Sub Regional RTEP Committee PJM South

July 29, 2015

Reliability Analysis Update

Dominion End of Life Criteria

- Dominion Local TO Criteria
  - http://pjm.com/planning/planning-criteria/to-planning-criteria.aspx
  - 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

Dominion Transmission Area

Problem: DOM End-Of-Life Criteria Violation

- End of Life Criteria - The Boydton Plank Rd to Kerr Dam 115kV line was constructed on wood H-frames in 1955. This line serves Mecklenburg's Boydton delivery point.
- System Impact Assessment - Permanent MW load loss for removal of this line is 4MW.
- This is an immediate need project based on "End of Life" criteria.
- When this criteria violation was identified, the need date was already in the immediate need timeframe This is an immediate need project based on "End of Life" criteria.

Alternatives Considered

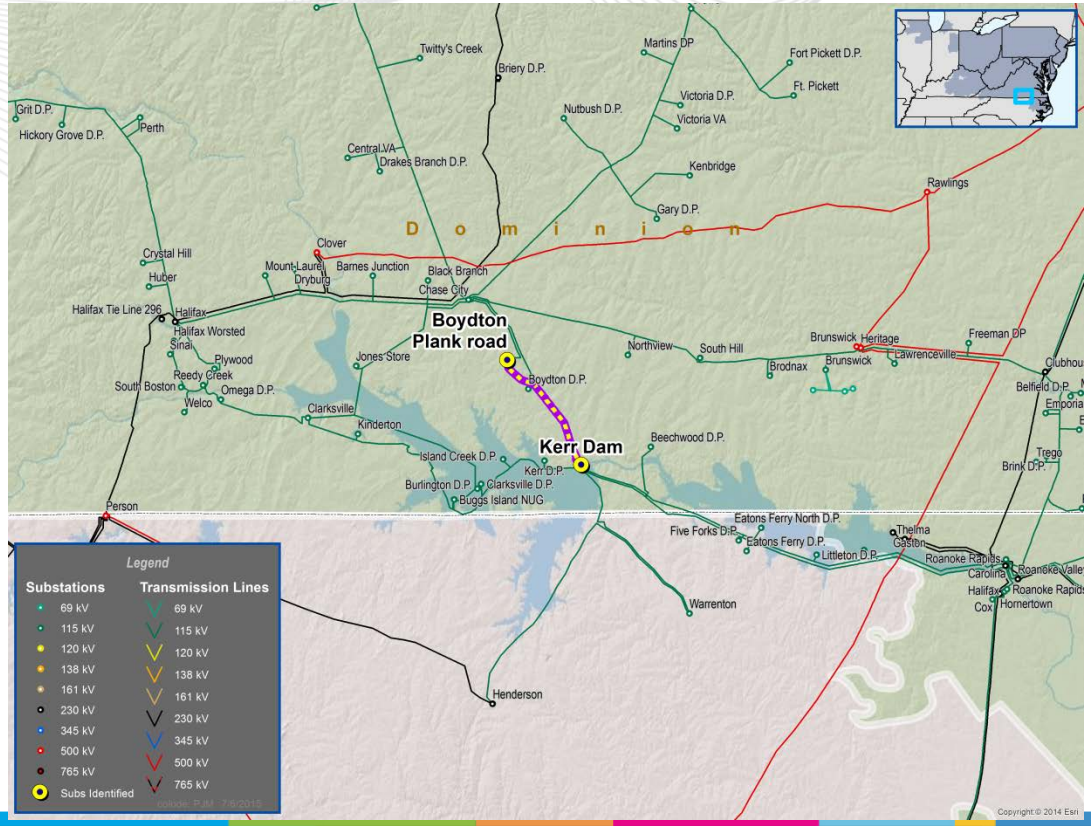
- Given the immediate need timing of the violation, alternatives that would require new lines to be built were not considered.

Proposed Immediate Need Solution

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be Designated Entity.

- Rebuild 115kV Line # 38 from Boydton Plank Rd and Kerr Dam (8.3 miles) to current standards with a summer emergency rating of 353 MVA at 115kV (b2647).

Estimated Project Cost: $12.5 M
Projected IS Date: 12/31/2020



Dominion Transmission Area

Problem: DOM End-Of-Life Criteria Violation

- End of Life Criteria - The Carolina to Kerr Dam 115kV line was constructed on wood H-frames in 1953. This line serves Halifax ED and Mecklenburg EC delivery points Beechwood and Five Forks.
- System Impact Assessment - Permanent MW load loss for removal of this line is 32 MW.
- This is an immediate need project based on “End of Life” criteria.
- When this criteria violation was identified, the need date was already in the immediate need timeframe This is an immediate need project based on “End of Life” criteria.

Alternatives Considered

- Given the immediate need timing of the violation, alternatives that would require new lines to be built were not considered.

