Subregional RTEP Committee - Mid-Atlantic
FirstEnergy Supplemental Projects

Submission of Supplemental Projects for Inclusion in the Local Plan

JCPL Transmission Zone M-3 Process
Gillette – Green Village 34.5 kV Lines

Need Number: JCPL-2019-026

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting – 03/25/2019
Solution Meeting – 11/16/2023

Project Driver(s):
Equipment Material Condition, Performance and Risk

Specific Assumption Reference(s)

Line Condition Rebuild/Replacement

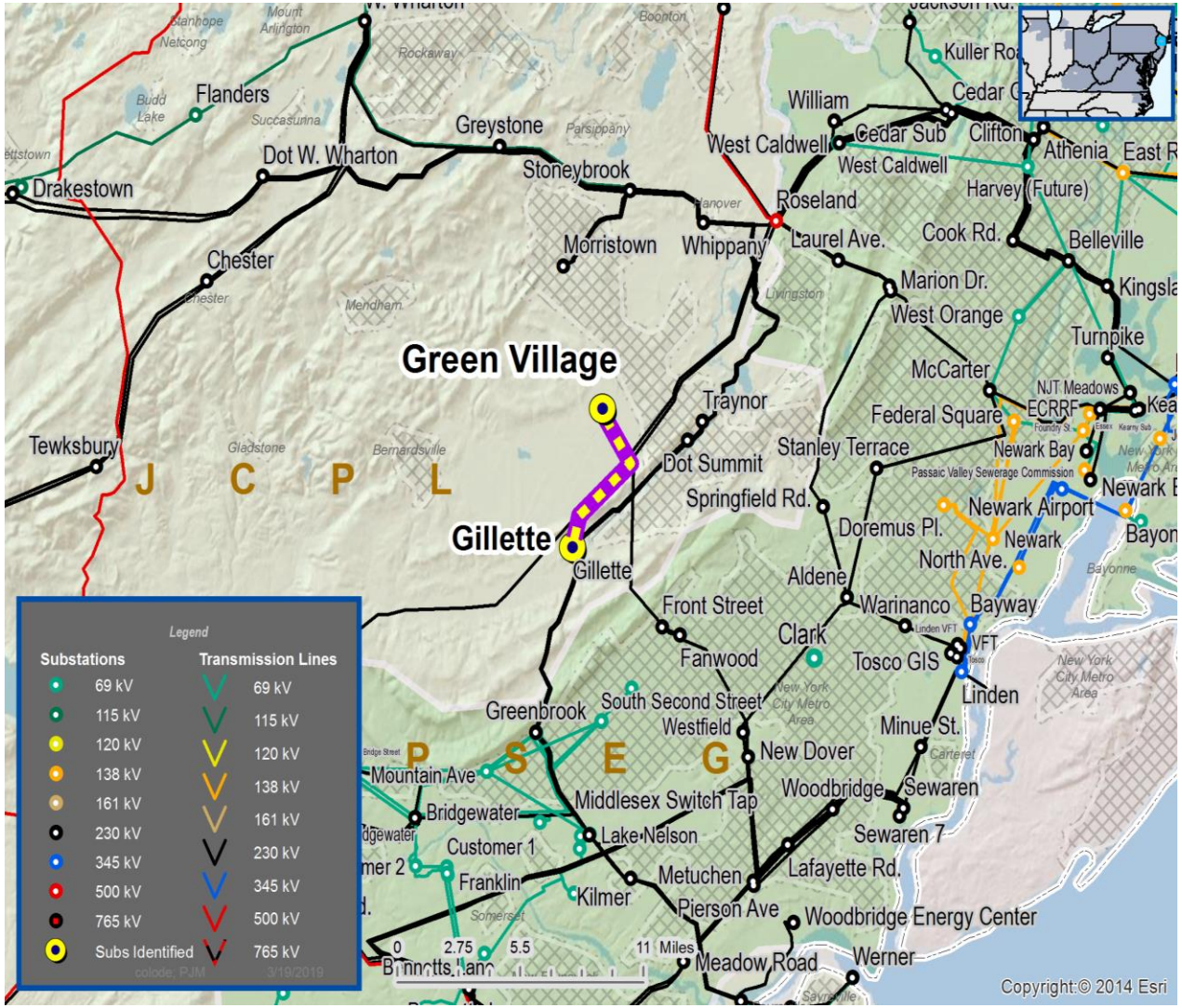
- Age/condition of wood pole transmission line structures
- Age/condition of steel tower or steel pole transmission line structures
- Age/condition of transmission line conductors

System Performance Projects

- Substation/line equipment limits

Problem Statement

- Line sections are exhibiting deterioration, increasing maintenance needs. Transmission line is approaching end of life
- Transmission line ratings are limited by terminal equipment.



JCPL Transmission Zone M-3 Process
Gillette – Green Village 34.5 kV Lines

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Need Number	Transmission Line / Substation Locations	Existing Circuit Rating (SN / SE)	Existing Conductor Rating (SN / SE)	Length of Line (miles)	Identified Structures (end of life / total)	Failure reasons
JCPL-2019-026	Gillette – Green Village 34.5 kV E5 Line Gillette – Green Village 34.5 kV J114 Line	41 / 50 44 / 53	41 / 50 44 / 53	5.7	132 / 134 (99% Failure Rate)	Age, bad/cut/missing grounds, rot/decay, woodpecker holes, etc.

JCPL Transmission Zone M-3 Process
Gillette – Green Village 34.5 kV lines

Need Numbers: JCPL-2019-026

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Rebuild the Gillette-Green Village 34.5kV E5 and J114 circuit (shared structures). Replace approximately 134 damaged poles. Install 5.7 miles of new conductor.
  - Gillette Substation: Replace line relaying, limiting substation conductor
  - Green Village Substation: Replace line relaying, line side disconnect switch

Transmission Line Ratings:

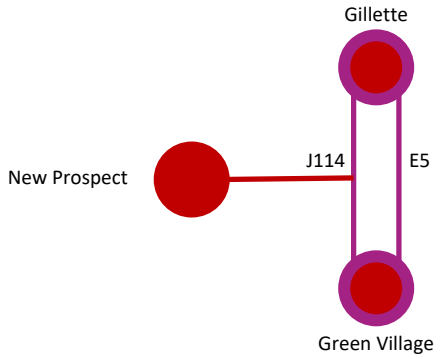
- Gillette-Green Village E5 34.5 kV Line
  - Before Proposed Solution: 41 / 50 MVA (SN / SE)
  - After Proposed Solution: 55 / 67 MVA (SN / SE)

- Gillette-Green Village J114 34.5 kV Line
  - Before Proposed Solution: 44 / 53 MVA (SN / SE)
  - After Proposed Solution: 55 / 67 MVA (SN / SE)

Estimated Project Cost: $ 24.2 M

Projected In-Service: 02/23/2024

Supplemental Project ID: s3232.1



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
New Customer Connection

Need Number: JCPL-2023-007

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 06/15/2023
Solution Meeting 12/13/2023

Project Driver:

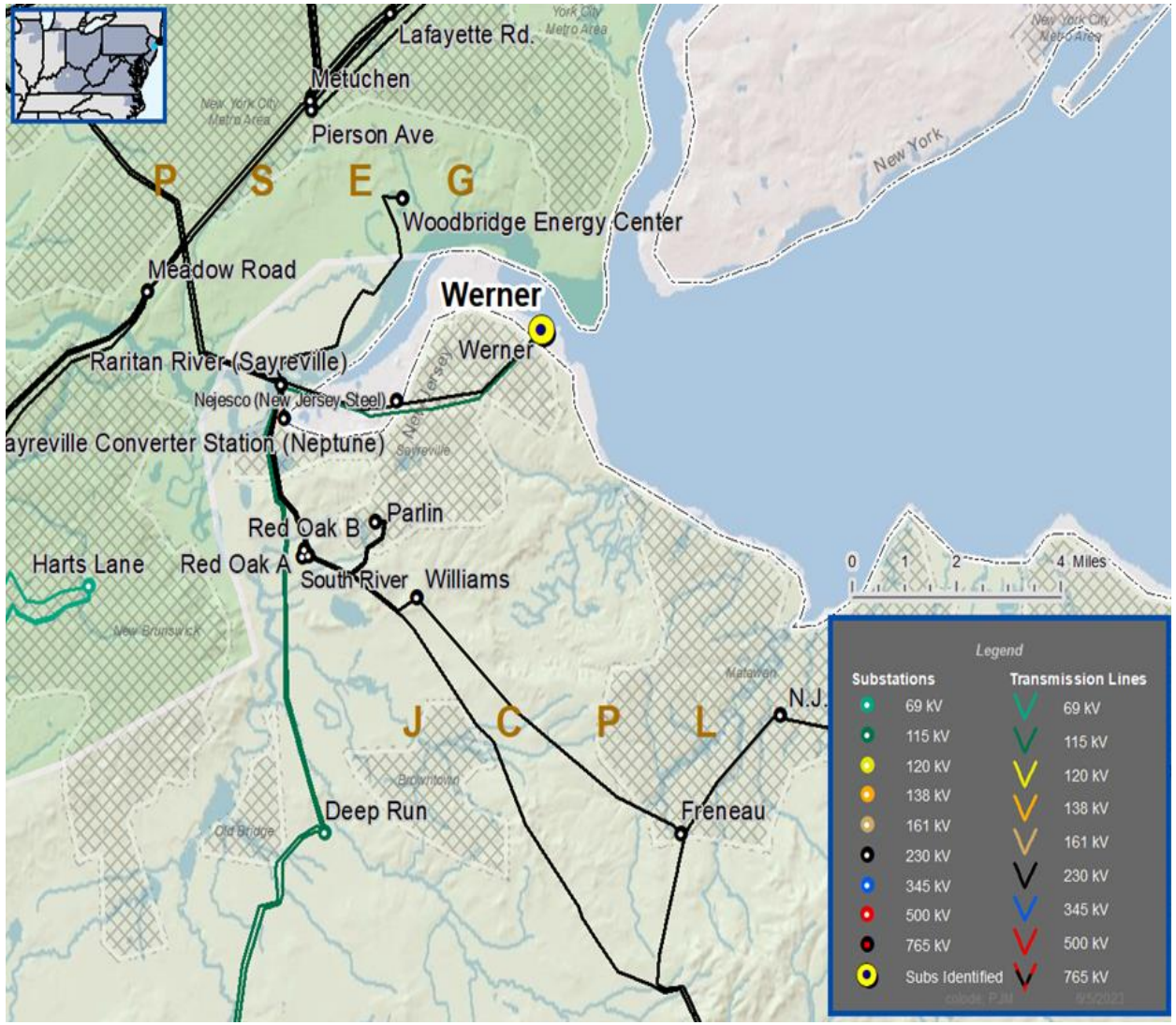
Customer Service

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 customer requested 34.5 kV service for load of approximately 29.9 MVA of capacity; location is near the Werner 115 kV Substation.



JCPL Transmission Zone M-3 Process
New Customer Connection

Need Number: JCPL-2023-007

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Selected Solution:

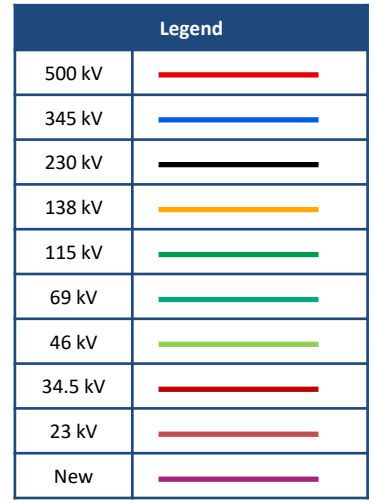
115 kV Breaker Addition

- Install one 115 kV breaker to create a 115 kV five breaker ring bus and create a terminal for customer connection
- Modify relay settings/scheme to accommodate breaker addition

Estimated Project Cost: $1.5M

Projected In-Service: 12/31/2025

Supplemental Project ID: s3233.1



JCPL Transmission Zone M-3 Process
Automatic Restoration Projects

Need Numbers: JCPL-2023-008, -009, -013, -014, -016-021, -024, -026, -028-030, -040, -041

Process State: Submission of Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 6/15/2023, 10/19/2023
Solution Meeting 11/16/2023

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance

Upgrade Relay Schemes

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

Problem Statement:

- There is a lack of automatic restoration of 34.5 kV lines following tripping events without the intervention of Transmission Operators.
- Manual restoration increases the risk of system constraints on adjacent facilities, especially for critical lines as identified by Transmission Operations.
- Obsolete electromechanical relay schemes. In many cases, the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- Transmission line ratings are limited by terminal equipment.

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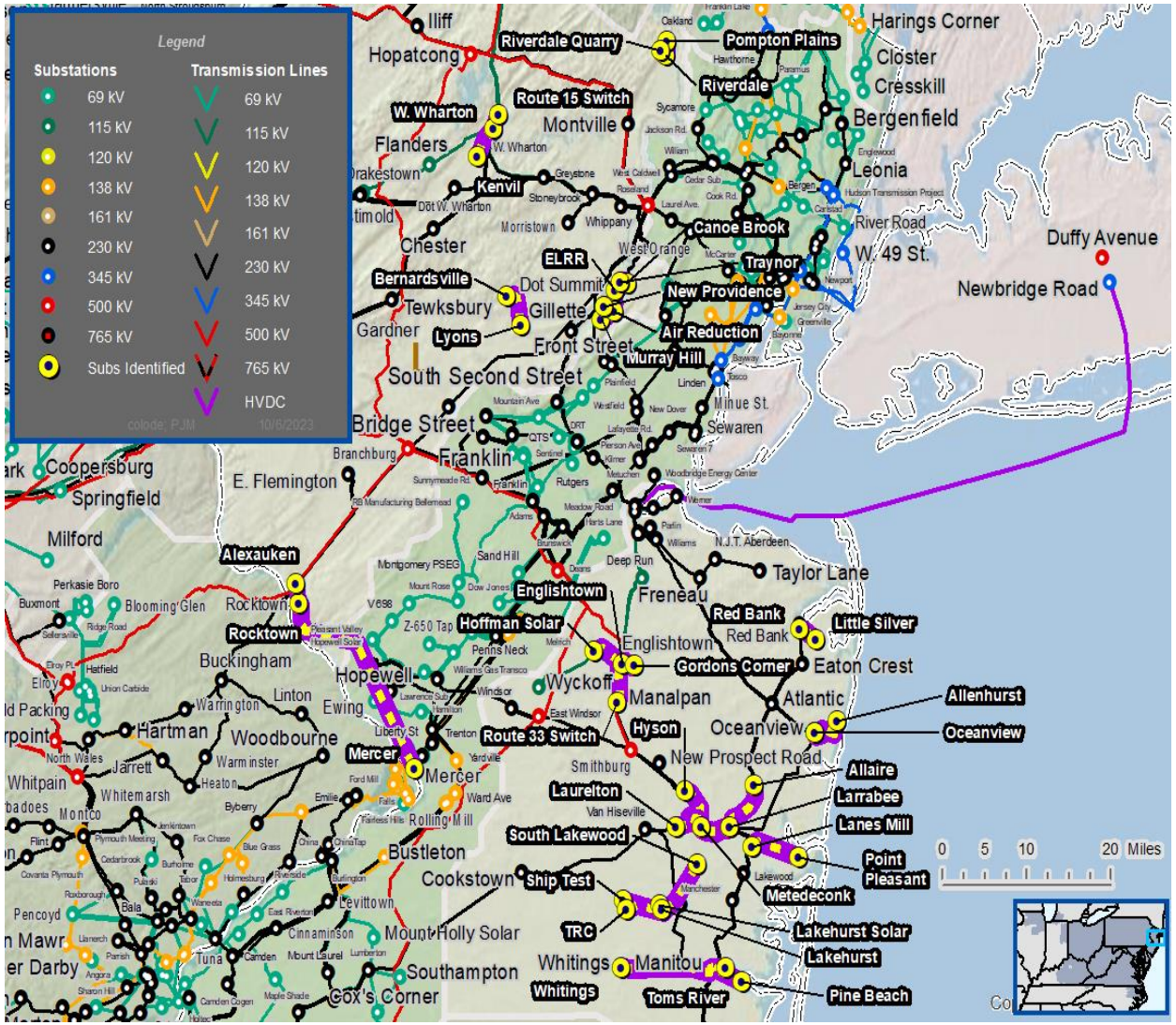


JCPL Transmission Zone M-3 Process
Automatic Restoration Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
JCPL-2023-008	Citgo D Tap – Monroe 34.5 kV	70/84	70/85
	Hoffman Solar Tap – Monroe 34.5 kV	44/57	70/85

JCPL Transmission Zone M-3 Process
Automatic Restoration Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
JCPL-2023-009	Freneau – Hillsdale Tap 34.5 kV	44/48	44/53
	Freneau – Pennwalt Tap 34.5 kV	44/48	44/53
	Freneau – Hazlet 34.5 kV	55/67	55/67
	Freneau – Ernston Tap 34.5 kV	40/48	40/48

JCPL Transmission Zone M-3 Process
Automatic Restoration Projects

Need #	Transmission Line	Existing Line Rating (SN/SE/WN/WE)	Existing Conductor Rating (SN/SE/WN/WE)
JCPL-2023-013	Manitou – Toms River Tap V126 34.5 kV	66/72/72/72	70/85/79/100
	Manitou - Pine Beach Tap X50 34.5 kV	55/63/63/63	55/67/63/79
JCPL-2023-014	Bernardsville – ELRR Tap C757 34.5 kV	44/53/50/57	44/53/50/63
	Bernardsville - Lyons B730 34.5 kV	44/47/47/47	44/53/50/63
JCPL-2023-016	Allenhurst - Oceanview H216 34.5 kV	44/48/48/48	55/67/63/79
JCPL-2023-017	Air Reduction – Murray Hill D108 34.5 kV	44/53/50/61	44/53/50/63
JCPL-2023-018	Rocktown Road - Mercer Tap N716 34.5 kV	39/48/45/48	39/48/45/56
	Alexauken Tap - Rocktown Road Y727 34.5 kV	38/38/38/38	40/48/45/57
JCPL-2023-019	Air Reduction Tap – New Providence D108 34.5 kV	35/46/48/48	41/50/48/60
JCPL-2023-020	West Wharton - Route 15 Switch Point T254 34.5 kV	55/67/63/72	55/67/63/79
	West Wharton - Kenvil Tap Z728 34.5 kV	55/67/63/77	55/67/63/79
JCPL-2023-021	Lanes Mill Tap - Point Pleasant T146 34.5 kV	41/48/48/48	44/53/50/63
	Brielle - Point Pleasant B106 34.5 kV	39/48/40/48	39/48/40/50
JCPL-2023-024	Englishtown - Hoffman Solar Tap H34 34.5 kV	70/72/72/72	70/85/79/100
	Englishtown - Route 33 Switch Point I87 34.5 kV	41/50/48/56	41/50/48/60
	Englishtown - Gordons Corner A209 34.5 kV	44/53/50/61	44/53/50/63

