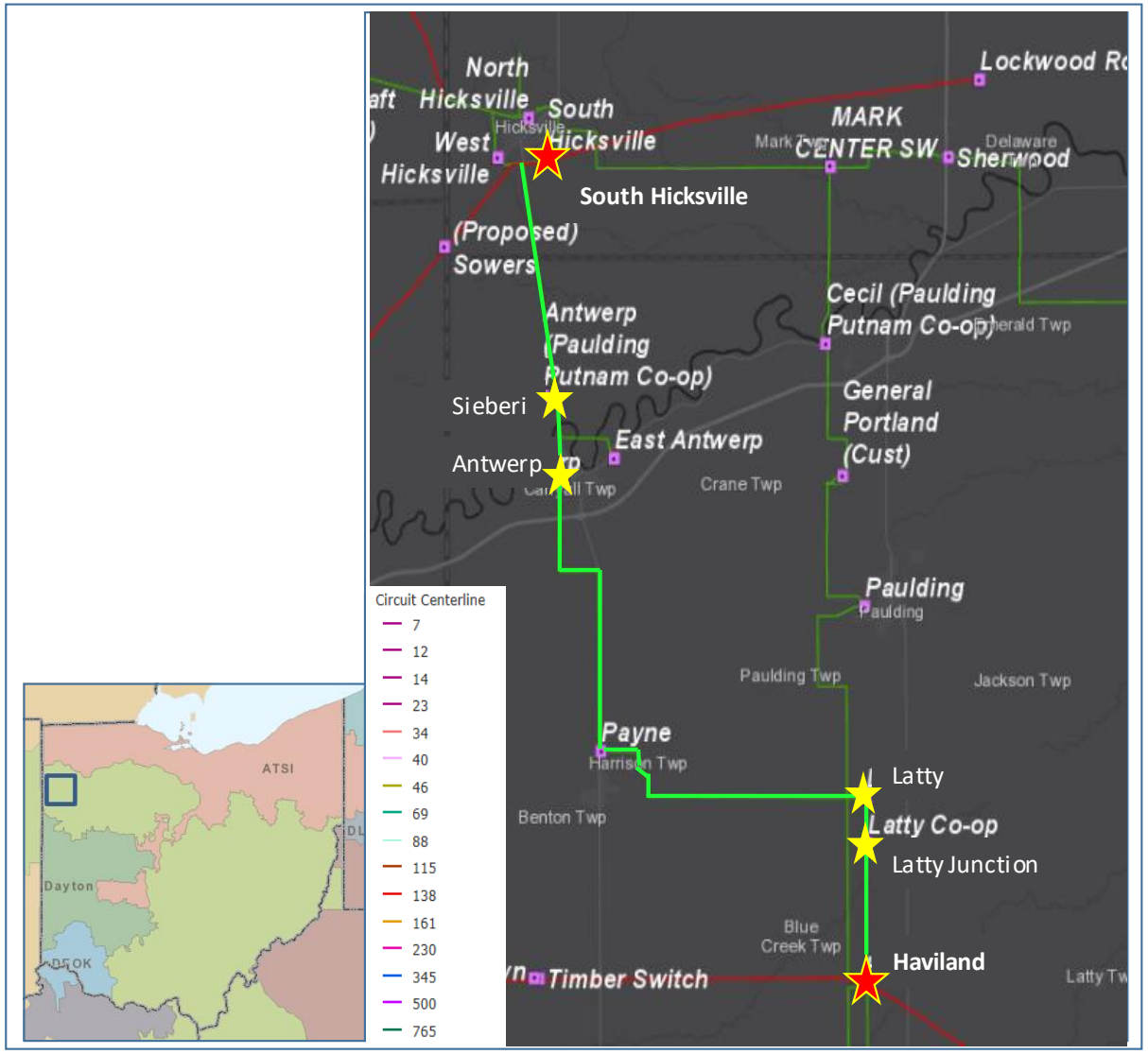
- **Length of Line:** 26.15
- **Total structure count:** 560
- **Original Line Construction Type:** Wood
  - 16% of structures recently replaced (~2.5 miles)
  - Wooden Cross Arms
  - Horizontal Ceramic insulators
- **Conductor Type:** 336.4 KCM ACSR 18/1 Merlin (original 1927 install)

CONDITION / PERFORMANCE / RISK ASSESSMENT:

- **Outage History**
  - **Momentary/Permanent Outages and Duration:** 12 Momentary and 8 Permanent – average duration of 26.32 hours
  - **CMI:** 8.2 M
  - This line is comprised of two circuits, having breakers in between at Payne. No automatic line sectionalizing scheme between the breakers.
- **Condition Summary**
  - **Number of open conditions by type / defects / inspection failures:** 40 open conditions on 39 unique structures
  - **Open conditions / defects / inspection failures include:** broken structures, rotting structures, burnt conductors, broken/missing ground lead

Risk

- **Number of Customers at Risk:** 9,639
- **Load at Risk:** 17.794 MVA
- The Antwerp (Paulding Putnam Co-op) customer is served off of a hard tap.



AEP Transmission Zone M-3 Process
Haviland – South Hicksville

Need Number: AEP-2020-OH015

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution:

- Rebuild ~14.3 mi of the Payne - South Hicksville 69kV circuit. (**S2394.1**) **Estimated Cost $30.6M**
- Rebuild ~9.3 mi of the line between Haviland – Payne 69kV circuit. Reconductor the remaining 2.7 mi line sections. (**S2394.2**) **Estimated Cost $21.8M**
- Install Seiberi switch as a new 69 kV, 1200A, 3-way Phase-over-Phase switch with sectionalizing capability to eliminate the hard tap. (**S2394.3**) **Estimated cost $0.5M**
- Replace Antwerp Sw with 69 kV, 1200A, 3-way Phase-over-Phase switches with sectionalizing capability, including 4.3 miles of fiber buildout to allow for sectionalizing. (**S2394.4**) **Estimated cost $1.1M**
- Replace North Antwerp Sw with 69 kV, 1200A, 3-way Phase-over-Phase switches with sectionalizing capability. (**S2394.5**) **Estimated cost $0.6M**
- Replace Latty Switch with 69 kV, 1200A, 3-way Phase-over-Phase switches with sectionalizing capability. (**S2394.6**) **Estimated Cost $0.6M**
- At Latty Junction Switch, install motor operators, a relay, and PT's on existing Phase-over-Phase switches to add sectionalizing capability. (**S2394.7**) **Estimated Cost $0.4M**

Ancillary Benefits: Outage restoration and Operational Flexibility will be improved by replacing/installing switches and adding sectionalizing capability.

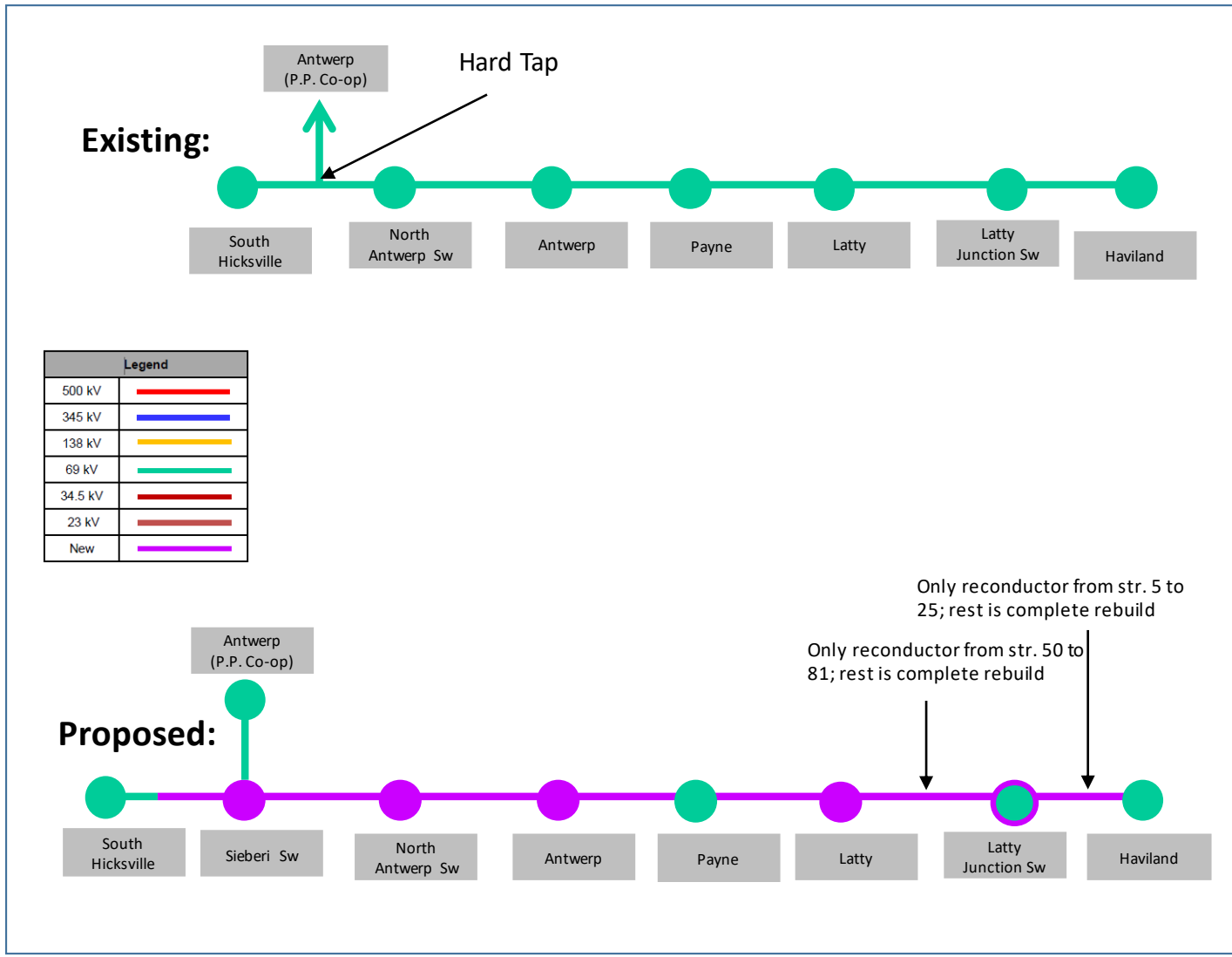
Estimated Cost: $55.6M

Projected In-Service: 11/15/2024

Supplemental Project ID: S2394.1-.7

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Walnut Creek Capacitor Bank

Need Number: AEP-2020-OH027

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:

Needs Meeting 4/20/2020

Solution Meeting 9/11/2020

Project Driver:

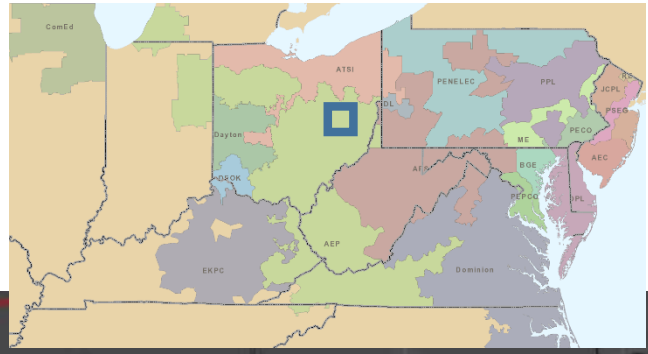
Customer Service

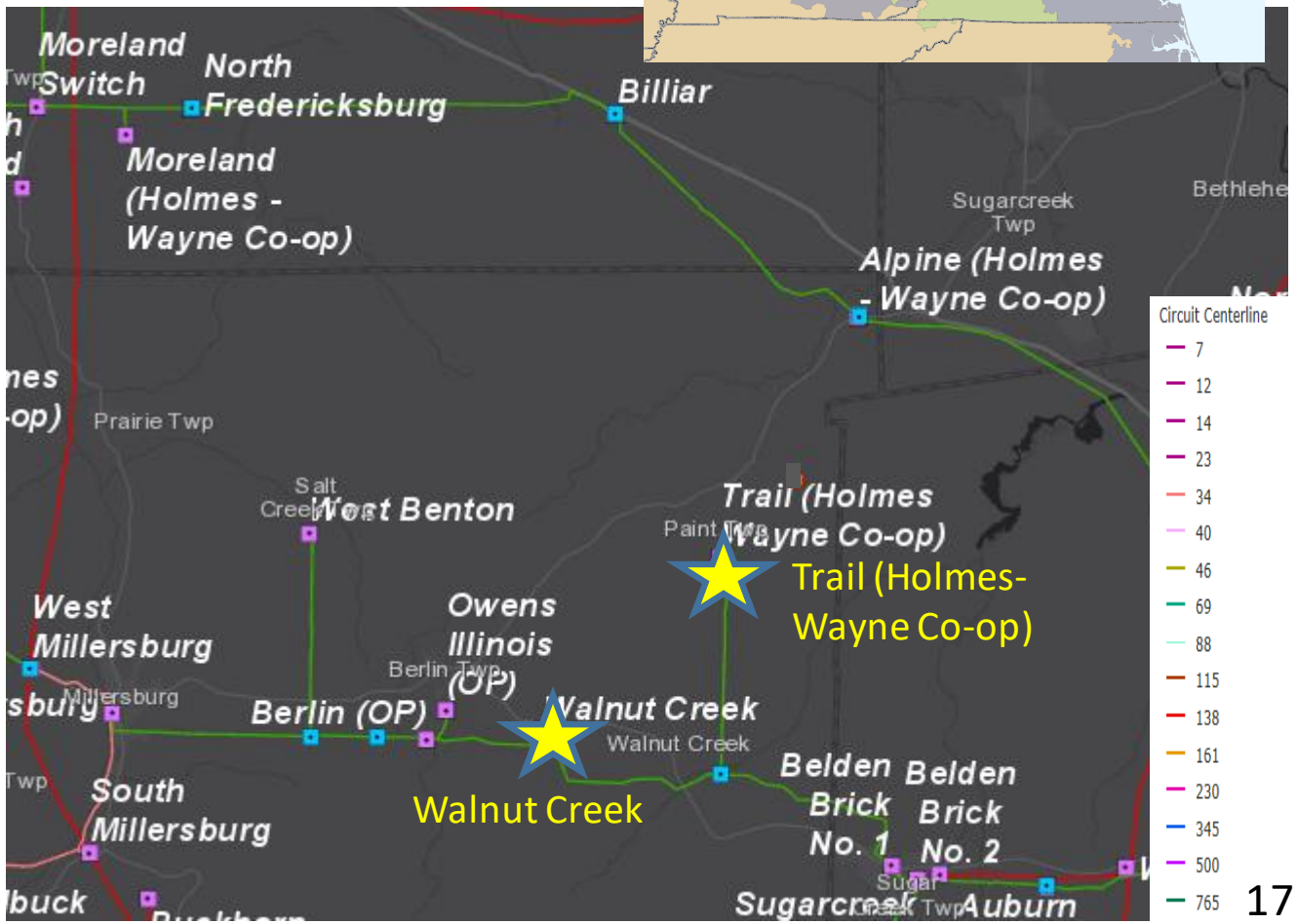
Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

- Holmes-Wayne Electric Cooperative has an urgent large block load increase and is replacing their Trail substation transformer with a larger unit.
- The anticipated new load is 8 MW. The load will be added incrementally starting in August 2020.





Need Number: AEP-2020-OH027

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution:

Double the size of the existing Walnut Creek 69kV capacitor bank, from 7.2 to 14.4 MVAR. Update relay settings and SCADA equipment accordingly. (**S2396**)

Estimated Cost: $0.1M

Projected In-Service: 11/1/2020

Supplemental Project ID: S2396

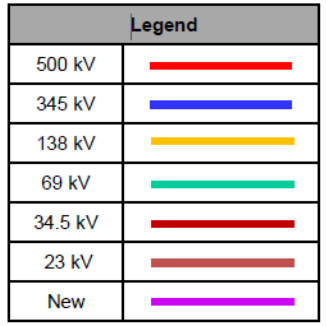
Project Status: Engineering

Model: 2019 RTEP

Existing:

Bubble diagram not applicable.
Station work only.

Proposed:



AEP Transmission Zone M-3 Process
South Point – West Huntington

Need Number: AEP-2020-AP021

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Previously Presented:

Needs Meeting 4/20/2020

Solution Meeting 9/11/2020

Project Driver:

Equipment Condition/Performance/Risk

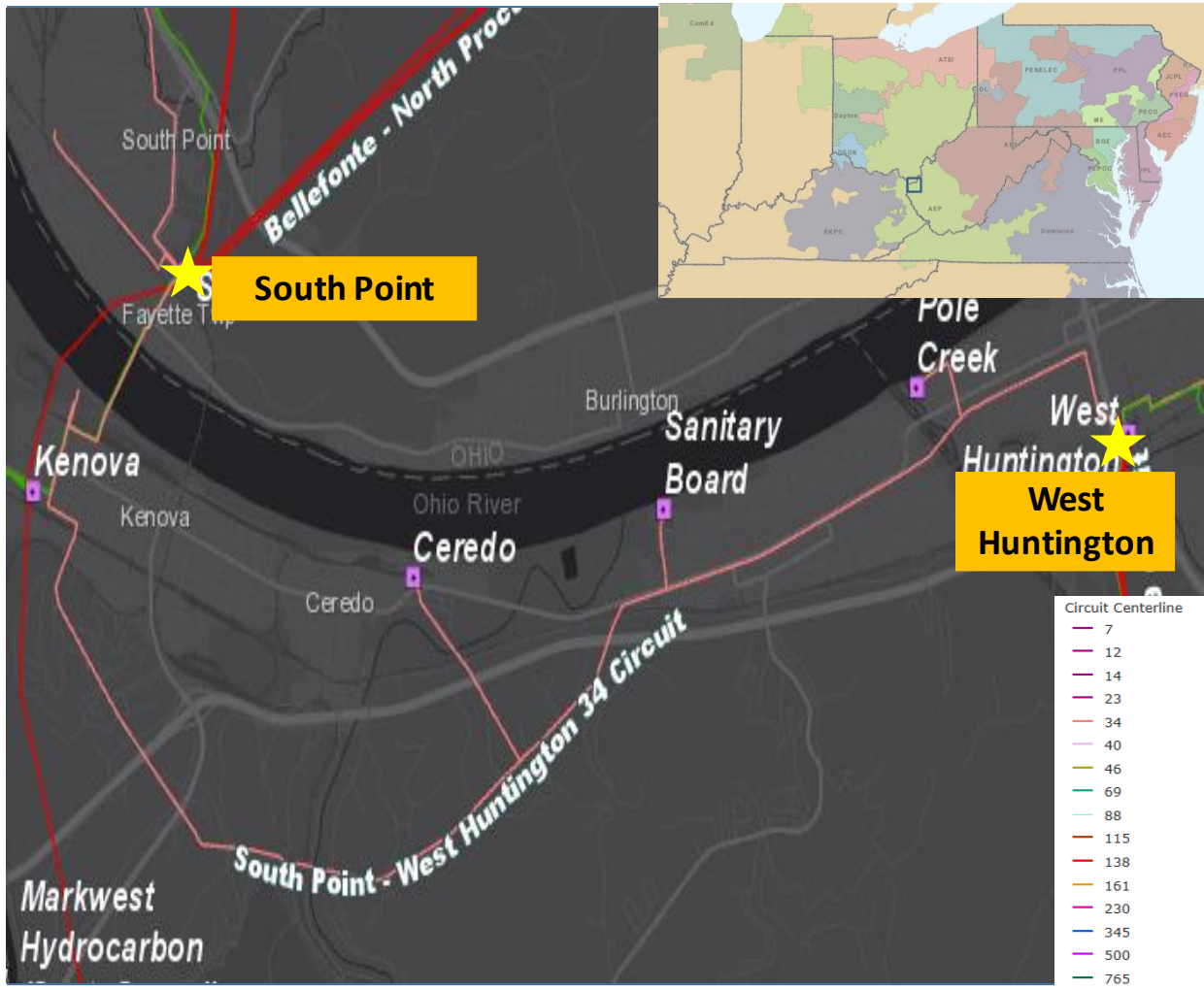
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

South Point – West Huntington 34.5 kV Line (~11 miles)

- The line consists of mainly wood pole (79%) structures in addition to steel (12%) and lattice steel (9%) structures.
- The line was originally built in 1926 (69%) and 1930 (10%) primarily with 4/0 copper conductor.
- Structures on the line failed to meet 2017 NESC Grade B loading criteria, failed to meet current AEP structural strength requirements, and failed to meet current ASCE structural strength requirements
- Current shielding on the majority of the line does not meet current standards.
- There are currently 93 structures (62% of the line) with at least one open condition
    - A total of 159 structural open conditions on the line primarily related to pole and crossarm rot. Other structure conditions include woodpecker damage, split crossarms/poles and bowed crossarms/poles.
    - There are 54 shielding and grounding related open conditions including missing ground wire leads, damaged shield wire and broken ground wire leads.
    - There are an additional 15 open conditions related to burnt/broken insulators and guy wire.
- Since 2014 there have been 4 permanent outages on the circuit due to arrestor failure, wind, switch failure and vegetation contact from outside the ROW. The outages resulted in a total of 198k customer minutes interrupted.



AEP Transmission Zone M-3 Process
South Point – West Huntington

Need Number: AEP-2020-AP021

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 1/11/2021

Selected Solution:

Rebuild approximately 1.2 miles of line on the West Huntington – South Point 34.5 kV line between Kenova station and South Point station. (**S2397.1**) **Estimated Cost: $8.9M**

- **Cost drivers on this line section include Ohio River crossing, urban line route through Huntington, WV, and encroachments along the line.**

Rebuild approximately 5.5 miles of line on the West Huntington – South Point 34.5 kV line between Kenova station and West Huntington station. (**S2397.2**) **Estimated Cost: $0.0M**

- **Note: This segment of line is classified as Distribution and thus has no transmission cost.**

Install 3-way Phase over Phase GOAB switch at Ceredo Switch Station addressing hard tap. (**S2397.3**) **Estimated Cost: $0.6M**

Install 3-way Phase over Phase GOAB switch at Sanitary Board Station addressing hard tap. (**S2397.4**) **Estimated Cost: $0.6M**

Install 3-way Phase over Phase GOAB switch at Four Pole Creek Station addressing hard tap. (**S2397.5**) **Estimated Cost: $0.6M**

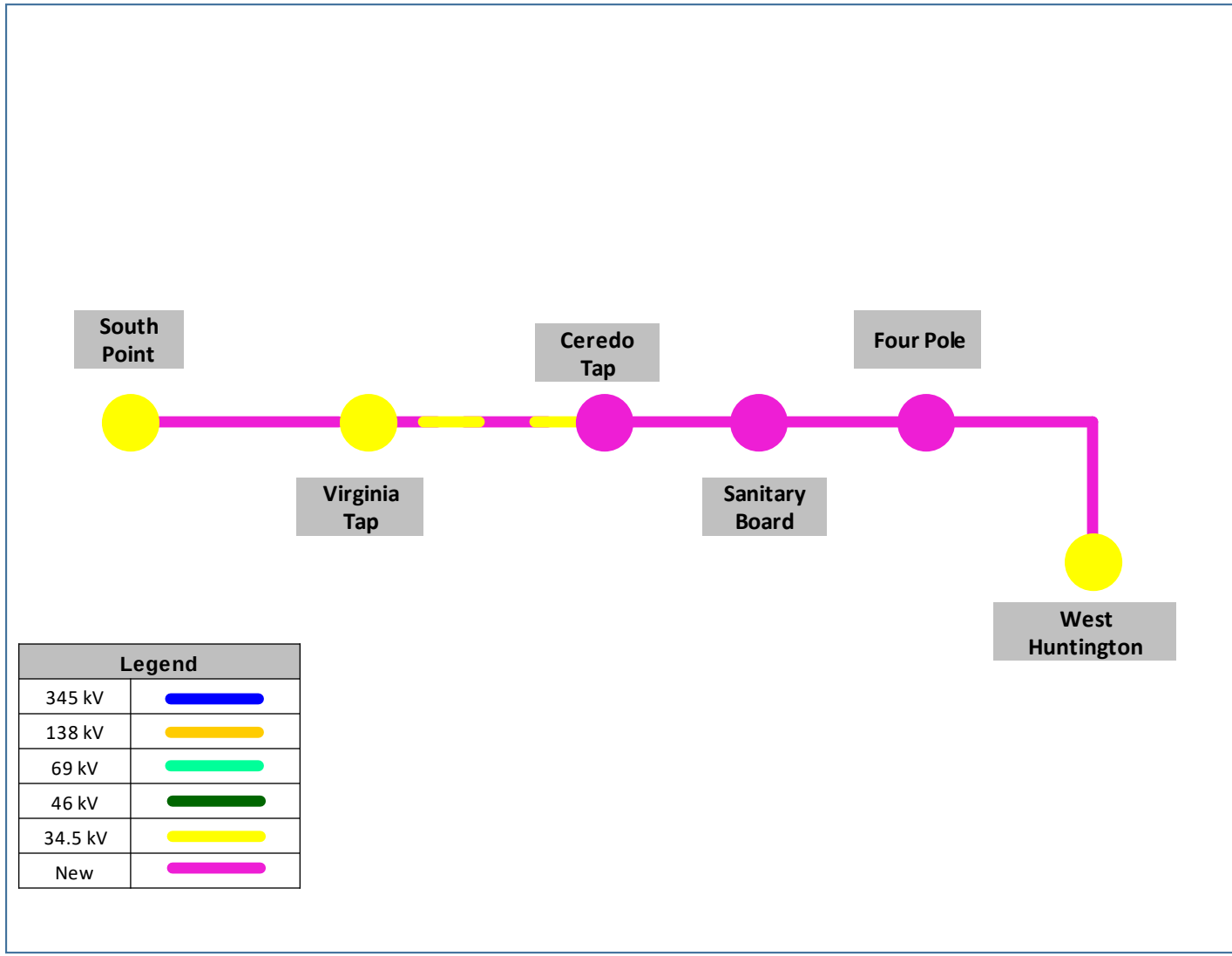
Estimated Cost: $10.7M

Projected In-Service: 11/1/2023

Supplemental Project ID: S2397.1-.5

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Bim Station

Need Number: AEP-2019-AP001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:

Needs Meeting 2/20/2019

Solutions Meeting 10/16/2020

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Bim 69 kV

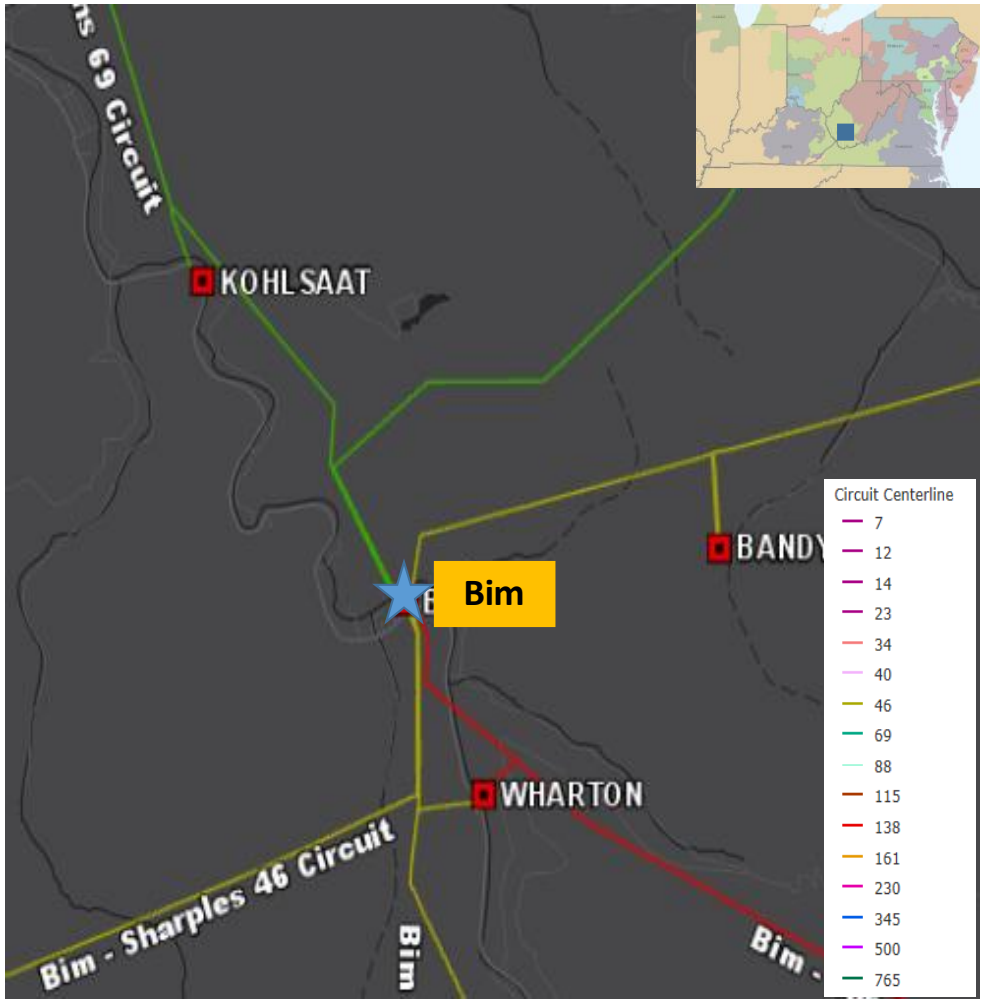
- Breaker "D"
  - 1967 FK oil type breaker without containment
  - Fault operations: 369, recommended 10 operations
- Cap Switchers "AA" and "BB"
  - SC-2030 type
  - No gas monitoring
  - Sister units have experienced numerous gas and interrupter failures

Bim 46 kV

- Breakers "A", "B", "C", and "E"
  - 1967 FK oil type breakers without containment
  - Fault operations: CB A (85), CB B (14), CB C (131), CB E (63), recommended 10 operations

Bim Station

- Existing Gr. SW. MOAB configuration creates faults in the station; known safety hazard in legacy station designs
- Transformer Bank #1 138/69/46
  - Oil leaking at a steady rate
  - Deteriorating wooden crossties, obsolete arresters and bushings, LTC is not in adequate condition
  - Cooling system and controls need replaced
- GND Bank
  - Interfacial tension in all three units has been on the decline or at sustained low levels for around 15 years, indicating the development of sludge which can impede oil circulation/cooling
  - Rising/Sustained high moisture content has resulted in degrading/sustained low levels of dielectric strength
  - Obsolete arresters/bushings, deteriorating wooden crossties
  - Cooling system/controls need replaced



AEP Transmission Zone M-3 Process
Bim Station

Need Number: AEP-2019-AP001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Selected Solution:

Replace existing 138/69/46 kV 75 MVA with a new 138/69/46 kV 130 MVA XFR. Replace existing 138 kV ground switch MOAB with a new 138 kV circuit switcher. Replace existing 69 kV CB D with a new 69 kV 3000 A 40 kA breaker. Replace existing 69 kV shunt cap switcher BB with a new 69 kV 40 kA cap switcher. A 69 kV Ring bus was considered but not recommended considering circuit breaker F does not need to be replaced. In addition, a 69 kV ring bus would be difficult due to the lack of available high ground at the site, so a station expansion with major fill would be required. Replace existing 46 kV CBs A, B, C, and E with four new 46 kV 3000 A 40 kA breakers in a ring configuration. Retire existing 46 kV 14.4 MVAR cap bank. New DICM will be installed. The new equipment at Bim will result in a ratings increase on the Bim – Bandy Branch (Sundial) line section SN/SE/WE/WN: 84 MVA/84 MVA/106 MVA/ 106 MVA.

Remote end work required at Sharples, Skin Fork and Sundial.

Line work required on entrance spans due to the new station layout. Currently the 69 kV bus is located on top of the 46 kV bus. In order to perform the work necessary, the two buses will be separated and built in the clear. (**S2406**)

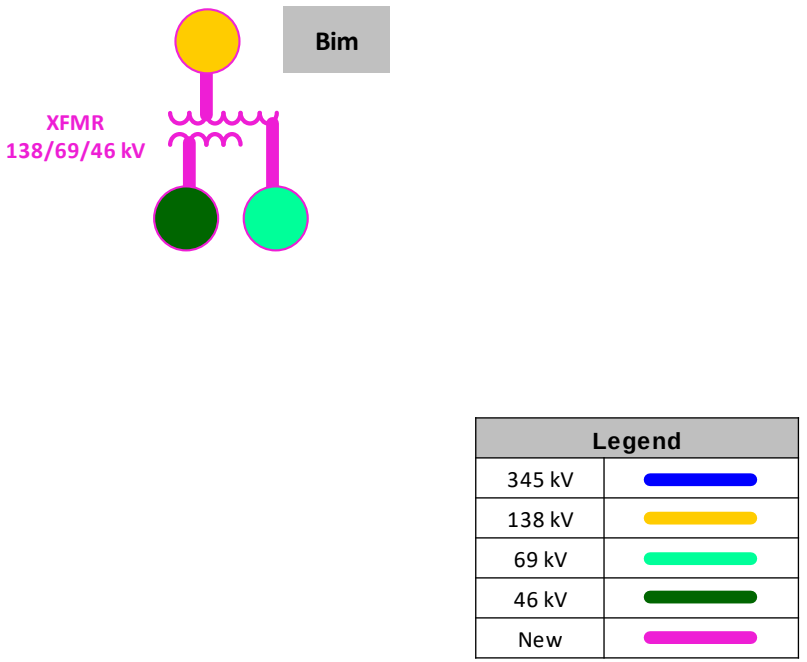
Estimated Cost: $14.9M

Projected In-Service: 6/1/2022

Supplemental Project ID: S2406

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Allen Station Rebuild

Need Number: AEP-2019-AP025

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

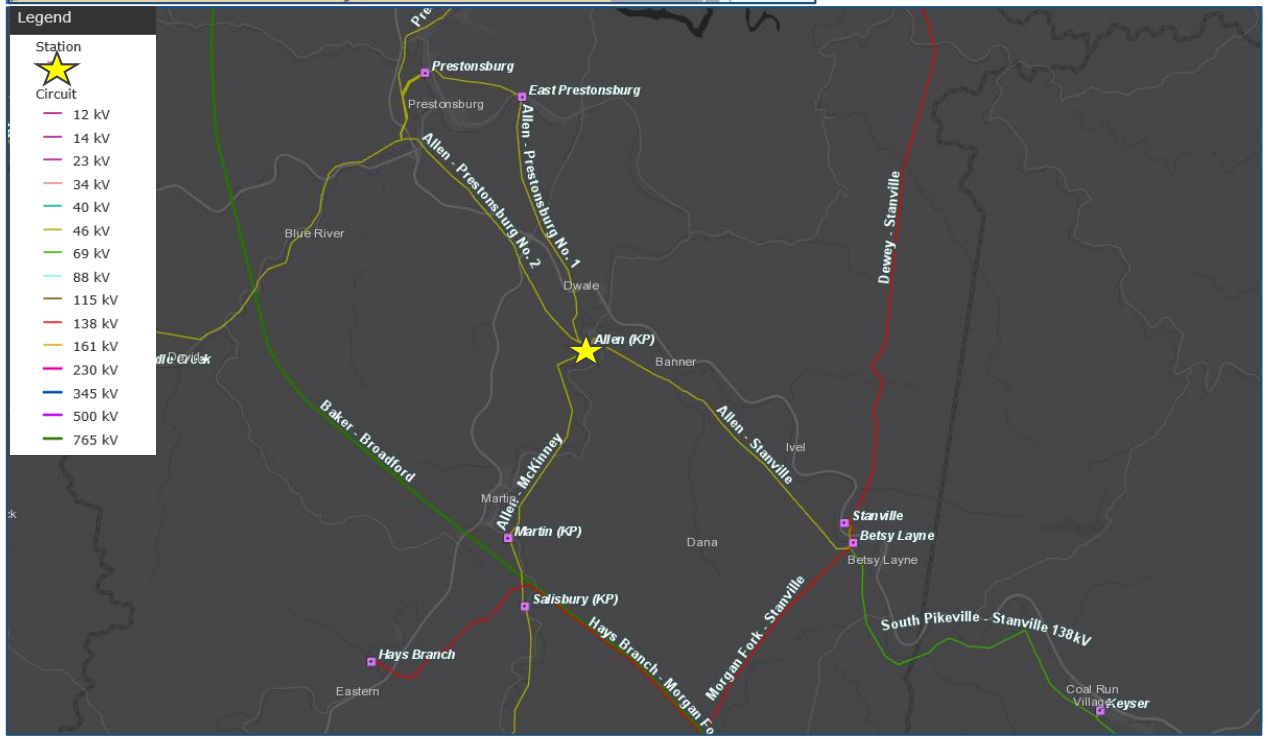
Previously Presented:
Needs Meeting 07/24/2019
Solution Meeting 10/16/2020

Project Driver:
Equipment Material/ Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- The existing Allen station has historically experienced severe flooding due to the stations current location in the flood plain. Historical flooding issues have lead to significant deterioration of the stations foundations and structures.
- The 46kV Circuit Breakers (CBs) A, B, C, & D are oil filled breakers without oil containment manufactured in 1960s. Oil filled breakers have much more maintenance required due to oil handling that their modern, SF6 counterparts do not require. These units comprise 4 of the remaining 12 of the FZO-69-1500P model family on the AEP System. Spare parts for these units are difficult to impossible to procure, and this model type is no longer vendor supported.
- The circuit breakers have experienced the following fault operations, CB A (27), C (20), and D (17). The manufacturer recommendation is 10 fault operations during it's in-service life. In addition, all CBs have documented malfunction records with A, C, and D having at least 1 documented since 2016. These include mainly air leaks, a broken trip latch component, and a trip test switch malfunction. The platform foundations that these are mounted on are crumbling in several locations.
- The 46kV CS AA is a VBM-69 model type, 1 of 15 remaining on the AEP System. Spare parts for these units are difficult to impossible to procure, and this model type is no longer vendor supported. These circuit switcher models are poor cold weather performers. This unit has 8 documented malfunction records including multiple failures to trip on poles 2 and 3 and one instance in 2011 in which the unit failed to close.



AEP Transmission Zone M-3 Process
Allen Station Rebuild

Need Number: AEP-2019-AP025

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Selected Solution:

Allen Substation:

Rebuild Allen Station to the northwest of its current footprint utilizing a standard air-insulated substation with equipment raised by 7' concrete platforms and control house raised by a 10' platform to mitigate flooding concerns. Install five 69 kV 3000A 40 kA circuit breakers in a ring bus (operated at 46kV) configuration with a 13.2 MVAR capacitor bank. Existing Allen station will be retired (**S2405.1**)

Estimated Cost: $10.55 M (Does not include the distribution cost)

Distribution Scope of Work: Install 69/46kV-12kV 20 MVA transformer along with 2-12kV breakers on 7' concrete platforms.

Transmission Line:

Allen – East Prestonsburg: A 0.20 mile segment of this 46 kV line will be relocated to the new station. (SN/SE/WN/WE: 53/61/67/73MVA). (**S2405.2**) **Estimated Cost: $0.33 M**

McKinney – Allen: The new line extension will walk around the south and east sides of the existing Allen Station to the new Allen Station being built in the clear. A short segment of new single circuit 69kV line and a short segment of new double circuit 69kV line (both operated at 46 kV) will be added to the line to tie into the new Allen Station bays. (**S2405.3**) **Estimated Cost: $1.95 M**

Stanville – Allen: A segment of this line will have to be relocated to the new station (SN/SE/WN/WE: 50/50/63/63MVA). (**S2405.4**) **Estimated Cost: $0.17 M**

Allen – Prestonsburg: 0.25 mile segment of this existing single circuit will be relocated. The relocated line segment will require construction of one custom self-supporting double circuit dead end structure and single circuit suspension structure. A short segment of new double circuit 69kV line (energized at 46 kV) will be added to tie into the new Allen Station bays which will carry Allen – Prestonsburg 46kV and Allen – East Prestonsburg 46kV lines. A temporary 0.15 mile section double circuit line will be constructed to keep Allen – Prestonsburg and Allen – East Prestonsburg 46kV lines energized during construction. (**S2405.5**) **Estimated Cost: $2.66 M**

Remote End

Remote end work will be required at Prestonsburg, Stanville, and McKinney stations. (**S2405.6**) **Estimated Transmission Cost: $0.34 M**

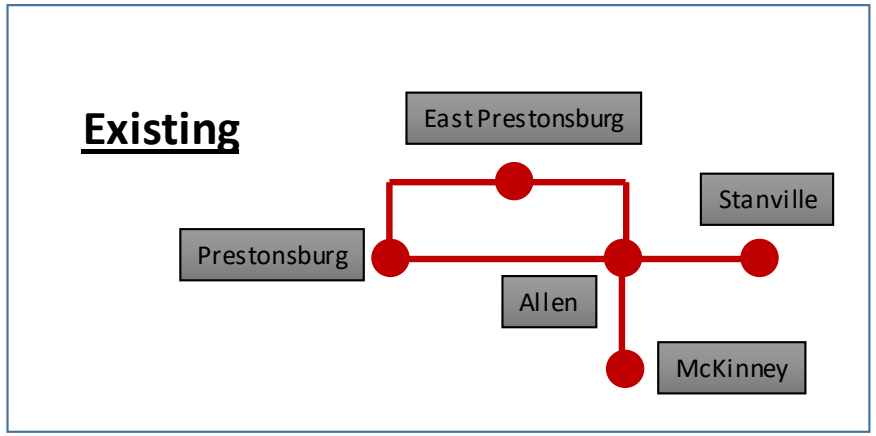
Estimated Cost: $16M

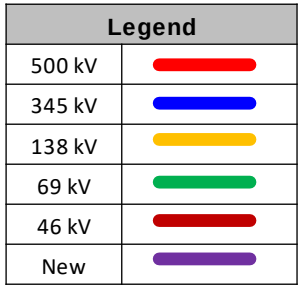
Projected In-Service: 12/31/2023

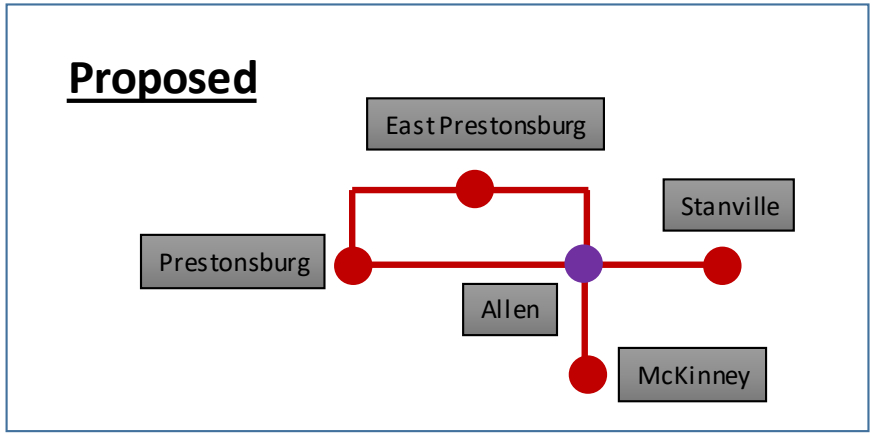
Supplemental Project ID: S2405.1-.6

Project Status: Scoping

Model: N/A







Need Number: AEP-2020-OH006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:

Need Meeting 2/21/2020

Solution Meeting 10/16/2020

Project Driver:

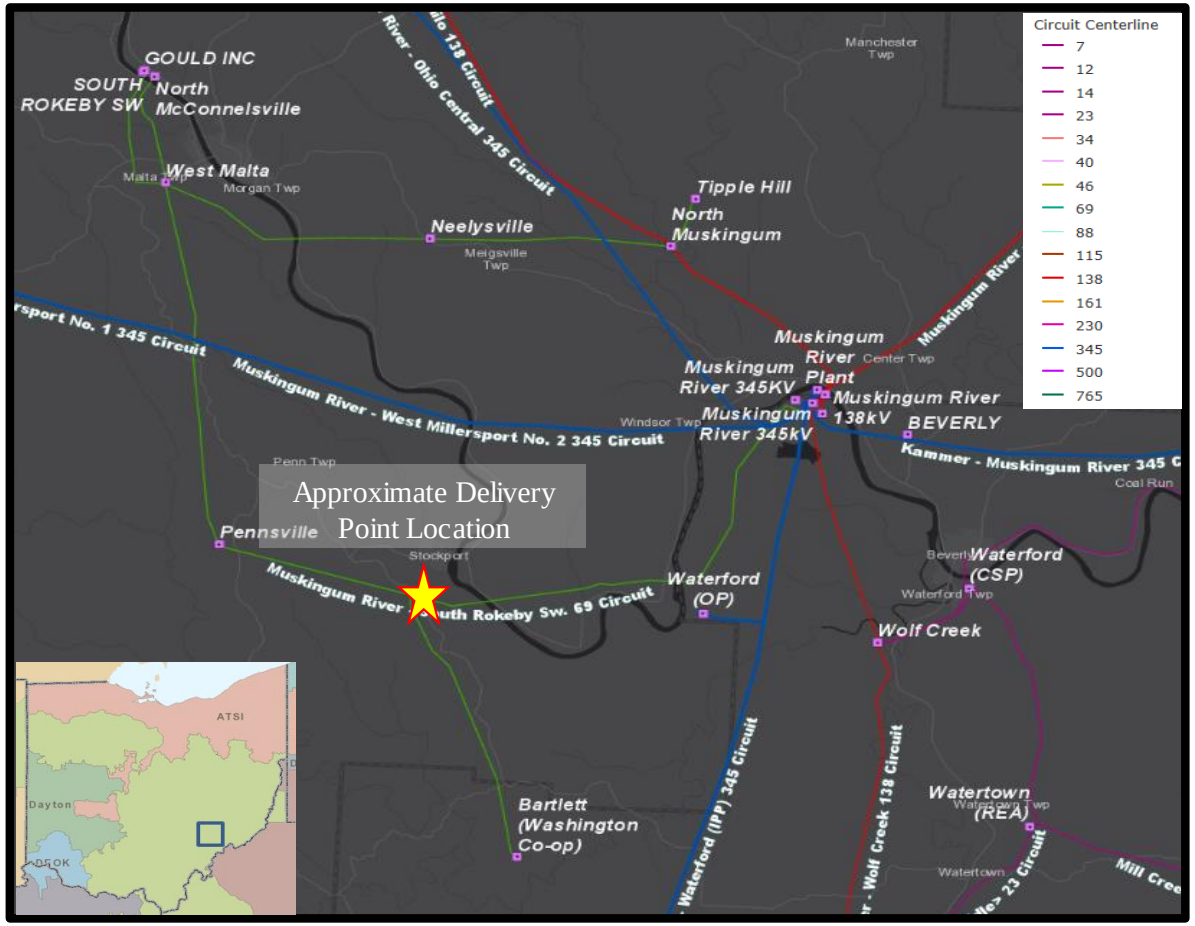
Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 7)

Problem Statement:

- AEP Ohio is Requesting a new 69kV delivery point on the Muskingum River – South Rokeby SW 69kV Circuit by 12/13/2021. Anticipated load is about 5 MVA.



AEP Transmission Zone M-3 Process
Grace 69kV

Need Number: AEP-2020-OH006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Selected Solution:

- Install a 3 - 3000A Breaker 69kV ring bus called Grace station to serve the requested delivery point. (**S2401.1**) **Estimated Cost: $2.3M**
- Install approximately 0.2 miles of 69kV line to tie the greenfield Grace station in-and-out to the Muskingum River – South Rokeby 69kV circuit. (**S2401.2**) **Estimated Cost: $2.1M**
- Remove/Relocate approximately 0.05 miles of line on the Muskingum River – South Rokeby 69kV Line asset between structures 75 and 74A to accommodate the cut in to the new station. (**S2401.3**) **Estimated Cost: $0.1M**
- Remote end work at South Rokeby Switch. (**S2401.4**) **Estimated Cost: $0.9M**

Estimated Cost: $5.4M

Projected In-Service: 5/1/2022

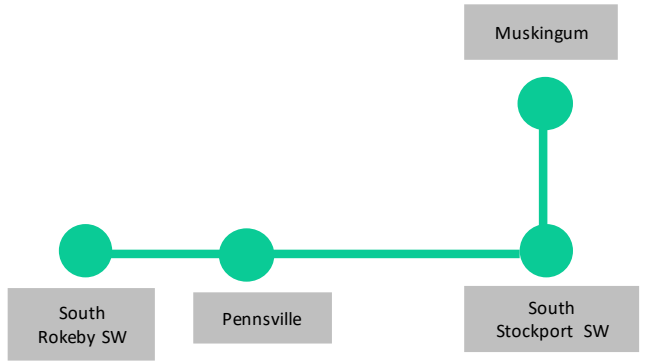
Supplemental Project ID: S2401.1-.4

Project Status: Engineering

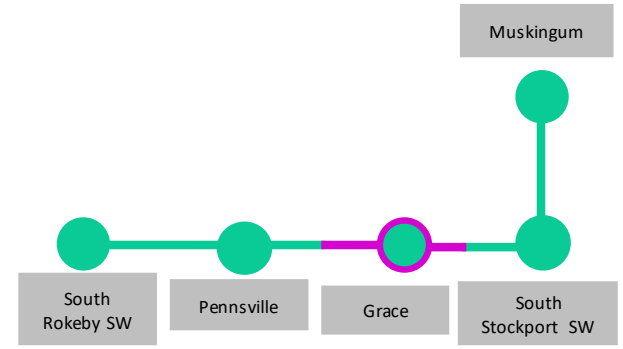
Model: 2024 RTEP

Existing:

Legend	
500 kV	
345 kV	
138 kV	
69 kV	
34.5 kV	
23 kV	
New	



Proposed:



Need Number: AEP-2020-OH030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:
Need Meeting 5/22/2020
Solutions Meeting 10/16/2020

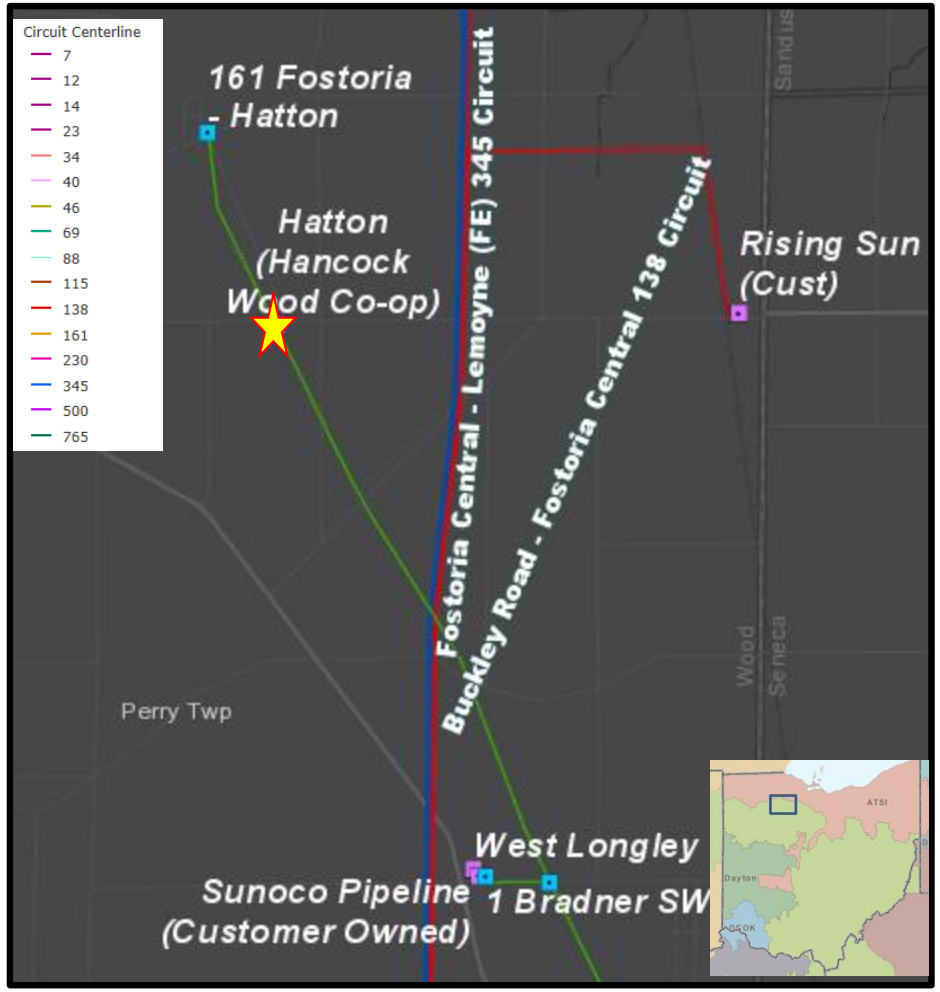
Project Driver:
Customer Service and Operational Flexibility

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 7)

Problem Statement:

- Hancock-wood Co-op's has requested for new service to replace their existing Hatton Delivery Point. Hatton delivery point is currently served via a hard tap from the Pemberville (FE) – West End Fostoria 69kV circuit. The new customer station is being built adjacent to their existing substation. The hard tap limits operational capabilities for this circuit. It is difficult to coordinate maintenance efforts because any work on the section from Longley Switch to Pemberville (FE) involves outage to the Hatton Delivery Point.
- Load is approximately 2.26 MVA
- CMI: There were no unplanned outages, but there were six scheduled and one monetary outages that affected the customer, in the last 5 years.



Existing Configuration:

Need Number: AEP-2020-OH030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Selected Solution:

- Re-terminate the Fostoria – Hatton line to the new Hatton Switch. (**S2402.1**) **Cost: $0.52M**
- Rebuild and re-terminate the Hancock Wood Co-op Extension - Hatton line into the new switch. (**S2402.2**) **Cost: $0.72M**
- Install a new three way phase-over-phase switch to serve the customer's station. (**S2402.3**) **Cost: $0.51M**

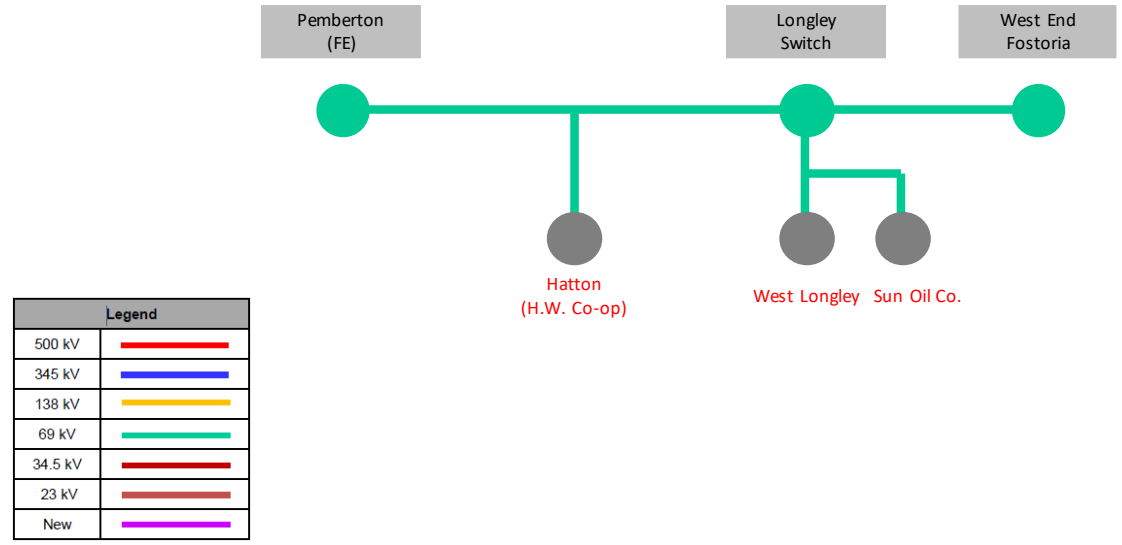
Estimated Cost: $1.75M

Projected In-Service: 5/15/2021

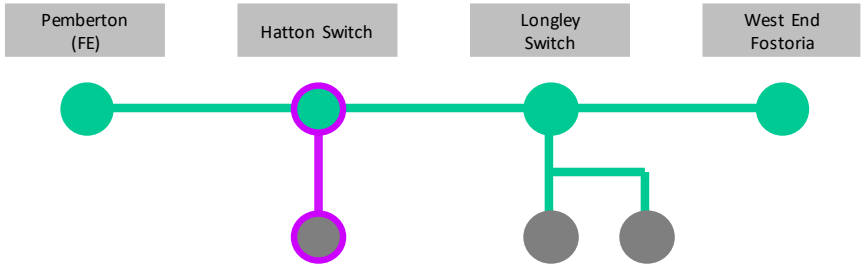
Supplemental Project ID: S2402.1-.3

Project Status: Engineering

Model: 2025 RTEP



Future Configuration:



Need Number: AEP-2020-OH031

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:
Needs Meeting 5/22/2020
Solutions Meeting 10/16/2020

Project Driver:

Customer Service and Operational Flexibility

Specific Assumption Reference:

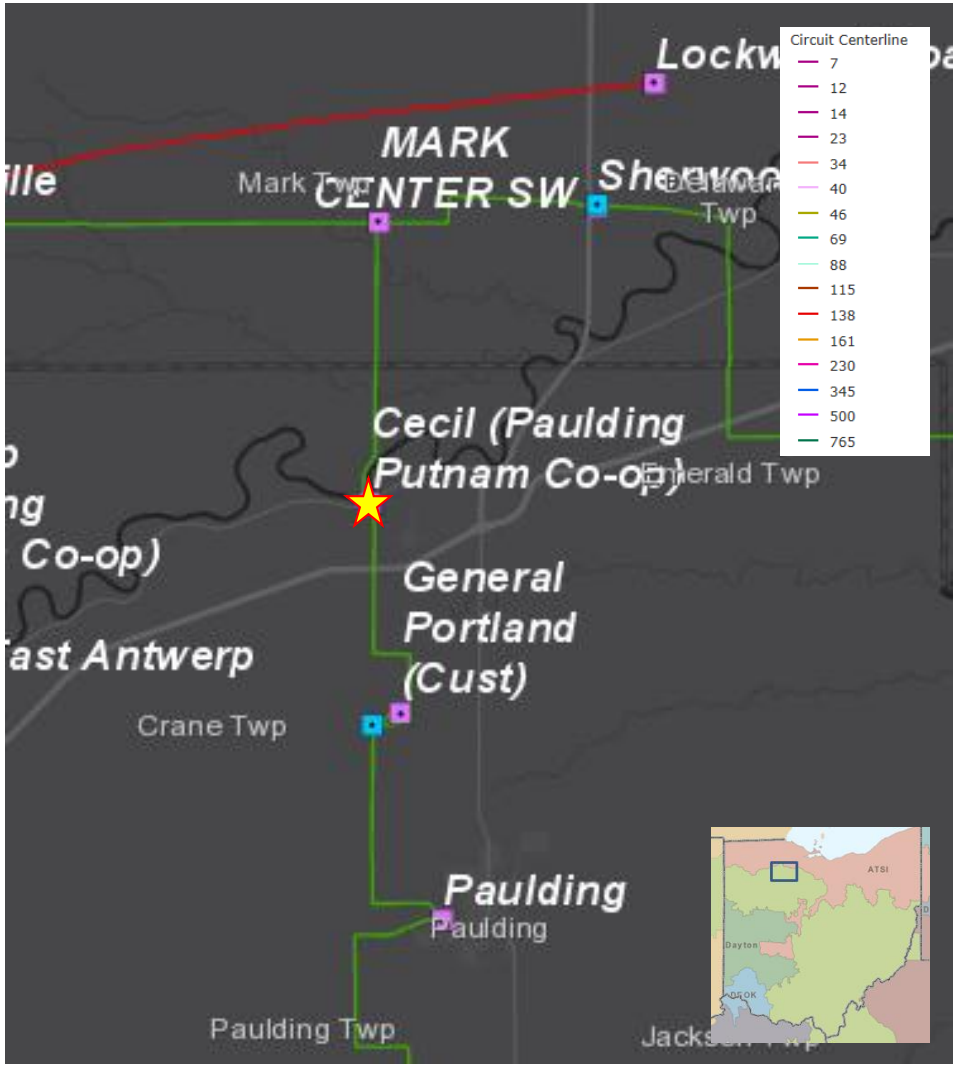
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 7)

Problem Statement:

Paulding – Putnam Electric Co-op is replacing their 3.75 MVA transformer with a 12/16/20 MVA transformer, which requires some changes to their delivery point. This delivery point is served by the North Cecil switch on the Mark Center – Paulding 69 kV circuit. North Cecil has no auto-sectionalizing capability.

Load: The Co-op delivery point serves approximately 4.9 MW

CMI: In the last 5 years, there were 6 unscheduled outages affecting the customer, 3 of which were momentary and 3 were permanent outages. The 5-year CMI experienced by this customer is 170,520.



Need Number: AEP-2020-OH031

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Selected Solution:

Add auto-sectionalizing and SCADA control to the existing North Cecil Switch. This requires installing PT's, motors, a relay, and communication equipment. (**S2403**) **Estimated Cost:** $360,023

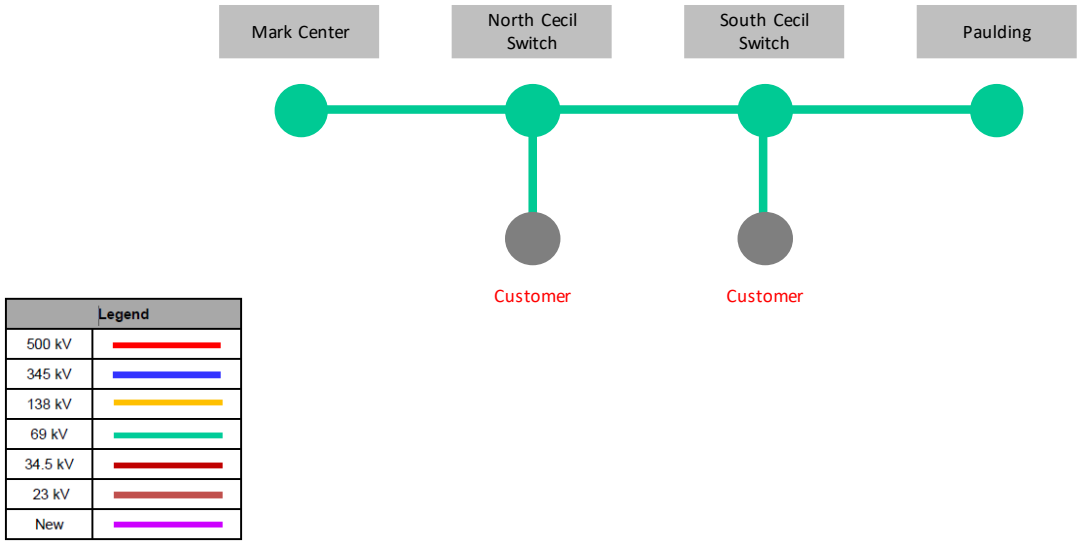
Projected In-Service: 5/15/2021

Supplemental Project ID: S2403

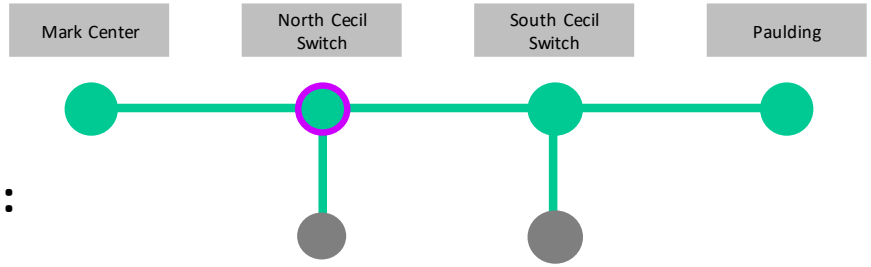
Project Status: Engineering

Model: 2023 RTEP

Existing Configuration:



Future Configuration:



AEP Transmission Zone M-3 Process
Reedurban Transformer

Need Number: AEP-2020-OH036

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:

Need Meeting 8/14/2020

Solutions Meeting 10/16/2020

Project Driver:

Equipment Material/Condition/Performance/Risk

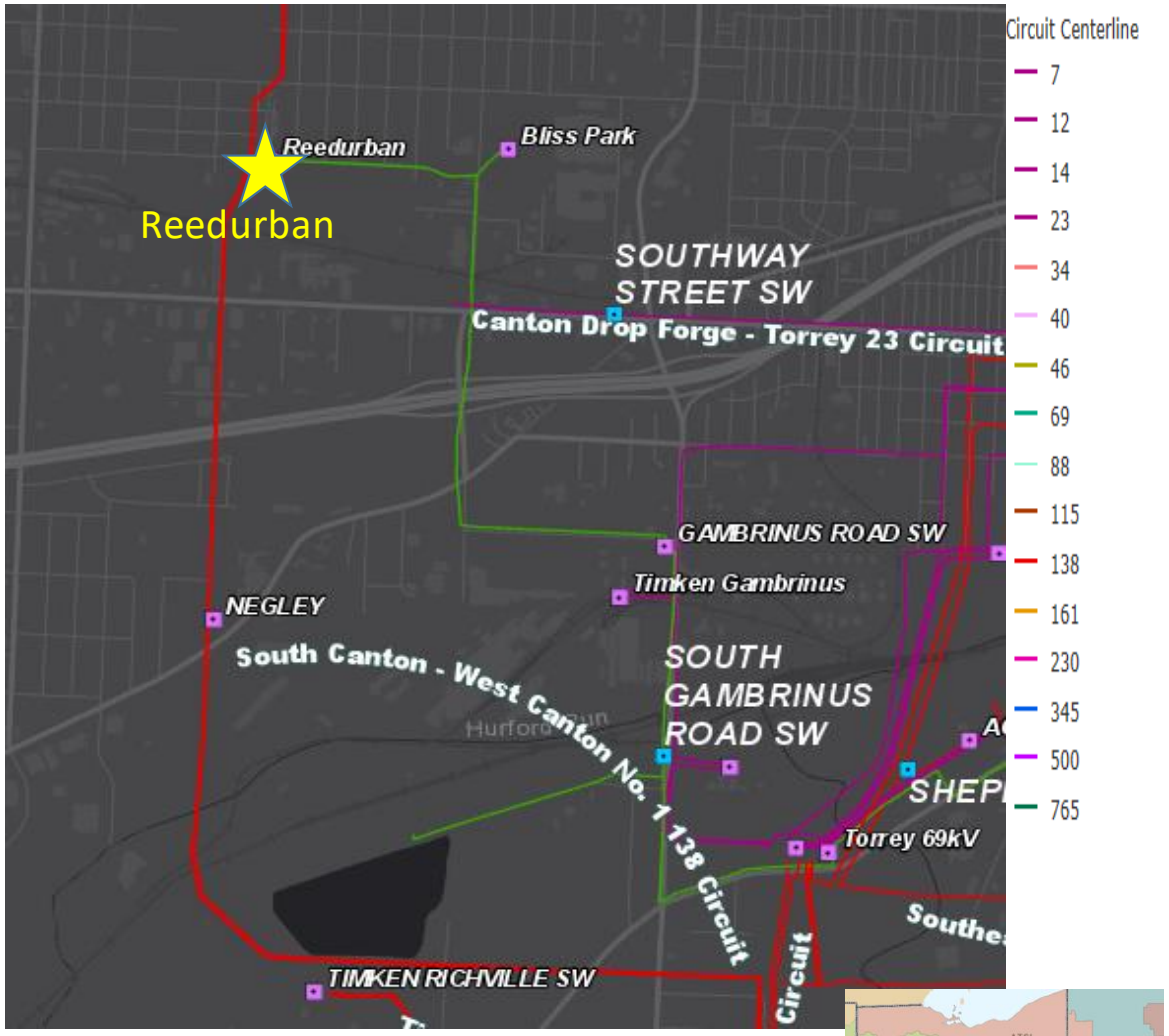
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Station Name: Reedurban

- The 138-69kV transformer has failed and has been temporarily replaced with a mobile 138-69kV transformer.
- Manufactured and installed in 1988.
- 60 MVA nameplate, Westinghouse unit.
- Failure attributed to significant deterioration of transformer windings



Need Number: AEP-2020-OH036

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Selected Solution:

Replace the failed 138-69kV transformer with a spare 90 MVA transformer. Install a transformer oil containment system. Replace electromechanical transformer protection relays with microprocessor relays, along with 69kV PT's. (**S2404**)

Estimated Cost: $1.2M

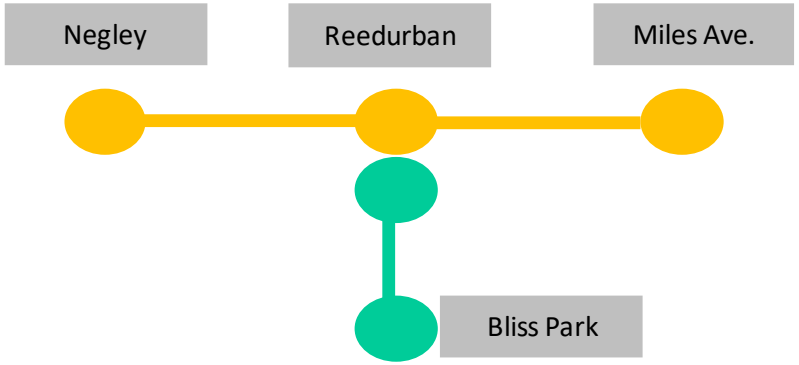
Projected In-Service: 12/10/2020

Supplemental Project ID: S2404

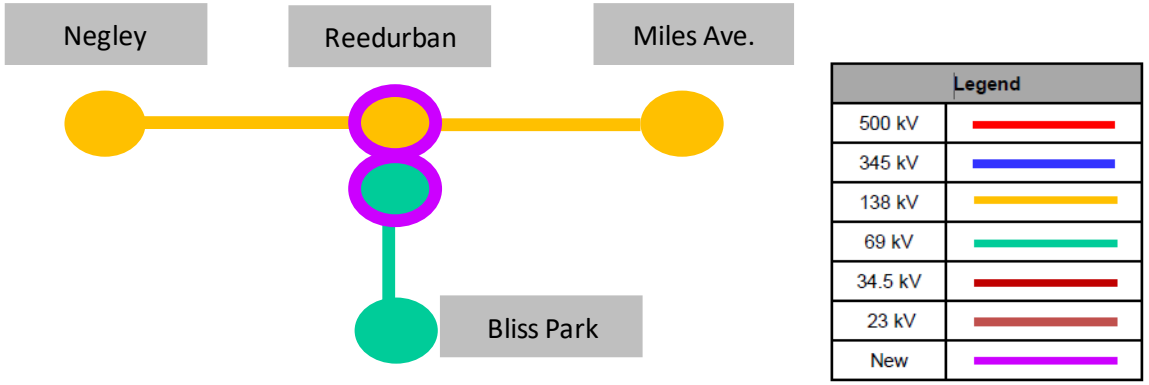
Project Status: Engineering

Model: N/A

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Fort Robinson – Hill 69

Need Number: AEP-2020-AP013

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:

Needs Meeting 2/21/2020

Solutions Meeting 10/16/2020

Project Driver:

Equipment Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Fort Robinson Station

Circuit Breaker E (69 KV):

- Circuit breaker E is 52 years old, CG/CF, oil filled type breaker without oil containment; oil filled breakers have much more maintenance required due to oil handling and spills can result in significant mitigation cost.
- It has experienced 113 fault operations — exceeding manufacturer's recommended number of 10.

Circuit Breaker D (34.5 KV) Concerns:

- Circuit breaker D is 36 years old, CG, oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling and spills can result in significant mitigation cost.
- It has experienced 33 fault operations — exceeding manufacturer's recommended number of 10.
- CB D is 1 of only 27 remaining of the CG-48-72.5-31.5-1200 models on the AEP system. The manufacturer provides no support for the CF/CG/CGH/CH family of circuit breakers and spare parts are increasingly more difficult to obtain. This model has experienced major malfunctions associated with their OA-3 hydraulic mechanism, which includes low-pressure readings, hydraulic leaks, pump lockouts, and failure to shut off.

Transformer 1 (138/69-34.5 KV) :

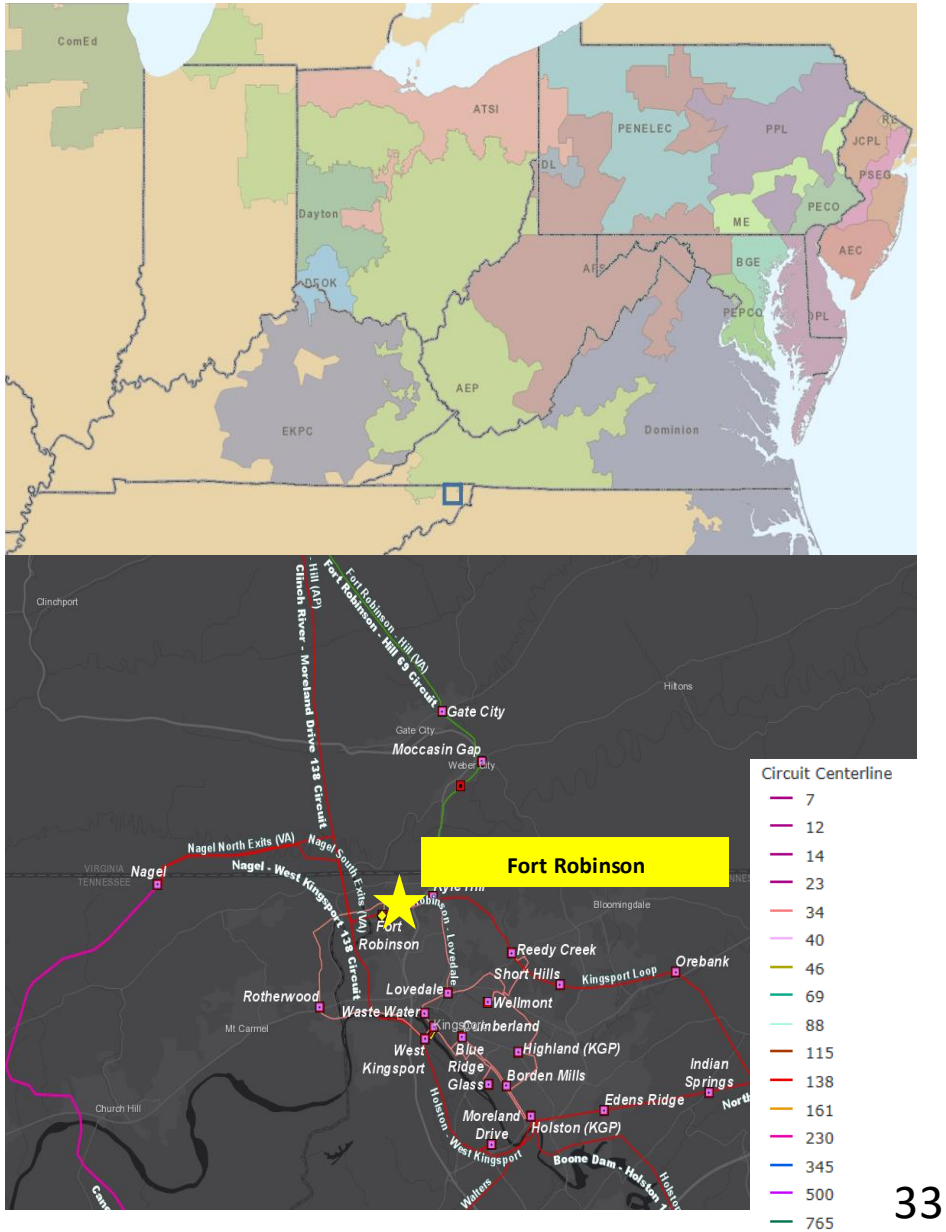
- The current low side GOAB switch on the tertiary side of 1 Bank is incapable of load breaking.
- MOAB/Ground SW configuration on the high side of the transformer.
- Grounding bank is 48 years old with elevated levels of acetylene. This concentration of acetylene indicates excessive internal component decomposition due to arcing within the tank.

Relay Concerns:

- There are 33 electromechanical type relays (82% of all relays at the station) which have significant limitations with regards to fault data collection and retention.
- There are 4 microprocessor based relays with unsupported firmware and lack of vendor support.

Operations Concerns:

- Fort Robinson Station is served off of the Nagel – Wolf Hills 138 kV circuit which is 39.11 miles long without CB sectionalizing.



AEP Transmission Zone M-3 Process
Fort Robinson – Hill 69

Need Number: AEP-2020-AP014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:

Needs Meeting 2/21/2020

Solutions Meeting 10/16/2020

Project Driver:

Equipment Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Hill Station

Circuit Breaker H (69 KV):

- Circuit breaker H is 52 years old, CF model type, oil filled type breaker filled without oil containment; oil filled breakers have much more maintenance required due to oil handling and oil spills can result in significant mitigation cost. Spare parts for these units are difficult to impossible to procure.
- 91 fault operations — exceeding manufacturer's recommended number of 10.

Circuit Switcher AA (69 KV):

- Circuit switcher AA is 25 years old, 2030-69, SF6 type breaker. This type of circuit switcher has no gas monitor and sister units have a history of malfunctions, including gas loss, interrupter failures, and operating mechanism failures.

Transformer 1 (138/69-34.5 KV) Concerns:

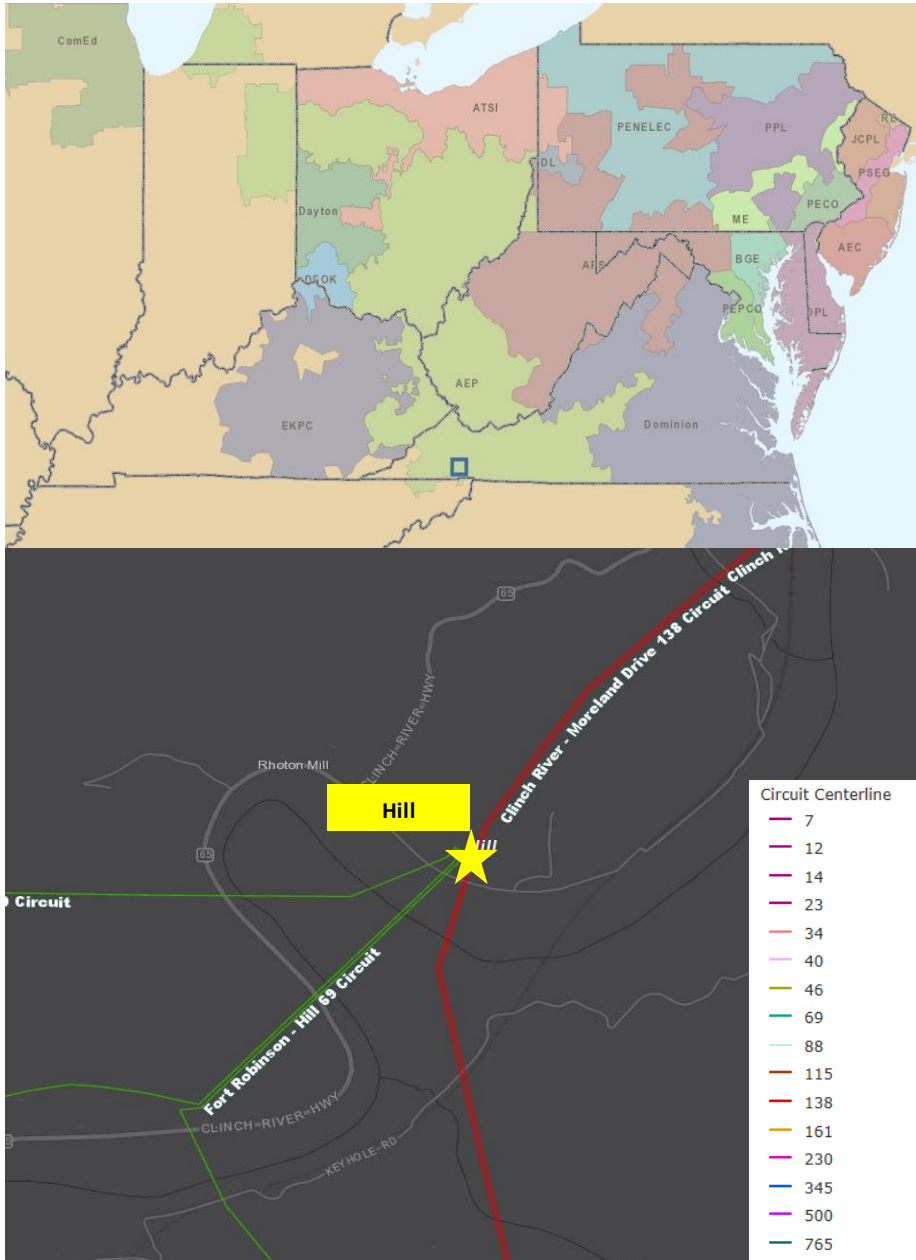
- Transformer bank 1 is 63 years old with elevated levels of carbon dioxide and moisture and a decrease in dielectric strength.
- The current MOAB/Ground SW configuration on the high side of the transformer

Relays

- 20 relays (53%) are of the electromechanical type which have limitations with regards to fault data collection and retention.
- These relays lack vendor support and have no access to spare parts.

Operations Concerns:

- Hill Station is served off of the Clinch River – Nagle 138 kV circuit which is 41.61 miles long without CB sectionalizing.



