

Subregional RTEP Committee – Western FirstEnergy Supplemental Projects

March 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

Need Number: APS-2025-006

Process Stage: Need Meeting 03/14/2025

Project Driver: Equipment Material Condition, Performance & Risk

Specific Assumption References:

System Performance Projects Global Factors

- Substation/line equipment limits
- System reliability and performance

Substation Condition Rebuild/Replacement

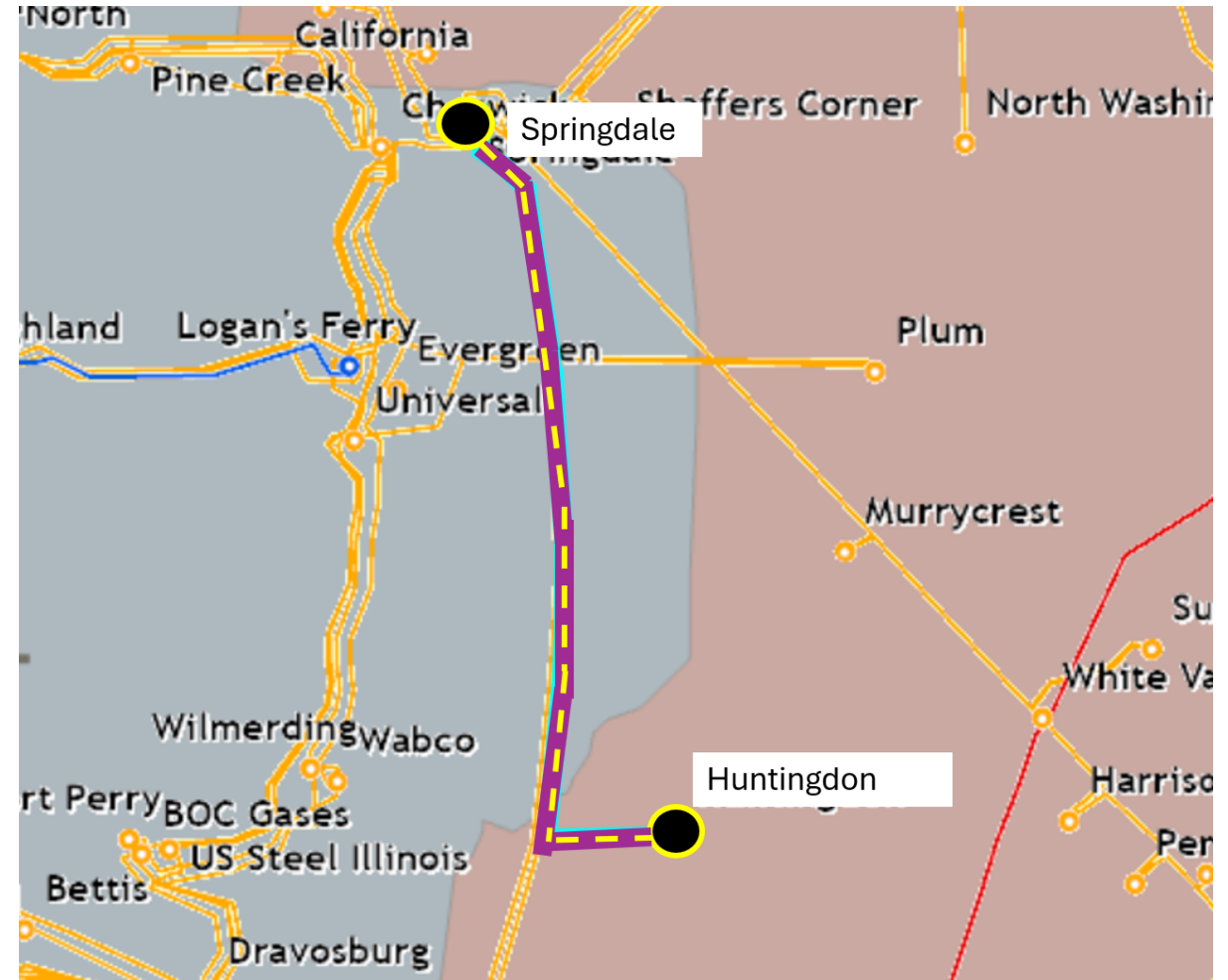
- Upgrade Relay Schemes
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

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

Proper operation of the protection scheme requires all the separate components perform adequately during a fault

