

First Energy MAAC Local Plan Submission for the 2019 RTEP

Met-Ed Transmission Zone

Need Number: ME-2018-001

Process Stage: Local Plan

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

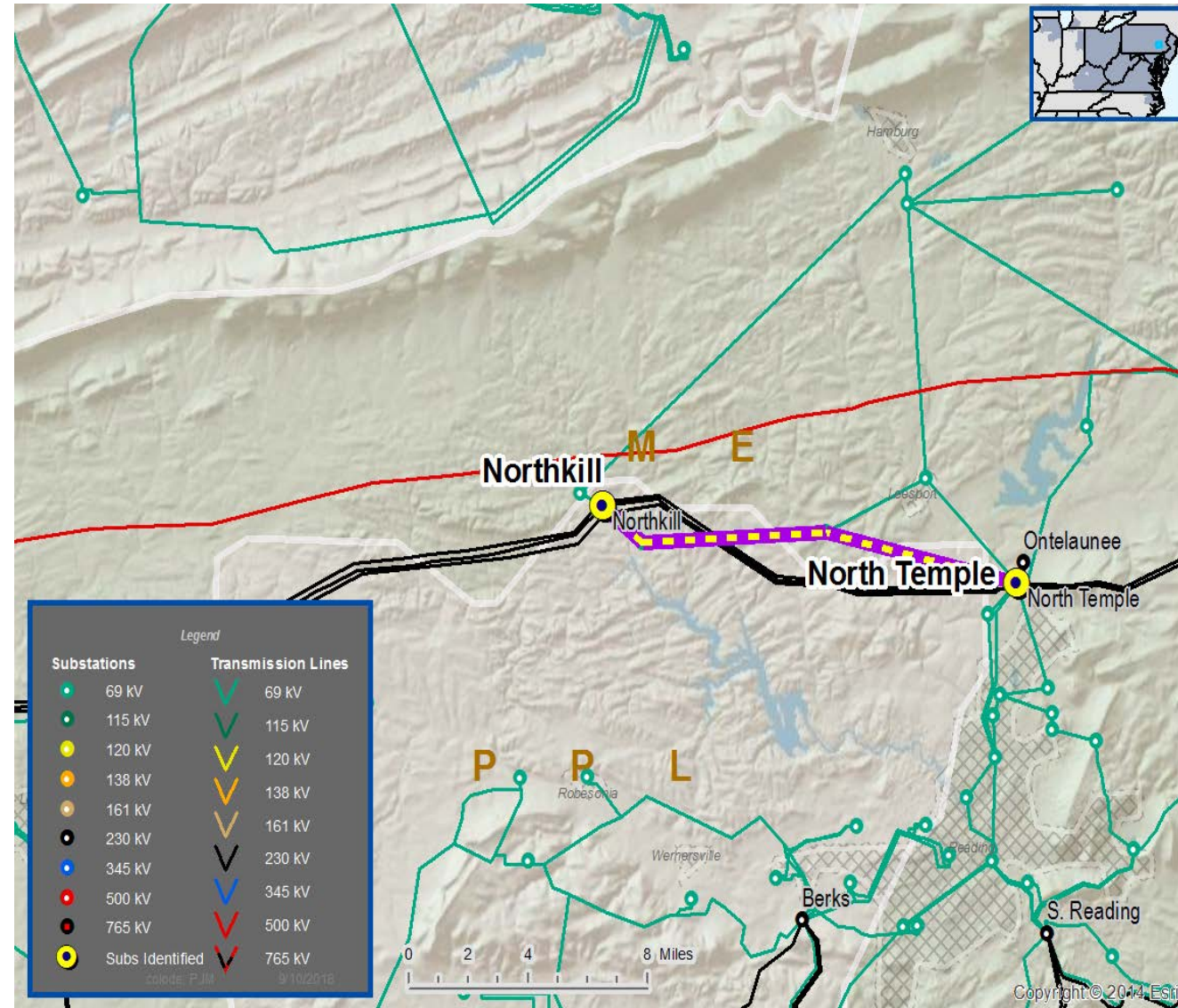
Customer Service

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 - A customer requested 69 kV service for load of approximately 17 MVA near the North Temple – Northkill 69 kV line. Requested in-service date is 12/2019.



Need Number: ME-2018-001

Selected Solution:

Van Reed Substation

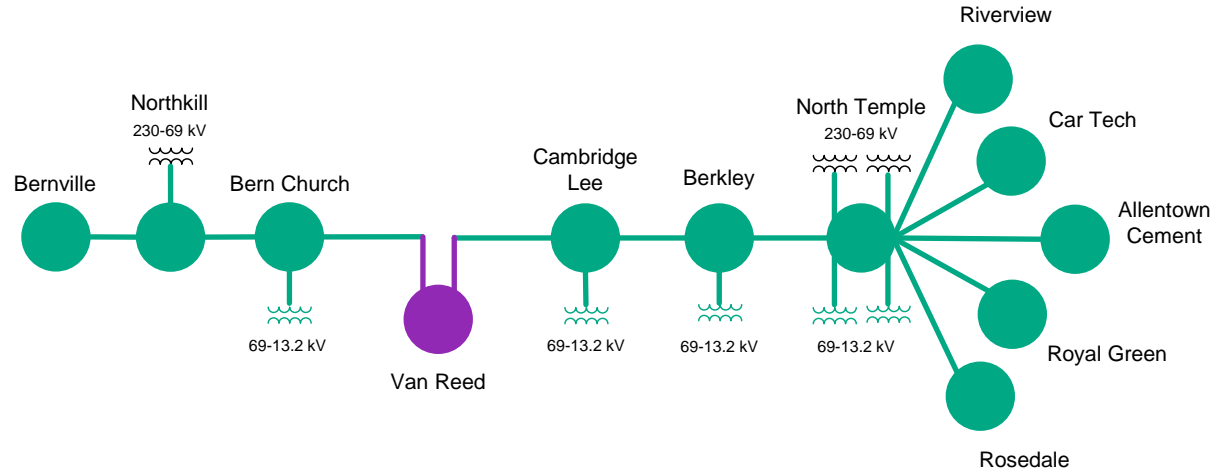
- Construct new Van Reed 69 kV Ring Bus Substation (s1761.1)
- Loop the Northkill - North Temple 69 kV line into Van Reed (s1761.2)
- Provide new 69 kV delivery point for customer (s1761.3)

Estimated Project Cost: \$3.6M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1761.1, s1761.2, s1761.3



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Met-Ed Transmission Zone

Need Number: ME-2018-002

Process Stage: Local Plan

Need Presented : 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Substation/Line Equipment Limits

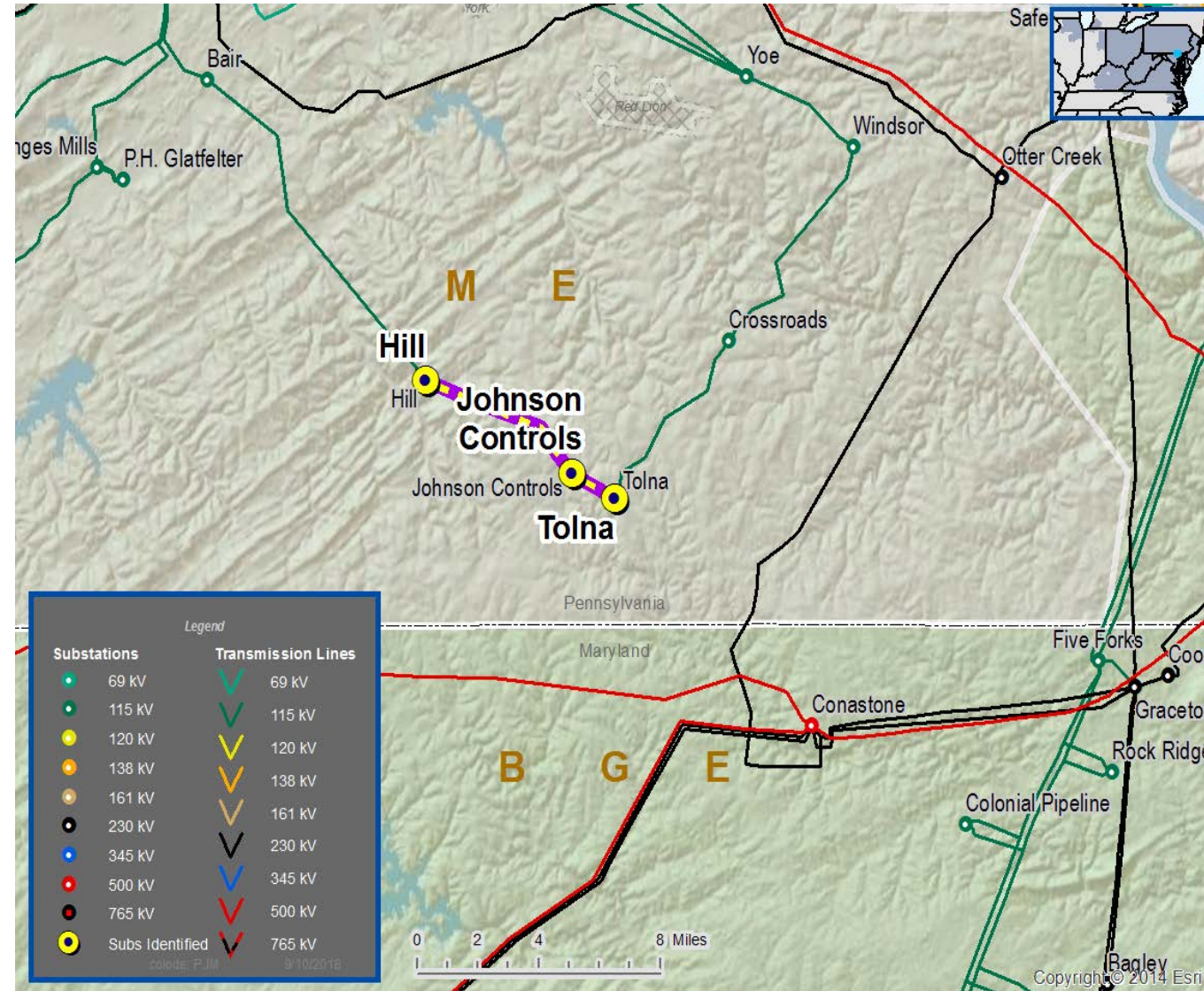
- Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

Maintenance/rehab work will be performed on the Hill-Tolna 115 kV line.

Transmission line rating limited by terminal equipment.

- Hill – Johnson Controls 115 kV line: Existing emergency line rating is 150 MVA. Existing conductor emergency rating is 223 MVA.
- Johnson Controls – Tolna 115 kV line: Existing emergency line rating is 208 MVA. Existing conductor emergency rating is 223 MVA.



Met-Ed Transmission Zone

Need Number: ME-2018-002

Selected Solution:

Replace terminal equipment at Hill and Tolna 115 kV

Hill 115 kV Substation – Terminal equipment to be replaced includes: (s1762.1)

- Line relaying, line drops, line trap, CCVT, line tuner, coax, substation conductor

Tolna 115 kV Substation – Terminal equipment to be replaced includes: (s1762.2)

- Line relaying, line drops, line trap, CCVT, line tuner, coax, substation conductor

Transmission Line Ratings:

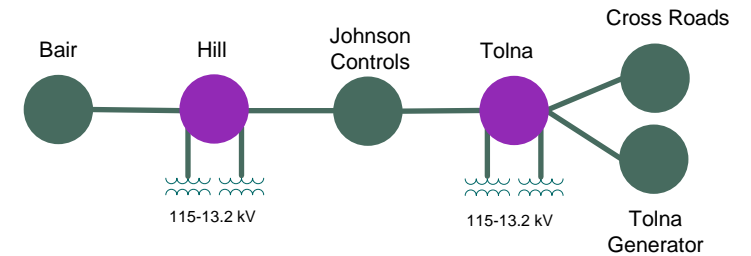
- Hill – Tolna 115 kV Line
 - Before Proposed Solution: 175 MVA SN / 208 MVA SE
 - After Proposed Solution: 184 MVA SN / 223 MVA SE

Estimated Project Cost: \$3.0M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1762.1, s1762.2



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Met-Ed Transmission Zone

Need Number: ME-2018-006

Process Stage: Local Plan

Need Presented : 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Upgrade Relay Schemes

Upgrade relay schemes that have historically high percentage of misoperation.

Substation/Line Equipment Limits

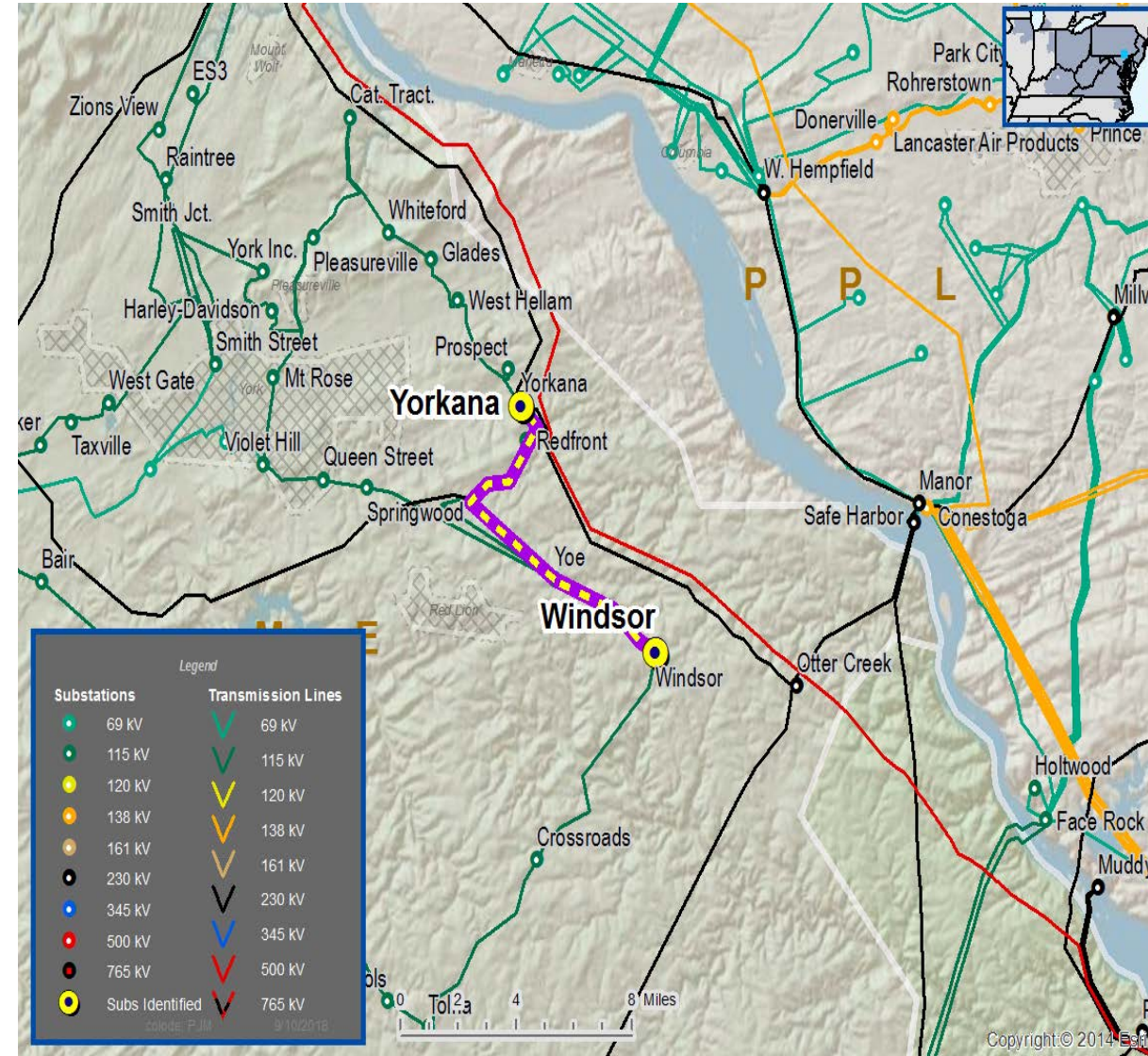
Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

Maintenance/rehab work will be performed on the Windsor-Yorkana Tap 115 kV line.

Relays on Windsor – Yorkana 115 kV line evaluated by Transmission Planning and Protection and determined to be obsolete and/or in a degraded condition.

Transmission line rating limited by terminal equipment. Existing emergency line rating is 277 MVA. Existing conductor emergency rating is 282 MVA.



Met-Ed Transmission Zone

Need Number: ME-2018-006

Selected Solution:

Replace terminal equipment at Windsor and Yorkana 115 kV

Windsor 115 kV Substation – Terminal equipment to be replaced includes: (s1763.1)

- Line relaying, line drops, CCVT, line trap, line tuner, arresters, breaker, and breaker disconnect switches

Yorkana 115 kV Substation – Terminal equipment to be replaced includes: (s1763.2)

- Line relaying, CCVT, line trap, line tuner, arresters, breaker, and breaker disconnect switch

Transmission Line Ratings:

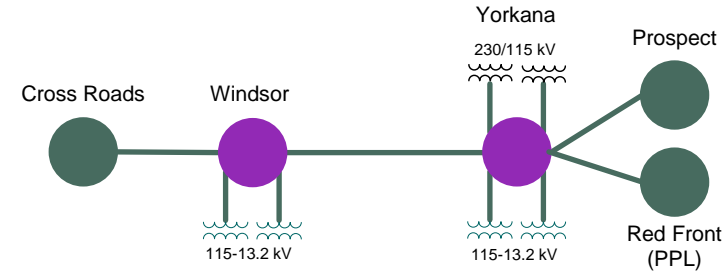
- Windsor – Yorkana 115 kV Line
 - Before Proposed Solution: 232 MVA SN / 277 MVA SE
 - After Proposed Solution: 232 MVA SN / 282 MVA SE

Estimated Project Cost: \$10.0 M

Projected IS Date: 6/1/2020

Status: Conceptual

Supplemental Project Number: s1763.1, s1763.2



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Met-Ed Transmission Zone

Need Number: ME-2018-007

Process Stage: Local plan

Need Presented : 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Upgrade Relay Schemes

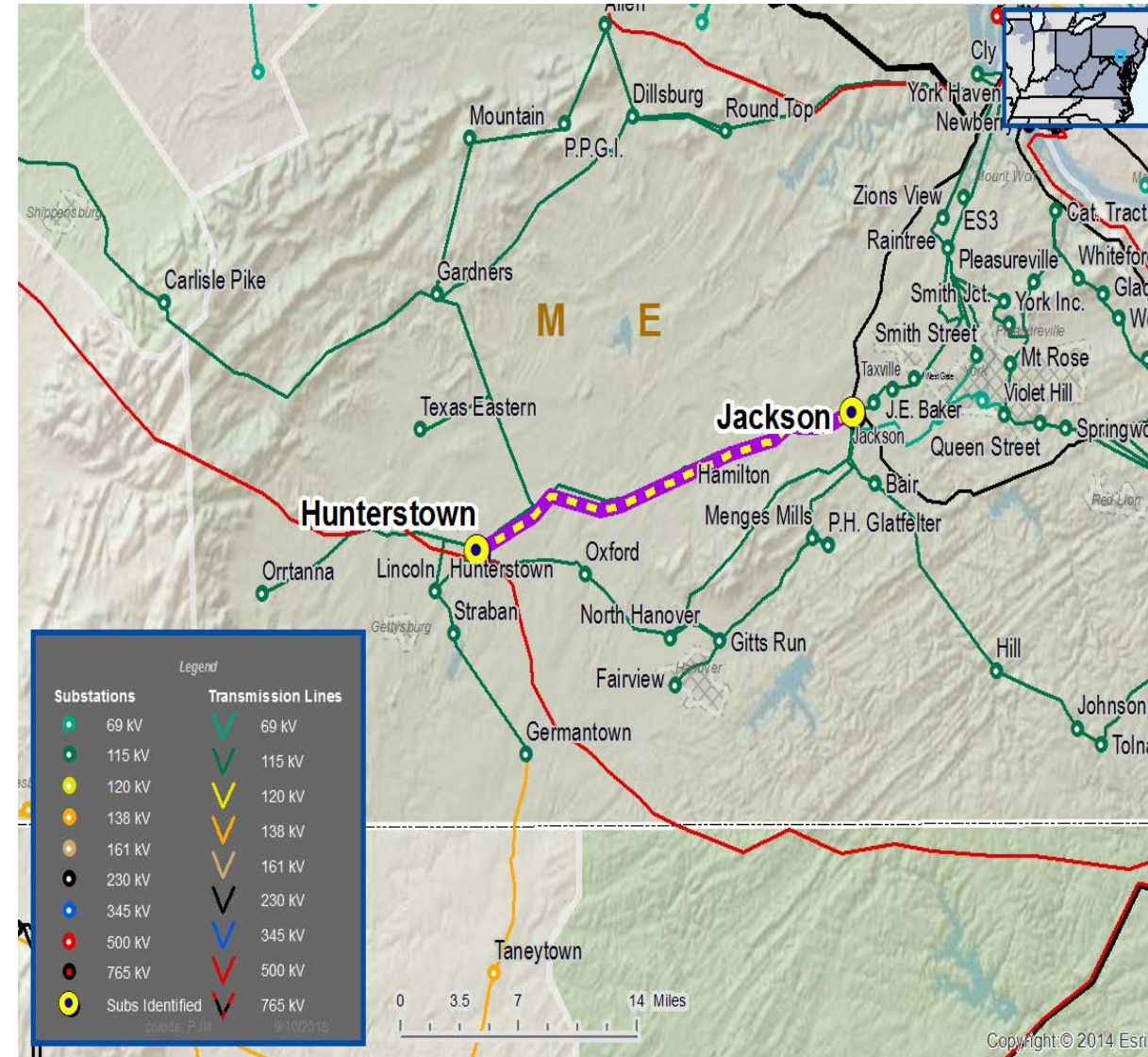
- Upgrade relay schemes that have historically high percentage of misoperation.

Substation/Line Equipment Limits

- Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

- Relays on Hunterstown – Jackson 230 kV line evaluated by Transmission Planning and Protection and determined to be obsolete and/or degraded condition.
- Transmission line rating limited by terminal equipment. Existing normal line rating is 678 MVA. Conductor normal rating is 709 MVA.



Met-Ed Transmission Zone

Need Number: ME-2018-007

Selected Solution:

Replace terminal equipment at Hunterstown and Jackson 230 kV

Hunterstown 230 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, CCVT, coax, and line tuner (s1764.1)

Jackson 230 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, coax, and line tuner (s1764.2)

Transmission Line Ratings:

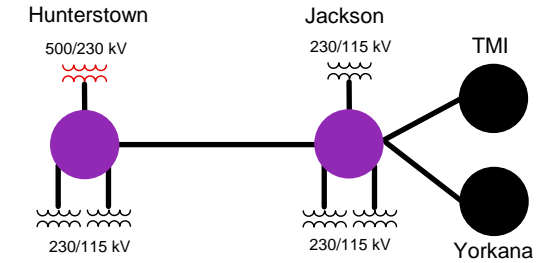
- Hunterstown – Jackson 230 kV Line
 - Before Selected Solution: 678 MVA SN / 797 MVA SE
 - After Selected Solution: 709 MVA SN / 870 MVA SE

Estimated Project Cost: \$0.8M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1764.1, s1764.2



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Met-Ed Transmission Zone

Need Number: ME-2018-008
 Process Stage: Local Plan
 Need Presented : 9/21/2018
 Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

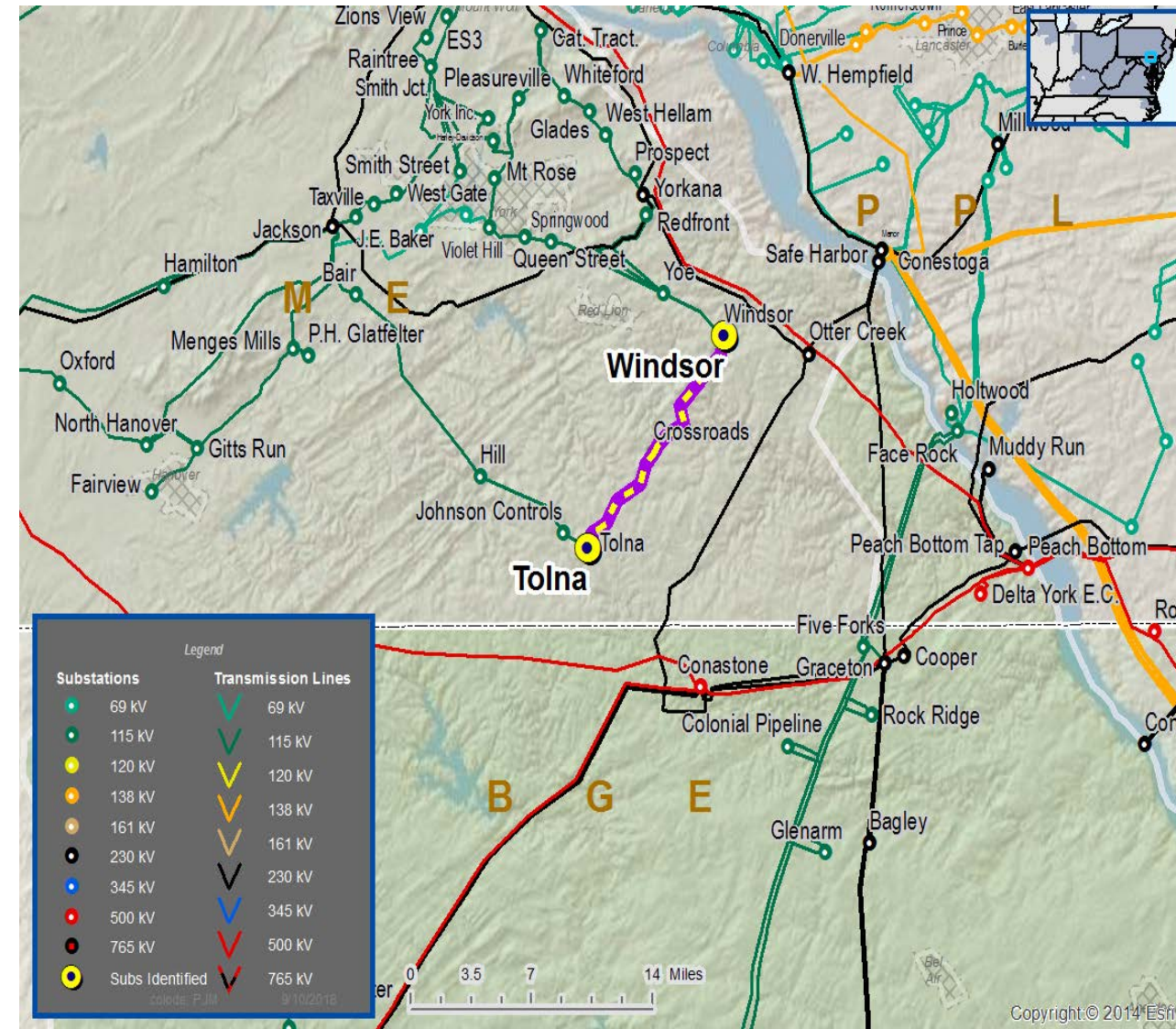
Specific Assumption Reference(s)

Upgrade Relay Schemes
 Upgrade relay schemes that have historically high percentage of misoperation.
 Substation/Line Equipment Limits
 Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

Relays on Tolna – Windsor 115 kV line evaluated and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment.
 Tolna – Cross Roads 115 kV Line – Existing emergency line rating is 277 MVA.
 Conductor emergency rating is 282 MVA.



