



# Reliability Analysis Update

Transmission Expansion Advisory  
Committee  
June 9, 2016

# 2016 RTEP Timeline

- Cases
  - 2016 RTEP summer case finalized
  - 2016 RTEP winter case sent to Transmission Owners for modeling updates
  - 2016 RTEP light load case sent to Transmission Owners for modeling updates
- Analysis
  - Completed and validated the N-1, generation deliverability analysis and common mode outage analysis, preliminary results are posted.
  - Completed load deliverability analysis
    - No potential problems identified in any Locational Deliverability Area (LDA)
  - Currently working on validating N-1-1 analysis



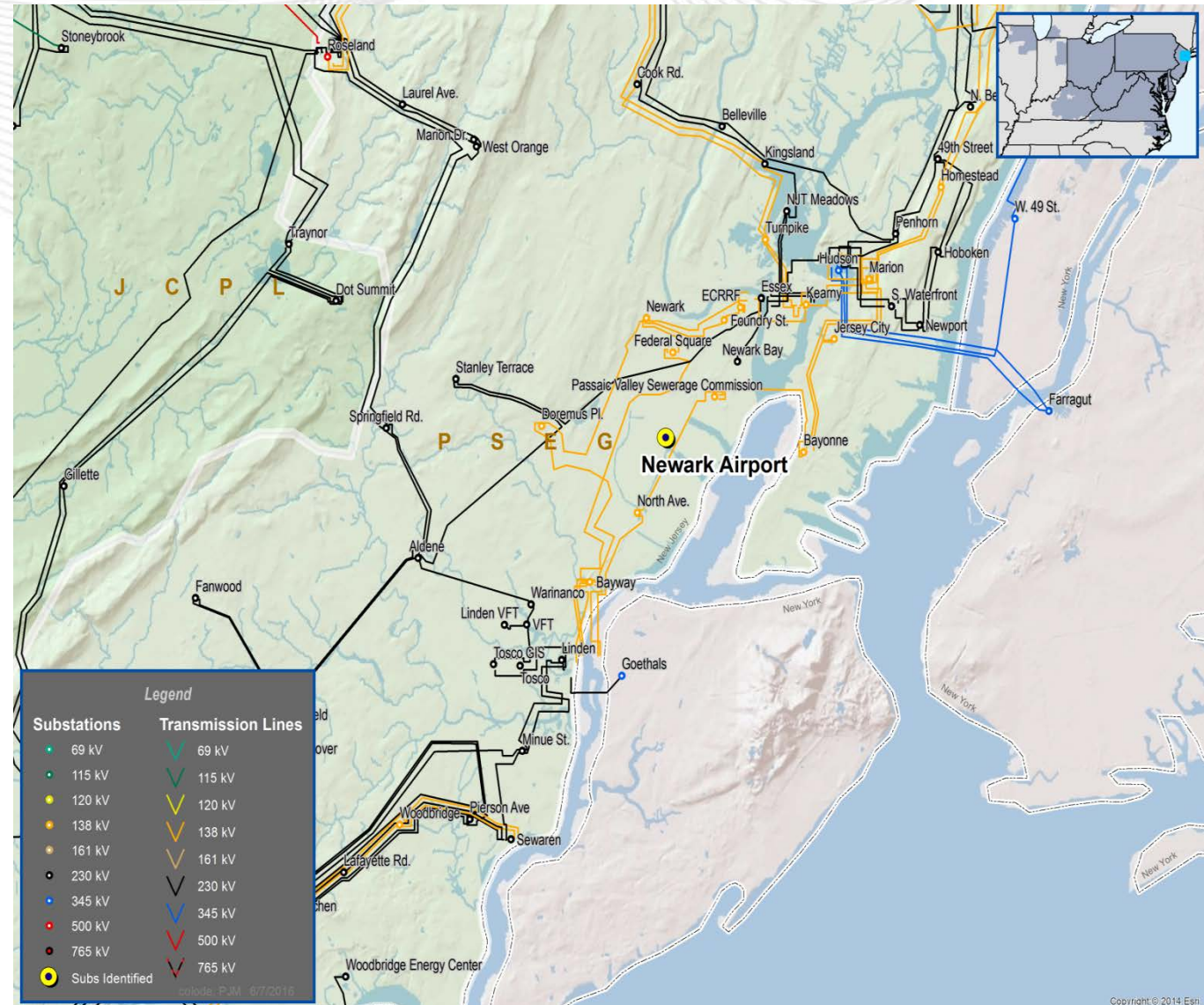
# 2016 RTEP Proposal Window 2

- Anticipated 2017 FERC Order 1000 Window #2 Scope
  - Year 2021 Analysis
    - N-1 Thermal and Voltage (posted to PJM.com)
    - Generation deliverability and common mode outage test procedure (posted to PJM.com)
    - Load deliverability thermal and voltage (posted to PJM.com)
    - N-1-1 thermal and voltage
  - 2016 RTEP Window #2 anticipated opening date is last week of June 2016

