Sub Regional RTEP Committee
PJM Western – ATSI Supplemental Projects

May 20, 2019

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

Need Number: ATSI-2019-055

Process Stage: Need Meeting – 05/20/2019

Supplemental Project Driver(s):

Customer Service

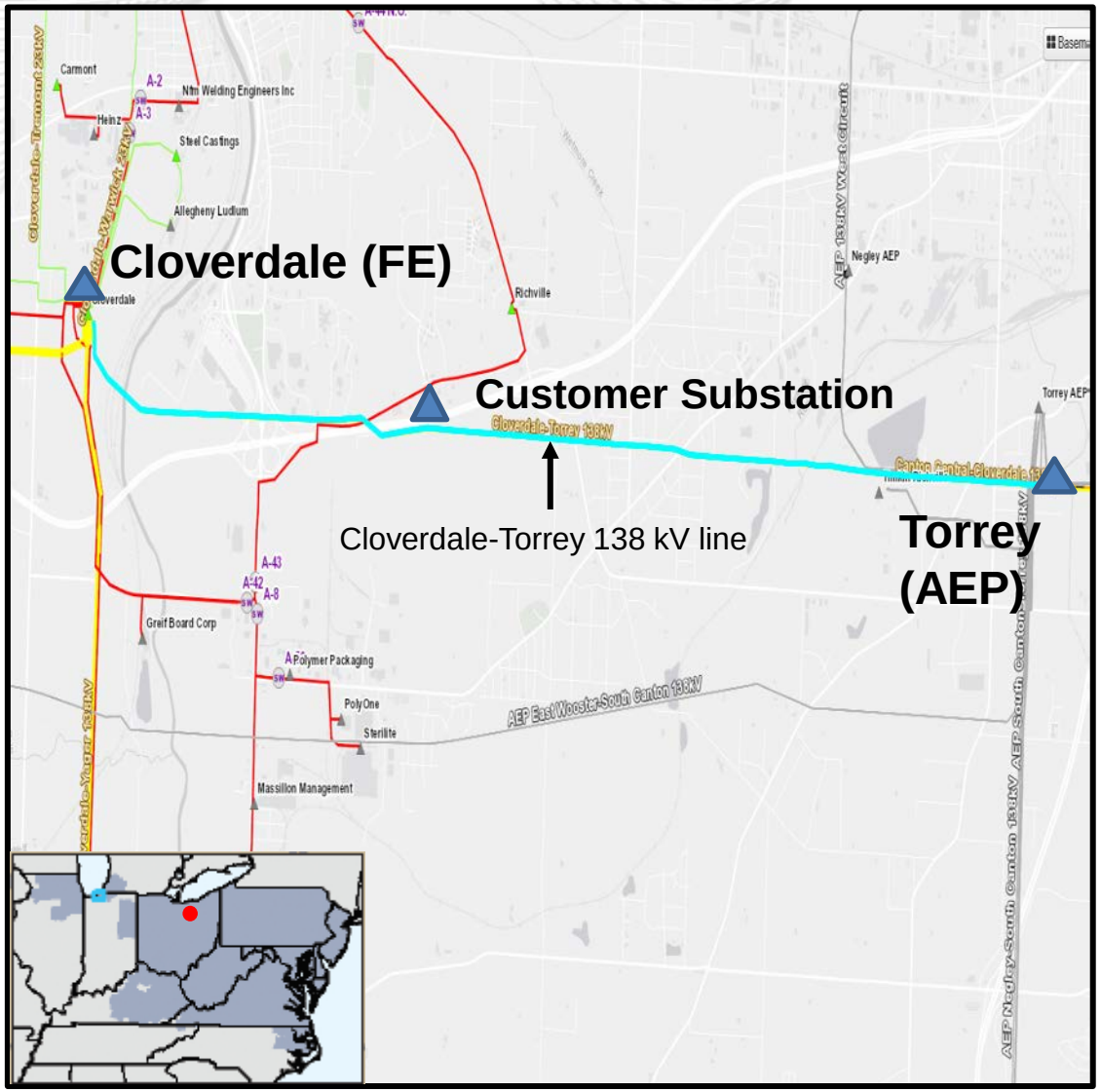
Specific Assumption Reference(s)

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

Problem Statement

New Customer Connection - A customer requested a 138 kV transmission service for a 138/12.47 kV substation with approximately 17.5 MVA of load be connected to the Cloverdale-Torrey 138 kV line approximately 2.3 miles from Cloverdale 138 kV substation.

Requested In-Service Date: 06/01/2020



ATSI Transmission Zone M-3 Process

Need Number: ATSI-2019-056

Process Stage: Need Meeting – 05/20/2019

Supplemental Project Driver(s):

