

Transmission Expansion Advisory Committee FirstEnergy Supplemental Projects

April 30, 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

Need Number: JCPL-2024-017

Process Stage: Need Meeting – 04/30/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

Add/Replace Transformers

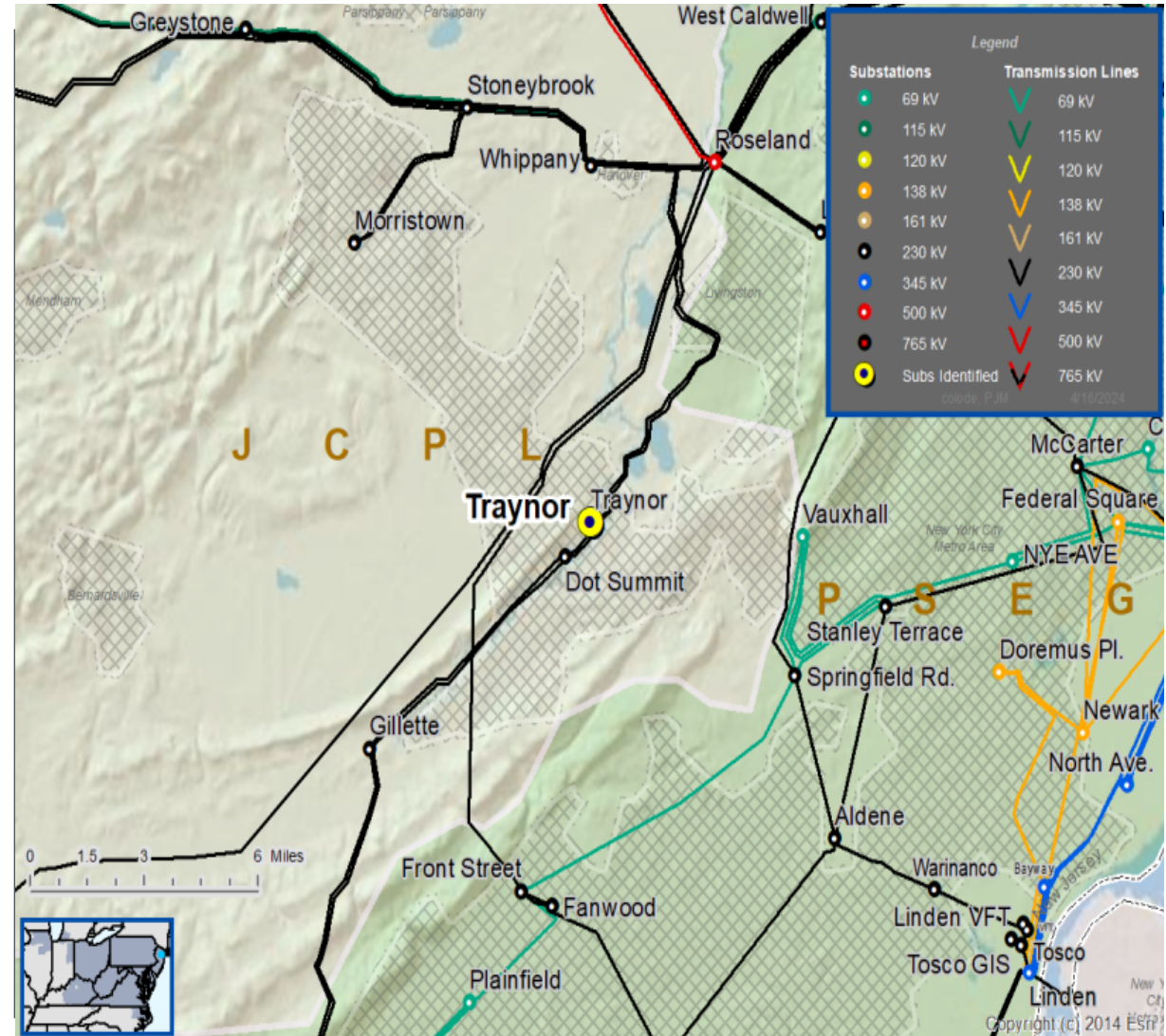
Past System Reliability/Performance

Problem Statement:

- The Traynor No. 13 230-34.5 kV Transformer is approximately 51 years old and is approaching end of life.
- Recent testing has shown the transformer has developed hot metal gasses.
- In recent years, there have been oil leaks, oil pump failures and radiator fan failures requiring repairs.
- The transformer is limited by terminal equipment.

Existing Transformer Ratings:

- 164 / 187 MVA (SN/SSTE)
- 209 / 228 MVA (WN/WSTE)



Need Number: JCPL-2024-018

Process Stage: Need Meeting – 04/30/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance

Add/Replace Transformers

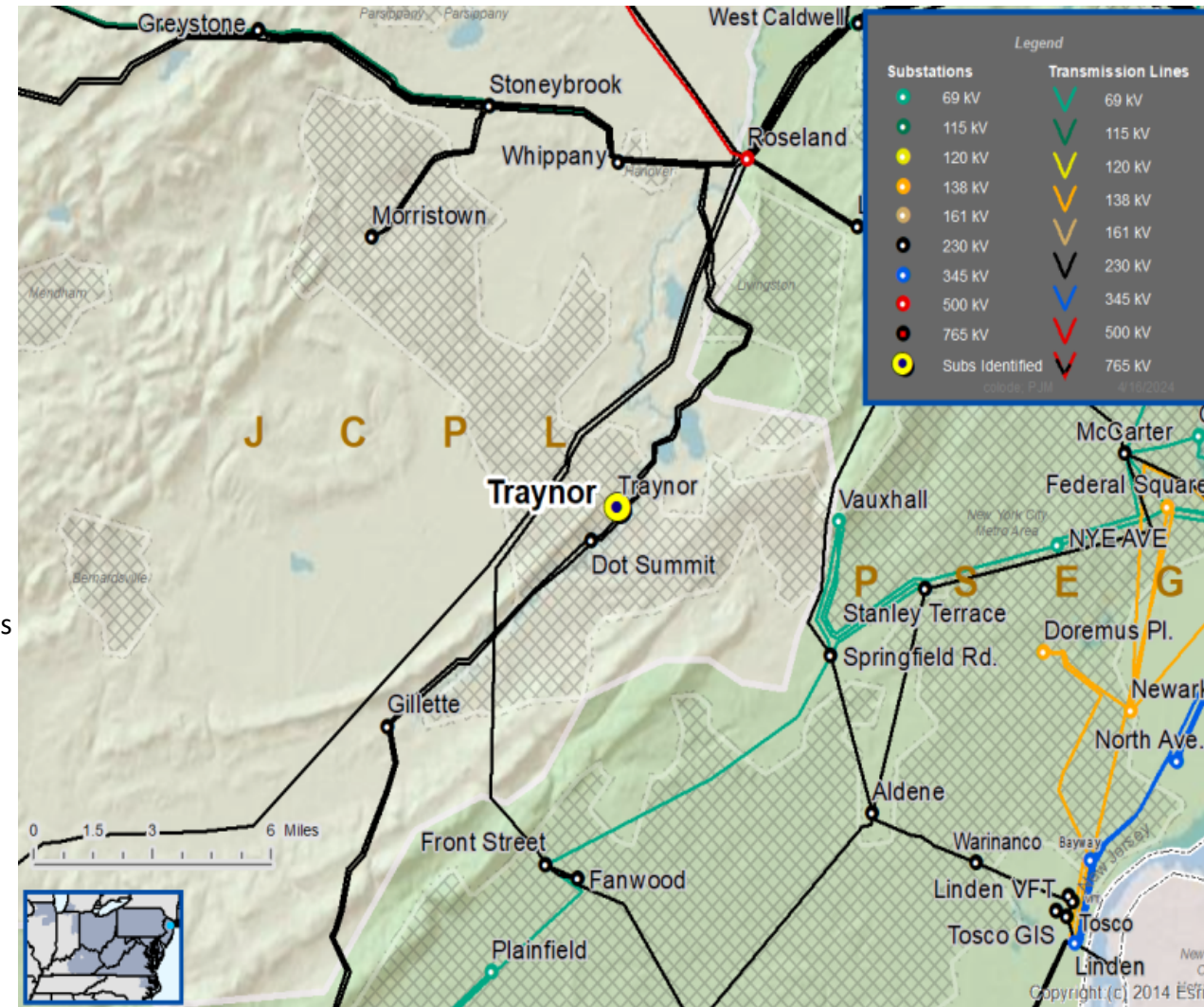
Past System Reliability/Performance

Problem Statement:

- The Traynor No. 14 230-34.5 kV Transformer is approximately 51 years old and is approaching end of life.
- Recent testing has shown the transformer has developed hot metal gasses.
- In recent years, there have been oil leaks, oil pump failures and radiator fan failures requiring repairs.

Existing Transformer Ratings:

- 166 / 187 MVA (SN/SSTE)
- 209 / 229 MVA (WN/WSTE)



Need Number: JCPL-2024-019

Process Stage: Need Meeting – 04/30/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

