Sub Regional RTEP Committee
PJM Mid-Atlantic
Penelec

April 26, 2019

Needs

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

Penelec Transmission Zone M-3 Process

Need Number: PN-2019-014

Process Stage: Need Meeting 4/26/2019

Supplemental Project Driver:

Operational Flexibility and Efficiency

Specific Assumption References:

Reconductor/Rebuild Transmission Lines

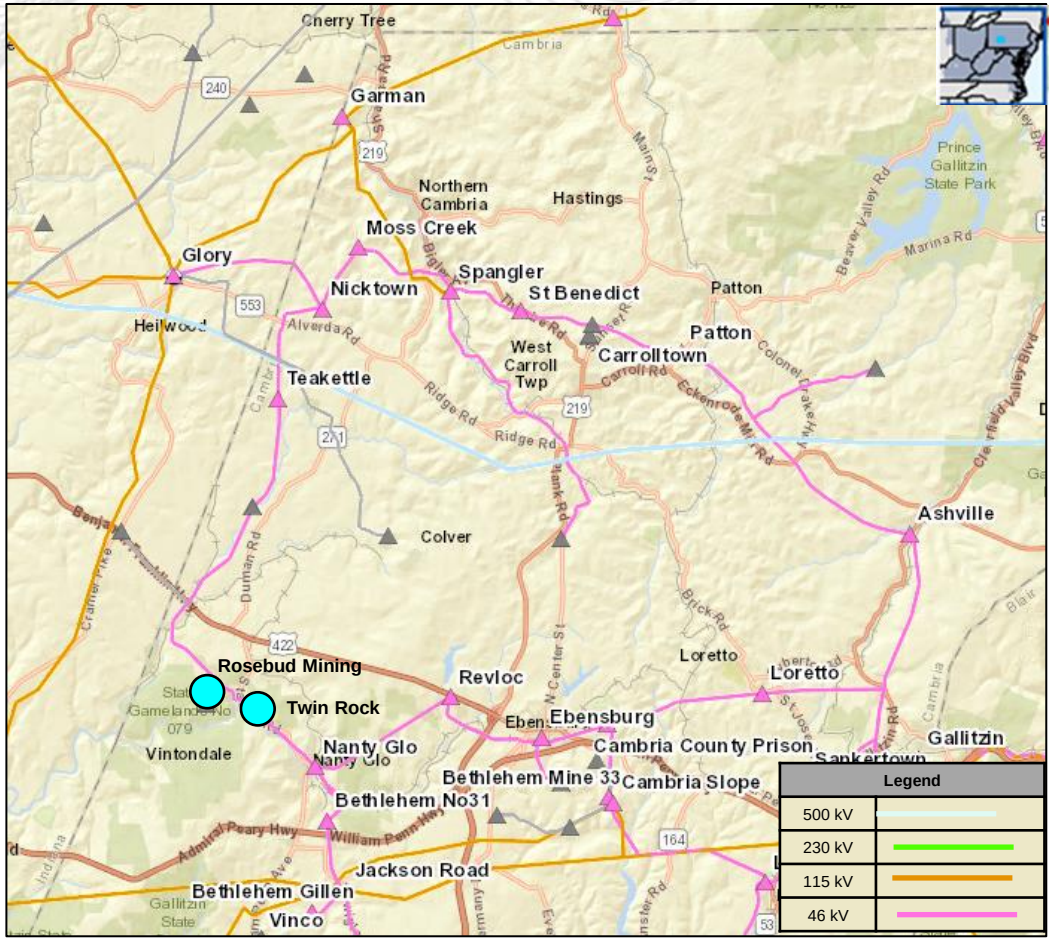
- Transmission lines that frequently require operational switching

Problem Statement:

Loss of the Garman – Spangler 115 kV (PN-P1-2-PN-115-048) and Ashville – Summit 46 kV line (PN-P1-2-PN-46-014) overloads the Rosebud Mining – Twin Rock 46 kV to 138% of its 32 MVA SE rating.

(2018 RTEP Model – 2023 Summer)

Operations has performed pre-contingency switching to mitigate overloads on this line during peak summer conditions. Line loading is worsened when Shawville generation is offline or reduced. The overloaded line places approximately 15 MW and 1,600 customers at risk.



Penelec Transmission Zone M-3 Process

Need Number: PN-2019-015

Process Stage: Need Meeting 4/26/2019

Supplemental Project Driver:

Operational Flexibility and Efficiency

Specific Assumption References:

System Performance Projects

- Substation/line equipment limits
- Load at risk in planning and operational scenarios
- Load and/or customers at risk on single transmission line

Problem Statement:

Philipsburg 115 kV substation serves approximately 42 MW of load and 18,600 customers. A stuck bus tie breaker at Philipsburg will outage both 115-34.5 kV transformers and 115 kV network path. A fault on the Philipsburg – Shawville 115 kV line outages the #2 115-34.5 kV transformer. Over the past five years, the Philipsburg – Shawville 115 kV line has experienced six sustained outages.

