

Sub Regional RTEP Committee: Western AEP Supplemental Projects

June 15, 2022

Needs

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

AEP Transmission Zone M-3 Process Logan County, West Virginia

Need Number: AEP-2022-AP033

Process Stage: Need Meeting 06/15/2022

Supplemental Project Driver: Operational Flexibility and Efficiency

Specific Assumption Reference:

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

Problem Statement:

Line Name: Chauncey Tap 138kV Line

Original Install Date (Age): 1949

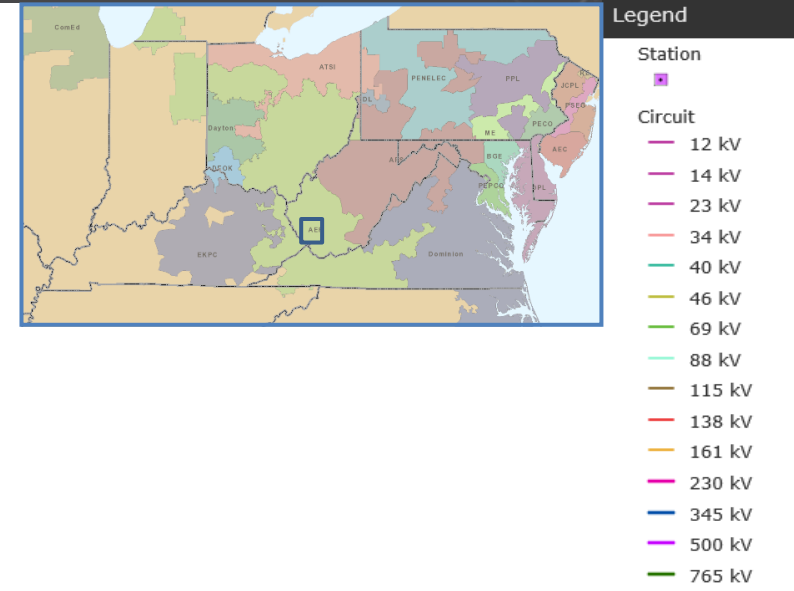
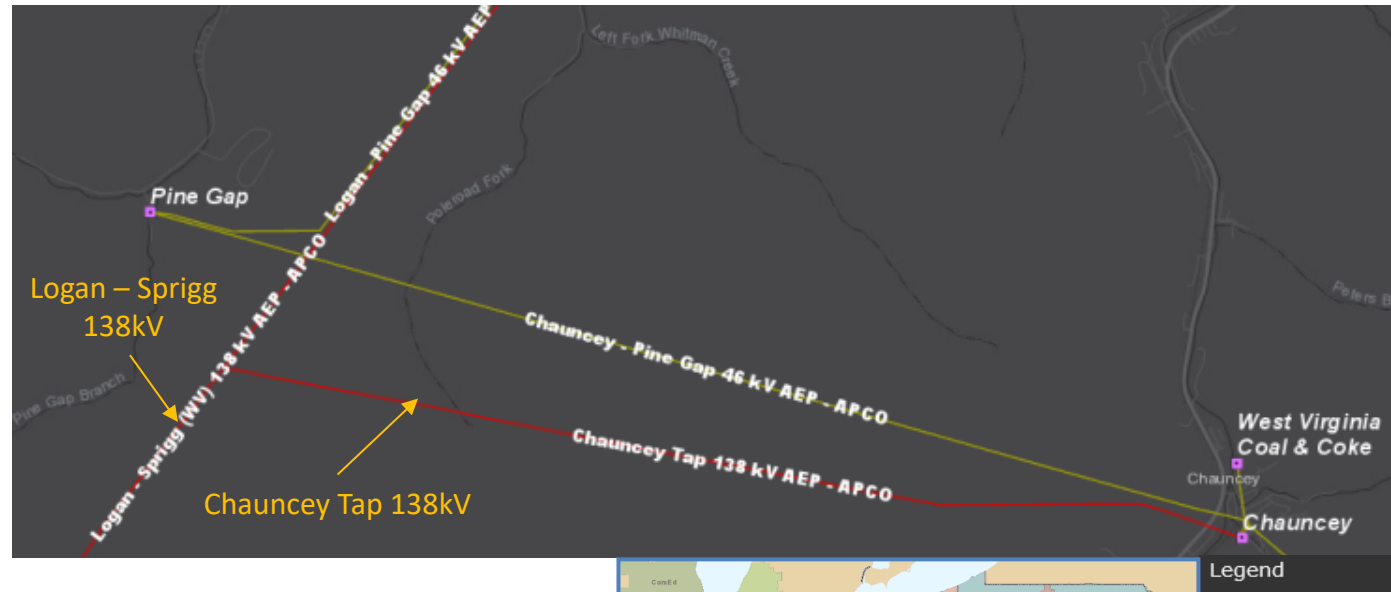
Length of Line: ~3.7 mi

Total structure count: 15

Conductor Type: 397,500 ACSR

Momentary/Permanent Outages: 11 Momentary and 1 Permanent (2017 – 2021)

- The outages include the Logan – Sprigg 138kV line because the Chauncey Tap is hard tapped to the Logan – Sprigg line and the outages travel onto the Chauncey Hard Tap and vice versa.
- Hard tapped lines are difficult when there is a line fault, the fault will take out the through line and leave no way for Transmission Operations to restore the tapped station. Requiring a Transmission Line crew to “open loops” means (1) finding a dead-end structure that is accessible with a bucket truck, (2) having an available and usable access road and (3) having a Transmission Line crew available.
- This consideration also extends to the tap line, where a fault on this section will outage the through-path with no readily available restoration procedure. While the primary consideration is forced outages, these considerations also apply to planned outages such that much more effort and planning is required to perform the above steps than if switches are available to be used to separate the line sections.



AEP Transmission Zone M-3 Process Pike County, KY

Need Number: AEP-2022-AP034

Process Stage: Need Meeting 06/15/2022

Project Driver:

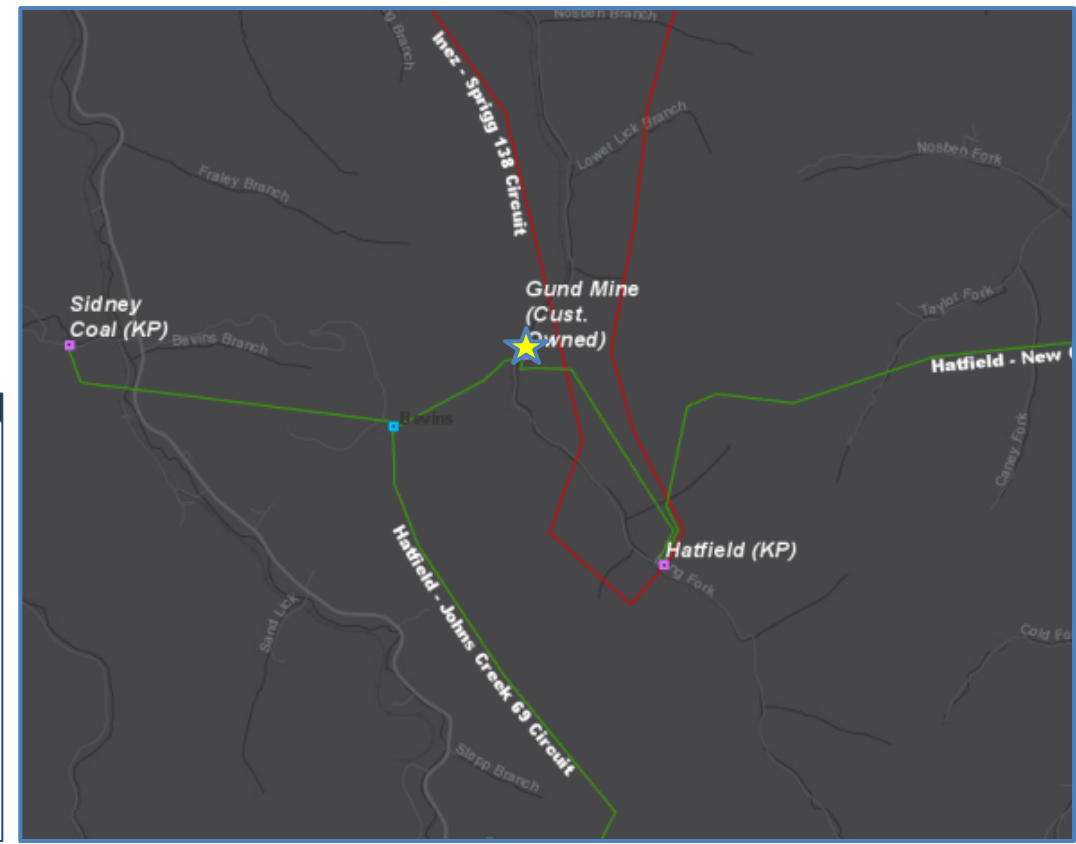
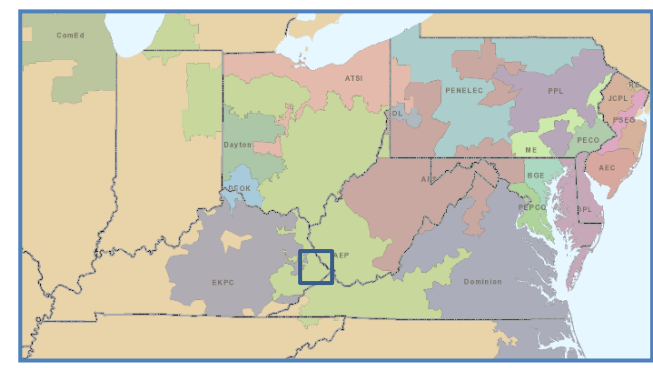
Customer Service Criteria/ Operational Flexibility and Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 11,12 and 14)

Problem Statement:

- A customer has requested service for 20 MW peak load out of the Gund metering location in Pike County, KY.
- Gund metering is an existing delivery point served via a Hard tap from Hatfield - Johns Creek 69kV line. Hard Taps have no switching capability and result in longer restoration times for any outage along the line.

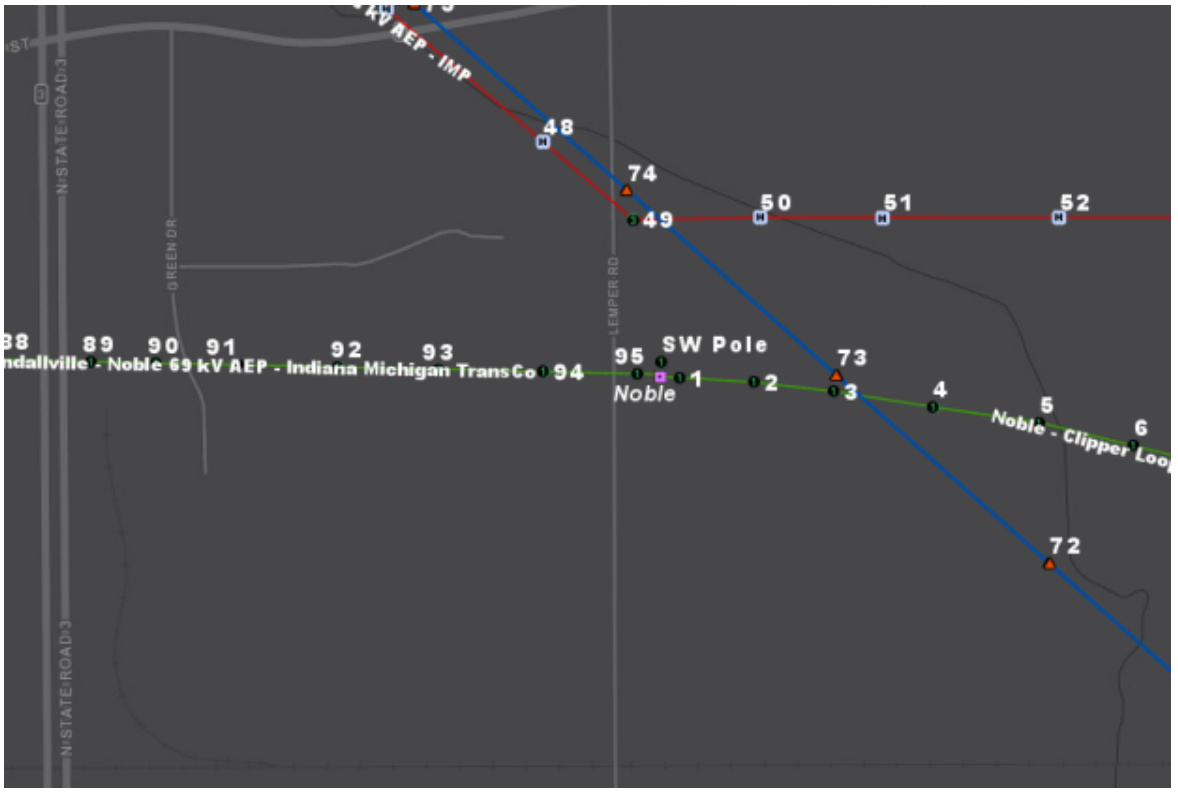


Legend	
Station	★
Circuit	—
	12 kV
	14 kV
	23 kV
	34 kV
	40 kV
	46 kV
	69 kV
	88 kV
	115 kV
	138 kV
	161 kV
	230 kV
	345 kV
	500 kV
	765 kV

Need Number: AEP-2022-IM011
Process Stage: Needs Meeting: 6/15/2022
Supplemental Project Driver: Customer Need
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

Noble 69kV Station:
 Noble Station is a vintage 1950's wood pole station that is currently loaded beyond its capacity. The peak 2021 loading reached 12.04MVA which is 103% over the transformer's capacity.

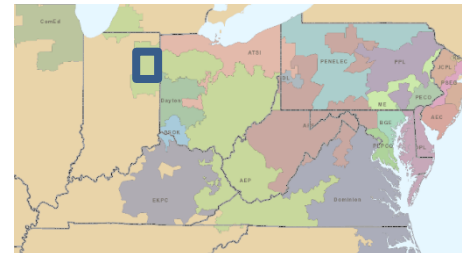
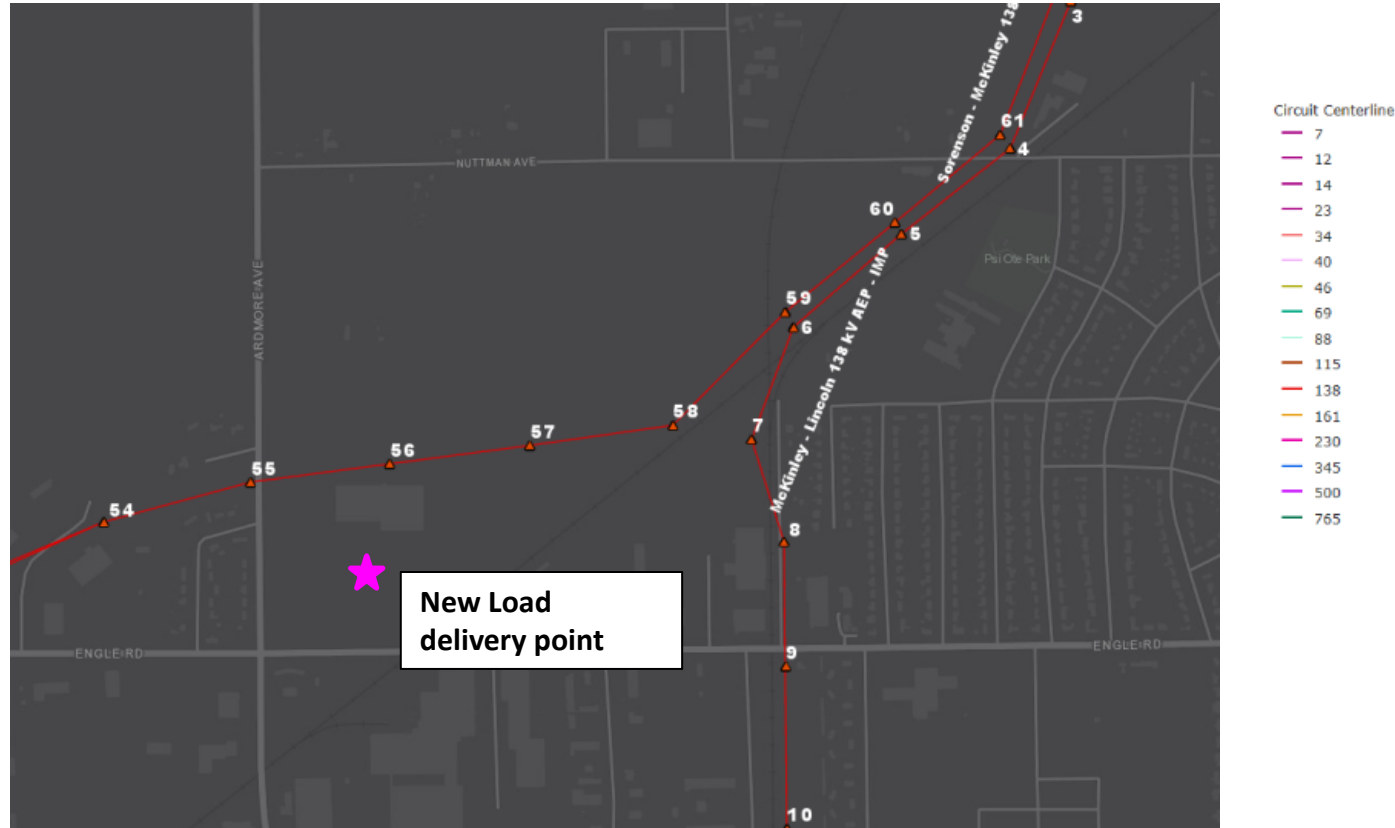
Because of this, I&M Distribution has requested a new delivery point in this area.



