

Sub Regional RTEP Committee - Southern

March 03, 2011

- Review of ongoing projects
 - Stakeholder request

- 2015 Analysis Update
 - Review of NOVA Reliability Deficiencies Stakeholder Request
 - New Reliability Deficiencies
 - N-1-1 Voltage Analysis ongoing

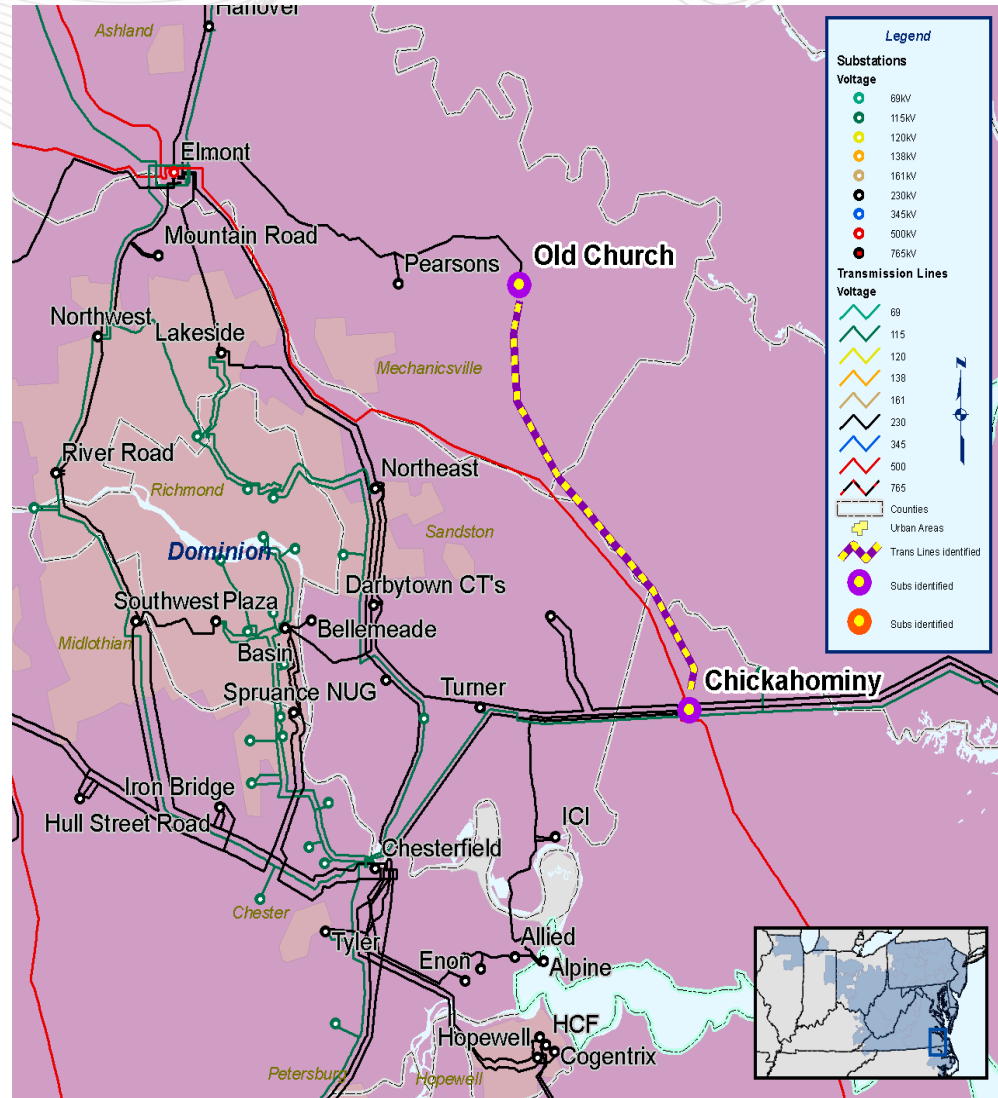
Dominion Criteria Violation

- Old Church – Chickahominy 230 kV Line (b0767)
- PJM Board Approved
- Updated Estimated Cost: \$39 M
 - Communicated at the 10/27/2010 SRRTEP meeting
- Expected IS Date: 3/18/2011

- Stakeholder feedback: Should other alternatives be considered?

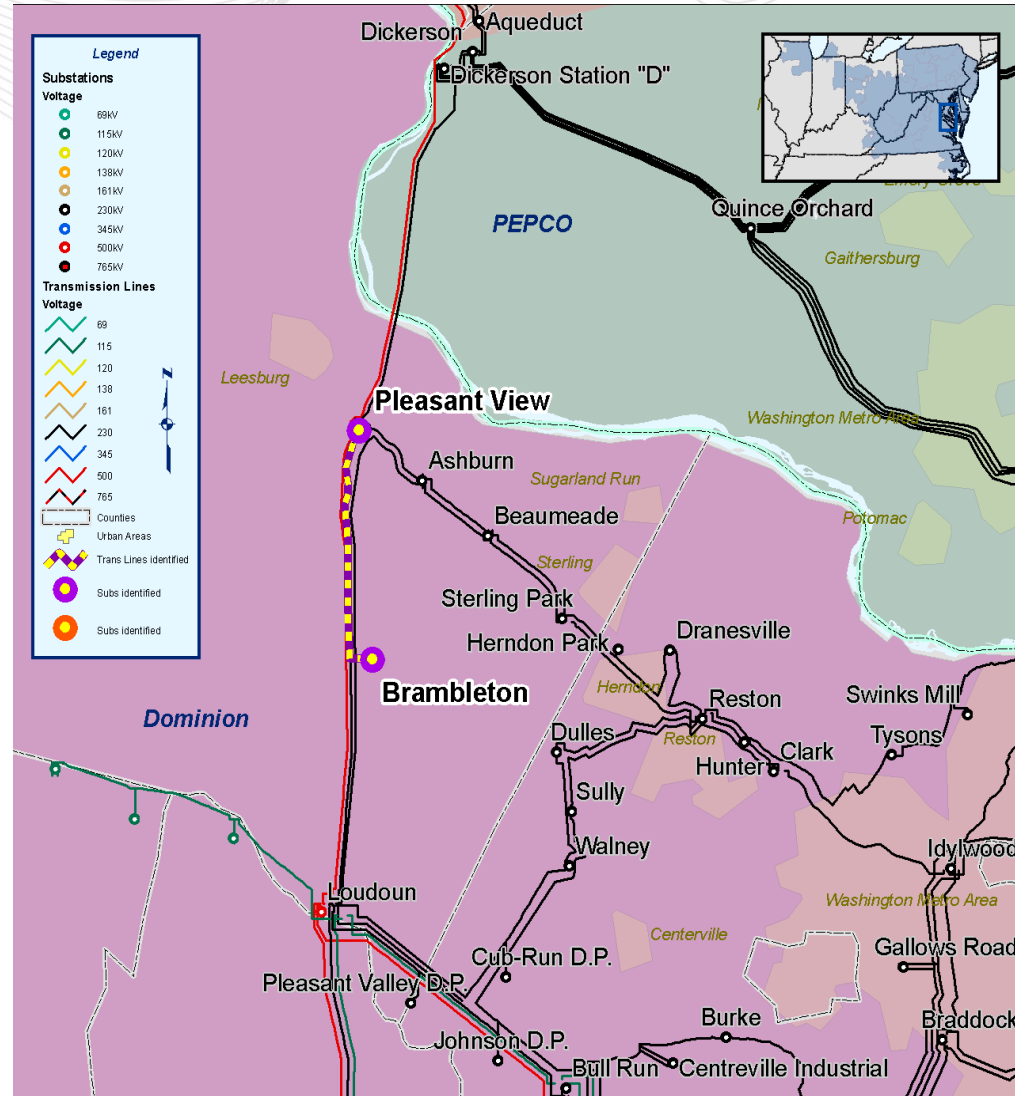
- Majority of cost increase driven by permitting requirements and right-of-way acquisition costs
- Outstanding work to be completed:
 - Finish pulling wire
 - 230 kV Breaker replacements in spring

- Recommendation: Complete project



Cochran Mill DP Substation – Increased Cost

- Tap Line #201 (Brambleton – Pleasant View) and install 2-230 kV switches (s0121)
 - Presented June 5, 2008 SSRTEP Meeting
- Estimated Project Cost: Increase from \$0.45 M to \$0.8 M
 - Increase cost in foundations driven by rock in area
- Expected IS Date: 11/30/2011

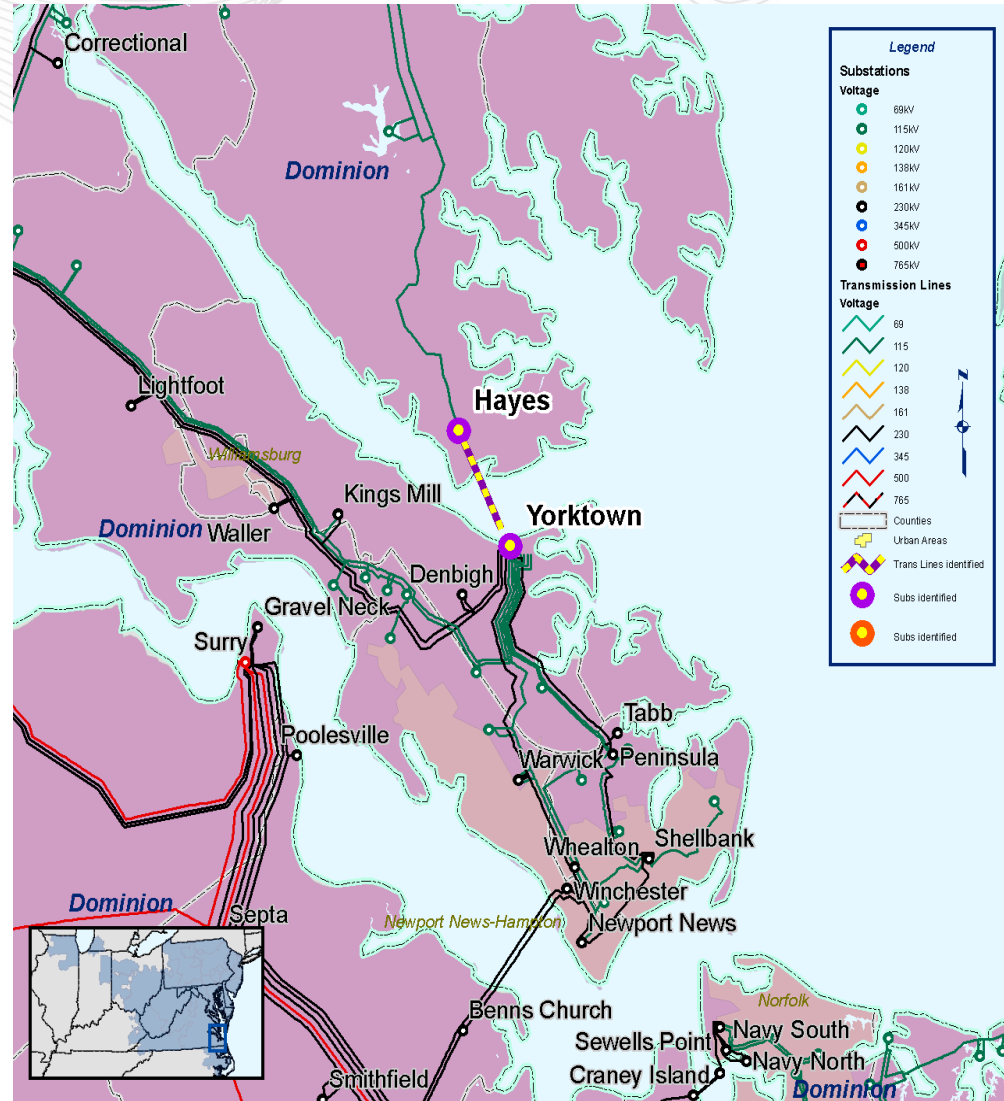


NERC Category B & C Violations

- Yorktown – Hayes 230 kV Line (b0779)
- PJM Board Approved
- Estimated Cost: Increase from \$63 M to \$74 M
 - Cost increase driven by need to construct drilling platforms in York River.
- Expected IS Date: 05/30/2012

