Submission of Supplemental Projects for Inclusion in the Local Plan

Met-Ed Transmission Zone M-3 Process
Middletown Junction-Smith Street #1 115 kV New Customer

Need Number: ME-2023-005

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

Previously Presented: Need Meeting – 5/18/2023

Solution Meeting – 07/20/2023

Project Driver(s):

Customer Service

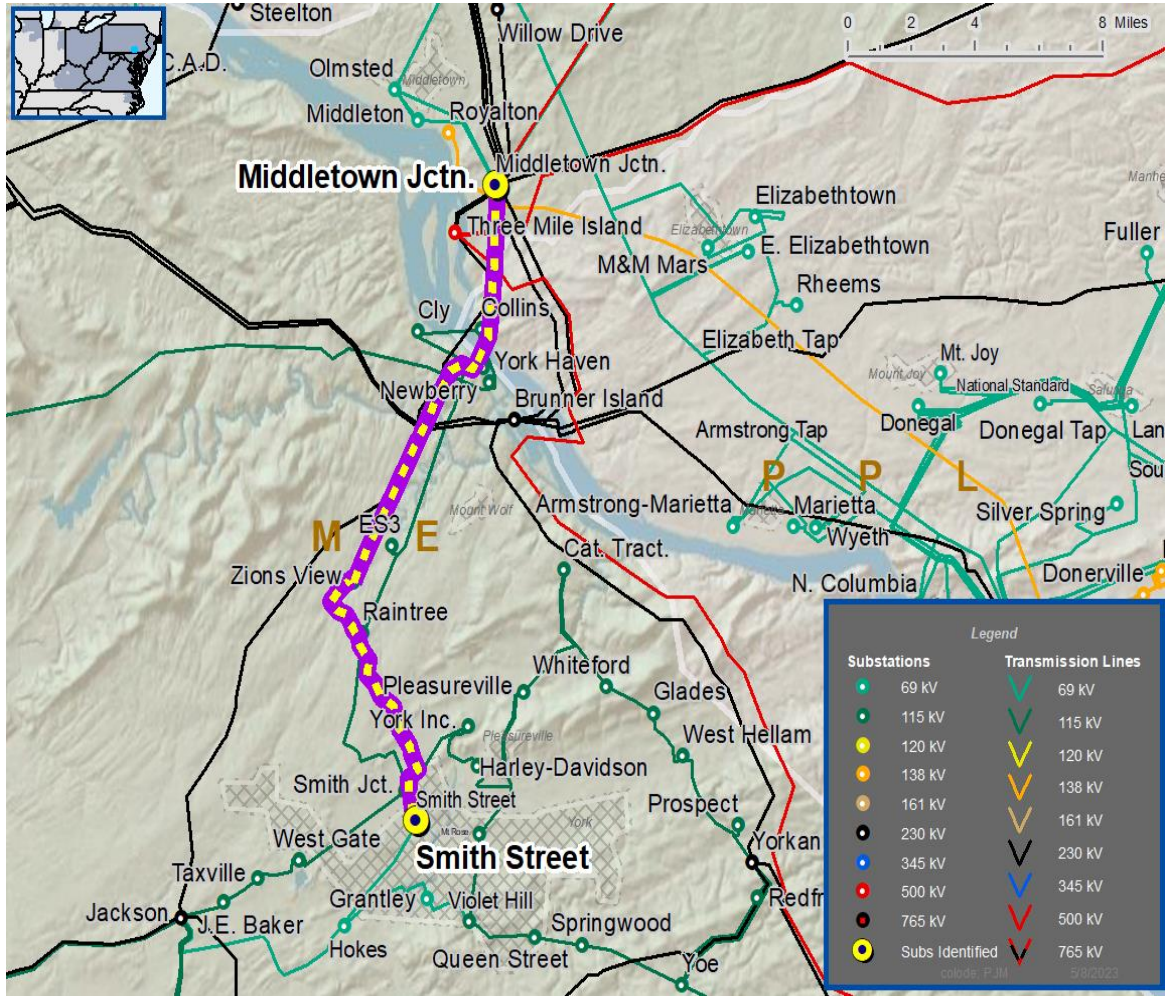
Specific Assumption Reference(s)

New customer connection request will be evaluated per FirstEnergy's "Requirements for Transmission Connected Facilities" document and "Transmission Planning Criteria" document.

Problem Statement

New Customer Connection - has requested a new 115 kV delivery point near the Middletown Junction-Smith Street #1 115 kV line. The anticipated load of the new customer connection is 12 MVA.

Requested in-service date is 05/31/2024.



Met-Ed Transmission Zone M-3 Process
Middletown Junction-Smith Street #1 kV New Customer- Solution

Need Number: ME-2023-005

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

Selected Solution:

115 kV Transmission Line Tap

- Install three SCADA controlled transmission line switches
- Construct approximately 0.2 miles of transmission line using 556 ACSR 26/7 from tap point to customer substation
- Install one 115 kV revenue metering package at customer substation
- Modify relay settings at Middletown Junction and Smith Street substations

Estimated Project Cost: $4.9M

Projected In-Service: 7/3/2024

Supplemental Project ID: s3017

Legend	
500 kV	
345 kV	
115 kV	
69 kV	
34.5 kV	
23 kV	
New	

Met-Ed Transmission Zone M-3 Process
Hokes Ring Bus

Need Number: ME-2023-003

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

Previously Presented: Need Meeting 4/20/2023
Solution Meeting 11/16/2023

Project Driver:

Operational Flexibility and Efficiency

Specific Assumption Reference:

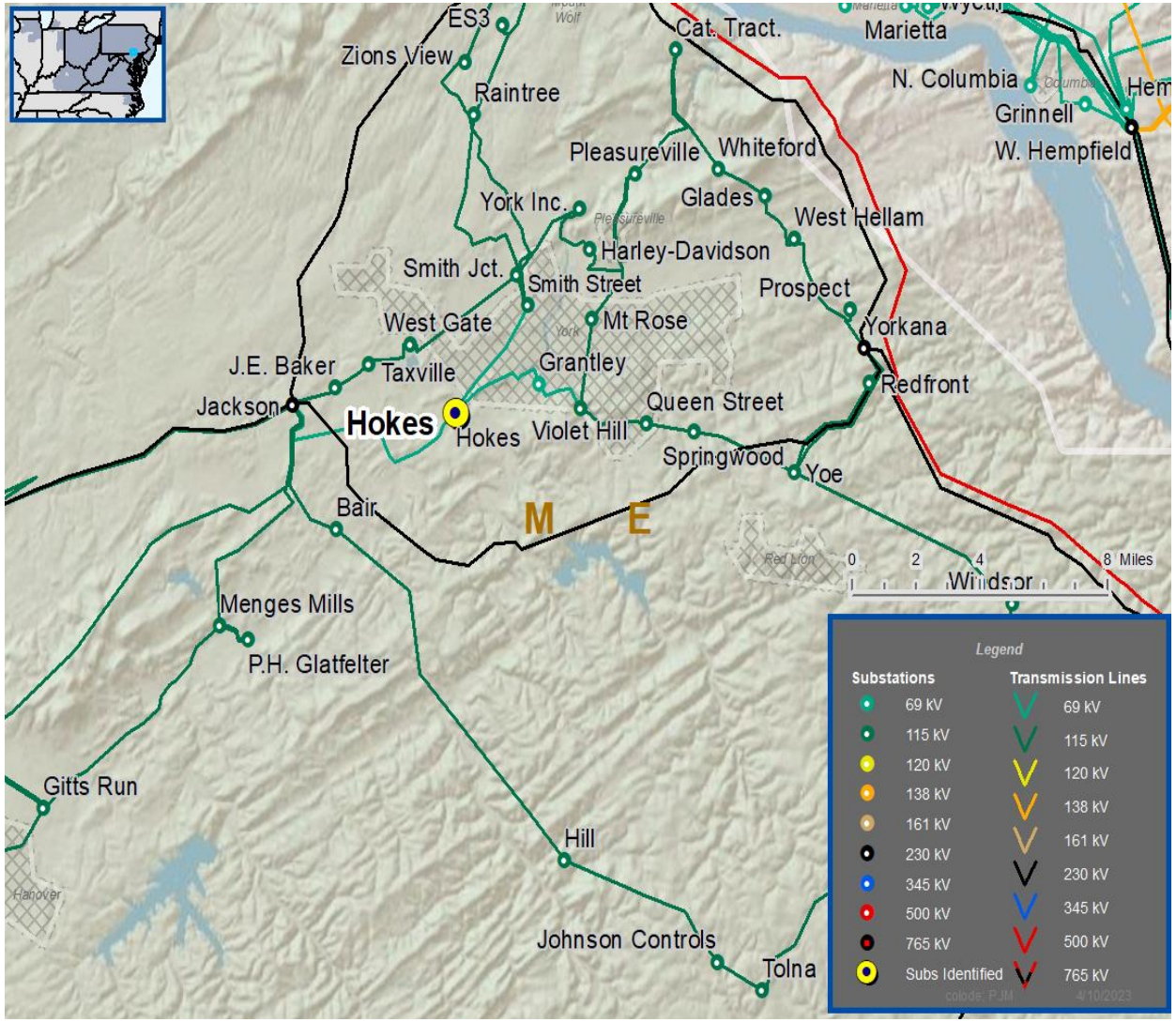
System Performance Projects

- Add/Expand Bus Configuration
- Load at risk in planning and operational scenarios
- Reduce the amount of exposed potential local load loss during contingency conditions
- Eliminate simultaneous outages to multiple networked elements

Problem Statement:

The loss of Hokes Substation results in the loss of approximately 23 MW of load and approximately 2650 customers.
Substation consists of:

- Three 69 kV transmission lines
- Two 69-13.2 kV distribution transformers



Met-Ed Transmission Zone M-3 Process
Hokes Ring Bus

Need Number: ME-2023-003

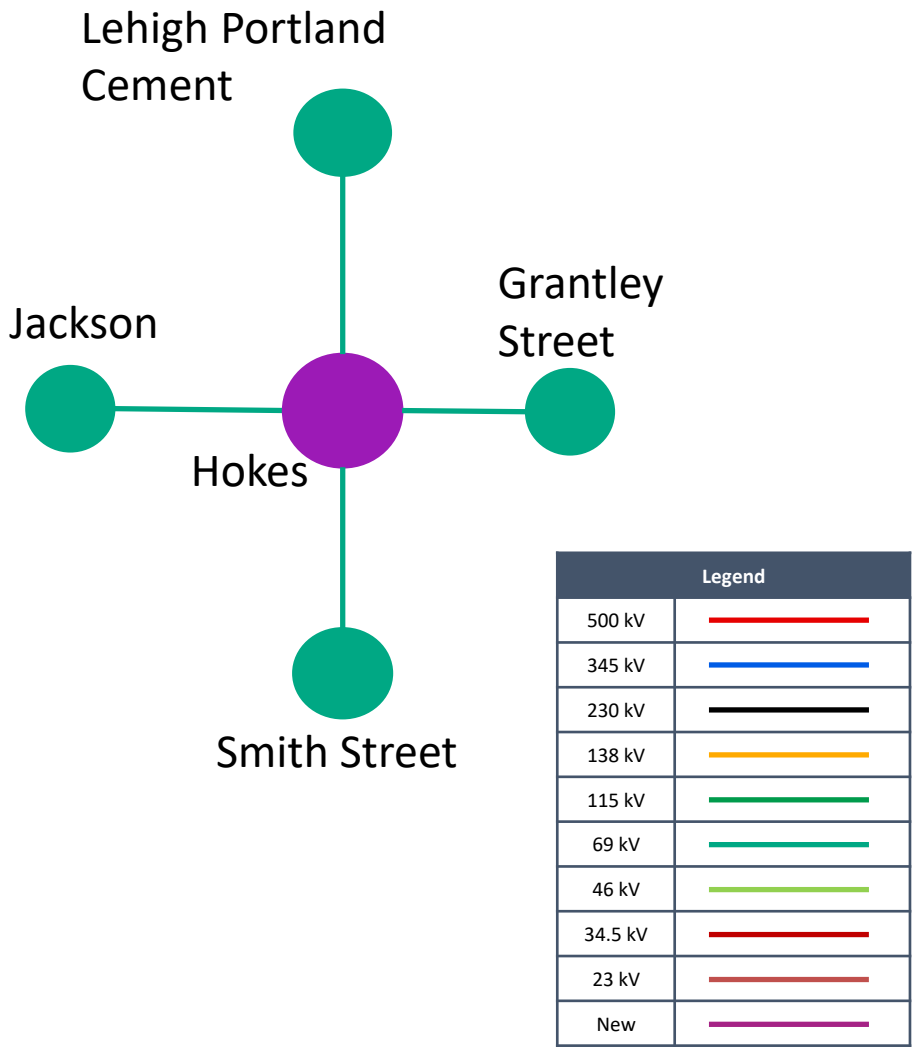
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:

- Convert Hokes Substation into a six-breaker ring bus
- Upgrade terminal equipment to transmission line ratings and adjust relay settings

Transmission Line Ratings:

- Hokes – Lehigh Portland Cement 69 kV Line
  - Before Proposed Solution: 50 / 50 MVA (SN/SE)
  - After Proposed Solution: 53 / 64 MVA (SN/SE)
- Hokes – Smith Street 69 kV Line
  - Before Proposed Solution: 43 / 44 MVA (SN/SE)
  - After Proposed Solution: 139 / 169 MVA (SN/SE)
- Hokes – Jackson 69 kV Line
  - Before Proposed Solution: 51 / 62 MVA (SN/SE)
  - After Proposed Solution: 139 / 169 MVA (SN/SE)
- Hokes – Violet Hill 69 kV Line
  - Before Proposed Solution: 51 / 66 MVA (SN/SE)
  - After Proposed Solution: 74 / 90 MVA (SN/SE)



Estimated Project Cost: $24.1M

Projected In-Service: 6/1/2025

Supplemental Project ID: s3263.1

Met-Ed Transmission Zone M-3 Process
North Lebanon – Fredericksburg 69 kV Line

Need Number: ME-2023-007

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

Previously Presented: Need Meeting 05/18/2023
Solution Meeting 11/16/2023

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

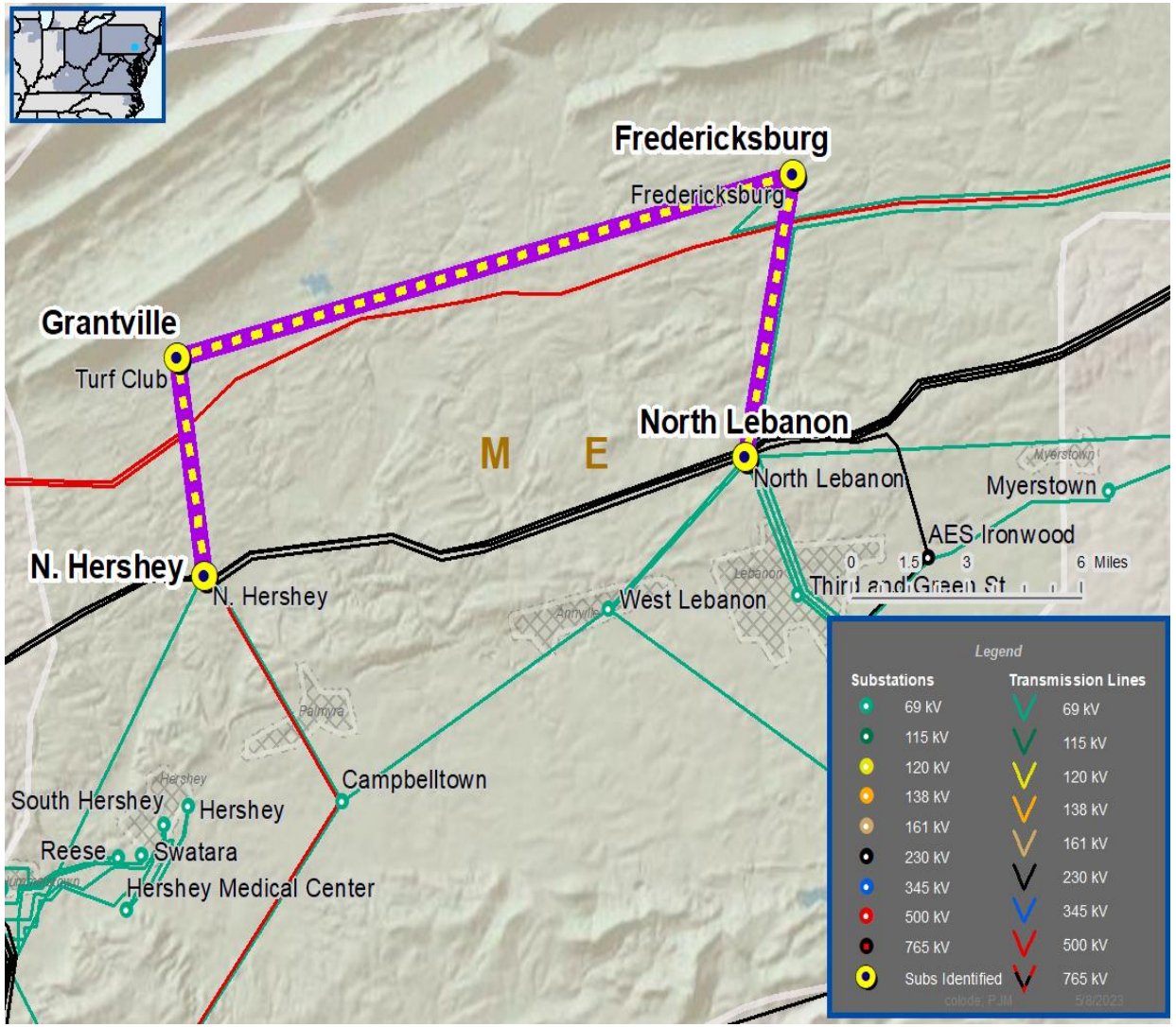
Specific Assumption Reference:

System Performance Projects

- System reliability and performance
- Load at risk in planning and operational scenarios

Problem Statement:

A N-1-1 outage of the North Hershey – Grantville 69 kV and North Lebanon – Fredericksburg 69 kV lines can lead to a potential voltage collapse resulting in a loss of service to 80 MW of load and 10,600 customers.



