Sub Regional RTEP Committee
Mid-Atlantic

April 25, 2017

Supplemental Projects

AEC Transmission Zone

Supplemental Upgrade:

Monroe – Pine Hill 69kV – Rebuild Line 0752

Problem Statement:

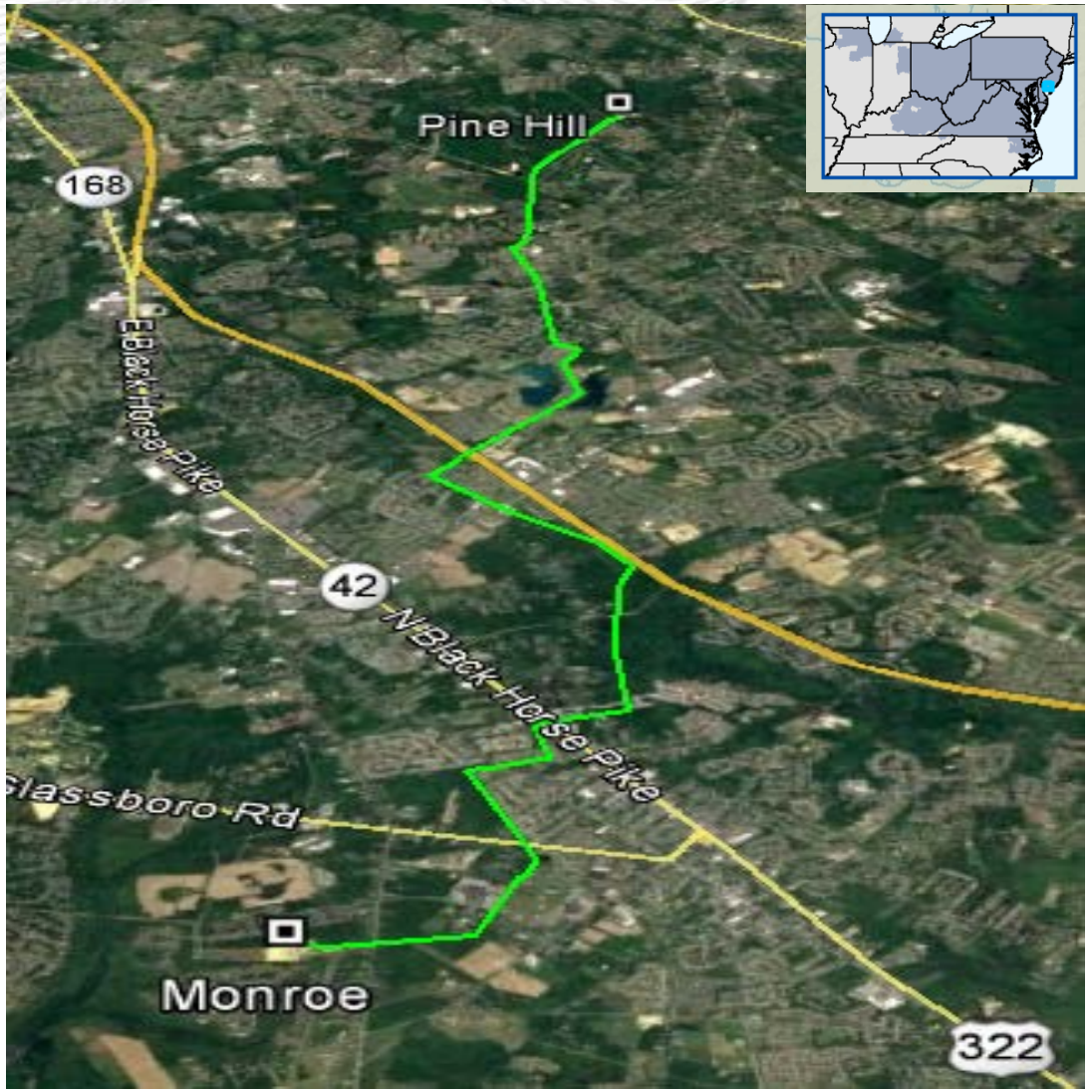
- Based on aerial inspection data, several cracked, deteriorated, and woodpecker damaged poles along with several deteriorated crossarms were identified, which places this line in the top quartile of the ACE age and condition ranking. This line was originally installed in 1965 and the majority of the structures are single wooden poles and crossarms with suspension insulators.

Potential Solutions/Alternatives:

- Rebuild 10.47 miles of line 0752 between Monroe and Pine Hill Substations. All structures, conductor, and static wire will be replaced with new weathering steel poles, 795 ACSR 26/7 Drake Conductor, and 0.638" 48-count OPGW.
- Obtain new ROW to install a new line.

Estimated Project Cost: $12 M

Project Status: Planning



Supplemental Upgrade:

Monroe – Tansboro 69kV – Rebuild Line 0754

Problem Statement:

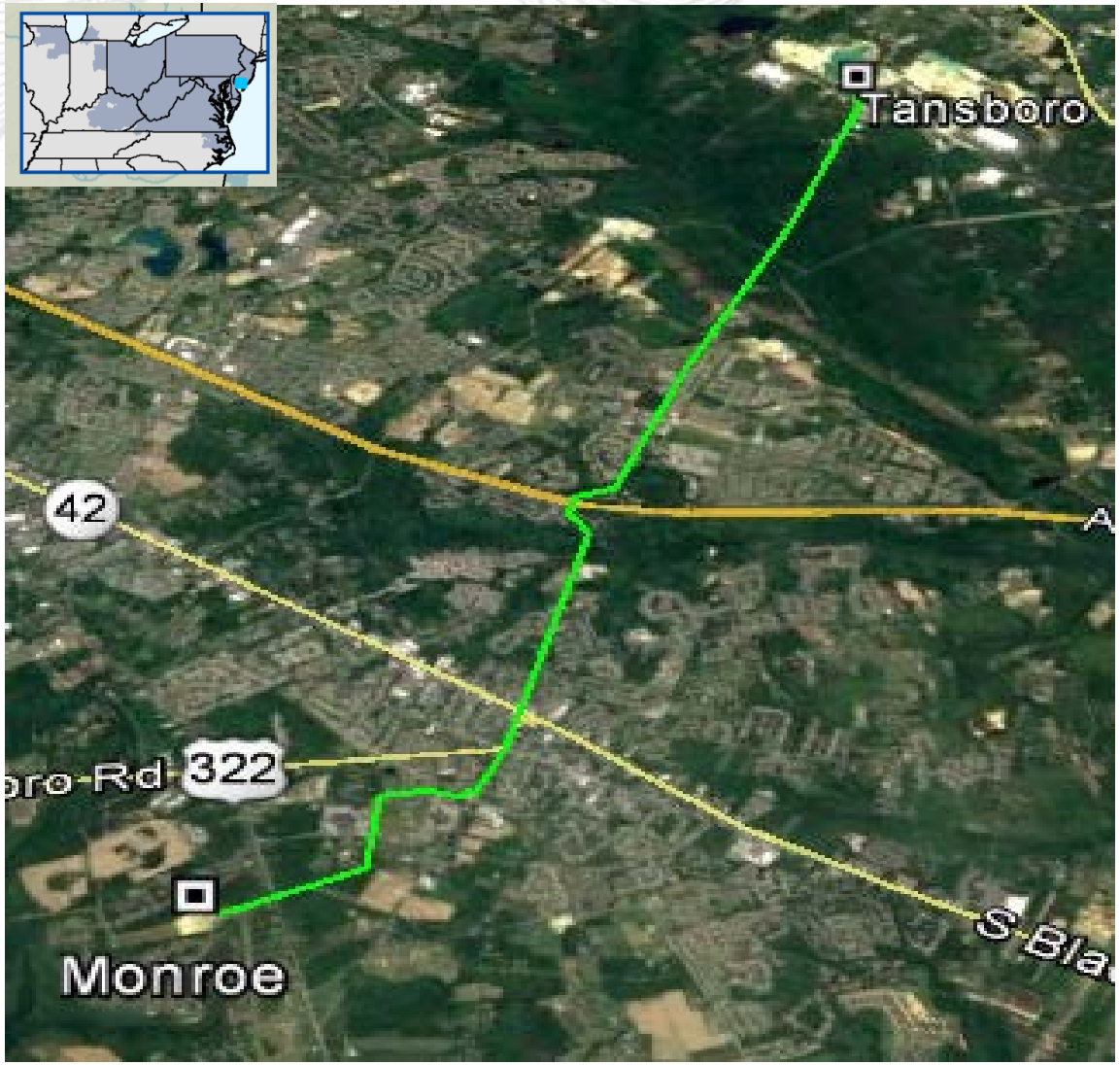
- Based on aerial inspection data, several cracked and deteriorated poles along with several deteriorated and cracked crossarms were identified, which places this line in the top quartile of the ACE age and condition ranking. This line was originally installed in 1970 and the majority of the structures are single wooden poles.

