

Subregional RTEP Committee – Western FirstEnergy Supplemental Projects

July 17, 2020

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: ATSI-2020-007
Process Stage: Solution Meeting
Solutions Meeting: 07/17/2020
Process Stage: Need Meeting – 05/22/2020

Supplemental Project Driver(s):

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

Specific Assumption Reference(s):

Global Considerations

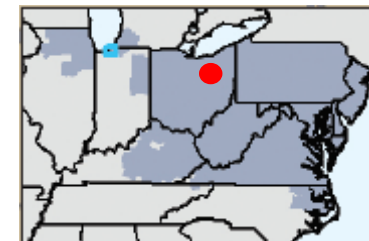
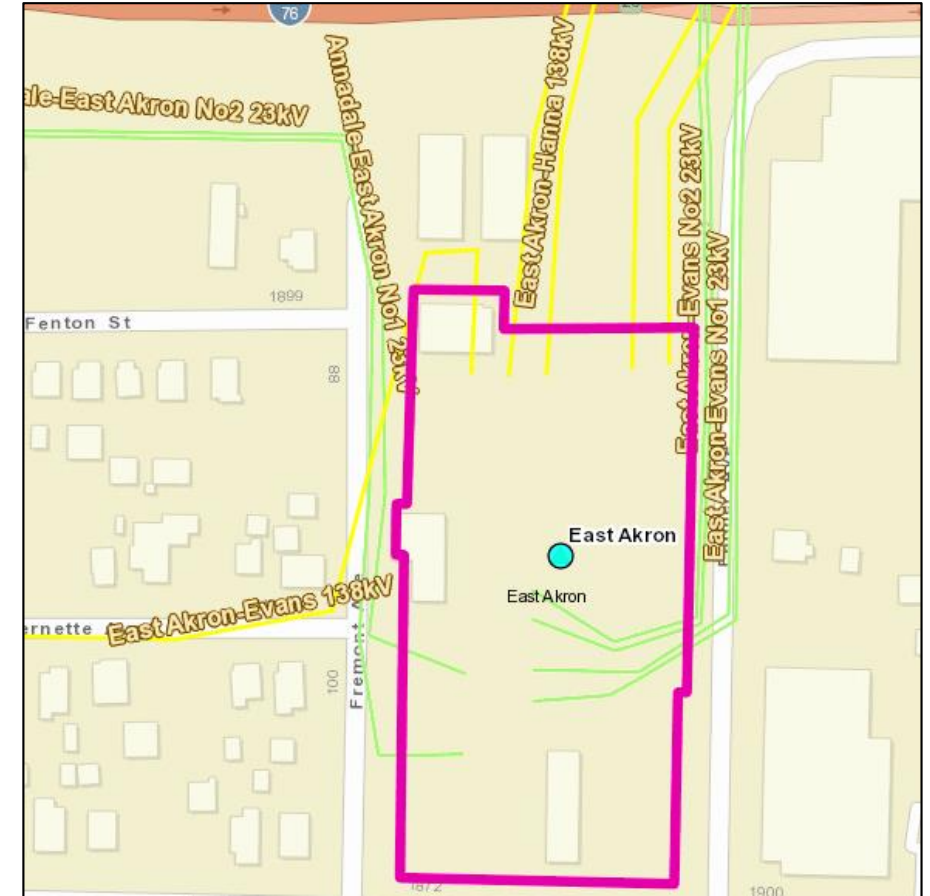
- System reliability and performance
- Load at risk in planning and operational scenarios

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



Legend	
345 kV	
138 kV	
69 kV	

Need Number: ATSI-2020-007
Process Stage: Solution Meeting
Solutions Meeting: 07/17/2020
Process Stage: Need Meeting – 05/22/2020

Problem Statement (continued)

East Akron 138 kV configuration and condition:

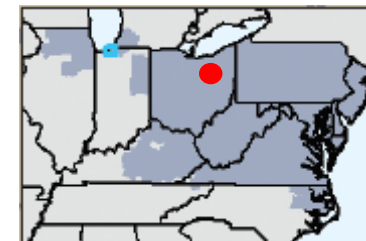
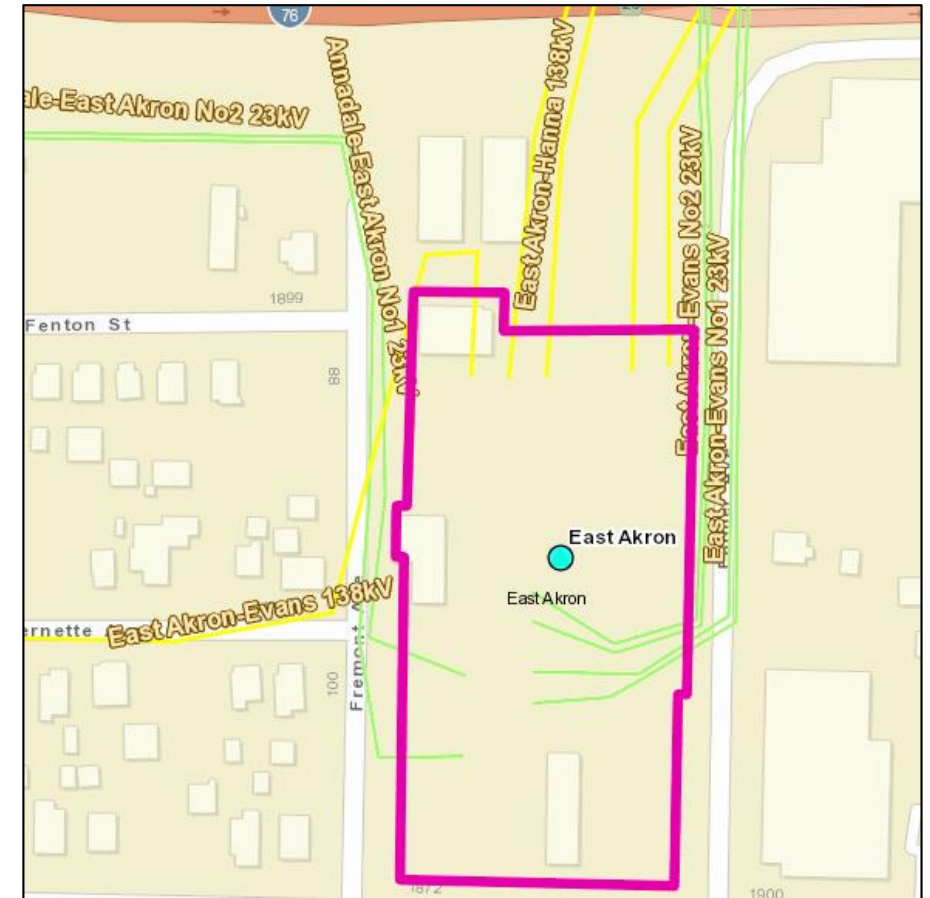
- East Akron 138 kV substation is a main and transfer bus configuration substation
 - A fault on the bus or between the bus and the circuit breaker will result in an outage of the entire bus or substation or a failure of a single circuit breaker or a failure of a relay to trip will result in an outage 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)



Legend	
345 kV	
138 kV	
69 kV	

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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

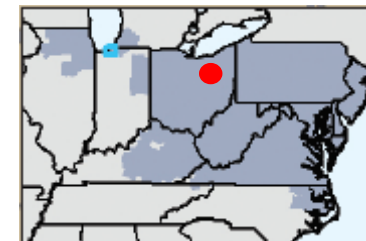
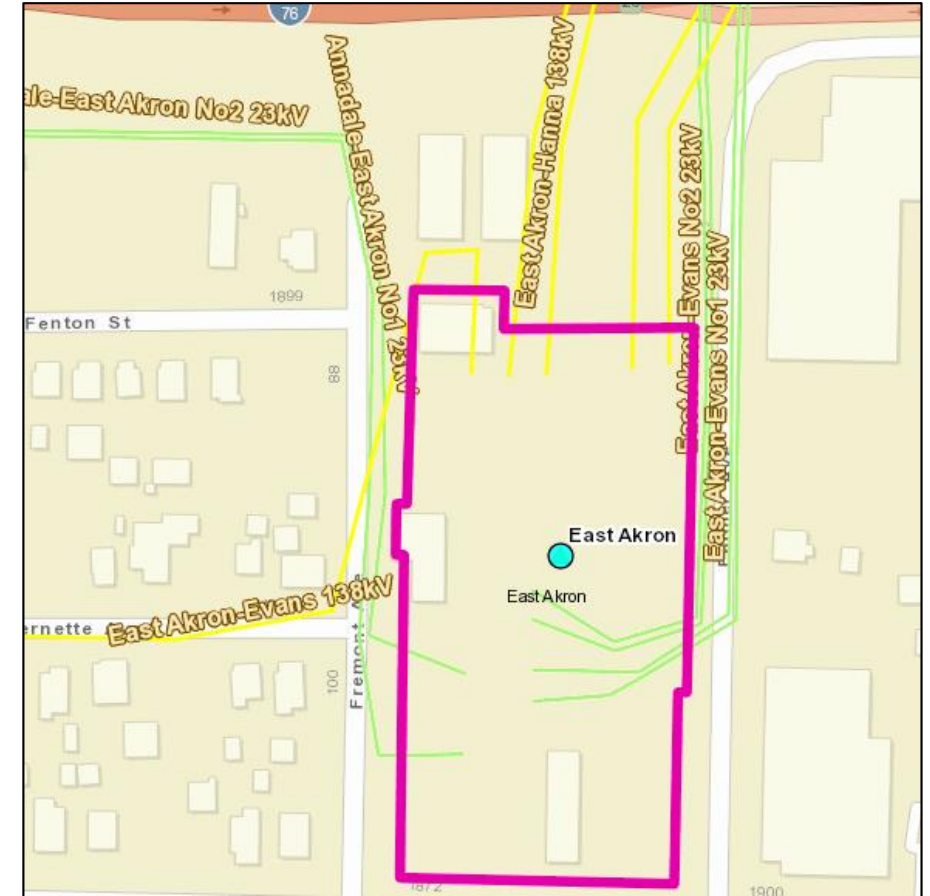
Power flow analysis:

- 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.



Legend	
345 kV	
138 kV	
69 kV	



Need Number: ATSI-2020-007
Process Stage: Solution Meeting
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Proposed Solution:

- Convert East Akron 138 kV Substation into Breaker and Half configuration
- 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

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

Alternatives Considered:

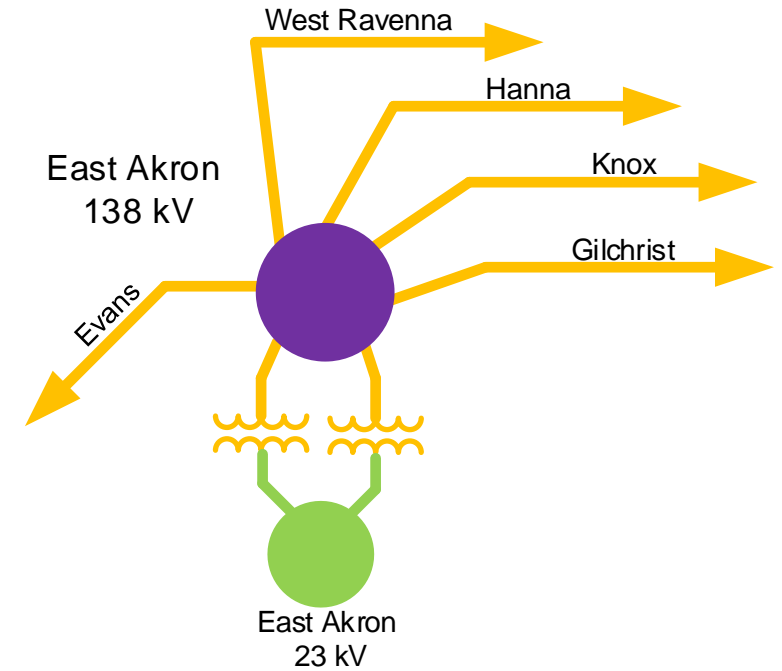
- Maintain existing condition and risk of failure

Estimated Project Cost: \$13.8 M

Projected IS Date: 12/30/2023

Status: Conceptual

ATSI Transmission Zone M-3 Process East Akron 138 kV Substation



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

Need Number: ATSI-2020-008
Process Stage: Solution Meeting
Solutions Meeting: 07/17/2020
Process Stage: Need Meeting – 05/22/2020

Supplemental Project Driver(s):

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

Specific Assumption Reference(s)

