Western Sub Regional RTEP:
APS Supplemental Projects

February 14, 2025

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

APS Transmission Zone M-3 Process
Shepherdstown, WV/Sleepy Hollow, WV

Need Number: APS-2025-005
Process Stage: Needs Meeting: 2/14/2025
Supplemental Project Driver: Equipment Condition/Performance/Risk

Specific Assumption Reference:

System Performance Projects Global Factors

- Substation/line equipment limits

System Reliability and Performance

- Substation Condition Rebuild/Replacement
- Upgrade relay schemes
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

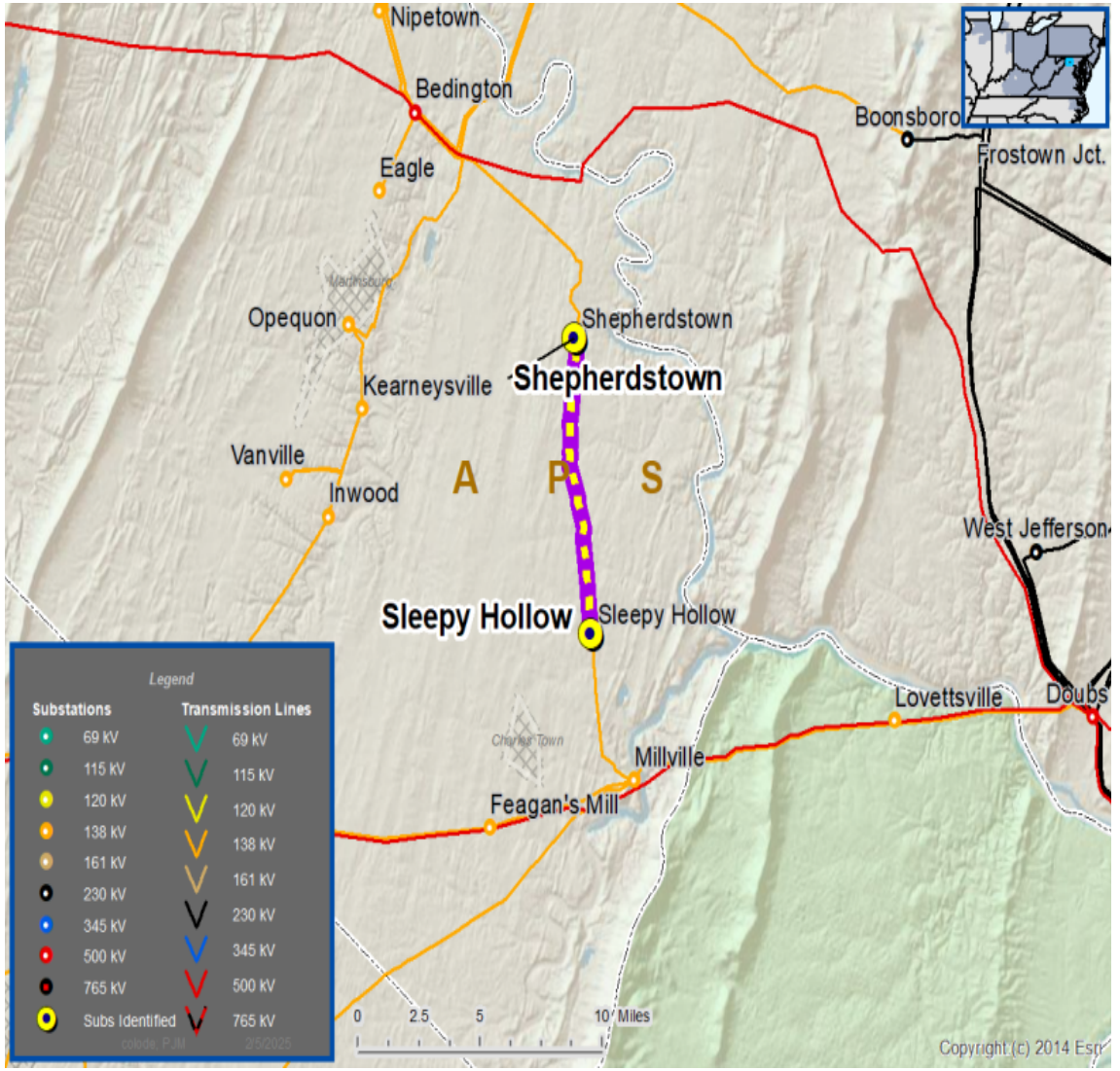
Problem Statement:

FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation on Shepherdstown - Sleepy Hollow 138 kV Line.

