

# Sub Regional RTEP Committee: Western AEP Supplemental Projects

June 15, 2021

# Changes to Existing Supplemental Projects

**Project s1412.1-8 Revision** (Originally Presented on 11/02/2017 W-SRRTEP)

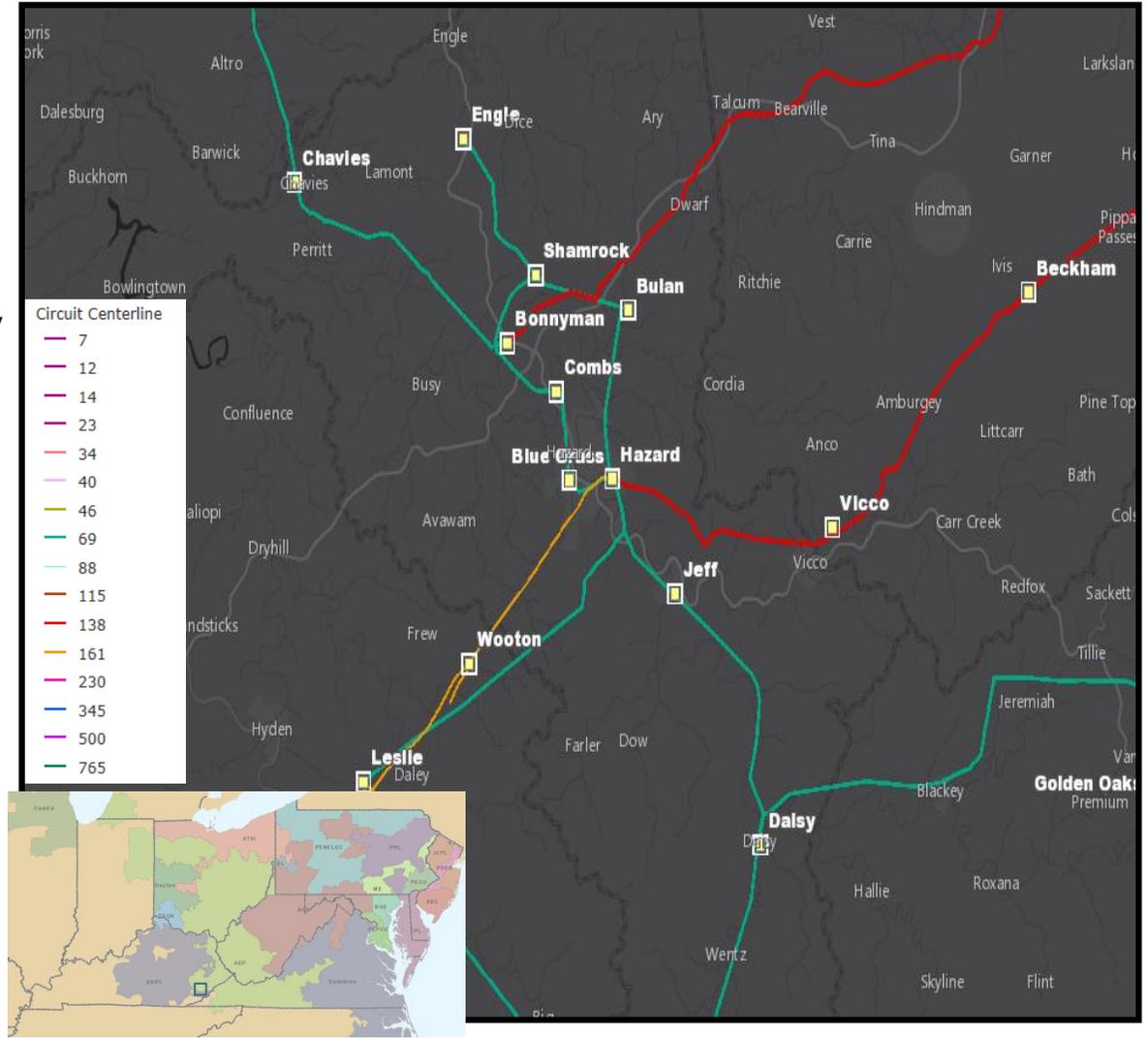
- Install a new 3000A 40 kA 138 kV circuit breaker at Hazard station on the line exit towards Beckham station. Add a 138 kV circuit switcher to the high side of transformer #4. **(s1412.1)**
- Replace 138 kV capacitor bank and switcher BB with a new switcher and 43.2 MVAR capacitor bank. **(s1412.2)**
- Replace 138/69 kV transformers #1 and #2 with new 138/69 kV 130 MVA transformers with 138 kV circuit switchers on the high side and 3000A 40 kA 69 kV breakers on the low side. **(s1412.3)**
- Replaces 69 kV circuit breakers S, E, and F with 3000A 40 kA 69 kV circuit breakers with a bus tie 3000A 69 kV circuit breaker being installed between the existing 69 kV box bays. **(s1412.4)**
- ~~Retire Replace existing~~ 69 kV capacitor bank and switcher CC ~~with a new switcher and 28.8 MVAR capacitor bank.~~ 69 kV capacitor bank and switcher AA will be retired. **(s1412.5)**
- Replace 161 kV circuit breaker M towards Wooton with a 161 kV 3000 A 40 kA breaker. **(s1412.6)**  
~~This work has moved to the baseline project (b2761.1).~~
- Add a 3000A 40 kA 138 kV circuit breaker to the low side of 161/138 kV transformer #3. **(s1412.7)**  
~~This work has moved to the baseline project (b2761.1).~~
- Address safety and access issues associated with existing equipment platforms and drainage issues at the station. **(s1412.8)**

**Reason for Revision:** Removal of the cap bank from the overall station scope mitigates the need to expand the substation. This project proposes connecting the two 69kV buses with a bus tie breaker. Once the 69kV buses at Hazard station are tied together this cap bank is no longer needed for voltage support.

