Sub Regional RTEP Committee: Western
AEP Supplemental Projects

Nov 18, 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-AP038

Process Stage: Need Meeting 11/18/2022

Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement
Chauncey Station:

- The current foundations in the station are in poor shape and require replacement.

138/46-19.5kV TR-1

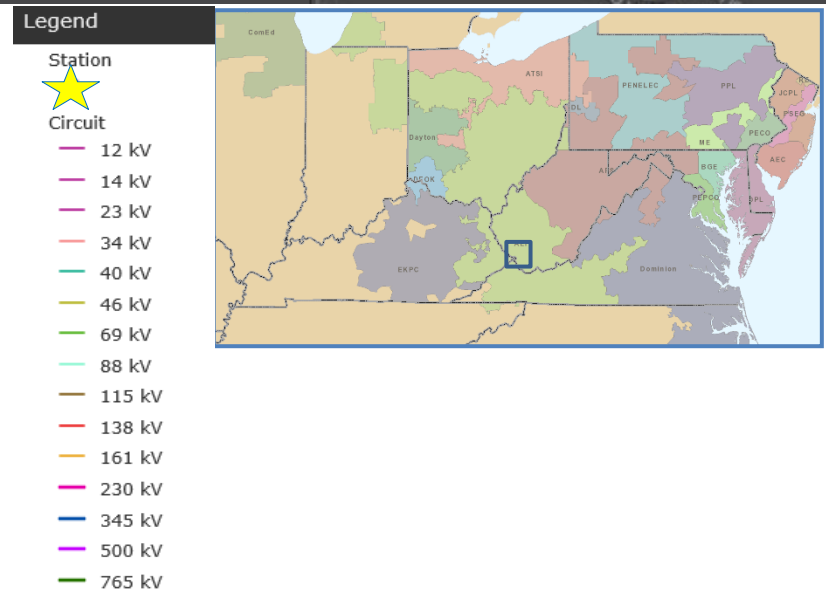
- 1949 Vintage Transformer
- The rising levels of moisture, upward trend in power factor, and low levels of interfacial tension (IFT) indicate the overall dielectric strength of the insulation systems (oil and paper) are in poor condition. The current and historical presence of acetylene in Phases A and C confirms the insulation systems are in poor condition and also indicates electrical discharge faults of high energy have occurred within the main tank of Phase A, causing electrical breakdown of this unit.
- The dielectric is driven by the upward trend in insulation power factor, which indicates an increase in particles within the oil.

46/12kV TR-2

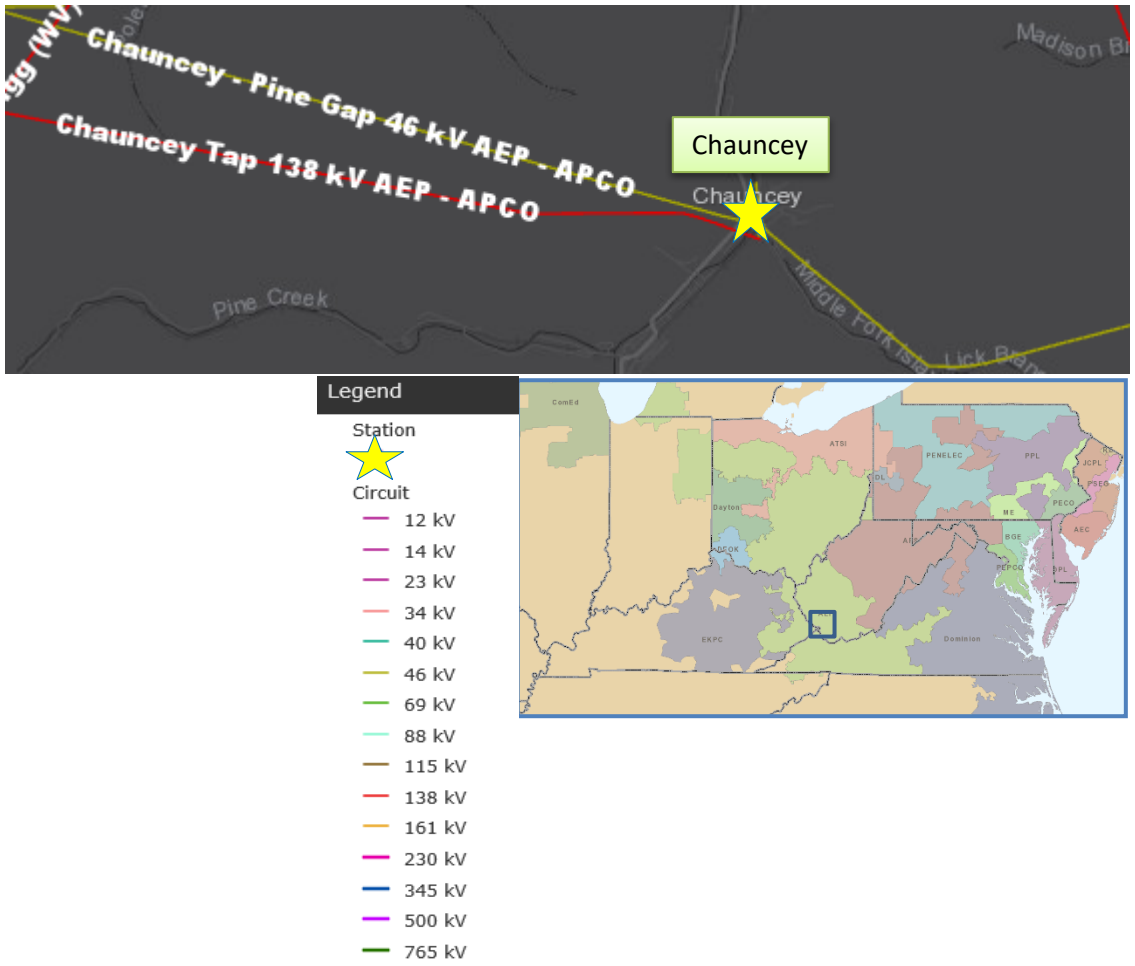
- 1976 Vintage Transformer
- High levels of carbon dioxide which indicates decomposition of the paper insulating materials.
- The H3 bushing has seen a 20% increase in bushing power factor, which indicates capacitive level deterioration.
- The values and trends of interfacial tension (IFT) and power factor indicate the dielectric strength of the insulation system is in poor condition, which impairs the unit's ability to withstand electrical faults.

46/2.4kV TR-GND

- 1956 Vintage Transformer
- The presence of carbon dioxide and carbon monoxide indicates decomposition of the increasingly brittle, non-thermally upgraded paper insulation that impairs the unit's ability to withstand future short circuit or through fault events.
- The upward trend in insulation power factor indicates an increase in particles within the oil.



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



Need Number: AEP-2022-AP038

Process Stage: Need Meeting 11/18/2022

Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement
Chauncey Station Continued:

Relay

- There are currently 17 electromechanical type relays which have no spare part availability and limitations on fault data collection and retention. In addition, these relays lack vendor support. 21 of the 34 relays (62% of all station relays) are in need of replacement.

46kV Circuit Breaker B

- Circuit Breaker B is a 1948 vintage oil filled breaker without oil containment. This breaker has exceeded the manufacturer's designed number of full fault operations. The manufacturer provides no support for these types of breakers and there are no spare parts available for these breakers.

