Sub Regional RTEP Committee
PJM West

May 20, 2019

Proposal Window Exclusion Definitions

- The following definitions explain the basis for excluding flowgates and/or projects from the competitive planning process and designating projects to the incumbent Transmission Owner.
- Flowgates/projects excluded from competition will include the underlined language on the corresponding slide.
  - Immediate Need Exclusion: Due to the immediate need of the violation (3 years or less), the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be the Designated Entity. - Operating Agreement, Schedule 6 § 1.5.8(m)
  - Below 200kV Exclusion: Due to the lower voltage level of the identified violation(s), the driver(s) for this project are excluded from the competitive proposal window process. As a result, the local Transmission Owner will be the Designated Entity - Operating Agreement, Schedule 6 § 1.5.8(n)
  - FERC 715 (TO Criteria) Exclusion: Due to the violation need of this project resulting solely from FERC 715 TO Reliability Criteria, the driver(s) for this project are excluded from the competitive proposal window process. As a result, the local Transmission Owner will be the Designated Entity - Operating Agreement, Schedule 6 § 1.5.8(o)
  - Substation Equipment Exclusion: Due to identification of the limiting element(s) as substation equipment, the driver(s) for this project are excluded from the competitive proposal window process. As a result, the local Transmission Owner will be the Designated Entity - Operating Agreement, Schedule 6 § 1.5.8(p)

Second Review

Baseline Reliability Projects

Previously Presented on 2/20/2019 SRRTEP

TO Criteria Violation (FERC 715 (TO Criteria) Exclusion)

Problem Statement:
In the 2022 PJM Winter RTEP, TO Criteria violation due to exceeding thermal emergency rating (105% of the 35 MVA thermal emergency rating) on Mullens 138/46 kV transformer #4 under N-1-1 contingency condition involving the loss of the Bradley – Jehu Branch 138 kV line plus the loss of the Tams Mountain – Mullens 138 kV line.

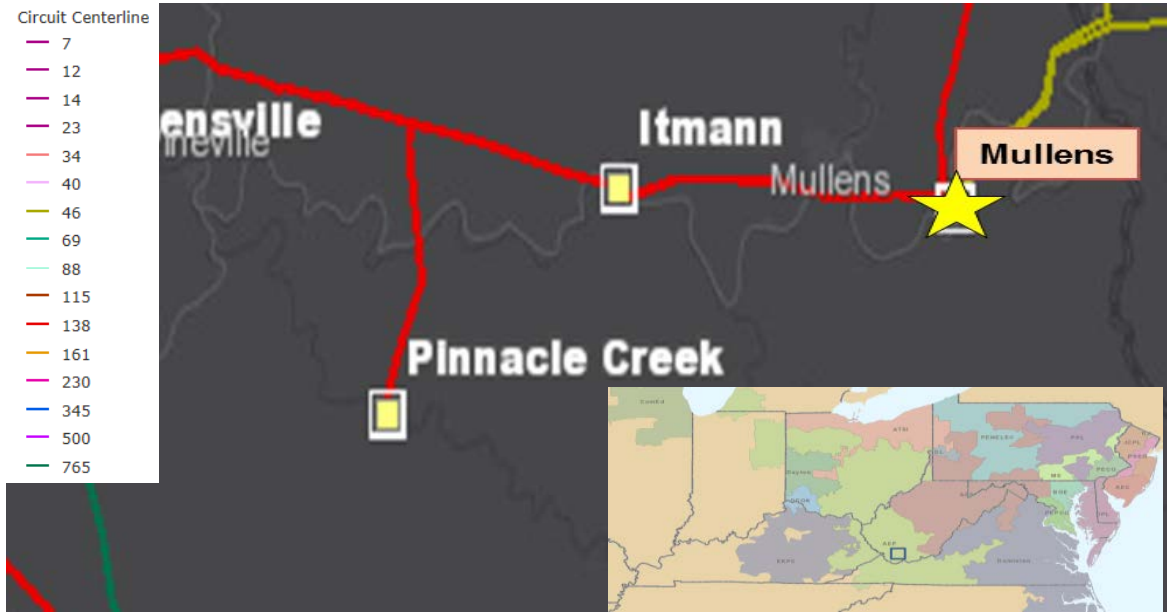
Selected Solution:
Replace existing Mullens 138/46kV 30 MVA transformer #4 and associated protective equipment with a new 138/46 kV 90 MVA transformer and associated protective equipment. (b3116)

Total Estimated Transmission Cost: $3.0M

Required In-service Date: 12/1/2022

Projected In-service Date: 6/1/2022

Project Status: Scoping



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AEP Transmission Zone: Baseline Chadwick 2nd Transformer Installation

Previously Presented on 2/20/2019 SRRTEP

TO Criteria Violation (FERC 715 (TO Criteria) Exclusion)

Problem Statement:

In the 2022 PJM Summer RTEP case, both thermal and voltage TO criteria violations were identified.

- The Leach – Miller S.S 69 kV line section (~0.5 mi.) will load to 113% of its summer emergency rating (75 MVA) for loss of the Big Sandy 138/69 kV transformer and Tri-State – West Huntington 138 kV circuit.
- For the loss of the 138/69 kV transformers at Chadwick and Kenova:
  - The Leach – Miller S.S 69 kV line section (~0.5 mi.) will load to 219% of its summer emergency rating (75 MVA) (127% of its largest conductor).
  - The South Neal – Miller S.S 69 kV line section (~1.5 mi.) will load to 205% of its summer emergency rating (82 MVA) (113% of its largest conductor).
  - The South Neal – West Huntington 69 kV line (~9.3 mi.) will load to 136% of its summer emergency rating (75 MVA) (100% of its largest conductor).
  - Voltage Magnitude issues at: South Neal (.91pu), Miller S.S. (.89pu), Leach (.89pu), England Hill (.88 pu), and ASFI (.88pu)
  - Voltage Deviation issues at: South Neal (8%), Miller S.S. (9%), Leach (9%), England Hill (10%), and ASFI (10%)
- Similar issues are observed for loss of the Chadwick 138/69 kV transformer followed by the loss of the Kenova – England Hill 69 kV or Tri State – South Point 138 kV circuits.