Met-Ed Transmission Zone

Need Number: ME-2018-008

Selected Solution:

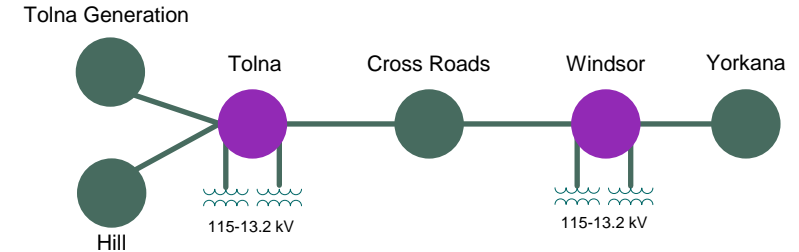
Replace terminal equipment at Tolna and Windsor 115 kV

Tolna 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, line trap, line tuner, and arresters (s1765.1)

Windsor 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, CCVT, line trap, line tuner, and arresters (s1765.2)



Transmission Line Ratings:

- Tolna – Cross Roads 115 kV Line
 - Before Selected Solution: 232 MVA SN / 277 MVA SE
 - After Selected Solution: 232 MVA SN / 282 MVA SE

Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Estimated Project Cost: \$0.7M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1765.1, s1765.2

Met-Ed Transmission Zone

Need Number: ME-2018-009

Process Stage: Local Plan

Need Presented : 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Upgrade Relay Schemes

Upgrade relay schemes that have historically high percentage of misoperation.

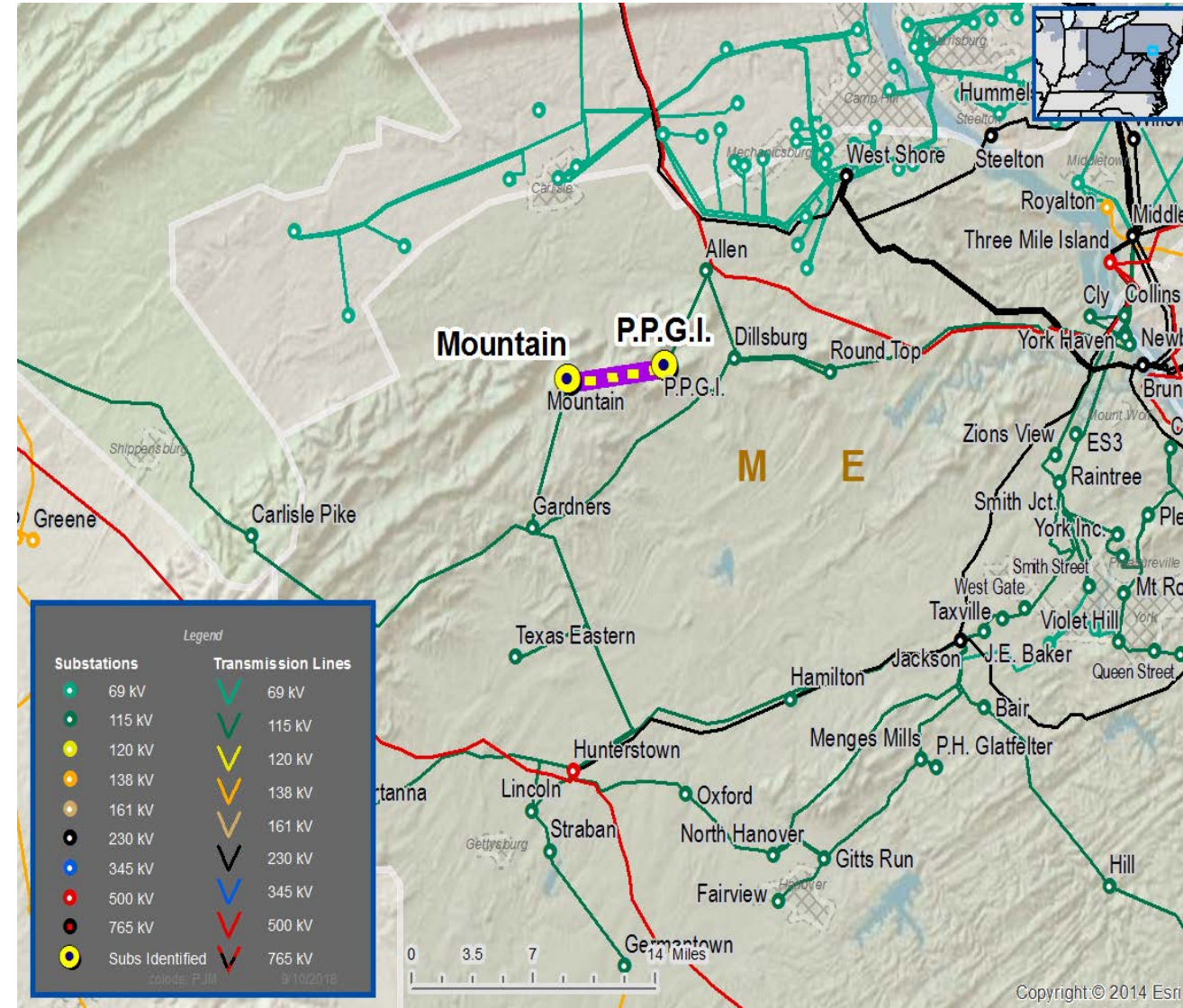
Substation/Line Equipment Limits

Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

Relays on Mountain – P.P.G.I. 115 kV line evaluated and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment. Existing normal line rating is 159 MVA. Conductor normal rating is 184 MVA.



Met-Ed Transmission Zone

Need Number: ME-2018-009

Selected Solution:

Replace terminal equipment at Mountain and PPGI 115 kV

Mountain 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, line trap, line tuner, arresters and breaker disconnect switch (s1766.1)

PPGI 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, CCVT, line trap, line tuner, arresters, and breaker disconnect switch (s1766.2)

Transmission Line Ratings:

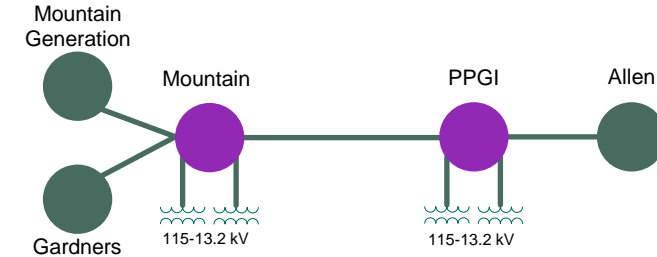
- Mountain – PPGI 115 kV Line
 - Before Selected Solution: 159 MVA SN / 211 MVA SE
 - After Selected Solution: 184 MVA SN / 223 MVA SE

Estimated Project Cost: \$0.6M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1766.1, s1766.2



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Met-Ed Transmission Zone

Need Number: ME-2018-010

Process Stage: Local Plan

Need Presented : 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Upgrade Relay Schemes

Upgrade relay schemes that have historically high percentage of misoperation.

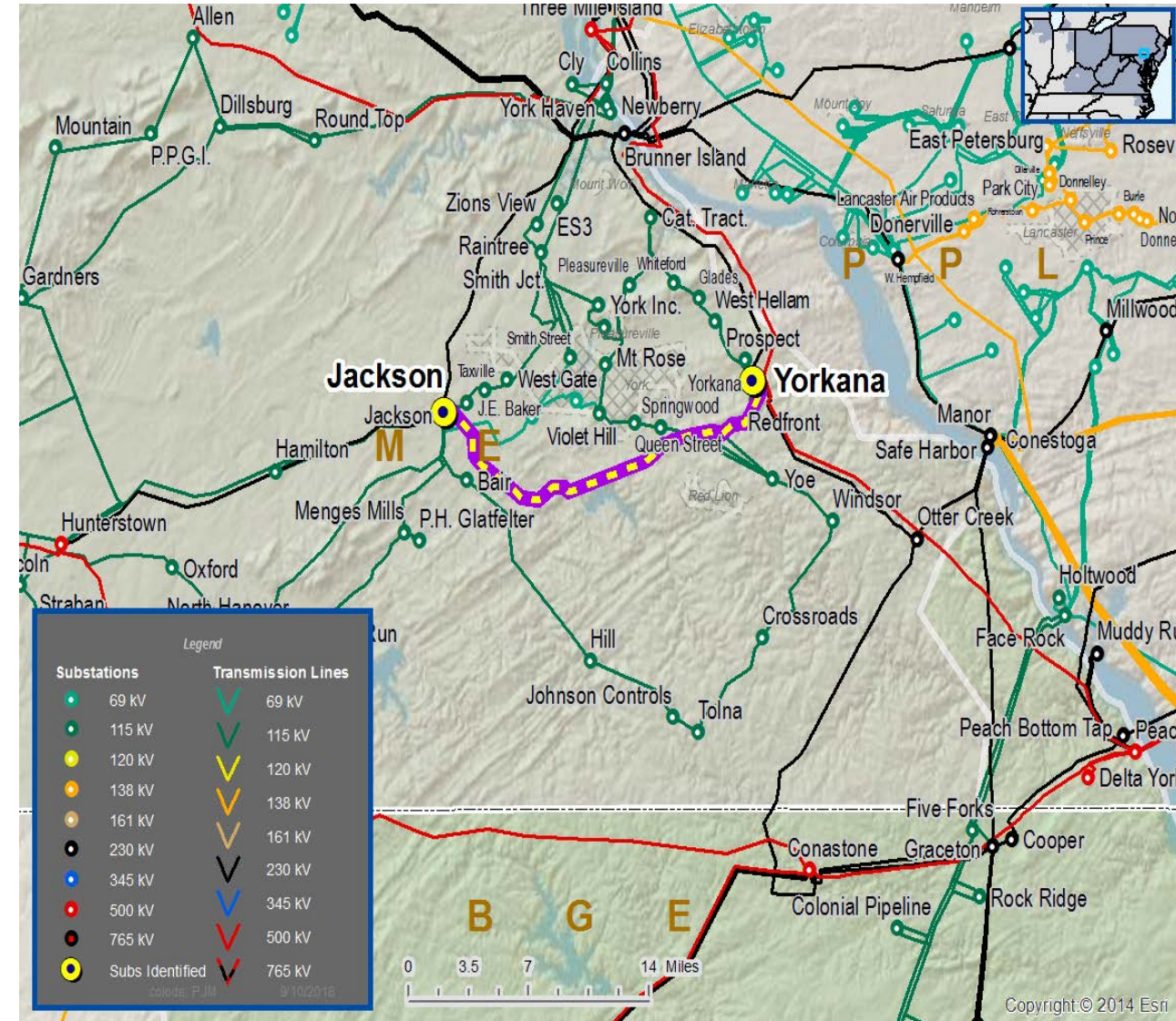
Substation/Line Equipment Limits

Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

Relays on Jackson – Yorkkana 230 kV line evaluated and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment. Existing normal line rating is 650 MVA. Conductor normal rating is 709 MVA.



Met-Ed Transmission Zone

Need Number: ME-2018-010

Selected Solution:

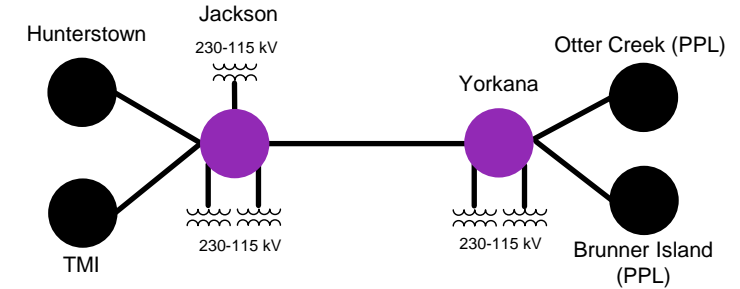
Replace terminal equipment at Jackson and Yorkana 230 kV

Jackson 230 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, line trap, and line tuner (s1767.1)

Yorkana 230 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, line trap, and line tuner (s1767.2)



Transmission Line Ratings:

- Jackson – Yorkana 230 kV Line
 - Before Selected Solution: 650 MVA SN / 817 MVA SE
 - After Selected Solution: 709 MVA SN / 869 MVA SE

Estimated Project Cost: \$0.6M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1767.1, s1767.2

Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Met-Ed Transmission Zone

Need Number: ME-2018-011

Process Stage: Local Plan

Need Presented : 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Upgrade Relay Schemes

- Upgrade relay schemes that have historically high percentage of misoperation.

Substation/Line Equipment Limits

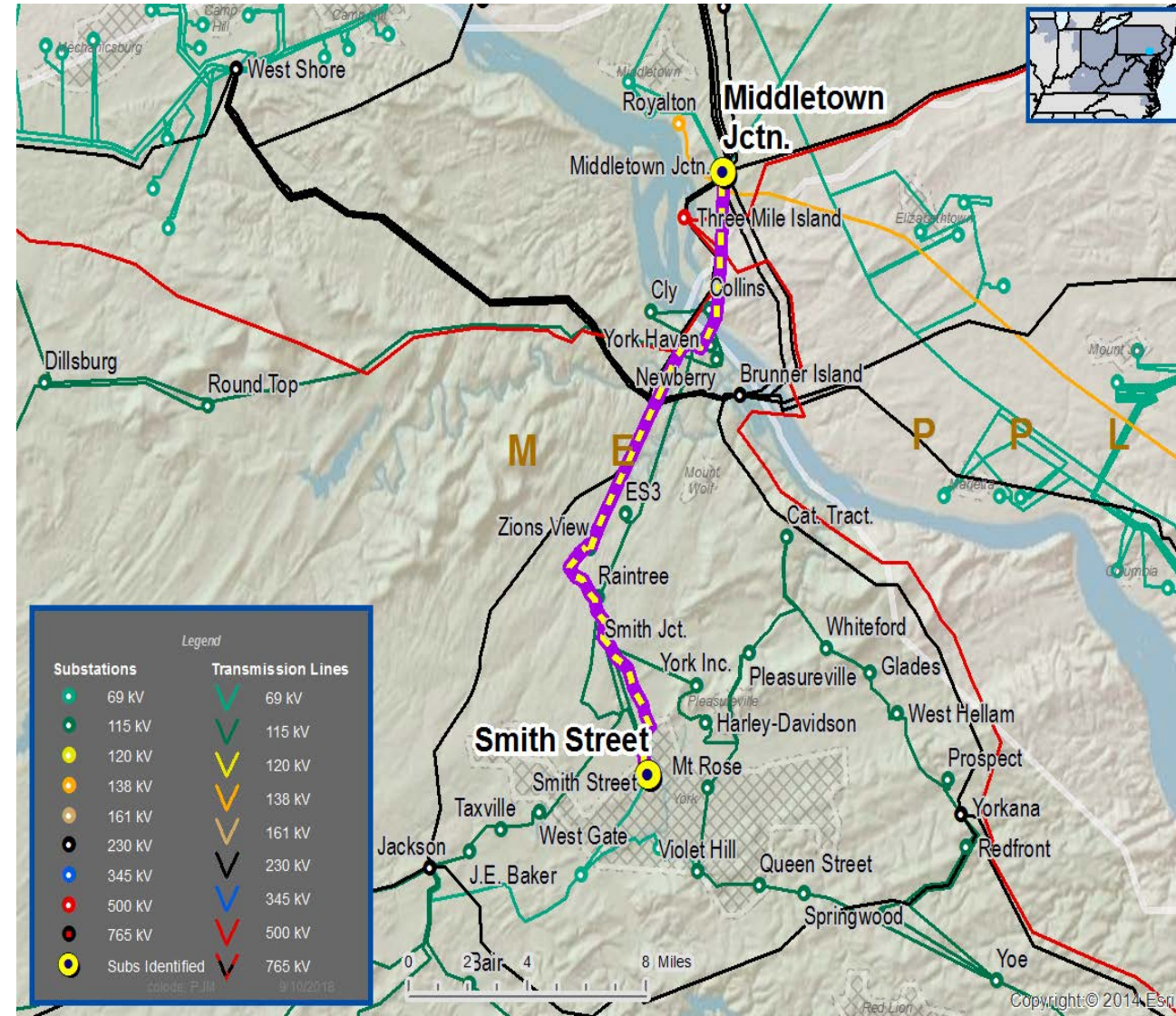
- Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

Relays on Middletown Junction – Smith Street (978) 115 kV line evaluated by Transmission Planning and Protection and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment.

- Raintree – Smith Street (978) 115 kV Line – Existing normal line rating is 103 MVA. Conductor normal rating is 129 MVA.



Met-Ed Transmission Zone

Need Number: ME-2018-011

Selected Solution:

Replace terminal equipment at Middletown Junction and Smith Street (978) 115 kV

Middletown Junction 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, CCVT, line trap and line tuner (s1768.1)

Smith Street 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, line trap, line tuner, breaker and breaker disconnect switches (s1768.2)

Transmission Line Ratings:

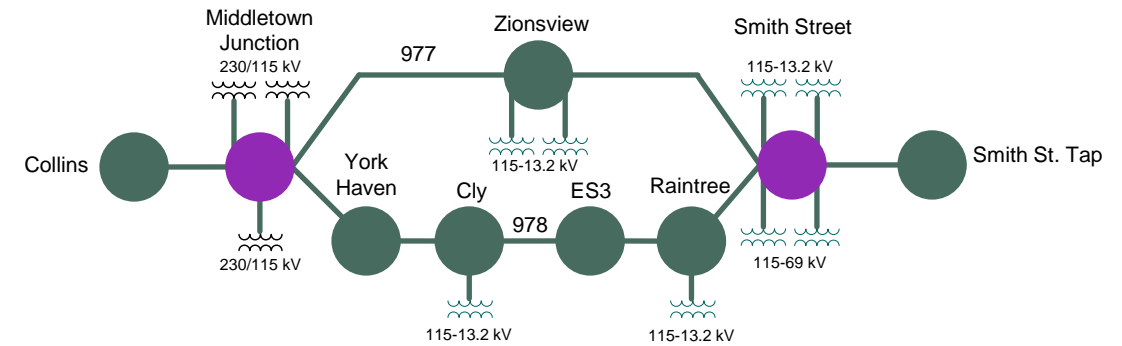
- Raintree – Smith Street (978) 115 kV Line
 - Before Selected Solution: 103 MVA SN / 129 MVA SE
 - After Selected Solution: 129 MVA SN / 156 MVA SE

Estimated Project Cost: \$1.1M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1768.1, s1768.2



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Met-Ed Transmission Zone M-3 Process Pleasureville – Harley Davidson – York Incinerator 115 kV Line Rehab

Need Number: ME-2018-003

Process State: Submission of Supplemental Project for inclusion in the Local Plan
7/26/2019

Previously Presented:

Need Meeting 9/21/2018
Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Substation/Line Equipment Limits

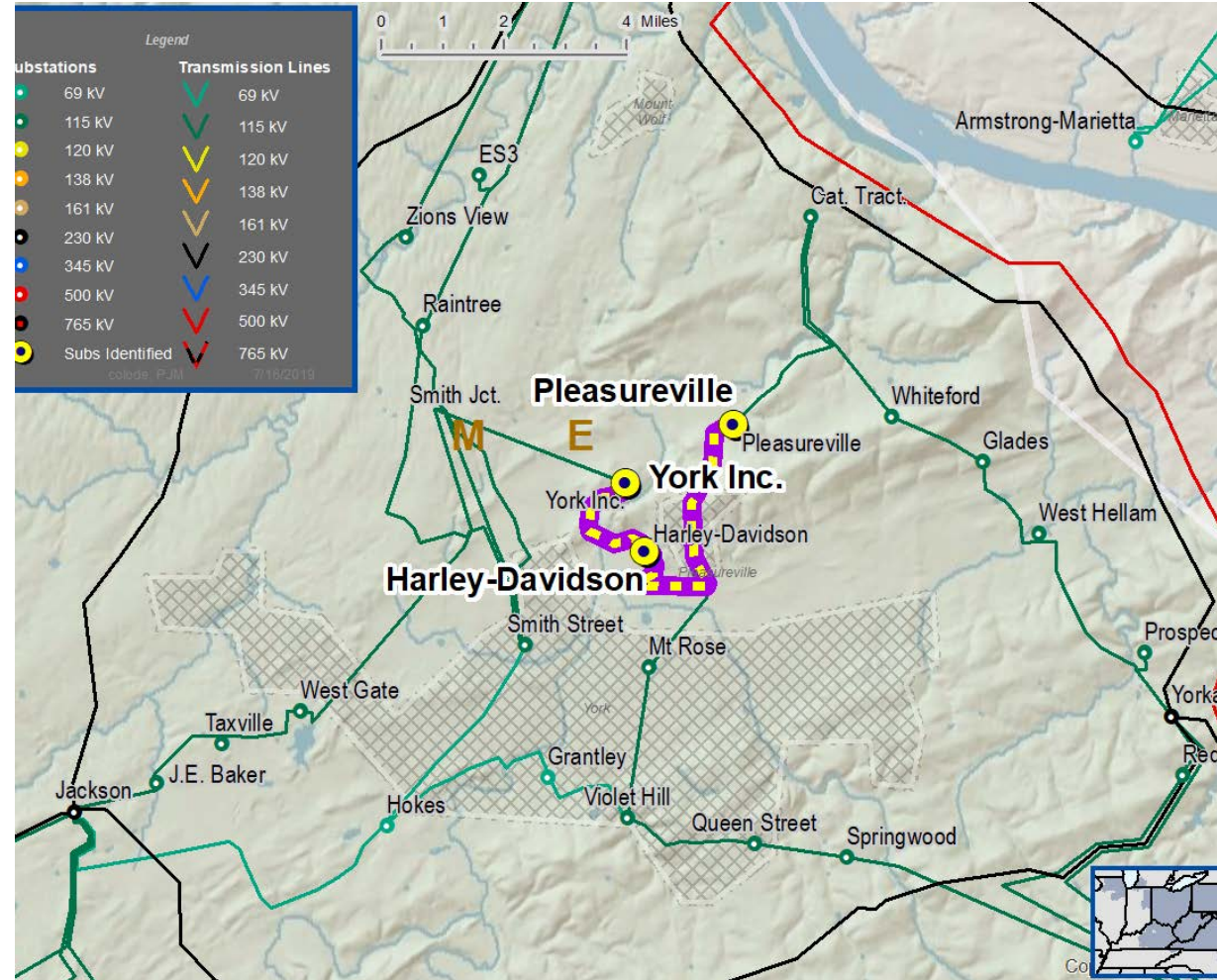
- Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement:

Maintenance/rehab work will be performed on the Pleasureville-Harley Davidson-York Solid Waste 115 kV line.

Transmission line rating limited by terminal equipment.

- Pleasureville – Harley Davidson 115 kV line: Existing emergency line rating is 263 MVA. Existing conductor emergency rating is 430 MVA.
- Harley Davidson – York Inc. 115 kV line: Existing emergency rating is 263 MVA. Existing conductor emergency rating is 282 MVA.



Met-Ed Transmission Zone M-3 Process Pleasureville – Harley Davidson – York Incinerator 115 kV Line Rehab

Need Number: ME-2018-003

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Pleasureville – Harley Davidson – York Incinerator 115 kV Line Rehab (**s1811.1**)

Pleasureville 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line trap, CCVT, line tuner, coax, substation conductor, and breaker disconnect switches (**s1811.2**)

York Incinerator 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line trap, CCVT, line tuner, coax, substation conductor, circuit breaker, and disconnect switches (**s1811.3**)

Transmission Line Ratings:

Pleasureville – Harley Davidson 115 kV Line

- Before Proposed Solution: 221/263 MVA (SN/SE)
- After Proposed Solution: 297/376 MVA (SN/SE)

Harley Davidson – York Incinerator 115 kV Line

- Before Proposed Solution: 221/263 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)

Estimated Cost: \$3.9 M

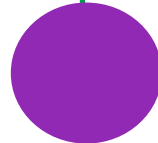
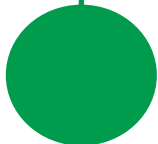
Projected In-Service: 12/22/2021

Supplemental Project ID: s1811.1, s1811.2, : s1811,.3

Project Status: Conceptual

Model: 2018 Series 2023 Summer RTEP 50/50

York Incinerator



Pleasureville

Harley Davidson

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

Pleasureville – Mt. Rose – Violet Hill 115 kV Line Rehab & Misoperation Relay Replacement

Need Number: ME-2018-004 & ME-2018-012

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 9/21/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Upgrade Relay Schemes

- Upgrade relay schemes that have historically high percentage of misoperation.

Substation/Line Equipment Limits

- Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

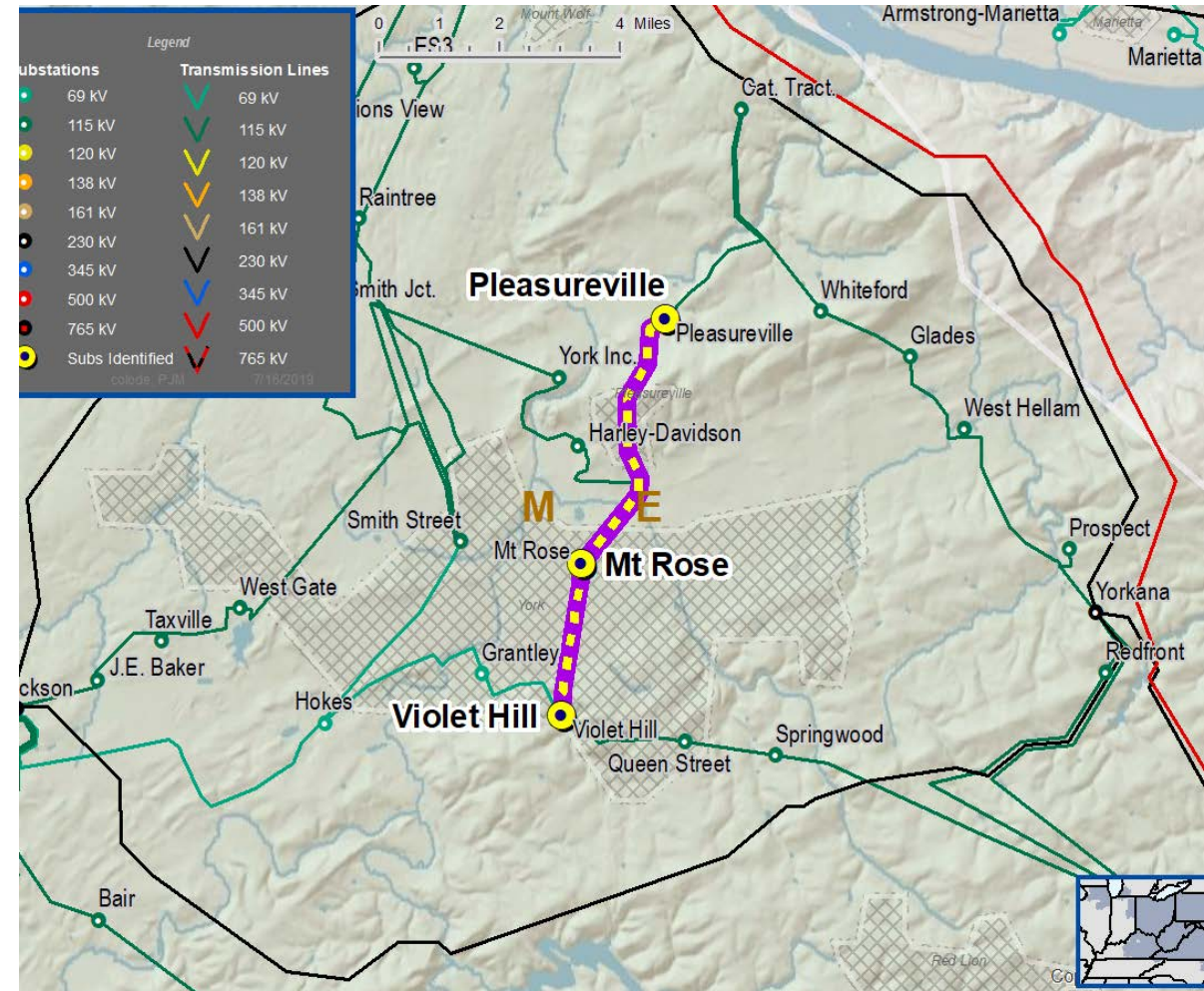
Problem Statement:

Maintenance/rehab work will be performed on the Pleasureville-Mt. Rose-Violet Hill 115 kV line.

