

Subregional RTEP Committee – Western FirstEnergy Supplemental Projects

April 21, 2023

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

Need Number: ATSI-2023-002
Process Stage: Need Meeting – 04/21/2023

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

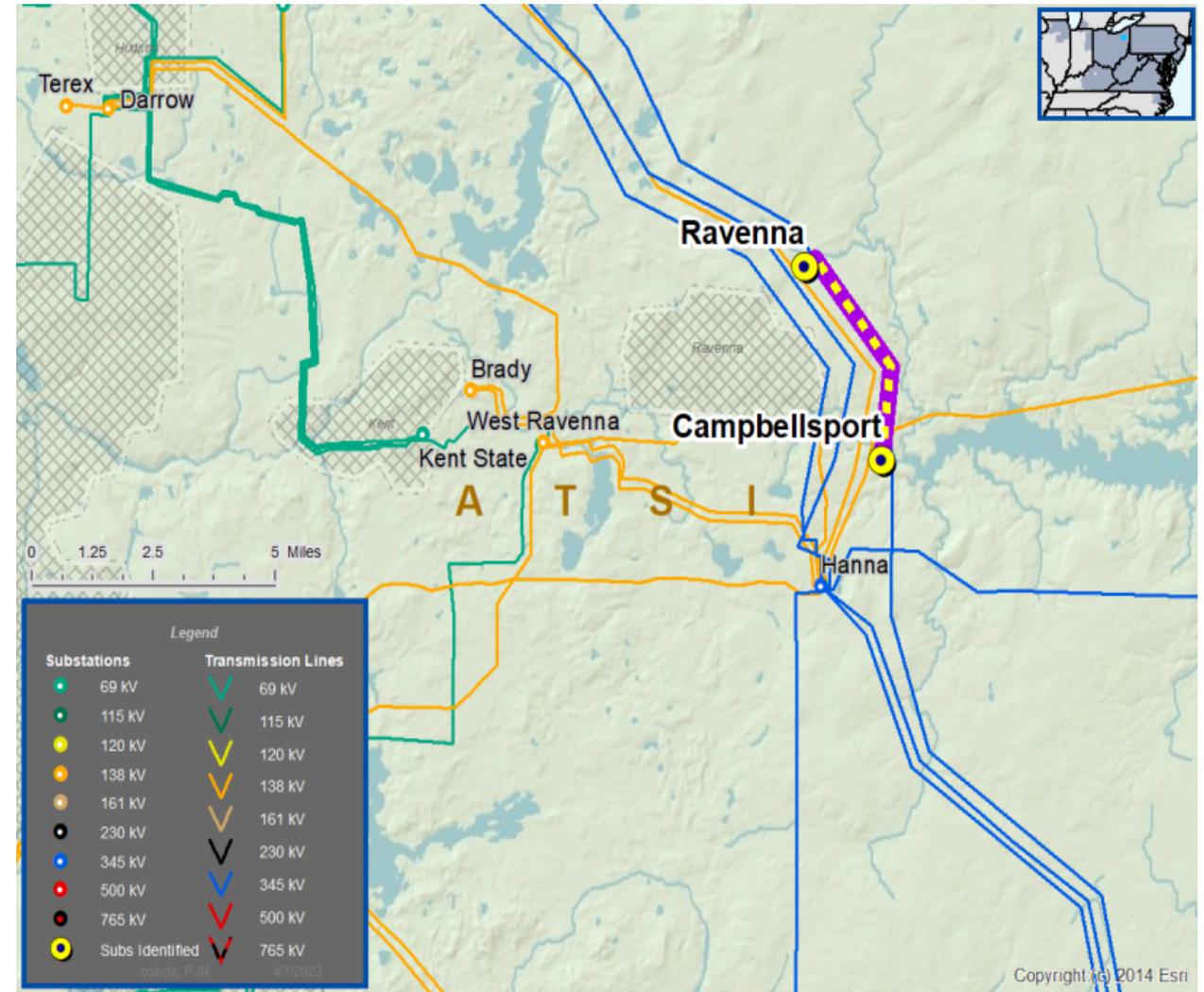
Specific Assumption Reference(s)

Line Condition Rebuild / Replacement

- Substation / Line equipment limits
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities
- Transmission line with high loading

Problem Statement:

- Campbellsport - Ravenna #1 69 kV Line is 10.77 miles, and a 2.8 mile section of the line showed high loading (95% of Summer Emergency rating) using the 2021 RTEP 2026 Summer peak case for an N-1-1 outage.
- FE Transmission System Operations identified a potential real-time overload on the Campbellsport – Ravenna #1 69 kV Line and issued two PCLLRW’s in two consecutive days 6/28/2021 & 6/29/2021 for the same N-1-1 outage noted above. (Line out for maintenance, plus next contingency)



Need Number: ATSI-2023-009
Process Stage: Need Meeting – 04/21/2023

Supplemental Project Driver(s):

*Operational Flexibility and Efficiency
 Equipment Material Condition, Performance and Risk
 Infrastructure Resilience*

Specific Assumption Reference(s):

Global Considerations

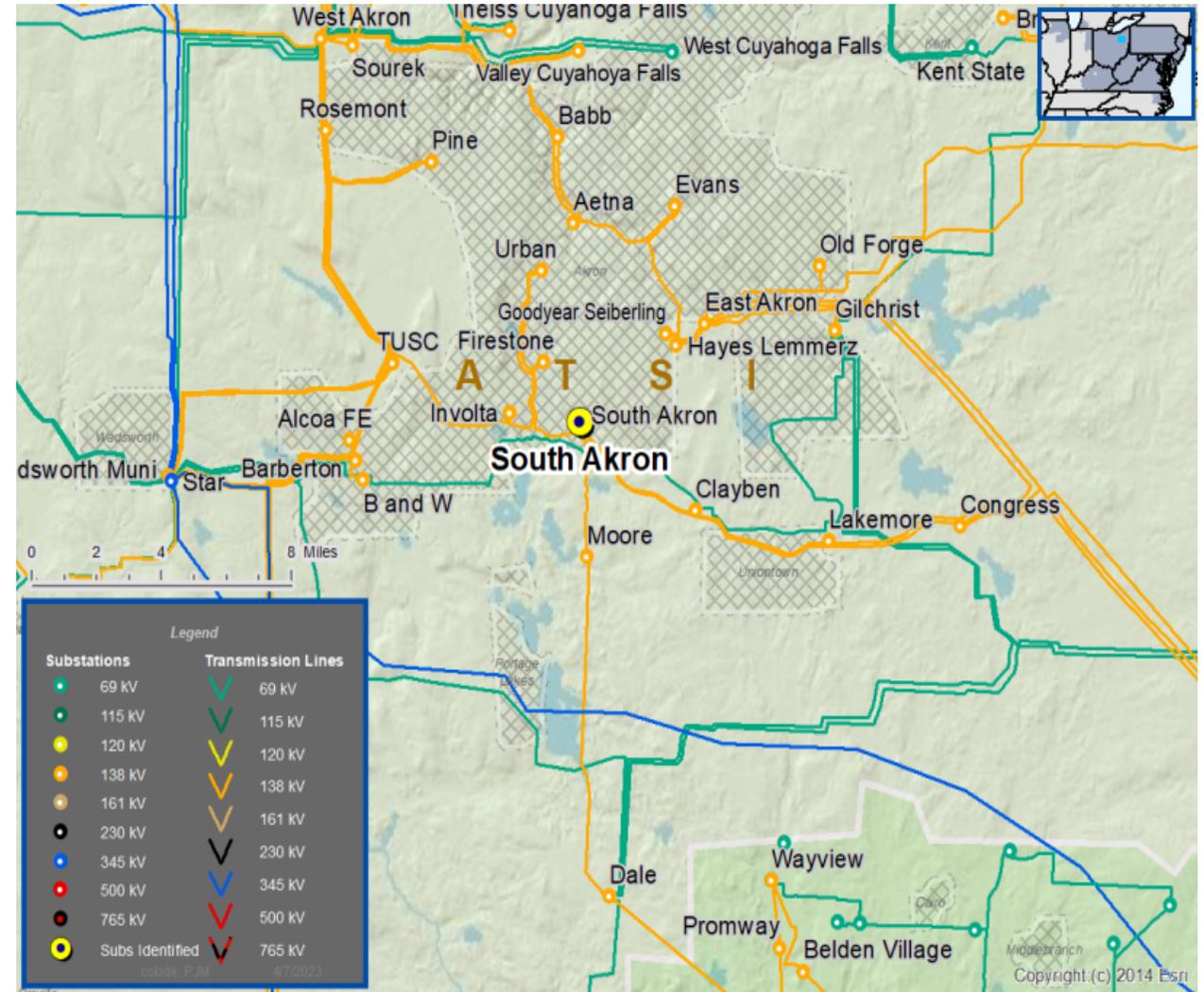
- System reliability and performance
- Load at risk in planning and operational scenarios