AEP Transmission Zone M-3 Process Southern Fort Wayne

Need Number: AEP-2022-IM012
Process Stage: Needs Meeting: 6/15/2022
Supplemental Project Driver: Customer Need
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

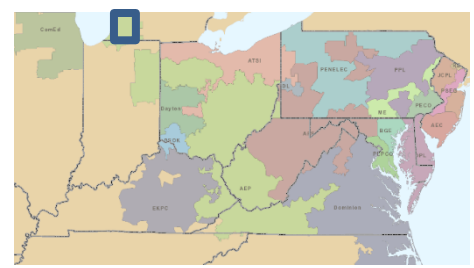
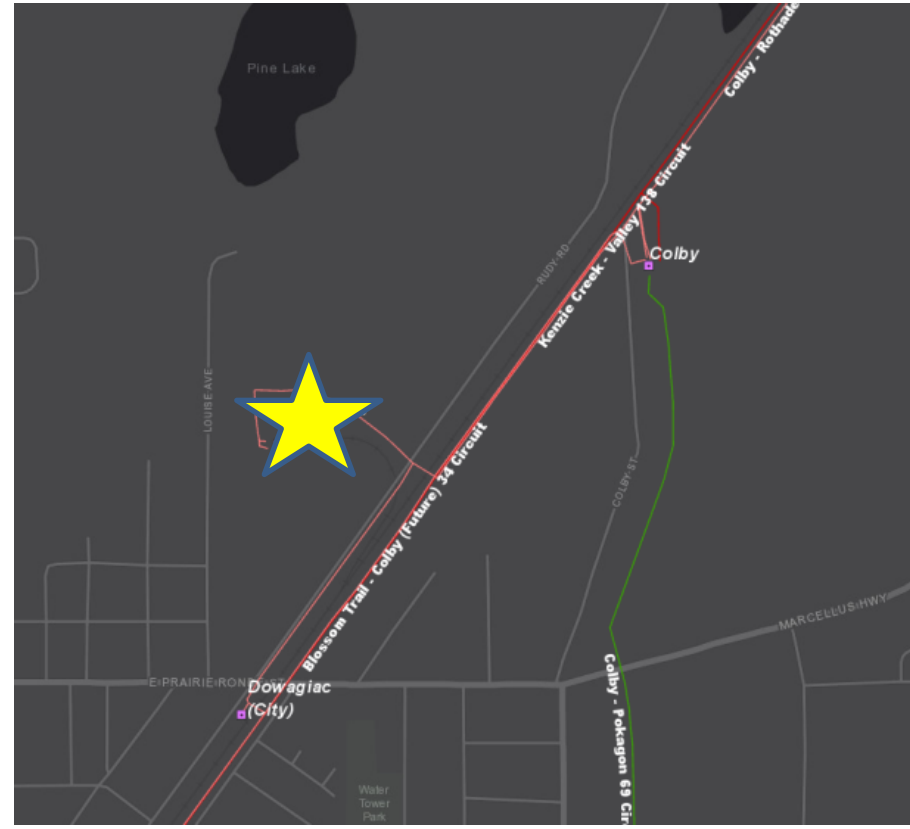
AEP I&M distribution has requested a new delivery point on the southern side of Fort Wayne to serve 13MW of load, transferred from McKinley station. The requested in service date is 6/1/2025



AEP Transmission Zone M-3 Process Dowagiac 34.5kV Customer Load

Need Number: AEP-2022-IM013
Process Stage: Needs Meeting: 6/15/2022
Supplemental Project Driver: Customer Need
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

- Dowagiac Customer Growth:
- The customer served from Rudy Tap 34.5kV Sw has requested a load increase.
 - The customer has indicated a demand of 28MW at their existing delivery point with plans to expand and increase load significantly



Need Number: AEP-2022-IM014

Process Stage: Need Meeting 6/15/2022

Project Driver: Equipment Material Condition, Performance and Risk

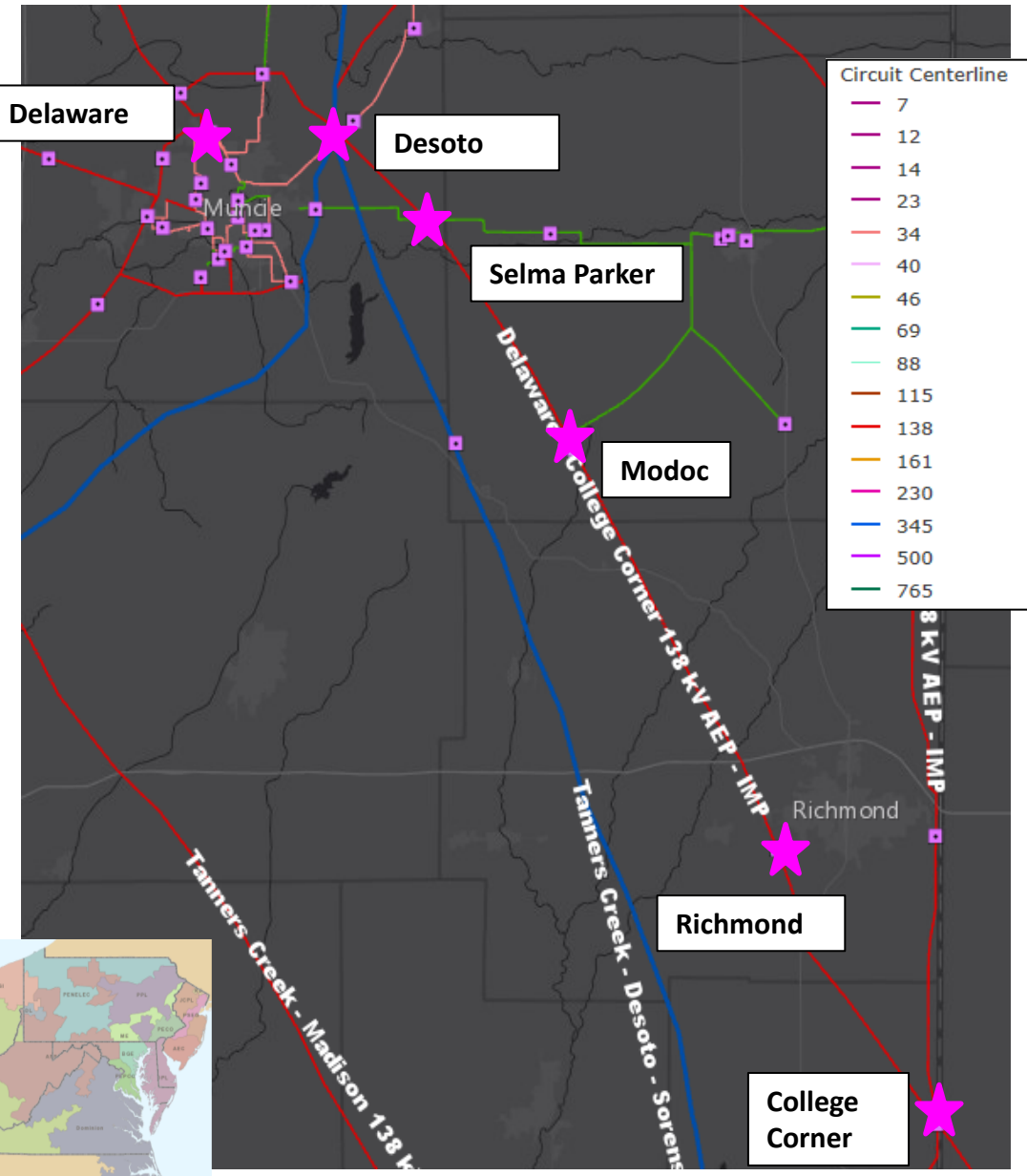
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 13 and slide 14.)

Problem Statement:

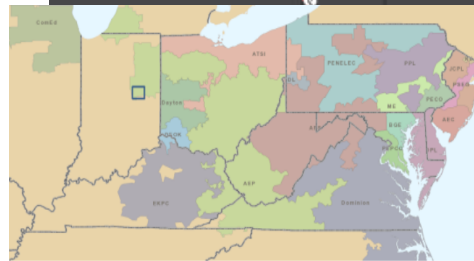
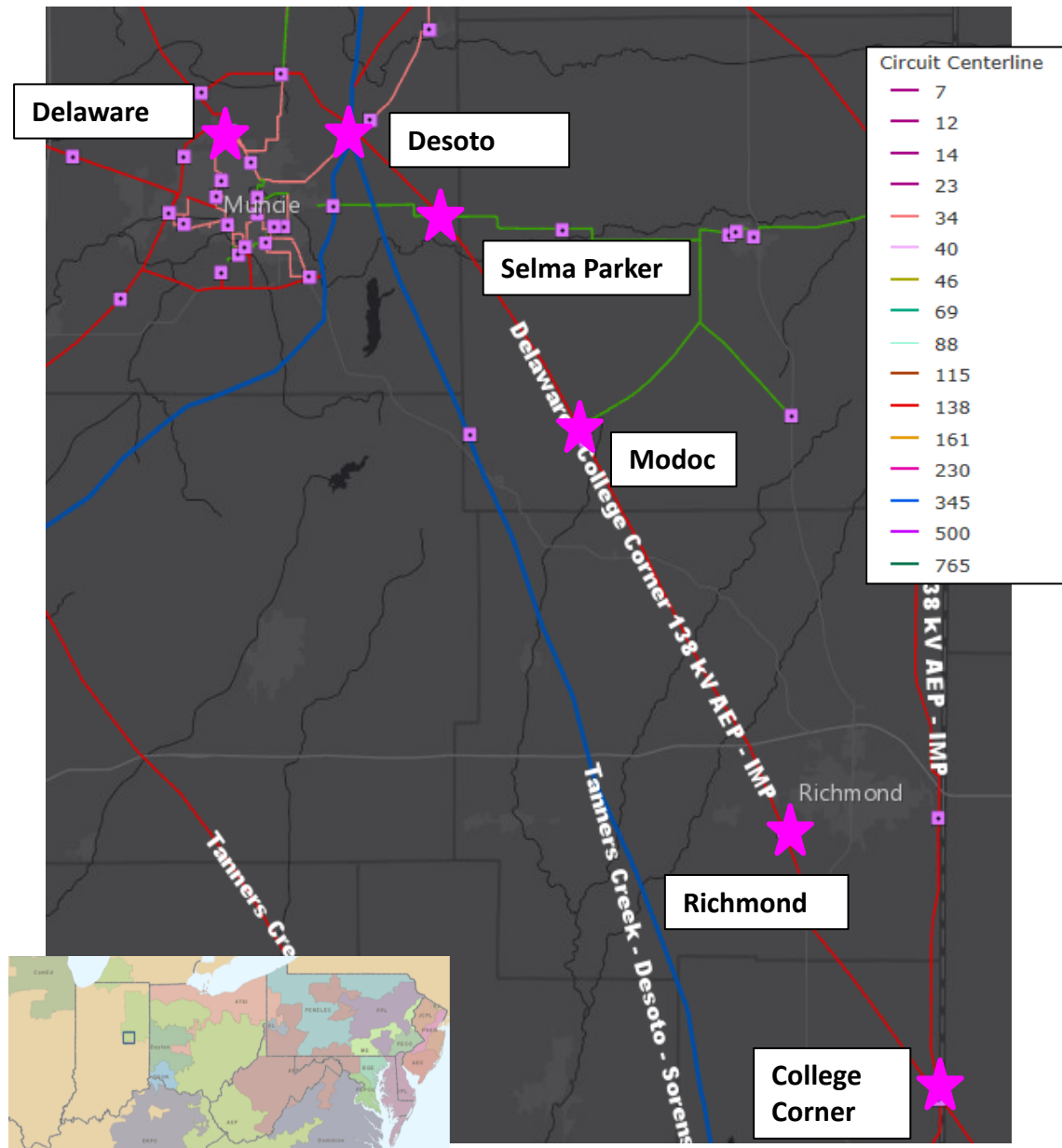
Delaware – College Corner 138 kV double circuit line is 50.66 miles long originally installed in 1941. The line is part of the College Corner – Desoto, College Corner – Richmond, Richmond – Selma Parker and Desoto – Selma Parker 138 kV circuits.

- Length: 50.66 Miles
- Original Construction Type: Steel double circuit lattice structures with porcelain insulators.
- Conductor Type:
 - 477 kCM ACSR 26/7 Hawk (49.11 mi, 1941 vintage); (0.22 mi; vintage 2017-2020)
 - 397.5 kCM ACSR 30/7 Lark (49.19 mi, 1941 vintage); (0.12 mi, vintage 2017-2020)
 - 1033.5 kCM ACSR 26/7 Curlew (0.01 mi, 1941 vintage)
 - 795 kCM ACSR 26/7 Drake (0.15 mi, 2014 vintage)
- Outage history:
 - College Corner – Desoto 138 kV circuit:
 - Momentary/Permanent Outages: 13 total outages: 12 (Momentary), 1 (Permanent).
 - College Corner – Richmond 138 kV circuit:
 - Momentary/Permanent Outages: 1 (Permanent)
 - Delaware-Selma Parker 138kV circuit:
 - Momentary/Permanent Outages: 7 total outages: 3 (Momentary), 4 (Permanent)
 - 5 Year CMI: 762,430
 - Richmond – Selma Parker 138 kV circuit:
 - Momentary/Permanent Outages: 5 total outages: 4 (Momentary), 1 (Permanent).
 - 5 Year CMI: 139,198



• Condition Summary

- Number of open conditions: 112
 - Open conditions include conductor broken strands and failed conductors. Conductor hardware that is broken, missing bolt, loose, missing a cotter key, worn broken strands, heavy rust, insulators with heavy rust. Shield wire broken or loose, insulator assembly hardware heavy rusted, loose conductor damper.
- Based on the aerial drone and ground crew assessment done on 43 structures, the following was noted.
 - Moderate wear between insulator C- hook attachment and tower arm brackets.
 - Heavy corrosion to insulator cap and pins. 17% of the structures assessed have flashed insulators. High percentage of insulators have only partial glazing covering the top surface which results in higher amounts of contaminated and flashed insulators.
 - Most towers with low to moderate corrosion to the lattice members.
 - Tower coatings are worn resulting in lead-based paint exposure. Recoating towers will be a significant expense which will include mitigation to remove and dispose of lead-based paints
 - Conductor splice hardware is an older barrel-type sleeve that have failed due to loss of steel core inside sleeve that is prone to advancing conductor corrosion in the core and increasing conductor damage.
 - Damper design is a type that requires on-going maintenance to replace in order to avoid damage to conductors. This design is prone to shifting on the wire and contacting the conductor strands increasing conductor damage.
 - Amore – Grip Suspension (AGS) hardware in ~ 15% of the structures assessed. AGS is installed at some conductor attachment locations due to broken strands. Wire deterioration will continue as conductors age.
- Total structure count: 299, with 275 dating back to original installation.
- Centerville is a hard tap interconnection with Duke Energy.