Relays on Pleasureville – Violet Hill 115 kV line evaluated and determined to be obsolete and/or degraded condition. 204 MVA.

Transmission line rating limited by terminal equipment.

- Pleasureville – Mt. Rose 115 kV line: Existing emergency line rating is the existing conductor emergency rating.
- Mt. Rose – Violet Hill 115 kV line: Existing emergency line rating is 204/266 MVA (SN/SE). Existing conductor rating is 232/282 MVA (SN/SE).



Met-Ed Transmission Zone M-3 Process

Pleasureville – Mt. Rose – Violet Hill 115 kV Line Rehab & Misoperation Relay Replacement

Need Number: ME-2018-004 & ME-2018-012

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Pleasureville – Mt. Rose – Violet Hill 115 kV line rehab & replace relays prone to misoperation (**s1812**)

Violet Hill 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, wave trap, line tuner, arresters, and breaker disconnect switches

Transmission Line Ratings:

Mt. Rose – Violet Hill 115 kV Line

- Before Proposed Solution: 204/266 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)

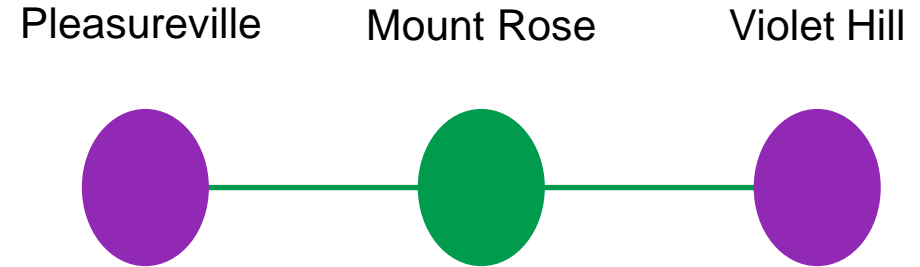
Estimated Cost: \$0.9M

Projected In-Service: 12/31/2019

Supplemental Project ID: s1812

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	

Met-Ed Transmission Zone M-3 Process

Smith Street – Westgate– York Solid Waste 115 kV Line Rebuild

Need Number: ME-2018-005

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 9/21/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Line Condition Rebuild/Replacement

- Equipment characteristics are near or beyond existing service life or contain components that are obsolete.

Reconductor/Rebuild Transmission Lines

- Transmission lines with high loading while factoring in its overall condition assessment.

Substation/Line Equipment Limits

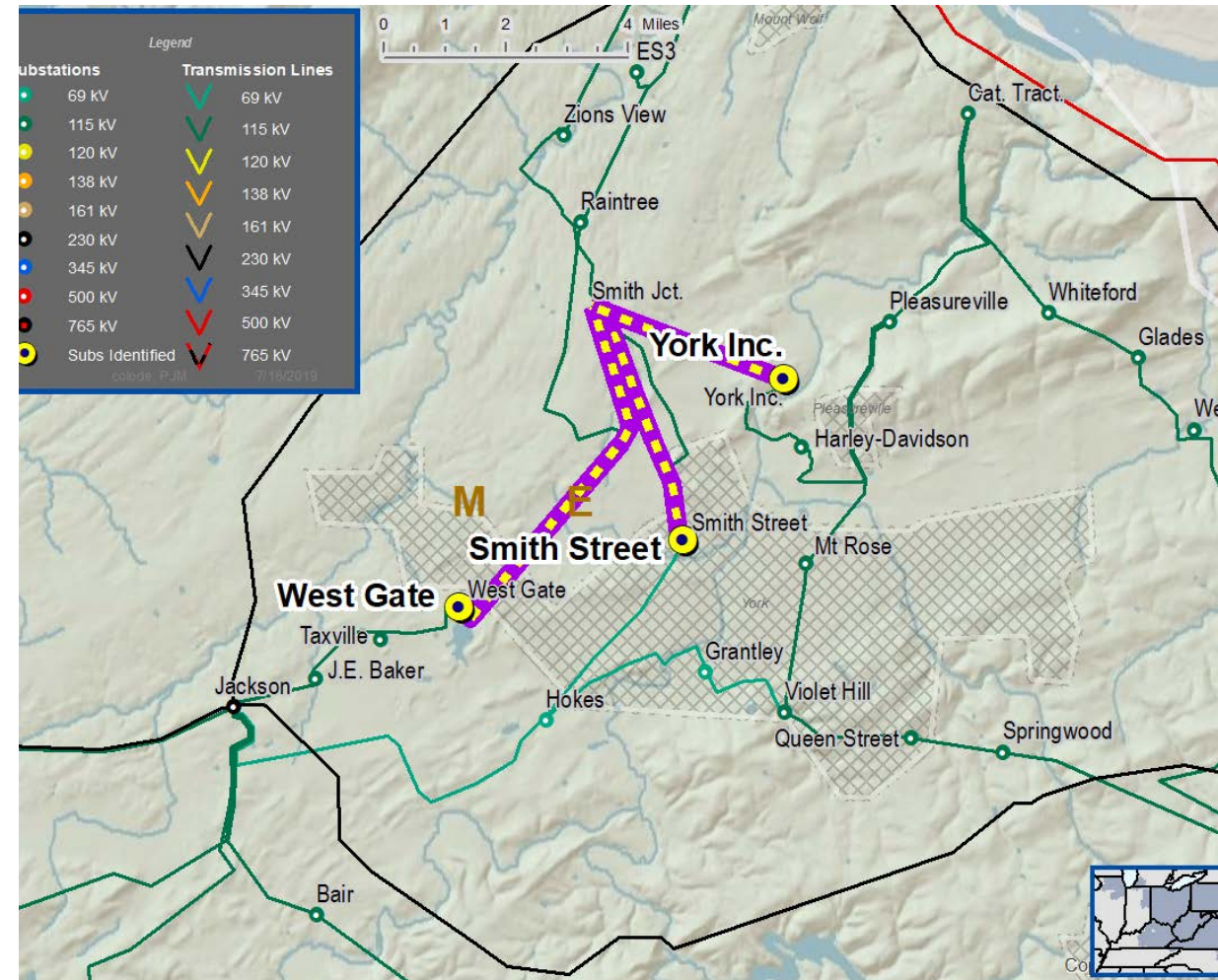
- Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement:

Segments of Smith Street-Westgate-York Solid Waste 115 kV line are at or beyond service life.

Transmission line rating limited by terminal equipment.

- Smith Street – Smith Street Tap 115 kV line: Existing emergency line rating is 152 MVA. Existing conductor emergency rating is 223 MVA.
- Westgate – Smith Street Tap 115 kV line: Existing emergency line rating is 263 MVA. Existing conductor emergency rating is 282 MVA.
- York Inc. – Smith Street Tap 115 kV line: Existing emergency line rating is the existing conductor emergency rating.



Met-Ed Transmission Zone M-3 Process Smith Street – Westgate– York Solid Waste 115 kV Line Rebuild

Need Number: ME-2018-005

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Smith Street – Smith Street Tap 115 kV Line Rebuild (s1813.1)

- Rebuild approximately 1.3 miles of wood pole construction (s1813.2)

Smith Street Tap – York Incinerator 115 kV Line Rebuild

- Rebuild/reconductor approximately 2 miles of wood pole construction (s1813.3)

Smith Street 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, substation conductor, CCVT, circuit breaker and breaker disconnects (s1813.4)

Westgate 115 kV Substation – Terminal equipment to be replaced includes:

- Substation conductor (s1813.5)

York Incinerator 115 kV Substation – Terminal equipment to be replaced includes:

- Substation conductor (s1813.6)

Transmission Line Ratings:

Smith Street – Smith Street Tap 115 kV Line

- Before Proposed Solution: 118/152 MVA (SN/SE)
- After Proposed Solution: 184/223 MVA (SN/SE)

Westgate – Smith Street Tap 115 kV Line

- Before Proposed Solution: 221/263 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)

York Incinerator – Smith Street Tap 115 kV Line

- Before Proposed Solution: 184/223 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)

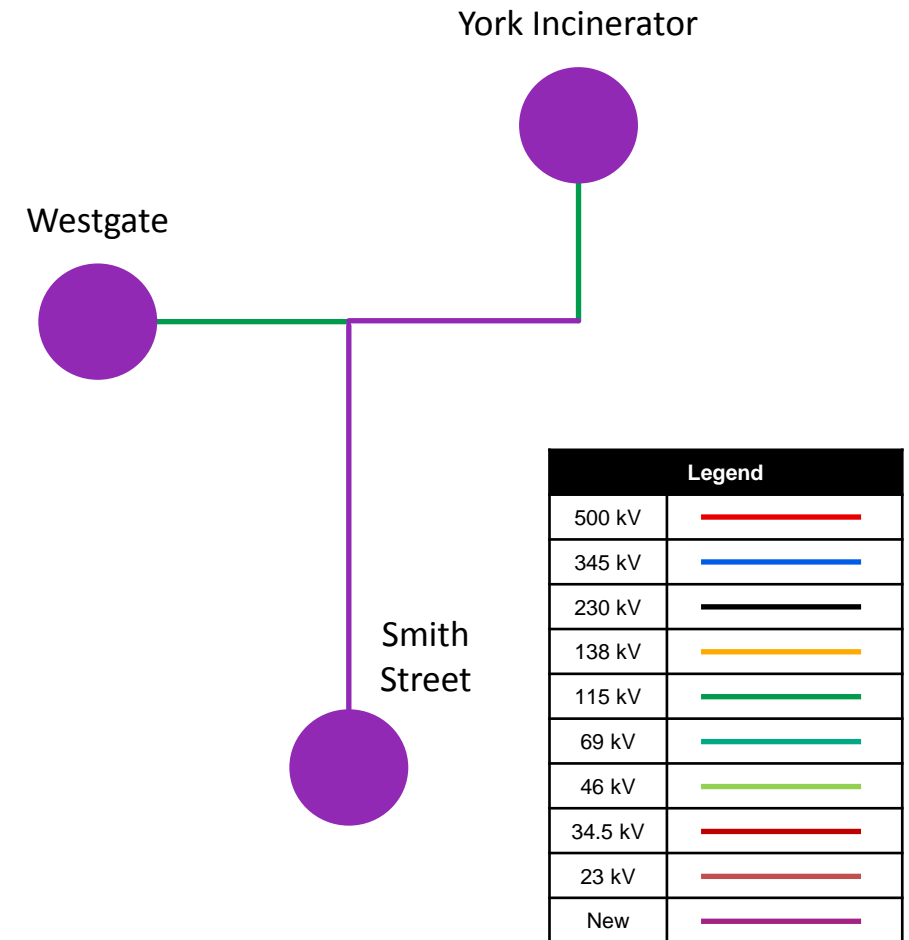
Estimated Cost: \$6.4 M

Projected In-Service: 12/31/2019

Supplemental Project ID: s1813.1, s1813.2, s1813.3, s1813.4, s1813.4, s1813.5, s1813.6

Project Status: Conceptual

Model: 2018 Series 2023 Summer RTEP 50/50



Met-Ed Transmission Zone M-3 Process Middletown Junction #3 230-69 kV Transformer Replacement

Need Number: ME-2018-013

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

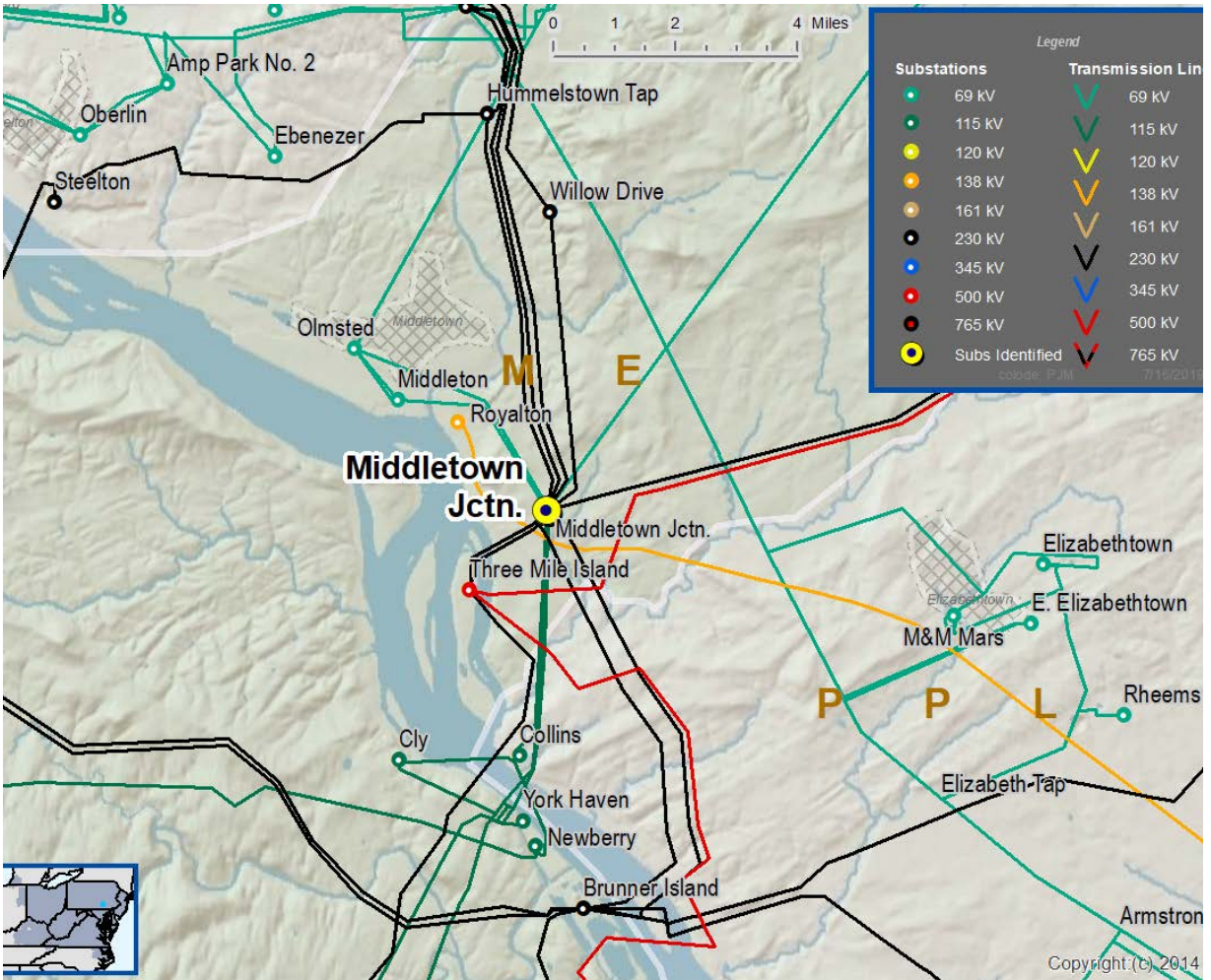
Substation Condition Rebuild/Replacement

System Performance Projects – Substation/Line Equipment Limits

Problem Statement:

Middletown Junction #3 230-69 kV:

- Transformer is 55 years old
- There have been 44 maintenance orders since 2003
- Multiple oil leaks in load tap changer
- Combustible gasses found in load tap changer oil



Met-Ed Transmission Zone M-3 Process Middletown Junction #3 230-69 kV Transformer Replacement

Need Number: ME-2018-013

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Middletown Junction #3 230-69 kV transformer replacement **(s1814)**

Middletown Junction Substation – Equipment to be replaced includes:

- 230-69 kV 100/134/168 MVA Transformer, grounding transformer, circuit breaker, breaker drops, bus conductor

Transformer Ratings:

Middletown Junction 230-69 kV Transformer No.3

- Before Proposed Solution: 88/106 MVA (SN/SE)
- After Proposed Solution (anticipated): 211/232 MVA (SN/SE)

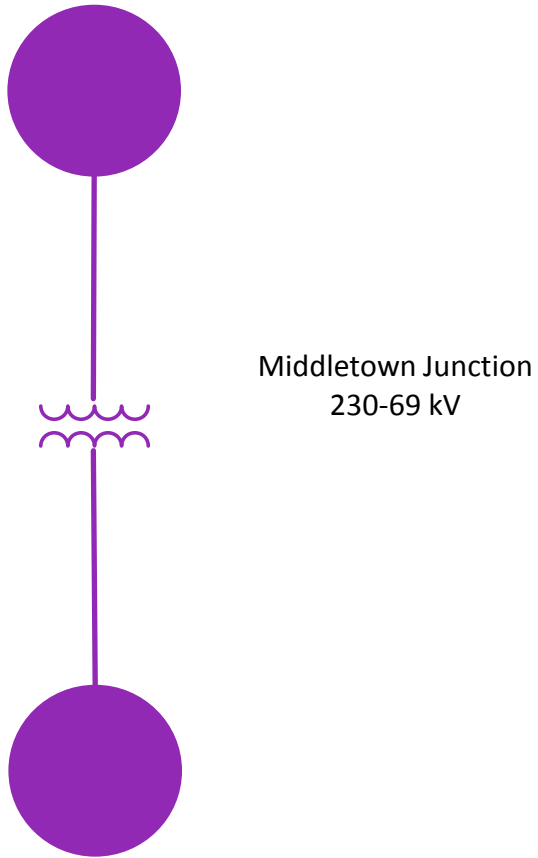
Estimated Cost: \$2.6M

Projected In-Service: 12/31/2019

Supplemental Project ID: s1814

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	

Met-Ed Transmission Zone M-3 Process

West Lebanon – Broad Street 69 kV Misoperation Relay Replacement

Need Number: ME-2018-014

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Substation Condition Rebuild/Replacement – Station system protection and controls – Electromechanical relays

System Performance Projects – Substation/Line Equipment Limits

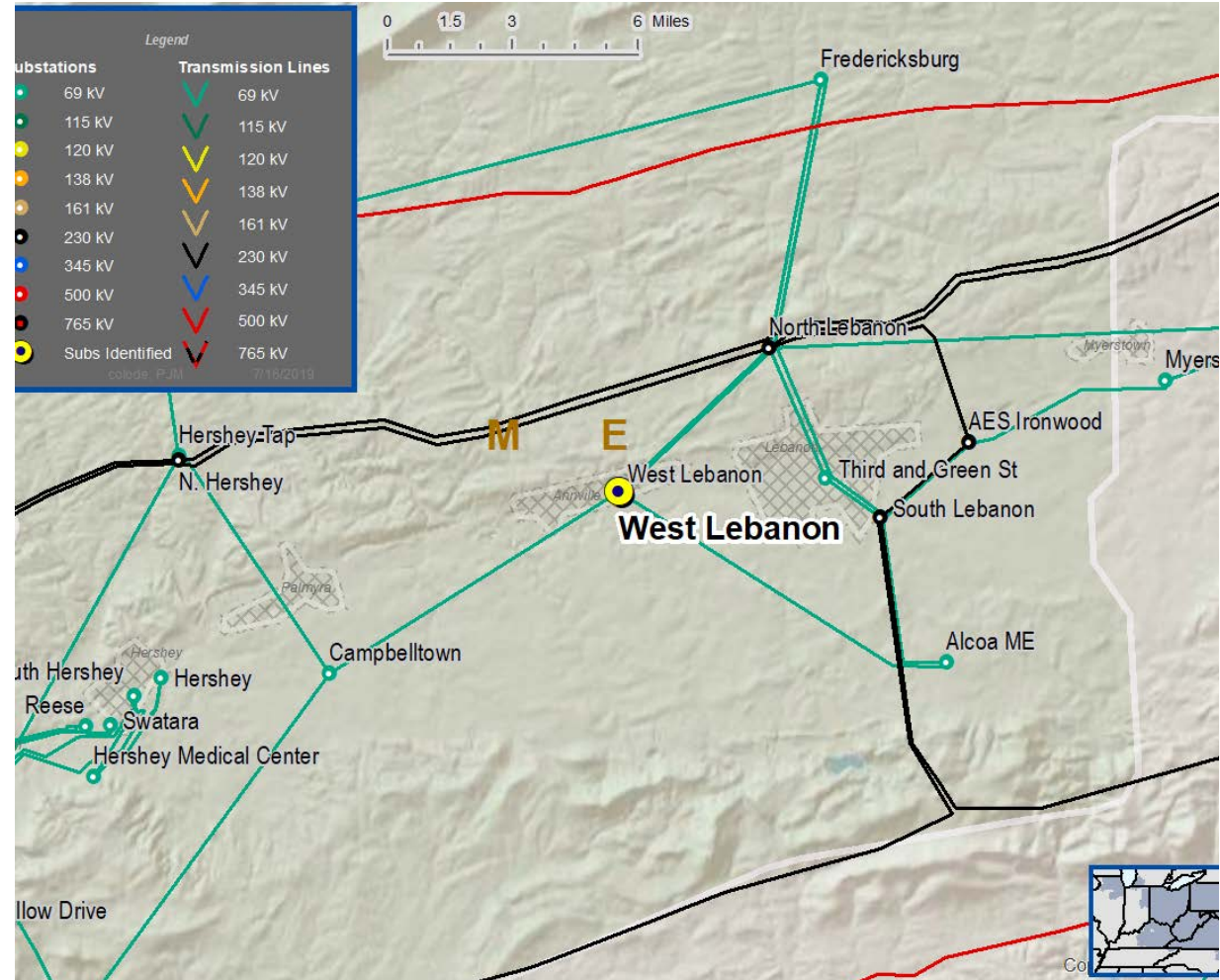
Upgrade Relay Schemes

Problem Statement:

Relays on Broad Street – West Lebanon 69 kV line evaluated and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment. Existing line rating is 71/91 MVA (SN/SE). Existing conductor rating is 111/134 MVA (SN/SE).

(substation conductor and disconnect switches)



Met-Ed Transmission Zone M-3 Process West Lebanon – Broad Street 69 kV Misoperation Relay Replacement

Need Number: ME-2018-014

Process State: Submission of Supplemental Project for inclusion in the Local Plan
7/26/2019

Selected Solution:

West Lebanon – Broad Street 69 kV replace relays prone to misoperation (**s1815.1**)

West Lebanon 69 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, arresters, a circuit breaker, and disconnect switches (**s1815.2**)

Broad Street 69 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, arresters, a circuit breaker, and disconnect switches (**s1815.3**)

Transmission Line Ratings:

West Lebanon – Broad Street 69 kV Line

- Before Proposed Solution: 71/91 MVA (SN/SE)
- After Proposed Solution: 111/134 MVA (SN/SE)

Estimated Cost: \$0.7 M

Projected In-Service: 12/31/2019

Supplemental Project ID: s1815.1, s1815.2, s1815.3

Project Status: Conceptual

Model: 2018 Series 2023 Summer RTEP 50/50

West Lebanon

Broad Street



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

Hokes, Jackson, and Smith Street 69 kV Misoperation Relay Replacement

Need Number: ME-2018-015

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Substation Condition Rebuild/Replacement – Station system protection and controls – Electromechanical relays

System Performance Projects – Substation/Line Equipment Limits

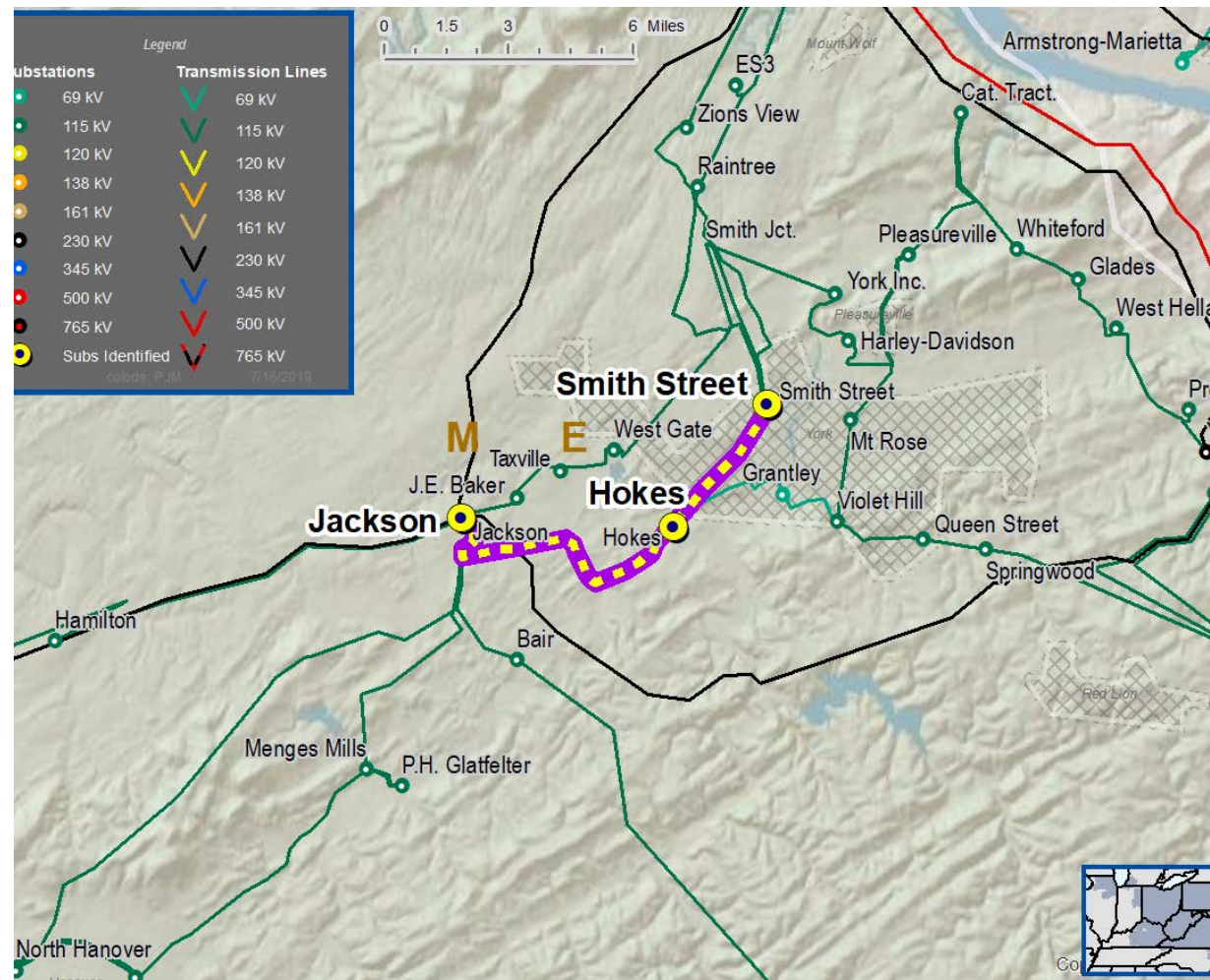
Upgrade Relay Schemes

Problem Statement:

Relays on Hokes – Smith St, Hokes – Lehigh Cement, & Hokes – Jackson 69 kV lines evaluated and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment.

