FirstEnergy – Penelec – 2025
Submission of Supplemental Projects for Inclusion in the Local Plan

Penelec Transmission Zone M-3 Process
Piney Substation

Need Number: PN-2020-004, APS-2020-003

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Previously Presented: Solution Meeting – 08/15/2024
Need Meeting – 04/16/2020

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

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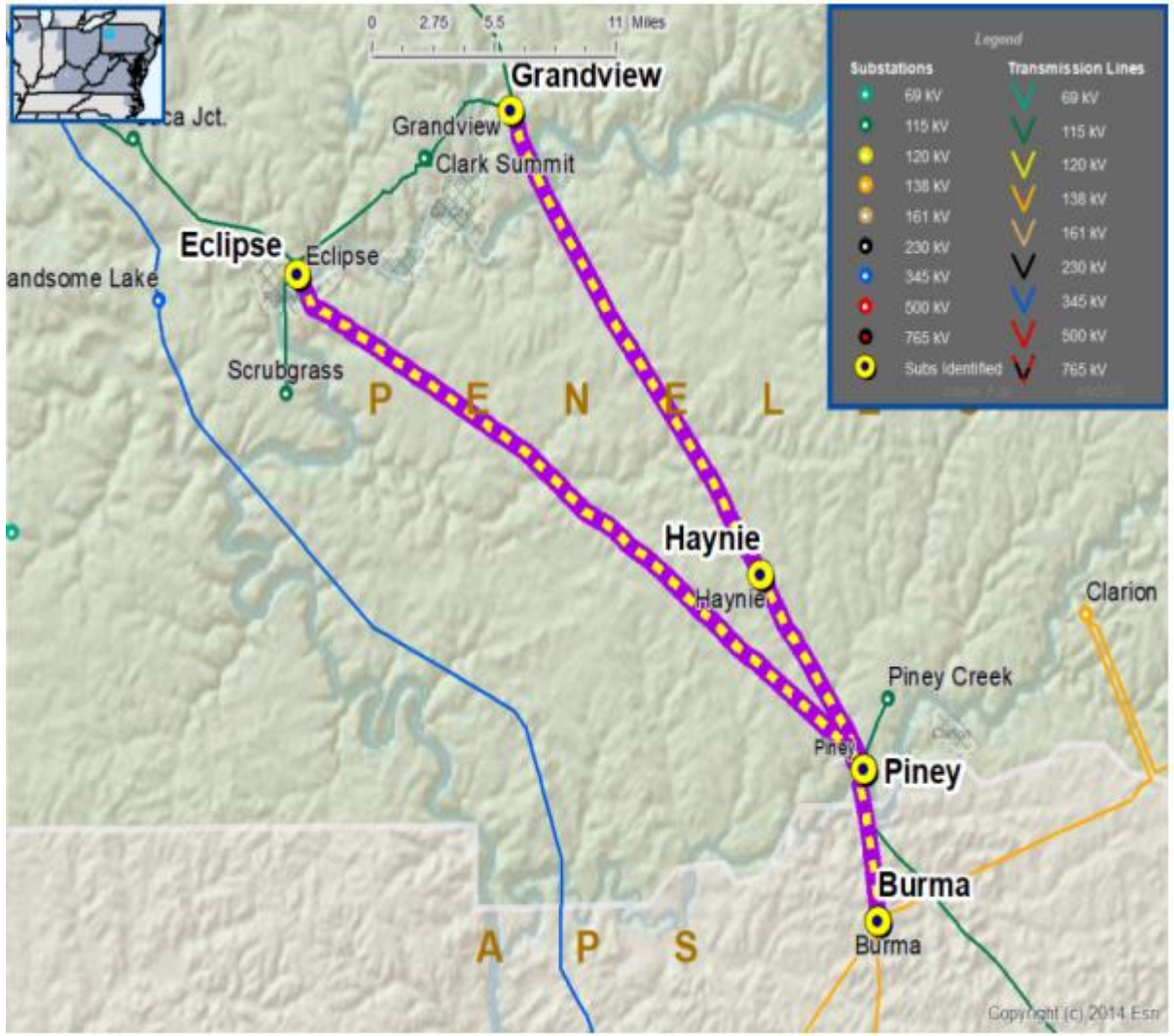

Penelec Transmission Zone M-3 Process
Piney Substation

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cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.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

Need Number	Transmission Line / Substation Locations	Existing Line Rating MVA (SN / SE/ WN / WE)	Existing Conductor Rating MVA (SN / SE/ WN / WE)
PN-2020-004	Grandview – Haynie 115 kV Line Haynie – Piney 115 kV Line	147 / 190 / 181 / 190 147 / 190 / 181 / 190	202 / 245 / 228 / 290 202 / 245 / 228 / 290
PN-2020-004 APS-2020-003	Burma – Piney 115 kV Line	221 / 262 / 263 / 286	232 / 282 / 263 / 334
PN-2020-004	Eclipse – Piney 115 kV Line	162 / 174 / 181 / 190	232 / 282 / 263 / 334

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Penelec Transmission Zone M-3 Process
Piney Substation

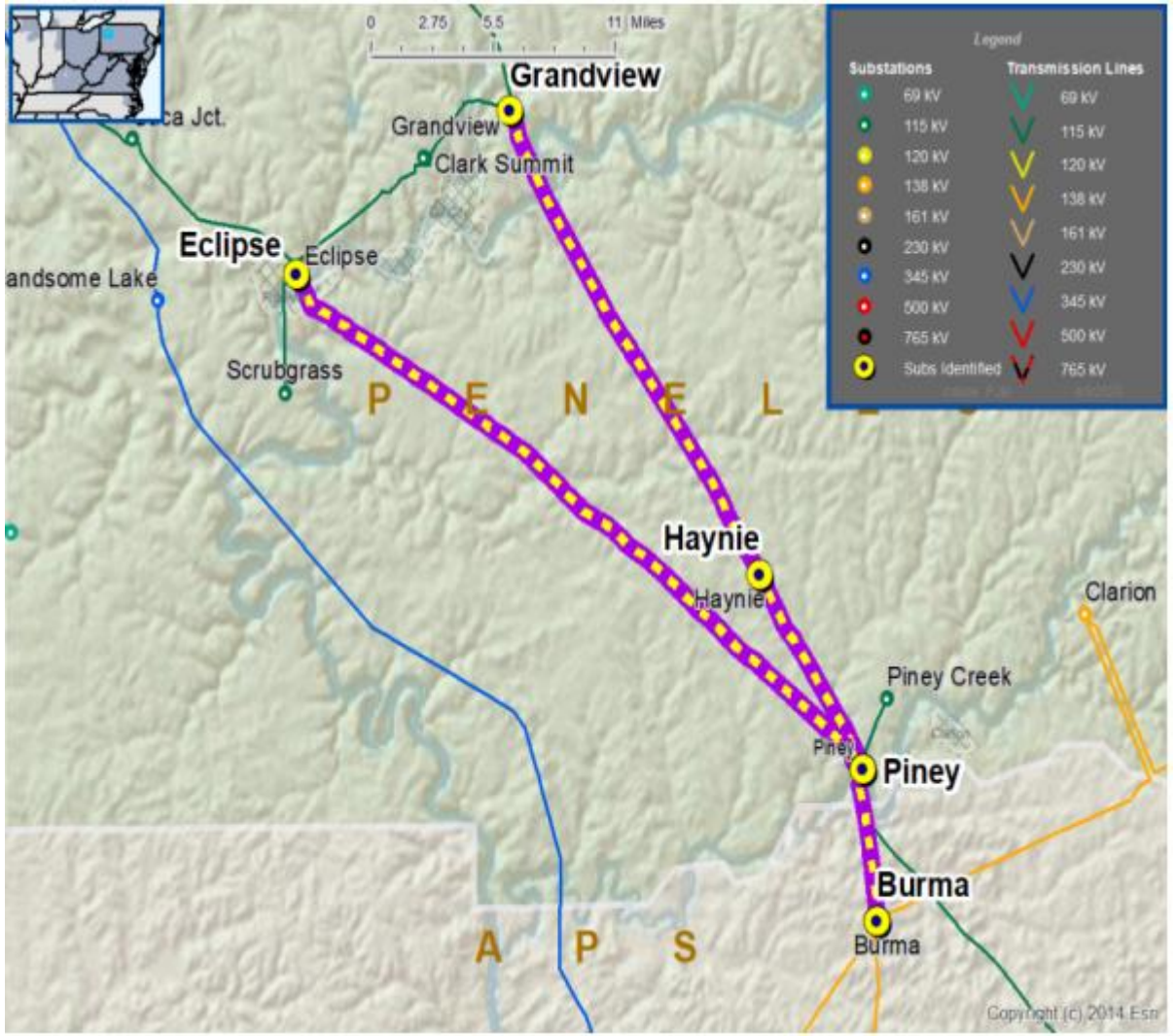
Problem Statement (Continued):