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

Need Number: AEP-2022-AP039

Process Stage: Need Meeting 11/18/2022

Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Line Name: Chauncey – Huff Creek 46kV Circuit

Original Install Date (Age): 1930

Length of Line: ~7.7 mi

Total structure count: 58

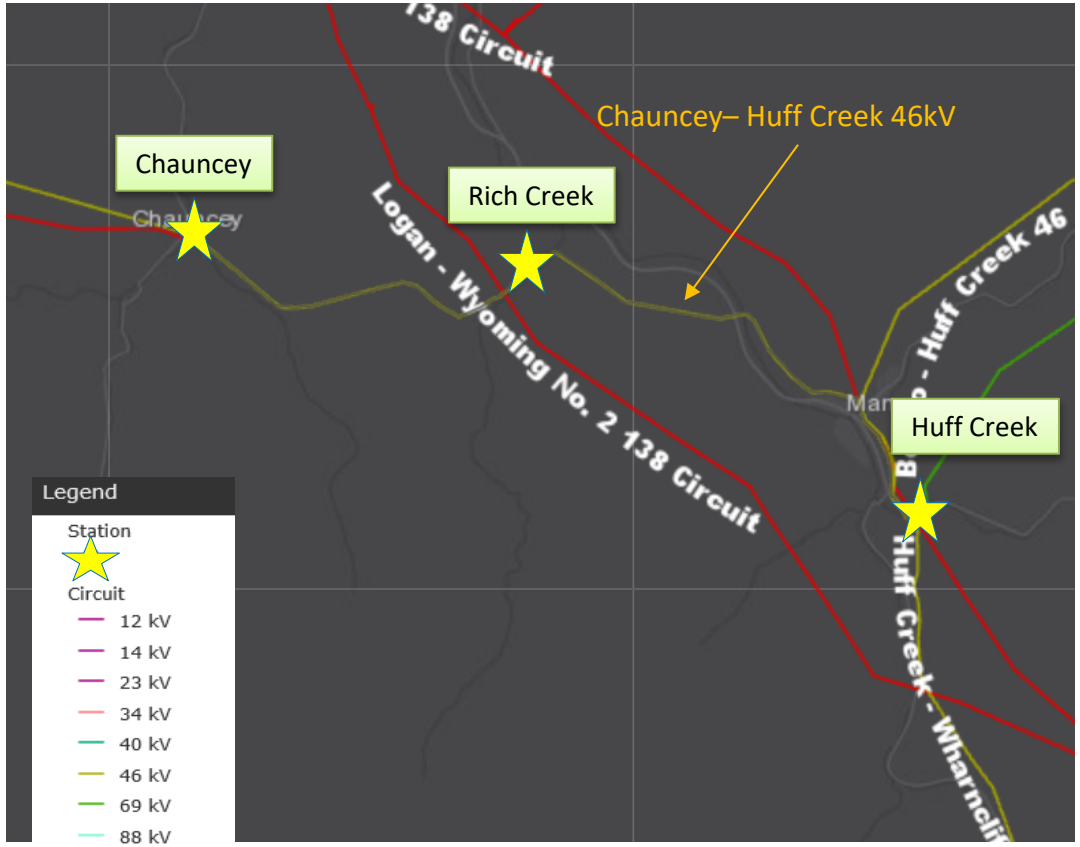
Original Line Construction Type: Wood

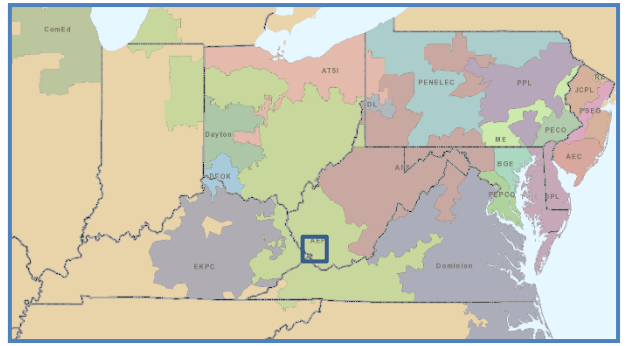
Conductor Type: 1/0 Copper, 3/0 ACSR 6/1, 4/0 ALUM ALLOY, 336,400 CM ACSR 18/1, 336,400 CM ACSR 30/7, 397,500 CM ACSR 30/7, 556,500 CM ACSR 26/7

Momentary/Permanent Outages: 5 Momentary and 7 Permanent

Line Conditions:

- Since 2017, there have been 5 momentary and 7 permanent outages on the Chauncey – Huff Creek 46kV Circuit. The momentary outages were due to lightning and ice/snow causes. The permanent outages were due to vegetation fall-ins from outside the AEP ROW, non-AEP tree removal, distribution, lightning, and other causes, totaling 69 hours of circuit outage time. These outages resulted in 178k minutes of interruption for customers served from Rich Creek Substation.
- The line structures fail to meet 2017 NESC Grade B loading criteria, current AEP structural strength requirements, and the current ASCE structural strength requirements.
- 39 of the 58 structures are 1930s vintage accounting for 67% of the structures. There are 14 structures that have conditions which relates to 24% of the structures on this line, like top rot and crossarms, Pole cracking and ground line rot, Woodpecker damage, loose guys, and a disconnected X-Brace.
- The butt wrap grounding and typical shield angle is inadequate per current AEP Standards and can cause poor lightning performance. The current grounding system, poor shielding angle, and the electrical strength of the insulators do not meet current AEP and industry accepted criteria, making the line susceptible momentary and permanent outages, affecting customer reliability.
    - The inadequate grounding limits the available path to ground during any type of line fault, increasing the intensity the conductor and related hardware have to withstand during the fault. The reduced electrical strength of the insulators could lead to electrical damage to structures and hardware during a fault if the insulator were to fail from elevated electrical stresses.
    - The line serves a peak load of 5.4 MVA at Rich Creek substation.





AEP Transmission Zone M-3 Process
Buchanan County, Virginia

Need Number: AEP-2022-AP040

Process Stage: Need Meeting 11/18/2022

Supplemental Project Driver: Equipment Condition/Performance/Risk

Specific Assumption Reference:

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

Problem Statement:

Line Name: Big Rock - Grundy 34.5kV Circuit

Original Install Date (Age): 1932

Length of Line: ~6.4 mi

Total structure count: 70

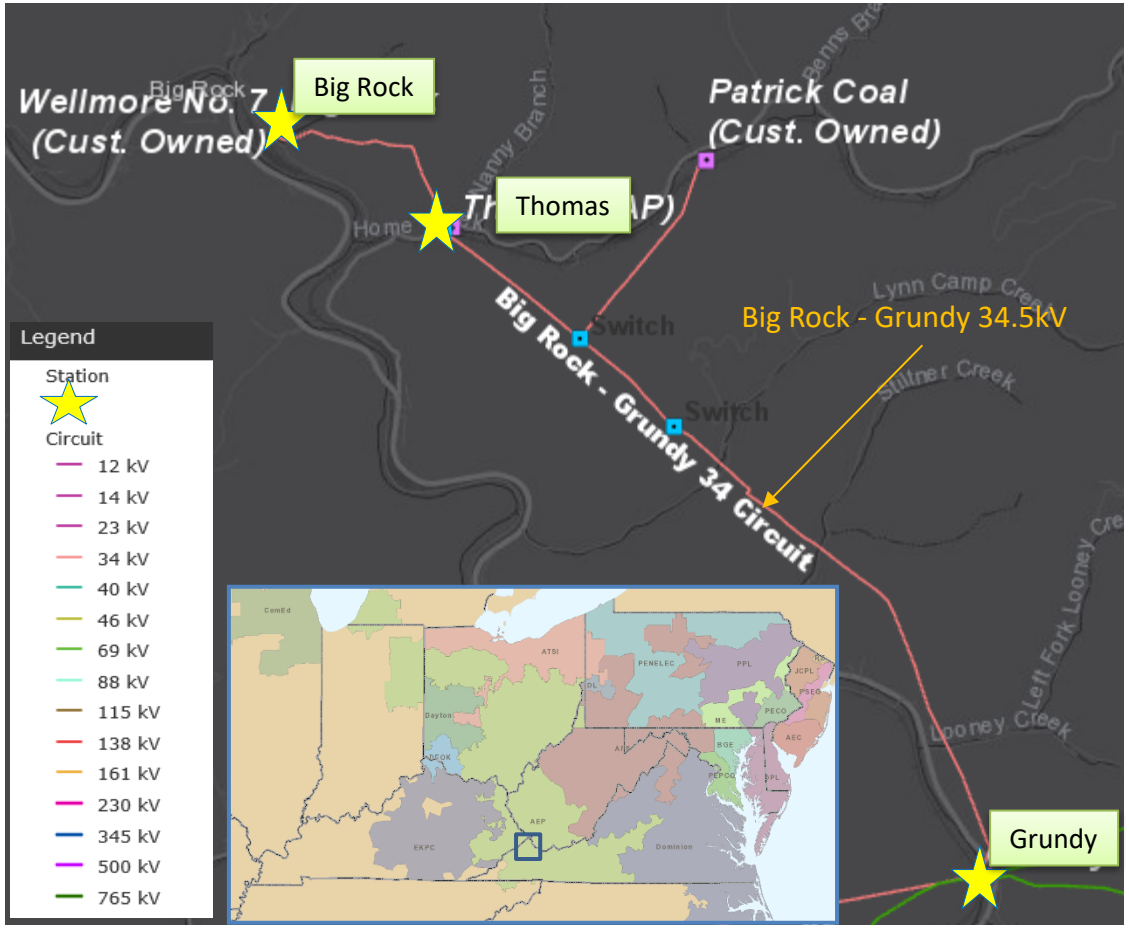
Original Line Construction Type: Wood

Conductor Type: 1/0 Copper, 1/0 AAAC, 4/0 ACSR, 336,000 ACSR, 556,000 ACSR

Momentary/Permanent Outages: 2 Permanent causing 856k CMI since 2017

Line Conditions:

- The line structures fail to meet 2017 NESC Grade B loading criteria, current AEP structural strength requirements, and the current ASCE structural strength requirements.
- 67 of the 70 structures are 1930s vintage accounting for 96% of the structures.
- The line is insulated in some segments with Distribution class cap and pin insulators which do not meet current AEP standards for CIFO and minimum leakage distance requirements. Shield wire is not present on significant segments of this line.
- The line is radial and serves a peak nontransferable load of 2.63 MVA at Thomas and 1.8 MVA at Big Rock substations.