**Estimated Transmission Cost:** ~~\$20.0M~~ ~~\$23.3M~~ **\$22.65**

**Projected In-service:** ~~12/31/2019~~ **06/24/2022**

**Project Status:** ~~Scoping~~ **Under Construction**



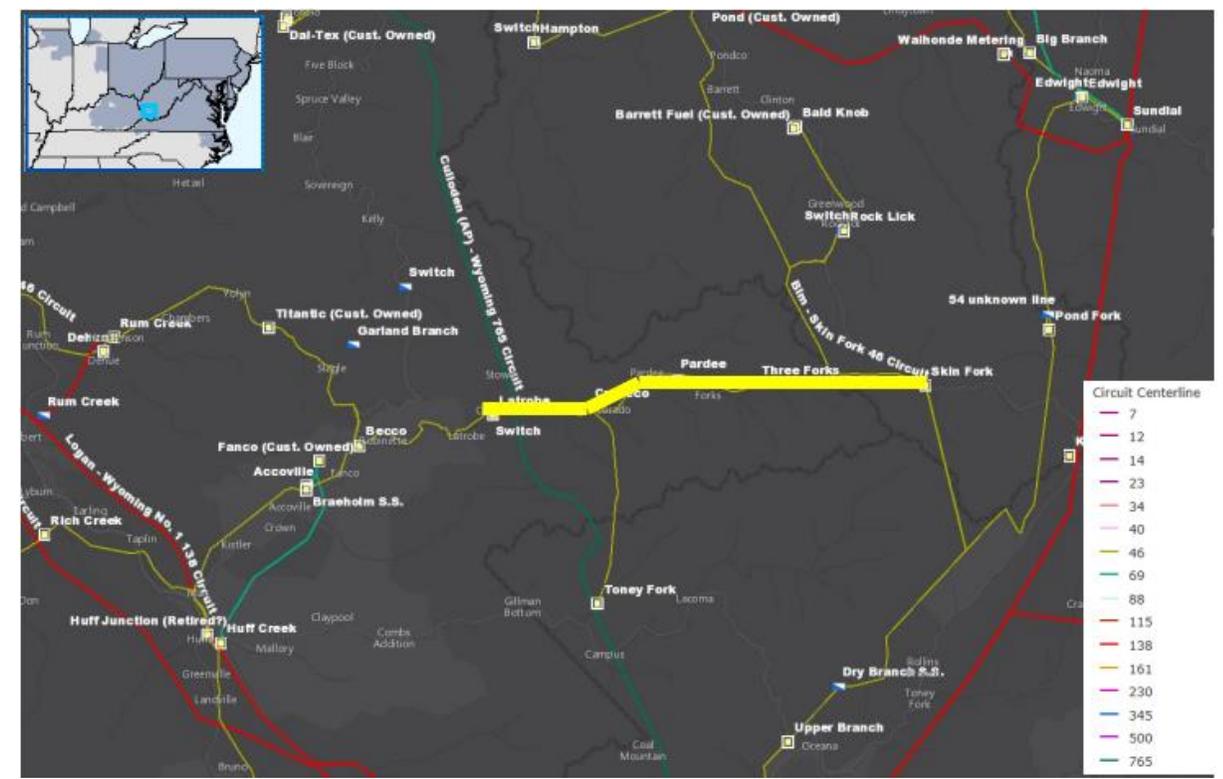
**Project S1292 Revision** ( Originally Presented: 4/21/2017 SRRTEP)

**S1292:** Rebuild Latrobe – Craneco 46kV line section (approximately 2.3 miles) utilizing 795 26/7 ACSR conductor.

**Estimated Supplemental Project Cost: \$4M \$8.3M**  
**Functional Estimated Transmission Costs: (S1292): \$4.4M**

**Required IS date:** 6/1/2021  
**Projected IS date:** ~~4/4/2018~~ 11/2021

- Major Reasons for Cost increase:**
- Project complexity and terrain (\$1.3M) :** Due to the complexity of the project and difficult terrain, construction bids came in higher than original estimates.
  - Unaccounted for rock at drilling and grillage sites (\$0.8M):** Encountering excessive access road rock & excessive rock drilling costs above anticipated amounts based on available soil borings.
  - Additional SWPPP Maintenance (\$0.7M):** WVDEP requirement on enhanced SWPPP including increased inspection intervals and enhanced environmental barriers. Recent change to state regulations.
  - Changes to Station Scopes (\$0.4M):** Non-topology changes identified in detailed design to Station Scopes resulted in additional costs associated with station work at Lacey’s Branch, Skin Fork and Becco stations. These changes include relay panel changes, the addition of SST/CTs/CCVTs, rock adders and scope for testing and commissioning.
  - Changes to Line Scopes (\$0.7M):** Non-topology changes identified in detailed design to Line scopes resulted in additional costs which include changes in foundation designs, distribution relocations, steel tariffs, and bat studies.