Customer Service

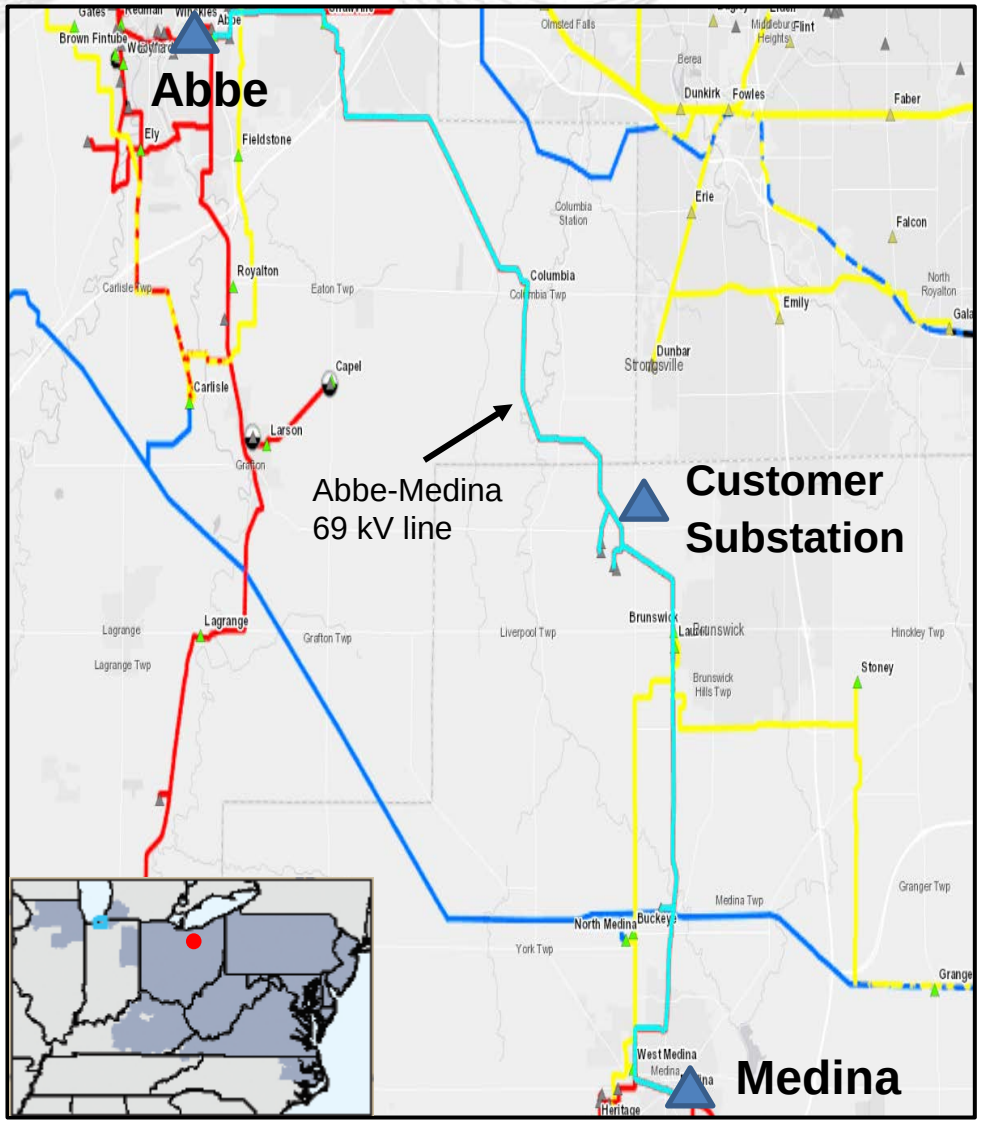
Specific Assumption Reference(s)

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

Problem Statement

New Customer Connection - A customer requested 69 kV transmission service for a 69/12.47 kV substation with approximately 13 MVA of load be connected to the Abbe-Medina 69 kV line approximately 10.9 miles from Medina 69 kV substation.

Requested In-Service Date: 12/31/2020



Need Number: ATSI-2019-057

Process Stage: Need Meeting – 05/20/2019

Supplemental Project Driver(s):
Customer Service

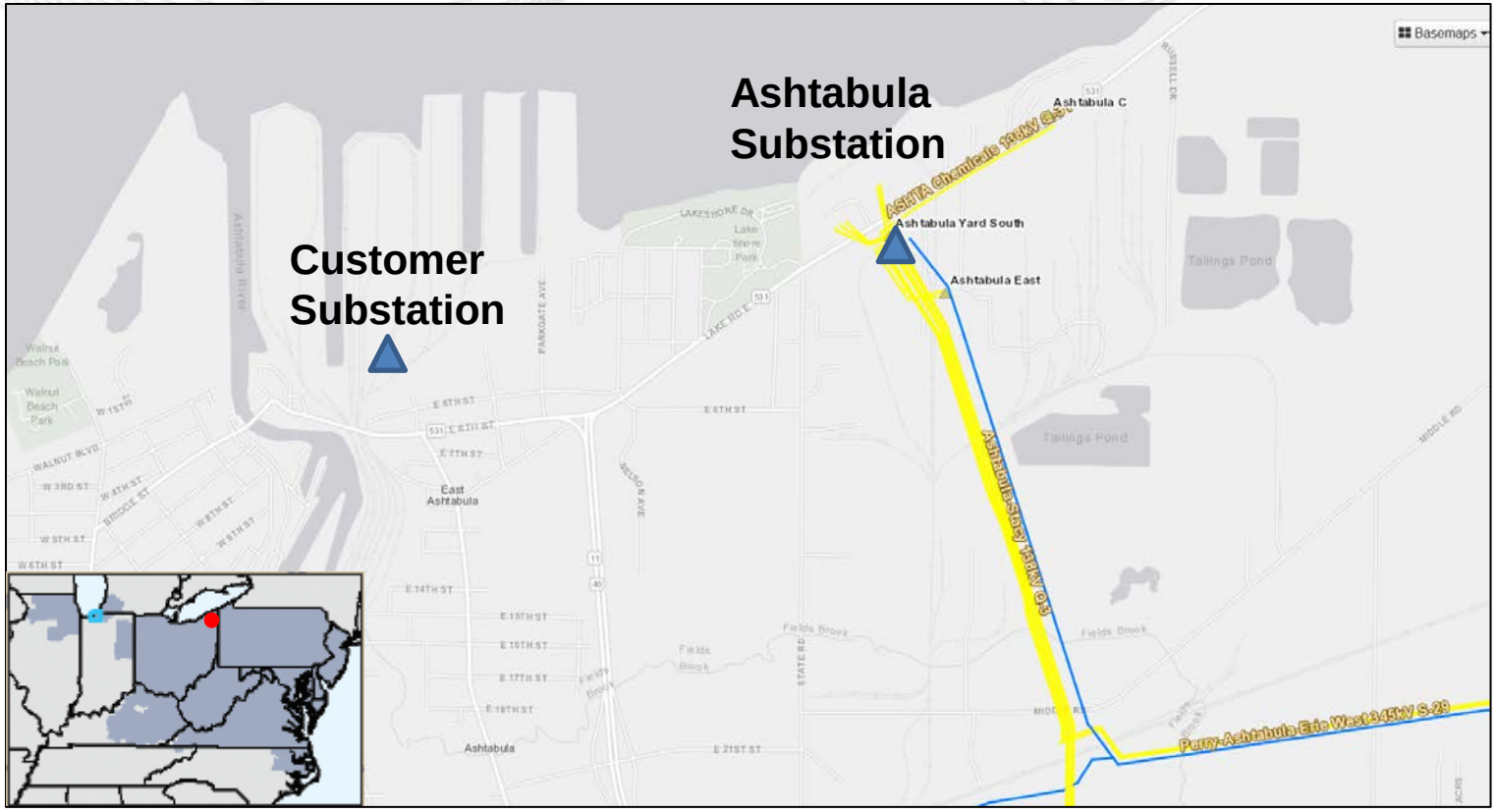
Specific Assumption Reference(s)

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

Problem Statement

New Customer Connection - A customer requested 138 kV transmission service approximately 75 MVA of load be connected to the Ashtabula 138 kV substation, approximately 1.7 miles from the customer substation.

