



# Sub Regional RTEP Committee Mid-Atlantic



October 31, 2017



# First Preliminary Review Baseline Reliability and Supplemental Projects



# PSE&G Transmission Zone: Baseline Reliability Hillsdale Substation

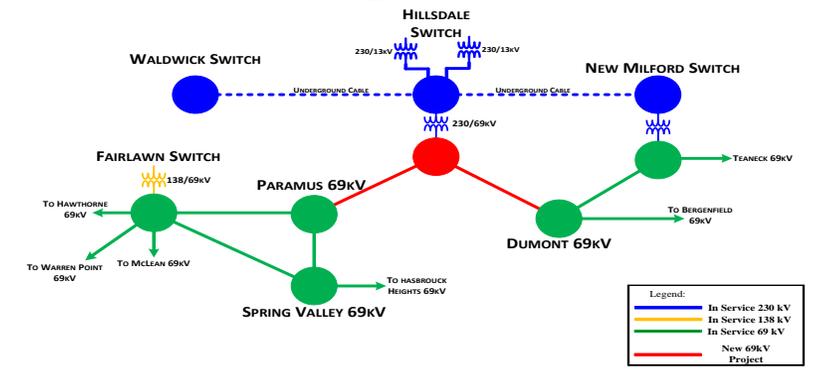
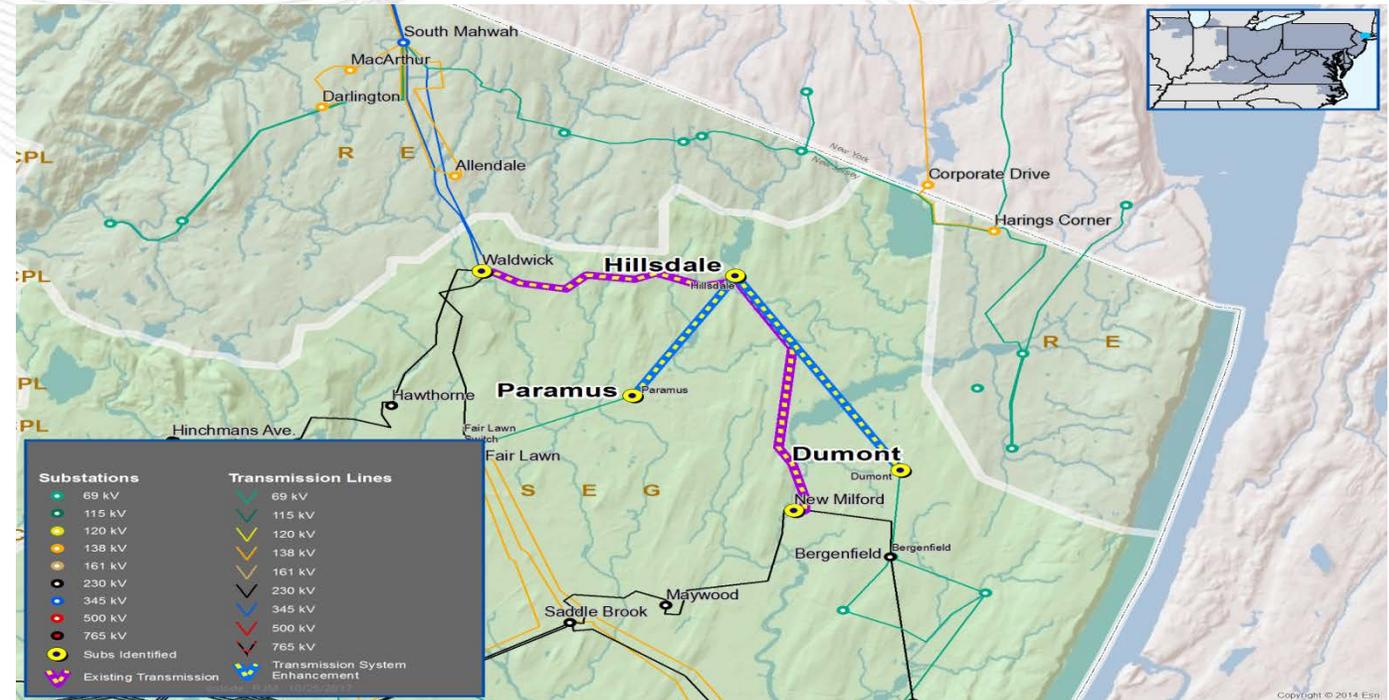
## Problem Statement:

- **FERC Form 715:** Hillsdale Substation is supplied by two underground 230kV lines. Hillsdale supplies more than 17,000 customers with load in excess of 80 MVA. An N-1-1 event would result in a complete loss of electric supply to the station for more than 24 hrs, a violation of PSE&G acceptable load drop levels and durations.

## Alternatives:

1. Construct a new 230kV cable to Hillsdale from New Milford Switching Station.
  - Purchase additional property to accommodate new construction at Hillsdale.
  - Rebuild Hillsdale 230kV to provide additional line positions.
  - Install new 230kV XLPE cable from New Milford to Hillsdale.
    - Estimated Project Cost: \$273M
2. Construct a 230/69kV station at Hillsdale Substation and tie to Paramus and Dumont at 69kV.
  - Install a 69kV ring bus and one (1) 230/69kV transformer at Hillsdale.
  - Construct a 69kV network between Paramus, Dumont, and Hillsdale Substation using existing 69kV circuits.
    - Estimated Project Cost: \$115M
3. Construct a 230/69kV station at Hillsdale Substation and tie to Paramus and Fair Lawn at 69kV.
  - Install a 69kV ring bus and one (1) 230/69kV transformer at Hillsdale.
  - Construct a 69kV network between Paramus, Fair Lawn, and Hillsdale Substation using existing 69kV circuits.
  - This option would require crossing the Garden State Parkway.
    - Estimated Project Cost: \$122M
4. Do Nothing Alternative – criteria violation and loss of load

Required In-service: 6/1/2018





# PSE&G Transmission Zone: Baseline Reliability

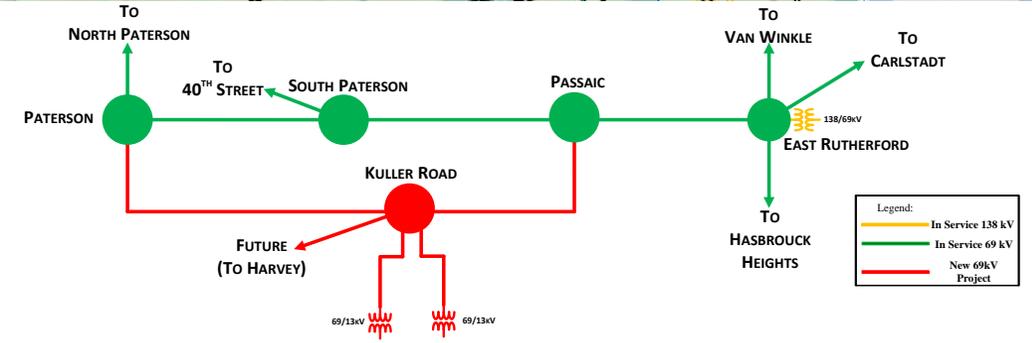
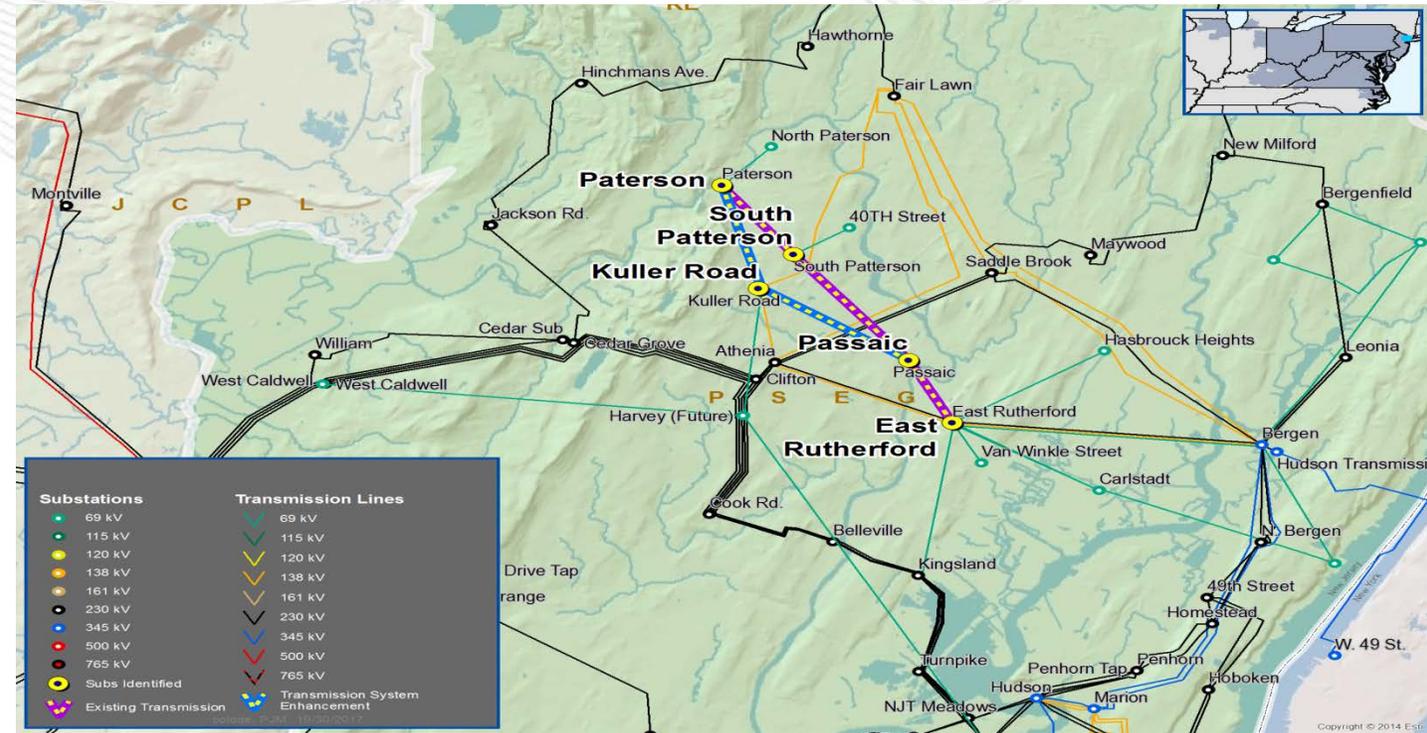
## Kuller Road Substation

### Problem Statement:

- **FERC Form 715:** Kuller Road Substation is supplied by two underground 138kV lines. Kuller Road supplies more than 18,000 customers with load in excess of 60 MVA. An N-1-1 event would result in a complete loss of electric supply to the station for more than 24 hrs, a violation of PSE&G acceptable load drop levels and durations.