# Newark Airport Additional Source Need

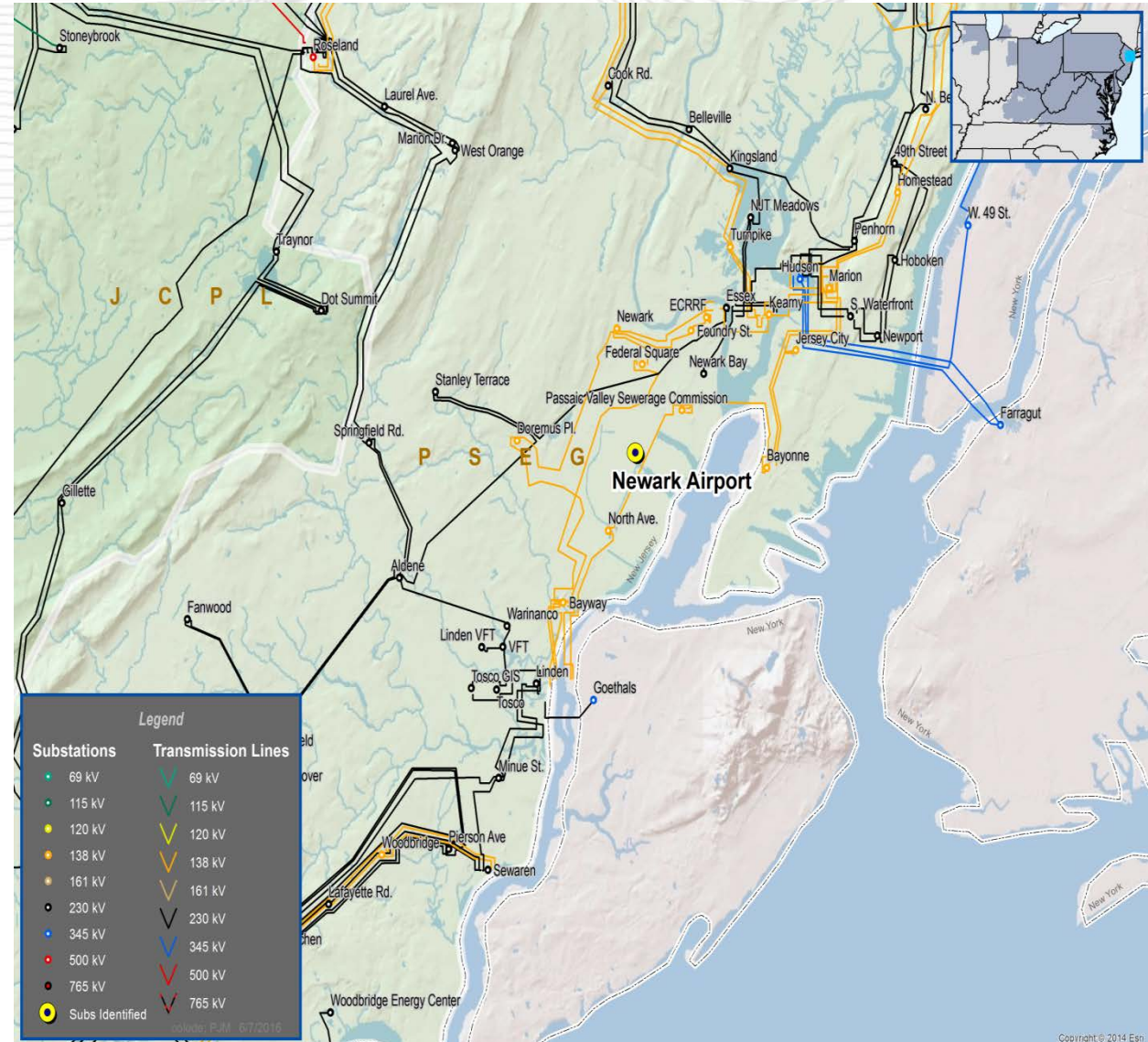
## Newark Airport Loads

- Current Newark Airport load is ~40MVA.
- A new Terminal A is planned and will increase the current load by another ~33MVA.
- The current Terminal A will remain in-service.



## Newark Airport Loads

- Future Port Authority plans for PATH are anticipated to add another ~8MVA to the total airport load.
- The planned projects and existing load at the Airport will total approximately 81MVA, and are projected to increase in the future with anticipated future Terminal B and Terminal C upgrades.



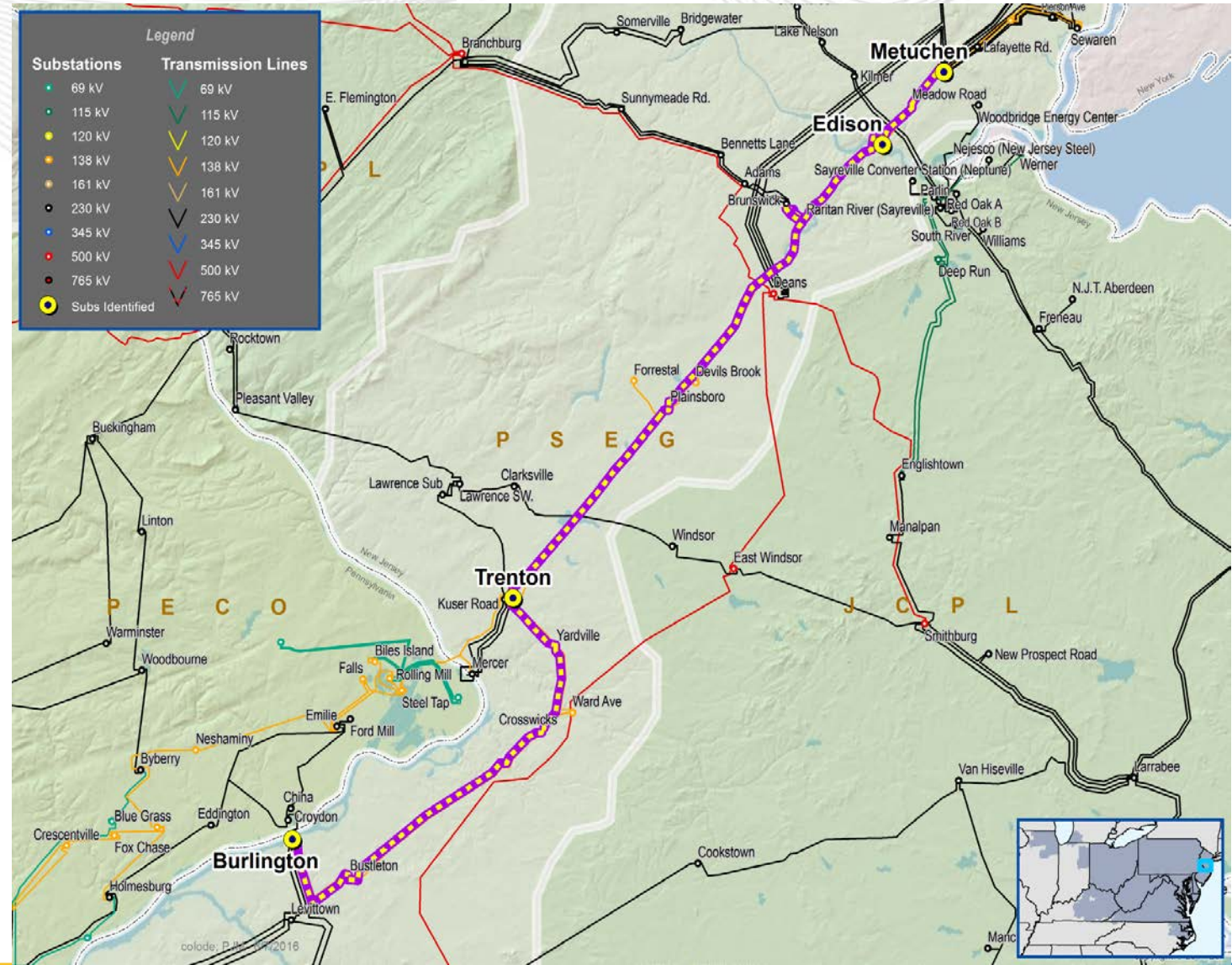


- **Potential reliability violation:**
  - Newark Airport load will be primarily served from two new 345 kV underground cable circuits as part of the Bergen to Linden Corridor project and the existing 26 kV circuits will be used for back up.
  - For the loss of two under ground cable circuits (TO criteria) serving the Newark Airport, the load would be served from the 26 kV circuits
    - A portion of the 26 kV station property is owned by the Newark Airport and the Airport requested that the use of the property be returned back to them
    - The 26 kV facilities are aging, potentially thermally overloaded, and therefore have to be replaced unless an alternate solution is used to serve the Airport load under the 345 kV N-1-1 condition

# PSE&G End Of Life Assessment

- PSE&G's FERC 715 Transmission Owner criterion addresses equipment condition assessments

- As a result, PSE&G assessed the condition of the Metuchen to Trenton (MT-T) and Trenton to Burlington (T-BU) 138 kV circuits.



