Submission of Supplemental Projects for Inclusion in the Local Plan

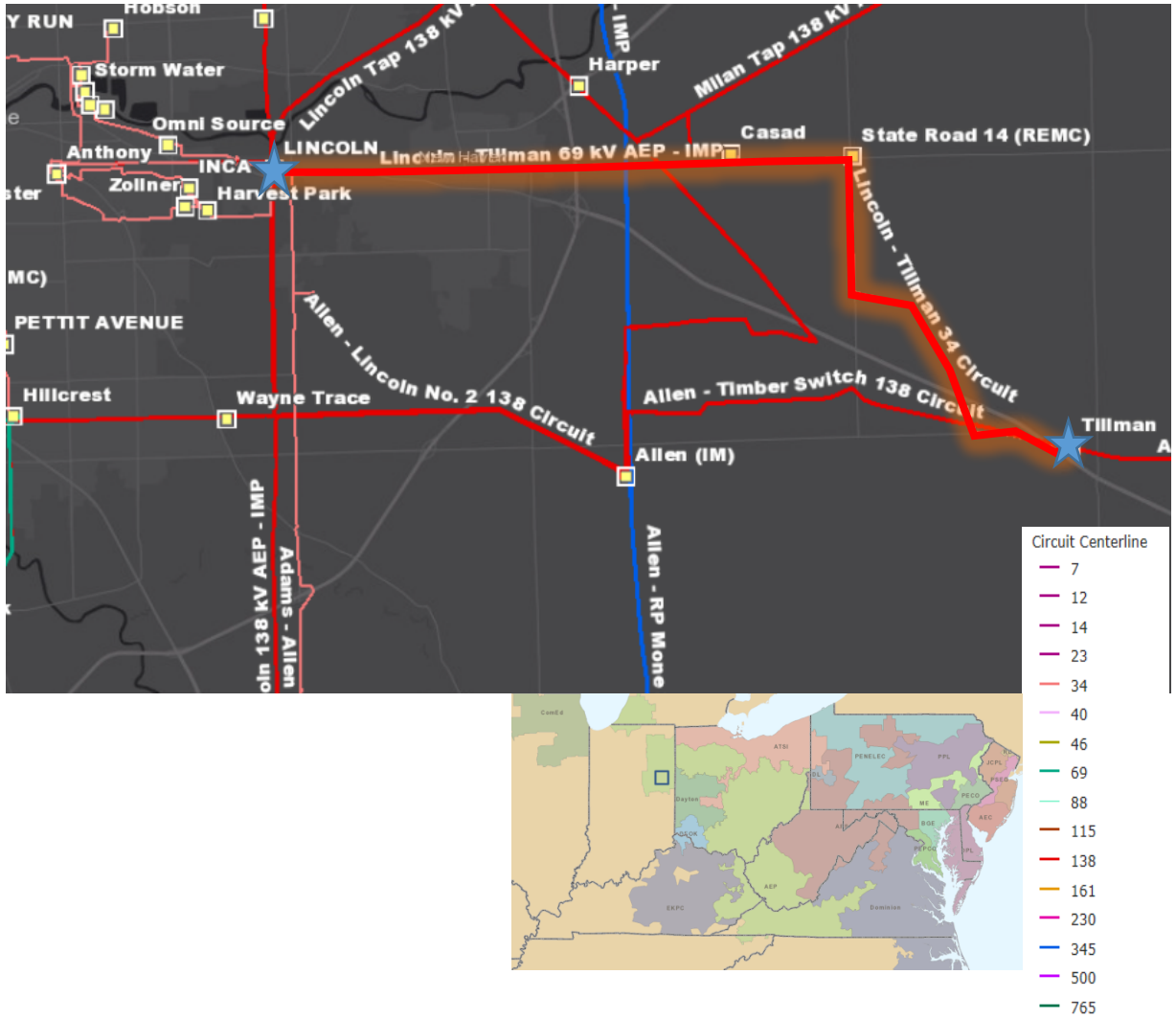
Huguenard Area Improvements

Need Number: AEP-2019-IM048
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021
Previously Presented:
Needs Meeting 4/23/2019
Solution Meeting 12/09/2021
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Lincoln – Tillman 69kV Line (~13 Miles)

- 1968 vintage wood crossarm construction with 4/0 ACSR
- Currently 102 of the 306 structures have at least one open condition on this line including broken, corroded, cracked, rotting, leaning, split or damaged crossarms and poles;
- Currently fails to meet NESC Grade B, AEP Structural Strength requirements, AEP CIFO standards nor minimum leakage distance requirements
- ~2.9 miles are legacy crossarm cap and pin style construction



Huguenard Area Improvements

Need Number: AEP-2019-IM048

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

Lincoln – Tillman 34.5kV line: Retire approximately ~11 miles of the Lincoln – Tillman 34.5kV line.
Estimated Cost: $2.8M (s2632.1)

Lincoln 138/69/34.5kV substation : Remove Lincoln CB "P".
Estimated Cost: $0.1M (s2632.2)

Tillman 138/34.5kV substation: Remove CB "A" and "B" as well as the 138/34.5kV transformer and all 34.5kV equipment

Estimated Cost: $0.4M (s2632.3)

St Rd 14 Sw: Remove St Rd 14 34.5kV Sw

Estimated Cost: $0.1M (s2632.4)

Huguenard 138kV extension: Rebuild a portion of the Lincoln-Tillman line as a new ~2.5 mile 138kV double circuit extension from the Allen – Milan 138kV line to Huguenard 138/34.5kV substation

Estimated Cost: $7.9M (s2632.5)

Huguenard 138/34.5kV station: Build the new 138/34.5kV substation to feed the St Rd 14 load. This station will have 2 138kV CB's, 1 138kV Circuit switcher, 1 34.5kV CB and a 138/34.5kV 30MVA XFR. The XFR, 34.5kV CB and high side switcher will be reused from Tillman substation.

Estimated Cost: $5.1M (s2632.6)

Huguenard – ST Rd 14 34.5kV: Rebuild the radial 34.5kV line to connect to the new Huguenard substation.

Estimated Cost: $0.9M (s2632.7)

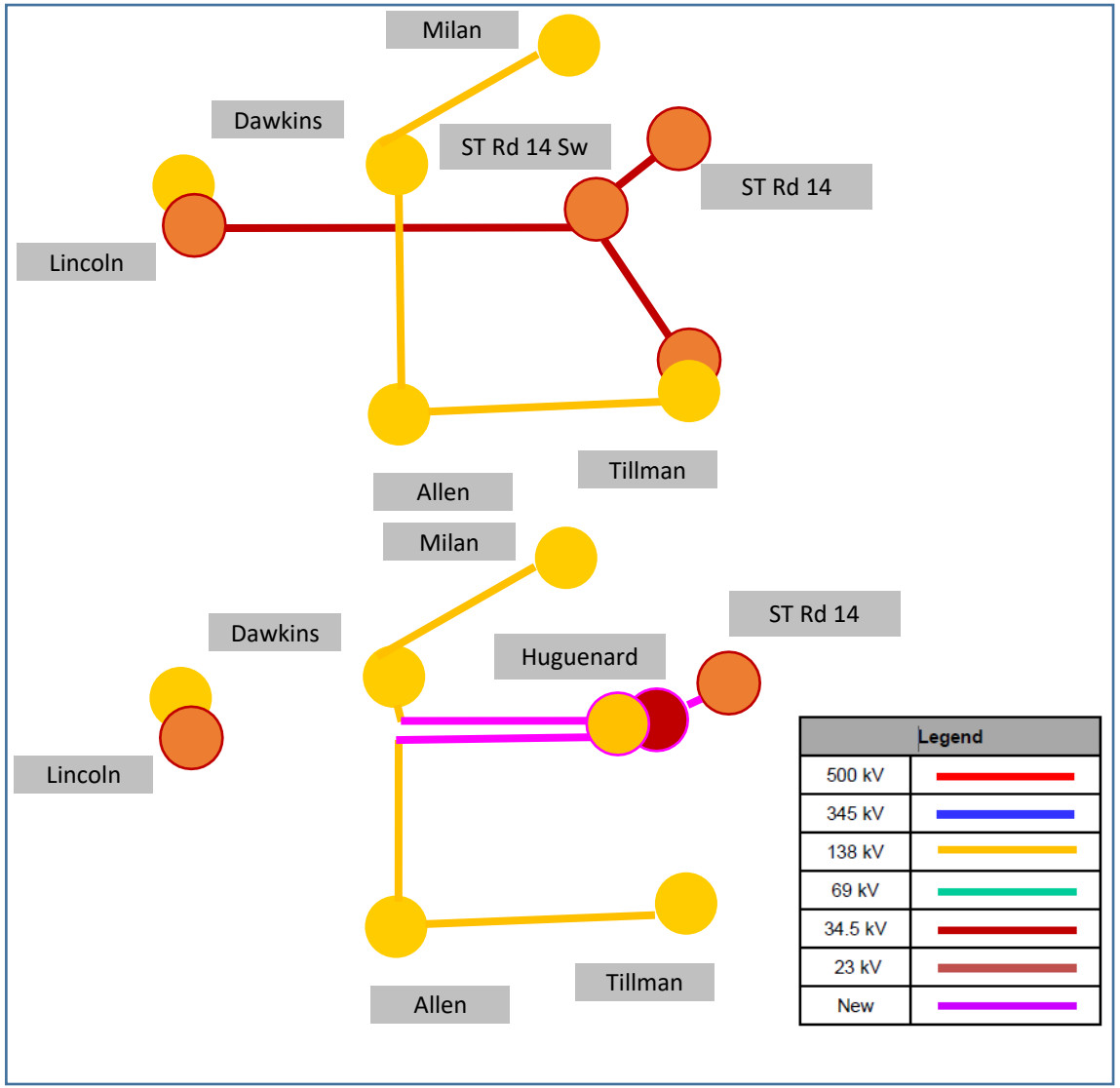
Total Estimated Cost: $ 17.3Million

Ancillary Benefits: By constructing 2.5 miles of new 138 kV line, AEP will retire an additional 11 miles of deteriorated 34.5 kV line in this area while reusing a portion of the existing ROW as the path for the new line.

Projected In-Service: 10/31/2024

Supplemental Project ID: s2632.1-.7

Project Status: Scoping



AEP Transmission Zone: Supplemental Decker 69kV Load Addition

Need Number: AEP-2021-IM012
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021
Previously Presented:
Needs Meeting 02/17/2021
Solutions Meeting 12/09/2021

Supplemental Project Driver: Customer Service

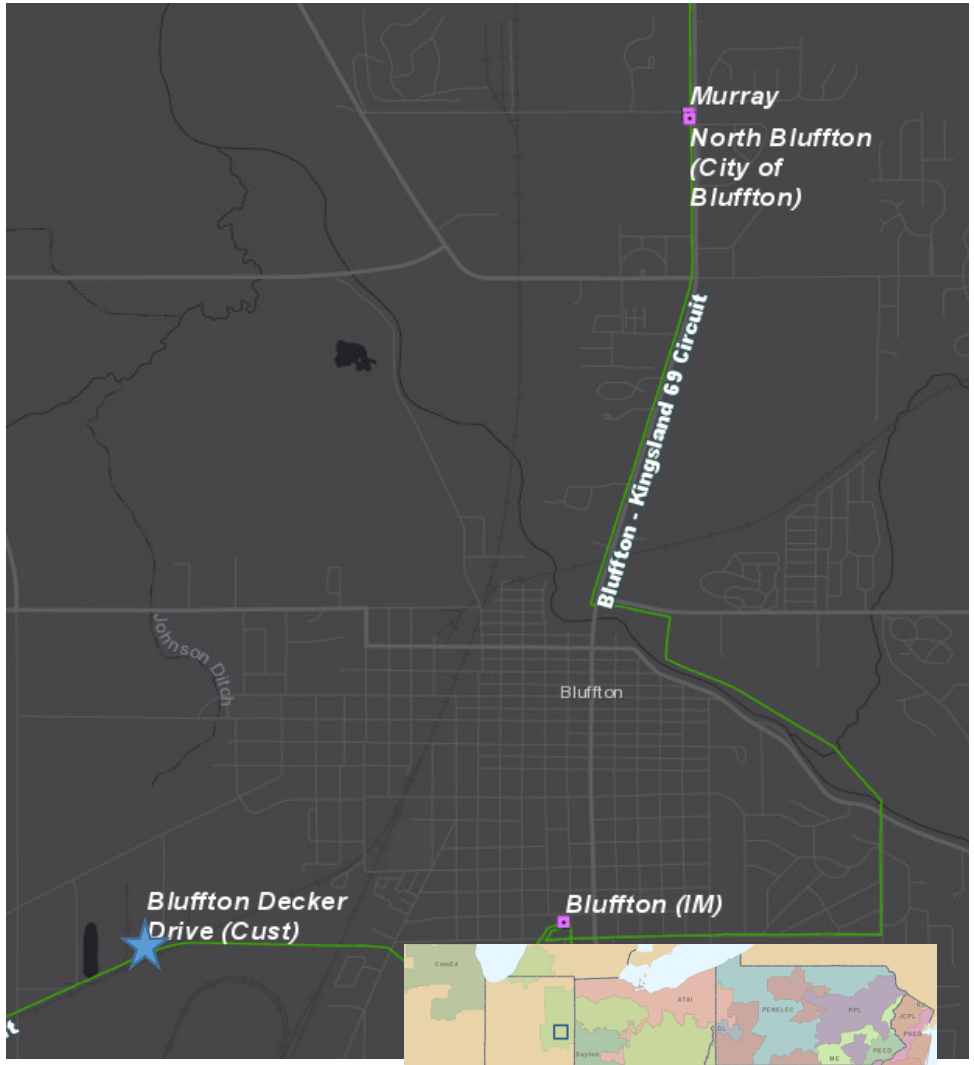
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 12)

Problem Statement:

Decker 69kV

- City of Bluffton has requested an expansion to their delivery point at Decker 69 kV station to serve a new 15.8MW load by November 1, 2021.

Model: N/A



AEP Transmission Zone: Supplemental
Decker 69kV Load Addition

Need Number: AEP-2021-IM012

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

Install a new switch pole to feed the new Decker 69kV XFR. Install a motor on the switch toward Liberty Center. **Estimated Cost: $0.4M (s2633.1)**

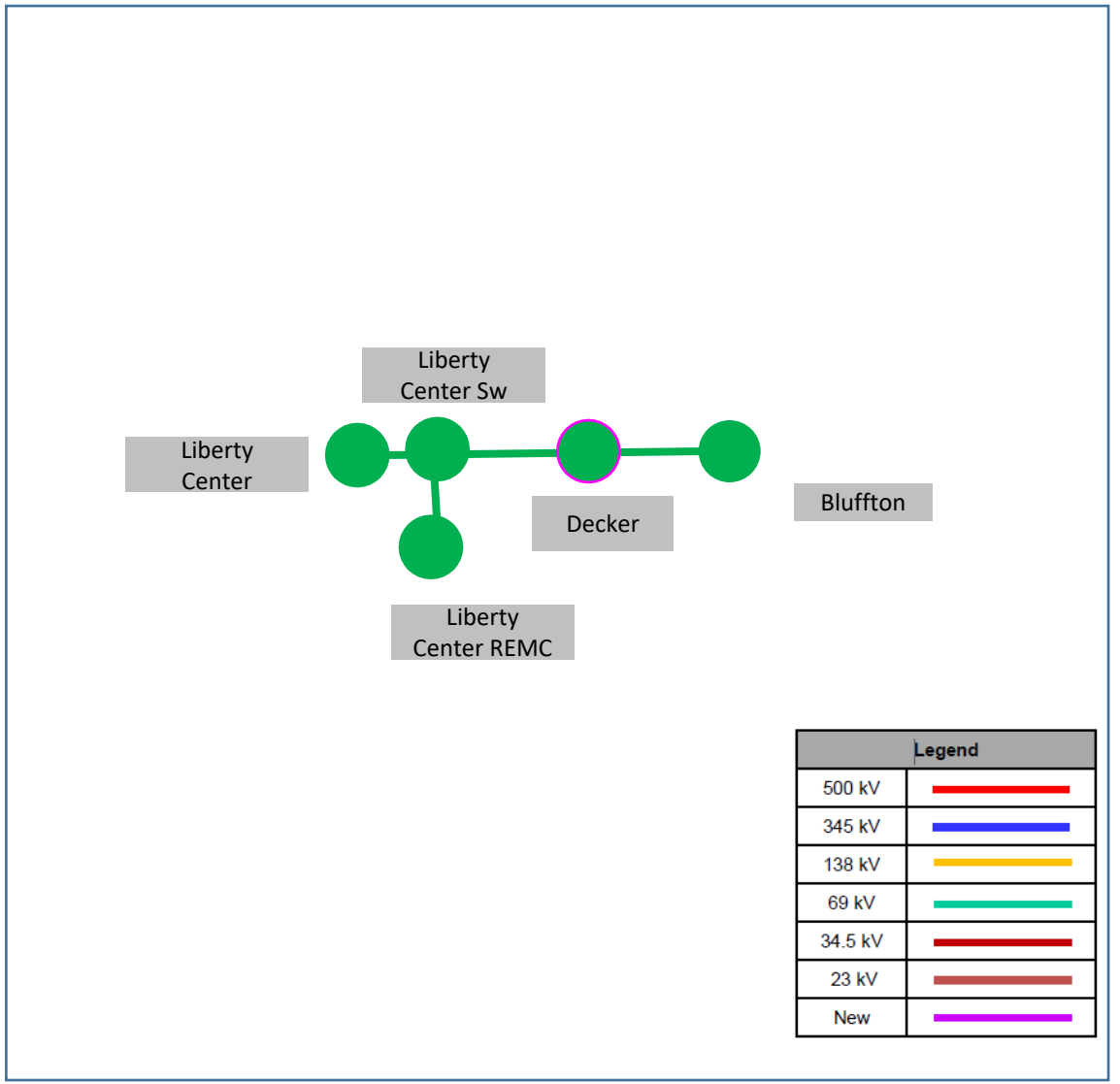
Cut the new pole at Decker Switch into the Liberty Center – Bluffton 69kV line. **Estimated Cost: $0.1M (s2633.2)**

Total Estimated Cost: $0.5 Million

Projected In-Service: 03/31/2022

Supplemental Project ID: s2633.1-.2

Project Status: Scoping



AEP Transmission Zone M-3 Process
Kincaid – Pax Branch

Need Number: AEP-2020-AP001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Previously Presented:
Needs Meeting 1/17/2020
Solutions Meeting 9/17/2021

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

Specific Assumption Reference:

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

Problem Statement:

Pax Branch – Toms Fork 46 kV line (~17.4 miles)

- Majority of the circuit is constructed with wood structures varying in age from 49-106 years old. The circuit also contains some lattice structures that are 50 years old. 85% of the line is constructed with 1950s wood.
  - 55% of the structures on the line have conditions
  - Steel structures show evidence of corrosion on arms and braces as well as hardware rusting
  - Wood structures show evidence of rot, split, and woodpecker damage.
- The line is insulated with 4-bell porcelain insulators originally installed in 1915 and do not meet current AEP standards for CIFO and minimum leakage distance requirements
- Approximately 70% of the line conductor is from 1915.
- Static wire is 104 years old and does not comply with the current material standards.
- Since 2014, the circuit experienced 8 momentary and 27 permanent outages.

Model: 2026 RTEP

AEP Transmission Zone M-3 Process
Kincaid – Pax Branch

Need Number: AEP-2020-AP001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

Construct approximately 3 miles of new 46 kV line from Kincaid to Westerly. Rebuild 5.4 miles of the existing Westerly – Pax Branch 46 kV line. New line to be constructed at 69 kV, operated at 46 kV. Install fiber on the new line construction for upgraded relaying communication. **Estimated Trans. Cost: $23.1M (s2634.1)**

Retire Toms Fork – Westerly 46 kV and Toms Fork – Str. 364-13 46 kV (approximately 24 miles total) **Estimated Trans. Cost $8.9M (s2634.2)**

6 wire the existing double circuit 46 kV line from Cabin Creek to Str. 364-13 to maintain the feed to Rhoda station. **Estimated Trans. Cost: $0.2M (s2634.3)**

Construct a new 138 kV double circuit in/out (approx. 2 miles) from Kanawha – Sundial #1 138 kV circuit to Toms Fork Station. Because of the very rugged terrain in the area, large angles and long span construction is required. These heavy angles and long spans mean minimal tangent structures could be utilized and required dead end towers for nearly every structure instead. These dead end towers are very heavy, resulting in larger equipment and steel costs, and require large foundations resulting in higher costs. **Estimated Trans. Cost: $9.1M (s2634.4)**

Convert Toms Fork Station to 138 kV by installing a new 138/12 kV XFR, circuit switcher and two 138 kV line switches. **Estimated Trans. Cost: $1.5M** (Note: this estimate does not include Distribution costs for the transformer) **(s2634.5)**

Replace existing switches at Westerly Station with two new 1200 A switches. **Estimated Trans. Cost: $0.5M (s2634.6)**

Replace existing switches at Fork Ridge/Mossy Creek with two new 1200 A switches, renamed Haystack Station. **Estimated Trans. Cost: $0.7M (s2634.7)**

Kincaid remote end work. **Estimated Trans. Cost: $0.4M (s2634.8)**

Pax Branch remote end work. **Estimated Trans. Cost: $0.4M (s2634.9)**

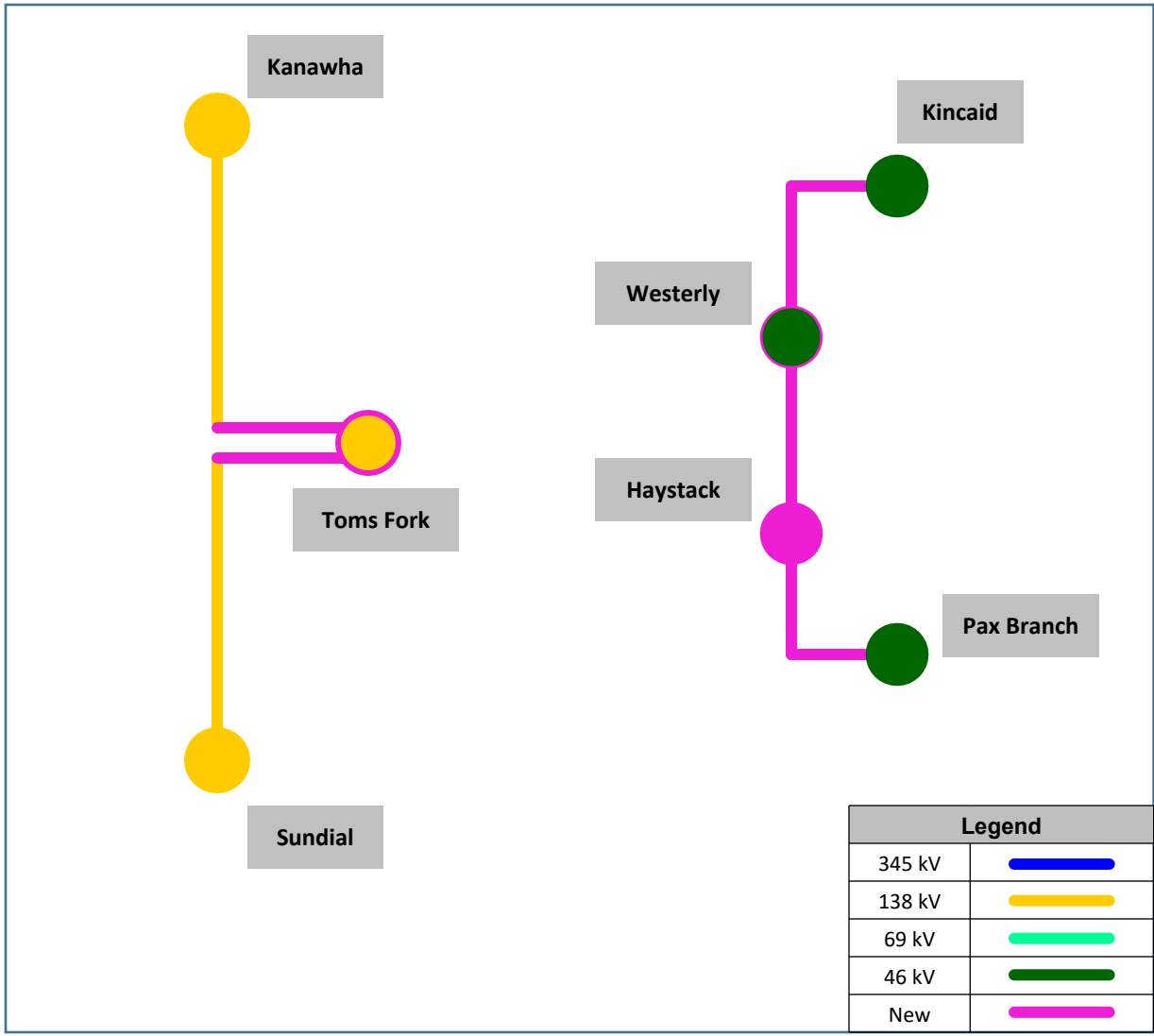
Total Estimated Transmission Cost: $44.8M

Ancillary Benefits: This proposal allows for the retirement of an additional 7 miles of 46 kV line from Toms Fork – Cabin Creek 46 kV

Projected In-Service: 10/7/2024

Supplemental Project ID: s2634.1-.9

Project Status: Scoping



AEP Transmission Zone M-3 Process
Chemical – Ward Hollow Hard Taps

Need Number: AEP-2021-AP007

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Previously Presented:

Needs Meeting 3/19/2021

Solutions Meeting 9/17/2021

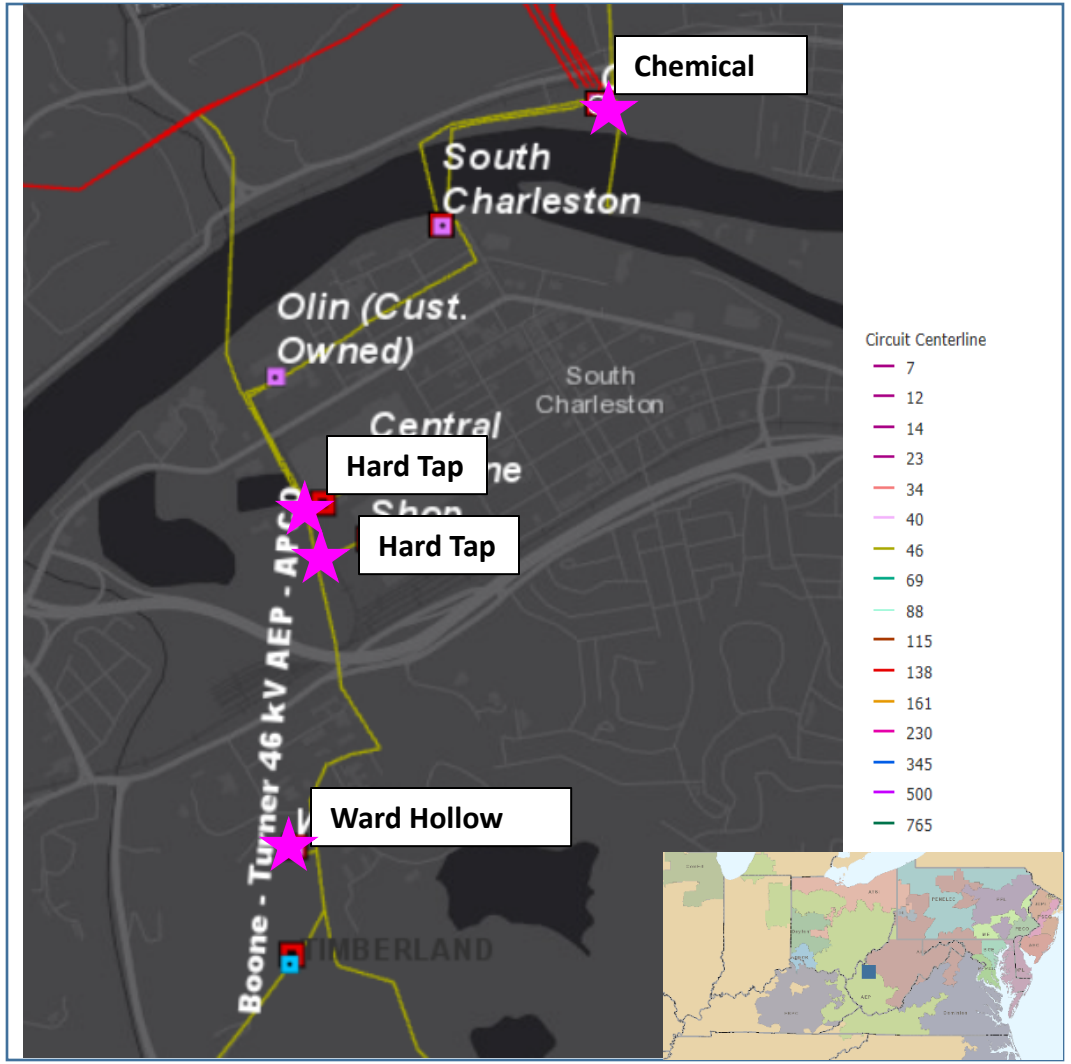
Project Driver: Operational Flexibility, Customer Service (AEP Assumptions slides 12, 14)

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs

Problem Statement:

- The 3 mile Chemical – Ward Hollow 46 kV line has two delivery points that are connected via hard taps. The hard taps complicate restoration activities and extend outages.
- Customers served at the hard taps have communicated concerns regarding continuation of service due to upcoming outages scheduled for ongoing projects at Chemical (B3100, S2348), South Charleston (S2348) and Turner (S2165)



AEP Transmission Zone M-3 Process Chemical – Ward Hollow Hard Taps

Need Number: AEP-2021-AP007

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

Replace existing hard tap at SCSM with a new 1200 A three way SCADA controlled MOAB switch **Estimated Trans Cost: $0.7M (s2635.1)**

Replace existing hard tap at CMS with a new 1200 A three way switch **Estimated Trans Cost: $0.4M (S2635.2)**

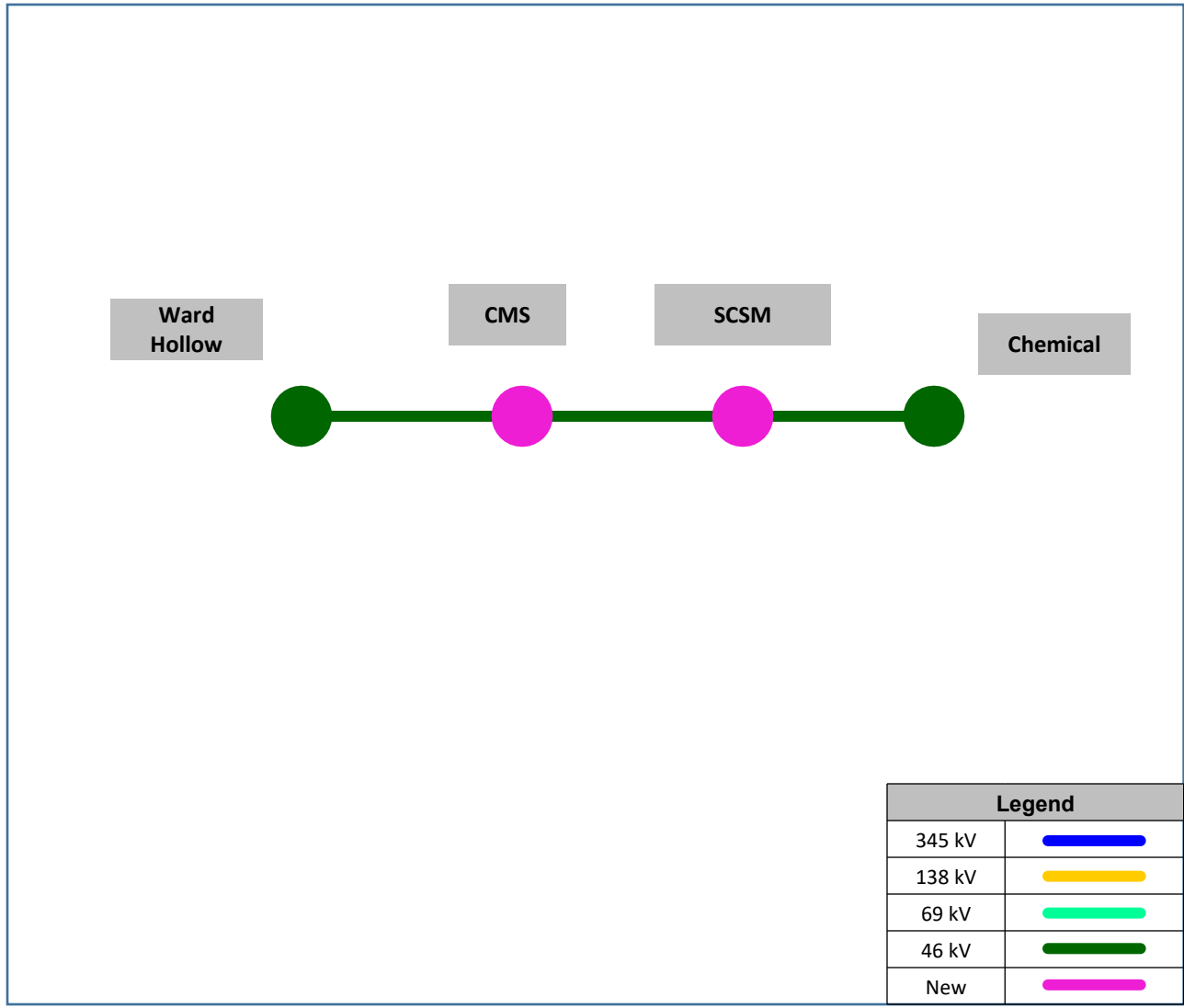
Reconfigure 0.13 mile of the Chemical – Ward Hollow line to accommodate the new switches being installed **Estimated Trans. Cost: $1.8M (S2635.3)**

Total Estimated Trans. Cost: $2.9M

Projected In-Service: 10/7/2022

Supplemental Project ID: s2635.1-.3

Project Status: Scoping



AEP Transmission Zone M-3 Process
Christiansburg, VA

Need Number: AEP-2021-AP008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

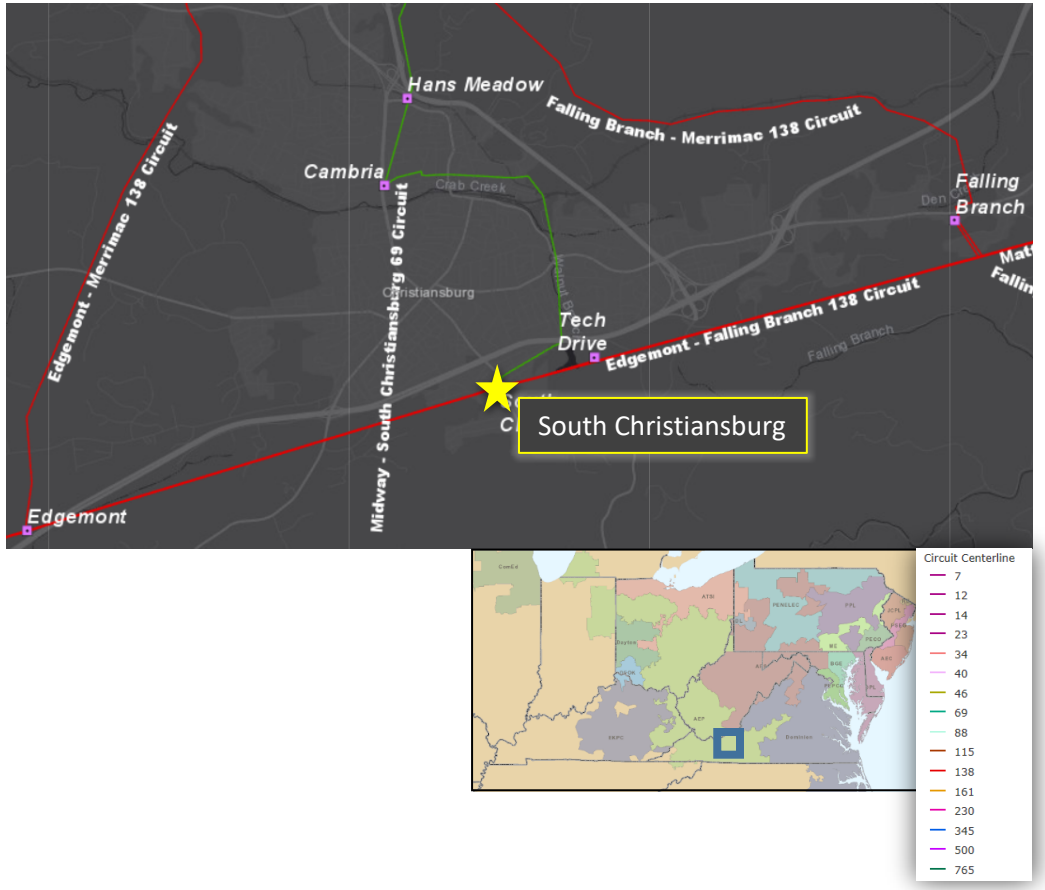
Previously Presented:
Needs Meeting 03/19/2021
Solutions Meeting 12/09/2021

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

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

Problem Statement:

- The 13.2 Mvar 69 kV capacitor bank at South Christiansburg station has failed.



AEP Transmission Zone: Supplemental
Christiansburg, VA

Need Number: AEP-2021-AP008

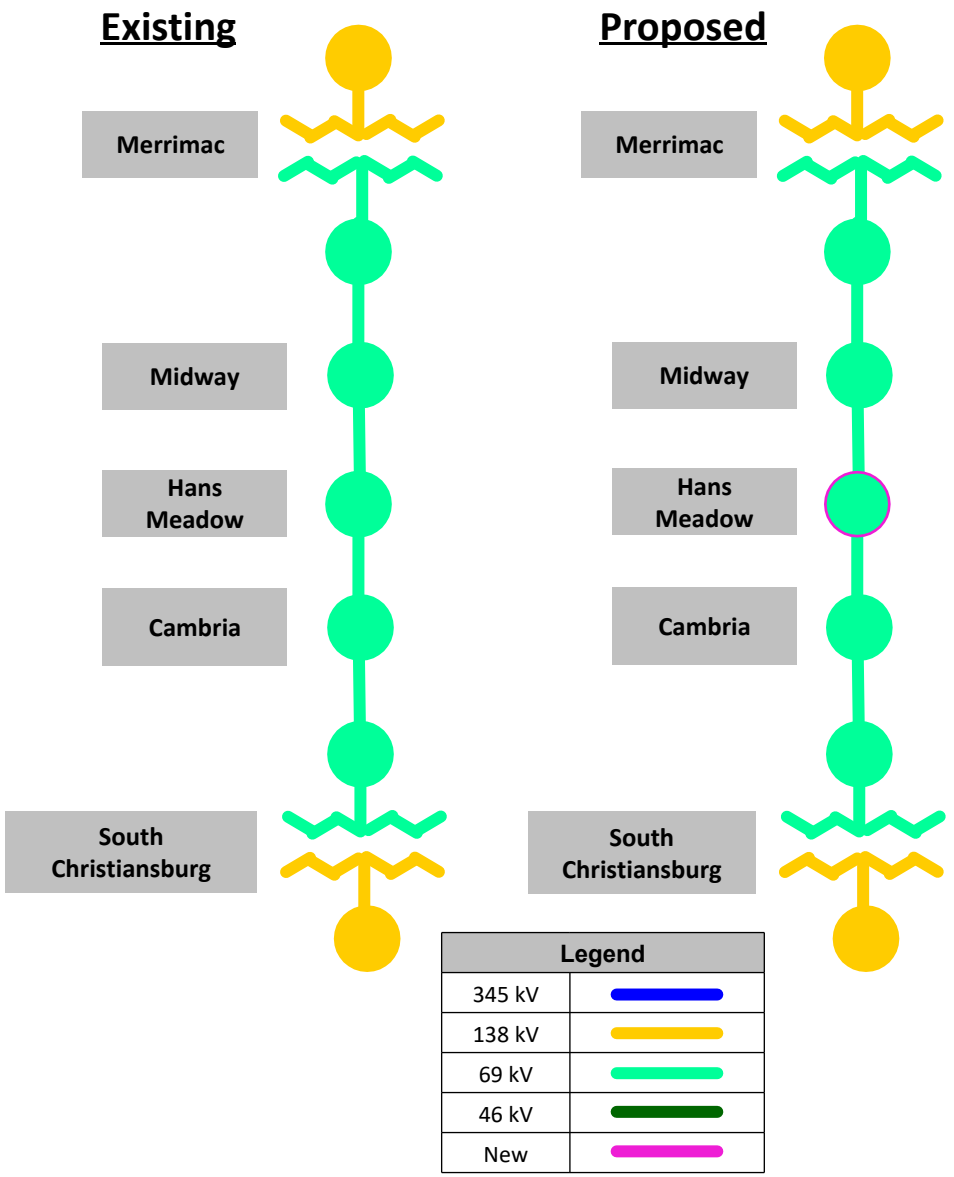
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution: The 13.2 Mvar 69 kV capacitor bank and circuit switcher at South Christiansburg station will be replaced with a circuit switcher and a 17.2 Mvar 69 kV capacitor bank at Hans Meadow Station. The placement of the capacitor bank at Hans Meadow will provide better support to the 69 kV network and place the capacitor bank closer to the load centers on the 69 kV circuit. **(s2636)**

Total Estimated Transmission Cost: $1.097M
Projected IS Date: 11/19/2021

Supplemental Project ID: s2636

Project Status: Engineering



AEP Transmission Zone M-3 Process
Seneca County, Ohio

Need Number: AEP-2019-OH031

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Previously Presented:

Needs Meeting 6/17/2019

Solutions Meeting 9/17/2021

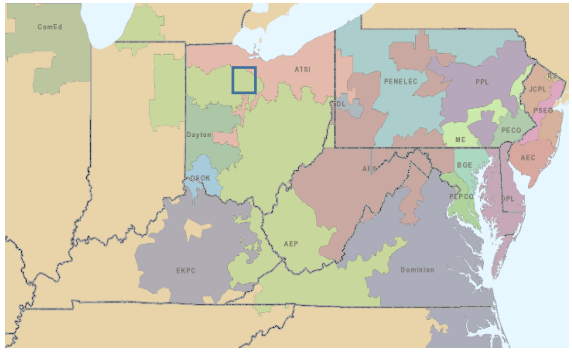
Supplemental Project Driver: Operational Flexibility, and Customer Service

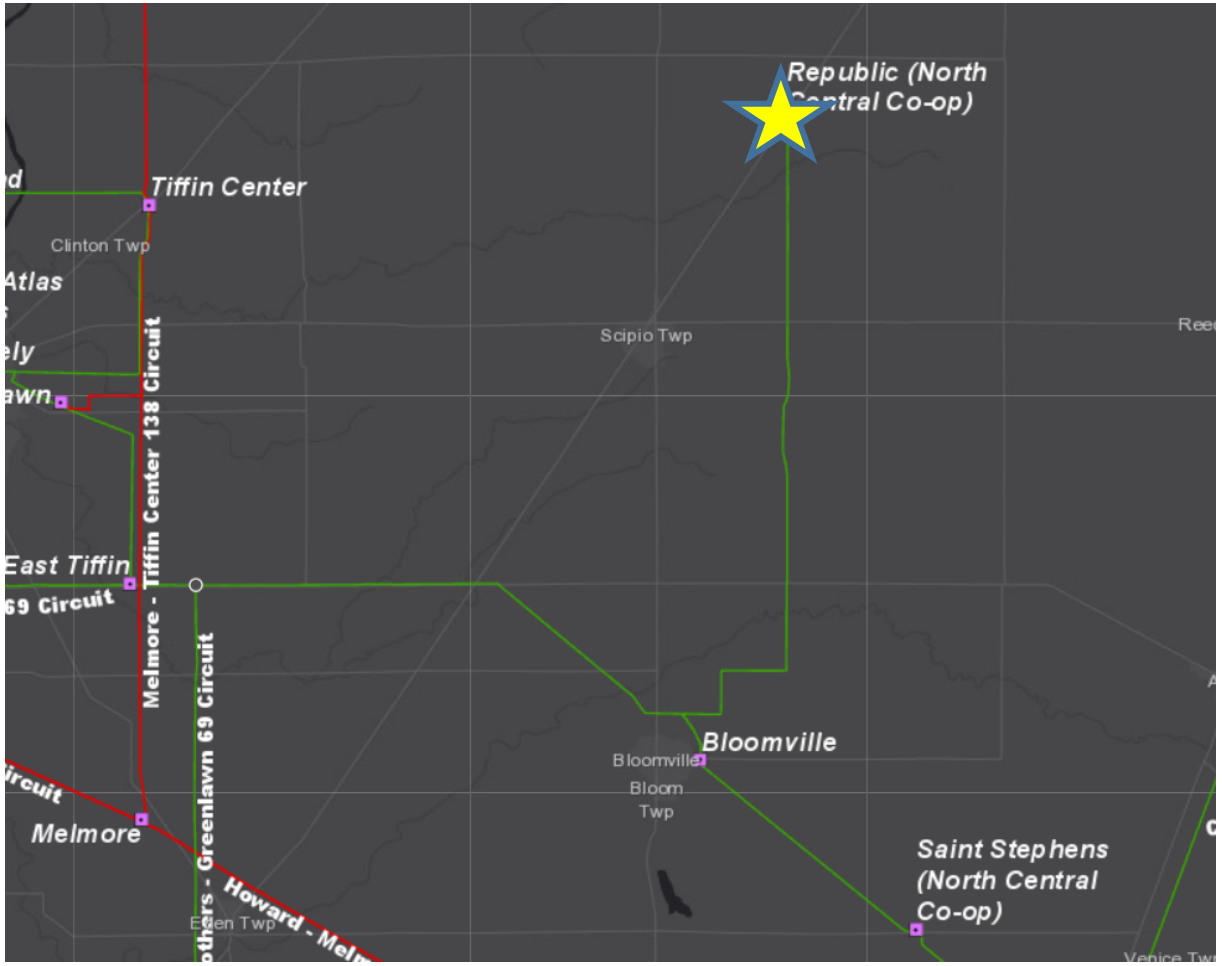
Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 8)

Problem Statement:

- North Central Cooperative has experienced below average reliability due to the radial nature of the Carrothers- Greenlawn 69kV circuit.
- There have been 14 momentary and 8 permanent outages from 2014-2019 (CMI: 4,881,447; 9.278 MW). The radial line is 8.1 miles long.

Model: PJM 2019 RTEP Series Cases





AEP Transmission Zone M-3 Process
Seneca County, Ohio

Need Number: AEP-2019-OH031

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

- Install a new 69 kV 3-way POP Switch (Kilbourne Sw) and 69 kV metering to serve North Central's Republic Station. **Estimated Cost: $0.64 M (s2637.1)**
- Construct a new 3- breaker 69kV Station in a ring configuration named Founders. **Estimated Cost: $5.1M (s2637.2)**
- Construct ~ 8 miles of new 69 kV line between Tiffin Center and the new Kilbourne Switch delivery point using 556 ACSR conductor. **Estimated Cost: $11.99 M (s2637.3)**
- Install a new 69 kV 3000A 40kA breaker and associated terminal equipment at Tiffin Center on the line towards Kilbourne switch. **Estimated Cost: $0.7 M (s2637.4)**
- Remove the existing Honey Creek 69 kV switch currently used to radially serve the Republic delivery point. **Estimated Cost: $0.1 M (s2637.5)**
- Construct ~ 0.83 miles of new 69 kV double circuit line between structure 103 on the Carrothers- Greenlawn circuit to the new Founders delivery point using 556 ACSR conductor. **Estimated Cost: $2.4M (s2637.6)**

Total Estimated Transmission Cost: $20.93 M

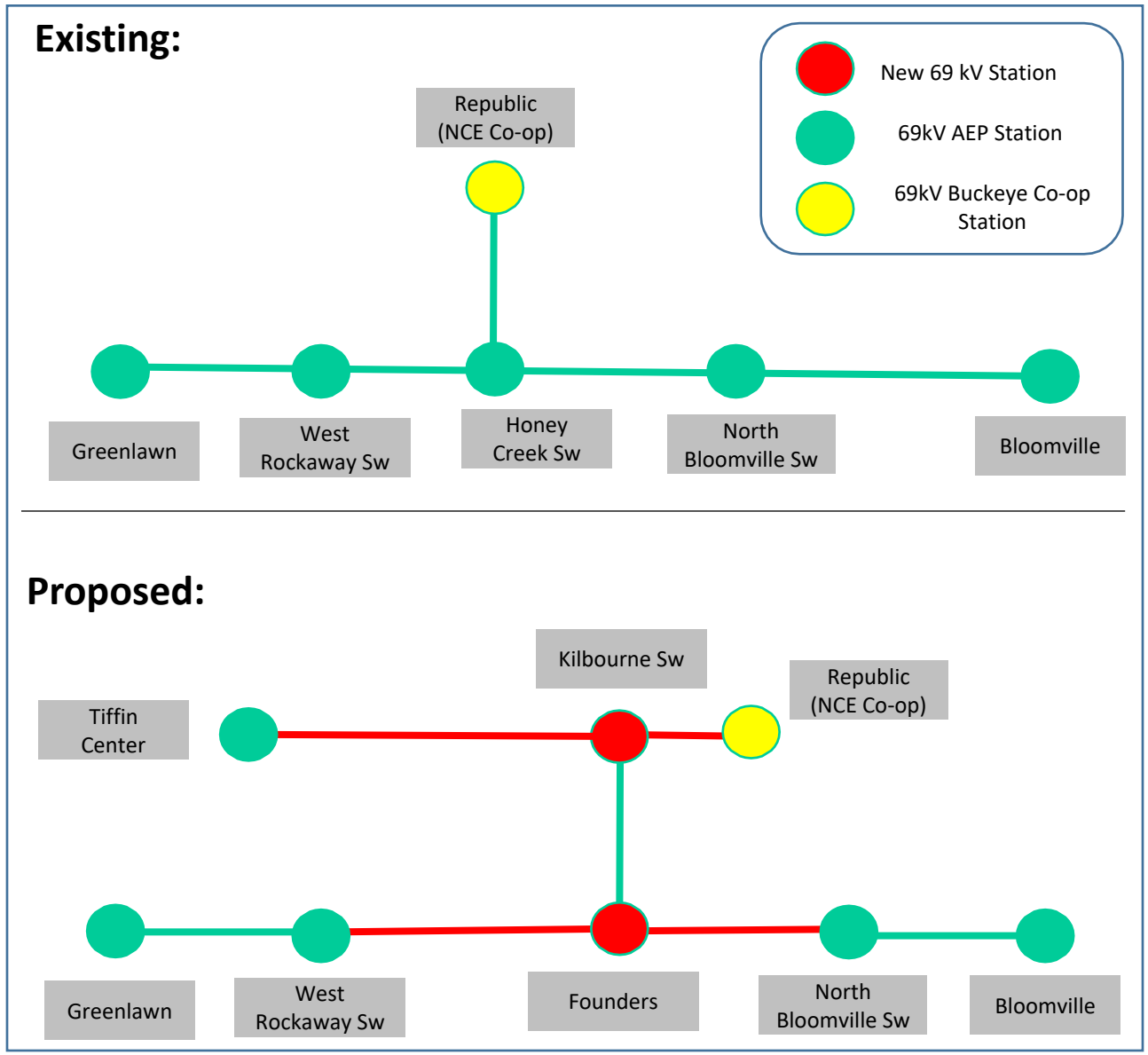
Ancillary Benefits:

Provides the Republic radial line looped transmission service to reduce the number of outages.

Projected In-Service: 9/1/2024

Supplemental Project ID: s2637.1-.6

Project Status: Engineering



AEP Transmission Zone M-3 Process
Robyville Station Upgrade

Need Number: AEP-2020-OH007

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Previously Presented:

Needs Meeting 2/21/2020

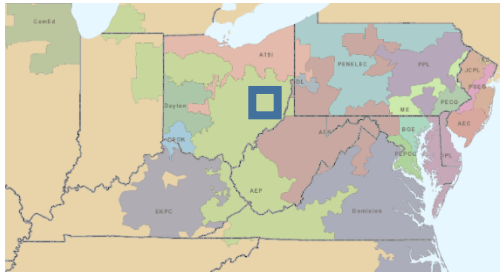
Solutions Meeting 9/17/2021

Supplemental Project Driver:

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

Specific Assumption Reference:

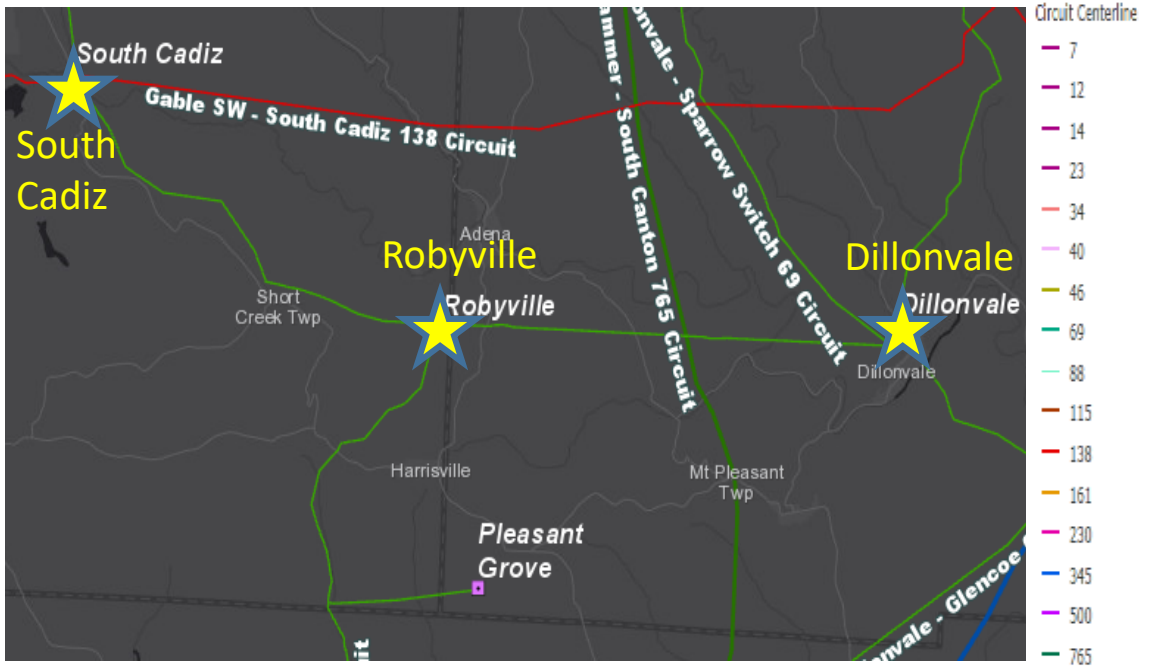
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)



Problem Statement:

Equipment Material Condition, Performance and Risk:

- The Robyville 69-12kV substation is in poor condition. The 69kV breaker 'C' is an oil-filled unit from 1965, has experienced 143 fault operations (manufacturer recommends 10), and has mechanical problems on the breaker's open/close mechanism.
- The station consists of deteriorating wooden 69kV & 12kV station structures. Foundations for the 2- transformers and voltage regulator are of wooden rail road tie construction. The station fence and retaining wall are in very poor condition. The two distribution transformers date to 1941 & 1947; both are showing signs of thermal degradation (due to past electrical faults), high carbon-monoxide levels (due to excessive heating), contaminated oil, and hot spots.
- The small control house dates to the 1940's. Of the 16 relays, 12 are original electromechanical models, which lack modern fault recording, no SCADA functionality, and have limited spare part availability.

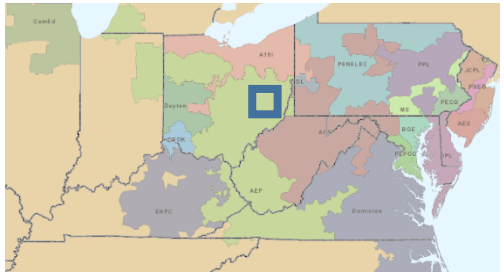


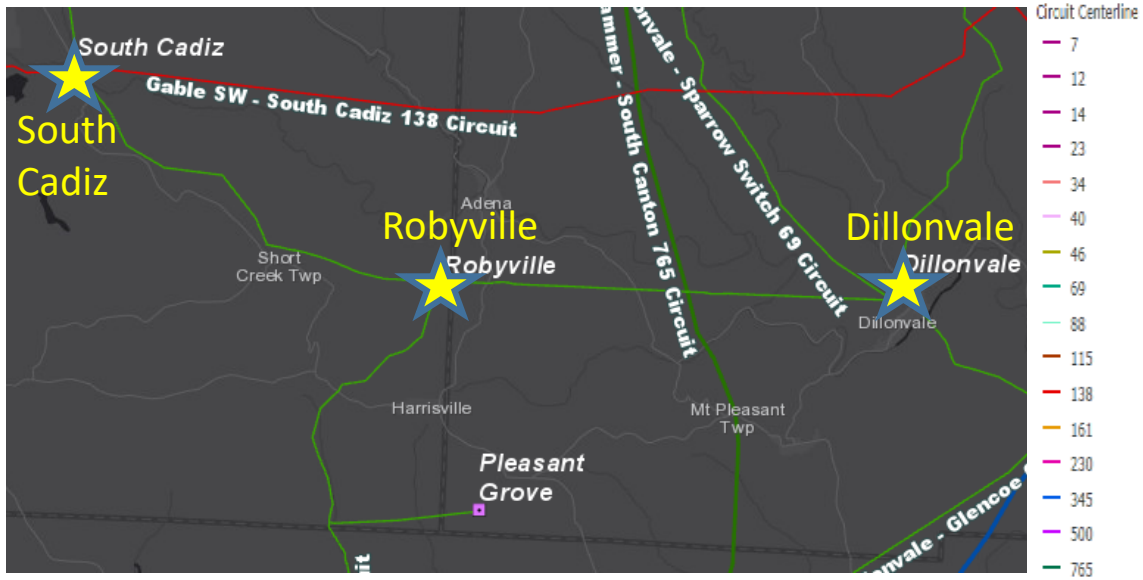
AEP Transmission Zone M-3 Process
Robyville Station Upgrade

Need Number: AEP-2020-OH007
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021
Previously Presented:
Needs Meeting 2/21/2020
Solutions Meeting 9/17/2021

Operational Flexibility & Efficiency:

- Robyville Station contains dissimilar zones (2-lines, bus, and transformer) of protection that cause misoperations and over tripping.
- The distribution transformers at Robyville are in parallel (1.5 MVA each) and lack a high-side protective device. A fault on either transformer or the low-side 12kV bus will take out both 69-12kV transformers an outage 1,000+ customers served from this station.
- In the past 5 years, the Dillonvale-Robyville-South Cadiz 69kV circuit has experienced 10 momentary outages and 2 sustained outages. Distribution customers served from Robyville have experienced a CMI (customer-minutes-of-interruption) total of 610,598.
- South Cadiz 69 kV breaker D is an oil-filled unit from 1965, with 34 fault operations; it exhibits signs of mechanical degradation.
- Dillonvale 69 kV breaker B is an oil-filled unit from 1952, with 35 fault operations.





AEP Transmission Zone M-3 Process
Robyville Station Upgrade

Need Number: AEP-2020-OH007

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

Construct a new 69-12kV station ("Ruby") 0.2-mile to the east of Robyville, on new property. The station will have a 4-breaker 69kV ring bus, with 3- 69kV circuit connections and serving one AEP Ohio distribution transformer. **Estimated Cost: $6.2M (s2638.1)**

At the 69kV remote-end of South Cadiz: Replace 69kV circuit breaker D, line relays to Ruby, and 69kV bus protection; expand control building. **Estimated Cost: $1.3M (s2638.2)**

At the 69kV remote-end of Dillonvale: Replace 69kV circuit breaker B, line relays to Ruby, and 69kV bus protection. **Estimated Cost: $0.8M (s2638.3)**

Re-route the three 69kV transmission lines near Robyville to extend to the new Ruby station: **Estimated Cost: $1.8M (s2638.4)**

Remove the former DTE Coal 69kV switch just south of South Cadiz station. **Estimated Cost: $0.04M (s2638.5)**

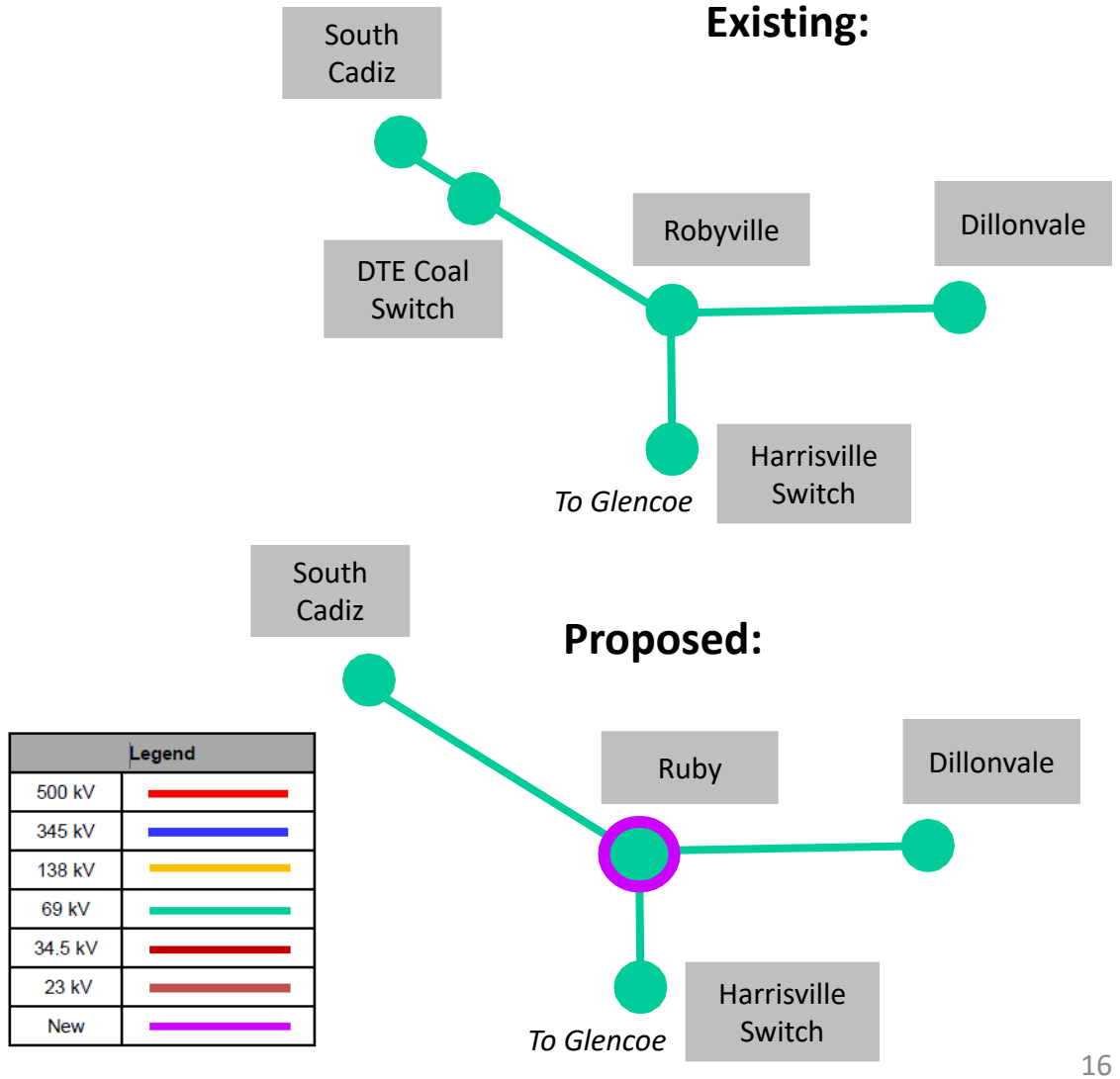
Retire the existing Robyville station and remove all equipment. **Estimated Cost: $0.4M (s2638.6)**

Total Estimated Transmission Cost: $10.54 Million

Projected In-Service Date: 11/1/2023

Supplemental Project ID: s2638.1-.6

Project Status: Scoping



AEP Transmission Zone M-3 Process
Whitehall, OH

Need Number: AEP-2020-OH016

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Previously Presented:

Needs Meeting 03/19/2020

Solutions Meeting 12/09/2021

Supplemental Project Driver: Customer Service

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

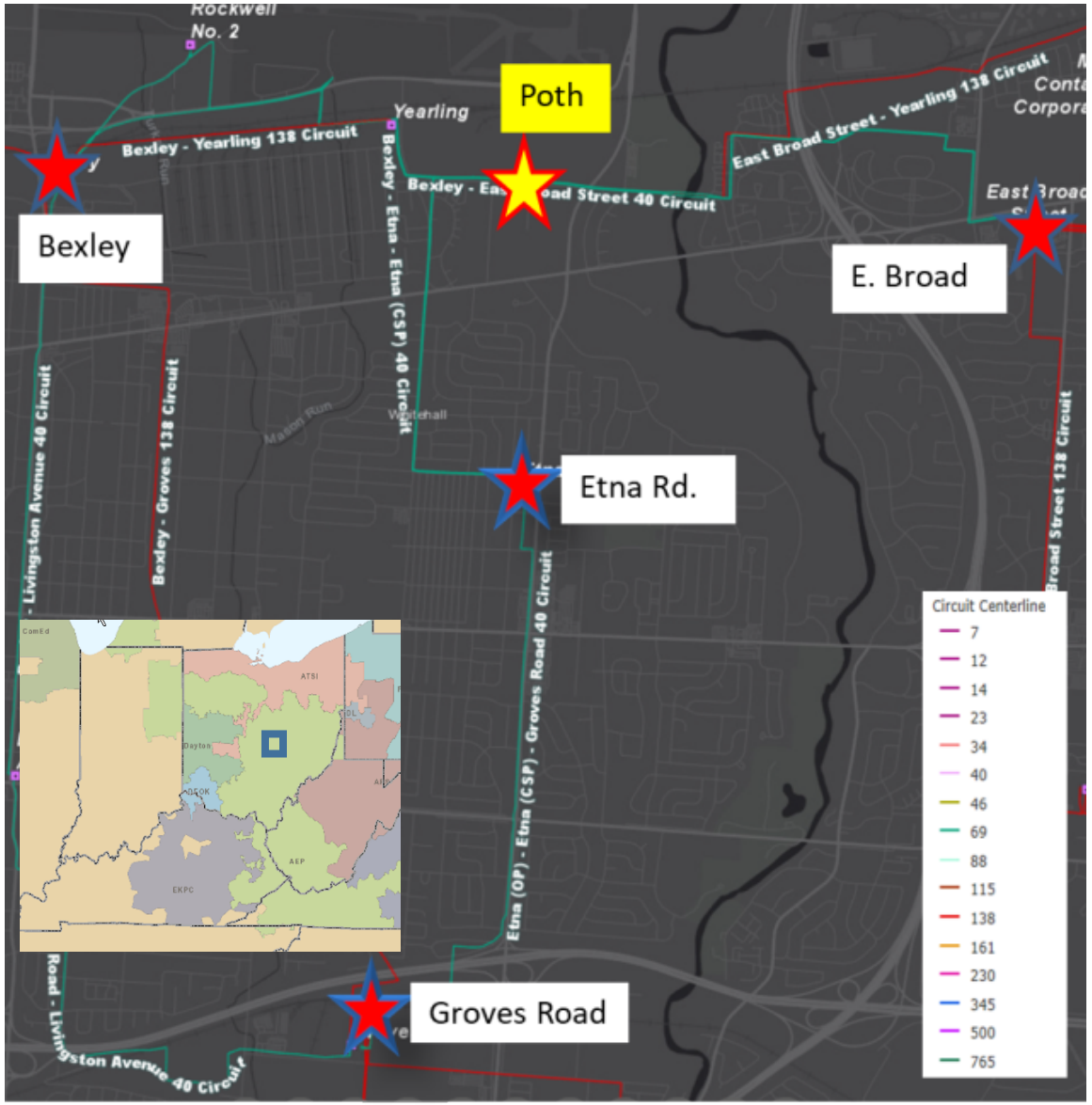
Problem Statement:

AEP Ohio has requested a new 138kV delivery point (Poth) off the East Broad Street - Bexley 138kV circuit by December 2022.

At Etna Road station, 101/102 of the relays are electro-mechanical that are no longer supported by the manufacturer, lack SCADA ability, and lack fault collection. 46 kV CB's 30, 31, 32, 33, 34, and 36 (vintage 1955) are oil type breakers, with some have a high number of fault operations, and are an obsolete kV. Over the last 5 years we have had 402,323 CMI and three outages.

Etna-Groves Road 40 kV line is a majority 1960's vintage (70%) wood pole line with the remainder being built since 1990. The conductor is the original 636 ACSR from 1965. There are a total of 56 open conditions on this line with 51% (42/82) of the poles having at least one condition. These conditions include rot top poles and cross arms, woodpecker damage, broken/missing ground leads, and damaged guy wires. Over the last 5 years there have been 1 momentary and 3 permenant outages on this line.

Etna Tap 40 kV extension (part of the Etna – Bexley circuit) is a vintage 1957 (57%) with the remainder between 1970 (8%), 1980 (5%), 1990 (5%), and 2010 (22%). There are currently 30 open conditions with 28% (22/80) of poles having at least one condition. These conditions include rot top poles and cross arms, woodpecker damage, broken/missing ground leads, and damaged guy wires. Over the last 5 years there have been 4 momentary and 2 permanent outages.



AEP Transmission Zone M-3 Process
Whitehall, OH

Need Number: AEP-2020-OH016

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

- **Poth 138 kV Station:** Construct a greenfield station 138kV ring bus with (4) 3000A 63kA 138kV breakers and two 138/13 kV transformers to replace the existing 40 kV station. **Estimated Cost: $4.19M (s2639.1)**
- **East Broad 138 kV Station:** Replace CB 3 & CB 7 and 4 disconnect switches with 3000A 63kA 138kV breakers and 4-3000A disconnect switches and install new relaying to coordinate with the new relays at Poth station. **Estimated Cost: $0.793M (s2639.2)**
- **Yearling 138 kV Station**: Remote end relay settings. **Estimated Cost: $0.064M (s2639.3)**
- **Poth Extension 138 kV:** Tap the existing East Broad-Bexley 138kV line into Poth station by constructing approximately 0.5 miles of greenfield lines from the line taps. Extend telecom ADSS for relaying and communication from Bexley to Poth & East Broad to Poth. **Estimated Cost: $3.06M (s2639.4)**

Total Estimated Cost: $8.107M

Ancillary Benefits: The existing CB-3 at East Broad Station is an oil filled breaker has experienced 13 Fault Ops & the CB-7 is also an oil filled breaker with 15 Fault Ops. Furthermore, the oil filled breakers have more maintenance required due to oil handling. Therefore, along with replacing the remote end relays required for relay coordination, the circuit breakers will be replaced with this project to best align outages in the area. The remaining East Broad needs are presented as AEP-2021-OH045.

Projected In-Service: 12/18/2023

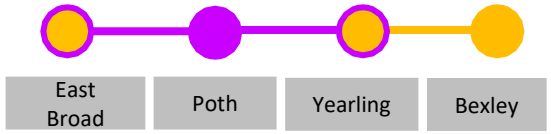
Supplemental Project ID: s2639.1-.4

Project Status: Scoping

Bubble Diagram

Existing:

Proposed:



AEP Transmission Zone M-3 Process
Dover, Ohio

Need Number: AEP-2020-OH051

Process Stage: Previously Presented: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Needs Meeting 3/19/2020

Solutions Meeting 9/17/2021

Supplemental 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)

Problem Statement:

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.

AEP Transmission Zone M-3 Process
West Dover Station Upgrade

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

Need Number: AEP-2020-OH051

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

At West Dover station, install 4- 138kV breakers in a ring bus arrangement. Install 1- 69kV breaker on the low-side of the 138-69kV transformer. Remove the existing control building and install a new prefabricated drop-in-control-module (DICM). Upgrade the 69kV circuit protection to Sugarcreek, replacing electromechanical relays with new fiber-based protection. Various improvements to the station site, including new fencing, grading, and station service. **Estimated Cost: $7.03M (s2640.1)**

Re-terminate the 3- 138kV transmission lines at West Dover to connect to the new ring bus layout. The Sugarcreek 138kV tap will be re-routed slightly. **Estimated Cost: $0.77M (s2640.2)**

Remote-end 69kV protection upgrades at Sugarcreek station, to coordinate with the West Dover upgrades. **Estimated Cost: $0.51M (s2640.3)**

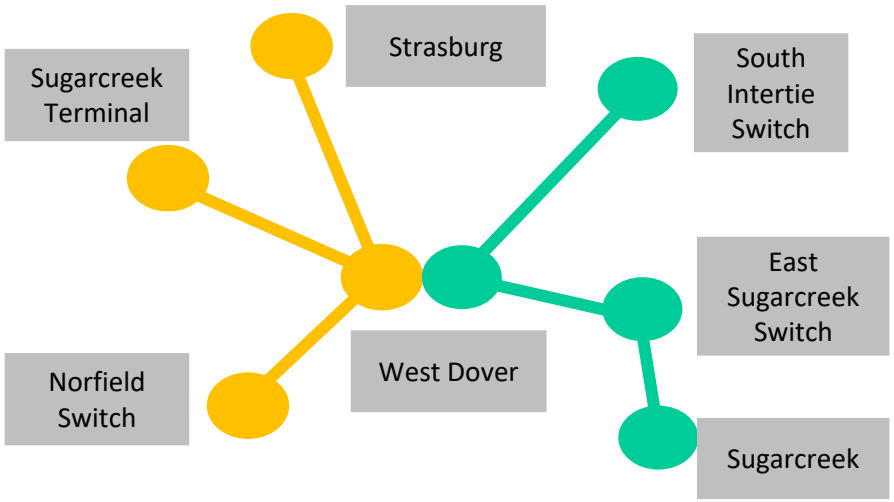
Total Estimated Transmission Cost: $8.31M

Projected In-Service: 12/1/2023

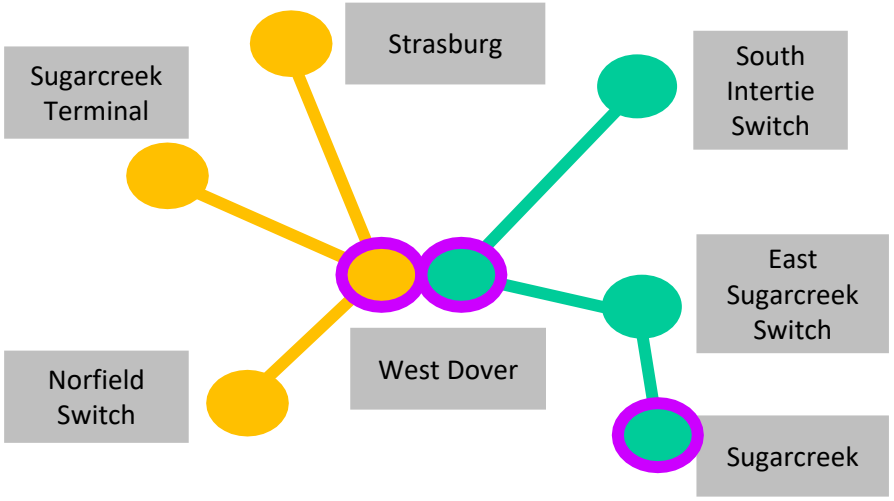
Supplemental Project ID: s2640.1-.3

Project Status: Scoping

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Holmesville, Ohio

Need Number: AEP-2021-OH012

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Previously Presented:

Needs Meeting 3/19/2021

Solutions Meeting 9/17/2021

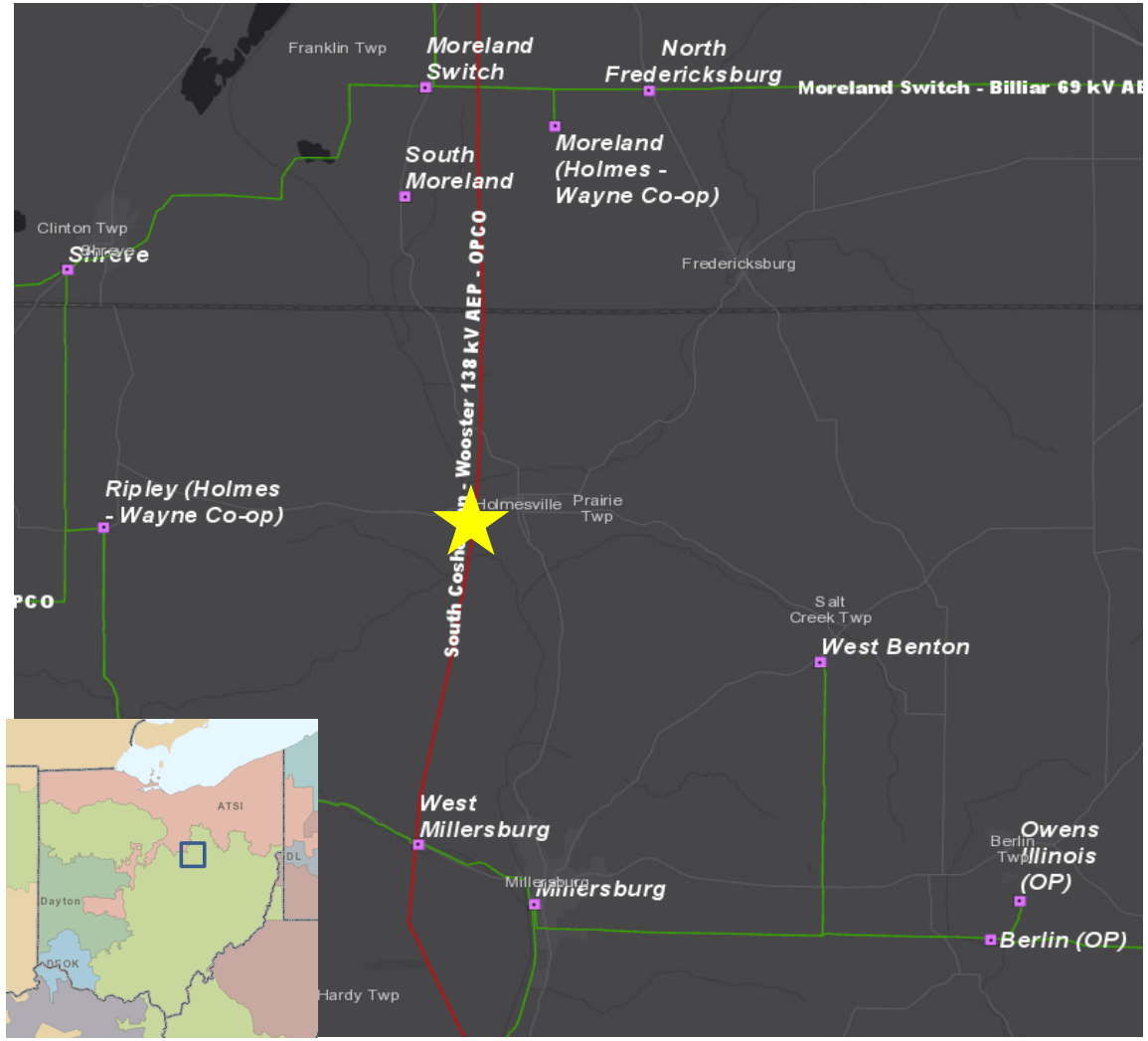
Supplemental Project Driver: Customer Service

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

Problem Statement:

- Buckeye Power is requesting on behalf of Holmes- Wayne Electric co-op for a new 138kV delivery point on the West Millersburg- Wooster 138kV Circuit by August 2023. Anticipated load is 4.4 MW.

Model: PJM 2025 RTEP Series Cases



AEP Transmission Zone M-3 Process
Seneca County, Ohio

Need Number: AEP-2021-OH012

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 12/09/2021

Selected Solution:

- Reconfiguring the existing West Millersburg – Wooster 138kV circuit to add in Salt Fork Switch. **$0.2 M (s2641.1)**
- Install a new 138kV three- way phase over phase switch named Salt Fork Switch. $**0.87 M (s2641.2)**
- Construct ~ 0.75 miles of new 138 kV line between Salt Fork Switch and Holmesville delivery point using 556 ACSR conductor. **$1.4 M (s2641.3)**
- Install new customer metering at Holmesville for Holmes Wayne Cooperative. **$0.009 M (s2641.4)**

Cost estimate: $2.48 M

Ancillary Benefits:

Provides Holmes- Wayne Electric Cooperative the ability to have supplementary service to the growing community and load demands as well as help to aid the loads currently served out of the Moreland delivery point.

