

Transmission Expansion Advisory Committee FirstEnergy (Penelec) Supplemental Projects

December 5, 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

Need Numbers: PN-2023-019

Process Stage: Need Meeting 12/05/2023

Project Driver:

System Performance and Operational Flexibility

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

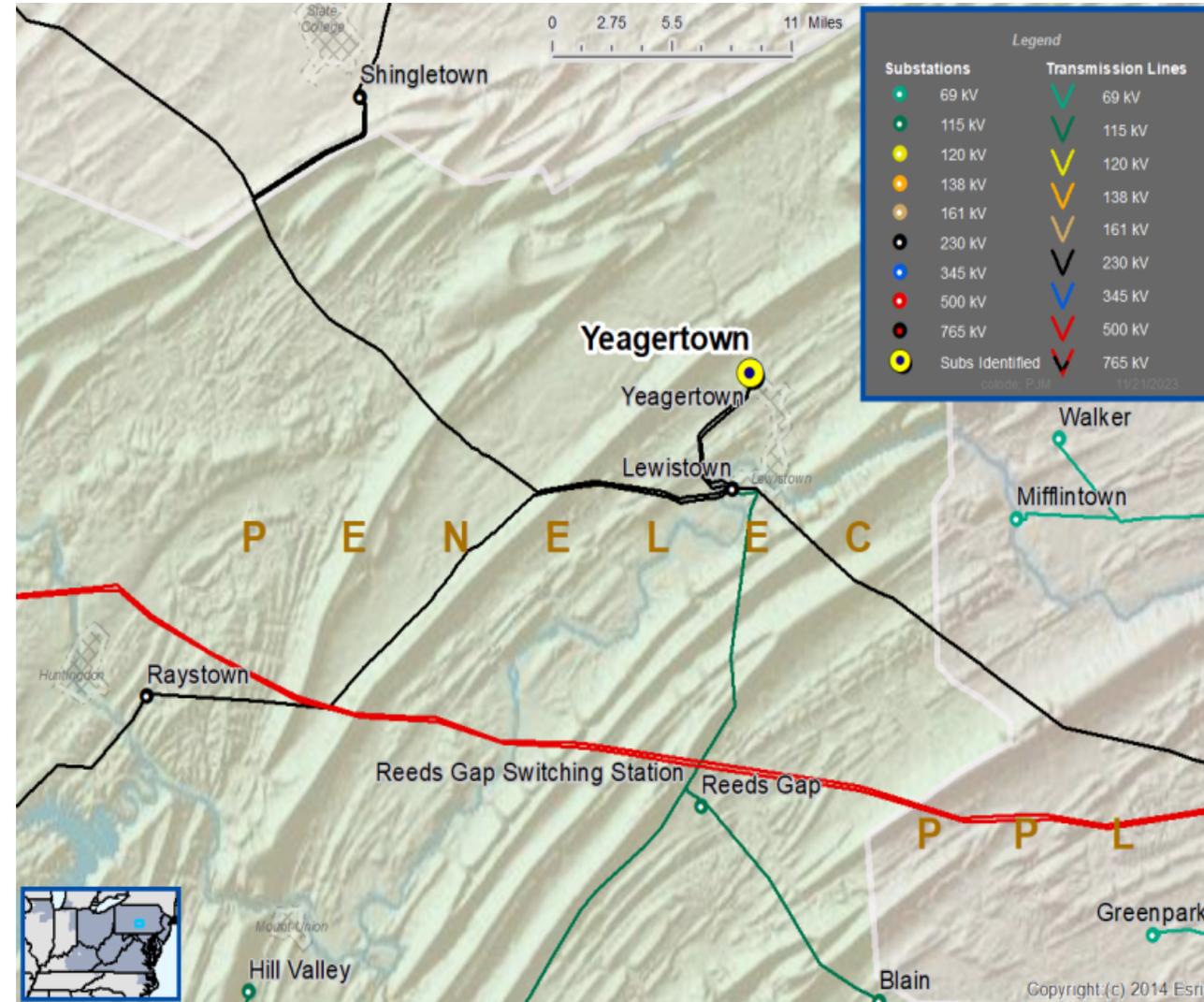
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The existing Yeagertown #1 230-46 kV Transformer is approximately 51 years old and is reaching end of life.
- The transformer is constructed with Type U bushings.
 - Type U bushing designs have been documented to dramatically increase the risk of bushing failures.
- Existing transformer ratings:
 - 83/83/83/83 MVA (SN/SLTE/WN/WLTE)



