



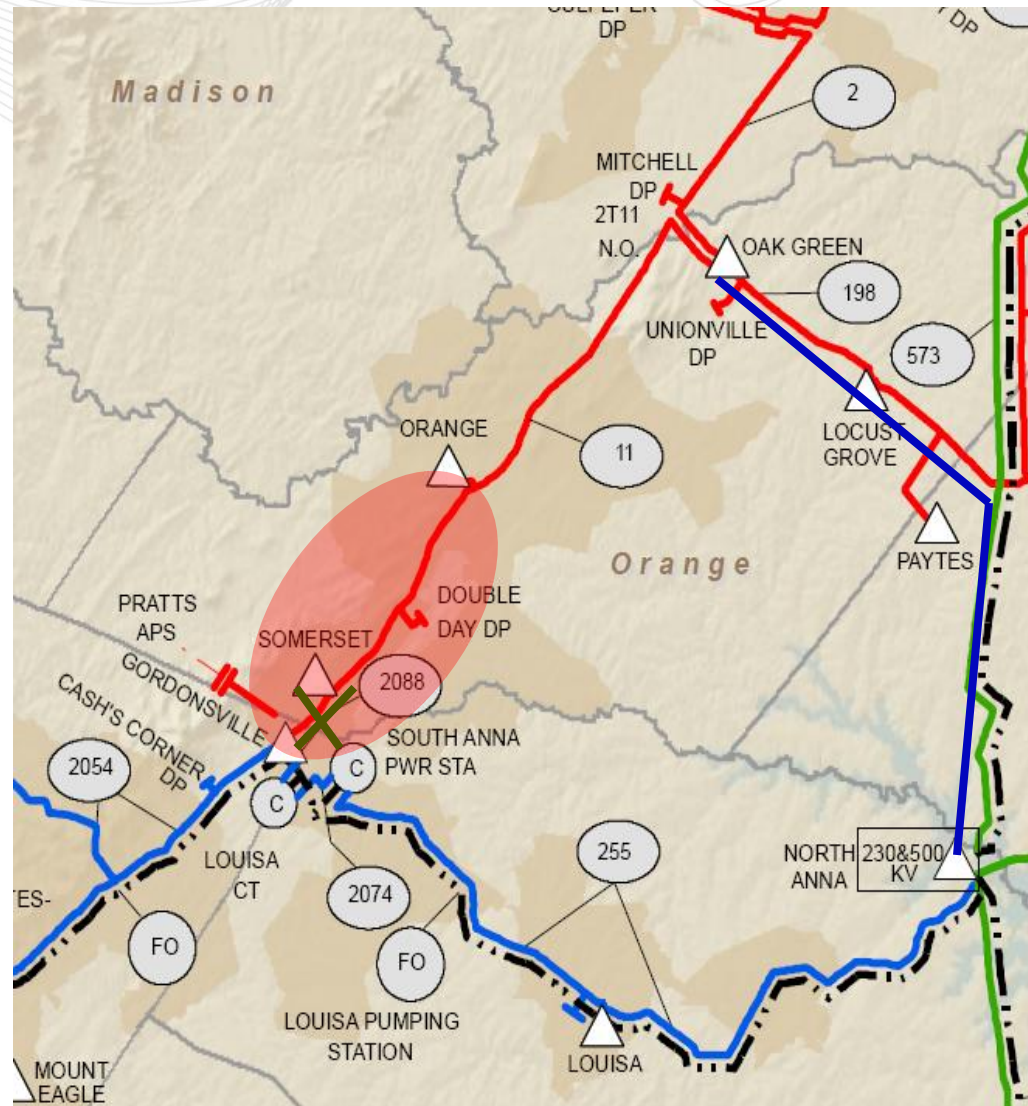
Sub Regional RTEP Committee - Southern

October 28, 2011

- 2016 RTEP Analysis Recommended Solutions
 - NERC Category A, B
 - NERC Category C (N-1-1 in progress)
 - Load Deliverability
 - Generator Deliverability
- Outstanding Issues
- Supplemental Projects

 **Region with thermal issues**

- NERC Category B Violations
- Problem: The 2016 summer base case indicates the following deficiencies:
 - An outage of Line #255 (North Anna – Louisa 230kV) overloads Line #11 (Gordonsville – Orange 115kV)
 - An outage of Line #255(North Anna – Louisa 230 kV) overloads Line #11 (Gordonsville – Orange 115kV)
 - System evaluated without the Warren generation per Dominion Planning Criteria
- Potential Solution –
 1. Wreck and rebuild Line #11 from Gordonsville – Orange 115 kV for higher capacity (230 kV Construction)
 2. Convert Paytes Substation to 230 kV and move load to a new North Anna to Oak Green 230 kV Line
 3. Build a second Gordonsville to North Anna 230 kV Line



	*Estimated Project Cost	ROW	Does solution solve Deficiencies?	
			A	B
Solutions Considered:				
1. Wreck and rebuild 2.1 mile section of Line #11 section between Gordonsville and Somerset.	\$5.25 M	No new ROW	Yes	Yes
2. Build a new 230kV line from Gordonsville to North Anna.	\$81.4 M	32.54 mi. of additional ROW	Yes	Yes
3. Convert Paytes to 230kV, move load to new North Anna to Oak Green 230kV Line.	\$5.0 M	No new ROW	No	No

Proposed Solution:

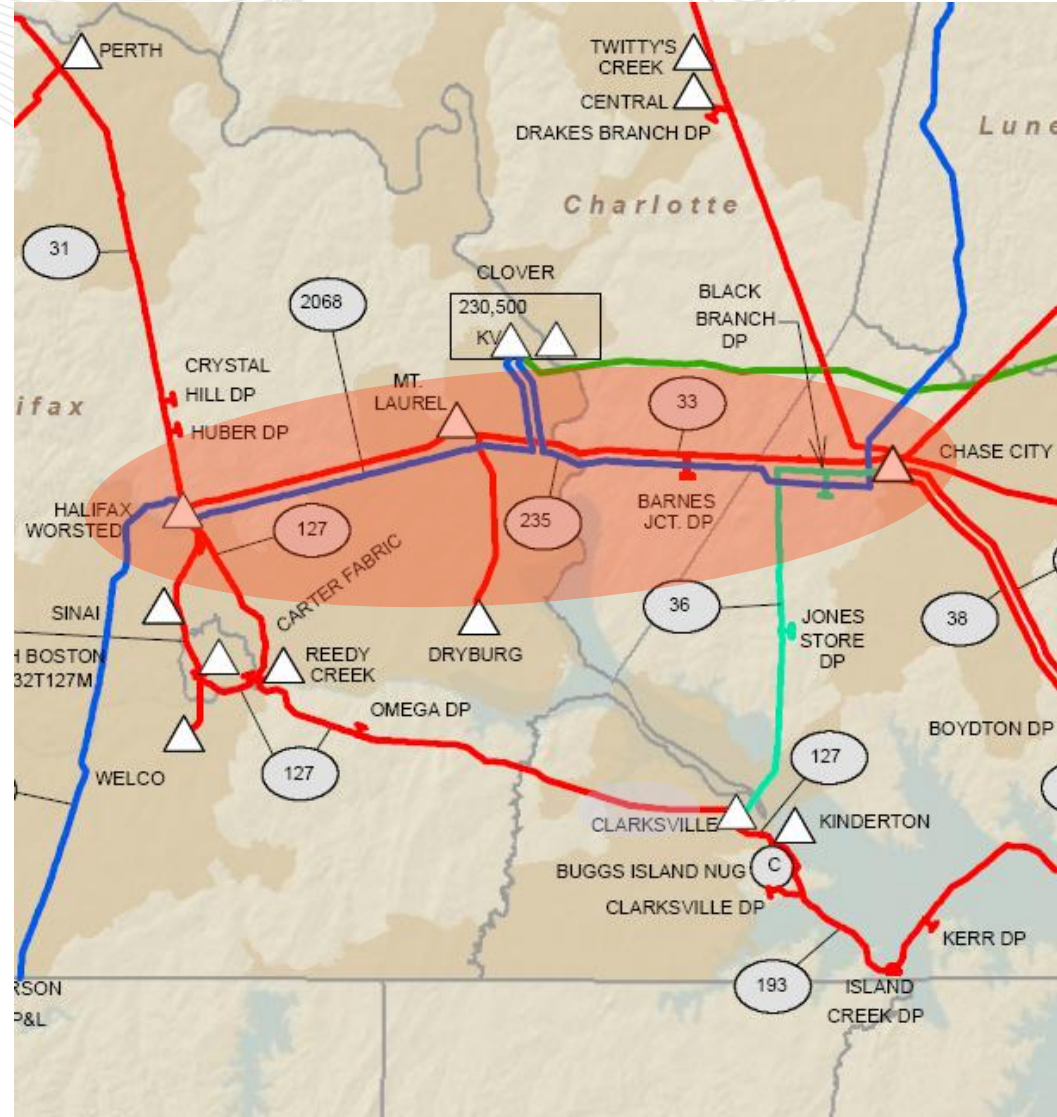
Option 1 - Wreck and rebuild 2.1 mile section of Line #11 section between Gordonsville and Somerset.