### Alternatives:

1. Construct new underground 138kV cable from Athenia to Kuller Road.
  - Purchase additional property at Kuller Road to accommodate new construction.
  - Expand Kuller Road 138kV bus to provide additional line position.
  - Construct new 138kV GIS bay at Athenia to provide additional line position.
    - Estimated Project Cost: \$178M
2. Convert Kuller Road to a 69/13kV station.
  - Install 69kV ring bus and two (2) 69/13kV transformers at Kuller Road.
  - Construct a 69kV network between Kuller Road, Passaic, Paterson, and Harvey (new Clifton area switching station).
    - Estimated Project Cost: \$98.25M
3. Do Nothing Alternative – criteria violation and loss of load



**Required In-service Date:** 6/1/2018

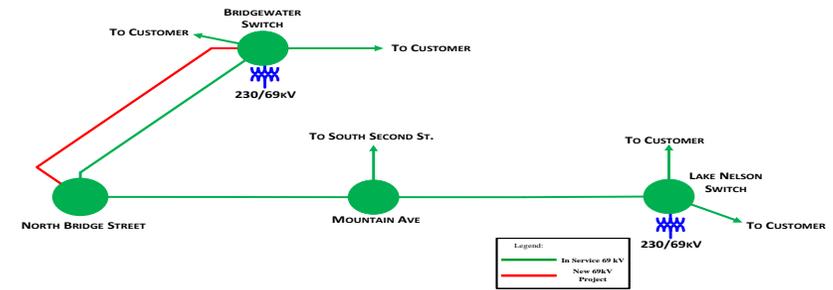
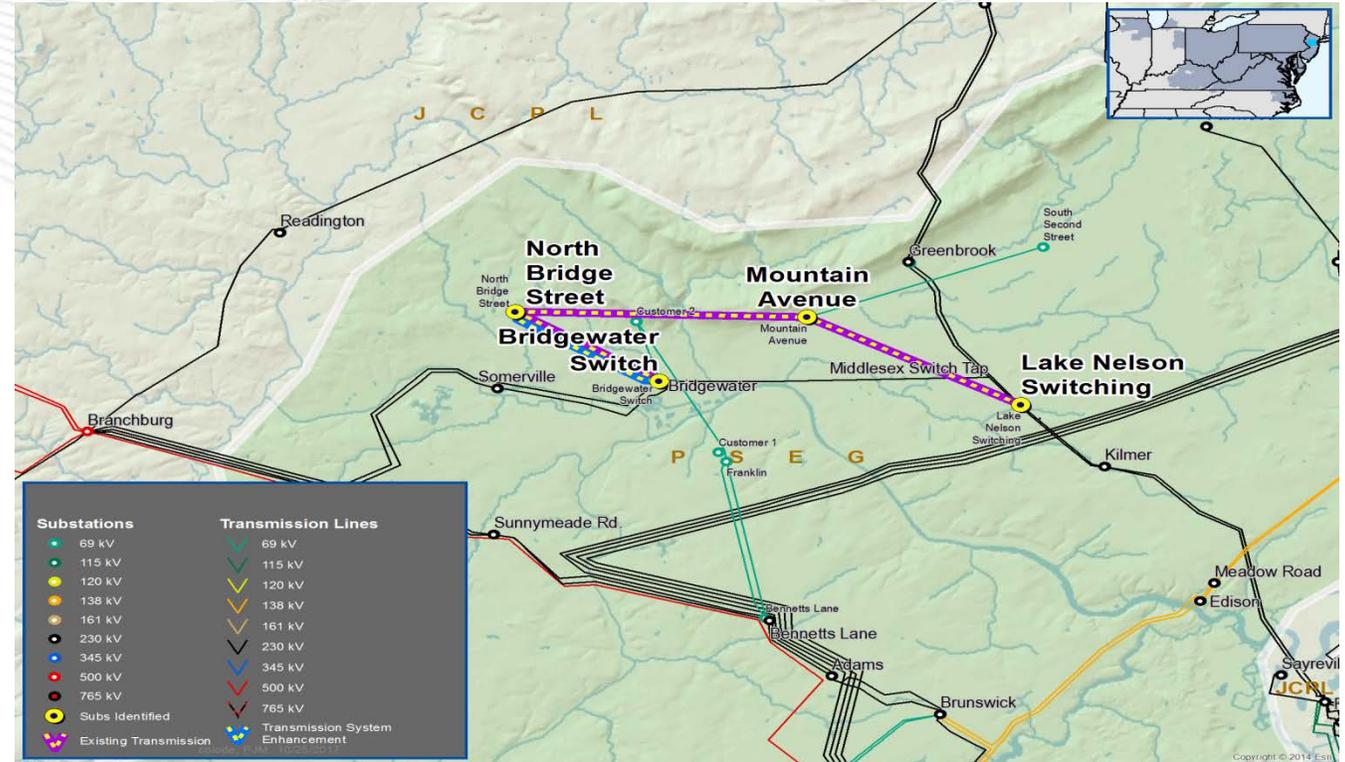
# PSE&G Transmission Zone: Supplemental Project North Bridge St and Mountain 69 kV stations

## Problem Statement:

- During an N-1-1 contingency event, the voltage at North Bridge St 69kV and Mountain Ave 69kV drops to below 0.95 p.u. The loss of the Bridgewater - North Bridge Street 69kV line and the Lake Nelson - Mountain Ave 69kV line would leave North Bridge Street and Mountain Ave fed from a single 69kV line. North Bridge Street serves around 2000 customers and over 40 MVA of load, while Mountain Ave also serves around 2000 customers and over 20 MVA of load.

## Alternatives:

1. Construct a new 69kV line from Bridgewater to North Bridge Street.
  - Rebuild North Bridge Street 69kV bus as a GIS ring bus.
  - Install new 69kV overhead line from Bridgewater to North Bridge Street using existing line position at Bridgewater.
    - Estimated Project Cost: \$80M
2. Construct a new 69kV line from Green Brook to North Bridge Street.
  - Rebuild North Bridge Street 69kV bus as a GIS ring bus.
  - Install new 69kV overhead line from Green Brook to North Bridge Street using existing line position at Green Brook.
    - Estimated Project Cost: \$91M
3. Do Nothing Alternative – criteria violation and loss of load



Required In-service: 6/1/2018



# Second Review and Recommendations Baseline Reliability and Supplemental Projects



# AE Transmission Zone: Baseline Reliability BL England – Middle tap 138 kV

## 2017 RTEP Window #1 Recommendation Generation Deliverability and N-1-1 Thermal Violation (Summer):

Previously Presented: 8/31/2017

### Problem Statement:

- The BL England – Middle Tap 138 kV circuit is overloaded for multiple contingencies. (FG# GD-S569, N2-ST1 and N2-ST4):

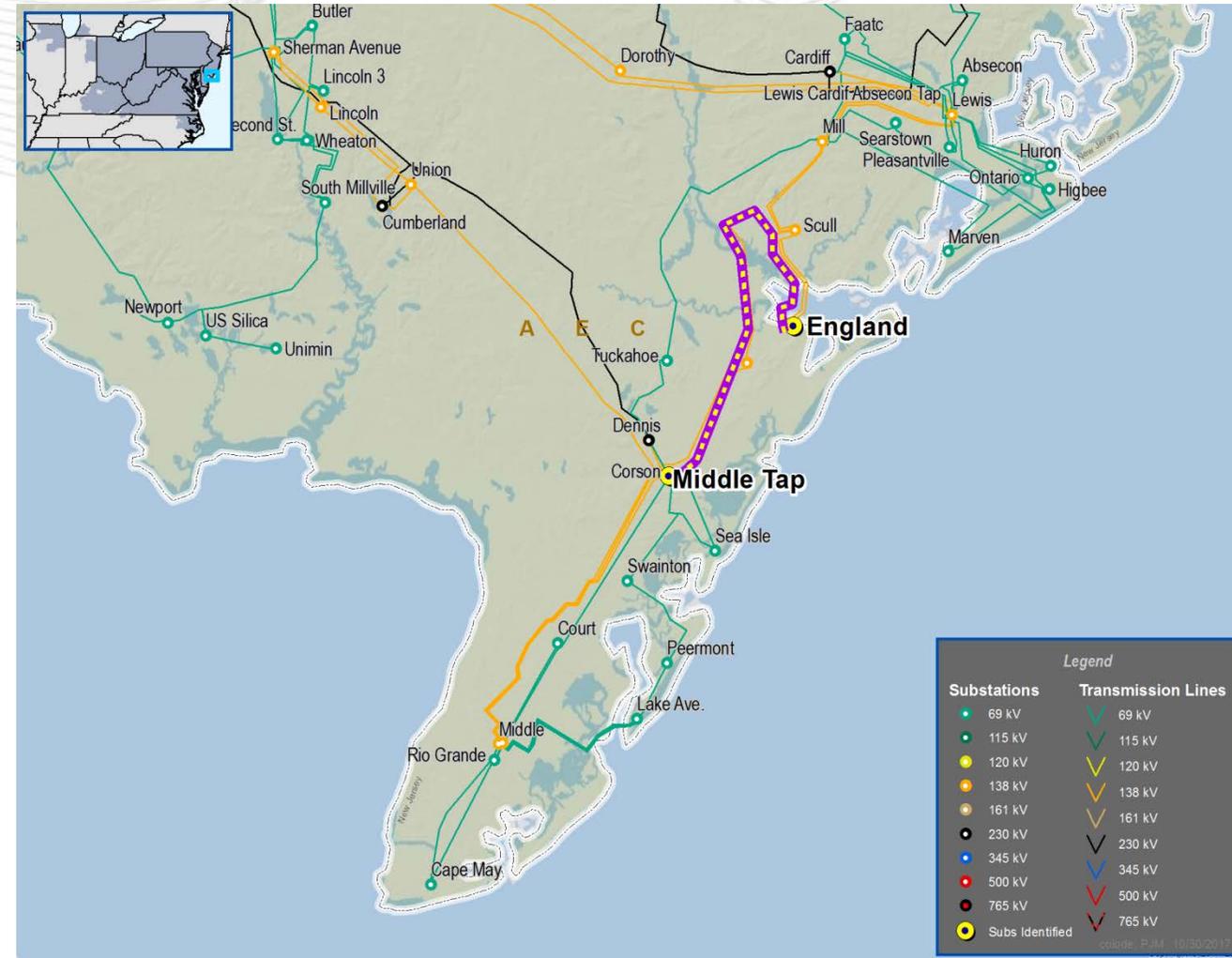
### Recommended Solution:

- The BL England – Middle Tap 138kV line is a 10.12 mile double circuit line with the BL England – Merion and Merion – Corson 138kV lines, constructed on steel lattice towers. **(B2945.1, B2945.2, and B2945.3)**
  - Rebuild the BL England – Middle Tap 138kV line to 2000A on double circuited steel poles and new foundations at a cost of \$22,640,000
  - Re-conductor BL England – Merion 138kV (1.9miles) and Merion – Corson 138kV (8miles) lines at cost of \$3,923,000 and \$9,845,000 respectively as they share the same lattice towers.