Proper operation of the protection scheme requires all the separate components to perform adequately during a fault. In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.

Transmission line ratings are limited by terminal equipment.

- Existing line ratings: 221 / 268 / 250 / 306 MVA SN/SE/WN/WE
- Existing conductor ratings: 221 / 268 / 250 / 317 MVA SN/SE/WN/WE



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

APS Transmission Zone M-3 Process
Misoperation Relay Projects

Need Number: APS-2024-114, APS-2024-116
Process Stage: Solutions Meeting: 2/14/2025
Previously Presented: Needs Meeting: 12/13/2024
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference:
System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

System Condition Projects

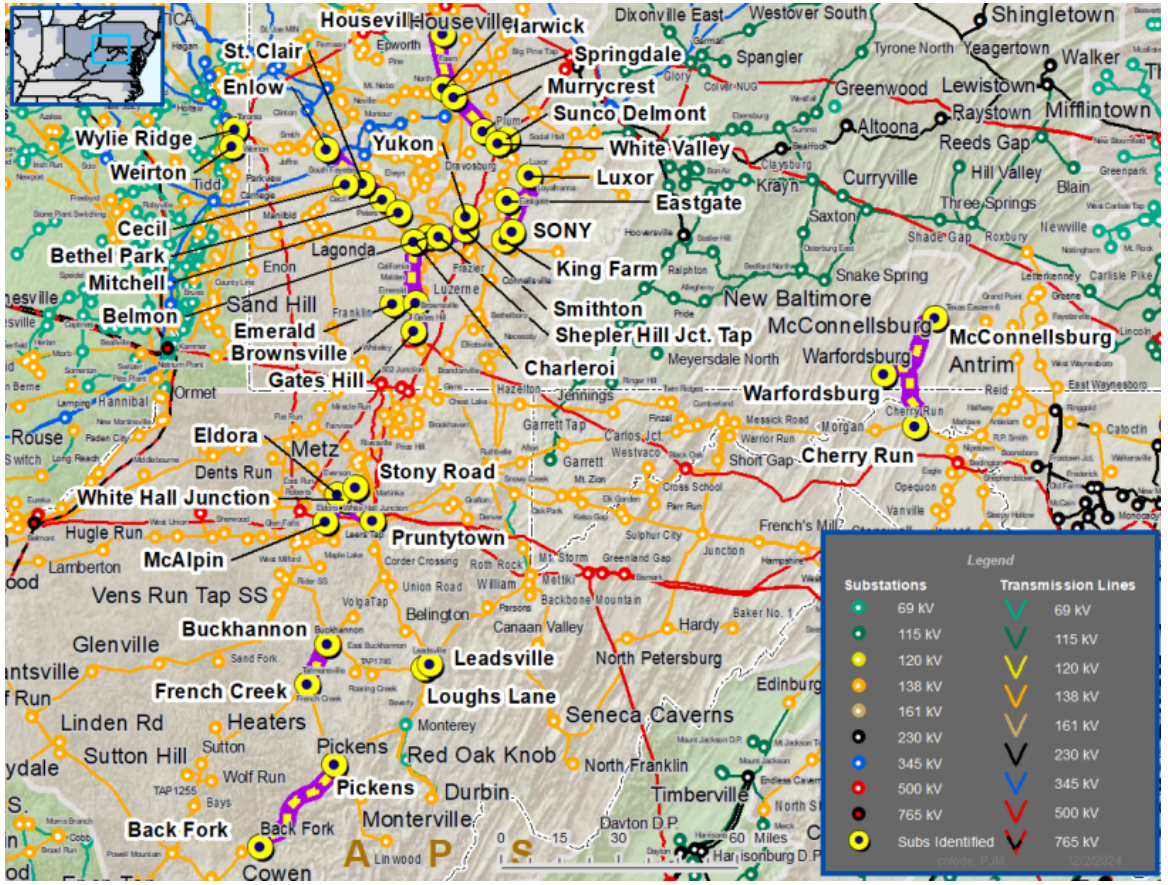
- Substation Condition Rebuild/Replacement

Upgrade Relay Schemes

- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.



