Subregional RTEP Committee – Western
FirstEnergy Supplemental Projects

APS Transmission Zone

July 17, 2026

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 Misoperations Relay

Need Number: APS-2026-008
Process Stage: Need Meeting 07/17/2026
Project Driver: Equipment Condition/Performance/Risk

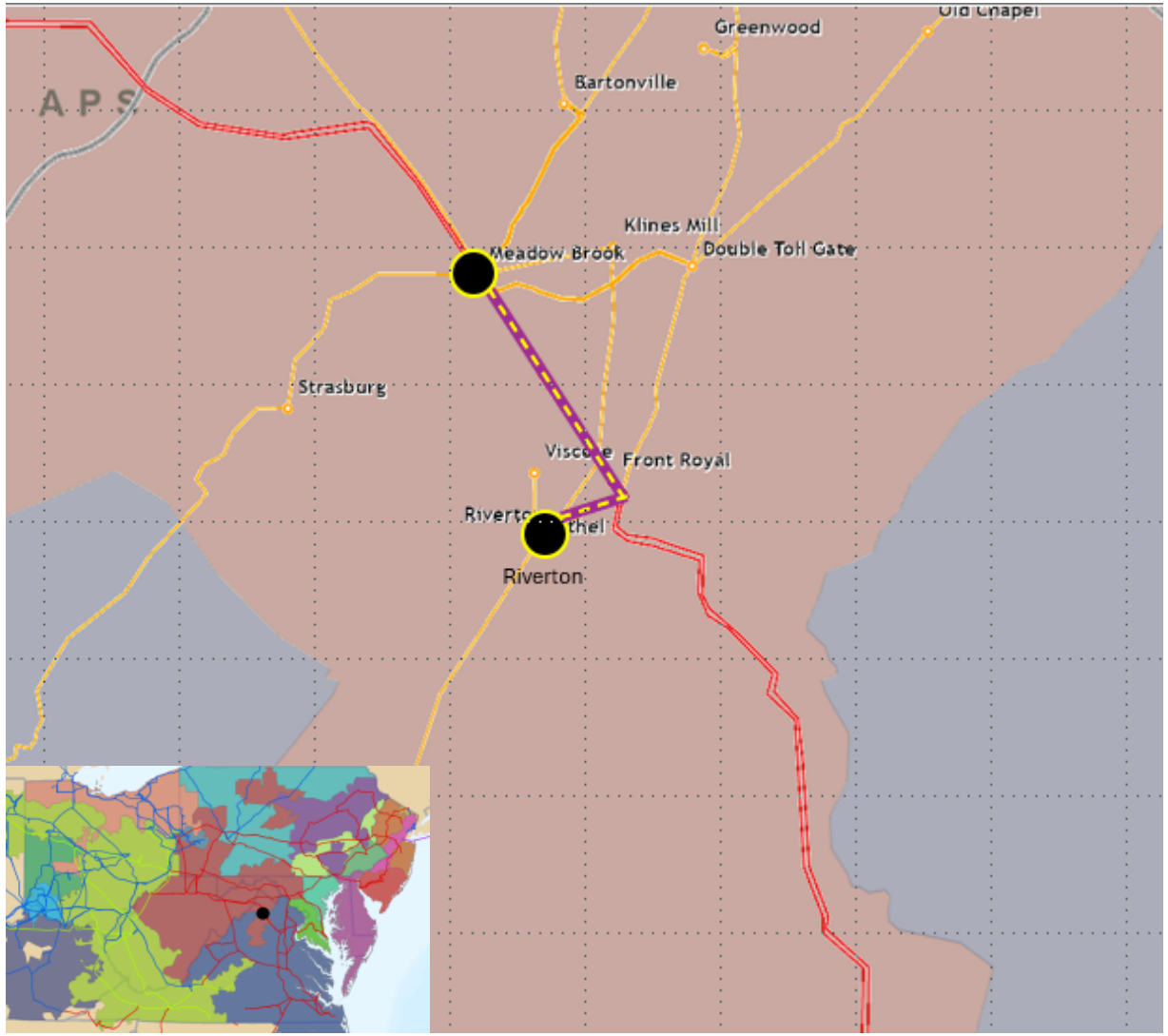
Specific Assumption Reference:
System Performance Projects Global Factors
- System reliability and performance
- Substation/line equipment limits

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 the Meadow Brook - Riverton 138 kV Line.
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cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.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.

Meadow Brook - Klines Mill 138 kV Line:
Existing Line Rating: 292 / 314 / 325 / 343 MVA (SN/SE/WN/WE)
Existing Conductor Rating: 308 / 376 / 349 / 445 MVA (SN/SE/WN/WE)
Klines Mill - Riverton 138 kV Line:
Existing Line Rating: 292 / 314 / 325 / 343 MVA (SN/SE/WN/WE)
Existing Conductor Rating: 308 / 376 / 349 / 445 MVA (SN/SE/WN/WE)