# 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

**Need Number:** AEP-2021-AP018 (Cancellation)

**Process Stage:** Needs Meeting 6/15/2021

**Previously Presented:** Needs Meeting 4/16/2021

**Supplemental Project Driver:** Customer Service

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

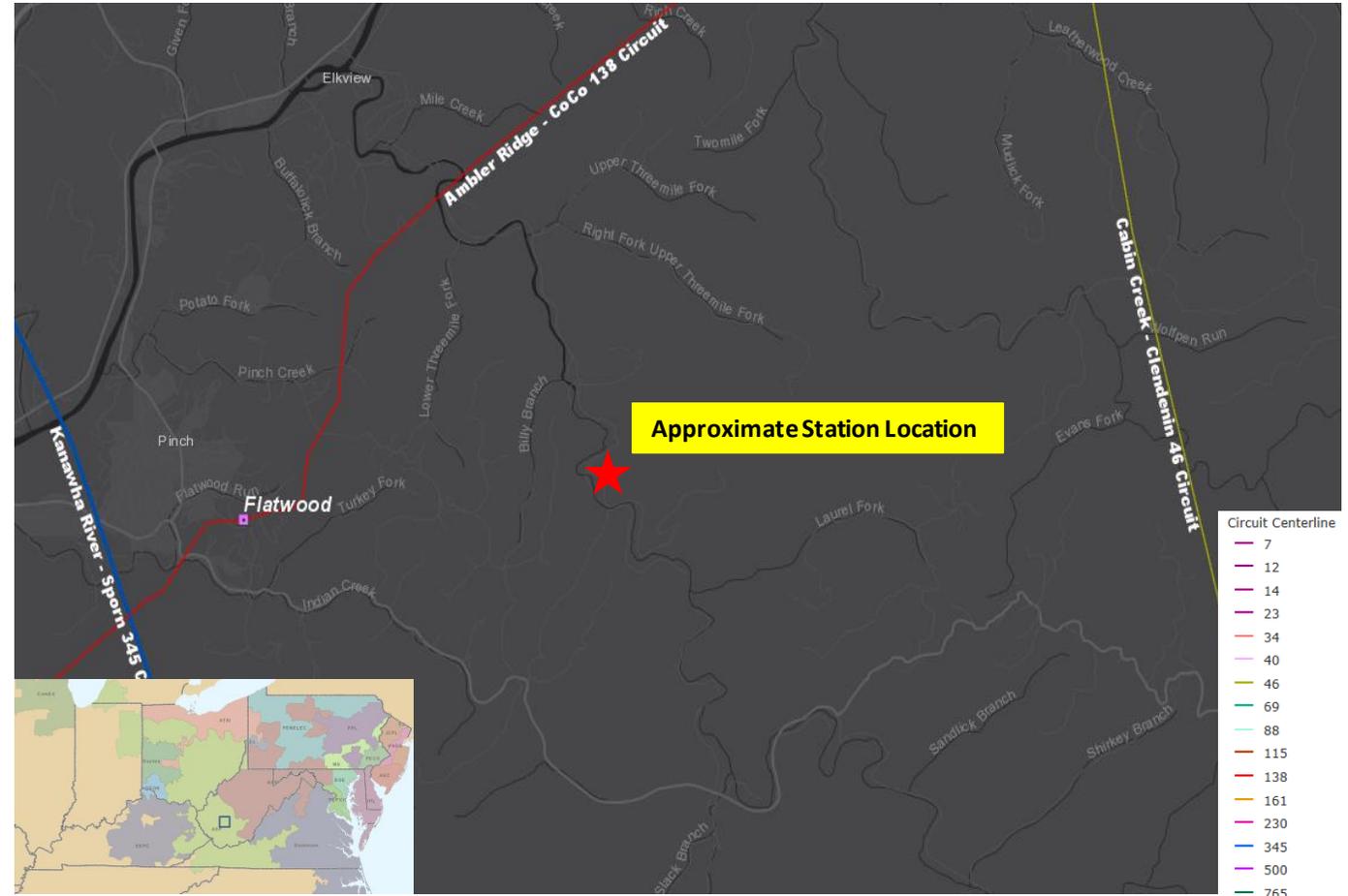
**Problem Statement:**

~~A customer has requested a new delivery point located in Kanawha County, West Virginia.~~

~~Summer projected load: 7 MVA~~

~~Winter projected load: 7 MVA.~~

~~Customer is no longer interested in this delivery point.~~



# AEP Transmission Zone M-3 Process Montgomery County, VA

**Need Number:** AEP-2021-AP026

**Process Stage:** Needs Meeting 06/15/2021

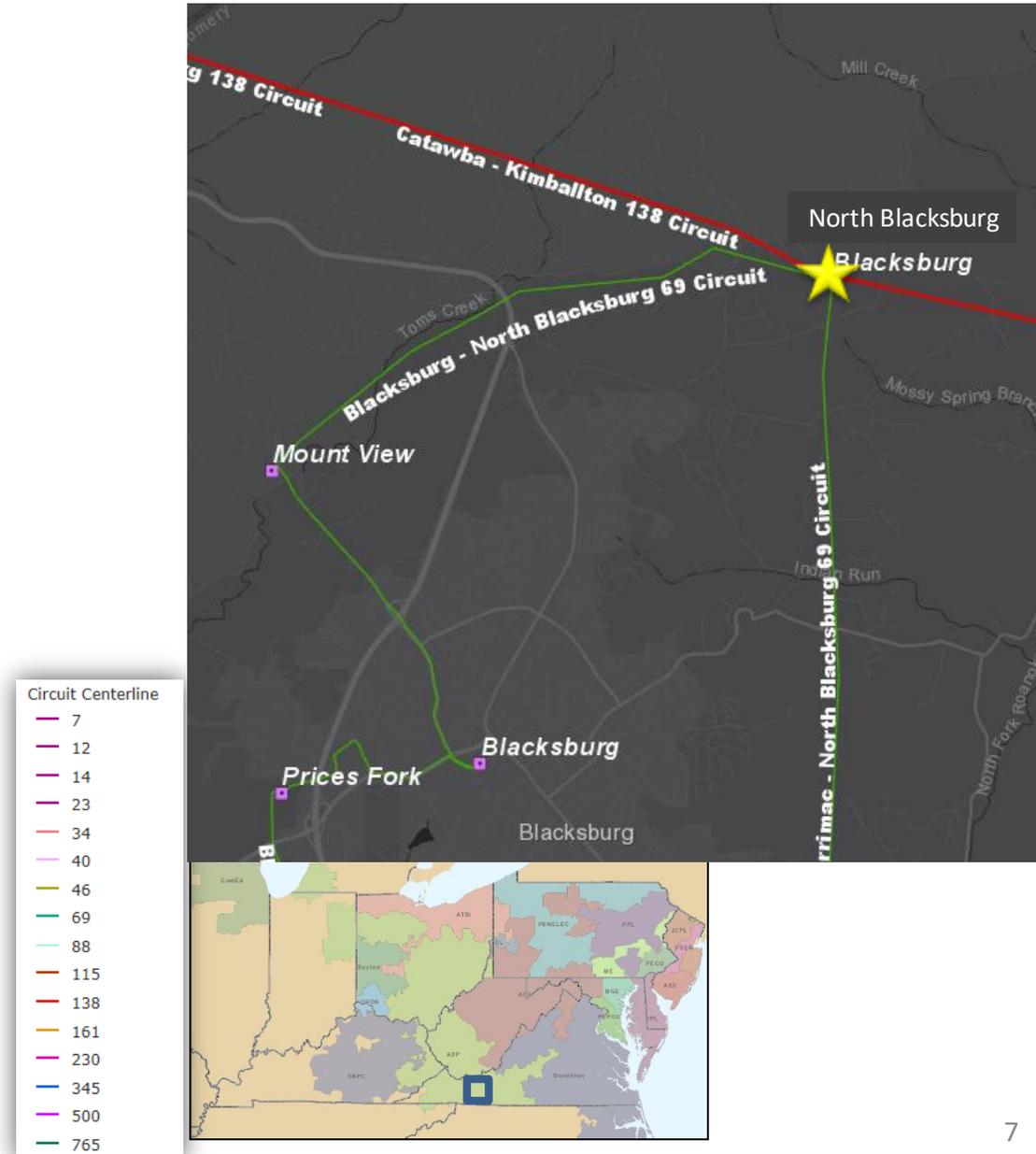
**Supplemental Project Driver:** Equipment Material/Condition/Performance/Risk