- Refer to PSE&G criteria:

## VII. EQUIPMENT ASSESSMENT AND STORM HARDENING

<http://www.pjm.com/~media/planning/planning-criteria/PSE&G-planning-criteria.ashx>

- Metuchen to Trenton is approximately 30 miles of 138 kV circuit and the average structure age is 86 years.
- Trenton to Burlington is approximately 22 miles of 138 kV circuit and the average structure age is 75 years.

- **Assessment Result:**
  - **Consultant - Foundation assessment**
    - 23% and 30% of structures for MT-T and T-BU respectively will require extensive foundation rehabilitation or total foundation replacement.
  - **Consultant – Tower line assessment**
    - 25 % of the tower structures exceed the tower load carrying design capability
    - 35% of the towers are at 99-100% of the tower's load bearing capability, and 81% of the towers at 95-100% of the tower's capability.



# Dominion Local TO Criteria - End Of Life Criteria Update

## Dominion End of Life Criteria decision point metrics:

- 1) Facility is nearing, or has already passed, its end of life, and*
- 2) Continued operation risks negatively impacting reliability of the transmission system.*

- Dominion Local TO Criteria
  - End of Life Criteria
    1. End of Life Assessment
      - Industry guidelines indicate equipment life standards
        - Wood structures - 35-55 years,
        - Conductor and connectors - 40-60 years
        - Porcelain insulators - 50 years.
    2. Reliability and System Impact
      - PJM and DOM are prioritizing and analyzing the impacts of the facilities on the next slides

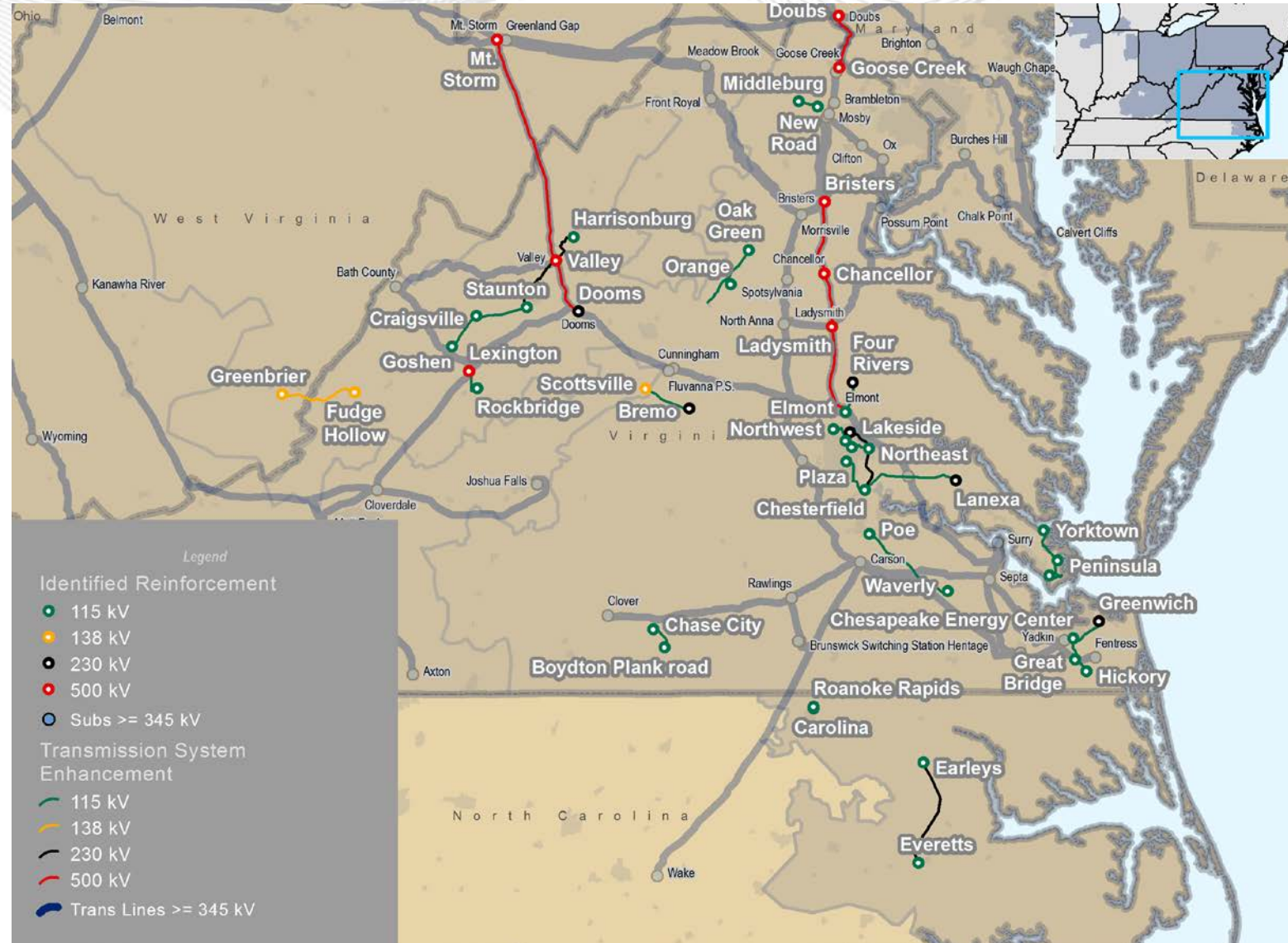




# Dominion End Of Life Facilities

Facilities reaching their End of Life within the immediate to 5 year horizon

Line	Voltage (kV)	In-Service Year
LEXINGTON-ROCKBRIDGE	115	1973
PORTSMOUTH-GREENWICH	115	1955
PORTSMOUTH-GREAT BRIDGE	115	1953
NEW ROAD-MIDDLEBURG	115	1953
LANEXA-WALLER	230	1952
EARLEYS-EVERETTS	115	1951
STR 551-STR 706	115	1959
CHESTERFIELD -LANEXA	115	1947
NORTHWEST-CHESTERFIELD	115	1951
STAUNTON-HARRISONBURG	115	1958
GOSHEN-CRAIGSVILLE	115	1925
PORTSMOUTH-CHURCHLAND	115	1957
CHESTERFIELD - PLAZA	115	1956
STAUNTON-CRAIGSVILLE	115	1925

