



Sub Regional RTEP Committee South

April 25, 2017

Problem Statement: DOM “End of Life Criteria”

- A 7 mile segment of 115kV Line #120 located approximately between Dozier and Thompsons Corner Substations was constructed on wood H-frame structures in 1955 . The existing summer emergency rating of this line segment is 147 MVA. Current conductor used is 477 ACSR.
- This line segment needs to be rebuilt to current standards based on Dominion’s “End of Life” criteria.
- Permanent MW load loss for removal of this line is 100MW.

Potential Solution:

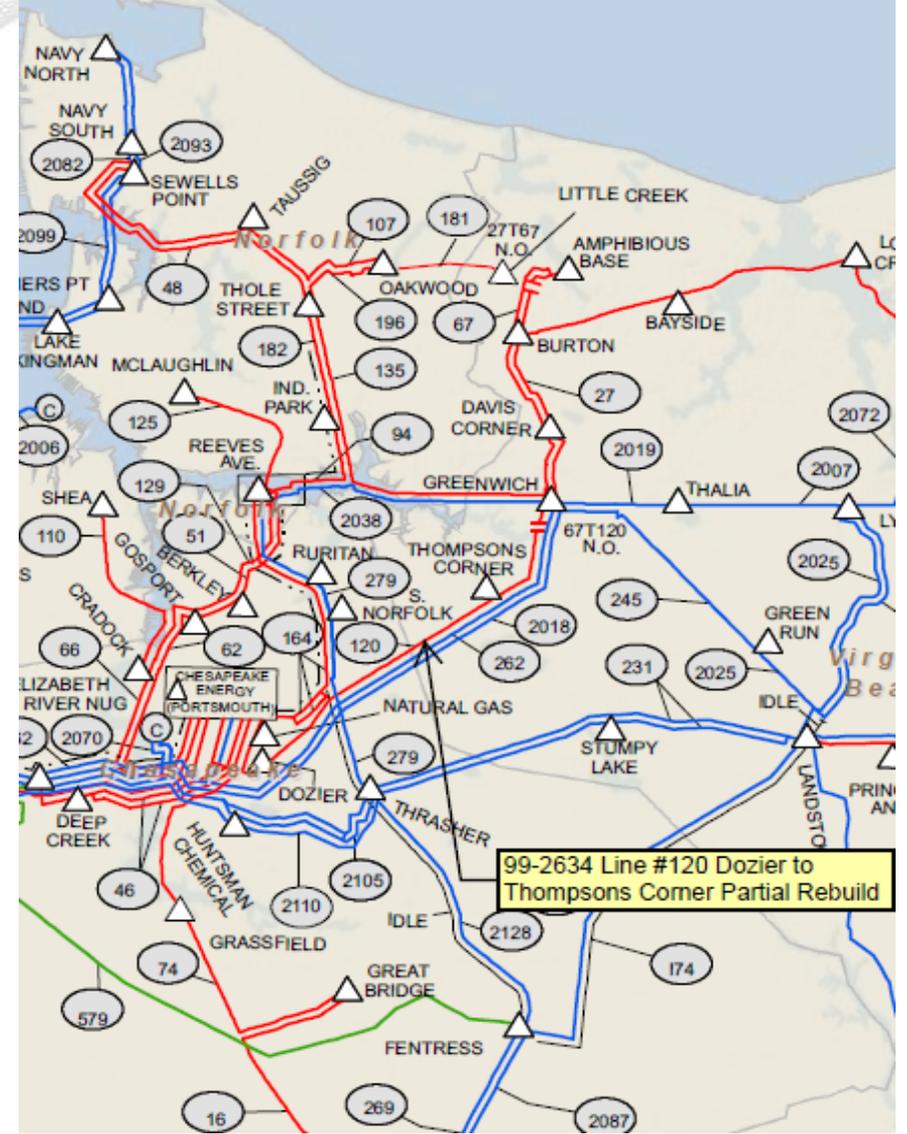
- The 7 mile section from Dozier to Thompsons Corner of line #120 will be rebuilt to current standards using 768.2 ACSS conductor with a summer emergency rating of 346 MVA at 115kV. Line is proposed to be rebuilt on single circuit steel monopole structures. **(b2800)**

Alternatives: No Feasible Alternatives

Estimated Project Cost: \$6.5 M

Possible IS Date: 12/30/2021

Project Status: Conceptual





Dominion Transmission Area

Problem Statement: DOM “End of Life Criteria”

- 115kV Lines #76 and #79 from Yorktown to Peninsula are 11 miles long and were constructed on double circuit 3 pole wood H-frame structures in 1957. The existing summer emergency rating of these lines are 193 MVA. Current conductor used includes 477 ACSR and 636 ACSR.
- This line needs to be rebuilt to current standards based on Dominion’s “End of Life” criteria.
- Permanent MW load loss for removal of these lines is 30 MW.