Need Numbers: PN-2023-020

Process Stage: Need Meeting 12/05/2023

Project Driver:

System Performance and Operational Flexibility

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

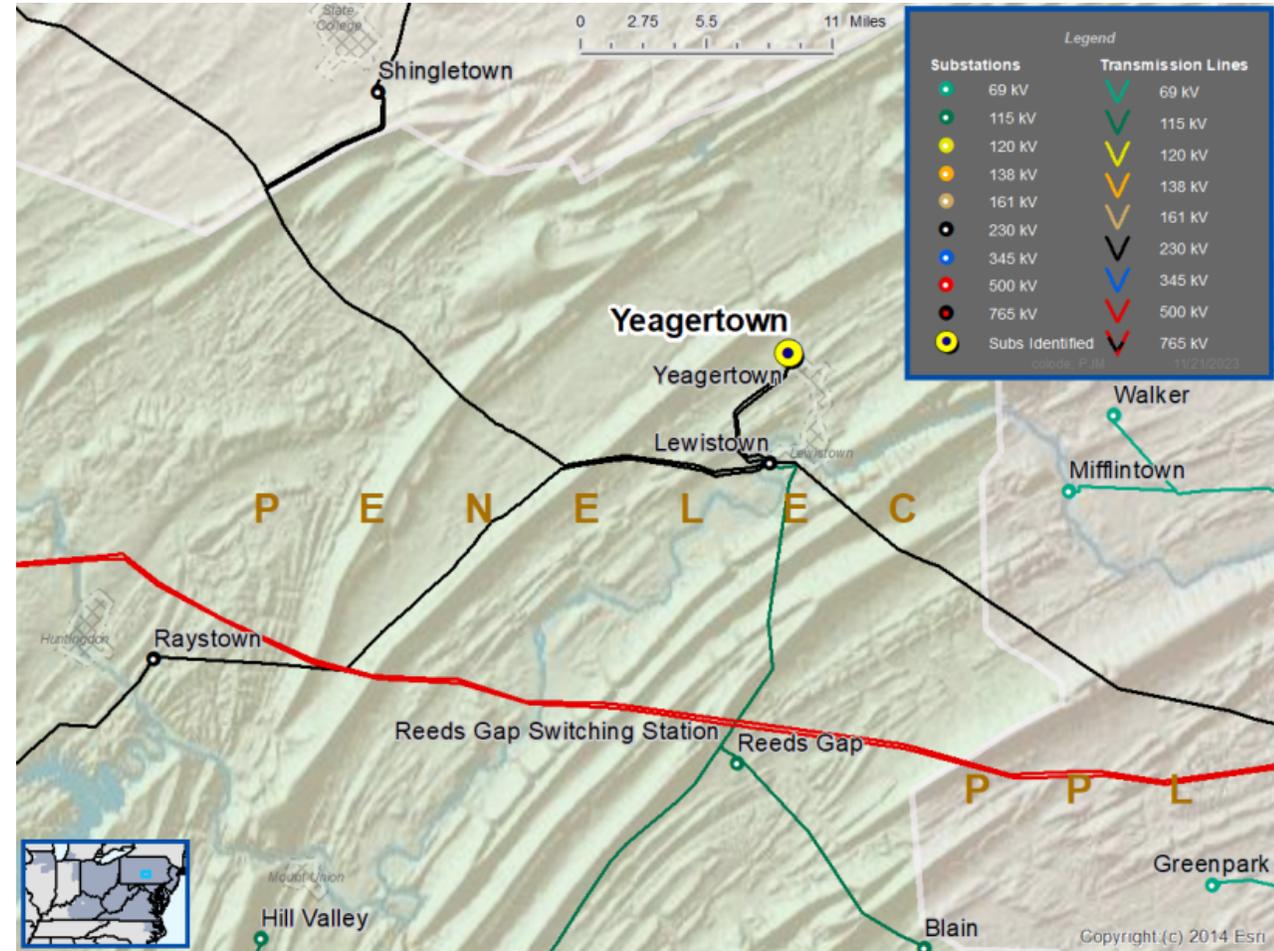
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The existing Yeagertown #2 230-46 kV Transformer is approximately 51 years old and is reaching end of life.
- The transformer is constructed with Type U bushings.
 - Type U bushing designs have been documented to dramatically increase the risk of bushing failures.
- Existing transformer ratings:
 - 69/75/83/83 MVA (SN/SLTE/WN/WLTE)



