Subregional RTEP Committee – Western
FirstEnergy Supplemental Projects

February 16, 2024

Needs

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

ATSI Transmission Zone M-3 Process Misoperation Relays Projects

Need Number: ATSI-2024-008, 011

Process Stage: Need Meeting 02/16/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

Upgrade Relay Schemes

- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

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cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.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

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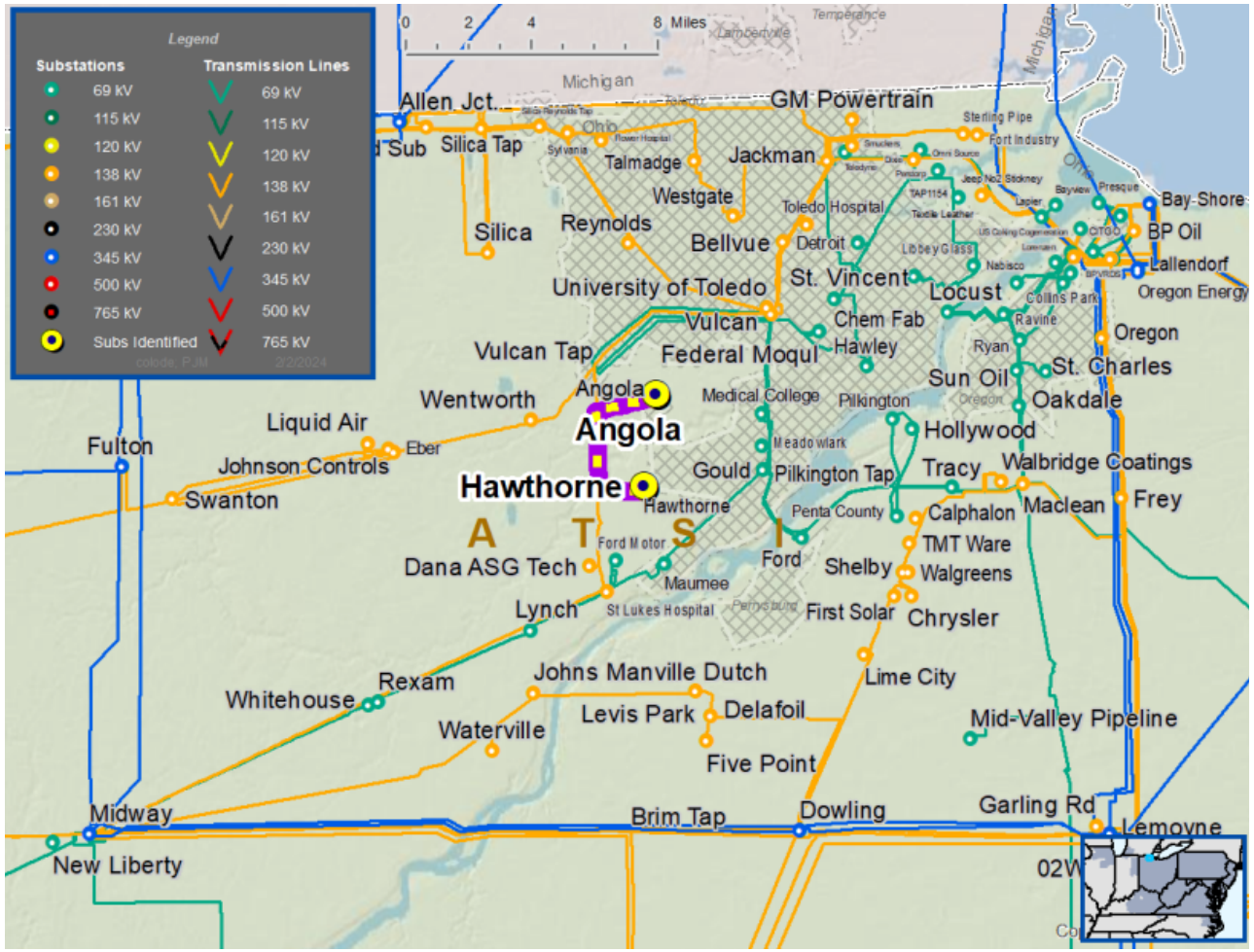


ATSI Transmission Zone M-3 Process
Misoperation Relays Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE / WN / WE)	Existing Conductor Rating (SN / SE / WN/ WE)
ATSI-2024-008	Angola – Hawthorne 138 kV Line	287 / 342 / 333 / 380	288 / 353 / 333 / 427
ATSI-2024-011	Dept of Corrections – McDowell Y-300 69 kV Line	47 / 48 / 48 / 48	47 / 56 / 53 / 67
	Mercer Tap – Sharon Y-300 69 kV Line	72 / 72 / 72 / 72	80 / 96 / 90 / 114

ATSI Transmission Zone M-3 Process
Allen Junction – Westgate 138 kV Line

Need Numbers: ATSI-2024-009

Process Stage: Need Meeting – 02/16/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

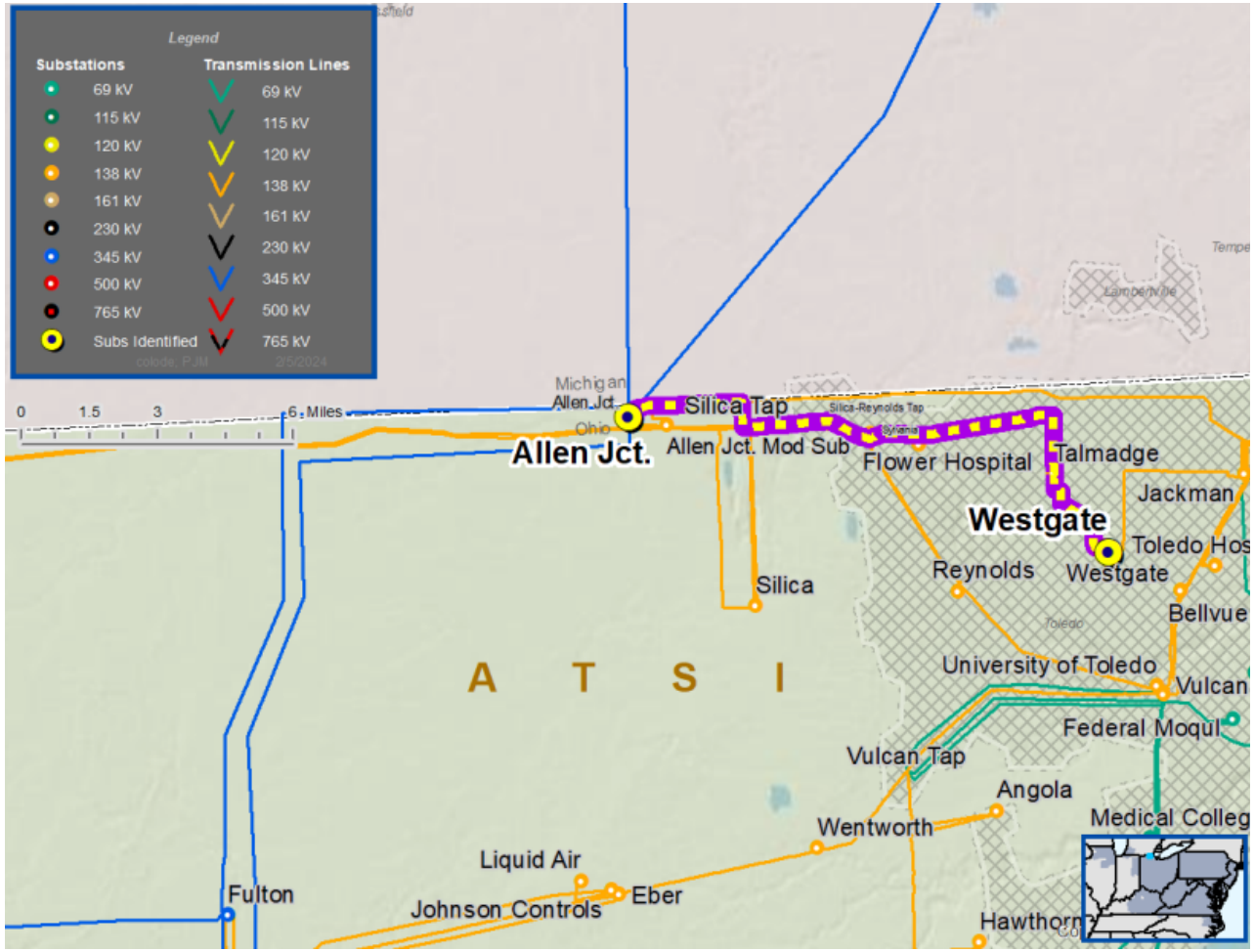
- Substation/line equipment limits

Substation Condition Rebuild/Replacement

- Circuit breakers and other fault interrupting devices

Problem Statement:

- Circuit Breakers B-13374 at Allen Junction Substation and B-13316 at Westgate Substation, associated disconnect switches and protective relaying are approximately 51 years old and have increasing maintenance concerns.
- Transmission lines are limited by terminal equipment.
  - Talmadge – Westgate 138 kV Line section
    - Existing line rating: 278 / 287 / 287 / 287 MVA (SN/SE/WN/WE)
    - Existing conductor rating: 278/ 343 / 327 / 420 MVA (SN/SE/WN/WE)



ATSI Transmission Zone M-3 Process
Cedar Street - Masury - Sharon 69 kV

Need Number: ATSI-2024-014

Process Stage: Need Meeting – 02/16/2024

Supplemental Project Driver(s):