Estimated Cost: \$36.4 M

Required In-service: 6/1/2022

Project Status: Conceptual



**Previously Presented: 8/31/2017**

**Problem Statement:**

- The lack of line breakers at Terrace substation has resulted in the loss of the entire Terrace substation whenever there is a trip on the Pine Hill – Pitman 69kV line.

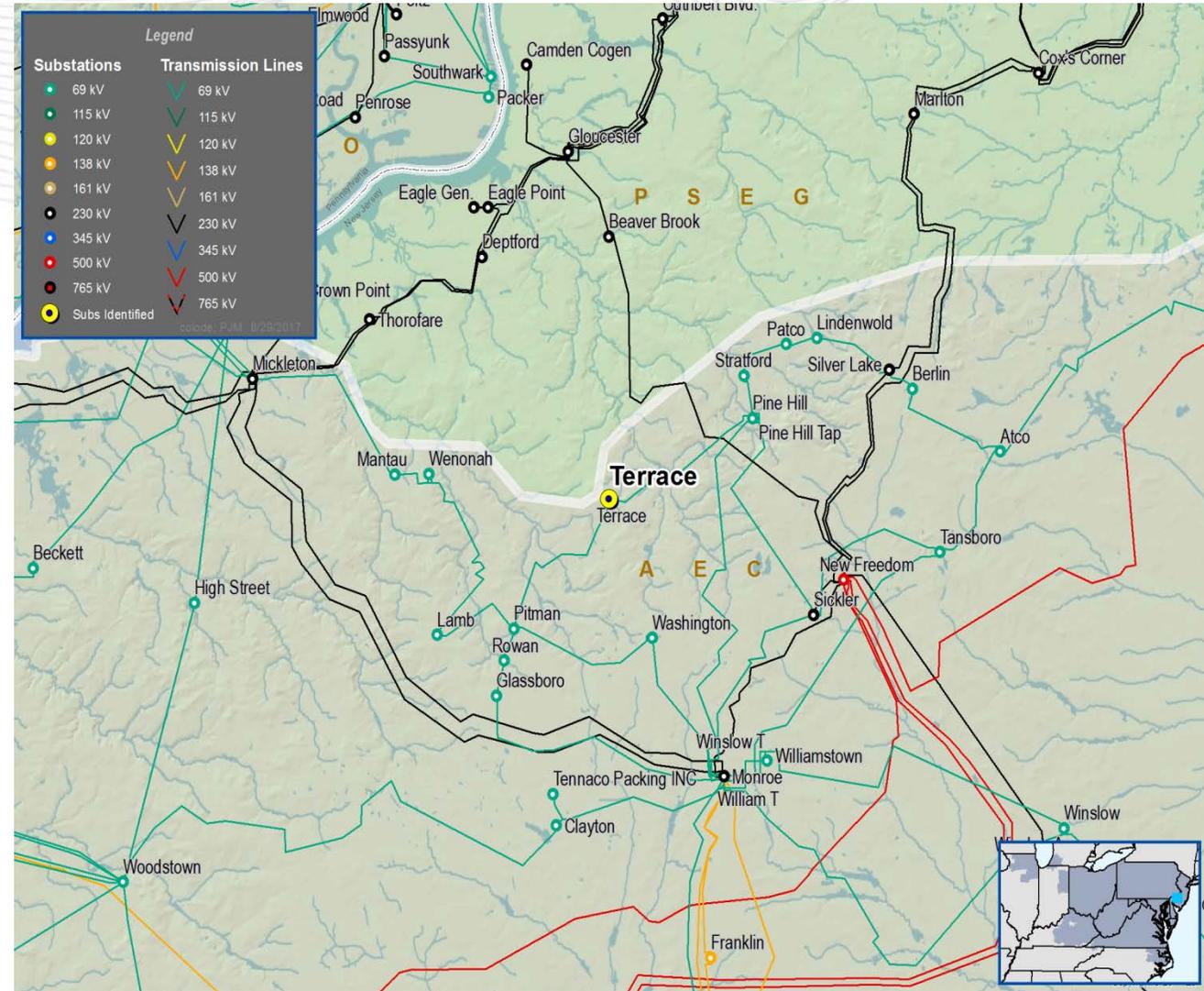
**Selected Solution:**

- Reconfigure the Terrace 69 kV station to a Ring bus – isolates substation from line faults that result in load loss and facilitates firm substation design and future expansion. (S1410)

**Estimated Cost: \$4.5 M**

**Expected In-service: 12/31/2022**

**Project Status: Engineering**





# AE Transmission Zone: Supplemental Project Clayton – Woodstown 69kV

**Previously Presented: 8/31/2017**

## Problem Statement:

- This project is needed to mitigate performance risk associated with the current equipment material and condition. Specifically, based on inspection data, deteriorated, cracked, and weathered crossarms and deteriorated poles were identified, which places this line in the top quartile of the ACE age and condition ranking. This line was originally installed in 1955.

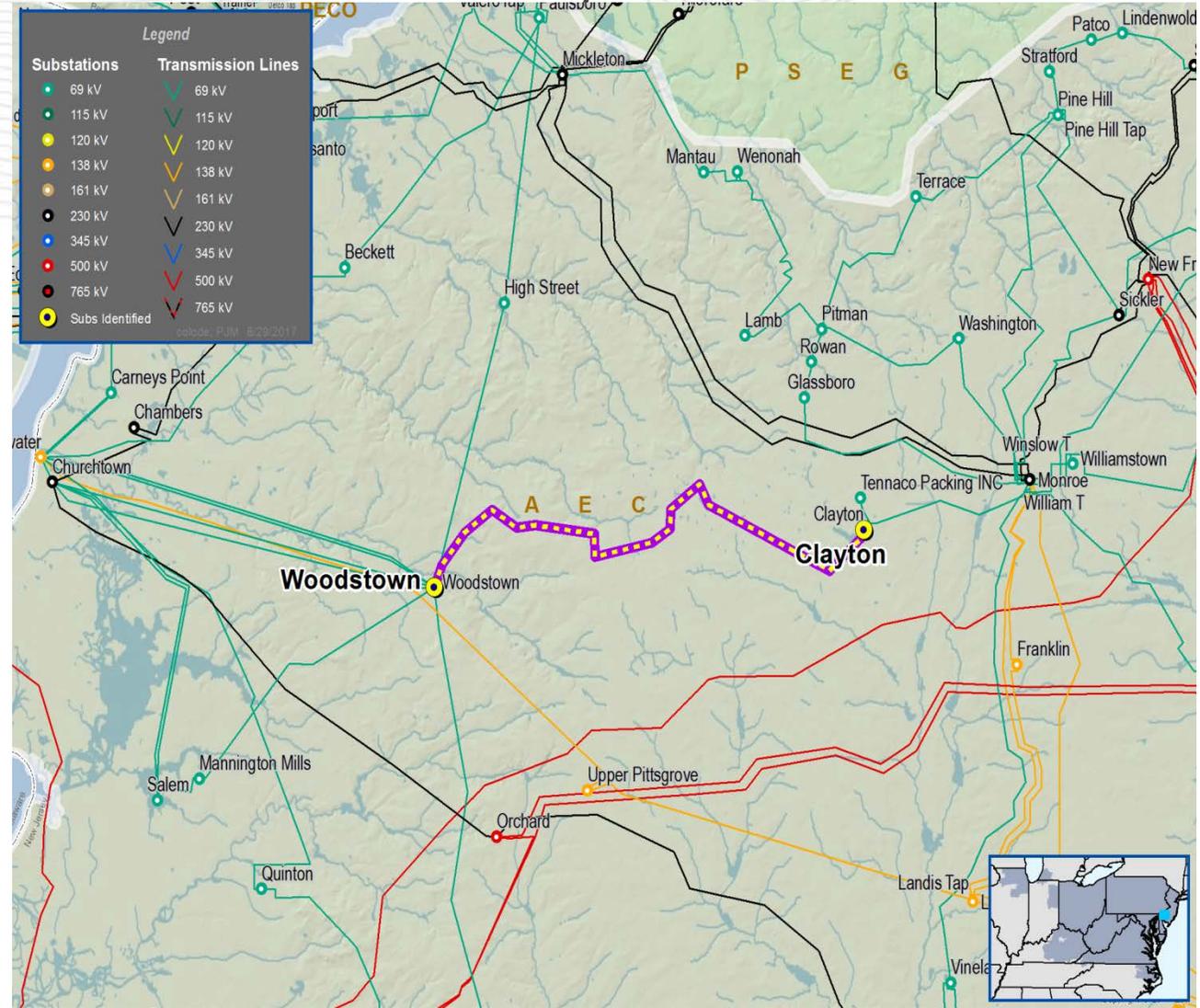
## Selected Solution:

- Rebuild line 0714 69 kV between Clayton and Woodstown substations. All structures, conductor, and static wire will be replaced with new wood (in county ROW) and steel poles, conductor, and OPGW. (S1411)

**Estimated Cost:** \$22.3M

**Required In-service:** 12/31/2022

**Project Status:** Engineering





# DPL Transmission Zone: Baseline Reliability Tanyard – Preston 69 kV

## 2017 RTEP Window #1 Recommendation Generation Deliverability Violation (Winter):

Previously Presented: 8/31/2017

### Problem Statement:

- The Tanyard – Preston 69 kV circuit is overloaded for line fault stuck breaker contingency loss of the Milford to Steele and Steele to Vienna 230 kV circuits. (FG# GD-W499):