Expected IS Date: 6/1/2016

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

Region with thermal issues

- NERC Category B & C Violations (Generation Deliverability & DVP Analysis)
- Studied with drought conditions: (Kerr Dam, Gaston and Roanoke Rapids generation off line)
- Problem:
 - An N-1 outage of Line #556 (Clover – Carson 500 kV) overloads Line #33 (Halifax – Chase City 115 kV)
 - An N-1-1 outage of Line 556 (Clover-Carson 500 kV) and Line #127 (Halifax - Buggs Island 115 kV) overloads Line #33
 - An N-1-1 outage of Line #556 (Clover-Carson 500 kV) and Line #36 (Chase City – Buggs Island 115 kV) overloads Line #33
 - PJM Operations is currently experiencing loading issues on Line 33 (Halifax – Chase City 115 kV)



	Estimated Project Cost	ROW	Does solution solve Deficiencies?			
			A	B	C	D
Solutions Considered:						
1. Rebuild line #33 Halifax to Chase City, 26 miles. Install 230kV 4 breaker ring bus at Halifax	\$26 M	None	Yes	Yes	Yes	Yes
2. Split 230kV line #235 Clover – Farmville and build 0.4 mile double circuit tap to Chase City. Install two 224MVA 230-115kV transformers at Chase city and a 230kV breaker. Reconductor 16 miles of 230kV line from Chase City to Clover	\$34 M	0.4 mi of new possible ROW	Yes	Yes	Yes	Yes

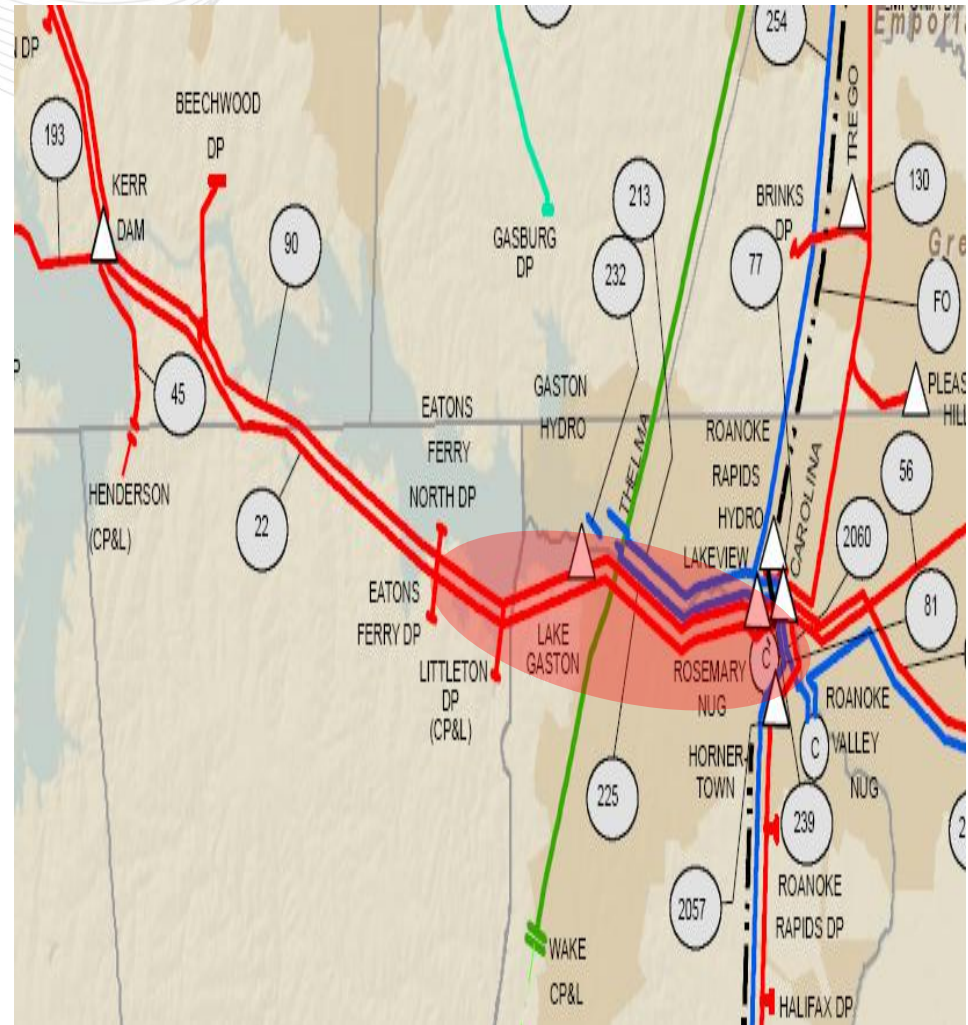
Proposed Solution:

Option 1 Is the best long-term solution based on economics and because it rebuilds a two pole wood H frame line built in 1957. Investigating the use of dynamic rating technology to increase rating of line #33 from Halifax – Chase City 115 kV during the years prior to construction.

Expected IS Date: 6/1/2016

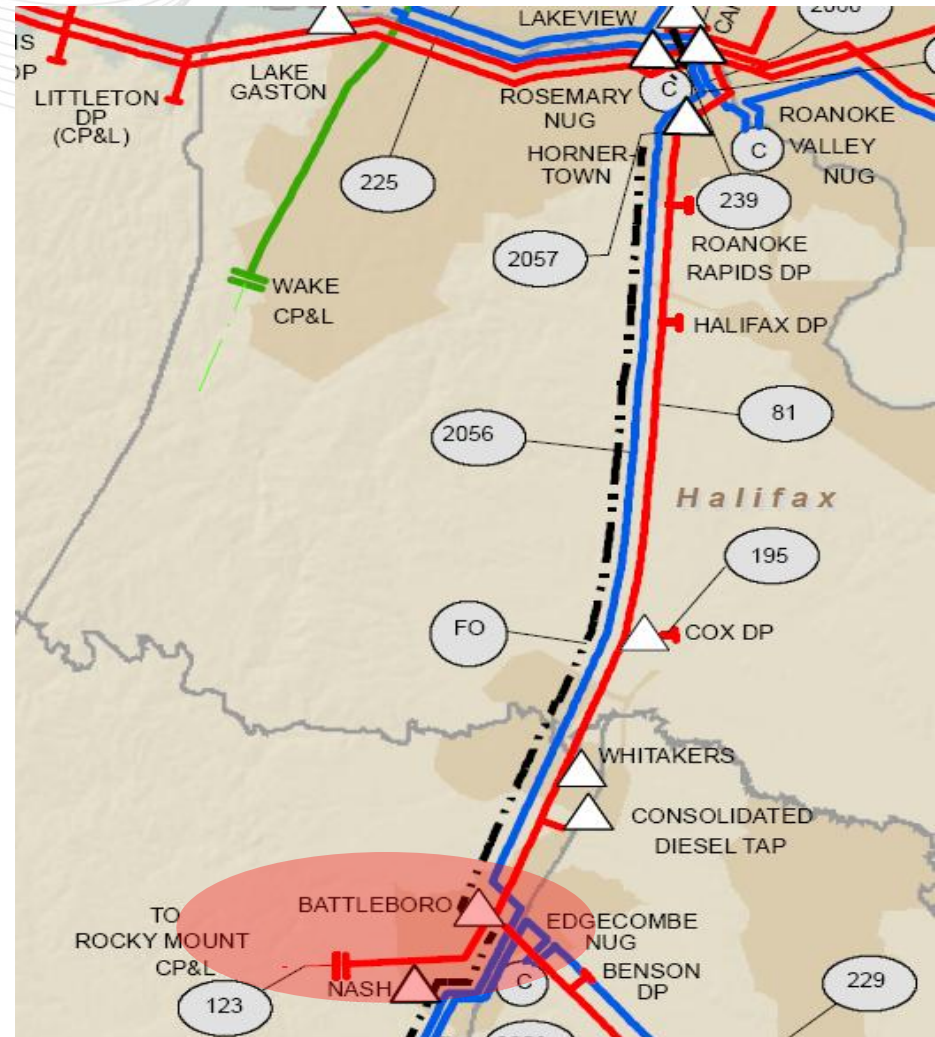
Region with thermal issues

- NERC Category B Violation
- Problem: The 2016 summer base case indicates the following deficiencies:
 - An outage of Line #90 breaker at Kerr overloads Line #22 from Eatons Ferry – Carolina 115kV
 - Surry 230 kV generation offline per Dominion Planning Criteria
- Proposed Solution –
 - Wreck and rebuild remaining section of Line #22, 19.5 miles and replace two pole H frame construction built in 1930.
- Expected IS Date: 6/1/2016
- Estimated Project Cost: \$ 25.0 M