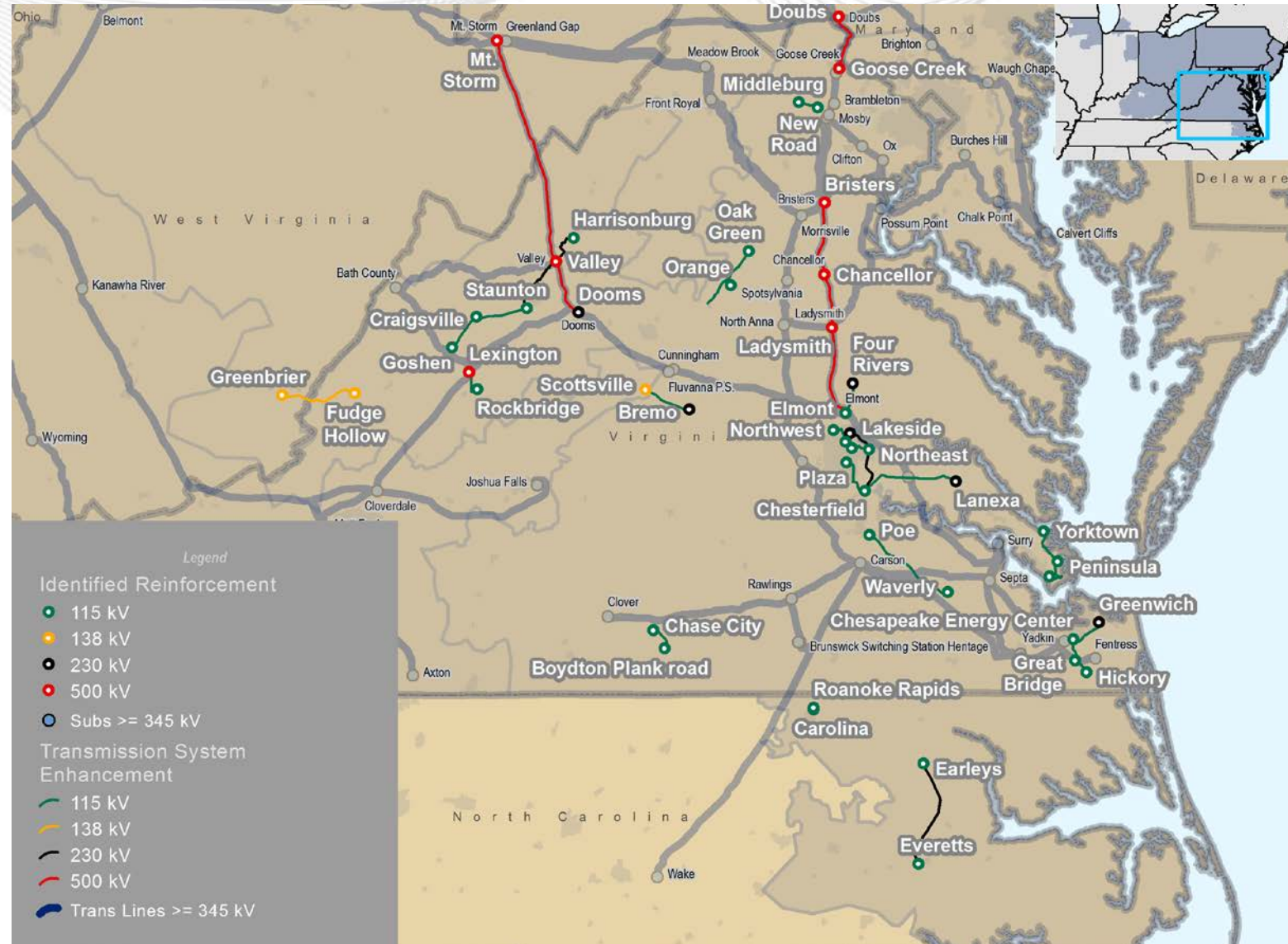




# Dominion End Of Life Facilities

Facilities reaching their End of Life within the immediate to 5 year horizon

Line	Voltage (kV)	In-Service Year
NORTHEAST-CARVER	115	1958
GREAT BRIDGE-HICKORY	115	1967
YORKTOWN-PENINSULA	115	1957
FUDGE HOLLOW-GREENBRIER INTER	138	1925
CAROLINA-ROANOKE RAPIDS HYDRO	115	1931
ELMONT-FOUR RIVERS	115	1956
WHEALTON-PENINSULA	115	1966
NORTHWEST-ACCA	115	1955
ACCA-LAKESIDE	115	1968
BREMO-SCOTTSVILLE INTER	115	1975
CHASE CITY-BOYDTON PLANK	115	1955
POE-WAVERLY	115	1951
MT STORM – VALLEY	500	1964
VALLEY – DOOMS	500	1964
ELMONT – LADYSMITH	500	1966
LADYSMITH - BRISTERS	500	1966