Met-Ed Transmission Zone M-3 Process
North Lebanon – Fredericksburg 69 kV Line

Need Number: ME-2023-007

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

Selected Solution:

Rebuild North Lebanon – Fredericksburg 73 69 kV Line as double circuit.

At North Lebanon Substation

- Add 69 kV breaker
- Replace limiting terminal equipment

At Fredericksburg Substation

- Add 69 kV breaker

Transmission Line Ratings:

- North Lebanon-Fredericksburg 69 kV Line
  - Before Proposed Solution: 82/103 MVA (SN/SE)
  - After Proposed Solution: 139/169 MVA (SN/SE)

Estimated Project Cost: $13.6 M

Projected In-Service: 12/31/2026

Supplemental Project ID: s3264.1

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

Met-Ed Transmission Zone M-3 Process
Northkill – Rehrersburg 69 kV Line

Need Number: ME-2023-008

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

Previously Presented: Need Meeting 06/15/2023

Solution Meeting 11/16/2023

Project Driver:

System Performance Projects

Specific Assumption Reference:

Add/Expand Bus Configuration

- Accommodate Future Transmission Facilities

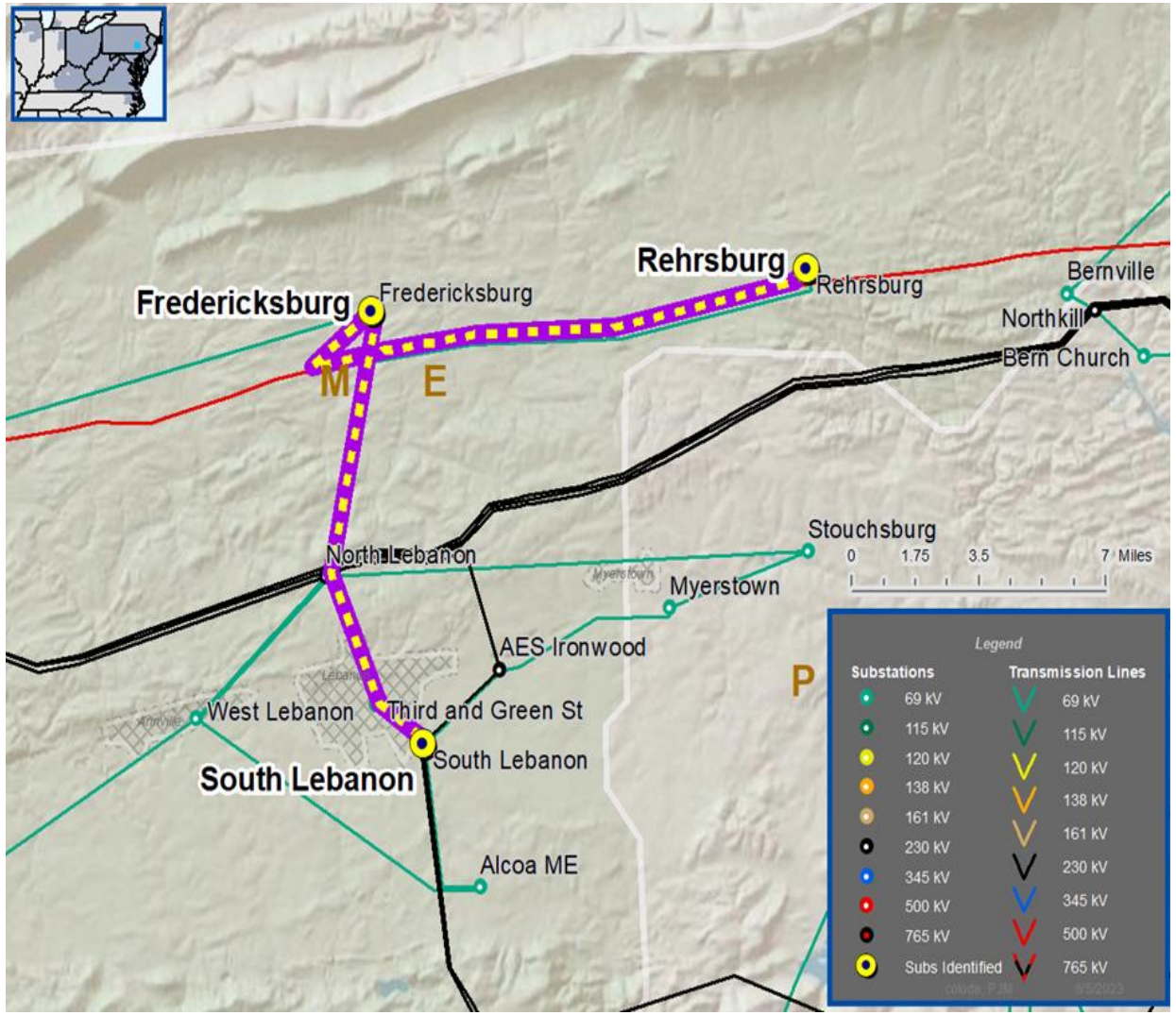
Build New Transmission Line

- Network Radial Lines
- Contingency constrained facilities

Automatic Sectionalizing Schemes

Problem Statement:

The Rehrersburg Substation is fed radially off the Frystown – South Lebanon 69 kV Line. An N-1 outage of this line forces an outage of Rehrersburg Substation, causing a loss of 10.1 MW and 1,230 customers.