Requested In-Service Date: 06/01/2020



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

ATSI Transmission Zone M-3 Process

Chamberlin-Treat 69 kV Network Radial Line

Need Number: ATSI-2019-053

Process Stage: Solution Meeting - 5/20/2019

Previously Presented: Needs Meeting – 03/25/2019

Project Driver(s):
Operational Flexibility and Efficiency
Infrastructure Resilience

Specific Assumption Reference(s)

Global Considerations

- System reliability and performance
- Substation / Line equipment limits
- Reliability of Non-Bulk Electric System (Non-BES) facilities
- Load and risk in planning and operational scenarios
- Load and/or customers at risk on single transmission lines

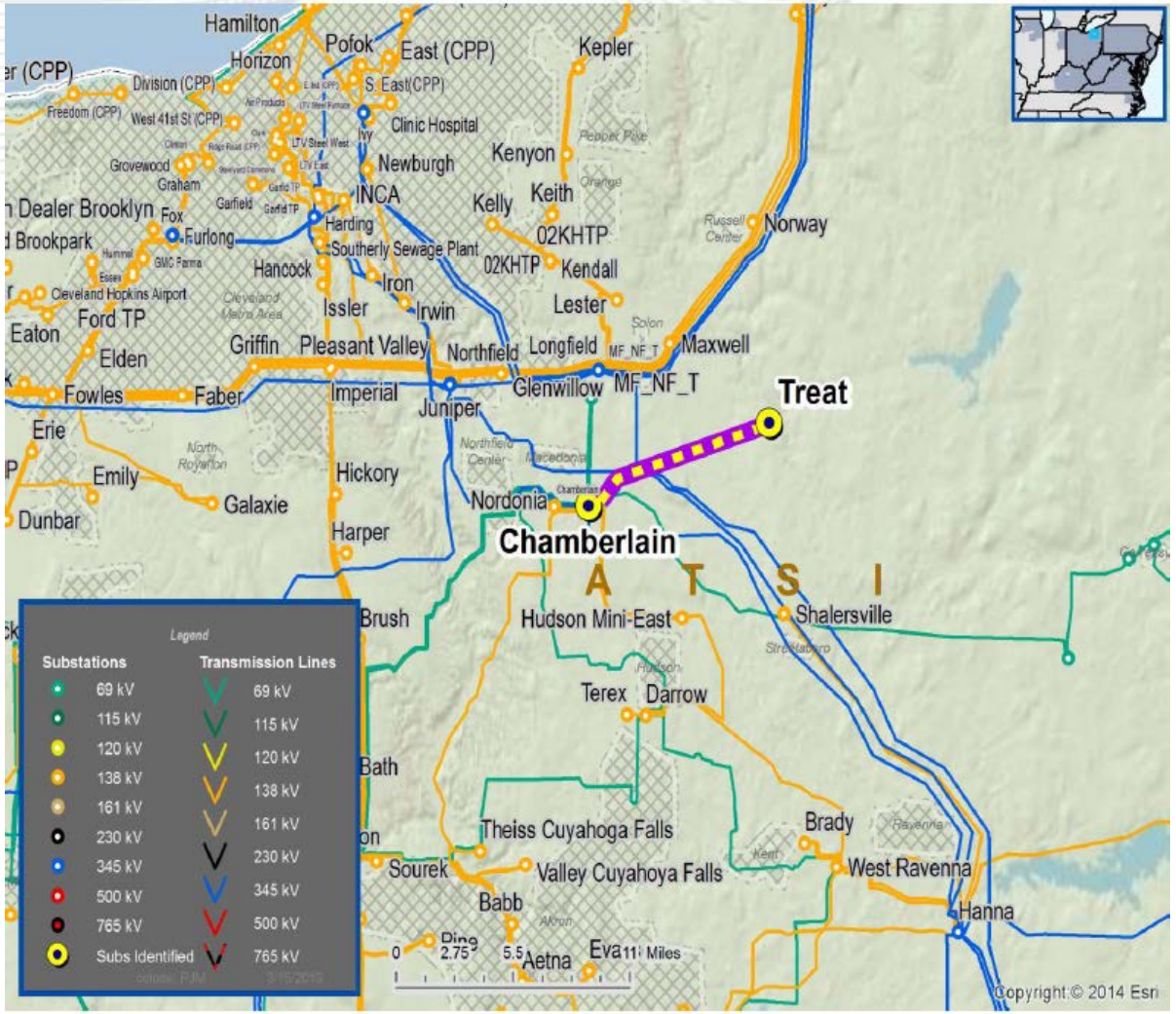
Network Radial Lines

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

Problem Statement

Chamberlin-Treat 69 kV Line (Radial)

- The Chamberlin-Treat 69 kV line (approximately 13.4 miles) is a radial line.
- Customers and load at risk: Approximately 8,802 customers and 37 MWs of load.
- Limited operational flexibility to maintain service under transmission maintenance and restoration efforts.
- The Chamberlin-Treat 69 kV line has experienced four outages in the past five years.



ATSI Transmission Zone M-3 Process

Chamberlin-Treat 69 kV Network Radial Line

Need Number: ATSI-2019-053

Process Stage: Solution Meeting - 5/20/2019

Potential Solution:

Build approximately five (5) miles of 69 kV line from Treat to Cantex to create the Aurora-Chamberlin #2 69 kV line. Operate the existing Aurora-Chamberlin 69 kV line radial out of Chamberlin. Serve Mantua 69 kV substation from Garrettsville. Add SCADA control switches at Treat and Cantex tap. Add an auto-sectionalizing scheme at Geauga substation.