AEP Transmission Zone M-3 Process Auglaize County, OH

Need Number: AEP-2022-OH022

Process Stage: Need Meeting 6/15/2022

Project Driver:

Equipment Material/Condition/Performance/Risk

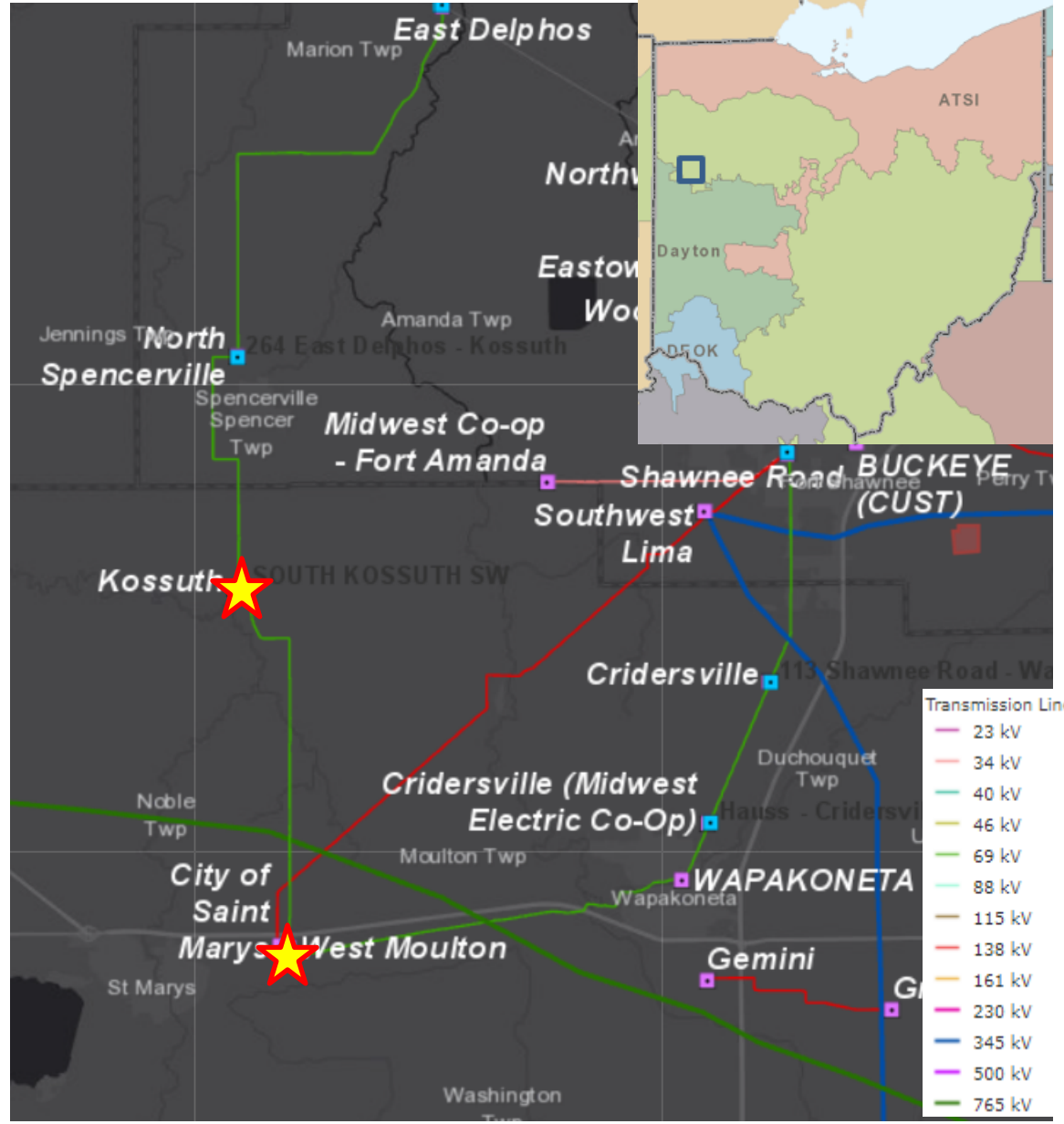
Specific Assumption Reference:

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

Problem Statement:

Kossuth – West Moulton 69kV Line(1963):

- Length of Line: 8.07 Miles
- Total Structure Count: 133
 - Wooden monopole, Steel monopole
 - Horizontal post insulators
- Conductor Types: 4/0 ACSR 6/1 (Penguin)
- Outage History: 25 Momentary and 2 Permanent outages – average duration of 3.25 hours, CMI 221,572 over the last five years
- Open Conditions: 32 Open Conditions, including poles with rot heart and rot pocket, chipped/broken insulators, cracked guy strain insulator, and loose hardware.
- The South Kossuth – West Moulton line fails to meet 2017 NESC Grade B loading criteria. The horizontal post ceramic 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 is measured at 13.36 degrees, which is inadequate for AEP current shield angle requirements and can lead to poor lightning performance.
- 10 structures were future assessed by a ground crew. 100% of those structures had reported conditions including rusty shield wires and ground line structure decay.



Need Number: AEP-2022-OH028

Process Stage: Need Meeting 06-15-2022

Project Driver:
Equipment Material/Condition/Performance/Risk

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

Problem Statement:

Sowers – Lockwood Road 138kV Line:

- Original Install Date: 1966
- Length of Line: 14.93 Miles
- Total Structure Count: 103
 - Wooden H frame structures, Steel H frame structures
 - Vertical ceramic insulators
- Conductor Type: 636 ACSR 26/7 (Grossbeak)
- Outage History: 5 Momentary and 3 Permanent outages – average duration of 10.4 hours, 46k CMI

The Sowers – Lockwood Road line does not meet 2017 NESC Grade B loading criteria. The line is grounded with butt wraps which does not meet current AEP standards. There are emerging issues due to the age of this line being at a point where the rate of the wood pole decay to heart rot is going to accelerate. The life expectancy of crossarms vs. the life expectancy of the poles is mismatched as well as knee and vee braces. Ground based inspections may fail to detect crossarm decay on the top side of the arms, which typically occurs prior to visible decay on the sides and bottom. Crossarm failure is often the first indication that decay was ever present.

Eight sample structures were further assessed by a ground crew. 87.5% of those structures had reported conditions, which included the following: four structures had bowing poles/crossarms, five structures had moderate deterioration of poles and crossarms, and one structure had significant deterioration of pole toppers.



Need Number: AEP-2022-OH045

Process Stage: Need Meeting 6/15/2022

Project Driver:

Customer Service

Specific Assumption Reference:

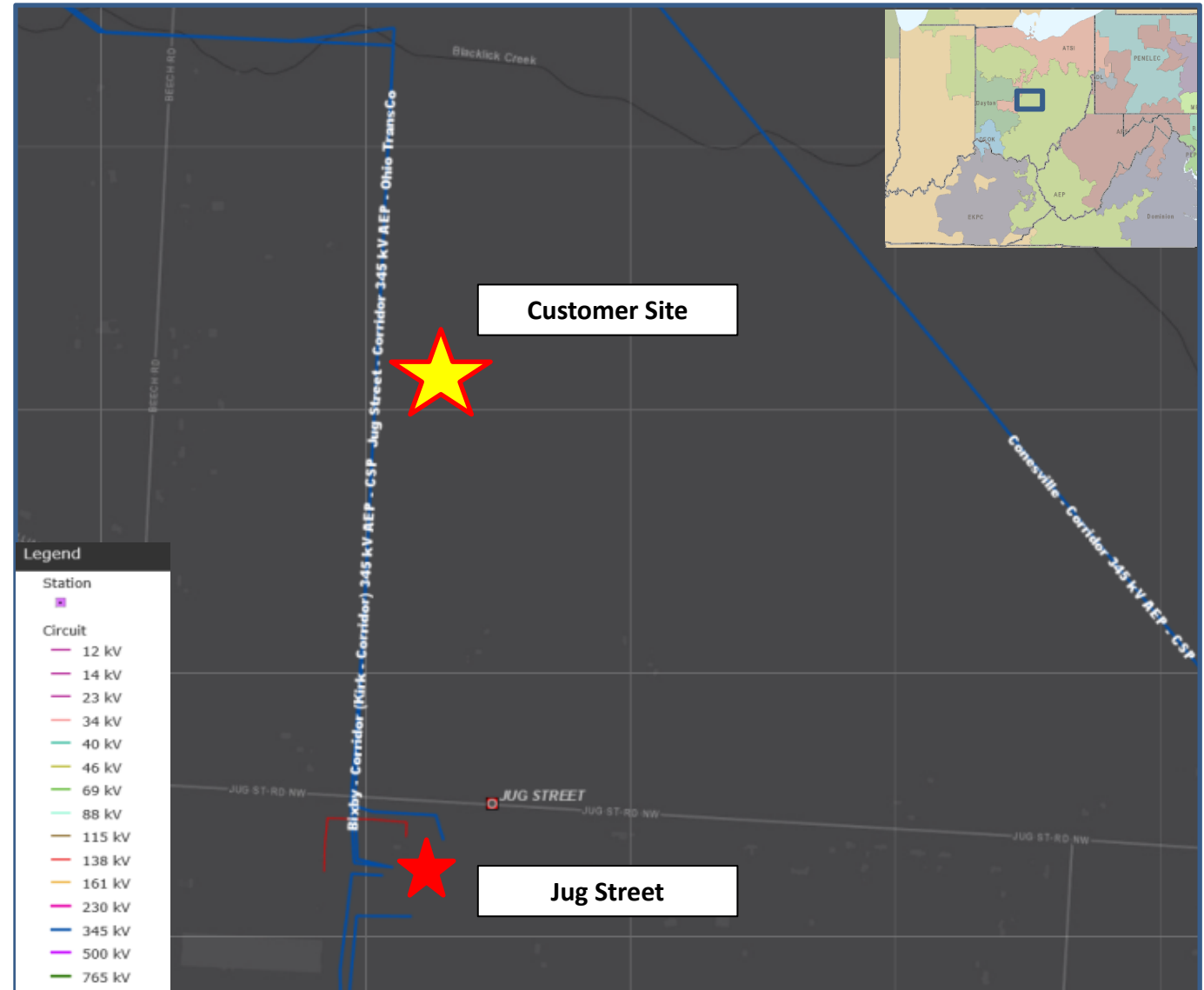
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

- A customer has requested distribution service at a site North of AEP’s existing Jug Street station in New Albany, OH. In addition, AEP Ohio has requested an additional delivery point from this location.
- The customer has indicated their initial load demand of 50 MW with an ultimate peak demand of 200 MW at the site.
- The customer has requested an ISD of 4/30/2024

Model: 2026 RTEP



Need Number: AEP-2022-OH046

Process Stage: Need Meeting 6/15/2022

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 East of AEP’s existing Jug Street station in New Albany, OH.
- The customer has indicated their initial demand of 50 MW with an ultimate peak demand up to 400 MW in the future.
- The customer has requested an ISD of 6/28/2024

Model: 2026 RTEP



Solutions

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

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

Need Number: AEP-2019-OH045

Process Stage: Solutions Meeting 06/15/2022

Previously Presented: Need Meeting 07/24/2019

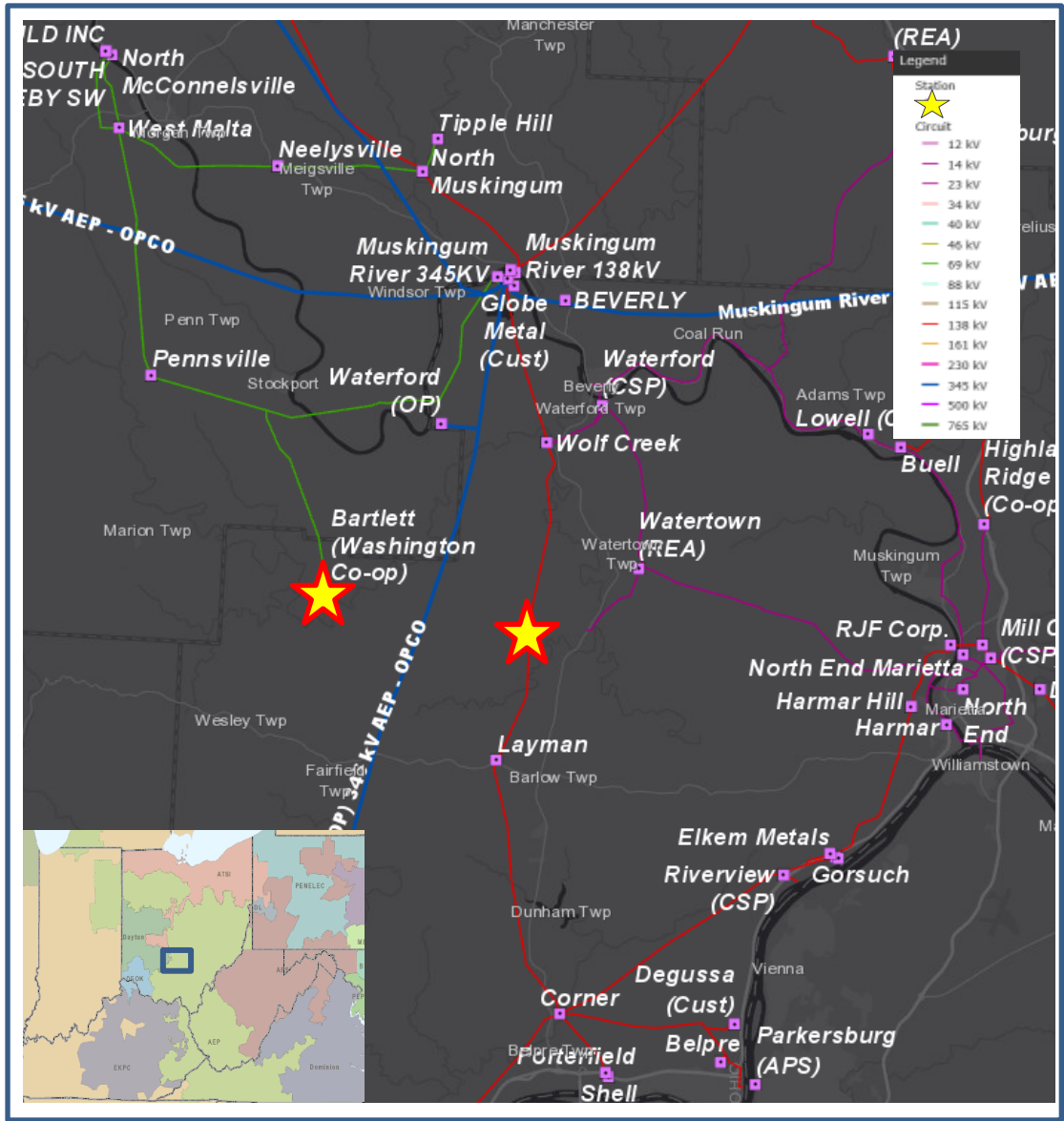
Project Driver:
Equipment Condition, Operational Flexibility, and Customer Service

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: Solutions Meeting 06/15/2022
Previously Presented: Need Meeting 03/19/2021

Problem Statement

Equipment Condition:

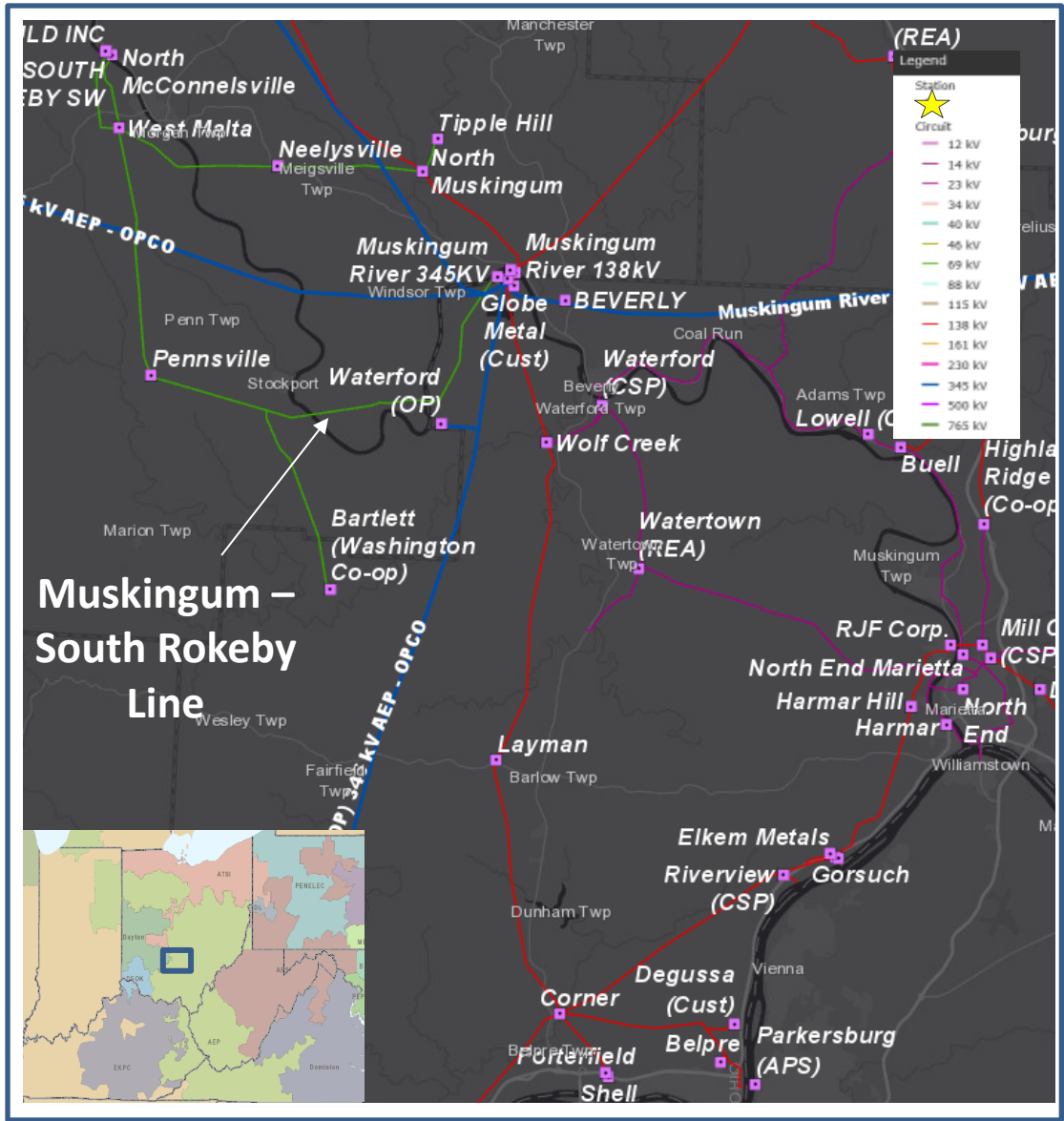
Line Name: Muskingum – South Rokeby 69kV
 Original Install Date (Age): 1965
 Length of Line: ~21.3 mi
 Total structure count: 164
 Original Line Construction Type: Wood
 Conductor Type: 4/0 ACSR 6/1, 336,400 CM ACSR 18/1, and 336,400 CM ACSR 30/7
 Momentary/Permanent Outages and Duration: 10 Momentary 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