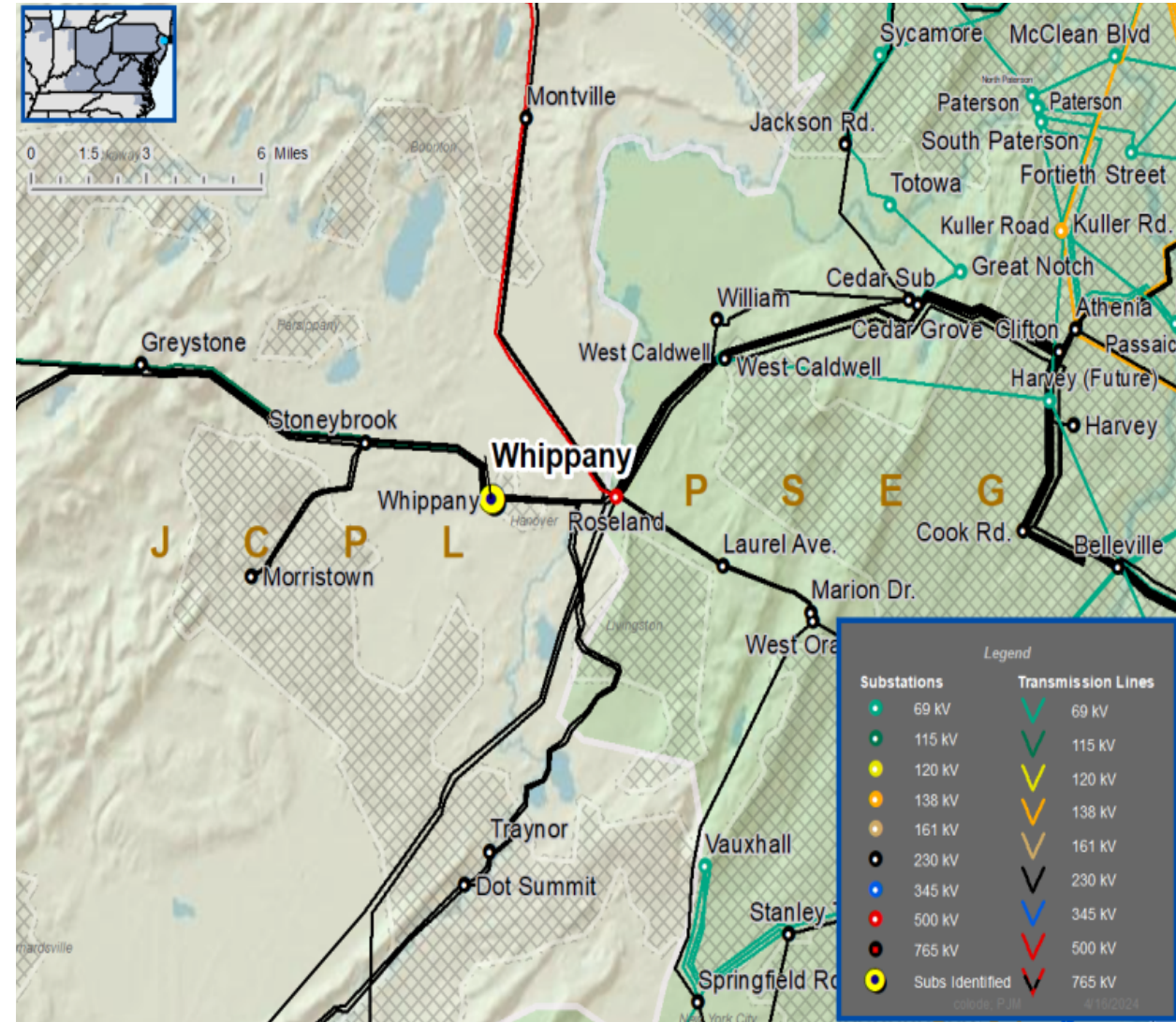
- System reliability and performance
- Substation/line equipment limits

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The Whippany No. 12 230/115 kV Transformer is approximately 66 years old and is approaching end of life.
- The transformer is experiencing issues with oil leaks and nitrogen gas leaks.
- The transformer is limited by terminal equipment.
- Existing Transformer Ratings:
 - 187 / 239 MVA (SN/SLTE)
 - 239 / 239 MVA (WN/WLTE)



Need Number: JCPL-2024-020

Process Stage: Need Meeting – 04/30/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

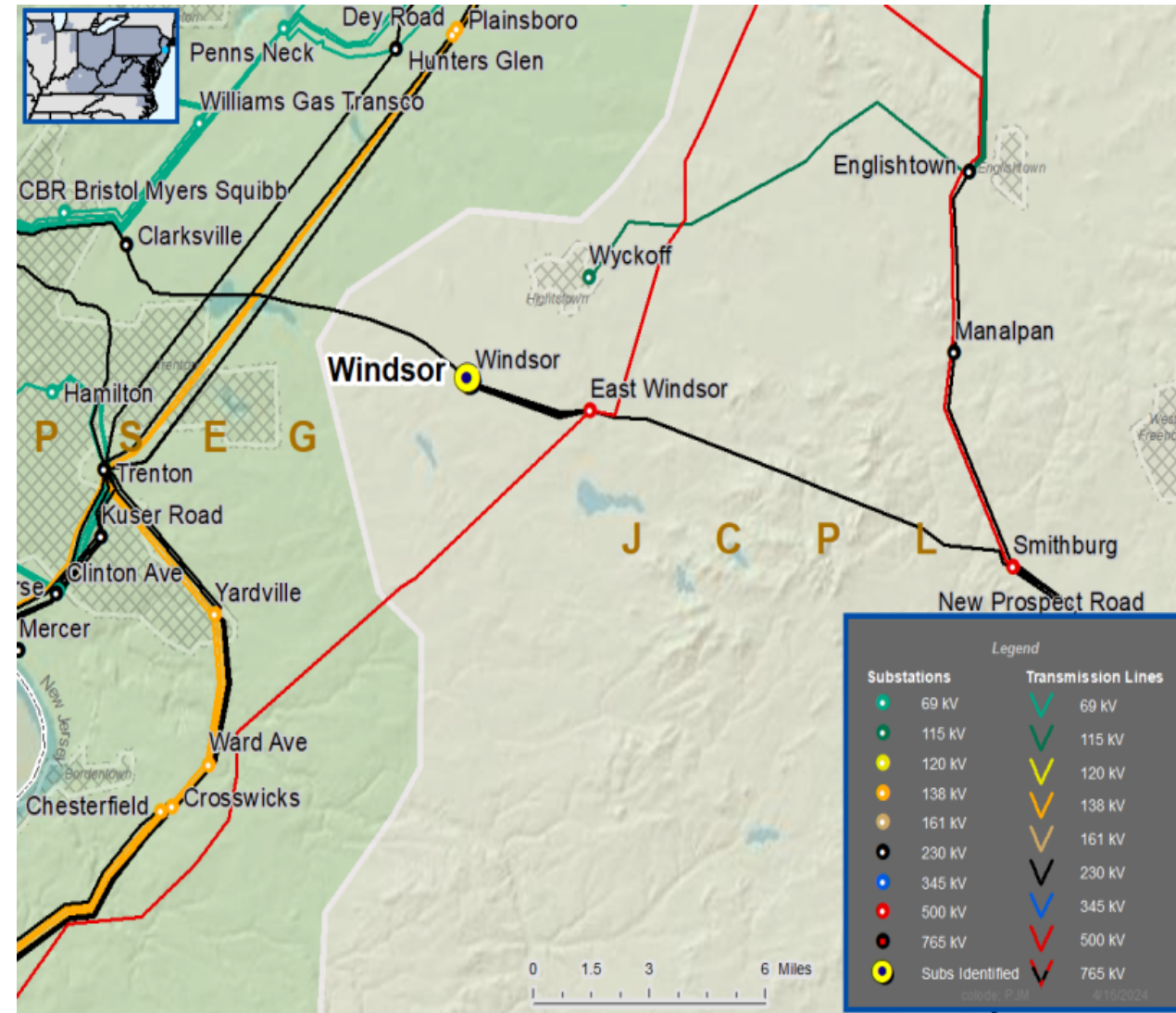
- System reliability and performance
- Substation/line equipment limits

