Subregional RTEP Committee – Western
FirstEnergy Supplemental Projects

May 17, 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
Abbe – Medina 69 kV Line Customer Connection

Need Number: ATSI-2024-036

Process Stage: Need Meeting – 05/17/2024

Supplemental Project Driver(s):

Customer Service

Specific Assumption Reference(s):

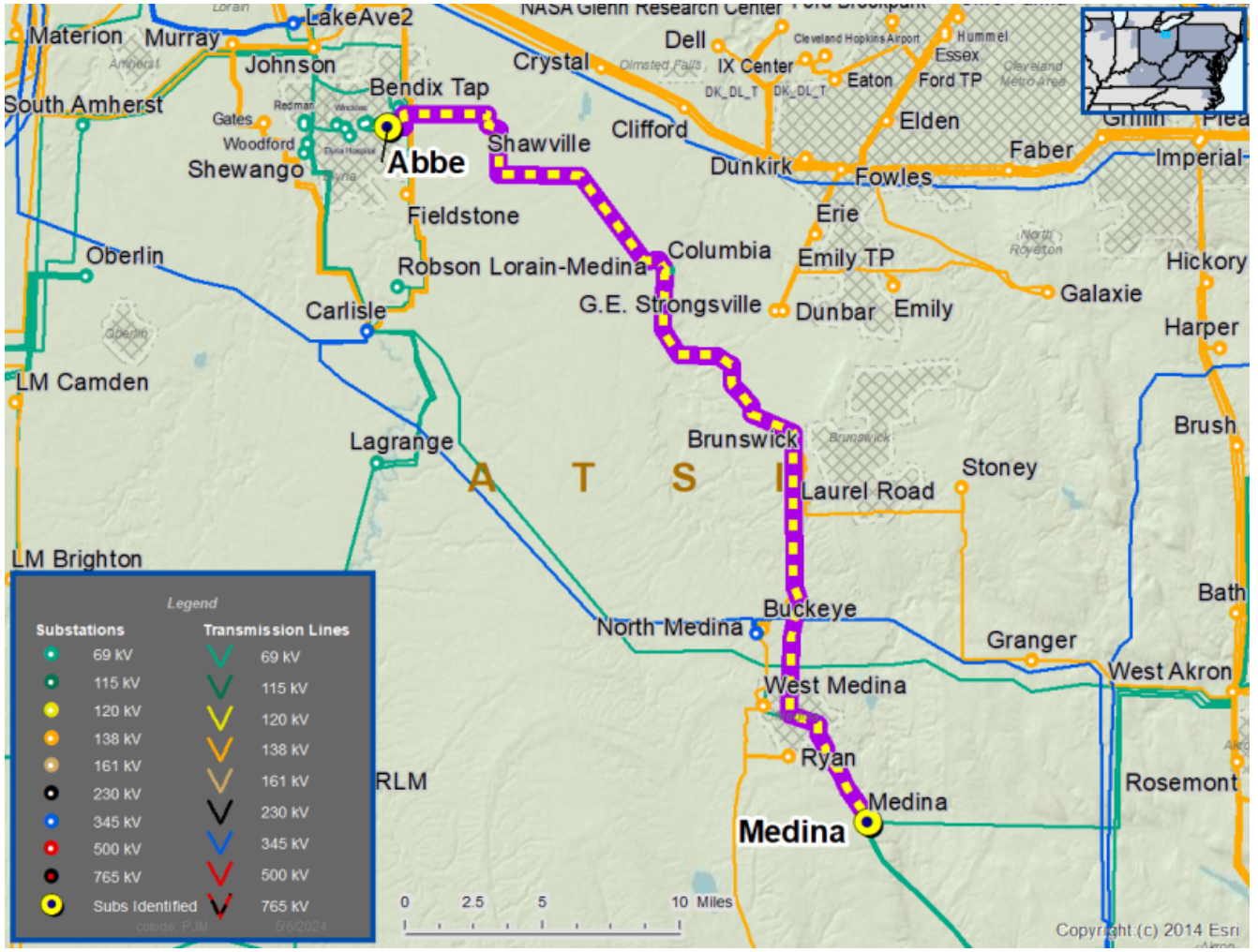
New customer connection request will be evaluated per FirstEnergy's "Requirements for Transmission Connected Facilities" document and "Transmission Planning Criteria" document.

Problem Statement

New Customer Connection – A retail customer requested 69 kV service for load of approximately 5 MVA near the Abbe – Medina 69 kV Line. The service request location is approximately 0.1 miles from Abbe Substation.

Requested In-Service Date:

September 30, 2025



ATSI Transmission Zone M-3 Process
Longview – Nottingham 138 kV Line Customer Connection

Need Number: ATSI-2024-039

Process Stage: Need Meeting – 05/17/2024

Supplemental Project Driver(s):

Customer Service

Specific Assumption Reference(s):

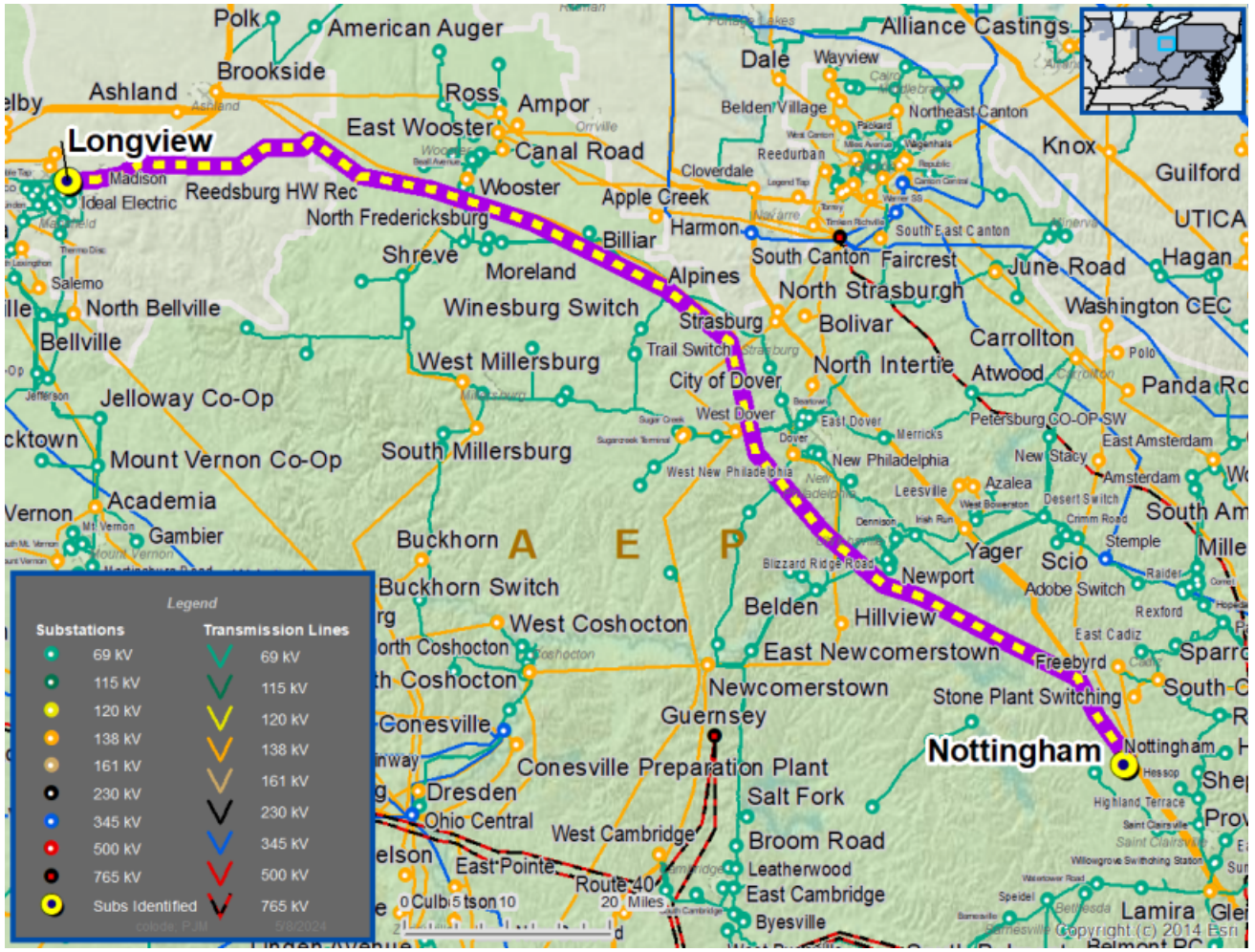
New customer connection request will be evaluated per FirstEnergy's "Requirements for Transmission Connected Facilities" document and "Transmission Planning Criteria" document.