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

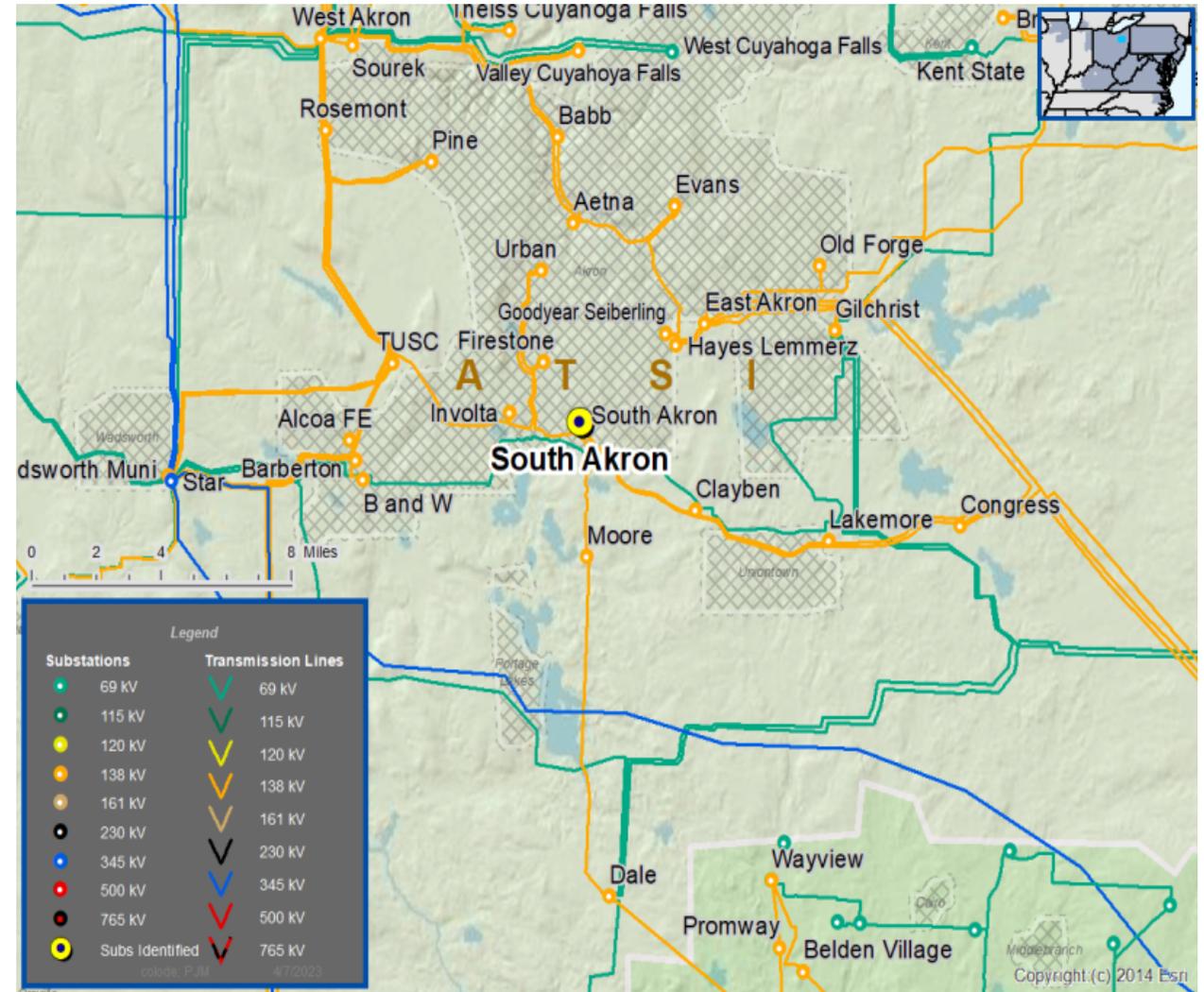
- Loss of substation bus adversely impacts transmission system performance
- Eliminate simultaneous outages to multiple networked elements under N-1 analysis
- Capability to perform system maintenance



Need Number: ATSI-2023-009
Process Stage: Need Meeting – 04/21/2023

Problem Statement

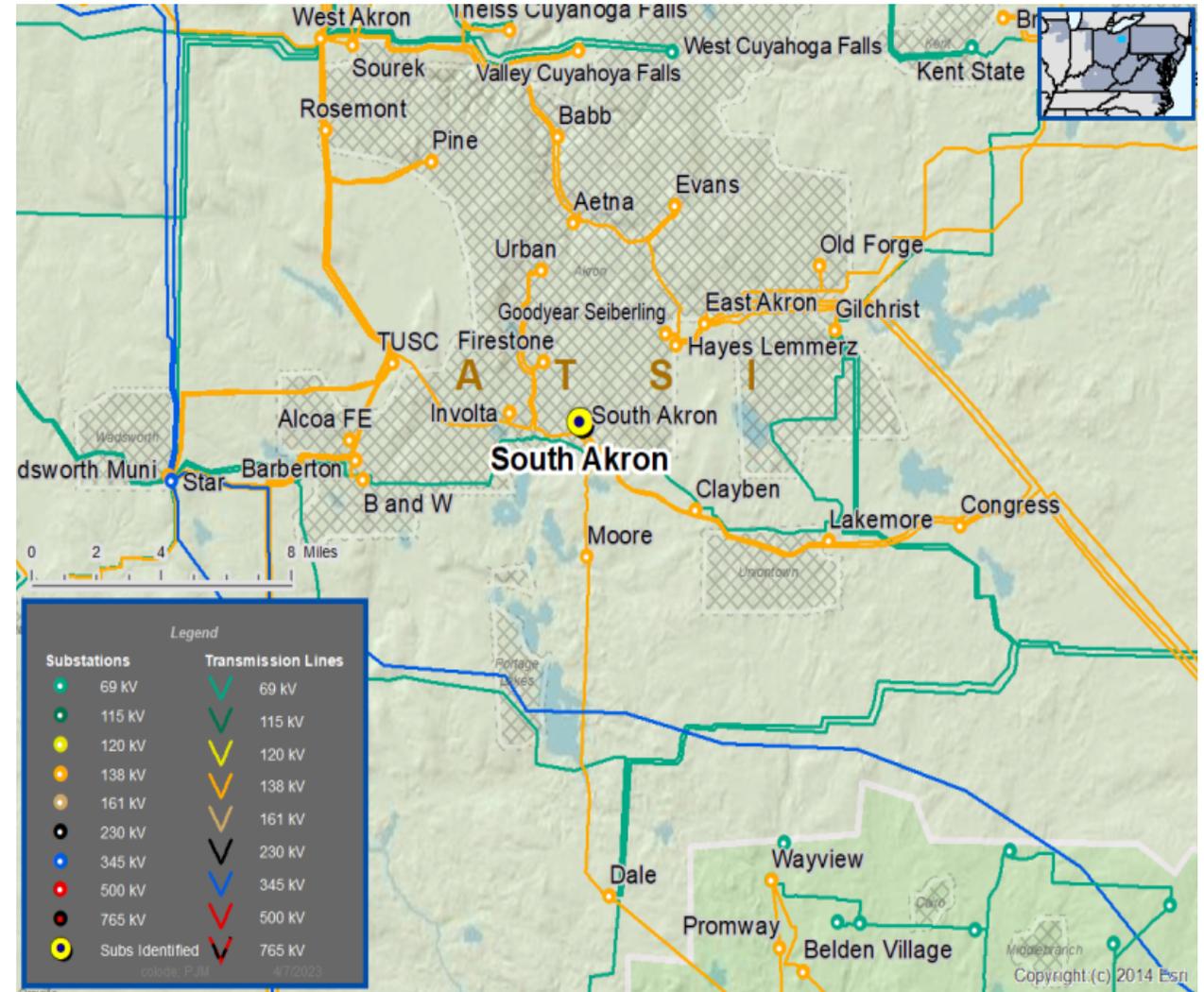
- An N-1 bus outage at South Akron Substation results in the loss of approximately 55 MW and 17,000 customers.
- An N-1 bus outage at South Akron Substation results in several sub-transmission 23 kV lines overloaded beyond the summer emergency rating.
- The South Akron 138 kV bus protection consists of a non-redundant electromechanical (PVD) scheme
- 138 kV Breaker B-30 is 66 years old with increasing maintenance concerns; compressor issues, deteriorated operating mechanisms and increasing maintenance trends.
- 138 kV Breaker B-1 has a pneumatic mechanism
 - Manufacture date is 1952
 - Several corrective maintenance and preventive issues (magnetic loader failed, valve for pneumatic mechanism failed, replaced 52Y relay) and anticipated reoccurring failures
- 138 kV breaker B-10 has a pneumatic mechanism
 - Manufacture date is 1951
 - Several corrective maintenance and preventive issues (high ductor reading (high resistance on contact, air compressor for pneumatic mechanism failed, lower control valve failed for air charged to trip breaker) and anticipated reoccurring failures



Need Number: ATSI-2023-009
Process Stage: Need Meeting – 04/21/2023

Problem Statement

- Since 2017, the South Akron 138 kV lines have experienced the following unscheduled outages:
 - The Dale-South Akron 138 kV line has one momentary and one sustained outage.
 - The Firestone-South Akron 138 kV line has one sustained outage.
 - The Lakemore-South Akron 138 kV line has one sustained outage.
 - The South Akron-Toronto 138 kV has five momentary and two sustained outages.