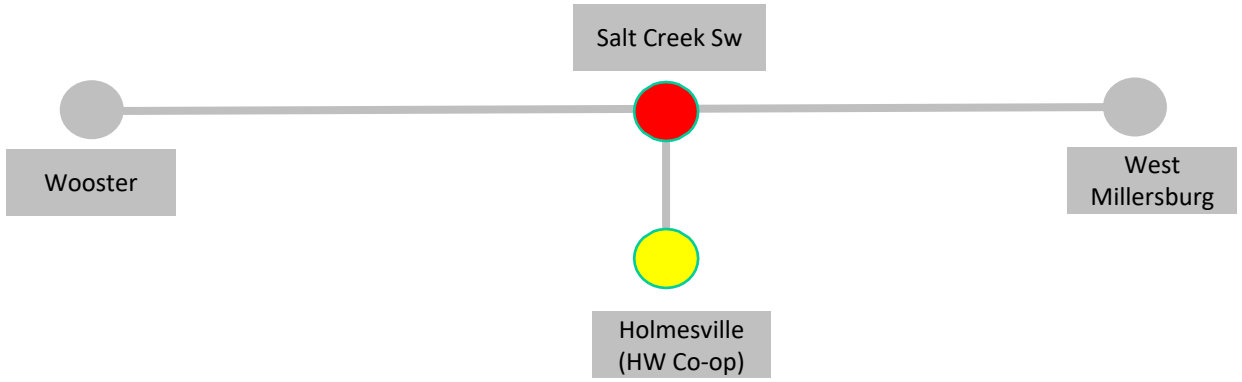
Projected In-Service: 7/31/2023

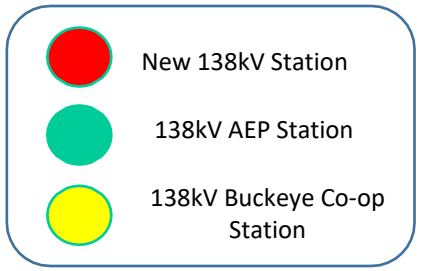
Supplemental Project ID: s2641.1-.4

Project Status: Engineering

Existing:

Proposed:





AEP Transmission Zone M-3 Process
Mark Center SW

Need Number: AEP-2021-OH004

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solutions Meeting 10/15/2021
Needs Meeting 2/17/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

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

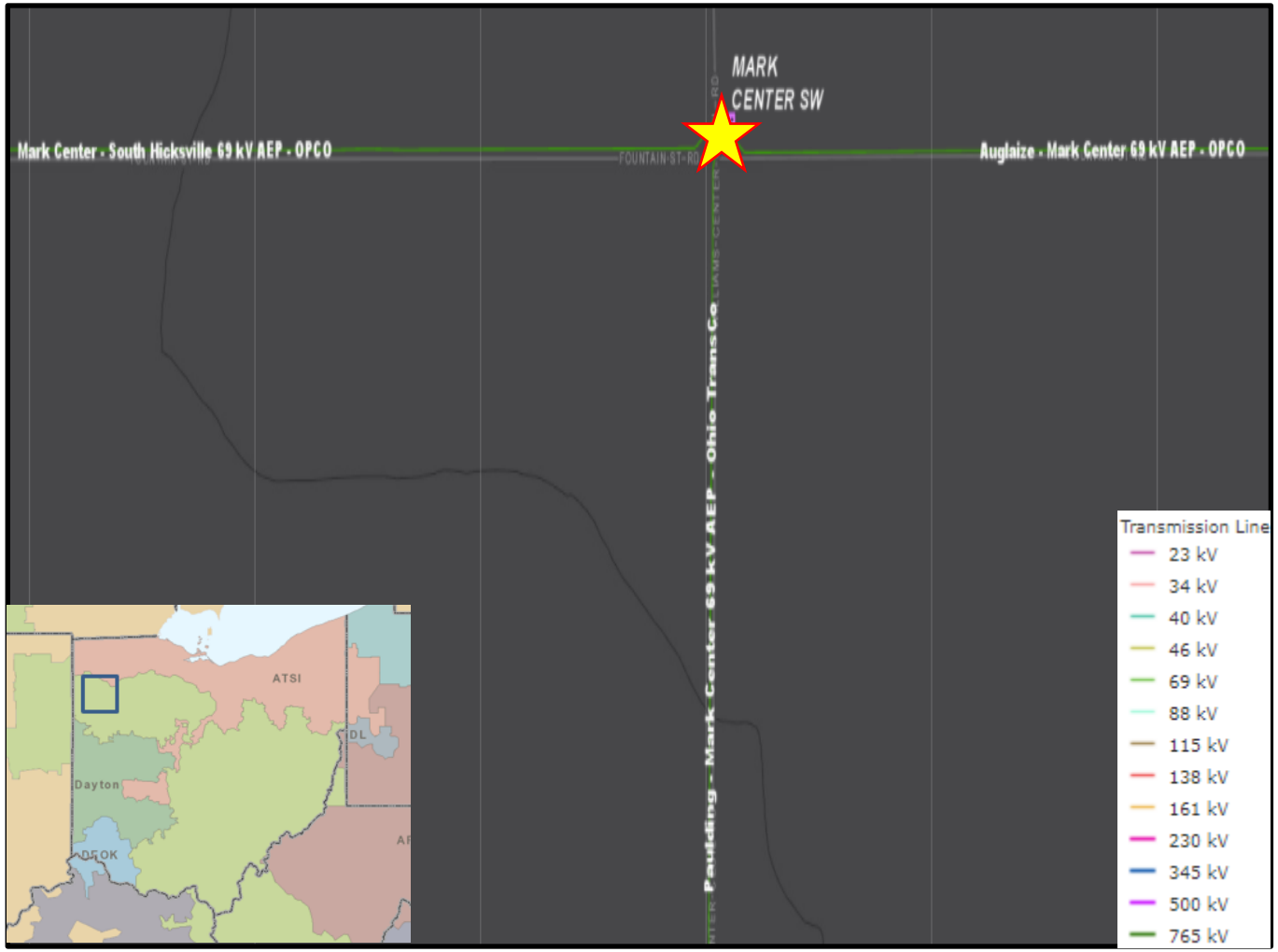
Problem Statement:

Mark Center Switch 69kV:

Circuit Breakers B, C, & D:

- Breaker Age: B 1956, C 1967, & D 1975
- Interrupting Medium: (Oil)
- Fault Operations:
  - Number of Fault Operations: B 26 , C 140, & D 40
  - **Additional Breaker Information**: The breakers are oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling. Oil spills are common and can result in significant environmental mitigation costs.

- **Relays:** Currently, 41 of the 47 relays (87% of all station relays) are in need of replacement. 39 of these are of the electromechanical type and 2 of these are of the static type which have significant limitations with regards to spare part availability, SCADA functionality, and fault data collection and retention.



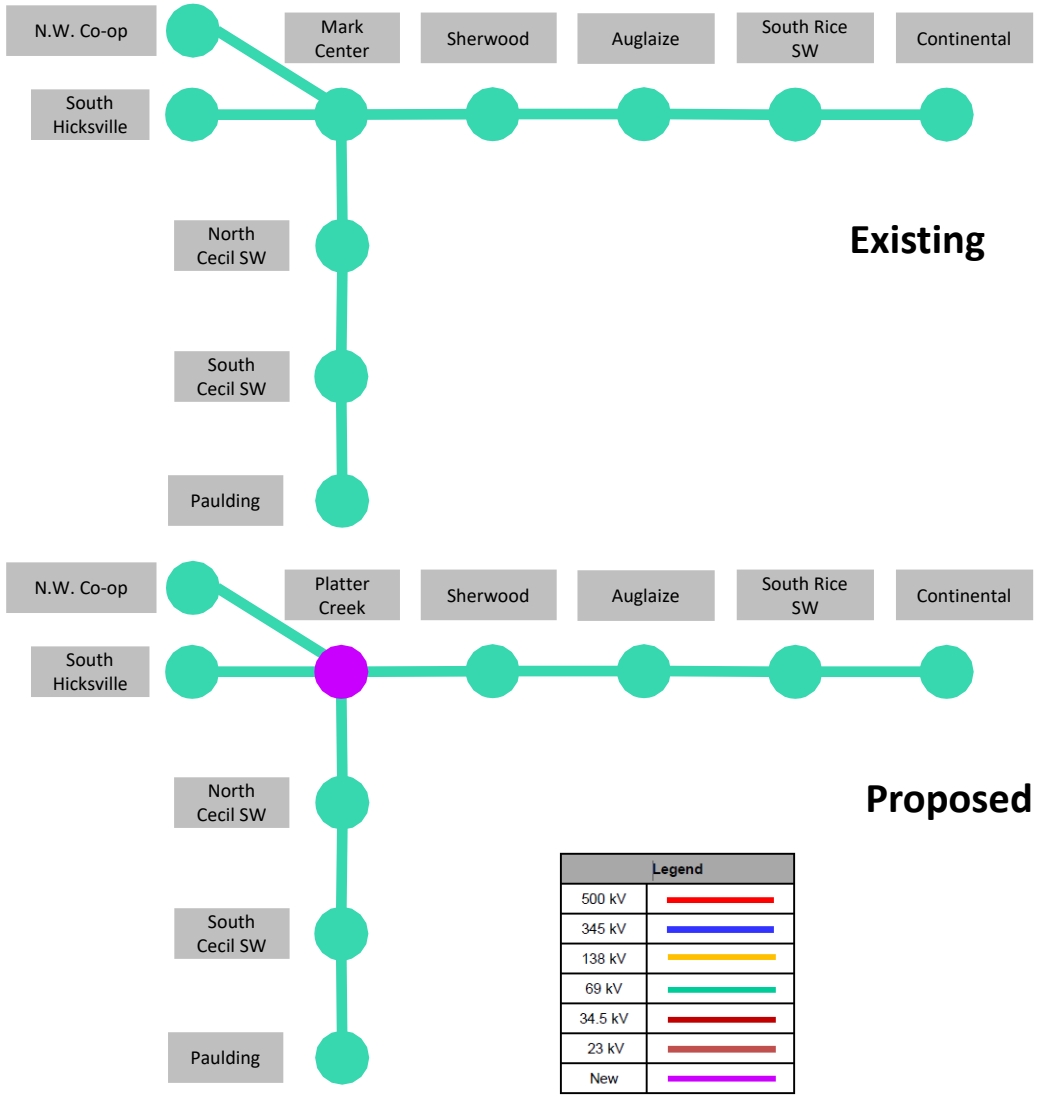
AEP Transmission Zone M-3 Process
Mark Center Rebuild Project

Need Number: AEP-2021-OHO04
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

- Rebuild Mark Center station in the clear as Platter Creek station. Install 4 new 3000A, 40kA, 69 kV breakers at the new Platter Creek ring bus and add a DICM. Upgrade NW Coop 69 kV metering. **Estimated Cost $6.37M (s2650.1)**
- Retire existing Mark Center station. Relocate circuit switcher AA to Platter Creek. **Estimated Cost $0.76M (s2650.2)**
- Remote end work at South Hicksville station. **Estimated Cost $0.57M (s2650.3)**
- Relocate Mark Center – Continental to terminate at Platter Creek. **Estimated Cost $0.37M (s2650.4)**
- Relocate Mark Center – Paulding to terminate at Platter Creek. **Estimated Cost $0.51M (s2650.5)**
- Relocate Mark Center – South Hicksville to terminate at Platter Creek. **Estimated Cost $0.40M (s2650.6)**
- Relocate Mark Center- NW Co-op to terminate at Platter Creek. **Estimated Cost $0.02M (s2650.7)**

Total Estimated Transmission Cost: $8.99M
Projected In-Service: 03/31/2023
Project Status: Scoping
Supplemental Project ID: s2650.1-.7
Related Project: B3315 calls for the line relays to be changed out at Mark Center along with a cap bank replacement.



AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2020-OH052

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:

Solution Meeting 10/15/2021

Need Meeting 3/19/2020

Supplemental Project Driver:

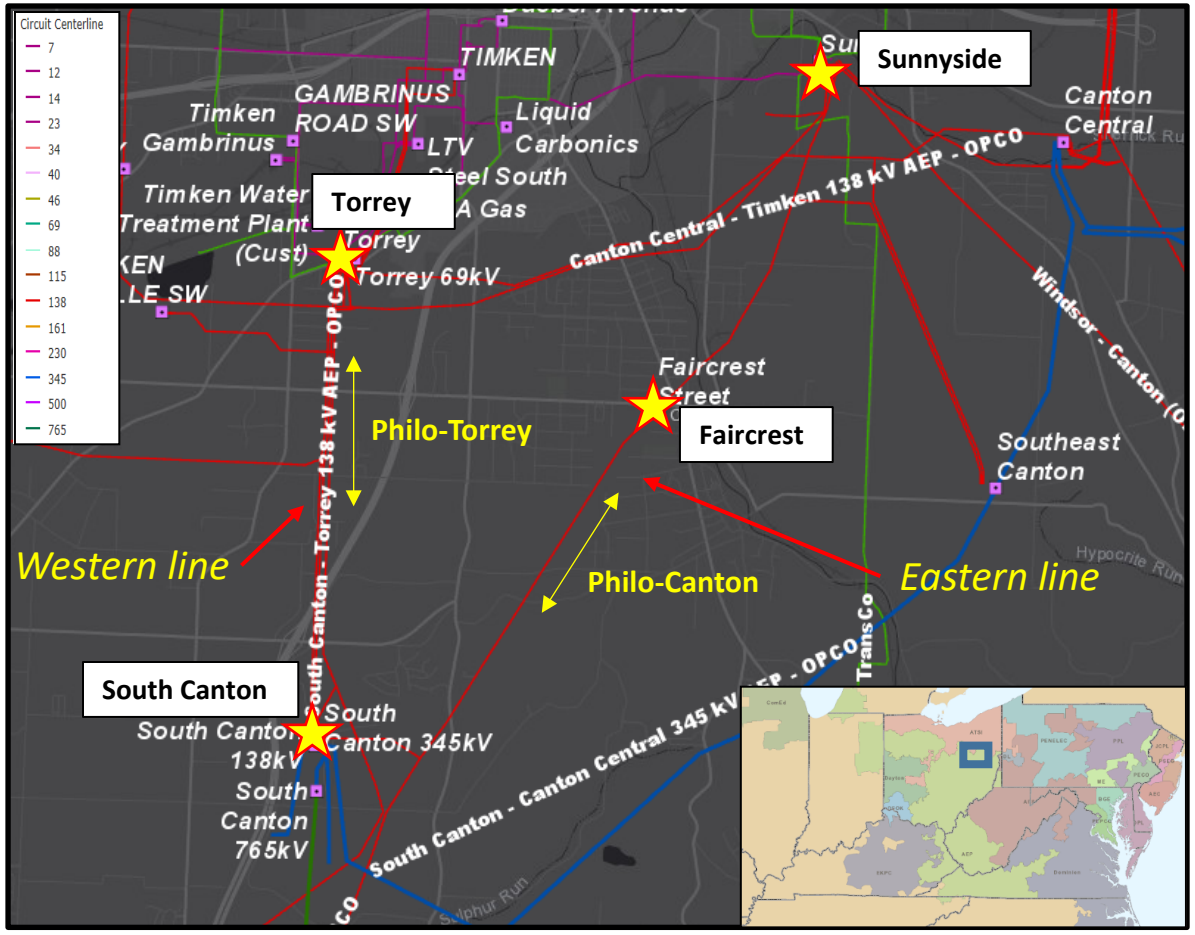
Equipment Material Condition, Performance and Risk; Operational Flexibility & Efficiency

Specific Assumption Reference:

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

Problem Statement:

- The South Canton - Sunnyside eastern 138kV transmission line is 5.5 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 South Canton and Sunnyside stations.
- Insulator assemblies are showing corrosion and deterioration, which could lead to additional failures and safety concerns.
- This line has experienced 3 momentary outages and 1 sustained outages over the past 10 years (2008/2018).



AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2020-OH052

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

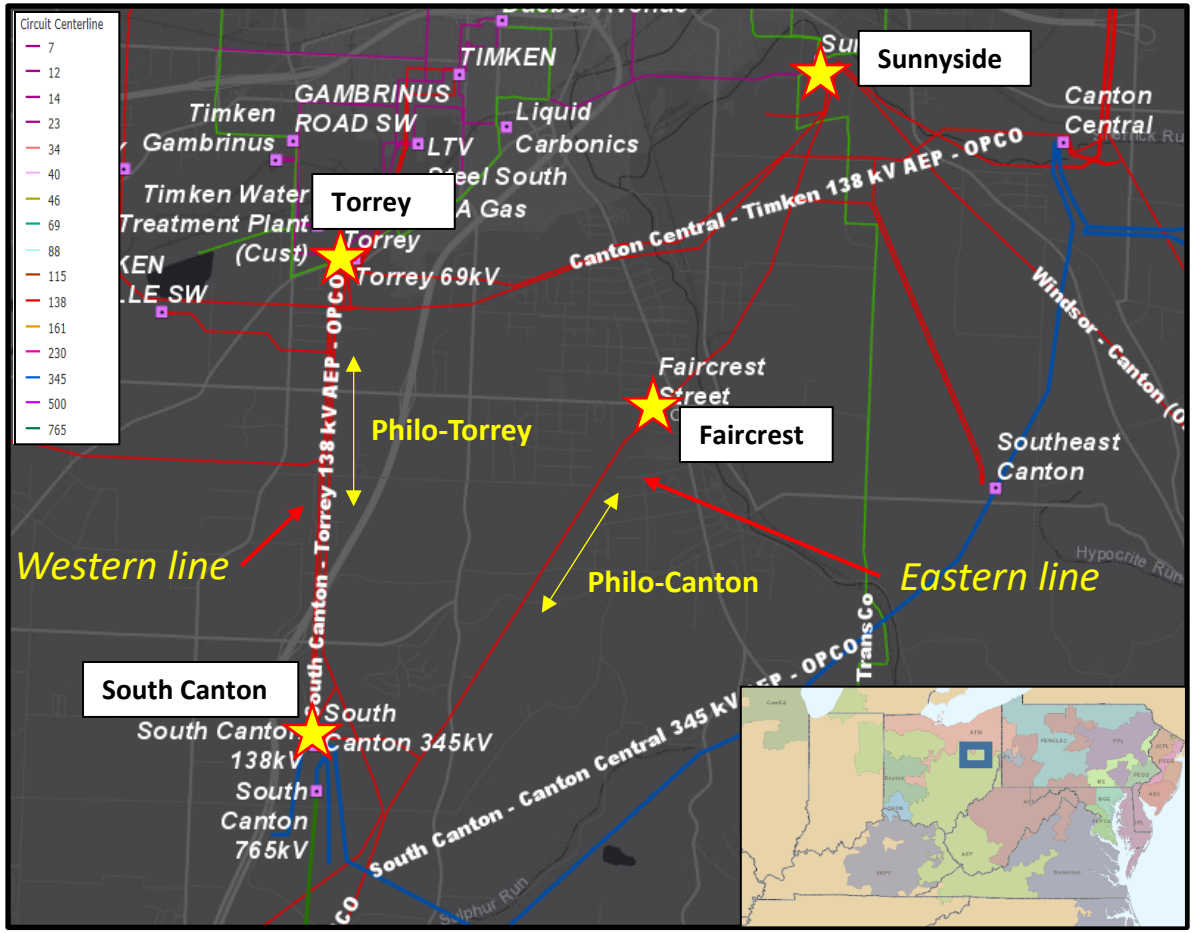
Previously Presented:

Solution Meeting 10/15/2021

Need Meeting 3/19/2020

Problem Statement, continued:

- The South Canton-Torrey western 138kV transmission line is 3.5 miles long and consists of portions of the following circuits: 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 2- 138kV line switches at Faircrest station (part of S.Canton-SE Canton circuit) are barely functional, difficult to open/close, and date to 1971.
- The protection equipment on the Southeast Canton-Sunnyside 138kV circuit consists of legacy electromechanical relays and pilot wire communications channel. Electromechanical relays lack vendor support, don't have SCADA, and lack fault data collection capabilities. Aging pilot wire is increasingly prone to failure and increased maintenance, leading to risk of having to rely on backup protection methods.



AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2020-OH052

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

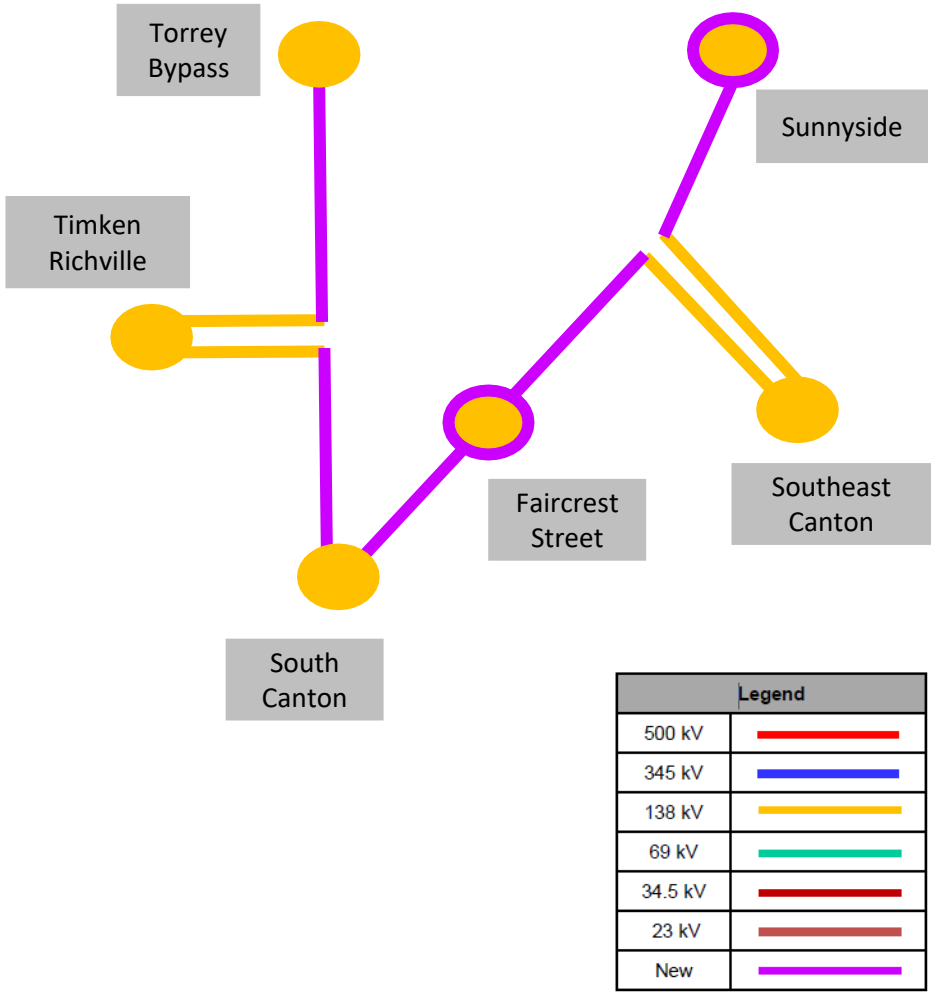
- Rebuild the Philo-Torrey 138kV transmission line between South Canton and Torrey (3.5 miles). The circuits affected are South Canton-Timken Richville and Timken Richville-Timken 138kV. **Estimated Cost: $7.64M (s2651.1)**
- Rebuild the Philo-Canton 138kV transmission line between South Canton and Sunnyside (5.5 miles). The circuits affected are South Canton-Southeast Canton and Southeast Canton-Sunnyside 138kV. **Estimated Cost: $14.22M (s2651.2)**
- Replace the 138kV switches at Faircrest Street station to accommodate the new line structures. **Estimated Cost: $0.12 M (s2651.3)**
- At Sunnyside, upgrade the relays on the 138kV circuit to Southeast Canton. The control building needs expanded to accommodate the new relay panels. **Estimated Cost: $0.73 M (s2651.4)**

Total Estimated Transmission Cost: $22.71 Million

Projected In-Service: 11/01/2025

Supplemental Project ID: s2651.1-.4

Project Status: Scoping



Need Number: AEP-2021-OH010

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solutions Meeting 10/15/2021
Needs Meeting 03/19/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

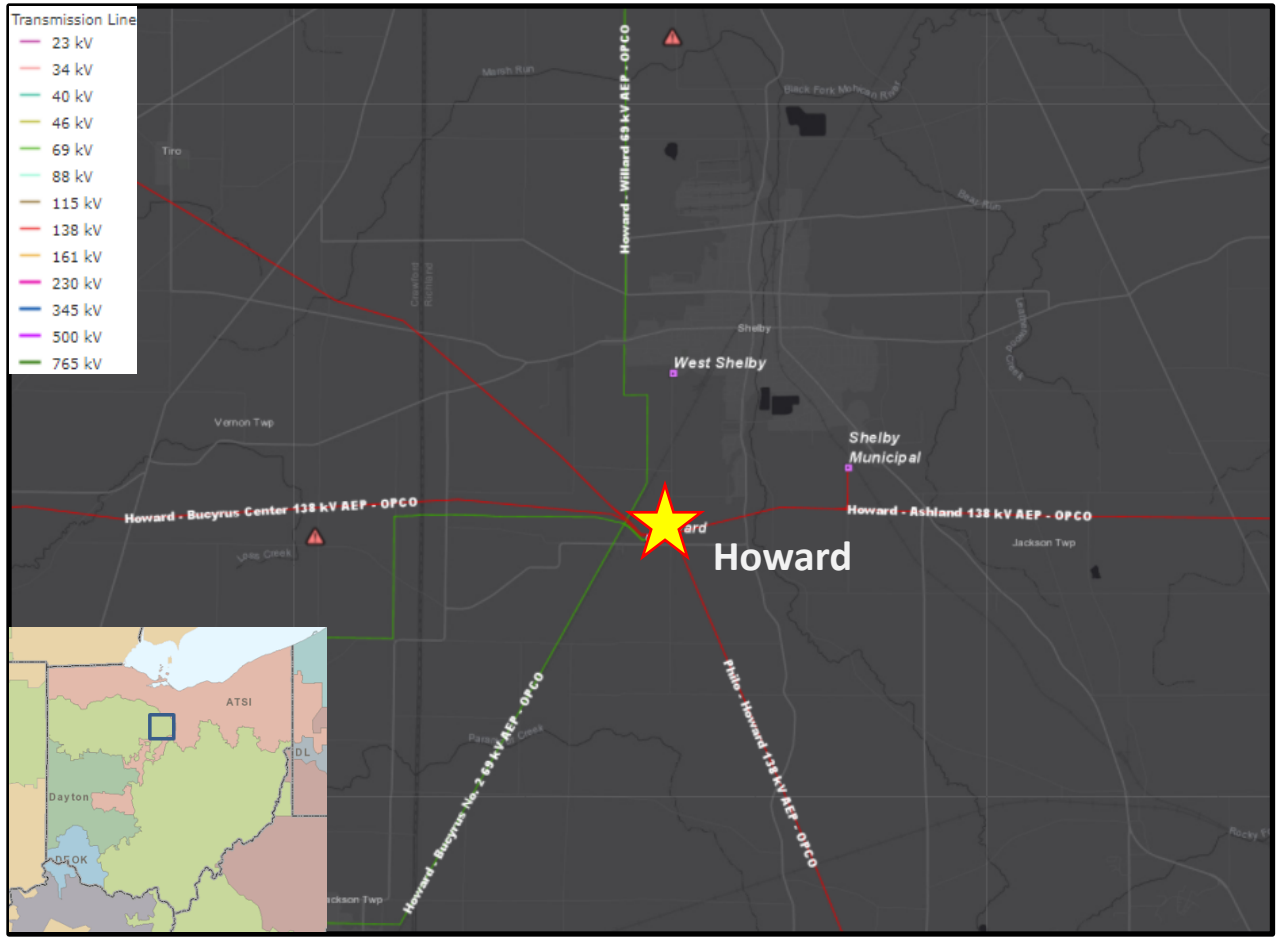
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 11)

Problem Statement:

Circuit Breaker: 69 kV breaker K

- Breaker Age:
  - 1959
- Interrupting Medium: (Oil)
- Fault Operations:
  - Number of Fault Operations: 27
  - Manufacturer recommended Number of Operations: 10

Additional Oil Filled Breaker Information: 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.



Need Number: AEP-2021-OH010

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

- Install a new 69kV 3000A 40kA breaker to replace breaker K at Howard station. **$1.1 M (S2652)**

Cost estimate: $1.1 M

Ancillary Benefits:

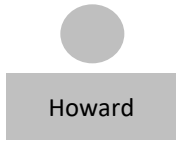
Accelerating the replacement of this breaker allows the work to be better coordinated with the baseline rebuild of the Howard-Willard line under b3310. The rest of the needs identified under AEP-2021-OH037 will be presented separately.

Projected In-Service: 5/1/2025

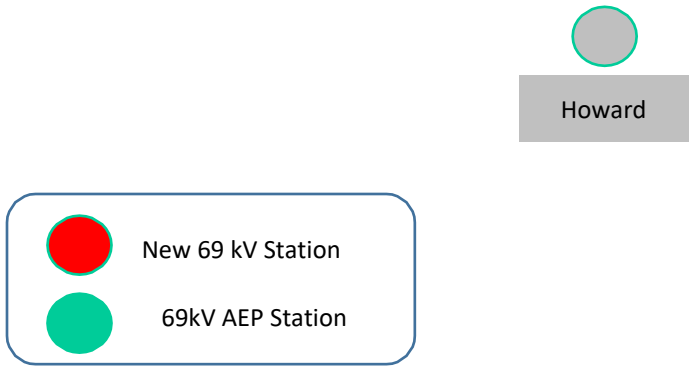
Supplemental Project ID: s2652

Project Status: Engineering

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Franklin County, OH

Need Number: AEP-2021-OH014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solutions Meeting 10-15-2021
Needs Meeting 3/19/2021

Project Driver:

Customer Service

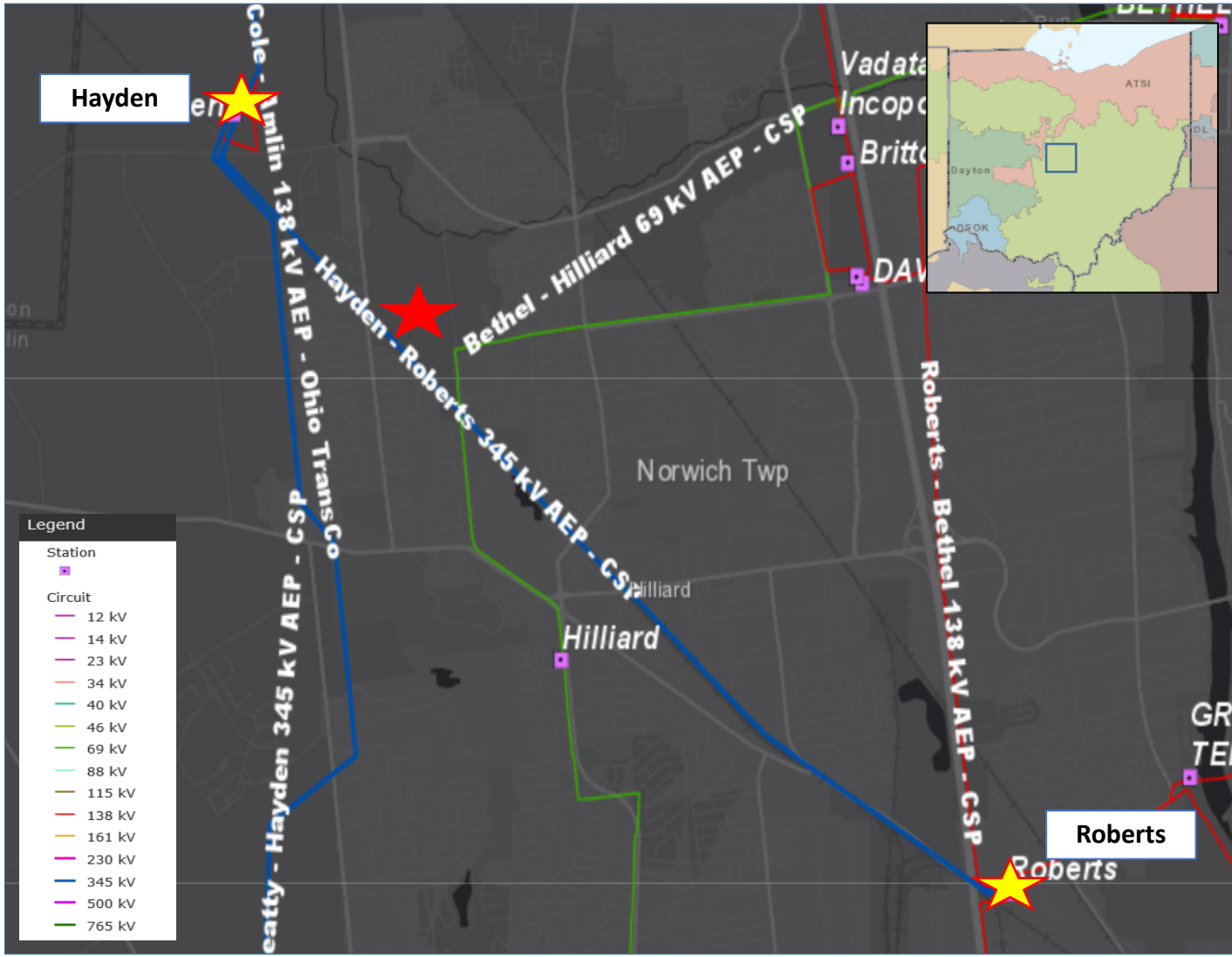
Specific Assumption Reference:

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

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site just southeast of AEP's existing Hayden station in Hilliard, OH.
- The customer has indicated an initial peak demand of 64 MW with an ultimate capacity of up to 256 MW at the site.



AEP Transmission Zone M-3 Process
Franklin County, OH

Need Number: AEP-2021-OH014

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

- **Cosgray 345 kV Station:** Greenfield 345 kV ring bus station laid out as a six breaker ring bus for future expansion that includes four (4) 345 kV 63 kA breakers initially. 345kV revenue metering equipment will be installed. **Estimated Cost: $16M (s2653.1)**
- **Hayden-Roberts #2 Tap & Extension:** Cut into the Hayden–Roberts No. 1 345 kV circuit with 2 dead end monopoles that will then tie directly in to the new Cosgray Station. Fiber extension & termination into new Cosgray Station. Remote end relay settings updates. **Estimated Cost: $1.87M (s2653.2)**
- **Cosgray-Customer Tie Line 1 & 2:** Install tie lines between Cosgray and the customer's Station. **Estimated Cost: $0.15M (s2653.3)**

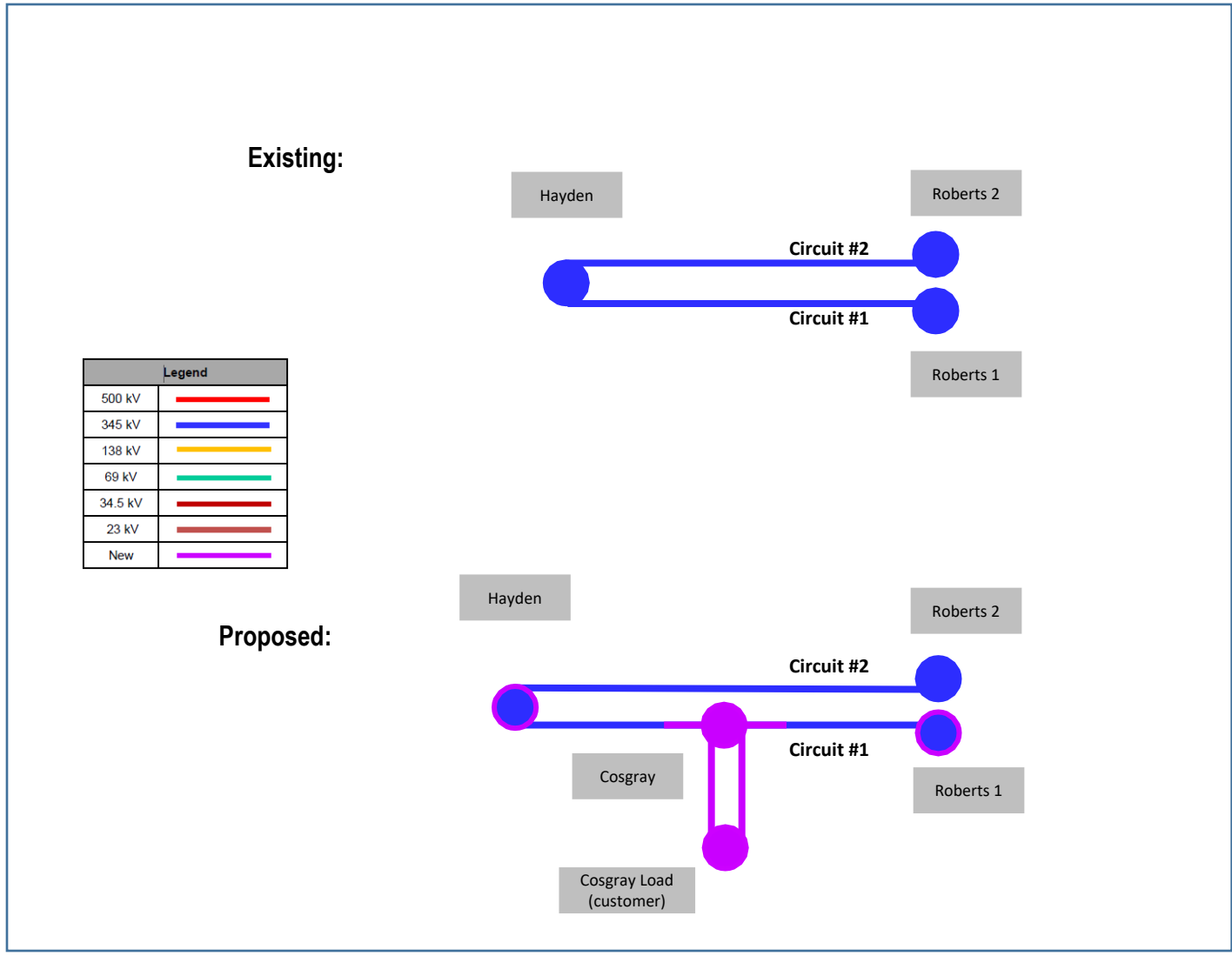
Total Estimated Transmission Cost: $18.02M

Projected In-Service: 5/1/2023

Supplemental Project ID: s2653.1-.3

Project Status: Scoping

Model: RTEP 2026



Need Number: AEP-2021-IM001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solution Meeting 10/15/2021
Needs Meeting 02/17/2021

Project Driver: Equipment Material Condition, Performance and Risk

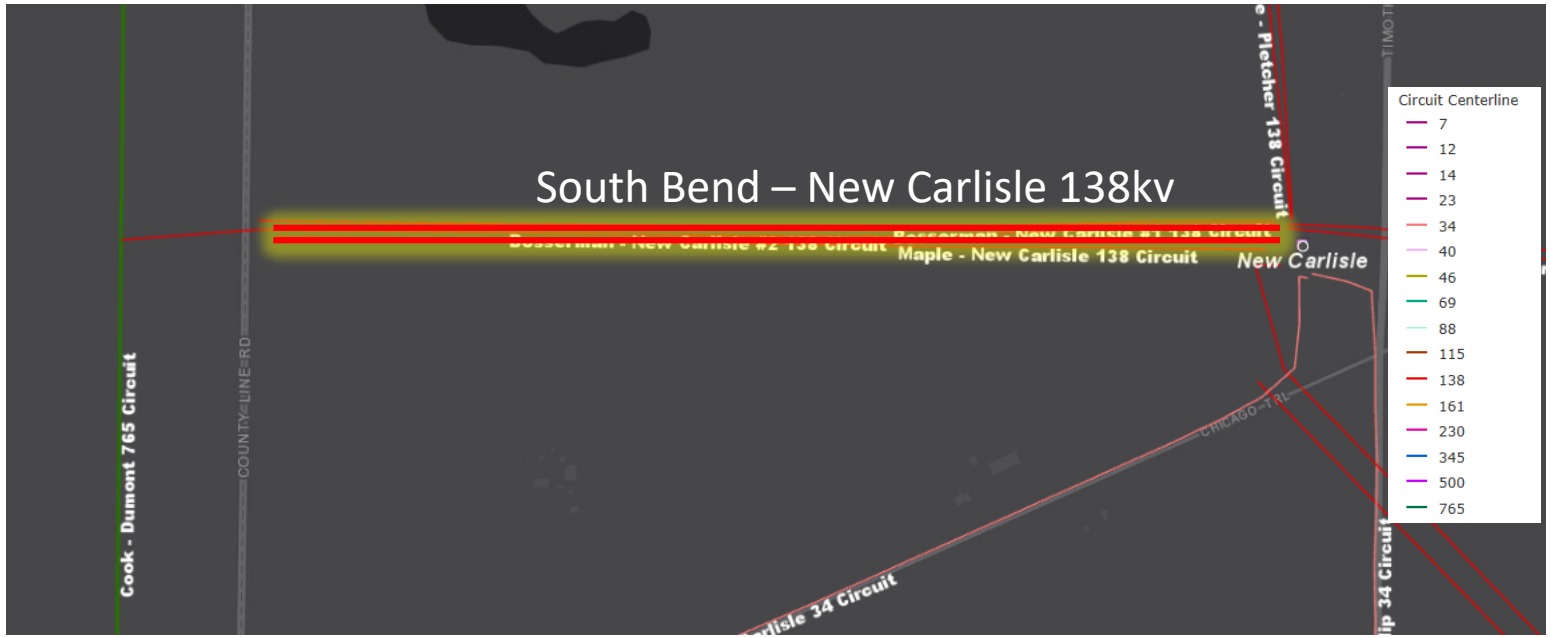
Specific Assumption Reference:

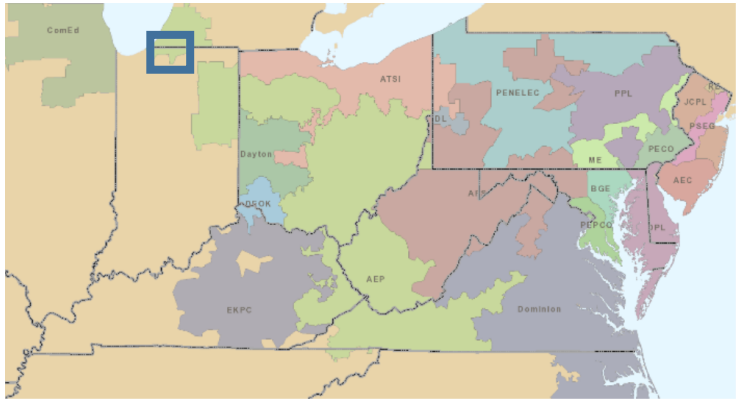
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13), AEP presentation on pre-1930s lines (link)

Problem Statement:

South Bend – New Carlisle 138kV line:

- 0.88 miles of double circuit 1930 steel lattice line
- Original 397 MCM ACSR and steel structures are still on the line
- There is one structure with open conditions (20% of line) relating to worn shield wire hardware
- Circuit 1 has had 3 momentary outages and 3 permanent outages since 2015.
- Circuit 2 had 1 permanent outage since 2015
- Circuit is a tie with NIPSCO





AEP Transmission Zone M-3 Process
New Carlisle 138 kV line rebuilds

Need Number: AEP-2021-IM002

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solution Meeting 10/15/2021
Needs Meeting 02/17/2021

Project Driver: Equipment Material Condition, Performance and Risk

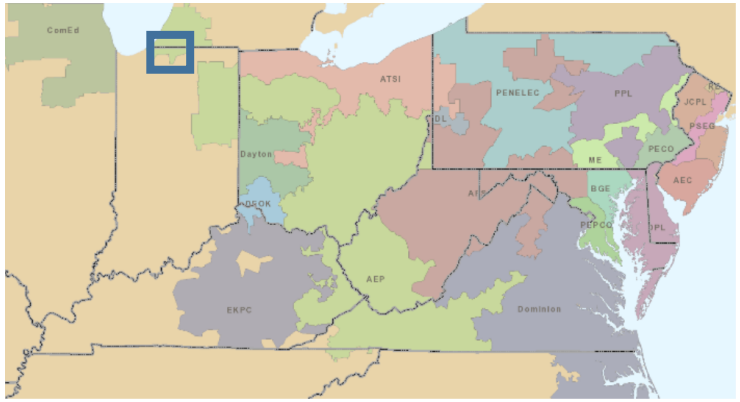
Specific Assumption Reference:

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

Problem Statement:

New Carlisle - Maple 138kV line:

- 0.86 miles of 1952 wood pole H frame line
- Utilizes original structures and 397 ACSR from 1952
- 5 structures have open conditions (63% of line) relating to pole rot, split or rot crossarms, broken ground lead wire, rusty guy wires, and cracked static bracket
- 2 momentary outages over the past 5 years
- Circuit is an interconnection with NIPSCO and MISO



AEP Transmission Zone M-3 Process
New Carlisle 138 kV line rebuilds

Need Number: AEP-2021-IM001 and AEP-2021-IM002

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

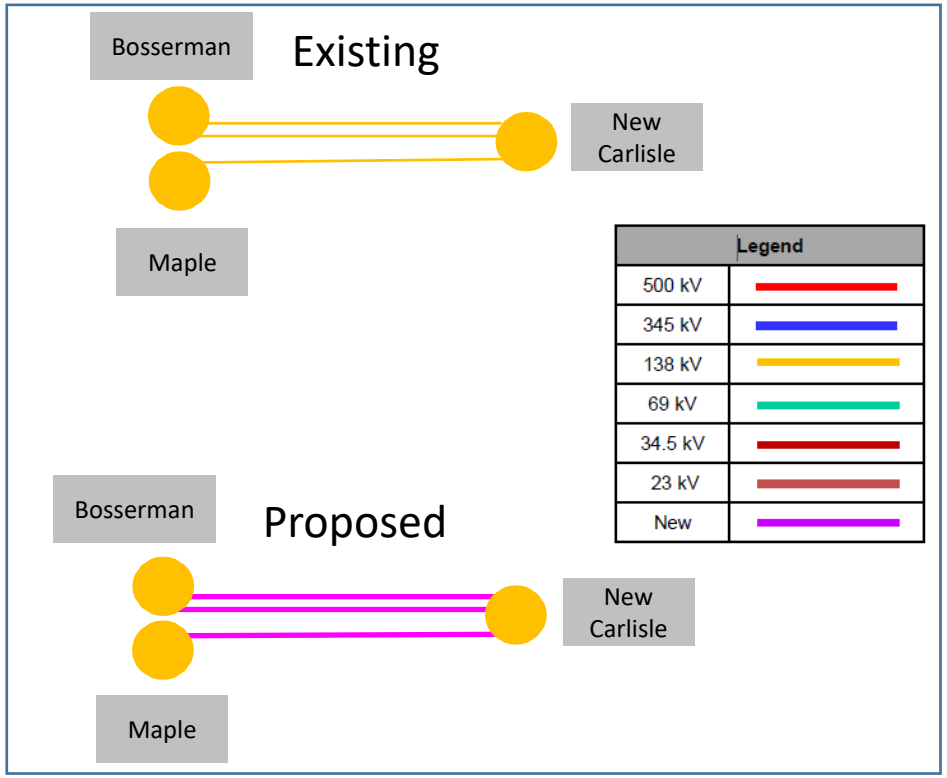
- New Carlisle - Maple 138 kV: Rebuild ~0.95 miles of 138 kV single circuit line with 1590 ACSR 45/7 Lapwing to match the NIPSCO owned conductor size. **Estimated Cost: $1.76M (s2654.1)**
- New Carlisle - Bosserman 138 kV: Rebuild ~0.95 miles of 138 kV double circuit line with 1590 ACSR 45/7 Lapwing to match the NIPSCO owned conductor size and transition fiber installation for NIPSCO connectivity. **Estimated Cost: $ 1.86M (s2654.2)**
- New Carlisle – South Bend 138 kV: Remove ~0.86 mile of the existing 138 kV line. **Estimated Cost: $0.17M (s2654.3)**
- Bosserman 138 kV Station: Relay settings changes. **Estimated Cost: $0.08M (s2654.4)**
- New Carlisle 138 kV station: Remote end relaying upgrades and settings changes. **Estimated Cost: $0.82M (s2654.5)**

Total Estimated Transmission Cost: $4.69 M

Proposed In Service Date: 10/28/2024

Supplemental Project ID: s2654.1-.5

Status: Scoping



AEP Transmission Zone: Supplemental Lincoln Extension Retirement

Need Number: AEP-2021-IM010

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

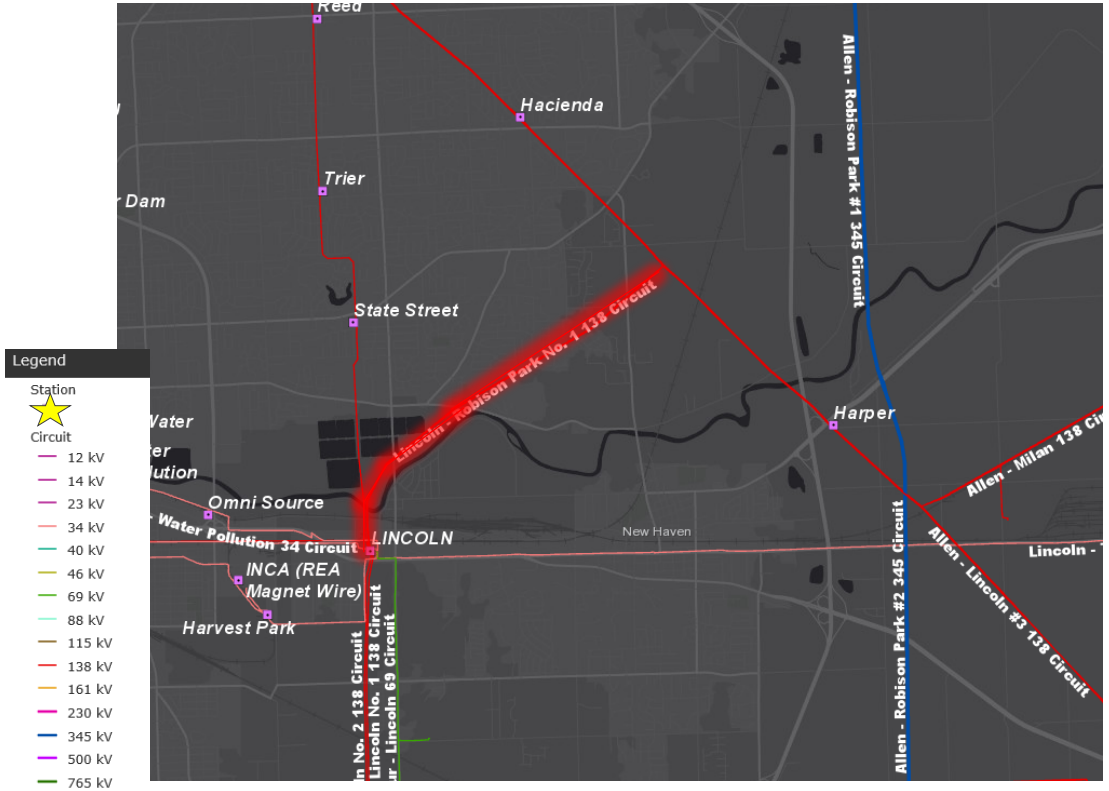
Previously Presented:
Solution Meeting 10/15/2021
Needs Meeting 04/16/2021

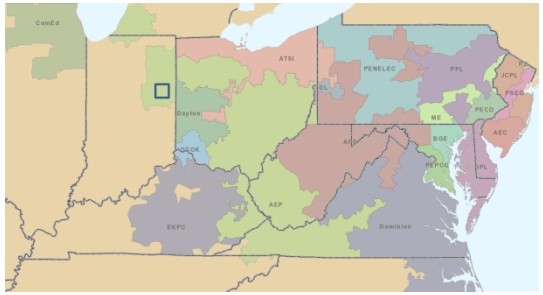
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

- **Lincoln Tap 138kV ~3.65 Miles**
  - Steel lattice double circuit 397 ACSR construction with all 20 structures original from 1947
  - 9 open hardware conditions on 7/20 structures
    - Insulator equipment and hooks with moderate wear
    - 50% of the towers had flashed insulator strings
    - Corrosion on insulator caps & pins





AEP Transmission Zone: Supplemental Lincoln Extension Retirement

Need Number: AEP-2021-IM011

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

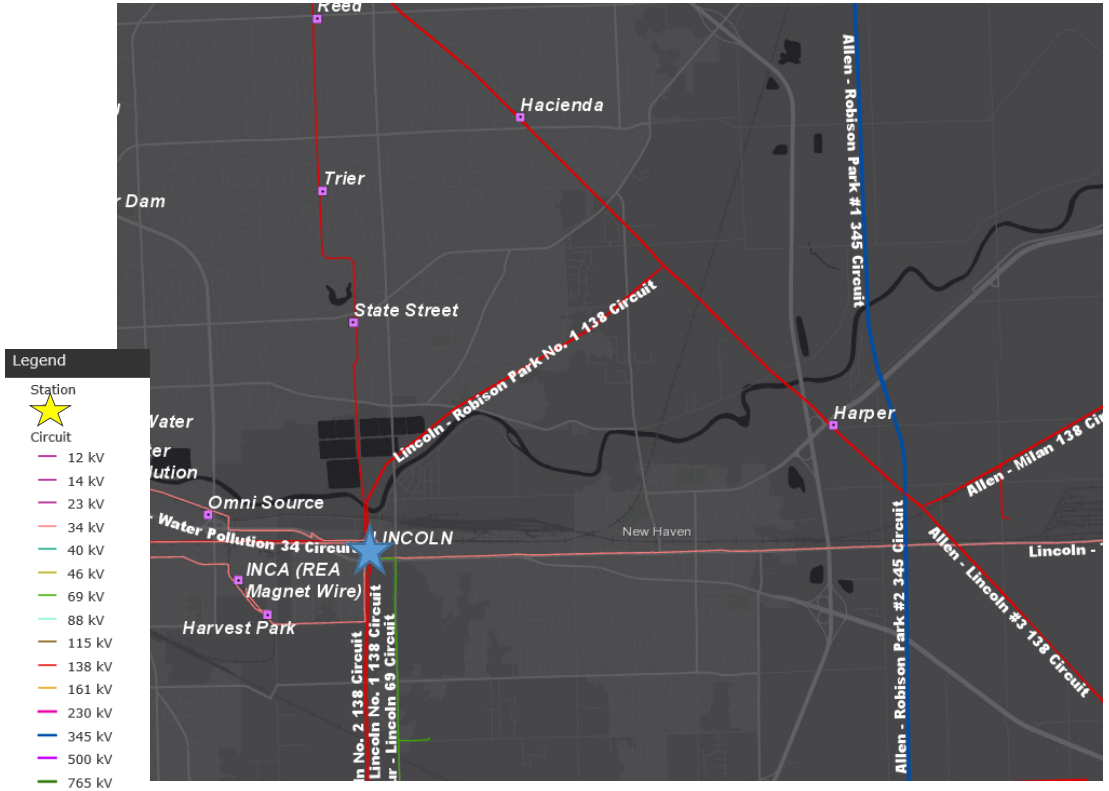
Previously Presented:
Solution Meeting 10/15/2021
Needs Meeting 04/16/2021

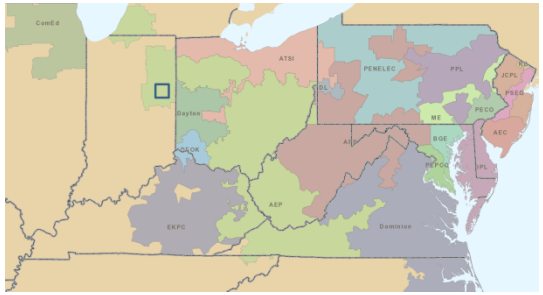
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

- **Lincoln 138/69/34.5kV**
- CB "B", "C" and "I" are 1995, 1988 and 1987 vintage 145-PA type breakers
  - The 145-PA Type Breakers are experiencing marked increases in malfunctions. There have been 437 recorded malfunctions on 132 total units of this model type on the AEP System. The most common issues are related to loss of SF6 gas and mis-operations. The expected life of the bushing gaskets and door inspection port seals is 25 years; all three of these units have reached this age. Seals that are no longer adequate can cause SF6 leaks to become more frequent. Low SF6 pressure in the breaker reduces the ability of the breaker to correctly interrupt a fault. Additionally, low pressure alarms and SF6 leaks lead to increased maintenance costs. The manufacturer provides no support or parts for this model of circuit breakers. Finally, SF6 leaks impact the environment.
  - CB "B" has experienced 37 fault operations





AEP Transmission Zone: Supplemental Lincoln Extension Retirement

Need Number: AEP-2021-IM010, AEP-2021-IM011

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

Retire the ~3.65 mile 138kV Lincoln extension and reconnect the existing line between Robison Park and Allen. The extension can be retired due to previous upgrades strengthening the underlying sub-transmission system through connections to other sources and a rebuild of the existing Robison Park-Allen and Lincoln-Robison Park lines which increased the 138 kV capacity. This extension does not impact the larger 138 kV network as Lincoln station will keep three 138 kV sources to serve the Fort Wayne area.

Cost: $2.8M (s2655.1)

At Lincoln station, retire 138kV CB "B" and "C", Replace 138kV CB "I" and relocate 138kV CB "A" to the old CB "C" position.

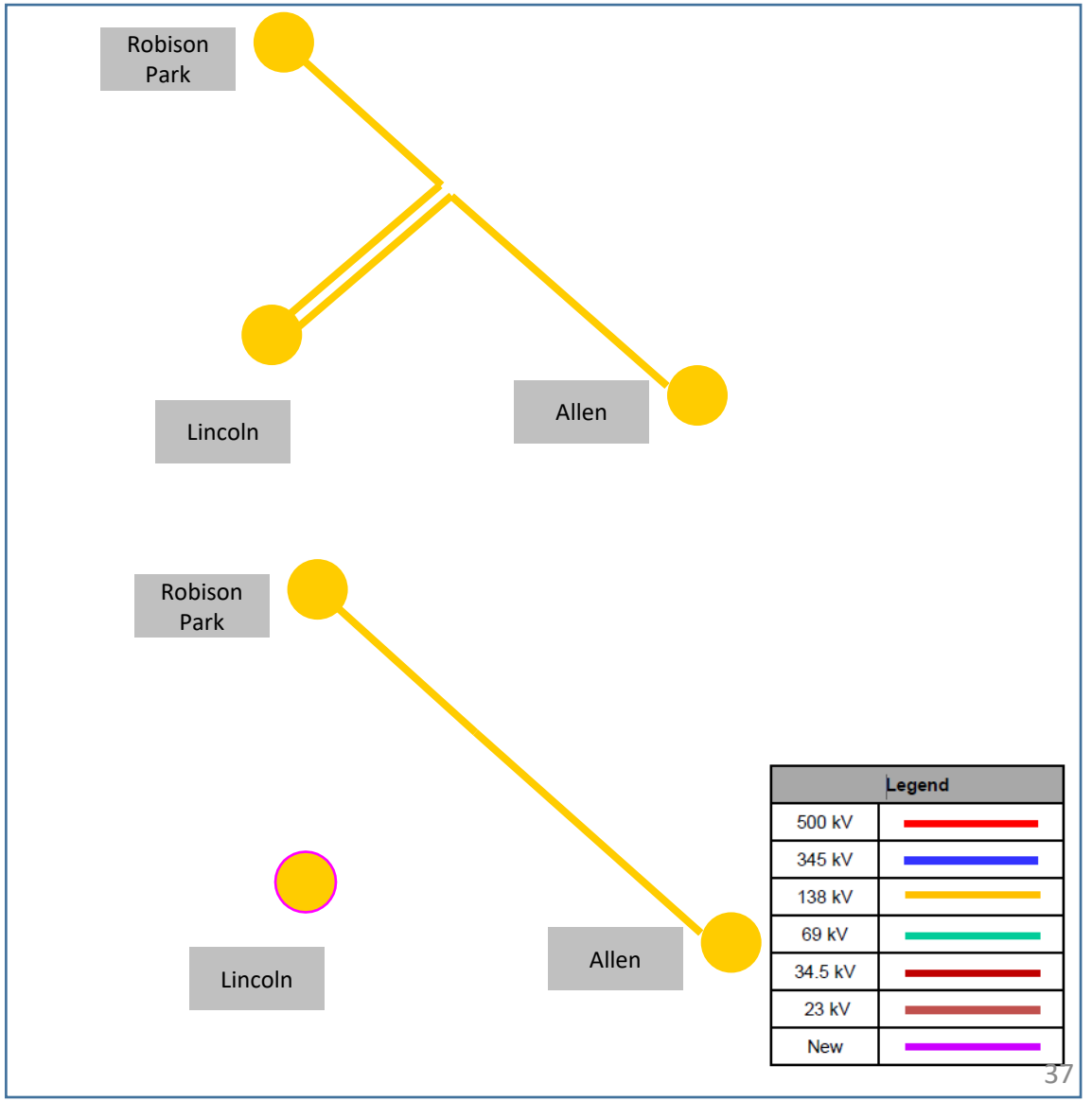
Cost: $2M (s2655.2)

Total Estimated Transmission Cost: $4.8M

Projected In-Service: 3/25/2025

Supplemental Project ID: s2655.1-.2

Project Status: Scoping



AEP Transmission Zone M-3 Process
Colony Bay – Illinois Rd 69kV

Need Number: AEP-2021-IM020

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solution Meeting 10/15/2021
Needs Meeting 07/16/2021

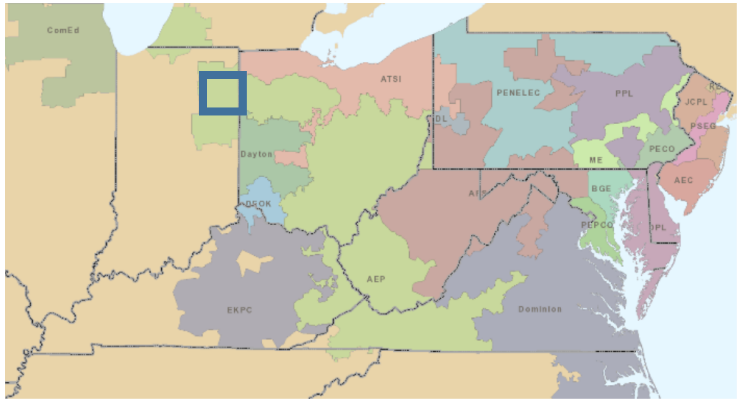
Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Colony Bay – Illinois Rd 69kV line (6.92 miles):

- 71 of the 189 poles are original 1969 wood poles.
- 6.33 miles of line is original 1969 556.5 AL conductor
- Since 2015 there have been 6 momentary outages
- Structures fail NESC Grade B, AEP Strength requirements and ASCE structural strength standards
- 14 of 36 structures assessed had issues such as ground line decay, insect/bird, shell damage
- 30% of structures on this line were identified as having beyond normal levels of decay.



AEP Transmission Zone: Supplemental
Colony Bay – Illinois Rd 69kV

Need Number: AEP-2021-IM020

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

On the Colony Bay – Illinois Rd 69kV line, rebuild approximately 2.7 miles and re-conductor approximately 3.6 miles with 556.5 ACSR. The 3.6 miles to be reconductored has newer structures that do not need replaced due to various INDOT and Fort Wayne road widening projects that have replaced structures more recently but kept the original conductor in place.
Estimated Cost: $10.7M (s2656.1)

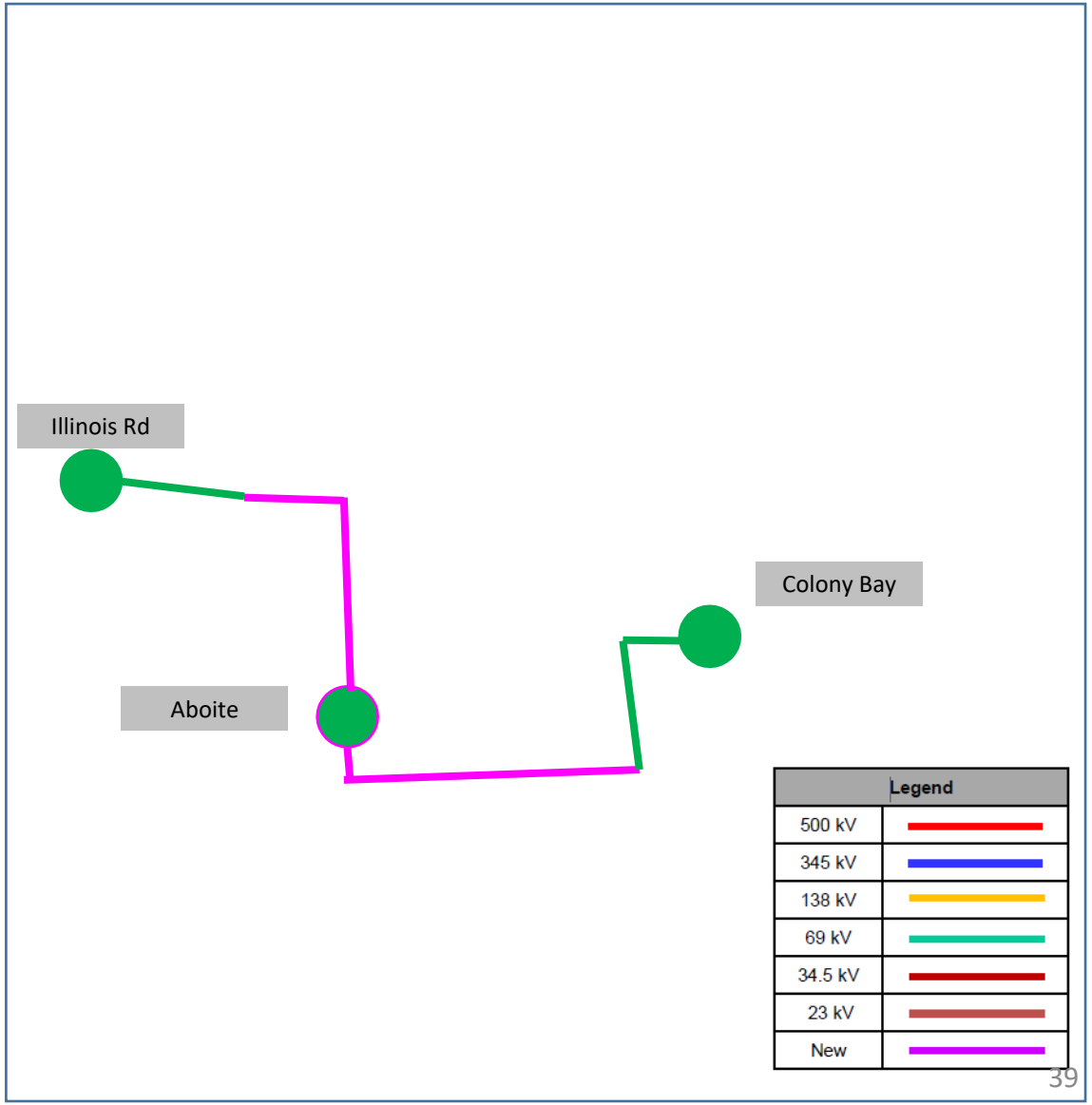
Aboite 69kV Switch:
Replace Aboite 69kV Switch due to the line structure replacements.
Estimated Cost: $0.8M (s2656.2)

Total Cost: $11.5M

Projected In-Service: 10/01/2025

Supplemental Project ID: s2656.1-.2

Project Status: Scoping



Need Number: AEP-2019-IM010
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solutions Meeting 10/15/2021
Needs Meeting 04/23/19

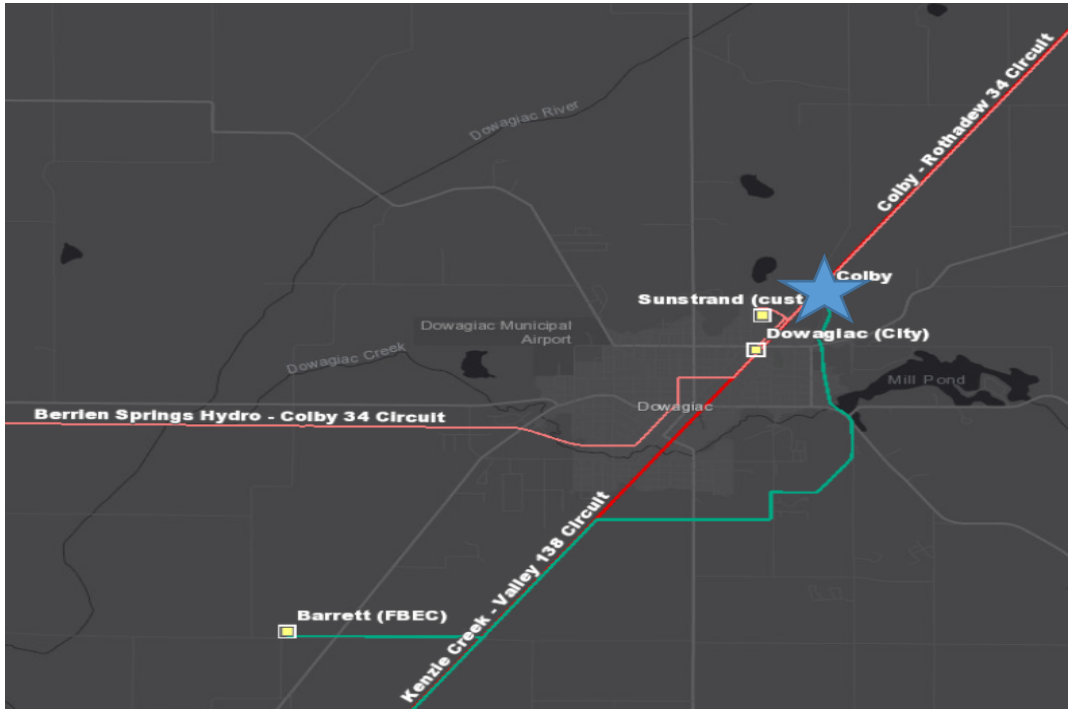
Supplemental Project Driver: Equipment Condition/Performance & Operational Flexibility

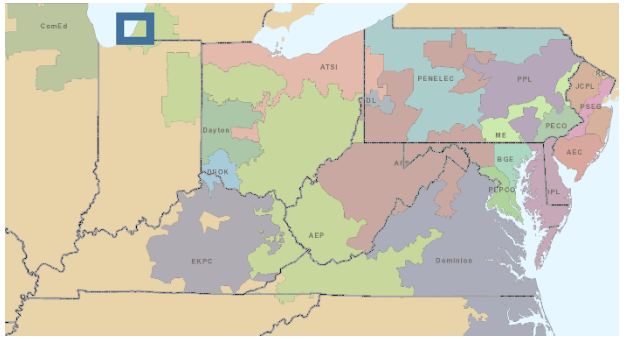
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Colby Station -

- Breakers A, B, C, D, and E
  - 1963-1968 vintage oil breakers
  - CB Fault operations: CB A(38), C(67), D(86), E(12) – Recommended(10)
  - Breaker B control cabinet has documented corrosion concerns
  - Since 2017 breaker D's operation counter hasn't functioned
- Currently contains a 3-terminal line within the station.





AEP Transmission Zone M-3 Process
Colby Area Improvements

Need Number: AEP-2020-IM001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solutions Meeting 10/15/2021
Needs Meeting 02/21/2020

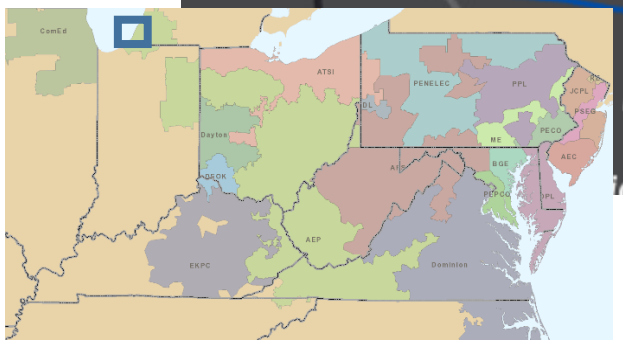
Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Berrien Springs-Colby 69kV line

- 15.72 miles of wood pole structures with horizontal insulators rebuilt in 1995
- 148 structures with at least one open condition, 31% of the structures on the line
  - Open conditions include insect or woodpecker damage, broken or stolen ground wire conditions, and broken or burnt insulators. The damage caused by the insects and woodpecker activity have decimated poles in this area.
- Outages: 2 permanent since 2015
- CMI: 297,132



AEP Transmission Zone: Supplemental Colby Area Improvements

Need Number: AEP-2021-IM030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

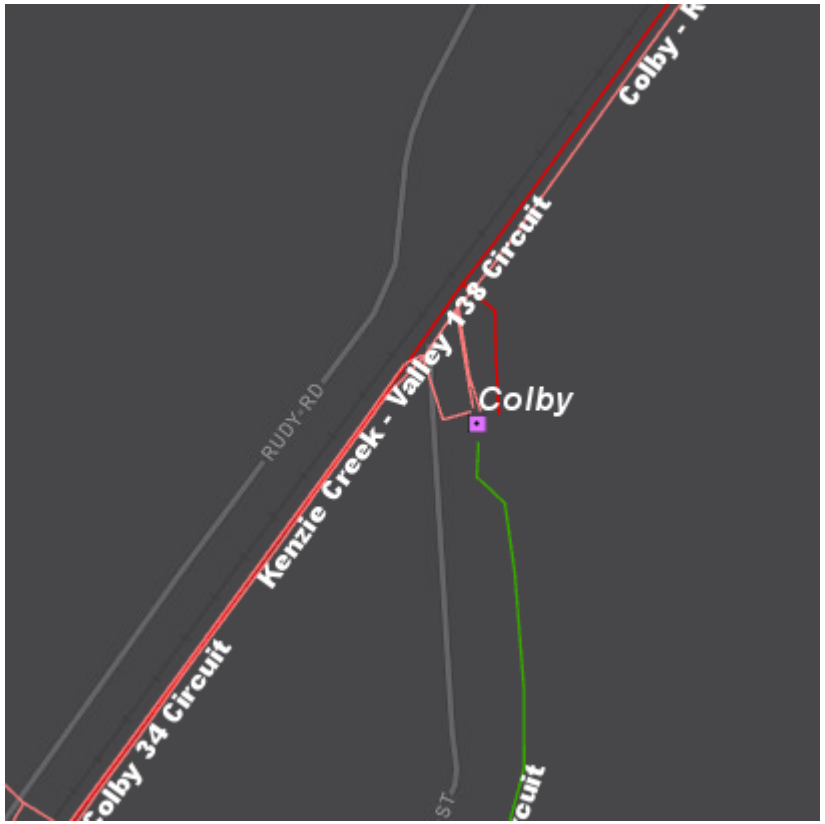
Previously Presented:
Solutions Meeting 10/15/2021
Needs Meeting 09/17/2021

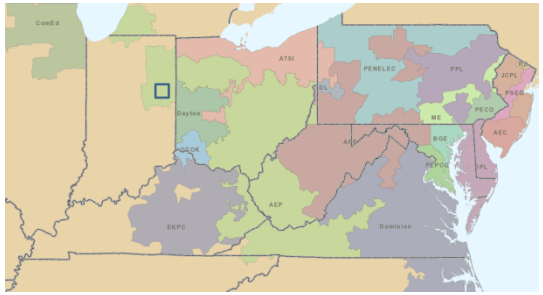
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

- **Colby 138/69/34.5kV**
  - 69/34.5kV XFR 1
    - 1965 Vintage unit
    - DGA indicates elevated levels of CO2 gas concentration
    - Decomposition in paper insulating materials
    - Wood tie foundations
    - No oil containment
  - 138/12kV XFR 2
    - 1970 Vintage LTC unit
    - DGA shows Ethylene levels exceeding Acetylene which indicates deteriorating internal components
    - Dielectric data indicates this LTC is at greater risk of failure.
    - Increase of Power factor indicates an increase of particles in the oil
    - Wood tie foundation
  - 138kV Bus structures are corroding
  - 34.5kV bus structures are corroding.





AEP Transmission Zone: Supplemental Colby Area Improvements

Need Number: AEP-2020-IM001, AEP-2021-IM030 & AEP-2019-IM010

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

Blossom Trail – Colby 34.5kV : Retire the ~10.2 miles of 34.5kV line between Blossom Trail – Dowagiac Tap.

Estimated Cost: $3.0M (s2657.1)

Rudy Tap 34.5kV : Replace the failed Rudy Tap Switch.

Estimated Cost: $0.7M (s2657.2)

Colby North Ext 138kV : Reterminate the Valley 138kV line into Colby with a .1 mile new extension.

Estimated Cost: $1.1M (s2657.3)

Colby South Ext 138kV : Reterminate the Kenzie Creek 138kV line into Colby with a .25 mile new extension.

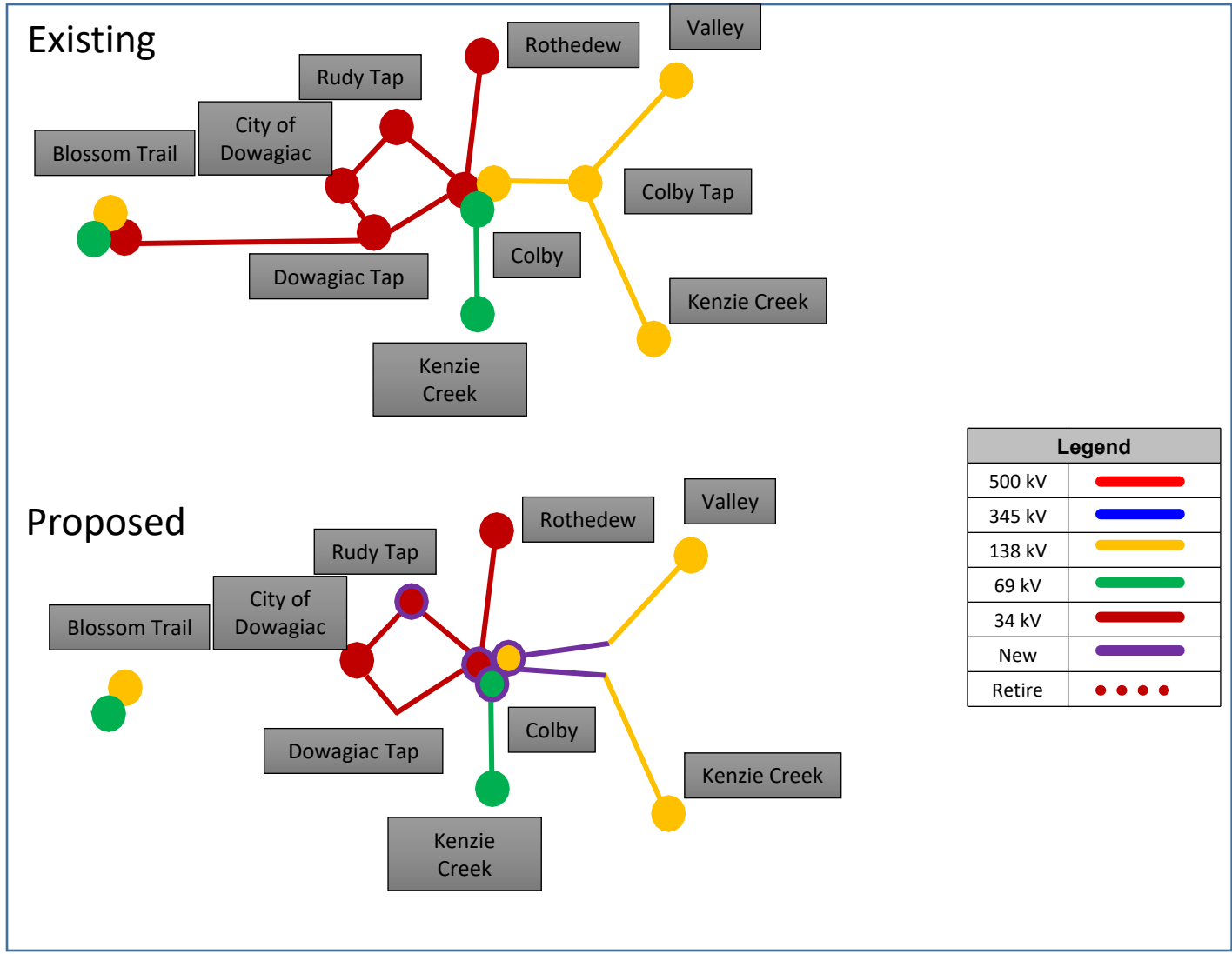
Estimated Cost: $1.5M (s2657.4)

Colby – Rothedew 34.5kV line : Reterminate the Rothedew 34.5kV line into Colby.