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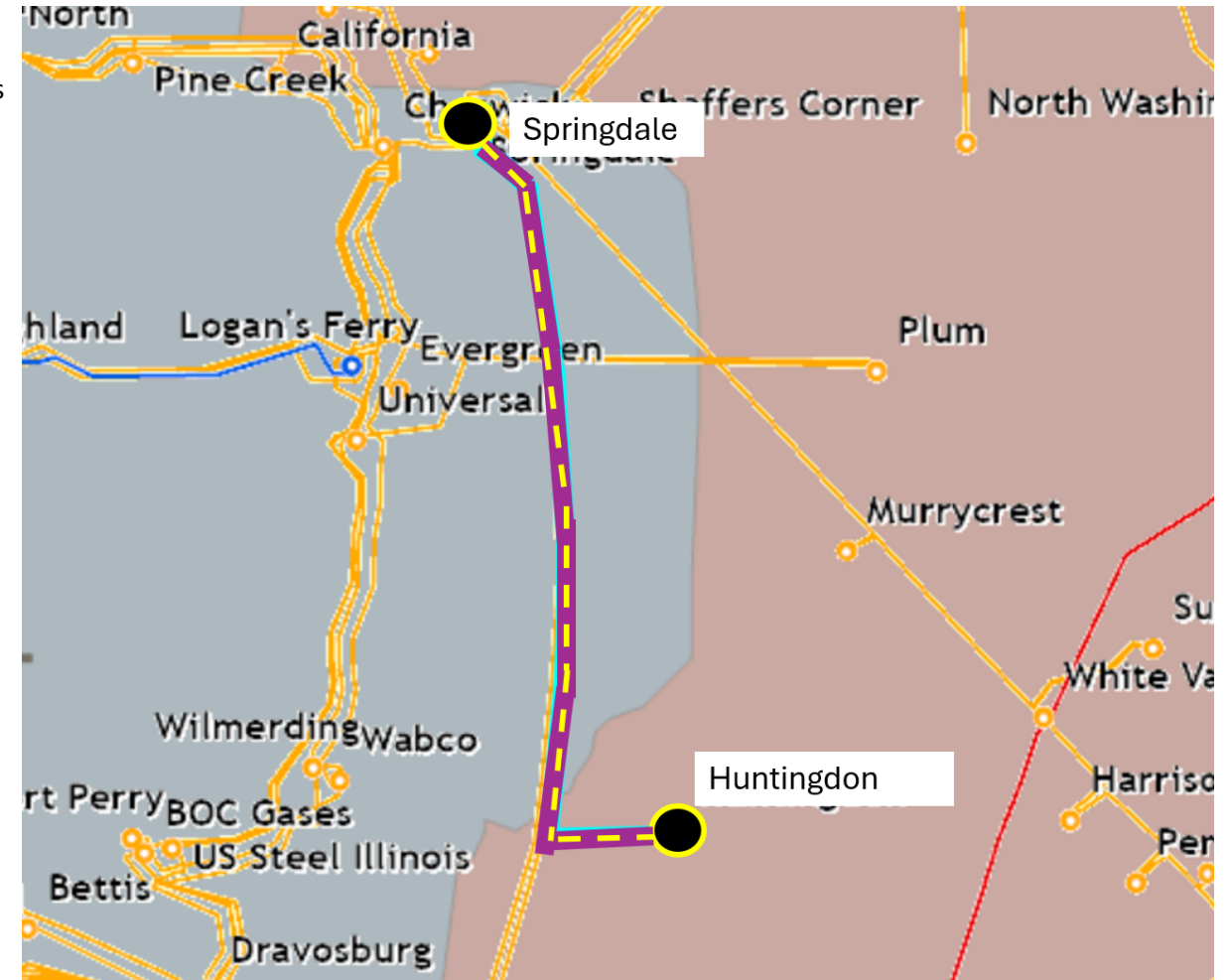
Problem Statement (cont):

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cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology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

Huntingdon - Springdale 138 kV Line:

- Existing line ratings: 267 / 287 / 287 / 287 MVA SN/SE/WN/WE
- Existing conductor ratings: 297 / 365 / 345 / 441 MVA SN/SE/WN/WE



Need Number: APS-2025-007

Process Stage: Need Meeting 03/14/2025

Project Driver: Equipment Material Condition, Performance & Risk

Specific Assumption References:

System Performance Projects Global Factors

- Substation/line equipment limits
- System reliability and performance

Substation Condition Rebuild/Replacement

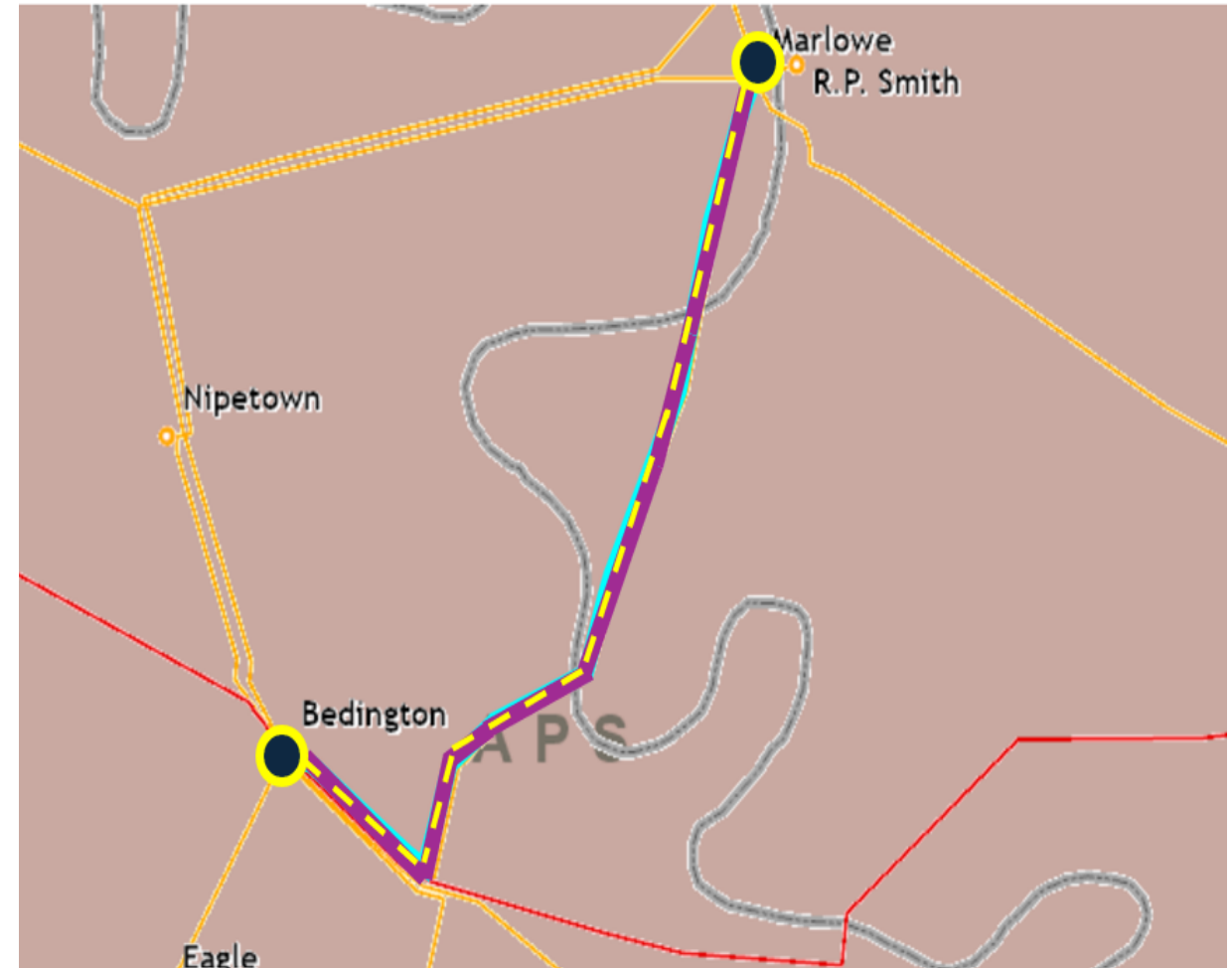
- Upgrade Relay Schemes
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

