



2018 Supplemental Projects

Mid-Atlantic

BGE

Previously Reviewed at 2/8/2018 TEAC

Problem Statement:

- Two 230 kV oil circuit breakers at Howard and two oil circuit breakers at Jericho Park are at risk of poor performance, environmental concerns, and parts availability issues.

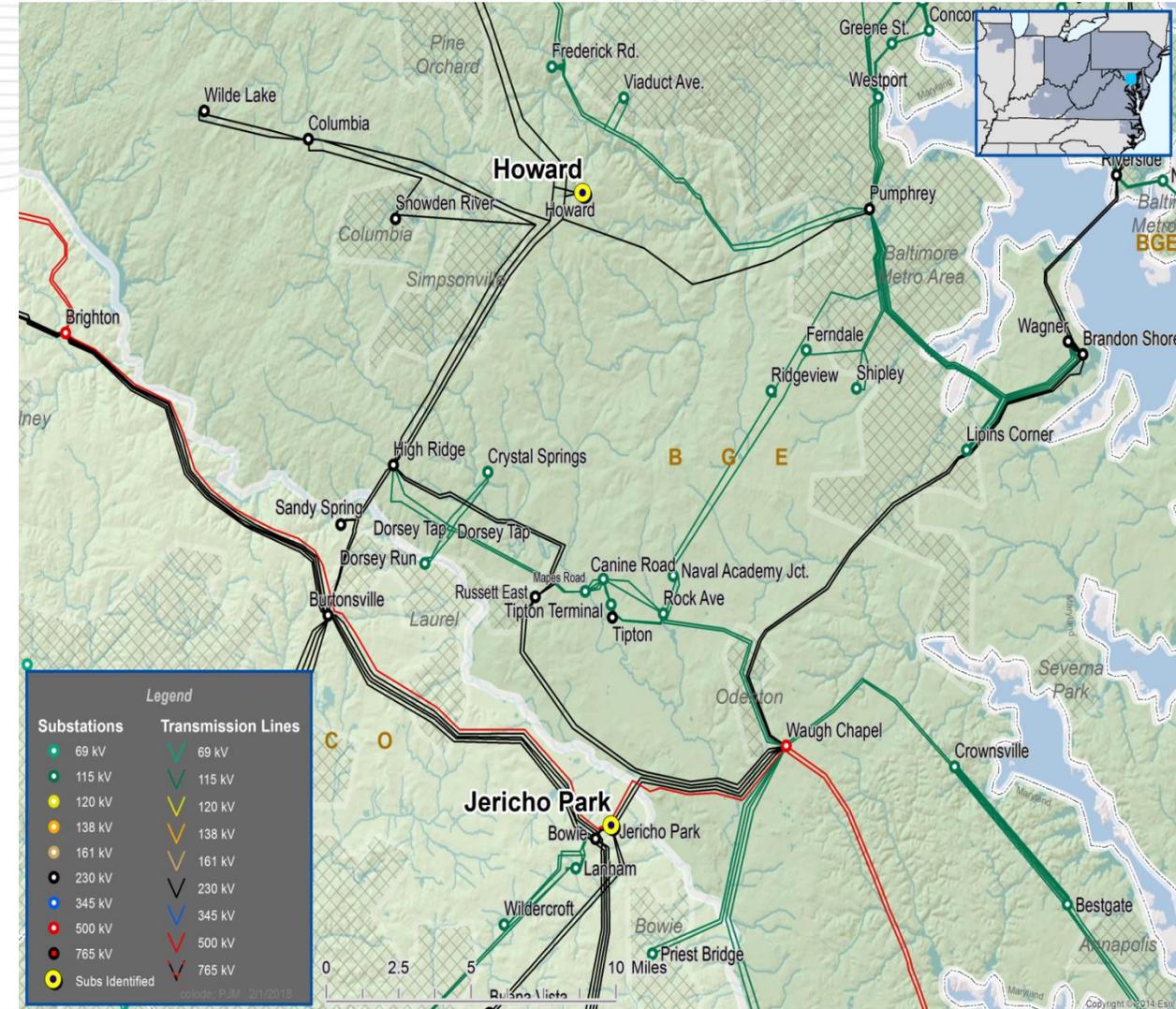
Selected Solution:

- Replace two breakers at Howard 230 kV and two breakers at Jericho Park 230 kV with new 63 kA rated gas circuit breakers. (S1531.1 & S1531.2)

Estimated Cost: \$1.308 M

Expected In-Service: 12/1/2018

Status: Engineering



BGE Transmission Zone: Supplemental Project Calvert Cliffs Nuclear Power Plant Swing Transformer Upgrade

Previously Reviewed at 2/8/2018 TEAC

Problem Statement:

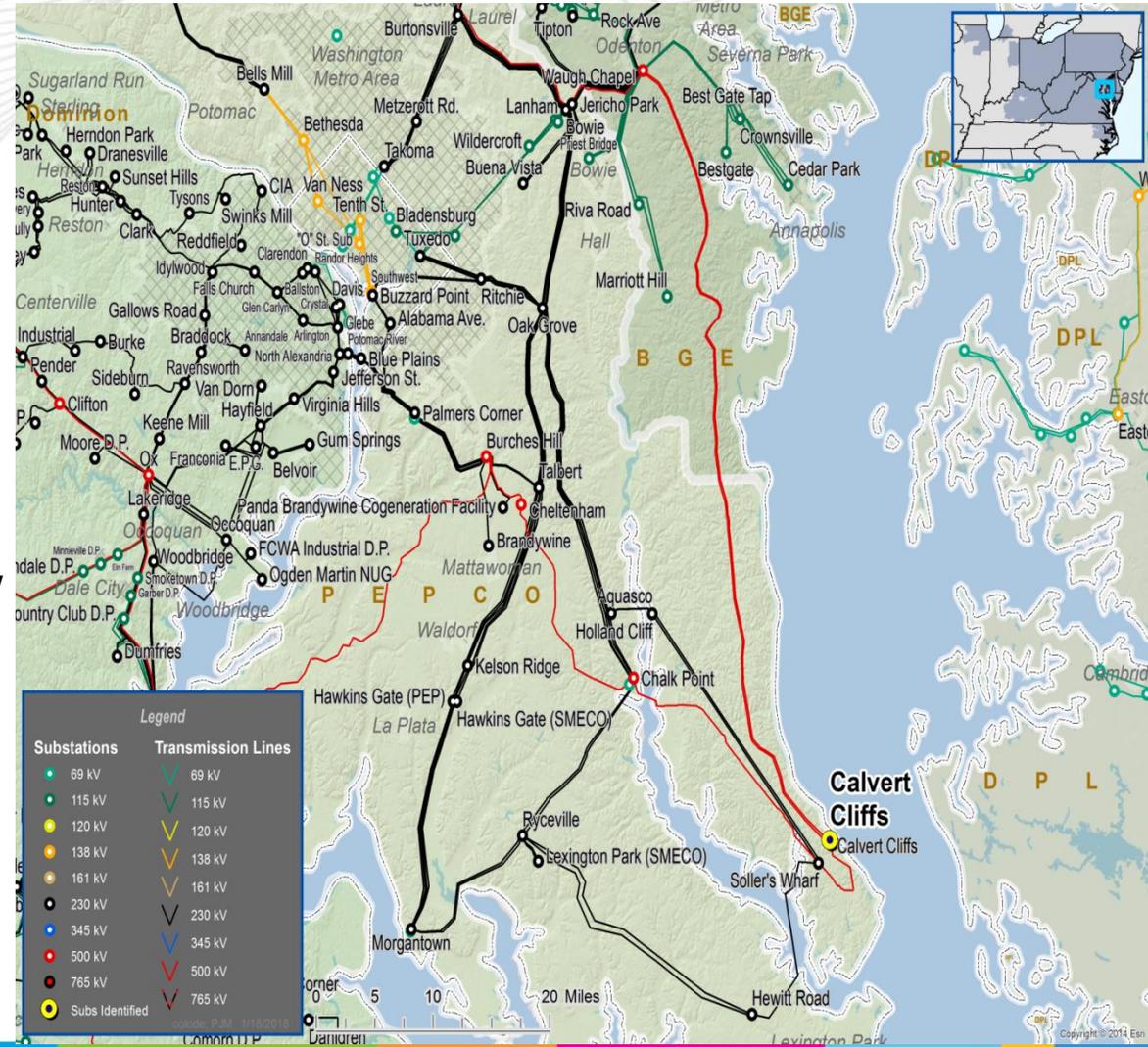
- Calvert Cliffs is planning to add an additional (third) plant service transformer to:
 - Improve reliability in case of a plant service transformer failure
 - Further protect against loss of offsite power sources
 - Improve operational flexibility during maintenance outages

Selected Solution:

- Connection of the new plant service transformer requires modification to the BGE 500 kV switchyard, including the addition of four breakers in a new 500 kV bay
- Two additional breakers will be installed for the current plant service transformers. (S1532)

Expected In-Service: 9/30/2020

Project Status: Engineering



BGE Transmission Zone: Supplemental Project Northeast and Pumphrey Breaker Replacement

Previously Presented: 01/26/2018

Problem Statement:

- Five 115 kV oil circuit breakers at Northeast and two 115 kV oil circuit breakers at Pumphrey are at risk of poor performance, environmental concerns, and parts availability issues

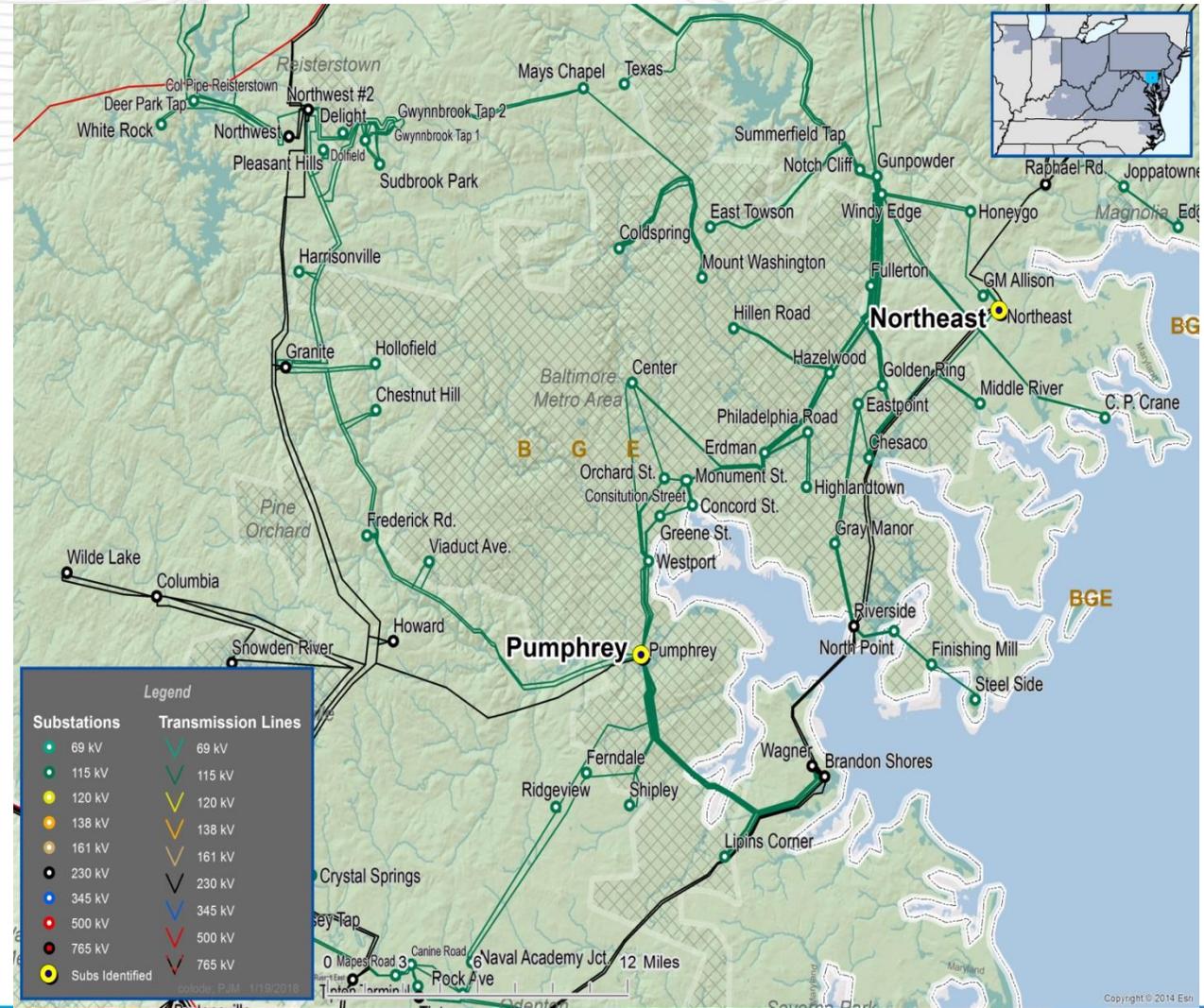
Selected Solution:

- Replace five breakers at Northeast with new 63 kA rated gas circuit breakers. (S1574.1)
- Replace two breakers at Pumphrey with new 80 kA rated gas circuit breakers. (S1574.2)

Estimated Cost: \$2.389 M

Expected In-Service: 12/1/2018

Status: Engineering





BGE Transmission Zone: Supplemental Project Five Forks – Face Rock 115kV line Re-conductoring

Previously Presented: 03/23/2018

Problem Statement:

- The BGE owned portion of the 110901-1/110901-2 115kV tie-line consists of double lattice towers operating as a six wire circuit
- The BGE-owned portion of the line is approximately two miles long extending from BGE's Five Forks station to the Maryland/Pennsylvania state line.
- The towers were installed in the 1910's and are experiencing hardware deterioration and avian-related issues
- The existing 300kcm 19-strand AAC conductor and hardware was installed in the 1930's and is showing signs of corrosion and annealing along with having past splice failures

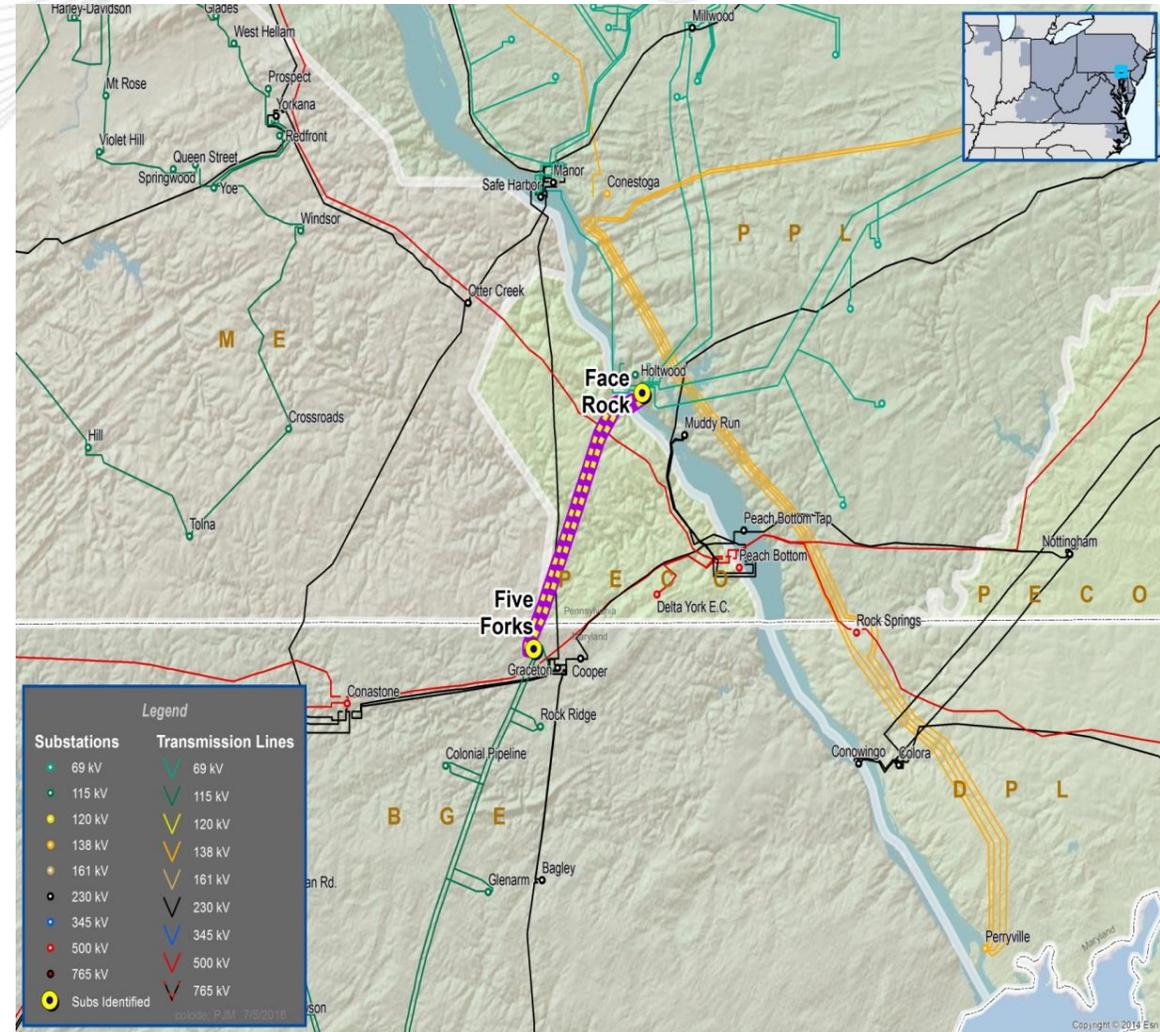
Selected Solution:

- Replace the BGE side of the Five Forks – Face Rock 115 kV double lattice towers with single monopole structures and install single 795kcm 30/19 ACSR conductor, connect into single dead end switch and the existing breaker at Five Forks. (S1630)
 - Coordinates with PPL Supplemental Project S1154 presented - 7/26/2016

Estimated Cost: \$2.7 M

Expected In-Service: 12/1/2020

Status: Engineering



Previously Presented: 01/26/2018

Problem Statement:

- A 115kV transmission supply is needed for the new Loch Raven distribution substation. The new Loch Raven distribution substation replaces an existing Hillen Road distribution substation that is at end of life due to both aging infrastructure and capacity limitations.
- The existing transmission supply to the area is via 115kV Hazelwood – Hillen Road underground (UG) Self Contained Fluid Filled (SCFF) transmission cables which require replacement and should not to be used to re-supply the new Loch Raven Substation
 - 445kcm CU hollow conductor (2.4” OD) Medium Pressure Fluid Filled (MPFF) cable pair originally built in 1968
 - Cables are the only two transmission cables supplying this area and are connected to Windy Edge – Erdman circuits in a simple tap configuration
 - Cables have experienced 12 leaks over the past 20 years with most recent in November 2017 and January 2018.
 - Outages associated with leak repairs generally last at least 2-3 days and require significant operating steps to secure distribution load during repairs
 - One of the four stop-joints failed in the late 1990s, requiring a 3 month repair time
 - Cable duct manhole end walls are cracking and are not BGE’s to be able to consider repairs
 - Spare materials for this cable type are becoming obsolete
 - Specialized contractors to support cable repairs are not widely available and cannot always provide immediate support

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BGE Transmission Zone: Supplemental Project Transmission Supply to new Loch Raven Distribution Substation

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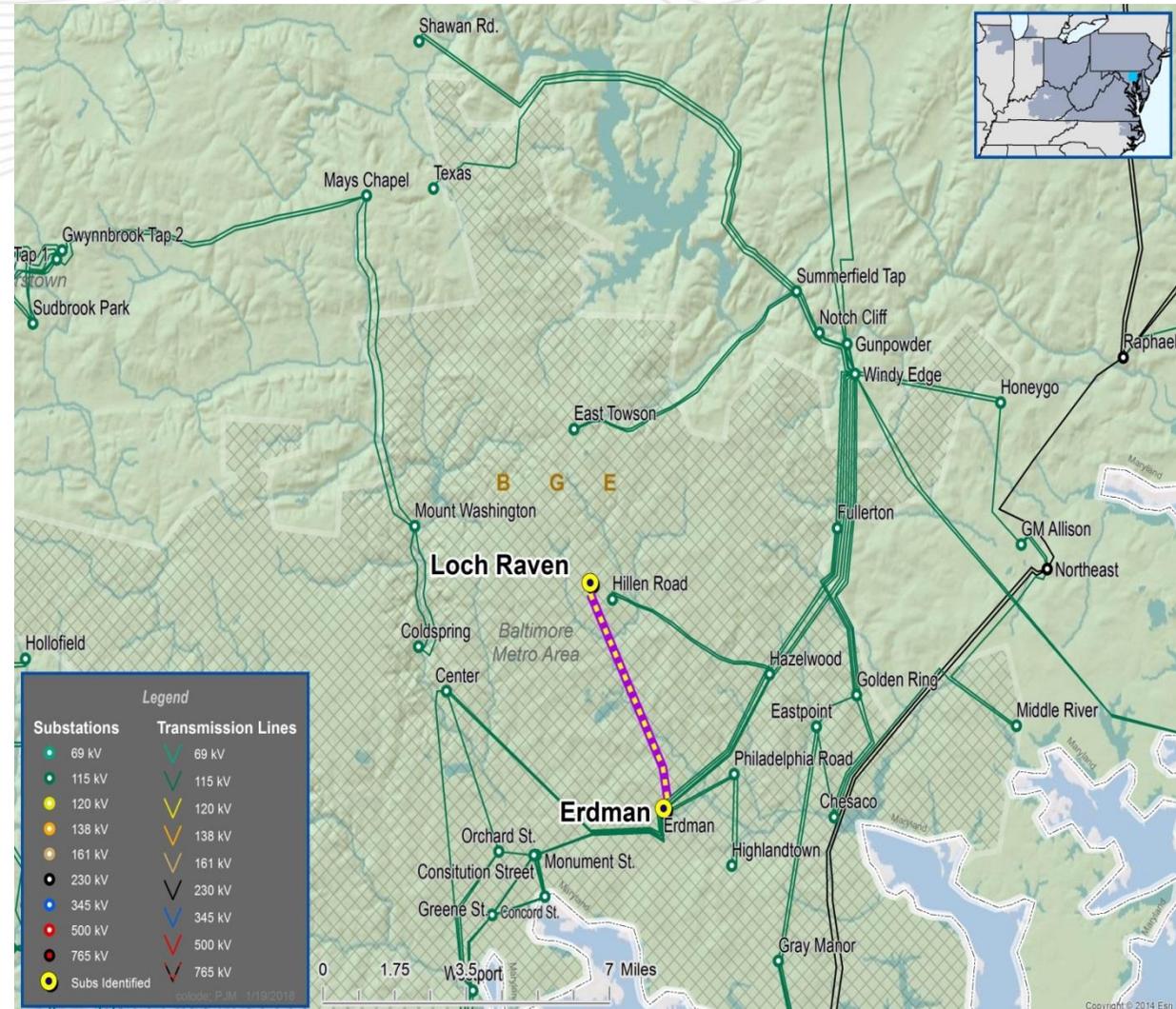
Selected Solution:

- Build new Loch Raven 115/13 kV substation and supply the new Substation with UG XLPE 115kV cables from Erdman Substation
- At new Loch Raven Substation, install 115kV breakers and high side bus work to supply the distribution station
- At Erdman 115kV Substation, expand the 115kV station to a GIS breaker and half configuration to connect new circuits to supply the new Loch Raven substation. **(\$1631)**

Estimated Cost: \$130M

Expected In-Service: 6/1/2024

Status: Conceptual





BGE Transmission Zone: Supplemental Project East Towson-Loch Raven Transmission Network

Previously Presented: 01/26/2018

Problem Statement:

- Current East Towson and Hillen Road distribution stations are each radially fed by 115 kV fluid filled cable pairs
- Single cable outages expose distribution stations to risks requiring significant operational steps to ensure continued customer service
- N-2 contingencies create undesirable conditions which have significant customer impacts to numerous major customers, such as hospitals, universities, government facilities, etc.
 - Operating procedures including distribution load transfers are no longer a feasible option to maintain customer load
 - Time to repair cable problems and associated equipment failures can be significant
 - Distribution recovery plans are difficult to implement, require significant construction and material, and take a long time

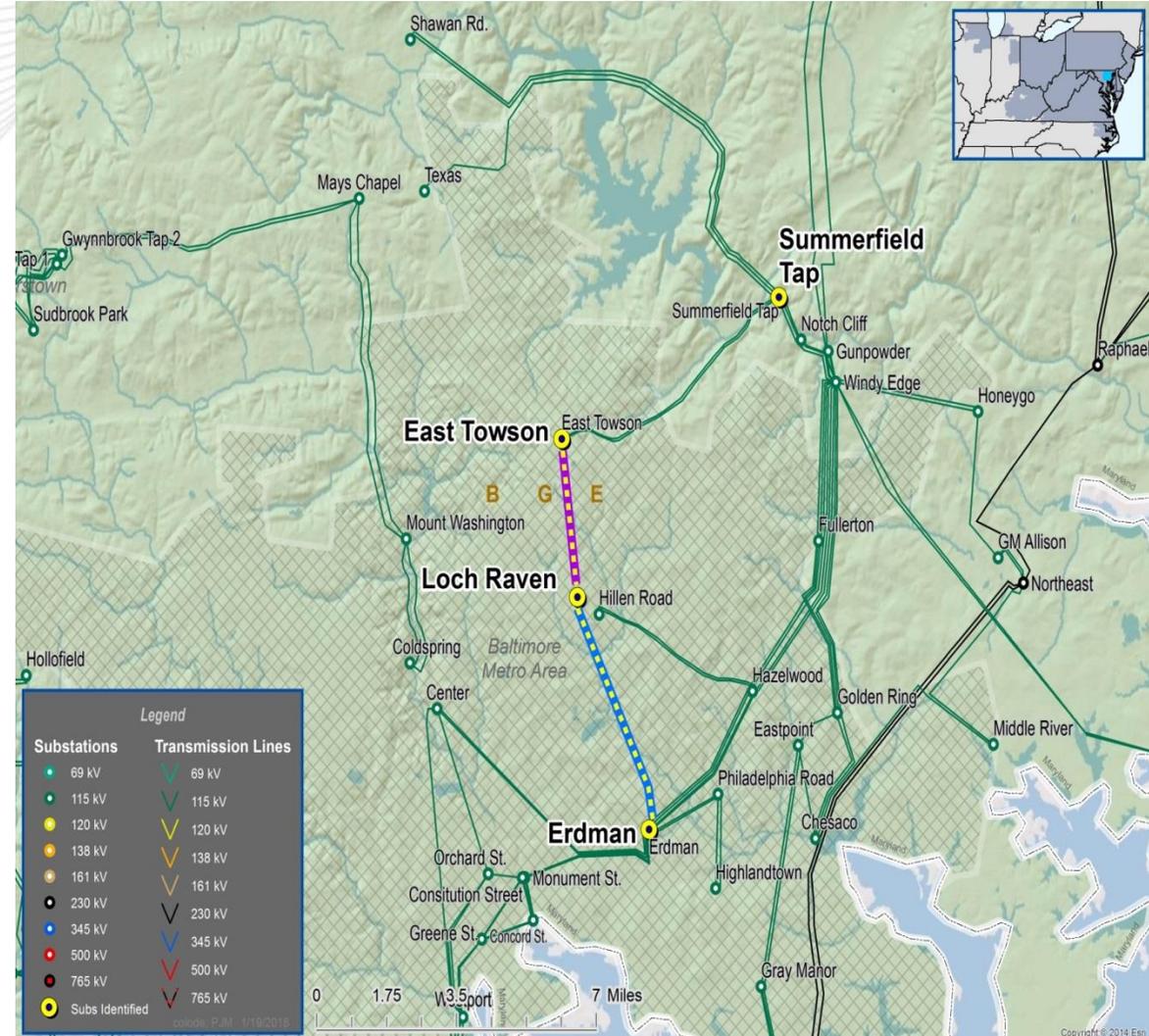
Selected Solution:

- Network East Towson substation to new Loch Raven Distribution Substation with UG 115kV XLPE cables
- Install East Towson and Summerfield substation breakers and equipment to accommodate transmission network. (S1632)

Estimated Cost: \$93 M

Expected In-Service: 6/1/2024

Status: Conceptual



BGE Transmission Zone: Supplemental Project

Rebuild Five Forks – Windy Edge 115kV (110511, 110512)

Previously Presented : 05/25/2018

Problem Statement:

Aging Infrastructure

- The 20.7 mile Five Forks – Windy Edge 110511/110512 115kV Circuit pair (Conductors/Towers/Foundations) was originally constructed during the period between 1910 and 1918
- Construction of the **115kV** circuit pair is two single circuit lattice towers contained in a single ROW with a circuit configuration that is conducive to Avian related issues
- Original towers were re-conducted between 1965 and 1966 with 1033.5kcm 45/7 ACSR & 634.9kcm 12/7 ACAR conductor
- Foundations are grillage type foundations that have shown signs of rust, particularly at the air/surface line
- Porcelain insulation hardware is deteriorating/losing glaze preventing adequate washing, allowing dirt and dust to accumulate, compounded the tower location through farm fields where dirt is regularly disturbed
- Directly serves two BGE distribution substations and two transmission customers along with providing network transmission to BGE system

Performance - BGE's 4th worst performing circuit pair

- Avian related issues as a result of conductor spacing/configuration
- Farm equipment tower hits
- Normalized outage rate of 6.1 operations/100mi/year (110511), 2.03 operations/100mi/year (110512)

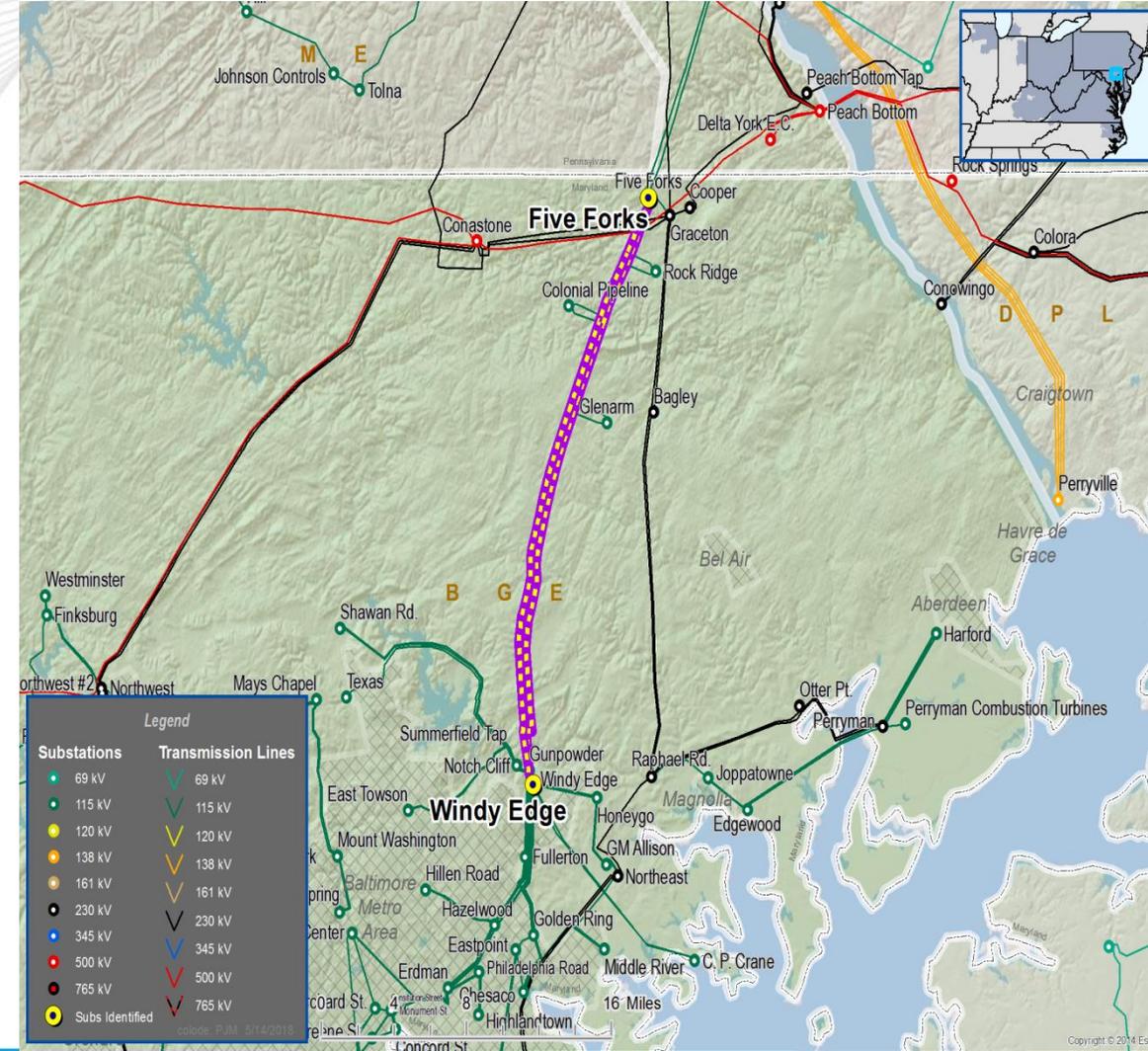
Selected Solution:

- Rebuild both **Five Forks – Windy Edge 115kV (110511, 110512)** circuits using steel monopole, double circuit construction with sufficient capacity to support future needs. **(\$1670)**
- Addresses line and customer reliability, aging infrastructure, ground-line impact, future capacity requirements

Estimated Cost : \$60M

Expected In-Service: 12/31/2022

Status: Conceptual



BGE Transmission Zone: Supplemental Project Transmission Supply to Sparrows Point Redevelopment

Previously Presented : 05/25/2018

Problem Statement:

- Redevelopment of the Sparrows Point peninsula
- Retirement of existing customer owned Finishing Mill and Steel Side substations
- Planned (BGE Distribution) construction of new 34kV&13kV (Fitzell) substation located near existing Steel Side substation to supply ~95 MW of new forecasted distribution customer demand on peninsula

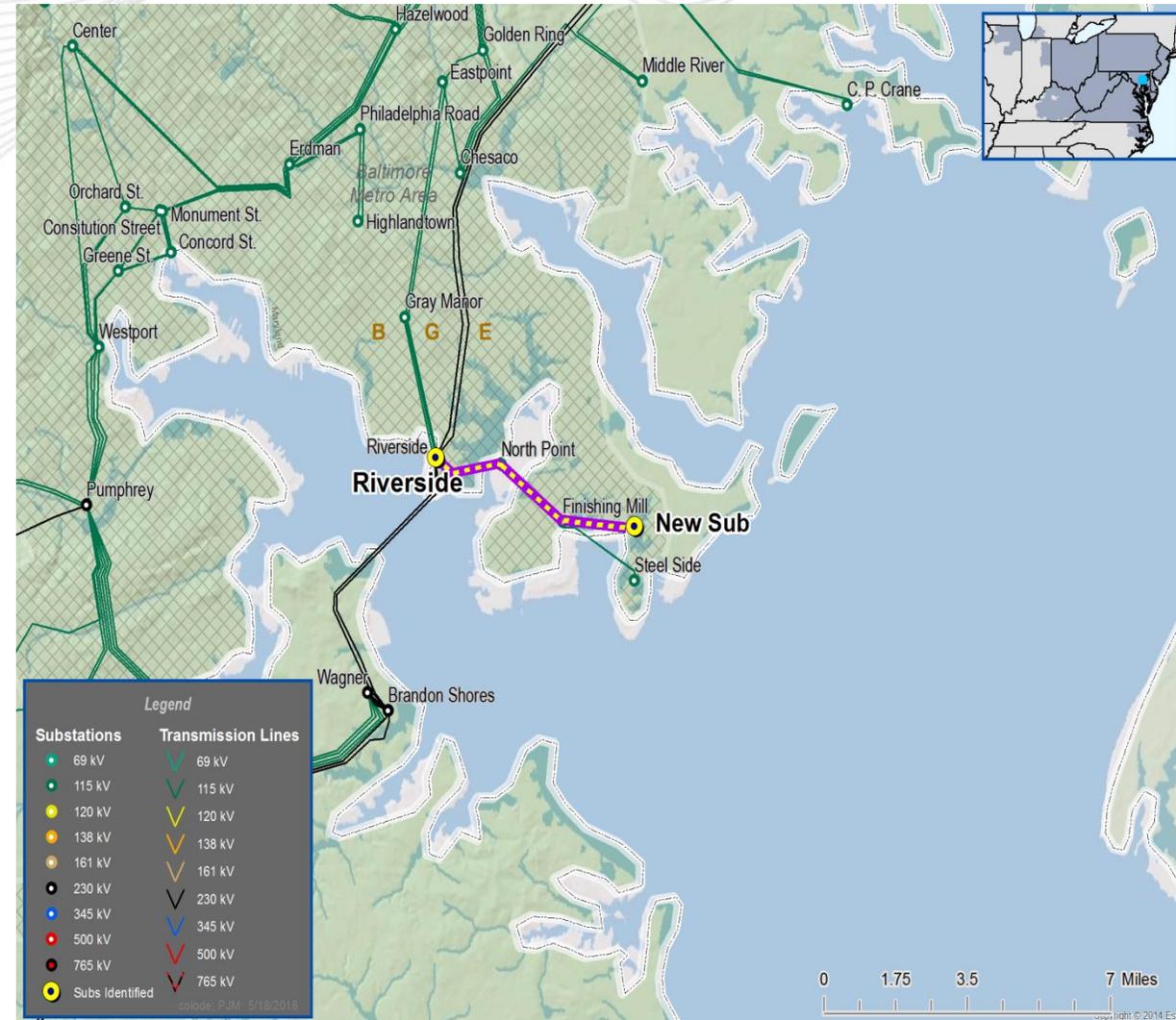
Selected Solution:

- Build new 115kV station to supply 34kV & 13kV distribution station. **(S1671)**
- Provide diverse overhead transmission supplies from Riverside and Windy Edge substations to new 115kV station
- Retire remainder of unused transmission infrastructure at Finishing Mill and Steel Side Substations.

Estimated Project Cost: \$45M

Expected In Service Date: 12/1/2026

Status: Conceptual



PSE&G



PSE&G Transmission Zone: Supplemental Project Rebuild Circuit 5038 Highway Ramp Tower

Problem Statement:

- PSEG recently have performed LiDAR analysis and identified a conflict on 5038 causing a deration.
- Two spans of the existing New Freedom – East Windsor (5038) 500 kV circuit conductors are currently hanging above the right shoulder of a reconfigured on-ramp to a major highway and doesn't meet minimum NESC ground clearance without de-rating the circuit.

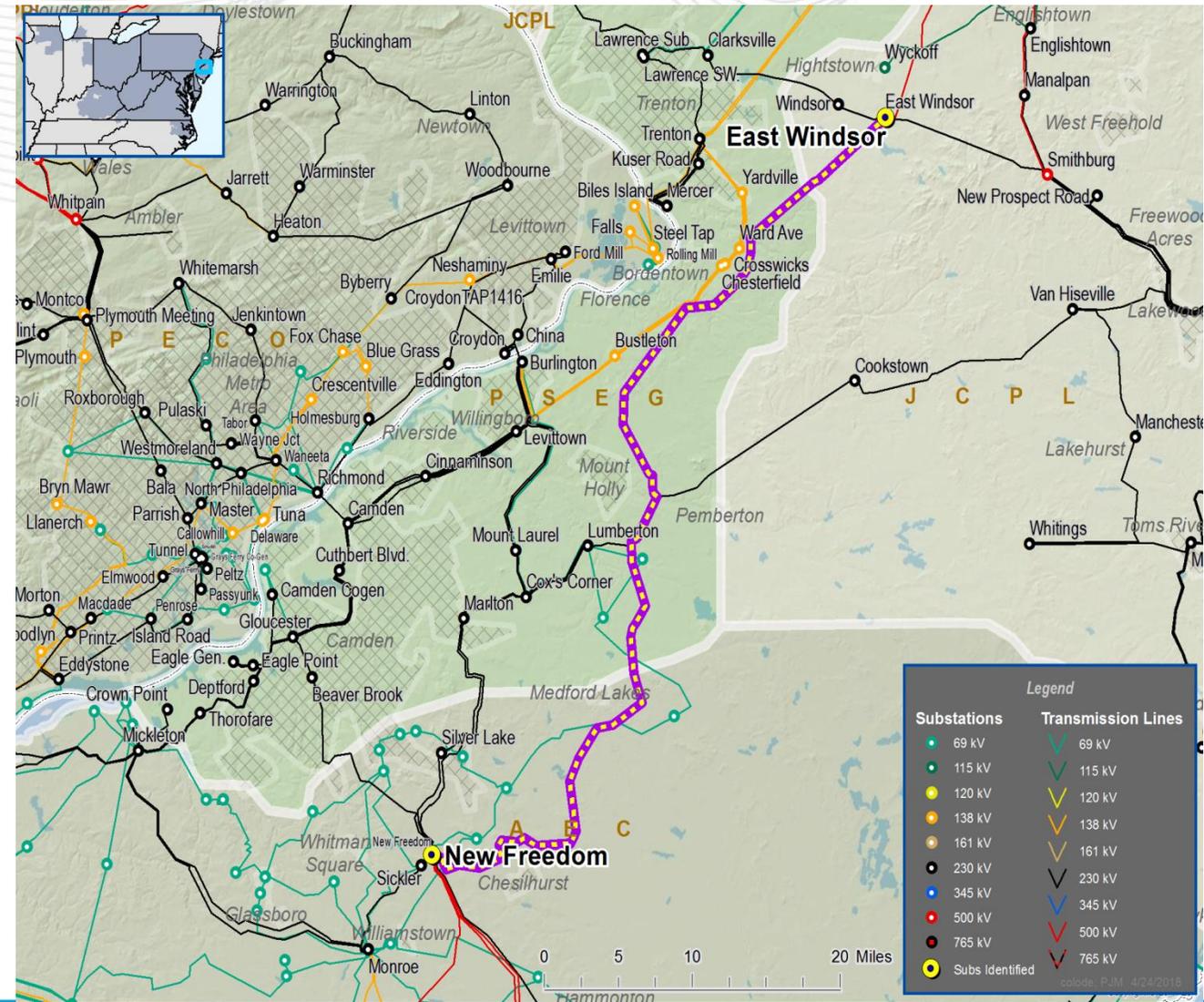
Selected Solutions:

- Rebuild/Replace Two spans of the exiting 5038 (New Freedom - East Windsor 500 kV) circuit. Replace the tower structure with an offset to the east of the ramp. This project will provide a clearance that meets NESC requirements along with PSE&G standards without derating the circuit. **(\$1655)**

Estimated Project Cost: \$3.9M

Projected IS date: 12/31/2018

Project Status: Engineering





PSEG Transmission Zone: Supplemental Project Harvey Switching Station

Previously Presented: 12/19/2017

Problem Statement:

Equipment Material Condition, Performance and Risk:

As discussed during the 8/31/2017 SRRTEP Mid Atlantic meeting, there are several 26kV and 13kV substations in the Clifton area with equipment in poor condition. The majority of equipment at Allwood, Nutley, and Van Houten Substations is over 60 years of age and must be addressed.

Selected Solution:

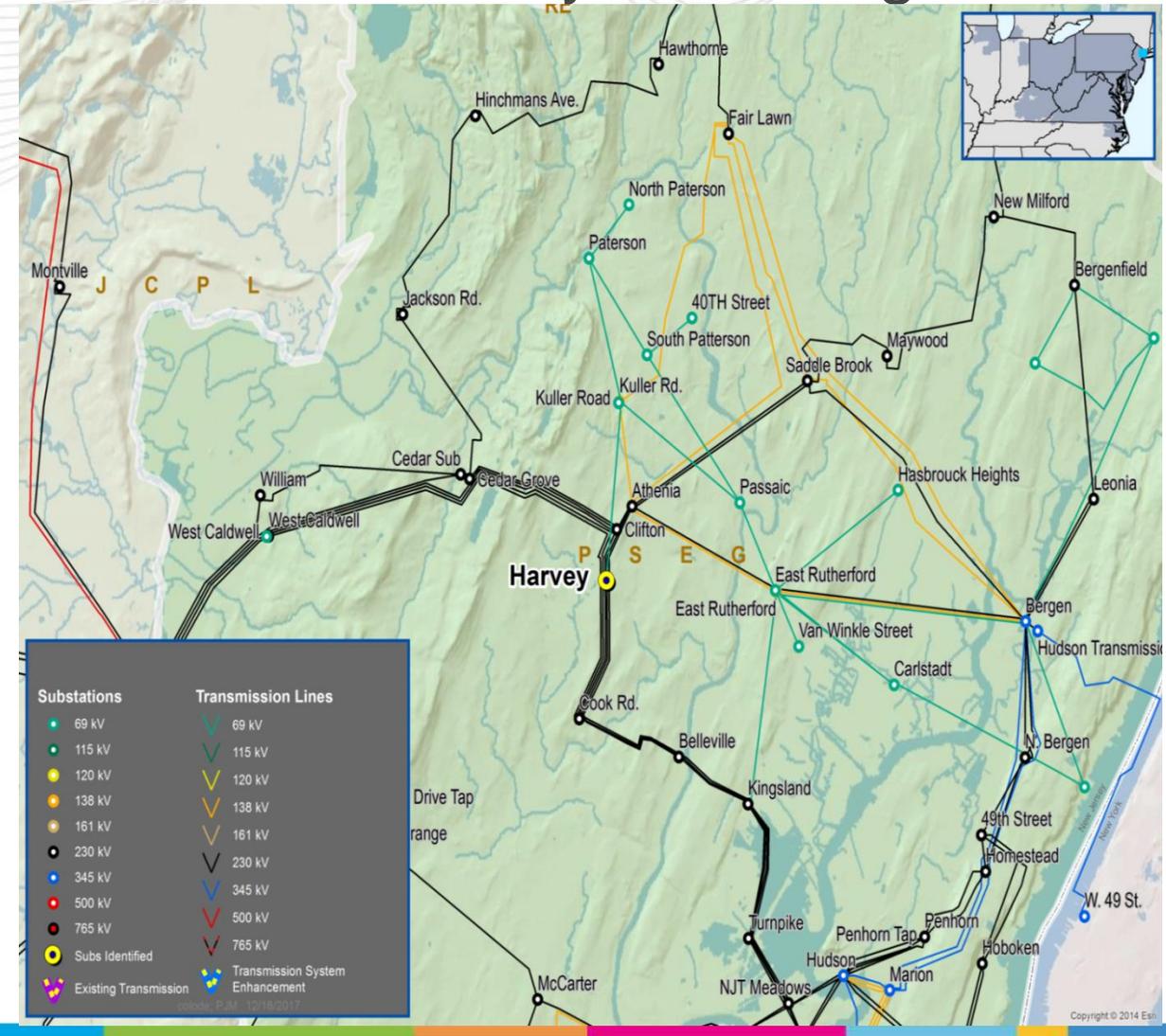
Construct a new 230/69kV and a new 69/13kV station in the Clifton area on the existing ROW. (S1575)

- Construct a new 230/69kV (Harvey) station in the Clifton area.
- Install 230kV ring bus with two (2) 230/69kV transformers and 69kV ring bus at Harvey Switching Station.
- Loop in overhead 230kV (Athenia – Cook Rd.) line to Harvey Switching Station.
- Install two (2) 69/13kV transformers fed from Harvey 69kV ring bus.
- Provides a source for a third supply to Kuller Road from Harvey 69 kV.

Estimated Cost: \$195 M

Expected In-Service: 12/30/2022

Status: Engineering



PSEG Transmission Zone: Supplemental Project Cranbury Area Network

Previously Presented: 03/23/2018

Problem Statement:

Load Growth:

The Cranbury area is currently served by long 13kV circuits from Plainsboro and Devils Brook. Of the eight Plainsboro and Devils Brook 13kV circuits feeding this area, five experienced overloads in 2016, while the remaining three were loaded at over 75%. PSE&G continues to receive new business requests in the area.

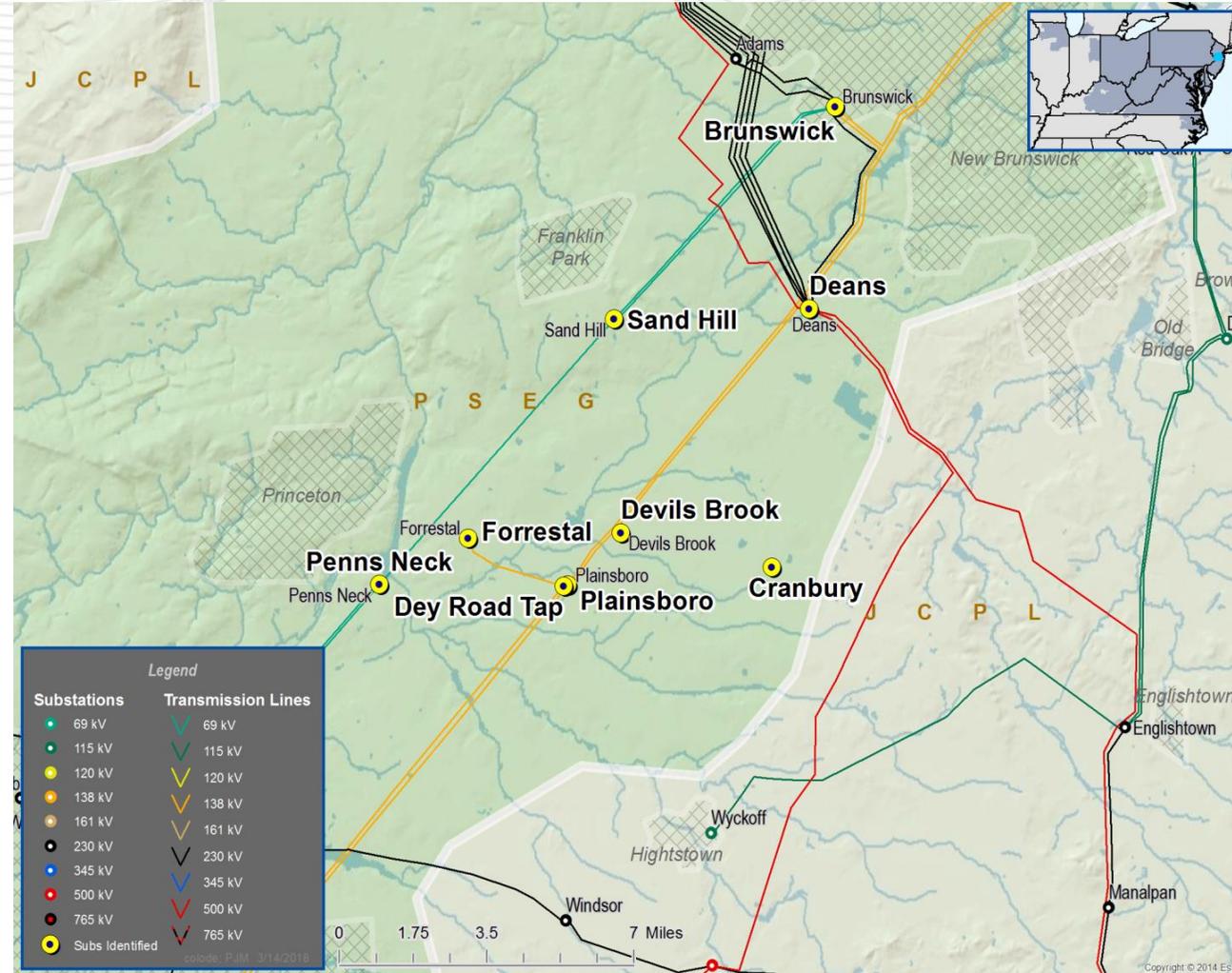
Network Availability:

The Cranbury area is at the edge of PSE&G territory and does not have a transmission supply source to feed a new station.

Operational Flexibility and Efficiency, Customer Service:

Sand Hills is a 69/13kV station that serves around 20,000 customers with load of around 80MVA. A stuck breaker event on the 69kV bus would cause the loss of two lines and a capacitor bank. This would cause the voltage on the 69kV bus to drop by roughly 10%, resulting in a voltage below 0.95 pu.

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PSEG Transmission Zone: Supplemental Project Cranbury Area Network

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Selected Solution:

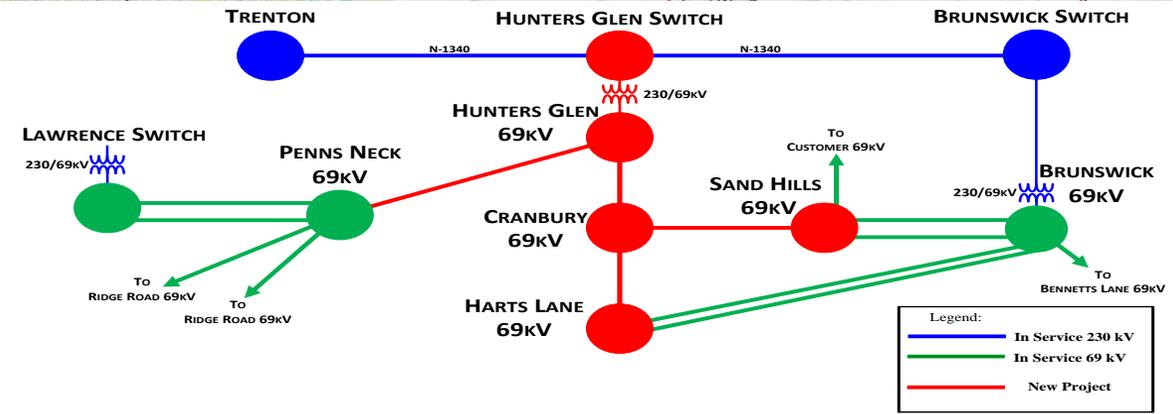
Construct a new 69/13kV station in Cranbury, construct a 230/69kV station at Plainsboro (Hunters Glen), and reconfigure 69kV bus at Harts Lane and Sand Hills. **(\$1647)**

- Install a 69kV ring bus, two (2) 69/13kV transformers, and 18 MVAR capacitor bank at new Cranbury station.
- Reconfigure 230kV bus, install a 69kV ring bus, and install one (1) 230/69kV transformer at Hunters Glen.
- Convert 69kV straight bus to 69kV ring bus at Harts Lane to provide a new line position.
- Convert 69kV straight bus to 69kV breaker-and-a-half bus at Sand Hills to resolve voltage issues and provide a line position.
- Construct a 69kV network between Cranbury, Harts Lane, Hunters Glen, Penns Neck, and Sand Hills.

Estimated Project Cost: \$307 M

Projected IS date: 11/31/2021

Status: Engineering





PSEG Transmission Zone: Supplemental Project Academy Street 69kV Conversion

Problem Statement:

Infrastructure Resilience:

Academy St is currently below FEMA 100 year flood elevations and is at risk in case of a major storm event.

Equipment Material Condition, Performance and Risk:

The majority of the equipment at Academy St is over 60 years of age and must be addressed.