Estimated Cost: $0.3M (s2657.5)

Colby - Dowagiac 34.5kV : Reterminate the Dowagiac 34.5kV feed back into Colby station.

Estimated Cost: $1M (s2657.6)



AEP Transmission Zone: Supplemental Colby Area Improvements

Need Number: AEP-2020-IM001, AEP-2021-IM030 & AEP-2019-IM010

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

Colby – Rudy Tap 34.5kV : Reterminate the Rudy Tap 34.5kV feed back into Colby station.

Estimated Cost: $1M (s2657.7)

Colby – Kenzie Creek 69kV : Reterminate the Kenzie Creek 69kV feed back into Colby station.

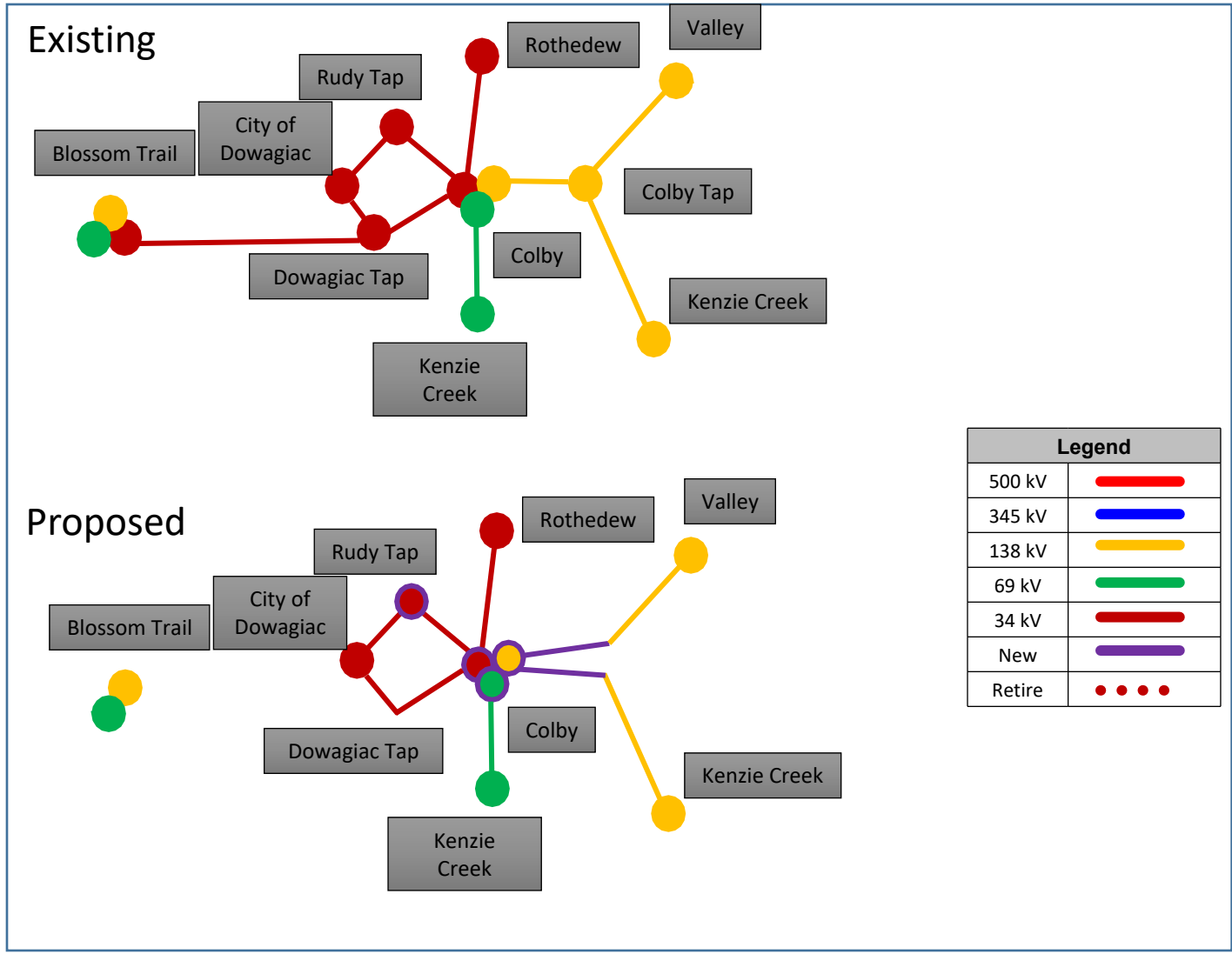
Estimated Cost: $0.7M (s2657.8)

Colby 138kV Switch: Retire the Colby 138kV Switch.

Estimated Cost: $0.2M (s2657.9)

Colby 138/69/34.5kV: On the existing property, build a new 138kV yard with 4 CB's built in a ring configuration. Install a new 138/34.5 50MVA XFR with a low side CB protecting the single line exit toward Rudy Tap to replace the source previously served by the retired line to Blossom Trail. Install 3 34.5kV CB's on a new 34.5kV bus that will be connected to the existing 138/69/34.5kV XFR, and the Rothedew and Dowagiac exits. Install a new 69kV CB toward Kenzie Creek.

Estimated Cost: $11.9M (s2657.10)



AEP Transmission Zone: Supplemental Colby Area Improvements

Need Number: AEP-2020-IM001, AEP-2021-IM030 & AEP-2019-IM010

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Selected Solution:

Blossom Trail 138/69/34.5kV: Remove CB “M” and reuse it at Colby station.

Estimated Cost: $0.2M (s2657.11)

Total Estimated Transmission Cost: $21.6M

Ancillary Benefits:

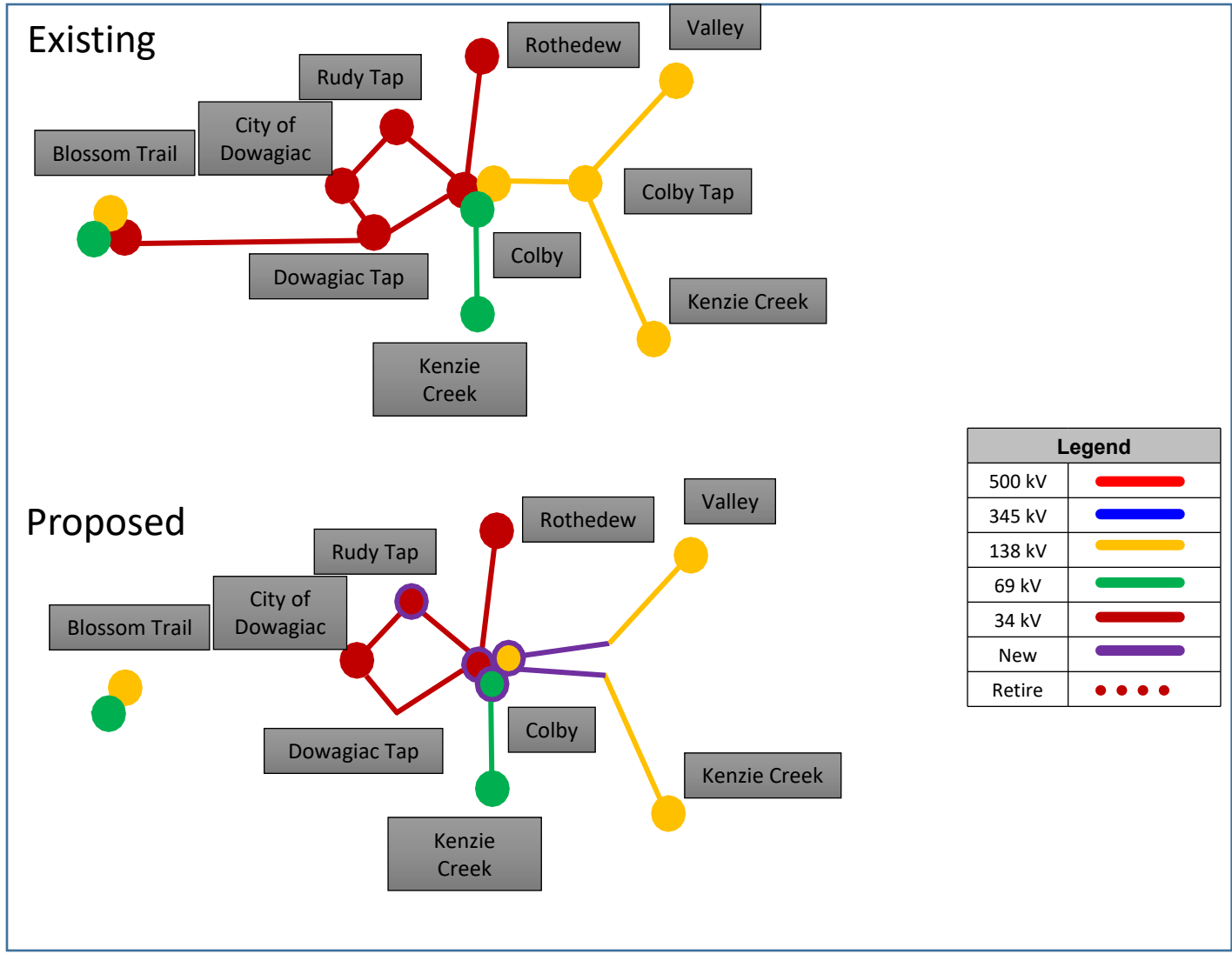
Due to the planned retirement of Eau Claire and Indian Lake 34.5kV substations, installing a 138/34.5kV XFR at Colby will allow AEP to retire the 10.2 mile Blossom Trail – Colby 34.5kV line that has seen significant damage from woodpeckers and insects.

Process Stage: 10/15/2021

Projected In-Service: 6/13/2024

Supplemental Project ID: s2657.1-.11

Project Status: Scoping



AEP Transmission Zone M-3 Process
New Buffalo – Bridgman 69kV Rebuild

Need Number: AEP-2021-IM016

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

Previously Presented:
Solution Meeting 10/15/2021
Needs Meeting 5/21/2021

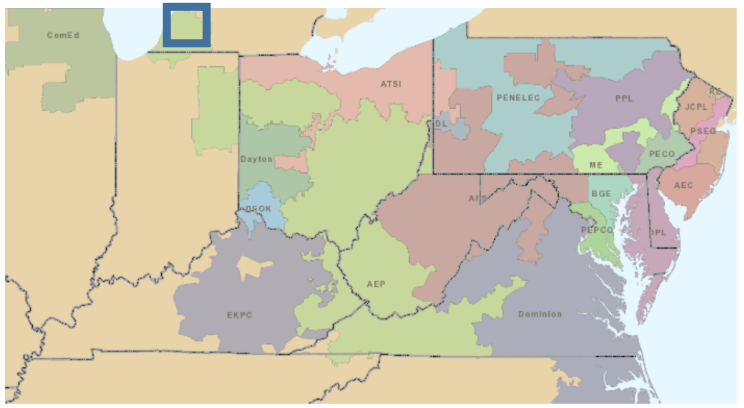
Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

New Buffalo – Bridgman 69kV line:

- 22.1 miles of mostly 1964-68 wood pole
- Conductor is 336.4 ACSR and 4/0 ACSR
- Since 2015 there have been 4 momentary and 6 permanent outages on the Three Oaks – Bridgman circuit.
- Since 2015 there have been 8 momentary and 2 permanent outages on the Three Oaks – Bosserman circuit.
- 4,488,189 CMI from 2015-2020 on the Bosserman – Three Oaks circuit
- Structures fail NESC Grade B, and AEP Strength requirements with portions failing ASCE structural strength standards
- 23 of 53 structures assessed had wood decay such as rot, heavy checking or woodpecker damage.
- All inspected poles show moderate to heavy shell decay



New Buffalo – Bridgman 69kV Rebuild

Need Number: AEP-2021-IM016

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 01/21/2022

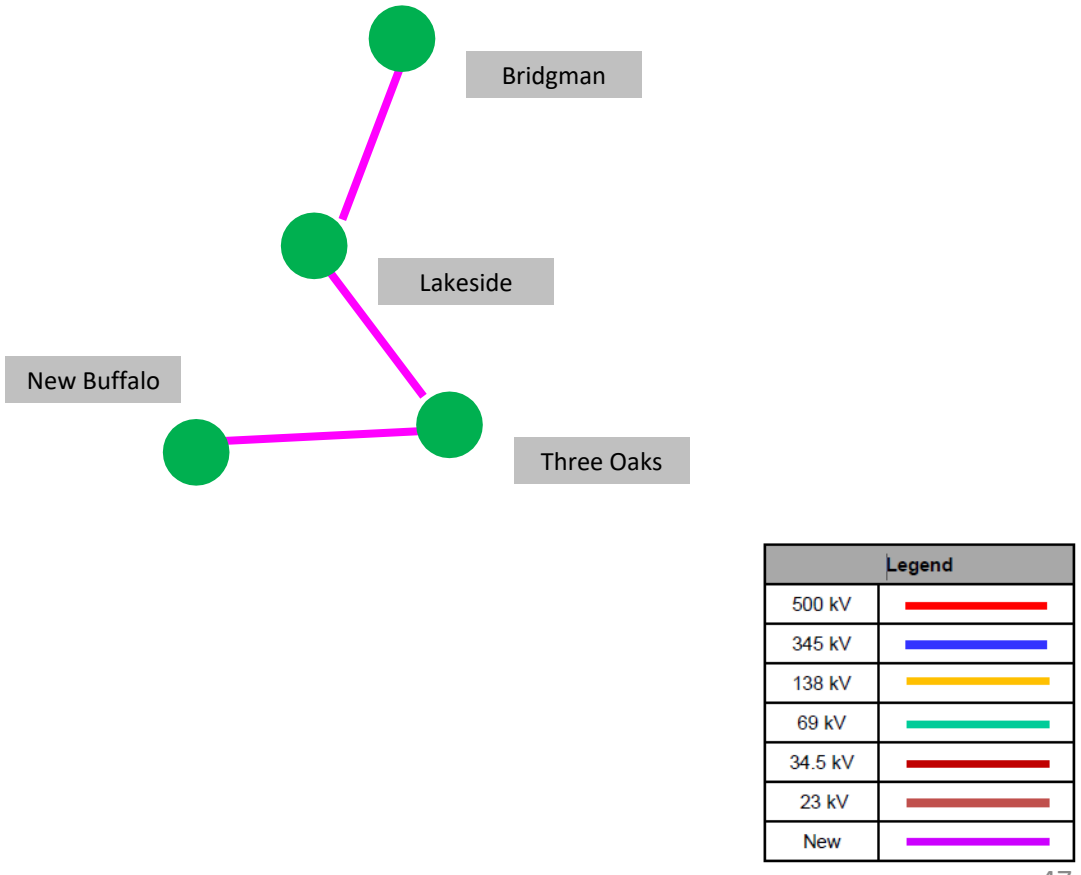
Selected Solution:

New Buffalo – Bridgman 69kV line:
Rebuild the 22.1 mile New Buffalo – Bridgman 69kV line with 556.5 ACSR Dove.
Estimated Cost: $55.5M (s2658)

Projected In-Service: 10/01/2025

Supplemental Project ID: s2658

Project Status: Scoping



AEP Transmission Zone: Supplemental
Roanoke, VA Area

Need Number: AEP-2020-AP036

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 02/15/2022

Previously Presented:
Solutions Meeting 11/19/2021
Needs Meeting 7/17/2020

Supplemental Project Driver: Customer Service

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

Problem Statement:

- Distribution requested a new station (Winston Avenue) located just south of the Hancock-Walnut Avenue 69 kV circuit to serve load currently fed from Walnut Avenue Station, which is located in the flood way of the Roanoke River as determined by FEMA and the Army Corps of Engineers. There have been several instances in the last three years where prolonged periods of rain have resulted in water levels that reached the bottom of the breaker control cabinets in the station.
- Medical related load continues to grow in the area served by Walnut Avenue Station. The main feed for Roanoke Memorial Hospital (RMH) is the Walnut Avenue/South Roanoke 12 kV feeder. RMH has plans to construct a new 15 story (2 MVA) expansion at nearby Crystal Springs along with a renovation/relocation of their existing Cancer Center by April 2024. The load on the South Roanoke 12 kV feeder is projected to reach 8.9 MVA, or 69% of its 12.9 MVA capability by summer 2024. This load is primarily RMH and while the concern is not necessarily related to a projected overload, it is about having Roanoke's largest hospital served by a main feed in the Roanoke River Floodway and its alternate feed (Wasena/Wiley 12kV) in the Roanoke River Floodplain.
- The Walnut Avenue/Maher Ave 12 kV feeder has seen and will continue to see medical related growth. Recent additions have been the Virginia Tech School of Medicine, Carilion Biomedical center for which the first of three planned expansions was announced for 6/2020. The load on the Maher Avenue 12 kV feeder is projected to reach 9.1 MVA, or 80% of its 11.4 MVA capability by summer 2024. While the concern is not necessarily related to a projected overload, cold load pickup is a concern following an outage when trying to restore power on a 12 kV feeder when its load exceeds 9.0 MVA.

Need Number(s): AEP-2020-AP036

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 02/15/2022

Phase 1 - Selected Solution:

- Extend a 0.37 mile double circuit 69 kV line to the new station location by tapping the existing Hancock-Walnut Ave 69 kV Circuit using 556 ACSR 26/7 overhead conductor. **Estimated Cost: $2.8M (s2663.1)**
- Establish new 69 kV station (Winston Avenue) in a straight bus configuration with 2-69 kV circuit breakers, 69/12 kV, 25 MVA transformer with high-side circuit switcher and three 12 kV feeder breakers. **Estimated Cost: $0 (Station cost is Distribution) (s2663.2)**
- Update relay settings at Walnut Ave and Hancock stations. **Estimated Cost: $0.03M (s2663.3)**

Projected In-Service: 12/1/2023
Project Status: Scoping

Phase 2 - Selected Solution:

- At Winston Ave install a second 69/12 kV, 25 MVA transformer with high-side circuit switcher and 12 kV feeders. **Estimated Cost: $0 (Station cost is Distribution) (s2663.4)**
- At Roanoke install a second 138/12 kV Distribution transformer with high-side circuit switcher and 12 kV feeders. **Estimated Cost: $2 M (s2663.5)**
- Retire Distribution from Walnut Ave. Station. **Estimated Cost: $0 (Station cost is Distribution) (s2663.6)**

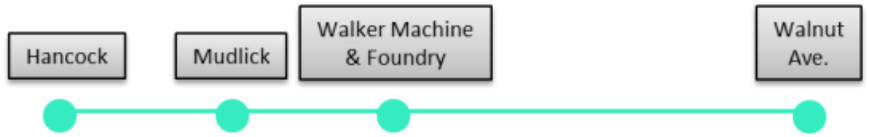
Projected In-Service: 12/1/2026
Project Status: Conceptual

Total Estimated Transmission Cost: $4.83 M

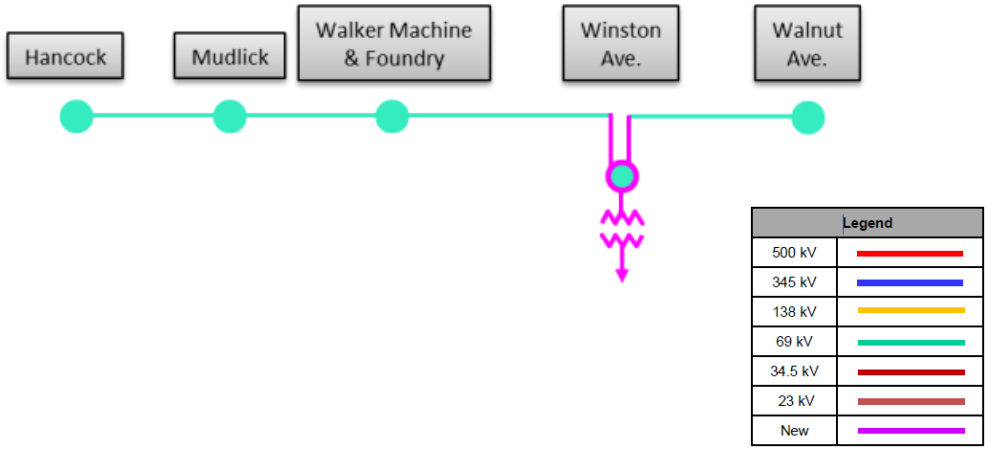
Ancillary Benefits:
This project will be completed in 2 phases to transfer load away from Walnut Ave. which is located in a flood way while continuing to provide reliable service to sensitive customers currently served and future growth.

Supplemental Project ID: s2663

Existing



Proposed



AEP Transmission Zone M-3 Process
Hummel Creek – Marion Plant 34.5 kV line rebuild

Need Number: AEP-2021-IM025

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 02/15/2022

Previously Presented:

Solution Meeting 11/19/2021
Needs Meeting 07/16/2021

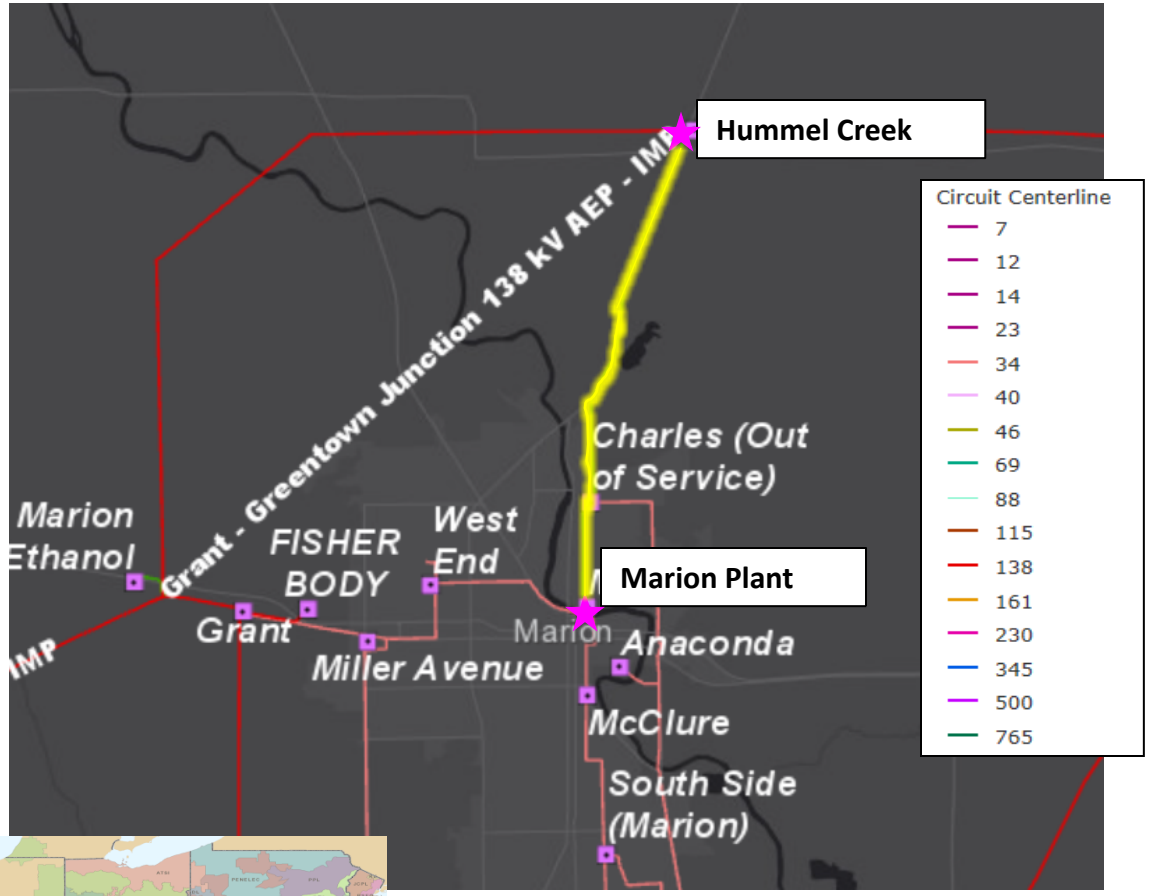
Project Driver: Equipment Material Condition, Performance and Risk

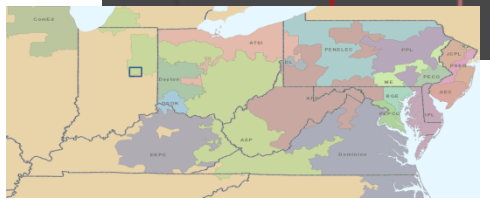
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 13)

Problem Statement:

Hummel Creek – Marion Plant 34.5 kV (Vintage 1967)

- Length of Line: 4.47 miles
- Total structure count: 136 with 119 dating back to original installation.
- Original Line Construction Type: Wood monopole and two pole structures with cross arm construction.
  - Porcelain insulators
- Conductor Type: 556,500 CM ALUM/1350 19 Dahlia
- Condition Summary
  - Number of open conditions: 19 structure open conditions
    - Open conditions include knee/vee brace, shielding/grounding open conditions related to the ground lead wire with missing or stolen, hardware, broken insulators.
    - Based on the ground crew assessment most poles and arms assessed are in poor condition with a overall condition of the line moving towards increased maintenance cycles and less reliability.
  - Structures fail NESC Grade B, AEP Strength requirements, and ASCE structural strength standards
  - The grounding method utilizes butt wraps on every other structure, providing reduced lightening protection for the line.





AEP Transmission Zone M-3 Process
Hummel Creek – Marion Plant 34.5 kV line rebuild

Need Number: AEP-2021-IM025

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 02/15/2022

Selected Solution:

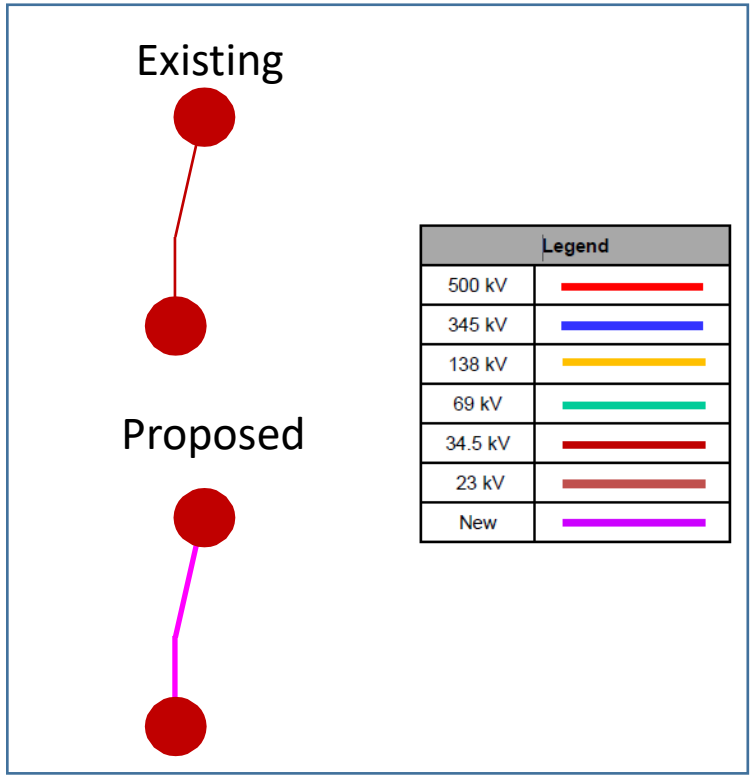
Hummel Creek – Marion 34.5 kV: Rebuild ~4.5 miles of 34.5 kV line with the conductor size 556.5 ACSR 26/7 Dove to 69 kV standards. The following cost includes the line rebuild, line removal and ROW.
Cost: $11.3 M (s2664)

Total Cost: $11.3 M

Projected In-Service: 10/15/2026

Supplemental Project ID: s2664

Project Status: Scoping



AEP Transmission Zone M-3 Process
Bellaire, Ohio

Need Number: AEP-2021-OH053

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 02/15/2022

Previously Presented:

Solution Meeting 11/19/2021
Need Meeting 10/15/2021

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

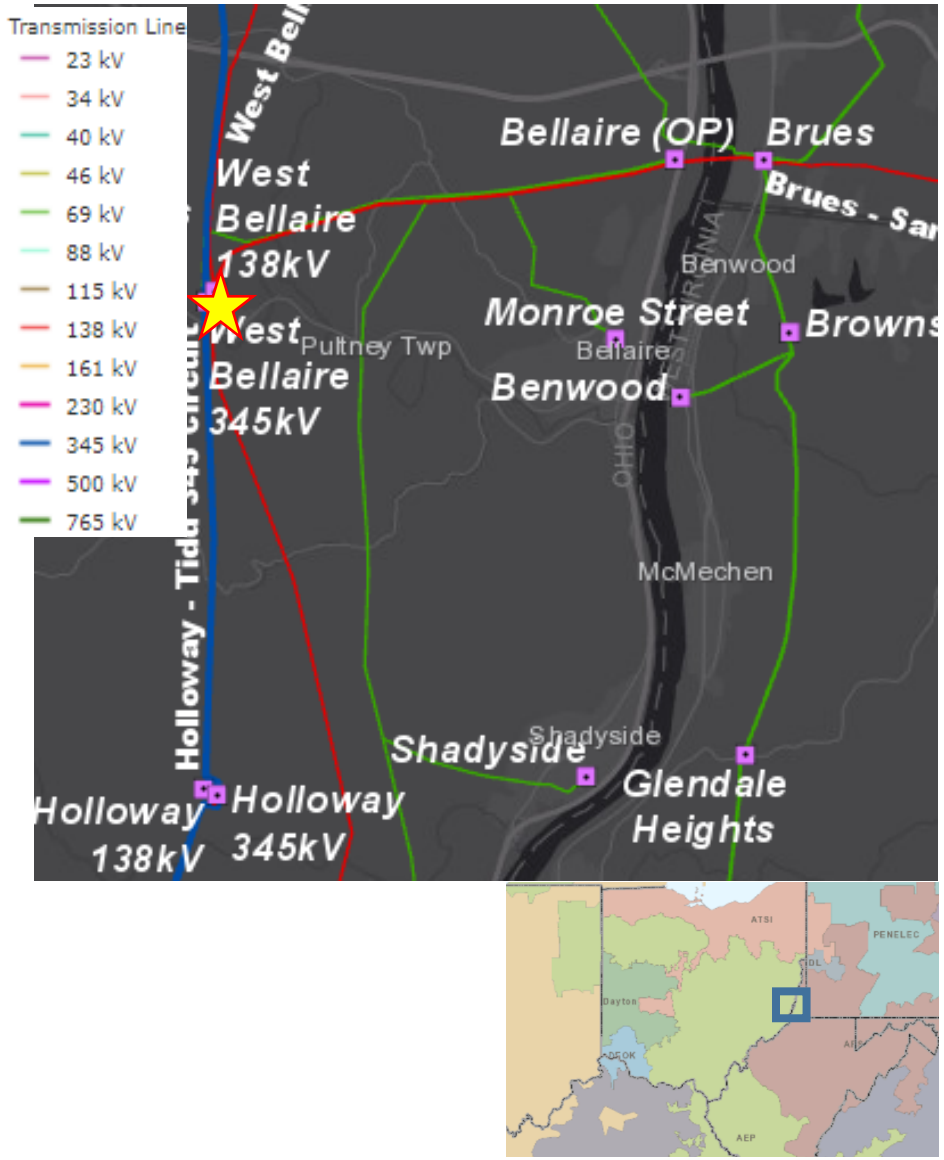
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

West Bellaire 138 – 69 kV Transformer #2:

Transformer #2 has failed due to a short circuit event verified by extremely high excitation currents and oil sampling results.

- Transformer Age: 1969, rewound in 1989
- Nameplate Rating: 115/128.8 MVA



AEP Transmission Zone M-3 Process
West Bellaire Transformer Replacement

Need Number: AEP-2021-OH053

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 02/15/2022

Selected Solution:

Replace the failed 138-69 kV transformer with a spare transformer (130 MVA nameplate, 2016 vintage). Cost includes removal costs, transport, and installation of the transformer. **Estimated Cost: $0.5M (s2665)**

Total Estimated Transmission Cost: $0.5M

Projected In-Service: 1/6/2022

Supplemental Project ID: s2665

Project Status: In service

Single transformer replacement. Bubble diagram not applicable.

AEP Transmission Zone M-3 Process
Lynchburg, VA Area

Need Number: AEP-2020-AP041

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 02/23/2022

Previously Presented:

Solutions Meeting 12/17/2021

Needs Meeting 10/16/2020

Supplemental Project Driver: Customer Service

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

Problem Statement:

AEP Distribution is requesting a new 138/12 kV transformer at Reusens station to transfer load from Peakland and Boonsboro stations due to the following concerns:

- Peakland station site inadequate for significant expansion (size & terrain) and is currently served by a radial tap from Reusens – Dearington 69 kV line.
- Both Peakland 12 kV circuits are loaded over 90% summer capacity
- Boonsboro 138/12 kV, 20 MVA transformer loaded over 90% in winter
- Boonesboro 12 kV circuit projected to overload by summer 2025

AEP Transmission Zone M-3 Process
Lynchburg, VA Area

Need Number(s): AEP-2020-AP041

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 02/23/2022

Selected Solution:

Reusens Station ($3.07 M)

- Expand Reusens Station and install 138/12kV, 20MVA transformer connected to 138 kV bus #2, 12 kV bus regulators and two 12 kV breakers **(s2667)**

Estimated Total Cost: $3.07 M

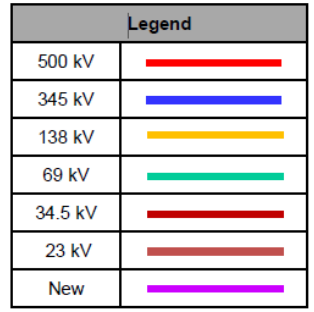
Ancillary Benefits:
Reliability to customers served from Peakland and Boonsboro stations will increase by transferring load to Reusens, eliminating the potential for future overloads

Projected In-Service: 3/31/2022

Supplemental Project ID: s2667

Project Status: Engineering

No Bubble Diagram Needed



AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2019-IM017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solutions meeting 1/21/2022
Needs Meeting 4/23/2019

Supplemental Project Driver: Equipment Condition/Performance/Risk

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

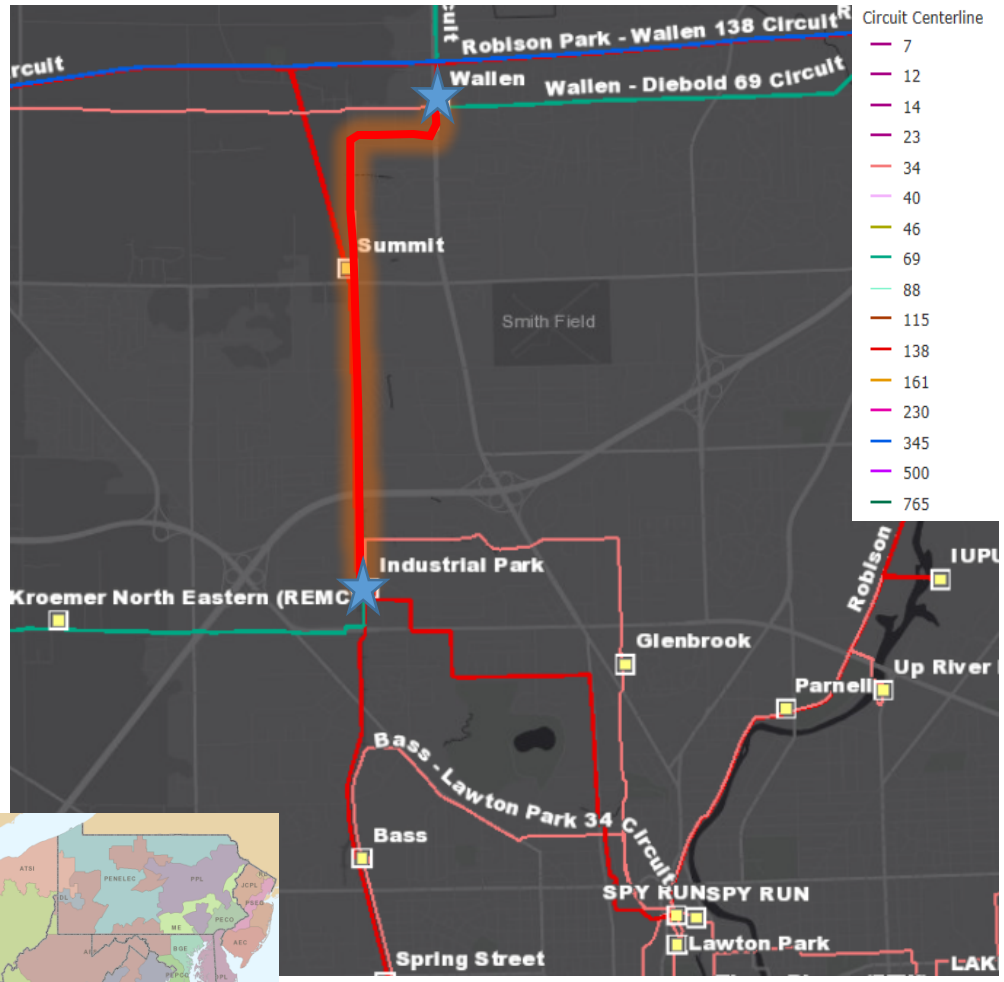
Problem Statement:

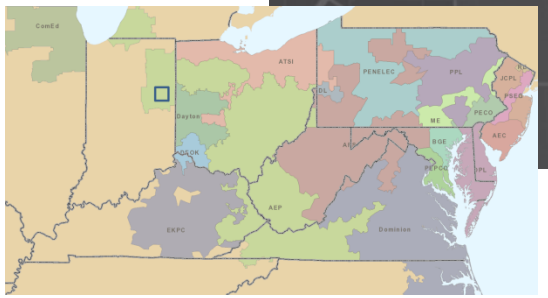
Industrial Park – Wallen 34kV (~3.3 Miles)

- 1925 vintage steel lattice construction
- There are currently 5 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.
- Six wired Copper conductor with copper weld shield wire. Copper conductors become brittle with age and Copper weld conductor has long been obsolete

Industrial Park 138kV

- Breakers F, D & E 34kV
  - 1967 vintage Oil breakers
  - Fault Operations: F(18), D(0) & E(14) – Recommended(10)
- Breakers G 69kV
  - 1967 vintage Oil breakers
  - Fault Operations: G(50) – 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.
- Multiple wood pole 138kV transformer lead support structures inside Industrial Park Station





AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2020-IM006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solutions meeting 1/21/2022
Needs Meeting 2/21/2020

Supplemental Project Driver: Equipment Condition/Performance/Risk

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

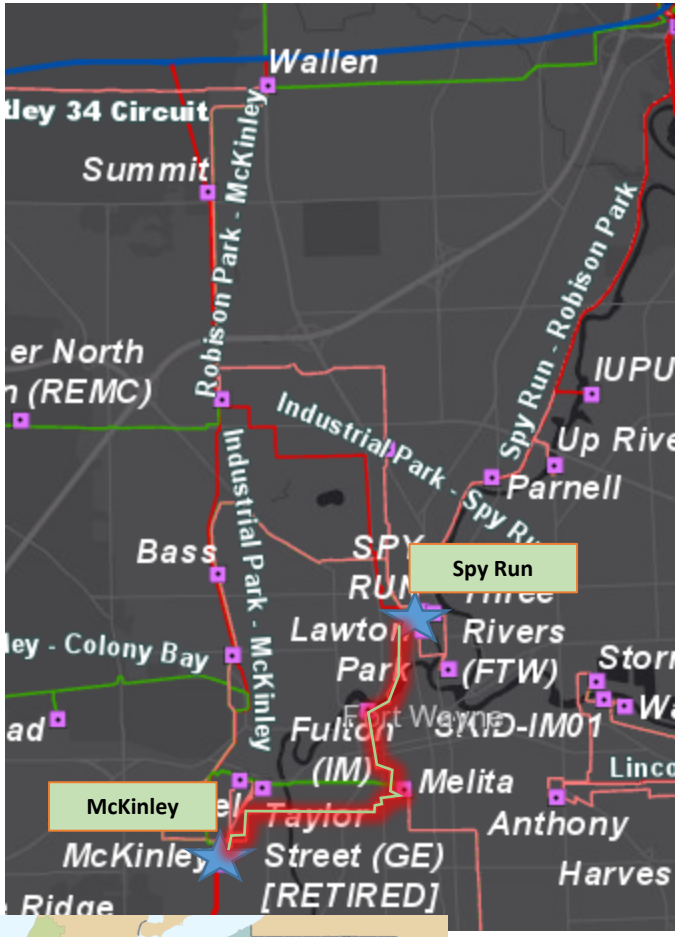
Problem Statement:

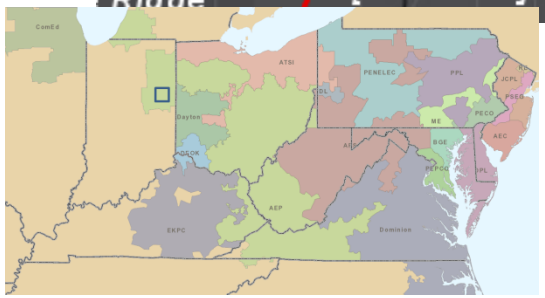
McKinley 138/69/34.5kV

- Breakers G 34kV
  - 1956 vintage Oil breakers
  - Fault Operations: G(10) – Recommended(10)
- Oil filled breakers have much more maintenance required due to oil handling that modern, vacuum counterparts do not require. Finding spare parts for these units is difficult or impossible, and these models are no longer vendor supported. Oil spills can result in significant costs associated with mitigation.

McKinley – Spy Run 34.5kV line asset (~5 miles)

- 1960 vintage wood crossarm construction
- There are currently 42 open conditions on this line across 37 unique structures (27% of the line) including, but not limited to, split crossarms, rot top, rot heart and broken grounds.
- Structures are in the river flood plains and in the flood control berm.





AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2020-IM025

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solutions meeting 1/21/2022
Needs Meeting 11/20/2020

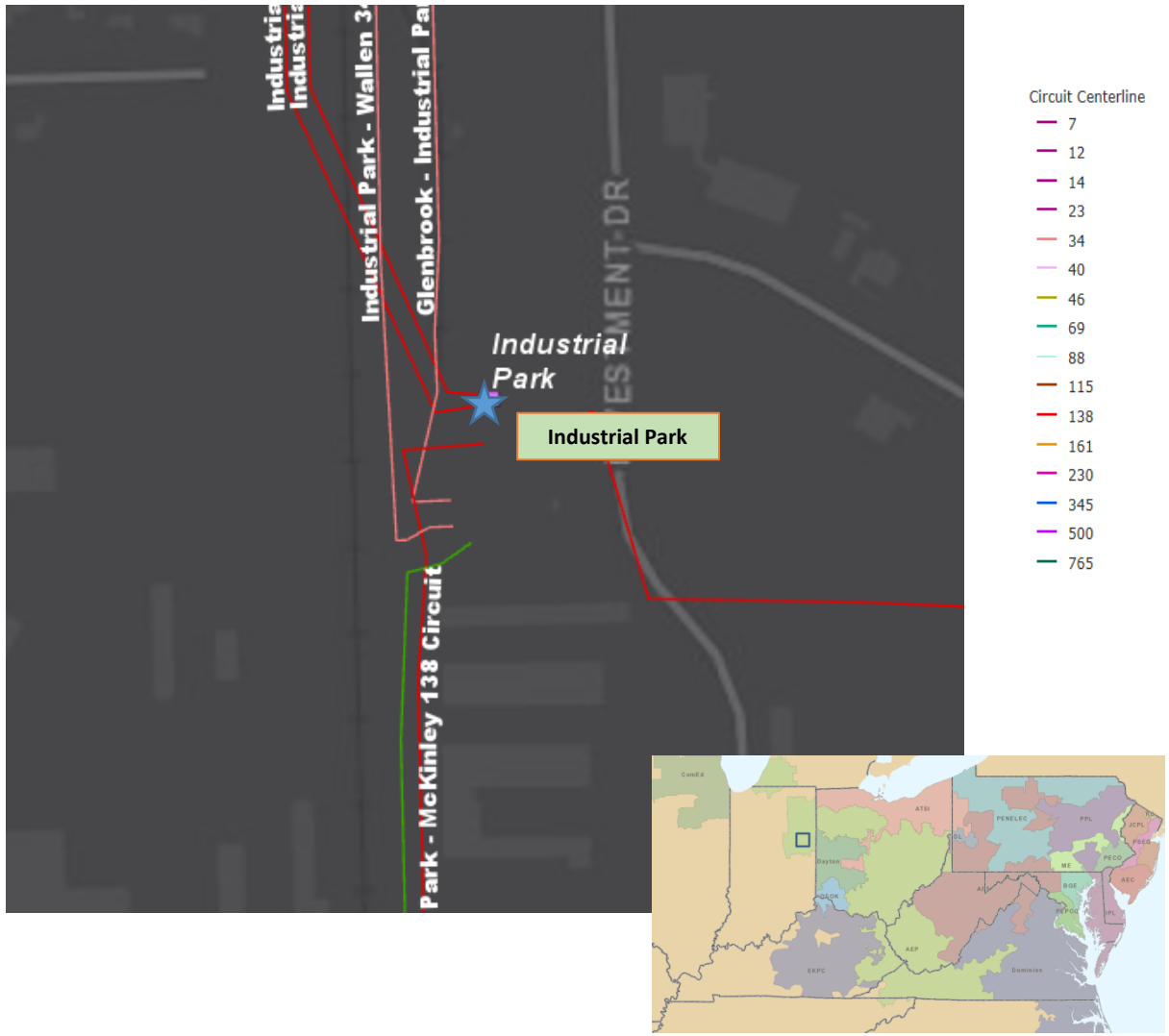
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

Industrial Park 138/69/34.5kV Station:
138/69/34.5kV Transformer 1

- Manufactured in 1967
- Transformer has increased levels of CO2 indicated in the dissolved gas analysis.
- Level of CO2 indicates decomposition of the paper insulating materials which impairs units ability to withstand faults.
- The downward Interfacial Tension trend paired with upward power factor trend indicate that there are increased particles within the oil, which decreases the dielectric strength of the transformer.
- Doble tests on the bushings indicate changes in the bushing power factor and capacitance. This change indicates these bushings are at a greater risk of failure.



AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2021-IM004

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solutions meeting 1/21/2022
Needs Meeting 02/17/2021

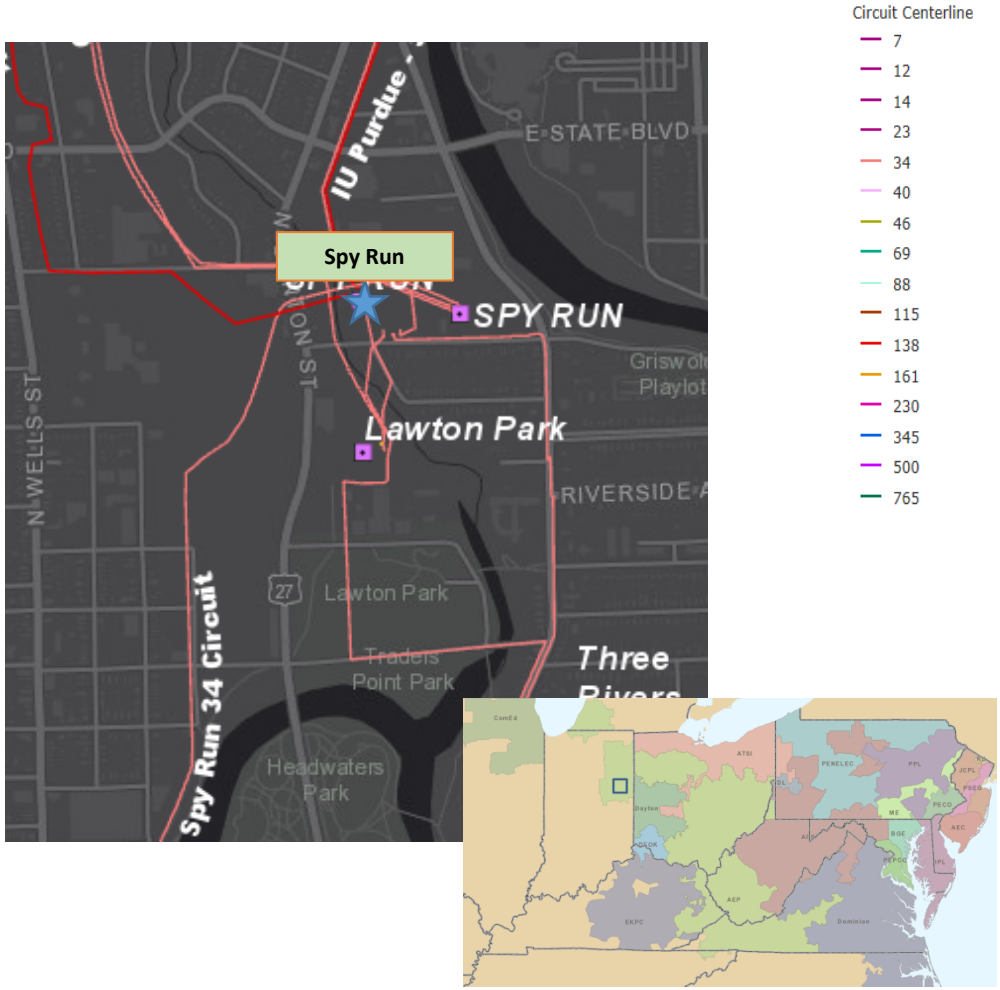
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

Spy Run 138/34.5kV Station
138/34.5kV Transformer 3

- Manufactured in 1975
- Per DGA analysis, this transformer has increased levels of gassing of Ethylene, Ethane, and CO2
- The low level of dielectric strength indicates acid coating insulation with sludge ready to deposit in the transformer, increasing the risk of failure.
- The levels of moisture and dielectric strength indicate the insulation system is in poor condition, reducing the ability of the unit to withstand through faults.



AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2021-IM005

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solutions meeting 1/21/2022
Needs Meeting 3/19/2021

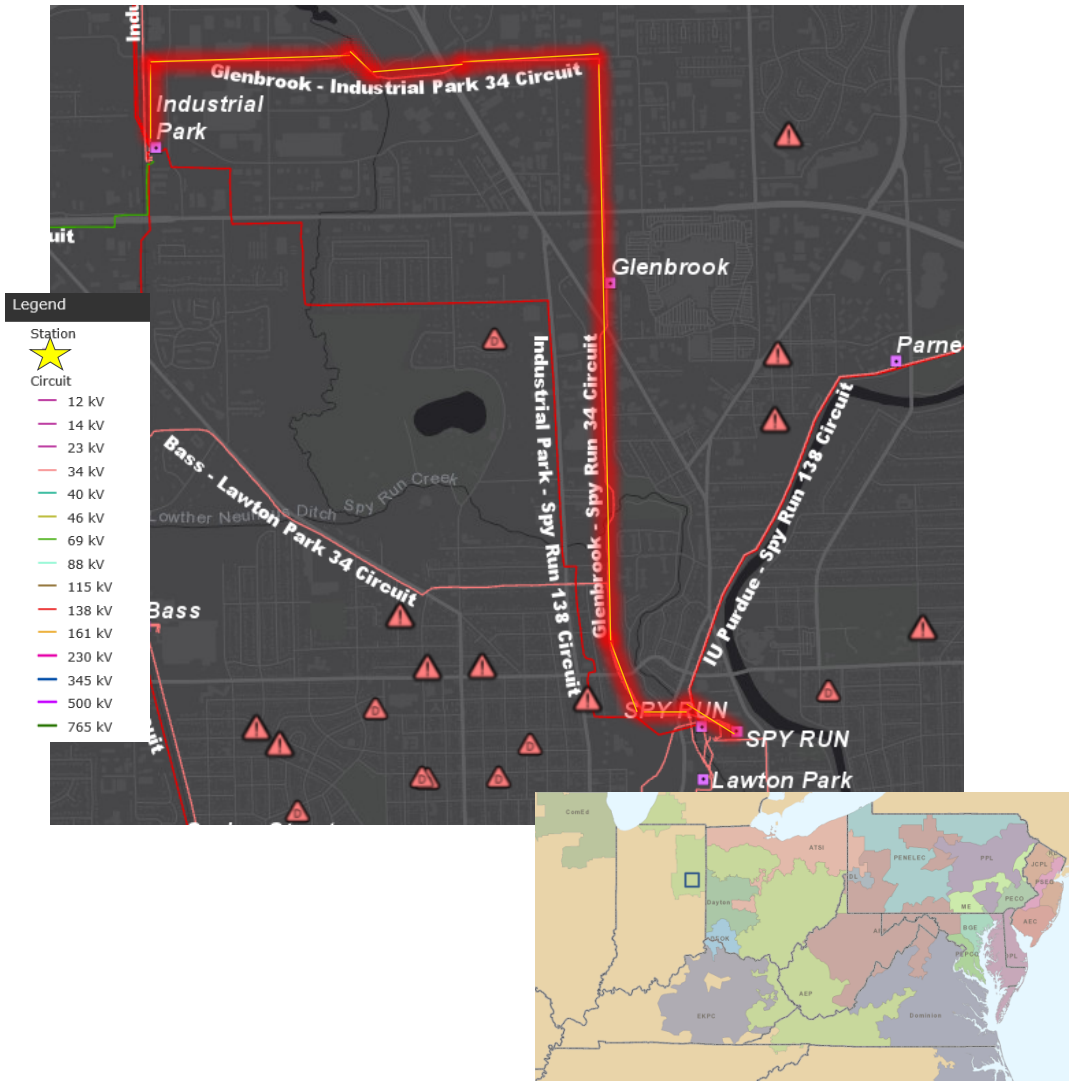
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

- **Industrial Park – Spy Run 34.5kV ~4.2 Miles**
  - Wood pole line originally constructed in 1965
  - 45 structures have at least one open condition (37% of line) including Rot Top, Insect Damage and Woodpecker holes
  - 18 structures were assessed by an aerial drone and 12 assessed by ground crew. 6 structures had heart rot, 12 structures had insect/woodpecker damage.
  - 121,563 CMI over the past 5 years with 2 outages
  - Structures do not meet 2017 NESC Grade B loading criteria, do not meet current AEP structural strength requirements, and do not meet the current ASCE structural strength requirements.

Model: N/A



AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2019-IM017, AEP-2020-IM025, AEP-2021-IM004, AEP-2021-IM005 & AEP-2020-IM006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Selected Solution:

Spy Run-Melita 69kV

- Rebuild the Spy Run – McKinley 34.5kV line as the ~2.2 mile Spy Run – Melita 69kV line and retire the remaining 2.8 miles.
  Estimated Cost: $12.15M – $24.8M depending on route considerations and underground construction through this heavily developed urban area. (s2682.1)

Melita Station

- Add a 69kV CB to Melita station.
  Estimated Cost: $1.2M (s2682.2)

Fulton Station

- Rebuild the through-path of Fulton 34.5/12kV station at 69kV and replace the transformer with a 69/12kV unit.
  Estimated Cost: $0.6M (2682.3)

Spy Run Station

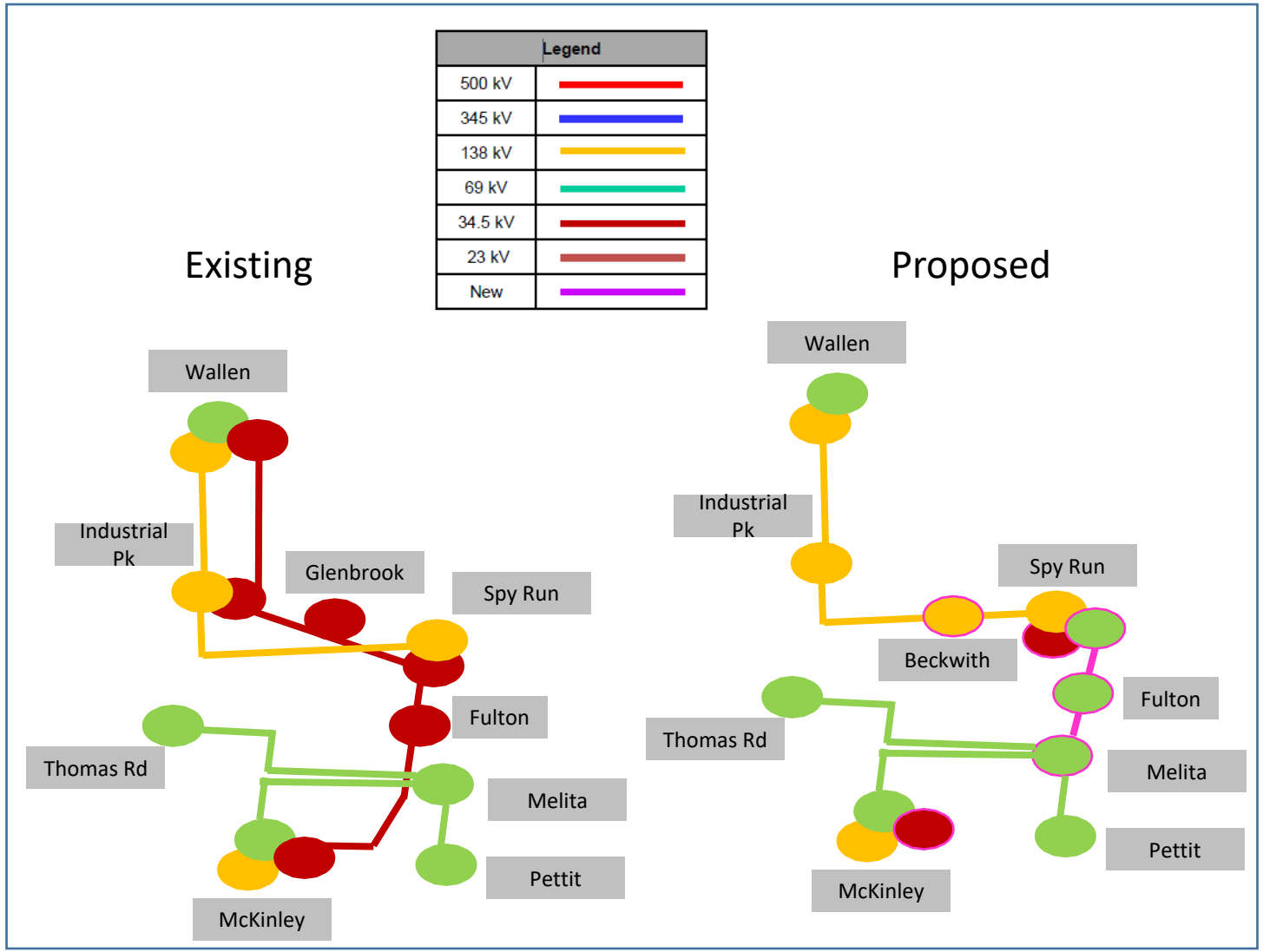
- At Spy Run station, replace transformer #3 with a 138/69/34.5kV unit. Move the Fulton exit from 34.5kV to 69kV.
  Estimated Cost: $2.6M (2682.4)

McKinley Station

- Retire CB "G" at McKinley station.
  Estimated Cost: $0.2M (s2682.5)

Wallen Station

- Retire the 34.5kV voltage class equipment at Wallen station.
  Estimated Cost: $0.2M (s2682.6)



AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2019-IM017, AEP-2020-IM025, AEP-2021-IM004, AEP-2021-IM005 & AEP-2020-IM006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Selected Solution:

Industrial Park

- At Industrial Park station, retire the entire 34.5kV voltage class, install a new 138/12kV load delivery to replace the 34.5/12kV delivery. Replace 69kV CB "G", Replace the 138/69kV XFR 1 and add a high side switcher to XFR 1.
  Estimated Cost: $11.1M (s2682.7)

Wallen-Industrial Park 34.5kV

- Retire the ~3.3 mile Wallen – Industrial Park 34.5kV line.
  Estimated Cost: $2.9M (s2682.8)

Glenbrook Station

- Retire Glenbrook 34.5/12kV substation
  Estimated Cost: $0M (s2682.9)

Industrial Park-Spy Run 34.5kV

- Retire the ~4.2 mile 34.5kV Industrial Park – Spy Run line
  Estimated Cost: $2.2M (s2682.10)

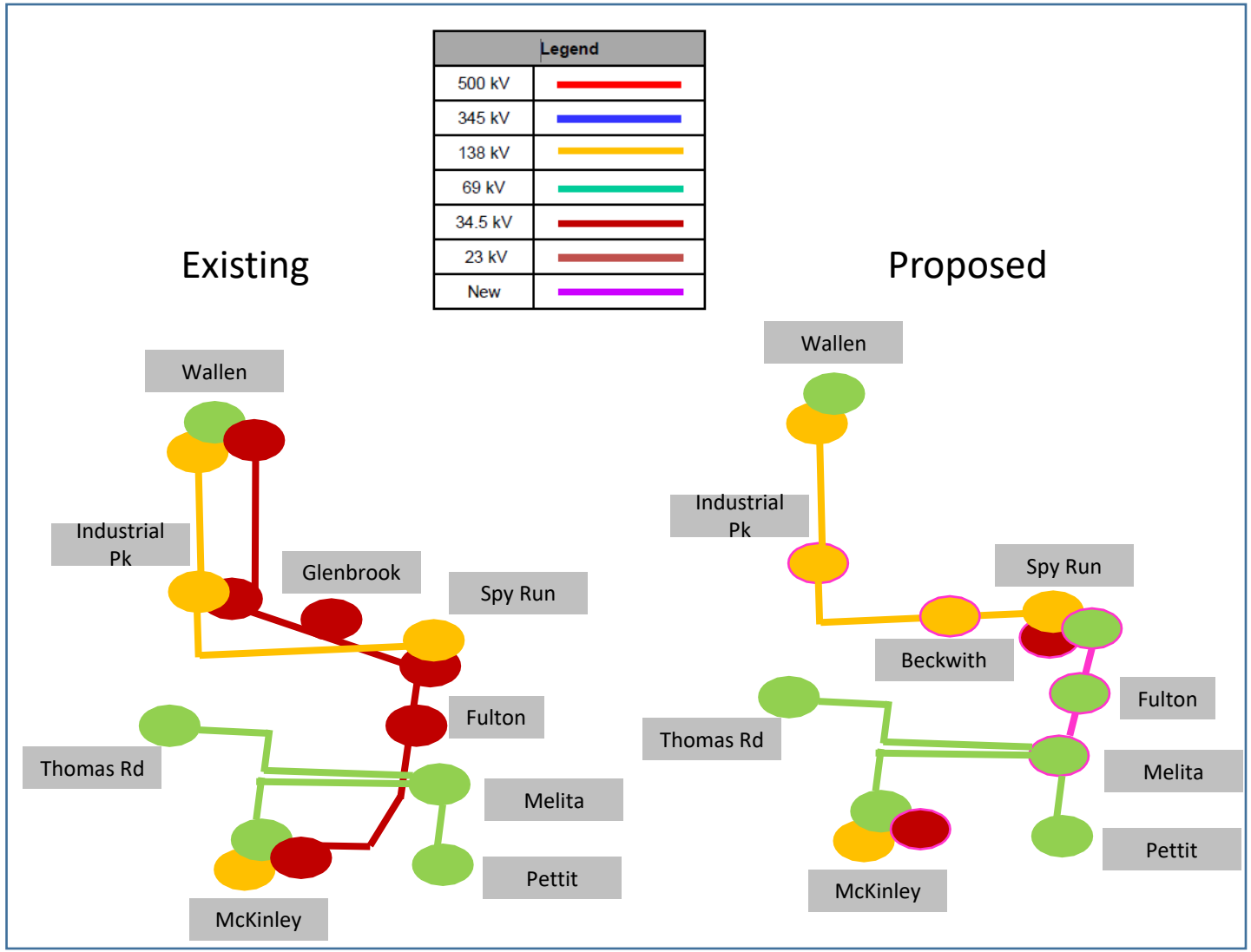
Beckwith Station

- Install a new 138/12kV Beckwith substation to take the place of Glenbrook with 2 25MVA XFR's and a 138kV bus tie CB.
  Estimated Cost: $1.5M (s2682.11)

Industrial Park-Spy Run 138kV

- Cut in the Industrial Park – Spy Run 138kV to Beckwith station.
  Estimated Cost: $0.6M (s2682.12)

Total Estimated Transmission Cost: $35.25M-$47.9M



AEP Transmission Zone: Supplemental Northern Melita Area Improvements

Need Number: AEP-2019-IM017, AEP-2020-IM025, AEP-2021-IM004, AEP-2021-IM005 & AEP-2020-IM006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Ancillary Benefits: Removes 7.5 miles of 34.5 kV line and converts 2.2 miles to 69 kV, moving the Glenbrook and Fulton delivery points to 138 kV and 69 kV respectively. The existing 34.5 kV feeds are out of phase with the surrounding 138 and 69 kV systems, requiring a drop-and-pick outage whenever the 34.5 kV source is out of service. This project simplifies the transferability of the existing load and removes 7.5 miles of line through urban Fort Wayne area.

Projected In-Service: 5/1/2023

Supplemental Project ID: s2682.1-.12

Project Status: Scoping

AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2020-OH019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:

Solution Meeting 1/21/2021

Need Meeting 05/22/2020

Supplemental Project Driver:

Customer Service, Equipment Material Condition, Performance and Risk; Operational Flexibility & Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slides 7, 8)

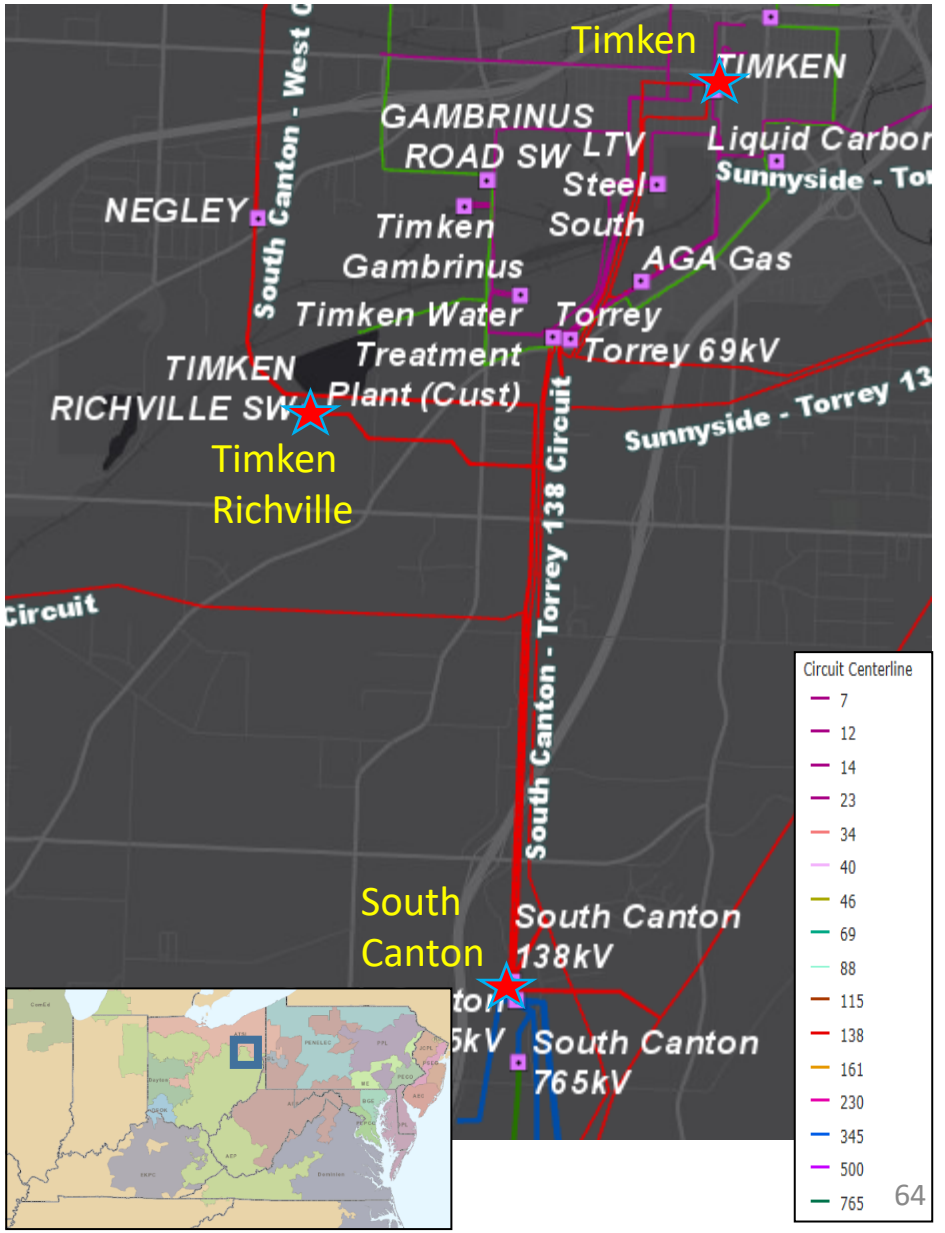
Problem Statement:

Customer Service:

- **Timken Richville 138kV Station**
  - Peak customer load is 150 MW; steel mill with an arc furnace.
  - Outage history: the customer has experienced 2 prolonged outages over the past 5 years. Any interruption to service is disruptive and costly for this facility.
  - The customer's sensitive equipment includes a continuous caster, electric arc furnace, and refining furnaces. If there is a loss of power it could lead to the customer having to dump the molten steel and risks the steel solidifying in the equipment. These events would be very detrimental to the company's long-term business operations.

Operational Flexibility & Efficiency:

- **Timken Richville 138kV Station**
  - The station contains 2- 138kV lines and 2- 138kV customer feeds with only a single 138kV bus-tie breaker. A fault on either of the 138kV lines or bus will take out up to 75 MW of load for a single event (1/2 of peak load).
  - A fault on either 138kV circuit requires tripping one of the customer's 138kV breakers to clear the fault. If the customer's equipment were to fail to clear a line fault, a single 138kV circuit fault would expand to take out both 138kV circuits connected to Timken Richville, dropping the customer entirely and requiring additional remote-end clearing (at South Canton or Timken station).



AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2020-OH019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

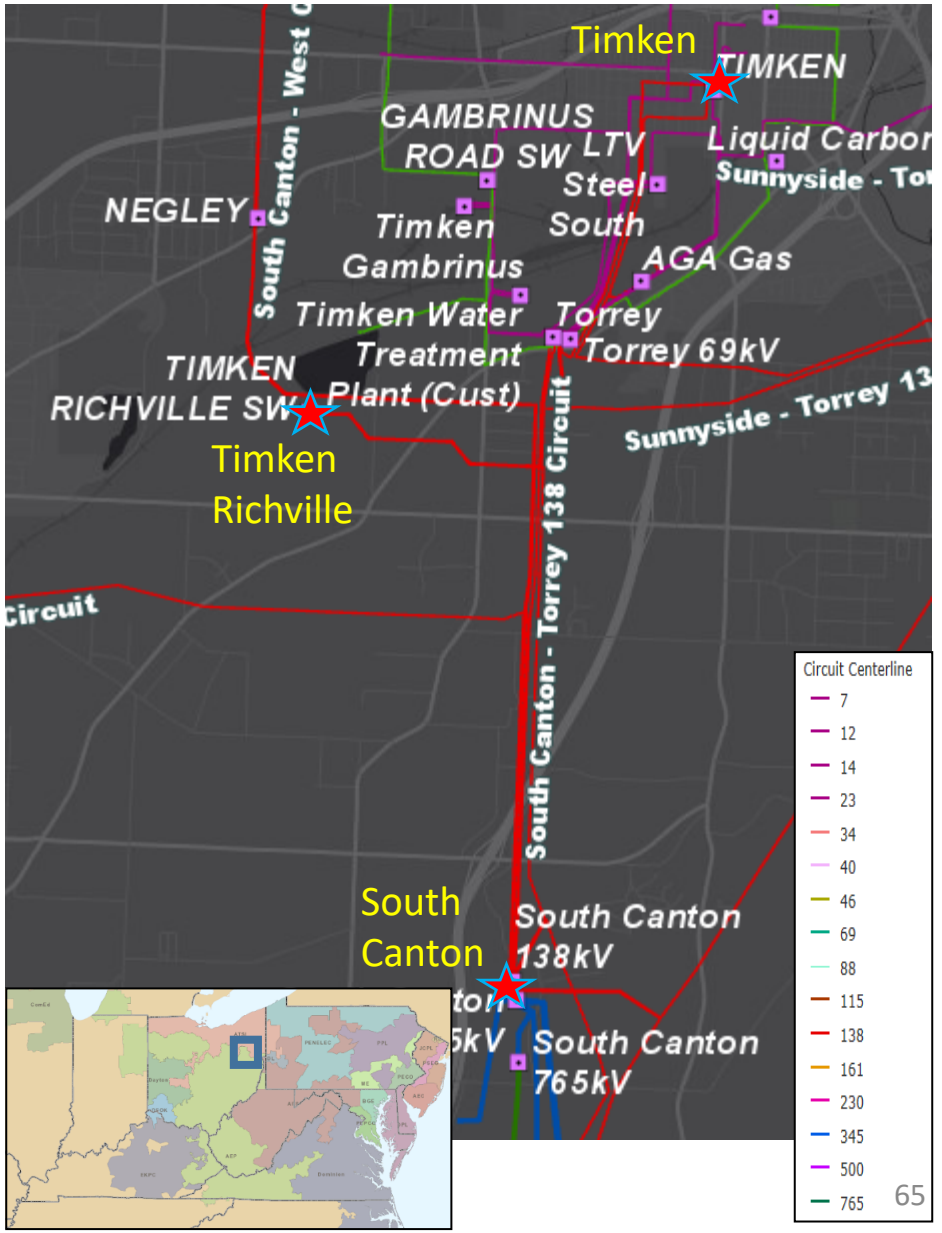
Previously Presented:

Solution Meeting 1/21/2021

Need Meeting 05/22/2020

Equipment Material Condition, Performance and Risk:

- **Timken Richville 138kV Station**
  - The station was constructed in 1985 and 32 of the 34 protective relays in the station are electromechanical (with 2 static relays). Electromechanical relays lack vendor support, don't have SCADA, and lack fault data collection.
  - The line protection to Timken and to South Canton consists of an outdated pilot wire scheme that is increasingly prone to failure.
  - The RTU is a legacy model that is no longer supported by the manufacturer.
  - AC station service comes from the customer's substation, which is a reliability concern.
  - The control house ceiling is made of an asbestos-cement product (transite).
  - There is no fence separating AEP's substation from the customer's substation, which is a physical security risk.
  - The metering PT's and CT's show signs of heavy rusting.



AEP Transmission Zone M-3 Process
Timken Richville Upgrade

Need Number: AEP-2020-OH019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Selected Solution:

At Timken Richville, install 2- 138kV circuit breakers on the 2 line exits to Timken & South Canton. Retire the old control house and install a new prefabricated building with new relaying. Remote end settings updates only required at South Canton. **Estimated Cost: $3.55 Million (s2683.1)**

At Timken, upgrade the 138kV line relays to coordinate with Timken Richville and Southeast Canton. Retire the pilot-wire and electromechanical relays. Install new 3-phase CCVT's. **Estimated Cost: $0.63 Million (s2683.2)**

At Southeast Canton, upgrade the 138kV line relays to Timken. Retire the pilot-wire and electromechanical relays. **Estimated Cost: $0.51 Million (s2683.3)**

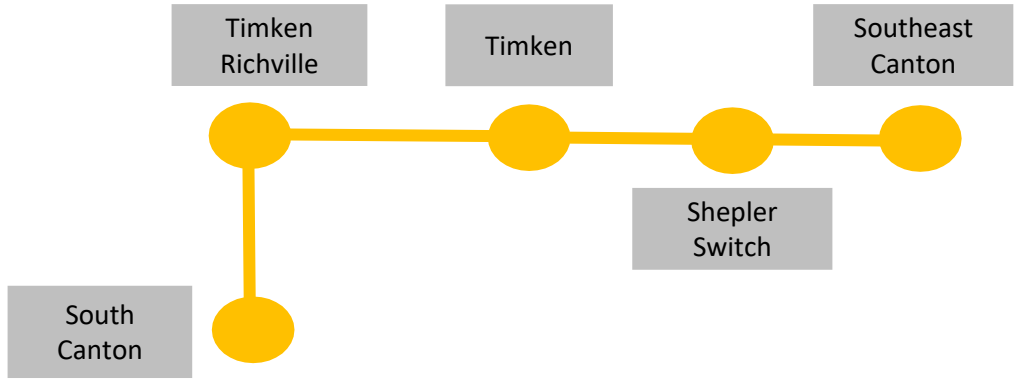
Total Estimated Transmission Cost: $4.69 Million

Projected In-Service: 8/1/2023

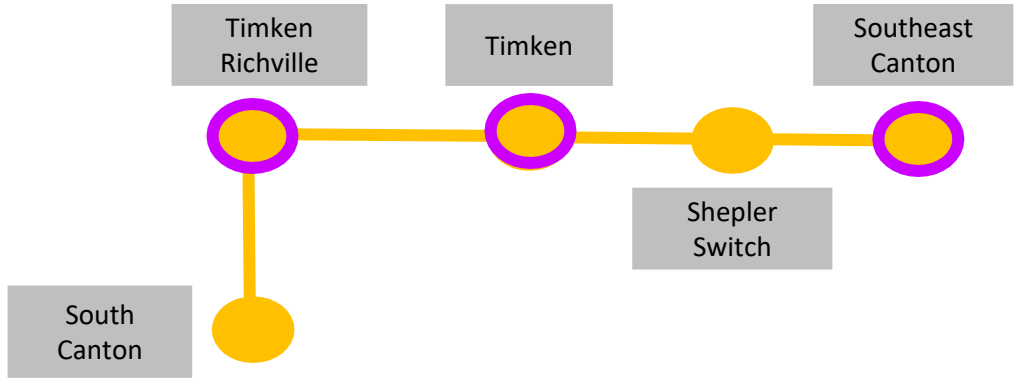
Supplemental Project ID: s2683.1-.3

Project Status: Scoping

Existing:



Proposed:



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

AEP Transmission Zone M-3 Process
Montgomery County, VA

Need Number: AEP-2021-AP026

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solutions Meeting 01/21/2022
Needs Meeting 06/15/2021

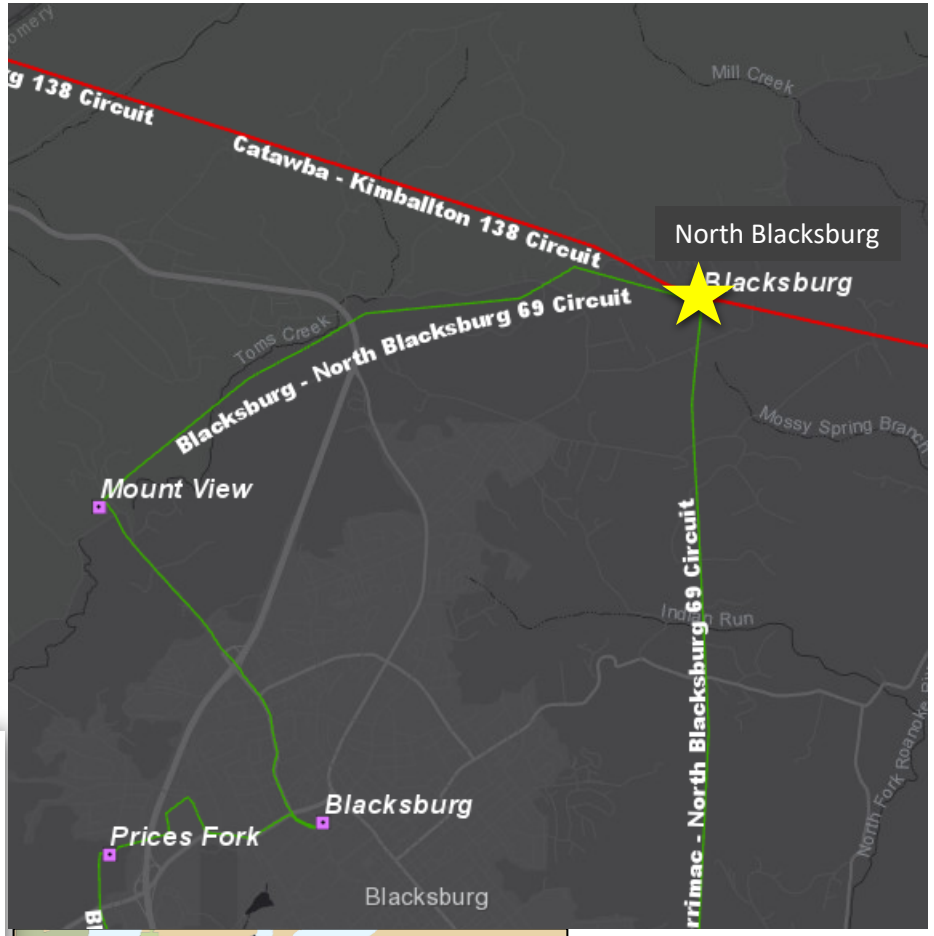
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

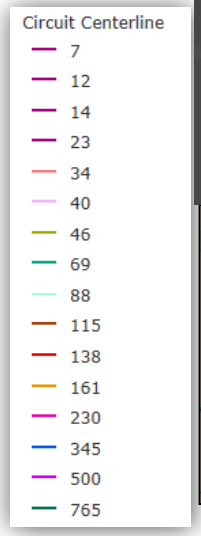
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

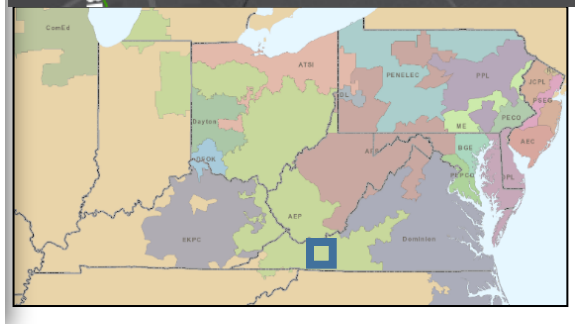
Problem Statement:

North Blacksburg Station:

- 138/69-12 kV Transformer #1
  - 1972 Vintage Transformer
  - The presence of Ethane, along with the indication of overheating faults, indicates decomposition of the paper insulation that impairs the unit's ability to withstand future short circuit or through fault events.
  - The dielectric is driven by the upward trend in insulation power factor, which indicates an increase in particles within the oil.
  - The transformer has had issues with proper oil flow.
- 138/12 kV Transformer #2
  - 1967 VintageThe presence of Acetylene, confirms the insulation system (oil and paper) is in poor condition and also indicates electrical discharge faults of low energy have occurred within the main tank causing electrical breakdown of the unit.
  - The transformer has significant rust spots and weld leaks.
  - This is allowing voltage phase imbalances, specifically high voltage, to pass through to distribution customers served from North Transformer
  - Blacksburg station.