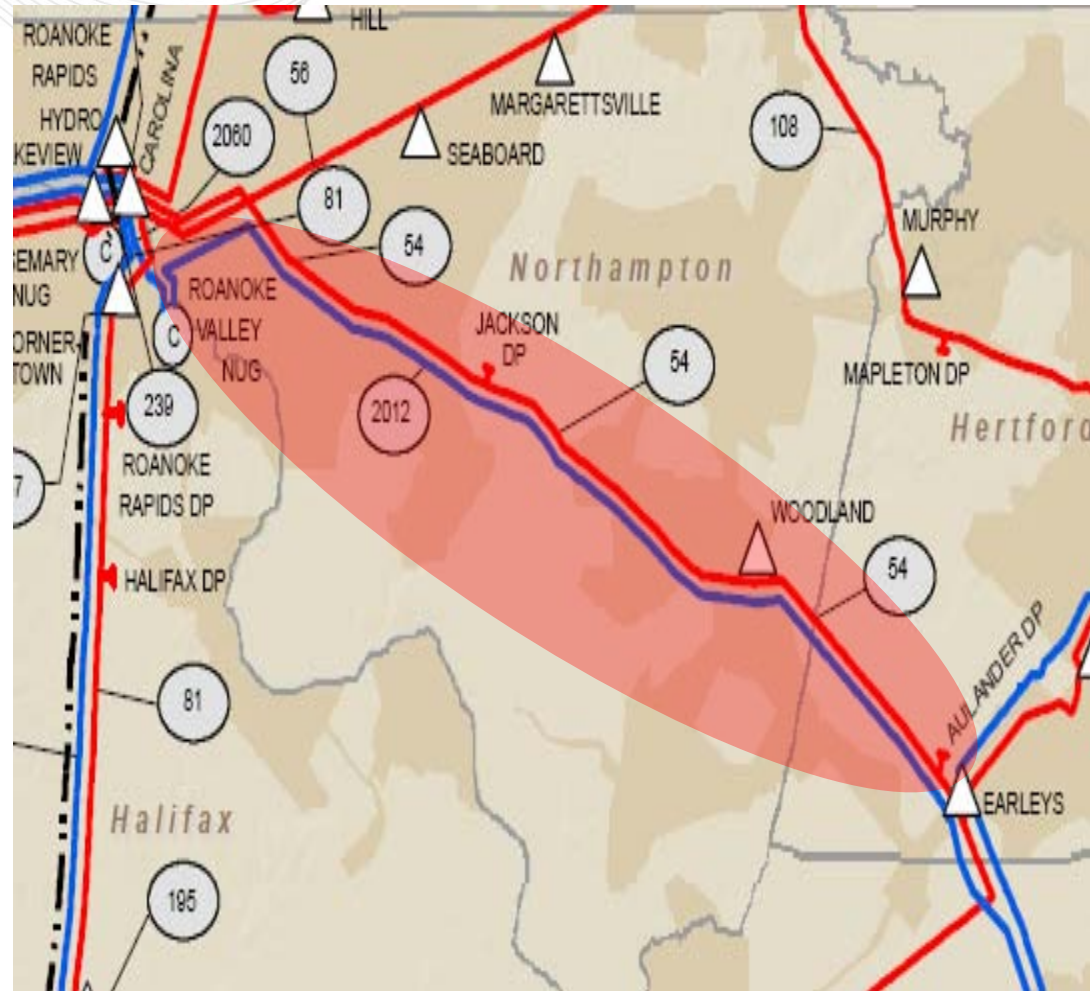
Region with thermal issues

- NERC Category B Violations
- Problem: The 2016 summer base case indicates the following deficiencies:
 - An outage of Line #81 (Battleboro – Carolina 115kV) breaker at Carolina overloads Line #123 (Rocky Mt – Battleboro 115kV)
 - Progress Energy Transmission Operating Procedure opens the 115 kV (tie line) breaker at Rocky Mt.
- Proposed Solution –
 - Split 230 kV Line #2056 (Hornertown to Rocky Mount) and double tap line to Battleboro Substation. Expand station, install a 230 kV 3 breaker ring bus at Battleboro and install a 230-115kV (224 MVA) transformer.
- Expected IS Date: 6/1/2016
- Estimated Project Cost : \$ 8.0 M



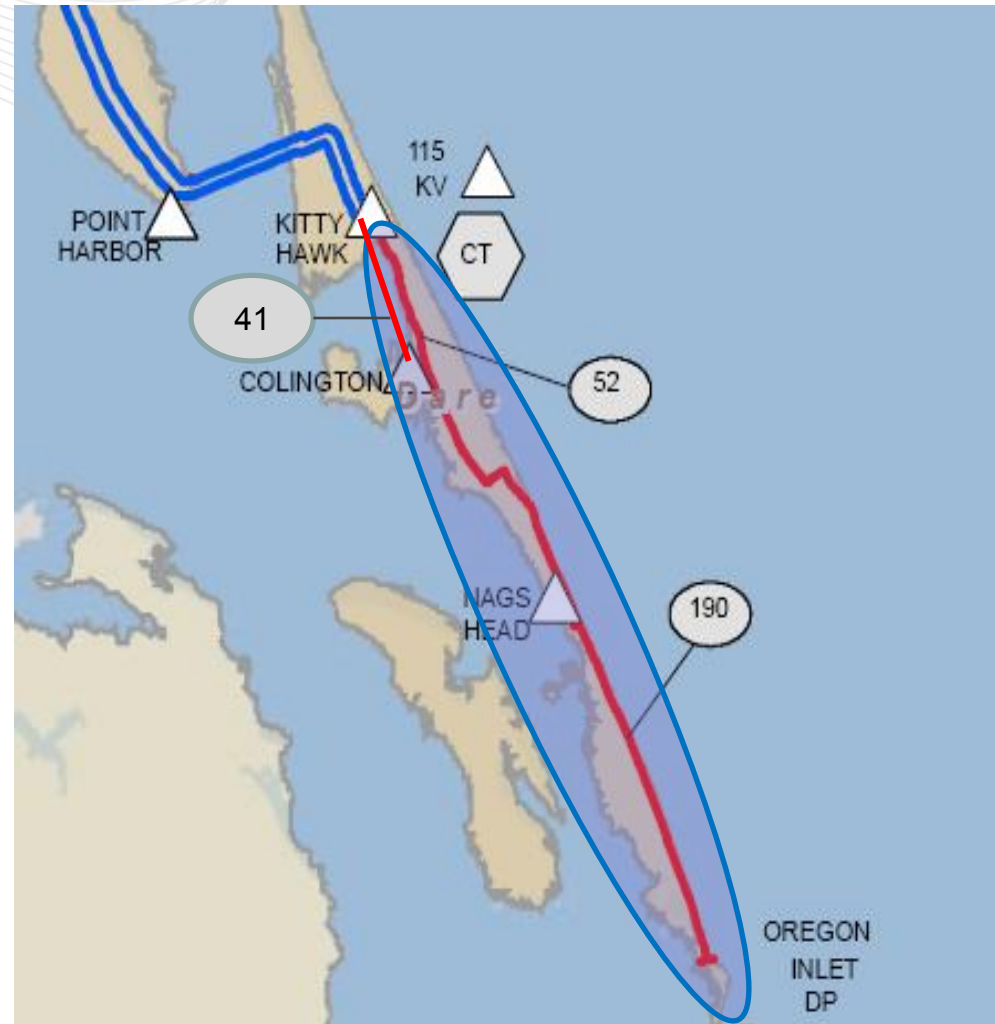
Region with thermal issues

- NERC Category B Violations
- Problem: The 2016 summer base case indicates the following deficiencies:
 - An outage of Line #2012 (Roanoke Valley – Earleys 230 kV) line overloads a segment of Line #54 (Carolina to Woodland 115kV) without Surry 230 kV generation available per Dominion planning criteria.
- Proposed Solution
 - Reconductor segment of Line #54 (Carolina to Woodland 115kV) to a minimum of 300 MVA. Most of the 27 miles of line are on the same structures with Line # 2012. Preliminary Engineering review indicates that the structures will not need to be replaced due to the reconductoring.
- Expected IS Date: 6/1/2016
- Estimated Project Cost \$ 18.0 M