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APS Transmission Zone M-3 Process
Misoperation Relay Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating MVA (SN / SE / WN / WE)	Existing Conductor Rating MVA (SN / SE / WN / WE)
APS-2024-114	Buckhannon – French Creek 138 kV Line	229 / 229 / 229 / 229	308 / 376 / 349 / 445
APS-2024-116	Weirton – Wylie Ridge 138 kV No. 1 Line	225 / 292 / 306 / 306	308 / 376 / 349 / 445

APS Transmission Zone M-3 Process Misoperation Relay Projects

Need Number: APS-2024-114
Process Stage: Solutions Meeting: 2/14/2025

Proposed Solution:

Buckhannon Substation: At Buckhannon, replace circuit breaker, disconnect switch, substation conductor, wave trap, line turner and coax, and relaying. Estimated Cost: $3.55 M

French Creek Substation: At French Creek, replace circuit breaker, disconnect switch, substation conductor, wave trap, line turner and coax, and relaying. Estimated Cost: $3.55 M

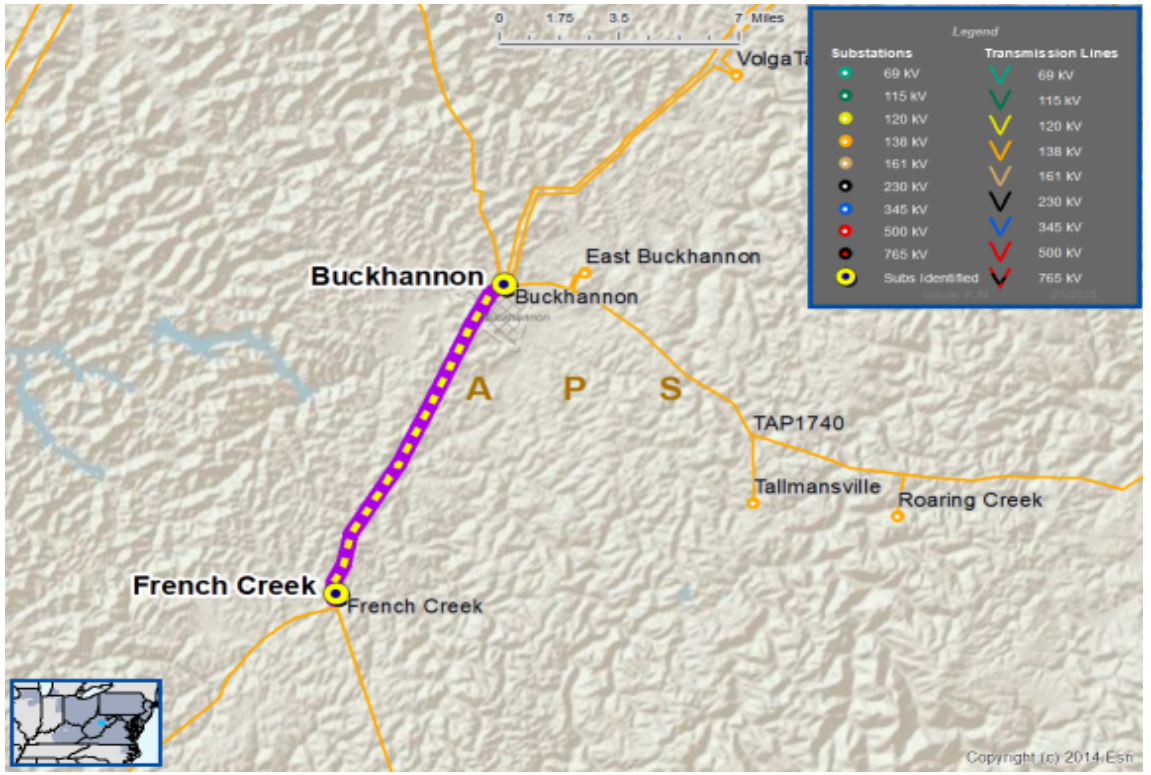
Transmission Cost Estimate: $7.1 M

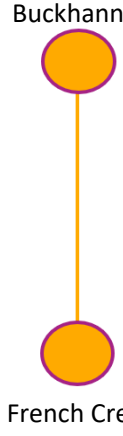
Alternatives Considered:

Maintain equipment in existing condition with elevated risk of misoperations.