Estimated Project Cost $11M

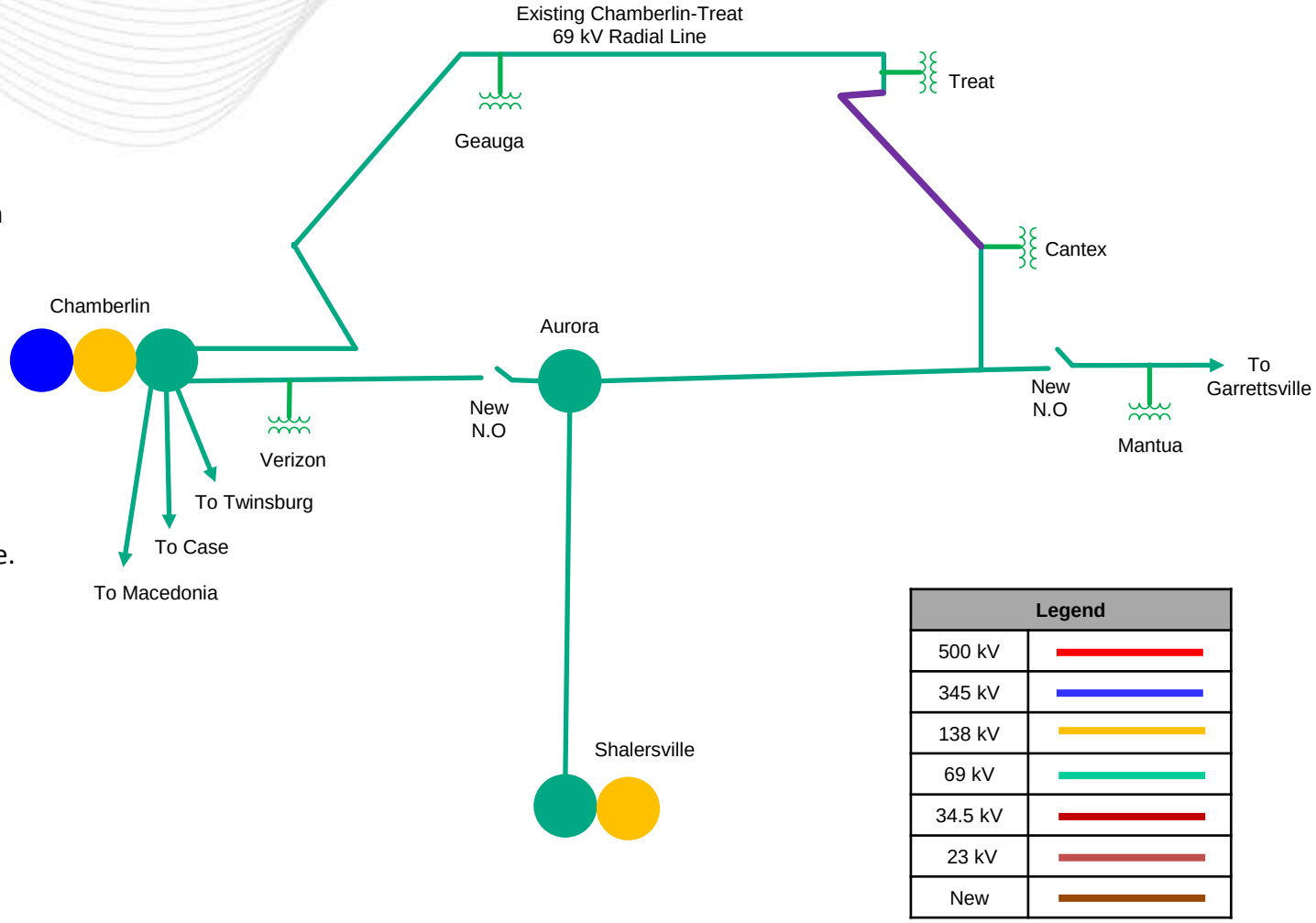
Alternatives Considered:

Build approximately 8.5 miles 69 kV line from Treat to Mantua and add a 138/69 kV source at Mantua by building approximately 10 miles of 138 kV line.

Estimated Alternative Cost $33M

Projected In-Service: 8/14/2020

Status: Conceptual



ATSI Transmission Zone M-3 Process

Ottawa-West Fremont #2 138 kV Switch Upgrade

Need Number: ATSI-2019-054

Process Stage: Solution Meeting - 5/20/2019

Previously Presented: Needs Meeting – 03/25/2019

Supplemental Project Driver(s):

Equipment Material, Condition, Performance and Risk

Operational Flexibility and Efficiency

Infrastructure Resilience

Specific Assumption Reference(s)