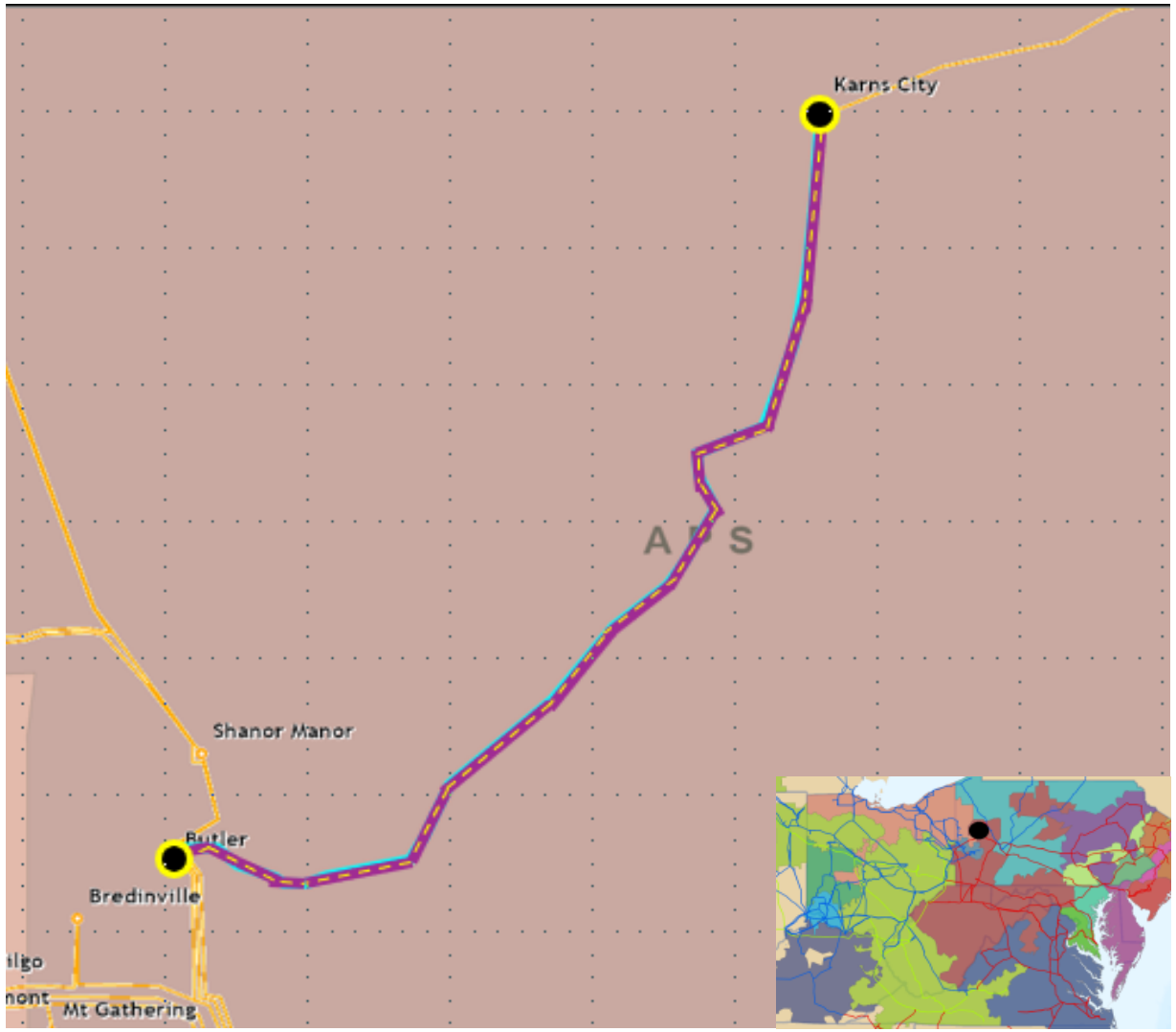
APS Transmission Zone M-3 Process
Butler- Karns City 138 kV Line

Need Number: APS-2026-046
Process Stage: Need Meeting 07/17/2026
Project Driver: Equipment Condition/Performance/Risk

Specific Assumption Reference:
System Performance Global Factors
- System reliability/performance
- Substation/Line equipment limits

Problem Statement:
Under normal operating conditions, power flows from generation in the ATSI region (west) toward load in the Penelec region (east). This west-to-east transfer increases significantly when the Seneca Pump Storage facility is operating in pumping mode. An N-1 contingency under this condition results in an overload on the Butler - Karns City 138 kV Line exceeding its emergency rating. To mitigate this overload, Armstrong Substation is operated in an abnormal configuration by removing transmission facilities from service. While this pre-contingency switching effectively reduces the overload risk, it significantly decreases overall system reliability.

Butler - Karns City 138 kV Line:
Existing Transmission Line and Conductor Ratings:
- 160 / 192 / 180 / 228 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
Mitchell Substation

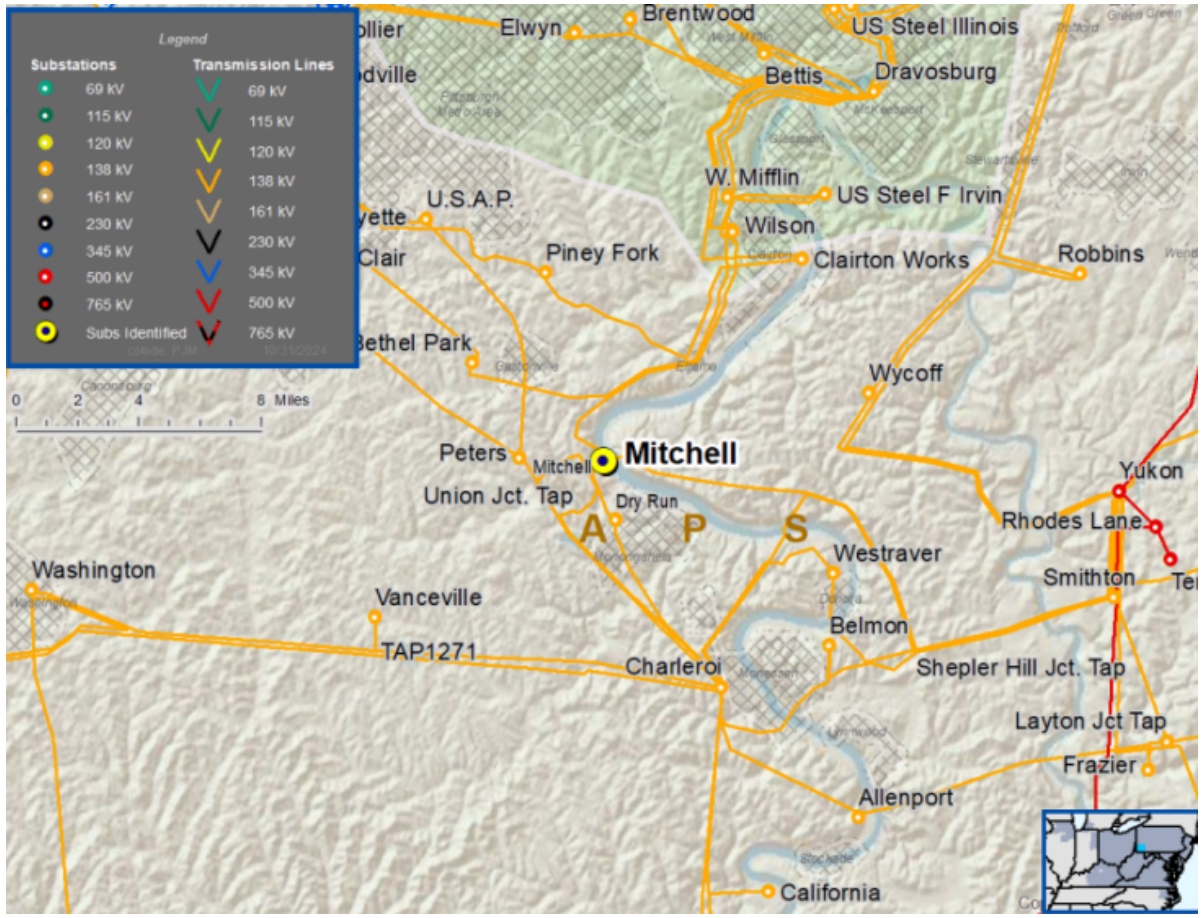
Need Number: APS-2024-073
Process Stage: Solution Meeting SRRTEP-W - 07/17/2026
Previously Presented: Need Meeting 11/15/2024
Project Driver: Other

