Sub Regional RTEP Committee - Southern

October 27, 2010

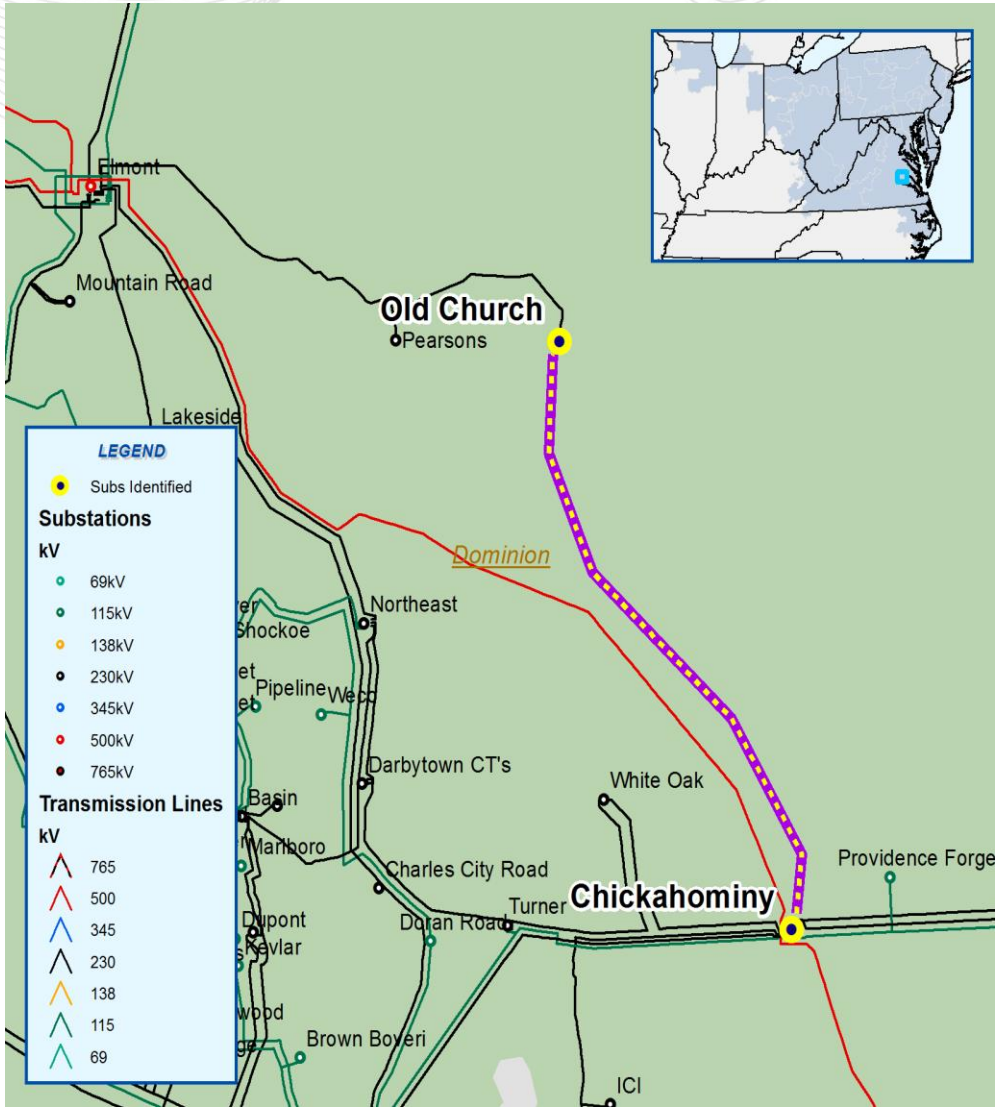
Summer 2011

Dominion Criteria Violation

- Problem: Line loading at Pearsons and Old Church Subs. exceeds 100 MVA.
- Solution: Extend the line from Old Church to Chickahominy 230 kV (b0767)

- Previous Estimated Project Cost: $17.0 M
- New Estimated Project Cost: $39.0 M

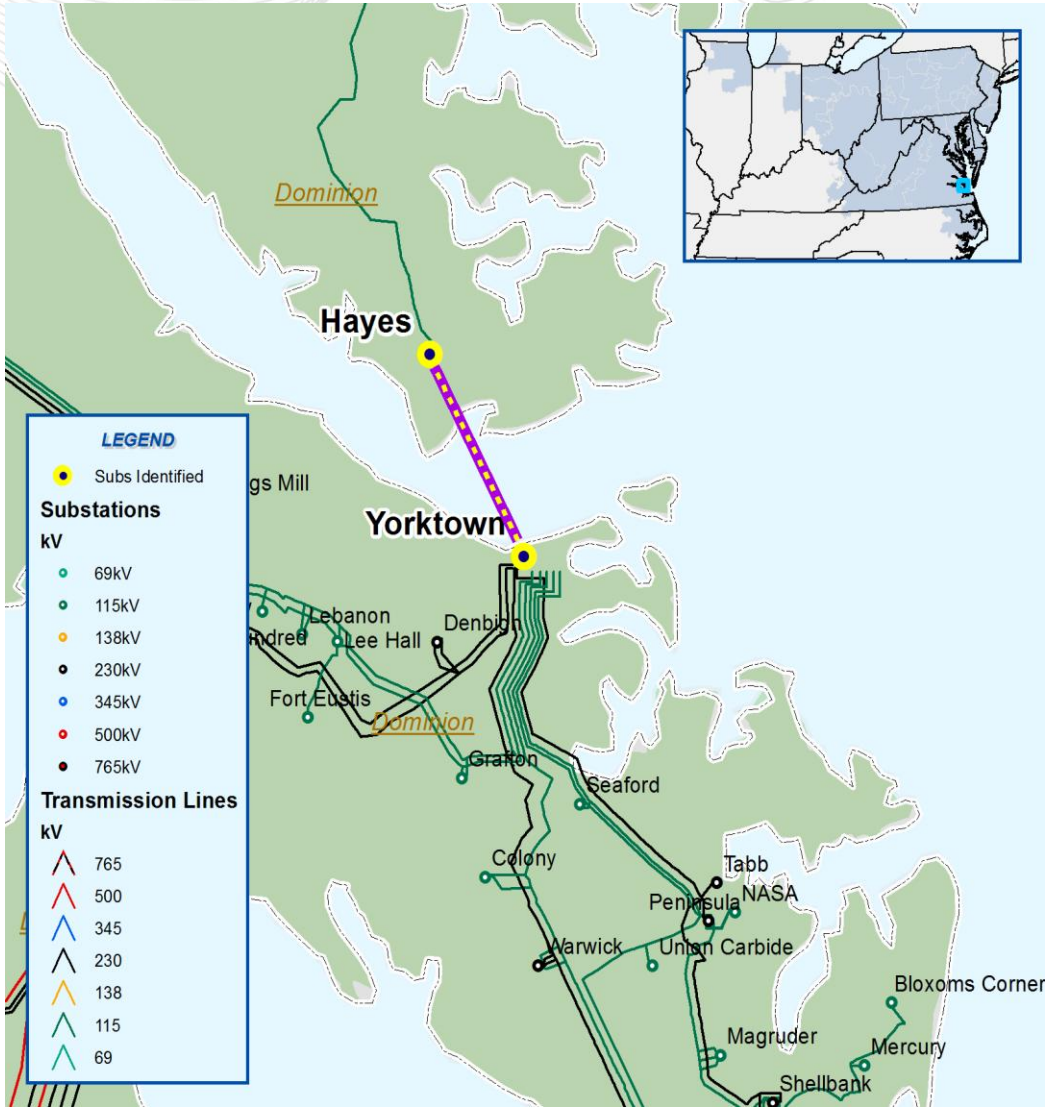
- Previous Projected IS Date: November 2009
- New Projected IS Date: March 18, 2011