Additionally, high loading observed for the following circuits:

- The Big Sandy – Inco Burnaugh 69 kV line section (~6.6 mi.) will load to 99% of its summer emergency rating (102 MVA) (99% of its largest conductor).
- The Chadwick – England Hill 69 kV circuit loads to 97% of its summer emergency rating (148 MVA) of its largest conductor for the loss of the Kenova – England Hill 69 kV and Chadwick – Leach 69 kV circuits.
- The South Neal – Miller S.S 69 kV line section (~1.5 mi.) will load to 99.5% of its summer emergency rating (82 MVA) for loss of the Big Sandy 138/69 kV transformer and Tri-State – West Huntington 138 kV circuit.
- The Chadwick – Leach 69 kV circuit loads to 99.6% of its summer emergency rating (148 MVA) of its largest conductor for the loss of the Kenova – England Hill 69 kV and Chadwick – England Hill 69 kV circuits.

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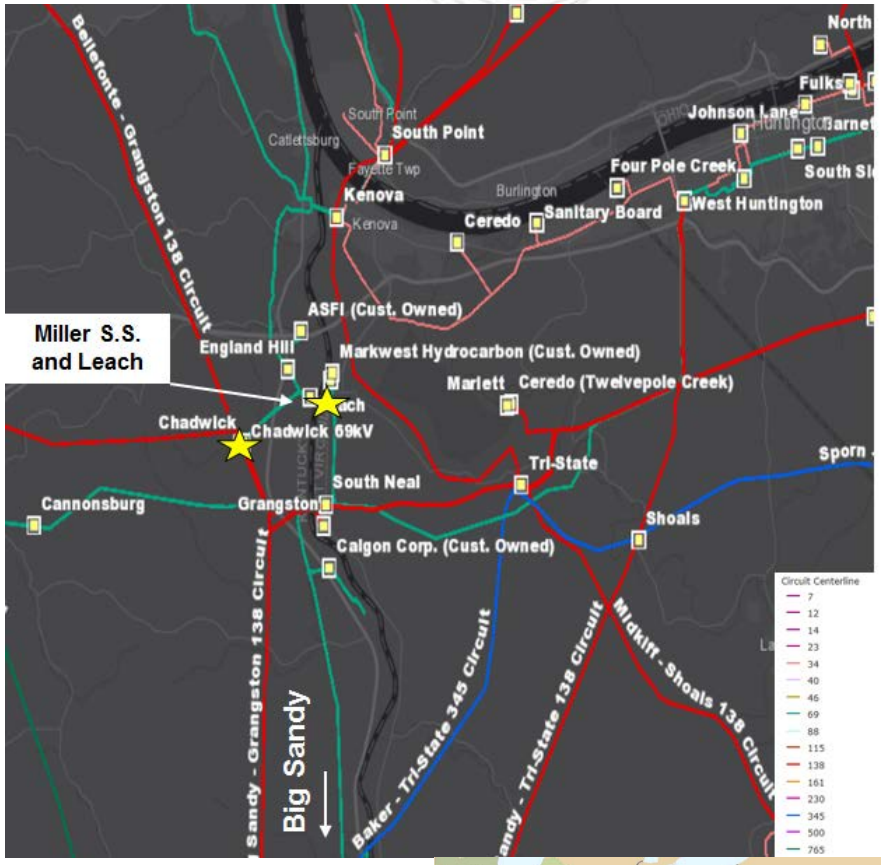

AEP Transmission Zone: Baseline
Chadwick 2nd Transformer Installation

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Selected Solution:

Chadwick station: Expand existing Chadwick station and install a second 138/69 kV transformer at a new 138 kV bus tied into the Bellefonte – Grangston 138 kV circuit. The 69 kV bus will be reconfigured into a ring bus arrangement to tie the new transformer into the existing 69 kV via installation of four 3000A 63 kA 69 kV circuit breakers. (b3118.1)

Estimated Conceptual Trans. Cost: $9.3M

Grangston Station: Remote end will be required at Grangston station. (b3118.2)

Estimated Conceptual Trans. Cost: $0.5M

Bellefonte Station: Remote end will be required at Bellefonte station. (b3118.3)

Estimated Conceptual Trans. Cost: $0.5M

Chadwick – Leach 69 kV: Relocate the Chadwick – Leach 69 kV circuit within Chadwick station. (b3118.4)

Estimated Conceptual Trans. Cost: $0.5M

Bellefonte Grangston 138 kV circuit: The Bellefonte – Grangston 138 kV circuit currently spans over top of Chadwick station, but does not terminate. Work will be completed to bring the circuit into Chadwick station at the newly established 138 kV bus. (b3118.5)

Estimated Conceptual Trans. Cost: $1.1M

Chadwick – Tri-State #2 138 kV circuit: The existing Chadwick – Tri-State #2 138 kV circuit will be reconfigured within the station to terminate into the newly established 138 kV bus #2 at Chadwick due to construability aspects. (b3118.6)