Specific Assumption Reference:
System Performance Global Factors
- System reliability/performance
- Substation/Line equipment limits

Equipment/Technology/Design Upgrades
- FirstEnergy owned equipment located in non-FirstEnergy affiliated facilities

Problem Statement:
Mitchell Plant was previously owned by FirstEnergy. With the sale of the plant, FirstEnergy must separate assets owned by FirstEnergy from assets owned by the new plant owners.

The Charleroi – Mitchell – Yukon (Shepler Hill Jct) 138 kV Line needs to be rerouted off the Mitchell Plant roof.



APS Transmission Zone M-3 Process
Mitchell Substation

Need Number: APS-2024-073

Process Stage: Solution Meeting SRRTEP-W - 07/17/2026

Proposed Solution:

- Relocate approximately 0.5 miles of the existing Charleroi - Mitchell - Yukon (Shepler Hill Jct) 138 kV Line.

At Mitchell Substation:

- Re-terminate the Charleroi - Mitchell - Yukon (Shepler Hill Jct) 138 kV Line to isolate the transmission line from the power plant.
- Install new CCVT, CCVT junction box and stand foundation, grounding connectors, bus support adapters, switch stands, wave trap and line turner, surge arrester and dead-end tower.
- Replace disconnect switches.
- Revise relay settings.

Transmission Line Ratings:

Mitchell - Shepler Hill Jct 138 kV Line Segment:

- Before Proposed Solution: 295 / 375 / 349 / 441 MVA (SN/SE/WN/SE)
- After Proposed Solution: 308 / 376 / 349 / 445 MVA (SN/SE/WN/SE)

Alternatives Considered:

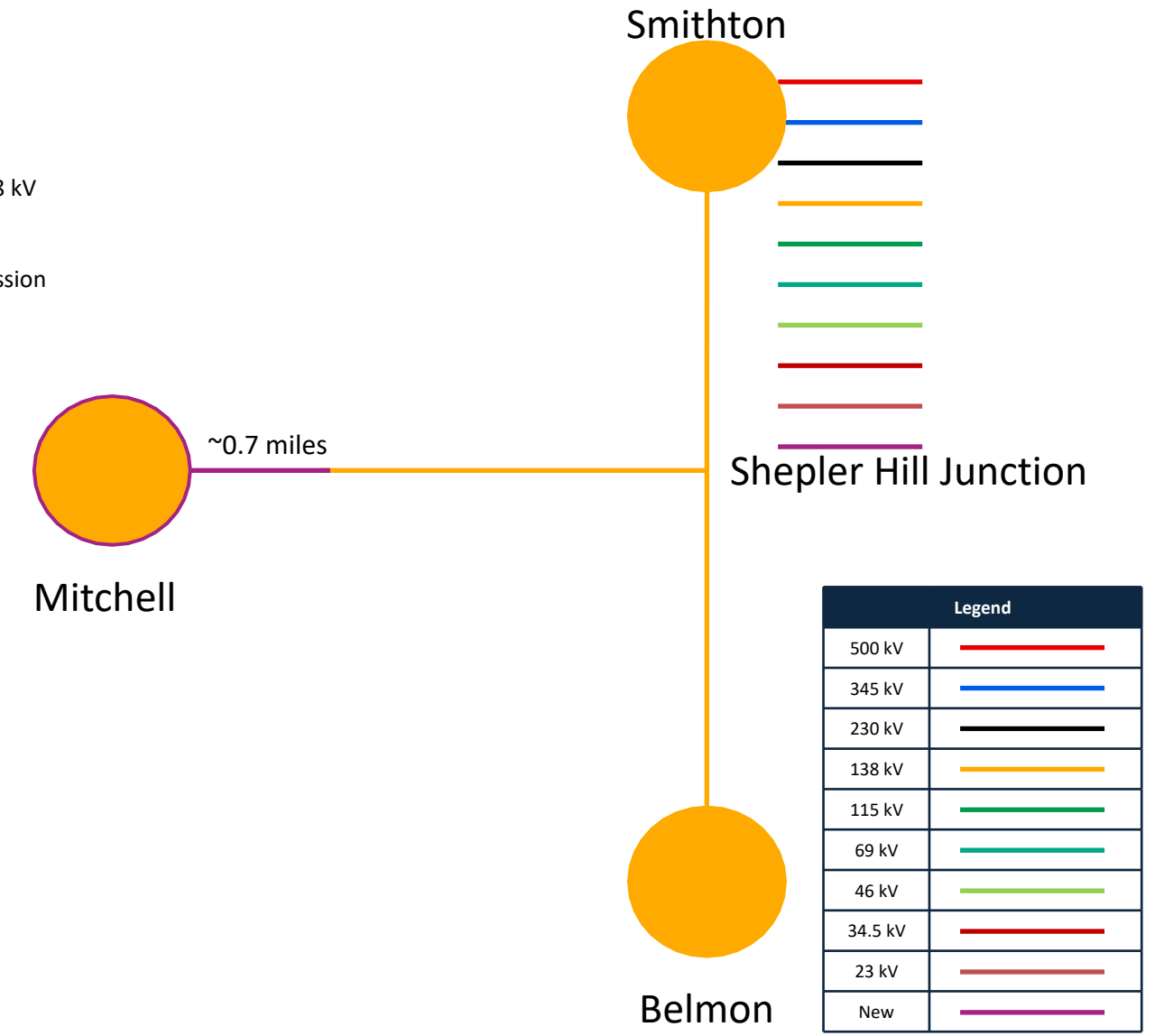
No alternatives considered as the line needs to be rerouted off the roof of the power plant.