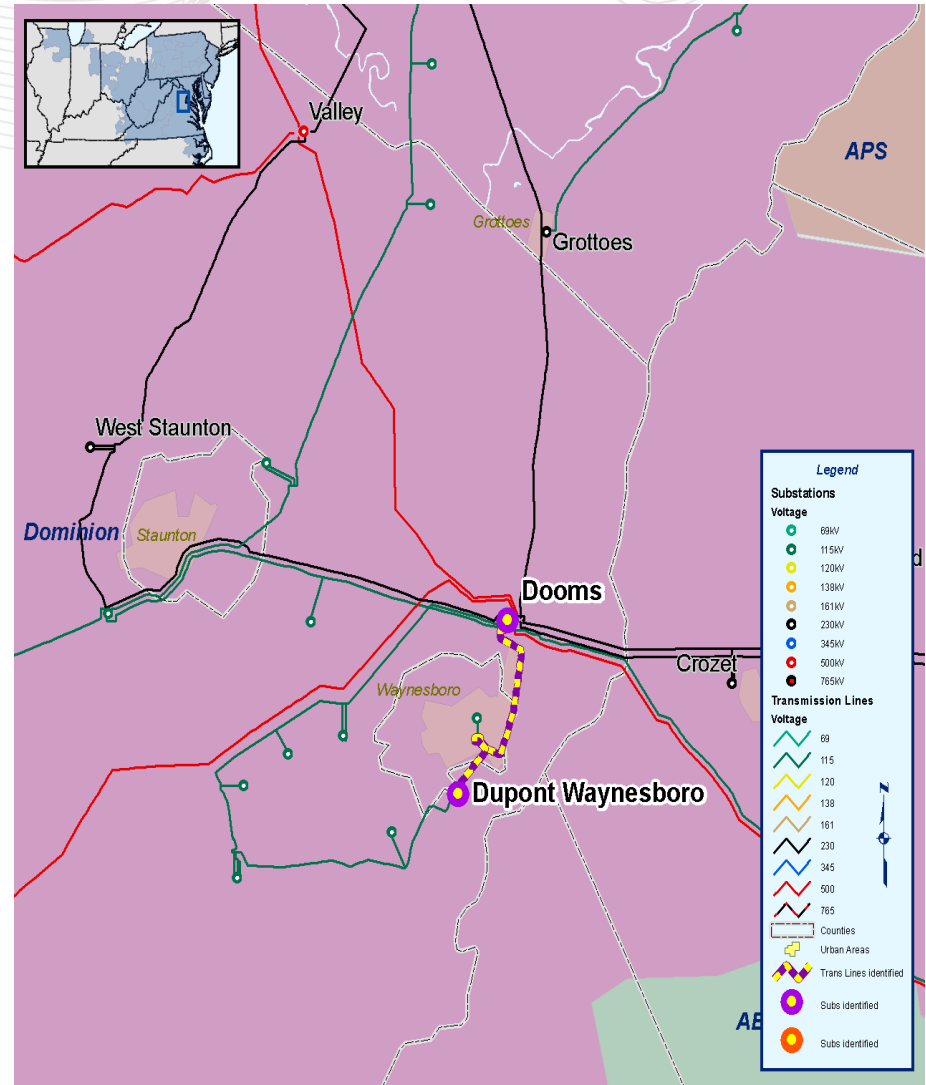
- Stakeholder question should other alternatives be considered?
 - Va. SCC CPCN Issued 6/18/2010, considered following alternatives:
 - Yorktown – Hayes 230 kV Line \$63 M
 - Yorktown – Hayes 115 kV Line \$57 M
 - Convert Line #65 (N. Neck – Harmony Village) to 230 kV \$96 M
 - Build new generation \$316 M

- PJM concurs with Va. SCC decision on 230 kV line



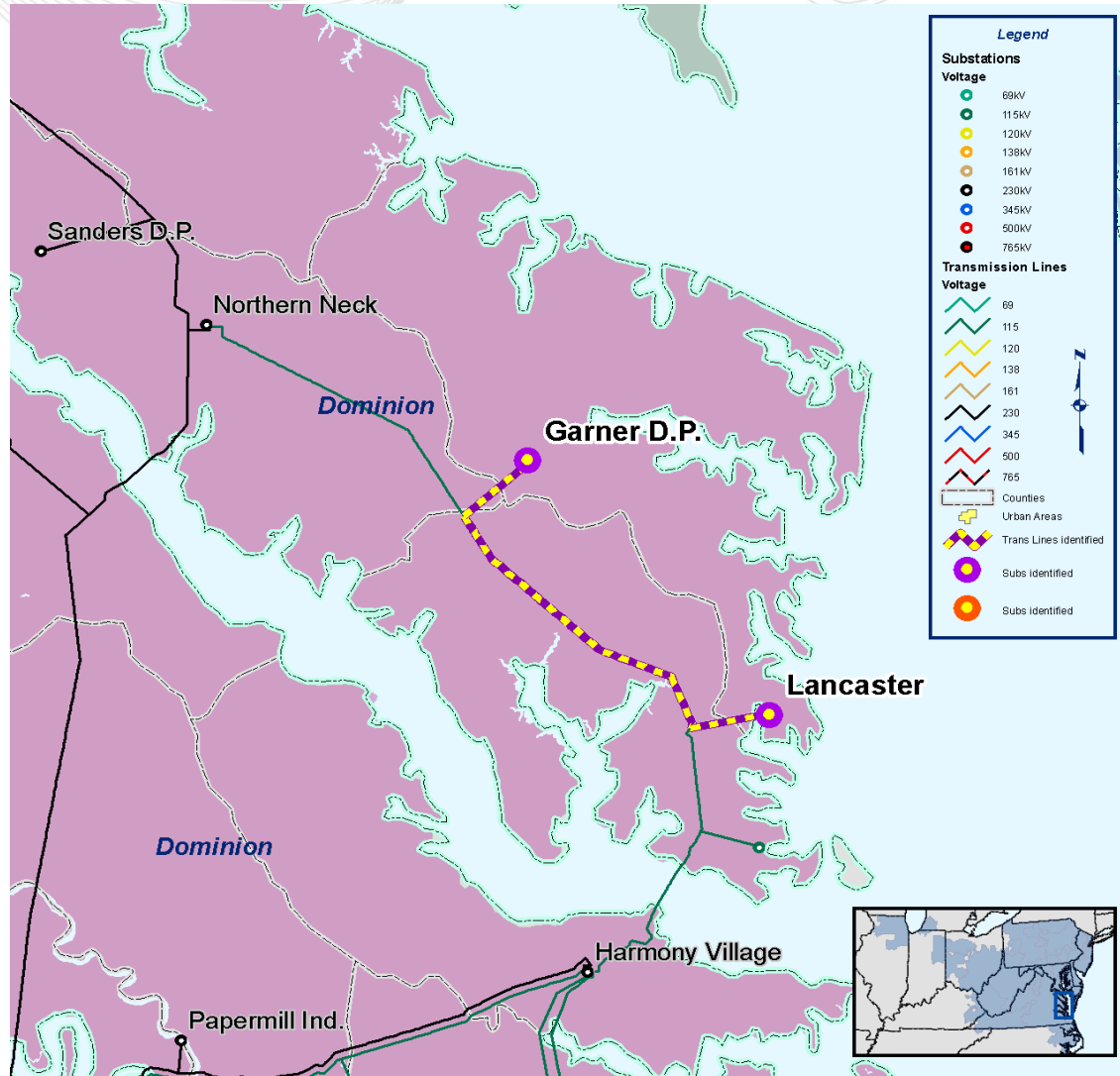
NERC B&C Violation

- Problem: Outage of Line #160 from Doods to Dupont Waynesboro 115 kV or the 115 kV bus at Doods causes low voltage and thermal overload of Line #117 from Doods to Dupont Waynesboro 115 kV
- Solution: Add a 2nd Doods – Dupont Waynesboro 115 kV Line on the existing line #160 route, resulting in 3 paths from Doods to Dupont Waynesboro (b0759)
- PJM Board Approved
- Estimated cost increased from \$6 to 20.5 M
 - Primary driver right-of-way acquisition cost
- Required IS Date: 6/1/2013
- Stakeholder question: Should other alternatives be considered?
 - 230 kV conversion of Line #117 and Line #160 is cost prohibitive
- PJM willing to consider other alternatives suggested by stakeholders