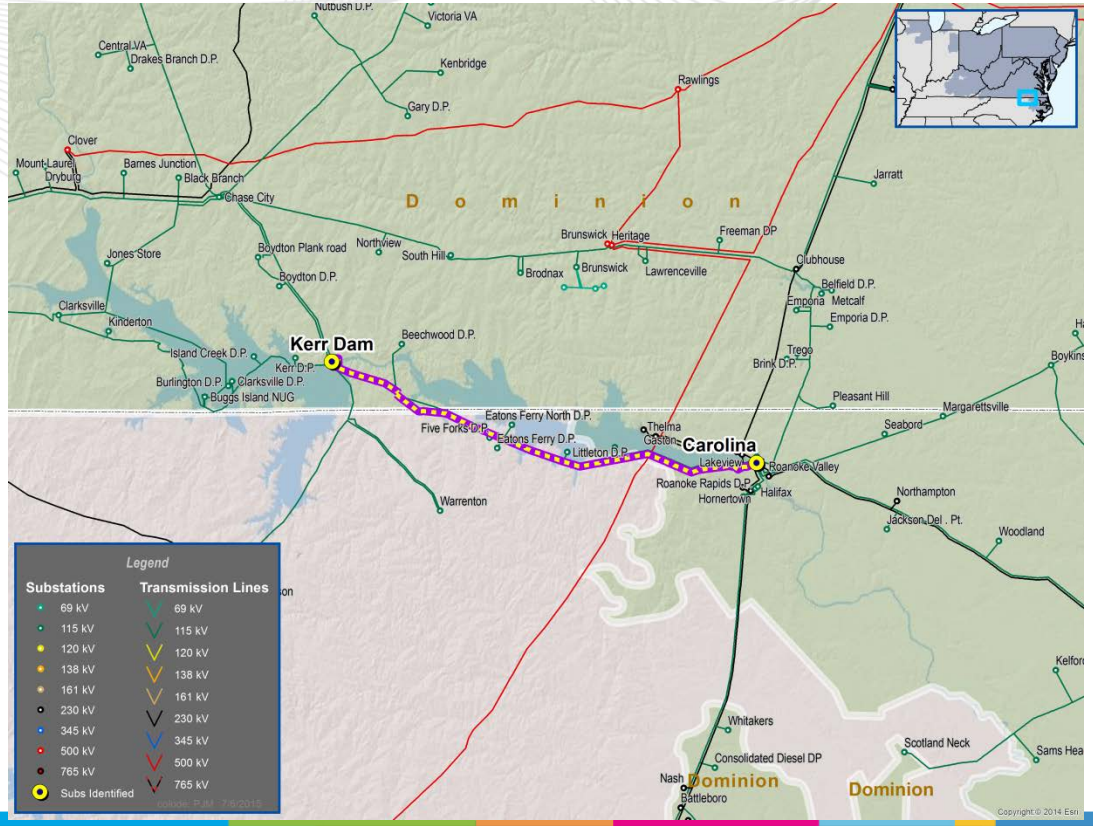
Proposed Immediate Need Solution

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be Designated Entity.

- Rebuild 115kV Line #90 from Carolina to Kerr Dam 115kV (38.7 miles) to current standards with a summer emergency rating of 262 MVA at 115kV (b2648).

Estimated Project Cost: $58.0 M

Projected IS Date: 12/31/2019



Dominion Transmission Area

Problem: DOM End-Of-Life Criteria Violation

- End of Life Criteria - The Clubhouse to Carolina 115kV line was constructed on wood H-frames and single poles in 1962. This line serves Mecklenburg delivery points Brink, Belfield and Emporia.
- System Impact Assessment - Permanent MW load loss for removal of this line is 42 MW.
- This is an immediate need project based on “End of Life” criteria.
- When this criteria violation was identified, the need date was already in the immediate need timeframe This is an immediate need project based on “End of Life” criteria.

Alternatives Considered

- Given the immediate need timing of the violation, alternatives that would require new lines to be built were not considered.

