Transmission Expansion Advisory Committee FirstEnergy Supplemental Projects

June 4, 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

JCPL Transmission Zone M-3 Process
Glen Gardner No. 8 230-34.5 kV Transformer

Need Number: JCPL-2024-031

Process Stage: Need Meeting – 06/04/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

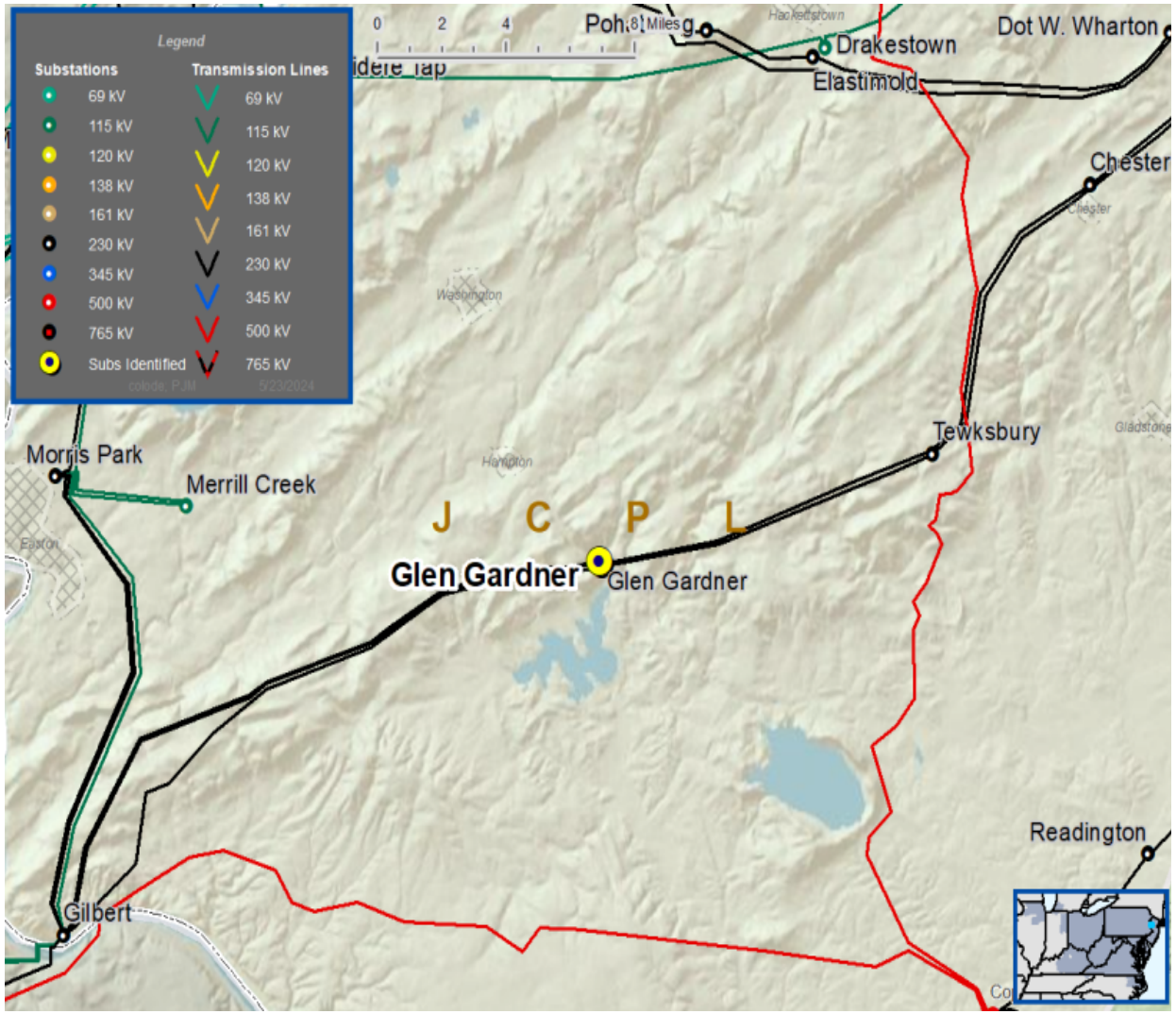
- System reliability and performance

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The Glen Gardner No. 8 230-34.5 kV Transformer is approximately 54 years old and is approaching end of life.
- Most recent DGA results show elevated ethane gas levels above IEEE limits and dielectric strength is low.
- The transformer has experienced issues with cooling components due to pump and fan failures.
- Existing transformer ratings:
  - 108 / 136 MVA (SN/SSTE)
  - 137 / 152 MVA (WN/WSTE)



