Subregional RTEP Committee – Mid-Atlantic
FirstEnergy Supplemental Projects

April 18, 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
EH Werner – Freneau – Keyport 34.5 kV E31 Line

Need Number: JCPL-2024-012

Process Stage: Need Meeting – 04/18/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Global Factors

- System reliability/performance
- Substation/Line equipment limits

Line Condition Rebuild/Replacement

- Age/condition wood pole transmission line structures

Problem Statement:

The EH Werner – Freneau – Keyport 34.5 kV E31 Line was constructed approximately 92 years ago and is approaching end of life. It is approximately 13 miles long with 424 wood pole transmission line structures.

The line is exhibiting deterioration resulting in increased maintenance costs.

Recent inspection findings include:

- 362 structures are reaching end of life.
- 299 structures failed inspection due to sound, woodpecker damage, top rot, decay, cracking, and/or delamination of cross-arms.
- 104 structures failed the sound test requiring repair or replacement due to deterioration.

- Replacement components are difficult to source in quantity leading to non-standard repairs.
- Since 2019, the line has had 17 unscheduled sustained outages.

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JCPL Transmission Zone M-3 Process
EH Werner – Freneau – Keyport 34.5 kV E31 Line

Need #	Transmission Line / Substation Locations	Existing Line Rating MVA (SN / SE / WN / WE)	Existing Conductor Rating MVA (SN / SE / WN/ WE)
JCPL-2024-012	EH Werner – Feltus St 34.5 kV E31 Line	44 / 53 / 50 / 62	44 / 53 / 50 / 62
JCPL-2024-012	Feltus St – Laurence Harbor 34.5 kV E31 Line	35 / 44 / 35 / 44	35 / 44 / 35 / 44
JCPL-2024-012	Laurence Harbor – Freneau East Tap 34.5 kV E31 Line	35 / 44 / 35 / 44	35 / 44 / 35 / 44
JCPL-2024-012	Freneau East Tap – Clark Street 34.5 kV E31 Line	55 / 67 / 63 / 79	55 / 67 / 63 / 79
JCPL-2024-012	Clark Street – Keyport 34.5 kV E31 Line	44 / 53 / 50 / 63	44 / 53 / 50 / 63
JCPL-2024-012	Freneau East Tap – Freneau 34.5 kV E31 Line	53 / 62 / 63 / 71	53 / 62 / 63 / 71

JCPL Transmission Zone M-3 Process
Flanders – Pequest River 115 kV Line

Need Number: JCPL-2024-013

Process Stage: Need Meeting – 04/18/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Global Factors