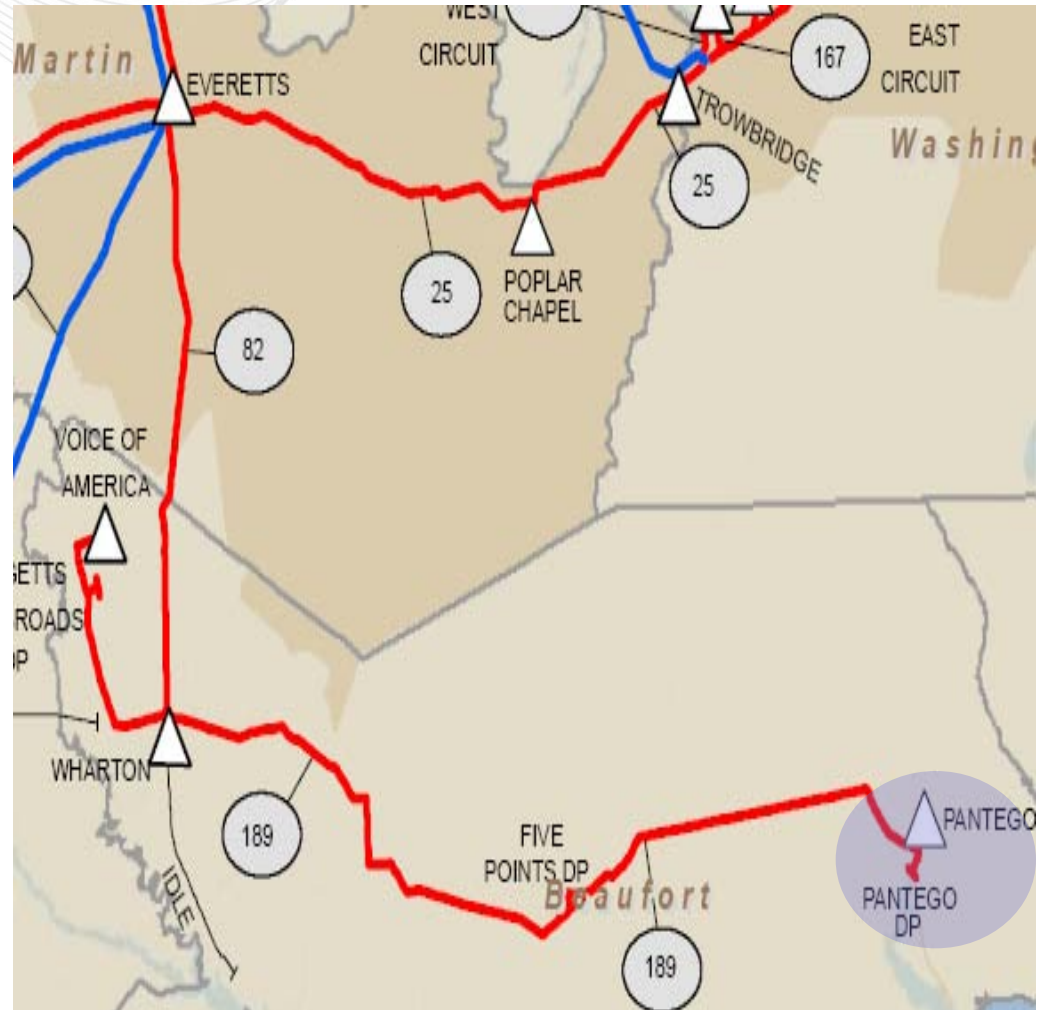
Region with voltage issues

- NERC Category B Violations
- Problem: The 2016 summer base case indicates the following deficiencies:
 - An outage of Line #41 (Kitty Hawk – Colington 115 kV) causes low voltage magnitude on the Outer Banks. Voltages less than 88%
 - An outage of the SVC at Colington causes low voltage magnitude on the Outer Banks. Voltages less than 88%
- Proposed Solution –
 - Install 115 kV 25 MVAR capacitor bank at Kitty Hawk Substation
- Estimated Project Cost \$ 0.7 M
- Expected IS Date: 6/1/2016



Region with thermal issues

- NERC Category B Violations
- Problem: The 2016 summer base case indicates the following deficiencies:
 - An outage of Wharton 115 kV Capacitor bank cause low voltage magnitude at Pantego (92.5%)
- Proposed Solution –
 - Split Wharton 115 kV capacitor bank into two smaller units
 - Add additional reactive support in area by correcting power factor at Pantego 115 kV DP and Five Points 115 kV DP to minimum of 0.973
- Expected IS Date: 6/1/2016
- Estimated Project Cost: \$ 1.0 M