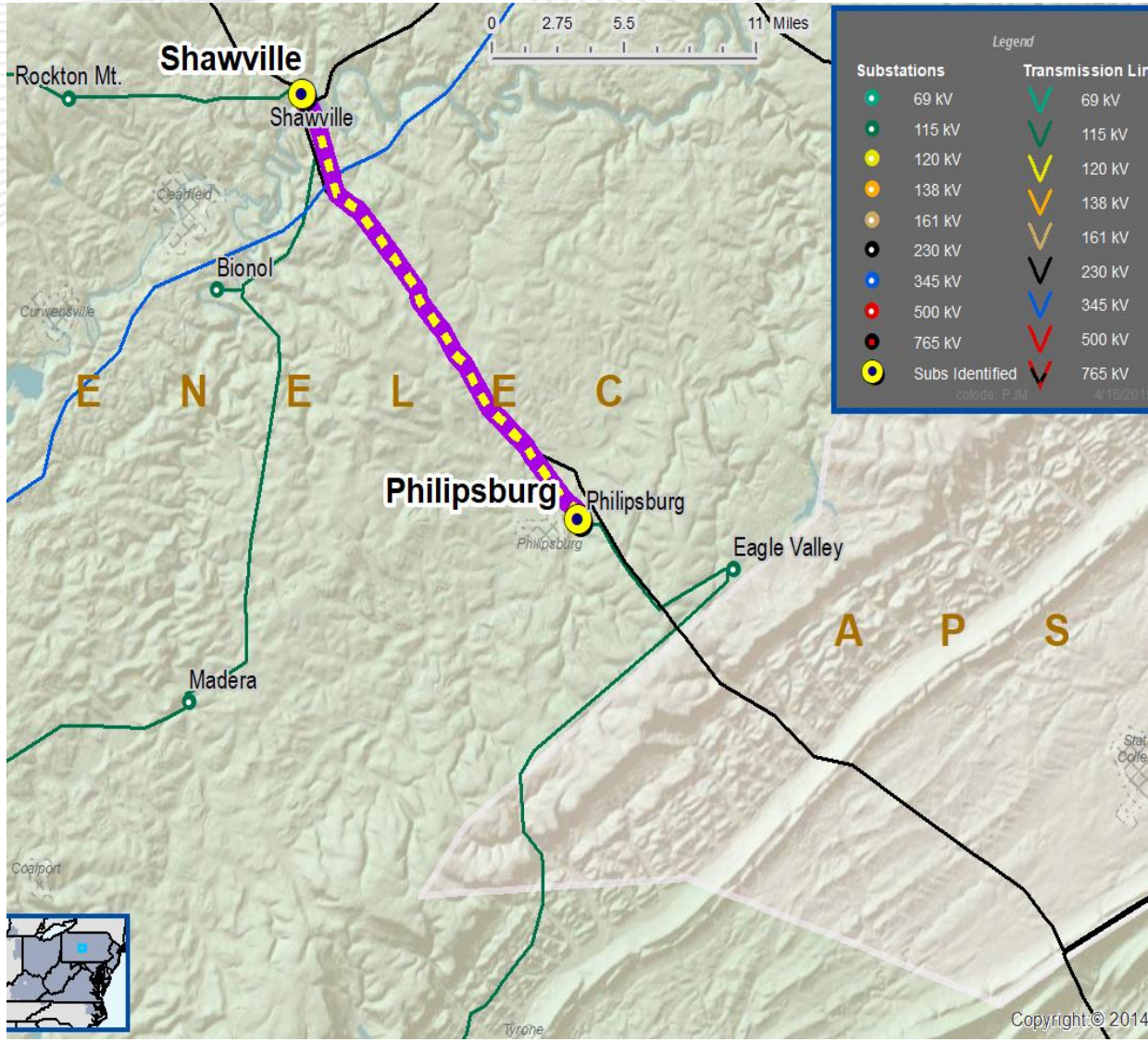
Transmission line ratings are limited by terminal equipment.