AEP Transmission Zone M-3 Process
Fort Robinson – Hill 69

Need Number: AEP-2020-AP015

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:
Needs Meeting 2/21/2020
Solutions Meeting 10/16/2020

Project Driver:

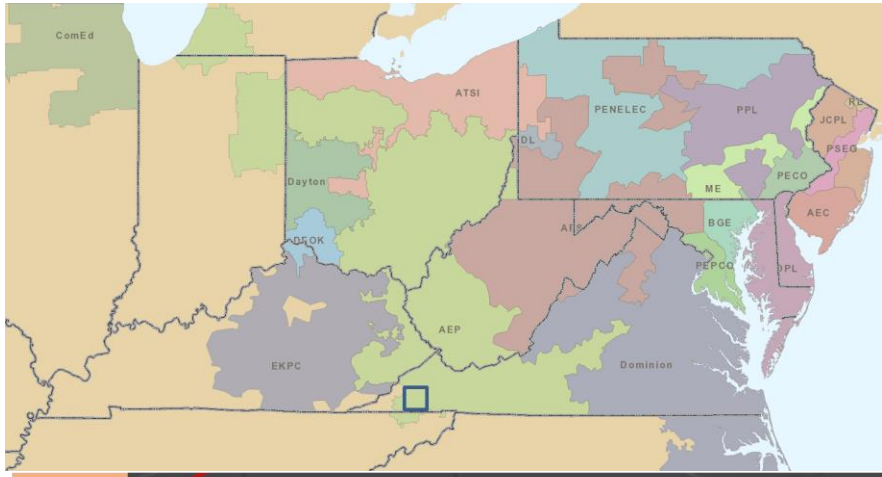
Equipment Condition/Performance/Risk

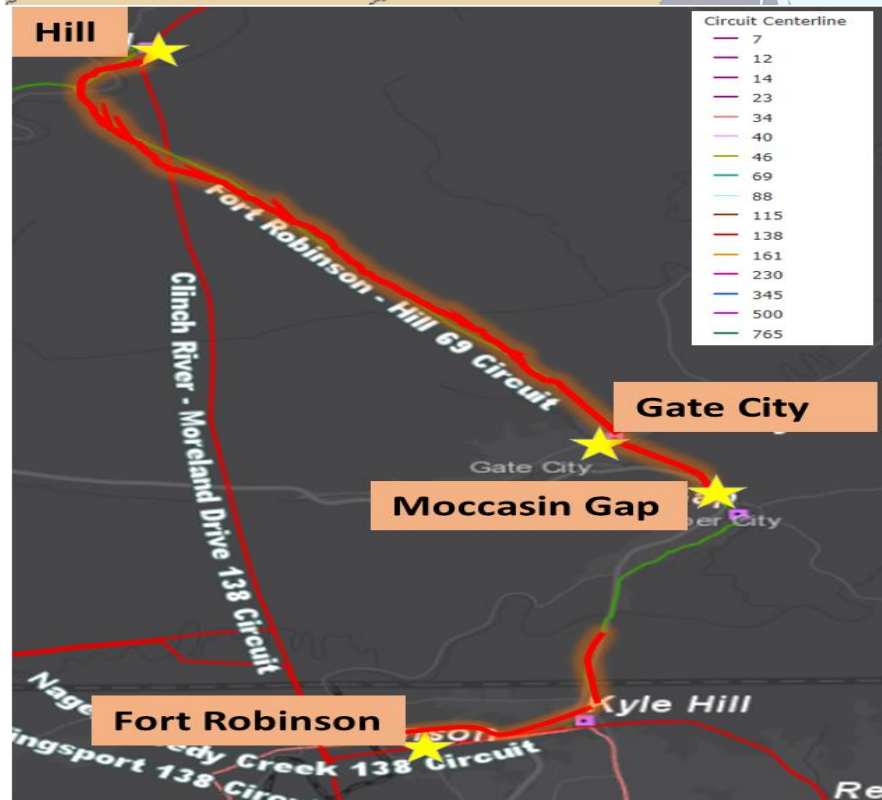
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:
Fort Robinson —Hill 69 KV (installed in 1970)

- Length: ~~12.7~~ ~14.2 Miles
- Original Construction Type: Wood (86% original)
- Original Conductor Type (91% original): 219.9 ACSR, 1/0 CU, 336 ACSR, 4/0 ACSR, and 556 ACSR
- Momentary/Permanent Outages: 7 momentary, 8 permanent (5 years)
- CMI: 5,721,762
- Total structure count: ~~127~~ 213
- Number of open conditions: 120
    - Open conditions include: broken conductor strands, broken/burnt insulators, split Bayonet, cracked X-Brace.
- Unique structure count with open conditions: 95 (44%)
- Additional Info:
    - There have been 5 weather related momentary outages, with 4 of those being attributed to lightning as well as 1 permanent outage. These lightning caused outages are indicative of insufficient shielding and/or insufficient grounding

Note: ~1.5 mile 1/0 Cu conductor section of the ~5 miles Fort Robinson – Moccasin Gap 69 KV line section will be addressed as part of b3101





AEP Transmission Zone M-3 Process
Fort Robinson – Hill 69

Need Number: AEP-2020-AP013, AEP-2020-AP014, AEP-2020-AP015

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Selected Solution:

- Rebuild ~12.7 miles of the existing Fort Robinson – Hill 69 kV line between Fort Robinson and Hill stations.
  Fort Robinson – Moccasin Gap: (SN/SE/WN/WE: 102/142/120/160MVA) Limited by Line Conductor
  Moccasin Gap - Gate City - Hill: (SN/SE/WN/WE: 79/92/100/109MVA)) Limited by Risers at Gate City
  (**S2408.1**) **Estimated Cost: $30.9M**
- At Fort Robinson station, replace existing 69 KV circuit breaker E with a new 3000A 40 KA circuit breaker. Replace existing 34.5 KV circuit breaker D with a new 69 KV rated 3000A 40 KA circuit breaker. Replace existing ground bank at transformer # 1 with new ground bank. Replace existing ground MOAB for transformer #1 with H.S. circuit switcher. Replace existing line MOABs Y & W with 138 kV circuit breakers. Replace 34.5 kV disconnects on breaker J. Install new low side 34.5 KV Circuit breaker at Transformer #1. (**S2408.2**) **Estimated Cost: $7.2M**
- At Hill station, replace existing 69 KV circuit breaker H with new 40 KA 3000A circuit breaker. Replace existing 69 KV circuit breaker E with new 40 KA 3000A circuit breaker for constructability flexibility, existing breaker E can be used as a capital spare. Replace existing 69 KV cap bank circuit switcher AA with new circuit breaker. Replace existing 138/69 KV 40 MVA transformer # 1 with new 138/69 KV 40 MVA transformer #1, add H.S. circuit switcher to the new transformer. Replace existing 138KV line MOABs W & Y with new 138 kV circuit breakers. Replace ground MOAB switches on 138/12 KV T2 with circuit switcher. (**S2408.3**) **Estimated Cost: $6.7M**
- Remote end relaying work at Clinch River, Wolf Hills, Lovedale, Holston, West Kingsport. (**S2408.4**) **Estimated Cost:** $**2M**

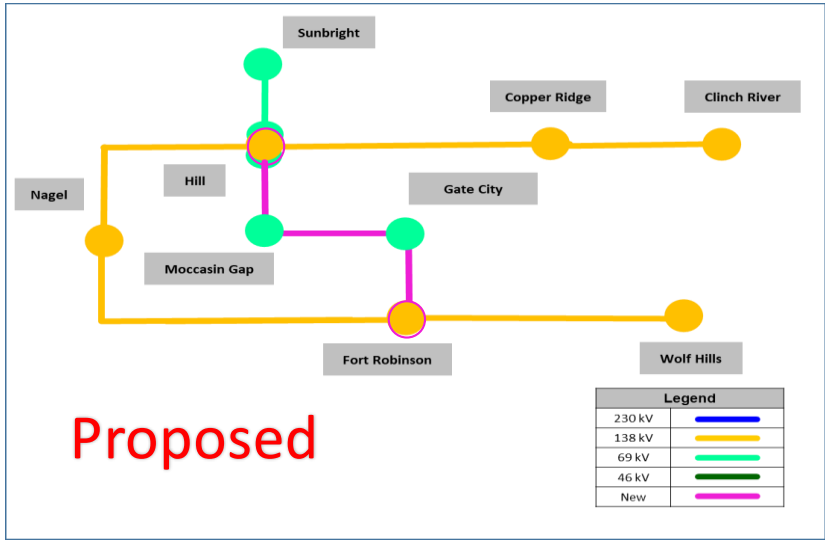
Estimated Cost: $46.8M

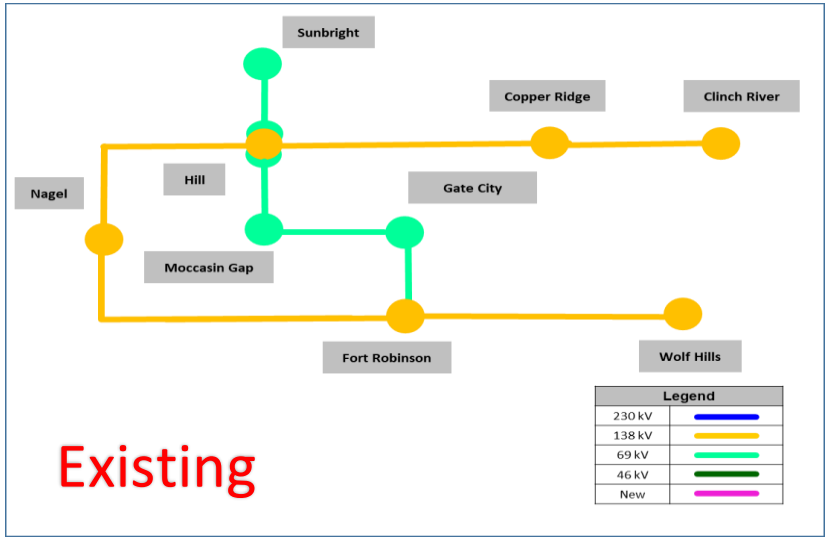
Projected In-Service: 7/01/2023

Supplemental Project ID: S2408.1-.4

Project Status: Scoping

Model: N/A





AEP Transmission Zone M-3 Process
Lovedale Solution

Need Number: AEP-2020-AP040

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Previously Presented:

Needs Meeting 9/11/2020

Solutions Meeting 10/16/2020

Project Driver:

Equipment Material/ Condition/Performance/Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Station Name: Lovedale

Circuit Breakers A, B & G (34.5 KV) Concerns:

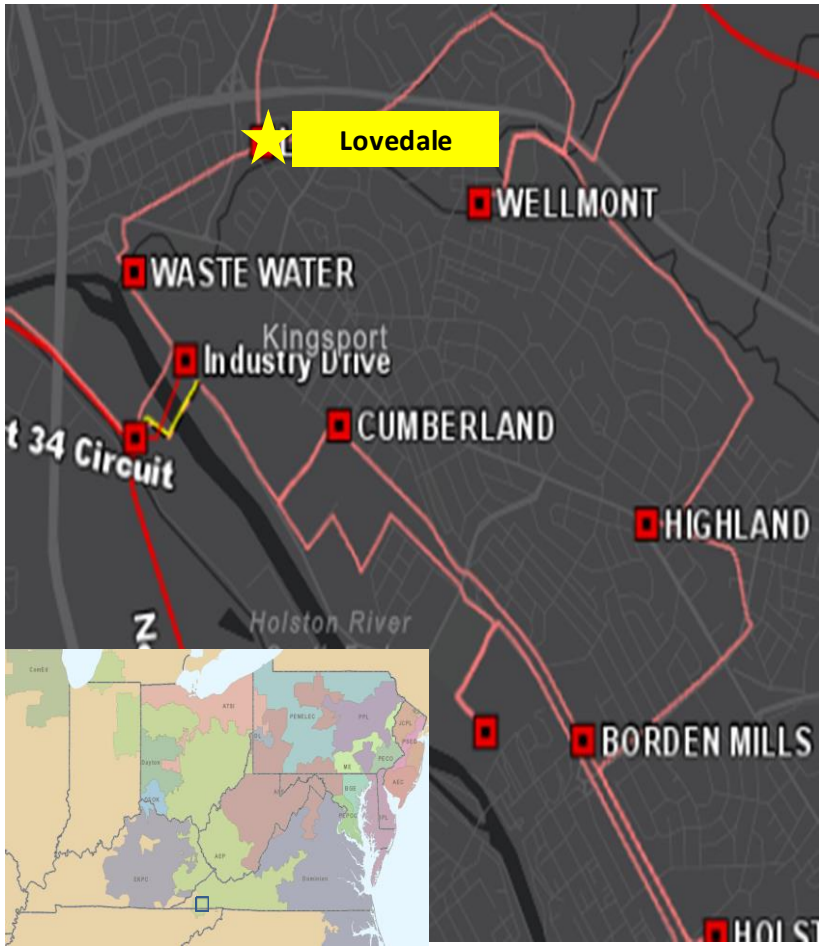
- All of these breakers are 52 years old, oil filled without oil containment; oil filled breakers pose significant environmental risk associated with oil handling and leaks. Additionally, oil filled breakers require frequent maintenance. Oil spills are common and can result in significant environmental mitigation costs.
- Breakers A & B have experienced 41 & 11 fault operations, respectively, exceeding manufacturer's recommended number of 10.
- Breakers A, B & G are 3 of 31 of the FKA-34.5-1500-1 model remaining on the AEP system. Spare parts for these units are impossible to procure as this model type is no longer vendor supported.

Other station concerns:

- The station yard is very cramped and tight. There is limited ability for crews to perform necessary maintenance due to a lack of space for vehicles and equipment.
- The bus arrangement is tight and congested with tubing comprised mainly of copper
- Cap and pin insulators are used throughout the station
- There are additional needs on the Distribution voltage class equipment within the station

Relay concerns:

- Currently, 33 of the 40 deployed relays are electromechanical type which have significant limitations with regards to fault data collection and retention. In addition, these relays lack vendor support with no spare part availability for repairs.



AEP Transmission Zone M-3 Process
Lovedale Solution

Need Number: AEP-2020-AP040

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 2/19/2021

Selected Solution:

- Rebuild Lovedale Substation to 69 kV standards (energized at 34.5 kV)
  - Station highside at Lovedale: Replace existing 34.5 kV circuit breakers A, B & G with new 69 KV rated 3000A 40 KA circuit breakers. (**S2407.1**) **Estimated Cost: $2.3M (Distribution cost is not included)**
  - Required T-line Entrance Work necessary to relocate to the new station site (Highland-Lovedale, Fort Rob-Lovedale, Lovedale-Waste Water) (**S2407.2**) **Estimated Cost: $1.1M**
  - Required ROW (Lovedale-Waste Water) (**S2407.3**) **Estimated Cost: $0.1**
  - Remote End Work (Highland, Reedy Creek, Fort Robinson) (**S2407.4**) **Estimated Cost:$0.7M**
  - **Distribution Scope of Work:** Install (2) 69-34.5/12 kV distribution Transformers, (4) feeder exits with breakers and a bus-tie.

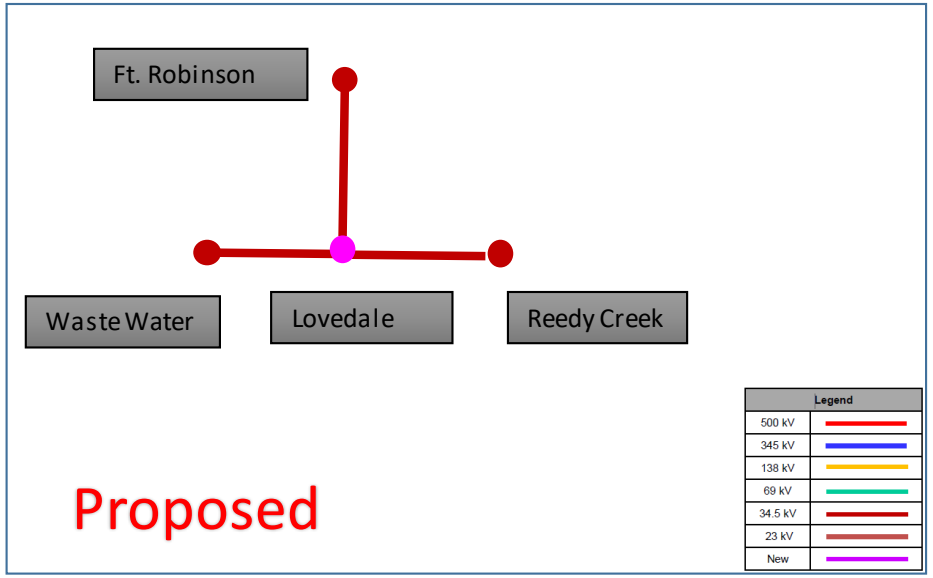
Estimated Cost: ~$4.2M

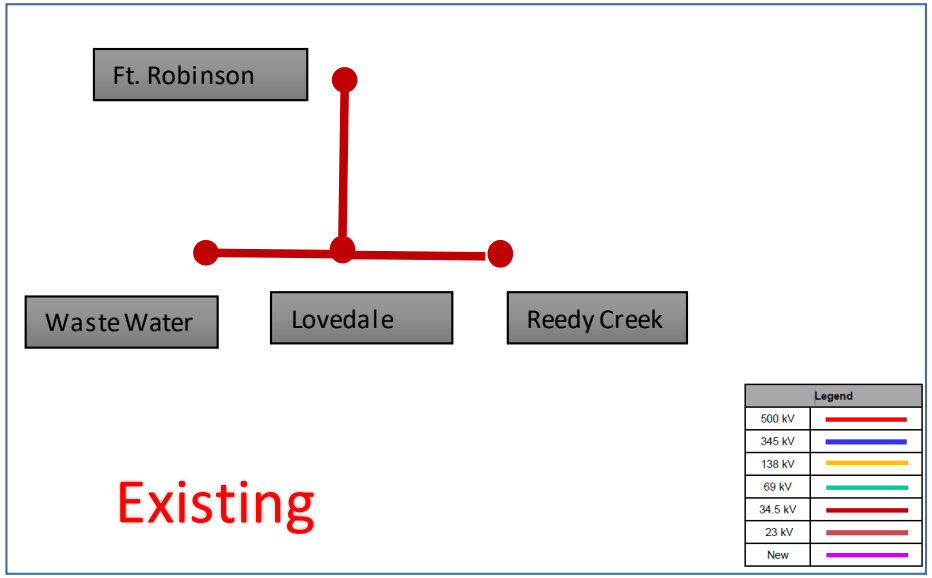
Projected In-Service: 11/15/2023

Supplemental Project ID: S2407.1-.4

Project Status: Scoping

Model: N/A





AEP Transmission Zone M-3 Process
Rarden – Rosemount

Need Number: AEP-2018-OH015

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

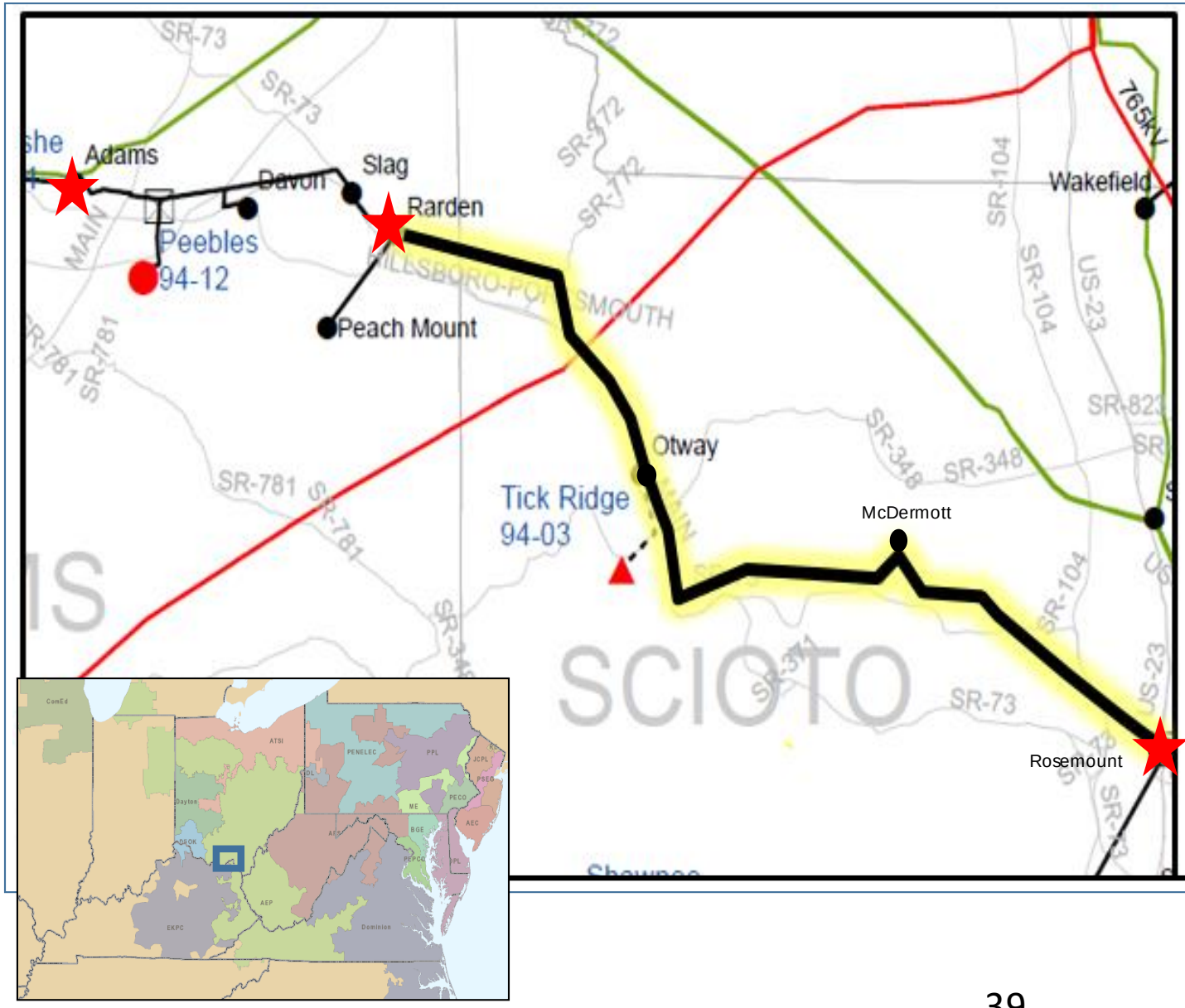
Previously Presented:
Needs Meeting 10/28/2018
Solutions Meeting 11/20/2020

Project Driver:
Operational Flexibility and Efficiency, Customer Service.

Specific Assumption Reference:
AEP Connection Requirements for the AEP Transmission System

Problem Statement:

- Rarden and Rosemount Stations are connected by a 34.5 kV line with four 34.5/12 kV substations and several distribution customers served directly from the line. The total load served along this 24 mile line is 26/30 MVA (summer/winter).
- There is a normal-open point near Otway.
- The area suffers from reliability issues due to the rugged terrain and remote access. Customers have experienced over four million customer minutes of interruption over the past three years.
- The area's peak load can exceed the source transformers (Rarden and Rosemount). The 336 AAC conductor has already been overloaded (115% on 2014). Because the line is categorized as distribution these are not considered TO criteria violations.
- The two 69-34.5 kV transformers at Rarden are protected with high-speed ground switches which can cause through-faults on the transmission system.



AEP Transmission Zone M-3 Process
Rarden – Rosemount

Need Number: AEP-2018-OH015

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- Rarden: The existing station will be rebuilt to 69 kV with a new 69kV breaker (3000A, 40kA) facing Adams and a MOAB switch (2000A) facing Otway. **Estimated Cost: $2.24M (s2426.1)**
- Adams – Rarden 69kV: Reroute the line to the rebuilt Rarden station with 795 ACSR 26/7 (SE 179MVA). **Estimated Cost: $0.12M (s2426.2)**
- Rarden – Otway 69kV: Install ~8.5 miles of greenfield 69 kV line between Rarden & Otway stations; using 556.5 ACSR 26/7 conductor (SE 142 MVA). **Estimated Cost: $12.49M (s2426.3)**
- Otway: Construct a new 69kV Station with 4-CBs (3000 Amp, 40kA) in a ring bus configuration. **Estimated Cost: $5.23M (s2426.4)**
    - Note: Cost does not include Distribution work to install 69-12 kV transformer and 12 kV feeders.
- Tick Ridge Extension: Install ~0.1 miles of greenfield line between Otway and Tick Ridge (Adams) stations using 556.5 ACSR 26/7 conductor (SE 142 MVA) **Estimated Cost: $0.29M (s2426.5)**
- Otway – McDermott 69kV: Install ~7.3 miles of greenfield 69 kV line between Otway & McDermott stations; using 556.5 ACSR 26/7 conductor (SE 142 MVA) **Estimated Cost: $17.59M (s2426.6)**
- McDermott: Rebuild the existing station with a 69kV box bay and 2 MOAB switches (2000A) on the line connections. **Estimated Cost: $2.15M (s2426.7)**
    - Note: Cost does not include Distribution work to install 69-12 kV transformer and 12 kV feeders.
- McDermott – Rosemount 69kV: Install ~6.3 miles of greenfield line between McDermott & Rosemount stations; using 556.5 ACSR 26/7 conductor (SE 142 MVA). **Estimated Cost: $12.49M (S2426.8)**
- Rosemount: Expand the existing station footprint. Install 5-CBs (3000 Amp, 40kA) in a ring configuration. **Estimated Cost: $3.88M (s2426.9)**
- Rosemount Extension: Reroute the line into the Rosemount 69kV ring bus with 795 ACSR 26/7 (SE 179MVA). **Estimated Cost: $0.95M (s2426.10)**

Estimated Cost: $57.43M

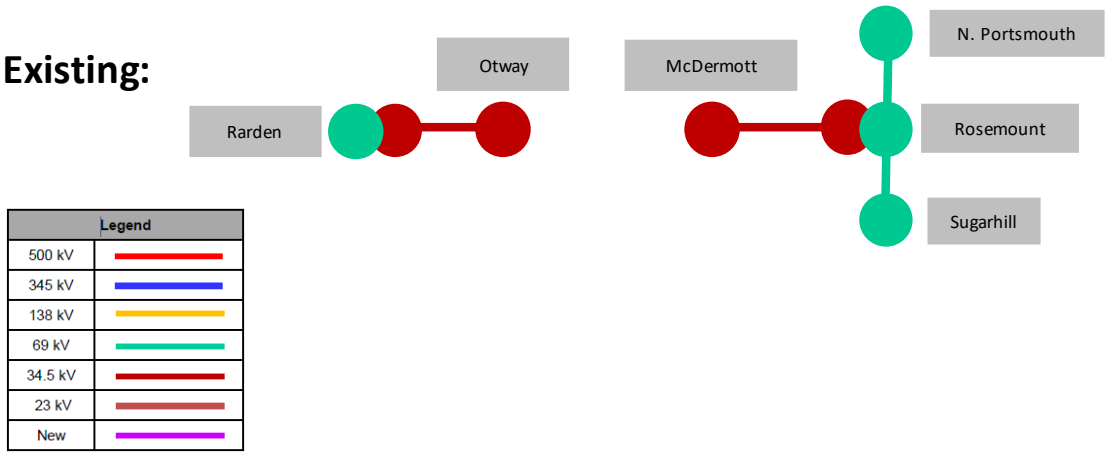
Projected In-Service: 10/15/2023

Supplemental Project ID: s2426.1-.10

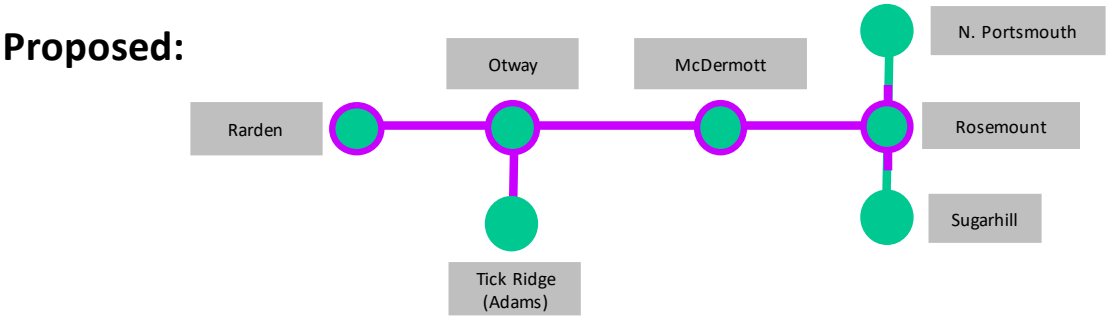
Project Status: Engineering

Model: N/A

Existing:



Proposed:



AEP Transmission Zone M-3 Process
West Kingsport

Need Number: AEP-2018-AP017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 1/11/2019
Solutions Meeting 12/18/2020

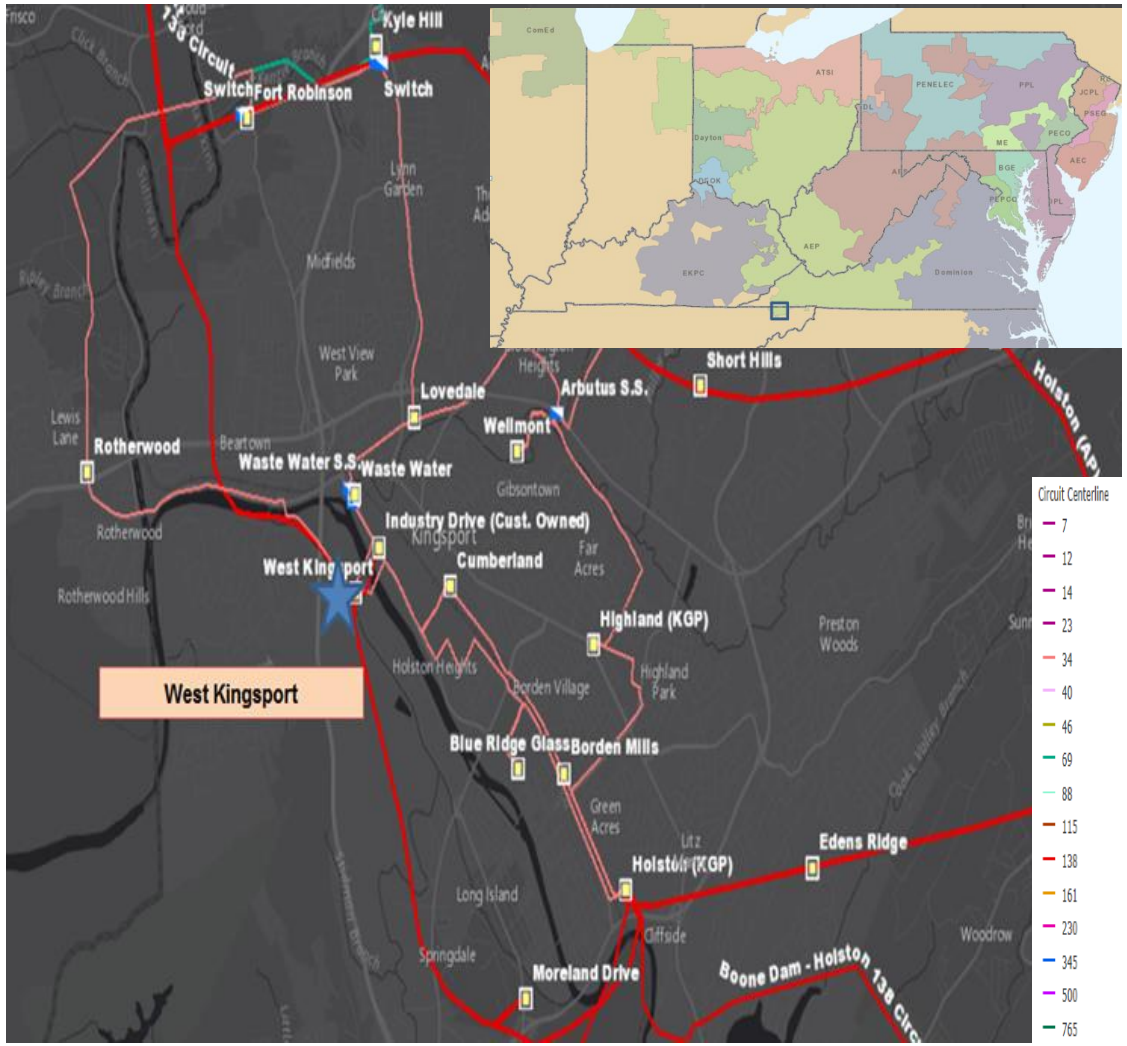
Project Driver:
Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:
138 kV circuit breaker 'E' at West Kingsport station is a type FX-11 breaker, which is one of only two remaining circuit breakers of this class on the AEP system. Due to a lack of spare replacement parts, it is not possible to maintain the breaker in the event of a failure. Breaker 'E' has had historical issues with gas leaks. In addition, this circuit breaker has experienced 30 fault operations exceeding the manufacturers recommendation 10.

Currently dissimilar zones of protection exist at the West Kingsport between the 138 kV bus #1, 138 kV circuit towards North Bristol (~25 miles), and the 138 kV service point towards the Royal Ordnance Ammunitions Plant.

The existing configuration at West Kingsport station results in an outage of the entire 138 kV yard and all customers served from the station for a failure of 138 kV circuit breaker 'G'.



AEP Transmission Zone M-3 Process
West Kingsport

Need Number: AEP-2019-AP019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 05/20/2019

Solutions Meeting 12/18/2020

Project Driver:

Equipment Material/ Condition/Performance/Risk

Specific Assumption Reference:

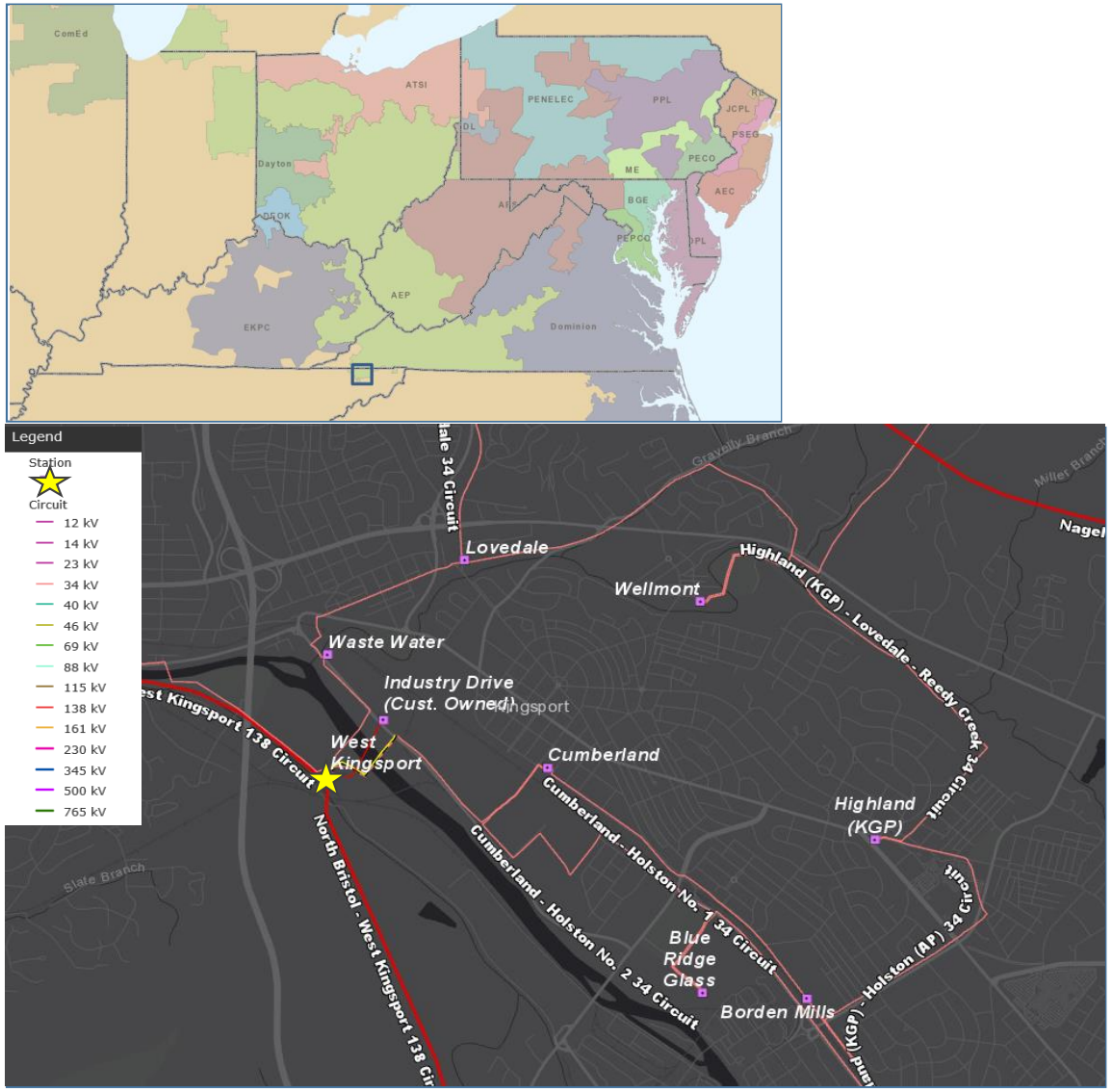
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

West Kingsport 34.5 kV

34.5 kV Circuit breakers A, C, and F

- FK type oil breakers. (1955, 1955, and 1966 vintage)
- These are oil breakers that are difficult to maintain due to the required oil handling. There is an increased potential for oil spills during routine maintenance and failures with these types of breakers.
- Other drivers include damage to bushings and an excessive number of fault operations exceeding the manufacturer's recommendations.
- Have experienced 26, 26, and 21 fault operations respectively. The manufacturer's recommendation for this type of breaker is 10.



Need Number: AEP-2018-AP017, AEP-2019-AP019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:
West Kingsport Station Work: Install five 138 kV 40 kA 3000A CBs and reconfigure existing Bus #2 to a breaker and a half arrangement. Note that the replacement of breaker E was accelerated due to a customer request and constrained outages and is currently in service to feed Industry Drive. Replace existing 34.5 kV CBs A, C and F with three new 69 kV-rated 3000A 40 kA breaker — to be energized at 34.5kV. Replace existing 34.5kV bus structures with new box bays built to 69kV. Remove existing 34.5 KV 14.4 MVAR Cap bank and Cap Bank Switcher. **Estimated Cost: ~$9.2M (s2435.1)**

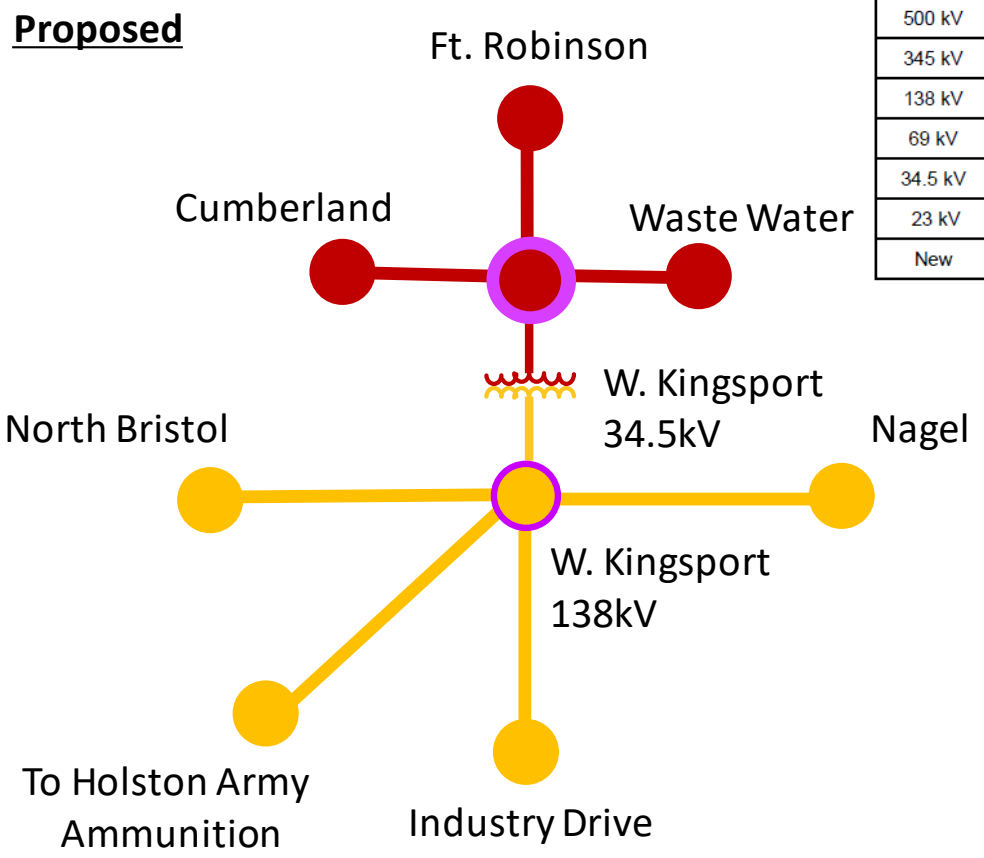
Line work and ROW required to relocate the North Bristol and Industry Drive 138KV lines at West Kingsport Station into the new configuration. This includes installing 3 structures (2 tower structures and 1 custom Steel Pole) to bring North Bristol Circuit in and relocate the Industrial Drive Circuit to final string of breakers. This also includes re-terminating the Ft. Robinson-West Kingsport 34kV line, Cumberland- West Kingsport 34.5kV Line and the Waste Water- West Kingsport 34kV Line into new station bays. **Estimated Cost: ~$4.2 M (s2435.2)**
Total Estimated Transmission Cost: $13.4M

Projected In-Service: 7/20/2023

Supplemental Project ID: s2435.1-.2

Project Status: Engineering

Model: N/A



AEP Transmission Zone M-3 Process
Bixler Area Impovements

Need Number: AEP-2019-IM015

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 04/23/2019

Solution Meeting 11/20/2020

Project Driver:

Equipment Condition/Performance/Risk

Specific Assumption Reference:

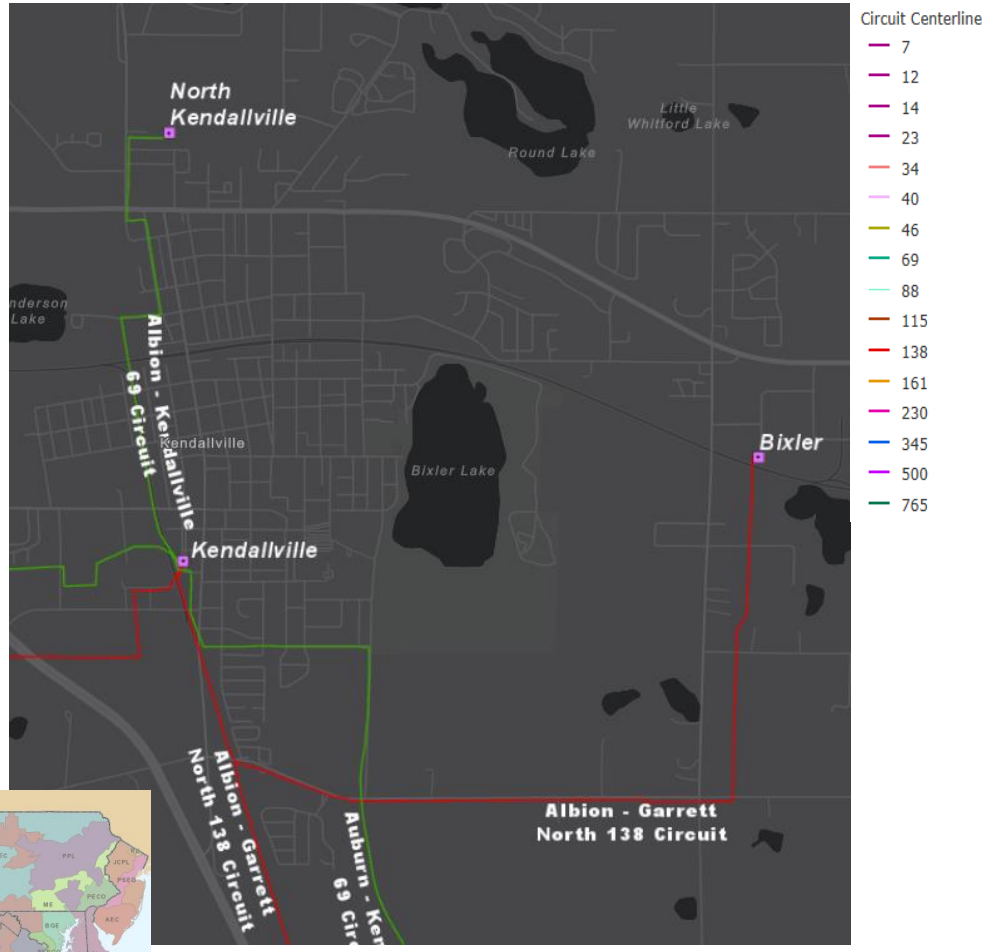
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

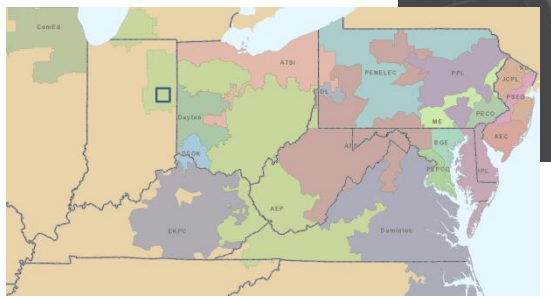
Problem Statement:

The loads at Bixler and North Kendallville are 20.58 MW and 17.13 MW respectively. Bixler is radially served from a 2.89 mile long 138kV line. North Kendallville is radially served from a 1.79 mile long 69kV line.

Kendallville – North Kendallville 69kV Line (~1.7 Miles)

- 1960's vintage wood pole construction
- There are currently 5 open conditions on this line with majority being structure issues.
- CMI: 1,541,297
- Forced Momentary Outages: 1
- Forced Permanent Outages: 9





Need Number: AEP-2020-IM008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 2/21/2020

Solution Meeting 11/20/2020

Project Driver:

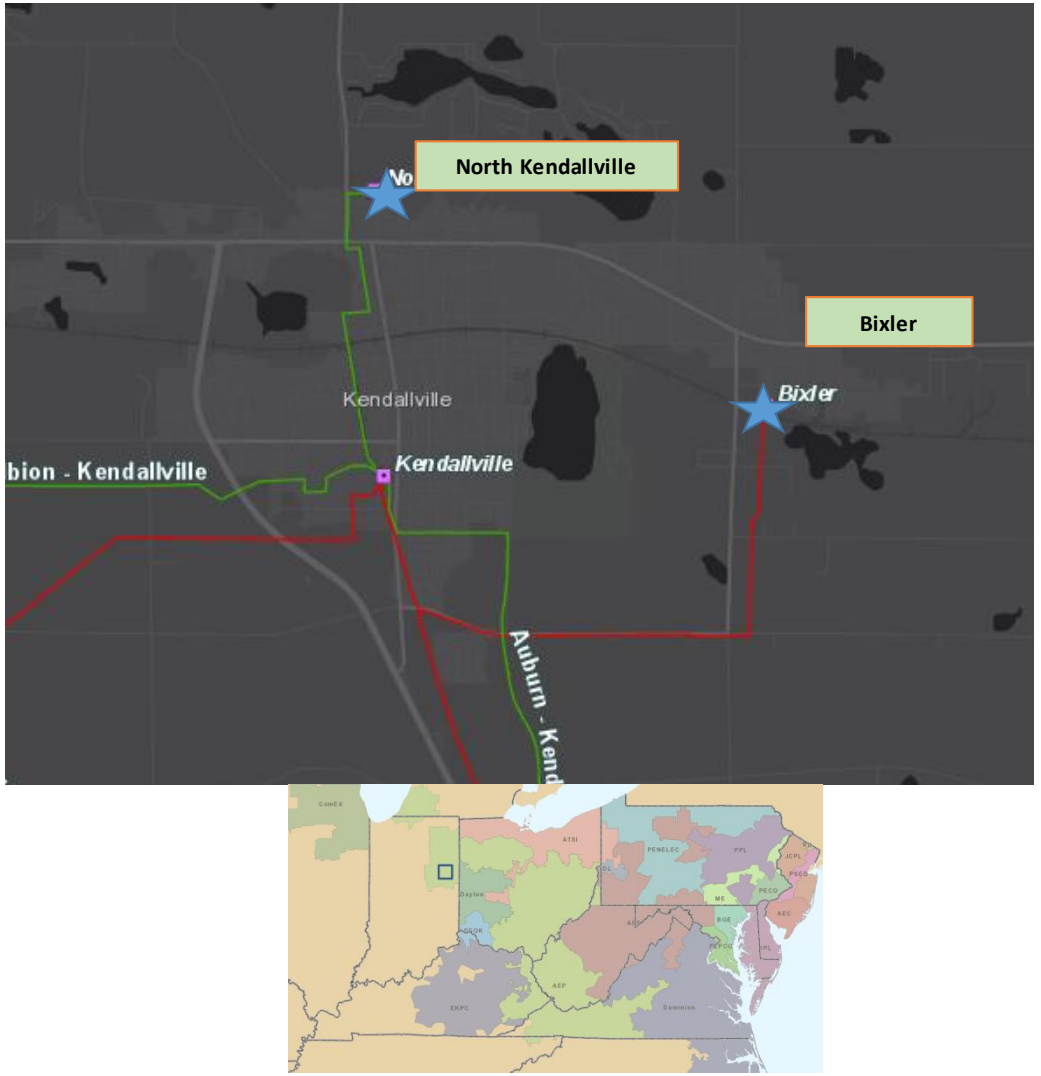
Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 7)

Problem Statement:

I&M Distribution has requested a expansion of their Bixler station and a rebuild of their North Kendallville stations in order to help address the loading and recoverability of the area. These stations serve sensitive customers, including industrial plants and the local hospital, and the load is not recoverable for an outage due to the radial nature of the transmission feeds as presented in need AEP-2019-IM015.



AEP Transmission Zone M-3 Process
Bixler Area Impovements

Need Number: AEP-2019-IM015, AEP-2020-IM008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

Rebuild North Kendallville 69/12kV station as Henderson 138/12kV station. **Estimated Cost: $0.7M (s2431.1)**

Expand Bixler 138/12kV station with a second transformer. Rebuild the through path to accommodate the expansion with a bus tie breaker and line MOAB's. **Estimated Cost: $2.5M (s2431.2)**

Add a 138kV CB to Kendallville station on the line exit to Henderson. **Estimated Cost: $1.5M (s2431.3)**

Rebuild the ~1.8 mile North Kendallville 69kV tap as the 138kV Henderson – Kendallville line. **Estimated Cost: $5.5M (s2431.4)**

Build the new ~2.6 mile Henderson – Bixler 138kV line. **Estimated Cost: $6.9M (s2431.5)**

Retire the 138kV Bixler Sw, and the ~.6 mile between Bixler SW and Kendallville station. **Estimated Cost: $0.7M (s2431.6)**

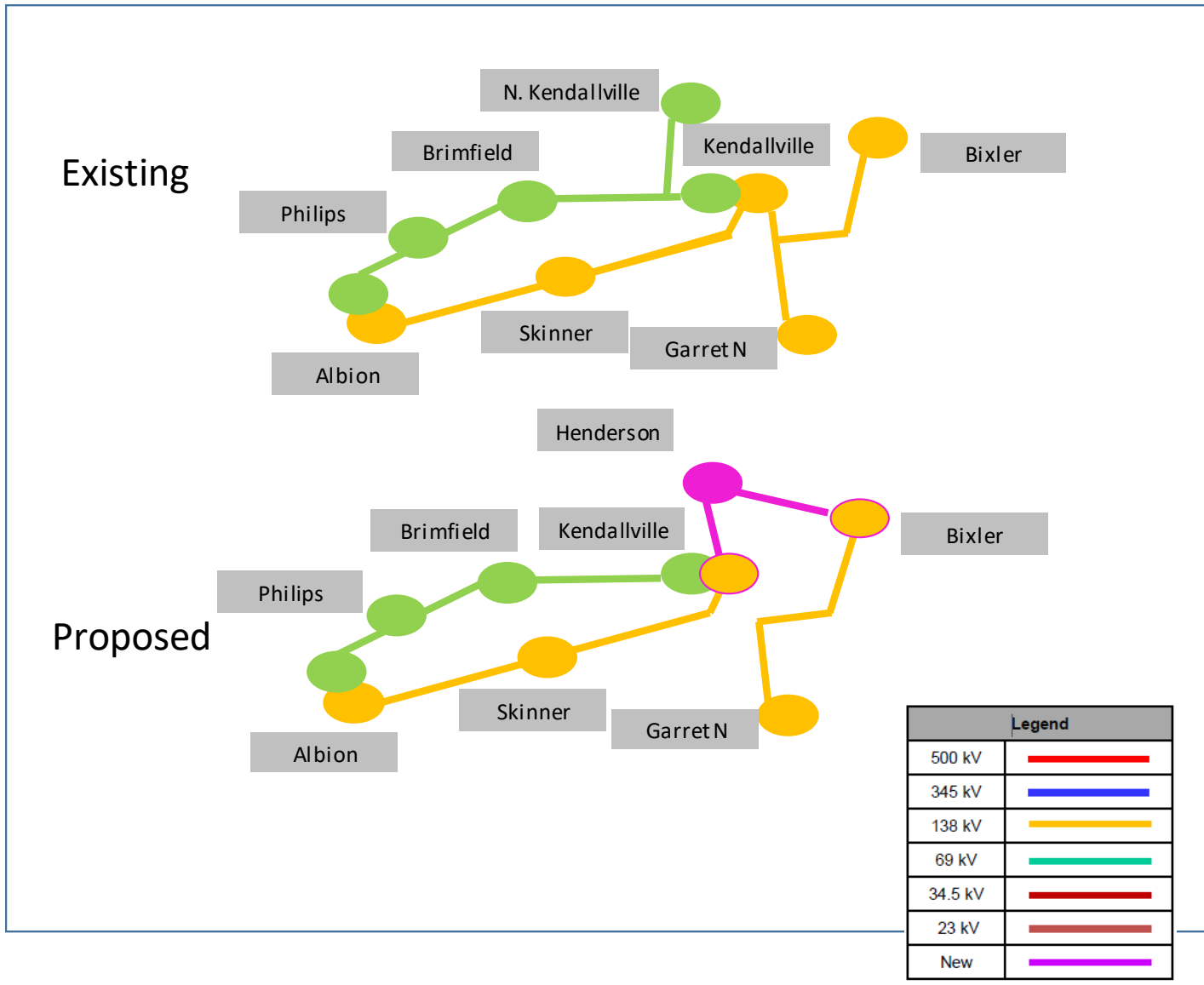
Estimated Cost: $17.8 M

Projected In-Service: 06/01/2024

Supplemental Project ID: s2431.1-.6

Project Status: Scoping

Model: 2024 RTEP



AEP Transmission Zone: Supplemental Eastern Melita Area Improvements

Need Number: AEP-2019-IM016

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 4/23/2019

Solutions Meeting 11/20/2020

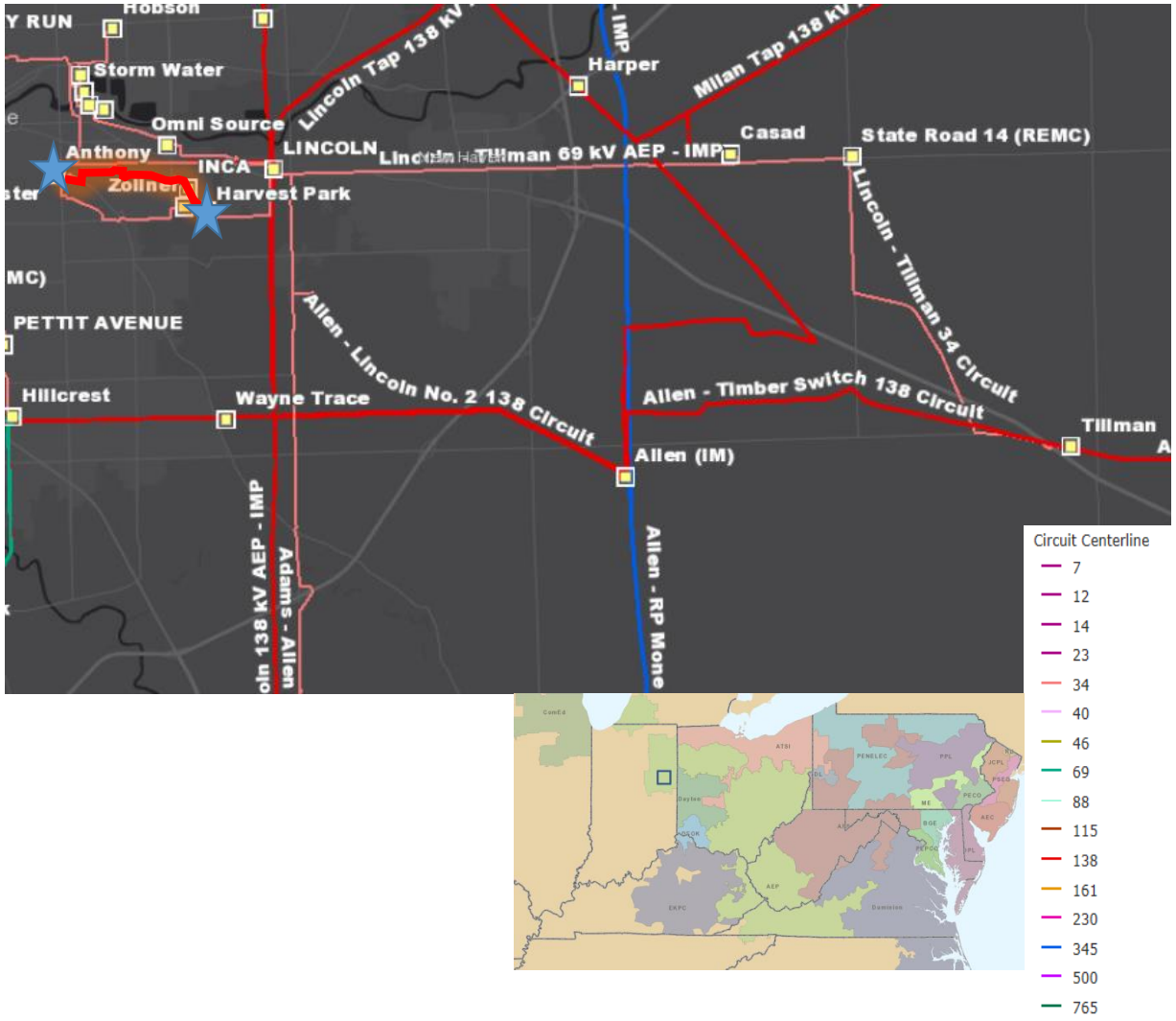
Supplemental Project Driver: Equipment Condition/Performance/Risk

Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Anthony – Harvest Park No.2 34kV Line (~2.5 Miles)

- 1930's vintage wood crossarm construction
- There are currently 14 open conditions on this line with majority being structure issues. The O&M cost of the line is expected to increase as the age of the line increases.



AEP Transmission Zone M-3 Process
Eastern Melita Area Improvements

Need Number: AEP-2019-IM016

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

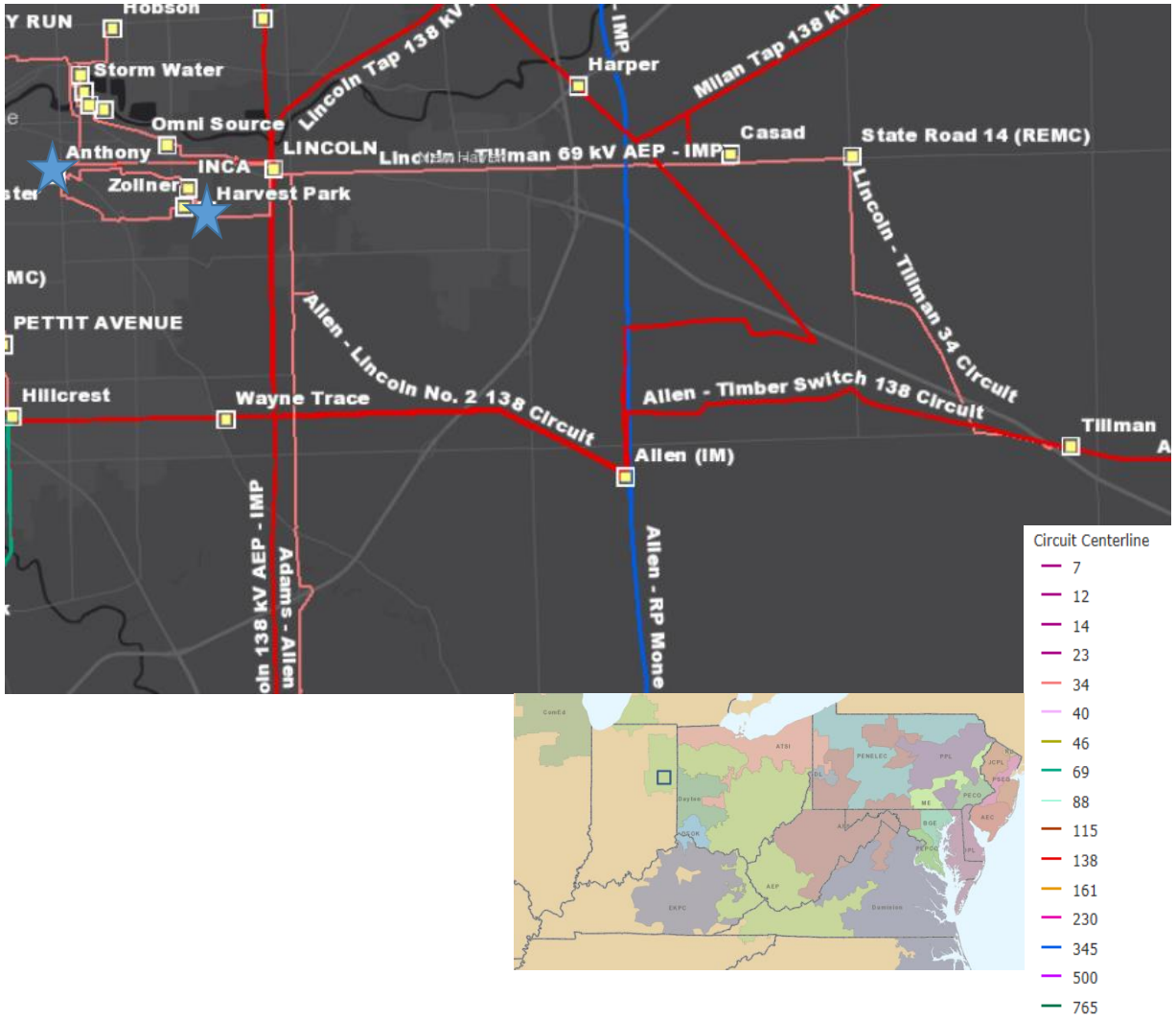
Previously Presented:
Needs Meeting 4/23/2019
Solutions Meeting 11/20/2020

Project Driver:
Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:
Anthony 34kV station
Breakers H, Q, D, C & A 34kV
1970 vintage FK Oil breakers
Fault Operations: H(21), A(12) – Recommended(10)
Oil filled breakers have much more maintenance required due to oil handling that their modern, vacuum counterparts do not require. Finding spare parts for these units is difficult or impossible, and these models are no longer vendor supported

Harvest Park 34kV station
Breakers S, N, A & B 34kV
1962 vintage FK Oil breakers S, N & B
1956 vintage FK Oil breakers B
Fault Operations: A(49) – Recommended(10)
Oil filled breakers have much more maintenance required due to oil handling that their modern, vacuum counterparts do not require. Finding spare parts for these units is difficult or impossible, and these models are no longer vendor supported



AEP Transmission Zone M-3 Process
Eastern Melita Area Improvements

Need Number: AEP-2019-IM038

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 10/25/2019

Solutions Meeting 11/20/2020

Project Driver:

Customer Request/Operational

Specific Assumption Reference:

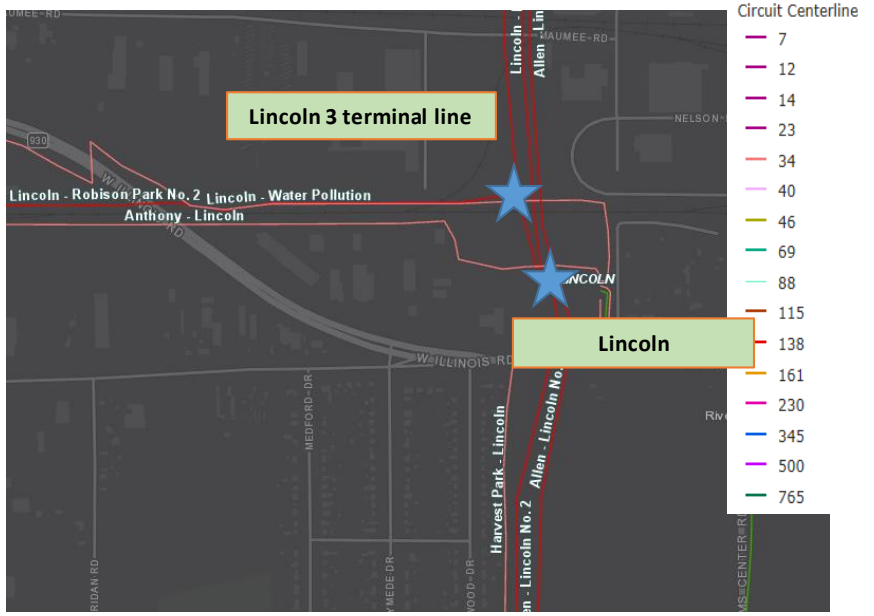
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

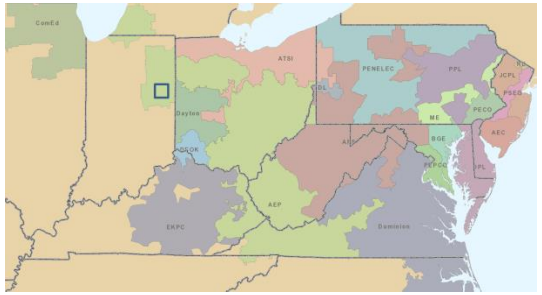
Problem Statement:

Lincoln 138/69/34.5kV Station

I&M Distribution has requested a new delivery point at Lincoln station.

There is currently a three terminal line outside Lincoln station that connects Anthony, Lincoln and Robison Park. AEP has been addressing these three terminal lines when feasible.





AEP Transmission Zone M-3 Process
Eastern Melita Area Improvements

Need Number: AEP-2020-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 5/22/2020
Solutions Meeting 11/20/2020

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Anthony 138/34.5/12kV

- 34.5/12kV XFR 4 is a 1954 unit with IEEE level 2 CO and level 3 CO2 gassing with decreasing interfacial tension and oil deterioration.
- Transformer #5 currently has a high side moab switch protection scheme.

Water Pollution 34.5/4kV

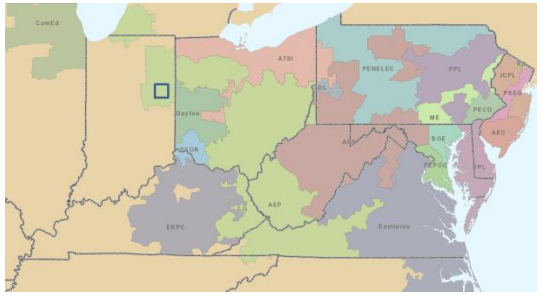
- 34.5/4kV XFR 1 is a 1974 unit with IEEE level 4 Ethane and level 3 CO2 gassing.

Filtration 34.5/12kV Switch Station

I&M has an obligation to remove this station upon completion of the FT Wayne tunneling project.

Lincoln – Harvest Park 34.5kV line (~1.5 miles)

- 1.5 miles of 1920-1930's steel structures with 300,000 CM copper conductor. There are currently 4 structures with open conditions (20% of the line)



AEP Transmission Zone M-3 Process
Eastern Melita Area Improvements

Need Number: AEP-2020-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 5/22/2020
Solutions Meeting 11/20/2020

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

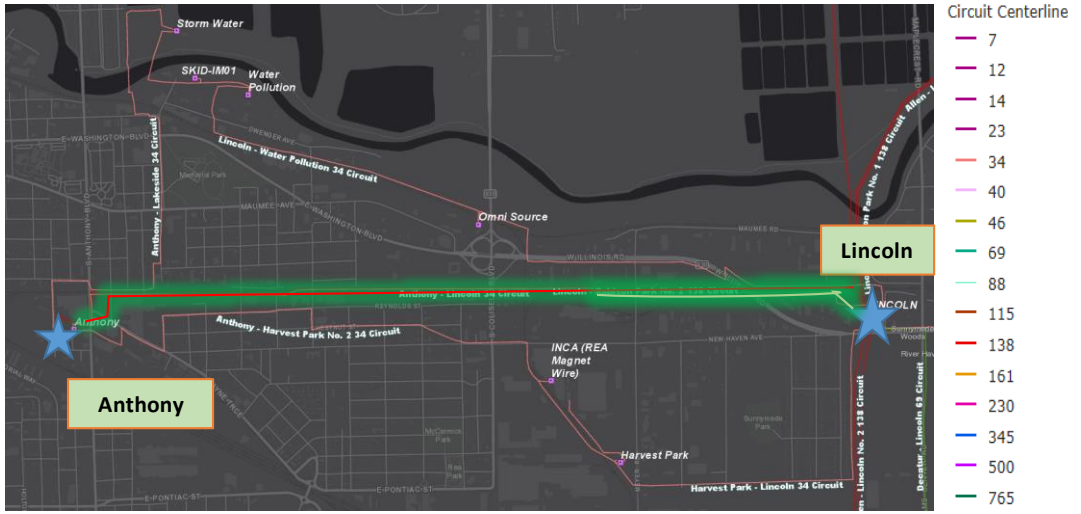
Problem Statement:

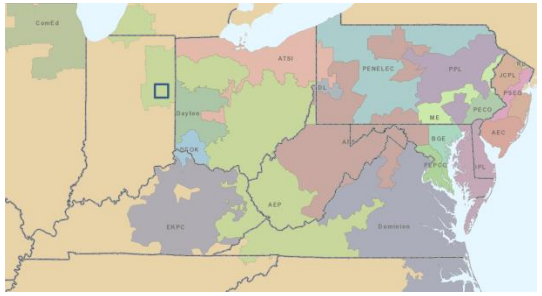
Lincoln – Anthony 34.5kV line (~1.1 miles)

- 1.1 miles of 1971 wood pole line with 300,000 CM copper conductor. 9 unique structures with open conditions (36% of the line)
- This line segment fails to meet several loading and leakage distance requirements.

Lincoln – Anthony 138/34.5kV line (~3.07 miles)

- 3.07 miles of 1971 wood pole line with 23 unique structures with open conditions (37% of the line). These conditions include insect damaged poles, twisted crossarms, broken strands and missing grounds.
- This line segment fails to meet several loading and leakage distance requirements.





AEP Transmission Zone M-3 Process
Eastern Melita Area Improvements

Need Number: AEP-2019-IM016, AEP-2019-IM038, AEP-2020-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

Retire Harvest Park 34.5kV station and move distribution load source to Lincoln station. **Estimated Cost: $0M (s2432.1)**

Retire ~.6 miles of the Storm Water - Lincoln line. **Estimated Cost: $0.1M (s2432.2)**

Retire the ~2.5 mile Anthony – Harvest Park line. **Estimated Cost: $0.5M (s2432.3)**

Retire Filtration Switch. **Estimated Cost: $0.1M (s2432.4)**

Retire the ~1.1 mile Anthony – Lincoln 34.5kV line. **Estimated Cost: $0.2M (s2432.5)**

Retire the ~2.9 mile Anthony – Lincoln 138kV line. **Estimated Cost: $0.6M (s2432.6)**

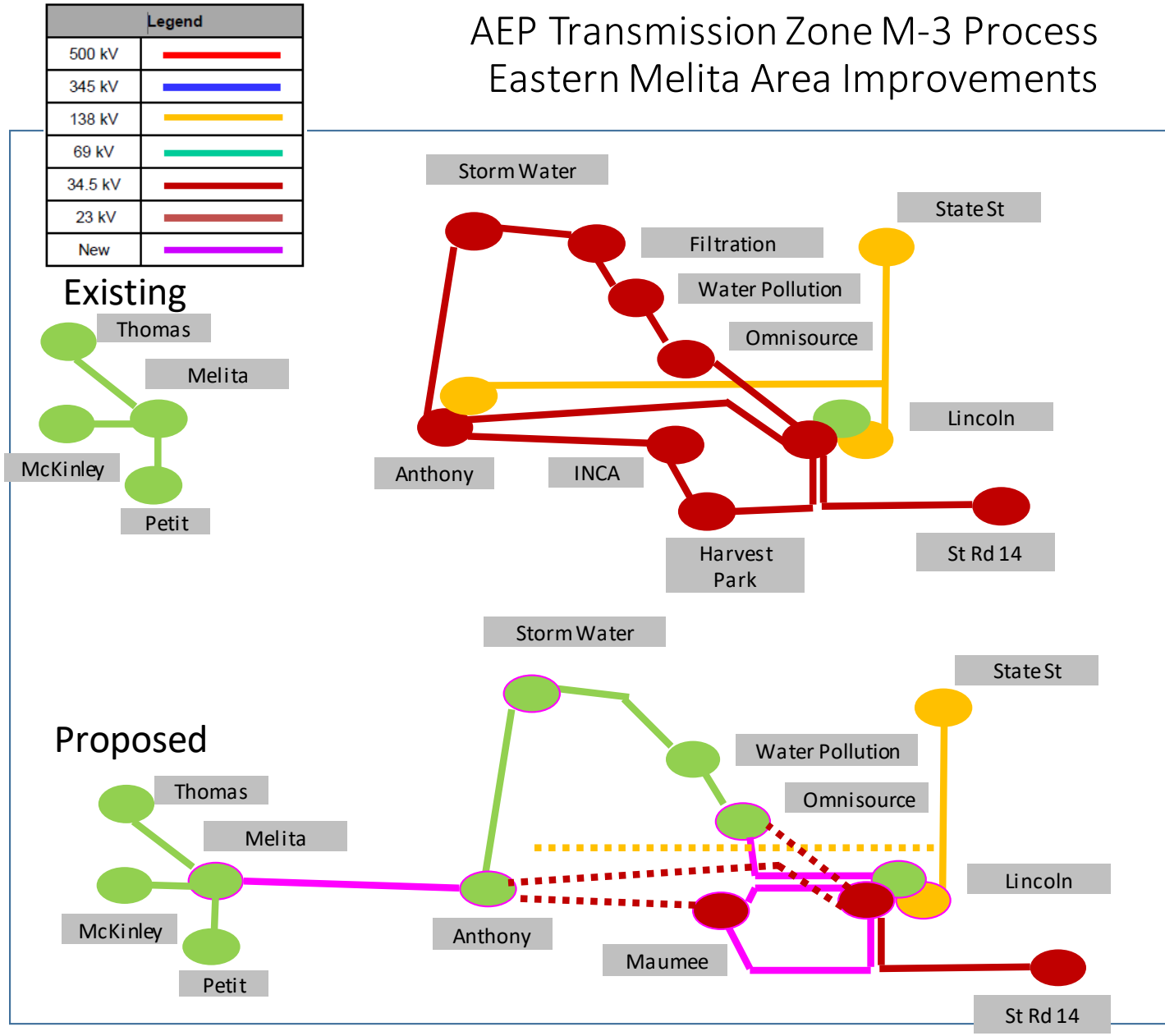
At Lincoln station, move the Storm Water CB to the 69kV bus. Install 138/12kV transformer with new 12kV distribution bay to replace Harvest Park. **Estimated Cost: $5.7M (s2432.7)**

Rebuild the Lincoln – Inca line. Line will connect to the new Lincoln 69/34.5kV extension at Maumee switch. **Estimated Cost: $6.3M (s2432.8)**

Build a ~0.9 mile 69/34.5kV double circuit line out of Lincoln station to connect to the Lincoln – Maumee 34.5kV line and the Lincoln – Stormwater 69kV line. **Estimated Cost: $3.4M (s2432.9)**

Install a 34.5kV POP Switch to feed Inca station called Maumee switch. **Estimated Cost: $0.6M (s2432.10)**

Build a greenfield ~1.7 mile Anthony – Melita 69kV line. **Estimated Cost: $6.2M (s2432.11)**



AEP Transmission Zone M-3 Process
Eastern Melita Area Improvements

At Storm Water station, replace Transformer 1 with a 69/12kV unit and re-energize station at 69kV. **Estimated Cost: $0M (s2432.12)**

At Water Pollution station, re-energize station at 69kV. Station was previously built to take either 34.5 or 69 kV service. **Estimated Cost: $0M (s2432.13)**

At Omnisource station, replace Transformer 1 with a 69/4kV unit and re-energize station at 69kV. **Estimated Cost: $1.2M (s2432.14)**

At Melita station, install a 3000A 40kA 69kV CB for the Anthony line entrance. **Estimated Cost: $0.9M (s2432.15)**

At Anthony station, replace both 34.5/12kV transformers with 69/12kV 25MVA units. Replace 2 CB's with 3000A 40kA 69kV CB's for the Water Pollution line exit and bus tie positions. Re-use the existing Water Pollution breaker for the new Melita line entrance. Install a 21.6Mvar Cap bank. Retire the 138/34.5kV transformer, the 34.5kV CB's Q and A, and the existing buswork. **Estimated Cost: $8.7M (s2432.16)**

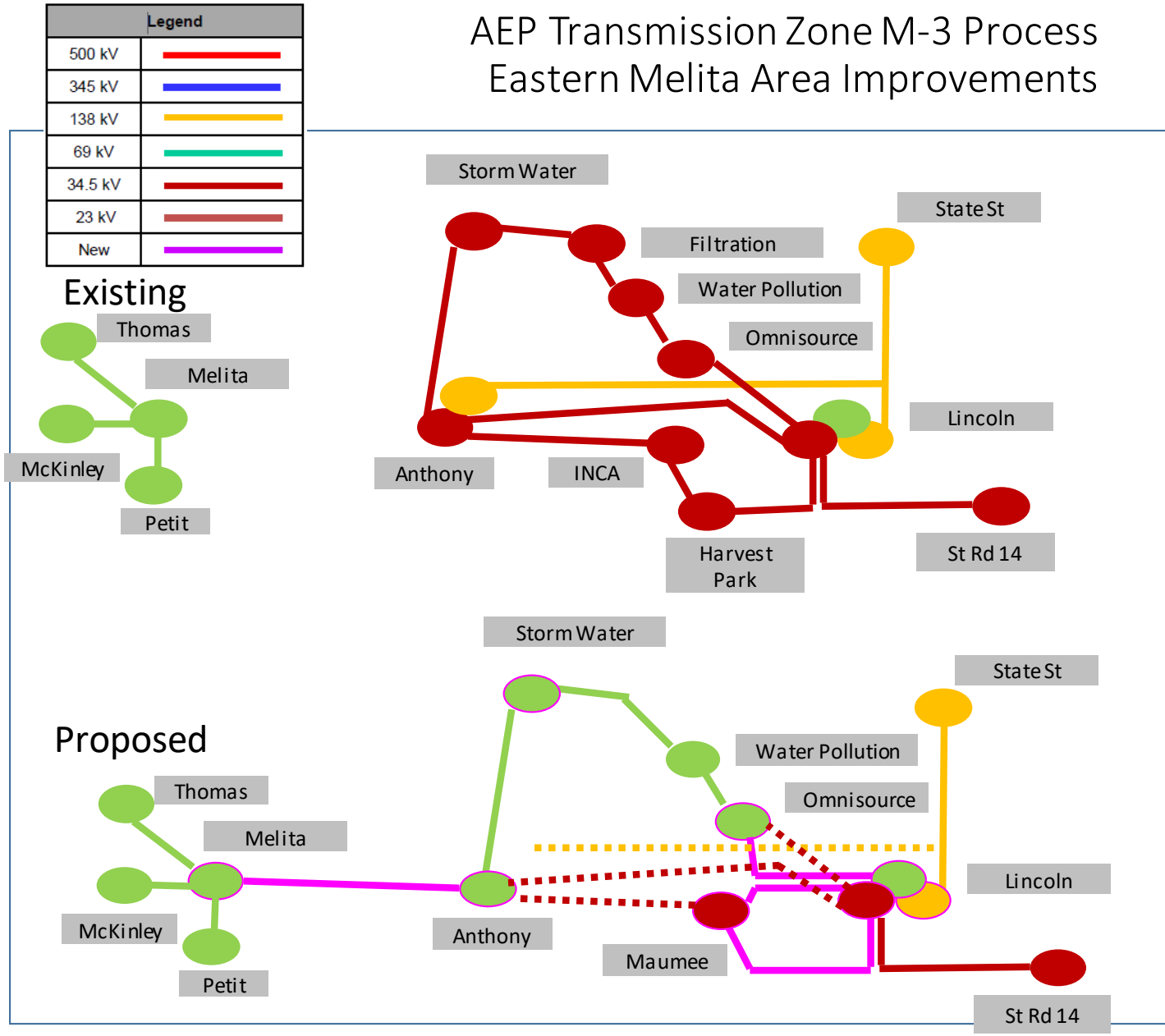
Total Estimated Transmission Cost: $34.5M

Projected In-Service: 04/03/2023

Supplemental Project ID: s2432.1-.16

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Cumberland

Need Number: AEP-2019-AP020

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 05/20/2019

Solutions Meeting 12/18/2020

Project Driver:

Equipment Material/ Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

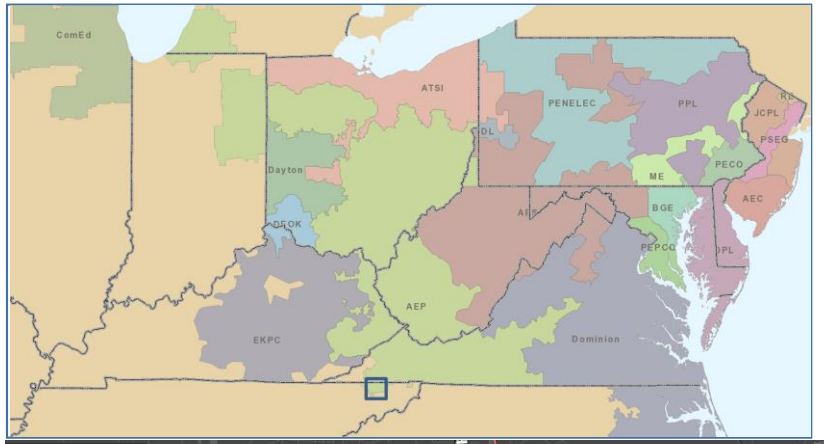
Problem Statement:

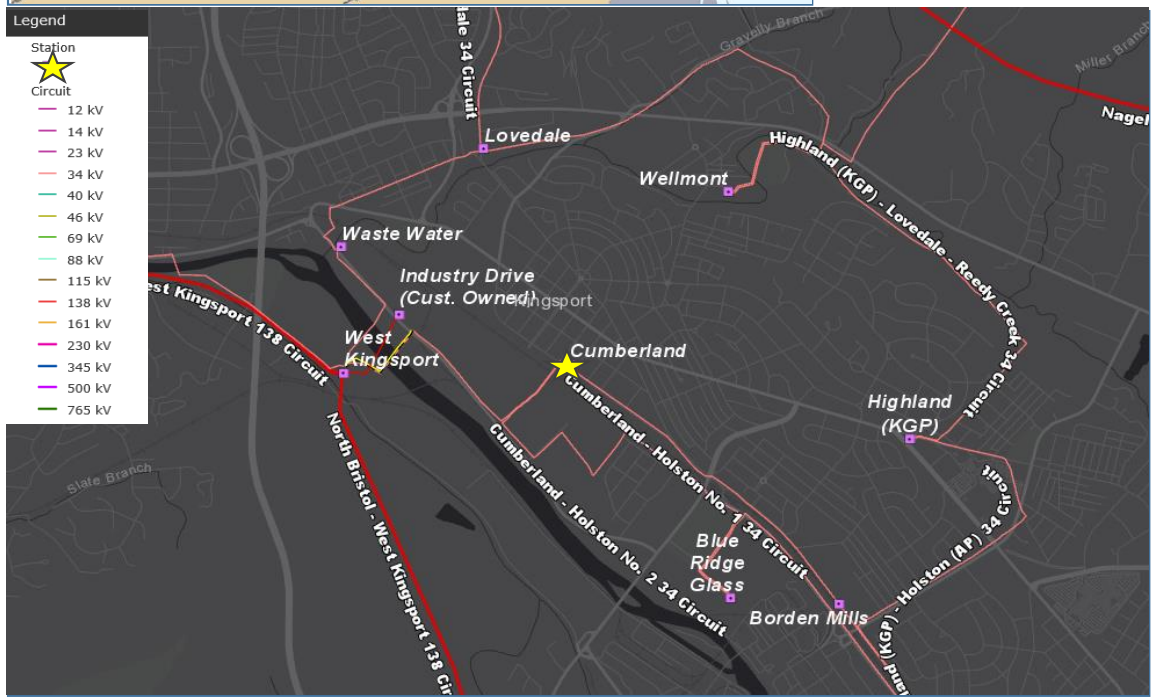
Cumberland Station

34.5 kV Circuit breakers A, B, and N

- FK type oil breakers. (1956, 1956, and 1954 vintage)
- These are oil breakers that are difficult to maintain due to the required oil handling. There is an increased potential for oil spills during routine maintenance and failures with these types of breakers.
- Other drivers include damage to bushings and an excessive number of fault operations exceeding the manufacturer's recommendations.
- Have experienced 40, 34, and 15 fault operations respectively. The manufacturer's recommendation for this type of breaker is 10.

- S&C Circuit Switcher 'AA'
  - No gas monitor, sister units on the AEP system have a history of gas loss, interrupter failures, and operating mechanism failures.





Need Number: AEP-2019-AP020

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

Cumberland Station Work: Replace existing 34.5 kV CBs A, B, and N with three new 69 kV 3000 A 40kA breakers operated at 34.5kV. Replace existing cap switcher AA with a new 34.5 kV cap switcher. A ring bus configuration was considered but due to space constraints in the station footprint, this configuration was not possible. Therefore, the breakers will be replaced in their existing locations.