Potential Solutions/Alternatives:

- Rebuild 8.05 miles of line 0754 between Monroe and Tansboro Substations. All structures, conductor, and static wire will be replaced with new weathering steel poles, 795 ACSR 26/7 Drake Conductor, and 0.638" 48-count OPGW.
- Obtain new ROW to install a new line.

Estimated Project Cost: $13.5 M

Project Status: Planning



Supplemental Upgrade:

Monsanto – River 69kV – Rebuild Line 0763

Problem Statement:

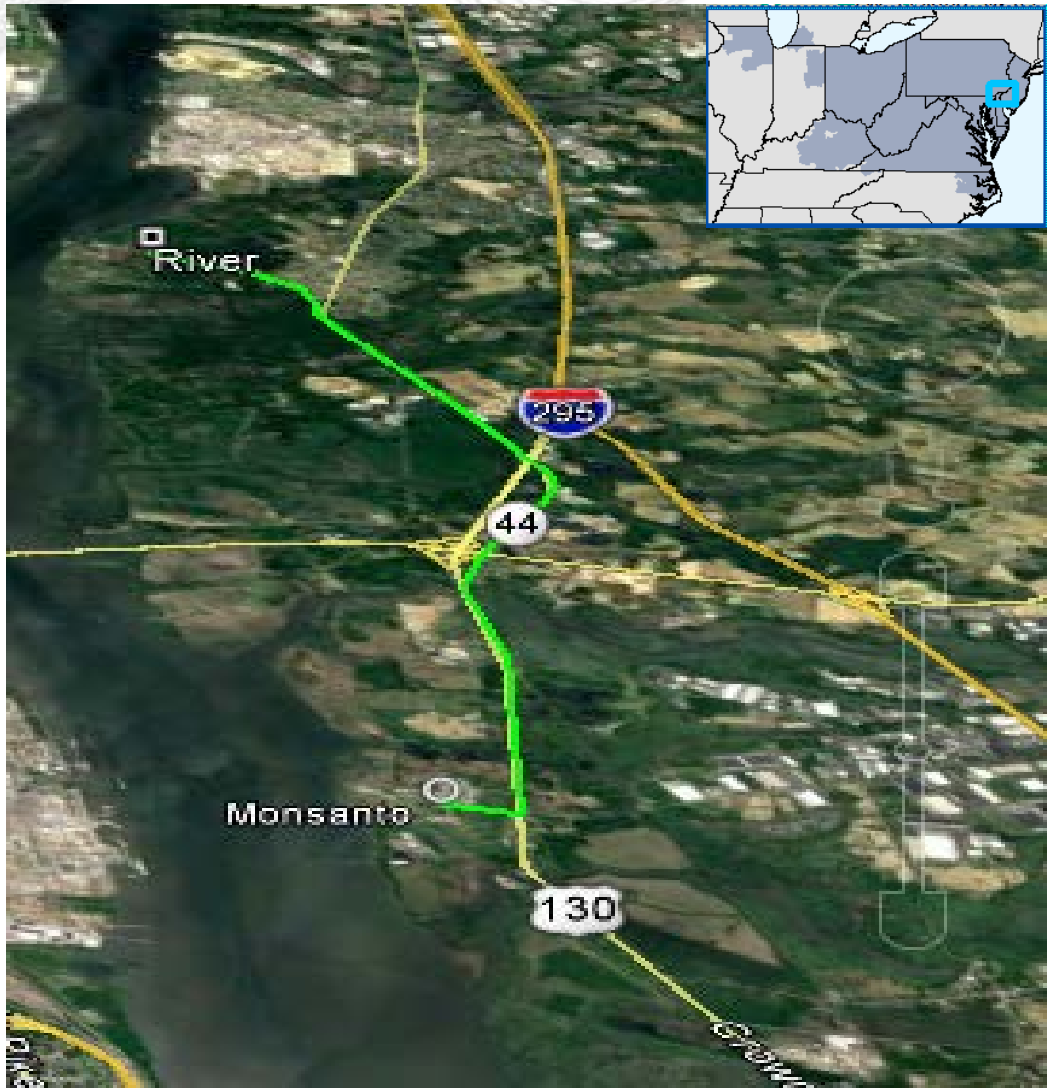
- Based on aerial inspection data, several cracked and deteriorated poles along with several deteriorated and cracked crossarms were identified, which places this line in the top quartile of the ACE age and condition ranking. This line was originally installed in 1930 and the majority of the structures are single wooden poles. A small portion of the line was rebuilt in 1992.
- The local 34 kV distribution system, served from River substation, is also being considered for retirement due to aging infrastructure.

Potential Solutions/Alternatives:

- Rebuild 8.41 miles of line 0763 between Monsanto and River Substations. All structures, conductor, and static wire will be replaced with new weathering steel poles, 795 ACSR 26/7 Drake Conductor, and 0.638" 48-count OPGW. Tie the Monsanto – River (0763) line to the Mickleton – River (0747) to create a new Monsanto – Mickleton 69 kV line.
- Obtain new ROW to install a new line.

Estimated Project Cost: $13.5 M

Project Status: Planning



Supplemental Upgrade:

South Millville – Lincoln 69kV – Rebuild Line 0603

Problem Statement:

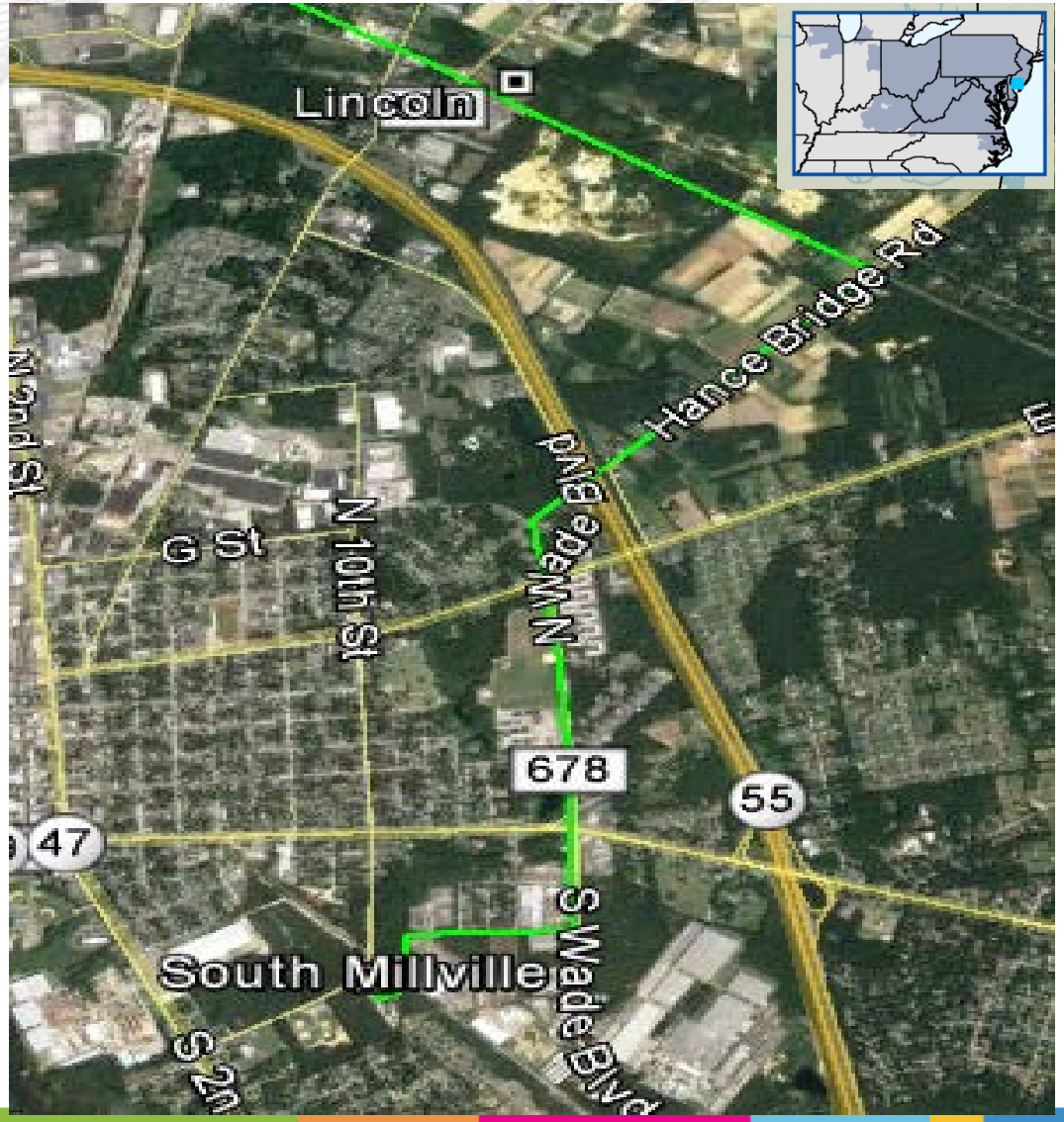
- Based on a aerial inspection data, this line was determined to be severely deteriorated. In addition, this circuit is considered an important circuit from a system perspective due to its connection to Vineland Electric's CT unit and its ability to serve the load in the area. This line was originally installed in 1950 with some poles replaced in 1980.

Potential Solutions/Alternatives:

- Rebuild 3.67 miles of line 0603 between South Millville and Lincoln Substations. All structures, conductor, and static wire will be replaced with new wood and steel poles, 795 kcmil 26/7 Drake Conductor, and 0.638" OPGW.
- Obtain new ROW to install a new line.

Estimated Project Cost: $4.6 M

Project Status: Planning



AEC Transmission Zone

Supplemental Upgrade:

Lenox – Lewis 69kV – Rebuild Line 0721

Problem Statement:

– Based on aerial inspection data, several cracked, deteriorated, and woodpecker damaged poles along with several heavily rusted insulator caps were identified, which places this line in the top quartile of the ACE age and condition ranking. This line was originally installed in 1939 and the majority of the structures are single wooden poles. In addition, this circuit feeds a large commercial customer..

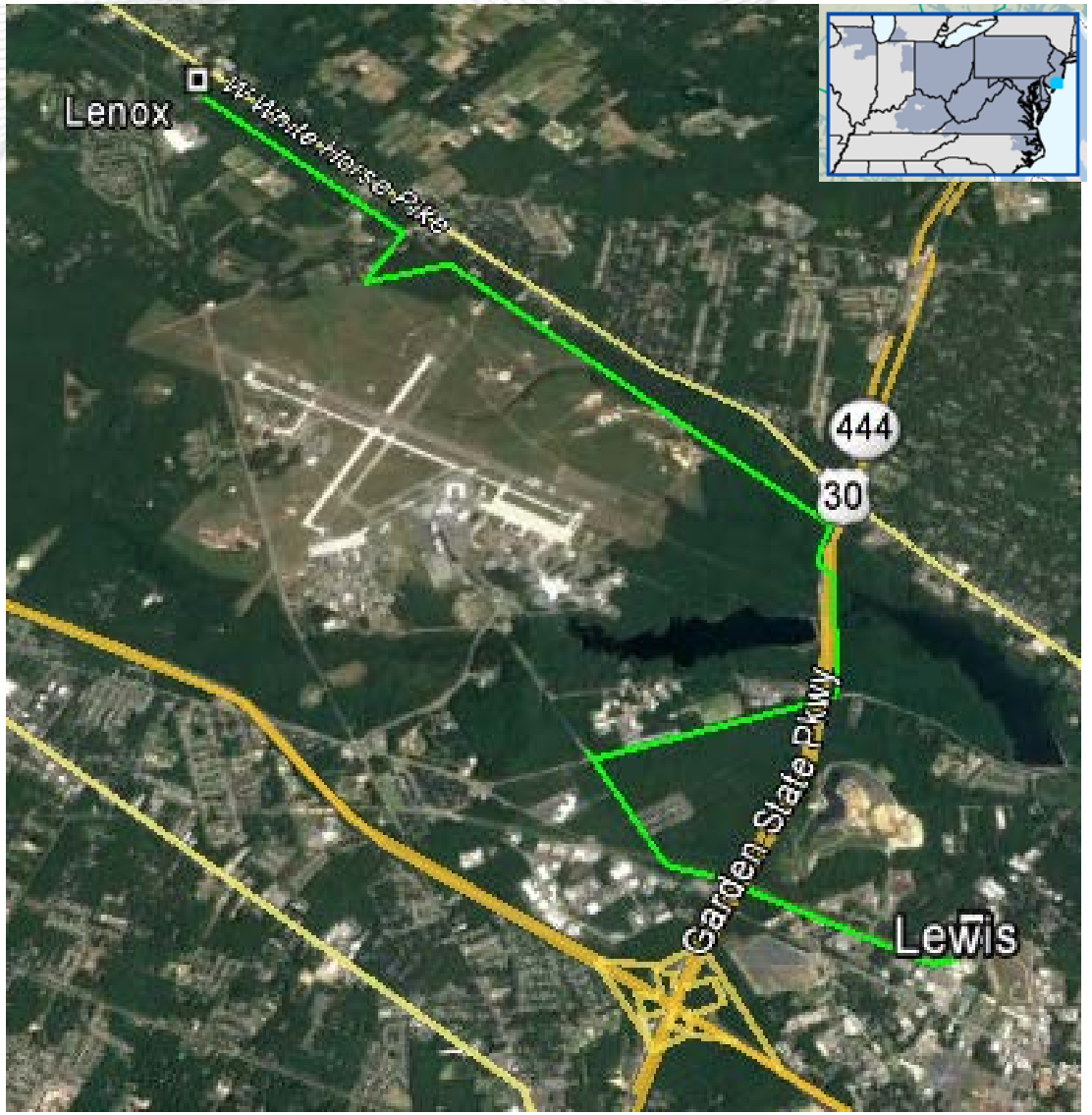
Potential Solutions/Alternatives:

– Rebuild 9.03 miles of line 0721 between Lewis and Lenox Substations. All structures, conductor, and static wire will be replaced with new weathering steel poles, 795 ACSR 26/7 Drake Conductor, and 0.638" 48-count OPGW.

