



Sub-Regional RTEP Committee PJM South

SRRTEP - South
July 26, 2016

B1696 Cost Increase and Scope Addition

Problem: N-1 and N-1-1 Thermal Violations

- For various contingencies, the Idylwood 230kV bus is overloaded

Proposed Solution

- Install a Breaker and Half Scheme at Idylwood

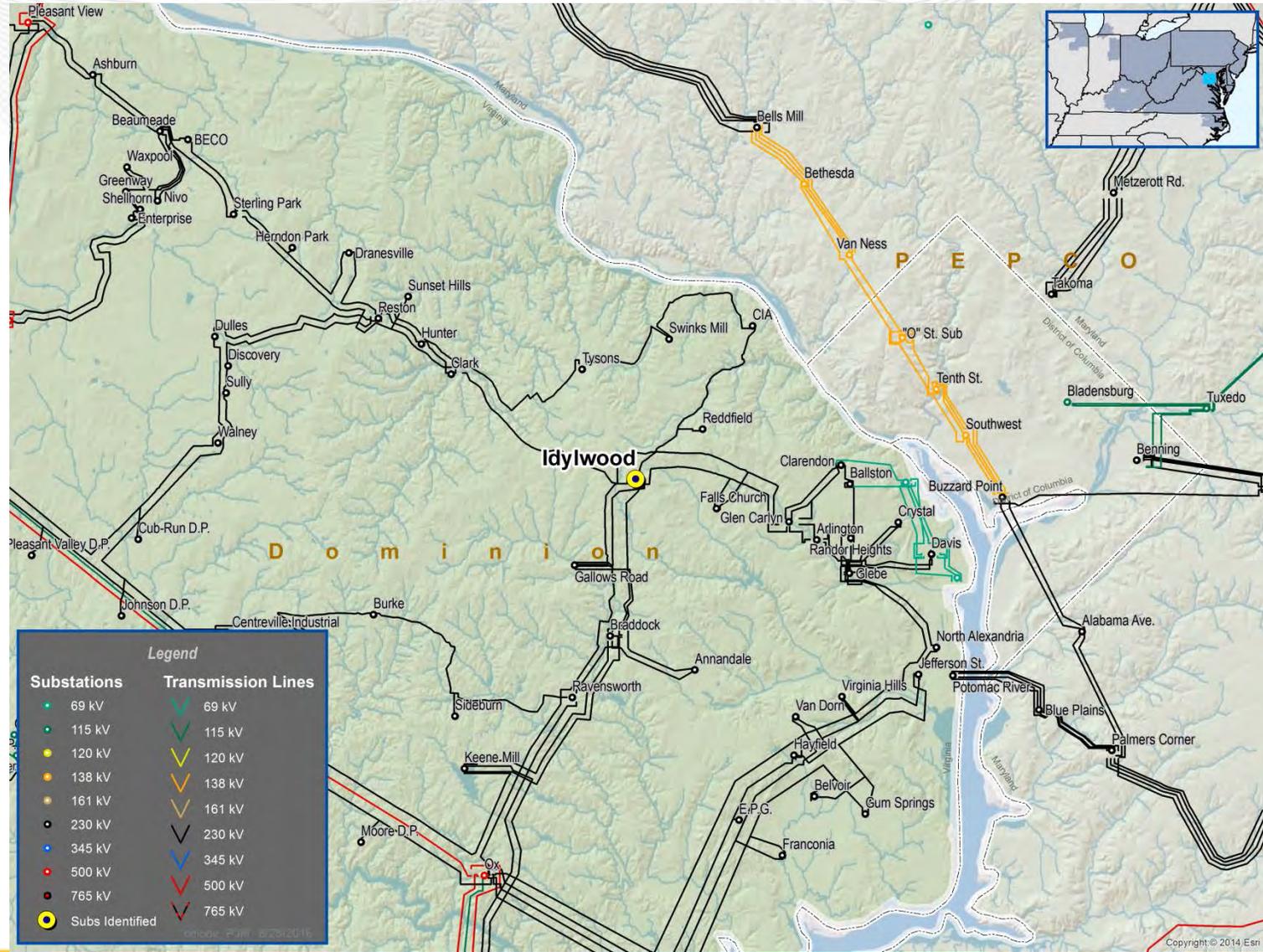
Reason for cost increase:

- Detailed cost estimate included additional cost due to GIS breakers, security wall, transmission structures, labor, and permitting.

Previous Cost Estimate: \$55 M

Revised Cost Estimate: \$80 M

Projected IS Date: 02/01/2020



Existing B1792 Cost Increase and Scope Modification

Problem: N-1 and N-1-1 Thermal Violations

- For several contingencies, the Halifax- Chase City 115kV line is overloaded

Proposed Solution

- Rebuild line #33 Halifax to Chase City 26 miles and install a 230kV four breaker ring bus at Halifax to eliminate the motor operator schemes.

Reason for Revision:

- The original plan was to expand Halifax substation. Halifax substation cannot be expanded because it is located in a flood plain.

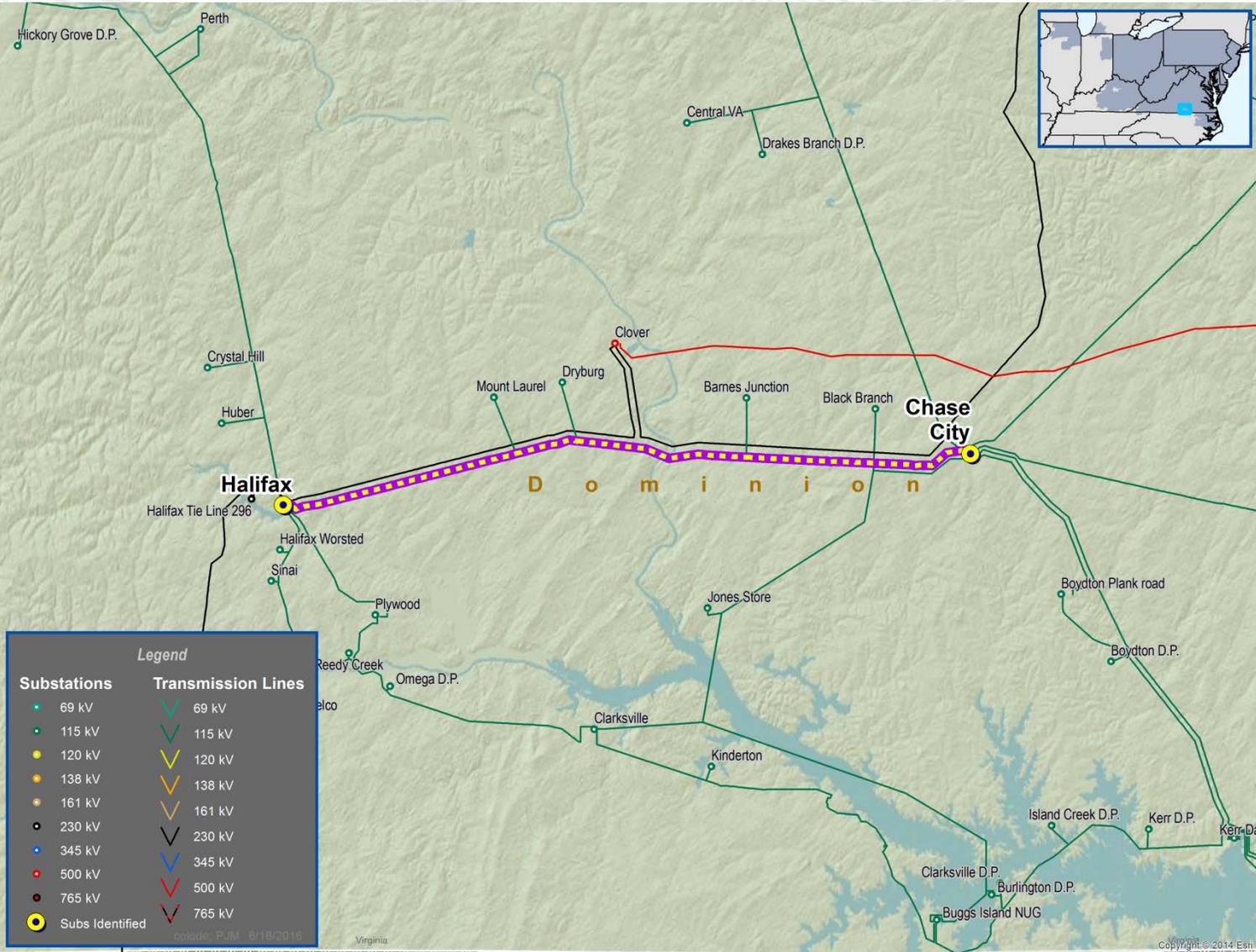
Proposed Revised Solution:

- Rebuild Line #33 Chase City – Halifax 230kV to a minimum summer emergency rating of 300 MVA.
- Relocate Halifax switching station out of the flood plain
- Build a new switching station, to be called Sedge Hill, with 230kV four breaker ring and a 115kV breaker and a half scheme with seven breakers.