Problem Statement

New Customer Connection – Ohio Edison distribution requested 138 kV service for load of approximately 6 MVA near the Longview – Nottingham 138 kV Line. The service request location is approximately 200 feet from Longview Substation.

Requested In-Service Date:

June 1, 2026



ATSI Transmission Zone M-3 Process
Cardington – Galion 138 kV Line Customer Connection

Need Number: ATSI-2024-040

Process Stage: Need Meeting – 05/17/2024

Supplemental Project Driver(s):

Customer Service

Specific Assumption Reference(s):

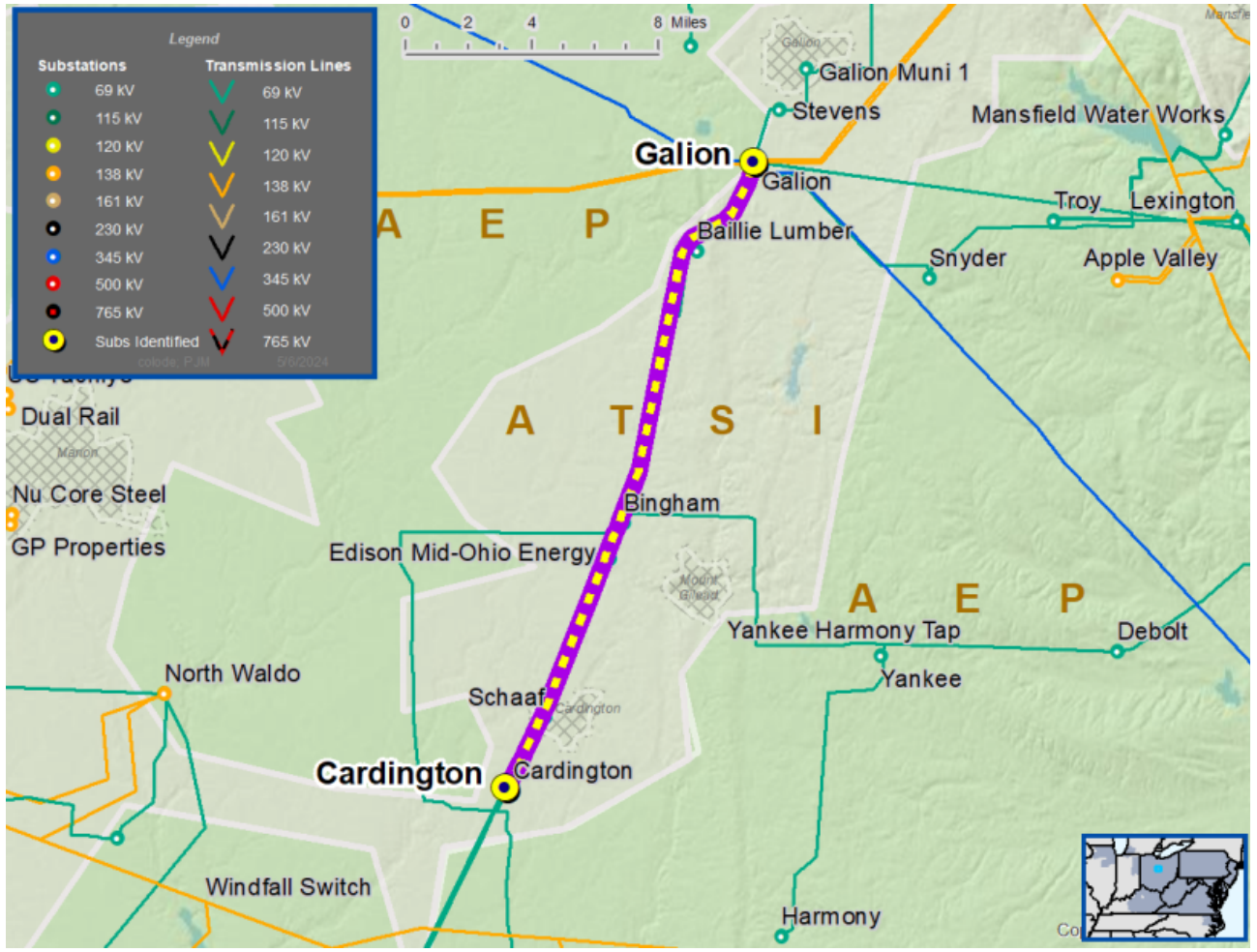
New customer connection request will be evaluated per FirstEnergy's "Requirements for Transmission Connected Facilities" document and "Transmission Planning Criteria" document.

Problem Statement

New Customer Connection – Ohio Edison distribution requested 138 kV service for load of approximately 6 MVA near the Cardington – Galion 138 kV Line. The service request location is approximately 0.1 miles from Cardington Substation.

Requested In-Service Date:

June 1, 2026



ATSI Transmission Zone M-3 Process
Cloverdale – Harmon 138 kV Line Customer Connection

Need Number: ATSI-2024-041

Process Stage: Need Meeting – 05/17/2024

Supplemental Project Driver(s):

Customer Service

Specific Assumption Reference(s):

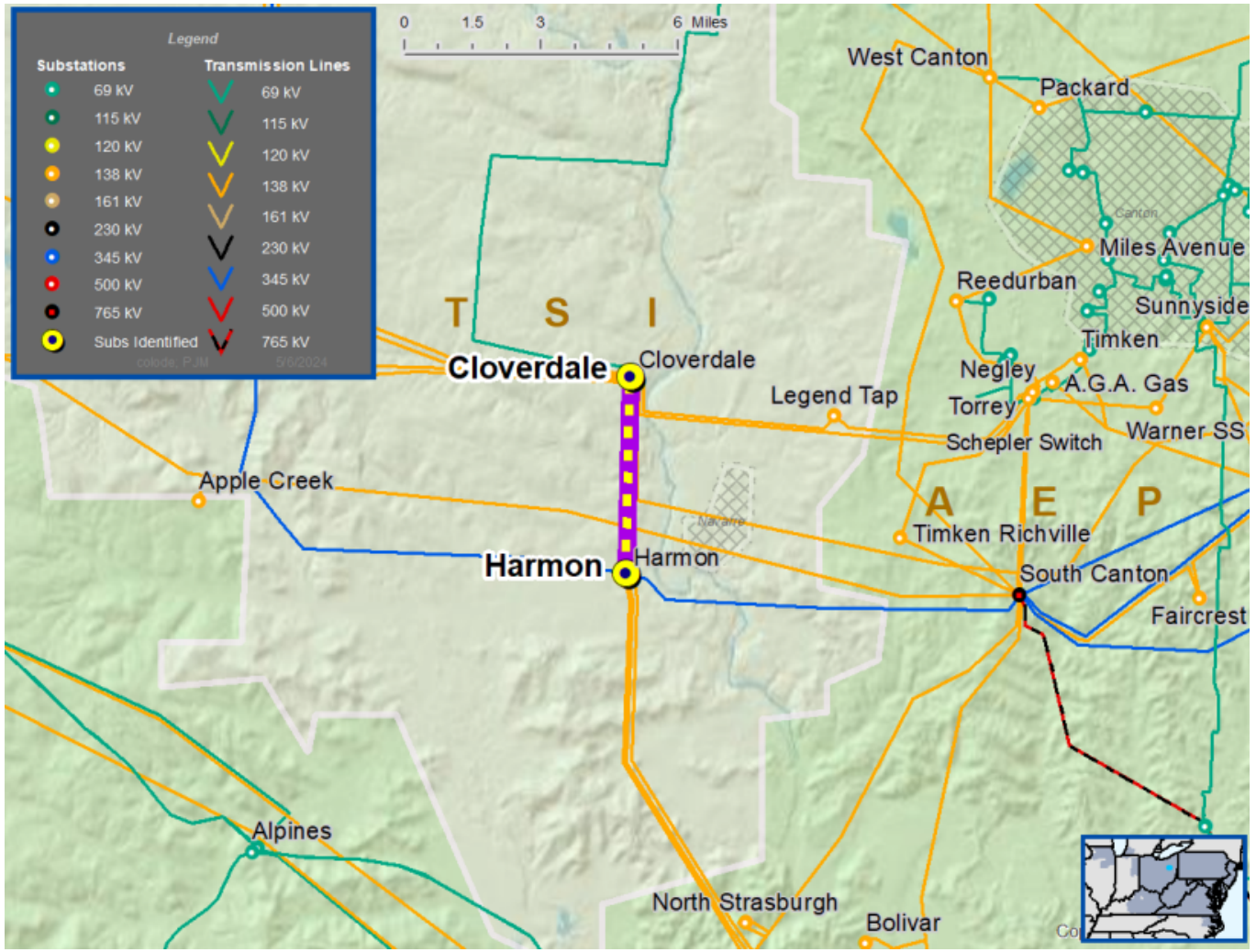
New customer connection request will be evaluated per FirstEnergy's "Requirements for Transmission Connected Facilities" document and "Transmission Planning Criteria" document.