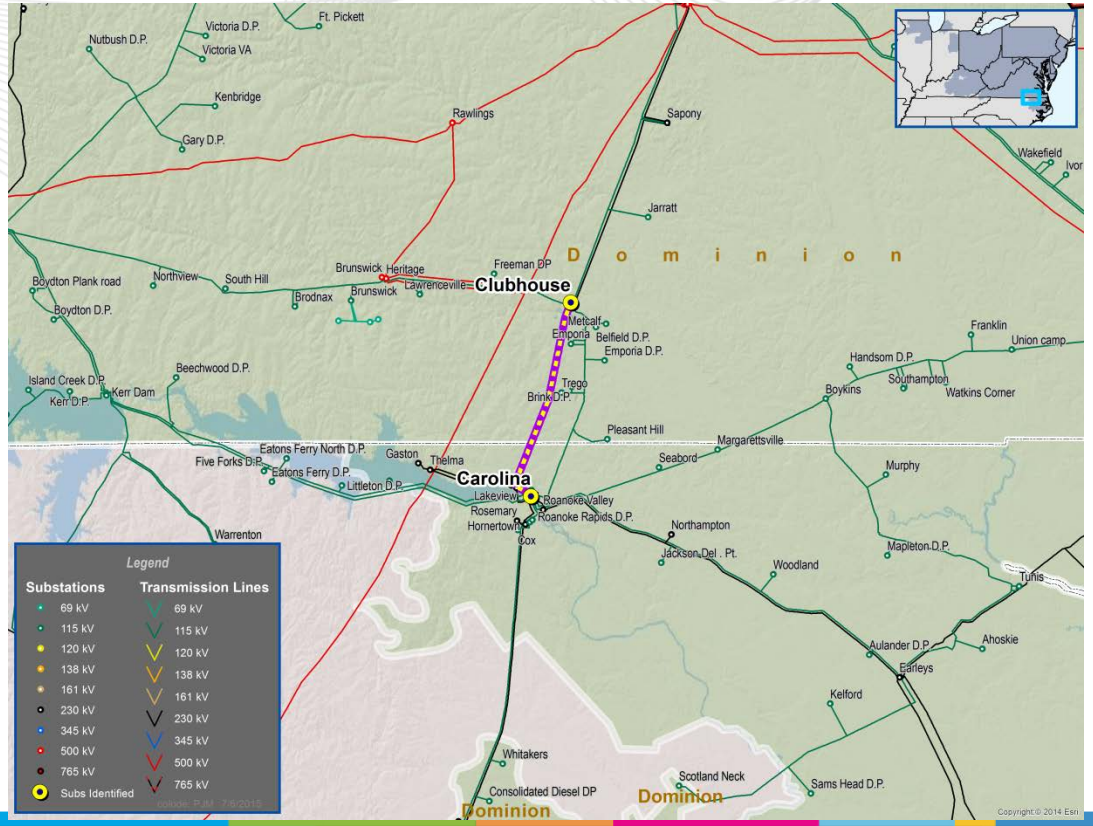
Proposed Immediate Need Solution

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be Designated Entity.

- Rebuild 115kV Line #130 from Clubhouse to Carolina (17.8 miles) to current standards with a summer emergency rating of 262 MVA at 115kV (b2649).

Estimated Project Cost: $26.7 M

Projected IS Date: 12/31/2019



Dominion Transmission Area

Problem: DOM End-Of-Life Criteria Violation

- End of Life Criteria - The Twittys Creek to Pamplin line was constructed on wood H-frames in 1953. This line serves Southside delivery points Drakes Branch and Madisonville..
- System Impact Assessment - Permanent MW load loss for removal of this line is 18 MW.
- This is an immediate need project based on “End of Life” criteria.
- When this criteria violation was identified, the need date was already in the immediate need timeframe This is an immediate need project based on “End of Life” criteria.

Alternatives Considered

- Given the immediate need timing of the violation, alternatives that would require new lines to be built were not considered.

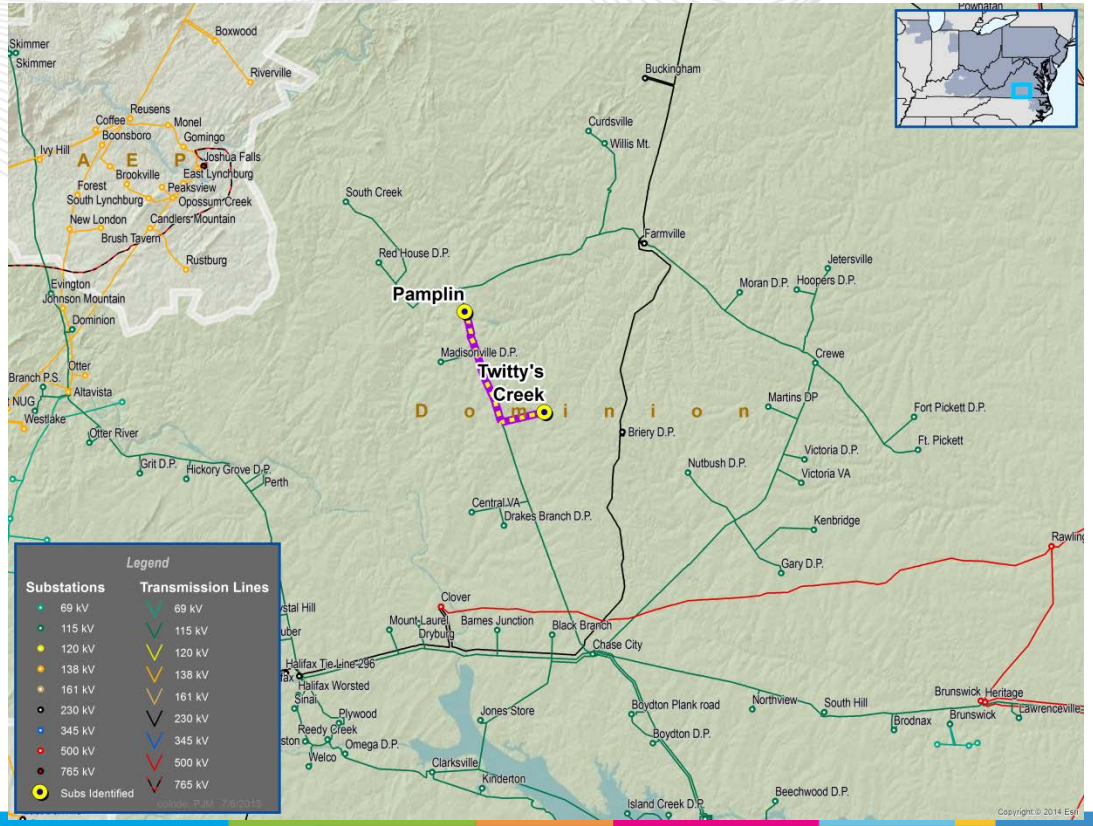
Proposed Solution:

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be Designated Entity.