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

**Problem Statement:**

North Blacksburg Station:

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



# AEP Transmission Zone M-3 Process Nicholas County, WV

**Need Number:** AEP-2021-AP021

**Process Stage:** Need Meeting 06/15/2021

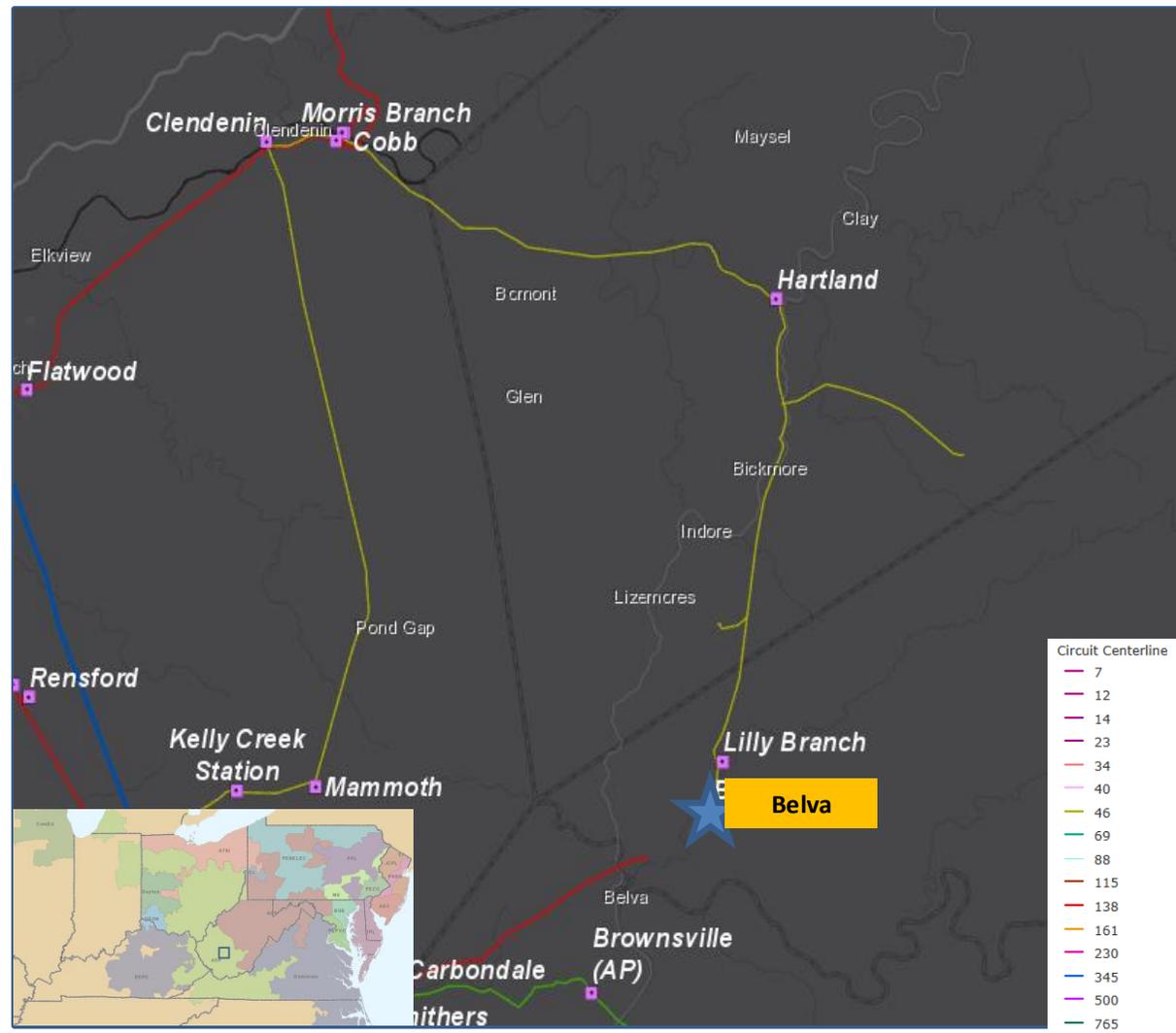
**Project Driver:** Equipment Condition/Performance/Risk