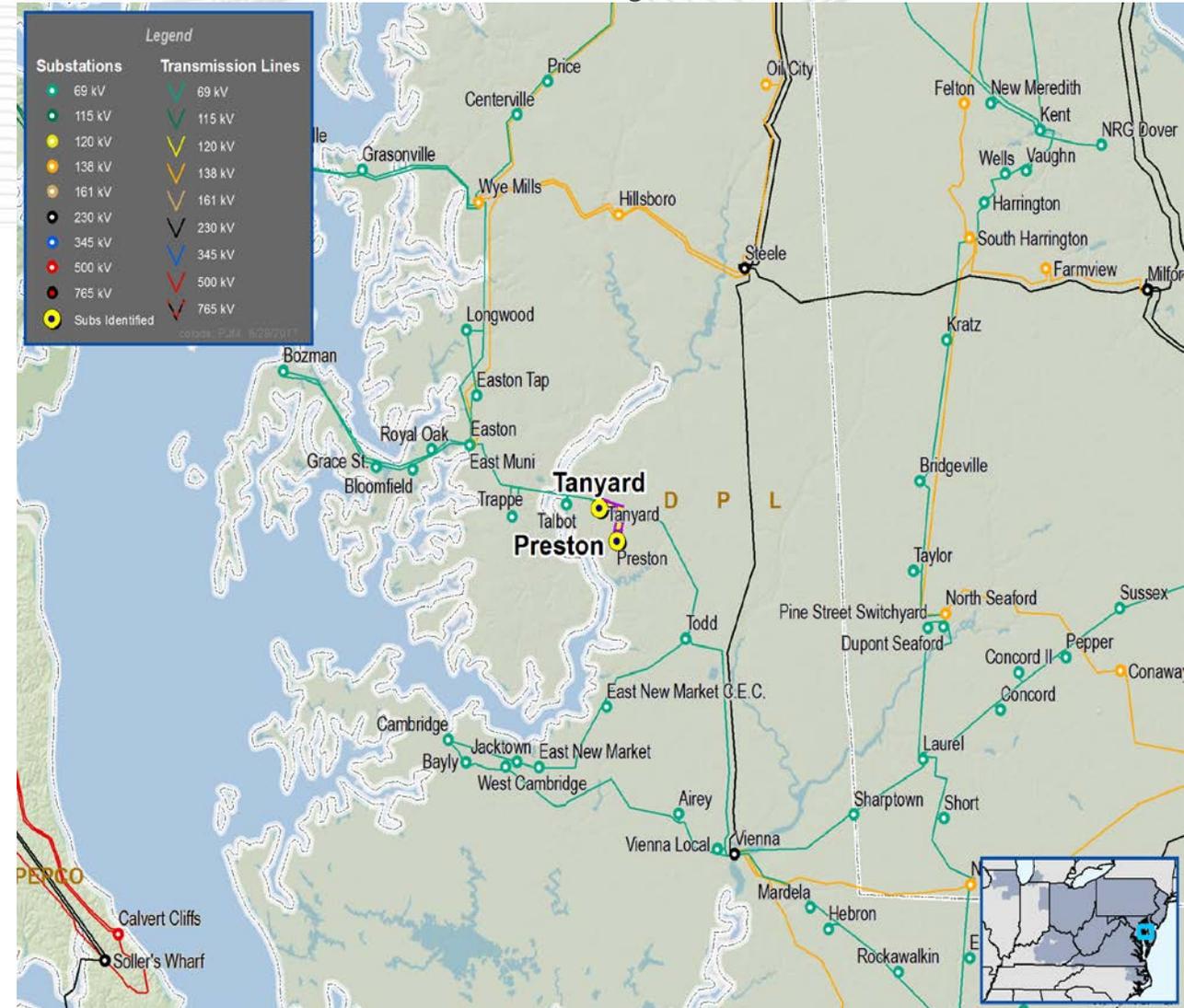
### Recommended Solution:

- Convert existing Preston 69 kV Substation to DPL's current design standard of a 3-breaker ring bus. **(B2946)**
  - This solution resolves the overload, provides operation flexibility and the opportunity for future expansion at the Preston Substation.

Estimated Cost: \$2.64 M

Required In-service: 6/1/2022

Project Status: Conceptual





# DPL Transmission Zone: Baseline Reliability Darley – Naamans 69 kV

## 2017 RTEP Window #1 Recommendation Generation Deliverability Violation (Summer):

Previously Presented: 8/31/2017

### Problem Statement:

- The Darley – Naamans 69 kV circuit is overloaded for tower line outage of the loss of the Edge Moor to Claymont and Edge Moor to Linwood 230 kV circuits. (FG# GD-SNew):

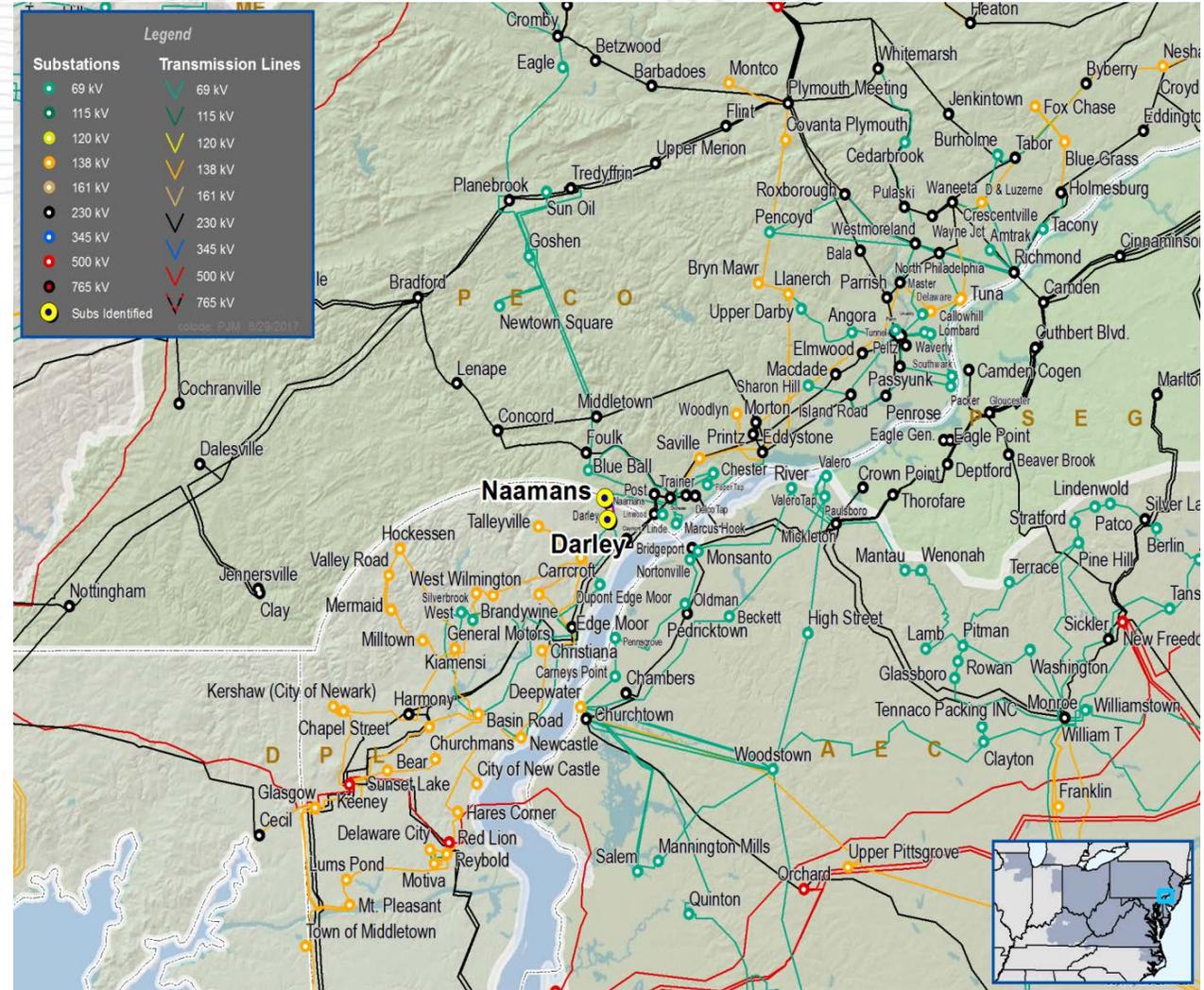
### Recommended Solution:

- Upgrade terminal equipment at DPL’s Naamans Substation (Darley - Naamans circuit 69 kV) with an estimated cost of \$151,200. **(B2947.1)**
- Re-conductor 0.11 mile section of Darley - Naamans circuit 69 kV with an estimated cost of \$197,000. **(B2947.2)**
  - This reconductor and terminal upgrade will eliminate the aforementioned overloads.