- Philipsburg – Shawville 115 kV line:

Existing line rating is 163/185 MVA (SN/SE). Existing conductor rating is 167/202 MVA (SN/SE). *(line trap, circuit breaker)*

- Philipsburg – Eagle Valley 115 kV line:

Existing line rating is 137/174 MVA (SN/SE). Existing conductor rating is 201/244 MVA (SN/SE). *(CTs, substation conductor / drop, circuit breaker)*



Penelec Transmission Zone M-3 Process

Need Number: PN-2019-016

Process Stage: Need Meeting 4/26/2019

Supplemental Project Driver:

Operational Flexibility and Efficiency

Specific Assumption References:

System Performance Projects

- Substation/line equipment limits
- Load at risk in planning and operational scenarios
- Load and/or customers at risk on single transmission line

Problem Statement:

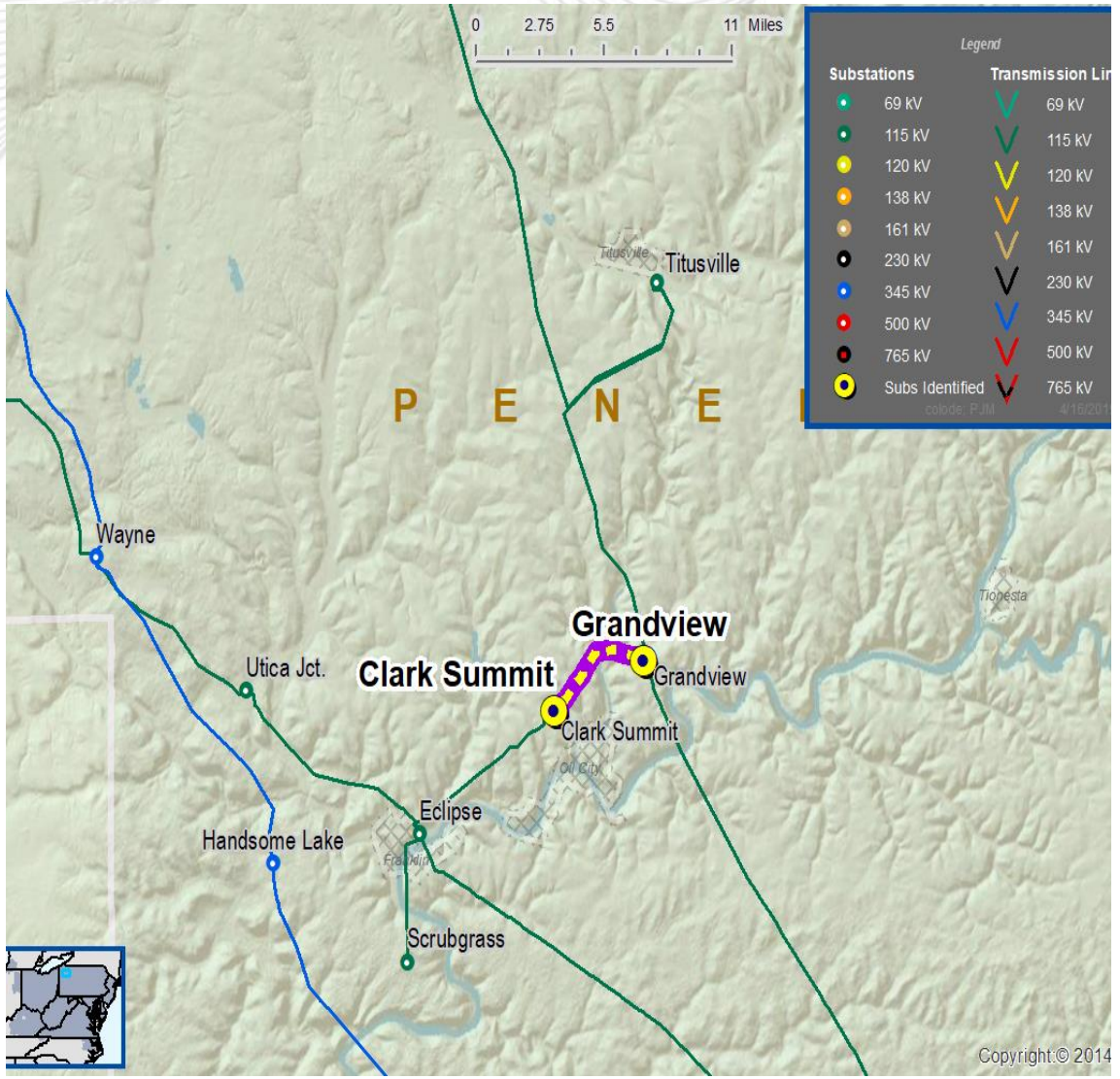
Clark Summit 115 kV substation serves approximately 42 MW of load and 11,200 customers. Substation has two transformers and no breakers. A fault on the Eclipse-Clark Summit-Grandview 115 kV line results in loss of line and both distribution transformers.