Estimated Project Cost: $11.01 M

Projected In-Service: 06/02/2028

Project Status: Conceptual

Model: 2024 RTEP model for 2029 Summer & Winter (50/50)



APS Transmission Zone M-3 Process Misoperations Relays

Need Number: APS-2024-086
Process Stage: Solution Meeting SRRTEP-W - 07/17/2026
Previously Presented: Need Meeting 10/18/2024
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

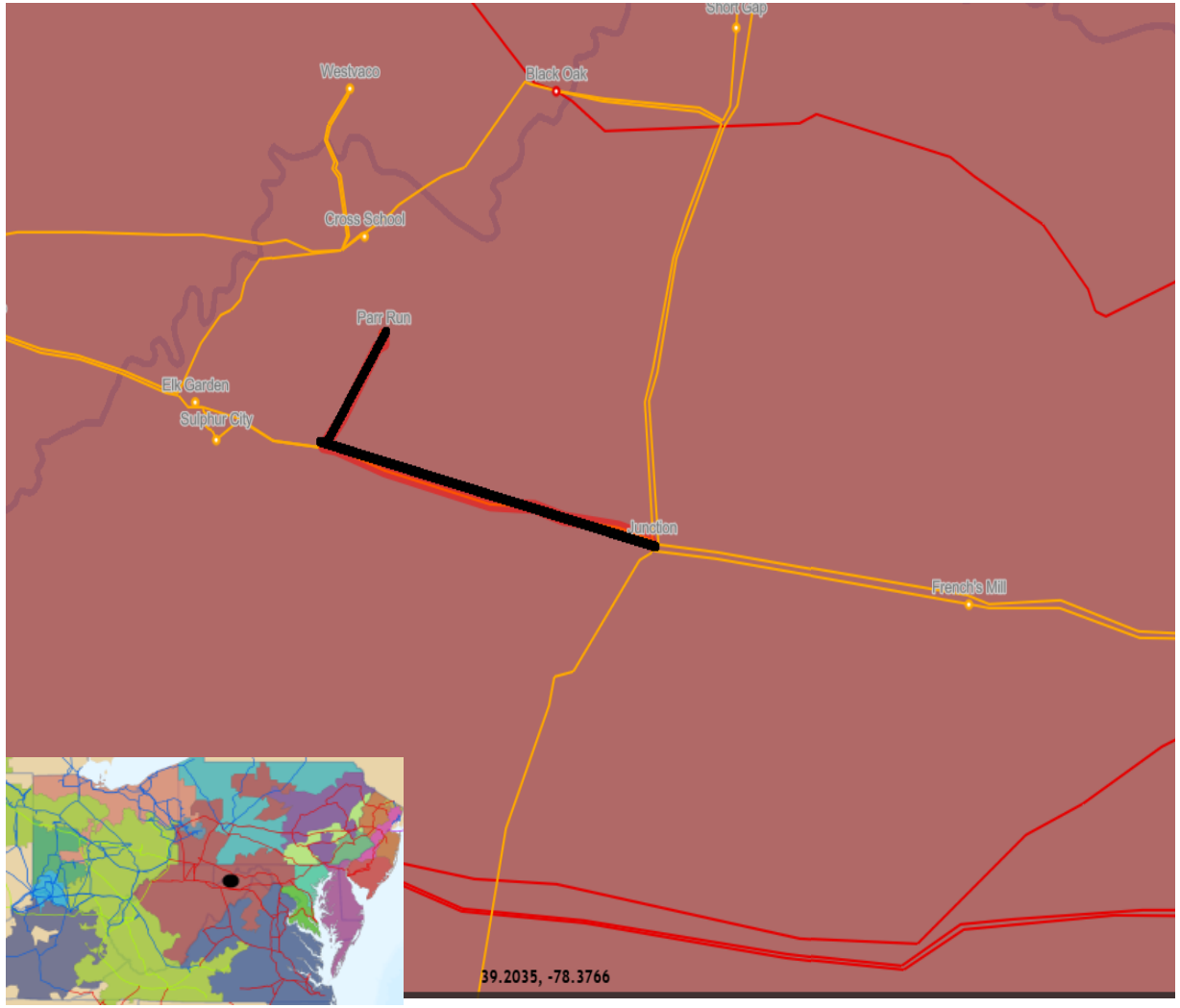
Problem Statement:
FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.

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.

Parr Run – Junction 138 kV Line
Existing Line Rating: 164 / 206 / 216 / 229 MVA (SN/SE/WN/WE)
Existing Conductor Rating: 221 / 268 / 250 / 317 MVA (SN/SE/WN/WE)



APS Transmission Zone M-3 Process Misoperations Relays

Need Number: APS-2024-086
Process Stage: Solution Meeting SRRTEP-W - 07/17/2026

Proposed Solution:

- At Parr Run Substation: Replace substation conductor, circuit breaker, disconnect switches, line trap, PT, CCVT, and relaying.
- At Junction Substation: Replace disconnect switches, circuit breaker, CCVT, substation conductor, line trap, and relaying.