Met-Ed Transmission Zone M-3 Process
Northkill – Rehrersburg 69 kV Line

Need Number: ME-2023-008

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

Selected Solution:

- Construct new 69 kV line from Structure #37 on the S. Lebanon –Frystown/Rehrersburg 83 69 kV Line to the Northkill Substation (Approximately 8.9 miles). (s3300.1)
- Create a new line terminal and add a fourth 69 kV breaker at Northkill Substation.
- Install two (2) sets of 69 kV disconnect switches with SCADA control and Auto-Transfer Scheme.
- Install 1 set of 69 kV disconnect switches with SCADA control on the tap to Rehrersburg Substation. (s3300.2)
- Rebuild the Bernville-Northkill 845 69 kV Line (0.84 mi) to double circuit construction.
- New line will share ~0.94 miles of common structure with newly rebuilt 825 line (s3300.3)

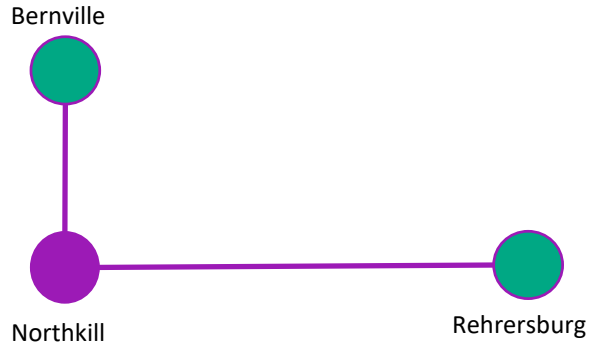
Tranmission Line Ratings:

- Rehrersburg T– South Lebanon 69 kV Line
  - Before Proposed Solution: 55 / 56 MVA (SN/SE)
  - After Proposed Solution: 74 / 90 MVA (SN/SE)
- Rehrersburg T– Frystown 69 kV Line
  - Before Proposed Solution: 55 / 56 MVA (SN/SE)
  - After Proposed Solution: 74 / 90 MVA (SN/SE

Estimated Project Cost: $24.13M

Projected In-Service: 12/01/2026

Supplemental Project ID: s3300.1, s3300.2, s3300.3



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

Met-Ed Transmission Zone M-3 Process

Campbelltown 69 kV Ring Bus

Need Number: ME-2019-034

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

Previously Presented: Need Meeting – 05/31/2019

Solution Meeting – 02/15/2024

Supplemental Project Driver:

Operational Flexibility and Efficiency

Specific Assumption References:

System Performance Projects

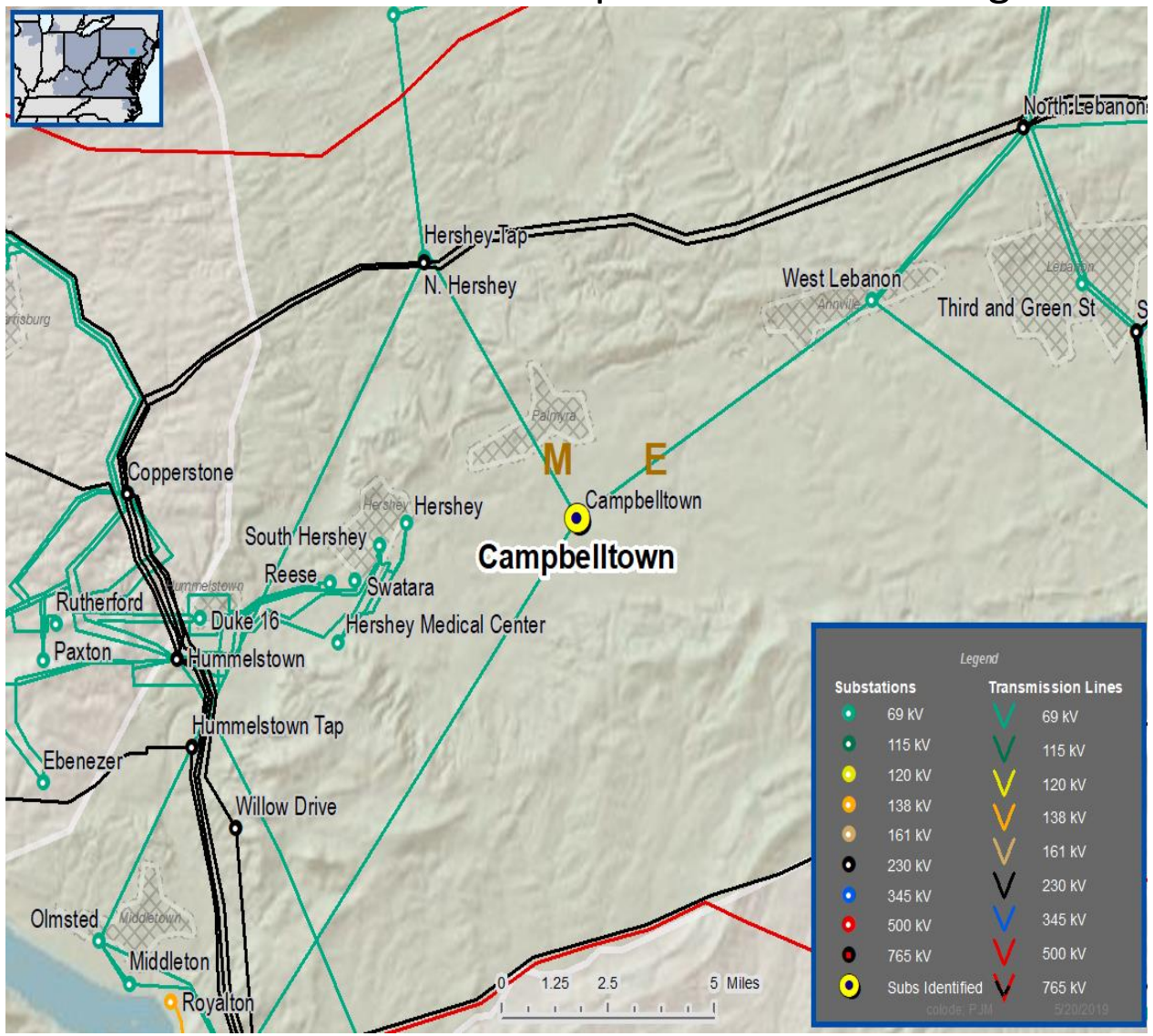
- Load at risk in planning and operational scenarios

Add/Expand Bus Configuration

- Reduce the amount of exposed potential local load loss during contingency conditions
- Eliminate simultaneous outages to multiple networked elements

Problem Statement:

- The loss of Campbelltown Substation results in the loss of approximately 40 MW of load and approximately 8,800 customers.
- Campbelltown Substation consists of:
  - Three networked 69 kV transmission lines
  - Two distribution transformers connected to the bus with switches
  - No bus tie breaker



Met-Ed Transmission Zone M-3 Process
Campbelltown 69 kV Ring Bus

Need Number: ME-2019-034

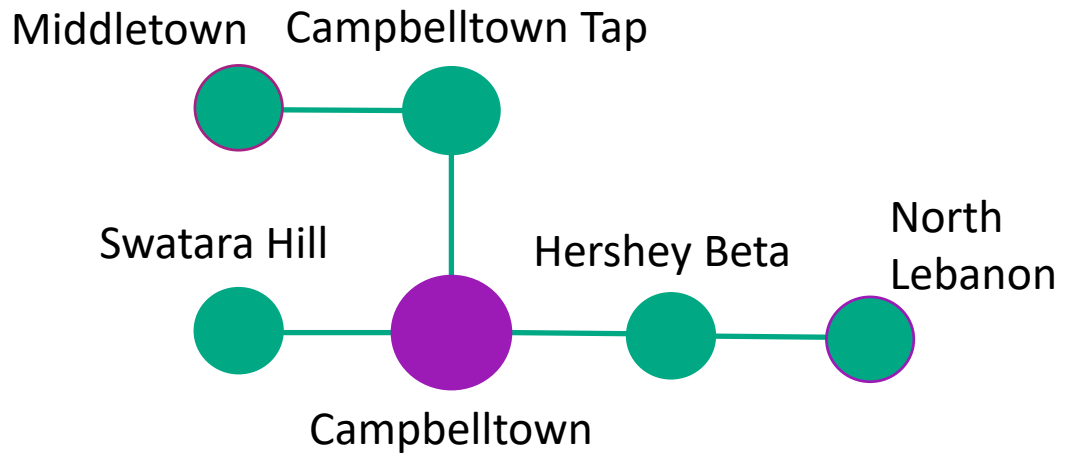
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:

- Convert Campbelltown into a five breaker 69 kV ring bus
- At Campbelltown Substation:
  - Replace two 69 kV circuit breakers and associated disconnect switches
  - Install two new 69 kV circuit breakers and associated disconnect switches
  - Relocate one existing 69 kV circuit breaker and associated disconnect switches
  - Install new bus conductor
  - Install four standard transmission line relay panels
  - Replace substation conductor

- At North Lebanon Substation:
  - Replace one 69 kV circuit breaker
  - Replace one 69 kV disconnect switch
  - Install one standard transmission line relay panel
  - Replace substation conductor

- At Middletown Substation:
  - Replace one 69 kV circuit breaker
  - Replace one 69 kV disconnect switch
  - Install one standard transmission line relay panel
  - Replace substation conductor



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

Met-Ed Transmission Zone M-3 Process
Campbelltown 69 kV Ring Bus

Need Number: ME-2019-034

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

Selected Solution (continued):

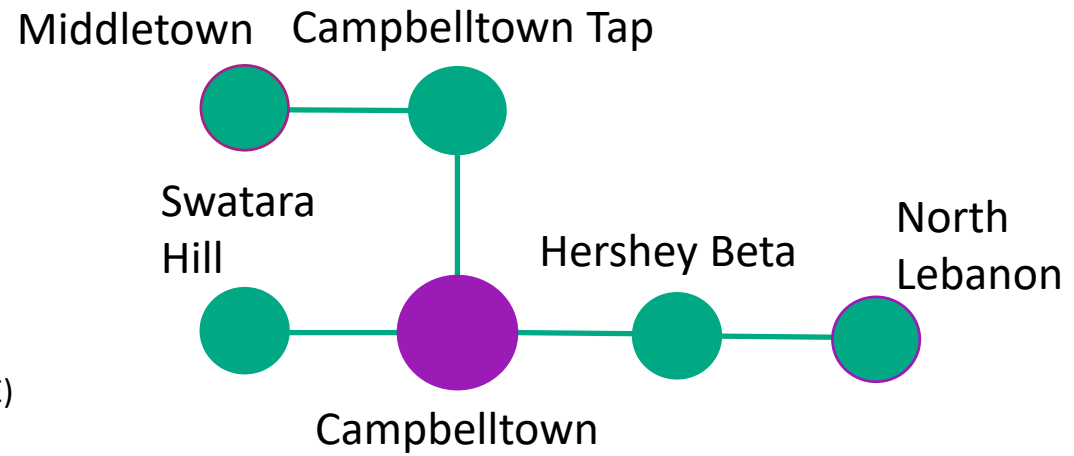
Transmission Line Ratings:

- Campbelltown – Swatara #70 69 kV Line
  - Before Proposed Solution: 71 / 90 / 85 / 109 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 74 / 90 / 85 / 109 MVA (SN/SE/WN/WE)
- Campbelltown – Campbelltown Tap #72 69 kV Line
  - Before Proposed Solution: 82 / 103 / 108 / 124 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 139 / 169 /158 / 201 MVA (SN/SE/WN/WE)

Estimated Project Cost: $10.0M

Projected In-Service: 6/1/2026

Supplemental Project ID: s3287.1



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

Met-Ed Transmission Zone M-3 Process
Carpenter Technology – South Reading 69 kV Line

Need Number: ME-2019-043
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Previously Presented: Need Meeting 07/31/2019
Solution Meeting 2/15/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Line Condition Rebuild/Replacement

- Age/condition of wood pole transmission line structures
- Age/condition of steel tower or steel pole transmission line structures
- Age/condition of transmission line conductors