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The Windsor No. 3 230-34.5 kV Transformer is approximately 47 years old and is approaching end of life.
- The transformer is experiencing issues with oil leaks.
- The transformer has elevated methane, ethane and carbon monoxide gas in the transformer oil.
- The transformer is limited by terminal equipment.
- Existing Transformer Ratings:
 - 83 / 104 MVA (SN/SSTE)
 - 101 / 118 MVA (WN/WSTE)



Need Number: JCPL-2024-021

Process Stage: Need Meeting – 04/30/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

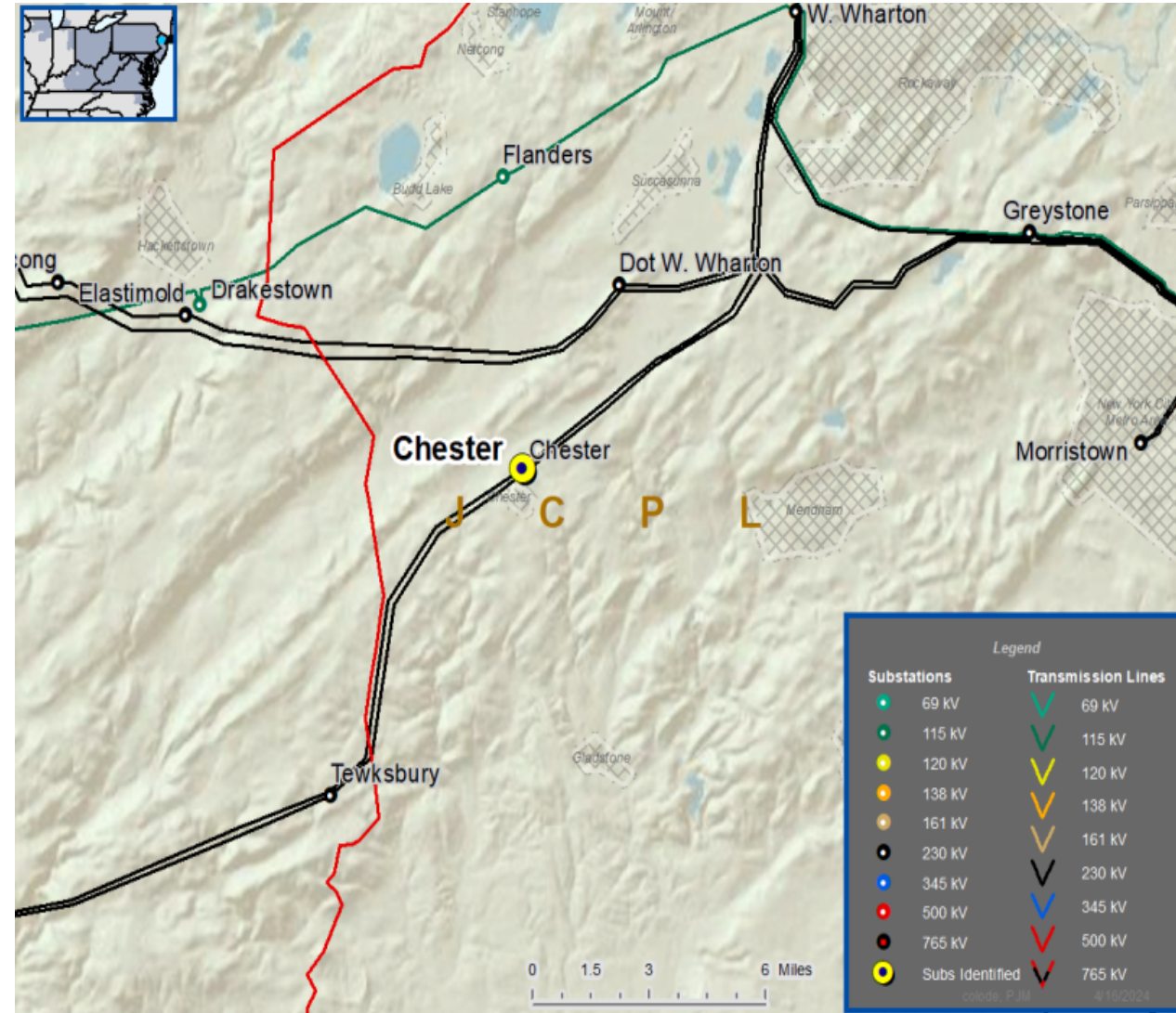
- System reliability and performance
- Substation/line equipment limits