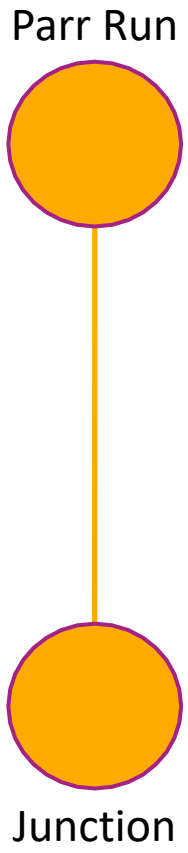
Parr Run - Junction 138 kV Line Ratings:

- Before Proposed Solution: 164 / 206 / 216 / 229 MVA (SN/SE/WN/WE)
- After Proposed Solution: 308 / 376 / 349 / 445 MVA (SN/SE/WN/WE)

Alternatives Considered:

Maintain equipment in existing condition with elevated risk of misoperations.

Estimated Project Cost: $4.67 M
Projected In-Service: 12/31/2028
Project Status: Conceptual
Model: 2024 RTEP model for 2029 Summer & Winter (50/50)



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 Misoperations Relays

Need Number: APS-2025-005
Process Stage: Solution Meeting SRRTEP-W - 07/17/2026
Previously Presented: Need Meeting 02/14/2025
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

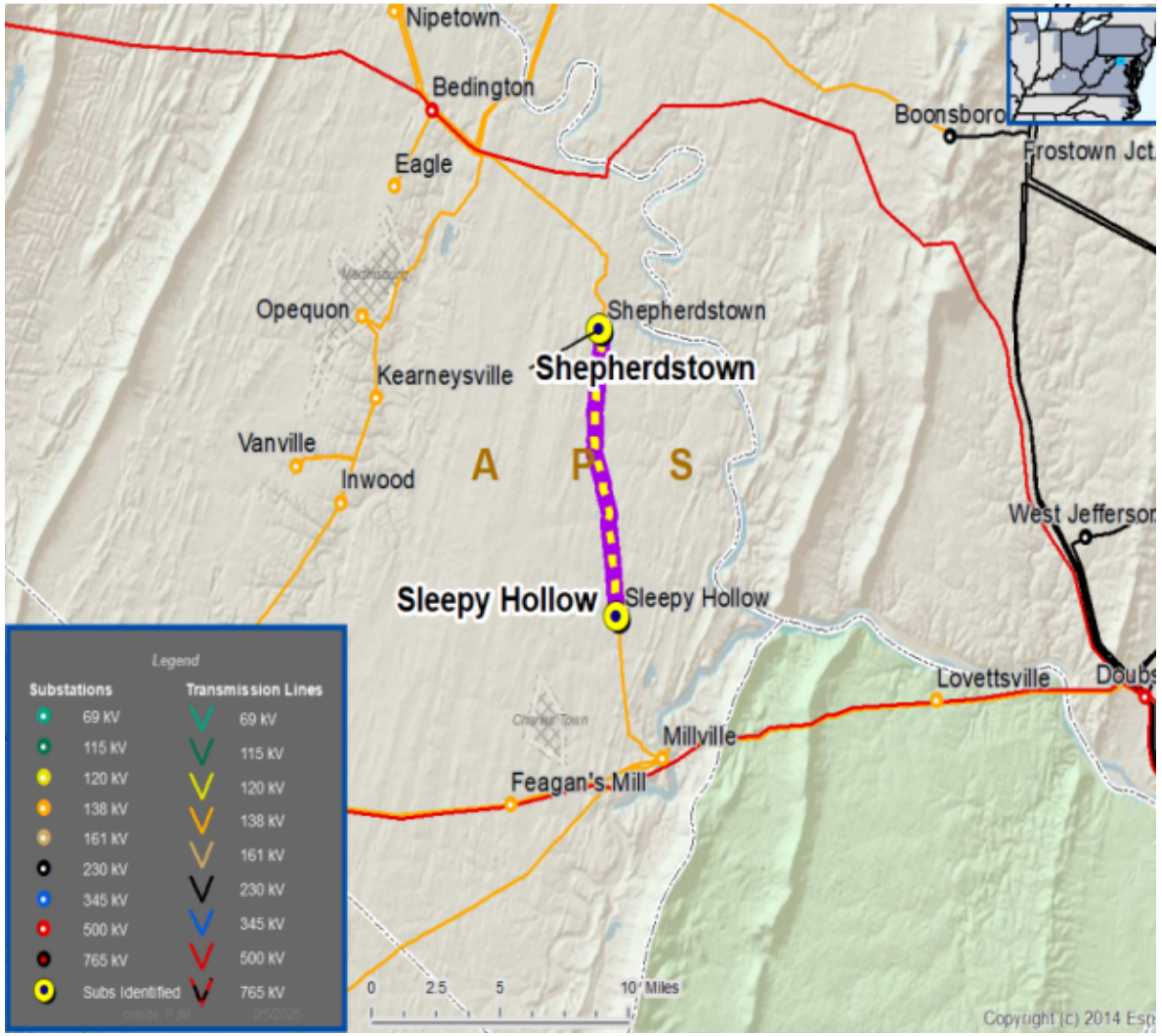
Problem Statement:
FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation on Shepherdstown - Sleepy Hollow 138 kV Line.

Proper operation of the protection scheme requires all the separate components 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)



APS Transmission Zone M-3 Process Misoperations Relays

Need Number: APS-2025-005
Process Stage: Solution Meeting SRRTEP-W - 07/17/2026

Proposed Solution:

- At Shepherdstown Substation: Replace relaying, circuit switcher, disconnect switches, PT, and CCVT.
- At Sleepy Hollow Substation: Replace relaying, circuit breaker, disconnect switches, PT, CCVT, and line trap.