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

**Problem Statement:**

Belva 138/46 kV Station

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



# AEP Transmission Zone M-3 Process Clay County, WV

**Need Number:** AEP-2021-AP022

**Process Stage:** Need Meeting 6/15/21

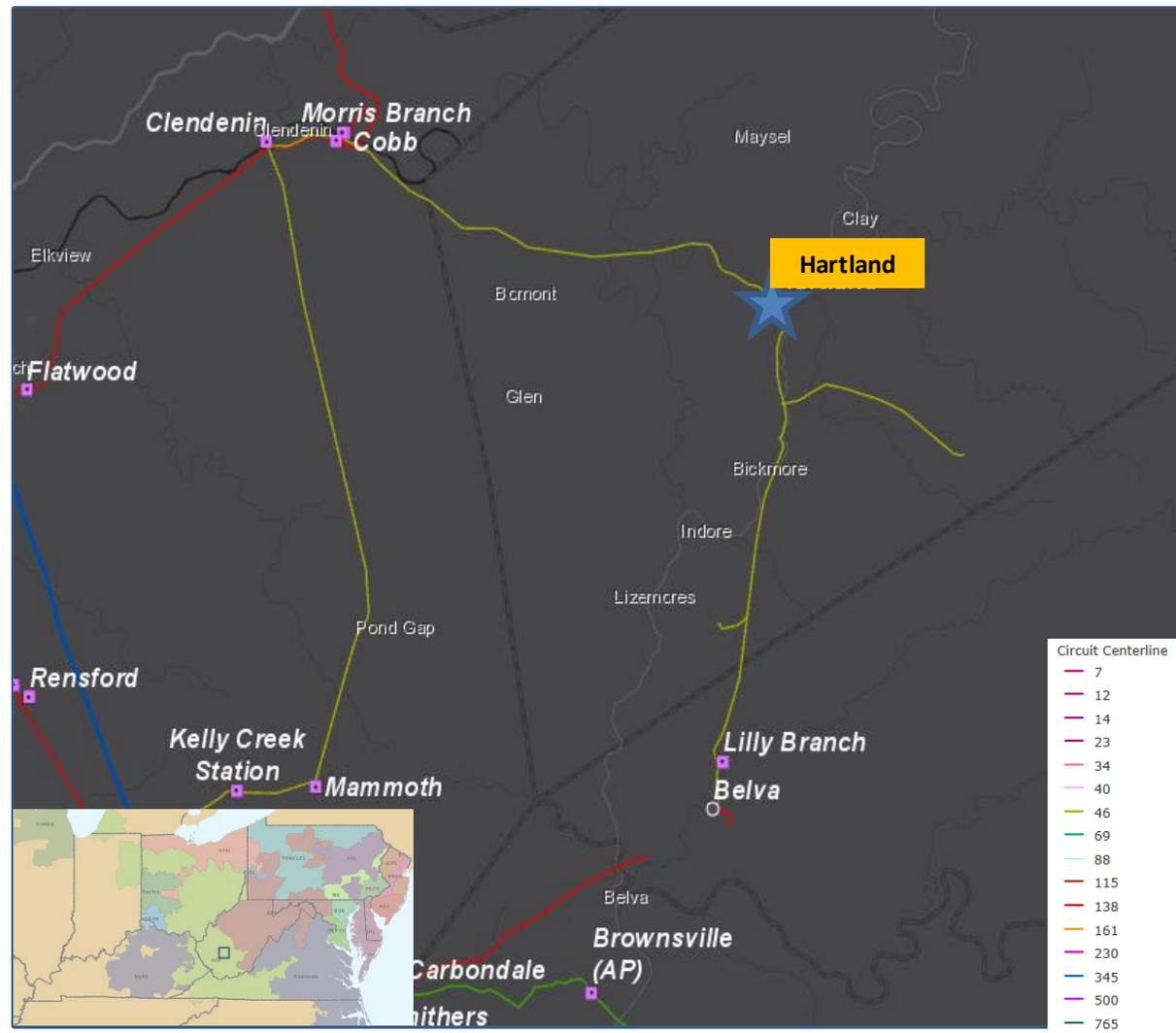
**Project Driver:** Equipment Condition/Performance/Risk

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

**Problem Statement:**

Hartland 46 kV Station

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



**Need Number:** AEP-2021-AP023

**Process Stage:** Need Meeting 06/15/21

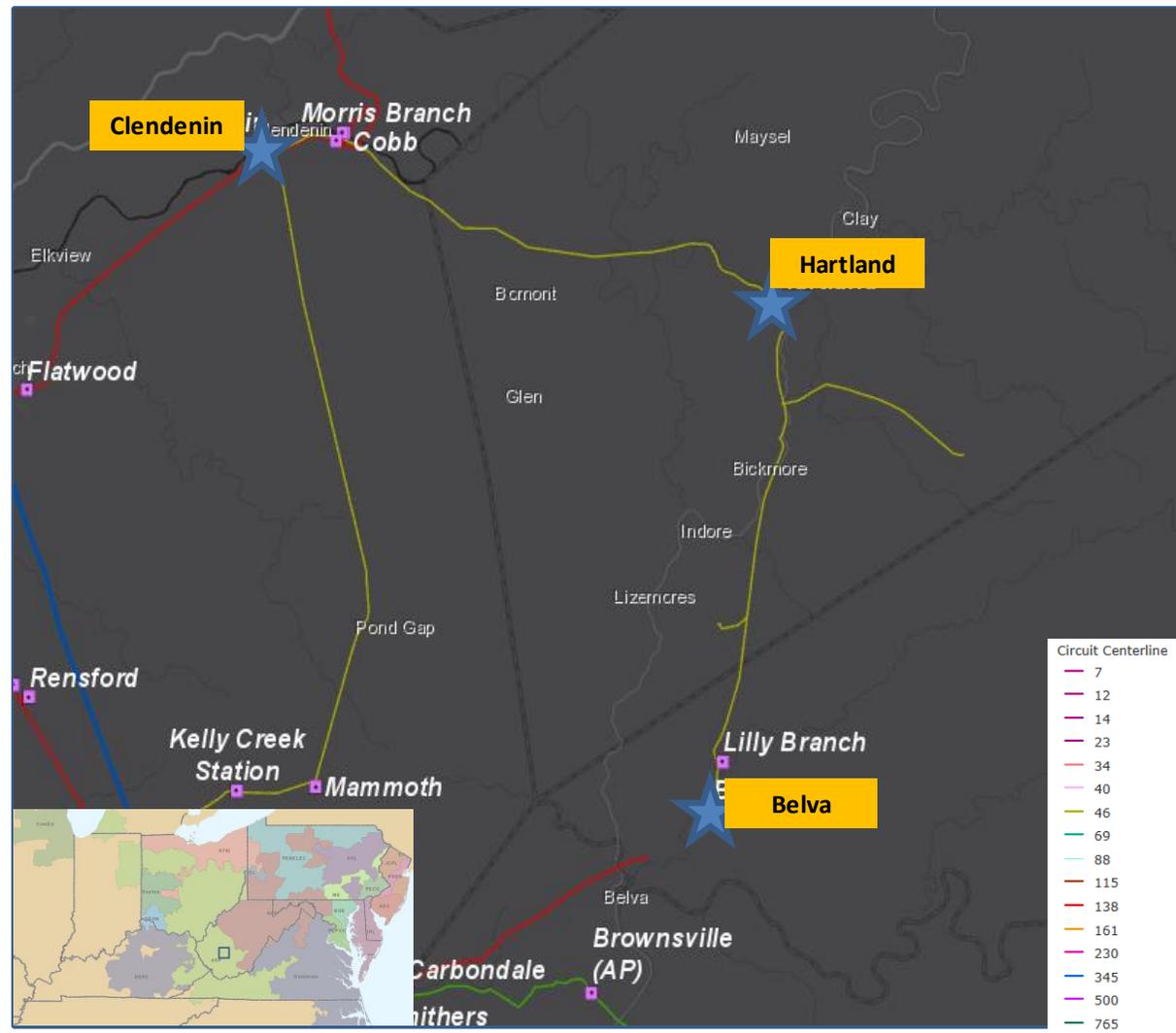
**Project Driver:** Equipment Condition/Performance/Risk