Estimated Cost: $2.4 M (s2443)

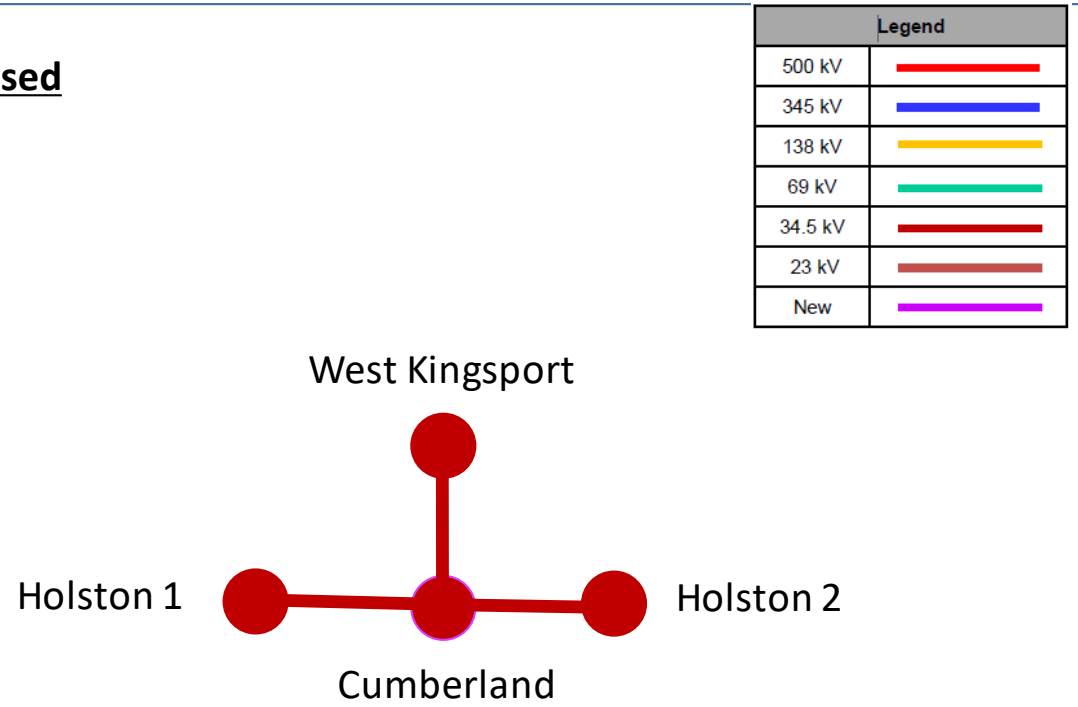
Projected In-Service: 07/20/2023

Supplemental Project ID: s2443

Project Status: Engineering

Model: N/A

Proposed



AEP Transmission Zone M-3 Process
Kincaid Area Project

Need Number: AEP-2019-AP042

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 11/22/2019

Solutions Meeting 10/16/2020

Project Driver:

Equipment Condition/Performance/Risk

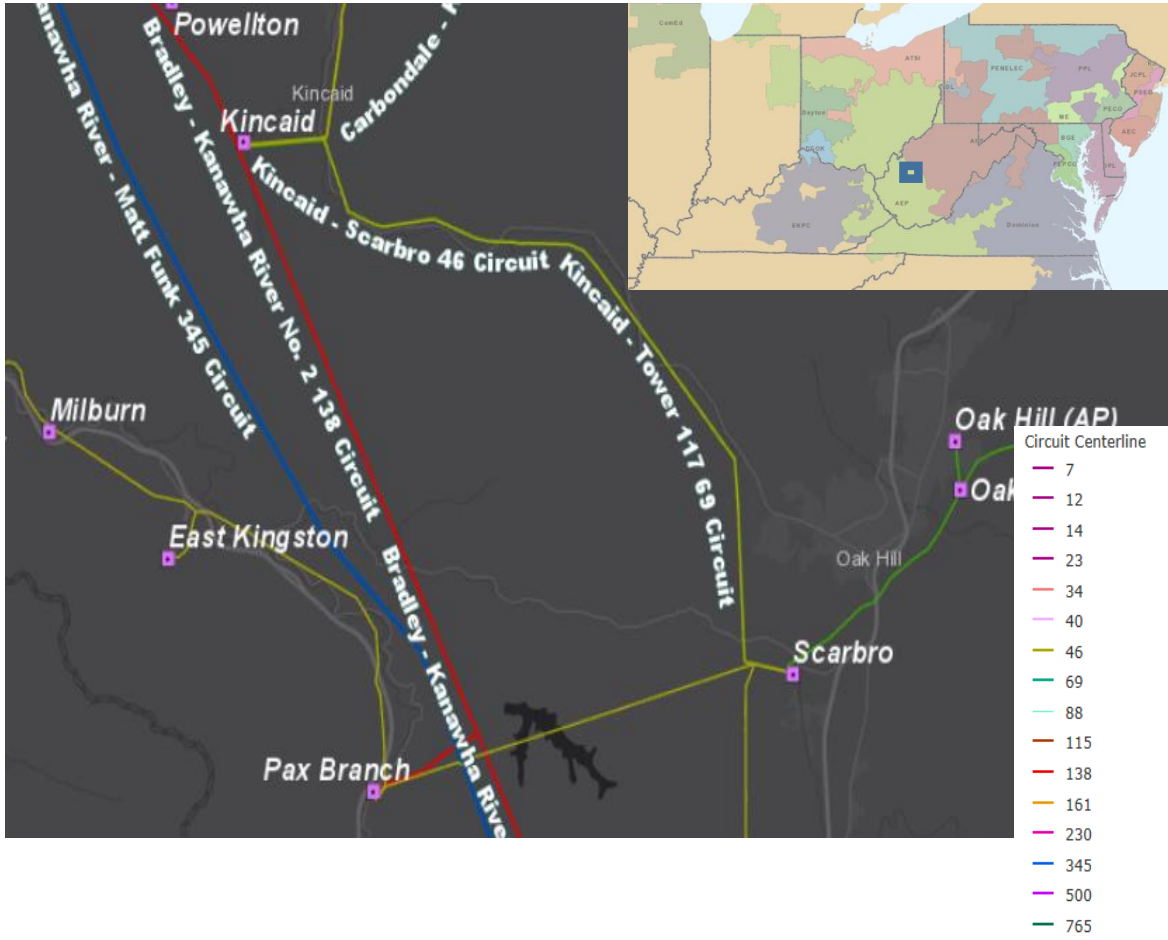
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Kincaid – Tower 117 69 kV (22.42 mile), includes Kincaid – Scarbro 46 kV line (10.1 miles)

- The double circuit segment from Kincaid to Scarbro is comprised of a combination of lattice steel and wood poles.
  - Lattice structures utilize direct embed grillage foundation
  - Line originally installed in 1913, primarily with 3/0 Copper conductor
  - The structures failed to meet 2017 NESC 250B and 250D loading criteria
  - The lattice towers show flaking of the galvanized coating with significant section loss and corrosion above and below grade on the tower legs.
  - 4-bell insulators have noticeable wear and tear including rusting
  - The original conductor has visible signs of wear, such as burns and rust.
- Since 2014 there have been 86 momentary and 27 permanent outages on the Kincaid – Tower 117 69 kV and Kincaid – Scarbro 46 kV circuits.
  - Majority of the momentary outages were due to weather including wind/lightning
    - This is indicative of insufficient shielding, and/or insufficient grounding
  - Permanent outages were caused by a vegetation fall-ins due to insufficient ROW and line equipment failures
    - These permanent outages attributed to 1.1M customer minutes of interruption
- There are currently 33 structures with at least one open structural condition, which relates to 29% of the structures on the double circuit segment (10.1 miles).
- There are currently 68 open structural conditions mainly related to heavy rust on lattice steel lacing and rot on poles/crossarms.



Need Number: AEP-2020-AP002

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 1/17/2020

Solutions Meeting 10/16/2020

Project Driver:

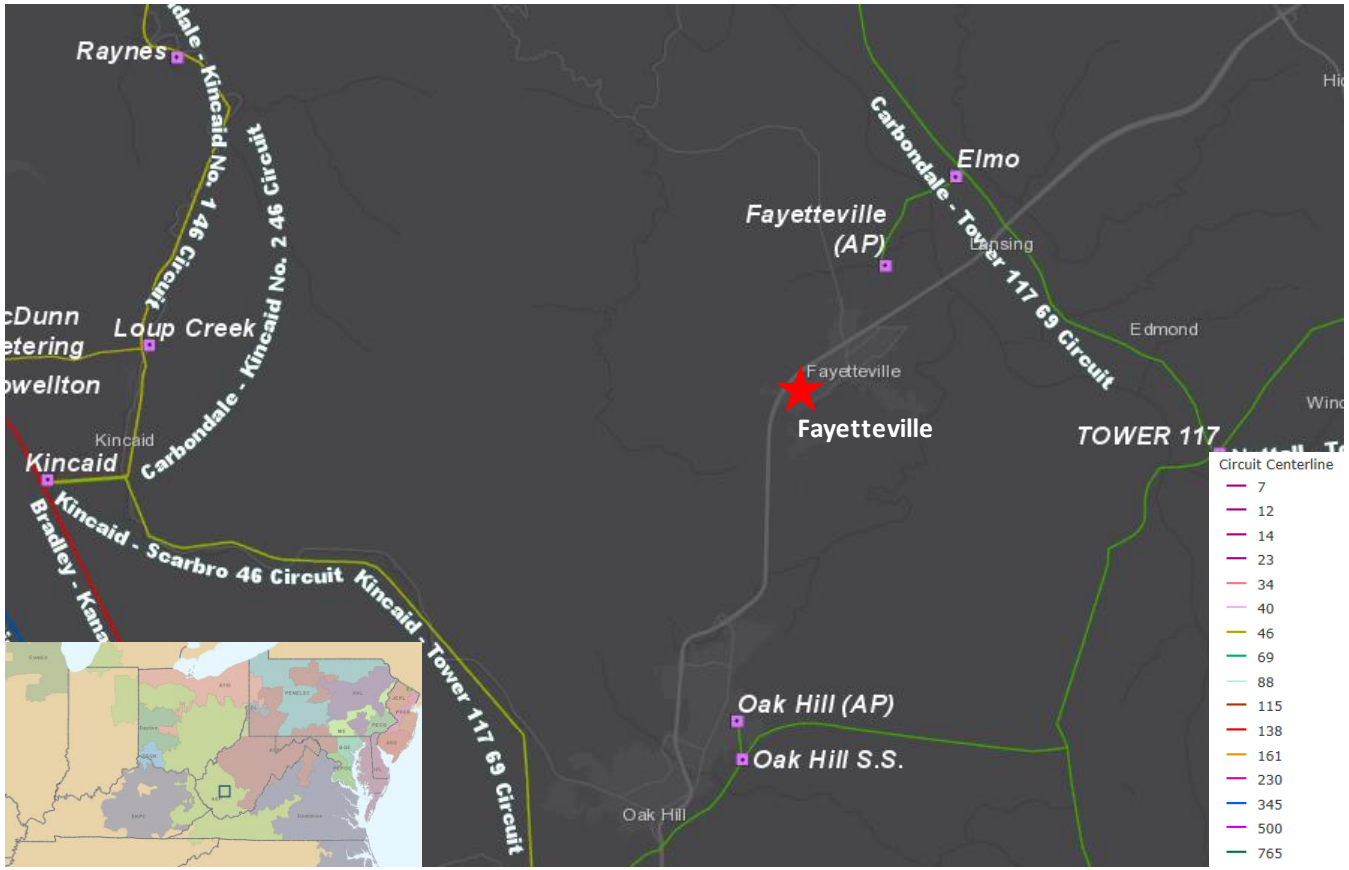
Customer Service

Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

APCO Distribution has requested a new distribution station located in Fayetteville, West Virginia. Summer projected load 11 MVA Winter projected load 13 MVA.



AEP Transmission Zone M-3 Process
Kincaid Area Project

Need Number: AEP-2020-AP039

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 9/11/2020

Solutions Meeting 10/16/2020

Project Driver:

Customer Service

Specific Assumption Reference:

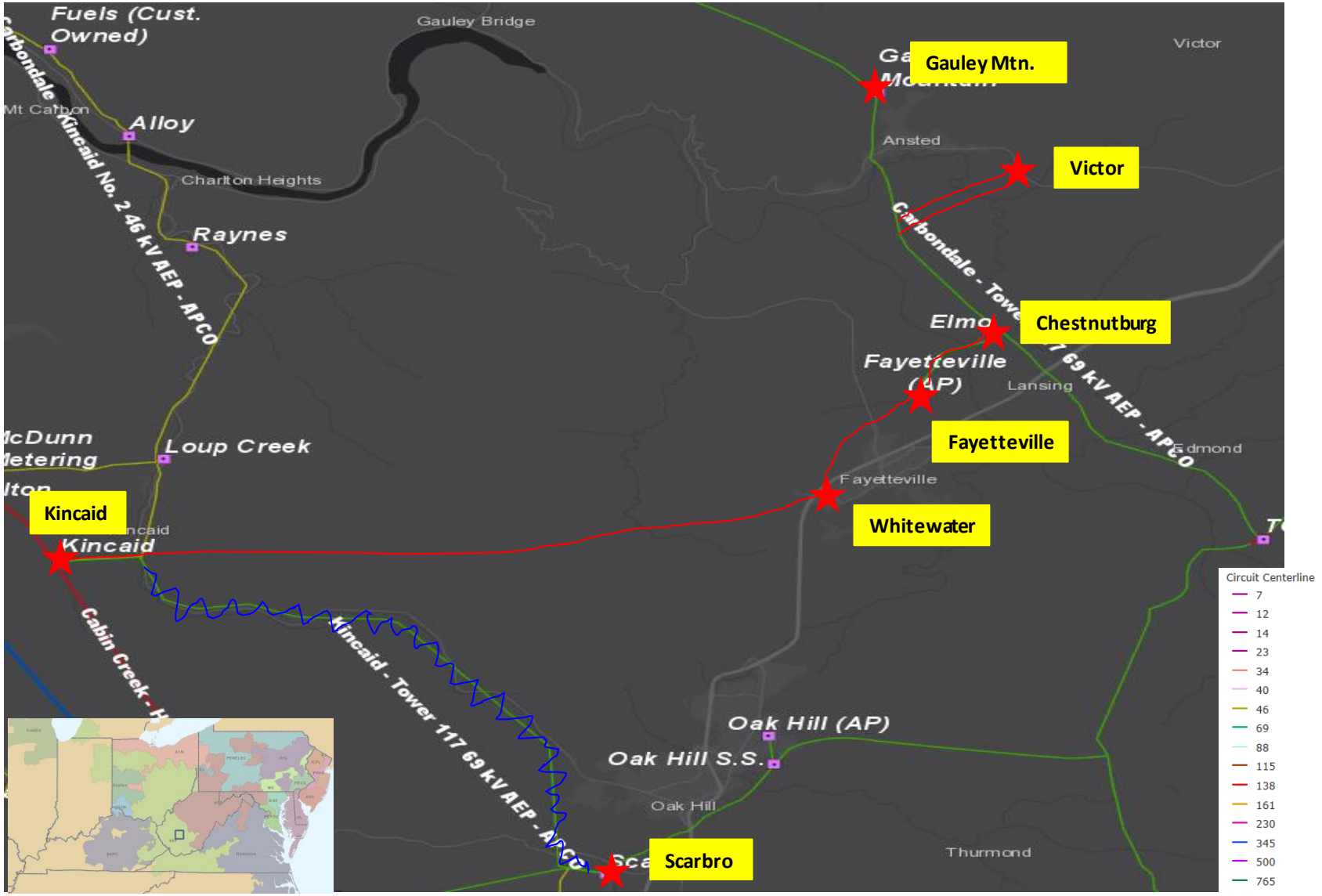
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

APCO Distribution has requested a new distribution station located in Fayette County, West Virginia.

Summer projected load: 9 MVA

Winter projected load: 14 MVA.


Fuels (Cust. Owned)
Gauley Bridge
Victor
Gauley Mtn.
Mt Carbon
Alloy
Ansted
Victor
Charlton Heights
Carbondale - Kincaid No. 2 46 kV AEP - APCO
Raynes
Carbondale - Tower
Elmo
Chestnutburg
Fayetteville (AP)
Lansing
69 kV AEP - APCO
Fayetteville
McDunn Metering
Loup Creek
Edmond
Fayetteville
Kincaid
Whitewater
Kincaid
Kincaid
Cabin Creek -
Kincaid - Tower 117 69 kV AEP - APCO
Oak Hill (AP)
Oak Hill S.S.
Oak Hill
Scarbro
Thurmond
Circuit Centerline
7
12
14
23
34
40
46
69
88
115
138
161
230
345
500
765

Need Number: AEP-2019-AP042, AEP-2020-AP002, AEP-2020-AP039

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

Construct ~9.6 miles of new 69kV line from Kincaid station to the new Whitewater distribution station. **Estimated Cost: $27.0M (s2430.1)**

Construct ~3.9 miles of new 69kV line from Whitewater station to Fayetteville 69 kV station. Rebuild the line section between Fayetteville and Elmo SS 69kV (~1.7 miles). **Estimated Cost: $16.5M (s2430.2)**

Construct ~1.5 miles of new 69 kV double circuit line from the Carbondale – Tower 117 69 kV circuit to serve the new Victor Station in/out. **Estimated Cost: $5.8M (s2430.3)**

Retire the Kincaid – Scarbro 46kV/Kincaid – Oak Hill 69kV double circuit line to a point just outside Scarbro station. Reconfigure and terminate the line towards Oak Hill into Scarbro station. **Estimated Cost: $8.8M (s2430.4)**

Reconfigure a line section between Tower 117 – Carbondale to connect in the new Chestnutburg Station. **Estimated Cost: $0.6M (S2430.5)**

Whitewater Station: Establish 69 kV bus and install two new 69kV 3000A 40 kA circuit breakers to serve requested Distribution delivery point. **Estimated Cost: $3.3M (s2430.6)**

Victor Station: Retire/remove Gauley Mountain 69 kV Station. Establish a 69 kV bus and install two new 69 kV 3000 A 40 kA circuit breakers at the new site to be called Victor Station to serve requested Distribution delivery point. **Estimated Cost: $2.3M (s2430.7)**

Fayetteville Station: Install a new 69kV 3-way PoP switch outside of the station. **Estimated Cost: $0.4M (s2430.8)**

Chestnutburg SS: Construct a new three breaker ring utilizing three new 69kV 3000A 40kA circuit breakers to eliminate a three terminal line connection. **Estimated Cost: $3.2M (s2430.9)**

Scarbro Station: Establish a 69kV bus and install a new 69/46kV 50 MVA transformer and a new 69kV 3000A 40kA circuit breaker to tie in Tower 117 69 kV line exit. **Estimated Cost: $3.5M (S2430.10)**

Tower 117 Station: Remote end work **Estimated Cost: $0.3M (s2430.11)**

Carbondale Station: Remote end work **Estimated Cost: $0.3M (s2430.12)**

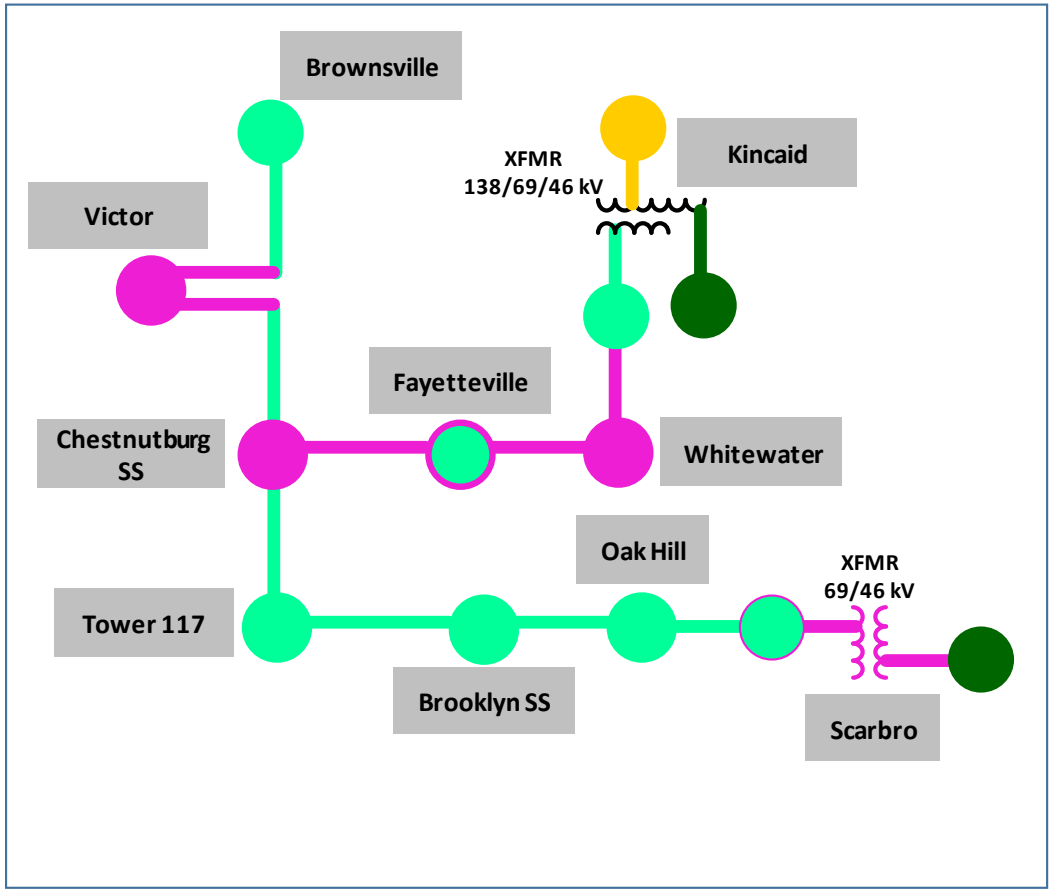
Estimated Cost: $72.0 M

Projected In-Service: 9/1/2023

Supplemental Project ID: S2430.1-.12

Project Status: Scoping

Model: 2024 RTEP



Legend	
345 kV	
138 kV	
69 kV	
46 kV	
New	

Need Number: AEP-2019-OH049

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Need Meeting 09/25/2019

Solutions Meeting 12/18/2020

Project Driver:

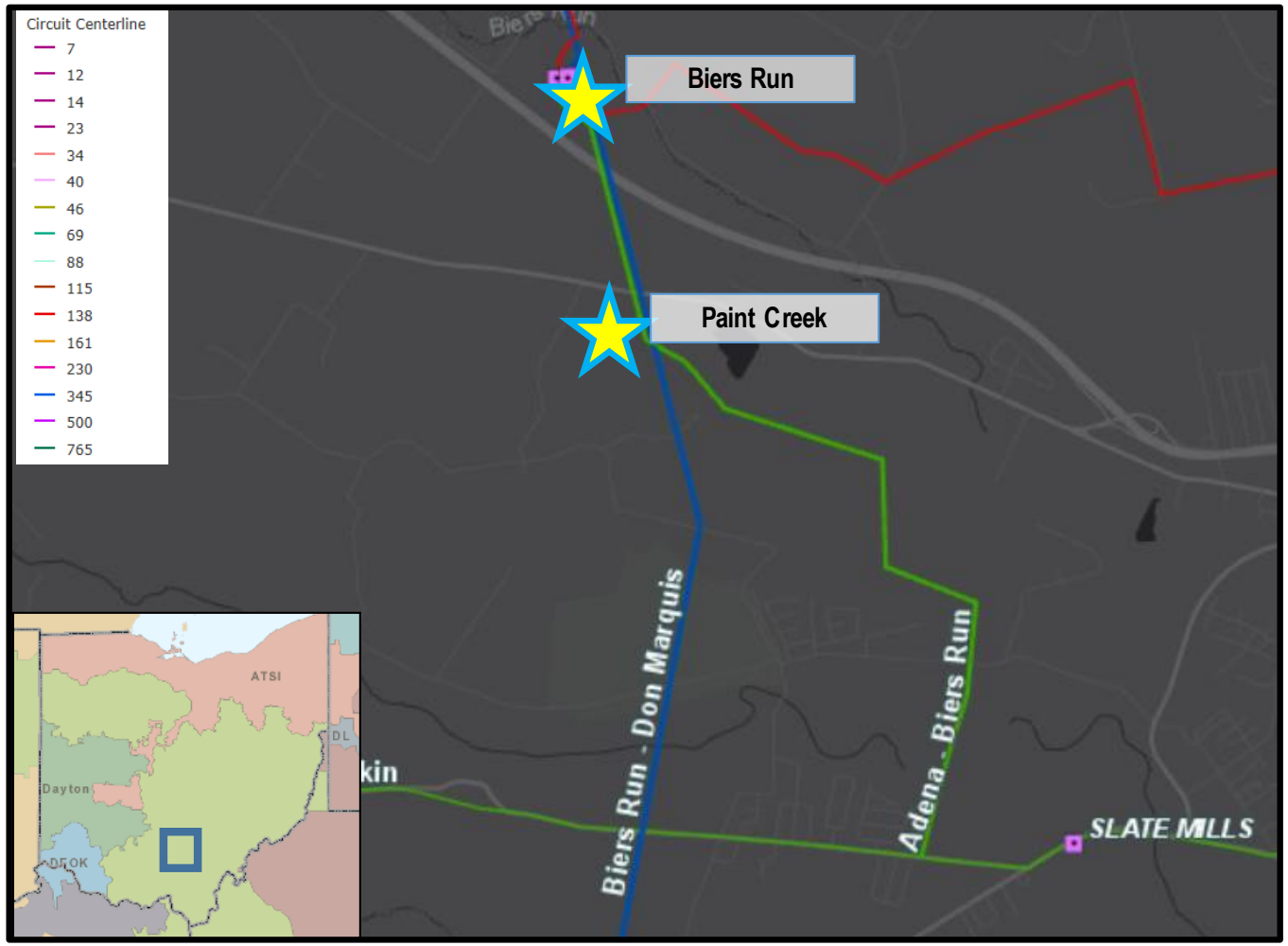
Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 7)

Problem Statement:

- South Central Power is requesting a new 69 kV delivery point at Paint Creek to alleviate several highly loaded distribution circuits out of SCP's Anderson & Budd Co. stations.
- Peak load:12MW (Winter)
- Requested ISD September 1, 2020



AEP Transmission Zone M-3 Process
Towhee Switch

Need Number: AEP-2019-OH049

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

Install a new 3-way 1200 A 69kV switch (Towhee Switch) with Auto-Sectionalizing, MOABs, and SCADA to serve the new Paint Creek Delivery Point. Install low side metering at Paint Creek customer station. **Estimated Cost: $0.5M (s2433.1)**

Tie Towhee Switch into the Biers Run – Buckskin 69kV circuit. **Estimated Cost: $0.1M (s2433.2)**

Install approximately 0.1 mile radial line extension connecting Towhee Switch to the structure outside SCP's Paint Creek Substation. **Estimated Cost: $0.1M (s2433.3)**

Estimated Cost: $0.7M

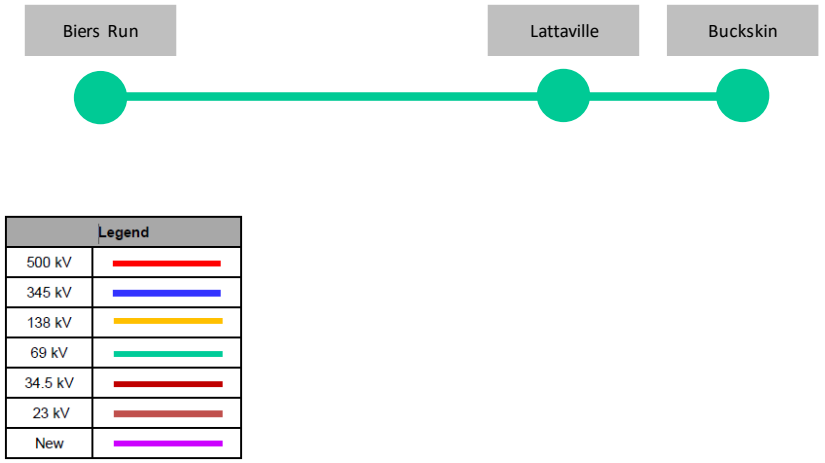
Projected In-Service: 06/30/2022

Supplemental Project ID: s2433.1-.3

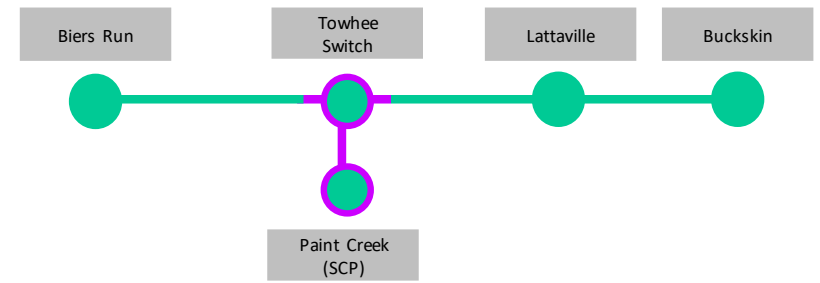
Project Status: Engineering

Model: 2024 RTEP

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Niles West

Need Number: AEP-2020-IM003

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 02/21/2020

Solutions Meeting 12/18/2020

Project Driver:

Equipment Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

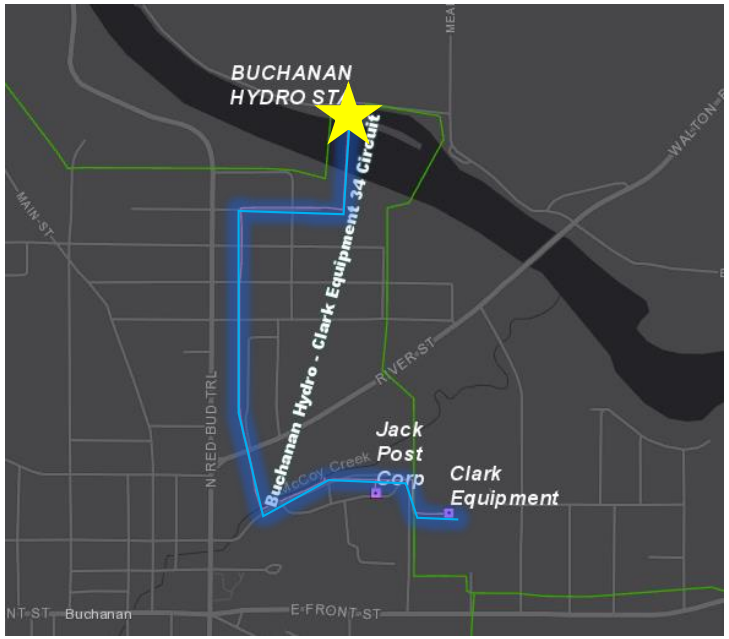
Problem Statement:

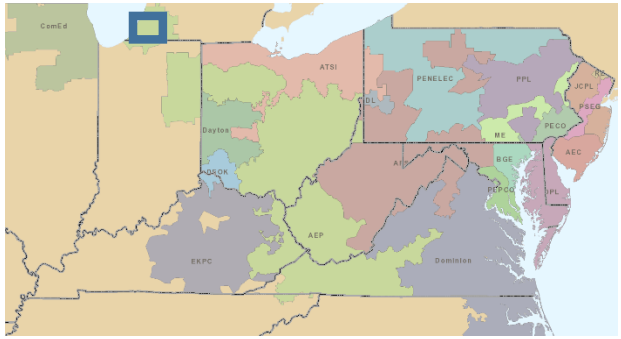
Buchanan Hydro Station:

- Buchanan Hydro station has flooded twice in the last 5 years causing the 12kV load to be dropped from the station.
- (2) FK-type Oil filled breakers, AEP has common failure modes for these types of breakers with compressor failures, valve defects, reclose failures and charging motor failures.
    - Both breakers installed in 2003
    - Breaker A has exceeded the designed number of fault operations
- (2) CF-Type oil filled breakers. This model family has experienced major malfunctions associated with their hydraulic mechanisms which have led to several failures to close and other types of mis-operations.
    - Both breakers have exceed the designed number of fault operations
- Transformer #1 was installed in 1964. The transformer has elevated levels of carbon dioxide and ethylene, there is indication of overheating faults occurring in the main tank which have further degraded the insulating paper materials. There is also indication of capacitive layer deterioration.
- Transformer #2 was installed in 1965. The age of the unit's insulation materials can lead to susceptibility of short circuit faults which may cause failure in the main tank. The transformer has elevated levels of carbon dioxide and ethylene, there is indication of overheating faults occurring in the main tank which have further degraded the insulating paper materials

Buchanan Hydro –Clark Equipment Tap 34.5kV:

- 1.36 miles of 1954 and 1984 wood pole cross arm line
- 10 unique structures (26%) with at least one open condition
- Open conditions include pole or crossarm with rot conditions





AEP Transmission Zone M-3 Process
Niles West

Need Number: AEP-2020-IM009

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 02/21/2020

Solutions Meeting 12/18/2020

Project Driver:

Equipment Condition/Performance/Risk

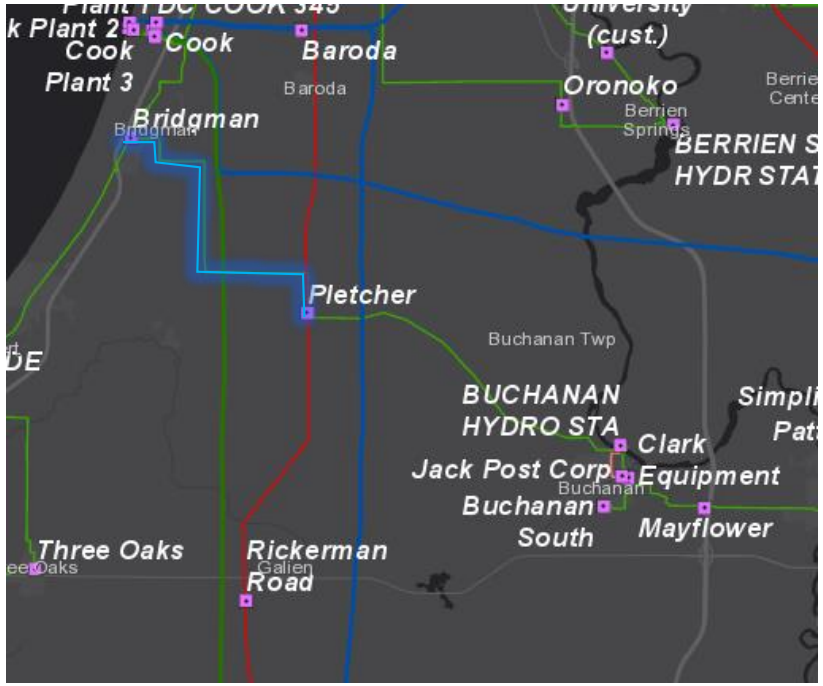
Specific Assumption Reference:

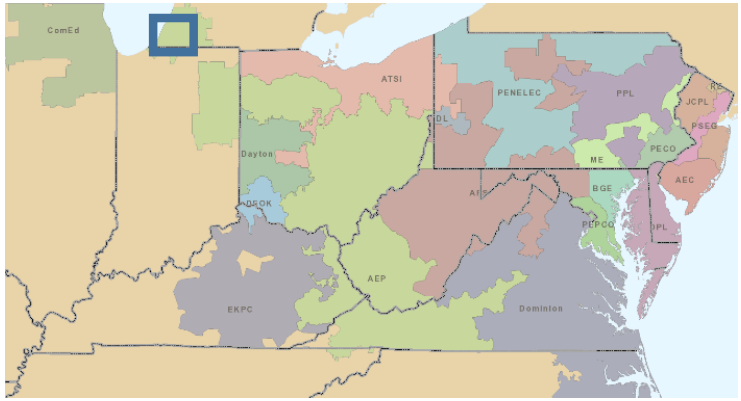
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Bridgman-Pletcher 69kV line:

- 7.7 miles of 1964 wood pole line
- 57 unique structures (46%) with at least one open conditions relating to structure and conductor issues
- Open conditions include rotted poles, burnt or broken insulators, split or damaged poles or broken conductor strands, woodpecker damage and guy/ground wire damage





Need Number: AEP-2020-IM002, AEP-2020-IM013

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

Rebuild the 7.7 mile long Bridgman-Pletcher line with 556 ACSR conductor. **Estimated Cost: $18.8M (s2440.1)**

Install new 69/34.5kV Bucktown station to replace Buchanan Hydro station. Install new 69/34.5kV transformer with (2) 34.5kV line breakers and a (4) 69kV breaker ring bus. **Estimated Cost: $10.4M (s2440.2)**

Retire 1 mile of 4/0 copper conductor from Buchanan Hydro to Clark Equipment and Jack's Post customer. Construct 0.1 miles of 34.5 kV line from Jack's Post to new Bucktown station. **Estimated Cost: $1.5M (s2440.3)**

At Buchanan Hydro station, retire the Transmission and Distribution equipment. Install one new 34.5kV breaker for line protection to Bucktown to continue service to the hydro plant. **Estimated Cost: $1.3M (s2440.4)**

Total Estimated Transmission Cost: $32 M

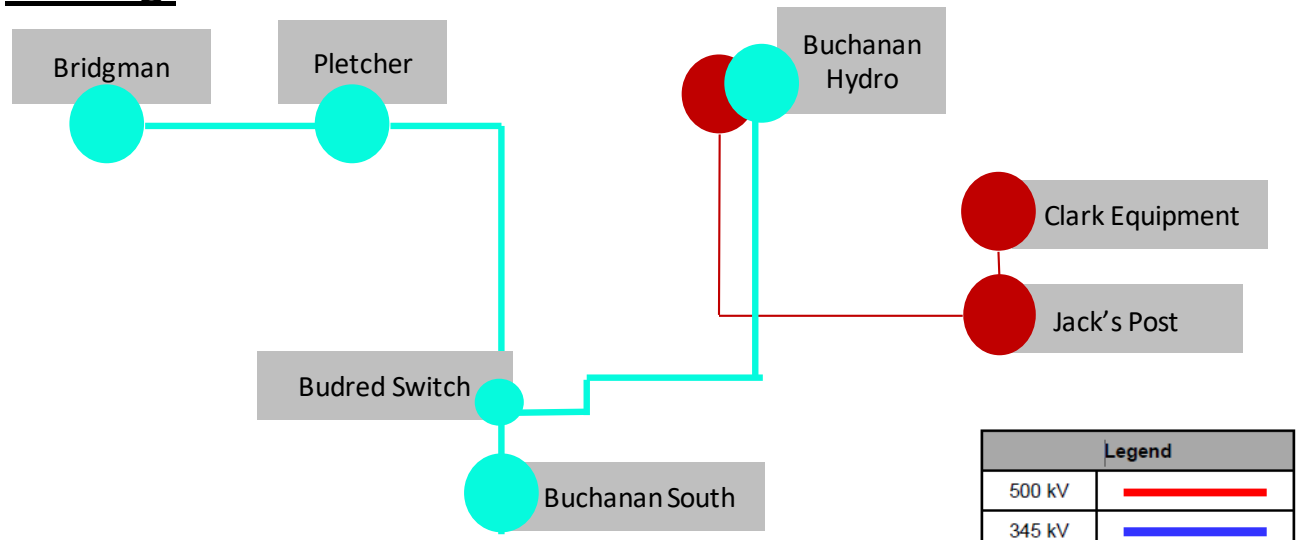
Projected In-Service: 02/14/2024

Supplemental Project ID: s2440.1-.4

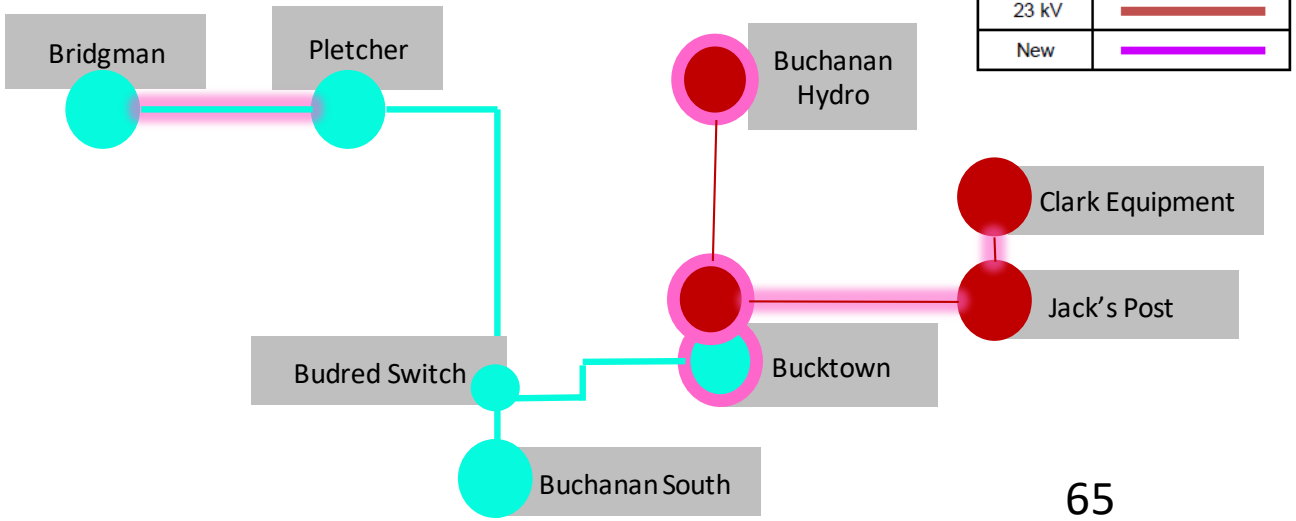
Project Status: Scoping

Model: N/A

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Beaver Creek – Elwood 46kV

Need Number: AEP-2020-AP009

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 02/21/2020
Solutions Meeting 11/20/2020

Project Driver:
Equipment Condition/Performance/Risk, Operational Flexibility

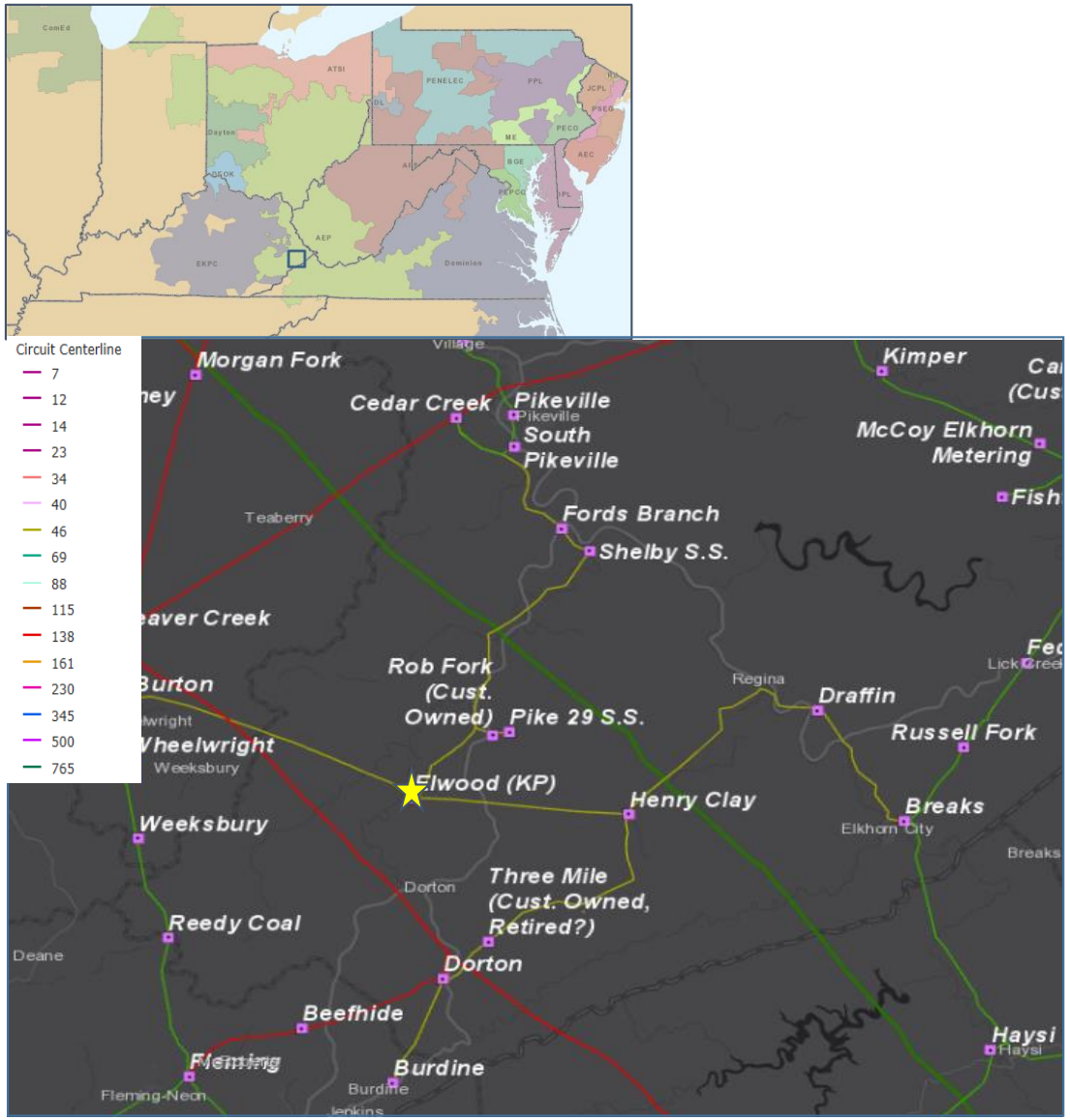
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Elwood 46kV Station:

46 kV Circuit Breakers A,B, and C

- 1960's vintage FZO-69-1500P type oil circuit breakers.
- Fault Ops: CB A (33), CB B (83), and CB C (105). Recommended : 10
- Other drivers: damage to bushings, spare part availability, historical reliability, and lack of vendor support of the breakers.
- There are 8 remaining FZO-69-1500P circuit breakers on the AEP system, including the 3 at this station.
- 86% of the relays (36/42) at the station are electromechanical, which have significant limitations with regards to fault data collection and retention and have no spare part availability due to a lack vendor support.



AEP Transmission Zone M-3 Process
Beaver Creek – Elwood 46kV

Need Number: AEP–2020-AP011

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 02/21/2020
Solutions Meeting 11/20/2020

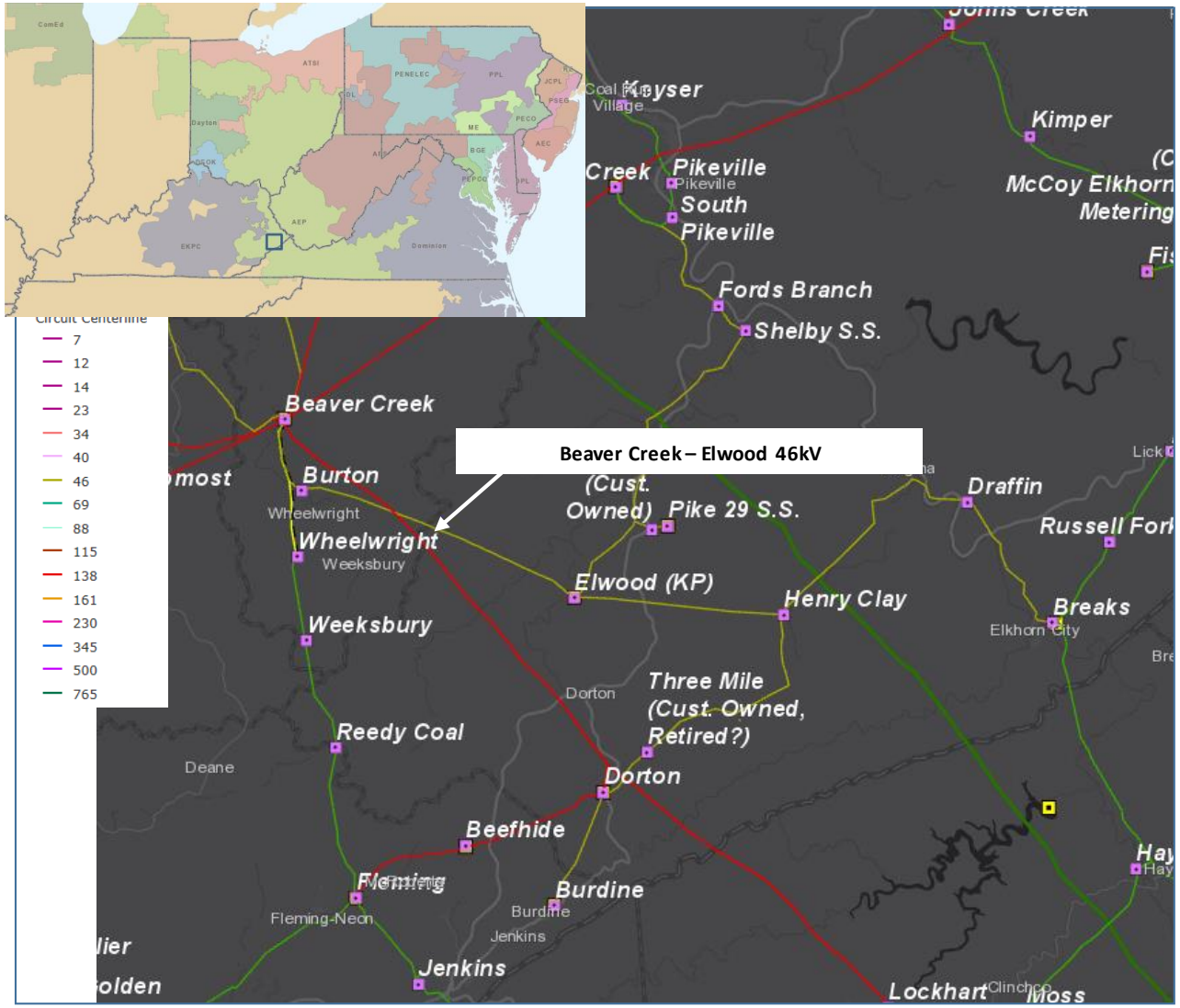
Project Driver:
Equipment Material/ Condition/Performance/Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Beaver Creek – Elwood 46kV:

- Original Install Date: 1930s vintage
- Length of Line: ~10.48 mi
- Total structure count: 60
- Original Line Construction Type: Wood
- Conductor Type: 336 ACSR
- Momentary/Permanent Outages and Duration: 18 Momentary and 1 permanent Outage
- CMI (last 5 years only): 269,070 minutes
- Number of open conditions: 34 open conditions on 20 unique structures.
- Open conditions include crossarms and poles with rot top, woodpecker damage and leaning-in-line conditions.



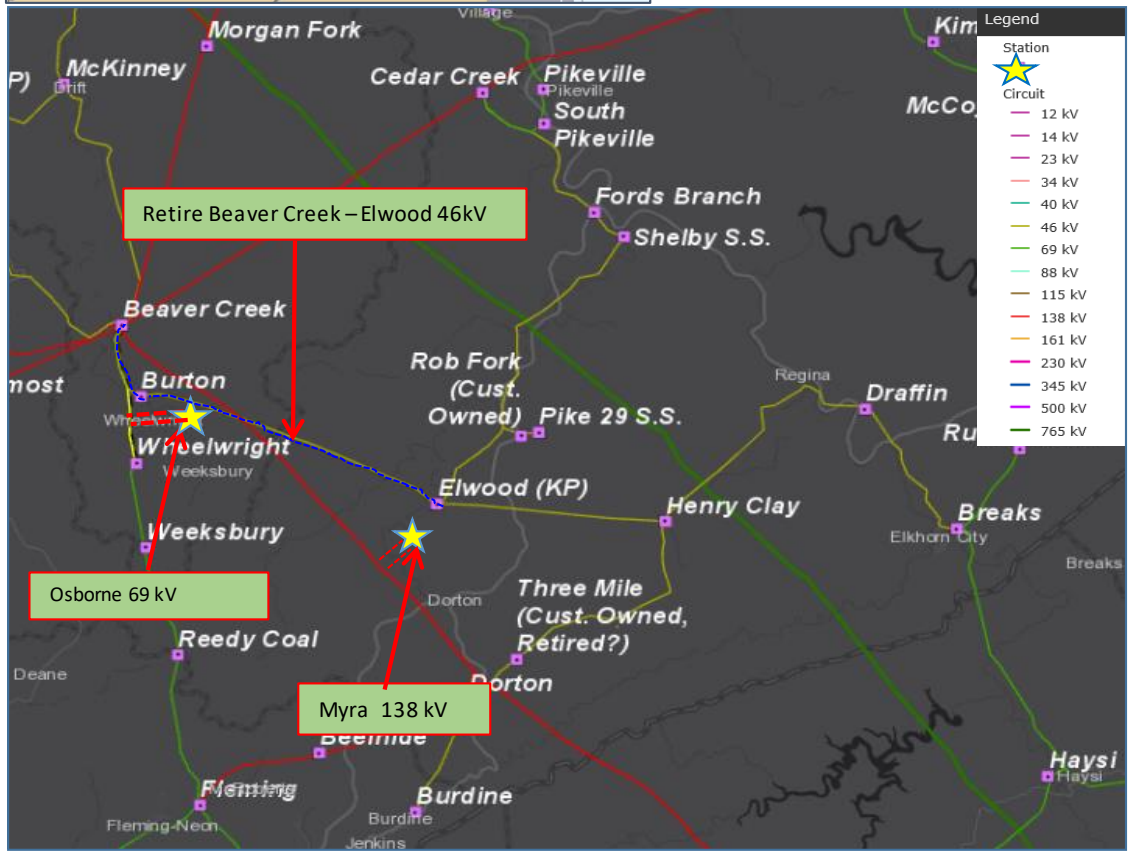
AEP Transmission Zone M-3 Process
Beaver Creek – Elwood 46kV

Need Number: AEP-2020-AP009, AEP–2020-AP011

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- Construct a greenfield 69/12 KV Osborne Station to replace Burton Station, including a high-side 69KV Phase Over Phase switch, fiber connectivity, a circuit switcher, and one 69/12kV 12/16/20MVA transformer and associated distribution feeders. **Estimated Transmission Cost: $0.74M (s2436.1)**
    - Note: Cost does not include the Distribution scope of work.
- Construct a greenfield 138KV Myra Station to replace Elwood Station. Install 138KV double box bay with two 138kV circuit breakers and line exits to Fremont & Beaver Creek. Install 138/34.5 kV transformer with high-side circuit switcher and associated 34.5kV breakers. Install fiber connectivity for upgraded relaying. **Estimated Transmission Cost: $3.43 M (s2436.2)**
    - Note: Cost does not include the Distribution scope of work.
- Remote end relaying work at Beaver Creek substation. Remove 46KV Elwood Line 46kV circuit breaker "G" and associated equipment. **Estimated Transmission Cost: $0.17 M (s2436.3)**
- Remote end relaying work at Fremont substation. **Estimated Transmission Cost: $0.42 M (s2436.4)**
- At Burton station, retire and remove all existing equipment. **Estimated Transmission Cost: $0M (s2436.5)**
- At Elwood station, retire and remove all existing equipment. **Estimated Transmission Cost: $0 M (s2436.6)**
- Construct a new ~0.5 mi double circuit 69 kV line to the proposed Osborne substation. **Estimated Cost: $2.56 M (s2436.7)**
- Reconfigure the existing Beaver Creek - Fleming 69kV line to facilitate the construction of the new double circuit Osborne 69kV line to feed the proposed Osborne Substation. **Estimated Cost: $1.22 M (s2436.8)**



Proposed Solution (Cont.):

- Construct a new ~2 mi double circuit 138 kV line to the proposed Myra substation. **Estimated Cost: $8.8 M (s2436.9)**
- Reconfigure the existing Beaver Creek - Fremont 138kV circuit to facilitate the construction of the new double circuit Myra Extension 138kV Line to feed the proposed Myra Substation. **Estimated Cost: $1 M (s2436.10)**
- Install two replacement structures in order to bypass Elwood station. Transfer wires from old structure to new structure. Tie new structure to Cedar Creek-Henry Clay 46kV Line. **Estimated Cost: $1.35 M (s2436.11)**
- Retire ~10.48 mi Beaver Creek – Elwood 46kV line. **Estimated Cost: $6.47 M (s2436.12)**

Total Estimated Transmission Cost: $26.16 M

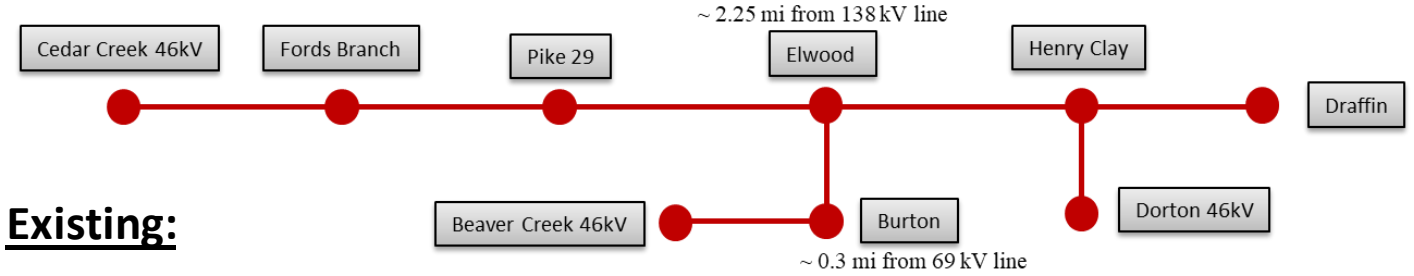
Projected In-Service: 11/31/2024

Supplemental Project ID: s2436.1-.12

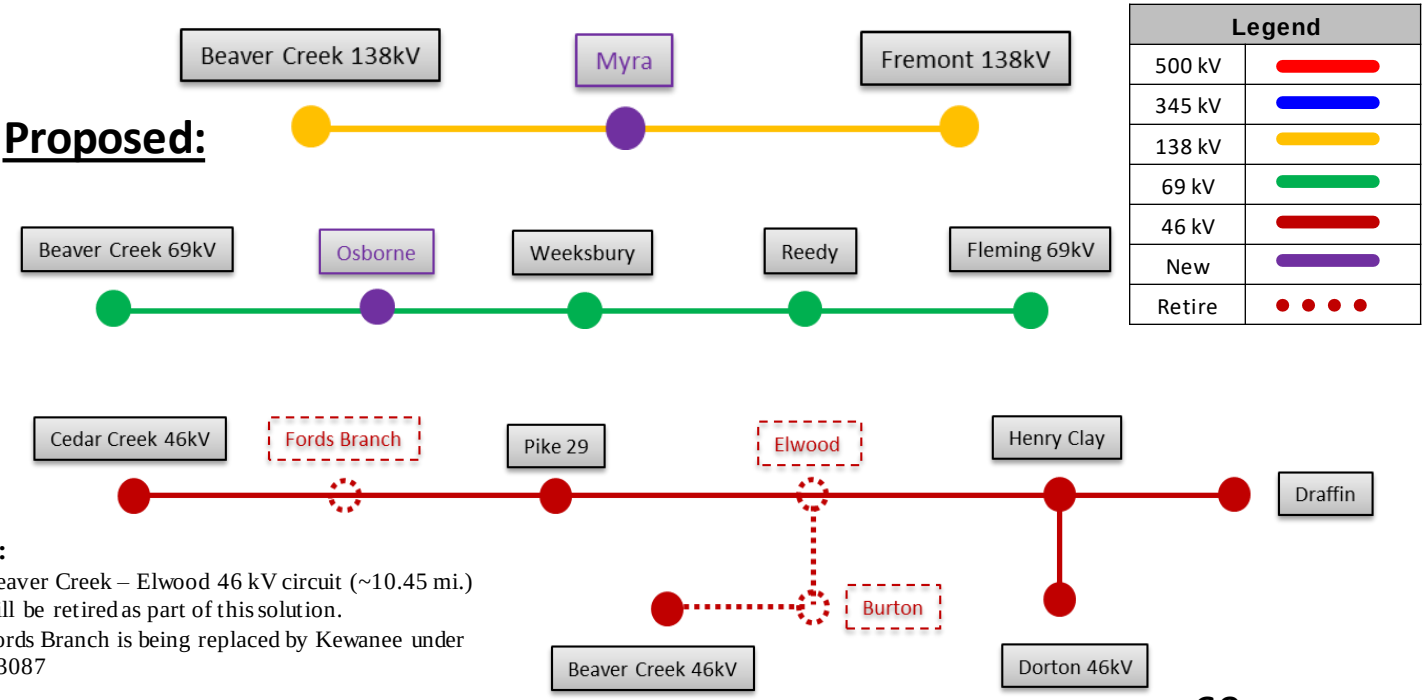
Project Status: Scoping

Model: N/A

Existing:



Proposed:



Note:

- Beaver Creek – Elwood 46 kV circuit (~10.45 mi.) will be retired as part of this solution.
- Fords Branch is being replaced by Kewanee under B3087

AEP Transmission Zone M-3 Process
Hemlock – Bryson 69kV

Need Number: AEP-2020-OH017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Need Meeting 03/19/2020

Solutions Meeting 12/18/2020

Project Driver:

Customer Service

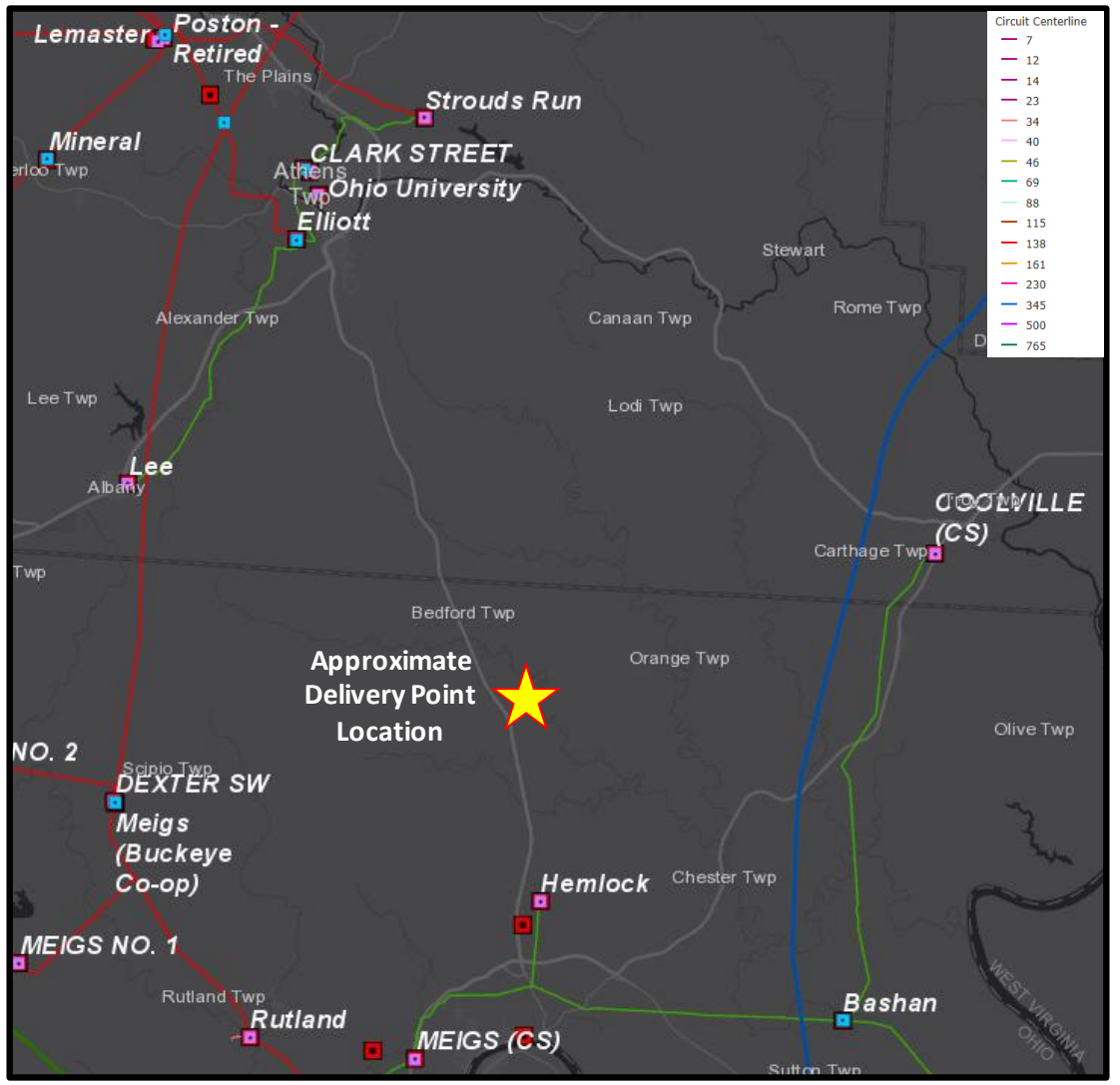
Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

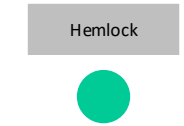
Customer Service:

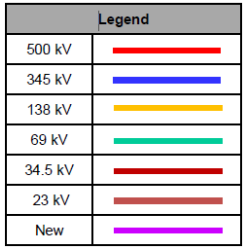
- Buckeye Rural Electric Cooperative, Inc. has requested 69kV service to a new delivery point near AEP's Hemlock station by December 2022. Anticipated load is approximately 2.6 MW of transferred load.



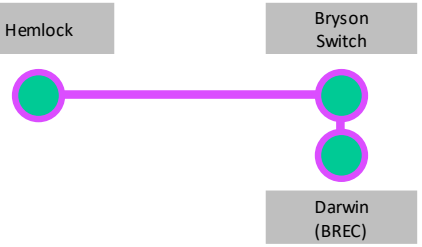
Need Number: AEP-2020-OH017
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021
Selected Solution:
Install a greenfield 3-way 69 kV 1200 A phase over phase switch (Bryson Switch) with Auto-Sectionalizing, MOABs, and SCADA to serve the new requested delivery point. Install metering at the proposed customer station. **Estimated Cost: $0.7M (s2434.1)**
Build a ~4.3 miles of greenfield single circuit 69kV transmission line between Hemlock – Bryson Switch with 556 ACSR conductor. **Estimated Cost: $9.4M (s2434.2)**
At Hemlock station, install a new 69kV 3000 A 40kA circuit breaker towards Bryson Switch. **Estimated Cost: $1.1M (s2434.3)**
Estimated Cost: $11.2 M
Projected In-Service: 12/15/2022
Supplemental Project ID: s2434.1-.3
Project Status: Engineering
Model: 2024 RTEP

Existing:





Proposed:



AEP Transmission Zone M-3 Process
Gomer

Need Number: AEP-2020-OH021

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Need Meeting 4/16/2020
Solutions Meeting 12/18/2020

Project Driver:
Equipment Material/Condition/Performance/Risk, Customer Service

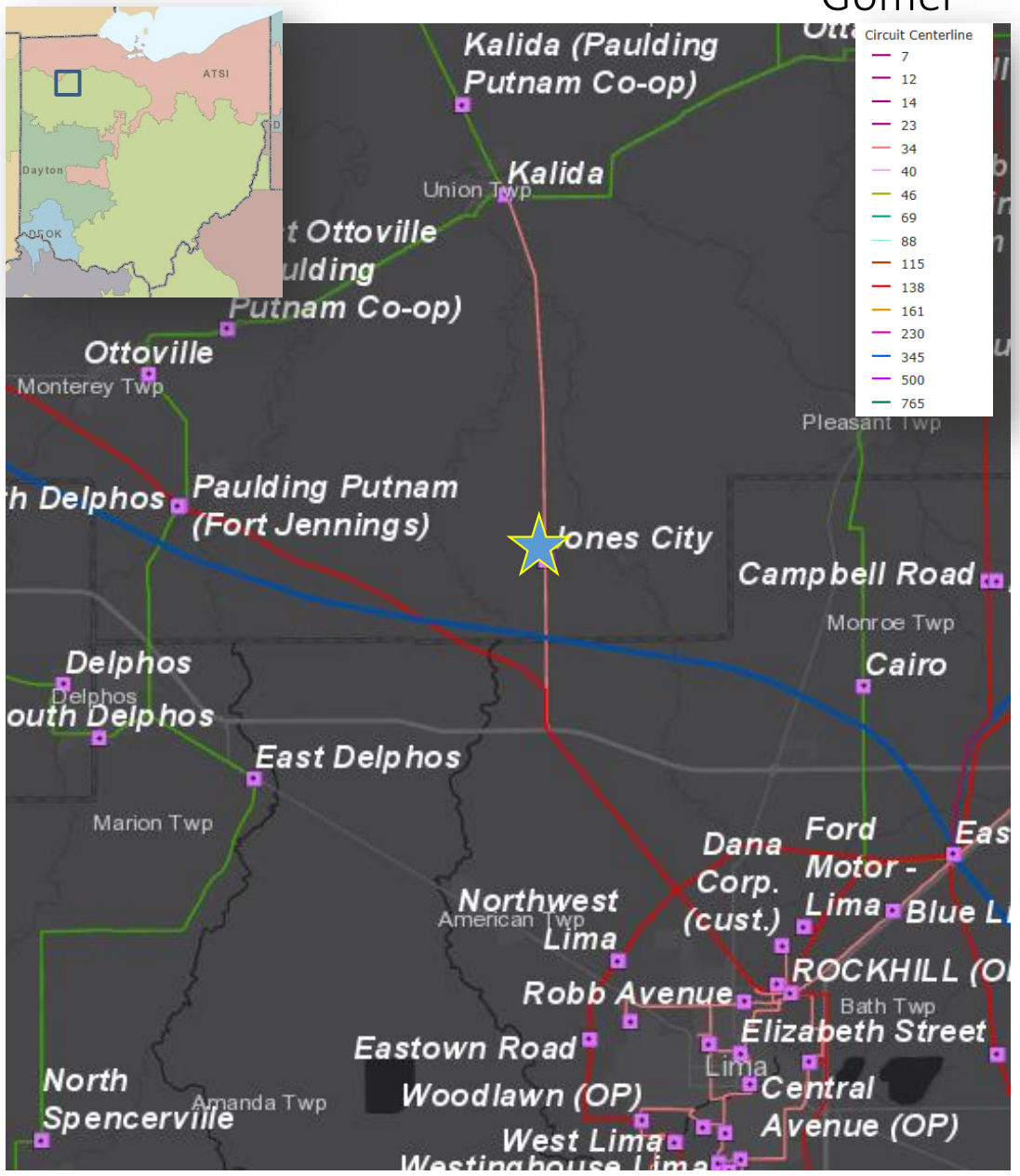
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs

Problem Statement:

Line Name: Kalida – Rockhill 34.5 kV

- **Original Install Date (Age):** 1923
- **Length of Line:** 17.22 miles
- **Total structure count:** 451
- **Original Line Construction Type:** Wood Monopoles
  - 96% of structures are from 1923, remaining 4% from 2000's.
  - Short wood poles susceptible to vegetation outages outside of the ROW.
  - Wooden Crossarm construction with vertical post insulators.
- **Conductor Type:** #1 Copper from 1923 (99%), remaining 795 ACSR (<1%)
- **5 Year Outage History**
  - **Momentary/Permanent Outages**: 2 Momentary
  - **CMI:** 222,797
- **Condition Summary**
  - **Number of open conditions:** 6
- **Additional Information**
  - The line is insulated with vertical post insulators which do not meet current AEP standards for CIFO and minimum leakage distance requirements.
  - The line shielding angle on the typical tangent structure is measured at 45 °, which is inadequate for AEP current shielding angle requirements.
  - The wood structure's current age is 191% of the 95% Probability of Failure (POF) of 51 years. The shield wire's current age is 134% of the 95% POF of 72 years. The insulator's current age is 111% of the 95% POF of 87 years. The POF values are based on CEATI Report No T144700-3257

Customer Service: AEP Ohio has requested new service to replace their existing Jones City Station, which has conditions on the AEP Ohio assets (Transformer is 70 years old with existing conditions).



Need Number: AEP-2020-OH021

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

Transmission Line Description:

- Remove and Retire the existing Lima – Kalida line asset (~17 miles). Top off poles for distribution underbuilt. **$16.6 M (s2442.1)**

Station Description:

- **Jones City Station:** Remove all equipment from the existing Jones City 34.5 kV station and retire the station. **$0 (s2442.2)**
- **Gomer Station:** Cut in the North Delphos – East Side 138 kV line and install a 138 kV Box Bay with two 138 kV, 3000A auto-sectionalizing MOABs to provide service to AEP Ohio's new Gomer Delivery Point. **$3.43 M (s2442.3)**

Total Estimated Transmission Cost: $20.03 M

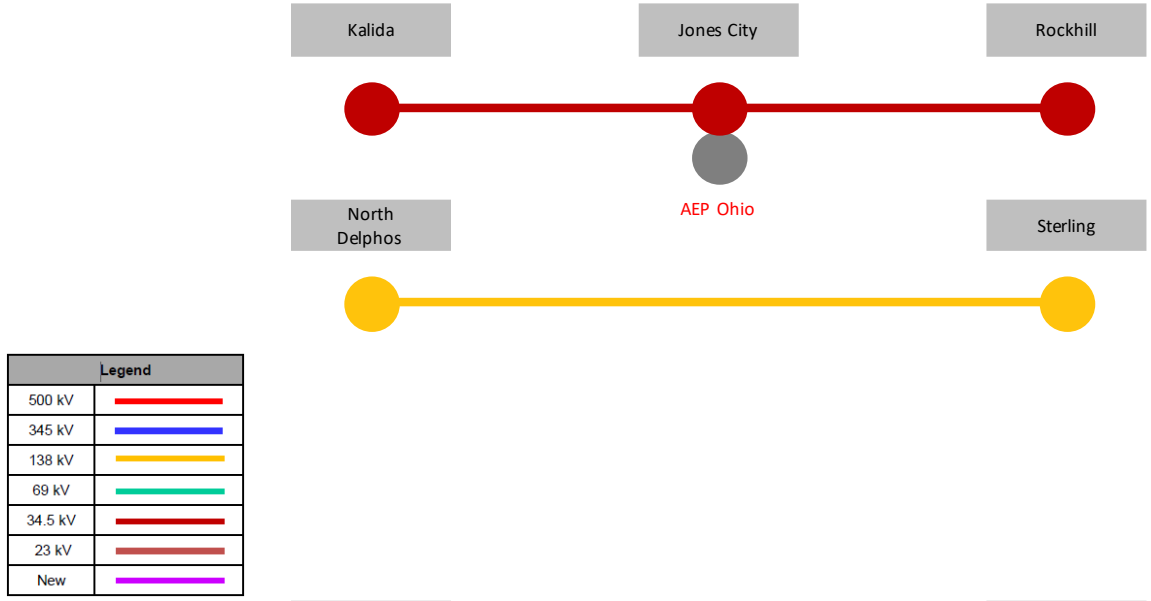
Projected In-Service: 4/15/2022

Supplemental Project ID: s2442.1-.3

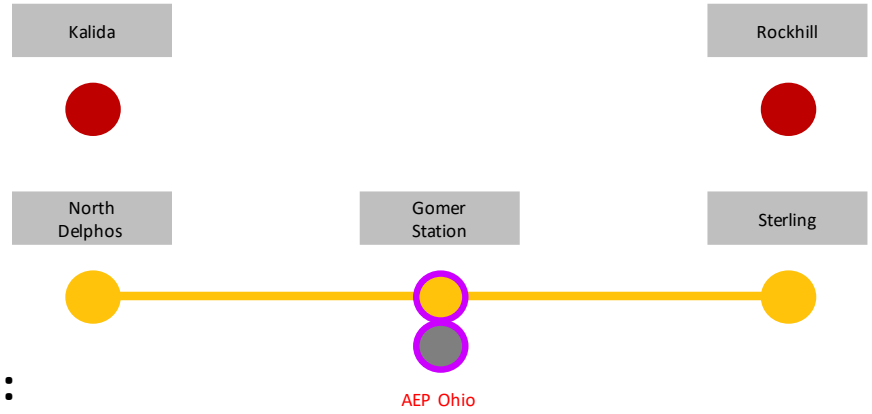
Project Status: Engineering

Model: N/A

Existing Configuration:



Future Configuration:



AEP Transmission Zone M-3 Process
Hockman Station

Need Number: AEP-2020-AP023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 03/19/2019

Solutions Meeting 01/15/2021

Project Driver:

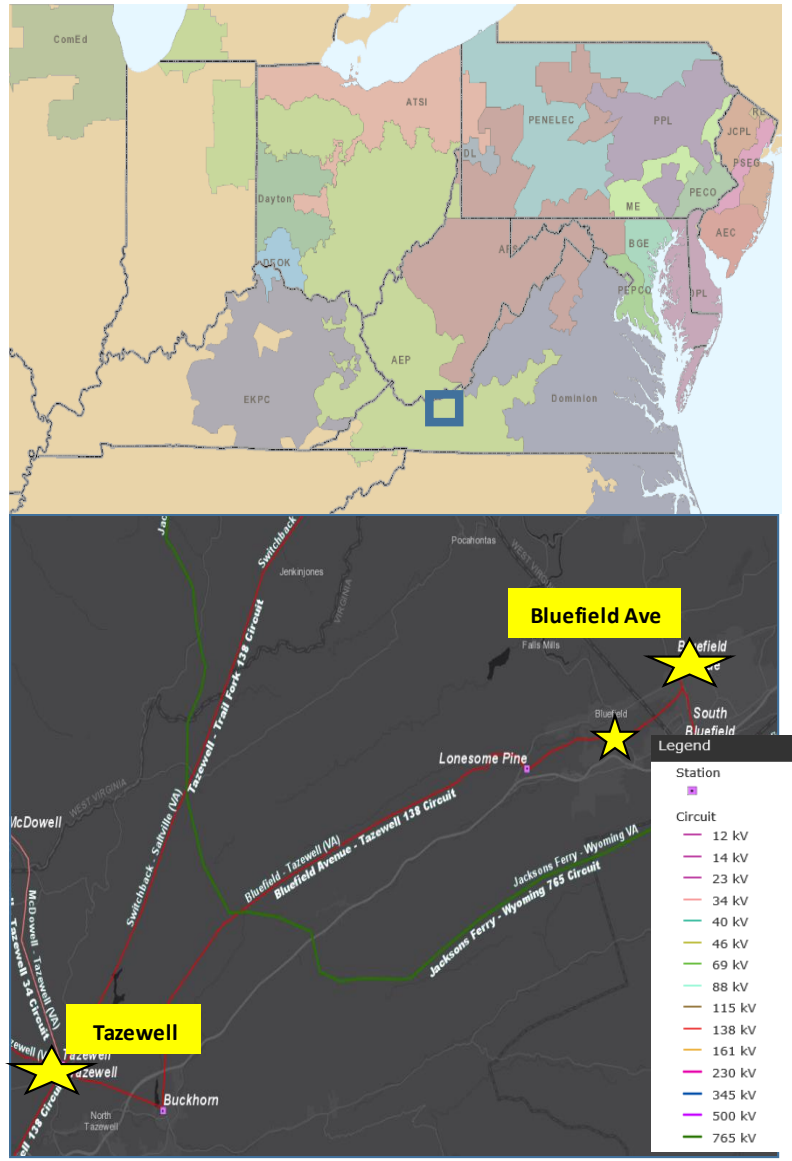
Customer Service

Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

Distribution has requested a new station to be served from the Bluefield — Tazewell 138 KV line. The projected peak demand is 28 MW.



AEP Transmission Zone M-3 Process
Hockman Station

Need Number: AEP-2020-AP023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- **Hockman Station**: Construct a greenfield station consisting of one 3000A 138kV line breakers, one 2000A MOAB switch in an in & out configuration. Install 138/12kV station with 1-25 MVA non load tap changing transformer with high side circuit switcher, 4-12kV-rated distribution circuit breakers that tie in with existing circuitry outside of the station, property purchase. **Estimated Transmission Cost: ~ $~~1.3~~ 0M (s2445.1)**
  - **Note:** All cost is distribution cost at Hockman station.
- Line work to loop the existing Bluefield - Tazewell 138 kV line in and out of the proposed Hockman 138 KV Station. **Estimated Cost: ~$~~2.8~~ 4.5M (s2445.2)**
- **Remote end work (including fiber install) at Tazewell and Bluefield Avenue station: Estimated Cost: $0.4M (s2445.3)**

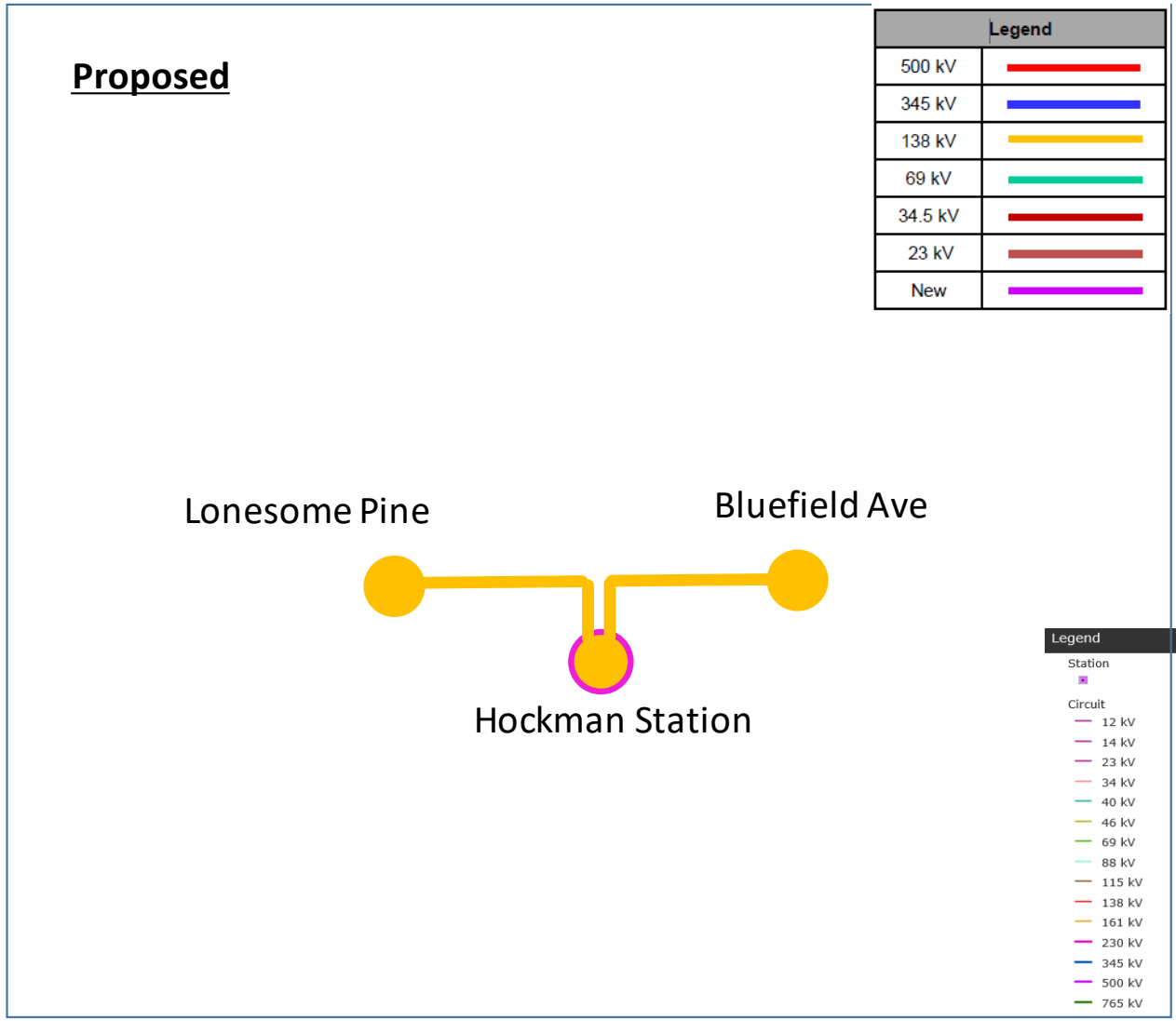
Total Estimated Transmission Cost: ~$~~4.1~~ 4.9M

Projected In-Service: 11/01/2022

Supplemental Project ID: s2445

Project Status: 11/01/2022.1-.3

Model: 2024 RTEP



AEP Transmission Zone M-3 Process
Abingdon Solution

Need Number: AEP-2020-AP024

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 03/19/2020
Solutions Meeting 12/18/2020

Project Driver:
Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

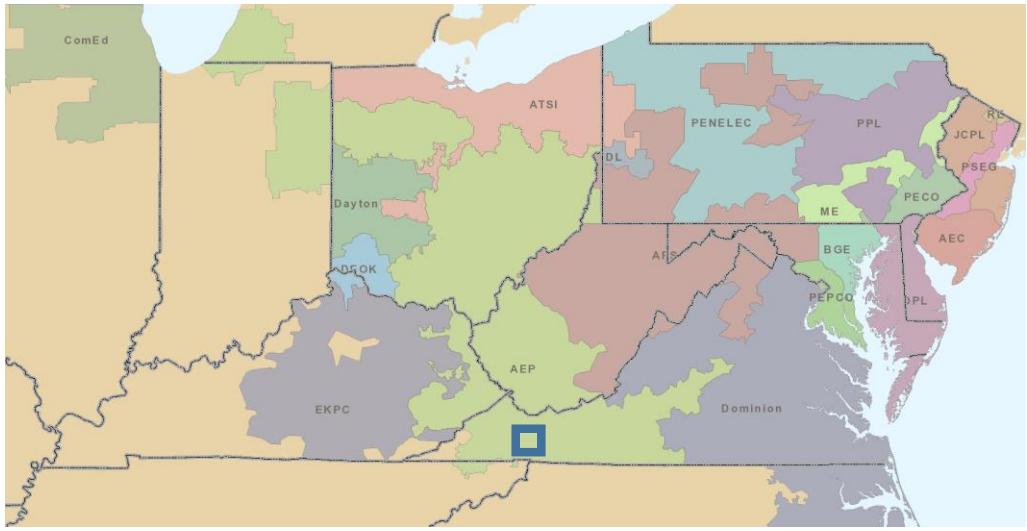
Problem Statement:

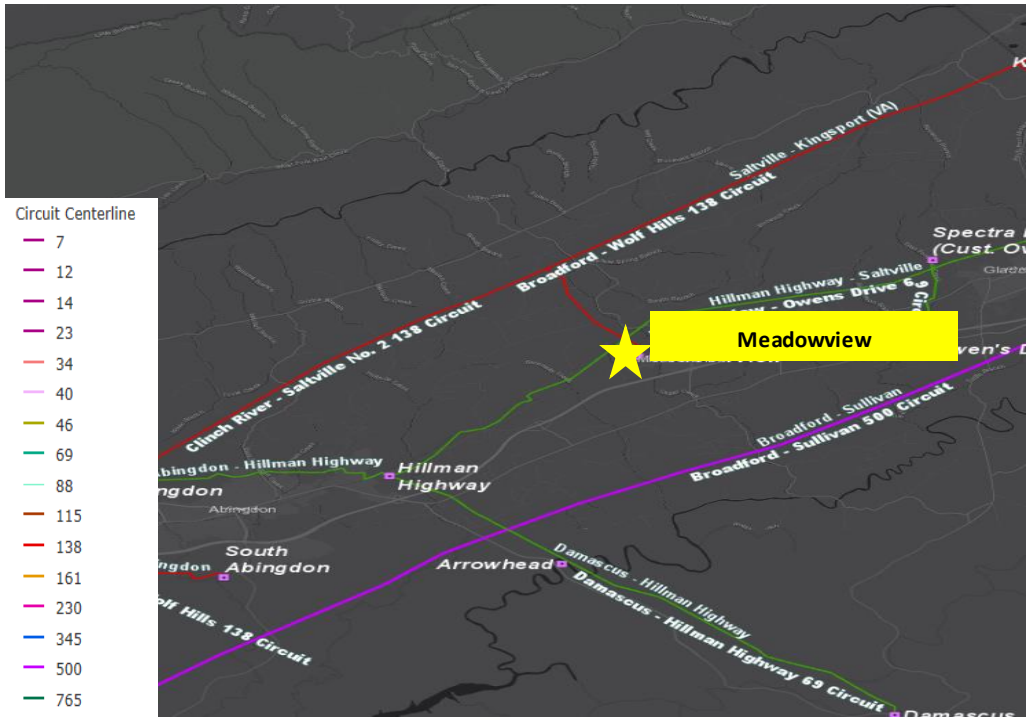
Station

Meadowview Station

Transformer 2 (138/69-34.5 KV):

- Transformer 2 is 39 years old with indications of brittle insulation materials
- There are elevated levels of Carbon Dioxide, which is indicative of high decomposition of the paper insulating materials.
- The decomposition of the paper insulation impairs the unit's ability to withstand short circuit or through fault events.