AEP Transmission Zone M-3 Process
Montgomery County, VA

Need Number(s): AEP-2021-AP026

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Selected Solution:

North Blacksburg Station

- Replace existing Transformer #1 with a 130 MVA 138/69-12 kV transformer.
- Replace existing Transformer #2 with a 25 MVA 138/12 kV transformer and add bus regulators.
- Add a 69kV circuit breaker on the low side of Transformer #1

Estimated Total Transmission Cost: $4.06 M (s2684)

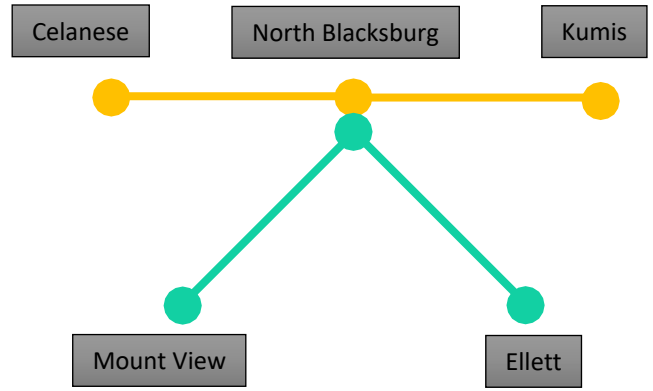
Ancillary Benefits: A 69kV breaker in between Transformer #1 and the 69kV bus would maintain two way service to Blacksburg Station which supplies a large load for Virginia Tech State University in the event of a high side fault.

Projected In-Service: 11/01/2024

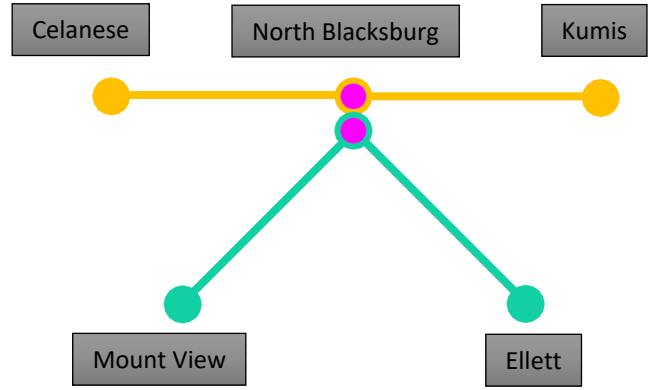
Supplemental Project ID: s2684

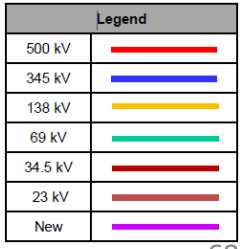
Project Status: Scoping

Existing



Proposed





AEP Transmission Zone M-3 Process
Robison Park – Sowers 138kV

Need Number: AEP-2021-IM022

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solution Meeting 01/21/2022
Needs Meeting 7/16/2021

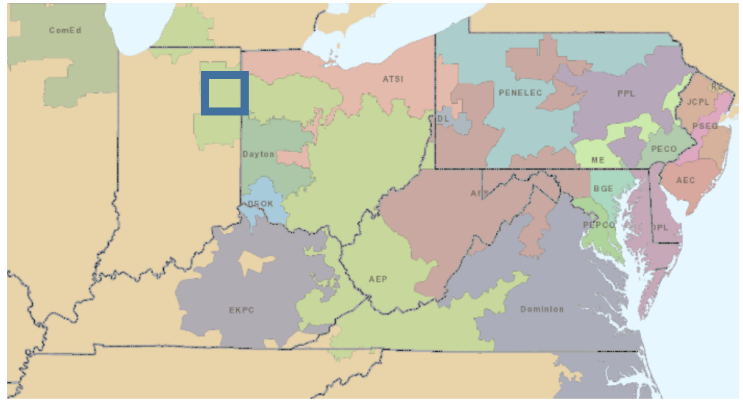
Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Robison Park – Sowers 138kV line:

- 13.6 miles of this 18 mile line is 1966 wood H Frame construction
- 4.3 miles of this 18 mile line is 1966 Steel lattice and isn't identified as a need at this time.
- 17.9 miles of this 18 mile line is 1966 636 Grosbeak ACSR conductor
- The wood structures fail AEP Strength requirements and ASCE structural strength standards and AEP Shielding requirements
- The 2015-2020 time period has seen 4 momentary and 3 permanent outages
- Line has been subject to 464,404 CMI to customers served out of Grabill station.
- 15 structures were inspected by drone with 16 assessed by ground crew
  - Moderate shell decay on most wood poles
  - Most Cross Arms have moderate decay on top side of arms
  - 40% of structures had broken/missing gounds.
- 11 structures with open conditions are on this line currently including disconnected X Braces/Crossarms, Rot Top and broken ground leads.



AEP Transmission Zone: Supplemental
Robison Park – Sowers 138kV

Need Number: AEP-2021-IM022

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Selected Solution:

Robison Park – Sowers 138kV line:
Rebuild the 13.6 miles of wood construction with double circuit capable 138kV with one side strung. Reconductor 4.3 miles of the steel lattice section with 795 Drake ACSR. This 4.3 mile section is already constructed as double circuit capable.
Estimated Cost: $42.3M (s2685.1)

Replace switches and risers at Grabill switch to accommodate the line rebuild.

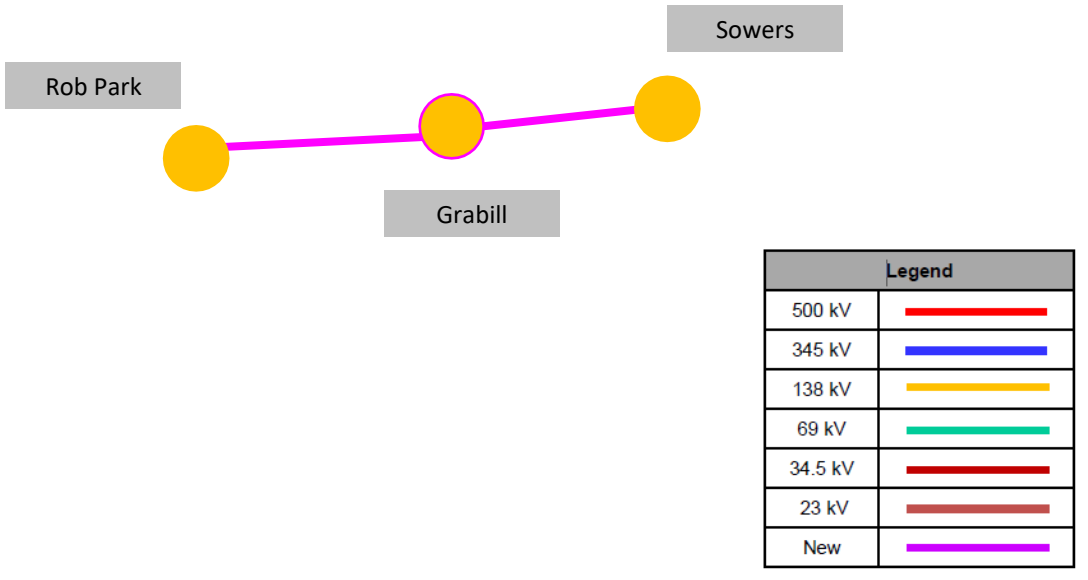
Estimated Cost: $1M (s2685.2)

Total Estimated Transmission Cost: $43.3M

Projected In-Service: 11/01/2025

Supplemental Project ID: s2685.1-.2

Project Status: Scoping



AEP Transmission Zone: Supplemental Kenzie Creek Rehab

Need Number: AEP-2021-IM021

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solution Meeting 11/19/2021
Needs Meeting 07/16/2021

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

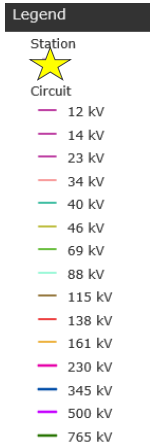
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

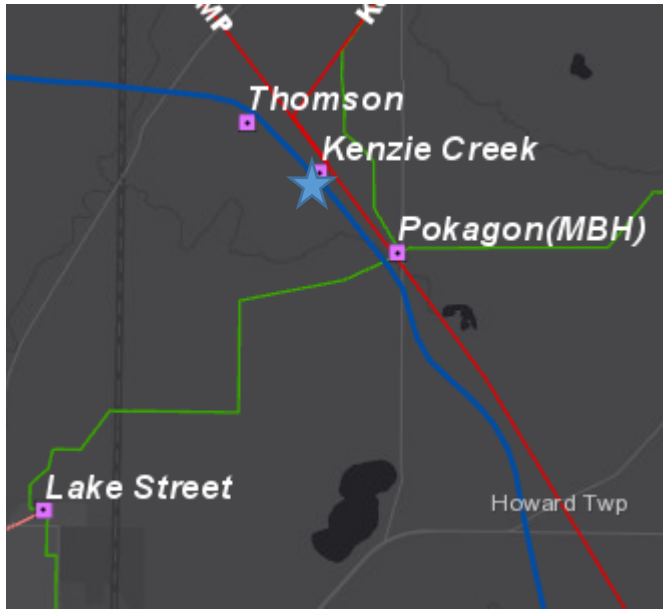
Problem Statement:

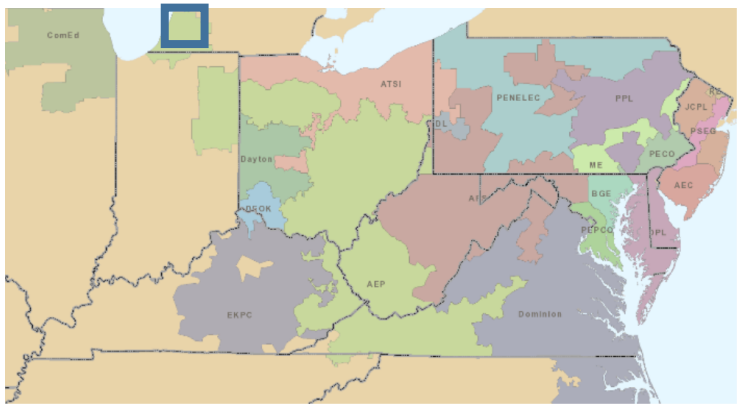
Kenzie Creek 345/138/69kV

- CB "F", "F1", "F2", "G" and "G1" are 1990's vintage 145-PA type breakers
  - The 145-PA Type Breakers are experiencing marked increases in malfunctions. There have been 437 recorded malfunctions on 132 total units of this model type on the AEP System. The most common issues are related to loss of SF6 gas and mis-operations. The expected life of the bushing gaskets and door inspection port seals is 25 years. Seals that are no longer adequate can cause SF6 leaks to become more frequent. Low SF6 pressure in the breaker reduces the ability of the breaker to correctly interrupt a fault. Additionally, low pressure alarms and SF6 leaks lead to increased maintenance costs. The manufacturer provides no support or parts for this model of circuit breakers. Finally, SF6 leaks impact the environment.
  - The CB's have experience the following faults and are above the manufacturers recommended rating of 10
    - Breaker G: 39
    - Breaker G1: 24
    - Breaker F1: 12
    - Breaker F: 29
    - Breaker F2: 34

Model: N/A







Kenzie Creek Rehab

Need Number: AEP-2021-IM021

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

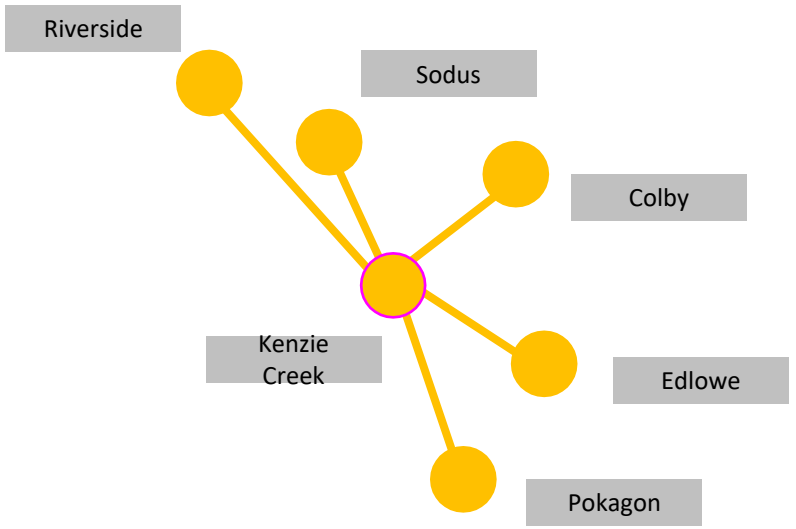
Selected Solution:

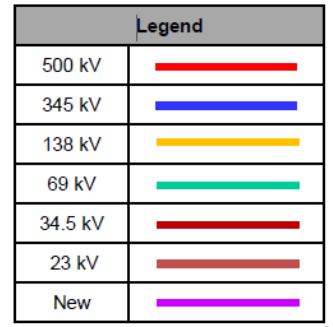
Kenzie Creek 345/138/69kV station:
Replace 138kV CB's "F", "F1", "F2", "G" and "G1" with 40 kA circuit breakers.
Estimated Cost: $ 1.8M (s2686)

Projected In-Service: ~~3/3/2021~~ 3/3/2024

Supplemental Project ID: s2686

Project Status: Scoping





AEP Transmission Zone M-3 Process
Dover Customer Service

Need Number: AEP-2021-OH042

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:

Solution Meeting 01/21/2022

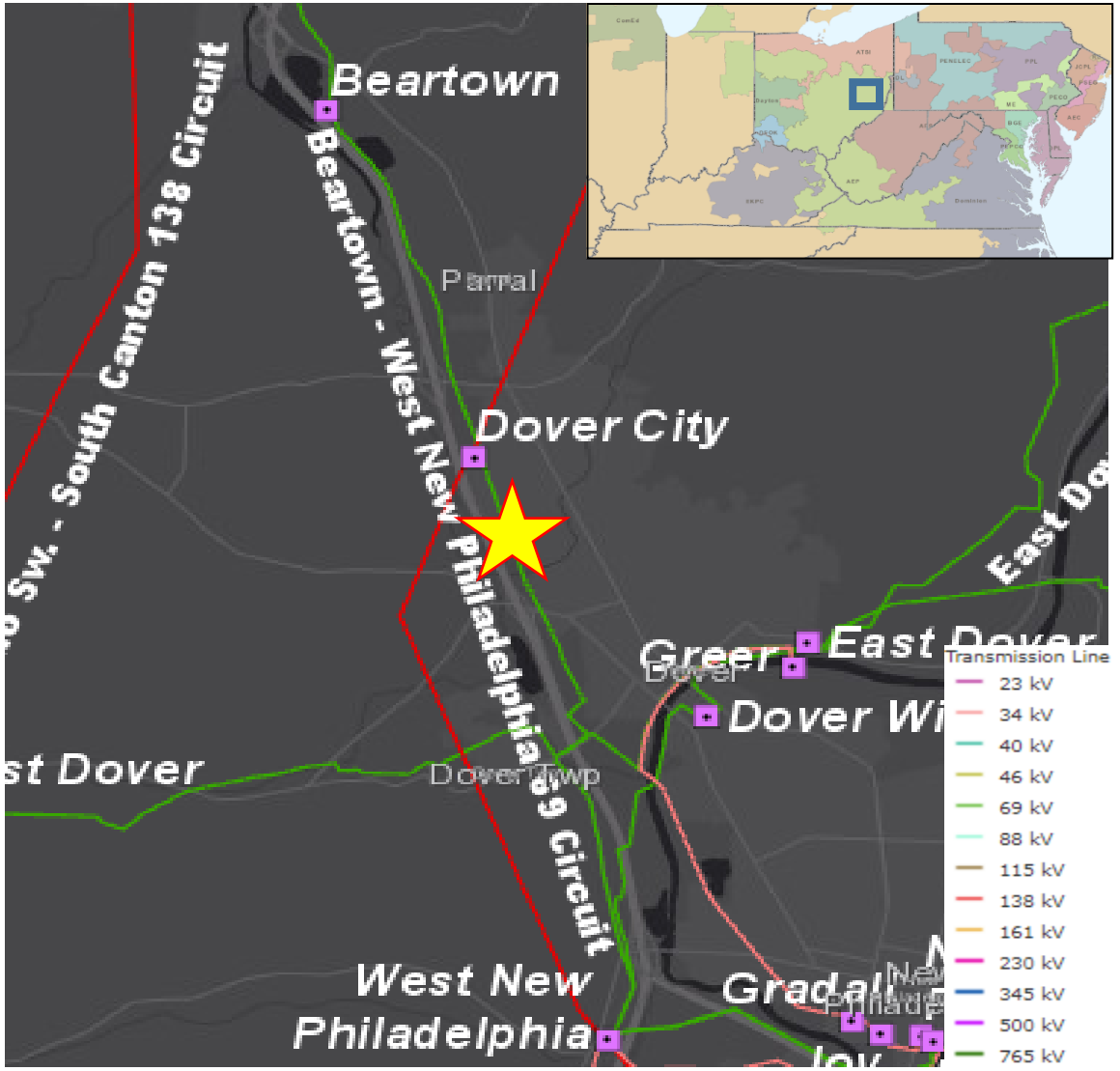
Need Meeting 08/16/2021

Project Driver: Customer Service

Specific Assumption Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

An industrial customer in Dover, Ohio has requested new transmission service. The expected peak demand is 3 MW, with a requested in-service-date of July 2022.



AEP Transmission Zone M-3 Process
Dover Customer Service

Need Number: AEP-2021-OH042

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Selected Solution:

Tap the Beartown-West New Philadelphia 69kV circuit and install a 3-way switch (“Stout Switch”). Extend 2 spans of radial 69kV T-line to reach the customer’s substation. **(s2687)**

Total Estimated Transmission Cost: $1.41 Million

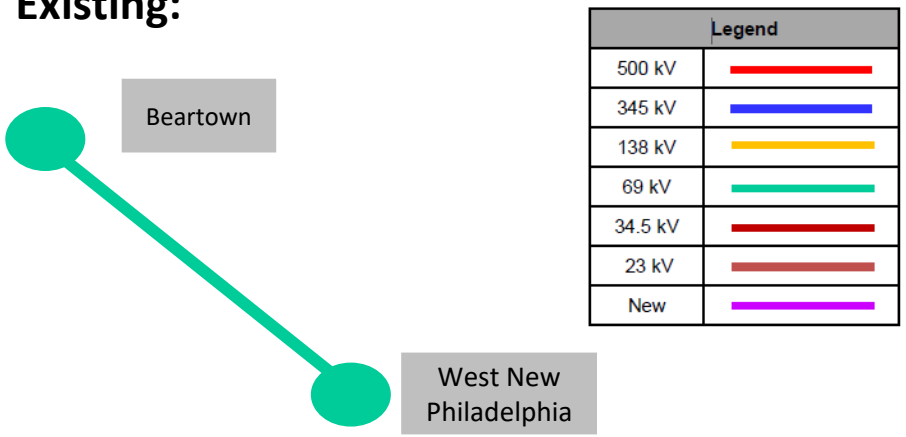
Projected In-Service: 07/01/2022

Supplemental Project ID: s2687

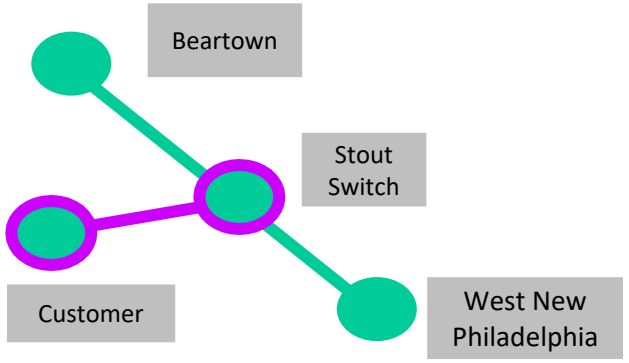
Project Status: Scoping

Model: 2026 PJM RTEP

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Pumpkin Station

Need Number: AEP-2021-OH061

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Previously Presented:
Solution Meeting 01/21/2022
Need Meeting 11/19/2021

Project Driver:

Customer Service; Operational Flexibility and Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs; AEP Connection Requirements (AEP Assumptions Slides 12-13)

Problem Statement:

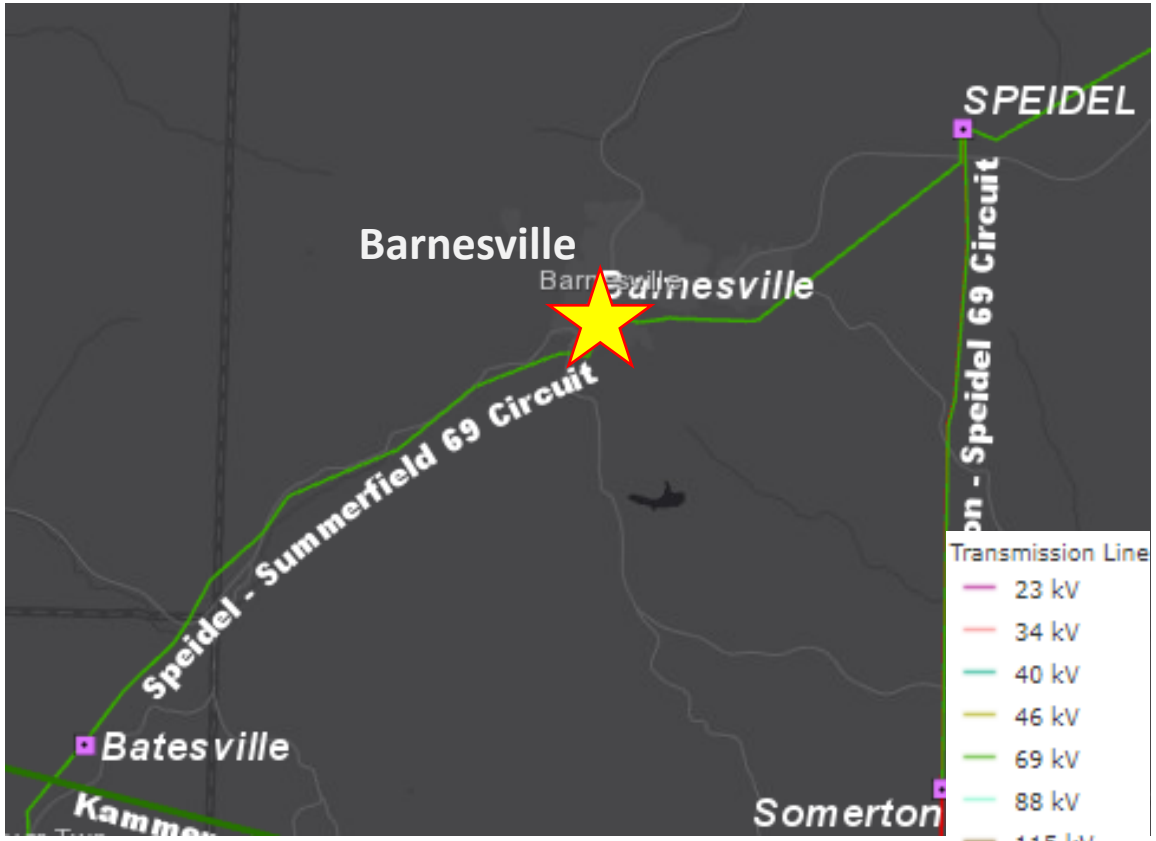
Customer Service:

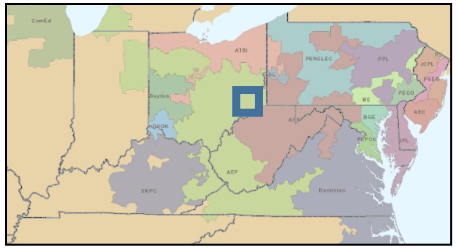
AEP Ohio has requested a new load delivery point due to capacity loading limits at the Barnesville 69/12kV substation. The station is limited by its power transformer and secondary cables. The transformer was manufactured in 1968, has poor oil quality, and has bushing issues reported.

Operational Flexibility and Efficiency:

The station is served radially via a 0.4-mile 69kV tap. This T-line tap dates back to 1942, with original #1 copper conductor, and currently has 2 open conditions. Other projects in the area have proposed to rebuild the remainder of the 69 kV line in the area.

Barnesville has an obsolete MOAB/ground-switch for the transformer protection system. This requires remote-end breaker clearing many miles away, and drops another tapped AEP Ohio distribution station in the process (Batesville).





AEP Transmission Zone M-3 Process
Pumpkin Station

Need Number: AEP-2021-OH061

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 04/25/2022

Selected Solution:

Install a new distribution station ("Pumpkin") adjacent to the 69kV transmission through-path south of Barnesville. Retire Barnesville station. **Estimated Cost $0.83 Million** (does not include Distribution costs for the station) **(s2688.1)**

Retire the 0.4-mile 69kV transmission line tap into Barnesville station. **Estimated Cost: $0.46 Million (s2688.2)**

Loop the Speidel-Summerfield 69kV transmission line into Pumpkin station. **Estimated Cost: $1.38 Million (s2688.3)**

Total Estimated Transmission Cost: $2.67 Million

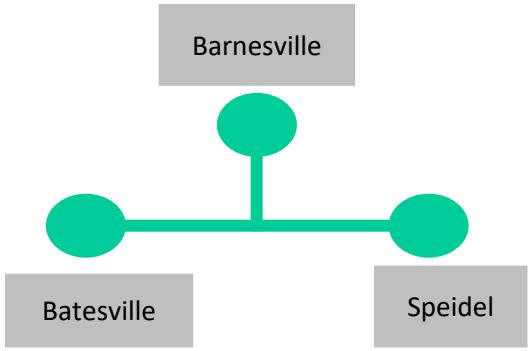
Projected In-Service: 12/01/2023

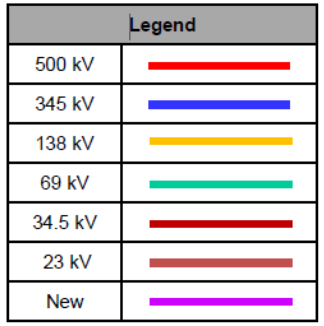
Supplemental Project ID: s2688.1-.3

Project Status: Scoping

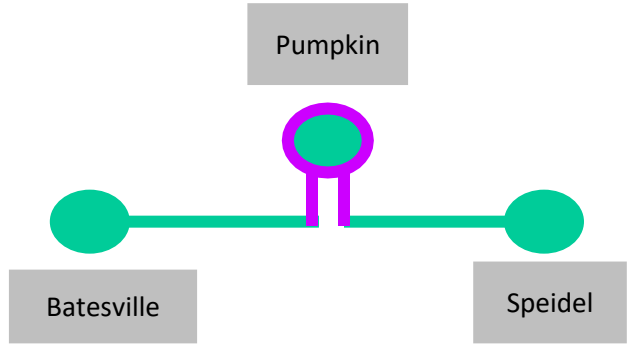
Model: 2026 PJM RTEP

Existing:





Proposed:



AEP Transmission Zone: Supplemental North Bluffton 69kV Load Addition

Need Number: AEP-2021-IM013

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Previously Presented:
Solutions Meeting 2/18/2022
Needs Meeting 03/19/2021

Supplemental Project Driver: Customer Request

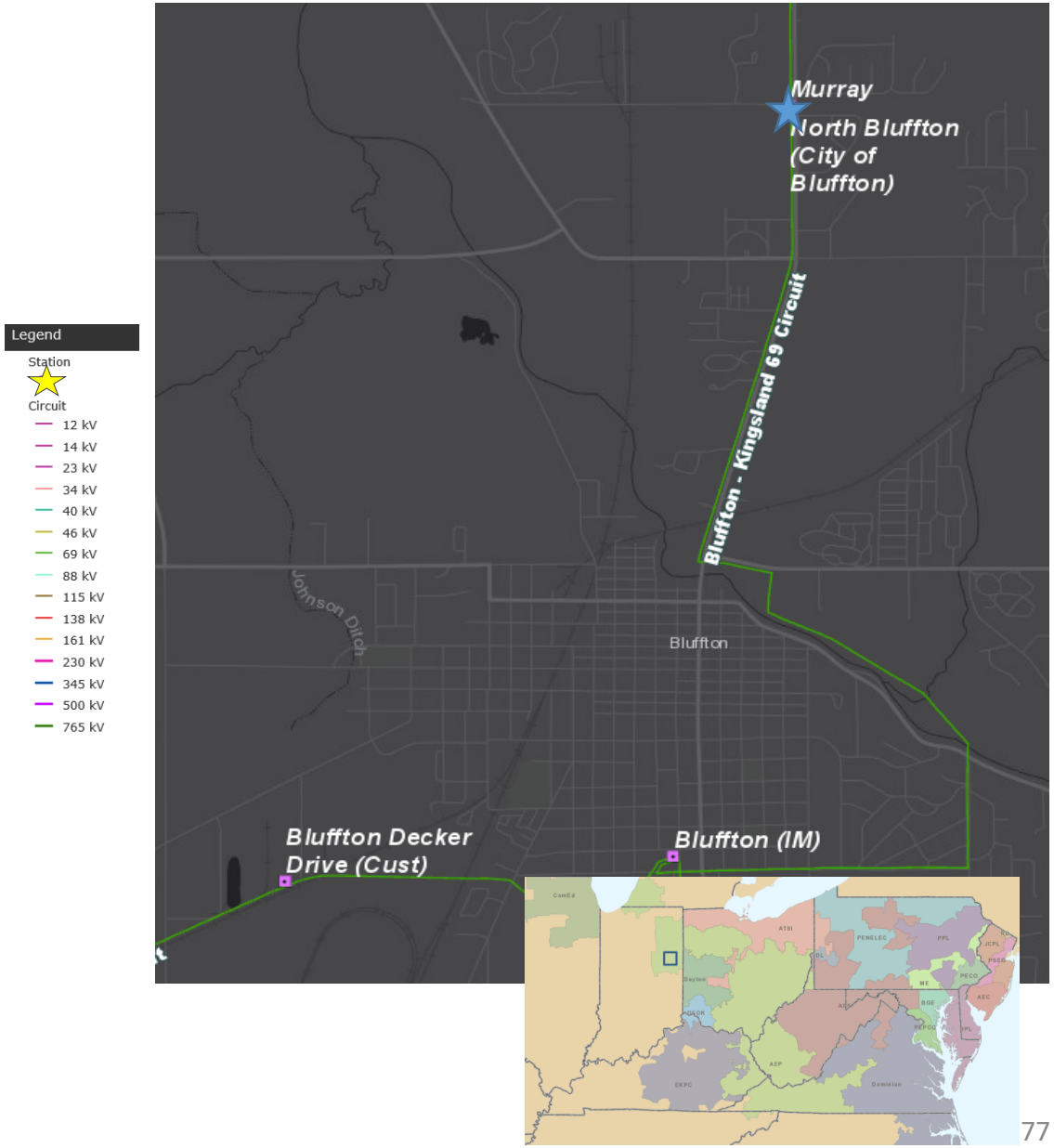
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 12)

Problem Statement:

North Bluffton 69kV

- City of Bluffton has requested an expansion to their delivery point to serve a new 5MW load increase by November 1, 2021

Model: 2025 RTEP



AEP Transmission Zone: Supplemental

•North Bluffton 69kV Load Addition

Need Number: AEP-2021-IM013

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Solution:

North Bluffton 69kV Switch:
Install a new Switchpole to feed the new North Bluffton 69kV XFR.
Estimated Cost: $0.3M (s2690.1)

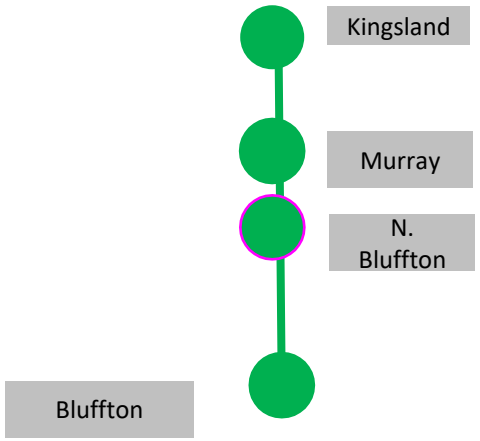
Kingsland – Bluffton 69kV:
Cut the new pole at North Bluffton into the 69kV line.
Estimated Cost: $0.3M (s2690.2)

Total Estimated Cost: $ 0.6 Million

Projected In-Service: 02/21/2022

Supplemental Project ID: s2690.1-.2

Project Status: Scoping



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

AEP Transmission Zone M-3 Process
Babbitt 138 kV

Need Number: AEP-2021-OH058

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Previously Presented:
Solutions Meeting 2/18/2022
Need Meeting 11/19/2021

Project Driver:

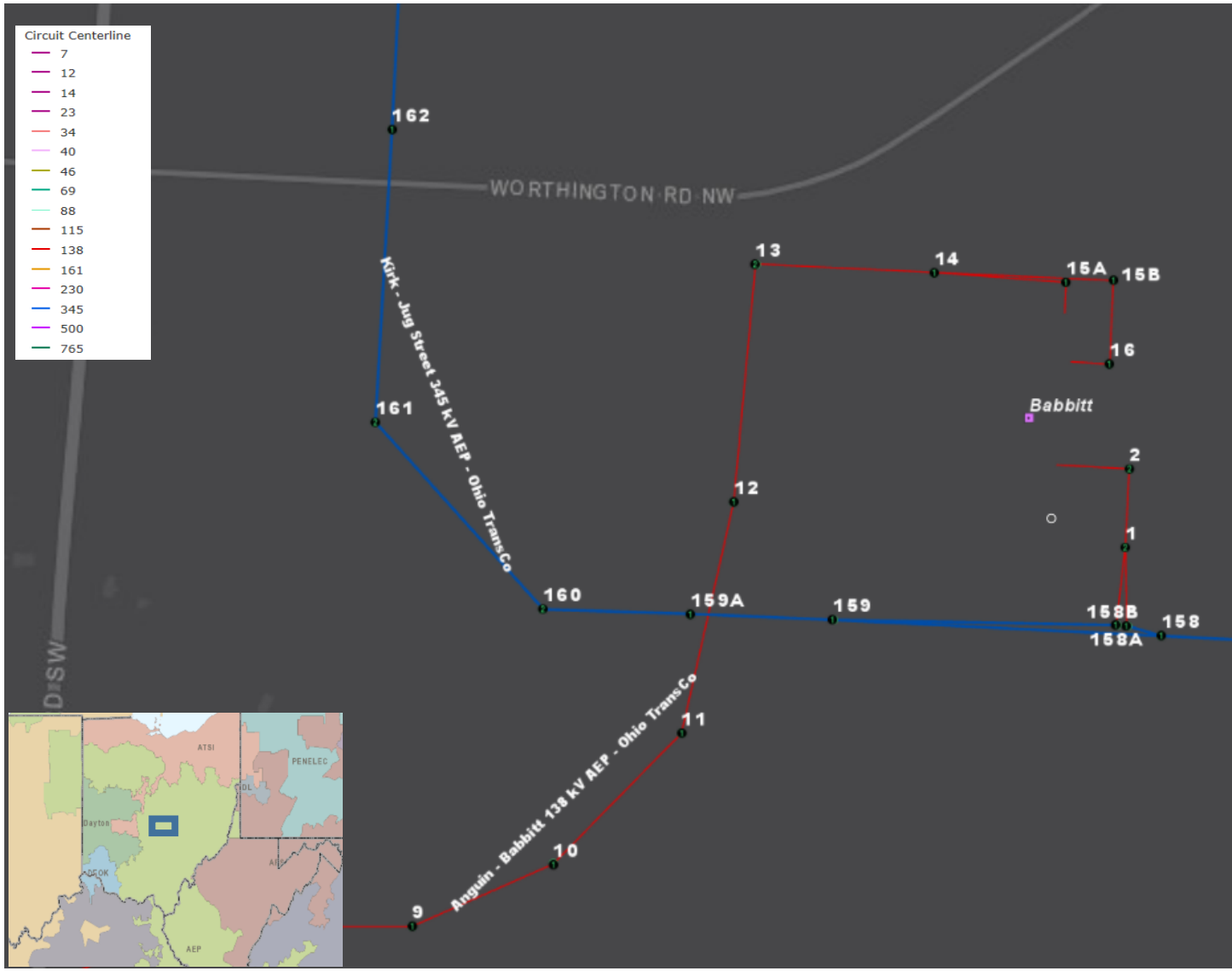
Customer Service

Specific Assumption Reference:

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

Problem Statement:

- AEP Ohio has requested a permanent capacity arrangement at Babbitt Station to replace the temporary skid station installed that is currently feeding long term load.
- **Model:** 2025 RTEP



AEP Transmission Zone M-3 Process
Babbitt 138 kV

Need Number: AEP-2021-OH058

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Solution:

- **Babbitt 138 kV station:** Install (1) 138 kV 4000 A 63 kA circuit breaker & breaker control relays to accommodate the installation of a new 138/34.5 kV distribution bank at the station. **Estimated Cost: $0.7M** (Cost does not include the distribution scope of work to install the new permanent transformer) **(s2691)**

Total Estimated Transmission Cost: $0.7M

Projected In-Service: 9/01/2023

Supplemental Project ID: s2691

Project Status: Scoping

Model: 2025 RTEP

AEP Transmission Zone: Supplemental
Lynchburg, VA Area

Need Number: AEP-2021-AP030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

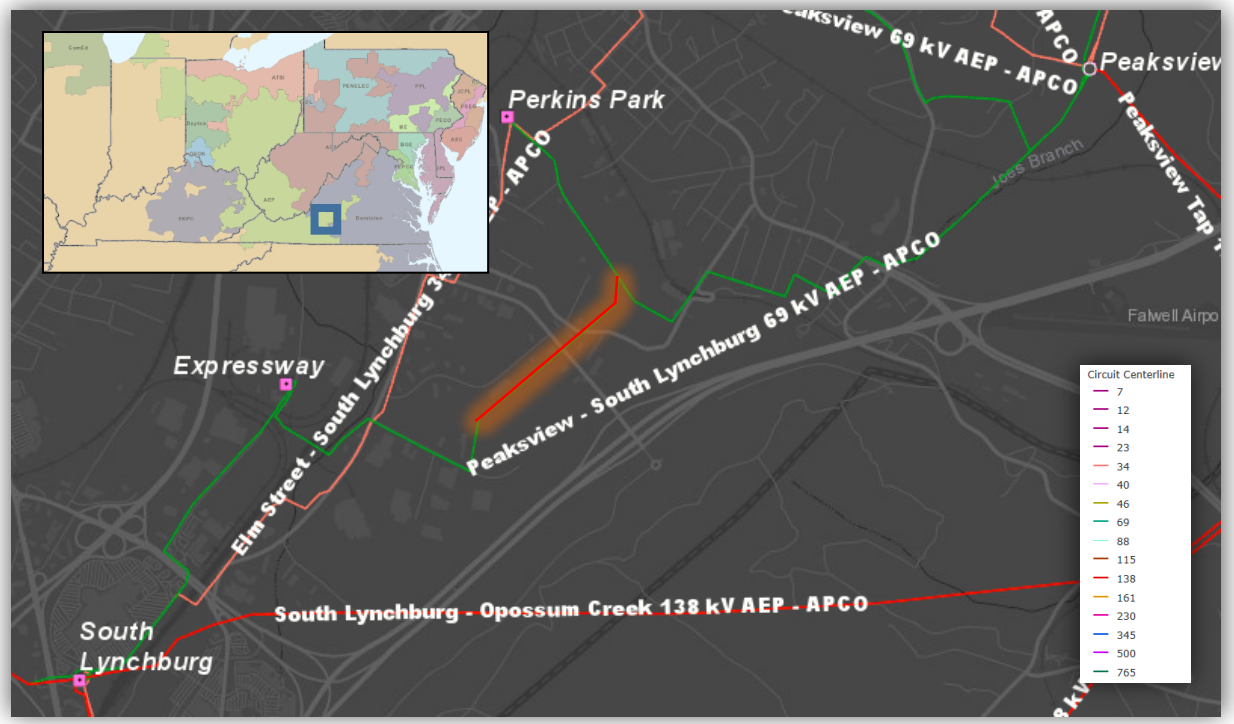
Previously Presented:
Solution Meeting 02/18/2022
Needs Meeting 09/17/2021

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

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

Problem Statement:

- **Peaksview-South Lynchburg 69 kV Line Asset**
  - 0.63 miles of 4/0 COPPER 7 conductor is 1938 vintage
  - Structures 443-43 to 443-49 are all wood poles
    - Structure 48 is 2004 vintage
    - 1 of the 3 poles of Structure 443-49 is 2001 Vintage
    - 2 Open Structural Conditions on this section (woodpecker damage and corroded cross-arms)
- **Performance**
  - 4 Permanent Outages for 37.5 Total Hours
    - 180,000 Customer Minutes of Interruption (CMI)
  - 16 Momentary Outages - Lightning (7), Distribution (3), Unknown (2), Station Insulator (1), Other Station Equipment (1), Animal (1) & Other (1)
  - Operational studies identified thermal overloads of this line section during upcoming scheduled construction outages in the area. Addressing the 4/0 COPPER section will allow for upcoming outages to continue without risk to load served in the area.



Need Number(s): AEP-2021-AP030

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Solution:

Expressway-Perkins Park 69 kV

- Rebuild ~0.63 miles of 4/0 copper between Expressway and Perkins Park Tap 69 kV (Str.443-43 to Str. 443-49) **($1.71 M) (s2692)**

Ancillary Benefits:

Per Energy Delivery Operations, during the beginning of the scheduled fall of 2023 outage when both the Boonsboro – Reusens 138 kV and Graves Mill – Reusens 138 kV lines are out related to PJM supplemental project s2192, the Expressway – Perkins Park 69 kV line section can overload as high as 143% for the loss of the Opossum Creek – South Lynchburg 138 kV circuit. Upgrading the 4/0 Cu overhead conductor will provide additional operational flexibility in order to sustain upcoming scheduled outages.

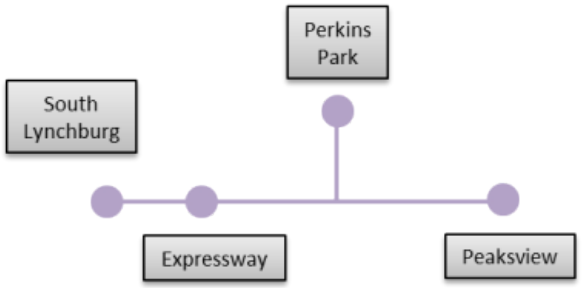
Estimated Cost: $1.71 M (s2692)

Projected In-Service: 10/31/2022

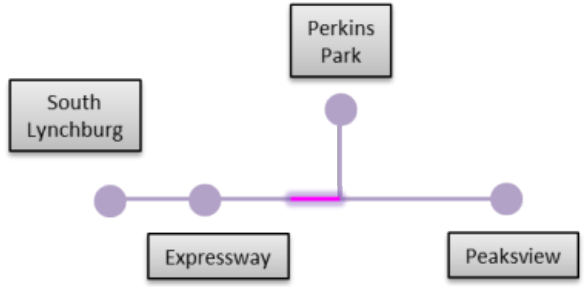
Supplemental Project ID: s2692

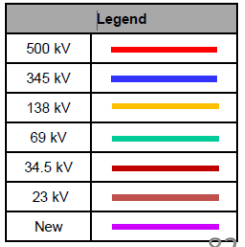
Project Status: Scoping

Existing



Proposed





AEP Transmission Zone M-3 Process
Cabin Creek – London 46 kV Rebuild

Need Number: AEP-2020-AP043

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Previously Presented:
Solutions Meeting 2/18/2022
Need Meeting 11/20/2020

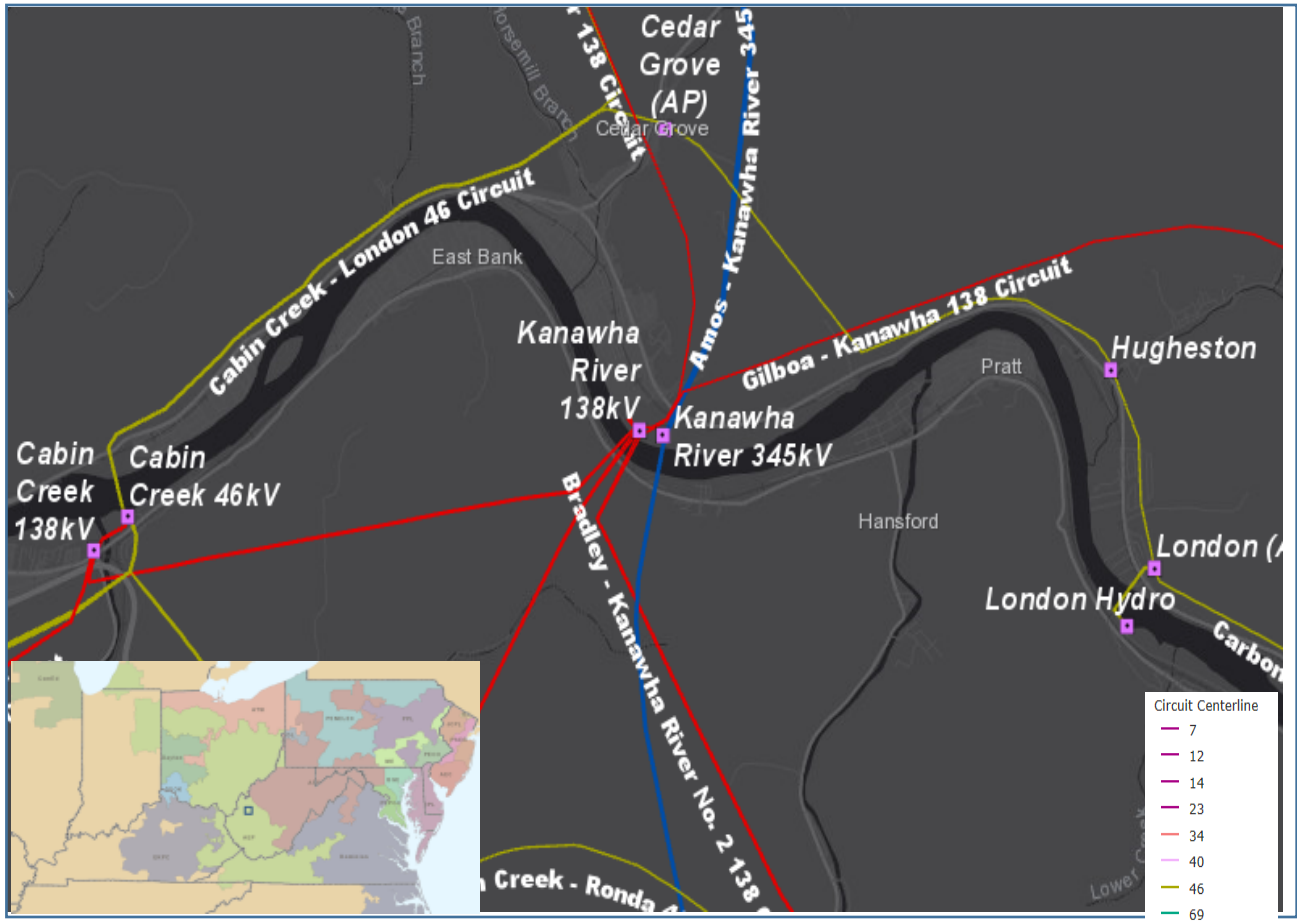
Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Cabin Creek – London 46 kV (8.35 miles)

- Circuit is comprised primarily of 1913 vintage lattice steel (38%), 1999 vintage wood (27%) and 2011 vintage steel (29%)
  - Line was originally constructed in 1913
  - Circuit fails to meet 2017 NESC Grade B loading criteria, AEP structural strength requirements, and fails to meet current ASCE structural strength requirements
  - 4-bell porcelain insulators do not meet current AEP Standards
  - Conductor on the line is primarily 3/0 and 4/0 Copper
  - The circuit is located along the Kanawha River and has a history of landslides
- 9 Structures with at least one open condition (7% of the line)
  - 13 structural conditions include rot top, insect damage, woodpecker holes, bent/damaged steel lacing
- 58 hardware conditions related to rusted/corroded shielding and conductor hardware, broken insulators and guys, worn/cracked conductor hardware
- Since 2014, there have been 9 momentary and 1 permanent outages on the Cabin Creek – London 46 kV circuit
  - Majority of the momentary outages were due to weather including lightning/wind
  - Permanent outages were caused by vegetation fall-in from outside the ROW, flood/slides, lightning/ice/snow
  - Outages resulted in approximately 10k customer minutes of interruption
- There are a significant number of landslides along the length of this line. Known slides have occurred in the last 10 years. The terrain along the line is very rough and mountainous.



AEP Transmission Zone M-3 Process
Cabin Creek – London 46 kV Rebuild

Need Number: AEP-2020-AP045

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Previously Presented:
Solutions Meeting 2/18/2022
Need Meeting 11/20/2020

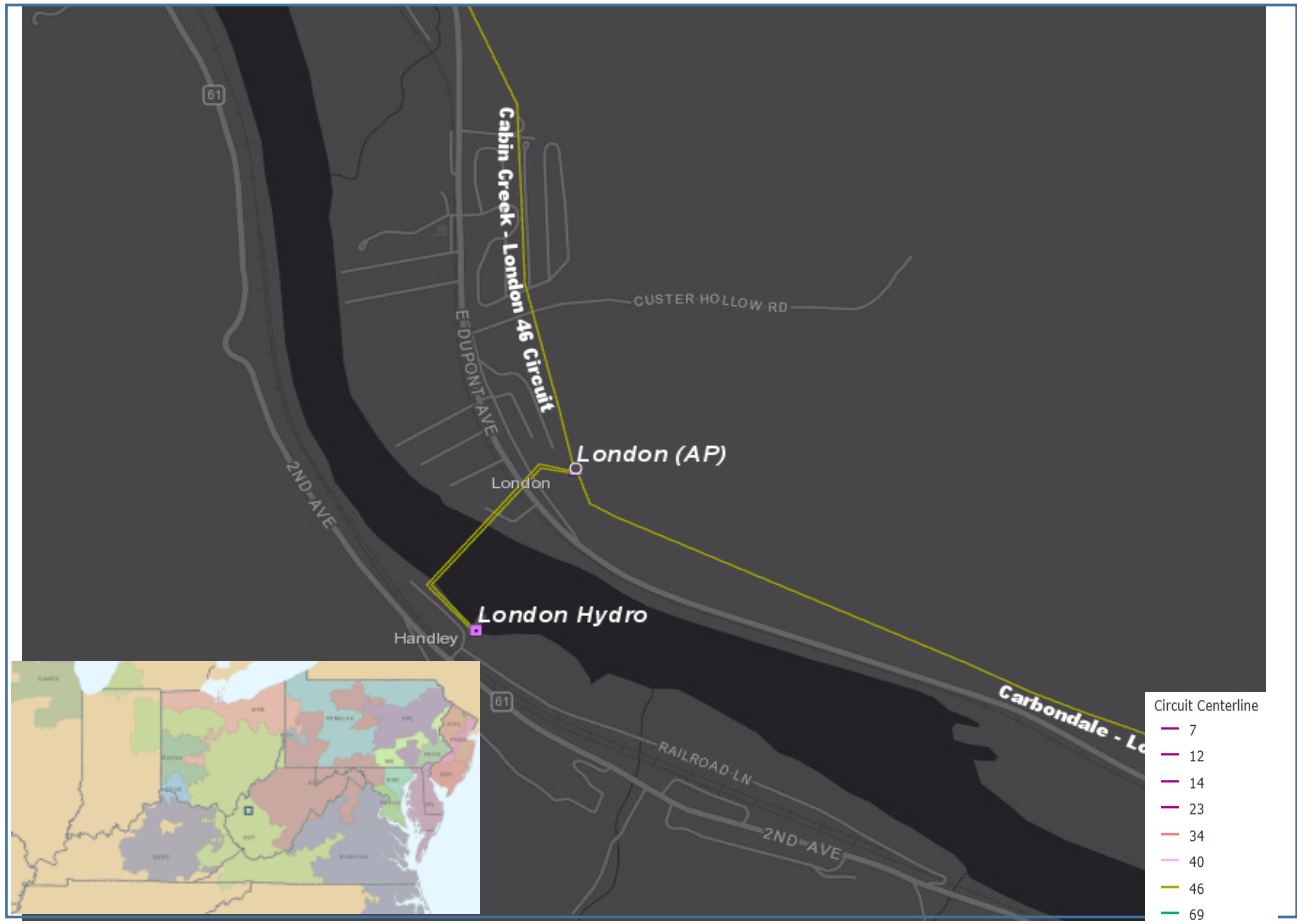
Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

London Station

- 46 kV CB-B
  - 1988 vintage
  - The breaker is oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling. Oil spills are common and can result in significant environmental mitigation costs.
  - 53 total fault operations
- 46 kV CB-F
  - 1968 vintage
  - The breaker is oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling. Oil spills are common and can result in significant environmental mitigation costs.
  - 15 total fault operations
- London station currently deploys 35 relays
  - 33 out of 35 relays are in need of replacement (94%)
  - 28 are electromechanical relays which have significant limitations with regards to fault data collection
  - 5 of the microprocessor relays utilize legacy firmware
- Control House
  - Asbestos/lead paint is present in the control house
- Access road to the station severely limits the ability to deliver large equipment to the station
- 46 kV bus shows significant signs of rust on lattice members and on bolts



AEP Transmission Zone M-3 Process
Cabin Creek – London 46 kV Rebuild

Need Number: AEP-2020-AP043, AEP-2020-AP045

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Solution:

Rebuild approximately 4.5 miles of 46 kV line on the Cabin Creek – London 46 kV circuit (total length approximately 8 miles) in an area where there's larger than standard ROW requirements due to long spans from ridge-ridge and more angle/dead ends required to mitigate landslide risk in rugged terrain. Long access roads due to terrain. **Trans Cost: 17.7M (s2693.1)**

Remove/retire existing Cabin Creek – London (4.5 miles). Helicopter removal will be utilized for existing line to avoid avoiding landslide prone areas. **Trans Cost: 2.3M (s2693.2)**

Retire the existing Hugheston Station **Trans Cost: 0.0M (s2693.3)**

Rebuild London Station in the clear due to space constraints and access concerns. Install four 46 kV circuit breakers in a single bus configuration, DICM and appropriate metering equipment for the adjacent Hydro Plant. **Trans Cost: 8.3M (s2693.4)**

Rebuild approximately 1 mile of double circuit line from the existing London Hydro Station to the new London Station. Due to terrain dead-end structures will be used to construct this section of line. **Trans Cost: 5.4M (s2693.5)**

Rebuild approximately 1 mile of single circuit line on the Carbondale – London 46 kV to accommodate the new London Station location. **Trans Cost: 3.5M (s2693.6)**

Total Estimated Transmission Cost: $37.2M

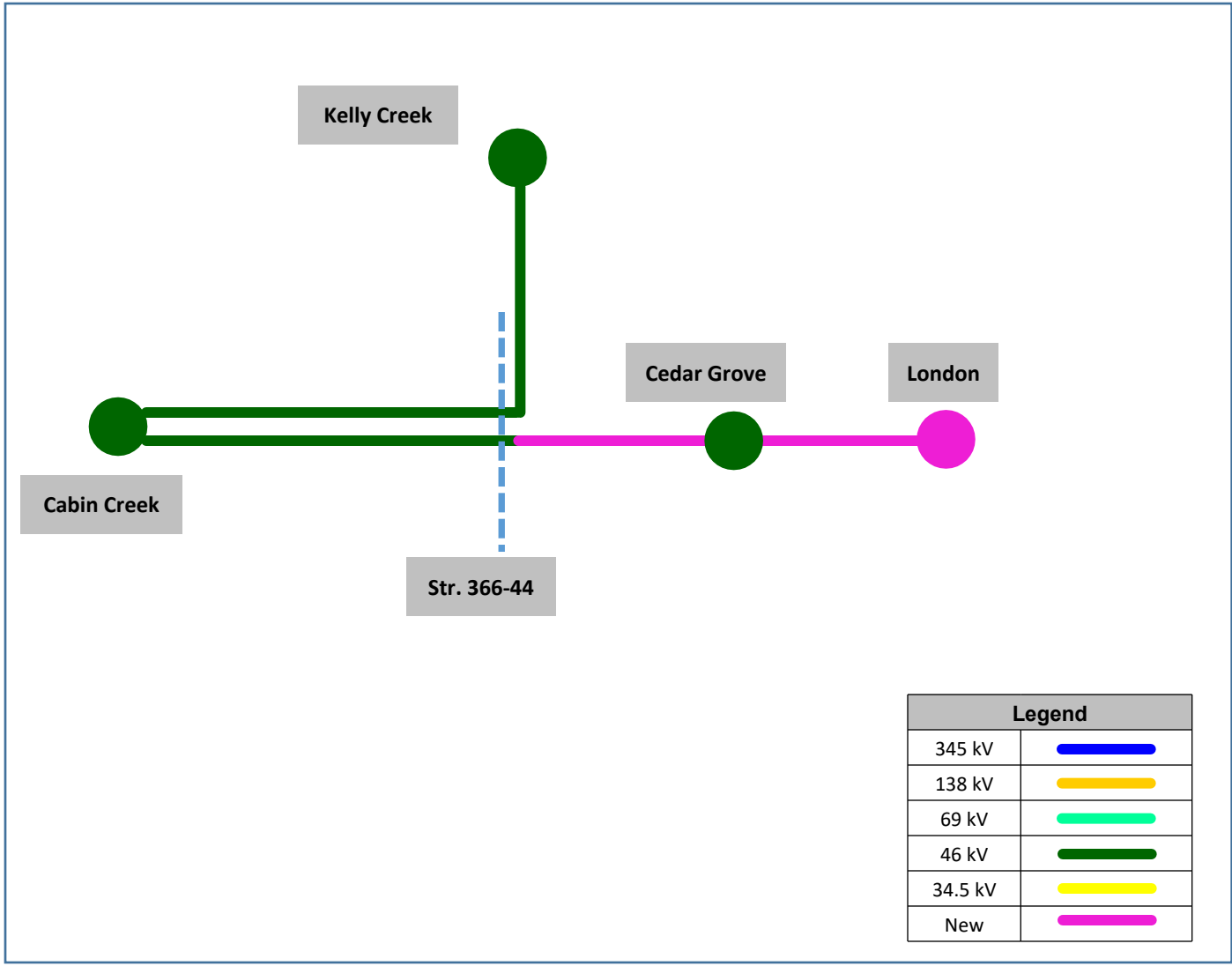
Ancillary Benefits: 4 miles of this line shares towers with the Cabin Creek – Kelly Creek 46 kV line and is already being rebuilt under baseline project B3280

Projected In-Service: 5/1/2025

Supplemental Project ID: s2693.1-.6

Project Status: Scoping

Model: 2025 RTEP



AEP Transmission Zone M-3 Process
Troutville, VA Area

Need Number: AEP-2021-AP001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Previously Presented:
Solutions Meeting 2/8/2022
Needs Meeting 1/6/2021

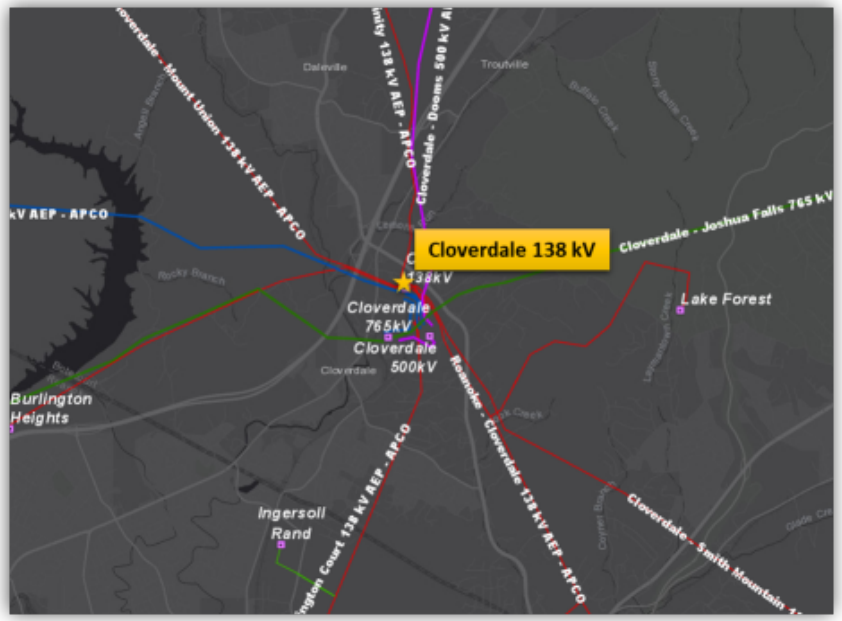
Supplemental Project Driver: Equipment Condition/Performance/Risk

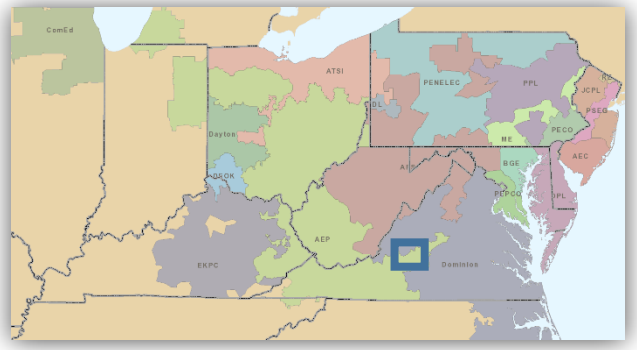
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Cloverdale Station:

- **345/138 kV Transformer #11A**
  - Transformer 11A was manufactured in 1972 with identified upward trending insulation power factor which indicates increased particles in the oil as well as elevated levels of ethylene indicating increased decomposition of the insulating paper materials, decreasing the units ability to withstand electrical faults
  - Unit leaks oil
  - Connected in parallel with transformer 11B; high-side connected directly to 345 kV bus #1 exposing it to faults and scheduled maintenance outages
- **345/138 kV Transformer #11B**
  - Transformer 11B was manufactured in 1997 with increased tertiary bushing power factor indicating capacitive layer deterioration. The change in bushing dielectric data indicates the tertiary bushings are at greater risk of failure or loss of service of the transformer. Also, observed elevated levels of carbon monoxide and carbon dioxide indicates decomposition of the paper insulation that impairs the units ability to withstand future short circuit or through fault events
  - Unit leaks oil
  - Connected in parallel with transformer 11A; high-side connected directly to 345 kV bus #1 exposing it to faults and scheduled maintenance outages
- **345/138 kV Transformer #3**
  - High-side connected to 345 kV bus #2 via Motor Operated Air-Break Switch (MOAB) exposing the bus to momentary transformer fault events
- 31 of the 94 microprocessor relays in the Cloverdale 138 kV Station were commissioned between 2003 and 2020 utilize obsolete firmware
- 69 kV hook-stick circuit breaker and switcher disconnect switches identified in need of replacement with Gang Operated Air-Breaker Switches





AEP Transmission Zone M-3 Process
Troutville, VA Area

Need Number(s): AEP-2021-AP001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 05/04/2022

Solution:

Cloverdale Station

- Replace 345/138 kV Transformer 11A & 11B with new 345/138 kV, 675 MVA Transformer 11 and reconnect to the 138 kV structure via a new 138 kV tie-line with 3 custom single-pole structures outside of the station in order to keep storage/driving space within the station. Install two new 345 kV 5000A 63 kA breakers to connect the new transformer and existing transformer 3 into a string position in the 345 kV yard.
- Replace all 69 kV hook-stick switches new 2000 A GOAB switches.

Total Estimated Transmission Cost: $12.33 M (s2694)

Ancillary Benefits:

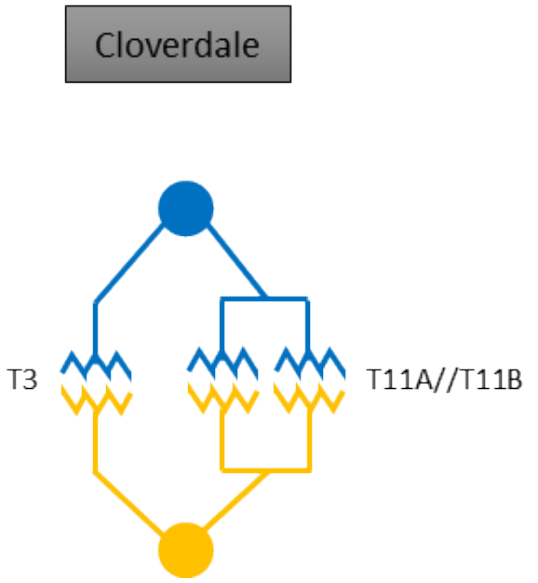
Installation of 2 new 345 kV circuit breakers will allow for the high-side of the new 345/138 kV transformer 11 and the existing 345/138 kV transformer 3 to be located in a breaker and a half position, preventing an outage of the 345 kV buses for loss of either transformer.

Projected In-Service: 10/31/2025

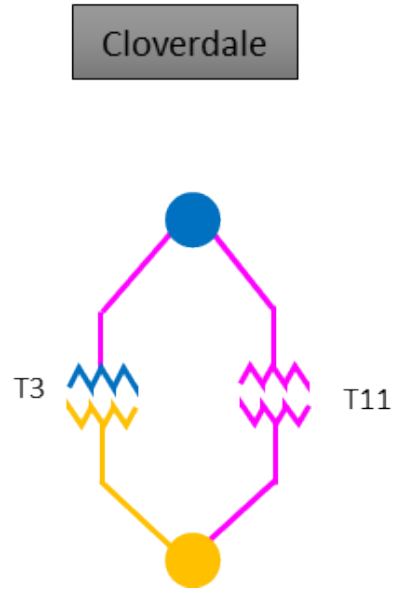
Supplemental Project ID: s2694

Project Status: Scoping

Existing



Proposed



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

AEP Transmission Zone: Supplemental
Danville, VA

Need Number: AEP-2021-AP027

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 8/26/2022

Previously Presented:

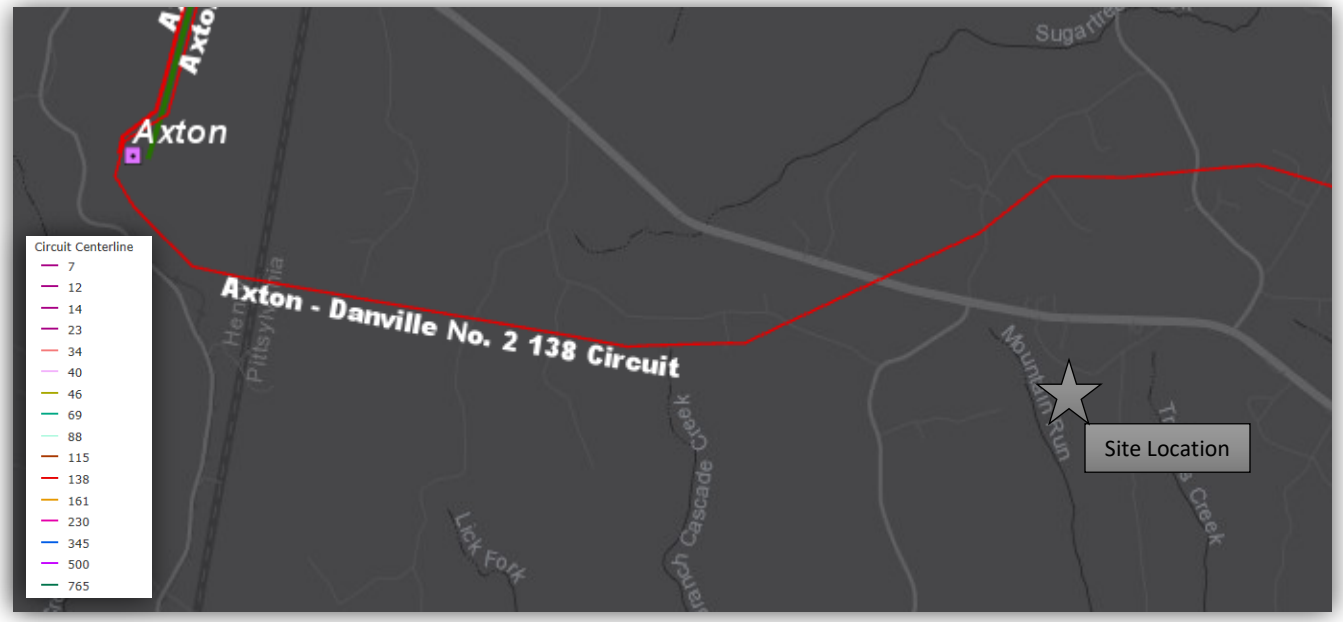
Solutions Meeting 3/18/2022
Needs Meeting 7/16/2021

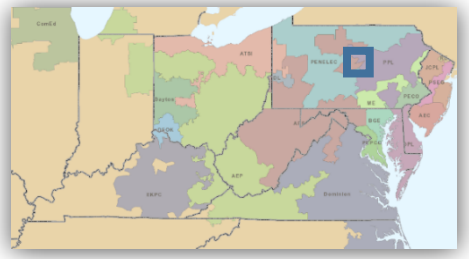
Supplemental Project Driver: Customer Service

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

Problem Statement:

- The City of Danville has requested a new delivery point to feed their West Fork station. The new delivery point will support the City's networked 69 kV system.





AEP Transmission Zone: Supplemental
Danville, VA

Need Number(s): AEP-2021-AP027

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 8/26/2022

Solution:

- Establish new 138 kV Brosville station consisting of 2-138 kV, 3000 A, 40 kA circuit breakers and 138 kV revenue metering. **Estimated Cost: $5.27 M (s2746.1)**
- Install 1.66 miles of greenfield double circuit 138 kV transmission line that will run from the new Brosville Station to the new tap structure being installed on the Axton- Danville No.2 138 kV transmission line. Acquire associated ROW for new double circuit 138 kV line. **Estimated Cost: $5.95 M (s2746.2)**
- Install a tap structure to accommodate the new greenfield transmission line on the Axton-Danville #2 circuit. Acquire associated ROW for new structure as needed. **Estimated Cost: $0.84 M (s2746.3)**
- Berry Hill & Danville remote end relay setting changes and fiber extension to Brosville. **Estimated Cost: $0.25 M (s2746.4)**

Total Estimated Transmission Cost: $12.31 M

Ancillary Benefits:

Establishing a new delivery point for the City of Danville will provide the reliability and redundancy needed by supporting the three existing delivery points during outage scenarios. Specifically, the Brantley and Rocksprings delivery points cannot support the City's entire load during an outage of the Riverside delivery point. The addition of the proposed Brosville Station will address this issue.

The City of Danville's total peak load is approximately 225 MW, of which ~80 MW is estimated to be served by the new delivery point during peak months and ~50 MW during spring/fall months. The City of Danville serves approximately 15 schools, the only Danville, Virginia hospital, 3 nursing homes and 2 industrial parks.

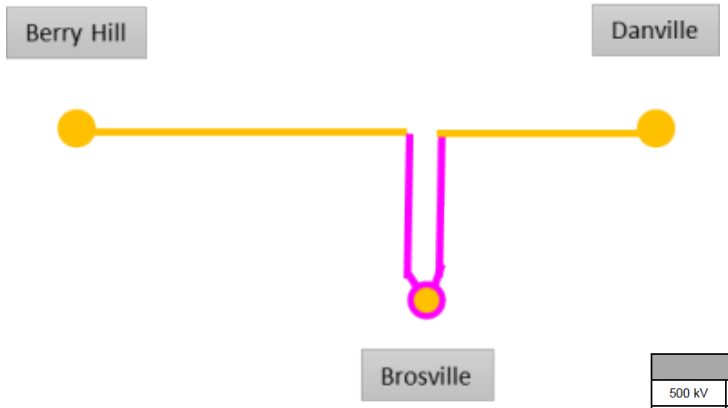
Projected In-Service: 9/1/2023

Supplemental Project ID: s2746.1-.4

Project Status: Scoping

Existing

Proposed



AEP Transmission Zone M-3 Process
Cowan 138 kV Customer Service

Need Number: AEP-2021-IM029

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 8/26/2022

Previously Presented:

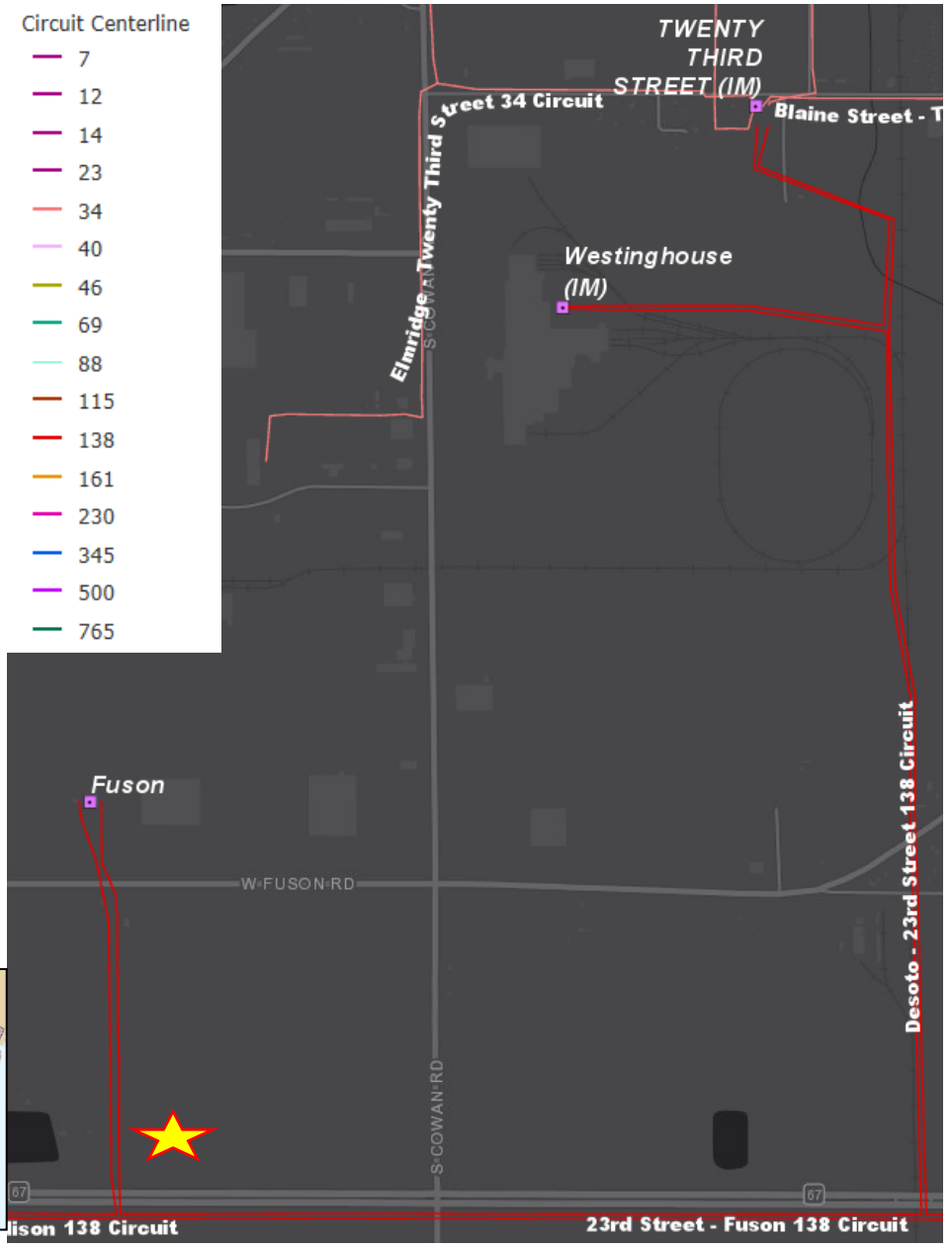
Solution Meeting 3/18/2022
Needs Meeting 08/16/2021

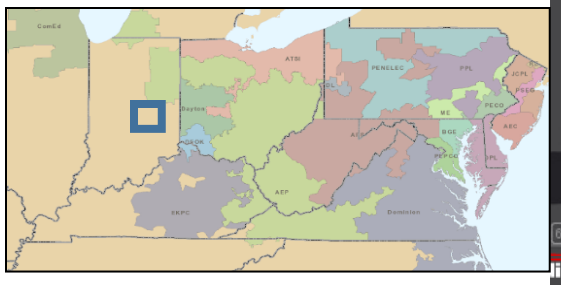
Project Driver: Customer Service

Specific Assumption Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

A customer has requested new transmission service in Muncie, Indiana by March 2022. Anticipated load is 16.16 MVA.