Need Numbers: PN-2023-029

Process Stage: Need Meeting 12/05/2023

Project Driver:

System Condition, System Performance

Specific Assumption Reference:

FE Global Factors

- Past system reliability/performance
- Substation/Line Equipment Limits

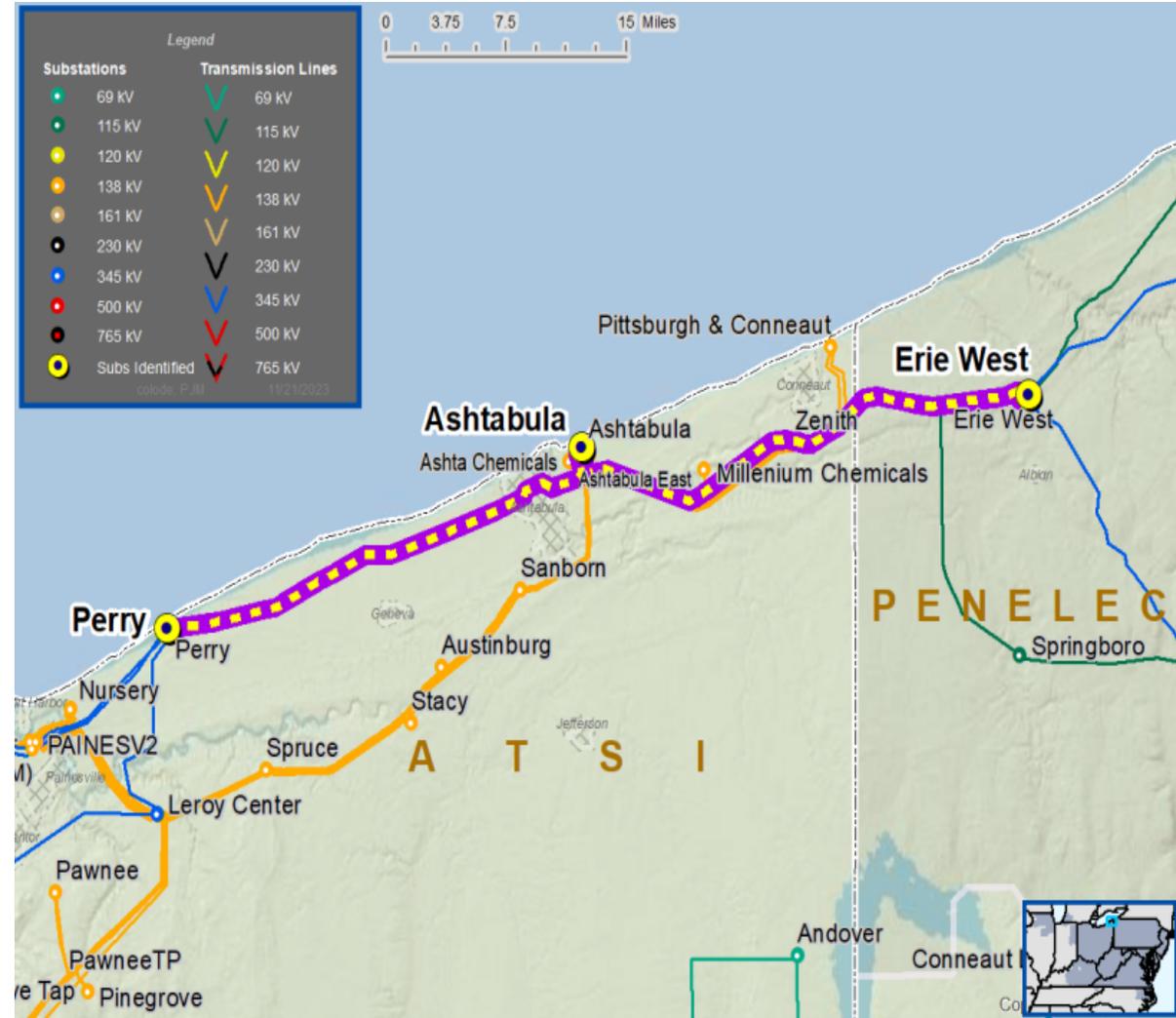
Line Condition Rebuild/Replacement

- Transmission Steel Tower, Wood & Steel Poles
- Transmission Line Hardware

Problem Statement:

- The Perry-Ashtabula-Erie West 345 kV Line was constructed approximately 60 years ago. It is a critical east-to-west power transfer interface.
- The Ashtabula – Erie West 345 kV Line is approximately 20 miles long with 7.2 miles in the Penelec territory in Pennsylvania.
- The insulators and related hardware are severely corroded and reaching end of life.

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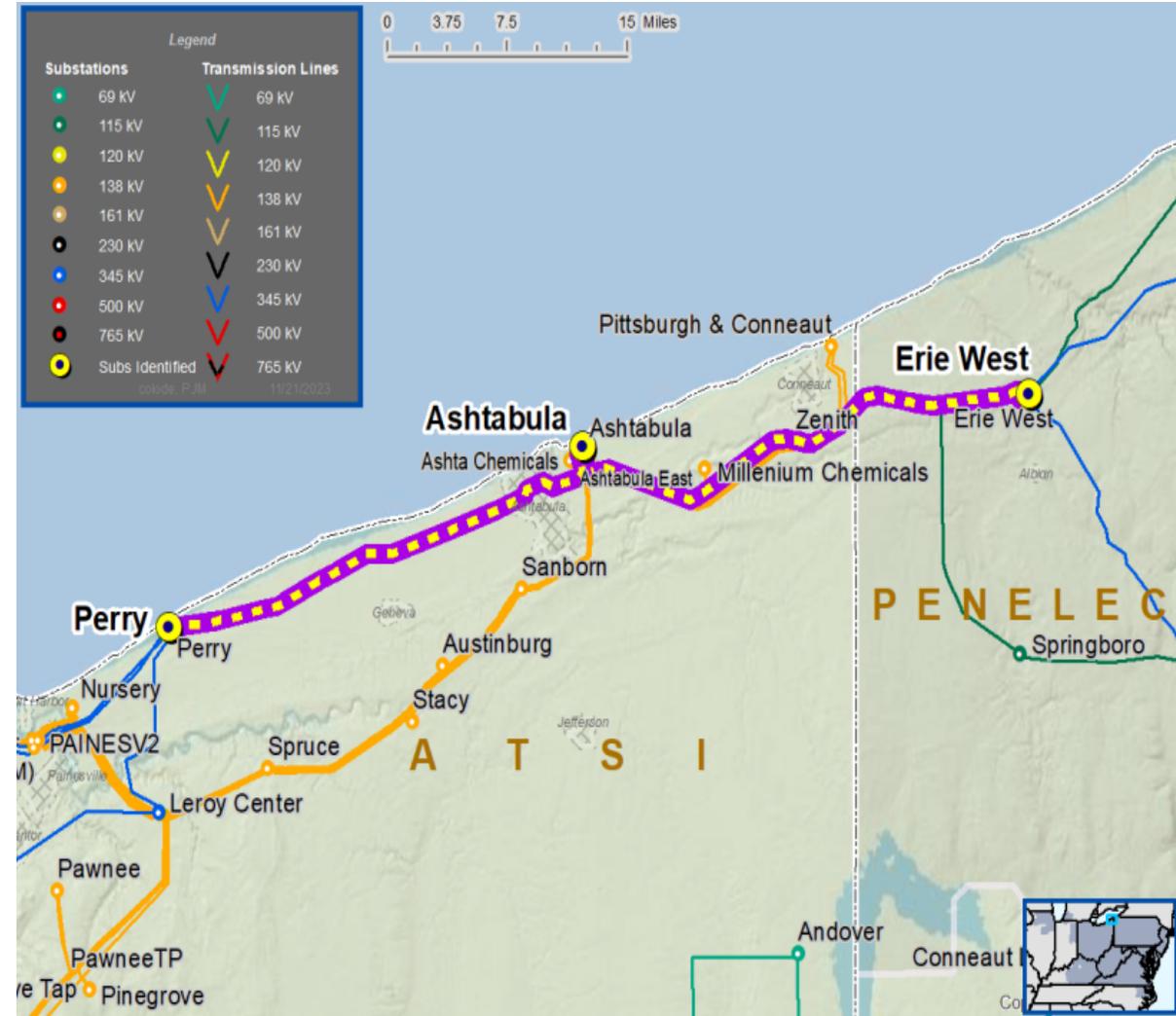
Need Numbers: PN-2023-029