JCPL Transmission Zone M-3 Process
Automatic Restoration Projects

Need #	Transmission Line	Existing Line Rating (SN/SE/WN/WE)	Existing Conductor Rating (SN/SE/WN/WE)
JCPL-2023-026	Lakehurst - Ship Test E109 34.5 kV	25/25/25/25	44/53/50/63
	Lakehurst - Lakehurst Solar Tap N140 34.5 kV	18/18/19/19	18/18/20/20
	Lakehurst - South Lakewood W777 34.5 kV	41/50/48/57	41/50/48/60
	Lakehurst - TRC O Tap O41 34.5 kV	41/50/48/51	41/50/48/60
JCPL-2023-028	Pompton Plains Tap – Riverdale M117 34.5 kV	41/48/48/48	41/50/48/60
	Riverdale Quarry Tap - Riverdale I9 34.5 kV	44/53/50/57	44/53/50/63
JCPL-2023-029	Traynor - Canoe Brook T72 34.5 kV	41/48/48/48	41/50/48/60
	Traynor - ELRR Summit Q Tap Q17 34.5 kV	42/48/48/48	44/53/50/63
	Canoe Brook Tap - Traynor C81 34.5 kV	44/53/50/53	44/53/50/63
JCPL-2023-030	Larrabee - Laurelton Tap Q43 34.5 kV	55/67/63/72	55/67/63/79
	Hyson - Larrabee K219 34.5 kV	66/76/76/76	70/85/79/100
	Larrabee - Metedeconk Tap E213 34.5 kV	41/50/48/53	41/50/48/60
	Larrabee - Allaire Tap B106 34.5 kV	41/50/48/52	41/50/48/60
JCPL-2023-040	Red Bank - Little Silver Z78 34.5 kV	55/67/63/72	55/67/63/79
JCPL-2023-041	Manitou - Whitings L138 34.5 kV	41/50/48/56	41/50/48/60

JCPL Transmission Zones M-3 Process
Automatic Restoration Projects

Selected Solution(s):

Need #	Transmission Line	New Line Rating (SN/SE/WN/WE)	Scope of Work	Supplemental Project ID	Estimated Cost ($ M)	Target ISD
JCPL-2023-008	Citgo D Tap – Monroe D82 34.5 kV	70/85/79/100	• At Monroe, replace relaying	s3234.1	$1.89	12/31/2024
	Hoffman Solar Tap – Monroe H34 34.5 kV	44/57/63/71				
JCPL-2023-009	Freneau – Hillsdale Tap F32 34.5 kV	44/53/50/63	• At Freneau, replace relaying	s3235.1	$3.78	12/31/2024
	Freneau – Pennwalt Tap V100 34.5 kV	44/53/50/63				
	Freneau – Hazlet S45 34.5 kV	55/67/63/79				
	Freneau – Ernston Tap W101 34.5 kV	40/48/45/57				
JCPL-2023-013	Manitou – Toms River Tap V126 34.5 kV	66/79/79/90	• At Manitou, replace relaying	s3236.1	$1.92	10/15/2024
	Manitou - Pine Beach Tap X50 34.5 kV	55/67/63/79				
JCPL-2023-014	Bernardsville – ELRR Tap C757 34.5 kV	44/53/50/63	• At Bernardsville, replace relaying	s3237.1	$1.28	11/15/2024
	Bernardsville - Lyons B730 34.5 kV	44/53/50/63				
JCPL-2023-016	Allenhurst - Oceanview H216 34.5 kV	44/57/63/71	• At Allenhurst, replace relaying	s3238.1	$1.28	11/16/2024
JCPL-2023-017	Air Reduction – Murray Hill D108 34.5 kV	35/46/48/57	• At Murray Hill, replace relaying	s3239.1	$0.64	12/15/2024
JCPL-2023-018	Rocktown Road - Mercer Tap N716 34.5 kV	39/48/45/56	• At Rocktown Road, replace relaying	s3240.1	$1.28	12/31/2024
	Alexauken Tap - Rocktown Road Y727 34.5 kV	40/48/45/57				

JCPL Transmission Zones M-3 Process
Automatic Restoration Projects

Selected Solution:

Need #	Transmission Line	New Line Rating (SN/SE/WN/WE)	Scope of Work	Supplemental Project ID	Estimated Cost ($ M)	Target ISD
JCPL-2023-019	Air Reduction Tap – New Providence D108 34.5 kV	44/53/50/63	• At New Providence, replace relaying	s3241.1	$0.64	12/10/2027
JCPL-2023-020	West Wharton - Route 15 Switch Point T254 34.5 kV	55/67/63/79	• At West Wharton, replace relaying	s3242.1	$1.92	6/1/2025
	West Wharton - Kenvil Tap Z728 34.5 kV	55/67/63/79				
JCPL-2023-021	Lanes Mill Tap - Point Pleasant T146 34.5 kV	41/52/50/62	• At Point Pleasant, replace relaying	s3243.1	$1.92	5/15/2025
	Brielle - Point Pleasant B106 34.5 kV	39/48/40/50				
JCPL-2023-024	Englishtown - Hoffman Solar Tap H34 34.5 kV	70/85/79/100	• At Englishtown, replace relaying	s3244.1	$2.56	10/15/2025
	Englishtown - Route 33 Switch Point I87 34.5 kV	41/50/48/60				
	Englishtown - Gordons Corner A209 34.5 kV	44/53/50/63				
JCPL-2023-026	Lakehurst - Ship Test E109 34.5 kV	44/53/50/63	• At Lakehurst, replace relaying	s3245.1	$2.56	12/31/2025
	Lakehurst - Lakehurst Solar Tap N140 34.5 kV	18/18/20/20				
	Lakehurst - South Lakewood W777 34.5 kV	41/50/48/60				
	Lakehurst - TRC O Tap O41 34.5 kV	41/50/48/57				
JCPL-2023-028	Pompton Plains Tap – Riverdale M117 34.5 kV	41/50/48/60	• At Riverdale, replace relaying	s3246.1	$1.28	12/31/2025

JCPL Transmission Zones M-3 Process
Automatic Restoration Projects

Selected Solution:

Need #	Transmission Line	New Line Rating (SN/SE/WN/WE)	Scope of Work	Supplemental Project ID	Estimated Cost ($ M)	Target ISD
JCPL-2023-029	Traynor - Canoe Brook T72 34.5 kV	41/50/48/60	• At Traynor, replace relaying	s3247.1	$1.92	12/31/2025
	Traynor - ELRR Summit Q Tap Q17 34.5 kV	42/50/50/57				
	Canoe Brook Tap - Traynor C81 34.5 kV	44/53/50/63				
JCPL-2023-030	Larrabee - Laurelton Tap Q43 34.5 kV	55/67/63/79	• At Larrabee, replace relaying	s3248.1	$2.56	12/20/2024
	Hyson - Larrabee K219 34.5 kV	70/85/79/100				
	Larrabee - Metedeconk Tap E213 34.5 kV	41/50/48/60				
	Larrabee - Allaire Tap B106 34.5 kV	41/50/48/60				
JCPL-2023-040	Red Bank - Little Silver Z78 34.5 kV	55/67/63/79	• At Red Bank, replace relaying	s3250.1	$1.28	12/31/2027
JCPL-2023-041	Manitou - Whitings L138 34.5 kV	41/50/48/60	• At Whitings, replace relaying	s3251.1	$1.28	6/1/2025

JCPL Transmission Zone M-3 Process
Vernon Substation

Need Number: JCPL-2023-038

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/19/2023

Solution Meeting 03/14/2024

Project Driver:

Equipment Material Condition, Performance and Risk

Operational Flexibility and Efficiency

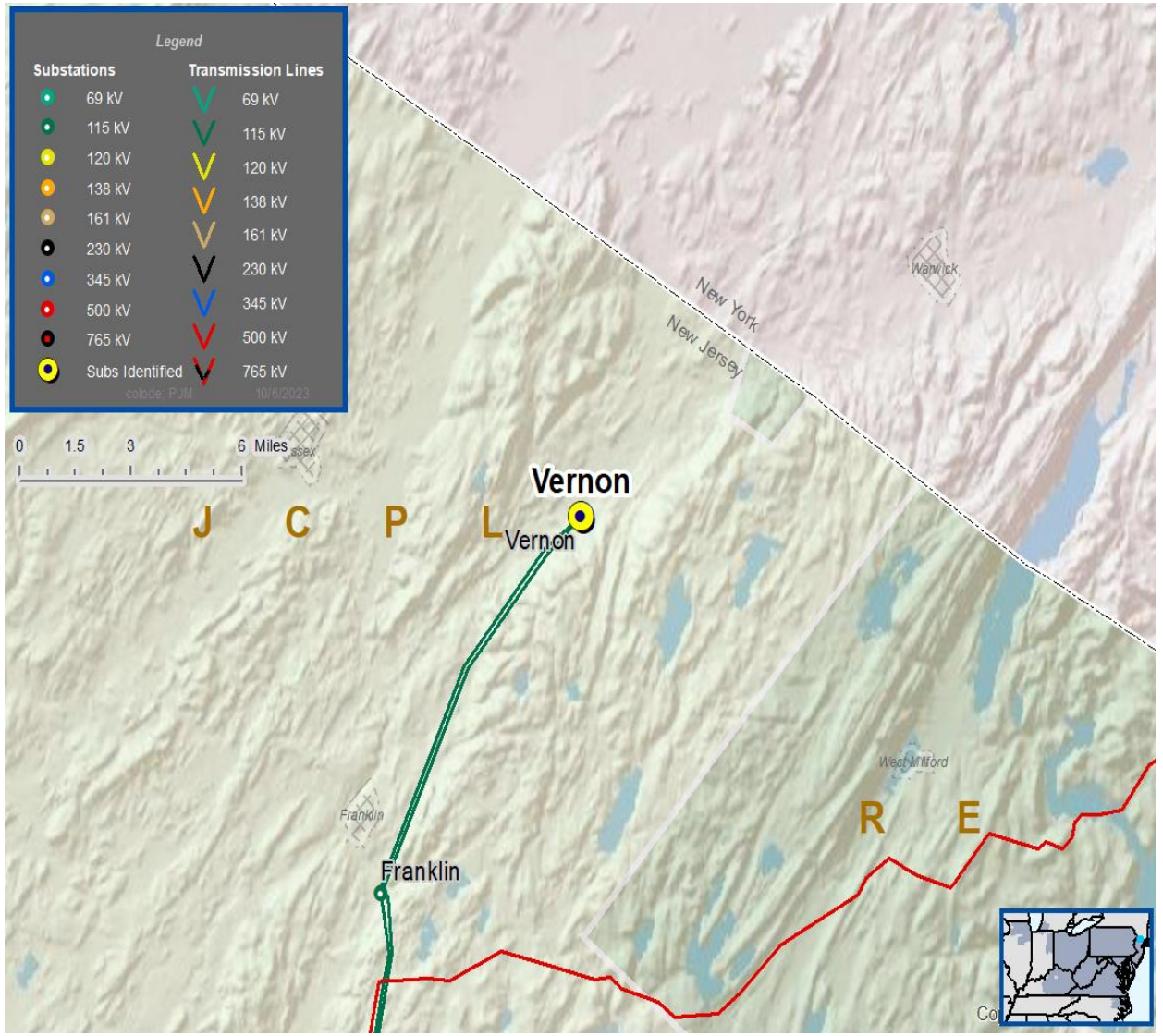
Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities
- Substation/line equipment limits

Problem Statement:

- The 115-34.5 kV No. 1 Transformer at Vernon Substation is approximately 50 years old and is approaching end of life. Most recent DGA results showed elevated methane and ethane gas levels compared with IEEE Standards.
- Existing Transformer Ratings:
  - 65 / 77 MVA (SN / SSTE)



JCPL Transmission Zone M-3 Process
Vernon Substation

Need Number: JCPL-2023-038

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace the 115-34.5 kV No. 1 Transformer at Vernon Substation.
- Replace 115 kV circuit switcher with a circuit breaker.
- Upgrade transformer relaying.

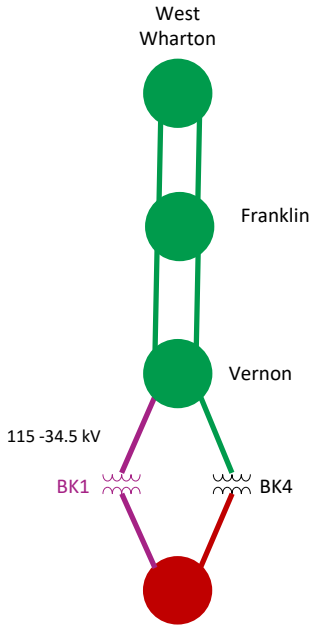
Transformer Ratings:

- Vernon 115-34.5 kV No. 1 Transformer:
  - Before Proposed solution: 65 / 77 / 80 / 88 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution: 161 / 161 / 175 / 175 MVA (SN/SSTE/WN/WSTE)

Estimated Project Cost: $4.7 M

Projected In-Service: 12/15/2025

Supplemental Project ID: s3249.1



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
Franklin Substation

Need Number: JCPL-2023-006

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 9/14/2023
Solution Meeting 11/16/2023

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

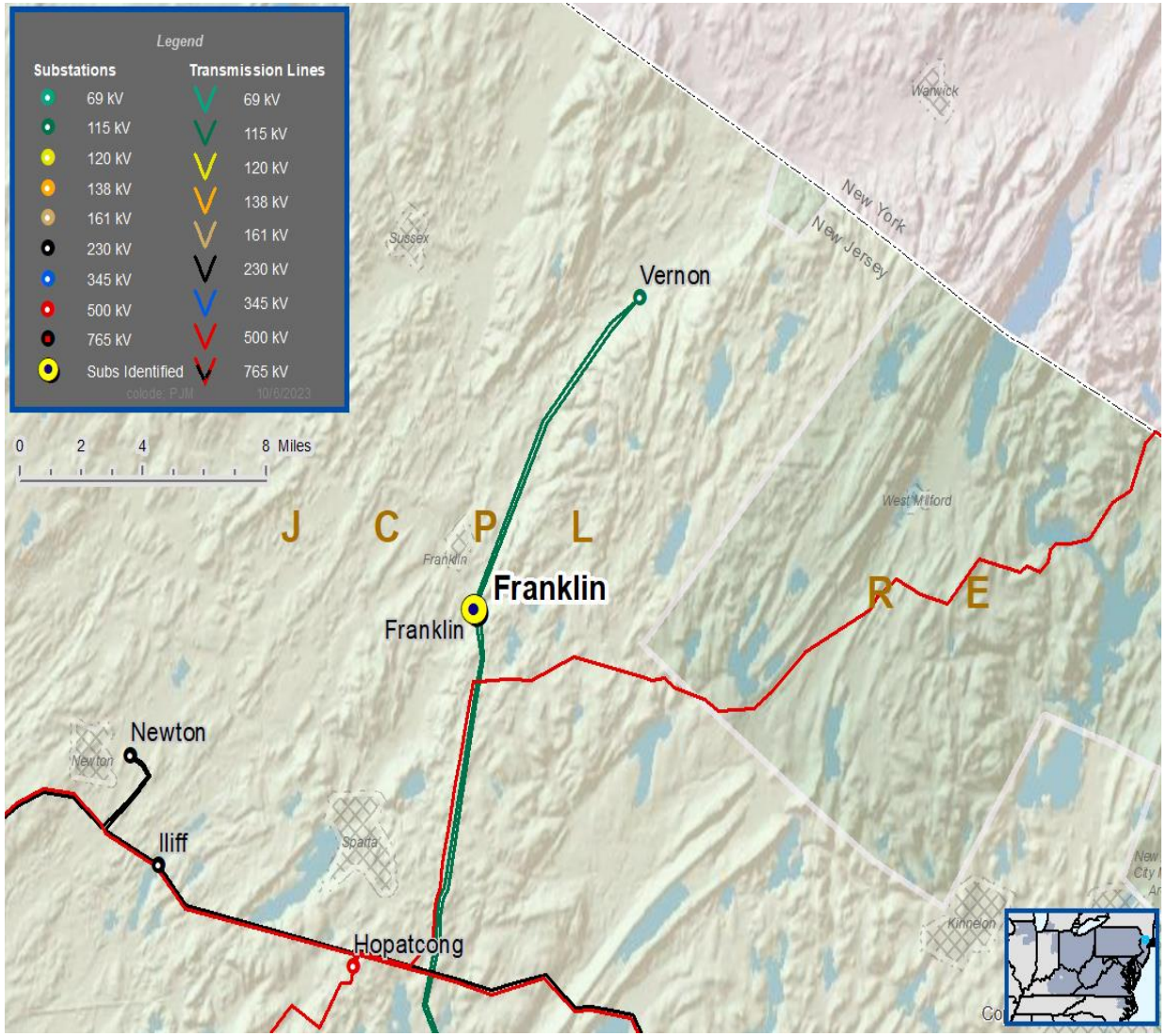
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The 115 – 34.5 kV No. 2 Transformer at Franklin Substationwas installed 70 years ago and is approaching end of life.
- Ethane and Hydrogen gases have been exhibited as elevated compared to IEEE standards.
- Existing TR Ratings:
  - 61 / 66 MVA (SN / SLTE)



JCPL Transmission Zone M-3 Process
Franklin Substation

Need Number: JCPL-2023-042

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/19/2023
Solution Meeting 11/16/2023

Project Driver:

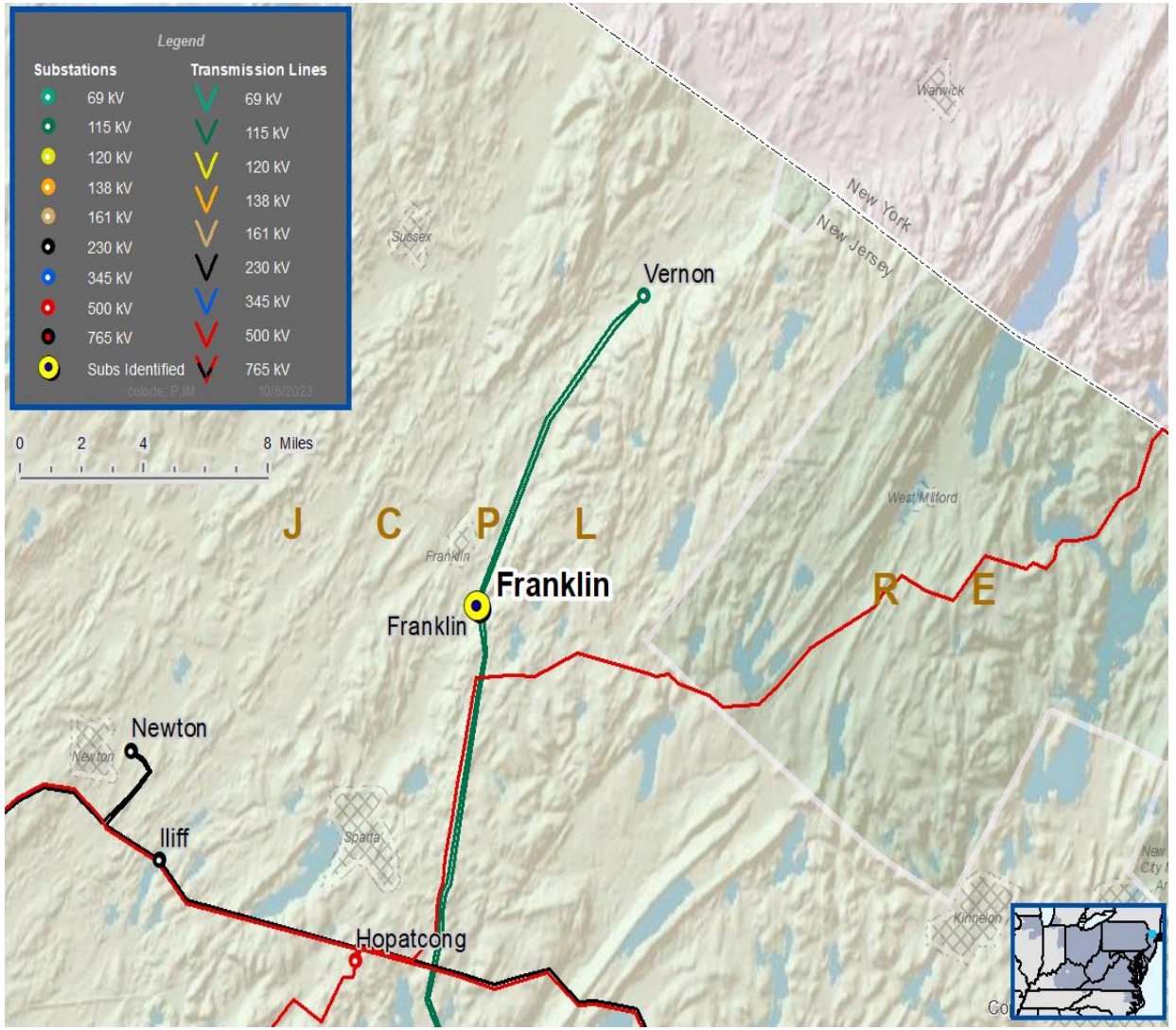
Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

- Load at risk in planning and operational scenarios
- Add/Expand Bus Configuration

Problem Statement:

- Franklin Substation is configured as a straight bus with two 115 kV sources. Each 115 kV source is a tap connection on the Vernon – West Wharton 115 kV lines
  - Franklin Substation serves approximately 67 MW of load and 4,464 customers.
  - Both existing Vernon – West Wharton 115 kV Lines are 16.7 miles long. A fault anywhere on either line will cause an outage at Franklin and Vernon substations.



JCPL Transmission Zone M-3 Process
Franklin Substation

Need Number: JCPL-2023-006, JCPL-2023-042

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

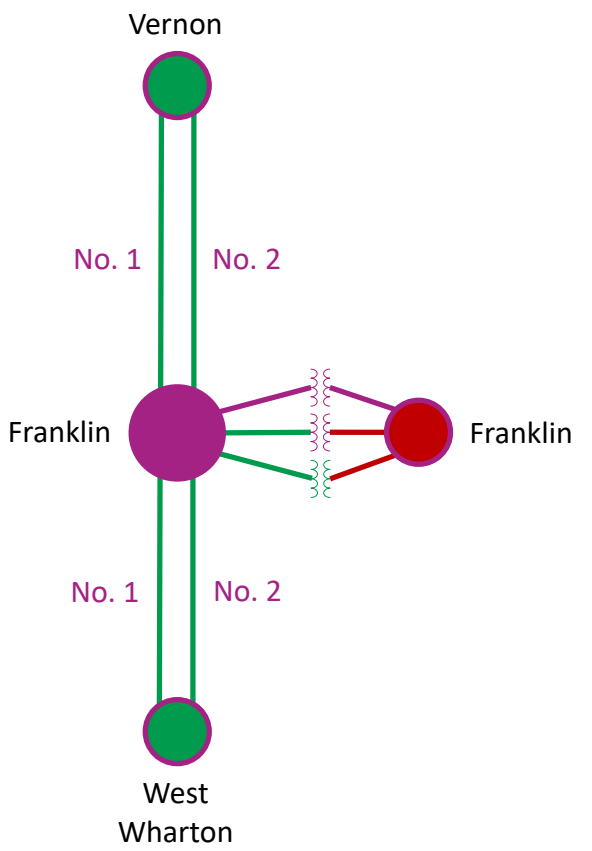
- At Franklin Substation:
  - Construct an 11 breaker 115 kV breaker-and-a-half substation
  - Cut the existing Vernon – West Wharton 115 kV D931 & J932 Lines and terminate them at Franklin Substation. This will create the following 115 kV Lines:
    - Franklin – West Wharton No. 1 115 kV
    - Franklin – West Wharton No. 2 115 kV
    - Franklin – Vernon No. 1 115 kV
    - Franklin – Vernon No. 2 115 kV
  - Install a new 90 MVA 115-34.5 kV transformer
  - Replace the existing 115-34.5 kV No. 2 transformer with a 90 MVA unit.
- Replace relaying at Franklin, Vernon, and West Wharton Substations

Estimated Project Cost: $32.0 M

Projected In-Service: 12/31/2025

Supplemental Project ID: JCPL-2023-006: s3299.1, s3299.2, s3299.3, s3299.4

JCPL-2023-042: s3252.1



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
Misoperation Relay Projects

Need Number: JCPL-2023-044, -045, -048

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/31/2023
Solution Meeting 12/05/2023

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption References:

Global Factors

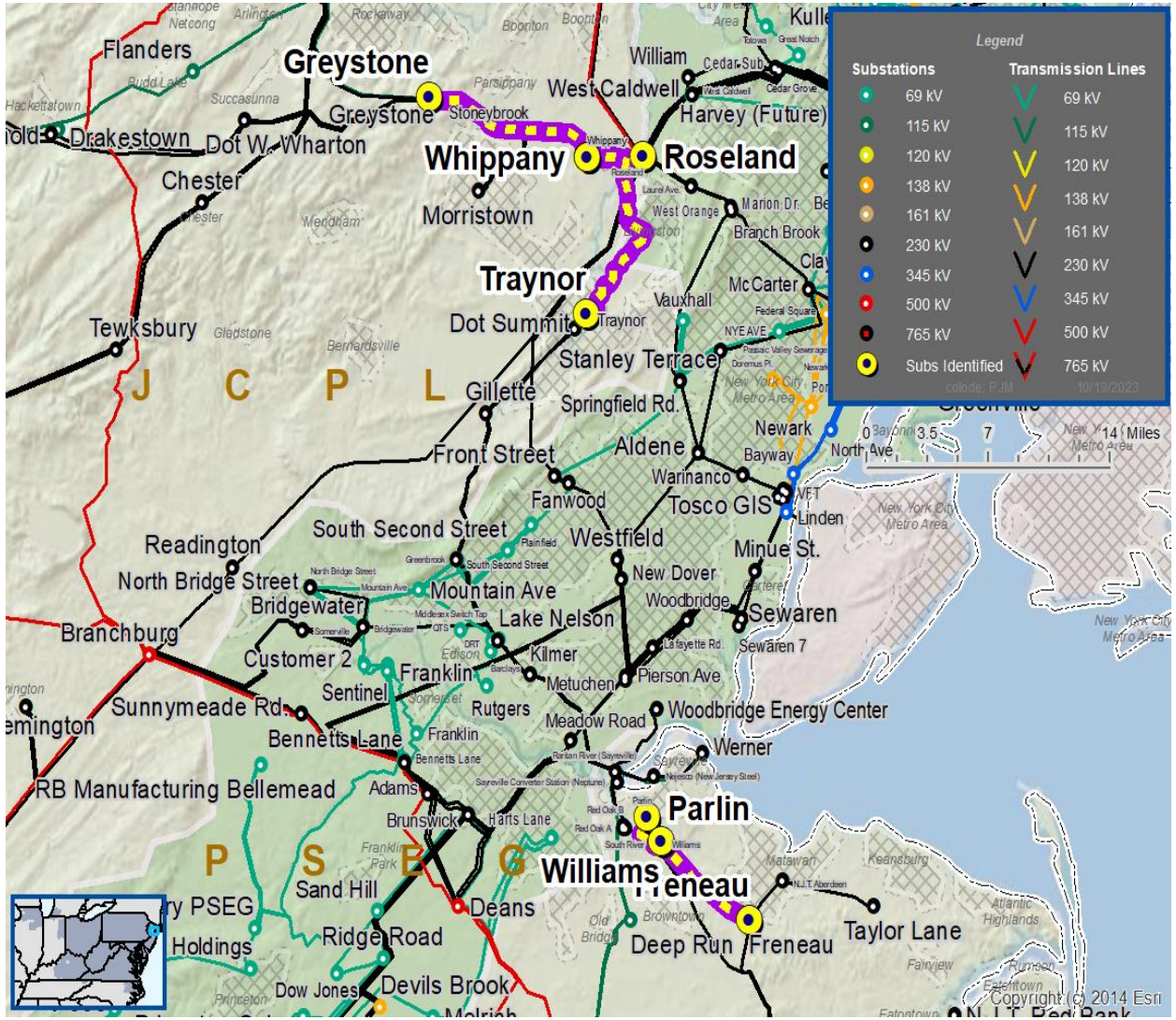
- System reliability and performance
- Substation / line equipment limits

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.



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-2023-044	Traynor – Whippany 230 kV Z1040 Line	574 / 574 / 574 / 574	709 / 869 / 805 / 1031
JCPL-2023-045	Greystone – Whippany 230 kV J1024 Line	649 / 698 / 723 / 762	709 / 869 / 805 / 1031
JCPL-2023-048	Parlin – Williams Gas 230 kV K1025 Line Williams Gas - Freneau 230 kV K1025 Line	709 / 869 / 805 / 952 709 / 869 / 805 / 1031	709 / 869 / 805 / 1031 709 / 869 / 805 / 1031

JCPL Transmission Zones M-3 Process
Traynor – Whippany 230 kV Misoperation Relays

Need Number: JCPL-2023-044

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace relaying and limiting substation conductor at Traynor and Whippany substations

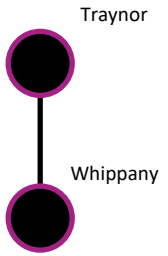
Transmission Line Ratings:

- Traynor – Whippany Z1040 230 kV Line
  - Before Proposed Solution: 574/574/574/574 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 709/869/805/1031 MVA (SN/SE/WN/WE)

Project Cost: $3.25M

Projected In-Service: 11/15/2024

Supplemental Project ID: s3253.1



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

JCPL Transmission Zones M-3 Process
Greystone – Whippany 230 kV Misoperation Relays

Need Number: JCPL-2023-045

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace relaying and line trap at Greystone and Whippany substations.

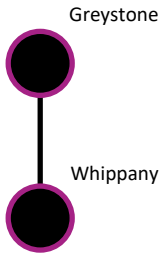
Transmission Line Ratings:

- Greystone – Whippany J1024 230 kV Line
  - Before Proposed Solution: 649/698/723/762 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 709/869/805/1031 MVA (SN/SE/WN/WE)

Project Cost: $2.75M

Projected In-Service: 12/31/2024

Supplemental Project ID: s3254.1



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

JCPL Transmission Zones M-3 Process
Freneau-Williams Gas-Parlin 230 kV Misoperation Relays

Need Number: JCPL-2023-048

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace relaying and limiting substation conductor at Freneau, Williams Gas and Parlin substations

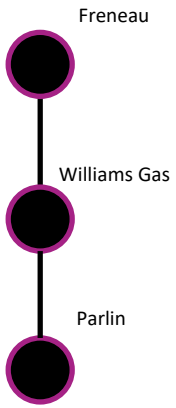
Transmission Line Ratings:

- Freneau-Williams Gas-Parlin K1025 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)

Project Cost: $4.1M

Projected In-Service: 05/30/2025

Supplemental Project ID: s3255.1



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
Gilbert Substation

Need Number: JCPL-2023-043

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/31/2023
Solution Meeting 12/05/2023

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

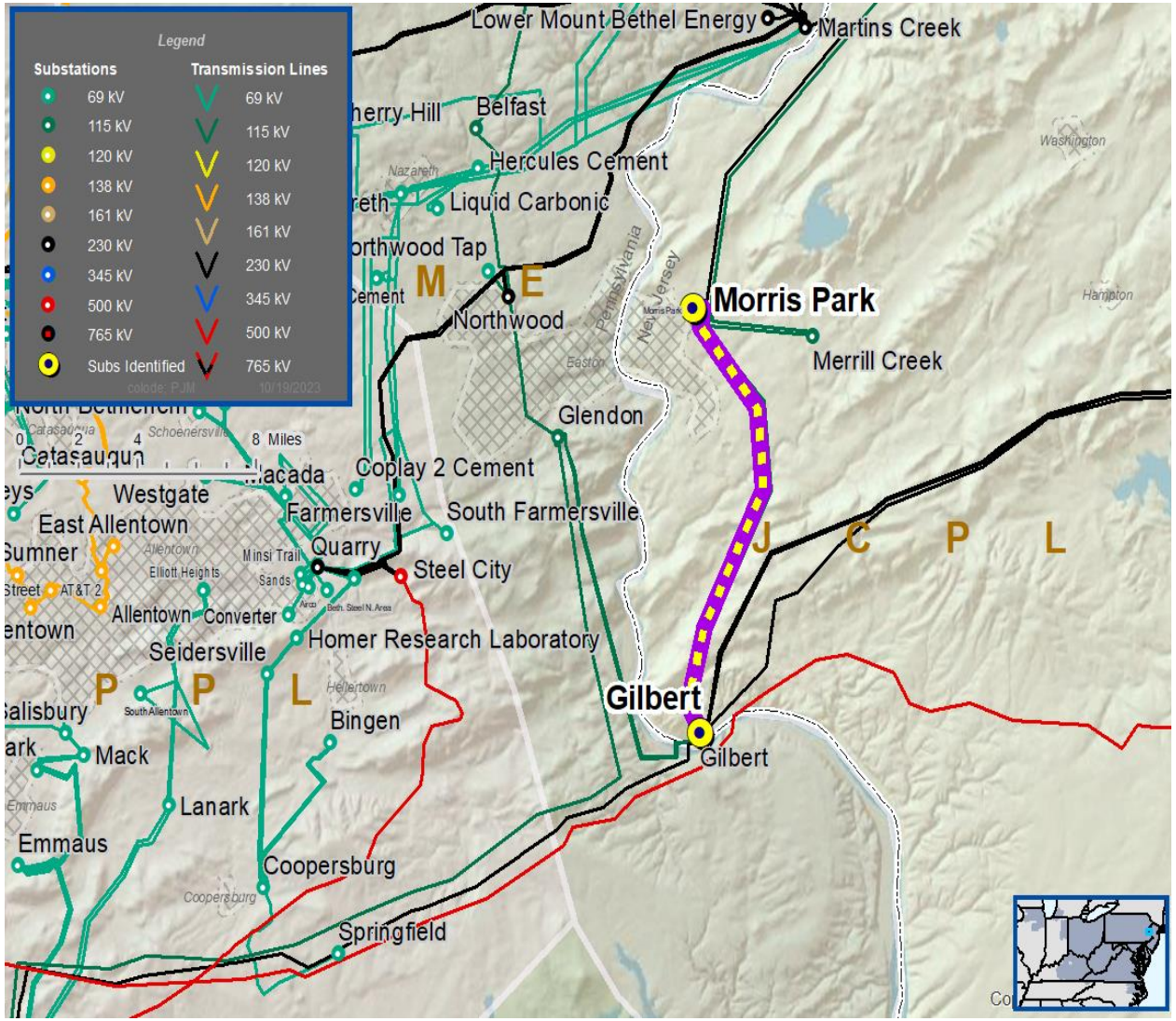
Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

Problem Statement:

- FirstEnergy has identified operational constraints when a single breaker is out of service for maintenance at Gilbert and substation on the Gilbert – Morris Park 230 kV P2016 line.
- The Gilbert – Morris Park 230 kV P2016 line is limited by terminal equipment:
  - Normal Ratings: 1306/1593/1593/1593 MVA (SN/SE/WN/WE)
  - Single Breaker Outage #1: 678/813/833/929 MVA (SN/SE/WN/WE)
  - Single Breaker Outage #2: 830/1000/1040/1171 MVA (SN/SE/WN/WE)



JCPL Transmission Zones M-3 Process
Gilbert Substation

Need Number: JCPL-2023-043

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace limiting substation equipment to meet or exceed the line (P2016) conductor rating at Gilbert substation:
  - Circuit breakers
  - Disconnect switches
  - Substation conductor