Estimated Conceptual Trans. Cost: $0.1M

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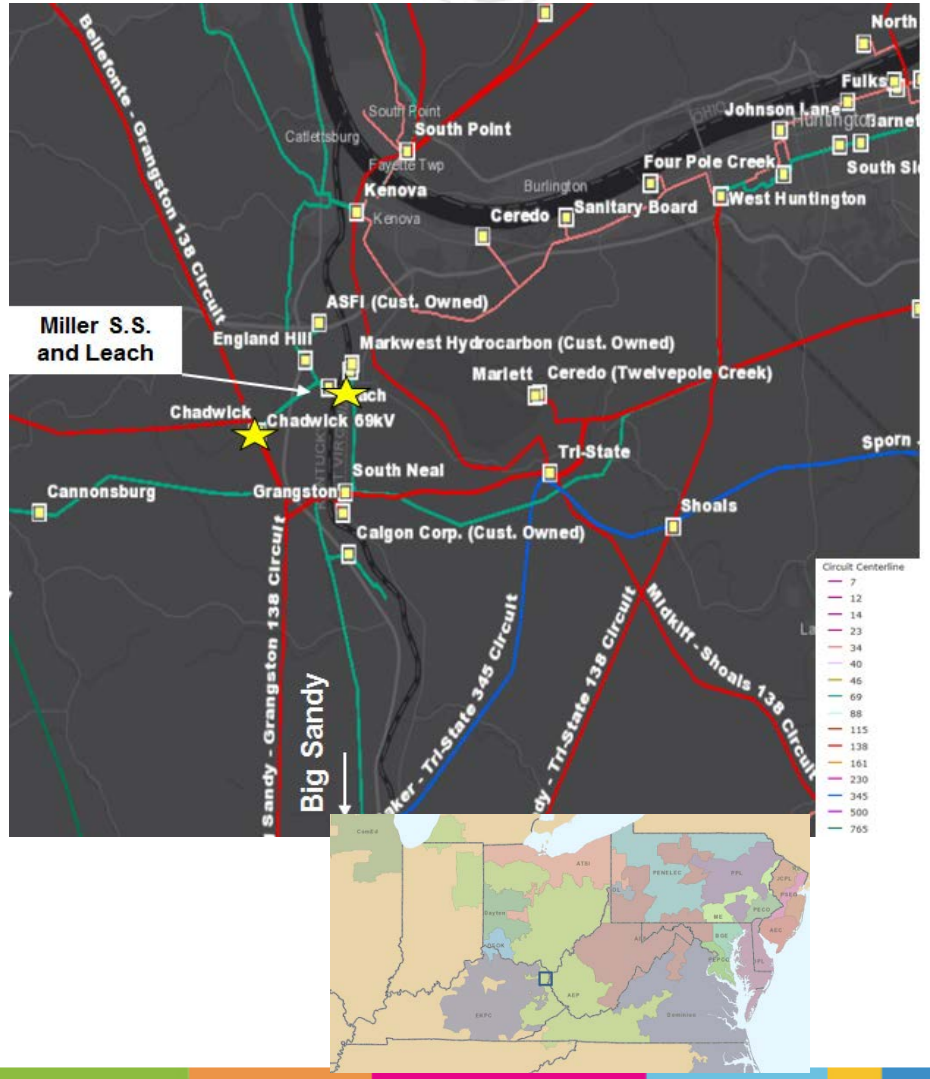

AEP Transmission Zone: Baseline Chadwick 2nd Transformer Installation

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Chadwick – Leach and Chadwick – England Hill 69 kV circuits (share same structures for majority of circuits):
Reconductor circuits with 795 ACSS conductor. A LiDAR survey and a sag study will need to be performed to confirm that the reconductored circuits would maintain acceptable clearances. (b3118.7)

Estimated Conceptual Trans. Cost: $3.3M

South Neal Station:
Replace line risers towards Leach station. Replace 20 kA 69 kV circuit breaker 'F' with a new 3000A 40 kA 69 kV circuit breaker (b3118.8)

Estimated Conceptual Trans. Cost: $0

Leach – Miller S.S. 69 kV line section:
Rebuild 336 ACSR portion of Leach - Miller S.S 69 kV line section (~0.3 miles) with 795 ACSS conductor. (b3118.9)

Estimated Conceptual Trans. Cost: $1.5M

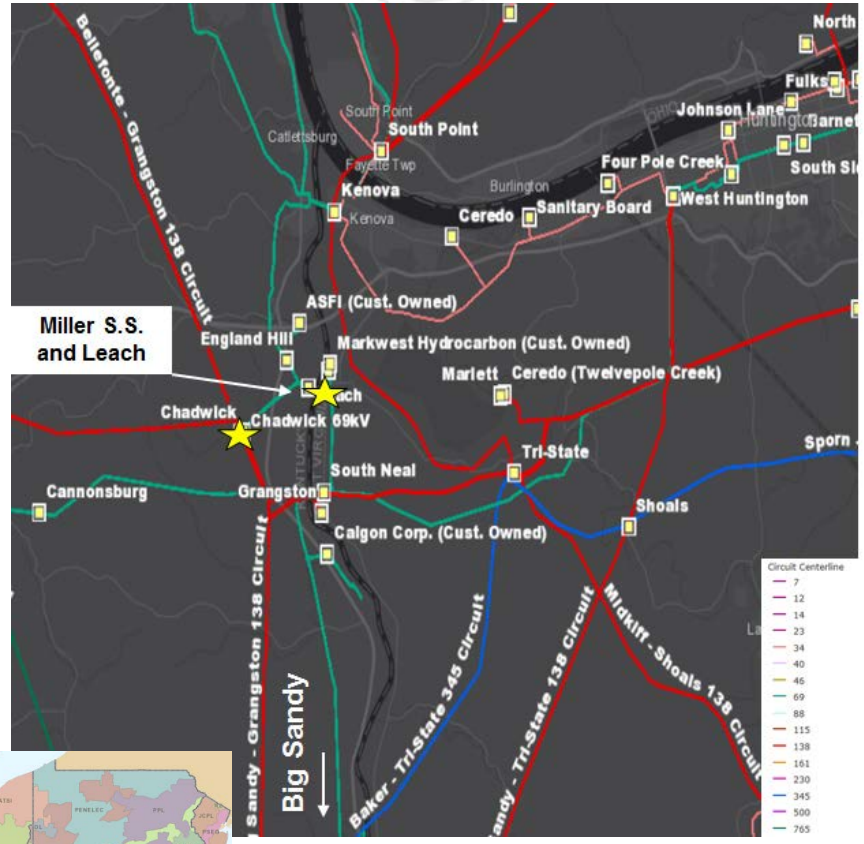
Leach Station:
Replace line risers towards Chadwick station. (b3118.10)