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

**Problem Statement:**

Belva – Clendenin 46 kV Circuit (~27 miles)

- Circuit is comprised mostly of vintage wood pole structures.
  - Original vintage wood structures from 1940
  - The Belva – Clendenin 46kV Line uses primarily original vintage conductor including 2/0 Copper, 4/0 ACSR and 336 ACSR.
  - The circuit fails to meet 2017 NESC Grade B loading criteria, AEP structural strength requirements, and ACSE structural strength requirements
- Since 2015, there have been 28 momentary and 30 permanent outages on the Belva – Clendenin 46kV Circuit.
  - The momentary outages were due to lightning (16), unknown (5), wind (3), misoperation (3), field error (1) causes.
  - The permanent outages were due to vegetation on fall-in from outside of the AEP ROW (15), lightning (7), vegetation contacts from inside the AEP ROW (4), flood/slide (1), crossarm failure (1), ice/snow (1), and distribution (1) causes.
  - These outages caused 8.9M minutes of interruption for customers. The reported CMI is an estimated value due to the wholesale delivery point at Hartland Station.
- Currently, there are 114 structures with at least one open structural condition, which relates to 44% of the structures
  - 357 structural open conditions primarily related to rotten poles and crossarms. Other structural conditions include woodpecker damage, leaning in-line, or split poles, broken rusted, or corroded crossarms, and a split knee/vee brace.
  - 22 open forestry conditions related to brush clearances and dead trees
  - 21 open hardware conditions related to broken, loose, or damaged guys, broken insulators, and rusted or worn conductor hardware.
  - 1 open conductor related condition related to damaged conductor
  - 1 open grounding condition related to a broken ground lead wire



**Need Number:** AEP-2021-AP024

**Process Stage:** Needs Meeting 06/15/2021

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

**Specific Assumption Reference:**

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

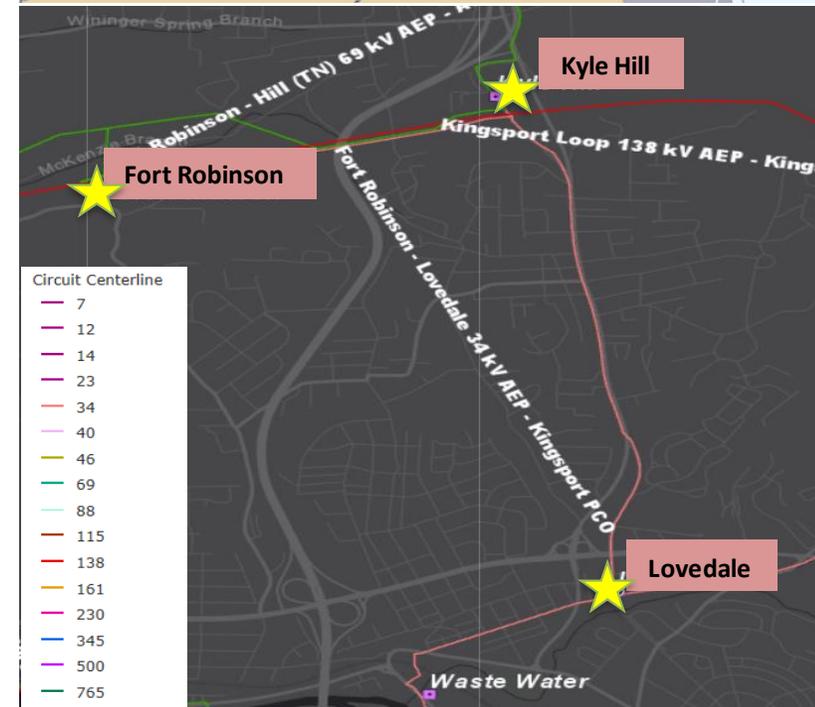
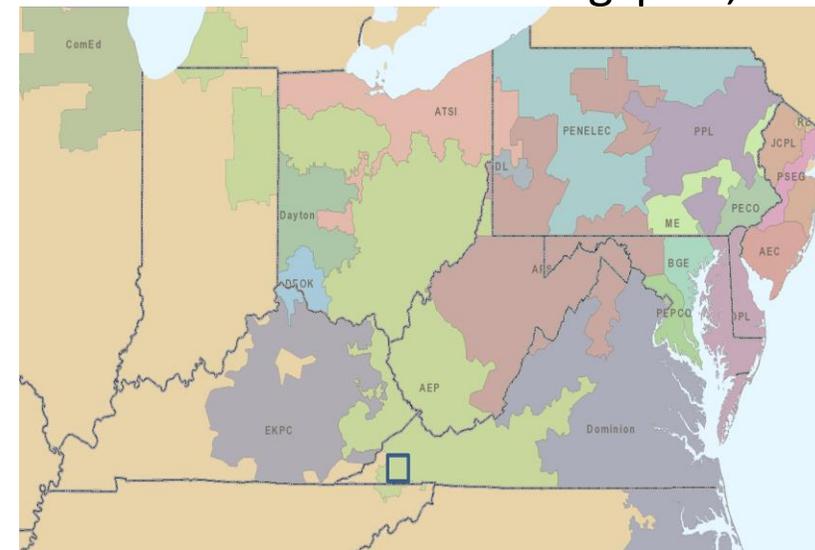
**Problem Statement:**

**Line:**

Fort Robinson — Lovedale 34.5 KV (Installed in 1969)