Problem Statement

New Customer Connection – Ohio Edison distribution requested 138 kV service for load of approximately 11 MVA near the Cloverdale - Harmon 138 kV Line. The service request location is approximately 1 mile from Cloverdale Substation.

Requested In-Service Date:

December 31, 2025



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
Milton – Newton Falls 69 kV Line

Need Number: ATSI-2022-027
Process Stage: Solutions Meeting – 05/17/2024
Previously Presented: Need Meeting– 10/14/2022

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

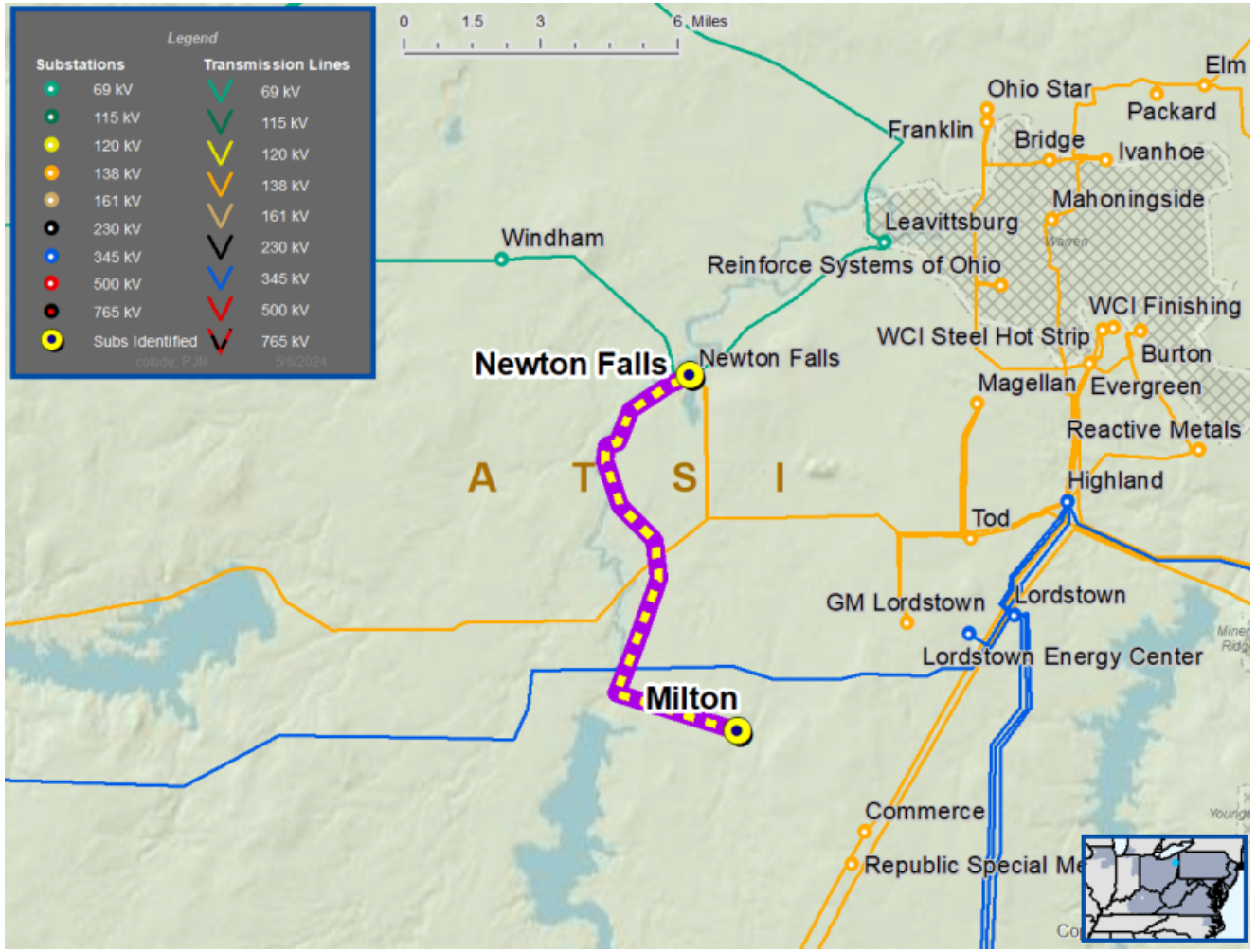
Specific Assumption Reference(s):
Global Factors

- 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 Milton – Newton Falls 69 kV Line is approximately 27.3 miles in length:

- Assessment found 70 of 343 wood poles had defects that could negatively affect reliability. Defects included decay, top rot and multiple woodpecker holes.
- 313 wood poles nearing end of life; Original poles date 1970 (50+ years at construction).
- 23 maintenance records including 13 pole replacements in last 5 years indicating upward trend in maintenance.
- There are four delivery points with approximately 6,538 customers and 44.65 MVA of load served.
- Since 2017, the Milton – Newton Falls 69 kV Line had six momentary and five sustained outages.



ATSI Transmission Zone M-3 Process
Milton – Newton Falls 69 kV Line

Need Number: ATSI-2022-027

Process Stage: Solutions Meeting – 05/17/2024

Proposed Solution:

Milton – Newton Falls 69 kV Line Rebuild

- Rebuild approximately 27.3 miles of Milton – Newton Falls 69 kV Line
- Replace line relaying at Milton Substation on the Newton Falls terminal

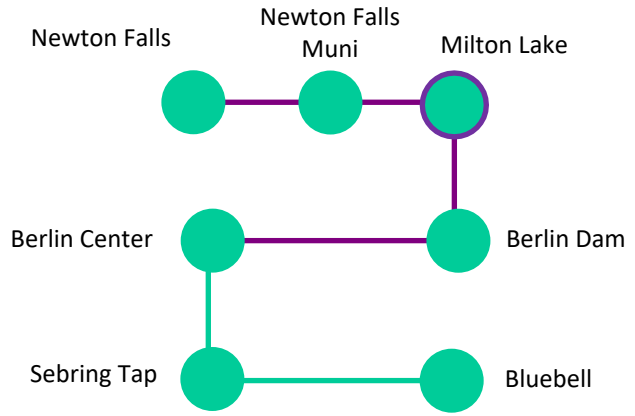
Transmission Line Ratings:

- **Newton Falls – Newton Falls Muni 69 kV Line**
  - Before Proposed Solution: 45 MVA SN / 48 MVA SE / 48 MVA WN / 48 MVA WE
  - After Proposed Solution: 80 MVA SN / 96 MVA SE / 90 MVA WN / 114 MVA WE
- **Newton Falls Muni – Milton Lake 69 kV Line**
  - Before Proposed Solution: 45 MVA SN / 54 MVA SE / 51 MVA WN / 65 MVA WE
  - After Proposed Solution: 80 MVA SN / 96 MVA SE / 90 MVA WN / 114 MVA WE
- **Berlin Dam – Milton Lake 69 kV Line**
  - Before Proposed Solution: 45 MVA SN / 54 MVA SE / 51 MVA WN / 65 MVA WE
  - After Proposed Solution: 80 MVA SN / 96 MVA SE / 90 MVA WN / 114 MVA WE
- **Berlin Dam – Berlin Center 69 kV Line**
  - Before Proposed Solution: 45 MVA SN / 54 MVA SE / 51 MVA WN / 65 MVA WE
  - After Proposed Solution: 80 MVA SN / 96 MVA SE / 90 MVA WN / 114 MVA WE

Alternatives Considered:

- Maintain existing condition and elevated risk of failure due to structure deterioration.