Potential Solution:

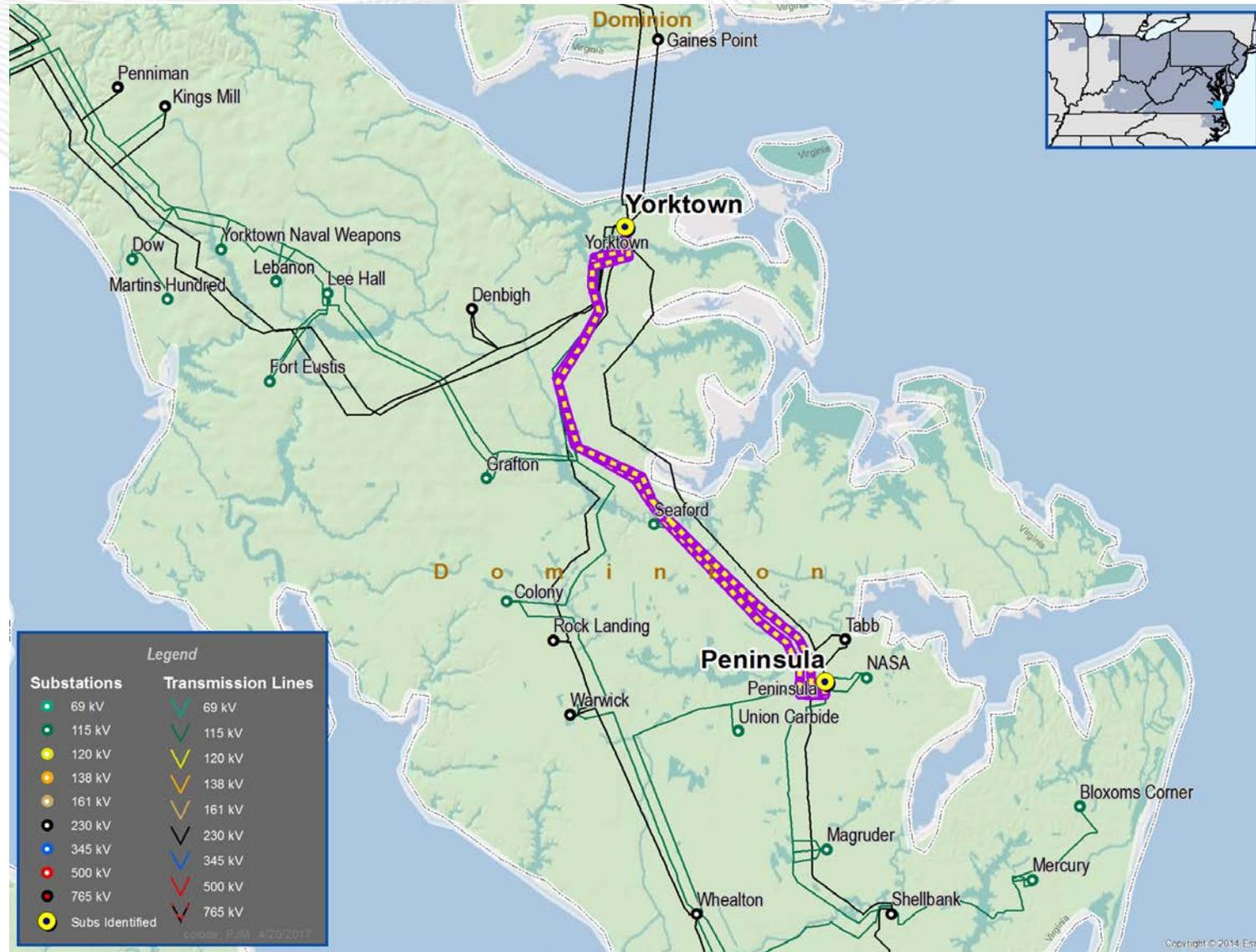
- Line #76 and #79 will be rebuilt to current standard using 768.2 ACSS conductor with a summer emergency rating of 346 MVA at 115kV. Proposed structure for rebuild is double circuit steel monopole structure. **(b2801)**

Alternatives: No Feasible Alternatives

Estimated Project Cost: \$22.0 M

Possible IS Date: 12/30/2020

Project Status: Conceptual



Problem Statement: DOM “End of Life Criteria”

- 115kV Line #101 from Mackeys to Creswell (14 miles) was constructed on wood H-frames in the 1970-1975 timeframe. The conductor has broken stranding consistent across entire line. The existing summer emergency rating of this line is 152 MVA. Current conductor used is 545.6 ACAR 15/7 ACAR.
- This line needs to be rebuilt to current standards based on Dominion’s “End of Life” criteria.
- Permanent MW load loss for removal of this line is 21 MW.
- The MW-mile for line #101 is 518 MW-mile based on the Winter 2025/26 projection. Dominion’s 700 MW-mile radial line criteria would be violated if 8 MW or more of new load were added in the future.