Need Number: ATSI-2023-003
Process Stage: Need Meeting – 4/21/2023

Project Driver(s):
Customer Service

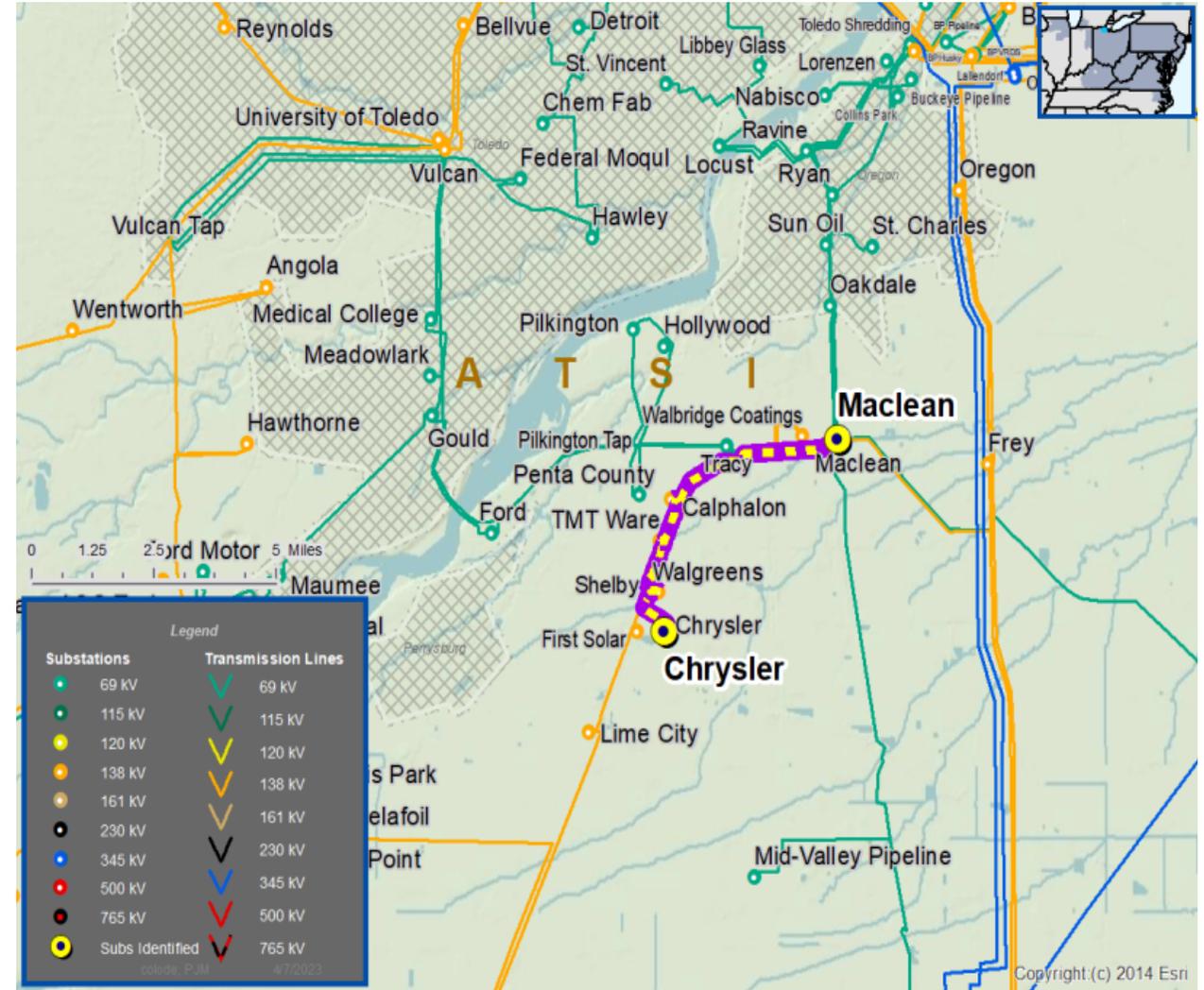
Specific Assumption Reference(s)

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 – Customer has requested a new 138 kV delivery point near the Chrysler-Maclean 138 kV line. The anticipated load of the new customer connection is 30 MVA.

Requested in-service date is 10/01/2024.



Solution

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

Need Number: ATSI-2021-005
Process Stage: Solution Meeting – 04/21/2023
Previously Presented: Need Meeting – 10/15/2021

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

Specific Assumption Reference(s)

Global Considerations

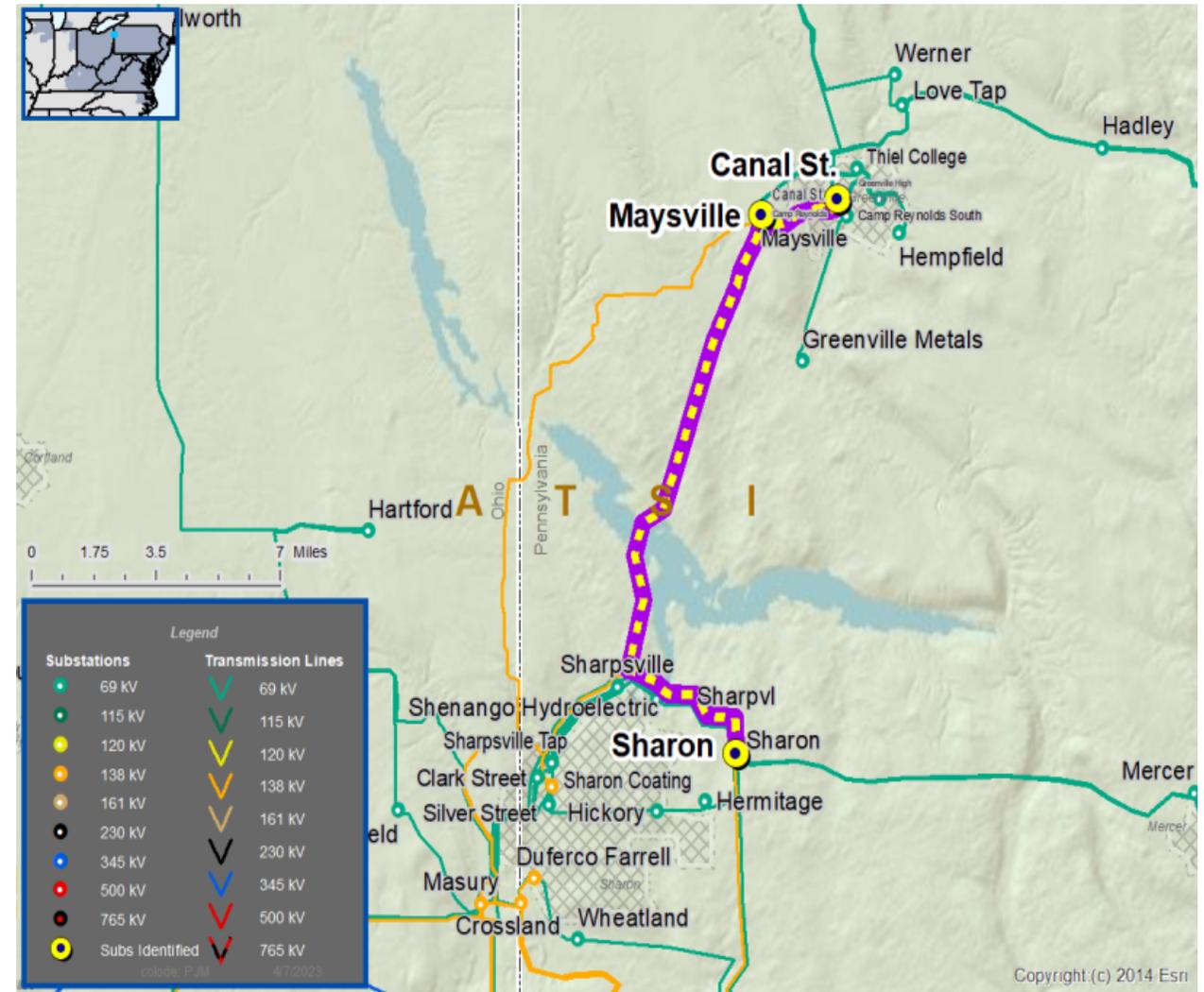
- System Reliability and Performance
- Substation/line equipment limits
- Reliability of Non-BES Facilities
- Load at risk in planning and operational scenarios.
- Load and/or customers at risk on single transmission lines

Network Radial Lines

- Load at risk and/or customers affected
- Proximity to other networked facilities

Build New Transmission Line

- Network radial lines



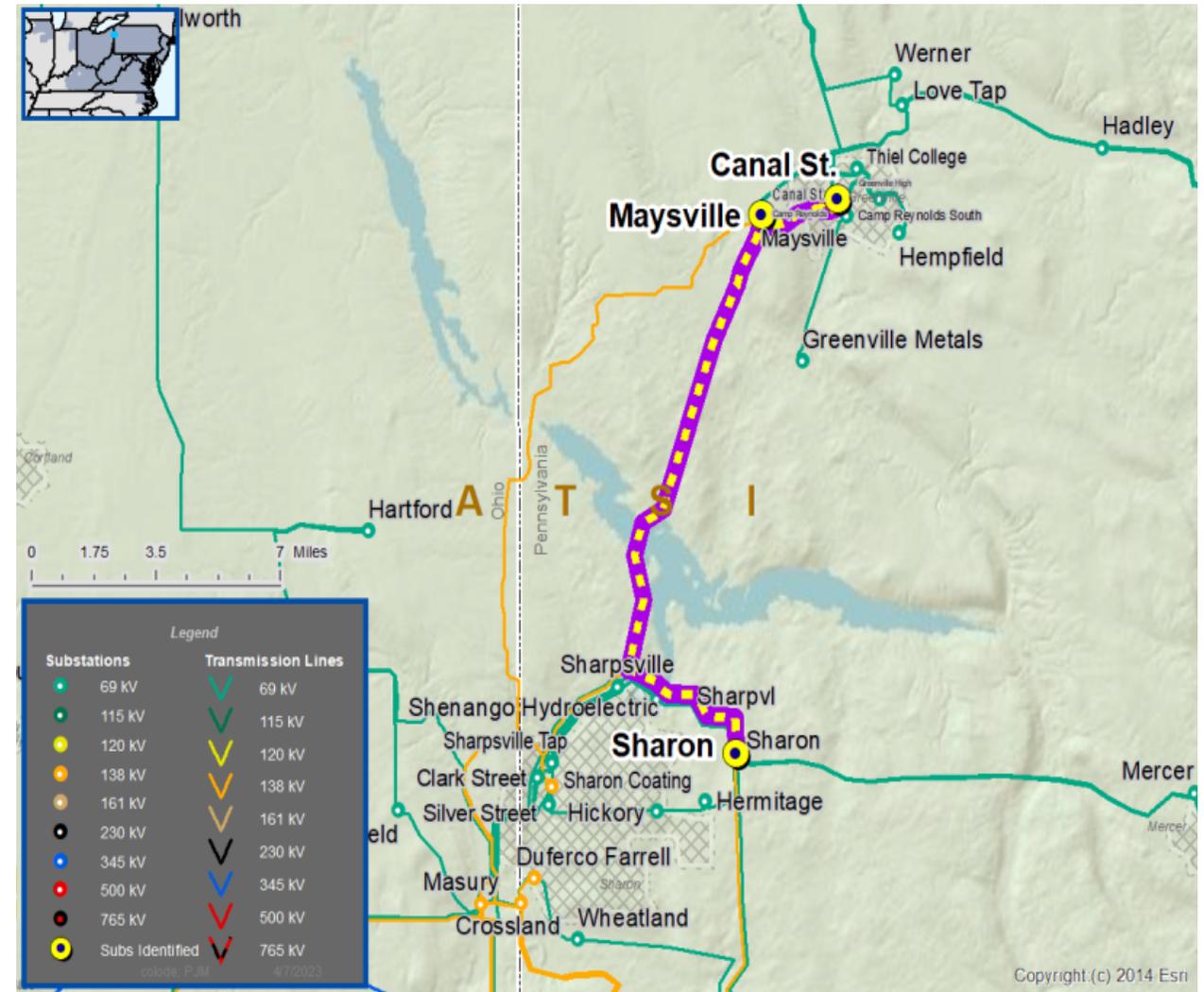
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Need Number: ATSI-2021-005
Process Stage: Solution Meeting – 04/21/2023
Previously Presented: Need Meeting – 10/15/2021