- Rebuild 115kV Line #154 from Twittys Creek to Pamplin (17.8 miles) to current standards with a summer emergency rating of 353 MVA at 115kV (b2650).

Estimated Project Cost: $25.7 M

Projected IS Date: 12/31/2020



Dominion Transmission Area

Problem: DOM End-Of-Life Criteria Violation

- End of Life Criteria - The Buggs Island to Plywood 115kV line was constructed on wood H-frames. The original construction date has not been identified in our records. A portion of the line was re-insulated and reconductored for 115kV operation in 1970. This line serves Mecklenburg delivery point Omega.
- System Impact Assessment - Permanent MW load loss for removal of this line is 10 MW.
- This is an immediate need project based on “End of Life” criteria.
- When this criteria violation was identified, the need date was already in the immediate need timeframe This is an immediate need project based on “End of Life” criteria.

Alternatives Considered

- Given the immediate need timing of the violation, alternatives that would require new lines to be built were not considered

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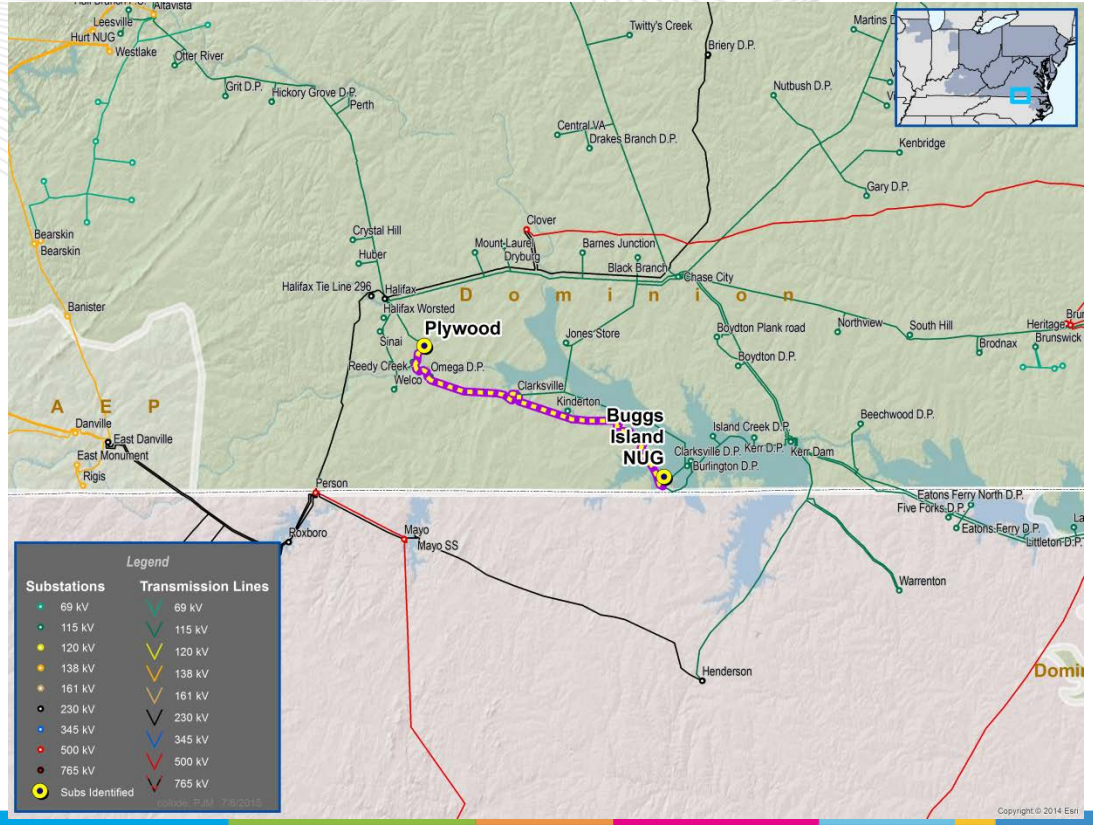

