

Subregional RTEP Committee - Mid-Atlantic FirstEnergy Supplemental Projects

November 18, 2019

Solutions

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

Met-Ed Transmission Zone M-3 Process Campbelltown – Middletown – North Hershey 69 kV Line Rebuild

Need Number: ME-2019-039

Process Stage: Solutions Meeting 11/18/2019

Previously presented: Need Meeting 7/31/2019

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:

Campbelltown – Middletown – North Hershey 69 kV line sections are exhibiting deterioration.

- Total line distance is approximately 19.7 miles.
- 260 out of 407 structures failed inspection (64% failure rate).
- Failure reasons include age, decay, woodpecker holes.

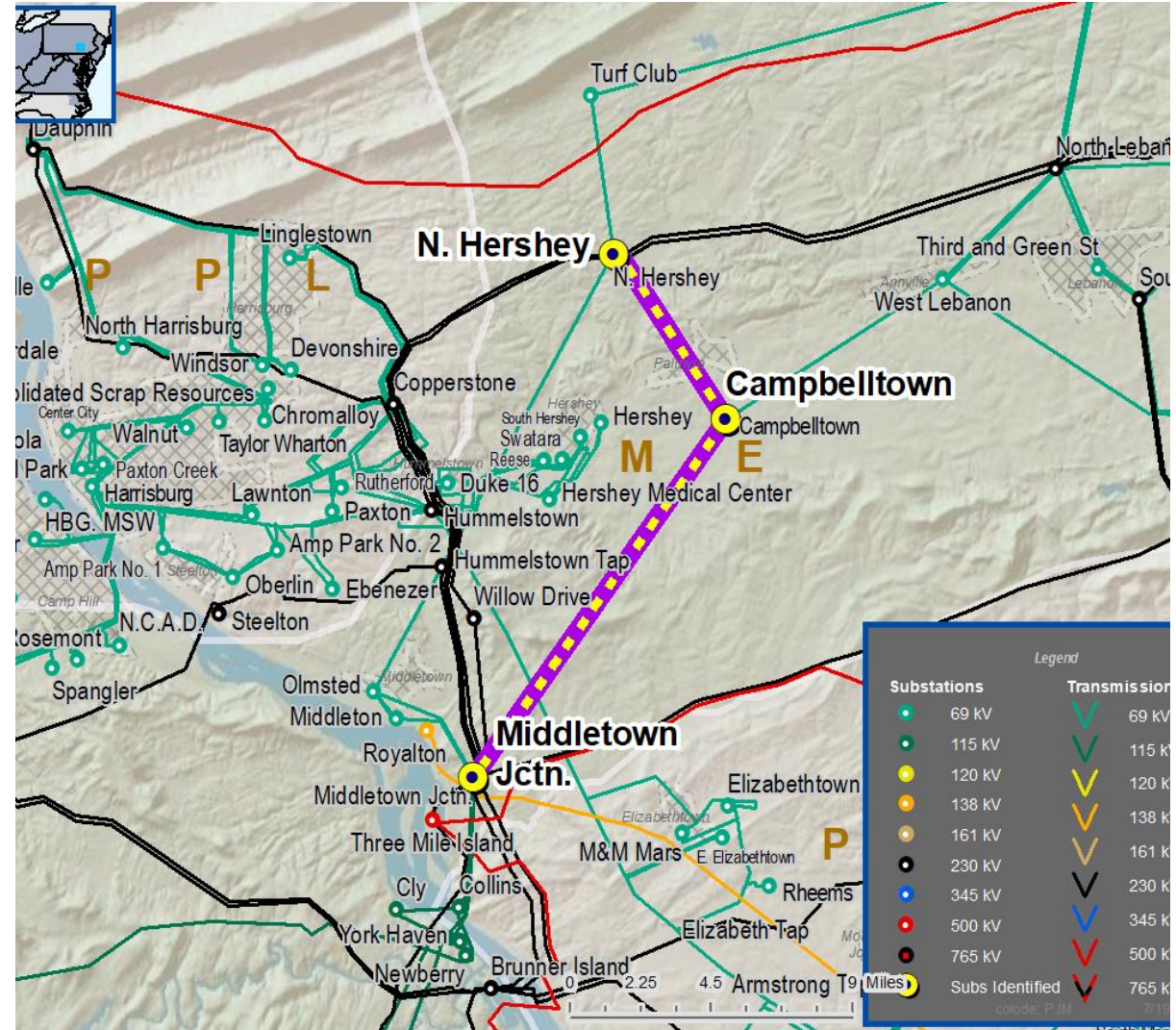
Transmission line ratings are limited by terminal equipment:

Campbelltown – Campbelltown Tap 69 kV line (substation conductor, disconnect switches, relaying)

- Existing line rating: 71/91 MVA (SN/SE)
- Existing conductor rating: 139/169 MVA (SN/SE)

Middletown – Wood St Tap 69 kV line (disconnect switches, line relaying, substation conductor)

- Existing line rating: 82/103 MVA (SN/SE)
- Existing conductor rating: 139/169 MVA (SN/SE)



Met-Ed Transmission Zone M-3 Process Campbelltown – Middletown – North Hershey 69 kV Line Rebuild

Need Number: ME-2019-039

Process Stage: Solutions Meeting 11/18/2019

Proposed Solution:

Rebuild and reconductor approximately 15.1 miles of the 19.7 mile line

Replace line relaying, substation conductor, and disconnect switches

Cost: \$30.9 M

Transmission Line Ratings:

- Middletown – Wood St Tap 69 kV Line:
 - Before Proposed Solution: 82/103 MVA (SN/SE)
 - After Proposed Solution: 139/169 MVA (SN/SE)
- Wood St Tap – Mill Street 69 kV Line:
 - Before Proposed Solution: 80/96 MVA (SN/SE)
 - After Proposed Solution: 139/169 MVA (SN/SE)
- Mill Street – Campbelltown Tap 69 kV Line:
 - Before Proposed Solution: 74/90 MVA (SN/SE)
 - After Proposed Solution: 139/169 MVA (SN/SE)
- Campbelltown Tap – North Hershey 69 kV Line:
 - Before Proposed Solution: 74/90 MVA (SN/SE)
 - After Proposed Solution: 136/169 MVA (SN/SE)
- Campbelltown – Campbelltown Tap 69 kV Line:
 - Before Proposed Solution: 71/91 MVA (SN/SE)
 - After Proposed Solution: 82/103 MVA (SN/SE)

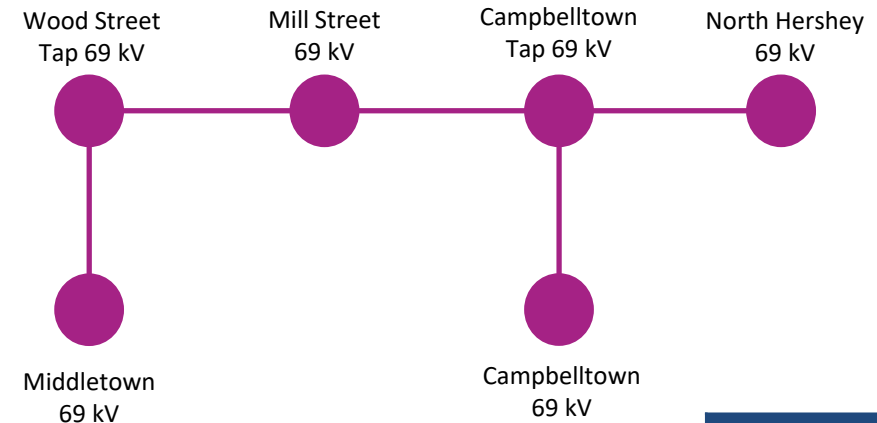
Alternatives Considered:

Maintain existing condition

Projected In-Service: 6/30/2021

Project Status: Conceptual

Model: 2019 RTEP model for 2024 Summer (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

Middletown Junction – Olmsted – Middletown 69 kV Line Terminal Upgrades

Need Number: ME-2019-042

Process Stage: Solutions Meeting 11/18/2019

Previously presented: Need Meeting 7/31/2019

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Condition Projects

- Substation Condition Rebuild/Replacement

System Performance Projects

- Substation/line equipment limits

Problem Statement:

Middletown Junction – Olmsted - Middletown 69 kV line – Terminal equipment has an increased risk of failure (circuit breaker, disconnect switches, line relaying) due to obsolescence of equipment. Limited spare parts are available.

- Circuit breakers are 50+ years old with Type U bushings
- Circuit breakers have a history of failed compressor belt
- Circuit breaker has failing dielectric strength

Transmission line rating is limited by terminal equipment:

Middletown Junction – Olmsted 69 kV line (line relaying)

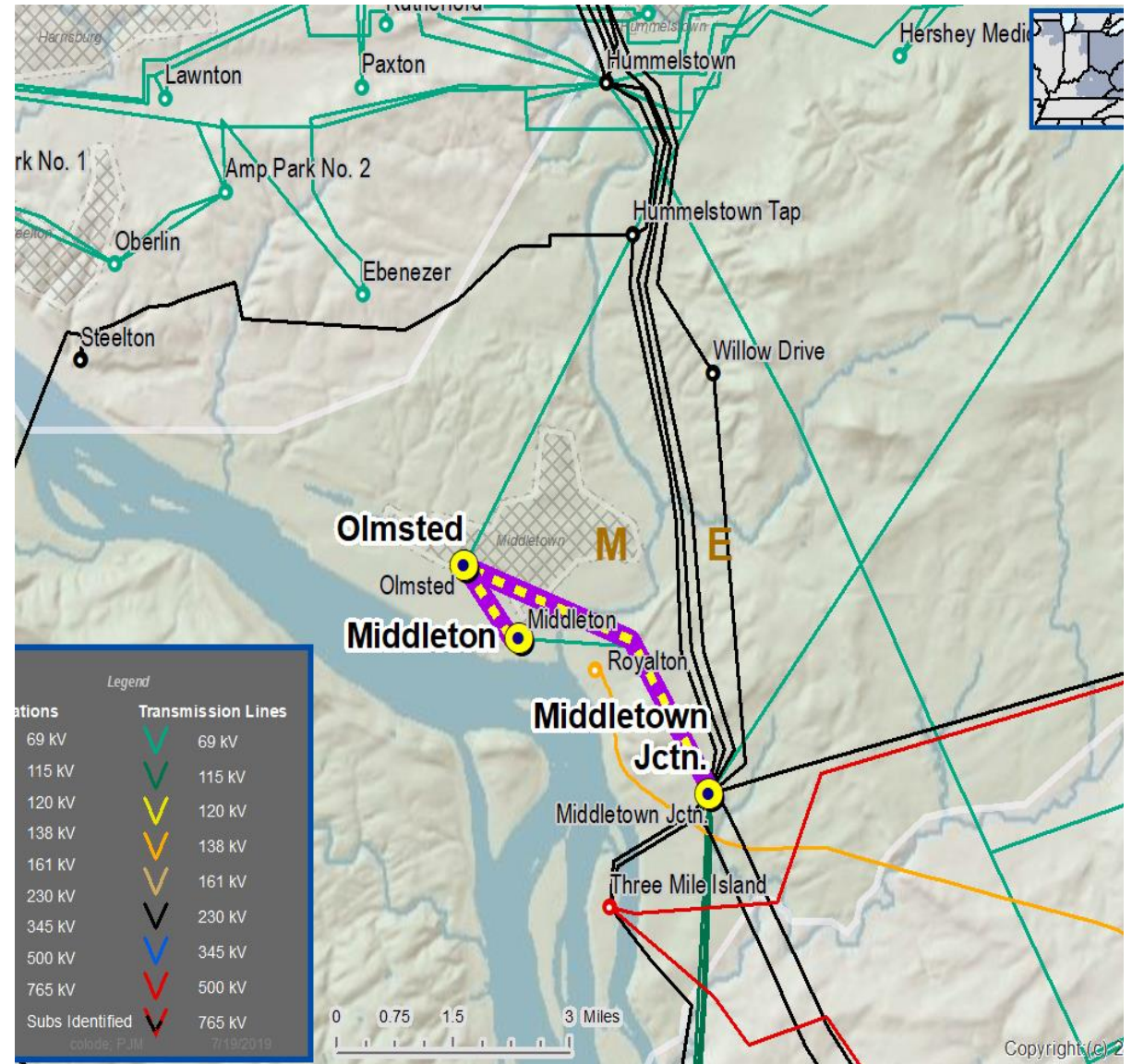
- Existing line rating: 62/72 MVA (SN/SE)
- Existing conductor rating: 62/77 MVA (SN/SE)

