Subregional RTEP Committee – Western
FirstEnergy Supplemental Projects

June 19, 2020

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
Ford Road-Maclean and Gould-Maclean 69 kV Line

Need Number: ATSI-2020-012

Process Stage: Need Meeting – 06/19/2020

Supplemental Project Driver(s):

Operational Flexibility and Efficiency

Load At Risk

Specific Assumption Reference(s)

Global Considerations

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

Add/Expand Bus Configuration

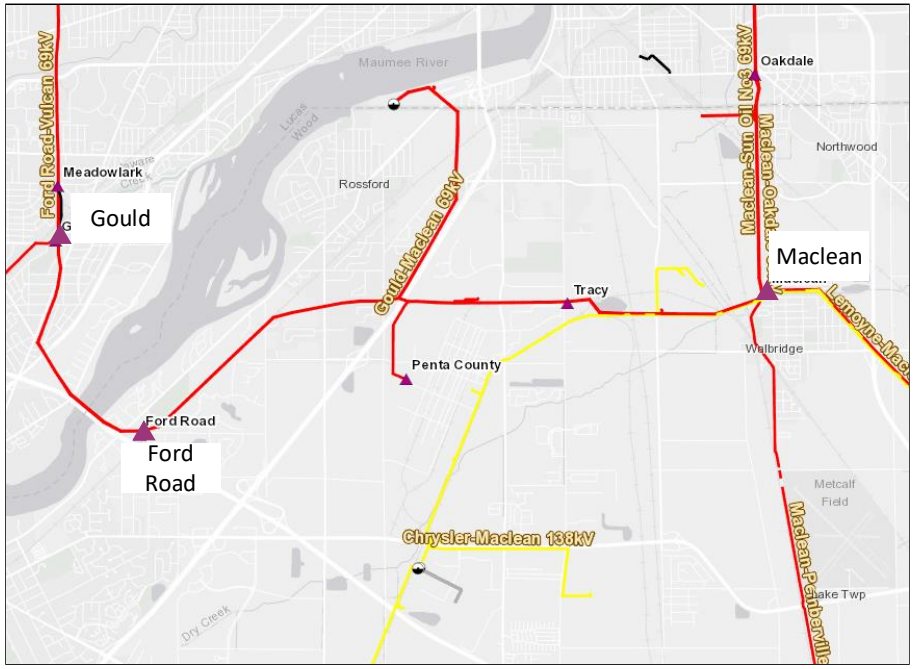
- Capability to perform system maintenance

Automatic Sectionalizing Scheme

- Projects are developed under this methodology by evaluating load at risk and/or customers impacted

Upgrade Relay Schemes

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



Legend	
345 kV	
138 kV	
69 kV	

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ATSI Transmission Zone M-3 Process
Ford Road-Maclean and Gould-Maclean 69 kV Line

Need Number: ATSI-2020-012

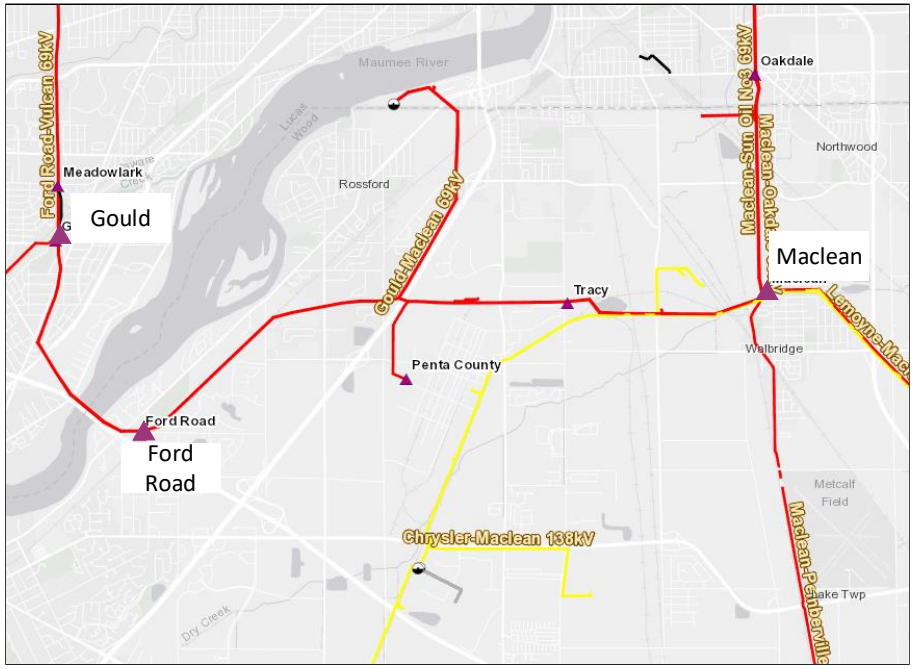
Process Stage: Need Meeting – 06/19/2020