AEP Transmission Zone M-3 Process
Cowan 138 kV Customer Service

Need Number: AEP-2021-IM029

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 8/26/2022

Solution:

Cowan 138 kV: Install a new 138 kV four circuit breaker ring bus, 2-138 kV revenue metering, fiber and relaying. **Estimated Cost: $7 M (s2747.1)**

Cowan 138 kV North Extension and Right of way: Install ~0.1 mi of 138 kV single circuit with the conductor size 795 ACSR 26/7 Drake. **Estimated Cost: $0.45 M (s2747.2)**

Cowan 138 kV South Extension and Right of way: Install ~0.1 mi of 138 kV single circuit with the conductor size 795 ACSR 26/7 Drake. **Estimated Cost: $0.45 M (s2747.3)**

Fuson - 23rd Street 138 kV: Replace two structures with dead end structures on the Fuson – 23rd Street 138 kV circuit to connect the Cowan North Extension and Cowan South Extension. **Estimated Cost: $0.66 M (s2747.4)**

23rd Street relay upgrades. **Estimated Cost: $0.3 M (s2747.5)**

Fuson relay upgrades. **Estimated Cost: $0.21 M (s2747.6)**

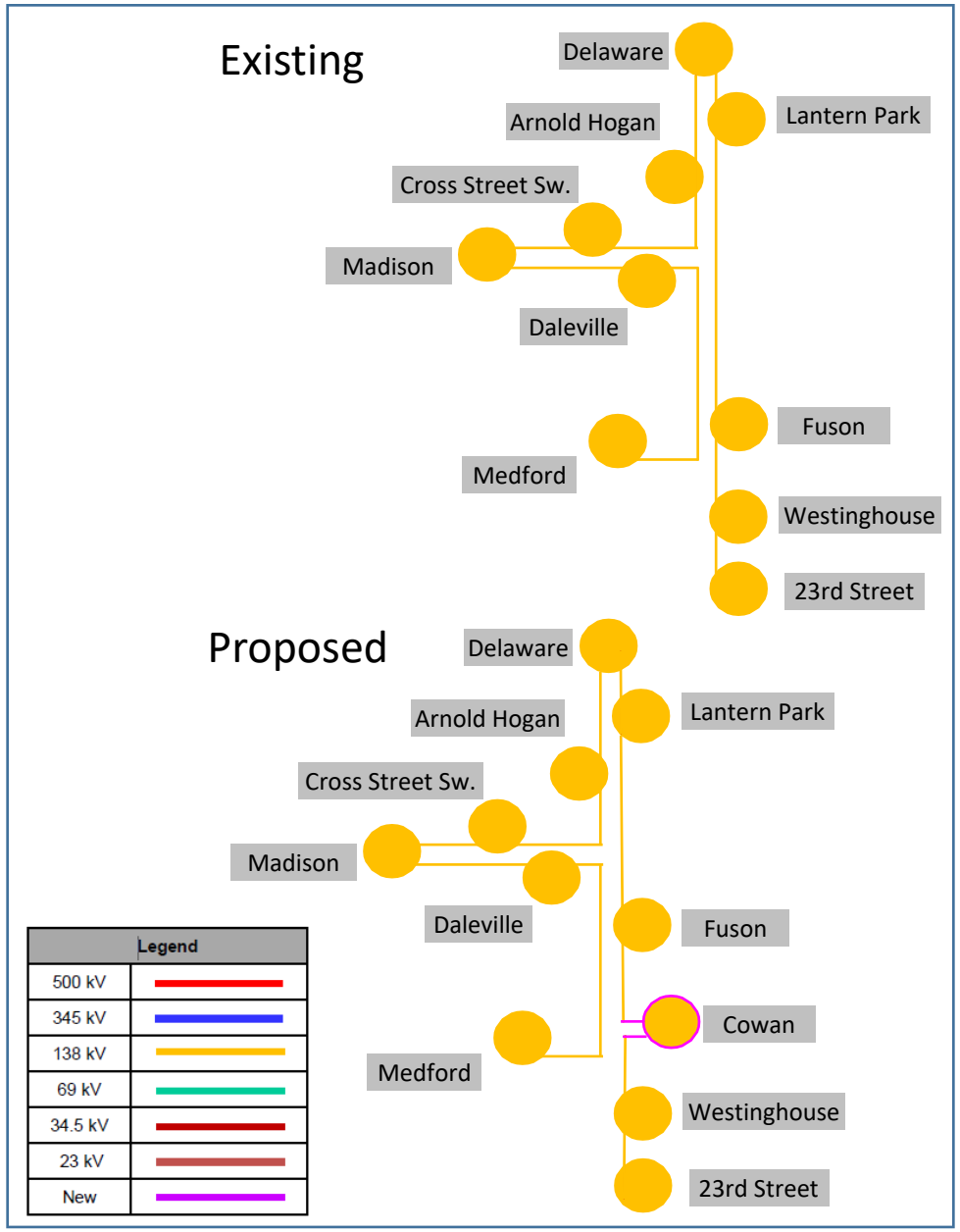
Total Estimated Transmission Cost: $9.07 M

Ancillary Benefits: A ring bus is proposed to serve the two required feeds for the customer. Breakers are also required here to eliminate having more than four automated switches on the circuit. Further, the load to be served (metal processing plant) at Cowan station is extremely sensitive to momentary outages where any momentary outage results in lost product and cleanup costs for any event. A ring bus will eliminate maintenance outages to the customer that would be needed in a straight bus arrangement.

Projected In-Service: 9/22/2022

Supplemental Project ID: s2747.1-.6

Project Status: Scoping



AEP Transmission Zone M-3 Process
Huron County, Ohio

Need Number: AEP-2019-OH034

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 8/26/2022

Previously Presented:

Solutions Meeting 3/18/2022
Needs Meeting 6/17/2019

Supplemental Project Driver: Operational Flexibility, and Customer Service

Specific Assumption Reference:

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

Problem Statement:

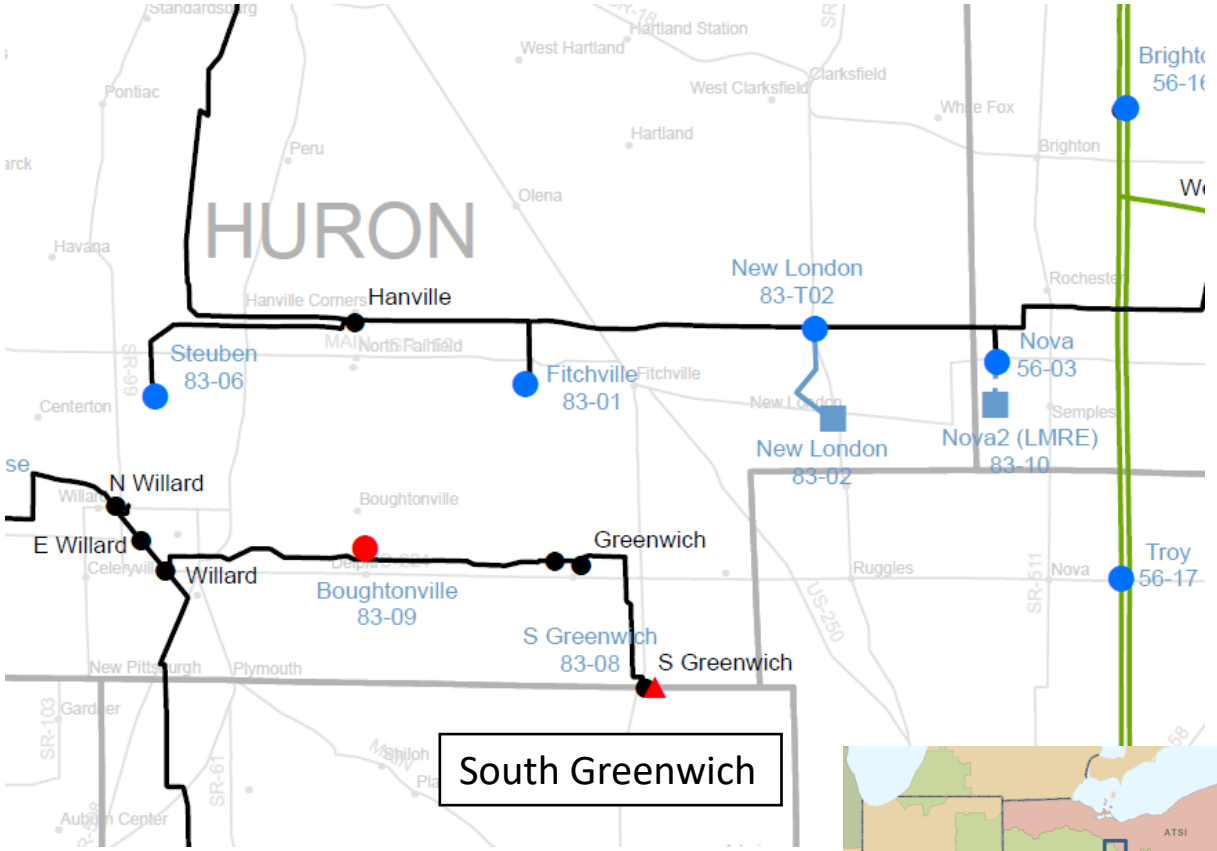
South Greenwich-Willard (vintage 1964)

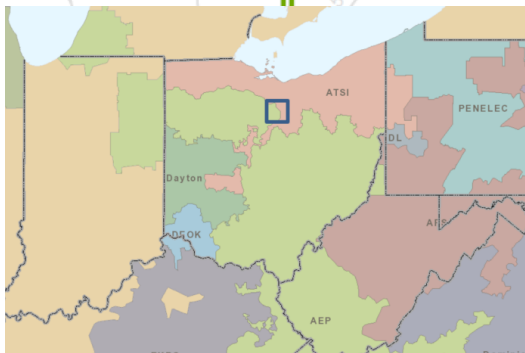
- Length: 15.22 Miles
- Original Construction Type: Wood
- Original Conductor Type: 4/0 ACSR 6/1 (Penguin)
- Momentary/Permanent Outages: 13 in the past 5 years
- Number of open conditions: 77

Open conditions include: Damaged Insulator, Structure, Guy Wire, Ground

- Lead Wire, & Shield Wire

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.





AEP Transmission Zone M-3 Process
Huron County, Ohio

Need Number: AEP-2019-OH034

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 8/26/2022

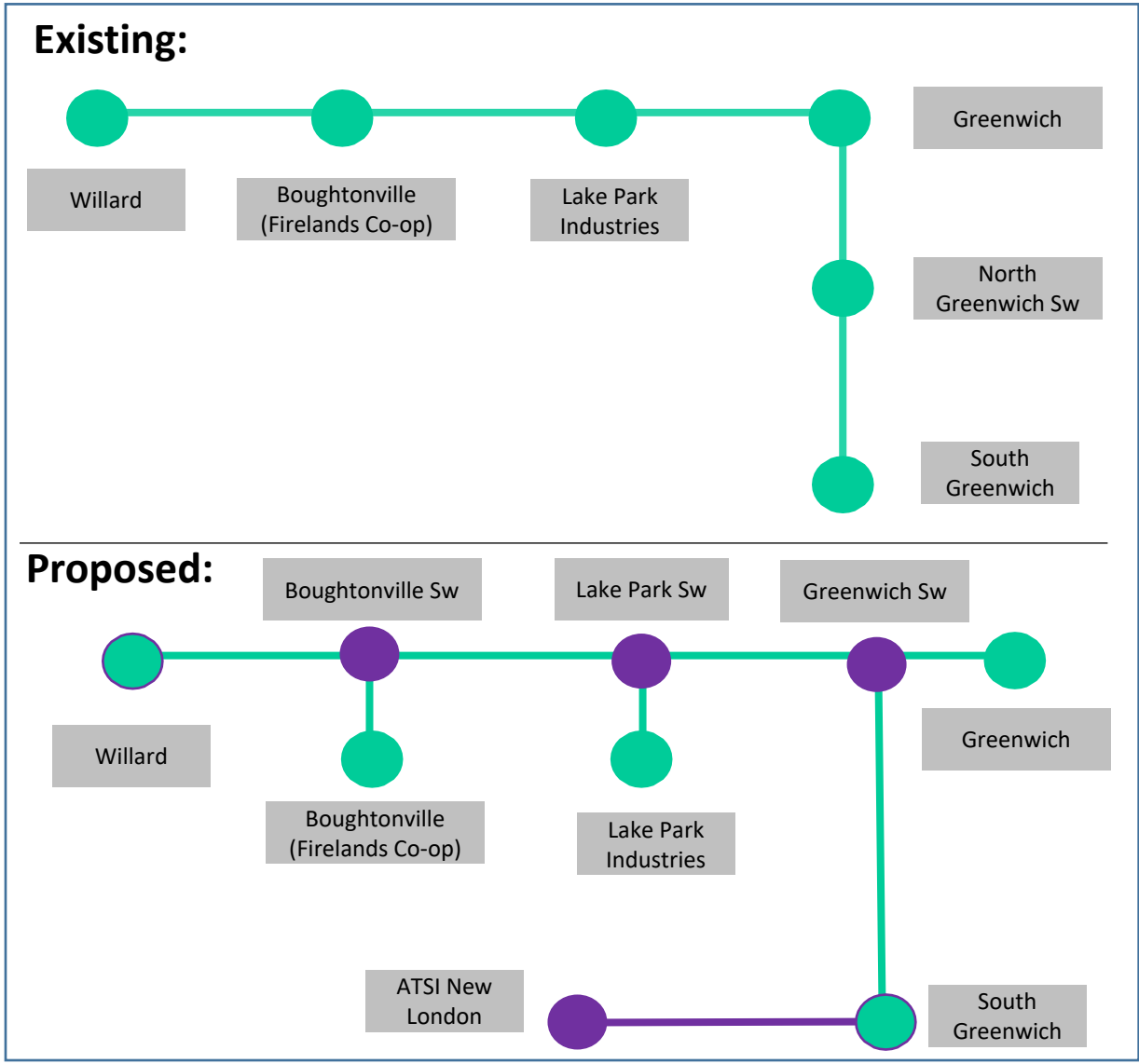
Solution:

AEP Scope:

- Install a new 3-way POP Switch (Boughtonville Sw) and 69 kV metering to address the hard tap to Firelands' Boughtonville station. **$0.75 M (s2748.1)**
- Install a new 3-way POP Switch (Lake Park Sw) and 69 kV metering to address the hard tap to Lake Park Industries. **$0.76 M (s2748.2)**
- Install a new 3-way POP Switch (Greenwich Sw) to address the hard tap to the Village of Greenwich's Greenwich station **$0.6 M (s2748.3)**
- Remove North Greenwich Switch**. $0.07 M (s2748.4)**
- Construct ~ 10.4 miles of new 69 kV line between South Greenwich and ATSI's New London delivery point using 556 ACSR conductor to give the existing radial line looped transmission service . **$18.0 M (s2748.5)**
- Install a box bay and two new 69 kV 3000A 40kA breaker at South Greenwich to accommodate the new line to New London (ATSI). **$3 M (s2748.6)**
- Remove the existing 69kV bypass line at Willard station. **$0.32 M (s2748.7)**

Cost estimate: $23.5 M

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



ATSI Transmission Zone M-3 Process
New London 69 kV Project

Need Number: AEP-2019-OH034

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 8/26/2022

Solution:

ATSI Scope:

- Build a new four breaker 69 kV ring bus substation adjacent to the Fireland's New London distribution substation
- Acquire the Fireland 69 kV tap (~2 miles) and rebuild as a double circuit into the new ring bus and loop in/out the Hanville-Wellington 69 kV line.
- Serve the Firelands New London distribution substation from the new ring bus substation.
- Transfer the existing Firelands New London revenue metering from the existing location (line) into the Firelands New London distribution substation at the transformer high side within the zone of protection.
- Install new 69 kV tie line revenue metering equipment at the new ring bus substation exit to South Greenwich (AEP)
- Upgrade/adjust relaying at Hanville and Wellington
- Upgrade terminal equipment at Wellington

Transmission Line Ratings:

- Hanville-New London 69 kV Line
  - Before Proposed Solution: N/A
  - After Proposed Solution: 100 MVA SN / 121 MVA SE
- New London-Wellington 69 kV Line
  - Before Proposed Solution: N/A
  - After Proposed Solution: 100 MVA SN / 121 MVA SE
- New London-South Greenwich (AEP) 69 kV line
  - Before Proposed Solution: N/A
  - After Proposed Solution: (AEP) 102 MVA SN / (AEP) 142 MVA SE

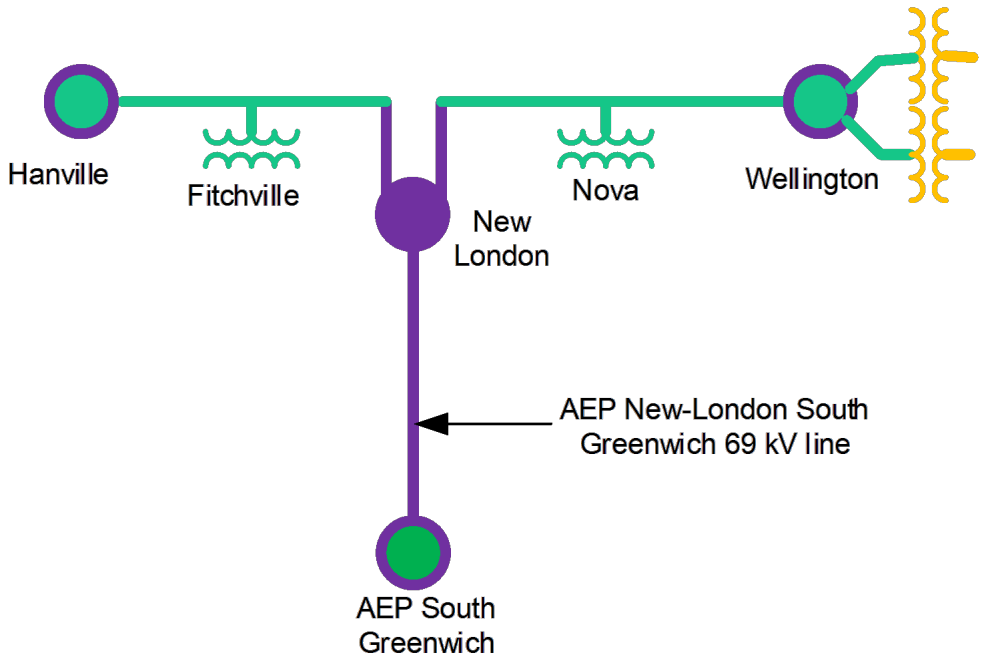
Estimated ATSI Project Cost: $10.0M (s2748.8)

Status: Conceptual

Projected In-Service: 9/3/2025

Supplemental Project ID: s2748.1-.8

Project Status: Scoping



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

AEP Transmission Zone M-3 Process
North Columbus, OH

Need Number: AEP-2021-OH038

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Need Meeting 7/16/2021

Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

Lazelle Station

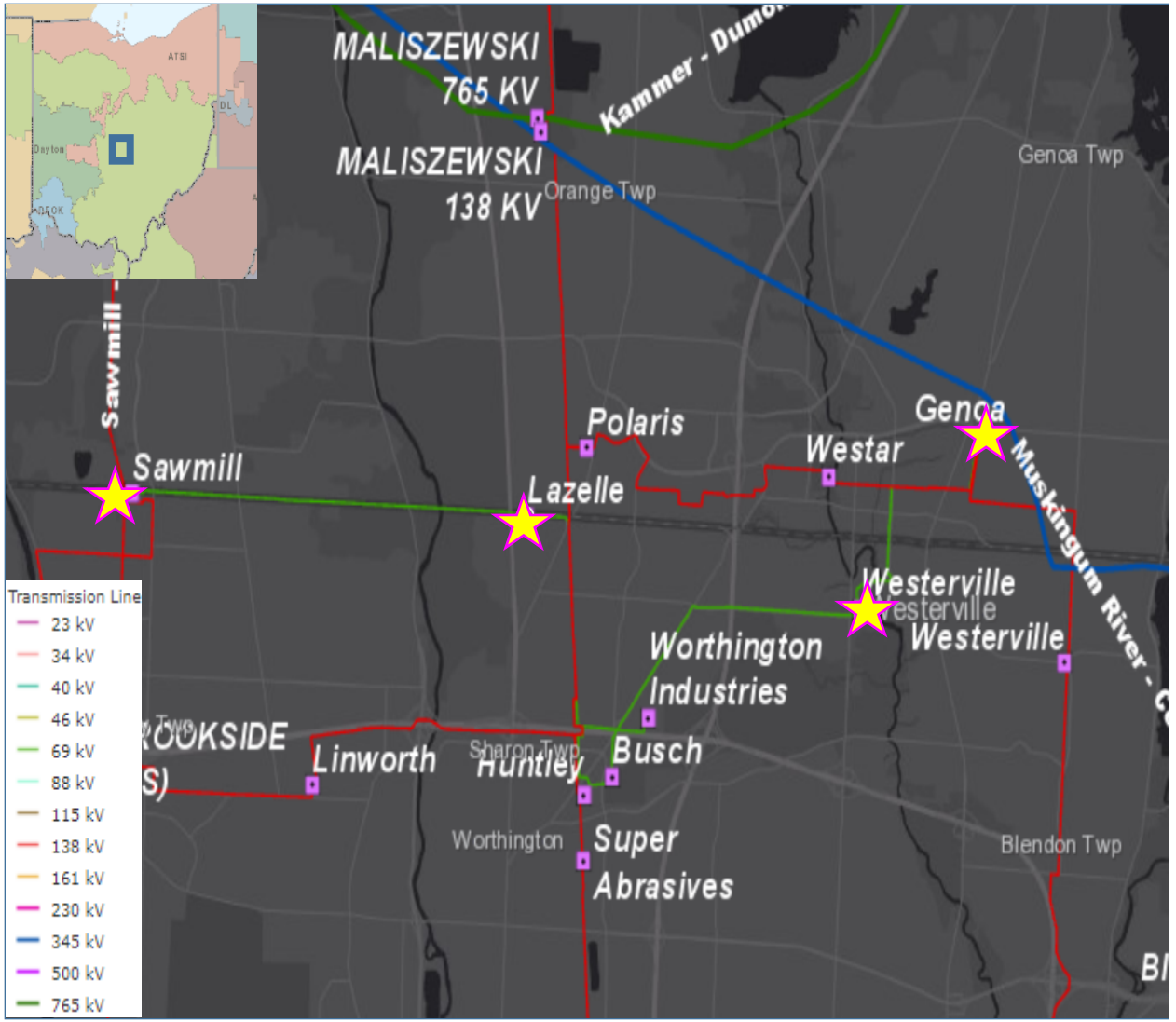
69 kV Circuit Breakers 61 & 62

- Breaker Age: 1967
- Interrupting Medium: Oil
- Fault Operations: 11 (CB-61)
- Manufacturer recommended Number of Operations: 10
- The manufacturer provides no support for these units and spare parts are increasingly more difficult to obtain. Signs of internal flashovers are present and heavy rust is showing on the breaker itself.
- 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.

Westerville Station

69 kV Circuit Breakers 62 & 63

- Breaker Age: 1967
- Interrupting Medium: Oil
- Fault Operations: 22 (CB-63)
- The manufacturer provides no support for these units and spare parts are increasingly more difficult to obtain. Signs of internal flashovers are present and heavy rust is showing on the breaker itself.
- 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.



Genoa Station

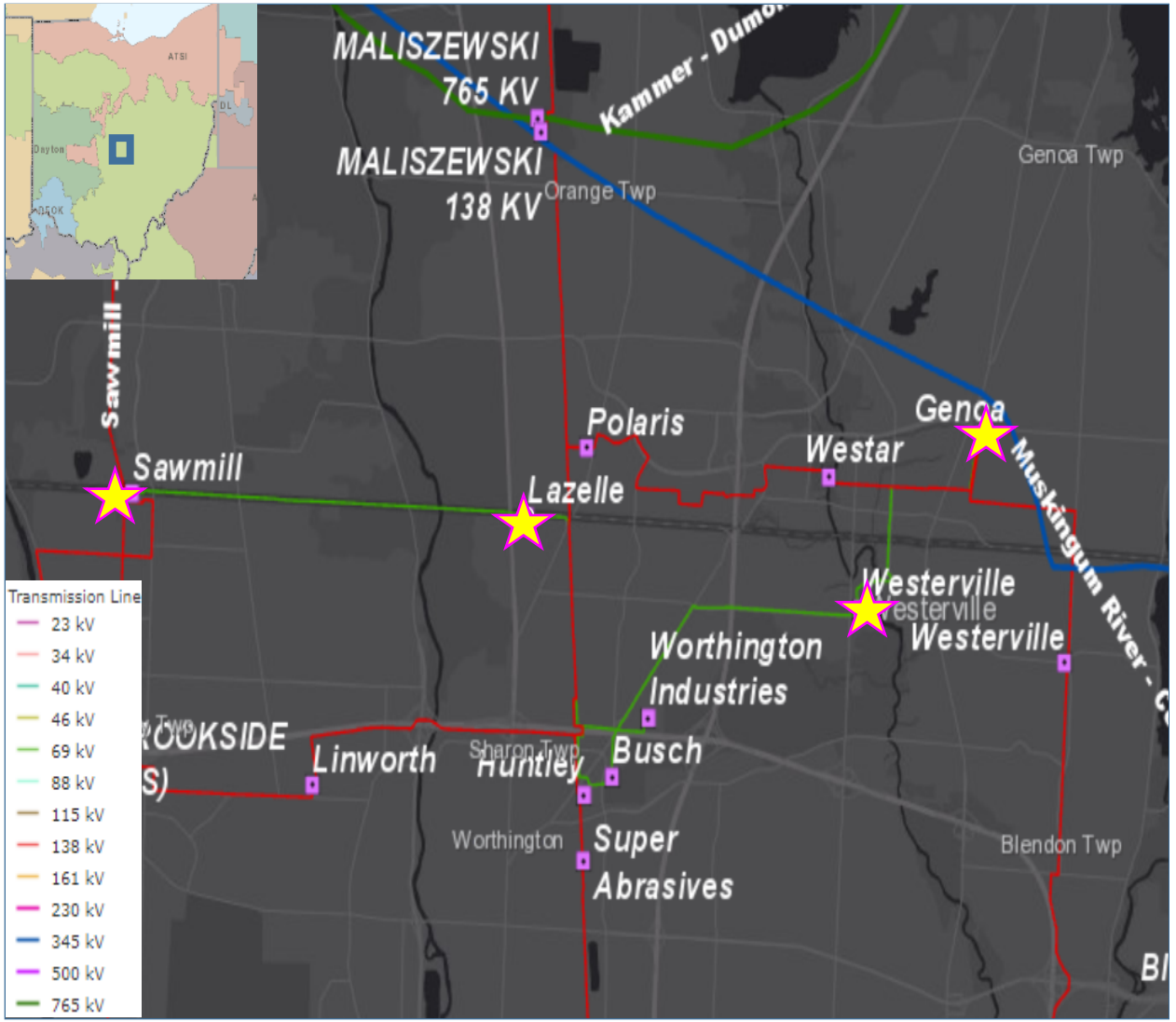
69 kV Circuit Breaker 64

- Breaker Age: 1967
- Interrupting Medium: Oil
- Fault Operations: 15 (CB-64)
- Manufacturer recommended Number of Operations: 10
- The manufacturer provides no support for these units and spare parts are increasingly more difficult to obtain.
- 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.

Sawmill Station

69 kV Circuit Breaker B

- Breaker Age: 1989
- Interrupting Medium: Oil
- 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.
- The manufacturer provides no support for the family of circuit breakers and spare parts unavailable.
- This model family has experienced major malfunctions associated with their hydraulic mechanisms, eventually leading to failure.



Need Number: AEP-2021-OH038

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- **Lazelle 69 kV Station:** Replace 69kV circuit breakers 61 and 62 with 3000A 40kA breakers and associated equipment and relaying. **Estimated Cost: $0.62M (s2770.1)**
- **Sawmill 138kV Station:** Replace 69kV circuit breaker B with 3000A 40kA breaker and associated controls. **Estimated Cost: $0.4M (s2770.2)**
- **Westerville 69kV Station:** Replace 69kV circuit breakers 62 and 63 with 3000A 40kA breakers and associated equipment and relaying. **Estimated Cost: $0.44M (s2770.3)**
- **Genoa 138kV Station:** Replace 69kV circuit breaker 64 with 3000A 40kA breaker. **Estimated Cost: $0.28M (s2770.4)**
- **Hyatt Telecom Site:** Install Telecom site with CES SFP to communicate with Lazelle station. **Estimated Cost: $0.04M (s2770.5)**

Total Estimated Transmission Cost: $1.78M

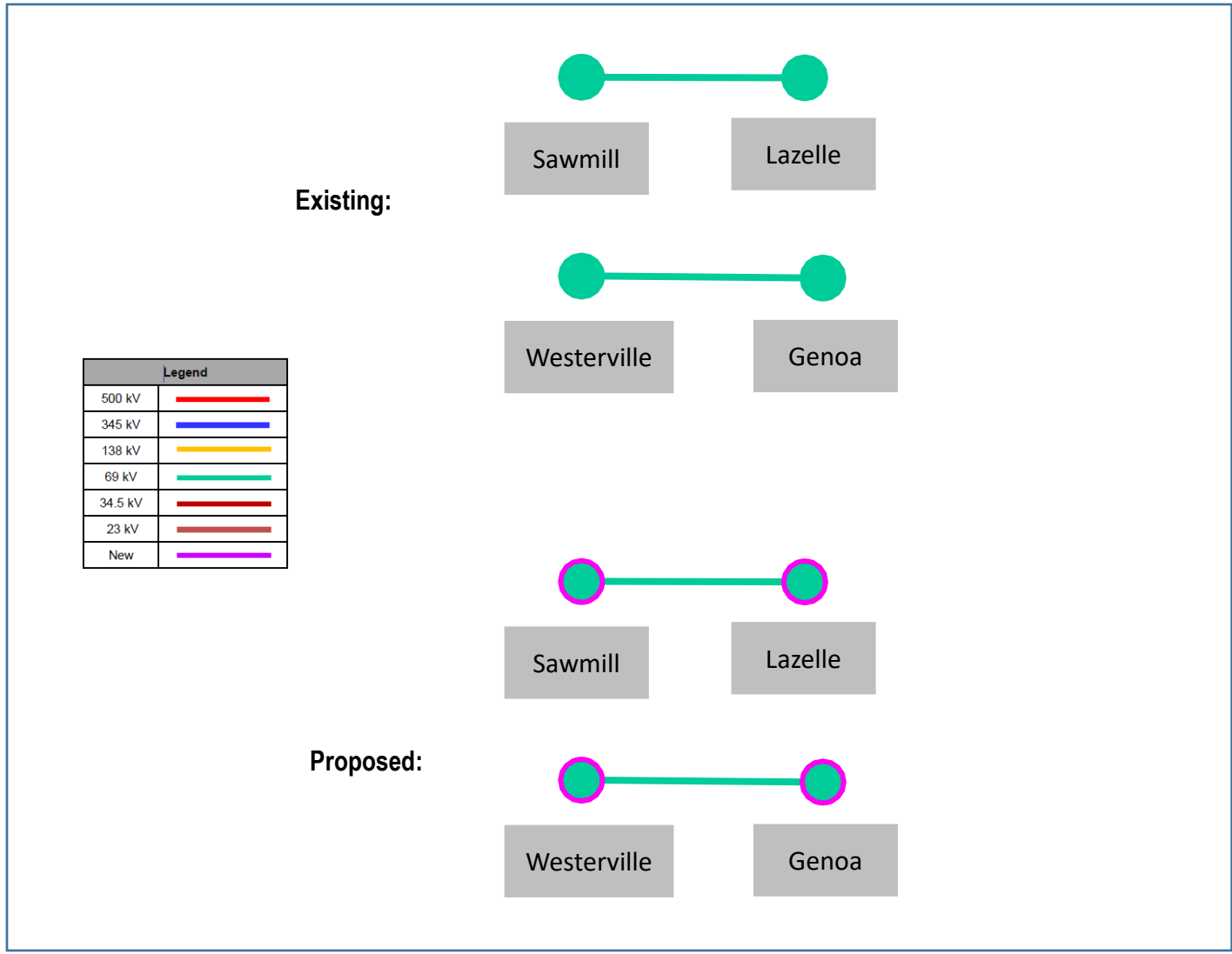
Additional Info: The supplemental work will be performed alongside the baseline scope of work (**B3297**) which includes rebuilding ~4.23 miles of 69 kV line between Sawmill and Lazelle station as well as replacing risers and switches. Further, partial rebuild ~1.94 miles of 69kV Line between Westerville and Genoa stations as well as replacing risers and switches.

Projected In-Service: 6/1/2025

Supplemental Project ID: s2770.1-.5

Project Status: Scoping

Model: 2026 RTEP



AEP Transmission Zone M-3 Process
Bradley – Layland 69 kV Project

Need Number: AEP-2020-AP042

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Need 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:

Bradley – Layland 69 kV (14.25 miles)

- Circuit is comprised mostly of wood pole structures
  - 1930s vintage structures (81%)
  - Circuit fails to meet 2017 NESC Grade B loading criteria, AEP structural strength requirements, and fails to meet current ASCE structural strength requirements
  - 4-bell porcelain insulators do not meet current AEP Standards
- 39 structures with at least one open condition (38% of the structures)
  - Structure conditions include rot top, insect damage, woodpecker holes
- Since 2014, there have been 30 momentary and 23 permanent outages on the Bradley - Layland 69 kV circuit
  - Majority of the momentary outages were due to weather including lightning/wind
  - Outages resulted in approximately 984k customer minutes of interruption

AEP Transmission Zone M-3 Process
Bradley – Layland 69 kV Project

Need Number: AEP-2020-AP042

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

Retire the existing Bradley – Layland 69 kV line (approx. 14.3 miles) **Total Estimated Trans. Cost: $9.7M (s2771.1)**

Construct a new double circuit 138 kV in/out line from the existing Bradley – Grandview 138 kV line (approx. 2.6 miles) **Total Estimated Trans. Cost: $8.3M (s2771.2)**

Prince Station: Retire existing station **Total Estimated Trans. Cost: $0.0M (s2771.3)**

Chessie Station: Install new 138 kV station including two 138 kV switches, circuit switcher and 138/12 kV 20 MVA XFR **Total Estimated Trans. Cost: $0.3M (s2771.4)**

Grandview Station: Install a new 138/12 kV transformer to accommodate the retirement of Prince Station **Total Estimated Trans. Cost: $2.2M (s2771.5)**

Bradley Station: Remove existing 69 kV breaker due to line retirement **Total Estimated Trans. Cost: $0.1M (s2771.6)**

Layland Station: Remove existing 69 kV breaker due to line retirement **Total Estimated Trans. Cost: $0.1M (s2771.7)**

Total Estimated Trans. Cost: $20.6M

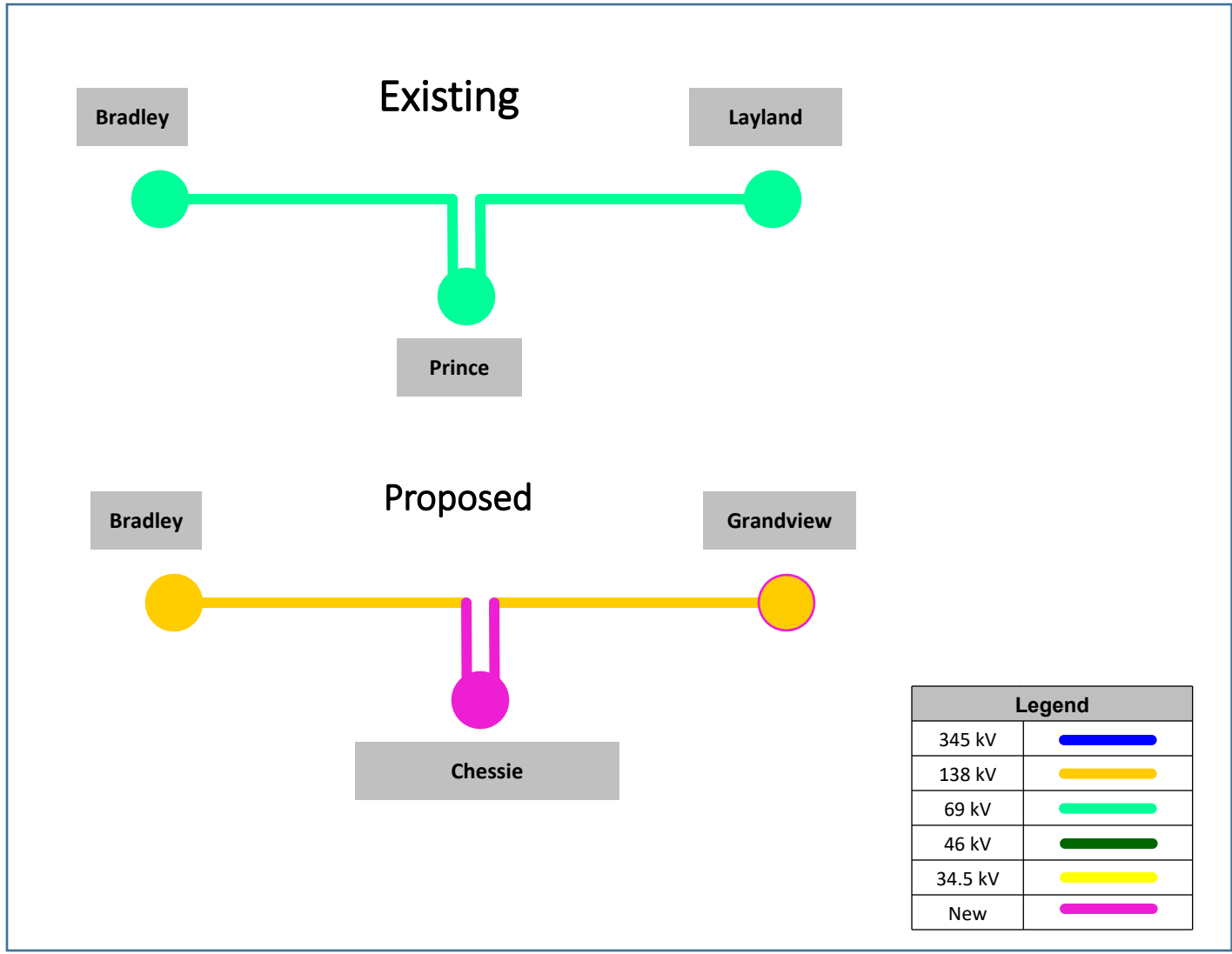
Ancillary Benefits: The majority of the existing Bradley – Layland line is located within the Park Service Territory and will be retired and removed upon completion of the proposed project, this also includes a crossing on the New River. The station will also be re-located across the river and the work related to the new station and bank at Grandview will reduce exposure to the customers in the area.

Projected In-Service: 5/1/2025

Supplemental Project ID: s2771.1-.7

Project Status: Scoping

Model: 2025 RTEP



AEP Transmission Zone: Supplemental
Pettit Ave – Melita 69kV

Need Number: AEP-2020-IM023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

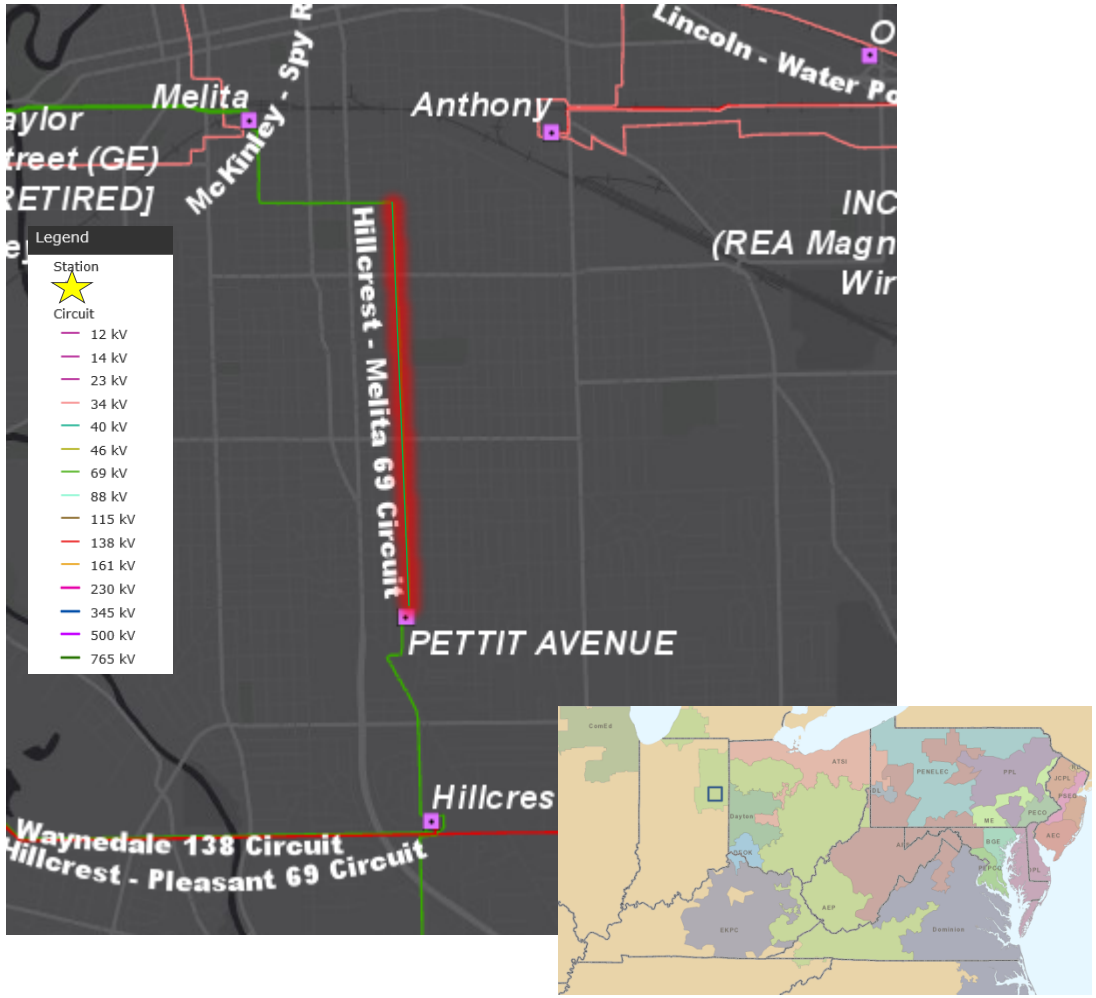
Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 11/20/2020

Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- **Pettit Ave – Melita 69kV ~1.84 Miles**
  - Originally constructed in 1967
  - Wood pole construction with 61/62 structures original from 1967.
  - Recent field inspection identified 48 of the 62 structures on the line have moderate to advanced decay or shell damage.
    - Additional conditions include insect damage and stolen/missing ground leads along with the rot top and/or shell decay on the structures.
  - Structures do not meet 2017 NESC Grade B loading criteria, do not meet current AEP structural strength requirements, and do not meet the current ASCE structural strength requirements.

Model: N/A



AEP Transmission Zone: Supplemental Pettit Ave – Melita 69kV

Need Number: AEP-2020-IM023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

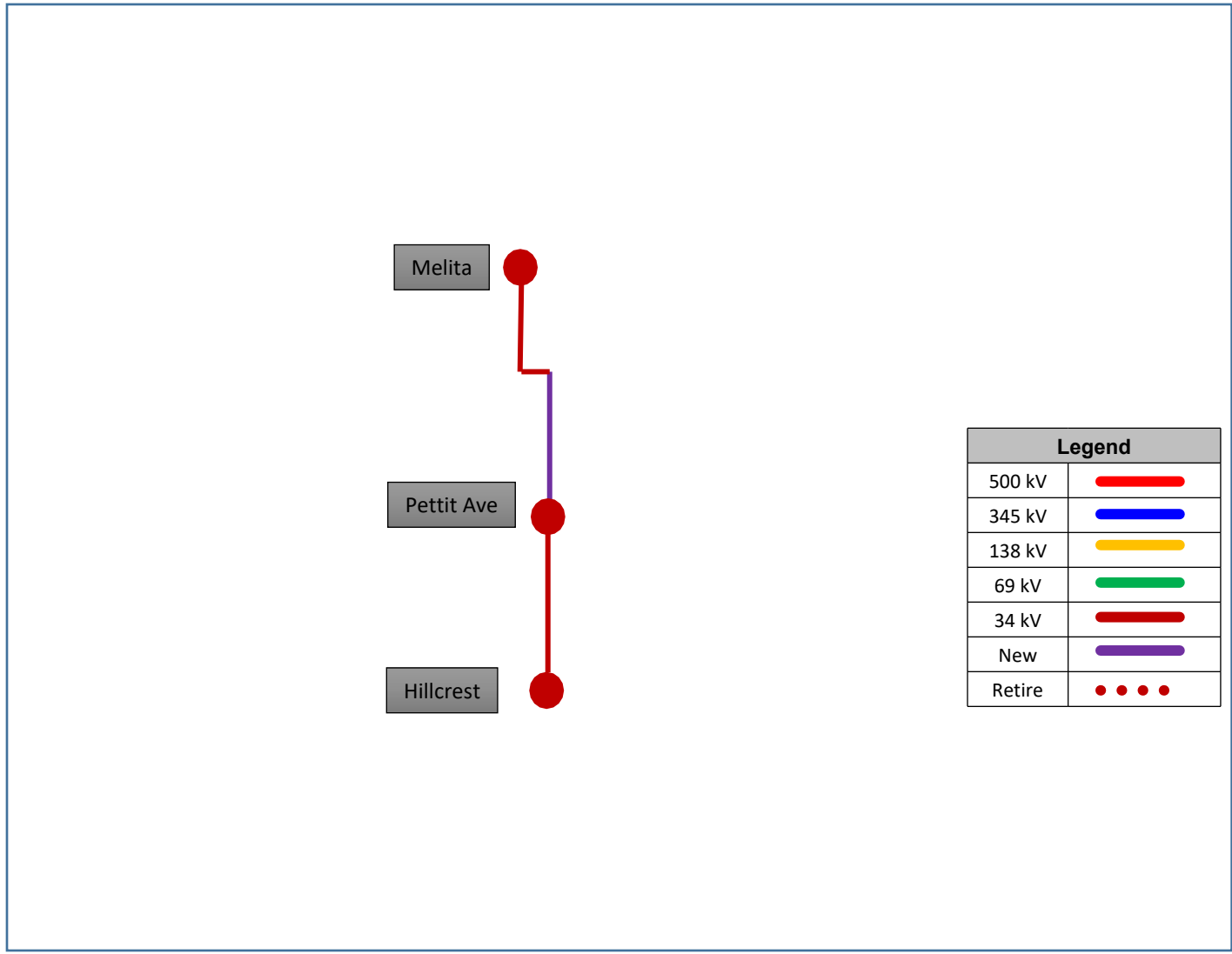
Rebuild the Pettit Ave – Melita 69kV 1.84 mile section on centerline utilizing 556.5 ACSR. Construction includes a high percentage of custom self-supporting running corners and dead ends due to line angles created by route adjustments. Constrained corridors are not suitable for guy wire installation. There are also an increased number of structures per mile due to configuration of existing underbuild and existing distribution service connections to residential and commercial customers along the existing line route. The line also passes through a heavily developed urban area of Fort Wayne, requiring new easements along the route and short span construction which all lead to higher than normal costs.

Total Estimated Transmission Cost: $7.4 to 12.0M (s2772)

Projected In-Service: 2/14/2025

Supplemental Project ID: s2772

Project Status: Scoping



AEP Transmission Zone M-3 Process
East Lima – Columbus Grove 69kV Line Rebuild

Need Number: AEP-2020-OH037

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Need Meeting 10/16/2020

Project Driver:

Equipment Material/Condition/Performance/Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs

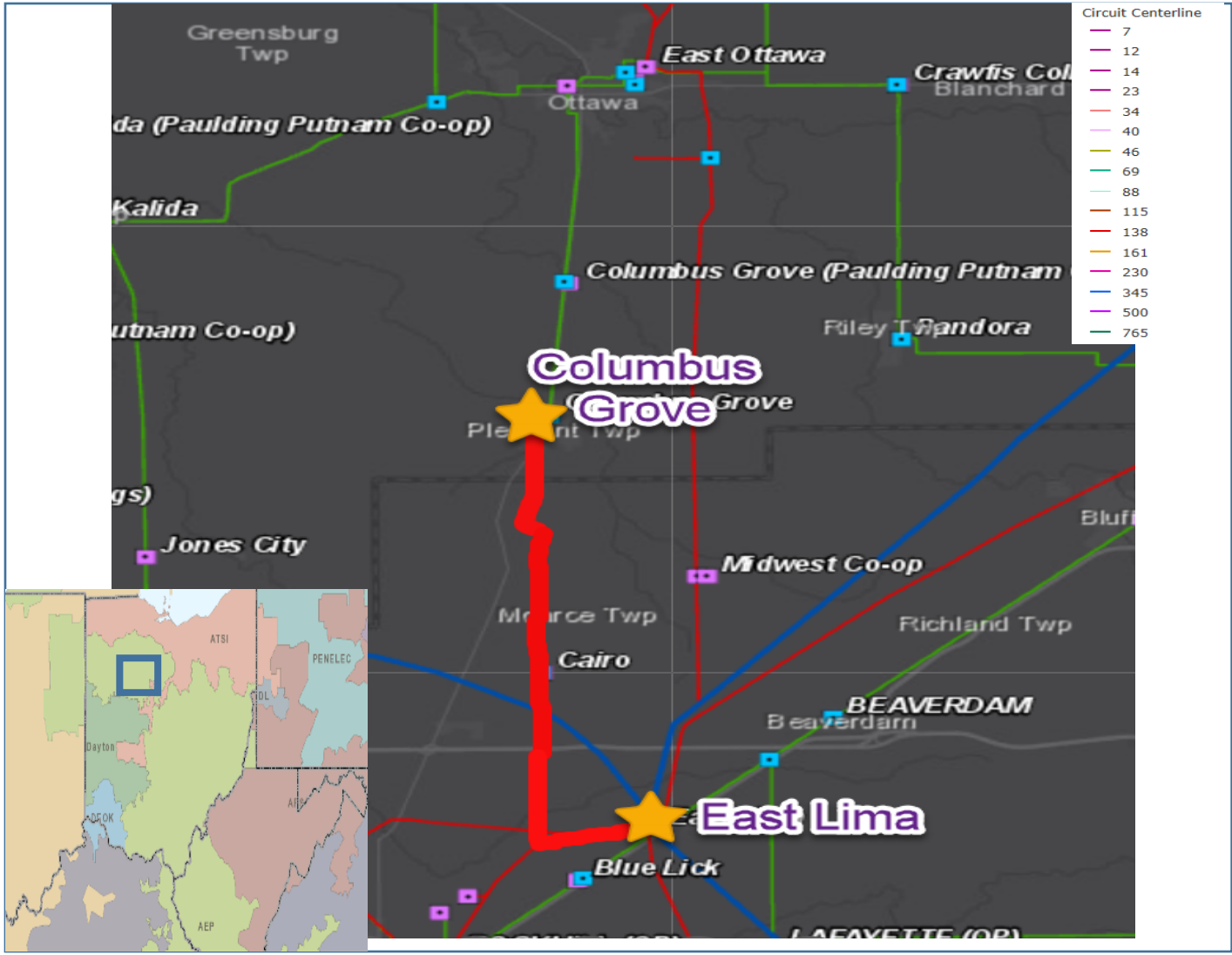
Problem Statement:

Line

East Lima – Columbus Grove 69kV (vintage 1953)

LINE CHARACTERISTICS

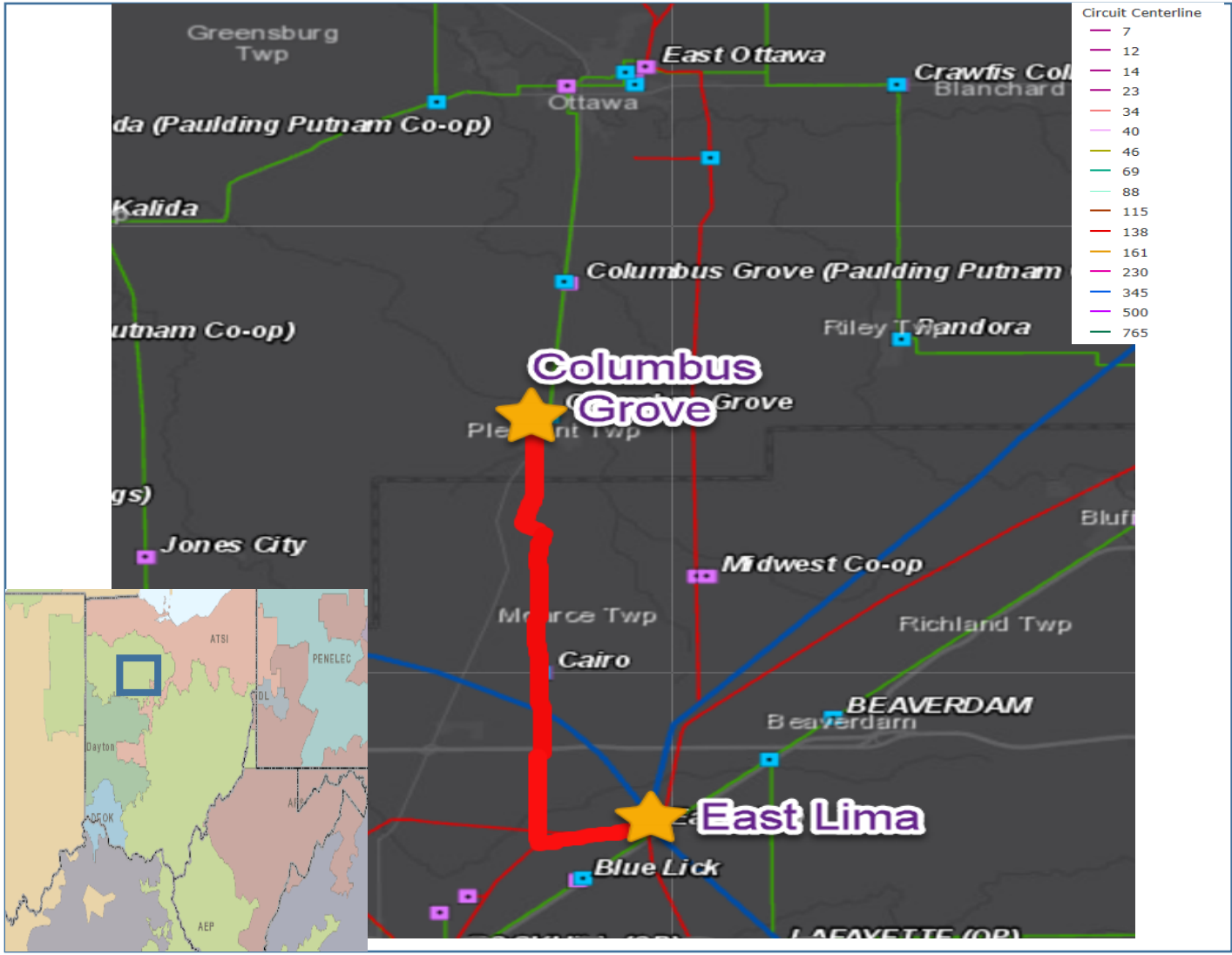
- Original install date: 1953
- Length of Line: 10.86 miles
- Total structure count: 255; 150 dating back to original installation.
- Original Line Construction Type: Wood monopoles
  - Cross Arm Material: Wood
  - The line has vertical and horizontal ceramic insulators and is butt wrap grounded
- Conductor: 4/0 ACSR 6/1 (Penguin) -72% and 556 kCM ACSR 26/7 (Dove) -28%



AEP Transmission Zone M-3 Process
East Lima – Columbus Grove 69kV Line Rebuild

CONDITION / PERFORMANCE / RISK ASSESSMENT:

- Momentary/Permanent Outages and Duration: 20 total outages: 17 (Momentary), 3 (Permanent)
- 5 Year CMI: 911,294
- Number of open conditions: 112 Open conditions on 94 unique structures
  - Open conditions include: rotten heart, woodpecker holes, insect damage, split crossarms, burnt insulators, broken ground lead wires etc.
- Risk
  - Number of Customers at Risk: 3,272
  - Load at Risk: 22.71 MVA
  - The grounding/shielding and the insulation of the line is inadequate according to the current AEP standards.



Need Number: AEP-2020-OH046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Need Meeting 12/18/2020

Project Driver:

Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs

Problem Statement:

Customer Service:

- **Station/Area Name:** Bluelick Switch
- **Load:** 3.185MW Existing/3.7MW projected by 2029
- **Customer Request:** The customer has requested to upgrade their existing delivery point from 34.5kV to 69kV.
- **Requested In-service Date:** 6/1/2024

AEP Transmission Zone M-3 Process
East Lima- Columbus Grove 69kV

Need Number: AEP-2021-OHO37, AEP-2021-OH046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- **East Lima – Columbus Grove Line:** Rebuild 9.3 miles of the East Lima - Columbus Grove line between Columbus Grove and structure 38. Construct ~1 mile of greenfield 69 kV line between structure 38 and the existing Bluelick Sw. Rebuild 1.65 miles of the 34.5 kV line section between Bluelick and East Lima to 69 kV to provide looped service to the new 69 kV delivery at Bluelick. Retire 1.7 miles of the Columbus Grove – East Lima line from structure 38 into East Lima. **Estimated Cost $25.547M (s2773.1)**
- **Slabtown Switch:** Install Slabtown SW with 1200A POP switches. Install Auto-sectionalizing on the through path. Upgrade Bluelick delivery point metering. **Estimated Cost $0.885M (s2773.2)**
- **Bluelick Switch:** Retire 34.5 kV Bluelick SW **Estimated Cost $0.054M (s2773.3)**
- **Cairo Switch:** Replace Cairo switch with 1200A POP switches. Install SCADA control on the through-path. **Estimated Cost $0.706M (s2773.4)**
- **East Lima Station:** Upgrade telecom equipment at East Lima station. **Estimated Cost $0.021M (s2773.5)**
- **Columbus Grove Station:** In order to accommodate the line rebuild, work will be performed on the existing Columbus Grove switch. Install a box bay with two 69 kV, 1200A line witch automated MOABs, at Columbus Gove station. **Estimated Cost $1.141M (s2773.6)**

Total Estimated Cost: $28.354M

Projected In-Service: 05/15/2024

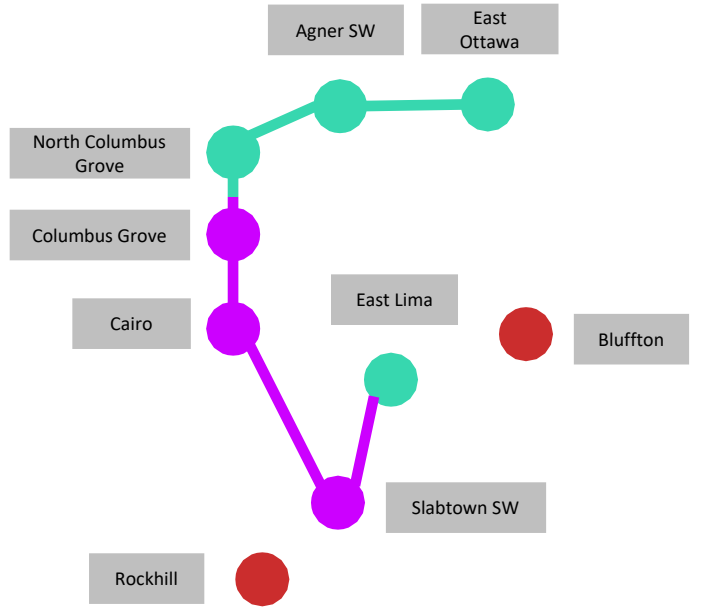
Supplemental Project ID: s2773.1-.6

Project Status: Scoping

Model: 2026 PJM RTEP Load-Flow and Short Circuit Models

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

Existing



Proposed

AEP Transmission Zone M-3 Process
Tazewell County, VA

Need Number: AEP-2021-AP003

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

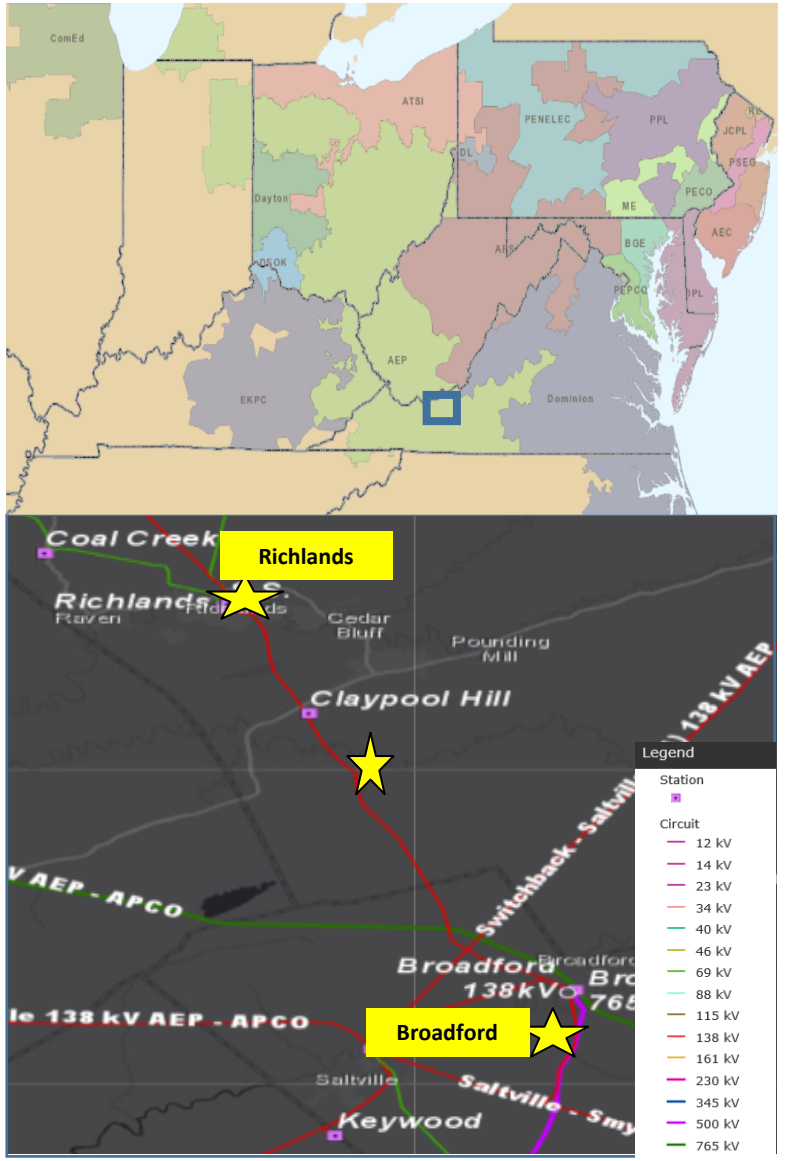
Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 01/15/2021

Supplemental Project Driver: Customer Service

Specific Assumption References: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

APCo Distribution has requested a new station to be served from the Broadford — Richlands 138 KV line. The projected peak demand is 21 MW.



AEP Transmission Zone M-3 Process
Tazewell County, VA

Need Number(s): AEP-2021-AP003

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- Construct a greenfield station (Salmon) with a 138/12 kV 25 MVA transformer with high side circuit switcher. There will be two 12 kV feeders from the station. The 138 kV side will be a straight bus with two 138kV circuit breakers. **Estimated Cost: $0 (APCO Distribution Cost) (s2774.1)**
- Tap the Broadford – Claypool Hill 138kV line and construct an in and out line to the greenfield Salmon station by building 2.3 miles of greenfield double circuit 138kV line. The higher estimated cost is due to environmental surveying and a large amount of new access roads required for this greenfield line that is in hilly terrain. **Estimated Cost: $8.5M (s2774.2)**
- Build 4.1 miles of 96 ADSS Telecom underbuilt cable to connect Salmon station to the existing fiber network. **Estimated Cost: $0.8M (s2774.3)**

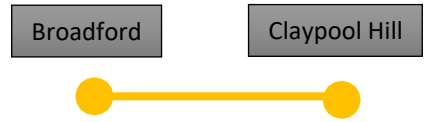
Total Estimated Transmission Cost: $9.3M

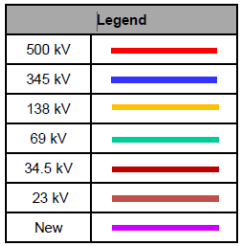
Projected In-Service: 9/1/2024

Supplemental Project ID: s2774.1-.3

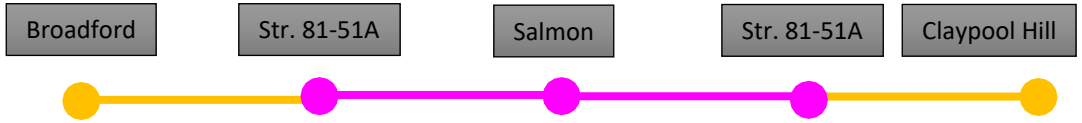
Project Status: Scoping

Existing





Proposed



AEP Transmission Zone M-3 Process
Belva – Clendenin Rebuild

Need Number: AEP-2021-AP021

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Need Meeting 06/15/2021

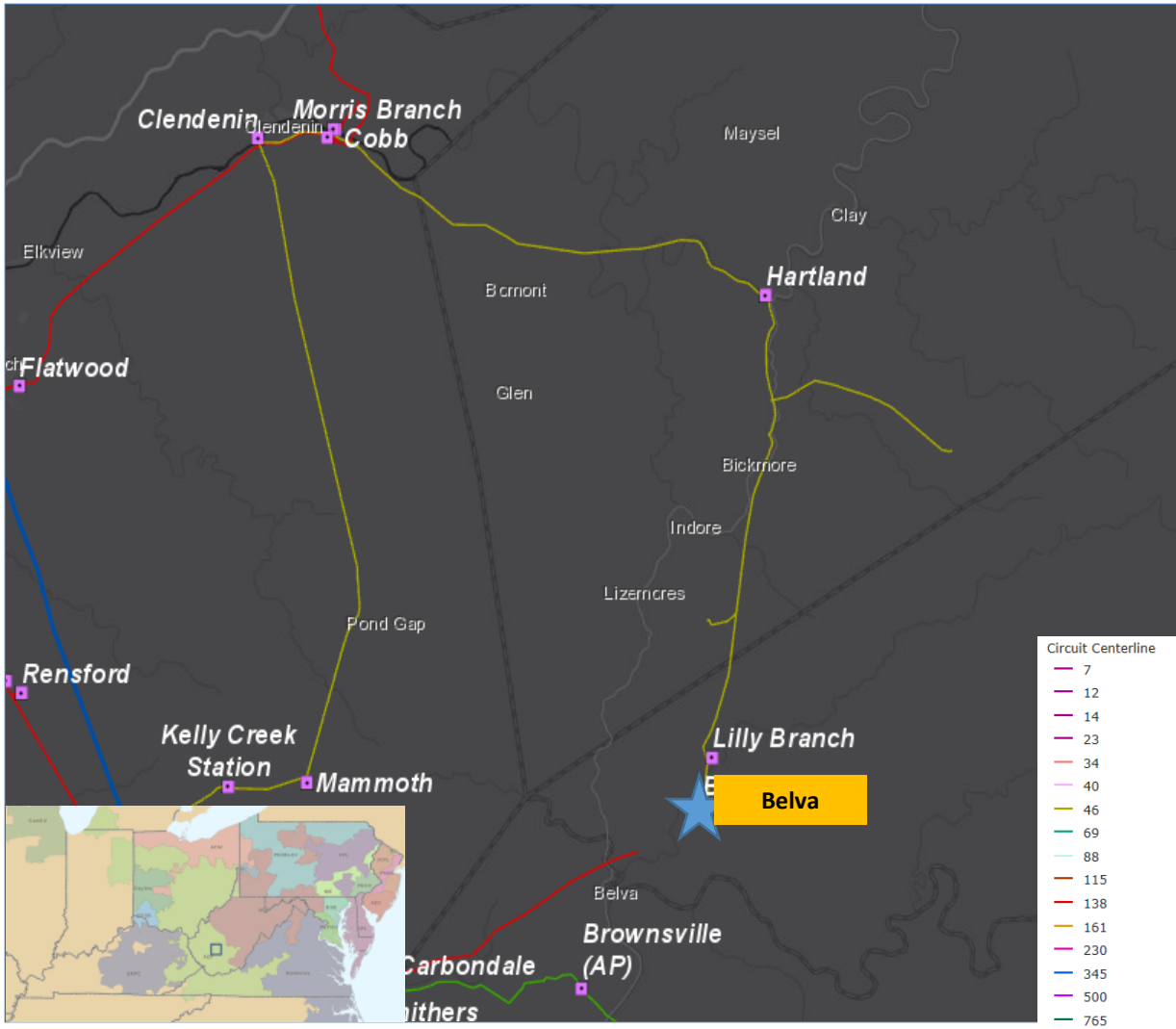
Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Belva 138/46 kV Station

- The transformer protection includes an obsolete MOAB-ground-switch system, which relies on remote station fault clearing.
- The lack of sectionalizing at the station creates dissimilar zones of protection (line, bus, and transformer) which can cause over tripping and mis-operations.
- Belva Station deploys 40 relays and currently 36 of the 40 (90%) are in need of replacement. 35 are electromechanical and 1 is static type, which have significant limitations with regards to part availability and fault data collection/retention.



AEP Transmission Zone M-3 Process
Clay County, WV

Need Number: AEP-2021-AP022

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Need Meeting 06/15/2021

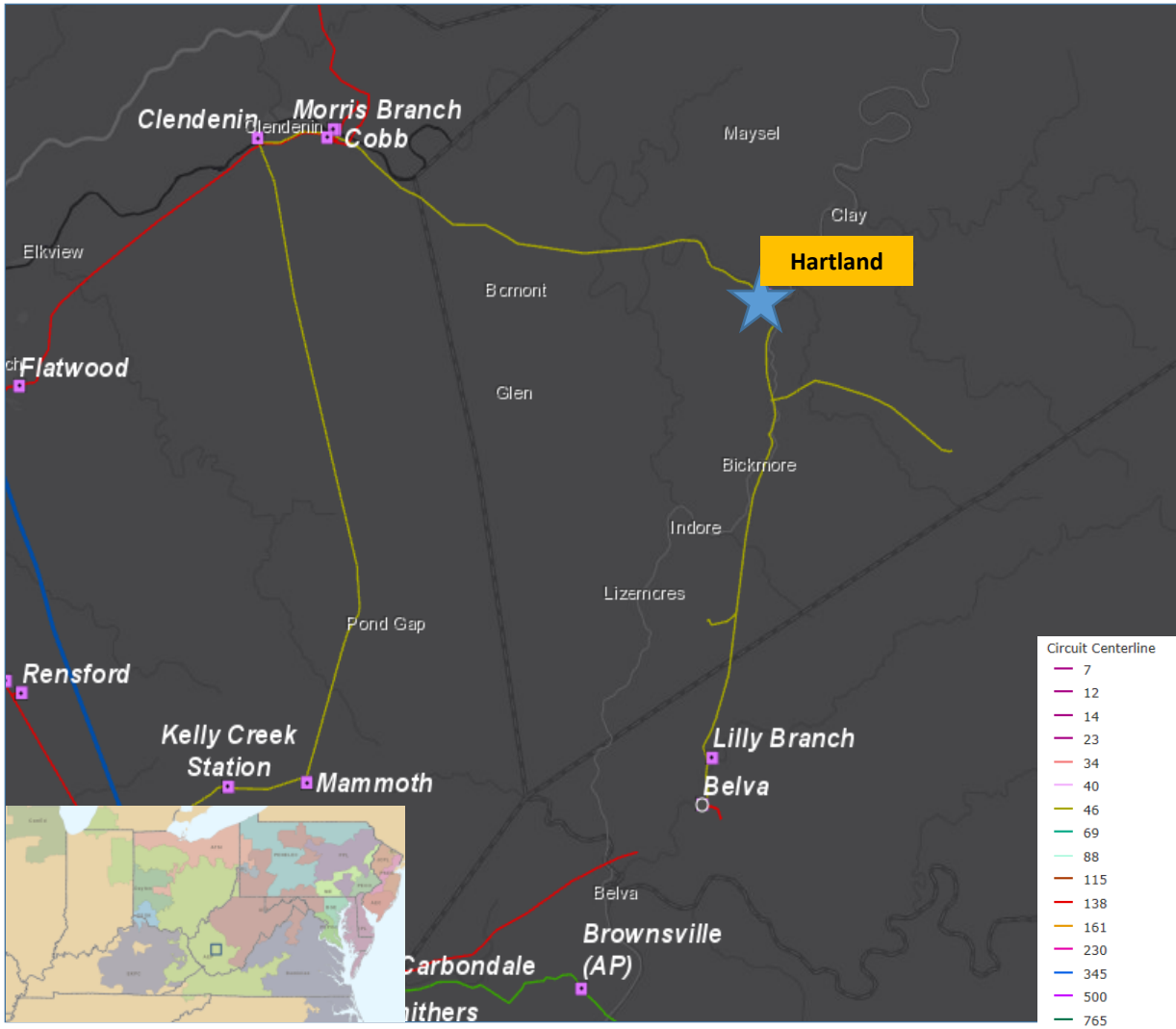
Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Hartland 46 kV Station

- Circuit switcher AA is a 2030-69 type SF6 filled switcher. The S&C 2030 family of circuit switchers have no gas monitor and currently in-service units on the AEP system have experienced 80 malfunctions from May 2002 to August 2019.
- Vacuum bottles on MOABs 'W' and 'Y' show signs of damage.