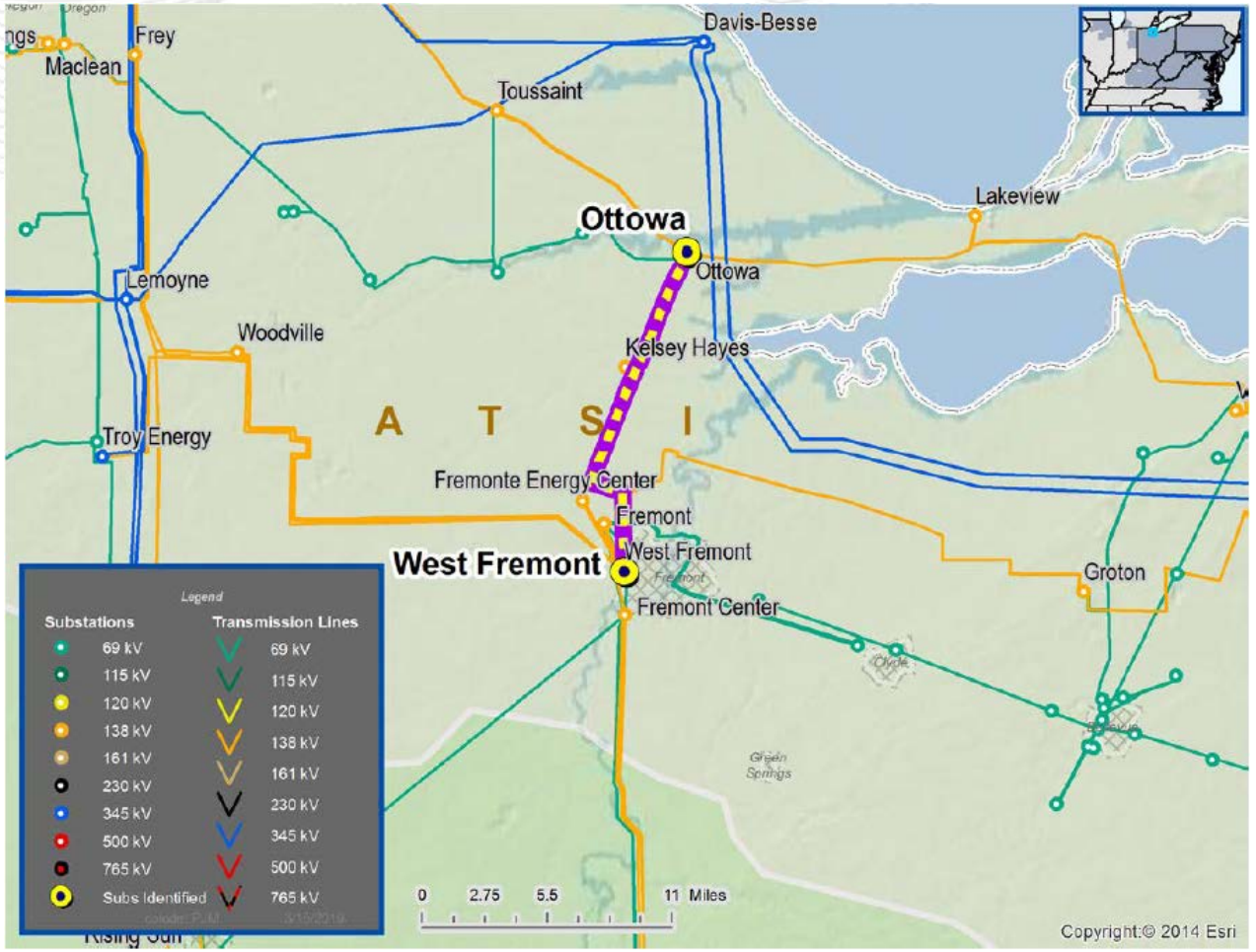
Global Considerations

- System reliability and performance
- Substation / Line equipment limits

Problem Statement

Ottawa-West Fremont #2 138 kV Equipment and Tap Connection

- The existing KPF switches A-13135 and A-13136 are obsolete and no longer supported by the manufacturer. The existing customer tap connection (tapped between switch A-13135 and switch A-13136) on the Ottawa-West Fremont #2 138 kV line requires a 270 degree turn and crosses under both the Ottawa-West Fremont #1 and Ottawa-West Fremont #2 138 kV lines which creates operational maintenance constraints.



ATSI Transmission Zone M-3 Process

Ottawa-West Fremont #2 138 kV Switch Upgrade

Need Number: ATSI-2019-054

Process Stage: Solution Meeting - 5/20/2019

Potential Solution:

Replace switches A-13135P and A-13136 and install SCADA. Transfer customer tap connection and new switches A-13135P and A-13136 onto the Ottawa-West Fremont #1 138 kV line from the existing Ottawa-West Fremont #2 138 kV line to eliminate the 270 degree turn which crosses under both the Ottawa-West Fremont #1 and Ottawa-West Fremont #2 138 kV lines creating operational maintenance constraints.

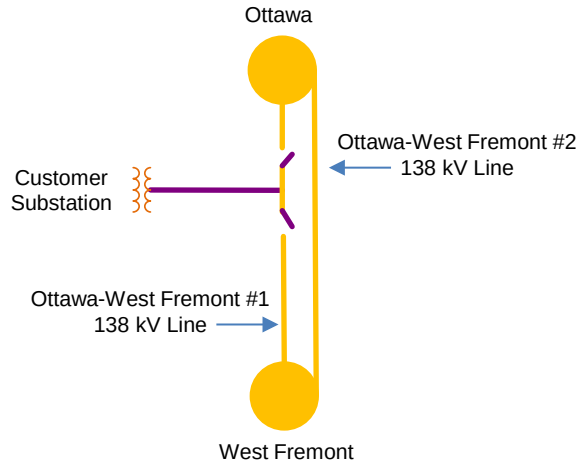
Estimated Project Cost $0.4M

Alternatives Considered:

Maintain existing condition with an elevated risk of failure and continued operational maintenance constraints.

Projected In-Service: 11/30/2019

Status: Conceptual



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

Changes to Existing Supplemental Projects Before M-3 Process

Need Number: N/A – Before new M3 Process

Previously Presented: SRRTEP Meeting (Final Plan) - 9/28/2018
SRTEP Meeting (Need / Solution) – 08/31/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts
- Reduce amount of potential local load loss (Approximately 99 MWs) under contingency conditions
- Mitigate non-planning criteria voltage concerns on the < 100 kV system under contingency (P6) conditions.
  - *Loss of Crissinger-Roberts 138 kV and Crissinger-Tangy 138 kV Lines*
  - *Results in potential local voltage collapse on the 34.5 kV sub-transmission system.*

Potential Solution: (Revised 05/20/2019)

Crissinger 138 kV Ring Bus Expansion (S1696)

- Expand existing Crissinger substation from a four (4) breaker to a six (6) breaker 138 kV ring bus.
- Cut and extend the Kirby-Roberts 138 kV line to Crissinger substation. (Approximately 1.0 mile)
- Reconfigure Crissinger substation to include terminals for:
  Crissinger – Kirby 138 kV Line and Crissinger – Roberts #1 138 kV Line
  Crissinger – Roberts #2 138 kV Line and Crissinger – Tangy 138 kV Line
- PJM no harm analysis indicates that existing Crissinger 138 kV breakers (B1 and B2) are overdutied The project scope has be expanded to include the replacement of these breakers.