Wood Street Tap – Wood Street 69 kV line (substation conductor)

- Existing line rating: 38/49 MVA (SN/SE)
- Existing conductor rating: 53/64 (SN/SE)

Wood Street Tap – Middletown 69 kV line (substation conductor, disconnect switches, relaying)

- Existing line rating: 51/66 MVA (SN/SE)
- Existing conductor rating: 139/169 MVA (SN/SE)



Need Number: ME-2019-042

Process Stage: Solutions Meeting 11/18/2019

Proposed Solution:

Middletown Junction 69 kV substation:

- Replace circuit breaker, disconnect switches, line relaying

Middletown 69 kV substation:

- Replace circuit breaker, disconnect switches, line relaying, substation conductor

Cost \$1.6 M

Transmission Line Ratings:

- Middletown Junction – Olmsted 69 kV line
 - Before Proposed Solution: 62/72 MVA (SN/SE)
 - After Proposed Solution: 62/77 MVA (SN/SE)
- Wood St Tap – Middletown 69 kV line
 - Before Proposed Solution: 51/66 MVA (SN/SE)
 - After Proposed Solution: 139/169 MVA (SN/SE)

Alternatives Considered:

Maintain existing condition

Projected In-Service: 12/31/2020

Project Status: Conceptual

Model: 2019 RTEP model for 2024 Summer (50/50)



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

Need Number: ME-2019-045

Process Stage: Solutions Meeting 11/18/2019

Previously presented: Need Meeting 7/31/2019

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Condition Projects

- Substation Condition Rebuild/Replacement

System Performance Projects

- Substation/line equipment limits

Problem Statement:

Baldy – East Tipton 69 kV line – Terminal equipment has an increased risk of failure (circuit breaker and line relaying) due to obsolescence of equipment. Limited spare parts are available.

- East Tipton circuit breaker is 40+ years old with Type U bushings and has a history of failed oil dielectric strength