AEP Transmission Zone M-3 Process
Marion, IN

Need Number: AEP-2022-IM017

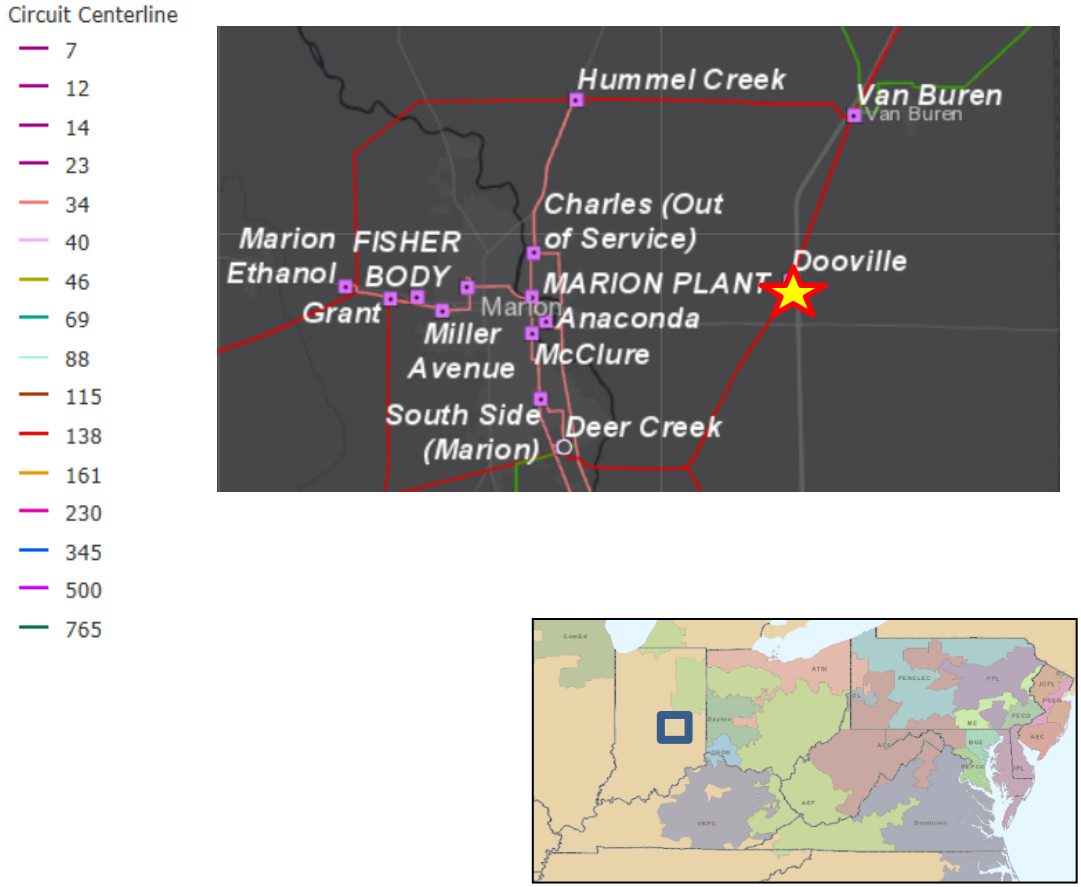
Process Stage: Need Meeting 11/18/2022

Project Driver: Customer Need

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

Problem Statement:

Indiana Michigan Power has requested a bulk load increase at Dooville station. Total anticipated load to be served at the site is 40 MW.



AEP Transmission Zone M-3 Process
Portland, IN

Need Number: AEP-2022-IM019

Process Stage: Need Meeting 11/18/2022

Project Driver: Equipment Material Condition, Performance and Risk

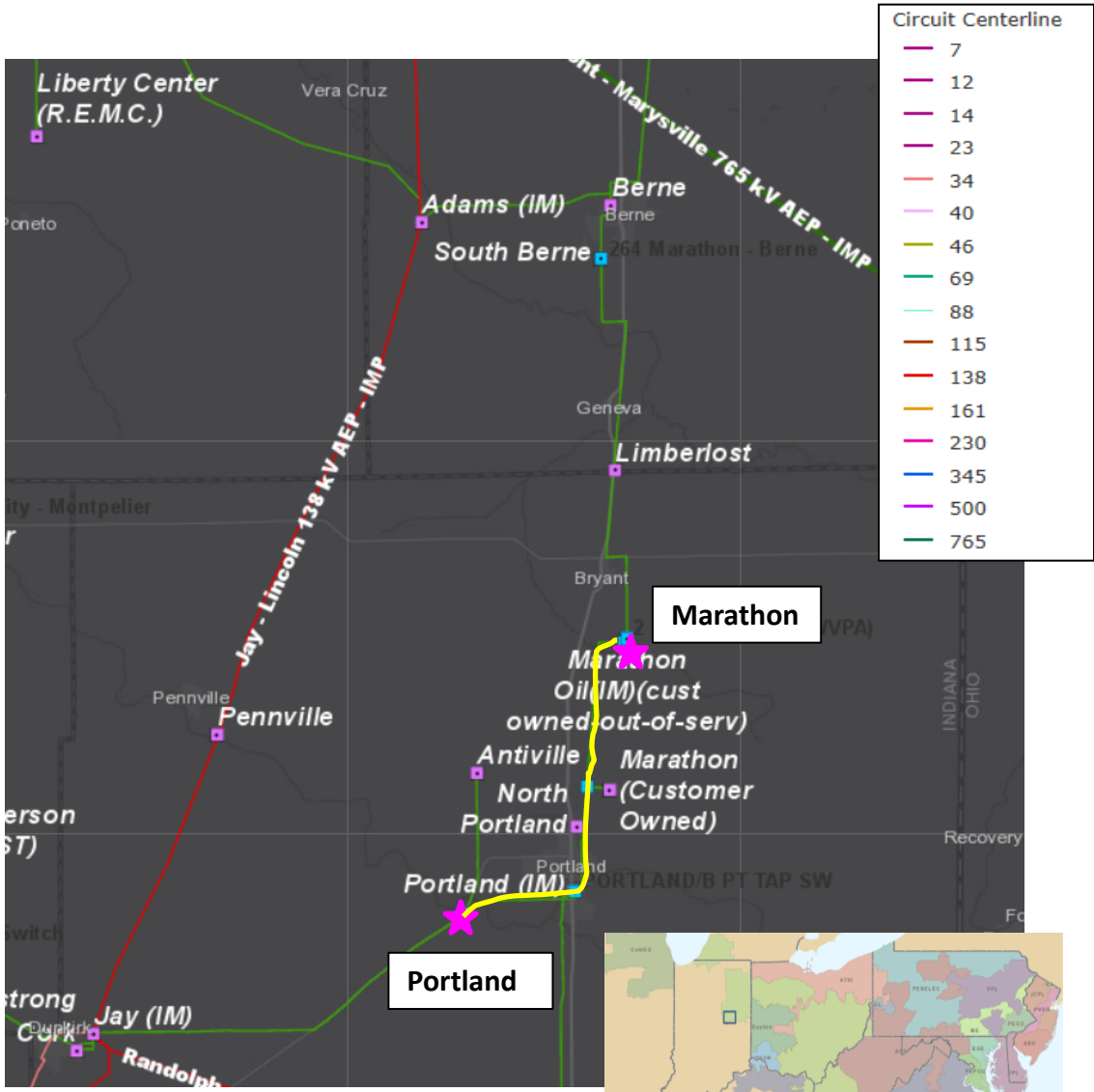
Specific Assumption Reference:

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

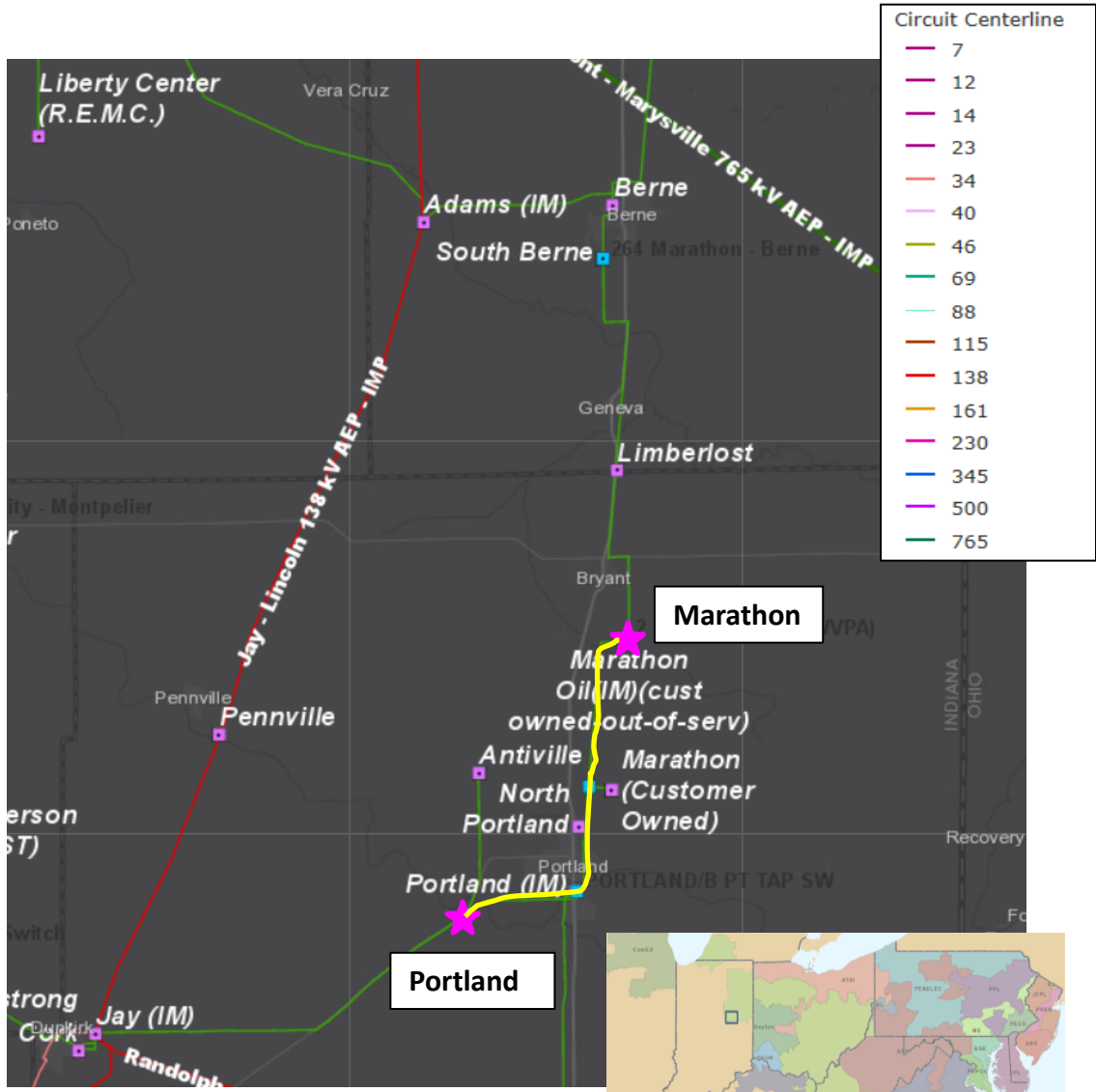
Problem Statement:

Portland – Marathon Oil 69 kV line is 6.77 miles long originally installed in 1968. The line is part of the Portland – North Portland and North Portland – Limberlost 69 kV circuits.

- Length: 6.77 Miles
- Original Construction Type: Wood pole structures with porcelain insulators along with several recently replaced steel poles (structures 49-59 and 74-75).
- Conductor Type:
  - 336.4 kCM ACSR 18/1 Merlin (5.79 mi, 1968 vintage); (0.94 mi; vintage 2017-2018)
- Outage history:
  - Portland – North Portland 69 kV circuit:
    - Momentary/Permanent Outages: 2 Permanent outage 2017-2018
  - North Portland – Limberlost 69 kV circuit:
    - Momentary/Permanent Outages: 3 Permanent and 1 Momentary 10/2018 – 1/2021



- Condition Summary
  - Number of open conditions: 7
    - The open conditions affecting the pole include rot heart and leaning transverse conditions.
  - Based on the aerial drone and ground crew assessment done on 56 structures, the following was noted.
    - Approximately 32% of the structures assessed have wood decay, insect damage and bird damage.
    - Most wood poles have moderate to advanced shell decay.
    - Structure ground are not to AEP standards. Only partial grounds exists with a mix of aluminum to copper down-lead, and to a butt wrap.
  - Structures fail NESC Grade B and AEP Strength requirements.
  - The grounding method utilizes grounding rod on every other structure reducing lightning protection for the line.
- Total structure count: 175, with 143 dating back to original installation.



AEP Transmission Zone M-3 Process
New Albany, OH

Need Number: AEP-2022-OH075

Process Stage: Need Meeting 11/18/2022

Project Driver:

Customer Service

Specific Assumption Reference:

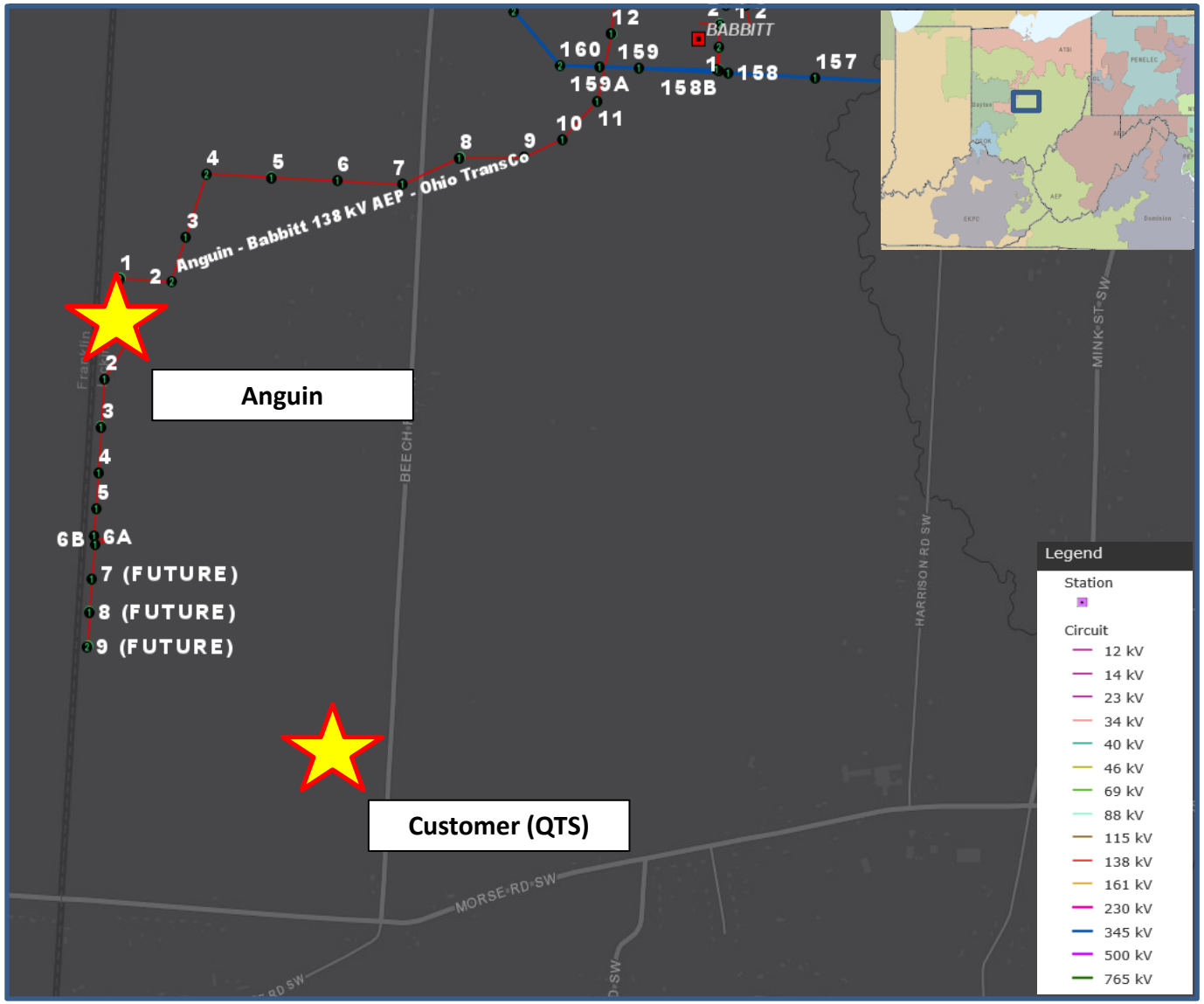
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site Southeast of AEP's existing Anguin station in New Albany, OH.
- The customer has indicated a peak demand of 100 MW at the site.
- The customer has requested an ISD of 8/1/2024