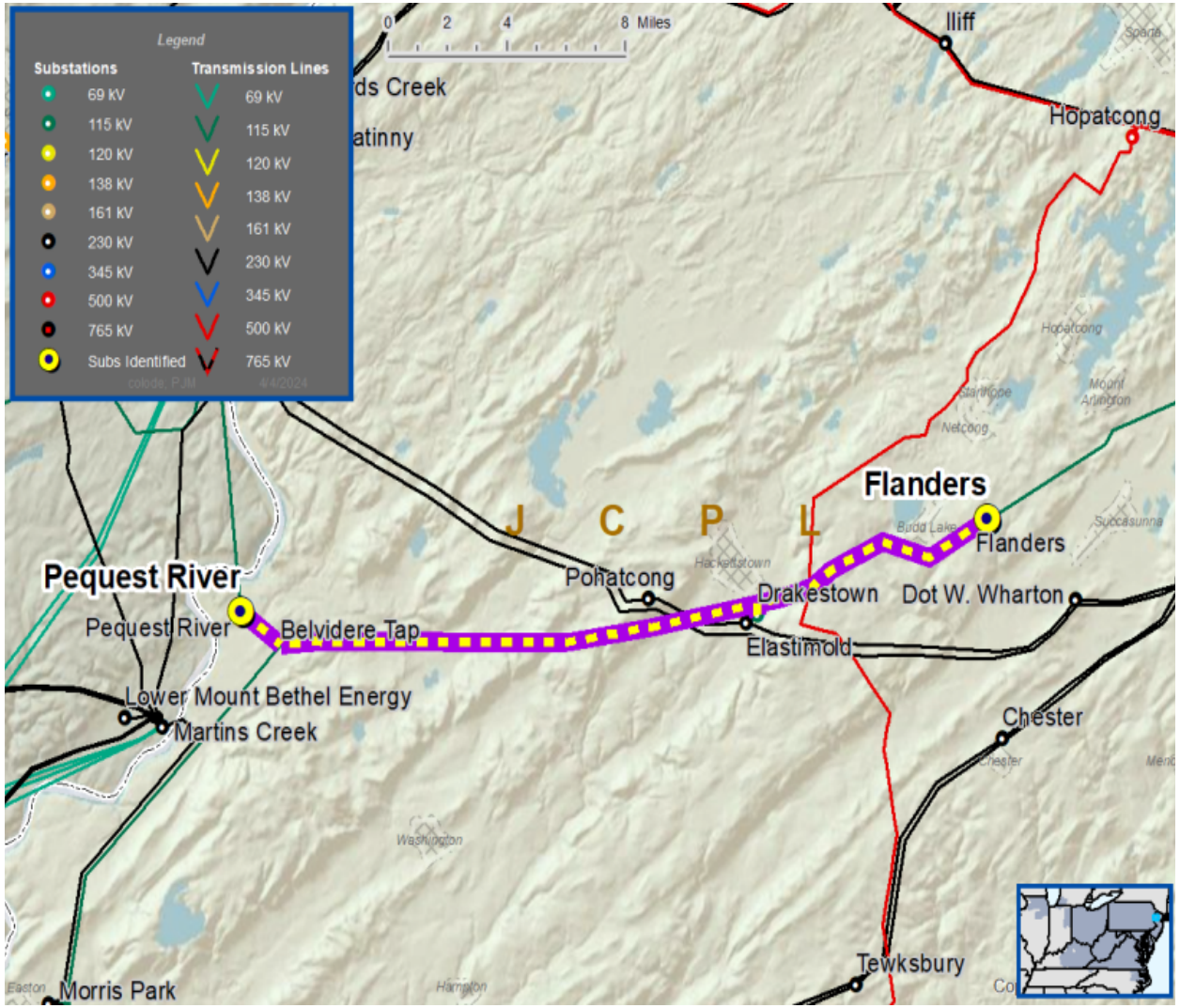
- System reliability/performance

Line Condition Rebuild/Replacement

- Age/condition of wood pole transmission line structures

Problem Statement:

- The Flanders – Pequest River 115 kV Line was constructed approximately 72 years ago. It is approximately 20 miles long with 217 transmission line structures (206 wood pole H-frame & 11 steel poles) .
- The line is exhibiting deterioration resulting in increased maintenance costs. Recent inspection findings include:
  - 23 structures require repairs due to deterioration.
  - 74 structures require repairs to insulators and related hardware, indicating that components are reaching end of life.
  - 70 structures failed inspection due to sound, woodpecker damage, top rot, decay, cracking, and/or delamination of cross-arms.
- Replacement components are difficult to source in quantity leading to non-standard repairs.
- Since 2019, the line has had four unscheduled sustained outages.
- Existing Transmission Line Ratings:
  - 184 / 223 / 208 / 264 MVA (SN/SE/WN/WE)



JCPL Transmission Zone M-3 Process
Customer Connection

Need Number: JCPL-2024-016

Process Stage: Need Meeting – 04/18/2024

Project Driver:

Customer Service

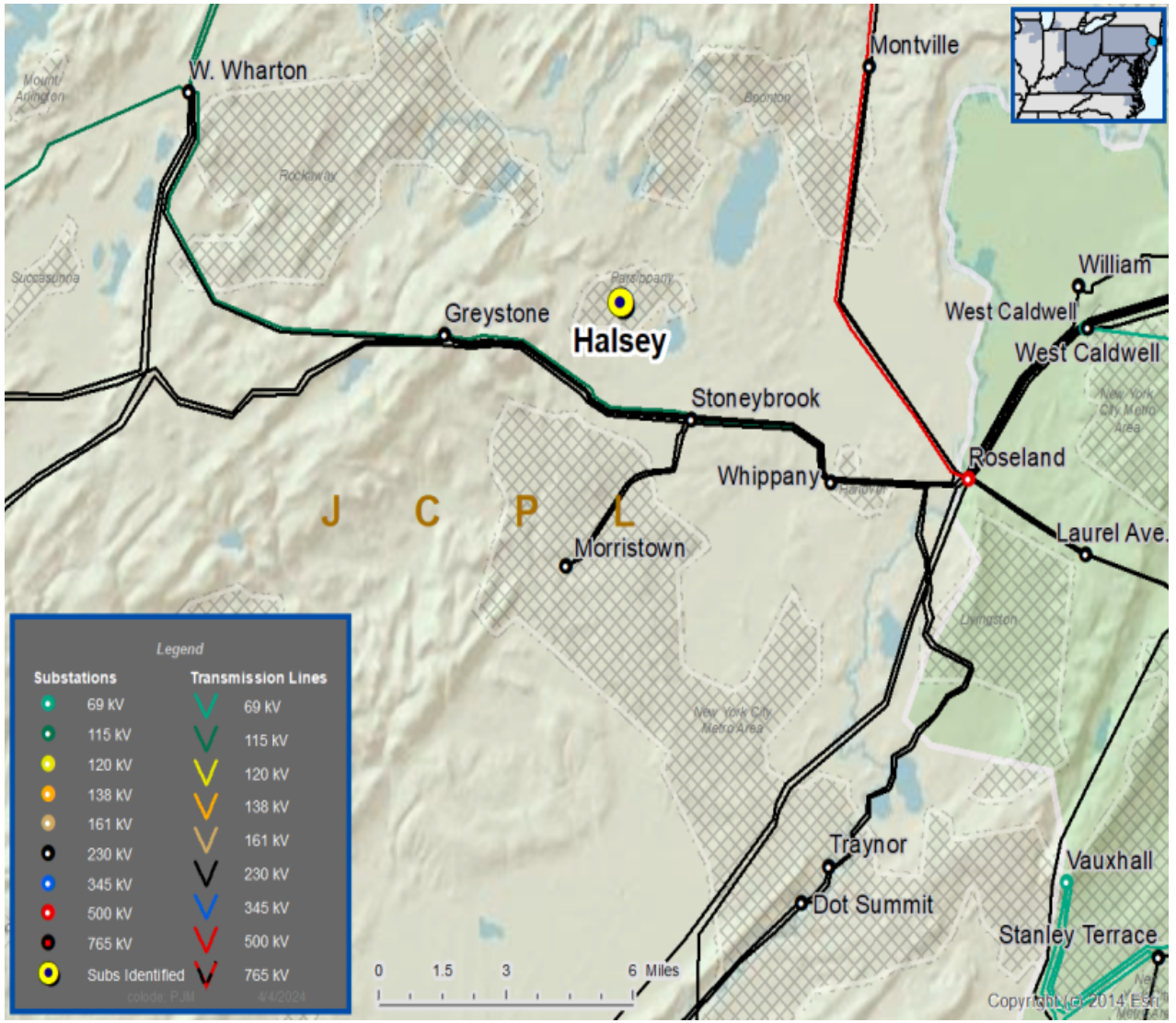
Specific Assumption Reference:

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

Problem Statement:

New Customer Connection - A retail customer requested 34.5 kV service for load of approximately 11 MVA; location is near the Halsey Substation.

Requested in-service date is 6/30/2024



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
Flanders Substation

Need Number: JCPL-2023-039

Process Stage: Solution Meeting – 04/18/2024

Previously Presented: Need Meeting – 10/19/2023

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

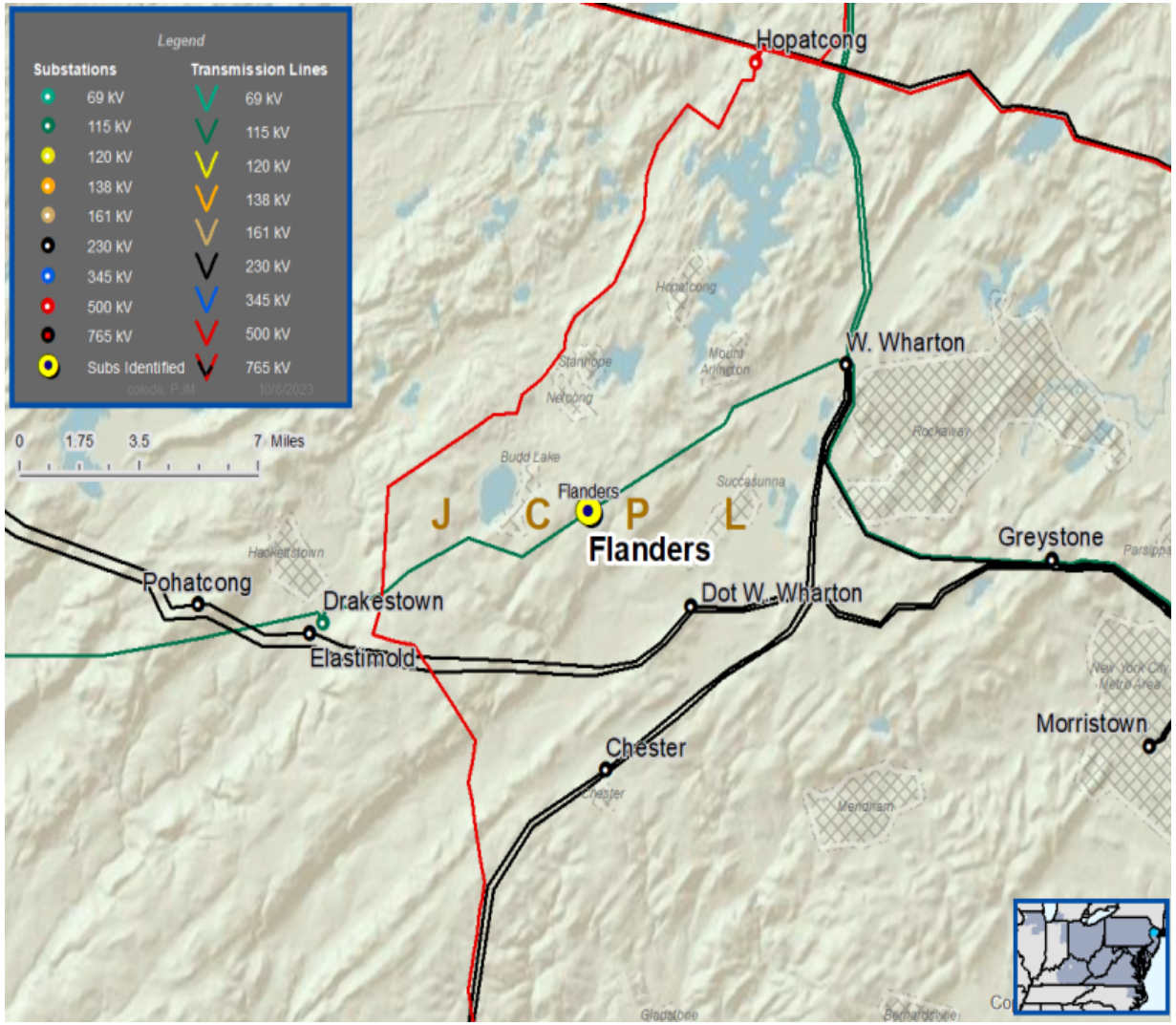
Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Problem Statement:

- The 115-34.5 kV No. 1 Transformer at Flanders Substation is approximately 50 years old and is approaching end of life. Recent analysis shows combustible hot metal gasses have developed.
- Existing Transformer Ratings:
  - 76 / 80 / 96 / 97 MVA (SN/SSTE/WN/WSTE)



JCPL Transmission Zone M-3 Process
Flanders Substation

Need Number: JCPL-2023-039

Process Stage: Solution Meeting – 04/18/2024

Proposed Solution:

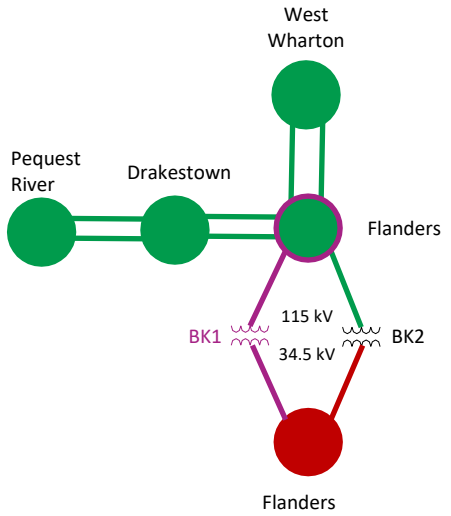
- Replace the 115-34.5 kV No. 1 Transformer at Flanders Substation.
- Replace the 115 kV circuit switcher with a circuit breaker.
- Upgrade the transformer relaying.
- Install new control enclosure.

Transformer Ratings:

- Flanders 115-34.5 kV No. 1 Transformer:
  - Before Proposed solution: 76 / 80 / 96 / 97 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution: 161 / 161 / 175 / 175 MVA (SN/SSTE/WN/WSTE)

Alternatives Considered:

- Maintain transformer in existing condition and replace upon failure.



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

Estimated Project Cost: $8.1 M

Projected In-Service: 12/31/2025

Project Status: Engineering

Model: 2023 RTEP model for 2028 Summer (50/50)