- Hokes – Jackson 69 kV line: Existing line rating is 51/56 MVA (SN/SE). Existing conductor rating is 53/56 MVA (SN/SE). (substation conductor)



Met-Ed Transmission Zone M-3 Process Hokes, Jackson, and Smith Street 69 kV Misoperation Relay Replacement

Need Number: ME-2018-015

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Hokes, Jackson, and Smith Street 69 kV Substations - replace relays prone to misoperation
(s1816.1)

At Hokes Substation:

Smith St Line Terminal – Terminal equipment to be replaced includes:

- Circuit breaker and disconnect switches (s1816.2)

Jackson Line Terminal – Terminal equipment to be replaced includes:

- Circuit breaker, disconnect switches, and substation conductor (s1816.3)

Lehigh Cement Terminal – Terminal equipment to be replaced includes:

- Circuit breaker and disconnect switches (s1816.4)

At Jackson Substation:

Hokes Terminal – Terminal equipment to be replaced includes:

- Substation conductor (s1816.5)

Transmission Line Ratings:

Hokes – Jackson 69 kV Line

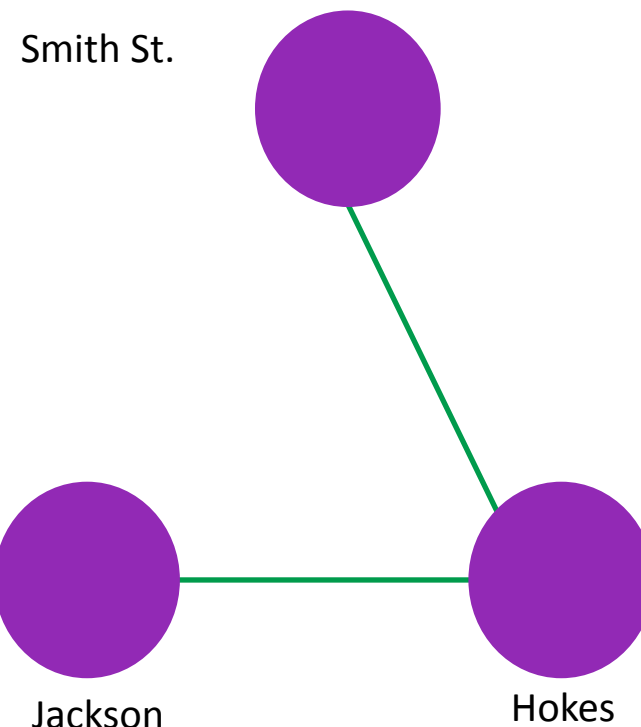
- Before Proposed Solution: 51/56 MVA (SN/SE)
- After Proposed Solution: 53/56 MVA (SN/SE)

Estimated Cost: \$1.6M

Projected In-Service: 12/31/2019

Supplemental Project ID: s1816.1, s1816.2, s1816.3, s1816.4, s1816.5

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	

Met-Ed Transmission Zone M-3 Process Hunterstown – North Hanover 115 kV Misoperation Relay Replacement

Need Number: ME-2018-016

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Substation Condition Rebuild/Replacement – Station system protection and controls – Electromechanical relays

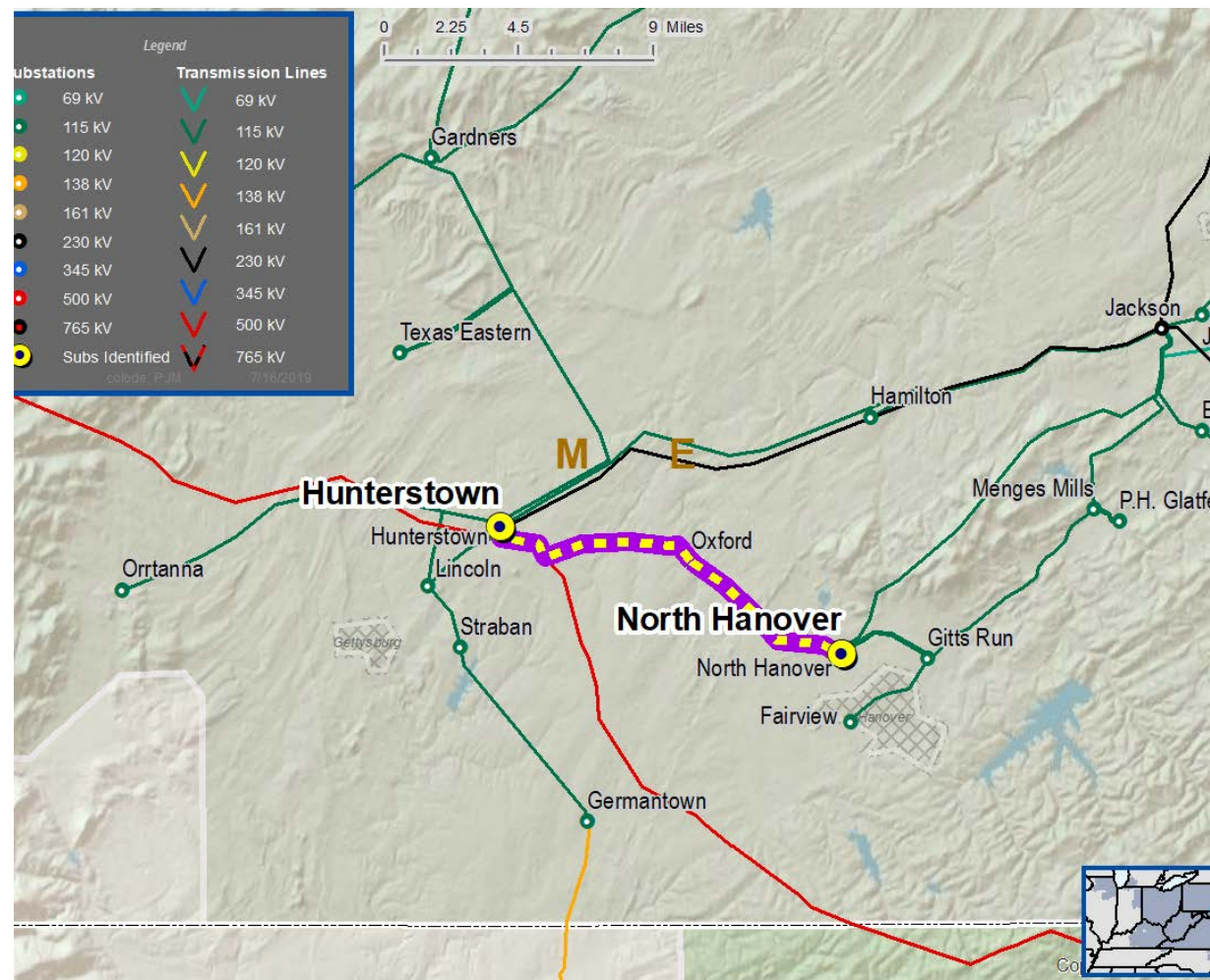
System Performance Projects – Substation/Line Equipment Limits

Upgrade Relay Schemes

Problem Statement:

Relays on Hunterstown – North Hanover 115 kV line evaluated and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment. Existing line rating is 232/277 MVA (SN/SE). Existing conductor rating is 232/282 MVA (SN/SE). (line trap)



Met-Ed Transmission Zone M-3 Process Hunterstown – North Hanover 115 kV Misoperation Relay Replacement

Need Number: ME-2018-016

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Hunterstown – North Hanover 115 kV replace relays prone to misoperation (**s1817.1**)

Hunterstown 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line trap, line tuner, arresters, and disconnect switches (**s1817.2**)

North Hanover 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, CCVT, line trap, line tuner, arresters, and disconnect switches (**s1817.3**)

Transmission Line Ratings:

Hunterstown – North Hanover 115 kV Line

- Before Proposed Solution: 232/277 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)

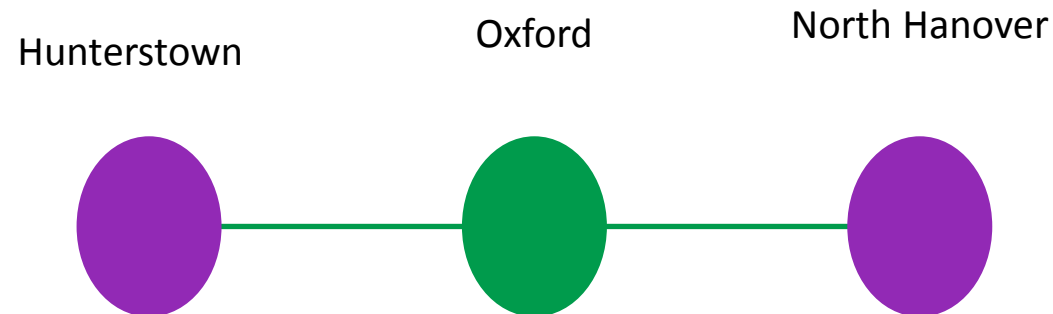
Estimated Cost: \$0.8M

Projected In-Service: 12/31/2019

Supplemental Project ID: s1817.1, s1817.2, s1817.3

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	

Met-Ed Transmission Zone M-3 Process

Jackson – Westgate 115 kV Misoperation Relay Replacement

Need Number: ME-2018-017

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

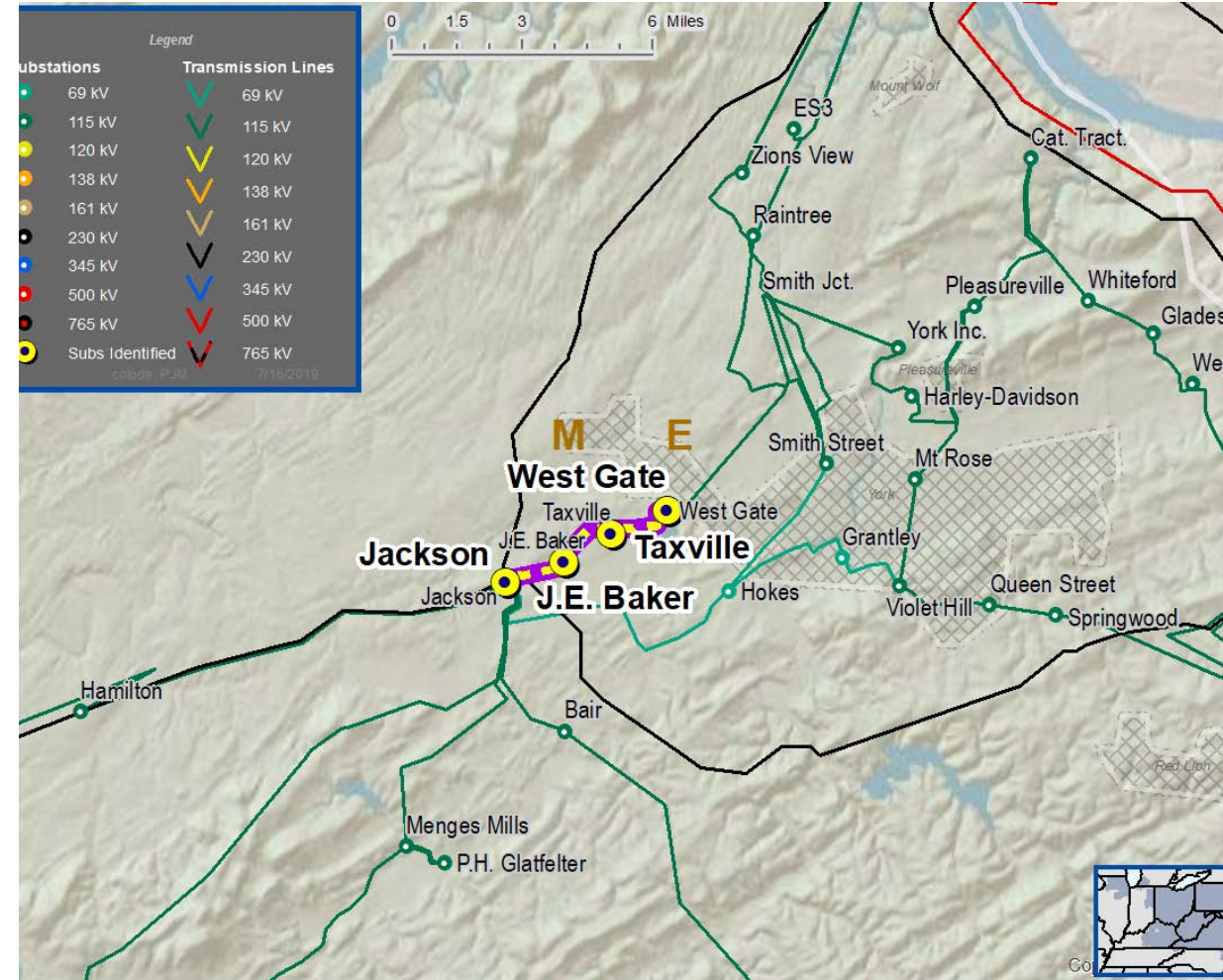
Specific Assumption Reference:

Substation Condition Rebuild/Replacement – Station system protection and controls – Electromechanical relays
 System Performance Projects – Substation/Line Equipment Limits
 Upgrade Relay Schemes

Problem Statement:

Relays on Jackson – Westgate 115 kV line evaluated and determined to be obsolete and/or degraded condition.

- Jackson - JE Baker 115 kV line: Existing line rating is 274/344 MVA (SN/SE). Existing conductor rating is 373/430 MVA (SN/SE). (substation conductor and disconnect switches)
- JE Baker - Taxville 115 kV line: Existing line rating is 274/344 MVA (SN/SE). Existing conductor rating is 373/430 MVA (SN/SE). (substation conductor and disconnect switch)
- Taxville - Westgate 115 kV line: Existing line rating is 232/277 MVA (SN/SE). Existing conductor rating is 232/282 MVA (SN/SE). (line trap)



Met-Ed Transmission Zone M-3 Process Jackson – Westgate 115 kV Misoperation Relay Replacement

Need Number: ME-2018-017

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Jackson – Westgate 115 kV replace relays prone to misoperation (**s1818.1**)

Jackson – Taxville 115 kV Line section equipment to be replaced includes:

- Line disconnect switches (JE Baker Tap) (**s1818.2**)

Jackson 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, line trap, line tuner, coax, substation conductor, and breaker disconnect switches (**s1818.3**)

Westgate 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, CCVT, line trap, line tuner, and arresters (**s1818.4**)

Transmission Line Ratings:

Jackson – JE Baker 115 kV Line

- Before Proposed Solution: 274/344 MVA (SN/SE)
- After Proposed Solution: 373/430 MVA (SN/SE)

JE Baker – Taxville 115 kV Line

- Before Proposed Solution: 274/344 MVA (SN/SE)
- After Proposed Solution: 365/430 MVA (SN/SE)

Taxville – Westgate 115 kV Line

- Before Proposed Solution: 232/277 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)











Estimated Cost: \$1.1M

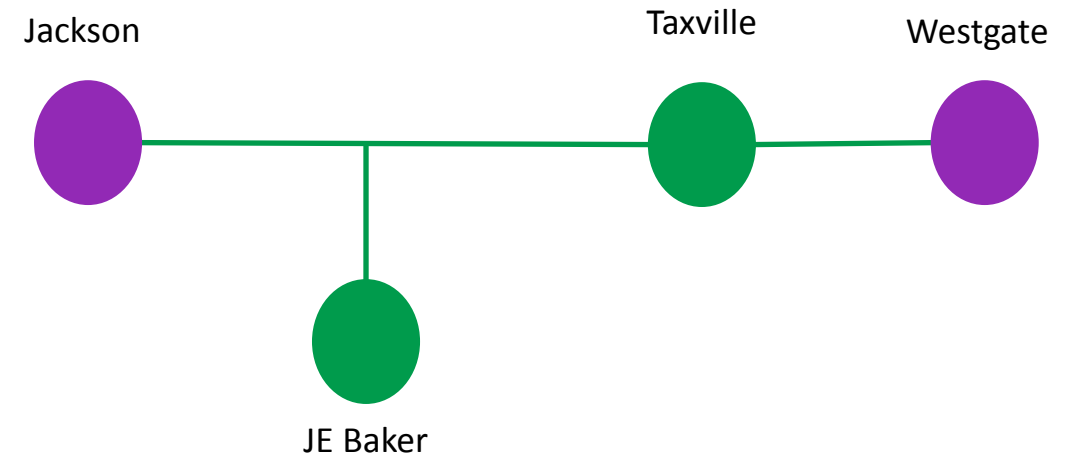
Projected In-Service: 12/31/2019

Supplemental Project ID: s1818.1, s1818.2, s1818.3, s1818.4

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	



Met-Ed Transmission Zone M-3 Process Gardners – Hunterstown 115 kV Misoperation Relay Replacement

Need Number: ME-2018-018

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Substation Condition Rebuild/Replacement – Station system protection and controls – Electromechanical relays

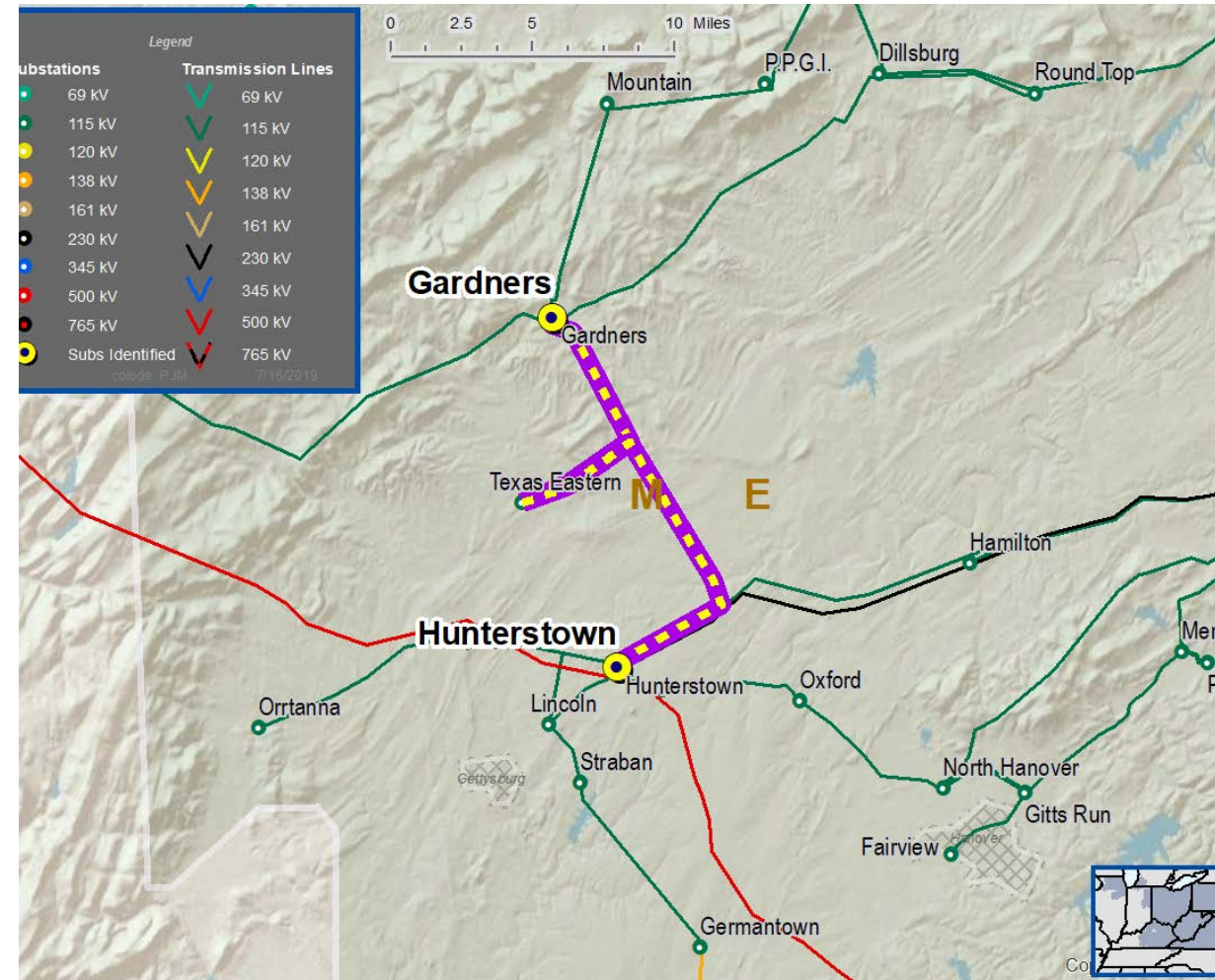
System Performance Projects – Substation/Line Equipment Limits

Upgrade Relay Schemes

Problem Statement:

Relays on Hunterstown – Gardners 115 kV line evaluated and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment. Existing line rating is 163/185 MVA (SN/SE). Existing conductor rating is 232/282 MVA (SN/SE). (line trap, breaker, CTs, relay, and substation conductor)



Met-Ed Transmission Zone M-3 Process Gardners – Hunterstown 115 kV Misoperation Relay Replacement

Need Number: ME-2018-018

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Gardners – Hunterstown 115 kV replace relays prone to misoperation (**s1819.1**)

Gardners 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, CCVT, line trap, line tuner, coax, arresters, substation conductor, circuit breaker and disconnect switches (**s1819.2**)

Hunterstown 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, CCVT, line trap, line tuner, coax, and arresters (**s1819.3**)

Transmission Line Ratings:

Gardners – Texas Eastern Tap 115 kV Line

- Before Proposed Solution: 163/185 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)

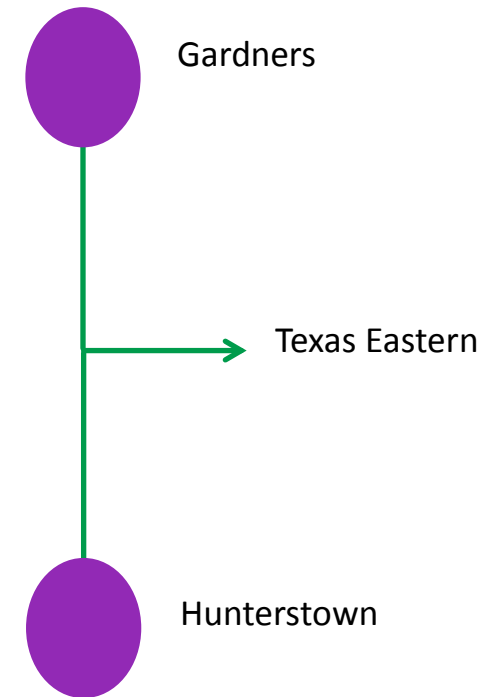
Estimated Cost: \$2.6 M

Projected In-Service: 12/31/2019

Supplemental Project ID: s1819.1, s1819.2, s1819.3

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

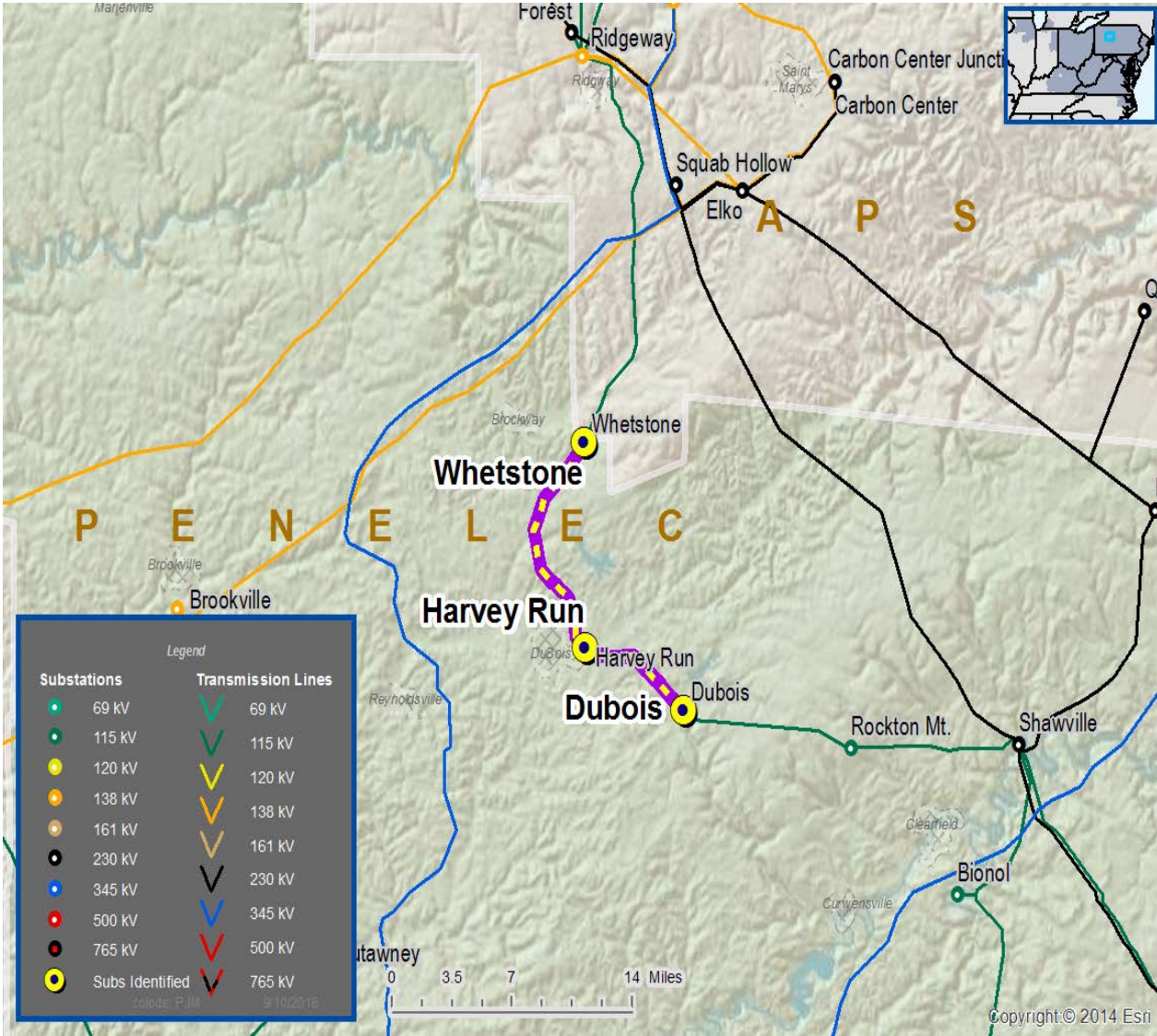
Need Number: PN-2018-001
 Process Stage: Local Plan
 Need Presented: 9/21/2018
 Solution Presented: 10/29/2018

Project Driver(s):
Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)
 Substation/Line Equipment Limits
 Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement
 Maintenance/rehab work will be performed on the Dubois-Harvey Run-Whetstone 115 kV line.

