Sub Regional RTEP Committee: Western
AEP Supplemental Projects

January 15, 2021

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
Buchanan County, Virginia

Need Number: AEP-2021-AP002

Process Stage: Need Meeting 01/15/2021

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: Dismal River – Grundy – Looney Creek 69kV

Original Install Date (Age): 1935

Length of Line: ~8.8 mi

Total structure count: 64

Original Line Construction Type: Wood

Conductor Type: 3/0 ACSR, 336,400 ACSR, 556,500 ACSR, 795,000 ACSR

Momentary/Permanent Outages and Duration: 6 Momentary and 1 permanent Outage

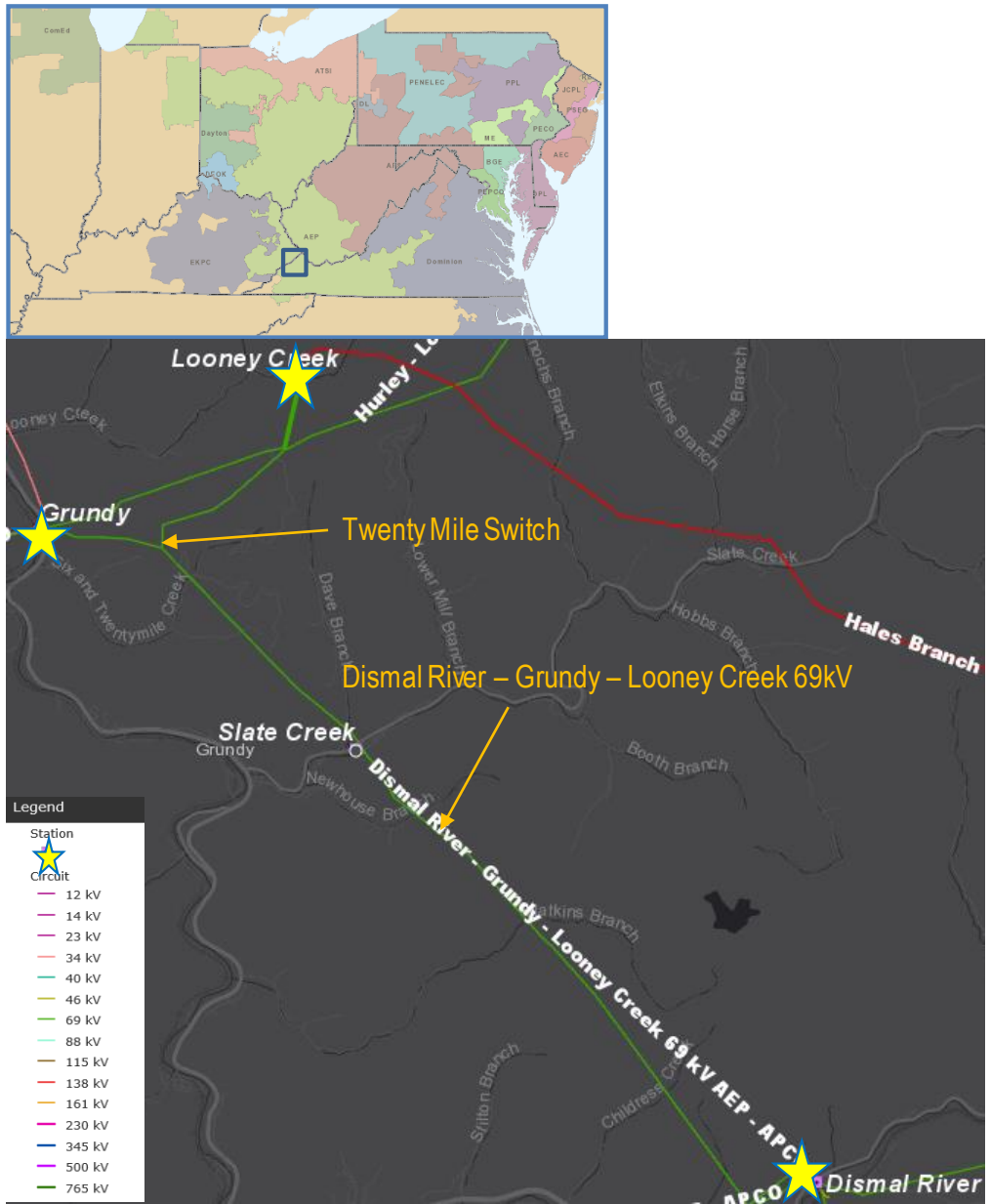
CMI (last 5 years only): 339,660 minutes

Line conditions:

Dismal River – Grundy – Looney Creek 69kV:

- 13 structures with at least one open condition, 20% of the structures on this circuit.
- 16 structure related open conditions: woodpecker holes in poles, rot top crossarms, rot top poles, and a broken knee / vee brace.
- 1 open condition related to broken guy wire.
- 13 of 64 structures are 1930s vintage, 20% of the structures on this circuit.
- 18 of 64 structures are 1970s vintage, 28% of the structures on this circuit.