- Length: ~3.57 Miles
- Original Construction Type: Vintage Wood Pole
- Original Conductor Type: 556 ACSR 26/7
- Permanent Outages: 3 (5 years)
- CMI: 107,429 (2015-2020)
- Total structure count: 88
- Number of open conditions: 19
  - Open conditions include: broken conductor strands, broken/burnt insulators.
- Unique structure count with open conditions: 6 (7%)
- Structures on the line failed to meet 2017 NESC Grade B loading criteria, failed to meet current AEP structural strength requirements, and failed to meet current ASCE structural strength requirements.
- Additional Info on Wood Assessment, Insulator & Conductors:
  - Wood Assessment: The structures are in poor overall condition. Conditions include rot, pole top weathering, bowing, cracking, and woodpecker holes.
  - The insulators on the line do not meet current AEP standards for Critical Impulse Flashover CIFO (an insulator rating related to what level of flashover the insulator is expected to be able to withstand) and minimum leakage distance requirements.
- **Model:** N/A

## AEP Transmission Zone: Supplemental Kingsport, TN



**Need Number:** AEP-2021-AP025

**Process Stage:** Need Meeting 6/15/2021

**Supplemental Project Driver:**

Equipment Material/Condition/Performance/Risk

**Specific Assumption Reference:**

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

**Problem Statement:**

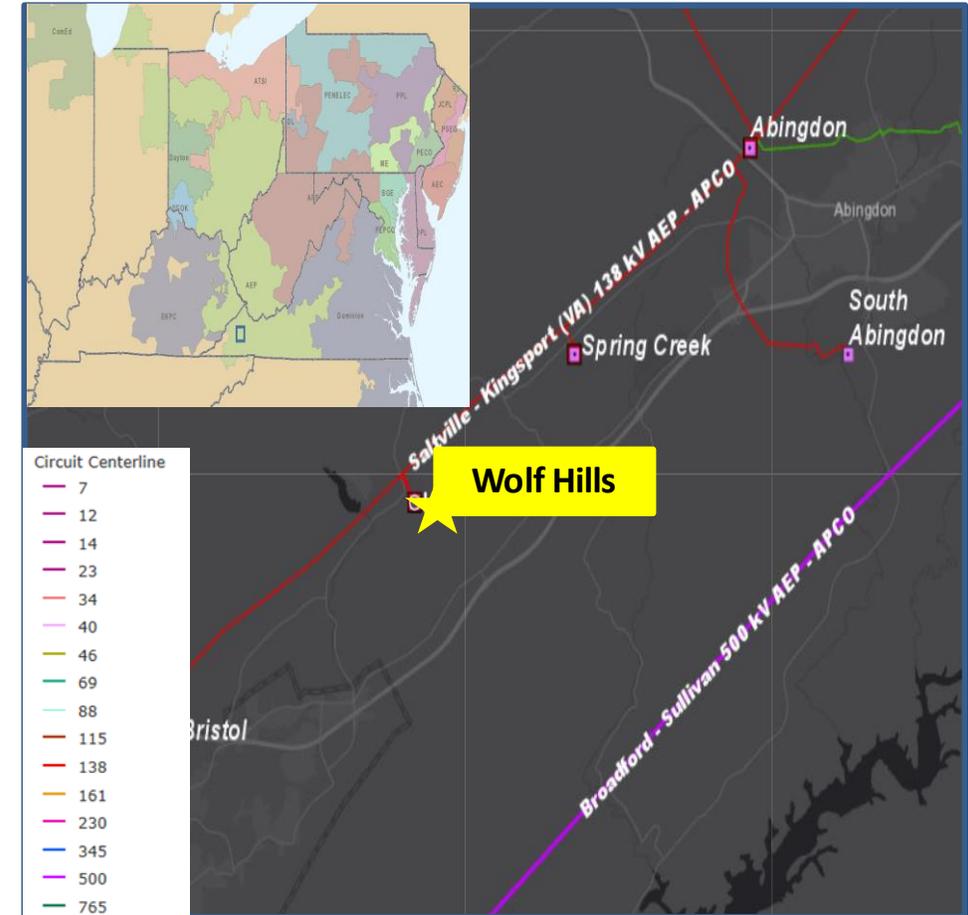
Station Name: Wolf Hills

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

- All of these breakers are HVB145-40000 type, SF6 filled. These breakers are 2000 (CBs B, C, & D) and 2001 (CB A) vintage and manufactured by GE-Hitachi.
- This type of CB requires maintenance beyond the typical SF6 model type because of air trip mechanisms. The entire air system must be rebuilt whenever maintenance is performed resulting in significant costs.
- The HVB145 model family has the propensity to mechanically pump closed instead of locking open as it awaits an electrical close command from the relaying. This presents a high mis-operation risk on the system.
- All of these breakers have exceeded or met the manufacturer's designed number of full fault operations of 10 – Breakers A, B, C, and D have experienced 43, 35, 12, and 10 fault operations, respectively. While each of these fault operations is likely not at the full fault current rating of the circuit breakers, fault operations of any magnitude come with accelerated aging.
- Environmental concerns: The HVB circuit breaker model used in this station has a high occurrence of SF6 gas leaks. There have been 215 malfunction records of "Low Gas" or "Adding SF6" across the AEP System. This is an environmental concern since SF6 is a potent greenhouse gas with a high climate change potential, and its concentration in the earth's atmosphere is rapidly increasing.

Relay concerns:

- Currently, 25 of the 33 relays (76% of all station relays) are in need of replacement.
- There are 12 electromechanical and 3 static type relays which have significant limitations with regards to fault data collection and retention, lack sufficient spare part availability, and lack vendor support. There are 10 microprocessor relays that utilize obsolete firmware.