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

Proper operation of the protection scheme requires all the separate components perform adequately during a fault

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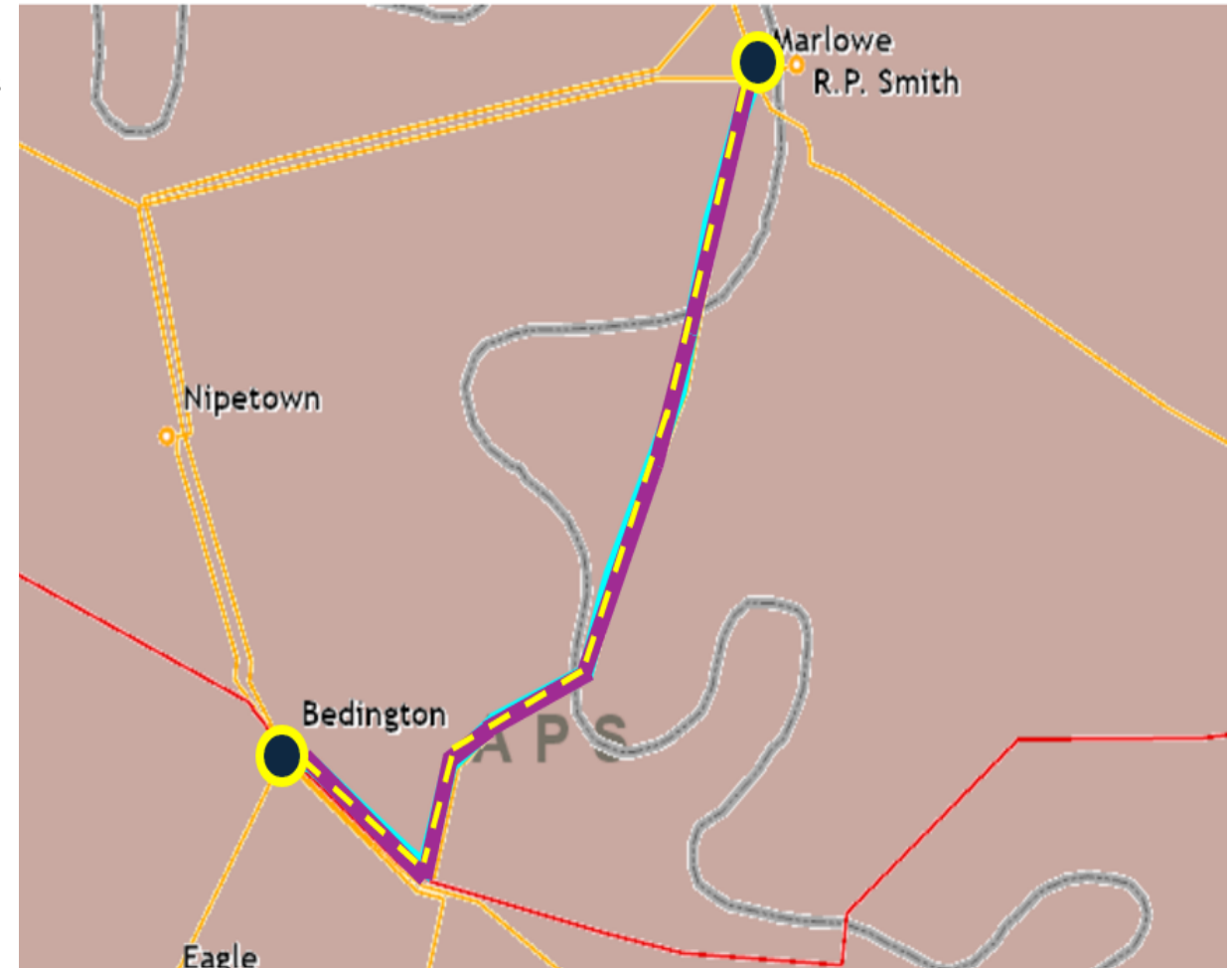
Problem Statement (cont):