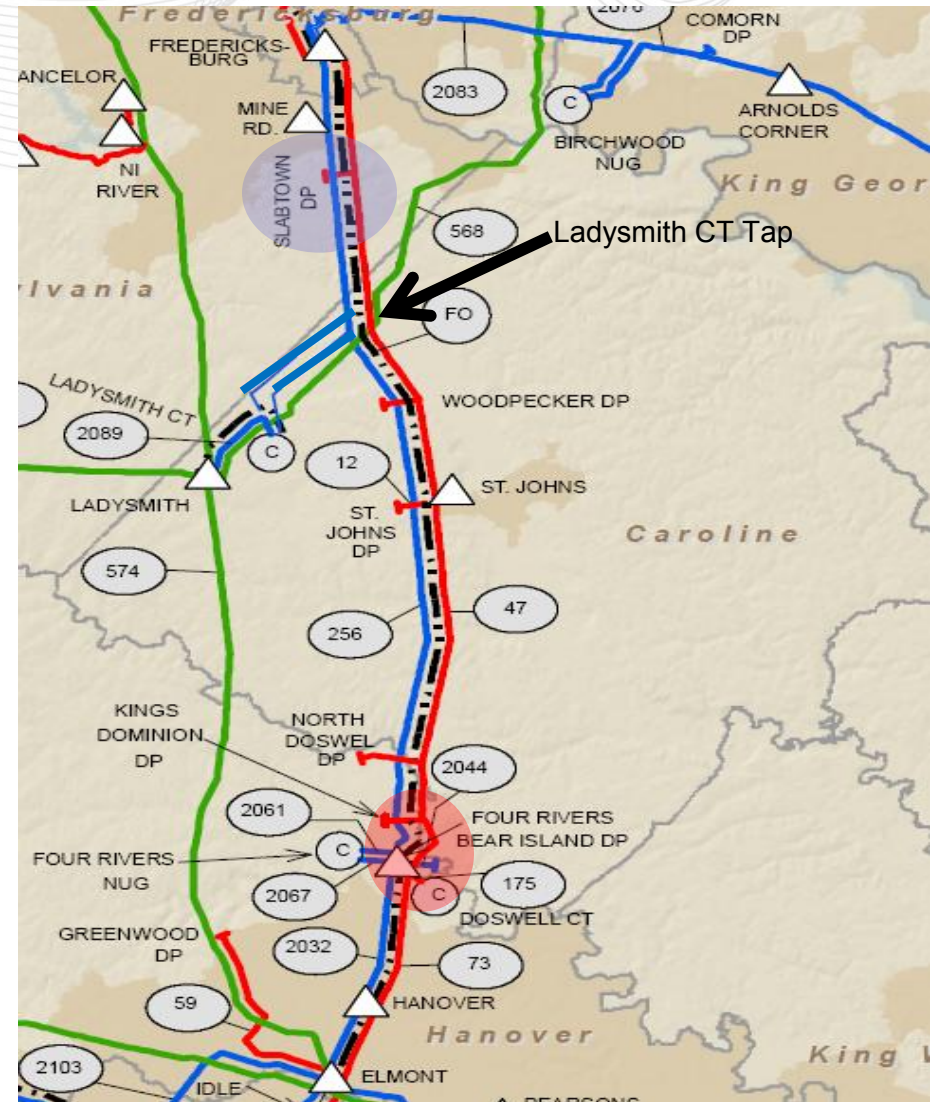


Outstanding Issues

 **Region with thermal issues**

 **Region with voltage issues**

- NERC Category B Violations
- Problem: The 2016 summer base case indicates the following deficiencies:
 - An outage of Line #2090 (Ladysmith CT – Mine Rd 230 kV) overloads Line #47 (Four Rivers – Kings Dominion 115 kV) (with Possum Point #5 off line per Dominion Planning Criteria)
 - An outage of Fredericksburg to Slabtown 115 kV causes low voltage magnitude at Slabtown 115 kV 0.917 pu (with Four Rivers 115 kV generation offline per Dominion Planning Criteria)
- Potential Solutions –
 1. Uprate or rebuild Line #47
 2. Convert load from 115 kV System to 230 kV System at Slabtown
 3. Convert Line #47 (Four Rivers – Fredericksburg 115 kV) between Fredericksburg and Ladysmith CT Tap to 230 kV and install a 230-115 kV Tx (Keep Line #47 between Four Rivers and Ladysmith CT at 115 kV)
- Long term analysis that incorporates new load information to be completed in February 2012
- Potential IS Date May 2016



Planning Area of Concern

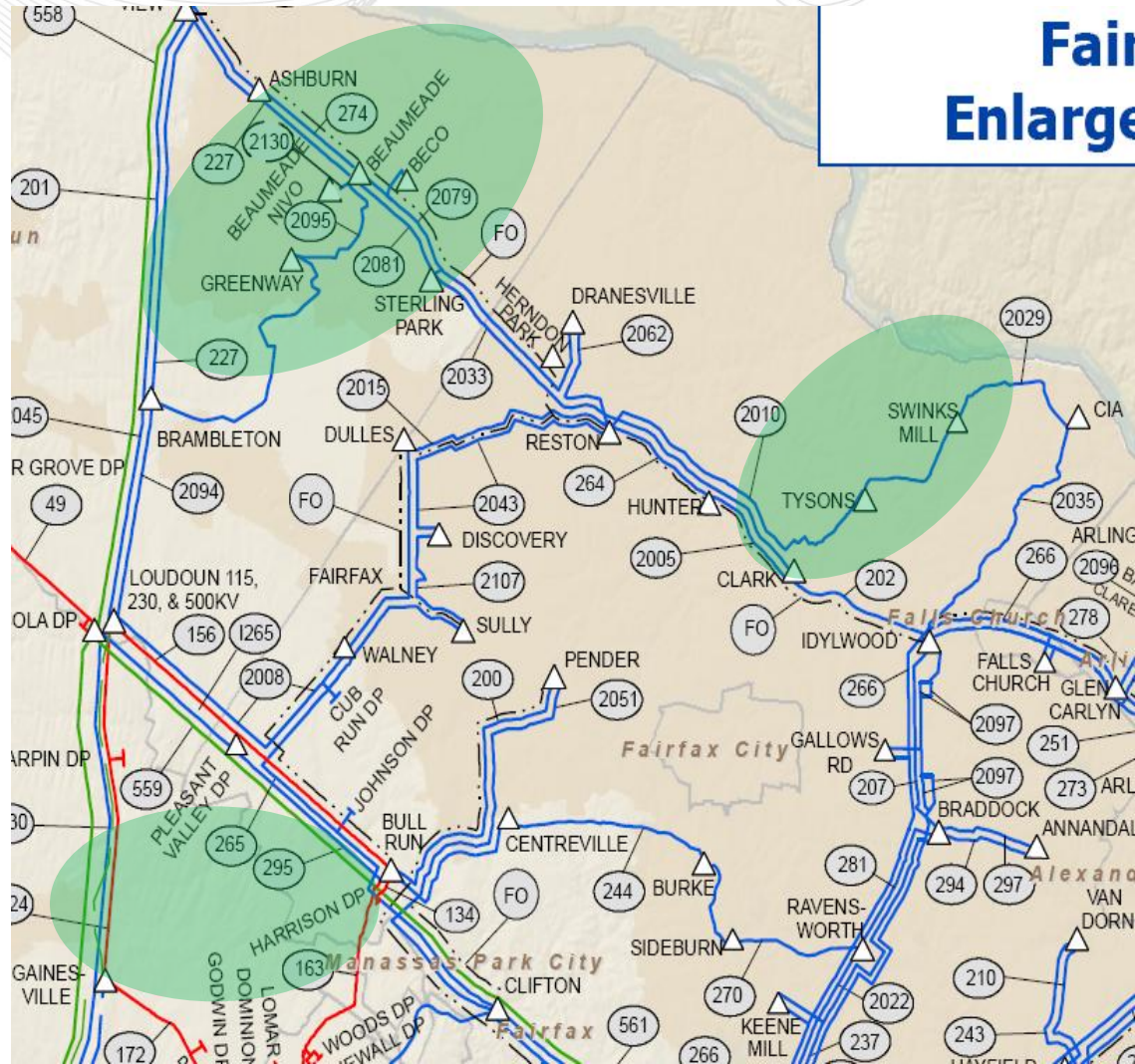
- Problem:
 - Rapid Load growth in area.
 - Potential for an additional 300-900 MW over existing models

- System Evaluation:
 - Develop a 2020 case to evaluate long term transmission expansion in area.
 - Evaluating HV and EHV possibilities.

- Estimated completion date for system evaluation is February 2012

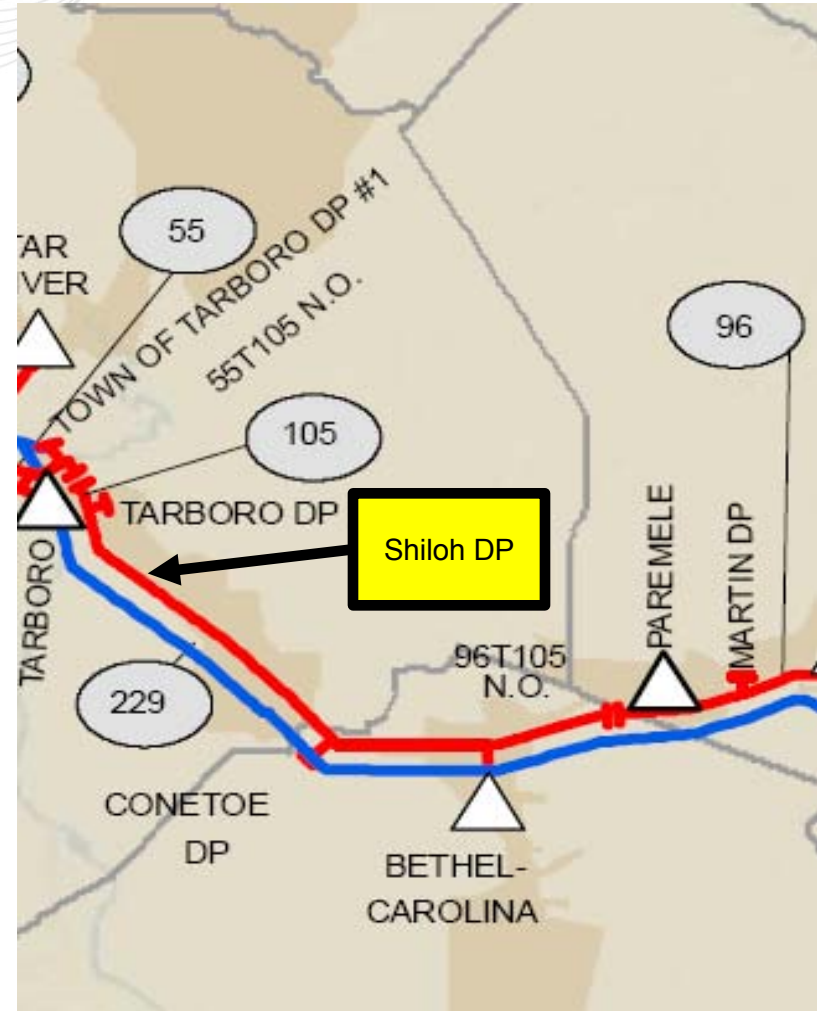
- Finalizing loads & Power Flow case by mid November 2011

Area of Concern



Supplemental Projects

- Establish a new Shiloh 115 kV (Edgecombe-Martin EMC) delivery point West of Parmele on line #105.
- Estimated load is 8 MW.