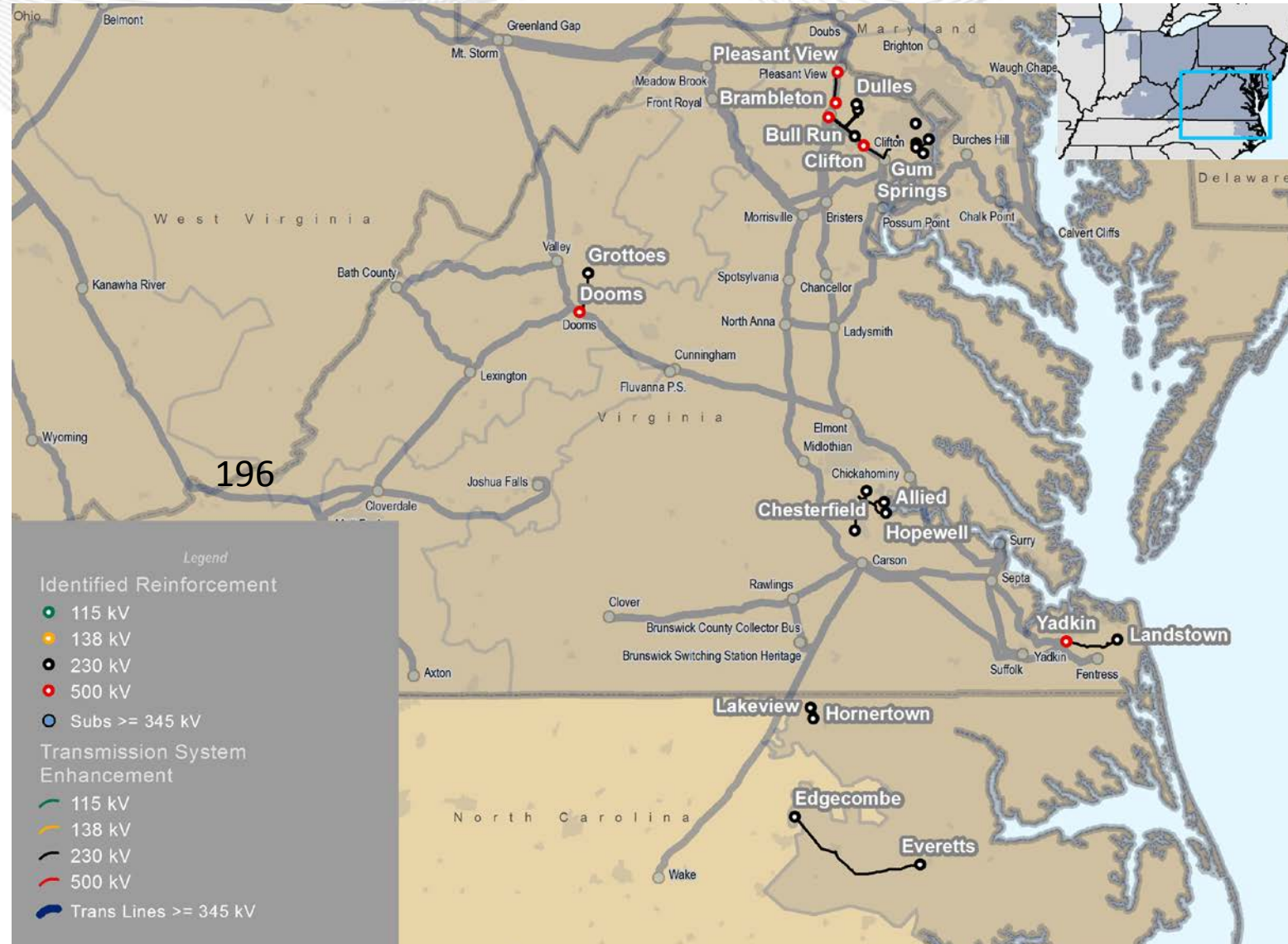




# Dominion End Of Life Facilities

Facilities needing to be replaced within the immediate to 5 year horizon

Line	Voltage (kV)	In-Service Year
CHESTERFIELD - HOPEWELL	230	1969
YADKIN - LANDSTOWN	230	1965
BRAMBLETON - PLEASANT VIEW	230	1966
CLIFTON - SULLY	230	1966
LOUDOUN - BULL RUN	230	1966
HAYFIELD - VAN DORN	230	1967
LAKEVIEW - HORNERTOWN	196 230	1967
DOOMS - GROTTOS	230	1967
GUM SPRINGS - JEFFERSON ST	230	1966
CHESTERFIELD - LOCKS	230	1962
CHESTERFIELD - ALLIED	230	1964
EVERETTS - EDGECOMBE NUG	230	1967
CLIFTON - GLEN	230	1966
LOUDOUN - DULLES	230	1967
HORNERTOWN - HATHAWAY	230	1967

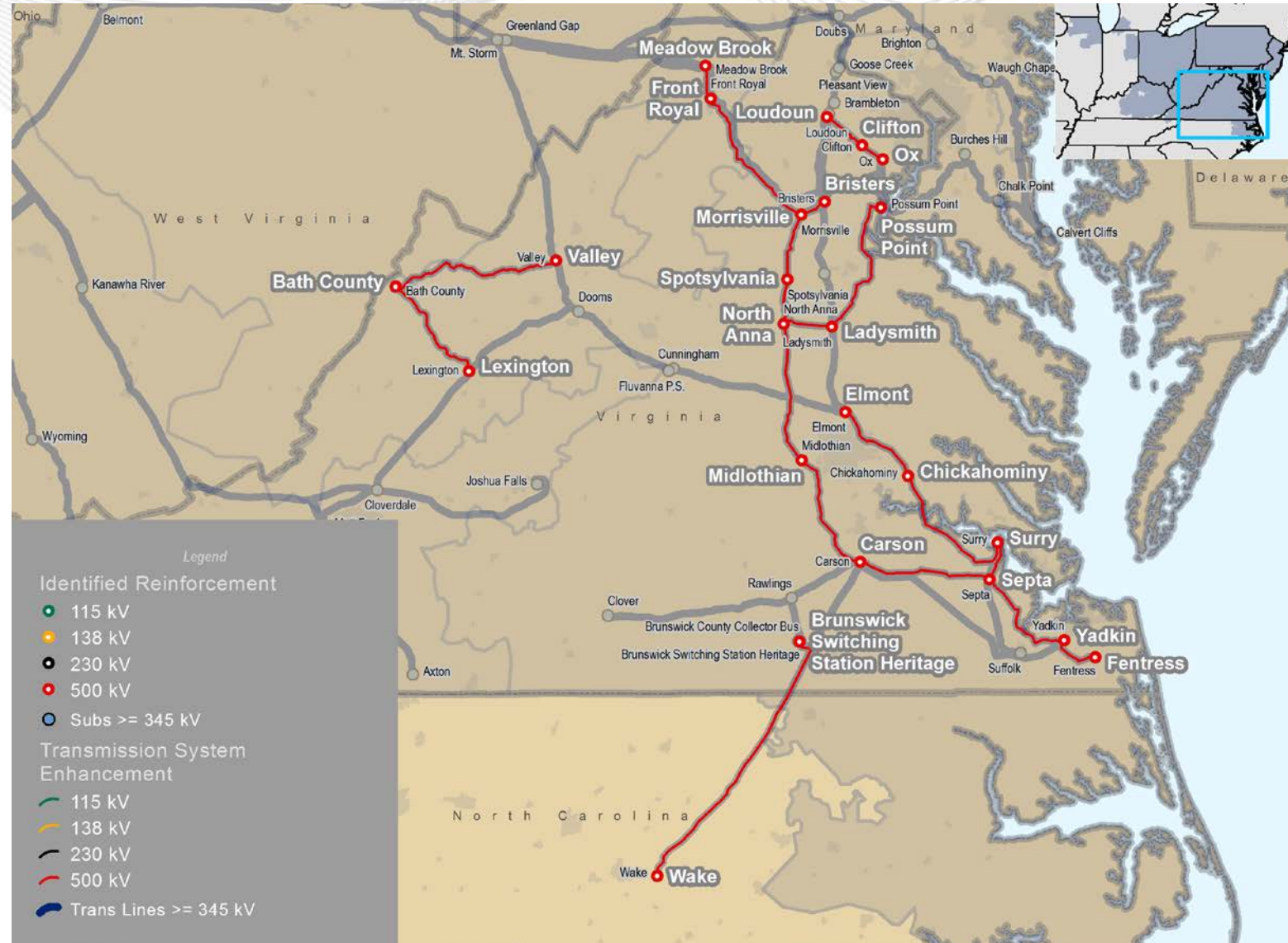




# Dominion End Of Life Facilities

Facilities reaching their End of Life within the 5 to 10 year horizon

Line	Voltage (kV)	In-Service Year
SURRY - SEPTA	500	1972
NORTH ANNA - LADYSMITH	500	1973
SURRY - YADKIN	500	1970
SEPTA - YADKIN	500	1975
CHICKAHOMINY - ELMONT	500	1971
SEPTA - CARSON	500	1972
SURRY - CHICKAHOMINY	500	1971
YADKIN - FENTRESS	500	1975
BATH COUNTY - VALLEY	500	1984
BATH COUNTY - LEXINGTON	500	1984
NORTH ANNA SPOTSYLVANIA	500	1976