AEP Transmission Zone M-3 Process
Abingdon Solution

Need Number: AEP-2020-AP025

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 03/19/2020
Solutions Meeting 12/18/2020

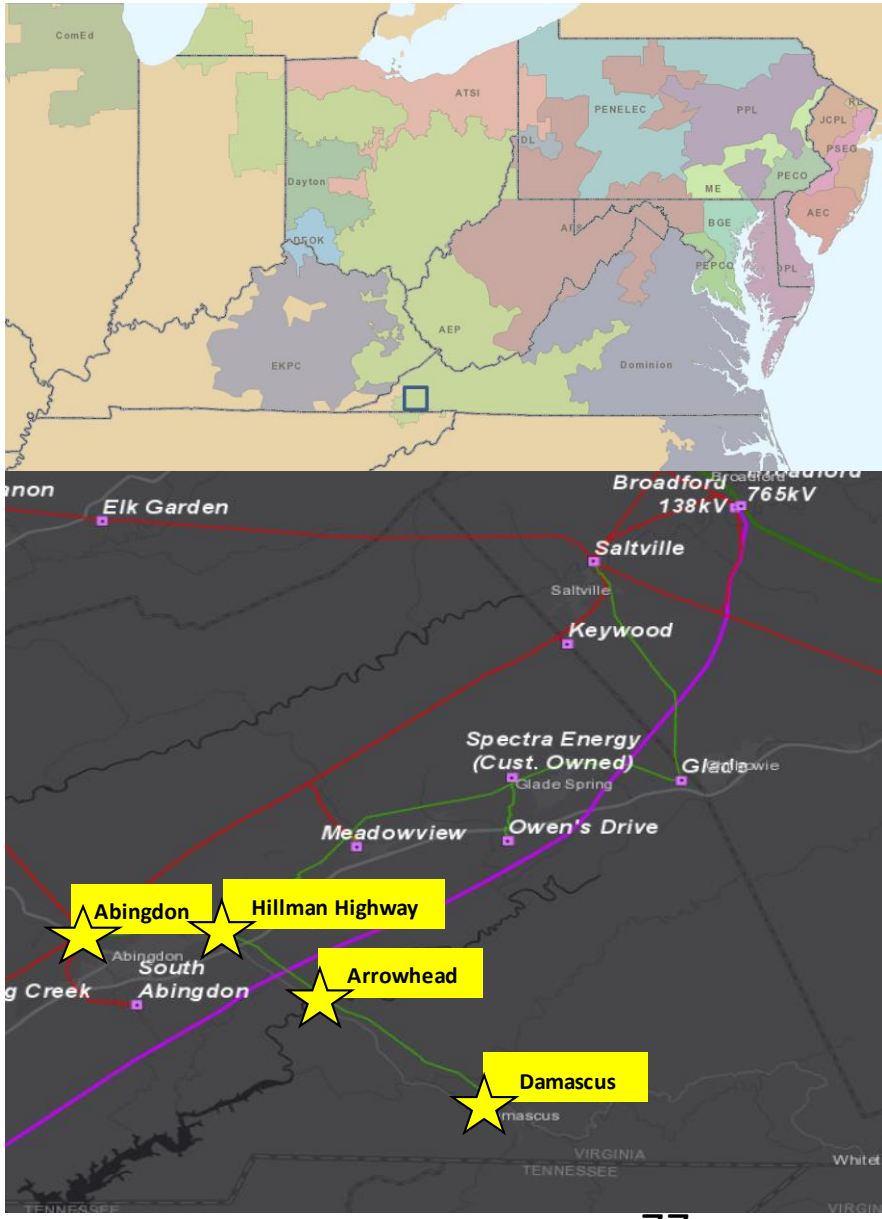
Project Driver:
Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:
Abingdon Area

- There is approximately 25 MVA of nontransferable load on the ~10 mile radial line between Hillman Highway – Damascus stations

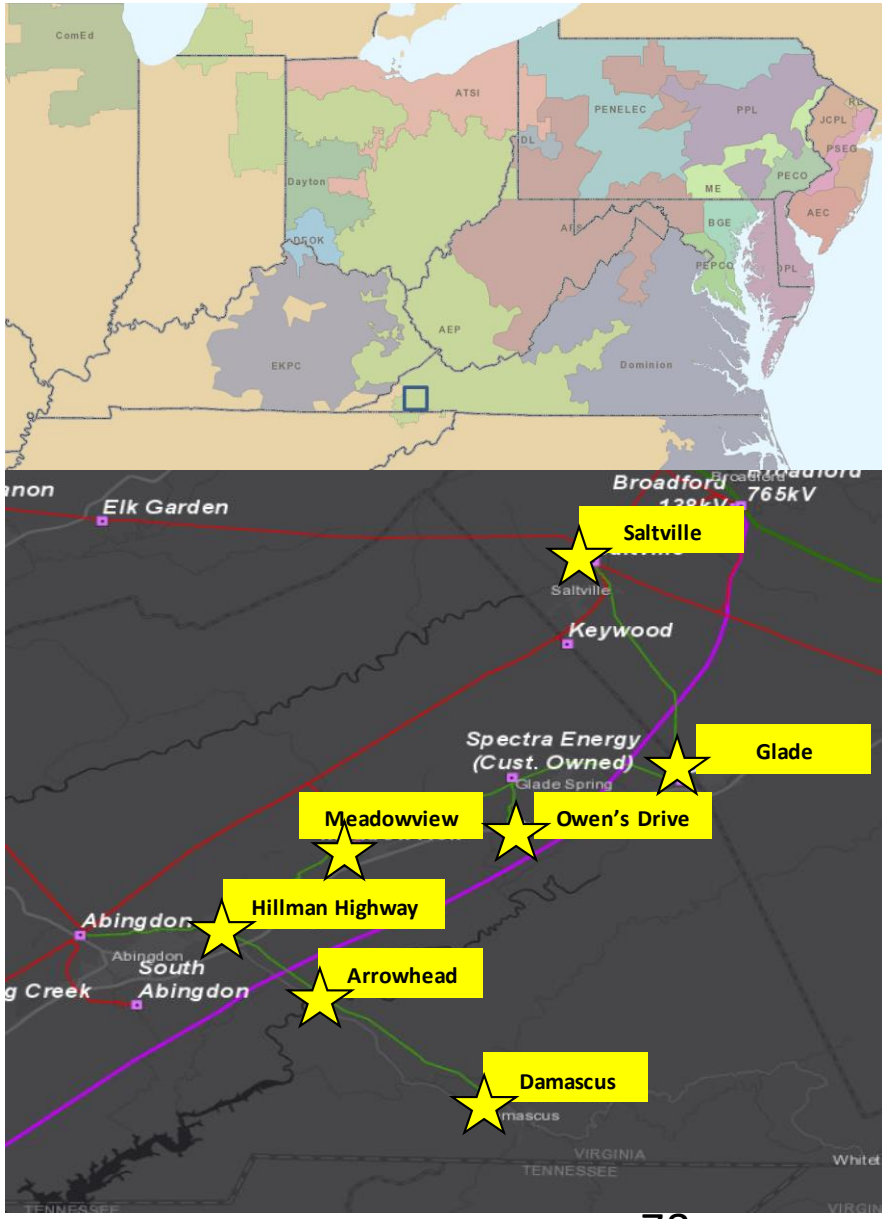
- Abingdon — Hillman Highway 69 KV (installed in 1969)
  - Length: ~ 5 Miles
  - Original Construction Type: Wood
  - Conductor Type: 52% 4/0 ACSR 6/1 (Penguin), 20% 556,600 CM ALUM, 14% 336,400 CM ALUM 19
  - Momentary/Permanent Outages: 3/8 (5 years)
  - Total structure count: 71
  - Number of open conditions: 70
  - Open conditions include: structure, broken conductor strands, broken/burnt insulators, shield wire, hardware.
  - Unique structure count with open conditions: 44 (62%)
    - Affected crossarms and poles show signs of rot, woodpecker holes, bowed, twisted conditions, broken and loose bayonets, loose, broken, and rusted guys, and loose insulators.



AEP Transmission Zone M-3 Process
Abingdon Solution

Problem Statement (continued)

- Hillman Highway — Saltville 69 KV (installed in 1951)
  - Length: ~ 23 Miles
  - Original Construction Type: Wood
  - Conductor Type: 37% 336,400 CM ACSR 30/7 (Oriole), 32% 219,900 CM ACSR 8/7 (219AC), 29% 336,400 CM ALUM 19
  - Momentary/Permanent Outages: 10/5 (5 years)
  - Total structure count: 243
  - Number of open conditions: 70
  - Unique structure count with open conditions: 42 (17%)
    - Affected cross-arms and poles show signs of rot, woodpecker damage, leaning in-line poles, corrosion, and insect damage.



AEP Transmission Zone M-3 Process
Abingdon Solution

Need Number: AEP-2020-AP035

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 06/19/2020
Solutions Meeting 12/18/2020

Project Driver:
Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

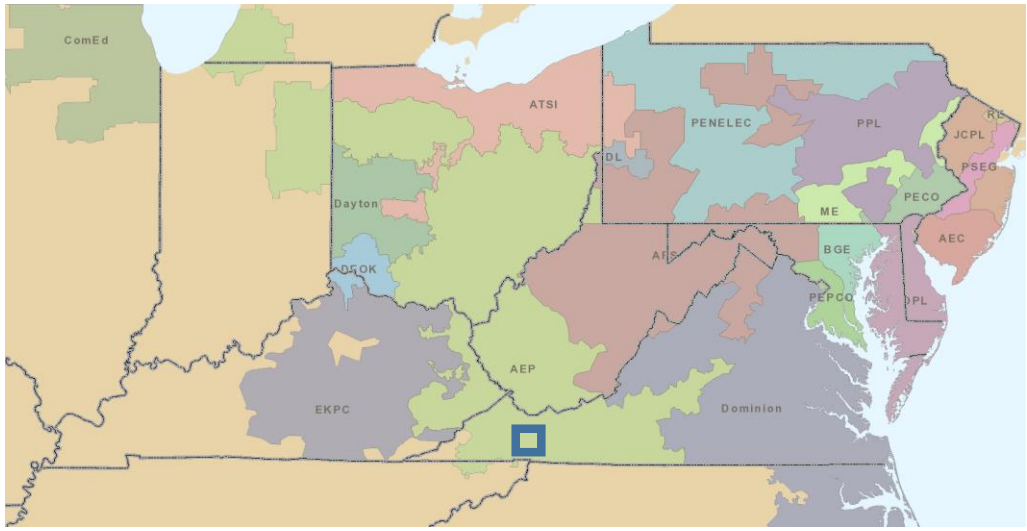
Problem Statement:

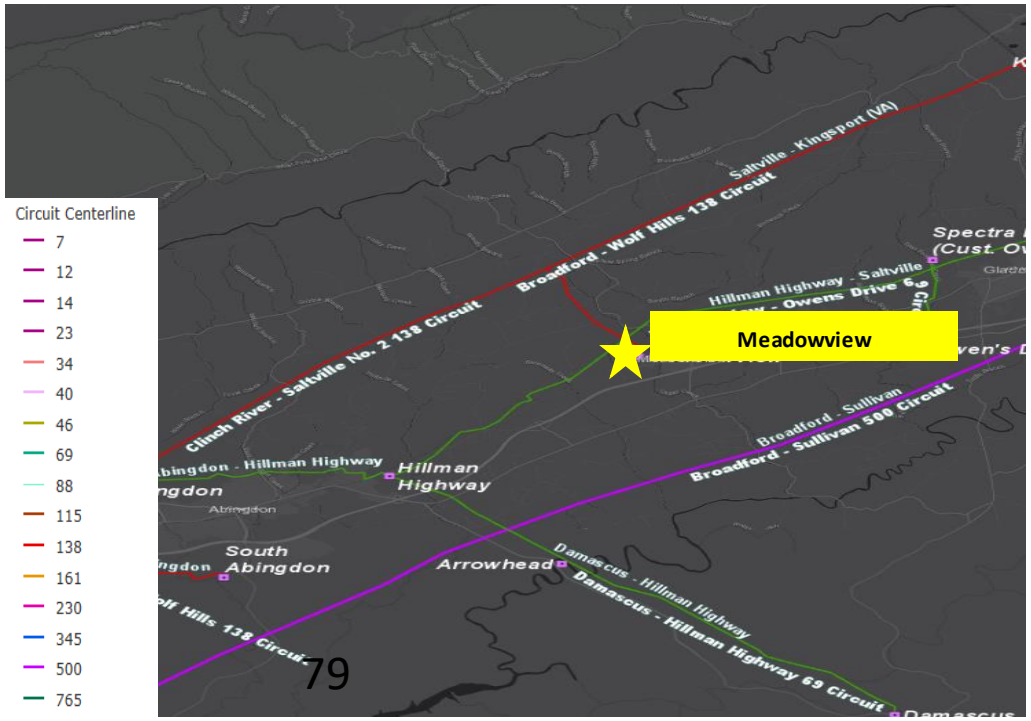
Station

Meadowview Station

Circuit Breakers F&G (69 KV) Concerns:

- Circuit Breakers F and G are 23 years old, 72PM31-20 type, SF6 filled breakers.
- Circuit Breakers F and G have experienced 88 and 72 total fault operations, respectively, exceeding manufacturer's recommended number full fault operations of 6.
- Circuit breakers of this type across the AEP system have had reports of moisture ingress into the breaker tank, which leads to increased maintenance and a higher risk of failure.
- This model type of breakers have experienced five catastrophic failures.
- There are documented issues with failures to close due to burned up coils, and 98 malfunction records related to SF6 gas leaks.





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AEP Transmission Zone M-3 Process
Abingdon Solution

Need Number: AEP-2020-AP024, AEP-2020-AP025, AEP-2020-AP035

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- At Meadowview station, replace 69KV circuit breakers F&G with new 69kV 3000A 40kA breakers. Due to limited space at the station on the existing footprint, the 69 kV bus is proposed as a straight bus instead of a ring bus. **Estimated Cost: $1.86M (s2444.1)**
- At South Abingdon, install a new 90 MVA 138/ 69KV transformer bank. **Estimated Cost: $3.4M (s2444.2)**
- Construct a new 69kV line from South Abingdon to Arrowhead (~6.6 miles) (SN:129 MVA, SE: 180 MVA, WN: 162 MVA, WE: 202 MVA). **Estimated Cost: $20.2M (s2444.3)**
- At Arrowhead station, install three 69kV 3000A 40kA breakers towards Damascus, Hillman Highway, and South Abingdon. **Estimated Cost: $2.2M (s2444.4)**
- Retire the 69kV section of line from Abingdon to Hillman Highway (~5 miles). **Estimated Cost: $6.2M (s2444.5)**
- Rebuild ~23 miles of the Hillman Highway – Saltville 69 kV line (SN:129 MVA, SE: 180 MVA, WN: 162 MVA, WE: 202 MVA). **Estimated Cost: $57.5M (s2444.6)**
- Retire ~23 miles of the Hillman Highway – Saltville 69 kV line. **Estimated Cost: $6.9M (s2444.7)**
- Hillman Highway Remote End Work**. Estimated Cost: $0.1 M (s2444.8)**
- At Abingdon station, retire 138/69-12kV transformer bank #1 and associated equipment. **Estimated Cost: $0.3M (s2444.9)**

Ancillary Benefits: Solution will be worked in conjunction with baseline project B3278, which will replace the Meadowview transformer.

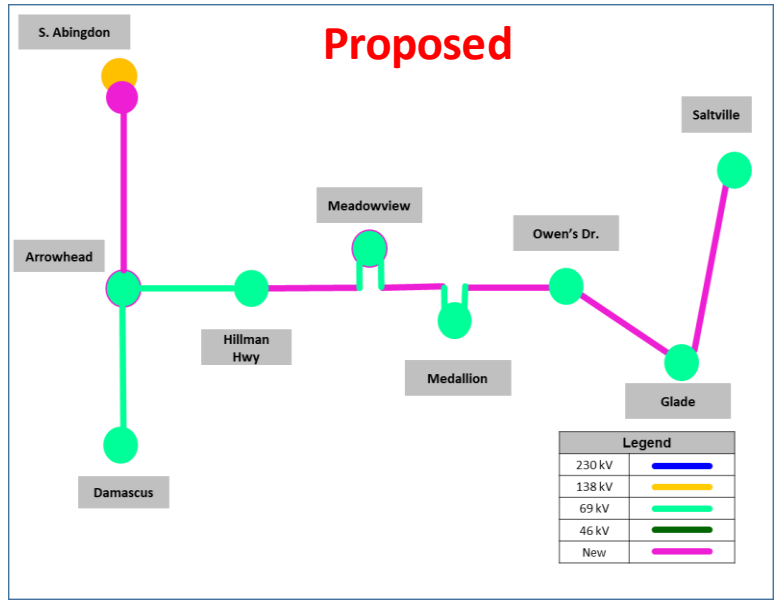
Total Estimated Transmission Cost: $98.66M

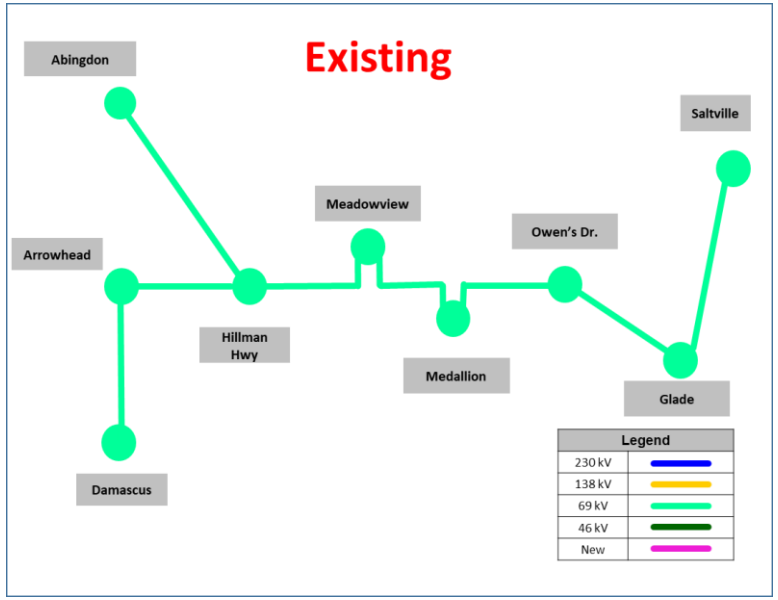
Projected In-Service: 7/01/2024

Supplemental Project ID: s2444.1-.9

Project Status: Scoping

Model: N/A





AEP Transmission Zone M-3 Process
Wooton – Pineville 161kV Rebuild

Need Number: AEP-2020-AP026

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Need Meeting 03/19/2020

Solutions Meeting 11/20/2020

Project Driver:

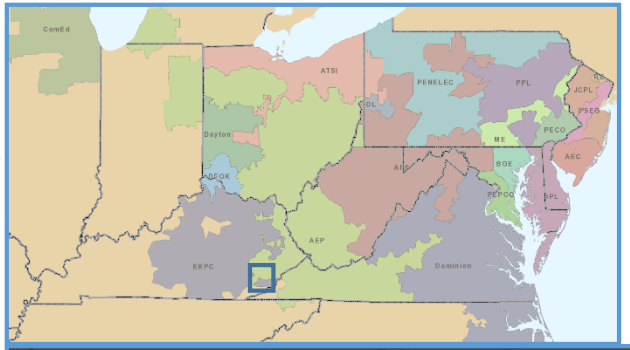
Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:
Line Name: Wooton – Pineville 161kV
Line Section: Leslie – Pineville 161kV
Original Install Date (Age): 1942
Length of Line: ~34.24 mi
Total structure count: 189
Original Line Construction Type: Wood
Conductor Type: 500 KCM COPPER
Momentary/Permanent Outages and Duration: 12 Momentary and 5 permanent Outage
CMI (last 5 years only): 26,096 minutes
Line conditions:

Leslie – Pineville line section:

- 130 structures with at least one open condition, 69% of the structures on this circuit.
- 221 structure related open conditions : affecting the crossarm, knee/ vee brace, or pole including rot, split, woodpecker, damaged, loose, and bowed conditions
- 2 open conditions related to the shielding wire, including broken strands
- 3 hardware related open conditions related to insulator, conductor hardware, or shield wire hardware, including broken, missing bolt, and worn



Need Continued:

Line Section: Wooton – Leslie 161kV

Original Install Date (Age): 1942

Length of Line: ~4.68 mi

Total structure count: 23

Original Line Construction Type: Wood

Conductor Type: 500 KCM COPPER

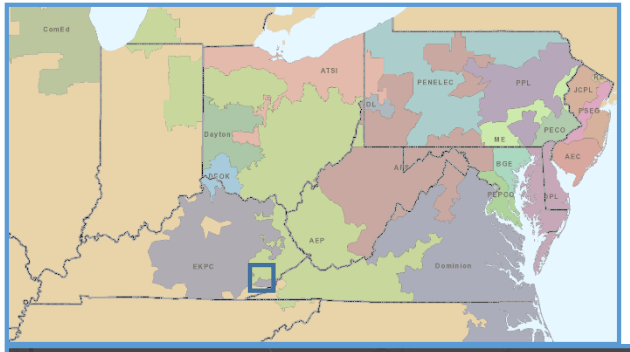
Momentary/Permanent Outages and Duration: none in last five years

CMI (last 5 years only): none in last five years

Line conditions:

Leslie – Wooton line section:

- 17 structures with at least one open condition, 74% of the structures on this section.
- 32 structure related open conditions including: crossarm or pole including rot, insect damage and woodpecker damage



AEP Transmission Zone M-3 Process
Wooton – Pineville 161kV Rebuild

Need Number: AEP-2020-AP026

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- At Wooton station, upgrade relaying to accommodate new OPGW fiber protection. **Estimated Cost: $1.1 M (s2428.1)**
- At Leslie station, reconductor the 161kV Bus, Relaying upgrades towards Wooton and Pineville, Replace 161kV MOAB W, Replace 161kV XF#1 high side switch. Install DICM. **Estimated Cost: $1.2 M (s2428.2)**
- Remote end work at Hazard substation **Estimated Cost: $0.03 M (s2428.3)**
- Rebuild approximately ~40 miles of Wooton – Pineville 161kV line to address the identified asset condition needs. This work also includes line removal work as well as access road construction. Majority of proposed line rebuild is to be constructed on existing center line. **Estimated Cost: $115.0M (s2428.4)**
- Expand existing ROW for the Wooton – Pineville 161kV line. **Estimated Cost: $8.5 M (s2428.5)**
- Relocate ~0.32 mi 69kV Leslie – Clover Fork which includes of one structure and reconfiguration of the existing line to cross underneath the proposed Wooton-Stinnett 161kV Line. **Estimated Cost: $0.7 M (s2428.6)**
- At Stinnett station, upgrade relaying to accommodate new OPGW fiber protection. Provide transition, entry and termination for OPGW connectivity to the Hazard-Pineville fiber route. **Estimated Cost: $0.7M (s2428.7)**
- Provide transition, entry and termination for OPGW connectivity at Leslie substation. **Estimated Cost: $0.1 M (s2428.8)**

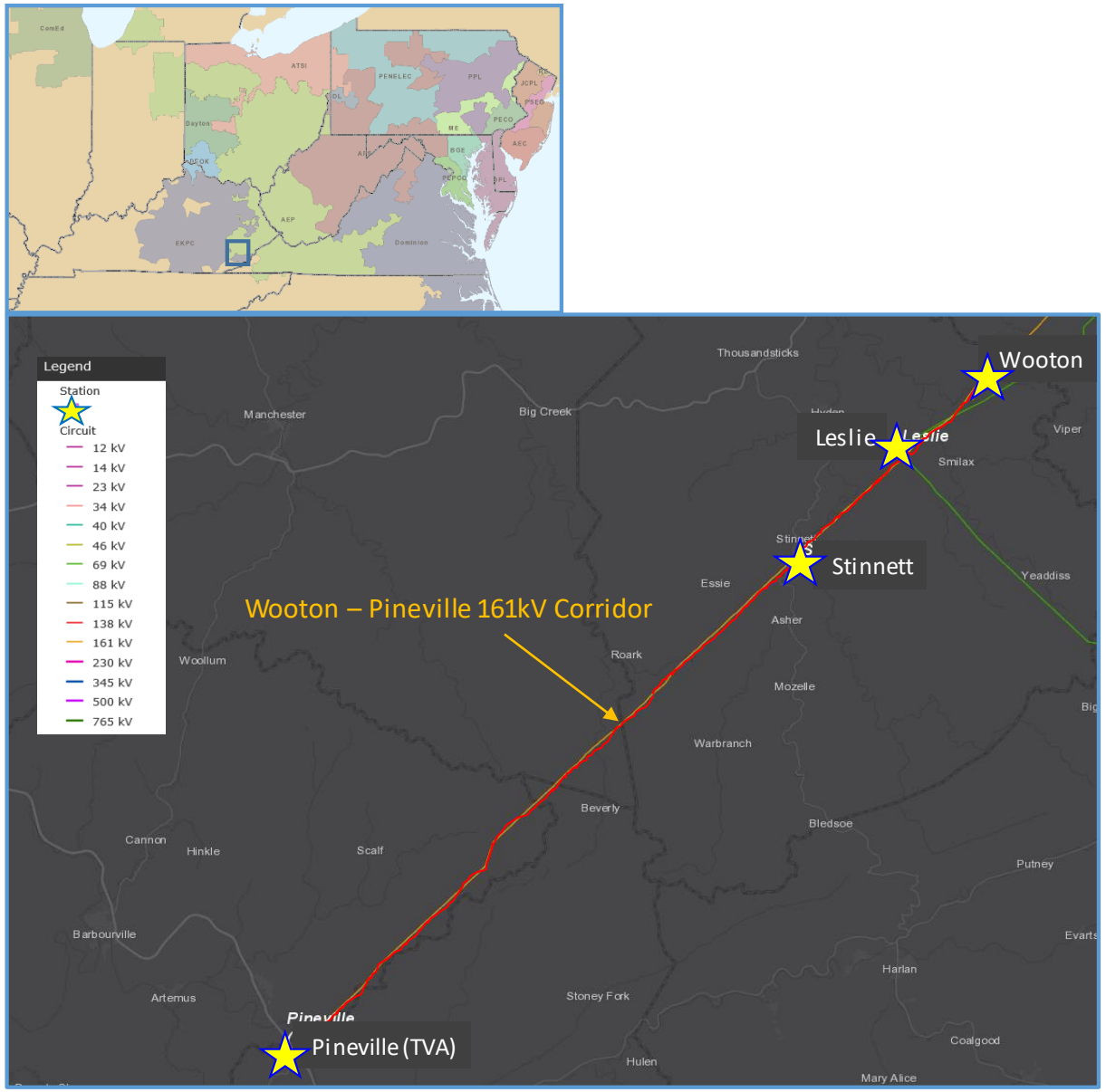
Estimated Cost: $127.33 M

Projected In-Service: 11/31/2027

Supplemental Project ID: s2428.1-.8

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
New Camp

Need Number: AEP-2020-AP028

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

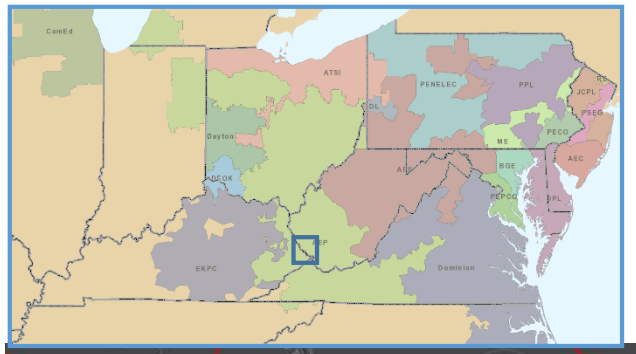
Previously Presented:
Need Meeting 04/20/2020
Solution Meeting 01/15/2021

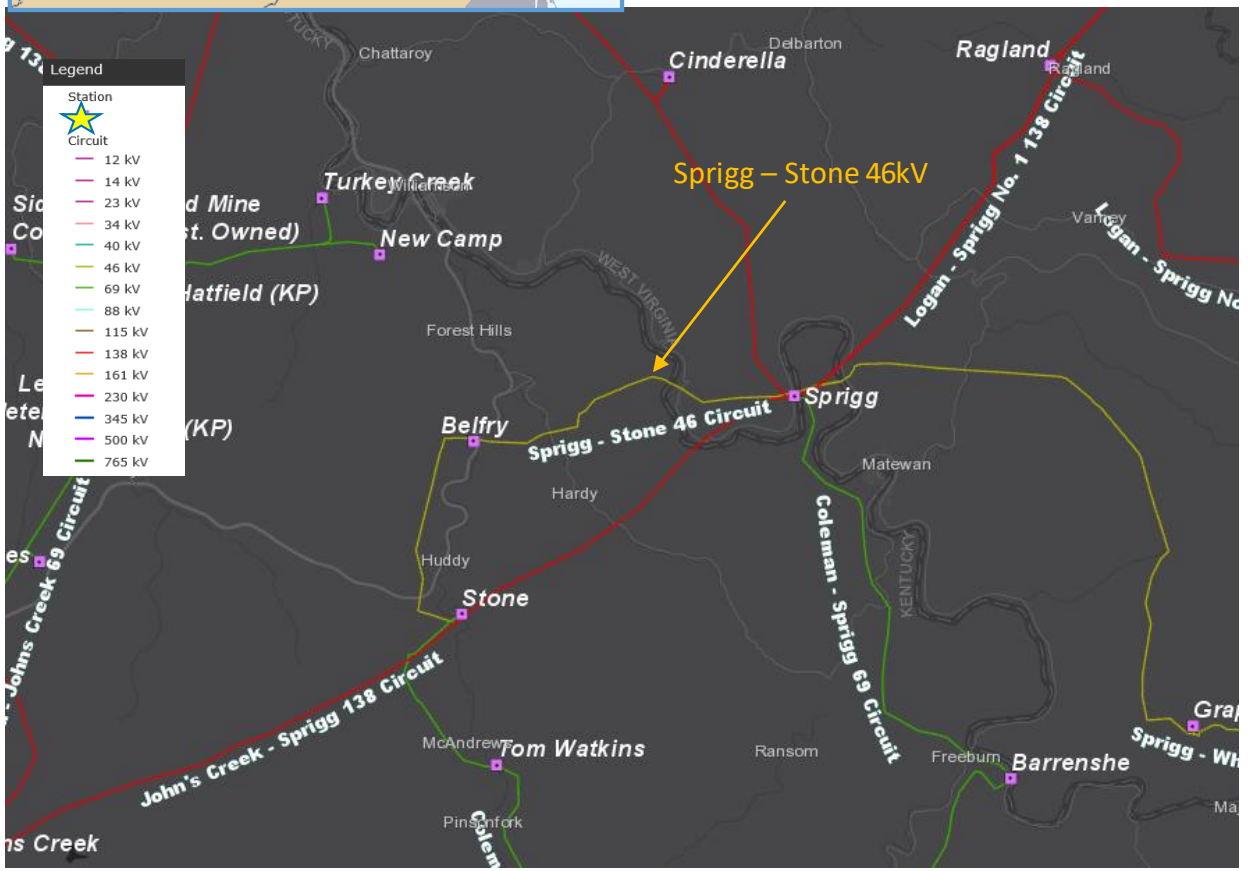
Project Driver:
Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:
Line Name: Sprigg – Stone 46kV
Original Install Date (Age): 1940
Length of Line: 8.23 mi
Total structure count: 55
Original Line Construction Type: Wood
Majority Conductor Type: 3/0 ACSR 6/1 (Pigeon) and 2/0 COPPER
Momentary/Permanent Outages and Duration: 6 Momentary and 7 permanent Outage
CMI (last 5 years only): 1,119,129 minutes
Line conditions:

- 35 structures with at least one open condition, 64% of the structures on this circuit.
- 98 structure related conditions: rotted poles, crossarms and braces, woodpecker damage, bowed braces and loose braces, affecting the crossarm, knee/ vee brace, or pole including rot, split, woodpecker, damaged, loose, and bowed conditions
- 1 open conditions related to the broken strands on a jumper conductor
- 9 hardware related open conditions loose or broken guy wires





AEP Transmission Zone M-3 Process
New Camp

Need Number: AEP-2020-AP028

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

In conjunction with the baseline work identified under B3288 presented in 12/18/2020 SRRTEP – West meeting which would install new 69kV line between Stone and New Camp via Orinoco substation, the following is proposed under this solution to address the identified needs on the Sprigg – Stone 46kV line.

Replace Belfry substation with Orinoco substation by installing a 69KV box bay and 12KV rural bay to be built in the clear southwest of existing Belfry station. Install 69/12kV 20 MVA transformer and two 12kV breakers. **Estimated Transmission Cost: $0.65 M (s2446.1)**

Retire Belfry 46kV substation. **Estimated Transmission Cost: $0 M (s2446.2)**

Retire 46kV equipment from Stone substation. **Estimated Transmission Cost: $0.07 M (s2446.3)**

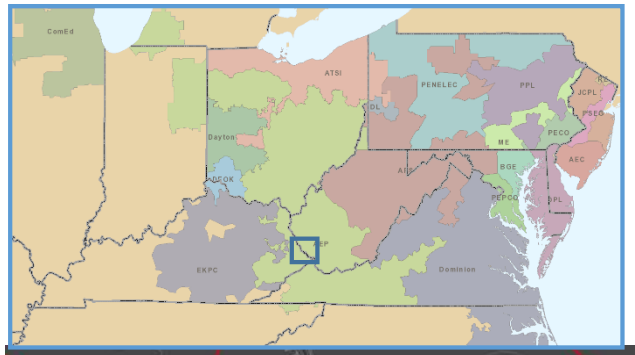
At Hatfield substation, replace MOAB Y with a 69KV Circuit Breaker towards Stone 69kV line via New Camp and Orinoco. **Estimated Transmission Cost: $0.85 M (s2446.4)**

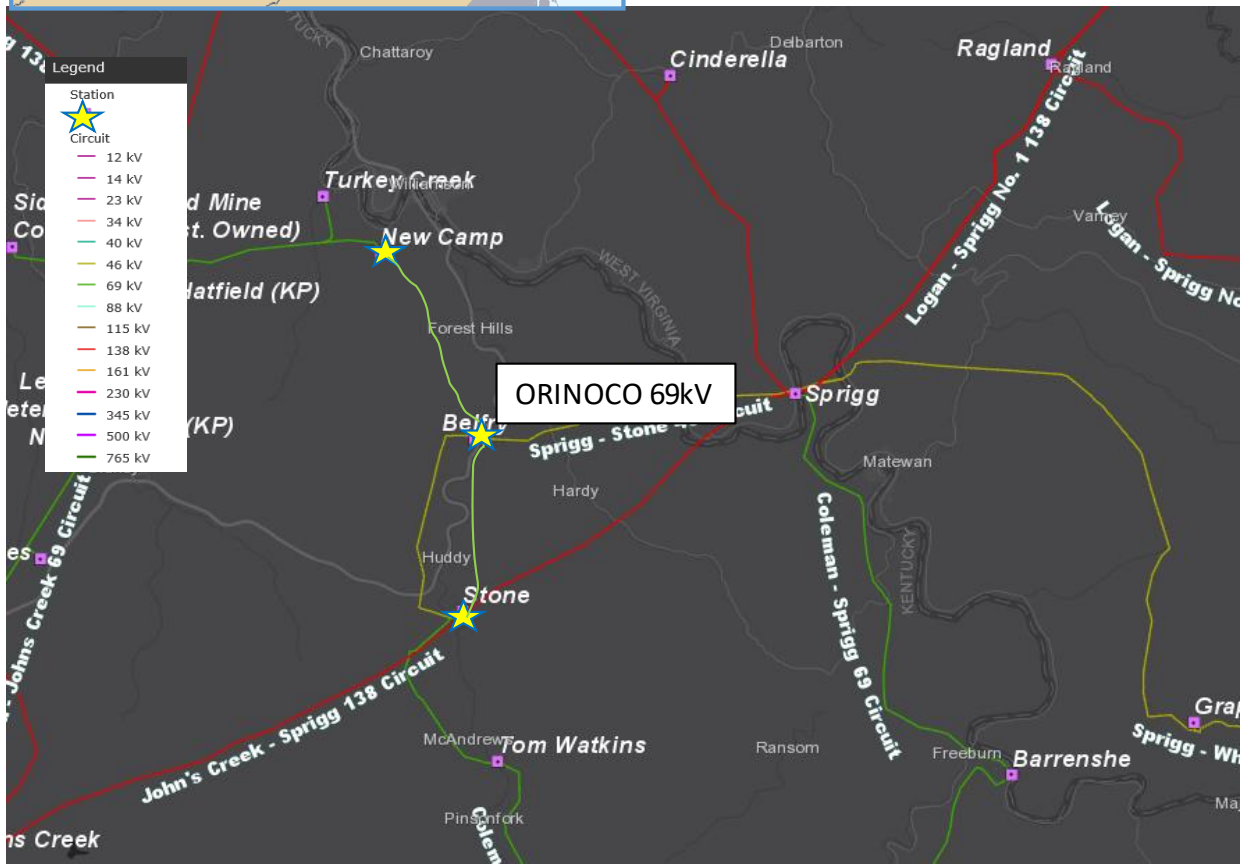
Retire the 46kV equipment at Sprigg station towards Stone (via Belfry). **Estimated Transmission Cost: $0.05 M (s2446.5)**

Retire Turkey Creek Tap. **Estimated Transmission Cost: $0.76 M (s2446.6)**

Retire the ~8.23 miles of the 46kV Sprigg – Stone 46 KV circuit. **Estimated Transmission Cost: $6.73 M (s2446.7)**

Total Estimated Transmission Cost: $9.11 M





Need Number: AEP-2020-AP028

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Ancillary Benefits: Removal of obsolete ~8.23 mi of 46kV transmission line and associated equipment

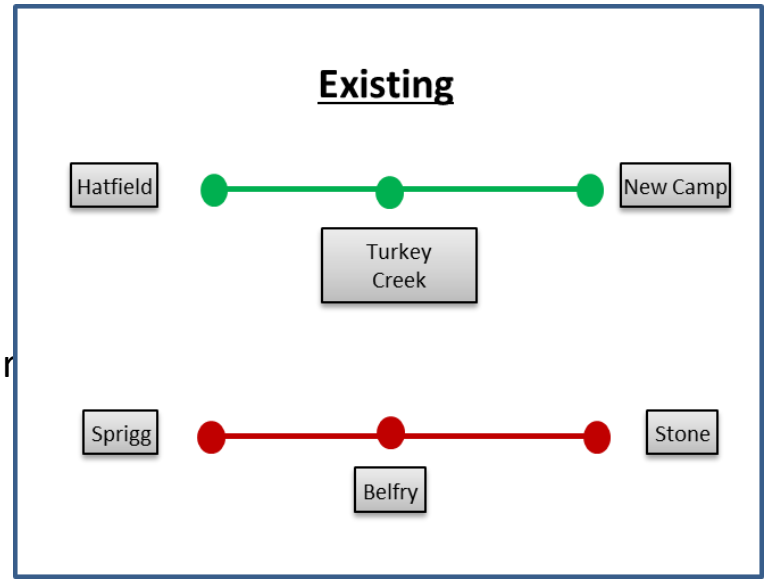
Required In Service Date: 9/1/2025

Projected In Service Date: 12/31/2024

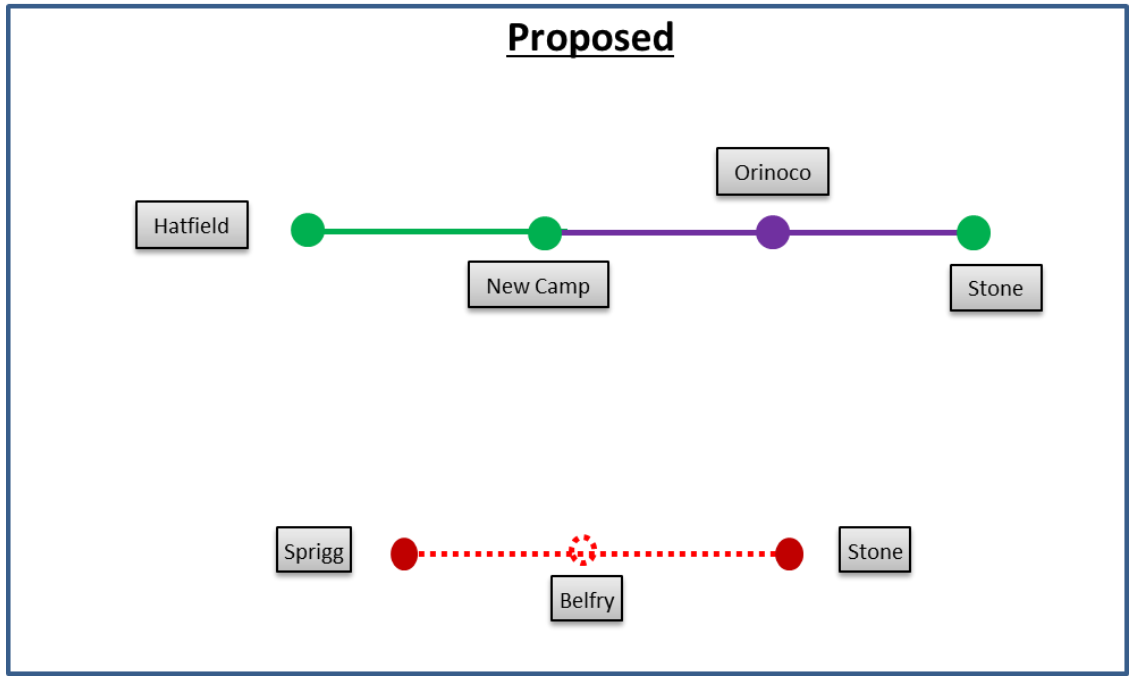
Supplemental Project ID: s2446.1-.7

Project Status: Scoping

Model: N/A



Legend	
500 kV	
345 kV	
138 kV	
69 kV	
46 kV	
Related	
Retire	



AEP Transmission Zone M-3 Process
Eden's Ridge

Need Number: AEP-2020-AP030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Needs Meeting 04/20/2020

Solution Meeting 12/18/2020

Project Driver:

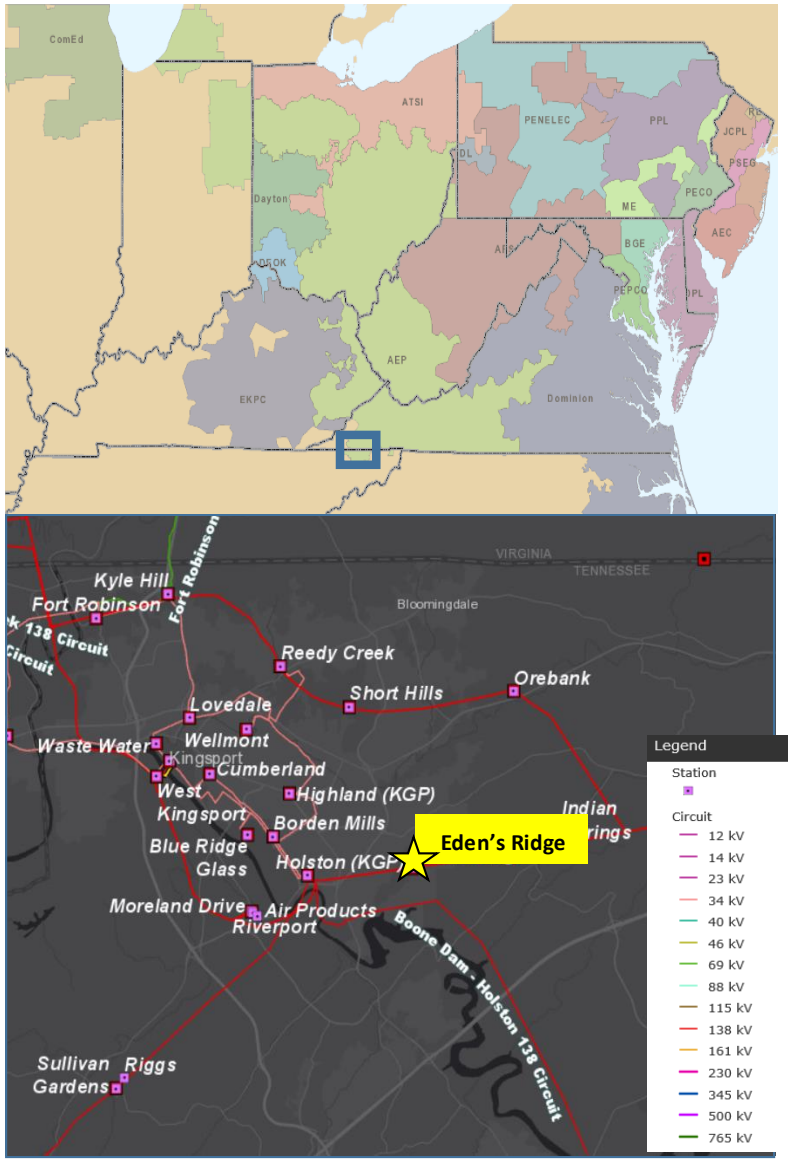
Customer Service

Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

Appalachian Power Co. (Distribution) has requested adding a new 25 MVA 138/12KV transformer at Eden's Ridge Station to serve growing load in the Kingsport area.



AEP Transmission Zone M-3 Process
Eden's Ridge

Need Number: AEP-2020-AP030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- **Eden's Ridge Station**: Expand the station to install a 138kV box bay replacing the phase over phase switching structure and replace line switches with motor operated switches and CCVTs **Estimated Cost: $1.5M (s2437.1)**
    - Note: Cost does not include Distribution scope of work to install circuit switchers, a new transformer, and new feeder breaker and exits.

- Line work on the North Bristol-West Kingsport 138kV circuit to terminate onto the Edens' Ridge Station new 138kV box bay. **Estimated Cost: $2.5M (s2437.2)**

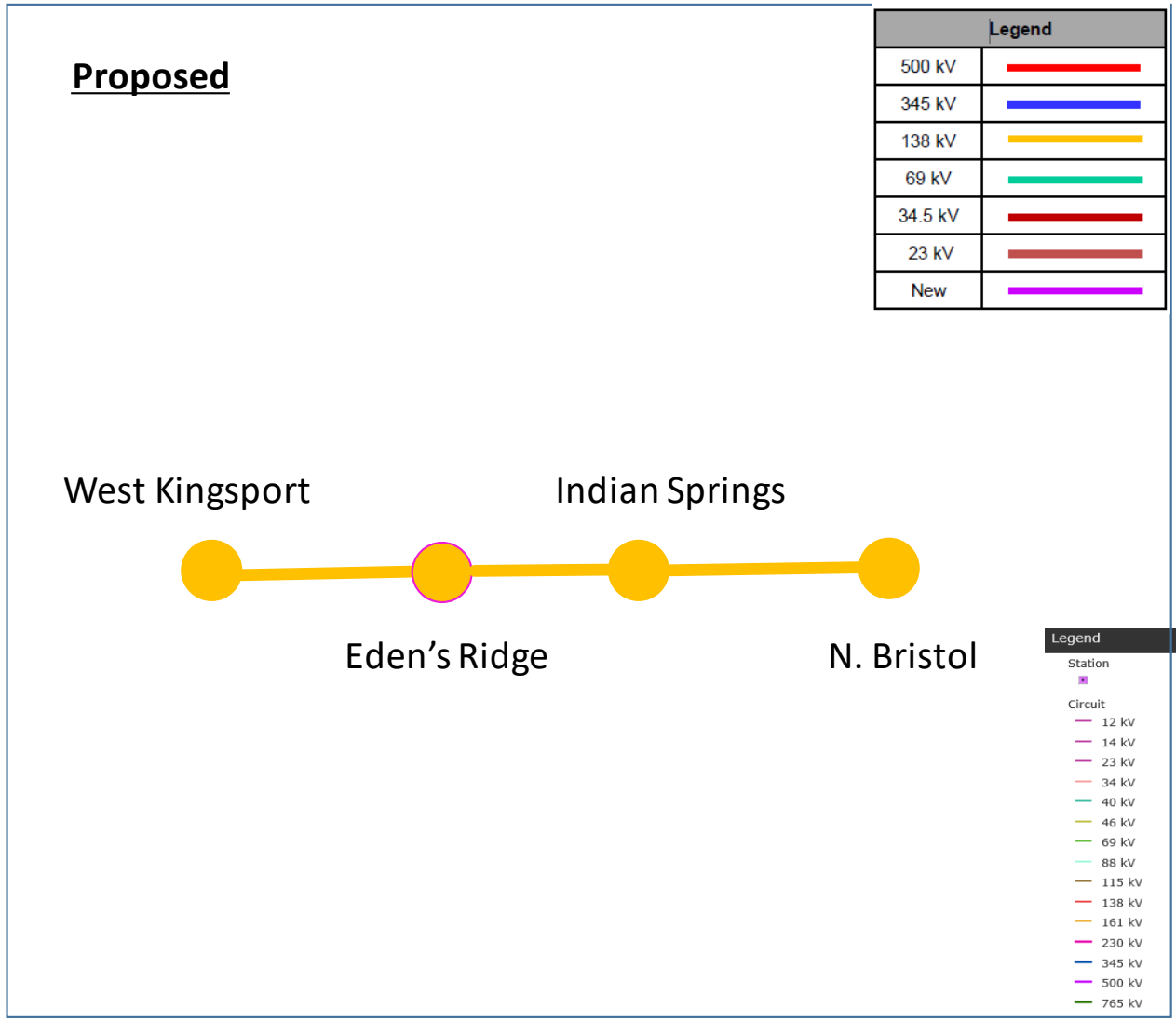
Total Estimated Transmission Cost: $4M

Projected In-Service: 4/30/2023

Supplemental Project ID: s2437.1-.2

Project Status: Engineering

Model: N/A



AEP Transmission Zone M-3 Process
Clifford Station

Need Number: AEP-2020-AP031

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 5/22/2020
Solutions Meeting 12/18/2020

Project Driver:
Equipment Material/Condition/Performance/Risk

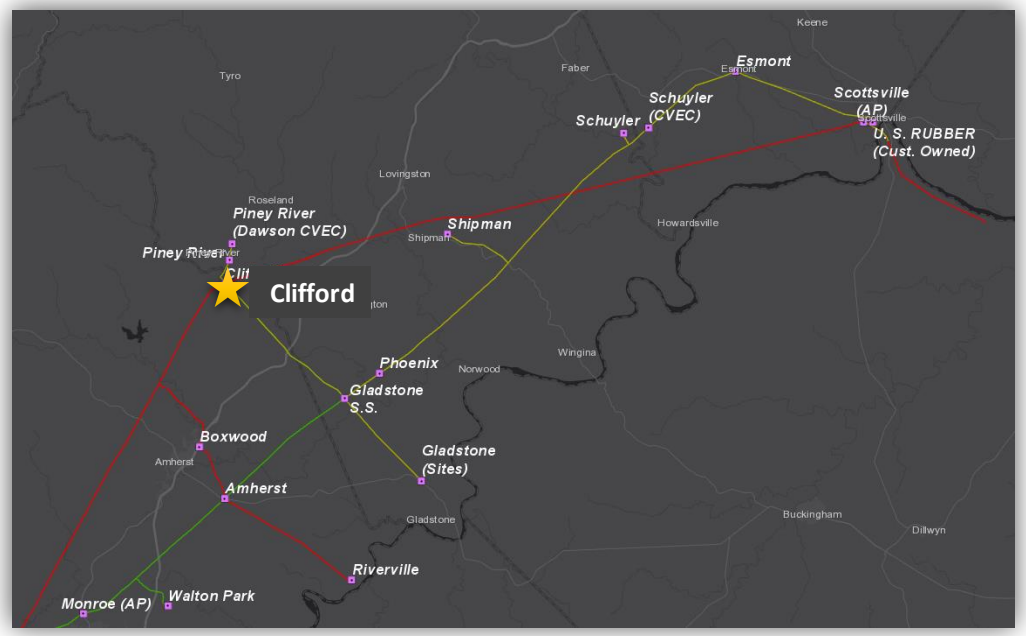
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

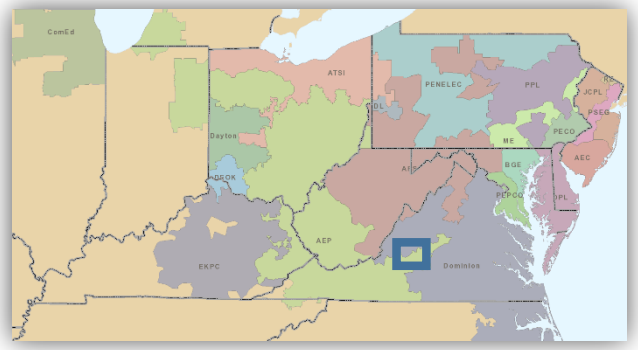
Problem Statement:

Clifford Station:

- 138/69/46 kV Transformer #1
  - 1963 Vintage Transformer
  - Elevated levels of Acetylene have been documented indicating increased decomposition of the paper insulating materials. The presence of acetylene indicates electrical discharge faults of high energy have occurred within the main tank causing electrical breakdown of the unit.
  - Due to deteriorated gaskets at the radiator headers, this unit is leaking oil.

- 138/46 kV Transformer #3
  - 1950 Vintage Transformer
  - An upward trend in insulation power factor indicates an increase in particles within the oil and the dielectric strength of the insulation system (oil and paper) are in poor condition, impairing the unit's ability to withstand electrical faults.





Need Number: AEP-2020-AP031

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- Clifford Station: Replace the existing 138/69-46 kV, 50 MVA transformer #1 and 138/46 kV, 20 MVA transformer #3 with two 138/46 kV, 30 MVA transformers.

Estimated Cost: $5.9 M (s2438)

Ancillary Benefits: This project will be coordinated with B3608 addressing all the needs as one holistic solution

Projected In-Service: 10/31/2022

Supplemental Project ID: s2438

Project Status: Scoping

Model: N/A

No Bubble Diagram
Station Work Only

AEP Transmission Zone M-3 Process
Scottsville

Need Number: AEP-2020-AP032

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:
Needs Meeting 5/22/2020
Solutions Meeting 12/18/2020

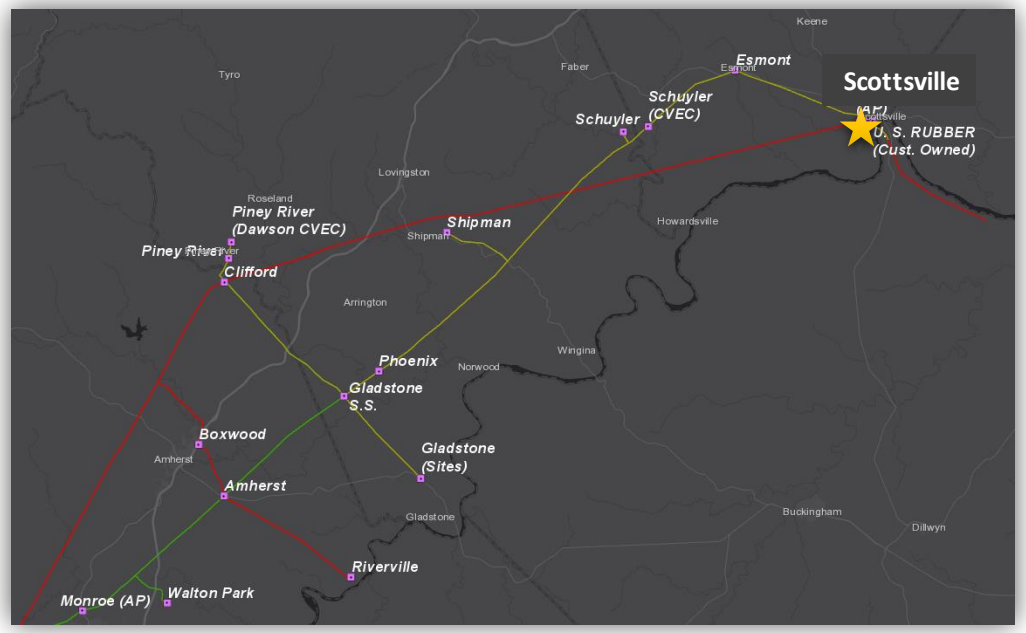
Project Driver:
Equipment Material/Condition/Performance/Risk

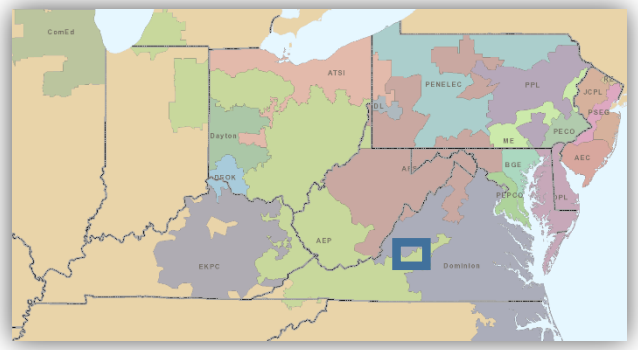
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Scottsville Station:

- 138/46 kV Transformer #1 (connected in parallel with T2)
  - 1950 Vintage Transformer
  - Unit has low levels of dielectric strength, indicating an increase in particles within the oil which decreases the ability to withstand fault events, leading to damage to the paper insulation.
  - Observed high oil power factor and low oil dielectric strength are strong indications of elevated moisture in the oil.
- 138/46 kV Transformer #2 (connected in parallel with T1)
  - 1954 Vintage Transformer
  - Elevated levels of carbon dioxide and ethane indicate excessive decomposition of the paper insulating materials.
  - An upward trend in insulation power factor indicates an increase in particles within the oil and the dielectric strength of the insulation system (oil and paper) are in poor condition, impairing the unit's ability to withstand electrical faults.
- 138/46 kV Transformer #5
  - 1950 Vintage Transformer
  - This transformer is the source for documented excessive sound and complaints from nearby home owners, which required a sound abatement wall.





AEP Transmission Zone M-3 Process
Scottsville

Need Number: AEP-2020-AP046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

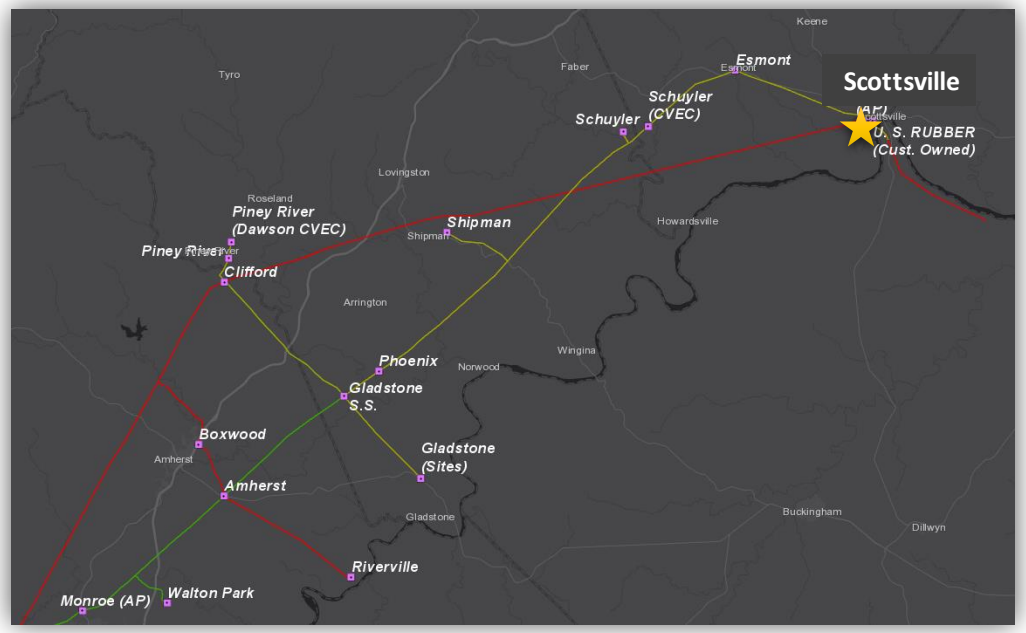
Previously Presented:
Needs Meeting 11/20/2020
Solutions Meeting 12/18/2020

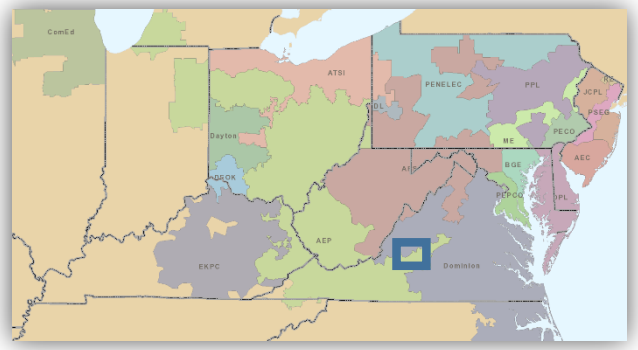
Project Driver:
Customer Service/Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7), AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- **Scottsville Station**
  - AEP Distribution is requesting additional load serving capability at Scottsville Station
  - 46 kV Circuit Breaker E:
    - 72EPB-31.5-20 Type, SF-6 filled breaker manufactured in 1992
    - This circuit breaker has experienced 116 fault operations, exceeding the manufacturer's designed number of 15 full fault operations. Each of these fault operations is likely not at the full fault current rating of the circuit breaker, but with each fault operation of any magnitude comes accelerated aging.
    - Since 2003, there have been 24 gas leak malfunction records associated with CB E at Scottsville
    - These model types have historically exhibited bad gas leaks, bushing failures, and CT cores getting wet.





Need Number: AEP-2020-AP032, AEP-2020-AP046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

At Scottsville station, replace the existing 138/46 kV, 20 MVA transformer #1 & #2 (connected in parallel) and 138/46 kV, 20 MVA transformer #5 with two 138/46 kV, 30 MVA transformers; replace 46/12 kV, 5 MVA transformer #3 with 46/12 kV, 20 MVA transformer; replace 46 kV circuit breaker E; add 12 kV circuit breaker & feeder. A ring bus configuration was considered but there is no additional room at the station to accommodate a ring. Therefore, a straight bus configuration is proposed.

Estimated Cost: $7.0 M (s2439)

Ancillary Benefits: This project will be coordinated with B3608 addressing all the needs as one holistic solution

Projected In-Service: 10/31/2022

Supplemental Project ID: s2439

Project Status: Scoping

Model: 2024 RTEP

No Bubble Diagram
Station Work Only

Need Number: AEP-2020-OH035

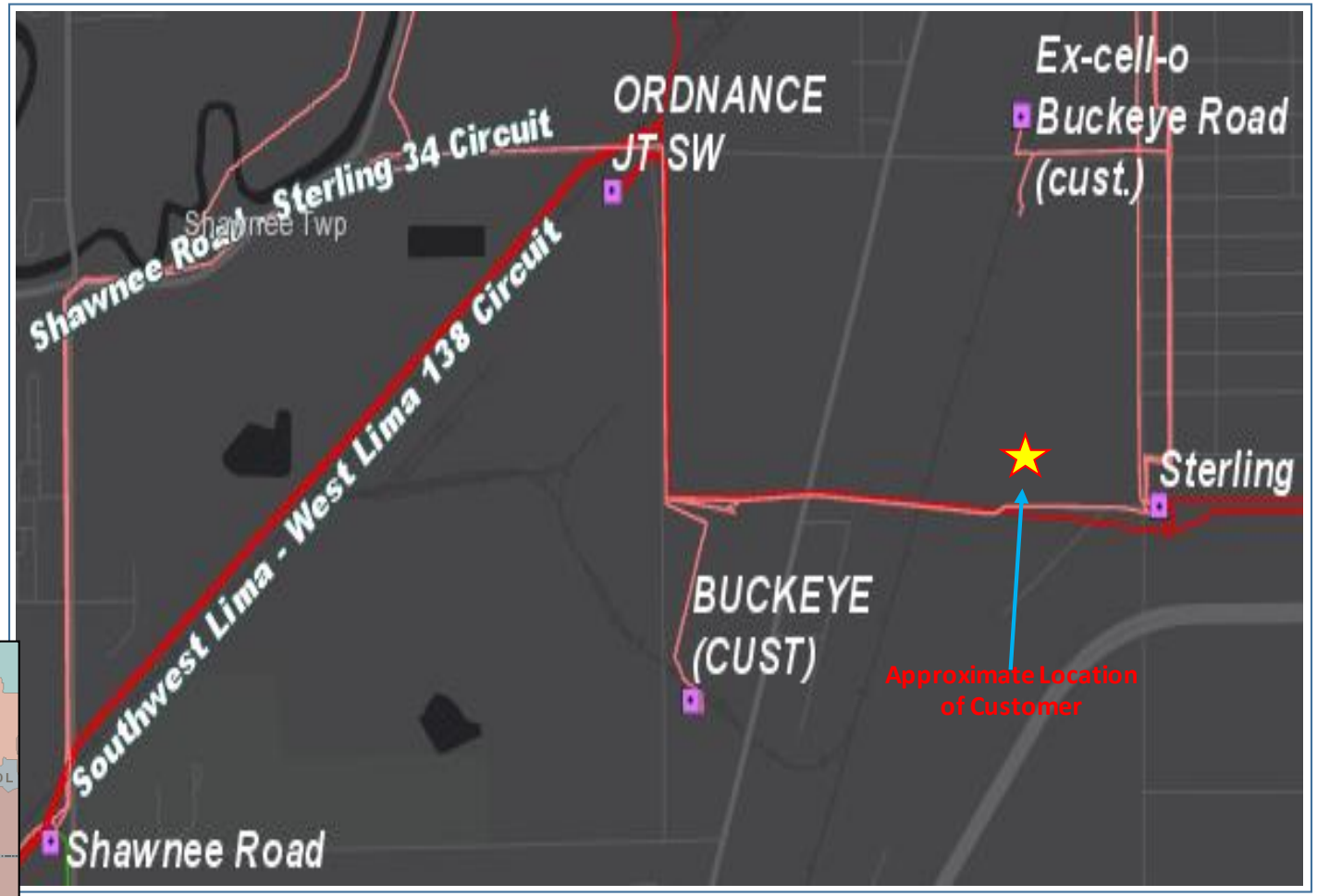
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

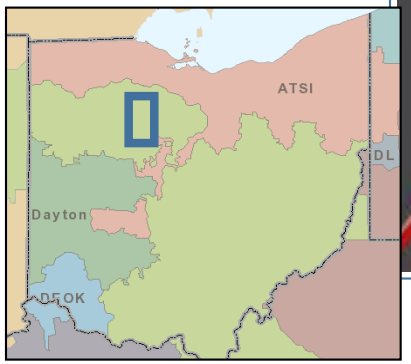
Previously Presented:
Needs Meeting 07/17/2020
Solutions Meeting 11/20/2020

Project Driver:
Customer Service

Specific Assumption Reference:
AEP Connection Requirements for the AEP Transmission System

Problem Statement:
A request has been made by a customer to provide service for a 1.7 MW load to be connected to the Shawnee Road – Sterling 34.5kV circuit.





Need Number: AEP-2020-OH035

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- Cut-in the Sterling Extension line asset at Str. 8 to install the new Lima Petrol Switch. **Estimated Cost: $0.5M (s2427.1)**
- Build 0.07 mile line extension from Lima Petrol Switch to customer station. **Estimated Cost: $0.2M (s2427.2)**
- Install a new manually operated 1200A 3-way Phase over Phase switch named Lima Petrol Switch. **Estimated Cost: $0.2M (s2427.3)**

Estimated Cost: $0.9M

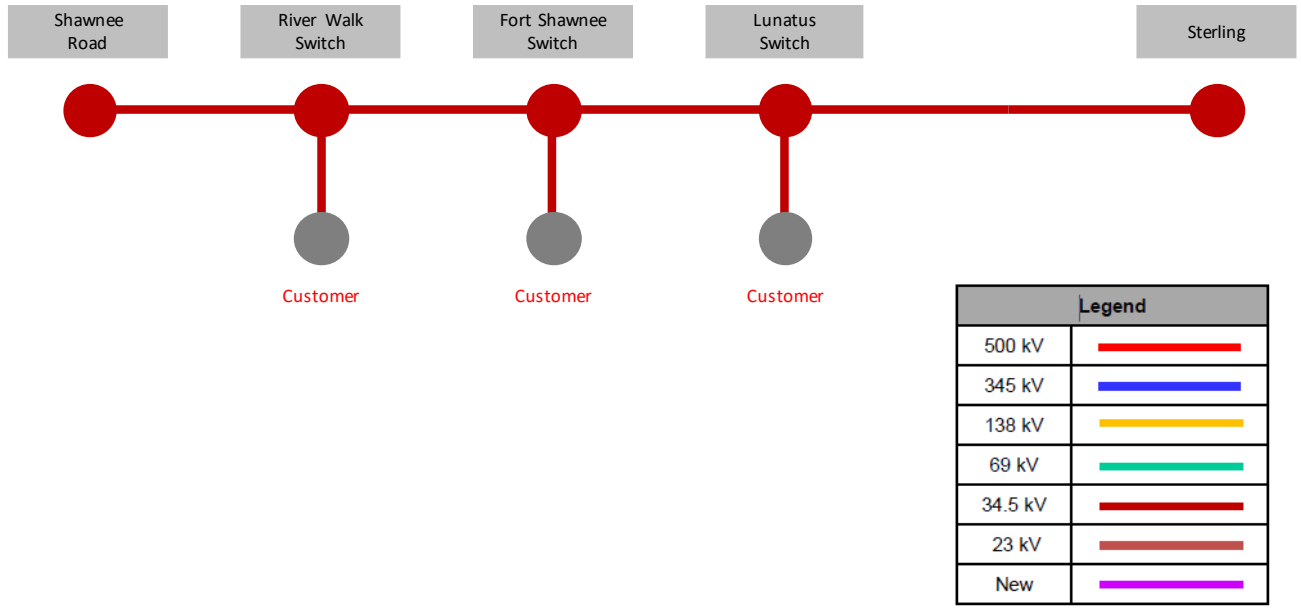
Projected In-Service: 9/15/2021

Supplemental Project ID: s2427.1-.3

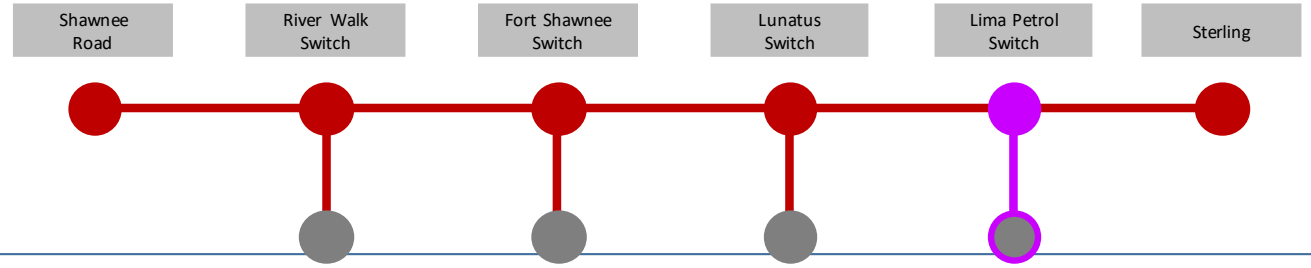
Project Status: Engineering

Model: 2025 RTEP

Existing Configuration:



Future Configuration:



AEP Transmission Zone M-3 Process
Grassy Hill Loop and Tank Hill Loop

Need Number: AEP-2020-AP038

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

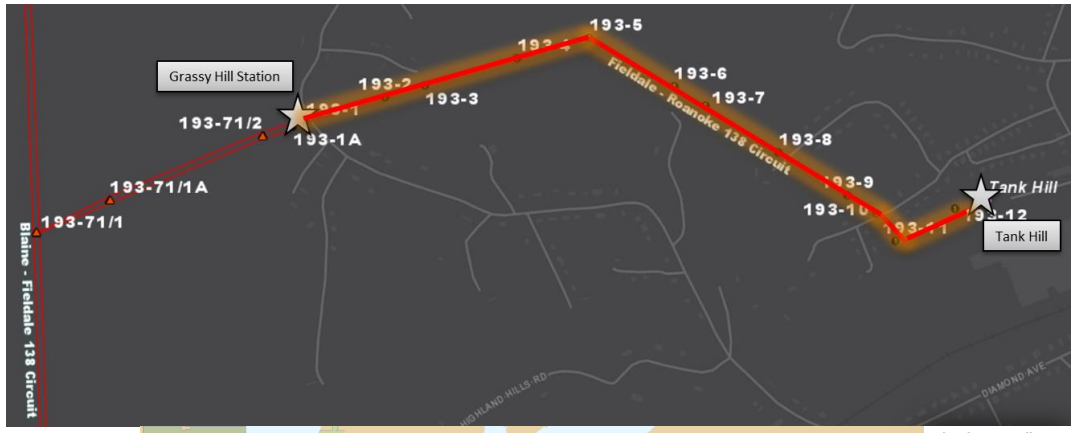
Previously Presented:
Needs Meeting 07/17/2020
Solutions Meeting 11/20/2020

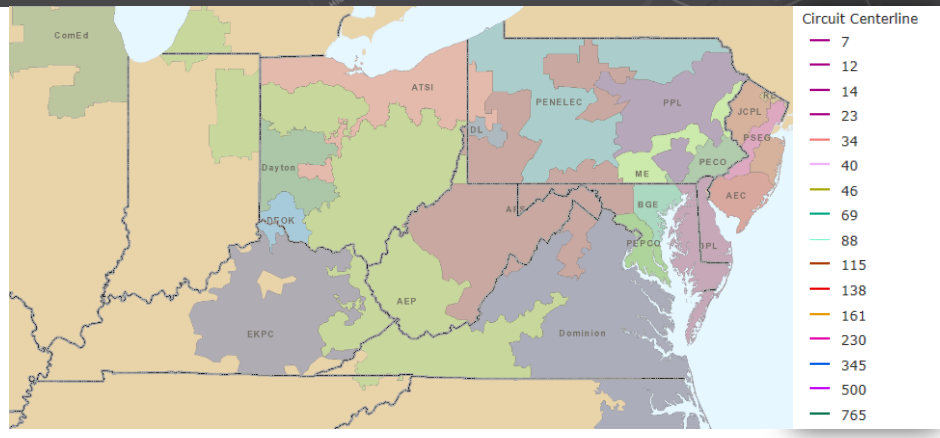
Project Driver:
Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- **Grassy Hill Loop and Tank Hill Tap 138 kV Line Asset (1.3 mi.)**
  - The single circuit wood pole structures that make up 0.95 miles of the 1.3 mile long Grassy Hill Loop and Tank Hill Tap 138 kV Line Asset are the focus of the concern.
  - Recent field assessments have identified severe Woodpecker holes and cracking damage, accounting for 67% of the 12 single pole structures on the radial line.
    - Weather cracks range in size from 2 to 7 feet in length, with many poles having multiple.
    - Woodpecker holes range in size from 1 to 5 inches in diameter and the poles have 10 to 30 of them.
    - A pole appears to be hollow on the inside.
    - A pole has mold on the upper portion, that is 10 feet in length.
  - The radial line feeds sensitive industrial customers in the Rocky Mount, VA area. These customers operate 24 hours a day and do not take outages. The Tank Hill station that is fed from the Fieldale – Roanoke line is the only station that can handle the industrial load.
  - From 2015, there have been 6 momentary and 2 permanent outages on the associated Fieldale - Roanoke circuit.





AEP Transmission Zone M-3 Process
Grassy Hill Loop and Tank Hill Loop

Need Number: AEP-2020-AP038

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

- Replacement of all the structures that make up the Grassy Hill Loop & Tank Hill Tap 138 kV line asset from the Grassy Hill switch to the Tank Hill Tap, consisting of approximately 0.95 miles of single circuit 138 kV wood poles. **Estimated Cost: $1.97M (s2429)**

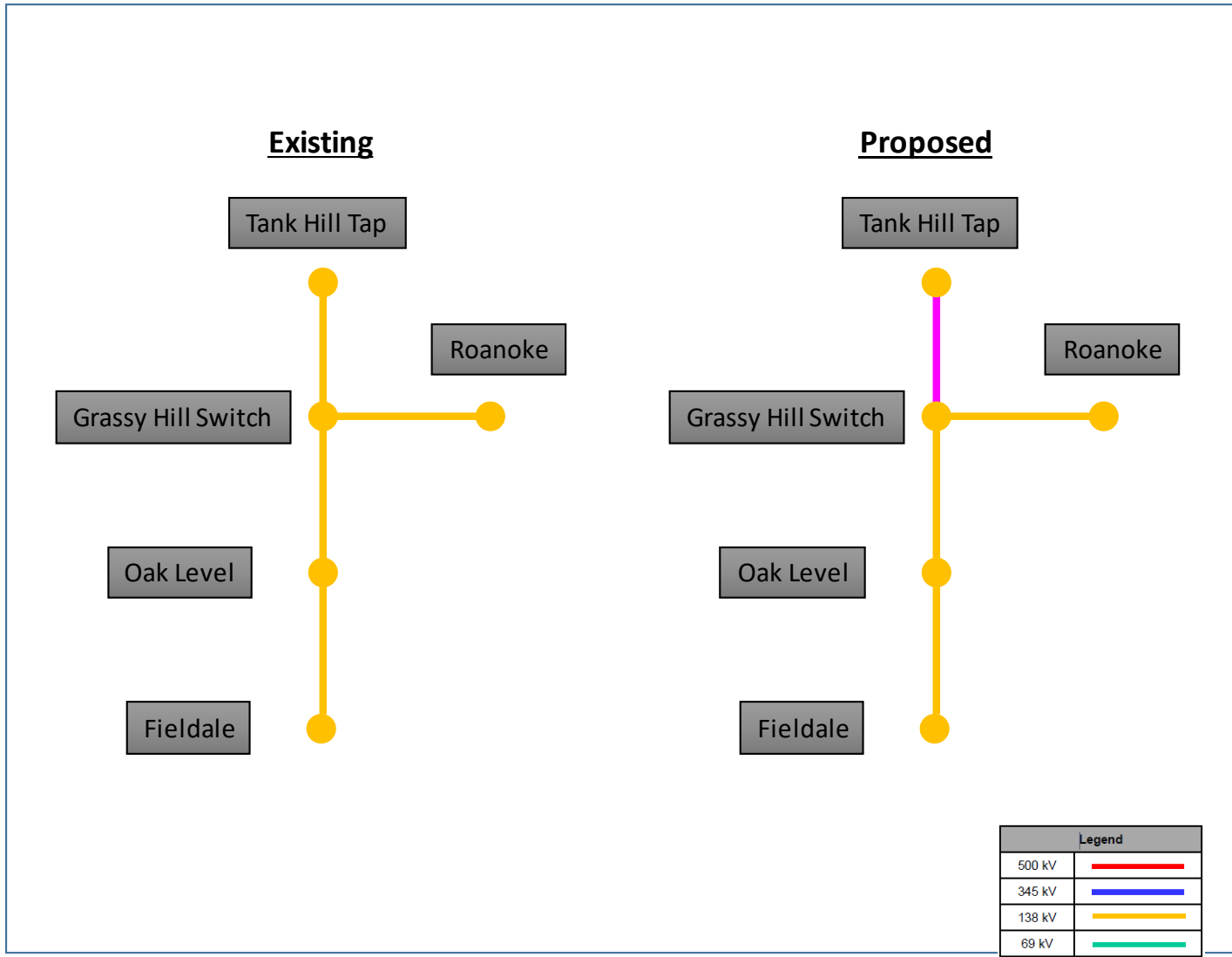
Estimated Cost: $1.97 M

Projected In-Service: 10/31/2021

Supplemental Project ID: s2429

Project Status: Scoping

Model: N/A



Need Number: AEP-2020-OH043

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Previously Presented:

Need Meeting 10/16/2020

Solutions Meeting 12/18/2020

Project Driver:

Equipment Material/Condition/Performance/Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (slide 8)

Problem Statement:

The condition of Slate Mills is very unsafe; the structures have been deemed a failure the week of August 17th 2020. Much of the wooden structures are in a state where collapse could easily happen. Any attempt at repair would be dangerous and might precipitate the collapse that we would be trying to mitigate.