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The Chester No. 4 230-34.5 kV Transformer is approximately 46 years old and is approaching end of life.
- The transformer has elevated ethane gas in the transformer oil.
- The transformer is limited by terminal equipment.
- Existing Transformer Ratings:
 - 75 / 90 MVA (SN/SSTE)
 - 94 / 100 MVA (WN/WSTE)



Need Number: JCPL-2024-022

Process Stage: Need Meeting – 04/30/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

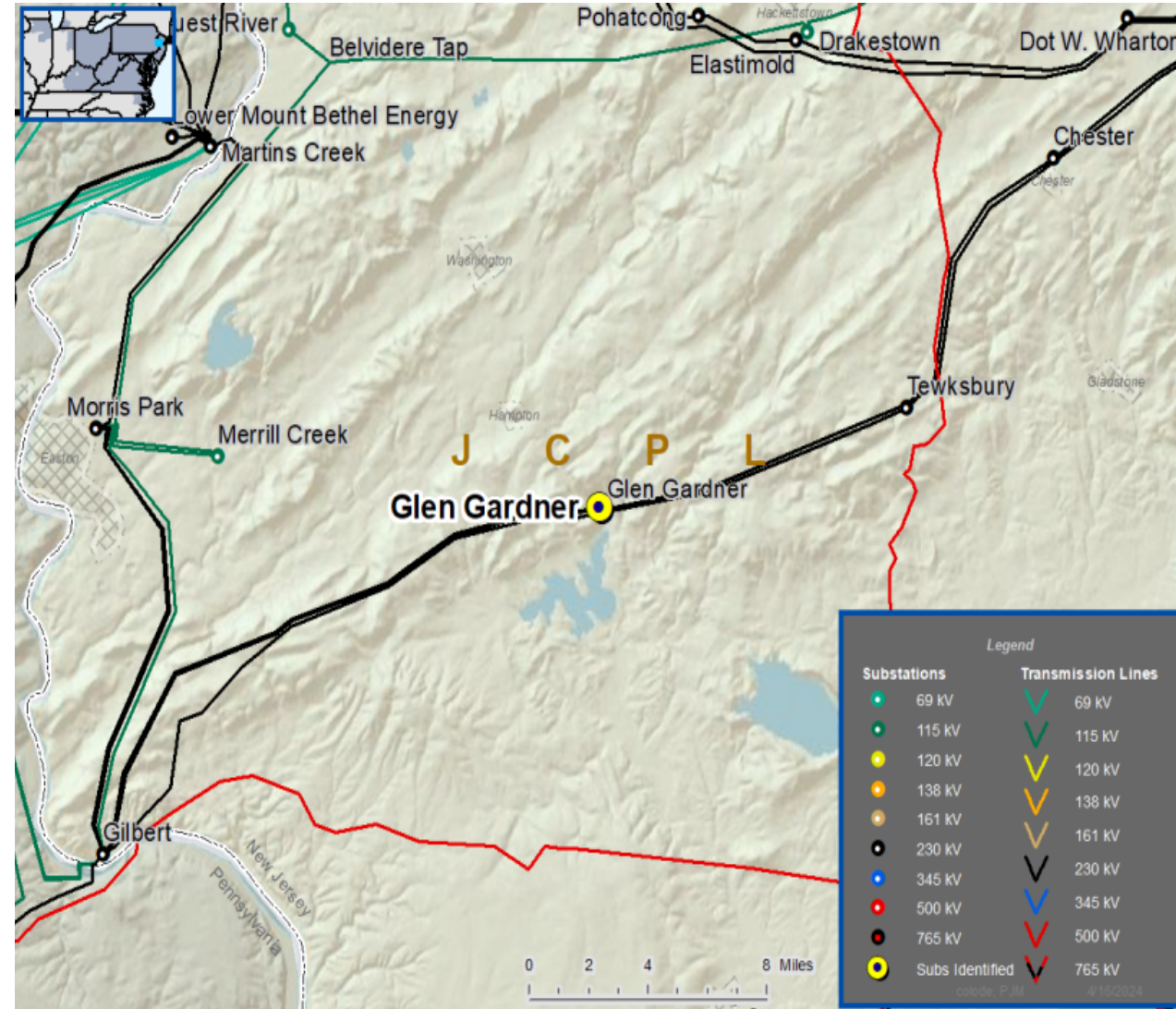
- System reliability and performance
- Substation/line equipment limits

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The Glen Gardner No. 1 230-34.5 kV Transformer is approximately 51 years old and is approaching end of life.
- The transformer is experiencing issues with cooling capacity, heat exchangers, inoperable fans, bushing failures and oil drain valve failure.
- The transformer is limited by terminal equipment.
- Existing Transformer Ratings:
 - 111 / 140 MVA (SN/SSTE)
 - 141 / 155 MVA (WN/WSTE)



Need Number: JCPL-2024-023

Process Stage: Need Meeting – 04/30/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