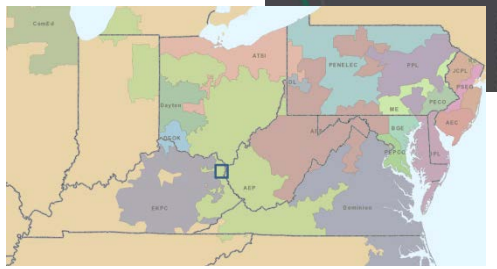
Estimated Conceptual Trans. Cost: $0.1M

Required In Service Date: 6/1/2022

Projected In Service Date: 10/1/2020

Project Status: Scoping





AEP Transmission Zone: Baseline
Clifford-Scottsville, VA Area

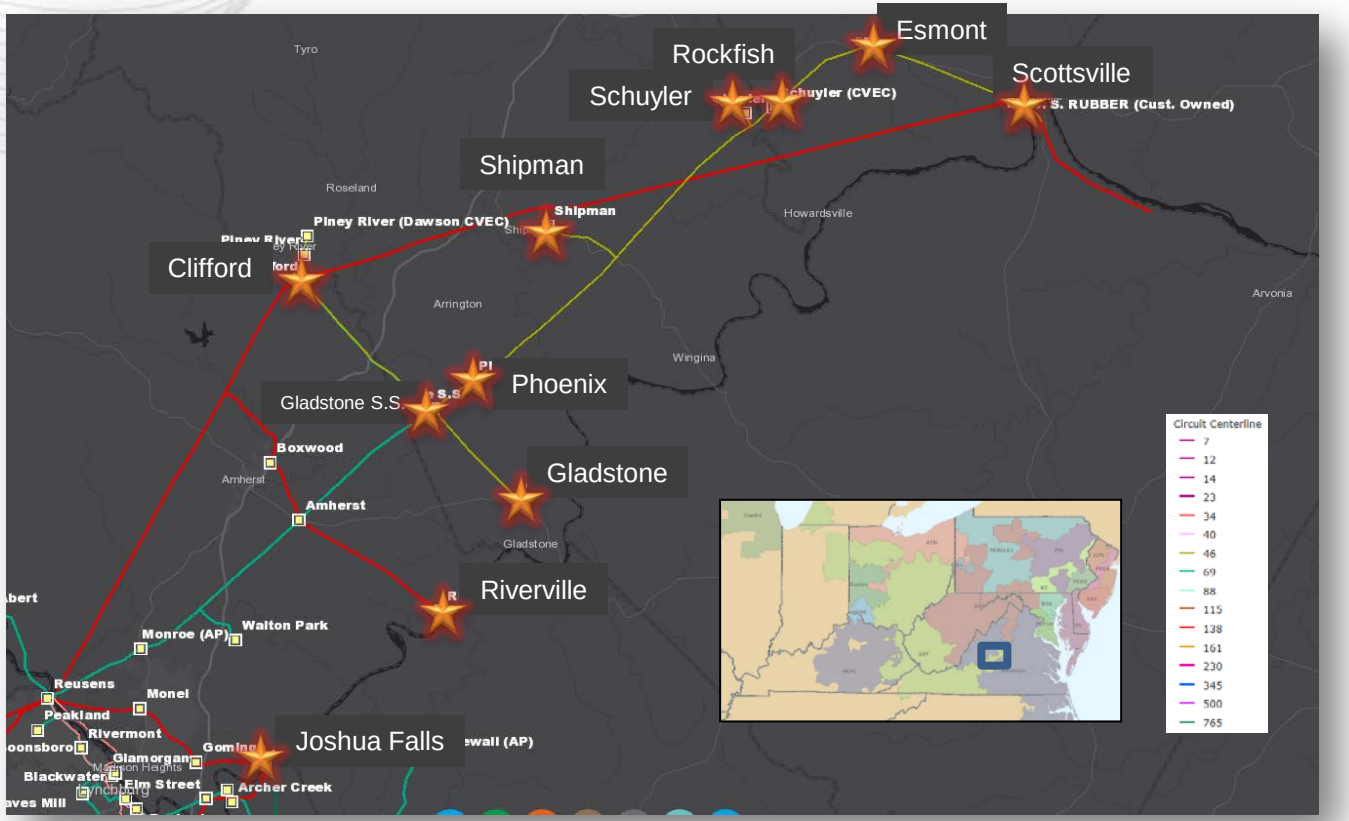
Previously Presented on 2/20/2019 SRRTEP

TO Criteria Violation (FERC 715 (TO Criteria) Exclusion)

Problem Statement:
In the 2022 PJM Winter RTEP case, both thermal and voltage T.O. planning criteria violations were identified.

For the loss of both transformers at Scottsville (138/46 kV T#1 & T#2 in parallel and 138/46 kV T#5 or the failure of breaker T) the Clifford 138/69-46 kV T#1 tertiary exceeds its emergency rating of 26 MVA by 229% and the Clifford-Gladstone Tap 46 kV (42 MVA) and Gladstone Tap-Phoenix 46 kV (42 MVA) line sections exceed their emergency ratings by 115% and 100% respectively. In addition, all the 46 kV bus voltages served by the Clifford-Scottsville 46 kV circuit experienced extreme low voltage magnitude and drop violations resulting a voltage collapse scenario. The 46 kV bus voltages violations include Scottsville, Esmont, Rockfish, Schuyler, Shipman, Phoenix, Gladstone, Clifford and Piney River.

Also, for the loss of both transformers at Clifford (138/69-46 kV T#1 and 138/46 kV T#3) the Scottsville 138/46 kV T#5 exceeds its emergency rating of 30 MVA by 187% and the same 46 kV bus voltages served by the Clifford-Scottsville 46 kV circuit experience extreme low voltage magnitude and drop violations resulting in per unit voltages of 0.83 p.u. and below.