Need Number: AEP-2020-OH043

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/08/2021

Selected Solution:

At Slate Mills, rebuild the existing 3-way switch as a In-Out Box Bay with 2-2000A switches on the line exits. **Estimated Cost: $0.8M (s2441.1)**

Re-terminate the Ross – Highland 69kV line into the rebuilt station. **Estimated Cost: $0.7M (s2441.2)**

Remote end relay and coms work at Adena, Biers Run, & Ross. **Estimated Cost: $0.7M (s2441.3)**

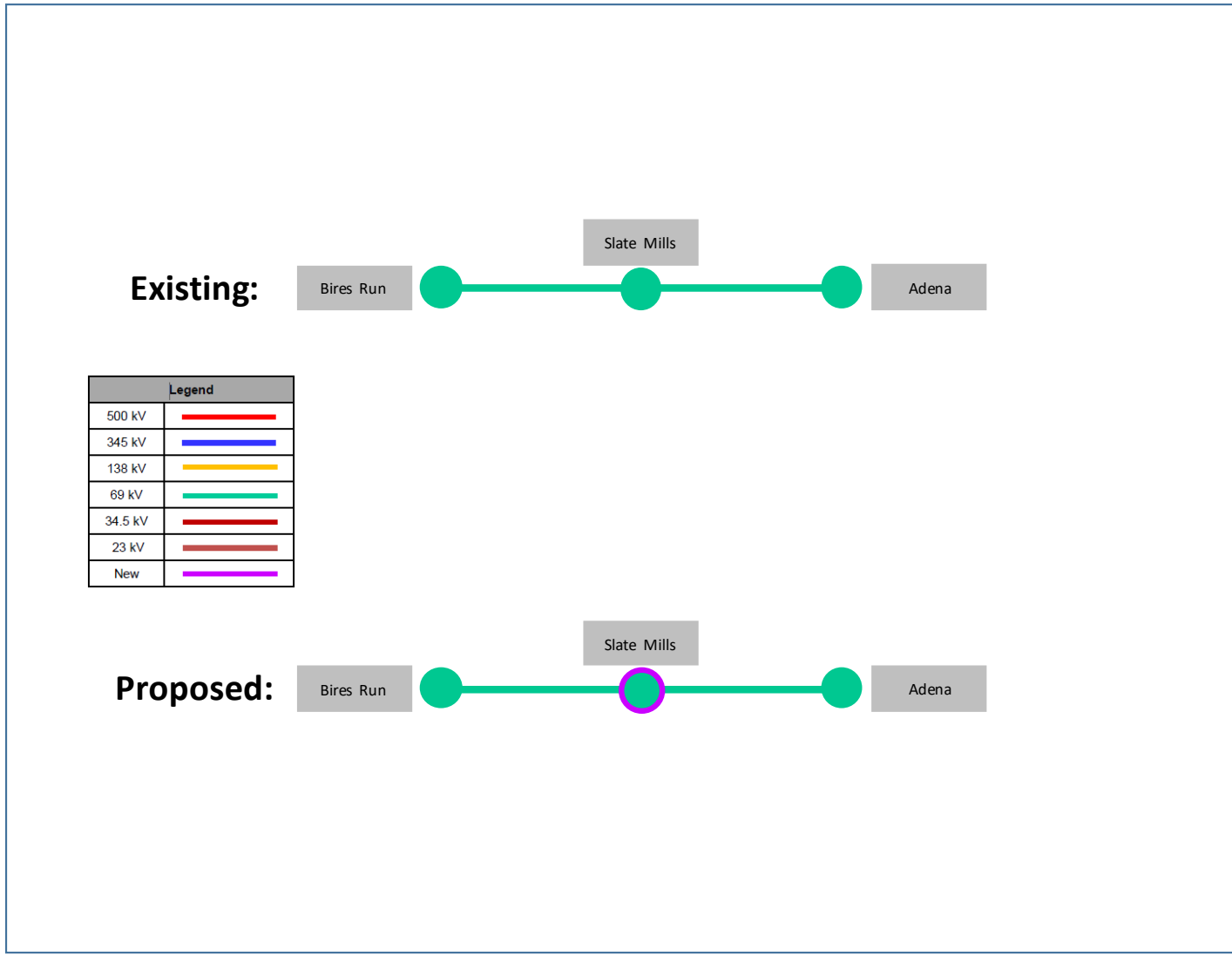
Total Estimated Transmission Cost: $2.2M

Projected In-Service: 12/31/2021

Supplemental Project ID: s2441.1-.3

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Millbrook Park – Franklin Furnace

Need Number: AEP-2018-OH030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Previously Presented:
Needs Meeting 01/11/2019
Solution Meeting 02/17/2021

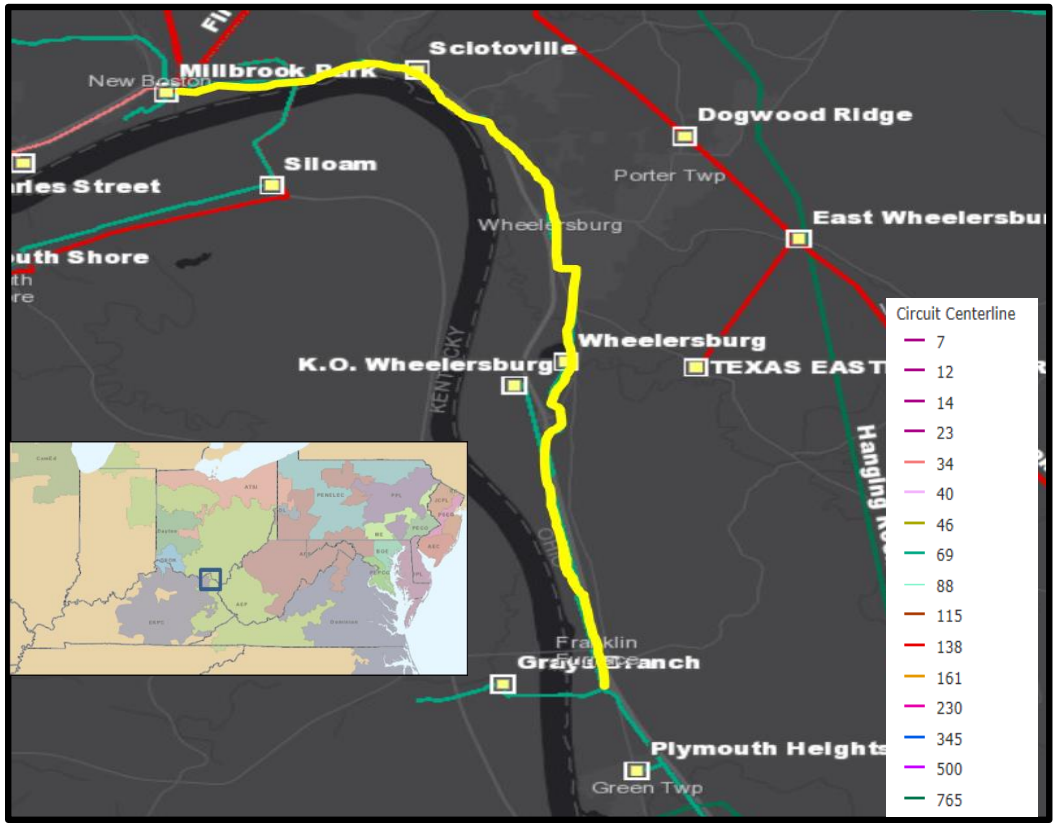
Project Driver:
Equipment Condition, Performance Risk, Customer Service, Operational Flexibility

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs.

Problem Statement:

- The 27-mile 69kV Portsmouth-Ironton line (vintage 1915) uses wood pole structures with variety of conductors, mostly 2/0 Cu (40 MVA rating). A 11.9 mile section between Millbrook Park and Franklin Furnace has 73 open A conditions, including rotten cross-arms, burnt/broken insulators, and loose/broken conductor hardware.
- The Millbrook Park-Franklin Furnace-Argentum line is a 3-terminal line. Three-terminal lines cannot be adequately protected due to the complexity of coordination, which, causes misoperations including over-tripping. The Millbrook Park-North Haverhill-Argentum circuit is protected by an impedance based Directional Comparison Blocking (DCB) pilot system, which cannot adequately protect a three terminal lines.
- Over the past several years, the Millbrook Park-Argentum-North Haverhill circuit has experienced reliability issues including 5 sustained outages and 21 momentary outages.
- The Texas Eastern Substation serves a peak load of 26 MW via a 2.1-mile radial line from East Wheelersburg. Also, K.O. Wheelersburg is a 1.2 MVA 69 kV retail load served off a 1.3-mile radial line. These radial loads are at risk of extended outages for line maintenance or repair.
- At Sciotoville, CBs A and B are both oil type breakers with 16 and 10 fault operations respectively. This particular model has no spare parts and a history of poor reliability. Sciotoville has a ground switch MOAB on the transformer. Ground switch MOAB's cause intentional high side faults to clear the transformer faults which cause damage to and reduction in life of nearby equipment.
- Sciotoville and Wheelersburg currently have 8 (of 10) and 10 (of 10) electro-mechanical relays respectively. EM relays have no spare part availability, a lack vendor support, no SCADA functionality, and no fault data collection ability.



AEP Transmission Zone M-3 Process
Millbrook Park – Franklin Furnace

Need Number: AEP-2018-OH030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Selected Solution:

Rebuild ~2 miles of 138kV line between East Wheelersburg and Texas Eastern using 795 ACSR 26/7 Drake (SE 359 MVA). **Estimated Cost: $3.41M**

NOTE: The remaining needs identified with AEP-2018-OH030 are addressed with the proposed scope change associated with b2604. This rebuild will be done in conjunction with that project.

Estimated Cost: $3.41M

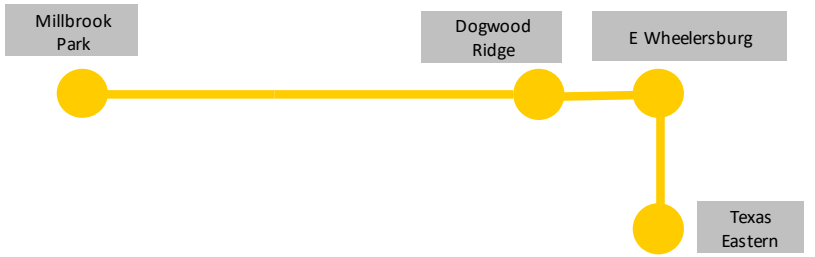
Projected In-Service: 4/15/2025

Supplemental Project ID: S2464

Project Status: Scoping

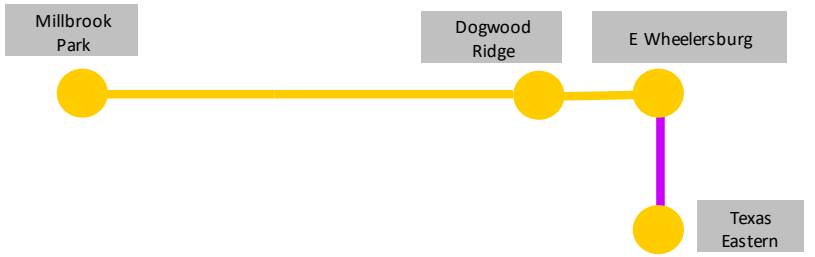
Model: N/A

Existing:

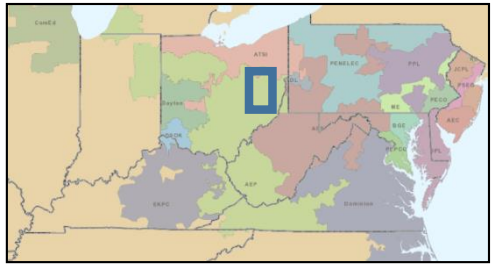


Legend	
500 kV	
345 kV	
138 kV	
69 kV	
34.5 kV	
23 kV	
New	

Proposed:



AEP Transmission Zone M-3 Process
Philo-Newcomerstown



Need Number: AEP-2019-OH018

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Previously Presented:
Need Meeting 4/23/2019
Solution Meeting 2/17/2021

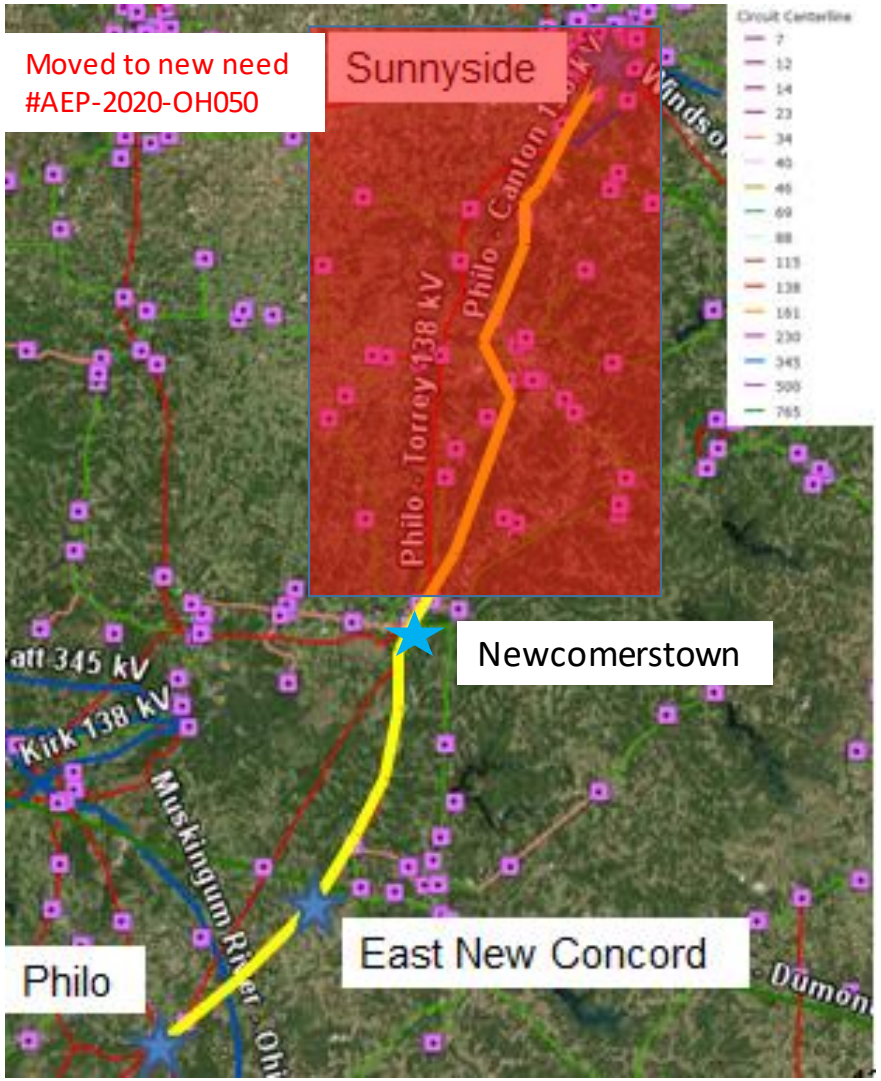
Project Driver:
Equipment Material/ Condition/Performance/Risk and Operational Flexibility

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs

Problem Statement:

- The Philo-Newcomerstown ~~Sunnyside~~ 138kV transmission line section is 33 ~~75~~ miles long, originally constructed in 1923. The vast majority of the structures are still original, as well as the six-wired 336 ACSR conductor, insulators, and hardware. This line is made up of several circuits connected between Muskingum River and Newcomerstown ~~Sunnyside~~ stations.
- Insulator assemblies are showing corrosion and deterioration, which could lead to additional failures and safety concerns.
- There have been 1.4 ~~2.1~~ million customer-minutes-of-interruption (CMI) over the 2008-2018 time period.
- This line has experienced 8 ~~44~~ momentary outages and 3 ~~8~~ sustained outages over the past 10 years.
- The East New Concord Station is connected via a hard tap (no sectionalizing switches present). Lack of sectionalizing requires a substation outage whenever maintenance or emergency repairs are performed on either side of the 138kV tap.



AEP Transmission Zone M-3 Process
Philo-Newcomerstown

Need Number: AEP-2020-OH001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

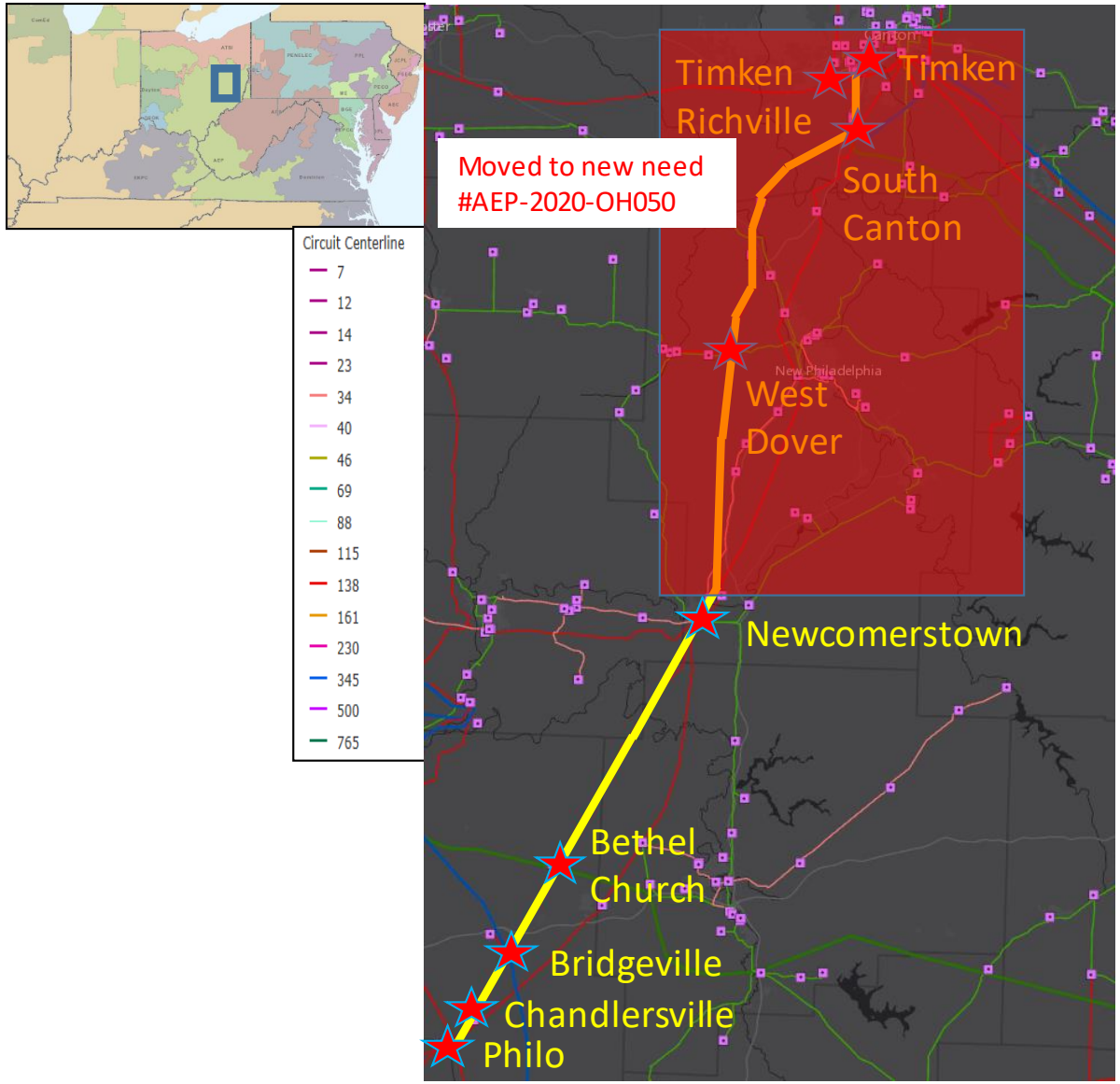
Previously Presented:
Need Meeting 3/19/2020
Solution Meeting 2/17/2021

Project Driver:
Equipment Material Condition, Performance and Risk; Operational Flexibility & Efficiency

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8), AEP Presentation on Pre-1930s Lines

Problem Statement:
The Philo-Newcomerstown ~~Torrey~~ 138kV transmission line section ~~asset~~ is 32 ~~70.8~~ miles long and consists of portions of the following circuits: Philo-South Canton (32 ~~68.2~~ miles of the total circuit length of 75.2 miles), ~~South Canton-Timken Richville (2.0 of 3.5 miles), and Timken Richville-Timken (0.6 of 3.4 miles)~~. The line was originally built in 1942 with steel lattice towers. The conductor is 6-wired single-circuit, with one side installed in 1942 (397 ACSR) and the other side installed in 1954 (477 ACSR). The line does not meet current grounding and shielding requirements, due to the condition of the obsolete shield wire size (159 ACSR), and the line shielding angle being inadequate. This T-line exhibits similar conditions as the examples listed in AEP's 1930's steel lattice tower line presentation.

The Philo-South Canton 138kV circuit has experienced 18 ~~15~~ momentary outages over the past 5 years ~~(zero sustained outages, resulting in zero CMI)~~ and 4 sustained outages, resulting in 437,567 minutes of CMI. There are currently 18 open conditions on the circuit. Examples of the conditions include: burnt insulators, worn hardware, rusting towers, damaged shield wire, and severe rusting of the tower steel.



AEP Transmission Zone M-3 Process
Philo-Newcomerstown

Need Number: AEP-2020-OH001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Previously Presented:

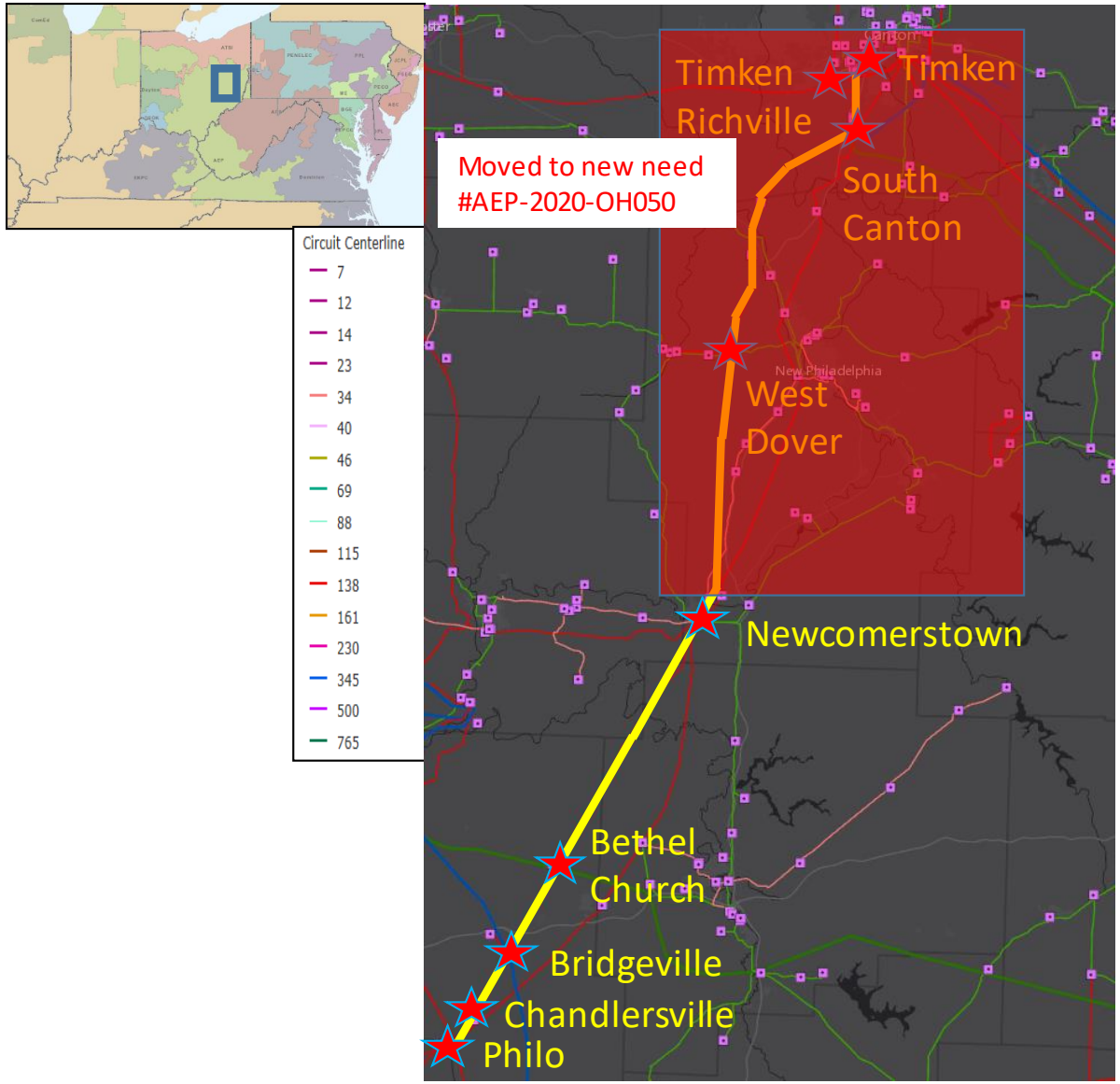
Need Meeting 3/19/2020

Solution Meeting 2/17/2021

The Philo-Newcomerstown ~~South Canton~~ 138kV circuit contains 3 consecutive hard taps: Chandlersville Co-op, Bridgeville, Bethel Church Co-op. Without line sectionalizing switches at these taps, it makes it very difficult to perform T-Line maintenance and restoration activities. Outages must be scheduled with the customers at each of these stations whenever the 138kV circuit needs taken out of service.

~~In addition, the West Dover 138-69kV station creates a 3-terminal point on the line, due to the lack of 138kV line breakers or a 138kV transformer protection device (just a MOAB/ground switch system today). This complicates the circuit protection scheme and is a risk for misoperations and over tripping. In addition, due to the lack of breakers at the station, there are 3 dissimilar zones of protection combined: 138kV circuit, 138-69kV XFMR, 69kV bus.~~

**Note that due to the long mileage of both transmission line needs (over 70 miles each), the previous two AEP Needs have been reduced, to include only the southern-most section between Philo and Newcomerstown stations. The solutions to the needs between Newcomerstown north to the Canton area will be presented in future PJM meetings, as solutions are studied and developed; these are placed in new Need AEP-2021-OH009.*



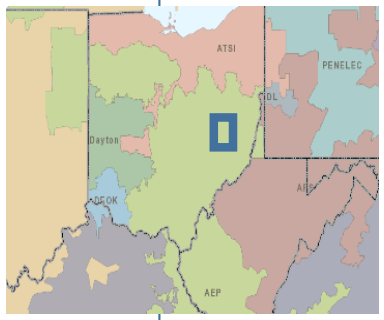
AEP Transmission Zone M-3 Process
Philo-Newcomerstown

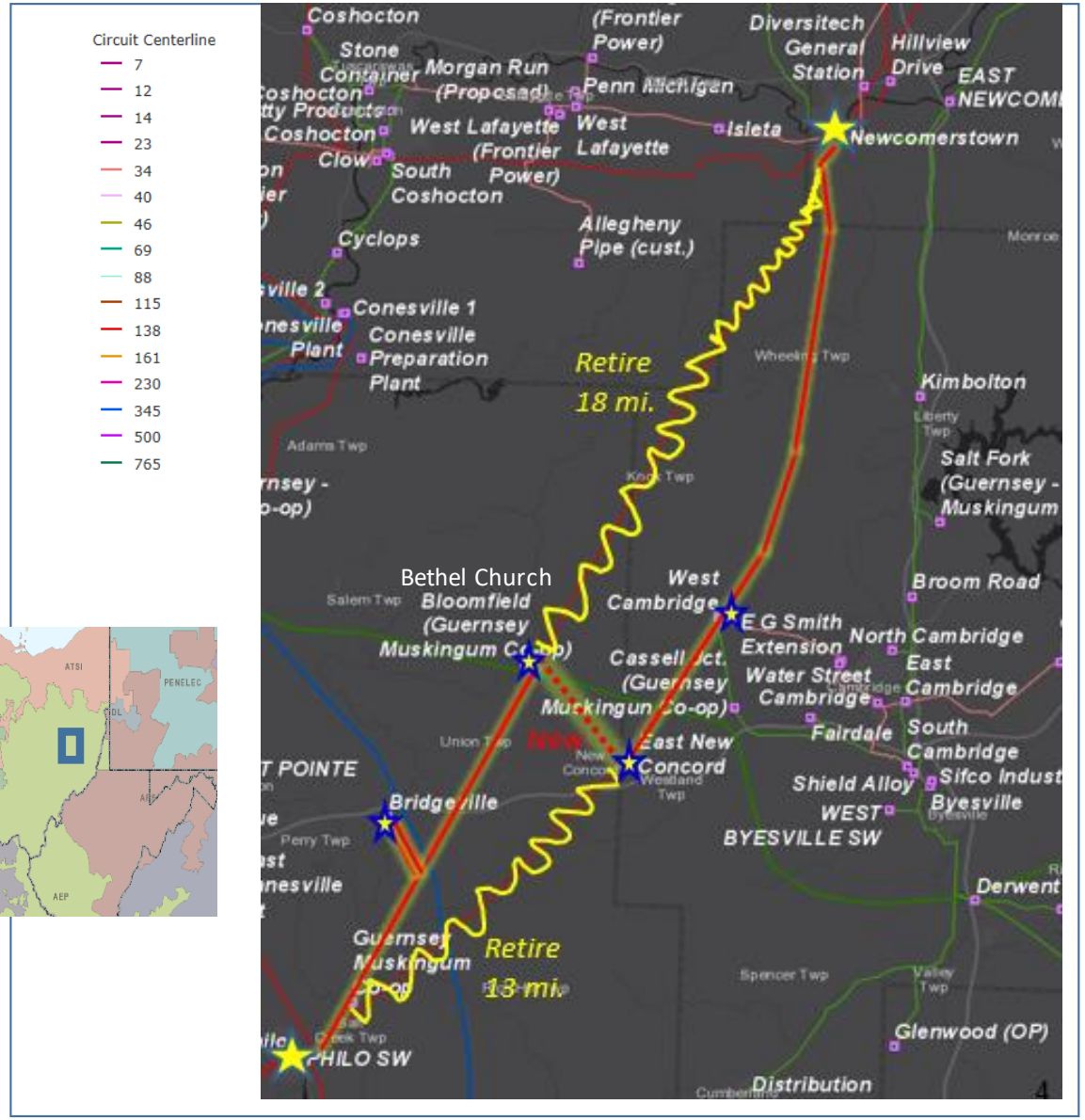
Need Number: AEP-2019-OH018 & AEP-2020-OH001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Selected Solution:

- Retire ~3 miles of the Philo- Canton 138kV line, between Philo and East New Concord. Estimated Cost: $6.18M **(s2465.1)**
- Retire ~18 miles of the Philo-Torrey 138kV line, north of Bethel Church/Bloomfield and stopping at Newcomerstown Estimated Cost: $6.01M **(s2465.2)**
- Rebuild from Philo to Str 62 a ~13.07 mile section of the Philo – Torrey 138kV line as double circuit, using 795 KCMIL 26/7 ACSR "Drake" conductor. Estimated Cost: $32.65M **(s2465.3)**
- Build a greenfield ~4.76 mile double circuit line between Str. 62 on the Philo – Torrey line to the greenfield East New Concord Switch, using 795 KCMIL 26/7 ACSR "Drake" conductor. Estimated Cost: $13.27M **(s2465.4)**
- Rebuild from the greenfield East New Concord Switch to Newcomerstown station a ~19.72 mile section of the Philo – Canton 138kV line as double circuit, using 795 KCMIL 26/7 ACSR "Drake" conductor. Estimated Cost: $49.26M **(s2465.5)**
- Install a 3 Way Phase Over Phase Switch, 1200A, 138 KV Full SCADA Functionality (Rustic Switch) to replace the hard tap to Bridgeville. Estimated Cost: $0.63M **(s2465.6)**
- Rebuild the 1.9-mile radial T-line tap to Bridgeville as a double-circuit in-and-out loop up to the new 3-way switch, Rustic Switch. The new line will use 556.5 KCMIL ACSR 26/7 "Dove". Estimated Cost: $4.62M **(s2465.7)**
- Install a 3 Way Phase Over Phase Switch, 1200A, 138 KV Full SCADA Functionality (Chandlersville Switch) to replace the hard tap to Chandlersville. Estimated Cost: $0.63M **(s2465.8)**
- A new 0.12-mile double circuit 138kV loop line is to be constructed to replace the existing tap to GM Co-op Chandlerville station, to supply a loop line circuit to a new switch structure The new line will use 556.5 KCMIL ACSR 26/7 "Dove". Estimated Cost:$1.3M **(s2465.9)**





AEP Transmission Zone M-3 Process
Philo-Newcomerstown

Need Number: AEP-2019-OH018 & AEP-2020-OH001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Selected Solution:

- Install a 3 Way Phase Over Phase Switch, 1200A, 138 KV Full SCADA Functionality (Norfield Switch) to replace the hard tap to Bethel Church. Remove the existing Bloomfield 1-way switch. Estimated Cost : $0.65M **(s2465.10)**
- A new 0.5-mile double circuit 138kV line is to be constructed to replace a portion of the Philo- Torrey 138kV line, to supply a loop line circuit to a new two pole dead-end with one of the poles of the two pole dead-end supporting a new switch structure. From the switch structure, it will connect to an existing structure of the existing tap line to supply the Bloomfield – GM Co-op tap. The new line will use 556.5 KCMIL ACSR 26/7 "Dove." Estimated Cost:$0.96M **(s2465.11)**
- Install a 3 Way Phase Over Phase Switch, 1200A, 138 KV Full SCADA Functionality (East New Concord Switch) to replace the hard tap to East New Concord. Estimated Cost: $0.63M **(s2465.12)**
- Upgrade the line protection relays at Philo, replacing the electromechanical relays with modern microprocessor-based relays. Estimated Cost : $0.16M **(s2465.13)**
- Connect OPGW fiber to stations and switches along the route, for telecom network connectivity. Estimated Cost:$0.47M **(s2465.14)**

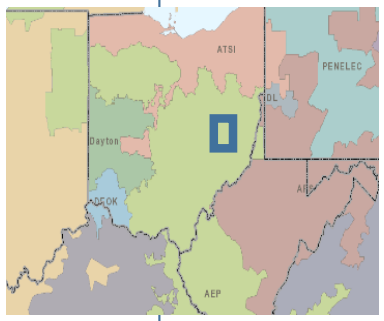
Estimated Cost: $117.42M

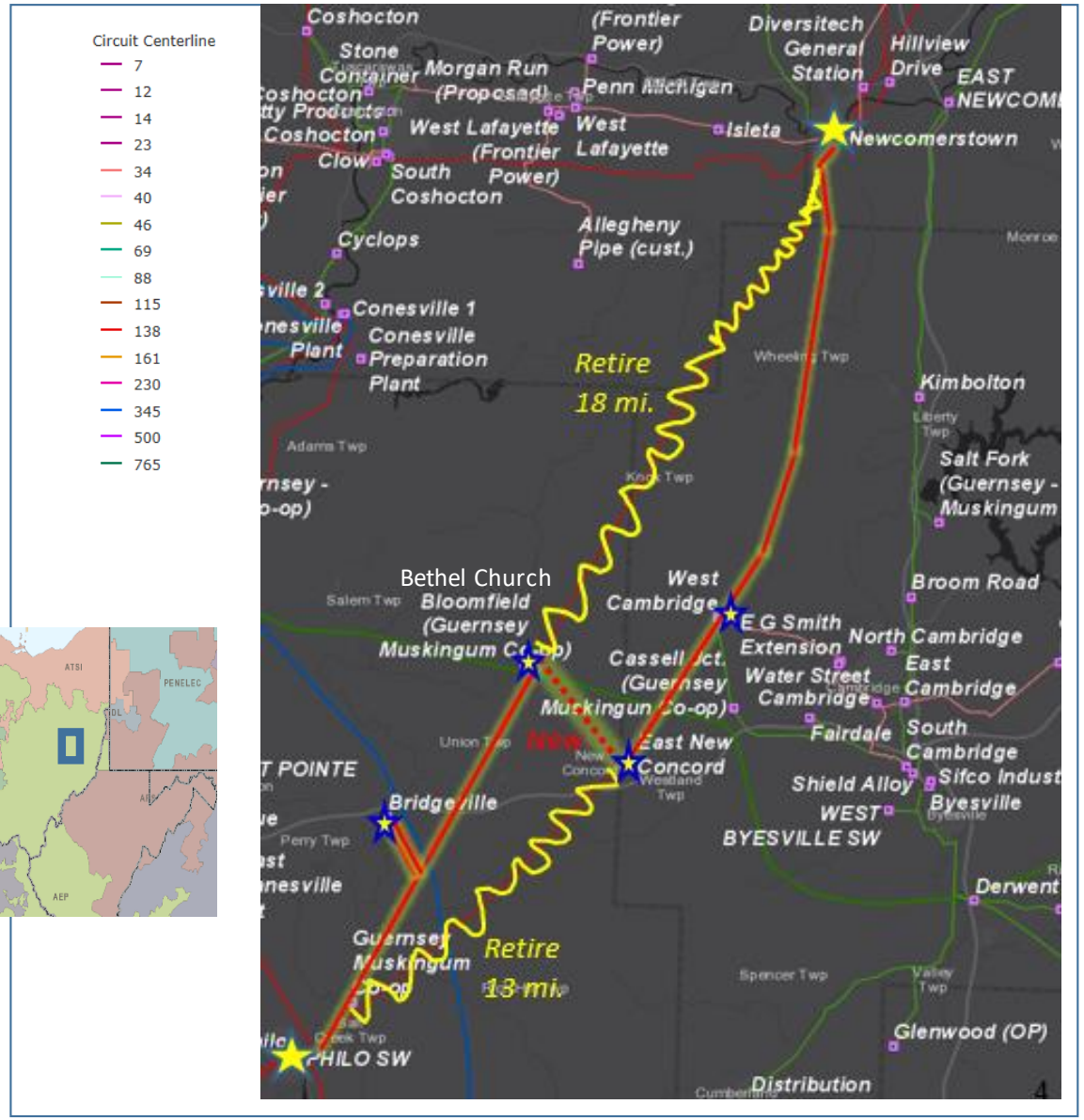
Projected In-Service: 12/1/2024

Supplemental Project ID: S2465.1-.14

Project Status: Scoping

Model: N/A





AEP Transmission Zone M-3 Process
Wes Del Transmission Upgrades

Need Number: AEP-2020-IM019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Previously Presented:

Needs Meeting 9/11/2020

Solution Meeting 2/17/2021

Project Driver:

Equipment Condition/Performance/Risk

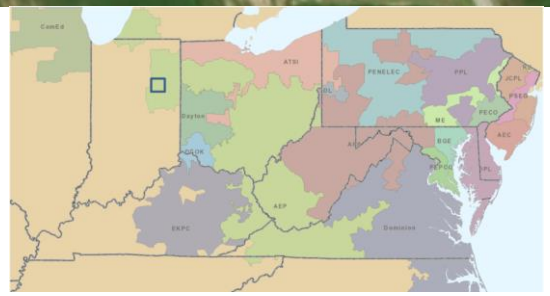
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Wes Del 138/12kv station

- 138/69/12 kV Transformer #1
  - Unit failed in February 2020, station currently served by mobile unit
  - 1968 vintage
- Line MOABs X & Y
  - Configuration of switches on non-standard structure makes them impossible to maintain without a transformer outage.
  - Due to switch operating condition and length of operating pipe, motor operators cannot be properly adjusted to attain full open/close position.
  - Switches were manufactured in 1969
  - Neither switch will fully close after operation without assistance.



AEP Transmission Zone M-3 Process
Wes Del Transmission Upgrades

Need Number: AEP-2020-IM019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Selected Solution:

Wes Del will now be connected to the Deer Creek – Desoto 138 kV circuit due to its location. It is easier access to it and avoids line crossings.

Install a 138 kV box bay with 138 kV 3000 A Moab switches towards Desoto and Deer Creek via Gaston.

Cost Estimate: $0.88 Million (s2466.1)

Reterminate the existing Desoto – Deer Creek – Delaware 138 kV line into the new station bays at Wes Del station with 0.2 miles of 636 ACSR 26/7. Remove 0.1 miles of the Desoto – Deer Creek – Delaware 138 kV line to accommodate the new connection of Wes Del to the Deer Creek – Desoto 138 kV circuit.

Cost Estimate: $0.51 Million (s2466.2)

Ancillary Benefits: Connecting Wes Del to the Deer Creek – Desoto 138 kV circuit will make it safer and easier to maintain given the proximity to the circuit. It is difficult for construction and design to bring a circuit under another circuit(south to north in this case). The station is north of the line so it is easiest and safer to energize and maintain the station from the northern circuit.

Estimated Cost: $1.39M

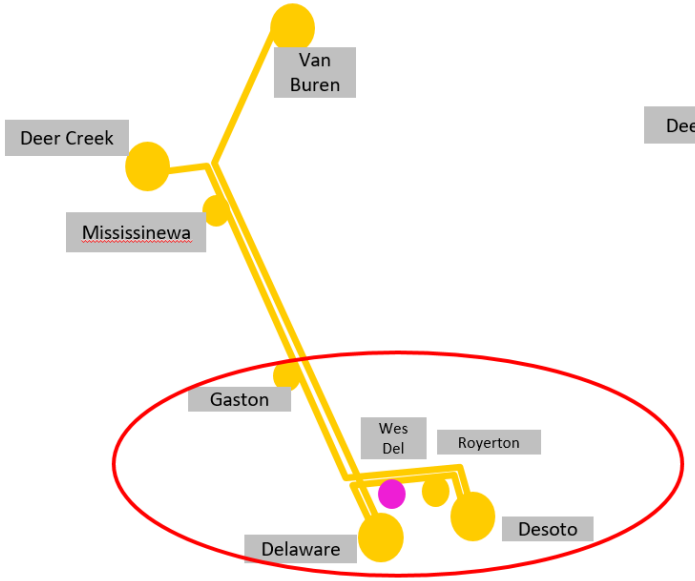
Projected In-Service: 1/2022

Supplemental Project ID: S2466.1-.2

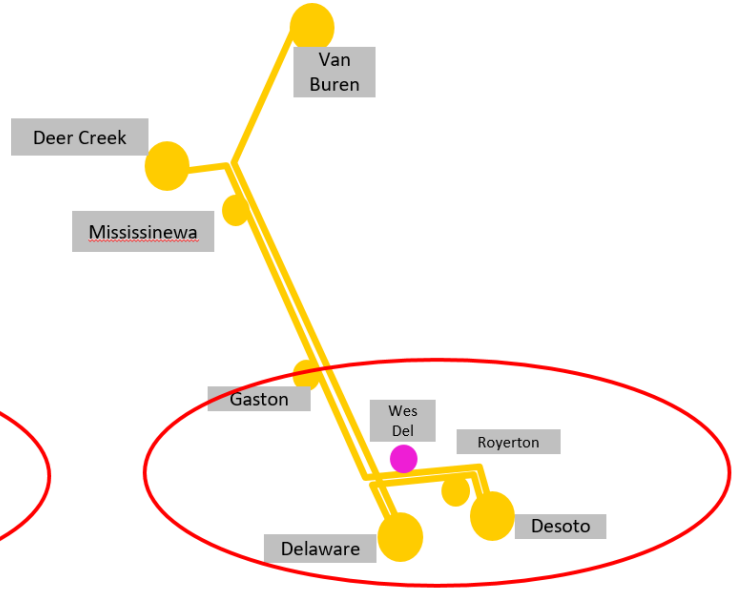
Project Status: Engineering

Model: N/A

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Payne 69kV

Need Number: AEP-2020-OH040

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Previously Presented:

Needs Meeting 9/11/2020

Solution Meeting 2/17/2021

Project Driver:

Equipment Material/Condition/Performance/Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (slide 11).

Problem Statement:

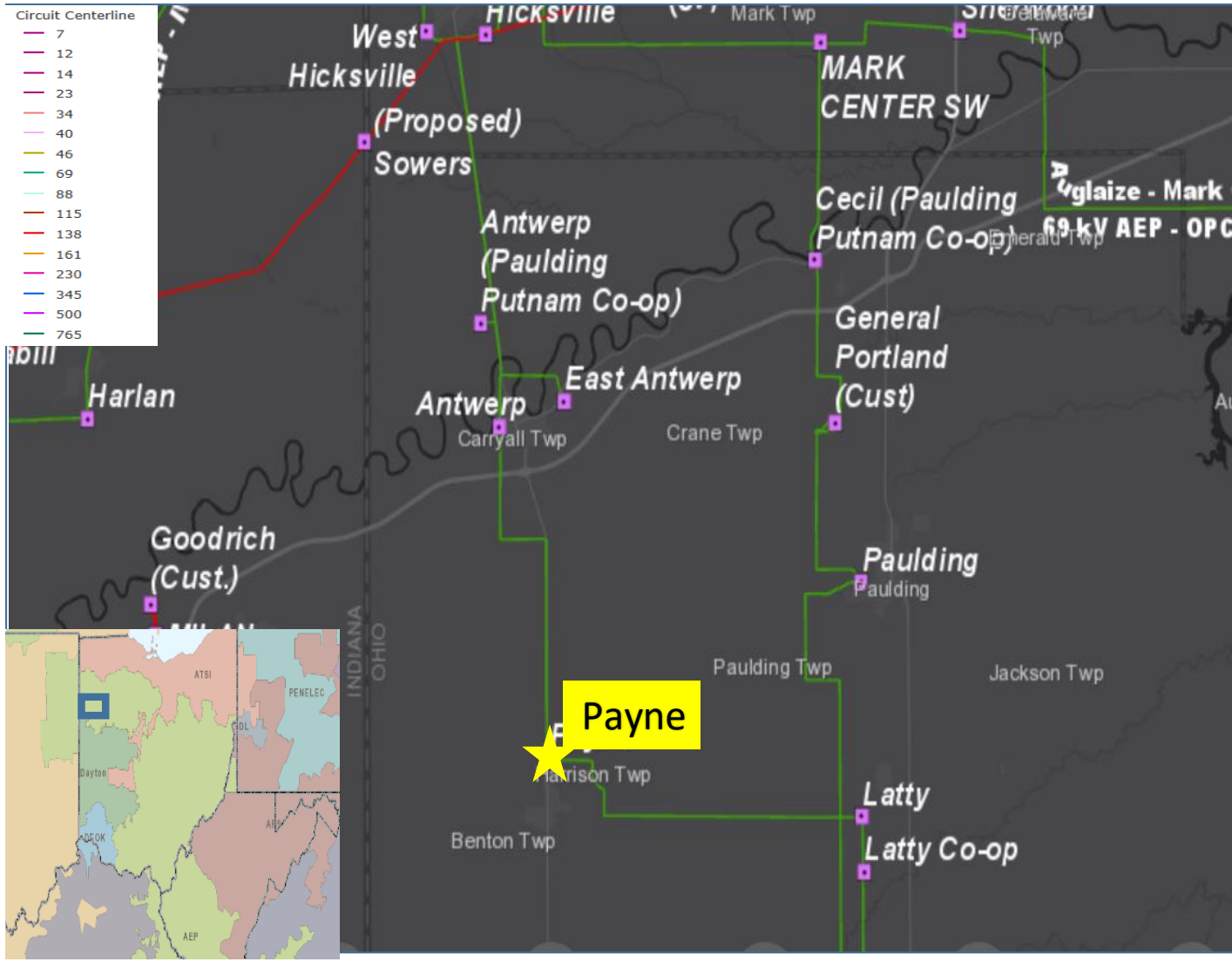
Station
Payne 69kV
CONDITION / PERFORMANCE / RISK ASSESSMENT:

- Two (2) 69 kV circuit breakers are oil filled breakers of 1960s vintage without oil containment and have exceeded the recommended fault operations of 10. These breakers have 66 and 46 fault operations respectively.
- 21 out 23 relays are electromechanical and 2 are static relays without vendor support
- The existing RTU is a legacy IBOX unit

Operational Flexibility and Efficiency

- The 69/12 kV transformer is a fused back with no sectionalizing capability.

  Breakers need to be opened to be able to safely work on the fuse.



Need Number: AEP-2020-OH040

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Selected Solution:

Payne: Replace circuit breakers B and C with 69kV 3000A 40kA breakers. Replace the EM relays with new relays and install a new control house. **Estimated Cost: $1.41M (s2467.1)**

Install a high side switch on the 69/12 kV transformer.

Estimated Cost: $0 (Distribution cost) (s2467.2)

Estimated Cost: $1.41M

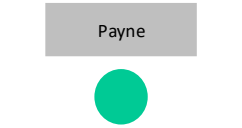
Projected In-Service: 07/31/2022

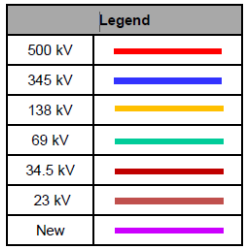
Supplemental Project ID: S2467.1-.2

Project Status: Scoping

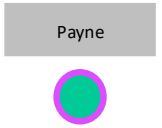
Model: N/A

Existing:





Proposed:



Need Number: AEP-2020-OH047

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Previously Presented:

Needs Meeting 11/202/2020
Solution Meeting 2/17/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (slide 13)

Problem Statement:

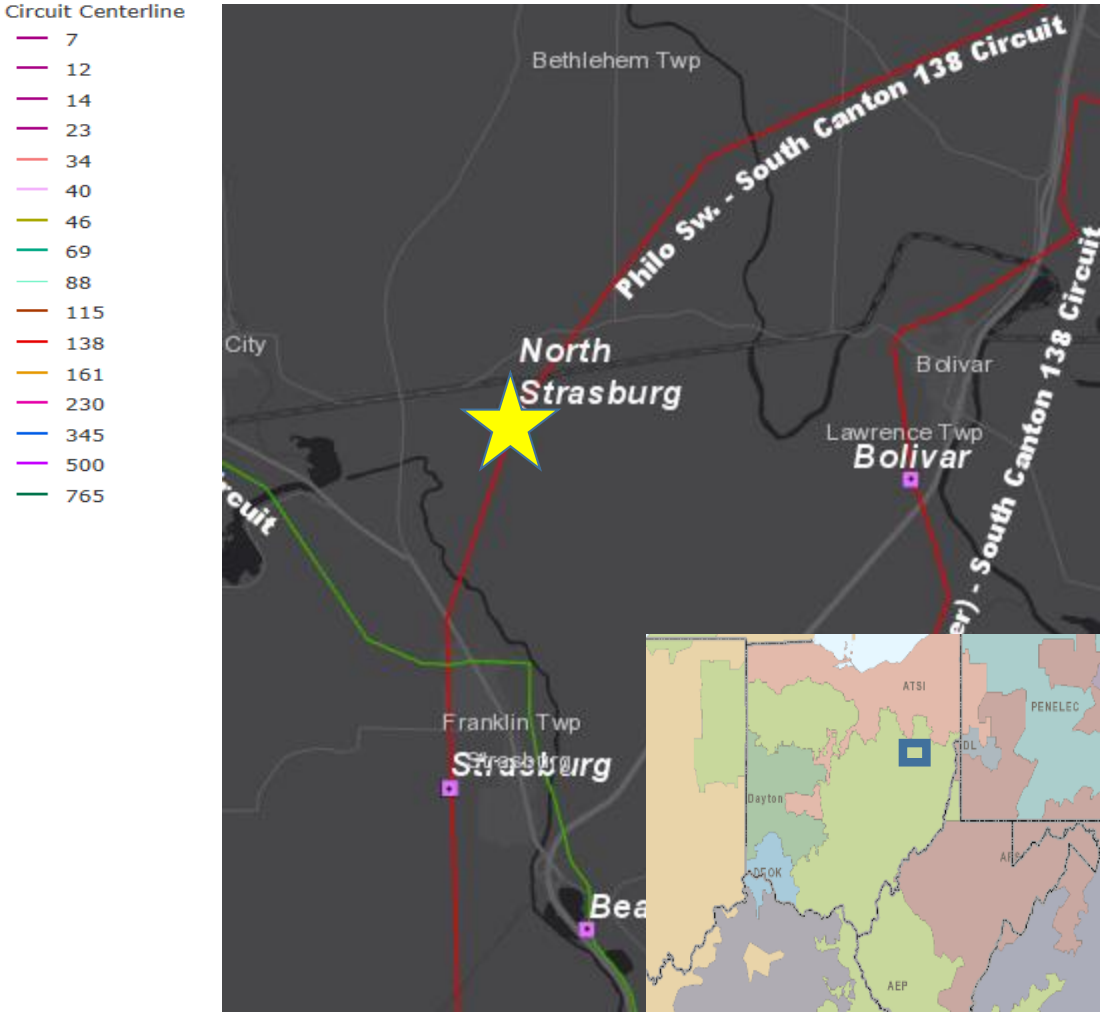
Station
North Strasburg 138kV
CONDITION / PERFORMANCE / RISK ASSESSMENT:

Equipment Concerns:

- The station utilizes two circuit switchers for 138kV sectionalizing devices on the through-path. The circuit switchers have failed and are no longer operable. They have been disabled to avoid a system misoperation.
    - 1966 vintage, S&C Electric type 'G' model (both switchers)
    - The motor mechanisms and relays no longer function properly.

Other Station Concerns:

- The circuit switchers are installed on deteriorating wood structures.



Need Number: AEP-2020-OH047

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/12/2021

Selected Solution:

Replace the failed 138kV circuit switchers with new station line switches. Replace the wood support structures with new steel structures. Add a high side fuse on the 138/4 kV (2.5 MVA) transformer.

Existing ratings (SN/SE/WN/WE):

North Strasburg-South Canton = 296/296/370/370 MVA

North Strasburg-Strasburg = 287/299/363/370 MVA

Future ratings (SN/SE/WN/WE):

North Strasburg-South Canton = 296/296/375/375 MVA

North Strasburg-Strasburg = 287/335/363/400 MVA

Estimated Cost: $0.23 M

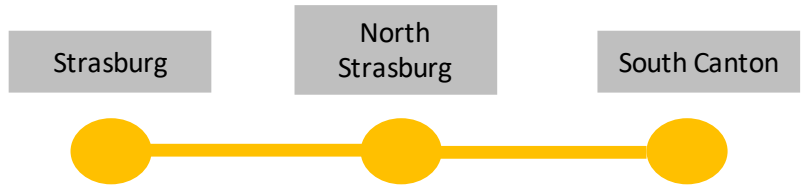
Projected In-Service: 7/1/2021

Supplemental Project ID: S2468

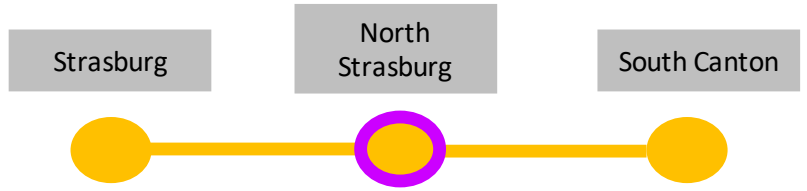
Project Status: Engineering

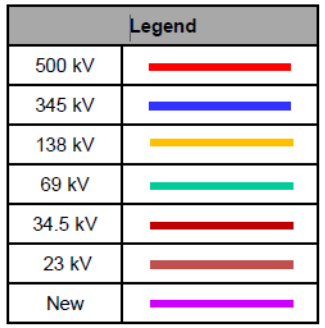
Model: N/A

Existing:



Proposed:





AEP Transmission Zone M-3 Process
Reusens – Roanoke 138kV Line Rebuild

Need Number: AEP-2020-AP027

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Previously Presented:
Needs Meeting 04/20/2020
Solutions Meeting 03/19/2021

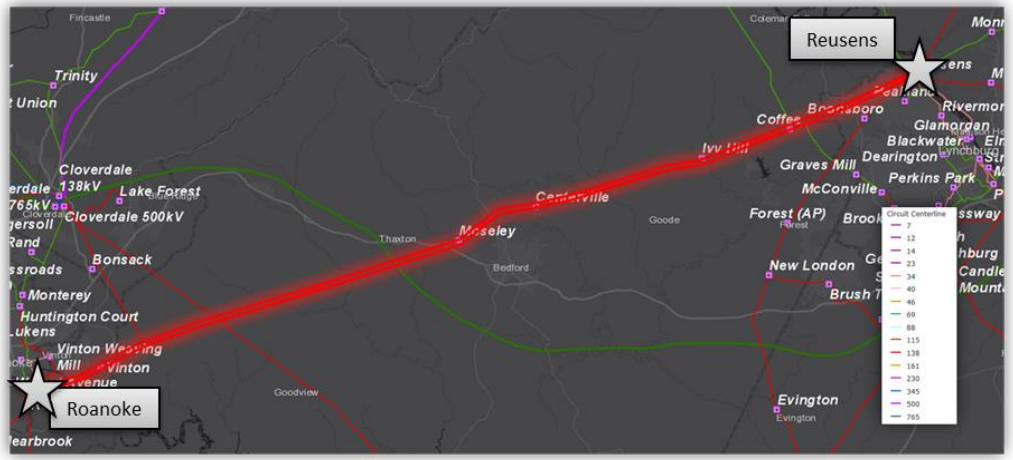
Project Driver:
Equipment Material/Condition/Performance/Risk

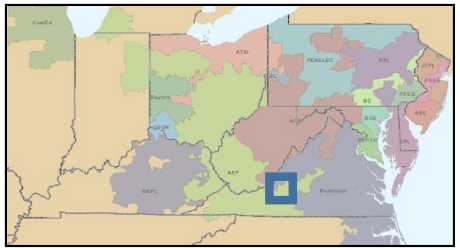
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8); AEP Eastern System Pre-1930s Era Lattice Tower and Transmission Line System

Problem Statement:

- **Reusens-Roanoke 138 kV Double Circuit Line Asset (43 mi.)**
  - Installed between 1926 and 1933 using double circuit steel lattice towers
  - Recent field assessments have identified severe ovalization of holes at hanger bar connections and severe cross arm and hanger rusting as well as uniform corrosion, pitting, and deformation of steel members below grade. Evidence of steel corrosion at joints and on upper steel members was also documented.
  - Ferrous clamps are present on this line asset; these types of clamps can cause accelerated degradation of conductor at connection points due to excess heat generated even when operated at acceptable, rated levels.
  - From 2014-2018, there have been 55 momentary and 12 permanent outages on the four circuits that comprise the Reusens-Roanoke line
    - **Cloverdale-Roanoke 138 kV Circuit***
      - From 2014-2018, 8 momentary and 1 permanent outage occurred resulting in 276,350 customer minutes of interruption impacting 69 MVA of peak load
      - Permanent outage(s) were caused by: Vegetation Fall-In (1)
    - **Cloverdale-Reusens 138 kV Circuit***
      - From 2014-2018, 28 momentary and 6 permanent outages occurred resulting in 1,467,704 customer minutes of interruption impacting 39 MVA of peak load
      - Permanent outage(s) were caused by: Lightning (4), Tree Removal (1), Vegetation Fall-In (1)
    - **Moseley-Roanoke 138 kV Circuit**
      - From 2014-2018, 9 momentary and 1 permanent outage occurred
      - Permanent outage(s) were caused by: Lightning (1)
    - **Moseley-Reusens 138 kV Circuit**
      - From 2014-2018, 10 momentary and 4 permanent outages occurred impacting 44 MVA of load (Town of Bedford)
      - Permanent outage(s) were caused by: Lightning (2), Vegetation Fall-In (1), Field Error (1)

*Note: Circuit is associated with both the Roanoke-Cloverdale and Reusens-Roanoke line assets





AEP Transmission Zone M-3 Process
Reusens – Roanoke 138kV Line Rebuild

Need Number: AEP-2020-AP033

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Previously Presented:

Needs Meeting 05/22/2020

Solution Meeting 03/19/2021

Project Driver:

Equipment Condition/Performance/Risk

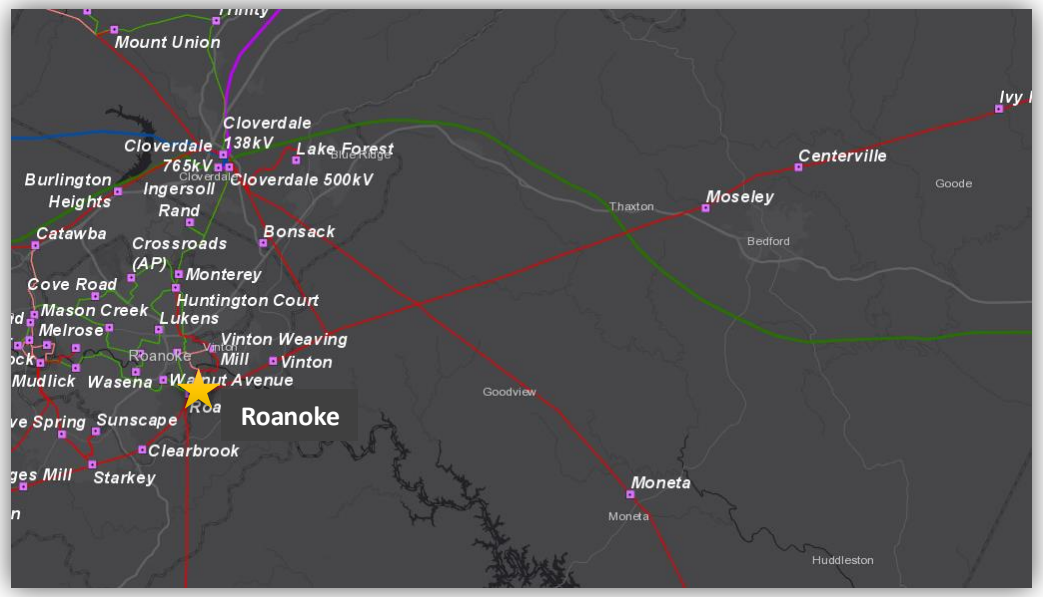
Specific Assumption Reference:

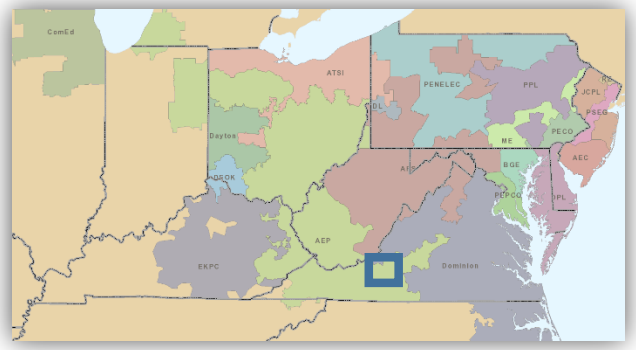
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Roanoke Station:

- 138/69/12 kV Transformer #5
  - 1981 Vintage Transformer
  - Elevated levels of carbon monoxide, carbon dioxide and hydrogen indicate excessive levels of decomposition of the paper insulating materials.
- 138 kV Circuit Switchers BB and CC
  - Both are 1990's vintage
  - The Mark V family of circuit switchers have no gas monitor and currently in-service units on the AEP system have experienced 110 malfunctions from May 2000 to August 2019. Failed operational components including high contact resistance, gas loss, and interrupter failure represent half of these malfunctions. Two malfunctions of note were catastrophic equipment failures involving failures to trip.
- 138 kV Capacitor Bank CC and 34.5 kV Capacitor Bank AA
  - Leaking around bushings on both banks
  - 6 cans are failed on bank CC
- 69 kV Circuit Breakers U and V
  - 1970's Vintage Circuit Breakers
  - These breakers are oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling that their modern, SF6 counterparts do not require
  - Circuit breaker U has each exceeded the manufacturer's designed number of full fault operations (12)





AEP Transmission Zone M-3 Process
Reusens – Roanoke 138kV Line Rebuild

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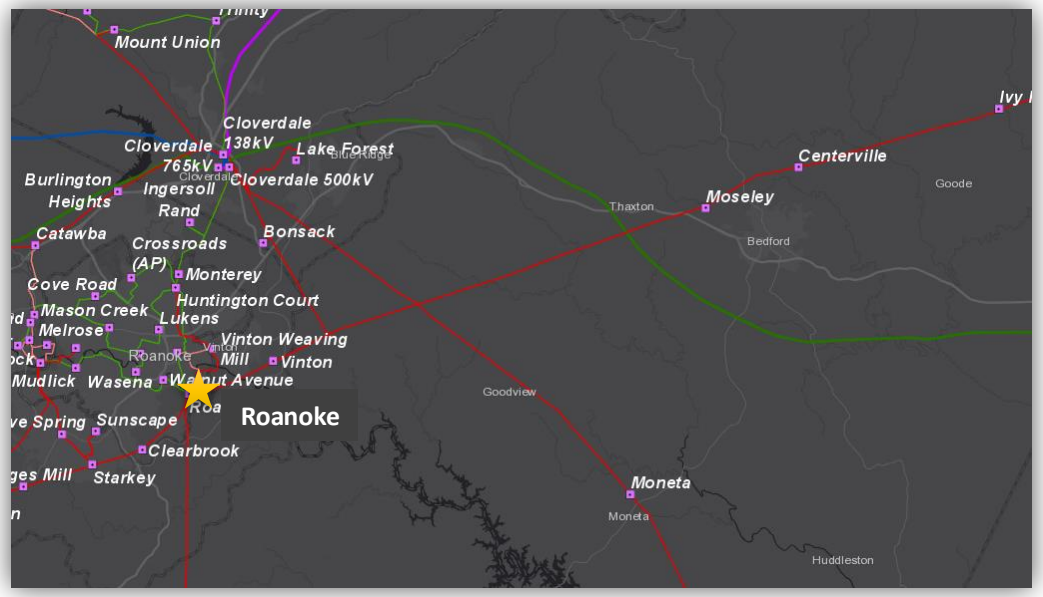
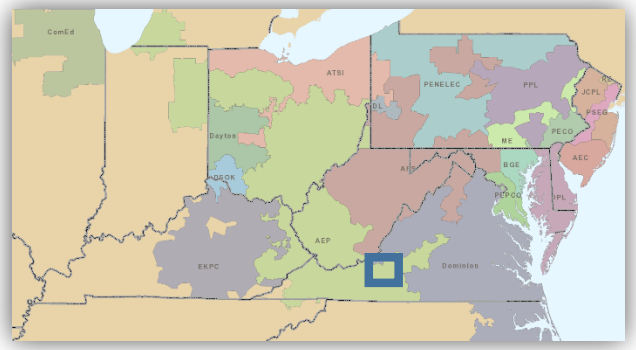
Roanoke Station:

- Relaying
  - Roanoke Substation currently deploys 103 relays, implemented to ensure the adequate protection and operation of the substation. Currently, 79 of the 103 relays (77% of all station relays) are in need of replacement.
    - There are 50 electromechanical and 8 static which have significant limitations with regards to fault data collection and retention. These relays lack vendor support and have little to no access to spare parts.
    - There are 3 DPU microprocessor type relays on the three distribution breakers. The DPU relays pose a potential safety risk to persons performing breaker operation because the DPUs are mounted directly on the circuit breaker without a delay for opening and closing the breaker.
    - There are 18 microprocessor relays that utilize legacy firmware.
- Pilot Wire
  - Pilot wire relaying exists on the Campbell Ave. 69 kV, Roanoke 69 kV and Campbell Ave 34.5 kV circuits
  - TFS lacks adequate crew training and experience on handling pilot wire; only a small number of crews are available with necessary experience to perform corrective maintenance
  - High corrective maintenance costs are incurred (P&C, line, forestry, build roads, etc.)
- High-Side Transformer Protection
  - No automatic high-side protection exists on transformer #5 or #2
  - Both are directly connected to 138 kV bus #2, which would operate five 138 kV circuit breakers for a transformer fault





AEP Transmission Zone M-3 Process
Reusens – Roanoke 138kV Line Rebuild

Need Number: AEP-2020-AP034

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Previously Presented:

Needs Meeting 05/22/2020
Solution Meeting 03/19/2021

Project Driver:

Equipment Condition/Performance/Risk

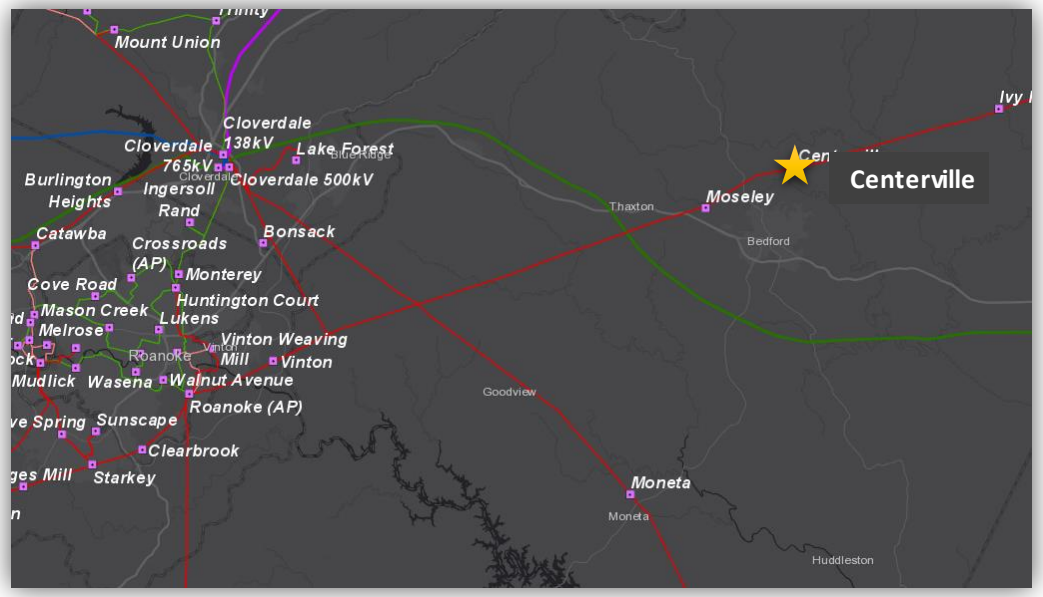
Specific Assumption Reference:

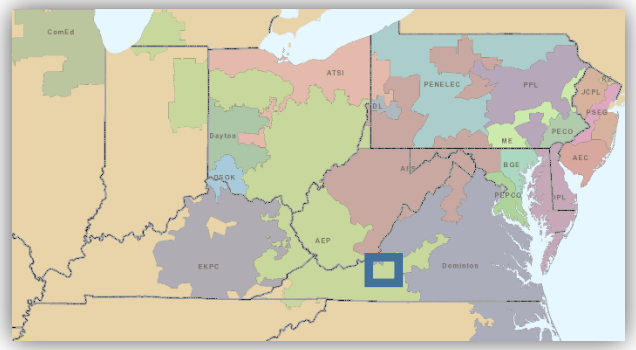
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Centerville Station:

- 69 kV Circuit Breaker B
  - 1970's Vintage Circuit Breaker
  - Oil filled breaker without oil containment. Oil filled breakers have much more maintenance required due to oil handling that their modern, SF6 counterparts do not require.
  - This circuit breaker, has exceeded the manufacturer's designed number of full fault operations (108)
- High-side Transformer MOAB Ground Switch (138/69/12 kV T1) is used for high-side transformer protection
- There is a three terminal line configuration through the Town of Bedford 69 kV loop.
- The flip-flop configuration connection to the double circuit 138 kV line that runs adjacent to the station is a source of operational and protection challenges when faults occur.
- Relaying
  - Centerville Substation currently deploys 26 relays, implemented to ensure the adequate protection and operation of the substation. Currently, all 26 of the relays (100% of all station relays) are in need of replacement. There are 21 of the electromechanical which have significant limitations with regards to fault data collection and retention. These relays lack vendor support and have little to no access to spare parts. Also, the remaining 5 relays that are microprocessor based from utilize legacy firmware.





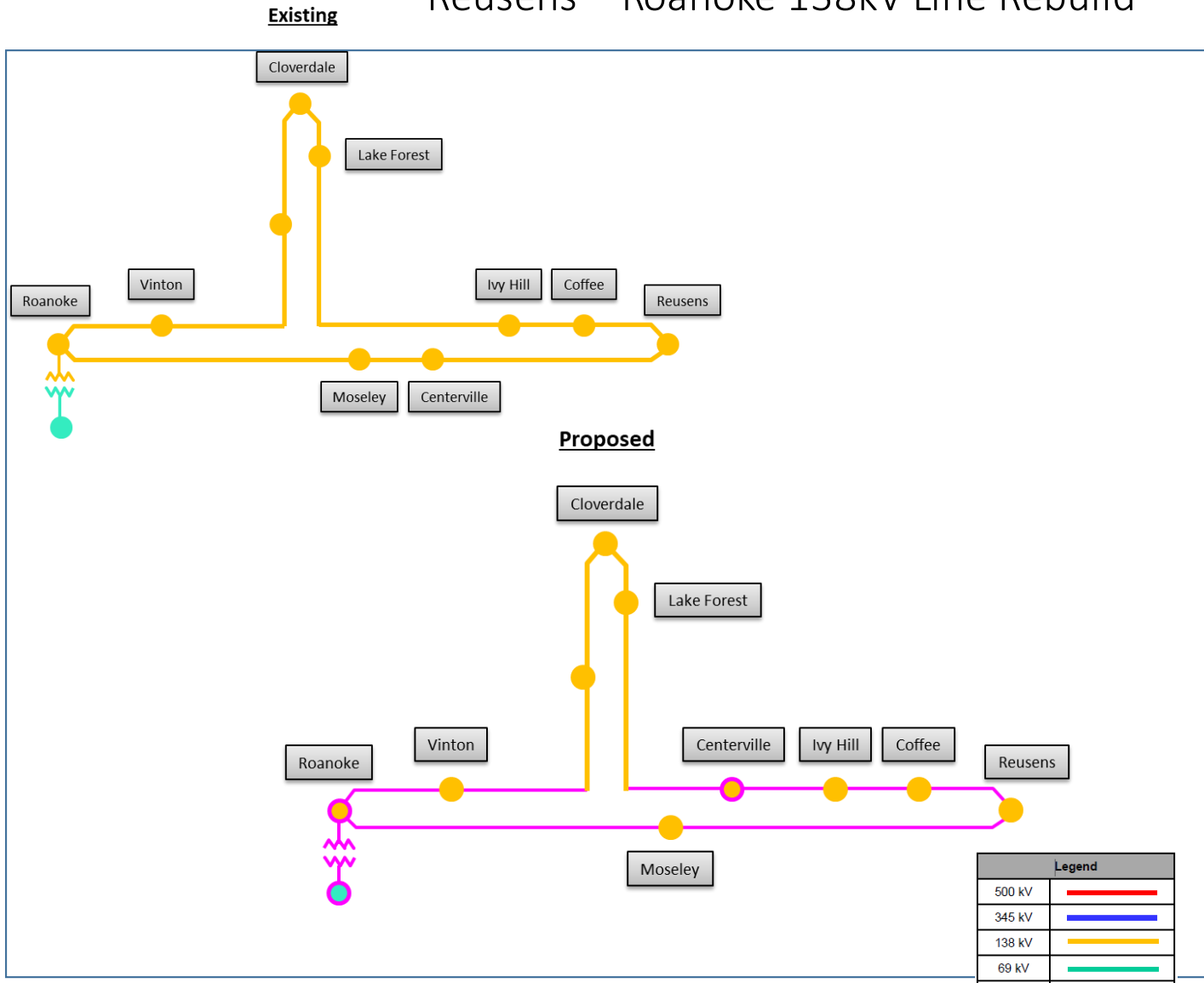
AEP Transmission Zone M-3 Process
Reusens – Roanoke 138kV Line Rebuild

Need Number: AEP-2020-AP027, AEP-2020-AP033, AEP-2020-AP034

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Selected Solution:

- Rebuild ~43 miles of double circuit 138 kV line between Reusens and Roanoke substations **Estimated Cost: $142.0 M (s2469.1)**
- Acquire additional Reusens-Roanoke 138 kV ROW as needed for the rebuild. **Estimated Cost: $13.7 M (s2469.2)**
- Reconductor ~0.1 mile span into Ivy Hill Station. **Estimated Cost: $0.2M (s2469.3)**
- Tie into the existing Roanoke-Cloverdale 138 kV Line via a new ~0.3 mile extension. **Estimated Cost: $0.7M (s2469.4)**
- Install new wire as underbuild on the Reusens-Roanoke 138kV line and re-route the existing Campbell Avenue-Roanoke 34.5 kV line due to Roanoke substation reconfiguration. **Estimated Cost: $0.5M (s2469.5)**
- Re-route the existing Roanoke-Walnut 69kV line due to Roanoke substation reconfiguration. Three (3) replacement structures are expected to shift the alignment and follow the western part of the substation fence to terminate into the new box bay at Reusens Substation. **Estimated Cost: $1.1M (s2469.6)**
- At Roanoke station, replace 138 kV capacitor bank switcher "BB" with a 3000 A, 40 kA circuit breaker. Replace 138 kV capacitor bank switcher "CC" with a 3000 A, 40 kA circuit breaker. Replace 138 kV capacitor bank "CC" with a new 57.6 MVAr capacitor bank. Install high-side circuit switchers on Transformers #2 (138/34.5 kV) and #5 (138/69 kV). Replace transformer #5 (138/69/12 kV) with a 130 MVA, 138/69/12 kV transformer. Replace 69 kV circuit breakers "U" and "V" with 2000 A, 40 kA circuit breakers. Replace pilot wire relaying with fiber relaying associated with 69 kV CBs "U" and "V", and 34.5 kV CB "L". **Estimated Cost: $10.1M (s2469.7)**



AEP Transmission Zone M-3 Process
Reusens – Roanoke 138kV Line Rebuild

Continued from previous slide …

- At Centerville station, reconfigure existing 138 kV with two (2) new 138 kV circuit breakers on each line exit towards Cloverdale and Reusens substations rated at 3000 A, 40 kA to eliminate the three terminal line. Replace MOAB ground switch with circuit switcher on high-side of the Transformer #1 (138/69/34.5 kV). Replace 69 kV circuit breaker "B", associated disconnect switches and foundations with 3000 A, 40 kA circuit breaker. **Estimated Cost: $6.7M (s2469.8)**
- At Campbell Avenue station, replace pilot wire relaying with fiber relaying associated with 34.5 kV CB-B and 69 kV CB-C. **Estimated Cost: $0.9M (2469.9)**
- At Walnut Avenue station, replace pilot wire relaying with fiber relaying associated with 69 kV CB-C. **Estimated Cost: $0.5M (s2469.10)**
- Install fiber extensions and telecom to support SCADA connectivity along the line and at Vinton, Ivy Hill, Coffee, and Moseley stations. **Estimated Cost: $1.2M (s2469.11)**

Ancillary Benefits: The reconfiguration of Centerville Station from a N.O. "flip-flop" scheme connected to the double circuit 138 kV line via Motor Operated Air-Breaker switches to 138 kV circuit breakers on each line exit of the Cloverdale-Reusens 138 kV circuit will improve the operational flexibility and reliability performance to the customers served from Centerville (Town of Bedford and AEP Distribution).

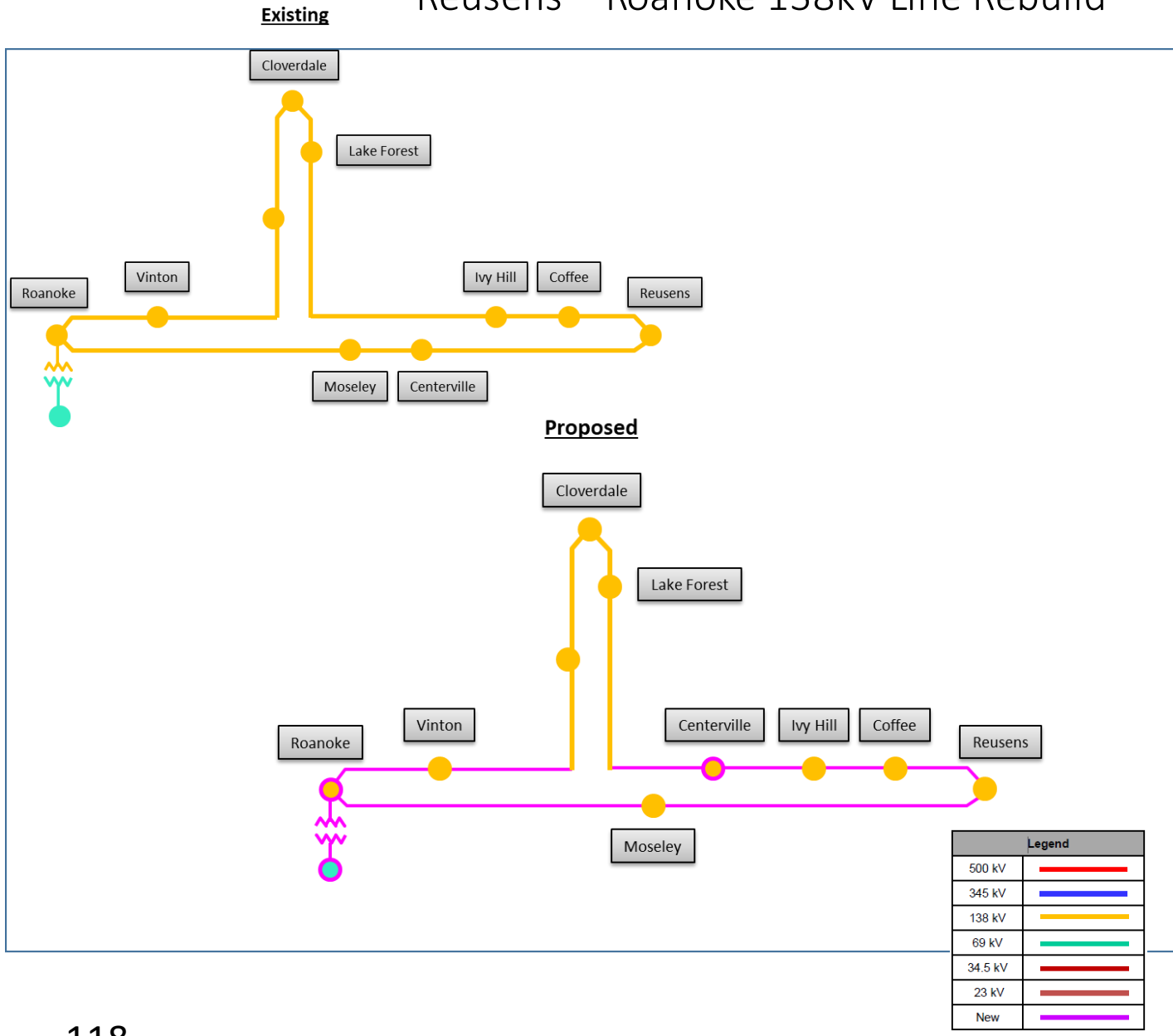
Estimated Cost: $177.6 M

Projected In-Service: 10/31/2028

Supplemental Project ID: S2469.1-.11

Project Status: Scoping

Model: N/A



Need Number: AEP-2020-AP029

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Previously Presented:
Needs Meeting 04/20/2020
Solutions Meeting 3/19/2021

Project Driver:
Equipment Condition/Performance/Risk

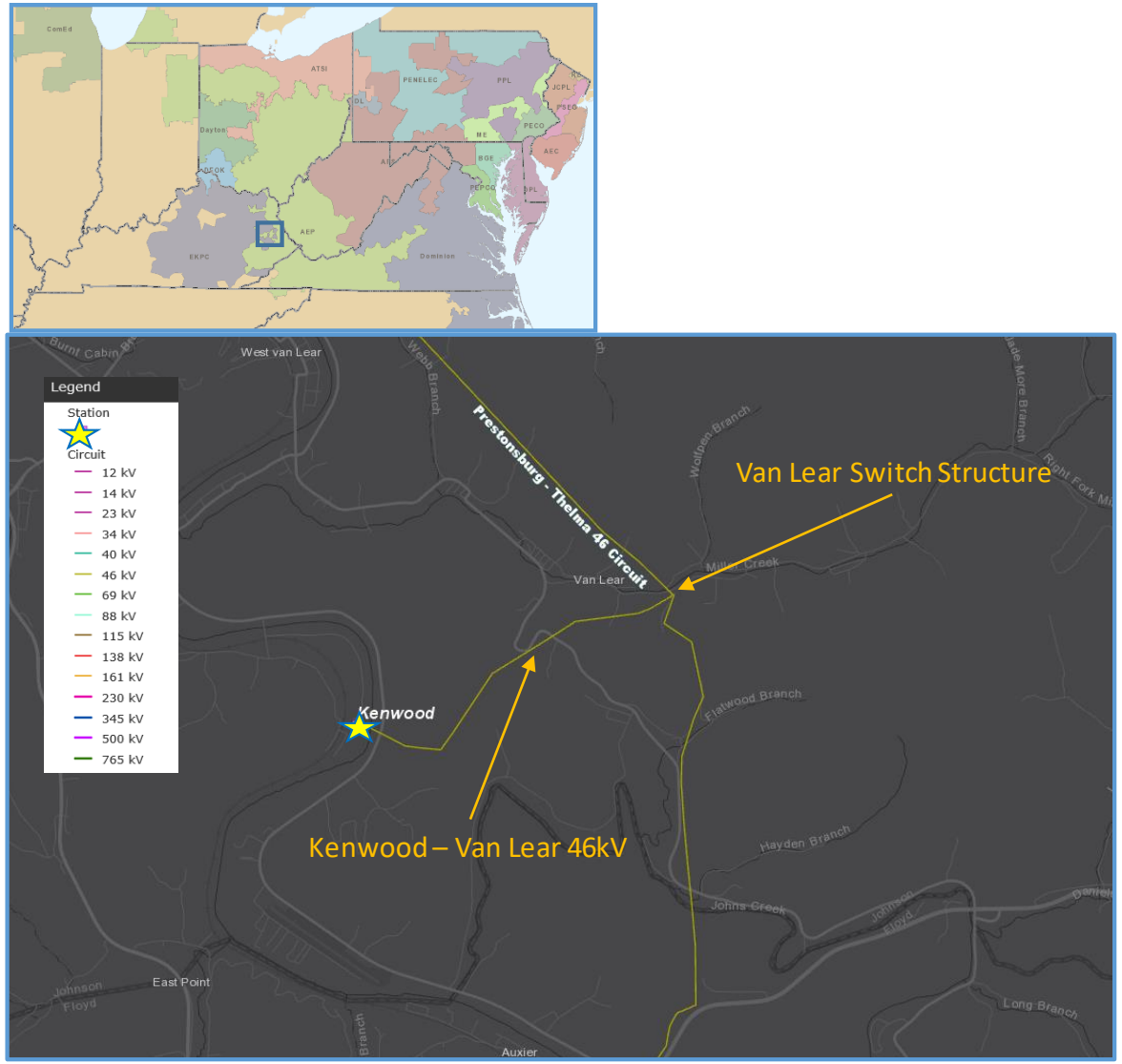
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:
Line Name: Kenwood – Van Lear 46kV
Original Install Date (Age): 1969
Length of Line: 1.77 mi
Total structure count: 11
Original Line Construction Type: Wood
Conductor Type: 336,400 ACSR 26/7
Line conditions:

- 3 of the 11 structures have conditions that comprise 27% of the line section.
- Open conditions include: rot and woodpecker damage.
- Kenwood Station is currently radially fed with a peak load near 22 MVA.