Model: 2027 RTEP



AEP Transmission Zone M-3 Process
New Albany, OH

Need Number: AEP-2022-OH077

Process Stage: Need Meeting 11/18/2022

Project Driver:

Customer Service

Specific Assumption Reference:

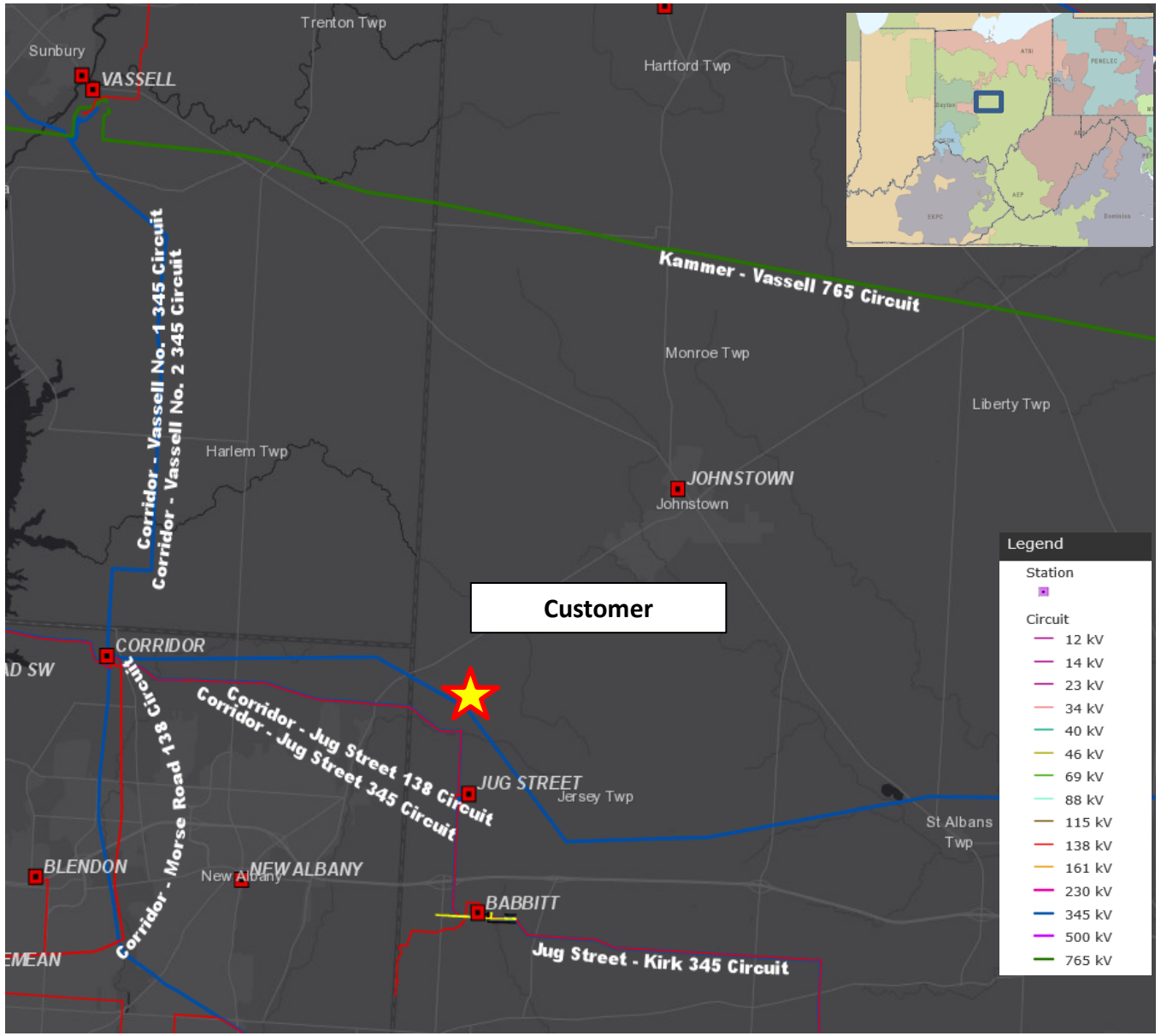
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

- A customer has requested transmission service at a site north of AEP's existing Jug Street station in New Albany, OH.
- The customer has indicated an initial peak demand of 226 MW with an ultimate capacity of up to 1065 MW at the site.
- The customer has requested an ISD of 5/1/2026

Model: 2027 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: Supplemental
Fieldale, VA Area

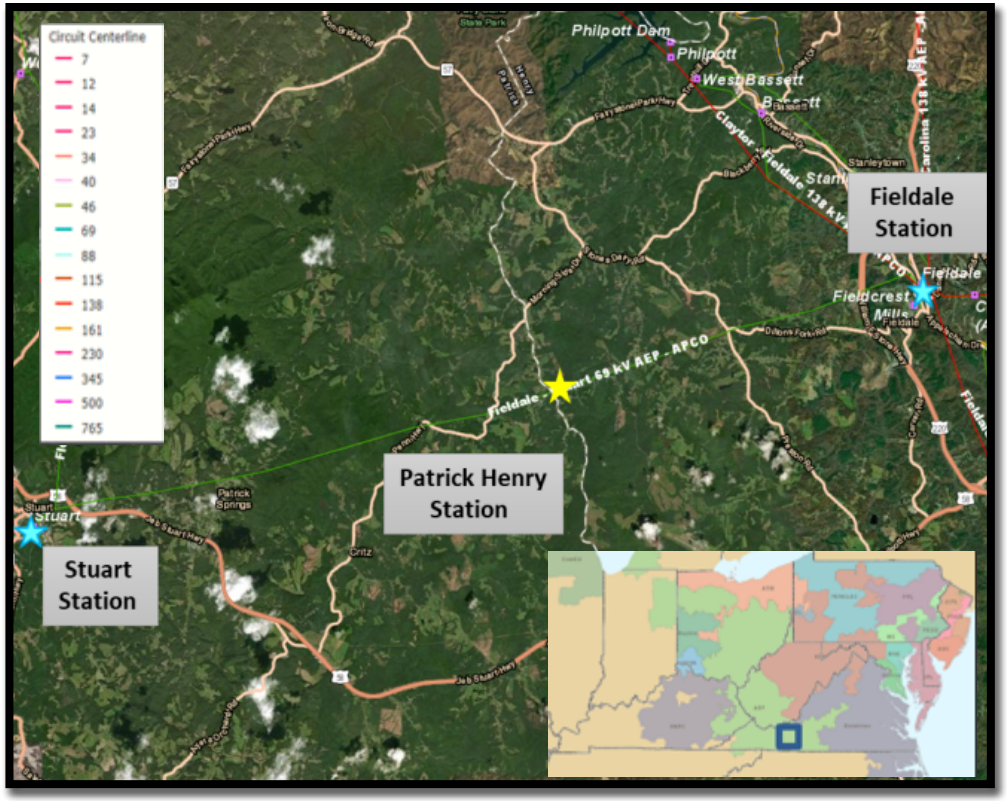
Need Number: AEP-2022-AP001
Process Stage: Solution Meeting 11/18/2022
Previously Presented: Needs Meeting 1/21/2022