Transmission line rating limited by terminal equipment.
 Dubois – Harvey Run 115 kV line: Existing emergency line rating is 179 MVA. Existing conductor emergency rating is 245 MVA.
 Harvey Run – Whetstone 115 kV line: Existing emergency line rating is 172 MVA. Existing conductor emergency rating is 245 MVA.



Penelec Transmission Zone

Need Number: PN-2018-001

Selected Solution:

Rehab Dubois – Harvey Run – Whetstone 115 kV

Rehab approximately 14.25 miles of wood pole construction (s1769.1)

Dubois 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line trap, substation conductor, line tuner, CCVT, circuit breaker and breaker disconnects (s1769.2)

Harvey Run 115 kV Substation – Terminal equipment to be replaced includes:

- Substation conductor, disconnect switches and CVTs (s1769.3)

Whetstone 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line trap, substation conductor, line tuner, CCVT, circuit breaker and breaker disconnects (s1769.4)

Transmission Line Ratings:








- Dubois – Harvey Run 115 kV Line
 - Before Selected Solution: 164 MVA SN / 179 MVA SE
 - After Selected Solution: 202 MVA SN / 245 MVA SE
- Harvey Run – Whetstone 115 kV Line
 - Before Selected Solution: 137 MVA SN / 172 MVA SE
 - After Selected Solution: 202 MVA SN / 245 MVA SE

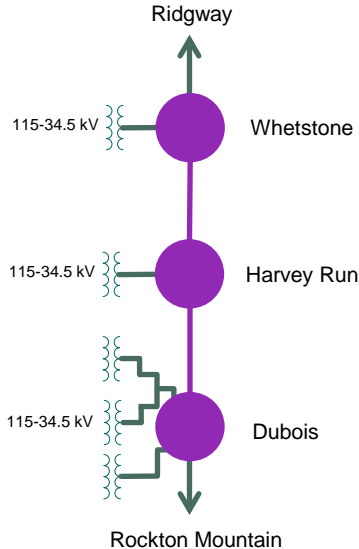
Estimated Project Cost: \$5.3M

Projected IS Date: 12/31/2021

Status: Conceptual

Supplemental Project Number: s1769.1, s1769.2, s1769.3, s1769.4

Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	



Penelec Transmission Zone

Need Number: PN-2018-002
 Process Stage: Local Plan
 Need Presented: 9/21/2018
 Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Line Condition Rebuild/Replacement

Equipment characteristics are near or beyond existing service life or contain components that are obsolete.

Substation/Line Equipment Limits

Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Reconductor/Rebuild Transmission Lines

Transmission lines with high loading while factoring in its overall condition assessment.

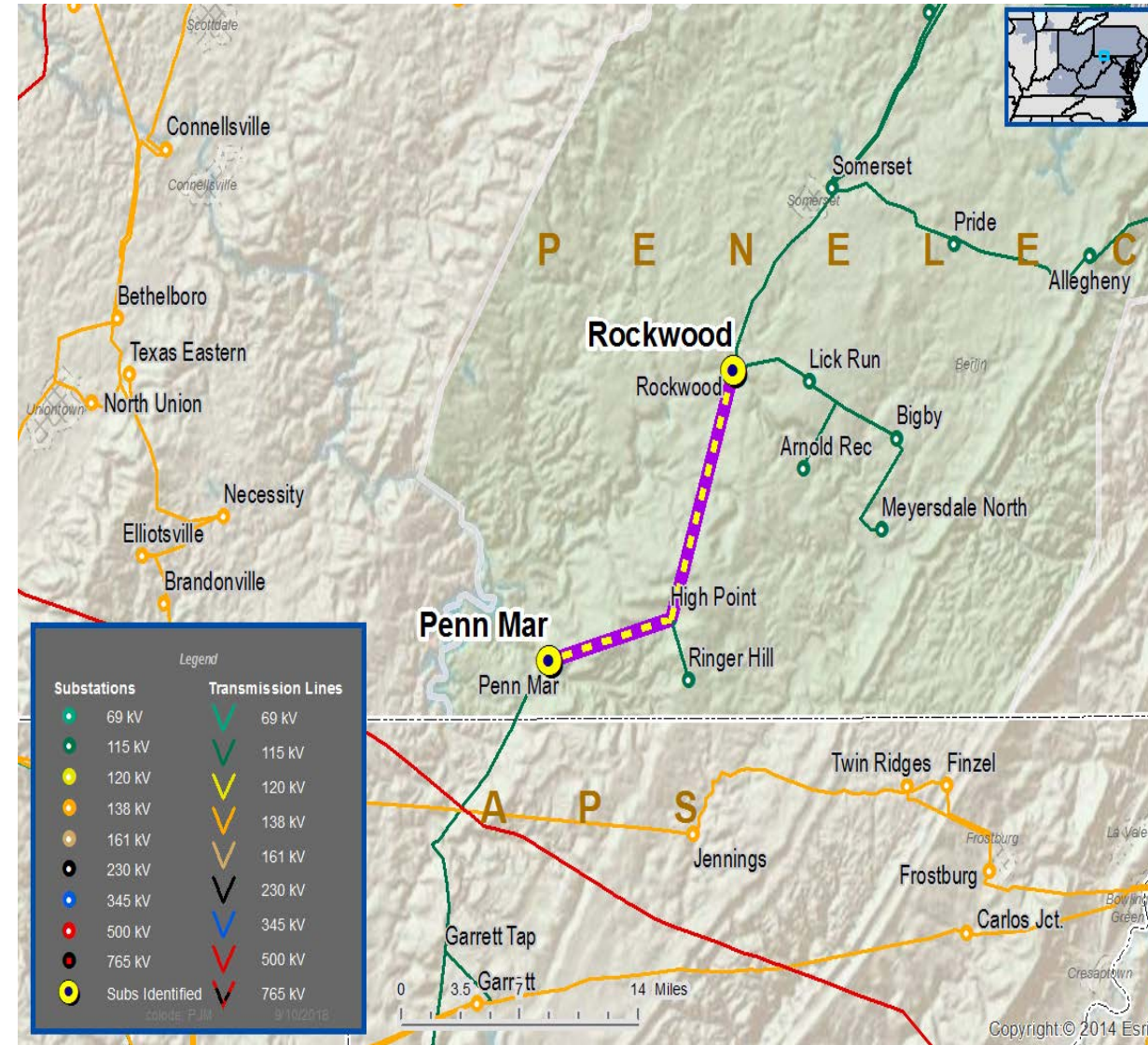
Problem Statement

Entire Penn Mar-Rockwood 115 kV line is at or beyond service life. Transmission line loading exceeds 90% under N-1 contingency.

Transmission line rating limited by terminal equipment.

Penn Mar – High Point 115 kV line: Existing emergency line rating is 174 MVA. Existing conductor emergency rating is 179 MVA.

High Point – Rockwood 115 kV line: Existing emergency line rating is the existing conductor emergency rating.



Penelec Transmission Zone

Need Number: PN-2018-002

Selected Solution:

Rebuild Penn Mar – High Point – Rockwood 115 kV Line

- Rebuild/reconductor approximately 14.8 miles of wood pole construction (s1770.1)

Rockwood 115 kV Substation

- Adjust CT ratios and replace substation conductor and breaker disconnect (s1770.2)

Penn Mar 115 kV Substation

- Adjust relaying and replace CTs, substation conductor, line drops, circuit breaker and disconnect switches (s1770.3)

Transmission Line Ratings:

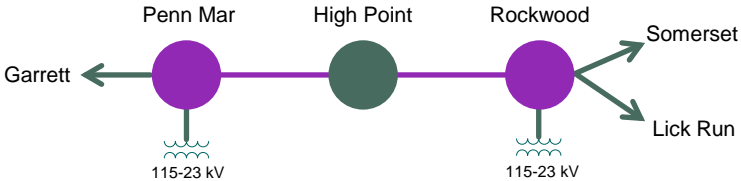
- Penn Mar – High Point 115 kV Line
 - Before Selected Solution: 137 MVA SN / 174 MVA SE
 - After Selected Solution: 273 MVA SN / 333 MVA SE
- High Point – Rockwood 115 kV Line
 - Before Selected Solution: 148 MVA SN / 179 MVA SE
 - After Selected Solution: 260 MVA SN / 311 MVA SE

Estimated Project Cost: \$29.3M

Projected IS Date: 6/1/2020

Status: Conceptual

Supplemental Project Number: s1770.1, s1770.2, s1770.3



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Penelec Transmission Zone

Need Number: PN-2018-003

Process Stage: Local Plan

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Upgrade Relay Schemes

Upgrade relay schemes that have historically high percentage of misoperation.

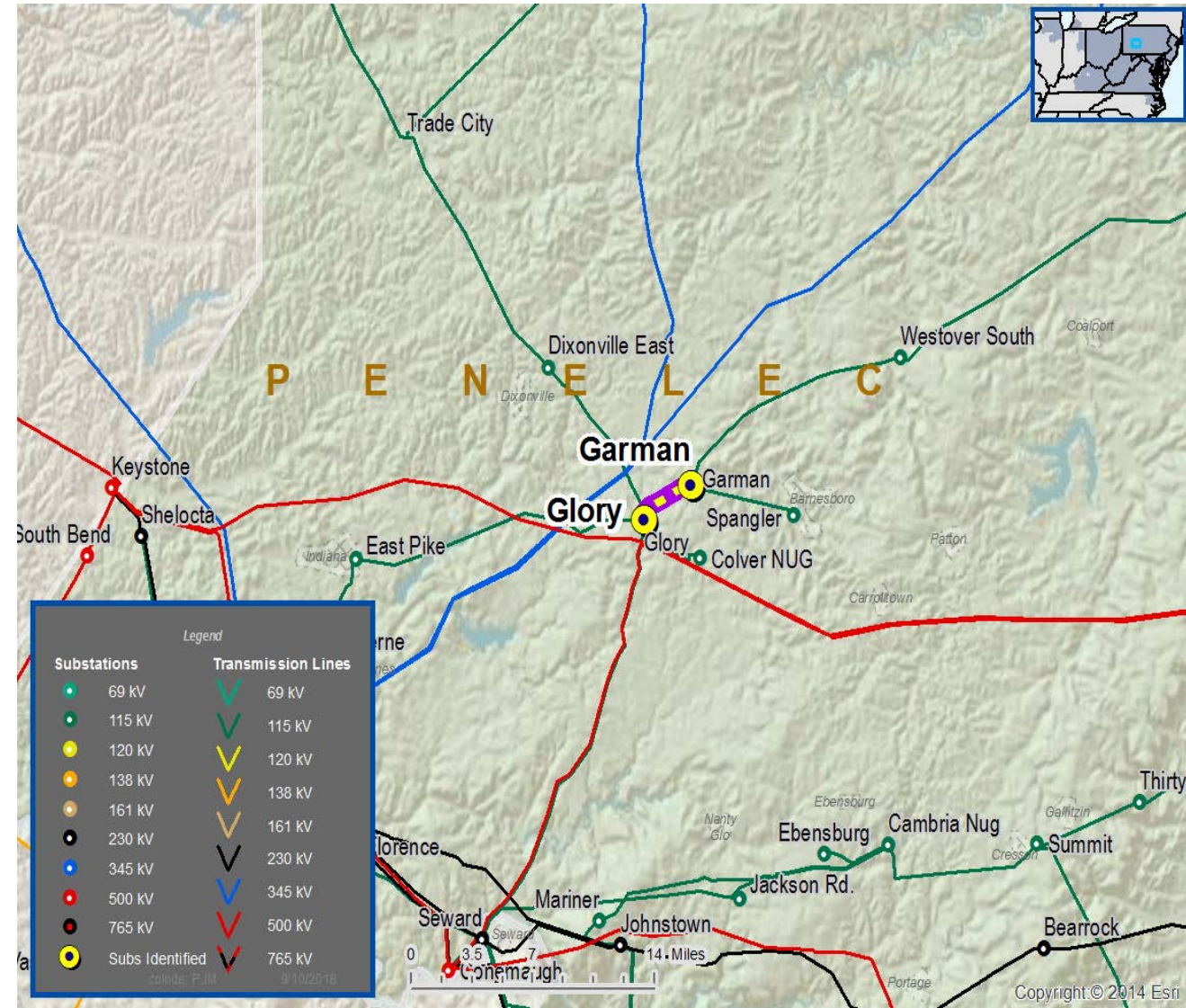
Substation/Line Equipment Limits

Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

Relays on Garman – Glory 115 kV line evaluated by Transmission Planning and Protection and determined to be obsolete and/or degraded condition.

Transmission line rating limited by terminal equipment. Existing emergency line rating is 233 MVA. Conductor emergency rating is 282 MVA.



Penelec Transmission Zone

Need Number: PN-2018-003

Selected Solution:

Replace terminal equipment at Garman and Glory 115 kV

Garman 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, line drops, CCVT, line trap, line tuner, coax, arresters and bus tie breaker (s1771.1)

Glory 115 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, DFR, CCVT, line trap, line tuner, coax, arresters and breaker (s1771.2)

Transmission Line Ratings:

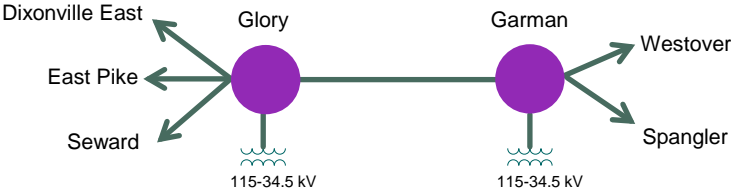
- Garman – Glory 115 kV Line
 - Before Selected Solution: 204 MVA SN / 233 MVA SE
 - After Selected Solution: 232 MVA SN / 282 MVA SE

Estimated Project Cost: \$1.1M

Projected IS Date: 10/26/2019

Status: Conceptual

Supplemental Project Number: s1771.1, s1771.2



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Penelec Transmission Zone

Need Number: PN-2018-004
Process Stage: Local Plan
Need Presented: 9/21/2018
Solution Presented: 10/29/2018

Project Driver(s):
Operational Flexibility and Efficiency

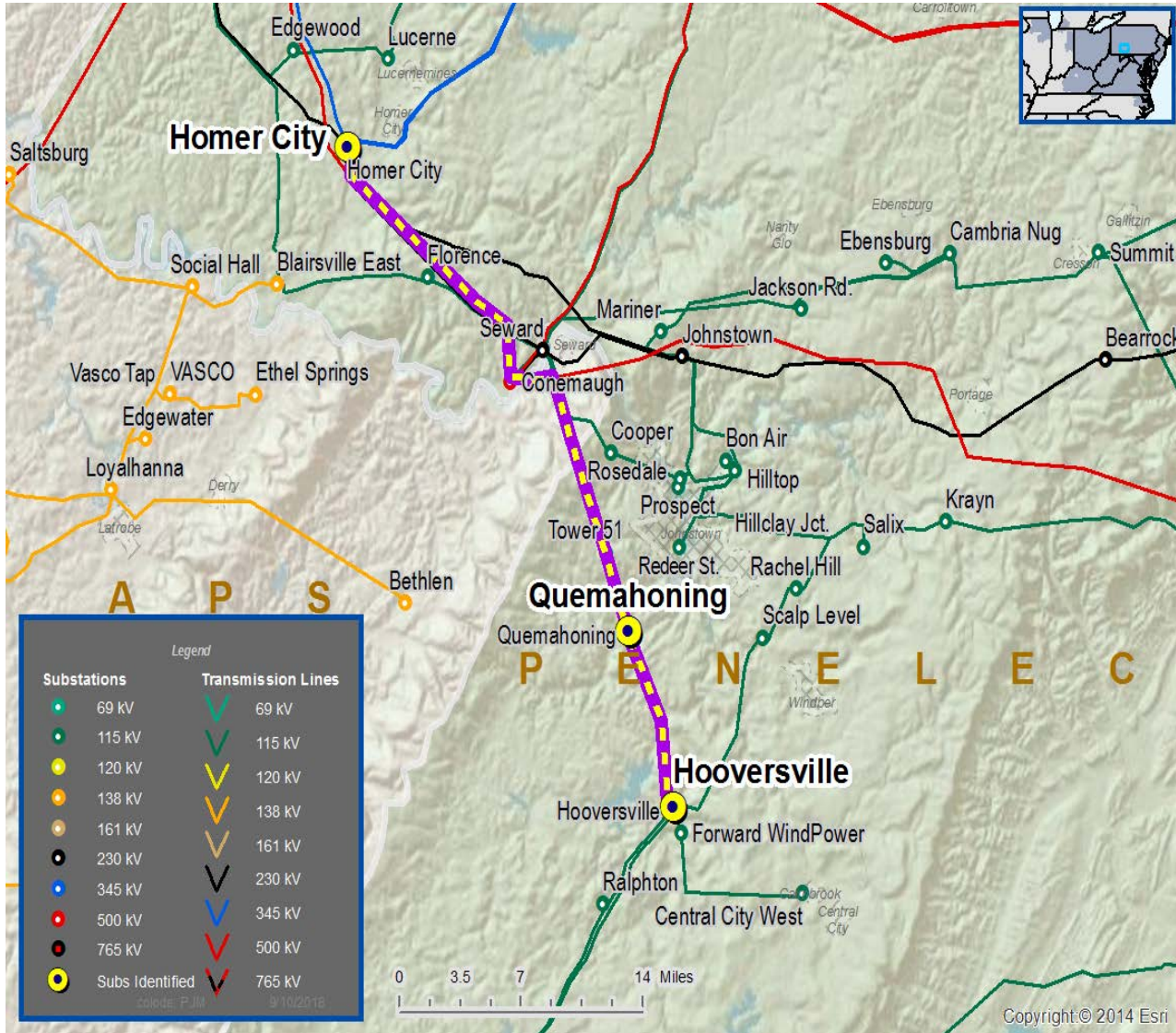
Specific Assumption Reference(s)

Critical Updates to Standards

- Elimination of Ground Switches – Where high-speed ground switches exist, a circuit breaker should be considered for installation to protect the transformer and not trip the line, thereby eliminating outages to customers on the transmission line.
- Line Switches – Switches should be considered for replacement to allow for desired operations (i.e. line charging, loop splitting, etc.).

Problem Statement

Planned maintenance on the Homer City – Hooversville 230 kV line results in the interruption of service for a large industrial customer served out of Quemahoning Substation. The line sectionalizing devices at Quemahoning are inadequate to interrupt charging current on the Homer City side of the substation. At Hooversville, the transformer breaker failure scheme utilizes a ground switch on the high side of the 230/115 kV transformer.



Penelec Transmission Zone

Need Number: PN-2018-004

Selected Solution:

Quemahoning 230 kV SF6 Interrupters

- Install SF6 interrupters on 230 kV network switches (s1772.1)

Hooversville 230 kV Substation

- Eliminate ground switch and install 230 kV breaker on high side of 230/115 kV transformer (s1772.2)

Homer City 230 kV Substation

- Adjust relay settings (s1772.3)

Transmission Line Ratings:








- Homer City – Quemahoning 230 kV Line
 - Before Selected Solution: 548 MVA SN / 688 MVA SE
 - After Selected Solution: 678 MVA SN / 813 MVA SE
- Quemahoning – Hooversville 230 kV Line
 - Before Selected Solution: 488 MVA SN / 488 MVA SE
 - After Selected Solution: 678 MVA SN / 813 MVA SE

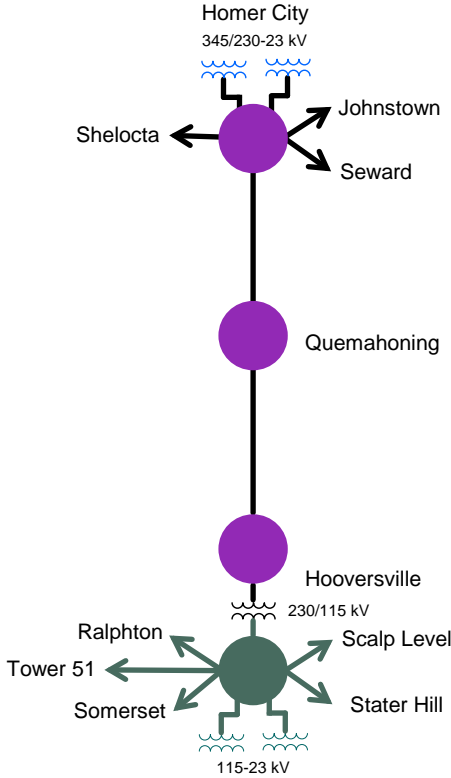
Estimated Project Cost: \$1.0 M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1772.1, s1772.2, s1772.3

Legend	
500 kV	
345 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Penelec Transmission Zone

Need Number: PN-2018-005

Process Stage: Local Plan

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Operational Flexibility and Efficiency

Specific Assumption Reference(s)

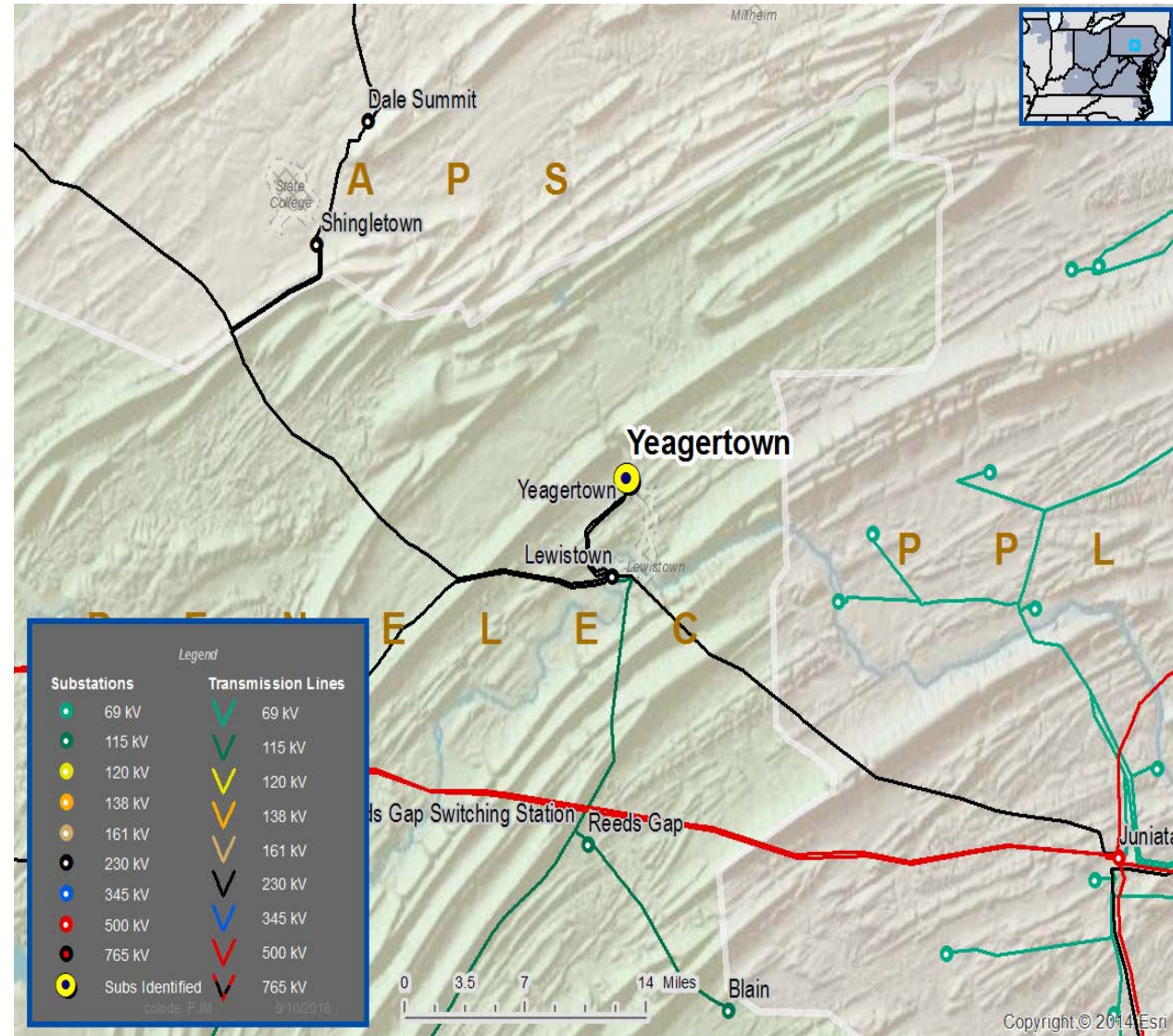
Add/Expand Bus Configuration

- Loss of substation bus adversely impacts transmission system performance.
- Reduce the amount of exposed potential local load loss during contingency conditions.
- Eliminate simultaneous outages to multiple networked elements for stuck breakers, bus outages, N-2 events, etc.

Problem Statement

At Yeagertown, in the event of a stuck 230 kV bus tie breaker, both 230 kV feeds from Lewistown are outaged, along with two 230-46 kV transformers feeding a large industrial customer and a 230/34.5 kV transformer.

In the current configuration, the 230 kV feeds the 34.5 kV bus via a 230/34.5 kV transformer. The 34.5 kV bus then feeds the 46 kV system via a 46-34.5 kV transformer. This arrangement creates a transmission path through a distribution facility.