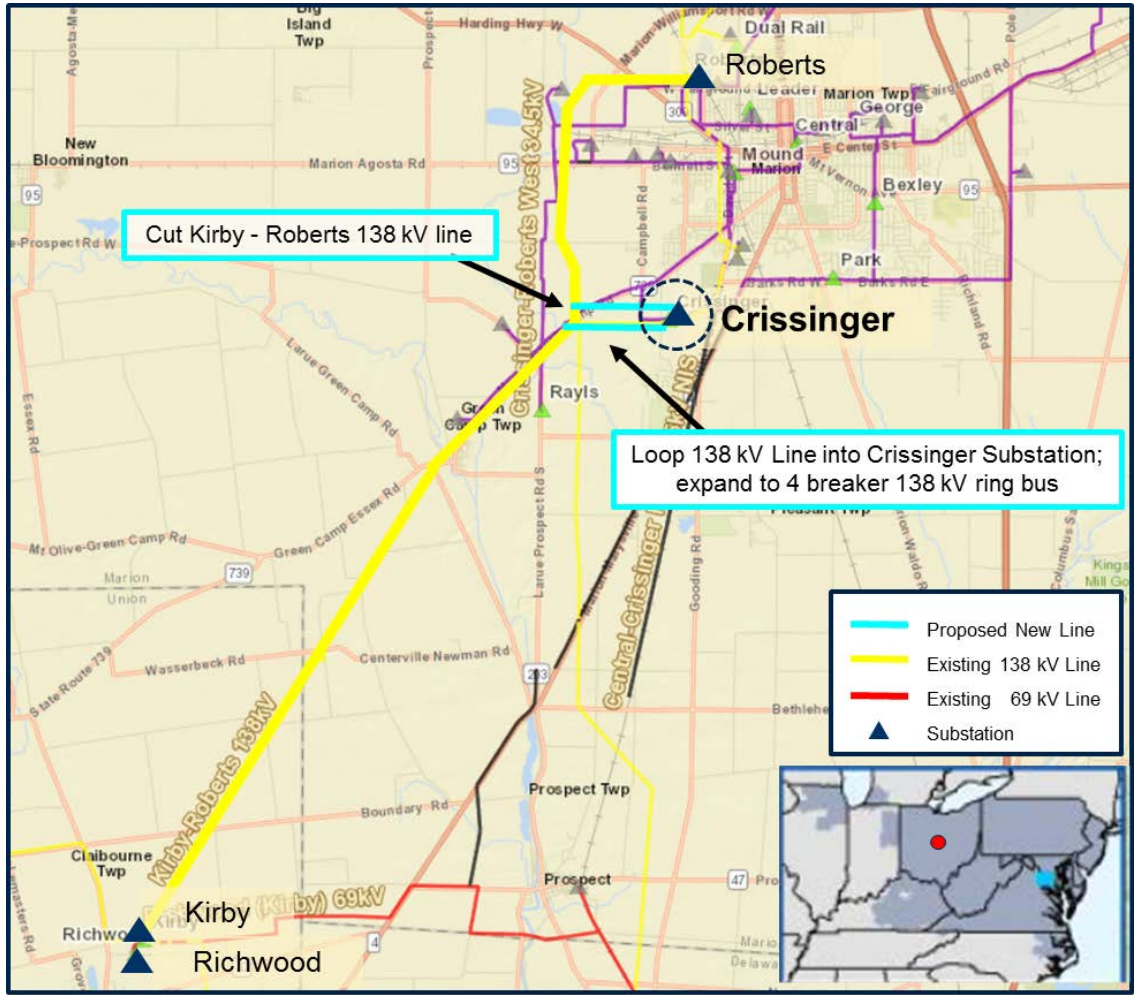
Alternatives Considered:

Add capacitor bank at Crissinger 138 kV substation

Estimated Project Cost: $7.5M (Revised 05/20/2019); $5.8 (Original Cost)

Projected IS Date: 12/31/2019

Status: Engineering



Changes to Existing Supplemental Projects After M-3 Process

ATSI Transmission Zone (Revision)

Need Number: ATSI-2018-009

Process Stage: Solution Meeting

Need Present: 9/28/2018

Project Driver(s):

Operational Flexibility and Efficiency

Specific Assumption Reference(s)

Add / Expand Bus Configuration

- Reduce amount of exposed potential local load loss during contingency conditions.

Build New Transmission Line

- Improve system reliability under contingency conditions.
- Reduce the amount of potential local load loss during contingency conditions.