AEP Transmission Zone: Baseline
Clifford-Scottsville, VA Area

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Selected Solution:

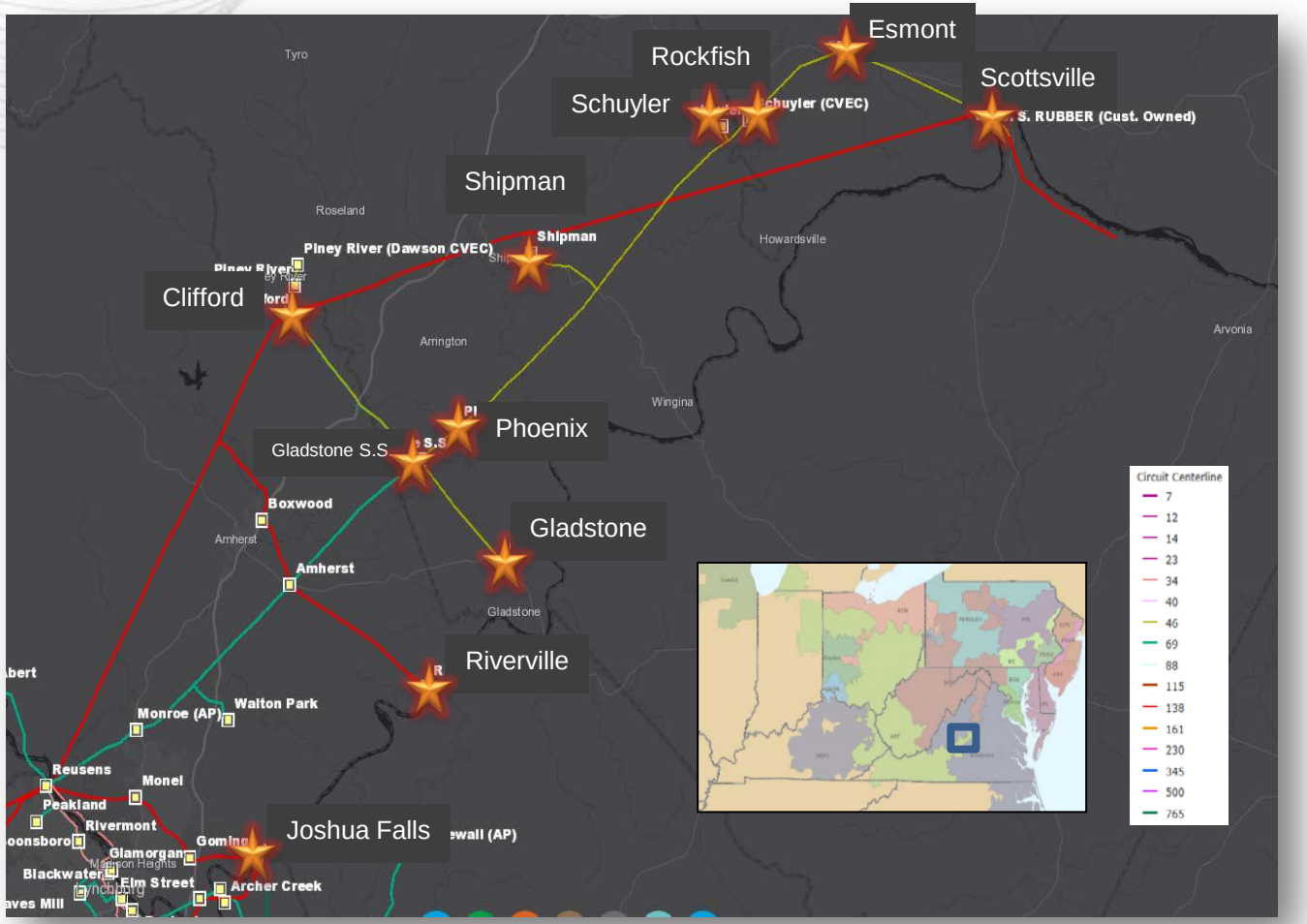
Retire approximately 38 miles of the 44 mile Clifford-Scottsville 46 kV circuit. Build new 138 kV "in and out" to two new Distribution stations to serve the load formerly served by Phoenix, Shipman, Schuyler (AEP), and Rockfish stations. Construct new 138 kV lines from Joshua Falls-Riverville (~10 mi.) and Riverville-Gladstone (~5 mi.). Install required station upgrades at Joshua Falls, Riverville and Gladstone stations to accommodate the new 138 kV circuits. Rebuild Reusen – Monroe (~4 mi.) (b3208)

Total Estimated Transmission Cost: $85 M

Required In-service Date: 12/1/2022

Projected In-service: 12/1/2022

Project Status: Scoping



AEP Transmission Zone: Baseline
Decatur, Indiana

Previously Presented on 4/23/2019 SRRTEP

TO Criteria Violation (FERC 715 (TO Criteria) Exclusion)

Problem Statement:
In 2022 and 2023 RTEP cases, the following issues were observed:
Upon loss of Magley – Decatur 69 kV and Lincoln 138/69/34.5 kV XF, Berne – Monroe 69 kV circuit overloads to 154% of the 50 MVA 4/0 ACSR; Monroe – South Decatur 69 kV circuit overloads to 137% of the 50 MVA 4/0 ACSR.
Additionally, Decatur – Berne 69 kV line is 1966 vintage wood pole line.