– Obtain new ROW to install a new line.

Estimated Project Cost: $12 M

Project Status: Planning



BGE Transmission Zone

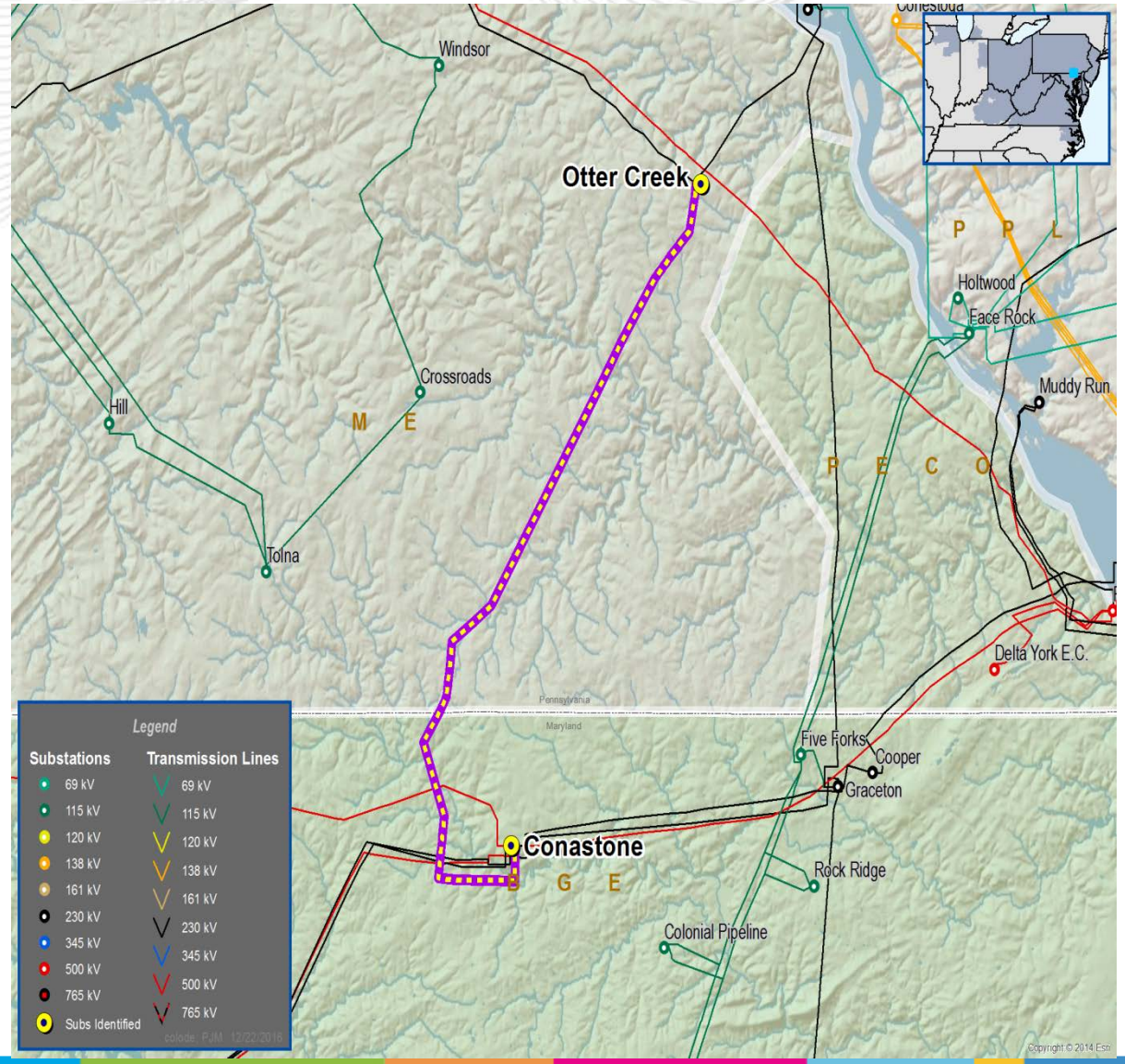
Supplemental Upgrade:

Conastone to Otter Creek #2302 230 kV Line Rebuild and Protection and Communications Upgrade

Previously presented: January 5, 2017

Problem Statement:

- Line #2302 is a 230 kV tie line between the BGE Conastone substation and the PPL Otter Creek Substation. The line is 85 years old.
- The line uses a power line carrier blocking relay scheme that is currently less reliable and a frequent contributor to misoperation(s). BGE standards call for dual pilot channels on 230 kV circuits. BGE has retired all internal PLC blocking schemes within the BGE zone and on all BGE tie lines with PEPCO in an effort to modernize the communication and protection systems.
- PPL identified this line to be rebuilt as part of supplemental project S0233 due to significant aging infrastructure concerns in their zone. To resolve this, PPL is rebuilding 12 miles of its portion of the line to 1590 ACSR, installing OPGW and upgrading relaying as part of PPL supplemental project S0233. This supplemental project was completed in February 2017.
- The line segment is only 7 towers long and there are routine maintenance issues regarding buried foundations, rusted steel at the foundation , and bent tower steel that are being managed. Maintenance inspections on a recently replaced BGE circuit similar (same age and structure configuration) to #2302 revealed the following problems:
  - Degraded phase conductors due to core wire corrosion, and aluminum annealing.
  - Temporary clearance mitigations previously installed need permanent resolutions
  - Steel corrosion at the foundation interface due to recurring soil cover
  - All the insulators needs replacement due to pin/cap corrosion as well as degraded porcelain due to years of lightning exposure. The attachment hardware and attachment plates are worn and need to be replaced
- BGE needs to address its portion of the tie line



BGE Transmission Zone

Supplemental Upgrade:

Conastone to Otter Creek #2302 230 kV Line Rebuild and Protection and Communications Upgrade