Estimated Project Cost:	$45.92 M
Projected In-Service:	12/29/2028
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
Misoperation Relays Projects

Need Number: ATSI-2024-008

Process Stage: Solution Meeting – 05/17/2024

Previously Presented: 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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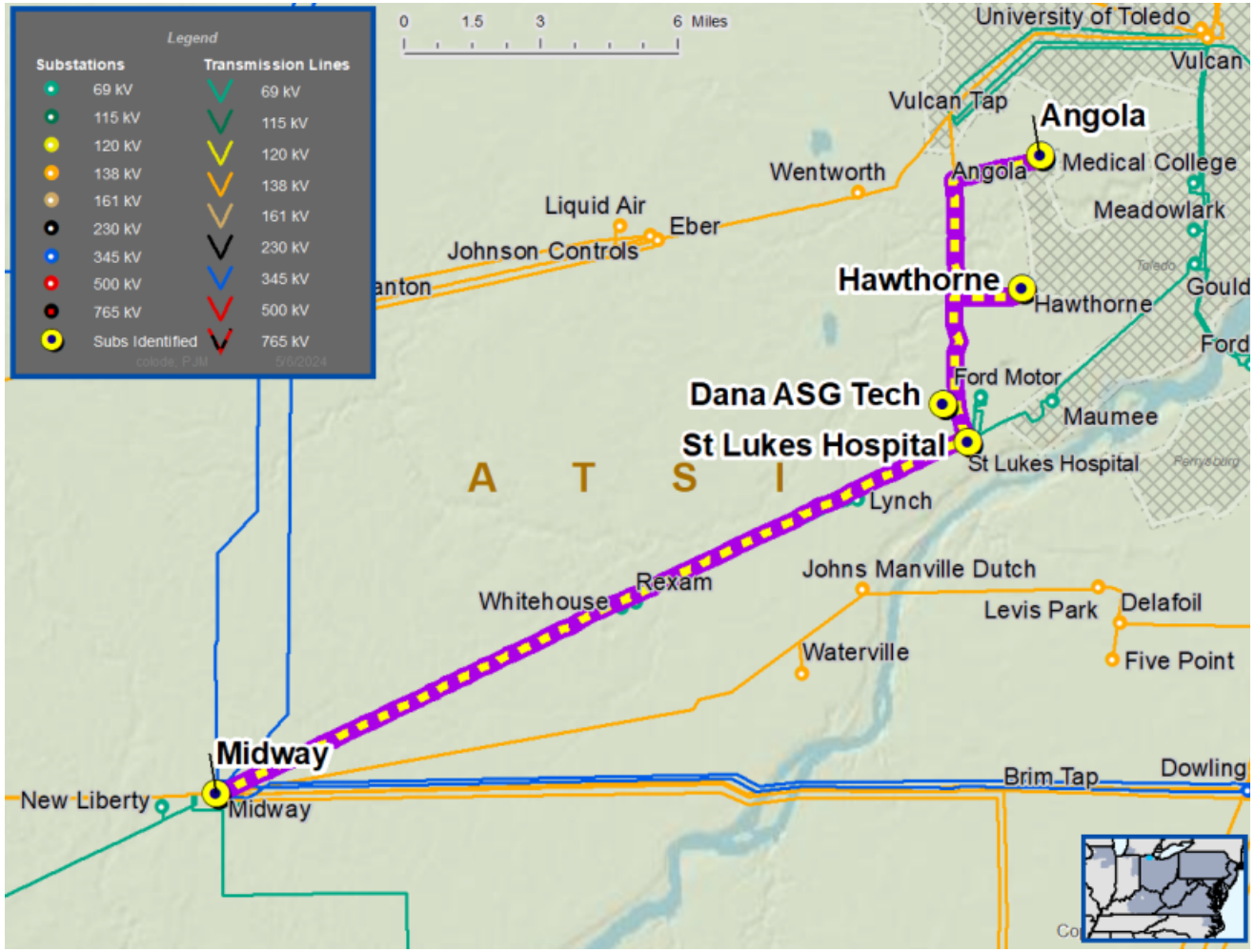


ATSI Transmission Zone M-3 Process
Misoperation Relays Projects

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-2024-008	Hawthorne – Dana Asg Tap 138 kV Line	288 / 353 / 333 / 427	288 / 353 / 333 / 427
ATSI-2024-008	Dana Asg Tap – St Lukes Tap 138 kV Line	288 / 353 / 333 / 427	288 / 353 / 333 / 427
ATSI-2024-008	St Lukes Tap – Midway 138 kV Line	288 / 353 / 333 / 427	288 / 353 / 333 / 427

ATSI Transmission Zone M-3 Process
Angola- Midway 138 kV Misoperation Relays

Need Number: ATSI-2024-008

Process Stage: Solutions Meeting – 05/17/2024

Proposed Solution:

Angola

- Replace circuit switcher with a new circuit breaker, replace line trap, limiting substation conductor and line relaying.

Midway

- Replace circuit breaker and associated disconnect switches, replace line trap and line relaying.

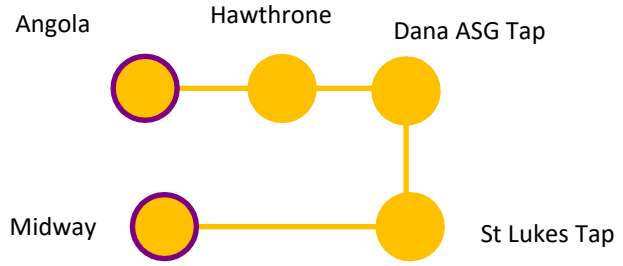
Transmission Line Ratings:

- **Angola- Hawthorne 138 kV Line Section**
  - Before Proposed Solution: 287 / 342 / 342 / 380 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 288 / 353 / 333 / 427 MVA (SN/SE/WN/WE)

Alternatives Considered:

- Maintain existing condition with elevated risk of equipment misoperation.

Estimated Project Cost:	$3.42 M
Projected In-Service:	04/01/2029
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
Galion – Roberts North 138 kV Line and Galion – Roberts South 138 kV Line

Need Number: ATSI-2024-024

Process Stage: Solutions Meeting – 05/17/2024

Previously Presented: Need Meeting – 03/15/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s):

System Performance Global Factors

- Past system reliability/performance
- Substation/line equipment limits

Line Condition Rebuild/Replacement

- Age/condition of wood pole transmission line structures

Problem Statement

- The double circuit Galion – Roberts North 138 kV Line and Galion – Roberts South 138 kV Line were constructed in 1948. The lines are approximately 22.2 miles in length with 129 shared wooden structures.
- Recent inspections have indicated that the conductor and armor rod on the line have experienced aeolian vibrations, resulting in concentrated stress on the conductor and armor rod in various locations. As the temperature of the conductor material is increased, the overall tensile strength decreases and causes tensile overload and the failure of the conductor.
- Since 2019, the Galion – Roberts North 138 kV Line had six unscheduled sustained outages.
- Since 2019, the Galion – Roberts South 138 kV Line had two unscheduled sustained outages.