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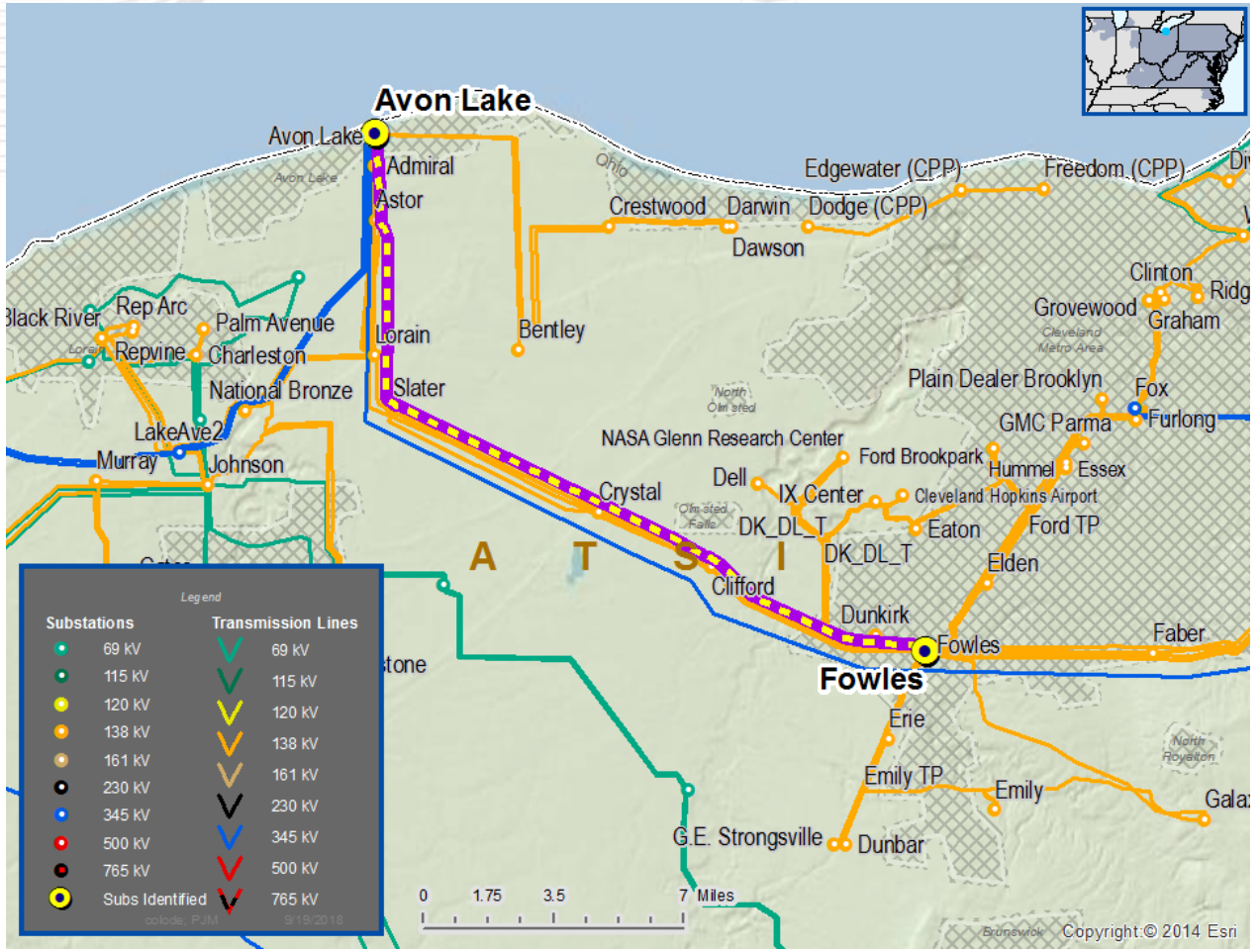


Need Number: ATSI-2018-009 (Continued)

Process Stage: Solution Meeting

Need Presented: 9/28/2018

CONTINUED FROM PREVIOUS SLIDE…

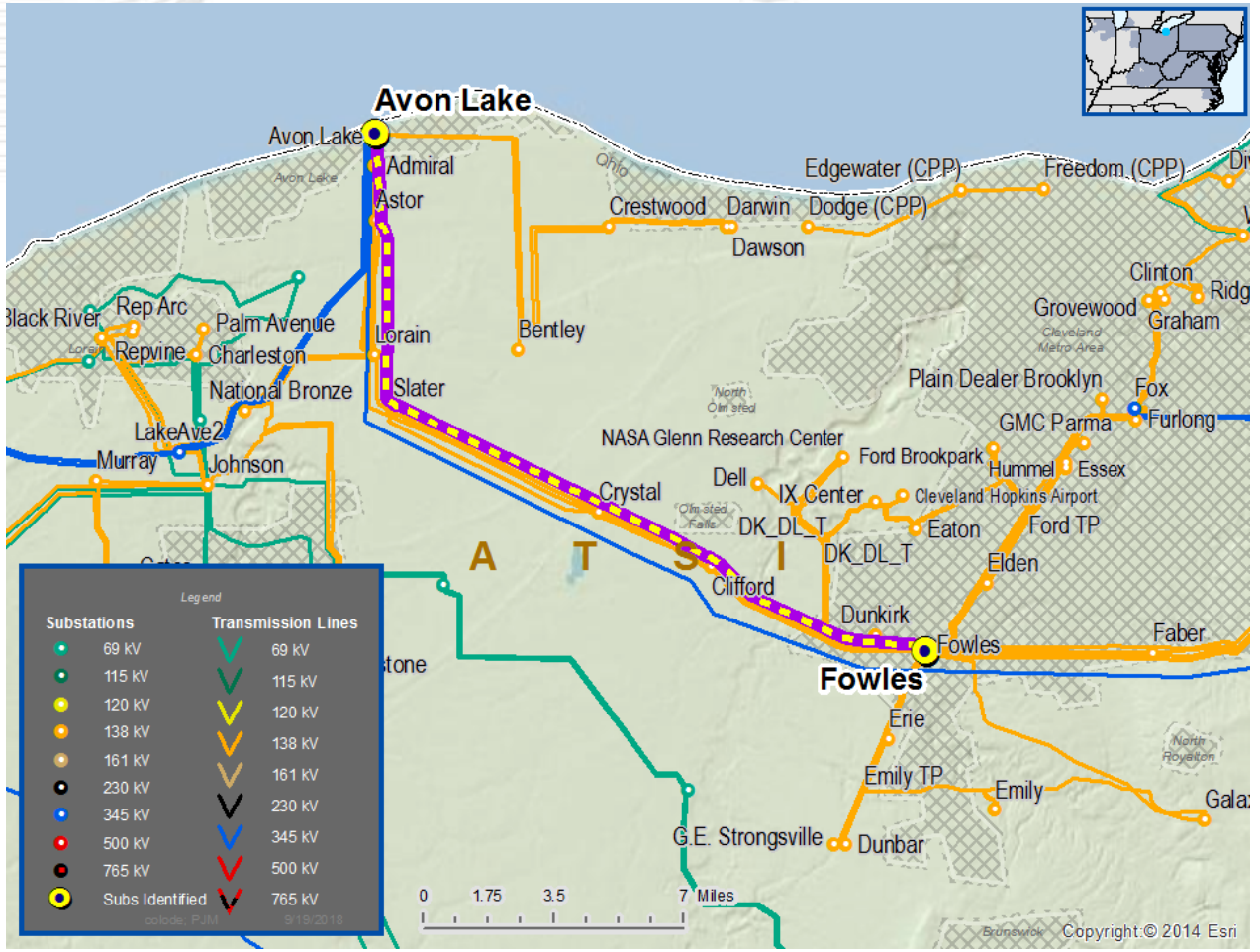
Problem Statement

Avon-Fowles 138 kV Q1 and Q3 Line Load at Risk

- Reduce the amount of local load loss at risk and mitigate non-planning criteria voltage concerns on the > 100 kV system under contingency conditions.
  - Loss of Avon-Fowles Q1 138kV line (“B_LINE1_NR_006”) and path-end outage of the Avon-Fowles Q3 138 line.
  - Results in the potential loss of approximately 60 MWs and 14,000 customers.
  - Results in the potential low voltage (0.91 p.u.) at Dawson 138kV Substation