Projected In-Service: 03/30/2029

Project Status: Conceptual





Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

APS Transmission Zone M-3 Process Misoperation Relay Projects

Need Number: APS-2024-116
Process Stage: Solutions Meeting: 2/14/2025

Proposed Solution:

Weirton Substation: At Weirton, replace circuit breaker, disconnect switches, wave trap, substation conductor, line turner and coax, and relaying. Estimated Cost: $3.52 M

Wylie Ridge Substation: At Wylie Ridge, replace circuit breaker, disconnect switches, wave trap, substation conductor, line turner and coax, and relaying. Estimated Cost: $3.52 M

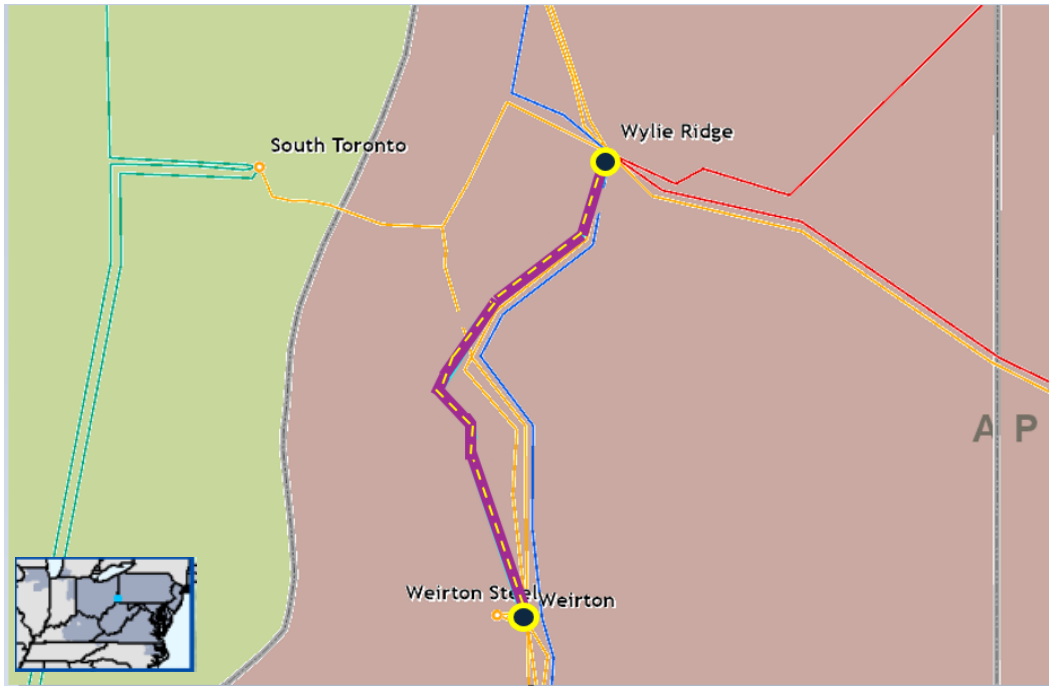
Transmission Cost Estimate: $7.04 M

Alternatives Considered:

Maintain equipment in existing condition with elevated risk of misoperations.

Projected In-Service: 04/27/2029

Project Status: Conceptual



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

APS Transmission Zone M-3 Process
Misoperation Relay Projects

Need Number: APS-2024-090
Process Stage: Solutions Meeting: 2/14/2025
Previously Presented: Needs Meeting: 10/18/2024
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference:
System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

System Condition Projects

- Substation Condition Rebuild/Replacement

Upgrade Relay Schemes

- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

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APS Transmission Zone M-3 Process
Misoperation Relay Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating MVA (SN / SE / WN / WE)	Existing Conductor Rating MVA (SN / SE / WN / WE)
APS-2024-090	Windsor – Tiltonsville (AEP) 138 kV Line	329 / 361 / 419 / 453	329 / 361 / 424 / 453

APS Transmission Zone M-3 Process Misoperation Relay Projects

Need Number: APS-2024-090
Process Stage: Solutions Meeting: 2/14/2025

Proposed Solution:

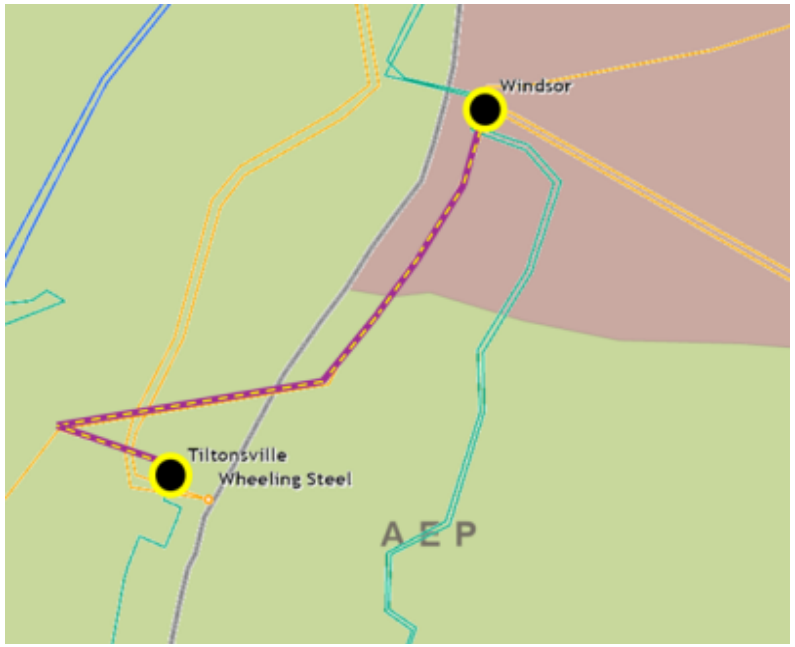
Windsor Substation: At Windsor, replace substation conductor, line turner and coax, and relaying. Estimated Cost: $1.05 M

Transmission Cost Estimate: $1.05 M

Alternatives Considered:

Maintain equipment in existing condition with elevated risk of misoperations.

Projected In-Service: 11/20/2026
Project Status: Conceptual



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

APS Transmission Zone M-3 Process
Albright Substation

Need Number: APS-2024-072
Process Stage: Solutions Meeting: 2/14/2025
Previously Presented: Needs Meeting: 8/16/2024
Supplemental Project Driver: Equipment Condition/Performance/Risk

Specific Assumption Reference:

System Performance Global Factors

- System reliability/performance
- Substation/Line equipment limits

Substation Condition Rebuild/Replacement

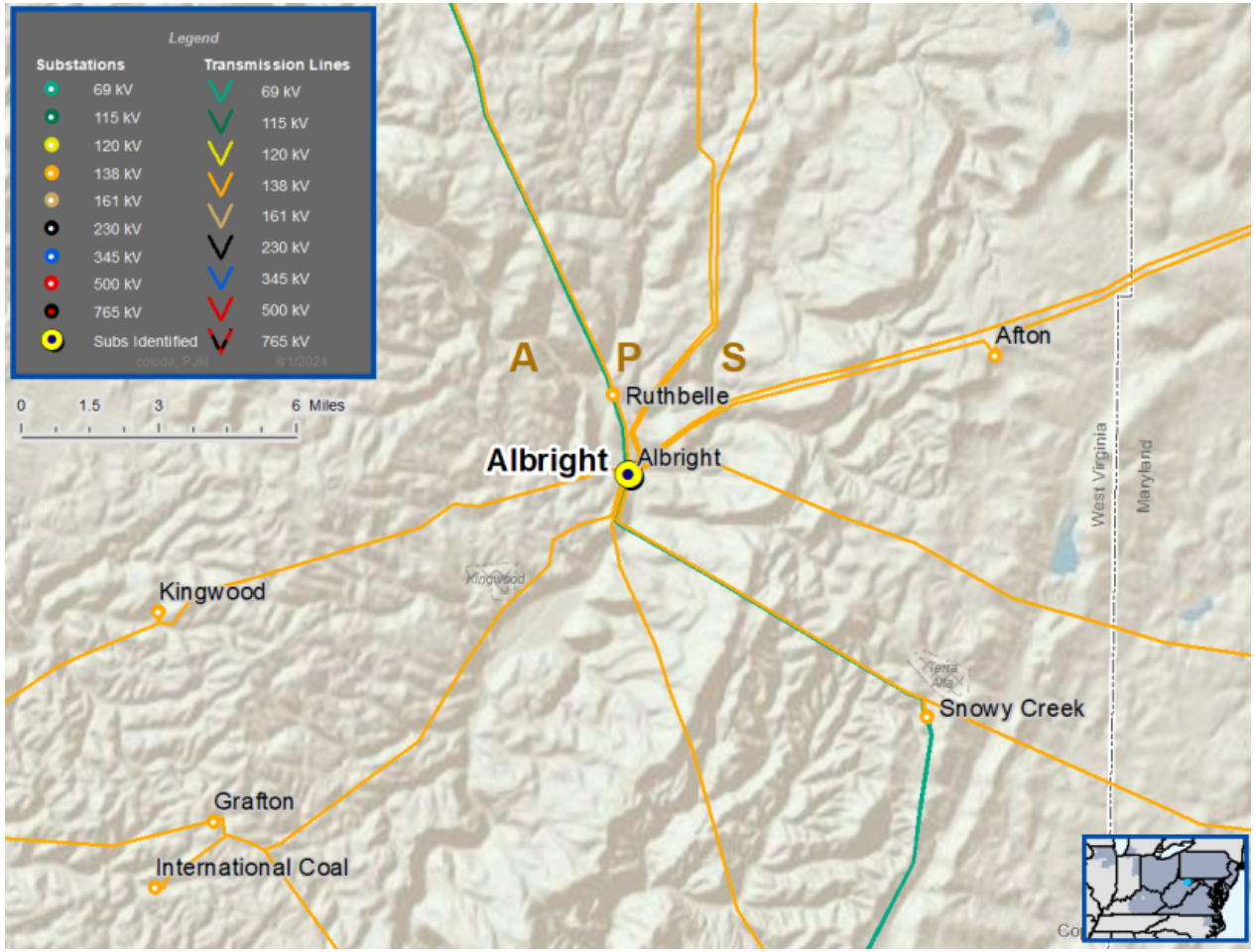
- Age/condition of substation equipment
- Circuit breakers and other fault interrupting devices