Potential Solution:

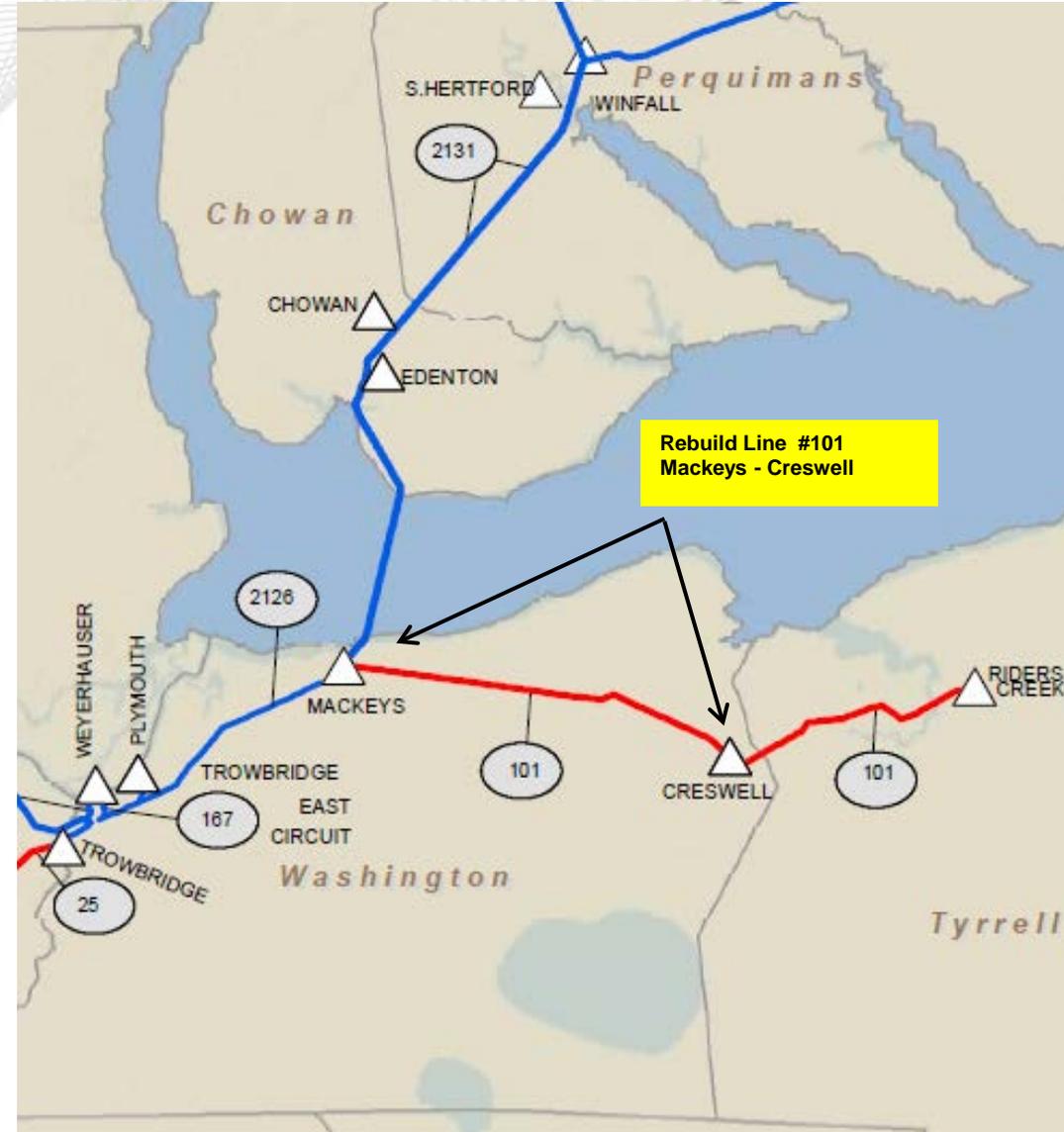
- Rebuild Line #101 from Mackeys to Creswell, 14 miles, with double circuit steel structures. Install one circuit with provisions for a second circuit. Provisions for a future second circuit would allow networking of the line (Mackeys – Creswell) if the 700 MW-mile level was exceeded. The conductor used will be at current standards (636 ACSR) with a summer emergency rating of 262 MVA at 115kV. Additional right-of-way is required for the temporary line. **(b2876)**
- **Estimated Project Cost: \$40 M**

Alternatives:

- Rebuild line #101 from Mackeys to Creswell, 14 miles, with single circuit structures. The conductor used will be at current standards (636 ACSR) with a summer emergency rating of 262 MVA at 115kV.
- Additional right-of-way is required for the temporary line. This alternative would not address the future 700MW-mile violation.
- **Estimated Project Cost: \$26 M**

Possible IS Date: 12/30/2022

Project Status: Conceptual



Problem Statement: DOM “End of Life Criteria”

- 138kV Line #112 from Fudge Hollow to Lowmoorline was constructed in 1929 and includes thirty-three Blaw Knox steel lattice towers that span 5.16 miles. These structures have experienced severe corrosion at grade and their grillage style foundations are no longer considered a dependable system to resist uplift forces that occur during a wind event. The existing summer emergency rating of this line is 207 MVA. Current conductor used for this line includes 4/0 ACSR, 721 ACAR, 336 ACSR, and 1109 ACAR.
- Of this distance, a 1.24 mile section includes double circuit towers that are shared with Line #161.
- Line #112 serves 9,778 customers including 3,586 fed by Co-op. The loss of a double circuit structure for this line would result in the additional loss of line numbers #161, #109, and #155 along with East Mill, Fudge Hollow, Covington, and Westvaco substations. In 2016 the peak load at Westvaco was 94 MW on August 18th.
- This line is part of the transmission loop between Westvaco and Lexington and needs to be rebuilt to current standards based on Dominion’s “End of Life” criteria.