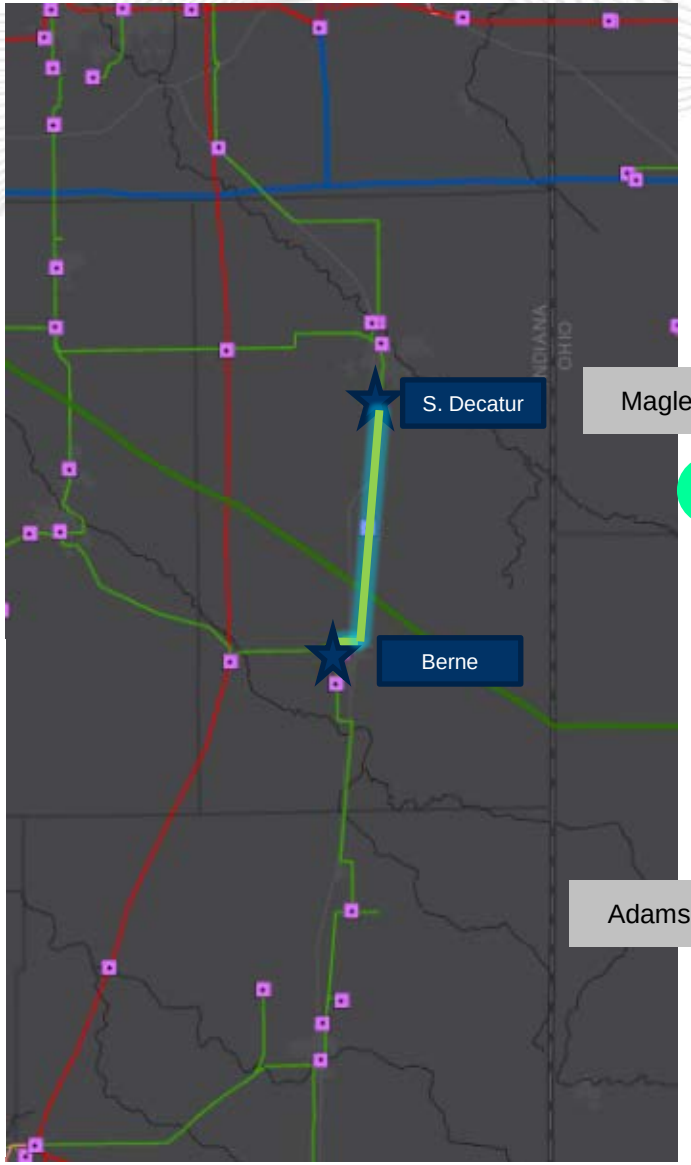
Selected Solution:
Rebuild the 10.5 mile Berne – South Decatur 69 kV line using 556 ACSR in order to alleviate the overload and address a deteriorating asset. (b3209)

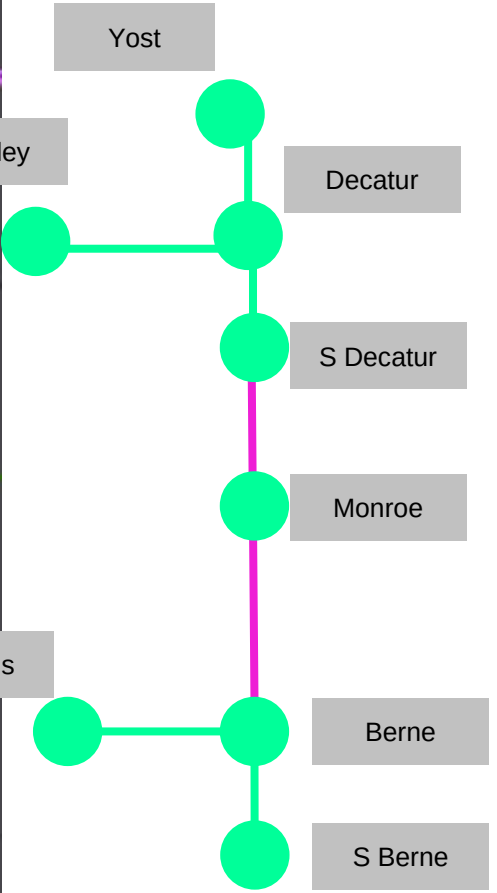
Estimated Transmission Cost: $16.6 M

Required IS Date: 6/1/2022

Projected IS Date: 6/1/2022

Project Status: Scoping





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

Circuit Centerline
7
12
14
23
34
40
46
69
88
115
138
161
230
345
500
765

Short Circuit Projects

DLCO Transmission Zone: Baseline
West Mifflin 138kV Breaker "Z-94", "Z-74", "Z-14" and "Z-13" Replacements

Baseline Reliability: Generator Deactivation
***This project inherits the exclusion of its parent project.**

Problem Statement: Short Circuit
The West Mifflin 138kV breakers "Z-94", "Z-74", "Z-14", and "Z-13" are overdutied.

Significant Driver:
b3064: Expand Elrama 138 kV substation to loop in the existing USS Steel Clariton - Piney Fork 138 kV line (Generator Deactivation Reinforcement, previously presented on 11/8/2018 TEAC)