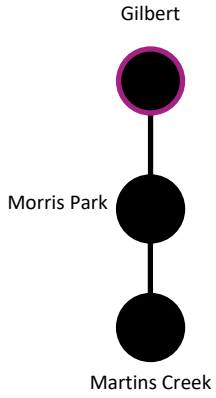
Transmission Line Ratings:

- Gilbert – Morris Park 230 kV Line
  - Before Proposed Solution:
    - Breaker Outage #1: 678/813/833/929 MVA (SN/SE/WN/WE)
    - Breaker Outage #2: 830/1000/1040/1171 MVA (SN/SE/WN/WE)
  - After Proposed Solution:
    - 1418/1739/1610/2062 MVA (SN/SE/WN/WE)

Project Cost: $2.4M

Projected In-Service: 05/30/2024

Supplemental Project ID: s3256.1



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
Gilbert and Glen Gardner Substations

Need Number: JCPL-2023-047

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/31/2023
Solution Meeting 12/05/2023

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

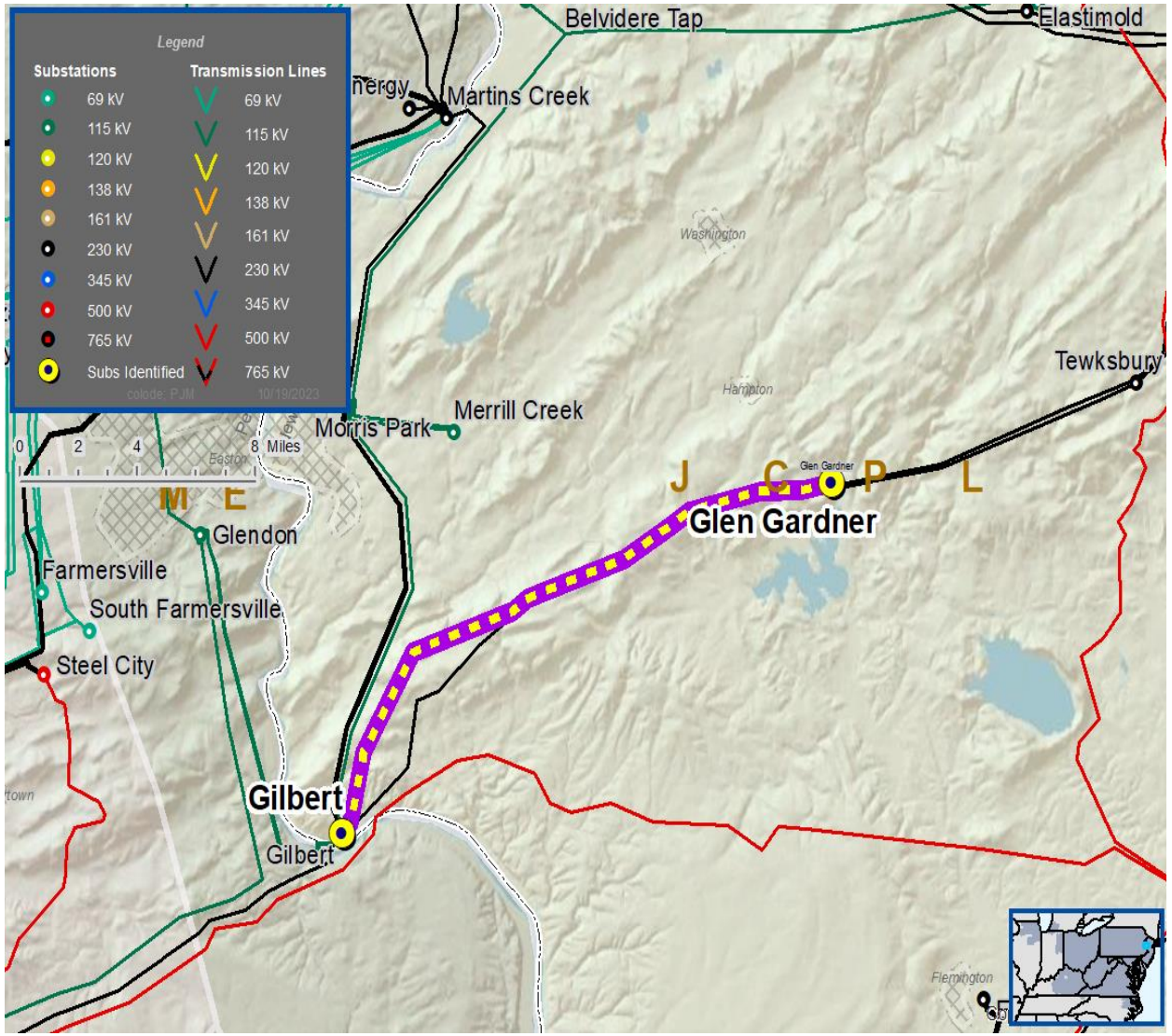
Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

Problem Statement:

- FirstEnergy has identified operational constraints when a single breaker is out of service for maintenance at Gilbert and Glen Gardner substations on the Gilbert - Glen Gardner 230 kV V1036 line.
- The Gilbert – Glen Gardner 230 kV V1036 line is limited by terminal equipment:
  - Normal Ratings: 913/1147/1139/1376 MVA (SN/SE/WN/WE)
  - Single Breaker Outage #1: 678/813/833/929 MVA (SN/SE/WN/WE)
  - Single Breaker Outage #2: 830/1000/1040/1171 MVA (SN/SE/WN/WE)
  - Single Breaker Outage #3 & #4: 909/1084/1119/1241 MVA (SN/SE/WN/WE)



JCPL Transmission Zones M-3 Process
Gilbert and Glen Gardner Substations

Need Number: JCPL-2023-047

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Selected Solution:

- Replace limiting substation equipment at Gilbert and Glen Gardner substations to meet or exceed the line (V1036) conductor rating:
  - Circuit breakers
  - Disconnect switches
  - Substation conductor

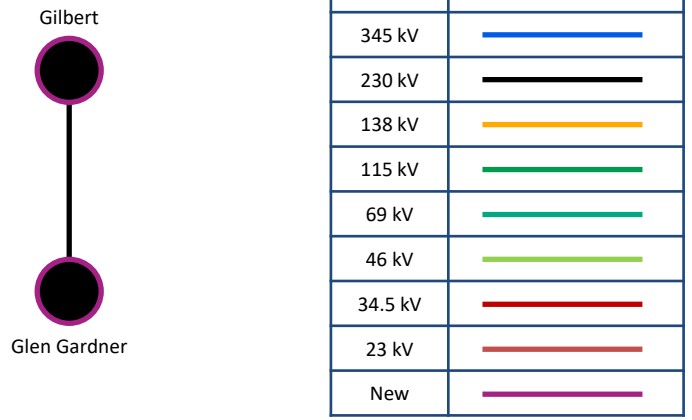
Transmission Line Ratings:

- Gilbert – Glen Gardner V1036 230 kV Line
  - Before Proposed Solution:
    - Breaker Outage #1: 678/813/833/929 MVA (SN/SE/WN/WE)
    - Breaker Outage #2: 830/1000/1040/1171 MVA (SN/SE/WN/WE)
    - Breaker Outage #3 & #4: 909/1084/1119/1241 MVA (SN/SE/WN/WE)
  - After Proposed Solution:
    - 1136/1311/1139/1379 MVA (SN/SE/WN/WE)

Project Cost: $5.2M

Projected In-Service: 04/04/2025

Supplemental Project ID: s3257.1



JCPL Transmission Zone M-3 Process
Montville Substation

Need Number: JCPL-2023-050

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/31/2023
Solution Meeting 02/06/2024

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

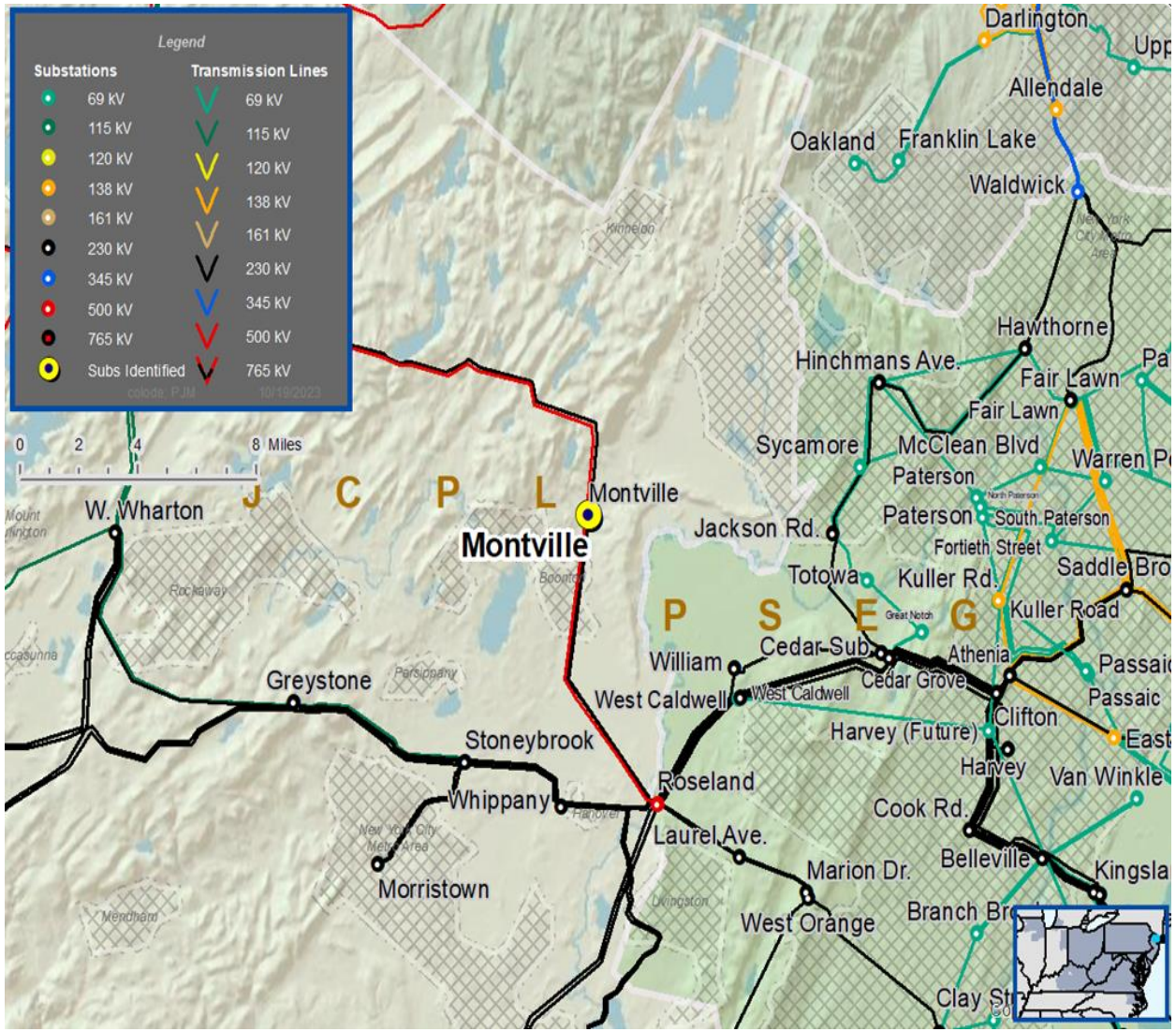
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The parallel 230-34.5 kV No. 3A and 3B Transformers at Montville Substation are approximately 55 and 60 years old, respectively, and are reaching end of life.
- Recent dissolved gas analysis (DGA) showed elevated Ethane gas levels compared to IEEE standards.
- Existing transformer ratings:
  - 175/194/200/220 MVA (SN/SLTE/WN/WLTE)



JCPL Transmission Zone M-3 Process
Montville Substation

Need Number: JCPL-2023-050

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace the 230-34.5 kV No. 3A and 3B transformers at Montville Substation with a single 168 MVA unit.
- Upgrade transformer relaying

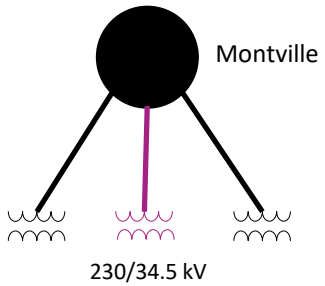
Transformer Ratings:

- Montville 230-34.5 kV No. 3A and 3B Transformer:
  - Before Proposed Solution: 175/194/200/220 MVA (SN/SLTE/WN/WLTE)
  - After Proposed Solution: 216/216/279/282 MVA (SN/SLTE/WN/WLTE)

Estimated Project Cost: $8.55M

Projected In-Service: 04/01/2026

Supplemental Project ID: s3258.1



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
New Customer Connection

Need Number: JCPL-2023-058

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 11/16/2023
Solution Meeting 01/18/2024

Project Driver:

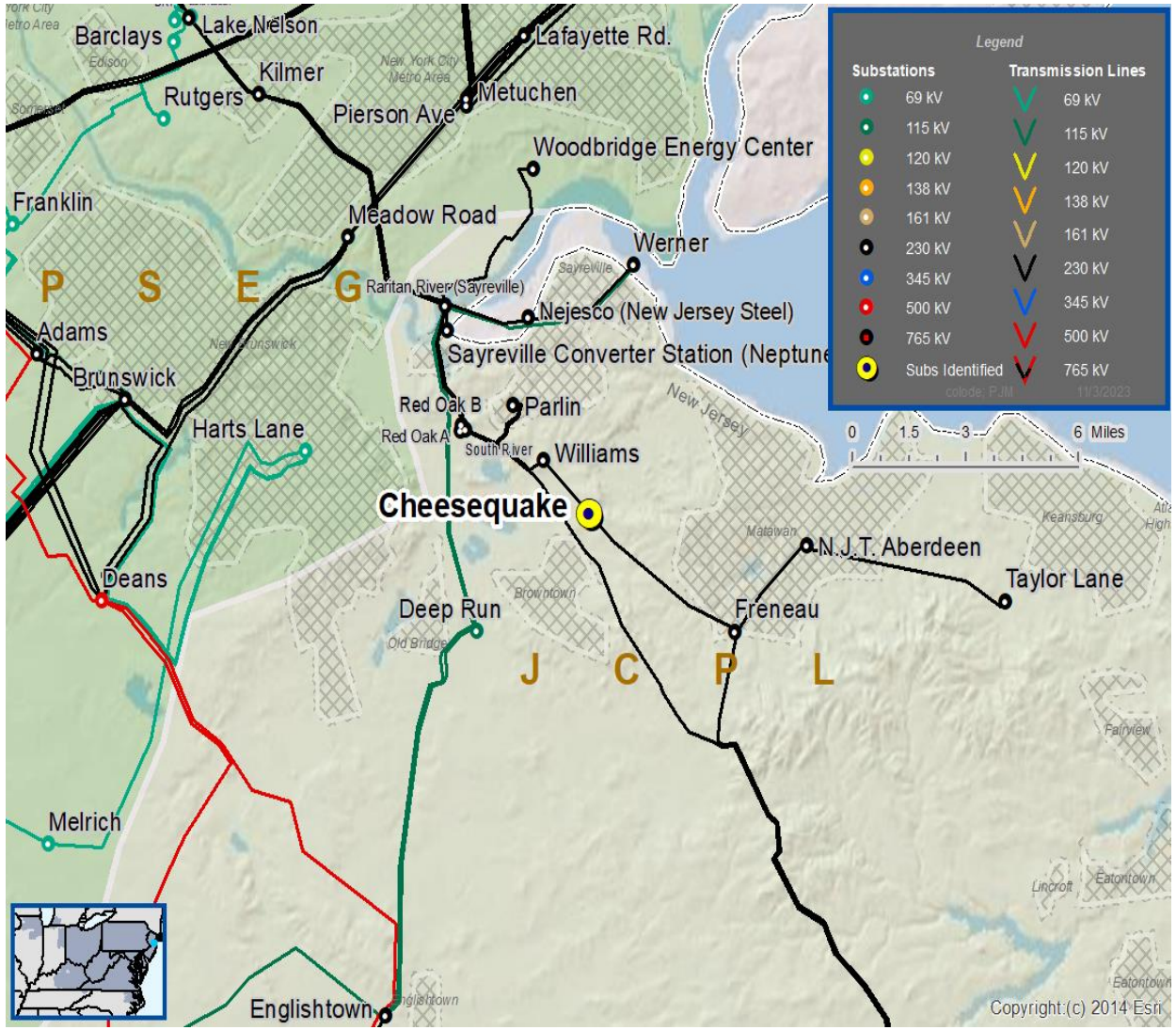
Customer Service

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 customer requested 34.5 kV service for load of approximately 14 MVA; location is near Cheesequake Substation.