Problem Statement

Canal (Maysville) 69 kV Line

- The Canal (Maysville) Y-79 69 kV Line serves 14 MW and 6,500 customers on a ~3.6 mile radial
- A P1-2 contingency for the loss of the Canal (Maysville) Y-79 69 kV Line will outage roughly 14 MW and 6,500 customers
- The Canal (Maysville) Y-79 69 kV Line has experienced 1 sustained outage the past 5 years
- The Maysville-Sharon Y-301 69 kV Line serves 18 MW and 2,600 customers at two delivery points served on a ~2.7-mile tap
- A P1-2 contingency for the loss of the Maysville-Sharon Y-301 69 kV Line will outage roughly 18 MW and 2,600 customers
- The Maysville-Sharon Y-301 69 kV Line has experienced 4 sustained outages the past 5 years

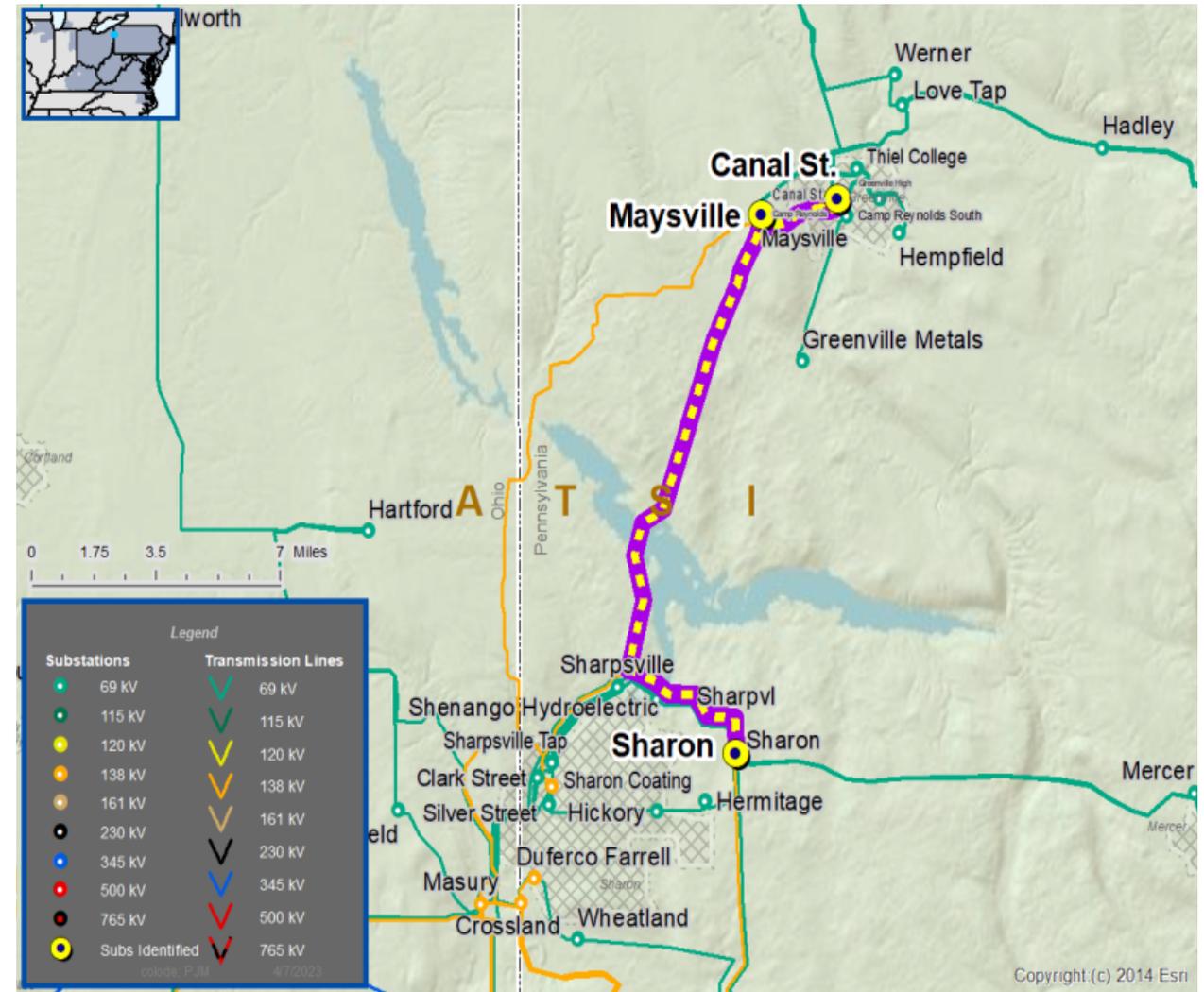


Need Number: ATSI-2021-005
Process Stage: Solution Meeting – 04/21/2023
Previously Presented: Need Meeting – 10/15/2021

Proposed Solution:

- Remove switches A118 and A119 on the Maysville-Sharon Y-301 69 kV Line
- De-energize roughly 3.6 miles of the Maysville-Sharon 69 kV line from Maysville to the Camp Reynolds tap location.
- Remove switches A2153, A23, A2151, A260, A261 and A2152 at Greenville
- Build approximately 3.0 mi of 69 kV line connecting the Camp Reynolds (near TY19) tap to the Canal Tap (near TY104)
- Add 69 kV line switches with SCADA at Camp Reynolds tap, Greenville Metal tap, and Canal tap
- Add one 69 kV line switch with SCADA at Trinity tap

- **Transmission Line Ratings:**
- Maysville-Sharon Y301 69 kV Line
 - Before Proposed Solution: 69 MVA SN / 72 MVA SE
- Canal-Greenville 69 kV Line
 - Before Proposed Solution: 47 MVA SN / 56 MVA SE
- Sharon-Greenville 69 kV Line
 - After Proposed Solution: 47 MVA SN / 56 MVA SE

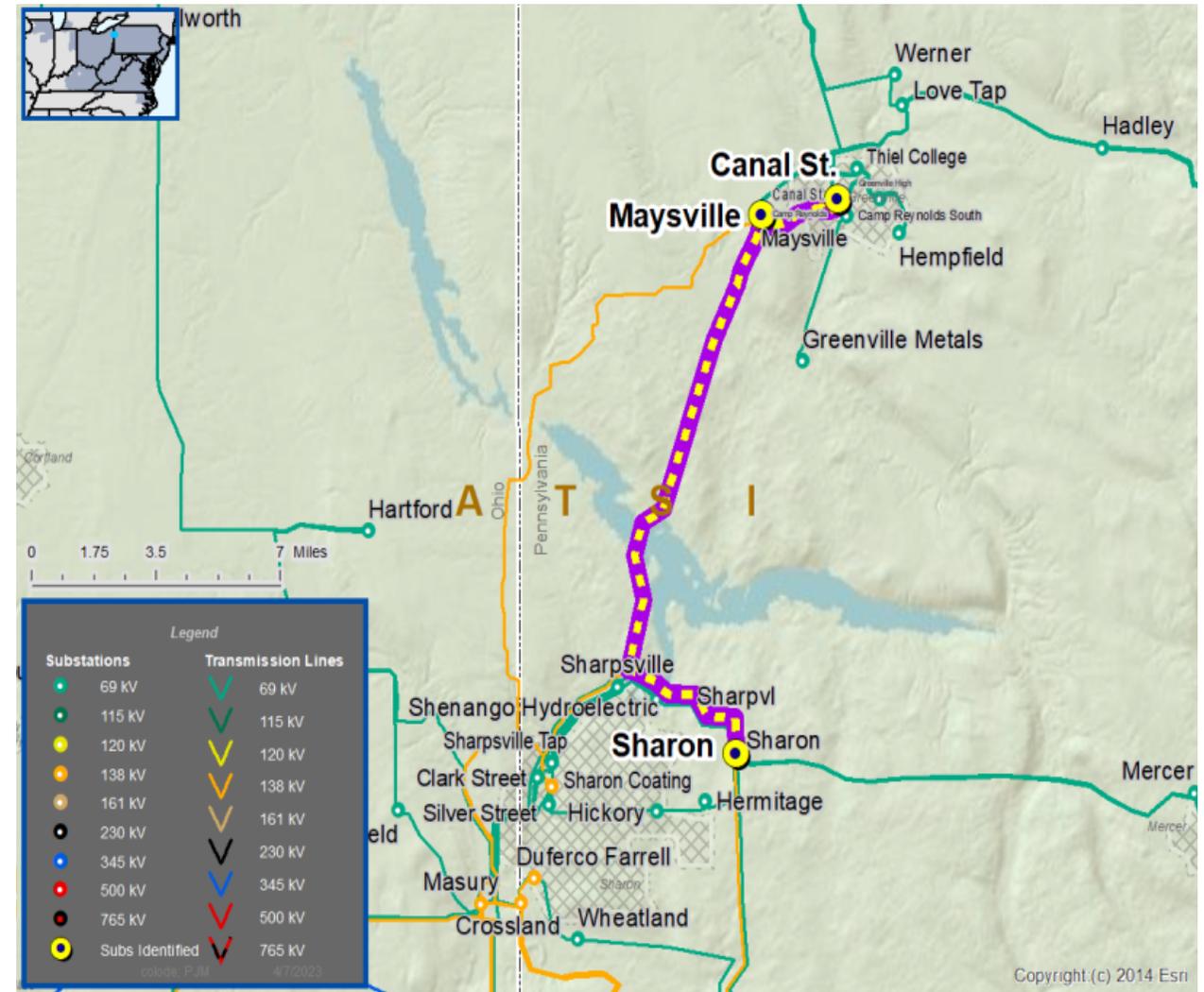


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Need Number: ATSI-2021-005
Process Stage: Solution Meeting – 04/21/2023
Previously Presented: Need Meeting – 10/15/2021

Alternatives Considered:
 There were no reasonable alternatives to network the two radial 69 kV lines to improve the reliability of service to the customers served from the radial lines.