Van Lear Switch:

- The switches at Van Lear have been tagged as inoperable and unsafe to operate. The old hydraulic type mechanism on these switches does not operate properly, arcing horns are burnt off, and operating rod supports are damaged.



AEP Transmission Zone M-3 Process
Kenwood Loop

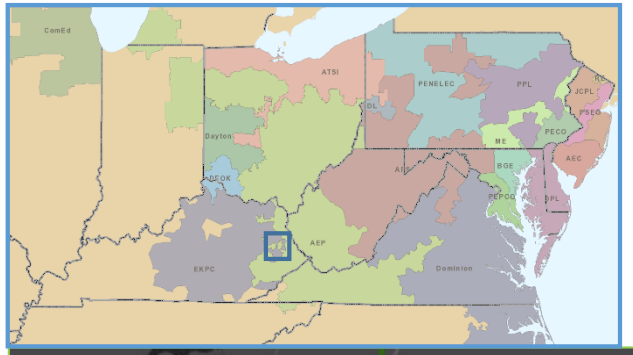
Need Number: AEP-2020-AP029

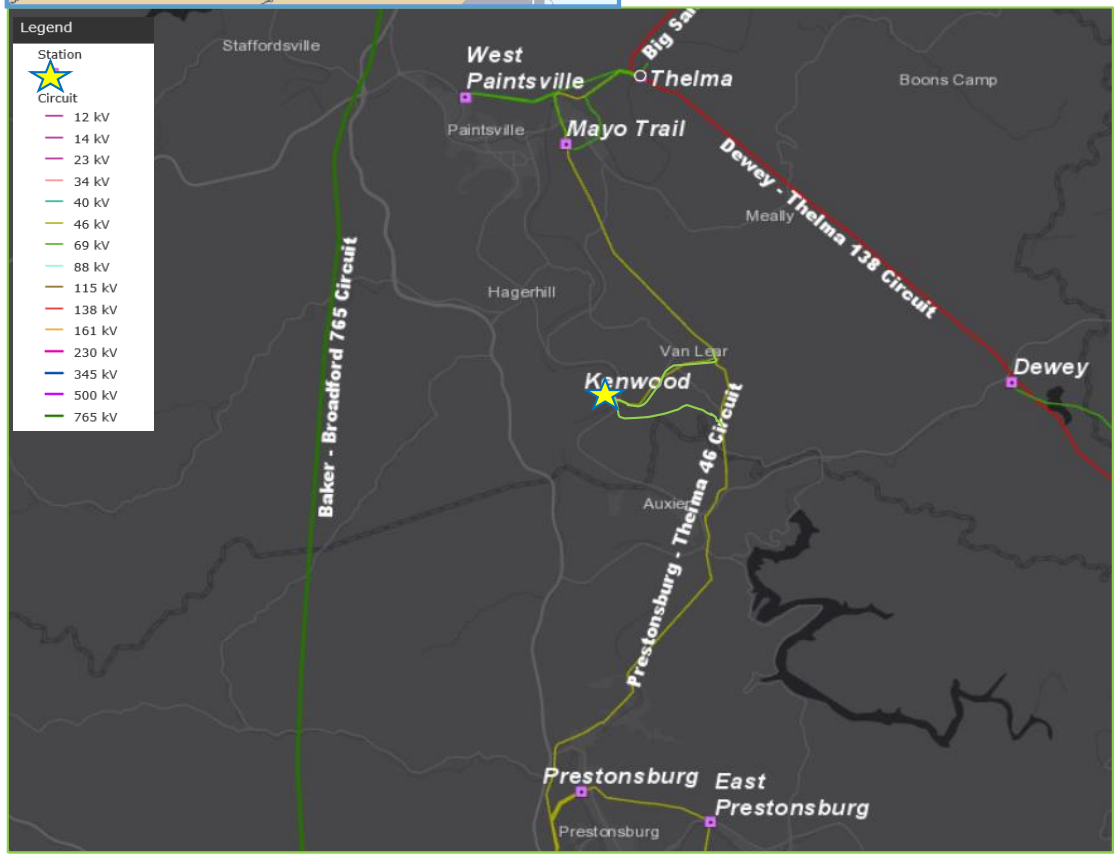
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Selected Solution:

- A green field line is to be constructed (Kenwood 69kV Extension) and to be operated at 46kV. The new extension will provide looped service into Kenwood substation. It will be approximately 2.25 miles of single circuit construction through mountainous terrain in Floyd and Johnson Counties in Kentucky. The extension will tap the existing Prestonsburg-Thelma 46kV Line around structure K346-50. (SN:53 MVA, SE:61 MVA, WN:67 MVA, WE:73 MVA) **Estimated Cost: $5.8 M (s2470.1)**
- Rebuild the existing ~1.77 mi Kenwood Tap line from Kenwood to Van Lear Tap Structure on the existing center line. (SN:53 MVA, SE:61 MVA, WN:67 MVA, WE:73 MVA)

  Estimated Cost: $4.9 M (s2470.2)
- Provide splicing for 2.25 miles of 96ct OPGW on the Kenwood 69kV Extension Line and 1.77 mi Kenwood TAP line. This extension spans from Kenwood Station to the Prestonsburg-Thelma 46kV line. **Estimated Cost: $0.1 M (s2470.3)**
- At Kenwood substation, Extend the walk bus and add second 46KV line to set up Kenwood station as a looped station with MOABS protecting each exit. Add new H-Frame dead end with MOAB and single phase CCVT. Add MOAB and single phase CCVT to existing line. Relocate 3 phase CCVT's from cap bank AA to 46KV Bus. Add 3-bay transclosure, and separate battery enclosure. Replace Battery and Charger. **Estimated Cost: $0 M (Distribution costs only) (s2470.4)**
- Retire Van Lear SS. **Estimated Cost: $0.1 M (s2470.5)**
- Remote end work at Prestonsburg substation. **Estimated Cost: $0 M (Distribution costs only) (s2470.6)**
- Retire the ~1.5 mi 46kV line section from str. 52 to Van Lear SS. This line section is part of the Prestonsburg – Thelma 46kV line need (AEP-2018-022). **Estimated Cost: $1.2 M (s2470.7)**





Proposed Solution (Cont.):

Ancillary Benefits:

- Removal of ~1.5 mi 46kV line section on Prestonsburg – Thelma 46kV line mitigates issues identified on this line section, solutions are currently being evaluated to address the remainder of the needs on the entire Prestonsburg – Thelma line (AEP-2018-AP022).
- Proposed work would also improve reliability for customers served from Kenwood substation. Kenwood substation serves 22 MVA of load at peak and only half of that load is transferrable.

Estimated Cost: $12.1 M

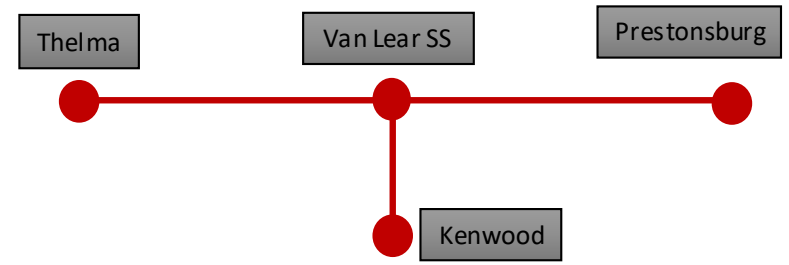
Projected In-Service: 11/31/2023

Supplemental Project ID: s2470.1-.7

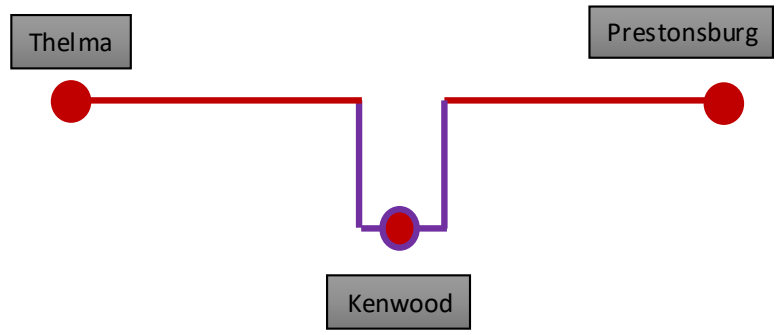
Project Status: Scoping

Model: N/A

Existing:



Proposed:



Need Number: AEP-2020-IM024

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Previously Presented:
Needs Meeting 11/20/2020
Solution Meeting 3/19/2021

Project Driver:
Equipment Material/Condition/Performance/Risk

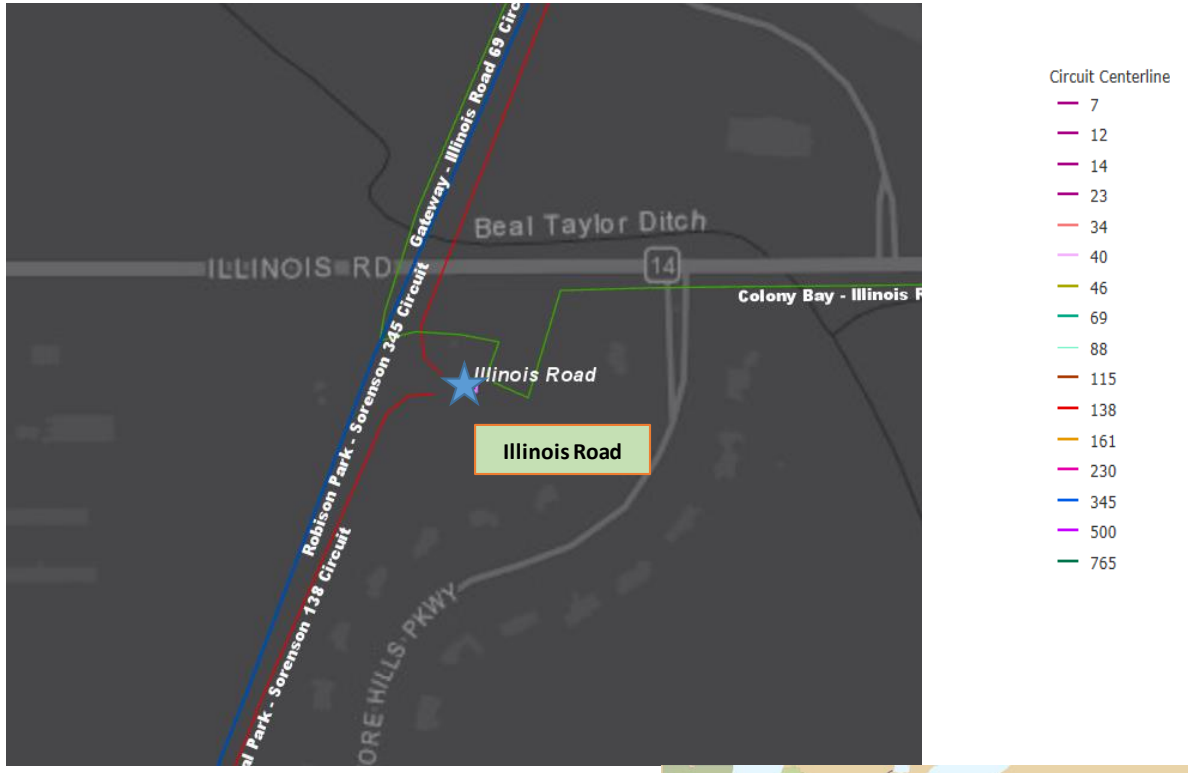
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

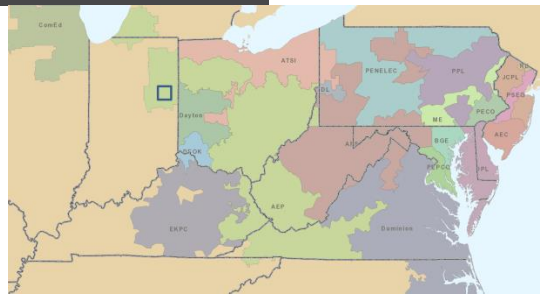
Problem Statement:

Illinois Road 138/69kV Station:

138/69/12kV Transformer 1

- Manufactured in 1980
- Transformer is showing elevated moisture levels, low levels of Interfacial Tension and an increasing trend in Power Factor.
- This level of moisture is an indication of gasket leaks and breakdown in oil or paper insulation.
- The low level of Interfacial Tension is an indication acid has coated the insulation and sludge is ready to deposit within the main tank.
- The upward trend in PF indicates that there is an increase in particles in the oil.





AEP Transmission Zone M-3 Process
Illinois Road Transformer

Need Number: AEP-2020-IM024

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Selected Solution:

Replace the 138/69kV Transformer with a 90MVA 138/69kV Transformer. (S2471)

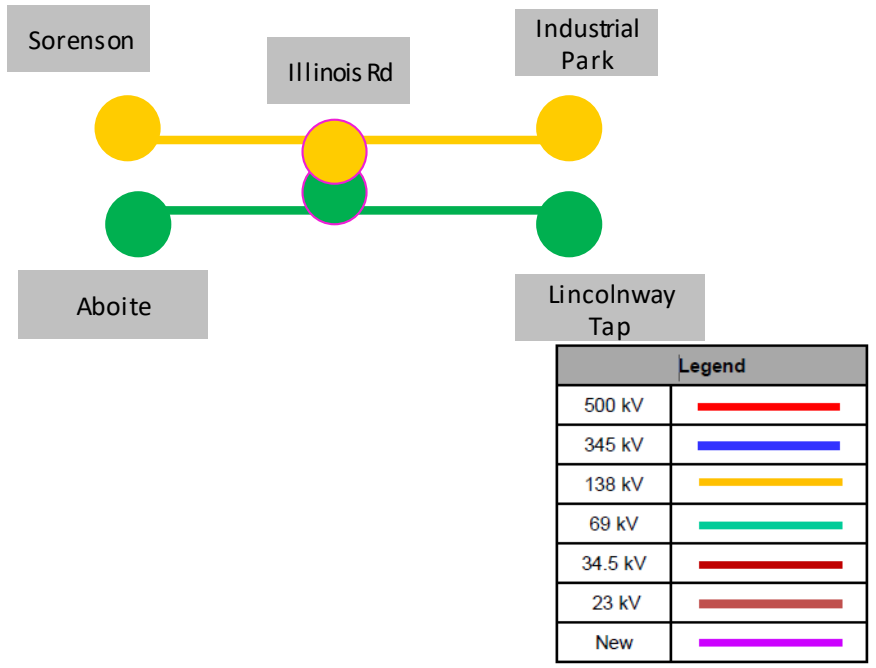
Estimated Cost: $1.7 M

Projected In-Service: 5/16/2022

Supplemental Project ID: S2471

Project Status: Scoping

Model: N/A



Need Number: AEP-2020-OH045

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Previously Presented:

Need Meeting 11/20/2020

Solutions Meeting 03/19/2021

Project Driver:

Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 7)

Problem Statement:

- AEP Ohio has requested installation of a second 138/13.8 kV transformer at Fifth Ave Station to address increased loading on the existing distribution feeders at the station due to load growth in the area. Fifth Avenue station has limited transferability and serves approximately 7,000 customers via a single transformer in an urban environment.
- AEP Ohio has also expressed concerns over the amount of exposure that existing feeders out of Hess station are subject to in the area.

Need Number: AEP-2020-OH045

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 6/1/2021

Selected Solution:

- Fifth Avenue 138kV: Upgrade the existing 138kV partial ring bus to a complete 138kV ring bus and provide a high side connection for a new Distribution transformer. Complete the 138kV ring bus by adding 2-138KV circuit breakers along with associated bus work and relaying equipment. (S2472)

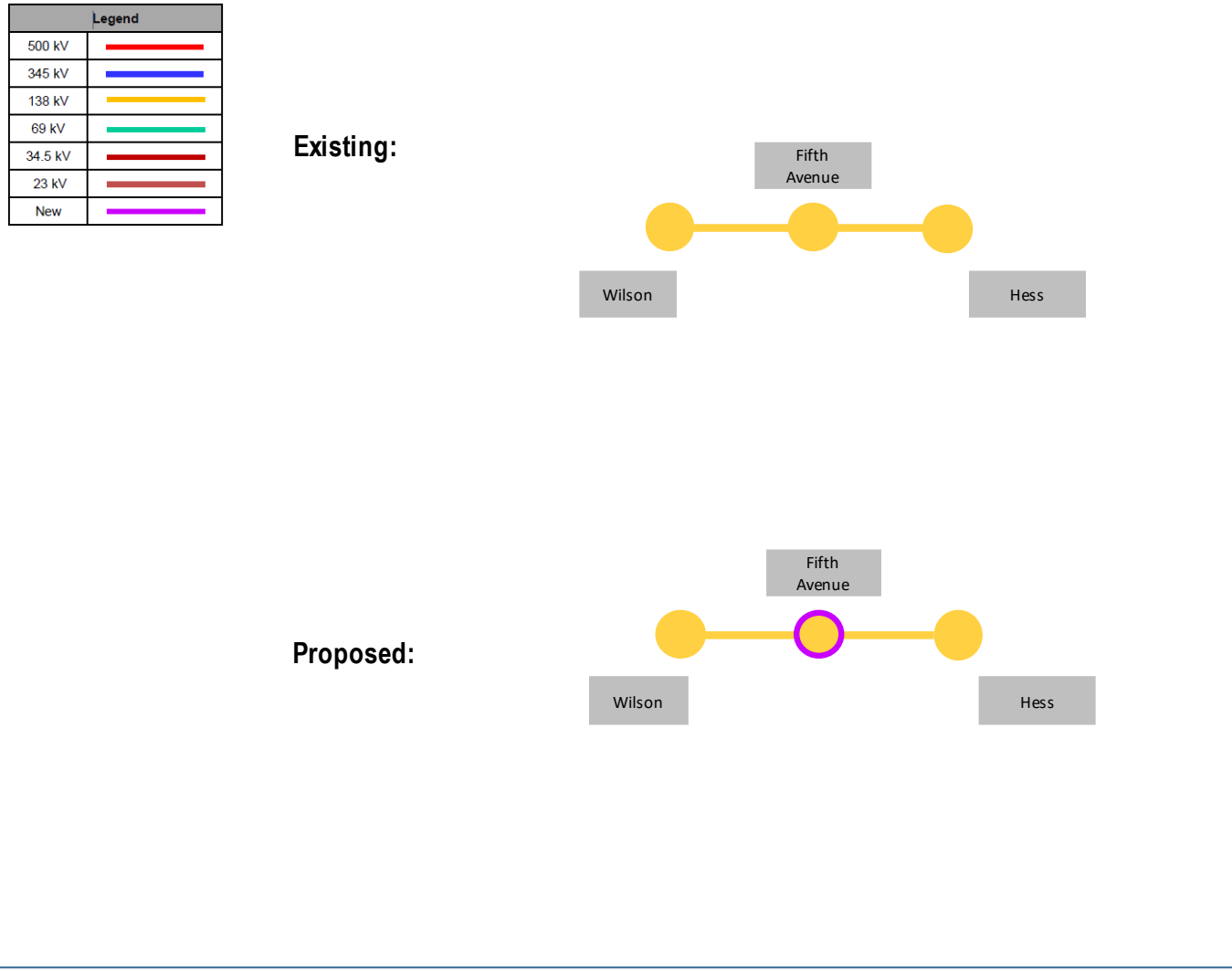
Estimated Cost: $1.0 M

Projected In-Service: 5/16/2022

Supplemental Project ID: S2472

Project Status: Engineering

Model: 2025 RTEP



AEP Transmission Zone M-3 Process
AM General #2 – Twin Branch 34.5kV Rebuild

Need Number: AEP-2020-IM020

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/04/2021

Previously Presented:

Needs Meeting 8/14/2020

Solutions Meeting 4/16/2021

Project Driver:

Equipment Condition/Performance/Risk

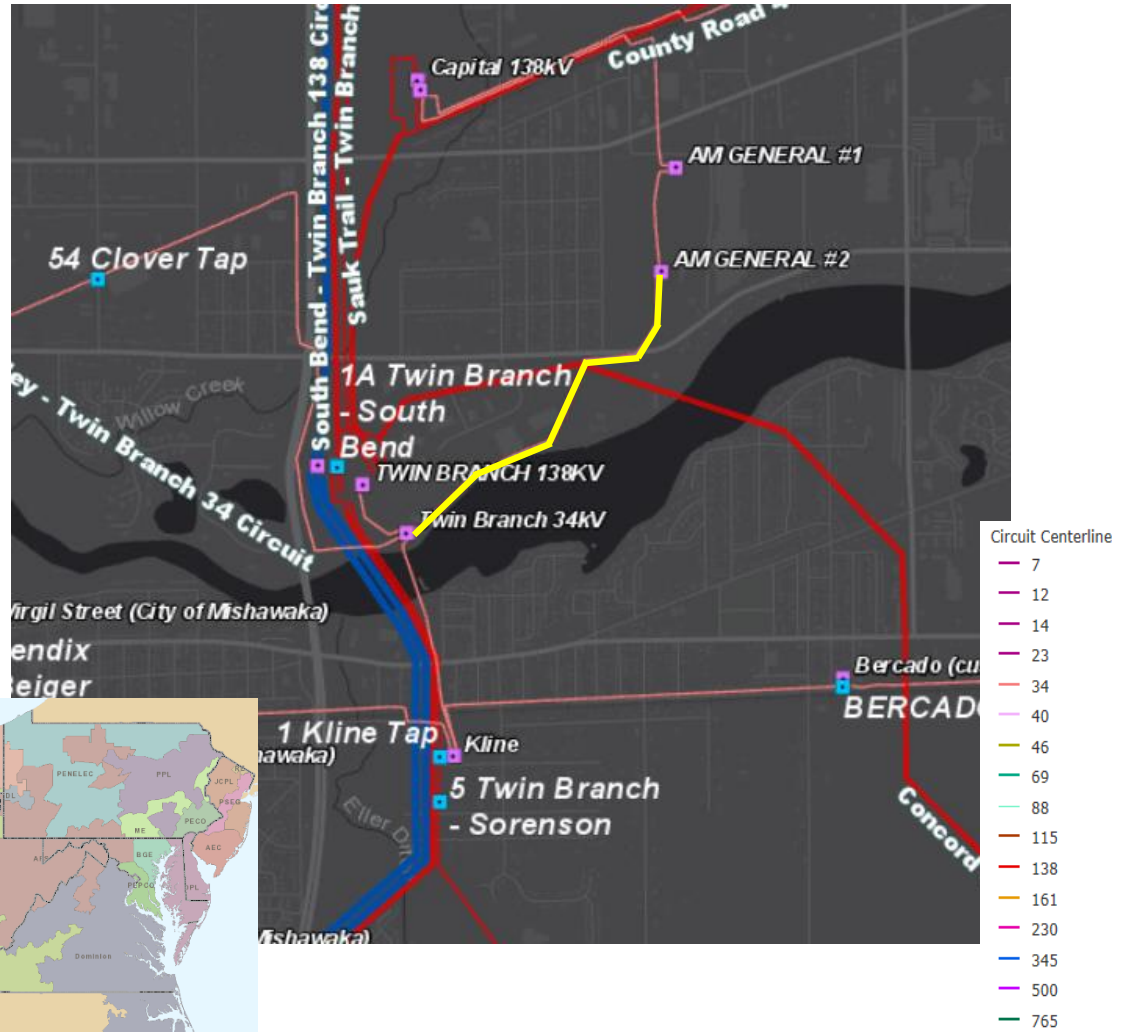
Specific Assumption Reference:

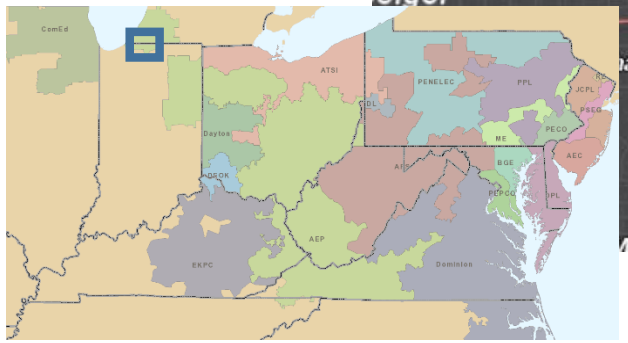
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

AM General-Twin Branch-Kline 34.5kV

- 1 mile of 1950's wood pole cross arm construction
- 7 structures, 28% of the line, with open conditions
    - Open conditions include: pole rot, broken or missing ground lead wires
- The grounding method utilizes butt wraps which is not current AEP standards
- During field assessment structures were found with vertical pole splitting, decay to cross arms, rot top, and upper pole decay





AEP Transmission Zone M-3 Process
AM General #2 – Twin Branch 34.5kV Rebuild

Need Number: AEP-2020-IM020

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/04/2021

Selected Solution:

- Rebuild 0.96 miles of the AM General #2 – Twin Branch 34.5 kV.

Estimated Cost: $4.3 M

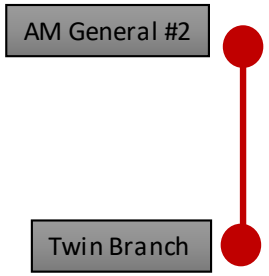
- Note: Increased costs in this area due to commercial/urban development surrounding the existing line resulting in higher ROW costs and short line construction. Current scope requires foundations for 40% of the structures proposed in the rebuild, which also increases the costs. AEP will continue to investigate potential alternates to foundations in order to reduce costs where possible.

Projected In-Service: 10/1/2024

Supplemental Project ID: s2510

Project Status: Scoping

Model: N/A



Legend	
500 kV	
345 kV	
138 kV	
69 kV	
34 kV	
New	
Retire	

AEP Transmission Zone M-3 Process
Van Buren

Need Number: AEP-2020-IM018

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/04/2021

Previously Presented:
Needs Meeting 05/22/2020
Solutions Meeting 04/16/2021

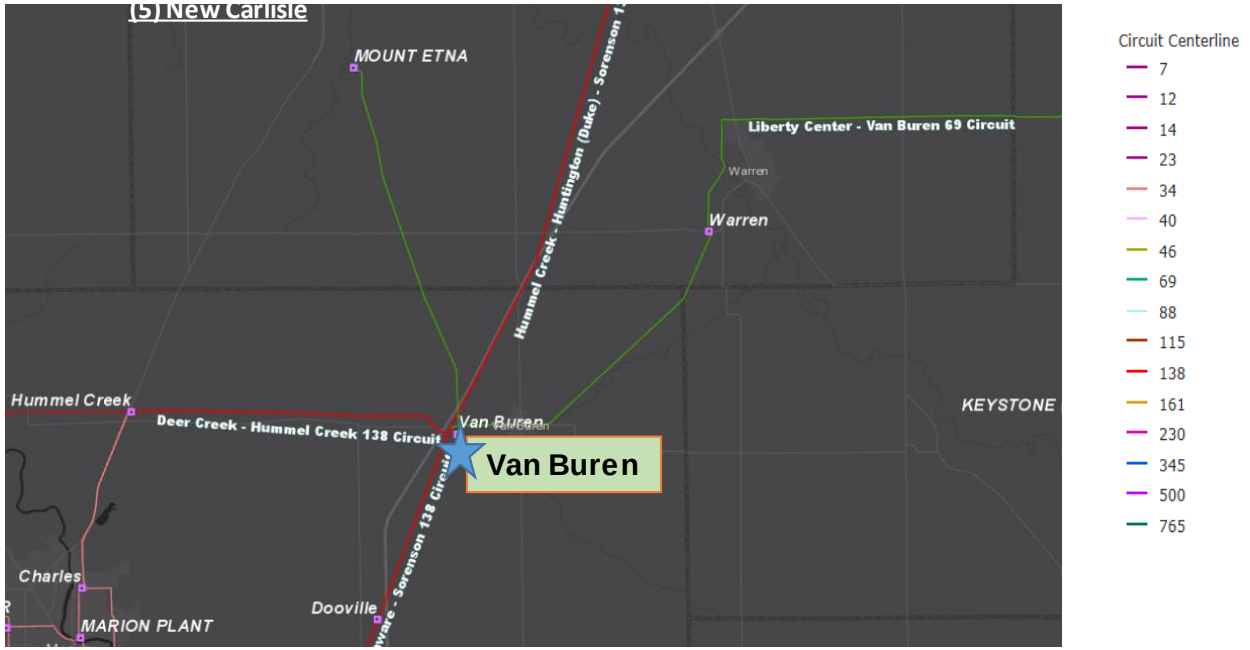
Project Driver:
Equipment Material/Condition/Performance/Risk/Operational

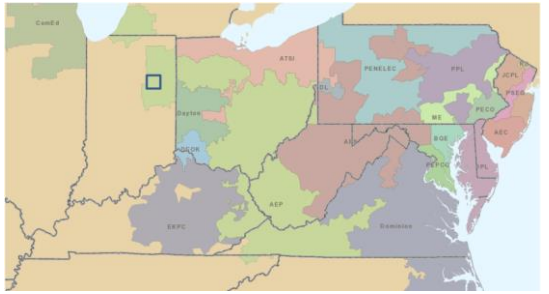
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Van Buren 138/69/12kv station

- 138/69/12 kV Transformer #1
  - 1967 vintage
  - Elevated moisture levels
  - Increased cost of maintenance due to leaking
  - Increased levels of decomposition of the paper insulating materials, leading to increased risk of failure
- Breaker B 69kV
  - 1964 vintage oil filled, CF-type breaker.
  - This type is oil filled without oil containment. Oil filled breakers have much more maintenance required due to oil handling that their modern, vacuum counterparts do not require.
  - Finding spare parts for these units is not possible due to these models no longer being vendor supported
- Van Buren is part of a three-terminal line configuration with the Delaware – Sorenson 138kV circuit.





AEP Transmission Zone M-3 Process
Van Buren

Need Number: AEP-2020-IM018

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/04/2021

Selected Solution:

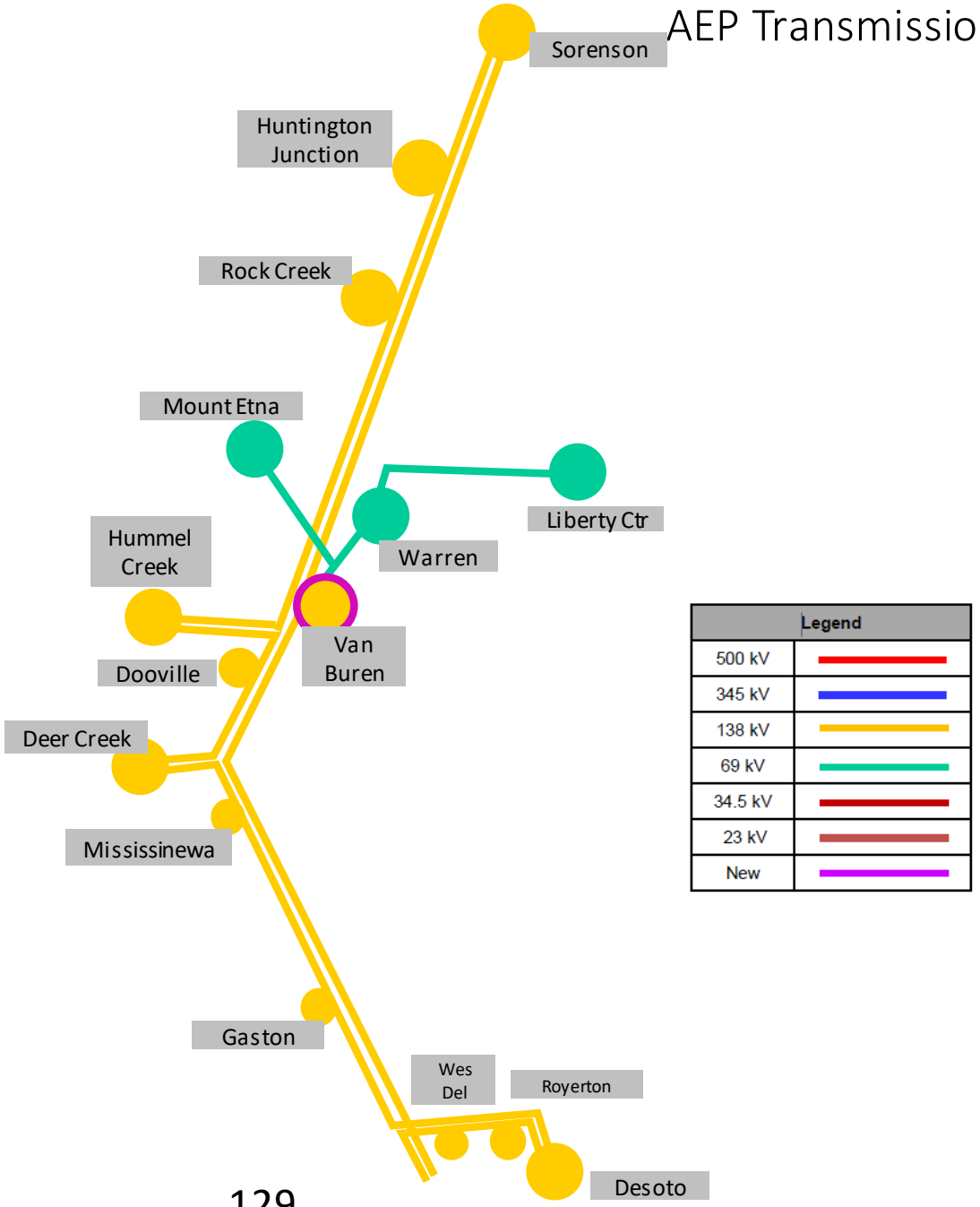
Expand and upgrade Van Buren station to a 3 138kV breaker ring bus to accommodate 3 elements (2 transmission lines and 1 transformer) and eliminate the three-terminal line. Replace 138/69/12kV transformer with separate 138/69kV and 69/12kV transformers to separate the Distribution load from the Transmission transformer's tertiary winding. Replace 69kV CB B. **Estimated Cost:** $9.1 M

Projected In-Service: 9/1/2022

Supplemental Project ID: s2511

Project Status: Scoping

Model: N/A



AEP Transmission Zone M-3 Process
Lakin – Point Pleasant 69 kV Rebuild

Need Number: AEP-2020-AP017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Previously Presented:

Needs Meeting 2/21/2020

Solution Meeting 5/21/2021

Project Driver:

Equipment Condition/Performance/Risk

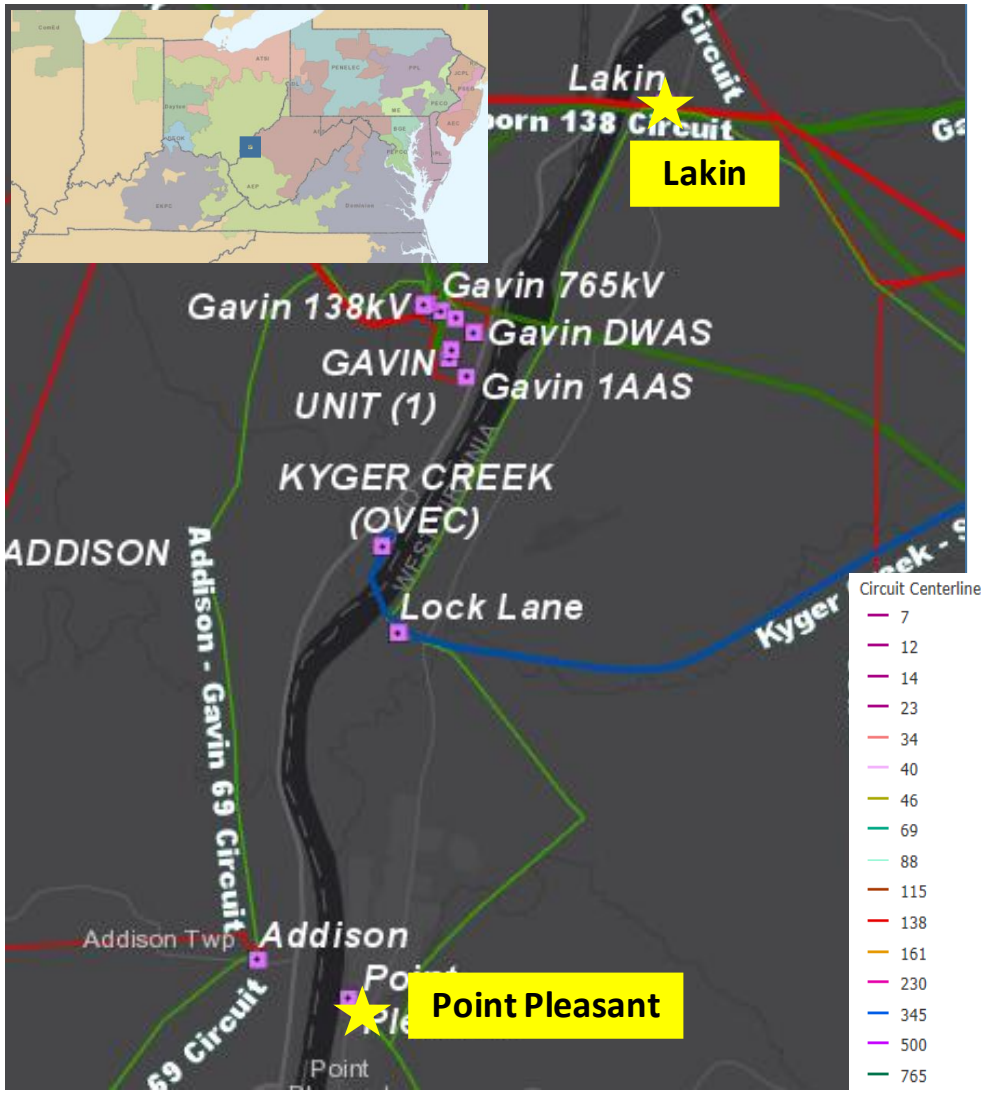
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Lakin – Point Pleasant 69 kV (11 miles)

- The line entirely consists of 1960s wood pole structures with 4-bell porcelain insulators
    - Line was originally installed in 1966, with a combination of 556 ACSR and 3/0 ACSR conductor
    - Structures on the line failed to meet 2017 NESC Grade B loading criteria, failed to meet current AEP structural strength requirements, and failed to meet current ASCE structural strength requirements
    - The insulators do not meet current AEP standards for CIFO and minimum leakage distance requirements.
    - There are currently 95 structures (86% of the line) with at least one open condition
        - A total of 222 open conditions on the line, related to damaged/worn shield wires, rotted crossarms and poles, woodpecker damage, broken or missing ground wire leads, broken or loose guys.
- Since 2014 there have been 17 momentary and 7 permanent outages on the circuit
- CMI: 3.1M



AEP Transmission Zone M-3 Process
Lakin – Point Pleasant 69 kV Rebuild

Need Number: AEP-2020-AP019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Previously Presented:

Needs Meeting 2/21/2020

Solutions Meeting 5/21/2021

Project Driver:

Equipment Condition/Performance/Risk

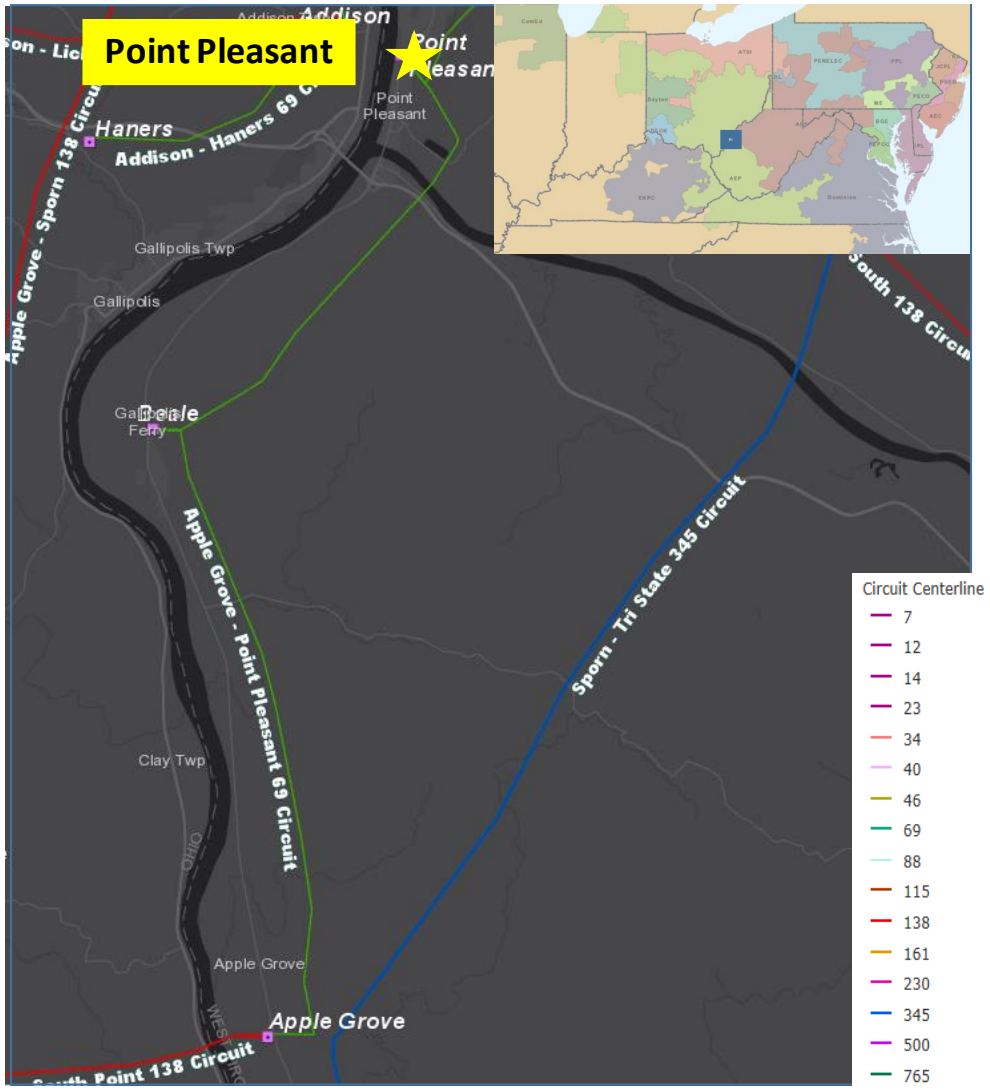
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Point Pleasant Station

- 69 kV circuit breakers G and H are an CF type oil filled breaker, without oil containment.
  - 1968 vintage
  - Oil filled breakers need more maintenance due to the oil handling required
  - The manufacturer does not provide support for this type of breaker and spare parts not available.
  - Oil spills can result in significant mitigation costs.
- 69 kV circuit switcher AA is a 2030-69 type SF6 switcher.
  - 1991 vintage
  - S&C 2030 circuit switcher has no gas monitor and sister units have experienced numerous malfunctions
- 39 out of the 40 relays (98% of all station relays) are in need of replacement
  - 34 relays are electromechanical type and 5 static type which have significant limitations with regards to fault data collection and retention.



Need Number: AEP-2020-AP017, AEP-2020-AP019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Selected Solution:

Rebuild the existing 5.36 mile Lakin – Lock Lane 69 kV line. **Estimated Trans. Cost: $11.9M (s2522.1)**

Point Pleasant Station: replace existing 69 kV circuit breakers G and H with two new 69 kV 3000 A 40 kA circuit breakers. Replace existing cap switcher AA with a new 69 kV cap switcher. **Estimated Trans Cost: $2.1M (s2522.2)**

Ancillary Benefits: Project will be coordinated with PJM Baseline project B3284 that addresses 5.44 miles of 69 kV line from Lock Lane – Point Pleasant.

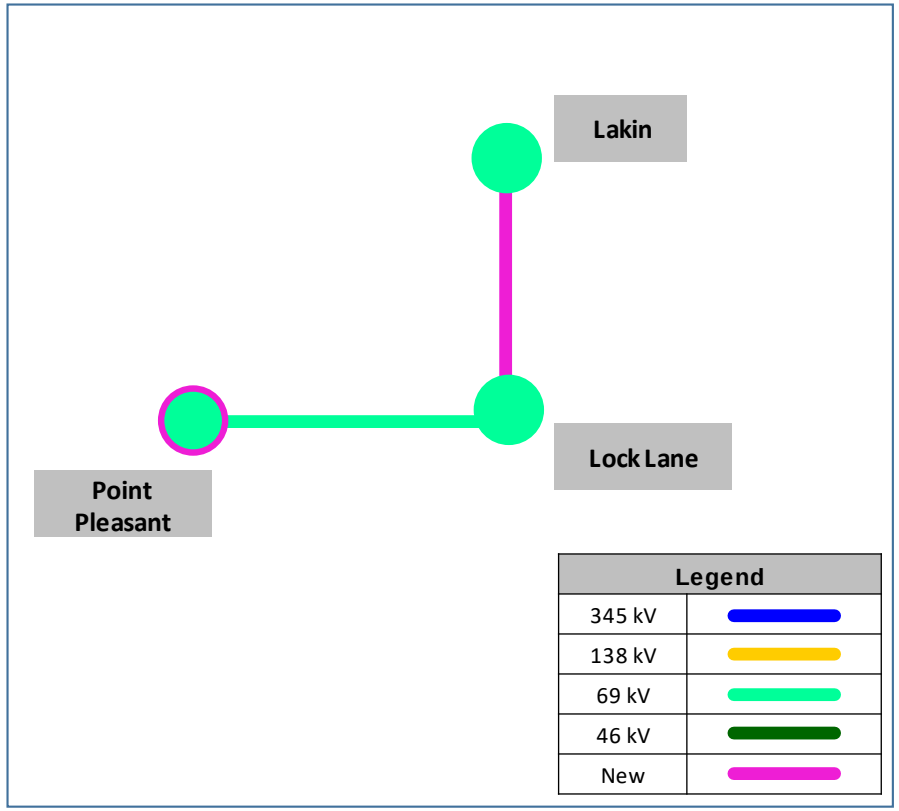
Estimated Cost: $14.0M

Projected In-Service: 10/31/2025

Supplemental Project ID: S2522.1-.2

Project Status: Scoping

Model: 2025 RTEP



AEP Transmission Zone M-3 Process
West Malta Station Upgrades

Need Number: AEP-2020-OH028

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Previously Presented:

Needs Meeting 7/17/2020

Solution Meeting 5/21/2021

Project Driver:

Equipment Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

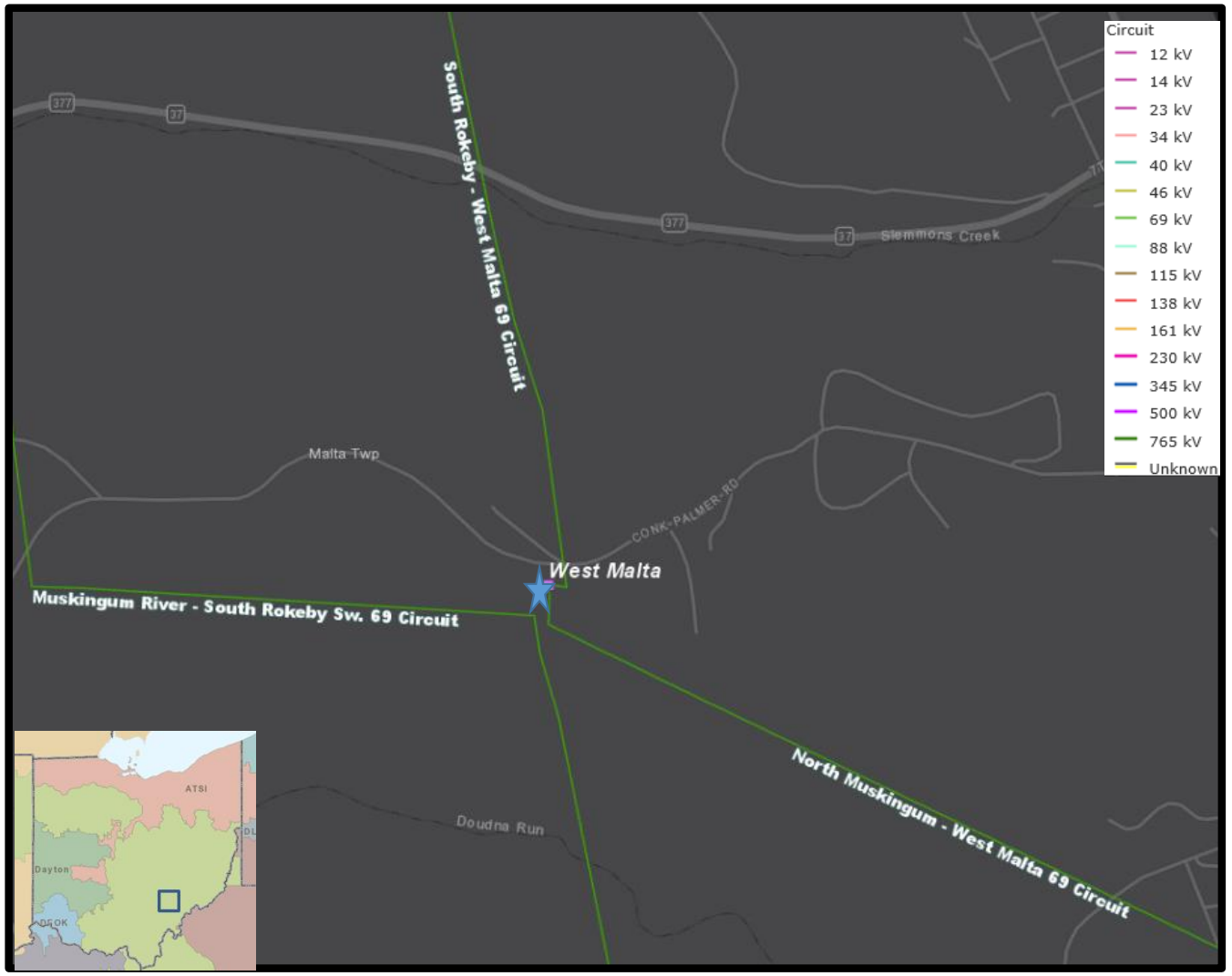
Problem Statement:

West Malta 69kV
Circuit Breaker "A" 1965

- Interrupting Medium: Oil
- Additional Information:
  - Interrupting Capability: 21 kA
  - Oil breaker maintenance has become more difficult due to the oil handling required to maintain them. Oil spills are frequent with breaker failures and routine maintenance and can become an environmental hazard. Spare parts for these units are not available due to their obsoleteness.

Additional Information:

- MOAB X has a retrofitted motor mechanism installed that prohibits the switch from opening correctly.
- Overlapping zone of protection exist at the station between a 69 kV line, the bus, and the 69/12 kV transformer which can result in relay coordination issues.
- 23 of the 25 relays at the station are of the electromechanical type and 2 of the static type all of which have significant limitations with regards to fault data collection and retention. In addition, these no longer have vendor support and spare parts are unavailable.



Need Number: AEP-2020-OH028

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Selected Solution:

- West Malta: Replace circuit breaker "A" with a 69kV 3000A 40kA circuit breaker. Replace MOAB "X" with a 69kV SCADA controlled switch. Remove Capacitor bank "AA" and the circuit switcher. **Estimated Cost: $1.87M** (Note: Distribution scope of work to replace 69/12 kV bank is not included in this cost.) **(s2523.1)**
- South Rokeby: Remote end upgrades to coordinate with new relaying at West Malta will require a transclosure at South Rokeby and an upgrade to the existing station service. **Estimated Cost: $0.69M (s2523.2)**

Estimated Cost: $2.56M

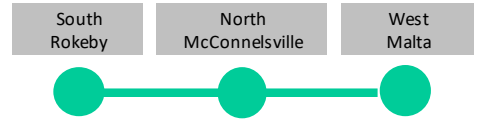
Projected In-Service: 12/10/2022

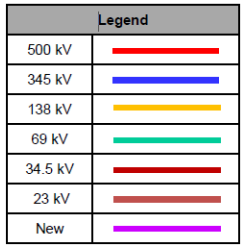
Supplemental Project ID: s2523.1-.2

Project Status: Scoping

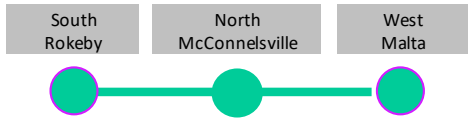
Model: N/A

Existing:





Proposed:



AEP Transmission Zone M-3 Process
Philo-Howard 138kV Line Rebuild

Need Number: AEP-2020-OH034

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Previously Presented:
Needs Meeting 6/19/2020
Solutions Meeting 5/21/2021

Project Driver:
Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs.
Please reference needs materials on pre-1930s era Lattice Lines.

Problem Statement:

Line
Philo – Howard 138kV (vintage 1929):

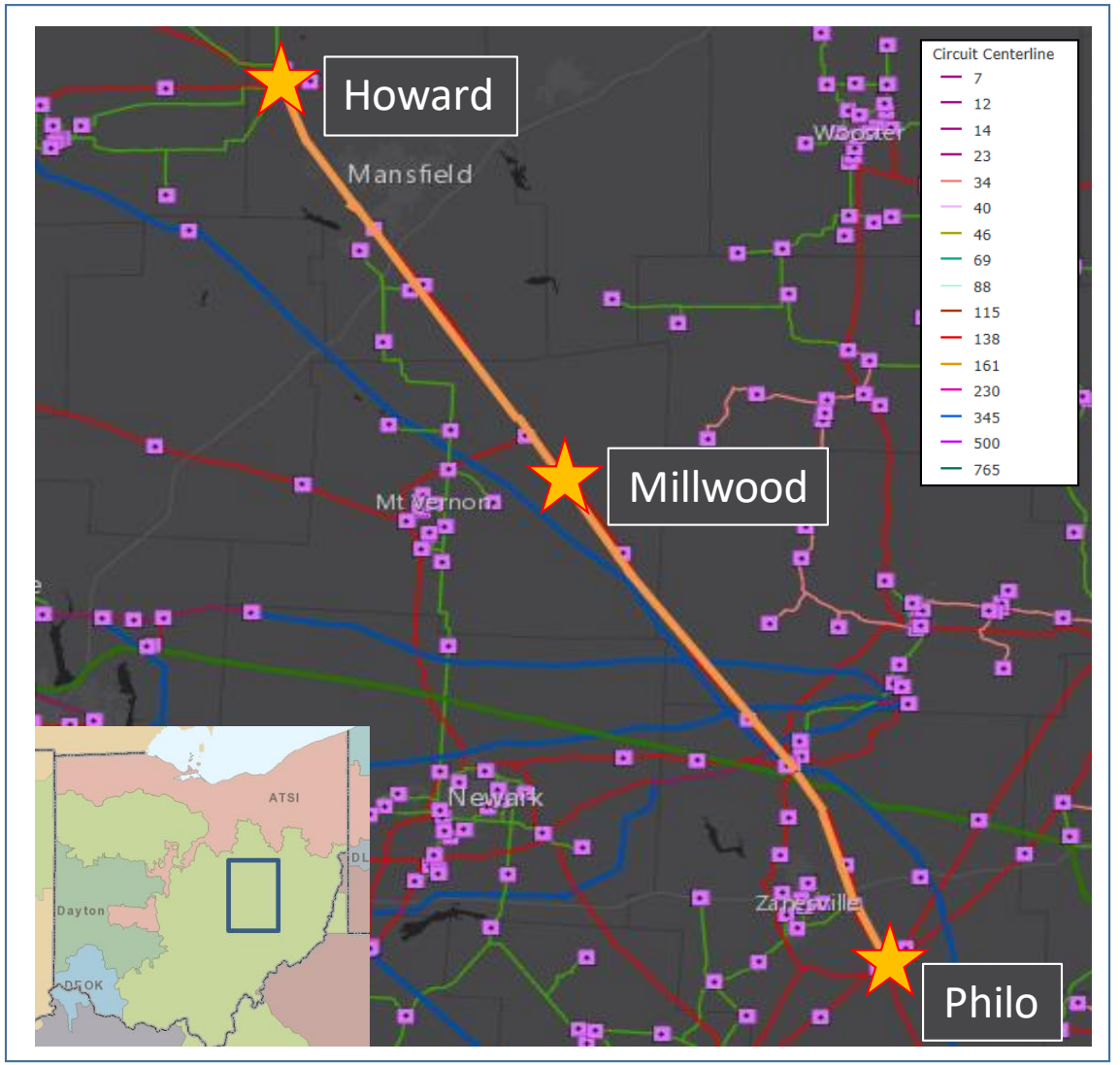
The Philo –Howard 138 kV transmission line asset serves 60 MVA of load consisting of four AEP substations and three non-AEP substations; the line asset is operated as double-circuit.

LINE CHARACTERISTICS

- Length of Line: 81.15 Miles
- Original install date: 1929
- Total structure count: 404, 398 dating back to original installation.
- Conductor Type: 556,500 CM ACSR 18/1 (Osprey) and 556,500 CM ACSR 26/7 (Dove)

CONDITION / PERFORMANCE / RISK ASSESSMENT:

- Momentary/Permanent Outages and Duration: 35 total outages: 28 (Momentary), 7 (Permanent).
- 5 Year CMI: 2,667,652
- Number of open Structure, Conductor, and Hardware conditions: 149
    - Conditions include broken conductor strands, burnt insulators, along with broken/damaged lattice members and hardware.
- Structures with at least one open condition: 55
- The line does not meet current grounding and shielding requirements, due to the condition of the obsolete shield wire size (159 ACSR), and the line shielding angle being inadequate. This T-line exhibits similar conditions as the examples listed in AEP's pre-1930's steel lattice tower line presentation.



Need Number: AEP-2020-OH034

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Selected Solution:

Rebuild from Howard to Ohio Central as 138kV double-circuit (64 miles), using 795 ACSR conductor. Note that the approx. 0.5 mile 138kV line segments outside Ohio Central station will not be rebuilt, as they are newer and in better condition; connect these existing T-line segments to the rebuilt Philo-Howard line asset**. Estimated Cost: $142.26 Million (s2524.1)**

Rebuild from Ohio Central to Philo as 138kV single-circuit (19 miles), using 795 ACSR conductor. The existing Ohio Central-Philo #2 138kV circuit will be retired. Update both terminal stations to account for the retired circuit. **Estimated Cost: $43.45 Million (s2524.2)**

At Millwood station, retire the 138kV flip-flop switching scheme, including the 2- 138kV switches. Install 2 new 138kV switches and replace the 138kV through-path risers & bus. Reconfigure the 138kV T-line entrances. **Estimated Cost: $1.32 Million (s2524.3)**

At West Trinway station, replace 138kV through-path risers & bus. **Estimated Cost: $0.12 Million (s2524.4)**

Modify 138kV protective relay settings at Philo, Culbertson, Ohio Central, Academia, North Bellville, North Lexington, and Howard stations. **Estimated Cost: $0.69 Million (s2524.5)**

Estimated Cost: $187.84M

Projected In-Service: 6/1/2028 (project will have staggered in-service dates, due to lengthy mileage)

Supplemental Project ID: s2524.1-.5

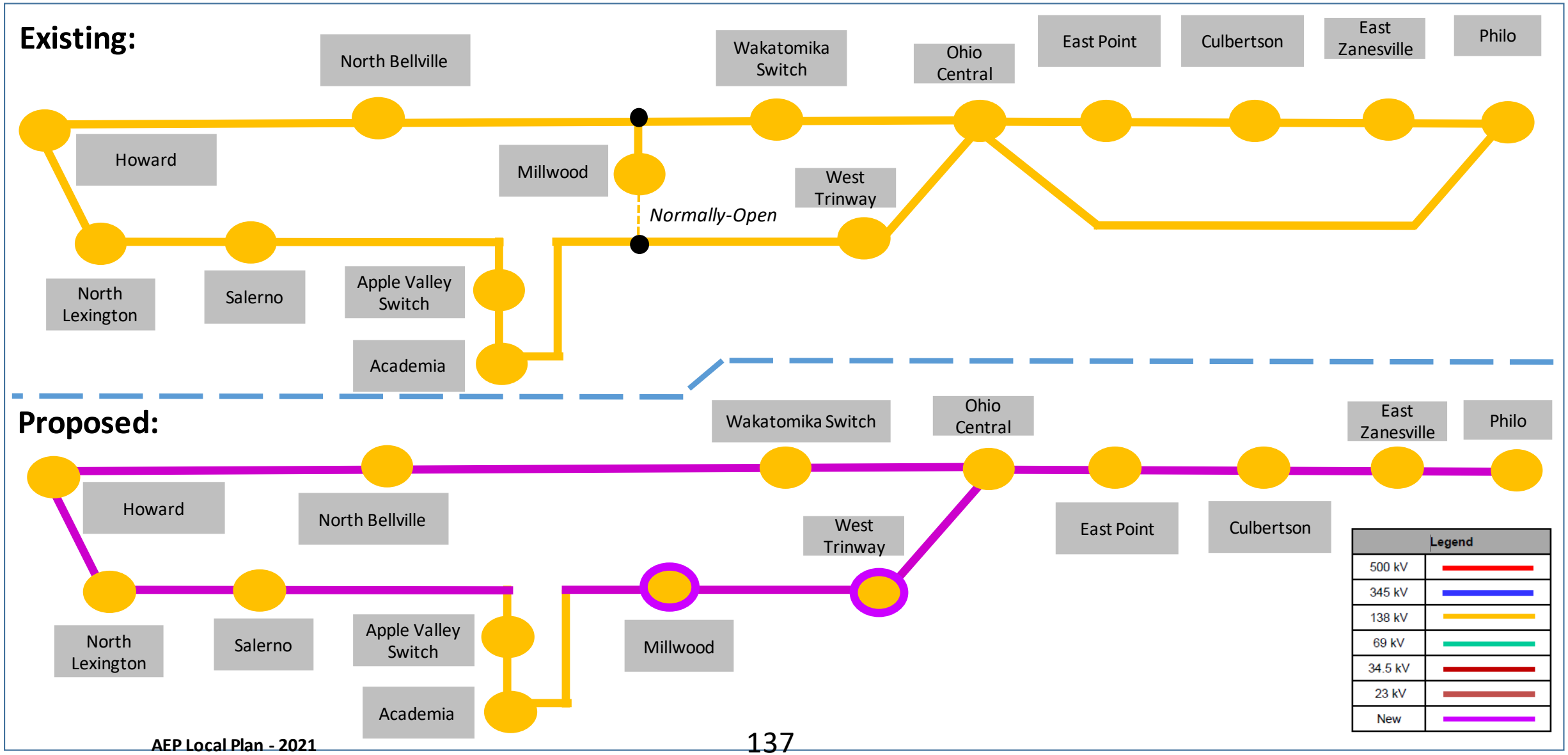
Project Status: Scoping

Model: 2025 PJM RTEP Model, with latest approved AEP Supplemental projects added

Need Number: AEP-2020-OH034

Process Stage: Solutions Meeting 5/21/2021

AEP Transmission Zone M-3 Process
Philo-Howard 138kV Line Rebuild



AEP Transmission Zone M-3 Process
Astor – East Broad 138 kV

Need Number: AEP-2019-OH041

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Previously Presented:
Need Meeting 10/16/2020
Solutions Meeting 05/21/2021

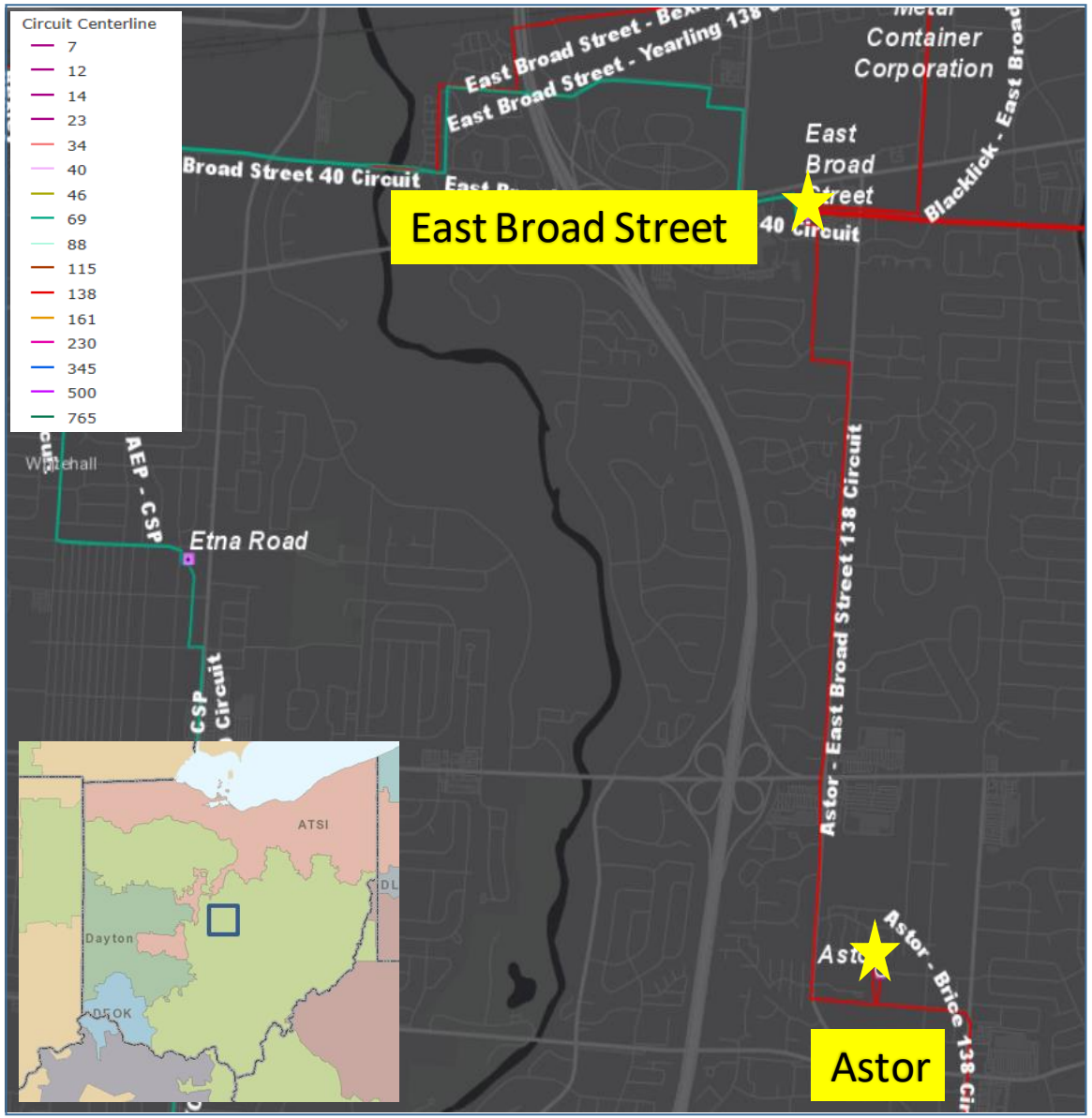
Project Driver:
Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Astor – East Broad Street 138 kV Single Circuit (2.75 miles)

- From 2015 – 2020 this circuit has experienced 2 momentary and 4 permanent outages resulting in 671K CMI.
- The circuit currently has 54 open conditions on 30 structures (out of 55 total structures) which includes pole damage, rot top, rotted/spit poles, and missing ground lead wires.
- 12 structures have been replaced at different times from 1970 to 2011; remaining are wood poles from 1955.
- The circuit conductor span was primarily installed in 1974 of 636,000 CM ALUM/1350 37 (Orchid 2.75 miles). There are also two spans of 795,000 CM ACSR/AW 26/7 (Drake)
- An Engineering and Field Assessment was conducted in 2019 and found the following issues:
    - The majority of structures do not meet 2017 NESC Grade B loading criteria
    - The majority of structures do not meet the current AEP structural strength
    - The majority of structures do not meet the current ASCE structural strength requirements
    - The phase to ground clearance of the typical structure supporting the average span length fails to meet current clearance requirements



Need Number: AEP-2019-OH041

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Selected Solution:

- Rebuild of the Astor – East Broad 138 KV circuit, approximately 2.75 miles in length; with 477KCM ACSS **Estimated Cost: $9.5M (s2525.1)**
- Astor 138 kV Station: Remote end work including replacing the line surge arresters, relay settings, and line termination. **Estimated Cost: $0.1M (s2525.2)**
- East Broad 138 kV Station: Remote end work including relay settings and line termination. **Estimated Cost: $0.02M (s2525.3)**

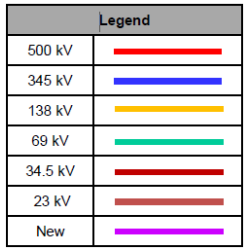
Estimated Cost: $9.62M

Projected In-Service: 06/30/2025

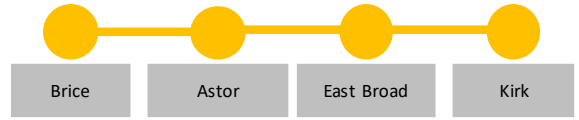
Supplemental Project ID: s2525.1-.3

Project Status: Scoping

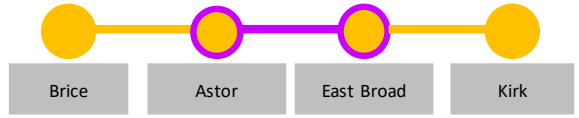
Model: N/A



Existing:



Proposed:



AEP Transmission Zone M-3 Process
Cyprus Station 138kV

Need Number: AEP-2021-OH002

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Previously Presented:

Needs Meeting 1/15/2021

Solution Meeting 5/21/2021

Project Driver:

Customer Service

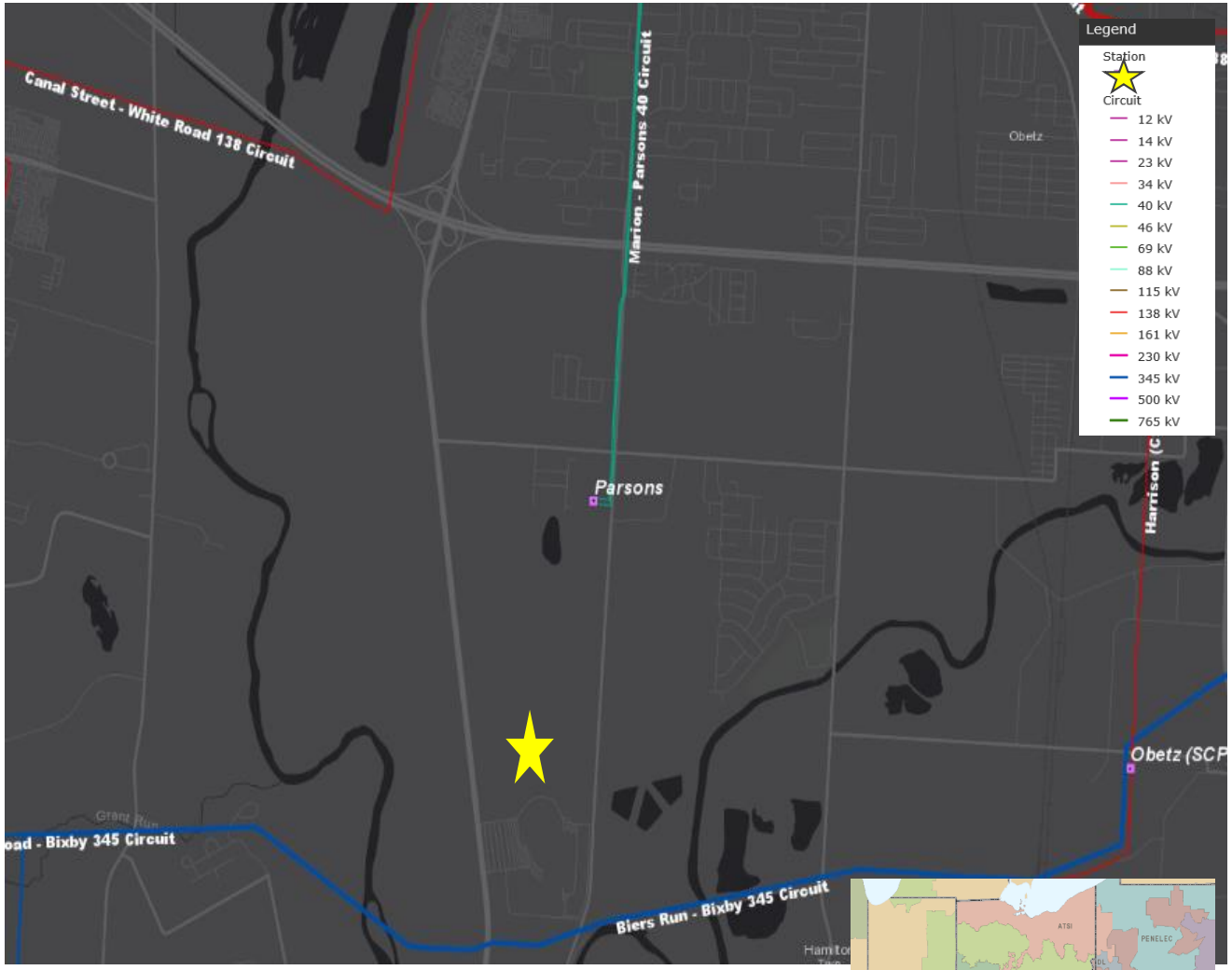
Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

- A customer has requested transmission service just south of AEP's existing Parsons Station in Lockbourne, OH.
- The customer has indicated an initial peak demand of 100 MW with an ultimate capacity of up to 675 MW at the site.



AEP Transmission Zone M-3 Process
Cyprus Station 138kV

Need Number: AEP-2021-OH002

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Selected Solution:

- **Cyprus 138 kV Station:** Establish a greenfield ten-breaker 138kV (63 kA) laid out as breaker and a half station on property provided by the customer south of AEP's Parsons station. Install 138 kV retail metering towards Customer station. **Estimated Cost: $ 14.22M (s2526.1)**
- **Cyprus – Cyprus (Customer) 138 kV #1**: Build ~0.3 miles of double circuit 138kV line using 795 ACSR conductor. Extend fiber cable & install redundant fiber cable for relaying and communication to the customer station. One circuit will serve customer's first building, second circuit will be partially constructed to be utilized for future second building to customer's redundancy requirements. **Estimated Cost: $ 0.96M (s2526.2)**
- **Cyprus – Cyprus (Customer) 138 kV #2**: Build ~0.3 miles of double circuit 138kV line using 795 ACSR conductor. Extend fiber cable & install redundant fiber cable for relaying and communication to Customer Station. One circuit will serve customer's first building, second circuit will be partially constructed to be utilized for future second building due to customer's redundancy requirements. **Estimated Cost: $ 0.0M (Fully Reimbursable) (s2526.3)**
- **White Road 138 kV:** Upgrade line to fiber relaying and remote end work. **Estimated Cost: $ 0.46M (s2526.4)**
- **Canal Street 138 kV:** Upgrade line to fiber relaying and remote end work. **Estimated Cost: $ 0.53M (s2526.5)**

Ancillary Benefits: The scope of work associated with s2342 establishes the 138 kV lines from Canal Street and White Road to feed Parsons station. This project will tap the new lines to provide service to the customer and then continue on to feed Parsons station as proposed in s2342. AEP will only build the site out to serve the initial 100 MW. Any future load growth and required upgrades will be developed as agreements are signed by the customer to expand their operations. Further, AEP is investigating any potential cost savings by relocating the Parsons station site to be included in the Cyprus construction. Any changes in scope to s2342 that results from this will be re-presented.

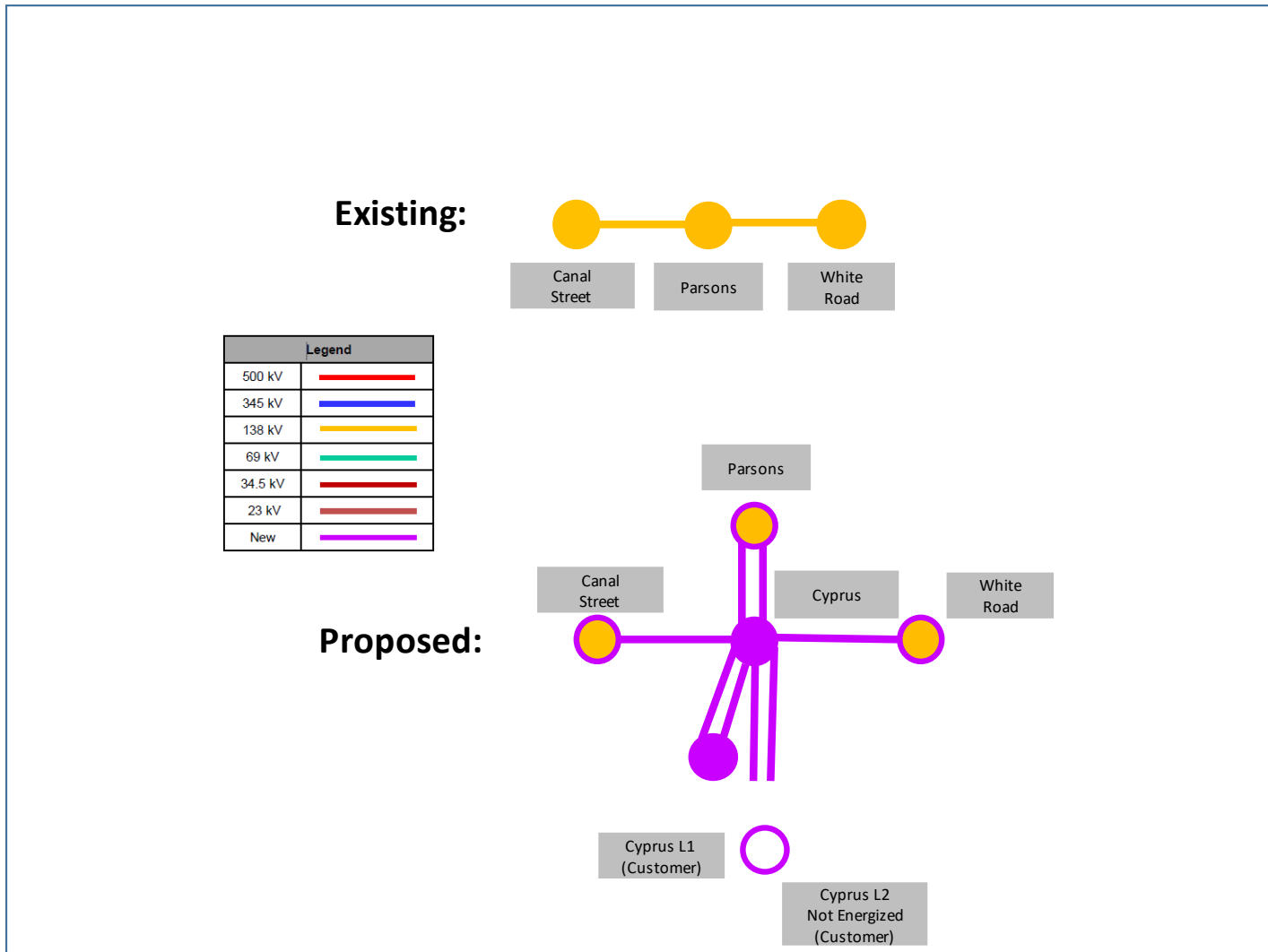
Estimated Cost: $16.17M

Projected In-Service: 12/1/2022 (07/31/2022 for customer portions)

Supplemental Project ID: s2526.1-.5

Project Status: Scoping

Model: 2025 RTEP



AEP Transmission Zone M-3 Process
Lancaster Customer Project

Need Number: AEP-2021-OH005

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Previously Presented:

Needs Meeting 02/17/2021

Solution Meeting 05/21/2021

Project Driver:

Customer Service

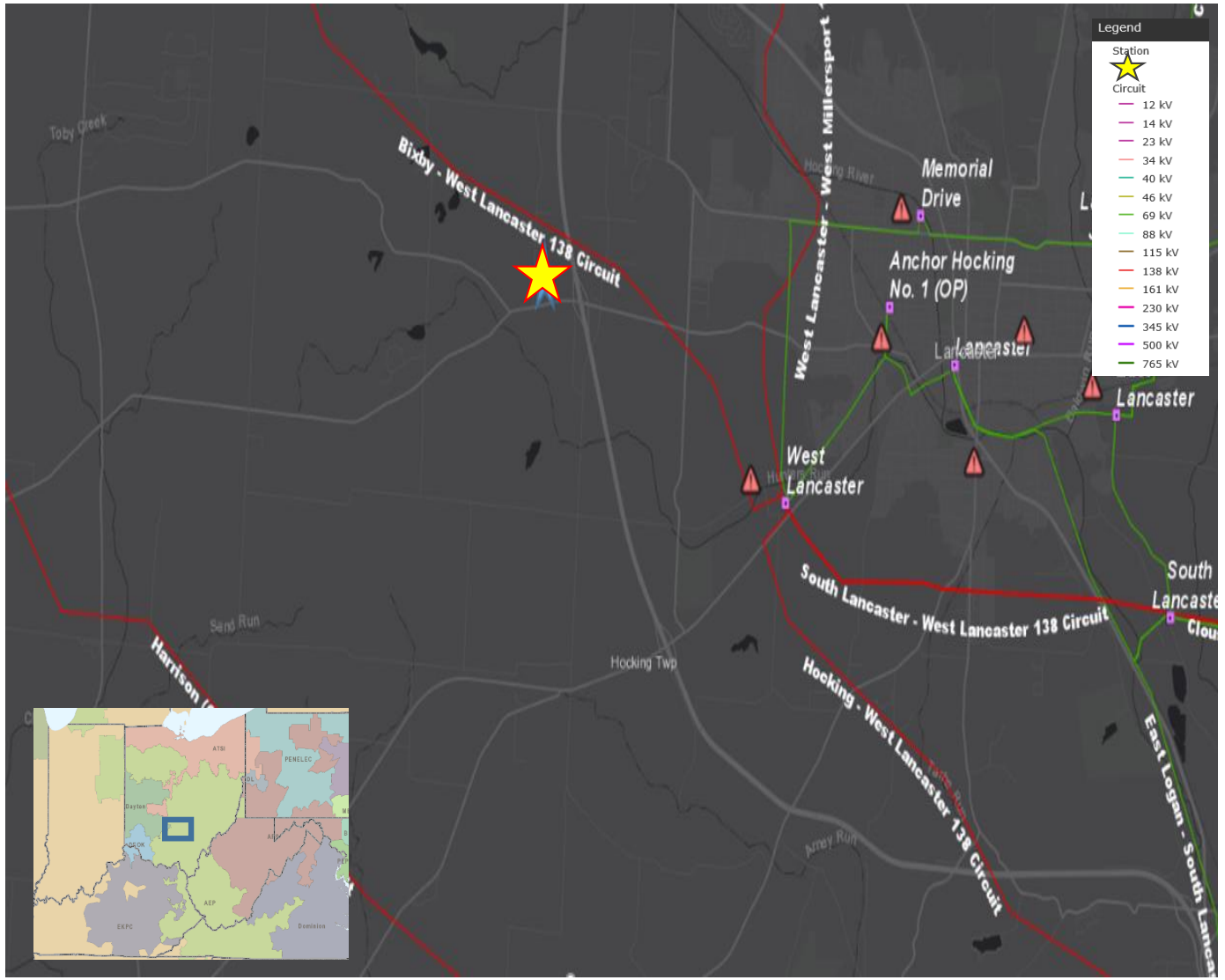
Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

- A customer has requested transmission service near AEP's existing Bixby – West Lancaster 138 kV circuit in Lancaster, OH.
- The customer has indicated an initial peak demand of 100 MW with the potential for an ultimate capacity of up to 300 MW at the site.