Previous Estimated Cost: \$26.0 M

Revised Estimated Cost: \$50.2 M

Projected IS Date: 12/15/2016





Dominion Transmission Area

Existing B2186 Cost Increase and Scope Modification

Problem: N-1-1 Thermal Violation

- For the loss of Line # 54 Carolina – Earleys and the Earleys 230-115kV transformer, the #108 line Boykins – Tunis 115kV is overloaded

Proposed Solution:

- Install a 2nd 230-115kV transformer at Earleys connected to the existing 115kV and 230kV ring busses. Add a 115kV breaker and 230kV breaker to the ring busses. (B2186)

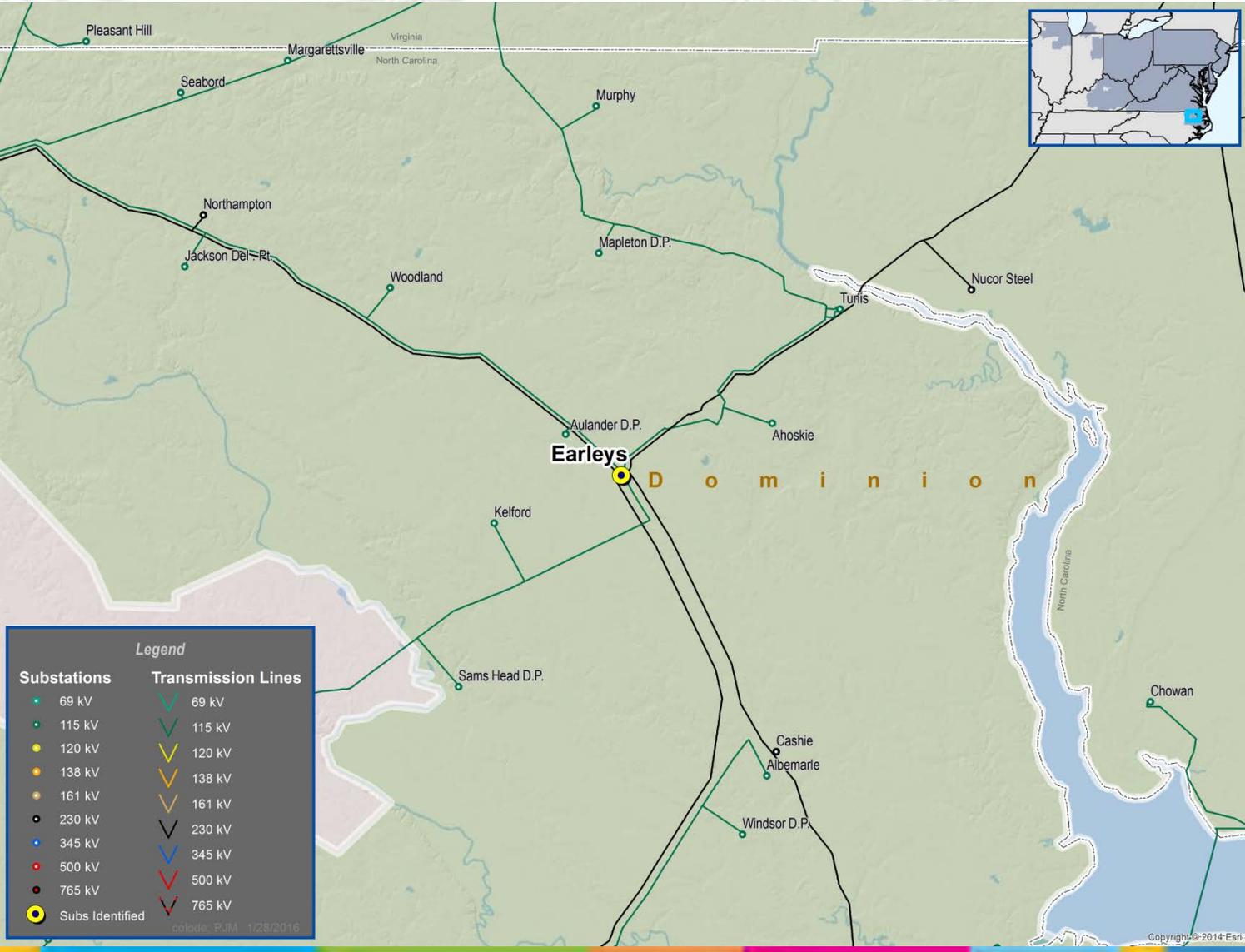
Reason for cost increase:

- Dominion design guidelines require that wood pole structures inside the station be replaced when there is a project at a substation.
- Therefore, four wood pole structures need to be replaced at Earleys.
- Two spans of conductor will be replaced on line #2012 Earleys- Roanoke Valley 230kV at Earley's substation that will increase the summer STE rating from 595 to 608 MVA.
- Due to additional DC load requirements from this project and previous projects and no room for expansion in the existing control house, a new battery enclosure is required.

Previous Estimated Cost: \$ 11.5 M

Revised Estimated Cost: \$ 13 M

Projected IS Date: 06/01/2017





Existing B2458 Cost Increase and Scope Modification

Problem: N-1 Thermal Violation

- Carolina – Woodland 115kV line is overloaded due to the loss Roanoke Valley NUG - Earleys 230 kV line

Existing Project Scope:

- Replace wood H- frame structure and 2.5 miles of static wire on Carolina - Woodland 115 kV
- Replace wood H- frame structures 4.5 miles of conductor between Carolina 115 kV and Jackson DP 115 kV with a minimum 174 MVA summer STE rating.

Construction Update:

- Broken strands at multiple locations along Carolina – Woodland 115kV circuit discovered during construction that need to be replaced. **(B2458.6)**

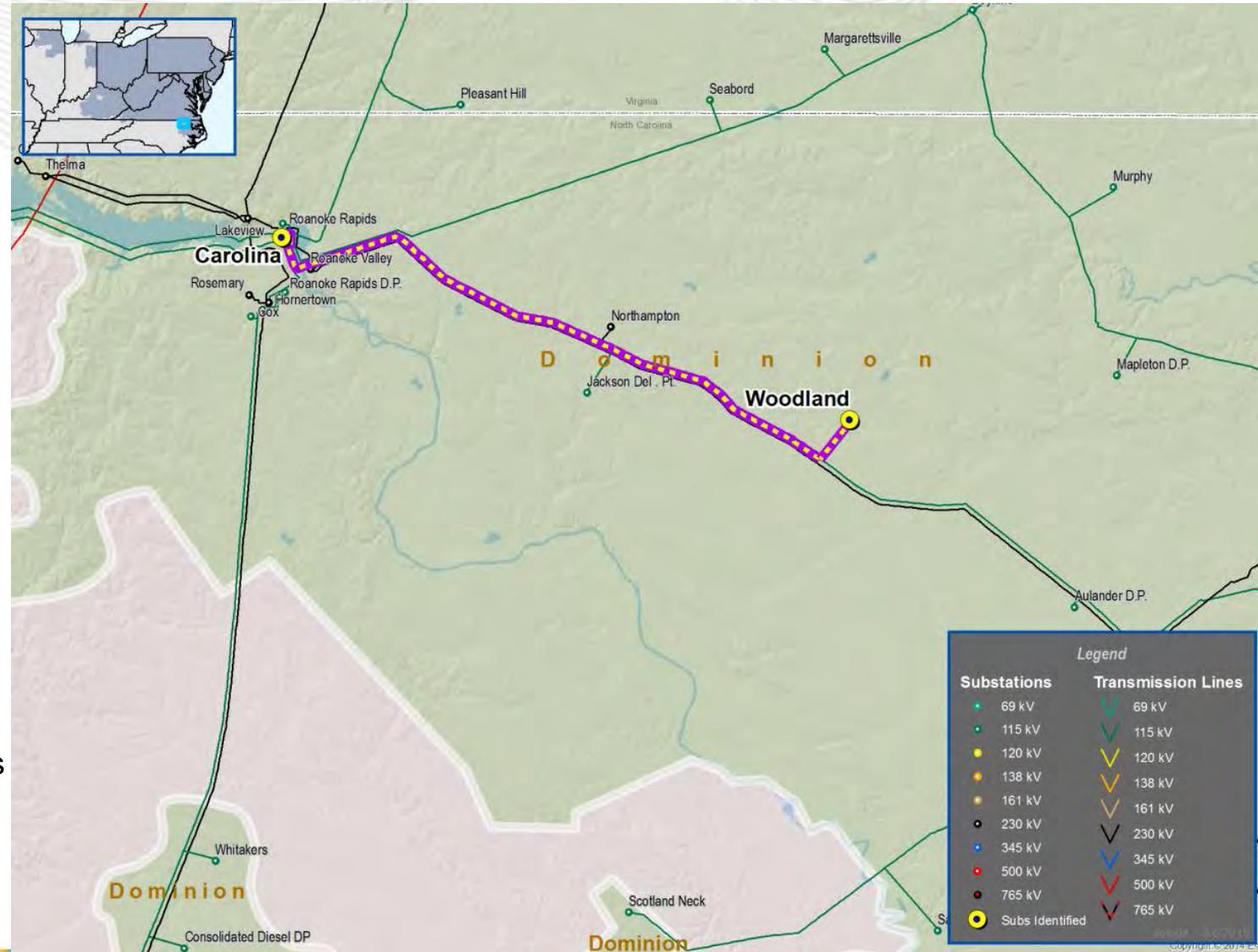
Addition to Project Scope:

- Reconductor 22.4 miles of Carolina–Jackson 115kV for min. 174 MVA summer STE rating using existing structures

Previous Estimated Cost: \$6.9 M

Revised Estimated Cost : \$13.9 M

Projected IS Date: 12/31/2018



Existing B2628 Cost and Scope Modification

- **Problem DOM “End of Life Criteria”:** The Everetts – Voice of America 115kV line #82 was constructed on wood H-frame structures in 1953. This line has ACSR conductor and 3/8 inch steel static.
- System Impact Assessment - Failure of Line #82 would permanently drop 49 MW of load

Existing Project Scope:

- Rebuild 115kV Line #82 Everetts – Voice of America (20.8 miles) to current standards with a summer emergency rating of 261 MVA at 115kV (B2628)

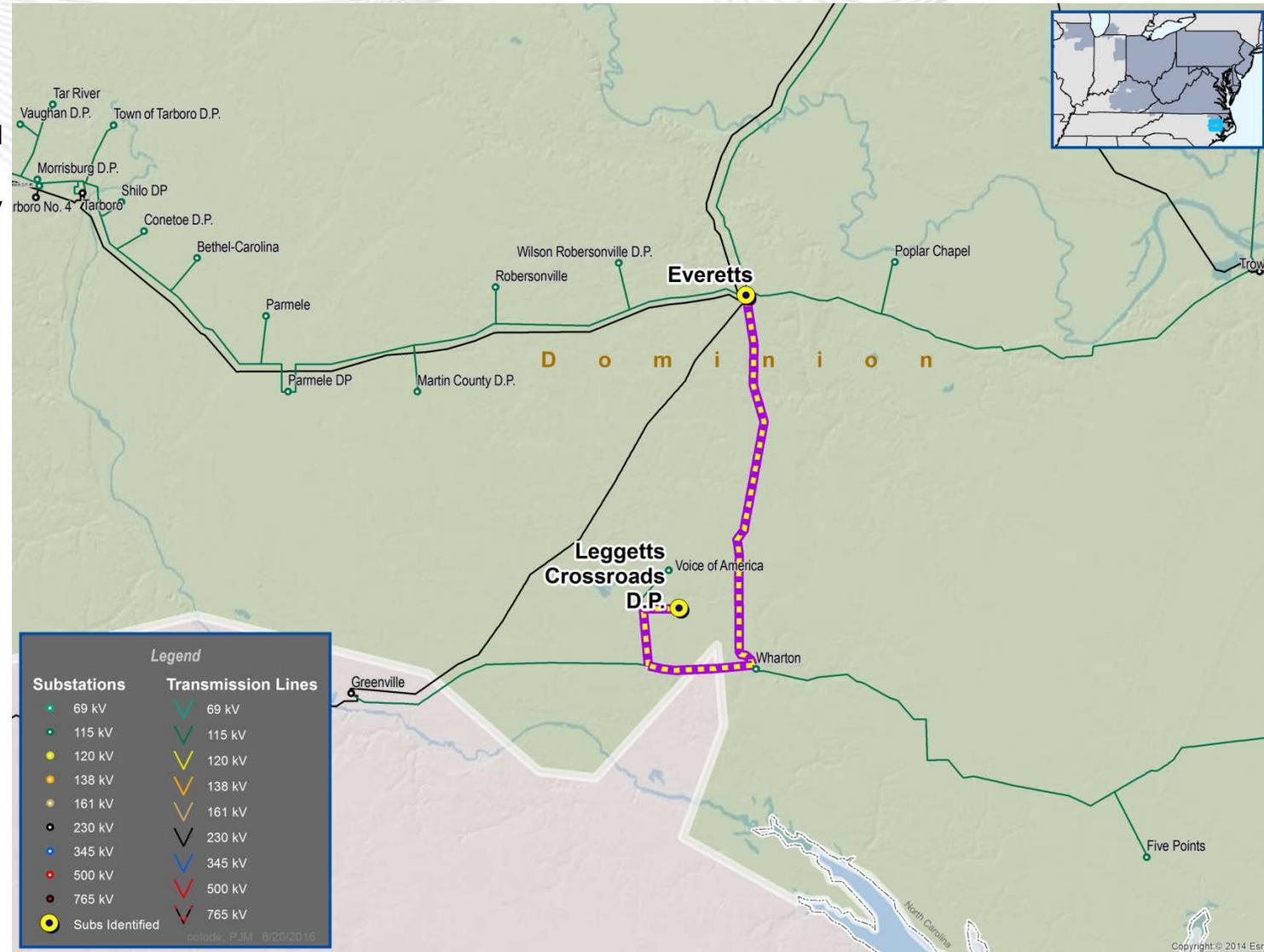
Scope Modification:

- Rebuild Everetts – Leggetts 115kV Line #82 Crossroads DP (19.1 miles) to current standards with a summer emergency rating of 353 MVA at 115kV (B2628)
- The cost increase is due to refined detailed cost estimates updates and the increase in line capacity.
- The last 1.75 mile section of Leggetts Crossroad DP to Voice of America (VOA) was removed from this project due to minimal load at VOA and the potential to remove this line section in the future for the load to be served from the distribution system.

Previous Estimated Cost: \$24.0 M

Revised Estimated Cost : \$32.1 M

Projected IS Date: 12/30/2019



Problem: NERC Category P1 N-1 Thermal and Voltage Analysis

- New block loads being added at Ridge Road substation (38 MW in 2017 & 38 MW in 2018) produce the following N-1 violations for summer 2018
- Chase City – Ridge Rd 115kV line and Kerr – Ridge Rd 115kV are overloaded for various single contingencies
- Ridge Road 115kV and Boydton Plank 115kV have low voltage for various contingencies.
- This is an immediate need project based on NERC TPL-001-004 criteria.
- When this criteria violation was identified, the need date was already in the immediate need timeframe