Piney Substation (Multiple System Condition Issues Identified):

- Burma 115 kV Terminal:
  - Breaker is experiencing oil leaks, foundation needs to be repaired, and oil containment needs replaced
  - Breaker disconnect switches are heavily worn
- Grandview 115 kV Terminal:
  - Breaker is experiencing oil leaks, foundation needs to be repaired, and oil containment needs replaced
  - Breaker disconnect switches are heavily worn
- Timblin 115 kV Terminal:
  - Breaker is experiencing oil leaks, foundation needs to be repaired, and oil containment needs replaced
  - Breaker disconnect switches are heavily worn
  - The existing line rating is the existing conductor rating of 178/214 MVA (SN/SE)
- Eclipse 115 kV Terminal:
  - Infrared inspection revealed hot spots on switches
- 115 kV bus tie breaker:
  - Breaker is experiencing oil leaks, foundation needs to be repaired, and oil containment needs replaced
  - Breaker disconnect switches are heavily worn
- No. 3 Transformer 115 kV Terminal:
  - Breaker is experiencing oil leaks, foundation needs to be repaired, and oil containment needs replaced
  - Breaker disconnect switches are heavily worn
- No. 4 Transformer 115 kV Terminal:
  - Breaker is experiencing oil leaks, foundation needs to be repaired, and oil containment needs replaced
  - Breaker disconnect switches are heavily worn

Grandview Substation:

- Piney 115 kV Terminal:
  - Breaker is experiencing SF6 gas leaks, replacement parts have been discontinued, and AC alarm is failed
  - Breaker disconnect switches are heavily worn



Penelec Transmission Zone M-3 Process
Piney Substation

Selected Solution:

Need Number	Transmission Line / Substation Locations	New MVA Line Rating (SN/SE/WN/WE)	Scope of Work
PN-2020-004 APS-2020-003	Piney – Burma 115 kV Line	232 / 282 / 263 / 334	At Piney Substation, on the Burma Line Terminal: ▪ Replace the circuit breaker, line trap, substation conductor, relays and associated disconnect switches.
	Piney – Haynie 115 kV Line Haynie– Grandview 115 kV Line	202 / 245 / 228 / 290	At Piney, on the Grandview/Haynie Line Terminal: ▪ Replace the circuit breaker, line trap, substation conductor, relays and associated disconnect switches. At Grandview Substation, on the Piney/Haynie Line Terminal: ▪ Replace the line trap, substation conductor, relays and associated disconnect switches.
	Piney – Timblin 115 kV Line	178 / 214 / 200 / 254	At Piney Substation, on the Timblin Line Terminal: ▪ Replace circuit breaker and associated disconnect switches.
	Piney – Eclipse 115 kV Line	232 / 282 / 263 / 334	At Piney Substation, on the Eclipse Line Terminal: ▪ Replace line trap, substation conductor, disconnect switches and relays. At Eclipse Substation, on the Piney Line Terminal: ▪ Replace line trap, substation conductor and relays.
	Piney Substation	N/A	At Piney Substation: ▪ Replace 115 kV bus tie breaker, 115 kV No. 3 Transformer Breaker, 115 kV No. 4 Transformer Breaker, relays and associated disconnect switches. ▪ Construct a new control building to house new equipment

Estimated Project Cost: $11.4M
Projected In-Service: 01/12/2026
Supplemental Project ID: s3628.1

Penelec Transmission Zone M-3 Process
Perry – Ashtabula – Erie West 345 kV Line

Need Number: PN-2023-029

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Previously Presented: Re-present Solution Meeting – 08/05/2025
Solution Meeting – 08/06/2024
Need Meeting – 12/05/2023

Supplemental Project Driver(s):

System Condition, System Performance

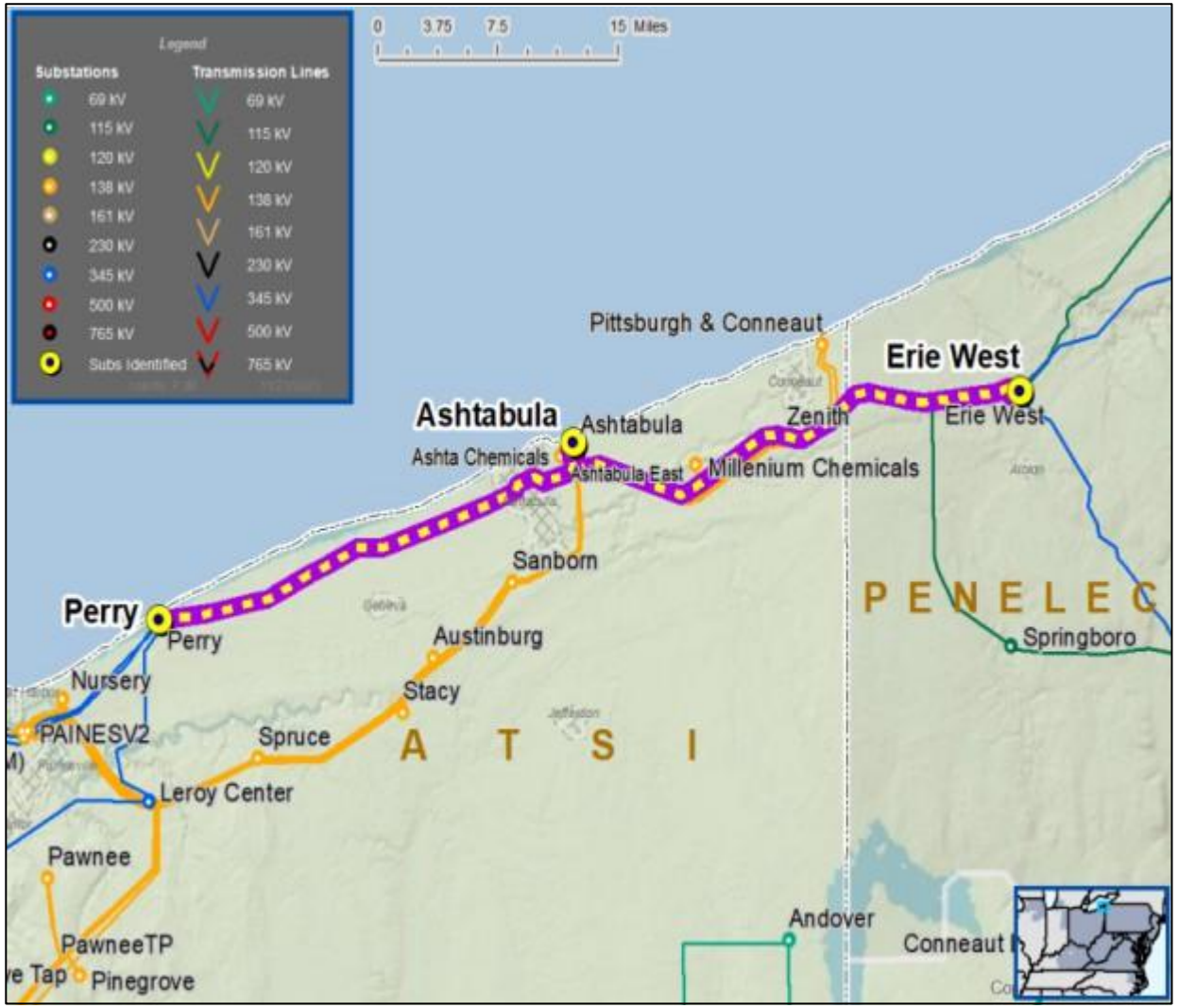
Specific Assumption Reference(s):