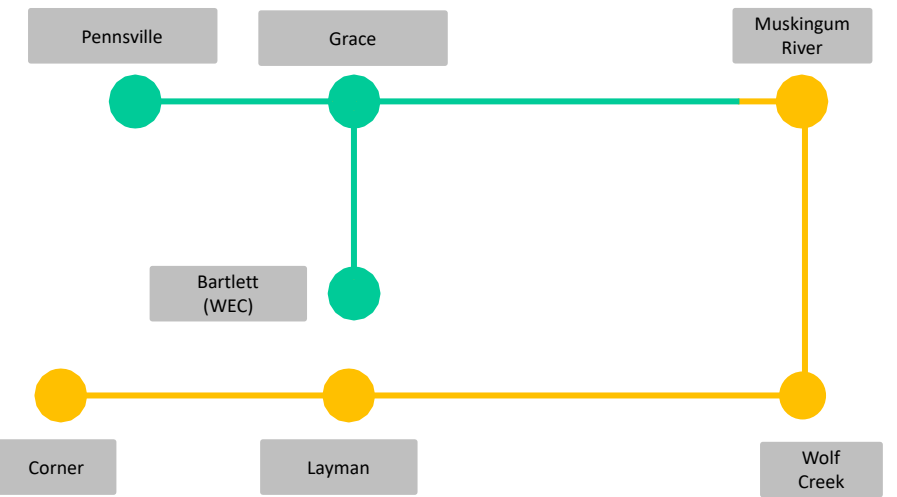
Process Stage: Solutions Meeting 06/15/2022

Proposed 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**
- **Wolf Creek – Corner 138 kV Line cut-in :** Cut-in on the line to install the new West Watertown station. **Estimated Cost: \$0.55M**
- **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**
- **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**
- **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**
- **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.**
- **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**
- **Muskingum River Removals:** At Muskingum River 138 kV yard, retire the 138/69 kV XF #C, CB-HM & HW. **Estimated Cost: \$0.63M**
- **Grace Station, 69 kV:** Retire Grace - Muskingum River circuit, upgrade protection and fiber work at Grace Station. **Estimated Cost: \$0.91M**

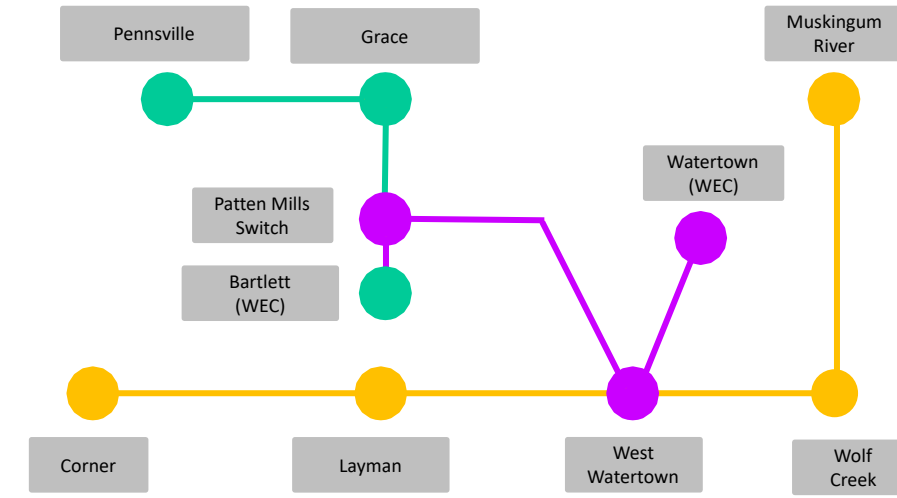
Existing:

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



Bubble Diagram

Proposed:



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

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

Process Stage: Solutions Meeting 06/15/2022

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

Total Estimated Transmission Cost: \$38.9M

Alternatives Considered:

Consideration was given to locating the 138/69 kV transformer at Wolf Creek station and rebuilding a portion of the Corner – Wolf Creek line as double circuit to address emerging needs associated with it. Initial engineering feedback identified risk of a significant amount of grading possibly being required to accommodate the transformer at Wolf Creek. The civil work would at very least have put the alternative solution on par from a cost perspective with the proposed solution. From an electrical perspective the alternative solution have resulted in a significant increase in line exposure to WEC’s customers at Watertown and Bartlett in comparisons with the proposed project. Because of this, the decision was made to move forward with the proposed plan of a new West Watertown station.

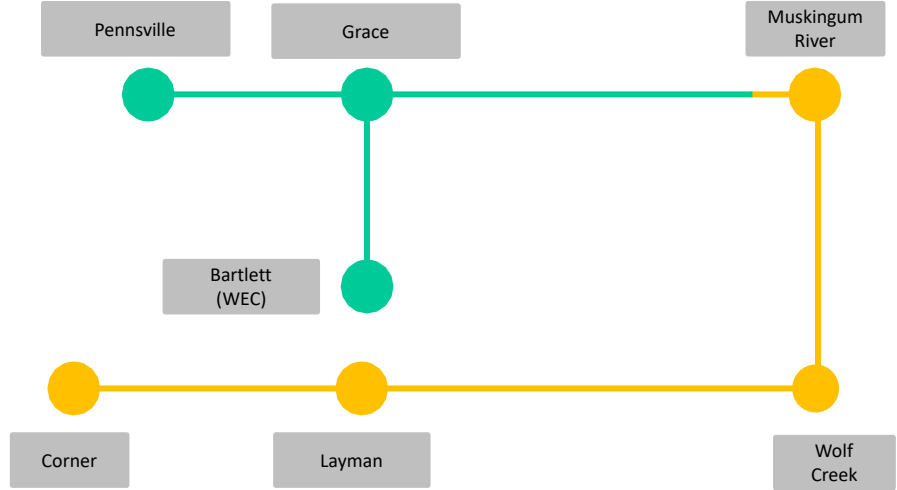
Projected In-Service: 9/1/2024

Project Status: Scoping

Model: 2025 RTEP

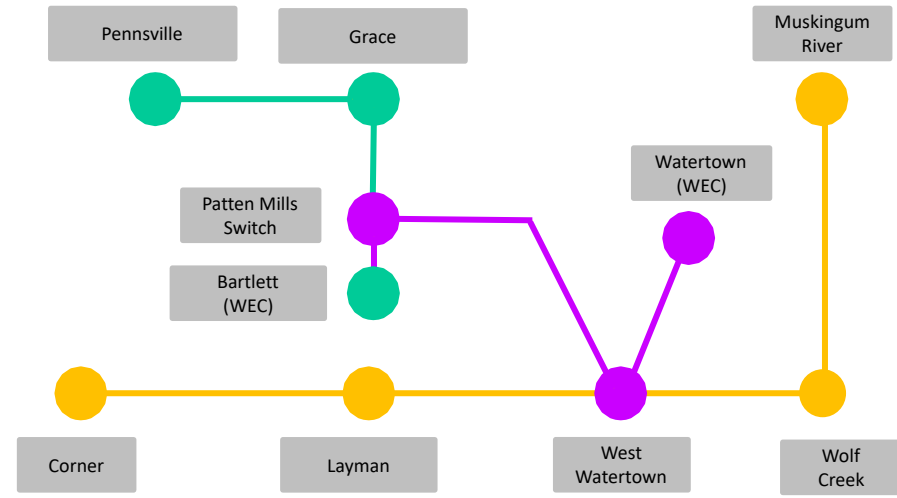
Existing:

Legend	
500 kV	
345 kV	
138 kV	
88 kV	
34.5 kV	
23 kV	
12kV	



Bubble Diagram

Proposed:



Need Number: AEP-2019-OH046

Process Stage: Solution Meeting 6/15/2022

Previously Presented: Needs Meeting 7/24/2019

Supplemental Project Driver:

Operational Flexibility and Customer Service

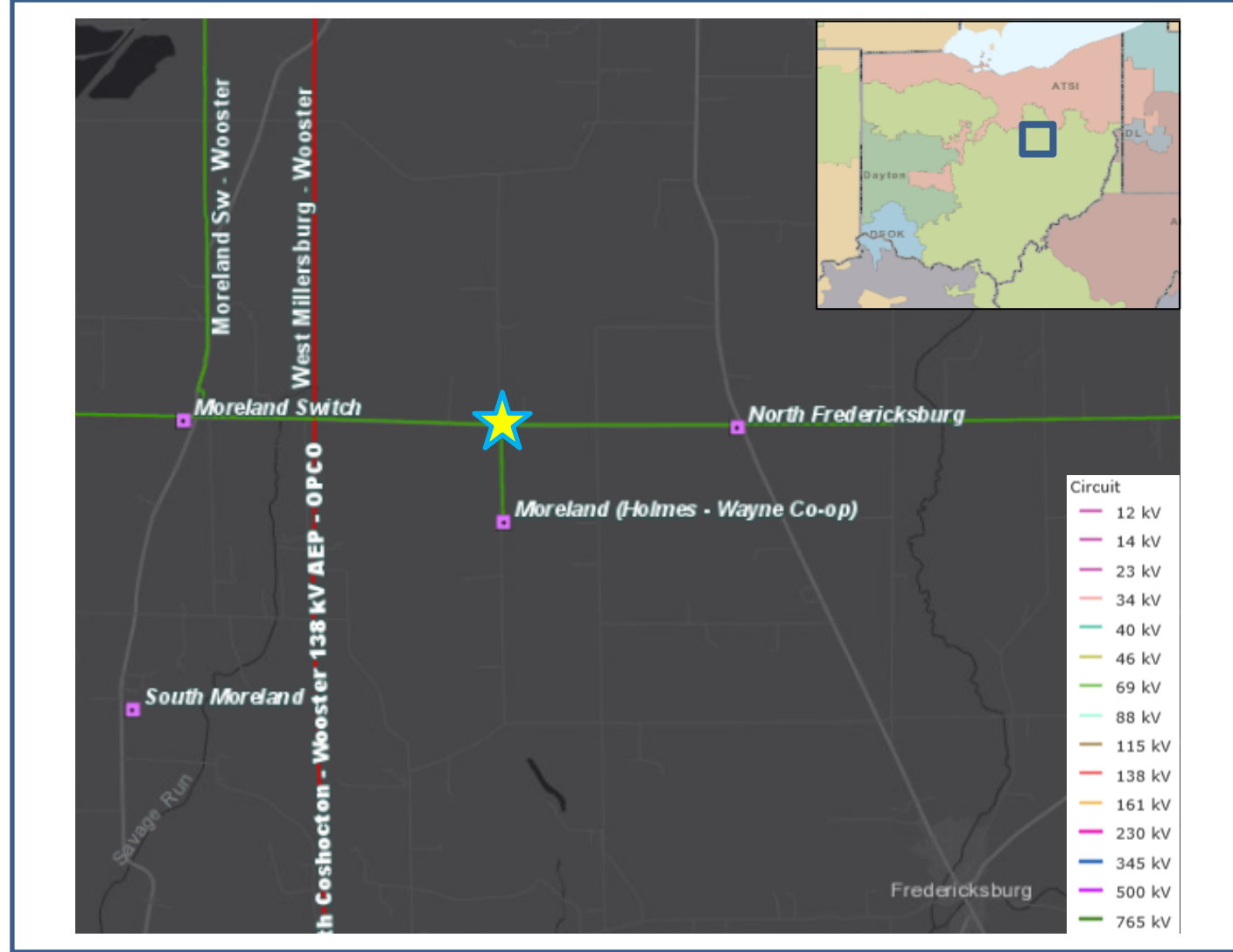
Specific Assumption Reference:

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: Solution Meeting 6/15/2022

Proposed 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

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

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

Total Estimated Transmission Cost: \$1.50 Million

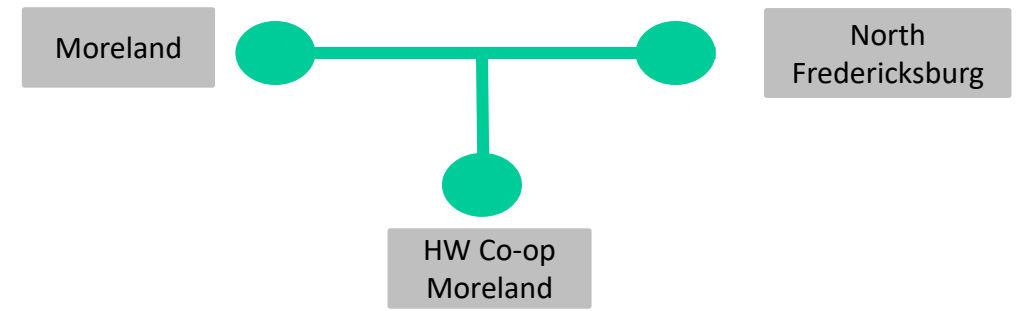
Alternatives Considered: No viable, cost-effective alternatives to installing a switch and eliminating the hard tap.

Projected In-Service: 12/01/2023

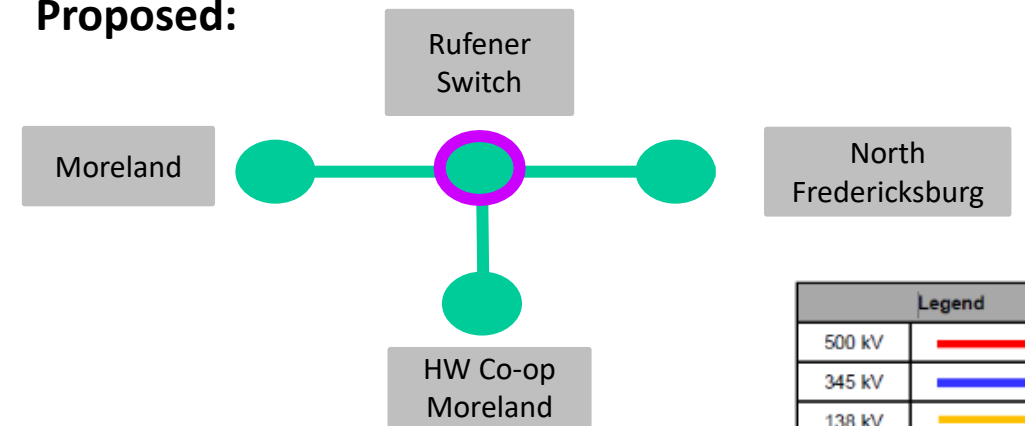
Project Status: Scoping

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

Existing:



Proposed:



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

Need Number: AEP-2020-OH044

Process Stage: Solution 6/15/2022

Previously Presented: 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



Problem Statement (cont.):

CONDITION / PERFORMANCE / RISK ASSESSMENT:

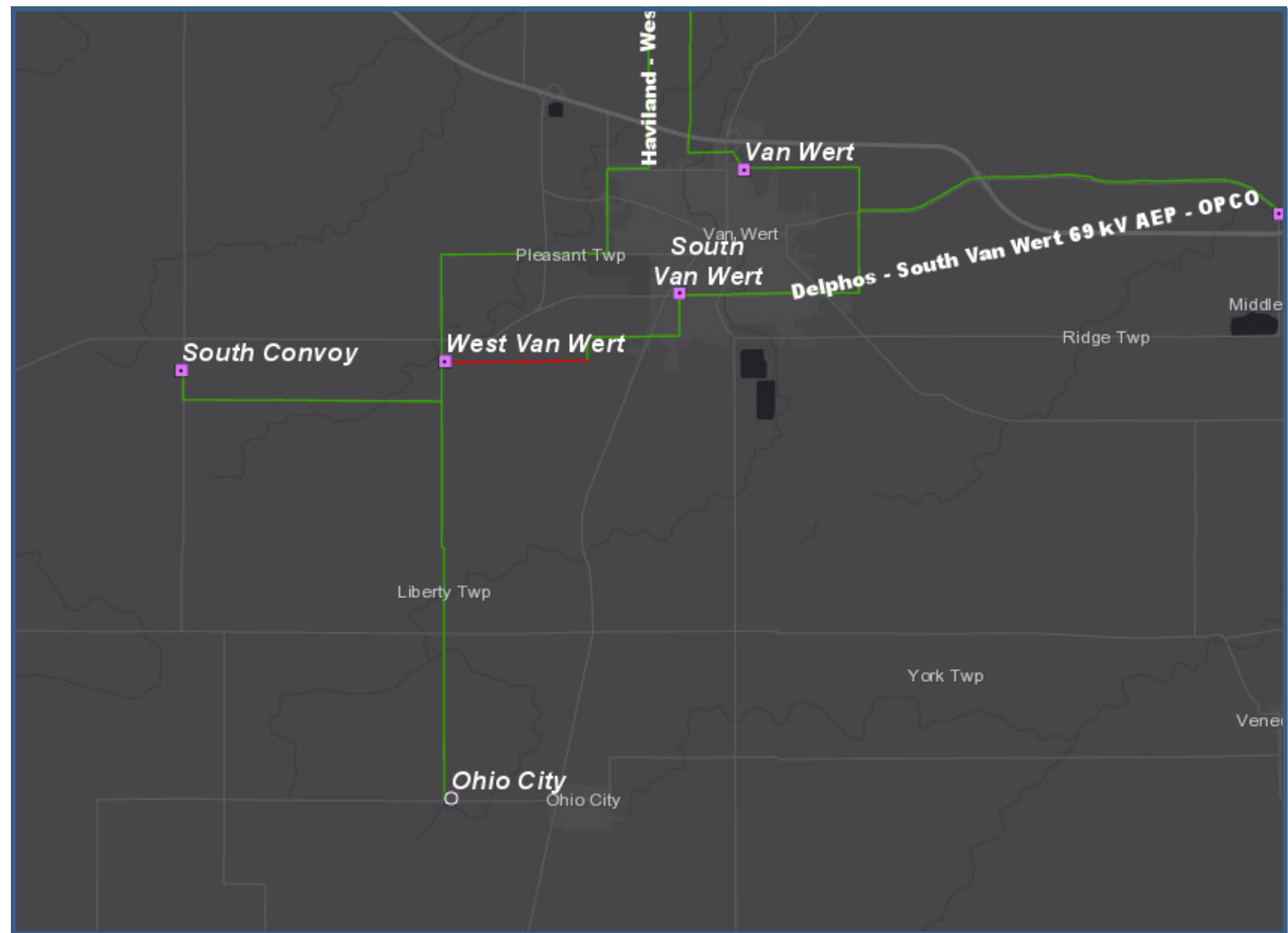
Station Name: Ohio City

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-OHO44

Process Stage: Solution 6/15/2022

Proposed Solution:

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

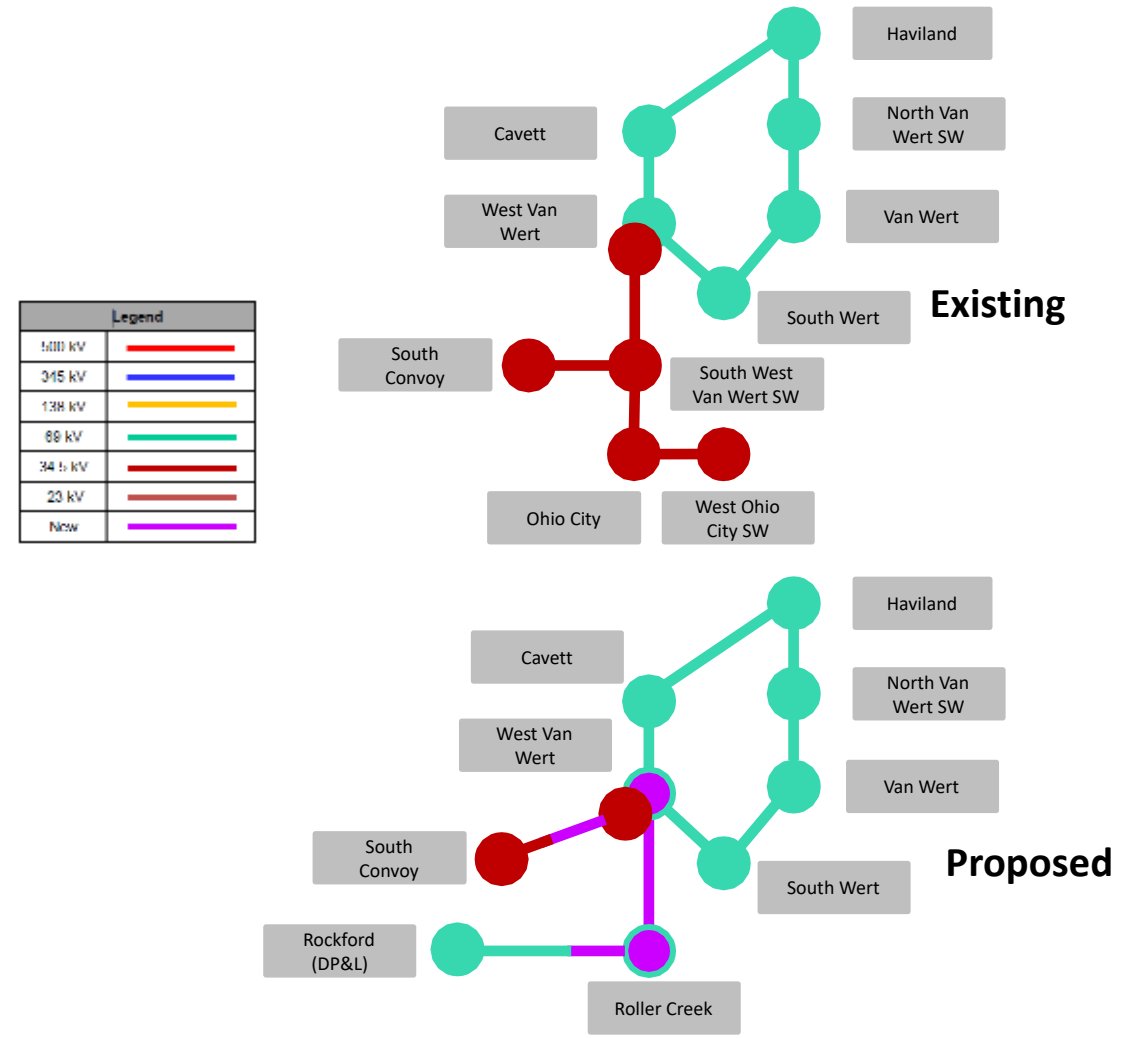
- **West Van Wert – Ohio City:** Rebuild the 8.9 mile West Van Wert – Ohio City 34.5 kV circuit to operate at 69 kV utilizing 556 ACSR conductor. **Estimated Cost \$12.271M**
- **West Van Wert 69kV:** In order to address the three terminal point created by closing in the interconnection at Rockford and 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**
- **Haviland – West Van Wert:** Relocate Haviland – West Van Wert 69kV to accommodate work at West Van Wert station. **Estimated Cost \$1.035M**
- **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**
- **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**
- **West Ohio City Switch 34kV:** Retire Switch **Estimated Cost \$0.039M**
- **Southwest Van Wert Switch 34kV:** Retire Switch **Estimated Cost \$.088M**

Total Estimated Cost: \$21.751M

Alternatives Considered: Consideration was given to utilizing some of the wood poles that were installed in 1994 on the Ohio City – West Van Wert 34.5 kV circuit initially. Further engineering investigation revealed though that the poles installed were class 3 sixty-five foot poles. The wooden poles would not be able to support the proposed 556 ACSR conductor required to meet the thermal capacity requirements of the new interconnection. In addition, there were concerns raised over the existing structures meeting current AEP clearance and strength requirements due to distribution underbuilds that now exist on the line along with the proposed conversion to 69 kV to match the interconnection with DP&L’s system.

Projected In-Service: 06/01/2025

Project Status: Scoping



Need Number: AEP-2021-OH046

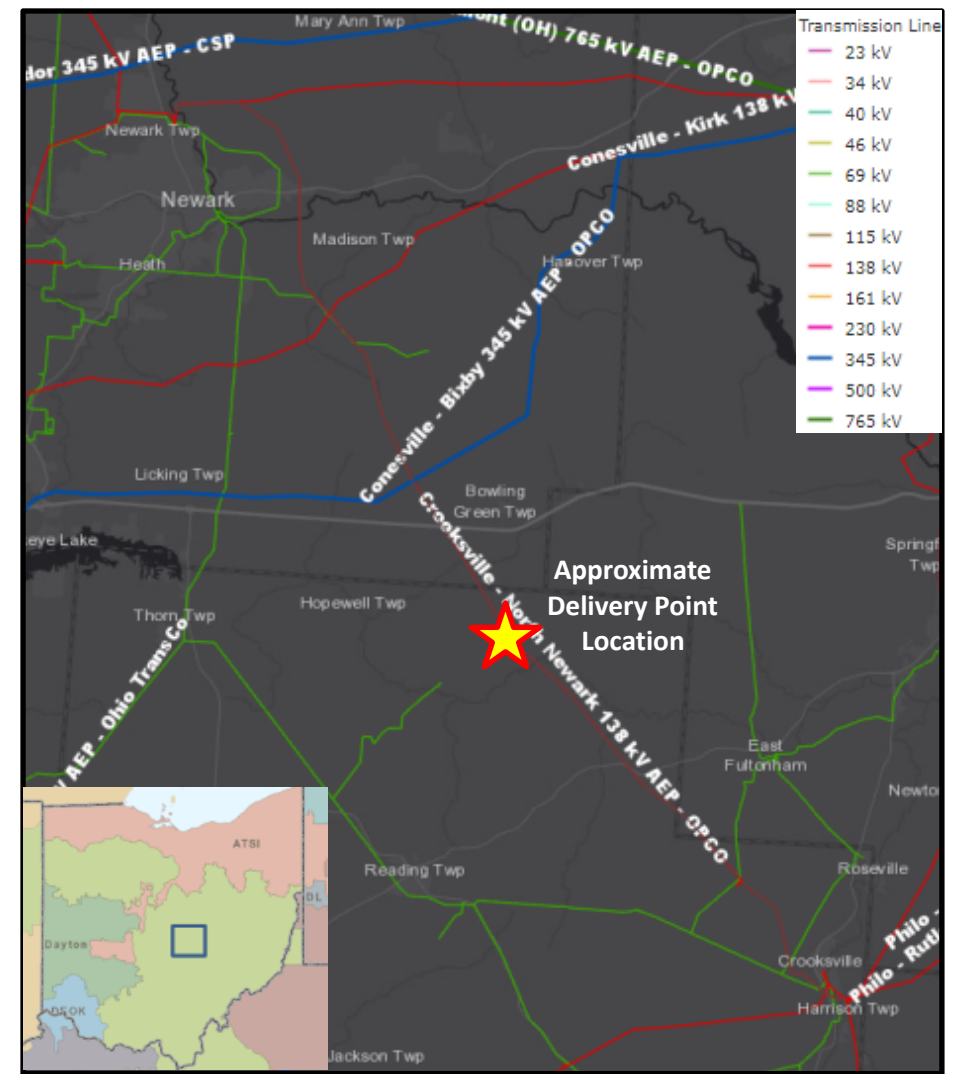
Process Stage: Solutions Meeting 06/15/2022

Previously Presented: 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: Solutions Meeting 6/15/2022

Proposed 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**
- **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**
- **Mount Perry Meter, 12 kV :** Install 12 kV metering at SCP’s new Mount Perry Station. **Estimated Cost: \$0.023M**
- **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**
- **Crooksville Protection upgrades:** Remote end protection upgrade . **Estimated Cost: \$0.551M**

Total Estimated Cost: \$2.44M

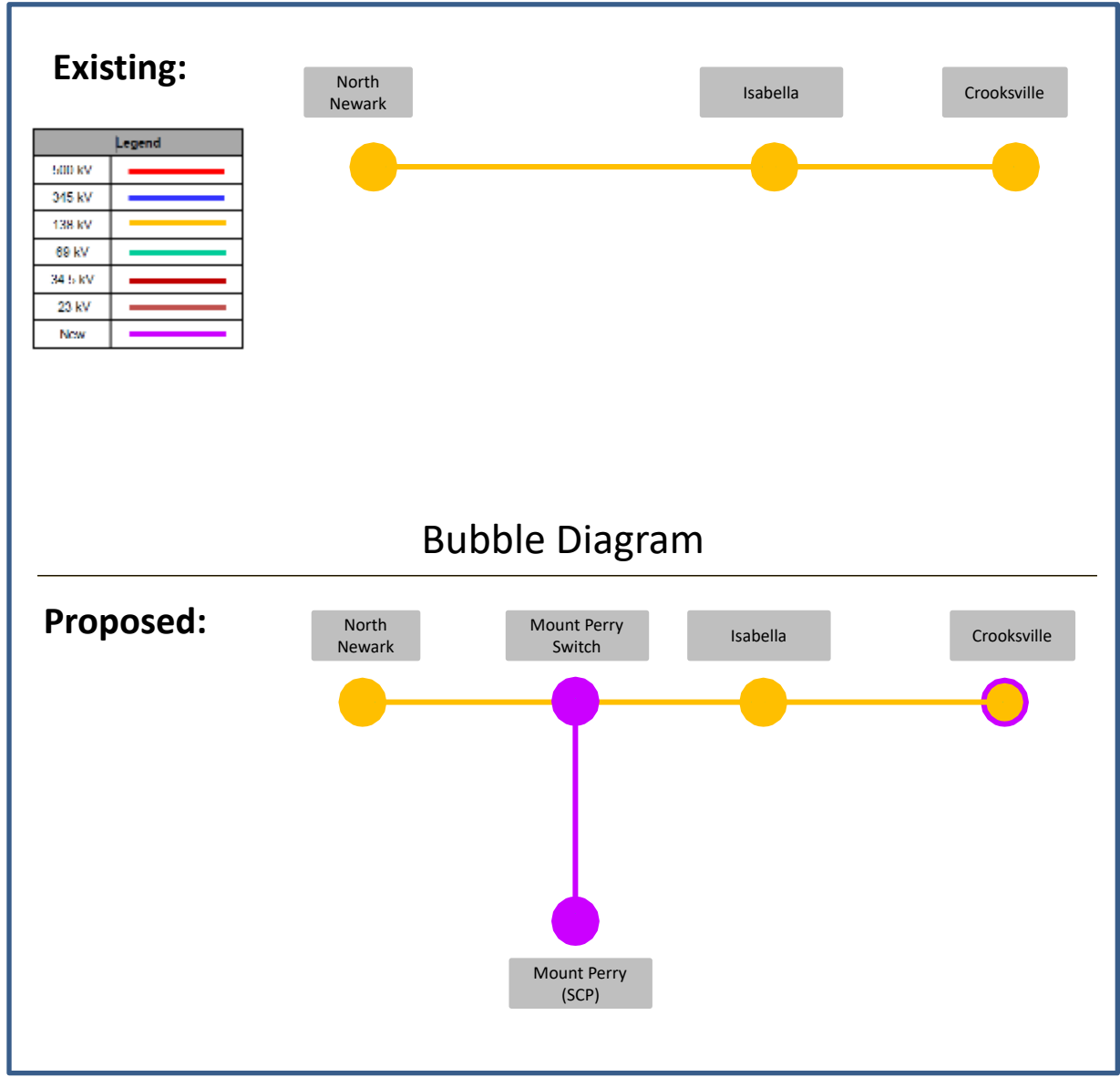
Alternatives Considered:

No other significant alternatives considered as the customer requested the delivery at a specific location.