AEP Transmission Zone M-3 Process
Belva – Clendenin Rebuild

Need Number: AEP-2021-AP023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Need Meeting 06/15/2021

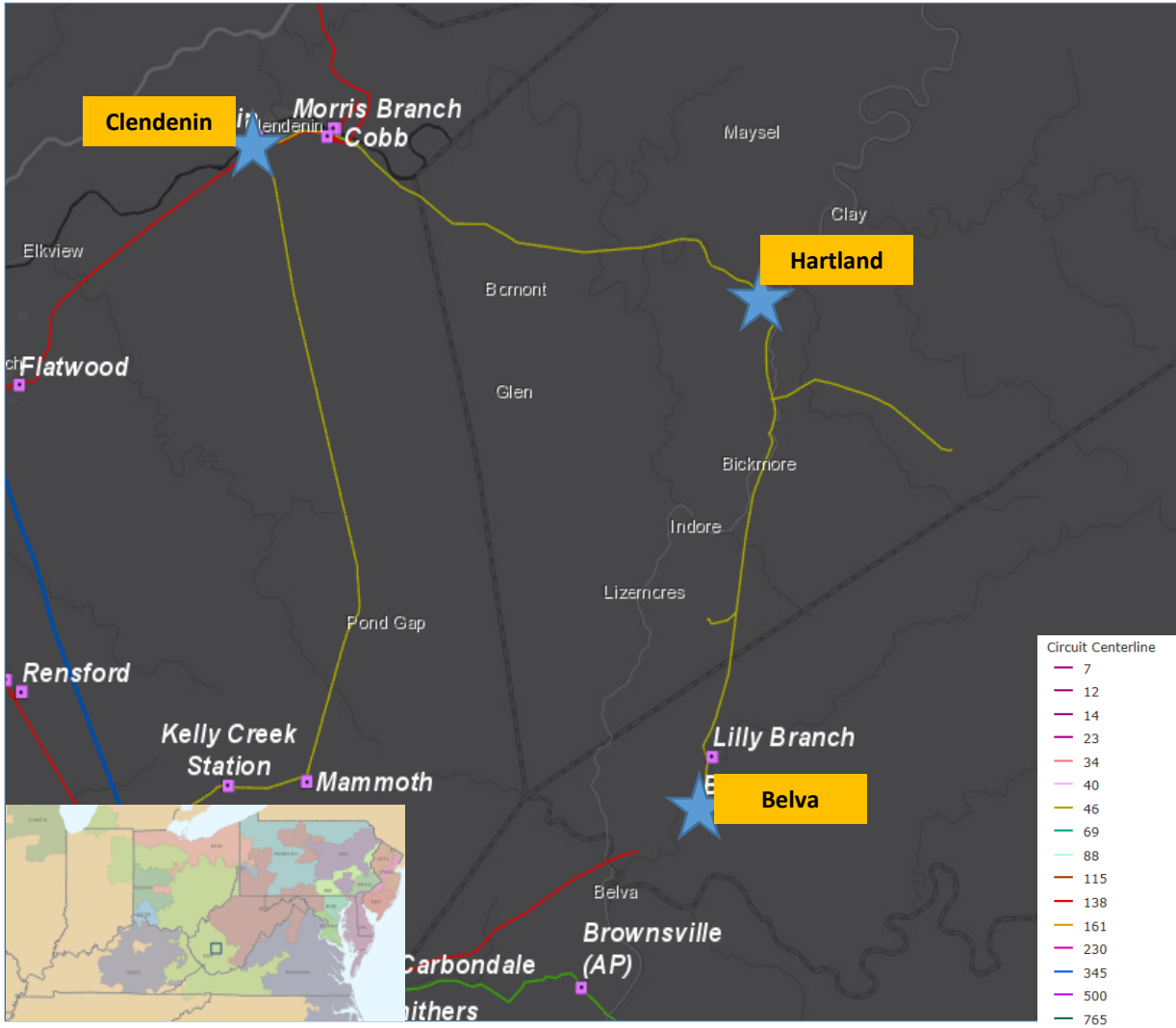
Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Belva – Clendenin 46 kV Circuit (~27 miles)

- Circuit is comprised mostly of vintage wood pole structures.
  - Original vintage wood structures from 1940
  - The Belva – Clendenin 46kV Line uses primarily original vintage conductor includeing 2/0 Copper, 4/0 ACSR and 336 ACSR.
  - The circuit fails to meet 2017 NESC Grade B loading criteria, AEP structural strength requirements, and ACSE structural strength requirements
- Since 2015, there have been 28 momentary and 30 permanent outages on the Belva – Clendenin 46kV Circuit.
  - The momentary outages were due to lightning (16), wind (3), misoperation (3), field error (1) causes.
  - The permanent outages were due to vegetation fall-in from outside of the AEP ROW (15), lightning (7), vegetation contacts from inside the AEP ROW (4), flood/slide (1), crossarm failure (1), ice/snow (1), and distribution (1) causes.
  - These outages caused 8.9M minutes of interruption for customers. The reported CMI is an estimated value due to the wholesale delivery point at Hartland Station.
- Currently, there are 114 structures with at least one open structural condition, which relates to 44% of the structures
  - 357 structural open conditions primarily related to rotten poles and crossarms. Other structural conditions include woodpecker damage, leaning in-line, or split poles, broken rusted, or corroded crossarms, and a split knee/vee brace.
  - 22 open forestry conditions related to brush clearances and dead trees
  - 21 open hardware conditions related to broken, loose, or damaged guys, broken insulators, and rusted or worn conductor hardware.
  - 1 open conductor related condition related to damaged conductor
  - 1 open grounding condition related to a broken ground lead wire



AEP Transmission Zone M-3 Process
Belva – Clendenin Rebuild

Need Number: AEP-2021-AP021, AEP-2021-AP022, AEP-2021-AP023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

Rebuild the existing Belva – Clendenin 46 kV line to 138 kV standards (approximately 27 miles). **Estimated Trans. Cost: $85.6M (s2775.1)**

Belva Station: Replace existing Gr. Sw. MOAB with a new 138 kV 3000 A 40 kA CB. Install a new 138 kV 3000 A 40 kA CB on the Belva – Gilboa 138 kV line at Belva Station. Install 9.6 MVAR cap bank. **Estimated Trans Cost: $2.9M (s2775.2)**

Hartland Station: Replace existing MOABs W and Y with two new switches. Retire/Remove existing circuit switcher AA and cap bank. **Estimated Trans Cost: $0.7M (s2775.3)**

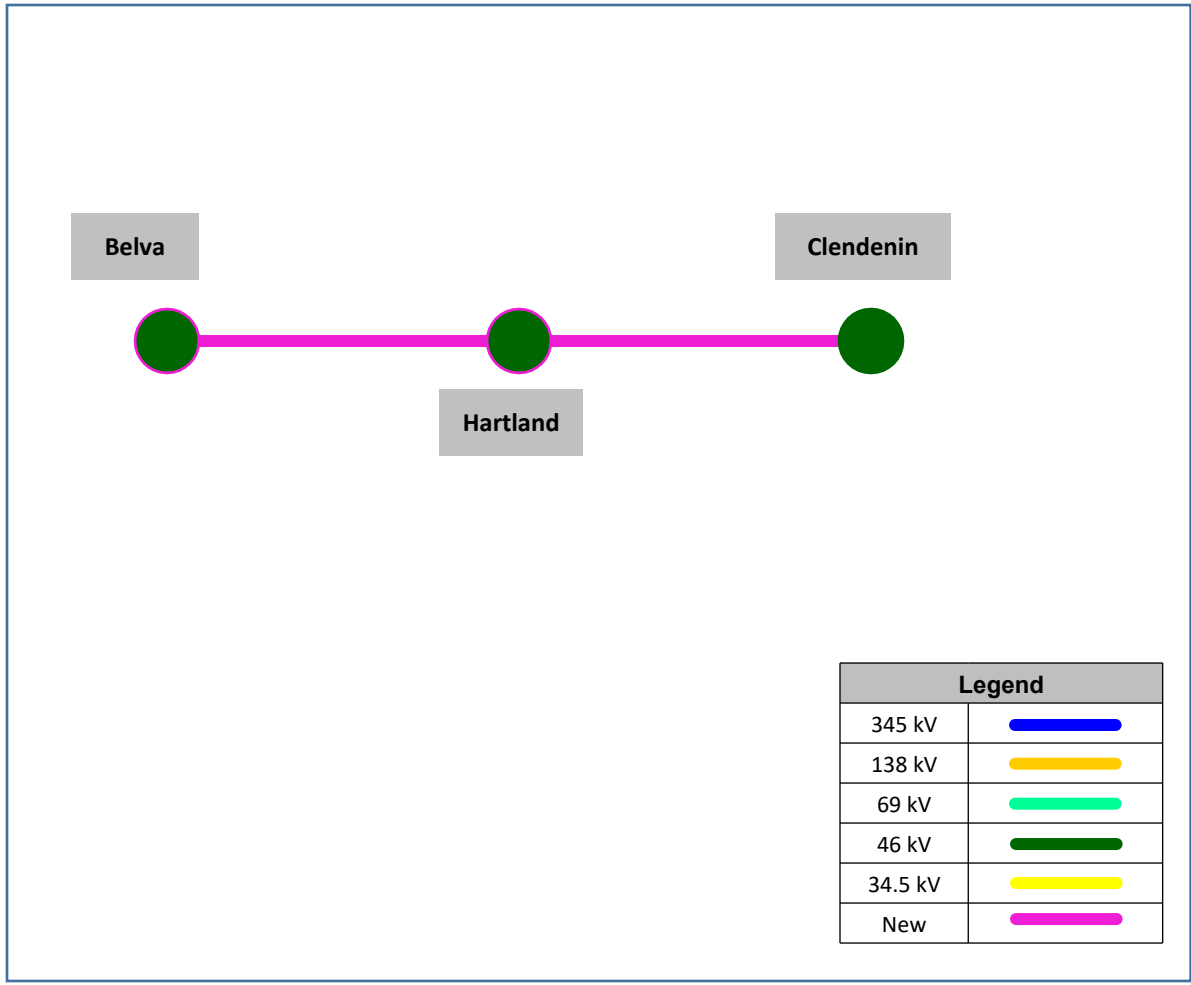
Total Estimated Trans. Cost: $89.2M

Projected In-Service: 9/1/2026

Supplemental Project ID: s2775.1-.3

Project Status: Scoping

Model: 2026 RTEP



AEP Transmission Zone M-3 Process
Industrial Park – McKinley 138kV

Need Number: AEP-2021-IM019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 07/16/2021

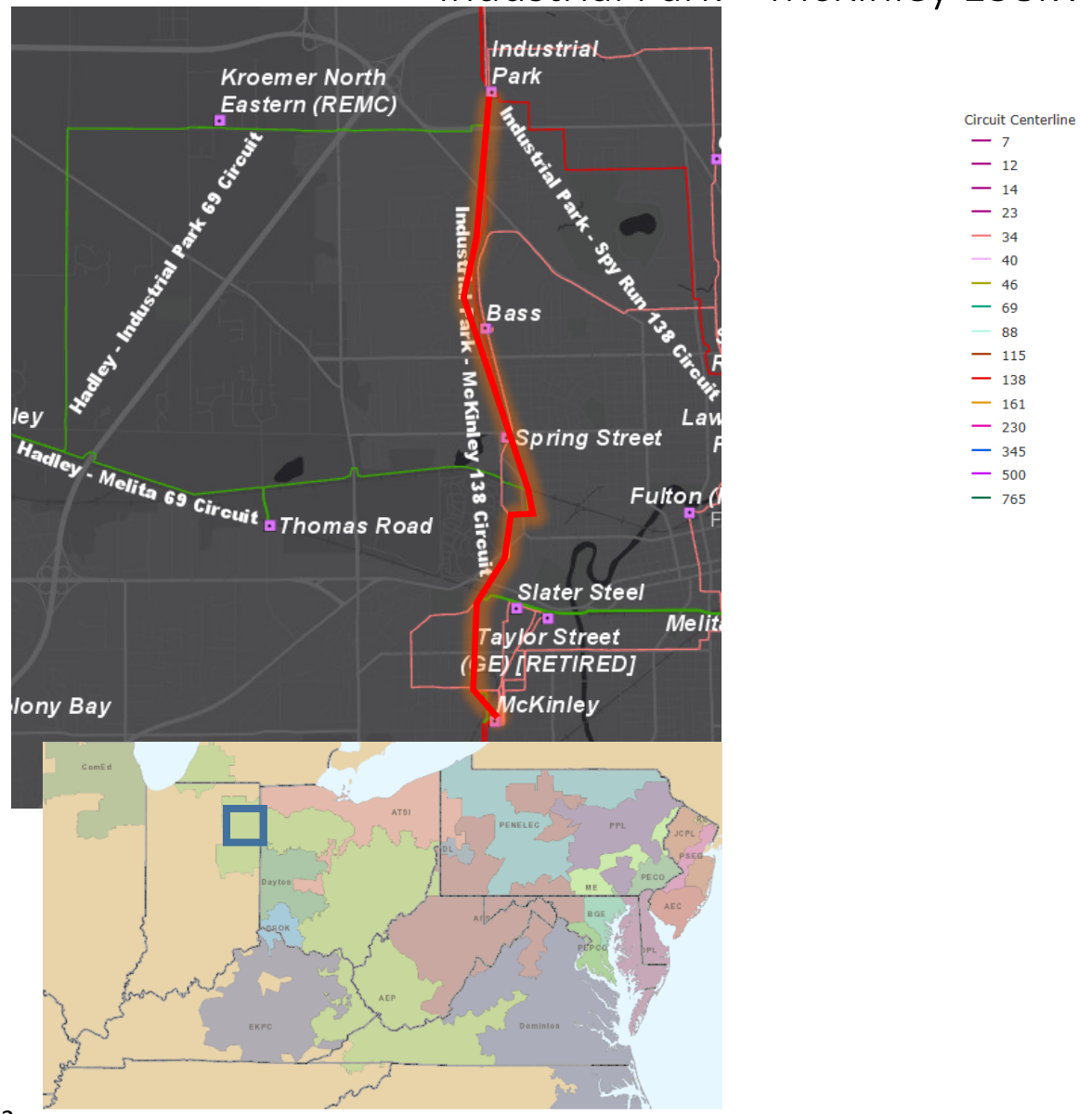
Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Industrial Park – McKinley 138kV line:

- 4.59 miles of 1968 795 ACSR. ~1 miles is double circuited with McKinley – Melita 69kV and ~.9 miles is double circuit with Melita – Hadley 69kV. The remainder is single circuit.
- All sections of this line is 1968 conductor, and 85/98 structures are original wood poles. There are 11 steel structures from 1968 and 2 steel structures from 2018 that are not identified as a need at this time.
- Structures fail NESC Grade B, AEP Strength requirements, and ASCE structural strength standards
- 18 structures were inspected by drone with 11 assessed by ground crew
    - 9 structures found to have moderate-heavy checking or insect/bird damage
    - Several instances of insulators tipping away from pole
    - 81% of poles inspected by ground crew had beyond normal decay.
- 12 open conditions are on this line including woodpecker damage, damaged guy wires, damaged insulators



AEP Transmission Zone M-3 Process
Industrial Park – McKinley 138kV

Need Number: AEP-2021-IM019

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

Industrial Park – McKinley 138kV line:
Rebuild the ~1 mile section that is double circuit with McKinley – Melita 69kV and rebuild the ~0.9 mile section that is double circuit with Melita – Hadley 69kV in place. The remaining ~1.3 miles will be rebuilt as single circuit. All new line conductor will be 795 Drake ACSR. The total rebuild length is 3.3 miles double circuit and 1.3 miles single circuit for a total of 4.6 miles. (s2776)

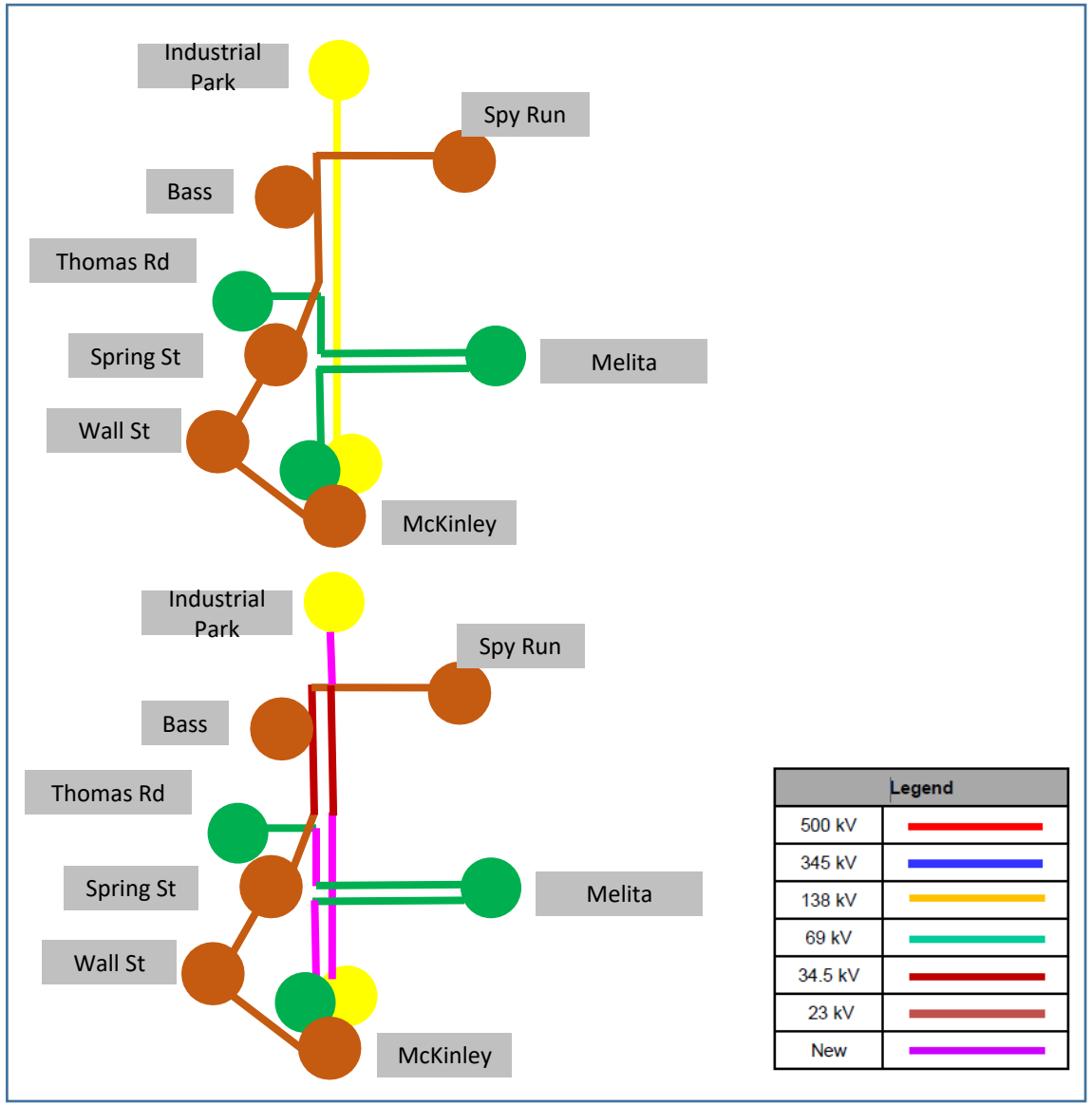
The remaining ~1.4 miles is rebuilt under S2152

Estimated Cost: $ 9.3M

Projected In-Service: 11/01/2026

Supplemental Project ID: s2776

Project Status: Scoping



AEP Transmission Zone M-3 Process
Robison Park – Wallen 69kV

Need Number: AEP-2021-IM027

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 08/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

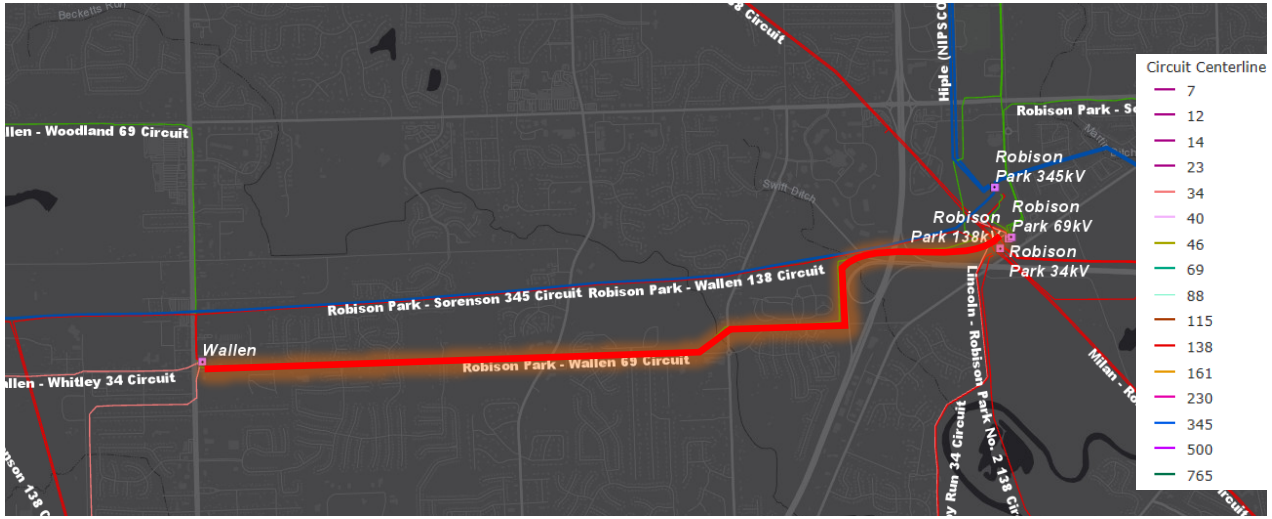
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

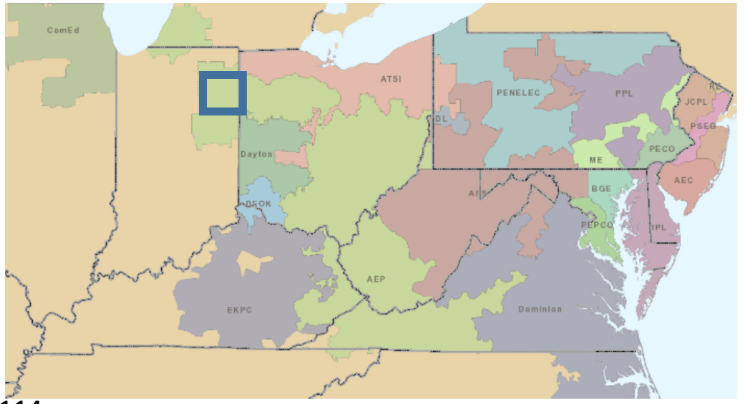
Model: N/A

Problem Statement:

Robison Park – Wallen 69kV line (3.24 miles):

- 14 of the 44 structures are original 1930 Steel Lattice
- There are 7 wood poles with significant insect and wood pecker damage, with insulators that are pulling away and flashed insulators.
- Remainder of structures are steel monopole and are in acceptable condition at this time.
- 2.96 miles of line is original 1930s vintage 300,000 CM CU conductor
- Since 2015 there have been 5 momentary and 1 permanent outages
- 7 wood structures fail NESC Grade B, AEP Strength requirements and ASCE structural strength standards





AEP Transmission Zone: Supplemental
Robison Park – Wallen 69kV

Need Number: AEP-2021-IM027

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

Robison Park – Wallen 69kV line:

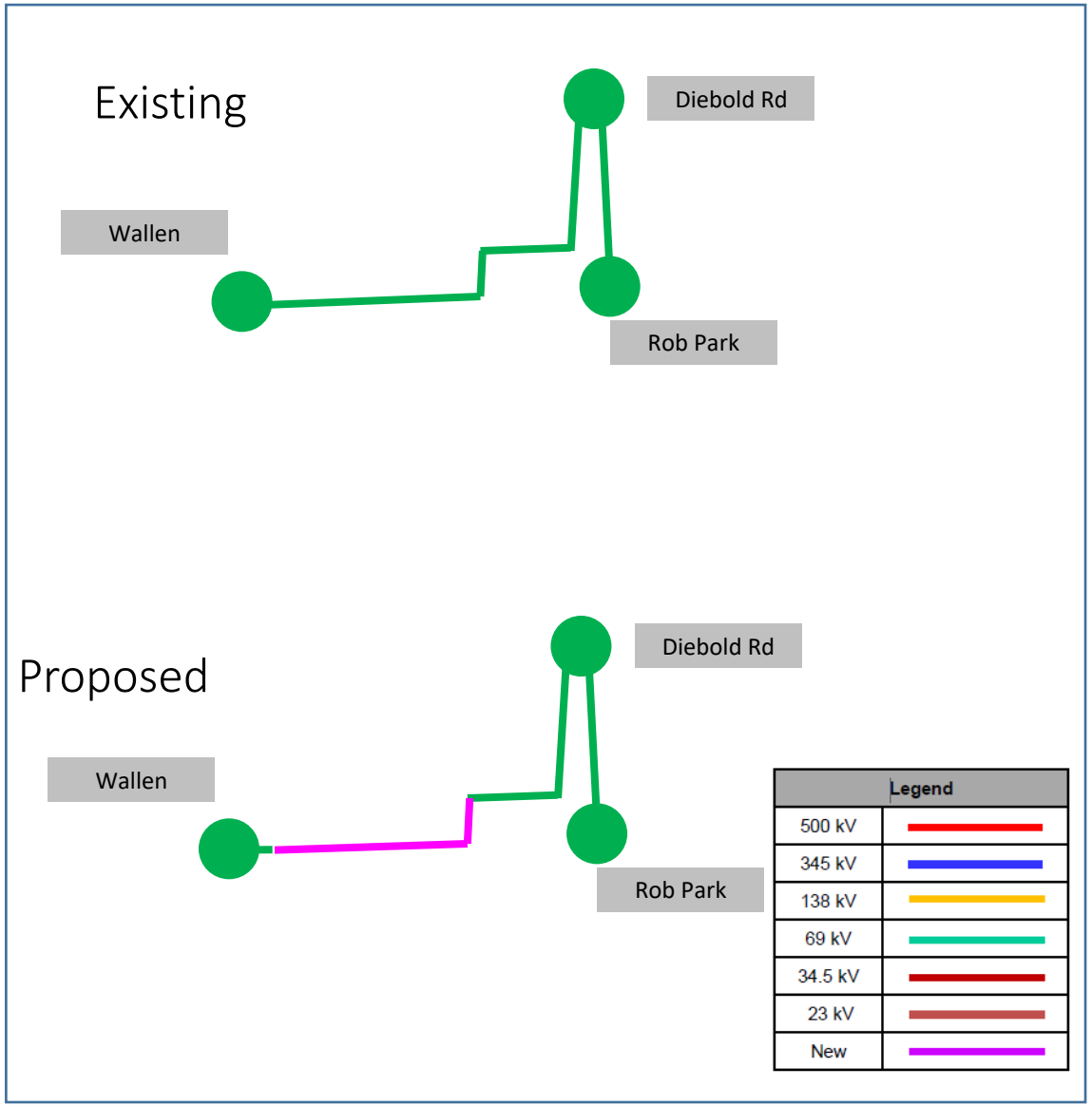
Reconductor the ~2.96 miles of 300,000 CU with 556.5 ACSR and replace 21 structures outlined in the need with steel monopole structures. (s2777)

Estimated Cost: $6.3M

Supplemental Project ID: s2777

Projected In-Service: 11/01/2025

Project Status: Scoping



AEP Transmission Zone M-3 Process
Richland, Ohio

Need Number: AEP-2021-OH006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 2/17/2021

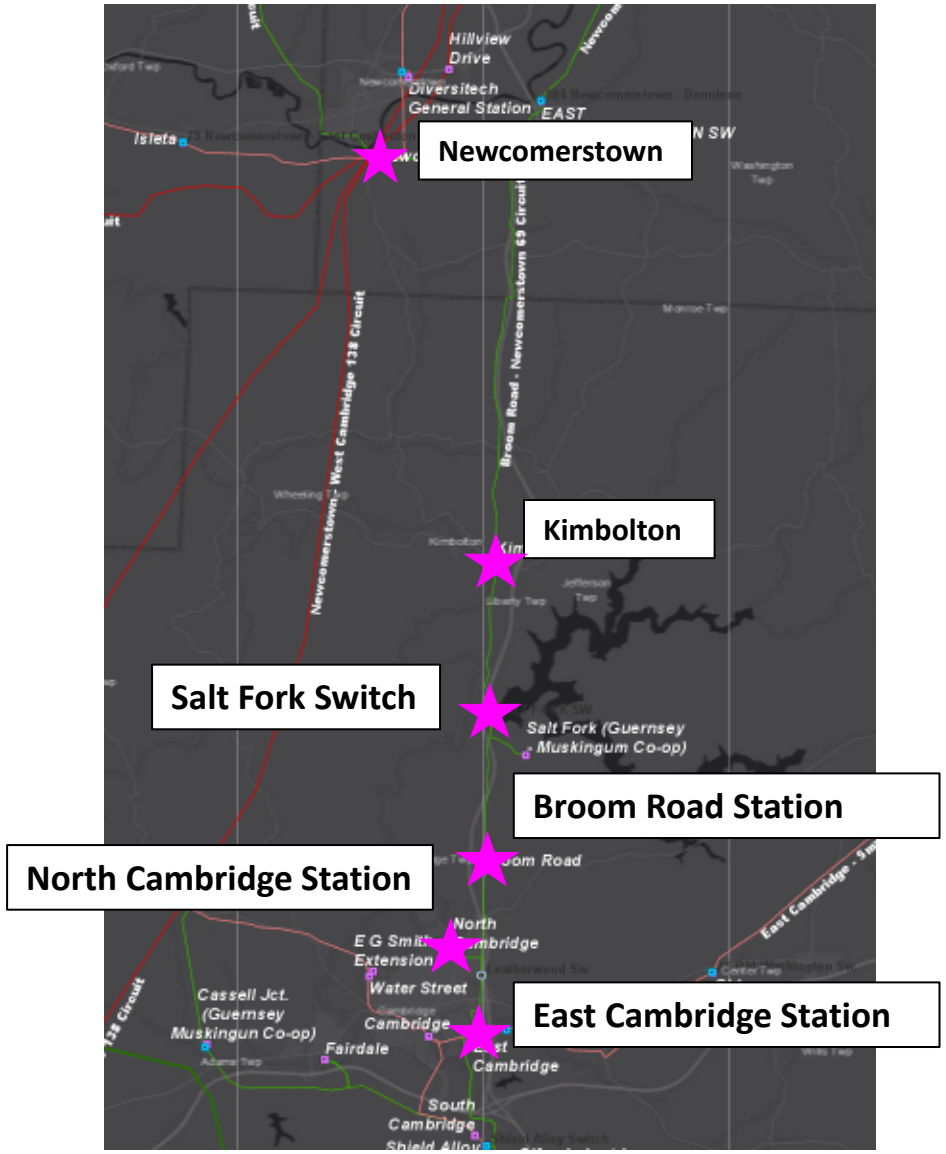
Supplemental Project Driver: Operational Flexibility, and Customer Service

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

Problem Statement:

- The Newcomerstown- Cambridge and Leatherwood- North Cambridge 69kV lines were originally constructed in 1926 with wood structures and copper conductor (3/0 CU). 79% of the lines still utilizes the original 1926 copper conductor. The remaining sections have been replaced over the years with 336 ACSR conductor.
- The circuits have had 23 forced operations in the last 5 years of which 5 have been permanent and resulted in 33.4 hours of down time and a CMI of 453,409.
- There are currently 88 open conditions along the Newcomerstown- Cambridge 69kV line and 13 open conditions along the Leatherwood- North Cambridge 69kV mile long line.
- The Leatherwood- North Cambridge 69kV line is served via a radial switch with old 1963 wood pole structures. Radial service severely restricts the ability to perform routine maintenance and restoration activities leading to longer customer outages.
- The FOI limit is surpassed for Salt Fork Switch to Newcomerstown requiring a MOAB to be added to Salt Fork. The existing structure is unable to accommodate this MOAB and a new switch pole will be required. Building this switch at Str 212 will also not require rebuilding the 0.4 mile double circuit spans thus increasing customer reliability as well

Model: PJM 2026 RTEP Series Cases



AEP Transmission Zone M-3 Process
Seneca County, Ohio

Need Number: AEP-2021-OH006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- Rebuild approximately 4.6 mile of the Newcomerstown- Cambridge 69kV line that wasn't addressed under b3274 and b3345 utilizing 556 ACSR conductor **$8.97 M (s2778.1)**
- Rebuild the 0.6 mile Leatherwood Sw- North Cambridge with double circuit 556 ACSR conductor to provide loop service to North Cambridge station. **$1.45 M (s2778.2)**
- Add line MOABs for each of the double circuit lines coming into North Cambridge station. **$0.28 M (s2778.3)**
- Remove the Leatherwood Switch that currently radially serves North Cambridge station. **$0.08 M (s2778.4)**
- Replace Salt Fork Switch with a new 1200A POP Switch. **$1.13 M (s2778.5)**

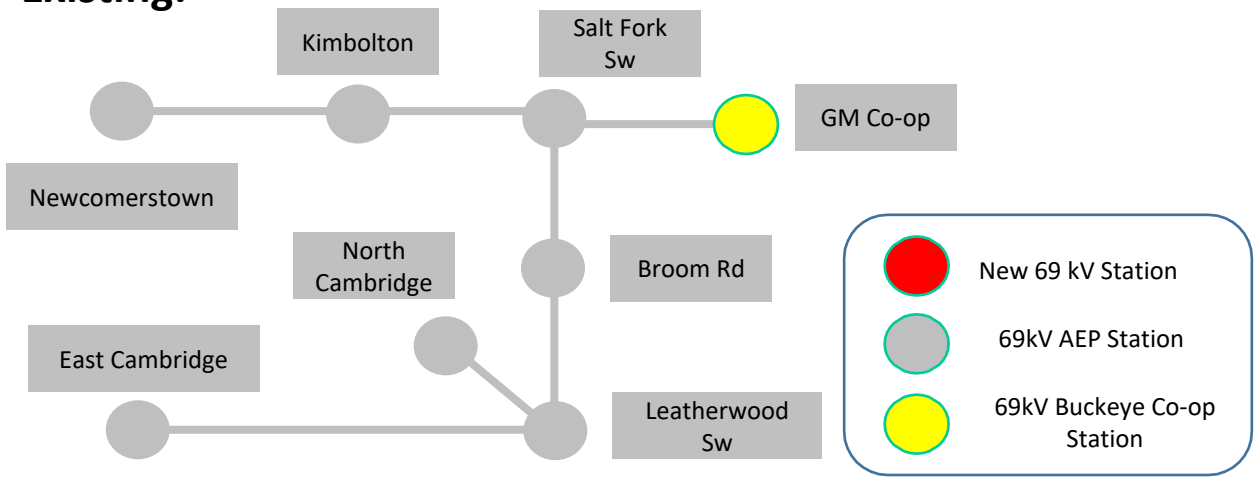
Cost estimate: $11.91 M

Projected In-Service: 6/1/2025

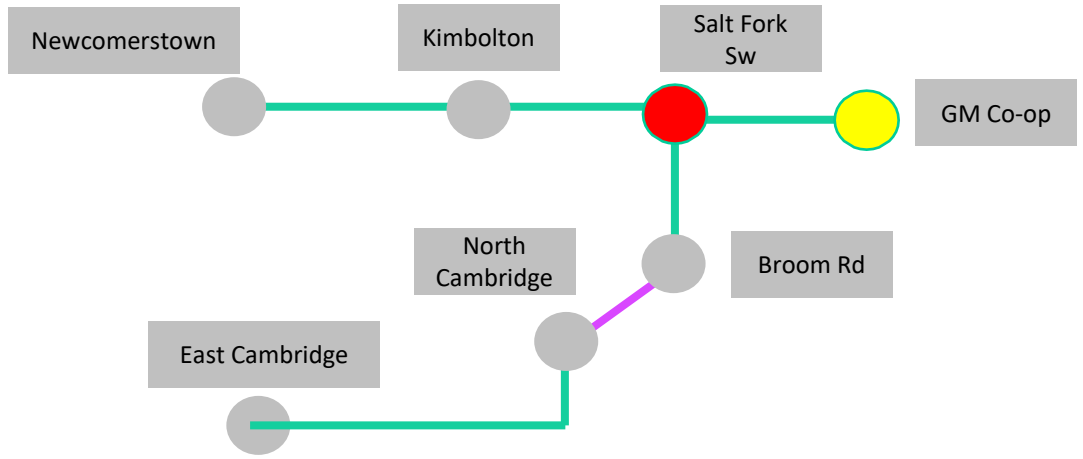
Supplemental Project ID: s2778.1-.5

Project Status: Scoping

Existing:



Proposed:



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

AEP Transmission Zone M-3 Process
Fremont, Ohio

Need Number: AEP-2021-OH007

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 2/17/2021

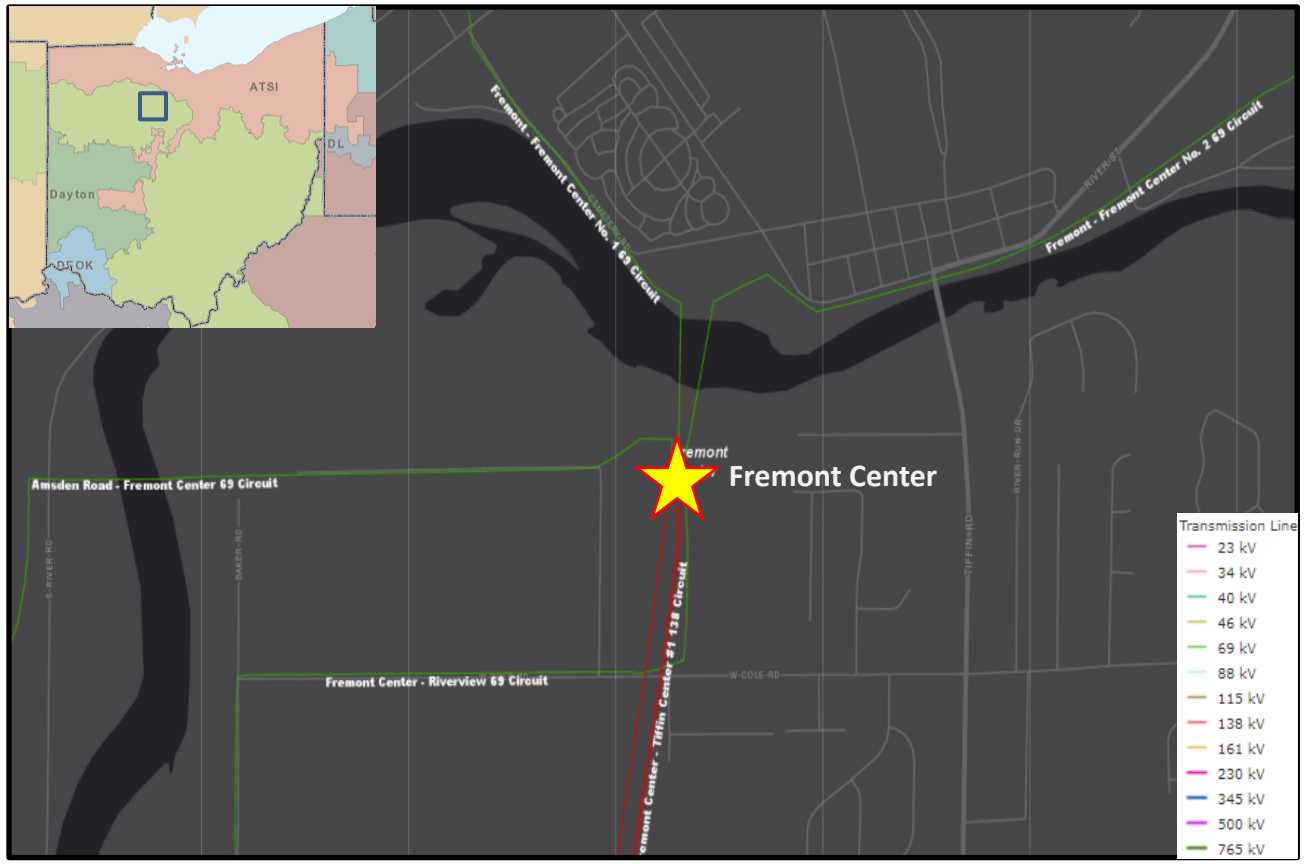
Supplemental Project Driver:
Equipment Material/Condition/Performance/Risk

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

Problem Statement:

- Circuit Breakers F, G, H, J, K, & L
- Breaker Age: F 1971, G 1971, H 1971, J 1971, K 1971, & L 1988
- Interrupting Medium: (Oil)
- Fault Operations:
- Number of Fault Operations: F 15, G 51, H 26, J 20, K 19, & L 69
- Manufacturer recommended Number of Operations: 10
- Additional Breaker Information: 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.
- Relays: Currently, 40 of the 76 relays (53% of all station relays) are in need of replacement or upgrades. 39 of these are of the electromechanical type and 1 of the static type which have significant limitations with regards to fault data collection and retention.
- RTU: The existing Data Concentrator – DOS type RTU installed at Fremont Center is a non-standard RTU with no vendor support, no active warranty, no available training and no Ethernet compatibility. In addition, this unit has high a malfunction rate.

Model: PJM 2025 RTEP Series Cases



AEP Transmission Zone M-3 Process
Fremont, Ohio

Need Number: AEP-2021-OH007

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- Rebuild the existing 69 kV yard to a breaker and a half arrangement. Install 11 new 3000A 40kA 69kV breakers and relocate one existing breaker into the new strings. **$10.35 M (s2779)**

Cost estimate: $10.35 M

Ancillary Benefits:

Currently, the 69 kV bus at Fremont Center is a single bus design with five 69 kV transmission lines and three transformers served from it. In order to improve operational flexibility and address the 69 kV breakers identified at the station the 69 kV bus will be reconfigured to a breaker and a half arrangement.

Projected In-Service: 12/15/2026

Supplemental Project ID: s2779

Project Status: Scoping

No bubble diagram needed. Station work only.

AEP Transmission Zone M-3 Process
Crawford County, Ohio
Seneca County, Ohio

Need Number: AEP-2021-OH023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 4/1/2021

Supplemental Project Driver: Operational Flexibility, and Customer Service

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

Problem Statement:

Line Name: Howard- Fostoria 138kV

LINE CHARACTERISTICS

- Original Install Date (Age): 1928
- Length of Line: 45.34 miles
- Total structure count: 264
- Original Line Construction Type: Steel Lattice
- Conductor Type: 397 CM ACSR 30/7

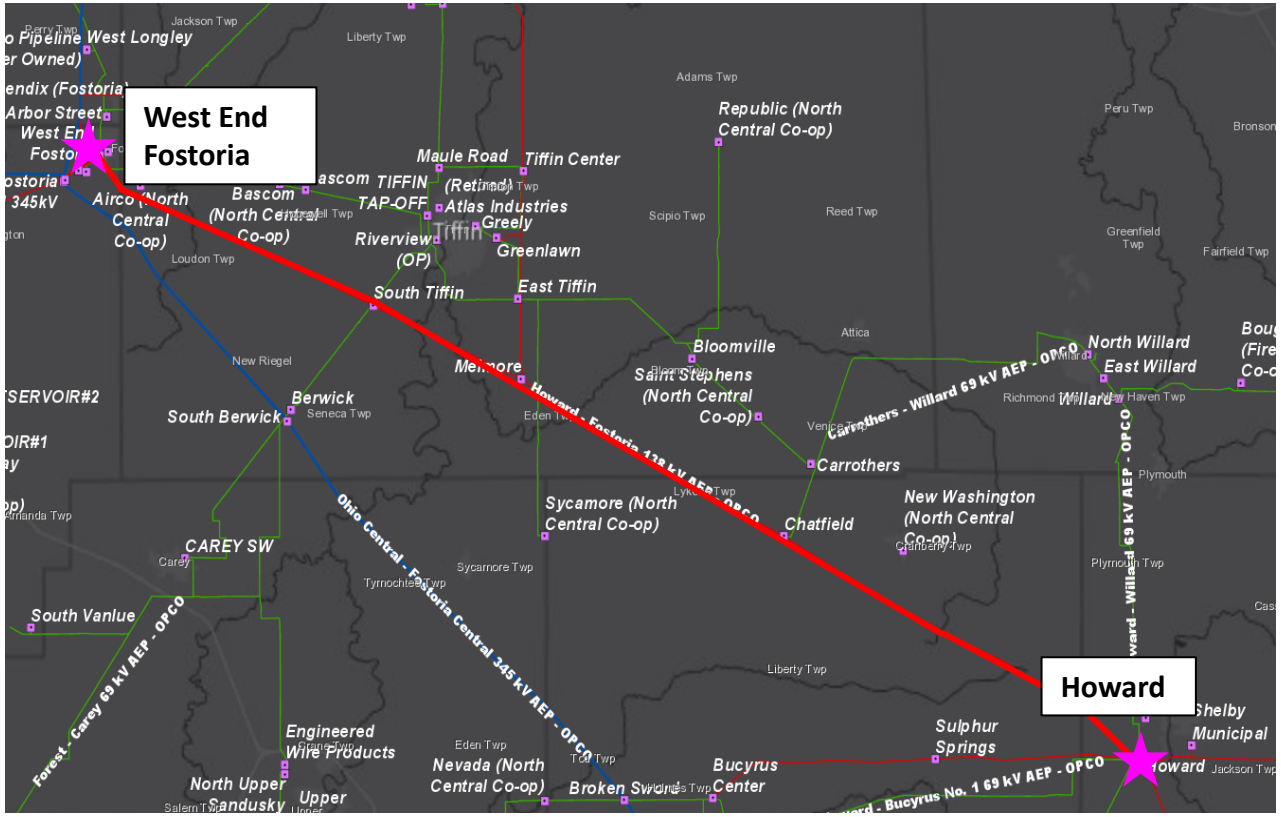
CONDITION / PERFORMANCE / RISK ASSESSMENT:

- Outage History
- 11 momentary and 2 permanent outages with an average duration of 28.53 hours
- Condition Summary
- Number of open conditions by type / defects / inspection failures: 126
- 37 structure based open conditions consisting of bent lacing, rust on the leg of a structure, vines on the leg of a structure and tower base, and tower base debris. There are currently 195 hardware based open conditions consisting of a broken/loose/missing conductors, bird droppings on insulators, broken/burnt/chipped/rusty insulators, bent/broken/burnt insulator assembly hardware and broken/loose/worn shield wire hardware.

Risk

- 410MW of planned generation on this line in the IPP queue.

Model: PJM 2026 RTEP Series Cases



AEP Transmission Zone M-3 Process
Seneca County, Ohio

Need Number: AEP-2021-OH023

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- Rebuild the 15.7 mile 138kV line between Howard and Chatfield stations with new 1033 ACSR conductor **$36.96 M (s2780.1)**
- Rebuild the 6.1 mile 138kV line between Melmore and South Tiffin stations with new 1033 ACSR conductor **$14.97 M (s2780.2)**
- Rebuild the 11.7 mile 138kV line between South Tiffin and West End Fostoria stations with new 1033 ACSR conductor **$30.19 M (s2780.3)**

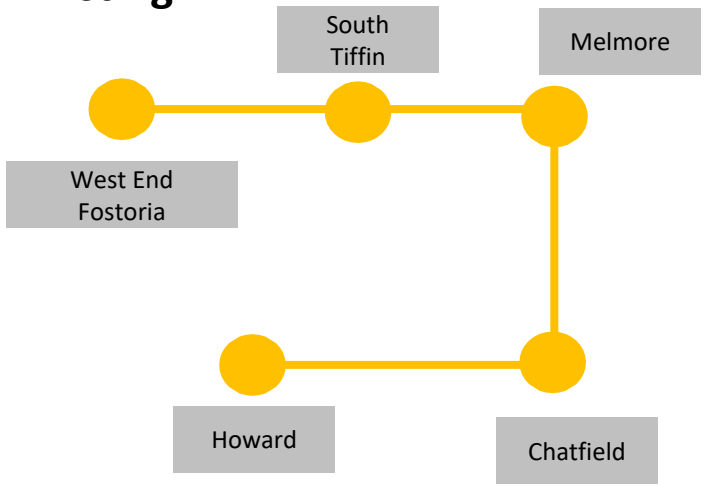
Cost estimate: $82.12 M

Projected In-Service: 5/1/2025

Supplemental Project ID: s2780.1-.3

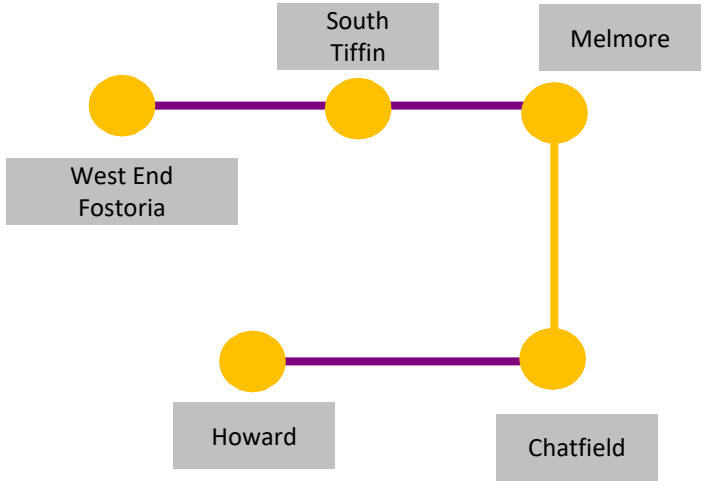
Project Status: Engineering

Existing:



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

Proposed:



AEP Transmission Zone M-3 Process
New Albany, Ohio

Need Number: AEP-2021-OH031

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 5/21/2021

Project Driver:

Customer Service

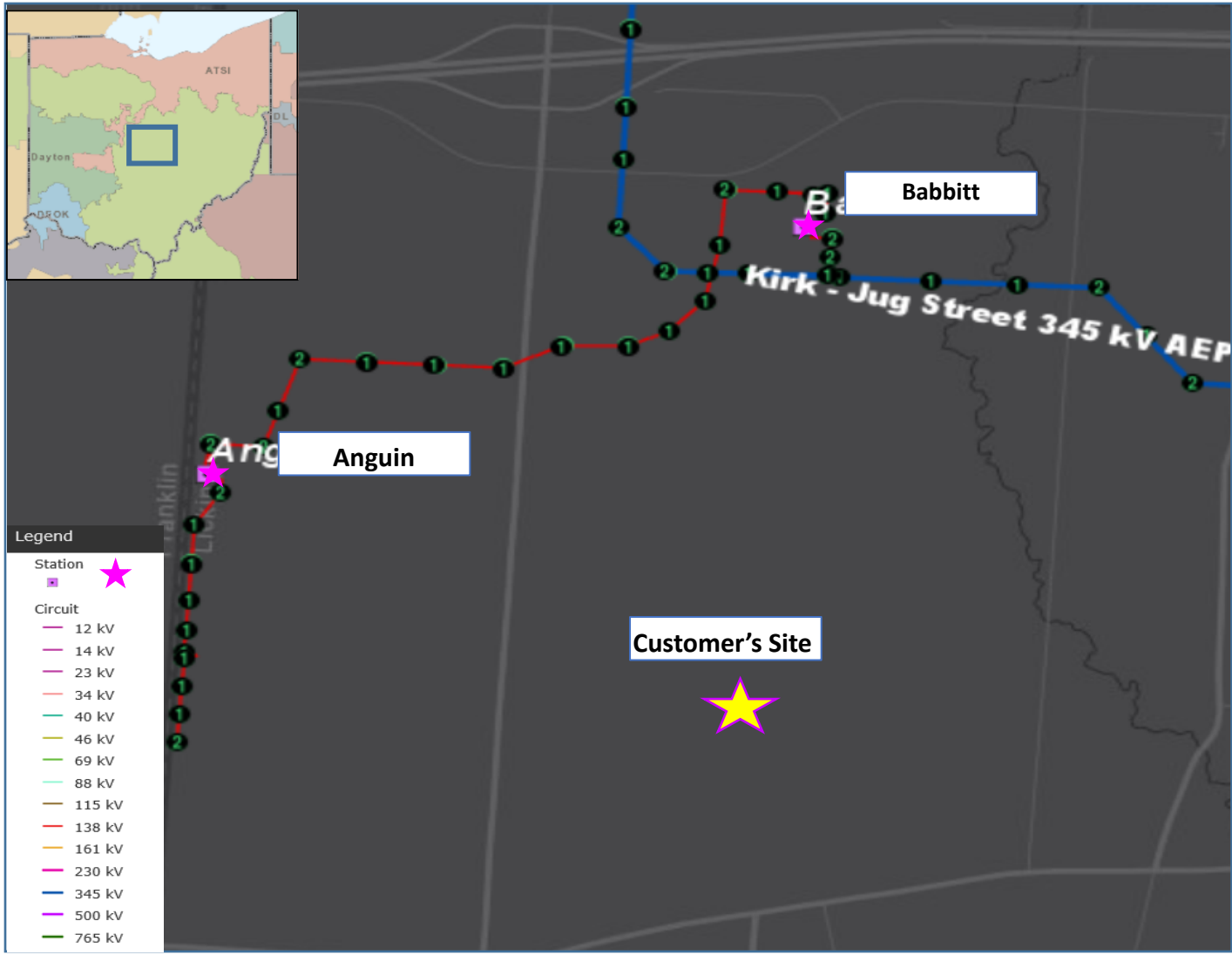
Specific Assumption Reference:

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

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site in New Albany, OH.
- The customer has indicated an initial peak demand of 84 MVA with an ultimate capacity of up to 240 MVA at the site.



AEP Transmission Zone M-3 Process
New Albany, Ohio

Need Number: AEP-2021-OH031

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- **Anguin 138 kV Station:** Relocate the Anguin extension No. 4 into strings C & D at Anguin station installing two circuit breakers in each string to complete the strings. The new double circuit line to Brie station will be installed in strings A & B. Expand DICM to accommodate additional relays. **Estimated Cost: $1.33M (s2781.1)**
- **Anguin – Penguin DP1 138kV:** Re-terminate the existing 138 kV Anguin Extension lines into strings C & D at Anguin Station. **Estimated Cost: $0.78M (s2781.2)**
- **Brie 138kV Station:** Establish the greenfield 138kV Brie station. Two full breaker and a half strings and 2 partial strings will be initially installed; total of ten (10) 138 kV breakers. **Estimated Cost: $11.04M (s2781.3)**
- **Anguin – Brie 138 kV:** Build ~1.5 miles of greenfield 138kV double circuit line between Anguin and Brie station with 2 Bundle ACSS 1033.5 Curlew. Extend the telecom fiber into Brie station for relaying/communication. Short span construction and larger than normal foundations are required in this area to maintain clearances and paths for future development from the customers in the area, leading to higher than normal costs for this line. **Estimated Cost: $7.83M (s2781.4)**
- **Brie – Customer Why 1 138kV:** Tie lines #1-4 to the customer's facility. **Estimated Cost: $0.11M (s2781.5)**

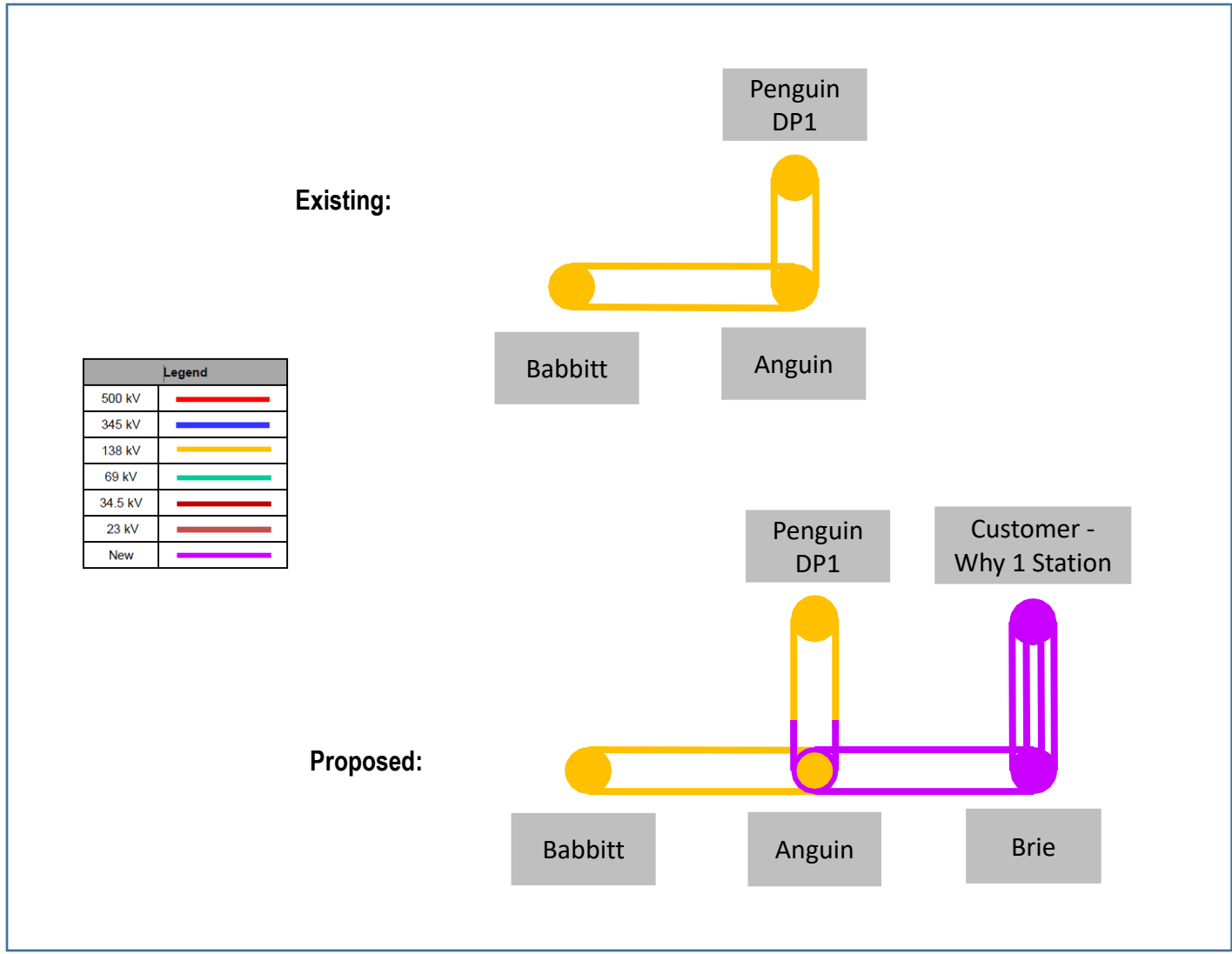
Total Estimated Transmission Cost: $21.08M

Projected In-Service: 6/1/2023

Supplemental Project ID: s2781.1-.5

Project Status: Scoping

Model: 2026 RTEP



AEP Transmission Zone M-3 Process
Fostoria, Ohio

Need Number: AEP-2021-OH054

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Need Meeting 10/15/2021

Supplemental Project Driver:

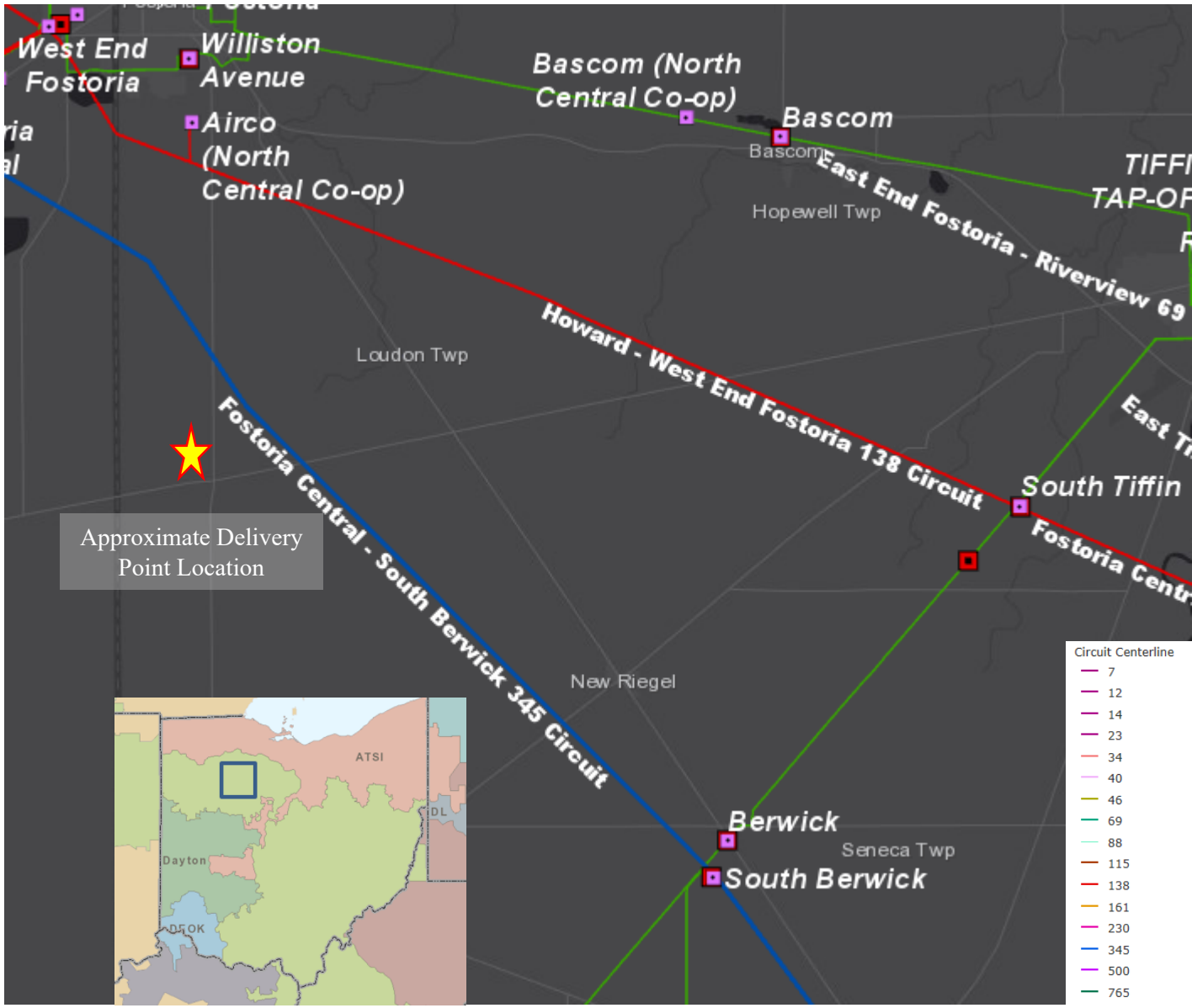
Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 12)

Problem Statement:

- Buckeye is requesting on behalf of North Central Electric Co-op a new 138kV delivery point tapped off of the Fostoria Central – Melmore 138kV Circuit by August 2022. Anticipated load is about 6.2 MVA.



AEP Transmission Zone M-3 Process
Iron Triangle 138kV Project

Need Number: AEP-2021-OH054

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- **Iron Triangle Switch 138kV:** Establish a new three way POP switch on the Fostoria Central – Melmore circuit to serve new North Central delivery point. The through-path will include auto-sectionalizing switches. **Estimated Cost $0.866M (s2782.1)**
- **Iron Triangle – Loudon 138kV**. Construct ~3.85 miles of single circuit 138 kV line utilizing 795 ACSR conductor between the proposed Iron Triangle Switch and the new NCEC Loudon delivery point **Estimated Cost $8.586M (s2782.2)**
- **West End Fostoria – Melmore 138kV:** Cut in work will be required on the Fostoria – Melmore Circuit for the Iron Triangle Switch. **Estimated Cost $0.627M (s2782.3)**
- **Ohio Central – Fostoria Central 345kV.** Modify Fostoria Central – South Berwick 345kV for the Iron Triangle – Loudon 138kV line crossing. **Estimated Cost $1.338M (s2782.4)**

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

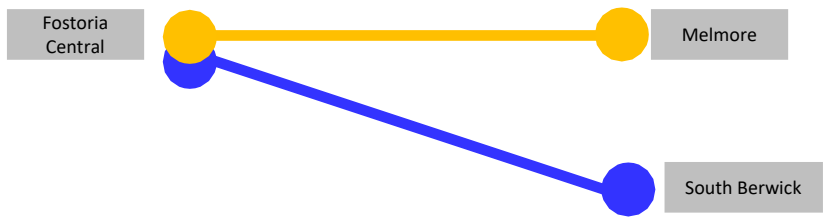
Total Estimated Cost: $11.432M

Projected In-Service: 7/1/2023

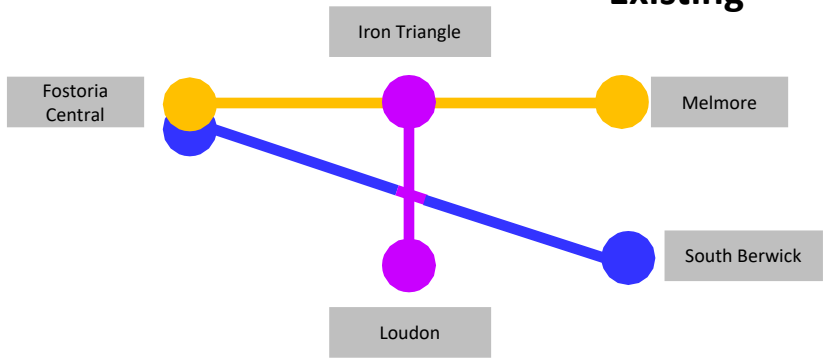
Supplemental Project ID: s2782.1-.4

Project Status: Scoping

Model: 2026 RTEP



Existing



Proposed

Need Number: AEP-2022-OH001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 4/22/2022
Needs Meeting 1/21/2022

Supplemental Project Driver:

Customer Service

Specific Assumption Reference:

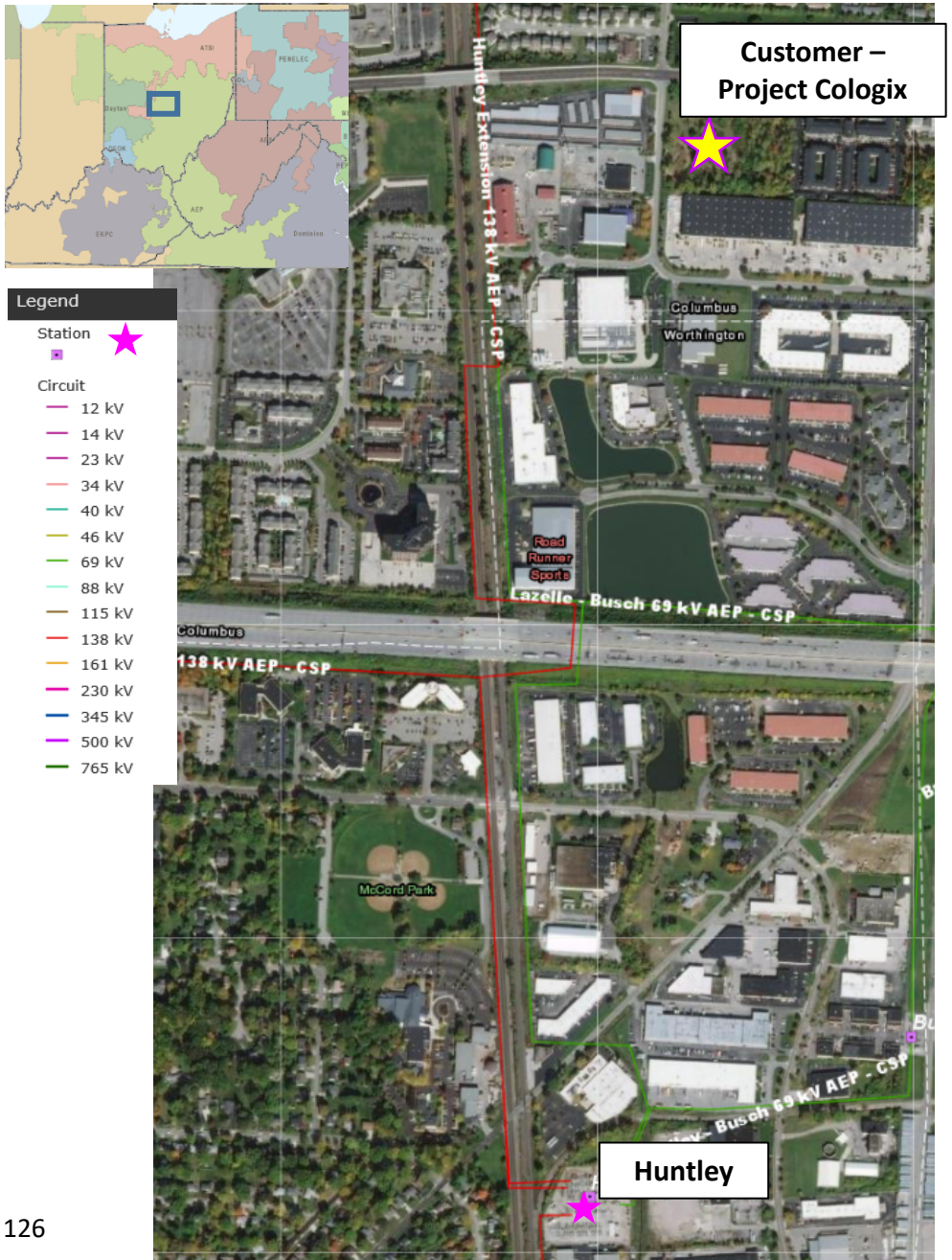
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site North of AEP's existing Huntley station in Worthington, OH.
- The customer has indicated a demand of 40 MW at the site.
- They are seeking an in service date of 4/1/2023 for their permanent transmission service.

Model: 2026 RTEP



Need Number: AEP-2022-OH001

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- **Scherers Switch 138kV:** Install a new 2000 A three-way Phase Over Phase switch with SCADA automation on the Huntley – Greif through path and install a bypass for maintenance. **Estimated Cost: $0.800M (s2789.1)**
- **Greif – Huntley 138kV line:** Tap the existing Greif-Huntley 138kV circuit by installing structures to carry the 69 kV underbuild Lazelle-Busch circuit and maintain separation from the new Scherers Switch as well as install dead end poles and centerline poles on each direction of the new switch. **Estimated Cost: $1.113M (s2789.2)**
- **Cologix Extension 138kV:** Construct ~0.24 miles of single circuit 138kV radial transmission line from Scherers Switch to the new Cologix Customer Station. **Estimated Cost: $0.795M (s2789.3)**

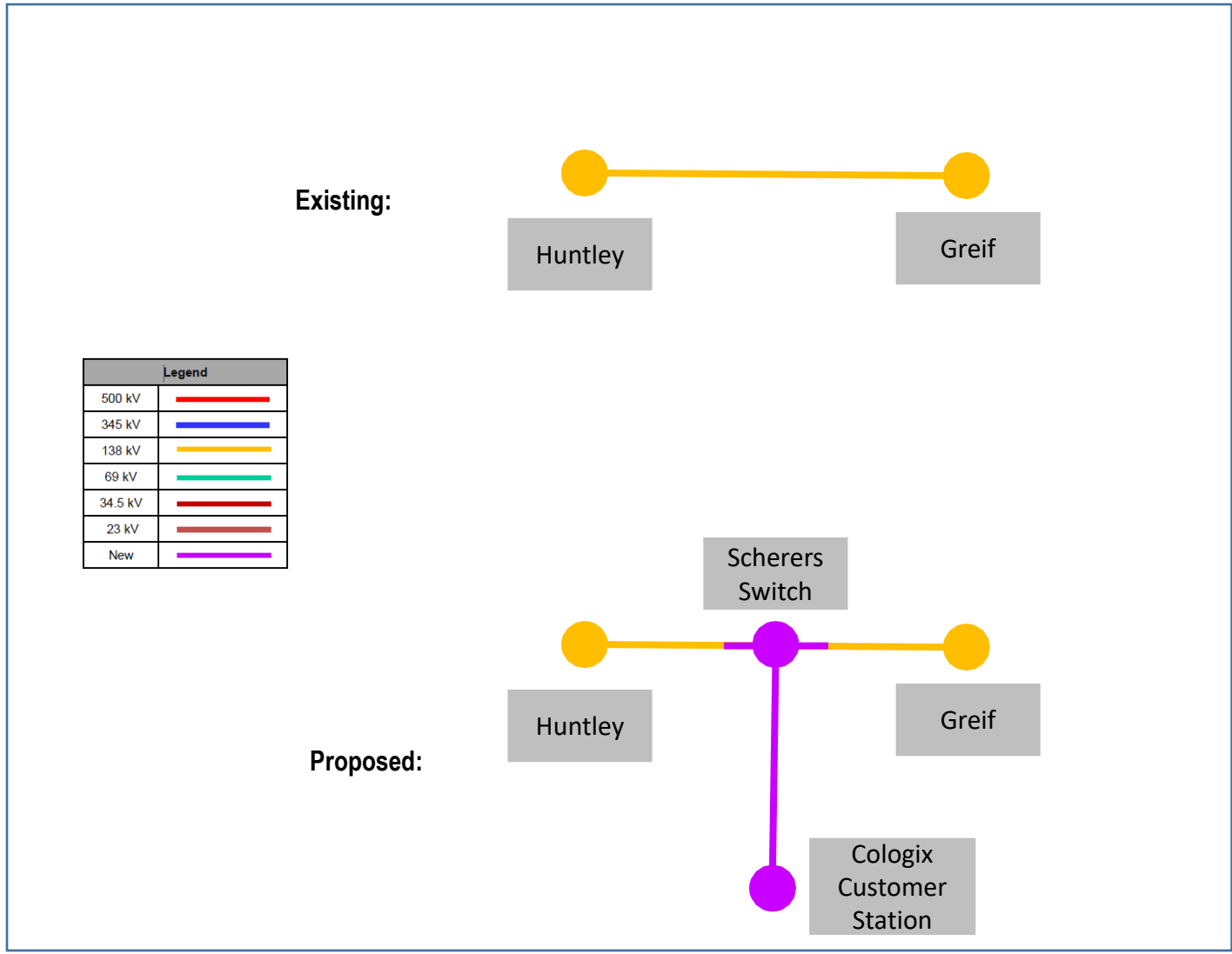
Total Estimated Transmission Cost: $2.708M

Projected In-Service: 4/1/2024

Supplemental Project ID: s2789.1-.3

Project Status: Scoping

Model: 2026 RTEP



AEP Transmission Zone: Supplemental
Danville, VA

Need Number: AEP-2021-AP033

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

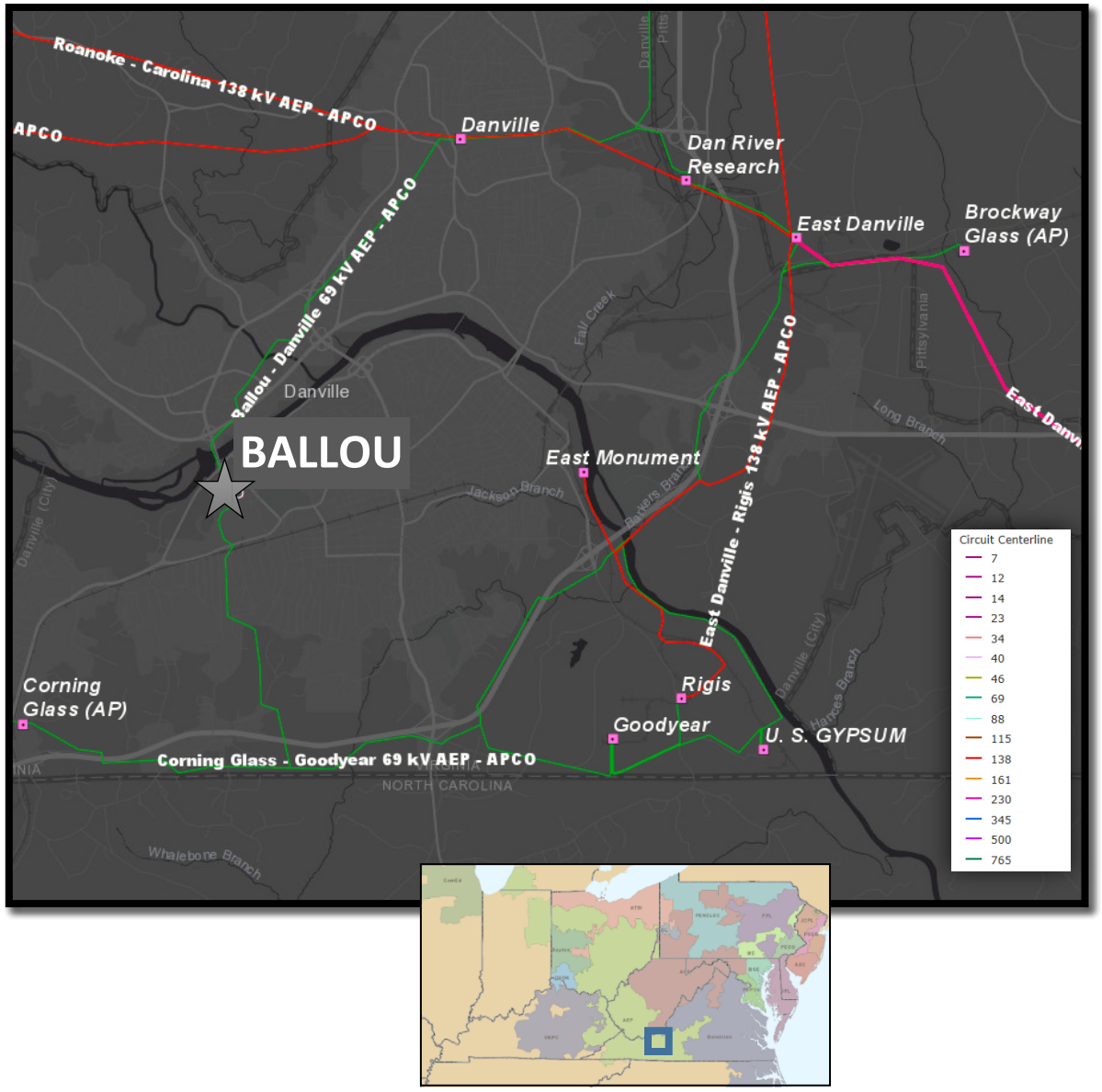
Previously Presented:
Solutions Meeting 5/19/2021
Needs Meeting 11/19/2021

Supplemental Project Driver: Customer Service

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

Problem Statement:

- The City of Danville requested a new 69 kV delivery point located at Ballou Station in Danville, VA to provide up to 25 MW of peak load (with an average load of 7-10 MW).



AEP Transmission Zone: Supplemental
Danville, VA

Need Number(s): AEP-2021-AP033

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- Ballou Station
  - This station was recently abandoned due to a previous customer no longer being served there. This project will remove all steel and cut all foundations down to 6" below grade. The only existing equipment that will be reused are two H-frames and the control house (AEP will not have any relaying equipment inside this building).
  - Two 138 kV Motor Operated Air-Break Switches (MOABs) and high-side 69 kV, 3-element metering and associated CT's and PT's will be installed
  - **Estimated Cost: $0 (Distribution) (s2783.1)**
- Ballou-State Line 69 kV Line Asset
  - Remove the temporary span between structure 290-58 and 289-1C, replace structure 289-1C, and then reinstall the span into Ballou Station using 795 kcmil 26/7 Drake ACSR with a 7#10 Alumoweld Shield Wire
  - **Estimated Cost: $0.46 M (s2783.2)**
- Ballou-Danville 69 kV Line Asset
  - Remove the temporary span between structure 290-58 and 289-1C, replace structure 290-58, and then reinstall the span into Ballou Station using 795 kcmil 26/7 Drake ACSR with a 7#10 Alumoweld Shield Wire
  - **Estimated Cost: $0.42 M (s2783.3)**

Total Estimated Transmission Cost: $0.88 M

Ancillary Benefits:

Establishing a new delivery point for the City of Danville will provide additional automatic sectionalizing on the existing Corning Glass-Danville-Goodyear 69 kV Circuit, decreasing the amount of exposure to permanent faults.

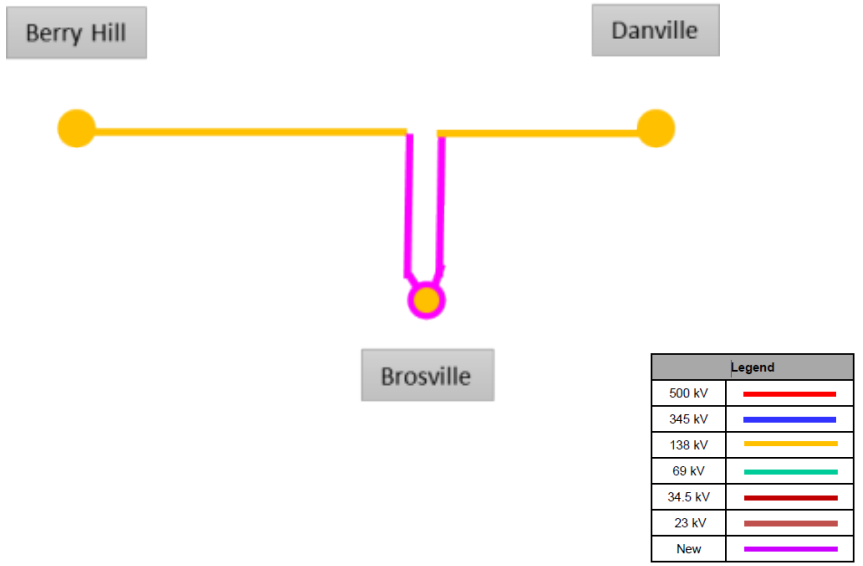
Projected In-Service: 11/1/2023

Supplemental Project ID: s2783.1-.3

Project Status: Scoping

Existing

Proposed



AEP Transmission Zone M-3 Process
East Dover – Atwood Upgrade

Need Number: AEP-2020-OH029

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 05/19/2022
Need Meeting 06/19/2020

Project Driver: Equipment Condition/Performance/Risk

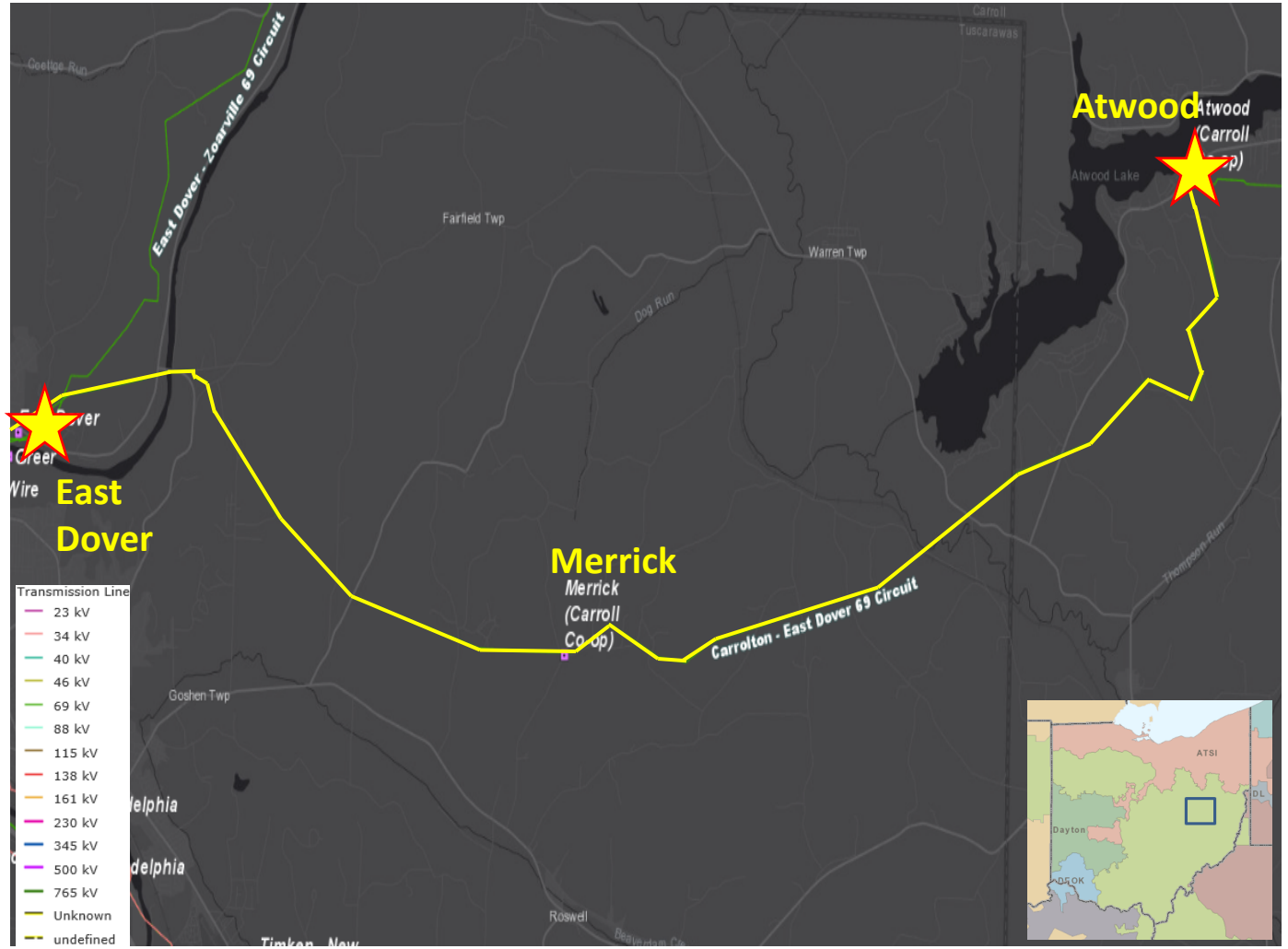
Specific Assumption Reference:

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

Problem Statement:

East Dover Carroll Co-op 69kV (15.30 miles)

- The line consists of wooden monopoles, H-frames and 3 pole structures.
- The line was originally built in 1958 with 4/0 ACSR conductor.
- There are currently 95 structures (55.5% of the line) with at least one open condition.
    - 69 structures with open conditions consisting of insect damage, rot top, rot heart, split crossarms, broken knee braces, rot shell, split poles and woodpecker holes.
    - 7 conductor-based open conditions consisting of damaged conductors and malfunctioning splices.
    - 28 hardware-based open conditions consisting of loose/broken insulators, burnt insulators, insulators missing bolts and broken/damaged/missing molding.
- For the 2015-2020 time period there have been 13 outage events on the Carrolton – East Dover Circuit. The permanent outages resulted in 2,344,426 minutes of interruption to the 2,643 customers served from the circuit (all Carroll Electric Co-op).