Process Stage: Need Meeting 12/05/2023

Problem Statement (Continued):

Below information is only for the Penelec section of the line (7.2 miles).

- The 27 of 39 structures in Pennsylvania are H-frame steel-pole structures which are exhibiting extensive coating failure resulting in ongoing corrosion.
- The steel pole structures have hinged bases and use guying for keeping vertical. The guying system at 19 of the 27 steel pole structures is severely deteriorated.
- Many of the original double rod attachments for supporting the crossarms to the steel poles have failed and have been replaced with wire supports.
- Since 2014, the line has had seven scheduled repair outages and four protection-operated outages due to failure of line equipment.



Need Numbers: PN-2023-030

Process Stage: Need Meeting 12/05/2023

Project Driver:

Equipment Material Condition, Performance and Risk

Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

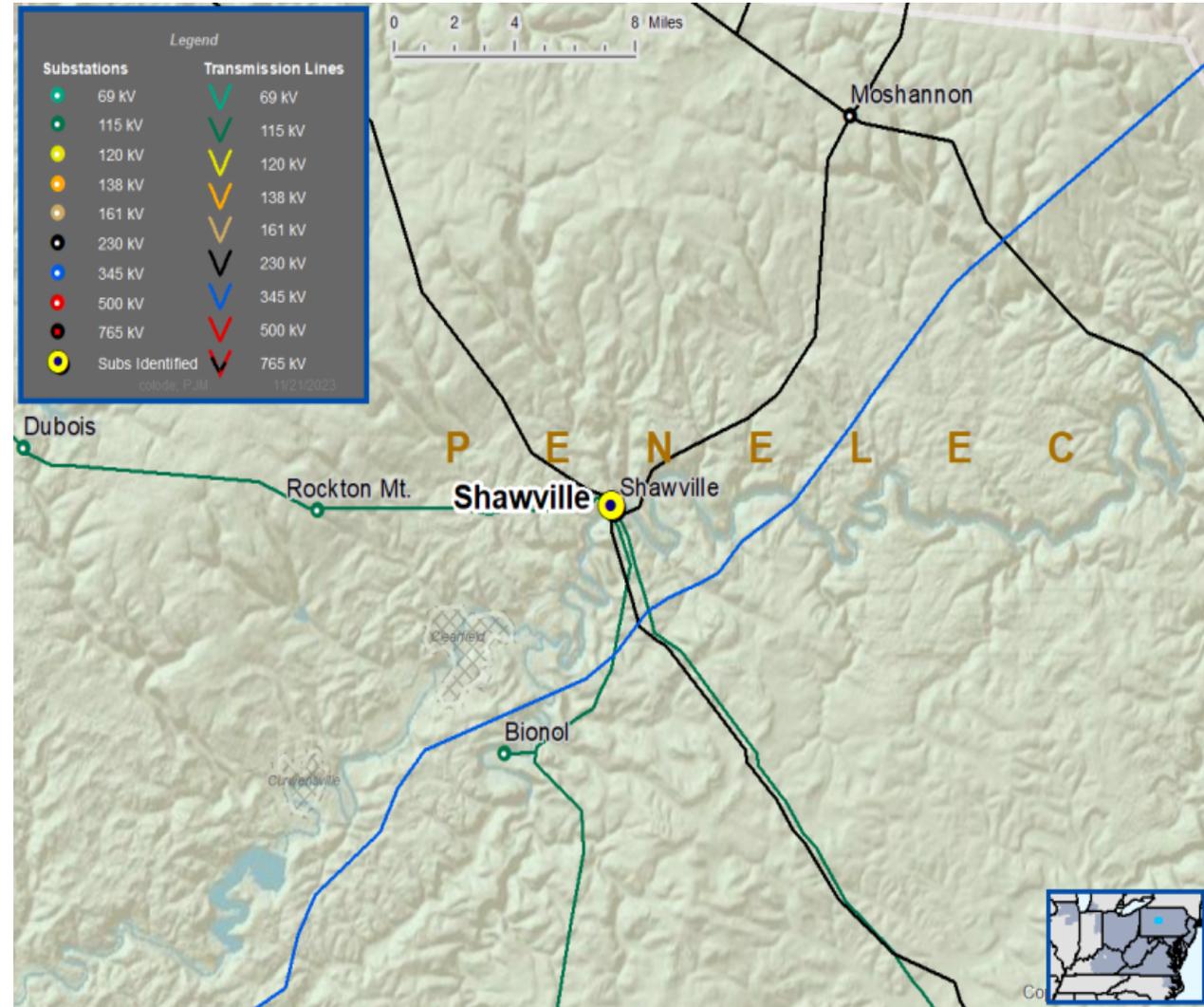
- System reliability and performance

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The Shawville 1A 230/115-17 kV Transformer is approximately 69 years old and serves as both a GSU and transmission transformer.
- The transformer has exhibited maintenance issues and has been requiring more frequent nitrogen additions due to leaks.
- Existing transformer ratings:
 - 141/186/230 MVA SN/SE/SLD
 - 181/222/230 MVA WN/WE/WLD



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: PN-2020-005

Process Stage: Solution Meeting 12/05/2023

Previously Presented: Needs Meeting 5/12/2020

Project Driver:

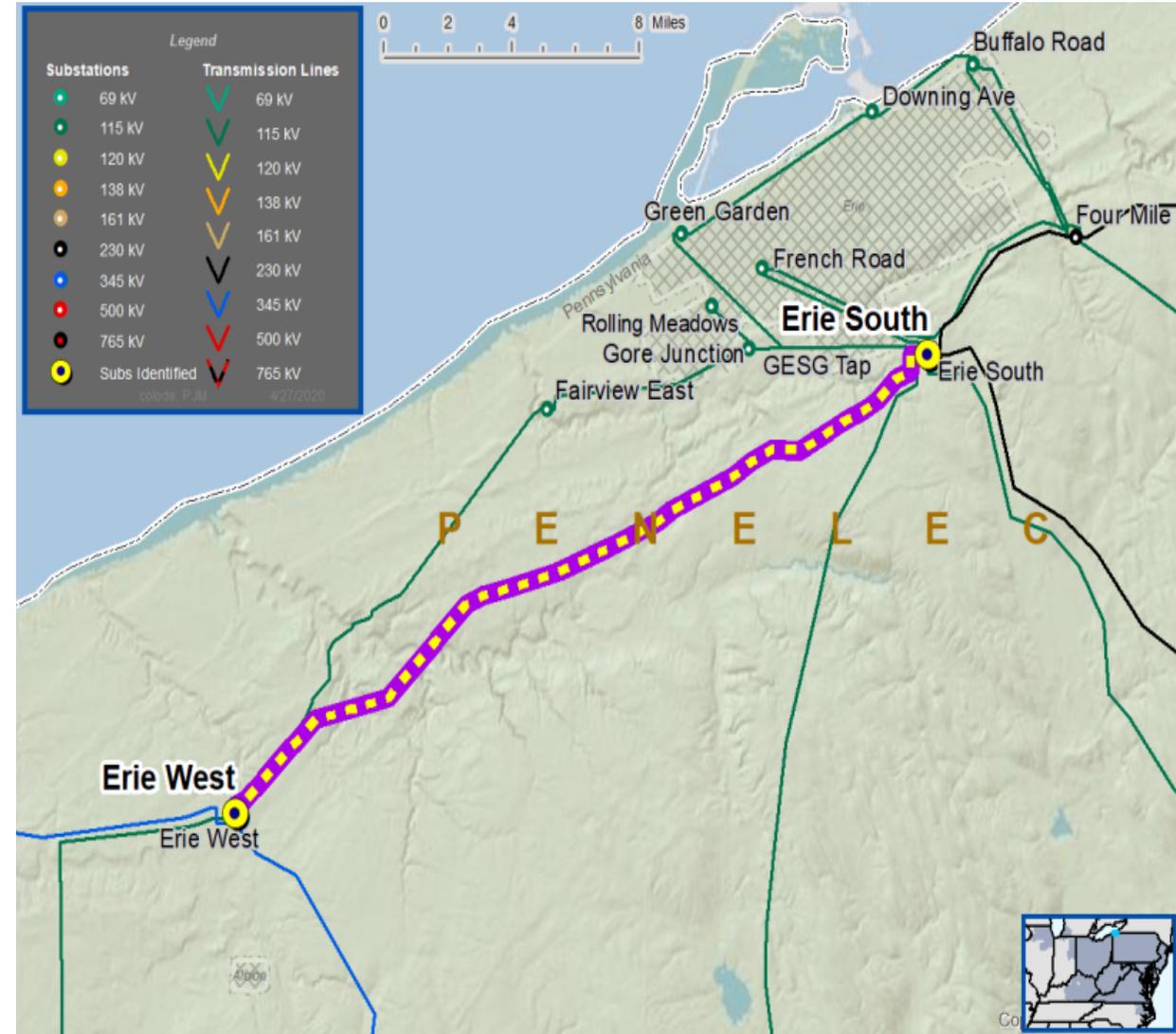
*Equipment Material Condition, Performance and Risk
Operational Flexibility and Efficiency*

Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
 - Substation/line equipment limits
- Upgrade Relay Schemes
- Relay schemes that have a history of misoperation
 - Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
 - Communication technology upgrades
 - Bus protection schemes

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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 part and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

Need Number	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)	Limiting Terminal Equipment
PN-2020-005	Erie South – Erie West 345 kV Line	1216 / 1308	1631 / 1989	