Summer 2012

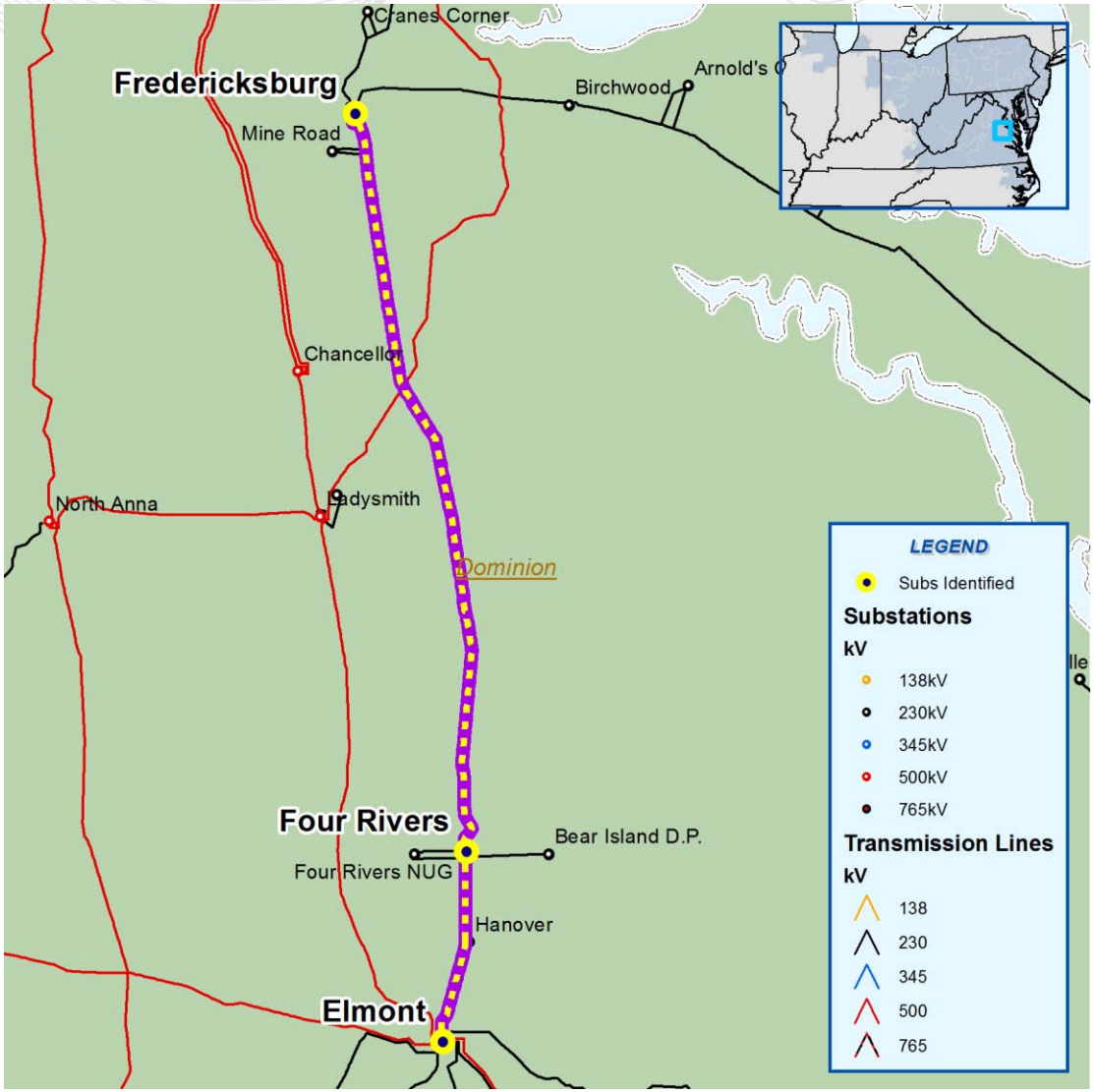
NERC Category B Violation

- Previously approved RTEP upgrade
- Problem: Loss of Lanexa to Harmony results in low voltage on underlying 115 kV
- Proposed Solution: Build a new 230 kV line from Yorktown to Hayes (b0779)
- Previous Estimated Project Cost: $25.0 M
- New Estimated Project Cost: $74.0 M
- Projected IS Date: May 2012



NERC Category C Violation

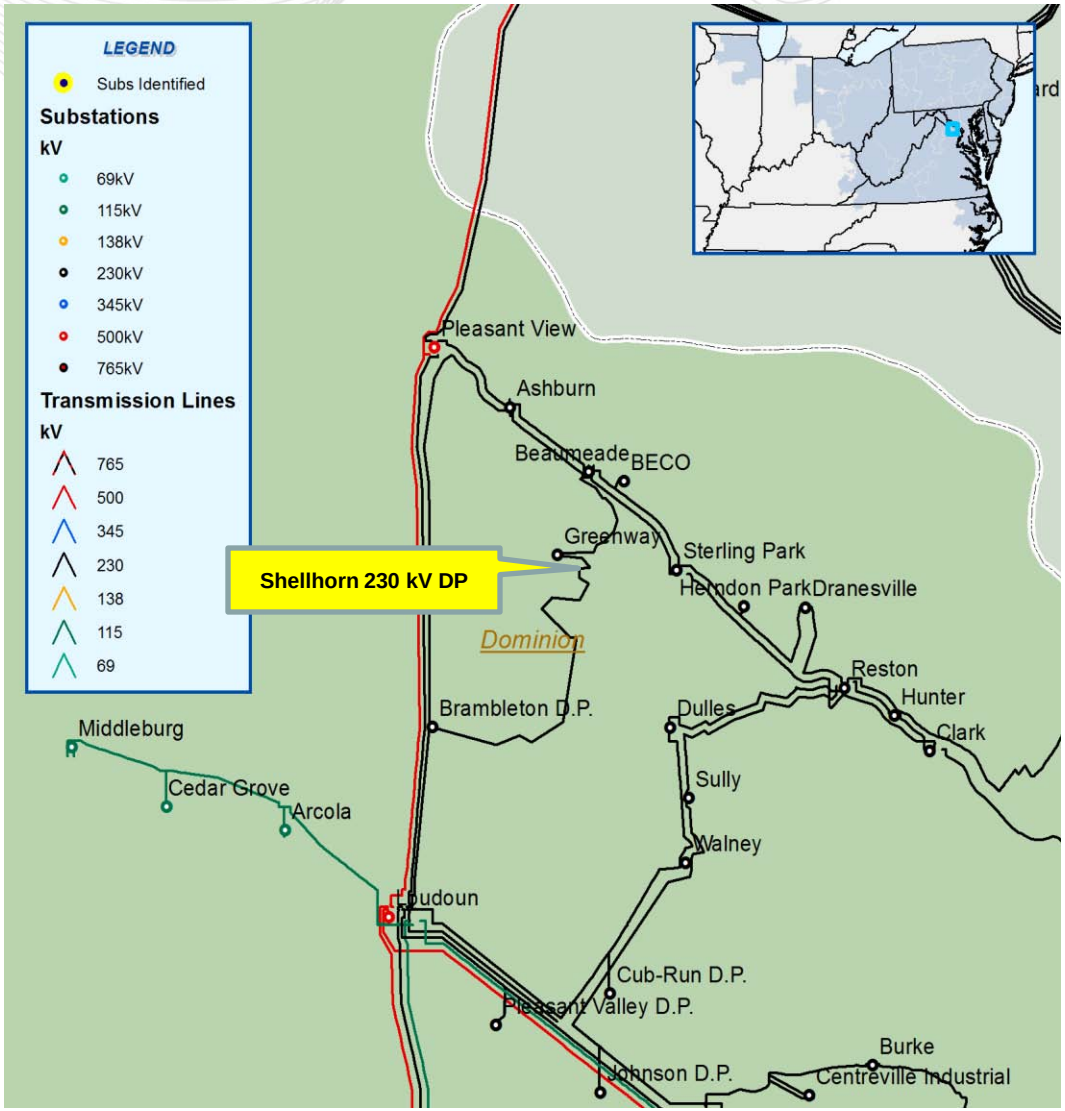
- Previously approved RTEP upgrade
- The outage of line #73 Four Rivers to Elmont with Four Rivers 115 kV generation off causes low voltages at line #45 Four Rivers to Fredericksburg 115 kV
- Also Line #47 Four Rivers to Fredericksburg overloads for the outage line #29 Fredericksburg to Possum Pt and Fredericksburg 230/115 kV
- Recommended Solution: Install 2nd Fredericksburg 230/115 kV Autotransformer (b0758)
- Estimated Project Cost: $5.5 M
- Previous Projected IS Date: 5/1/2013
- New Projected IS Date: 5/1/2012



