Transmission Expansion Advisory Committee
FirstEnergy Supplemental Projects

October 31, 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

Penelec Transmission Zone M-3 Process
Erie South Substation

Need Numbers: PN-2023-018

Process Stage: 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

Upgrade Relay Schemes

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

Problem Statement:

- The existing control building at Erie South is congested. There is not sufficient space for relay panel upgrades.
- 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cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.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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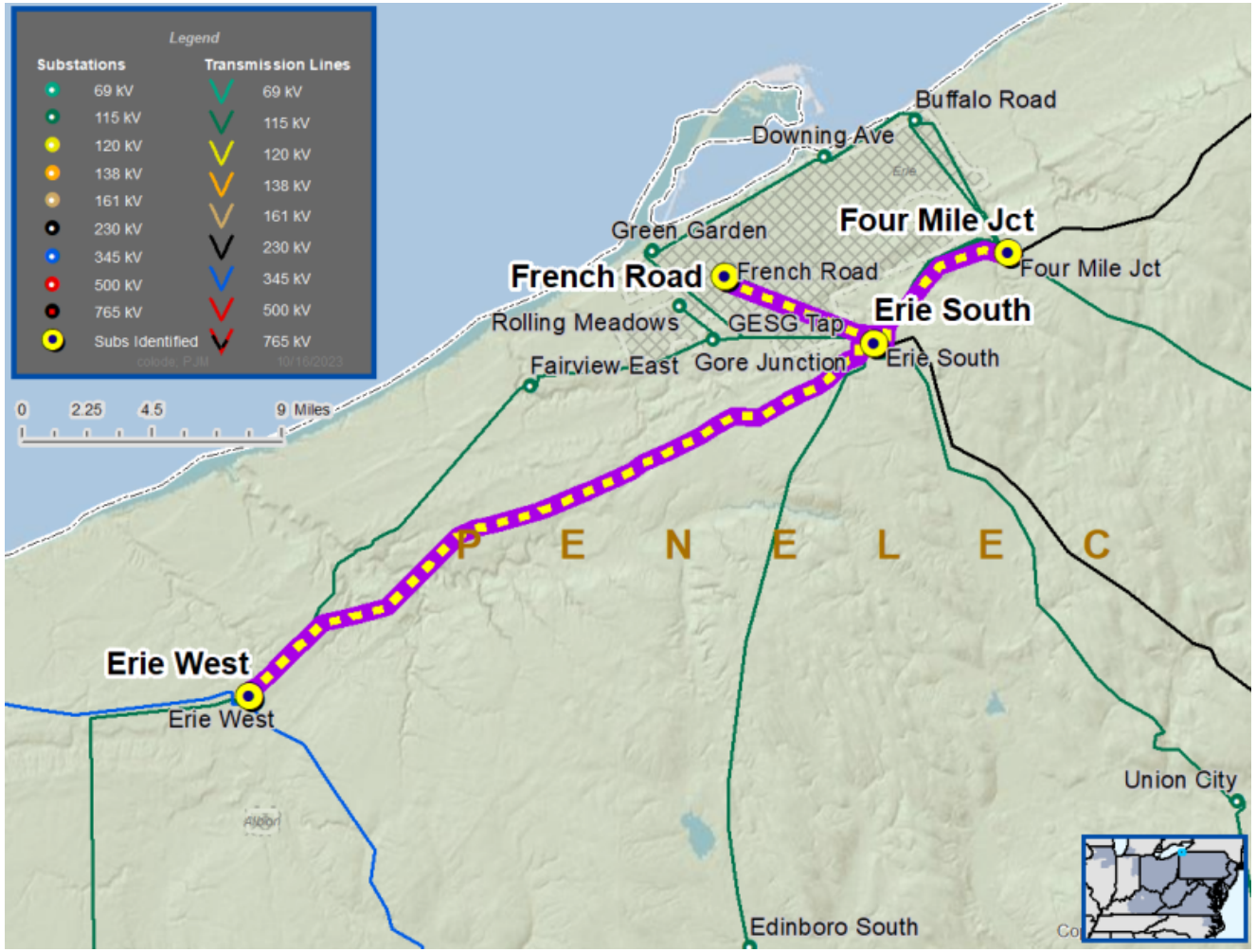