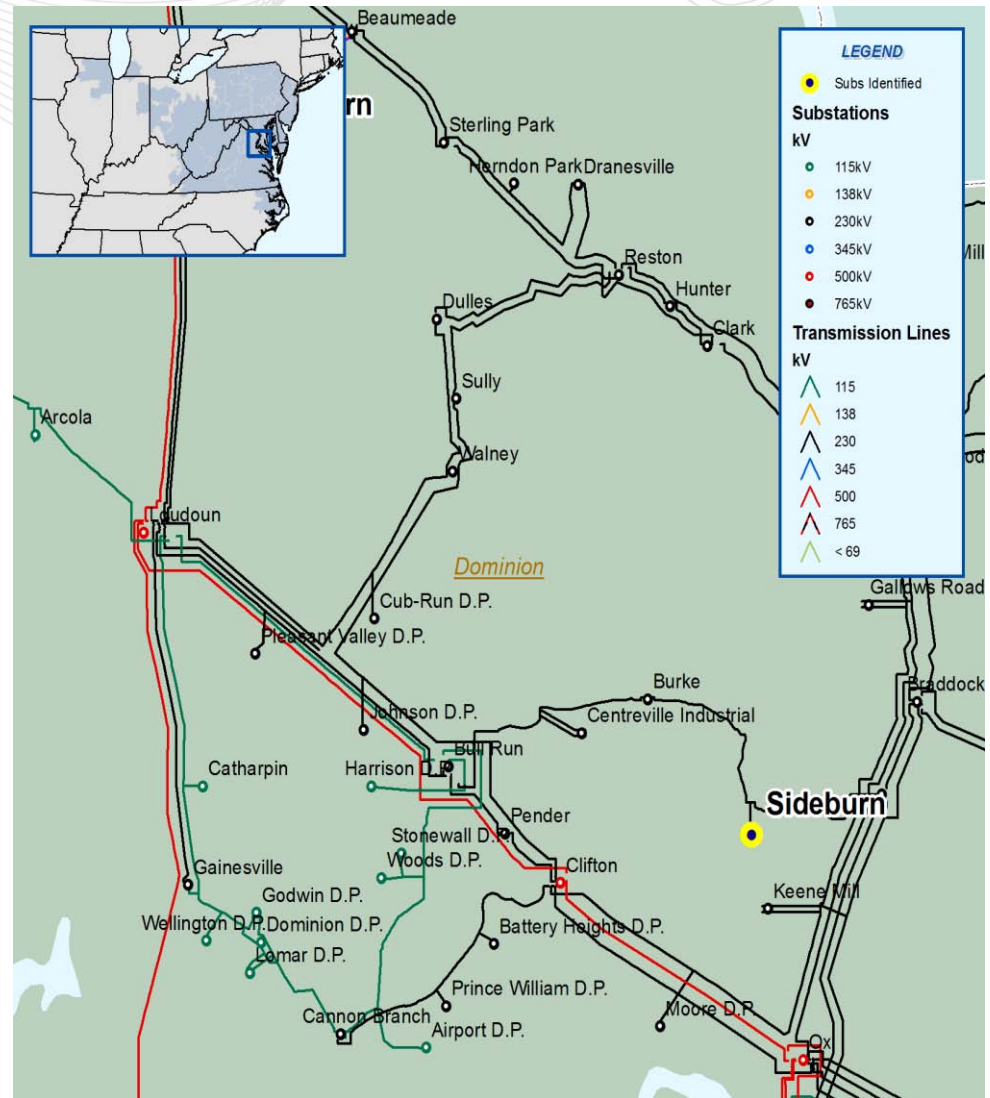
NERC Category B Violation

- Uprate Garner to Lancaster section of Line #65 (B0769)
- VDOT Bridge work not to be completed until May 2012
- Delays expected IS Date of Project from May 2012 to September 2013
- Cost of Project to increase from \$5.5 M to \$5.8 M
 - Driver one year delay in IS Date



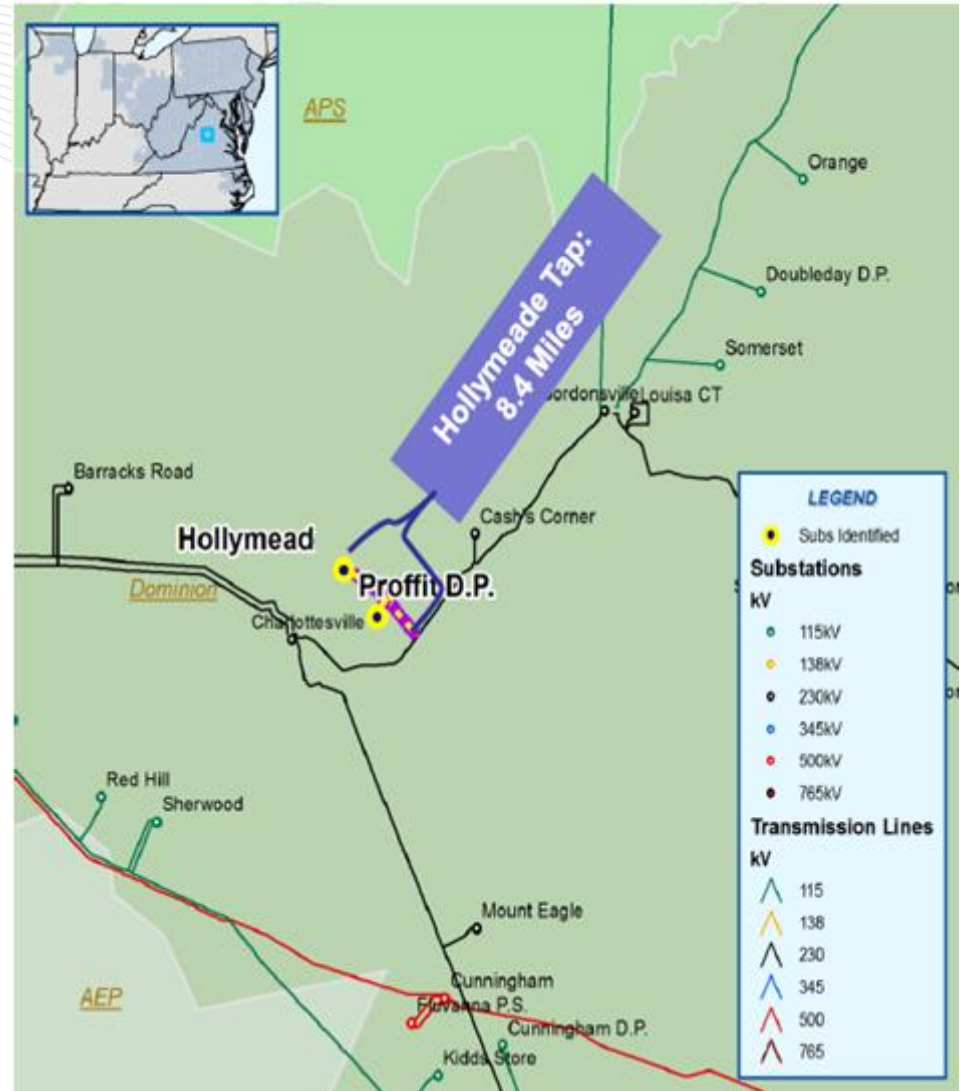
NERC C Violation

- Problem: N-1-1 loss of Clifton – Pender 230 kV and Bull Run - Loudoun 230 kV overloads Burke-Sideburn cable by 130%
- Solution: Burke – Sideburn install 2nd 230 kV cable (b1089)
- PJM Board Approved
- Estimated Cost: \$9 M
- Expected IS Date: 06/1/2014
- Stakeholder question should other alternatives be considered?
 - PJM and Dominion have identified this as the most effective and economical solution
- PJM willing to consider other alternatives suggested by stakeholders



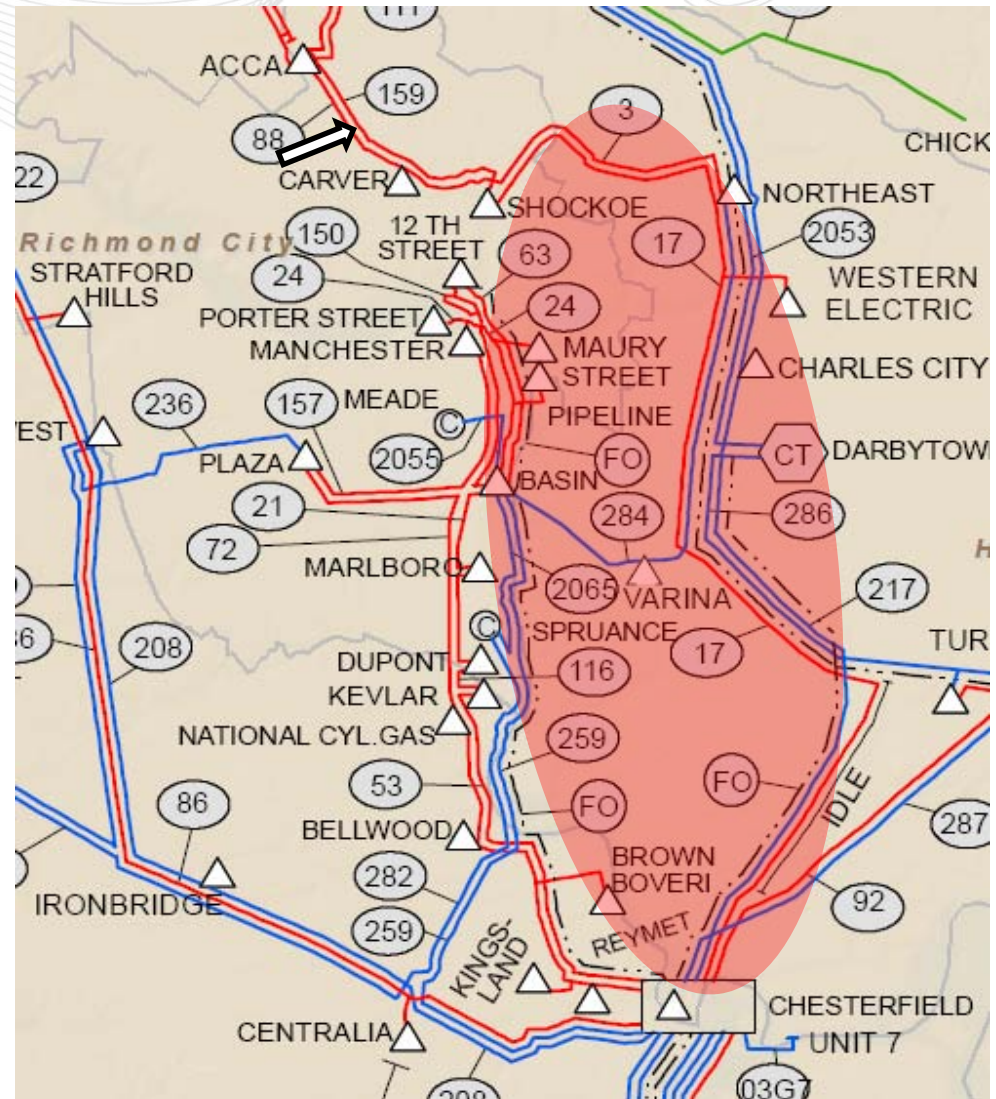
Dominion Criteria Violation

- Problem: Load on radial line exceeds 100 MW. The local co-op also can not pick-up load at Profit DP if an outage of the radial line occurs.
- Solution: Loop Line #2054 from Charlottesville to Gordonsville in and out of Hollymead and install a 230 kV breaker at Hollymead. (b1312)
- PJM Board Approved
- Estimated Cost: Increase from \$31 M to \$41 M
 - Driver: detailed engineering /permitting costs.
- Expected IS Date: 06/1/2014
- Stakeholder question should other alternatives be considered?
 - PJM and Dominion have identified this as the most effective and economical solution
- Application filed with Va SCC