Potential Solution:

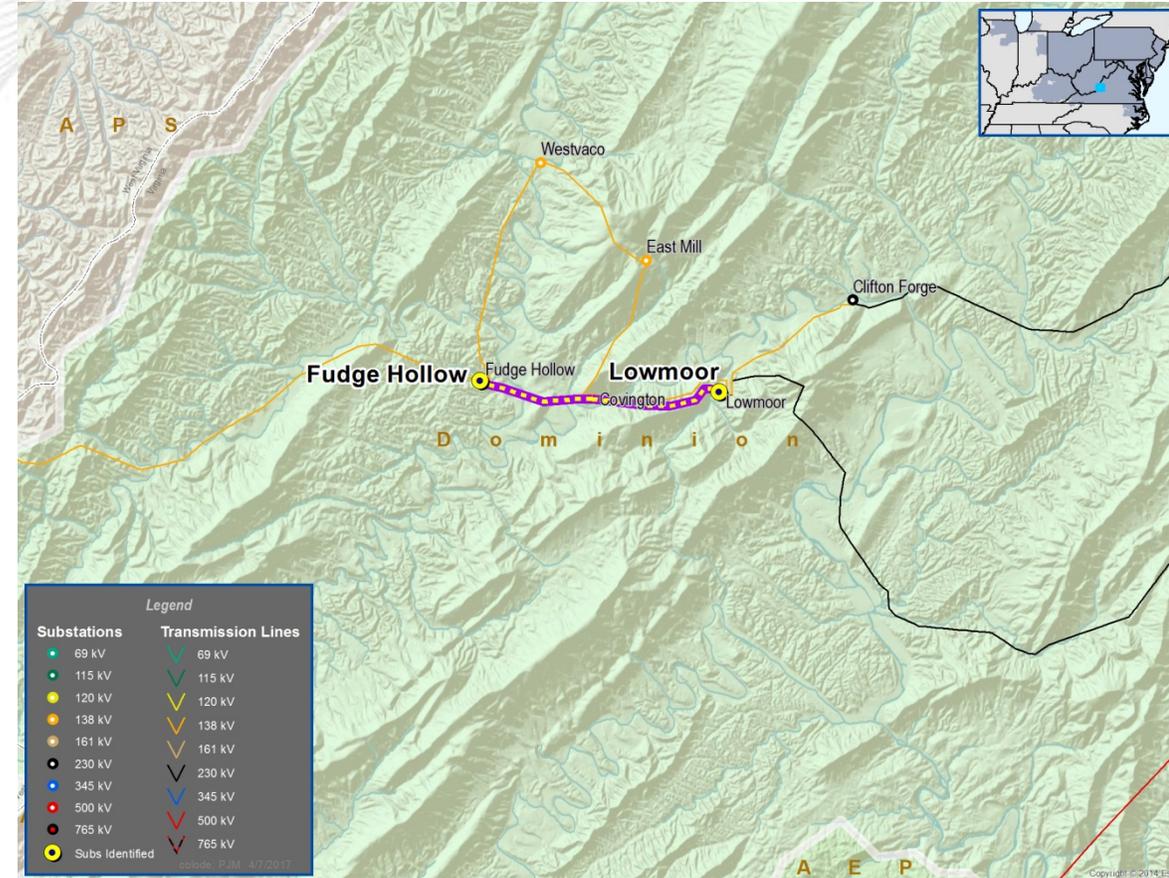
- Rebuild Line #112 from Fudge Hollow and Lowmoor (5.16 miles) to current standards (636 ACSR) with a summer emergency rating of 314 MVA at 138kV. Steel tower and double circuit steel monopole replacement structures are being considered. **(b2877)**