Equipment Material Condition, Performance and Risk

Infrastructure Resilience

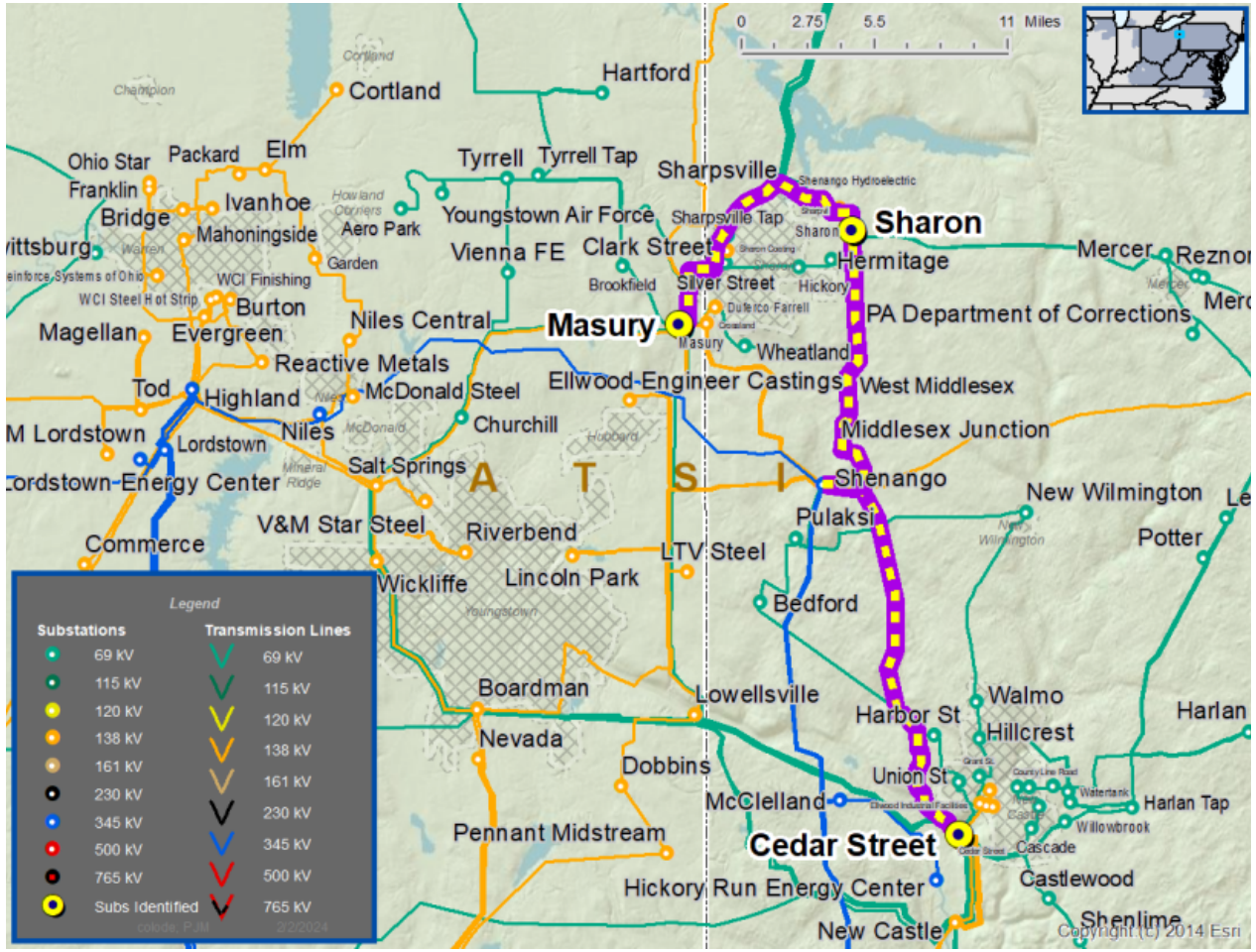
Specific Assumption Reference(s):

Global Factors

- Aged or deteriorated wood pole transmission line structures
- Negatively impact customer outage frequency and/or durations
- Demonstrate an increasing trend in maintenance findings and/or costs
- Transmission line ratings are limited by terminal equipment.

Problem Statement

- The Cedar Street - Masury - Sharon 69 kV Line was constructed in 1951 and is approximately 24 miles in length. This line was constructed utilizing wood poles with a total of 388 structures.
- A comprehensive aerial inspection was completed in 2019 which showed a rising trend in structure shell rot over a 15 mile section of this line. 135 of 235 wood poles over this section had measurable shell rot. Of the remaining 100 poles, 89 have early stages of shell rot.
- Since 2019, the Cedar Street - Masury - Sharon 69 kV Line had Four (4) sustained outages caused by failed AC equipment.



ATSI Transmission Zone M-3 Process
DCB Protection Scheme Projects

Need Number: ATSI-2024-016

Process Stage: Need Meeting 02/16/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption References:

System Performance Projects Global Factors

- System reliability and performance
- Substation / line equipment limits

Upgrade Relay Schemes

- Relay schemes that have a history of mis-operation
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

- Since 2018, there have been ten reportable mis-operations in ATSI due to power line carrier communication (PLC) issues and several other PLC systems have concerning health issues based on alarm and maintenance records.
- Per NATF reporting, DCB schemes are the most common protection scheme to mis-operate accounting for over 31% of all reported mis-operations.
- From 2014-2018, 2.4% of mis-operations in ATSI were due to the DCB protection scheme. Another 12% of mis-operations were due to communication failures, relay failures and unknowns in a DCB-PLC configuration.

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ATSI Transmission Zone M-3 Process
DCB Protection Scheme Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE / WN / WE)	Existing Conductor Rating (SN / SE / WN/ WE)
ATSI-2024-016	Materion Tap – New Departure 138 kV Line	189 / 230 / 219 / 249	189 / 230 / 219 / 278

ATSI Transmission Zone M-3 Process
Cedar St - Lowellville South 69 kV

Need Number: ATSI-2024-017

Process Stage: Need Meeting – 02/16/2024

Supplemental Project Driver(s):

Equipment Material Condition, Performance and Risk

Infrastructure Resilience

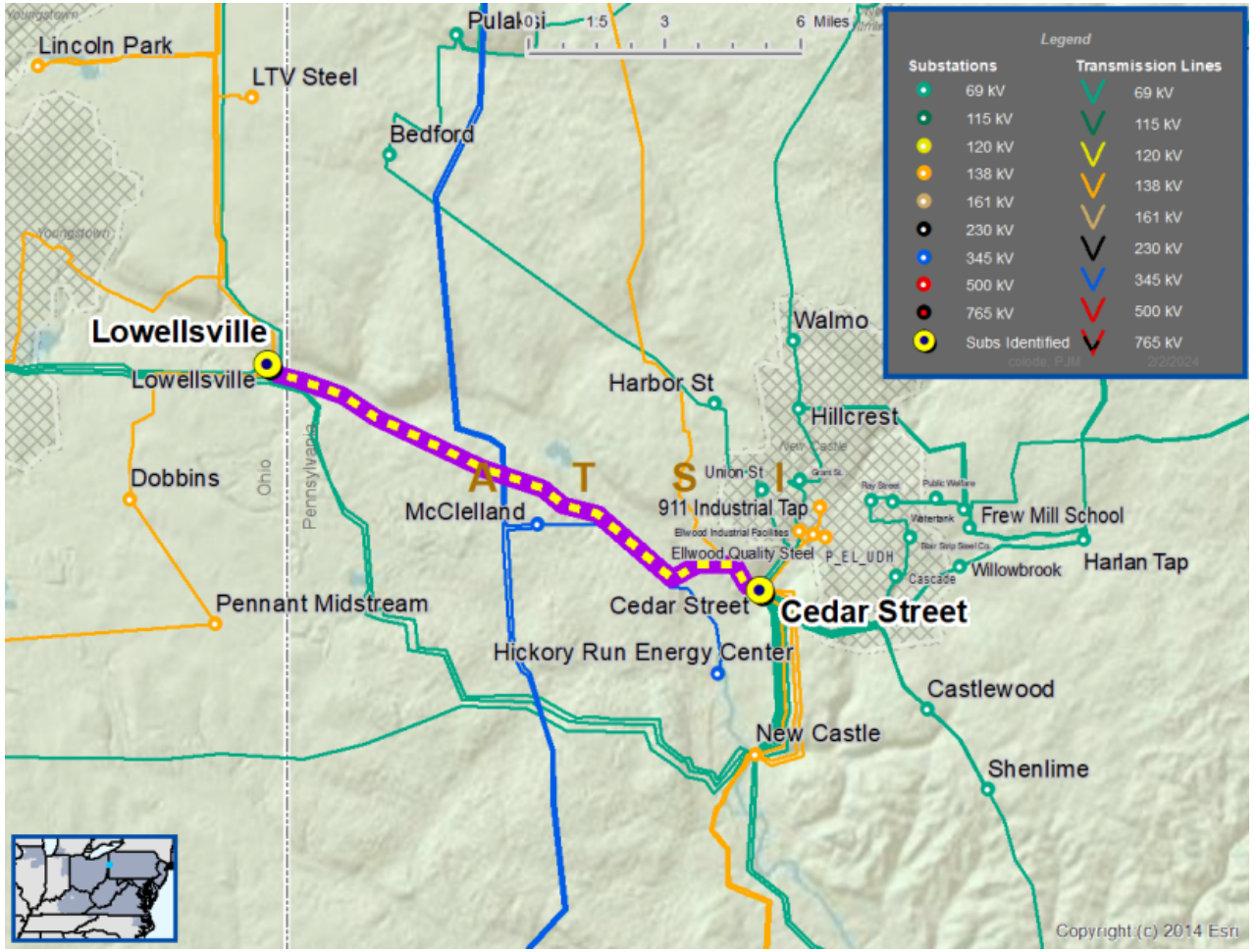
Specific Assumption Reference(s):

Global Factors

- Aged or deteriorated wood pole transmission line structures
- Negatively impact customer outage frequency and/or durations
- Demonstrate an increasing trend in maintenance findings and/or costs
- Transmission line ratings are limited by terminal equipment.