Penelec Transmission Zone M-3 Process
Erie South Substation

Need #	Transmission Line	Existing Line Rating (SN / SE / WN / WE)	Existing Conductor Rating (SN / SE / WN / WE)
PN-2023-018	Erie South – Erie West 345 kV	1216 / 1308 / 1355 / 1428	1631 / 1989 / 1848 / 2358
	Erie South – Warren 230 kV	546 / 666 / 619 / 762	546 / 666 / 619 / 790
	Erie South – Four Mile Junction 230 kV	506 / 621 / 586 / 717	546 / 666 / 619 / 790
	Erie South – French Road No. 2 115 kV	137 / 174 / 171 / 199	137 / 174 / 171 / 201

APS Transmission Zones M-3 Process
Shingletown Substation

Need Number: APS-2023-059, PN-2023-022

Process Stage: Need Meeting 10/31/2023

Project Driver:

System Performance and Operational Flexibility

Specific Assumption Reference:

Global Factors

- System reliability and performance
- Substation and line equipment limits
- Add/Expand Bus Configuration

Problem Statement:

- The existing 230 kV yard at Shingletown is configured as a straight bus. Shingletown serves approximately 82.7 MW of load and 1,152 customers. With a stuck breaker contingency, the entire Shingletown substation will be outaged.
- Transmission line ratings are limited by terminal equipment:

Dale Summit – Shingletown 230 kV Line

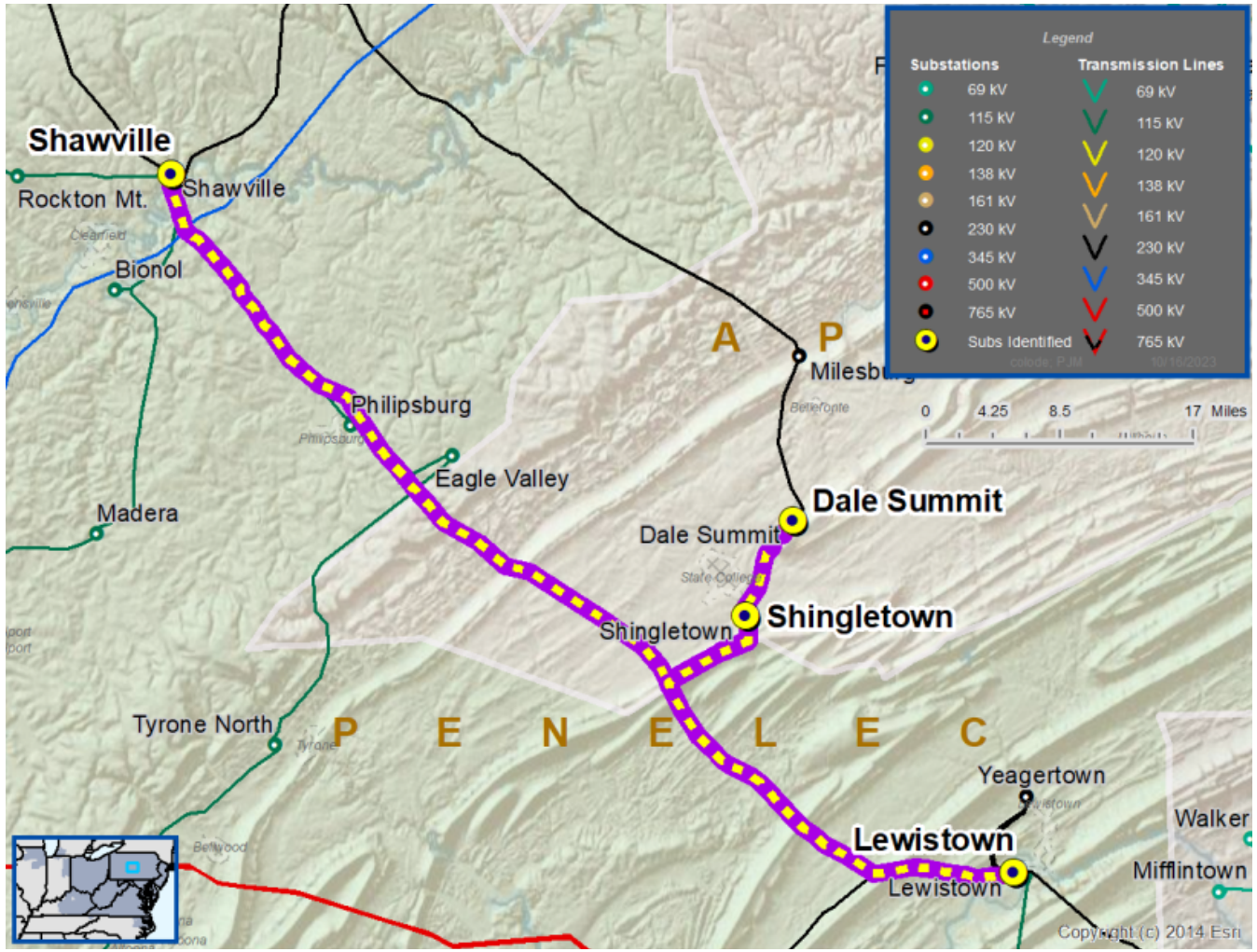
- Existing line rating: 486 / 523 MVA (SN / SE)
- Existing Transmission Conductor Rating: 617/ 754 MVA (SN / SE)