Summer 2013

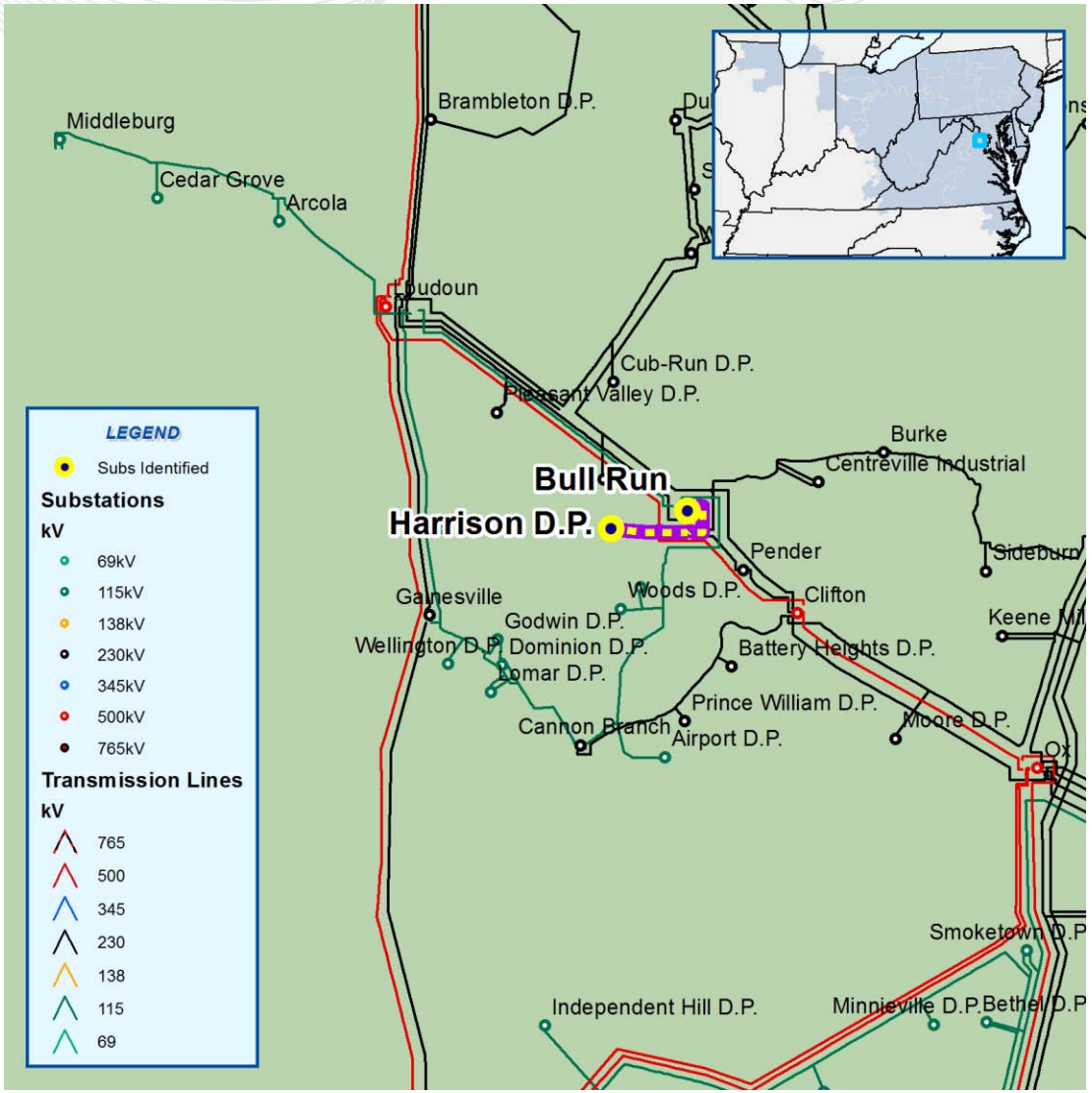
Dominion Criteria Violation

- Dominion Distribution has requested a new 230 kV delivery by 2013 to serve the expansion of an existing datacenter customer. Initial requested capacity is 70 MW in 2013, growing to 100 MW by 2015
- No existing 230 kV lines are located in the area. If a 230 kV line is extended from NIVO to Waxpool then loading on that radial line will exceed 100 MW and networking will be required. If a 230 kV source is extended from Shellhorn then radial line loading will exceed 100 MW and contingencies will drop more than 300 MW violating DVP and PJM criteria
- Proposed solution
  - Network NIVO and Waxpool Substations with Shellhorn Substation
  - Construct a 230 kV underground line approximately 1.6 miles from existing NIVO Substation to Waxpool Substation
  - Install a four-breaker, 230 kV ring-bus at Waxpool Substation
  - Network Waxpool Substation by constructing a 230 kV overhead line approximately 2.1 miles from Waxpool Substation to Shellhorn Substation and install two additional 230 kV breakers at Shellhorn
- Estimated Project Cost: $30 M
- Projected IS Date: May 2013