FE Global Factors

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

Line Condition Rebuild/Replacement

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



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Penelec Transmission Zone M-3 Process
Perry – Ashtabula – Erie West 345 kV Line

Need Number: PN-2023-029

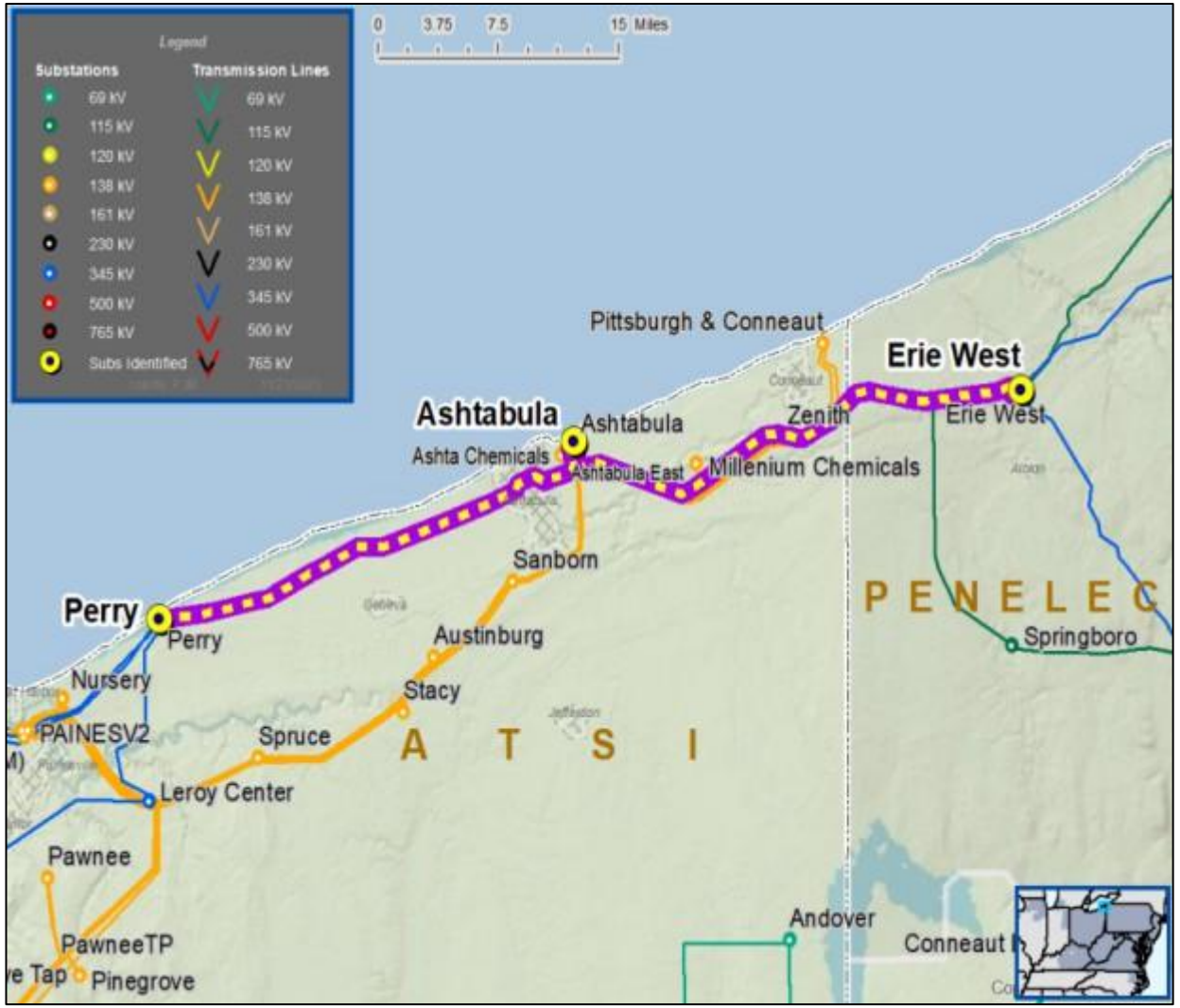
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

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.

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.



Penelec Transmission Zone M-3 Process
Perry – Ashtabula – Erie West 345 kV Line

Need Number: PN-2023-029

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:

- Rebuild the 7.2 mile, Penelec section of the Ashtabula – Erie West 345 kV Line

At Erie West:

- Replace disconnect switches.

At Ashtabula:

- Revise relay settings

Estimated Project Cost: $52.4 M

Projected In-Service: 5/31/2027

Supplemental Project ID: s3702.1

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
SGC Tap - Summit 46 kV Line

Need Number: PN-2024-002

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Previously Presented: Solution Meeting – 03/13/2025
Need Meeting – 02/15/2024

Project Driver:

Operational Flexibility and Efficiency

Equipment Material Condition, Performance, and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Substation and line equipment limits

System Performance

- Reconductor / Rebuild Transmission Line

Problem Statement:

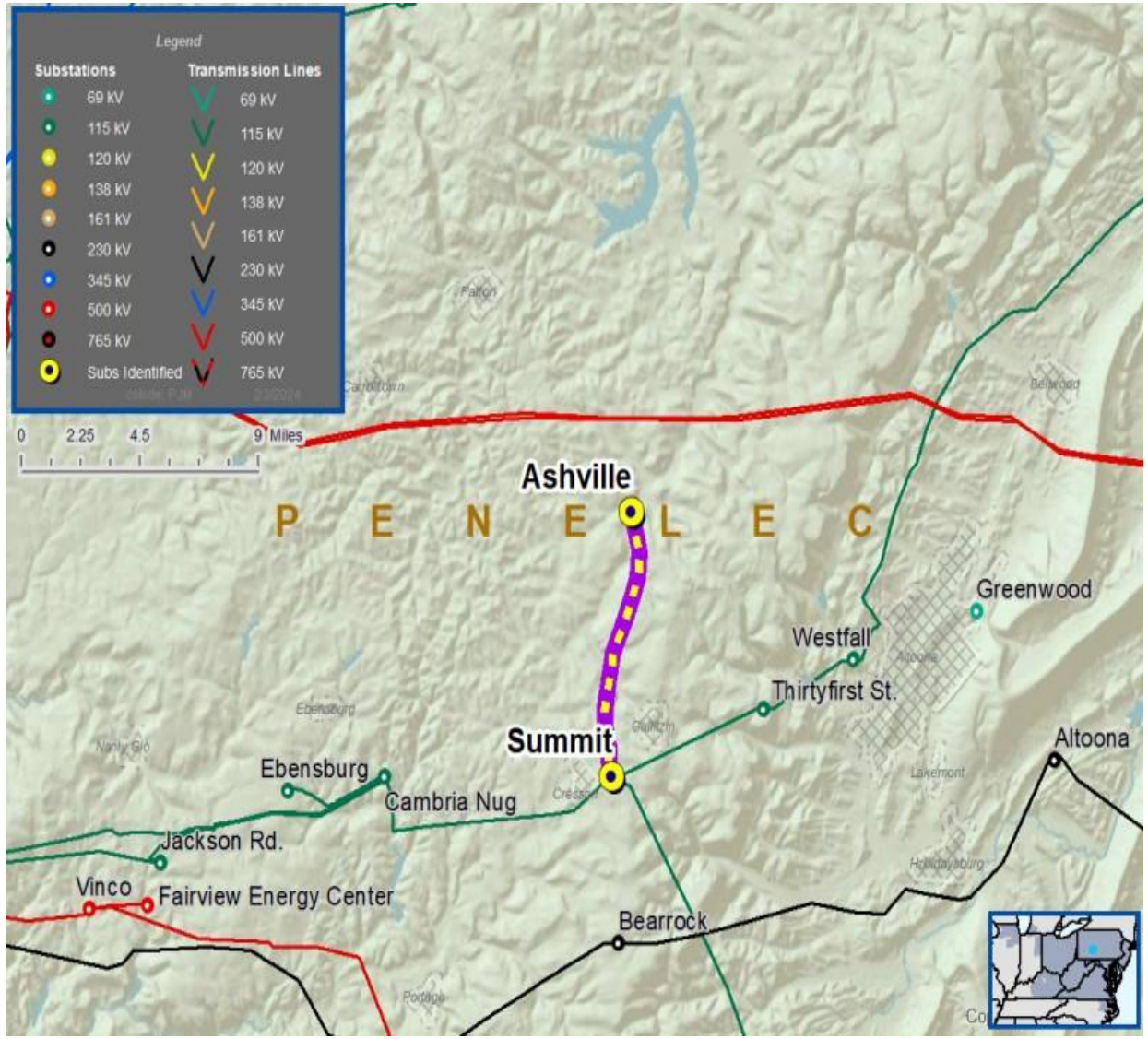
The Summit – SGC Tap section of the Summit – SGC Tap – Ashville 46 kV Line is 73 years old and 1.36 miles long.

Within the last five years, the line has experienced nine unscheduled outages due to a combination of storm damage, deteriorating cross-arms, and insulators. In addition, there have been five operational outages on this line to avoid thermal overloads.

The SGC Tap – Summit 46 kV Line section is currently limited by terminal equipment, including vintage electromechanical relaying.

Existing Ratings:

- 26 / 33 / 33 / 33 MVA (SN/SE/WN/WE)



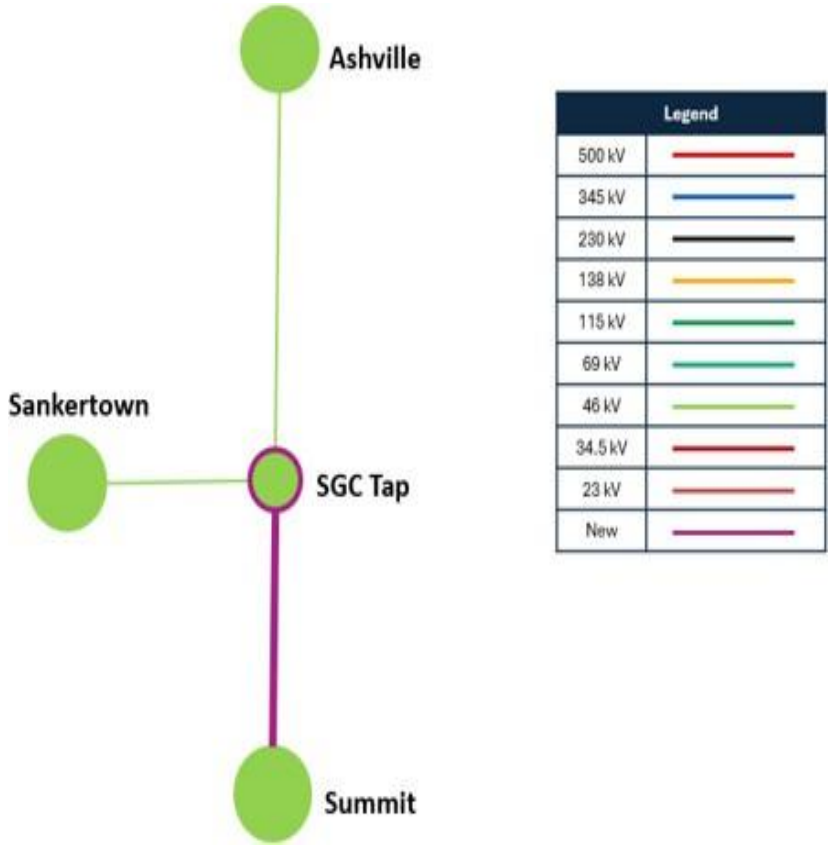
Penelec Transmission Zone M-3 Process
SGC Tap - Summit 46 kV Line

Need number: PN-2024-002
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:
SGC Tap - Summit 46 kV Line:

- Rebuild approximately 1.36 miles of existing line.