Alternatives Considered

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

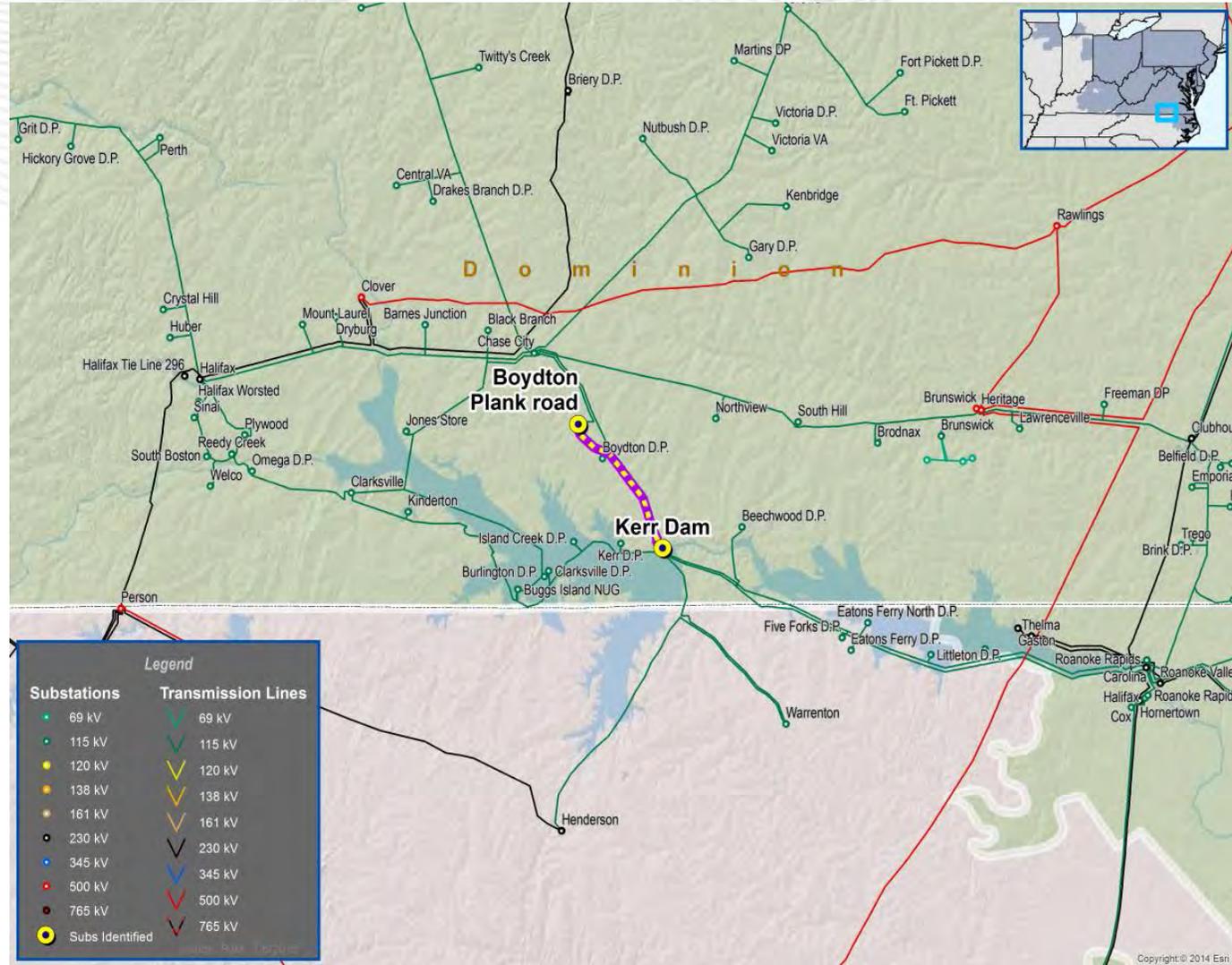
Proposed Immediate Need Solution

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 Line #137 Ridge Rd - Kerr Dam 115kV, 8.0 miles, for 346 MVA summer emergency rating (**B2746.1**)
- Rebuild Line #1009 Ridge Rd - Chase City, 9.5 miles, for 346 MVA summer emergency rating (**B2746.2**)
- Install a 25 MVAR 115kV capacitor bank at Ridge Rd (**B2746.3**)

Estimated Cost: \$39 M

Projected IS Date: 5/1/2018



Problem: Operational Performance

- Isolation of FirstEnergy's 115kV transmission line to REC's Pratts Substation is needed at Dominion's Gordonsville Substation and presently would be accomplished by the dispatch of local forces to manually open an air-break switch at Gordonsville.

Immediate Need:

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

Alternatives Considered:

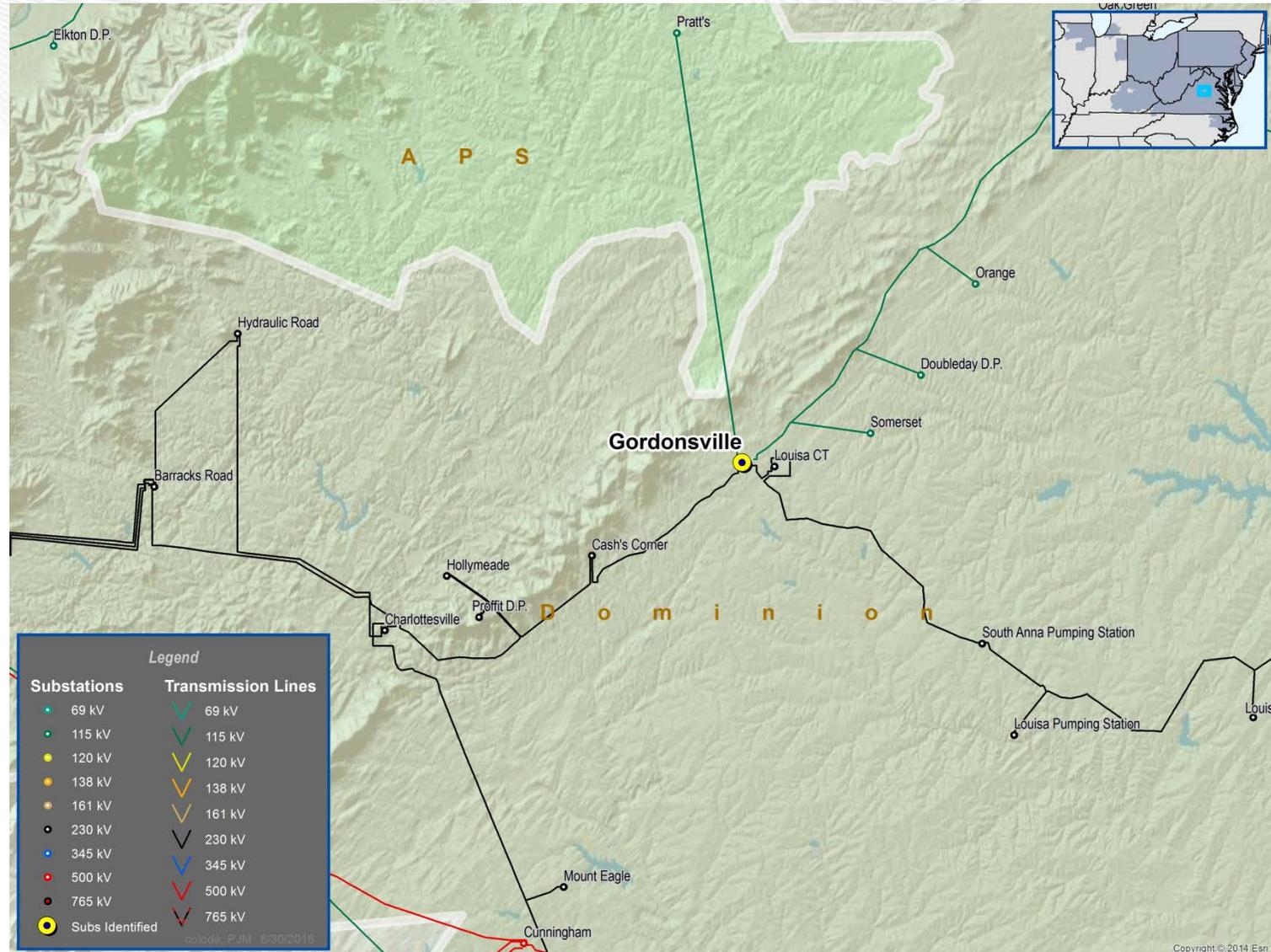
- Due to the immediate need of the project no alternatives were considered

Proposed Solution:

- Install a Motor Operated Switch and SCADA control between Dominion's Gordonsville 115kV bus and FirstEnergy's 115kV line. (B2747)

Projected IS Date: 06/01/2018

Estimated Cost: \$350K



Short Circuit Upgrades

Supplemental Upgrades

S0920 Cost Increase

Problem:

- 115 kV Line #90 (Carolina – Kerr Dam) has a 4.5 mile long radial tap that serves Beechwood DP. The need to remove this long tap exposure from the main line was identified to improve overall reliability. Line #90 is a 39 mile long 115kV line, also serving Five Forks DP, Littleton DP and Lake Gaston.