NERC Category B Violation

- Problem: N-1 Loss of Line 159 Acca to Shockoe results in overloads on Line 17 from Shockoe to Chesterfield exceeding 94%.
- Proposed Solution: Resag wire to 125C from Shockoe to Chesterfield (18.5 miles) and replace the line switch at Shockoe with a 1200 amp switch. The new rating will be 231 MVA.
- Estimated Project Cost: \$1.5 M
- Engineered Project Cost: \$ 8.9 M
 - Drivers for cost increase
 - \$3 M for pole replacements
 - \$3 M mats
- Expected IS Date: 6/1/2014



2015 ANALYSIS UPDATE

- A. Review of NOVA NERC Reliability Deficiencies – Stakeholder Request

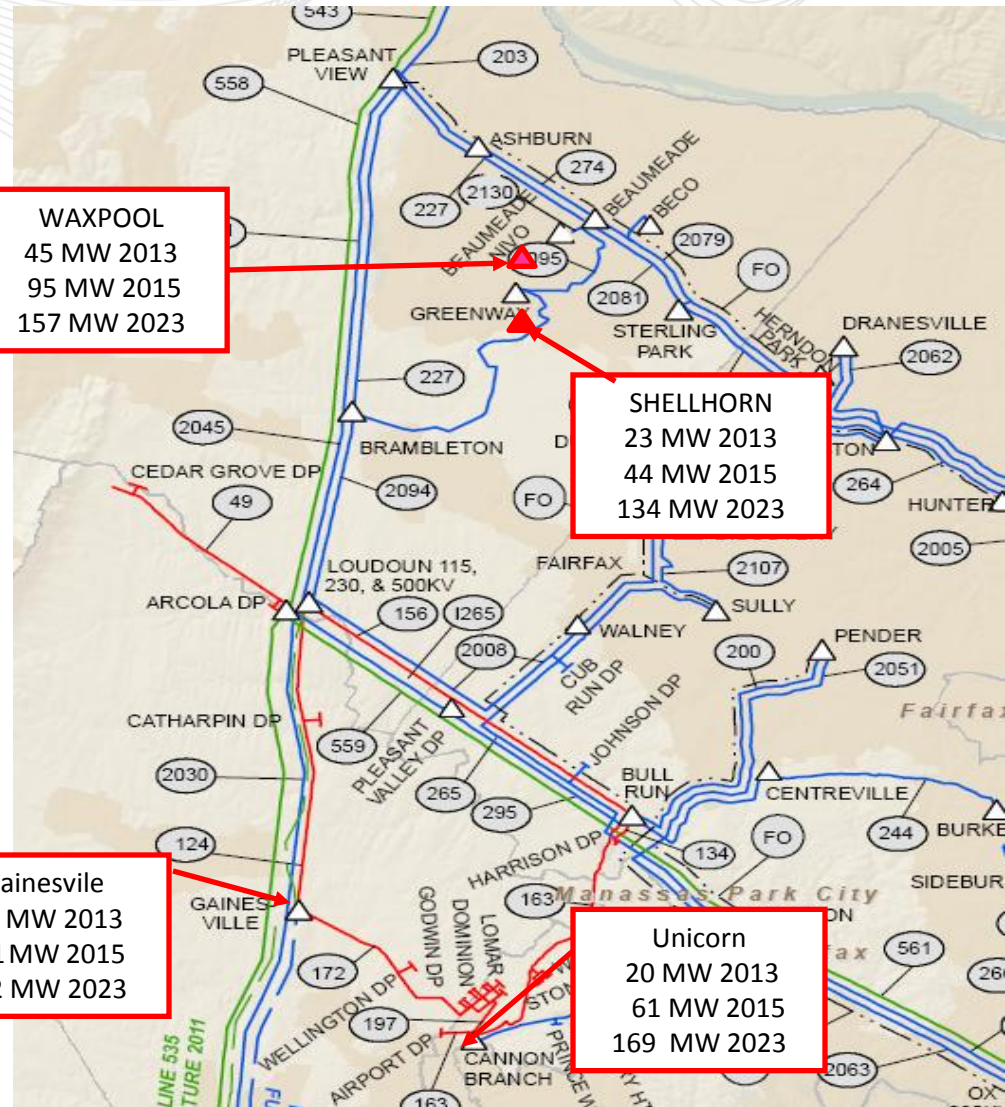
- B. New Projects



NOVA Load Additions Summer 2013 & 2015 Reliability Deficiencies

NOVA Block Load Additions 2013 & 2015 Summer

- Recently committed commercial developments, since August 2010, will add 170 MW of new load in 2013 and growing to 311 MW by 2015.
- New fiber route between Chicago – New York – Northern Virginia to be completed by Spring 2011 will intensify commercial growth in this area.
- Northern Virginia accounted for 40% of states growth between 2000 – 2010. Rural Virginia areas experiencing negative population growth.
- Economic activity appears to be picking up again:
 - New Zoning Requests will add: (100-150 MW)
 - 5490 Multi Family Homes
 - 7,700,000 sq feet commercial
 - 14,000,000 sq feet mixed use
 - New data centers to add 150-250 MW
 - Location is Greenway - Beaumeade area and these values are **not included** in projected substation loads



NERC Category B & C Violations

- Load Increase:
 - Proposed new Shellhorn Substation to add 23 MW in 2012 and growing to 44 MW by 2015 to Line #2095 from Brambleton to Beaumeade
 - Proposed new Waxpool Substation to add 45 MW in 2013 and growing to 95 MW by 2015
 - Total connected load on Line #2095 projected to exceed 330 MW in 2015 if connected to Line #2095.
- Expected IS Date: 11/2012 for Shellhorn Substation and 11/2013 for Waxpool Substation
- Violations:
 - 2015 RTEP:
 - Loss of Brambleton – Shellhorn kV overloads Brambleton – Beaumeade 230 kV to 103.6% of STE Rating
 - Loss of Loudoun – Cub Run 230 kV overloads Clifton - Johnson 230 kV to 95.6% of STE Rating
 - Critical system condition – Possum Point #5 out
 - Loss of Brambleton – Shellhorn 230 kV overloads Brambleton – Beaumeade 230 kV 106.1% of STE Rating
 - Loss of Loudoun – Cub Run 230 kV overloads Clifton - Johnson 230 kV to 96.9% of STE Rating
 - Loss of Brambleton 500-230 kV Tx results in Pleasant View 500-230 kV Tx being loaded to 93.1% of its STE.
 - Tower Line outage: Lines 2081 (from Beaumeade to Sterling Park) & 2095 results in load loss of 380 MW, a violation of PJM and Dominion acceptable load loss criteria
 - Breaker Failures at Beaumeade: 227T2095, 2045T2095 & 2094T2095 results in load loss greater than 300 MW

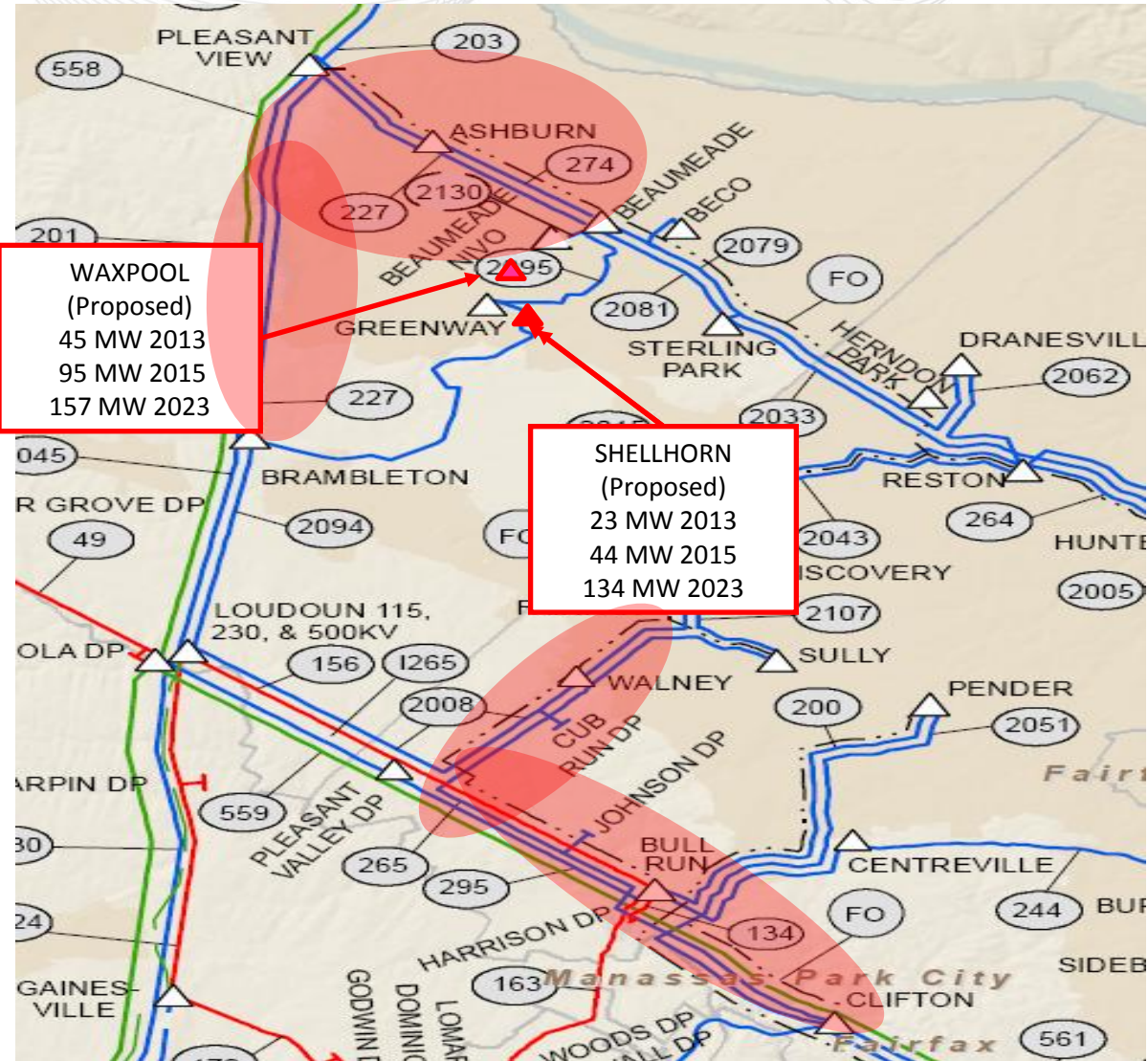
Region with thermal issues

NERC Category B violations

- Brambleton - Beaumeade 230 kV
- Clifton- Sully 230 kV
- Pleasant View 500-230 kV Tx

Potential Solution (not PJM Board approved):