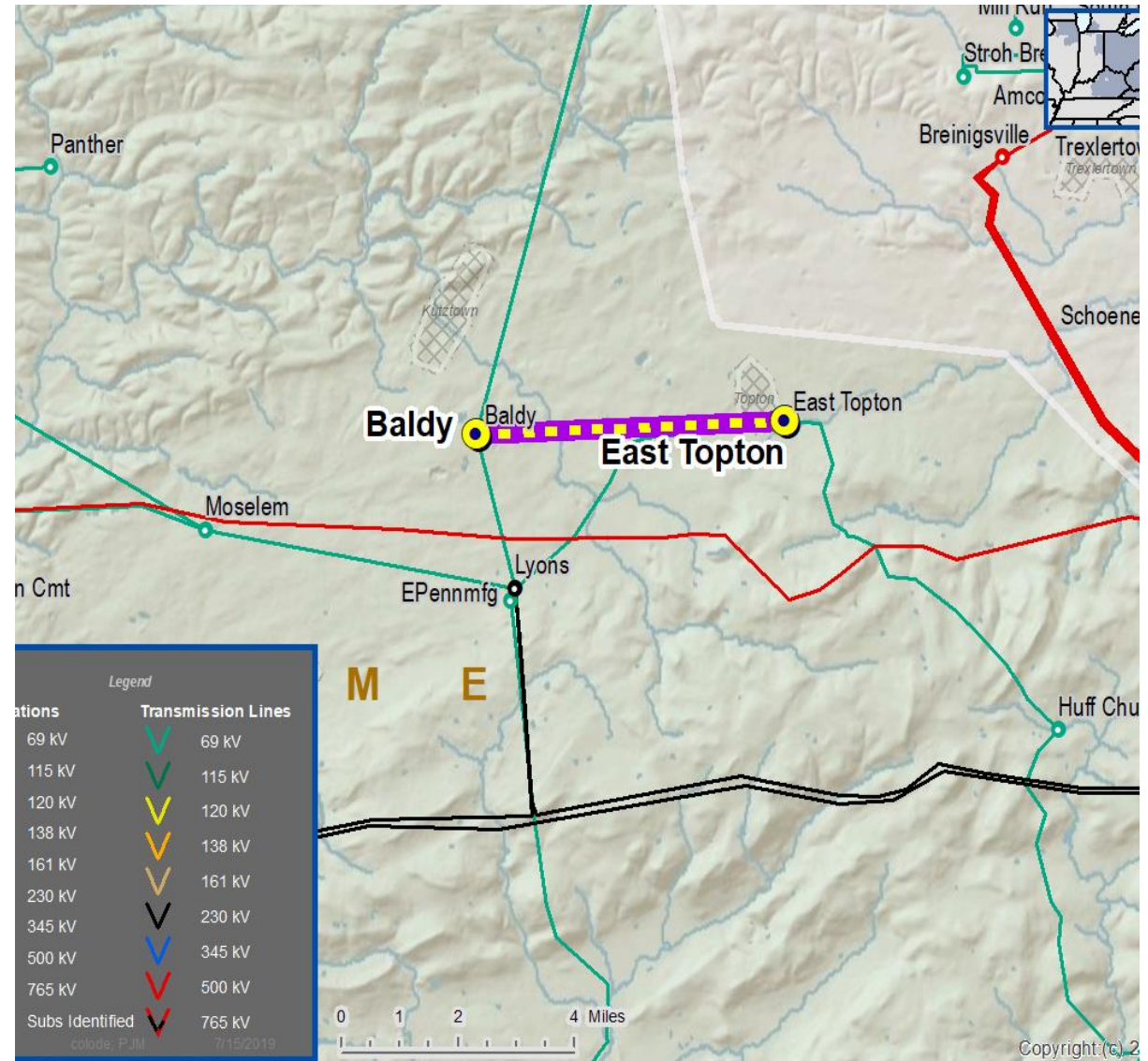
Transmission line rating is limited by terminal equipment:

Baldy – Kutztown 69 kV line (substation conductor)

- Existing line rating: 76/90 MVA (SN/SE)
- Existing conductor rating: 80/96 MVA (SN/SE)

Kutztown – East Tipton 69 kV line (substation conductor, line relaying)

- Existing line rating: 62/62 MVA (SN/SE)
- Existing conductor rating: 80/96 MVA (SN/SE)



Need Number: ME-2019-045

Process Stage: Solutions Meeting 11/18/2019

Proposed Solution:

Baldy 69 kV substation

- Replace line relaying and substation conductor

East Topton 69 kV substation

- Replace circuit breaker, line relaying, and substation conductor

Cost: \$0.7 M

Transmission Line Ratings

- Baldy – Kutztown 69 kV line
 - Before Proposed Solution: 76/90 MVA (SN/SE)
 - After Proposed Solution: 80/96 MVA (SN/SE)
- Kutztown – East Topton 69 kV line
 - Before Proposed Solution: 62/62 MVA (SN/SE)
 - After Proposed Solution: 80/96 MVA (SN/SE)