Shiloh 115 kV Delivery Point Supplemental Project

	Estimated Project Cost	Substation Cost	Transmission Cost	New ROW	Proposed Solution Meets Facility Connection Requirements
Solutions Considered:					
1. Build 1.7 mile long 115 kV Line and add 115 kV Breaker at tap point with Line #105	\$ 4.9 M	\$1.33 M	\$ 3.6 M	Yes	Yes
2. Loop Line #105 approximately 1.7 miles	\$ 4.4 M	\$ 0.0 M	\$ 4.4 M	Yes	Yes

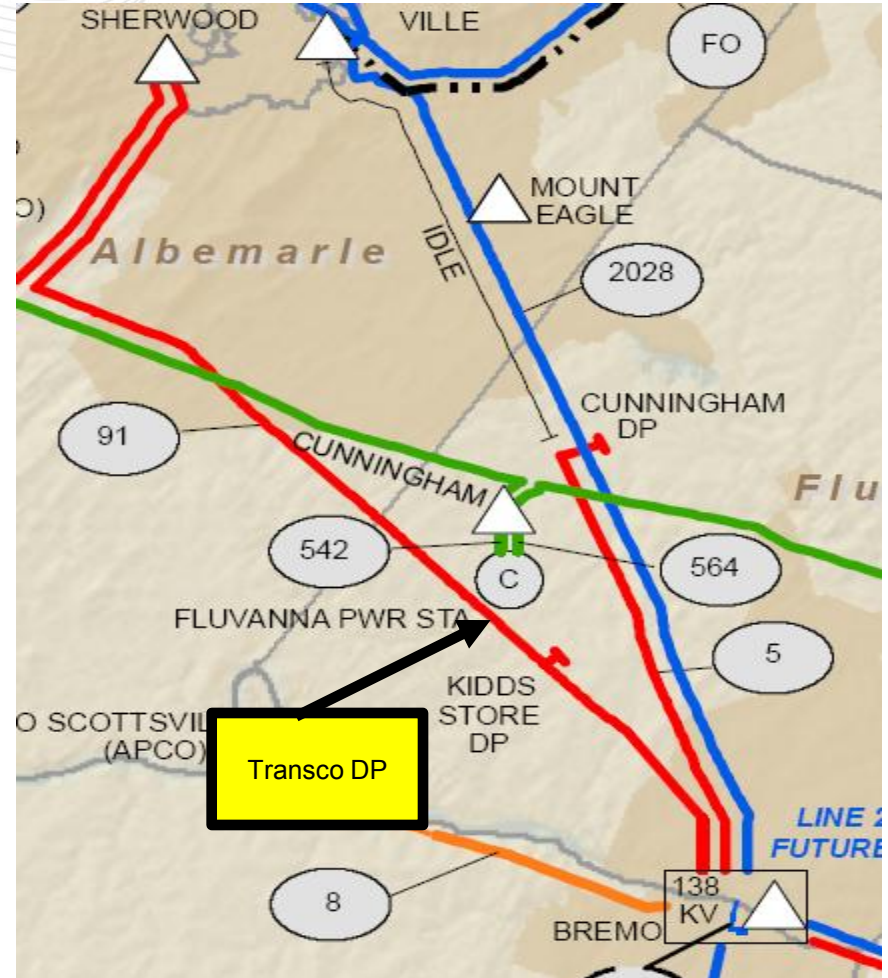
Proposed Solution:

Option 2 – Loop Line #105 to the proposed site

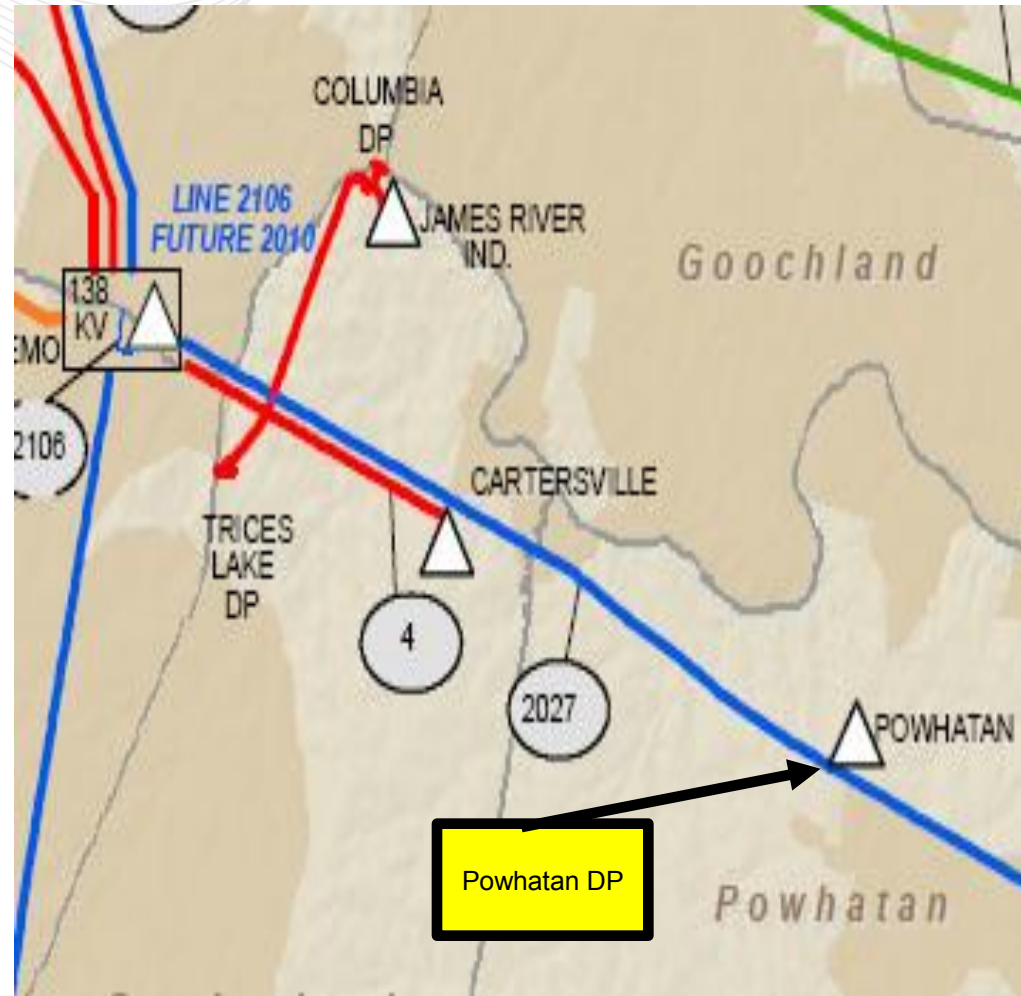
Expected IS Date: 9/2012

***Note:** Tap line greater than 1-mile and circuit voltage less than 138 kV therefore single breaker acceptable per Facility Connection Requirements

- New Transco 115 kV delivery point.
- Estimated load is 28 MW.
- Tap Line #91 (Sherwood to Bremo 115 kV) and install line switches and associated equipment
- Estimated Project Cost: \$ 0.75 M
- Potential IS Date: 10/2012