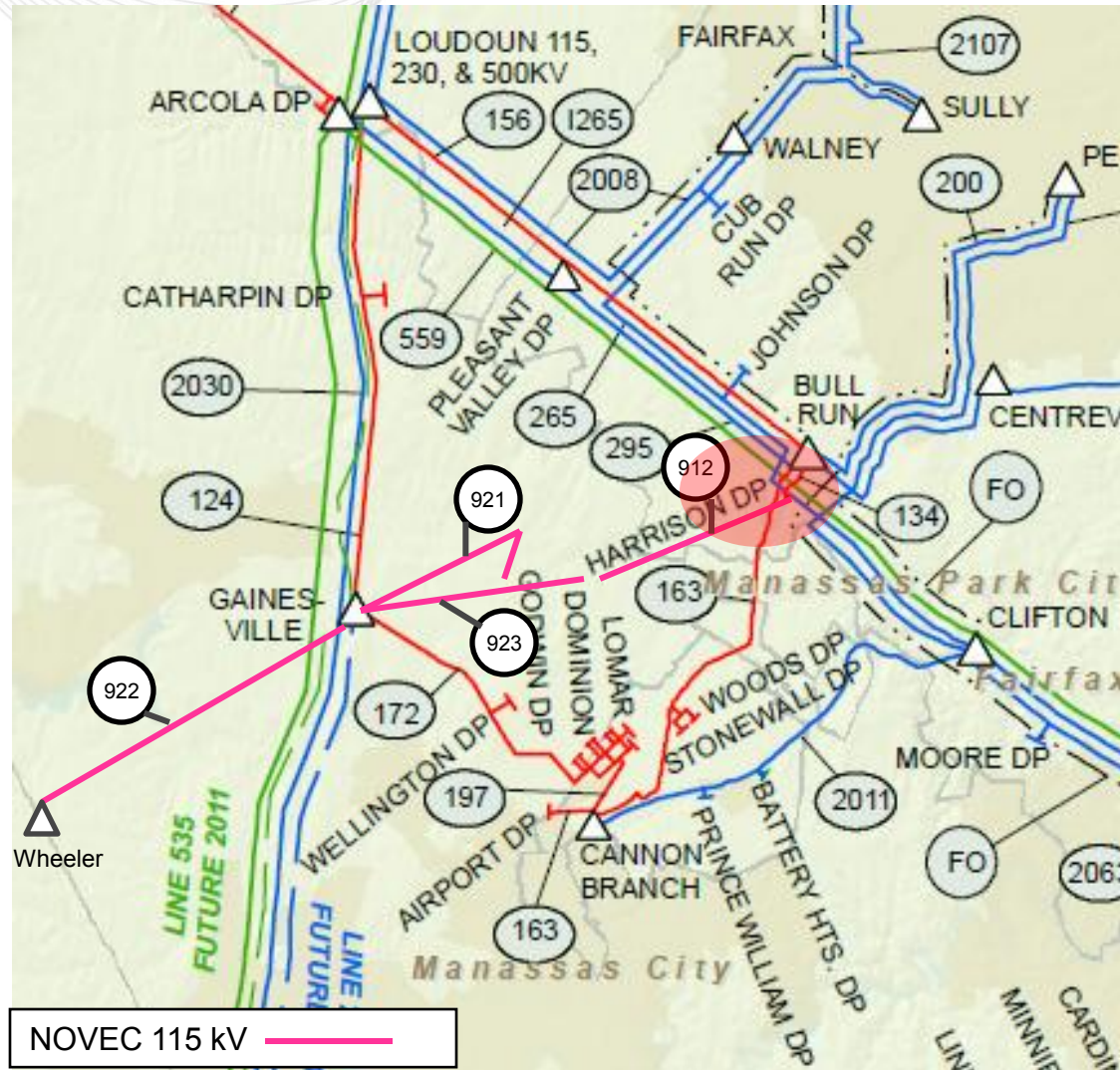
- Option A (preferred): Construct a 230 kV line from NIVO to Waxpool then extend 230 kV line to existing Line #2095 and extend new line on existing 230 kV structures to Brambleton. Install 230 kV breakers at Brambleton and Waxpool to interconnect new lines and resolve reliability violations.
- Expected IS Date: 11/2013
- Estimated Project Cost: \$30M
- Option B: Extend 230 kV line from Brambleton toward Beaumeade. New line would need to loop in and out of proposed Waxpool site. Acquire new R/Way along W&O Trail for new 230 kV line and convert portion of Beaumeade to GIS to install new breaker.
- Option C: PJM open to stakeholder suggestions



NOVA Load Additions Summer 2013 Reliability Deficiencies

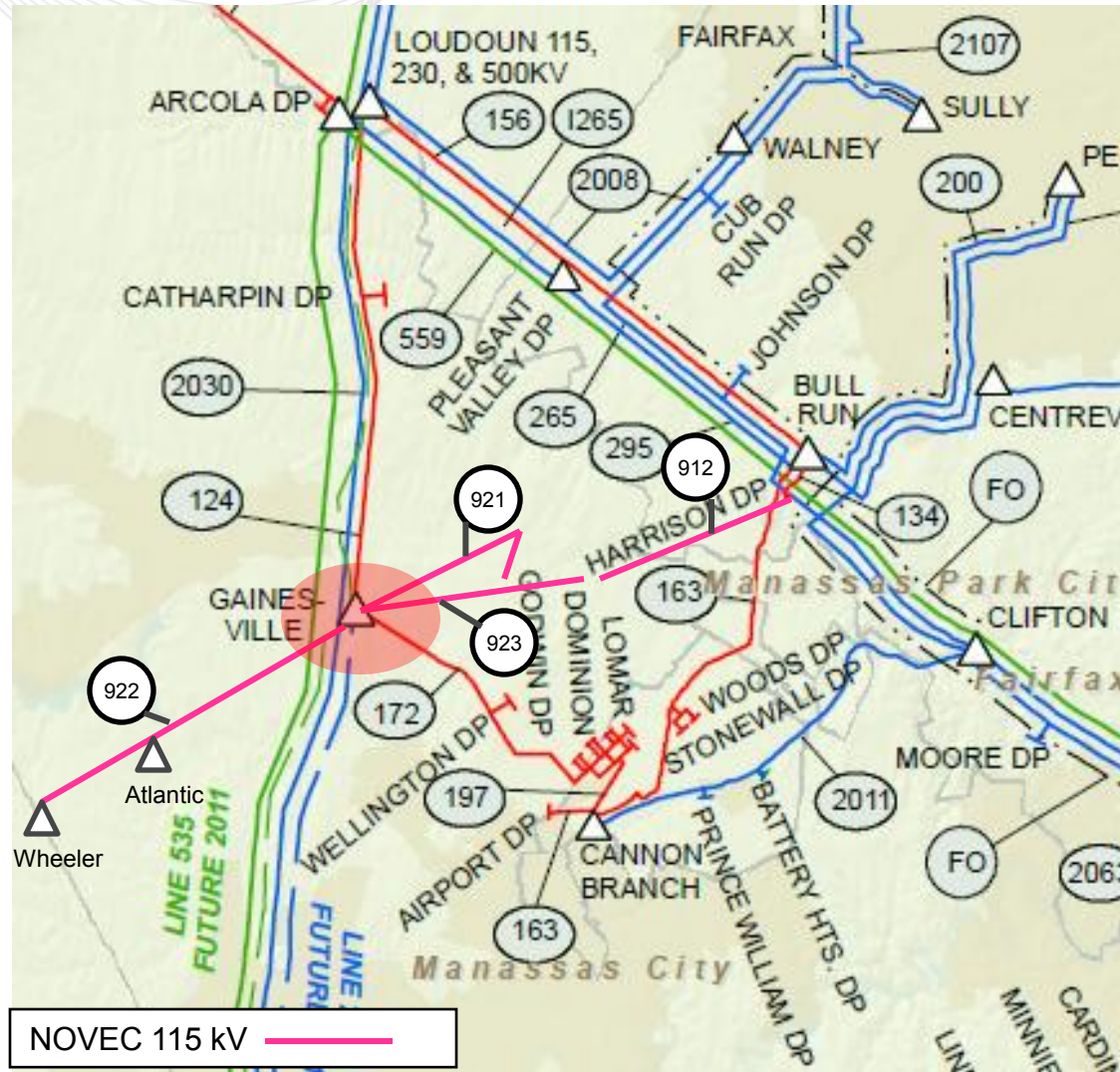
Regions with thermal issues

- Dominion Criteria violation radial load greater than 100 MW
 - Sumer 2010 loading Line #134 from Bull Run to Harrison DP exceeds 120 MW
- NERC Category B violation:
 - Outage of NOVEC CKT 923 from Gainesville - Manassas
 - NOVEC will transfer part or all of ckt 923 load to ckt 912 via normally open tie switch. DVP's Line #134 would overload to 135 % of its STE Rating.
- Potential solution re-build 0.5 miles of Line #134 and #163 for a higher capacity. Install a 115 kV line switch between Line #134 and Line #163 at Harrison DP to be operated normally open.
- Expected IS Date: May 2013
- Estimated cost: \$3 M
- PJM/DOM will consider other solutions.