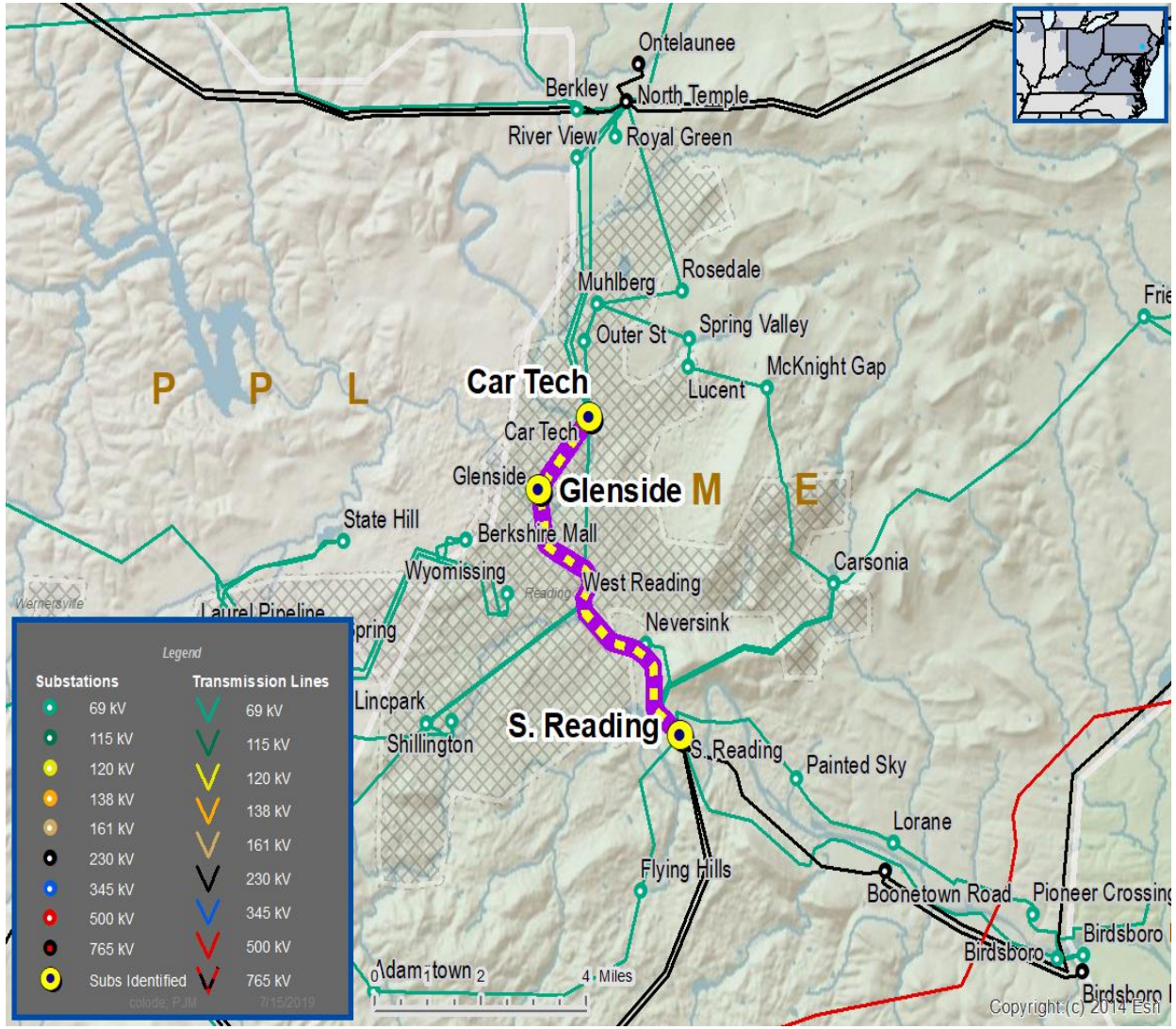
System Performance Projects

- Substation/line equipment limits

Problem Statement:

The Carpenter Technology – South Reading 69 kV Line is exhibiting deterioration.

- Total line distance is approximately 5.9 miles.
- 125 out of 151 structures failed inspection (83% failure rate).
- Failure reasons include age, woodpecker holes, and sound.
- Transmission line ratings are limited by terminal equipment
  - Carpenter Technology – Glenside 69 kV Line
    - Existing line rating: 82/103 MVA (SN/SE)
    - Existing conductor rating: 102/124 MVA (SN/SE)
  - Glenside – South Reading 69 kV Line
    - Existing line rating: 82/103 MVA (SN/SE)
    - Existing conductor rating: 102/124 MVA (SN/SE)



Met-Ed Transmission Zone M-3 Process
Carpenter Technology – South Reading 69 kV Line

Need Number: ME-2019-043
Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan

Selected Solution:
Rebuild approximately 5.9 miles of the Carpenter Technology – South Reading 69 kV Line.
At South Reading Substation:
- Replace 69 kV breaker, line-side disconnect and line relaying
- Install surge arresters

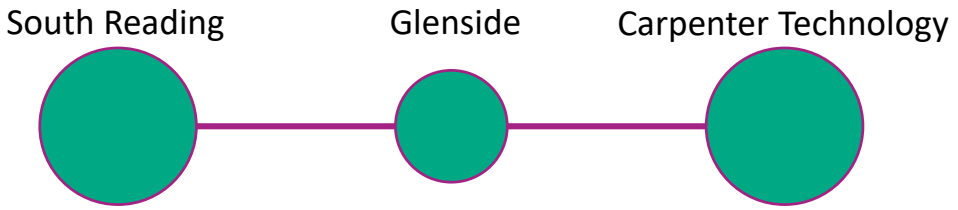
At Carpenter Technology Substation:
- Replace 69 kV line-side disconnect and line relaying

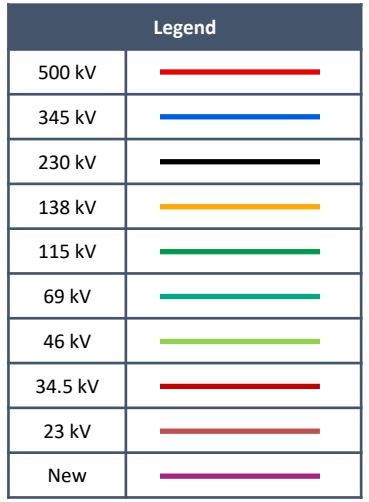
At Glenside Substation:
- Replace 69 kV motor-operated airbreak switches, disconnects and CCVTs

Transmission Line Ratings:
- Carpenter Technology – Glenside 69 kV Line:
  - Before Proposed Solution: 82 / 103 / 108 / 124 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 102 / 124 / 118 / 150 MVA (SN/SE/WN/WE)
- Glenside – South Reading 69 kV Line:
  - Before Proposed Solution: 82 / 103 / 108 / 124 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 102 / 124 / 118 / 150 MVA (SN/SE/WN/WE)