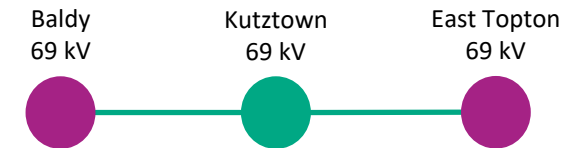
Alternatives Considered:

Maintain existing condition

Projected In-Service: 12/31/2020

Project Status: Conceptual

Model: 2019 RTEP model for 2024 Summer (50/50)



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

Need Number: ME-2019-046, ME-2019-050, and ME-2019-052

Process Stage: Solutions Meeting 11/18/2019

Previously presented: Need Meeting 7/31/2019

Project Driver:

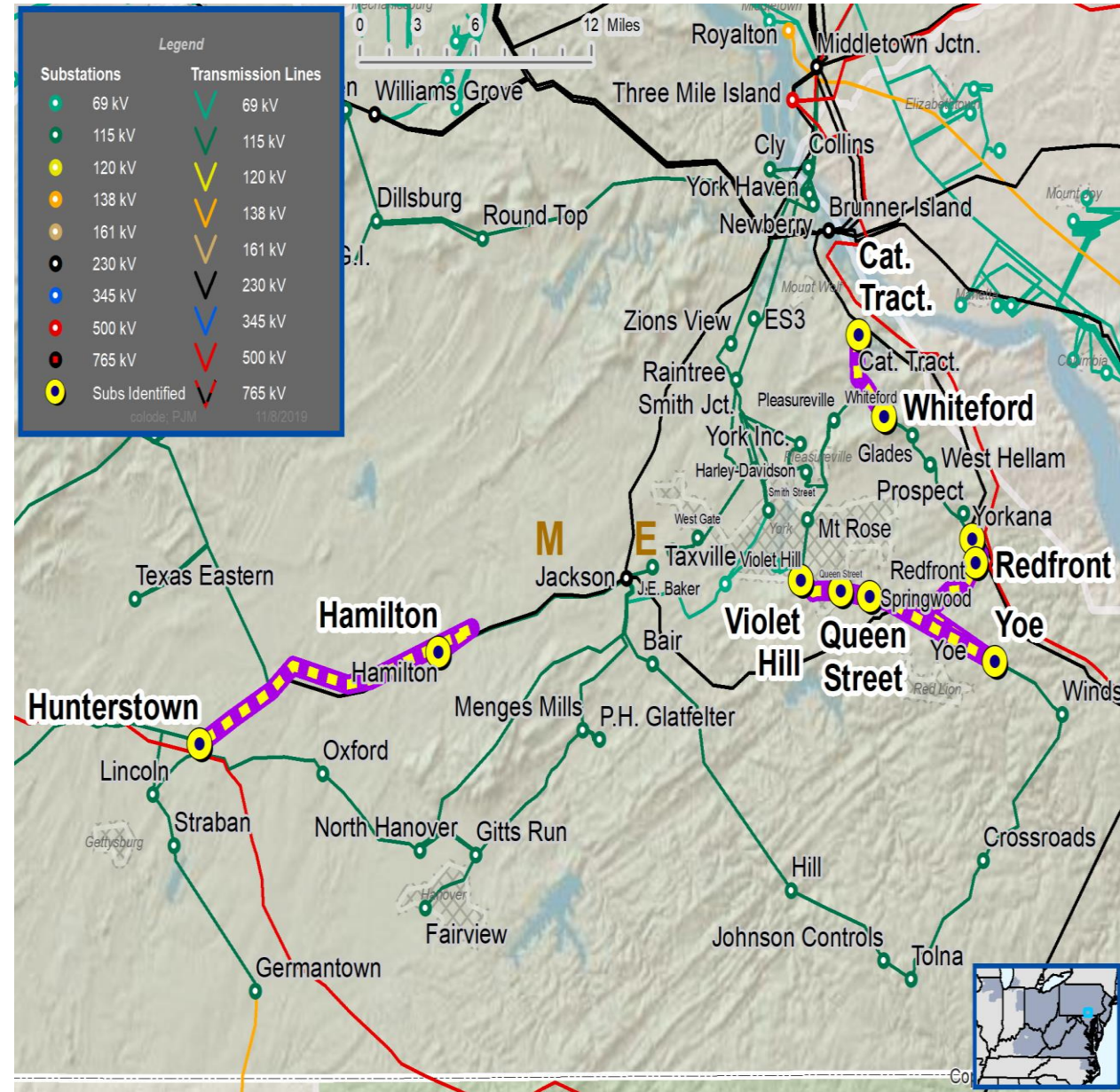
Equipment Material Condition, Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