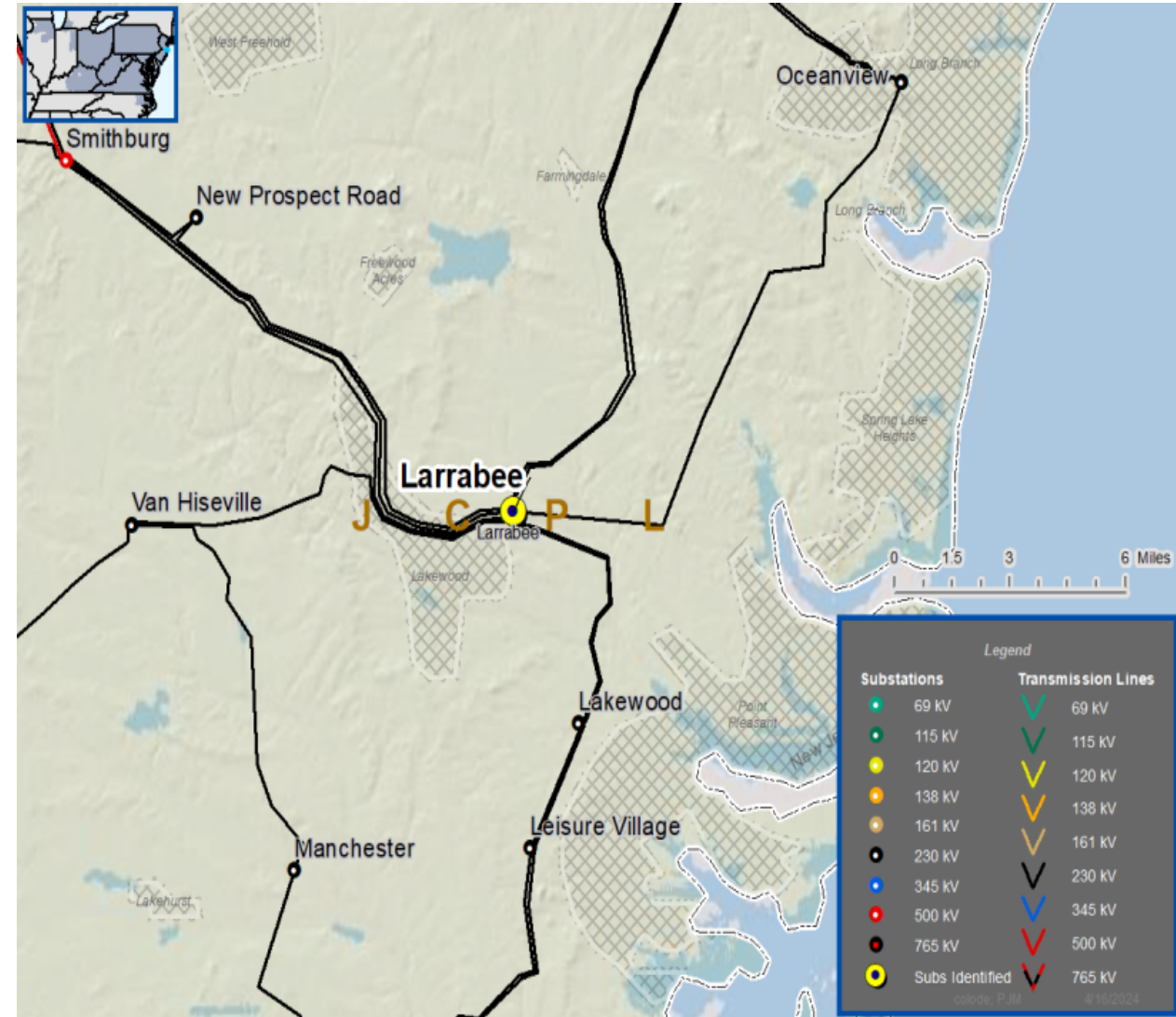
- System reliability and performance
- Substation/line equipment limits

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The Larrabee No. 3 230-34.5 kV Transformer is approximately 47 years old and is approaching end of life.
- The transformer is experiencing issues with the radiators leaking oil.
- The transformer has increased levels of water and carbon monoxide in the transformer oil.
- The transformer is limited by terminal equipment.
- Existing Transformer Ratings:
 - 137 / 174 MVA (SN/SSTE)
 - 171 / 201 MVA (WN/WSTE)



Need Number: JCPL-2024-024

Process Stage: Need Meeting – 04/30/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