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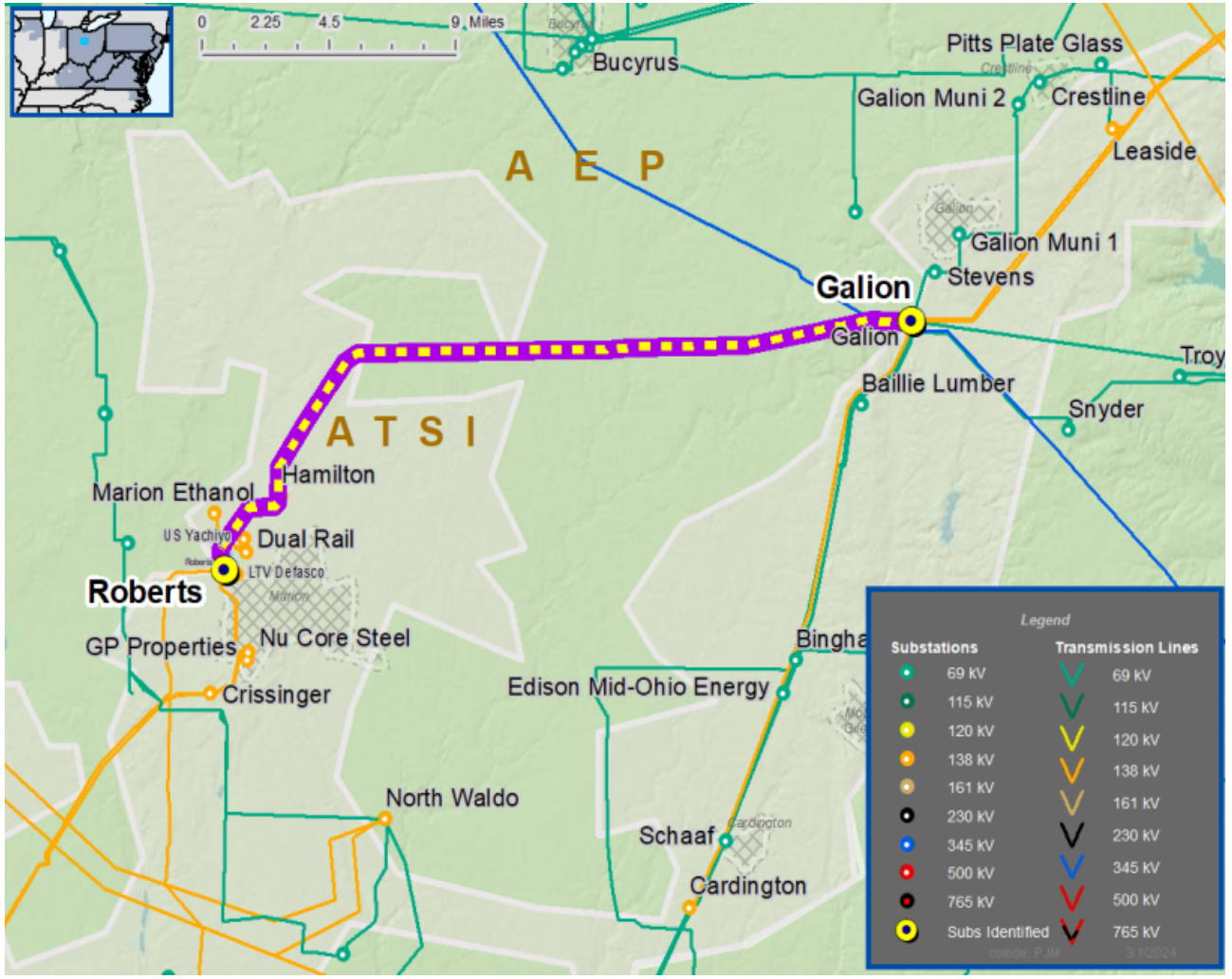


ATSI Transmission Zone M-3 Process
Galion – Roberts North 138 kV Line and Galion – Roberts South 138 kV Line

Need Number: ATSI-2024-024

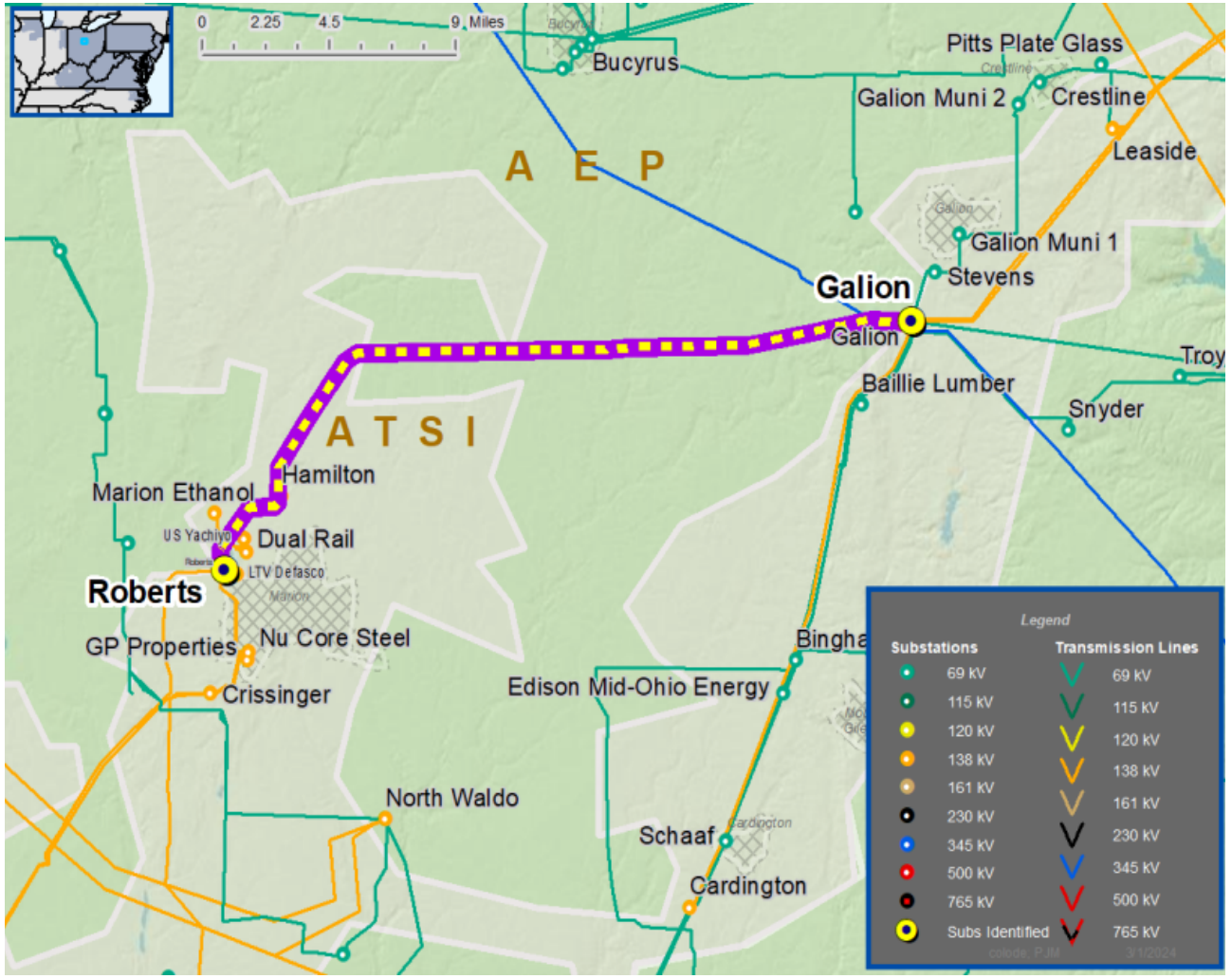
Process Stage: Solutions Meeting – 05/17/2024

Previously Presented: Need Meeting – 03/15/2024

Transmission Line Ratings:

- Existing Galion – Marion Ethanol 138 kV Line Rating:
  - 160 / 192 / 180 / 228 MVA (SN/SE/WN/WE)
- Existing Marion Ethanol – Roberts North 138 kV Line Rating:
  - 160 / 192 / 180 / 228 MVA (SN/SE/WN/WE)