Selected Solution:

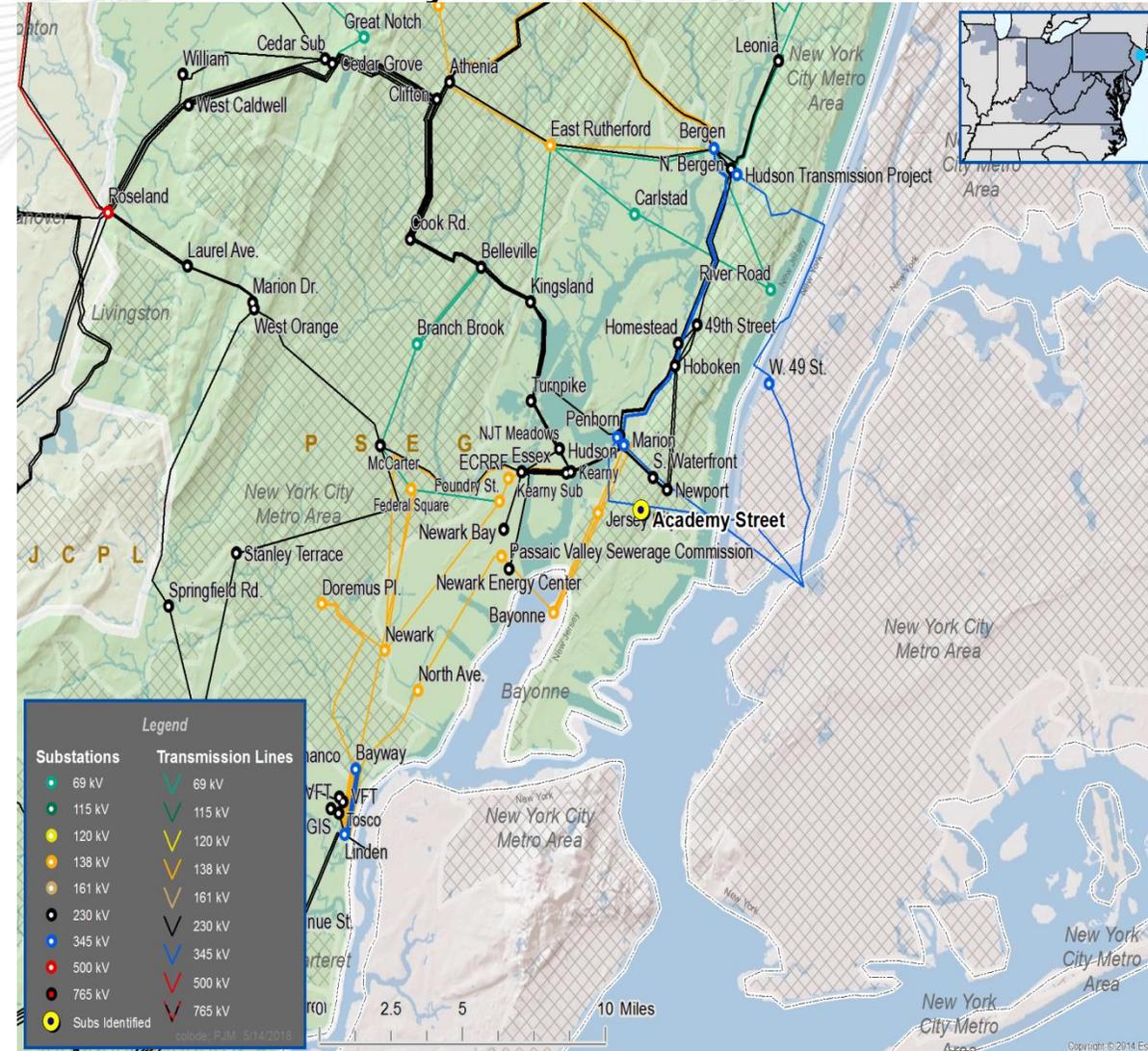
Eliminate Academy St and construct a new station at a nearby location. **(\$1674)**

- Purchase new property in Jersey City. Property negotiations are ongoing
- Install a 69kV ring bus and two (2) 69/13kV transformers at the new property.
- Construct a 69kV network between the following stations: Greenville, Kearny, Madison, and the new station.
- Easier constructability and logistics.

Estimated Project Cost: 90M

Expected IS Date: 12/31/2022

Status: Engineering





PSEG Transmission Zone: Supplemental Project Woodlynne & State Street 69kV Conversions

Problem Statement:

Infrastructure Resilience:

State Street and Woodlynne are currently below FEMA 100-year flood elevations and are at risk in case of a major storm event.

Equipment Material Condition, Performance and Risk:

The majority of the equipment at State St and Woodlynne is over 60 years of age and must be addressed.

Selected Solution:

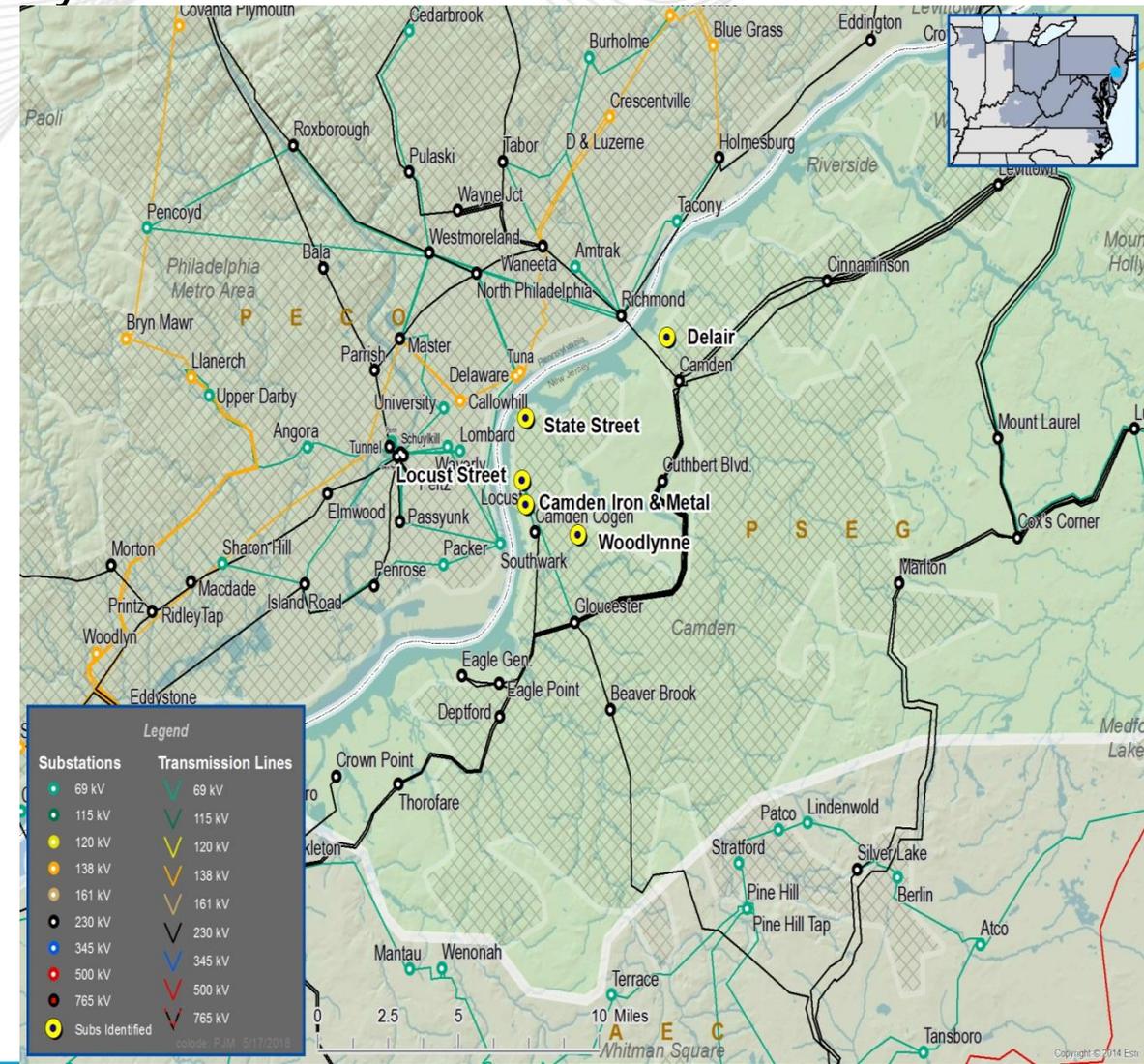
Eliminate State St and construct a new station at a nearby location. Raise and rebuild Woodlynne above FEMA flood elevation. **(\$1675)**

- At a new location, install a 69kV ring bus and three (3) 69/4kV transformers to feed State St load.
- At Woodlynne, purchase adjacent property and install a 69kV ring bus with two (2) 69/13kV transformers.
- Construct a 69kV network between the following stations: Camden, Gloucester, Delair, Locust St, Woodlynne, and the new station.

Estimated Project Cost: 153M

Expected IS Date: 06/01/2022

Status: Engineering





PSEG Transmission Zone: Supplemental Project Orange Heights Switching Station

Previously Presented : 07/20/2018

Problem Statement:

Infrastructure Resilience: Orange Valley is a 26kV station currently below FEMA 100 year flood elevations and is at risk in case of a major storm event.

Equipment Material Condition, Performance and Risk: Station equipment at East Orange and Orange Valley 26kV supplied stations has been identified as being in poor condition and must be addressed. Both of these stations are Type C stations, which have metal clad buildings that rust and leak over time, causing bus failures. East Orange was installed in 1959 and serves over 21,000 customers and 34 MW of load. Orange Valley was installed in 1952 and serves over 7,000 customers and 16 MW of load.

Selected Solution:

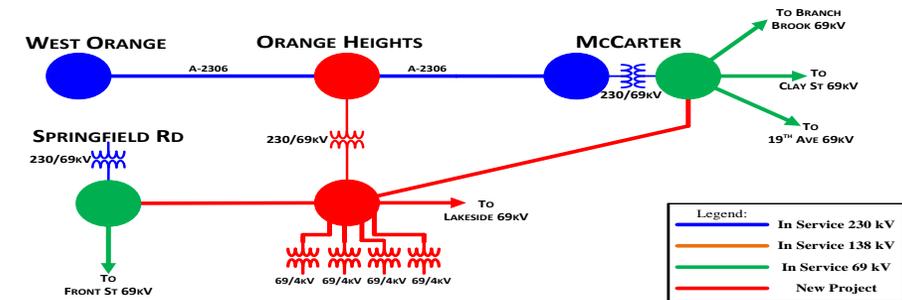
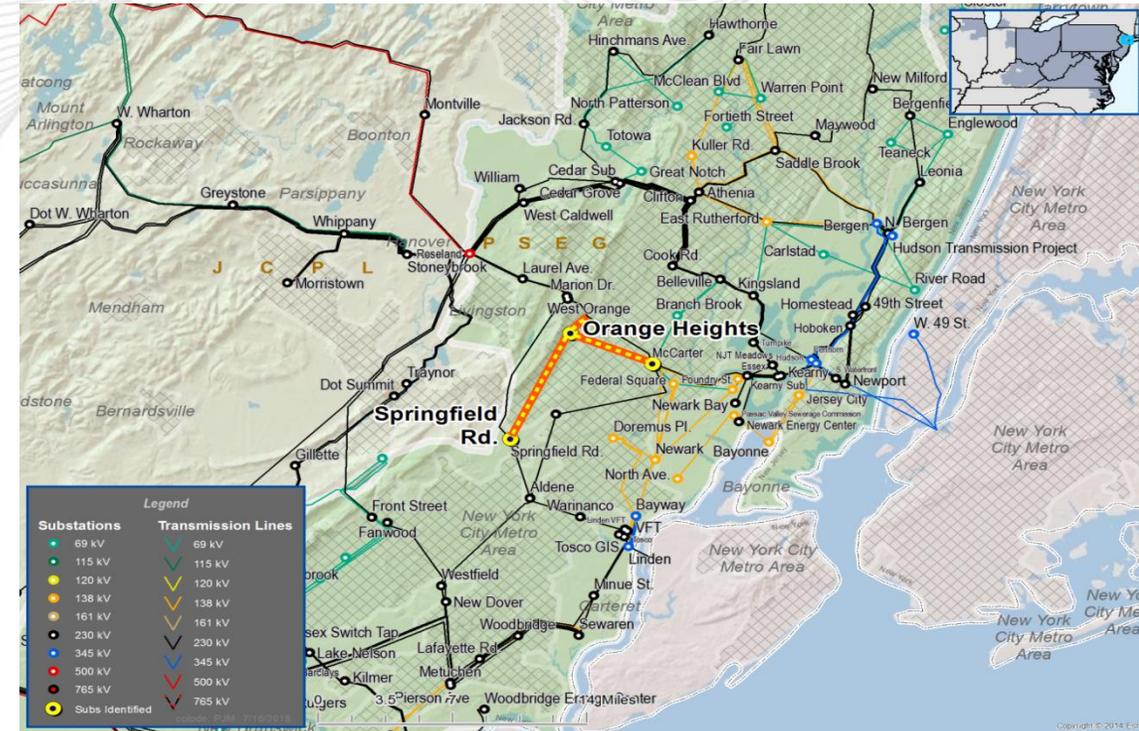
Construct a 230/69/4kV station near the location of Orange Valley. (\$1722)

- Purchase new property near Orange Valley.
- Install a 230kV ring bus with one (1) 230/69kV transformer.
- Install a 69kV breaker-and-a-half bus with three (3) 69/4kV transformers.
- Construct a 69kV network between Lakeside, McCarter, Springfield Rd, and the new station.
- Enables retirement of Orange Valley and East Orange 26kV Substations

Estimated Project Cost: \$ 328M

Expected IS date: 10/31/2022

Status: Engineering





PSEG Transmission Zone: Supplemental Project Lakeside 69kV Conversion

Previously Presented : 07/20/2018

Problem Statement:

Infrastructure Resilience:

Lakeside is a 26kV station that is currently below FEMA 100 year flood elevations and is at risk in case of a major storm event.

Equipment Material Condition, Performance and Risk:

Station equipment at Lakeside has been identified as being in poor condition because of its extreme age. In addition, the physical building is deteriorated and must be addressed. The majority of the equipment at the station is still original. Lakeside was installed in 1929 and serves over 10,000 customers and 22 MW of load.

Selected Solution:

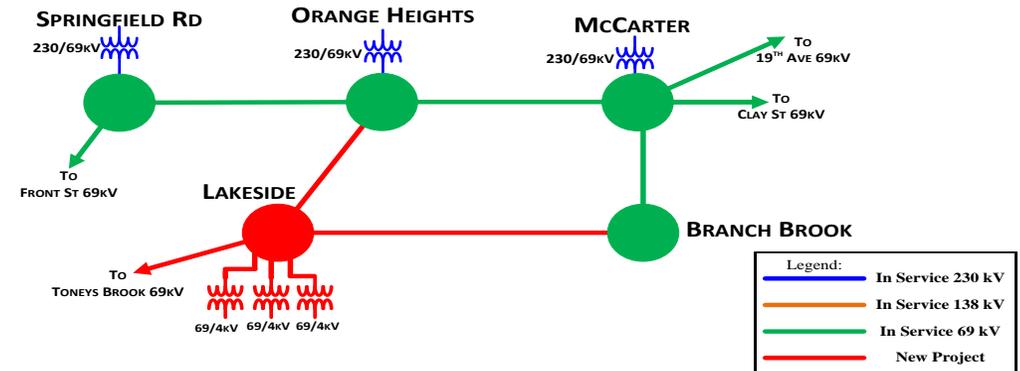
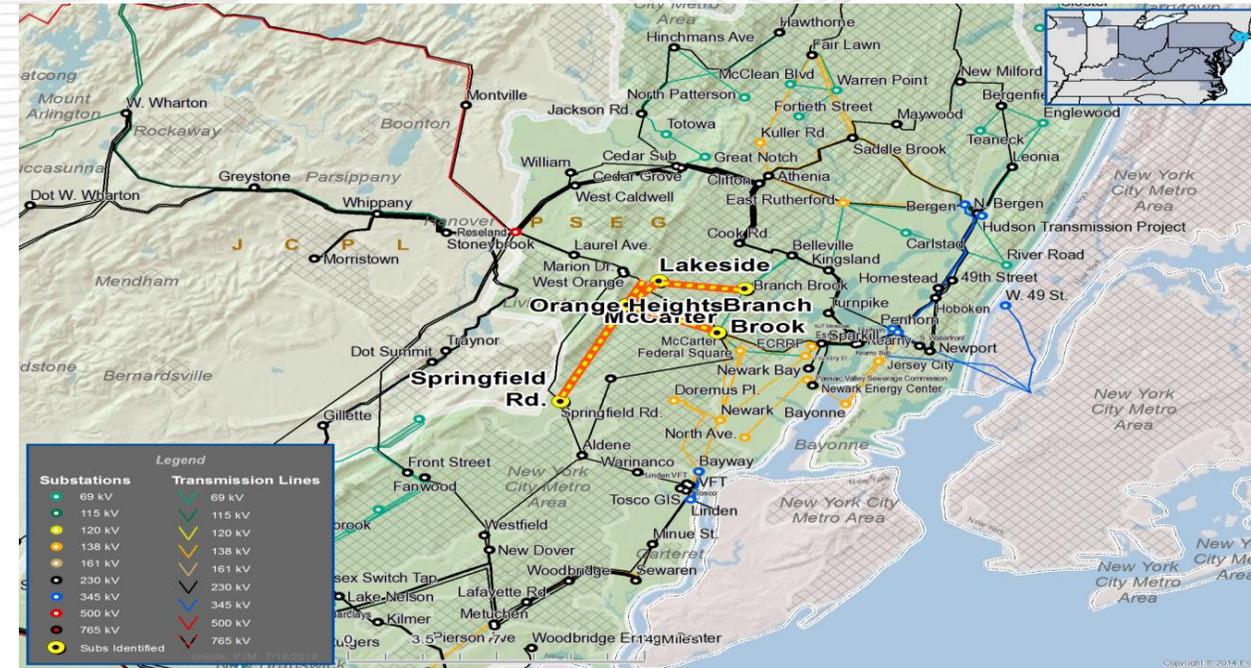
Relocate Lakeside outside of the FEMA flood zone. (S1723)

- Purchase property to relocate the Lakeside station.
- Install a 69kV ring bus and three (3) 69/4kV transformers at the new property.
- Construct a 69kV network between the following stations: Branch Brook, Orange Heights, Toney's Brook, and the new station.

Estimated Project Cost: \$106M

Expected IS date: 10/31/2022

Status: Engineering





PSEG Transmission Zone: Supplemental Project Toney's Brook 69kV Conversion

Previously Presented : 07/20/2018

Problem Statement:

Infrastructure Resilience: Toney's Brook is a 26kV station that is currently below FEMA 100 year flood elevations and is at risk in case of a major storm event.

Equipment Material Condition, Performance and Risk: Station equipment at Toney's Brook 26kV supplied station has been identified as being in poor condition and must be addressed. This station is a Type C station, which has metal clad buildings that rust and leak over time, causing bus failures. Toney's Brook was installed in 1964 and serves over 9,000 customers and 23 MW of load.

Selected Solution:

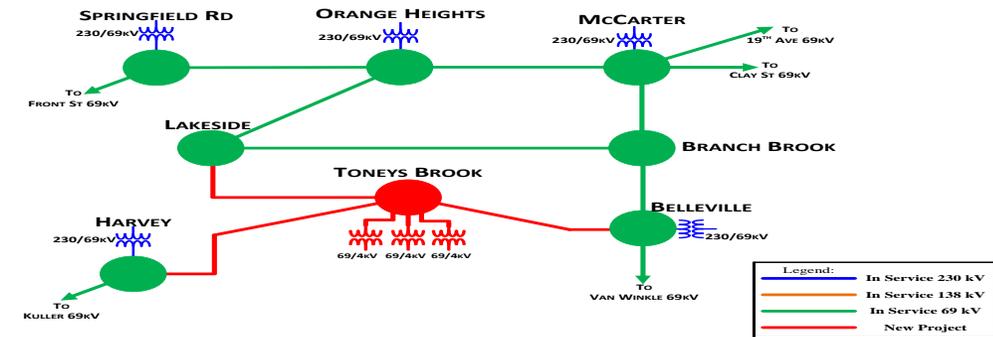
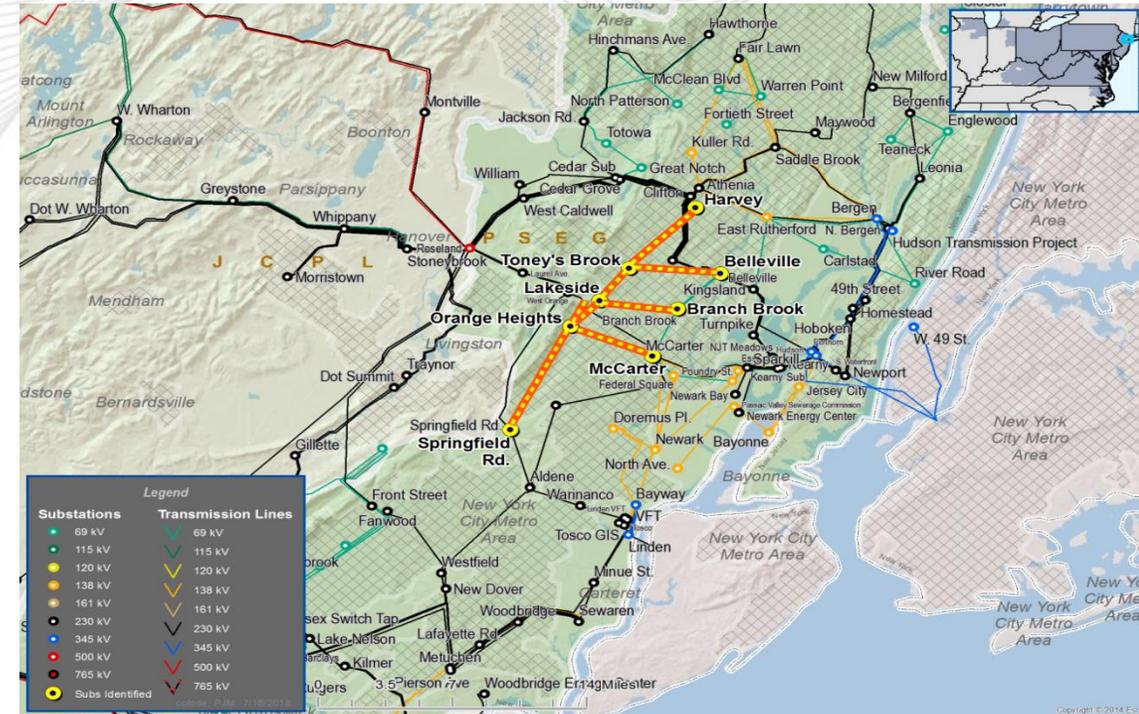
Raise and rebuild Toney's Brook above FEMA flood elevation. (S1724)

- Purchase neighboring property to accommodate new construction.
- Install a 69kV ring bus and three (3) 69/4kV transformers at Toney's Brook.
- Construct a 69kV network between the following stations: Belleville, Harvey, Lakeside, and Toney's Brook.

Estimated Project Cost: \$98M

Expected IS date: 10/31/2022

Status: Engineering





PSEG Transmission Zone

Need Number: PSEG-2018-0001
Need Presented: 9/21/2018
Solution Presented: 10/29/2018
Selected Solution Posted: 12/19/2018
Process Stage: Local Plan Submission

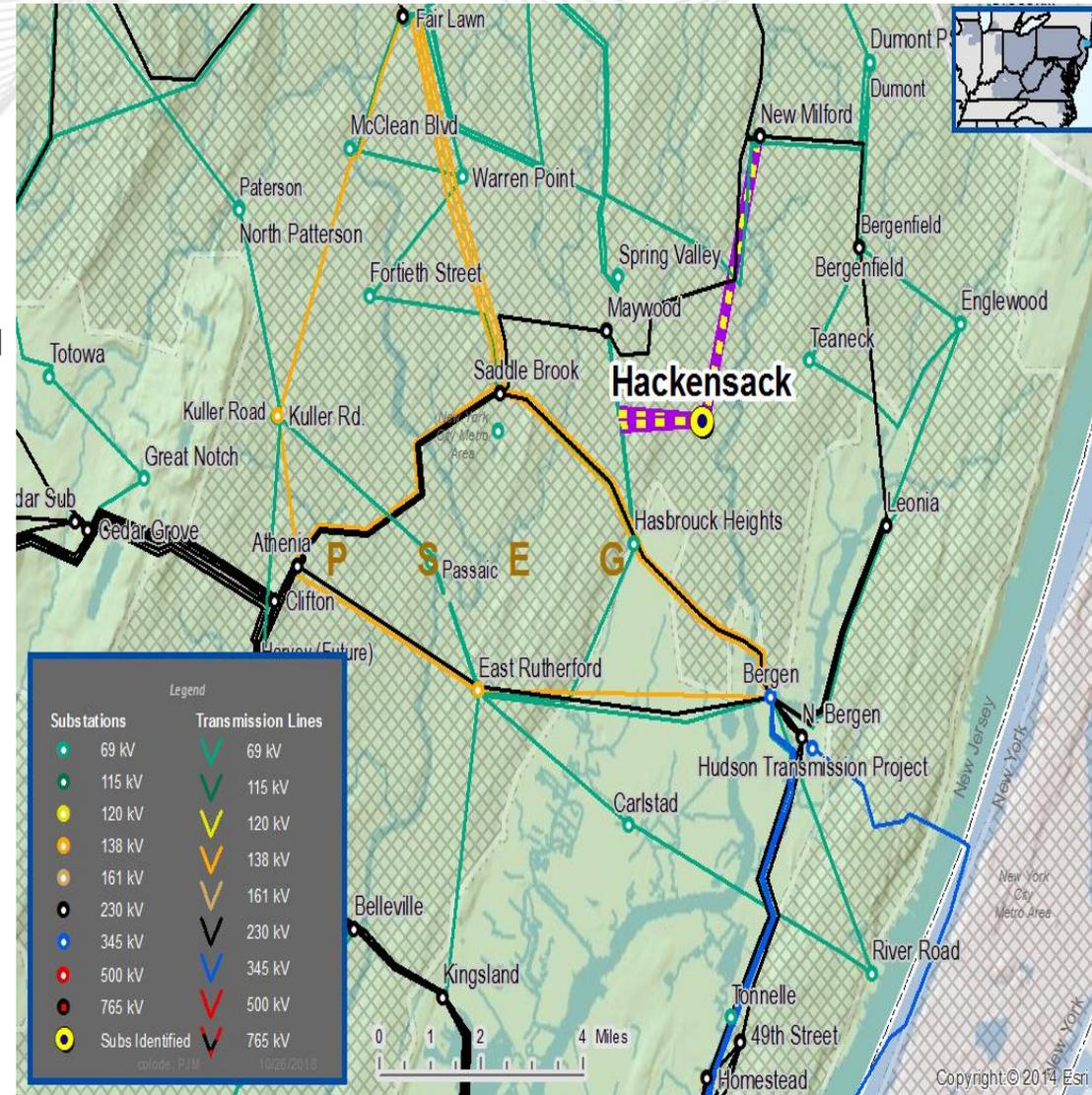
Supplemental Project Drivers: Equipment Material Condition, Performance and Risk

Problem Statement:

- Hackensack is supplied by 26kV circuits with increasing performance problems.
 - Over the past decade, the 26kV supply circuits have seen significant momentary and extended outages, with total duration of hundreds of hours.
- Station equipment at Hackensack has been in service for over 60 years. This equipment has been identified as being in poor condition and needs to be addressed.
 - Hackensack serves roughly 5,000 customers and 30 MVA of load

Specific Assumption References:

- [August 2017 26kV to 69kV PSE&G Presentation](#)
- [PSE&G 2018 Annual Assumptions](#)





PSEG Transmission Zone

Need Number: PSEG-2018-0001

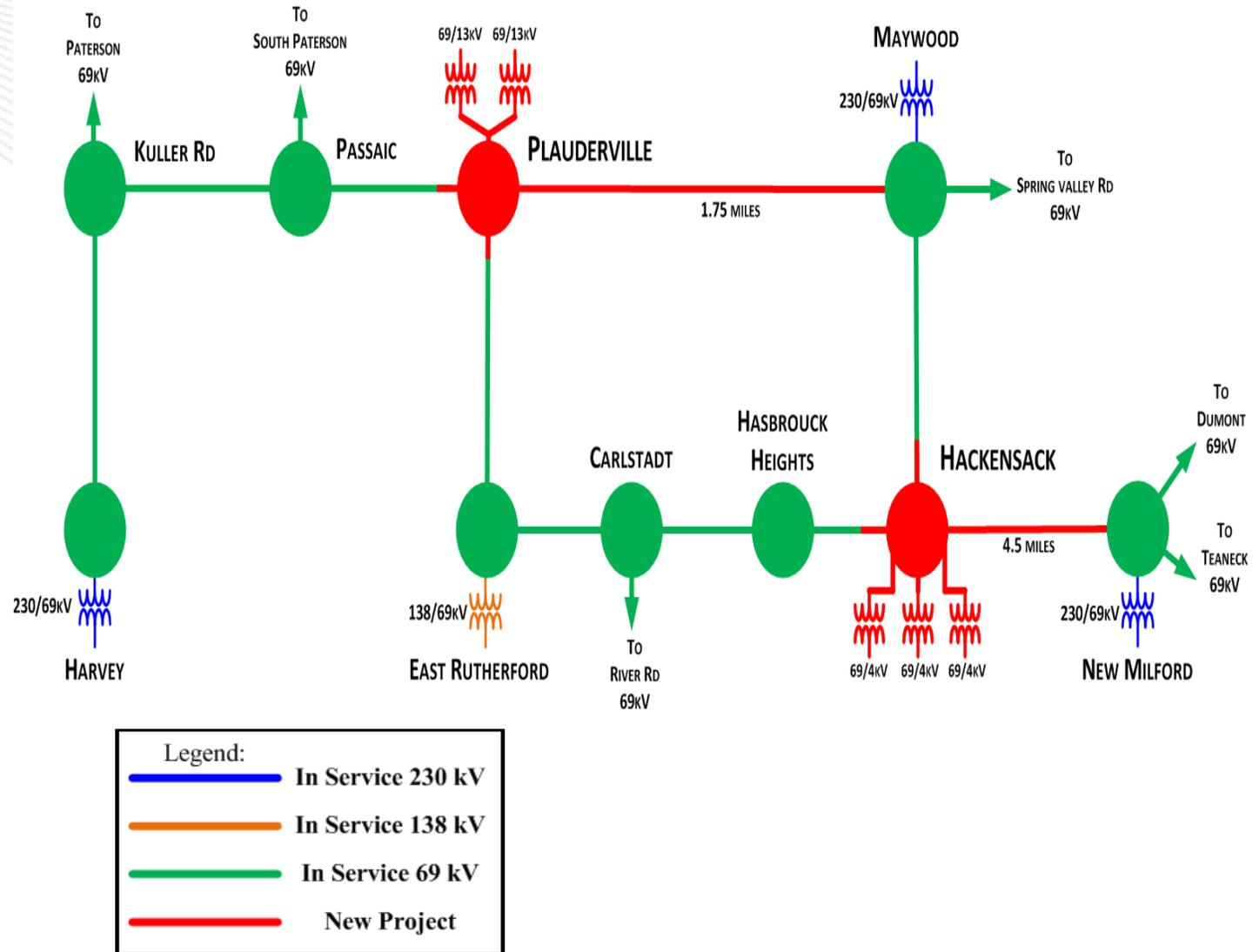
Solution:

- Hackensack Station Upgrade
 - Install a 69kV ring bus with three (3) 69/4kV transformers.
 - Construct a 69kV network between Hackensack, Hasbrouck Heights, Maywood, and New Milford.