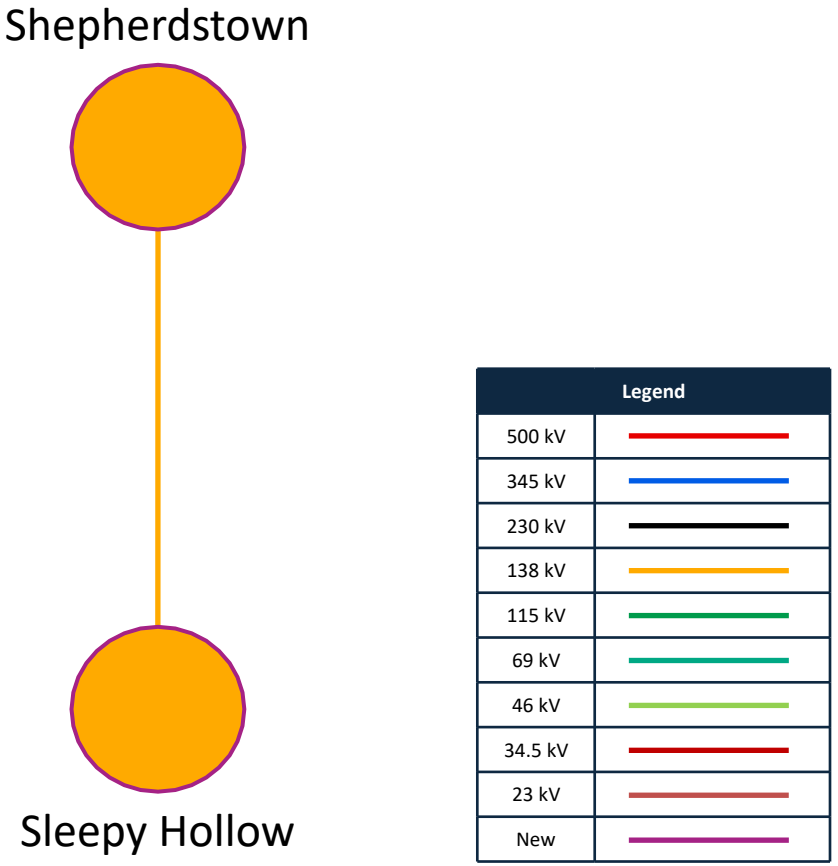
Shepherdstown - Sleepy Hollow 138 kV Line Ratings:

- Before Proposed Solution: 221 / 268 / 250 / 306 MVA (SN/SE/WN/WE)
- After Proposed Solution: 221 / 268 / 250 / 317 MVA (SN/SE/WN/WE)

Alternatives Considered:

Maintain equipment in existing condition with elevated risk of misoperations.

Estimated Project Cost: $2.60 M
Projected In-Service: 08/04/2028
Project Status: Conceptual
Model: 2024 RTEP model for 2029 Summer & Winter (50/50)



APS Transmission Zone M-3 Process
Smithton Substation

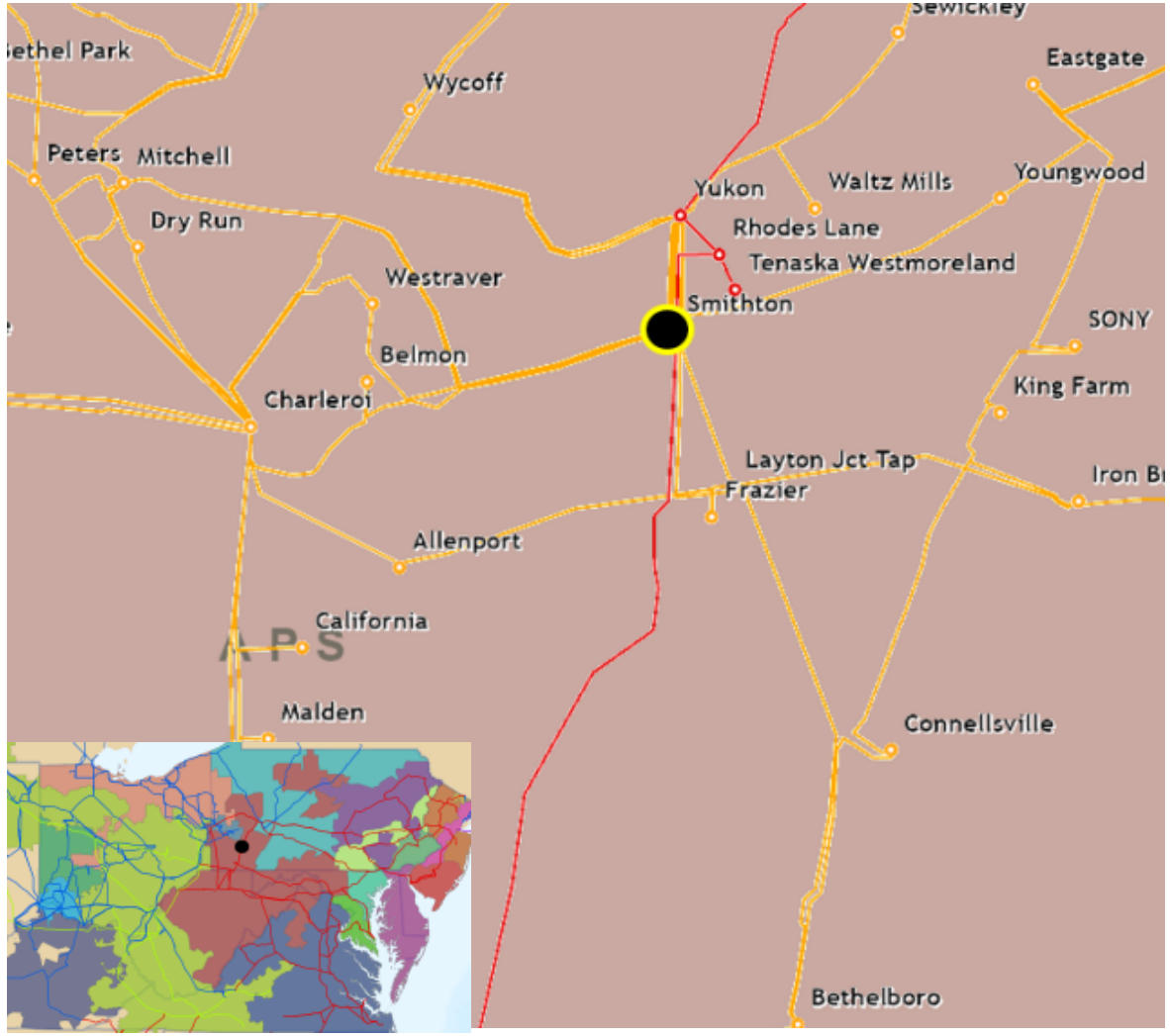
Need Number: APS-2026-001
Process Stage: Solution Meeting SRRTEP-W - 07/17/2026
Previously Presented: Need Meeting 01/16/2026
Project Driver: Operational Flexibility and Efficiency