Problem Statement

Ford Road-Maclean and Gould-Maclean 69 kV Line

- For a N-1-1 contingency, a Ford Road-Maclean 69 kV line fault and the Gould-Maclean 69 kV Line fault, local load loss of 61 MW is observed affecting over 5,600 customers.
- The Ford Road-Maclean 69 kV line has approximately 5.8 miles of line exposure. Additionally Pilkington tap adds another 2.3 miles of line exposure to the Ford Road-Maclean 69 kV line. This line servers approximately 38 MW and over 3,800 customers. This line has experienced three sustained outages in the last five years (2015-2019) with an average duration of 6.5 hours.
- The Gould-Maclean 69 kV line has approximately 7.9 miles of line exposure. Additionally, the Pilkington tap and Penta County tap adds another 3.1 miles of line exposure to the Gould-Maclean 69 kV line. This line servers approximately 23 MW and over 1,800 customers. This line has experienced one sustained outage in the last five years (2015-2019) with a duration of 18.6 hours.

Model: 2019 Series 2024 Summer RTEP 50/50



Legend	
345 kV	
138 kV	
69 kV	

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
Masury 138 kV Substation

Need Number: ATSI-2020-004
Process Stage: Solution Meeting – 6/19/2020
Previously Presented: Need Meeting – 04/20/2020

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

Specific Assumption Reference(s)
Global Considerations

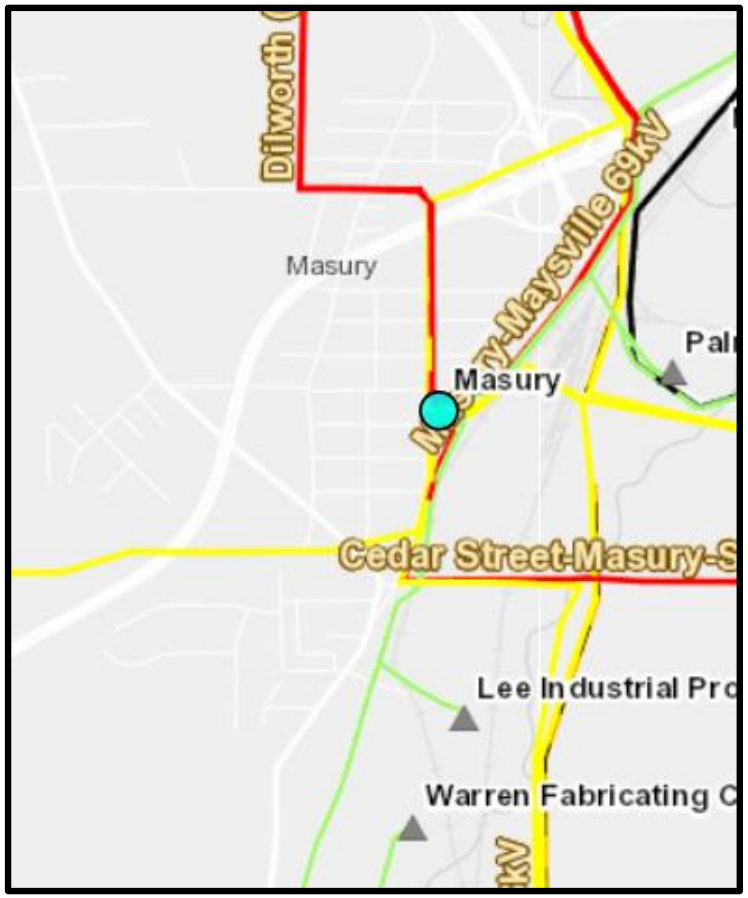
- System Reliability and Performance
- Load at risk in planning and operational scenarios