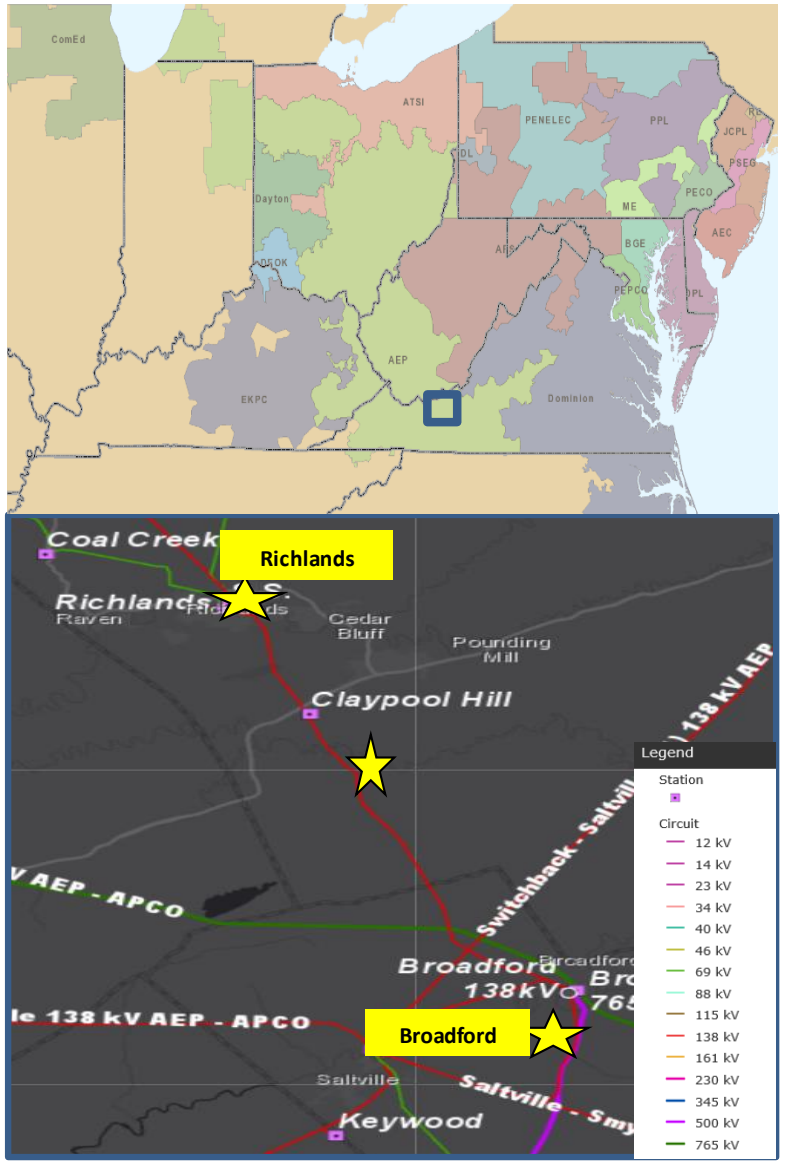
Twenty Mile Switch Station creates a three terminal line with no ability to sectionalize.



AEP Transmission Zone M-3 Process
Smyth County, VA

Need Number: AEP-2021-AP003
Process Stage: 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: Supplemental Smyth/Tazewell County, VA

Need Number: AEP-2021-AP004

Process Stage: Solutions Meeting 01/15/2021

Supplemental Project Driver: Equipment Condition/Performance/Risk

Specific Assumption Reference:

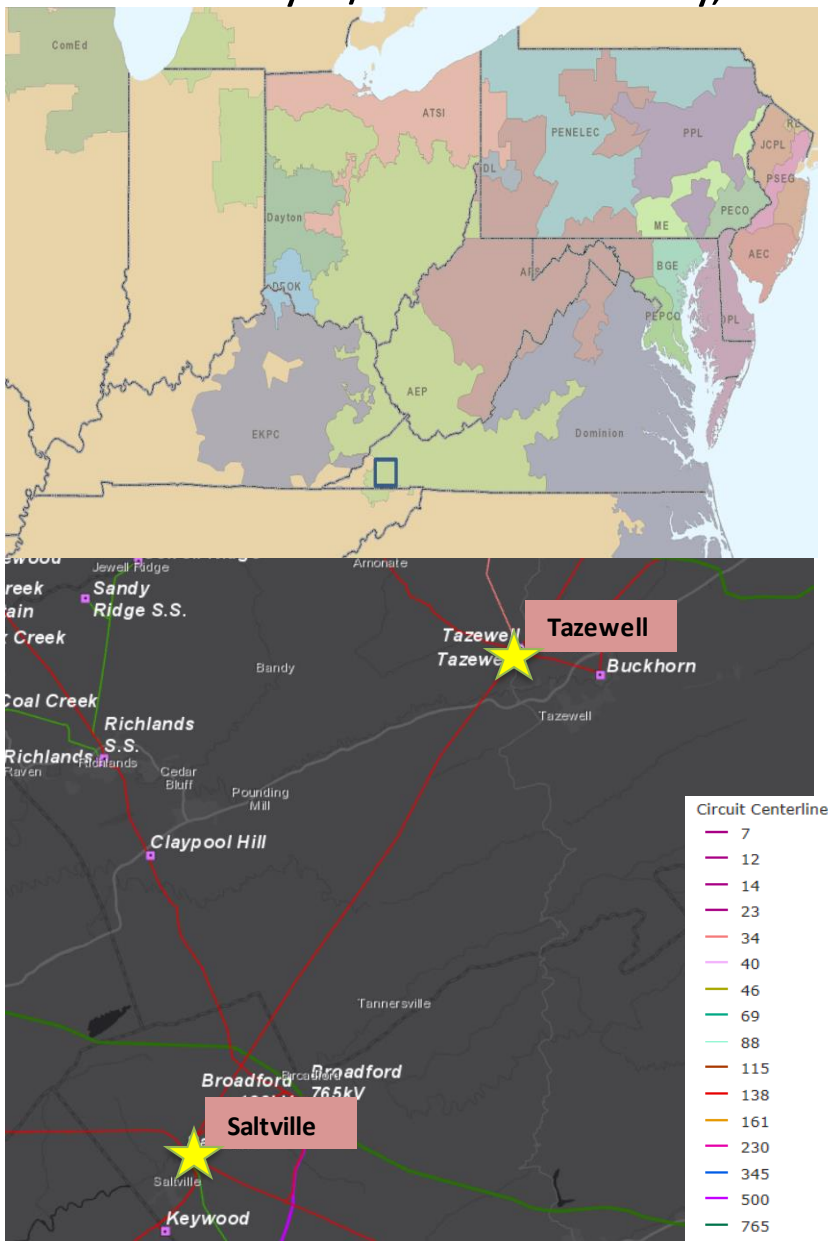
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13), AEP Presentation on Pre-1930s Lines

Problem Statement:

Line:

Saltville — Tazewell 138 KV (installed in 1927)

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



AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2021-OH001

Process Stage: Need Meeting 1/15/2021

Project Driver:

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

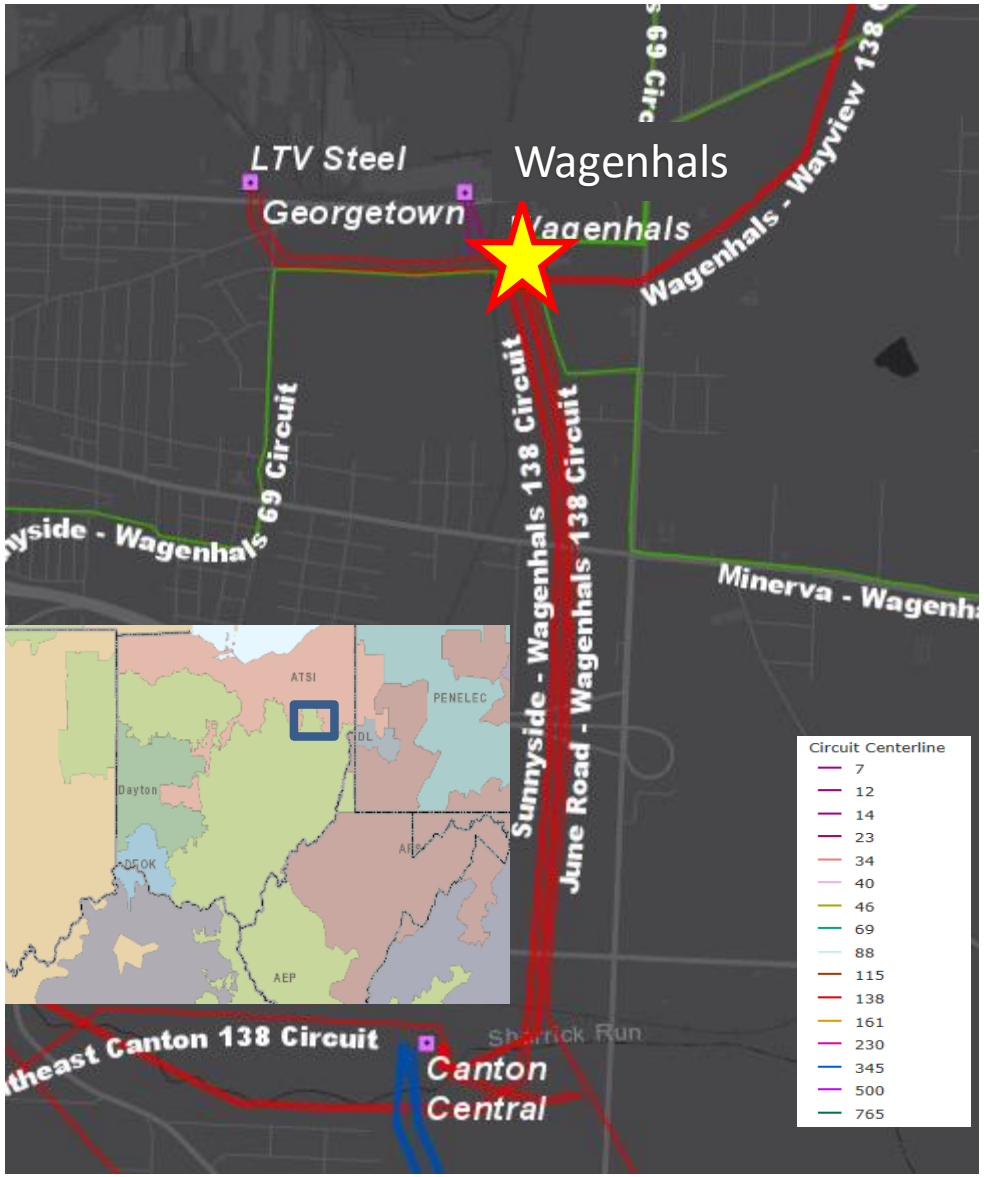
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (slide 13-14)

Problem Statement:

Equipment Material/Condition/Performance/Risk:

- The Wagenhals 138-69-23kV station was originally constructed in 1943.
- The station directly serves approximately 140 MW of industrial load (130 MW steel mill at 138kV; 10 MW casting plant at 23kV).
- The 138-23kV transformer #1 (vintage 1957) has the following asset concerns: insulation breakdown, elevated levels of CO2, high moisture readings, leaks, and wood-tie foundations in poor condition.
- The 138-69-23kV transformer #2 (vintage 1967) has the following asset concerns: insulation breakdown, elevated ethane and ethylene levels, high moisture readings, and low dielectric strength, and wood-tie foundations in poor condition.
- The control house has various issues: water intrusion, animal-related damage, lead paint, leaking roof, and asbestos.
- The 23kV yard has corroded steel and crumbling foundations, along with cap-and-pin insulators. In addition, energized equipment does not meet current clearance requirements.
- There are environmental concerns: positive tests for PCB's; lead paint and asbestos, which are a safety risk to field personnel.
- The ground grid is inadequate and the AC station service and DC cabinets are in very poor condition.
- All 3 station transformers lack an oil containment system.



AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2021-OH001

Process Stage: Need Meeting 1/15/2021

Project Driver:

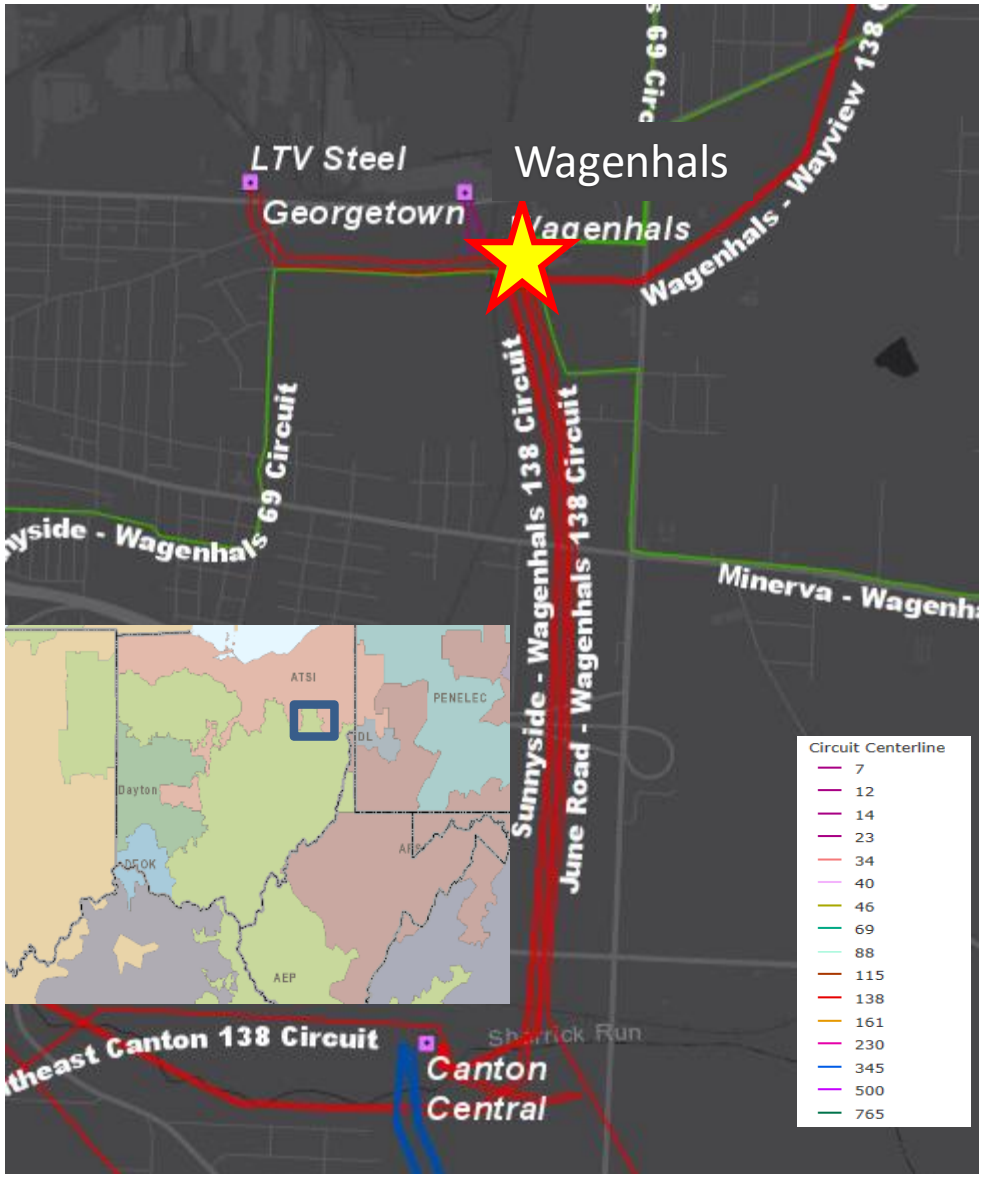
Equipment Material/Condition/Performance/Risk; Operational Flexibility and Efficiency

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (slide 13-14)

Problem Statement:

- 138kV breaker 'H' has routine SF6 leaks and 138kV breaker 'A' has an oil leak.
- There are 3- 69kV oil-filled breakers (P, Q, S), installed between 1962-1970, that are oil filled without oil containment; oil filled breakers have much more maintenance required due to oil handling requirements. In addition, spare parts or technical support for these breakers are not available. This model of breakers has been prone to hydraulic mechanism malfunctions.
- The 2- 23kV breakers are oil-filled and were installed in 1977. 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. In addition, spare parts or technical support for these breakers are not available. This model of breakers has been prone to hydraulic mechanism malfunctions.
- There are a large number of 69kV and 23kV transmission hook-stick switches identified in need of replacement with Gang Operated Air-Breaker Switches (GOAB)
- The 138kV & 23kV PT's are original to the station (1943) and have significant rusting and are at risk of oil spills.
- The station contains 103 electromechanical relays and 1 static relay. These relays have significant limitations with regard to spare part availability, SCADA functionality, and fault data collection and retention. In addition, these relays lack vendor support. The relays of concern are involved with 138kV, 69kV, & 23kV circuit protection, 69kV & 23kV bus protection, and transformer protection.



AEP Transmission Zone M-3 Process
Canton, Ohio

Need Number: AEP-2021-OH001

Process Stage: Need Meeting 1/15/2021

Project Driver:

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

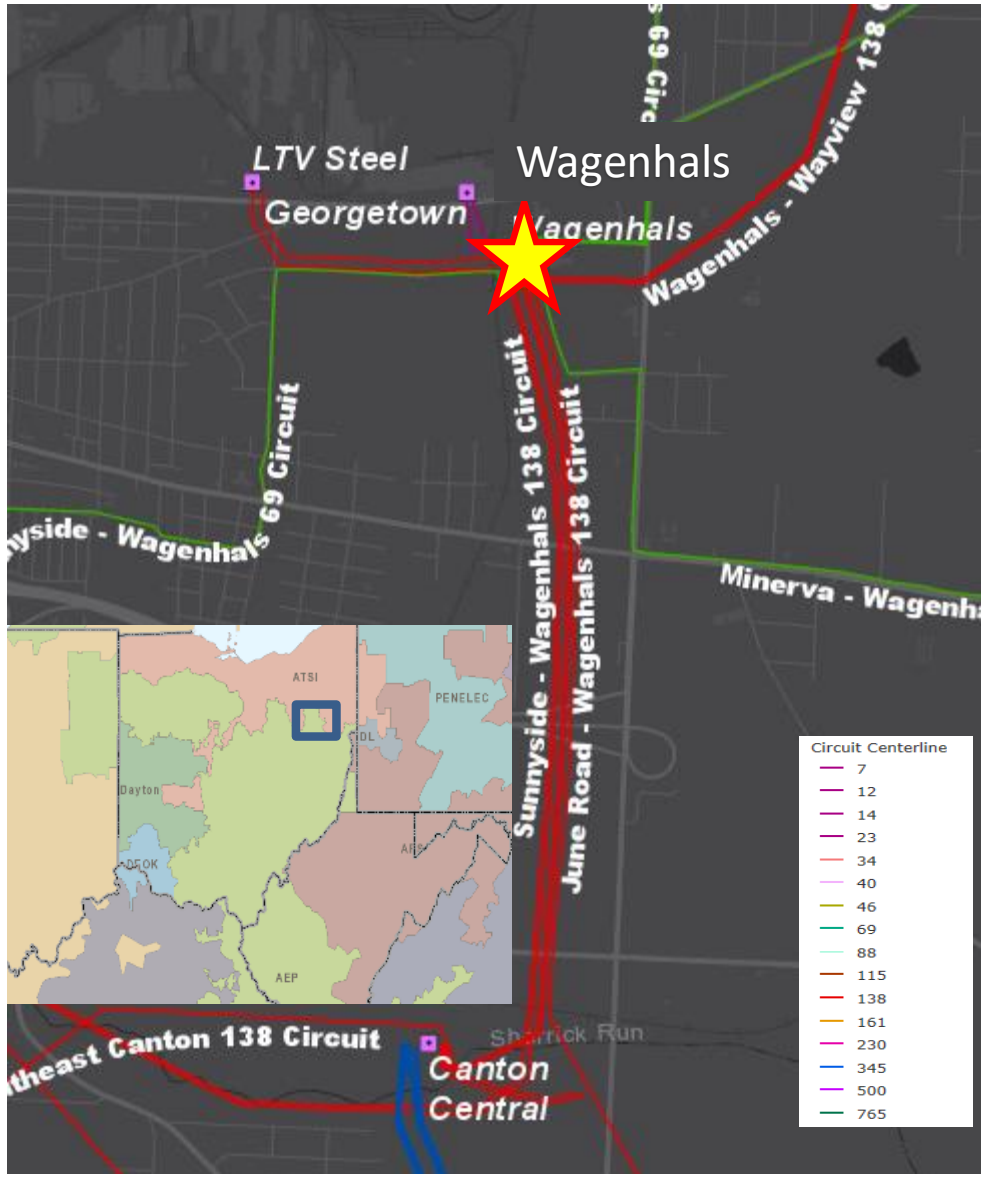
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (slide 13-14)

Problem Statement:

Operational Flexibility and Efficiency:

- The 3- transformers lack a high-side fault interrupting devices and require tripping an entire 138kV bus to clear a fault. These dissimilar zones of protection can cause over tripping and mis-operations.
- The 138kV design consists of 2- straight buses with a single bus-tie breaker, this configuration causes extended outages for maintenance, especially for a station serving a major steel customer. A stuck-breaker contingency on the 138kV bus-tie breaker requires tripping 9- 138kV breakers, 4- 69kV breakers, and 2- 23kV breakers (15 total breakers), taking the entire station out of service. This contingency would result in load loss of approximately 140 MW, loss of a 138kV cap bank, plus the loss of 2 sources to the local 69kV system.



AEP Transmission Zone M-3 Process
Franklin County, OH

Need Number: AEP-2021-OH002

Process Stage: Needs Meeting 1/15/2021

Supplemental Project Driver:
Customer Service

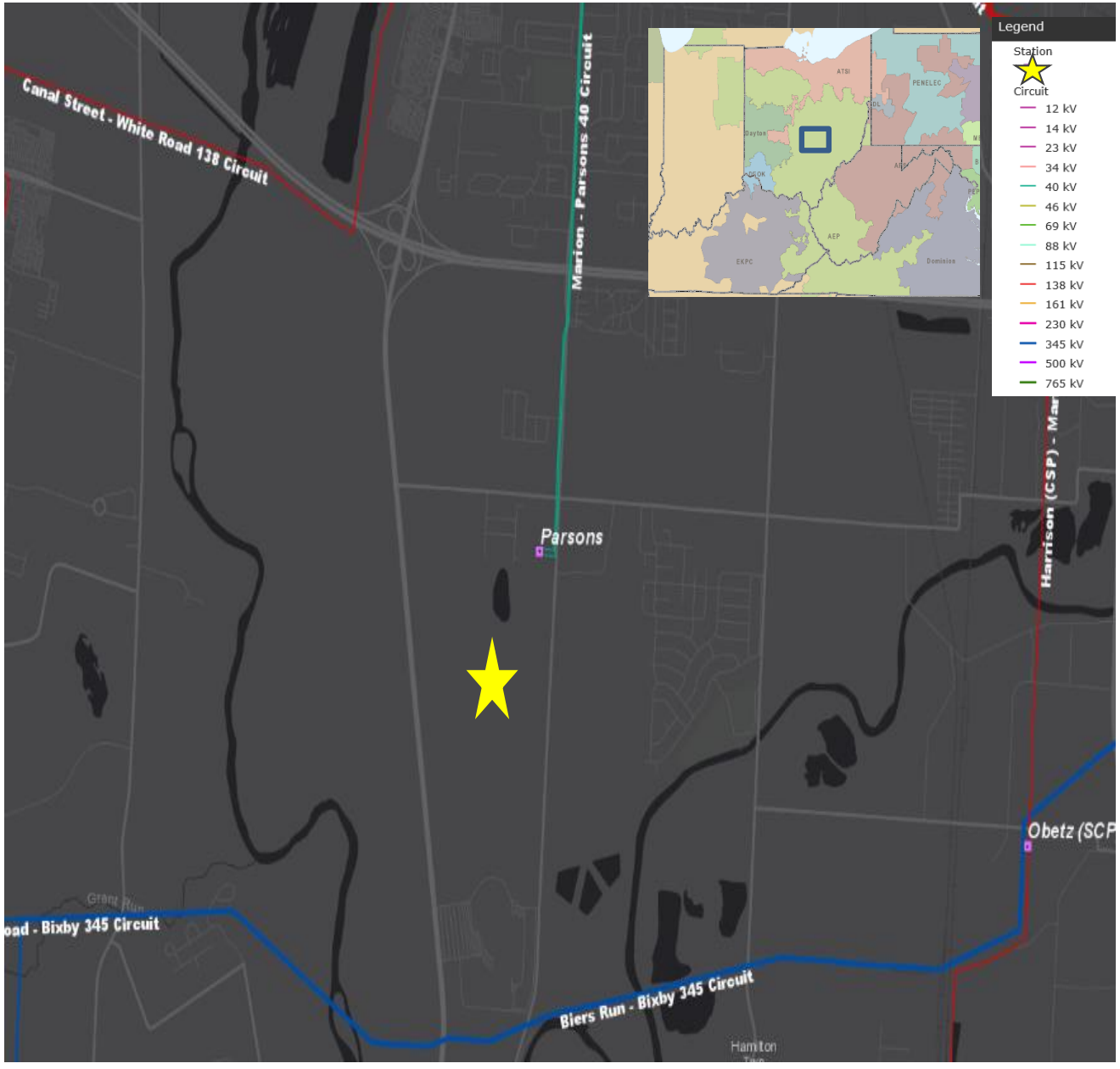
Specific Assumption Reference:
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 12)