Estimated Cost: \$83M

Projected In-Service Date: 05/2023

Supplemental Project Number: S1752





PSEG Transmission Zone

Need Number: PSEG-2018-0002

Need Presented: 9/21/2018

Solution Presented: 10/29/2018

Selected Solution Posted: 12/19/2018

Process Stage: Local Plan Submission

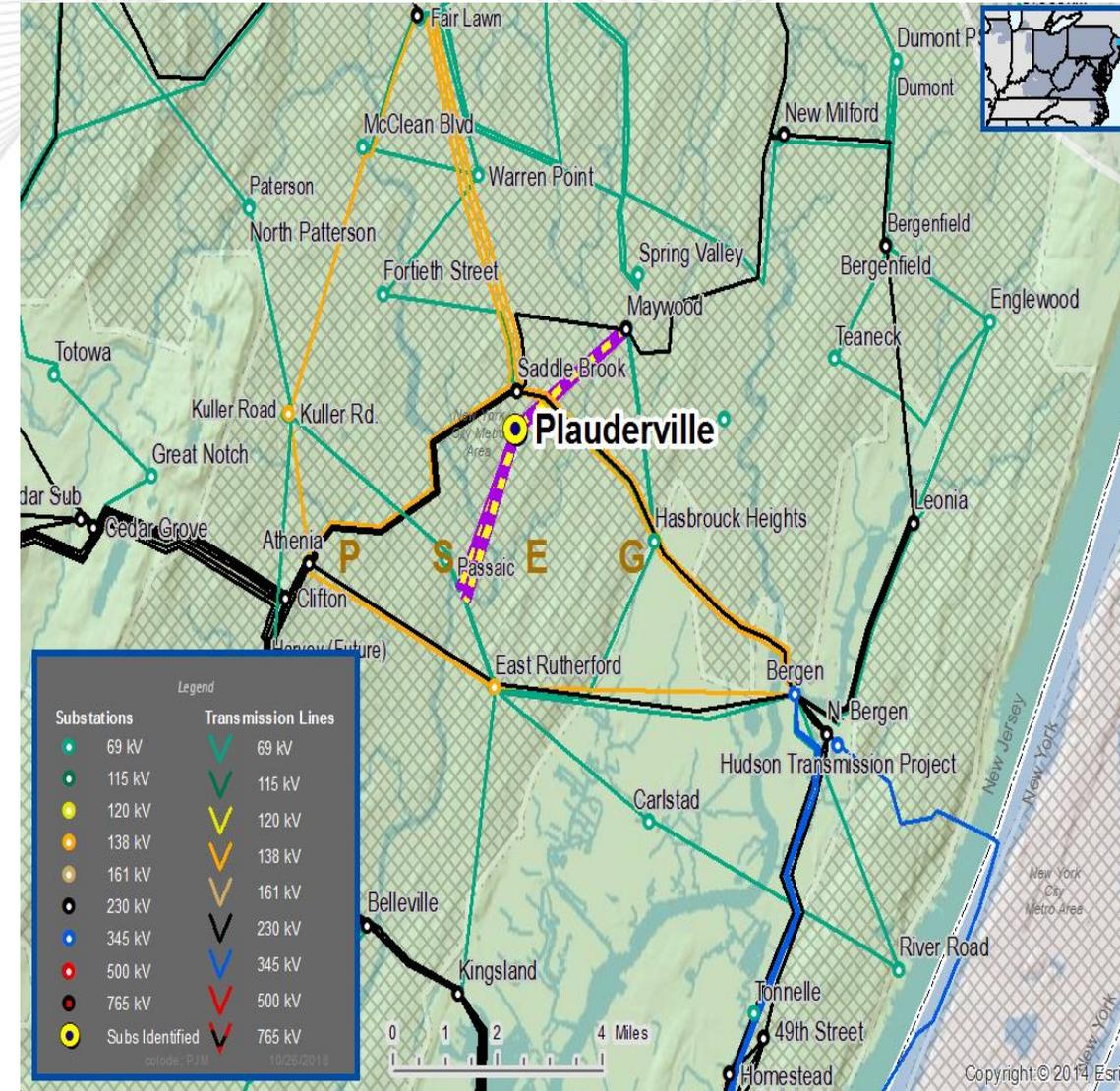
Supplemental Project Drivers: Equipment Material Condition, Performance and Risk; Customer Service

Problem Statement:

- Plauderville is supplied by 26kV circuits with increasing performance problems.
 - Over the past decade, the 26kV supply circuits have seen significant momentary and extended outages, with total duration of hundreds of hours.
- Station equipment at Plauderville has been in service for over 60 years. This equipment has been identified as being in poor condition and needs to be addressed. The station has outdoor metal clad switchgear that has resulted in rust and leaks over time, which causes bus failures.
 - Plauderville serves roughly 3,000 customers and 15 MVA of load.
- Stations around Plauderville are at or near capacity. There is a need for additional capacity in the area.
 - Maywood serves roughly 26,000 customers and 110 MVA of load.
 - Saddle Brook serves roughly 35,000 customers and 137 MVA of load.

Specific Assumption References:

- [August 2017 26kV to 69kV PSE&G Presentation](#)
- [PSE&G 2018 Annual Assumptions](#)



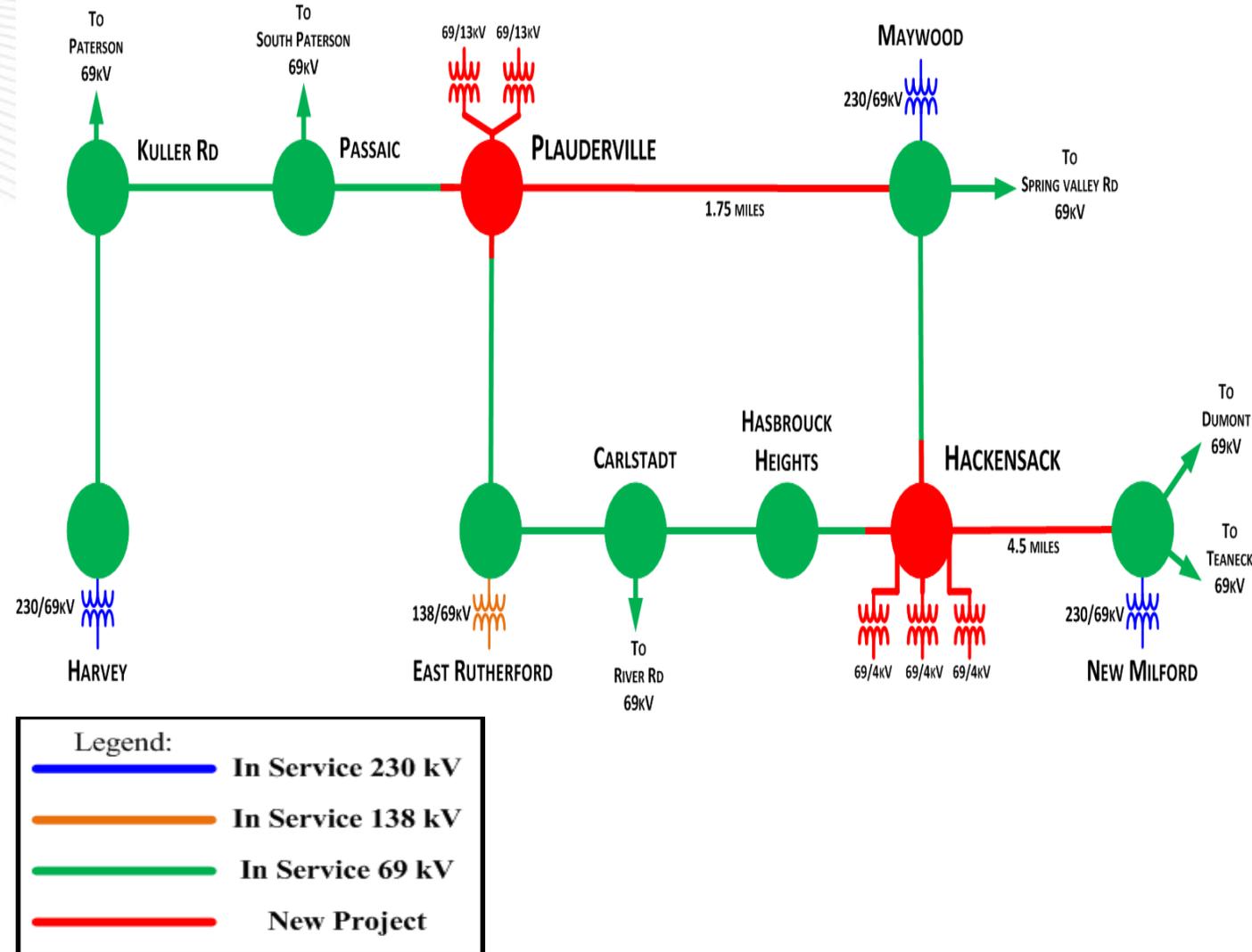


PSEG Transmission Zone

Need Number: PSEG-2018-0002

Solution:

- **Plauderville Station Upgrade**
 - Purchase nearby property to accommodate new construction.
 - Install a 69kV ring bus with two (2) 69/13kV transformers.
 - Construct a 69kV network between East Rutherford, Maywood, Passaic, and Plauderville.



Estimated Cost: \$94M

Projected In-Service Date: 05/2023

Supplemental Project Number: S1753

AEC

AEC Transmission Zone: Supplemental Project 69/12kV Wenonah Substation – Retire/Bypass Substation

Previously Presented: 03/23/2018

Problem Statement:

- Existing transformers at Wenonah, a 69/12kV distribution substation, are deteriorated. There are no existing 69kV breakers at the substation (current configuration is not built to existing standard).

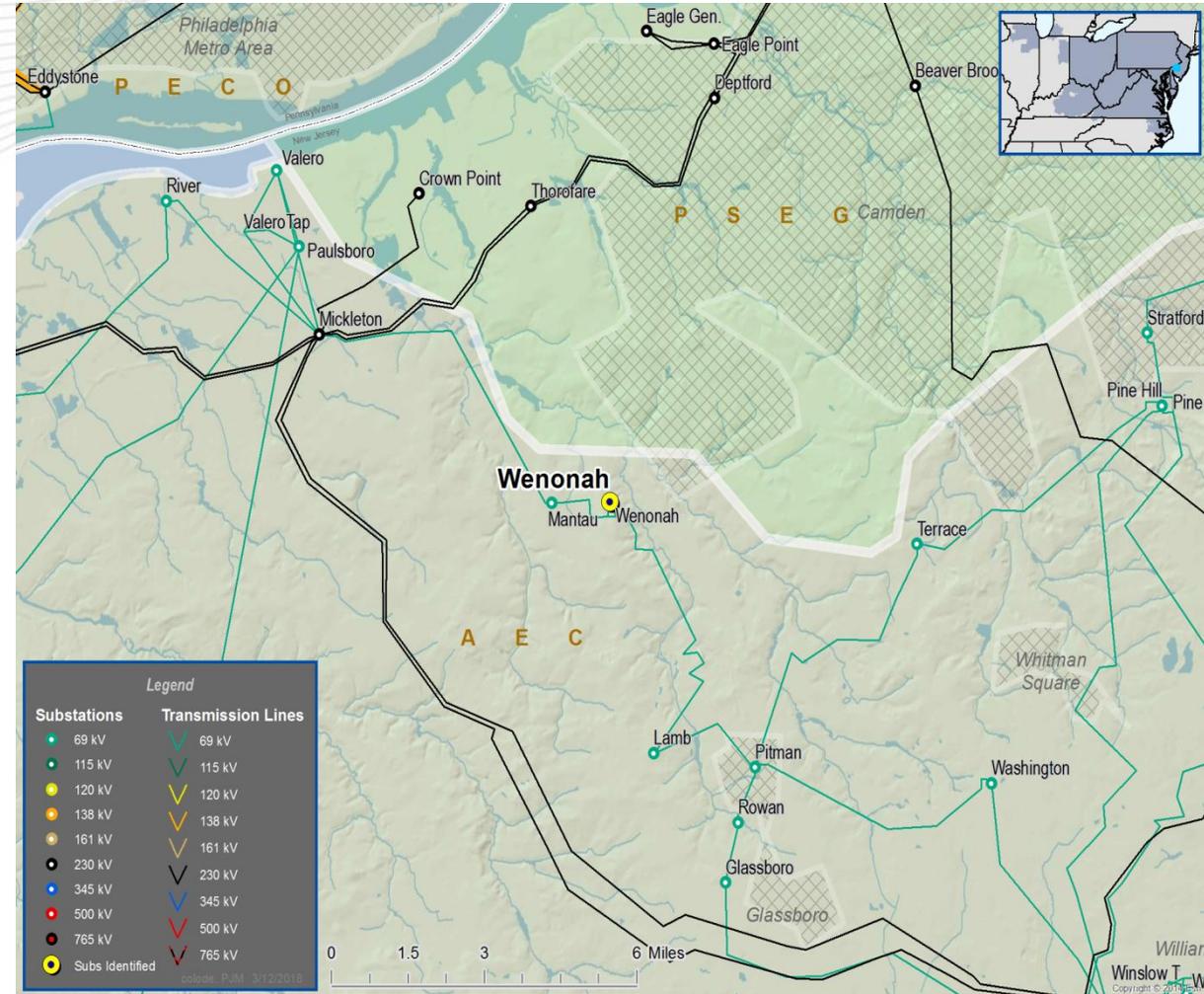
Selected Solution:

- Retire Wenonah substation, shift load to Mantua substation, and have the 69kV 0785 line from Mantua to Lamb bypass the existing Wenonah substation. (S1625)

Estimated Cost: \$0.3 M

Expected In-Service: 12/31/2020

Status: Engineering



AEC Transmission Zone: Supplemental Project Washington Substation – Convert Line Bus to Ring Bus

Previously Presented: 03/23/2018

Problem Statement:

- At Washington Substation, a 69/12kV distribution substation, the two existing transformers are projected to experience overloads beginning in summer 2020, requiring a third transformer.

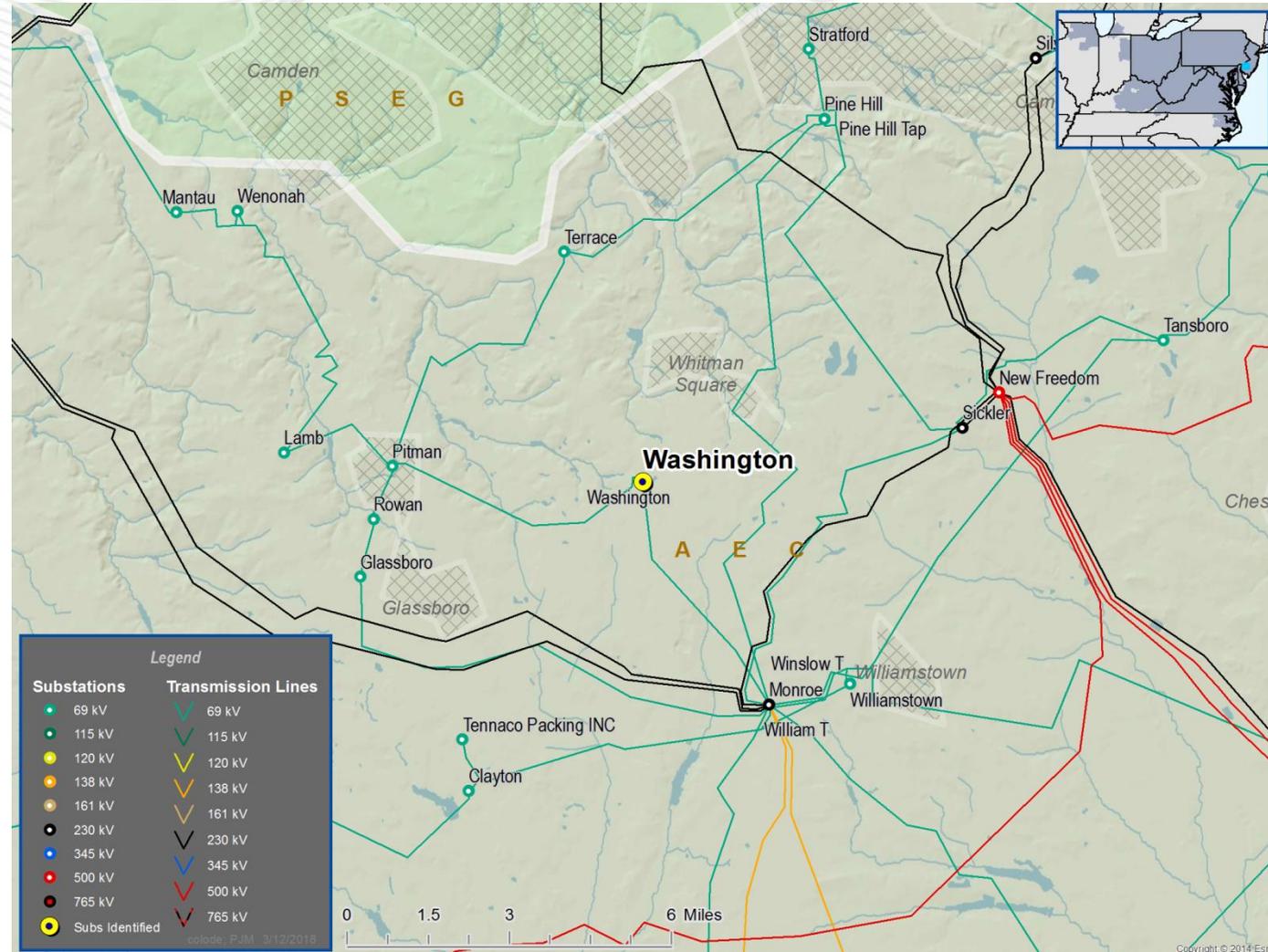
Selected Solution:

- Convert the Washington 69kV line bus to a ring bus to bring station up to AEC's current design standard while accommodating the additional transformer. (S1626)

Estimated Cost: \$5.6 M

Expected In-Service: 12/31/2020

Status: Engineering



AEC Transmission Zone: Supplemental Project

Middle – Rio Grande – Cape May 69 kV – Rebuild Line 0735 #2

Previously Presented: 03/23/2018

Problem Statement:

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

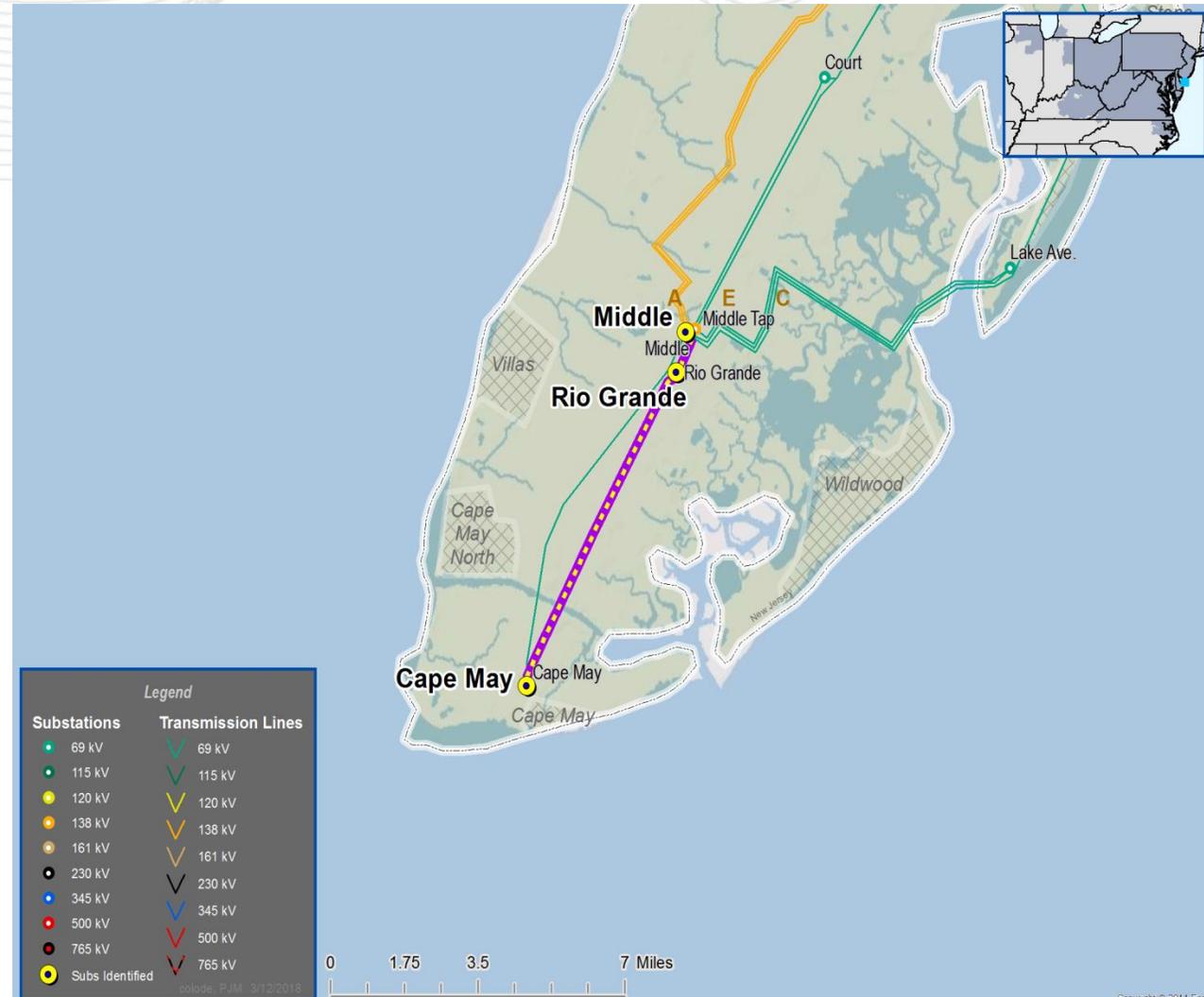
Selected Solution:

- Rebuild line 0735 #2 between Middle, Rio Grande, and Cape May substations. All structures, conductor, and static wire will be replaced with new weathering steel poles, conductor, and OPGW. (S1627)

Estimated Cost: \$9.9 M

Expected In-Service: 12/31/2021

Status: Engineering





AEC Transmission Zone: Supplemental Project Middle – Rio Grande – Cape May 69 kV – Rebuild Line 0735 #1

Previously Presented: 03/23/2018

Problem Statement:

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

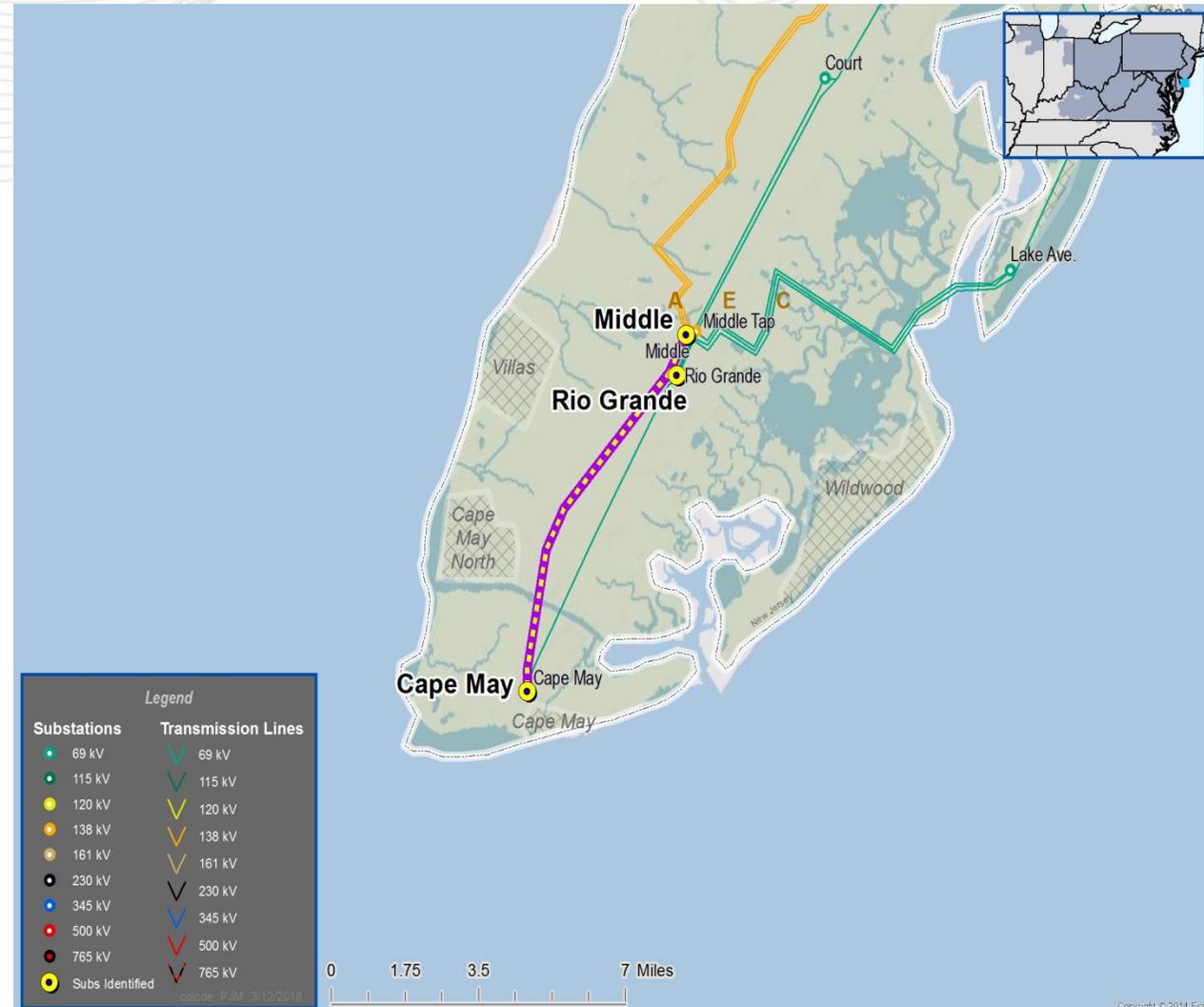
Selected Solution:

- Rebuild line 0735 #1 between Middle, Rio Grande, and Cape May substations. All structures, conductor, and static wire will be replaced with new weathering steel poles, conductor, and OPGW. (S1628)

Estimated Cost: \$11.4 M

Expected In-Service: 12/31/2022

Status: Engineering



AEC Transmission Zone: Supplemental Project Harbor Beach Substation 69/12kV Rebuild

Previously Presented: 03/23/2018

Problem Statement:

- Brigantine Island is supplied by the existing Harbor Beach and Brigantine Substations, which are served by two 23kV sources. The N-1 contingency loading is projected to reach the emergency limit of the 23kV lines. Additionally, the existing lines, transformers, and switchgear have been identified as being in deteriorated condition.