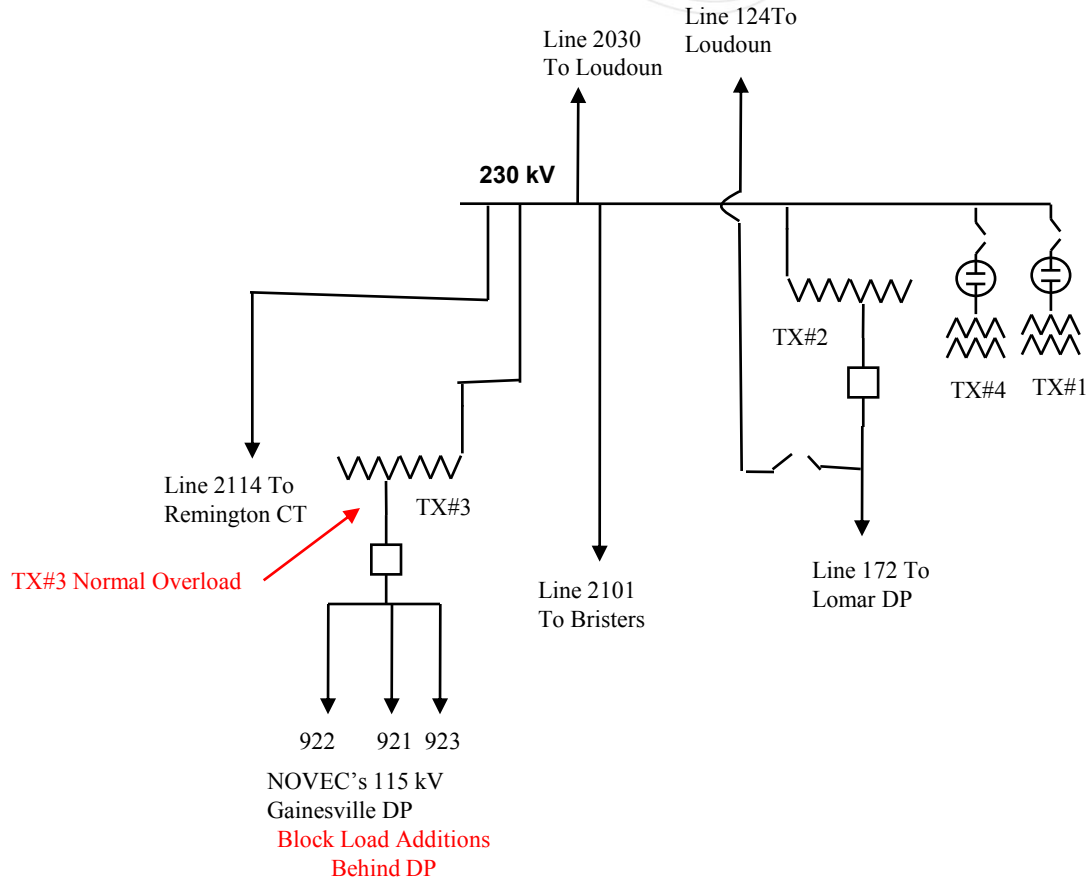


Regions with voltage issues

- NERC Category A violation
- Problem: Block load addition of 82 to 111 MW on ckt's 921 & 923 results in a normal overload of 230-115 kV tx feeding NOVEC ckt's 921, 922 & 923. Tx is loaded to 125% of its normal rating.
- Potential solutions:
 - Option A (preferred): Upgrade Line #124 for a higher capacity 500 MVA(line is already rebuilt for future 230 kV). Install a normal open tie switch between two 115 kV Gainesville busses. Convert NOVEC's ckt 922 to 230 kV.
 - Option B: Upgrade Line #124 for a higher capacity 500 MVA(line is already rebuilt for future 230 kV). Install a normal open tie switch between two 115 kV Gainesville busses. Install a third 230-115 kV Tx at Gainesville.
 - Option C: Other suggested solutions??
- Projected IS Date: May 2013
- Estimated project cost for Option A: \$20 M



Gainesville - Existing Oneline (in 2012)

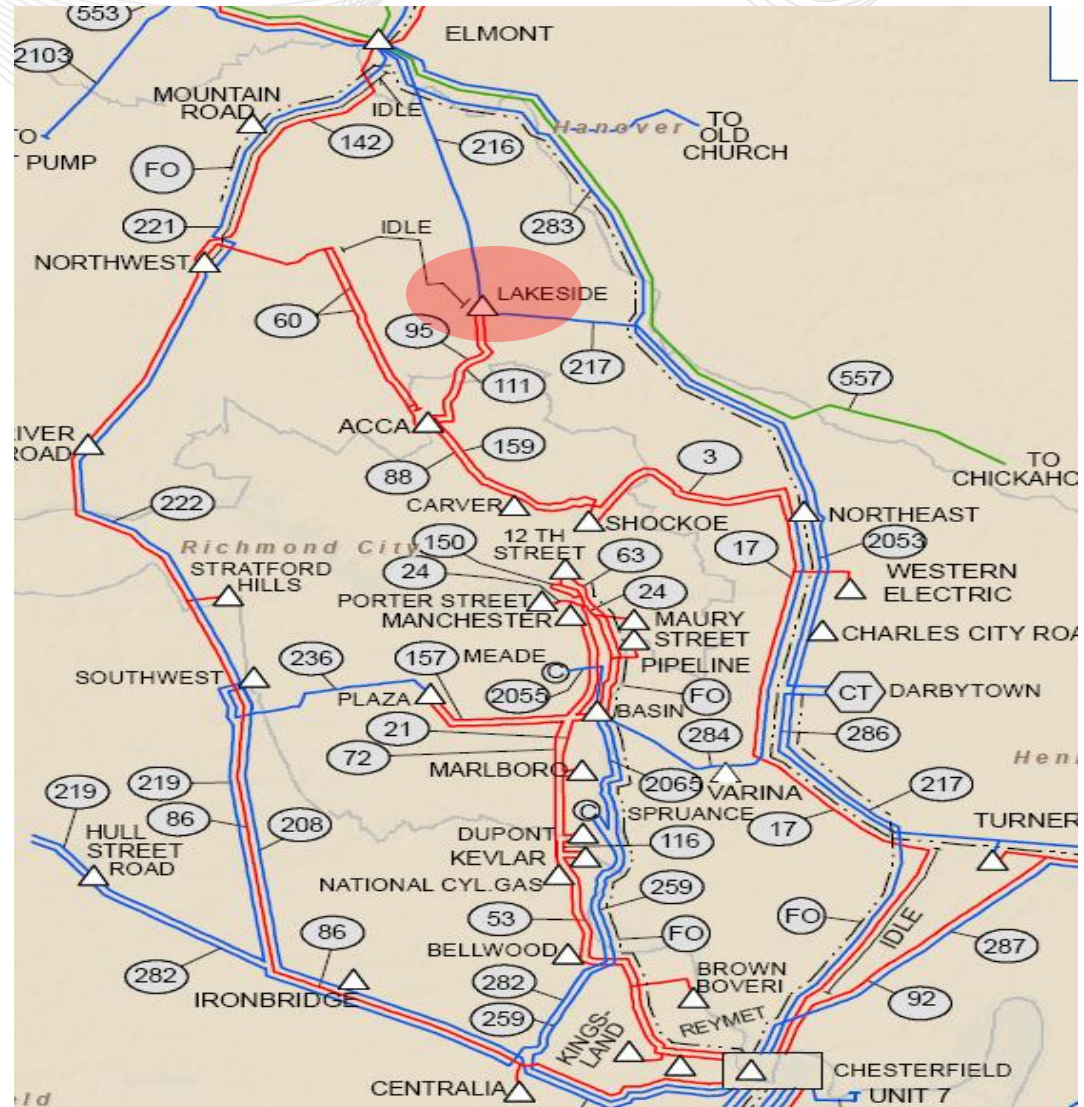




Summer 2011 Operational Performance Improvements

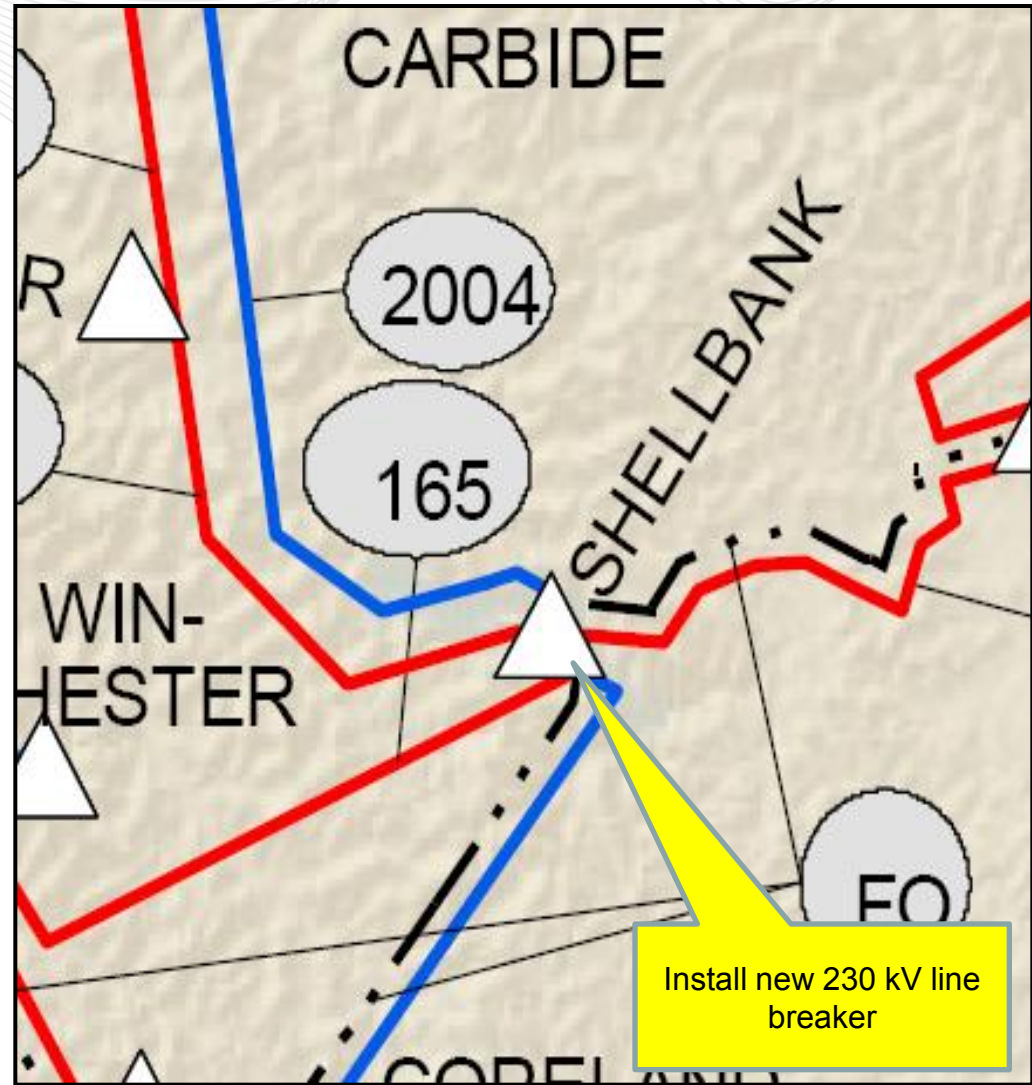
Operational Performance

- Problems: Aging infrastructure project is replacing the existing 230-115 kV Tx # 8 at Lakeside Substation. Currently an auto-sectionalizing scheme exists on Line 217 (Lakeside – Chesterfield) which requires a motor operated switch at Lakeside to open for line faults to keep the auto-transformer in service
- Potential Proposed Solution: Install a 230 kV breaker to replace the motor operated switch. The motor operated sectionalizing scheme will no longer be needed
- Expected IS Date: December 2011
- Estimated project cost: \$ 0.7 M



Operational Performance

- Problems: To improve operational performance at Shellbank Substation the high side motor operator on existing 230-115 kV Tx # 6 is being replaced with a circuit breaker(HS Protection). Currently an outage of Line #2004 (Peninsula – Shellbank) removes the auto-transformer from service. A 230 kV line breaker will be installed to prevent the loss of the autotransformer for line faults.
- Expected IS Date: December 2011
- Estimated project cost: \$ 0.75 M





Summer 2014 Reliability Deficiencies

Regions with thermal issues

- NERC Category B violations
- Problem: By summer 2012, Dominion Distribution will be transferring 14 MW from Virginia Beach substation to Long Creek substation.

N-1 loss of 115 kV line #27 between Greenwich to Davis Corner results in loading on line #27 Virginia Beach to Bains Store exceeding 94%.