AEP Transmission Zone M-3 Process
Lancaster Customer Project

Need Number: AEP-2021-OH005

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Selected Solution:

- **Sifford Station**: Construct a greenfield 138 kV Station served from the existing Bixby to West Lancaster 138 kV circuit to serve the customer facilities. Station includes installation of six 138 kV, 40 kA, 3000 A circuit breakers laid out in a breaker-and-half arrangement. Retail metering will also be needed. **Estimated Cost: $7.0M (s2527.1)**
- **West Lancaster – Bixby 138 kV Circuit**: A couple dead end structures will be installed to bring the West Lancaster – Bixby circuit into the new Sifford station. **Estimated Cost: $0.8M (s2527.2)**
- **Sifford – Ruble #1 138 kV Feed A**: Install 138 kV line extension from AEP's Sifford station to serve the customer's station located just south of the Sifford station. **Estimated Cost: $0.285M (s2527.3)**
- **Sifford – Ruble #1 138 kV Feed B**: Install a second 138 kV line from AEP's Sifford station to serve the customer's station located just south of the Sifford station to meet customer's redundancy requirements at the site. **Estimated Cost: $0M (reimbursable) (s2527.4)**
- **West Lancaster Station**: Upgrades will be needed on the existing relays at West Lancaster Station towards Sifford to ensure proper coordination. **Estimated Cost: $0.03M (s2527.5)**
- **Bixby Station:** Upgrades will be needed to the existing relays at Bixby Station towards Sifford to ensure proper coordination. **Estimated Cost: $0.03M (s2527.6)**
- **West Millersport – West Lancaster 138 kV Sag Study Mitigation**: The new customer will increase loading on the existing West Millersport – West Lancaster 138 kV circuit. Multiple structure and distribution crossing issues will be mitigated on the line in order to allow the line to operate to its conductor's designed maximum operating temperature. **Estimated Cost: $1.5M (s2527.7)**

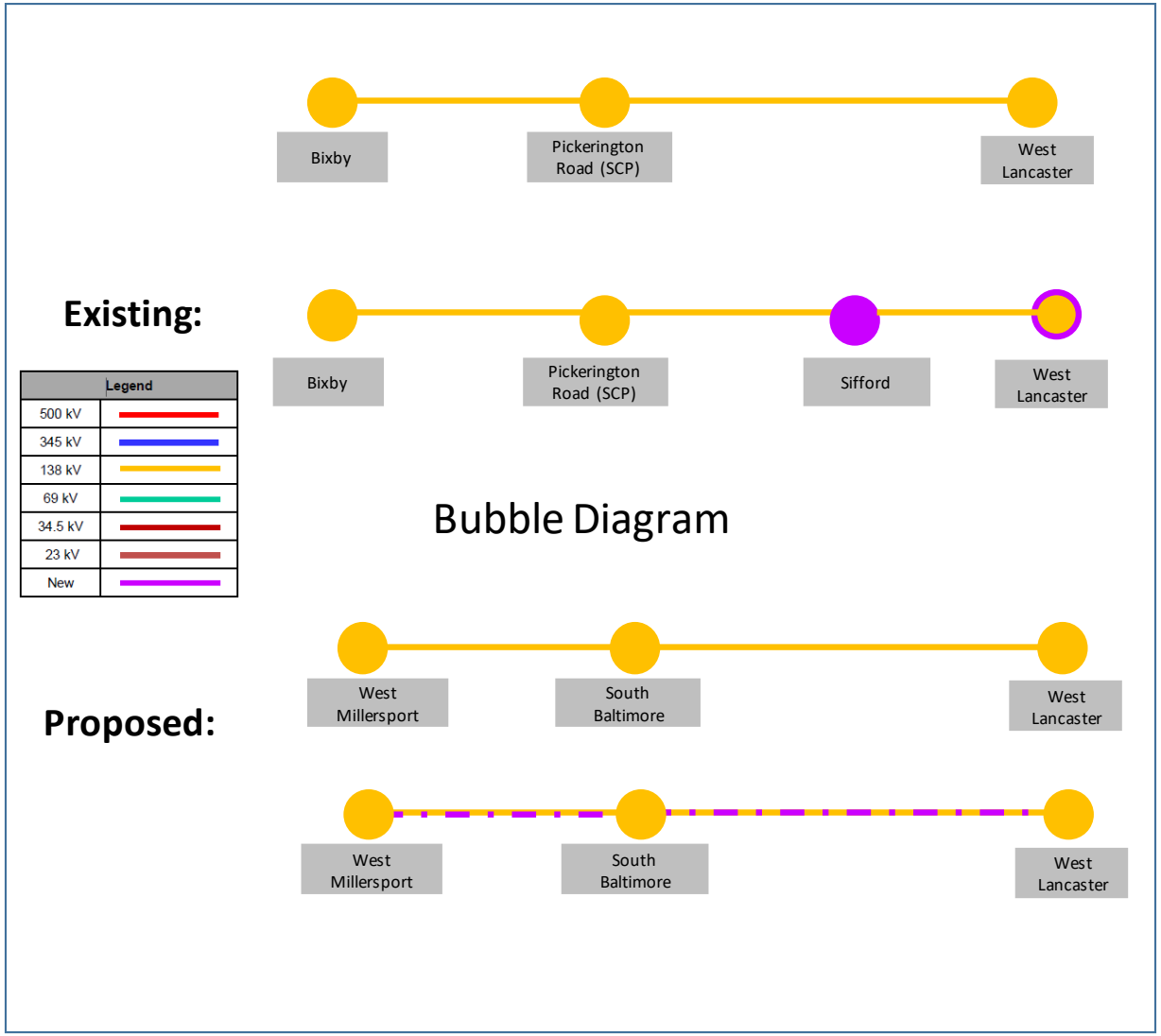
Estimated Cost: $9.645M

Projected In-Service: 5/30/2022

Supplemental Project ID: s2527.1-.7

Project Status: Scoping

Model: 2025 RTEP



Need Number: AEP-2019-OH035

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

Previously Presented:

Needs Meeting 6/17/2019

Solutions Meeting 10/16/2020

Project Driver:

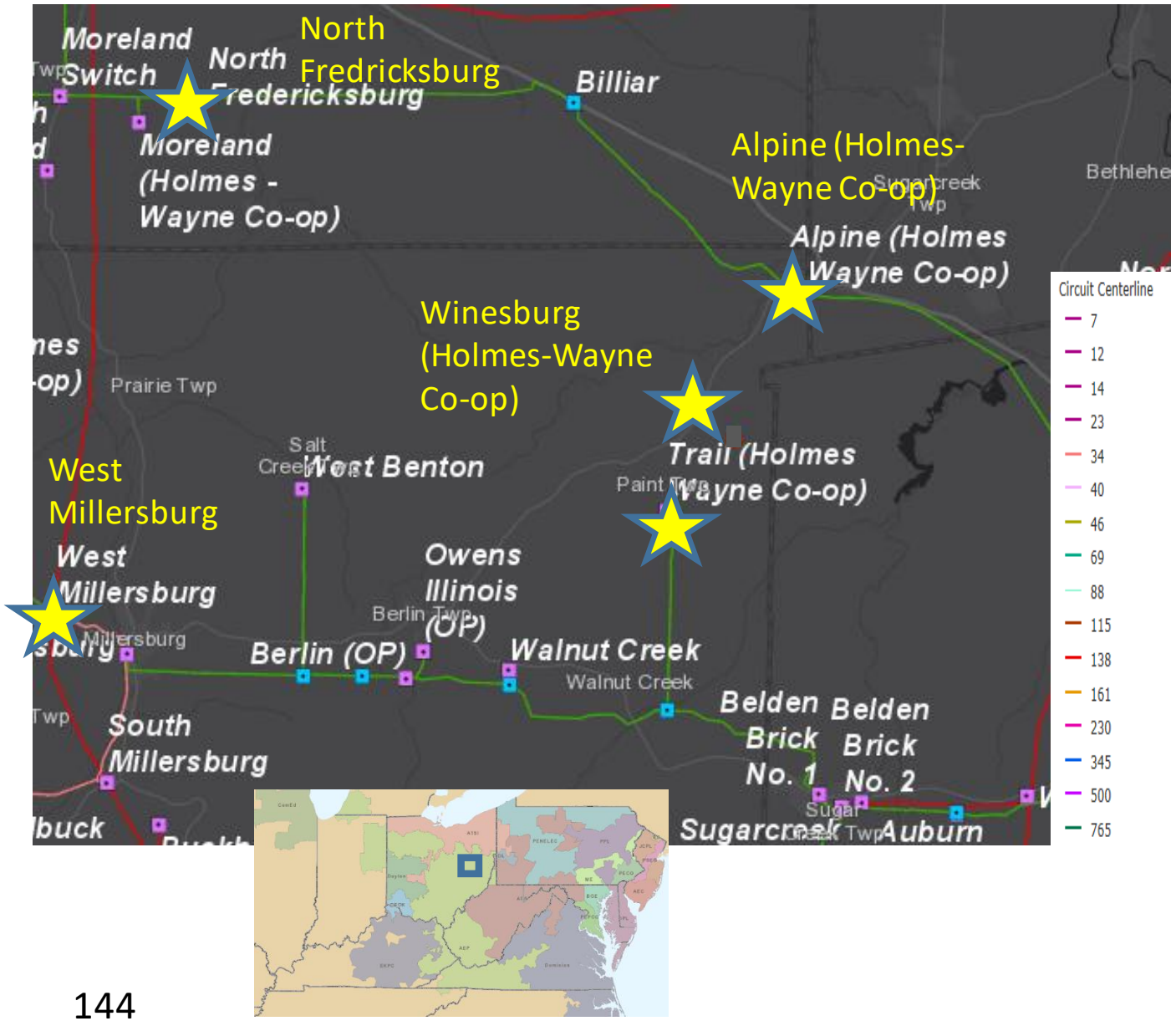
Equipment Condition, Operational Flexibility, and Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 8)

Problem Statement:

- Holmes-Wayne Electric Cooperative is requesting a new delivery point between Trail and Alpine stations at Winesburg.
- The anticipated new load is 13 MW. The load will be phased in starting in December 2021.



AEP Transmission Zone M-3 Process
Holmes County

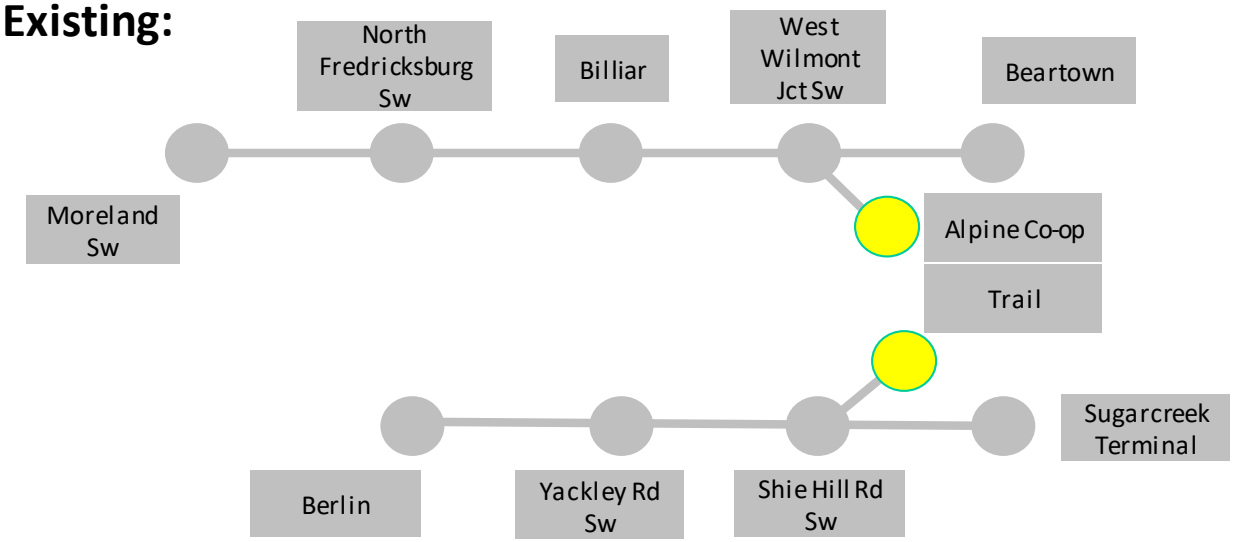
Need Number: AEP-2019-OH035

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 06/29/2021

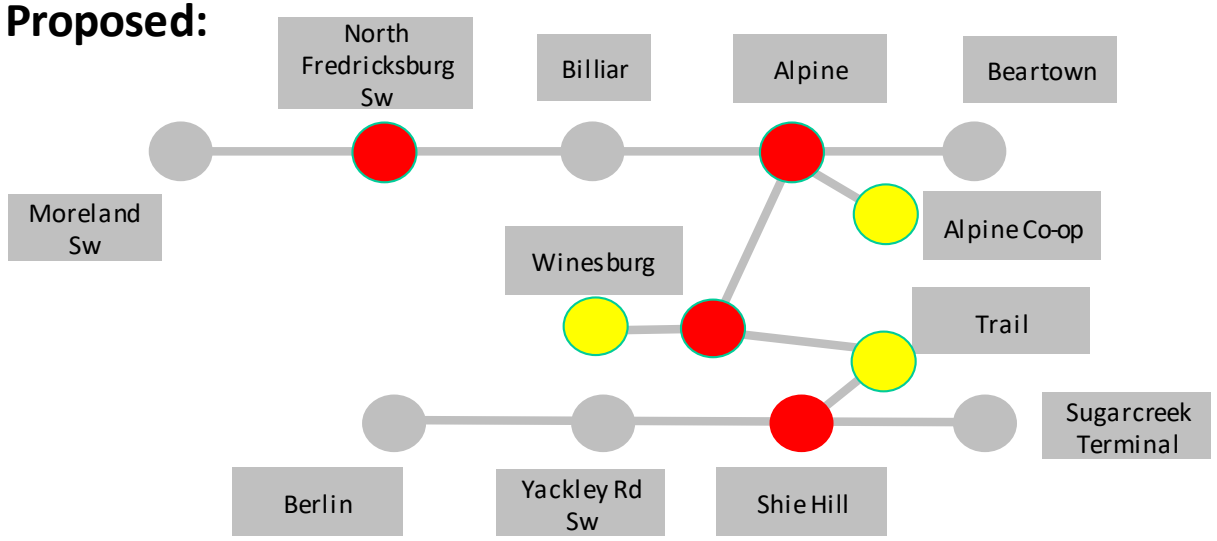
Selected Solution:

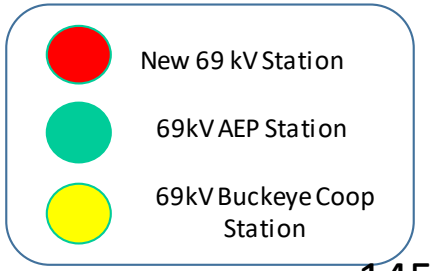
- Construct ~ 5.1 miles of new 69 kV line between the existing Trail and Alpine delivery points using 556 ACSR conductor. **$18.5 M (s2534.1)**
- Establish a new delivery point at Winesburg Switch by installing a new 1200A 69 kV Phase over Phase Switch with MOAB's and metering. **$0.7 M (s2534.2)**
- Build a new 3-way POP Switch to serve the Holmes- Wayne owned Trail station. **$0.6 M (s2534.3)**
- Retire West Wilmont Jct Sw. **$0.04 M (s2534.4)**
- West Wilmont- Holmes Wayne Co-op line work for Alpine station. **$0.1 M (s2534.5)**
- Biliar – West Wilmont 69kV line work for Alpine station. **$1.2 M (s2534.6)**
- Beartown – West Wilmont 69kV line work for Alpine station. **$0.5 M (s2534.7)**
- Build a new station (called Alpine), replacing West Wilmont Junction Switch. This station will be a 4 breaker 69kV ring bus utilizing 3000A 40kA breakers. **$6.8 M (s2534.8)**
- Remote end relay work at Beartown station. **$0.03 M (s2534.9)**
- Remote end relay work at Moreland Sw. **$0.03 M (s2534.10)**

Existing:



Proposed:





Proposed Solution continued:

- Retire Shie Hill Sw. **$0.04 M (s2534.11)**
- Build a new station replacing Shie Hill Sw named Shie Hill. This station will be a 3 breaker 69kV ring bus utilizing 3000A 40kA breakers. **$6.4 M (s2534.12)**
- Sugar Creek – Millersburg 34.5kV line work for Shie Hill station. **$1.6 M (s2534.13)**
- Shie Hill- Holmes Wayne Co-op line work for Shie Hill station. **$0.1 M (s2534.14)**
- Remote end relay work at Sugarcreek Terminal station. **$0.4 M (s2534.15)**
- Remote end relay work at Berlin station. **$0.3 M (s2534.16)**
- Install a new 138 kV 3000A 40kA breaker at West Millersburg Station on the line towards Wooster to reduce contingency impacts and potential low voltage concerns resulting from the new load. **$0.8 M (s2534.17)**
- Replace the 2-way POP Switch at North Fredericksburg with a new 1200A 69 kV POP with new MOAB's. The switch currently in place is not capable of supporting the necessary new equipment. **$1 M (s2534.18)**
- Moreland Sw- Biliar line work for North Fredricksburg Switch. **$0.9 M (s2534.19)**

Ancillary Benefits: Gives the existing Trail radial looped transmission service to reduce the number of sustained outages. The new load addition at Winesburg plus the existing load at Trail meets the 75-MW/mile threshold to loop the load.

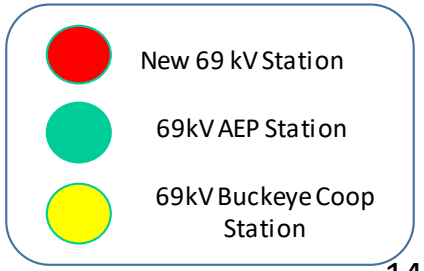
Estimated Cost: $40M

Projected In-Service: 2/10/2023

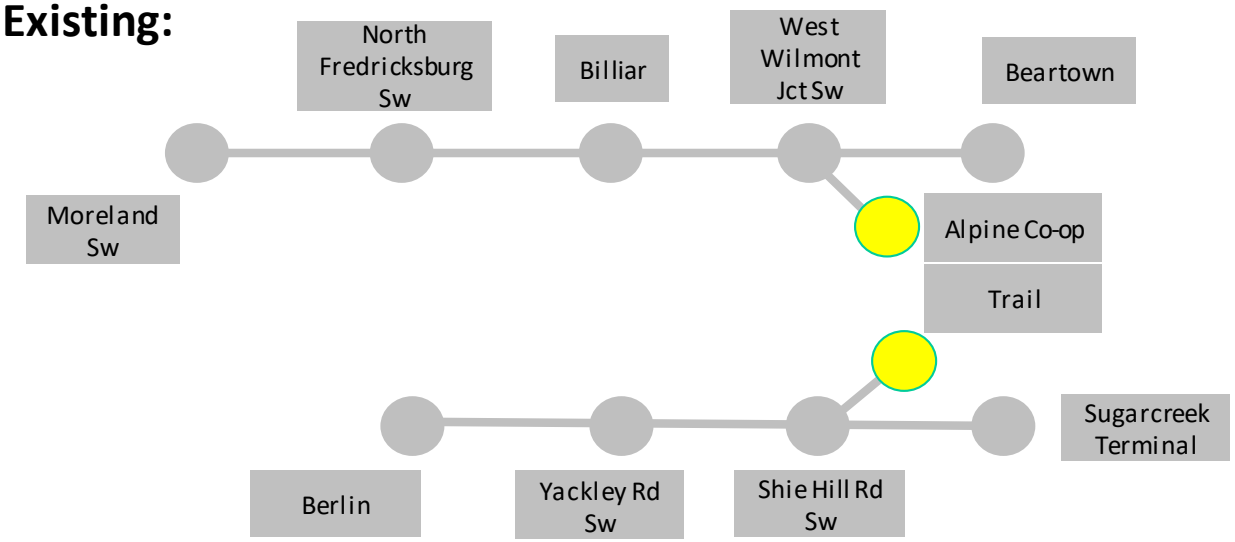
Supplemental Project ID: s2534.1-.19

Project Status: Engineering

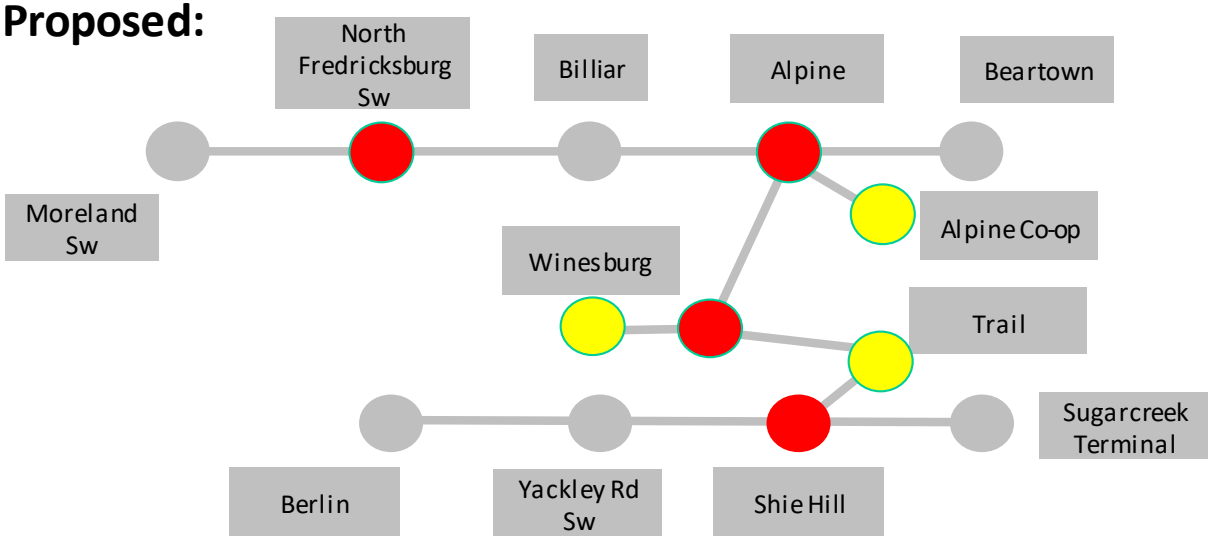
Model: PJM 2019 RTEP Series Cases



Existing:



Proposed:



Need Number: AEP-2019-AP046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021
Previously Presented:
Needs Meeting 11/22/19
Solutions Meeting 06/15/2021

Supplemental Project Driver: Customer Service

Specific Assumptions Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

- A siting assessment has been requested for establishing a new distribution station in anticipation of a future industrial customer(s) located at the Southern Virginia Mega Site at Berry Hill.
- Part of the VA House Bill 1840 (HB1840) (Electric Utilities: Pilot Programs for Transmission Facilities Serving Business Parks).

Model: 2024 RTEP

Need Number(s): AEP-2019-AP046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

Berry Hill 138 kV Station ($0 M - Distribution) – s2569.1

- Establish a new 138 kV, 3-breaker ring bus (space for a 6-breaker ring)
- Install 138/34.5 kV, 30 MVA Distribution transformer

Berry Hill 138 kV Extension ($14.66 M) – s2569.2

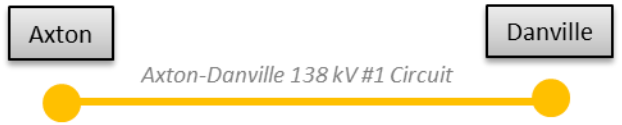
- 0.2 mile relocation of Axton-Danville #2 138 kV and installation of a new 138 kV tap structure
- Construct approximately 5.04 miles of double circuit 138 kV line from tap location to new Berry Hill substation

Estimated Total Transmission Cost: $14.66 M

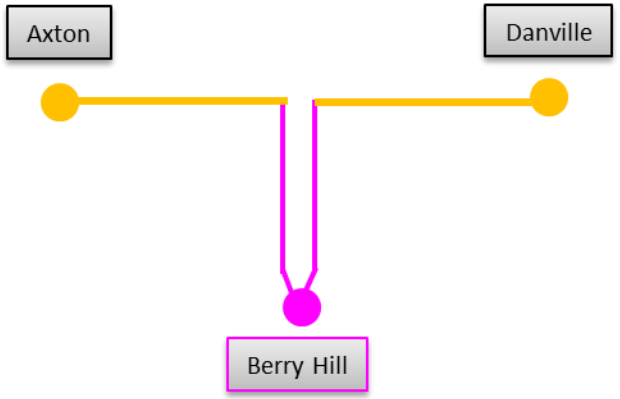
Ancillary Benefits:
Establishing a new 138 kV station near the Berry Hill Mega Park will allow for future interconnection opportunities and economic development in the area. This project is the result of VA House Bill 1840 (HB1840) (Electric Utilities: Pilot Programs for Transmission Facilities Serving Business Parks).

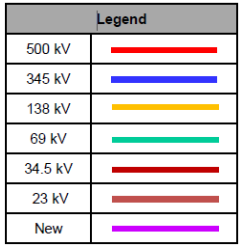
Projected In-Service: 4/15/2022
Supplemental Project ID: s2569
Project Status: Scoping

Existing



Proposed





AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2018-IM017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 1/10/2019

Solution Meeting 07/16/2021

Project Driver: Equipment Material Condition, Performance and Risk

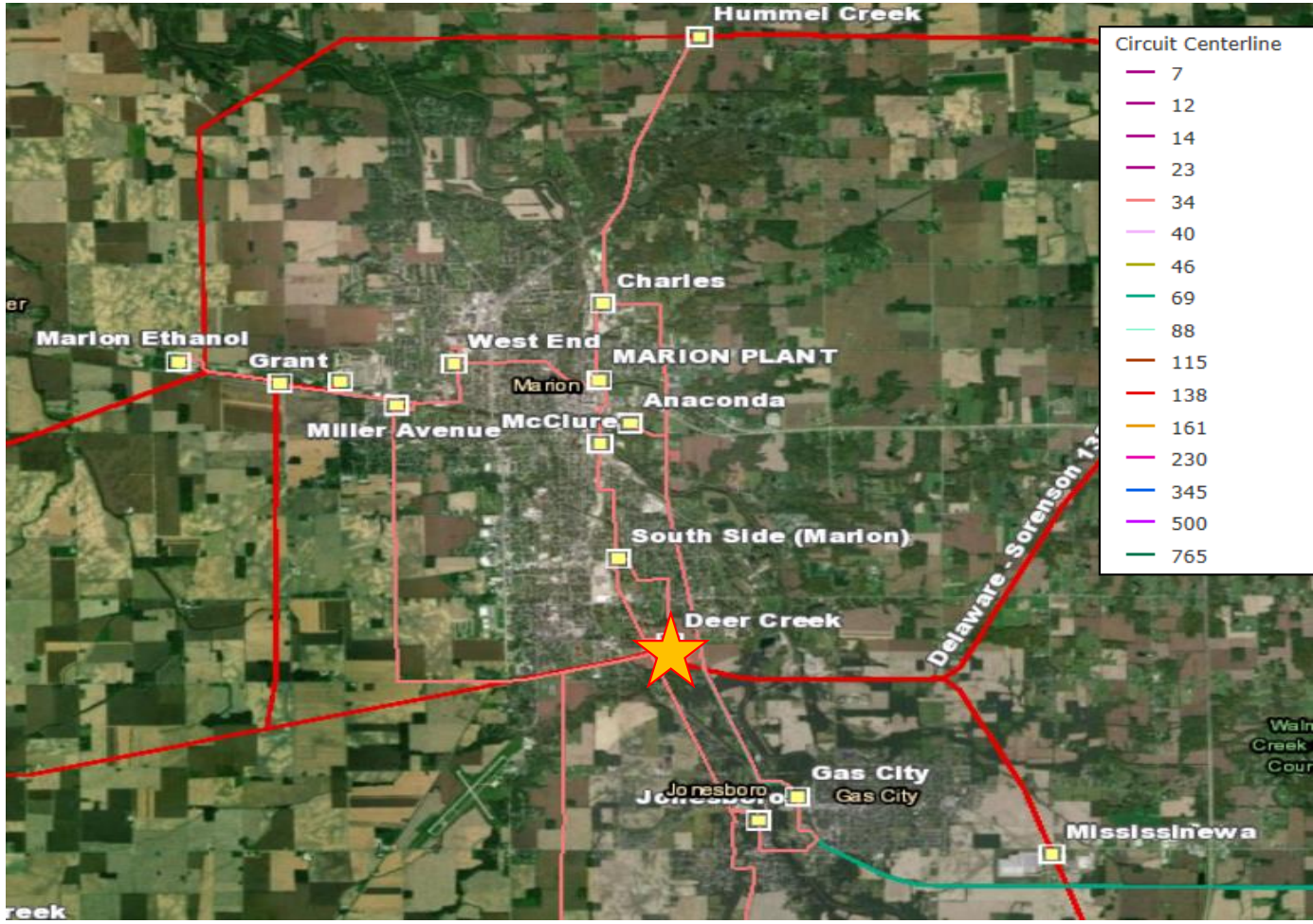
Specific Assumption Reference:

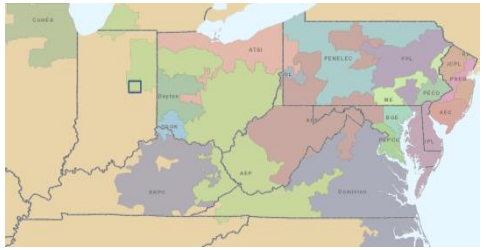
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8);

Problem Statement:

Deer Creek 34.5kV

- Breakers "K", "F", "M", "H", "V", "W"
  - 1949-62 vintage FK oil breakers without containment
  - Fault Operations: CB K(9) CB F(1) CB M(17) CB H(16) CB V(5) CB W(1) - Recommended(10)
  - CB W is over the recommended amount of switching operations.





AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2018-IM022

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 12/21/2018

Solution Meeting 07/16/2021

Project Driver: Equipment Material Condition, Performance and Risk

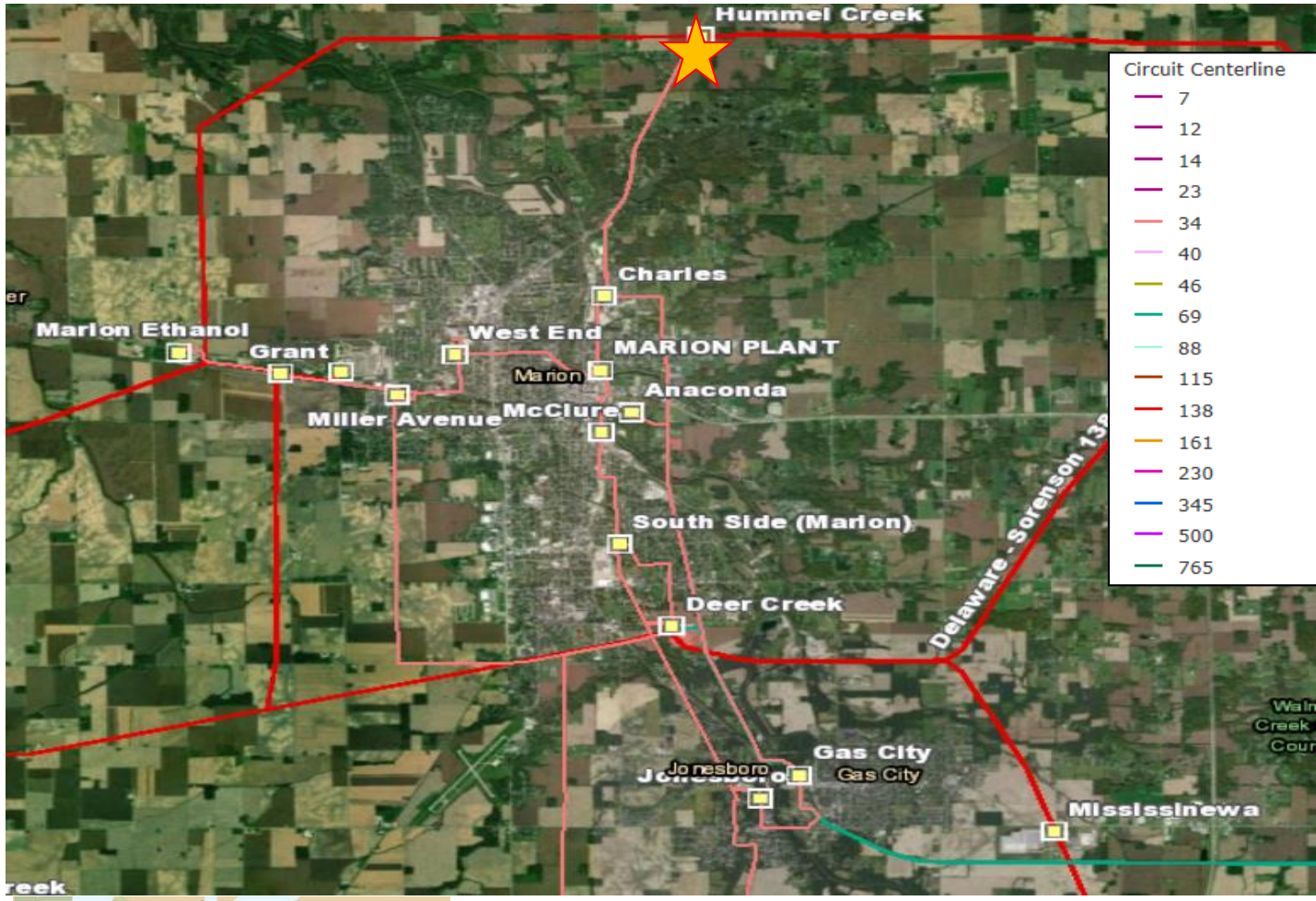
Specific Assumption Reference:

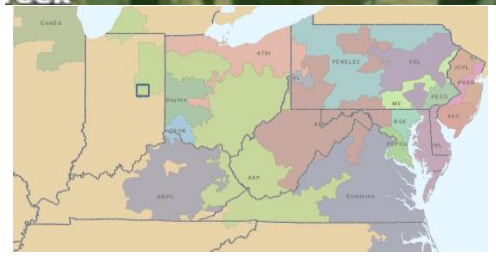
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8);

Problem Statement:

Hummel Creek 34.5kV

- Breakers "L" and "M"
  - 1949-1950 vintage FK oil breaker without containment
  - Fault Operations: CB M(33)– Recommended(10)





AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2018-IM023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 1/11/2019

Solution Meeting 07/16/2021

Project Driver: Equipment Material Condition, Performance and Risk

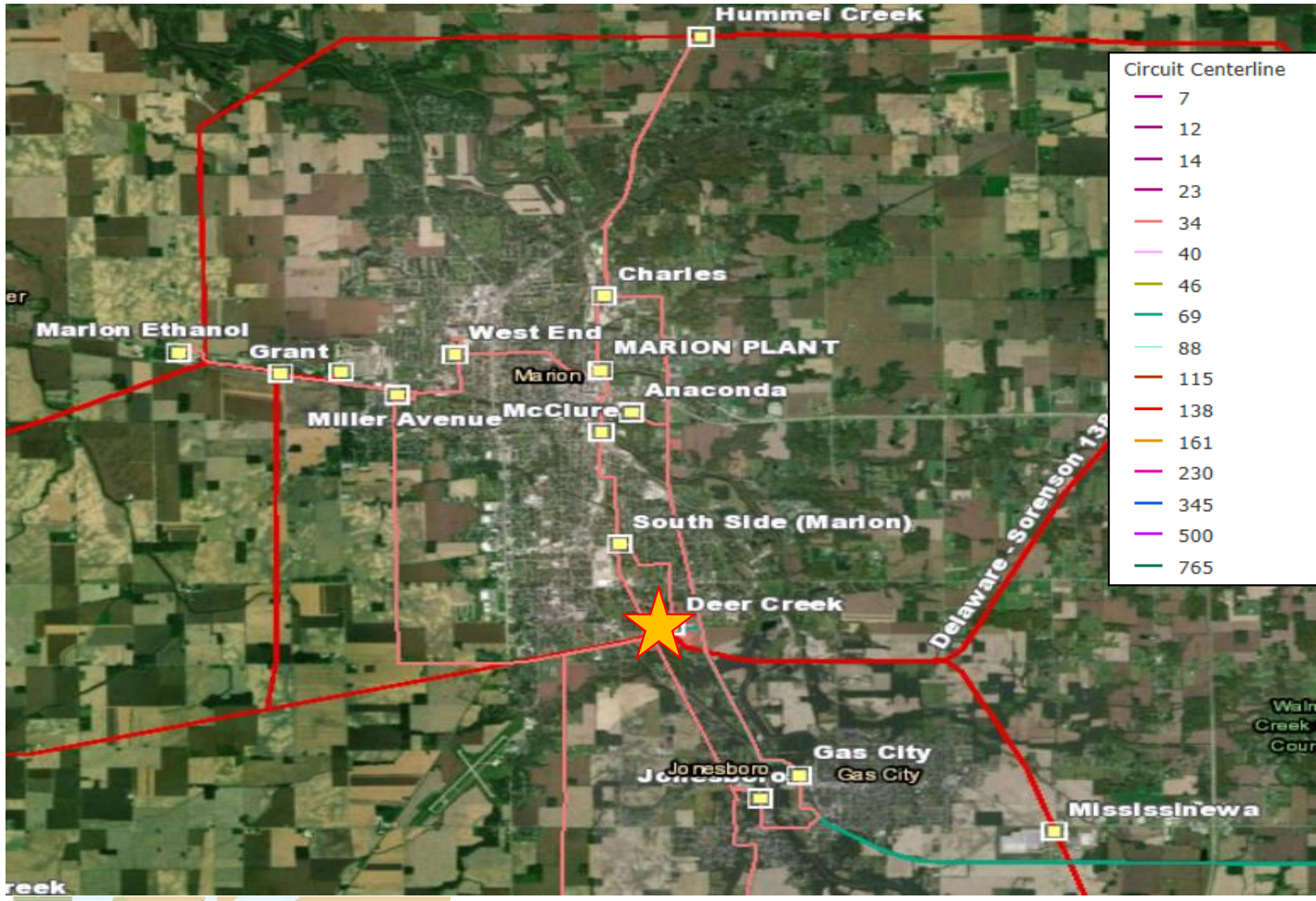
Specific Assumption Reference:

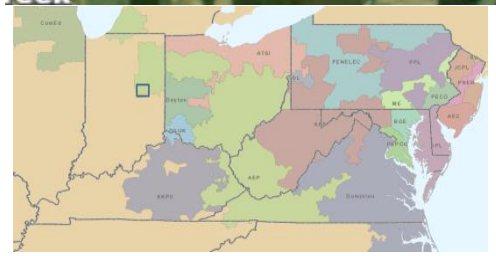
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8);

Problem Statement:

Deer Creek – Hummel Creek 34.5 kV (11 miles)

- 1940 wood crossarm construction (age based on age of station)
- Subject to 16 open A conditions
- Subject to 17 open B conditions
- In the past 10 years, 16 structures have had active maintenance performed. This is expected to increase as line ages.





AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2021-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 04/16/2021

Solution Meeting 07/16/2021

Project Driver: Equipment Material Condition, Performance and Risk

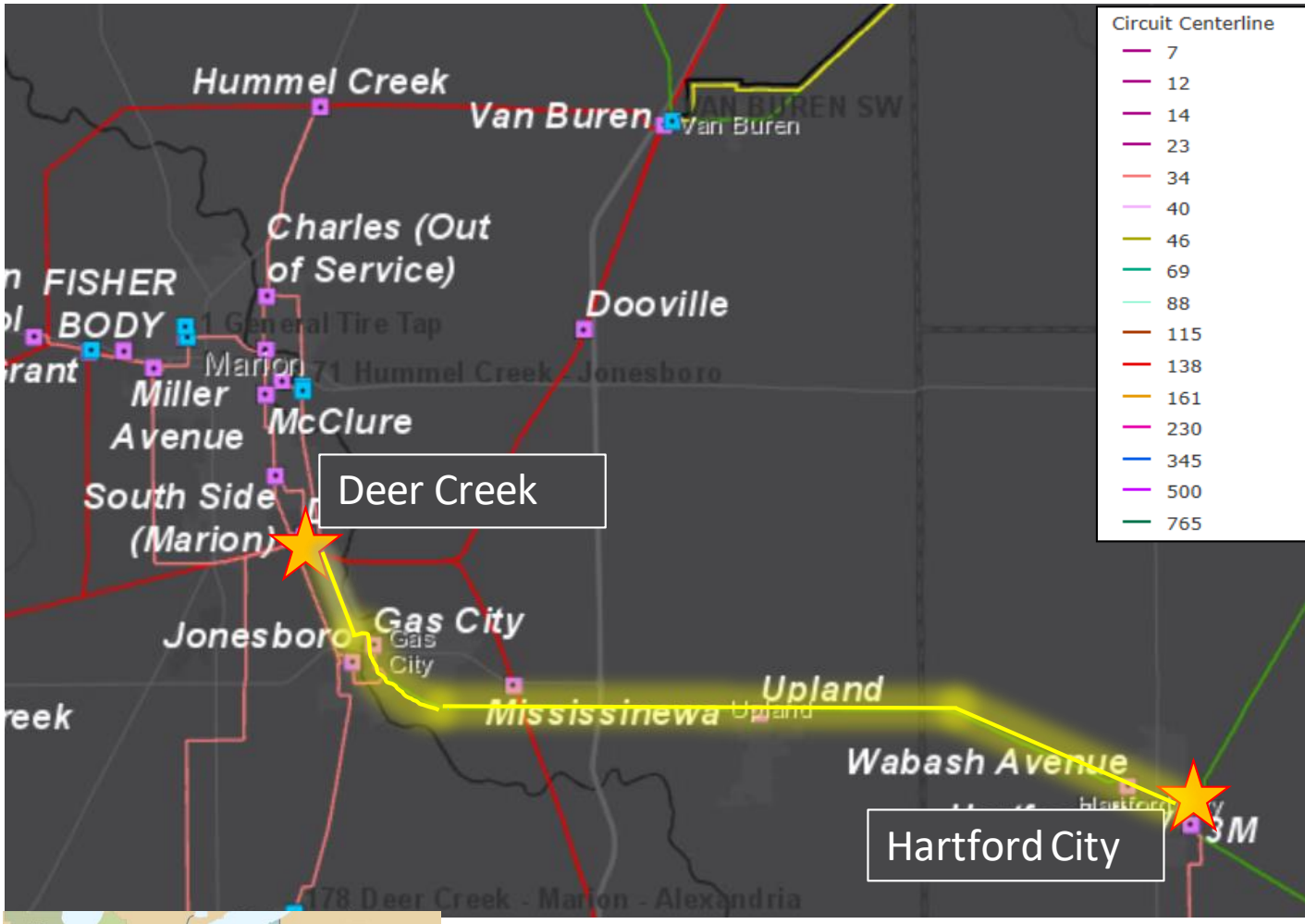
Specific Assumption Reference:

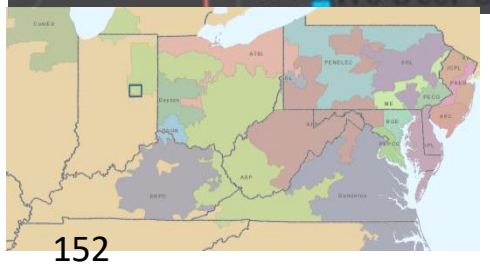
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13);

Problem Statement:

Deer Creek – Hartford City 69 kV (vintage 1967):

- Length: 17.67 Miles
- Original Construction Type: Wood pole structures with cross arm construction and vertical post insulators.
- Original Conductor Type:
  - 336.4 kCM ACSR 18/1 Merlin (18.17 mi, vintage 1967)
  - 3/0 Copper 7 (30COP) (2.24 mi, vintage 1967)
- Momentary/Permanent Outages: 21 total outages: 10 (Momentary), 11 (Permanent).
- 5 Year CMI: 67,818
- Number of open conditions: 4
  - Open conditions include: Cross arm or pole with split and woodpecker conditions and broken or missing ground lead wire.
- Based on the ground crew assessment roughly 28% of the structures had advanced levels of decay on the poles
- Total structure count: 378 with 366 dating back to original installation.





AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2021-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 04/16/2021

Solution Meeting 07/16/2021

Project Driver:

Equipment Material Condition, Performance and Risk

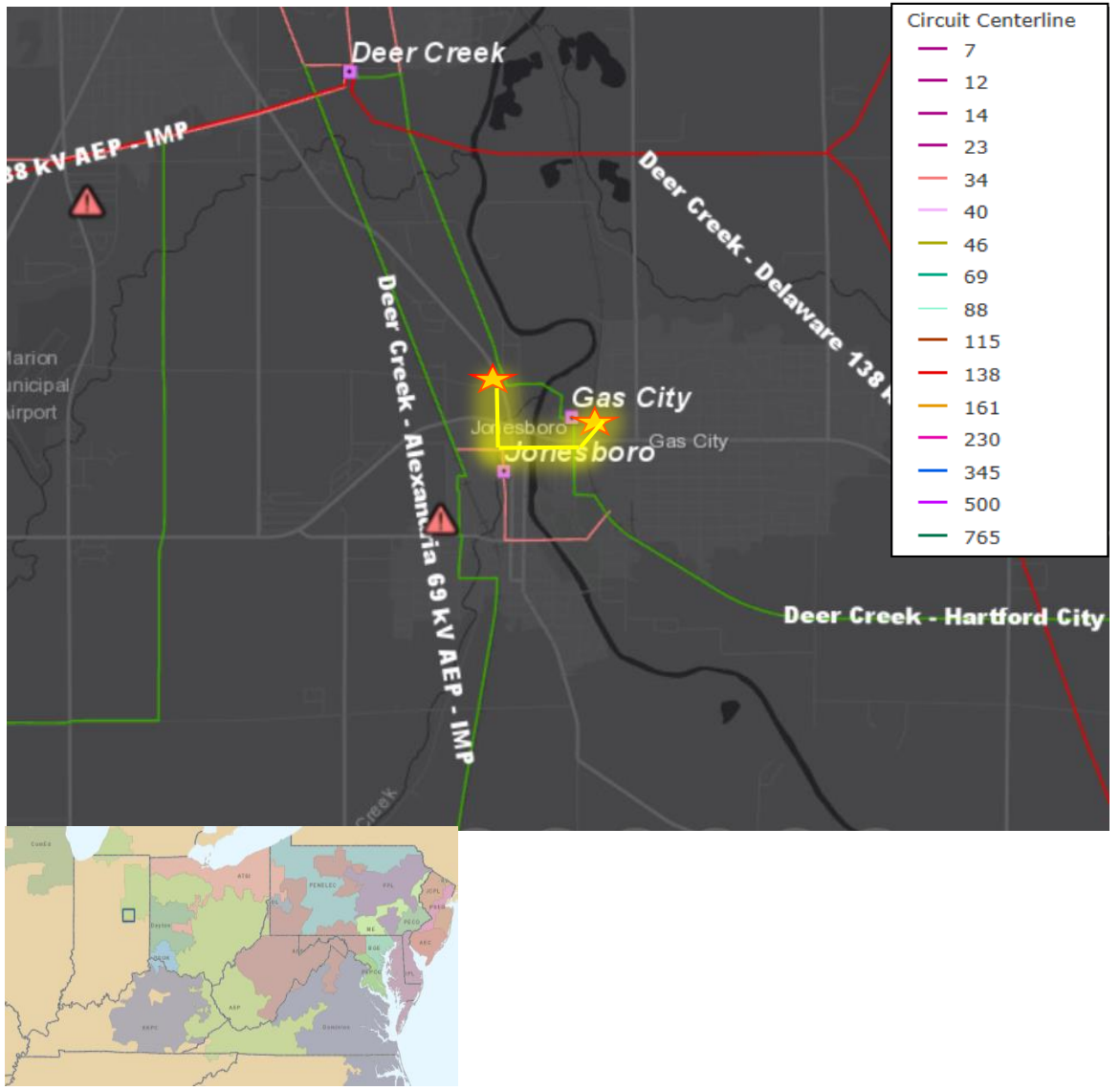
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13);

Problem Statement:

Jonesboro – Gas City 34.5 kV (vintage 1969):

- Length: 1.01 Miles
- Original Construction Type: Wood pole structures
- Original Conductor Type:
  - 336.4 ACSR 18/1 Merlin (0.65 mi, vintage 1969)
  - 3/0 Copper 7 (0.36 mi, vintage 1969)
- Number of open conditions: 12
  - Open conditions include: Cross arm or pole with split rot conditions, knee/vee brace with loose conditions, broken guy strain insulator and right of way encroaching buildings.
- Total structure count: 34 (original vintage)



AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2021-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 04/16/2021

Solution Meeting 07/16/2021

Project Driver:

Equipment Material Condition, Performance and Risk

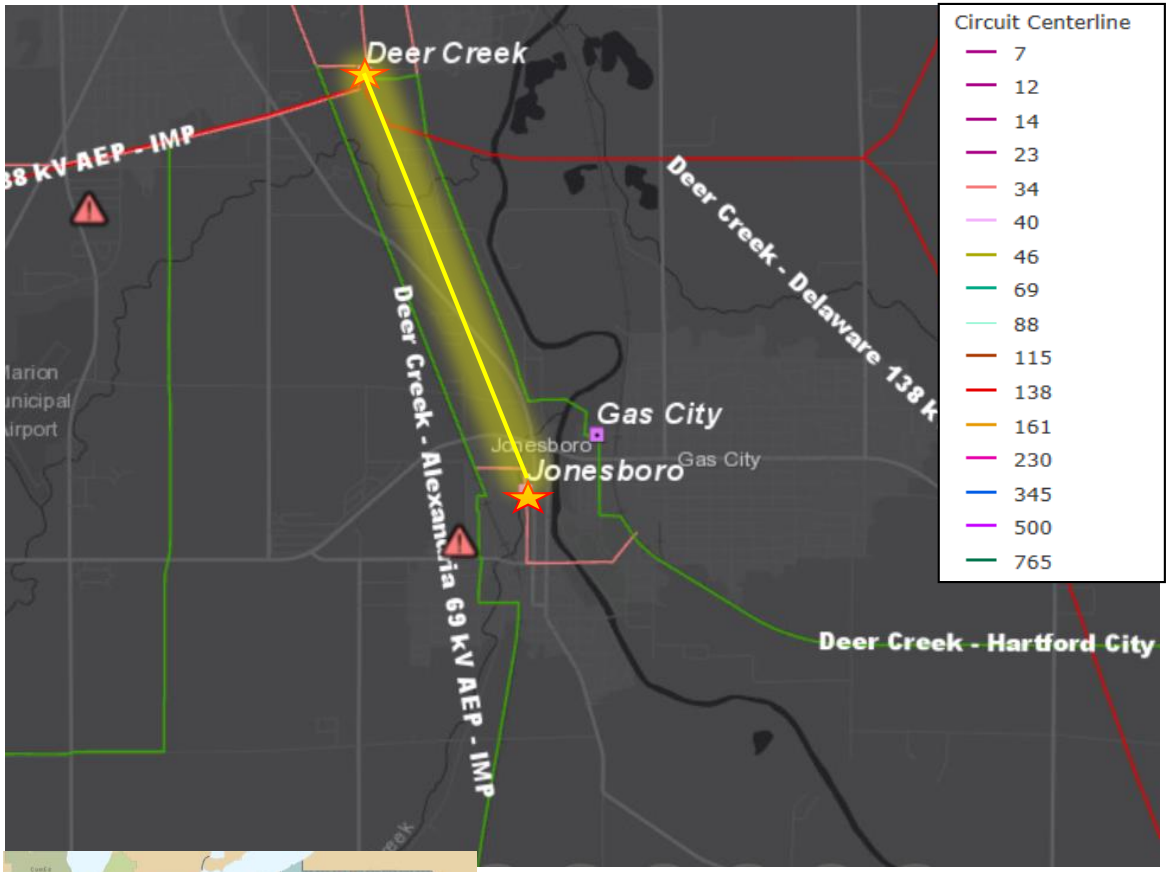
Specific Assumption Reference:

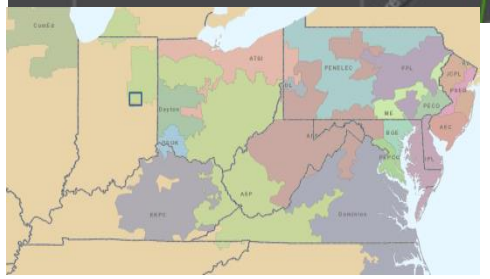
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13);

Problem Statement:

Deer Creek – Alexandria 34.5 kV (vintage 1968):

- Length: 2.19 Miles
- Original Construction Type: Wood pole structures
- Original Conductor Type:
    - 556.5 kCM ALUM/1250 19 Dahlia
- Number of open conditions: 7
    - Open conditions include: Cross arm or pole with rot top conditions, stolen ground lead wires and improperly installed shield wire.
- Total structure count: 61, with 60 dating back to original installation.





AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2018-IM017, AEP-2018-IM022, AEP-2018-IM023, AEP-2021-IM014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

Deer Creek – Hartford City 69 kV: Rebuild ~17.67 miles of 69 kV line with the conductor size 556.5 ACSR 26/7 Dove. The following cost includes the line rebuild, line removal and right of way.
Cost: $50.54 M (s2570.1)

Hummel Creek – Deer Creek 34.5 kV: Retire ~4.6 miles of 34.5 kV 1940s wood line.
Cost: $1.01 M (s2570.2)

Jonesboro – Gas City 34.5 kV : Retire ~0.99 miles of 34.5 kV 1969 wood line.
Cost: $0.42 M (s2570.3)

Deer Creek – Alexandria 34.5 kV : Retire ~2.2 miles of 34.5 kV 1968 wood line.
Cost: $1.23 M (s2570.4)

Hummel Creek 34.5 kV Station: Remove the 34.5 kV circuit breaker "M". Replace 34.5 kV circuit breaker "L" with a system spare circuit breaker. Rebuild the 34.5 kV bus to a 69 kV standards. Install a 138 kV high side circuit switcher on the 138/34.5 kV transformer.
Cost: $1.74 M (s2570.5)

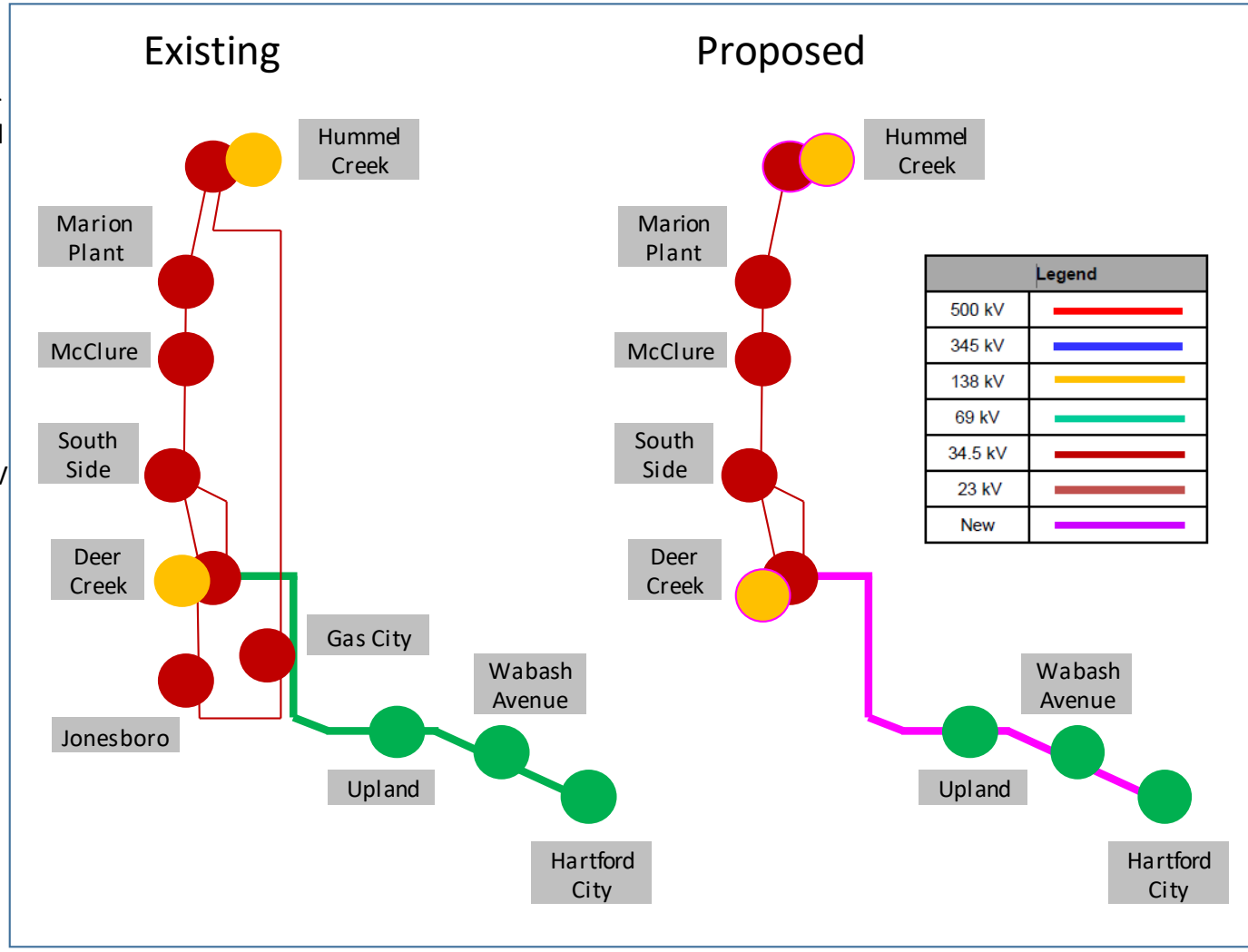
Deer Creek substation: Remove the 34.5 kV circuit breaker "M". Install a 138/12 kV 20 MVA transformer with a high side 138 kV circuit switcher. Also install a low side 12 kV 2000 A circuit breaker a 12 kV 2000 A bus tie circuit breaker and three 12 kV 2000 A feeder circuit breakers. Install a new high side 138 kV circuit switcher 138/12 kV transformer #4.
Cost: $4.14M (s2570.6)

Total Cost: $49 M

Projected In-Service: 10/25/2024

Supplemental Project ID: s2570.1-.6

Project Status: Scoping

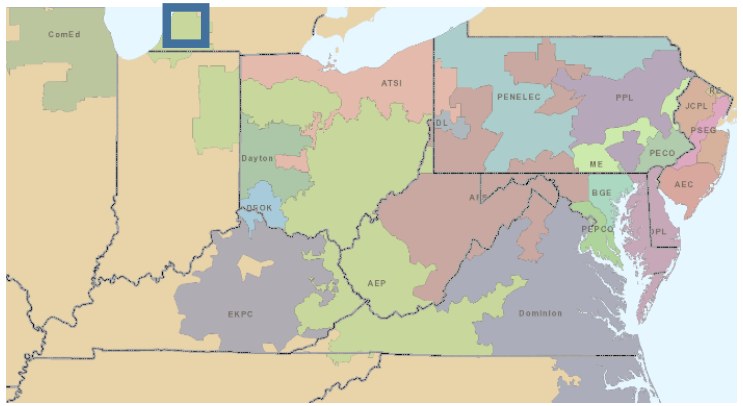


Need Number: AEP-2021-IM003
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021
Previously Presented:
Needs Meeting 4/16/2021
Solution Meeting 7/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

Riverside – Hartford 138kV line:

- 16.85 miles of mostly 1957 wood H-Frame construction
- Conductor is 397 MCM ACSR
- There are 48 structures with open conditions (36% of line). 40 of these are structure related affecting the crossarm, pole, or X-brace including rot, corrosion, cracked, woodpecker, and disconnected conditions.
- Additional assessment identified the following:
    - 15 structures were subject to some level of decay above normal weathering
    - 10 had crossarm decay
    - 9 had ground line decay
    - 4 had broken/flashed insulators
    - 64% of structures assessed had some level of decay



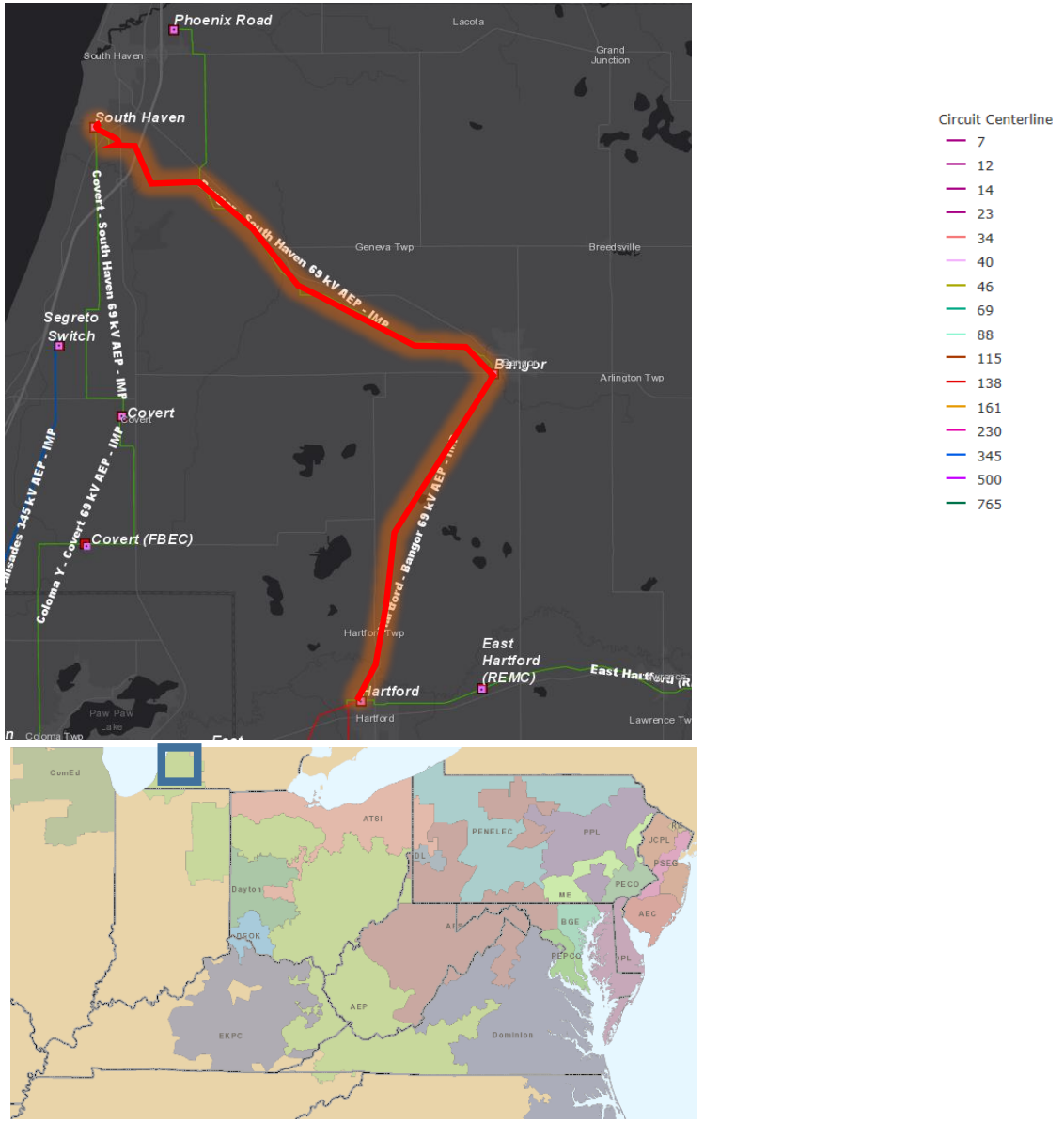
AEP Transmission Zone M-3 Process
Hartford Area Improvements

Need Number: AEP-2021-IM015
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021
Previously Presented:
Needs Meeting 4/16/2021
Solution Meeting 7/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

Hartford – South Haven 69kV line:

- 18.68 miles of mostly 1966 wood pole
- Conductor is 336.4 ACSR
- Since 2015 there have been 20 momentary and 4 permanent outages.
- 4,984,780 CMI from 2015-2020
- Structures fail NESC Grade B, AEP Strength requirements and ASCE strength requirements
- There are 90 structures with open conditions (29% of line). 52 of these are structure related including pole rot, split and woodpecker damage



AEP Transmission Zone: Supplemental Hartford Area Improvements

Need Number: AEP-2021-IM003 & AEP-2021-IM015

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

Riverside – Hartford 138kV:
Rebuild the ~14.7 miles of 1950's wood H Frame line with 795 Drake ACSR.
Estimated Cost: $26.9M (s2571.1)

South Haven – Hartford 69kV:
Rebuild the ~18.7 miles of 1960's wood pole line with 795 Drake ACSR.
Estimated Cost: $37.1M (s2571.2)

Phoenix Switch 69kV:
Replace the switch with a new POP Switch with line MOAB's
Estimated Cost: $0.6M (s2571.3)

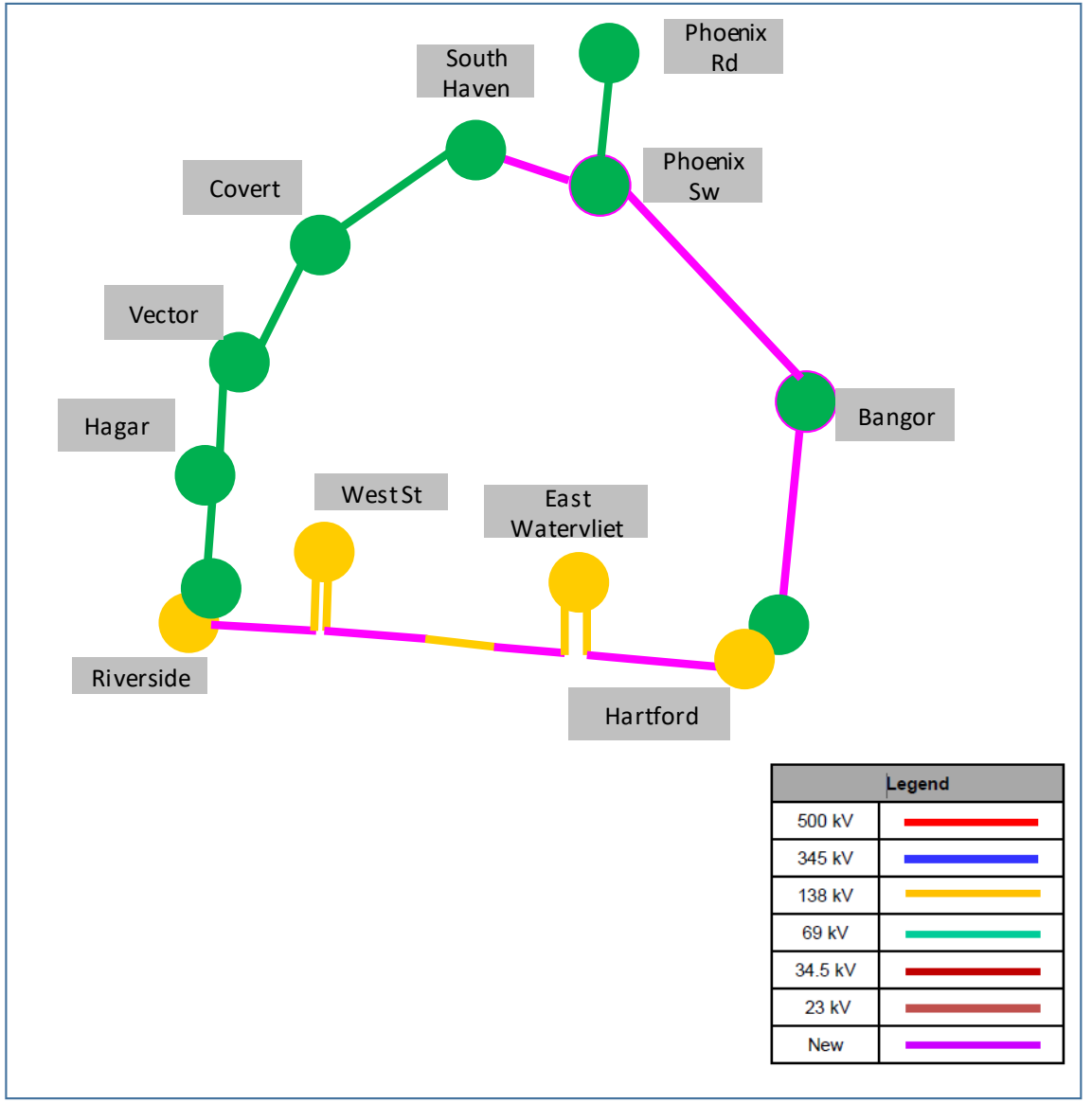
Bangor 69kV:
Install a bus tie breaker at Bangor 69kV station
Estimated Cost: $0.8M (s2571.4)

Total Estimated Cost: $ 65.4 Million

Projected In-Service: 10/28/2024

Supplemental Project ID: s2571.1-.4

Project Status: Scoping



AEP Transmission Zone M-3 Process
Smyth County, VA

Need Number: AEP-2020-AP037

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Need Meeting 7/17/2020

Solutions Meeting 07/16/2021

Supplemental Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

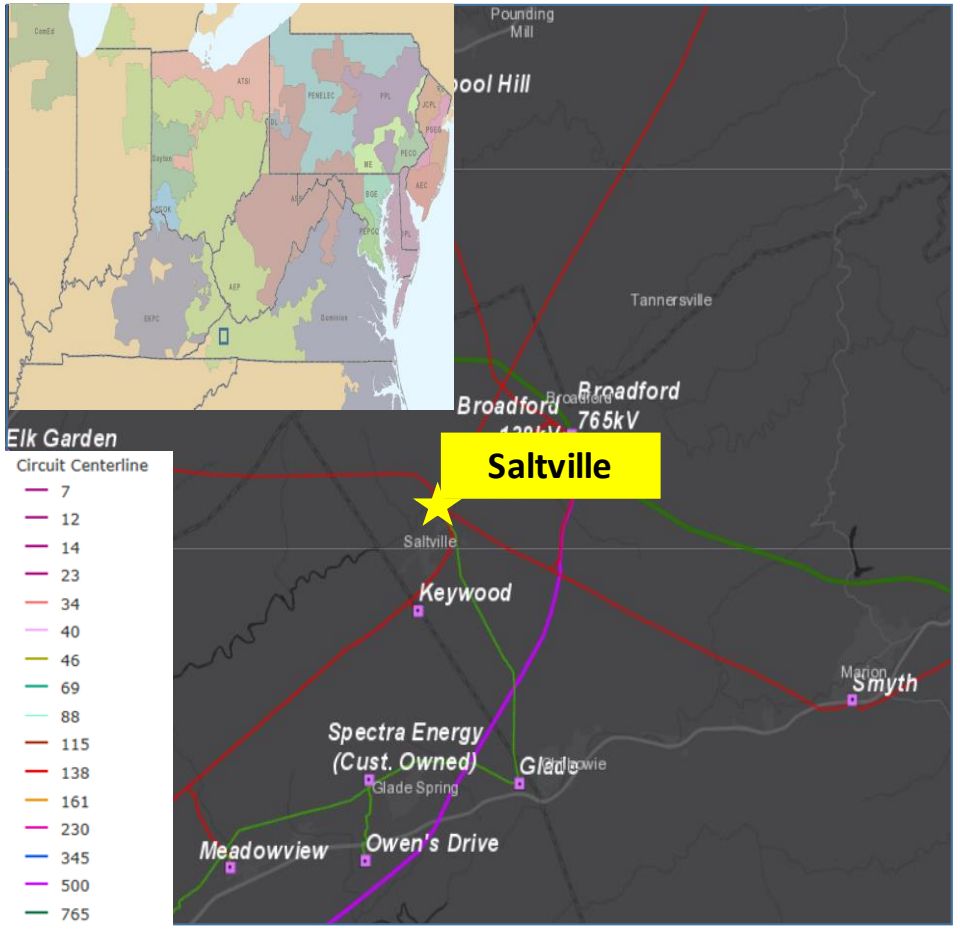
Station Name: Saltville

Circuit Breakers A, B, C, L & V (138 KV) Concerns:

- All of these breakers are HVB145-40000. These breakers are of either 1996 (A & B) or 2001 (C, L, & V) vintage.
- These CBs require maintenance beyond the typical SF6 model type because of air trip mechanisms. The entire air system must be rebuilt whenever maintenance is performed resulting in significant costs.
- All of these breakers have exceeded the manufacturer's designed number of full fault operations – Breakers A, B, C, L, V have experienced 51, 75, 12, 22, 70 fault operations, respectively — exceeding manufacturer's recommended number of 10.

Circuit Breakers J (69 KV) Concerns:

- Circuit breaker J is 53 years old, CF-48-69-2500 type, oil filled breaker – which requires frequent maintenance. Oil spills are common and can result in significant environmental mitigation costs.
- This breaker has experienced 34 fault operations — exceeding manufacturer's recommended number of 10.
- There is no support for the CF family of circuit breakers and spare parts are obsolete, impossible to obtain.



Saltville Station (continued)

Transformer Bank 1 (138/ 69-34.5 KV) Concerns:

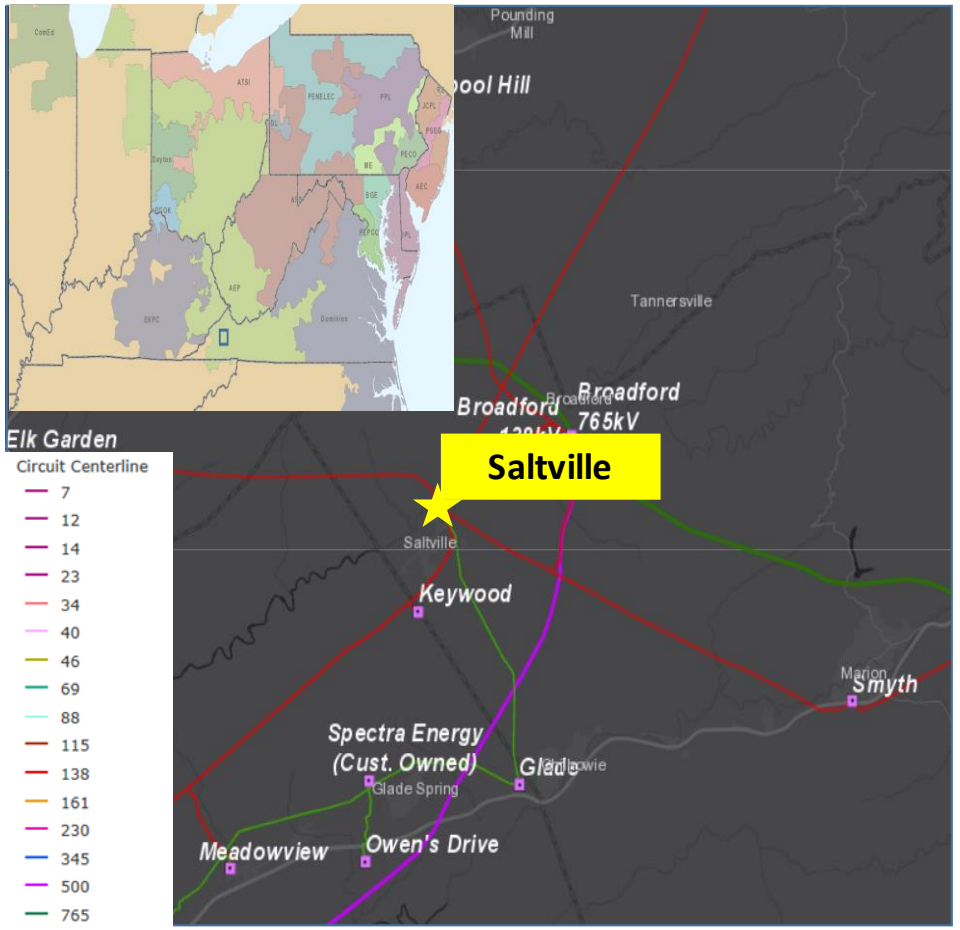
- The 138/ 69-34.5 KV Transformer Bank is 53 yeas old with no oil containment
- This unit shows elevated levels of Carbon Dioxide and Ethane, which are currently at IEEE Level 3 and 4, respectively. These levels indicate excessive decomposition of the paper insulating materials.
- The presence of Carbon Dioxide and Ethane indicates decomposition of the paper insulation that impairs the unit to withstand future short circuit or through fault events due to the state of the paper insulation.
- The low side surge arresters (on 69KV) are obsolete and in need of replacement.

Other station concerns:

- The station yard is tiered with stairs to access the different levels which creates a washout risk.
- Power transformers XF#1, XF#2, and XF#5 are connected directly to 138kV bus through MOABs — which renders Saltville bus#1 and bus#2 to a transformer fault. Moreover, malfunction record indicated that the MOAB X1 would not open during trip testing due to the plunger sticking on the contactor. Also, MOAB X2 is on cap and pin insulators.
- Perimeter fence is not standard height and damaged.
- Concrete cable trench along retaining wall is damaged.
- Several foundations throughout station are degraded.
- Lower elevation levels in the station yard are in the 100-year flood plain of the nearby New River.
- Asbestos and lead paint in both of the control buildings.

Relay concerns:

- Currently, 79 of the 95 relays are in need of replacement.
- There are 68 of the electromechanical, 6 static type and 5 legacy microprocessor relays — which have significant limitations with regards to fault data collection and retention.



AEP Transmission Zone: Supplemental Smyth/Tazewell County, VA

Need Number: AEP-2021-AP004

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 01/15/2021

Solutions Meeting 07/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

Specific Assumption Reference:

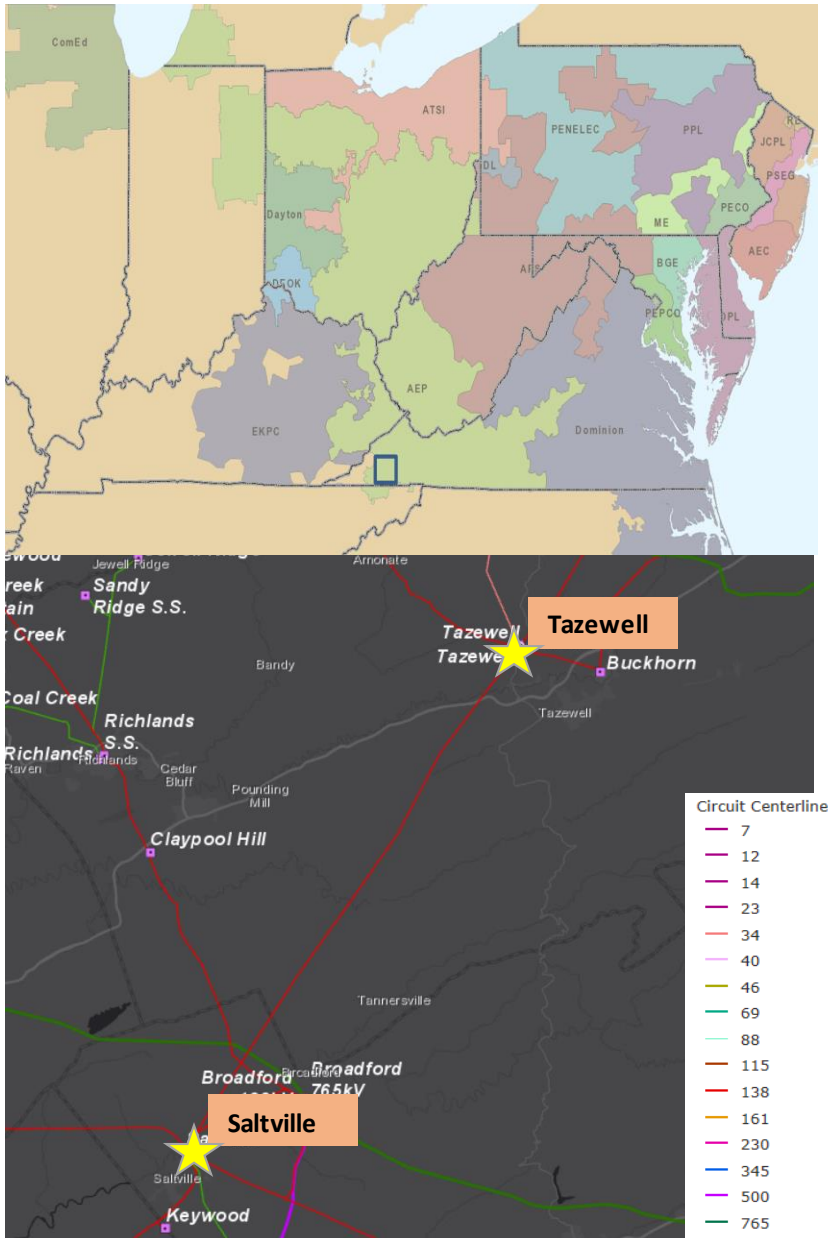
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13), AEP Presentation on Pre-1930s Lines

Problem Statement:

Line:

Saltville — Tazewell 138 KV (installed in 1927)

- Length: ~21 Miles
- Original Construction Type: Lattice Steel
- Original Conductor Type: 97.3% 397.5 ACSR, 1 % 795 ACSR, 1.5% 1033.5 ACSR
- Momentary/Permanent Outages: 15/2 (5 years)
- Total structure count: 98
- Number of open conditions: 26
  - Open conditions include: broken conductor strands, broken/burnt insulators.
- Unique structure count with open conditions: 12 (12%)
- Additional Info on Insulator & Hardware Corrosion:
  - Section Loss: The connecting elements including the tower attachment hole and the insulator hook have experienced serious cross-section loss due to corrosion and wear. This loss of metal cross-section significantly reduces the capacity of the connection
  - Corrosion: The insulator caps and connecting hardware have experienced heavy to complete loss of galvanizing. When the protective galvanized coating is gone or significantly compromised, the bare steel corrodes at an accelerated rate
  - Tower members with corrosion and damage. Lattice tower structures have little structural redundancy. A failure of one member of the structure will impact the integrity of the structure and may cause the entire tower to collapse.



AEP Transmission Zone: Supplemental
Smyth/Tazewell County, VA

Need Number: AEP-2020-AP037, AEP-2021-AP004

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

Rebuild and reconfigure the Saltville 138 KV station in a 3 string breaker-and-a-half bus arrangement to allow replacement of 138 KV CBs A, B, C, V, L, and U with new 3000A 40 KA circuit breakers. Replace existing 69 KV circuit breaker J with a new 3000A 40 KA circuit breaker. Replace existing Transformer #1 with a new 138/69-34.5 KV 50 MVA transformer. Replace existing high side MOAB switches with high side circuit switchers on T2&T5.

- Estimated Install Cost: ~$12.54M; Estimated Removal Cost: ~$1M (s2572.1)

Line work and ROW required to relocate the Broadford – Saltville #1 138KV, Broadford – Saltville #2 138KV, Clinch River – Saltville 138KV lines to terminate into Saltville Station's new configuration. This work includes installing 2 structures (steel tower structures) and total of ~0.24 new wire and old wire replacement. - **Estimated Cost: ~$1.87 M (s2572.2)**

Rebuild ~21 miles of the 138KV line between Saltville and Tazewell stations (SN/SE/WN/WE: 296/413/375/464 MVA) .