Problem Statement:

Customer Service:

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

Model: 2025 RTEP



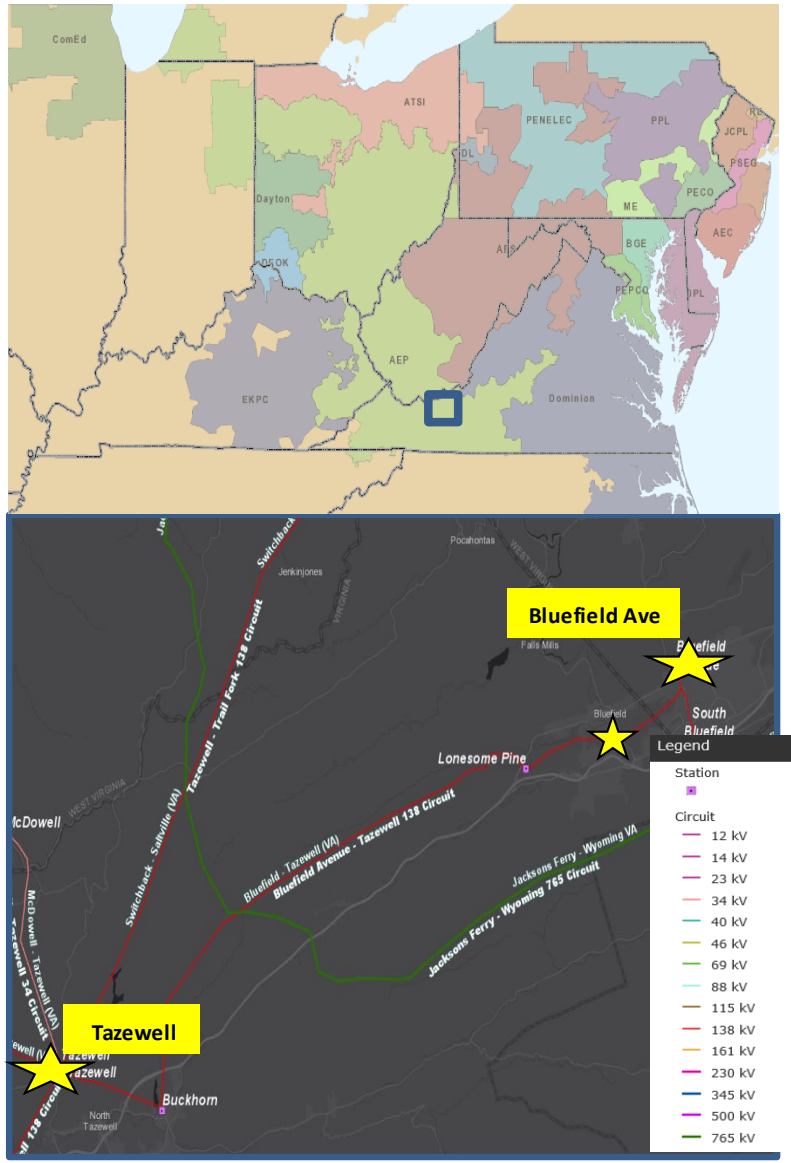
Solutions

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
~~Mercer~~ Bluefield, VA

Need Number: AEP-2020-AP023
Process Stage: Solutions Meeting 01/15/2021
Previously Presented: Needs Meeting 03/19/2020
Supplemental Project Driver: Customer Service
Specific Assumption References: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)
Problem Statement:

Distribution has requested a new station to be served from the Bluefield — Tazewell 138 KV line. The projected peak demand is ~~35~~ 28MW.



AEP Transmission Zone M-3 Process
Bluefield, VA

Need Number: AEP-2020-AP023
Process Stage: Solutions Meeting 01/15/2021
Supplemental Project Driver: Customer Service
Specific Assumption References: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Proposed Solution:

- **Hockman Station**: Construct a greenfield station consisting of one 138kV line breaker and one MOAB switch in an in & out configuration. **Estimated Transmission Cost: $1.3M**
  Note: Cost does not include Distribution scope of work to install 138/12kV station with 1-25 MVA non load tap changing transformer with high side circuit switcher, 4-12kV-rated distribution circuit breakers that tie in with existing circuitry outside of the station, and the property purchase.