JCPL Transmission Zone M-3 Process
Flanders Substation

Need Number: JCPL-2023-057

Process Stage: Solution Meeting – 04/18/2024

Previously Presented: Need Meeting – 11/16/2023

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

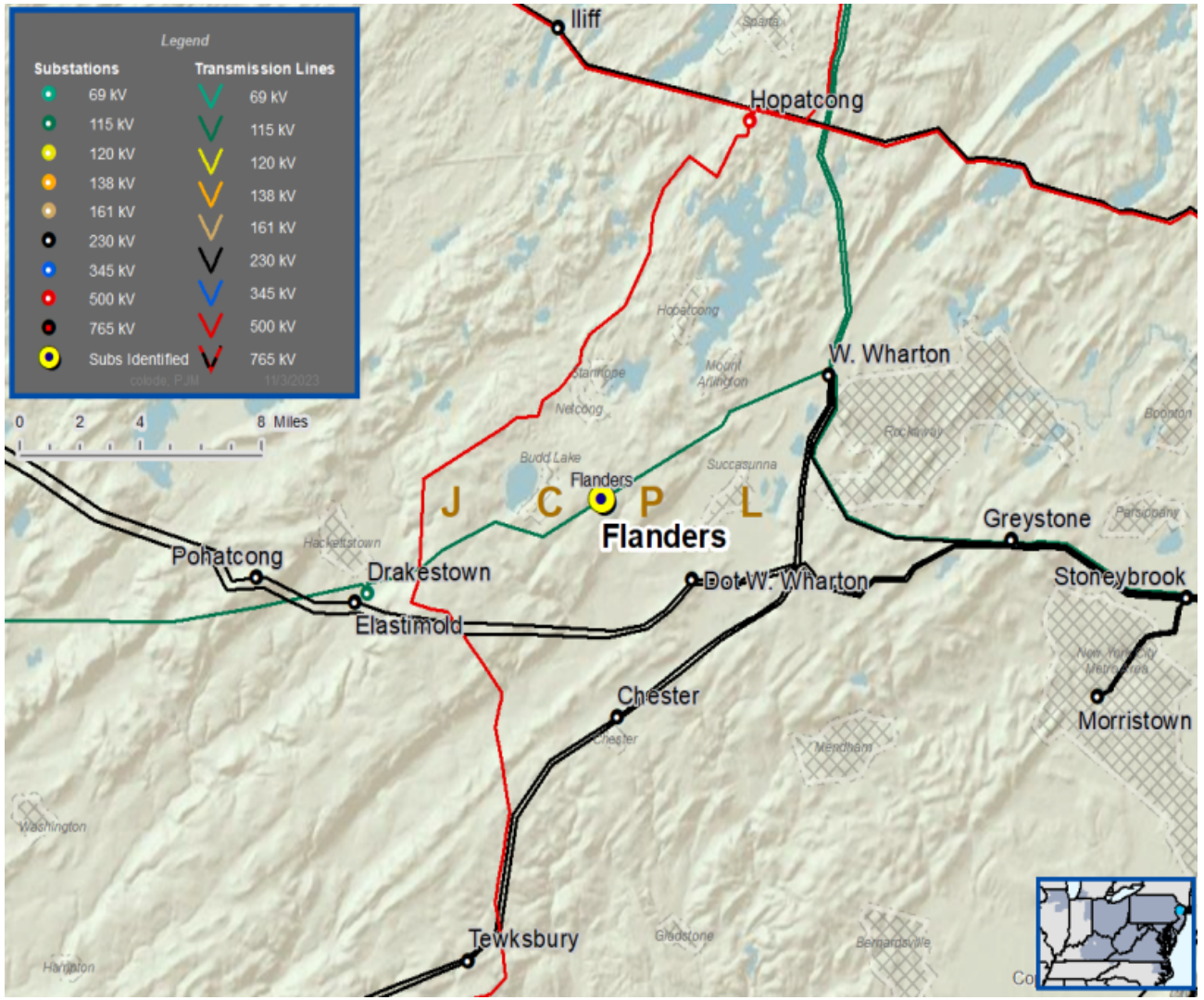
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The 115-34.5 kV No. 2 Transformer at Flanders Substation was manufactured approximately 70 years ago and is approaching end of life.
- High levels of moisture continue to develop in the transformer.
  - Moisture can reduce oil dielectric strength increasing risk of flashover and arcing.
- Existing Transformer Ratings:
  - 61 / 66 / 81 / 85 MVA (SN/SSTE/WN/WSTE)



JCPL Transmission Zone M-3 Process
Flanders Substation

Need Number: JCPL-2023-057

Process Stage: Solution Meeting – 04/18/2024

Proposed Solution:

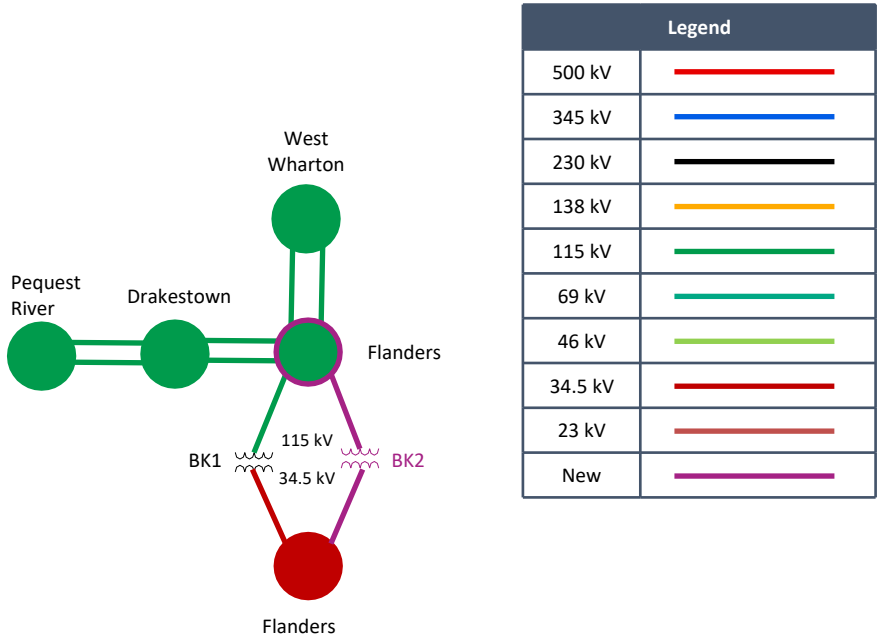
- Replace the 115-34.5 kV No. 2 Transformer at Flanders Substation.
- Replace the 115 kV circuit switcher with a circuit breaker.
- Upgrade the transformer relaying.

Transformer Ratings:

- Flanders 115-34.5 kV No. 2 Transformer:
  - Before Proposed solution: 61 / 66 / 81 / 85 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution: 161 / 161 / 175 / 175 MVA (SN/SSTE/WN/WSTE)

Alternatives Considered:

- Maintain transformer in existing condition and replace upon failure.