Proposed Solution:

- Build a new switching station (Palmer Springs) at the tap serving Beechwood DP with a 115kV three breaker ring to split Line #90 and terminate the end points. Terminate the Beechwood DP tap into the ring. **(S0920)**

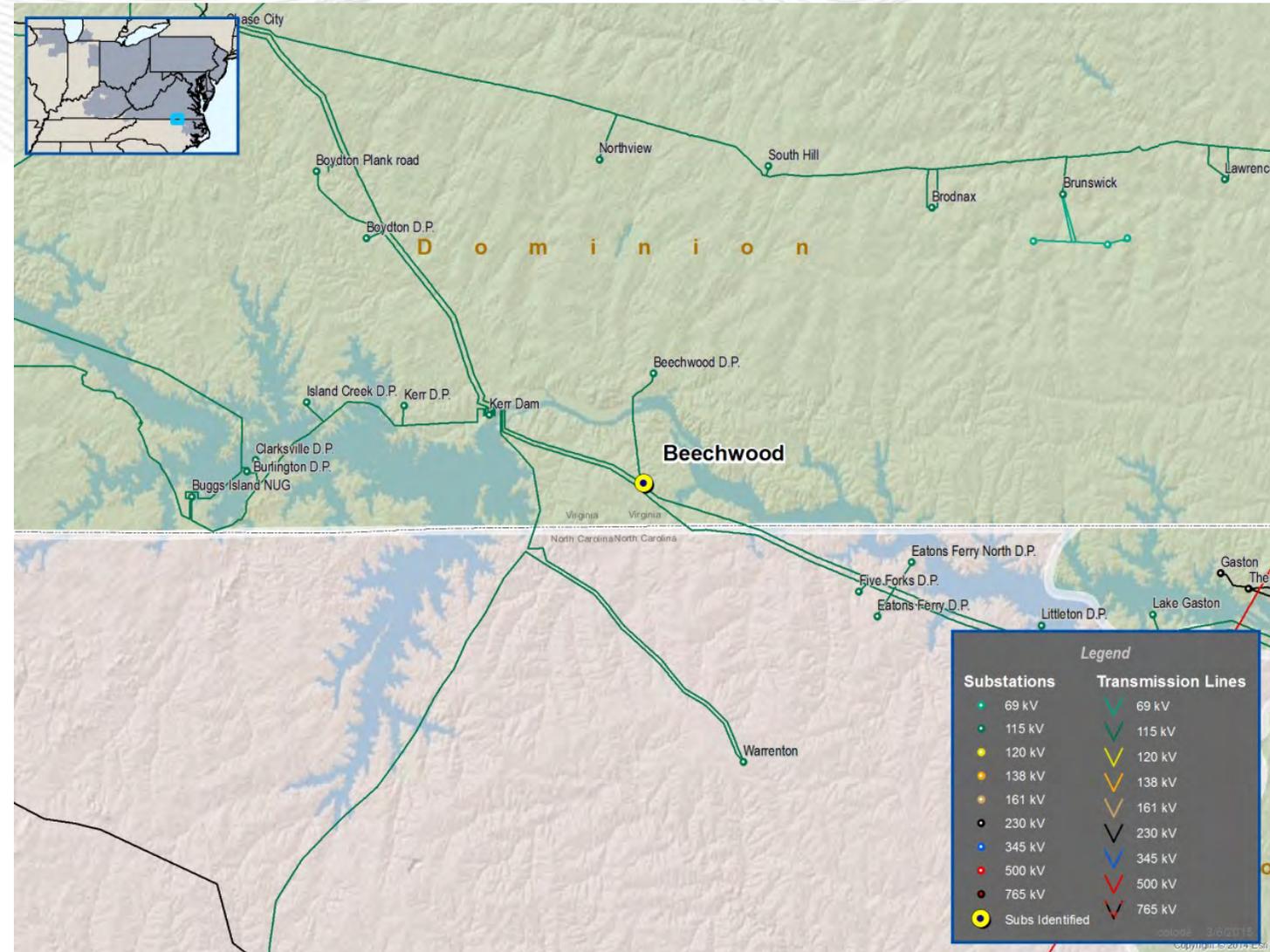
Reason For Cost Increase:

- Detailed cost increase includes higher real estate cost due to larger footprint needed to accommodate the breaker ring.

Previous Estimated Cost: \$4.0 M

Revised Estimated Cost : \$5.9 M

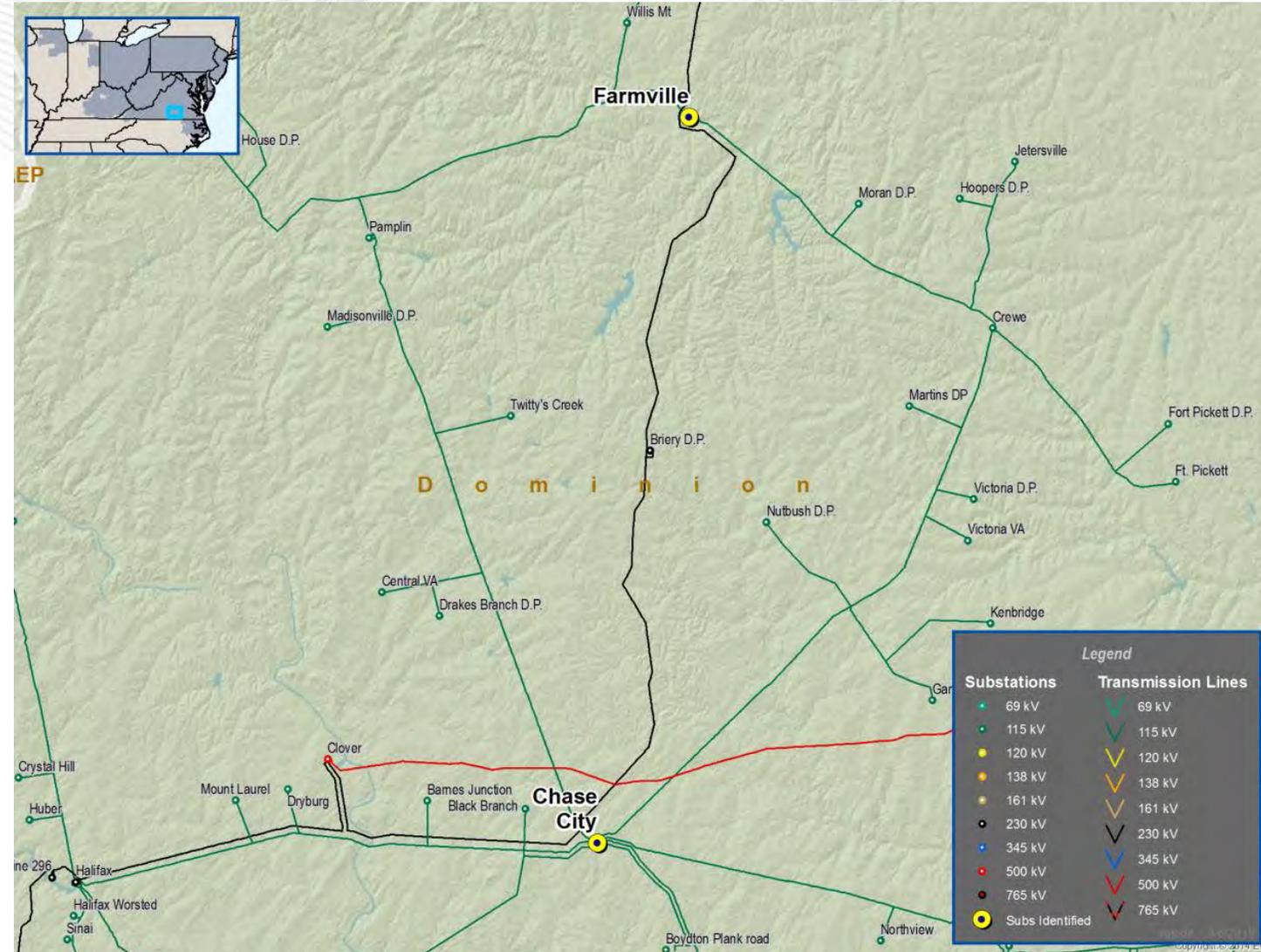
Projected IS Date: 12/31/2017



S0921 Cost Increase

Problem:

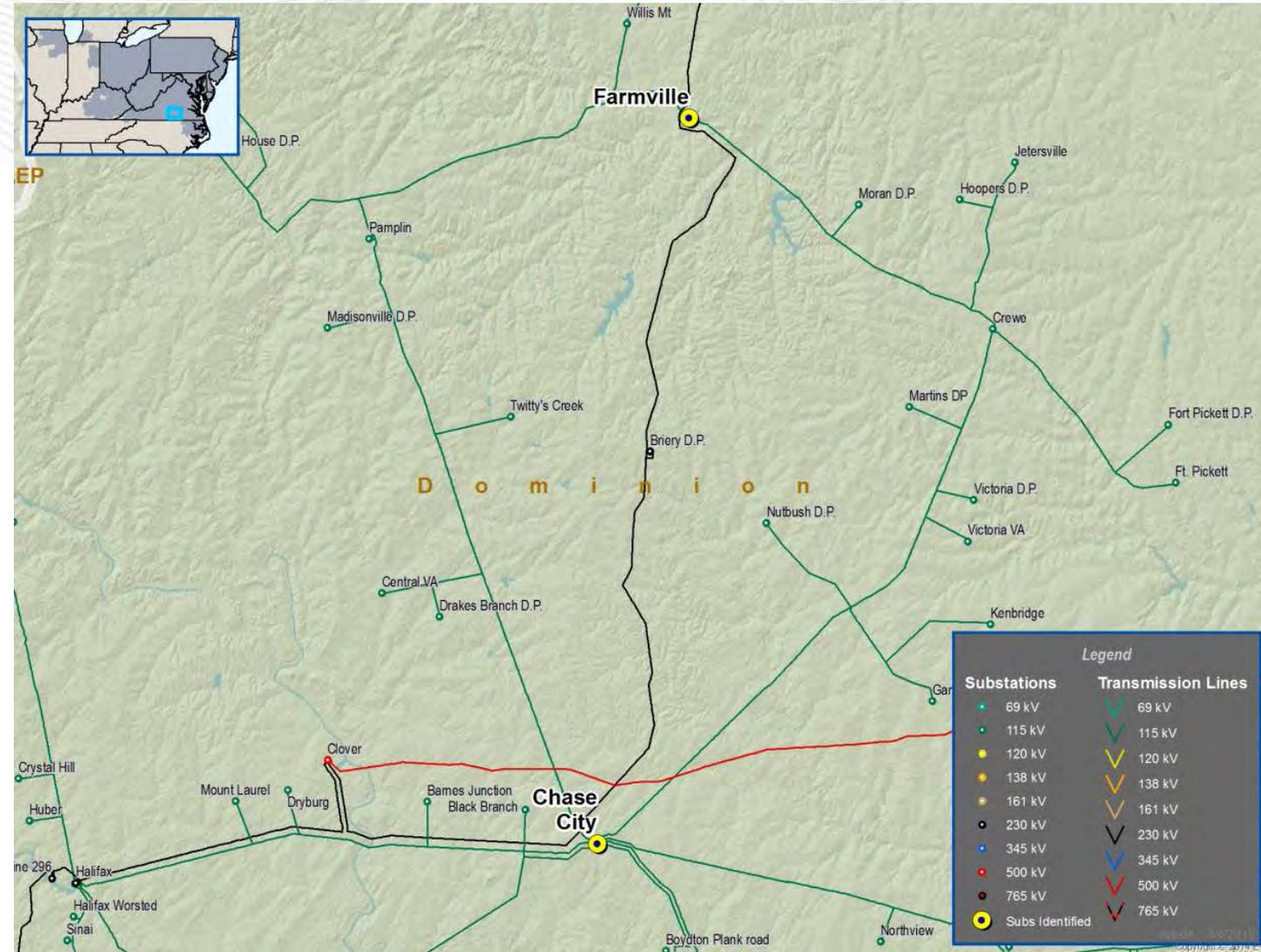
- The Dominion Facility Connection Requirement states that transmission tap lines greater than a mile should be protected by a breaker to improve the reliability of the line
- These lines also have increased exposure due to several long taps:
 - Jetersville tap is 8 miles increasing to 16 miles with the new Ponton DP in 2015
 - Nutbush DP tap is 5.4 miles
 - Gary DP tap is 7.9 miles
 - Redhouse DP tap is 17 miles



S0921 Cost Increase

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)**

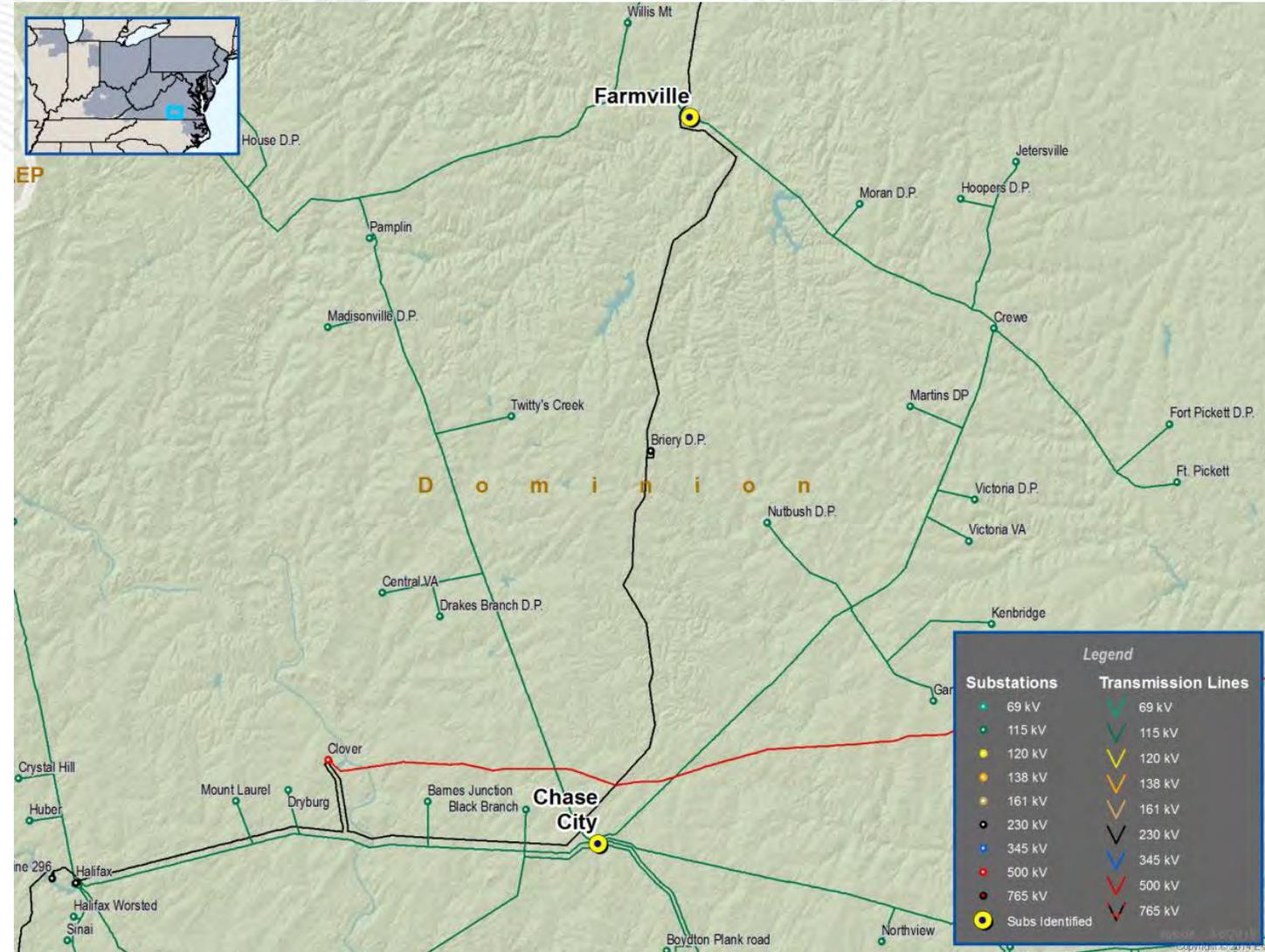


S0921 Cost Increase Reasons for Cost Increase

- Due to overruns in projects over the last 18 months, rates have increased to reflect the latest costs.
- The project affects 11 different sites including Lone Pine, Pamplin, Lunenburg, Twittys Creek, Farmville, Willis Mount, Victoria, Chase City, Crewe, Jetersville, and Fort Pickett. The work required at these substation is estimated at \$24.4M.
- Considerable transmission line re-work is required at Lone Pine, Lunenburg and Pamplin which is estimated at \$9.4M.