Dominion Transmission Area

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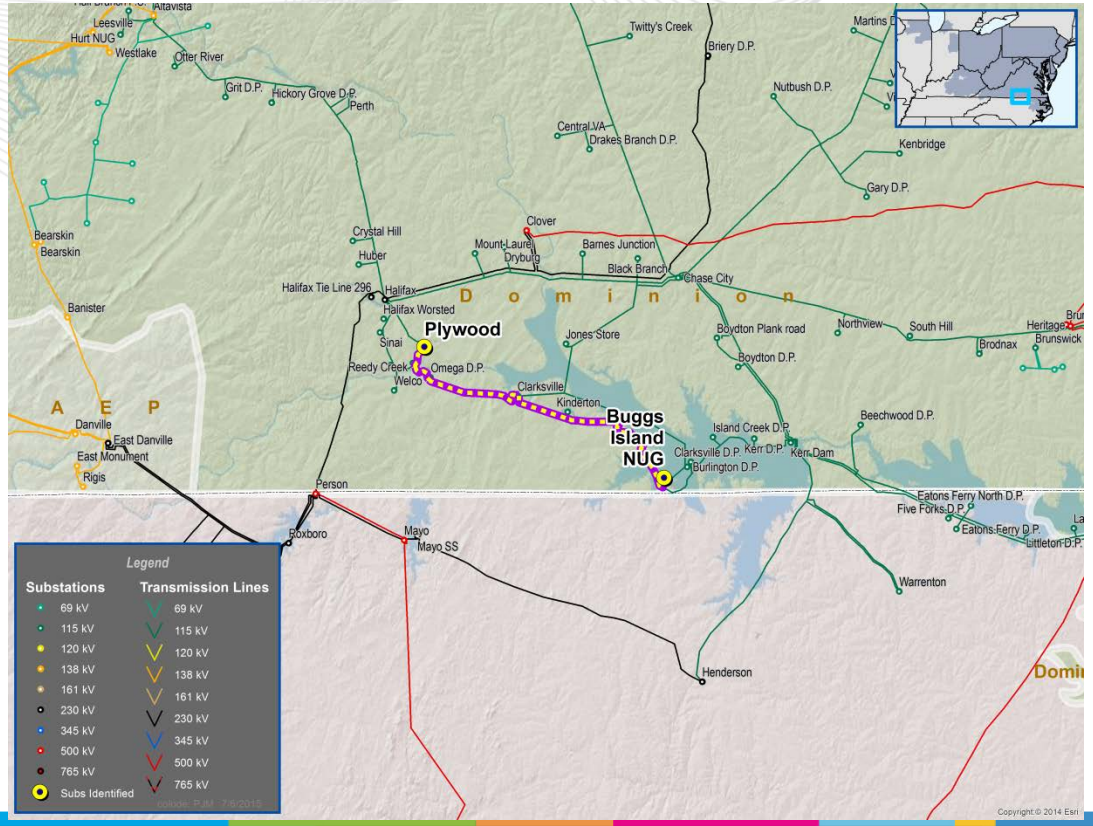
Proposed Immediate Need Solution

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be Designated Entity.

- Rebuild 115kV Line # 127 from Buggs Island to Plywood (25.8 miles) to current standards with a summer emergency rating of 353 MVA at 115kV. The line should be rebuilt for 230kV and operated at 115kV (b2651).

Estimated Project Cost: $38.7 M

Projected IS Date: 12/31/2021



Dominion Transmission Area

Problem :DOM End-Of-Life Criteria Violation

- End of Life Criteria - The Greatbridge to Hickory and Greatbridge to Chesapeake E.C.)were constructed on wood H-frames and Corten Towers in 1953 and 1967. The lines have ACSR conductor and mixture of 3/8" steel and 3#6 ALW static.

- System Impact Assessment - Permanent MW load loss for removal of these lines is 83MW.

- This is an immediate need project based on "End of Life" criteria.
- When this criteria violation was identified, the need date was already in the immediate need timeframe This is an immediate need project based on "End of Life" criteria.

Alternatives Considered

- Given the immediate need timing of the violation, alternatives that would require new lines to be built were not considered

