Transmission Expansion Advisory Committee
FirstEnergy Supplemental Projects

December 05, 2023

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 Zones M-3 Process
Bedington Substation

Need Number: APS-2023-028

Process Stage: Solution Meeting – 12/05/2023

Previously Presented: Need Meeting – 09/05/2023

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

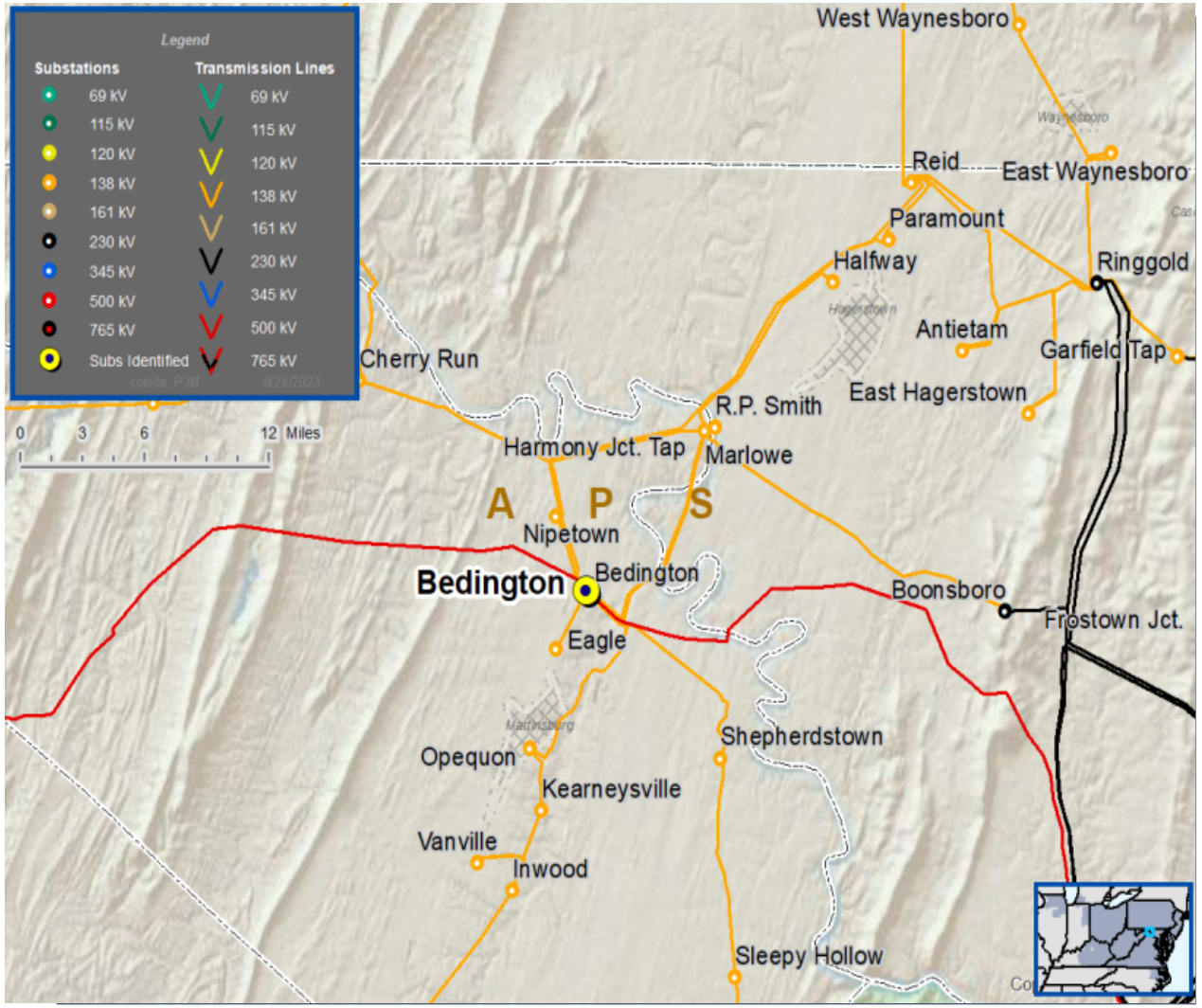
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The 500/138 kV No. 1 Transformer at Bedington was manufactured 47 years ago and is approaching end of life.
  - 500 kV and 138 kV protective devices are ~50 years old which produces reliability and safety concerns.
- The transformer exhibits multiple maintenance issues including:
  - Elevated methane and ethane gas levels compared with IEEE Standards
  - Equipment degradation and obsolete replacement parts
  - Oil leaks
- Existing TR Ratings:
  - 485 / 619 MVA (SN / SSTE)



APS Transmission Zones M-3 Process
Bedington Substation

Need Number: APS-2023-028

Process Stage: Solution Meeting 12/05/2023

Proposed Solution:

- Replace the Bedington No. 1 500/138 kV Transformer with a 425 MVA unit
- Upgrade transformer relaying

Transformer Ratings:

- Bedington No. 1 500/138 kV Transformer:
  - Before Proposed Solution: 485 / 619 MVA (SN / SSTE)
  - After Proposed Solution (anticipated): 576 / 699 MVA (SN / SSTE)

Alternatives Considered:

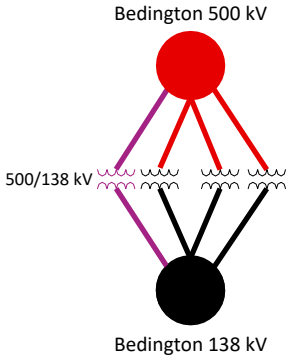
- Maintain transformer in existing condition & replace upon failure