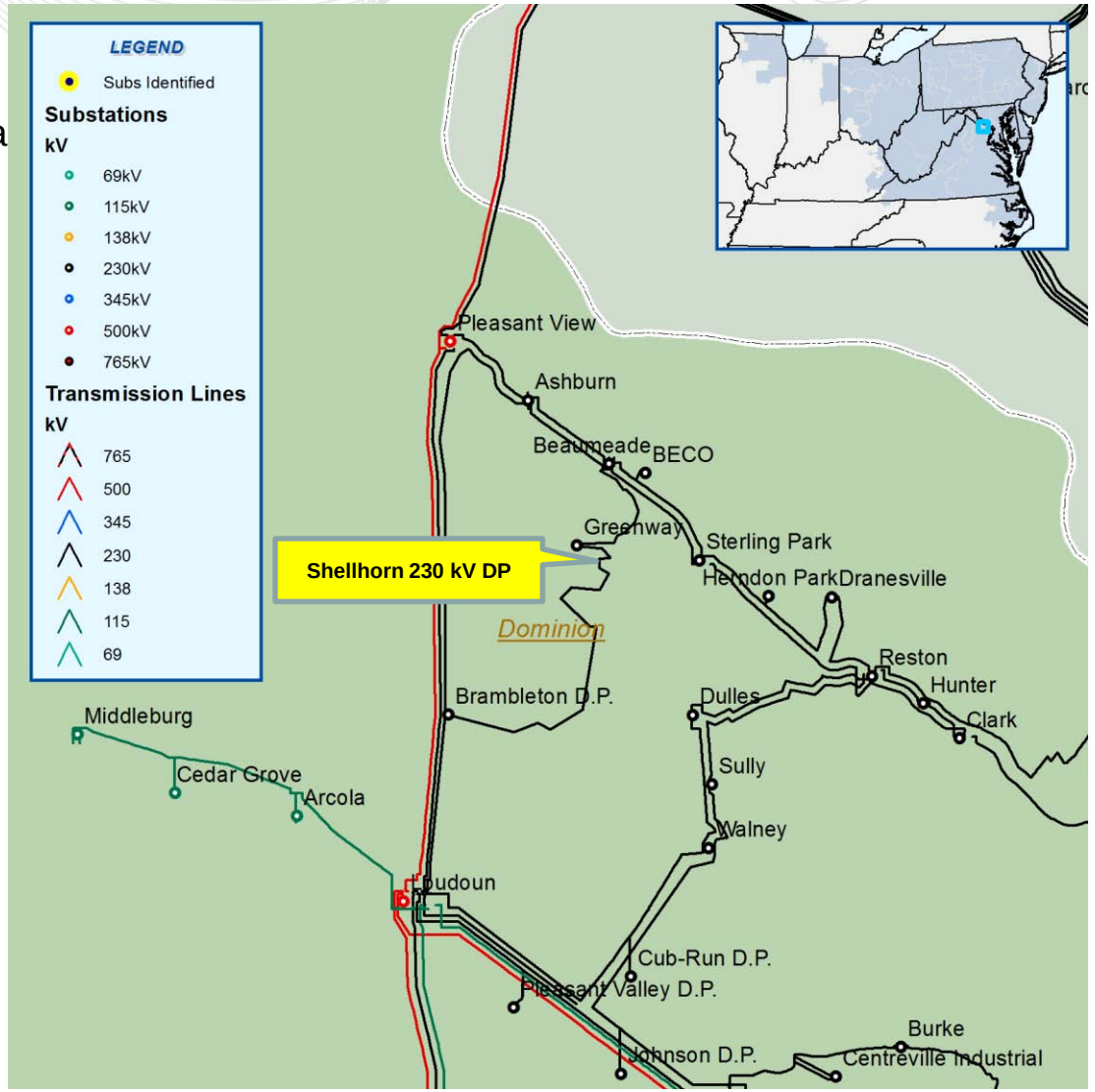
NERC Category B Violation

- Problem: The N-1 contingency loss of NOVEC's 115 kV transmission circuit #923 will result in an overload of Dominion's Line #134 (Bull Run-Harrison DP) while trying to restore load. Additionally, normal loading on Line #134 (radial) is above 100 MW
- Proposed Solution:
  - Re-build Lines #134 and #163 for higher capacity, approximately 0.5 miles from Bull Run Substation to Harrison DP
  - Install a tie-switch between the lines at Harrison DP
- Estimated Project Cost $3.0 M
- Projected IS Date: May 2013



Dominion Criteria Violation

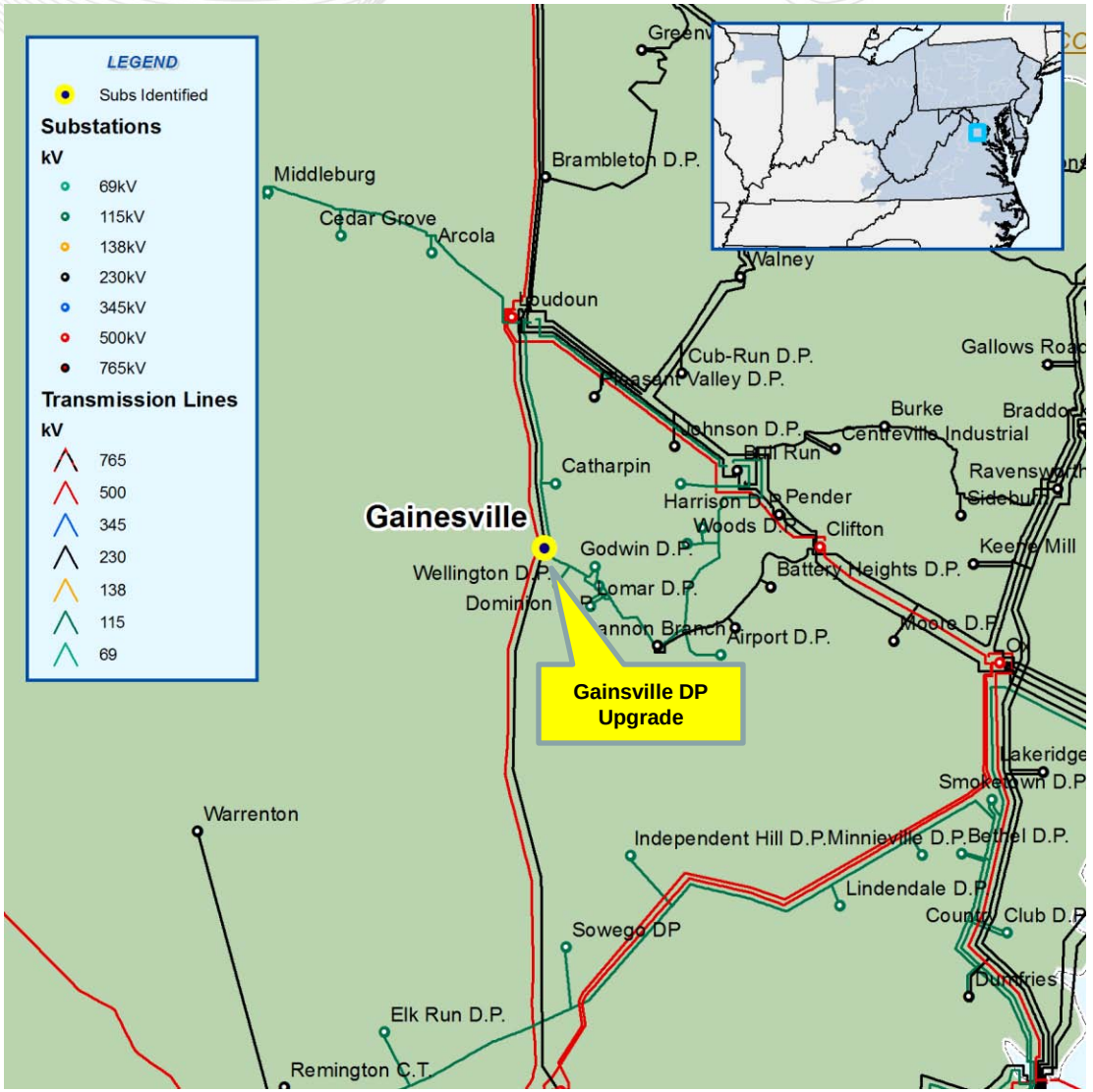
- Dominion Distribution has requested a new 230 kV delivery by 2013 to serve forecasted system conditions associated with the MetroRail extension into Loudoun County and also increased loading due to continued datacenter development. Initial load is 30 MW in 2013 growing to 60 MW by 2015.
- The initial installation will include looping Line 2095 approximately 200 feet in-and-out of the station and installing two 230 kV breakers to avoid having 300 MVA exposed to a single contingency event, Line stuck breaker failure L2095 (227T2095). The loss of 300 MVA would exceed Dominion and PJM criteria
- Estimated Project Cost $3.0 M
- Projected IS Date: May 2013