- Line work to loop the existing Bluefield - Tazewell 138 kV line in and out of the proposed Hockman 138 KV Station. **Estimated Cost: ~$2.8M**

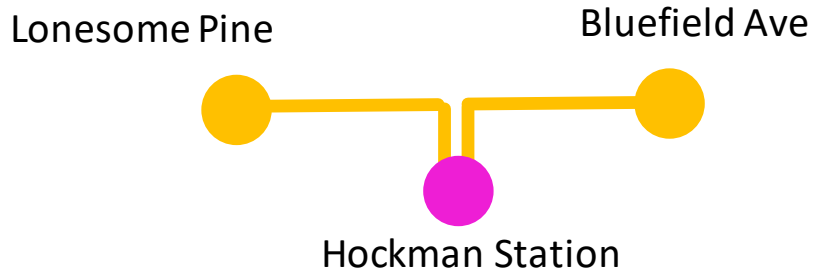
Total Estimated Transmission Cost: ~$4.1M

Alternatives Considered:
Box bay in and out construction was used for Hockman instead of a phase over phase because the line is very close to the distribution station. In accordance with our guidelines the proposal is to build an in and out to save cost. One breaker is installed to prevent more than three auto-sectionalizing MOABs in series on the line. Considering the location of the station request from APCO distribution, no other alternatives were considered.

Projected IS Date: 11/01/2022
Project Status: Engineering

Proposed

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



AEP Transmission Zone M-3 Process
Pike County, Kentucky

Need Number: AEP-2020-AP028

Process Stage: Need Meeting 01/15/2021

Previously presented: Need Meeting 04/20/2020

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: Sprigg – Stone 46kV

Original Install Date (Age): 1940

Length of Line: 8.23 mi

Total structure count: 55

Original Line Construction Type: Wood

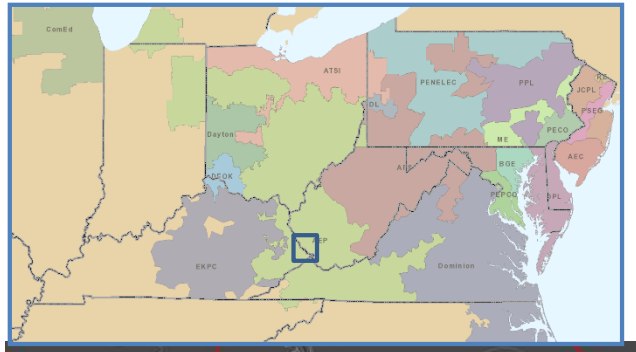
Majority Conductor Type: 3/0 ACSR 6/1 (Pigeon) and 2/0 COPPER

Momentary/Permanent Outages and Duration: 6 Momentary and 7 permanent Outage

CMI (last 5 years only): 1,119,129 minutes

Line conditions:

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



AEP Transmission Zone M-3 Process
Pike County, Kentucky

Proposed Solution:

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

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

Retire Belfry 46kV substation. **Estimated Transmission Cost: $0 M**

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

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

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

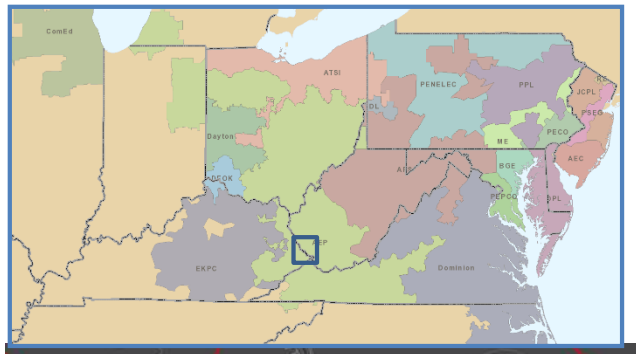
Retire Turkey Creek Tap. **Estimated Transmission Cost: $0.76 M**

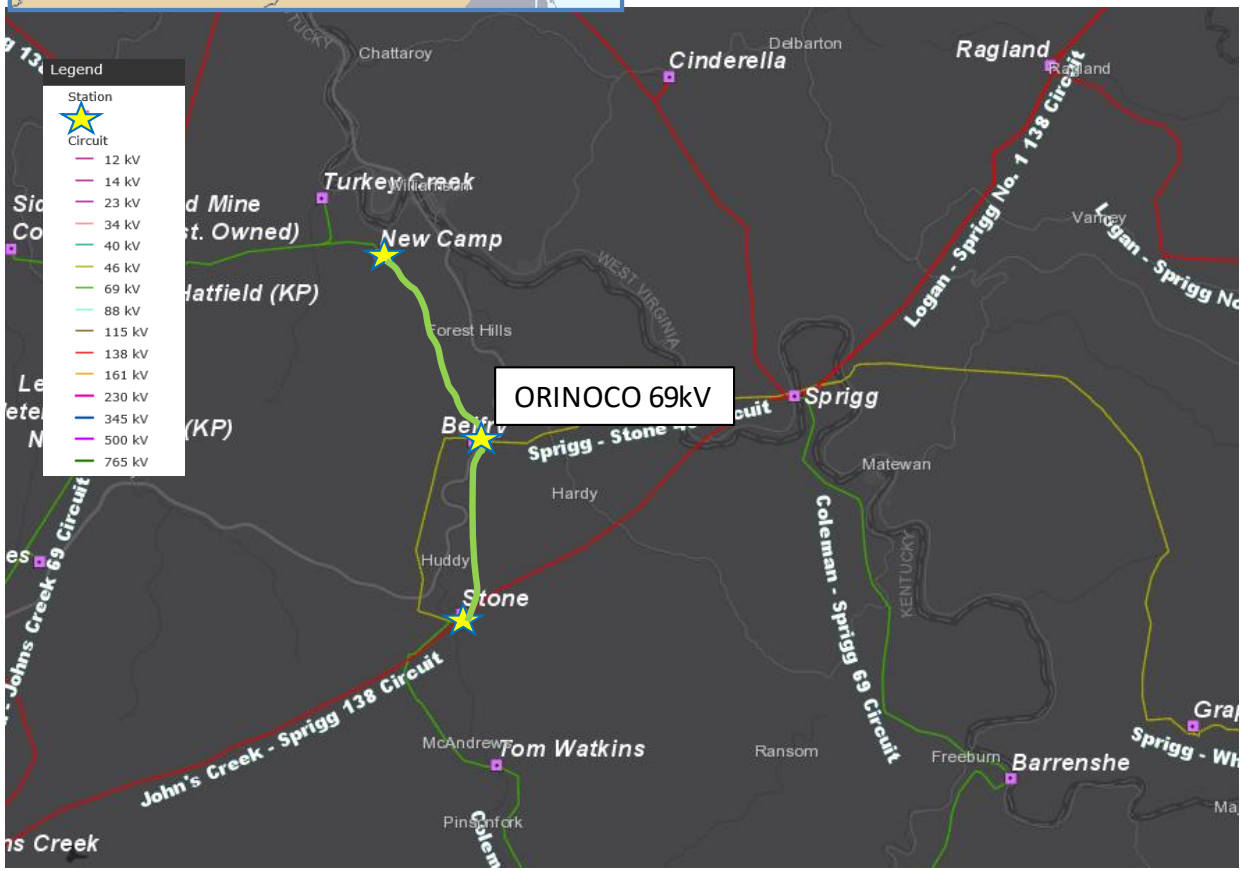
Retire the ~8.23 miles of the 46kV Sprigg – Stone 46 KV circuit. **Estimated Transmission Cost: $6.73 M**