Estimated Project Cost: $8.1 M

Projected In-Service: 5/29/2026

Project Status: Engineering

Model: 2023 RTEP model for 2028 Summer (50/50)

JCPL Transmission Zone M-3 Process Misoperation Relay Project

Need Number: JCPL-2024-007
Process Stage: Solution Meeting – 04/18/2024
Previously Presented: Need Meeting – 02/15/2024

Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption References:
System Performance Global Factors
- System reliability and performance
- Substation / line equipment limits

Upgrade Relay Schemes
- Relay schemes that have a history of misoperation
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades
- Bus protection schemes

Problem Statement:
- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

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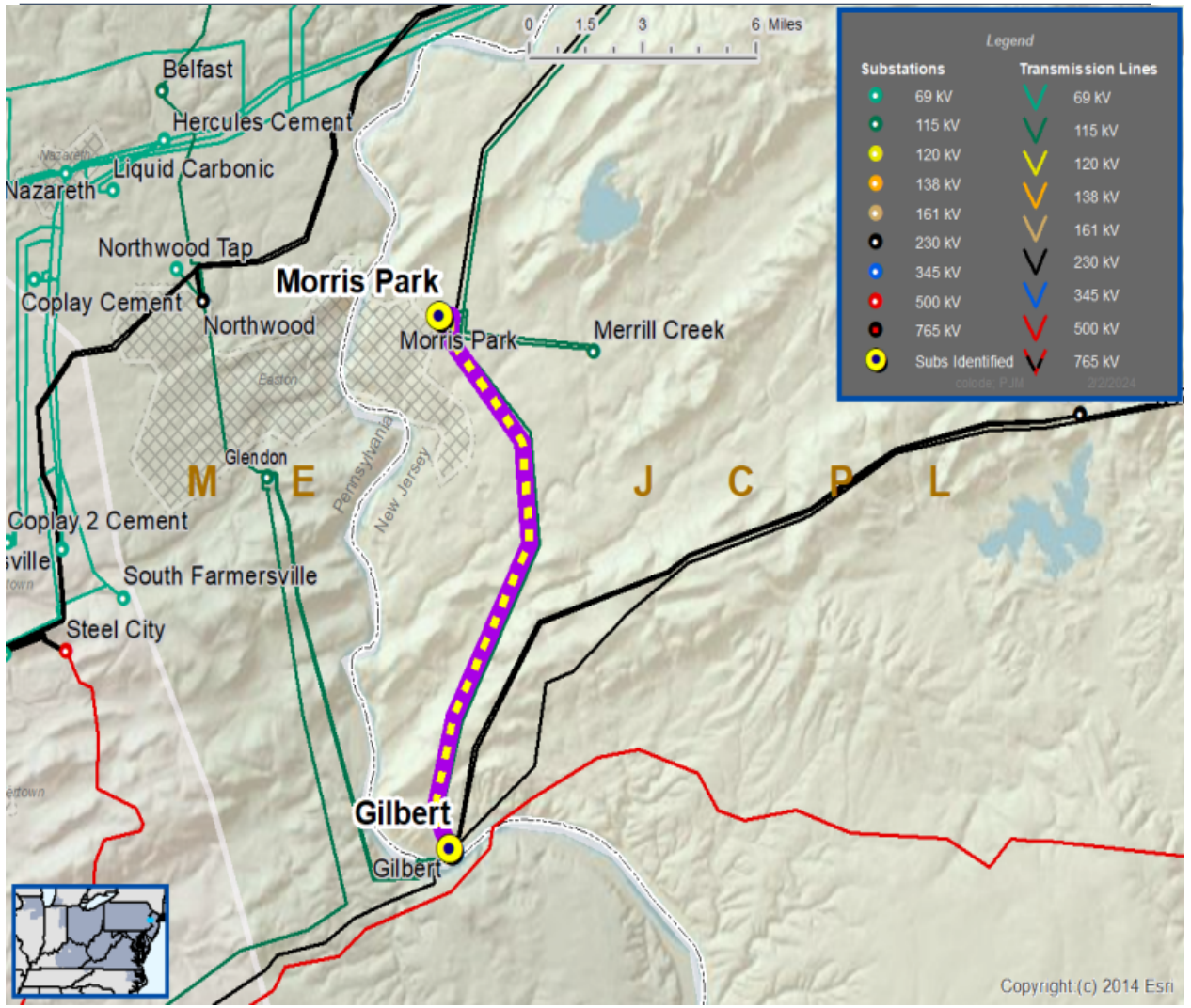

JCPL Transmission Zone M-3 Process Misoperation Relay Project

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Need Number	Transmission Line / Substation Locations	Existing Line Rating (SN / SE / WN / WE)	Existing Conductor Rating (SN / SE / WN / WE)
JCPL-2024-007	Gilbert – Morris Park 115 kV S919 Line	118 / 152 / 168 / 189	184 / 223 / 208 / 264