Estimated Project Cost: $3.54 M
Projected In-Service: 05/29/2026
Supplemental Project ID: s3629.1



Penelec Transmission Zone M-3 Process
Altoona - Hollidaysburg 46 AH kV Line

Need Number: PN-2024-005

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Previously Presented: Solution Meeting - 04/10/2025
Need Meeting - 03/14/2024

Project Driver:

Equipment Condition/Performance/Risk

Specific Assumption References:

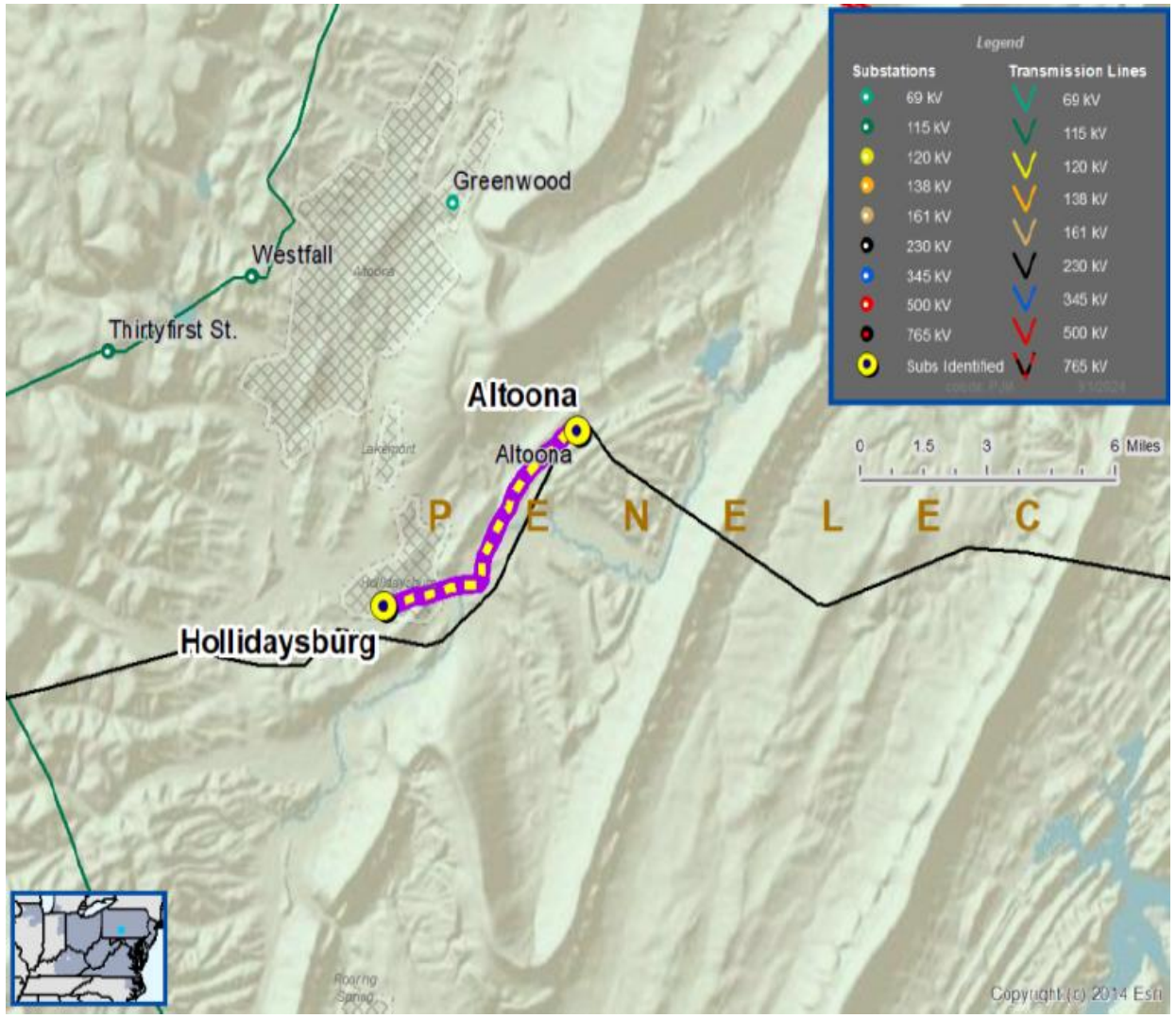
System Performance Projects Global Factors - System reliability and performance - Substation/line equipment limit Upgrade Relay Schemes - Obsolete and difficult to repair communication equipment - Communication technology upgrades

Problem Statement:

The Altoona - Hollidaysburg 46 kV AH Line has vintage electromechanical relays for overcurrent protection that have directional tripping. The relays limit the line and cause an operation monitoring issue.

Existing line rating is limited on the Altoona – AH-26 Tap 46 kV Line:

- 53 / 55 / 55 / 55 MVA (SN/SE/WN/WE)



Penelec Transmission Zone M-3 Process
Altoona - Hollidaysburg 46 AH kV Line

Need number: PN-2024-005

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:

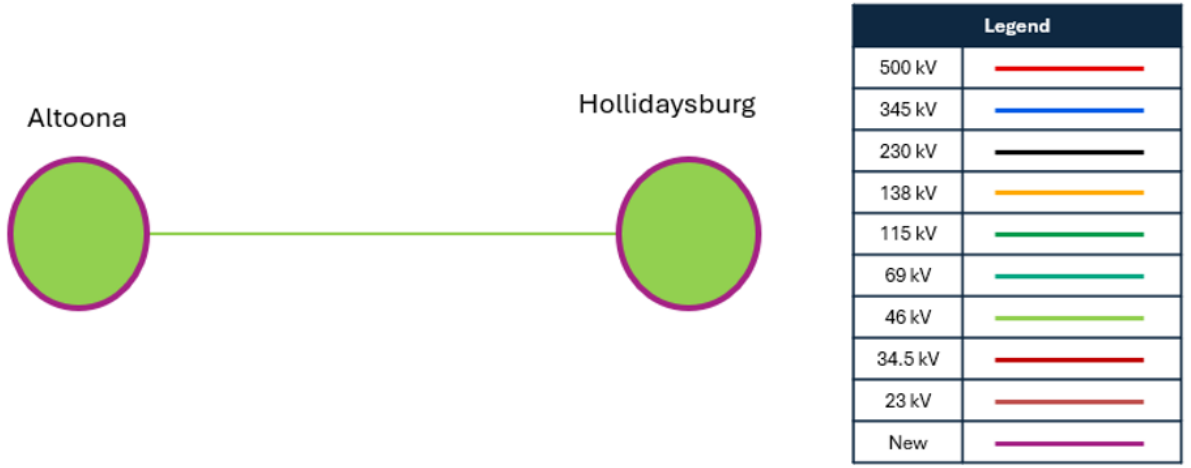
Altoona - Hollidaysburg 46 kV AH Line: Terminal Upgrades:

- Replace line relaying at Altoona and Hollidaysburg substations.

Estimated Project Cost: $2.21 M

Projected In-Service: 12/01/2027

Supplemental Project ID: s3634.1



Penelec Transmission Zone M-3 Process
Tyrone North – Tipton 46 kV Line

Need Number: PN-2024-006

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Previously Presented: Solution Meeting - 04/10/2025
Need Meeting - 02/15/2024