Estimated Cost: \$0.3482 M

Required In-service: 6/1/2022

Project Status: Conceptual



### 2017 RTEP Window #1 Recommendation Generation Deliverability Violation (Summer):

Previously Presented: 8/31/2017

#### Problem Statement:

- The Dupont Edge Moor – Silver R. 69 kV circuit is overloaded for tower line outage of the loss of the Edge Moor to Claymont and Edge Moor to Linwood 230 kV circuits. (FG# GD-S591)

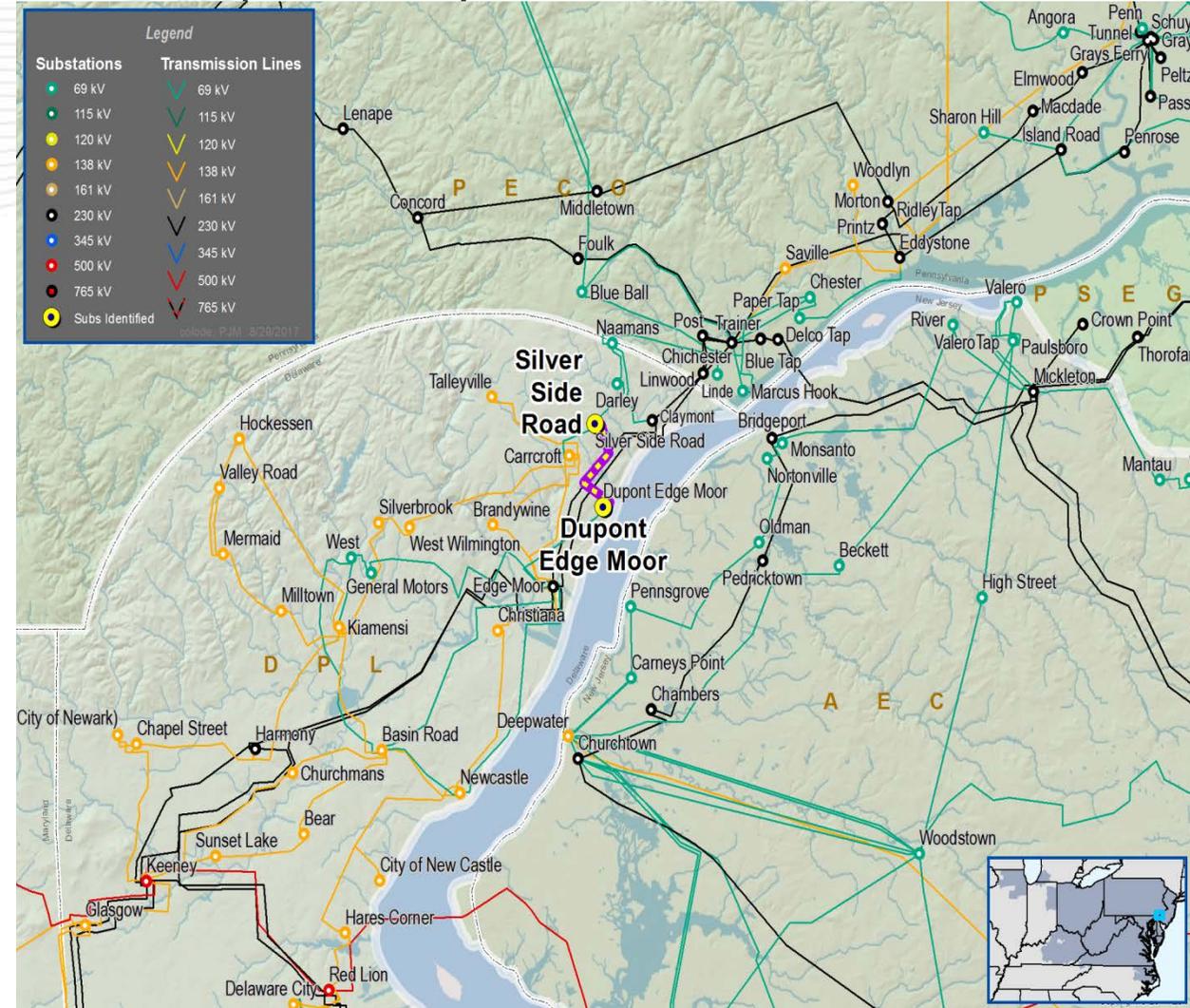
#### Recommended Solution:

- Upgrade terminal equipment at DPL's Silverside Road Substation (Dupont Edge Moor – Silver R. 69 kV). **(B2948)**

Estimated Cost: \$0.1512 M

Required In-service: 6/1/2022

Project Status: Conceptual





# ME Transmission Zone: Baseline Reliability Northwood 115 kV bus

## 2017 RTEP Window #1 Recommendation Generation Deliverability (Summer):

Previously Presented: 8/31/2017

### Problem Statement:

- The Northwood 115 kV bus is overloaded for Single contingency loss of the Hosensack to Steel City 500 kV circuit. (FG# GD-S180):

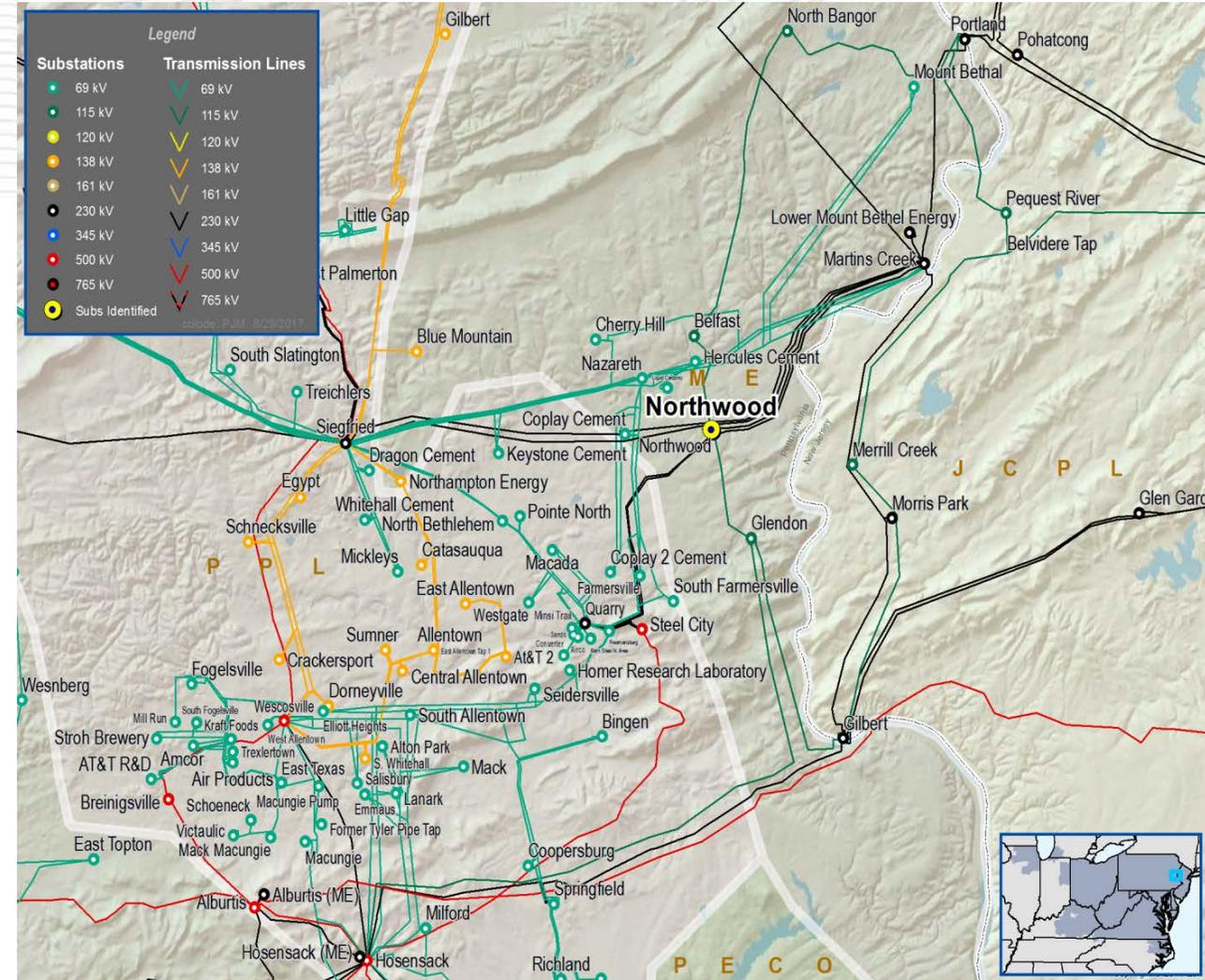
### Recommended Solution:

- Upgrade limiting 115 kV switches on the 115 kV side of the 230/115 kV Northwood substation and adjust setting on limiting ZR relay. **(B2950)**

Estimated Cost: \$0.0974 M

Required In-service: 6/1/2022

Project Status: Conceptual



### 2017 RTEP Window #1 Recommendation Generation Deliverability (Summer):

Previously Presented: 8/31/2017

#### Problem Statement:

- The Seward – Florence 115 kV circuit is overloaded for multiple line fault stuck breaker contingencies. (FG# GD-S792 and GD-S793):

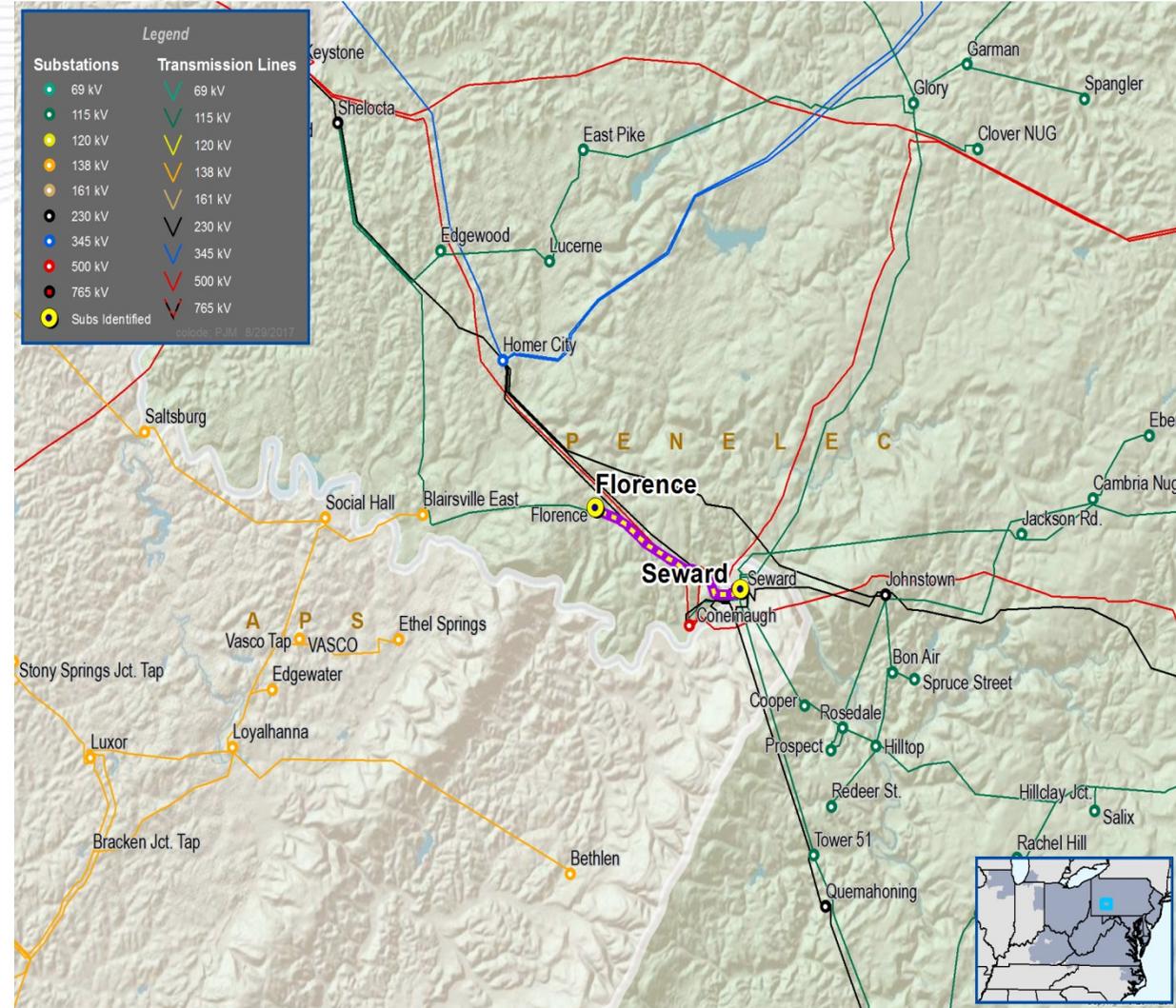
#### Recommended Solution:

- Upgrade Florence 115kV line terminal equipment at Seward SS. **(B2951.1)**
- Replace Blairsville East/Seward 115kV line tuner, coax, line relaying and carrier set at Shelocta SS. **(B2951.2)**
- Replace Seward/Shelocta 115kV line CVT, tuner, coax, and line relaying at Blairsville East SS. **(B2951.3)**

Estimated Cost: \$ 1.49 M

Required In-service: 6/1/2022

Project Status: Conceptual



### 2017 RTEP Window #1 Recommendation Generation Deliverability (Summer):

Previously Presented: 8/31/2017

#### Problem Statement:

- The North Meshoppen 230/115 kV transformer #3 along with the 115 kV series reactor are overloaded for single contingency loss of the North Meshoppen – Canyon – E. Towanda 230 kV circuit and the North Meshoppen 230/115 kV transformer #4 . (FG# GD-W35 and GD-W75):

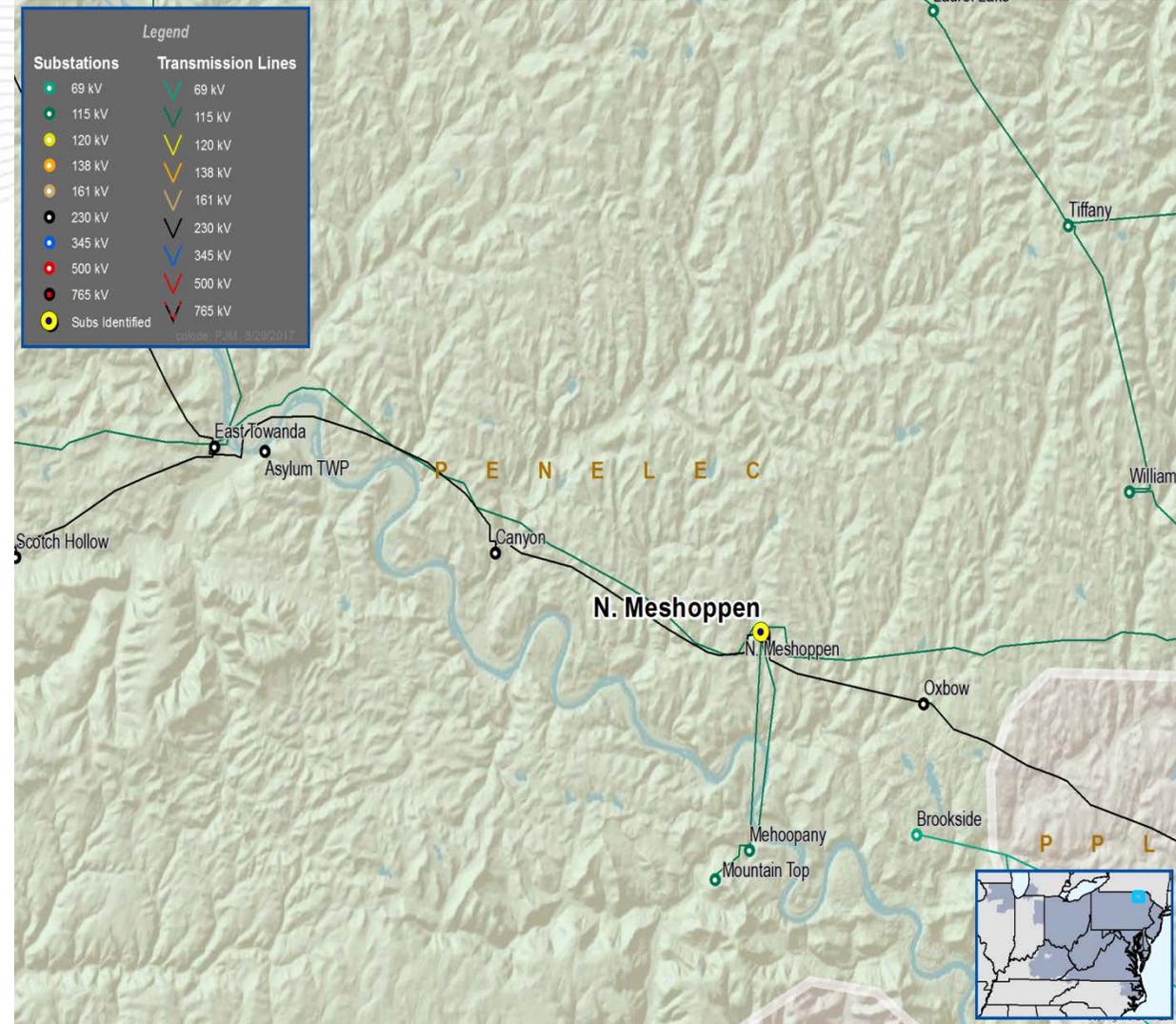
#### Recommended Solution:

- Replace the North Meshoppen #3 230/115kV transformer eliminating the old reactor and installing two breakers to complete a 230kV ring bus at North Meshoppen. **(B2952)**

Estimated Cost: \$6.802 M

Required In-service: 6/1/2022

Project Status: Conceptual





# PSE&G Transmission Zone: Supplemental Project Newport 230/13kV Substation

## Additional Supply to the Newport 13 kV station

Previously Presented: 8/31/2017

### Problem Statement:

- **Load Growth:** Currently Newport Class H supplies network customers (>7,300 customers) in the Jersey City area. The load supplied exceeded 72 MVA during summer 2017 and is expected to grow in the local area. During the loss of a transformer at Newport, there will be a ~16% overload on the remaining transformer.

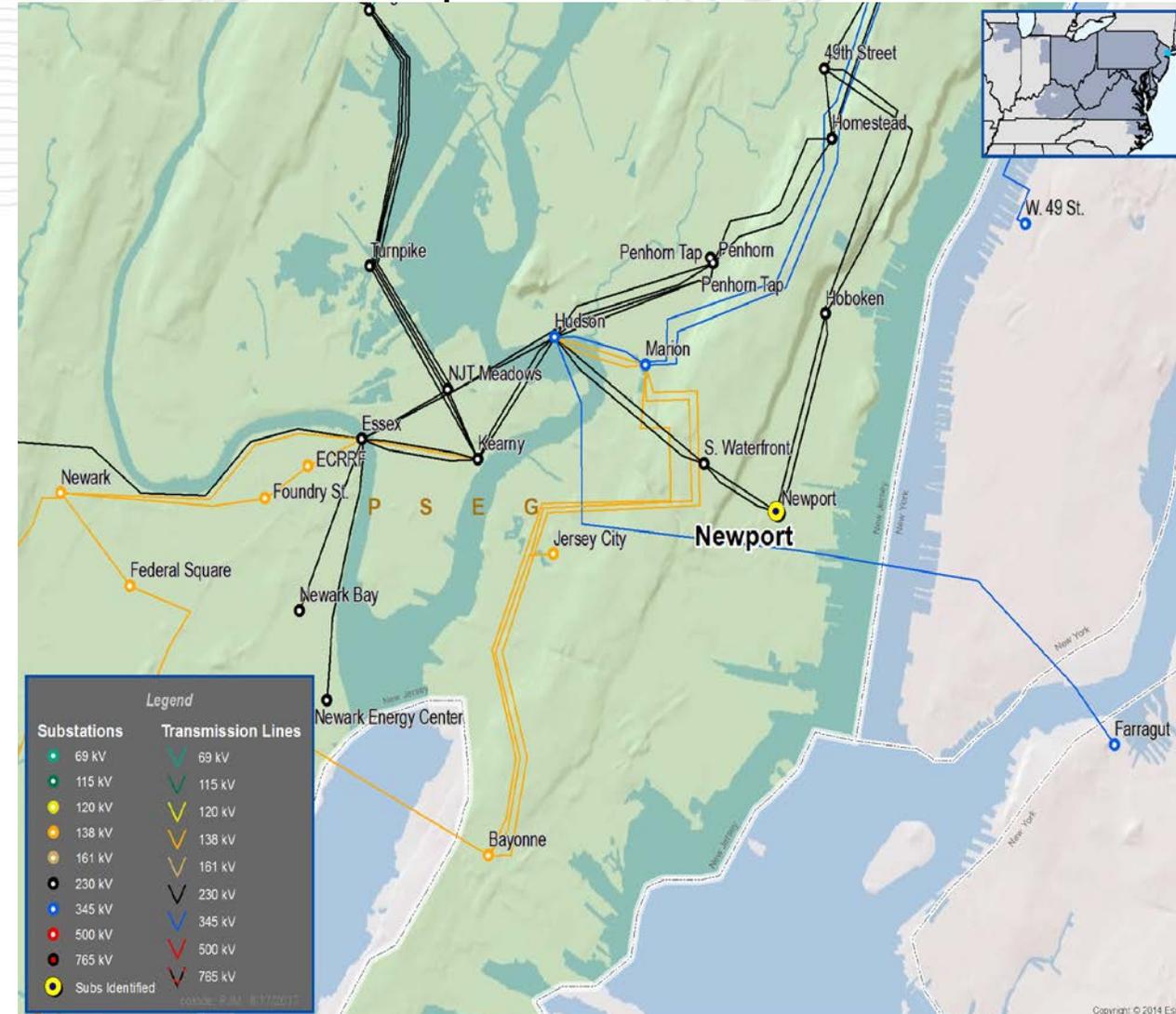
### Selected Solution:

- Install a new 230kV bay at Newport 230 kV. **(S1405.1)**
- Build a second 230/13kV substation at Newport. **(S1405.2)**

Estimated Cost: \$40 M

Expected In-service: 12/31/2020

Project Status: Engineering



## Station Reliability and Area Load Growth near Franklin 69kV

Previously Presented: 8/31/2017

### Problem Statement:

- Franklin 69kV station is connected to the Bridgewater and Bennetts Lane 69kV stations. A new 69kV customer will be going in service in the Franklin area in 2020. With the loss of the existing Franklin-Bennetts Lane 69kV line and a Lake Nelson -customer 69kV line, the voltage will drop below 0.95 p.u. at Franklin, the new customer, and three other customer stations in the area.