Total Estimated Transmission Cost: $9.11 M

Ancillary Benefits:

- Removal of obsolete ~8.23 mi of 46kV transmission line and associated equipment





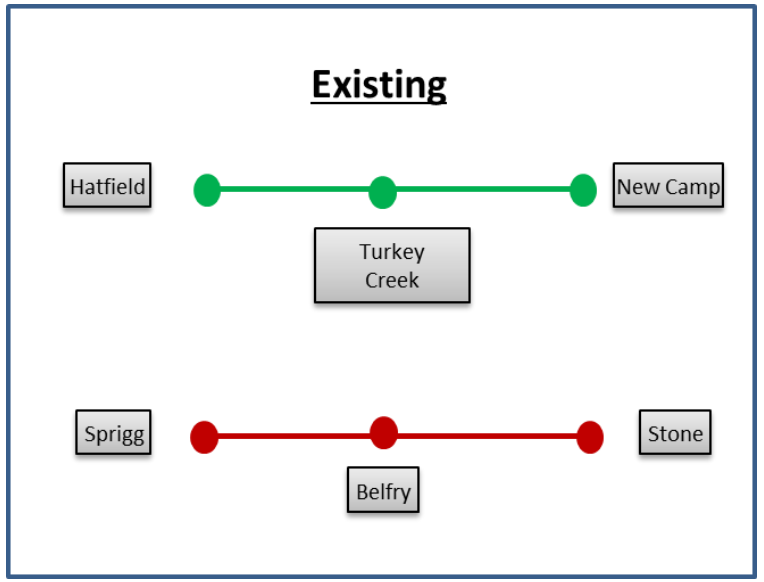
AEP Transmission Zone M-3 Process
Pike County, Kentucky

Alternative Solution:

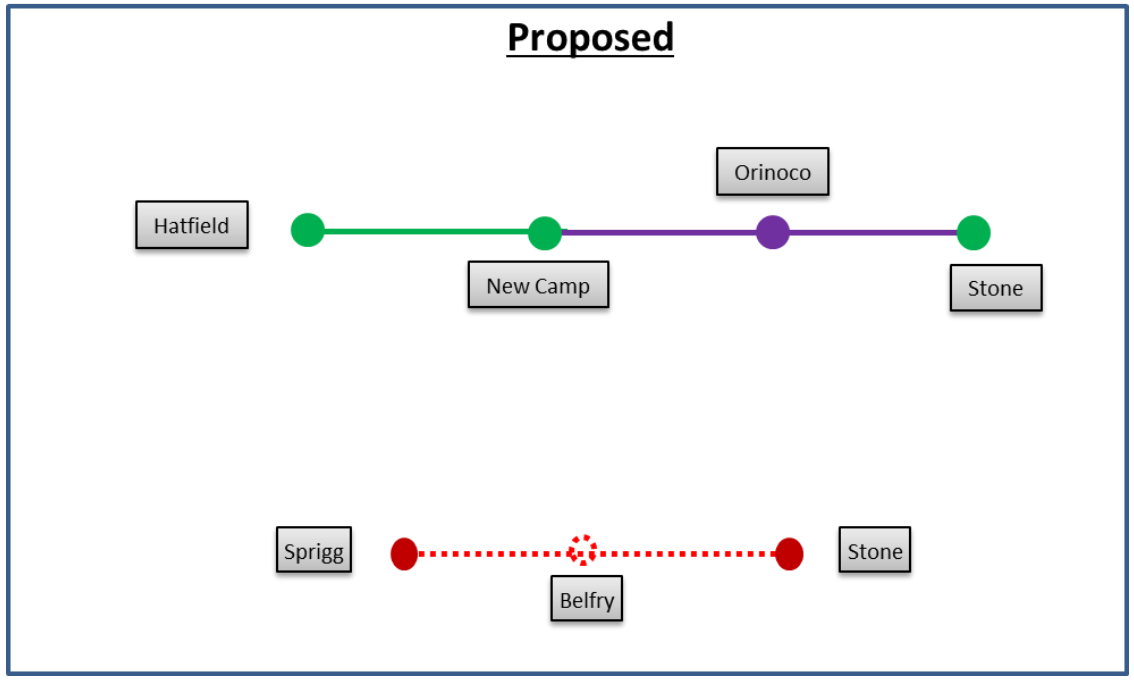
Rebuild 8.23 mi line between Sprigg and Stone to 69kV standards (operated at 46kV) via Belfry Station to address the identified asset needs. Retire the existing ~8.23 miles of the 46kV Sprigg – Stone 46 KV circuit.

Total Estimated Transmission Cost: $32.1 M

Project Status: Scoping
Required In Service Date: 9/1/2025
Projected In Service Date: 12/31/2024



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



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

1/5/2021 – V1 – Original version posted to pjm.com