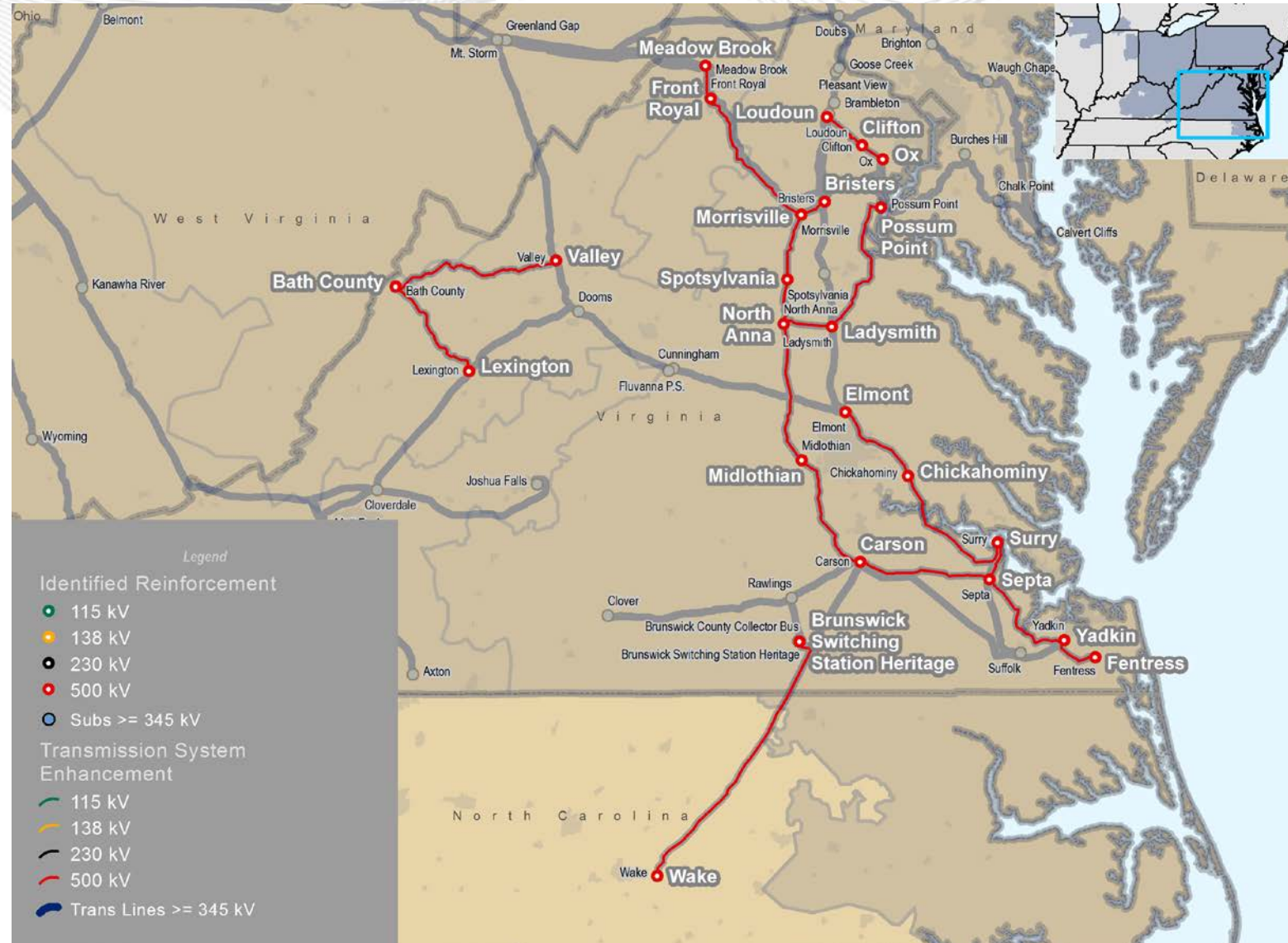




# Dominion End Of Life Facilities

Facilities reaching their End of Life within the 5 to 10 year horizon

Line	Voltage (kV)	In-Service Year
BRISTERS - MORRISVILLE	500	1976
HERITAGE - WAKE INTERTIE	500	1972
MORRISVILLE - SPOTSYLVANIA	500	1976
POSSUM POINT - LADYSMITH	500	1984
CARSON - MIDLOTHIAN	500	1981
MORRISVILLE - FRONT ROYAL	500	1979
MEADOWBROOK - MORRISVILLE	500	1979
LOUDOUN - CLIFTON	500	1970
NORTH ANNA - MIDLOTHIAN	500	1979
CLIFTON - OX	500	1970