AEP Transmission Zone M-3 Process
East Dover – Atwood Upgrade

Need Number: AEP-2020-OH029

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

Merrick Switch – Atwood Switch: Rebuild the existing 8.8 mile 69kV line section between Merrick Switch and Atwood Switch, using 477 ACSR conductor. $19.92 Million **(s2784.1)**

Zoarville – Merrick Switch: Build 7.0 mile greenfield 69kV line between Merrick Switch and Zoarville, using 477 ACSR conductor. $16.47 Million **(s2784.2)**

Merrick Switch – East Dover: Retire 6.5 miles of 69 kV line between Merrick Switch and East Dover. $1.84 Million **(s2784.3)**

East Dover: Remove 69kV breaker K and associated equipment. Connect the modified Carrollton 69kV circuit to breaker H; upgrade a small amount of risers at East Dover. $0.34 Million. **(s2784.4)**

Zoarville: Install 69kV switch and conductor to connect to new T-line entrance. Relay settings updates at Carrollton. $0.14 Million. **(s2784.5)**

Total Transmission Cost: $38.71 Million

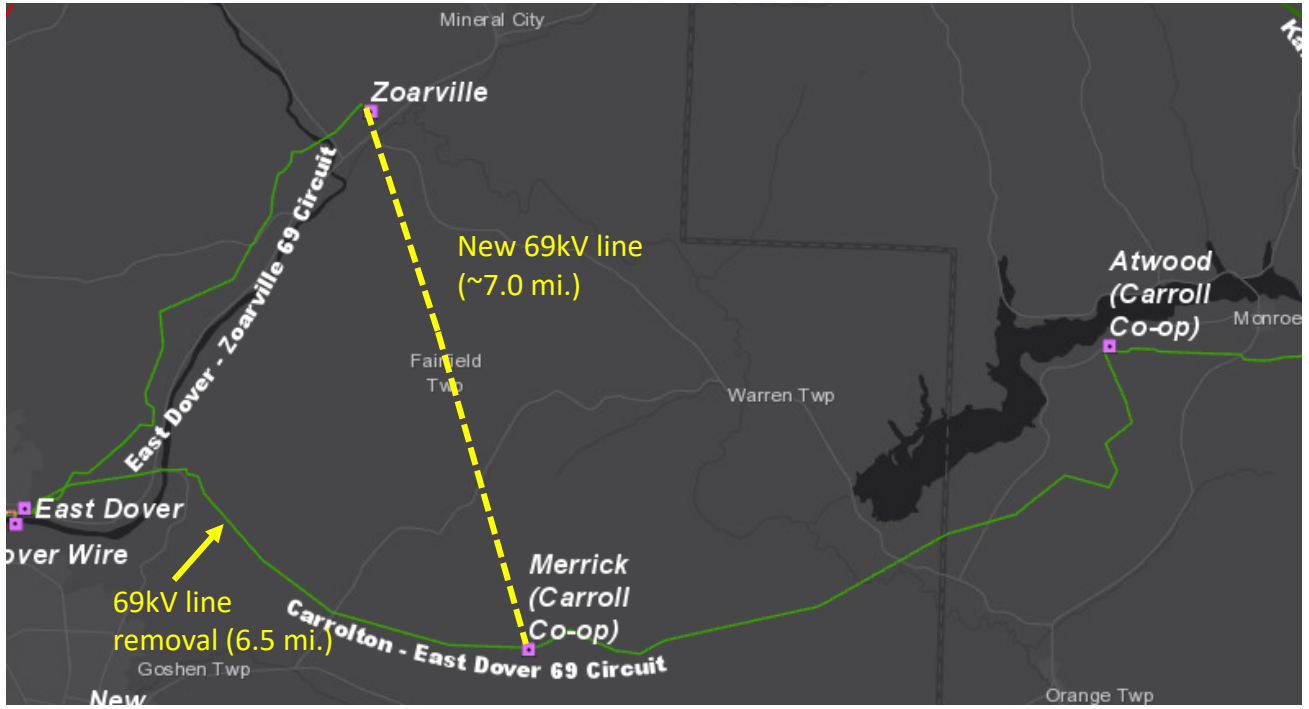
Ancillary Benefits: Addresses the 6.8-mile radial 69kV line to Zoarville station, by looping it into the Carrollton circuit. The existing radial system puts Zoarville area customers at risk of outages, due to the inability to take station or transmission line facilities out of service for maintenance or repairs.

Projected In-Service: 05/01/2025

Supplemental Project ID: s2784.1-.5

Project Status: Scoping

Model: 2026 PJM RTEP Load-Flow and Short Circuit Models

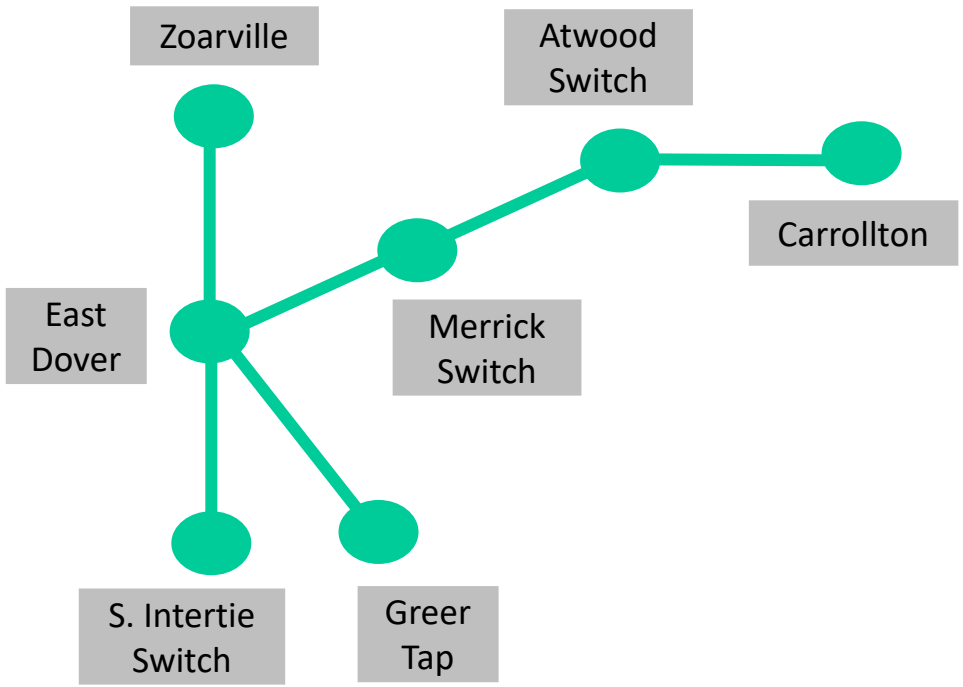


AEP Transmission Zone M-3 Process
East Dover – Atwood Upgrade

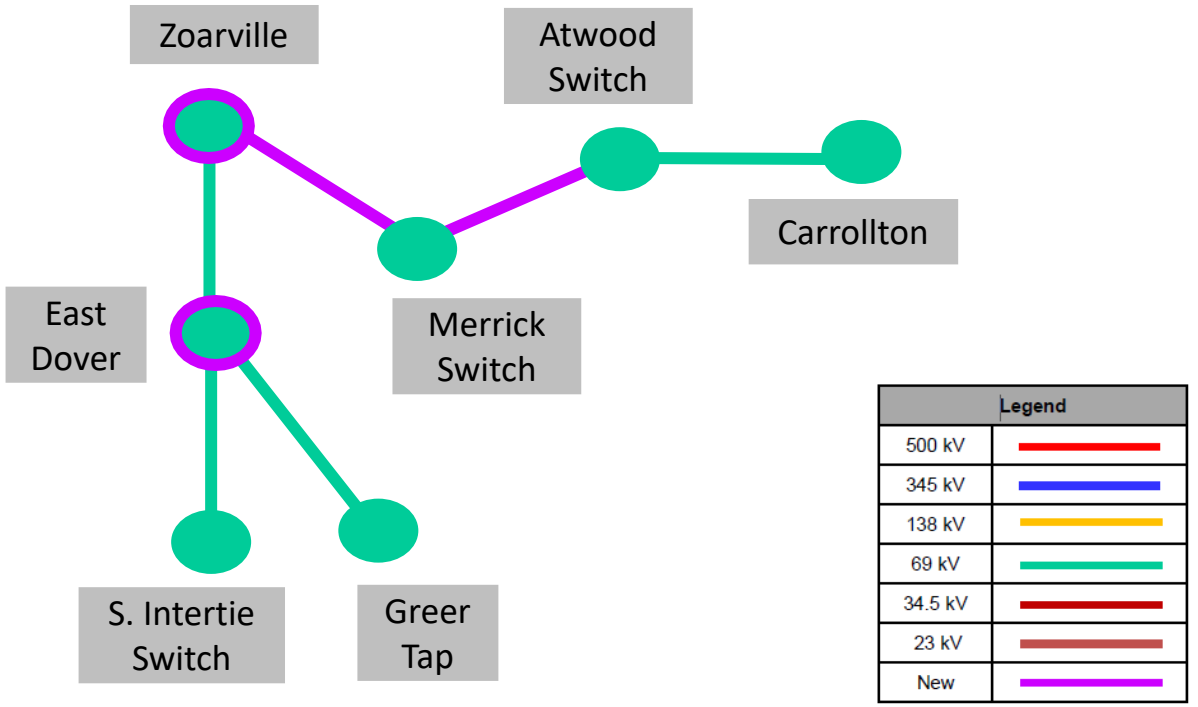
Need Number: AEP-2020-OH029

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan
10/11/2022

Existing:



Proposed:



AEP Transmission Zone M-3 Process
Hancock, Ohio

Need Number: AEP-2021-OH003

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 5/19/2022
Need Meeting 02/17/2021

Supplemental Project Driver:

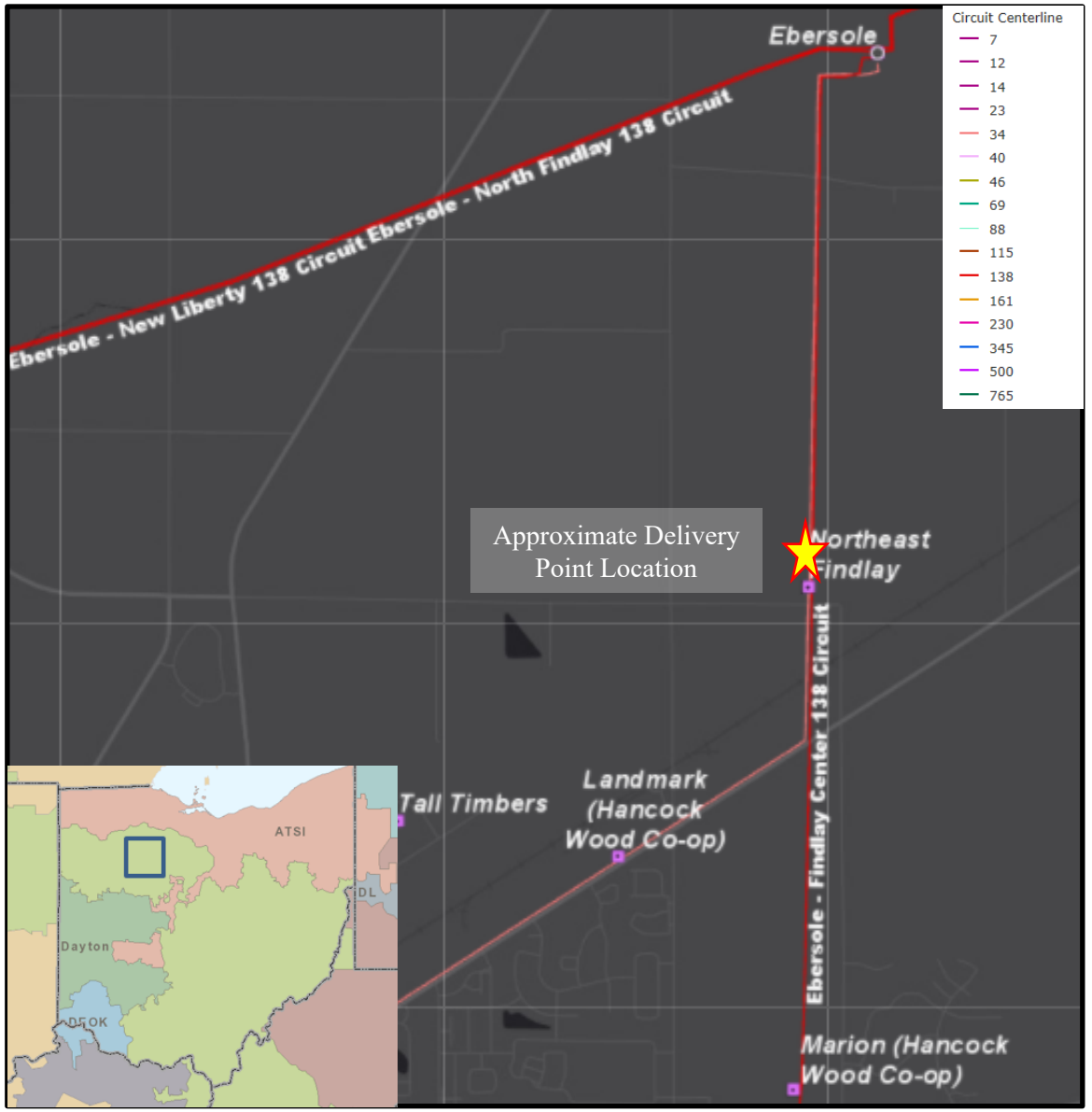
Customer Service

Specific Assumption Reference:

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

Problem Statement:

- Buckeye is requesting on behalf of Hancock-Wood Electric co-op for a new 138kV delivery point on the Ebersole – Findlay Center 138kV Circuit by August 2023. Anticipated load is about 3 MVA.



AEP Transmission Zone: Supplemental Portsmouth, Ohio

Need Number: AEP-2021-OH003

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

- Invision Switch: Install a new switch on the Ebersole – Findlay center 138 kV line to serve the new Buckeye Co-Op Cass Substation. Estimated Cost: $1.49 M **(s2785.1)**
- Invision – Cass: Install approximately 0.1 miles of new 138 kV line from Invision Switch to the Buckeye Co-op Cass Substation. Estimated cost: $595 k **(s2785.2)**

Total Estimated Transmission Cost: $2.085 M

Projected In-Service: 8/15/2023

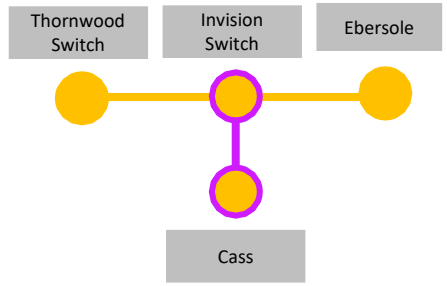
Supplemental Project ID: s2785.1-.2

Project Status: Engineering

Existing:

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

Proposed:



AEP Transmission Zone M-3 Process
George Washington-Kammer (Marshall County, WV)

Need Number: AEP-2021-OH013

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Previously Presented:
Solution Meeting 05/19/2022
Need Meeting 03/19/2021

Project Driver: Equipment Condition/Performance/Risk

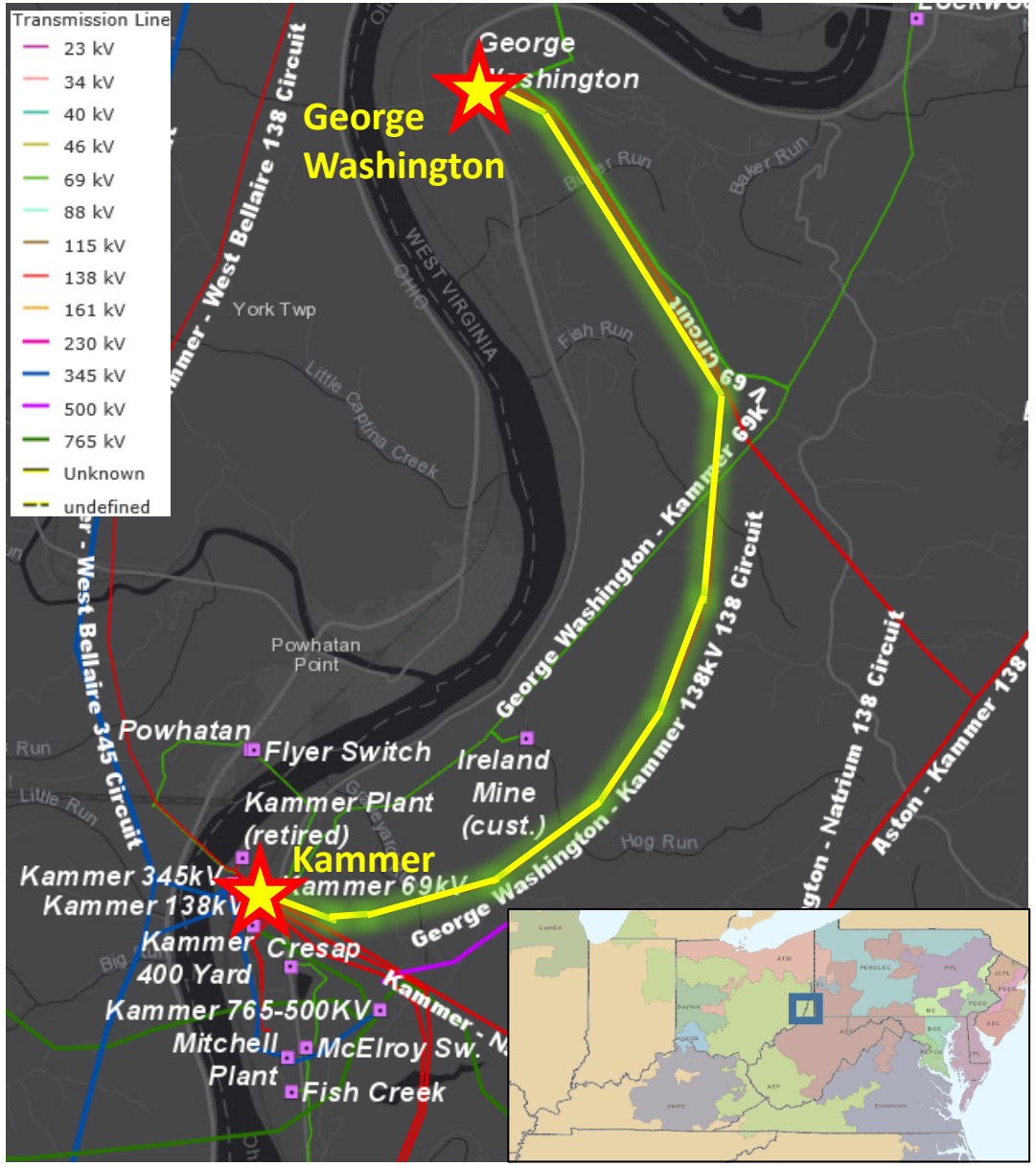
Specific Assumption Reference:

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

Problem Statement:

<u>George Washington-Kammer 138kV circuit (6.9 miles)</u>

- The line consist of 6.7 miles of original (1956) lattice towers and conductor (6-wired 636 ACSR). There is 0.2 miles of newer construction that is in adequate condition (outside the substation at each end).
- The shield wire design does not meet current shielding angle requirements.
- There are currently 14 hardware-based open conditions on the line (primarily insulator damage), 1 conductor condition (broken strands), and 1 structure condition.
- Some of the steel lattice towers show heavy rusting and corrosion. The original insulator strings show significant residue/contamination, leading to risk of flashovers and circuit outages.
    - Hook attachments freely move and wear through the hangers. This wear results in the loss of steel section over time. That section loss reduces the strength of the connection which can result in premature failure. There is evidence of hole elongation and the amount of steel left in the hanger holding up the suspension insulators is thin.



AEP Transmission Zone M-3 Process
George Washington-Kammer 138kV Line Rebuild

Need Number: AEP-2021-OH013

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution: Rebuild the George Washington – Kammer 138kV circuit, except for 0.1-mile of previously-upgraded T-line outside each terminal station (6.7 miles of total upgrade scope). Remove the existing 6-wired steel lattice towers and supplement the right-of-way as needed. **(s2786)**

Total Cost = $18.3 Million

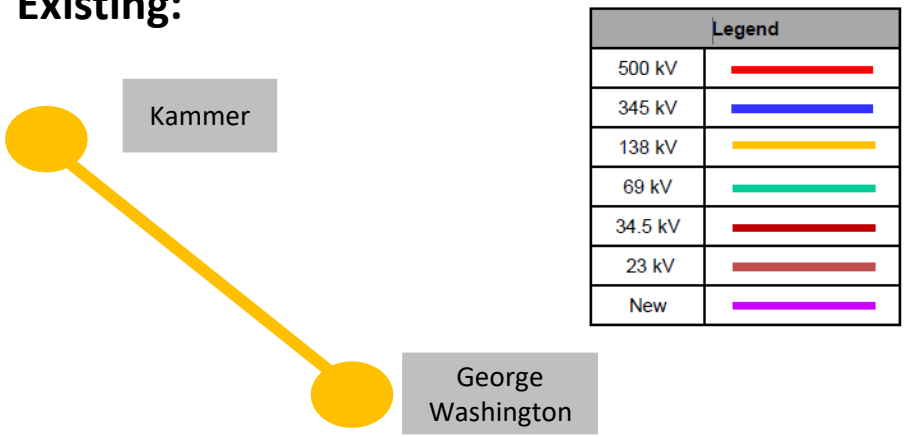
Projected In-Service: 06/01/2024

Supplemental Project ID: s2786

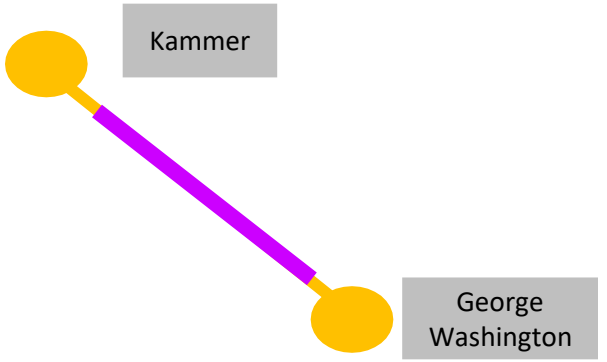
Project Status: Scoping

Model: 2026 PJM RTEP Load-Flow and Short Circuit Models

Existing:



Proposed:



AEP Transmission Zone M-3 Process
RV Capital Customer Request

Need Number: AEP-2021-IM035

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

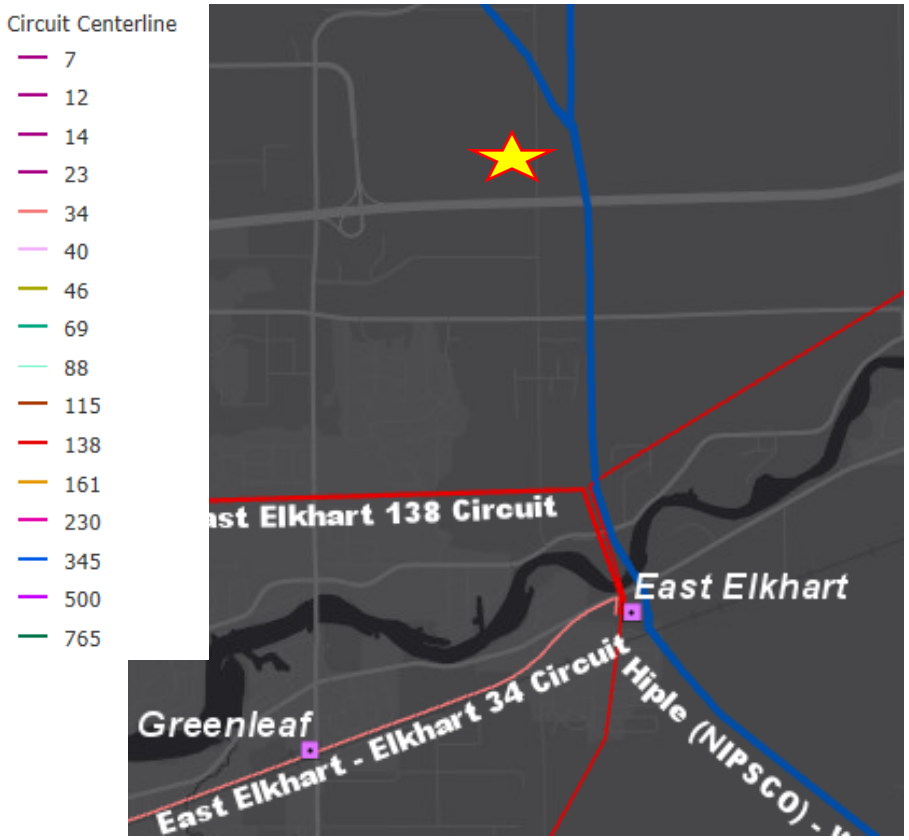
Previously Presented:
Solution Meeting 04/22/2022
Needs Meeting 11/19/2021

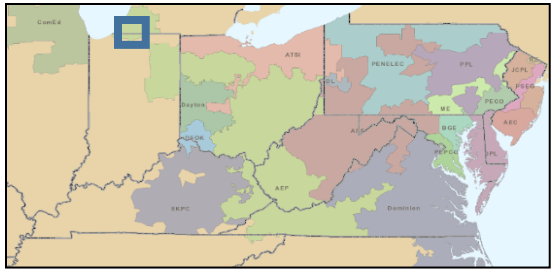
Project Driver: Customer Service

Specific Assumption Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

AMZ Propco, LLC has requested new transmission service in Elkhart, Indiana by January 2023. Anticipated load is approximately 8.5 MW.





AEP Transmission Zone M-3 Process
RV Capital Customer Request

Need Number: AEP-2021-IM035

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/11/2022

Solution:

RV Capital 138 kV - Install a new 138kV straight bus with a (2) 138kV MOAB switches, fiber and relaying.

Estimated Cost: $1.96M **(s2787.1)**

East Elkhart – RV Capital 138kV - Install ~1.44 mi of 138 kV single circuit from structure 1 to RV Capital on the East Elkhart – Mottville Hydro 138kV circuit with the conductor size 795 ACSR 26/7 Drake.

Estimated Cost: $3.34M **(s2787.2)**

East Elkhart Stateline Metering - Relocate to Mottville Hydro.

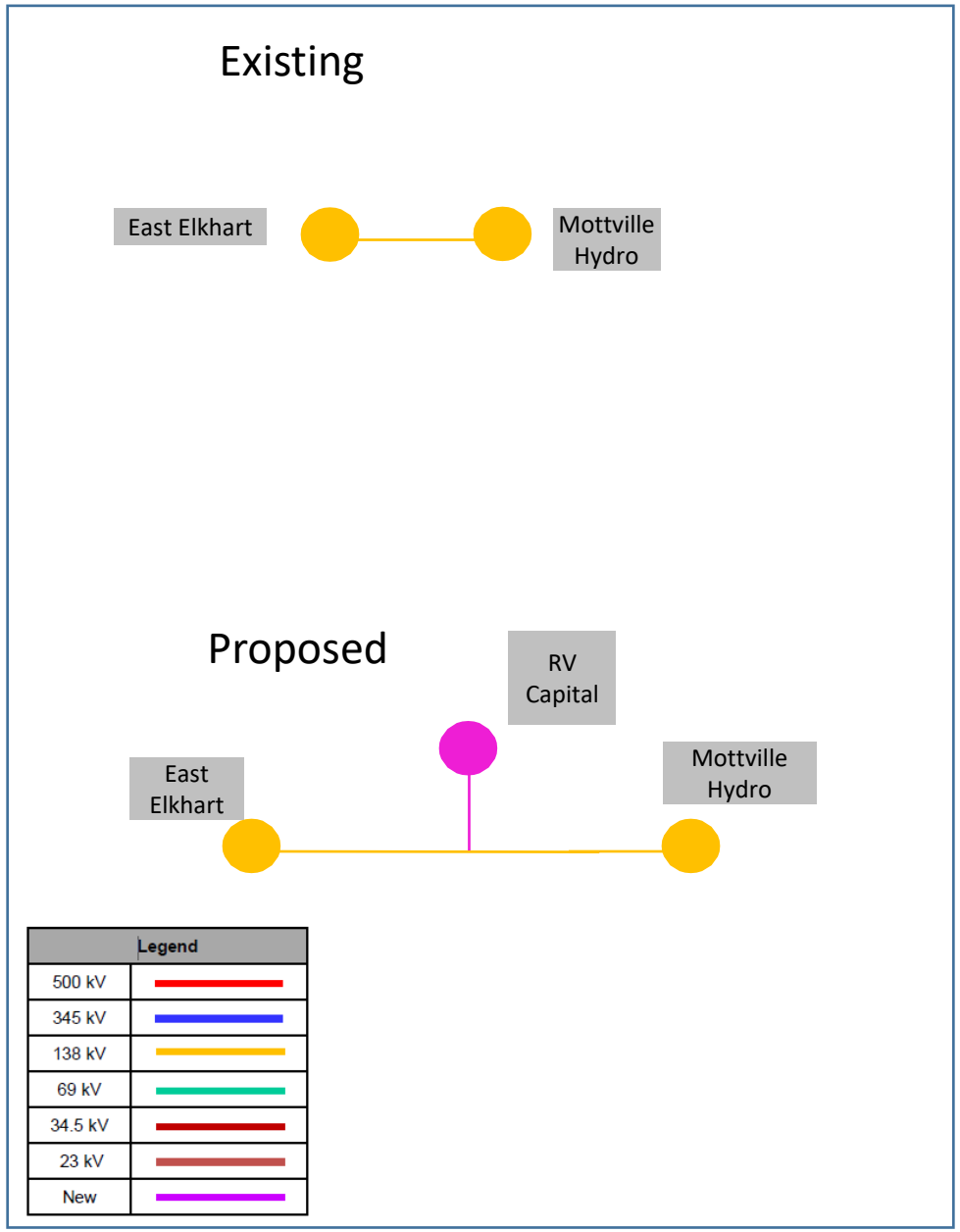
Estimated Cost: $0.47M **(s2787.3)**

Total Estimated Transmission Cost: $5.77M

Projected In-Service: 3/28/2023

Supplemental Project ID: s2787.1-.3

Project Status: Scoping



AEP Transmission Zone M-3 Process
Washington & Morgan Counties Ohio

Need Number: AEP-2019-OH045

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:

Solutions Meeting 06/15/2022

Need Meeting 07/24/2019

Project Driver:

Equipment Condition, Operational Flexibility, and Customer Service

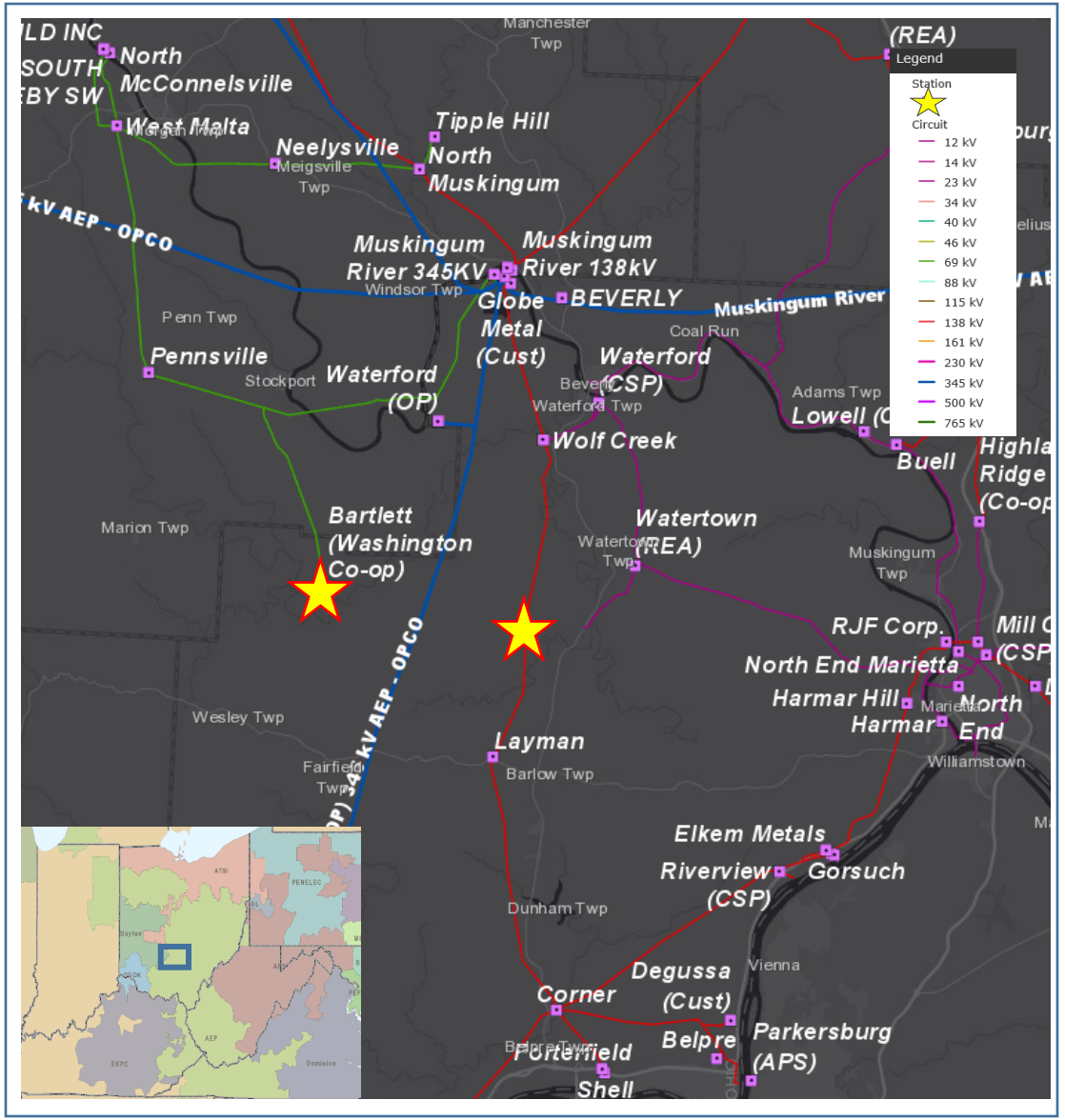
Specific Assumption Reference:

AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12) & AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

Customer Service:

- Buckeye Power, on behalf of Washington Electric Cooperative, has requested transmission service in western Washington County, Ohio.
- Washington Electric Cooperative customers are currently connected to radial 23 kV and 12 kV AEP Ohio distribution lines in the area.
- The delivery points connected to the 23 kV system have consistently been identified as having poor reliability by Buckeye.
- Washington Electric Cooperative (WEC) has reported approximately 3,780,000 customer-outage minutes (CMI) over a ten year period (2012-2021).
- WEC's Bartlett delivery, which reported a 1,893,000 CMI between 2012-2021, is currently served via a 5 mile radial extension from a manual switch on the Muskingum River – South Rokeby 69 kV circuit.



AEP Transmission Zone M-3 Process
Washington & Morgan Counties Ohio

Need Number: AEP-2021-OH011

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:

Solutions Meeting 06/15/2022

Need Meeting 03/19/2021

Problem Statement

Equipment Condition:

Line Name: Muskingum – South Rokeby 69kV

Original Install Date (Age): 1965

Length of Line: ~21.3 mi

Total structure count: 164

Original Line Construction Type: Wood

Conductor Type: 4/0 ACSR 6/1, 336,400 CM ACSR 18/1, and 336,400 CM ACSR 30/7 Momentary/Permanent Outages and Duration:10 Momentary and 2 Permanent Outages

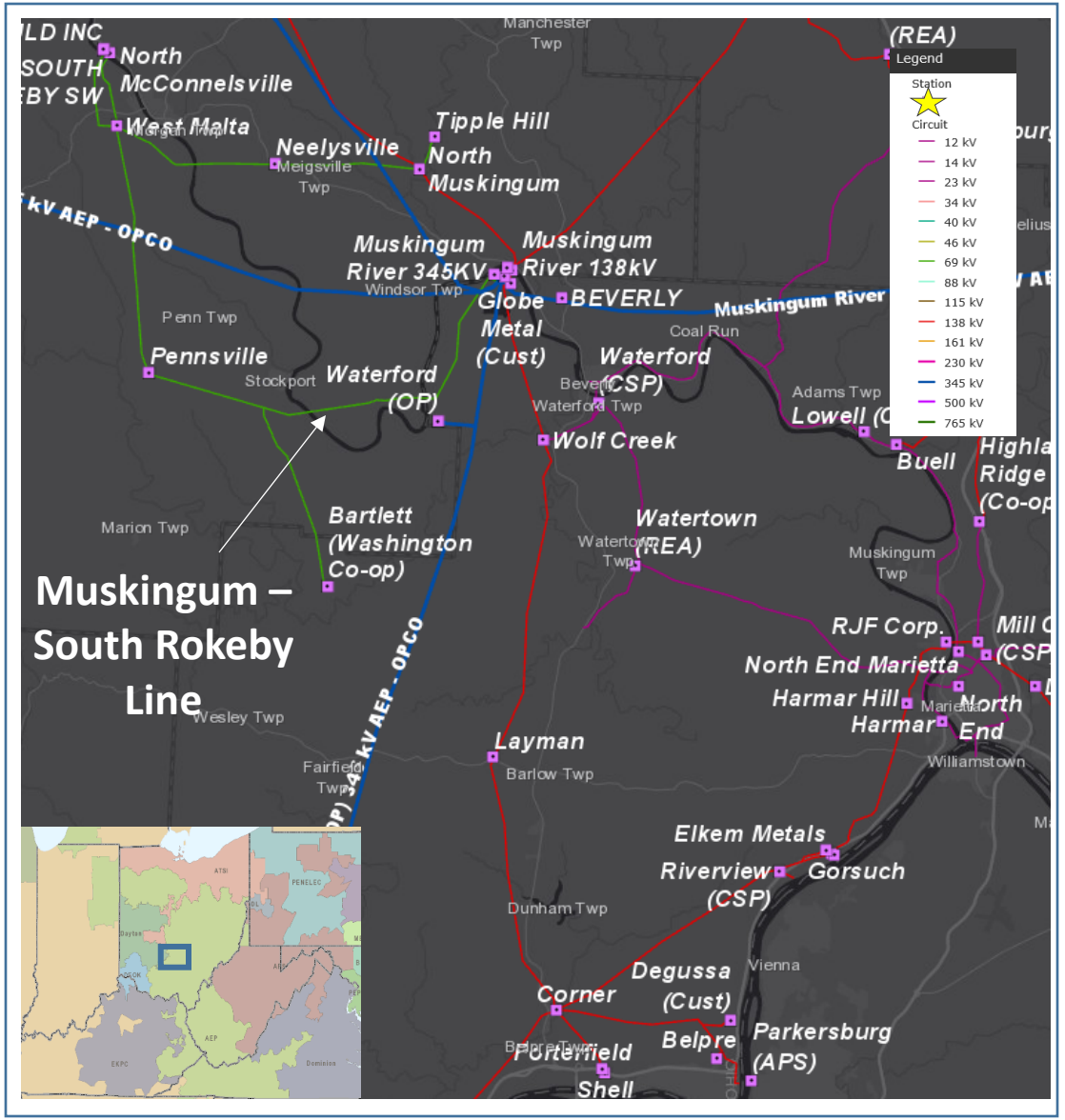
CMI: 756,000 (past five years)

Line conditions: 48 structures with at least one open condition, 29% of the structures on this circuit. 45 structure related open conditions impacting wooden poles, crossarms, braces, and filler blocks including rot, bowing, woodpecker holes, insect damage, cracked, split, and rot top. 12 open conditions related to conductor issues including broken strands. 12 hardware/shielding issues including open conditions related to burnt, broken, or chipped insulators.

Structure Age: 72% 1960's, 15% 1970, 13% 1980's or newer

Other: The line shielding angle does not meet AEP's current shielding angle requirements. Line does not meet current NESC Grade B loading criteria or AEP's current structural strength requirements.

Washington Co-op's Bartlett Station is served radially from this line (~ 5.09 miles) with limited sectionalizing ability.



AEP Transmission Zone M-3 Process
Washington & Morgan Counties Ohio

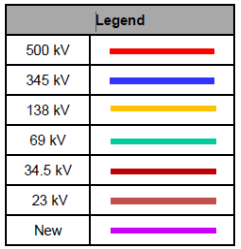
Need Number: AEP-2019-OH045 & AEP-2021-OH011

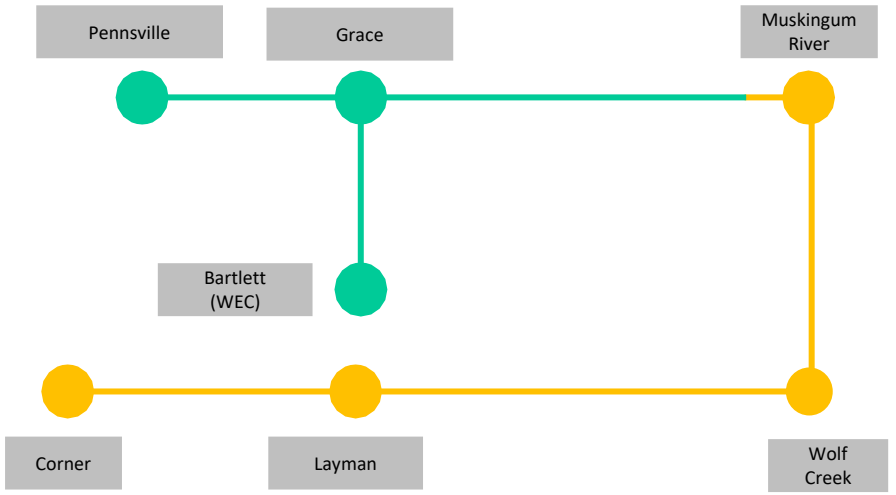
Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

- **West Watertown Station, 138 kV**: Construct a greenfield 138/69 kV West Watertown station off the existing Corner – Wolf Creek 138 kV circuit. Install four-138 kV 3000 A 40 kA breakers configured in a ring arrangement. Install 90 MVA 138/69/13.09 kV transformer along with a 3000A 40 kA 69 kV low side breaker towards WEC's Bartlett delivery. **Estimated Cost: $8.8M (s2791.1)**
- **Wolf Creek – Corner 138 kV Line cut-in**: Cut-in on the line to install the new West Watertown station. **Estimated Cost: $0.55M (s2791.2)**
- **West Watertown – Watertown (WEC) 138 kV circuit:** Construct approximately 4.3 miles of single circuit 138 kV line between the newly proposed West Watertown station and WEC's new 138 kV delivery at Watertown. **Estimated Cost: $9.32M (s2791.3)**
- **West Watertown – Patten Mills 69 kV circuit**: Construct approximately 5.8 miles of single circuit 69 kV line between the newly proposed West Watertown station and a proposed phase over phase switch (Patten Mills Switch) near WEC's delivery at Bartlett. **Estimated Cost: $11.81M (s2791.4)**
- **Patten Mills Switch, 69 kV**: Install a new 69 kV 2000A phase over phase (Patten Mills switch) to serve the Bartlett delivery point. **Estimated Cost: $0.9M (s2791.5)**
- **South Stockport - Washington Co-op 69 kV Line cut-in**: Cut-in on the line to install the new Patten Mills Switch. **Estimated Cost: $0.65M. (s2791.6)**
- **Muskingum River - South Rokeby 69 kV Line Removal**: Retire ~9 miles of existing 69 kV line between Grace and Muskingum River stations. **Estimated Cost: $4.1M (s2791.7)**
- **Muskingum River Removals**: At Muskingum River 138 kV yard, retire the 138/69 kV XF #C, CB-HM & HW. **Estimated Cost: $0.63M (s2791.8)**
- **Grace Station, 69 kV**: Retire Grace - Muskingum River circuit, upgrade protection and fiber work at Grace Station. **Estimated Cost: $0.91M (s2791.9)**

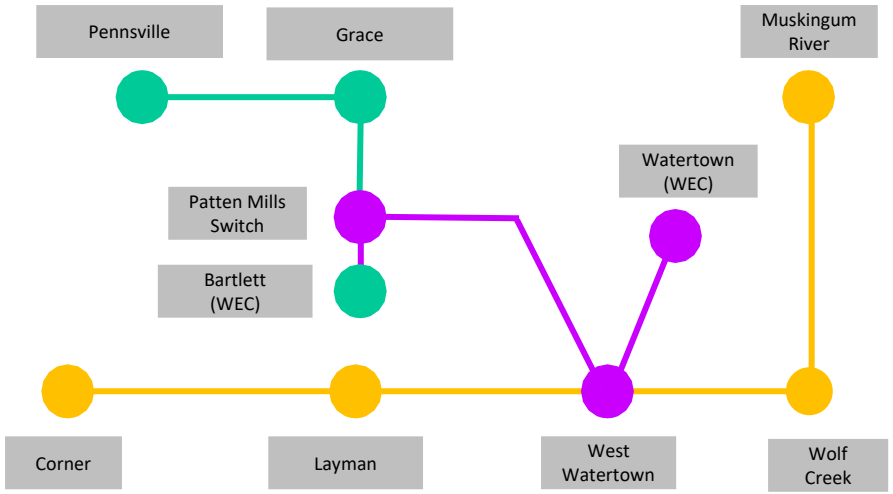
Existing:





Bubble Diagram

Proposed:



AEP Transmission Zone M-3 Process
Washington & Morgan Counties Ohio

Need Number: AEP-2019-OH045 & AEP-2021-OH011

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

- **Grace – Watertown Fiber**: Install fiber between Grace and Watertown stations. **Estimated Cost: $0.55M (s2791.10)**
- **Wolf Creek & Corner Stations Protection upgrades**: Remote end protection upgrade. **Estimated Cost: $0.65M (s2791.11)**
- **Watertown (WEC) Metering**: Install 12 kV revenue metering at WEC's new Watertown station. **Estimated Cost: $0.026M (s2791.12)**

Total Estimated Transmission Cost: $38.9M

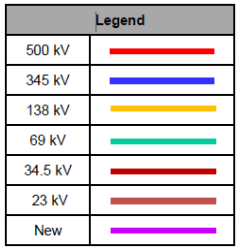
Projected In-Service: 9/1/2024

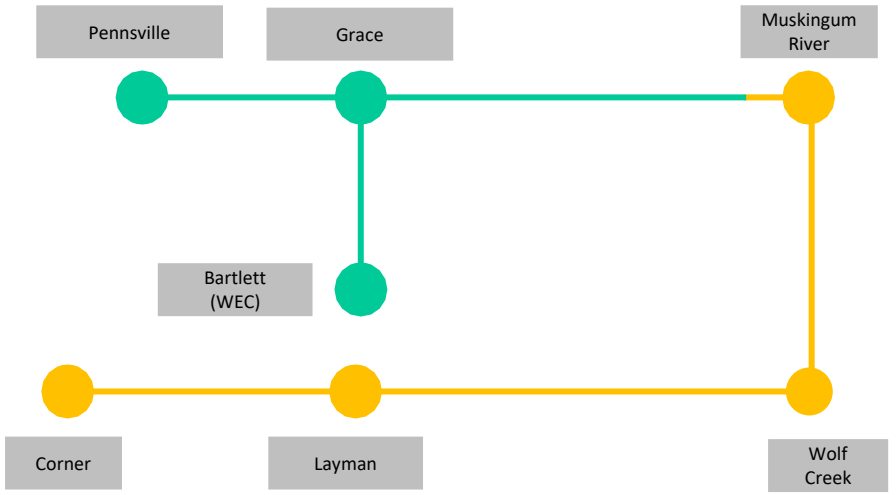
Supplemental Project ID: s2791.1-.12

Project Status: Scoping

Model: 2025 RTEP

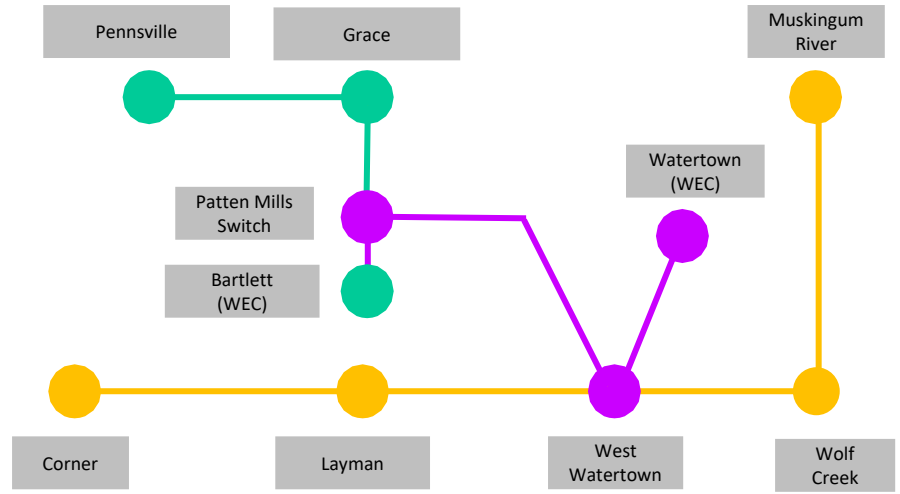
Existing:





Bubble Diagram

Proposed:



AEP Transmission Zone M-3 Process
Rufener Switch

Need Number: AEP-2019-OH046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:

Solution Meeting 6/15/2022

Needs Meeting 7/24/2019

Supplemental Project Driver:

Operational Flexibility and Customer Service

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs

Problem Statement:

- Holmes-Wayne Co-op's Moreland delivery point is served via a hard tap from the Beartown-Moreland 69kV circuit, with no line sectionalizing switches present. The hard tap limits operational capabilities in the area. It is difficult to coordinate maintenance efforts because the T-line cannot be removed from service without a customer outage for Holmes-Wayne Co-op.
- Load is approximately 7 MVA.
- CMI: 0.155 M reported by Holmes Wayne (2015-2018)

Model: N/A

AEP Transmission Zone M-3 Process
Rufener Switch

Need Number: AEP-2019-OH046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

Eliminate the Moreland area 69kV hard tap and install a new 3-way, motor-operated switch with SCADA functionality ("Rufener Switch"). **Estimated Cost: $0.60M (s2792.1)**

Modify the Beartown-Moreland 69kV through-path T-line and ROW, in order to install the new switch structure. **Estimated Cost: $0.60M (s2792.2)**

Modify the Rufener – Co-op 69kV radial T-line and ROW, in order to install the new switch structure. **Estimated Cost: $0.30M (s2792.3)**

Total Estimated Transmission Cost: $1.50 Million

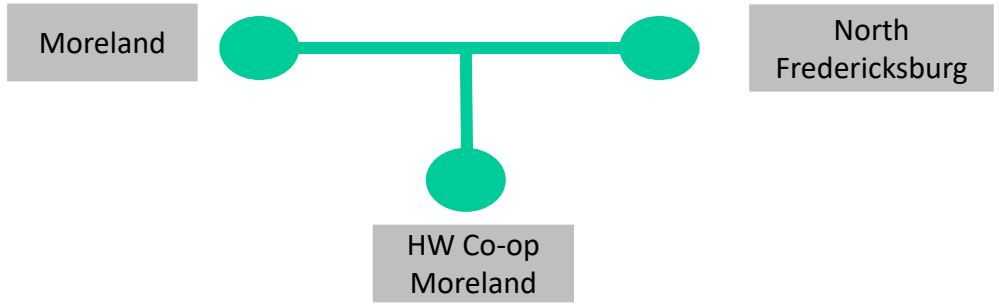
Projected In-Service: 12/01/2023

Supplemental Project ID: s2792.1-.3

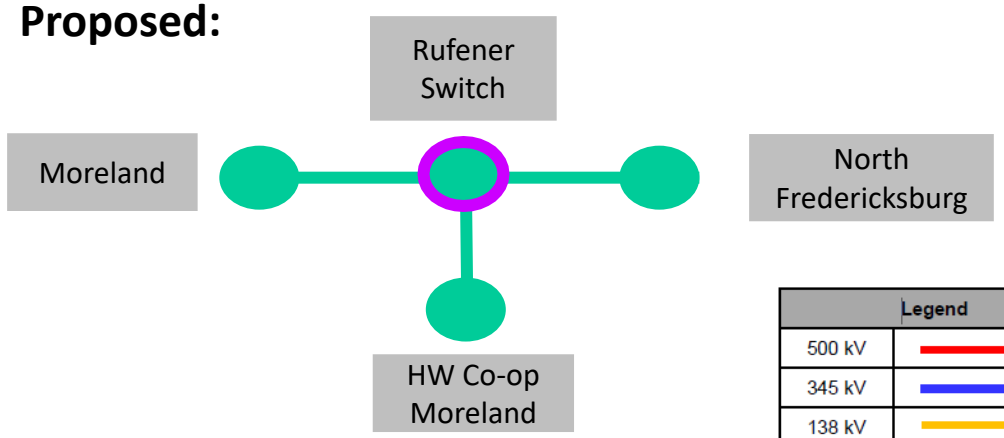
Project Status: Scoping

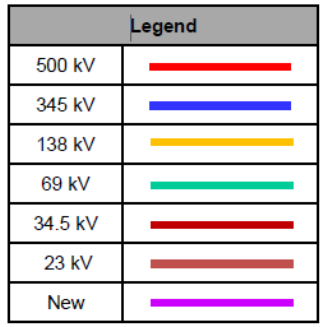
Model: 2026 PJM RTEP Load-Flow and Short Circuit Models

Existing:



Proposed:





AEP Transmission Zone M-3 Process
Van Wert County, Ohio

Need Number: AEP-2020-OH044

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:

Solution 6/15/2022

Need Meeting 10/16/2020

Project Driver:

Equipment Material/Condition/Performance/Risk, Operational Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs

Problem Statement:

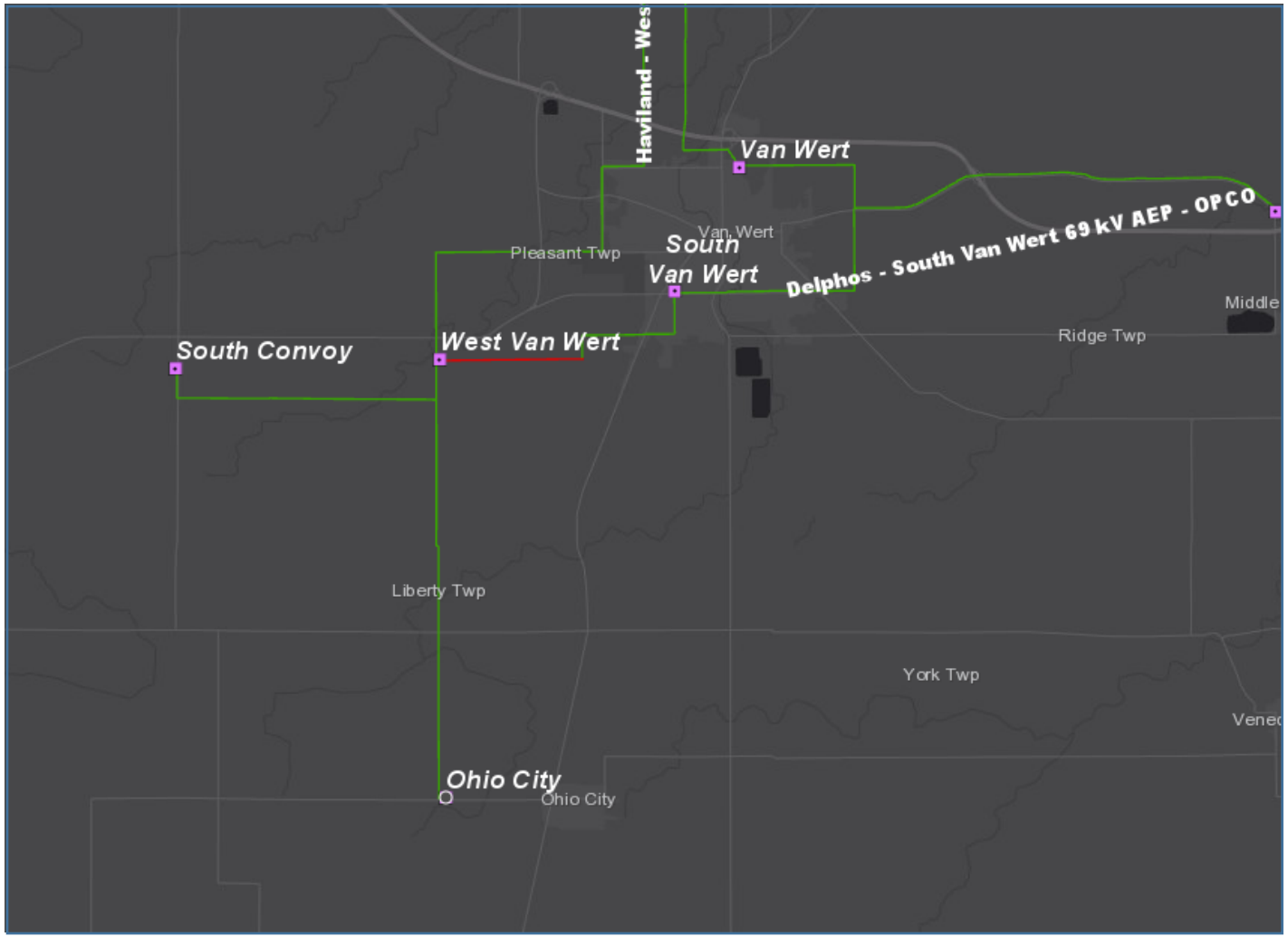
Line Name: Ohio City – West Van Wert 34.5kV Circuit

LINE CHARACTERISTICS

- **Original Install Date (Age):** 1963 (57 years)
- **Length of Line:** 8.90 miles
- **Total structure count:** 173
- **Original Line Construction Type:** Wood
    - 62% of structures replaced in 1994.
- **Conductor Type:** 1/0 Copper 7 (1939 Install), 4/0 ACSR 6/1 Penguin (1966 Install)

CONDITION / PERFORMANCE / RISK ASSESSMENT:

- **Condition Summary**
    - Open conditions / defects / inspection failures include: missing/broken ground wires, woodpecker damage, broken guy wires
    - Number of structures with defects/inspection failures: 24
- **Load at Risk:** 3.997 MVA
- **CMI:** 127,978 Customer Minutes of Interruption



AEP Transmission Zone M-3 Process
Van Wert County, Ohio

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:

Solution 6/15/2022

Need Meeting 10/16/2020

Problem Statement *(cont.)*:

CONDITION / PERFORMANCE / RISK ASSESSMENT:

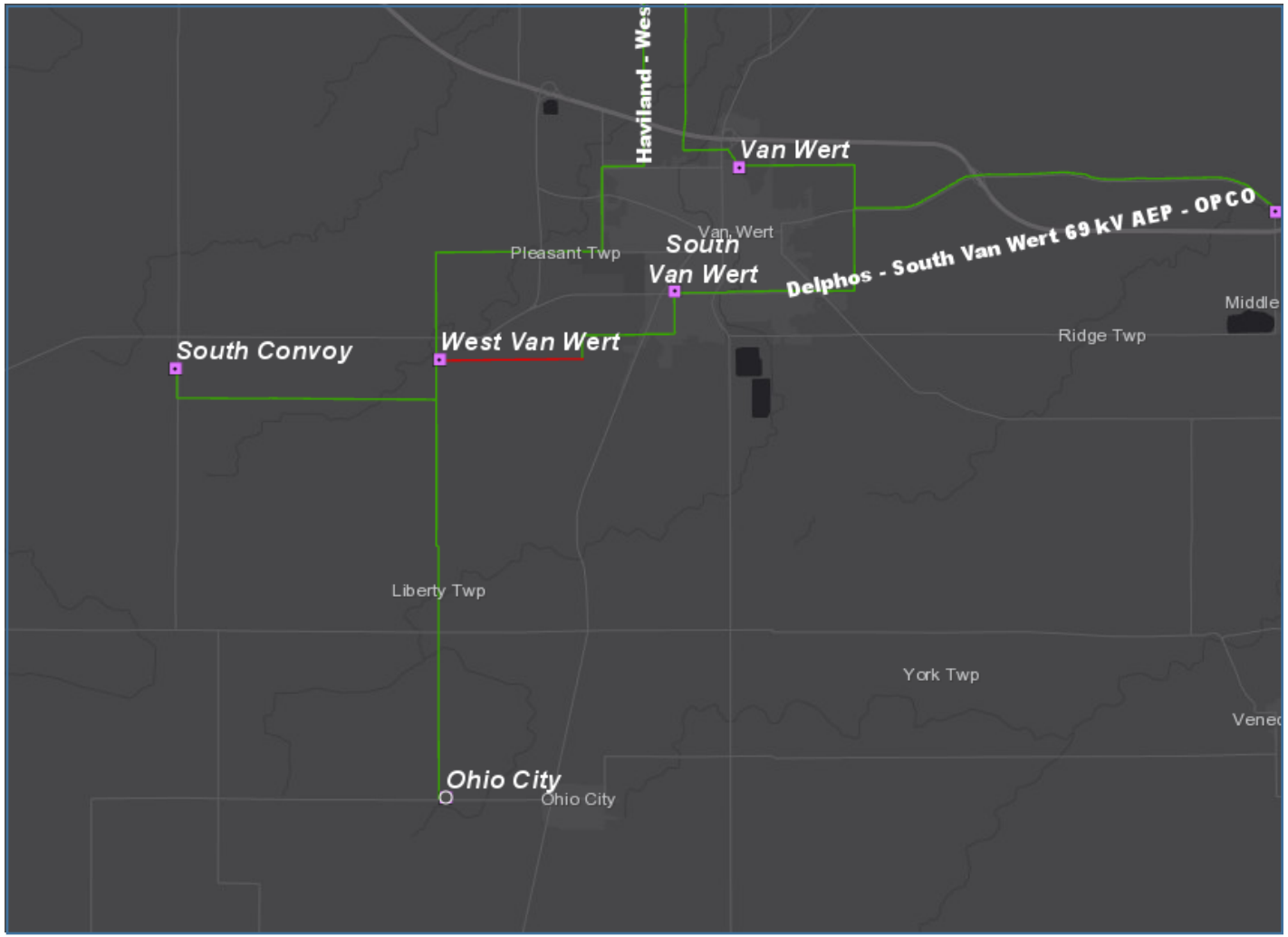
Station Name: Ohio City

Transformers Concerns:

- 1951 vintage and shows significant signs of dielectric breakdown (paper insulation), accessory damage (likely sludge in radiators, core, and coil), and short circuit breakdown.

OPERATIONAL EFFICIENCY:

- AEP has a normally open 34.5 kV tie with Dayton at Dayton's Rockford Substation that is built to 69kV standards. This is an out of phase interconnection point and can only be closed if the 12kV Dayton Rockford bus is de-energized first and the line is energized from AEP. AEP's Ohio City station is a radially served load out of West Van Wert. Since this is a normally open point, the Rockford load is radial under most operating conditions since a manual process must take place to switch the load to AEP's source if there is an issue with the Celina-Coldwater-Rockford 6688 69kV line. Dayton has limited switching options from Rockford substation so, the normally open point has needed to be used multiple times in recent years to transfer customers to the Ohio City source due to outages on the Dayton system.



AEP Transmission Zone M-3 Process
West Van Wert-Ohio City Conversion Project

Need Number: AEP-2020-OH044

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

This solution will be coordinated with the previously proposed DP&L solution s2521

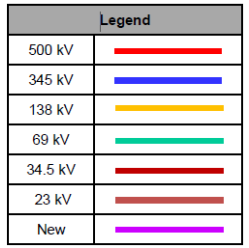
- **West Van Wert – Ohio City:** Rebuild the 8.9 mile West Van Wert – Ohio City 34.5 kV circuit to operate at 69 kV utilizing 556 ACSR conductor. **Estimated Cost $12.271M (s2793.1)**
- **West Van Wert 69kV:** In order to address the three terminal point created by closing in the interconnection at Rockford and address existing dissimilar zones of protection, 4 new 3000A, 40kA breakers will be installed at West Van Wert station in a ring configuration. **Estimated Cost $5.503M (s2793.2)**
- **Haviland – West Van Wert:** Relocate Haviland – West Van Wert 69kV to accommodate work at West Van Wert station. **Estimated Cost $1.035M (s2793.3)**
- **West Van Wert – South Van Wert:** Relocate West Van Wert –South Van Wert to accommodate work at West Van Wert station. **Estimated Cost $1.174.M (s2793.4)**
- **Roller Creek 69kV:** Install new 69/12 kV Roller Creek station to replace Ohio City 34.5/12 kV station. Install a box bay with a 1200A 69kV auto-sectionalizing MOAB and a 3000A,40kA 69kV breaker on the West Van Wert- Rockford through path. Install 69kV metering. **Estimated Cost $1.641M (s2793.5)**
- **West Ohio City Switch 34kV:** Retire Switch **Estimated Cost $0.039M (s2793.6)**
- **Southwest Van Wert Switch 34kV:** Retire Switch **Estimated Cost $.088M (s2793.7)**

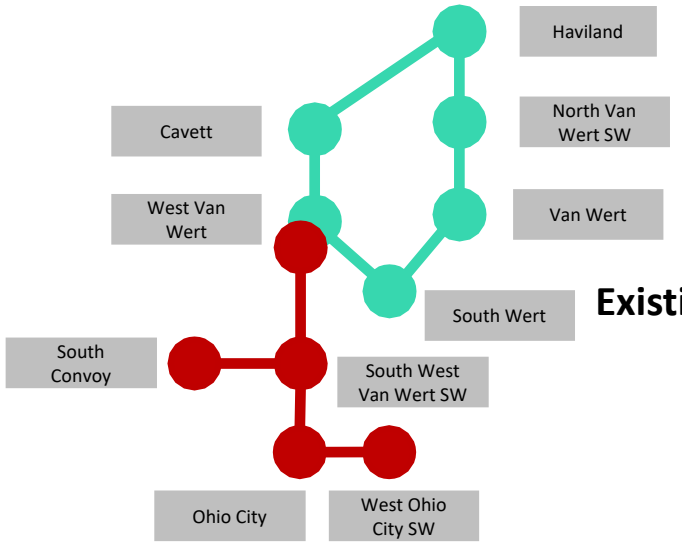
Total Estimated Cost: $21.751M

Projected In-Service: 06/01/2025

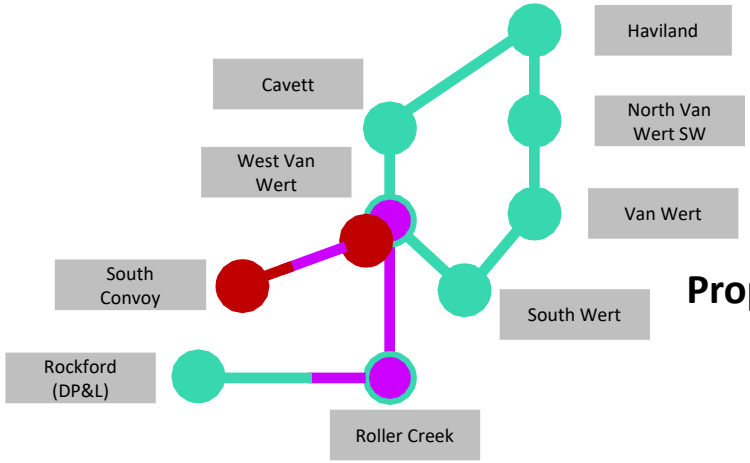
Supplemental Project ID: s2793.1-.7

Project Status: Scoping





Existing



Proposed

AEP Transmission Zone M-3 Process
Perry County, OH

Need Number: AEP-2021-OH046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:

Solutions Meeting 06/15/2022

Need Meeting 09/17/2021

Project Driver:

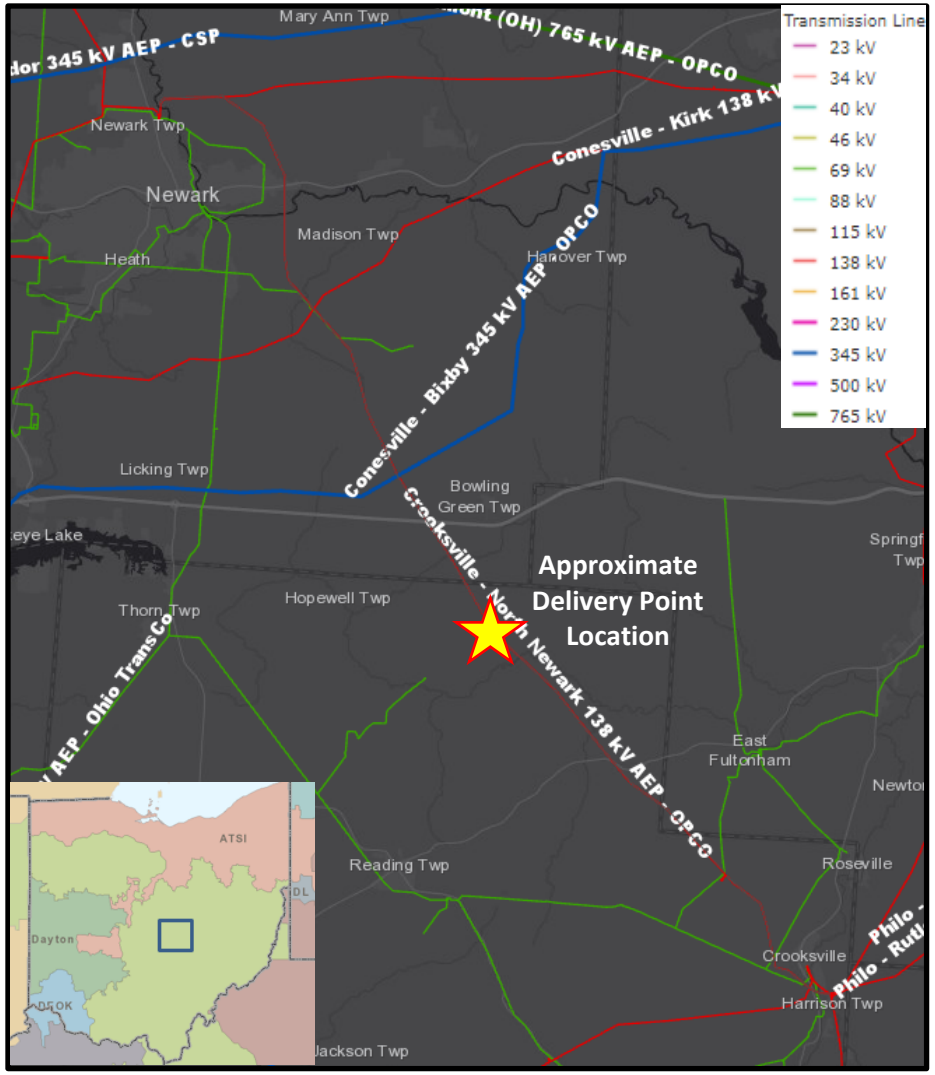
Customer Service

Specific Assumption Reference:

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

Problem Statement:

Buckeye is requesting, on behalf of South Central Power (SCP), a new 138kV delivery point on the Crooksville – North Newark 138kV circuit by April 2024. The anticipated peak demand at this delivery point will be approximately 4.3 MW considering contingency loading.



AEP Transmission Zone M-3 Process
Perry County, OH

Need Number: AEP-2021-OH046

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

- **Mount Perry Switch, 138 kV**: Install a new 3-way POP MOAB switch (Mount Perry Switch) tapping the Crooksville – North Newark 138kV circuit to SCP's new Mount Perry Station. **Estimated Cost: $0.966M (s2794.1)**
- **Mount Perry Extension, 138 kV**: Construct approximately 0.08 miles of greenfield 138kV transmission line from the greenfield 3-way POP MOAB switch to SCP's new Mount Perry Station. **Estimated Cost: $0.737M (s2794.2)**
- **Mount Perry Meter, 12 kV**: Install 12 kV metering at SCP's new Mount Perry Station. **Estimated Cost: $0.023M (s2794.3)**
- **Crooksville – North Newark 138 kV line**: Perform work to cut-in the Crooksville – North Newark 138 kV line to install the new POP MOAB switch. **Estimated Cost: $0.162M (s2794.4)**
- **Crooksville Protection upgrades:** Remote end protection upgrade**. Estimated Cost: $0.551M (s2794.5)**

Total Estimated Cost: $2.44M

Projected In-Service: 7/19/2024

Supplemental Project ID: s2794.1-.5

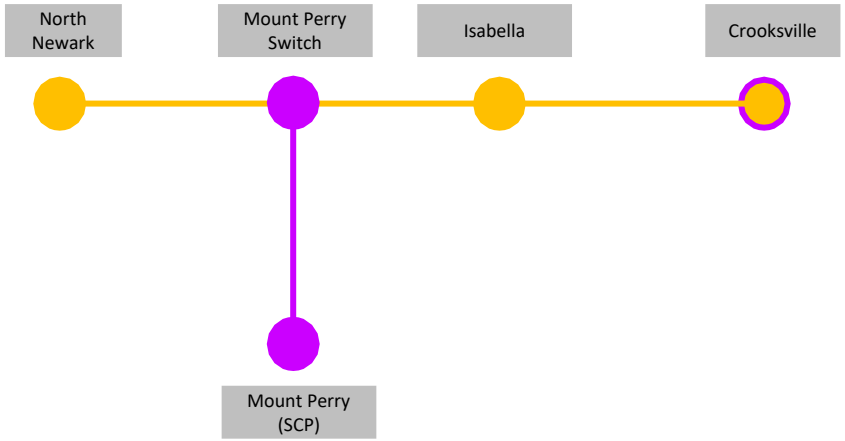
Project Status: Scoping

Model: 2025 RTEP

Existing:

Bubble Diagram

Proposed:



AEP Transmission Zone M-3 Process
Layland – Mollys Creek

Need Number: AEP-2021-AP012

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solution Meeting 6/15/2022
Need Meeting 3/19/2021

Project Driver: Equipment Condition/Performance/Risk

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

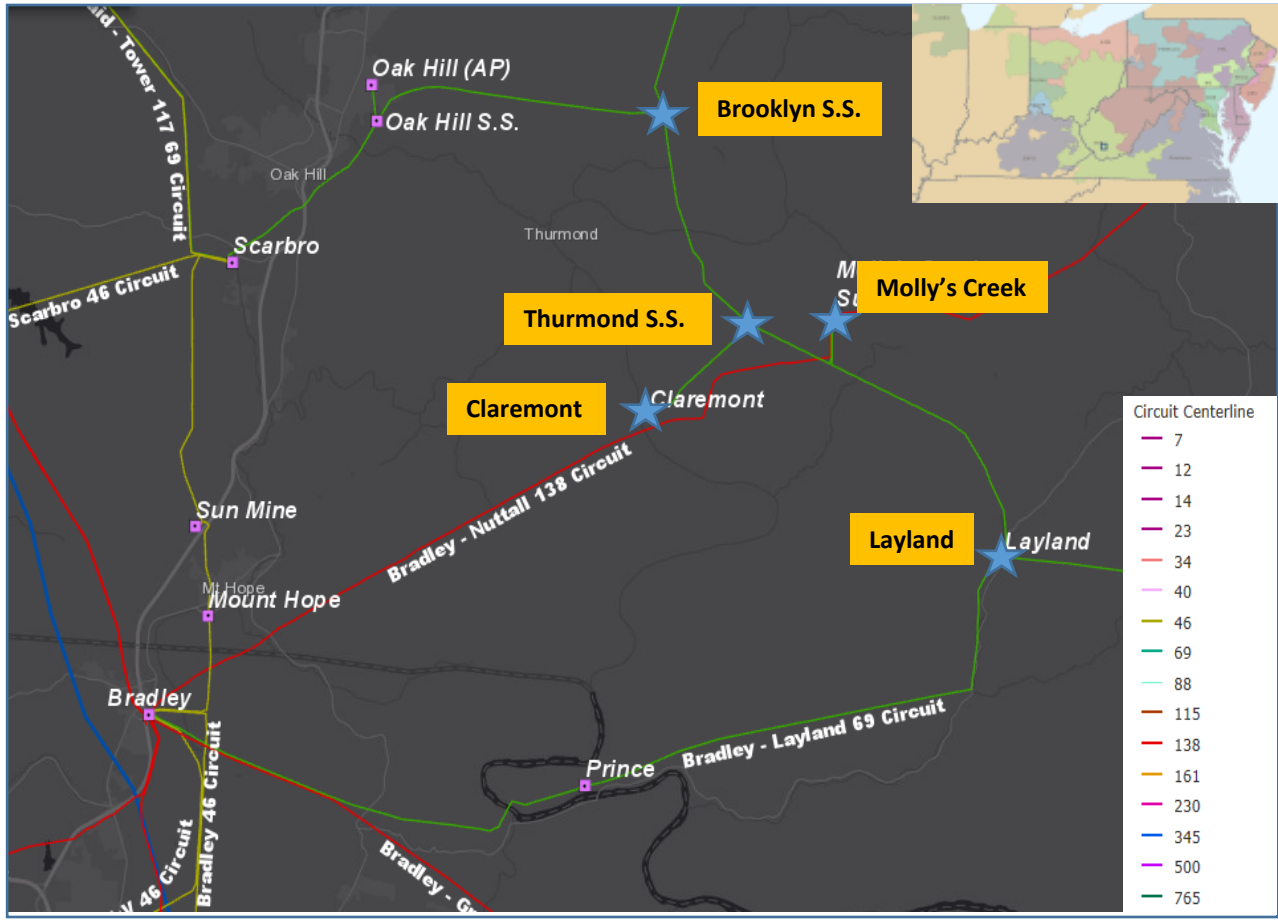
Problem Statement:

Layland – Molly's Creek 69 kV, Molly's Creek – Brooklyn Switch (~8 miles)

- Circuit is comprised mostly of wood pole structures
  - 1913 vintage structures (98%)
  - Circuit fails to meet 2017 NESC Grade B loading criteria and AEP structural strength requirements
  - 4-bell porcelain insulators do not meet current AEP Standards
- 32 structures with at least one open condition (38% of the structures)
  - There are 58 structural open conditions affecting poles and crossarms including rot, woodpecker holes and insect damage
  - There are 2 shield wire open conditions related to broken strands, 5 hardware open conditions affecting guys and 2 forestry open conditions related to brush clearance
- Since 2014, there have been 6 momentary and 5 permanent outages on the Bradley - Layland No. 2A 69 kV circuit
  - Majority of the momentary outages were due to weather including lightning
  - Permanent outages due to vegetation from outside the ROW and lightning
  - Lack of shielding on 28% of the circuit likely contributed to poor lightning performance
  - Outages resulted in approximately 114k customer minutes of interruption

Thurmond SS – Claremont 69 kV (~2 miles)

- Circuit is comprised of wood pole structures
  - 1972 vintage structures (100%)
  - Circuit fails to meet 2017 NESC Grade B loading criteria and AEP structural strength requirements, and fails to meet ASCE structural strength requirements
  - 4-bell porcelain insulators do not meet current AEP Standards
- 5 structures with at least one open structural condition (17% of the structures)
  - There are 5 structural open conditions related to woodpecker damage and rot and 3 hardware conditions related to cracked insulator assembly and broken guys
  - Outage statistics included in the data above



AEP Transmission Zone M-3 Process
Layland – Mollys Creek

Need Number: AEP-2021-AP012

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

Rebuild approximately 4 miles of line from Layland – Mollys Creek (Str. 1183-229) **Estimated Trans. Cost: $13.8M (s2795.1)**

Install a new 138 kV PoP switch on the Bradley – Mollys Creek 138 kV line and associated line work on the existing Bradley – Mollys Creek 138 kV line to accommodate switch. **Estimated Trans. Cost: $1.9M (s2795.2)**

Construct a new 138 kV extension from the new 138 kV PoP Switch to the existing Claremont Station (to be renamed Dun Glen) approximately 0.6 mi **Estimated Trans. Cost: $2.0M (s2795.3)**

Convert existing Claremont Station from 69 kV to 138 kV. Station to be renamed Dun Glen. **Estimated Trans. Cost: $0.0M (s2795.4)**

Retire existing Claremont – Mollys Creek 69 kV line (approximately 3.1 miles) Retire existing Thurmond S.S. – Brooklyn S.S. 69 kV line (approx. 3.2 miles) **Estimated Trans. Cost: 7.6M (s2795.5)**

Install two new 138 kV breakers at Mollys Creek Station **Estimated Trans. Cost: $1.5M (s2795.6)**

Total Estimated Transmission Cost: $26.8M

Ancillary Benefits: Approximately 3.8 miles of the retired line is currently located in the National Park, along with a crossing on the New River.