Problem Statement

- The Cedar St - Lowellville South 69 kV Line was constructed in 1960 and is approximately 9.5 miles in length. This line was constructed utilizing wood poles with a total of 100 structures.
- Assessment found 89 of 101 wood poles had defects that could negatively affect reliability. Defects included decay, top rot and multiple woodpecker holes.
- Since 2019, the Cedar St - Lowellville South 69 kV Line had three sustained outages



ATSI Transmission Zone M-3 Process
London – Tangy 138 kV Line New Customer Connection

Need Number: ATSI-2024-020

Process Stage: Need Meeting – 2/16/2024

Project Driver:

Customer Service

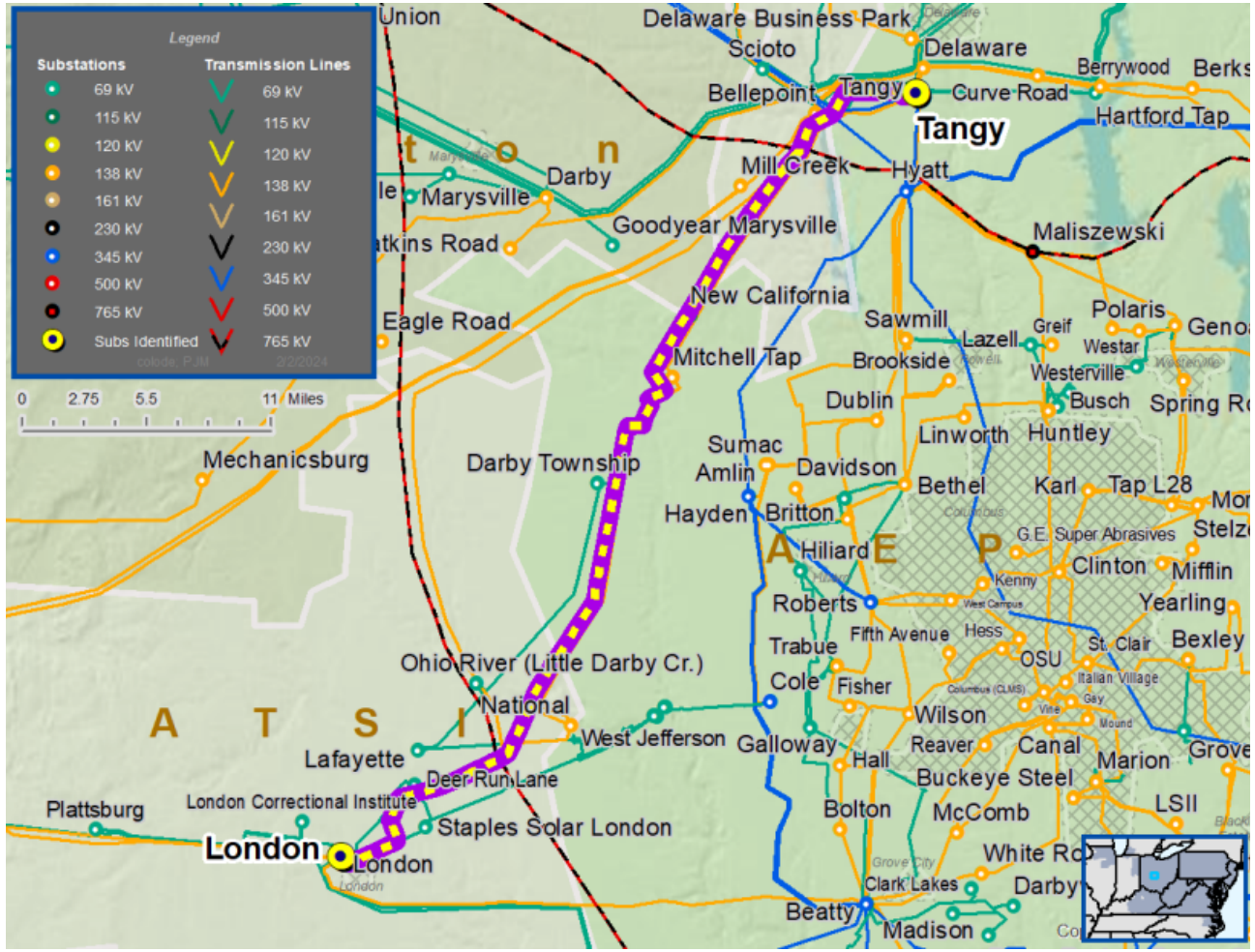
Specific Assumption Reference:

New Customer 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 has requested a new 138 kV delivery point near the London – Tangy 138 kV Line. The anticipated load of the new customer connection is 12 MVA.

Requested in-service date is 6/1/2024.



ATSI Transmission Zone M-3 Process
London – Tangy 138 kV Line New Customer Connection

Need Number: ATSI-2024-028

Process Stage: Need Meeting – 02/16/2024

Supplemental Project Driver(s):

Customer Service

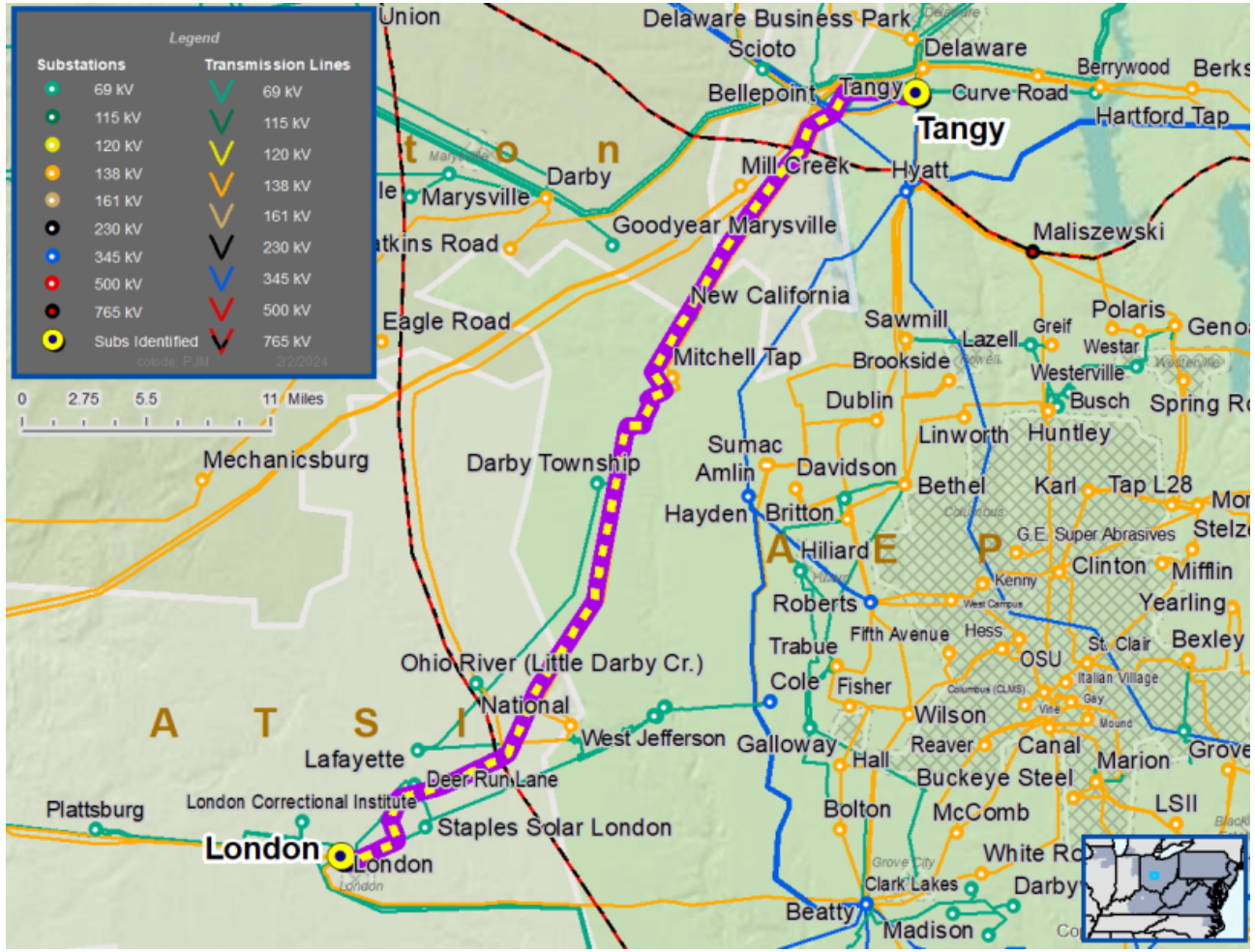
Specific Assumption Reference(s):

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 – Customer is requesting a temporary connection on the London – Tangy 138 kV Line for approximately 8 months. The anticipated load of the new customer connection is 30 MVA.