NERC Category A Violation

- Problem: Block load additions at NOVEC's Gainesville DP is increasing load by 120-140 MW over the next several years. By summer 2012, the transformer feeding their DP will be above its emergency rating (269.1 MVA) under normal conditions.
- Proposed Solution:
  - At Gainesville Substation, create two 115 kV straight-buses with a normally open tie-breaker
  - Upgrade Line 124 (radial from Loudoun) to a minimum continuous rating of 500 MVA and network it into the 115 kV bus feeding NOVEC's DP at Gainesville
  - Install two additional 230 kV breakers in the ring at Gainesville (may require substation expansion) to accommodate conversion of NOVEC's Gainesville to Wheeler line
  - Convert NOVEC's Gainesville-Wheeler line from 115 kV to 230 kV (will require replacement of three transformers total at Atlantic and Wheeler Substations)
- Estimated Project Cost $20.0 M*
- Projected IS Date: May 2013

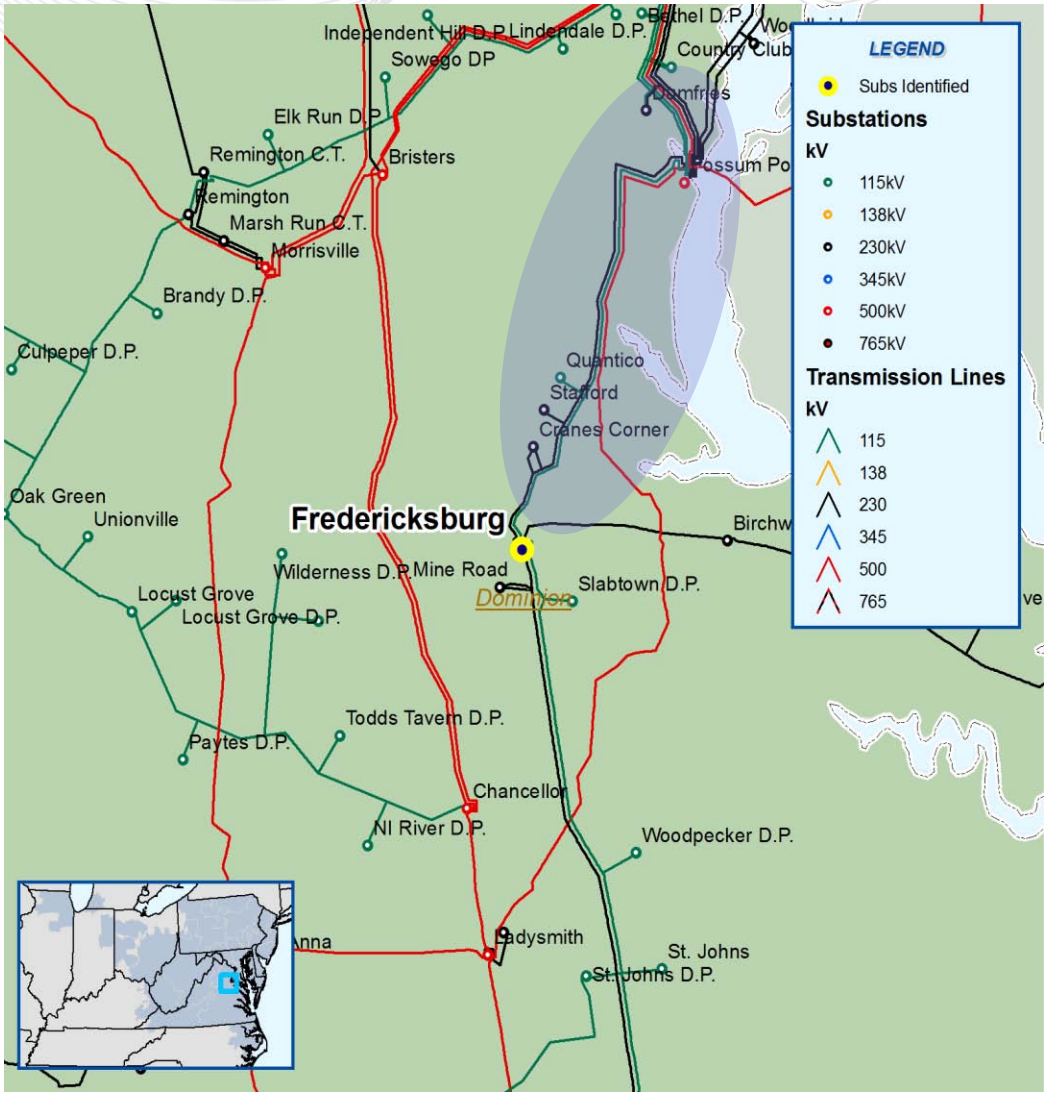
* Note: After conversion to 230kV there will be several radial 230kV lines approaching 100 MW; DVP is evaluating options that will be presented at a later TEAC