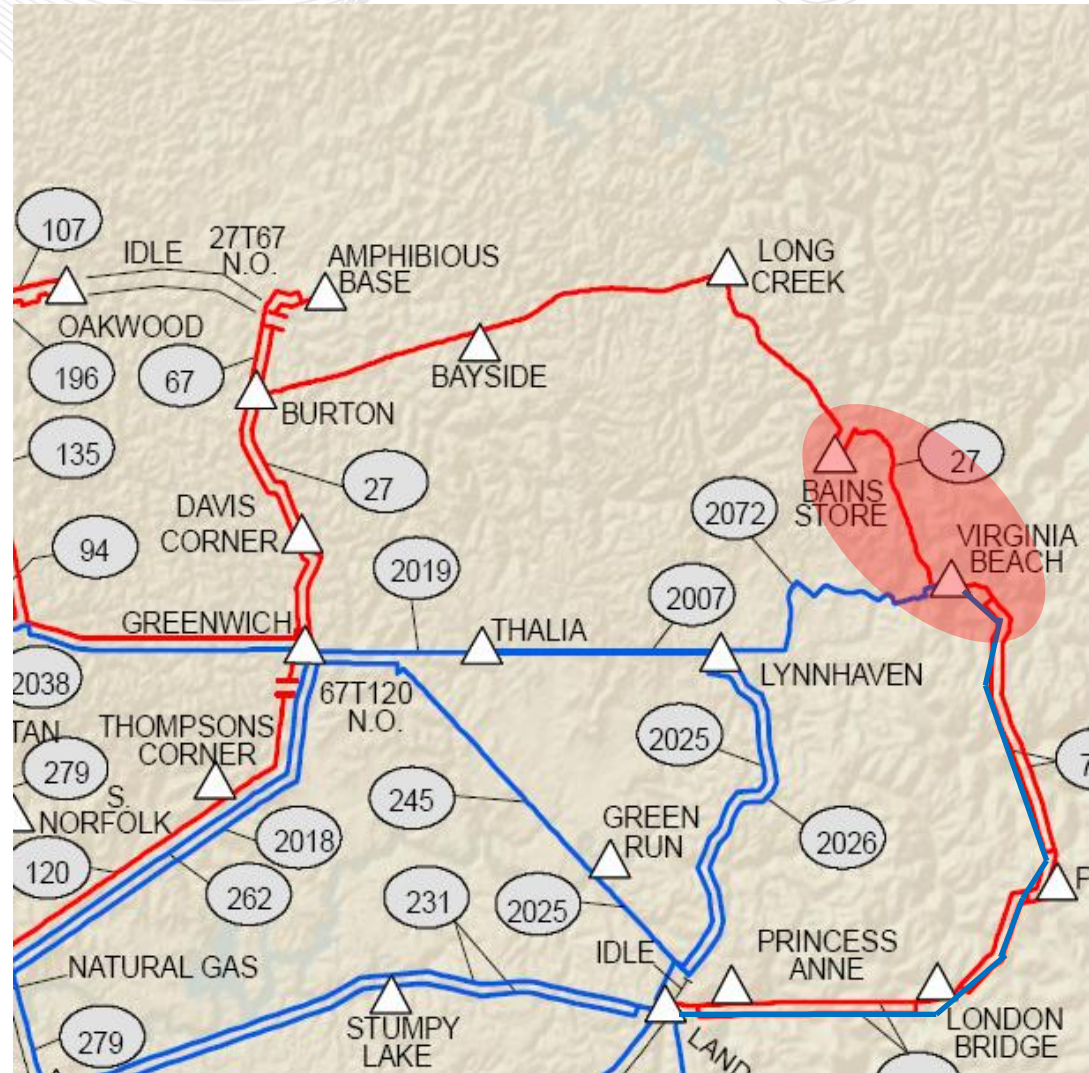
- Potential Solution:

Option A - Rebuild about 3 miles of Line #27 between Virginia Beach to Bains Store. Heavy distribution underbuild on the same tower between Virginia Beach to Bains Store will add substantial cost to this option.

Option B (preferred) - Add 4 breaker ring bus at Burton substation. Construct a 115kV line approximately 3.5 miles from Oakwood substation to Burton substation. About 2.8 mile of this new line will be using existing idle line and the remainder 0.7 mile of this new line must be built below FAA height restriction due to Norfolk International Airport.

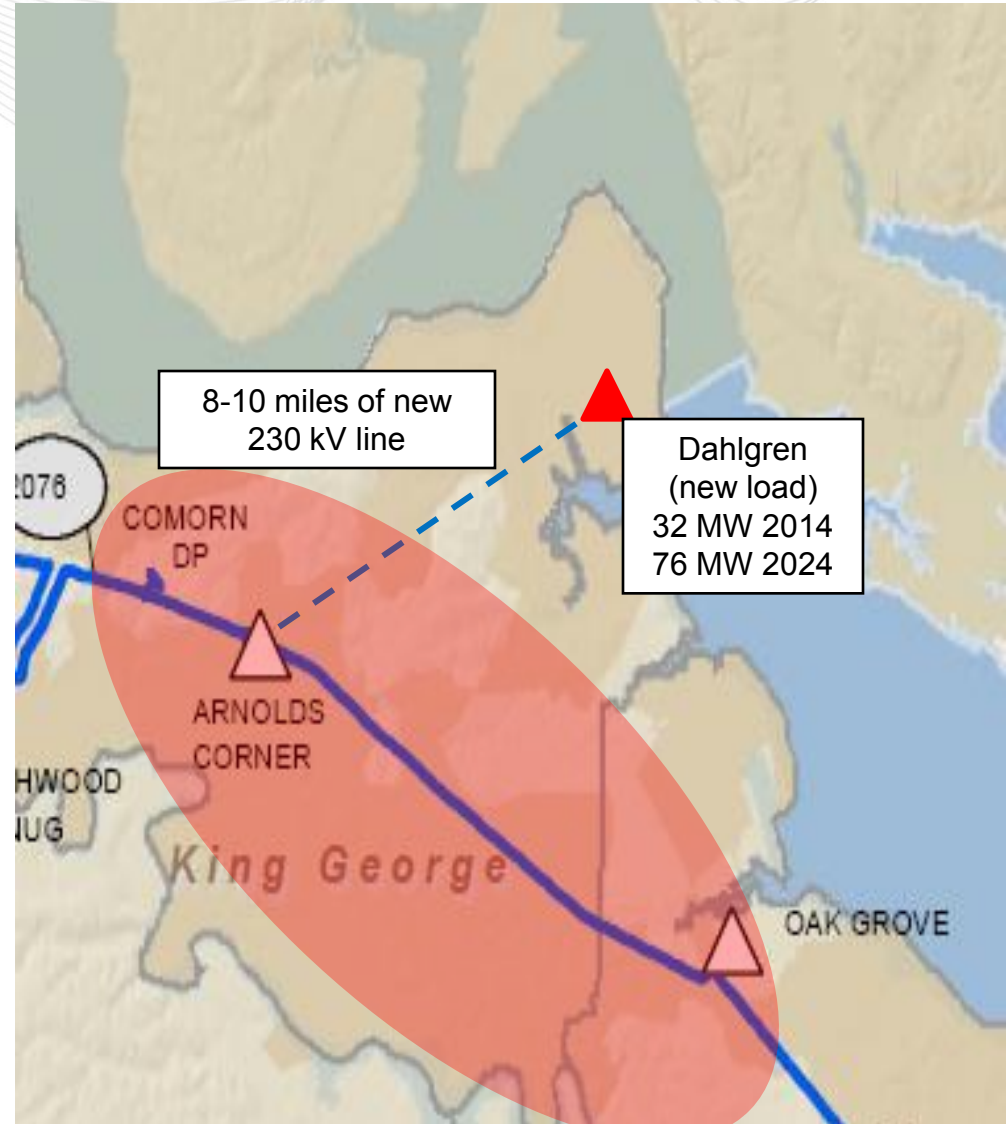
Option C – Other suggestions

- Potential IS Date: May 2014
- Between summer 2012 until this project is completed, we will open line 27 at Bayside substation and operate line #27 radially from both ends.



Regions with voltage issues

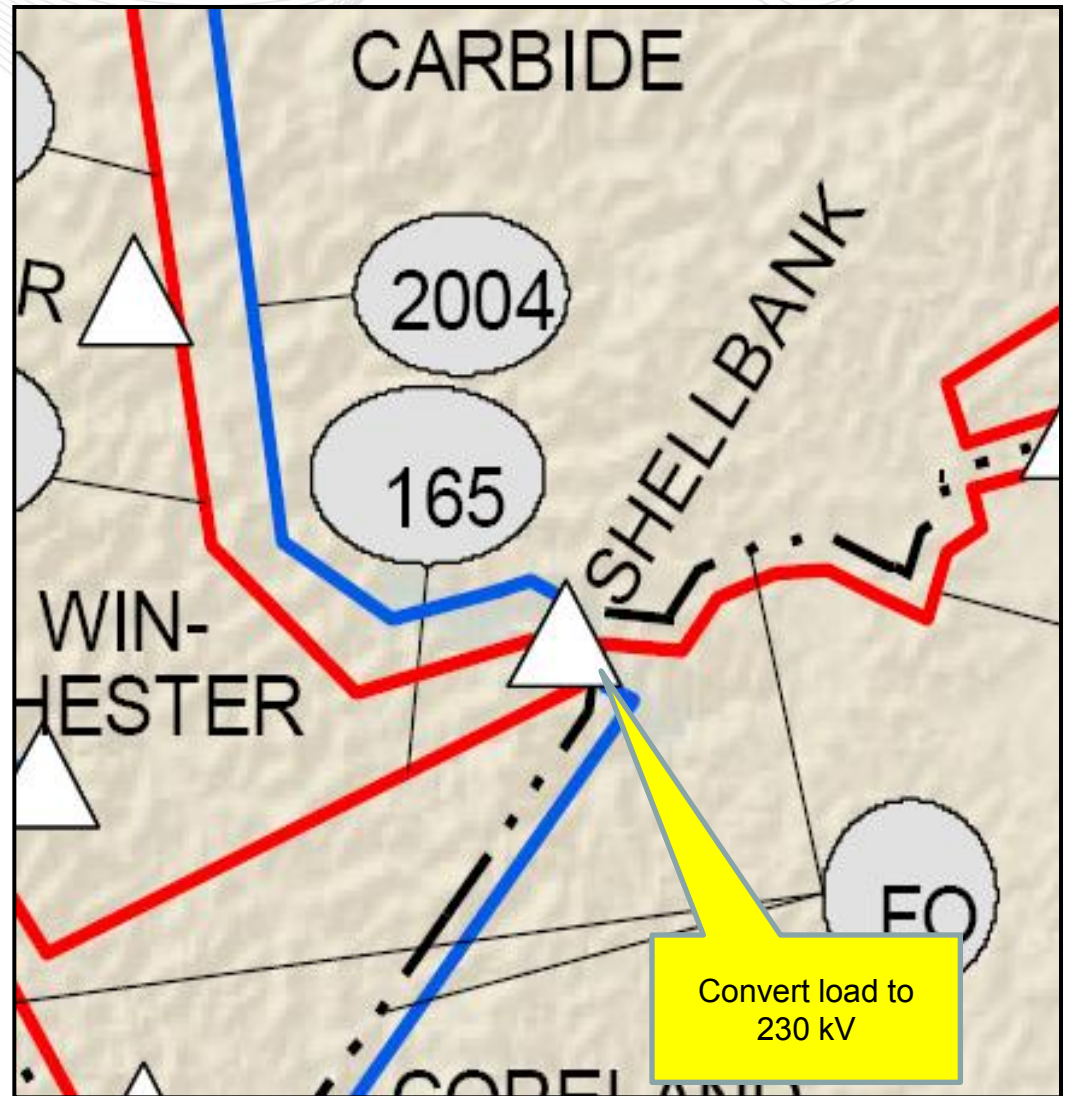
- NERC Category B violation
- Problems: Expansion of existing facility will add 32 MW of new load in 2014 and growing to 76 MW of new load by 2024. Existing load is 20 MW in 2013 growing to 22 MW in 2024 for total site load of 52 MW in 2013 and 98 MW in 2024.
- Outage of Birchwood end of 230 kV Line #2016 from Birchwood to Northern Neck results in low voltage (<93%) at Arnolds Corner, Oak Grove, Comorn, Westmoreland, Sanders and Dahlgren Substations.
- Potential solutions:
 - Option A - establish a new 230 kV breaker station in the vicinity of Arnolds Corner and install 230 kV capacitor bank and build a new 230 kV line to Dahlgren site.
 - Option B – split existing 230 kV line in the vicinity of Arnolds Corner and loop the 230 kV line in and out of the Dahlgren site and install 230 kV capacitor bank.
 - Option C – PJM open to stakeholder suggestions
- Expected IS Date: May 2014