Specific Assumption Reference:
System Performance Projects Global Factors

- Add/Expand Bus Configuration
- Load at risk in planning and operational scenarios
- Reduce the amount of exposed potential local load loss during contingency conditions
- Eliminate simultaneous outages to multiple networked elements

Problem Statement:
Smithton Substation is currently configured as a 138 kV straight bus with a feed from the Charleroi - Mitchell - Yukon 138 kV Line (Shepler Hill Jct) and the Allenport - Iron Bridge - Yukon 138 kV Line (Layton Jct). Smithton Substation also serves two distribution transformers, totaling approximately 4,300 customers and 10 MW of load.

There is a normally open 138 kV bus tie that cannot be closed when the Shepler Hill Jct 138 kV Line is energized, as it does not have the ability to clear certain fault scenarios. Therefore, each distribution transformer at Smithton Substation is served radially and requires Operational switching to restore customers upon loss of 138 kV source.



APS Transmission Zone M-3 Process
Smithton Substation

Need Number: APS-2026-001
Process Stage: Solution Meeting SRRTEP-W - 07/17/2026

Proposed Solution:

At Smithton Substation:

- Eliminate the normally open bus tie configuration by installing two 138 kV line breakers and a bus tie breaker.
- Re-terminate the connection from Smithton Substation to the Charleroi - Mitchell - Yukon (Shepler Hill Jct) 138 kV Line.
- Remove the connection from Smithton Substation to the Smithton Tap that is currently connected to the Allenport - Iron Bridge - Yukon 138 kV Line.

Transmission Line Ratings:

Charleroi - Belmon 138 kV Line:

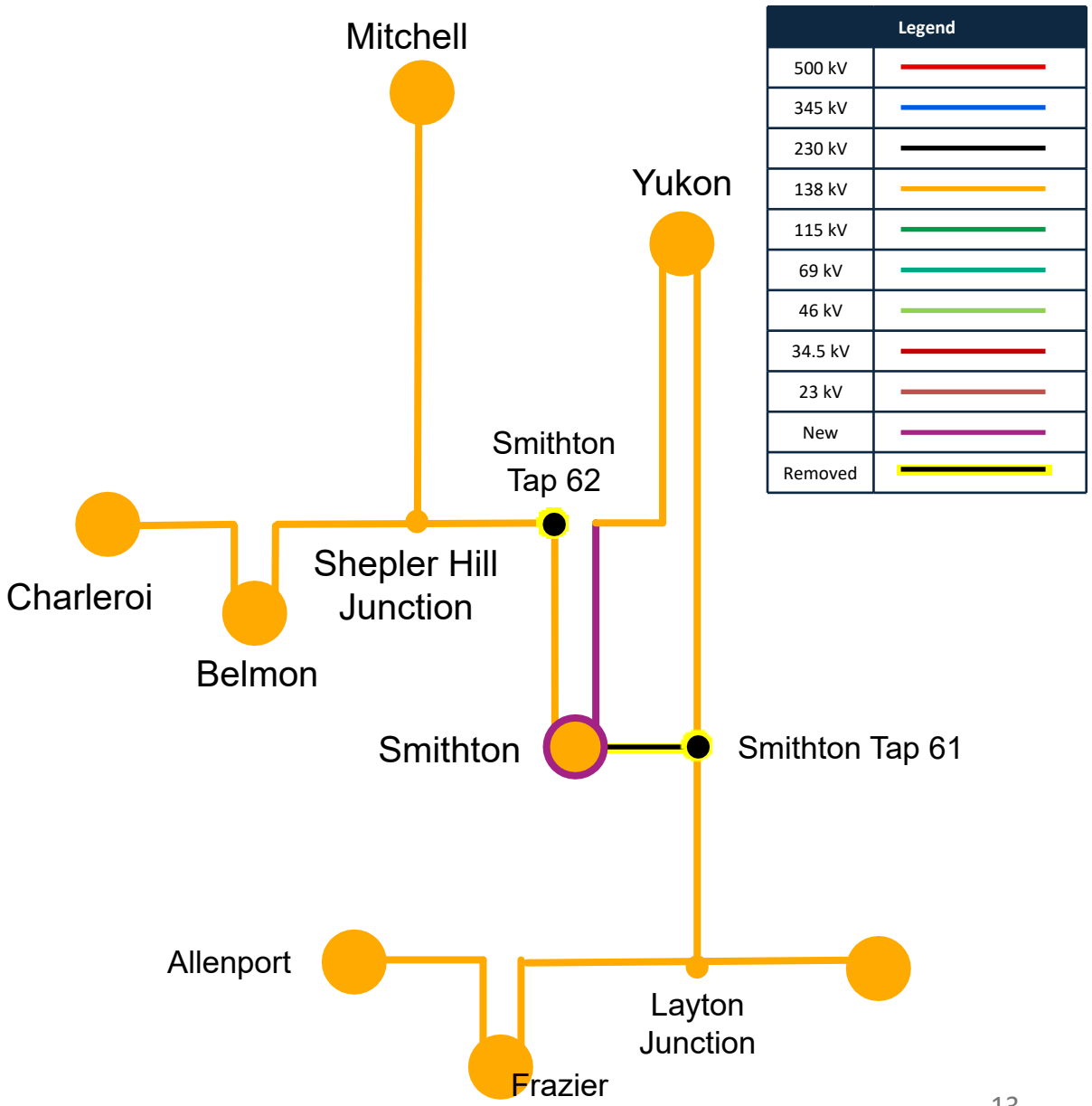
- Before Proposed Solution: 274 / 287 / 287 / 287 MVA (SN/SE/WN/WE)
- After Proposed Solution: 297 / 365 / 345 / 441 MVA (SN/SE/WN/WE)

