# Transmission Expansion Advisory Committee FirstEnergy Supplemental Projects

October 3, 2023

Transmission Expansion Advisory Committee – FirstEnergy Supplemental 10.03.2023

# 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 Black Oak-Hatfield 500 kV Misoperation Relays

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Penn Mar

Need Numbers: APS-2023-038

Process State: Need Meeting 10/3/2023

**Project Driver:** 

Equipment Material Condition, Performance and Risk

#### **Specific Assumption Reference:**

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

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cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.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

#### Р Brookhaven Garrett Tap rice Hill Garrett South Morgantown Deep Creek (RELIANT) Afton Ruthbelle Albright Kingwood Oak Park Mt. Zion-Beryl Grafton Snowy Creek Kelso Gap al Coal Mountain Lake Park Elk Garden Denver Sulphur City

Connellsville

South Union

Elliotsville

Bethelboro

North Union

Texas Eastern

Brandonville

Necessity

Hazelton

Malden

Emerald

Resource

Hatfield

unction

Hatfield Ronco

Luzerne

Brownsville

Gates Hil

Lardin

Pierpont

Morgantown Energy Facility

Gans

Fort Martin Reserve

Cheat Lake Brandonville Jct. Tap

Clarksville JCT.

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Legend

Subs Ide

4.5 9

Twin Ridges

Jennings

Transmission Lines

18 Miles

Dans

Finzel

Westvaco Black-Oa

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Cross School

Parr Run

Frostburg

Black Oak

Carlos Jct.





Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
APS-2023-038	Black Oak – Hatfield 500 kV	3526 / 3792	3573 / 4379

# 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 Numbers: APS-2023-037 Previously Presented: Need Meeting 09/05/2023 Process Stage: Solution Meeting 10/03/2023

**Project Driver:** 

Performance and Risk, Operational Flexibility and Efficiency

### **Specific Assumption Reference:**

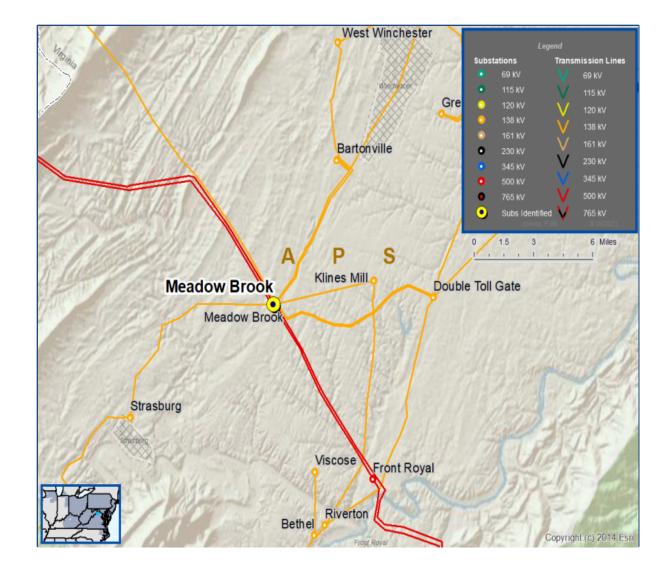
System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits
- Upgrade Relay Schemes

### **Problem Statement:**

- The protective equipment on the Meadow Brook No. 1 500/138 kV and Meadow Brook No. 4 500/138 kV transformers are electro-mechanical and vintage.
  - The protective equipment cannot be easily repaired due to a lack of replacement parts and available expertise in the outdated technology.
- FirstEnergy has identified operational constraints when a single breaker is out of service for maintenance.
- The Meadow Brook No. 1 500/138 kV transformer is limited by terminal equipment:
  - Normal Ratings: 470/567/579/612 MVA (SN/SSTE/WN/WSTE)
  - Single Breaker Outage: 306/306/306/306 MVA (SN/SSTE/WN/WSTE)
- The Meadow Brook No. 4 500/138 kV transformer is limited by terminal equipment:
  - Normal Ratings: 461/567/539/611 MVA (SN/SSTE/WN/WSTE)
  - Single Breaker Outage: 306/306/306/306 MVA (SN/SSTE/WN/WSTE)