New Supplemental Projects

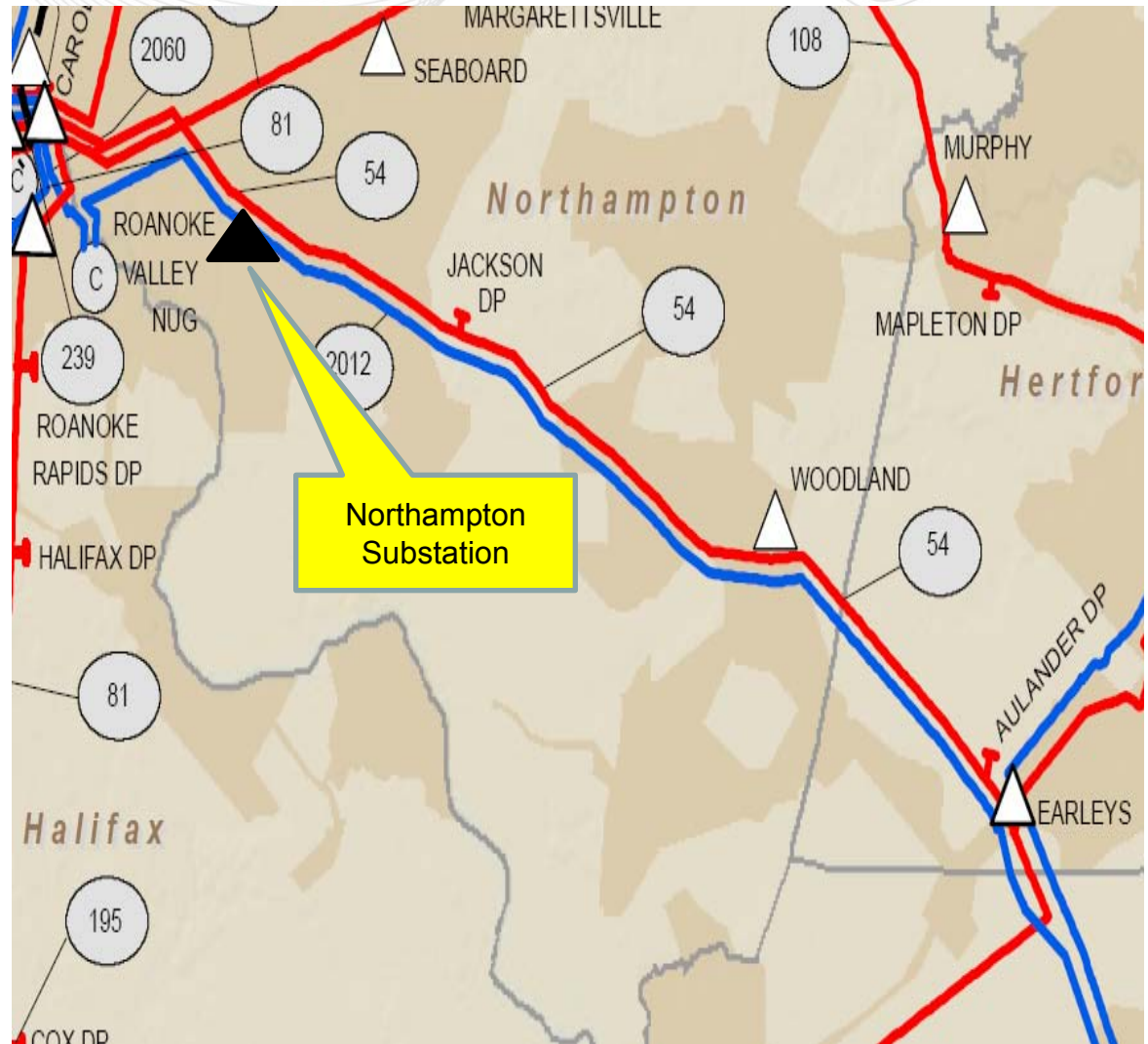
Shellbank Substation New T-D Delivery

- Dominion Distribution is modernizing their facilities located at this substation. As part of this modernization they will replace and convert the existing 115 kV Tx to 230 kV Txs.
- Expected IS Date: December 2011
- Estimated project cost: \$ 0.2 M

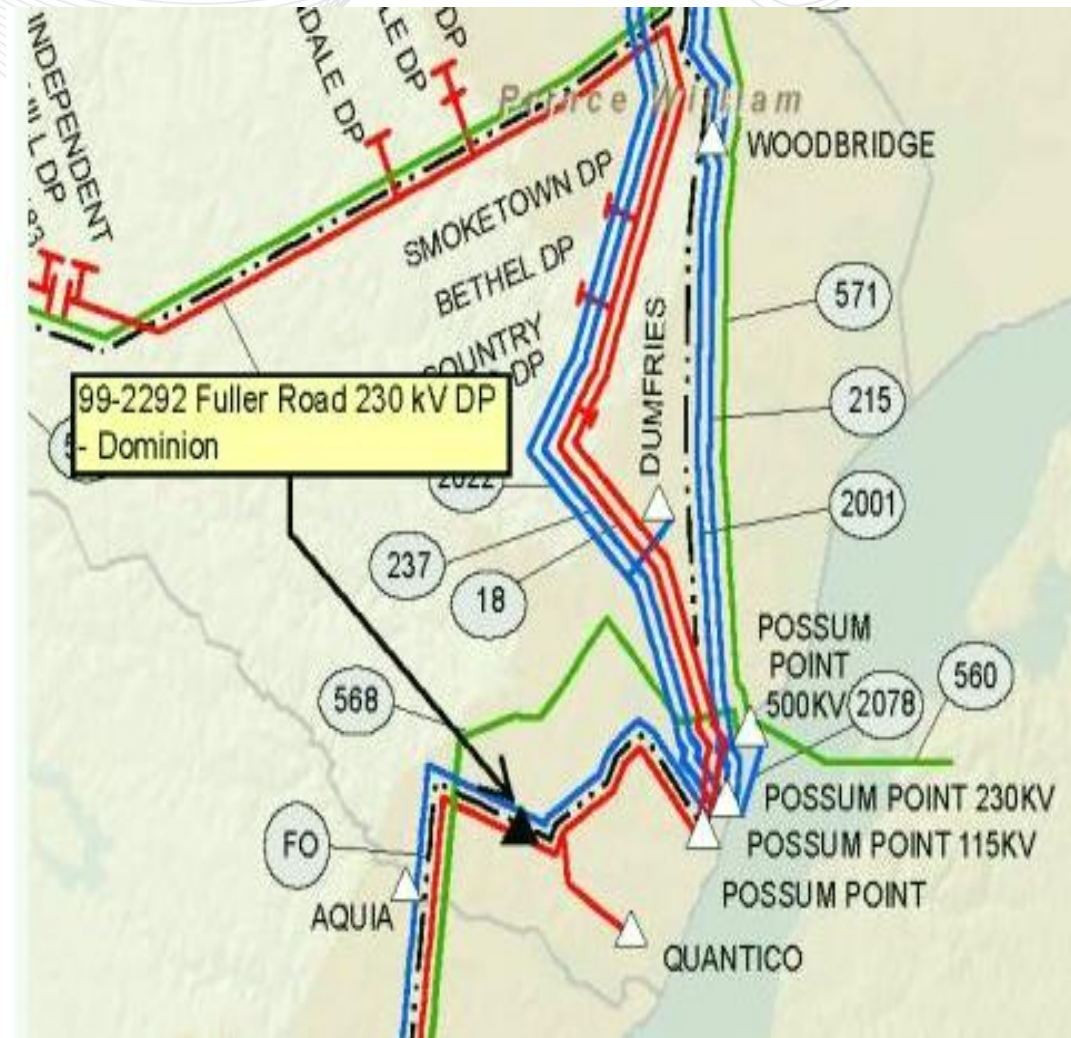


Northampton Substation New T-D Delivery

- Dominion Distribution has requested a new 230 kV delivery point to relieve normal circuit and transformer loading at Carolina and Hornertown Substations. This will require a tap from Line #2012 (Roanoke Valley NUG - Earleys) and installation of two 230 kV line switches. Estimated load is 17 MW(2012) and 22 MW in 10 years.
- Expected IS Date: May 2012
- Engineered project cost: \$ 0.65 M



- New growth on Quantico Marine Base is requiring Dominion Distribution to add a new substation to 230 kV Line #252. This will require a tap from Line #252 (Possum Pt. – Aquia Harbor) and installation of two 230 kV line switches.
- Expected IS Date: July 2012
- Estimated project cost: \$ 0.75 M



- Existing industrial facilities in the area are adding 30 + MVA of new load. Dominion Distribution has requested a new 230 kV delivery point on Line #292 to relieve normal circuit and transformer loading. This will require a tap from Line #292 (Yorktown - Wheelton) and installation of two 230 kV line switches.
- Expected IS Date: November 2012
- Estimated cost \$ 0.75 M