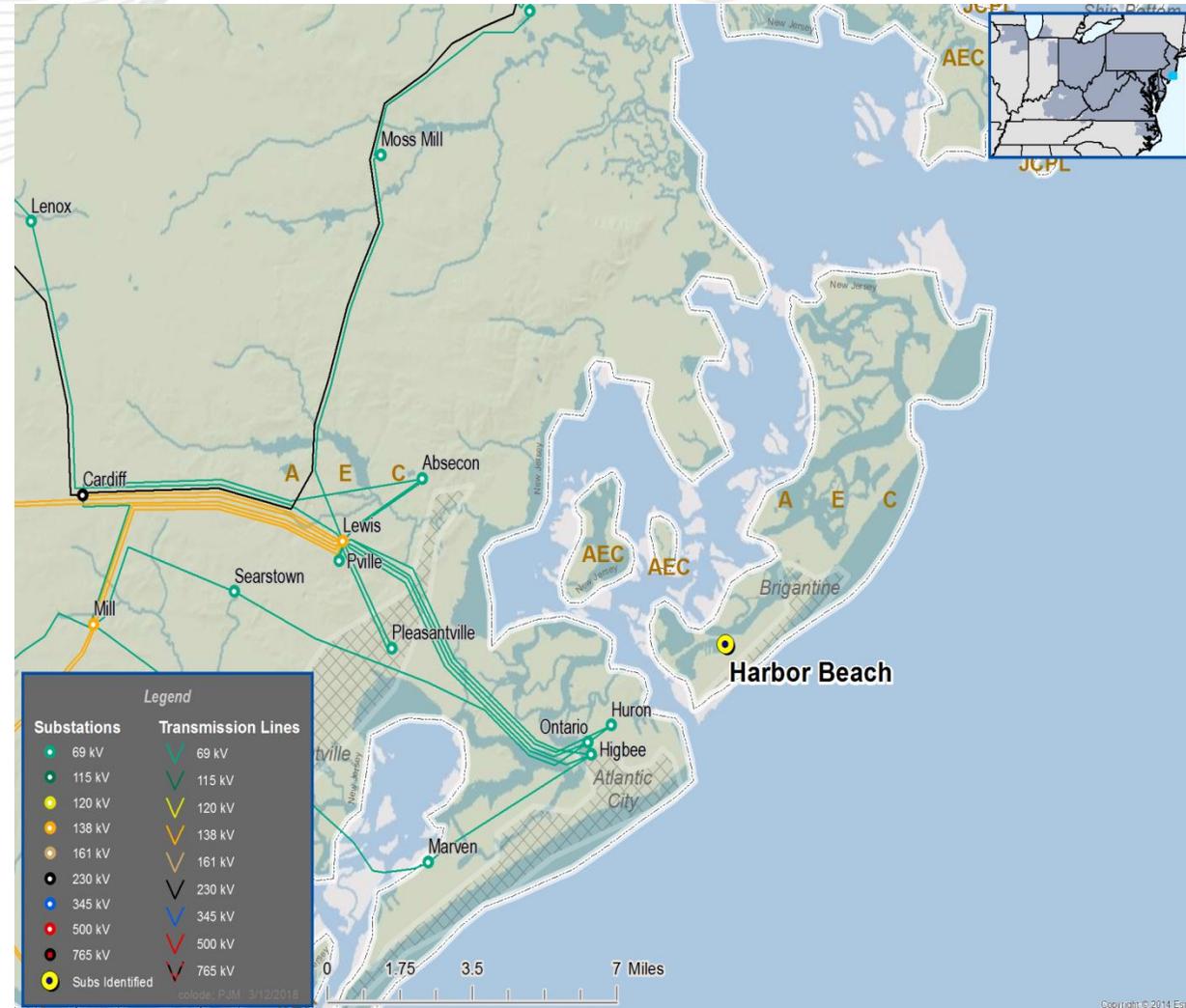
Selected Solution:

- Build a new six breaker 69kV GIS ring bus at Harbor Beach. Install two new 69kV sources from Huron and from Ontario. Retire the two existing Brigantine Island 23kV substations and 23kV lines. (S1629)

Estimated Cost: \$70.3 M

Expected In-Service: 12/31/2022

Status: Engineering



DPL

DPL Transmission Zone: Supplemental Project Stevensville Substation 69kV – Install Line Bus

Previously Presented: 03/23/2018

Problem Statement:

- The Stevensville area faces repeated outages due to the existing substation configuration and the remote location at the edge of DPL territory. There are no 69kV breakers at the substation.

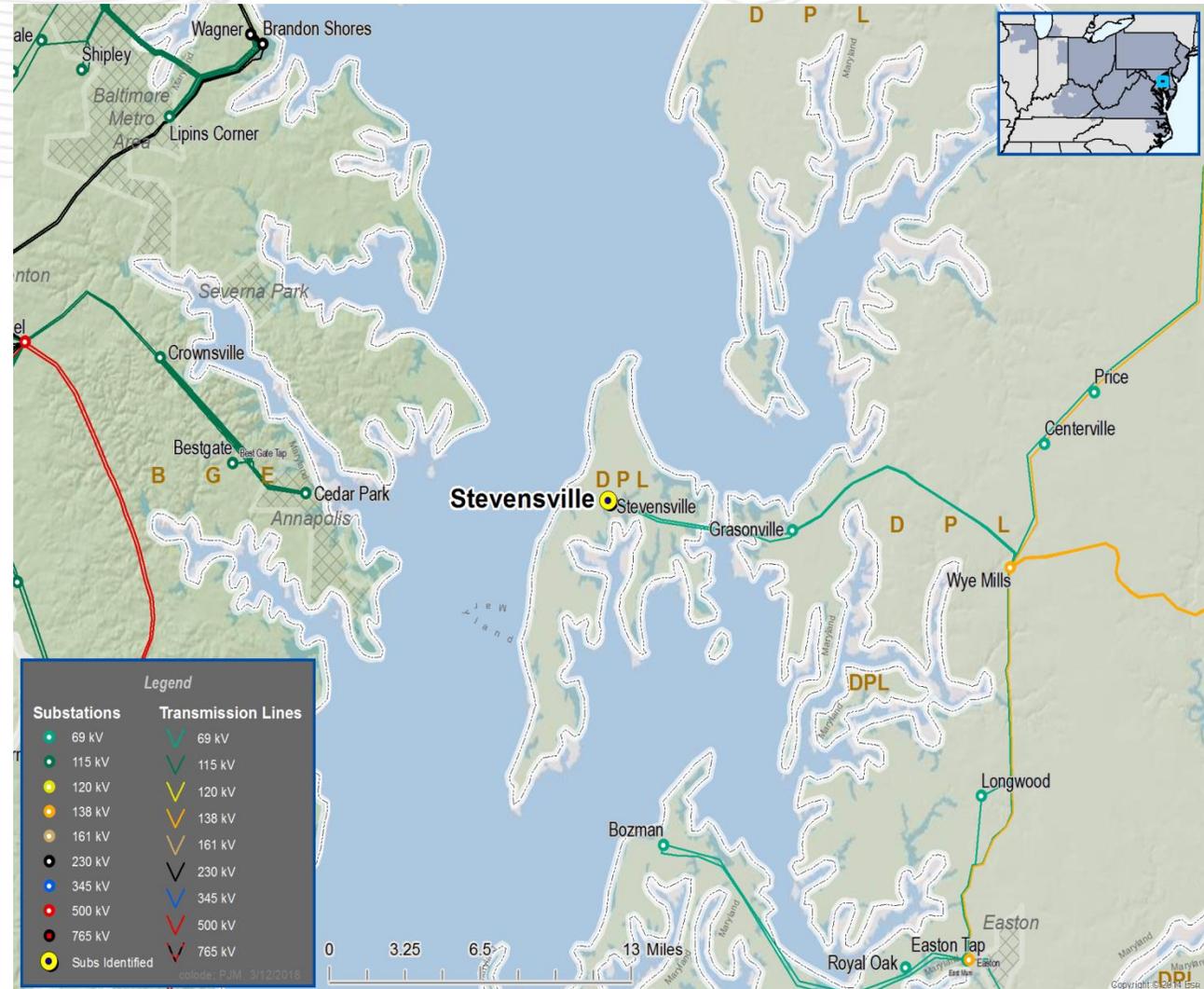
Selected Solution:

- Install a 3 breaker 69kV line bus at Stevensville, isolating faults and limiting customer interruptions. (S1633)

Estimated Cost: \$2.5 M

Expected In-Service: 12/31/2019

Status: Engineering



DPL Transmission Zone: Supplemental Project Massey Substation 69kV – Install Line Bus

Previously Presented: 03/23/2018

Problem Statement:

- The Massey faces repeated outages due to the existing substation configuration and the remote location. There is no 69kV bus arrangement at the substation.

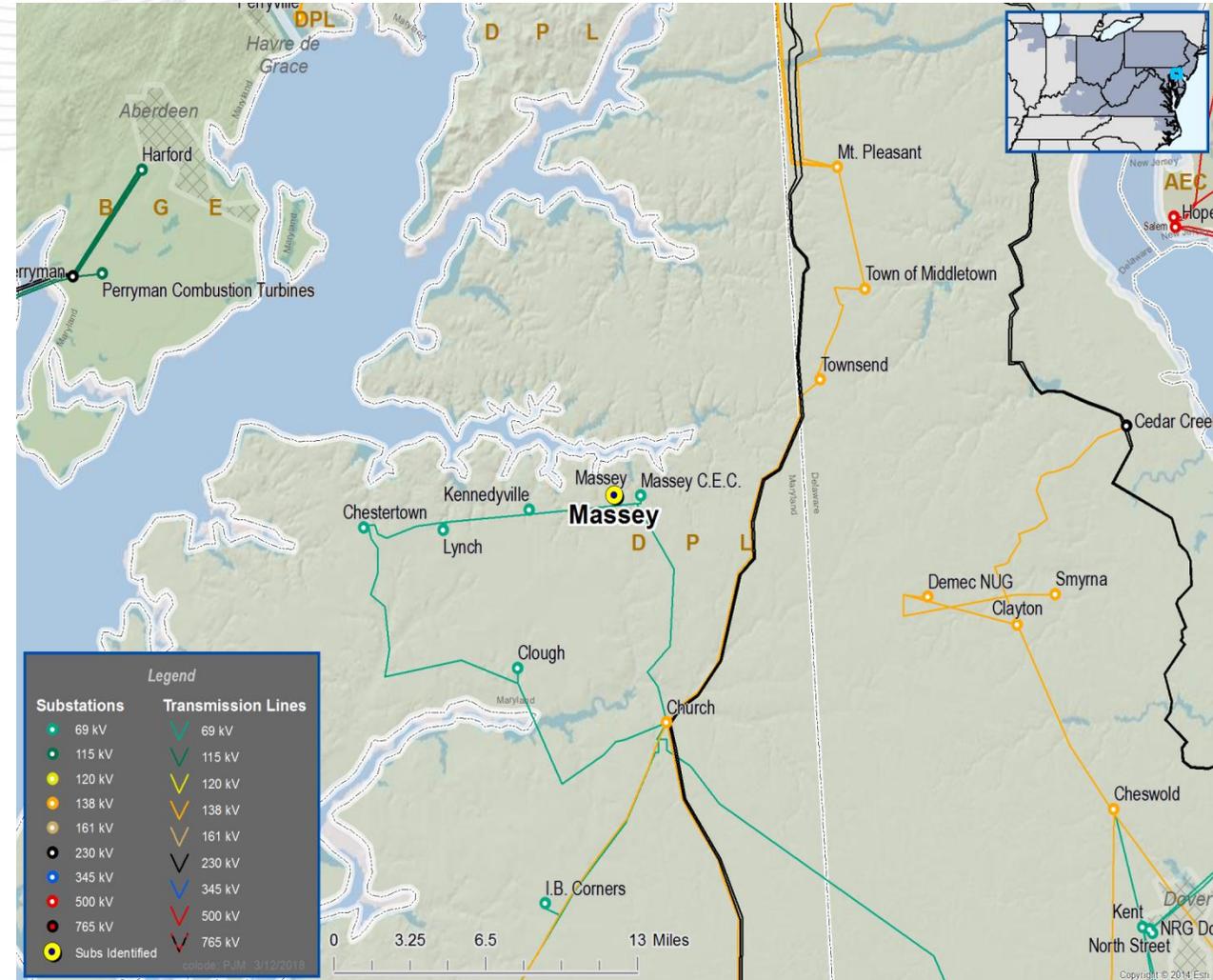
Selected Solution:

- Install a 3 breaker 69kV line bus at Massey, isolating faults and limiting customer interruptions. (S1634)

Estimated Cost: \$2.2 M

Expected In-Service: 12/31/2019

Status: Engineering



DPL Transmission Zone: Supplemental Project Lynch Substation 69kV – Install Line Bus

Previously Presented: 03/23/2018

Problem Statement:

- The Lynch area faces repeated outages due to the existing substation configuration and the remote location. There is no 69kV bus arrangement at the substation.

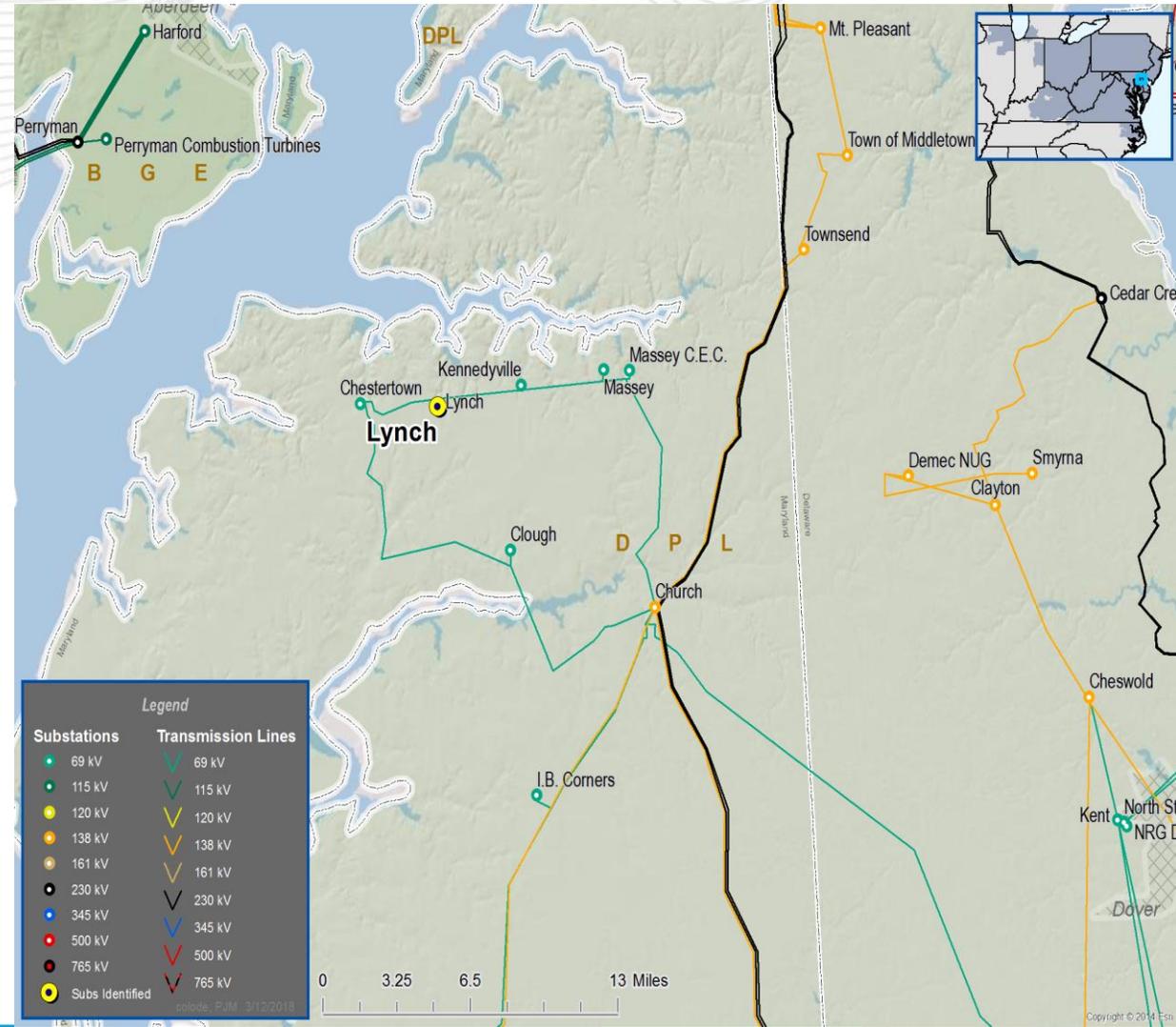
Selected Solution:

- Install a 3 breaker 69kV line bus at Lynch, isolating faults and limiting customer interruptions. (S1635)

Estimated Cost: \$1.9 M

Expected In-Service: 12/31/2019

Status: Engineering



DPL Transmission Zone: Supplemental Project Church – Chestertown 69kV– Rebuild Line 6727

Previously Presented: 03/23/2018

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 DPL age and condition ranking.

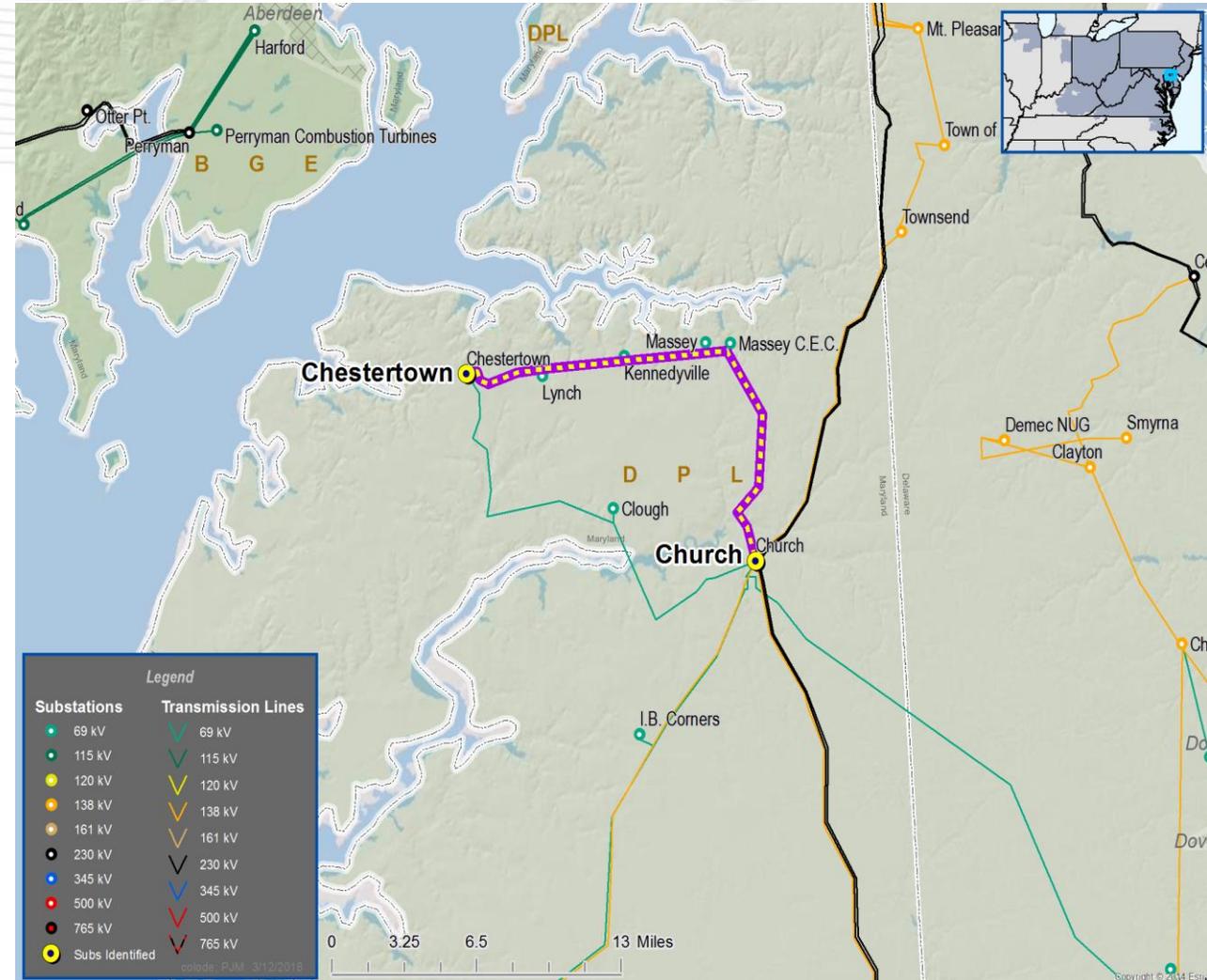
Selected Solution:

- Rebuild line 6727 between Church and Chestertown substations. The work would be split into three construction stages: Church – Massey REA, Massey REA – Lynch, and Lynch – Chestertown. All structures, conductor, and static wire will be replaced with new steel poles and conductor. (S1636)

Estimated Cost: \$35 M

Expected In-Service: 12/31/2022

Status: Engineering



DPL Transmission Zone: Supplemental Project North Seaford - Bridgeville 69kV – Rebuild Line 6737

Previously Presented: 03/23/2018

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 DPL age and condition ranking

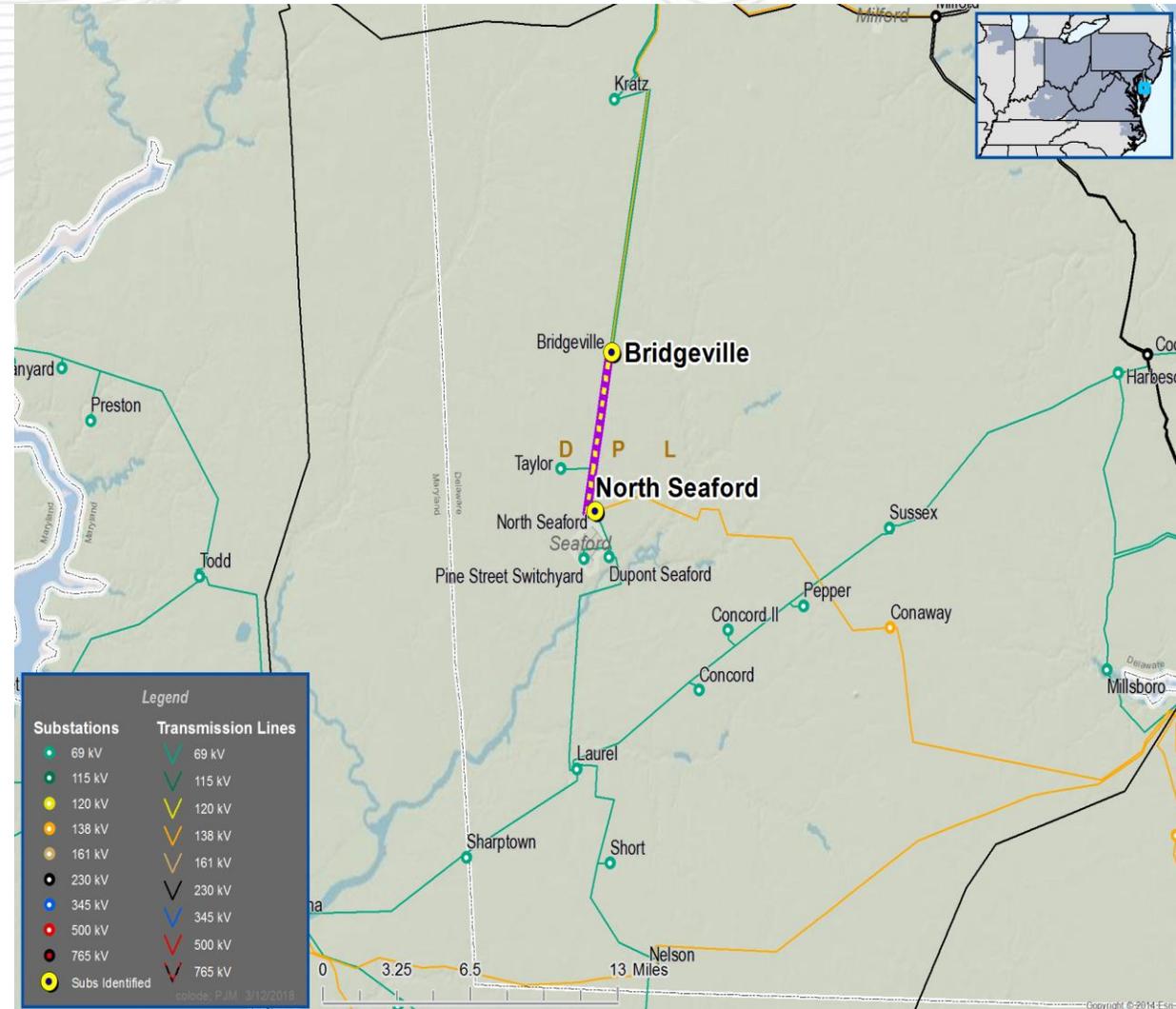
Selected Solution:

- Rebuild line 6737 between North Seaford and Bridgeville substations. All structures, conductor, and static wire will be replaced with new steel poles and conductor. (S1637)

Estimated Cost: \$7.2 M

Expected In-Service: 12/31/2020

Status: Engineering



DPL Transmission Zone: Supplemental Project Carrcroft – Silverside 69kV– Rebuild Line 6831

Previously Presented: 03/23/2018

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 DPL age and condition ranking.

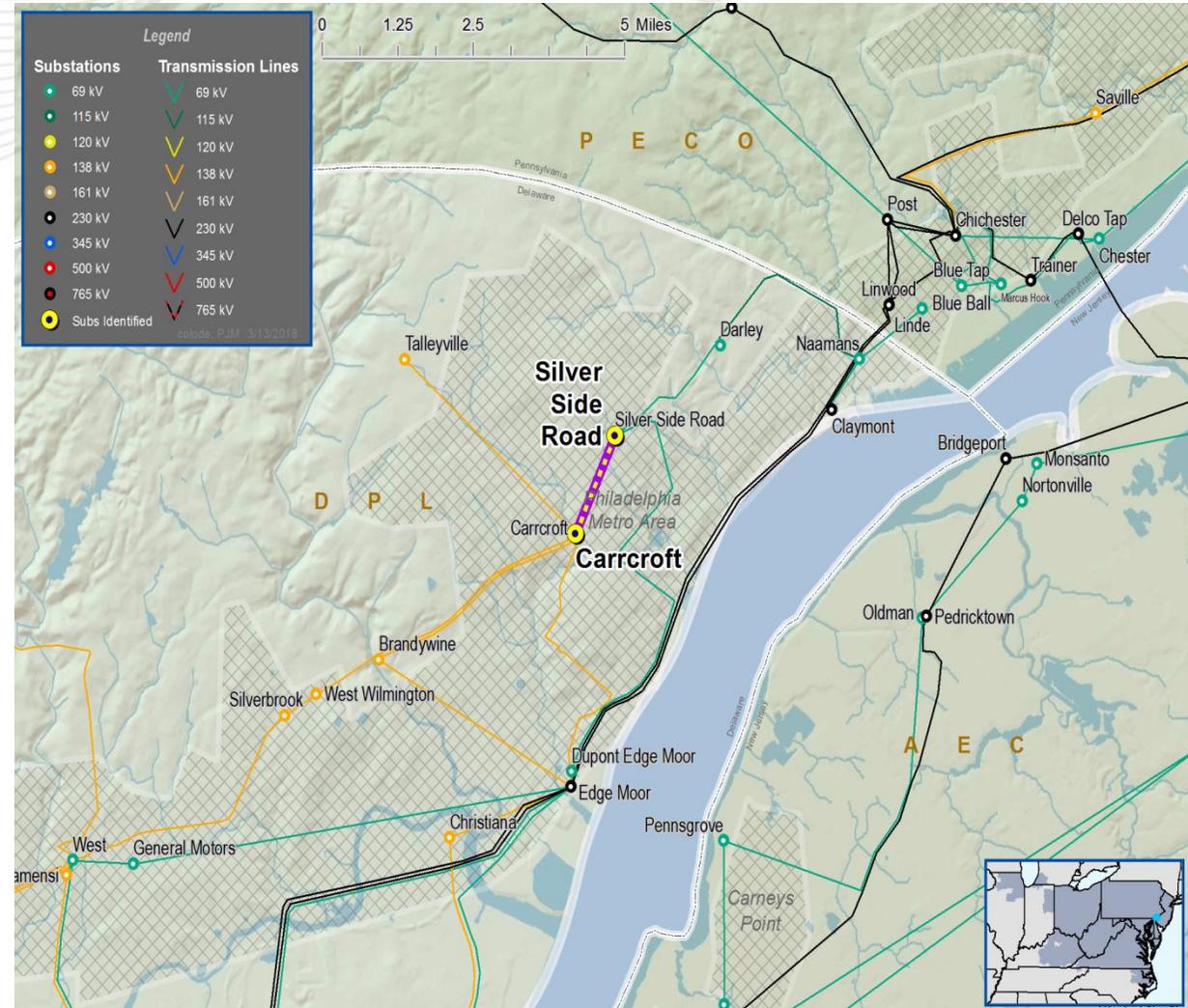
Selected Solution:

- Rebuild line 6831 between Carrcroft and Silverside substations. All structures, conductor, and static wire will be replaced with new poles, conductor, and OPGW. (S1638)

Estimated Cost: \$2.5 M

Expected In-Service: 12/31/2020

Status: Engineering





DPL Transmission Zone: Supplemental Project East New Market – Cambridge 69kV– Rebuild Line 6719

Previously Presented: 03/23/2018

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 DPL age and condition ranking.