Global Considerations

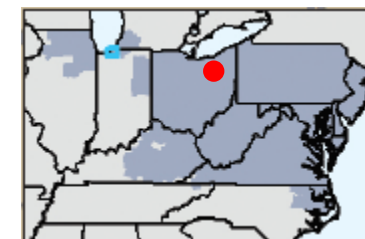
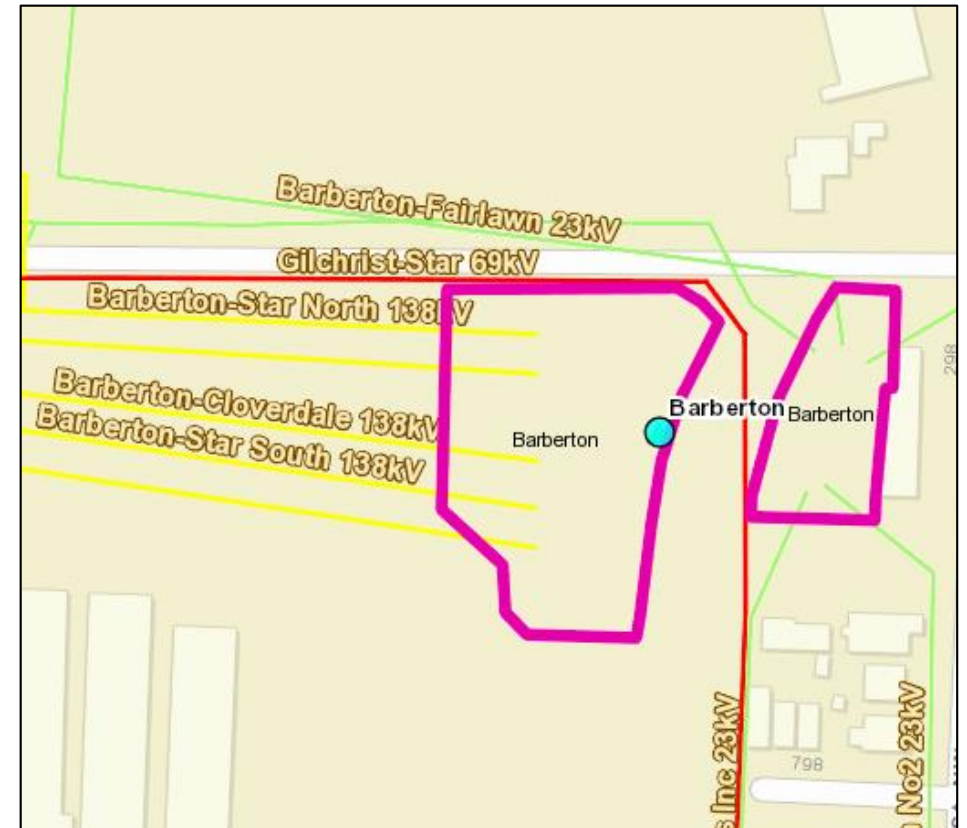
- System reliability and performance
- Load at risk in planning and operational scenarios

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



Legend	
345 kV	
138 kV	
69 kV	

Need Number: ATSI-2020-008
Process Stage: Solution Meeting
Solutions Meeting: 07/17/2020
Process Stage: Need Meeting – 05/22/2020

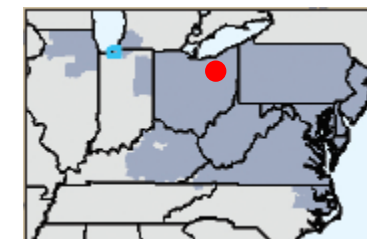
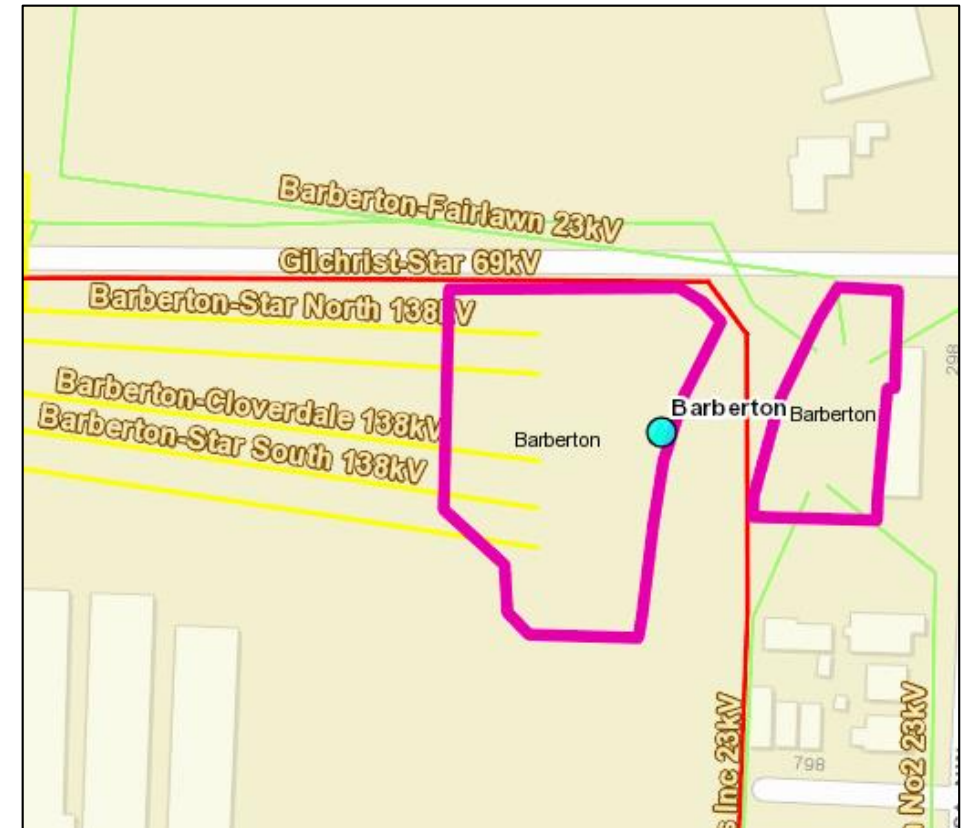
Problem Statement (continued)