Projected In-Service: 7/19/2024

Project Status: Scoping

Model: 2025 RTEP



AEP Transmission Zone M-3 Process Layland – Mollys Creek

Need Number: AEP-2021-AP012

Process Stage: Solution Meeting 6/15/2022

Previously Presented: 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)

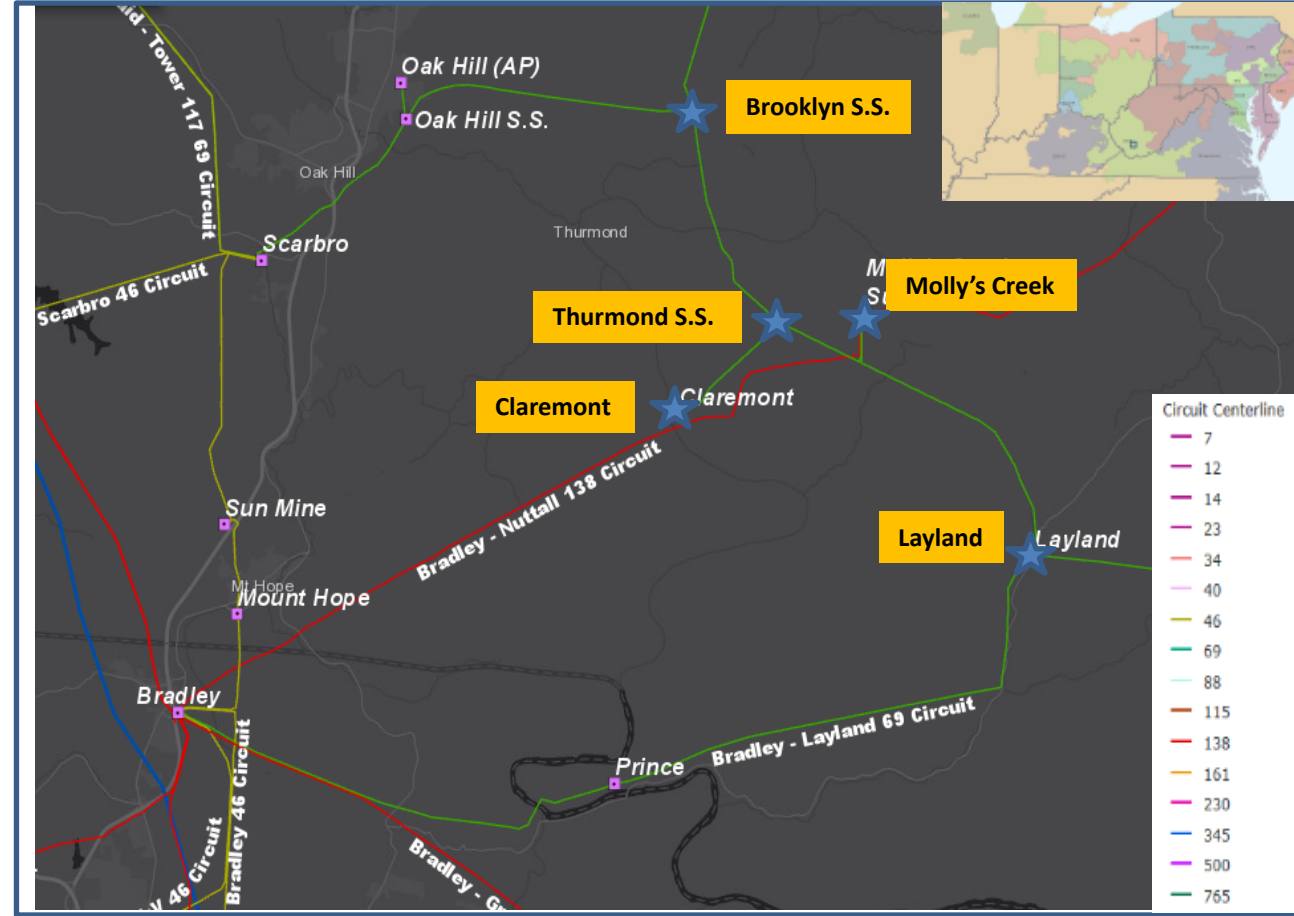
Problem Statement:

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: Solution Meeting 6/15/2022

Proposed Solution:

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

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**

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**

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

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**

Install two new 138 kV breakers at Mollys Creek Station **Estimated Trans. Cost: \$1.5M**

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.

Alternatives Considered:

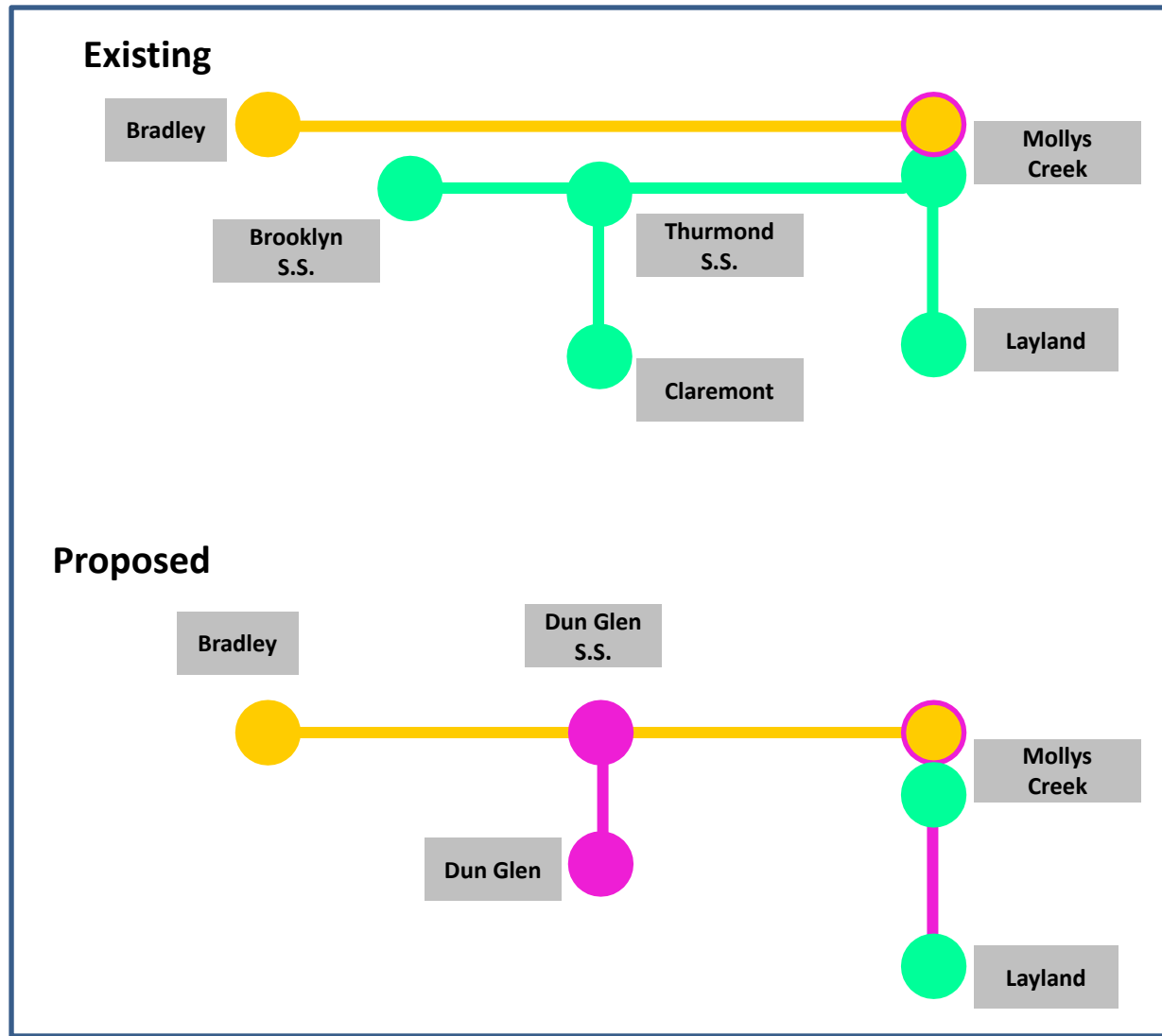
1. Rebuild existing Layland – Mollys Creek 69 kV line (approximately 4 miles). Rebuild existing Mollys Creek – Claremont 69 kV line (approximately 4 miles). Retire Thurmond S.S. – Brooklyn S.S. Total Estimated Trans. Cost: \$30.2M

Projected In-Service: 9/1/2025

Project Status: Scoping

Model: 2026 RTEP

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

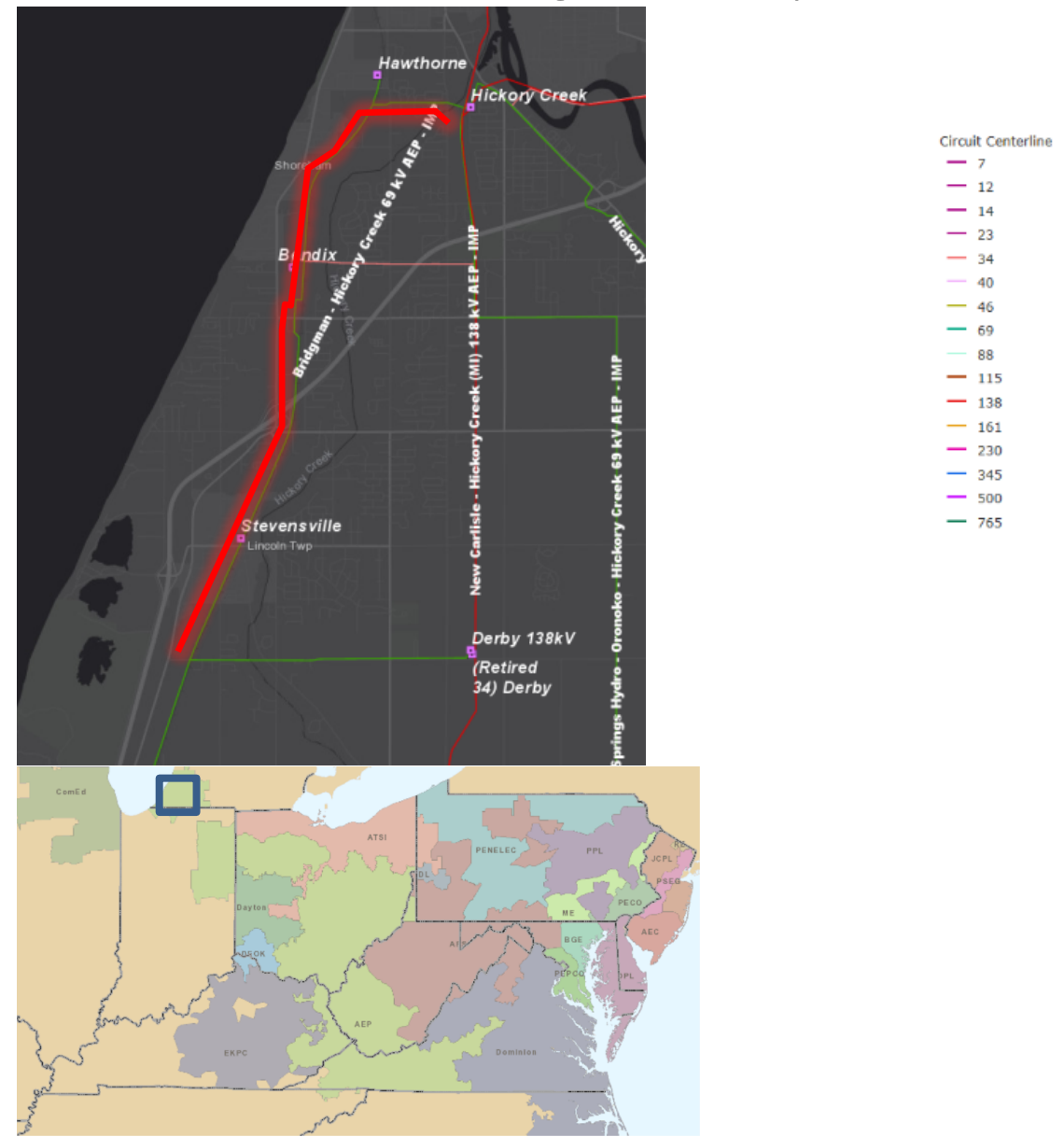


AEP Transmission Zone M-3 Process Western Michigan Area Improvements

Need Number: AEP-2021-IM017
Process Stage: Solutions meeting 6/15/2022
Previously Presented: 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: Solutions meeting 6/15/2022

Previously Presented: 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

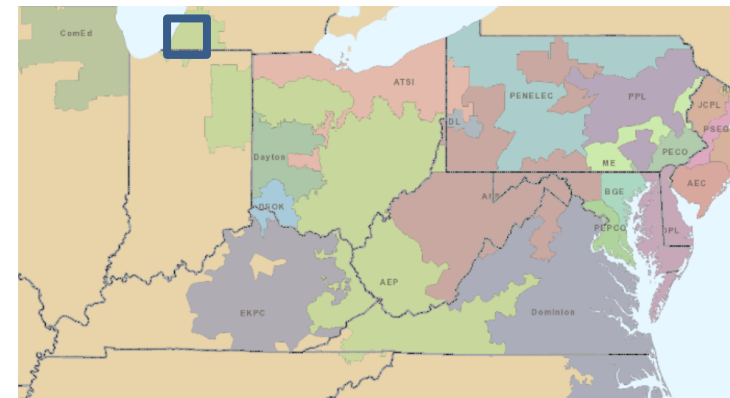
Problem Statement:

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 crossarms.

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.

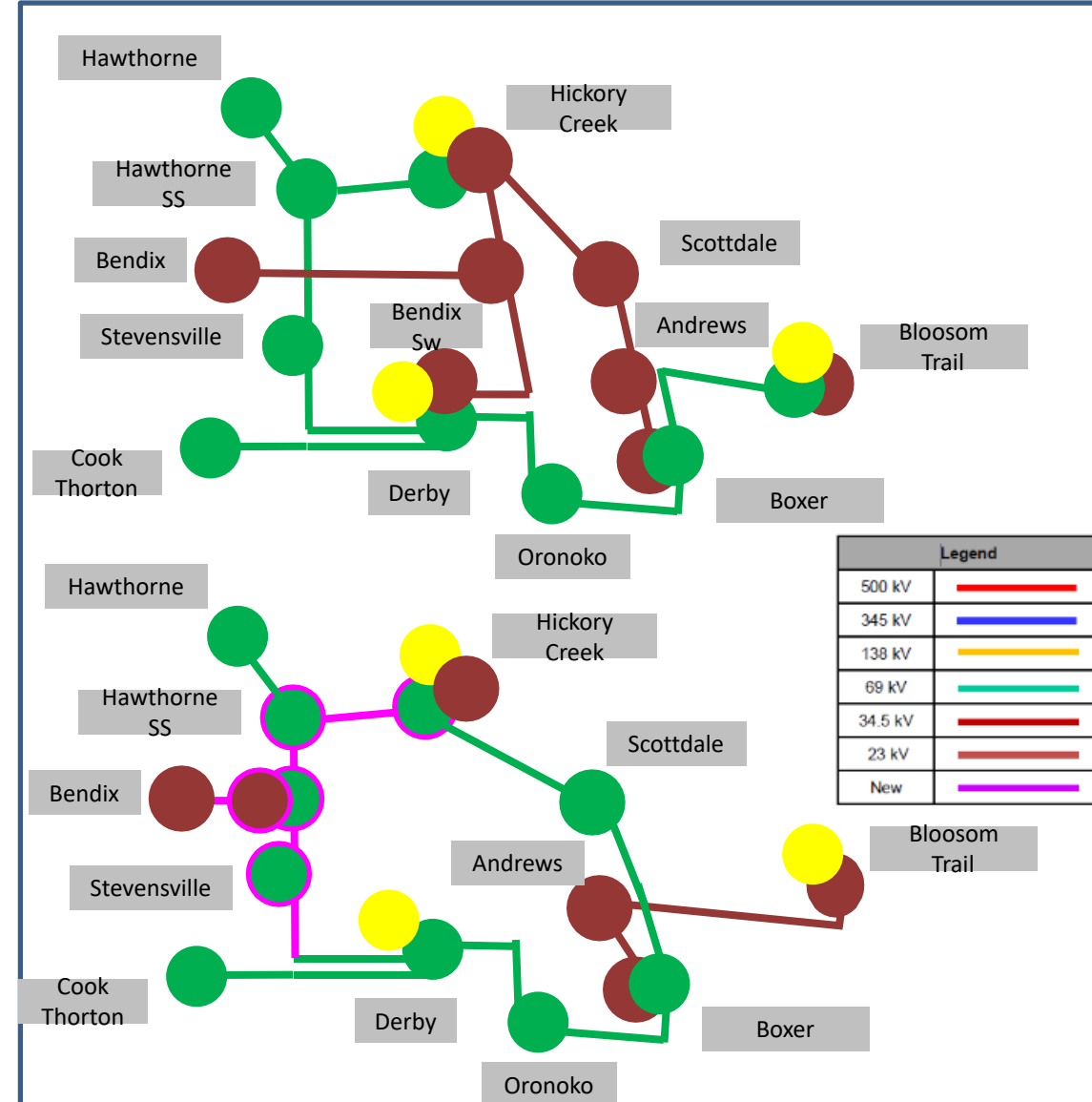


AEP Transmission Zone M-3 Process Western Michigan Area Improvements

Need Number: AEP-2021-IM018 & AEP-2021-IM017
Process Stage: Solution Meeting 6/15/2022

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 Scottsdale 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: Solution Meeting 6/15/2022

Proposed 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

Derby – Hickory Creek 34.5kV Line:

Retire the ~6.16 mile Derby – Hickory Creek 34.5kV line

Estimated Cost: \$1.2M

Bendix Lakeshore 34.5kV Tap:

Retire the ~1.73 mile Bendix Lakeshore 34.5kV Tap

Estimated Cost: \$ 0.6M

Hawthorne SS 69kV /Bendix Sw 34.5kV:

Remove the switch from Bendix Sw and re-use it at Hawthorne SS.

Estimated Cost: \$.7M

Stevensville 69kV:

Rework the through-path to accommodate the new line entrances.