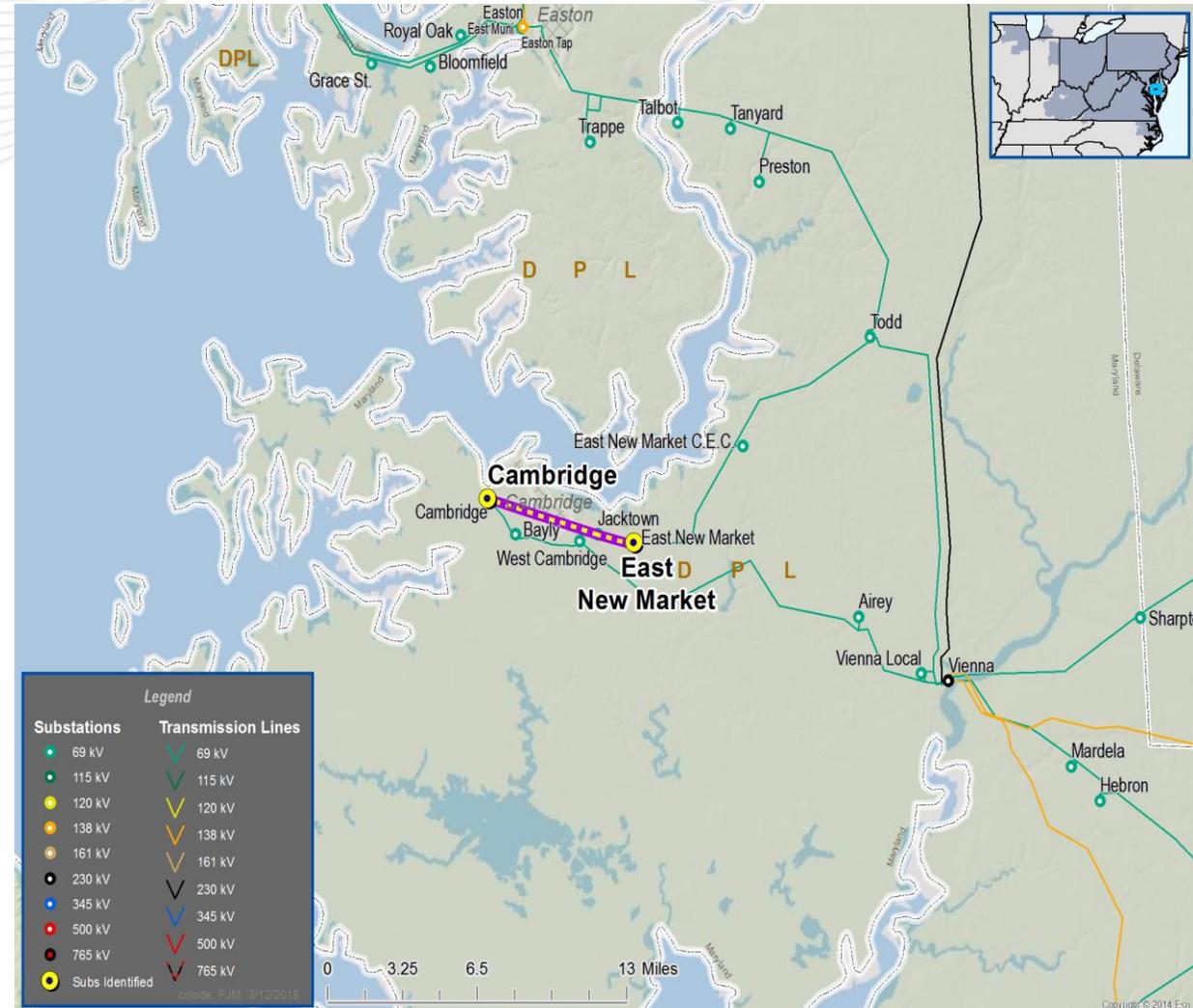
Selected Solution:

- Rebuild line 6719 between East New Market and Cambridge substations. All structures, conductor, and static wire will be replaced with new poles, conductor, and OPGW. (S1639)

Estimated Cost: \$21.6 M

Expected In-Service: 12/31/2020

Status: Engineering



Previously Presented : 05/25/2018

Problem Statement:

- Chestertown is currently an open ring bus. Closing in this substation will provide operational flexibility and provide high side protection for the existing transformers.

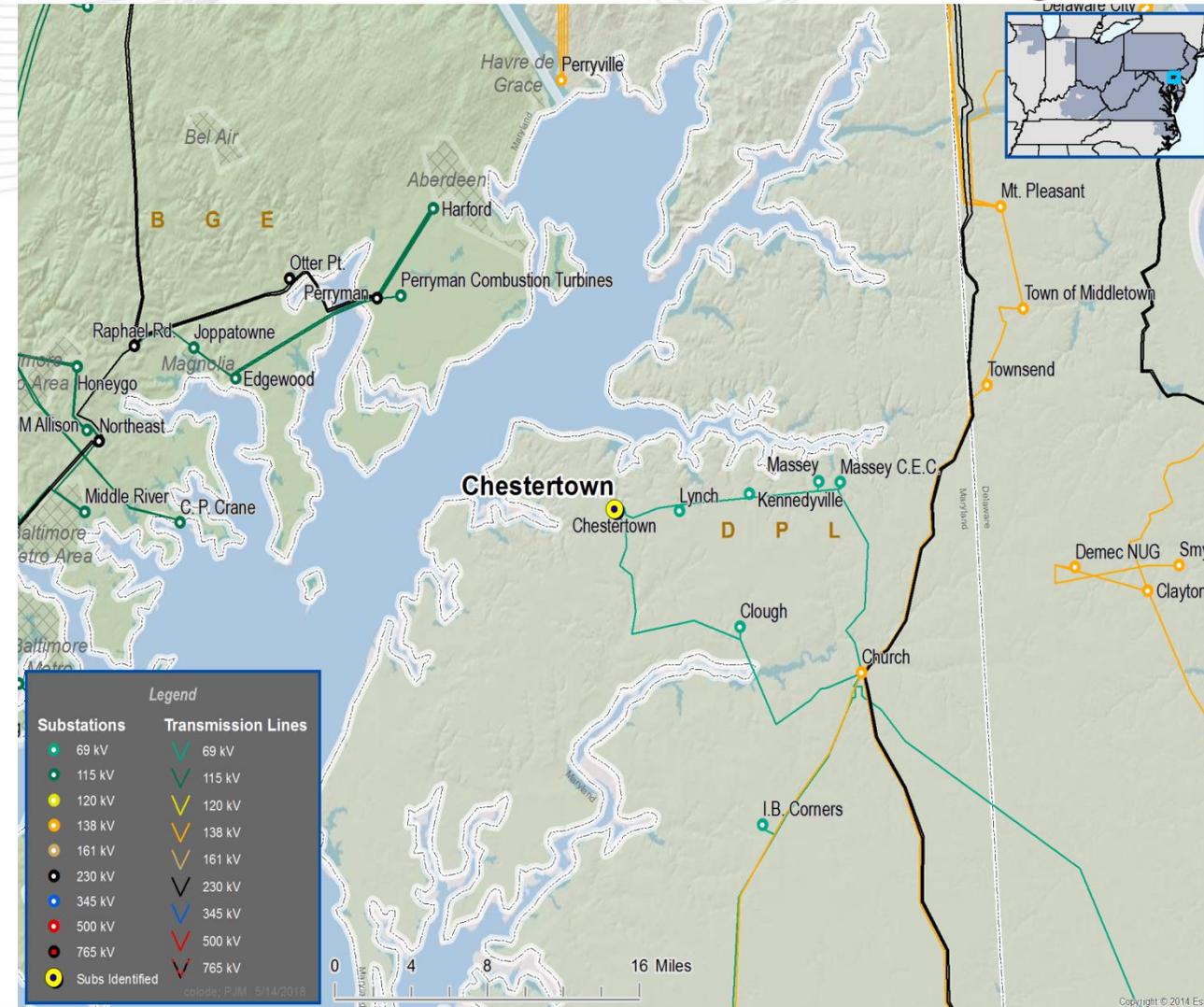
Selected Solution:

- Close the Chestertown 69 kV ring bus by installing a new circuit breaker and line relaying. **(\$1673)**

Estimated Project Cost: \$2.0M

Projected In-Service: 12/31/2019

Status: Engineering



MetEd



MetEd Transmission Zone: Supplemental Project Middletown Junction Substation

Previously Presented: 03/23/2018

Problem Statement:

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Eliminate the simultaneous outages to three or more system elements.

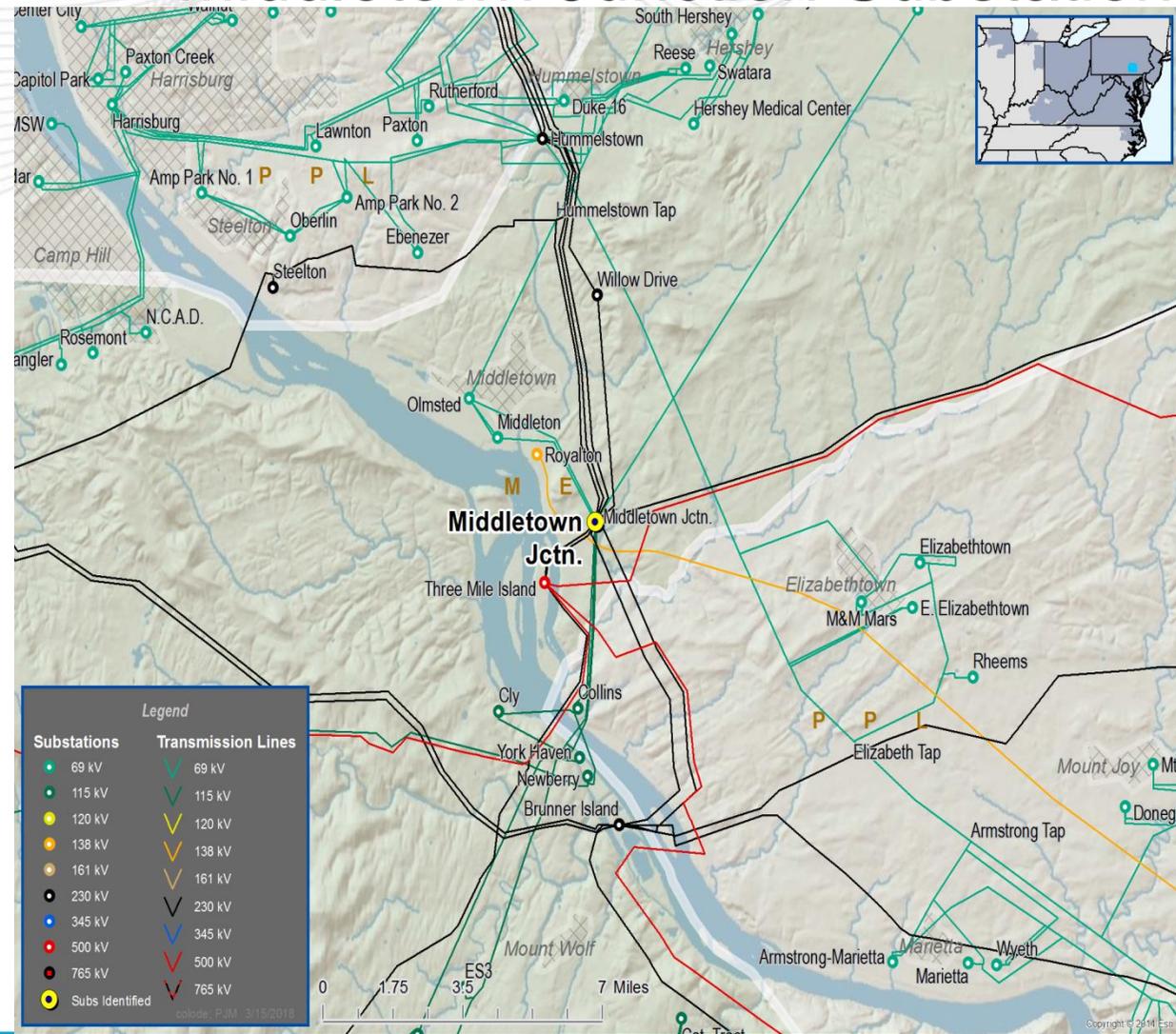
Selected Solution:

- Middletown Junction, Install eleven (11) 230 kV Circuit Breakers to complete the double bus configuration including replacement of the #2 (75 MVA) & #5 (75/84 MVA) 230/115 kV transformers with 180/240/300 MVA units, and removal of the #1 (75 MVA) 230/115 kV transformer. (S1640)

Estimated Project Cost: \$13.5 M

Projected IS date: 6/1/2023

Status: Engineering



Previously Presented: 03/23/2018

Problem Statement:

Operational Flexibility and Efficiency

- Reduces customer outage exposure.
- Mitigates loss of Tolna substation for a fault on the 115 kV line to the generator.

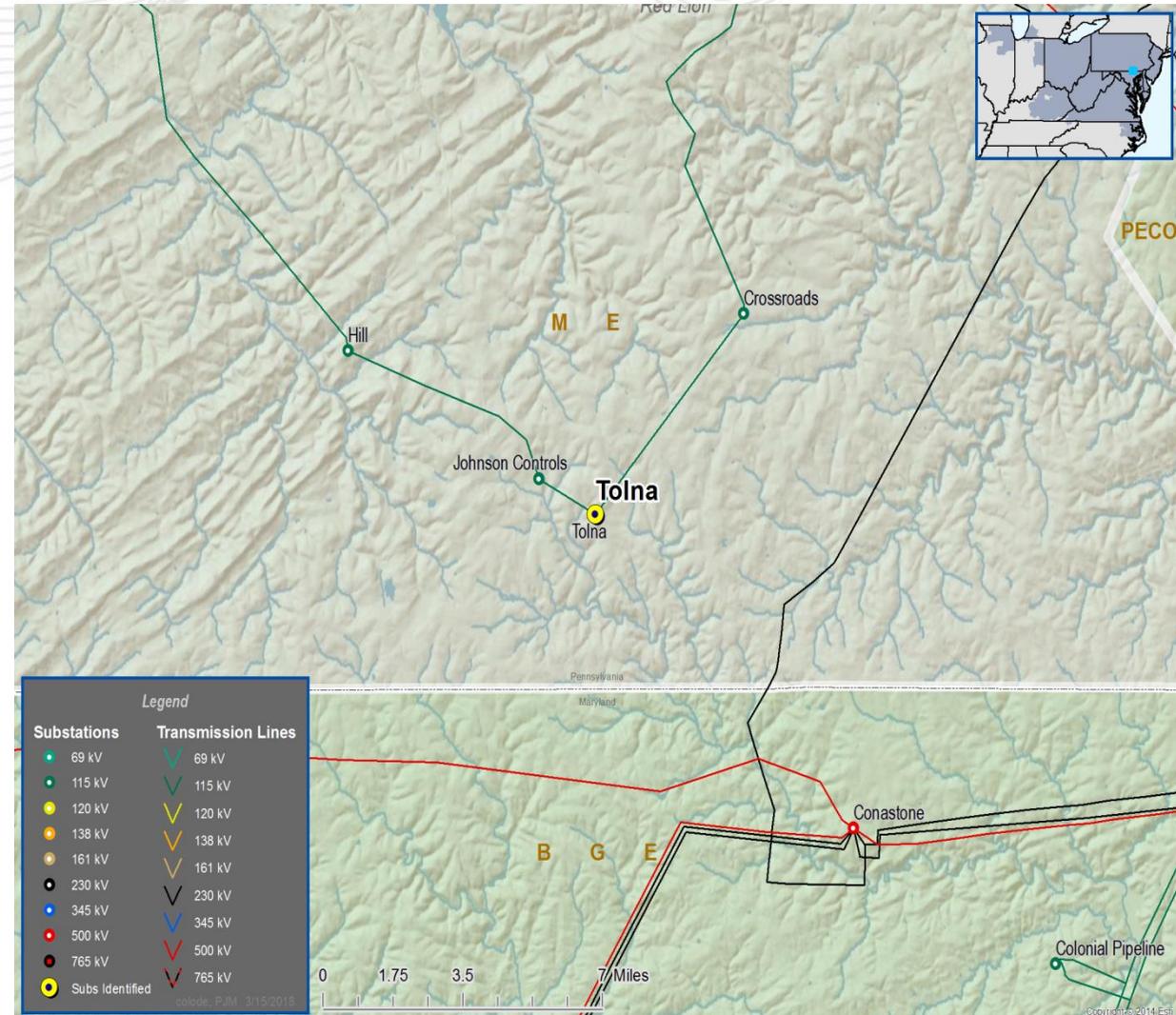
Selected Solution:

- Install new 115 kV circuit breakers at Tolna on the generator terminal and in the bus tie position. (S1641)

Estimated Project Cost: \$2.4M

Projected IS date: 12/31/2018

Status: Engineering



MetEd Transmission Zone: Supplemental Project

Hunterstown – Lincoln (963) 115 kV Line & Orrtanna 115 kV Substation

Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Provide networked source for radial load that cannot be transferred to other substations

Selected Solution:

Hunterstown – Lincoln (963) 115 kV Line. (S1725.1)

- Loop the Hunterstown – Lincoln (963) 115 kV line ~9 miles into Orrtanna substation

Orrtanna 115 kV Substation. (S1725.2)

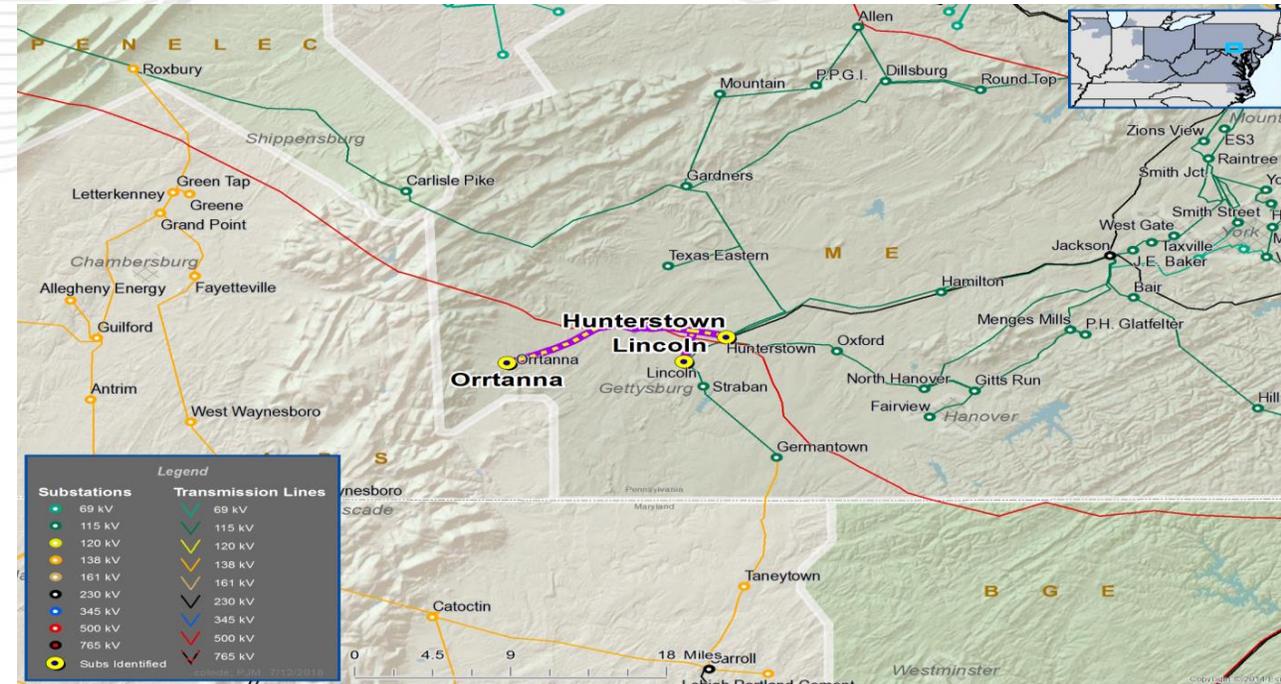
- Construct a five (5) breaker 115 kV ring bus

Estimated Project Cost (Line Loop): \$30.9M

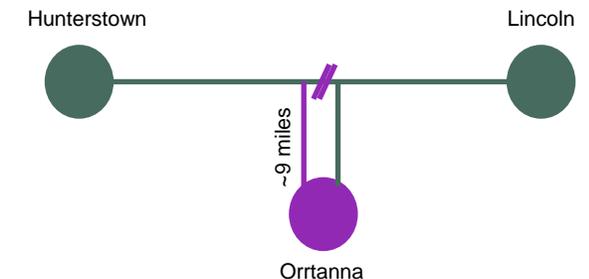
Estimated Project Cost (Ring Bus): \$ 9.2M

Projected IS date: 12/31/2021

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Reduce amount of potential local load loss under contingency conditions.
- Eliminate the simultaneous outages to three or more system elements

Selected Solution:

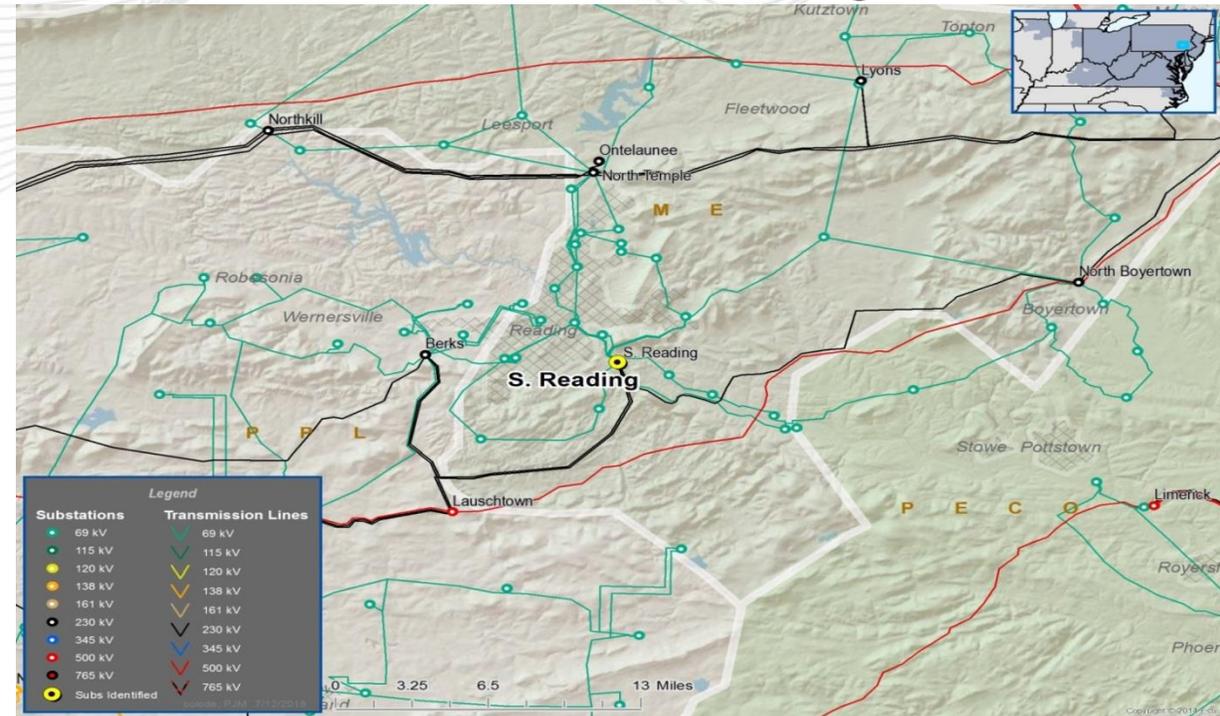
South Reading Substation. (S1726)

- Expand the existing 69 kV yard to a breaker-and-a-half configuration

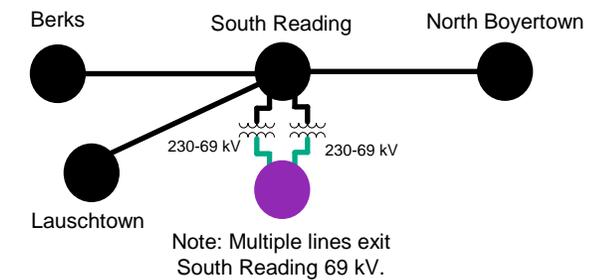
Estimated Project Cost : \$19.4M

Projected IS date: 12/31/2020

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Reduce amount of potential local load loss under contingency conditions

Selected Solution:

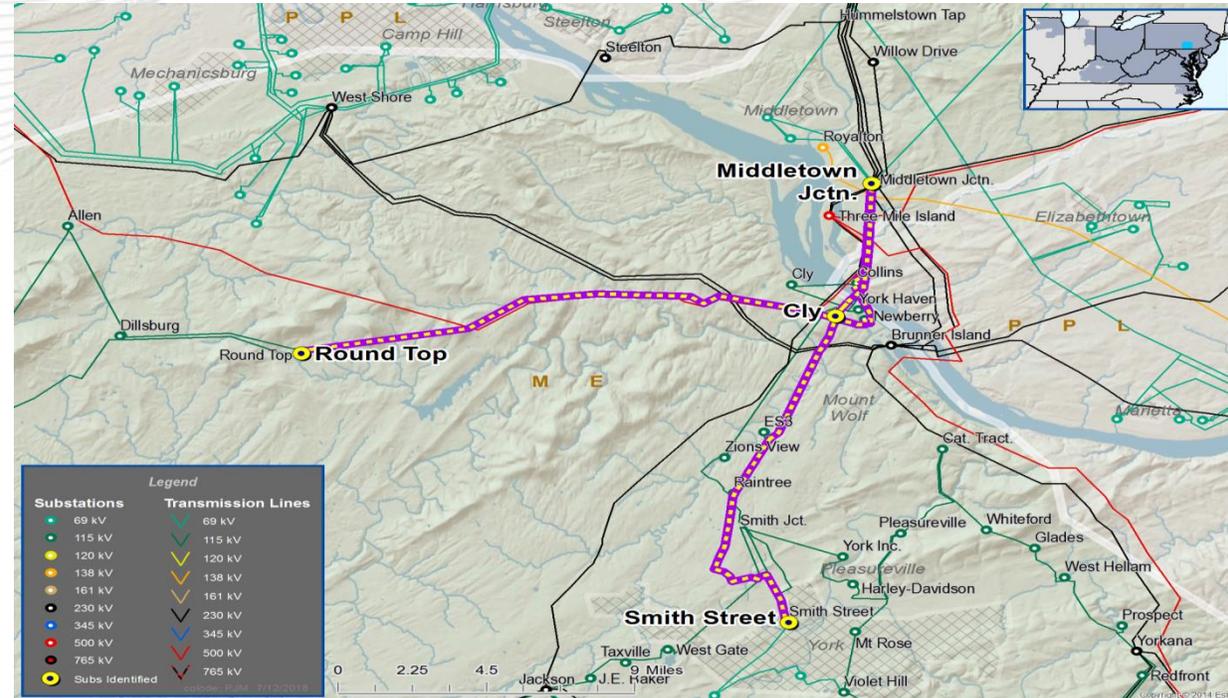
Cly Substation

- Construct a five (5) breaker 115 kV ring bus. (S1727.1)
- Loop the existing Middletown Jct. – Round Top and Middletown Jct. – Smith Street 115 kV line into the ring bus. (S1727.2)

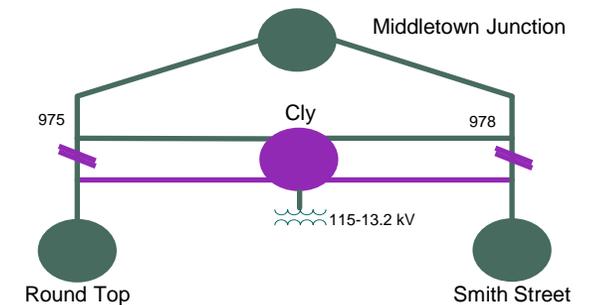
Estimated Project Cost : \$12.2M

Projected IS date: 12/31/2020

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Eliminate the simultaneous outages to three or more system elements
 - Loss of the South Reading – Hosensack 230 kV line also outages the North Boyertown 230-69 kV transformer.