Supplemental Project Driver: Customer Service

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

Problem Statement:

- Distribution requested a new station (Patrick Henry)
- Future capacity and contingency overload anticipated on the Stuart #2 69/34.5 kV (30 MVA) transformer, which is projected to be loaded to 44.2 MVA or 101% of its 44.1 MVA winter capability by winter 2025/26
- Poor reliability observed on the Stuart/Critz 34.5 kV circuit. The Stuart/Critz 34.5 kV circuit averages 945,000 customer minutes of interruption (CMI) per year during the last nine years (considering permanent outages only). There are over 2800 customers served from the Critz circuit over 263 line miles, making it one of the largest 34.5kV circuits in VA. The projected winter peak is 19.1 MVA.
- This project will reduce load and exposure on the West Bassett/Blackberry (111 miles), Stuart/Critz (263 miles), and Fieldale/Rangeley (118 miles) 34.5 KV circuits and create a much needed tie to the Fieldale/Carver (75 miles) 34.5kV circuit to improve area transfer capability.



Need Number(s): AEP-2022-AP001

Process Stage: Solutions Meeting 11/18/2022

Proposed Solution:

- Patrick Henry Station
  - Establish new Distribution station which will be designed at 138 kV and operated at 69 kV until the area conversion project converts the high-side to 138 kV as part of s2179 (Stuart Area Improvements). The new station will consist of two 138 kV Motor Operated Air-Break Switches (MOABs), high-side circuit switcher, 138 (69) kV/34.5 kV 30 MVA transformer, 34.5 kV low-side circuit breaker and 2-34.5 kV distribution feeder circuit breakers.

  - **Estimated Transmission Cost: $0 (Distribution Station)**

Total Estimated Transmission Cost: $0

Ancillary Benefits:
Establishing a new delivery point for Distribution will provide additional automatic sectionalizing on the existing Fieldale-Stuart 69 kV Circuit, decreasing the amount of exposure to permanent faults while establishing additional capacity for future distribution load growth in the area.

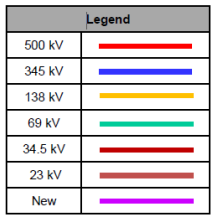
Alternatives Considered:
Considering the location of the request and the future improvements proposed in the area, no other alternatives were considered.

Projected In-Service: 12/02/2025

Project Status: Scoping

Existing

Proposed



AEP Transmission Zone M-3 Process
Conesville, Ohio

Need Number: AEP-2022-OH055

Process Stage: Solutions Meeting 11/18/2022

Previously Presented: Need Meeting 07/22/2022

Project Driver: Customer Service

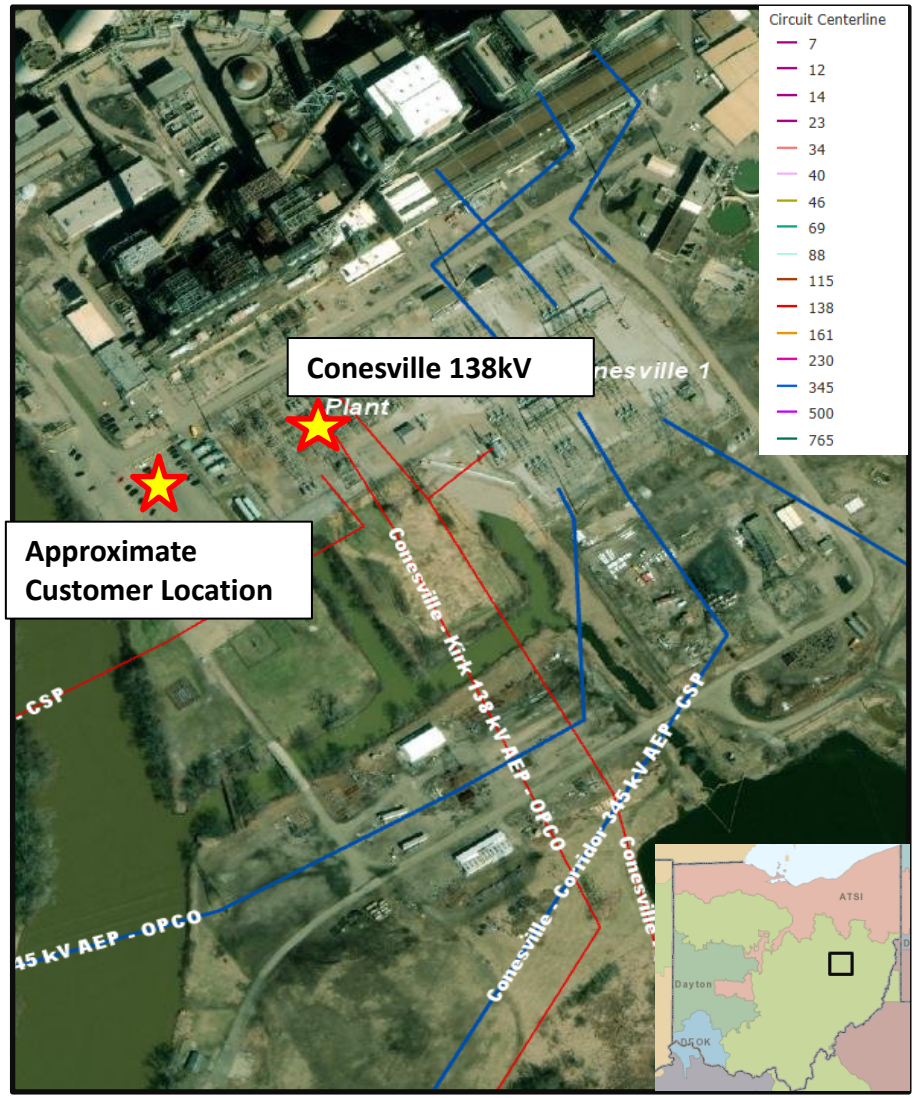
Specific Assumption Reference:

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

Problem Statement:

A customer has requested a new 138 kV service for their facility next to the existing 138 kV Conesville station. The initial peak demand will be 50 MW with an ultimate capacity of up to 300 MW.

Requested In-Service: 12/1/2022



AEP Transmission Zone M-3 Process
Conesville, Ohio

Need Number: AEP-2021-OH026
Process Stage: Solutions Meeting 11/18/2022

Proposed Solution:

Conesville – Slate (Customer) #1 138kV Line: Construct 138kV line approximately 200 feet from Conesville 138kV yard to the Slate Customer's new station. Cost: $ 0.045M

Conesville – Slate (Customer) #2 138kV Line: Construct 138kV line approximately 200 feet from Conesville 138kV yard to the Slate Customer's new station. Cost: $ 0.045M

Conesville - Centerburg 138 kV Line : Relocate the existing 138kV line to the 3rd string in Conesville station. Cost: $ 0.075M

Conesville 138kV Station: Relocate the existing Centerburg circuit to the 3rd string in the breaker and half, installing 2-138kV circuit breakers in the string to terminate the circuit. Replace the existing Horizontal takeoff structures in the 2nd string with Vertical takeoff structures. Install associated protection equipment. Replace the existing 138 kV Cap Bank-BB with a 69.1 MVAR bank. Cost: $ 4.32M

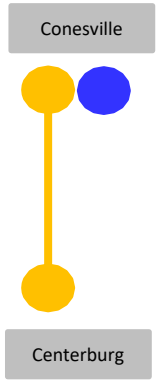
Total Estimated Transmission Cost: $ 4.485M

Alternatives Considered: No viable alternative to serve the customers load with their aggressive timeline.