Transmission line ratings are limited by terminal equipment.

- Clark Summit – Grandview 115 kV line:

Existing line rating is 147/190 MVA (SN/SE). Existing conductor rating is 202/245 MVA (SN/SE).

(substation conductor)



Penelec Transmission Zone M-3 Process

Need Number: PN-2019-017

Process Stage: Need Meeting 4/26/2019

Supplemental Project Driver:

Operational Flexibility and Efficiency

Specific Assumption References:

Network Radial Lines

- Radial lines defined by normally open points

Reconductor/Rebuild Transmission Lines

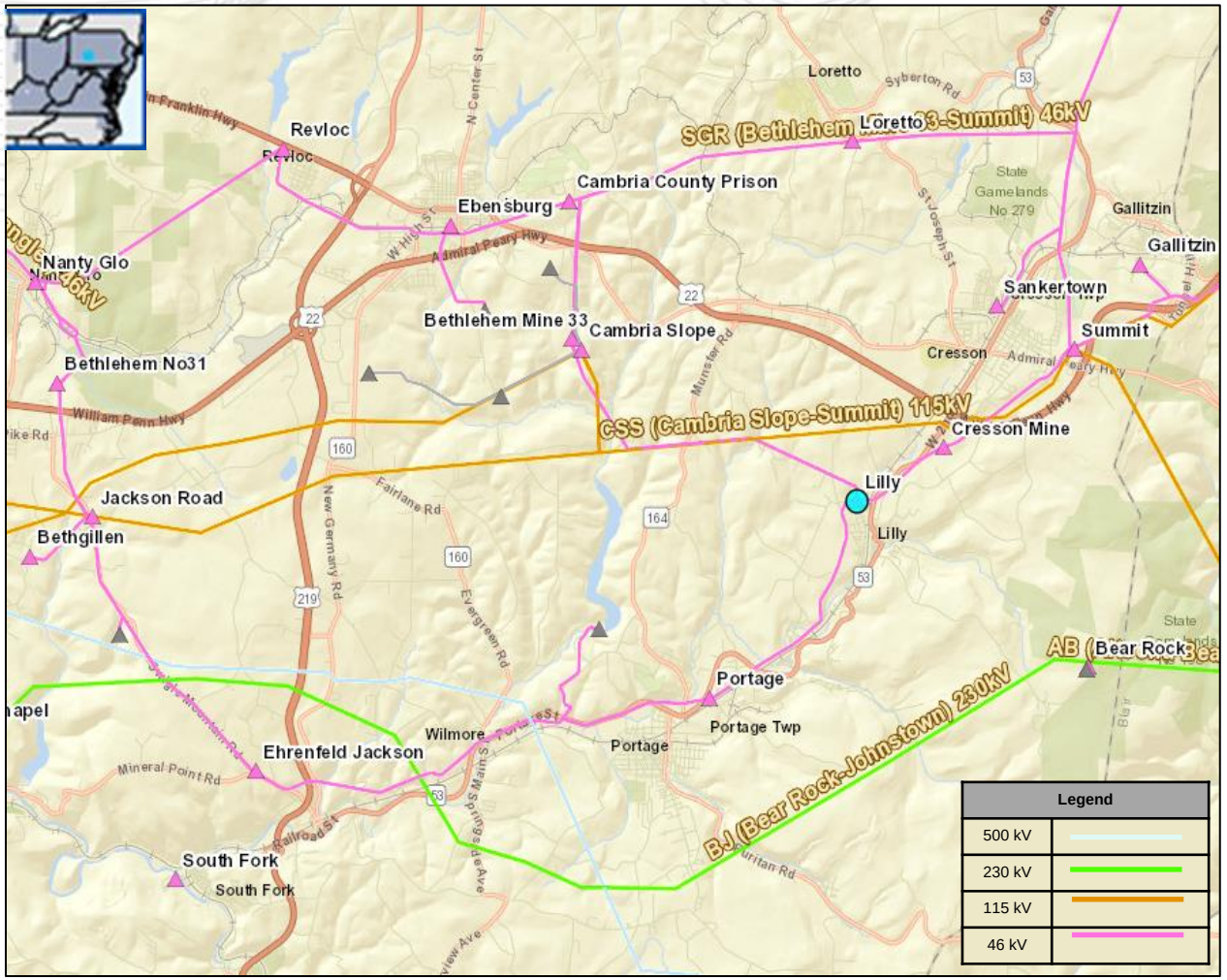
- Three or more terminal transmission lines

Add/Expand Bus Configuration

- Eliminate simultaneous outages to multiple network elements

System Performance Projects

- Substation/line equipment limits



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Penelec Transmission Zone M-3 Process

Need Number: PN-2019-017

Process Stage: Need Meeting 4/26/2019

Problem Statement:

A three terminal line exists at Lilly substation (46 kV) with line exits to Summit, Bethlehem 33 and Jackson Road (normally open at Portage). There is approximately 13 MW of load and 3,200 customers served radially from Jackson Road 46 kV substation.