Estimated Project Cost: $21.8M

Projected In-Service: 06/01/2027

Project Status: Engineering

Model: 2023 RTEP model for 2028 Summer (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
Bedington – Doubs 500 kV Misoperation Relays

Need Numbers: APS-2023-057

Process Stage: Solution Meeting 12/05/2023

Previously Presented: Need Meeting 10/31/2023

Project Driver:

Equipment Material Condition, Performance and 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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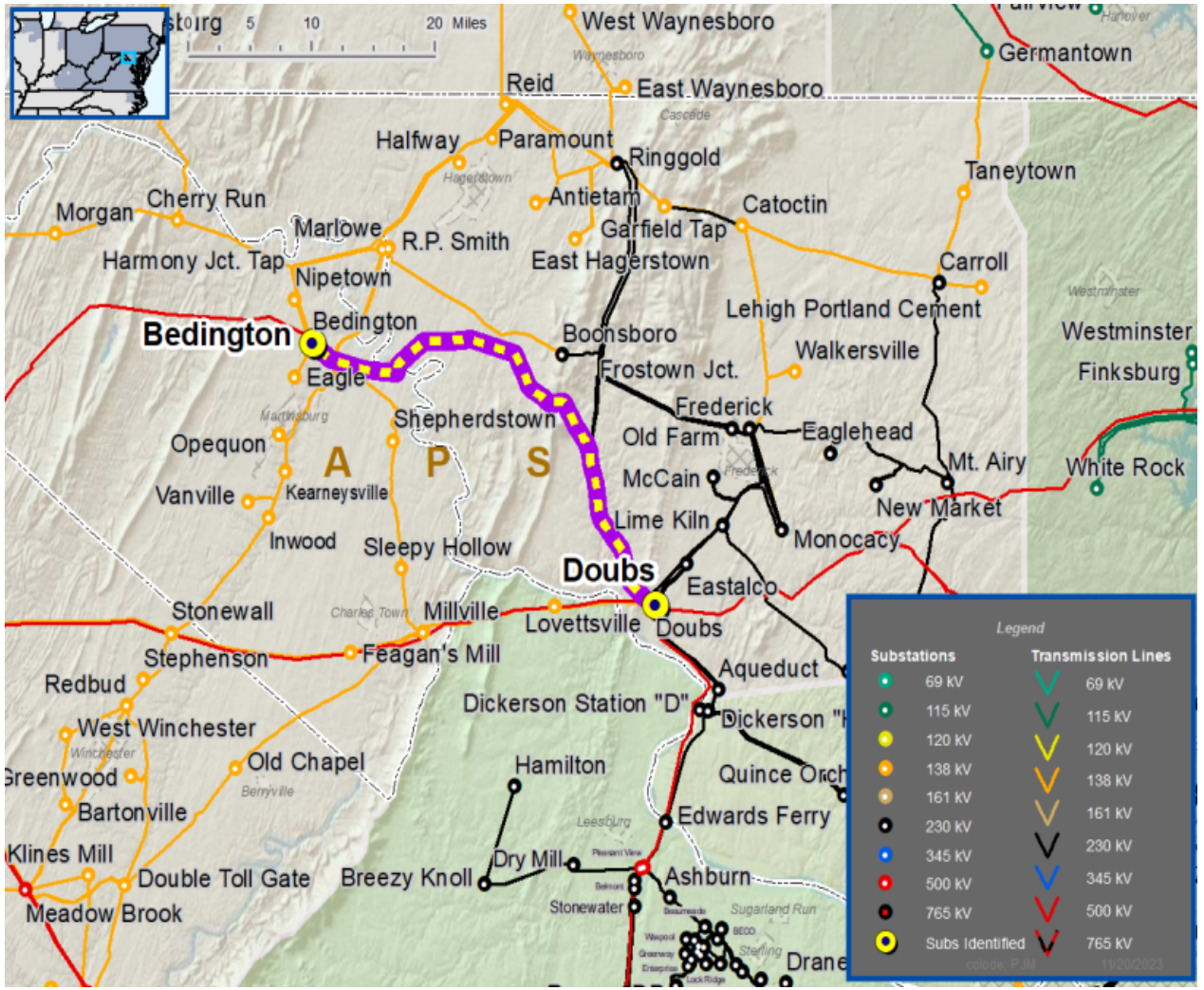

APS Transmission Zone M-3 Process
Bedington – Doubs 500 kV Misoperation Relays

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
APS-2023-057	Bedington – Doubs 500 kV	3526 / 3792	3573 / 4379

APS Transmission Zone M-3 Process
Bedington – Doubs 500 kV Misoperation Relays

Need Number: APS-2023-057

Process Stage: Solution Meeting 12/05/2023

Proposed Solution:

- Replace circuit breakers, disconnect switches, line trap, substation conductor and relaying at Bedington Substation
- Replace circuit breakers, disconnect switches, line trap, substation conductor and relaying at Doubs Substation

Transmission Line Ratings:

- Bedington – Doubs 500 kV Line:
  - Before Proposed Solution: 3526 / 3792 / 3928 / 4140 MVA (SN / SE / WN / WE)
  - After Proposed Solution: 3573 / 4379 / 4050 / 5194 MVA (SN / SE / WN / WE)

Alternatives Considered:

- Maintain line and vintage relay schemes with risk of misoperation

Estimated Project Cost: $ 6.95 M

Projected In-Service: 02/28/2025

Project Status: Engineering

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

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

Questions?

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

11/22/2023 - V1 – Original version posted to pjm.com