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	

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ATSI Transmission Zone M-3 Process
Masury 138 kV Substation

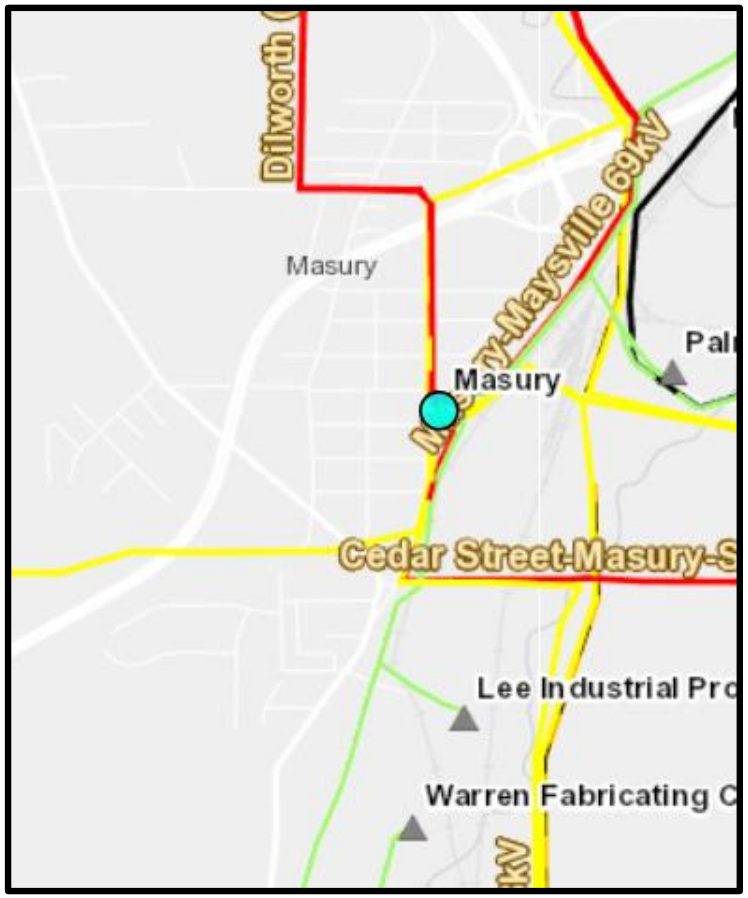
Need Number: ATSI-2020-004
Process Stage: Solution Meeting – 6/19/2020
Previously Presented: Need Meeting – 04/20/2020

Problem Statement

Masury 138 kV Substation

- System analysis shows that after a Masury 138 kV bus fault, a substantial amount of load is at risk (~42 MW)
- Masury 138 kV bus fault ATSI-P1-2-OEE-138-024 outages five 138 kV lines, two 138/69 kV transformers, and two 138-23 kV transformers
- There have been five pre-contingency switching events in the past year for the Masury 23 kV area
- Five (5) 138 kV OCB breakers (B2, B85, B101, B87, and B6) at Masury are showing end of life characteristics;
  - Deteriorated bushings
  - Deteriorated mechanism
  - Oil leaks
  - Age (>30 years) with increasing maintenance
  - Obsolescence of equipment and spare parts
- Masury 138 kV bus protection currently employs a bus blocking scheme which is not the FE standard protection scheme