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

Bedington - Marlowe 138 kV BMR Line:

- Existing line ratings: 265 / 314 / 325 / 343 MVA SN/SE/WN/WE
- Existing conductor ratings: 308 / 376 / 349 / 445 MVA SN/SE/WN/WE



Need Number: APS-2025-008

Process Stage: Need Meeting 03/14/2025

Project Driver: Equipment Material Condition, Performance & Risk

Specific Assumption References:

System Performance Projects Global Factors

- Substation/line equipment limits
- System reliability and performance

Substation Condition Rebuild/Replacement

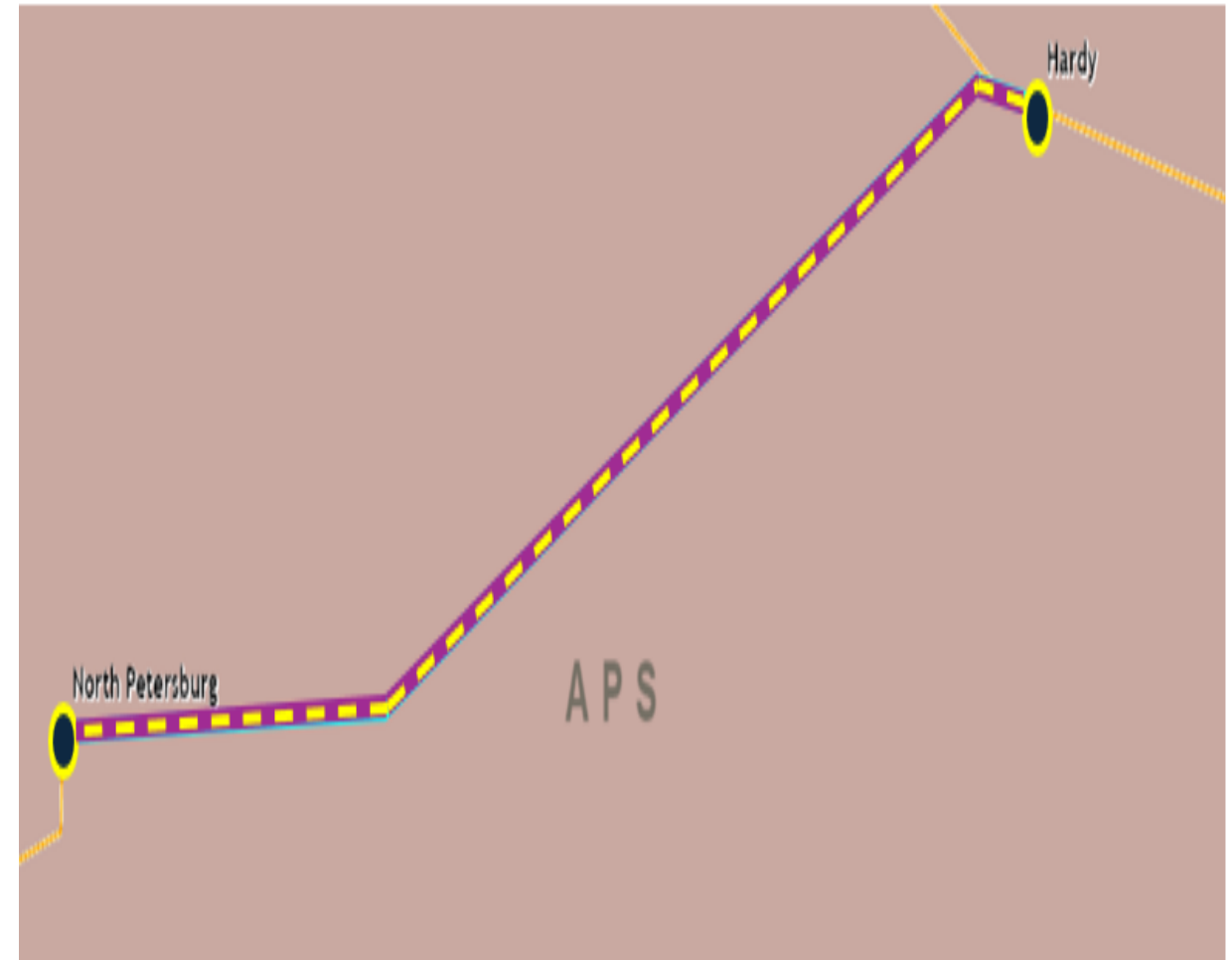
- Upgrade Relay Schemes
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

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

Proper operation of the protection scheme requires all the separate components perform adequately during a fault