Requested in-service date is 6/1/2024.



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

ATSI Transmission Zone M-3 Process
Gilchrist – Star 69 kV Line

Need Number: ATSI-2022-028
Process Stage: Solutions Meeting – 02/16/2024
Previously Presented: Need Meeting– 10/14/2022

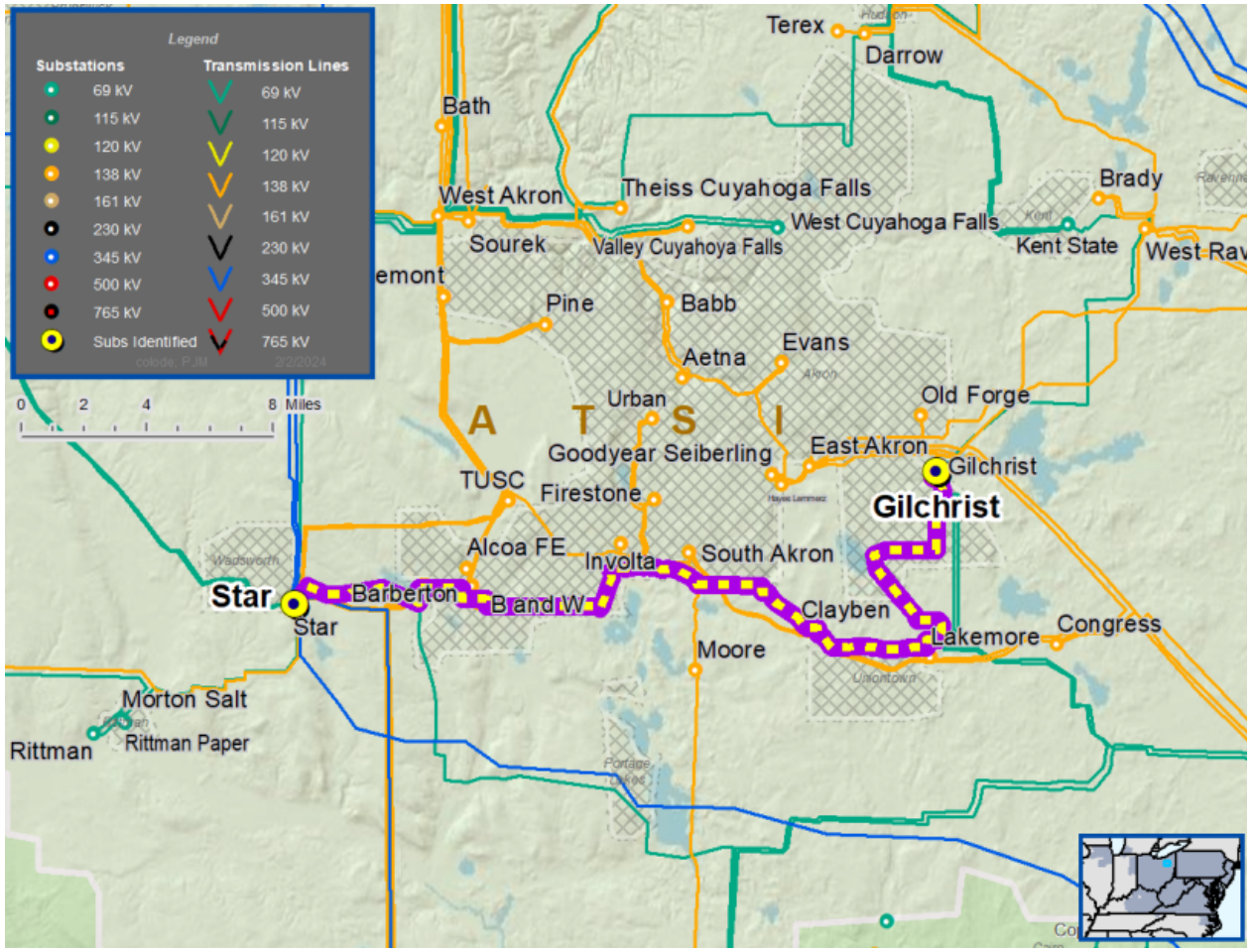
Supplemental Project Driver(s):
Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)
Line Condition Rebuild / Replacement

- Aged or deteriorated transmission line structures
- Negatively impact customer outage frequency and/or durations
- Demonstrate an increasing trend in maintenance findings and/or costs
- Transmission line ratings are limited by terminal equipment.

Problem Statement:
The Gilchrist-Star 69 kV Line is approximately 25 miles in length:

- Line survey in 2020 showed a structure reject rate of 89% (413 of 461). The primary reasons for reject were wood pole deterioration, woodpecker holes, ground system damage, and decay damage.
- Since 2017, there has been a total of eight (8) momentary and six (6) sustained unscheduled outages on the line.
- Transmission line switches are obsolete and limiting the transmission line rating.



ATSI Transmission Zone M-3 Process
Gilchrist – Star 69 kV Line

Need Number: ATSI-2022-028

Process Stage: Solutions Meeting – 02/16/2024

Proposed Solution:

Gilchrist-Star 69 kV Line

- Rebuild the Gilchrist – Star 69 kV Line with new conductor.
- Replace A-42, A-87, A-86, A-38 switches with new switches equipped with SCADA Control & Motor Operation.

Gilchrist Substation

- Replace 69 kV breaker B23

Transmission Line Ratings:

Gilchrist – McKnights 69 kV Line

- Before Proposed Solution: 80 / 96 / 90 / 114 MVA (SN/SE/WN/WE)
- After Proposed Solution: 111 / 134 / 125 / 159 MVA (SN/SE/WN/WE)

McKnights – Rochling Automotive 69 kV Line

- Before Proposed Solution: 80 / 96 / 90 / 114 MVA (SN/SE/WN/WE)
- After Proposed Solution: 111 / 134 / 125 / 159 MVA (SN/SE/WN/WE)

Rochling Automotive – Portage Lakes 69 kV Line

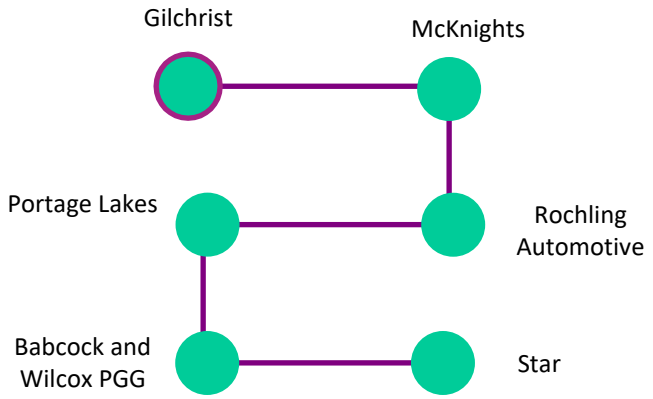
- Before Proposed Solution: 74 / 76 / 83 / 83 MVA (SN/SE/WN/WE)
- After Proposed Solution: 111 / 134 / 125 / 159 MVA (SN/SE/WN/WE)

Portage Lakes – Babcock and Wilcox PGG 69 kV Line

- Before Proposed Solution: 74 / 76 / 83 / 83 MVA (SN/SE/WN/WE)
- After Proposed Solution: 111 / 134 / 125 / 159 MVA (SN/SE/WN/WE)

Babcock and Wilcox PGG – Star 69 kV Line

- Before Proposed Solution: 74 / 76 / 83 / 83 MVA (SN/SE/WN/WE)
- After Proposed Solution: 111 / 134 / 125 / 159 MVA (SN/SE/WN/WE)



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

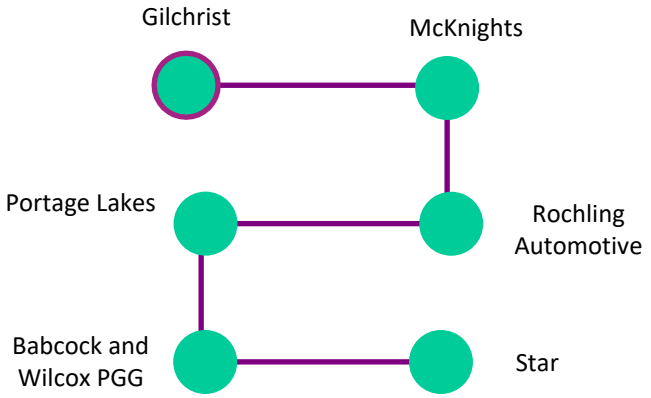
ATSI Transmission Zone M-3 Process
Gilchrist – Star 69 kV Line

Need Number: ATSI-2022-028
Process Stage: Solutions Meeting – 02/16/2024
Previously Presented: Need Meeting– 10/14/2022

Alternatives Considered:

- Maintain existing condition and elevated risk of failure.