Model: 2019 Series 2024 Summer RTEP 50/50



Legend	
345 kV	
138 kV	
69 kV	

ATSI Transmission Zone M-3 Process
Masury 138 kV Substation

Need Number: ATSI-2020-004
Process Stage: Solution Meeting – 6/19/2020
Previously Presented: Need Meeting – 04/20/2020

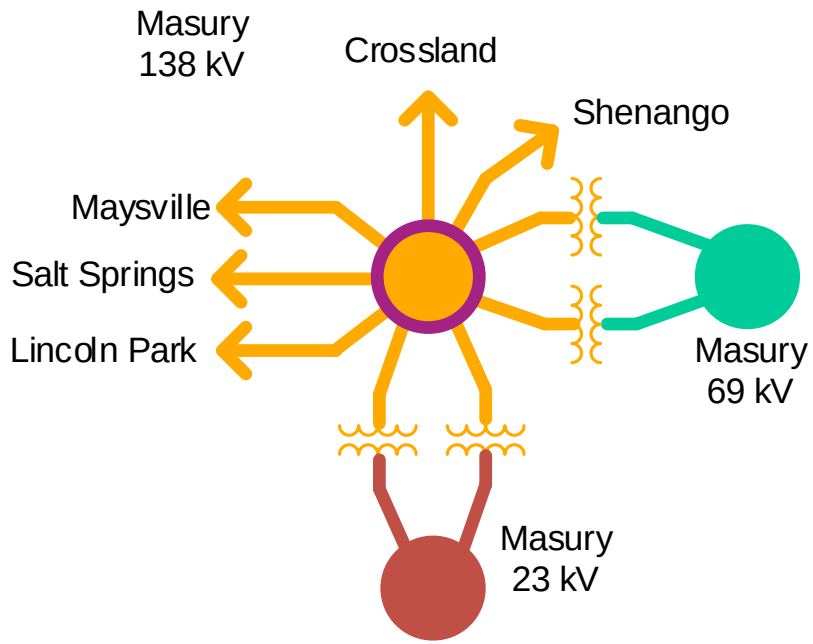
Proposed Solution:

Masury Bus Tie Breaker

- Replace bus disconnect switch with one 138 kV bus-tie breaker
- Replace 138 kV breaker B2
- Replace 138 kV breaker B85
- Replace 138 kV breaker B101
- Replace 138 kV transfer-bus breaker B6
- Replace 138 kV breaker B87
- Upgrade substation conductor at Masury

Transmission Line Ratings:

- **Masury-Salt Springs 138 kV Line**
  - Before Proposed Solution: 128 MVA SN / 165 MVA SE
  - After Proposed Solution: 185 MVA SN / 189 MVA SE
- **Masury-Ellwood Engineering Tap 138 kV Line Segment**
  - Before Proposed Solution: 128 MVA SN / 165 MVA SE
  - After Proposed Solution: 164 MVA SN / 206 MVA SE



Alternatives Considered:

- Maintain existing condition and elevated risk of failure
- Convert Masury into a breaker and a half configuration.
- Convert Masury into a double breaker double bus configuration

Estimated Project Cost: $2.96 M

Projected In-Service: 06/01/2023
Status: Engineering
Model: 2019 Series 2024 Summer RTEP 50/50

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

ATSI Transmission Zone M-3 Process
Boardman-Lowellville #2 69 kV New Customer

Need Number: ATSI-2020-009
Process Stage: Solution Meeting – 06/19/2020
Previously Presented: Need Meeting – 05/22/2020

Supplemental Project Driver(s):
Customer Service

Specific Assumption Reference(s)

Modification of existing 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 approximately 9 MW of total load near the Boardman-Lowellville #2 69 kV Line.