- Existing Galion – Hamilton Tap 138 kV Line Rating:
  - 195 / 209 / 217 / 229 MVA (SN/SE/WN/WE)
- Existing Hamilton Tap – Dual Rail Tap 138 kV Line Rating:
  - 200 / 242 / 226 / 286 MVA (SN/SE/WN/WE)
- Existing Dual Rail Tap – Roberts South 138 kV Line Rating:
  - 195 / 209 / 217 / 229 MVA (SN/SE/WN/WE)



ATSI Transmission Zone M-3 Process
Galion – Roberts North 138 kV Line and Galion – Roberts South 138 kV Line

Need Number: ATSI-2024-024

Process Stage: Solutions Meeting – 05/17/2024

Proposed Solution:

Galion – Roberts North 138 kV Line and Galion – Roberts South 138 kV Line

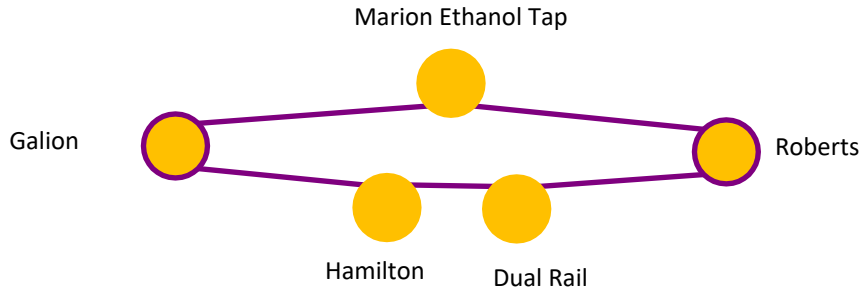
- Rebuild the double circuit Galion – Roberts North 138 kV Line and Galion – Roberts South 138 kV Line on shared structures.

Galion

- Replace circuit breakers and associated disconnect switches.

Roberts

- Replace substation conductor.



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

ATSI Transmission Zone M-3 Process
Galion – Roberts North 138 kV Line and Galion – Roberts South 138 kV Line

Need Number: ATSI-2024-024

Process Stage: Solutions Meeting – 05/17/2024

Transmission Line Ratings:

- **Galion- Marion Ethanol Tap 138kV Line**
  - Before Proposed Solution: 160 / 192 / 180 / 228 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 278 / 339 / 315 / 401 MVA (SN/SE/WN/WE)
- **Marion Ethanol Tap- Roberts North 138V Line**
  - Before Proposed Solution: 160 / 192 / 180 / 228 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 278 / 339 / 315 / 401 MVA (SN/SE/WN/WE)

Galion – Hamilton Tap 138 kV Line Rating:

- Before Proposed Solution: 195 / 209 / 217 / 229 MVA (SN/SE/WN/WE)
- After Proposed Solution: 278 / 339 / 315 / 401 MVA (SN/SE/WN/WE)

Hamilton Tap – Dual Rail Tap 138 kV Line Rating:

- Before Proposed Solution: 200 / 242 / 226 / 286 MVA (SN/SE/WN/WE)
- After Proposed Solution: 278 / 339 / 315 / 401 MVA (SN/SE/WN/WE)

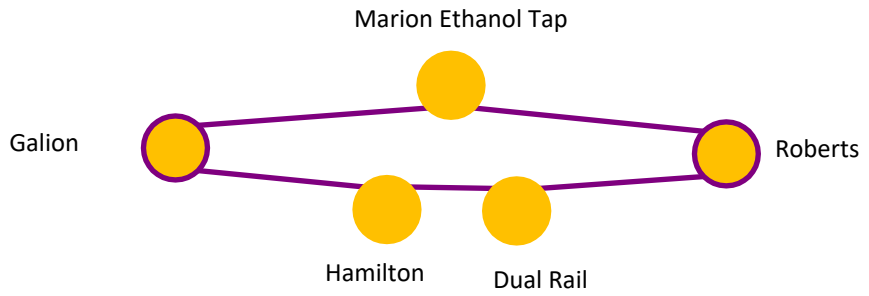
Dual Rail Tap – Roberts South 138 kV Line Rating:

- Before Proposed Solution: 195 / 209 / 217 / 229 MVA (SN/SE/WN/WE)
- After Proposed Solution: 278 / 339 / 315 / 401 MVA (SN/SE/WN/WE)

Alternatives Considered:

- Maintain existing condition and elevated risk of conductor failure.

Estimated Project Cost:	$66.5 M
Projected In-Service:	8/27/2026
Status:	Conceptual
Model:	2022 RTEP model for 2027 Summer (50/50)



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

Changes to the Existing Projects

ATSI Transmission Zone M-3 Process
East Akron Substation – s2297 Scope Change

s2297: Originally presented in 05/22/2020 and 07/17/2020 SRRTEP Western meetings

Changes are marked in red

Supplemental Project Driver(s):
Operational Flexibility and Efficiency
Equipment Material Condition, Performance and Risk
Infrastructure Resilience

Specific Assumption Reference(s):
Global Considerations

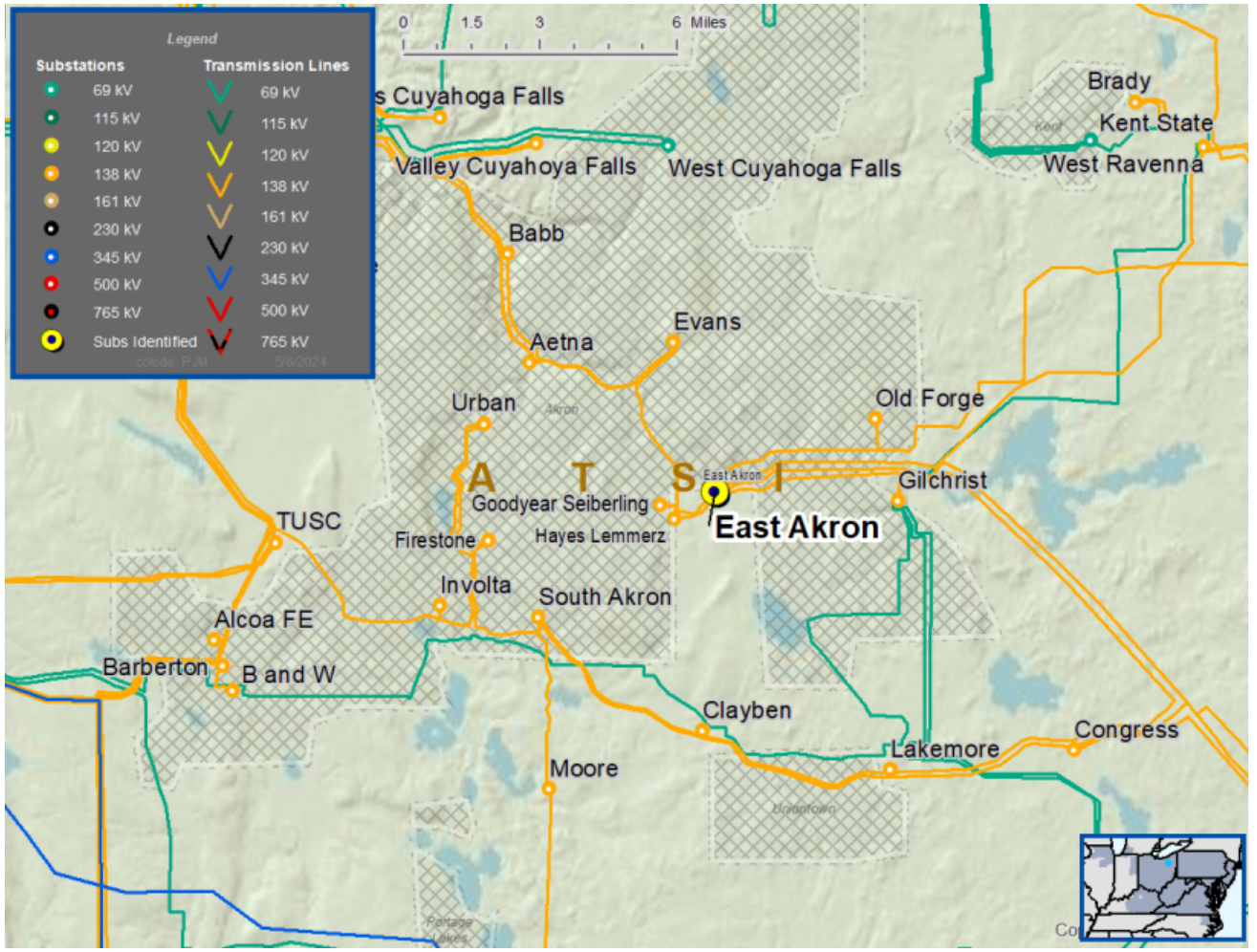
- System reliability and performance
- Load at risk in planning and operational scenarios