Lewistown – Shingletown 230 kV Line

- Existing line rating: 512 / 612 MVA (SN / SE)
- Existing Transmission Conductor Rating: 546 / 666 MVA (SN / SE)

Shawville – Shingletown 230 kV Line

- Existing line rating: 445 / 587 MVA (SN / SE)
- Existing Transmission Conductor Rating: 546 / 666 MVA (SN / SE)



Re-Present 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

Penelec Transmission Zone M-3 Process
Homer City North 345/230-23 kV Transformer Replacement

Need Number: PN-2019-032

Process Stage: Re-Present Solutions Meeting 10/31/2023

Previously Presented: Solutions Meeting 08/08/2019

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Substation Condition Rebuild/Replacement

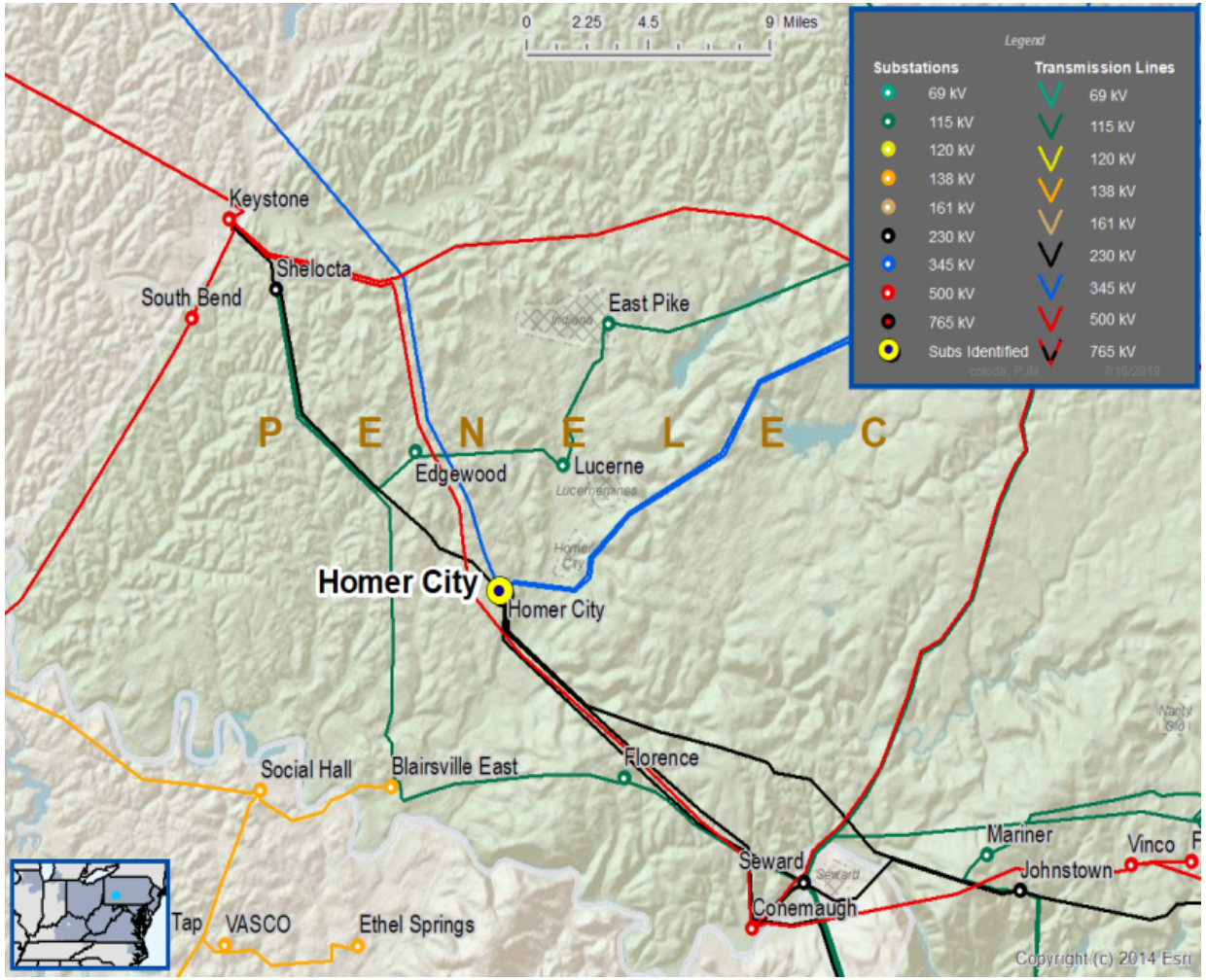
- Power transformers and load tap changers (LTCs)
- Station system protection and controls