Estimated Project Cost:	$62.5 M
Projected In-Service:	12/1/2027
Status:	Conceptual
Model:	2023 RTEP model for 2028 Summer (50/50)



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

ATSI Transmission Zone M-3 Process
Chamberlin 69 kV Breakers

Need Numbers: ATSI-2023-028

Process State: Solution Meeting 02/16/2024

Previously Presented: Need Meeting 11/17/2023

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

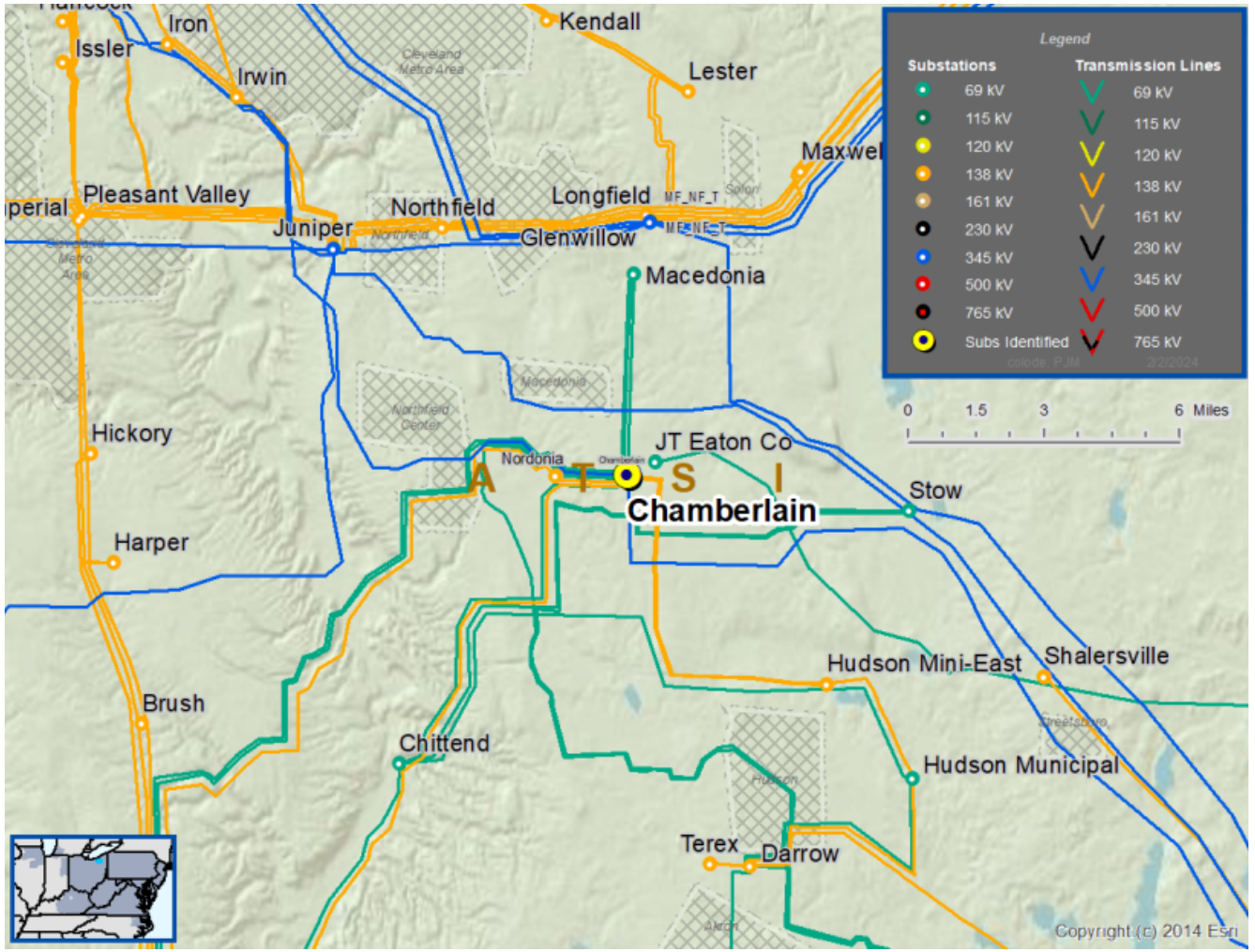
- Substation/line equipment limits

Substation Condition Rebuild/Replacement

- Circuit breakers and other fault interrupting devices

Problem Statement:

- The 69 kV Oil Circuit Breaker B-31, B-39 and B-74, associated disconnect switches and protective relaying at Chamberlin Substation are aging with increasing maintenance concerns. The equipment is 43 years old.
- Transmission line ratings are limited by terminal equipment.



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ATSI Transmission Zone M-3 Process
Chamberlin 69 kV Breakers

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE / WN / WE)	Existing Conductor Rating (SN / SE / WN / WE)
ATSI-2023-028	Chamberlin – Plastic Materials Tap 69 kV Line Section	82 / 103 / 108 / 124	110 / 134 / 127 / 162
	Chamberlin - Verizon Tap 69 kV Line Section	95 / 100 / 100 / 100	95 / 115 / 109 / 139
	Chamberlin No. 2 138/69 kV Transformer	163 / 163 / 163 / 163	164 / 174 / 199 / 208

ATSI Transmission Zone M-3 Process
Chamberlin 69 kV Breakers

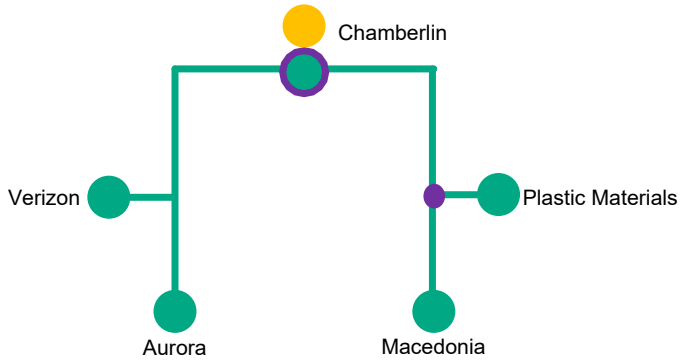
Need Numbers: ATSI-2023-028

Process State: Solution Meeting 02/16/2024

Previously Presented: Need Meeting 11/17/2023

Proposed Solution:

- At Chamberlin Substation, replace 69 kV circuit breakers B-31, B-39 and B-74, associated disconnect switches, limiting conductor and protective relaying for Plastic Materials, Verizon and No. 2 138/69 kV Transformer circuit.
- At Plastic Materials Tap, replace switch A-189.



Ratings:

Need #	Transmission Line / Substation Locations	Existing Ratings (SN / SE / WN / WE)	New Ratings (SN / SE / WN / WE)
ATSI-2023-028	Chamberlin – Plastic Materials Tap 69 kV Line Section	82 / 103 / 108 / 124	110 / 134 / 127 / 162
	Chamberlin - Verizon Tap 69 kV Line Section	95 / 100 / 100 / 100	95 / 115 / 109 / 139
	Chamberlin No. 2 138/69 kV Transformer	163 / 163 / 163 / 163	164 / 174 / 199 / 208

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

Alternatives Considered:

- Maintain existing condition and risk of failure.

Estimated Project Cost: $4.20M

Projected In-Service: 12/31/2024

Status: Engineering

Model: 2023 RTEP Series for 2028

ATSI Transmission Zone M-3 Process
Galion 138 kV Breakers

Need Numbers: ATSI-2023-036

Process Stage: Solutions Meeting – 02/16/2024

Previously Presented: Need Meeting – 11/17/2023

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

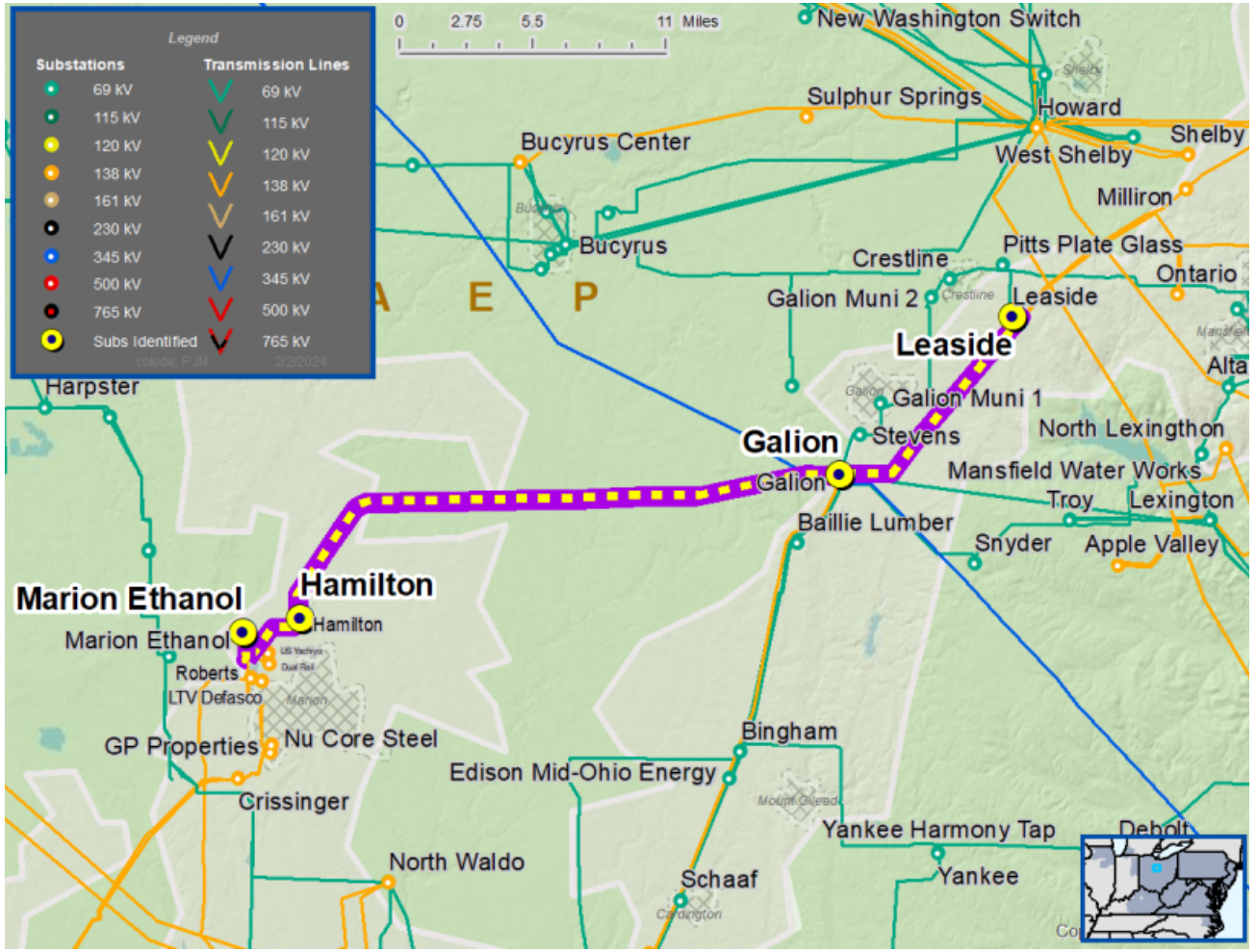
- Substation/line equipment limits

Substation Condition Rebuild/Replacement

- Circuit breakers and other fault interrupting devices

Problem Statement:

- The 138 kV Oil Circuit Breaker B-52, B-55, B-58, B-59 and B-60, Circuit Switchers CS-136 and CS-137, associated disconnect switches and protective relaying at Galion Substation are aging with increasing maintenance concerns. The equipment is 50 years old.
- Transmission line ratings are limited by terminal equipment.



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ATSI Transmission Zone M-3 Process
Galion 138 kV Breakers

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE / WN / WE)	Existing Conductor Rating (SN / SE / WN / WE)
ATSI-2023-036	Galion - Leaside 138 kV Line	251 / 290 / 250 / 306	251 / 290 / 250 / 306
	Galion – Hamilton Tap 138 kV Line Section	195 / 209 / 217 / 229	200 / 242 / 226 / 286
	Galion – Marion Ethanol Tap 138 kV Line Section	160 / 192 / 180 / 228	160 / 192 / 180 / 228
	Galion 345/138 kV Transformer #3	458 / 478 / 478 / 478	606 / 695 / 735 / 828
	Galion 345/138 kV Transformer #4	400 / 478 / 478 / 478	618 / 729 / 743 / 864

ATSI Transmission Zone M-3 Process
Galion 138 kV Breakers

Need Number: ATSI-2023-036

Process Stage: Solution Meeting – 02/16/2024

Proposed Solution:

At Galion:

- Replace 138 kV breakers B-52, B-55, B-58, B-59 and B-60 as well as circuit switchers CS-136 and CS-137.
- Replace and install associated disconnect switches and protective relaying.
- Replace limiting substation conductor.

Transmission Line Ratings:

Galion – Leaside 138 kV Line
- Before Proposed Solution: 251 / 290 / 250 / 306 MVA (SN/SE/WN/WE)
- After Proposed Solution: 251 / 290 / 250 / 306 MVA (SN/SE/WN/WE)

Galion – Hamilton Tap 138 kV Line
- Before Proposed Solution: 195 / 209 / 217 / 229 MVA (SN/SE/WN/WE)
- After Proposed Solution: 200 / 242 / 226 / 286 MVA (SN/SE/WN/WE)

Galion – Marion Ethanol Tap 138 kV Line
- Before Proposed Solution: 160 / 192 / 180 / 228 MVA (SN/SE/WN/WE)
- After Proposed Solution: 160 / 192 / 180 / 228 MVA (SN/SE/WN/WE)

Galion No. 3 345/138 kV Transformer
- Before Proposed Solution: 458 / 478 / 478 / 478 MVA (SN/SLTE/WN/WLTE)
- After Proposed Solution: 606 / 695 / 735 / 828 MVA (SN/SLTE/WN/WLTE)

Galion No. 4 345/138 kV Transformer
- Before Proposed Solution: 400 / 478 / 478 / 478 MVA (SN/SLTE/WN/WLTE)
- After Proposed Solution: 618 / 729 / 743 / 864 MVA (SN/SLTE/WN/WLTE)

Alternatives Considered:

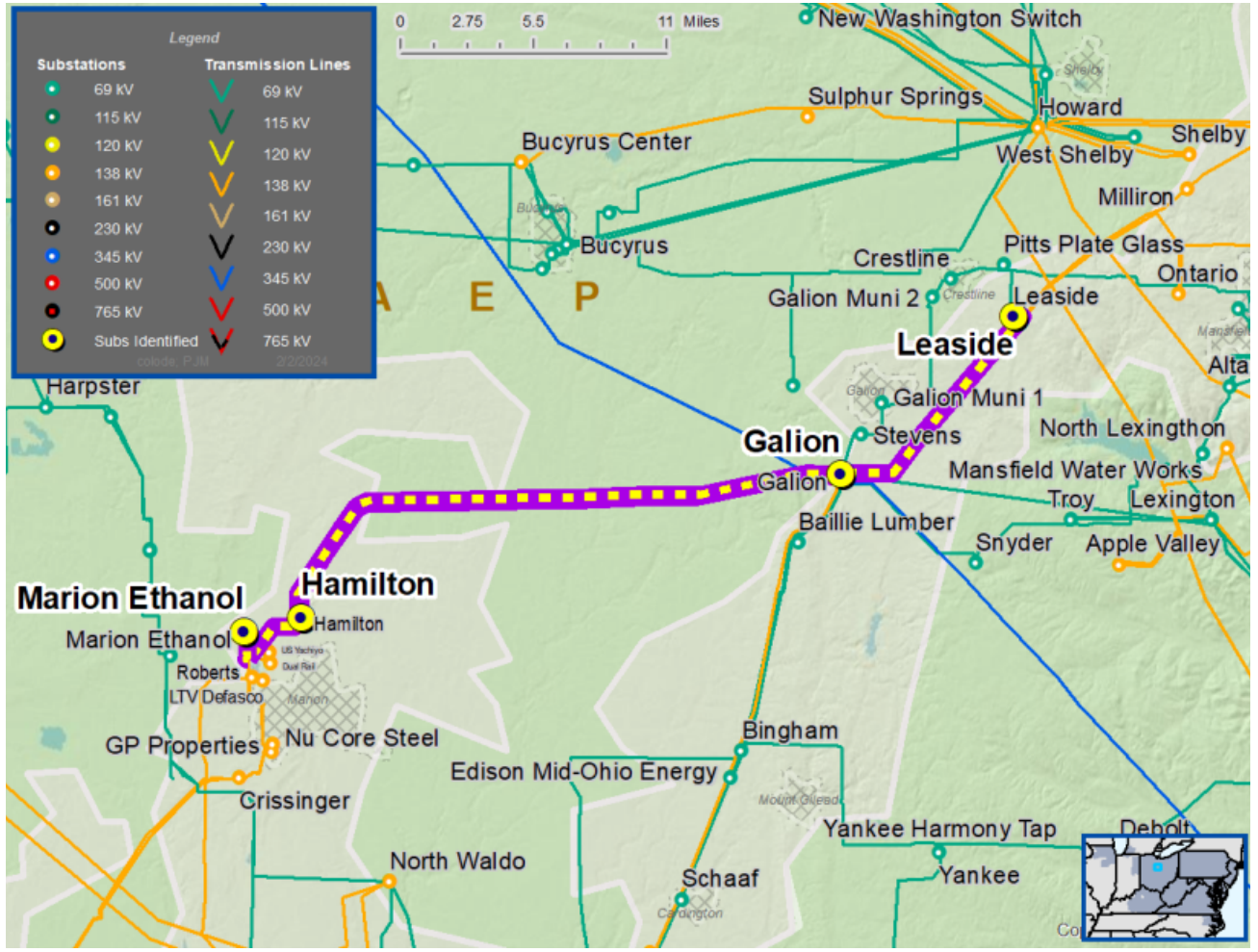
- Maintain existing condition and risk of failure.

Estimated Project Cost: $5.8M

Projected In-Service: 08/08/2025

Project Status: Conceptual

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



ATSI Transmission Zone M-3 Process
Dowling 138 kV Customer Connection

Need Number: ATSI-2023-044

Process Stage: Solution Meeting – 2/16/2024

Previously Presented: Need Meeting – 11/17/2023

Project Driver(s):