Substation Condition Rebuild/Replacement

- Increasing negative trend in maintenance findings and/or costs
- Expected service life (at or beyond) or obsolescence

Add/Expand Bus Configuration

- Loss of substation bus adversely impacts transmission system performance
- Eliminate simultaneous outages to multiple networked elements under N-1 analysis
- Capability to perform system maintenance



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ATSI Transmission Zone M-3 Process
East Akron Substation – s2297 Scope Change

Problem Statement (continued)

East Akron configuration and condition:

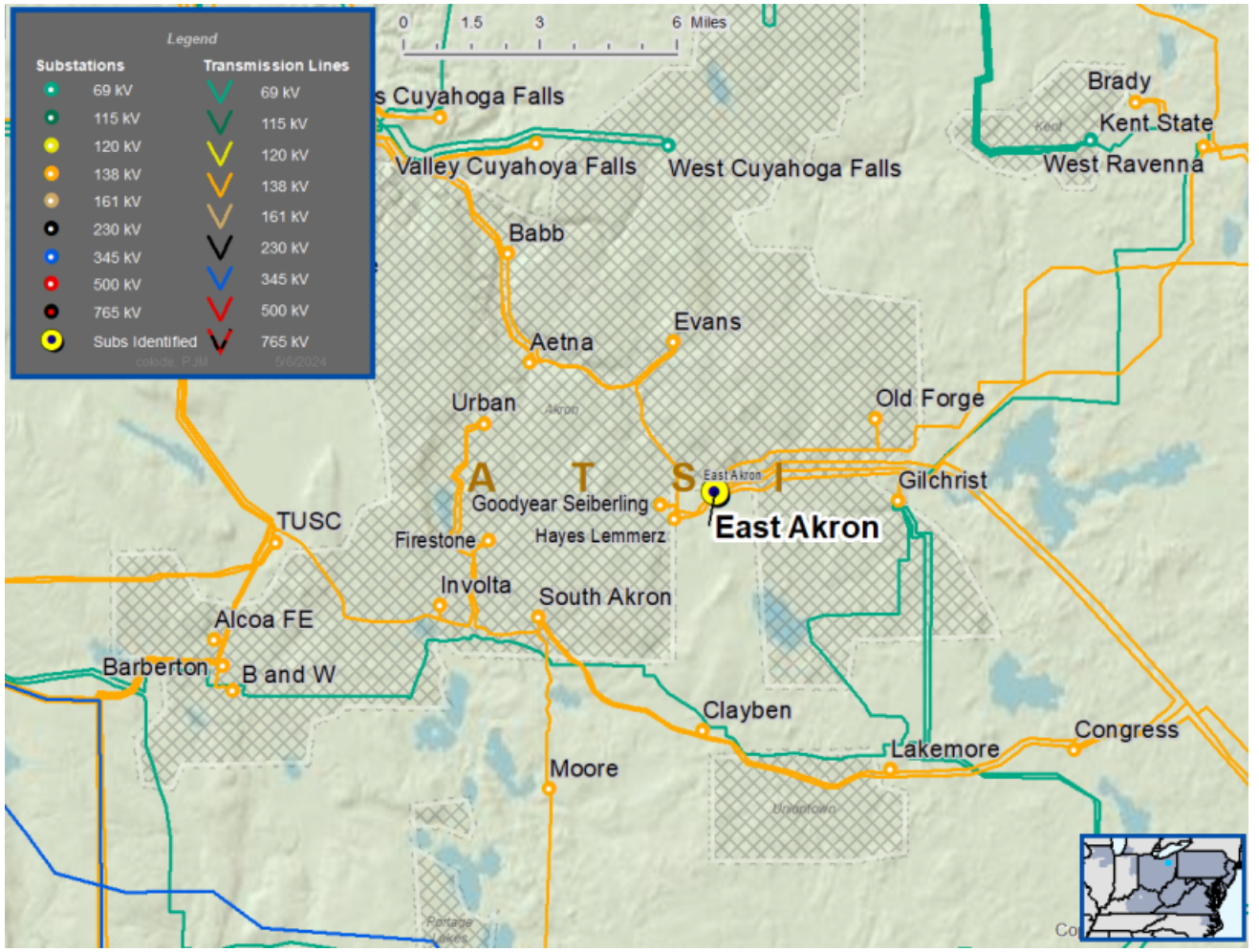
- East Akron Substation is a main and transfer bus configuration substation
  - A fault on the bus or between the bus and the circuit breaker will result in an outage of the entire bus or substation or a failure of a single circuit breaker or a failure of a relay to trip will result in an outage of the entire bus/substation and interrupt five 138 kV lines, two 138-23 kV transformers, and two 138-12.47 kV transformers. (Approximately 10,400 customers affected and 40 MW of load at risk)

Deteriorating control building and substation equipment:

- The control house was built more than 50 years ago.
  - Leaks, lacks HVAC, and has no security exits.

Breaker and switch conditions:

- Oil circuit breakers B-253, B-46, B-22, B-43 are at/beyond expected service life (greater than 50 years old) with increasing maintenance concerns; compressor issues, deteriorated operating mechanisms and increasing maintenance trends.
- Breaker B-37, ABB 145 is 30 years old with increasing maintenance concerns;
- Disconnect switches are 20 years old and deteriorating due to age and usage (D-257, D-245, D-126 D-132)
- AirBreak switches are 20 years old and deteriorating due to age and usage (A-256, A-247, A-128, A-134)



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ATSI Transmission Zone M-3 Process
East Akron Substation – s2297 Scope Change

Problem Statement (continued)

- East Akron-West Ravenna 138 kV line has been previously identified on the list of mis-operation relays (s1972)
- Associated terminal equipment line arrestors, wave trap, line tuner, CCVTs:
  - Older equipment has slower operating times and can produce longer duration of fault current
  - O&M costs increasing due to maintenance of older equipment