Alternatives: No feasible alternatives

Estimated Project Cost: \$8 M

Possible IS Date: 10/31/2020

Project Status: Conceptual





Supplemental Projects



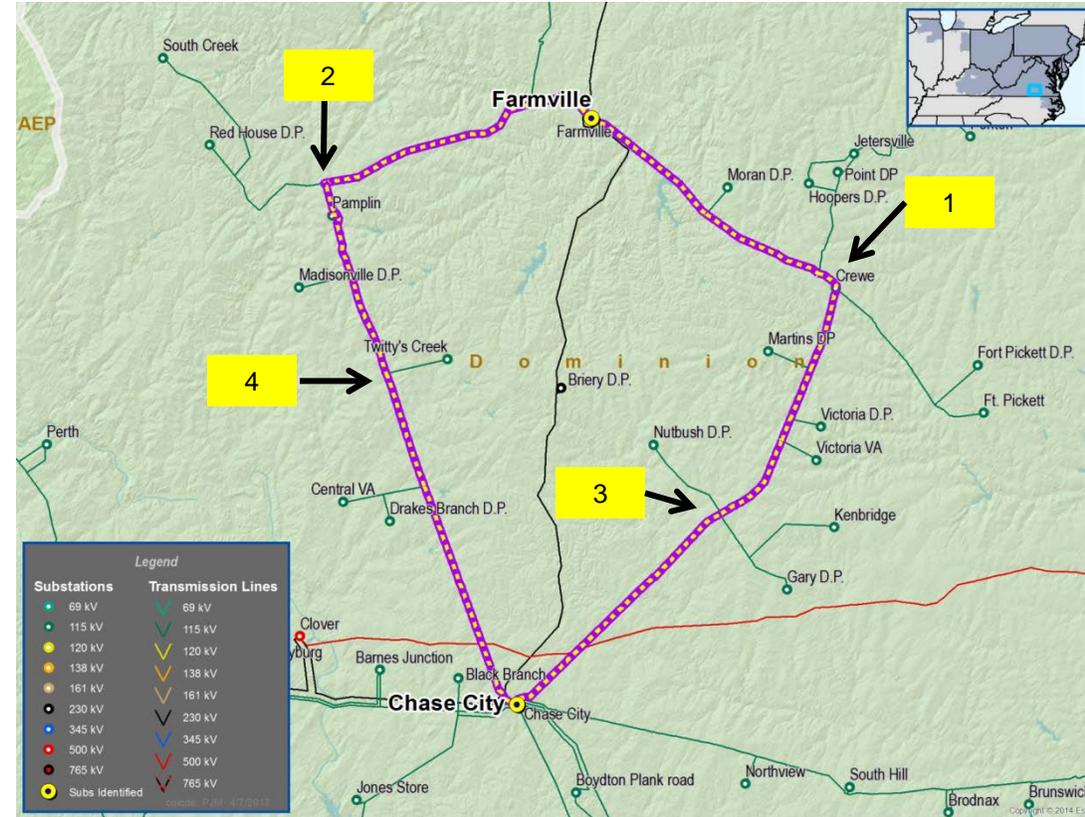
Supplemental Project

Existing s0921 Cost Increase

- The Dominion Facility Connection Requirements states that transmission tap lines greater than a mile should be protected by a breaker to improve the reliability of the line
- These lines also have increased exposure due to several long taps:
 - Jetersville tap is 8 miles increasing to 16 miles with the new Ponton DP in 2016
 - Nutbush DP tap is 5.4 miles
 - Gary DP tap is 7.9 miles
 - Redhouse DP tap is 17 miles

Proposed Solution:

- Network 115kV lines #98 and #158 by splitting line #158 between Crewe and the Jetersville tap and building a 4 breaker ring switching station (**s0921.1**). Double build the Jetersville tap 0.6 miles back to the new station. Double build Line #1 for 0.6 miles from Crewe back to the new station. Terminate the lines into the ring. (**s0921.5**).
- Network lines #84 and #154 by expanding Pamplin Substation and building a 4 breaker ring. Terminate lines #84, #154 and the Redhouse DP tap into the ring bus. (**s0921.2**)
- Purchase land and build a new station in the vicinity of the taps to Gary and Nutbush delivery points (**s0921.3**). Install a 4 breaker ring, split line #98 and terminate into the ring. Terminate the Gary and Nutbush DP taps into the ring. Splitting the #98 line is necessary for protection. (**s0921.6**).
- Add a 115kV breaker at Twittys Creek. Splitting the #154 line at Twittys Creek is necessary for protection. (**s0921.4**).





Dominion Transmission Area

Continued from previous slide...

Supplemental Project

Reason for Cost Increase:

- Due to soil borings taken at Lunenburg, the design of the transmission structure foundations was changed from drilled piers to H-piles.
- Additional substation expense at Pamplin, Lunenburg and Lone Pine.
 - Pamplin - \$456,000
 - Lunenburg - \$830,000
 - Lone Pine - \$298,000

Previous Estimated Project Cost: \$33.8 M

Revised Estimated Project Cost: \$35.4 M

Projected IS Date: December 2017

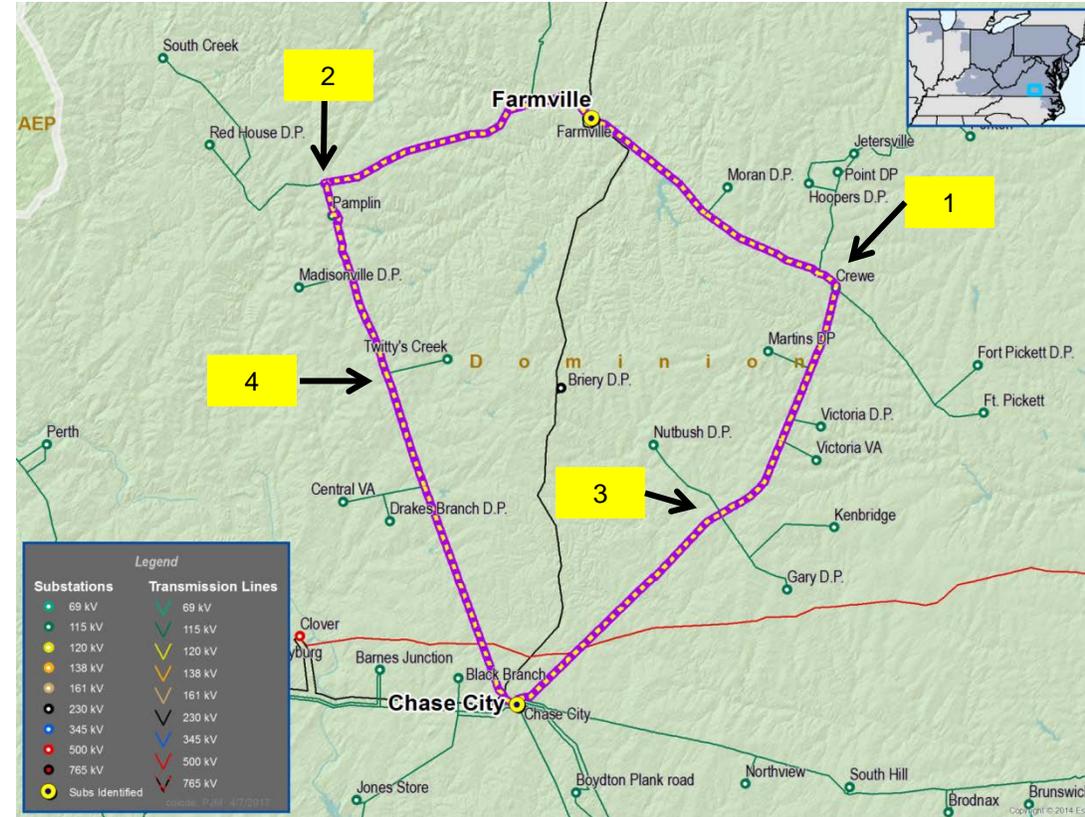
Project Status: Engineering & Construction