Estimated Project Cost: \$12.2 M
Projected In-Service: 6/1/2025
Project Status: Engineering
Model: 2022 Series 2027 Summer RTEP 50/50



Need Number: ATSI-2022-023
Process Stage: Solution Meeting – 04/21/2023
Previously Presented: Need Meeting – 09/16/2022

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

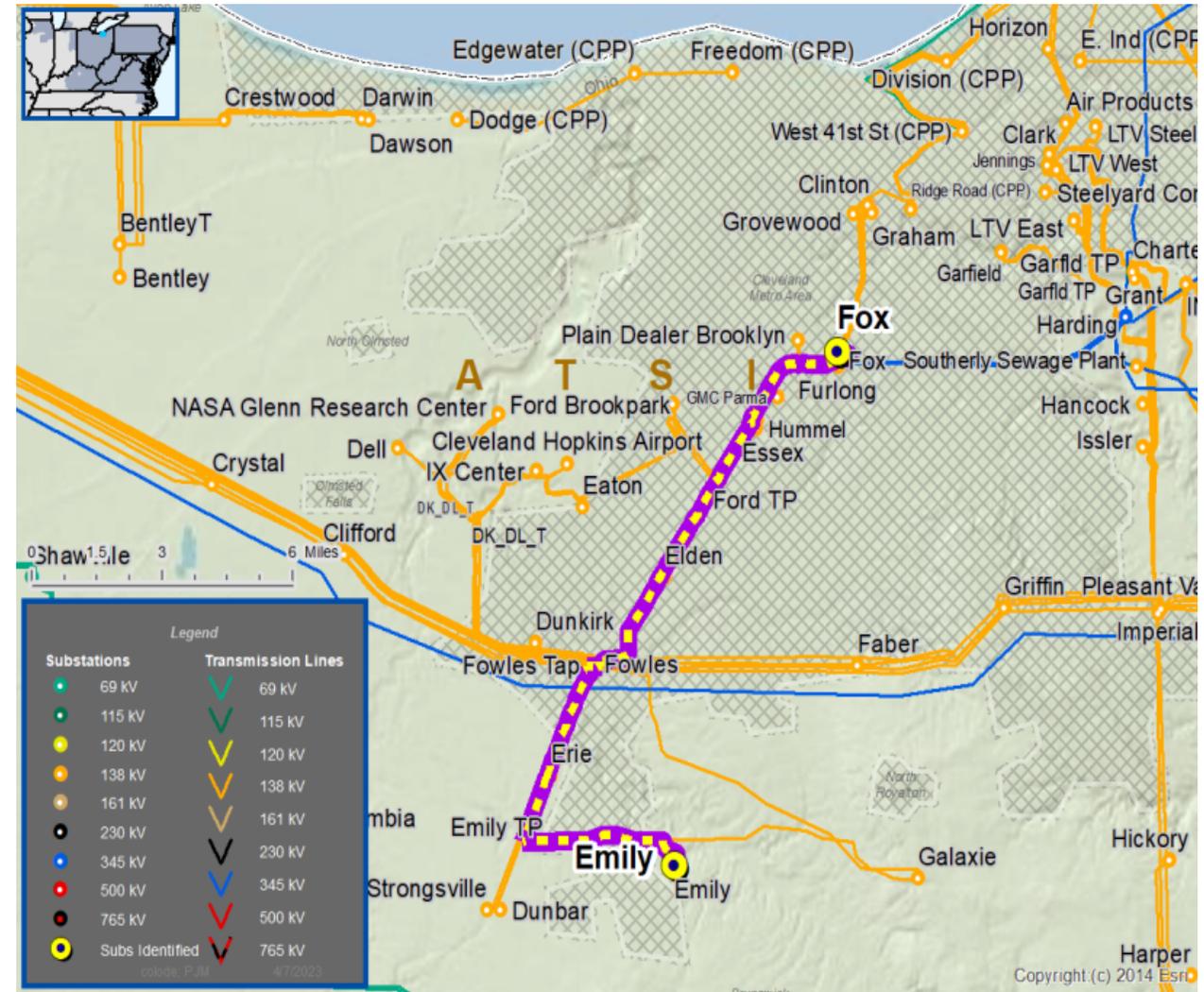
Specific Assumption Reference(s):

Global Factors

- System Reliability and Performance
- Increase line loading limits
- Age/condition of transmission line conductors
- Line Condition Rebuild/Replacement

Problem Statement

- During inspection of the Emily-Fox 138 kV Line (approximately 19 miles), seven (7) wood pole structures failed sound testing and/or decay has been noted, as well as miscellaneous broken insulators, missing or broken grounds, hardware, braces, climbing pegs, etc



Need Number: ATSI-2022-023
Process Stage: Solution Meeting – 04/21/2023
Previously Presented: Need Meeting – 09/16/2022

Proposed Solution:

Fowles 138 kV Substation

- Replace existing 500 Cu strain bus at Fowles 138 kV (Emily – Fox 138 kV Line is routed through Fowles 138 kV Station)

Emily – Fox Q14 138 kV Line

- Replace and upgrade seven (7) wood pole structures on Emily – Fox 138 kV Q14 Line
- Replace damaged and worn insulators on ten (10) additional structures

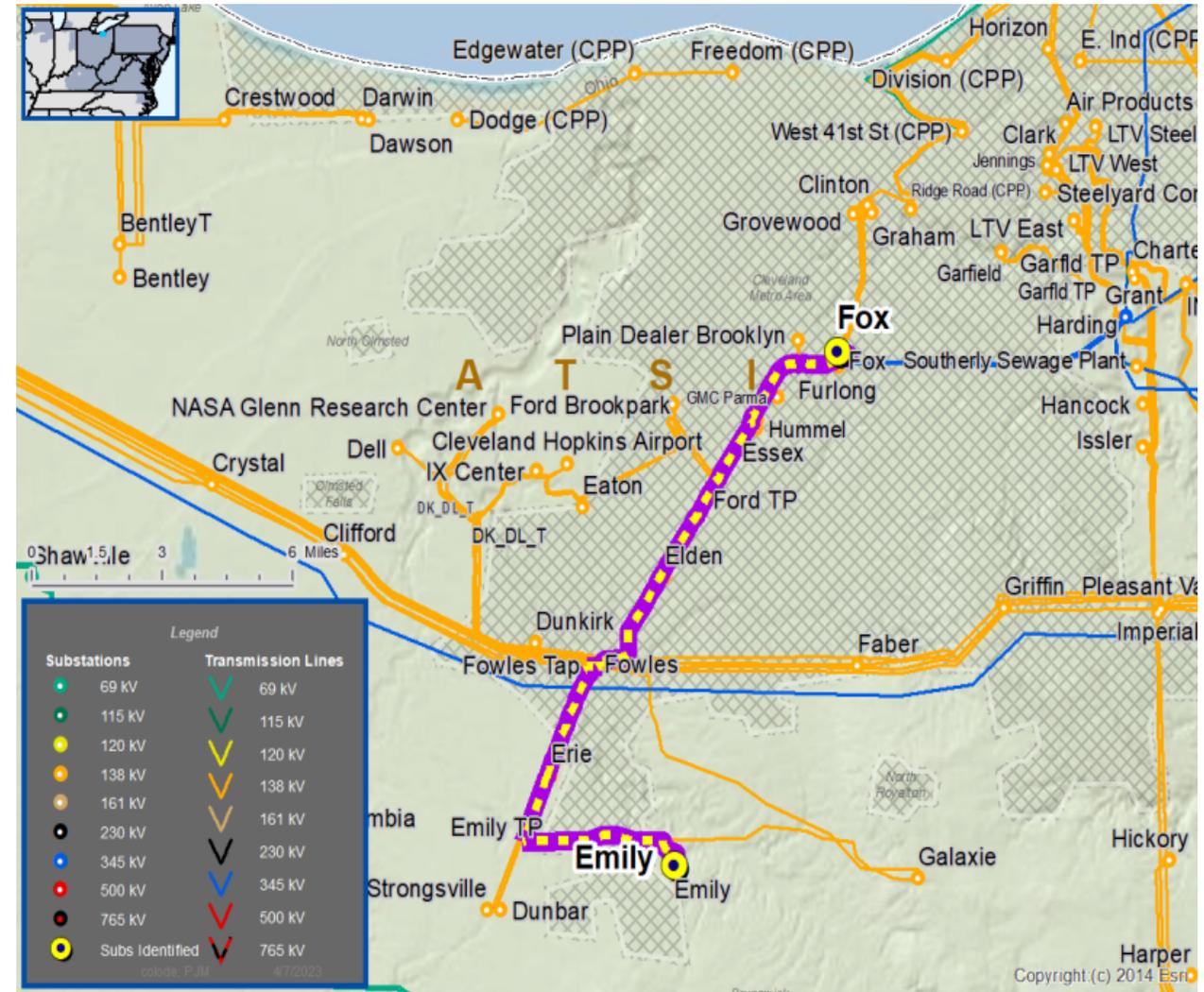
Transmission Line Ratings:

- Existing Galaxie – Hummel Tap line section rating: 176 SN / 229 SE / 253 WN / 284 WE
- New Galaxie – Hummel Tap line section rating: 347 SN / 423 SE / 393 WN / 501 WE

Alternatives Considered:

- Maintain existing condition and elevated risk of wood pole/insulator failures, increasing maintenance costs, and reduced transmission line loadability during peak conditions.