JCPL Transmission Zone M-3 Process Misoperation Relay Project

Need Number: JCPL-2024-007

Process Stage: Solution Meeting – 04/18/2024

Proposed Solution:

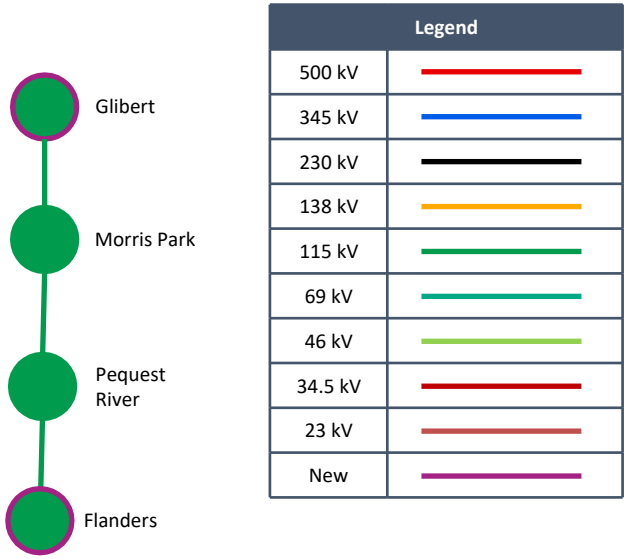
- Replace relaying and limiting substation conductor at Gilbert Substation.
- Replace circuit breakers and disconnect switches at Flanders Substation.

Transmission Line Rating:

- Gilbert – Morris Park 115 kV S919 Line
  - Before Proposed Solution: 118 / 152 / 168 / 189 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 184 / 223 / 208 / 264 MVA (SN/SE/WN/WE)

Alternatives Considered:

- Maintain line and vintage relay schemes in existing condition with risk of misoperation.



Estimated Project Cost: $3.27 M

Projected In-Service: 12/17/2026

Project Status: Conceptual

Model: 2023 RTEP model for 2028 Summer (50/50)

JCPL Transmission Zone M-3 Process
Misoperation Relay Projects

Need Number: JCPL-2024-010
Process Stage: Solution Meeting – 04/18/2024
Previously Presented: Need Meeting – 03/14/2024

Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption References:
System Performance Global Factors
- System reliability and performance
- Substation / line equipment limits

Upgrade Relay Schemes
- Relay schemes that have a history of misoperation
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades
- Bus protection schemes

Problem Statement:
- The existing control building at West Wharton Substation is congested. There is not sufficient space for relay panel upgrades.
- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

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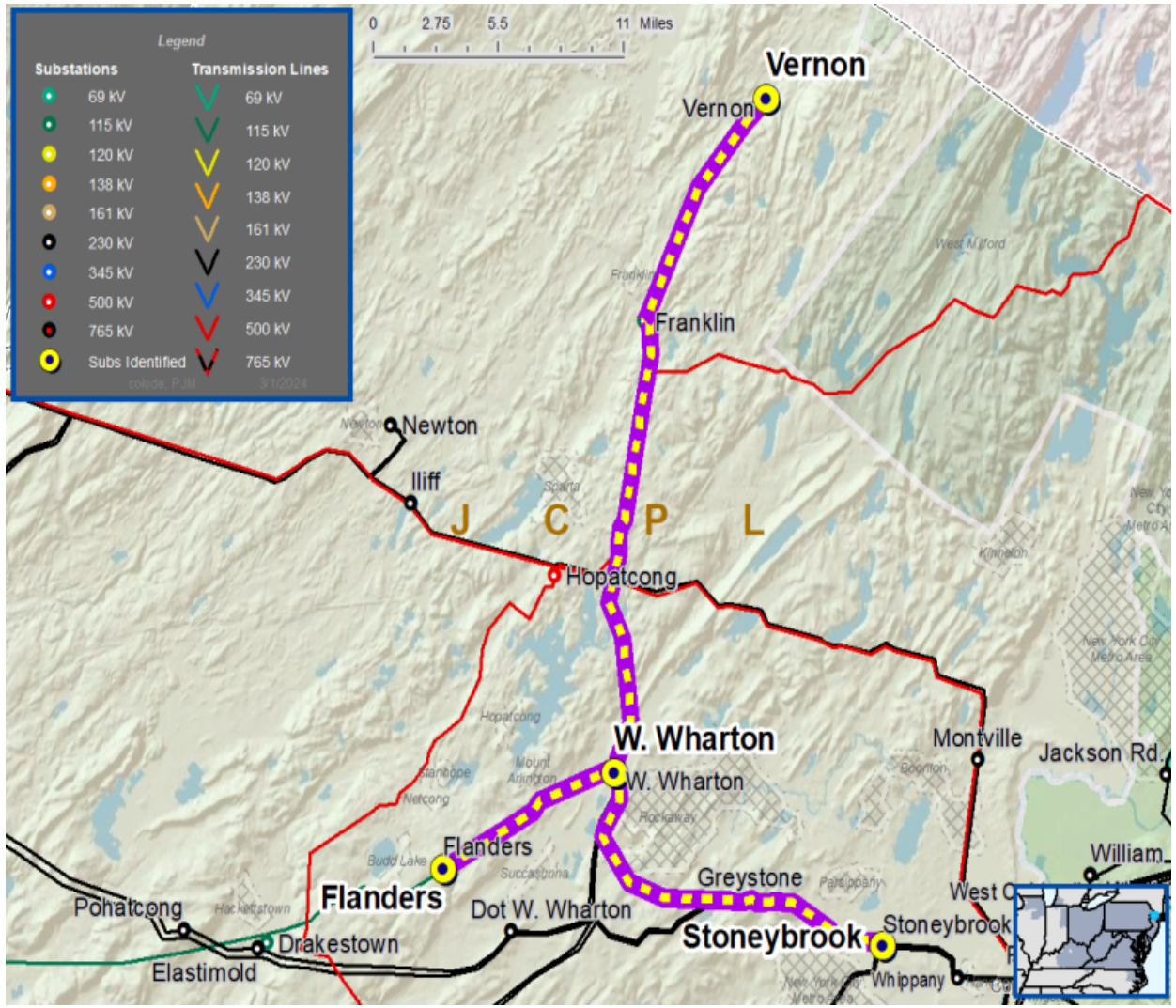