Original Sub Regional Date: 03/09/15

Original Sub Regional Cost: \$25 M

Latest Sub Regional Date: 07/26/16

Latest Sub Regional Cost: \$33.8 M



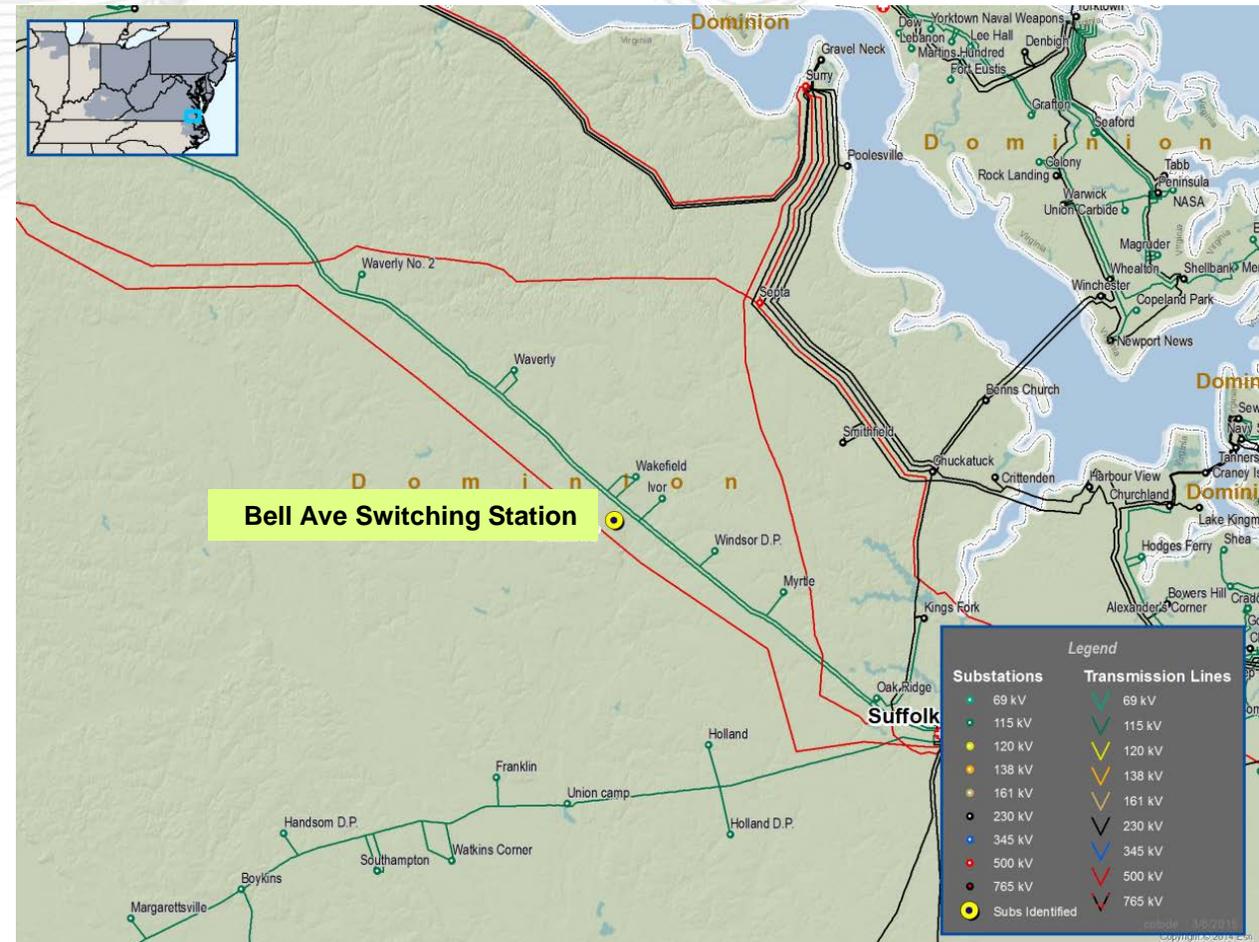
Supplemental Project Existing s0922 Cost Increase and Scope Modification

Problem:

- There are two 115kV lines between Poe and Suffolk substations; eleven delivery points are served from these lines. Both lines are normally open.
- To serve these DPs with better reliability the normally open switches will be closed therefore these lines become networked lines.
- Due to the 56-mile long length of the networked lines, breakers are needed to sectionalize both lines for protection and reliability consideration.