Previously presented: January 5, 2017

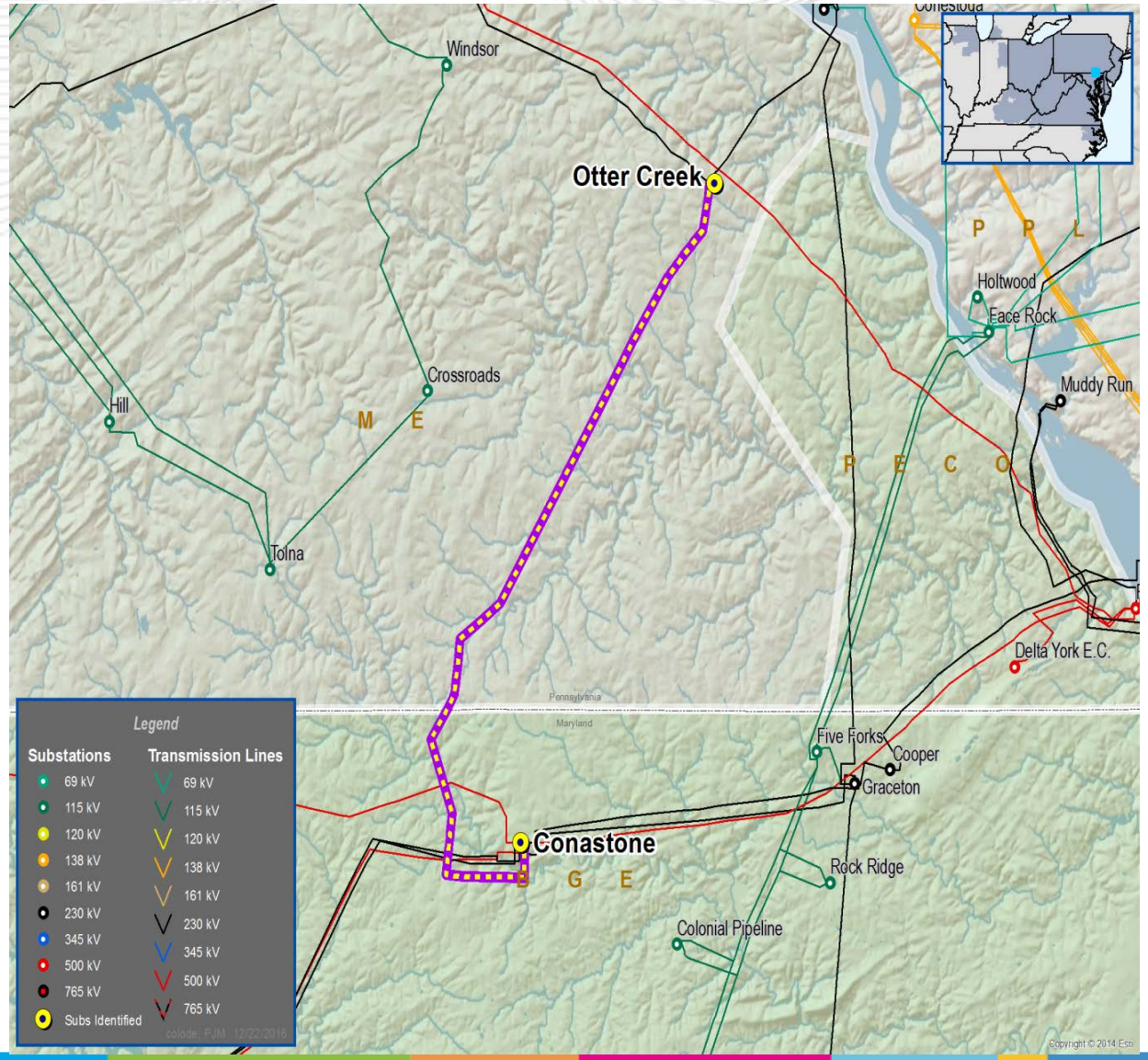
Proposed Solution:

- Rebuild 1.6 miles of the #2302 transmission circuit with 1590 ACSR, remove existing wave trap , replace static wire with OPGW, and install new communications and upgrade protective relaying equipment thereby matching PPL's construction.

Estimated Project Cost: $ 4.08 M

Projected IS Date: 06/01/2018

Project Status: Engineering and Construction



BGE Transmission Zone

Supplemental Upgrade:

Transmission Relay Replacement (2018)

Previously presented: January 5, 2017

Problem Statement:

–Relay configurations/schemes require replacement due to reasons such as inability to support system event recording, technologies prone to mis-operations, obsolete equipment or equipment for which spares are difficult to procure, enhanced ability to comply with NERC PRC-005, etc.

Potential Solutions

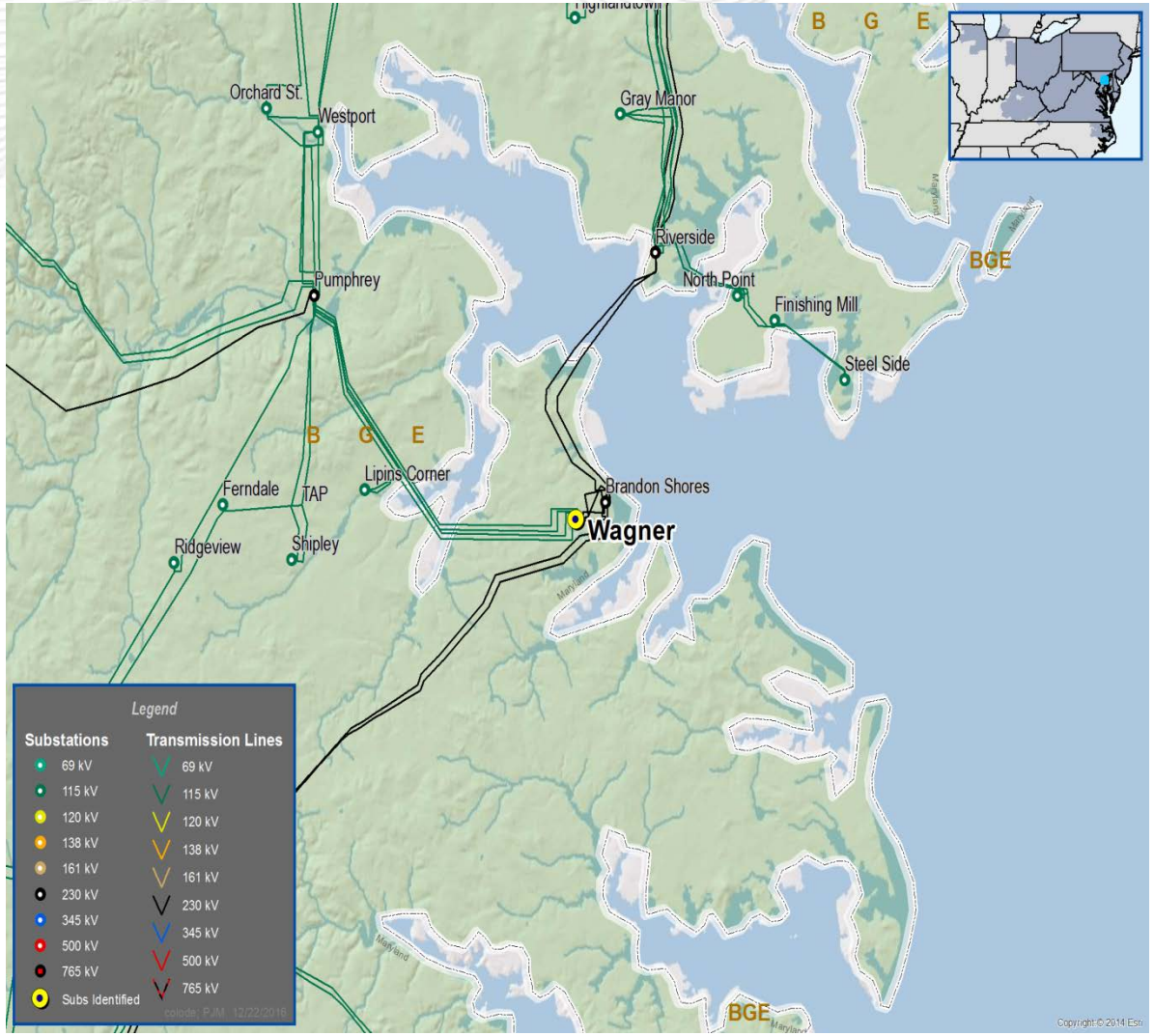
–Replacing the following relay configurations/schemes in 2018 (will result in an increase in the facility ratings).

- Wagner 230-1 Transformer 230/115 kV
- Wagner 230-2 Transformer 230/115 kV

Estimated Project Cost: $ 112K

Projected IS Date: 12/31/2018

Project Status: Engineering and Construction



Supplemental Upgrade:

Harbeson – Zoar – Rebuild Line 6734

Problem Statement:

- 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. This is a wood pole single circuit line that was originally installed in 1975. Additionally, there is a Delaware Electric Co-op “Zoar” 69kV substation that is tapped off of this line that would benefit from these upgrades.

Potential Solutions:

- Rebuild Circuit 6734 (5.64 miles) from Harbeson Substation to the Zoar Tap. All structures, conductor, and static wire will be replaced with new weathering steel poles, 954 ACSR 45/7 Stranding Rail Conductor, and 0.638" 48-count OPGW.