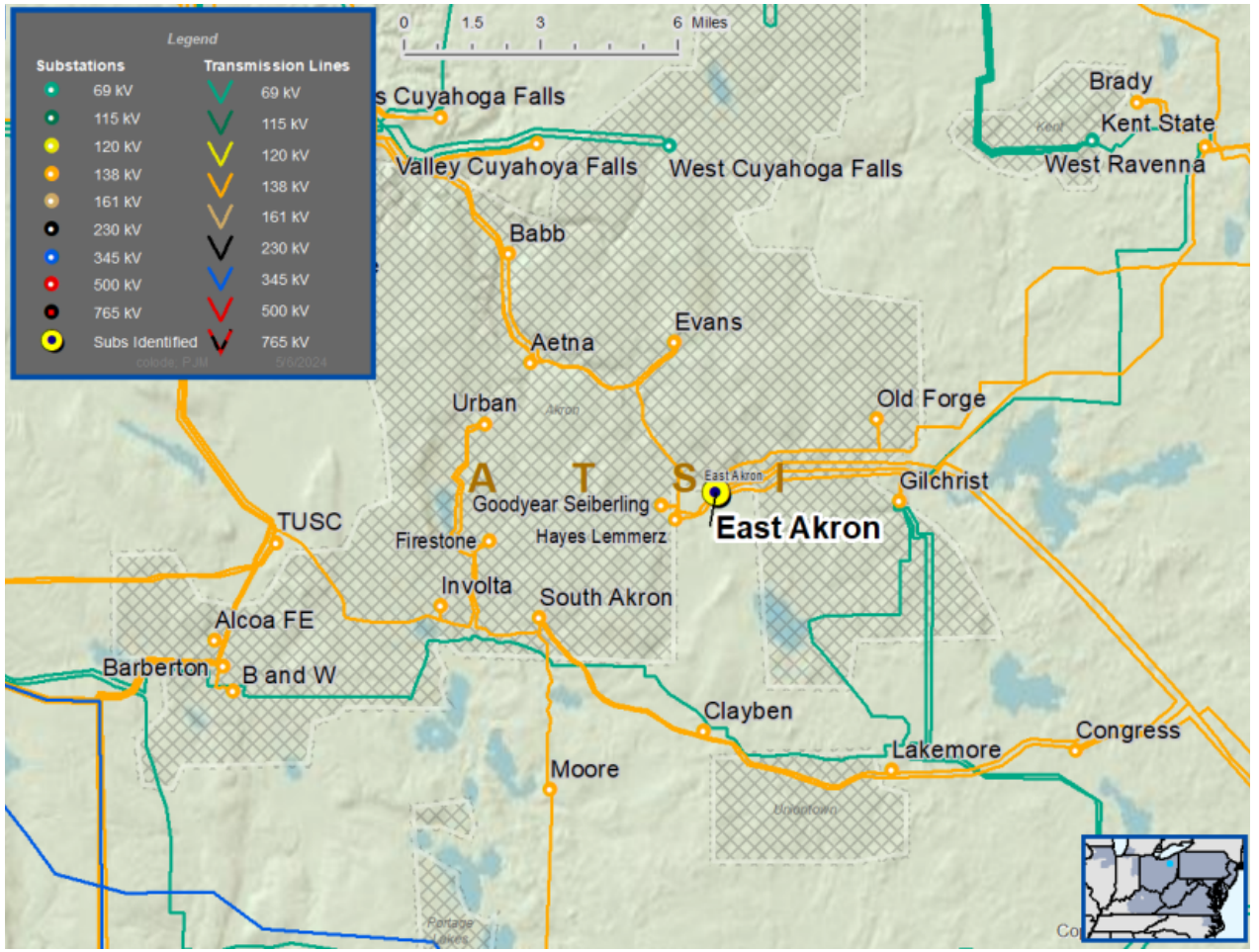
Power flow analysis:

- Breaker B-22 overdutied (102.1%) of its interrupting rating in PJM's 2019 RTEP 2024 generation reactivation study
- Breaker B-43 overdutied (102.9%) of its interrupting rating in PJM's No-Harm analysis of ATSI-2019-10 (FESub5 project).
- Breaker B-46 overdutied (103.0%) of its interrupting rating in PJM's No-Harm analysis of ATSI-2019-10 (FESub5 project).

System Performance

Over the past five years:

The East Akron 138 kV lines or bus has experienced three momentary outages and seven sustained outages.



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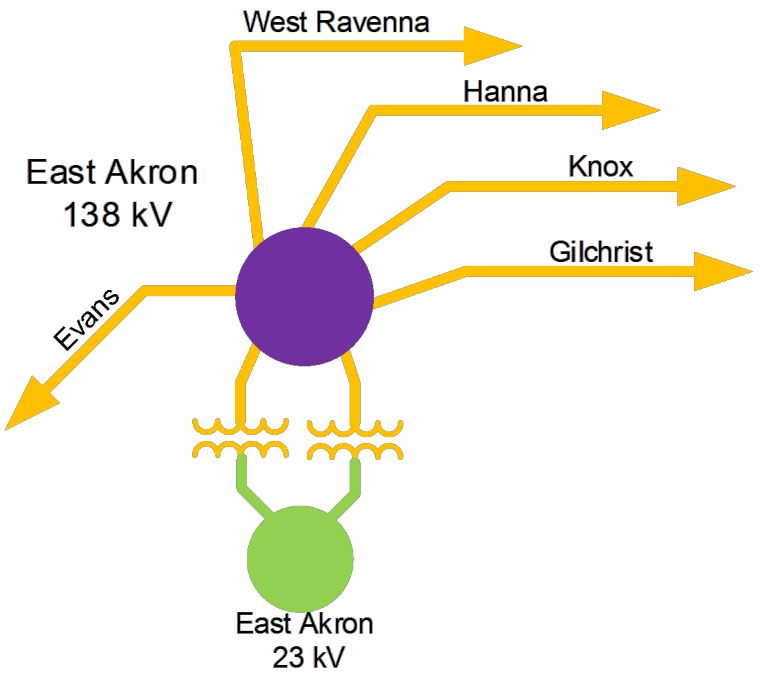
ATSI Transmission Zone M-3 Process
East Akron Substation – s2297 Scope Change

Proposed Solution:

- Convert East Akron Substation into Breaker and Half configuration with gas insulated equipment
- Install a new control building.
- Re-use two (2) breakers (B75 & 76)
- Upgrade three (3) breakers (B43, B46 and B253) with 138 kV, 40 kA, SF6 circuit breaker
- Install seven (7) additional 138 kV, 40 kA, SF6 circuit breakers
- Replace and install switches, surge arrestors, CVT's, SSVT's
- Upgrade wave trap on Knox exit, replace line tuner and coax
- Install new steel enclosure for the gas insulated equipment
- Expand fence
- Install 15 138 kV GIS breakers, 30 138 kV GIS motor operated disconnects, and one large prefabricated primary control enclosure
- Re-terminate five 138 kV circuits into new line positions

~~**Transmission Line Ratings:**~~

- ~~East Akron-Hanna 138 kV Line~~
  - ~~Before Proposed Solution: 221 MVA SN / 262 MVA SE~~
  - ~~After Proposed Solution: 233 MVA SN / 282 MVA SE~~



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

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ATSI Transmission Zone M-3 Process
East Akron Substation – s2297 Scope Change

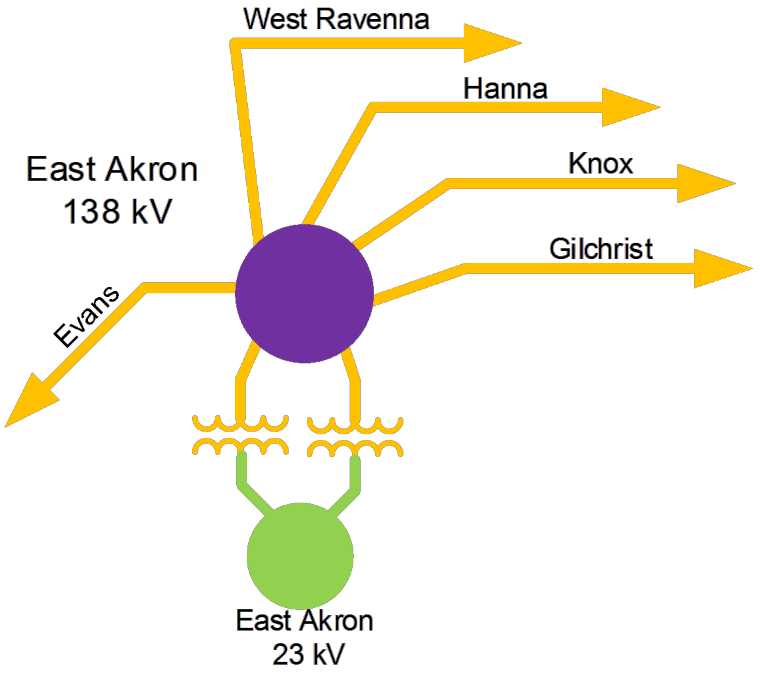
Alternatives Considered:

- Rebuild as a conventional substation (air insulated). However, this solution was not selected due to complex outage sequence, significant temporary wiring to support rebuild, and safety concerns with working around energized equipment as work is sequenced.

Estimated Project Cost: ~~$13.8M~~ $46.70 M

Projected IS Date: 12/18/2026

Status: ~~Conceptual~~ Engineering



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

5/7/2024– V1 – Original version posted to pjm.com

5/8/2024-V2 – Added map for ATSI-2024-039