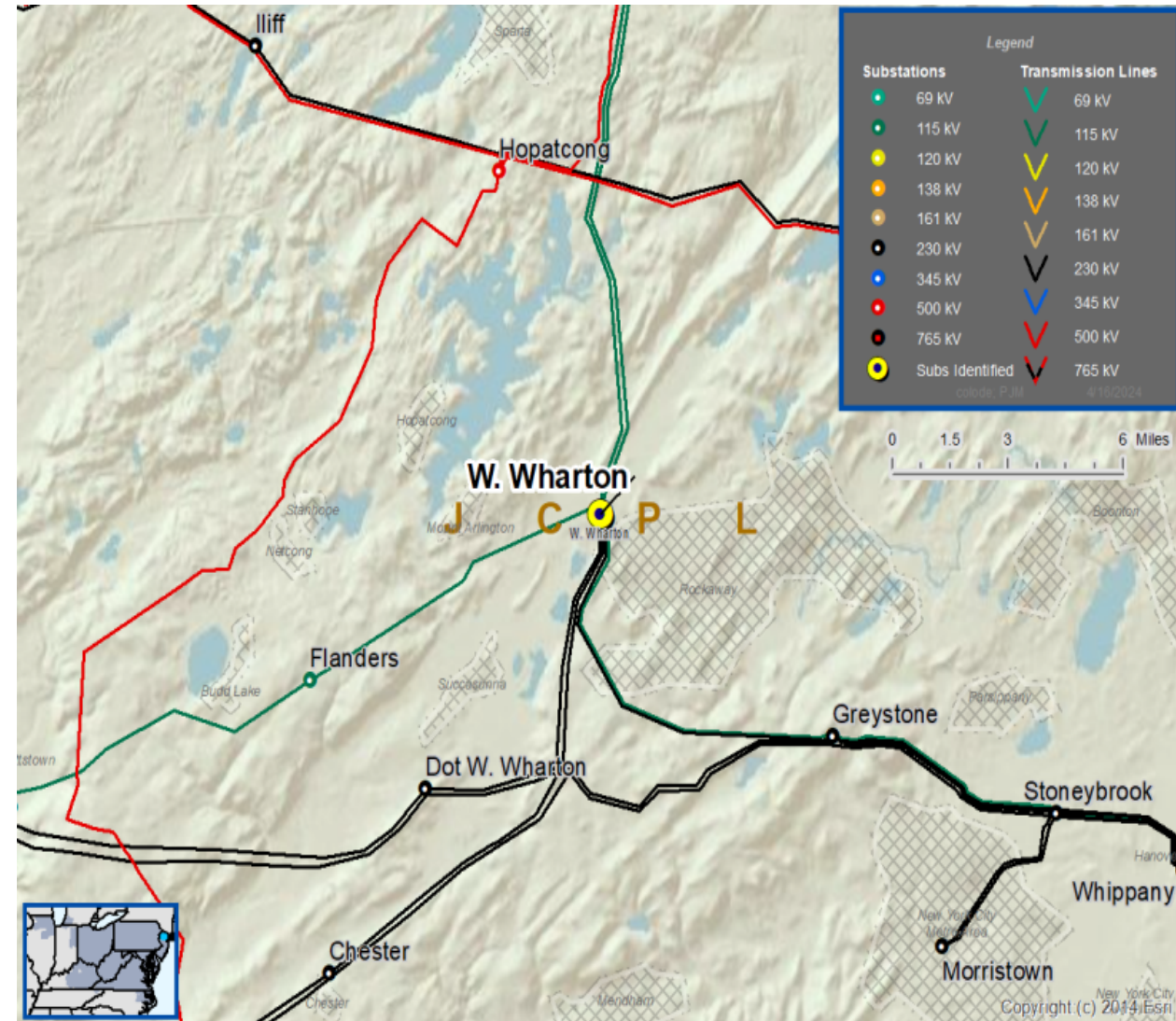
- System reliability and performance
- Substation/line equipment limits

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The West Wharton No. 2 230-34.5 kV Transformer is approximately 52 years old and is approaching end of life.
- The transformer is experiencing issues with bushing failures.
- The transformer has increased levels of water, carbon monoxide, oxygen and nitrogen in the transformer oil.
- The transformer is limited by terminal equipment.
- Existing Transformer Ratings:
 - 155 / 193 MVA (SN/SSTE)
 - 197 / 215 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

Need Number: JCPL-2024-005

Process Stage: Solutions Meeting – 04/30/2024

Previously Presented: Need Meeting – 04/02/2024

Project Driver:

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

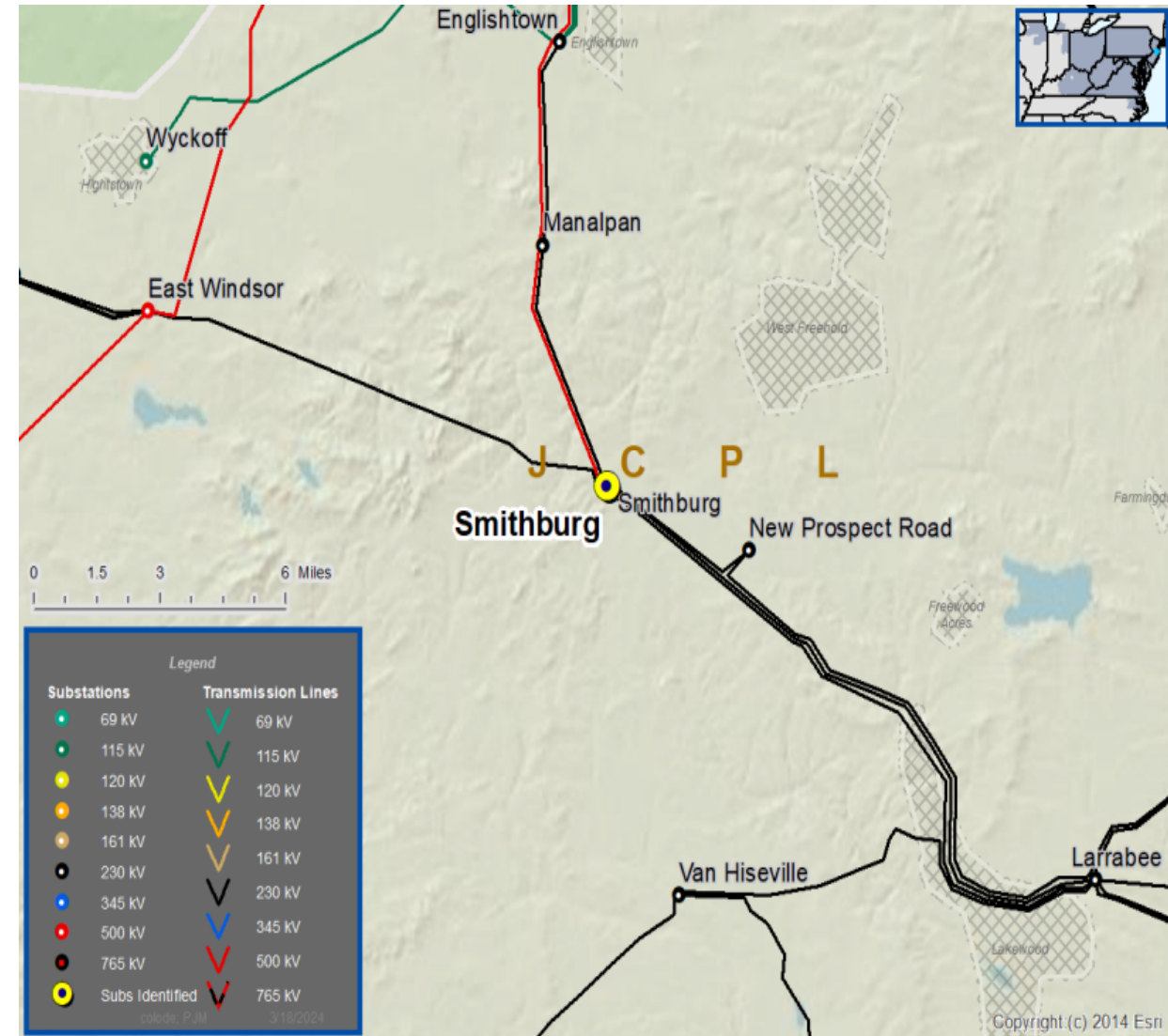
Specific Assumption Reference:

System Performance Projects Global Factors

- Reliability of Bulk Electric System (BES) Facilities
- Past system reliability and performance
- Add/Expand Bus Configuration
- Substation / line equipment limits

Problem Statement:

- Smithburg Substation 230 kV equipment is gas-insulated (GIS). It is over 40 years old and has a history of poor reliability and system performance and maintenance issues due to specialized parts needed for replacement.
- The Smithburg 230 kV GIS is configured as a nine-breaker, breaker-and-a-half configuration. Due overlapping equipment protection zones, N-1 contingencies or maintenance outages cause multiple elements to be removed from service:
 - An outage on the Larrabee – Smithburg No. 2 230 kV H2008 Line requires the Smithburg 500/230 kV No. 4 Transformer to be removed from service.
 - An outage on the Atlantic – Smithburg 230 kV G1021 Line requires the 230-34.5 kV No. 2 Transformer to be removed from service
- Transmission line ratings are limited by terminal equipment





JCPL Transmission Zone M-3 Process Smithburg Substation

Need Number: JCPL-2024-005

Process Stage: Solution Meeting – 4/30/2024

Proposed Solution:

- Rebuild the existing Smithburg 230 kV gas-insulated substation bus as an open-air, 230 kV breaker-and-a-half station with 10 230 kV breakers.
- Upgrade terminal equipment and re-terminate the existing 230 kV transmission lines and transformers.
- Retire the Smithburg – Larrabee No. 2 230 kV Line.
- Revise relay settings at Larrabee, East Windsor, New Prospect Rd, and Manalapan substations

Transmission Line Ratings:

East Windsor – Smithburg 230 kV Line:

- Before Proposed Solution: 1245 / 1272 / 1560 / 1560 MVA (SN/SE/WN/WE)
- After Proposed Solution: 1274 / 1528 / 1567 / 1746 MVA (SN/SE/WN/WE)

Manalapan – Smithburg 230 kV Line:

- Before Proposed Solution: 709 / 869 / 805 / 952 MVA (SN/SE/WN/WE)
- After Proposed Solution: 709 / 869 / 805 / 1031 MVA (SN/SE/WN/WE)

Larrabee – Smithburg No. 1 230 kV Line:

- Before Proposed Solution: 709 / 869 / 805 / 952 MVA (SN/SE/WN/WE)
- After Proposed Solution: 1136 / 1311 / 1139 / 1379 MVA (SN/SE/WN/WE)

New Prospect Rd – Smithburg 230 kV Line:

- Before Proposed Solution: 478 / 641 / 641 / 713 MVA (SN/SE/WN/WE)
- After Proposed Solution: 709 / 869 / 805 / 1031 MVA (SN/SE/WN/WE)

Alternatives Considered:

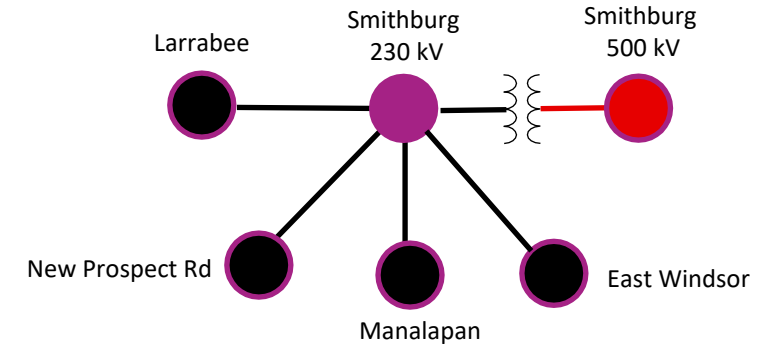
- Maintain the existing condition of the Smithburg 230 kV GIS equipment with on-going maintenance issues, limited operating flexibility, and risk of failures.

Estimated Project Cost: \$30.2M

Projected In-Service: 6/1/2027

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	

Questions?



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

04/19/2024– V1 – Original version posted to pjm.com

4/25/2024 – V2 – Updated solution for JCPL-2024-005