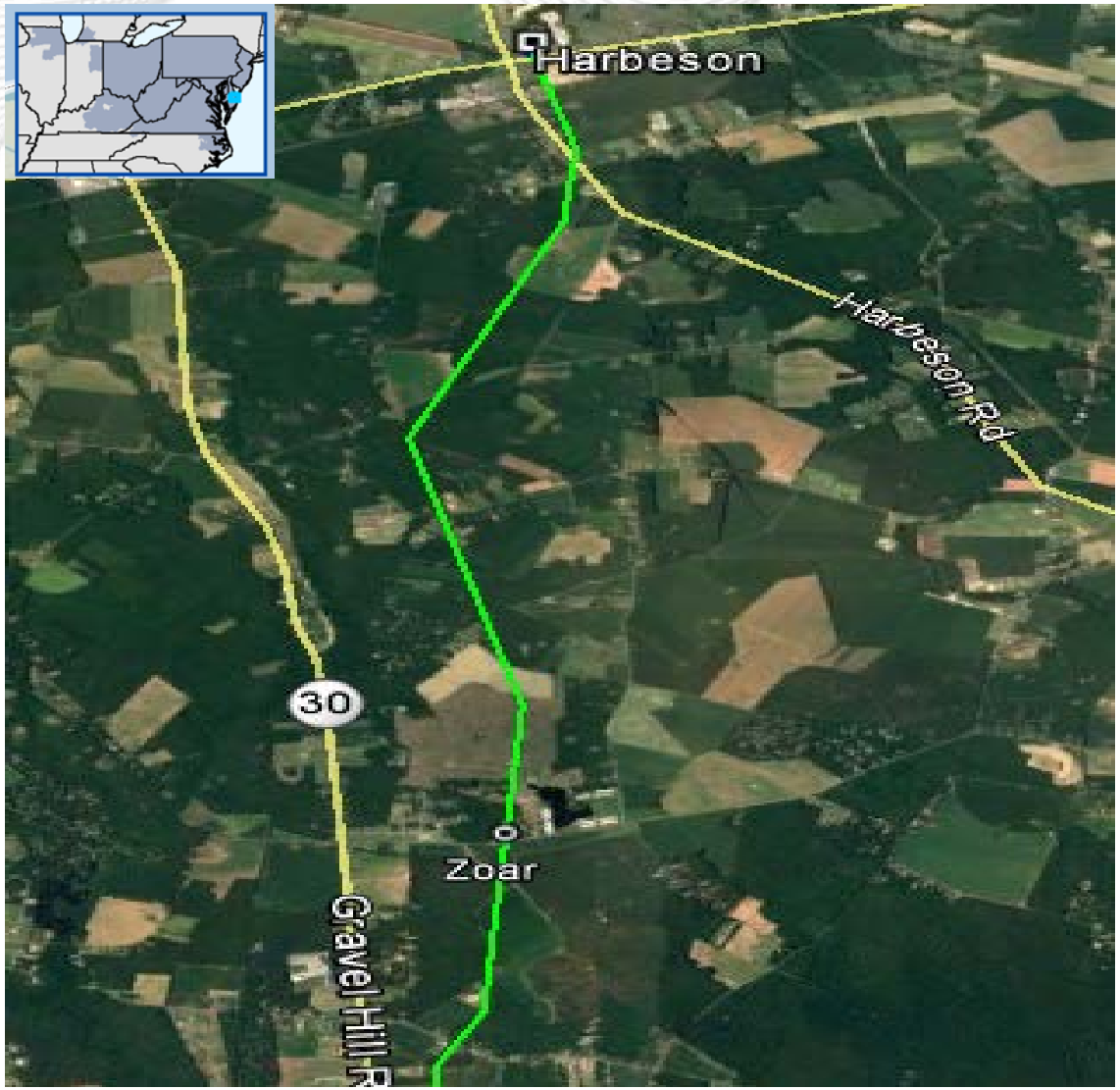
Alternatives:

- None

Estimated Project Cost: $6.25M

Projected IS Date: 12/31/2018

Project Status: Engineering & Construction



PenElec Transmission Zone

Supplemental Upgrade:

Bethlehem 33 - Summit 46kV line: Kokomo Road 46 kV Tap

Problem Statement:

Provide 46 kV service to new customer. Anticipated load is 2.8 MW (0.85 pf) in Cresson, PA.

Potential Solution:

Tap Lilly - Summit section of the Bethlehem 33 – Summit 46 kV line:

- Install (2) 46 kV disconnects with whips
- Install (1) disconnect with a vacuum bottle
- Install (1) revenue meter.
- Install (1) span (length~200 ft) to the interconnection point.
- Install SCADA on the network switches.

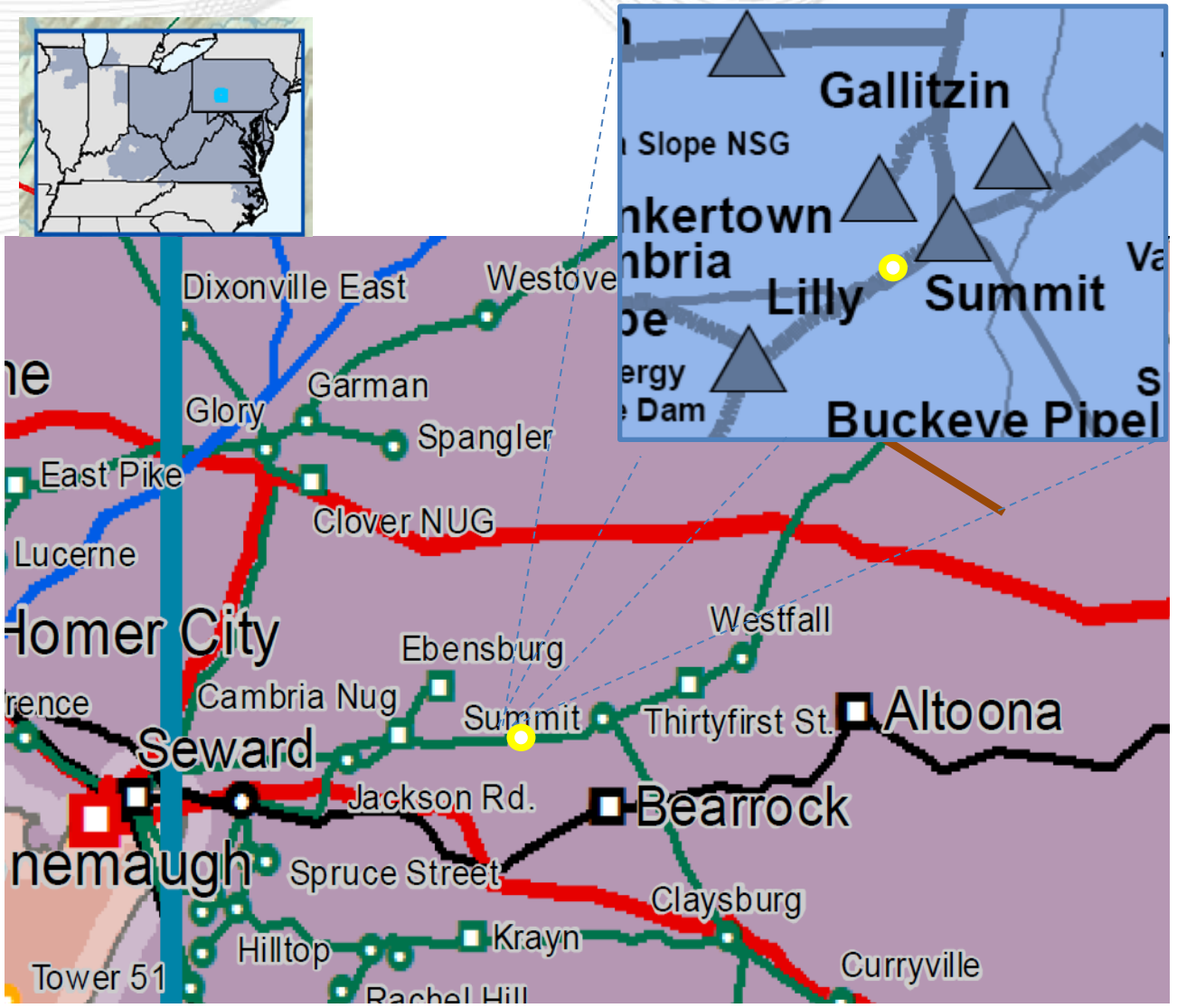
Alternatives:

- None

Estimated Project Cost: $0.2 M

Projectedl IS Date: 8/31/2017

Project Status: Engineering and Planning



PenElec Transmission Zone

Supplemental Upgrade:

Niles Valley – Wellsboro – Marshall 115 kV

Problem Statement:

Niles Valley-Wellsboro-Marshall 115 kV line is needed to:

- Improve reliability due to multiple outages over past several years
- Reduce loading on contingency constrained facilities

Potential Solution :

Phase 1: Niles Valley-Wellsboro 115 kV

- Construct ~5 miles of 115 kV line using existing right-of-way (where possible)
- Install new 115 kV bus tie breaker at Niles Valley
- Relocate Potter 115 kV line at Niles Valley
- Install two SCADA controlled switches
- Install switch structure for future network line extension

Phase 2: Wellsboro-Marshall 115 kV (Future)

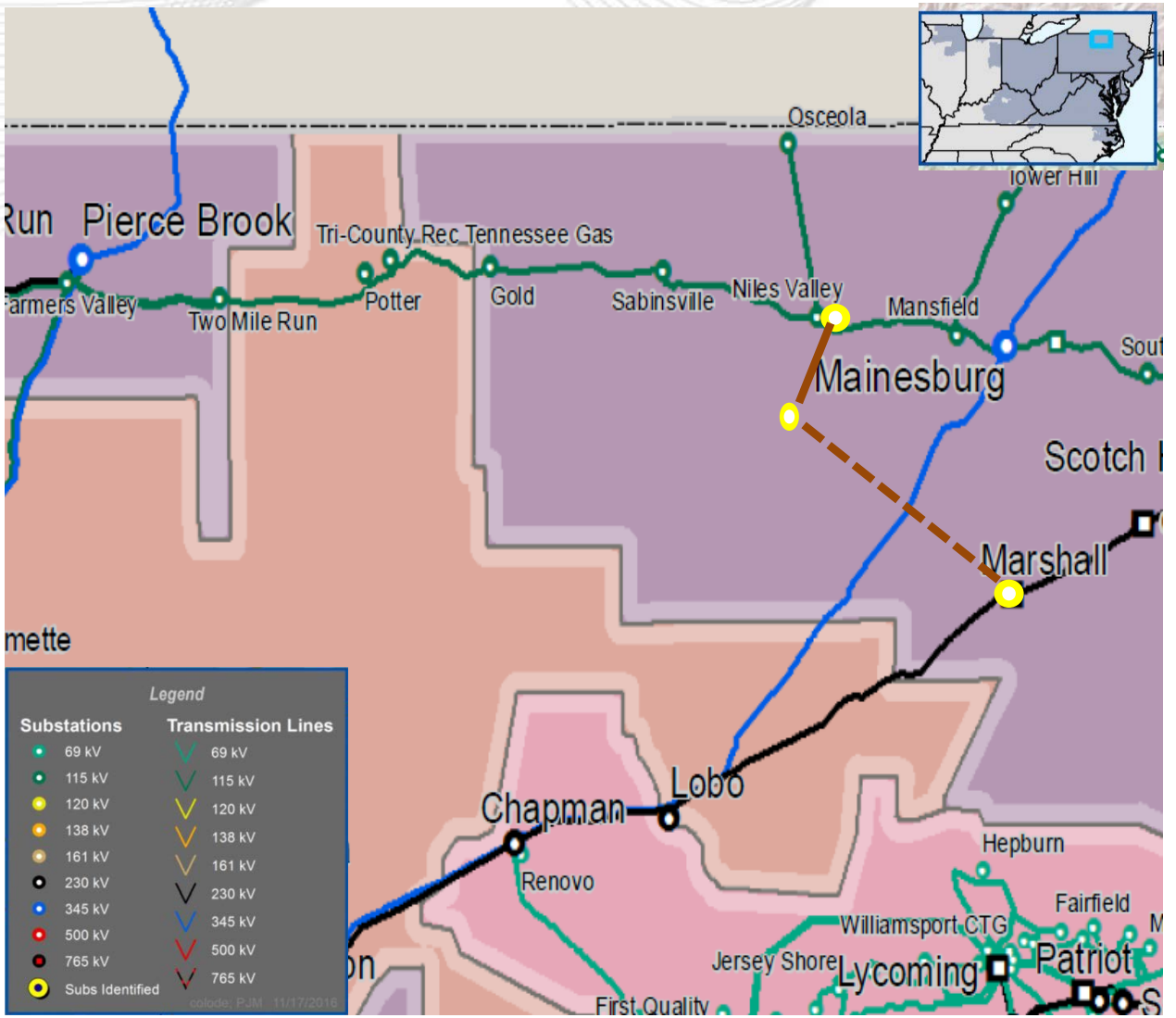
Alternatives:

- Rebuild the 34.5 kV system

Estimated Project Cost: Phase 1 - $12.8 M

Projected IS Date: Phase 1 - 6/1/2020

Project Status: Engineering and Planning (EP)



PenElec Transmission Zone

Supplemental Upgrade:

Tiffany - Thompson 115 kV line: Pentagon 115 kV Tap

Problem Statement:

Provide 115 kV service to new customer. Anticipated load is 13 MVA (0.97 pf) in New Milford, PA.

Potential Solution :

Tap the Tiffany - Thompson 115 kV line.

- Install (2) 115kV disconnects with SCADA.
- Install (1) revenue meter.
- Install (1) span (length~200ft) to the interconnection point.