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

Continued on next slide...



Problem Statement:

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement part and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

ME-2019-	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)	Limiting Terminal Equipment
046	Hamilton – Hunterstown 115 kV Line	221/263	232/282	Substation Conductor
050	Caterpillar Tractor – Whiteford 115 kV Line Whiteford – Glades 115 kV Line	232/277 184/223	232/282 184/223	Line Trap -
052	Violet Hill – Queen Street 115 kV Line Queen Street – Springwood 115 kV Line Springwood – Yoe 115 kV Line Yoe – Redfront 115 kV Line Redfront – Yorkana 115 kV Line	204/266 232/282 232/282 184/223 184/223	232/282 232/282 232/282 184/223 184/223	Substation Conductor - - - -



Met-Ed Transmission Zone M-3 Process Misoperation Relay Projects

Proposed Solution:

ME-2019-	Transmission Line / Substation Locations	New MVA Line Rating (SN / SE)	Scope of Work	Estimate Costs (\$ M)	Target ISD
046	Hamilton – Hunterstown 115 kV Line	232/282	<ul style="list-style-type: none"> Hamilton 115 kV Substation – Replace line relaying, substation conductor, circuit breaker Hunterstown 115 kV Substation – Replace line relaying 	\$1.6M	6/1/2020
050	Caterpillar Tractor – Whiteford 115 kV Line Whiteford – Glades 115 kV Line	232/282 184/223	<ul style="list-style-type: none"> Caterpillar Tractor 115 kV Substation – Replace line relaying, line trap Glades 115 kV Substation – Replace line relaying 	\$1.0M	4/1/2021
052	Violet Hill – Queen Street 115 kV Line Queen Street – Springwood 115 kV Line Springwood – Yoe 115 kV Line Yoe – Redfront 115 kV Line Redfront – Yorkana 115 kV Line	232/282 232/282 232/282 184/223 184/223	<ul style="list-style-type: none"> Violet Hill 115 kV Substation – Replace line relaying, substation conductor - - - Yorkana 115 kV Substation – Replace line relaying 	\$0.7M	12/1/2020

Alternatives Considered:

- Maintain existing condition

No topology changes, no bubble diagram required.

All projects are in the Conceptual phase.

Model: 2019 RTEP model for 2024 Summer (50/50)

Questions?



Appendix

High level M-3 Meeting Schedule

Assumptions	Activity	Timing
	Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
	Stakeholder comments	10 days after Assumptions Meeting
Needs	Activity	Timing
	TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
	Stakeholder comments	10 days after Needs Meeting
Solutions	Activity	Timing
	TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
	Stakeholder comments	10 days after Solutions Meeting
Submission of Supplemental Projects & Local Plan	Activity	Timing
	Do No Harm (DNH) analysis for selected solution	Prior to posting selected solution
	Post selected solution(s)	Following completion of DNH analysis
	Stakeholder comments	10 days prior to Local Plan Submission for integration into RTEP
	Local Plan submitted to PJM for integration into RTEP	Following review and consideration of comments received after posting of selected solutions

Revision History

11/08/2019 – V1 – Original version posted to pjm.com