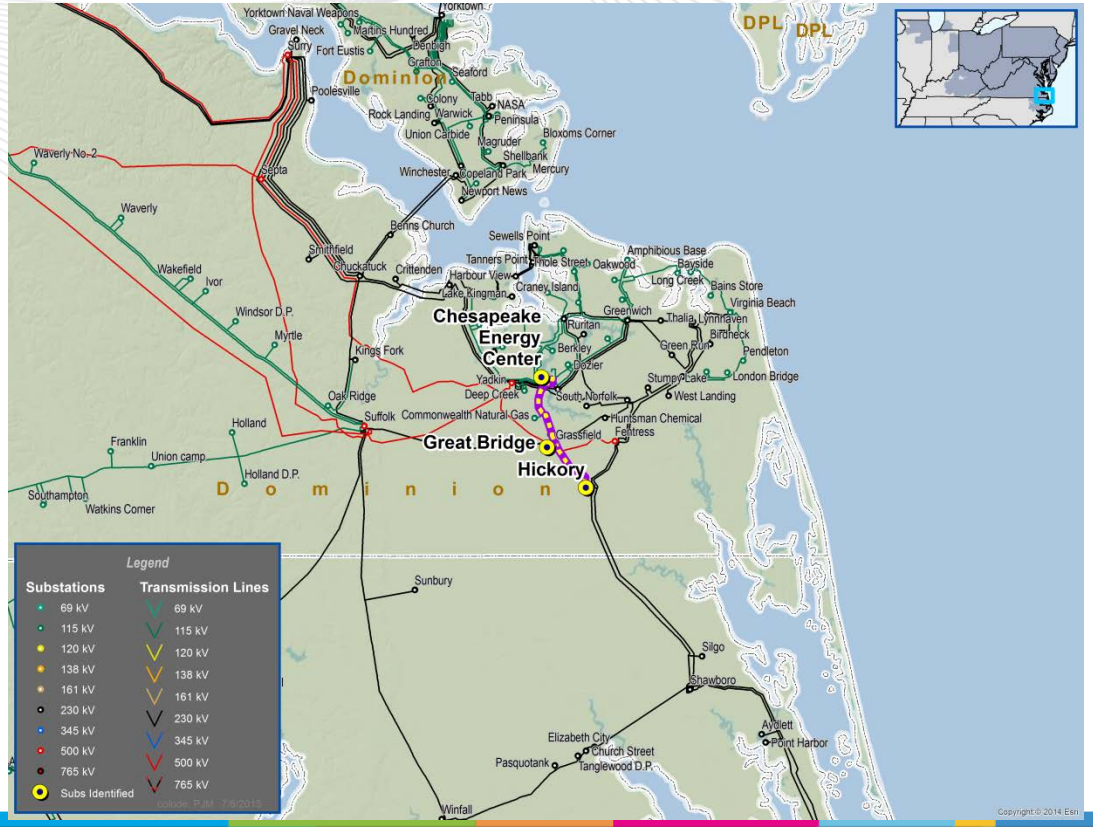
Proposed Immediate Need Solution

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be Designated Entity.

- Rebuild the 115kV Lines #16 and #74 from Greatbridge to Hickory and from Greatbridge to Chesapeake E.C. to current standard with a summer emergency rating of 262 MVA at 115kV (b2652).

Projected IS Date: 12/31/2021

Estimated cost: $ 21.7 M



Dominion Radial Transmission Lines

- **Radial transmission lines**
  - A Radial transmission line is defined as a single line that originates in a substation, serves load and does NOT tie to any other transmission line or substation
- Loading on single source radial transmission lines will be limited to the follow:
  - 100 MW Maximum
  - 700 MW-Mile Exposure (MW-Mile = Peak MW X Radial Line Length)

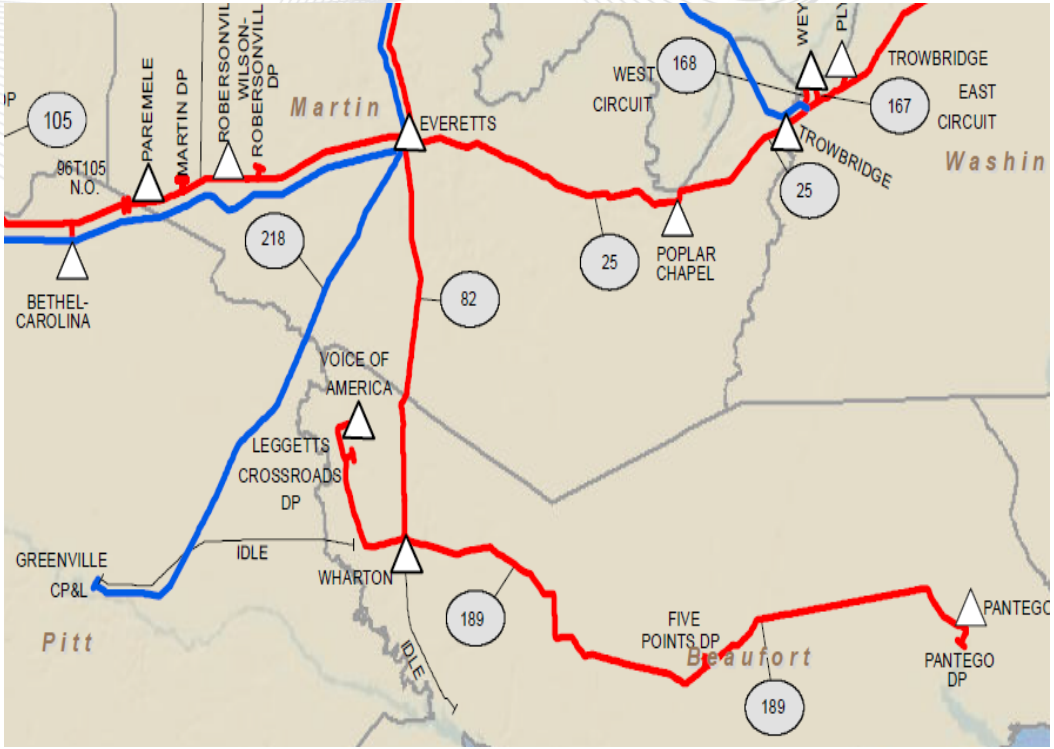
Dominion Transmission Area

Problem: DOM Radial Line Criteria Violation

- Line #82 is a 115kV radial line from Everetts to Wharton (13.8 miles) that feeds radial line #189 from Wharton to Pantego (30.2 miles).
- The MW-miles for Lines #82 and #189 are 2156 and 1419 MW-miles respectively, a violation of the DOM radial line criteria.
- This need is time sensitive due to the criteria violation in the immediate need timeframe.
- When this criteria violation was identified, the need date was already in the immediate need timeframe.