Project Driver:
Equipment Condition/Performance/Risk

Specific Assumption References:
System Performance Projects Global Factors

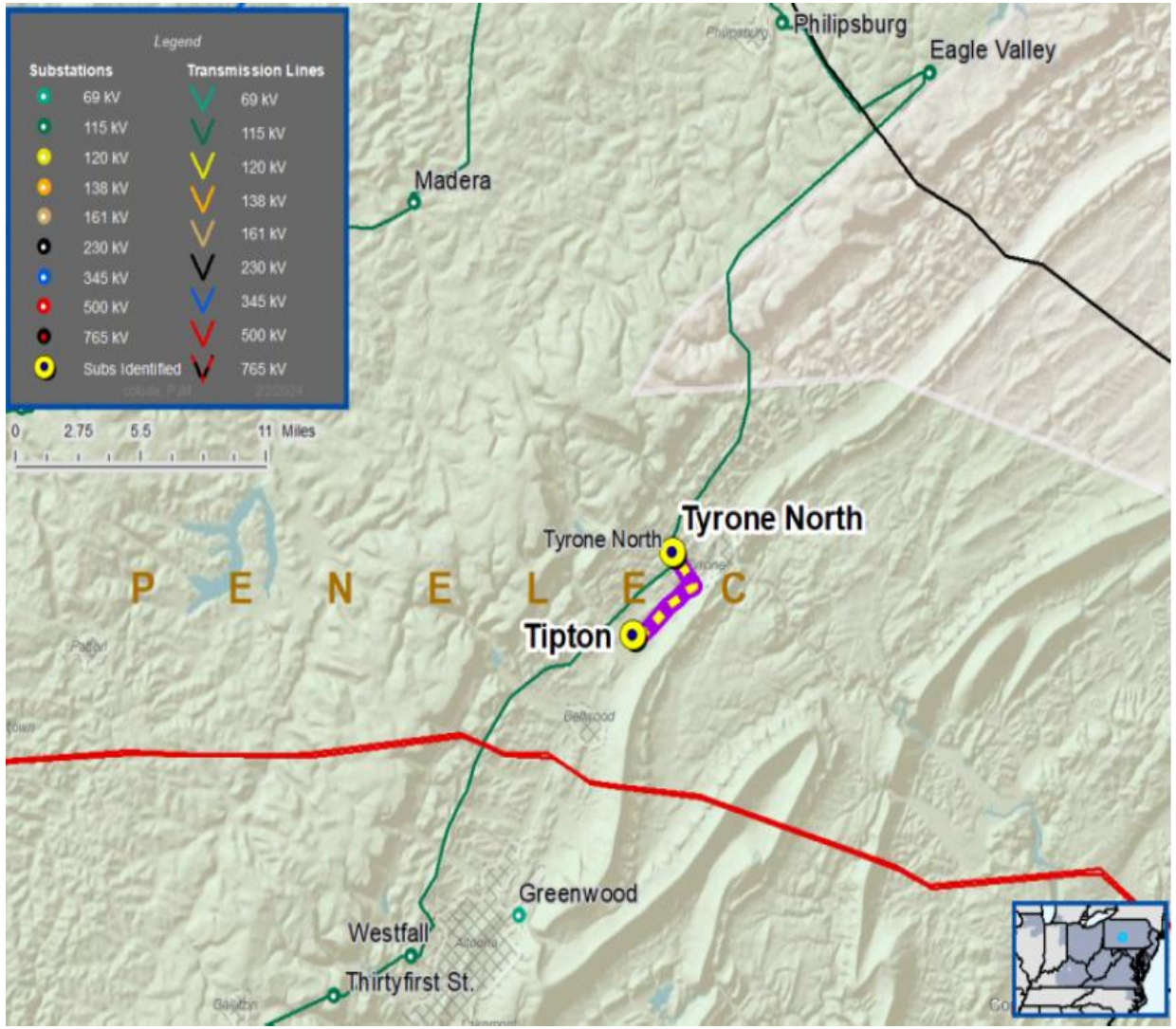
- System reliability and performance
- Substation/line equipment limit Upgrade Relay Schemes
- Obsolete and difficult to repair communication equipment
- Communication technology upgrades

Problem Statement:

- The Tyrone North – Tipton 46 kV Line has electromechanical relays with directional tripping.
- The relays limit the line and cause errors in operational monitoring.
- Substation conductor limits the line rating.

Existing line ratings:

- 34 / 44 MVA (SN/SE)
- 49 / 55 MVA (WN/WE)



Penelec Transmission Zone M-3 Process
Tyrone North – Tipton 46 kV Line

Need number: PN-2024-006

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:

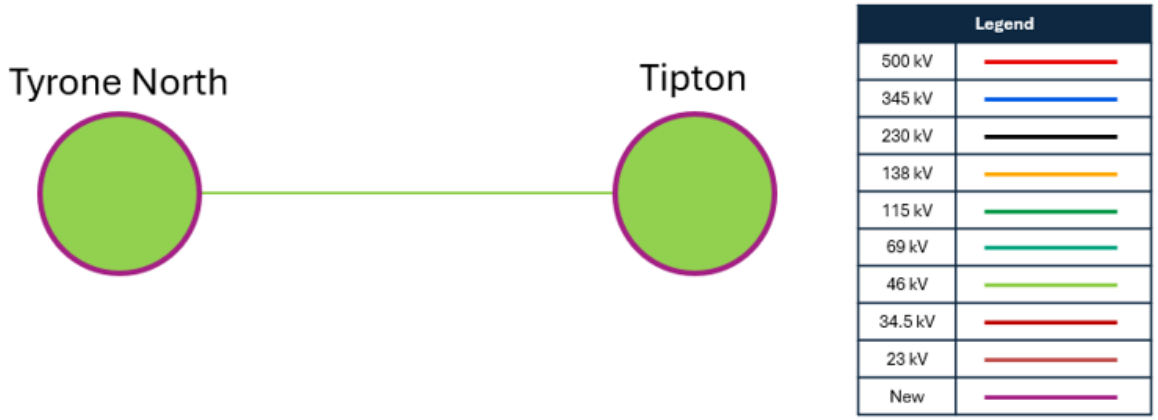
Tyrone North - Tipton 46 kV Line:

- Upgrade line relaying and limiting substation conductor at Tyrone North Substation.
- Upgrade protection and terminal equipment at Tipton Substation.

Estimated Project Cost: $2.92 M

Projected In-Service: 12/31/2027

Supplemental Project ID: s3635.1



Penelec Transmission Zone M-3 Process
Glade Substation

Need Number: PN-2024-013
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
Previously Presented: Solution Meeting – 03/04/2025
Need Meeting – 04/02/2024