Transmission line ratings are limited by terminal equipment.

- Jackson Road – Ampfire Mining 46 kV line:

  Existing line rating is 24/24 MVA (SN/SE). Existing conductor rating is 67/81 MVA (SN/SE).

  (line relaying, substation conductor, disconnect switches)

- Kokomo Road – Summit 46 kV line:

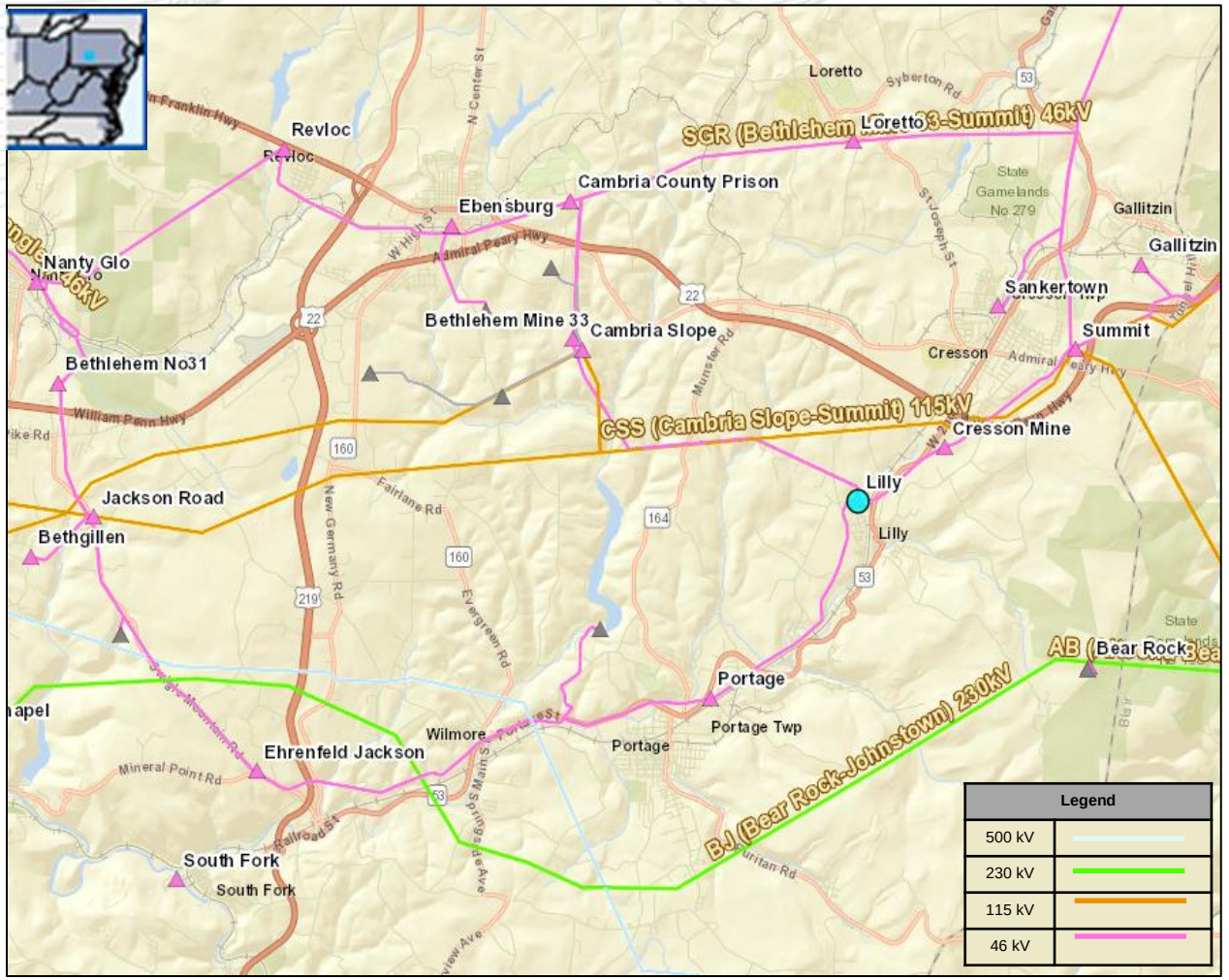
  Existing line rating is 25/25 MVA (SN/SE). Existing conductor rating is 32/32 MVA (SN/SE).