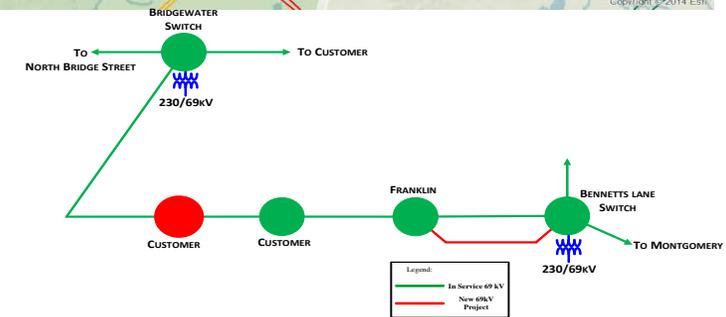
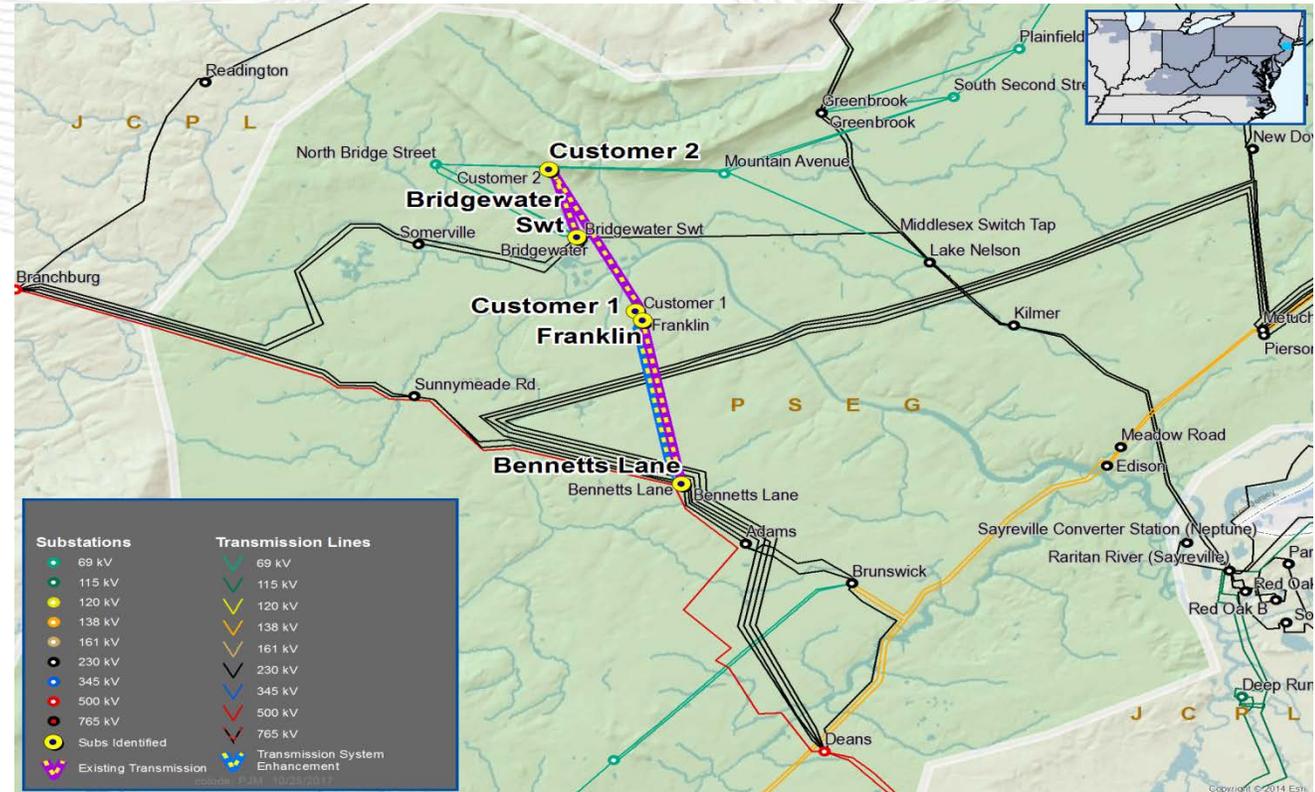
### Selected Solution:

- Construct a new 69kV line from Bennetts Lane to Franklin. **(1406.1)**
- Replace Franklin with a GIS ring. **(S1406.2)**
- Install one (1) new line position at Bennetts Lane. **(S1406.3)**

Estimated Cost: \$89 M

Expected In-service: 12/31/2020

Project Status: Engineering





# PSE&G Transmission Zone: Supplemental Project Mercer Generating station

## Mercer Generation Deactivation

**Previously Presented:** 8/31/2017

### Problem Statement:

- Mercer Generating station retired on June 1, 2017. As part of retirement and decommissioning activities PSE&G Power will be de-energizing and isolating all the interconnections to the Mercer Switching Station. After decommissioning, the generating station will not have any AC or DC power to support any interconnection protection / control / indication schemes at Mercer Switch.

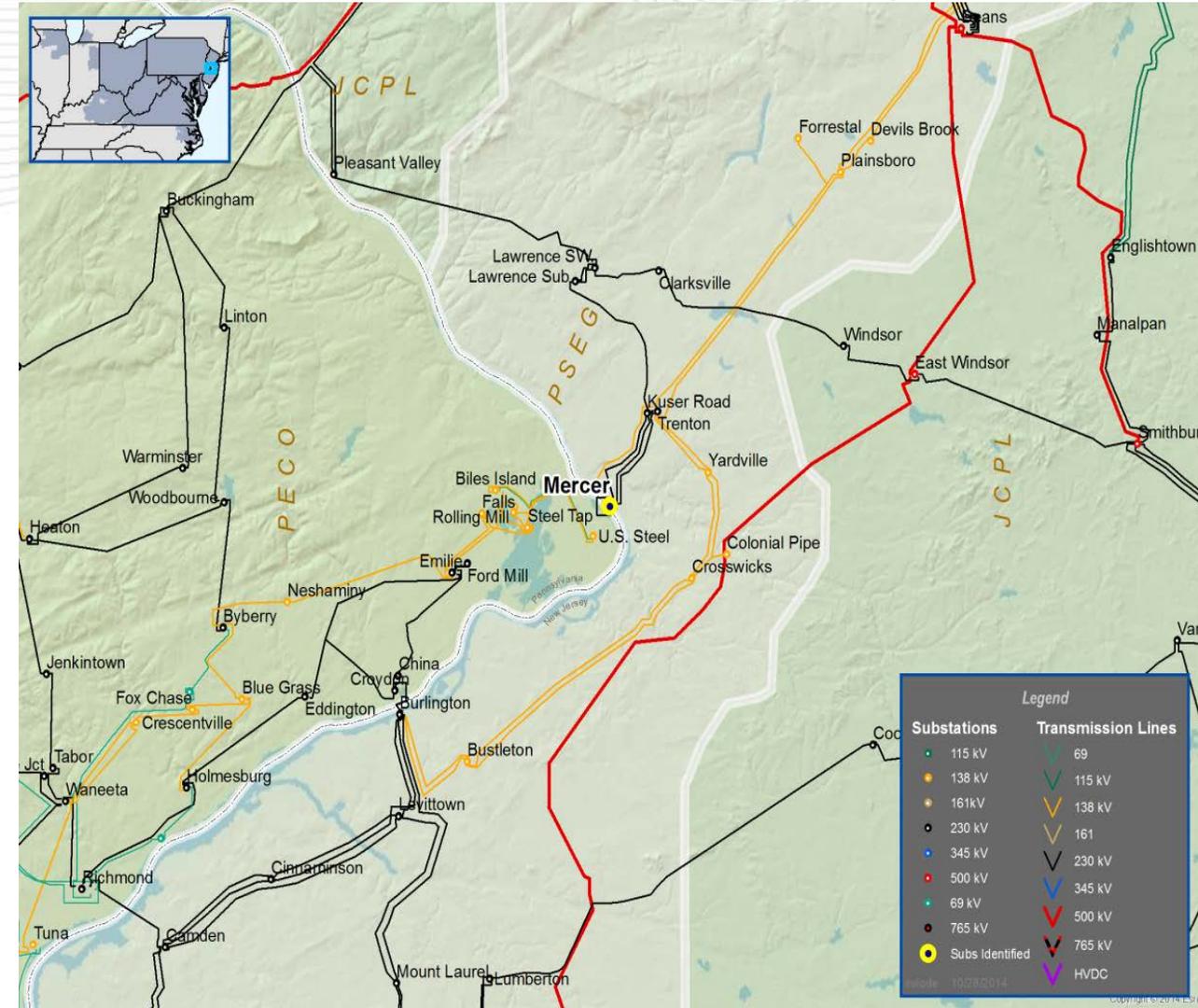
### Selected Solution:

- Remove all strain bus, dead-end assemblies, line drops, and static wire between the Switching Station A-frames and the Generating Station Unit #1 and #2 dead ends located in the Generating Station.
- Remove all control cables between the Switching Station 230kV control house and the Generating Station terminal cabinets located inside the Switching Station.
- Install new bus differential relay racks in the Switching Station 230kV control house to protect bus sections.
- Disconnect all relay racks associated with Station Power Transformers #1 and #2.
- Remove all equipment, bus, steel structures, and foundations from the bus to the high side bushings of 230/4kV Station Power Transformers #1 and #2 **(S1407)**

**Estimated Cost:** \$4.2 M

**Expected In-service:** 9/30/2018

**Project Status:** Engineering



## Hudson Generation Deactivation

**Previously Presented: 8/31/2017**

### Problem Statement:

- Hudson Generating station unit 2 has retired on June 1, 2017. As part of retirement and decommissioning activities PSE&G Power will be de-energizing and isolating all the interconnections to the Marion 345kV switchyard, 26 kV system for Aux Power, and the 138kV system for BET 1 & 2. After decommissioning, the generating stations will not have any AC or DC power to support any interconnection protection / control / indication schemes that are needed to operate Marion Switch.