Summer 2014

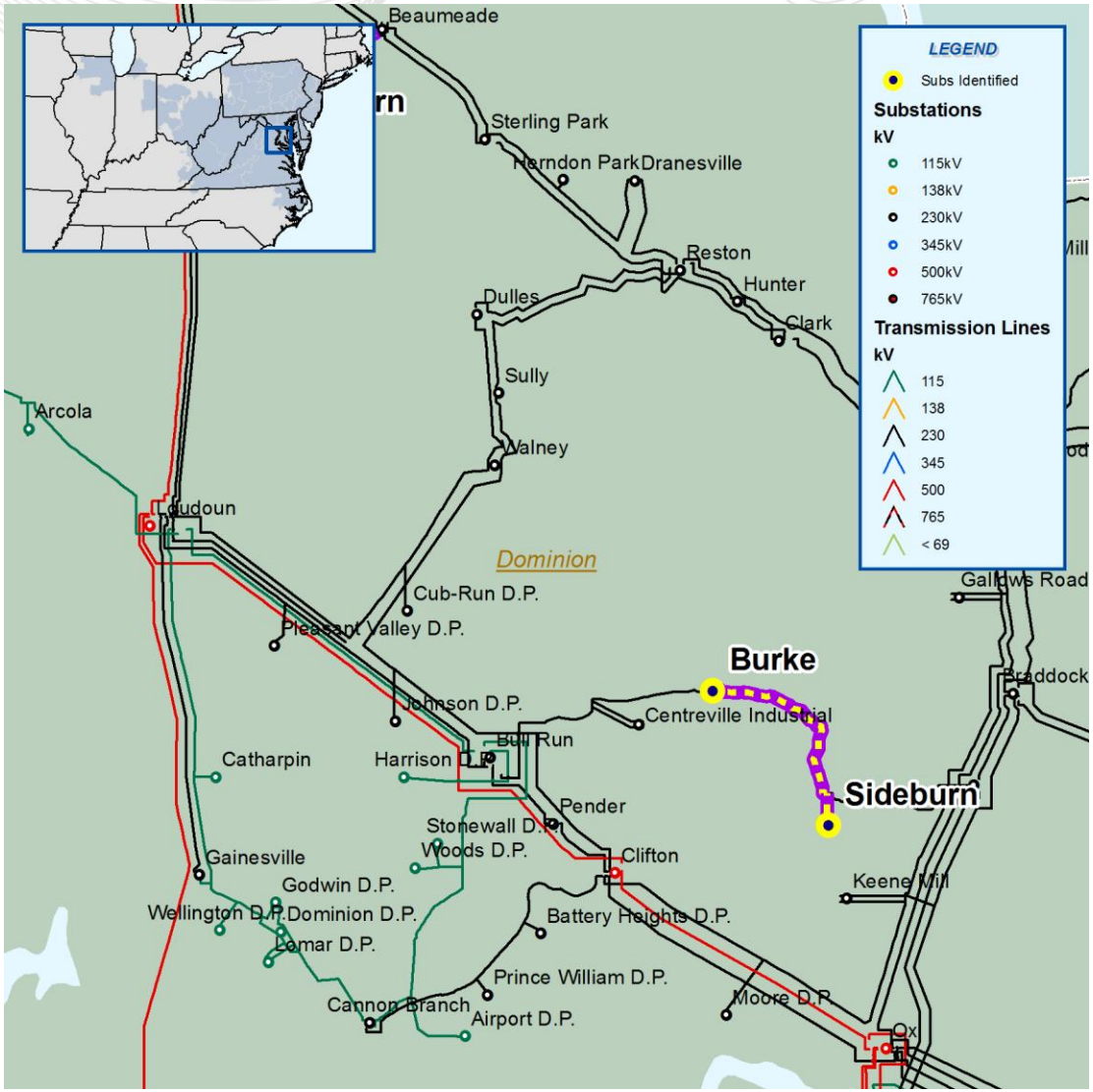
NERC Category C Violation

- Previously approved RTEP upgrade
- Problem: The failure of the Fredericksburg 230kV breaker #2090T2104 results in load loss greater than 300MW – Dominion & PJM Criteria violation
- Proposed Solution: Install a 230kV, 3000 amp breaker at Cranes Corner Substation to sectionalize the 2104 line into two lines. Project(b1311)
- Previous Estimated Project Cost: $0.75 M
- New Estimated Project Cost: $1.1M
- Projected IS Date: 05/01/2014



NERC Category C Violation

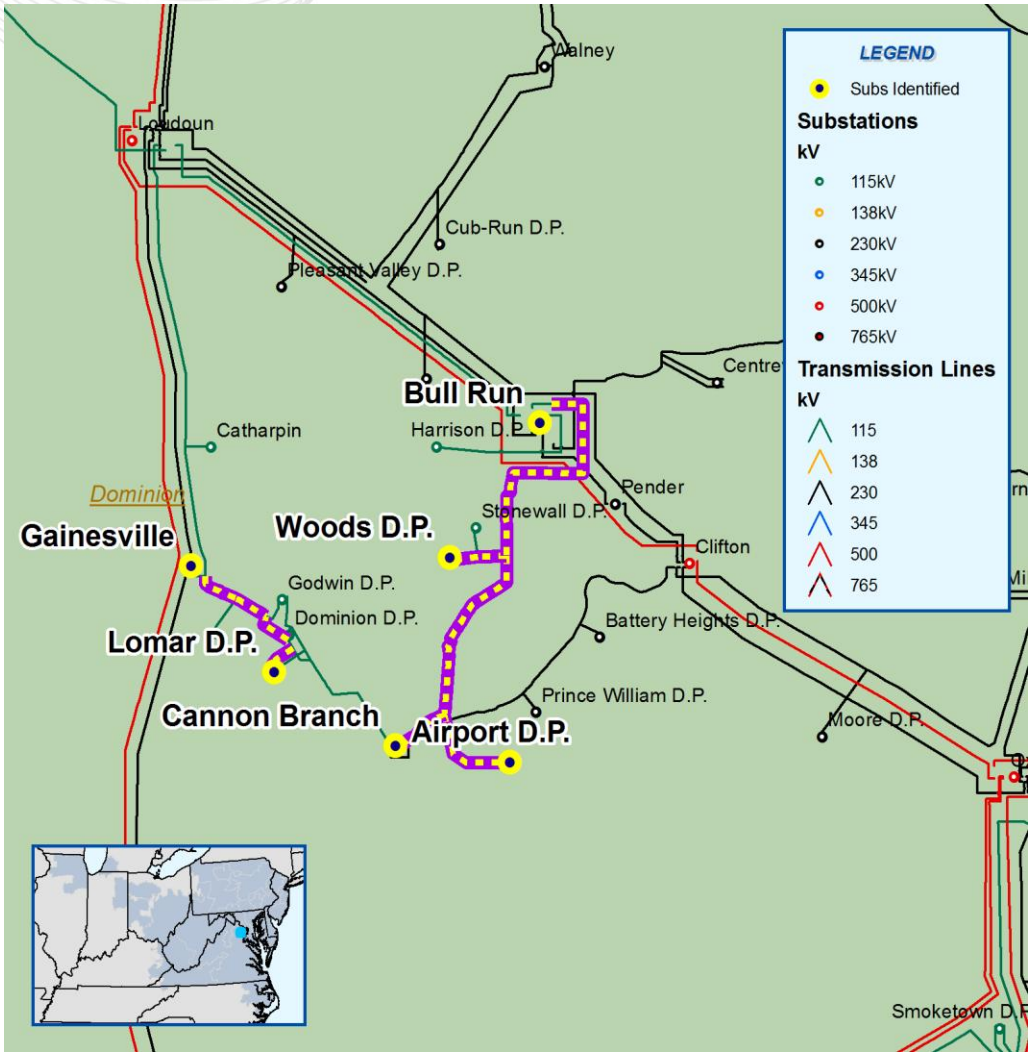
- Previously approved RTEP upgrade
- Problem: The Burke to Sideburn underground circuit overloads for the N-1-1 loss of Bull Run - Loudoun 230 kV and Clifton - Pender 230 kV
- Proposed Solution: Install 2nd Burke to Sideburn 230 kV underground cable (b1089)
- Previous Estimated cost: $4.0 M
- New Estimated cost: $9.0 M
- Projected IS date: 6/1/2014