  (line relaying)

- Bethlehem 33 – Lilly 46 kV line:

  Existing line rating is 25/33 MVA (SN/SE). Existing conductor rating is 53/64 MVA (SN/SE).

  (substation conductor, line relaying)



Penelec Transmission Zone M-3 Process

Need Number: PN-2019-018

Process Stage: Need Meeting 4/26/2019

Supplemental Project Driver:

Operational Flexibility and Efficiency

Specific Assumption References:

System Performance Projects

- Reliability of Non-Bulk Electric System (Non-BES) Facilities
- Load and/or customers at risk on single transmission lines

Add/Expand Bus Configuration

- Loss of substation bus adversely affects transmission system performance
- Eliminate simultaneous outages to multiple networked elements

Problem Statement:

Loss of the substation bus at Collinsville substation interrupts ~22 MW of load and 3,290 customers and opens the network connecting sources into the Altoona 46 kV load pocket.

Penelec Transmission Zone M-3 Process

Need Number: PN-2019-019

Process Stage: Need Meeting 4/26/2019

Supplemental Project Driver:

Operational Flexibility and Efficiency

Specific Assumption References:

System Performance Projects

- Substation/line equipment limits

Equipment/Technology/Design Upgrades

- Line switch limitations

Network Radial Lines

- Radial lines defined by normally open points

Reconductor/Rebuild Transmission Lines

- Transmission line that cannot be utilized for operational switching
- Three or more terminal transmission lines

Add/Expand Bus Configuration

- Eliminate simultaneous outages to multiple networked elements

Build New Transmission Line

- Three or more terminal lines
- Network radial lines

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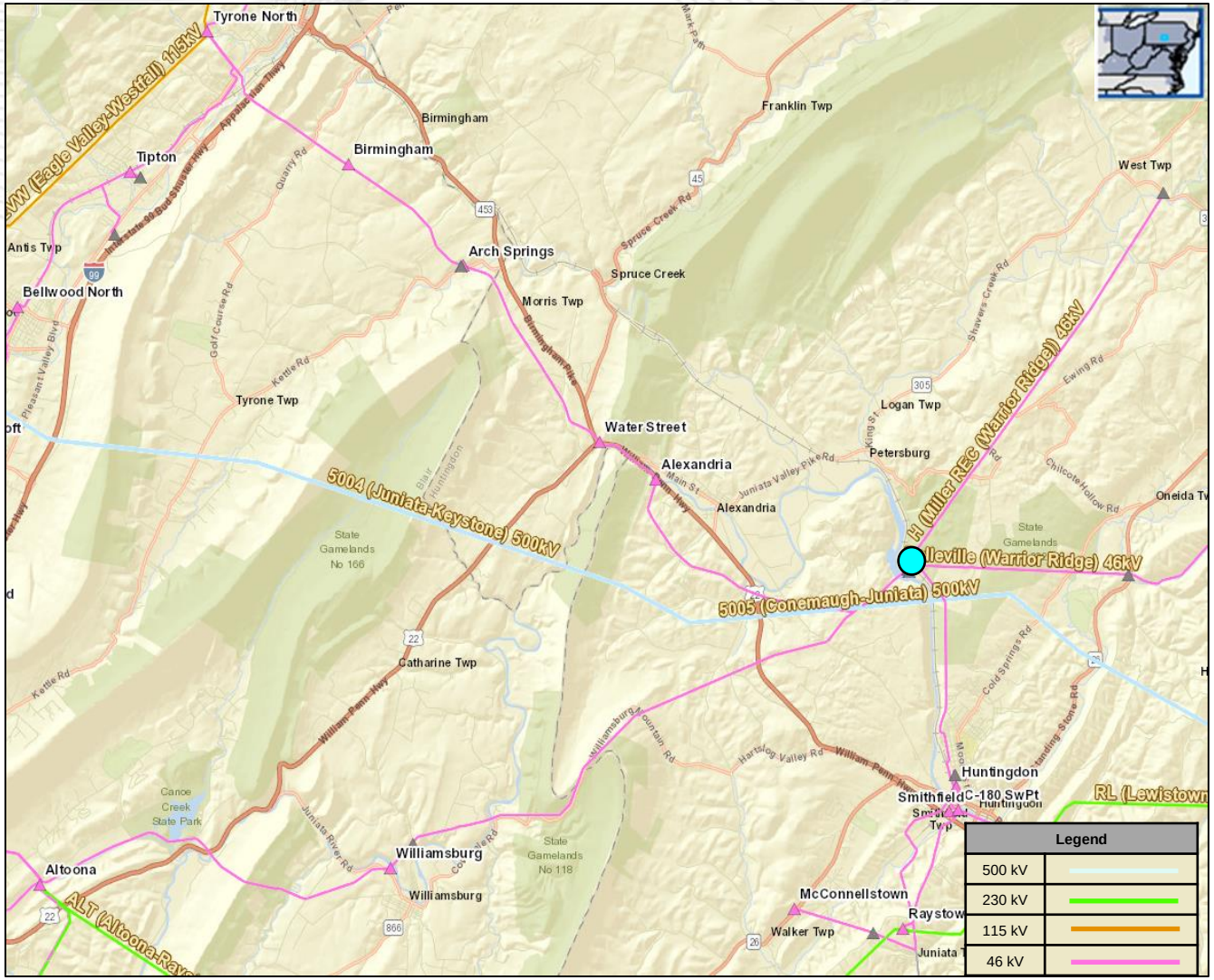