Alternatives Considered:

1) Network Line #82 by acquiring new right-of-way and building a 4.5 mile 115kV line from Line #218 to Line #82 near Voice of America. Acquire land and build a substation at the Line #218 end with a 230-115kV transformer, 230kV 3 breaker ring and 115kV breaker. Install a 115kV 3 breaker ring at Wharton. ($23 M)
2) Rebuild Line #189 (30.2 miles) with a 115kV double circuit line. Install a 3 breaker ring at Pantego and a 3 breaker ring at Wharton. ($60 M)



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Dominion Transmission Area

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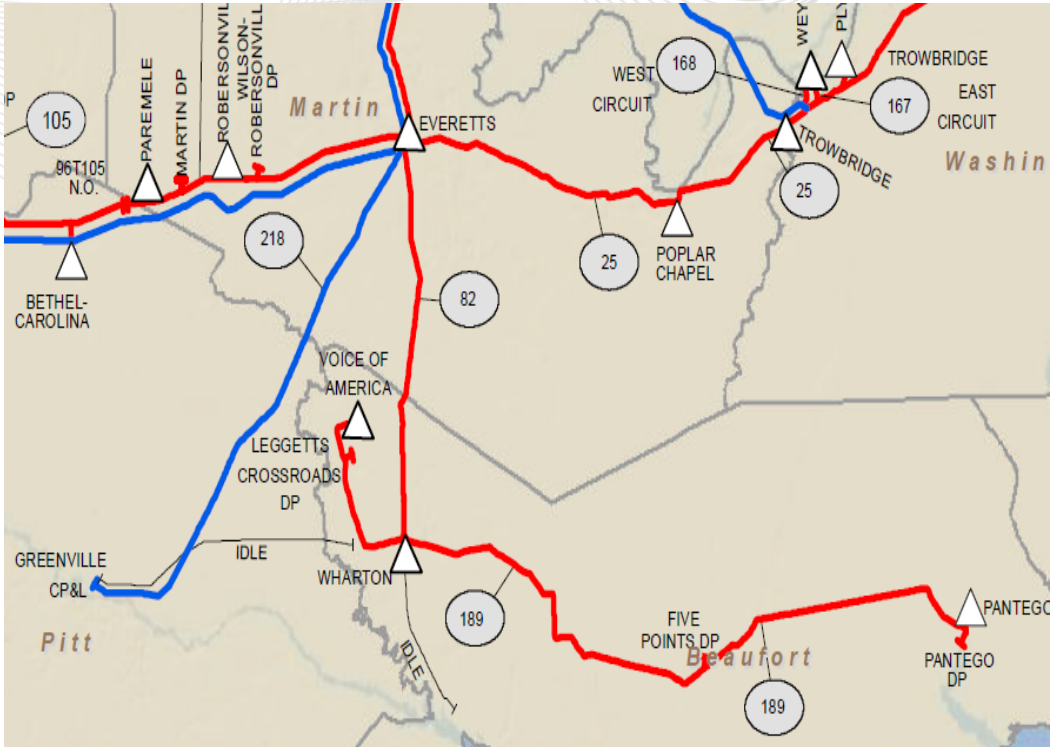
Proposed Immediate Need Solution

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be Designated Entity.

- Network Lines #82 and #189 by building a 20 mile 115kV line from Pantego to Trowbridge with a summer emergency rating of 262 MVA. (b2653.1)
- Install a 115kV four breaker ring at Pantego (b2653.2) and a 115kV breaker at Trowbridge (b2653.3).

Estimated Project Cost: $35 M

Projected IS Date: 6/1/2018



Dominion Transmission Area

Problem: DOM Radial Line Criteria Violation

- Line #126 is a 115kV 25 mile radial line from Earleys to Scotland Neck on 2 pole wood H frames mostly built in 1969.
- The MW-miles for Line #126 is 775 MW-miles, a violation of the DOM radial line criteria.
- This need is time sensitive due to the criteria violation in the immediate need timeframe.
- When this criteria violation was identified, the need date was already in the immediate need timeframe

Alternatives Considered:

1) Network Line #126 by building a 17 mile 115kV line from Scotland Neck to Line 55 at Tar River. Install a 115kV breaker at Scotland Neck. ($30 M)
2) Network Line #126 by rebuilding Line #126 as a double circuit line. Install a 115kV breaker at Scotland Neck and at Earleys. ($48 M)