JCPL Transmission Zone M-3 Process
New Customer Connection

Need Number: JCPL-2023-058

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Selected Solution:

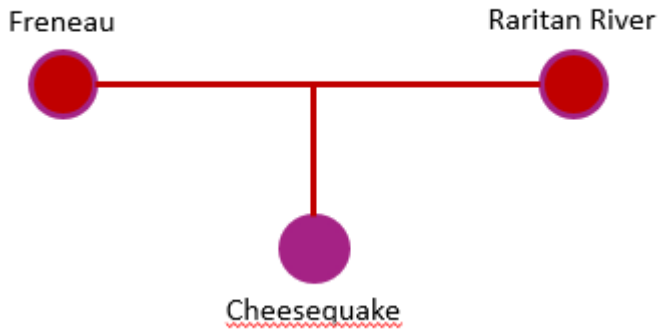
Tap the Freneau – Raritan River 34.5 kV Line at Cheesequake Substation

- Install one SCADA controlled line switch toward Freneau Substation and build approximately one to two spans toward Cheesequake Substation and install one SCADA controlled tap switch
- Install 34.5 kV revenue metering equipment
- Modify relay schemes/settings at terminal stations

Estimated Project Cost: $1.3M

Projected In-Service: 06/01/2024

Supplemental Project ID: s3259.1



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
Raritan River Substation

Need Number: JCPL-2023-060

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 12/05/2023
Solution Meeting 01/09/2024

Project Driver:
Equipment Material Condition, Performance and Risk

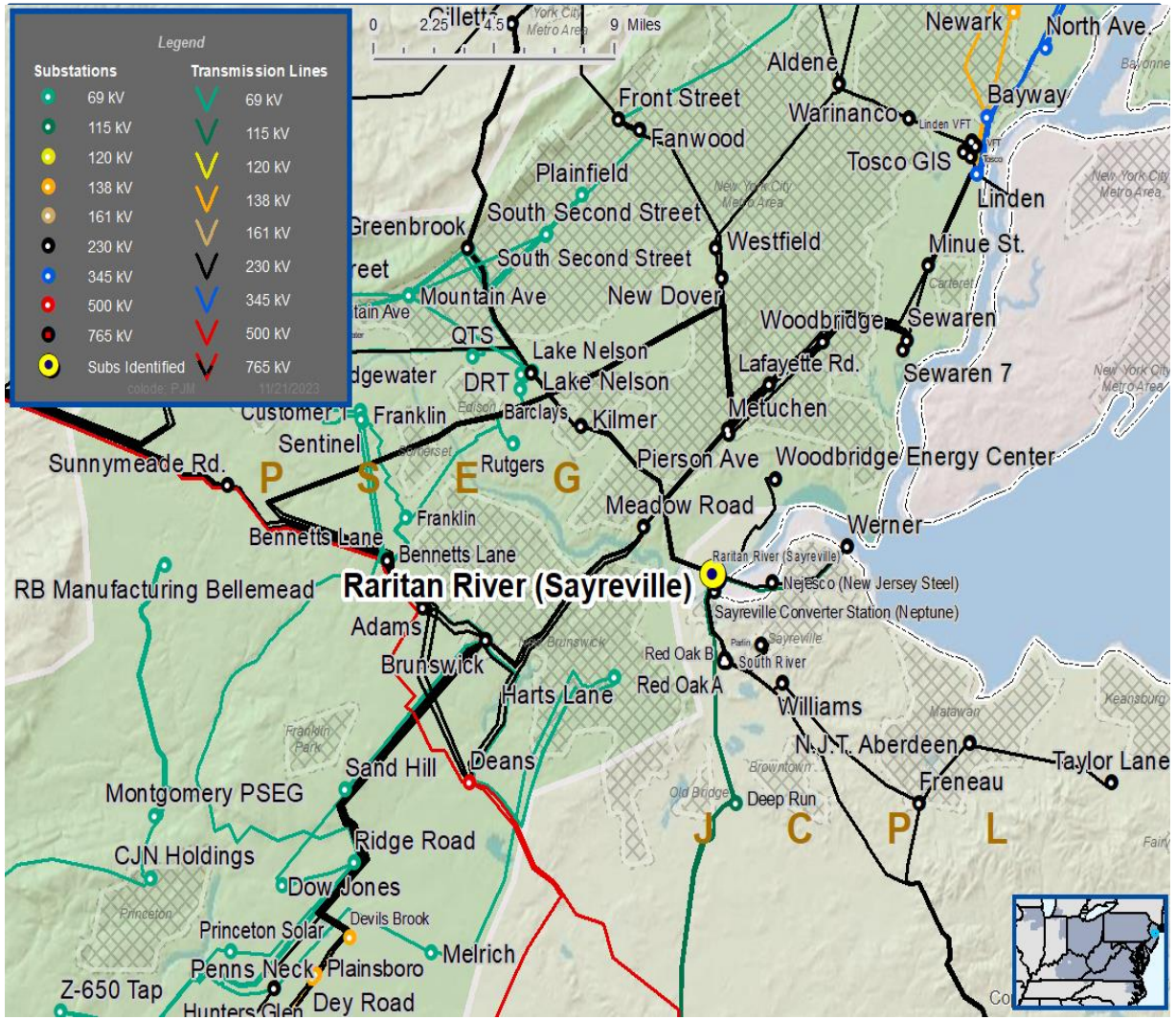
Specific Assumption References:
System Performance Projects Global Factors

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

Add/Replace Transformers
Past System Reliability/Performance

Problem Statement:

- The 230/115 kV No. 13 Transformer at Raritan River Substation was manufactured over 60 years ago and is reaching end of life.
- The transformer has exhibited heavy oil leaks that have been difficult to repair due to the condition of the transformer.
- The transformers measured dielectric strength is below acceptable IEEE limits.
- Incidental oil leaks at end-of-life period along with current dielectric strength greatly increases risk of failure.
- Existing transformer ratings:
  - 256/323/324/361 MVA (SN/SSTE/WN/WSTE)



JCPL Transmission Zone M-3 Process
Raritan River Substation

Need Number: JCPL-2023-060

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Selected Solution:

- Replace the 230-115 kV No. 13 Transformer at Raritan River Substation with a 224 MVA unit.
- Replace high side switch with a circuit breaker
- Upgrade transformer relaying

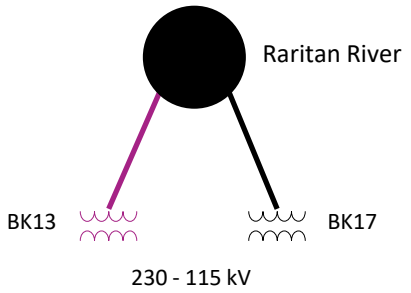
Transformer Ratings:

- Raritan River 230-115 kV No. 13 Transformer:
  - Before Proposed Solution: 256/323/324/361 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution: 280/334/354/390 MVA (SN/SSTE/WN/WSTE)

Estimated Project Cost: $5.4M

Projected In-Service: 06/30/2026

Supplemental Project ID: s3260.1



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
Middlesex 230 kV Switching Station

Need Number: JCPL-2023-062

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 12/05/2023

Solution Meeting 02/06/2024

Project Driver:

System Performance and Operational Flexibility

Specific Assumption Reference:

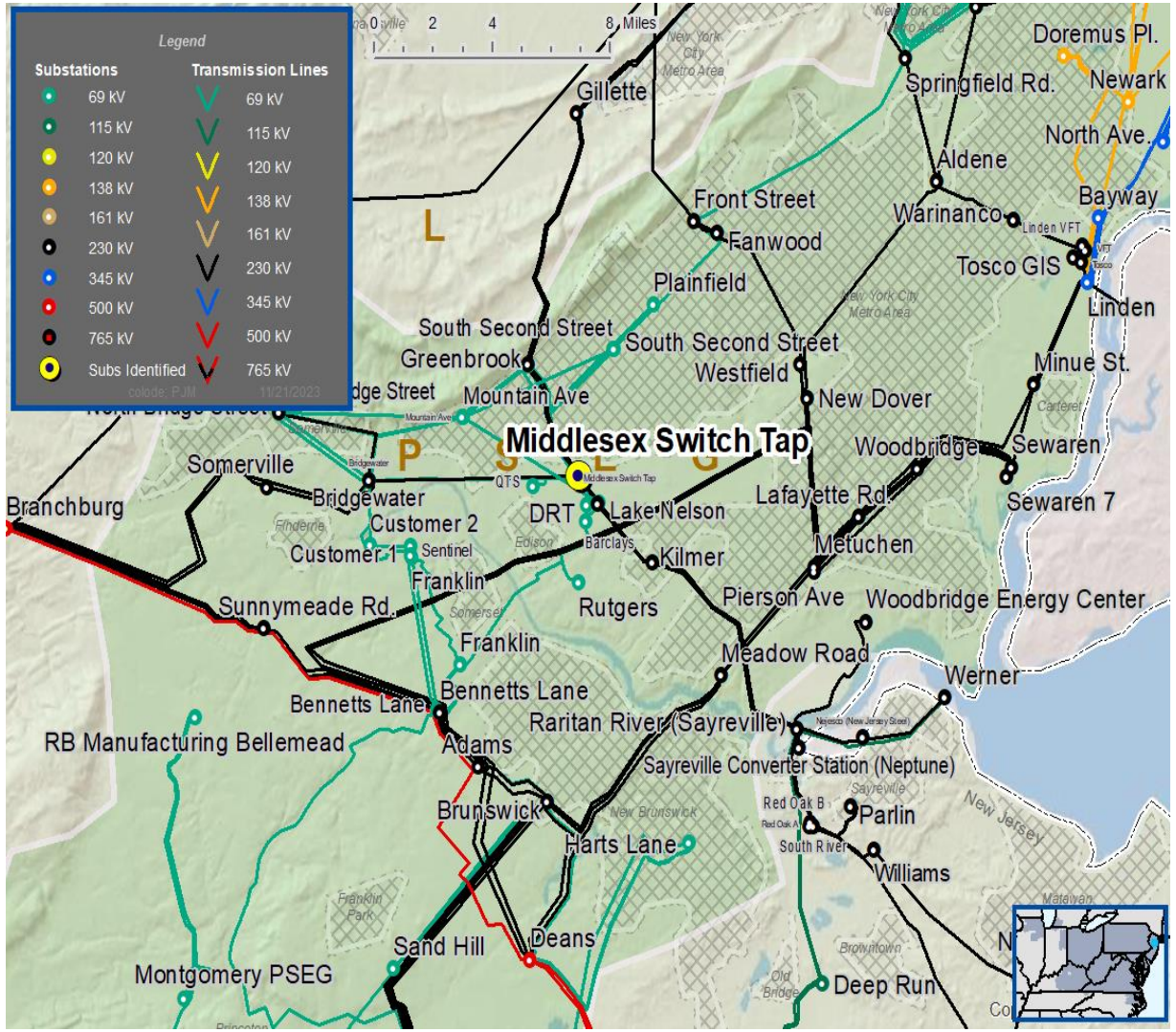
- System reliability and performance
- Add/Expand Bus Configuration
- Loss of substation bus adversely impacts transmission system performance
- Eliminate simultaneous outages to multiple networked elements
- Capability to perform substation maintenance

Problem Statement:

– The current configuration of the I1023 Line is a three-terminal line with terminals at Lake Nelson (PSEG), Bridgewater (PSEG), and Gillette substations.

– The Middlesex Switching Station serves as the connection point to the rest of the I1023 Line for the Bridgewater section. The I1023 Line is one of only a few lines that interconnect the Jersey North and Jersey Central regions.

– Over the past five years, the Gillette-Lake Nelson-Bridgewater I1023 230 kV Line experienced two unscheduled outages



JCPL Transmission Zone M-3 Process
Middlesex 230 kV Switching Station

Need Number: JCPL-2023-062

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Selected Solution:

- Convert the existing Middlesex 230 kV Switching Station to a three (3) breaker ring bus.
- Upgrade limiting switches and TL drops at the Middlesex 230 kV Switching Station.

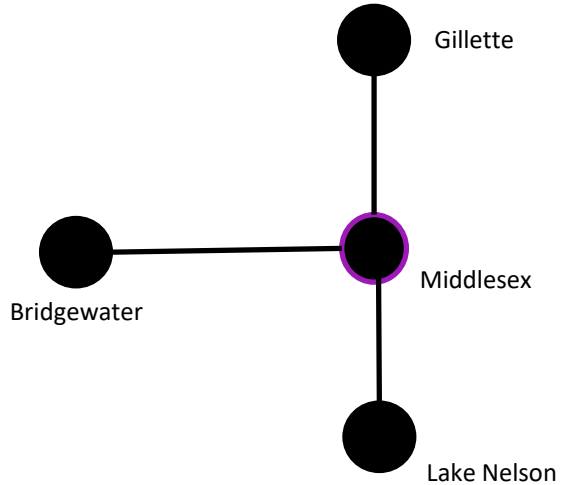
Transmission Line Ratings:

- Bridgewater(PSEG) - Middlesex 230 kV Line:
  - Before Proposed Solution: 709/ 819 / 797 / 819 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 732 / 887 / 823 / 980 MVA (SN/SE/WN/WE)
- Lake Nelson(PSEG) – Middlesex 230 kV Line:
  - Before Proposed Solution: 709/ 819 / 797 / 819 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 709 / 869 / 805 / 1031 MVA (SN/SE/WN/WE)
- Gillette – Middlesex 230 kV line section:
  - Before Proposed Solution: 709/ 819 / 797/ 819 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 709 / 869 / 805/ 1031 MVA (SN/SE/WN/WE)

Estimated Project Cost: $8.85M

Projected In-Service: 6/1/2026

Supplemental Project ID: s3261.1



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
East Windsor Substation

Need Number: JCPL-2023-064

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 12/05/2023
Solution Meeting 02/06/2024

Project Driver:

Operational Flexibility and Efficiency

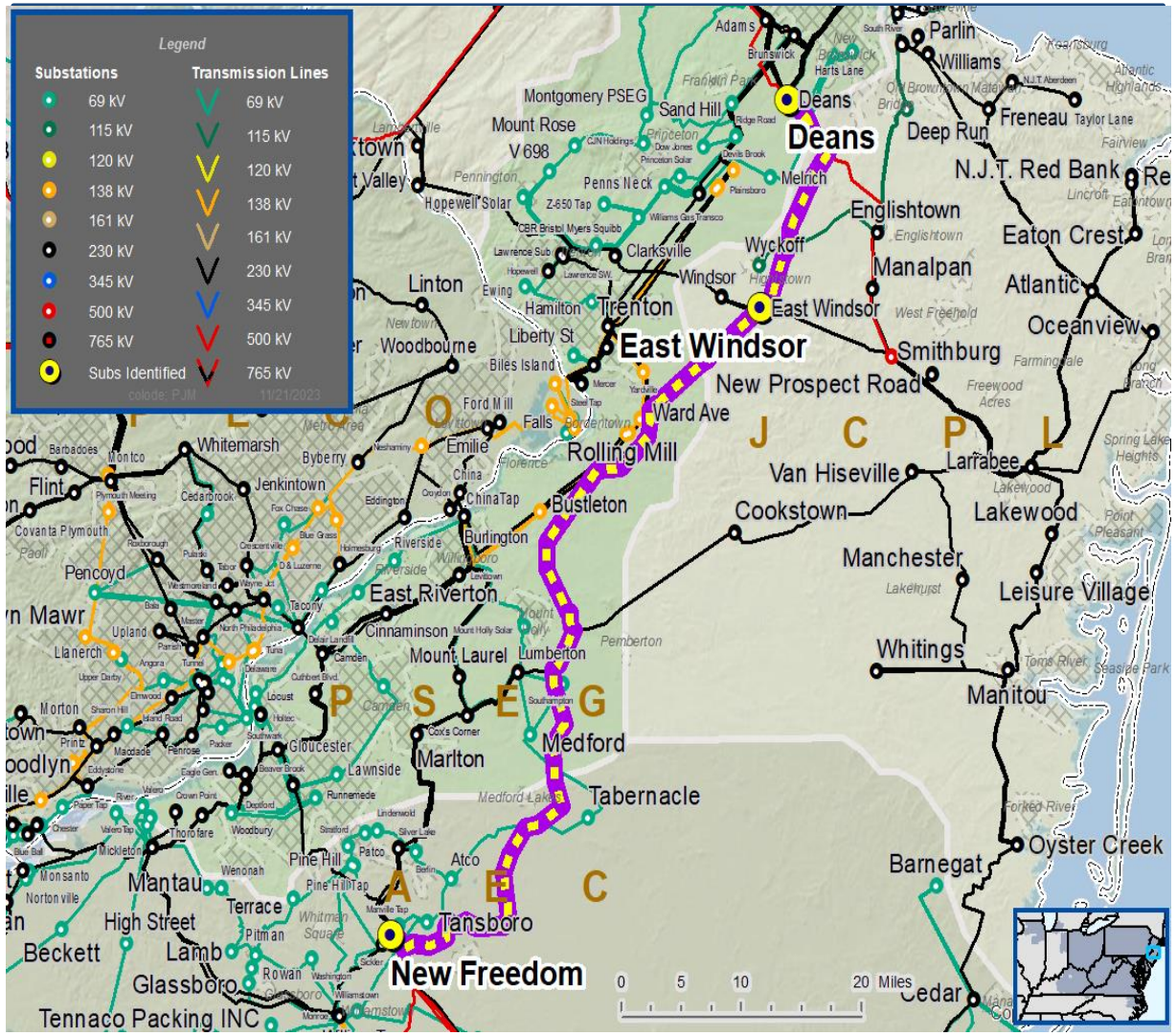
Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

Problem Statement:

- PSEG has identified a need (PSEG-2023-0013) at New Freedom and Deans substations to upgrade communication on the following lines:
  - Deans – East Windsor 500 kV 5022 Line
  - New Freedom – East Windsor 500 kV 5038 Line
- Existing communication equipment at East Windsor Substation is currently PLC.
- Transmission line ratings are limited by communication equipment.