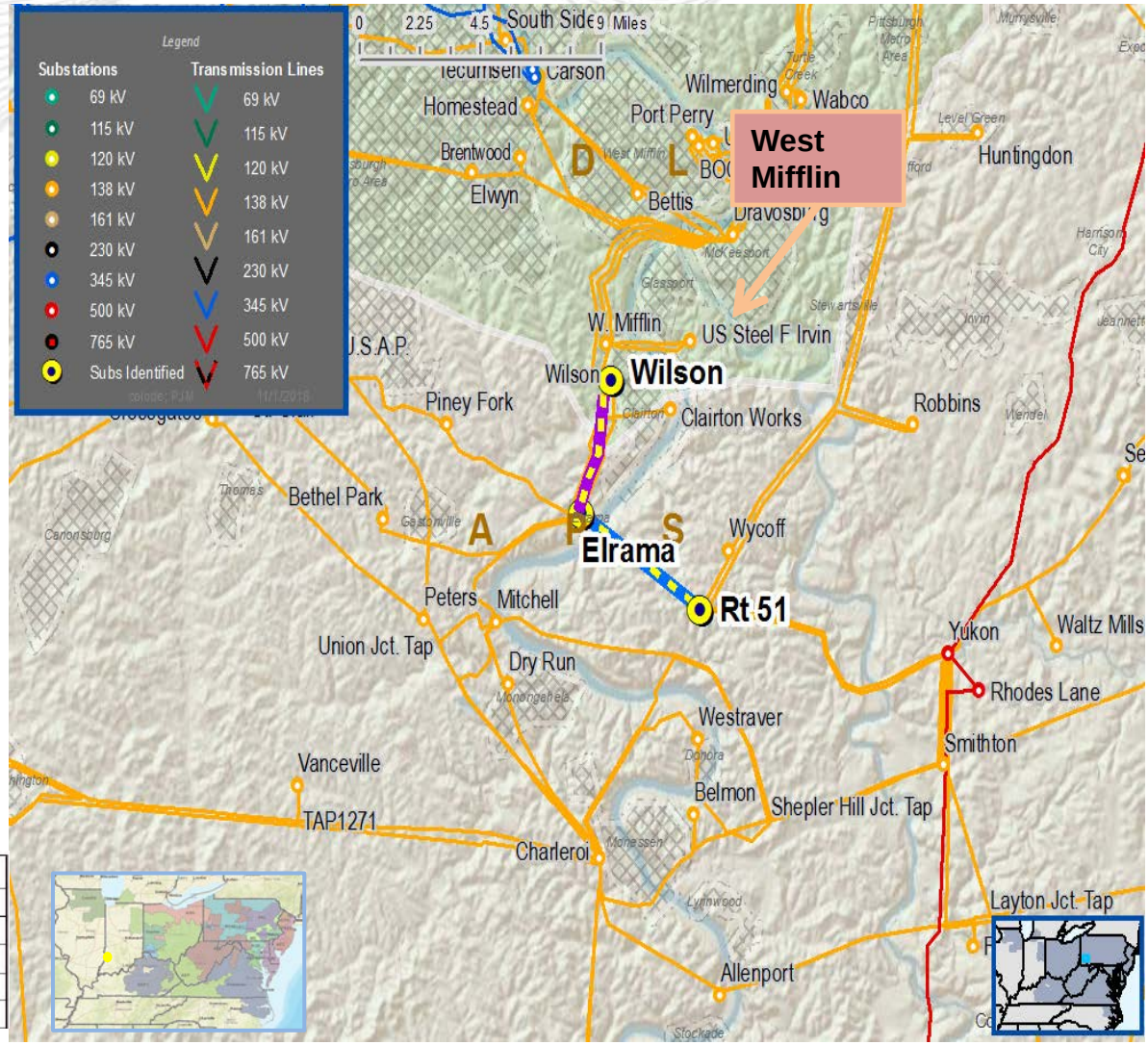
Recommended Solution:
Replace the West Mifflin 138kV breakers "Z-94" ($0.7M), "Z-74" ($0.8M), "Z-14" ($0.8M), and "Z-13" ($0.8M) with 63kA breakers (**b3064.2**)

Estimated Project Cost: $3.1 M

Required In-service Date: 6/1/2021

Projected In-service Date: 6/1/2021

Project Status: Conceptual



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

First Review

Baseline Reliability Projects

AEP Transmission Zone: Baseline
Jay - Portland

TO Criteria Violation (FERC 715 (TO Criteria) Exclusion)

Problem Statement:

For loss of Bluff Point – Portland 69kV and Adams – Berne 69kV lines, the following violation occurs in the 2022 RTEP case:

North Portland, Trinity, Berne, South Berne, Monroe and S. Decatur drop below .92 PU with North Portland reaching .8229 PU. The Bockoven load addition (need number AEP-2018-IM005) makes these violations slightly worse.

Proposed Solution:

Jay – North Portland 138/69kV line.

Rebuild the 138kV Jay – Pennville line as double circuit 138/69kV.

Build a new 9.8 mile single circuit 69 kV line from near Pennville station to North Portland station

Cost: $38.1M

Jay 138/69/34.5kV station

Install 3 69kV breakers to create the "U" string and add a low side breaker on the Jay transformer 2.