Summer 2015

NERC Category B & C Violation

- Previously approved RTEP upgrade
- Problem: For the N-1 loss of radial 230kV Line #2011 (Clifton-Cannon Branch), Line #172 (Gainesville-Lomar DP) and Line #163 (Bull Run-Airport DP) will load to 102% and 105%, respectively, while trying to restore the load. Additionally, the Gainesville 230/115 kV transformer will load to 96%.
- For a 2nd N-1 event (loss of the Gainesville 230/115 kV TX), Line #163 would exceed its emergency rating between Bull Run and Woods DP (approx 4 miles) and between Woods DP and Cannon Branch (approx 2.7 miles).
- Proposed Solution: Build Cannon Branch to Nokesville 230 kV Line (b1332)
- Estimated Project Cost: $40 M
- Previous Projected IS Date: 5/31/2018
- New Projected IS Date: 5/31/2015



Region with thermal issues

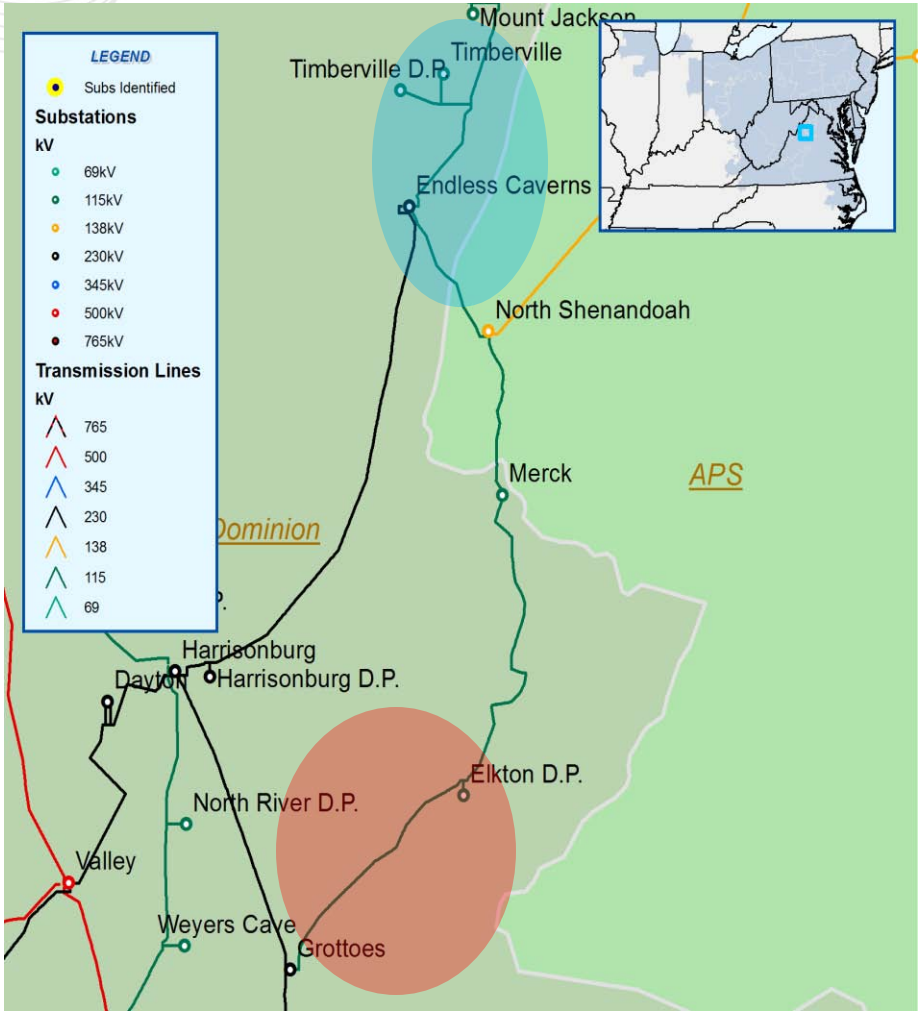
Region with voltage issues

A. NERC Category B. The N-1 loss of the 230kV line section HEC2 DP to Harrisonburg results in a thermal overload of the 115kV Line # 119 (Grottoes to Merck), and the 230-115kV TX at Grottoes

B. NERC Category B. The N-1 loss of one of 230-115kV transformers at Endless Caverns results in thermal overload of the remaining 230-115kV transformer at Endless Caverns.

C. NERC Category C3. The N-1-1 loss of the 230kV line section HEC2 DP to Harrisonburg and the 138kV Line Section (Strasburg to Meadow Brook) results in extreme low voltage in the area.

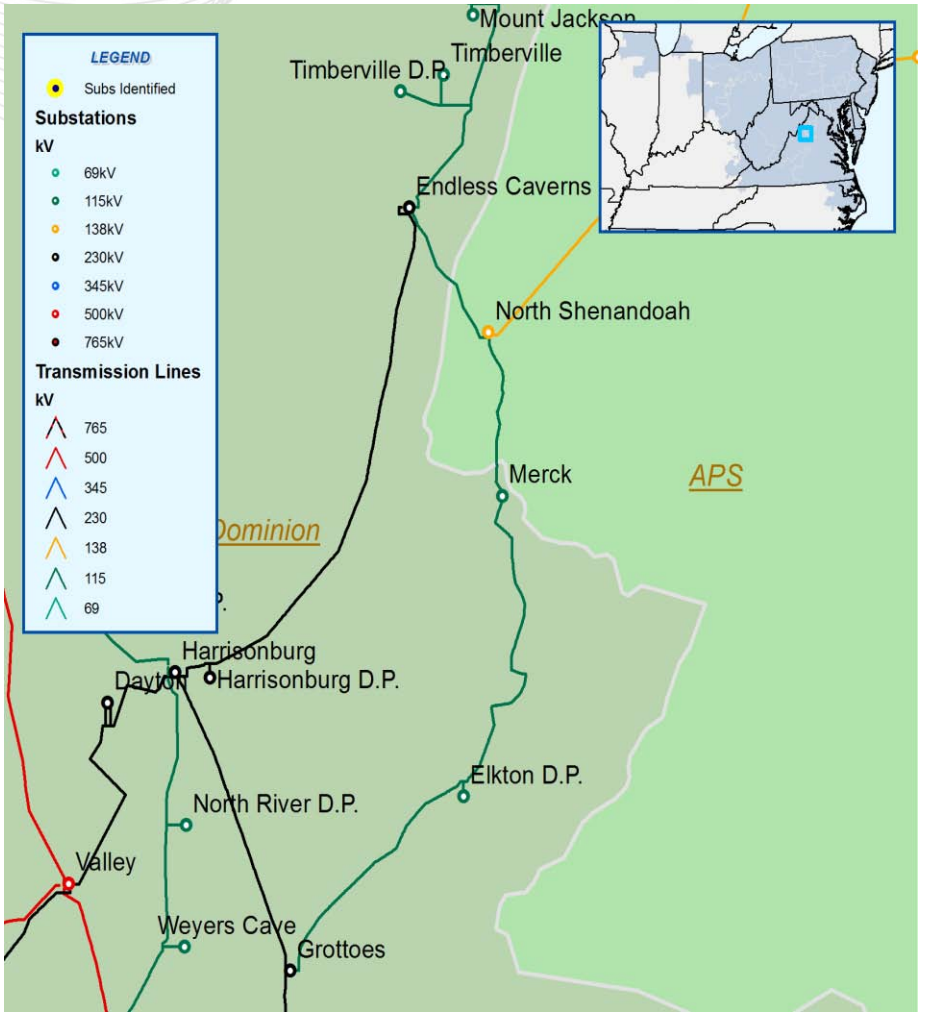
D. NERC Category C3. The N-1-1 loss of the 230kV line section HEC2 DP to Harrisonburg and the loss of the Grottoes 230-115kV TX results in extreme low voltage in the area.