JCPL Transmission Zone M-3 Process
Newton No. 1 230-34.5 kV Transformer

Need Number: JCPL-2024-032

Process Stage: Need Meeting – 06/04/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

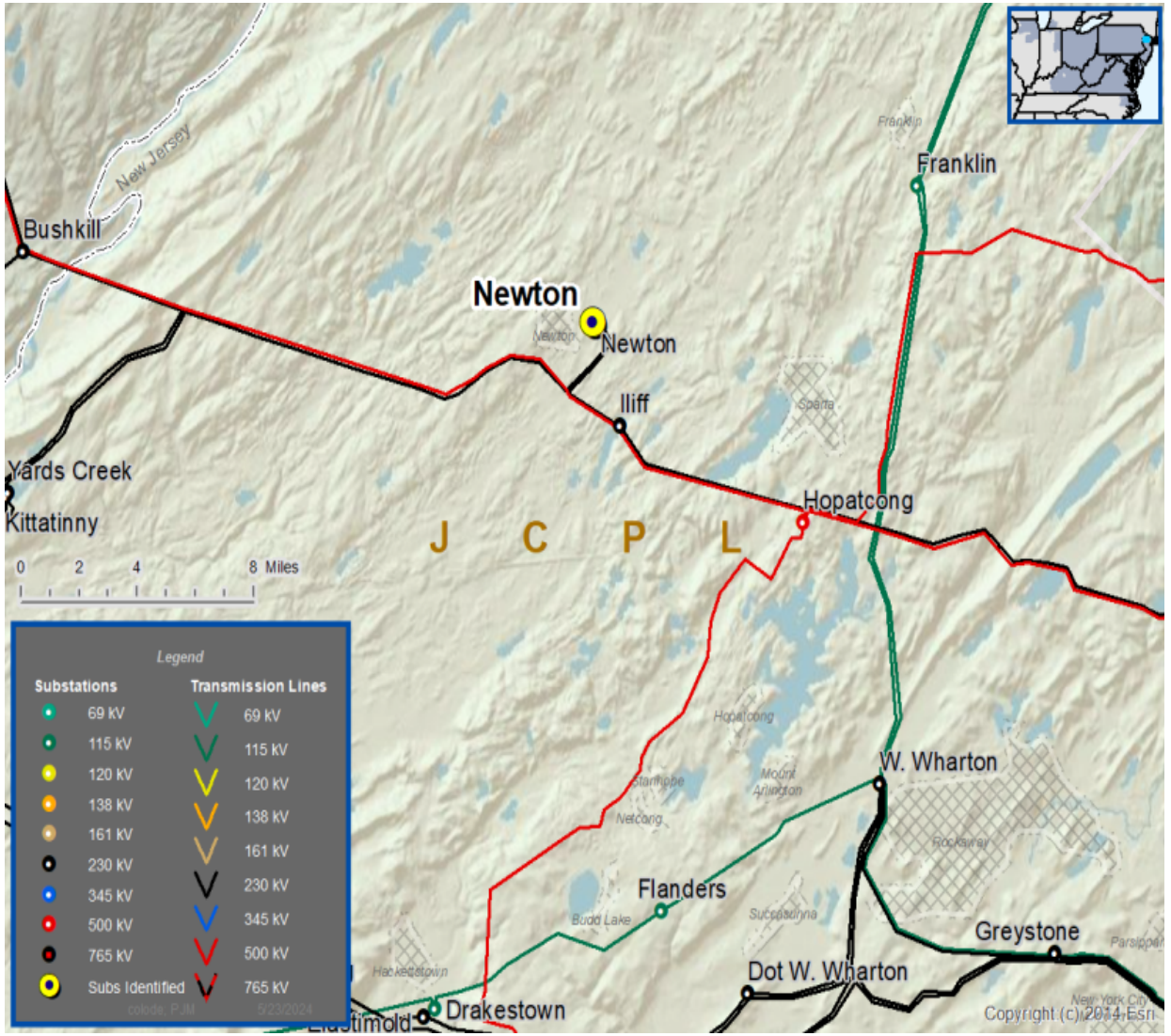
- System reliability and performance

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The Newton No. 1 230-34.5 kV Transformer is approximately 58 years old and is approaching end of life.