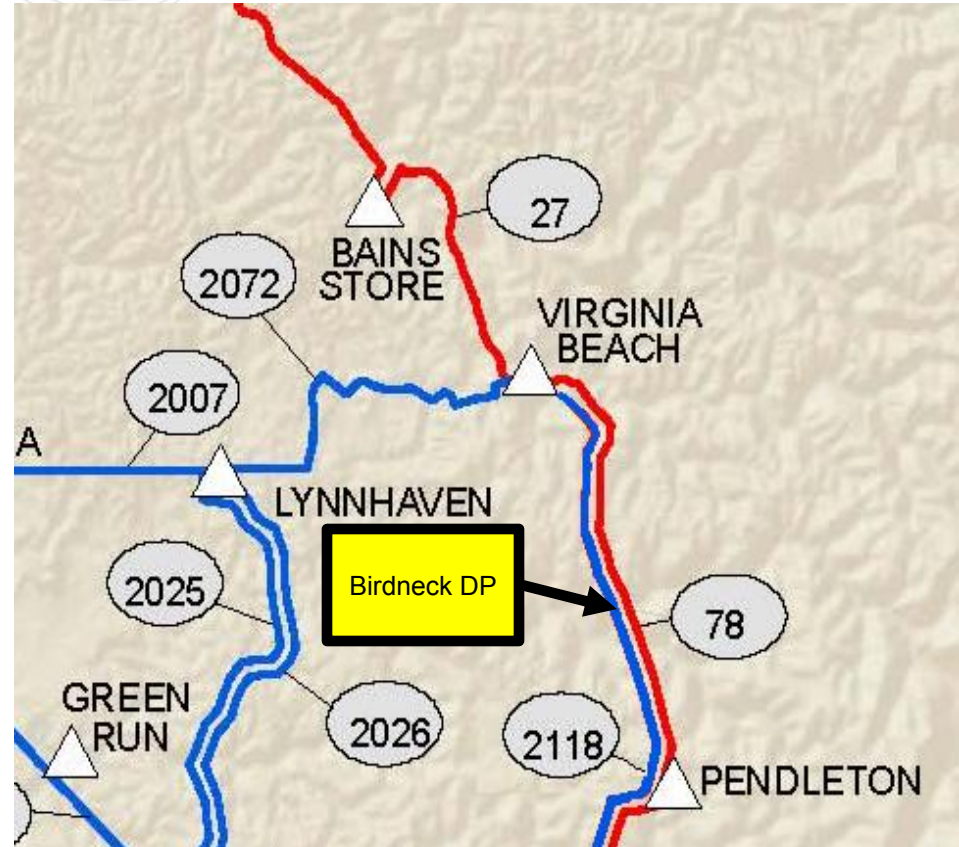
- Convert Powhatan DP from 35 kV to 230 kV.
- Estimated load 48 MW.
- Tap existing Powhatan 230 kV bus and install associated equipment.
- Estimated Project Cost: \$ 0.75 M
- Potential IS Date: 8/2012



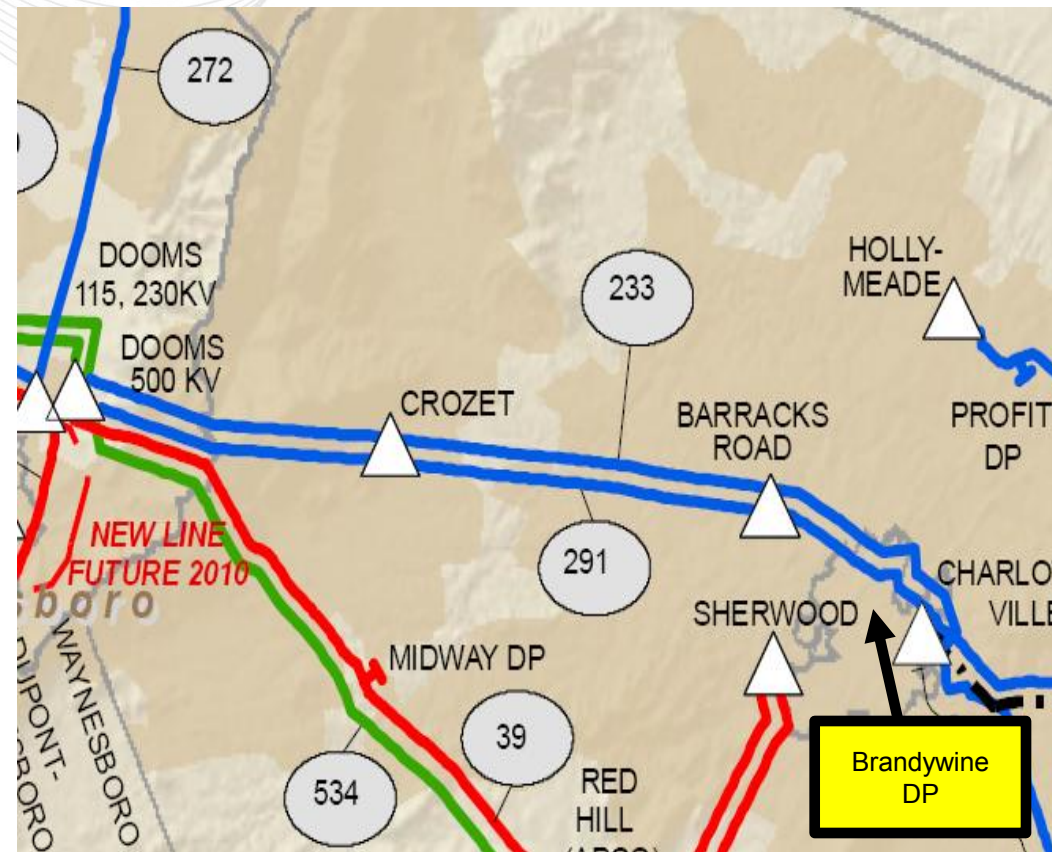
- New Elko 230kV delivery point
- Estimated initial load is 20 MW.
- Tap line #286 (Darbytown to White Oak) and install line switches and associated equipment.
- Estimated Project Cost: \$0.35 M
- Potential IS Date: 5/2012



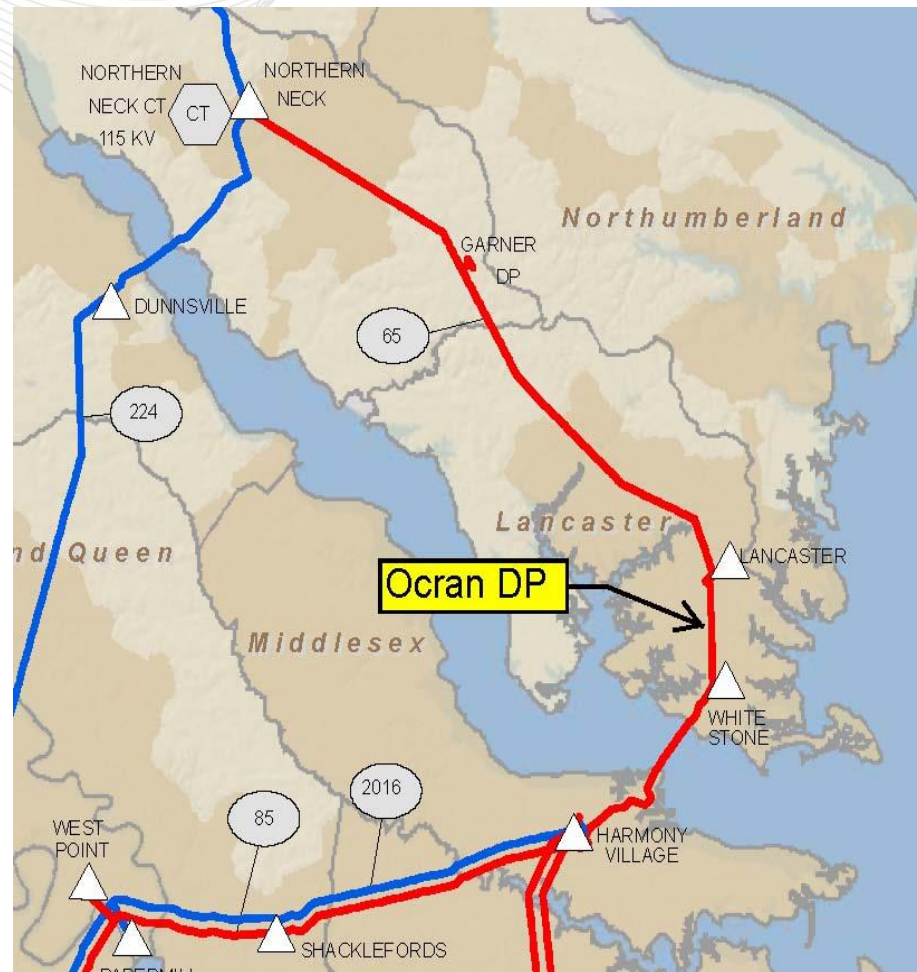
- New Birdneck 230 kV delivery point in Virginia Beach, VA.
- Estimated load is 60 MW.
- Tap line #2118 (Landstown to Virginia Beach) and install line switches and associated equipment.
- Estimated Project Cost: \$0.75 M
- Potential IS Date: 5/2013