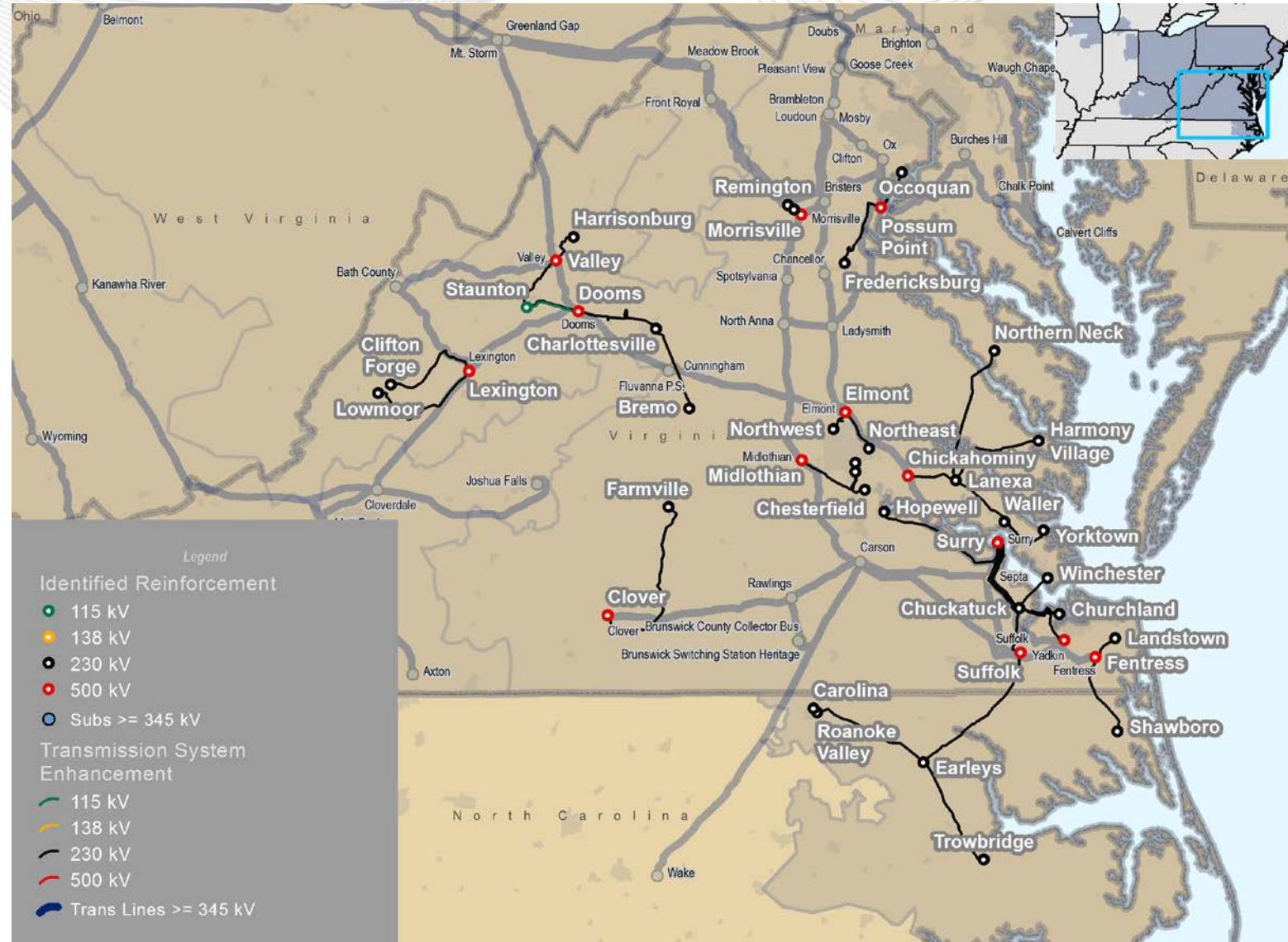




# Dominion End Of Life Facilities

Facilities reaching their End of Life beyond 10 year horizon

Line	Voltage (kV)	In-Service Year
LANEXA - HARMONY VILLAGE	230	1969
FREDERICKSBURG - POSSUM POINT	230	1978
SURRY - HOPEWELL	230	1969
WINCHESTER - Surry	230	1969
SURRY - CHURCHLAND	230	1971
CHICKAHOMINY - WALLER	230	1975
YADKIN - SURRY	230	1969
NORTHERN NECK - LANEXA	230	1969
CHICKAHOMINY - LANEXA	230	1975
MARSH RUN CT - REMINGTON	230	1976
POSSUM POINT - OCCOQUAN	230	1975
WALLER - YORKTOWN	230	1974
NORTHWEST - ELMONT	230	1978
BASIN - CHESTERFIELD	230	1973
ROANOKE VALLEY - EARLEYS	230	1979
SUFFOLK - EARLEYS	230	1971
NORTHEAST - ELMONT	230	1972
EARLEYS - TROWBRIDGE	230	1979