Barberton 138 kV configuration and condition:

- Barberton 138 kV substation is a main and transfer bus configuration substation
 - A fault on the bus or between the bus and the circuit breaker 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 or substation interrupting five 138 kV lines and two 138-23 kV transformers

Deteriorating control building and substation equipment:

- The control house was built in 1927, 93 years old.
 - Does not have space for new cables and additional panels.
 - The cables from the 138 kV yard run through an older tunnel under the railroad property to the control house in the distribution yard. The cables in the tunnel can't be removed because they are encased in mineral deposits.
 - The control house has the panels on the second story and poses a challenge to replace and/or maintain the panels.



Legend	
345 kV	
138 kV	
69 kV	

Need Number: ATSI-2020-008
Process Stage: Solution Meeting
Solutions Meeting: 07/17/2020
Process Stage: Need Meeting – 05/22/2020

Problem Statement (continued)

Breaker conditions:

- Oil circuit breakers (OCB) B-124, B-37, B-45, and B-74 are at/beyond expected service life (greater than 45 years) with increasing maintenance concerns; air leaks, deteriorated operating mechanisms, CCPD failures, deteriorated bushings, and increasing maintenance trends
- 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 cost increasing due to maintenance of older equipment

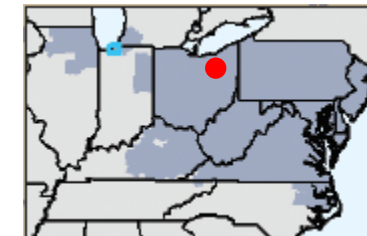
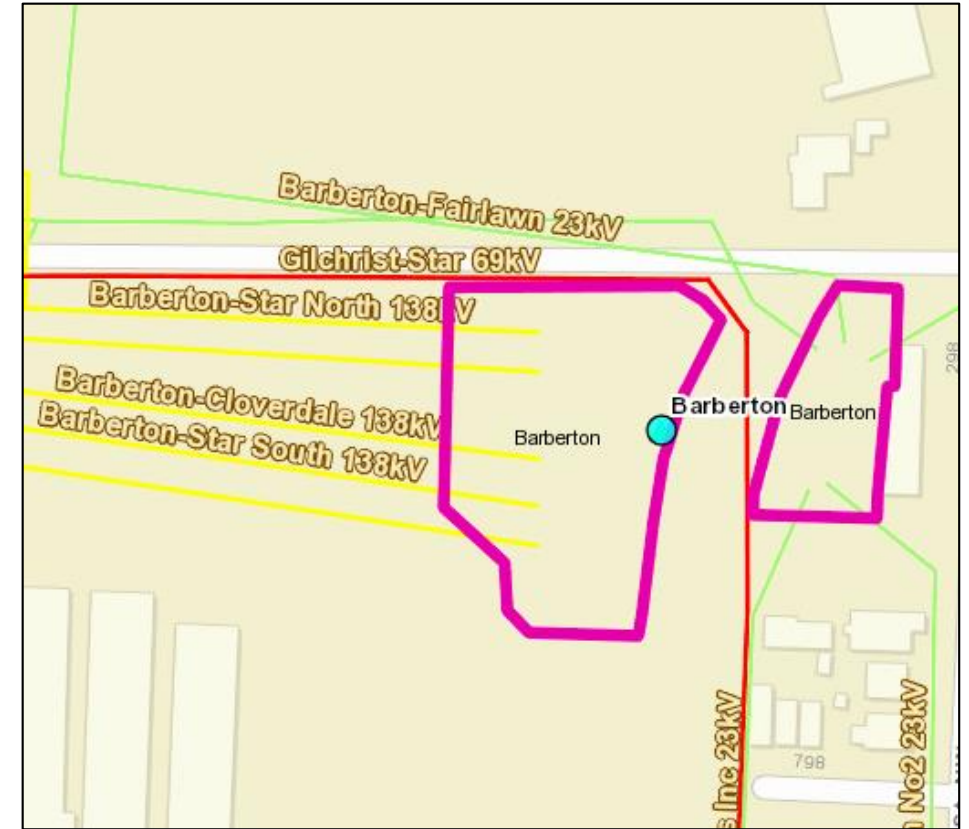
Protection Scheme:

- Barberton 138 kV breakers B-124, B-37, B-45, B-74, B-75 do not have enough CTs for separate inputs to a primary and backup differential scheme.

System Performance

Over the past five years:

The Barberton 138 kV lines or bus has experienced four momentary outages and nine sustained outages.



Legend	
345 kV	
138 kV	
69 kV	

ATSI Transmission Zone M-3 Process Barberton 138 kV Substation

Need Number: ATSI-2020-008
Process Stage: Solution Meeting
Solutions Meeting: 07/17/2020
Process Stage: Need Meeting – 05/22/2020

Proposed Solution:

- Convert Barberton 138 kV Substation into Double Bus Double breaker configuration
- Install a new control building
- Re-use two (2) breakers (B75 & 76)
- Upgrade five (5) breakers (B124, B45, B74, B37 & B357) with 138 kV, 40 kA, SF6 circuit breaker
- Install nine (9) additional 138 kV, 40 kA, SF6 circuit breakers
- Replace and install switches, surge arrestors, CVT's, SSVT's
- Upgrade less than 0.1 miles section of the Barberton-West Akron 138 kV line from 605 kcmil ACSR conductor to 795 kcmil ACSS conductor

Transmission Line Ratings:

- Barberton-West Akron 138 kV Line
 - Before Proposed Solution: 233 MVA SN / 282 MVA SE
 - After Proposed Solution: 310 MVA SN / 357 MVA SE

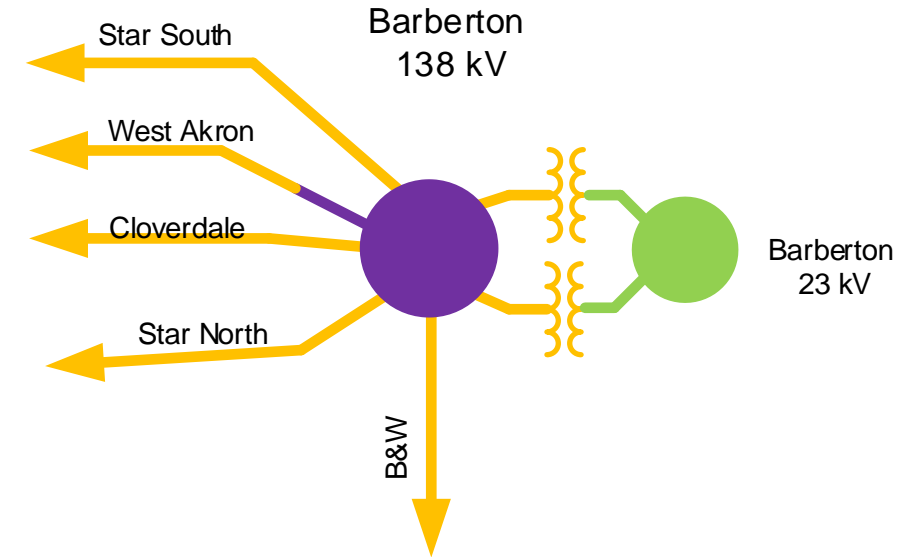
Alternatives Considered:

- Maintain existing condition and risk of failure
- Convert Barberton 138 kV substation into breaker and half configuration. Not considered due to space limitation

Estimated Project Cost: \$14.7 M

Projected IS Date: 12/30/2023

Status: Conceptual



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

7/7/2020 – V1 – Original version posted to pjm.com