Proposed Solution:

- Build a new switching station Bell Ave between Ivor and Wakefield substations.
- Land will need to be purchased for this new station.
- The station has two 115kV breakers to break existing 115kV lines #44 and #106. These two lines remain separate at the new station.





Dominion Transmission Area

Continued from previous slide...

Supplemental Project

Reason for Cost Increase and Scope Modification:

- Install wave traps and perform other related work at 9 substations and 4 delivery points along these two 115kV lines to prepare the lines for network condition (\$1.1 M)
- Site development and bus work to accommodate a new delivery point request that is in its final review stage (\$1.5 M)
- Install two double circuit 115kV double deadend steel poles to rearrange lines coming in and out of Bell Ave station (\$0.5 M)
- More expensive foundation works due to swampy site condition (\$0.2 M)
- Refined detailed cost estimate updates (\$3.7 M)

Previous Estimated Project Cost: \$ 2.8 M

Revised Estimated Project Cost: \$ 9.8 M

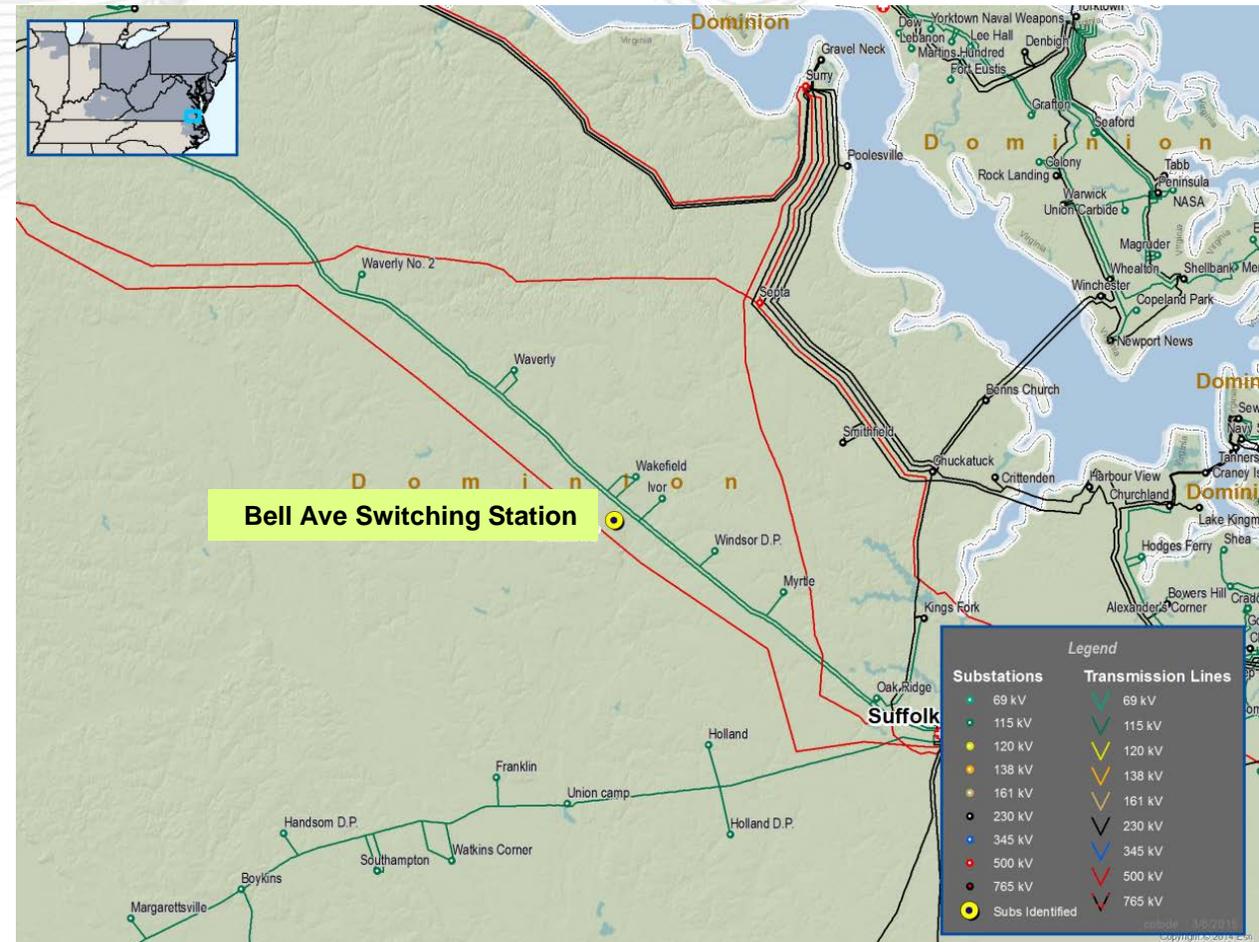
Previous Projected IS Date: May 2017

Revised Projected IS Date: 06/30/2017

Project Status: Under construction

Original Sub Regional Date: 03/09/15

Original Sub Regional Cost: \$2.8 M



Supplemental Project

Problem:

- Dominion filed an application with the Virginia SCC in December of 2016 to replace four structures of 500kV Line #567(Chickahominy – Surry PS).
- Two of these structures are located in the James River and are approximately 400 feet tall and the other two structures are located on the rivers edge.
- These structures have deteriorated to a point that they need to be replaced. A specialized conductor was used in the construction of the river crossing which limits the line to 1954 MVA.
- This is the only location on Dominion's system that this conductor is used.