JCPL Transmission Zone M-3 Process
East Windsor Substation

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Need Number	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
JCPL-2023-064	East Windsor – New Freedom 5038 500 kV Line East Windsor – Deans 5022 500 kV Line	2644 / 2844 2644 / 2844	2940 / 3733 2940 / 3733

JCPL Transmission Zone M-3 Process
East Windsor Substation

Need Number: JCPL-2023-064

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Upgrade communication equipment from PLC to fiber at East Windsor Substation on the 5022 and 5038 500 kV lines
  - Retire line traps, tuners and carrier equipment
  - Replace static wire
  - Replace line relays

Transmission Line Ratings:

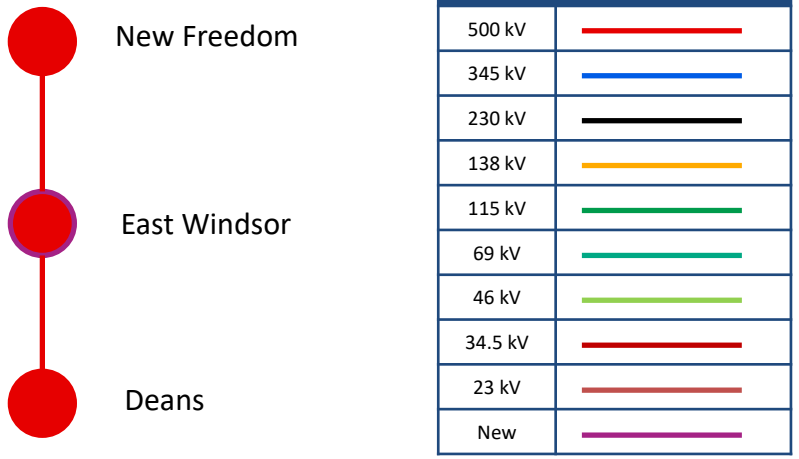
- East Windsor – Deans 5022 500 kV Line:
  - Before Proposed Solution: 2644/2844/2946/3106 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 2940/3733/3618/4424 MVA (SN/SE/WN/WE)

- East Windsor – New Freedom 5038 500 kV Line:
  - Before Proposed Solution: 2644/2844/2917/3106 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 2940/3386/3478/3827 MVA (SN/SE/WN/WE)

Project Cost: $2.00M

Projected In-Service: 12/2025 (East Windsor – Deans 5022 500 kV Line)
6/2027 (East Windsor – New Freedom 5038 500 kV Line)

Supplemental Project ID: s3262.1



JCPL Transmission Zone M-3 Process Misoperation Relay Project

Need Number: JCPL-2023-046

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/31/2023
Solution Meeting 01/09/2024

Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption References:
Global Factors

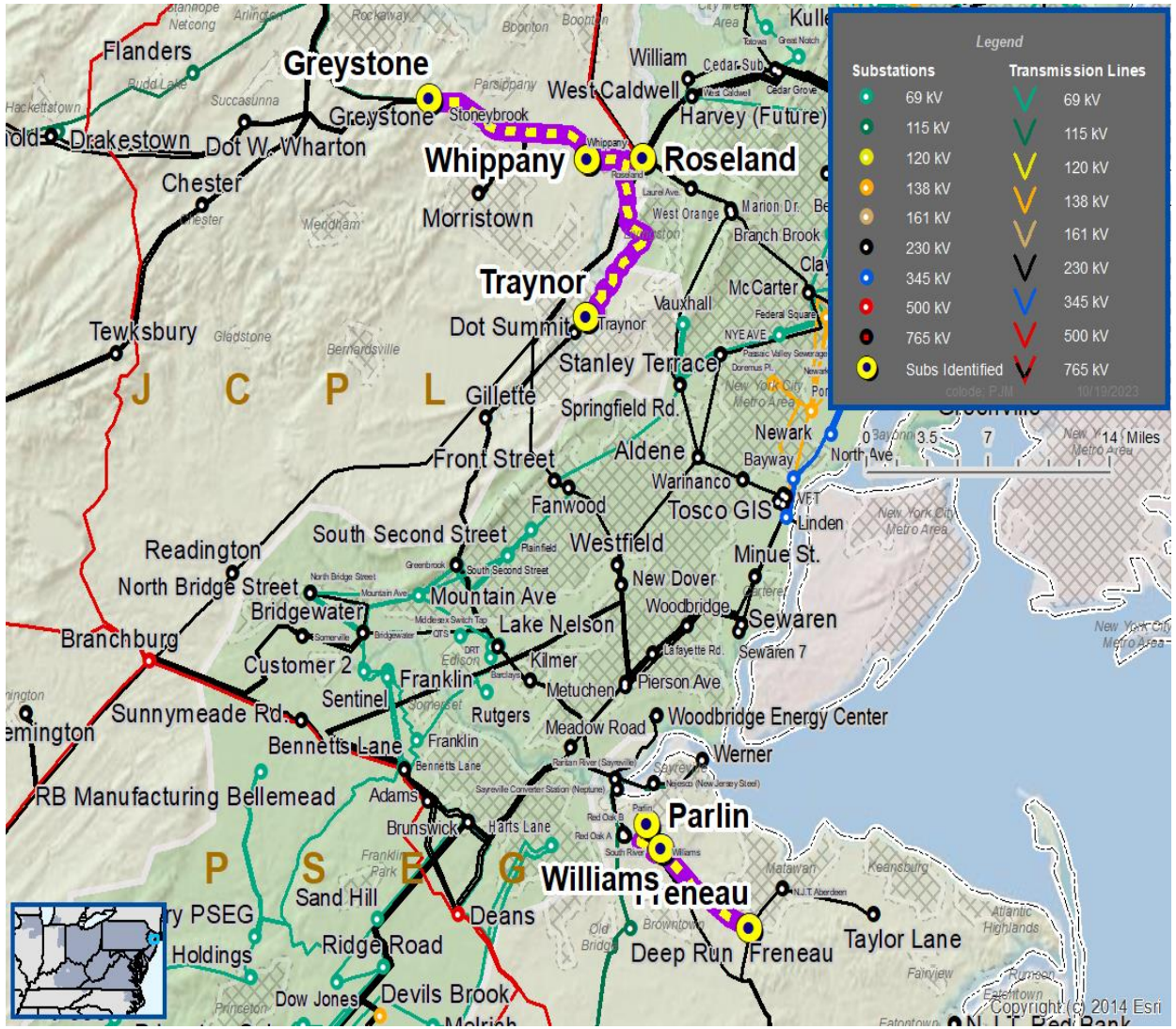
- System reliability and performance
- Substation / line equipment limits

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.



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-2023-046	Roseland – Whippany 230 kV A941 Line	1306 / 1697 / 1610 / 1905	2228 / 2570 / 2232 / 2704

JCPL Transmission Zone M-3 Process Misoperation Relay Project

Need Number: JCPL-2023-046

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Selected Solution:

- Replace relaying and limiting substation conductor at Whippany Substation.

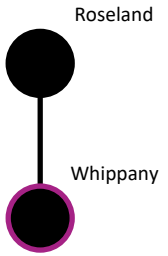
Transmission Line Ratings:

- Roseland – Whippany A941 230 kV Line
  - Before Proposed Solution: 1306/1697/1610/1905 MVA (SN/SE/WN/WE)
  - After Proposed Solution: 1593/1850/1789/1994 MVA (SN/SE/WN/WE)

Estimated Project Cost: $2.33M

Projected In-Service: 5/30/2025

Supplemental Project ID: s3272.1



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
Kittatinny Substation

Need Number: JCPL-2023-049

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/31/2023

Solution Meeting 01/09/2024

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

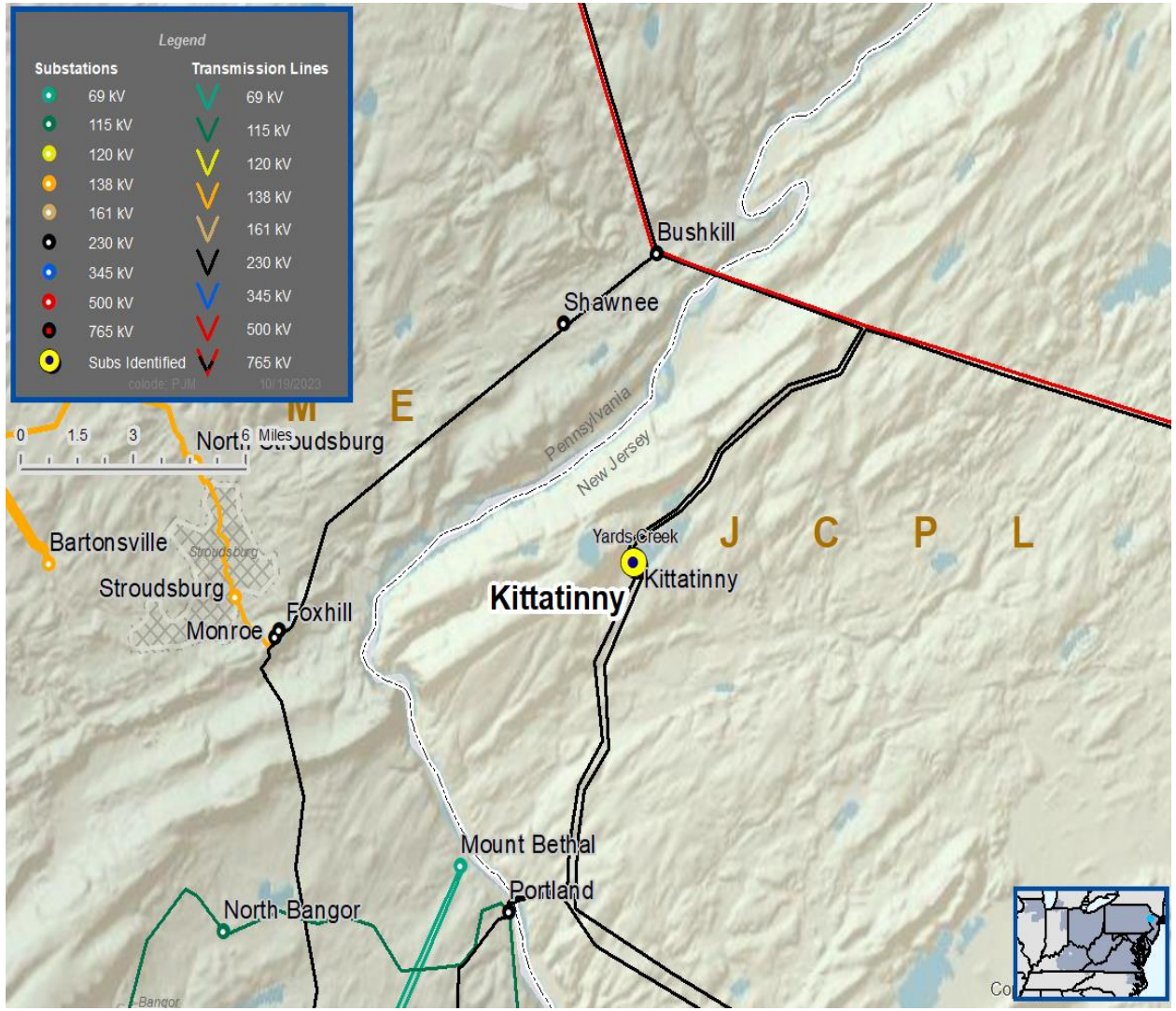
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The 230-34.5 kV No. 1 Transformer at Kittatinny is approximately 60 years old and is reaching end of life.
- Recent dissolved gas analysis (DGA) showed elevated Ethane gas levels compared to IEEE standards.
- Carbon oxide gas production also suggests thermal stressing of paper insulation.
- Existing transformer ratings:
  - 60/63/76/77 MVA (SN/SLTE/WN/WLTE)



JCPL Transmission Zone M-3 Process
Kittatinny Substation

Need Number: JCPL-2023-049

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace the 230-34.5 kV No. 1 Transformer at Kittatinny Substation with a 90 MVA unit.
- Replace high side switch with a circuit breaker.
- Upgrade transformer relaying

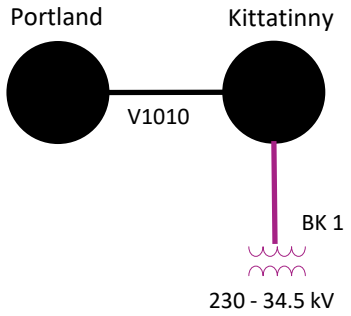
Transformer Ratings:

- Kittatinny 230-34.5 kV No. 1 Transformer:
  - Before Proposed Solution: 60/63/76/77 MVA (SN/SLTE/WN/WLTE)
  - After Proposed Solution: 123/142/148/166 MVA (SN/SE/WN/WLTE)

Estimated Project Cost: $7.0M

Projected In-Service: 12/31/2024

Supplemental Project ID: s3273.1



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
East Flemington Substation

Need Number: JCPL-2023-051

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/31/2023
Solution Meeting 01/09/2023

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

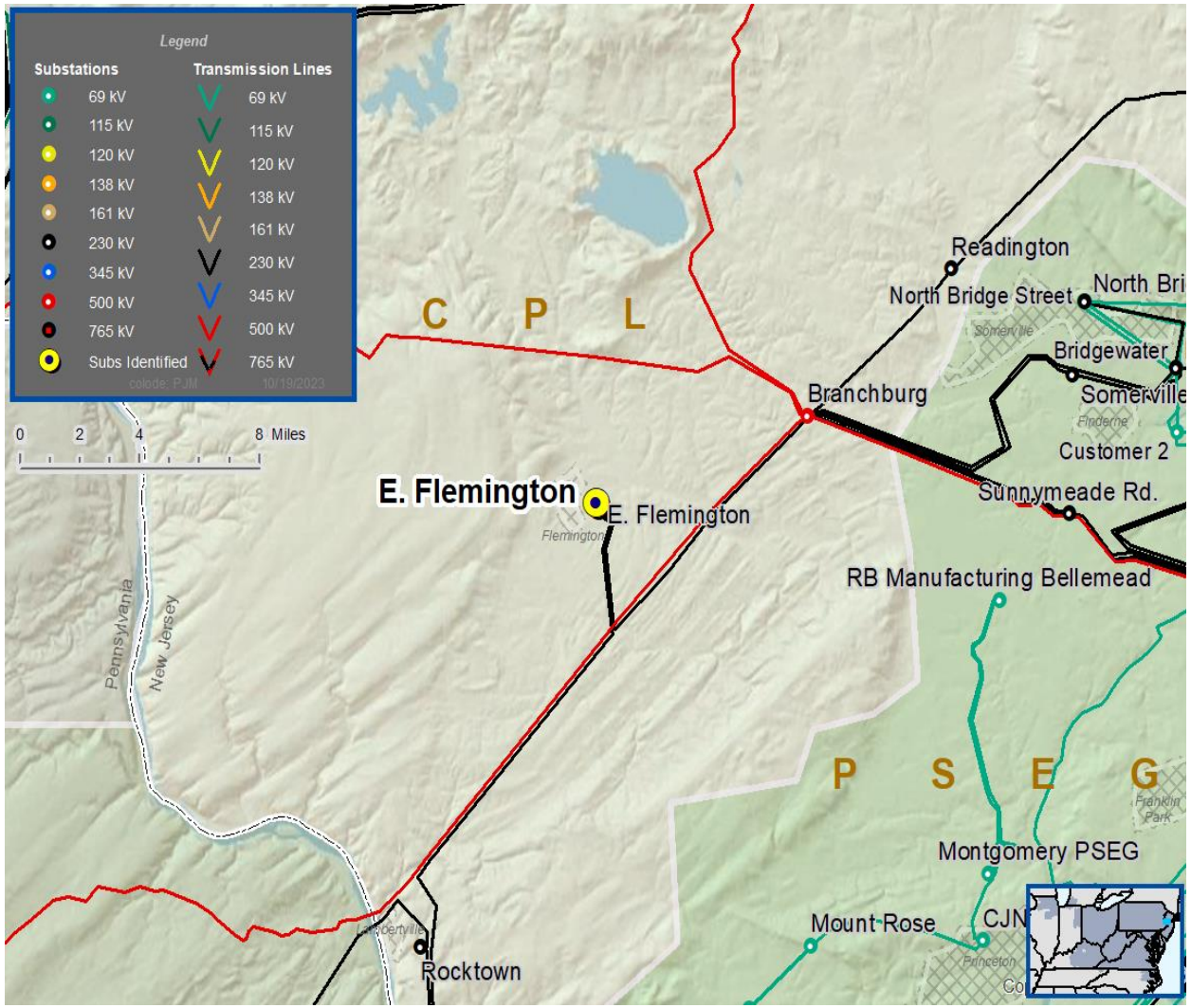
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The 230-34.5 kV No. 3 Transformer at East Flemington is approximately 45 years old and is reaching end of life.
- Recent dissolved gas analysis (DGA) showed elevated Ethane gas levels compared to IEEE standards.
- Existing transformer ratings:
  - 77/81/97/99 MVA (SN/SLTE/WN/WLTE)



JCPL Transmission Zone M-3 Process
East Flemington Substation

Need Number: JCPL-2023-051

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace the 230-34.5 kV No. 3 Transformer at East Flemington Substation with a 125 MVA unit.
- Install a 34.5 kV breaker with SCADA control
- Upgrade transformer relaying

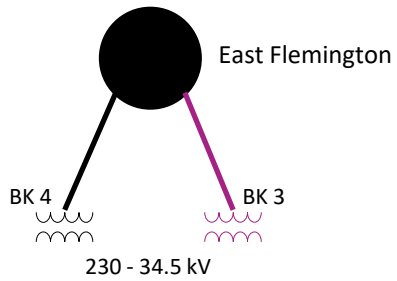
Transformer Ratings:

- East Flemington 230-34.5 kV No. 3 Transformer:
  - Before Proposed Solution: 77/81/97/99 MVA (SN/SLTE/WN/WLTE)
  - After Proposed Solution: 162/169/209/214 MVA (SN/SE/WN/WLTE)

Estimated Project Cost: $7.18M

Projected In-Service: 12/31/2026

Supplemental Project ID: s3274.1



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
East Flemington Substation

Need Number: JCPL-2023-052

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 10/31/2023

Solution Meeting 01/09/2024

Project Driver:

Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

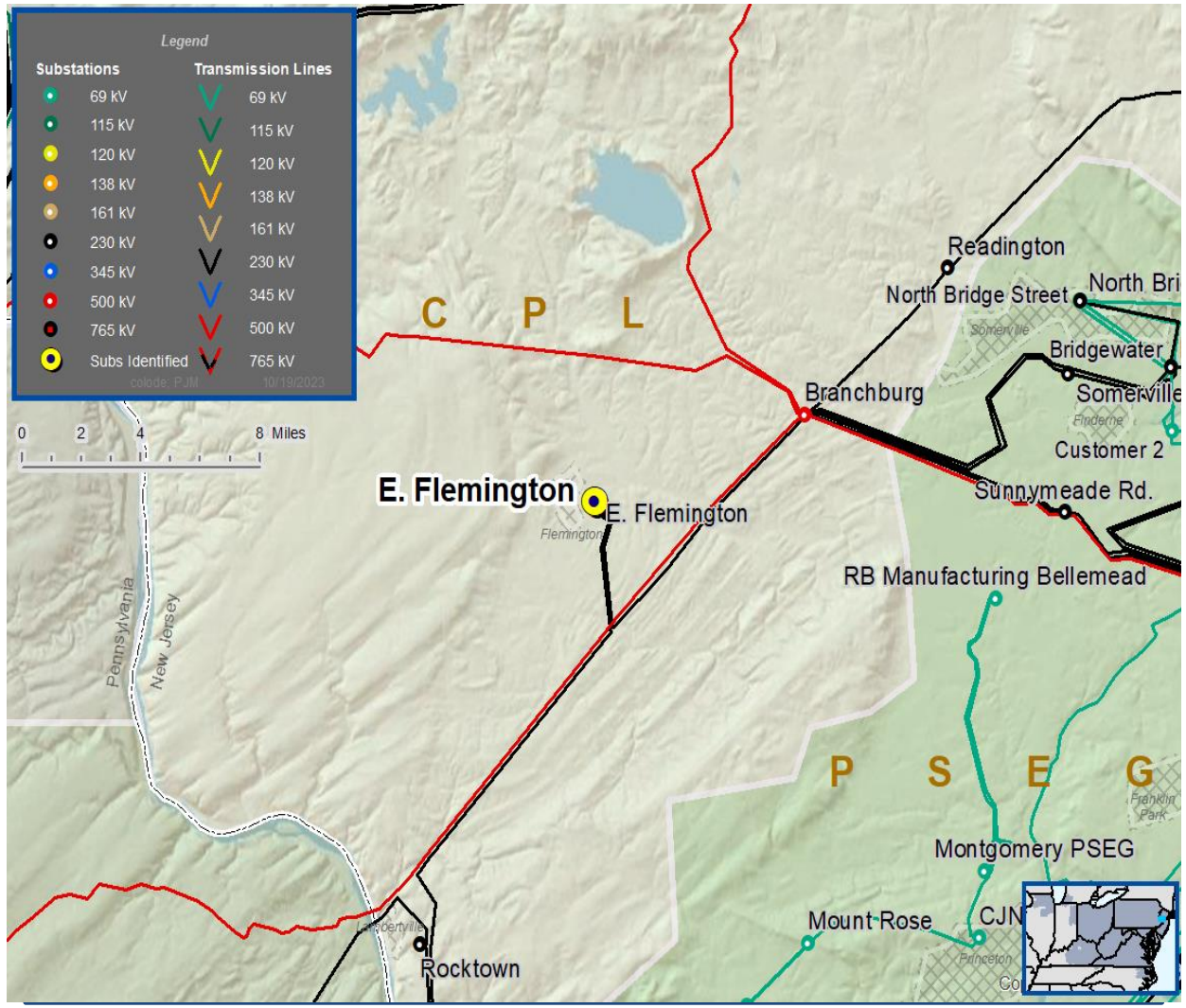
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The 230-34.5 kV No. 4 Transformer at East Flemington is approximately 45 years old and is reaching end of life.
- In recent months, the transformer exhibited oil leaks that needed repaired. Incidental oil leaks at end-of-life period increases risk of failure.
- Existing transformer ratings:
  - 76/81/97/99 MVA (SN/SLTE/WN/WLTE)



JCPL Transmission Zone M-3 Process
East Flemington Substation

Need Number: JCPL-2023-052

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace the 230-34.5 kV No. 4 Transformer at East Flemington Substation with a 125 MVA unit.
- Install a 34.5 kV breaker with SCADA control
- Upgrade transformer relaying

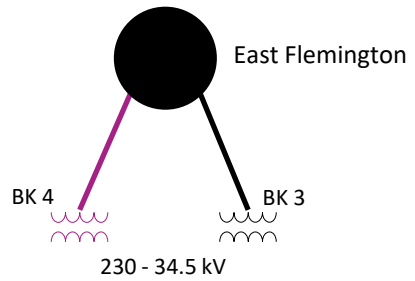
Transformer Ratings:

- East Flemington 230-34.5 kV No. 4 Transformer:
  - Before Proposed Solution: 76/81/97/99 MVA (SN/SLTE/WN/WLTE)
  - After Proposed Solution: 162/169/209/214 MVA (SN/SE/WN/WLTE)

Estimated Project Cost: $7.18M

Projected In-Service: 12/31/2027

Supplemental Project ID: s3275.1



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
Raritan River – Werner (D30) 115 kV Customer Connection

Need Number: JCPL-2023-004

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting - 6/15/2023

Solution Meeting – 02/15/2024

Project Driver(s):

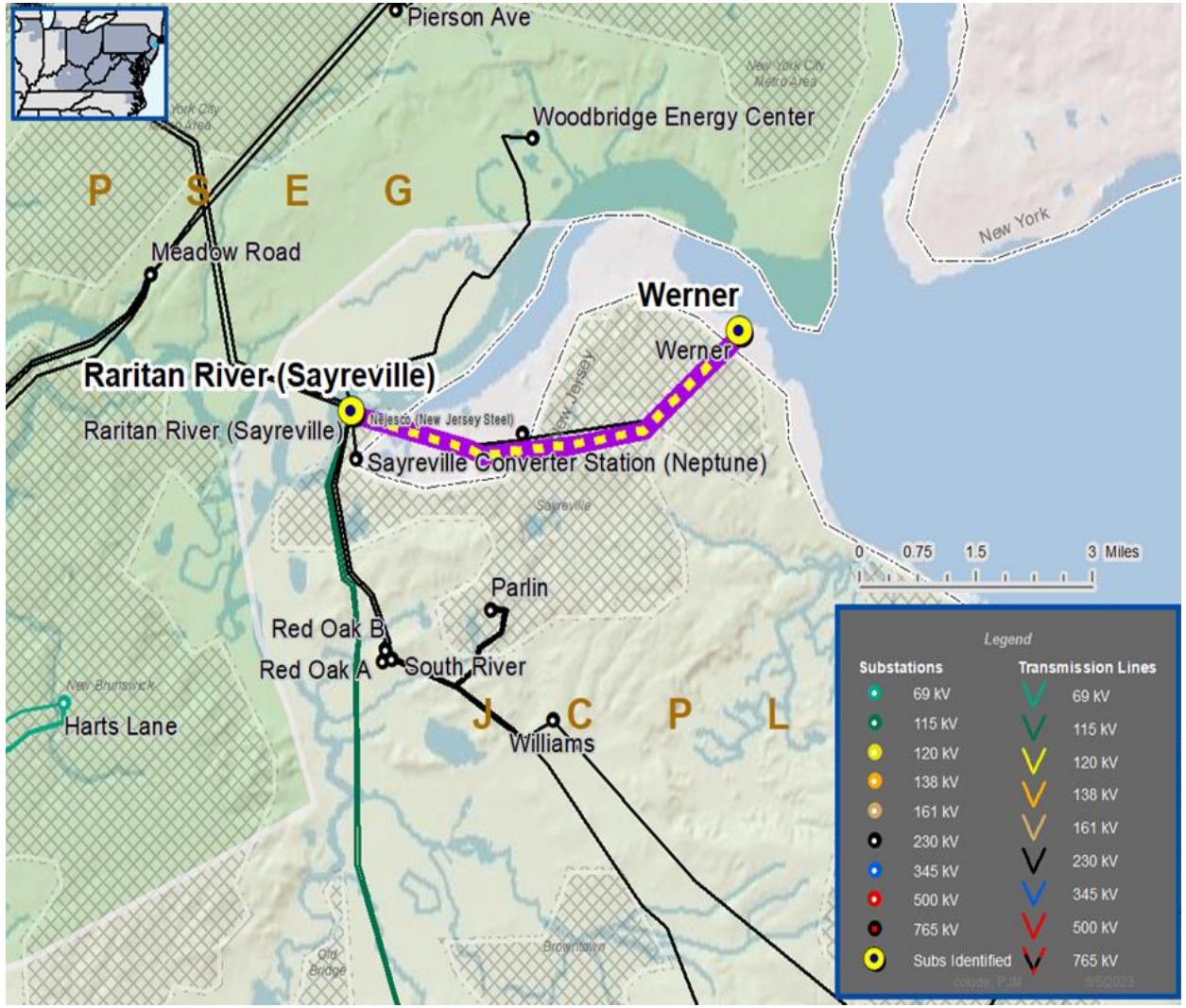
Customer Service

Specific Assumption Reference(s):

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

Problem Statement:

New Customer Connection – A customer requested a delivery point for approximately 22 MVA of capacity; location is near the Raritan River – Werner D30 115 kV Line.



JCPL Transmission Zone M-3 Process
Raritan River – Werner (D30) 115 kV Customer Connection

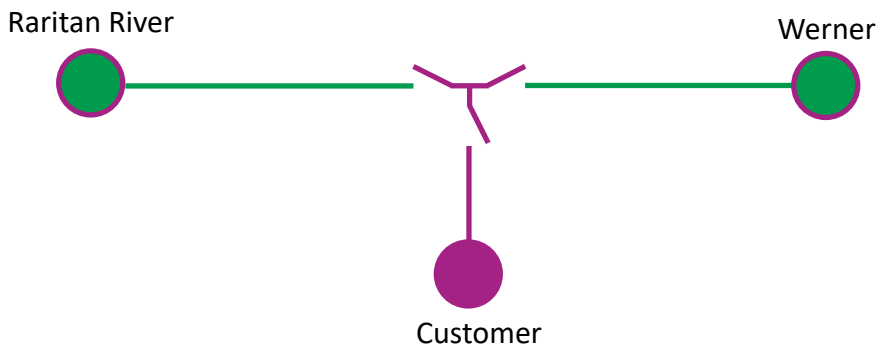
Need Number: JCPL-2023-004

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

Raritan River – Werner (D30) 115 kV Line:

- Construct approximately 1.5 miles of new 115 kV transmission line from the tap point to the customer's substation.
- Install two main line switches and one tap switch. Switches to be SCADA controlled.
- Modify relay settings at Raritan River Substation and Werner Substation.



Estimated Project Cost: $5.8M

Projected In-Service: 10/15/2025

Supplemental Project ID: s3280.1

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
EH Werner Substation

Need Number: JCPL-2023-037

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 11/16/2023

Solution Meeting 02/15/2024

Project Driver:

Equipment Material Condition, Performance and Risk
Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

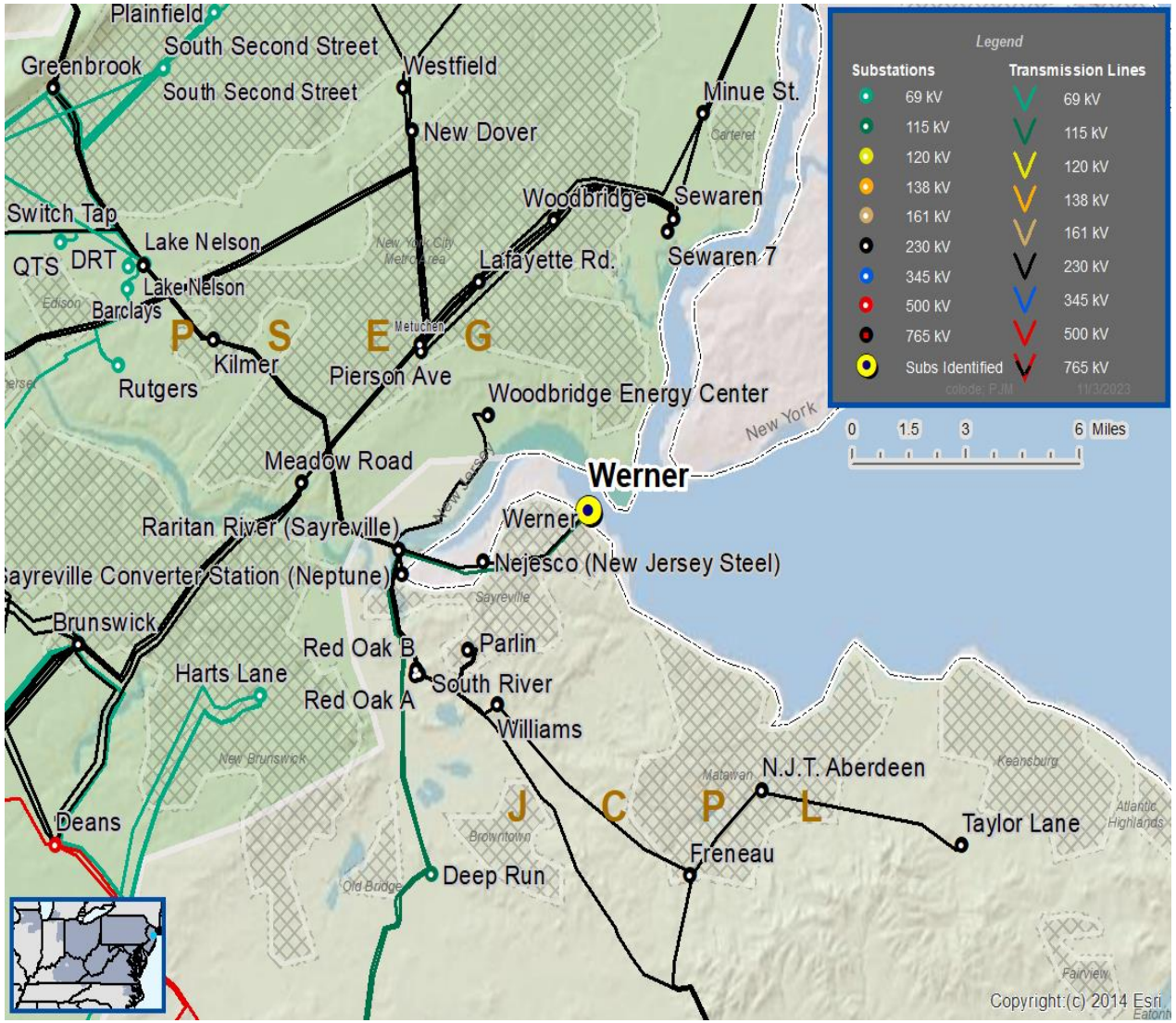
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The 115-34.5 kV No. 12 Transformer at Werner Substation was manufactured approximately 60 years ago and is approaching end of life.
  - 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:
  - 92/120/121/132 MVA (SN/SSTE/WN/WSTE)



JCPL Transmission Zone M-3 Process
EH Werner Substation

Need Number: JCPL-2023-037

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace the 115-34.5 kV No. 12 Transformer at EH Werner Substation with a 125 MVA unit.
- Upgrade transformer relaying.

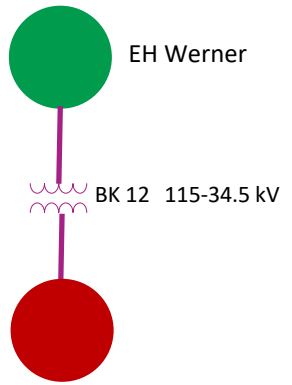
Transformer Ratings:

- EH Werner 115-34.5 kV No. 12 Transformer:
  - Before Proposed Solution: 92/120/121/132 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution: 148/158/190/192 MVA (SN/SSTE/WN/WSTE)

Estimated Project Cost: $6.4M

Projected In-Service: 12/31/2024

Supplemental Project ID: s3281.1



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
Pequest River Substation

Need Number: JCPL-2023-055

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 11/16/2023
Solution Meeting 02/15/2024

Project Driver:

Equipment Material Condition, Performance and Risk
Operational Flexibility and Efficiency

Specific Assumption Reference:

System Performance Projects Global Factors

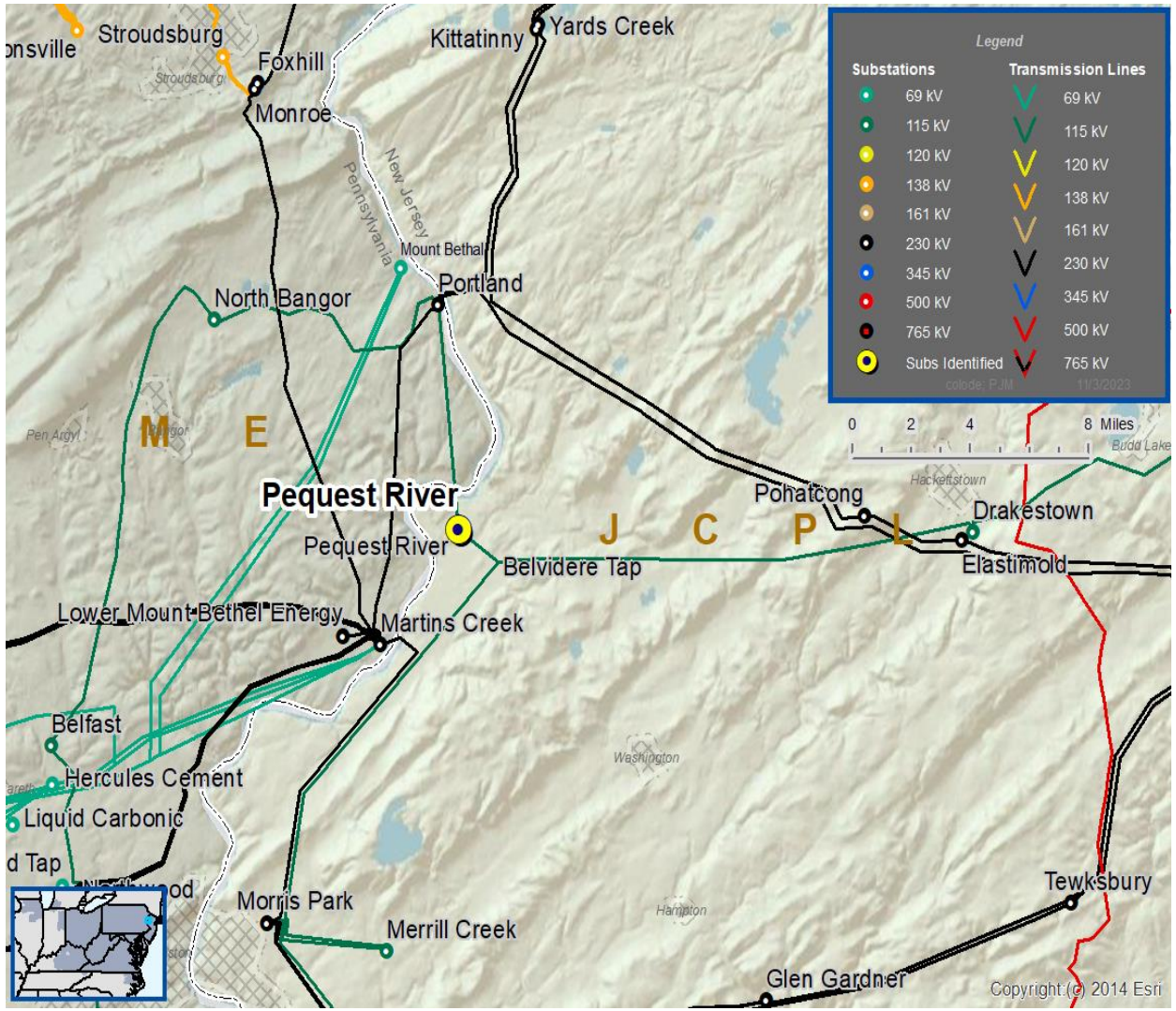
- System reliability and performance
- Reliability of Non-Bulk Electric System (Non-BES) Facilities

Add/Replace Transformers

Past System Reliability/Performance

Problem Statement:

- The 115-34.5 kV No. 2 Transformer at Pequest River Substation was manufactured approximately 50 years ago and is approaching end of life.
  - Most recent DGA results showed elevated ethane gas levels compared with IEEE Standards
- Existing Transformer Ratings:
  - 65/69 MVA (SN/SSTE)



JCPL Transmission Zone M-3 Process
Pequest River Substation

Need Number: JCPL-2023-055

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan
6/24/2024

Selected Solution:

- Replace the 115-34.5 kV No. 2 Transformer at Pequest River with a 90 MVA unit.
- Upgrade transformer relaying.