Estimated Project Cost: \$1.1M
Projected In-Service: 12/31/2023
Status: Engineering
Model: 2022 Series 2027 Summer RTEP 50/50



Re-Present 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

Need Number: (s1712)
Process Stage: Re-Present Solutions Meeting – 04/21/2023
Previously Presented: Need Meeting – 8/31/2018
 Solution Meeting – 9/28/2018

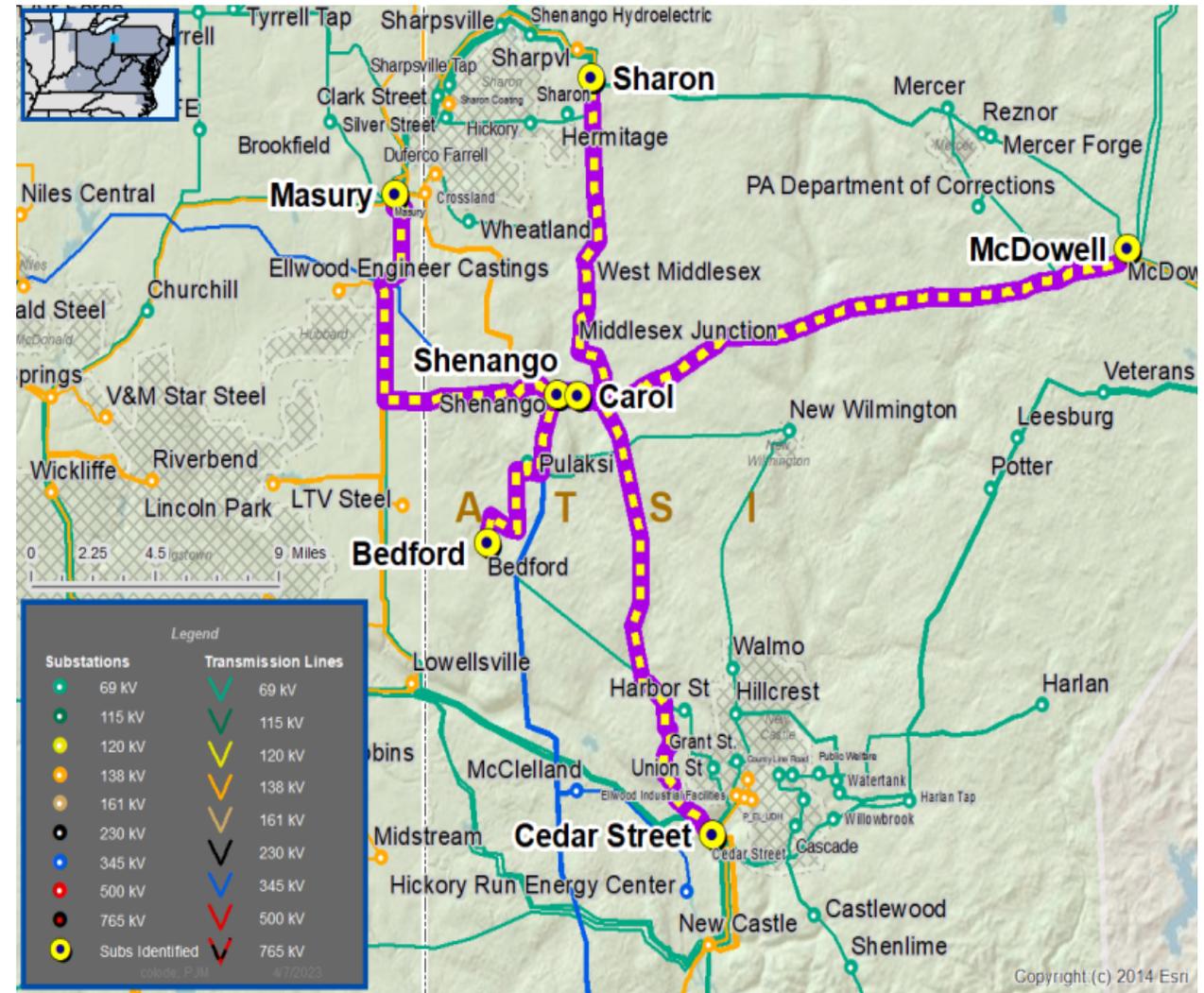
Supplemental Project Driver(s):
Operational Flexibility and Efficiency

Specific Assumption Reference(s):

- Global Factors
- Load Loss
 - System Reliability and Performance

Problem Statement

- Improve operational flexibility during maintenance and restoration efforts.
- Reduce amount of potential local load loss (Approximately 35 MWs worse case) under multiple (P1) contingency conditions on the 69 kV system.
 - Loss of the Cedar Street-Cascade (Walmo) 69 kV normally open radial line
- Improve relay coordination and network normally open 69 kV lines.
 - **Approximately 21,000 customers and radial load of 86 MWs at risk in the area.**



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Need Number: (s1712)
Process Stage: Re-Present Solutions Meeting – 04/21/2023
Previously Presented: Need Meeting – 8/31/2018
 Solution Meeting – 9/28/2018

Proposed Solution:

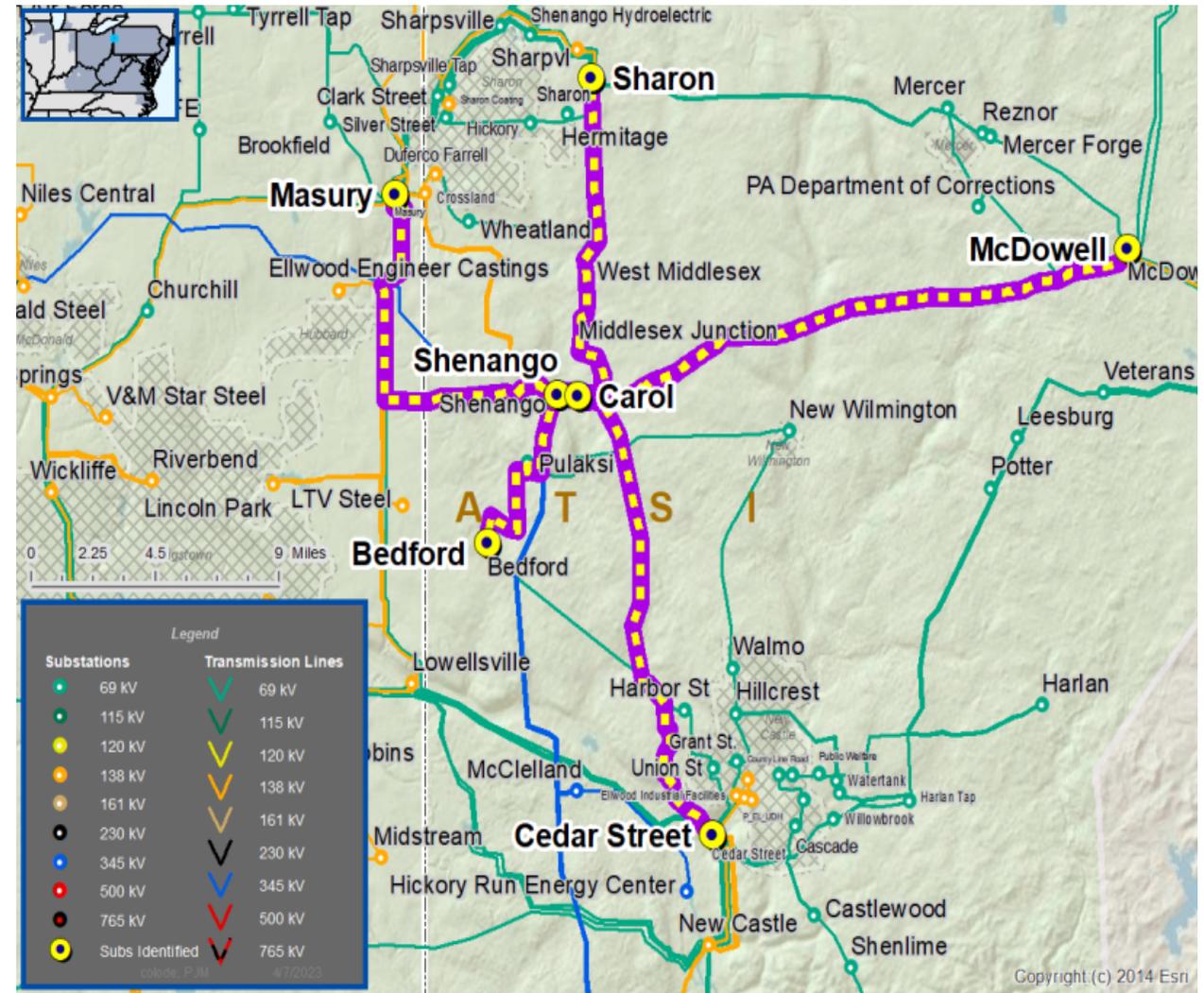
Shenango 69 kV Switching Station

■ Network radial 69 kV system by constructing two double circuit 477 ACSR 69 kV lines (~ 1.2 miles) to create four (4) new 69 kV circuits from the new Shenango 69 kV station

- Shenango-Masury 69 kV line
- Shenango-Sharon 69 kV line
- Shenango-Cedar Street #1 69 kV line
- Shenango-Cedar Street #2 69 kV line

- Install two (2) 138/69 kV transformers at Shenango
- Expand Shenango substation to create a six (6) breaker 69 kV ring bus

Shenango substation is built in a floodplain with significant challenges, including permitting and environmental mitigation costs.