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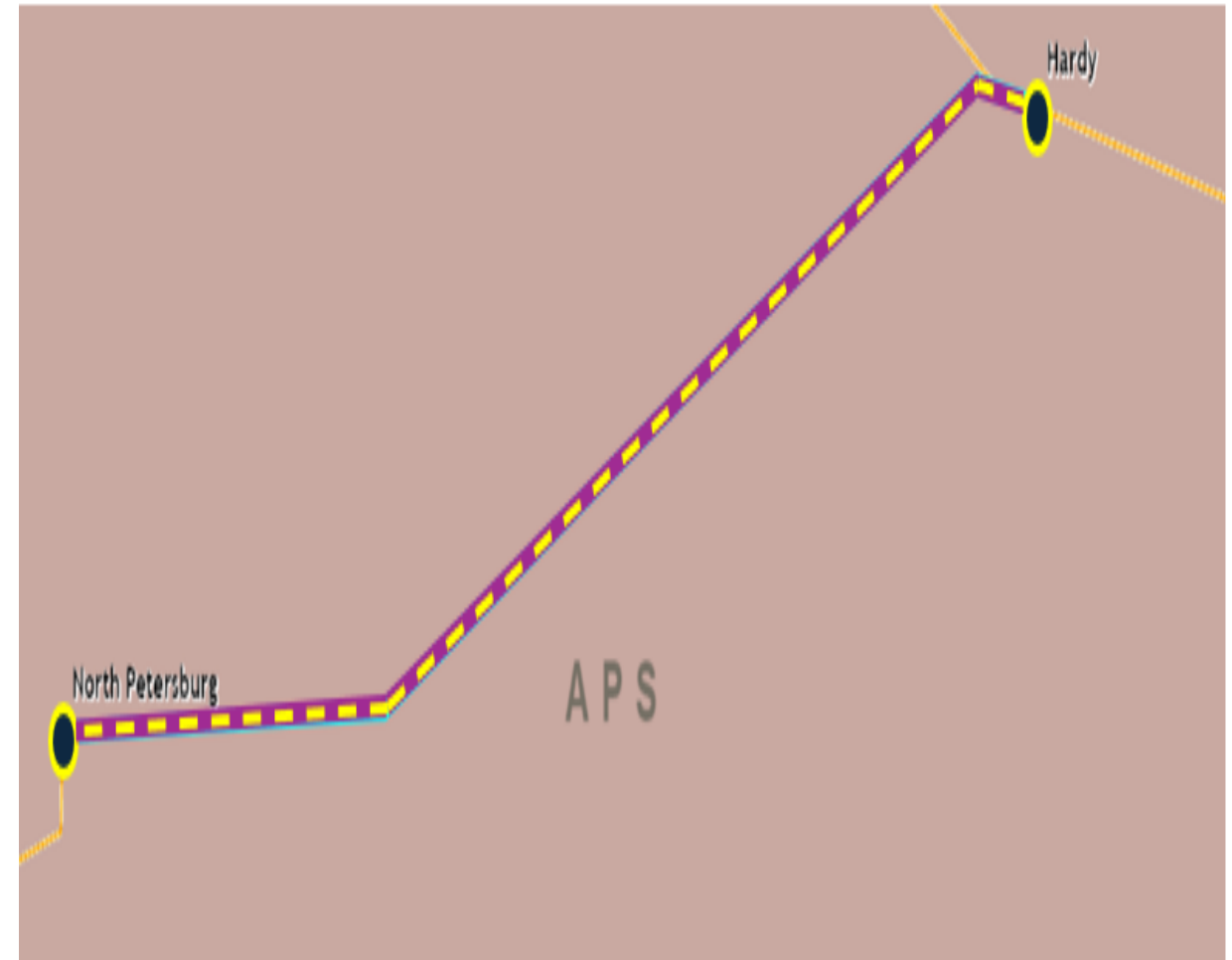
Problem Statement (cont):

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

Hardy - North Petersburg 138 kV Line:

- Existing line ratings: 292 / 314 / 325 / 343 MVA SN/SE/WN/WE
- Existing conductor ratings: 309 / 376 / 349 / 445 MVA SN/SE/WN/WE



Need Number: APS-2025-010

Process Stage: Need Meeting 03/14/2025

Project Driver: Equipment Material Condition, Performance & Risk

Specific Assumption References:

System Performance Projects Global Factors

- Substation/line equipment limits
 - System reliability and performance
- Line Condition Rebuild/Replacement
- Transmission line switches
 - Increasing negative trend in maintenance findings and/or costs
 - Limited availability of spare parts and/or vendor technical support