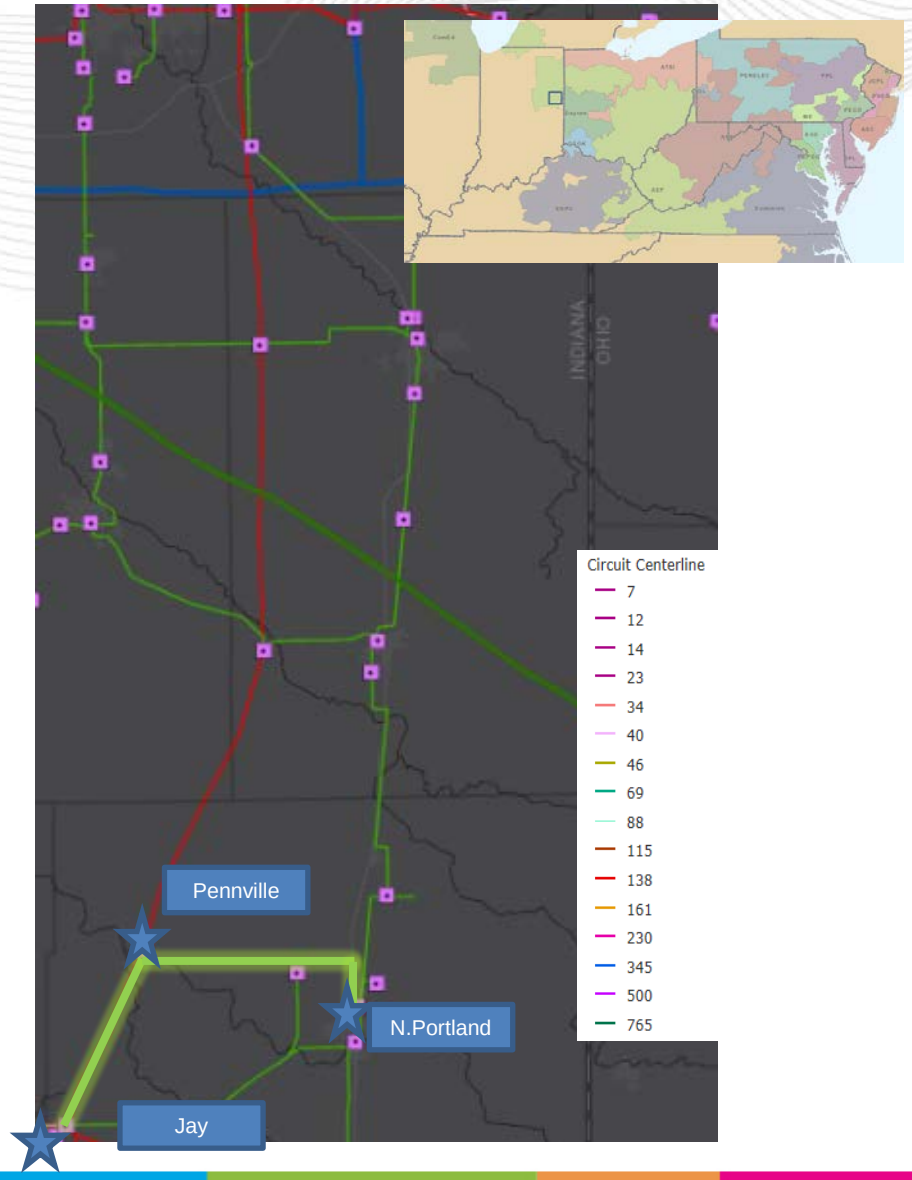
Cost: $3.4M

North Portland 69kV station

Install 2 69kV breakers to complete the ring and allow for the new line.

Cost: $1.9M

Total Estimated Transmission Baseline* Cost: $43.4M



AEP Transmission Zone: Baseline
Jay - Portland

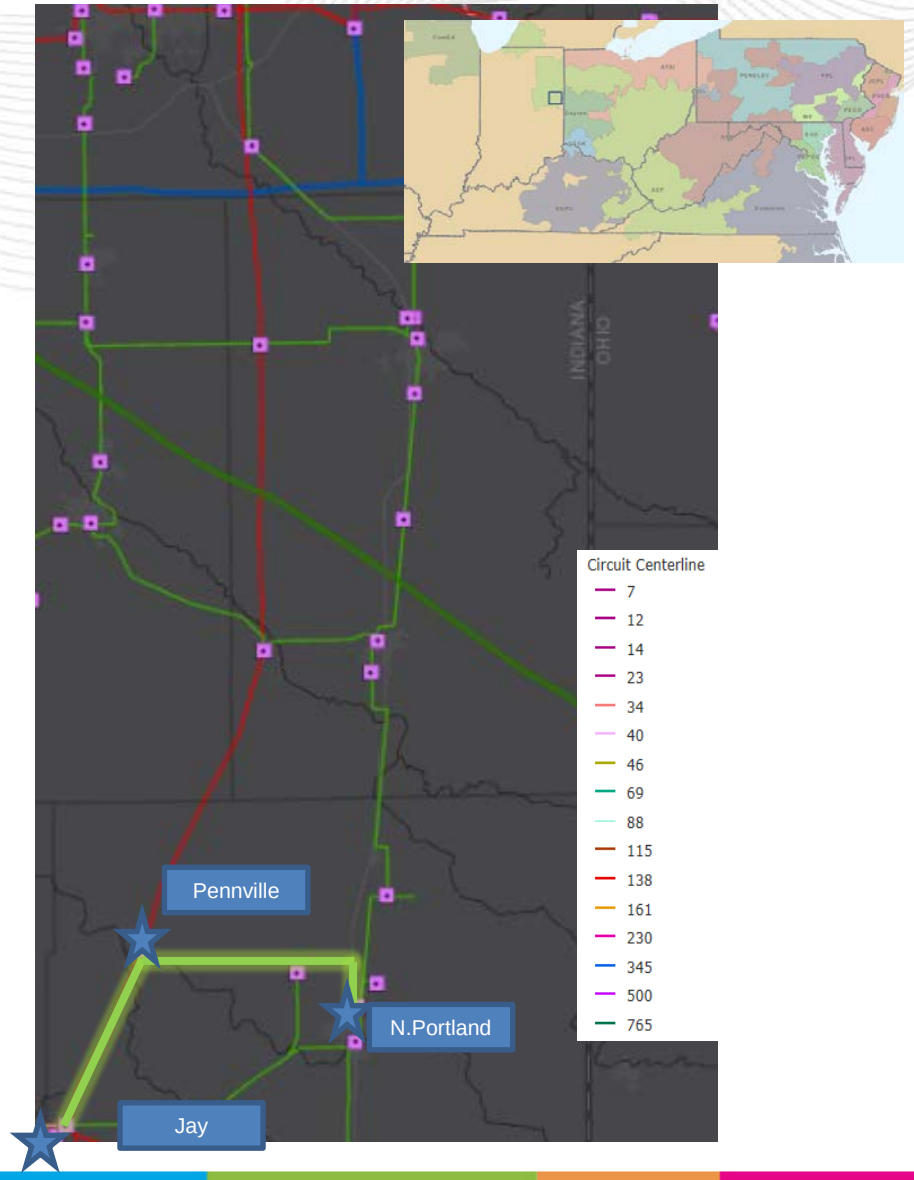
Alternatives:

Rebuild the 16 mile Berne – North Portland 69kV line and install a 14.4Mvar Cap Bank at North Portland in lieu of building the new Jay – North Portland line (10 mile rebuild not including the double circuit section). Cost: $28M.

This alternative does not address the radial Antiville station or the asset condition of the Jay-Pennville line, which needs minimum additional $20 - $21M to fix. This alternate also only brings the voltage in the area up to around .93PU as Berne is a weaker source. Because of this, this solution does not allow for any real load growth, which this area has seen a lot of in the past 10 years. For these reasons, this alternate was not preferred.

Required IS Date: 6/1/2022

Project Status: Scoping



Next Steps

Upcoming Western SRRTEP Dates

West	Start	End
6/17/2019	12:00	4:00
7/22/2019	12:00	4:00

Questions?

Revision History

5/13/2019 – V1 – Original version posted to pjm.com

5/14/2019 – V2 – Slide #2: Added “exclusion” to underlined categories

– Slide #4, #5, #8, #13: Added competition exclusion category

5/15/2019 – V3 – Add Slide #16- #18

5/17/2019 – V4 –Slides #17- #18, Update footer, Slide #18, change Portland to North Portland

– Remove Slides #5, #6, #7

5/17/2019 – V5 –Slides #15, Correct breaker names in Problem Statement