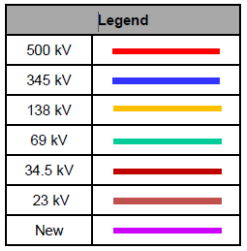
Projected In-Service: 5/31/2023

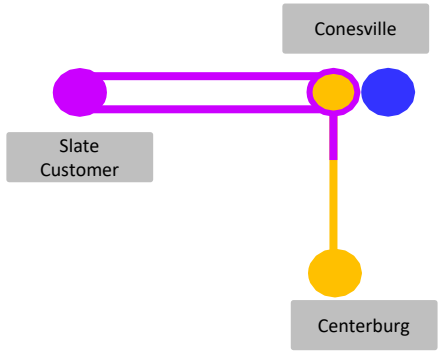
Project Status: Scoping

Existing:



Proposed:





Need Number: AEP-2022-OH070

Process Stage:

Solutions Meeting 11/18/2022

Previously Presented:

Needs Meeting 9/16/2022

Project Driver:

Customer Service

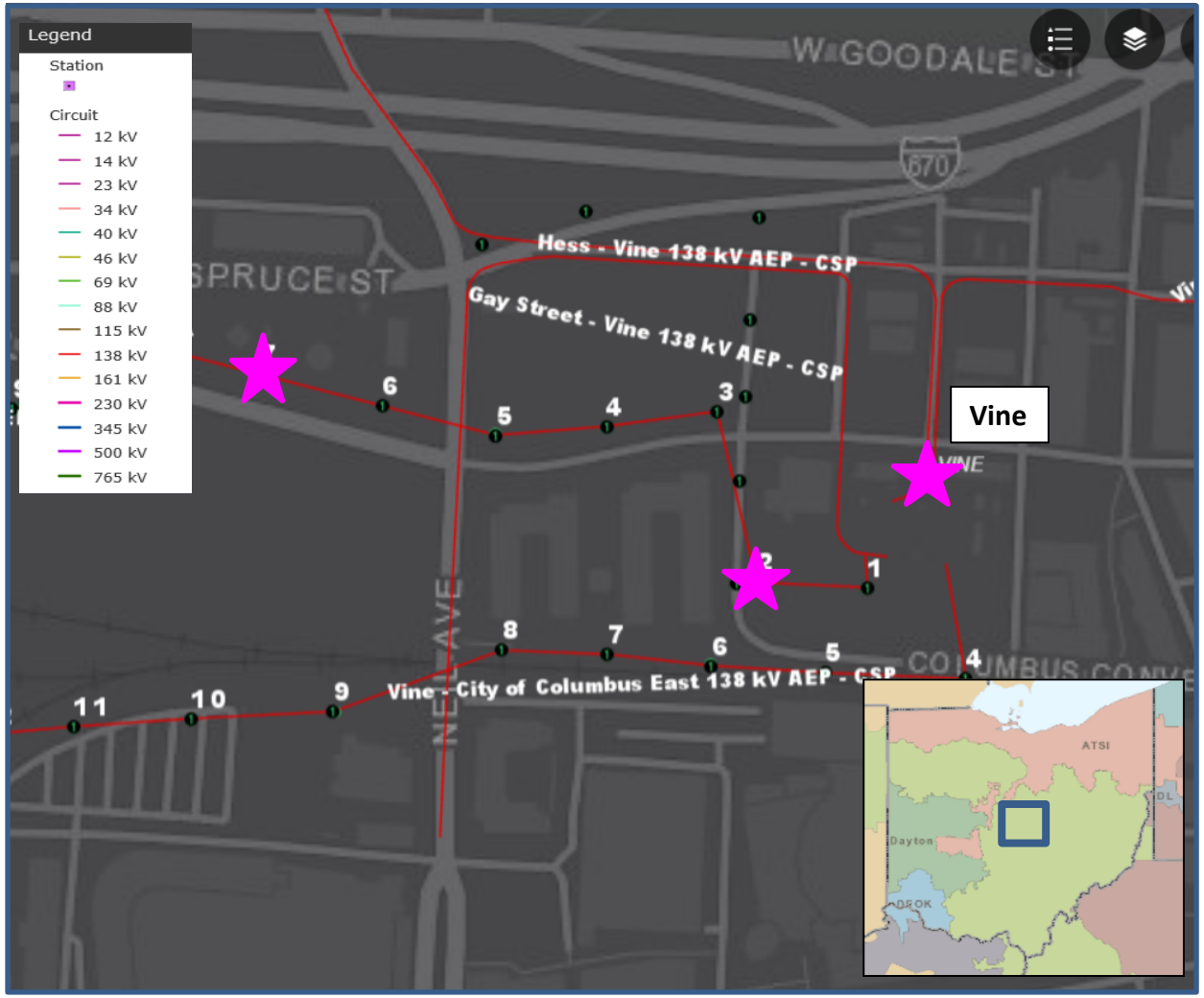
Specific Assumption Reference:

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

Problem Statement:

<u>Vine- City of Columbus West 138kV Line:</u>

- A customer has requested that AEP relocate the section from structures 2 to 7 of the Vine - City of Columbus West 138kV line from overhead to underground in a duct bank to accommodate development in the area.
- Service is requested by June 2023.



AEP Transmission Zone M-3 Process
Columbus, OH

Need Number: AEP-2022-OH070

Process Stage: Solutions Meeting 11/18/2022

Proposed Solution:

Vine- City of Columbus West 138kV Line: Rebuild the 0.3 mile section between structures 2-7 from above ground to underground.

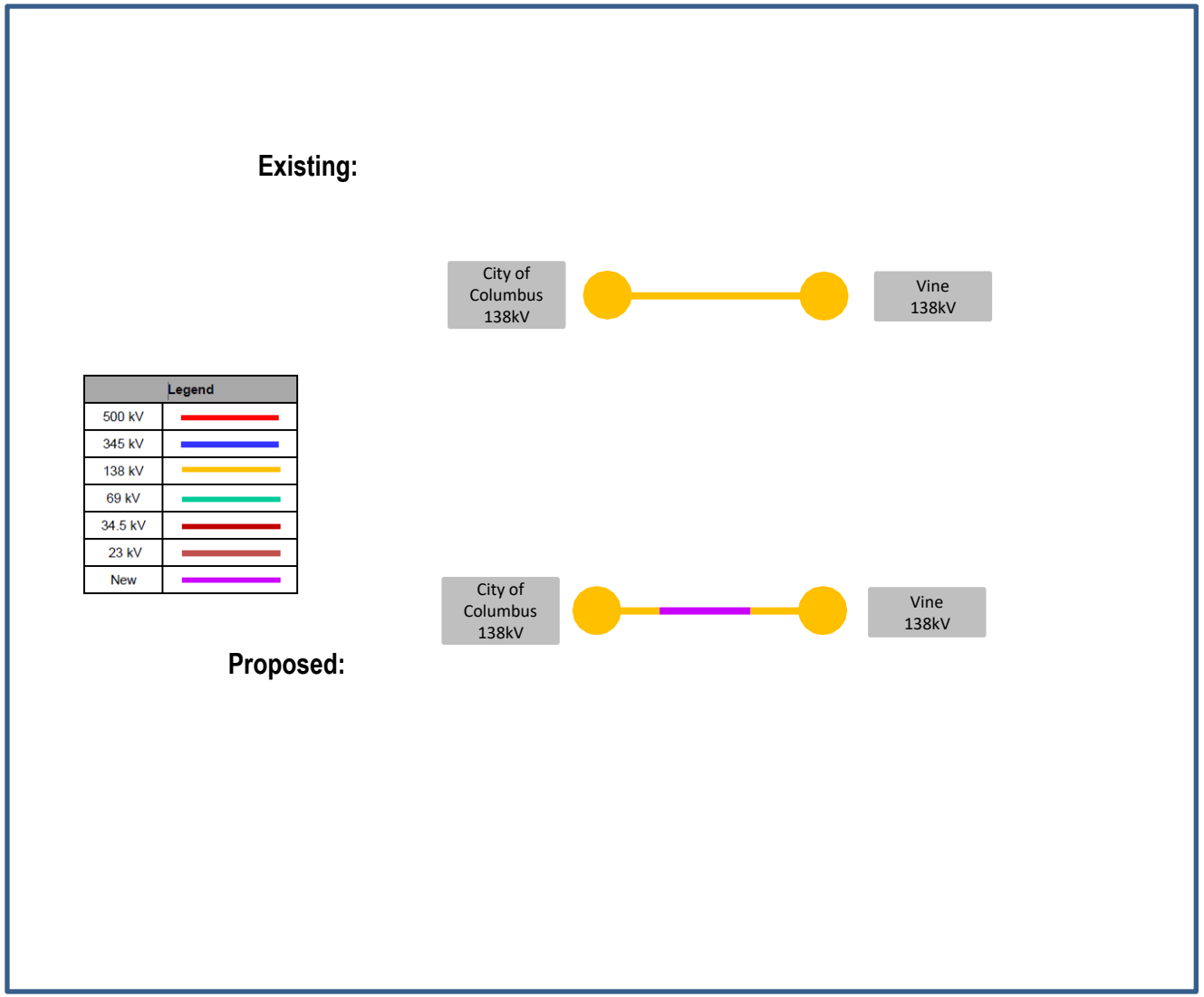
Estimated Cost: $0 (Fully Reimbursable)