Solutions Considered:	*Estimated Cost	ROW	Does solution solve Deficiencies?			
			A	B	C	D
Build a new 25 mile 230kV line Warrenton to Sperryville (APS) and install a 224MVA 230-138kV transformer at Sperryville.	$67 M	25 mi of new ROW	No	No	No	No
Build a new 13 mile 230kV line Harrisonburg to Merck and install a 224MVA 230-115kV transformer at Merck. Improve LSE's power factor in area.	$37 M	13 mi of new ROW	Yes	Yes	No	No
Install a 2nd 230-115kV TX at Grottoes. Build a 2nd 115kV transmission line from Grottoes to Merck. Improve LSE's power factor in area, and install a shunt capacitor bank.	$30.5 M	13 mi of additional ROW	Yes	No	No	No
Build a 2nd 230kV Line Harrisonburg to Endless Caverns. Install a 3rd 230-115kV Tx at Endless Caverns. Upgrade 115kV shunt capacitor banks at Merck and Edinburg.	$70.0 M	20 mi. May be able to utilize existing ROW	Yes	Yes	Yes	Yes

***Note:** Estimated costs do not include cost of right-of-way (ROW) or land purchases.

- Continued from previous slide
- Proposed Solution:
  - Build a 2nd 230kV Line Harrisonburg to Endless Caverns
  - Install a 3rd 230-115kV Tx at Endless Caverns
  - Upgrade 115kV shunt capacitor banks at Merck and Edinburg.
- Estimated Project Cost: $70 M
- Projected IS date: 6/1/2015

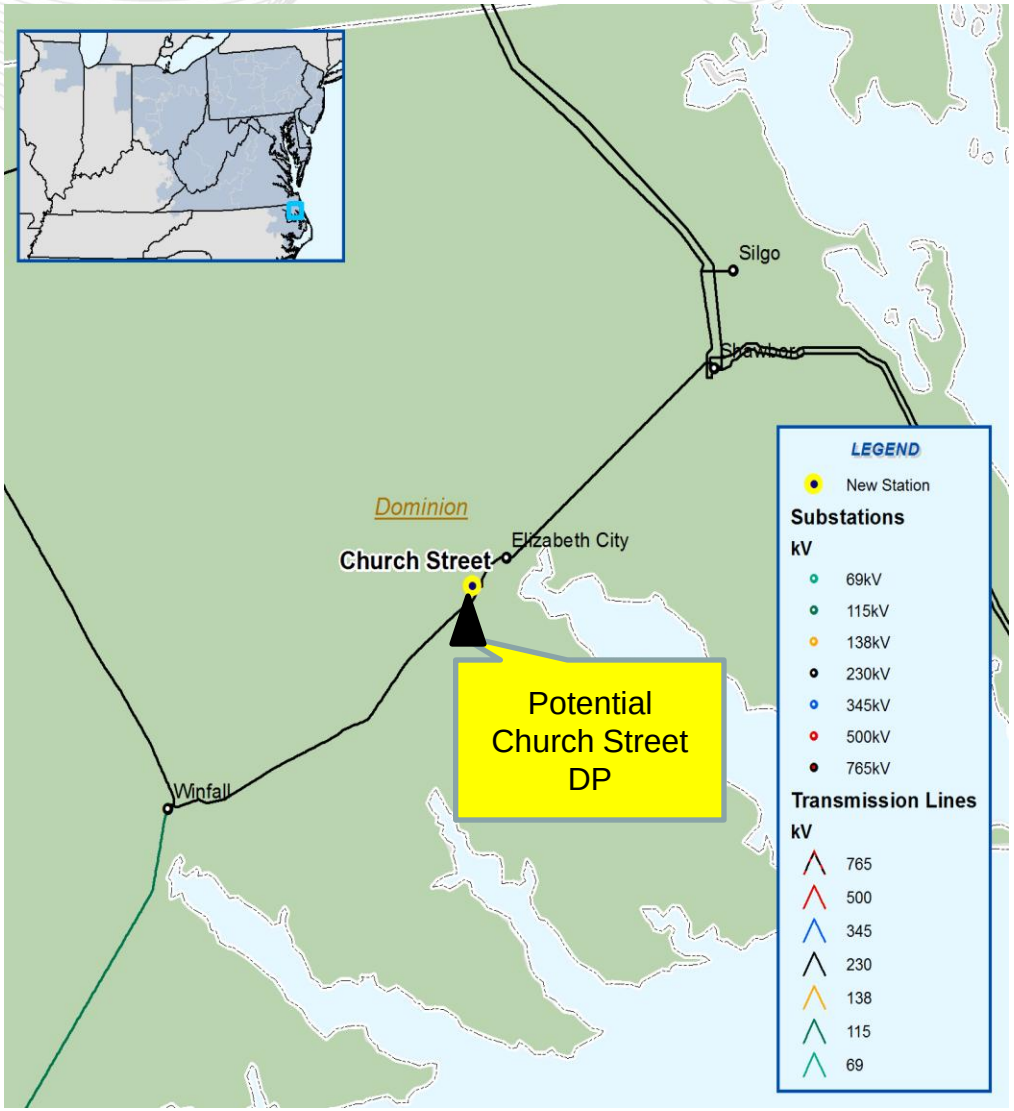


Supplemental Projects
2010 - 2015

Church Street Substation New T-D Delivery

New Delivery Point

- North Carolina Eastern Municipal Power Agency (NCEMPA) has requested a new 230 kV delivery point on behalf of the Town of Elizabeth City to provide increased capacity for future growth. This will require a tap from Line #2020 (Elizabeth City – Winfall) and installation of two 230 kV line switches. Estimated load 30 MW
- Estimated Project Cost: $0.5 M
- Projected IS Date: Sept 2011



Boydton Plank Rd Sub. & 115kV Double Ckt. Line

New Delivery Point

Microsoft is building their east coast data center in Boydton Plank Road Industrial Park in Mecklenburg County, VA, estimated load is 50 +MW.

Phase 1: Split 115kV Line 38 (Chase City – Kerr Dam) and build double circuit tap 1.5 miles (new ROW) to BPRI Park. Build substation in BPRI Park with 115kV four breaker ring bus (April 2011)

Estimated Project Cost: $15.6 M

Projected IS Date: April 2011