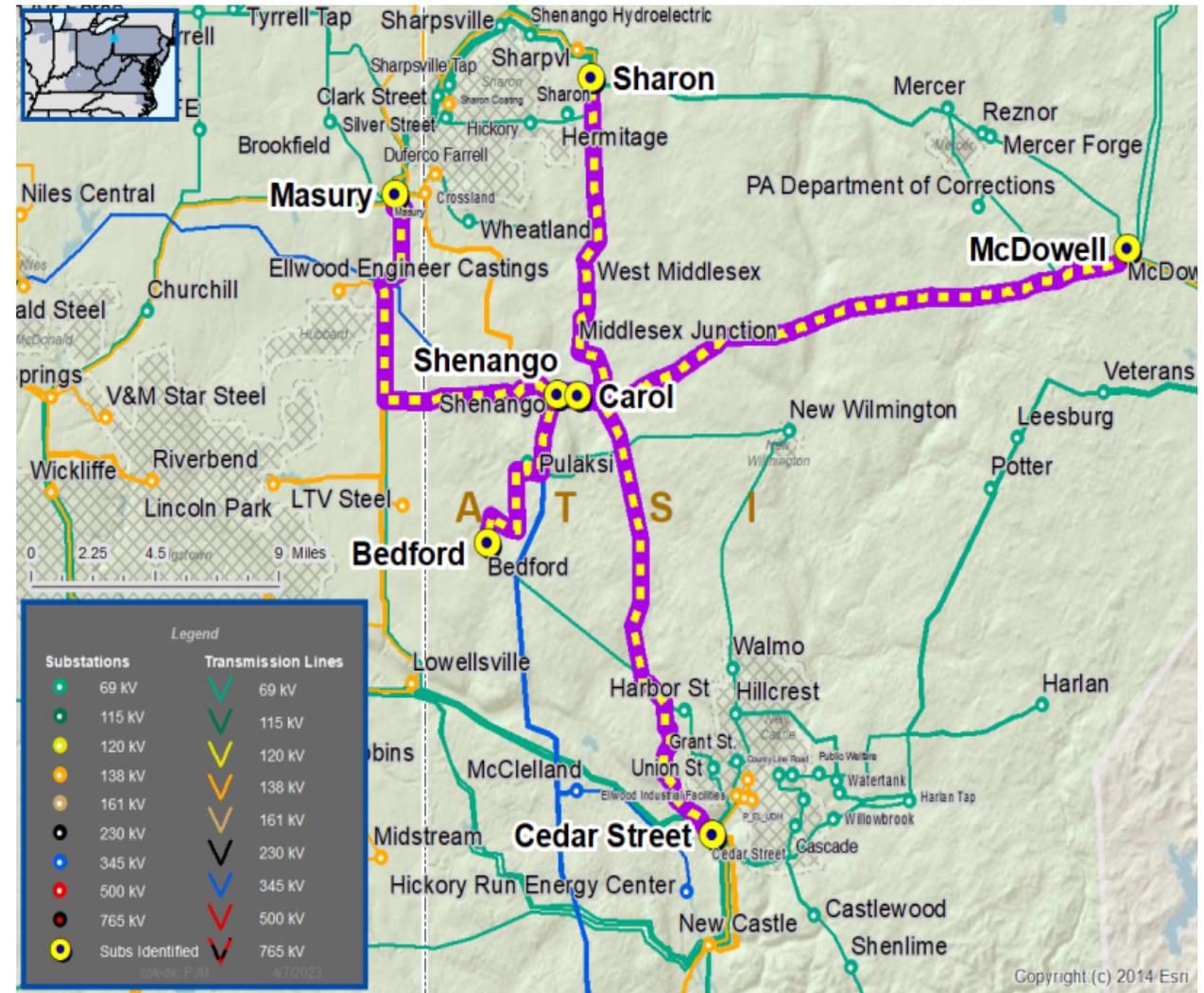


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Need Number: (s1712)
Process Stage: Re-Present Solutions Meeting – 04/21/2023
Previously Presented: Need Meeting 8/31/2018
 Solution Meeting – 9/28/2018

Proposed Solution:

- Carol 138-69 kV Switching Substation
- Construct a new 138 kV 6-breaker ring bus substation near the Shenango Substation (Future 12-Breaker Breaker-and-a-Half).
- Loop in the Cedar Street-Shenango and Shenango-McDowell 138 kV lines into the new substation.
- Construct a new 69 kV six-breaker ring bus adjacent to the new 138 kV substation.
- Loop in the Cedar Street-Masury-Sharon 69 kV line, undo the six-wire configuration between structures #169 and #216 to create four new 69 kV circuits out of the new Carol 69 kV Substation.
- Rebuild and reconductor approximately 3.0 miles
- Install (2) 138-69 kV 100/134 MVA transformers
- Install new control building

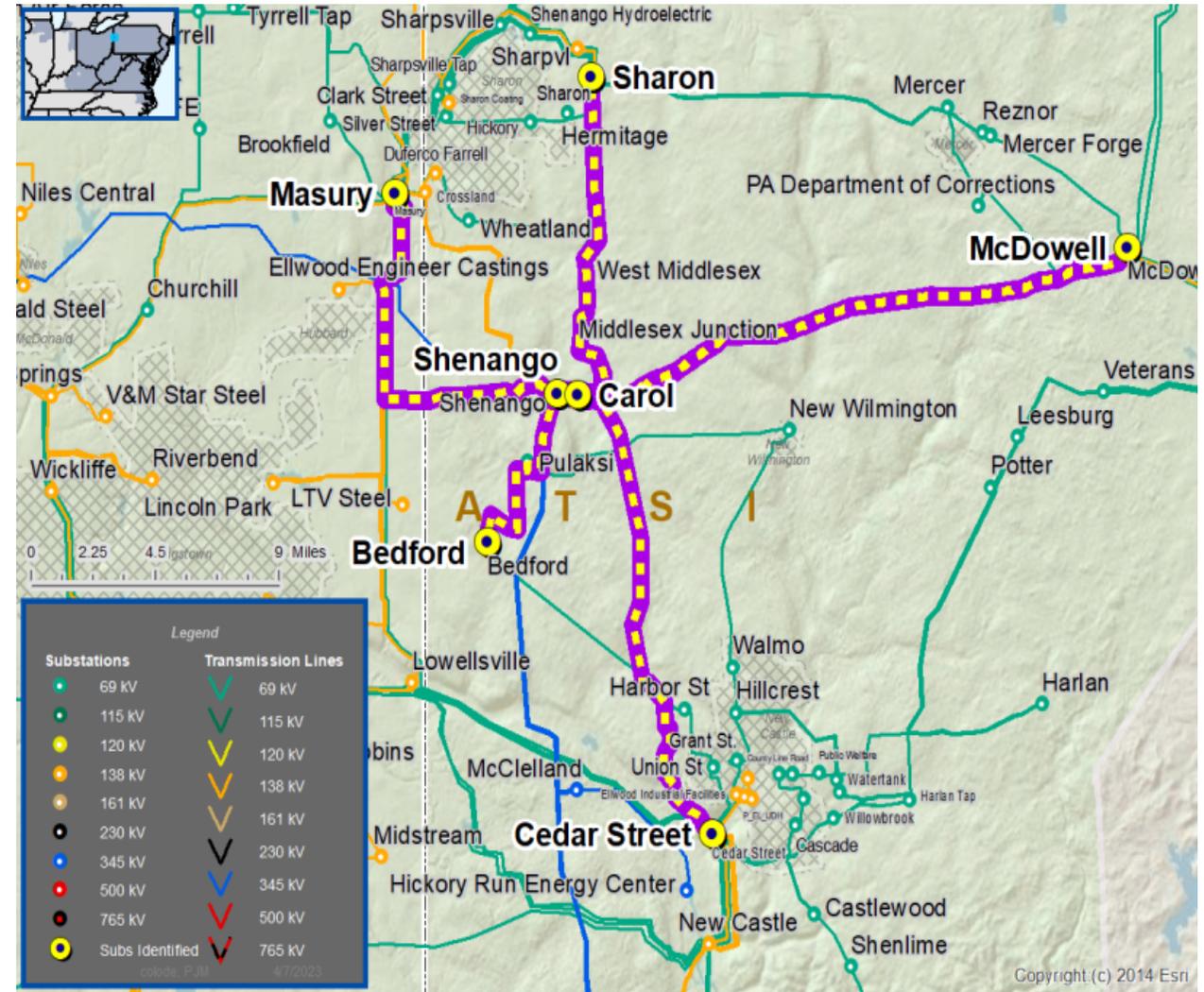


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Need Number: (s1712)
Process Stage: Re-Present Solutions Meeting – 04/21/2023
Previously Presented: Need Meeting 8/31/2018
 Solution Meeting – 9/28/2018

Proposed Solution:

- **At Masury:**
 - Replace Y-188 (B17) 69 kV line relaying and control with standard relay panel
- **At Sharon:**
 - Replace Y-188/Y-303 (B6) 69 kV line relaying and control with standard relay panel
 - Replace the limiting disconnect switch
- **At Shenango:**
 - Replace 138 kV breaker (B48) and line relaying
 - Replace two 138 kV breaker disconnect switches (D37 & D43)
 - Upgrade the terminal equipment (line drops) to exceed the TL rating
- **At McDowell:**
 - Upgrade the terminal equipment (substation conductor) to exceed the TL rating



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Need Number: (s1712)
Process Stage: Re-Present Solutions Meeting – 04/21/2023
Previously Presented: Need Meeting – 8/31/2018
 Solution Meeting – 9/28/2018

Proposed Solution:
Transmission Line Ratings:

Existing Lines:

- Cedar Street-Shenango 138 kV Line:
 - SN: 278 MVA SE: 339 MVA WN: 315 MVA WE: 401 MVA
- McDowell-Shenango 138 kV Line:
 - SN: 265 MVA SE: 309 MVA WN: 309 MVA WE: 309 MVA
- Cedar Street-Masury-Sharon 69 kV Line:
 - SN: 94 MVA SE: 113 MVA