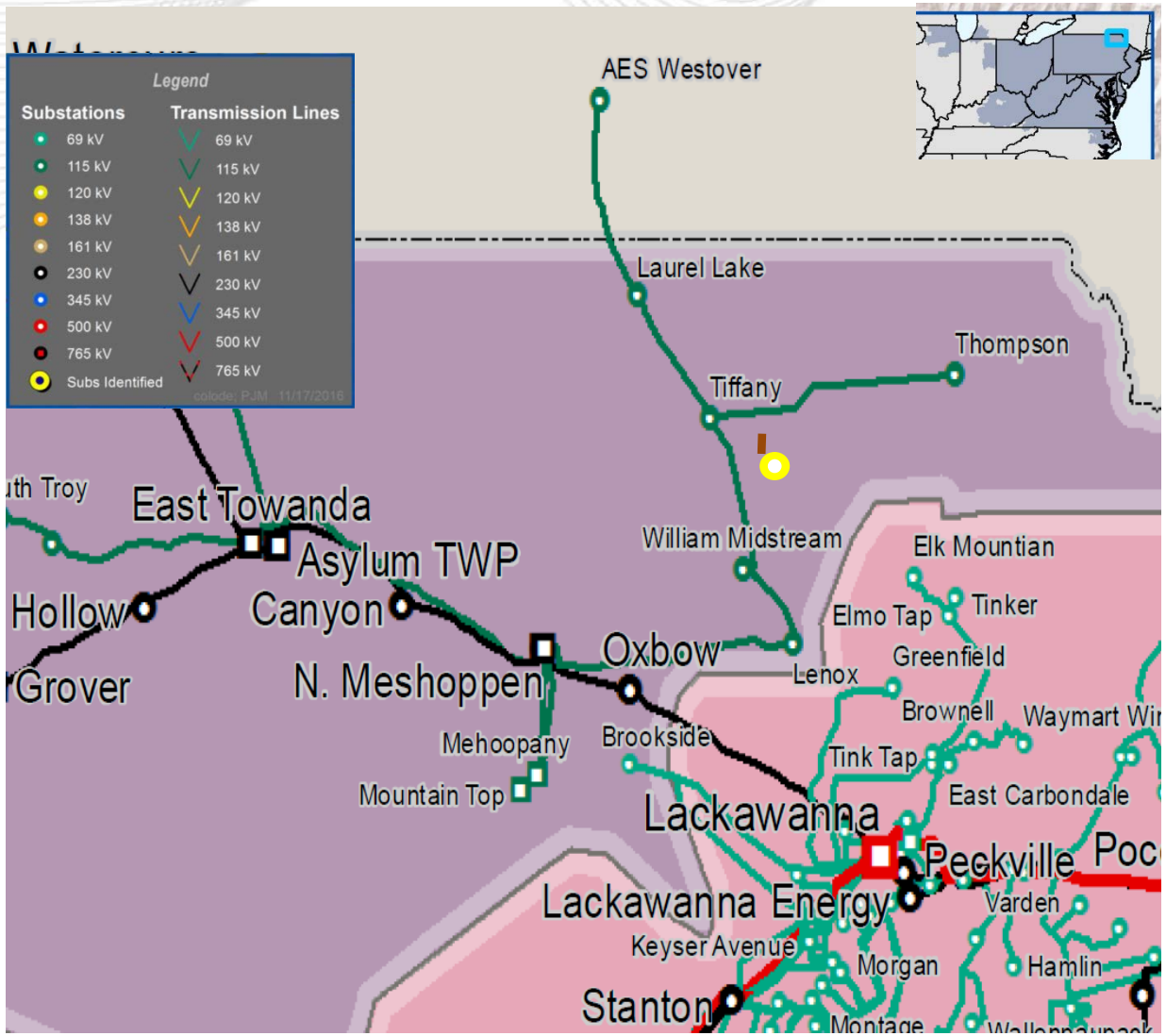
Alternatives:

None

Estimated Project Cost: $0.8 M

Projected IS Date: 12/31/2017

Project Status: Engineering and Planning (EP)



PSEG Transmission Zone

Supplemental Upgrade:

Reconfigure Kearny 230kV Station Light & Power

Problem Statement:

- The Kearny 230kV Switchyard is currently fed from less than reliable 4kV street power from nearby Turnpike and Third Street Substations, leaving Kearny Switching Station subject to interruptions from events in the area, such as pole damage.

Potential Solution:

- Providing a more robust and reliable power source to the 230kV Kearny Switching Station, the existing station light & power (SL&P) transformers fed from street power will be replaced with Station Service Voltage Transformers (SSVTs) fed from Kearny 230kV Bus 1 and Bus 2. The SSVTs will provide 208/120V directly to the control house.

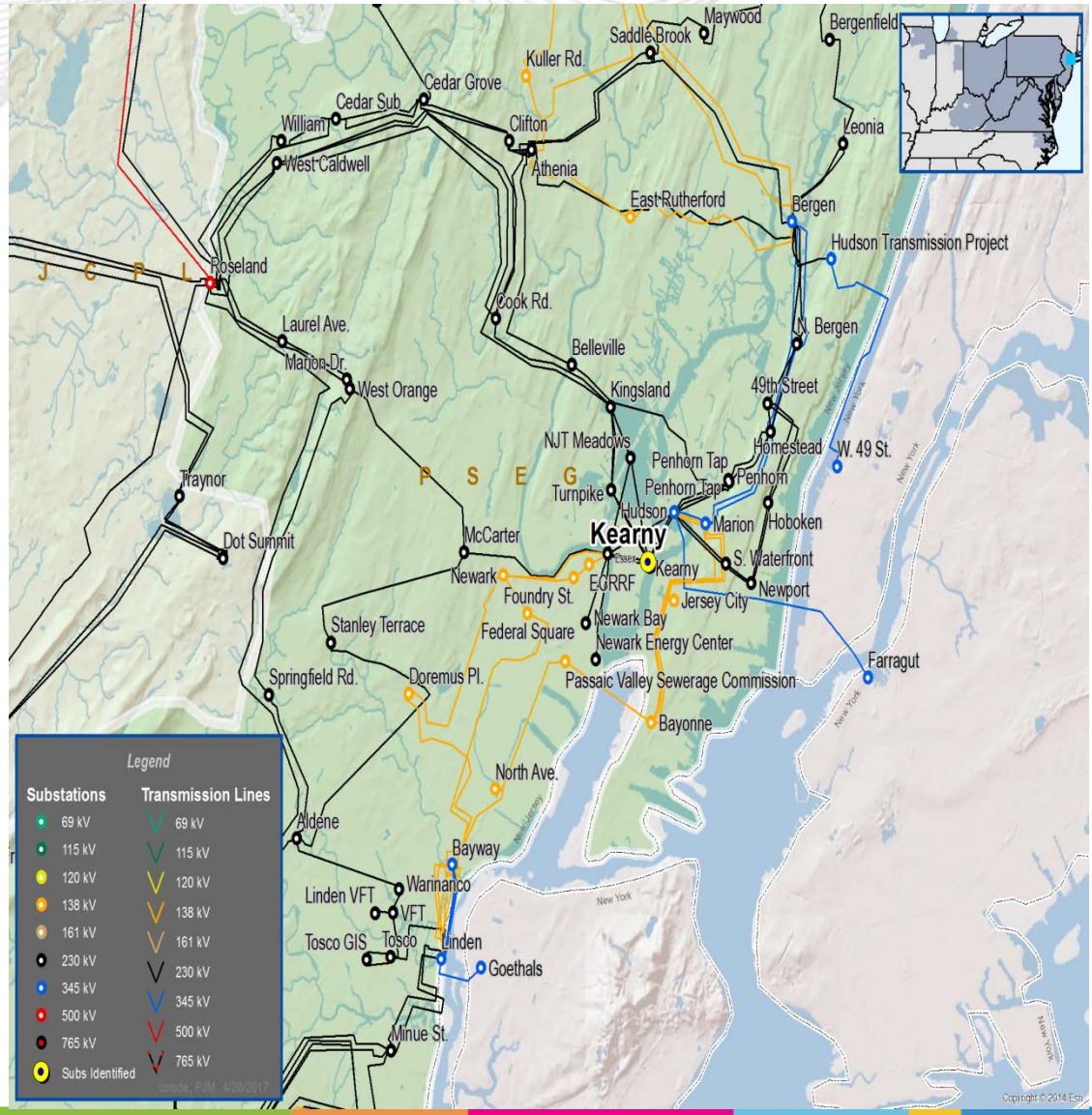
Alternatives:

- Continue using existing street power sources to provide station light & power accepting outages during stormy conditions and possible loss of all station power.
- Consideration was given to leverage one of the other power sources on Kearny property either from the 230/69kV station 1500 feet away or 230/13kV station which is 2000 feet away. A supply for either of the two on-site sources would be much costlier.
- Estimated Cost → $Exceeds 20 M

Estimated Project Cost: $6.3 M

Projected IS Date11/30/2017

Project Status: Conceptual Design



Revision History

04/20/2017 – Original version posted to PJM.com

04/21/2017 – V1 – Added overview map to all slides

05/04/2017 – V2 – Added cost for slides 3,4,5,6, and 7, and added kV transformer voltage level on slide 10

Questions?

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