Customer Service

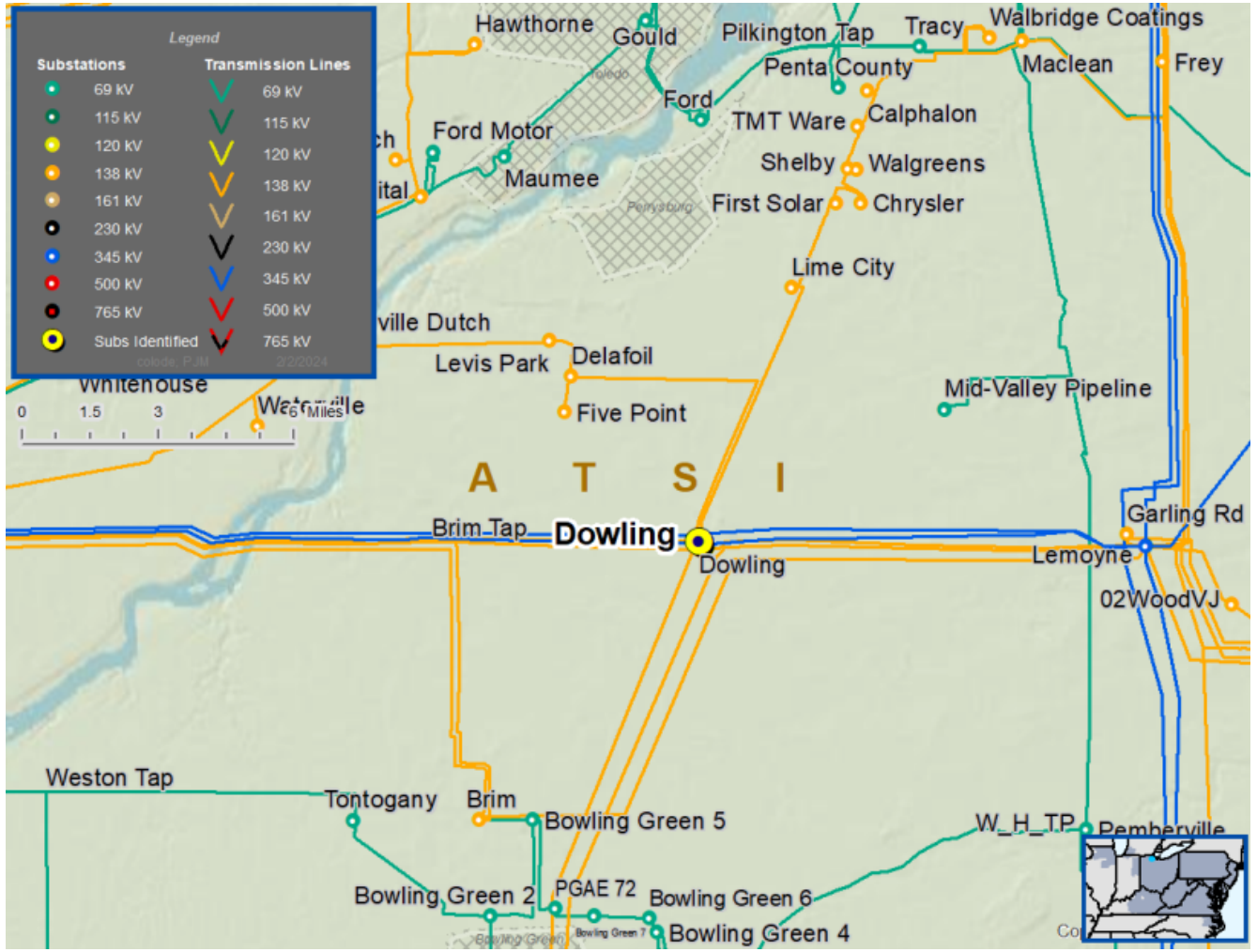
Specific Assumption Reference(s):

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 – A customer has requested a new 138 kV delivery point from the Dowling 138 kV Substation. The anticipated load of the new customer connection is 220 MW.

Requested in-service date is 11/30/2025.



ATSI Transmission Zone M-3 Process
Dowling 138 kV Customer Connection

Need Number: ATSI-2023-044

Process Stage: Solution Meeting – 2/16/2024

Previously Presented: Need Meeting – 11/17/2023

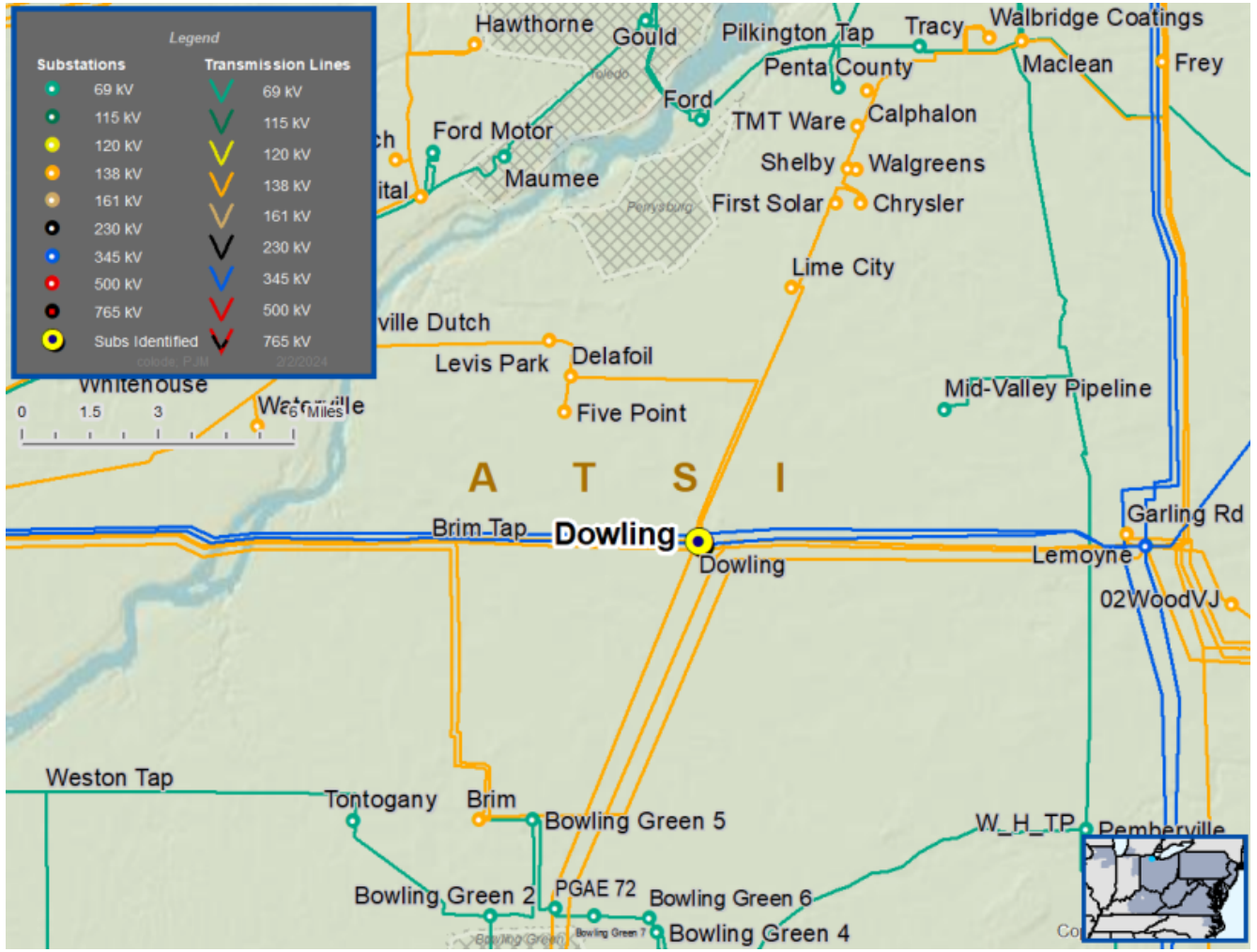
Proposed Solution:

- Expand the existing Dowling Substation to a 12-breaker, breaker-and-a-half substation.
- Build two 138 kV lines, approximately 0.5 miles, from Dowling Substation to the customer substation.

Alternatives Considered:

- No other feasible alternatives due to customer's proximity to Dowling Substation and the magnitude of the load to be served.

Estimated Project Costs:	$10.3M
Project In-Service Date:	11/30/2025
Status:	Engineering
Model:	2023 RTEP model for 2028 Summer (50/50)



ATSI Transmission Zone M-3 Process
Niles Central – Packard 138 kV Line

Need Numbers: ATSI-2024-002

Process Stage: Solutions Meeting – 02/16/2024

Previously Presented : Need Meeting 1/19/2024

Project Driver:

Equipment Condition

Specific Assumption Reference:

Global Considerations

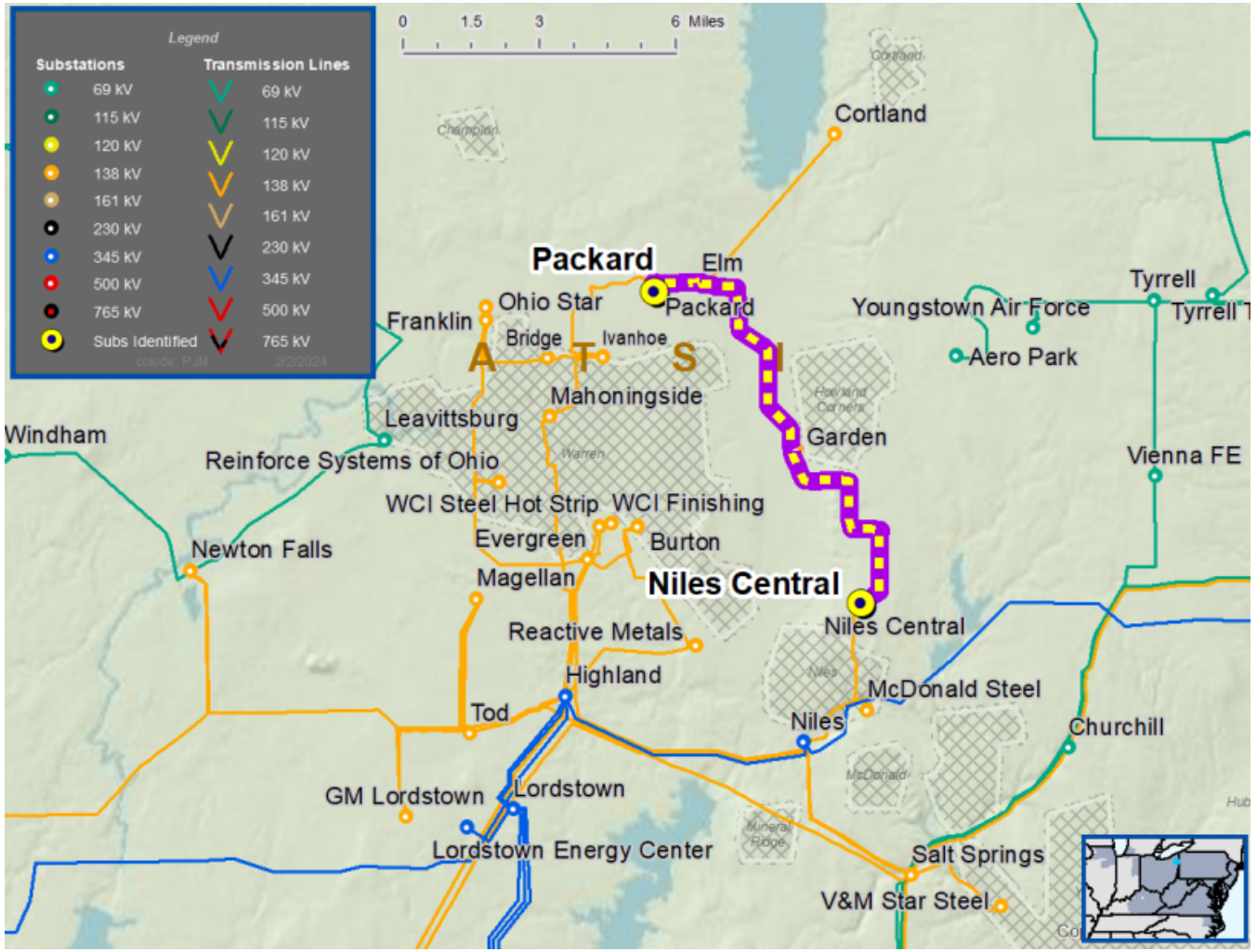
- Past system reliability and performance

Line Condition Rebuild/Replacement

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

Problem Statement:

- The Niles Central – Packard 138 kV Line was built in mid 1950s. 42 of the 83 wood pole structures failed inspection due to decay.
- Since 2005, the Niles Central – Packard 138 kV Line has experienced ten outages. Five of the outages were due to failed line equipment and the other five were weather-related. The last five outage have occurred since 2020 including three in 2023.
- The Niles Central – Packard 138 kV Line main section is 8.9 miles long and the tap to Cortland Substation is an additional 3.9 miles.
- A line fault will cause approximately 53 MW of consequential load loss with approximately 16,000 customers at risk.



ATSI Transmission Zone M-3 Process
Niles Central – Packard 138 kV Line

Need Number: ATSI-2024-002

Process Stage: Solutions Meeting – 02/16/2024

Proposed Solution:

Niles Central – Packard 138 kV Line Rebuild

- Rebuild the Niles Central – Packard 138 kV Line with new conductor, approximately 8.9 miles.

Transmission Line Ratings:

Packard – Elm 138 kV Line

- Before Proposed Solution: 157 / 196 / 198 / 255 MVA (SN/SE/WN/WE)
- After Proposed Solution: 221 / 268 / 250 / 317 MVA (SN/SE/WN/WE)

Elm – Garden 138 kV Line

- Before Proposed Solution: 157 / 196 / 198 / 255 MVA (SN/SE/WN/WE)
- After Proposed Solution: 221 / 268 / 250 / 317 MVA (SN/SE/WN/WE)

Garden – Niles Central 138 kV Line

- Before Proposed Solution: 157 / 196 / 198 / 255 MVA (SN/SE/WN/WE)
- After Proposed Solution: 221 / 268 / 250 / 317 MVA (SN/SE/WN/WE)

Alternatives Considered:

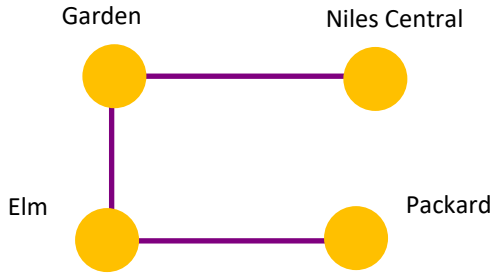
- Maintain existing condition and elevated risk of failure.

Estimated Project Cost: $12.6M

Projected In-Service: 12/31/2025

Status: Conceptual

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



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

ATSI Transmission Zone M-3 Process
Abbe – Medina 69 kV Line Customer Connection

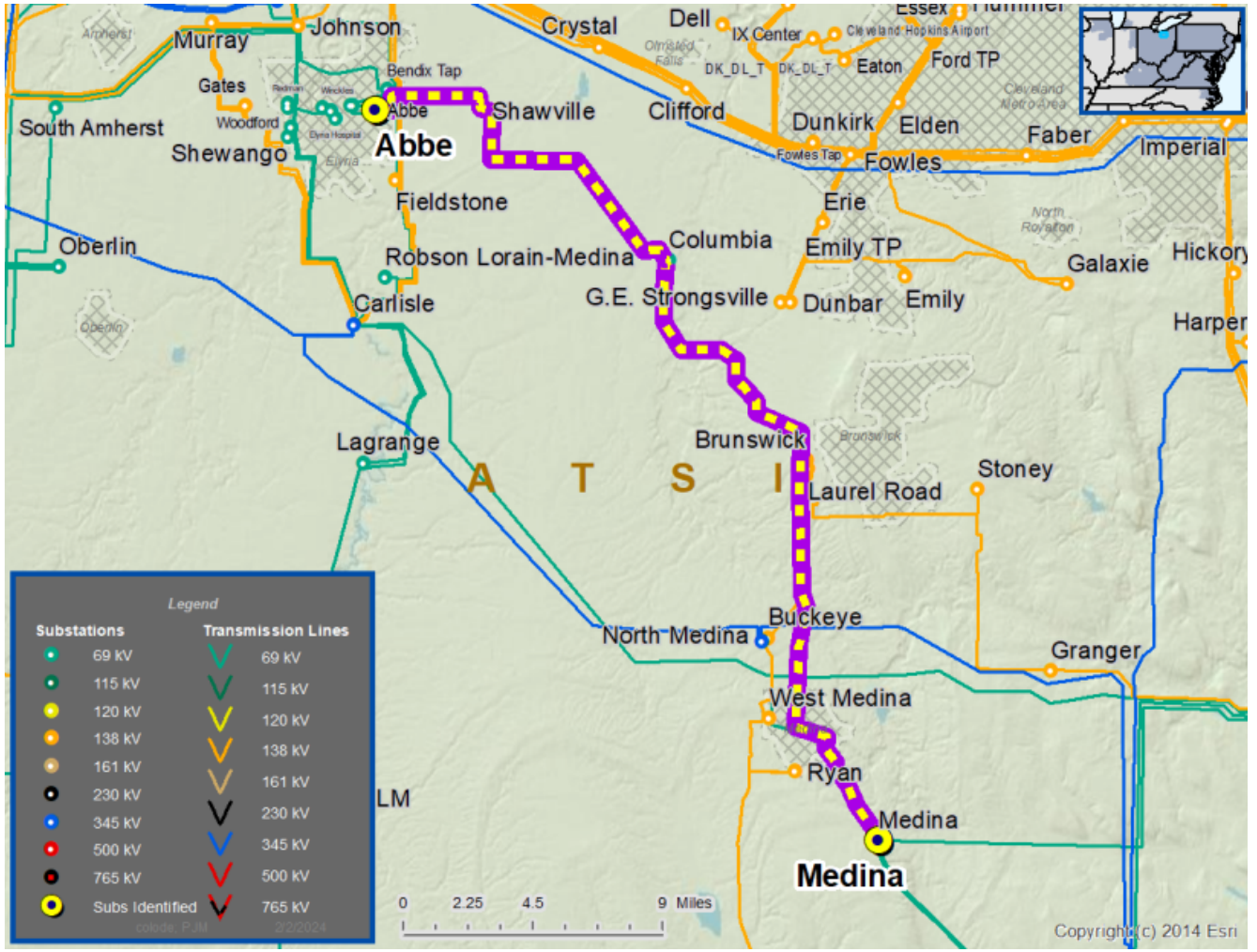
Need Number: ATSI-2024-005
Process Stage: Solution Meeting – 2/16/2024
Previously Presented: Need Meeting – 1/19/2024

Supplemental 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
Customer Connection – A customer has requested a new 69 kV delivery point from the Abbe – Medina 69 kV Line. The Customer is separating from a shared revenue metering point and is requesting a new delivery point along the same transmission line. The load of the customer connection is 3.1 MVA.

Requested In-Service Date:
December 1, 2021



ATSI Transmission Zone M-3 Process
Abbe – Medina 69 kV Line Customer Connection

Need Number: ATSI-2024-005
Process Stage: Solution Meeting – 2/16/2024

Proposed Solution:

- Install one SCADA controlled transmission line switch on existing tap from the Abbe – Medina 69 kV Line.
- Construct approximately 100 ft of transmission line from tap point to the customer substation.

Alternatives considered:

- No feasible alternatives due to customer's proximity to Abbe – Medina 69 kV Line.

Estimated Project Costs: $0.0M
Project In-Service Date: 6/1/2024
Status: Engineering
Model: 2023 RTEP model for 2028 Summer (50/50)

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

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

2/6/2024 - V1 – Original version posted to pjm.com