# 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

**Need Number:** AEP-2019-AP046

**Process Stage:** Solutions Meeting 6/15/2021

**Previously Presented:** Needs Meeting 11/22/2019

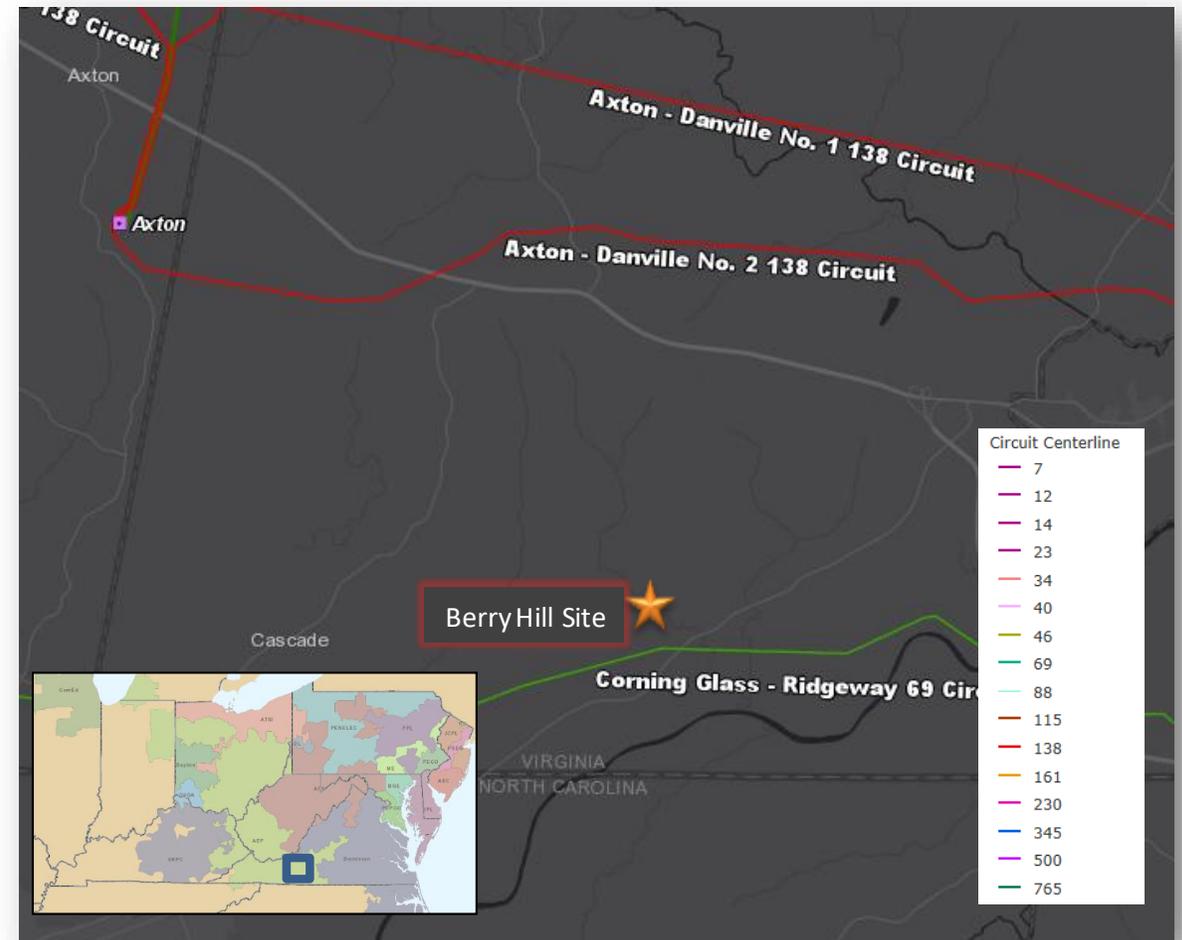
**Supplemental Project Driver:** Customer Request

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

**Problem Statement:**

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

**Model:** 2024 RTEP



**Need Number(s):** AEP-2019-AP046

**Process Stage:** Solutions Meeting 6/15/2021

**Proposed Solution:**

**Berry Hill 138 kV Station (\$0 M - Distribution)**

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

**Berry Hill 138 kV Extension (\$14.66 M)**

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

**Estimated Total Transmission Cost: \$14.66 M**

**Ancillary Benefits:**

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

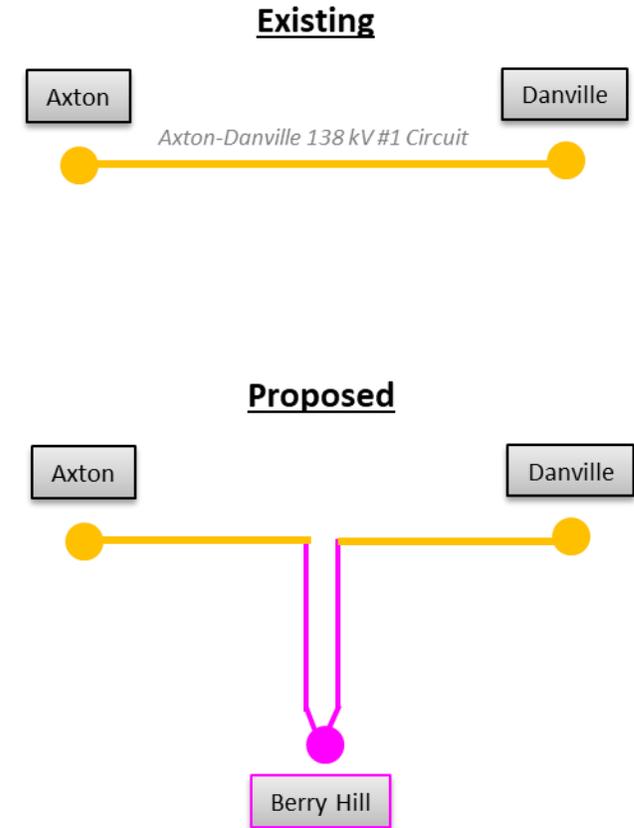
**Alternatives Considered:**

Tap the nearby Corning Glass-Ridgeway 69 kV Circuit to establish a new 69 kV Berry Hill station, however due to the intended nature to serve large industrial customers in the Berry Hill Mega Site, the 138 kV service is more desirable.

**Projected In-Service: 4/15/2022**

**Project Status: Scoping**

**AEP Transmission Zone M-3 Process  
Pittsylvania County, VA**



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

# 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

6/4/2021 – V1 – Original version posted to pjm.com

6/18/2021 – V2 – Slide #7, Corrected Need # to AEP-2021-AP026