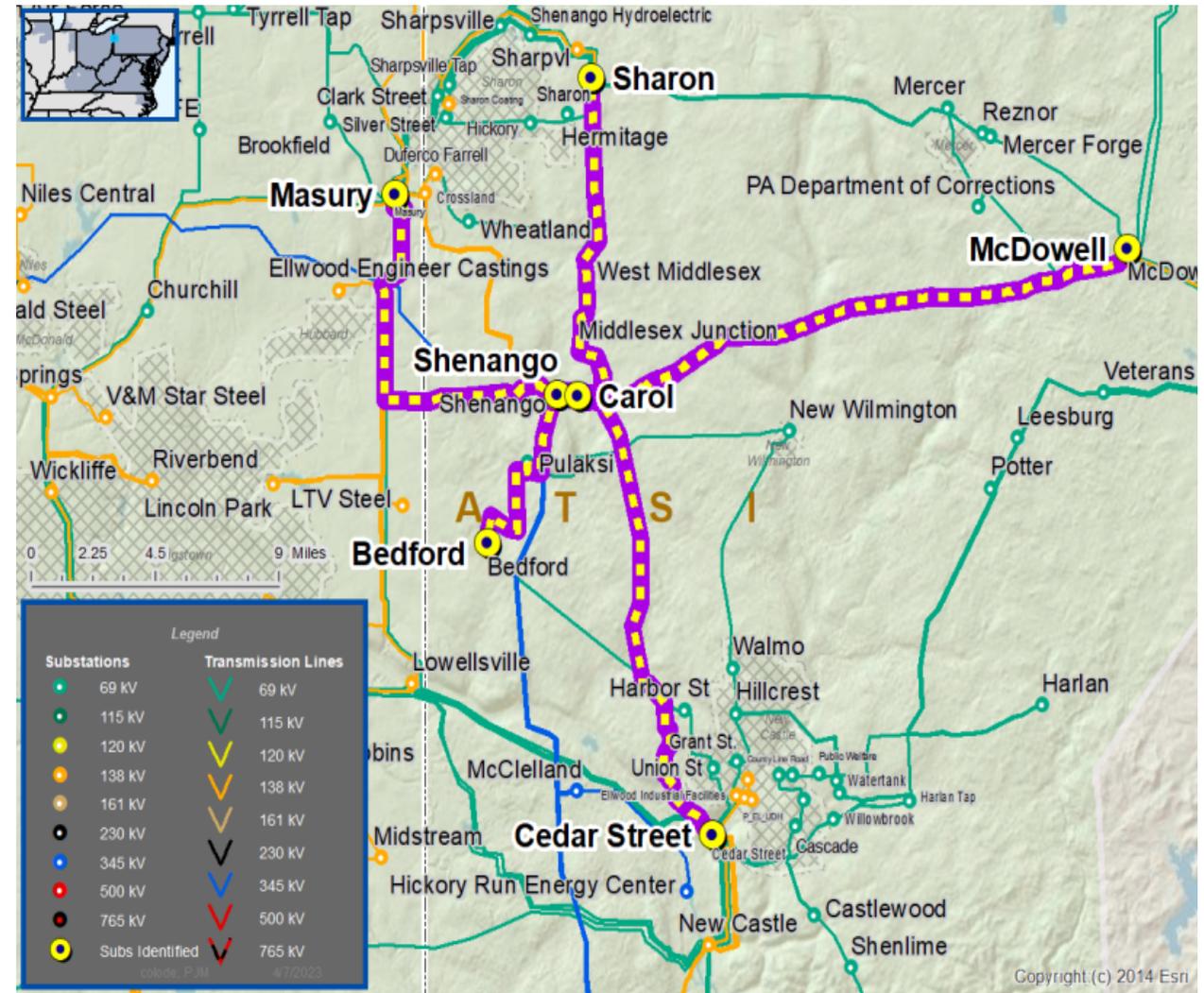
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Need Number: (s1712)
Process Stage: Re-Present Solutions Meeting – 04/21/2023
Previously Presented: Need Meeting – 8/31/2018
 Solution Meeting – 9/28/2018

Proposed Solution:
Transmission Line Ratings:

New Lines:

- Carol-Sharon 69 kV Line:
 - SN: 100 MVA SE: 121 MVA WN: 113 MVA WE: 143 MVA
- Carol- Masury 69 kV Line:
 - SN: 80 MVA SE: 96 MVA WN: 90 MVA WE: 114 MVA
- Carol- Pulaski (#1) 69 kV Line (Cedar Street):
 - SN: 80 MVA SE: 96 MVA WN: 90 MVA WE: 114 MVA
- Carol- Bedford (#2) 69 kV Line (Cedar Street):
 - SN: 94 MVA SE: 113 MVA WN: 105 MVA WE: 133 MVA
- Carol-Shenango (#1) 138 kV Line:
 - SN: 278 MVA SE: 339 MVA WN: 315 MVA WE: 401 MVA
- Carol-Cedar St (#1) 138 kV Line:
 - SN: 278 MVA SE: 339 MVA WN: 315 MVA WE: 401 MVA
- Carol-Shenango (#2) 138 kV Line:
 - SN: 278 MVA SE: 339 MVA WN: 315 MVA WE: 401 MVA
- Carol-McDowell (#2) 138 kV Line:
 - SN: 278 MVA SE: 339 MVA WN: 315 MVA WE: 401 MVA

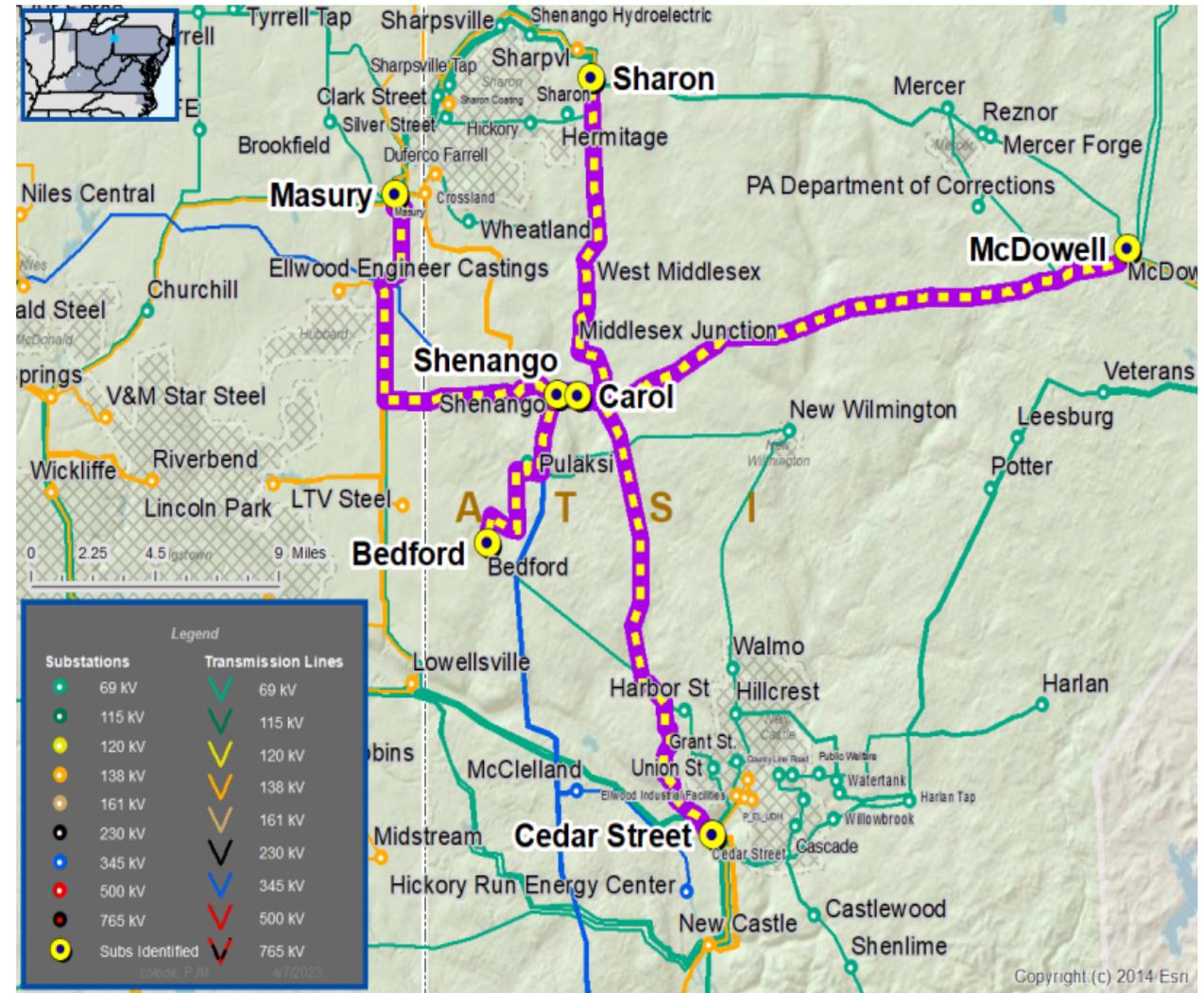


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Need Number: (s1712)
Process Stage: Re-Present Solutions Meeting – 04/21/2023
Previously Presented: Need Meeting – 8/31/2018
 Solution Meeting – 9/28/2018

Proposed Solution:
Alternatives Considered: Network radial 69 kV system by constructing two double circuit 477 ACSR 69 kV lines (~ 1.2 miles) to create four (4) new 69 kV circuits from the new Shenango 69 kV station. Install two (2) 138-69 kV transformers at Shenango. Expand Shenango substation to create a six (6) breaker 69 kV ring bus.

Estimated Project Cost: ~~\$16.3M~~-\$45M
Project IS Date: ~~12/31/2024~~ 12/1/2025
Model: 2022 RTEP model for 2027 Summer (50/50) Case
Status: ~~Conceptual~~ Pre-Engineering



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

4/xx/2022– V1 – Original version posted to pjm.com