Or

  - Common tower outage Avon-Fowles Q1 138kV line and the Avon-Fowles Q3 138 line (“C5-TWL-NR005”).
  - Results in the consequential load loss of approximately 237 MWs and 68,200 customers.



Need Number: ATSI-2018-009 (Continued)

Proposed Solution: (Revised 05/20/2019)

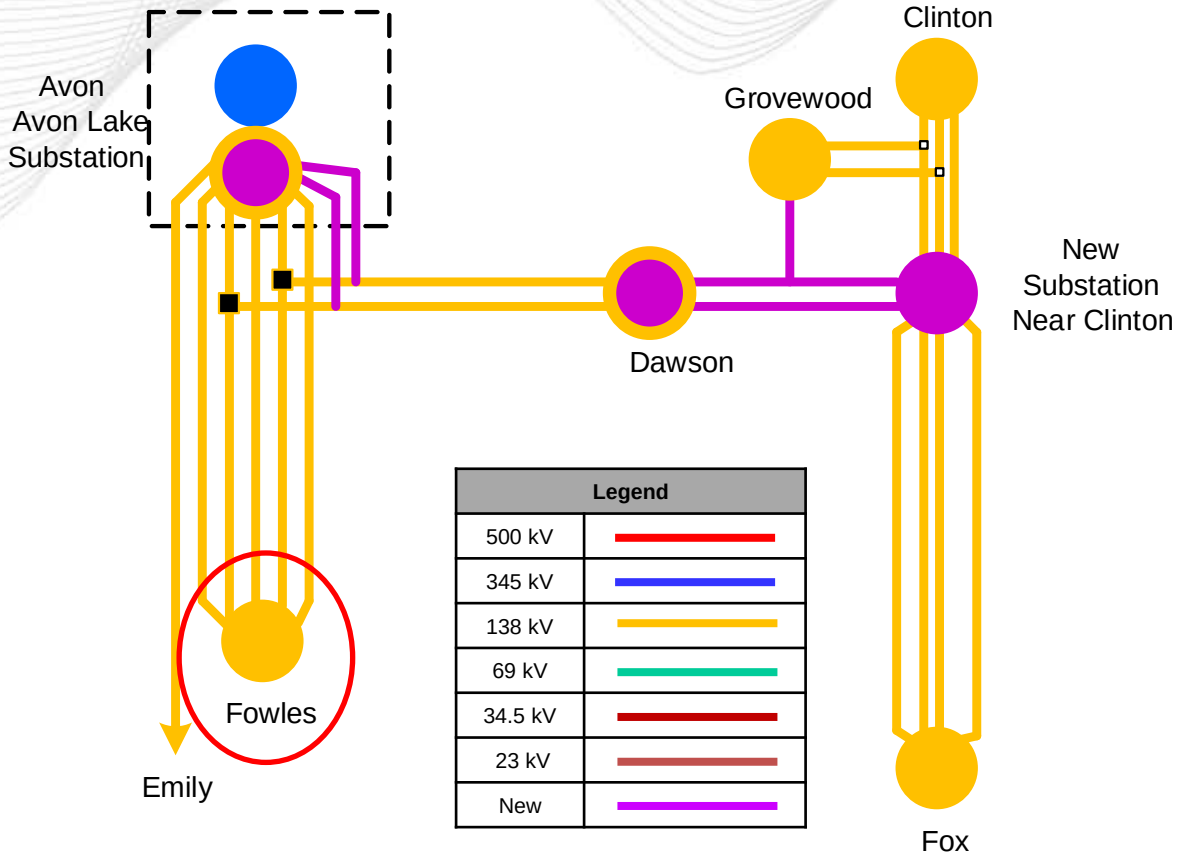
Avon-Clinton Install 138kV Double Circuit Corridor

- Construct double circuit lines (~ 12 miles) from Dawson to Clinton with 795 ACSR conductor; utilize existing lines that are build for future 138kV expansion for part of the new double circuit. New conductor rating is 278 MVA SN / 339 MVA SE
- Expand Dawson substation to a 6-breaker ring bus.
  - Avon-Dawson #1 and Avon-Dawson #2 138 kV Lines
  - Dawson-New Clinton Substation # 1 and Dawson-New Clinton Substation #2 138kV lines.
  - Connect 2 – 138 / 36 kV load transformers
- Build a new substation near Clinton substation to convert Clinton to a breaker and half bus scheme, and incorporate the new Avon-Clinton 138 kV lines into the scheme. The breaker and half scheme will have 4 strings (12 breakers total).
- Create two new line exits at Avon to incorporate the new Clinton lines.
- Rearrange Grovewood taps to eliminate common tower contingency issues by tapping one transformer to the new Avon-Clinton 138 kV line.
- PJM no harm analysis indicates that existing Fowles138 kV breaker (Q16) is overdutied. The project scope has be expanded to include the replacement of this breaker.

Alternatives Considered:

- Create two new line exits at Avon for dedicated 138kV radial lines to feed Dawson.

ATSI Transmission Zone (Revision)



Estimated Project Cost: $57.8M (Revised 05/20/2019); $57.1M (Original Cost)

Projected IS Date: 12/31/2022

Status: Conceptual

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

5/8/2019 – V1 – Original version posted to pjm.com

5/14/2019 – V2 – Slides 7 & 8: Changed Need ID from ATSI-2019-051 to ATSI-2019-053