Need Numbers: PN-2023-018

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

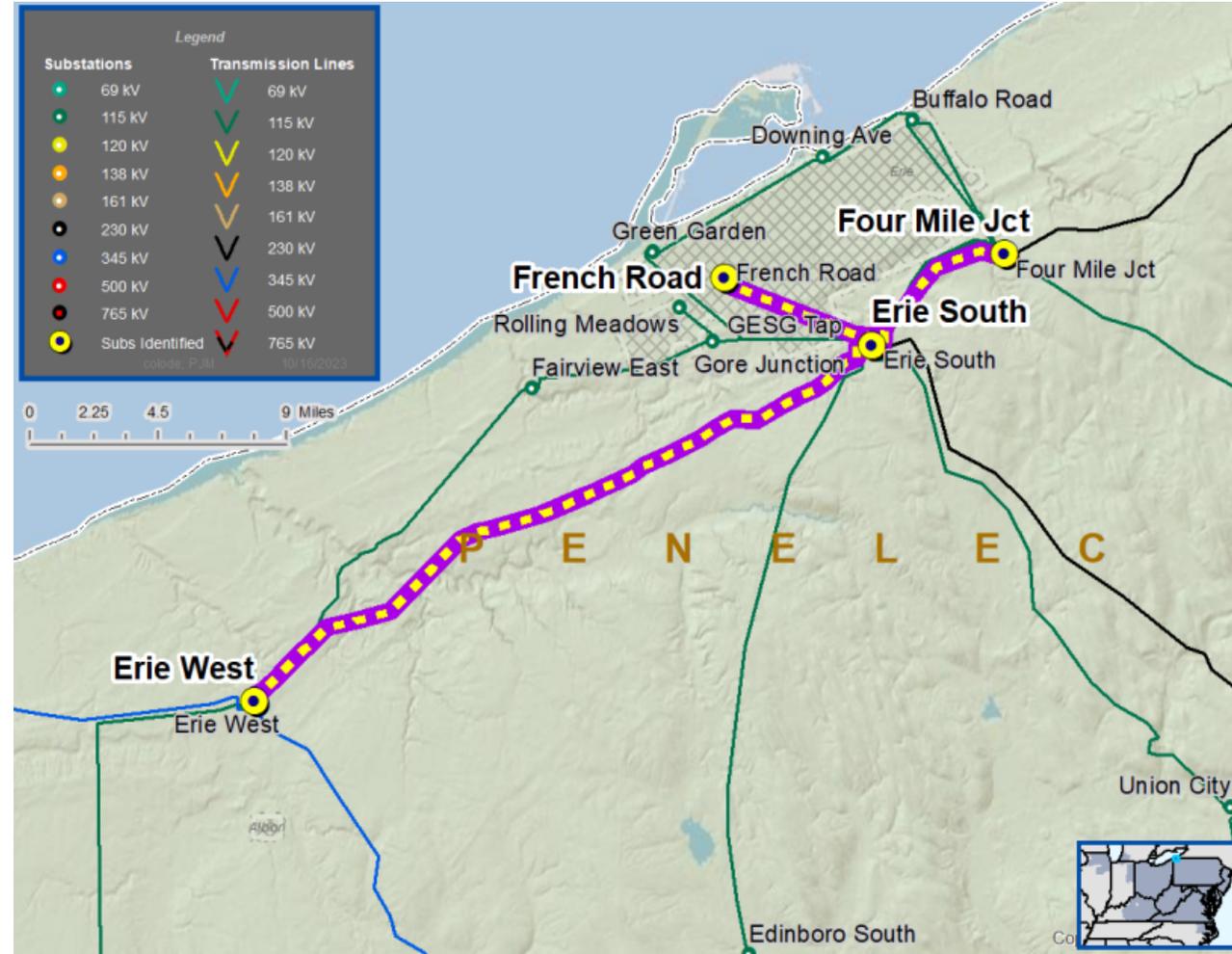
Upgrade Relay Schemes

- 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

Proposed Solution:

Need #	Transmission Line	New MVA Line Rating (SN / SE / WN / WE)	Scope of Work	Estimated Cost	Target ISD
PN-2020-005 and PN-2023-018	Erie South – Erie West 345 kV	1631 / 1989 / 1848 / 2358	<ul style="list-style-type: none"> At Erie South, replace relaying & line trap At Erie West, replace relaying & line trap 	\$10.7 M	6/3/2028
	Erie South – Warren 230 kV	546 / 666 / 619 / 790	<ul style="list-style-type: none"> At Erie South, replace relaying & line trap 		
	Erie South – Four Mile Junction 230 kV	546 / 666 / 619 / 790	<ul style="list-style-type: none"> At Erie South, replace relaying & substation conductor 		
	Erie South – French Road No. 2 115 kV	137 / 174 / 171 / 201	<ul style="list-style-type: none"> At Erie South, replace relaying 		

Alternatives Considered: Maintain equipment in existing condition and risk misoperation of protective relays

Project Status: Engineering

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

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