- The transformer is experiencing issues with oil leaks that have been difficult to repair due to the condition of the transformer.
- The transformer relaying is obsolete.
- Existing transformer ratings:
  - 107 / 129 MVA (SN/SSTE)
  - 135 / 147 MVA (WN/WSTE)



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

JCPL Transmission Zone M-3 Process
Kittatinny No. 4 230-34.5 kV Transformer

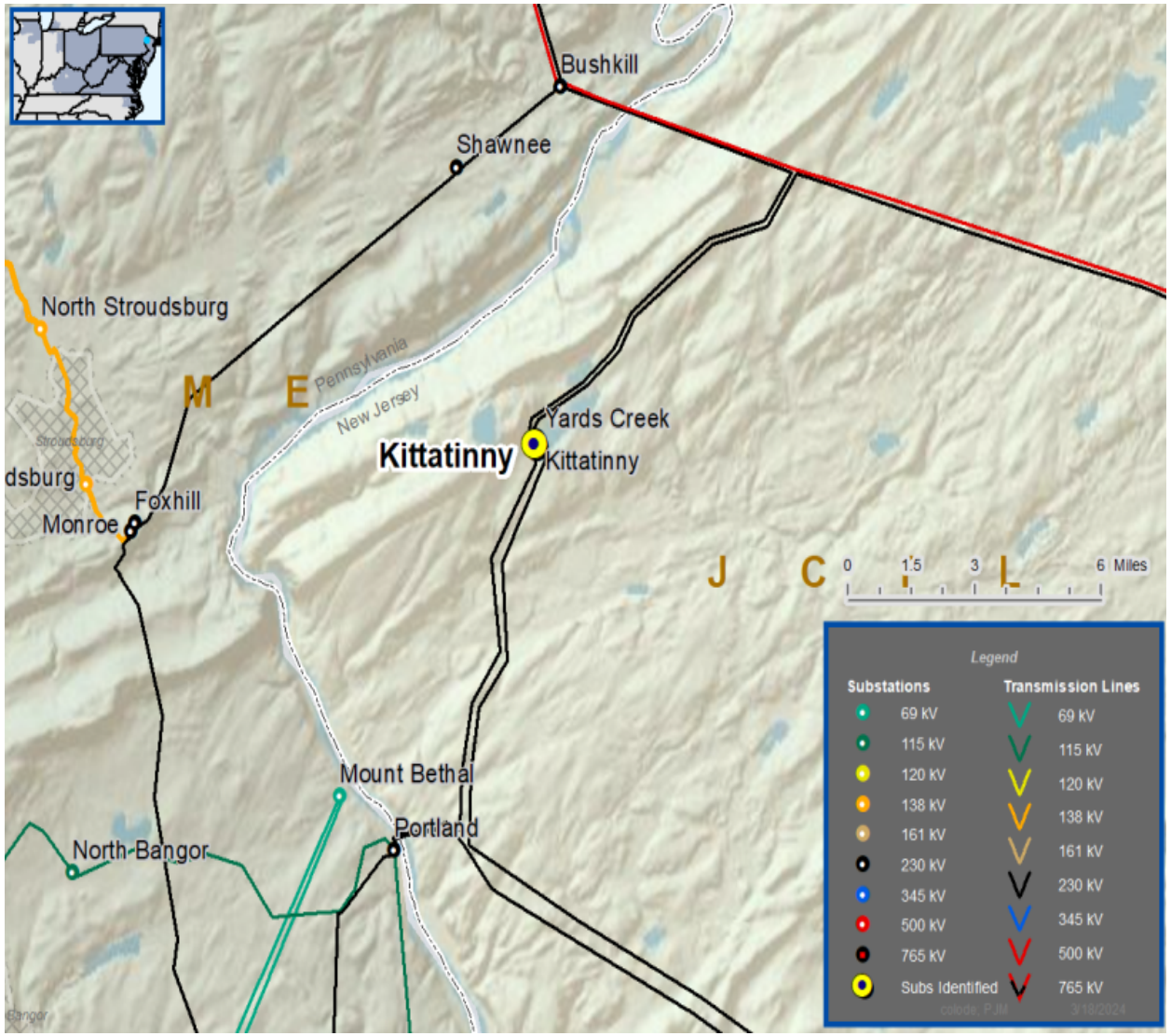
Need Number: JCPL-2024-014
Process Stage: Solution Meeting – 06/04/2024
Previously Presented: Need Meeting – 04/02/2024

Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption References:
System Performance Projects Global Factors
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers
Past System Reliability/Performance

Problem Statement:
- The 230-34.5 kV No. 4 Transformer at Kittatinny Substation was manufactured approximately 64 years ago and is reaching end of life.
- Most recent DGA results showed elevated ethane gas levels compared with IEEE Standards
- Transformer is constructed with Type U bushings
  - Type U bushing designs have been documented to dramatically increase the risk of bushing failures.
- Existing Transformer Ratings:
  - 92/99/121/128 MVA (SN/SSTE/WN/WSTE)



JCPL Transmission Zone M-3 Process
Kittatinny No. 4 230-34.5 kV Transformer

Need Number: JCPL-2024-014

Process Stage: Solution Meeting – 06/04/2024

Proposed Solution:

- Replace the Kittatinny No. 4 230-34.5 kV Transformer with a 125 MVA unit.
- Replace the transformer relaying.

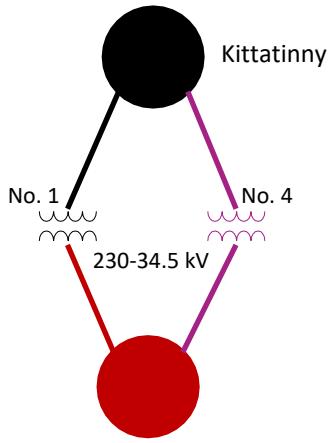
Transformer Ratings:

- Kittatinny 230-34.5 kV No. 4 Transformer:
  - Before Proposed Solution: 92 / 122 / 121 / 136 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution: 162 / 169 / 209 / 214 MVA (SN/SSTE/WN/WSTE)

Alternatives Considered:

- Maintain transformer in existing condition with elevated risk of failure.

Estimated Project Cost: $5M
Projected In-Service: 5/1/2028
Project Status: Conceptual
Model: 2023 RTEP model for 2028 Summer (50/50)