Requested In-Service Date: 11/26/2020

Legend	
345 kV	
138 kV	
69 kV	

ATSI Transmission Zone M-3 Process
Boardman-Lowellville #2 69 kV New Customer

Need Number: ATSI-2020-009
Process Stage: Solution Meeting – 06/19/2020
Previously Presented: Need Meeting – 05/22/2020

Proposed Solution:

A 69 kV Transmission Line Tap

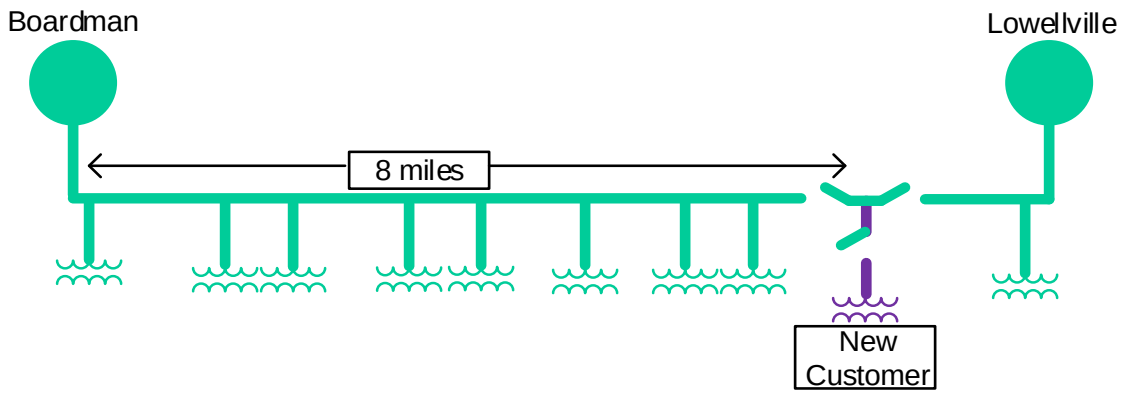
- Construct approximately one to two spans of 69 kV line off a currently existing tap on the Boardman-Lowellville #2 69 kV Line. The tap location is approximately 8 miles from Boardman substation.
- Provide two loss compensated electronic interval meters.

Alternatives Considered:

- No alternatives considered for this project

Estimated Project Cost: $0.4 M

Projected In-Service: 11/26/2020
Status: Engineering
Model: 2019 Series 2024 Summer RTEP 50/50