JCPL Transmission Zone M-3 Process Misoperation Relay Projects

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Need Number	Transmission Line / Substation Locations	Existing Line Rating (SN / SE / WN / WE)	Existing Conductor Rating (SN / SE / WN / WE)
JCPL-2024-010	West Wharton – Stony Brook 115 kV G943 Line	239 / 239 / 239 / 239	355 / 435 / 403 / 515
	West Wharton – Flanders 115 kV R918 Line	147 / 191 / 208 / 219	184 / 223 / 208 / 264
	West Wharton – Vernon 115 kV J932 Line	147 / 148 / 148 / 148	148 / 179 / 167 / 212

JCPL Transmission Zone M-3 Process Misoperation Relay Projects

Need Number: JCPL-2024-010

Process Stage: Solution Meeting – 04/18/2024

Proposed Solution:

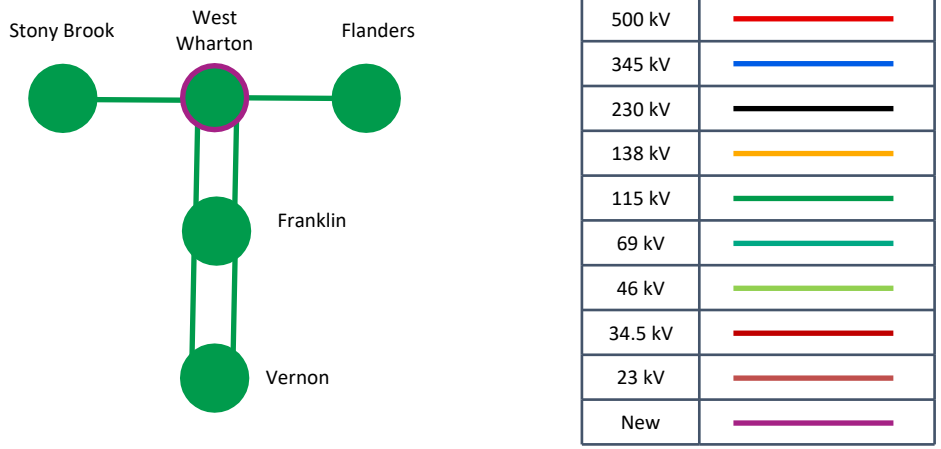
- Install a new control building at West Wharton Substation to provide adequate space needed for relay panel upgrades.
- Replace relaying and limiting substation conductor at West Wharton Substation.

Transmission Line Ratings:

- West Wharton – Stony Brook 115 kV G943 Line
  - Before Proposed solution: 239 / 239 / 239 / 239 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 355 / 435 / 403 / 515 MVA (SN/SE/WN/WE)
- West Wharton – Flanders 115 kV R918 Line
  - Before Proposed solution: 147 / 191 / 208 / 219 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 184 / 223 / 208 / 264 MVA (SN/SE/WN/WE)
- West Wharton – Vernon 115 kV J932 Line
  - Before Proposed solution: 147 / 148 / 148 / 148 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 148 / 179 / 167 / 212 MVA (SN/SE/WN/WE)

Alternatives Considered:

- Maintain line and vintage relay schemes in existing condition with elevated risk of misoperation.



Estimated Project Cost: $13.82 M

Projected In-Service: 04/04/2025

Project Status: Engineering

Model: 2023 RTEP model for 2028 Summer (50/50)

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

4/08/2024 – V1 – Original version posted to pjm.com
4/10/2024 – V2 – Added need maps