Selected Solution:

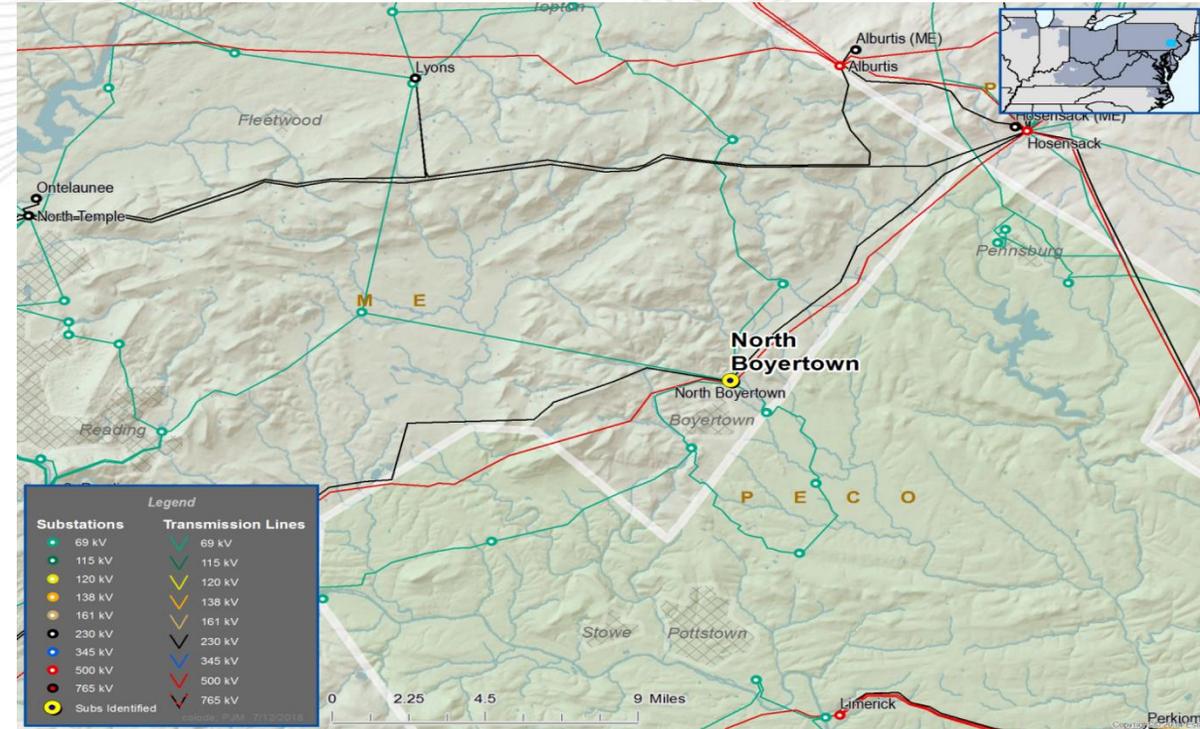
North Boyertown Substation

- Expand the 230 kV bus to a three (3) breaker 230 kV ring bus. (S1728)

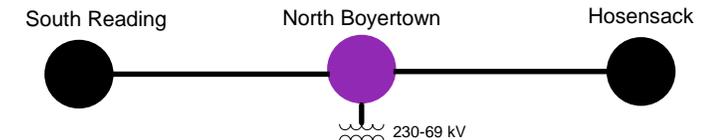
Estimated Project Cost : \$5.0M

Projected IS date: 12/31/2020

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Penelec

Penelec Transmission Zone: Supplemental Project Jackson Road 115/46 kV Substation

Previously Presented: 03/23/2018

Problem Statement:

Equipment Material Condition, Performance and Risk

- Improve system reliability and performance
- Remove obsolete & deteriorated equipment.

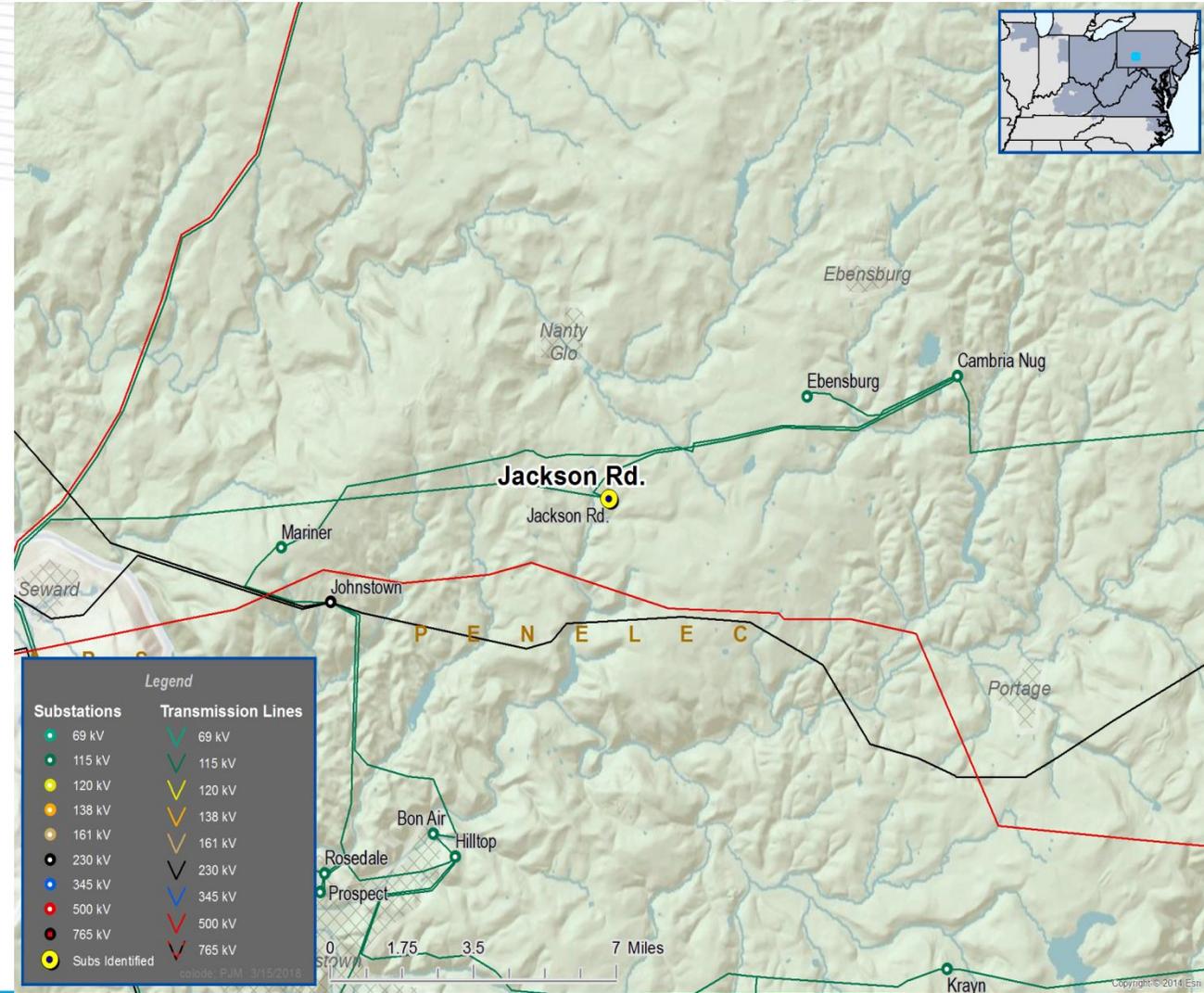
Selected Solution:

- Replace the existing Jackson Road 25 and 28/37.3 MVA 115/46 kV transformers with 45/60/75 MVA units.
- Install a 115 kV breaker on the high side of each Jackson Road transformer. (S1642)

Estimated Project Cost: \$3.7 M

Projected IS date: 11/30/2018

Status: Engineering



Penelec Transmission Zone: Supplemental Project Roxbury 138/115 kV Substation

Previously Presented: 03/23/2018

Problem Statement:

Equipment Material Condition, Performance and Risk

- Improve system reliability and performance
- Remove obsolete & deteriorated equipment.
- Upgrade to current FE Standards
- Eliminate the simultaneous outages to three or more system elements

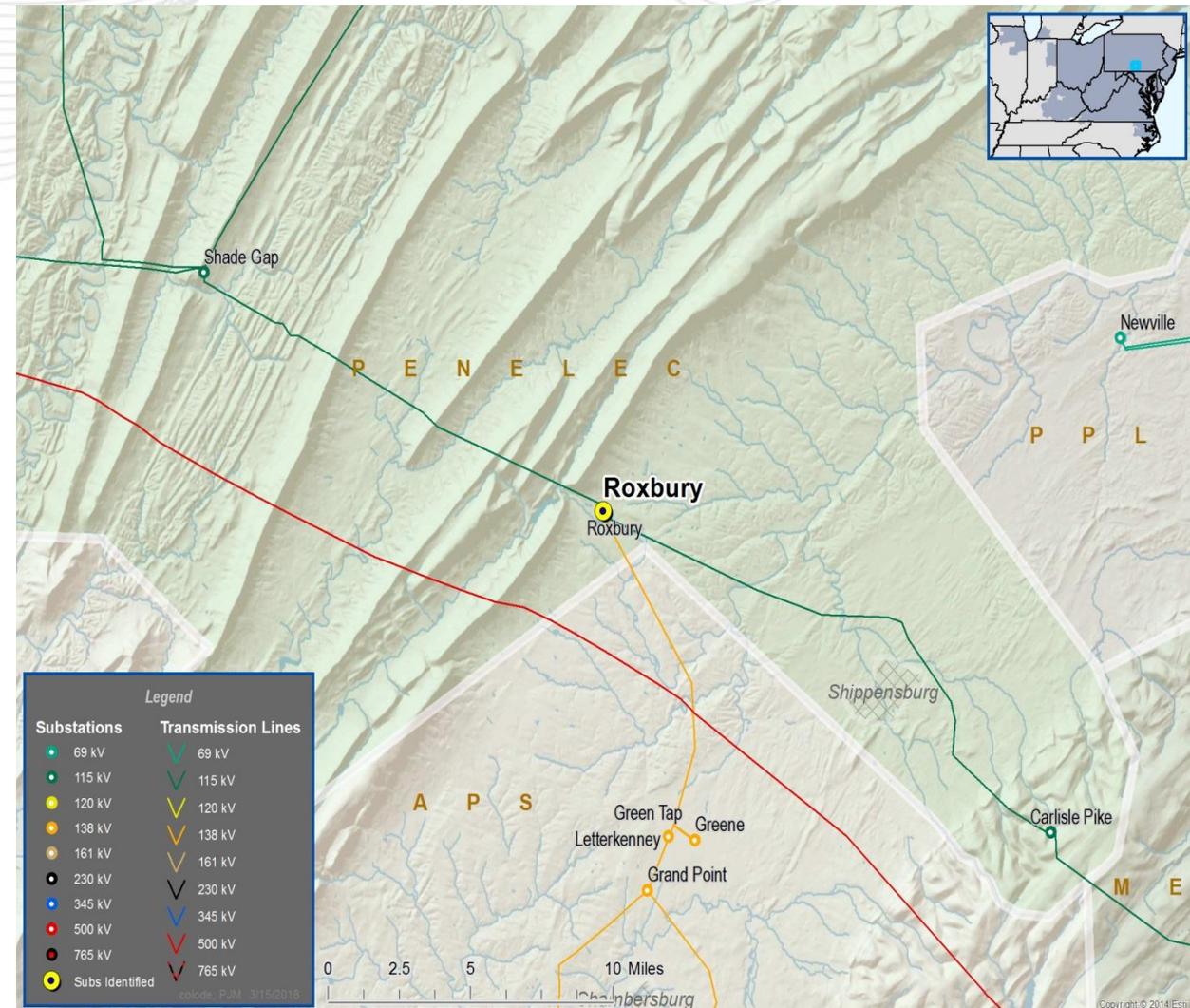
Selected Solution:

- Replace the existing Roxbury 100 MVA 138/115 kV transformer with a 224 MVA unit. (S1643)
- Convert Roxbury 115 kV substation into a four (4) breaker ring bus.

Estimated Project Cost: \$4.2 M

Projected IS date: 12/31/2019

Status: Engineering



Penelec Transmission Zone: Supplemental Project Hilltop 115 kV Substation

Previously Presented: 03/23/2018

Problem Statement:

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Reduce amount of potential local load loss under contingency conditions.
- Eliminate the simultaneous outages to three or more system elements.

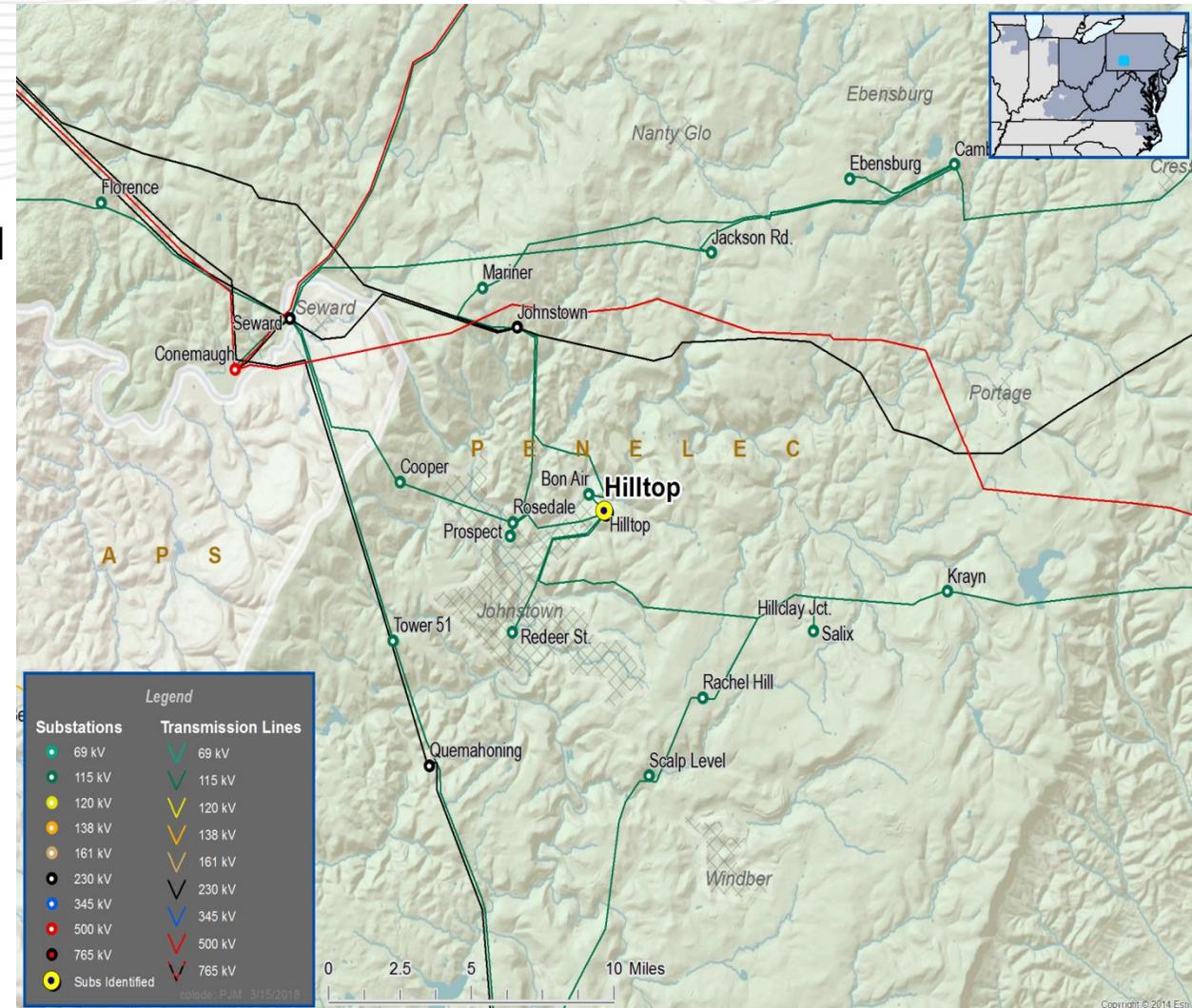
Selected Solution:

- Expand the existing Hilltop 115 kV substation to a six (6) breaker ring bus. (S1644)

Estimated Project Cost: \$9.3 M

Projected IS date: 12/31/2018

Status: Engineering



Previously Presented: 03/23/2018

Problem Statement:

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Eliminate the simultaneous outages to three or more system elements.

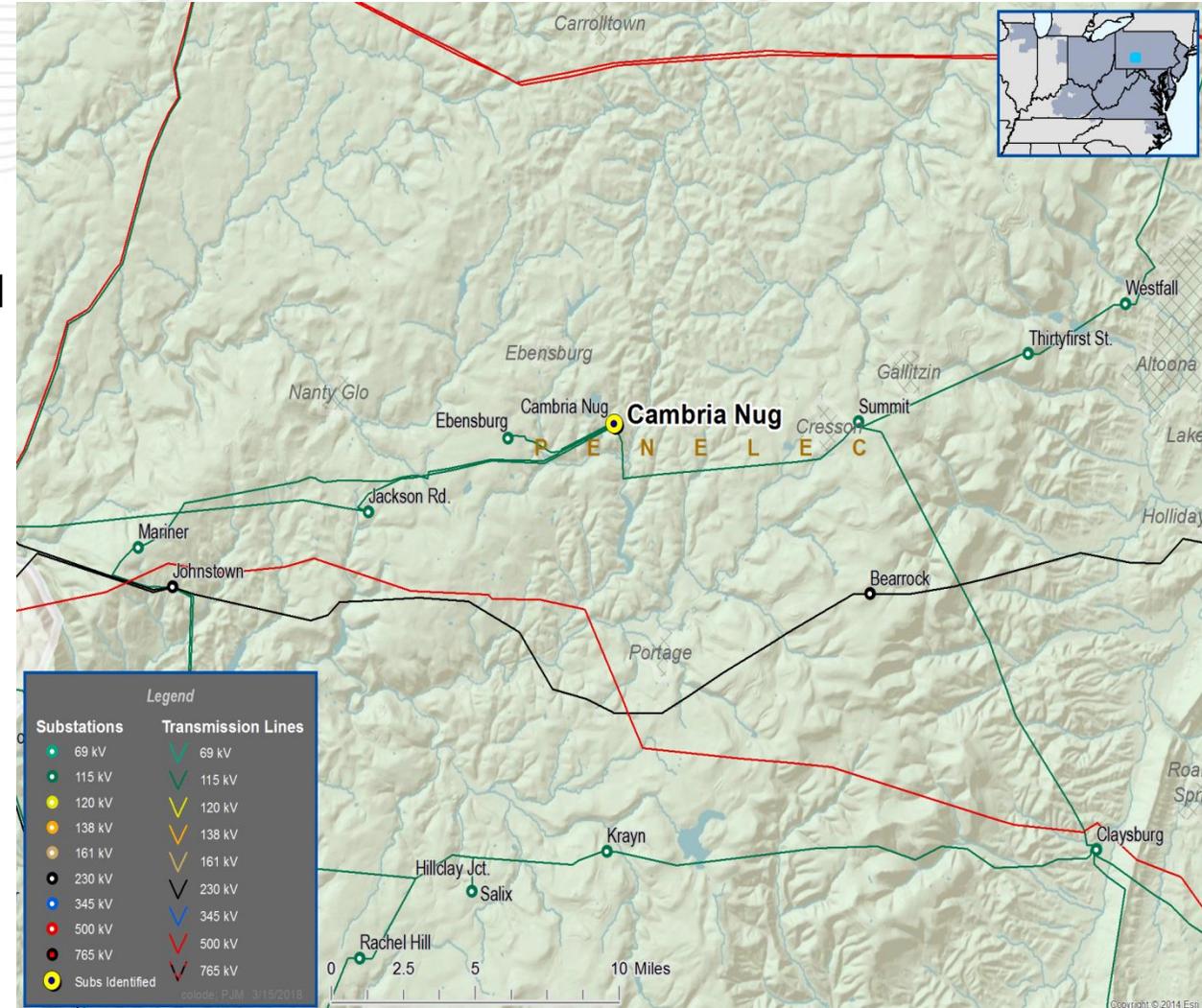
Selected Solution:

- Expand the existing Cambria Slope 115 kV substation to a six (6) breaker ring bus. (S1645)

Estimated Project Cost: \$8.7 M

Projected IS date: 6/1/2019

Status: Engineering



Penelec Transmission Zone: Supplemental Project Wayne 345/115 kV Substation

Previously Presented: 03/23/2018

Problem Statement:

Operational Flexibility and Efficiency

- Planning analysis identifies concerns related to loss of an existing transformer at a specific voltage level.
- Loss of substation bus adversely impact transmission system performance
- Improve operational flexibility during maintenance and restoration efforts.
- Eliminate the simultaneous outages to three or more system elements.

Selected Solution:

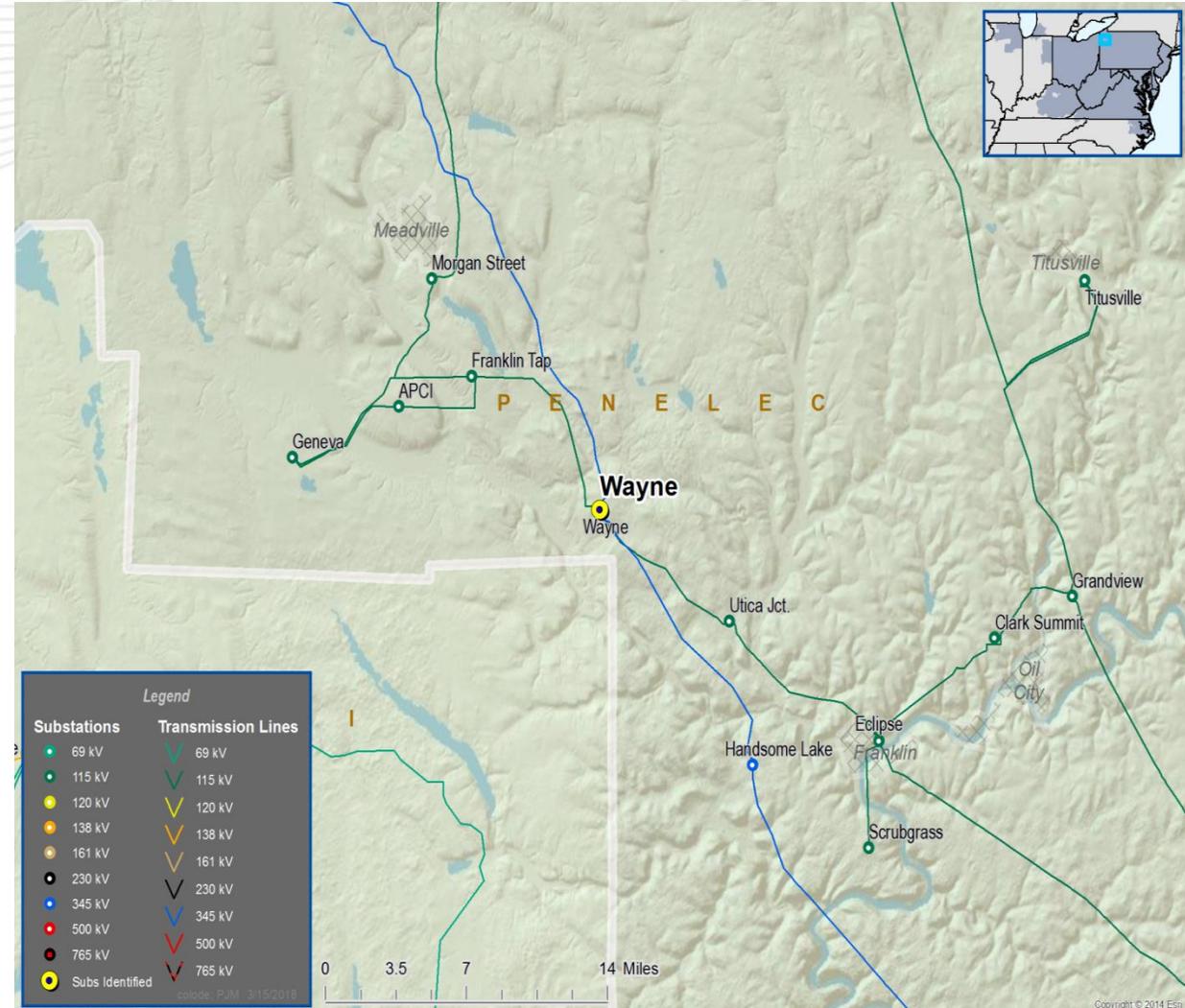
Wayne Substation

- Install a second 345/115 kV 168/224 MVA transformer.
Convert the 115 kV yard to a 4 breaker ring bus. (S1646)

Estimated Project Cost: \$5.8 M

Projected IS date: 6/1/2019

Status: Engineering



Penelec Transmission Zone: Supplemental Project Seward-Glory-Piney Rebuild

Previously Presented : 05/25/2018

Problem Statement:

Equipment Material Condition, Performance and Risk

- Enhance system reliability and performance.
- Upgrade equipment due to degraded equipment performance, material condition, and obsolescence.

Operational Flexibility and Efficiency

- Improve long-term overall system reliability and performance of the system.
- Improve operational flexibility during maintenance, outage, and restoration.
- Reduce amount of potential local load loss under contingency conditions

Selected Solution:

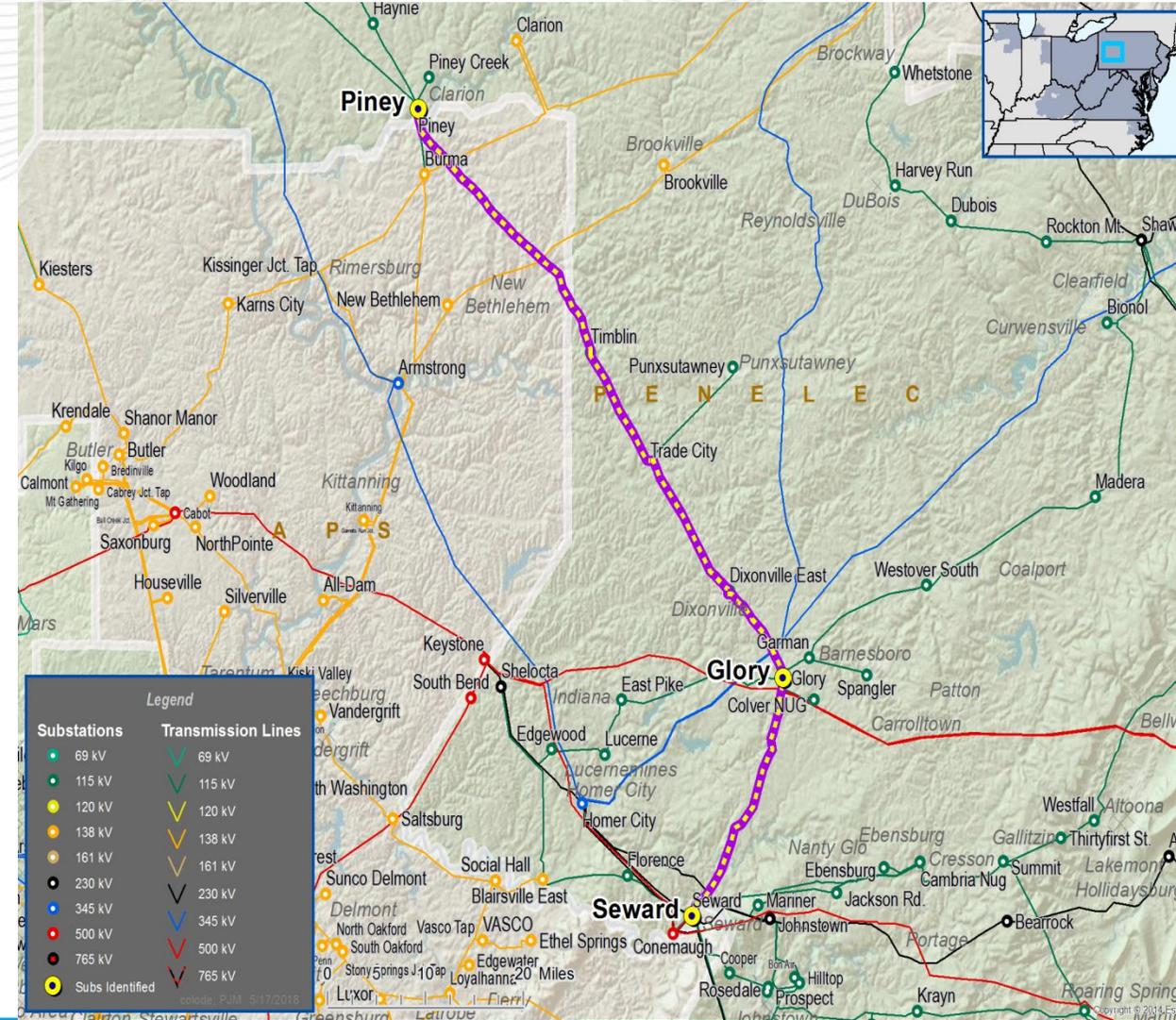
Rebuild Seward-Glory-Piney 115 kV line . (**\$1672**)

- Rebuild ~66 miles of 115 kV line using double circuit 230 kV construction.
- Install 1033 ACSR conductor (six-wired) energized at 115 kV.