Penelec Transmission Zone M-3 Process

Need Number: PN-2019-019

Process Stage: Need Meeting 4/26/2019

Problem Statement:

- Warrior Ridge Substation is currently configured as a straight bus. Loss of the bus interrupts ~25 MWs of load with limited transfer capability.
- Normally open points exist at Williamsburg, ABW tap, and MacLane (D-Tap) that are established to prevent network flows from Lewistown, Tyrone North, and Altoona.
- The system is unable to be networked due to thermal limits of line conductor, terminal equipment, and antiquated directional relaying.
- ABW tap is an established three terminal line between Altoona 46 kV, Warrior Ridge 46 kV, and Tyrone North 46 kV substations.
- Line switch interrupters are not capable of operational switching such as loop splitting and/or interrupting line charging current.

Transmission line ratings are limited by terminal equipment.

- Tyrone North – Birmingham 46 kV line: Existing line rating is 33/33 MVA (SN/SE). Existing conductor rating is 53/64 MVA (SN/SE). *(line relaying, substation conductor)*
- Birmingham – Sinking Valley 46 kV line: Existing line rating is 34/44 MVA (SN/SE). Existing conductor rating is 53/64 MVA (SN/SE). *(substation conductor)*
- Alexandria – ABW Tap – Warrior Ridge 46 kV line: Exiting line rating is 55/69 MVA (SN/SE). Existing conductor rating is 59/71 MVA (SN/SE). *(disconnect switches)*
- Williamsburg - ABW Tap – Warrior Ridge 46 kV line: Existing line rating is 25/25 MVA (SN/SE). Existing conductor rating is 49/50 MVA (SN/SE). *(line relaying, substation conductor)*
- Williamsburg REC – Williamsburg 46 kV line: Existing line rating is 25/25 MVA (SN/SE). Existing conductor rating is 49/50 MVA (SN/SE). *(line relaying, substation conductor)*
- Williamsburg – Altoona 46 kV line: Existing line rating is 26/28 MVA (SN/SE). Existing conductor rating is 53/64 MVA (SN/SE). *(substation conductor, line relaying)*
- Warrior Ridge – Center Union 46 kV line: Existing line rating is 17/17 MVA (SN/SE). Existing conductor rating is 59/71 MVA (SN/SE). *(line relaying, substation conductor, disconnect switches)*
- Warrior Ridge – WRH Tap– OC1 Tap – Huntingdon 46 kV: Existing line rating is 22/22 MVA (SN/SE). Existing conductor rating is 93/113 MVA (SN/SE). *(line relaying, disconnect switches, substation conductor)*

Penelec Transmission Zone M-3 Process

Need Number: PN-2019-021

Process Stage: Need Meeting 4/26/2019

Supplemental Project Driver:

Operational Flexibility and Efficiency

Specific Assumption References:

System Performance Projects

- Substation/line equipment limits
- Load at risk in planning and operational scenarios

Add/Expand Bus Configuration

- Eliminate simultaneous outages to multiple networked elements

Problem Statement:

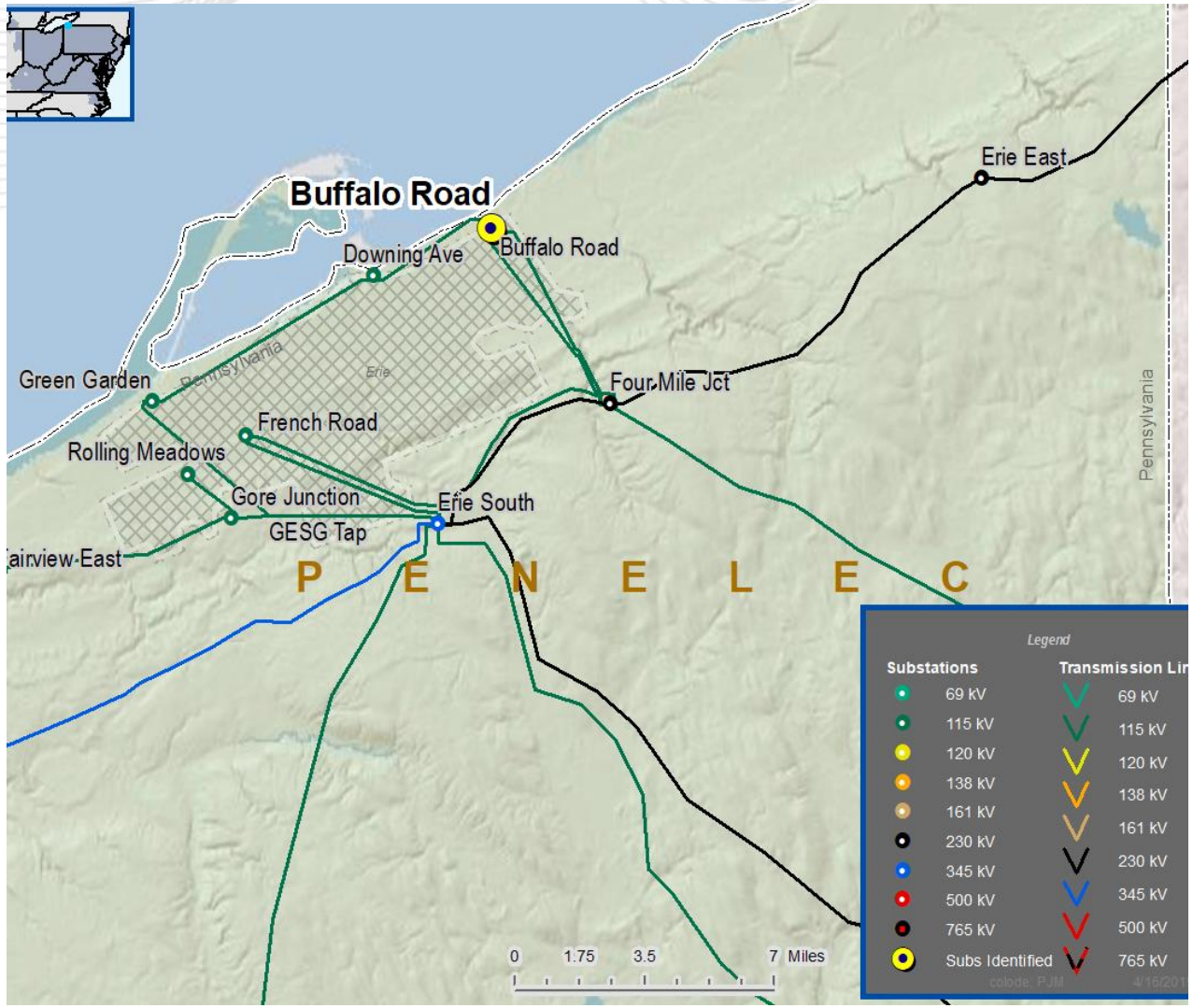
Buffalo Road 115 kV substation serves approximately 106 MW of load and 3,500 customers. A stuck bus tie breaker at Buffalo Road will outage both 115-34.5 kV transformers and three 115 kV lines.

Transmission lines are limited by terminal equipment.

- Buffalo Road – Four Mile Junction BRFM2 115 kV Line:

Existing line rating is 190/226 MVA (SN/SE). Existing conductor rating is 202/245 MVA (SN/SE).

(substation conductor)



Questions?

Appendix

Assumptions

Activity	Timing
Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
Stakeholder comments	10 days after Assumptions Meeting

Needs

Activity	Timing
TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
Stakeholder comments	10 days after Needs Meeting

Solutions

Activity	Timing
TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
Stakeholder comments	10 days after Solutions Meeting

Submission of Supplemental Projects & Local Plan

Activity	Timing
Do No Harm (DNH) analysis for selected solution	Prior to posting selected solution
Post selected solution(s)	Following completion of DNH analysis
Stakeholder comments	10 days prior to Local Plan Submission for integration into RTEP
Local Plan submitted to PJM for integration into RTEP	Following review and consideration of comments received after posting of selected solutions

Revision History

4/16/2019 – V1 – Original version posted to pjm.com

4/25/2019 – V2 – Map replaced for Need # PN-2019-014, PN-2019-017, PN-2019-018 and PN-2019-019

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