## APS Transmission Zones M-3 Process Meadow Brook Substation





Need Number: APS-2023-037

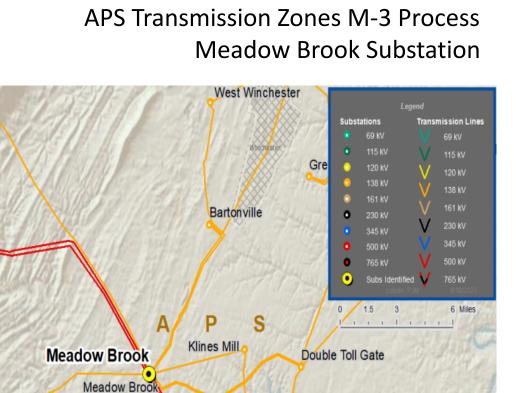
Process Stage: Solution Meeting 10/03/2023

**Proposed Solution:** 

- At Meadow Brook Substation:
  - On the No. 1 500/138 kV Transformer Circuit, replace:
    - Circuit Breakers
    - Relaying
    - Limiting substation conductor
  - On the No. 4 500/138 kV Transformer Circuit, replace:
    - Relaying
    - Limiting substation conductor

#### **Transformer Ratings:**

- No. 1 500/138 kV Transformer
  - Before Proposed Solution:
    - Normal Ratings: 470/567/579/612 MVA (SN/SSTE/WN/WSTE)
    - Single Breaker Outage: 306/306/306/306 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution:
    - Normal Ratings: 519/592/621/702 MVA (SN/SSTE/WN/WSTE)
    - Single Breaker Outage: 519/592/621/702 MVA (SN/SSTE/WN/WSTE)
- No. 4 500/138 kV Transformer
  - Before Proposed Solution:
    - Normal Ratings: 461/567/539/611 MVA (SN/SSTE/WN/WSTE)
    - Single Breaker Outage: 306/306/306/306 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution:
    - Normal Ratings: 461/571/539/611 MVA (SN/SSTE/WN/WSTE)
    - Single Breaker Outage: 461/571/539/611 MVA (SN/SSTE/WN/WSTE)



Viscose Front Royal

Riverton

Bethel

Strasburg

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## APS Transmission Zones M-3 Process Meadow Brook Substation

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### **Alternatives Considered:**

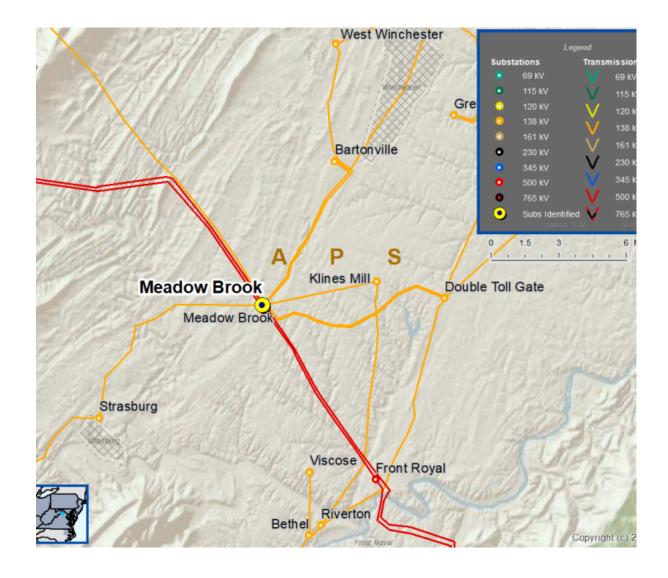
Maintain equipment in existing condition.

Estimated Project Cost: \$ 2.3 M

Projected In-Service: 12/20/2024

**Project Status:** Engineering

Model: 2022 RTEP model for 2027 Summer (50/50)



## Appendix

# High Level M-3 Meeting Schedule

Assumptions
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Activity	Timing
Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
Stakeholder comments	10 days after Assumptions Meeting

## Needs

## Solutions

## Submission of Supplemental Projects & Local Plan

Activity	Timing
TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
Stakeholder comments	10 days after Needs Meeting

Activity	Timing
TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
Stakeholder comments	10 days after Solutions Meeting

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**

9/22/2023 – V1 – Original version posted to pjm.com