Total Estimated Transmission Cost: $0 (Reimbursable)

Projected In-Service: 6/1/2023

Project Status: Engineering

Model: 2027 RTEP



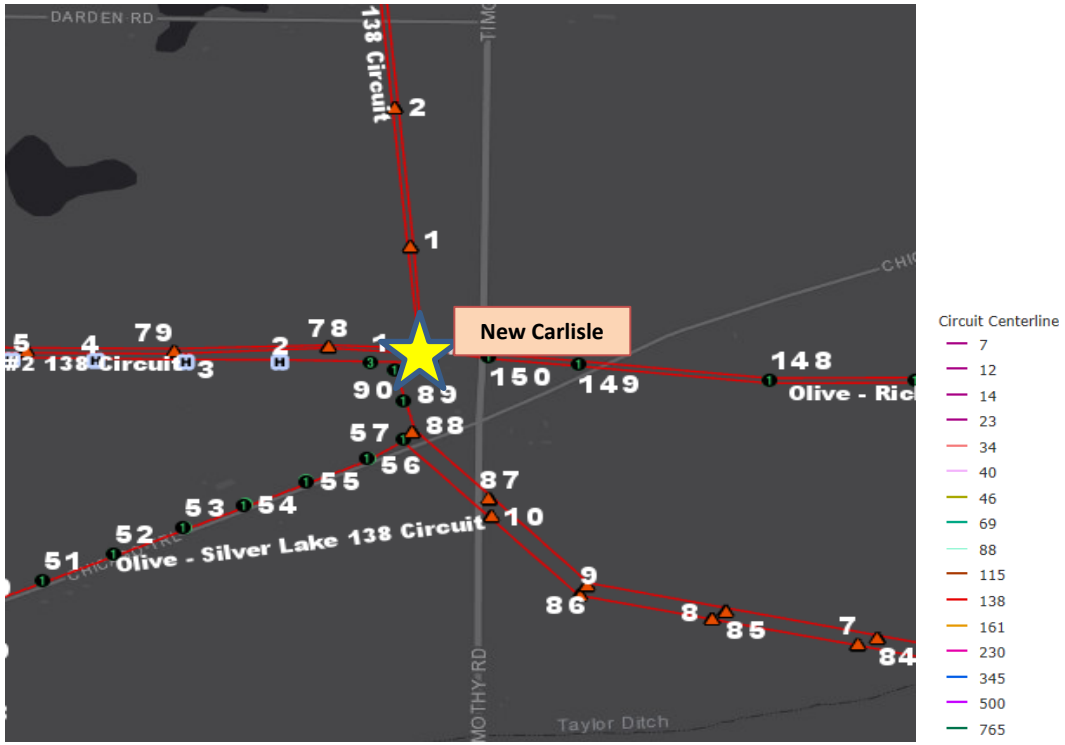
Need Number: AEP-2022-IM018
Process Stage: Solution Meeting 11/18/2022
Previously Presented: Needs Meeting 10/14/2022

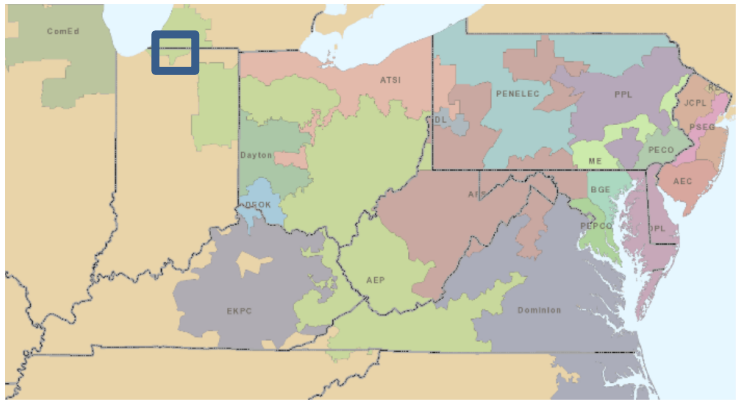
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

New Carlisle 138kV Circuit Breaker A:

- Only air trip breaker remaining at the station and is not preferred due to potential large air leaks which will cause the breaker to not trip before a lockout situation occurs. The air system is not designed to produce dry air, which in turn means that rusting and damaging components are common. Field services have been called out numerous times in a lockout position due to frozen airlines.
- Only remaining 2000A 40kA breaker left at the station
- Trip timing results are beginning to increase and major maintenance will soon be required. Trip timing results are roughly 9ms higher than what the manual recommends (less than 33 milliseconds).





Need Number: AEP-2022-IM018

Process Stage: Solution Meeting 11/18/2022

Proposed Solution:

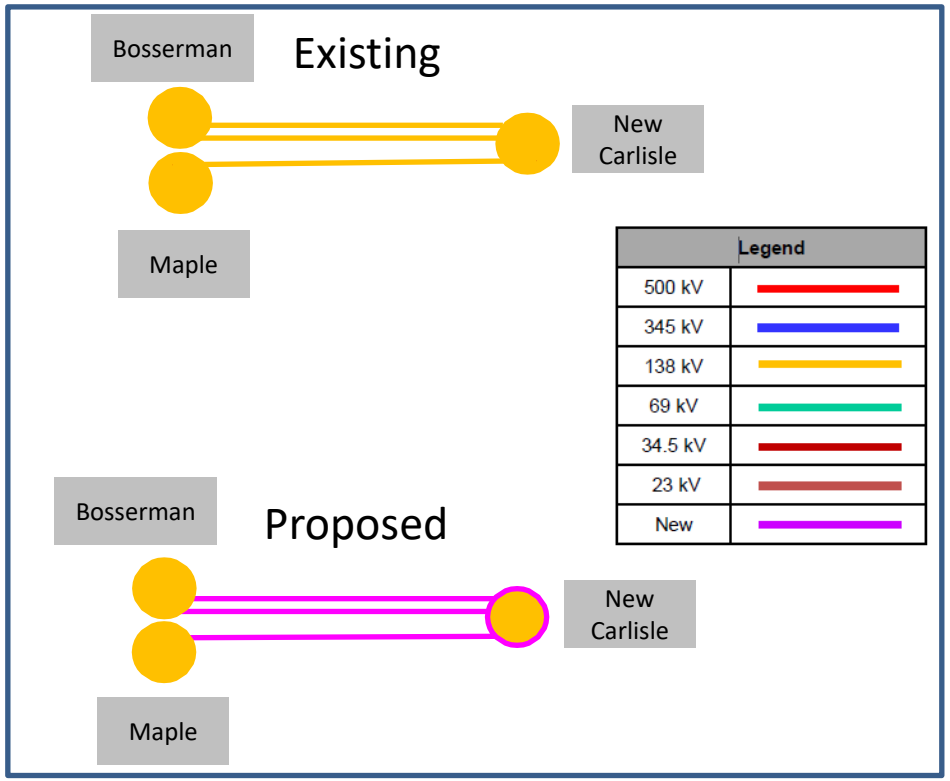
New Carlisle 138 kV station: Replace 138kV circuit breaker A with a new 3000A 63kA circuit breaker. **Estimated Cost: $0.35M**

Total Estimated Transmission Cost: $0.35M

Alternative: No viable transmission alternatives. No option to retire the breaker as it serves as an important tie to the NIPSCO system and no other options to rebuild in a new route that would be cost effective. Note that this replacement will be executed with the work associated with s2654, which is rebuilding the AEP-owned portion of lines out of New Carlisle station.

Proposed In Service Date: 10/28/2024

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

11/8/2022– V1 – Original version posted to pjm.com

11/10/2022– V2 – Removed original slides #21 and 22, solution for AEP-2021-IM028