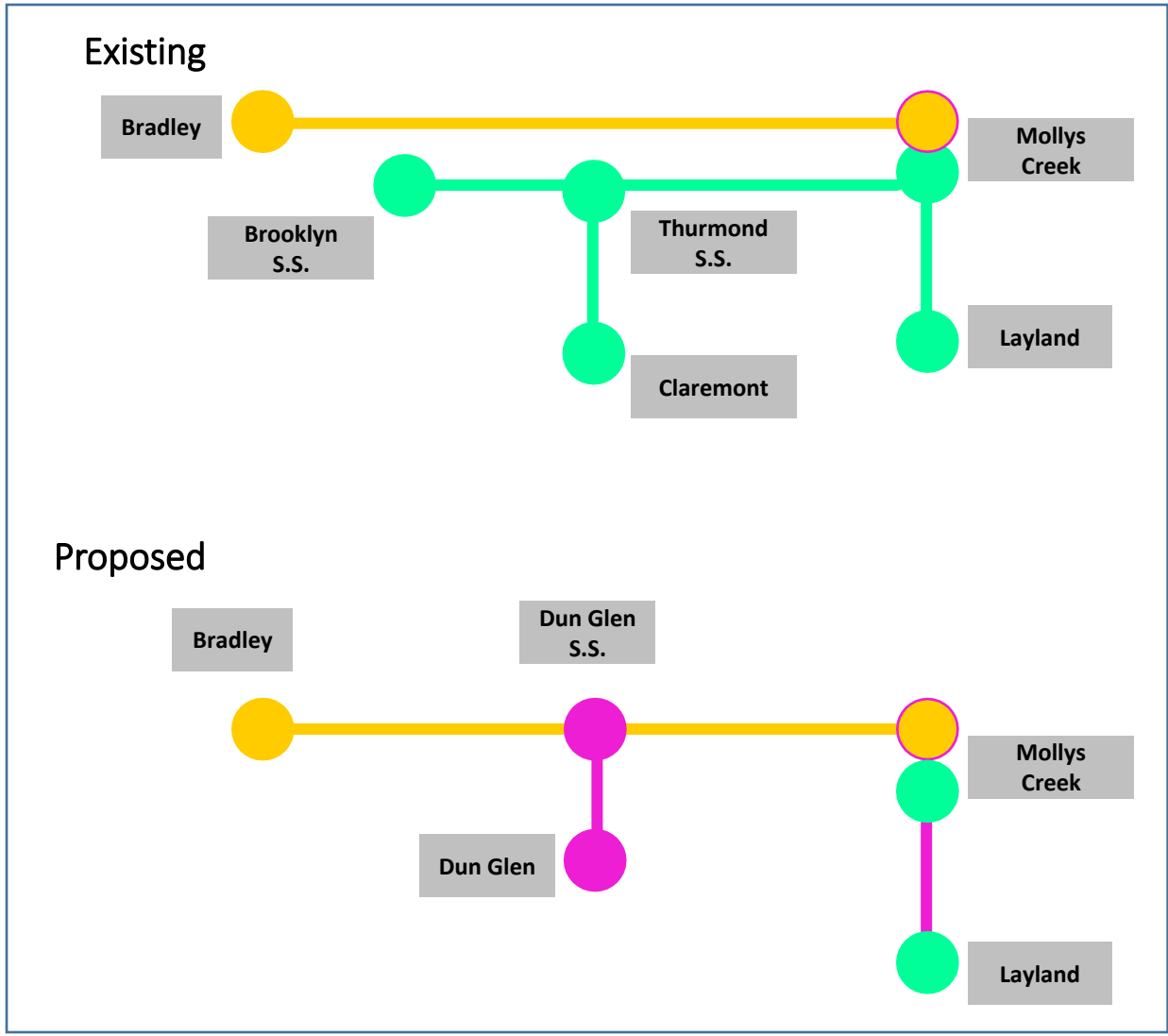
Projected In-Service: 9/1/2025

Supplemental Project ID: s2795.1-.6

Project Status: Scoping

Model: 2026 RTEP

Legend	
345 kV	
138 kV	
69 kV	
46 kV	
34.5 kV	
New	



AEP Transmission Zone M-3 Process
Western Michigan Area Improvements

Need Number: AEP-2021-IM017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solutions meeting 6/15/2022
Needs Meeting 7/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

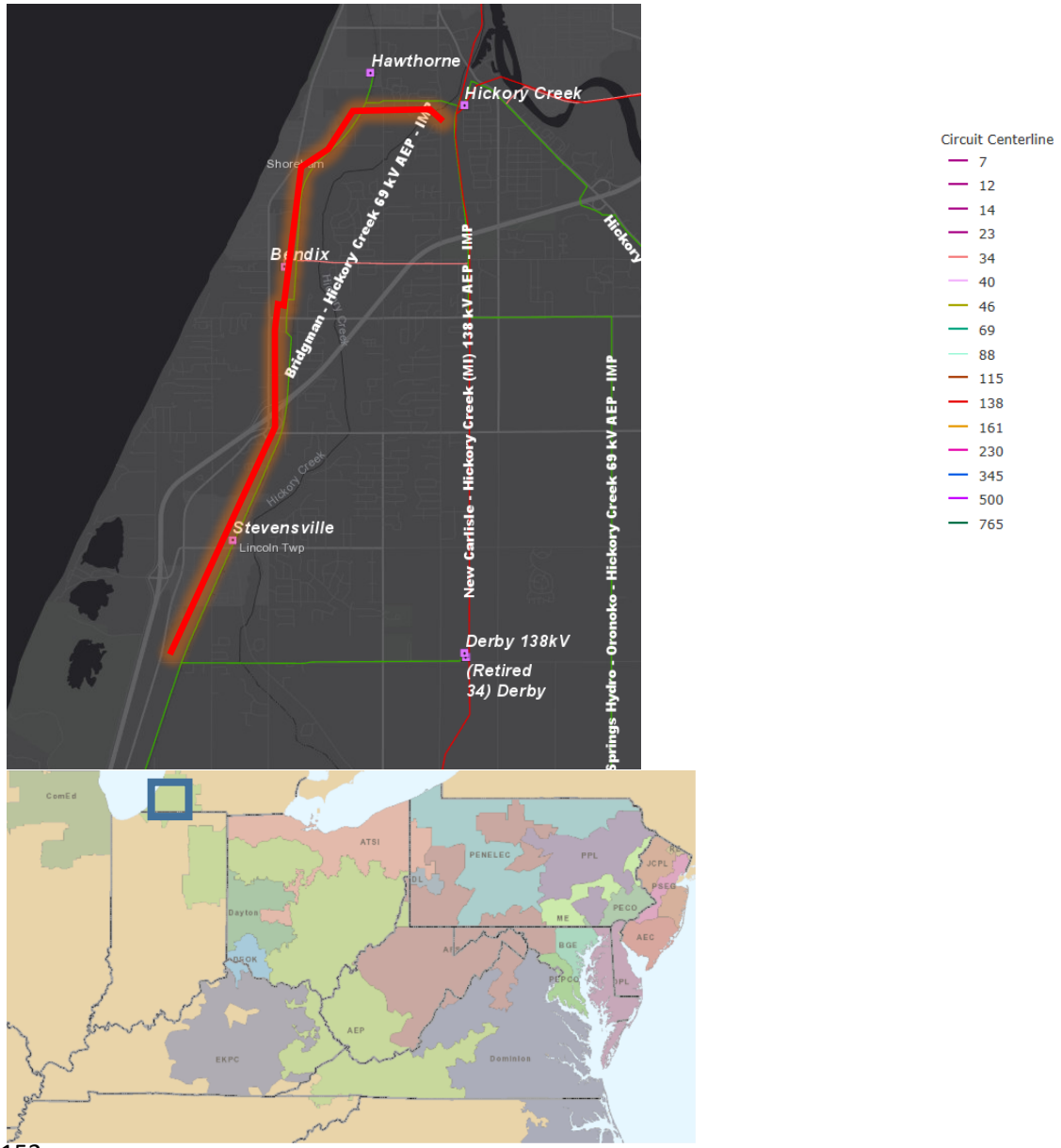
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Model: N/A

Problem Statement:

Derby – Hickory Creek 69kV line:

- ~6.2 miles of 1965 336.4 ACSR wood line exist on this line.
- Structures fail NESC Grade B, AEP Strength requirements, and ASCE structural strength standards
- Since 2015 there have been 13 momentary outages and 1 permanent outage on this circuit
- 13 structures were inspected by drone with 10 assessed by ground crew
    - 8 have flashed insulators
    - 7 had wood decay
    - 54% of poles inspected by ground crew had beyond normal decay.
- 24 structures have open conditions on this line including burnt insulators, broken/rust guys and corroded shield wires



AEP Transmission Zone M-3 Process
Western Michigan Area Improvements

Need Number: AEP-2021-IM018

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solutions meeting 6/15/2022
Needs Meeting 7/16/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

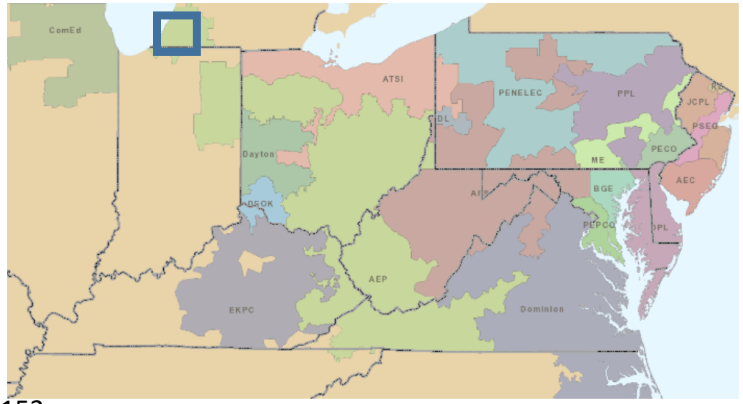
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Model: N/A

Problem Statement:

Derby – Hickory Creek 34.5kV line (6.16 miles):
- Majority structures are 1957 wood pole crossarm style.
- Conductor is original 1957 4/0 Copper conductor
- Insulation is legacy cap and pin style insulation
- Structures fail NESC Grade B, AEP Strength requirements, ASCE structural strength standards, Insulation standards minimum leakage distance and shielding angle.
- 24 were assessed by drone with 18 assessed by ground crew.
    - 50% of crossarms had ground or shell decay
    - 15/24 drone inspected poles had moderate decay or splitting arms
    - Most insulators and attachment hardware was corroded
- Currently there are 82 structures with open conditions on this segment including rot, corrosion, splitting, twisting and bowing on the poles and corssarms.

Bendix Lakeshore 34.5kV Tap (1.73 miles):
- Majority structures are 1952 wood pole crossarm style.
- Conductor is original 1952 4/0 ACSR
- Structures fail NESC Grade B, AEP Strength requirements, ASCE structural strength standards, Insulation standards minimum leakage distance and shielding angle.
- All structures were assessed by drone with 10 assessed by ground crew.
    - 25% of crossarms had decay
    - All structures had moderate levels of decay
    - Several crossarms had insect damage
- Currently there are 11 structures with open conditions on this segment including rot, cracked wood, and woodpecker damage.
- Line is a radial line which is difficult to maintain due to outage constraints.



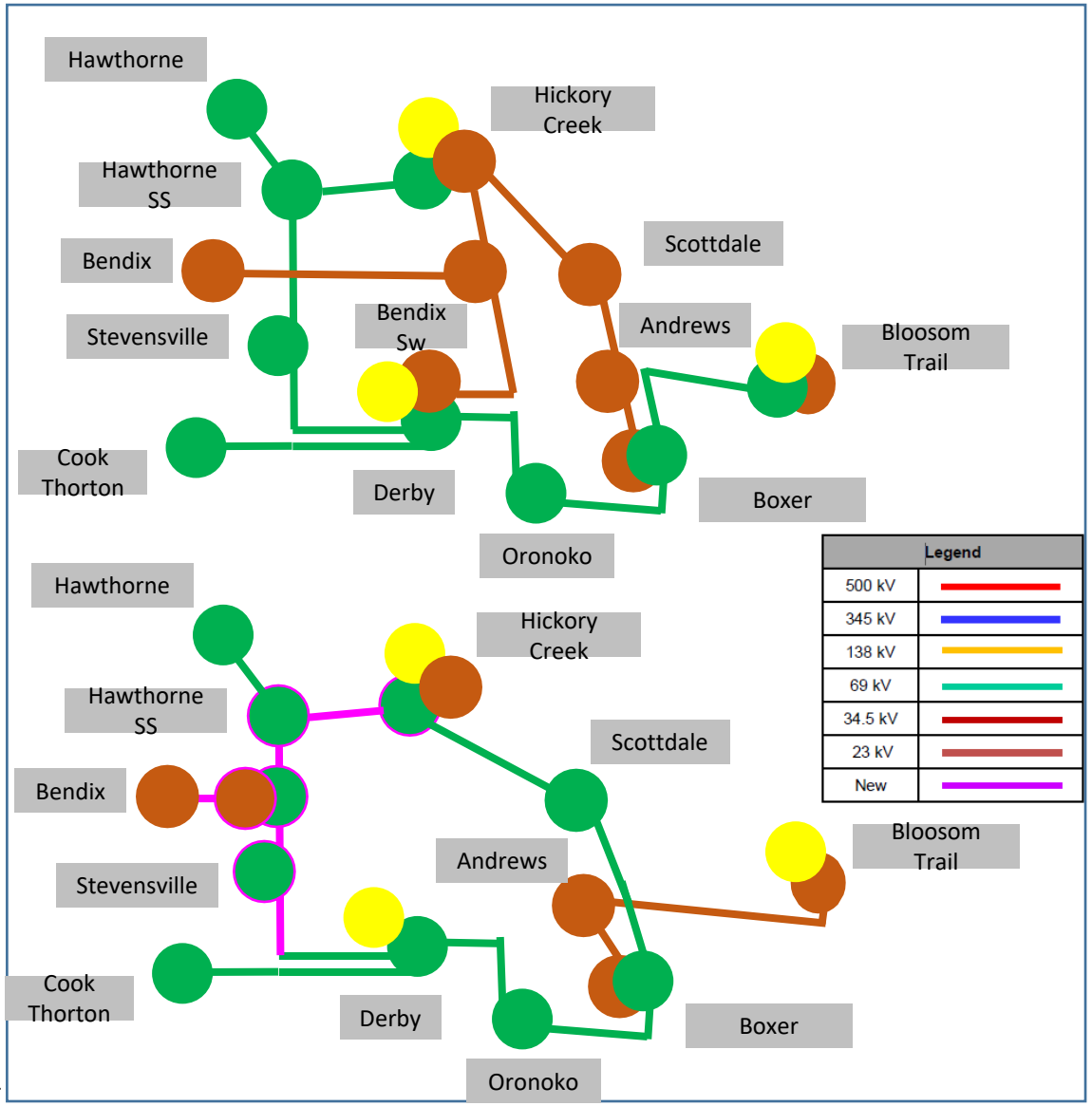
AEP Transmission Zone M-3 Process
Western Michigan Area Improvements

Need Number: AEP-2021-IM018 & AEP-2021-IM017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

General Solution Summary:

The remaining western Michigan 34.5kV network is comprised of 1950's and 60's wood that have been identified as needs on the previous slides. In addition to the asset health needs, the 34.5kV network is out of phase with other sub-transmission and BES delivery points and is subject to the operational drop and pick procedure that is problematic. By moving the Bendix load to the new "Trafalgar" station, AEP is able to retire ~7.89 miles of 34.5kV line, remove 34.5kV operation from Derby and with the conversion of Scottdale the drop and pick operation is fully removed from this area.



AEP Transmission Zone M-3 Process
Western Michigan Area Improvements

Need Number: AEP-2021-IM018 & AEP-2021-IM017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

Derby – Hickory Creek 69kV Line:
Rebuild the remaining ~6.2 miles of the Derby – Hickory Creek 69kV line utilizing 795 ACSR which will match the ~2.5 miles built in 2013.
Estimated Cost: $14.7M (s2796.1)

Derby – Hickory Creek 34.5kV Line:
Retire the ~6.16 mile Derby – Hickory Creek 34.5kV line.
Estimated Cost: $1.2M (s2796.2)

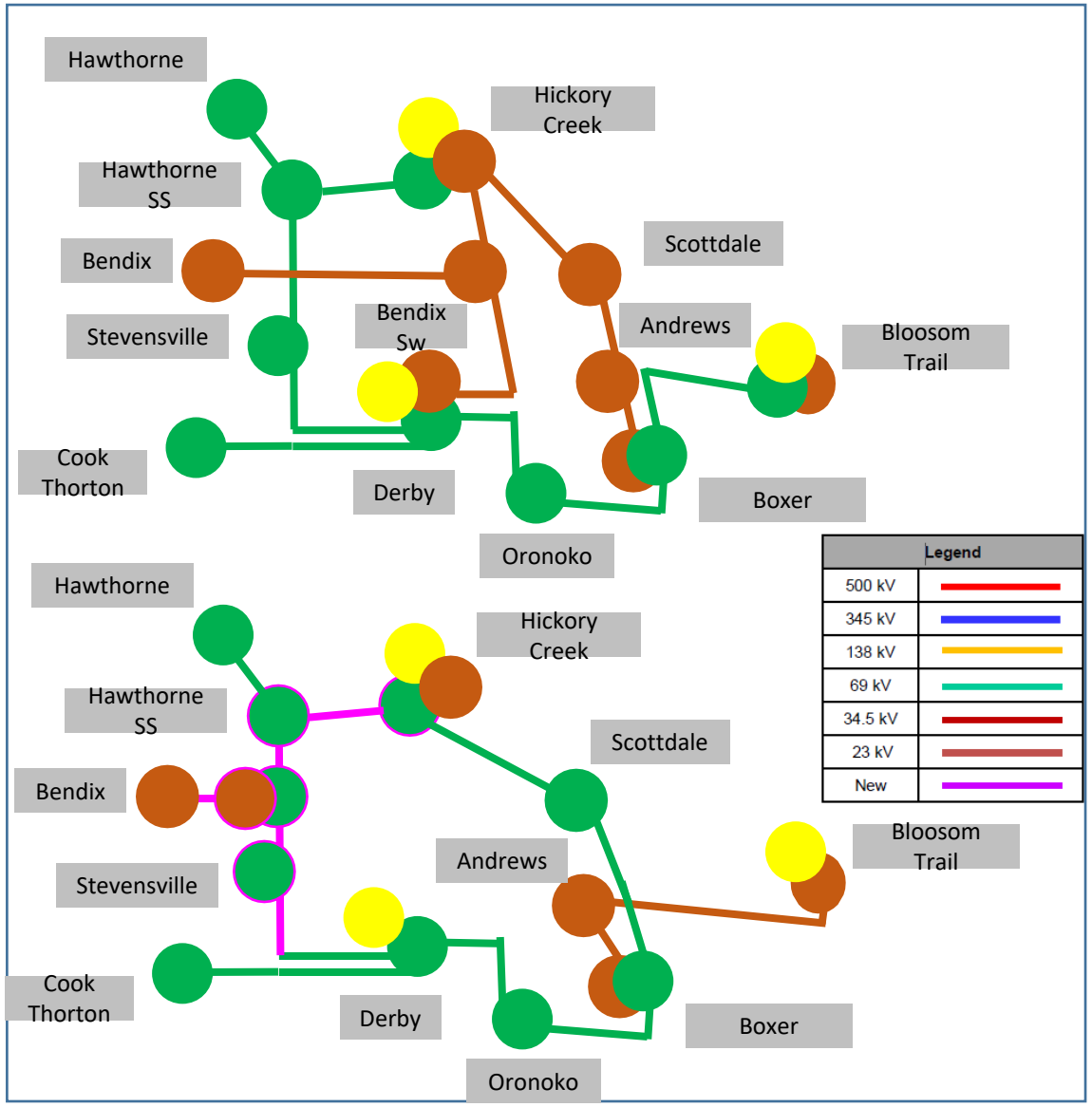
Bendix Lakeshore 34.5kV Tap:
Retire the ~1.73 mile Bendix Lakeshore 34.5kV Tap.
Estimated Cost: $ 0.6M (s2796.3)

Hawthorne SS 69kV /Bendix Sw 34.5kV:
Remove the switch from Bendix Sw and re-use it at Hawthorne SS.
Estimated Cost: $ .7M (s2796.4)

Stevensville 69kV:
Rework the through-path to accommodate the new line entrances.
Estimated Cost: $0.6M (s2796.5)

Trafalgar 69/34kV:
Install Trafalgar station to serve the Bendix 34.5kV customer. This station will include a new 69kV switcher and a new 69/34.5kV XFR. Two CB's will be reused from Derby and Hickory Creek.
Estimated Cost: $ 4.7M (s2796.6)

Scottdale 69kV:
Re-energize to 69kV
Estimated Cost: $ 0M (s2796.7)



AEP Transmission Zone M-3 Process
Western Michigan Area Improvements

Need Number: AEP-2021-IM018 & AEP-2021-IM017

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

Derby 138/69/34.5kV:
Retire the 34.5kV voltage class
Estimated Cost: $0.1M (s2796.8)

Boxer – Blossom Trail 34.5:
Re-energize at 34.5kV
Estimated Cost: $0.2M (s2796.9)

Boxer – Hickory Cr 69kV:
Re-energize at 69kV
Estimated Cost: $0.8M (s2796.10)

Trafalgar – Bendix 34.5kV:
Build a 0.15 mile radial line from Trafalgar to Bendix Lakeshore
Estimated Cost: $ .5M (s2796.11)

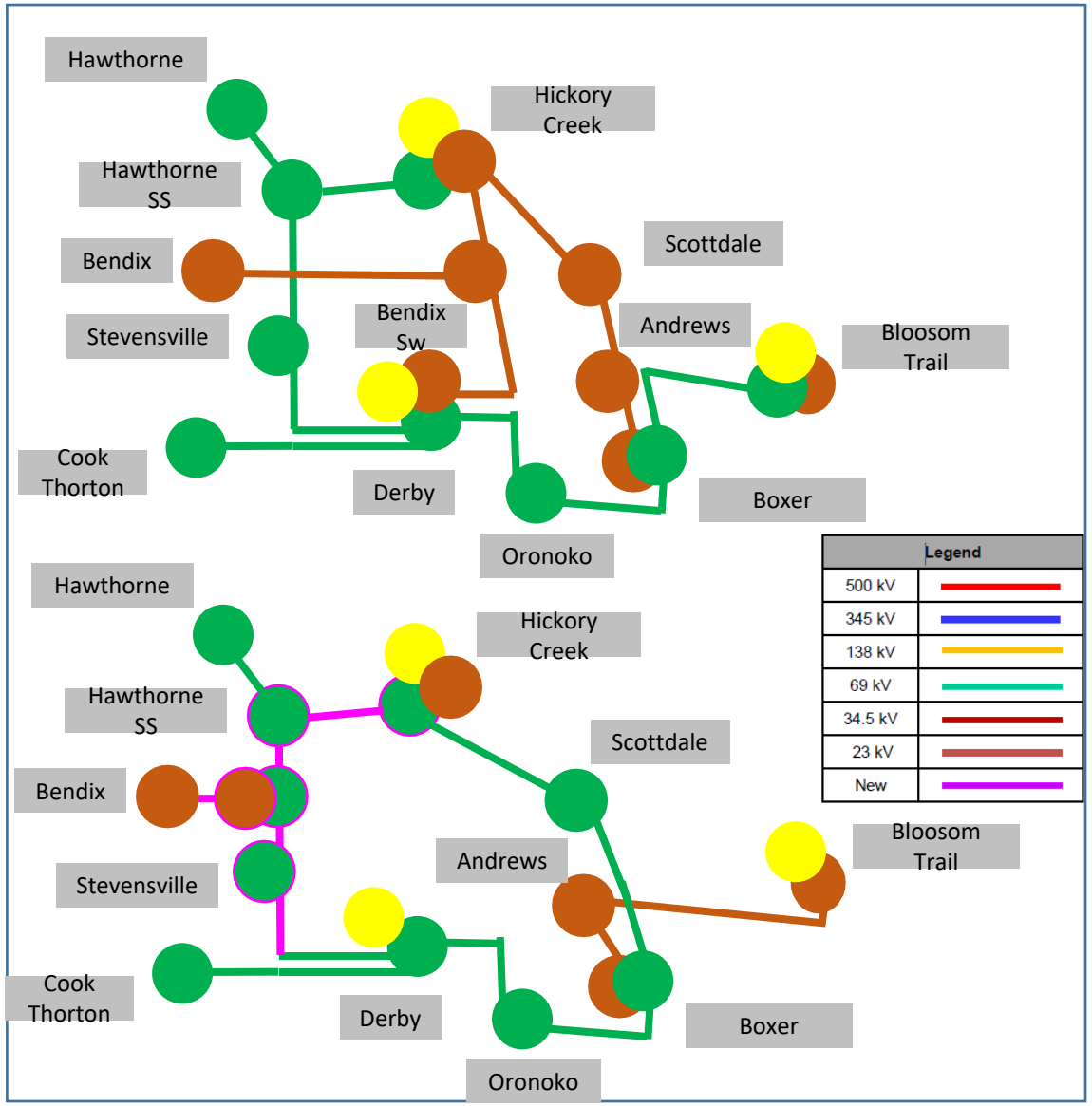
Total Estimated Transmission Cost: $24.1M

Ancillary Benefits
With the re-energization of Scottdale, the larger network will have successfully eliminated the "drop and pick" procedure inherent in 34.5kV operation thereby increasing the operational reliability of the network.

Projected In-Service: 11/1/2025

Supplemental Project ID: s2796.1-.11

Project Status: Scoping



AEP Transmission Zone M-3 Process
Pendleton – Makahoy 138 kV line rebuild

Need Number: AEP-2021-IM036

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solution Meeting 6/15/2022
Needs Meeting 11/19/2021

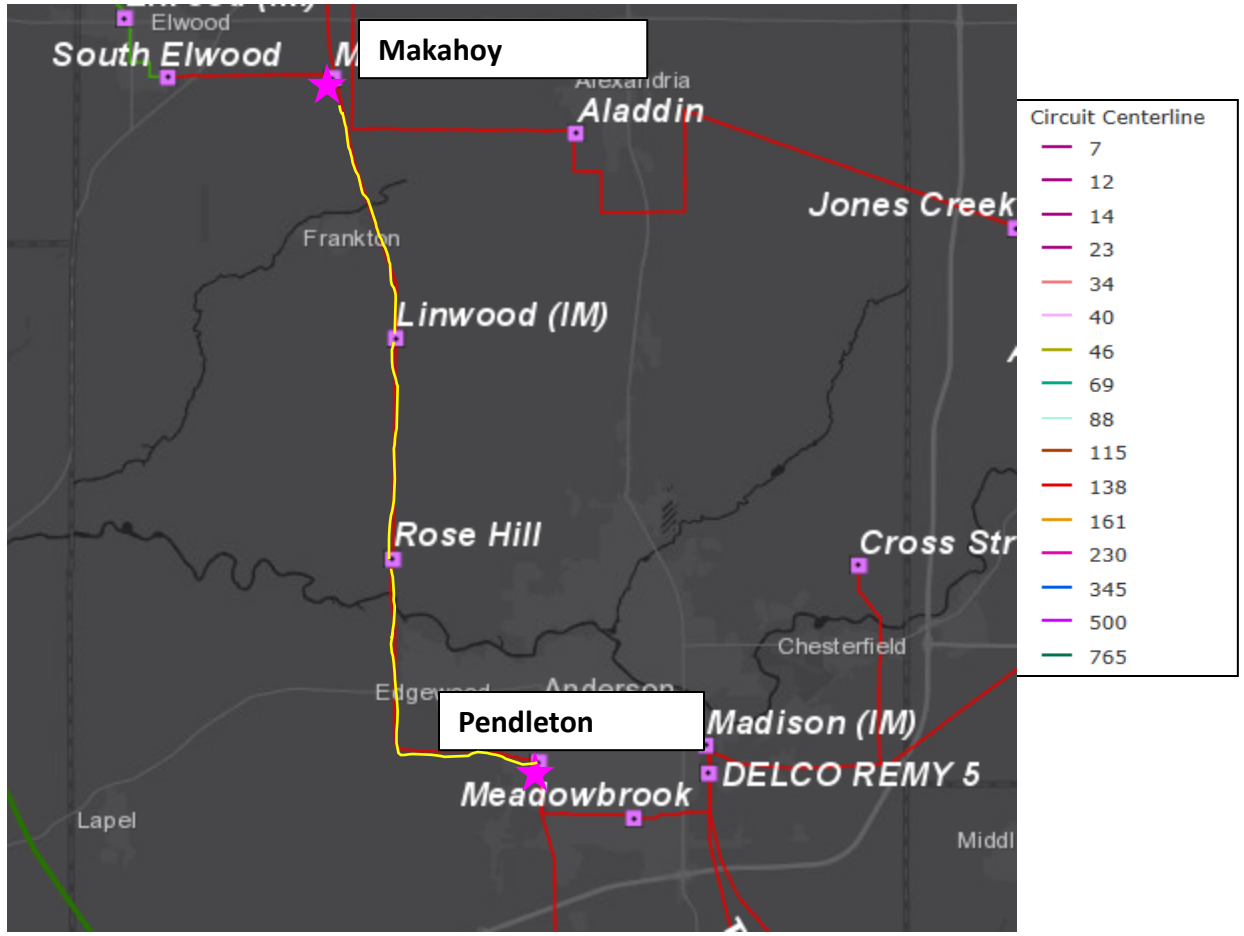
Project Driver: Equipment Material Condition, Performance and Risk

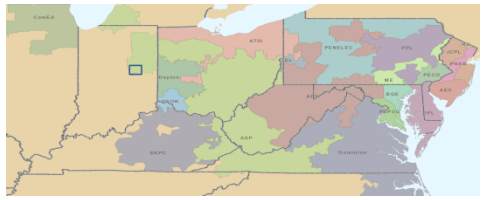
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 8)

Problem Statement:

Pendleton - Makahoy 138 kV (Vintage 1954)

- Length of Line: 14.93 miles
- Total structure count: 106 with 92 dating back to original installation.
- Original Line Construction Type: Predominantly wood poles
  - Wood cross arm
  - Horizontal insulators: Porcelain
  - Grounding method utilizes butt wraps on every other structure, providing reduced lightening protection for the line.
- Conductor Type: 556,500 CM ACSR 26/7 Dove
- Condition Summary
  - Number of open conditions: 21 structure open conditions with 8 structure related open conditions.
    - Open conditions include cross arm or pole with rot top, disconnected X-brace, disconnected conductor strands, shield wire broken strands, broken ground lead wire, burnt or broken insulators and shield wire hardware that is loose, broken or missing a cotter key.
    - Based on the aerial drone and ground crew assessment done on 56 structures, the following was noted.
      - Overall, a high percentage of the cross arms have moderate to advanced wood decay.
      - 40% of structures assessed at ground line have heart rot decay.
      - Structure hardware with moderate corrosion.
  - Structures fail NESC Grade B, AEP structural strength requirements, and ASCE structural strength requirements





AEP Transmission Zone M-3 Process
Pendleton – Makahoy 138 kV line rebuild

Need Number: AEP-2021-IM036

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solution Meeting 6/15/2022
Needs Meeting 11/19/2021

Project Driver: Equipment Material Condition, Performance and Risk

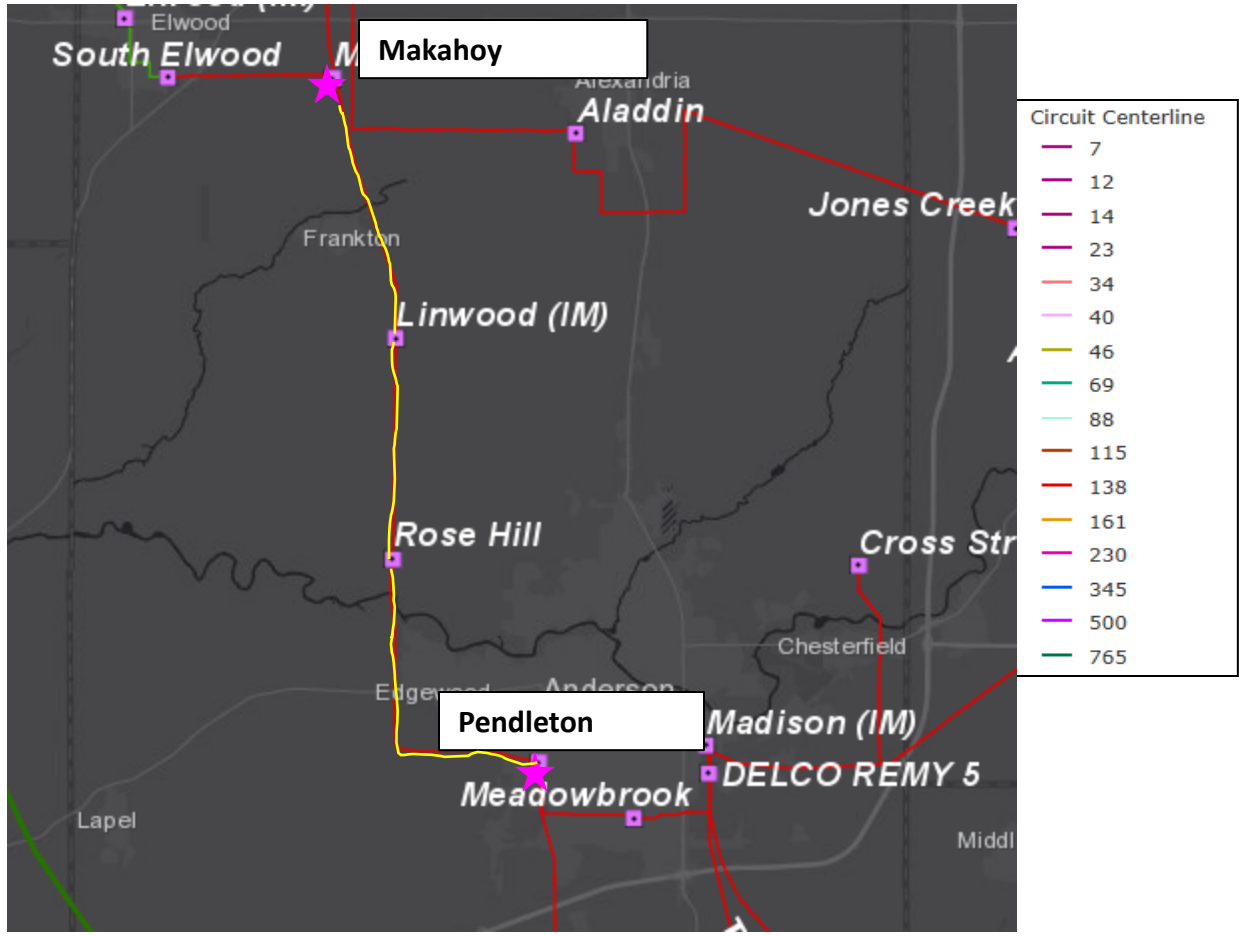
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 13)

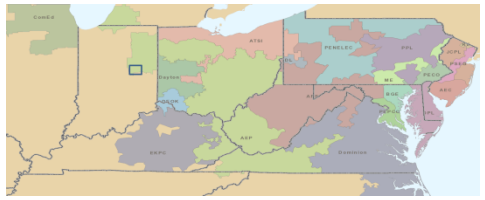
Problem Statement:

Pendleton 138/34.5 kV transformer #2

Transformers Concerns:

- Install date: 1967
- Oil concerns:
  - Dielectric strength breakdown: The elevated moisture levels and interfacial tension indicate the dielectric strength of the insulation system are in poor condition, which impairs the unit's ability to withstand electrical faults.
  - No oil containment
  - Oil / Gasket leaks
- Elevated moisture levels
- Interfacial Tension downward trend





AEP Transmission Zone M-3 Process
Pendleton – Makahoy 138 kV line rebuild

Need Number: AEP-2021-IM036

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

Pendleton – Makahoy 138 kV: Rebuild ~15 miles of 138 kV line with the conductor size 795 ACSR. The following cost includes the line rebuild, line removal and ROW.
Cost: $27.2 M (s2797.1)

Pendelton: Replace the Pendleton 138/34.5 kV transformer with a 138/34.5 kV 75 MVA transformer. The following cost includes the transformer install and removal.
Cost: $1.2 M (s2797.2)

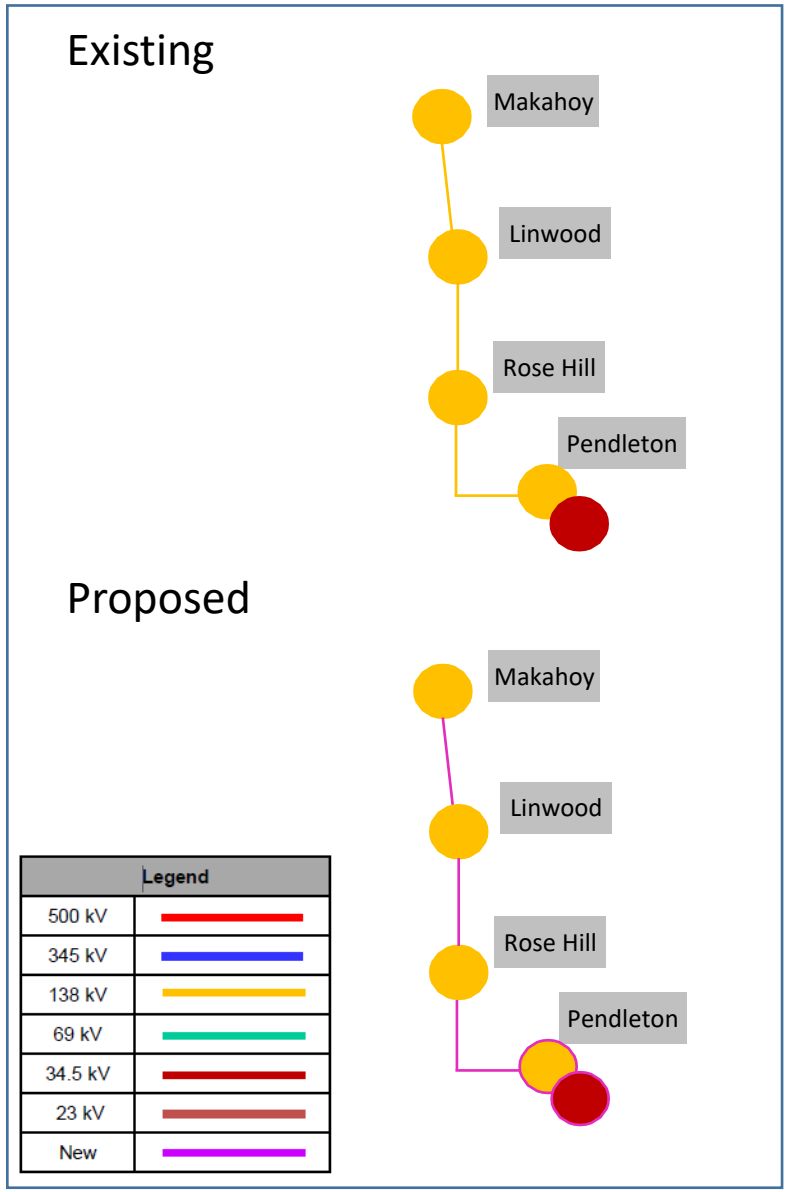
Total Estimated Transmission Cost: $28.4 M

Total Cost: $38.5 M

Projected In-Service: 9/2026

Supplemental Project ID: s2797.1-.2

Project Status: Scoping



AEP Transmission Zone M-3 Process
McGalliard Road 34.5 kV switch replacements

Need Number: AEP-2022-IM006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solution Meeting 6/15/2022
Needs Meeting 2/18/2022

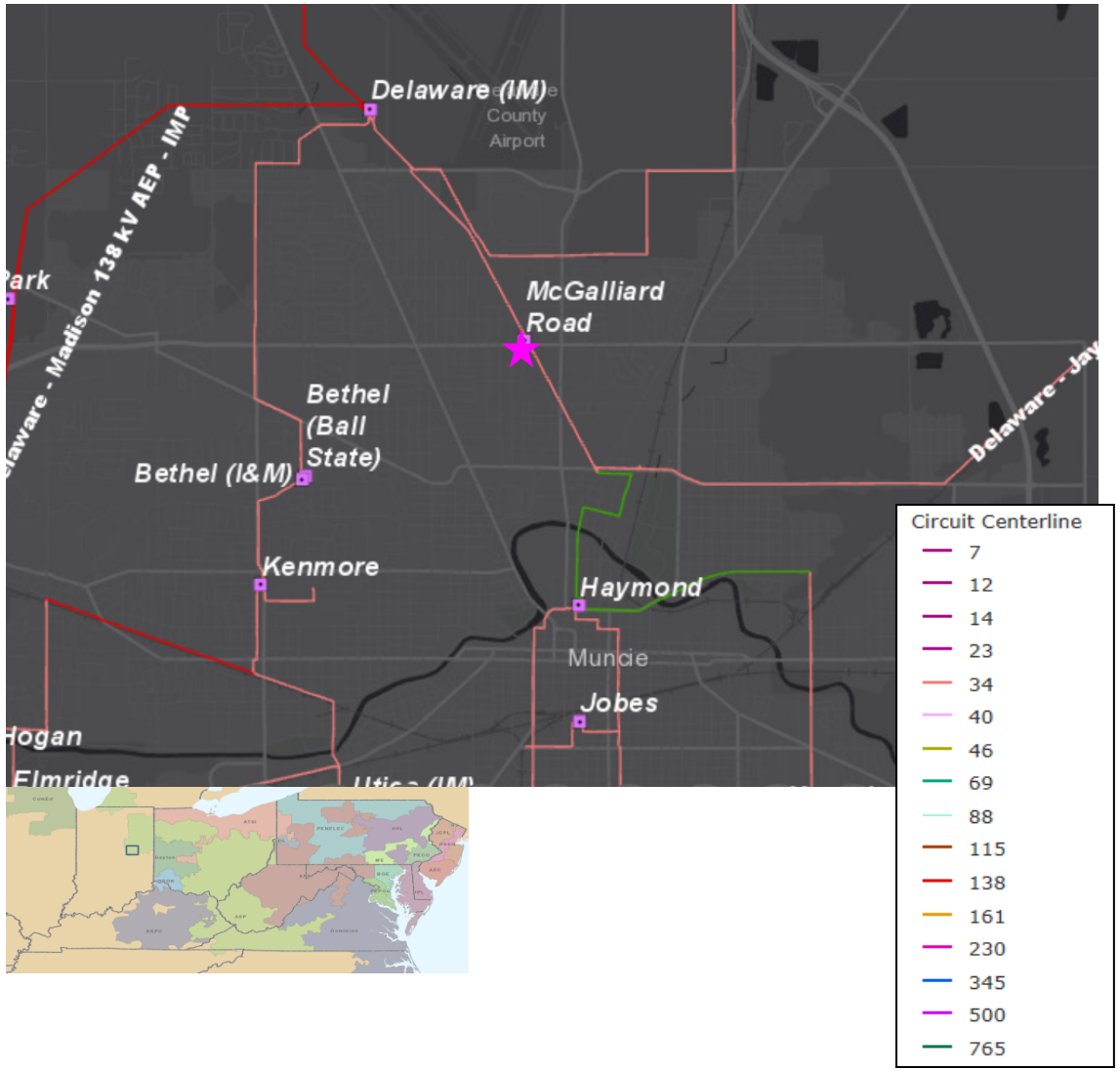
Project Driver: Equipment Material Condition, Performance and Risk

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

Problem Statement:

McGalliard Road 34.5 kV:

- The McGalliard Road 34.5 kV Moab switches “A” and “B” have Delta Star SF22 mechanisms that are no longer supported by the manufacturer
- Both switches are over 70 years old
- The 34.5 kV Moab “A” is a center break switch that is in a deteriorated condition and is no longer supported by the manufacturer
- The 34.5 kV Moab “B” is a vertical break switch that does not fully open and is in a deteriorated condition
- The structure foundations are in deteriorating condition
- Need on the switches was identified with Distribution concerns around 12kV equipment at the station



AEP Transmission Zone M-3 Process
McGalliard Road 34.5 kV switch replacements

Need Number: AEP-2022-IM006

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

McGalliard Road replace 34.5 kV Moab switches “A” and “B” with 2000 A switches and install a 2000 A bus tie switch for operational and transformer maintenance flexibility. (s2798)

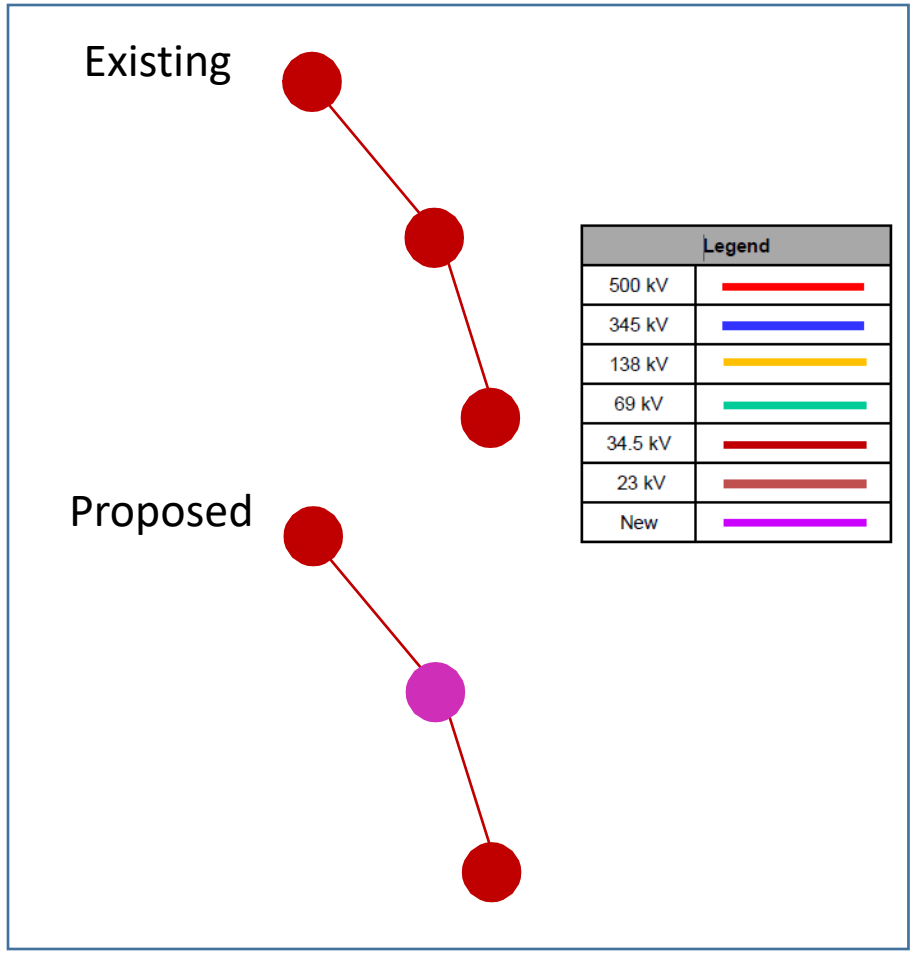
Cost: $0.4M

Total Estimated Transmission Cost: $0.4M

Projected In-Service: 9/6/2024

Supplemental Project ID: s2798

Project Status: Scoping



AEP Transmission Zone M-3 Process
Defiance, Ohio

Need Number: AEP-2021-OH009

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solutions Meeting 07/22/2022
Need Meeting 3/19/2021

Project Driver:

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

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 12-14)

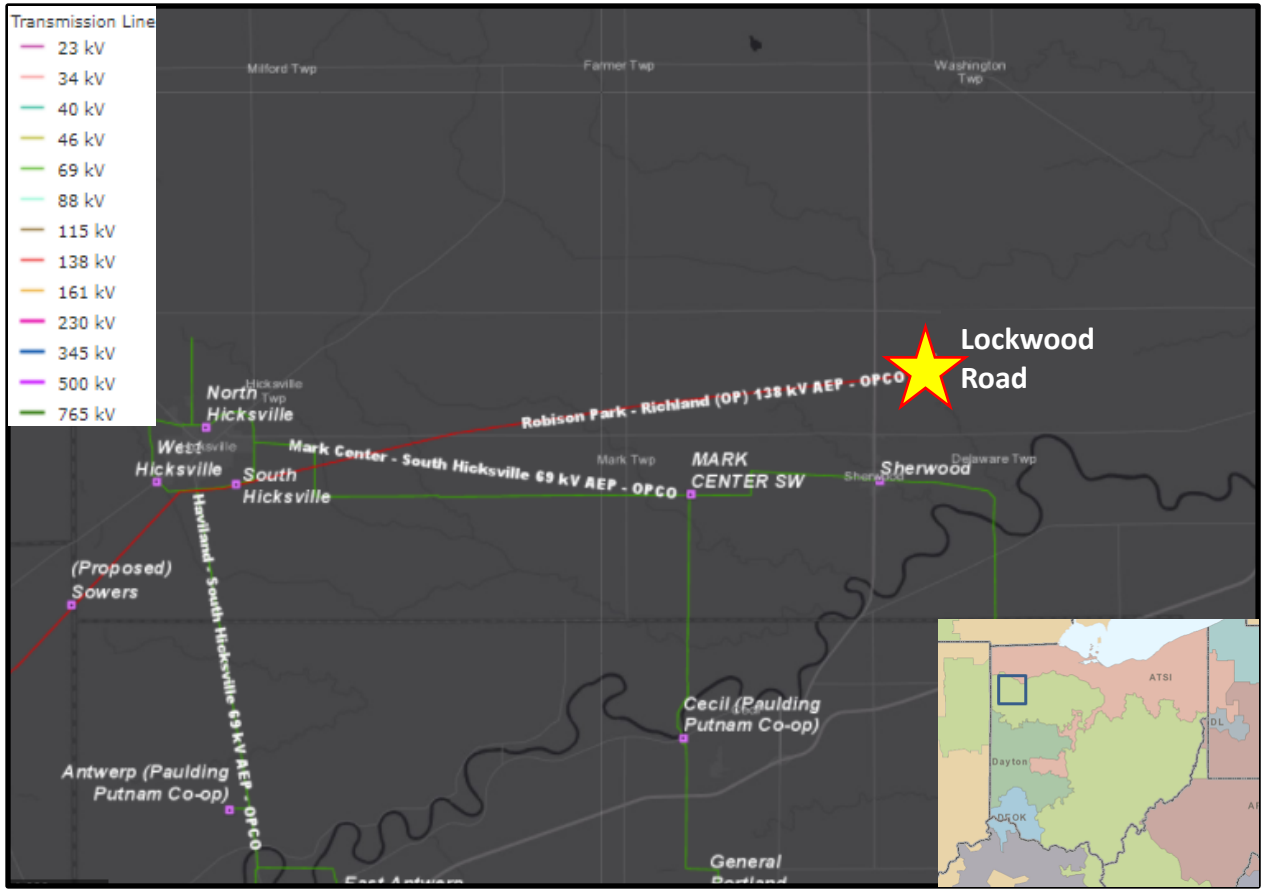
Problem Statement:

Equipment Material/Condition/Performance/Risk

Lockwood Road 138 kV Station

Circuit Breakers A:

- Manufactured Date: 1982
- Interrupting Medium: (SF6)
- Fault Operations:
  - Number of Fault Operations: 85
  - Manufacturer recommended Number of Operations: 10
- Additional Breaker Information: The expected life of the bushing gaskets and door inspection port seals is 25 years, this breaker has surpassed this age. Seals that are no longer adequate can cause SF6 leaks to become more frequent. The vendor provides no support or manufactures spare parts for this family of circuit breakers.
- Relays: Currently, 30 of the 31 relays (97% of all station relays) are in need of replacement. 25 of these are of the electromechanical type and 2 of the static type which have significant limitations with regards to spare part availability and fault data collection and retention. In addition, these relays lack of vendor support. There are also 3 microprocessor based relays commissioned in 2009 and have unsupported firmware.



AEP Transmission Zone M-3 Process
Defiance, Ohio

Need Number: AEP-2021-OH009

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solutions Meeting 07/22/2022
Need Meeting 3/19/2021

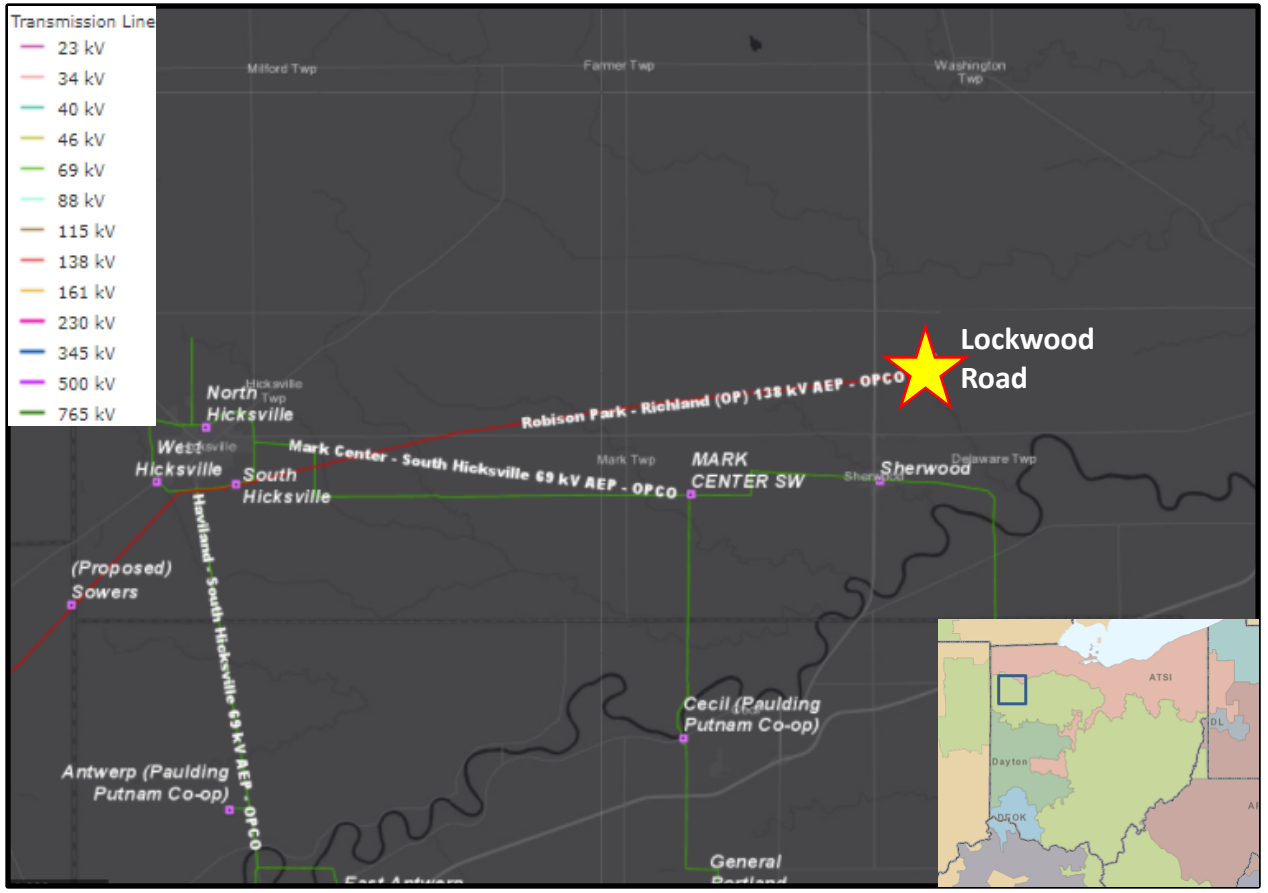
Problem Statement (Contd):

Operational Flexibility and Efficiency

- The Richland line terminal has a MOAB instead of a CB. This is a tie-line to First Energy.
- The bypass switch on CB-B complicates the bus protection. It is an operational challenge due to the City of Bryan having generation as well as a second source from the First Energy system (through Richland). Bypasses create protection reliability concerns.
- The capacitor at Lockwood Rd bank causes voltage quality issues for City of Bryan when either of the 138 kV sources into Lockwood Road are out of service due to the size of the bank.
- The radial nature of the service to the City of Brian along with the interconnect towards FE makes securing outages for reoccurring maintenance work at the station difficult.

Customer Service

- The existing Station is not expandable in its current configuration.
- There has been significant interest from large industrial load (future) to construct in this area, and specifically to connect to this station.



AEP Transmission Zone M-3 Process
Defiance, Ohio

Need Number: AEP-2021-OHO09

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

- **Lockwood Rd 138kV**:Retire the existing box bay and breaker bypass switch. Install two 138 kV 40 kA breakers in coordination with an active IPP AF1-063 project that will be installing an additional two breakers in a ring bus arrangement at the station. Install a DICM. Install a new 23MVAR capacitor bank with breaker. **Estimated Cost: $3.713M (s2801.1)**
- **Sowers – Lockwood Rd – Richlands 138 kV:** Relocate Lockwood Road – Sowers and Lockwood Road – Richland lines line to accommodate work at Lockwood Road station. **Estimated Cost $1.178M (s2801.2)**
- **Lockwood Rd – City of Bryan 138 kV:** Relocate Lockwood Road- City of Bryan line to accommodate work at Lockwood Road station. **Estimated Cost $0.693M (s2801.3)**

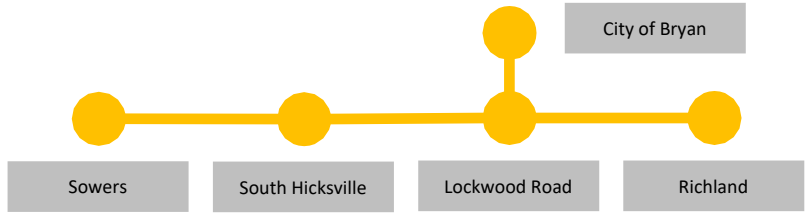
Total Estimated Transmission Cost:$5.584M

Projected In-Service: 06/20/2023

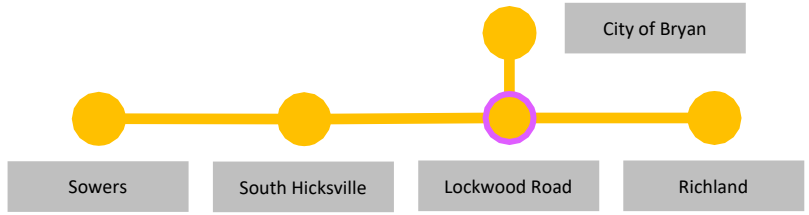
Supplemental Project ID: s2801.1-.3

Project Status: Scoping

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



Existing



Proposed

AEP Transmission Zone M-3 Process
Muskingum & Perry Counties, OH

Need Number: AEP-2022-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solutions Meeting 07/22/2022
Need Meeting 01/21/2022

Project Driver:

Equipment Material/Condition/Performance/Risk

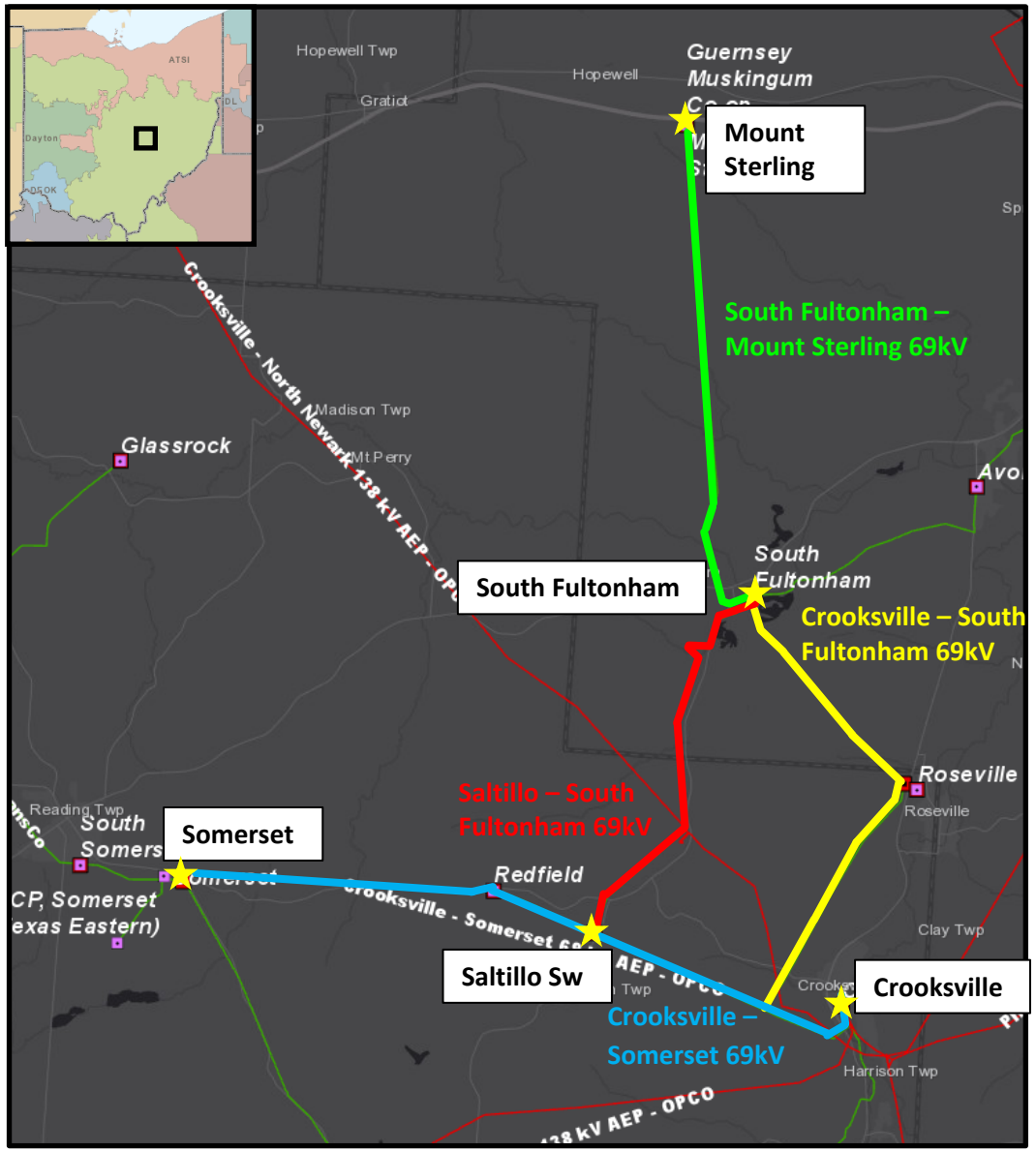
Specific Assumption Reference:

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

Problem Statement:

<u>Crooksville – Somerset 69kV (1916):</u>

- Line Length: ~10.4 Miles
- Total Structure Count 150
  - Structure Type: Wood / Steel Lattice
- Conductor Type: 3/0 ACSR 6/1 (Pigeon), 2/0 Cu 7 (20COP), & 4/0 ALUM/6201
- Outage History: 12 Momentary and 4 Permanent Outages, total CMI = 25,389 between 11/2016 – 11/2021.
- Open Conditions: 64 total. 13 are structure related open conditions including rust, rotted, broken, and burnt conditions, and vines, 1 open condition related to burnt conductor, 32 shielding/grounding conditions including broken and missing wires, 18 hardware based open conditions consisting of burnt, broken, missing, and chipped insulators as well as damaged guy wires.
- The line was originally constructed with wood monopoles and steel lattice towers. The ceramic horizontal post insulators on the line do not meet current AEP standards for CIFO and minimum leakage distance requirements. The conductors from Structure 41 to Structure 139A are 2/0 copper 7 with a shield wire of #1 copper 3 strand which do not meet current AEP standards for conductors and shield wires. The shield angle on a typical tangent structure is measured at 18° degrees, which is inadequate for AEP current shield angle requirements.
- 8 structures were further assessed by a ground crew. 100% of those structures had reported conditions including rusty shield wires, wear on connections, insulator deterioration, woodpecker holes, and ground line structure decay.



AEP Transmission Zone M-3 Process
Muskingum & Perry Counties, OH

Need Number: AEP-2022-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solutions Meeting 07/22/2022
Need Meeting 01/21/2022

Problem Statement Continued:

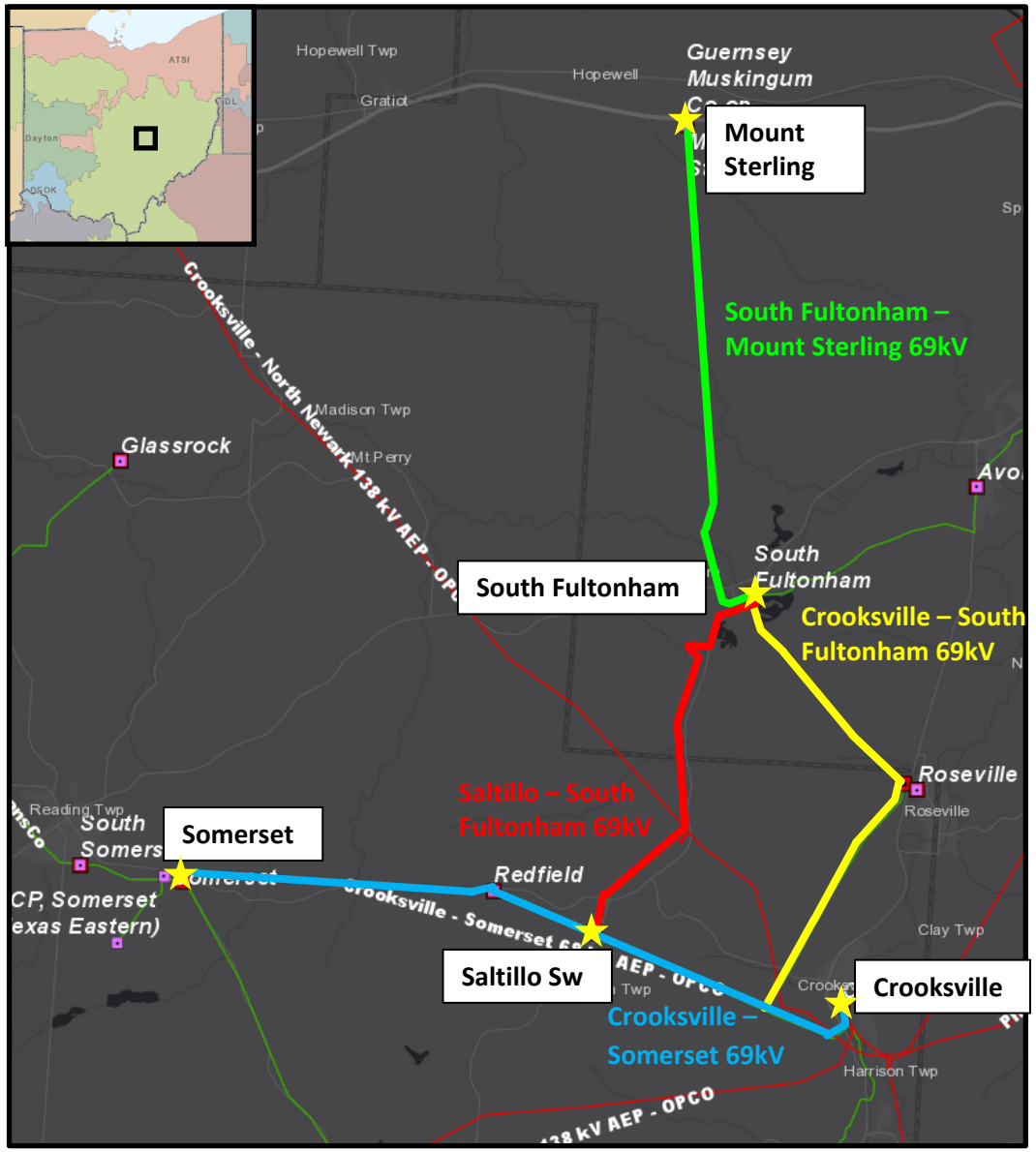
Saltillo - South Fultonham 69 kV (1952):

- Line Length: ~5.91 Miles (Normally open point at Saltillo Switch towards Crooksville)
- Total Structure Count 58
  - Structure Type: Wood
- Conductor Type: 4/0 ACSR 6/1 (Penguin) and 4/0 ALUM ALLOY
- Outage History: 3 Momentary and 1 Permanent Outages between 11/2016 – 11/2021
- Open Conditions: 22 total. 5 are open structure related conditions, 2 conductor related conditions, 3 shielding/grounding conditions and 12 hardware related conditions.

South Fultonham – Mount Sterling 69kV (1958):

- Line Length: ~7.2 Miles
- Total Structure Count 75
  - Structure Type: Wood
- Conductor Type: 1/0 ACSR 6/1 (Raven), 336.4 MCM ACSR 18/1 (Merlin)
- Outage History: 12 Momentary and 7 Permanent Outages, total CMI = 1,221,812 between 11/2016 – 11/2021.
- Open Conditions: 24 total. 6 are structure related open conditions including rot top, split pole, rot heart, and burnt pole, 7 open condition related to damaged conductor splice/dead ends, 8 shielding/grounding conditions related to damaged shield wires and a broken ground lead wire, 3 hardware based open conditions consisting of burnt insulators and a chipped insulator.

- Structures on South Fultonham – Mount Sterling 69kV line does not meet 2017 NESC Grade B loading criteria, does not meet current AEP structural strength requirements, and does not meet the current ASCE structural strength requirements. The line is insulated with ceramic horizontal post insulators which do not meet current AEP standards for CIFO and minimum leakage distance requirements. The line grounding is butt wrap, which does not meet AEP standards.



AEP Transmission Zone M-3 Process
Muskingum & Perry Counties, OH

Need Number: AEP-2022-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Previously Presented:
Solutions Meeting 07/22/2022
Need Meeting 01/21/2022

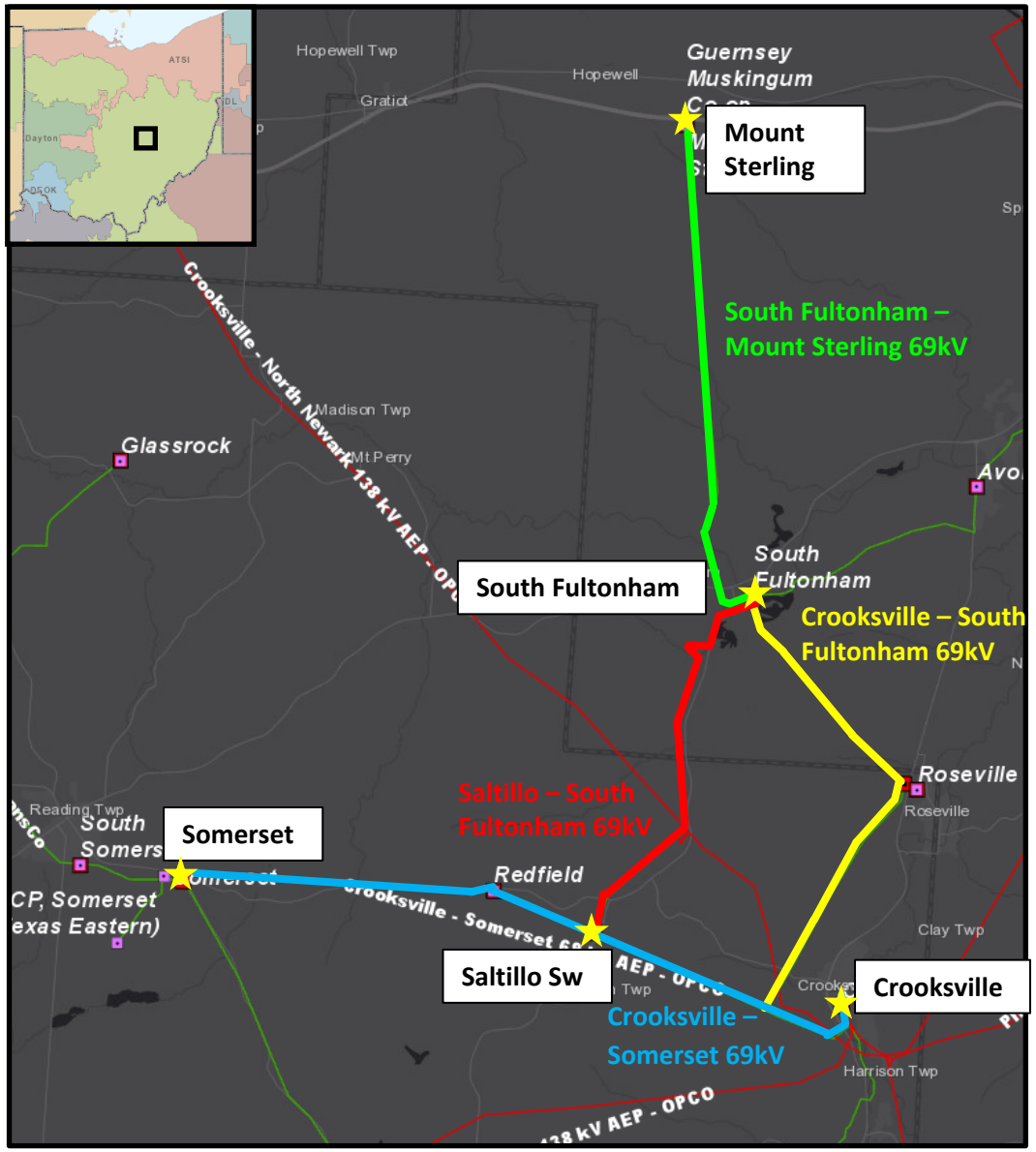
Problem Statement Continued:

Crooksville – South Fultonham 69kV (1958):

- Line Length: ~7.4 Miles
- Total Structure Count 67
  - Structure Type: Wood
- Conductor Type: 3/0 ACSR 6/1 (Pigeon), 2/0 Cu 7 (20COP), & 4/0 ACSR 6/1 (Penguin)
- Outage History: 10 Momentary and 2 Permanent Outages, total CMI = 700,805 between 11/2016 – 11/2021.
- Open Conditions: 39 total. 13 are structure related conditions rot top of poles/crossarms, split poles, insect and woodpecker damage, 12 open conditions related to conductor issues including broken strands, 14 hardware based open conditions consisting of burnt insulators and broken insulators.
- Structures on the Crooksville – South Fultonham 69kV Line fails to meet 2017 NESC Grade B loading criteria and fails to meet current AEP structural strength requirements. The ceramic horizontal post insulators on the line do not meet current AEP standards for CIFO and minimum leakage distance requirements. The line shielding angle on the typical tangent structure, H1B7, is measured at 27.2 degrees for phases one and two and 57 degrees for three, which is inadequate for AEP current shield angle requirements.
- 5 structures were futher assessed by a ground crew. 100% of those structures had reported conditions including pole weathering, rot top, hardware weathering, bowing, no top present, topper deterioration, weathering at ends of crossarms, woodpecker and holes.

Crooksville 69kV Circuit Breaker "W":

- Breaker Age: 1962
- Interrupting Medium: (Oil)
- Fault Operations: 19
- This breaker is 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



AEP Transmission Zone M-3 Process
Muskingum & Perry Counties, OH

Need Number: AEP-2022-OH008

Process Stage: Submission of Supplemental Project for inclusion in the Local Plan 10/12/2022

Solution:

- **Crooksville Station, 69 kV**: Replace 69 kV oil filled FK type breaker CB-W with a 3000A, 40 kA breaker . **Estimated Cost: $0.67M (s2802.1)**
- **South Fultonham, 69 kV**: Retire CB-B. **Estimated Cost: $0.09M (s2802.2)**
- **Saltillo Switch, 69 kV**: Retire Saltillo Switch. **Estimated Cost: $0.05M (s2802.3)**
- **Crooksville – South Fultonham 69 kV line**: Rebuild approximately 7.4 miles of single circuit 69 kV line between the Crooksville and South Fultonham stations. **Estimated Cost: $12.47M (s2802.4)**
- **Crooksville – Somerset 69 kV line**: Rebuild approximately 8.8 miles of single circuit and 1.6 miles of double circuit 69 kV line between the Crooksville and Somerset stations. **Estimated Cost: $19.92M (s2802.5)**
- **South Fultonham – Mount Sterling 69 kV line**: Rebuild approximately 7.2 miles of single circuit 69 kV line between the South Fultonham and Mount Sterling stations. **Estimated Cost: $13.88M (s2802.6)**
- **South Fultonham – Saltillo 69 kV line**: Retire approximately 5.9 miles of single circuit 69 kV line between the South Fultonham station and Saltillo Switch. **Estimated Cost: $3.22M (s2802.7)**

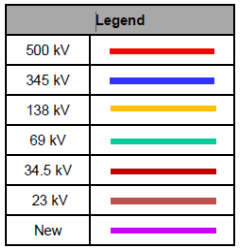
Total Estimated Cost: $50.3M

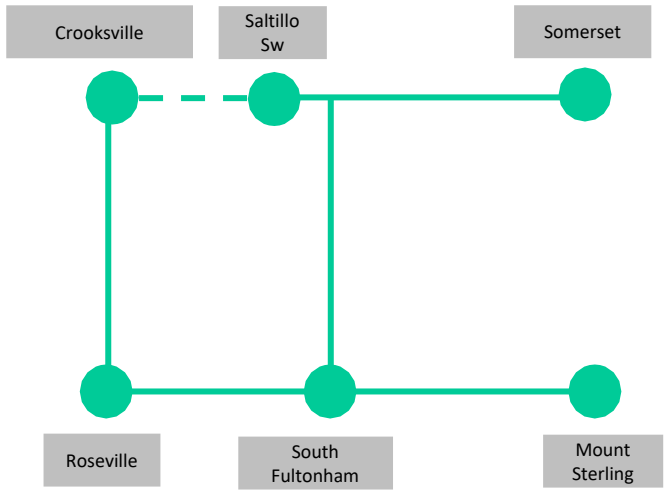
Projected In-Service: 1/2/2026

Supplemental Project ID: s2802.1-.7

Project Status: Scoping

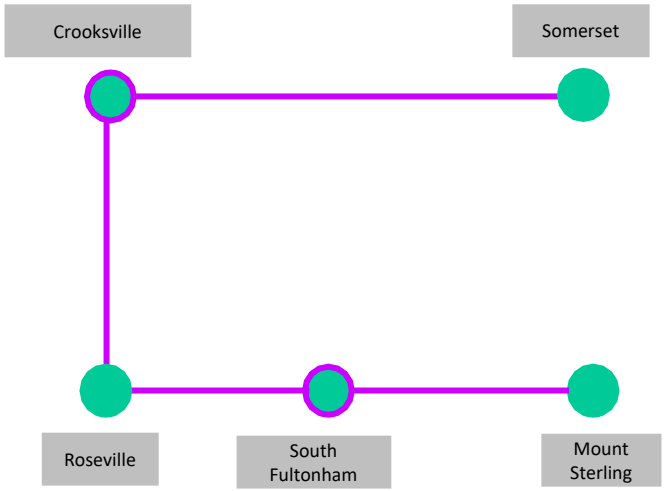
Existing:





Bubble Diagram

Proposed:



Revision History

12/13/2021 – V1 – Added Slides #2-22, S2632.1-.7 and S2641.1-.4

1/21/2022 – V2 – Added Slides #23-47, S2650.1-.7 and S2658

2/15/2022 – V3 – Added Slides #48-53, S2663.1-.6 and S2665

2/23/2022 – V4 – Added Slides #54-55, S2667

4/26/2022 – V5 – Added Slides #55-76, S2682.1-.2 through S2688.1-.3

5/4/2022 – V6 – Added Slides #77-87, S2690.1-.2 through S2694

8/26/2022 – V7 – Added Slides #88-94, S2746.1-.4 through S2748.1-.8

10/12/2022 – V8 – Added Slides #95-138, S2770.1-.5 through S2787.1-.3 and S2789.1-.3

10/13/2022 – V9 – Added Slides #139-168, S2791.1-.12 through S2798, S2801.1-.3 and S2802.1-.7