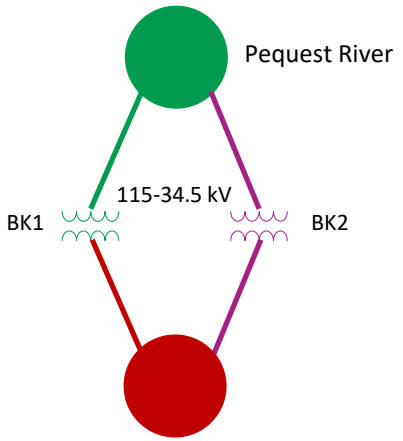
Transformer Ratings:

- Pequest River 115-34.5 kV No. 2 Transformer:
  - Before Proposed Solution: 65/69/82/94 MVA (SN/SSTE/WN/WSTE)
  - After Proposed Solution: 137/172/168/175 MVA (SN/SSTE/WN/WSTE)

Estimated Project Cost: $4.23M

Projected In-Service: 5/1/2025

Supplemental Project ID: s3283.1



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
Vermont Ave 34.5 kV Customer Connection

Need Number: JCPL-2023-059

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting – 11/16/2023

Solution Meeting – 02/15/2024

Project Driver(s):

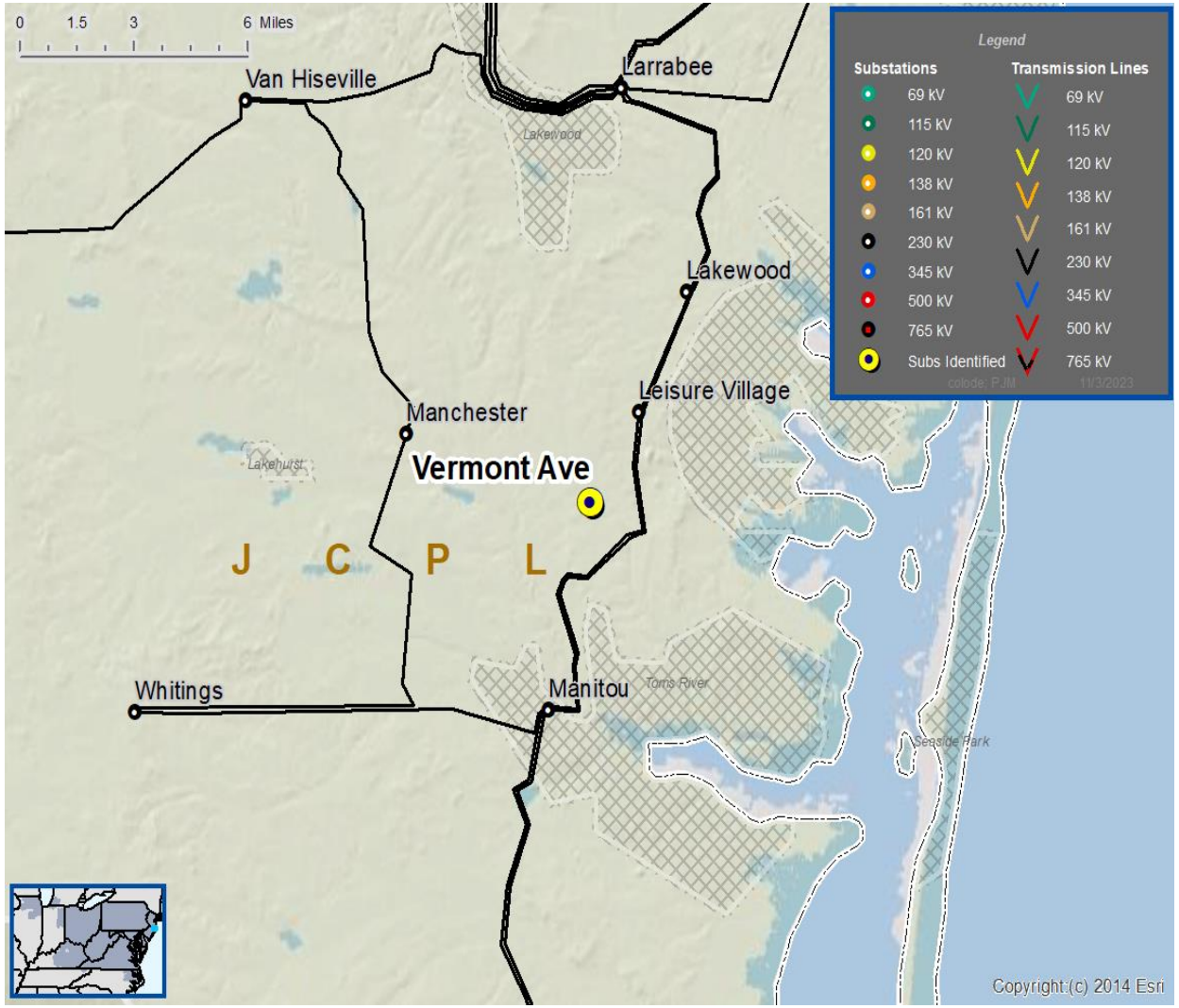
Customer Service

Specific Assumption Reference(s):

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

Problem Statement:

New Customer Connection – A customer has requested 34.5 kV service for a load of approximately 10 MVA near Vermont Ave Substation.



JCPL Transmission Zone M-3 Process
Vermont Ave 34.5 kV Customer Connection

Need Number: JCPL-2023-059

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

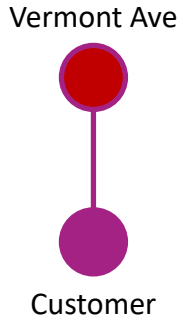
Selected Solution:

- Install a new 34.5 kV breaker, disconnect switch and relaying to connect to the existing 34.5 kV bus at Vermont Ave Substation.
- Modify relay schemes/settings on the Leisure Village – South Lakewood 34.5 kV F214 Line.
- Modify relay schemes/settings on the Larrabee – Metedeconk 34.5 kV E213 Line.

Estimated Project Cost: $0.3M

Projected In-Service: 03/31/2026

Supplemental Project ID: s3284.1



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

JCP&L Transmission Zone M-3 Process
Cookstown – Larrabee – Whitings 230 kV Line

Need Number: JCPL-2022-005

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Previously Presented: Need Meeting 09/06/2022
Solution Meeting 12/5/2023

Project Driver:

Operational Flexibility, Improved Reliability Performance

Specific Assumption Reference:

System Performance Projects Global Factors

- Past system reliability and performance

Add/Expand Bus Configuration

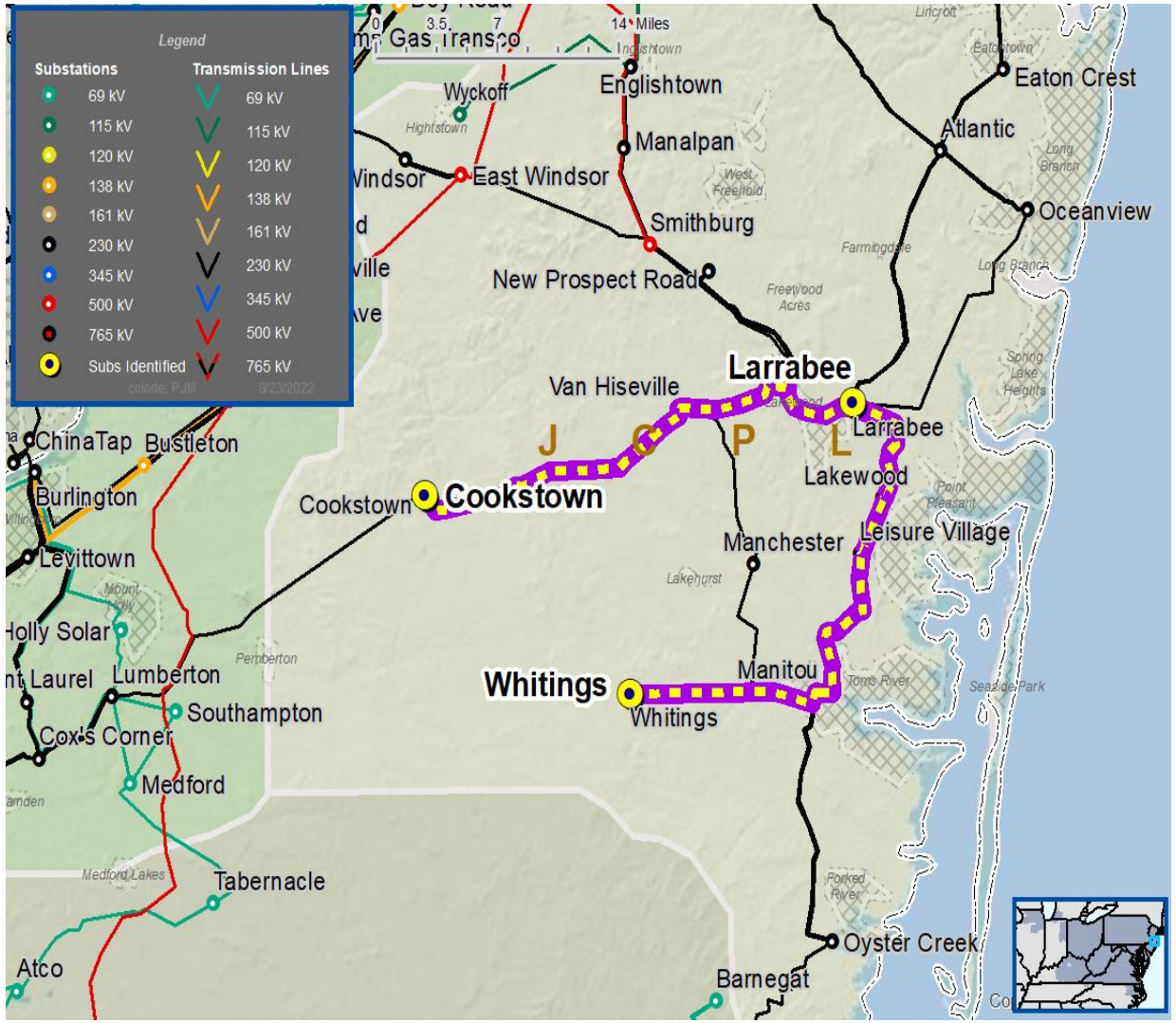
- Eliminate simultaneous outages to multiple networked elements

Reconductor/Rebuild Transmission Lines

- Three or more terminal transmission line.

Problem Statement:

The Cookstown – Larrabee – Whitings 230 kV Line is presently a 3-terminal line that removes multiple facilities from service under N-1 contingency scenarios.



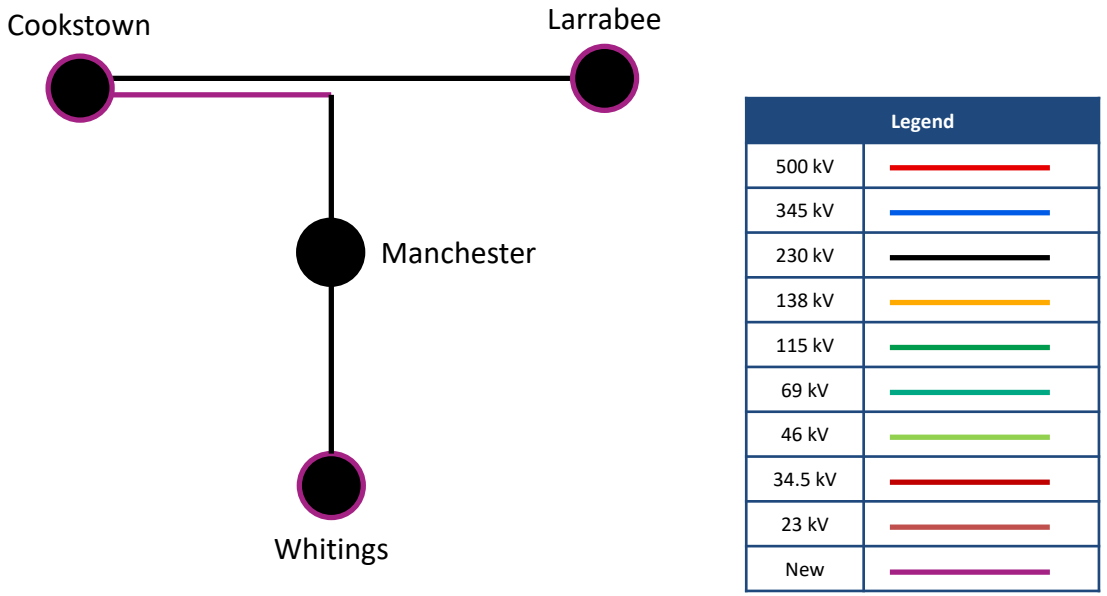
JCP&L Transmission Zone M-3 Process
Cookstown – Larrabee – Whitings 230 kV Line

Need Number: JCPL-2022-005

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Selected Solution:

- Expand Cookstown Substation from a four-breaker ring bus to a five-breaker ring bus (s3294.1)
- Construct a new 230 kV circuit from Cookstown Substation to the Van Hiseville Junction on existing vacant circuit position, creating two new 230 kV lines:
  - Cookstown – Larrabee 230 kV
  - Cookstown – Whitings 230 kV (s3294.2)
- At Cookstown Substation:
  - Replace circuit switcher, line trap and relaying
  - Install 230 kV circuit breaker, disconnect switches, and line trap (s3294.3)
- At Larrabee Substation:
  - Replace line trap, substation conductor and relaying (s3294.4)
- At Whitings Substation:
  - Replace line trap, substation conductor and relaying (s3294.5)



JCP&L Transmission Zone M-3 Process
Cookstown – Larrabee – Whitings 230 kV Line

Need Number: JCPL-2022-005

Process Stage: Submission of Supplemental Projects for Inclusion in the Local Plan 6/24/2024

Selected Solution (continued..):

Transmission Line Ratings:

Cookstown – Larrabee 230 kV (New line)
- Before Proposed Solution: N/A
- After Proposed Solution: 709/869 MVA (SN/SE)

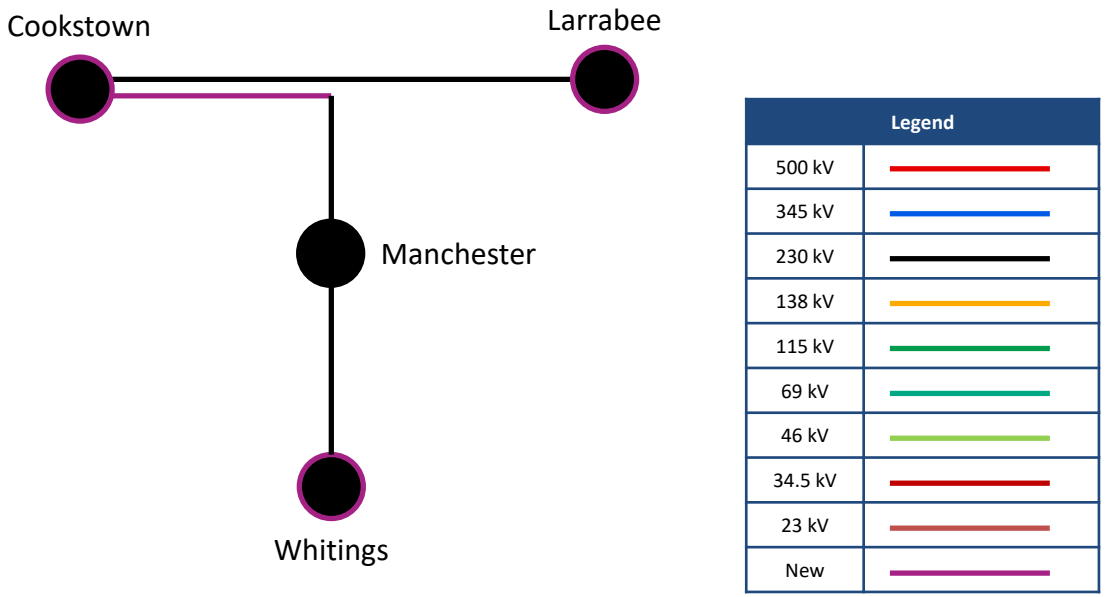
Cookstown – Manchester 230 kV (New line)
- Before Proposed Solution: N/A
- After Proposed Solution: 709/869 MVA (SN/SE)

Manchester – Whitings 230 kV
- Before Proposed Solution: 678/813 MVA (SN/SE)
- After Proposed Solution: 709/869 MVA (SN/SE)

Estimated Project Cost: $50.4M

Projected In-Service: 12/1/2024

Supplemental Project ID(s): s3298.1, s3298.2, s3298.3, s3298.4, s3298.5



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

6/24/2024 – V1 – Local Plan for s3232.1, s3233.1, s3234.1-s3251.1, s3299.1-.4, s3252.1, s3253.1, s3254.1, s3255.1, s3256.1, s3257.1, s3258.1, s3259.1, s3260.1, s3261.1, s3262.1, s3272.1, s3273.1, s3274.1, s3275.1, s3280.1, s3281.1, s3283.1, s3284.1, s3298.1, s3298.1, s3298.2, s3298.3, s3298.4, s3298.5, s3294.5, s3294.4, s3294.3