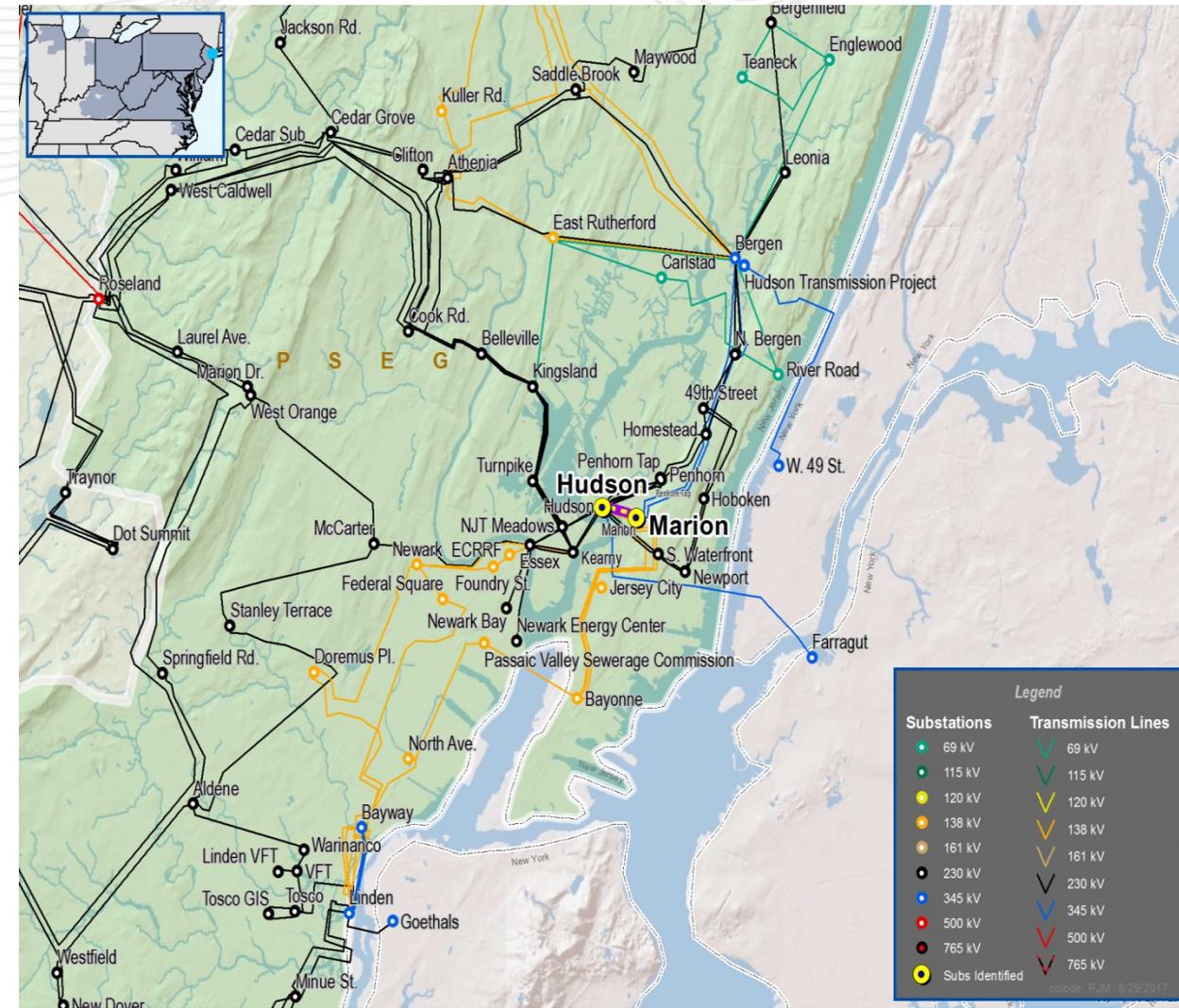
### Selected Solution:

- Physical isolation of:
  - HV interconnection for Unit 2 main step up transformer at Marion 345kV.
  - HV interconnection for Hudson Gen station power transformers 1 & 2, and Coal Handling 2B transformer at Marion 26kV.
  - BET transformers that are currently fed from Marion 138kV
  - Installation of relays in Hudson switchyard Control House (S1408)

**Estimated Cost: \$1.2 M**

**Expected In-service: 05/01/2018**

**Project Status: Engineering**





# PSE&G Transmission Zone: Supplemental Project Sewaren Generating station

## Sewaren Generation Deactivation

Previously Presented: 8/31/2017

### Problem Statement:

- PSE&G Power plans to retire Sewaren Generating Units 1-4 in June 2018. After commissioning of the new generating units at Sewaren the existing generating station associated with Units 1-4 will be removed from service. The entire 138 kV yard will be retired from service, including the autotransformer to the 230kV yard and 26kV yards

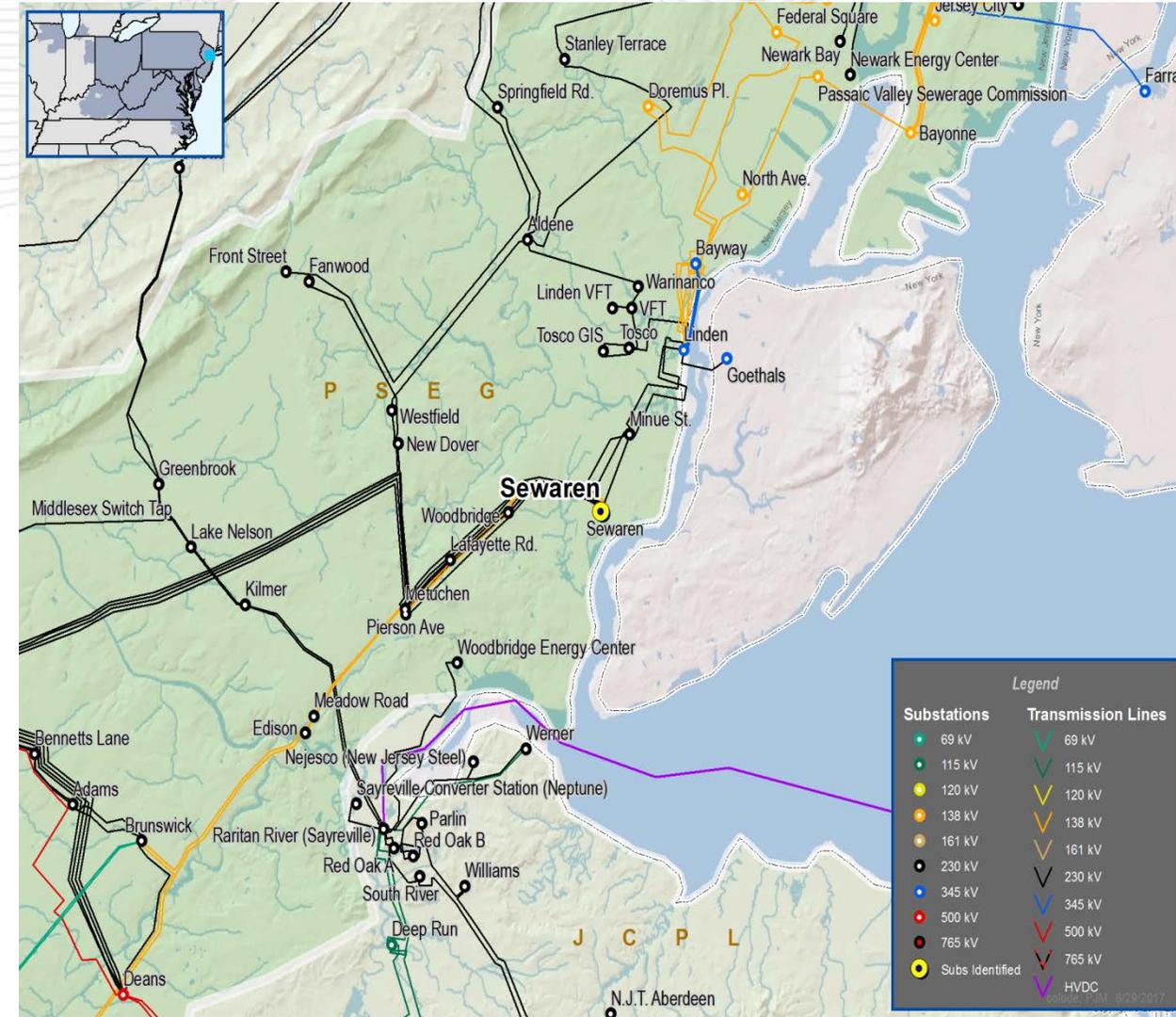
### Selected Solution:

- Physical isolation of all protective relay, control and indication circuits (both AC and DC) at 230kV to/from Gen station equipment
  - Cut clear control cables to Gen. station.
  - Retire and remove 220-1 transformer, and entire 138kV A-frame and associated bus, circuit breakers, and relay protection / control / indication schemes.
  - Remove and scrap 138kV transformers: 132-2, 132-3, and 132-7. Remove the associated wood pole line for 132-7
  - Physical isolation and removal of 26kV circuits LP1F6, LP3F3, LP2F6. Remove 26kV towers and wires from Sewaren Gen to the sheltered aisle switchgear.
  - Remove and scrap 26kV transformers 26-2 and 26-3. **(\$1409)**

Estimated Cost: \$ 7.4 M

Expected In-service: 10/01/2018

Project Status: Engineering



# Next Steps

Mid Atlantic	Start	End
12/19/2017	8:30	12:30
1/26/2018	8:30	12:30
3/23/2018	8:30	12:30
5/25/2018	8:30	12:30
7/20/2018	8:30	12:30
9/21/2018	8:30	12:30
11/28/2018	8:30	12:30

# Questions?



or

[RTEP@pjm.com](mailto:RTEP@pjm.com)

# Revision History

10/26/2017– V1 – Original version posted to PJM.com

10/30/2017– V2:

- Slide #3 – updated bubble diagram
- Slide #4 – updated bubble diagram and the map
- Slide #7 – updated the map
- Slide #8 and #9 – changed the Required IS date to Expected IS date