Problem Statement:

- The existing Albright 138 kV breaker AJ1 is 44 years old.
- Carrier sets, breakers and associated line trap on this terminal are beyond their useful life and are prone to failure.
- Replacement components are difficult to source in quantity leading to non-standard repairs.
- The line is currently limited by terminal equipment.

Albright – Snowy Creek Tap 138 kV Line

- Existing line rating: 195 / 209 / 217 / 229 MVA (SN/SE/WN/WE)
- Existing conductor rating: 221 / 268 / 250 / 317 MVA (SN/SE/WN/WE)



APS Transmission Zone M-3 Process
Albright Substation

Need Number: APS-2024-072
Process Stage: Solutions Meeting: 2/14/2025

Proposed Solution:

Albright Substation: At Albright, replace circuit breaker, disconnect switches, wave trap, and relaying. Estimated Cost: $1.69 M

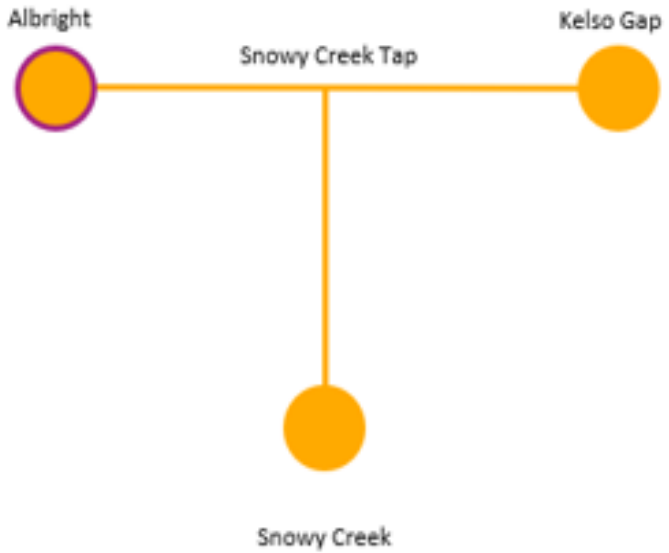
Transmission Cost Estimate: $1.69 M

Alternatives Considered:

Maintain equipment in existing condition with elevated risk of equipment failure.

Projected In-Service: 08/20/2029

Project Status: Conceptual



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
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46 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

2/4/2025 – V1 – Original version posted to pjm.com

2/6/2025 – V2 – Maps Updated

2/12/2025 – V3 – Bubble diagrams and maps updated