Previous Estimated Cost: \$25 M
Revised Estimated cost: \$ 33.8 M

Projected IS Date: 12/01/2017



Problem:

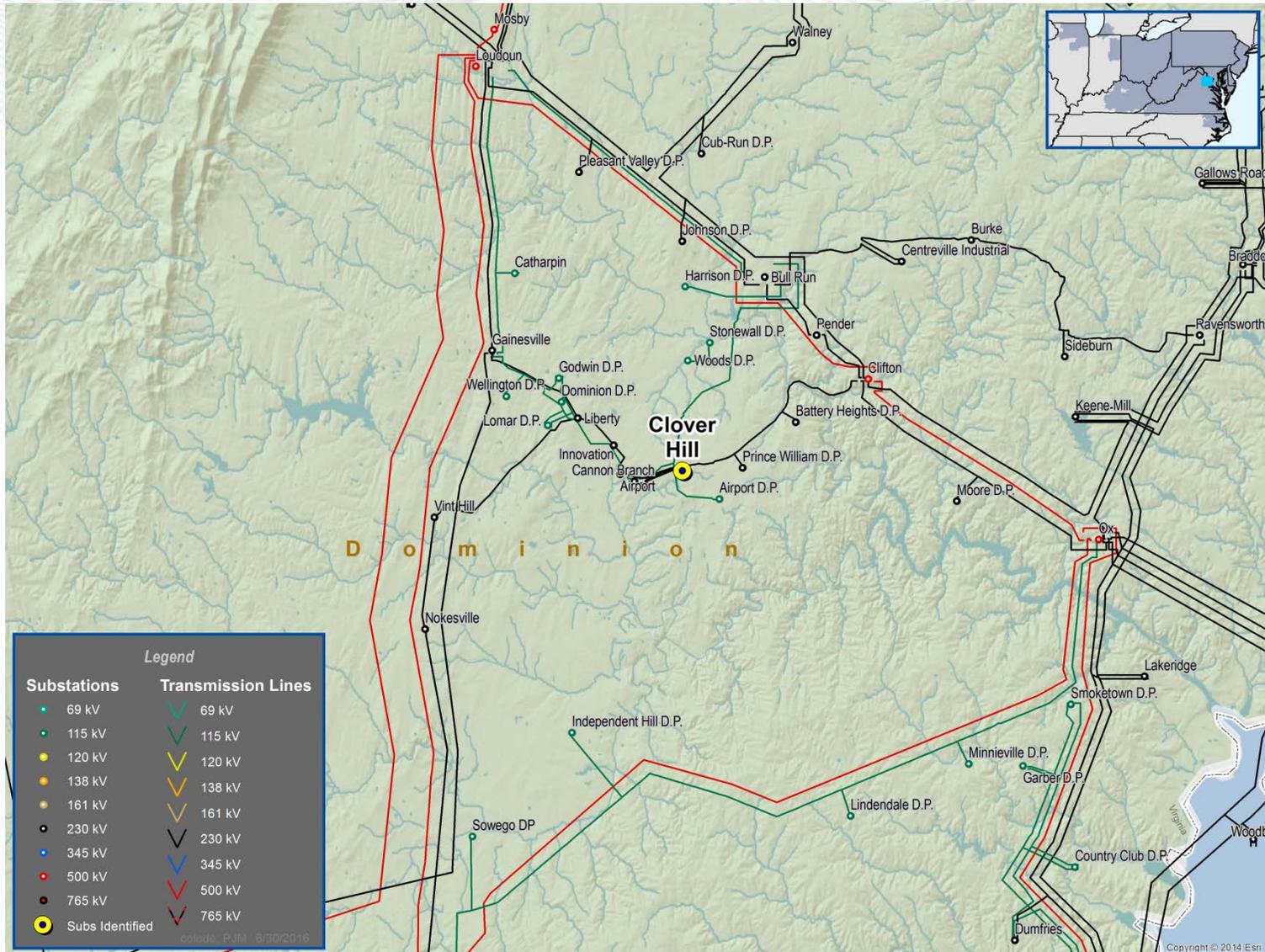
- Dominion Distribution is installing an 84MVA 230-34.5kV transformer at Clover Hill to serve a new data center.

Proposed Solution:

- Install a 230kV circuit switcher, high side switch and necessary bus work for the new transformer and additional high side switch for future transformer from same bus. (S1147)

Estimated Cost: \$900 K

Projected IS Date: 05/01/2017



Problem:

- Dominion Distribution needs to install a second 230-34.5kV transformer at Sligo for additional support.

Proposed Solution:

- Tap Line #2192 Moyock – Shawboro 230 kV , install two line switches, a 230kV circuit switcher, high side switch and necessary bus work for the new transformer. (S1148)
- **Estimated Cost:** \$1.25 M
- **Projected IS Date:** 11/15/2016





Dominion Transmission Area

Problem:

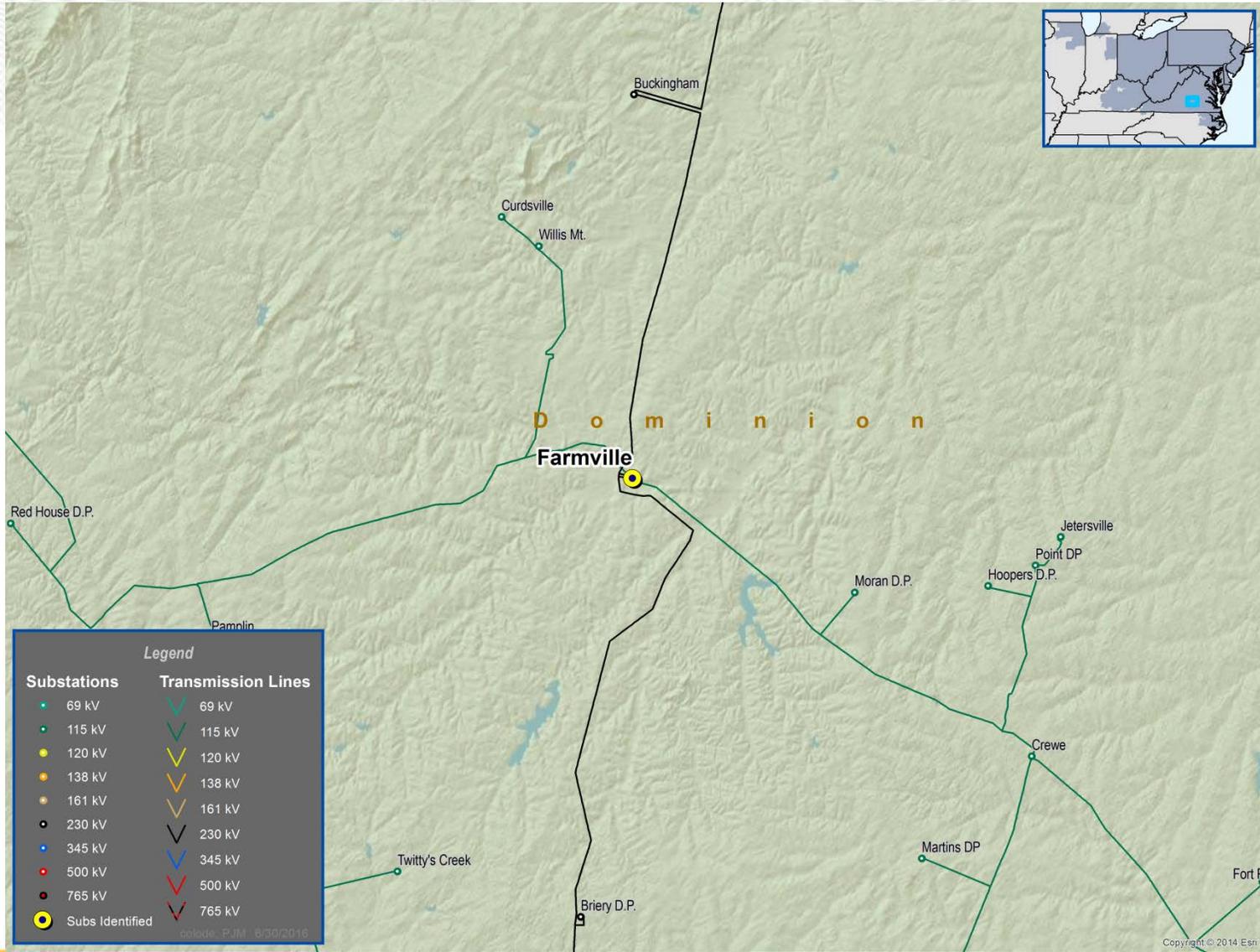
- Dominion Distribution needs to install a second 230-34.5kV transformer at Farmville for additional support.