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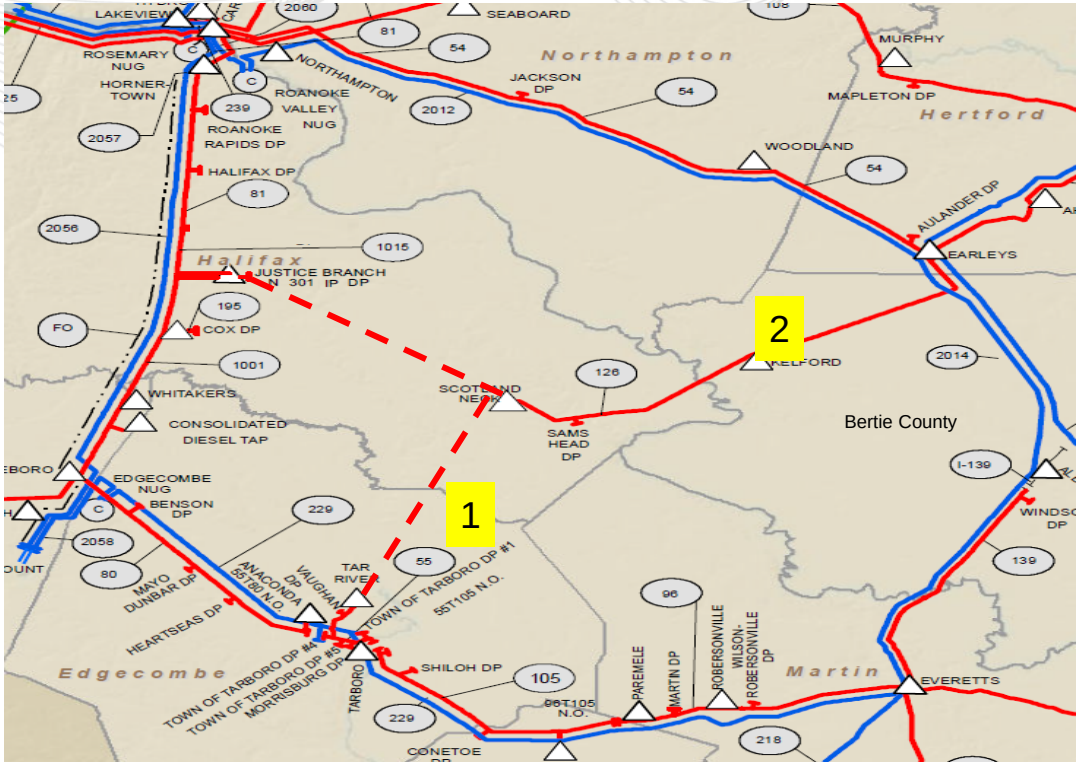

Dominion Transmission Area

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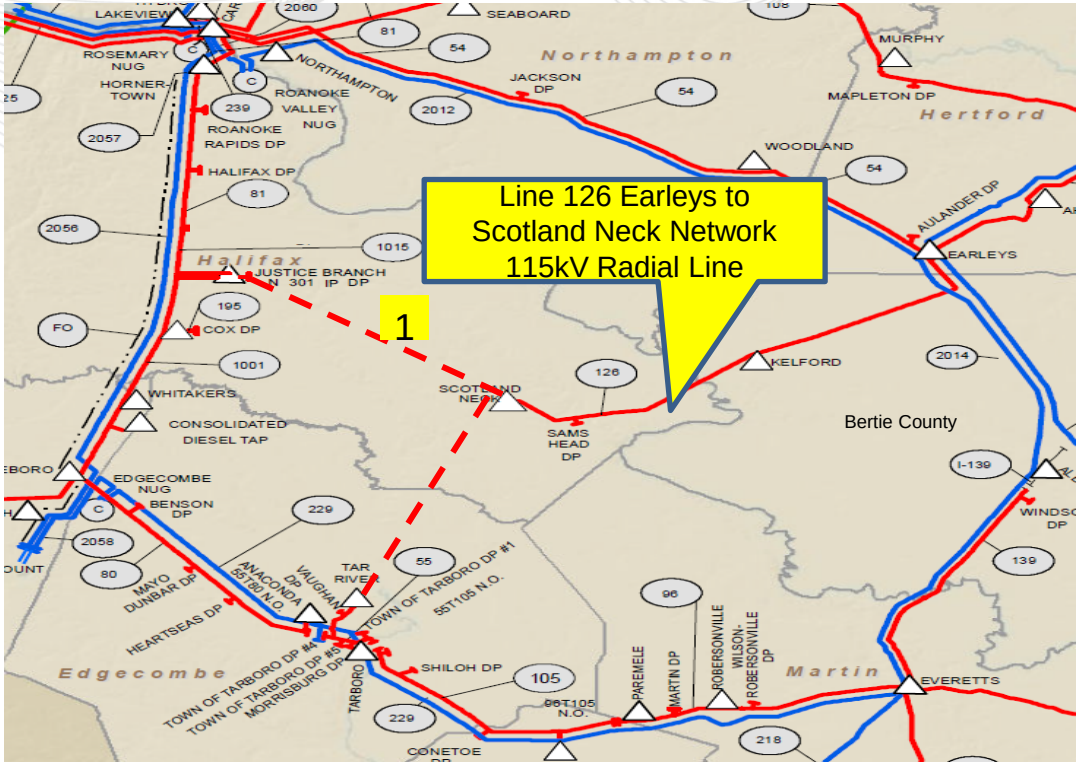
Proposed Immediate Need Solution

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be Designated Entity.

- Network Line #126 by building a 15 mile 115kV line from Scotland Neck to S. Justice Branch with a summer emergency rating of 262 MVA (b2654.1).
- Install a 115kV three breaker ring at S Justice Branch (b2654.2) and a 115kV breaker at Scotland Neck (b2654.3).
- Install a 224 MVA 230-115kV transformer at Morning Star (existing b1794) for contingency support. The new line would be routed to allow HEMC to convert Dawsons Crossroads DP from 34.5kV to 115kV.

Estimated Project Cost: $33 M

Projected IS Date: 6/1/2018



Questions?

Email: RTEP@pjm.com