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

ATSI Transmission Zone M-3 Process
Cedar Street-New Castle 138 kV New Customer

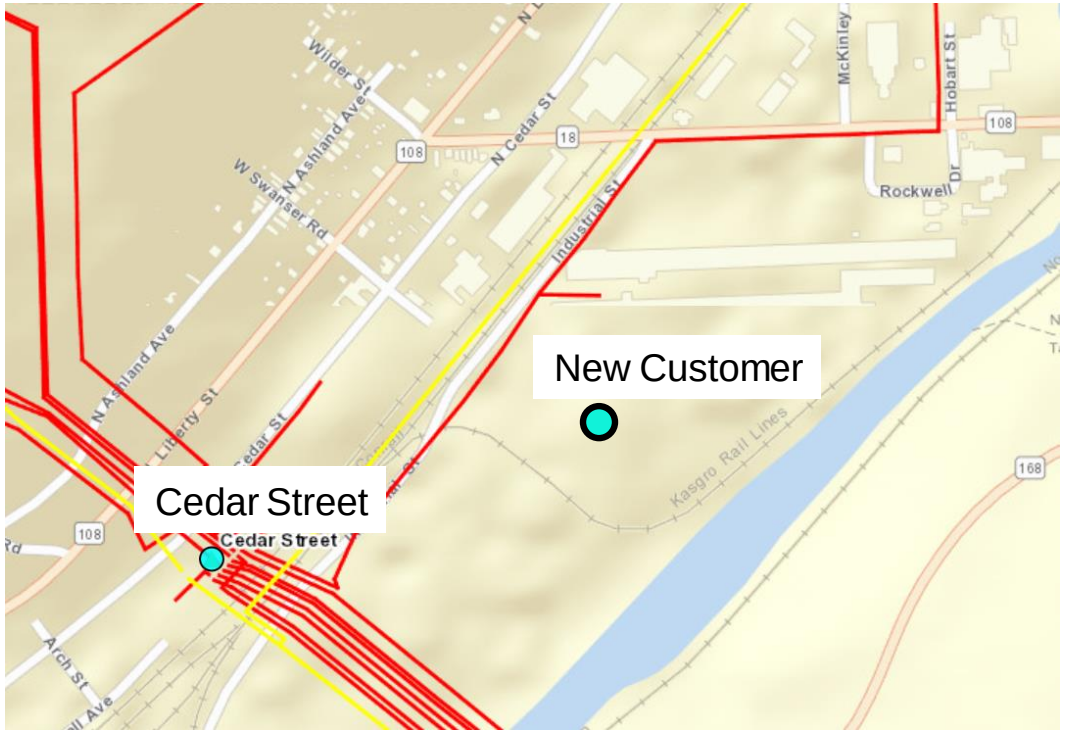
Need Number: ATSI-2020-010
Process Stage: Solution Meeting – 06/19/2020
Previously Presented: Need Meeting – 05/22/2020

Supplemental Project Driver(s):
Customer Service

Specific Assumption Reference(s)
Modification of existing 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 for approximately 10 MW of total load near the New Castle-Cedar Street 138 kV Line.

Requested In-Service Date: 11/25/2020



Legend	
345 kV	
138 kV	
69 kV	

ATSI Transmission Zone M-3 Process
Cedar Street-New Castle 138 kV New Customer

Need Number: ATSI-2020-010
Process Stage: Solution Meeting – 06/19/2020
Previously Presented: Need Meeting – 05/22/2020

Proposed Solution:

A 138 kV Transmission Line Tap

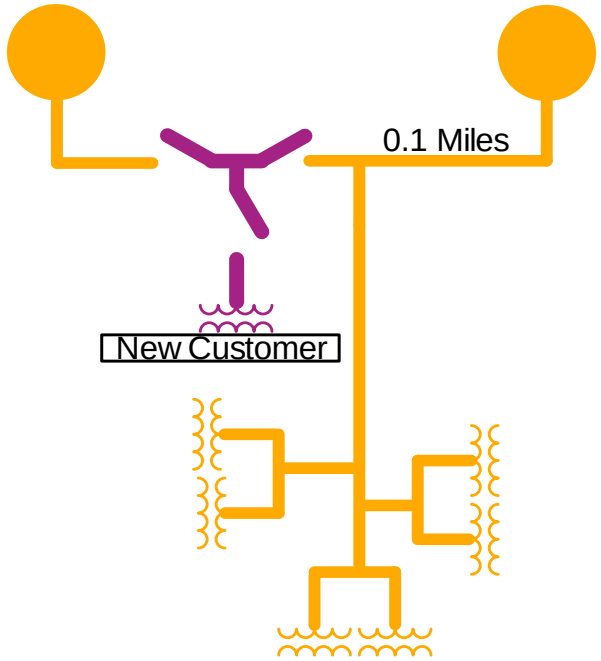
- Construct a 138 kV tap (approximately one to two spans) off the Cedar Street-New Castle 138 kV Line to the customer substation. The customer substation tap location is approximately 0.1 miles from the Cedar Street substation. Provide one 138 kV metering package.

Alternatives Considered:

- No alternatives considered for this project

Estimated Project Cost: $2.7 M

Projected In-Service: 11/25/2020
Status: Engineering
Model: 2019 Series 2024 Summer RTEP 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

6/8/2020 – V1 – Original version posted to pjm.com