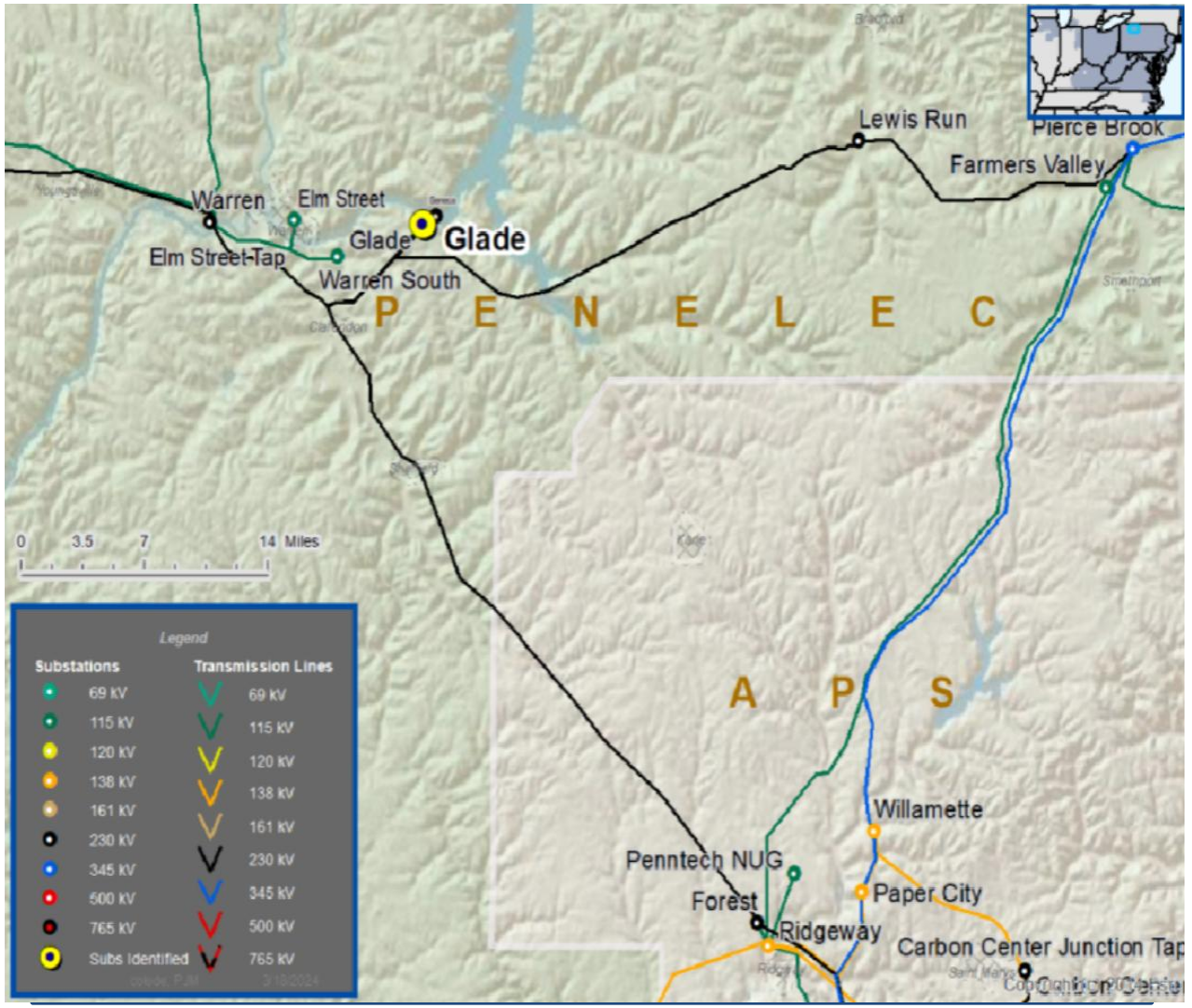
Project Driver:
- Equipment Condition/Performance/Risk
- Operational Flexibility and Efficiency

Specific Assumption References:
System Performance Projects Global Factors
- Failure risk, age and condition, obsolescence, operational or design limitations
- Substation/line equipment limits Upgrade Relay Schemes
- Obsolete and difficult to repair communication equipment
- Communication technology upgrades

Problem Statement:
The Glade Substation control building is deteriorated and has limited space. The walls are excessively rusty due to moisture penetration and the windows are broken.
The Glade Substation control building is 56 years old.
Transmission line ratings are limited by terminal equipment:
Forest – Glade 230 kV Line:
- Existing Ratings: 541 / 659 / 612 / 781 MVA (SN/SE/WN/WE)
- Transmission Line Conductor Ratings: 546 / 666 / 619 / 790 MVA (SN/SE/WN/WE)

Glade – Lewis Run 230 kV Line:
- Existing Ratings: 541 / 659 / 612 / 762 MVA (SN/SE/WN/WE)
- Transmission Line Conductor Ratings: 546 / 666 / 619 / 790 MVA (SN/SE/WN/WE)

Glade – Warren 230 kV Line:
- Existing Ratings: 520 / 621 / 619 / 710 MVA (SN/SE/WN/WE)
- Transmission Line Conductor Ratings: 546 / 666 / 619 / 790 MVA (SN/SE/WN/WE)



Penelec Transmission Zone M-3 Process
Glade Substation

Need number: PN-2024-013
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:

At Glade Control Building:

- Replace Glade Substation control building with a new package control enclosure.
- Install new cable trench, replace four disconnect switches, and two 230 kV breakers.
- Replace substation conductor and line trap on the Lewis Run and Warren line terminals at Glade Substation.
- Replace substation conductor on the Forest line terminal at Glade Substation -Install new relaying and control equipment.

At Lewis Run Substation, on the Glade line terminal:

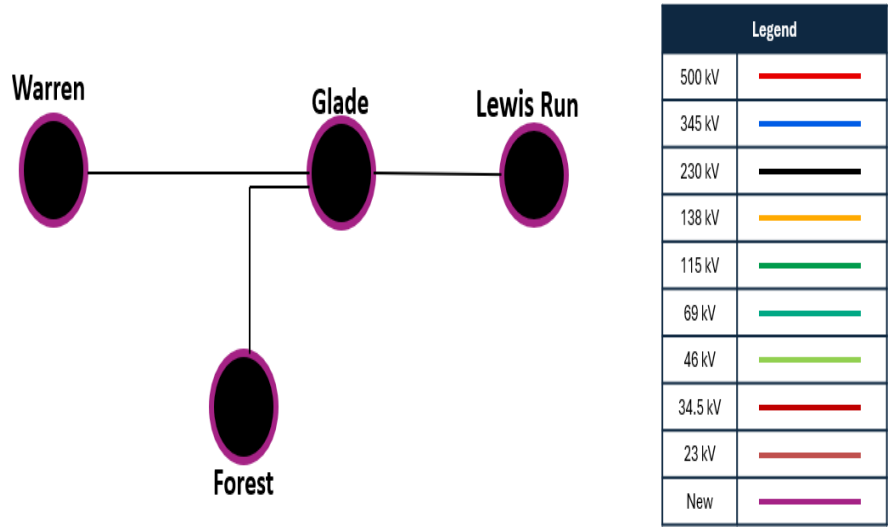
- Replace line trap.
- Install new relaying and control equipment.

At Warren Substation, on the Glade line terminal:

- Replace substation conductor.
- Install new relaying and control equipment.

At Forest Substation, on the Glade line terminal:

- Install new relaying and control equipment.



Estimated Project Cost: $12 M
Projected In-Service: 12/17/2027
Supplemental Project ID: s3631.1

Need Number: PN-2024-026
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
Previously Presented: Solution Meeting – 02/13/2025
Need Meeting – 10/17/2024
Project Driver: Equipment Condition/Performance/Risk
Specific Assumption References:
System Performance Global Factors

- System reliability and performance
- Substation/Line equipment limits
- Load at Risk and Customers Impacted Line Condition Rebuild/Replacement
- Negative impact on equipment health and/or system reliability
- Limited availability of spare parts and/or vendor technical support

Problem Statement:

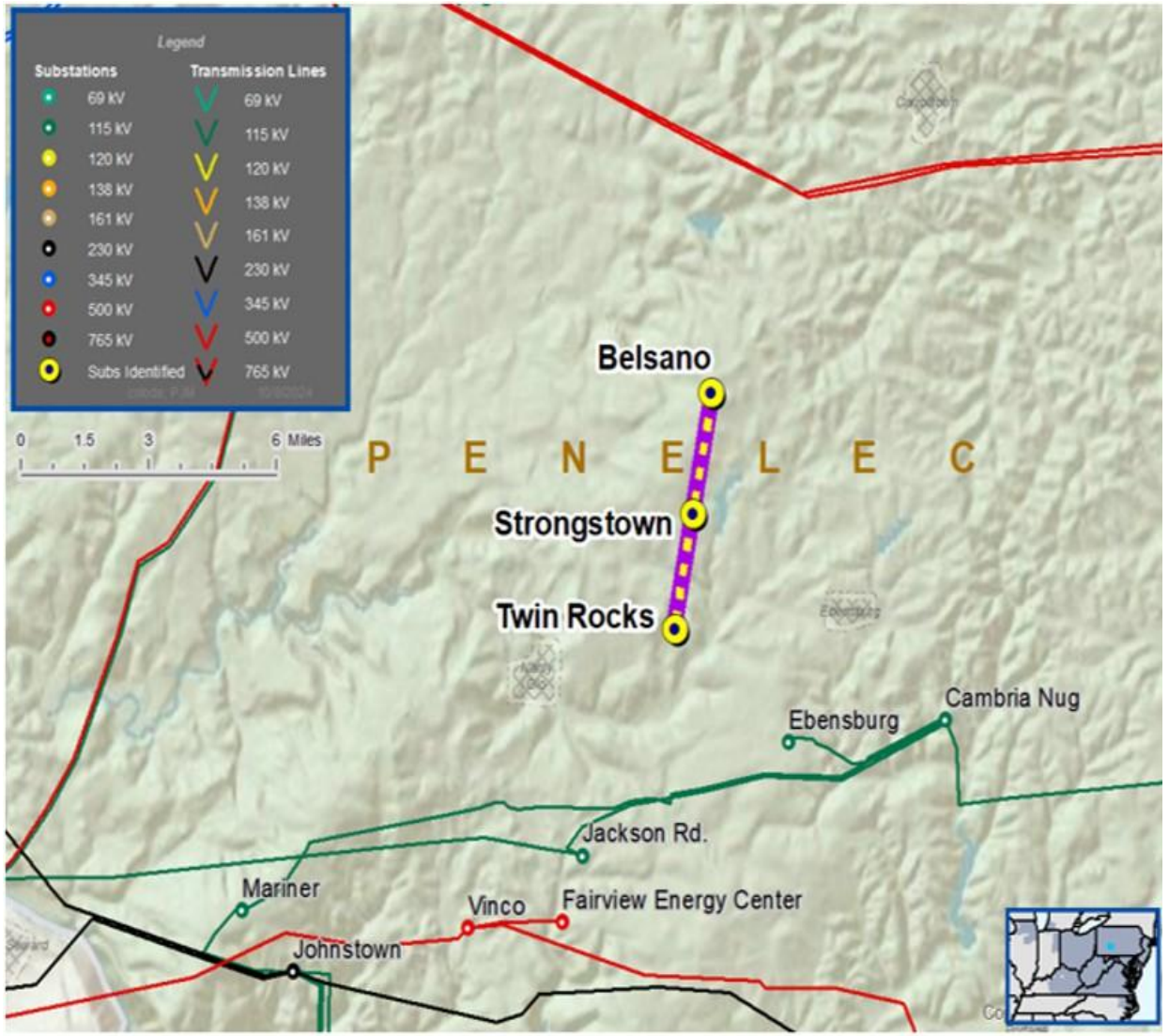
- Switches A-119 and A-120 on the Glory – Nanty Glo – Spangler 46 kV Line are obsolete and problematic to repair.
- Replacement components are difficult to source leading to non-standard repairs.
- The existing switches are on a four-pole wood box structure and can not be maintained without a complete line outage due to the required clearance requirements and are deteriorating with limited remaining life. - The lines are currently limited by terminal equipment.

Transmission Line / Substation Locations:
Strongstown – Belsano 46 kV Line

- Existing Line Rating: 55 / 69 / 72 / 83 MVA (SN/SE/WN/WE)
- Existing Conductor Rating: 81 / 98 / 91 / 116 MVA (SN/SE/WN/WE)

Strongstown – Twin Rocks 46 kV Line

- Existing Line Rating: 55 / 69 / 72 / 83 MVA (SN/SE/WN/WE)
- Existing Conductor Rating: 67 / 81 / 75 / 95 MVA (SN/SE/WN/WE)



Need number: PN-2024-026
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:

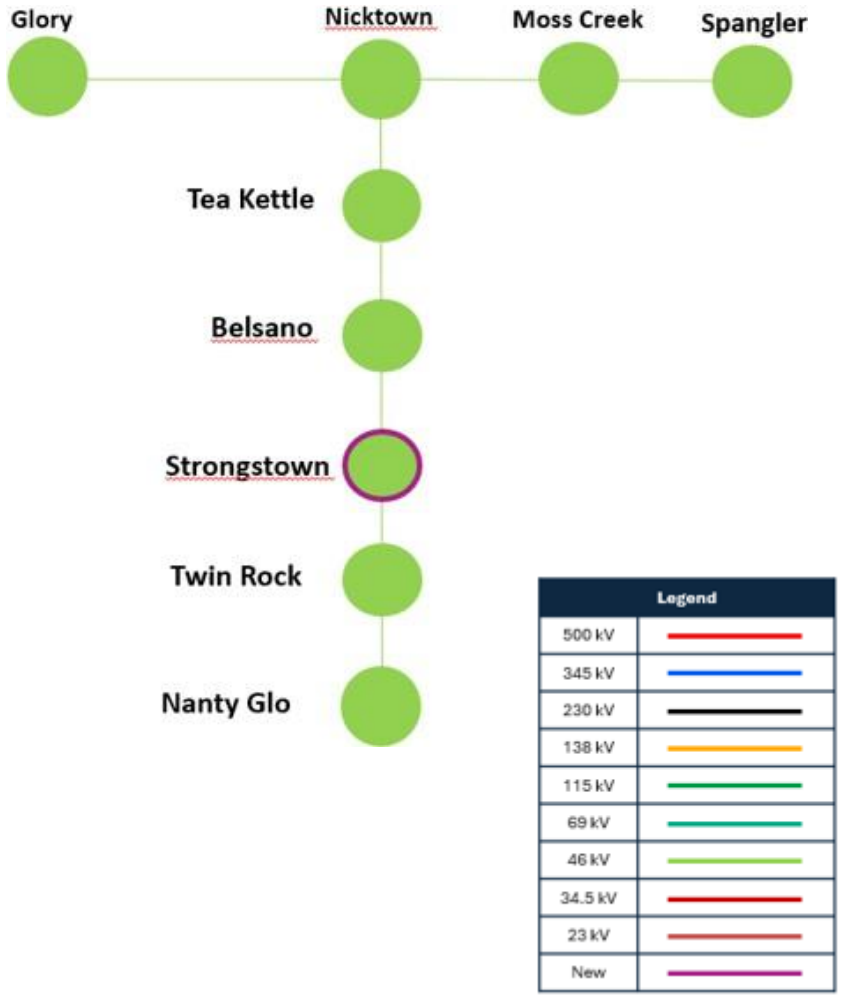
Strongstown - Belsano Replace line switch A119:

- Relocate and replace obsolete and non-repairable line switch Strongstown - Belsano A119.
- Upgrade switch to include SCADA controlled motor operators.
- Remove 4-pole wood structure and replace with appropriate tap structure.

Strongstown - Twin Rock Replace line switch A120:

- Relocate and replace obsolete and non-repairable line switch Strongstown - Twin Rock A120.
- Upgrade switches to include SCADA controlled motor operators.
- Remove 4-pole wood structure and replace with appropriate tap structure.

Estimated Project Cost: $1.86 M
Projected In-Service: 11/13/2026
Supplemental Project ID: s3633.1



Revision History

09/26/2025 – V1
s3628
s3629
s3631
s3633
s3634
s3635
s3702