- Estimated Cost: ~$53.8M; Estimated Removal Cost: ~$5.7M (s2572.3)

Remote End Work Costs Tazewell, Meadowview, Broadford and Clinch River Stations:

- Estimated Transmission Costs: ~$0.7M (s2572.4)

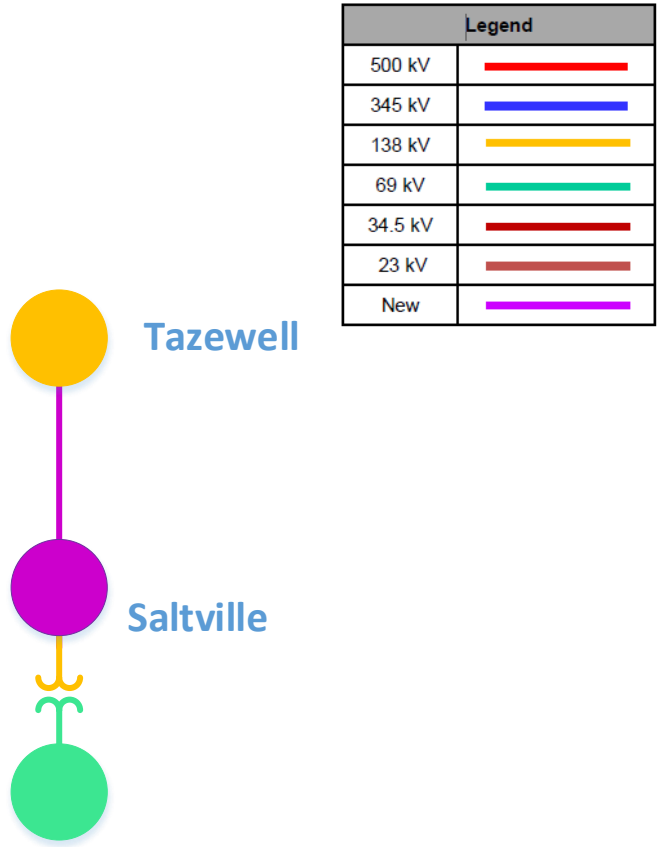
Total Estimated Transmission Cost: ~$75.61M

Projected IS Date: 7/01/2025

Supplemental Project ID: s2572.1-.4

Project Status: Scoping

Proposed



AEP Transmission Zone M-3 Process
Boone County, WV

Need Number: AEP-2021-AP010

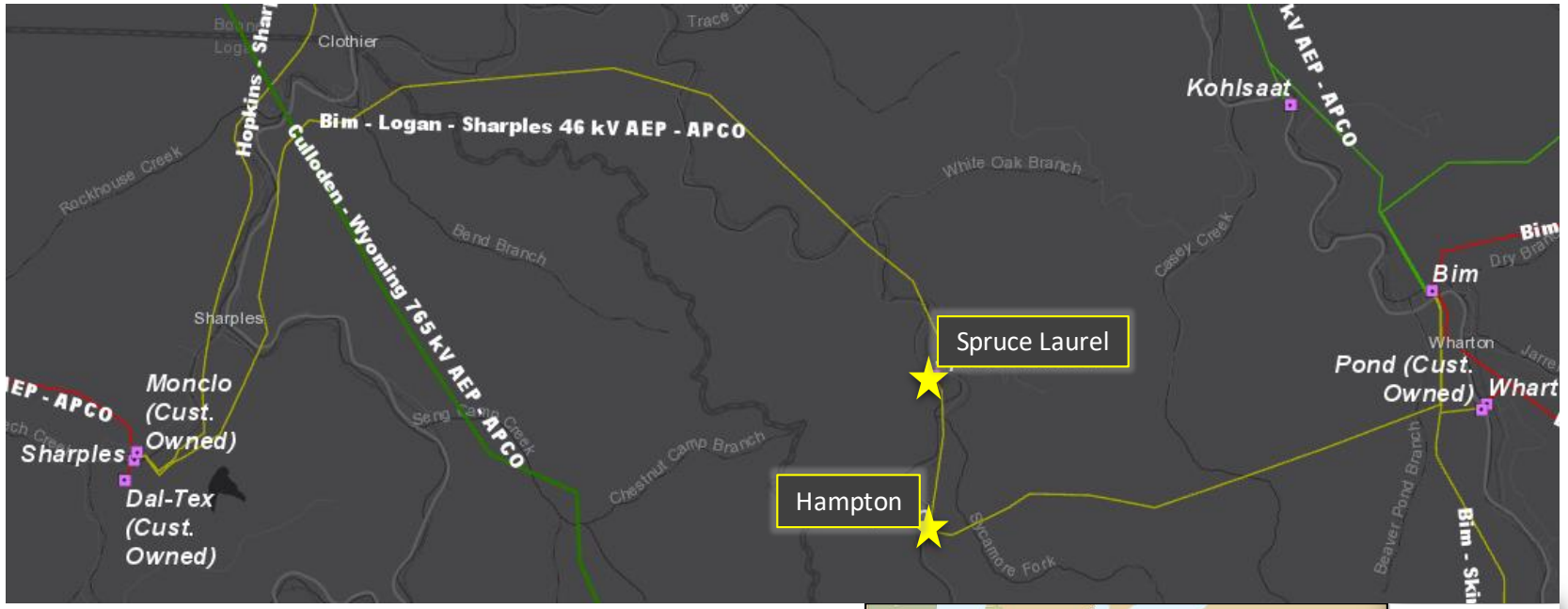
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021
Previously Presented:
Needs Meeting 03/19/2021
Solutions Meeting 07/16/2021

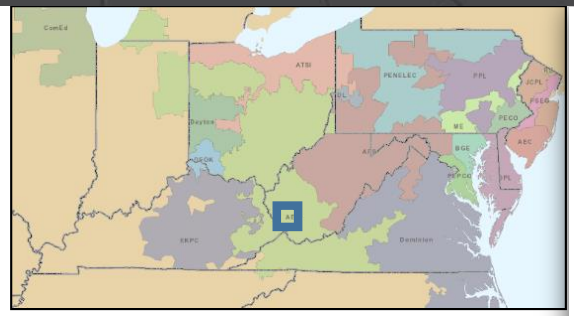
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

- Both Spruce Laurel and Hampton stations are no longer feeding customers but have equipment connected to the transmission through path.





Circuit Centerline
7
12
14
23
34
40
46
69
88
115
138
161
230
345
500
765

Need Number: AEP-2021-AP010

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

- Remove the equipment at Spruce Laurel station.
- **Estimated Transmission Cost: $0.224M (s2573.1)**

- Remove the equipment at Hampton station.
- **Estimated Transmission Cost: $0 (station is Distribution) (s2573.2)**

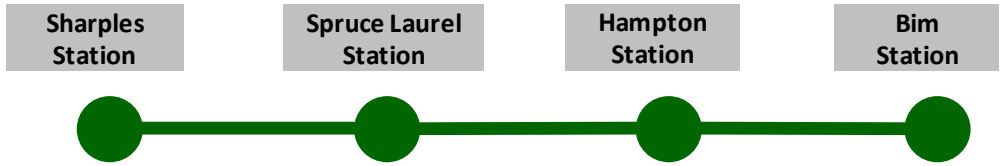
- One Transmission line structure at Hampton station will be removed and new guy wires will be added to an existing structure.
- **Estimated Transmission Cost: $0.222M (s2573.3)**

Total Estimated Transmission Cost: $0.446M

Ancillary Benefits: No longer need to maintain two stations, reducing future O&M costs.

Projected IS Date: 5/1/2022
Supplemental Project ID: s2573.1-.3
Project Status: Scoping

Existing



Proposed

Legend	
345 kV	
138 kV	
69 kV	
46 kV	
New	

AEP Transmission Zone: Supplemental
Grayson County, VA

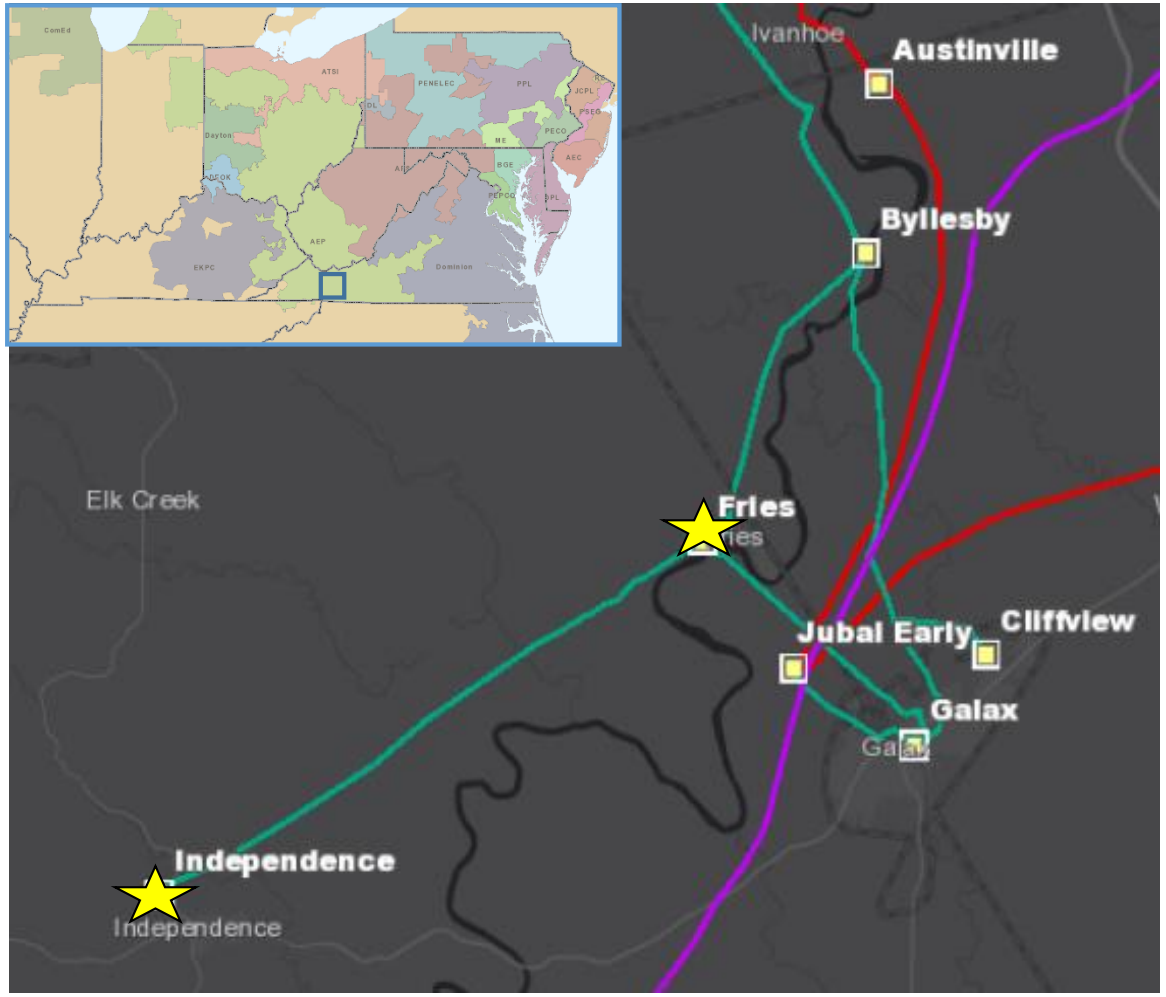
Need Number: AEP-2021-AP020
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021
Previously Presented:
Needs Meeting 5/21/2021
Solutions Meeting 07/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption References: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Problem Statement:
The Fries – Independence 69 kV line has 35 open conditions associated with the structures that make up 41% of the line. Conditions include woodpecker damage and rot top. Majority of the circuit utilizes 1950s wood structures.

Since 2013, there has been 5 momentary and 6 permanent outages on the Fries- Independence 69kV Circuit. The 5 momentary outages were due to lightning (3), ice/snow (1), and wind (1) causes. The 6 permanent outages were due to wind (2), lightning (1), vegetation fall-in from outside AEP ROW (2), and relay (1) causes.

The structures on the Fries – Independence 69kV Circuit fail to meet 2017 NESC Grade B loading criteria, fail to meet current AEP structural strength requirements, and fail to meet the current ASCE structural strength requirements. The line is grounded using the butt wrap method which does not meet current AEP standards. The line shielding angle on the typical tangent structure is measured at 33°, which is inadequate for current AEP shielding angle requirements.

S1851 was updated to present a scope change at Independence station due to space constraints and a cost update. The remaining need on the condition of the existing line is presented here.



Need Number: AEP-2021-AP020

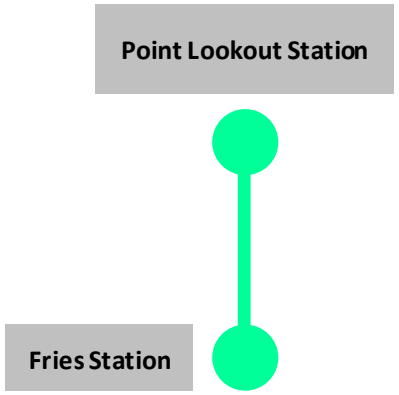
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Proposed Solution:

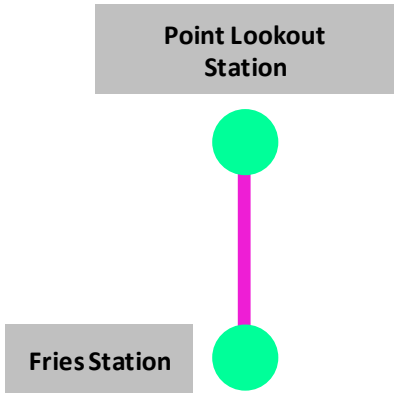
- Once the Jubal Early to Point Lookout line is built, rebuild the existing ~11.4 mile 69kV Fries – Point Lookout line on the current center line. **Estimated Transmission Cost: $33.0M (s2574)**

Projected IS Date: 5/1/2025
Supplemental Project ID: s2574
Project Status: Scoping

Existing



Proposed



Legend	
345 kV	
138 kV	
69 kV	
46 kV	
New	

AEP Transmission Zone M-3 Process
Seneca County, Ohio

Need Number: AEP-2019-OH032

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 6/17/2019

Solutions Meeting 07/16/2021

Supplemental Project Driver: Operational Flexibility, and Customer Service

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 8)

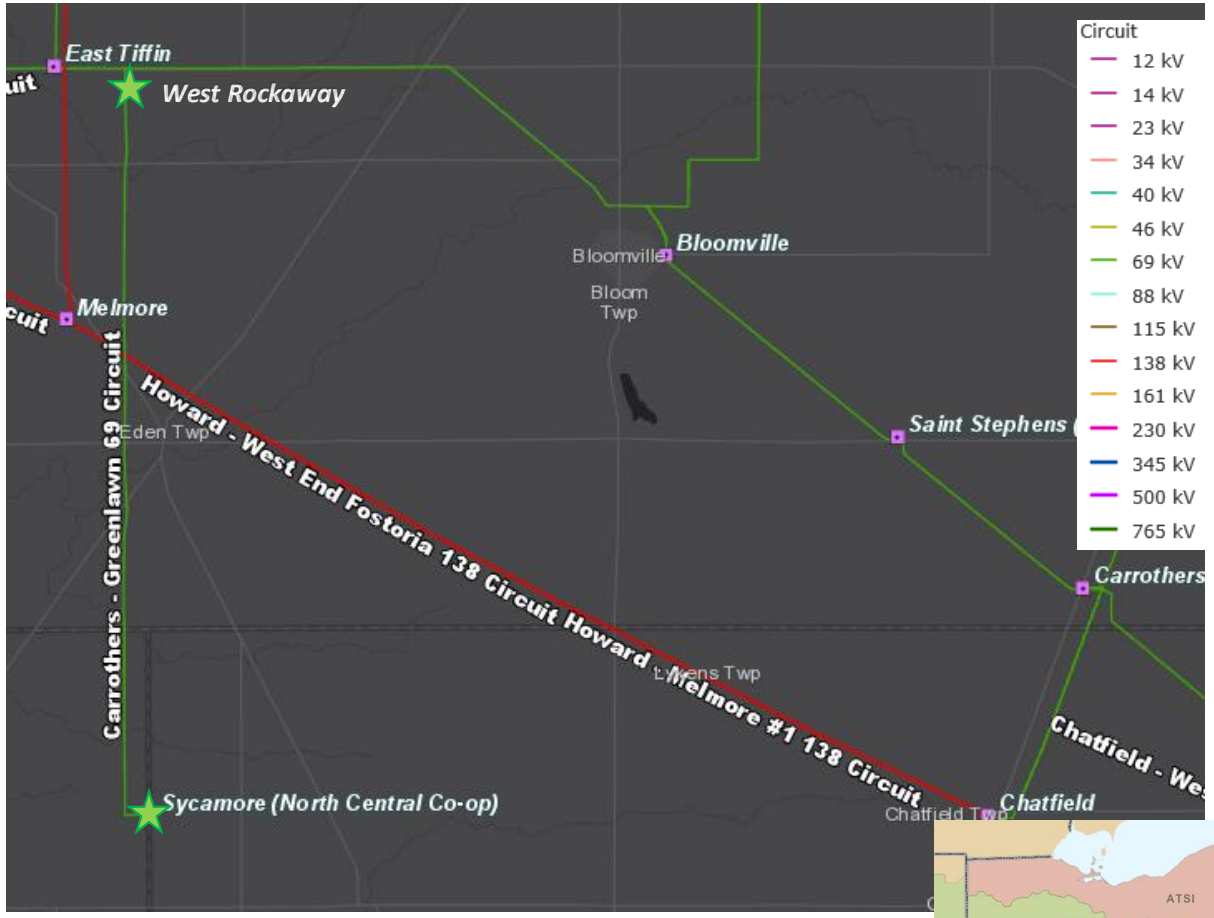
Problem Statement:

West Rockaway – North Central Co-op Line (vintage 1960)

- Length: 8.32 Miles
- Original Construction Type: Wood
- Original Conductor Type: 1/0 ACSR 6/1 (Raven)
- Momentary/Permanent Outages: 13 in the past 5 years
- CMI: 2,505,168

Additional Info: Radial service severely restricts the ability to perform routine maintenance and restoration activities. The maintenance of radial transmission lines often requires costly temporary facilities or other labor-intensive measures involving energized work because a maintenance outage to such radial loads is generally not feasible.

Model: PJM 2019 RTEP Series Cases



Need Number: AEP-2021-OH024

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 4/17/2021

Solutions Meeting 07/16/2021

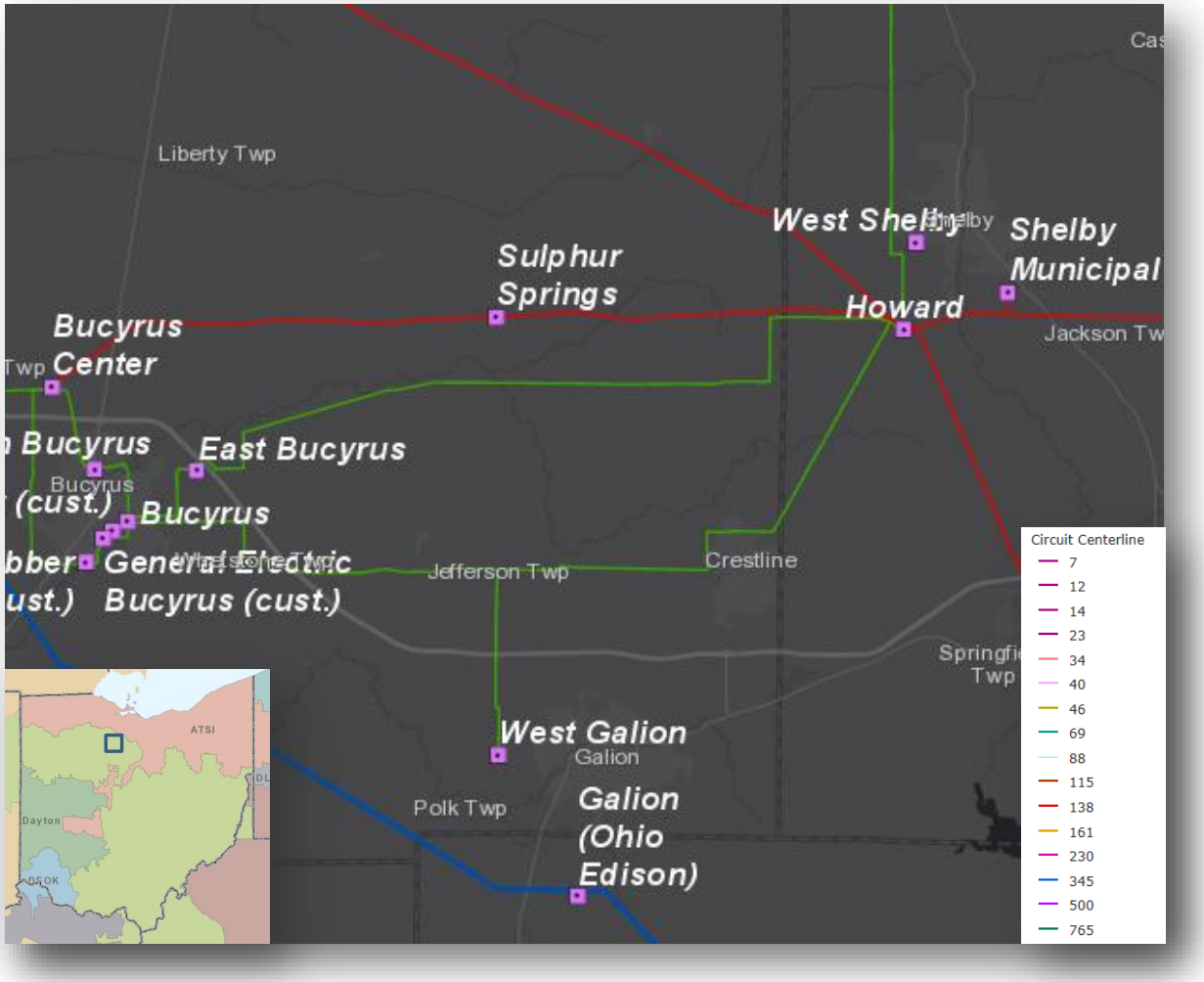
Project Driver: Equipment Material/Condition/Performance/Risk

Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 13)

Problem Statement:

Line Name: Bucyrus – Howard No.1 69kV

- **Original Install Date (Age):** 1948
- **Length of Line:** 18.05 miles
- **Total structure count:** 413
- **Original Line Construction Type:** Wood
  - 14 % of structures rehabbed since installation
  - Wood Cross Arms
- **Conductor Type:** 3/0 Copper 7 conductor
- **Outage History (past 5 years)**
  - 7 momentary and 2 permanent outages with an average duration of 5.37 hours
  - CMI: 60,120
- **Condition Summary**
  - Number of open conditions by type / defects / inspection failures: 78
  - Ground lead wire missing, stolen or broken, structure related conditions affecting the cross arm or pole including rot, split or woodpecker holes, contaminated or broken insulator hardware
- Number of Customers at Risk: 331, 11.527 MVA



AEP Transmission Zone M-3 Process
Seneca County, Ohio

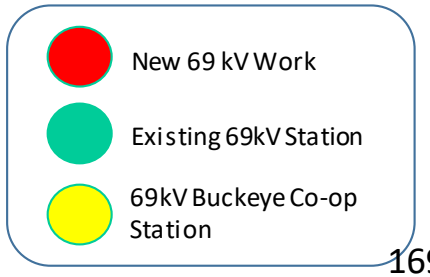
Need Numbers: AEP-2019-OH032, AEP-2021-OH024

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

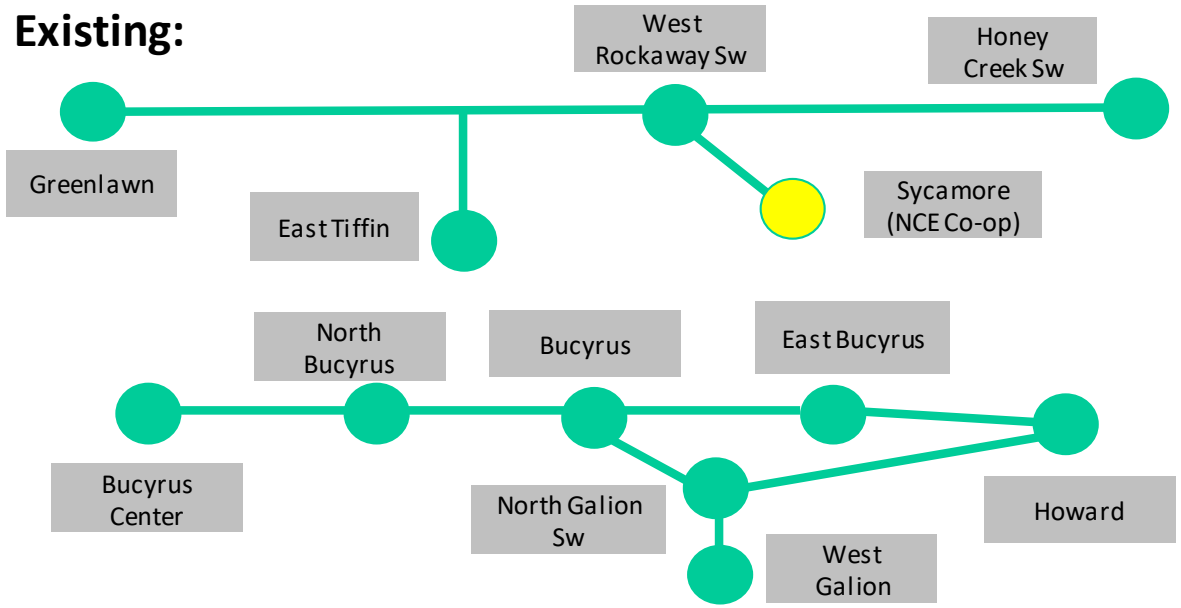
Selected Solution:

- Install a new 3-way POP Switch (Mousey Sw) and 69 kV metering to serve North Central's Sycamore station. **Estimated Cost: $0.68 M (s2575.1)**
- Construct ~ 13 miles of new 69 kV line between Bucyrus Center and the new Mousey Switch delivery point using 556 ACSR conductor. **Estimated Cost: $29.3 M (s2575.2)**
- Install a new 69 kV 3000A 40kA breaker and associated terminal equipment at Bucyrus Center on the line towards Mousey switch. **Estimated Cost: $1.02 M (s2575.3)**
- Remove the existing West Rockaway 69 kV switch currently used to radially serve the Sycamore delivery point. **Estimated Cost: $0.075 M (s2575.4)**
- Construct ~ 0.8 miles of new 69 kV line between the existing Sycamore radial line and East Tiffin delivery points using 556 ACSR conductor. **Estimated Cost: $2.54 M (s2575.5)**
- Reconfigure East Tiffin station to add in a box bay, a breaker, and terminal equipment towards Mousey switch and a new line MOAB toward South Tiffin. **Estimated Cost: $2.5 M (s2575.6)**
- Rebuild ~ 2.3 miles of new 69 kV line between the existing Bucyrus and East Bucyrus delivery points using 556 ACSR conductor. **Estimated Cost: $5.9M (s2575.7)**
- Remove ~ 16 miles of existing 69 kV line between the existing East Bucyrus and Howard delivery points. **Estimated Cost: $5.94 M (s2575.8)**
- Retire the existing ~1.4 miles of the Howard- Bucyrus #2 line between Bucyrus station and structure 366. **Estimated Cost: $0.32 M (s2575.9)**
- Construct ~ 1.3 miles of new 69 kV line between the existing East Bucyrus delivery point and structure 336 on the Howard- East Bucyrus #2 line. This construction will be coordinated with rebuild project S2156. **Estimated Cost: $3.3 M (s2575.10)**

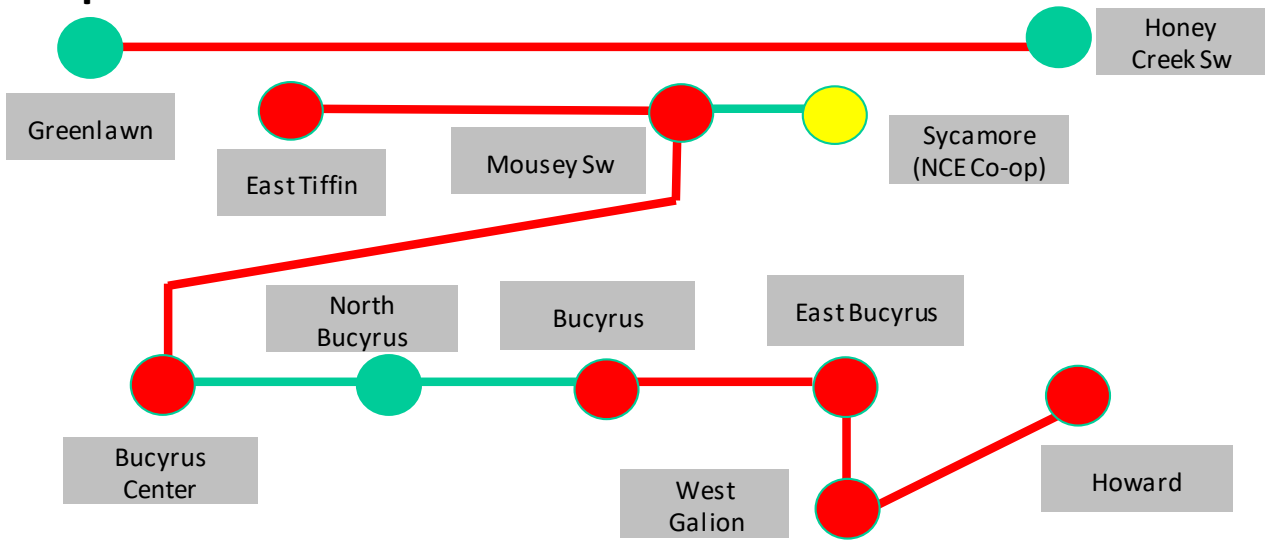
Total Estimated Transmission Cost: $51.6M



Existing:



Proposed:



AEP Transmission Zone M-3 Process
Seneca County, Ohio

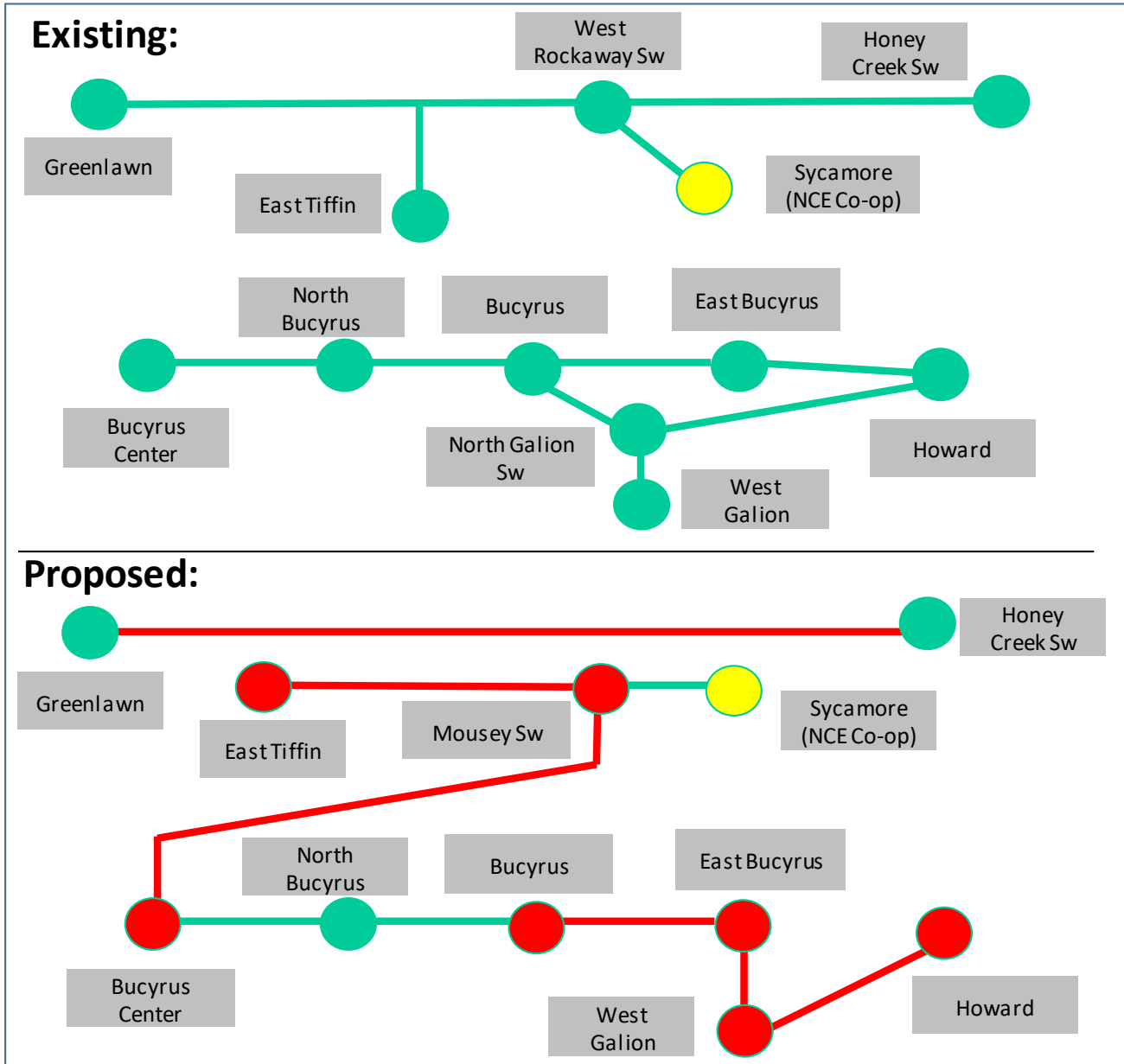
Ancillary Benefits:

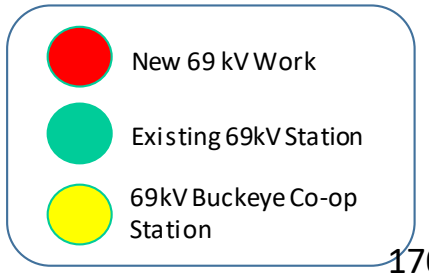
Provides both Sycamore and East Tiffin radial lines looped transmission service to reduce exposure of both stations to outages. Allows for 18 miles of line retirement instead of new construction.

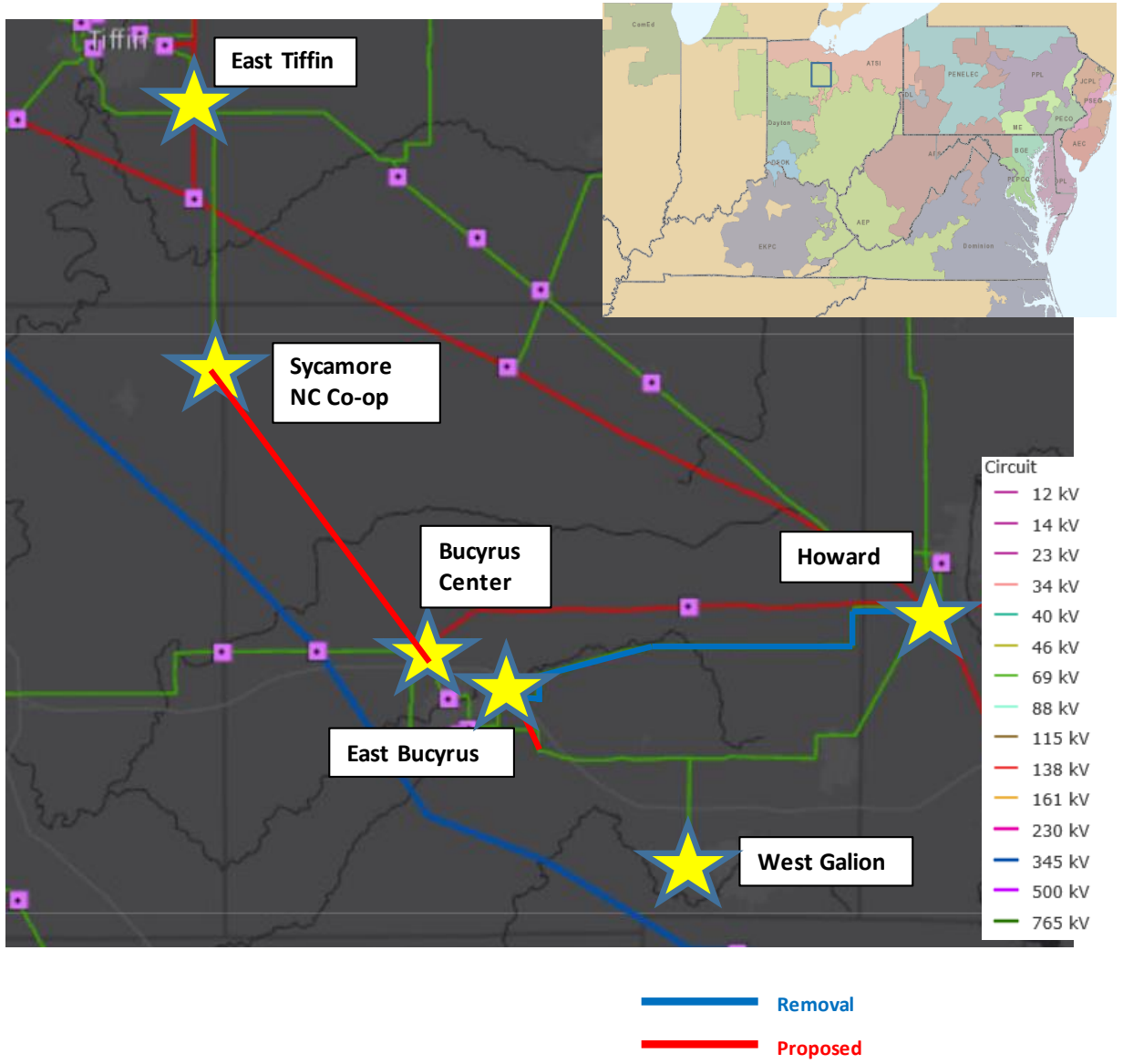
Projected In-Service: 11/1/2024

Supplemental Project ID: s2575.1-.10

Project Status: Engineering






East Tiffin
Sycamore
NC Co-op
Bucyrus
Center
East Bucyrus
Howard
West Galion
Circuit
12 kV
14 kV
23 kV
34 kV
40 kV
46 kV
69 kV
88 kV
115 kV
138 kV
161 kV
230 kV
345 kV
500 kV
765 kV
Removal
Proposed

AEP Transmission Zone M-3 Process
Lick – Pedro 69kV Line Rebuild

Need Number: AEP-2020-OH012

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 02/21/2020

Solutions Meeting 07/16/2021

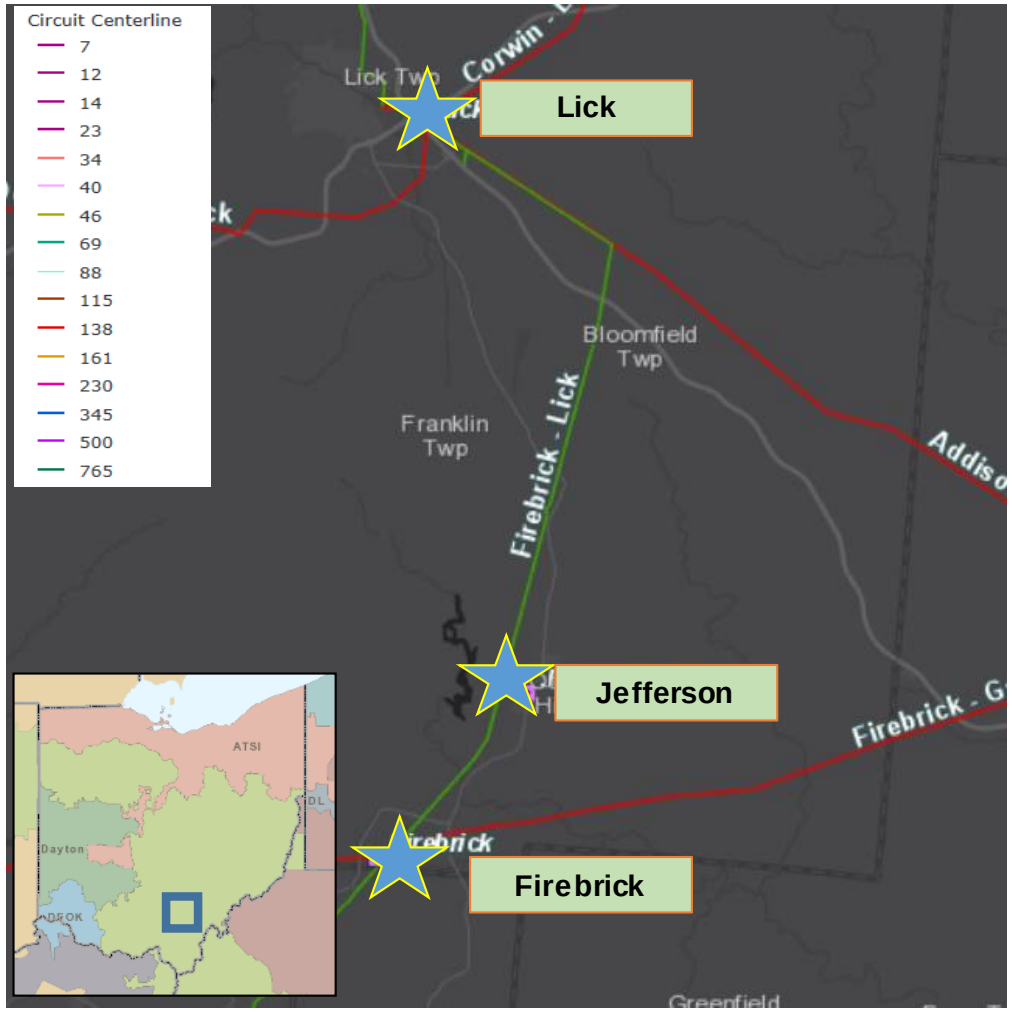
Supplemental Project Driver: Equipment Material/Condition/ Performance/Risk

Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 8)

Problem Statement:

Jefferson-Lick 69 kV line

- Original Construction Date: 1927
- Length: 12.5 miles
- Original Construction Type: Wood (1927, 1953, and 1980s)
- Conductor Type: 8.5 miles of 4/0 ACSR conductor (1927 and 1967) with 4.0 miles of 336 ACSR conductor (1980s)
- Outages: 4 Permanent and 17 Momentary (5 years)
- 3.96 million customer minutes of interruption (CMI) associated with the Firebrick – Lick 69 kV circuit over the last 5 years.
- Conditions: 27 of 93 structures have at least one open condition including rot top pole, crossarm damage, and insulator issues.



AEP Transmission Zone M-3 Process
Lick – Pedro 69kV Line Rebuild

Need Number: AEP-2020-OH012

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

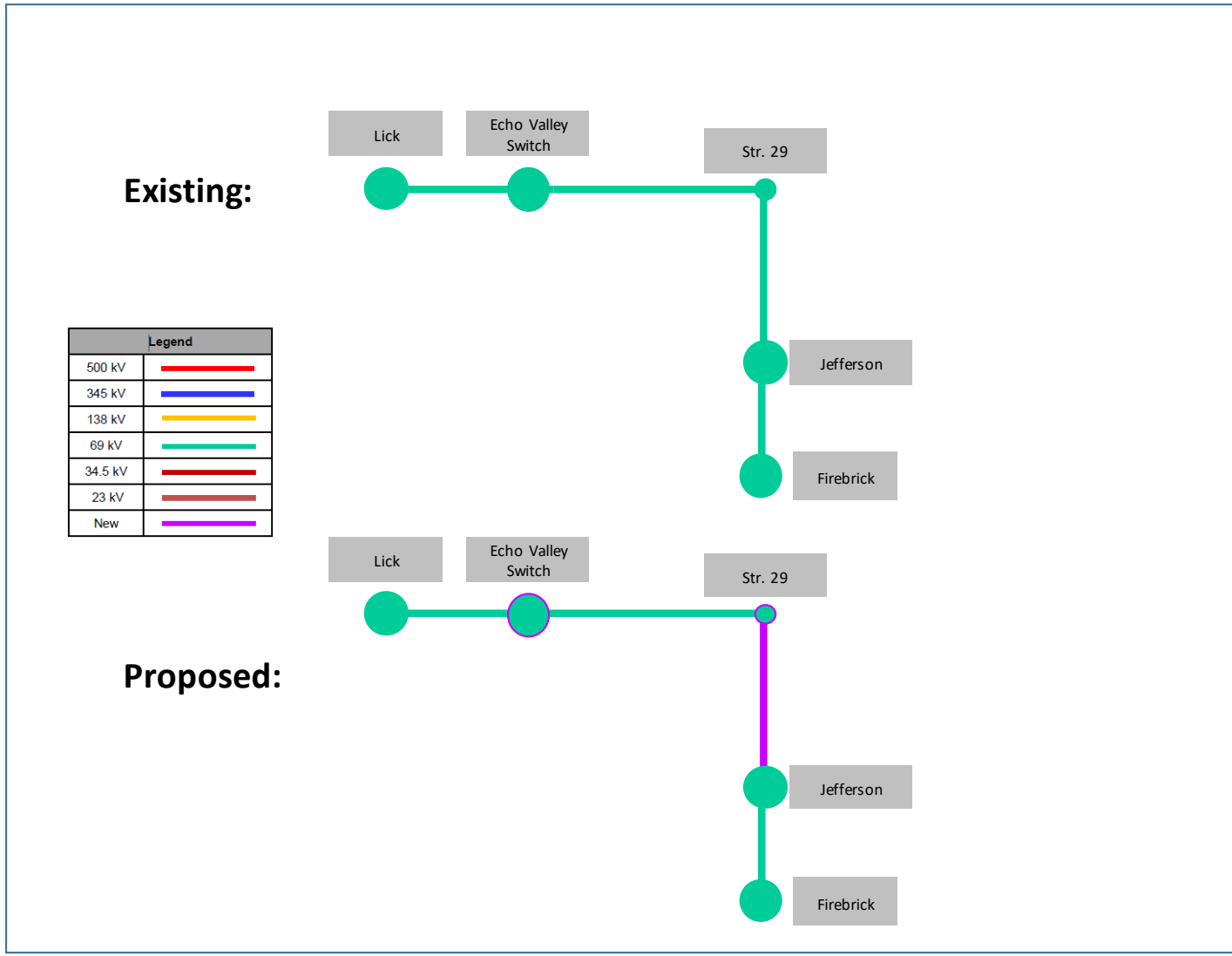
Lick-Jefferson 69kV: Rebuild ~8.3 miles of the 69kV line from Structure 29 to Jefferson switch station with 556.5 ACSR. Install shield wire from Structure 29 to Lick Station, approximately 4 miles. This work requires tree clearing and access road construction in order to add the shield wire to existing structures. Total access road construction is 5.5 miles. **Estimated Cost: $25.0M (s2576.1)**

Echo Valley: Replace existing switch with a 3-way phase over phase 69kV 1200A Switch with SCADA. There will be auto-sectionalizing enabled toward Firebrick. **Estimated Cost: $1.39M (s2576.2)**

Remote end work associated with the line rebuild at Lick & Firebrick. **Estimated Cost: $0.31M (s2576.3)**

Total Estimated Transmission Cost: $26.7M
Projected In-Service: 04/20/2023
Supplemental Project ID: s2576.1-.3

Project Status: Scoping



AEP Transmission Zone M-3 Process
East Logan – South Lancaster 69kV

Need Number: AEP-2019-OH042

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Need Meeting 7/24/2019

Solutions Meeting 07/16/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

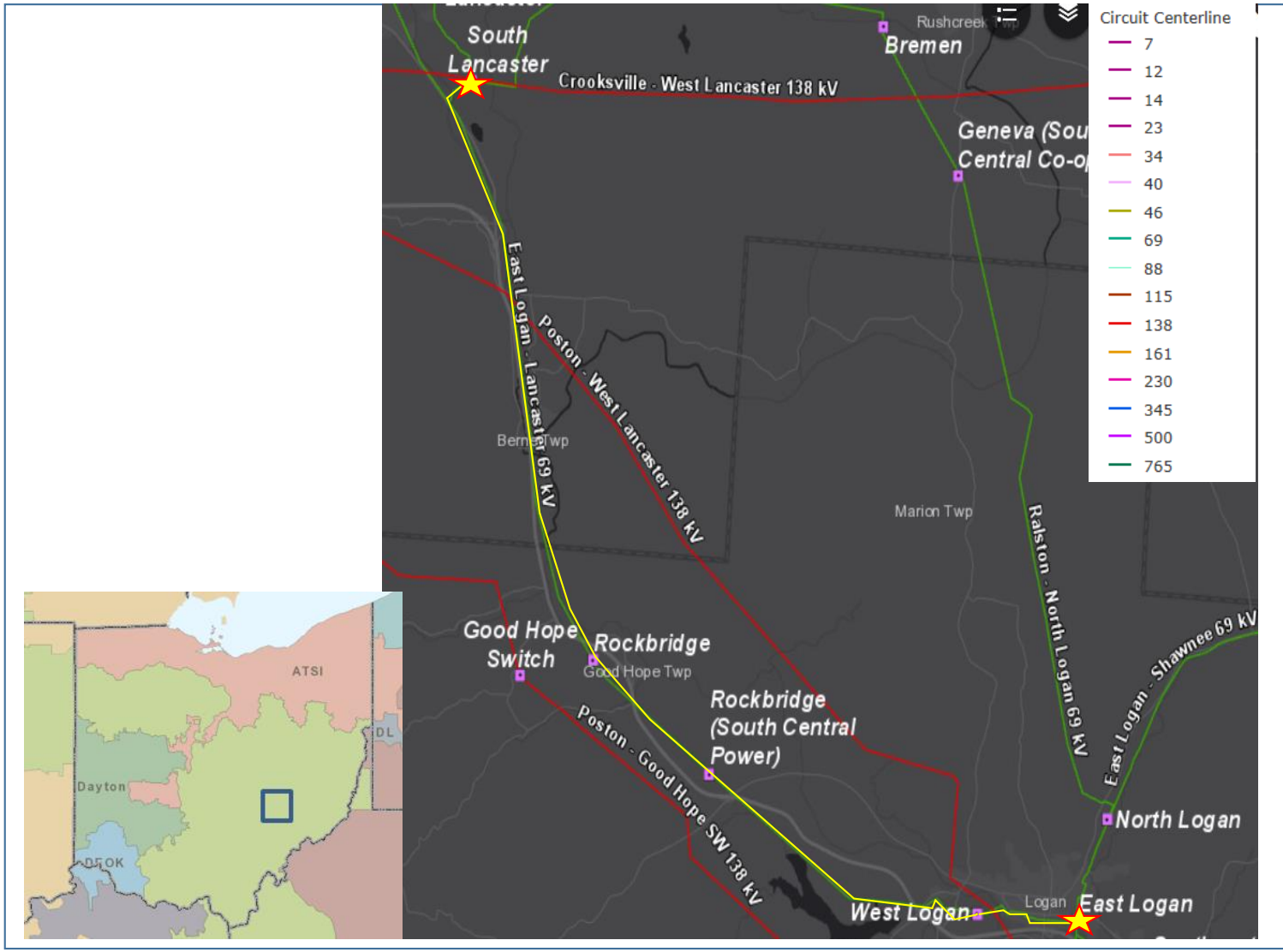
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

East Logan – South Lancaster 69kV (vintage 1923)

- Length: 16.43 Miles
- Original Construction Type: Steel Lattice/Wood
- Original Conductor Type: 2/0 Copper
- Momentary/Permanent Outages: 43 total outages
- CMI: 872,607 in the last 3 years
- Number of open conditions: 40
  - Open conditions include: Burnt/broken insulators, pole rot, insect damage, damaged conductor



AEP Transmission Zone M-3 Process
East Logan – South Lancaster 69kV

Need Number: AEP-2019-OH042

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

- Rebuild the South Lancaster – East Logan 69 KV circuit, approximately 16.6 miles in length, with 556.5 ACSR Dove conductor. **Estimated Cost: $40.0M to $52M (s2577.1)**
- Rebuild the Enterprise Switch - Enterprise Metering Structure, approximately 200' in length; with 556.5 ACSR Dove conductor. **Estimated Cost: $0.51M (s2577.2)**
- Enterprise Switch: Replace the two way phase over phase switch with a new 1200A three way phase over phase switch with auto sectionalizing and SCADA functionality. Replace the CTs, PTs, and metering. **Estimated Cost: $0.93M (s2577.3)**
- West Logan: Replace the three way phase over phase switch with a new 1200A three way phase over phase switch. **Estimated Cost: $0.77M (s2577.4)**
- South Lancaster: Remote end work **Estimated Cost: $0.1M (s2577.5)**

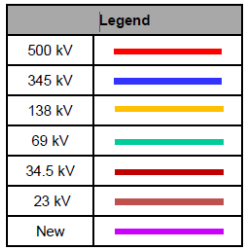
Total Estimated Cost: $42.31M to $54.31M

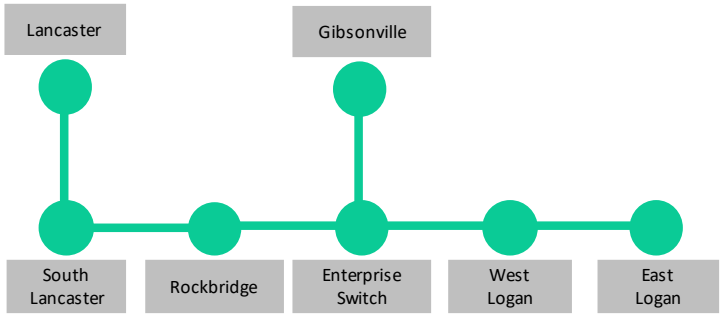
Projected In-Service: 5/02/2024

Supplemental Project ID: s2577.1-.5

Project Status: Scoping

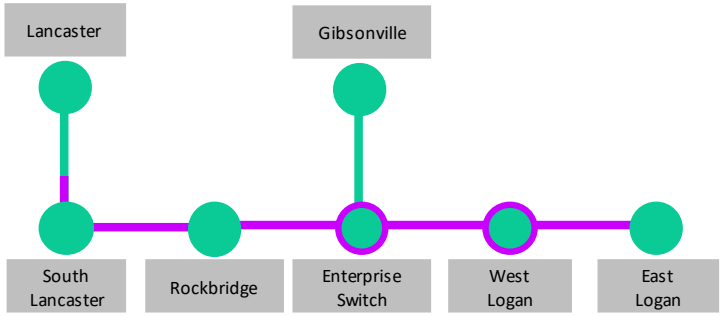
Existing:





Bubble Diagram

Proposed:



AEP Transmission Zone M-3 Process
Licking County, OH

Need Number: AEP-2020-OH048

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 12/18/2020

Solutions Meeting 07/17/2021

Supplemental Project Driver:

Customer Service

Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site just south of the existing Conesville – Corridor 345 kV circuit in New Albany, OH.
- The customer has indicated an initial peak demand of 64 MW with a potential capacity of up to 256 MW at the site.

Model: 2025 RTEP

Need Number: AEP-2020-OH048

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

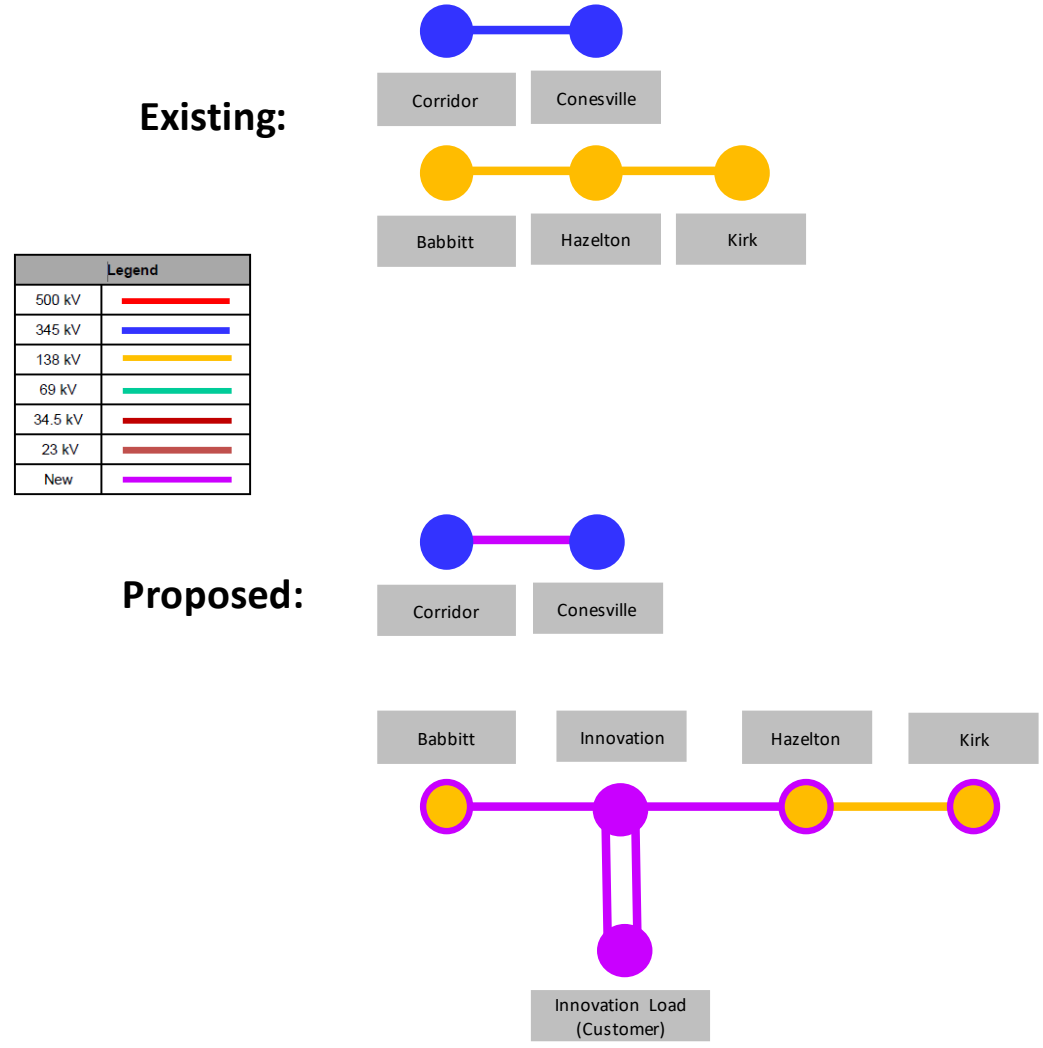
Selected Solution:

- **Innovation 138 kV Station:** Construct a greenfield 138kV breaker and half station that includes seven 138kV 3000A 63kA circuit breakers and four total line exits to serve the requested load. **Estimated Cost: $11.611M (s2578.1)**
- **Innovation Extension 138kV**: Tap the existing Babbitt-Kirk 138kV circuit creating the Babbitt-Innovation and Kirk-Innovation 138kV circuits and construct approximately 2.2 miles of double circuit line to serve the new station. Extend the telecom fiber into Innovation station for relaying/communication. **Estimated Cost: $ 13.334M (s2578.2)**
- **Conesville-Corridor 345kV**: Relocate a portion of the existing Conesville-Corridor 345kV single circuit line to accommodate the install of Innovation Station. Approximately 0.40 miles of line to be rerouted around station site. **Estimated Cost: $2.478M (s2578.3)**
- **Babbitt 138 kV Station:** Update remote end relay settings and telecom electronics. **Estimated Cost: $ 0.074M (s2578.4)**
- **Kirk 138 kV Station:** Update remote end relay settings and telecom electronics. **Estimated Cost: $0.062M (s2578.5)**

Total Estimated Cost: $ 27.6M
Projected In-Service: 3/31/2023
Supplemental Project ID: s2578.1-.5

Project Status: Scoping

Bubble Diagram



AEP Transmission Zone M-3 Process
Westfall Delivery Point

Need Number: AEP-2020-OH049

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Needs Meeting 12/18/2020

Solutions Meeting 07/16/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

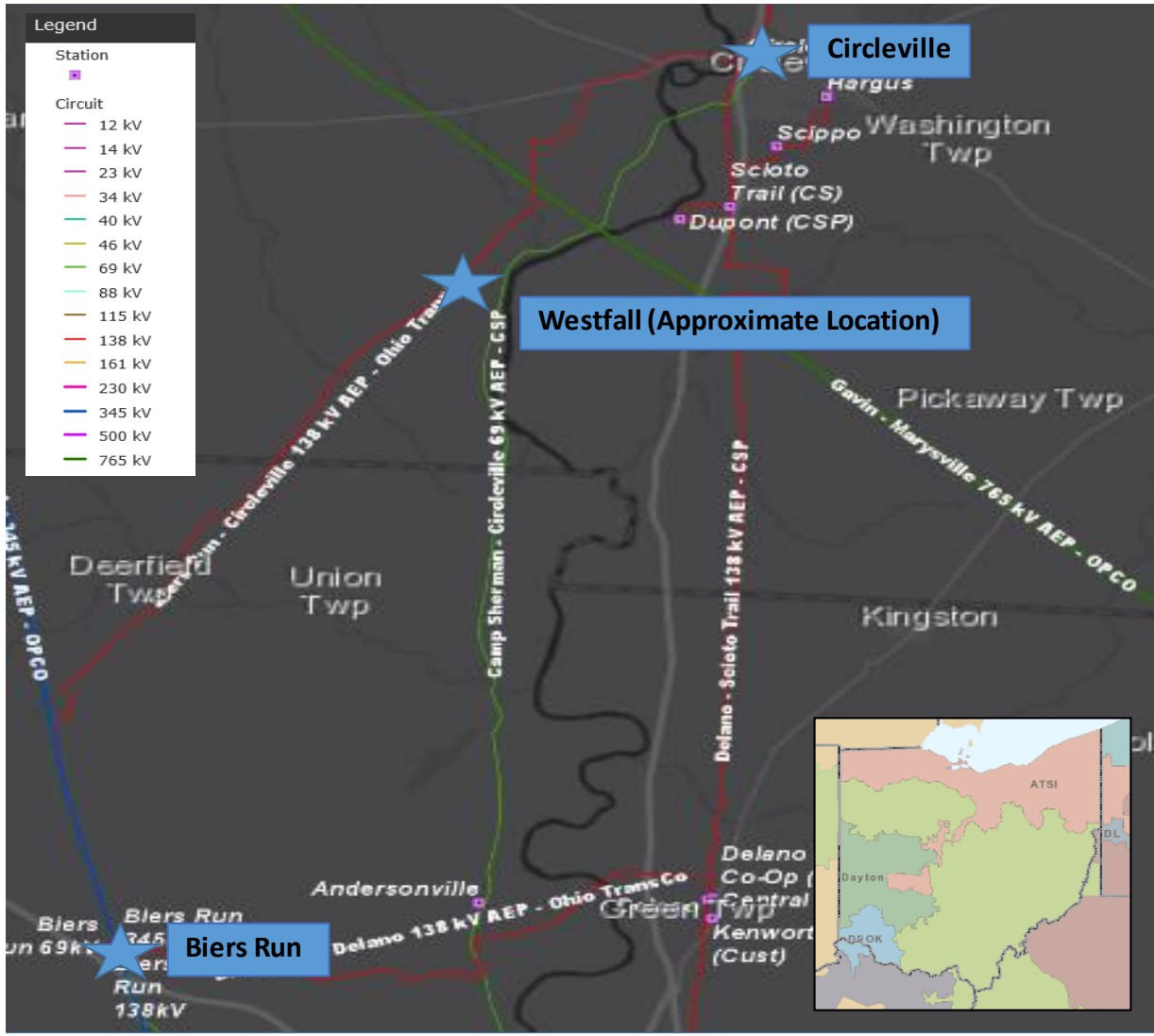
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs

Problem Statement:

Westfall Delivery Point (SCP) 138kV:

- Buckeye Power Inc., on behalf of South Central Power Company, has requested transmission service in Wayne Township, Pickaway County, Ohio.
- SCP currently has a radial 69 kV line served out of AEP's West Lancaster Station with a load of approximately 42.5 MW in 2022 and growth at a rate of 2% per year.
- South Central Power Company would like a new transmission delivery point on the on the other end of this long 69 kV radial line (44 miles of exposure; 5 delivery points).
- Service is requested by March 2022.



AEP Transmission Zone M-3 Process
Westfall Delivery Point

Need Number: AEP-2020-OH049

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

Westfall 138 kV Station: Build a new greenfield 138 kV three breaker ring configured station. The three breakers installed will be 138kV 40kA 3000A. 138 kV revenue metering equipment will be installed. **Estimated Cost: $5.316 M (s2579.1)**

Westfall-Westfall (SCP) Customer 138 kV: Install a 0.02 mile 138 kV single circuit line between Westfall and Westfall (SCP) customer station. **Estimated Cost: $0.116 M (s2579.2)**

Biers Run-Circleville 138kV: Tap the existing Biers Run-Circleville 138kV line, removing 0.1 miles and adding 2 dead-end structures in order to cut the line into the new AEP Westfall station. Extend the telecom fiber into Westfall station for relaying / communication. **Estimated Cost: $1.005 M (s2579.3)**

Circleville 138 kV Station: Update remote end relay settings and telecom electronics. **Estimated Cost: $0.04 M (s2579.4)**

Lutz 138 kV Station: Update remote end relay settings and telecom electronics. **Estimated Cost: $0.04 M (s2579.5)**

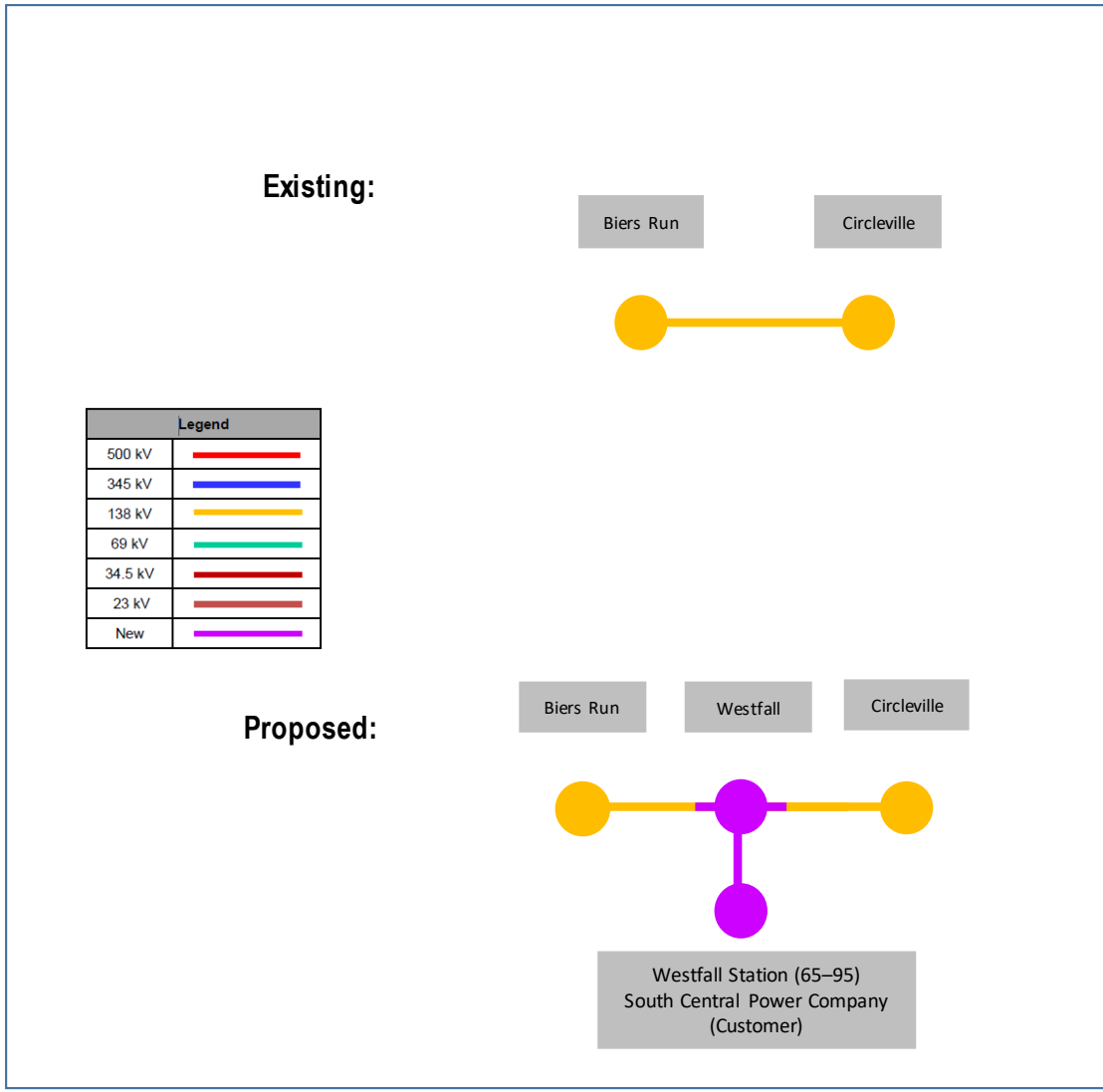
Total Estimated Transmission Cost: $6.517 M

Projected In-Service: 3/1/2023

Supplemental Project ID: s2579.1-.5

Project Status: Scoping

Model: 2025 RTEP



Need Number: AEP-2021-OH017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Need Meeting 04/16/2021

Solutions Meeting 07/16/2021

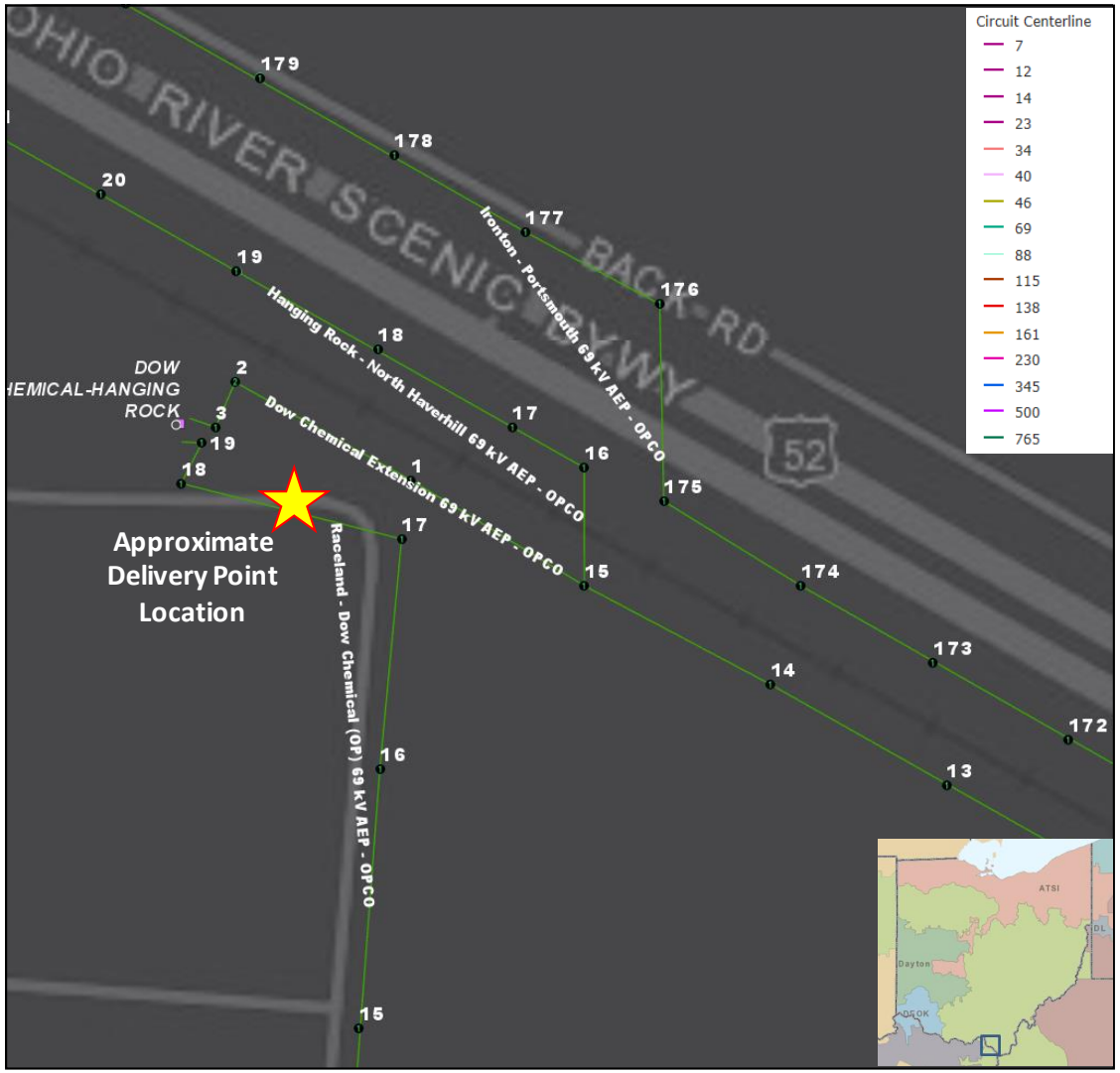
Project Driver: Customer Service

Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

PureCycle has requested 69kV service in Lawrence County, Ohio on the Dow Chemical – Highland line by February 2022. The anticipated load is approximately 22 MW.



AEP Transmission Zone M-3 Process
Gervais Switch

Need Number: AEP-2021-OH017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution:

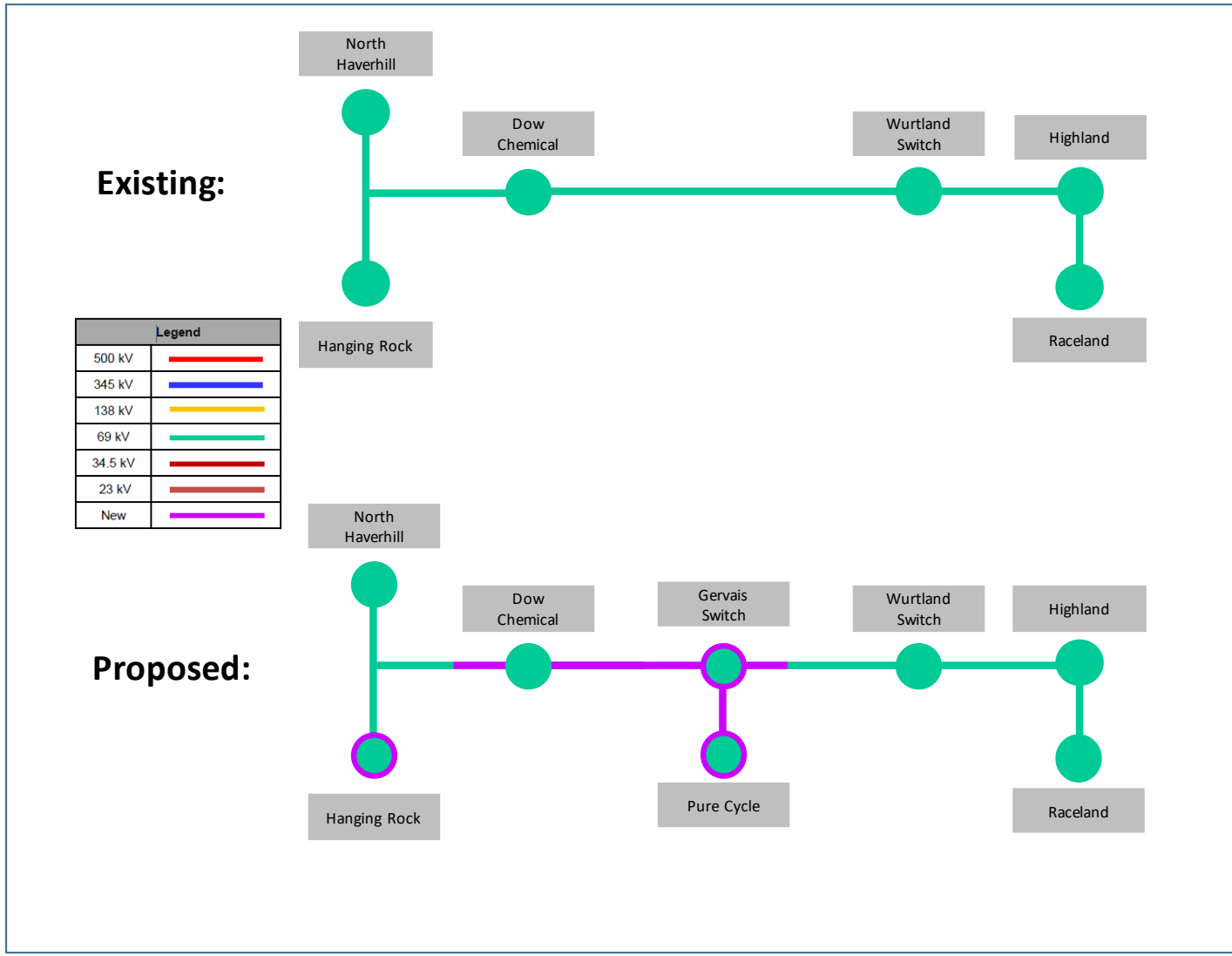
- Dow Chemical Extension: Rebuild Str. 1, 2, & 3 as double circuit to include the Dow Chemical – Highland 69kV & Dow Chemical – Hanging Rock circuits. ACSR Osprey 556.5 (18/1) conductor (SE 126 MVA) will be used. **Estimated Cost: $1.16M (s2580.1)**
- Raceland – Dow Chemical 69kV: Replace Str. 16 for new alignment. Remove Str. 17, 18, & replace Str. 19 to facilitate new tie in arrangement. Reconfigure line from new Str. 16 to Gervais Switch. ACSR Osprey 556.5 (18/1) conductor (SE 126 MVA) will be used. **Estimated Cost: $0.39M (s2580.2)**
- Gervais Switch: Install a new 3 way 69 kV 1200A 61kA phase-over-phase switch with one SCADA controlled MOAB (toward Dow Chemical) and one auto controlled MOAB (toward Wurtland Switch) to serve new PureCycle delivery point. Install a 69 kV revenue meter outside of customer station on monopole steel structure. **Estimated Cost: $0.92M (s2580.3)**
- Purecycle Extension: Install ~0.1 miles of single circuit line to connect the customer to Gervais Switch. ACSR Hawk 477 (26/7) conuctor (SE 128 MVA) **Estimated Cost: $0.33M (s2580.4)**
- Hanging Rock: Install the remote end SFP in the CES at Hanging Rock Station to provide the connection for the CGR router at Gervais Switch. **Estimated Cost: $0.04M (s2580.5)**

Total Estimated Transmission Cost: $2.84M

Projected In-Service: 03/01/2022

Supplemental Project ID: s2580.1-.5

Project Status: Scoping



AEP Transmission Zone M-3 Process
Tidd 69kV Breaker Replacement

Need Number: AEP-2021-OH028

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Previously Presented:

Need Meeting 05/21/2021

Solution Meeting 07/16/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

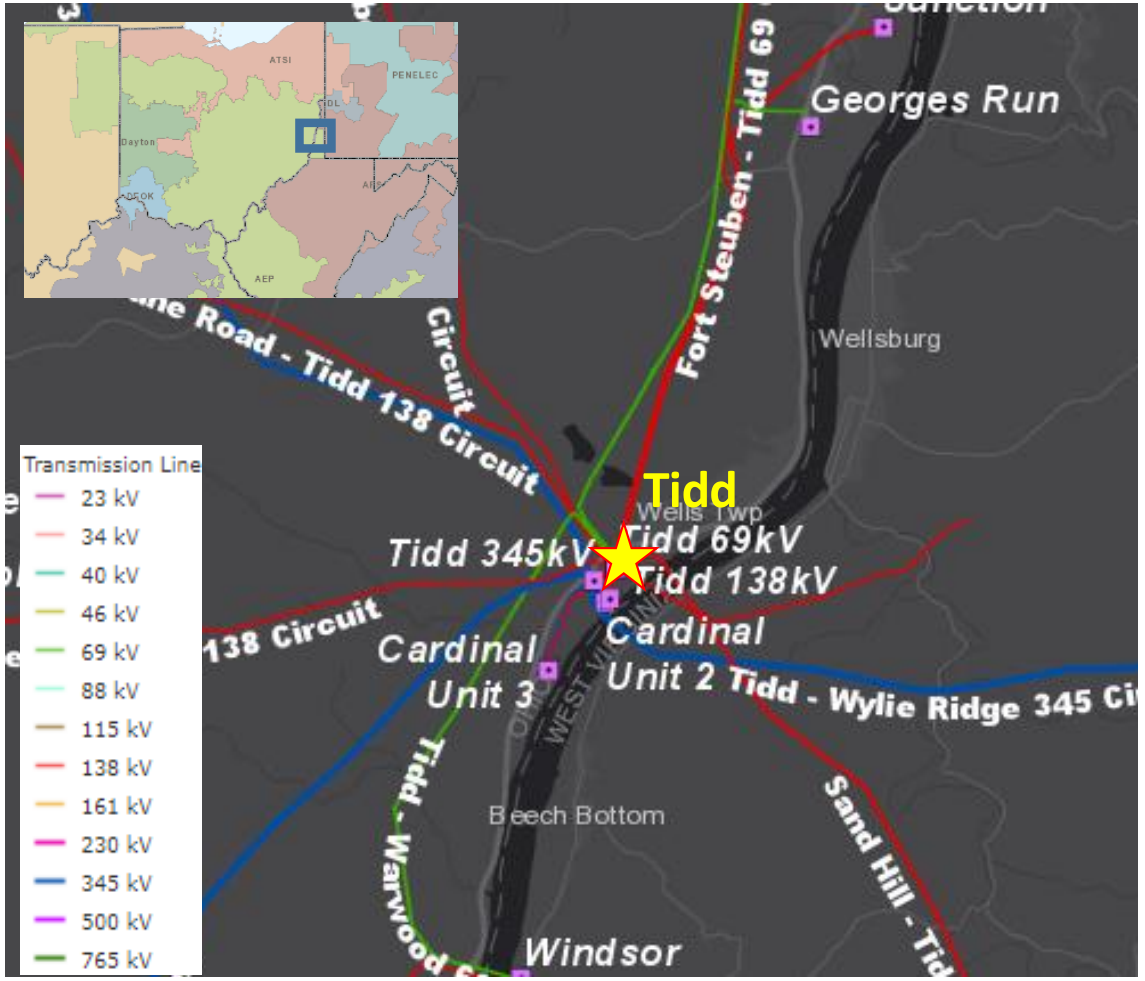
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Transmission Circuit Breaker Concerns (69 kV): AN

Tidd 69kV circuit breaker 'AN' failed in April 2021. Failure documented by very high sulfur dioxide (SO_2) readings in the SF6 gas, due to past fault activity. The SO_2 can cause internal corrosion, leading to mechanical and operational defects.

- Breaker Age: 1997 (installed in 1998)
- Interrupting Capability: 31.5 kA
- Ampacity Rating: 2000 A
- Interrupting Medium: SF6 Gas
- Number of Fault Operations: 38



AEP Transmission Zone M-3 Process
Tidd 69kV Breaker Replacement

Need Number: AEP-2021-OH028

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 09/01/2021

Selected Solution: Replace the failed 69kV circuit breaker with a spare 69kV SF6 gas breaker (3000A / 40kA nameplate). **(s2581)**

Project Cost: $0.1M

Projected In-Service: 6/24/2021

Supplemental Project ID: s2581

Project Status: In Service

Model: 2025 PJM Short Circuit Model

Single 69kV circuit breaker replacement. Bubble diagram not applicable.

Revision History

1/13/2021 – V1 – Added S2390 – S2397.1-.5

1/29/2021 – V2 – Slide #8, Changed S2390 to S2392.1 and S2392.2

– Slide #9, Corrected solution meeting date

– Slide #20, Correct the title of the slide

2/26/2021 – V3 – Added S2401.1-.4 – S2408.1-.4

4/9/2021 – V4 – Added slides #39-#99, S2426.1-.9 – S2446.1-.7

5/19/2021 – V5 – Added slides #100-#112, S2464 – S2468

6/2/2021 – V6 – Added slides #113-#125, S2469.1-11 – S2472

6/4/2021 – V7 – Added slides #126-#129, S2510 – S2511

6/29/2021 – V8 – Added slides #130-#146, S2522.1-.2 – S2527.1-.7 and S2534.1-.19

9/2/2021 – V9 – Added slides #147-#183, S2569.1-.2 – S2527.1-.7 and S2581

10/19/2021 – V10 – Added slides #121, Corrected AEP-2018-022 to AEP-2018-AP022