Proposed Solution:

- Install at Farmville a 230kV circuit switcher, high side switch and necessary bus work for the new transformer. (S1149)

Estimated Cost: \$500 K

Projected IS Date: 11/15/2017



Problem:

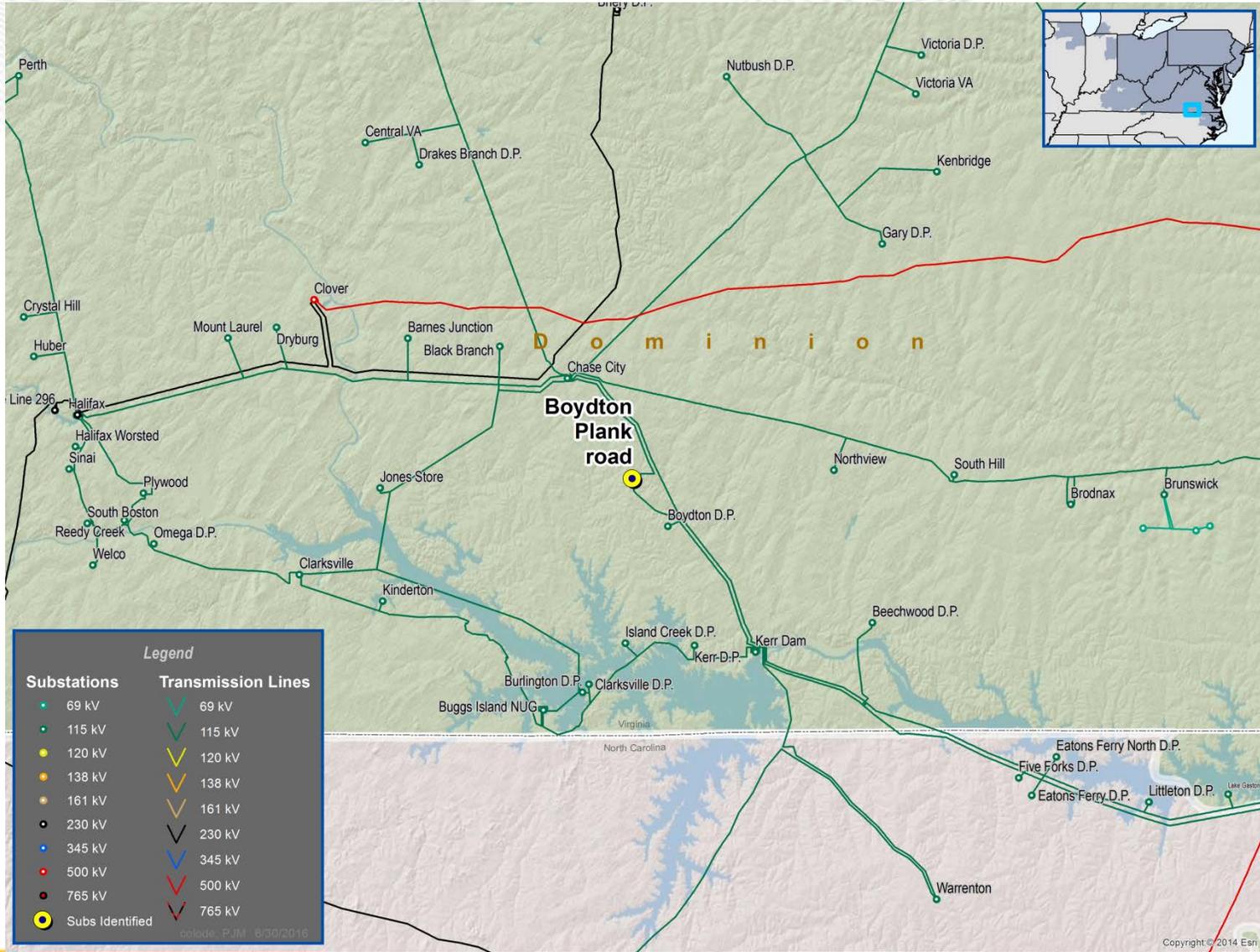
- A large load customer is building additional facilities north of Boydton Plank Road Substation in Mecklenburg County, VA. The contract minimum demand load for this addition is 38 MW.

Proposed Solution:

- Add two 115kV breakers to the existing breaker and a half scheme and the third distribution transformer with a high side circuit switcher at Ridge Road Substation (S1150)

Estimated Cost \$ 1.1M

Projected IS Date: 06/15/17





Dominion Transmission Area

Problem:

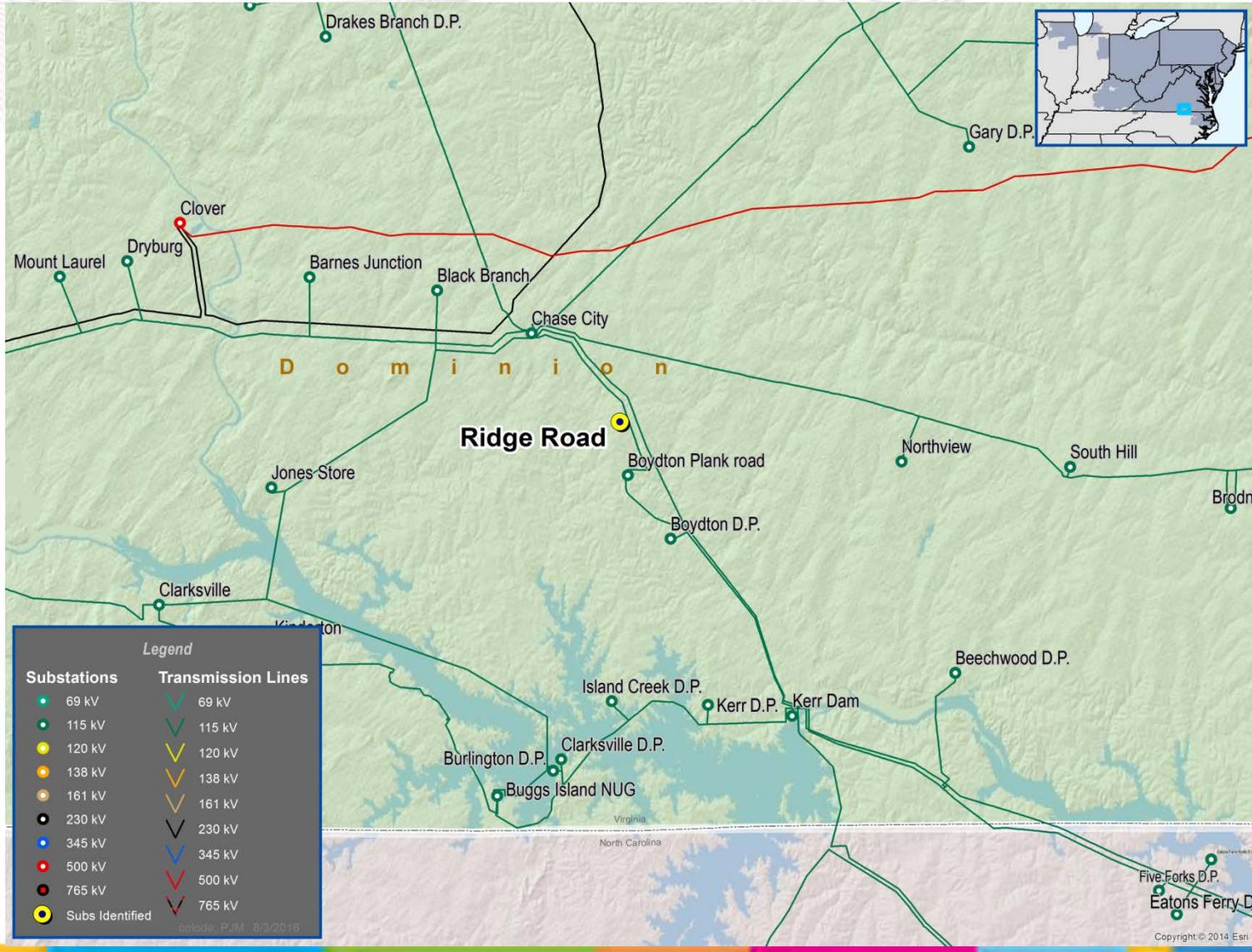
- New block loads being added at Ridge Road substation. The contract minimum demand load for this addition is 38 MW.

Proposed Solution:

- Add three 115kV breakers to the existing breaker and a half scheme and a fourth distribution transformer with a high side circuit switcher at Ridge Road Substation (S1156)

Estimated Cost \$ 2.2 M

Projected IS Date: 05/01/18



- Revision History
 - V1 - Original version posted to PJM.com – 7/07/2016
 - V2 – Updated slide 17 cost and projected service date
 - V3 – Updated slide 3 cost revision
 - V4 - Updated B2648 slide header name
 - Slide 8 – b2746 cost revised to exclude supplemental project s1156
 - New slide 21 – S1156 – Broken out from slide 8
 - Slide 11 - b1696 – cost clarification per breaker
 - Slide 14 – S0921- Ponton DP year 2015
 - Slide 18 – Updated Sligo map