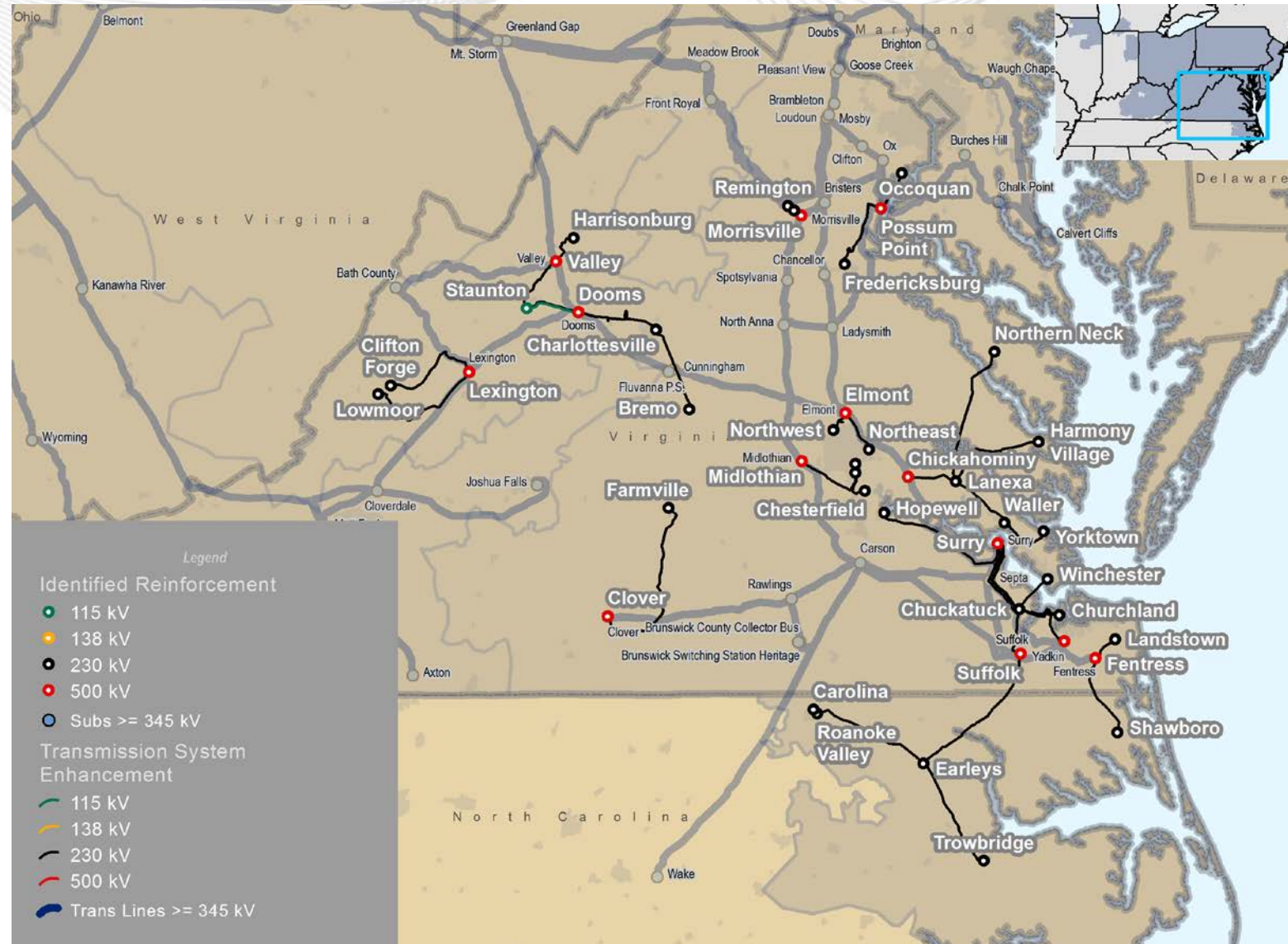




# Dominion End Of Life Facilities

Facilities reaching their End of Life within beyond 10 year horizon

Line	Voltage (kV)	In-Service Year
EARLEYS - TROWBRIDGE	230	1979
SUFFOLK - CHUCKATUCK	230	1974
LEXINGTON - CLIFTON FORGE	230	1970
DOOMS - VALLEY	230	1981
LEXINGTON - LOWMOOR	230	1985
STAUNTON - DOOMS	230	1981
MIDLOTHIAN - SPRUANCE	230	1973
CHARLOTTESVILLE - DOOMS	230	1989
CHARLOTTESVILLE - BREMO	230	1989
FENTRESS - SHAWBORO	230	1976
MORRISVILLE - MARSH RUN	230	1976
LANDSTOWN - FENTRESS	230	1975
HARRISONBURG - VALLEY	230	1975
FARMVILLE - CLOVER	230	1976
ROANOKE VALLEY - CAROLINA	230	1979



- PJM will continue to assess and prioritize the reliability impacts due to the End of Life Facilities and evaluate the need for Proposal Windows

End of Life Facilities Summary		
End of Life Need Date	# of facilities	Voltage Level
Immediate Need (0-3 years)	4	500 kV
3 – 5 years	41	115 kV– 230 kV
5 – 10 years	21	500 kV
Beyond 10 years	32	230 kV



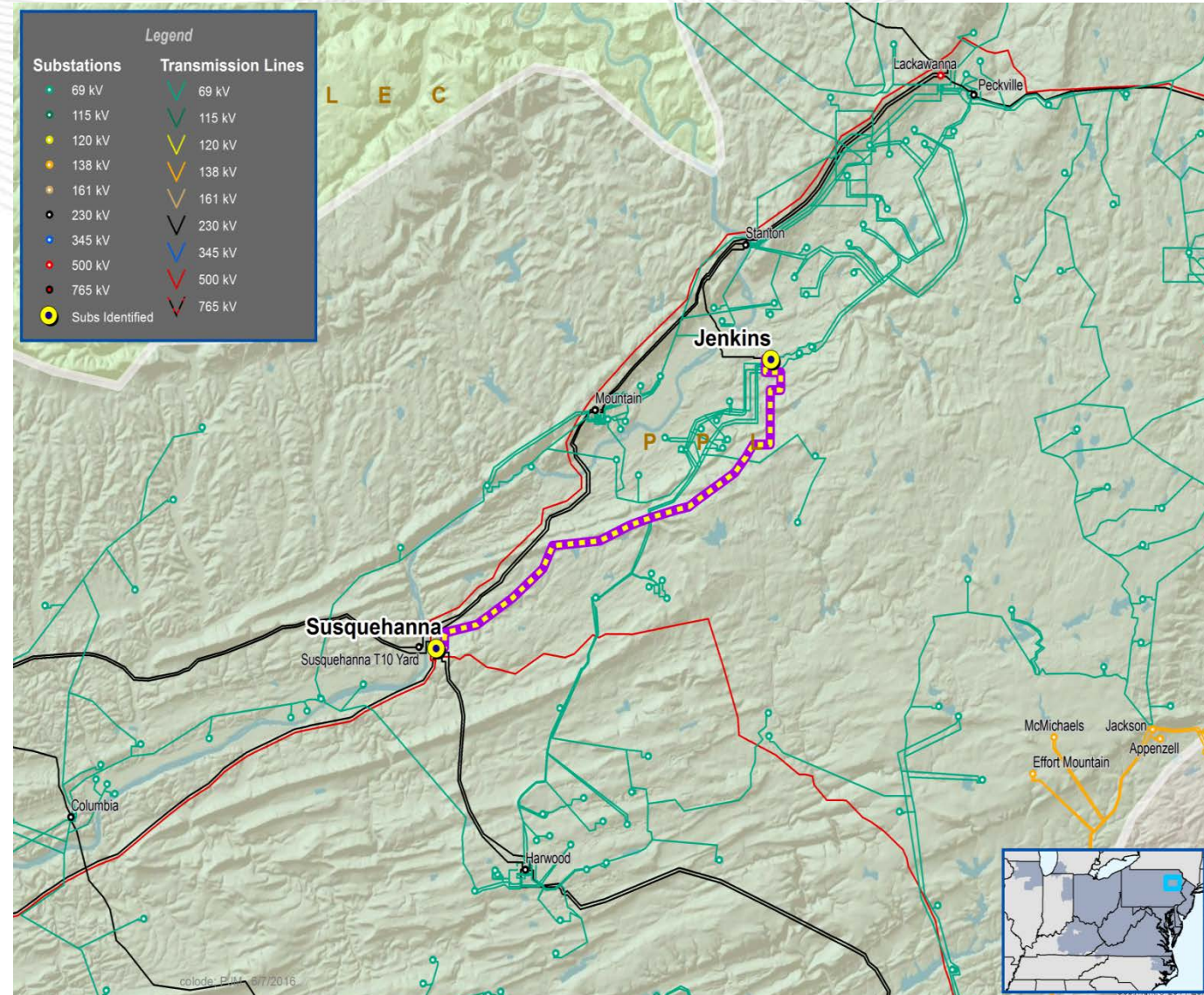


# Artificial Island Update

- Ongoing assessments
  - Physical
    - Evaluated several options for interconnection at Hope Creek
    - Identified a preferred option and confirmed feasibility
    - In progress – Development of detailed cost estimate is underway
    - In progress – Evaluation of schedule impacts is underway
  - Simulation
    - Performance of a Hope Creek termination
    - Incorporating updated assumptions

# Supplemental Projects

- **Supplemental Project:**
- Additional work to the Baseline Project b2269 (Susquehanna-Jenkins 230 kV Rebuild)
- **Baseline Scope:** Rebuild approximately 23.7 miles of the Susquehanna-Jenkins 230 kV line to single circuit using 1590 ACSR conductor.
- **Supplemental Scope:** Add second circuit to approximately 23.7 miles of the Susquehanna-Jenkins 230 kV line using 1590 ACSR conductor. (S1143)
- **Reason:** New Palooka 230-69 kV Substation along Susquehanna-Jenkins 230 kV line needs more than 2-230 kV lines for reliable supply.
- **Baseline Project Cost:** \$97 M
- **Supplemental Project Cost:** \$12.5 M
- **Project IS Date:** 5/31/2018



# RTEP Next Steps

# Questions?

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

- Revision History
  - V1 - Original version posted to PJM.com – 7/11/2016
  - V2 – Updated version posted to PJM.com – 7/14/2016