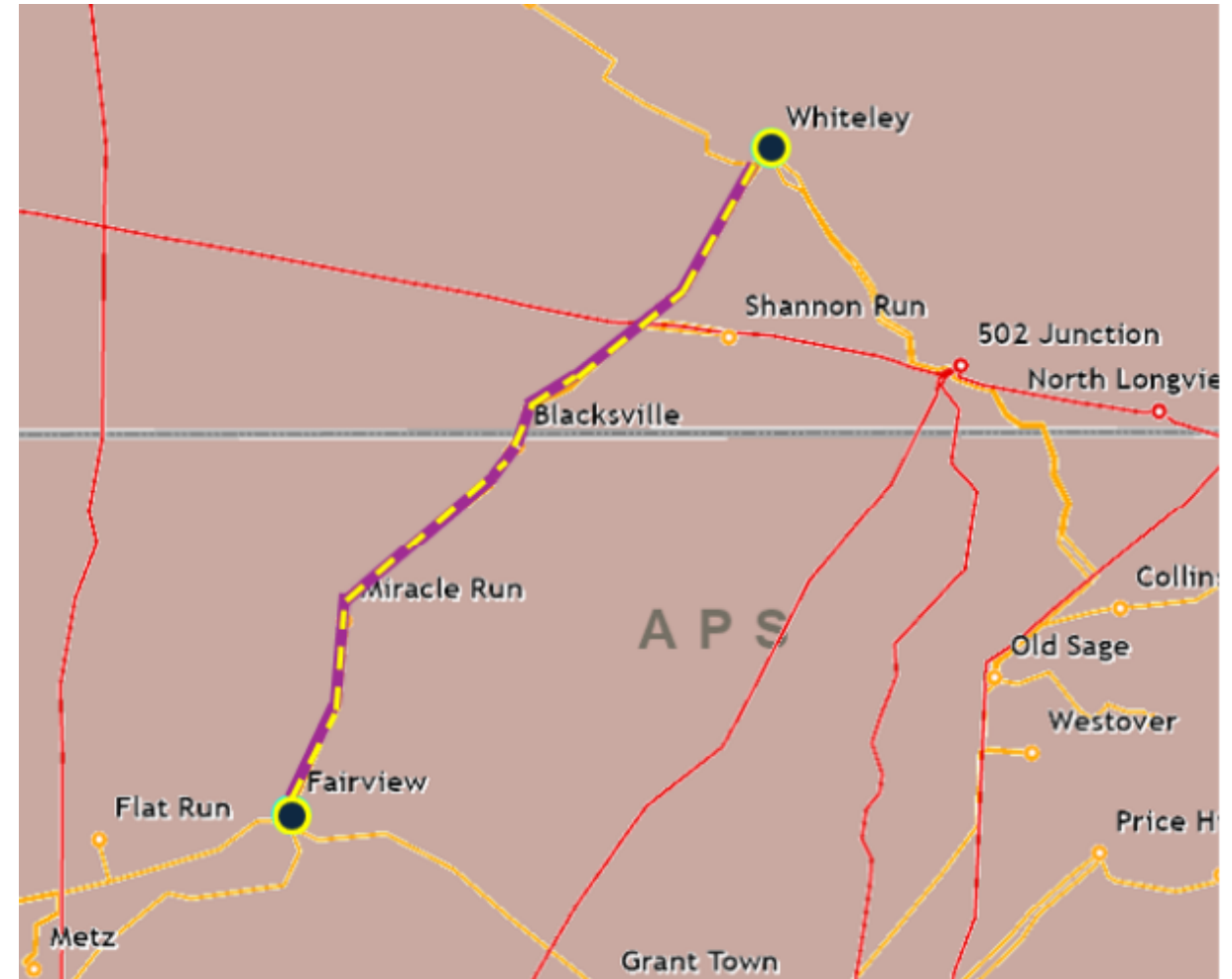
Problem Statement:

Line switch 1027 on the Fairview – Whiteley 138 kV Line at Blacksville No. 1 Tap is obsolete and no longer supported for repair parts

The switch is limiting the transmission line rating. Transmission line ratings are limited by terminal equipment

Miracle Run Tap - Blacksville No. 1 Tap 138 kV Line:

- Existing line ratings: 164 / 206 / 216 / 248 MVA SN/SE/WN/WE
- Existing conductor ratings: 308 / 376 / 349 / 445 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

Need Number: APS-2024-056

Process Stage: Solution Meeting SRRTEP-W - 03/14/2025

Previously Presented: Need Meeting 05/17/2024

Project Driver: Equipment Material Condition, Performance & Risk

Specific Assumption References:

- System Performance Global Factors
- System reliability/performance Line Condition Rebuild/Replacement
- Age/condition of wood transmission line structures

Problem Statement:

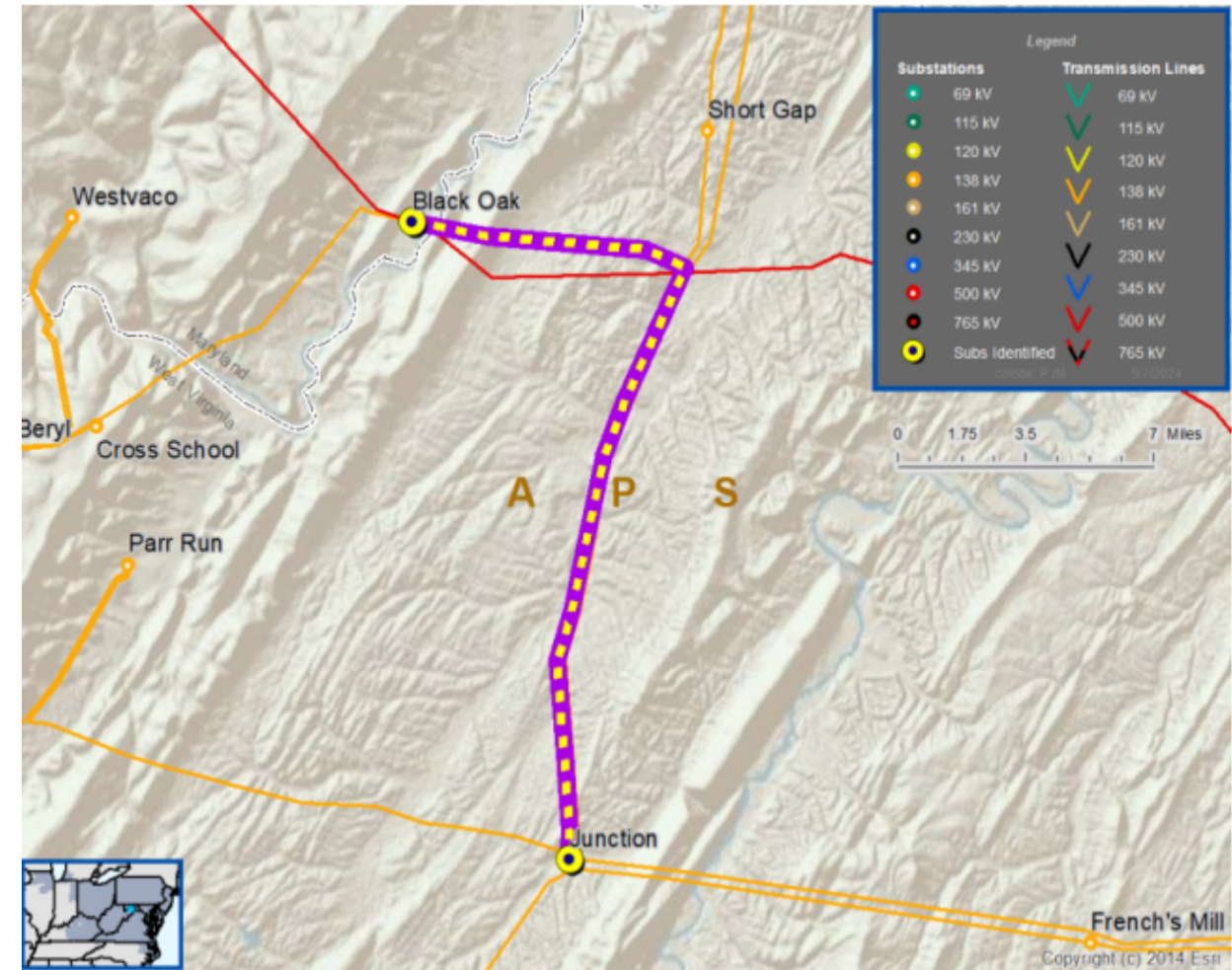
The Black Oak – Junction 138 kV Line was constructed approximately 58 years ago and is approaching end of life. It is approximately 22 miles long with 125 Wood H-Frame transmission line structures. Per recent inspections, the line is exhibiting deterioration. Inspection findings include:

- 27 structures have been recently replaced due to deteriorating conditions.
- 20 repairs have been made since 2019, 10 of which were made in 2023, indicating that components are reaching end of life.
- 138 structures failed recent inspection due to woodpecker damage, top rot, decay, cracking, and/or delamination of cross-arms.

Existing

Transmission Line Ratings: 221 / 268 / 250 / 317 MVA (SN/SE/WN/WE)

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APS Transmission Zone M-3 Process Black Oak – Junction 138 kV Line

Proposed Solution:

Black Oak - Junction 138 kV Line: Rebuild approximately 22 miles of the Black Oak - Junction 138 kV Line

At Black Oak Substation, replace circuit breaker, disconnect switches, substation conductor and relaying

At Junction Substation, replace circuit breaker, disconnect switches, line trap, substation conductor and relaying

Alternatives Considered:

Maintain existing condition with elevated risk of failure.

Estimated Project Cost: \$48.81 M

Projected In-Service: 12/14/2029

Status: Conceptual

Model: 2023 RTEP model for 2028 Summer (50/50)

Black Oak



Junction

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

Need Number: APS-2024-119

Process Stage: Solution Meeting SRRTEP-W - 03/14/2025

Previously Presented: Need Meeting 12/13/2024

Project Driver: Equipment Material Condition, Performance & Risk

Specific Assumption References:

- System Performance Global Factors
- System reliability/performance
- Substation/Line equipment limits Line Condition Rebuild/Replacement
- Transmission line switches
- Increasing negative trend in maintenance findings and/or costs
- Limited availability of spare parts and/or vendor technical support

Problem Statement:

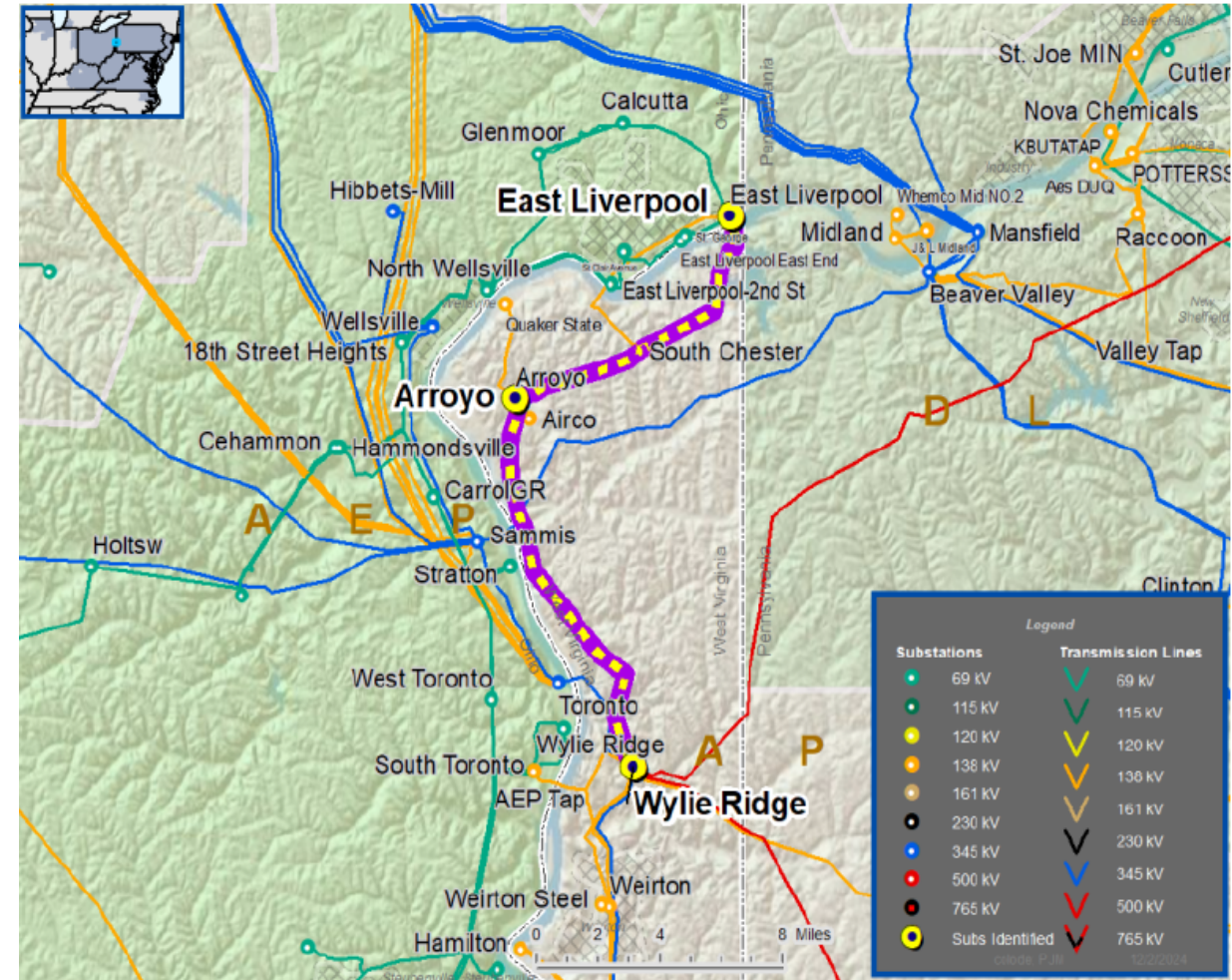
Line air switch 1017 on the Arroyo – East Liverpool – Wylie Ridge 138 kV Line is obsolete and is no longer supported for repair parts.

The H-frame wood pole structure on which the switch is mounted was installed in 1966 and is reaching end of life. The switch is limiting the transmission line rating.

Arroyo Junction – South Chester Tap 138 kV Line

Existing Line Rating: 164 / 206 / 216 / 248 MVA (SN/SE/WN/WE)

Existing Conductor Rating: 221 / 268 / 250 / 317 MVA (SN/SE/WN/WE)



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APS Transmission Zone M-3 Process Arroyo – East Liverpool – Wylie Ridge 138 kV

Proposed Solution:

Replace the obsolete line switch 1017 with 1200 A rated switch and install motor operator. Replace 2-pole structure 212-81 at Arroyo Junction

Alternatives Considered:

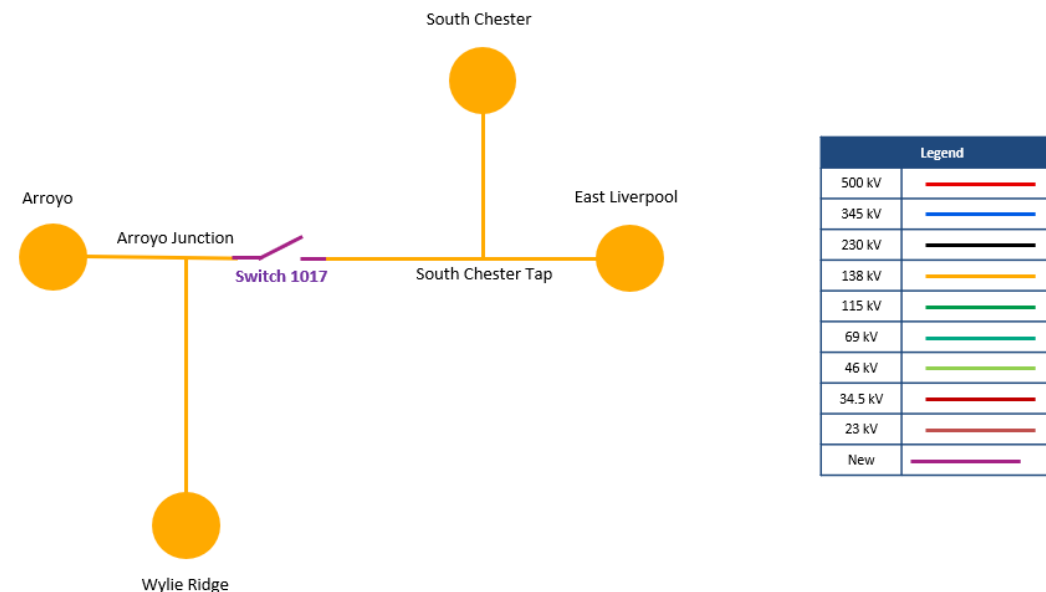
Maintain equipment in existing condition with elevated risk of failure due to equipment condition

Estimated Project Cost: \$1.1 M

Projected In-Service: 05/09/2025

Status: Engineering

Model: 2023 RTEP model for 2028 Summer (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

03/04/2025– V1 – Original version posted to pjm.com

03/11/2025 – V2 – Added bubble diagrams for APS-2024-056 & APS-2024-119