Estimated Cost: \$0.6M

Trafalgar 69/34kV:

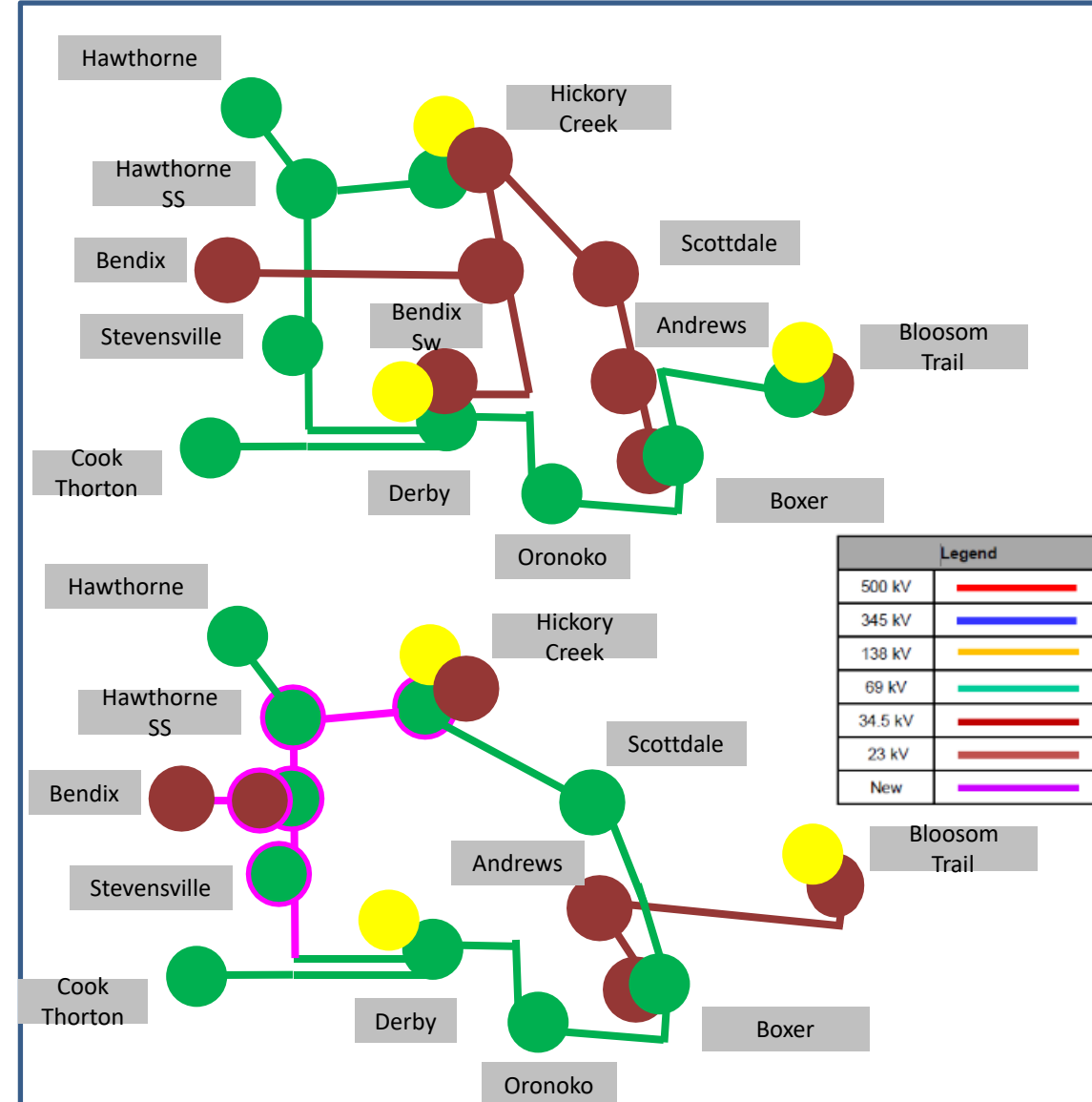
Install Trafalgar station to serve the Bendix 34.5kV customer. This station will include a new 69kV switcher and a new 69/34.5kV XFR. Two CB's will be reused from Derby and Hickory Creek.

Estimated Cost: \$ 4.7M

Scottdale 69kV:

Re-energize to 69kV

Estimated Cost: \$ 0M



AEP Transmission Zone M-3 Process Western Michigan Area Improvements

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

Process Stage: Solution Meeting 6/15/2022

Proposed Solution:

Derby 138/69/34.5kV:

Retire the 34.5kV voltage class

Estimated Cost: \$0.1M

Boxer – Blossom Trail 34.5:

Re-energize at 34.5kV

Estimated Cost: \$0.2M

Boxer – Hickory Cr 69kV:

Re-energize at 69kV

Estimated Cost: \$0.8M

Trafalgar – Bendix 34.5kV:

Build a 0.15 mile radial line from Trafalgar to Bendix Lakeshore

Estimated Cost: \$.5M

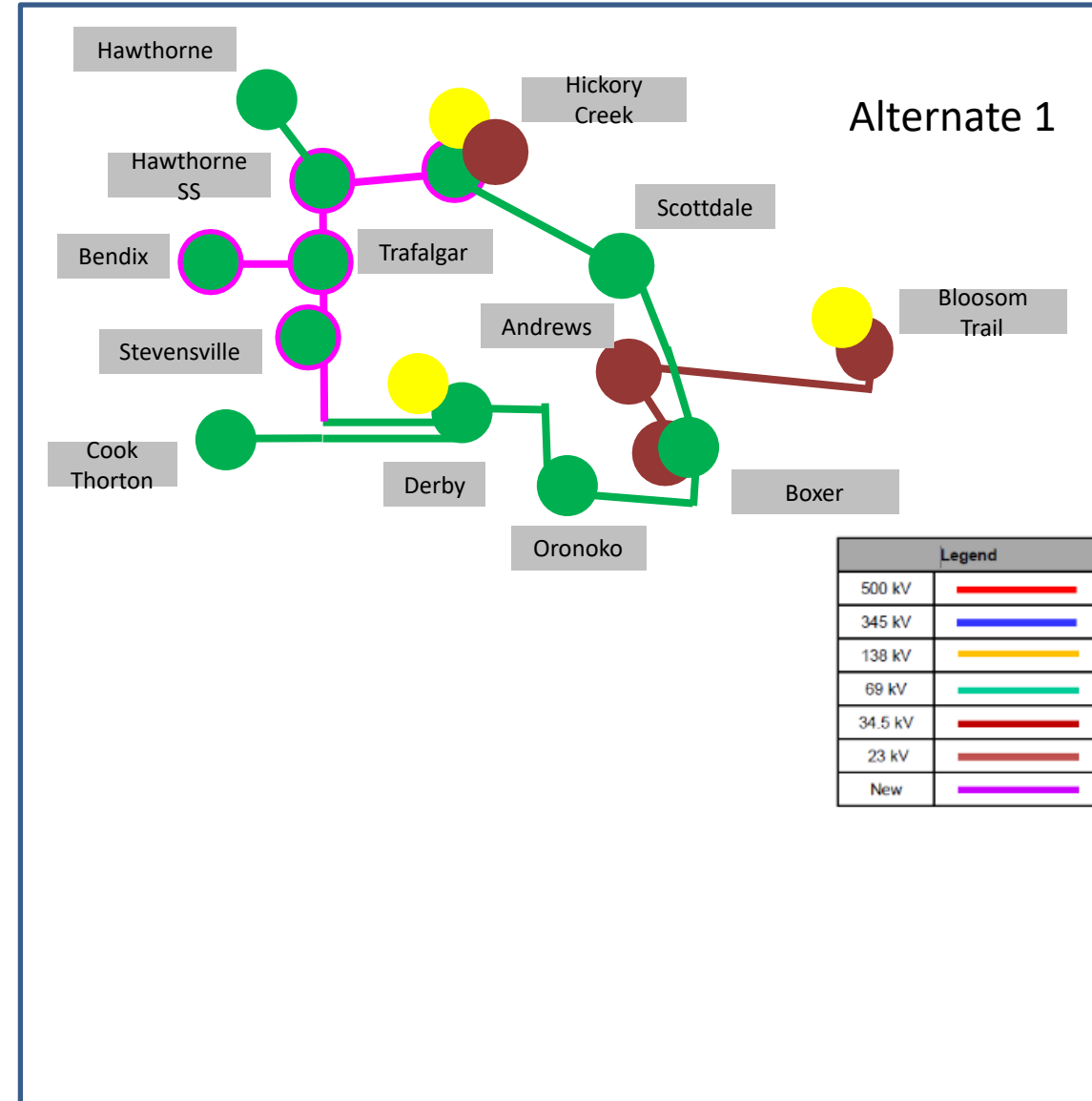
Total Estimated Transmission Cost: \$24.1M

Alternatives Considered:

Alternate 1

Instead of installing a 69/34.5kV XFR at Trafalgar and relocating a breaker there for the 34.5kV, upgrade Bendix Lakeshore to 69kV operation. This would cost roughly the same but would require additional work from the retail customer. AEP will continue to pursue this option based on the customer needs.

Estimated Cost: \$24.1M



AEP Transmission Zone M-3 Process Western Michigan Area Improvements

Need Number: AEP-2021-IM018 & AEP-2021-IM017
Process Stage: Solution Meeting 6/15/2022

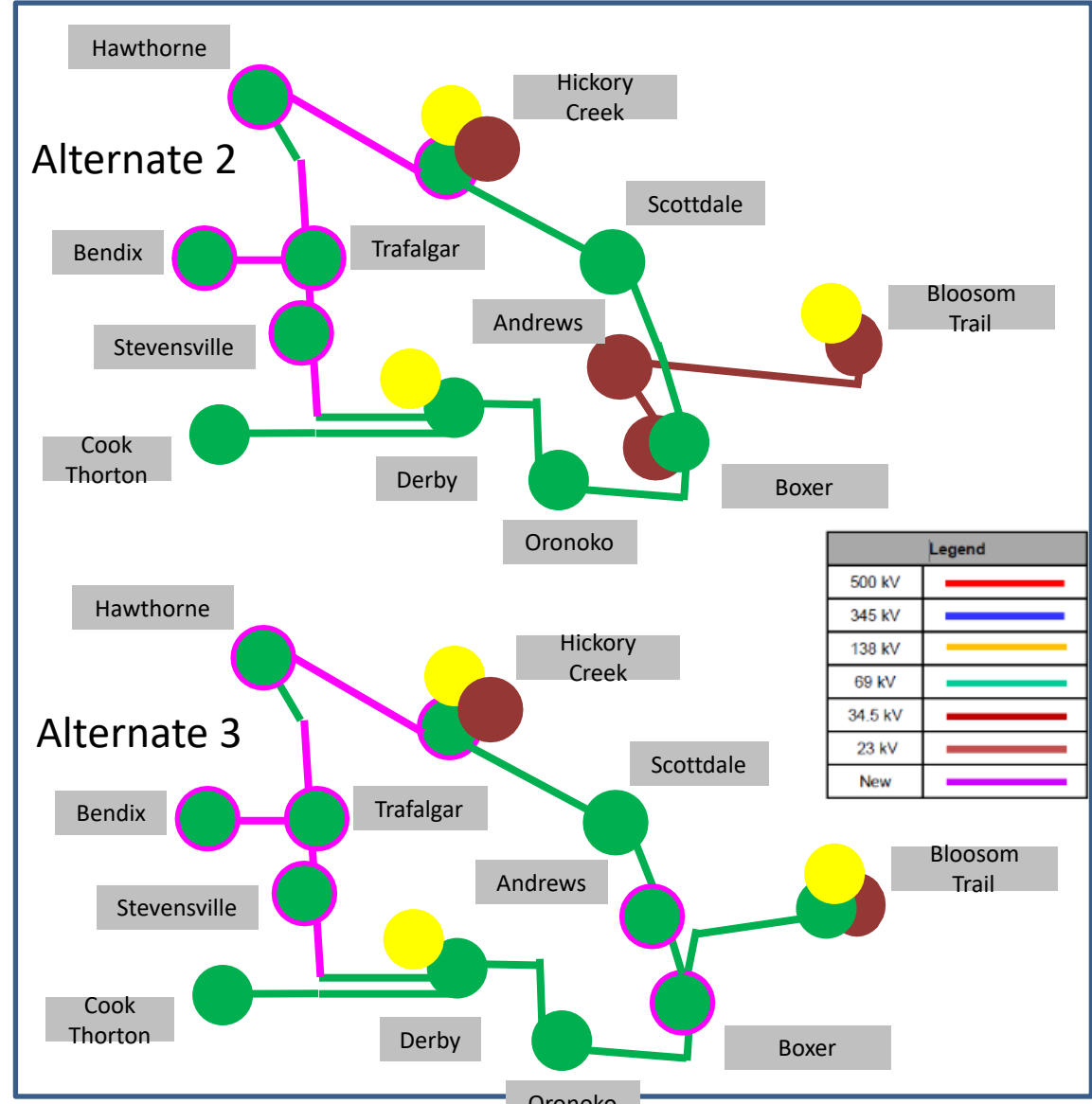
Alternatives Considered (Cont):

Alternate 2
Instead of re-using the Bendix Sw as the replacement for Hawthorne Sw, loop in Hawthorn with the line rebuild. While this would improve reliability to the customers, the area is fairly urban so even though the radial is only ~0.3 miles, a new line route would be costly and impactful to build. Because of this, the decision was to keep the station served from a radial line.
Estimated Cost: \$25.6M

Alternate 3
Instead of re-energizing Blossom Trail – Boxer to 34.5kV, bring Andrews University to 69kV operation. Andrews University is a non-recoverable delivery point which means it is not subject to the problematic “drop and pick” procedure inherent in 34.5kV operation. As such this investment wouldn’t help out our customers and wasn’t chosen.
Estimated Cost: \$26.1M

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
Project Status: Scoping



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

Need Number: AEP-2021-IM036

Process Stage: Solution Meeting 6/15/2022

Previously Presented: 11/19/2021

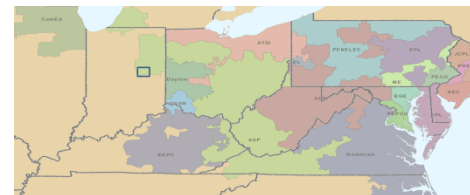
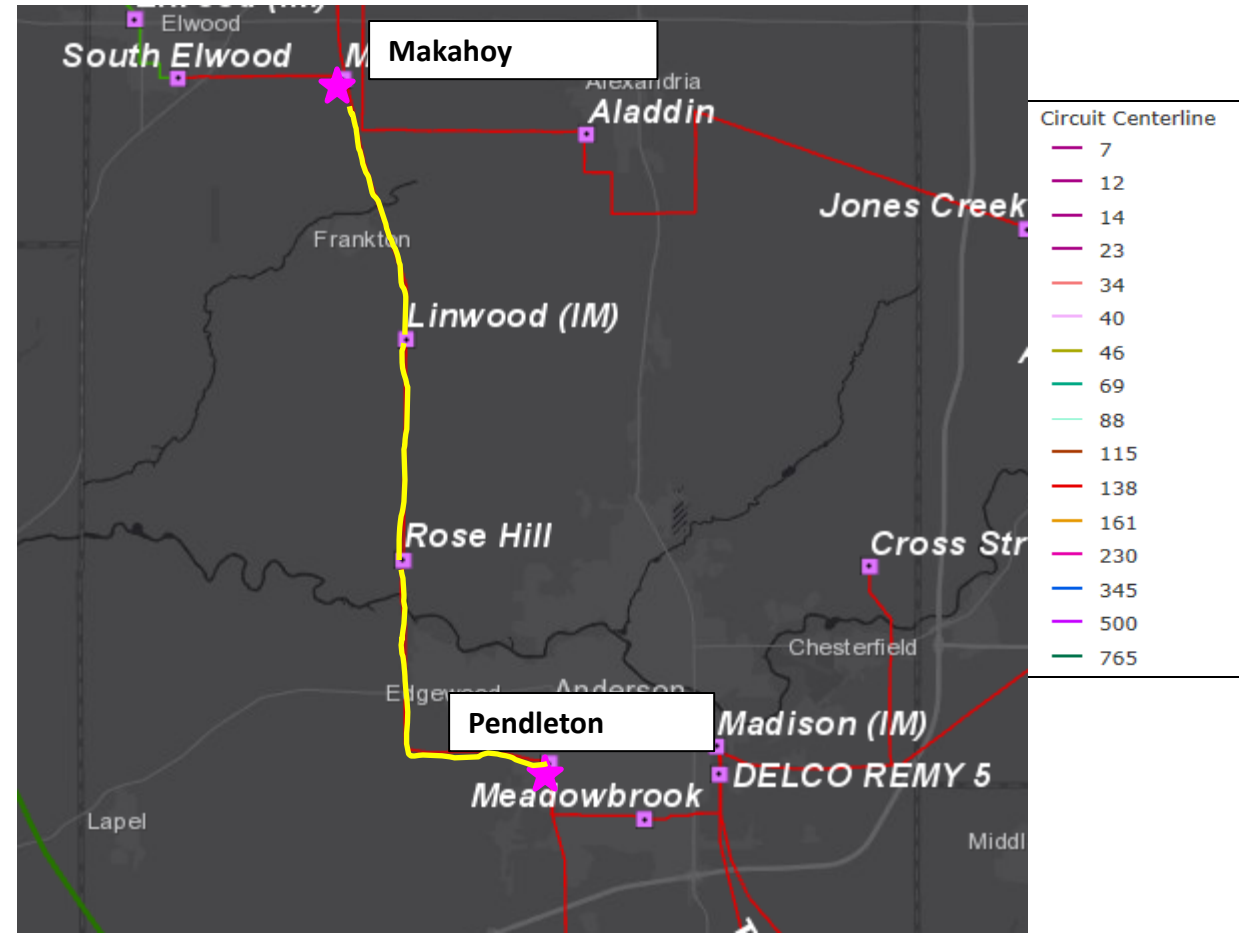
Project Driver: Equipment Material Condition, Performance and Risk