Potential Solution:

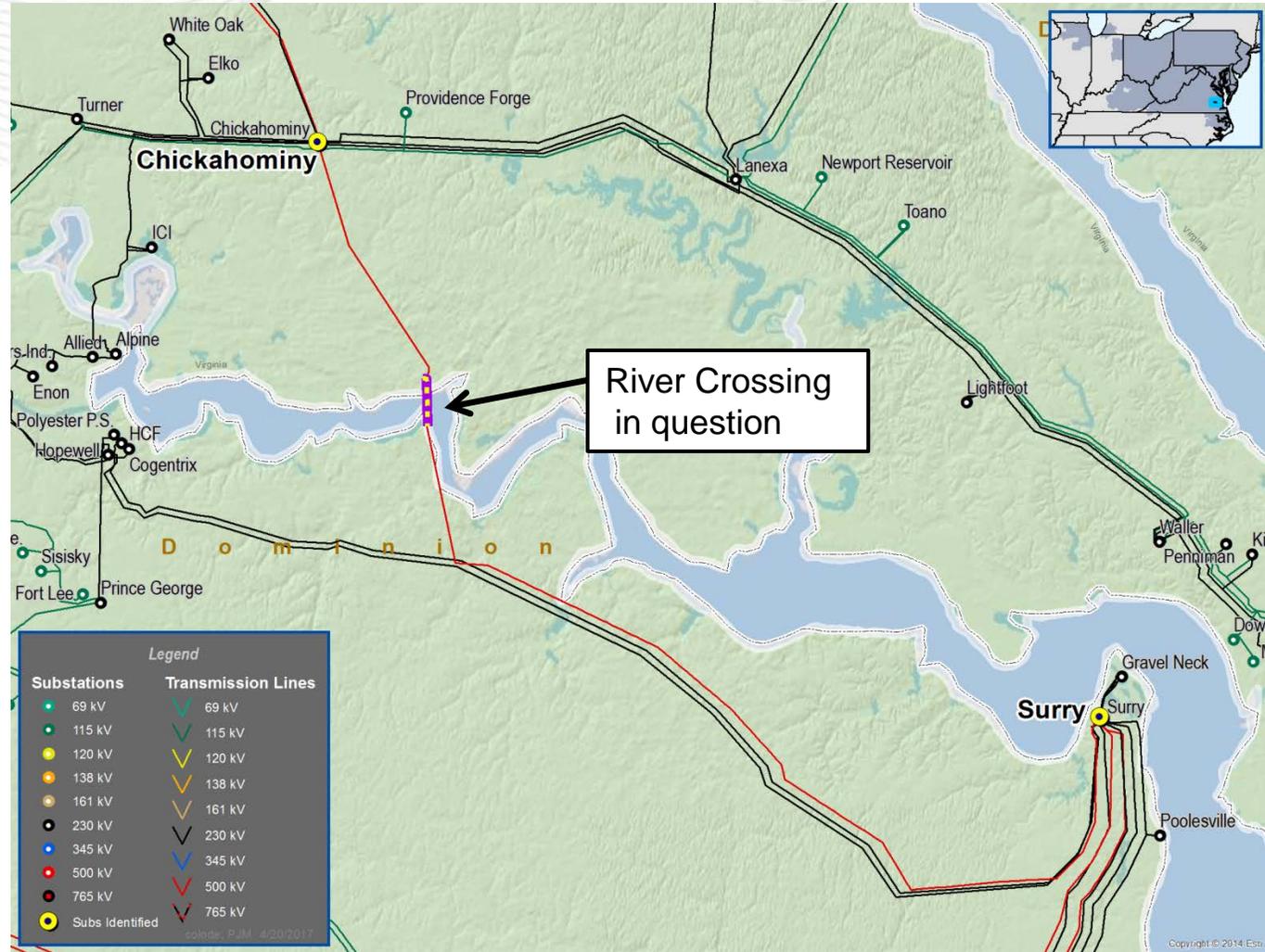
- Rebuild the four structures using galvanized steel and replace the river crossing conductor with 3-1534 ACSR.
- This will increase the 500kV Line #567 line rating from 1954 MVA to 2600 MVA. **(s1280)**

Alternatives: None

Estimated Project Cost: \$41 M

Possible IS Date: 12/30/2017

Project Status: Engineering



Questions?

Email: RTEP@pjm.com



Revision History

04/20/2017 – V1 – Original version posted to PJM.com.

04/21/2017 – V2 – Updated 1st 2 bullets on slide 5 to provide clarity. Updated slides 8 & 10 and replaced word “TEAC” with “Sub Regional”.

04/27/2017 – V3 – Incorporates updates based on stakeholder feedback to slides 2-5, 8 & 10 following the 04/25/2017 SRRTEP meeting. Updates include line length, current and new conductor types, structure types, voltage, maps and cost information.