Penelec Transmission Zone

Need Number: PN-2018-005

Selected Solution:

Reconfigure the Yeagertown 230 kV & 46 kV to a Ring Bus and install 3rd 230-46 kV Transformer

- Construct a new five breaker 46 kV ring bus (s1773.2)
- Construct a new six breaker 230 kV ring bus (s1773.1)
- Loop Lewistown – Logan 1LK line into the 46 kV ring bus (s1773.3)
- Tap the Yeagertown – Logan 1YL line and connect to the 46 kV ring bus (s1773.4)
- Install a new 230-46 kV 60/80/100 MVA transformer (s1773.5)
- Install a 46 kV bus tie breaker to be operated as normally open (s1773.6)
- Operate the 46-34.5 kV transformer high side circuit breaker as normally open (s1773.7)

Transformer Ratings:

- New Yeagertown 230-46 kV Transformer
 - Before Selected Solution: N/A
 - After Selected Solution: 120 MVA SN / 130 MVA SE

Transmission Line Ratings:









- Yeagertown – Logan Tap (1YL) 46 kV Line
 - Before Selected Solution: N/A
 - After Selected Solution: 81 MVA SN / 98 MVA SE

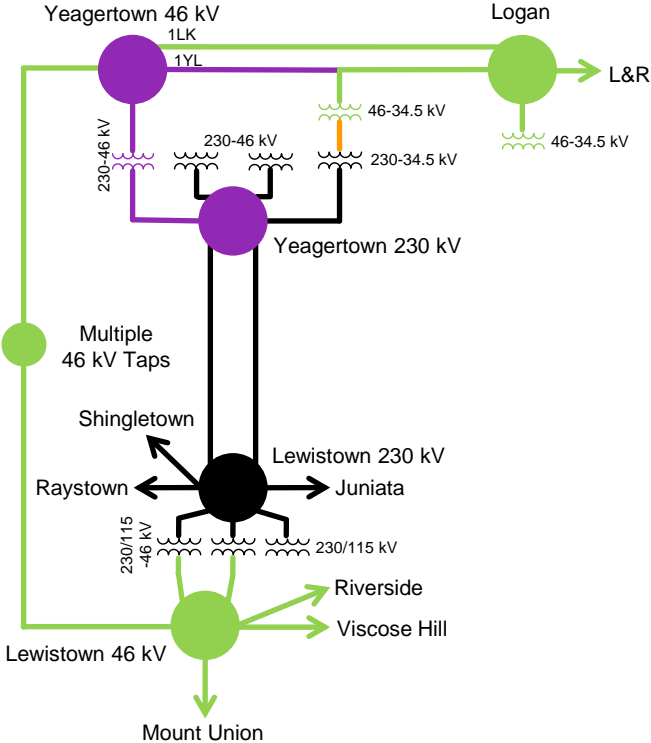
Estimated Project Cost: \$20.4M

Projected IS Date: 12/31/2020

Status: Conceptual

Supplemental Project Number: s1773.1, s1773.2, s1773.3, s1773.4, s1773.5, s1773.6, s1773.7

Legend	
500 kV	
345 kV	
230 kV	
115 kV	
69 kV	
46 kV	
Other	
New	



Penelec Transmission Zone

Need Number: PN-2018-006

Process Stage: Local Plan

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Operational Flexibility and Efficiency

Specific Assumption Reference(s)

Substation Condition Rebuild/Replacement

Show an increasing negative trend in maintenance findings and/or costs.

Are at a higher risk for failure based on asset design characteristics, or historical industry/company performance data, or application design error.

Are near or beyond expected service life or obsolete.

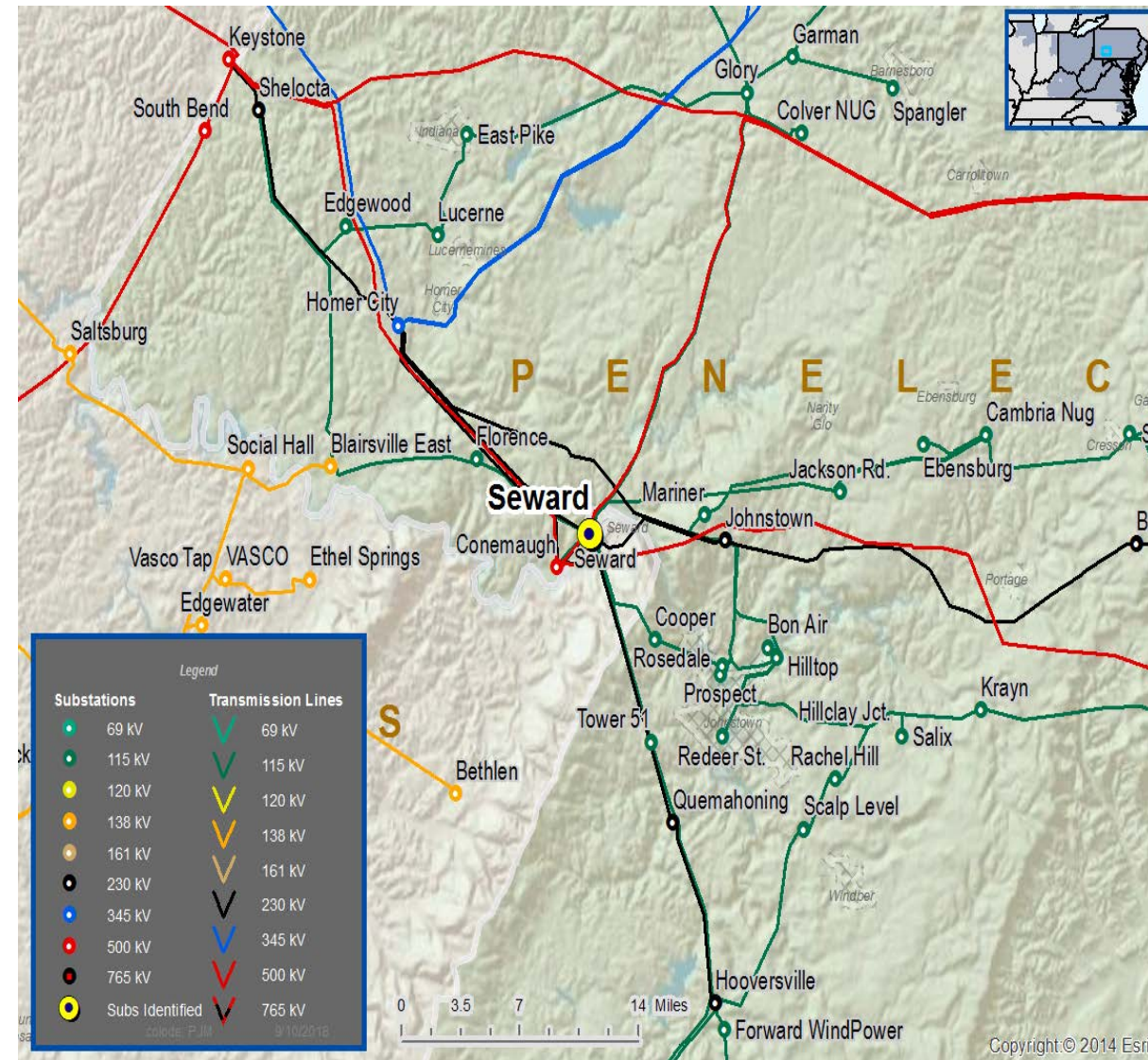
Add/Expand Bus Configuration

Eliminate simultaneous outages to multiple networked elements under N-1 analysis.

Problem Statement

A fault on the Seward #9 230/115 kV transformer outages the Seward #11 230/115 kV transformer or a fault on the Seward #11 230/115 kV transformer outages the Seward #9 230/115 kV transformer.

Seward #9 230/115 kV transformer has an increased failure probability due to aging/deteriorating bushings, components and fluid. The transformer was manufactured in 1971.



Penelec Transmission Zone

Need Number: PN-2018-006

Selected Solution:

Seward #9 230/115 kV Transformer Replacement & 230 kV Ring Bus

- Expand 230 kV ring bus to a six breaker ring bus (s1774.1)
- Relocate the Homer City – Seward 230 kV and Johnstown – Seward 230 kV line terminals (s1774.2)
- Replace the #9 230/115 kV with a 230/115 kV 180/240/300 MVA transformer (s1774.3)
- Install a 115 kV reactor on the low side of the #11 230/115 kV transformer (s1774.4)

Transformer Rating:








- Seward #9 230/115 kV Transformer
 - Before Selected Solution: 241 MVA SN / 303 MVA SE
 - After Selected Solution: 375 MVA SN / 438 MVA SE

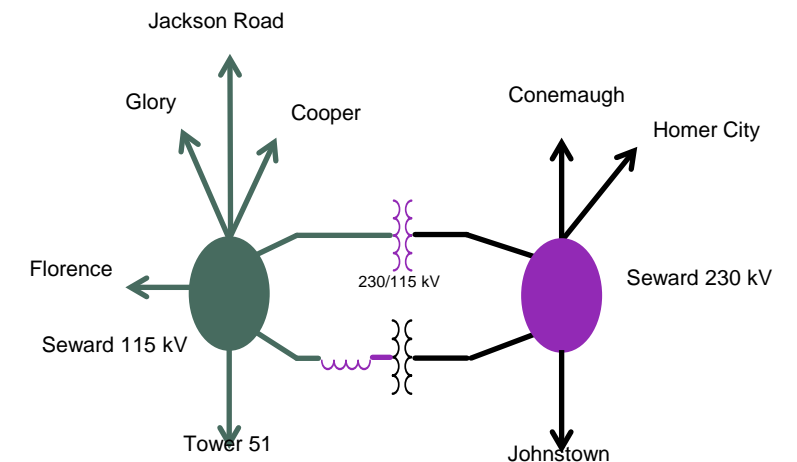
Estimated Project Cost: \$15.7M

Projected IS Date: 12/31/2020

Status: Conceptual

Supplemental Project Number: s1774.1, s1774.2, s1774.3, s1774.4

Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	



Penelec Transmission Zone

Need Number: PN-2018-007

Process Stage: Local Plan

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Operational Flexibility and Efficiency

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Substation Condition Rebuild/Replacement

Show an increasing negative trend in maintenance findings and/or costs.

Are near or beyond expected service life or obsolete.

Add/Expand Bus Configuration

Loss of substation bus adversely impacts transmission system performance.

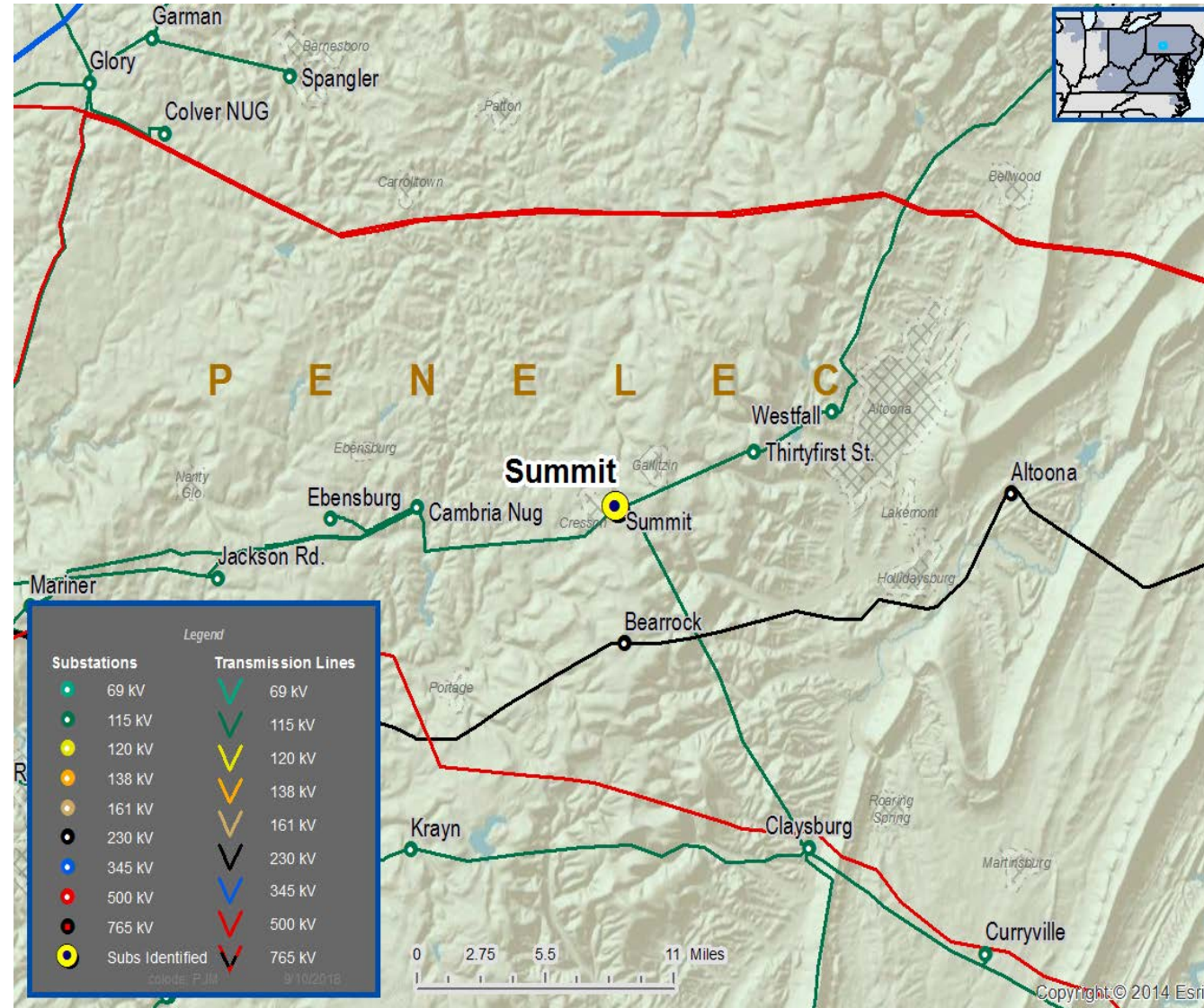
Eliminate simultaneous outages to multiple networked elements for stuck breakers, bus outages, N-2 events, etc.

Problem Statement

In the event of a Summit #1 or #2 115-46 kV transformer fault, the line exit breakers and the bus tie breaker are relied upon to clear the fault. The corresponding section of the bus is cleared, creating transfer and thermal issues.

A stuck 115 kV bus tie breaker at Summit will clear the entire 115 kV station.

Summit #1 and #2 115-46 kV transformers have an increased failure probability due to aging/deteriorating bushings, components and fluid. The #1 transformer was manufactured in 1937. The #2 transformer was manufactured in 1971.



Need Number: PN-2018-007

Selected Solution:

Summit 115 kV & 46 kV Substation Reconfiguration & Transformer Replacement

- Construct a five breaker 115 kV ring bus (**s1775.1**)
- Construct a 46 kV breaker-and-a-half station with eight breakers (**s1775.2**)
- Replace the #1 and #2 115/46 kV with 115/46 kV 45/60/75 MVA transformers (**s1775.3**)
- Adjust relay settings at remote ends (**s1775.4**)

Eldorado 46 kV Substation – Terminal equipment to be replaced includes:

- CTs, substation conductor, circuit breaker and disconnect switches (**s1775.5**)

Jackson Road 46 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, substation conductor, arresters, line and bus disconnect switches and circuit breaker (**s1775.6**)








Continue on the next slide

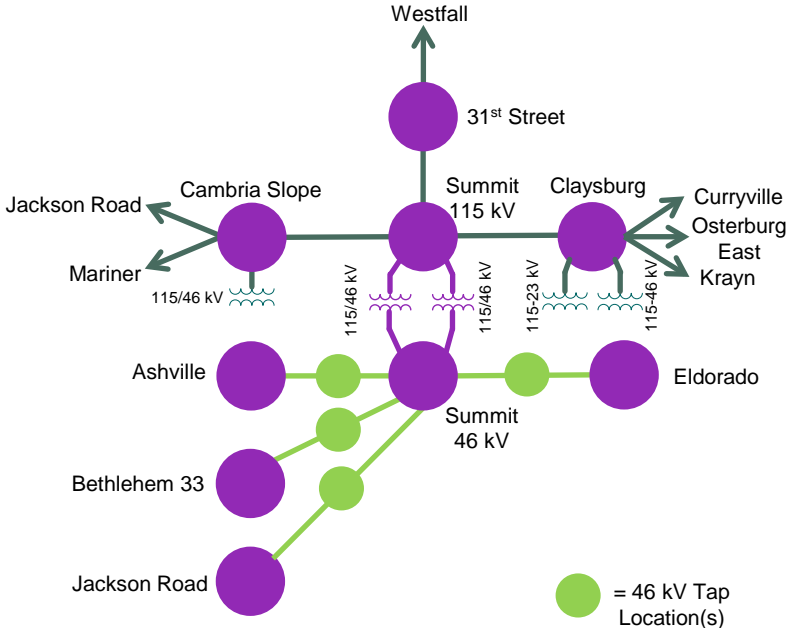
Estimated Project Cost: \$26.3M

Projected IS Date: 12/31/2020

Status: Conceptual

Supplemental Project Number: s1775.1, s1775.2, s1775.3, s1775.4, s1775.5, s1775.6

Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	



Continue from the last slide

Need Number: PN-2018-007

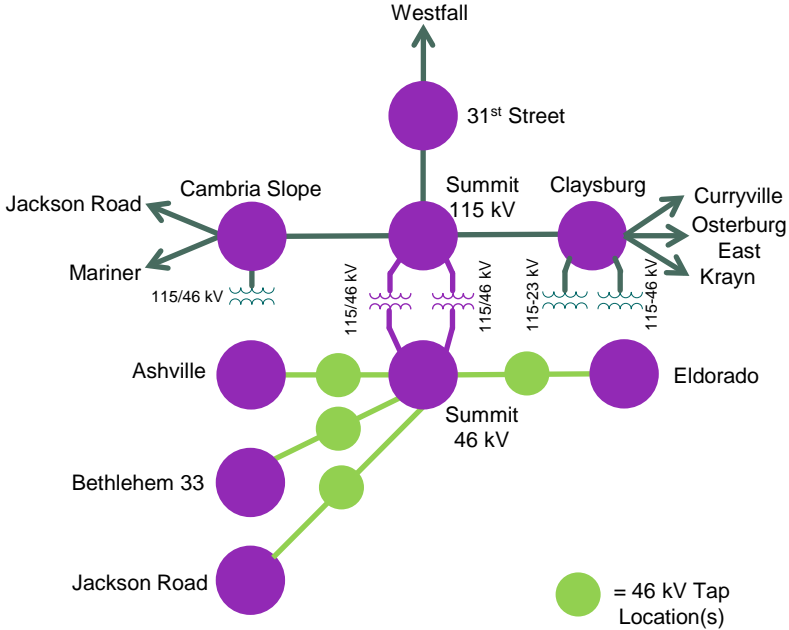
Transmission Line Ratings:

- Summit – Claysburg 115 kV Line
 - Before Selected Solution: 175 MVA SN / 237 MVA SE
 - After Selected Solution: 229 MVA SN / 278 MVA SE
- Summit – 31st Street 115 kV Line
 - Before Selected Solution: 221 MVA SN / 263 MVA SE
 - After Selected Solution: 232 MVA SN / 282 MVA SE
- Summit – Ashville (SGC Tap) 46 kV Line
 - Before Selected Solution: 26 MVA SN / 28 MVA SE
 - After Selected Solution: 37 MVA SN / 37 MVA SE
- Summit – Gallitzin Tap – Eldorado 46 kV Line
 - Before Selected Solution (Summit – Gallitzin Tap): 54 MVA SN / 66 MVA SE
 - Before Selected Solution (Gallitzin Tap – Eldorado): 55 MVA SN / 69 MVA SE
 - After Selected Solution: 81 MVA SN / 98 MVA SE
- Summit – Kokomo Road 46 kV Line
 - Before Selected Solution: 25 MVA SN / 25 MVA SE
 - After Selected Solution: 32 MVA SN / 32 MVA SE
- Jackson Road – Ampfire Mining Tap 46 kV Line
 - Before Selected Solution: 24 MVA SN / 24 MVA SE
 - After Selected Solution: 67 MVA SN / 81 MVA SE

Transformer Ratings:

- Summit #1 115/46 kV Transformer
 - Before Selected Solution: 32 MVA SN / 35 MVA SE
 - After Selected Solution: 97 MVA SN / 97 MVA SE
- Summit #2 115/46 kV Transformer
 - Before Selected Solution: 43 MVA SN / 44 MVA SE
 - After Selected Solution: 97 MVA SN / 97 MVA SE

Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	



Penelec Transmission Zone

Need Number: PN-2018-008

Process Stage: Local Plan

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Operational Flexibility and Efficiency

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Substation Condition Rebuild/Replacement

Show an increasing negative trend in maintenance findings and/or costs.

Are near or beyond expected service life or obsolete.

Add/Replace Transformers

Transformer that if added or replaced would alleviate loading conditions under contingency scenarios.

Add/Expand Bus Configuration

Loss of substation bus adversely impacts transmission system performance.

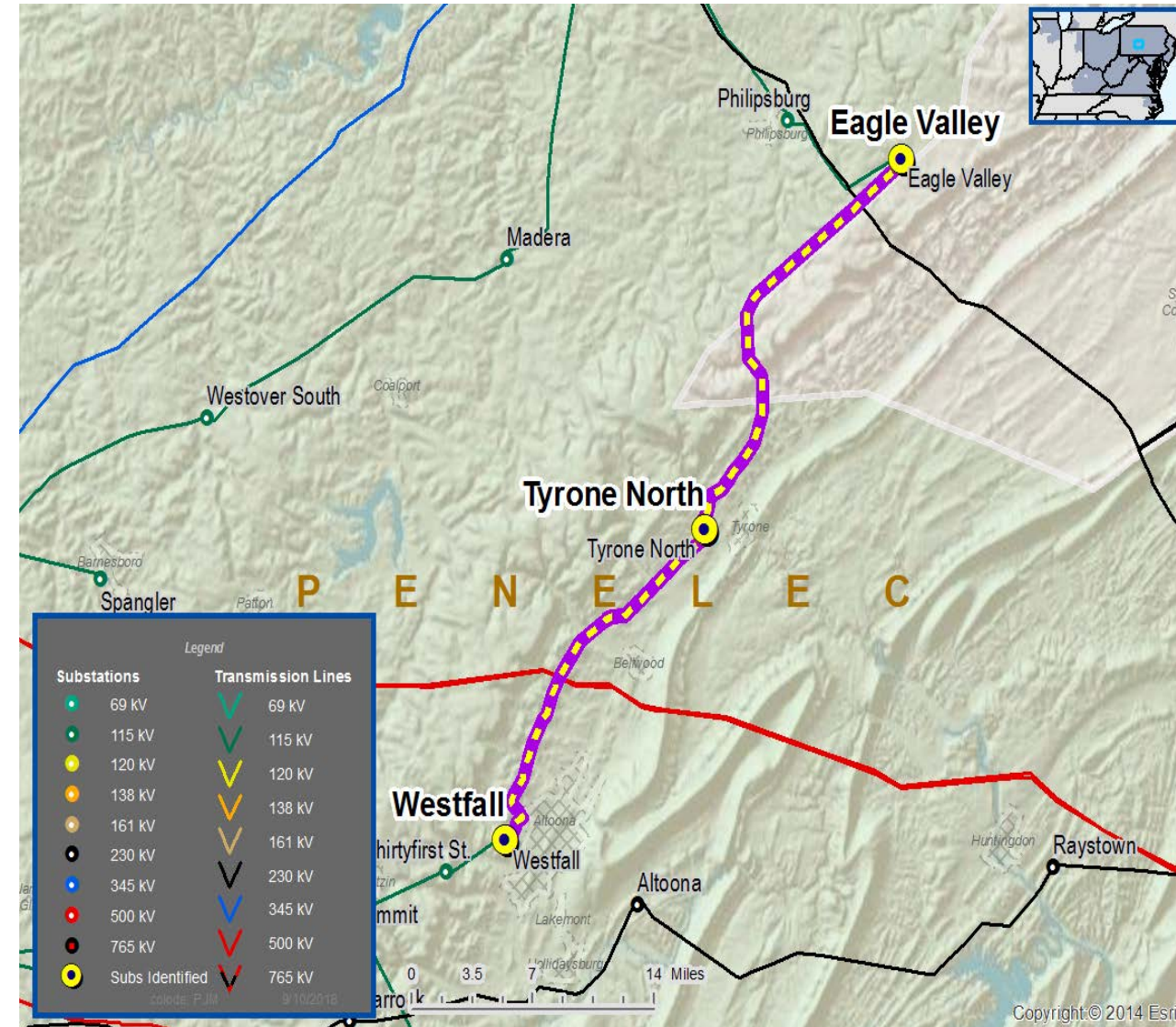
Reduce the amount of exposed potential local load loss during contingency conditions.

Eliminate simultaneous outages to multiple networked elements under N-1 analysis.

Problem Statement

Tyrone North 115 kV switching station serves ~50 MW of radial load and relies on breakers at Eagle Valley and Westfall 115 kV substations for remote clearing of fault conditions. Transformer or line faults result in interruption of the entire network path and interruption of service to both the #1 and #2 115-46 kV transformers with limited network transfer capability. In the event of a #1 115-46 kV transformer fault, all load cannot be served by the #2 115-46 kV transformer (the transformer loads to 123% of its 41 MVA summer emergency rating during restoration efforts under peak conditions).

Tyrone North #2 115-46 kV transformer has an increased failure probability due to aging/deteriorating bushings, components and fluid. The transformer was manufactured in 1950.