Belmon - Shepler Hill Jct 138 kV Line:

- Before Proposed Solution: 269 / 335 / 326 / 380 MVA (SN/SE/WN/WE)
- After Proposed Solution: 297 / 358 / 345 / 410 MVA (SN/SE/WN/WE)

Shepler Hill Jct - Smithton 138 kV Line:

- Before Proposed Solution: 309 / 376 / 349 / 445 MVA (SN/SE/WN/WE)
- After Proposed Solution: 309 / 376 / 349 / 445 MVA (SN/SE/WN/WE)



***** Continued on next page*****

APS Transmission Zone M-3 Process
Smithton Substation

Need Number: APS-2026-001
Process Stage: Solution Meeting SRRTEP-W - 07/17/2026

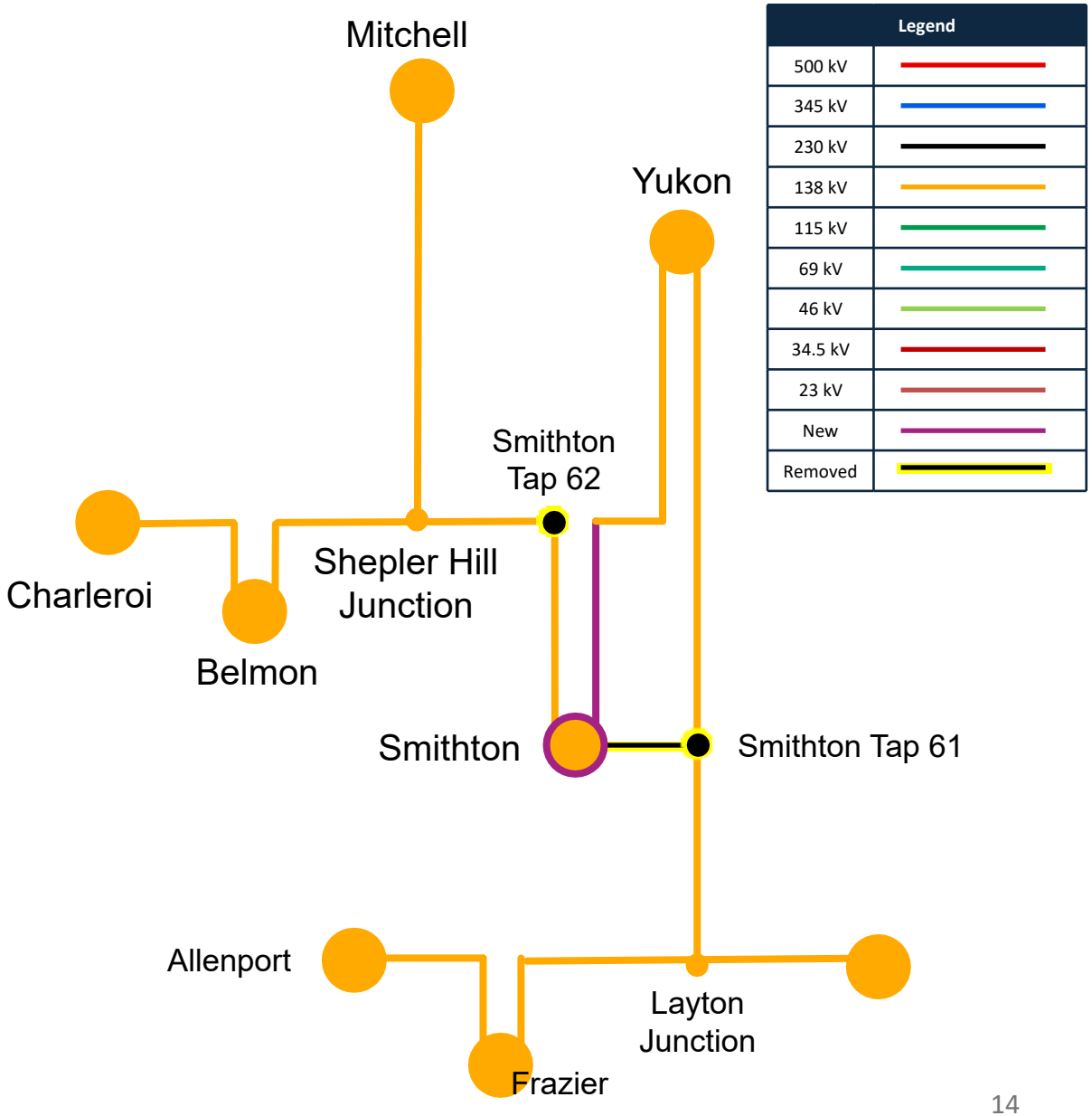
Proposed Solution (CONT'):
Smithton - Yukon 138 kV Line:
- Before Proposed Solution: 294 / 350 / 349 / 401 MVA (SN/SE/WN/WE)
- After Proposed Solution: 308 / 376 / 349 / 445 MVA (SN/SE/WN/WE)

Shepler Hill Jct - Mitchell 138 kV Line:
- Before Proposed Solution: 292 / 292 / 292 / 292 MVA (SN/SE/WN/WE)
- After Proposed Solution: 308 / 376 / 349 / 445 MVA (SN/SE/WN/WE)

Alternatives Considered:

Maintain the line in existing condition with elevated risk of customer outages under contingency scenarios.

Estimated Project Cost:	$11.52 M
Projected In-Service:	12/17/2027
Project Status:	Conceptual
Model:	2024 RTEP model for 2029 Summer & Winter (50/50)



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

07/xx/2026– V1 – Original version posted to pjm.com