Estimated Project Cost: $15.2M

Projected In-Service: 05/29/2026
Supplemental Project ID: s3288.1





Met-Ed Transmission Zone M-3 Process
Birdsboro – Birdsboro Extrusions 69 kV Line

Need Number: ME-2023-011

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

Previously Presented: Need Meeting 11/16/2023
Solution Meeting 02/15/2024

Project Driver:

Increased System Reliability

Specific Assumption Reference:

System Performance Projects

Add/Expand Bus Configuration

- Accommodate Future Transmission Facilities

Build New Transmission Line

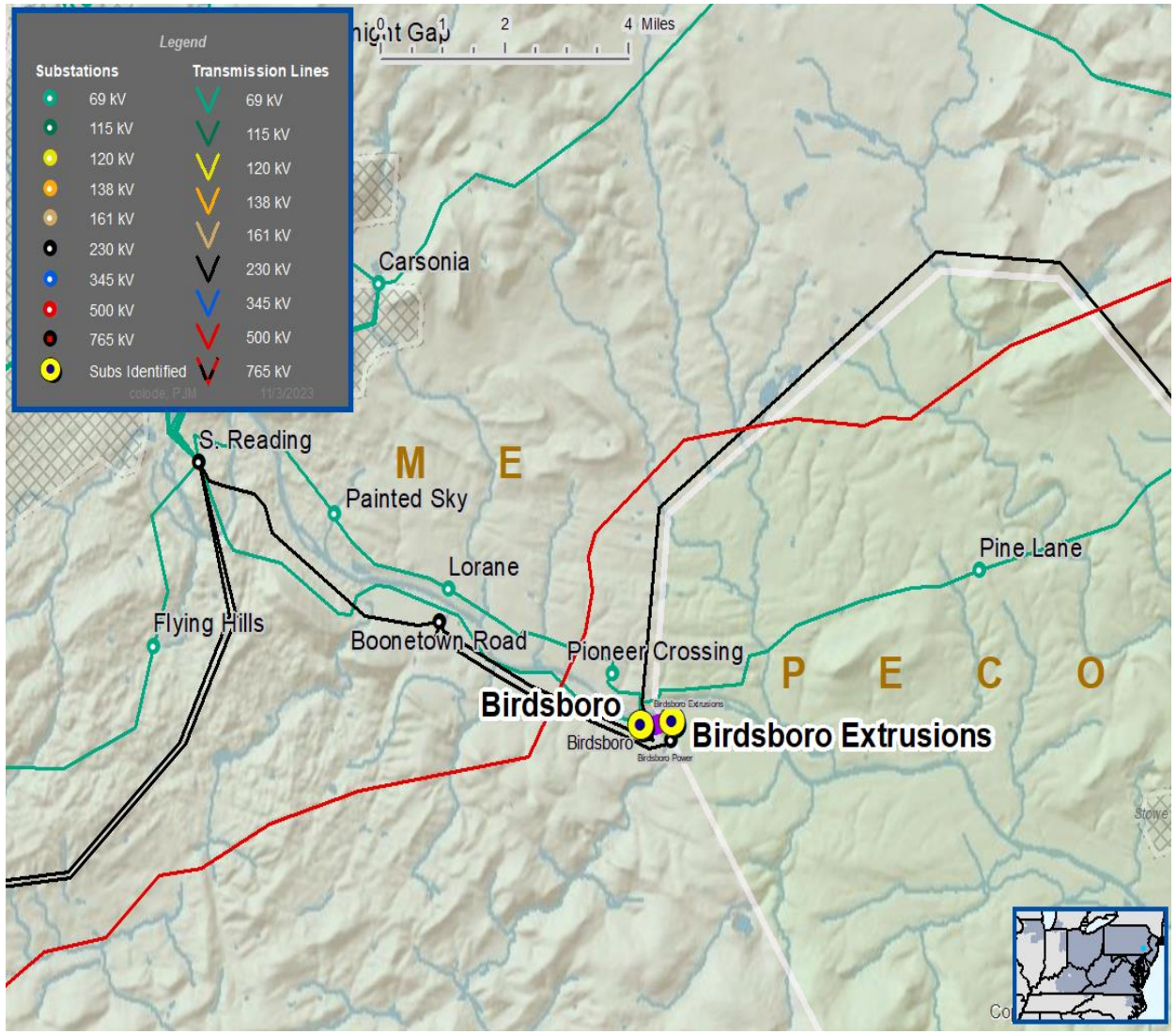
- Network Radial Lines
- Contingency constrained facilities

Automatic Sectionalizing Schemes

Problem Statement:

An N-1-1 contingency can lead to an overload of the Birdsboro – Birdsboro Extrusions 69 kV Line up to 111%.

Existing 69 kV line rating between Birdsboro Substation and Birdsboro Extrusions Substation is 71/90 MVA (SN/SE).



Met-Ed Transmission Zone M-3 Process
Birdsboro – Birdsboro Extrusions 69 kV Line

Need Number: ME-2023-011

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

Selected Solution:

- Rebuild and reconductor approximately 0.5 miles of the Birdsboro – Birdsboro Extrusions 69 kV Line.
- At Birdsboro Substation:
  - Replace 69 kV circuit breaker
  - Replace four 69 kV disconnect switches
  - Replace existing line drop and bus conductor
  - Replace existing line and breaker relaying
- At South Reading Substation:
  - Adjust relay settings

Transmission Line Ratings:

- Birdsboro – Birdsboro Extrusions 69 kV Line
  - Before Proposed Solution: 71 / 90 / 85 / 103 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 111 / 134 /125 / 159 MVA (SN/SE/WN/WE)

Estimated Project Cost: $2.1M

Projected In-Service: 12/10/2025

Supplemental Project ID: s3289.1

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

1/3/2024 – V1 – s3017 added to Local Plan

6/24/2024 – V2 – Local Plan for s3263.1, s3264.1, s3300.1, s3300.2, s3300.3, s3287.1, s3288.1, s3289.1