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: Solution Meeting 6/15/2022

Previously Presented: 11/19/2022

Project Driver: Equipment Material Condition, Performance and Risk

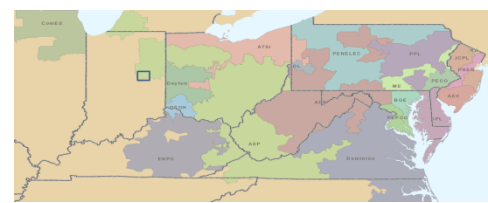
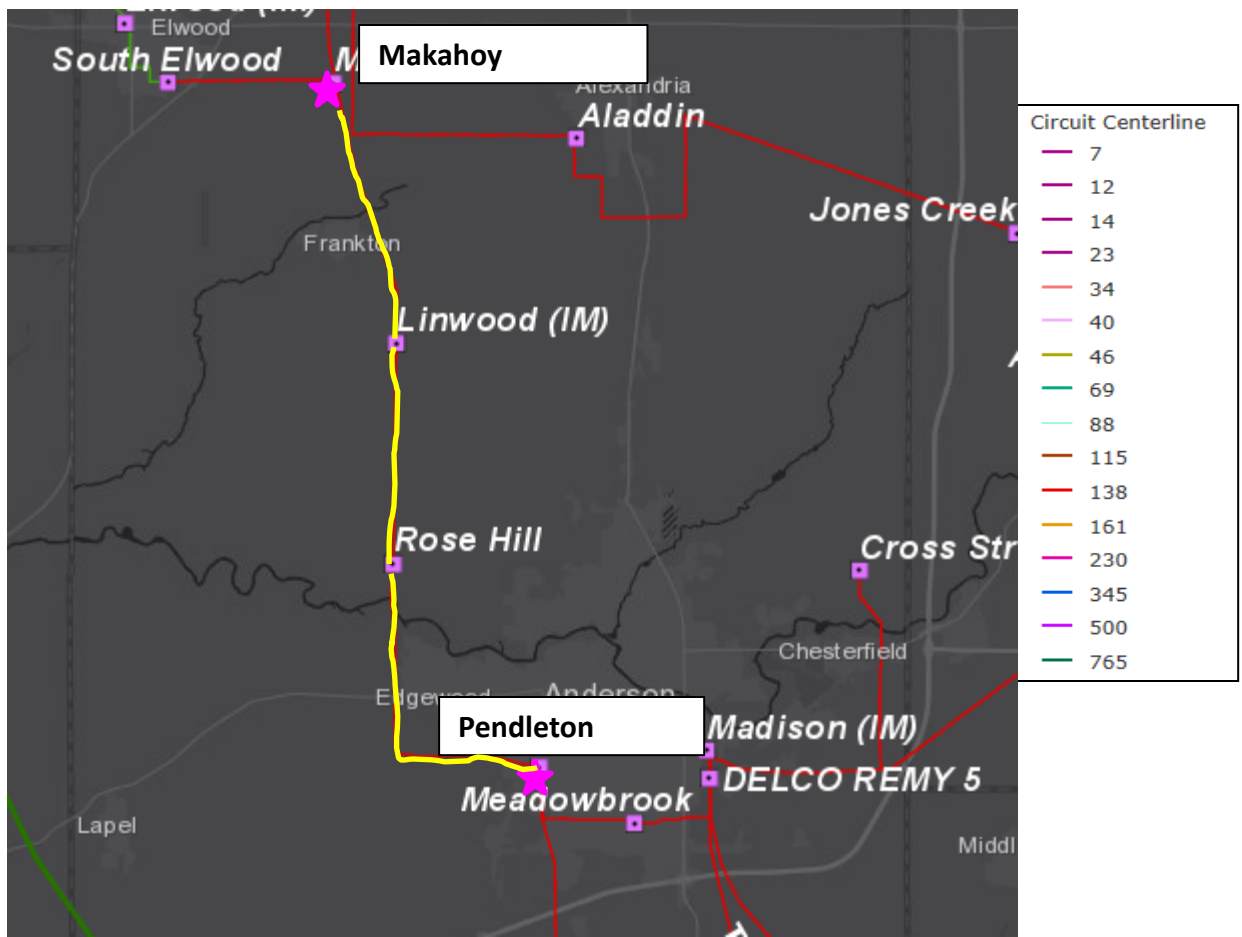
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions slide 13)

Problem Statement:

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: Solution Meeting 6/15/2022

Previously Presented: 11/19/2021

Proposed 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

Pendleton: 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

Total Estimated Transmission Cost: \$28.4 M

Alternative considered:

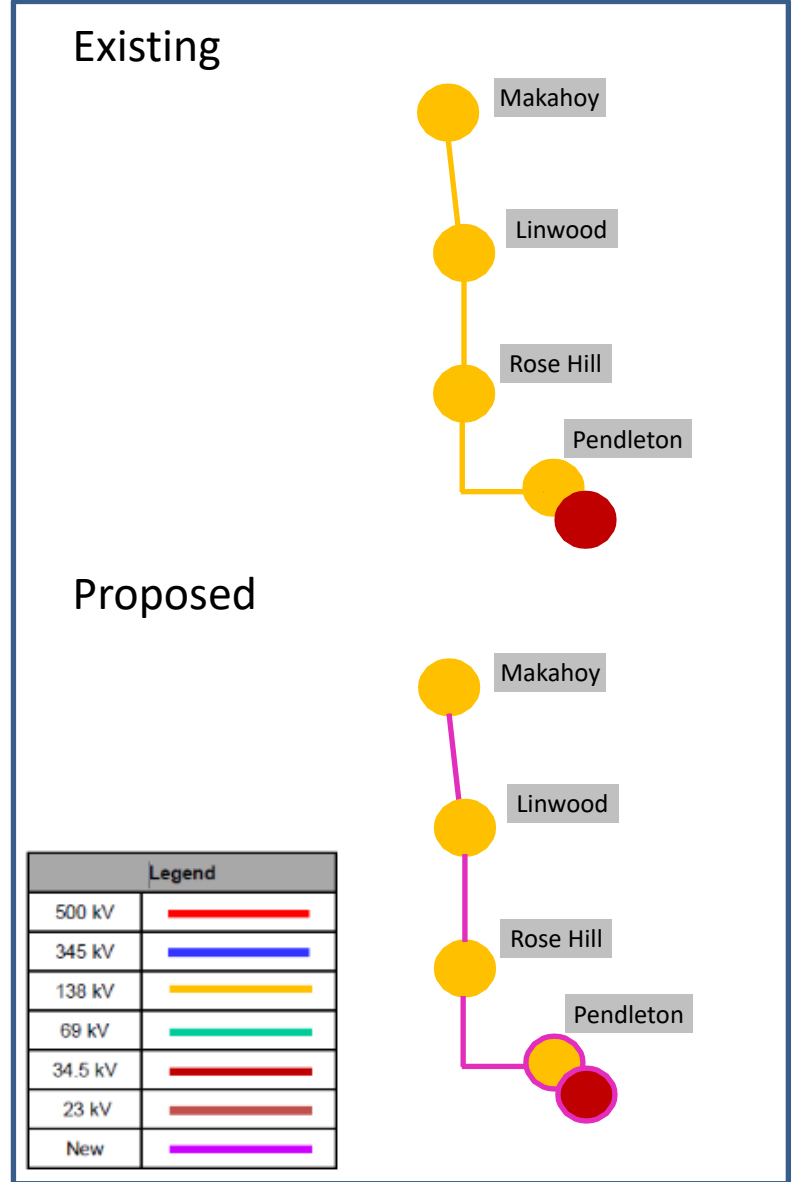
Remove 15 miles between Makahoy and Pendleton, install a 5 mile 138 kV loop between Makahoy and Linwood, install a 6 mile 138 kV loop between Rose Hill – Pendleton, install a 138 kV circuit breaker at Makahoy, install a 138 kV circuit breaker at Pendleton 138 kV bus #2, replace the Pendleton 138/34.5 kV transformer #2. Retire the section of line between Linwood and Rose Hill.

This option was not chosen as a tower outage on either 138 kV loops (Makahoy – Linwood and Rosehill – Pendleton) will drop the Rose Hill load or the Linwood load. Considering the loads served along the existing line, retirement of the asset is also not a consideration.

Total Cost: \$38.5 M

Projected In-Service: 9/2026

Project Status: Scoping



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

Need Number: AEP-2022-IM006

Process Stage: Solution Meeting 6/15/2022

Previously Presented: 2/18/2022

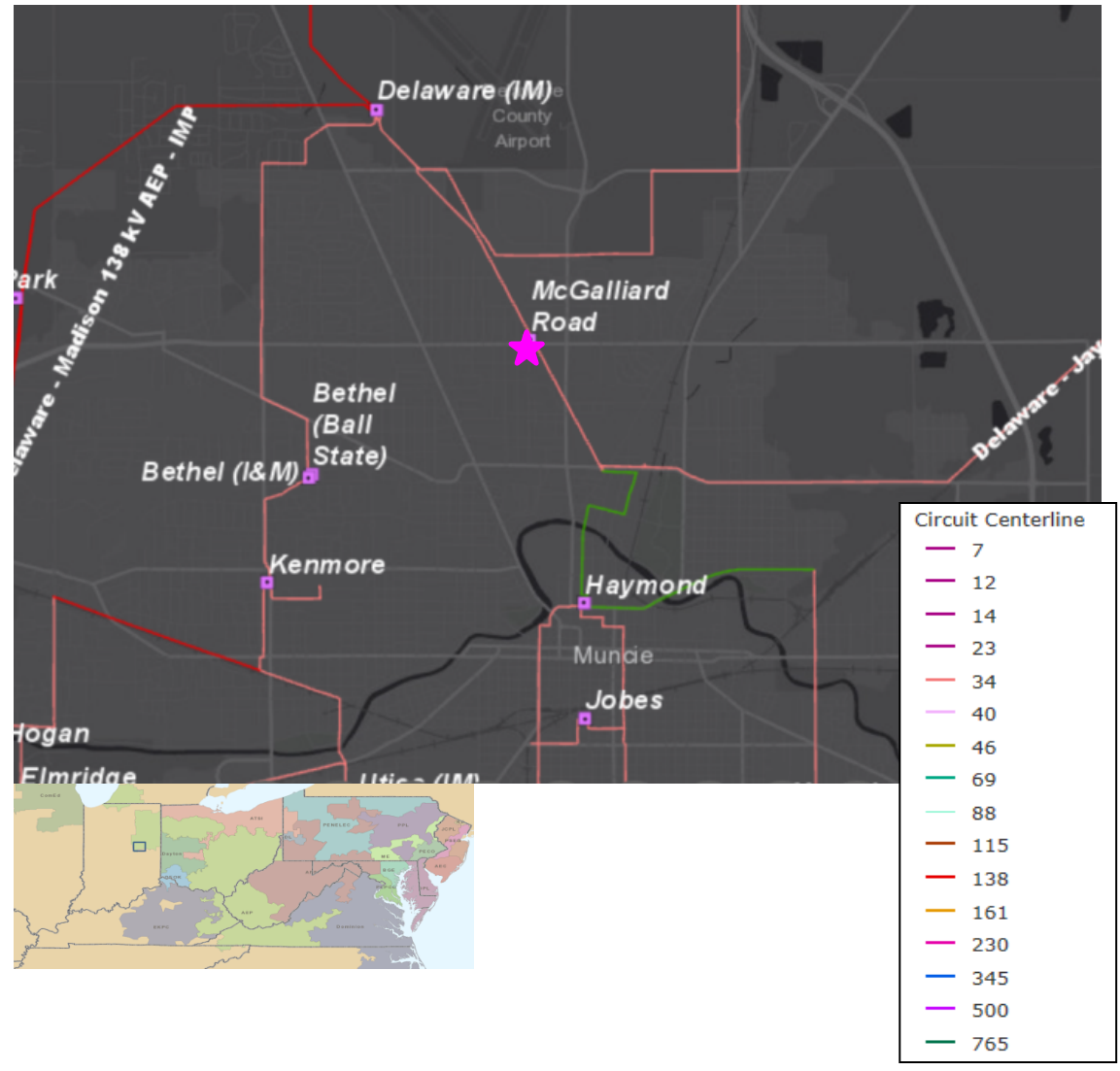
Project Driver: Equipment Material Condition, Performance and Risk

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



Need Number: AEP-2022-IM006

Process Stage: Solution Meeting 6/15/2022

Proposed 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.

Cost: \$0.4M

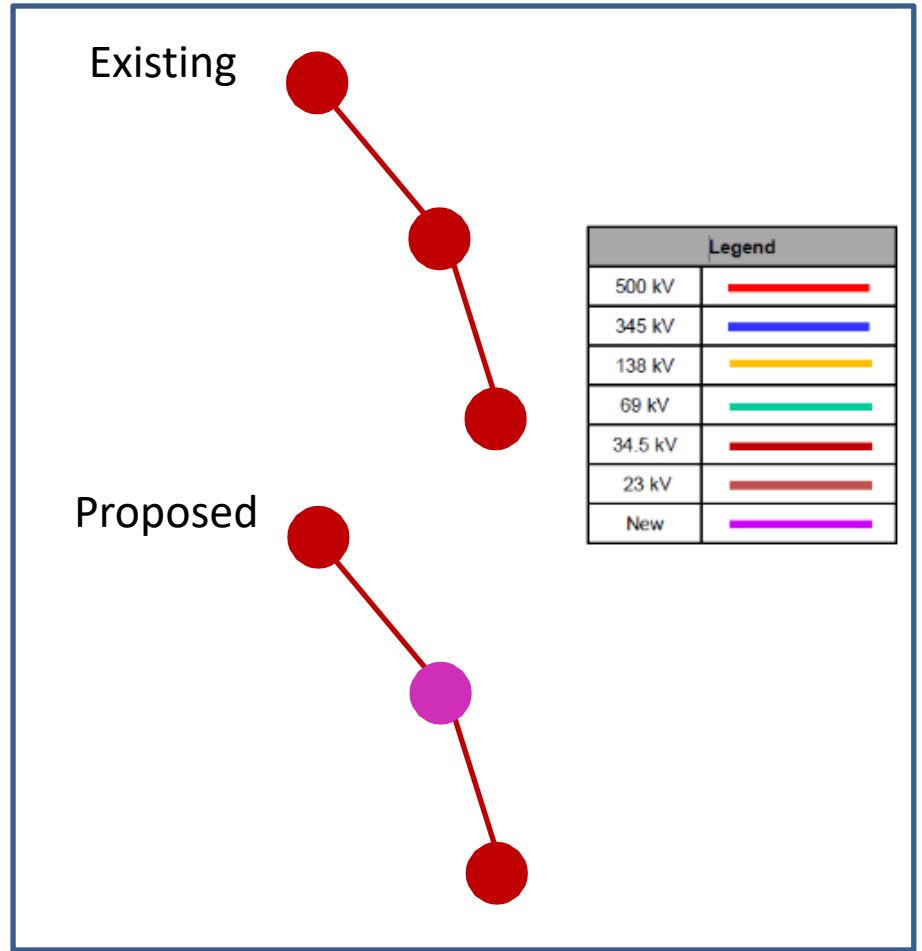
Total Estimated Transmission Cost: \$0.4M

Alternative considered:

There are no alternatives as the load served from McGalliard Road is not transferable and there are no other alternatives in the area to serve the load.

Projected In-Service: 9/6/2024

Project Status: Scoping



Appendix

High Level M-3 Meeting Schedule

Assumptions	Activity	Timing
	Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
	Stakeholder comments	10 days after Assumptions Meeting
Needs	Activity	Timing
	TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
	Stakeholder comments	10 days after Needs Meeting
Solutions	Activity	Timing
	TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
	Stakeholder comments	10 days after Solutions Meeting
Submission of Supplemental Projects & Local Plan	Activity	Timing
	Do No Harm (DNH) analysis for selected solution	Prior to posting selected solution
	Post selected solution(s)	Following completion of DNH analysis
	Stakeholder comments	10 days prior to Local Plan Submission for integration into RTEP
	Local Plan submitted to PJM for integration into RTEP	Following review and consideration of comments received after posting of selected solutions

Revision History

6/3/2022 – V1 – Original version posted to pjm.com

7/15/2022 – V2 – Slide #7, Corrected the typo in the Need number