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

JCPL Transmission Zone M-3 Process
Lakewood Gen No. 6 230-34.5 kV Transformer

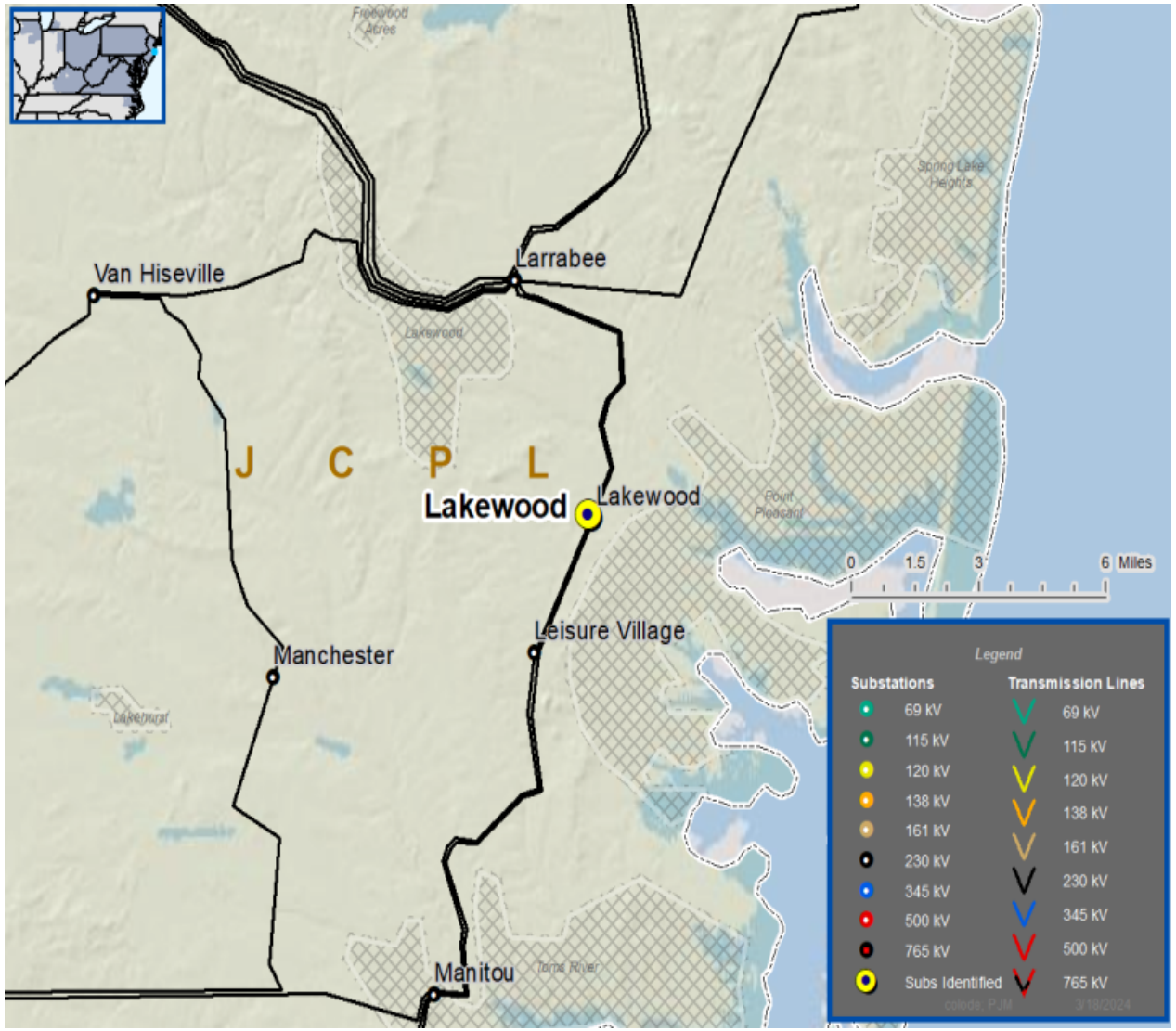
Need Number: JCPL-2024-015
Process Stage: Solution Meeting – 06/04/2024
Previously Presented: Need Meeting – 04/02/2024

Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption References:
System Performance Projects Global Factors
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers
Past System Reliability/Performance

Problem Statement:
- The 230-34.5 kV No. 6 Transformer at Lakewood Gen Substation was manufactured approximately 57 years ago and is reaching end of life.
- The transformer has exhibited leaking oil from the radiators, pumps and gauges.
  - Incidental oil leaks at end-of-life period increases risk of failure.
- Existing Transformer Ratings:
  - 105 / 129 / 132 / 144 MVA (SN/SSTE/WN/WSTE)



JCPL Transmission Zone M-3 Process
Lakewood Gen No. 6 230-34.5 kV Transformer

Need Number: JCPL-2024-015

Process Stage: Solution Meeting – 06/04/2024

Proposed Solution:

- Replace the Lakewood Gen No. 6 230-34.5 kV Transformer with a 125 MVA unit.
- Replace the transformer relaying.

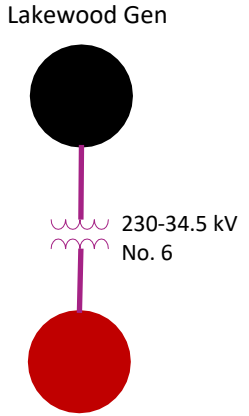
Transformer Ratings:

- Lakewood Gen 230-34.5 kV No. 6 Transformer:
  - Before Proposed Solution: 105 / 129 / 132 / 144 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution: 162 / 169 / 209 / 214 MVA (SN/SSTE/WN/WSTE)

Alternatives Considered:

- Maintain transformer in existing condition with elevated risk of failure.

Estimated Project Cost: $6M
Projected In-Service: 05/24/2028
Project Status: Conceptual
Model: 2023 RTEP model for 2028 Summer (50/50)



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 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

5/23/2024– V1 – Original version posted to pjm.com