Estimated Project Cost: \$150M - \$200M (subject to detailed design)

Expected In-Service: 12/01/2023

Status: Conceptual



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Reduce amount of potential local load loss under contingency conditions.
- Eliminate the simultaneous outages to three or more system elements

Selected Solution:

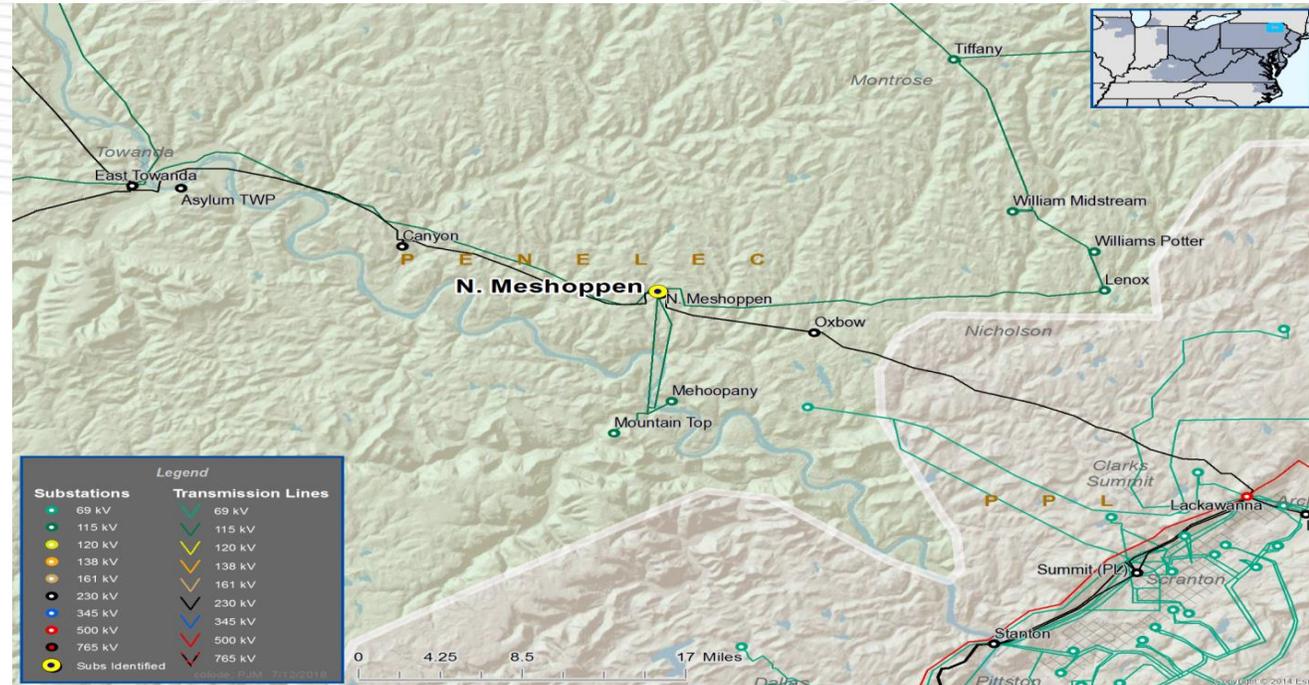
North Meshoppen Substation

- Expand the existing 115 kV yard to a breaker-and-a-half configuration. (\$1729)

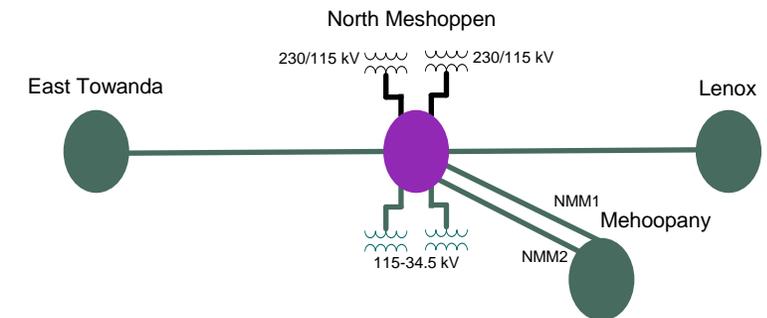
Estimated Project Cost: \$17.6M

Projected IS date: 12/31/2020

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Reduce amount of potential local load loss under contingency conditions.
- Eliminate the simultaneous outages to three or more system elements.

Selected Solution:

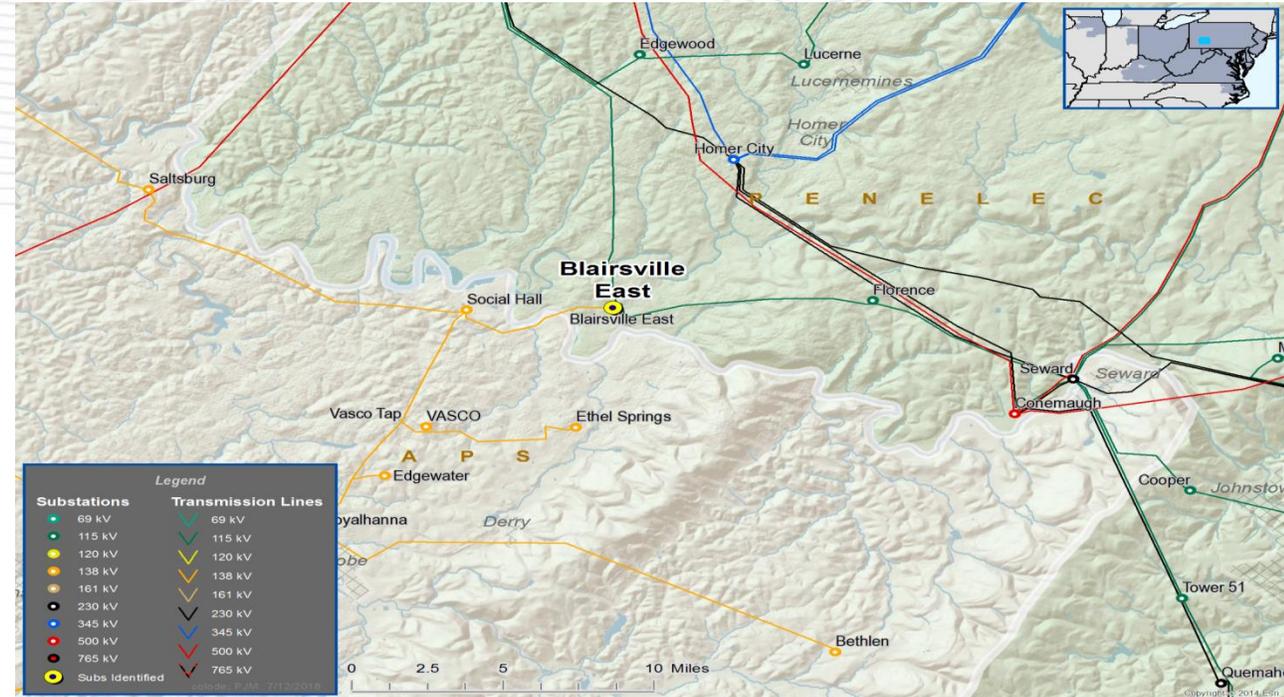
Blairsville Substation

- Convert the Blairsville East 115 kV substation into a six (6) breaker ring bus. (S1730)

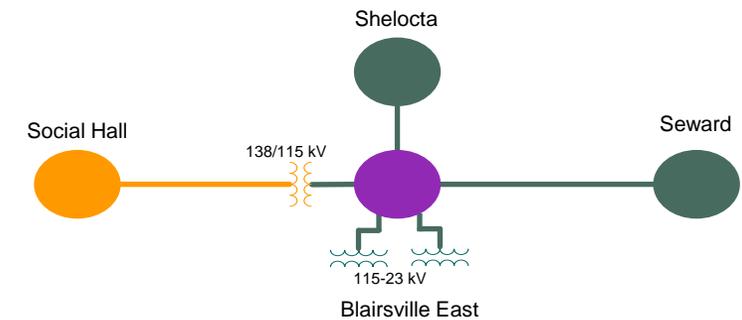
Estimated Project Cost: \$9.0M

Projected IS date: 12/31/2019

Status: Conceptual



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



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Reduce amount of potential local load loss under contingency conditions.
- Eliminate the simultaneous outages to three or more system elements.

Selected Solution:

Erie West Substation

- Convert the Erie West 115 kV substation into a five (5) breaker ring bus. (S1731)

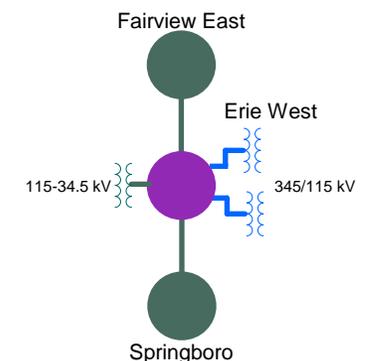
Estimated Project Cost: \$4.8M

Projected IS date: 12/31/2019

Status: Conceptual



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



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Reduce amount of potential local load loss under contingency conditions.
- Eliminate the simultaneous outages to three or more system elements

Selected Solution:

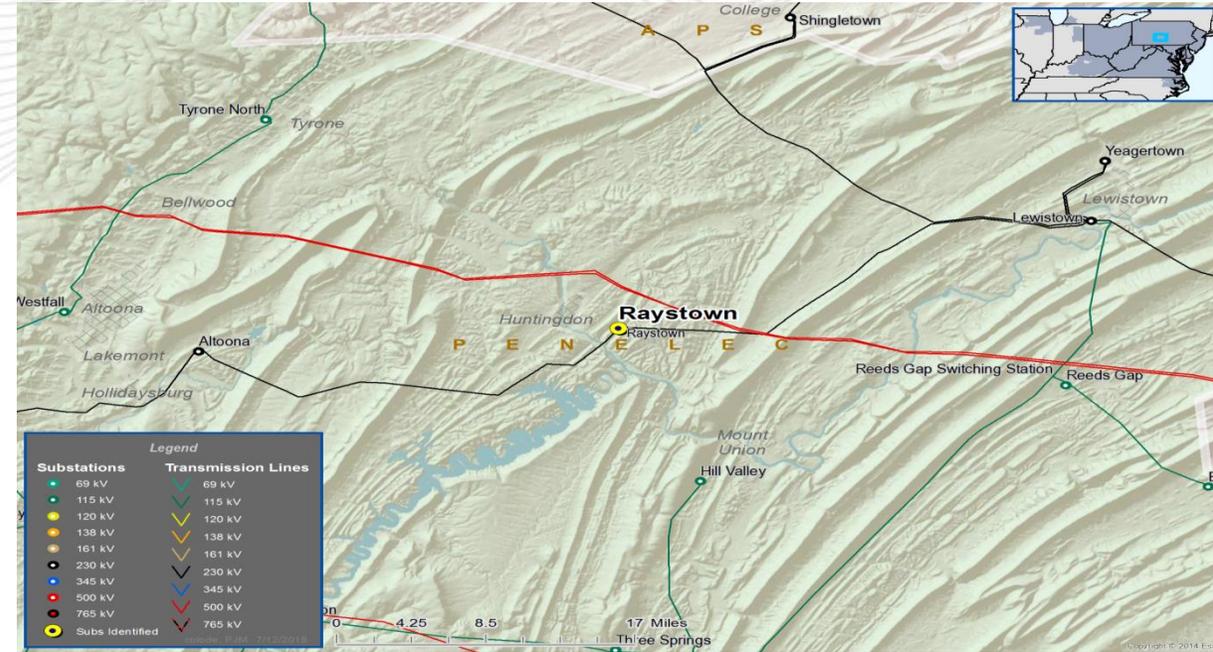
Raystown Substation (S1732)

- Install a second 230-46 kV transformer (100 MVA).
- Install 3-230 kV circuit breakers to create a four (4) breaker 230 kV ring bus.
- Install 46 kV bus tie breaker

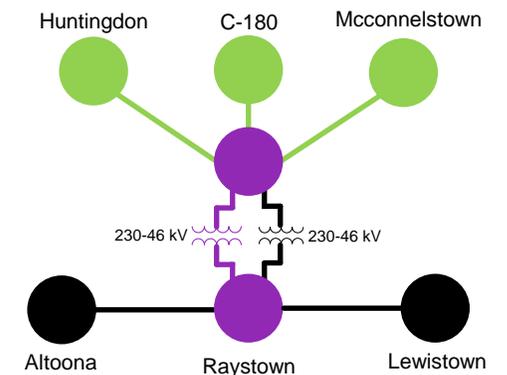
Estimated Project Cost: \$ 8.0M

Projected IS date: 6/1/2019

Status: Engineering



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Penelec Transmission Zone: Supplemental Project Hill Valley – Mount Union – Lewistown 46 kV Line

Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Transmission line that cannot be utilized for post contingency switching or networking normally open points

Selected Solution:

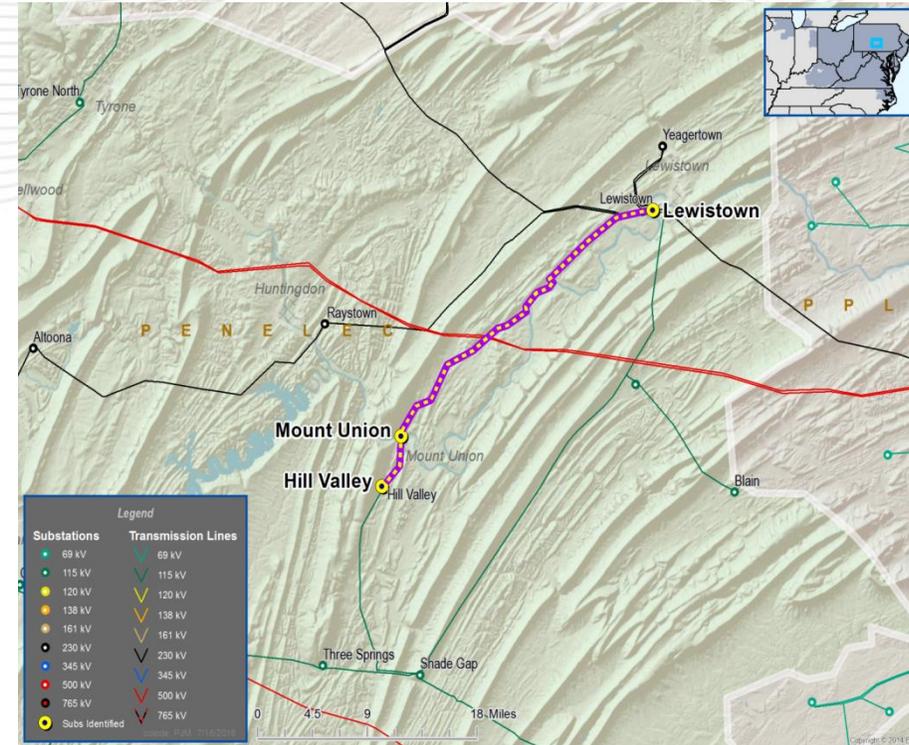
Hill Valley – Mount Union - Lewistown 46 kV Line. (S1733)

- Reconductor/Rebuild line and upgrade terminal equipment
- Replace line tap switches at Lewistown Industrial Park, Strodes Mill, McVeytown, and Atkins Mills

Estimated Project Cost: \$37.2M

Projected IS date: 12/31/2020

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Operational Flexibility and Efficiency

- Improve operational flexibility during maintenance and restoration efforts.
- Upgrade existing line switches to desired operating capability (i.e. line charging, loop splitting, etc.).

Selected Solution:

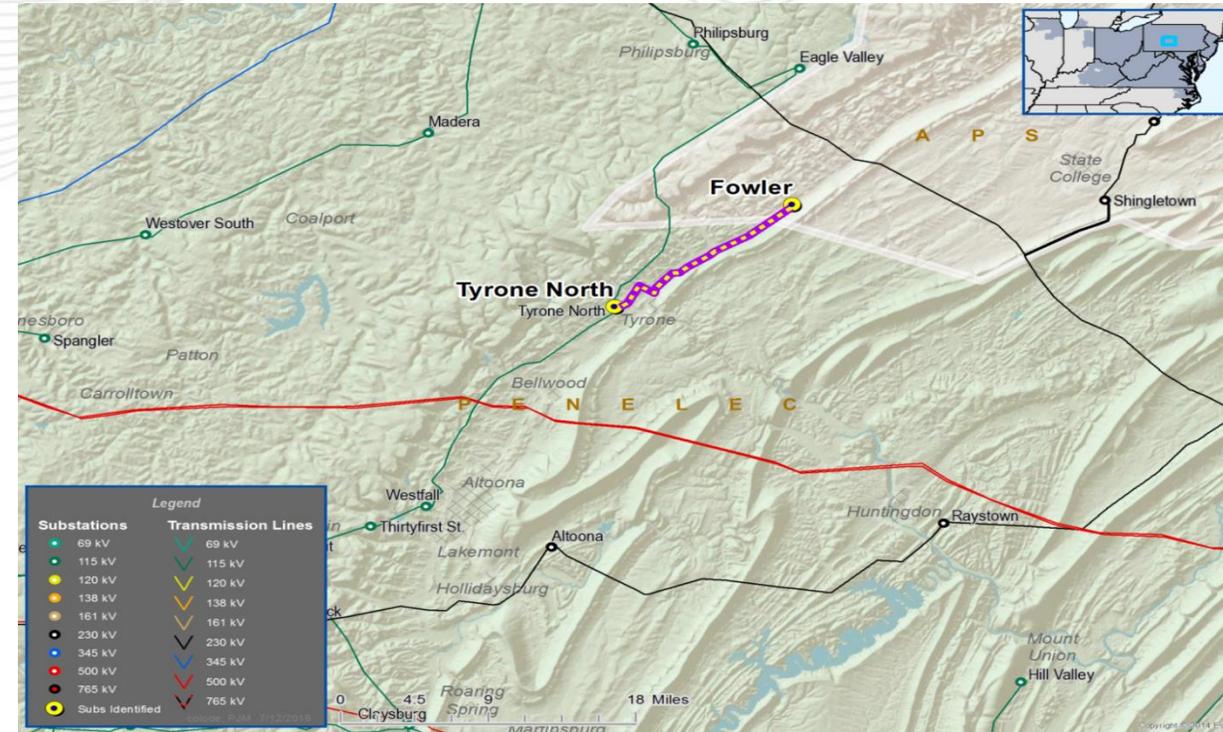
Tyrone North – Fowler 46 kV Line. (S1734)

- Upgrade terminal equipment at Tyrone North.
- Replace switches at Westvaco and Vail to provide appropriate interrupting capability.

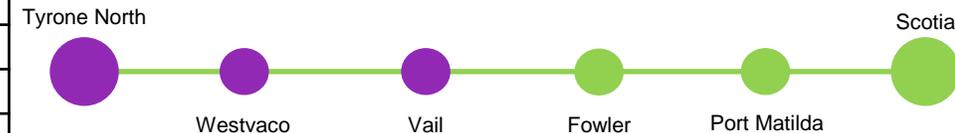
Estimated Project Cost: \$1.5M

Projected IS date: 6/1/2019

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Equipment Material Condition, Performance and Risk

- Improve system reliability and performance
- Remove obsolete & deteriorated equipment.
- Eliminate the simultaneous outages to three or more system elements

Selected Solution:

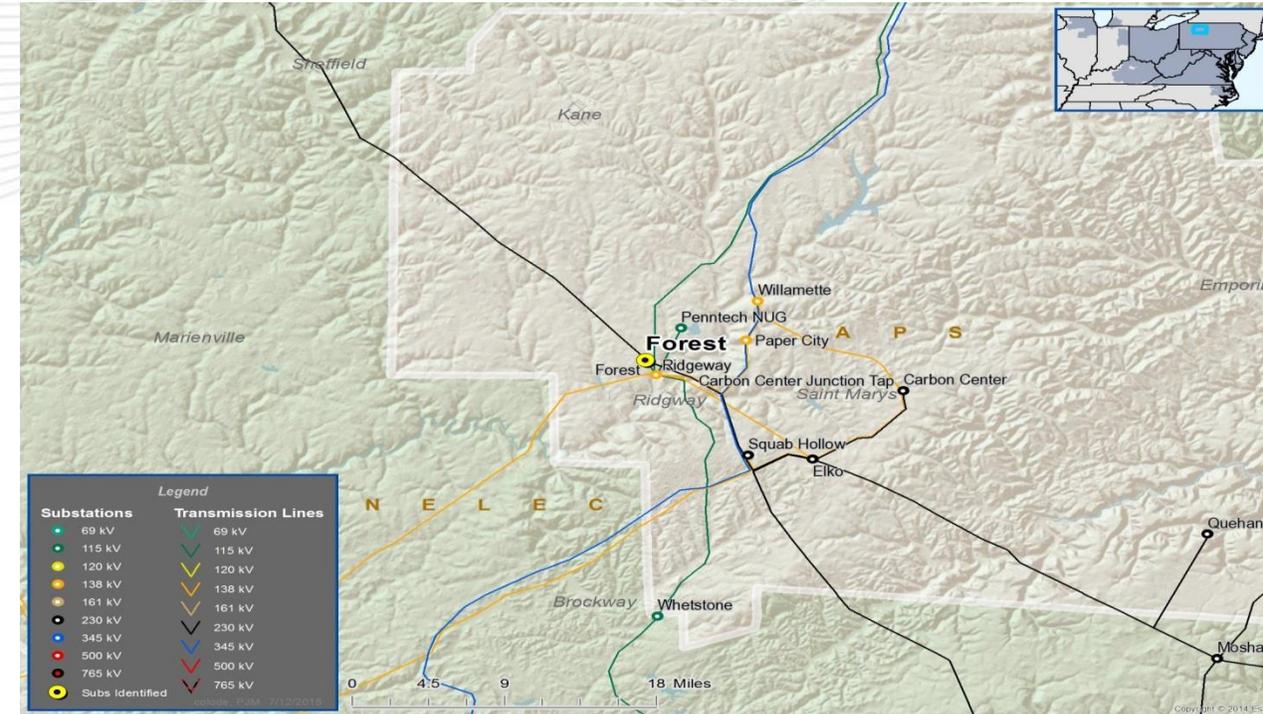
Forest Substation (S1735)

- Replace the existing 150 MVA 230/115 kV transformer.
- Convert the Forest 230 kV substation into a three (3) breaker ring bus.

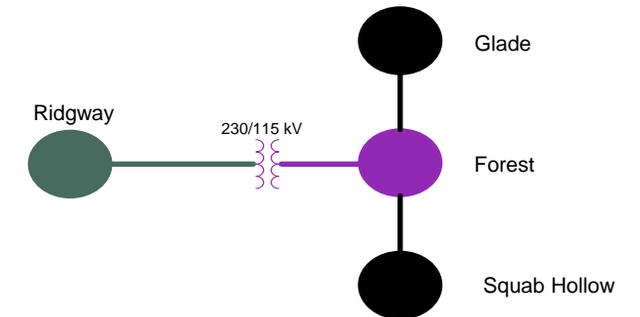
Estimated Project Cost: \$9.1M

Projected IS date: 6/1/2020

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



Previously Presented : 07/20/2018

Problem Statement (Scope and Need/Drivers):

Equipment Material Condition, Performance and Risk

- Improve system reliability and performance
- Remove obsolete & deteriorated equipment.

Selected Solution:

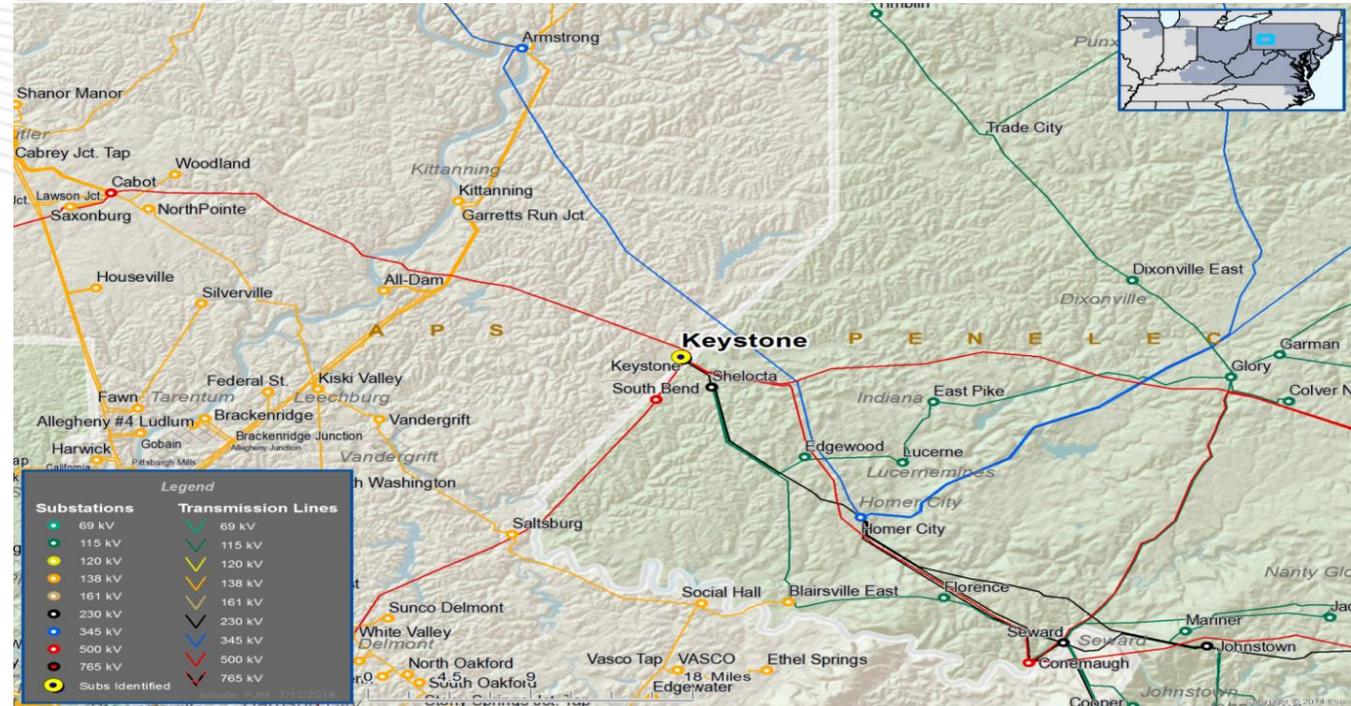
Keystone Substation. (S1736)

- Replace the existing 351 MVA 500/230 kV transformer.
- Install a 500 kV high side breaker.

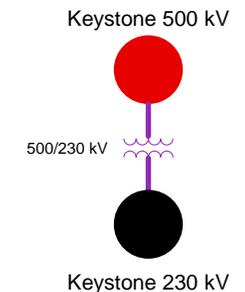
Estimated Project Cost: \$ 21.7M

Projected IS date: 12/31/2019

Status: Conceptual



Legend	
500 kV	
230 kV	
115 kV	
69 kV	
46 kV	
New	



UGI

Previously Presented: 03/23/2018

Problem Statement:

- Distribution load growth requires the construction of a double circuit 66kV transmission line serving a two-transformer (Type II) substation. The installed and under construction load served by UGI's HIP Substation (Type II) exceeds current substation capacity for loss of a single transformer reducing reliability. In addition, proposed expansion of industrial and commercial load further magnifies the capacity limitation.

Selected Solution:

- Construct 0.6 mile double circuit 66kV transmission line serving Looms 69/13.8 kV new substation with two-transformer (Type II) and six (6) overhead feeders. (S1648)

Estimated Cost: Transmission → \$1 M, Substation → \$8 M

Expected IS Date: 9/30/2019

Status: Planning and Engineering