Penelec Transmission Zone

Need Number: PN-2018-008

Selected Solution:

Tyrone North 115 kV Ring Bus & #1 115/46 kV Transformer Replacement

- Construct a four breaker 115 kV ring bus (s1776.1)
- Replace the #2 115/46 kV 45/60/75 MVA transformer (s1776.2)
- Install a 46 kV 1200 A bypass switch between the Tipton and Warrior Ridge 46 kV lines (s1776.3)

Transmission Line Ratings:








- Tyrone North – Westfall 115 kV Line
 - Before Selected Solution: 175 MVA SN / 237 MVA SE
 - After Selected Solution: 202 MVA SN / 245 MVA SE
- Tyrone North – Eagle Valley 115 kV Line
 - Before Selected Solution: 147 MVA SN / 191 MVA SE
 - After Selected Solution: 202 MVA SN / 245 MVA SE
- Tyrone North #2 115/46 kV Transformer
 - Before Selected Solution: 38 MVA SN / 41 MVA SE
 - After Selected Solution: 97 MVA SN / 97 MVA SE

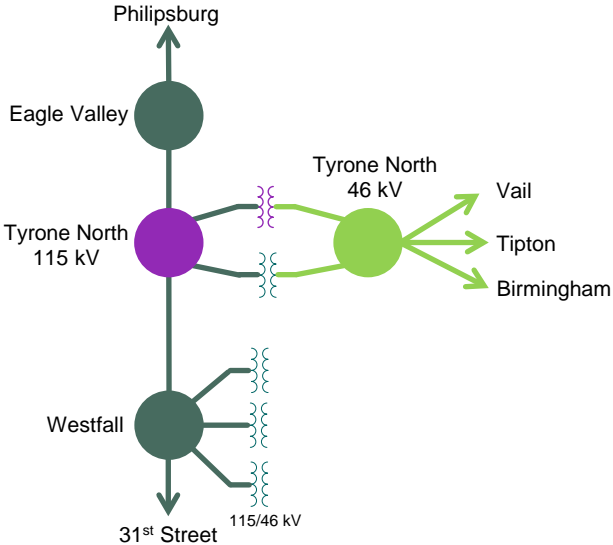
Estimated Project Cost: \$4.8M

Projected IS Date: 12/31/2020

Status: Conceptual

Supplemental Project Number: s1776.1, s1776.2, s1776.3

Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	



Penelec Transmission Zone

Need Number: PN-2018-009
 Process Stage: Local Plan
 Need Presented: 9/21/2018
 Solution Presented: 10/29/2018

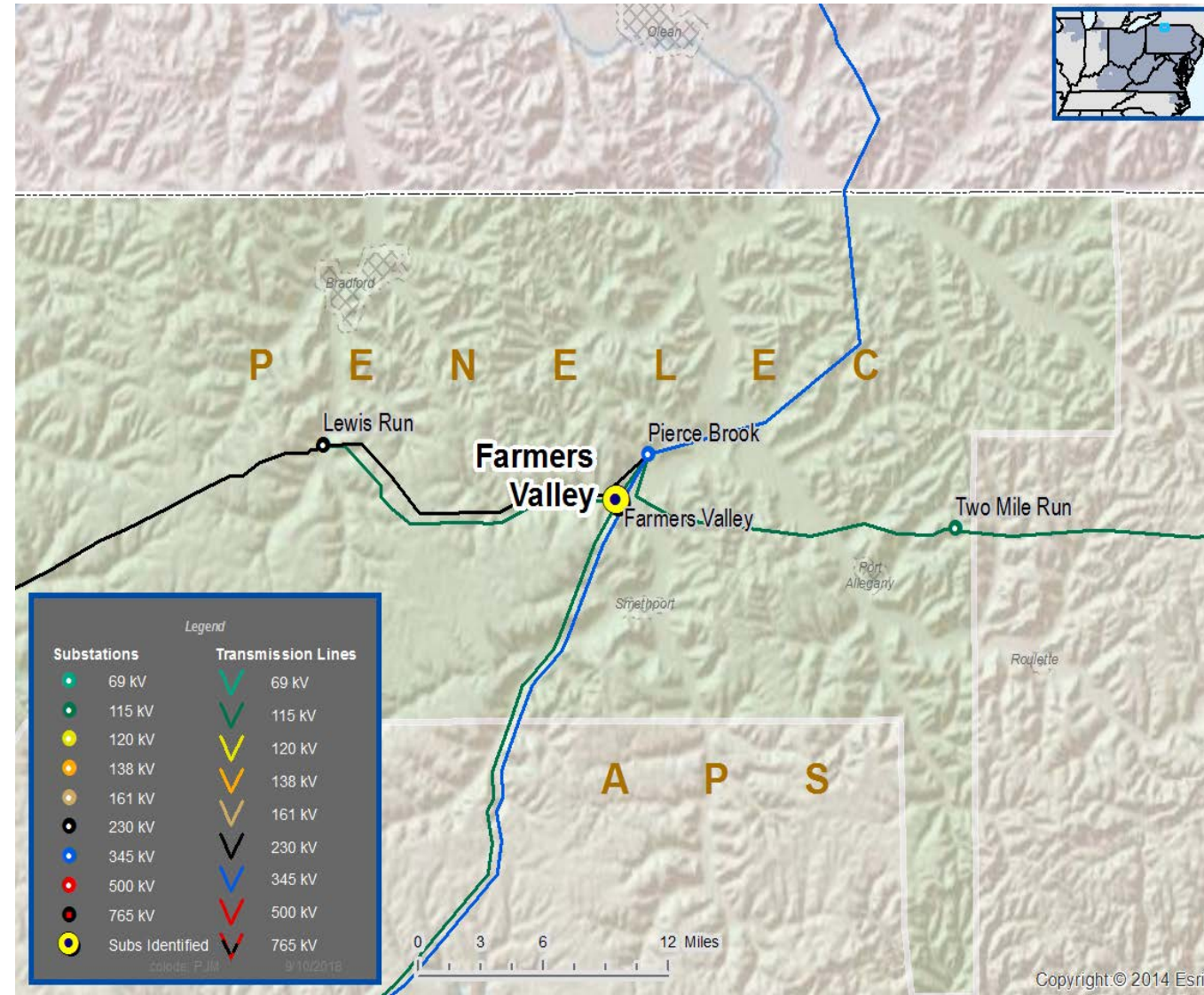
Project Driver(s):
Operational Flexibility and Efficiency

Specific Assumption Reference(s)

Add/Expand Bus Configuration
 Reduce the amount of exposed potential local load loss during contingency conditions.
 Eliminate simultaneous outages to multiple networked elements (excluding capacitor banks) under N-1 analysis.
 If substation bus configurations limit the ability to perform substation maintenance, the substation and/or transmission lines should be evaluated for reconfiguration.

Problem Statement

Farmers Valley 115 kV bus #1 does not have a transmission source, while Farmers Valley 115 kV bus #2 has two sources. Bus maintenance or outages result in loss of both 115-34.5 kV transformers impacting approximately 3,377 customers and approximately 10 MW of load.



Need Number: PN-2018-009

Selected Solution:

Farmers Valley 115 kV Substation: Relocate Ridgway Line to Lewis Run Terminal

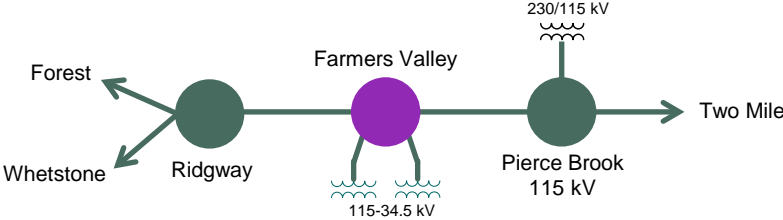
- Relocate the existing Ridgway line to the old Lewis Run terminal (s1777)

Estimated Project Cost: \$1.3M

Projected IS Date: 6/1/2019

Status: Conceptual

Supplemental Project Number: s1777



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Penelec Transmission Zone

Need Number: PN-2018-010
 Process Stage: Local Plan
 Need Presented: 9/21/2018
 Solution Presented: 10/29/2018

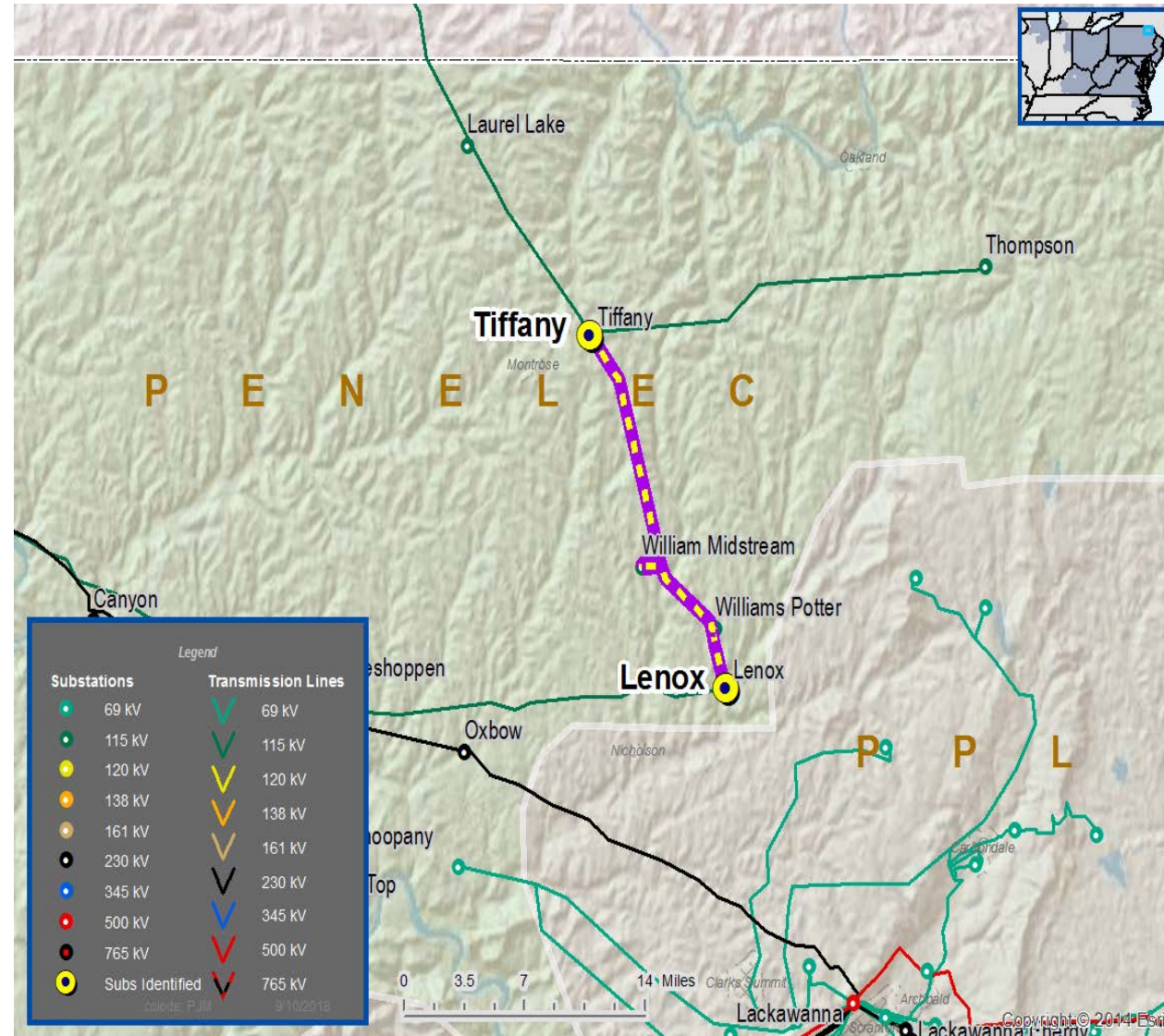
Project Driver(s):
Customer Service

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 – A customer requested 115 kV service for load of approximately 16 MW near the Lenox – Tiffany 115 kV line. Requested in-service date is 7/2019.



Need Number: PN-2018-010

Selected Solution:

Provide 115 kV Service

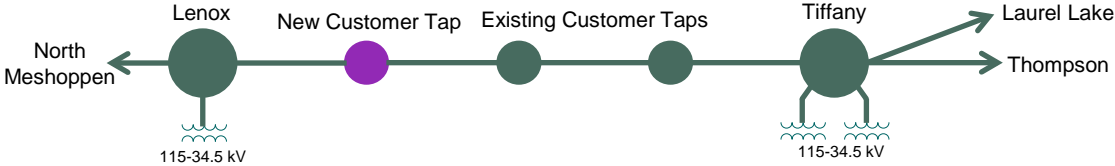
- Tap the existing Lenox – Tiffany 115 kV line (s1778.1)
- Install two 115 kV line switches (s1778.2)
- Install 115 kV line trap at tap location (s1778.3)
- Install 115 kV switch on tap (s1778.3)
- Construct ~200 ft of 115 kV line to customer substation

Estimated Project Cost: \$1.2M

Projected IS Date: 4/1/2019

Status: Conceptual

Supplemental Project Number: s1778.1, s1778.2, s1778.3



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Penelec Transmission Zone

Need Number: PN-2018-011

Process Stage: Local Plan

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Operational Flexibility and Efficiency

Specific Assumption Reference(s)

Substation/Line Equipment Limits

- Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Critical Upgrade to Standards

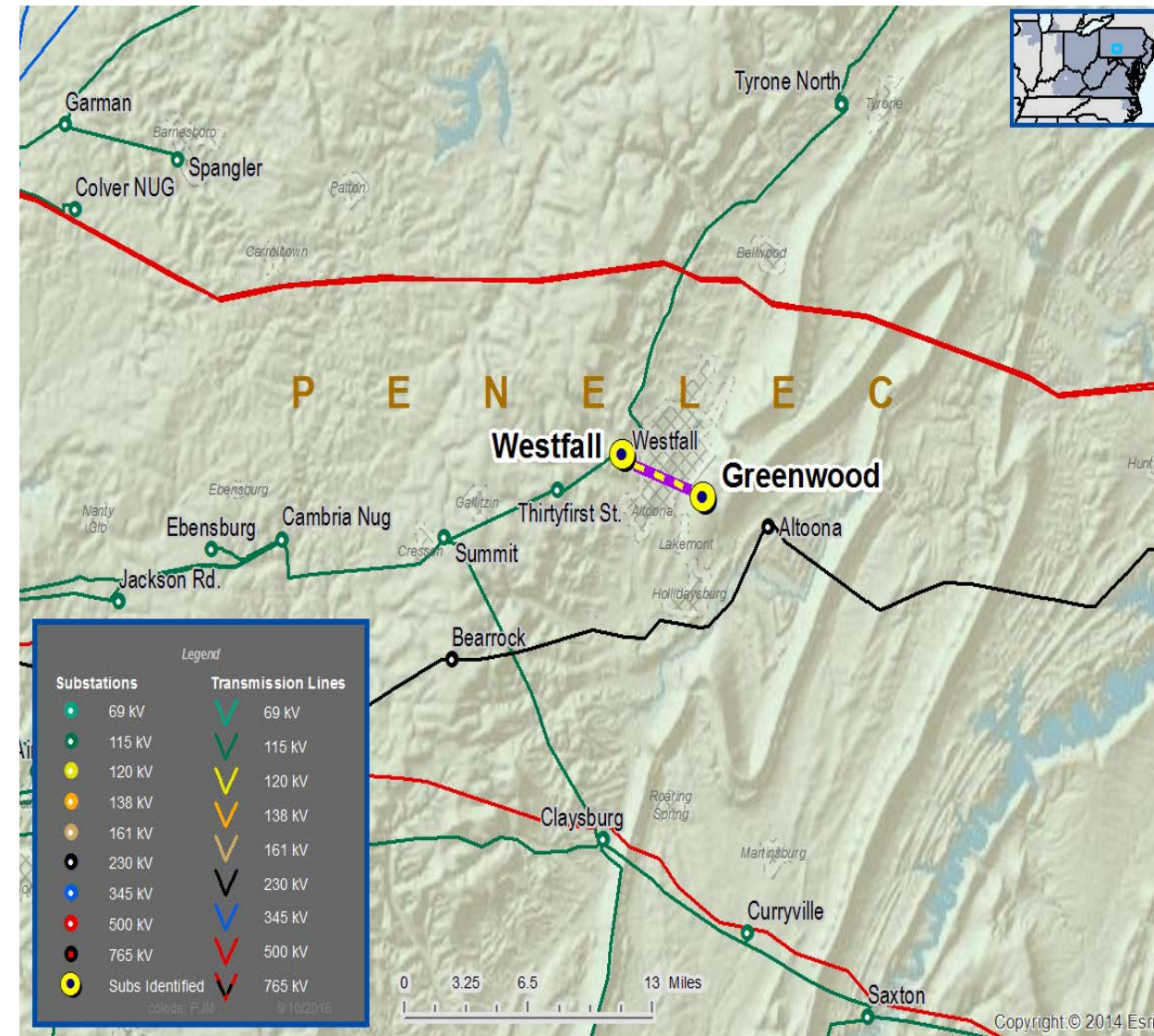
- Line Switches – Switches should be considered for replacement to allow for desired operations (i.e. line charging, loop splitting, etc.).

Problem Statement

Existing terminal equipment significantly derate the thermal capability of the Greenwood – Westfall 46 kV line. The line sectionalizing devices at East Altoona and Fairview are not capable of loop splitting.

Transmission line rating limited by terminal equipment.

- Westfall – Fairview 46 kV line: Existing emergency line rating is 64 MVA. Existing conductor emergency rating is 81 MVA
- Fairview – East Altoona 46 kV line: Existing emergency line rating is 69 MVA. Existing conductor emergency rating is 71 MVA.
- East Altoona – Greenwood 46 kV line: Existing emergency line rating is 33 MVA. Existing conductor emergency rating is 81 MVA.



Penelec Transmission Zone

Need Number: PN-2018-011

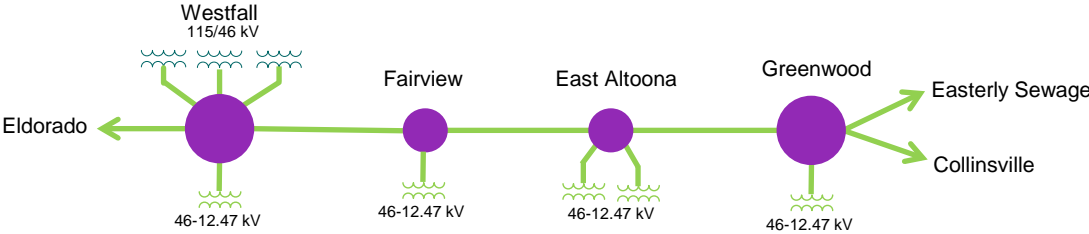
Selected Solution:

- Greenwood – Westfall 46 kV: Upgrade Bus Conductor & Relay Panels*
- Greenwood 46 kV Substation – Terminal equipment to be replaced includes:*
 - Line relaying, substation conductor and disconnect switches (s1779.1)
- East Altoona 46 kV Substation – Terminal equipment to be replaced includes:*
 - Disconnect switches (s1779.2)
- Fairview 46 kV Substation – Terminal equipment to be replaced includes:*
 - Disconnect switches (s1779.3)
- Westfall 46 kV Substation – Terminal equipment to be replaced includes:*
 - Line relaying, substation conductor and disconnect switches (s1779.4)

Transmission Line Ratings:

- Greenwood – East Altoona 46 kV Line
 - Before Selected Solution: 33 MVA SN / 33 MVA SE
 - After Selected Solution: 67 MVA SN / 81 MVA SE
- Fairview – East Altoona 46 kV Line
 - Before Selected Solution: 55 MVA SN / 69 MVA SE
 - After Selected Solution: 59 MVA SN / 71 MVA SE
- Westfall – Fairview 46 kV Line
 - Before Selected Solution: 55 MVA SN / 64 MVA SE
 - After Selected Solution: 67 MVA SN / 81 MVA SE

Estimated Project Cost: \$1.3 M
Projected IS Date: 6/1/2019
Status: Conceptual
Supplemental Project Number: s1779.1, s1779.2, s1779.3, s1779.4



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Penelec Transmission Zone

Need Number: PN-2018-012
Process Stage: Local Plan
Need Presented: 9/21/2018
Solution Presented: 10/29/2018

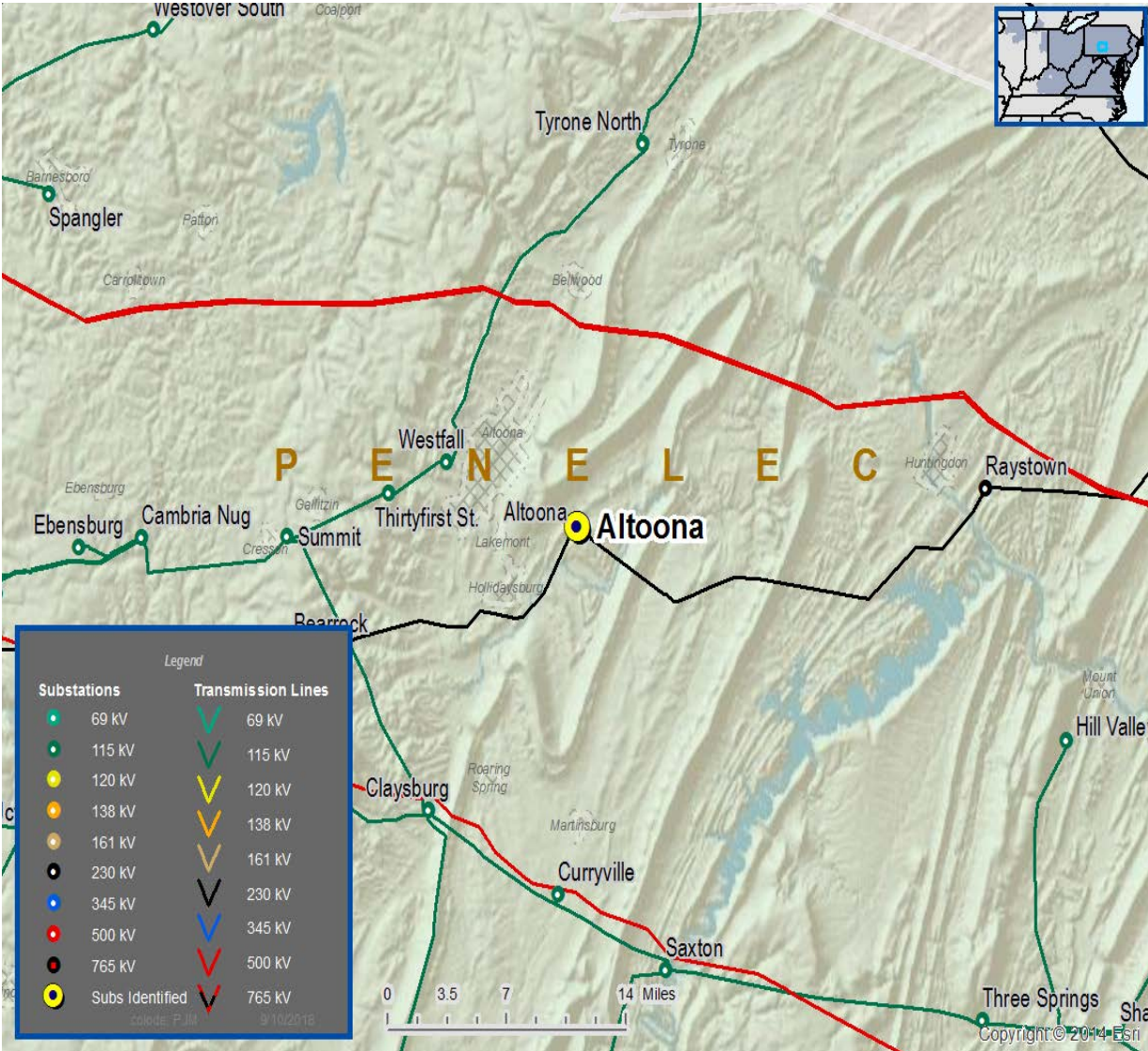
Project Driver(s):
Operational Flexibility and Efficiency

Specific Assumption Reference(s)

- Global Consideration
- Assess the risk associated with bus, stuck breaker, and N-2 contingencies to improve FERC tariffed Transmission < 100 kV facilities.
- Network Radial Lines
- Radial lines will be evaluated based on load at risk and/or customers impacted along with its proximity to other networked facilities.
- Build New Transmission Line
- Network radial lines.

Problem Statement

If the Altoona – Bear Rock and Raystown – Lewistown 230 kV lines or Raystown – Lewistown and Bear Rock – Johnstown 230 kV lines or both Altoona 230/46 kV transformers are out of service (N-1-1), voltage on the surrounding 46 kV system is less than 0.80 p.u.



Penelec Transmission Zone

Need Number: PN-2018-012

Selected Solutions:

Westfall – 20th Street – Collinsville 46 kV Line

- Construct a new 46 kV line between Westfall and 20th Street (~0.82 miles) and reconductor the 20th Street – Collinsville 46 kV line (~1.46 miles) (**s1780.1**)

Westfall 46 kV Substation

- Install one new 46 kV breaker and extend the bus to facilitate a new 46 kV terminal (**s1780.2**)
- Install new standard panels for line relaying (**s1780.3**)

20th Street 46 kV Substation – Terminal equipment to be replaced includes:

- Disconnect switches (**s1780.4**)

Collinsville 46 kV Substation – Terminal equipment to be replaced includes:

- Line relaying, substation conductor and disconnect switches (**s1780.5**)

Collinsville 46 kV Capacitor

- Install one 36 MVAR, 46 kV capacitor (**s1780.6**)

Hollidaysburg 46 kV Capacitor

- Install one 26 MVAR, 46 kV capacitor (**s1780.7**)

Transmission Line Ratings:

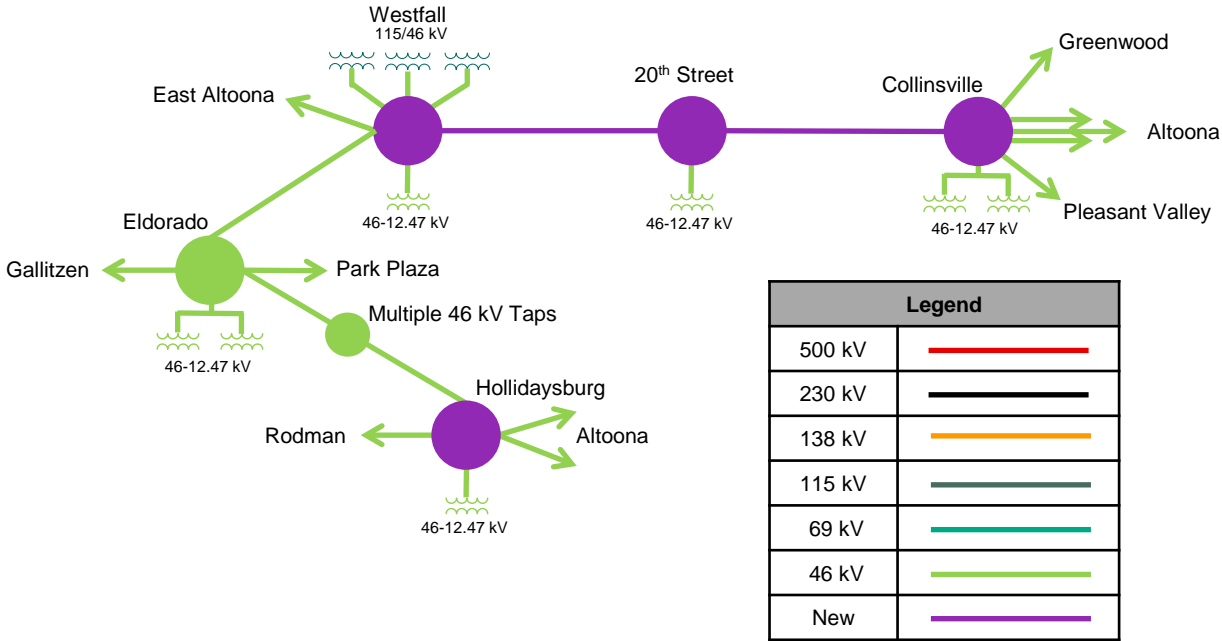
- Westfall – 20th Street 46 kV Line
 - Before Selected Solution: N/A
 - After Selected Solution: 91 MVA SN / 111 MVA SE
- 20th Street – Collinsville 46 kV Line
 - Before Selected Solution: 38 MVA SN / 42 MVA SE
 - After Selected Solution: 91 MVA SN / 111 MVA SE

Estimated Project Cost: \$5.3M (Westfall – 20th Street – Collinsville)
 \$0.9M (Collinsville 46 kV Capacitor)
 \$0.9M (Hollidaysburg 46 kV Capacitor)

Projected IS Date: 6/1/2020

Status: Conceptual

Supplemental Project Number: s1780.1, s1780.2, s1780.3, s1780.4, s1780.5, s1780.6, s1780.7



Penelec Transmission Zone

Need Number: PN-2018-013

Process Stage: Local Plan

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Project Driver(s):

Operational Flexibility and Efficiency

Specific Assumption Reference(s)

Global Consideration

- Assess the risk associated with bus, stuck breaker, and N-2 contingencies to improve FERC tariffed Transmission < 100 kV facilities.