Problem Statement:

Homer City North 345/230-23 kV Transformer

- Transformer has increased failure probability due to:
  - Type “U” bushings
  - High level heating gases and moisture
  - Deteriorated control cabinet components
  - Obsolete parts
  - Leaks
- Transformer is 51 years old.

Transformer circuit rating is the existing transformer rating of 653/697 MVA (SN/SE).



Homer City North 345/230-23 kV Transformer Replacement

Need Number: PN-2019-032

Process Stage: Re-Present Solutions Meeting 10/31/2023

Formerly Proposed Solution:

Replace Homer City North 345/230-23 kV Transformer

- Replace the North 345/230-23 kV transformer and associated equipment with 345/230-23 kV 336/448/560 MVA transformer

Estimated Cost: $6.6M

Transformer Rating:

Homer City North 345/230-23 kV Transformer

- Before Proposed Solution: 653/817 MVA (SN/SE)
- After Proposed Solution: 691/854 MVA (SN/SE)

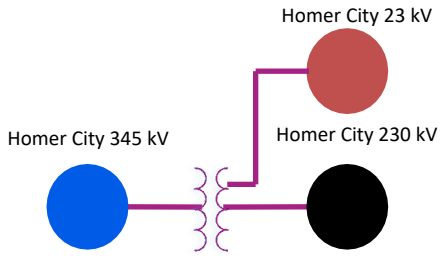
Alternatives Considered:

1. Maintain existing condition and elevated risk of failure

Projected In-Service: 12/31/2021

Project Status: Conceptual

Model: 2018 Series 2023 Summer RTEP 50/50



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

Penelec Transmission Zone M-3 Process
Homer City North 345/230-23 kV Transformer Replacement

Need Number: PN-2019-032

Process Stage: Re-Present Solutions Meeting 10/31/2023

Previously Presented: Solutions Meeting 08/08/2019

Newly Proposed Solution:

Replace Homer City North 345/230-23 kV Transformer

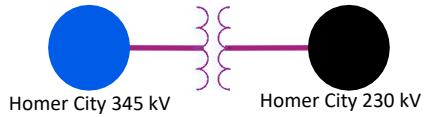
- Replace the North 345/230-23 kV transformer and associated equipment with :
  - One (1) 345-230 kV transformer rated 450/600/750 MVA SN/SE/SLD using three (3) single-phase 150/200/250 MVA units

Estimated Cost: $17.70M

Transformer Rating:

Homer City North 345-230 kV Transformer

- Before Proposed Solution: 653/817 MVA (SN/SE)
- After Proposed Solution: 913/1147 MVA (SN/SE)



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

Alternatives Considered:

1. Maintain existing condition and elevated risk of failure

Projected In-Service: 12/15/2023

Project Status: Construction

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

Penelec Transmission Zone M-3 Process
Homer City North 345/230-23 kV Transformer Replacement

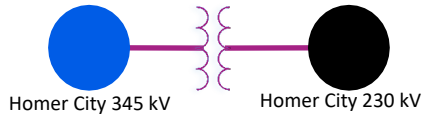
Need Number: PN-2019-032

Process Stage: Re-Present Solutions Meeting 10/31/2023

Newly Proposed Solution:

Replace Homer City North 345/230-23 kV Transformer

- Replace the North 345/230-23 kV transformer and associated equipment with :
  - One (1) 345-230 kV transformer rated 450/600/750 MVA SN/SE/SLD using three (3) single-phase 150/200/250 MVA units



Justification:

- Upon ordering the new unit, it was discovered that the 345/230-23 kV replacement transformer would not arrive until 2025.
- It was determined that a separate, larger sized 345-230 kV transformer and an auxiliary 230-23 kV transformer would suffice for the project ISD.
- Homer City Generation was retired in July 2023. The 230-23 kV auxiliary transformer was no longer needed.

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

10/20/2023 - V1 – Original version posted to pjm.com