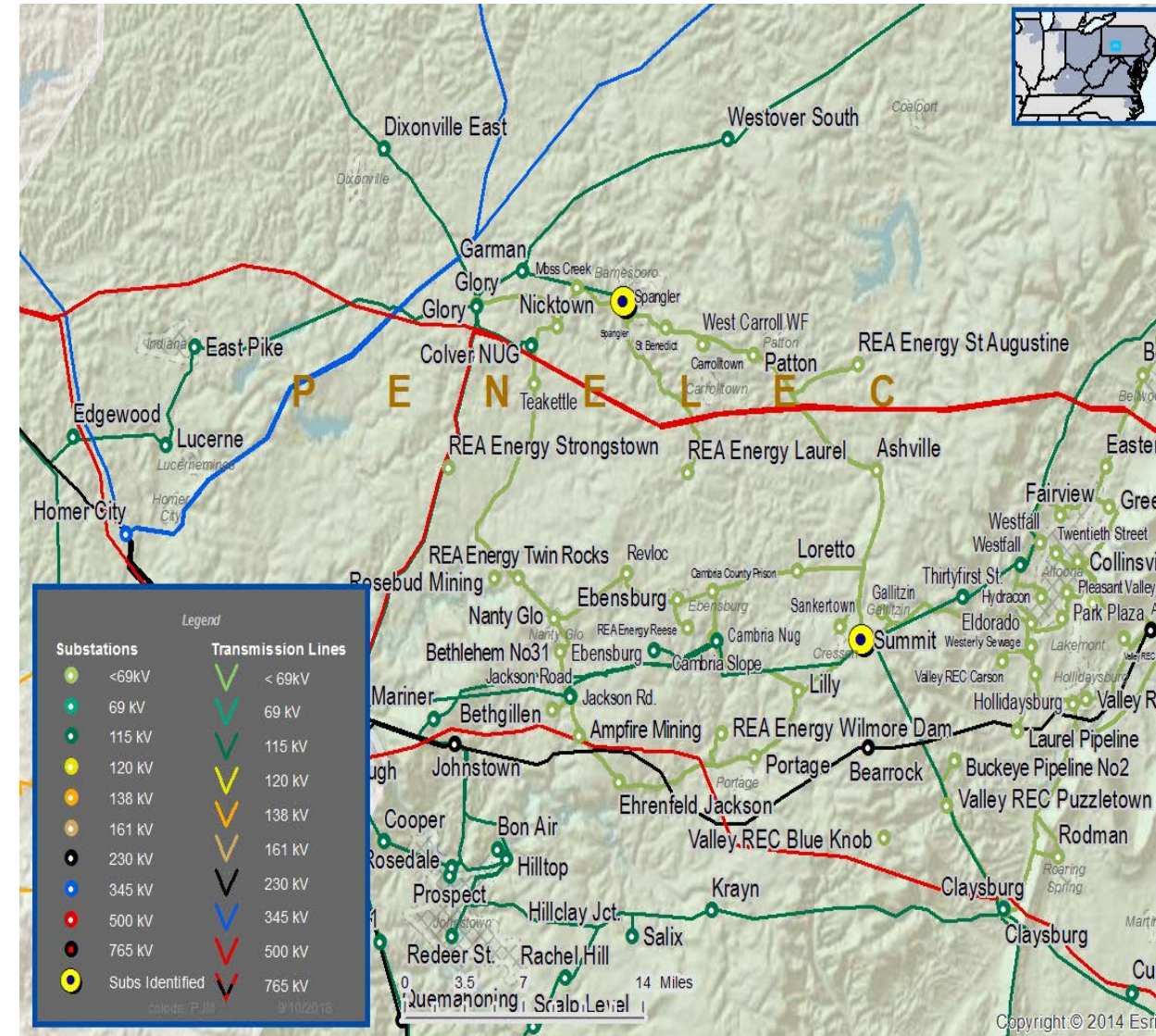
Substation/Line Equipment Limits

- Consider upgrading transmission line equipment (switches, conductor, splices, etc.) as well as terminal and protection equipment to meet or exceed the transmission line conductor rating.

Problem Statement

For the loss of Spangler 115-46 kV transformer and SGC Tap – Summit 46 kV line, the Nanty-Glo – Twin Rock 46 kV line loads to greater than 120% of its 44 MVA STE rating.

Transmission line rating limited by terminal equipment. Existing emergency line rating is 44 MVA. Existing conductor emergency rating is 81 MVA.



Penelec Transmission Zone

Need Number: PN-2018-013

Selected Solution:

Nanty Glo 46 kV: Replace Bus Conductor

- Replace substation conductor, circuit breaker and disconnect switches (s1781)

Transmission Line Ratings:

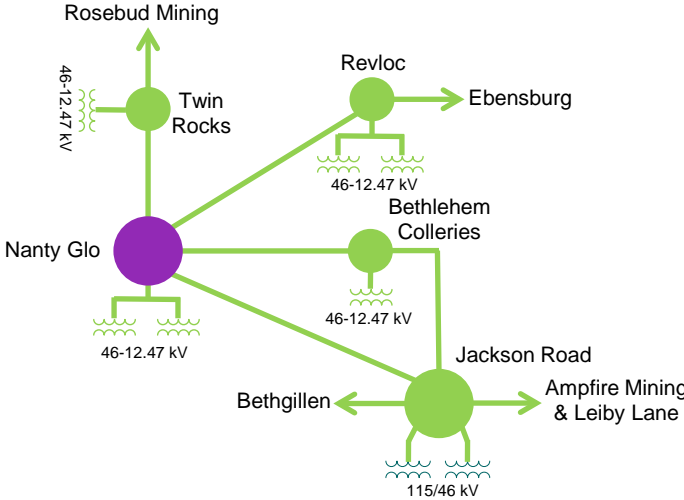
- Nanty Glo – Twin Rock 46 kV Line
 - Before Selected Solution: 34 MVA SN / 44 MVA SE
 - After Selected Solution: 55 MVA SN / 69 MVA SE

Estimated Project Cost: \$0.4 M

Projected IS Date: 12/31/2019

Status: Conceptual

Supplemental Project Number: s1781



Legend	
500 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
New	

Penelec Transmission Zone M-3 Process

Replace Bus Section Breaker and Upgrade Terminal Equipment at Edinboro South 115 kV

Need Number: PN-2018-014

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

Substation Condition Rebuild/Replacement – Circuit Breakers

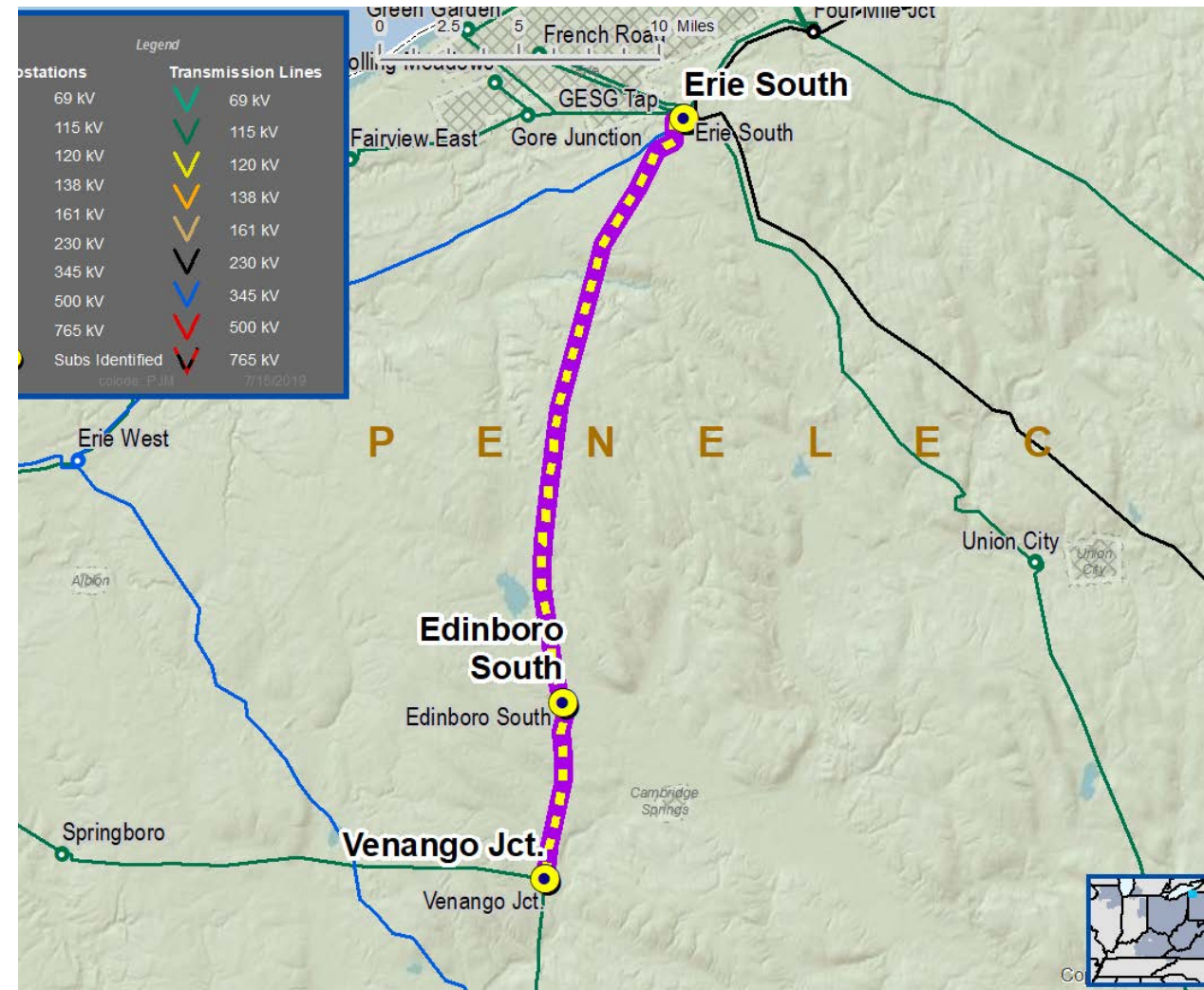
System Performance Projects – Substation/line equipment limits

Problem Statement:

Bus section circuit breaker at Edinboro South 115 kV evaluated and determined to be in degraded condition. Since 2006, there have been 10 maintenance orders on this breaker (interrupting media, compressor, and other issues)

Transmission line rating limited by terminal equipment.

- Edinboro South – Erie South 115 kV line: Existing line rating is 163/185 MVA (SN/SE). Existing conductor rating is 232/282 MVA (SN/SE).
(line trap, substation conductor, line relaying, CTs)
- Edinboro South – Venango Junction 115 kV line: Existing line rating is 163/179 MVA (SN/SE). Existing conductor rating is 232/282 MVA (SN/SE).
(line trap, substation conductor, line relaying, CTs)



Penelec Transmission Zone M-3 Process

Replace Bus Section Breaker and Upgrade Terminal Equipment at Edinboro South 115 kV

Need Number: PN-2018-014

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Edinboro South 115 kV: Replace Bus Section Breaker and Upgrade Terminal Equipment (s1820)

- Replace bus section breaker (**s1820.1**)

Edinboro South 115 kV Substation – Terminal equipment to be replaced includes:

- Line traps, substation conductor, line relaying and CCVTs (**s1820.2**)

Venango Junction 115 kV Substation – Terminal equipment to be replaced includes:

- Substation conductor, CCVT and arresters (**s1820.3**)

Erie South 115 kV Substation – Terminal equipment to be replaced includes:

- Circuit breaker, arresters, CCVT, line trap, line relaying and substation conductor (**s1820.4**)

Transmission Line Ratings:

Edinboro South – Erie South 115 kV Line

- Before Proposed Solution: 163/185 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)

Edinboro South – Venango Junction 115 kV Line

- Before Proposed Solution: 163/179 MVA (SN/SE)
- After Proposed Solution: 232/282 MVA (SN/SE)

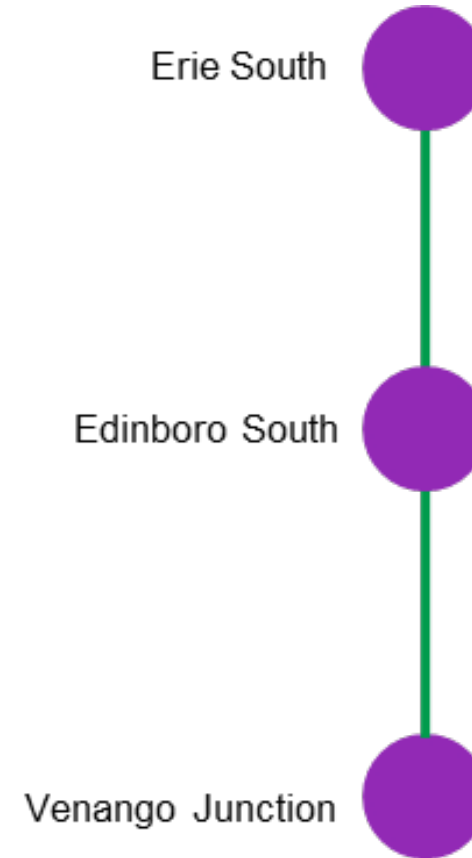
Estimated Cost: \$2.1M

Projected In-Service: 6/1/2019

Supplemental Project ID: s1820.1, s1820.2, s1820.3, s1820.4

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 Hill Valley #1 115/46 kV Transformer Replacement

Need Number: PN-2018-015

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

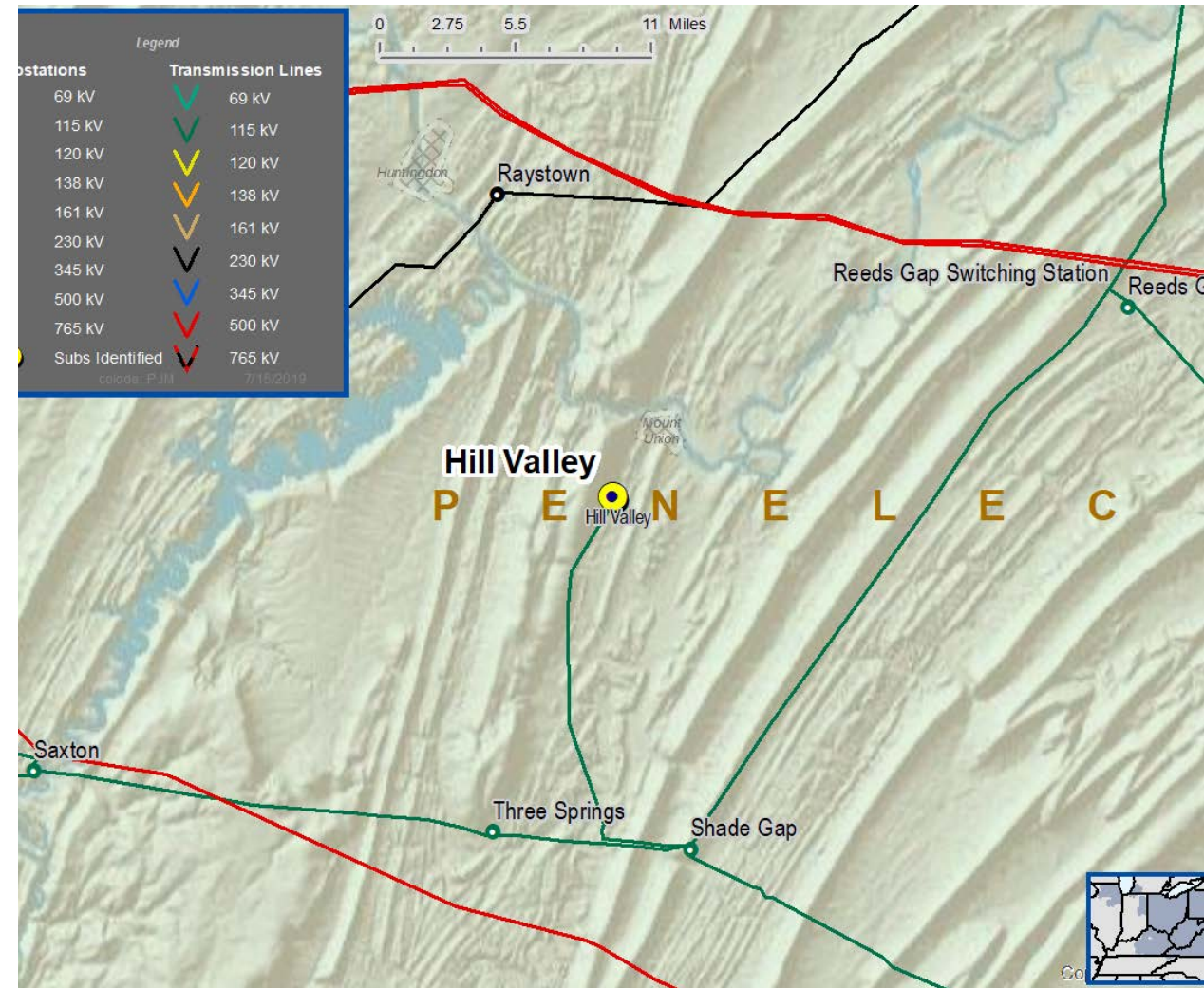
Specific Assumption Reference:

Substation Condition Rebuild/Replacement

Problem Statement:

Hill Valley #1 115/46 kV Transformer

- Transformer has Increased failure probability due to leaks, failed auxiliary equipment and damaged wiring.
- Transformer is 57 years old.
- Since 2004, there have been 25 maintenance orders on this transformer.



Penelec Transmission Zone M-3 Process Hill Valley #1 115/46 kV Transformer Replacement

Need Number: PN-2018-015

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Replace Hill Valley #1 115/46 kV Transformer (**s1821**)

- Replace the #1 115/46 kV transformer and associated equipment with 115/46 kV 45/60/75 MVA transformer

Transformer Rating:

Hill Valley #1 115/46 kV Transformer

- Before Proposed Solution: 32/34 MVA (SN/SE)
- After Proposed Solution: 97/97 MVA (SN/SE)

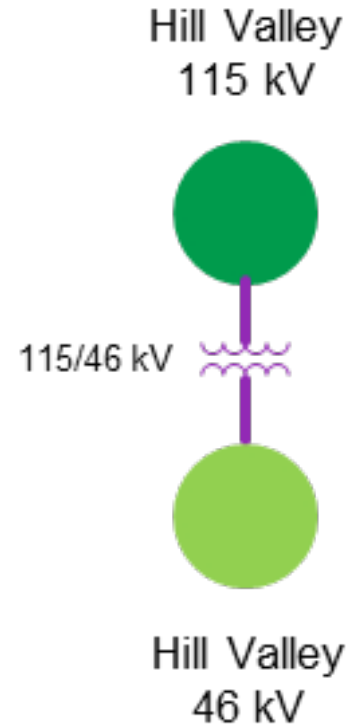
Estimated Cost: \$3.0 M

Projected In-Service: 12/1/2019

Supplemental Project ID: s1821

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 Lewistown #2 230/115-46 kV Transformer Replacement

Need Number: PN-2018-016

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Previously Presented:

Need Meeting 10/29/2018

Solution Meeting 11/28/2018

Project Driver:

Equipment Material Condition, Performance and Risk

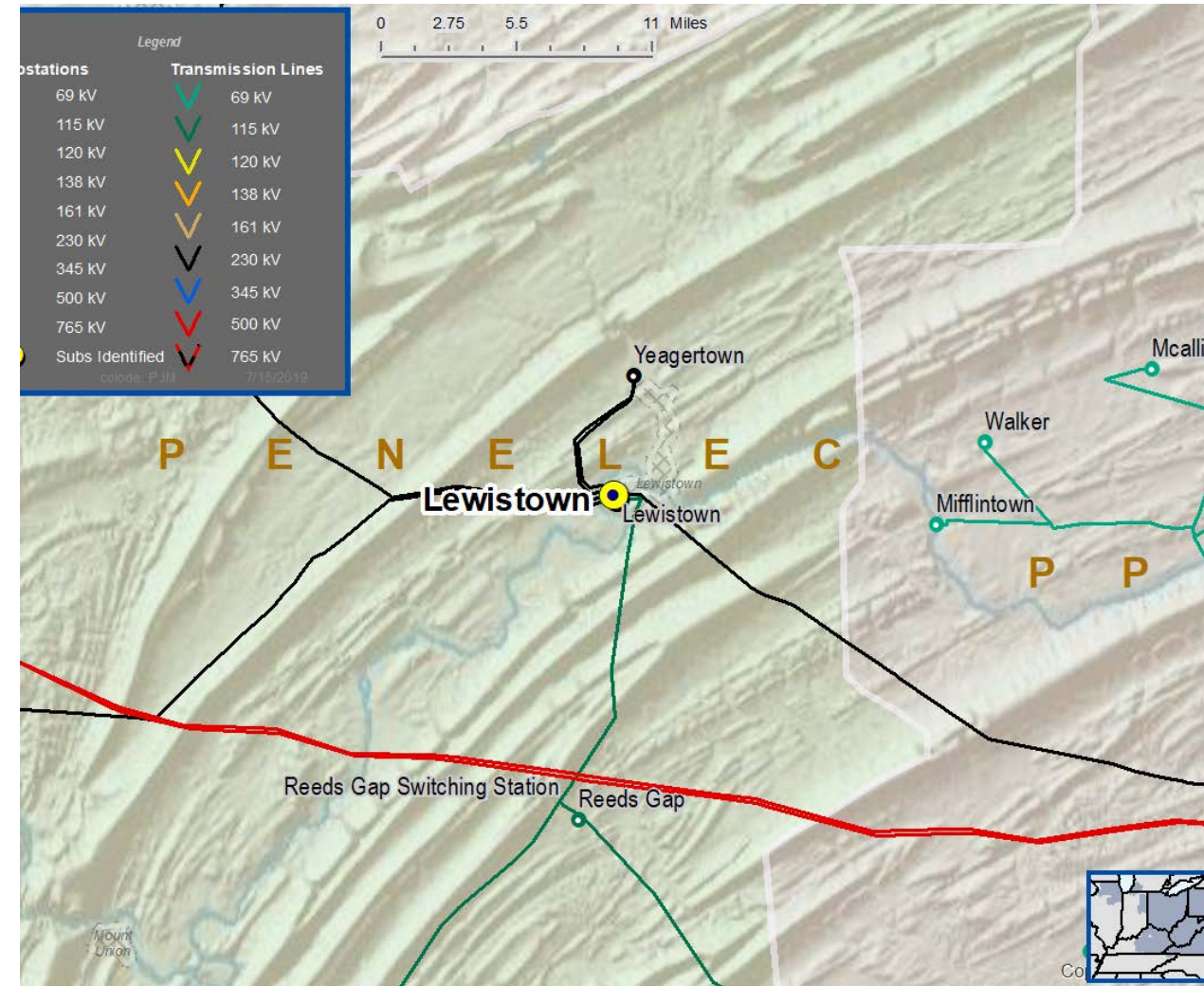
Specific Assumption Reference:

Substation Condition Rebuild/Replacement

Problem Statement:

Lewistown #2 230/115-46 kV Transformer

- Transformer has an increased failure probability due to leaks and failed auxiliary equipment.
- Transformer is 65 years old.
- Since 2004, there have been 96 maintenance orders on this transformer.



Penelec Transmission Zone M-3 Process Lewistown #2 230/115-46 kV Transformer Replacement

Need Number: PN-2018-016

Process State: Submission of Supplemental Project for inclusion in the Local Plan 7/26/2019

Selected Solution:

Replace Lewistown #2 230/115-46 kV Transformer

- Replace the #2 230/115-46 kV transformer and associated equipment with 230-46 kV 60/80/100 MVA transformer (**s1822.1**)
- Replace Lewistown 46 kV Breakers
- Replace overdutied 46 kV breakers due to transformer replacement (**s1822.2**) (Riverside (1LK), Viscose Hill (2LK), Mt Union, transformer No.2 and bus section breakers)

Transformer Rating:

Lewistown #2 230-46 kV Transformer

- Before Proposed Solution (230/115 kV): 65/72 MVA (SN/SE)
- Before Proposed Solution (115-46 kV): 62/67 MVA (SN/SE)
- Before Proposed Solution (230-46 kV): 55/67 MVA (SN/SE)
- After Proposed Solution (anticipated 230-46 kV): 120/129 MVA (SN/SE)

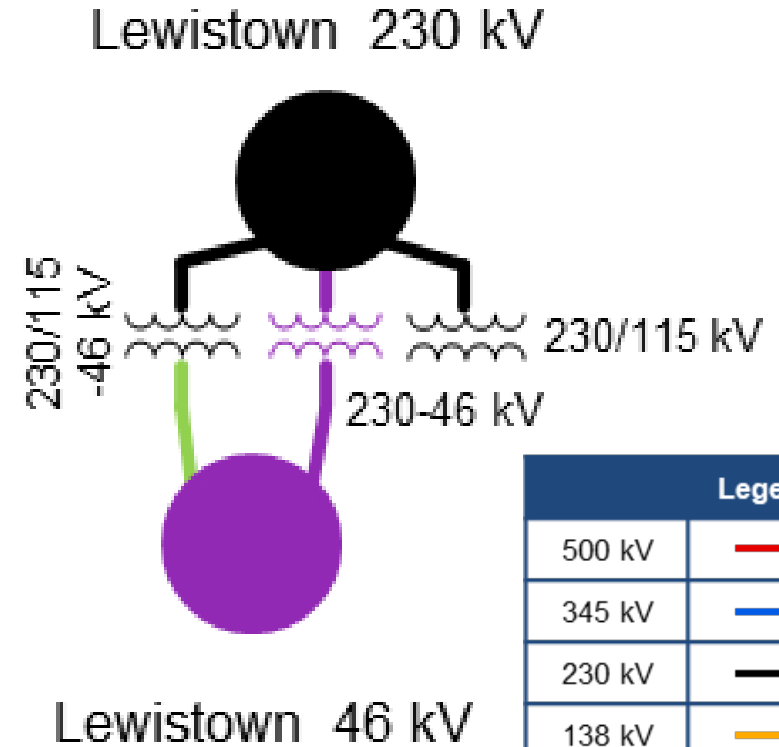
Estimated Cost: \$3.3 M (Transformer Replacement)
\$0.6 M (46 kV Breaker Replacements)

Projected In-Service: 12/31/2020

Supplemental Project ID: s1822.1, s1822.2

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	

Questions?



Revision History

1/30/2019 – V1 – Original version posted to pjm.com

7/26/2019 – V2 – Submission of Supplemental Project for inclusion in the Local Plan for s1811 ~ s1822