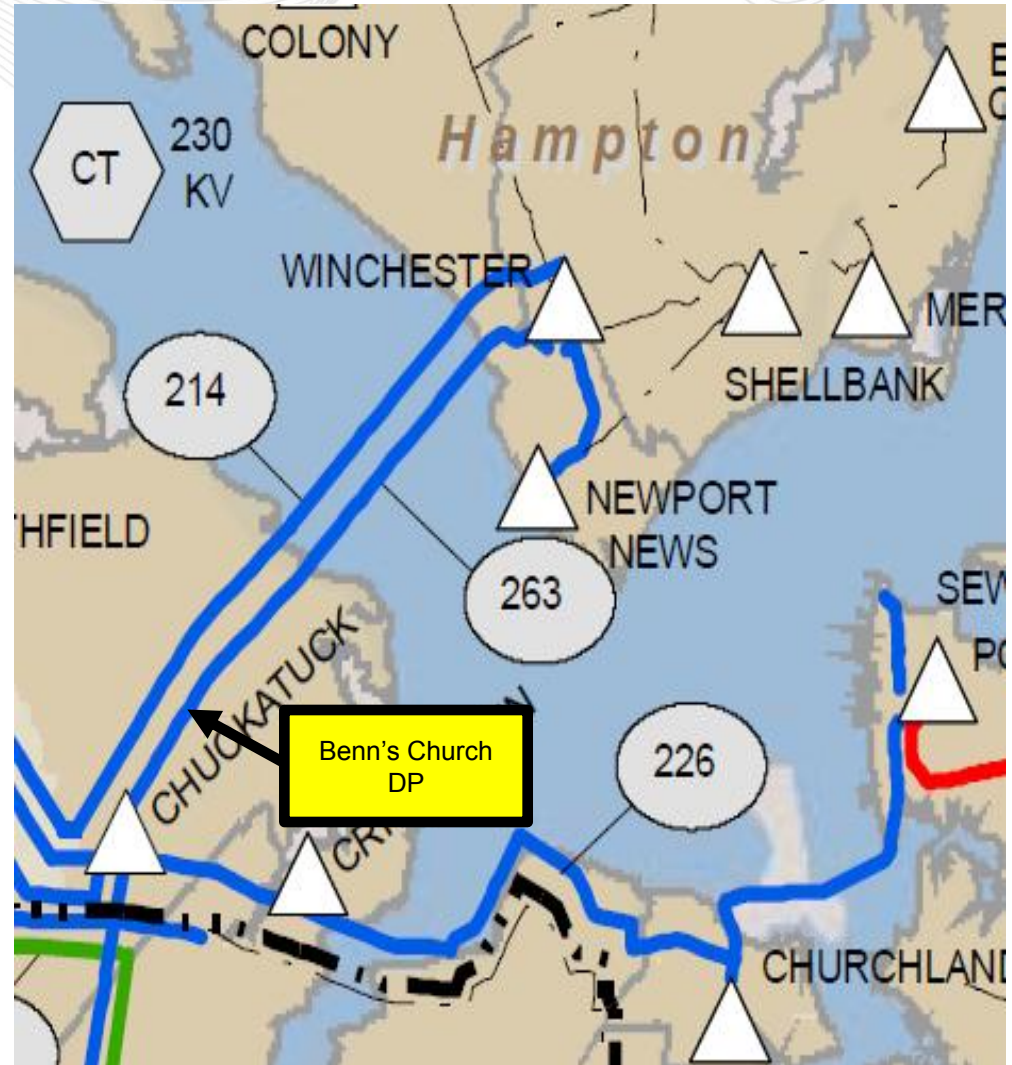
- New Brandywine 230 kV delivery point in Charlottesville, VA.
- Estimated load is 60 MW
- Tap line #233 (Dooms to Charlottesville) and install line switches and associated equipment.
- Estimated Project Cost: \$0.75 M
- Potential IS Date: 8/2013



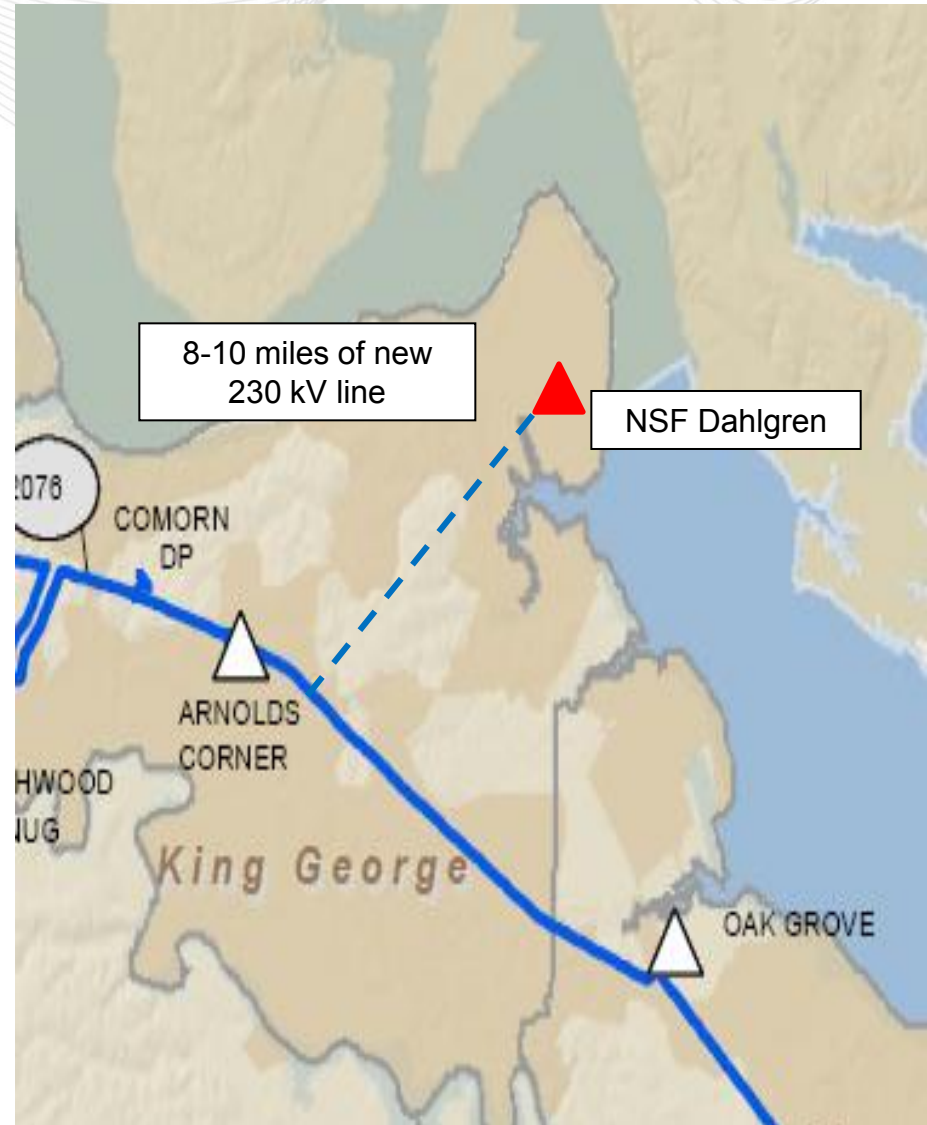
- New Ocran 115 kV delivery point.
- Estimated load is 12 MW.
- Tap line #65 (Northern Neck to Harmony Village) and install line switches and associated equipment.
- Estimated Project Cost: \$0.75 M
- Potential IS Date: 5/2013



- New Benn's Church 230 kV delivery point.
- Estimated load is 31 MW.
- Estimated Project Cost: \$0.85 M
- Potential IS Date: 5/2014



- New transmission delivery point at NSF Dahlgren
- Will serve a projected load of 45 MW in 2014, growing to an expected 85 MW in 2017
- Note: revised analysis based on 2011 load projections delayed previous voltage violations from 2014 to 2017 which removed the 2014 need for reactive reinforcements.



Dahlgren 230 kV Delivery Point Supplemental Project

	Estimated Project Cost	Substation Cost	Transmission Cost (Includes ROW)	New ROW	Proposed Solution Meets Facility Connection Requirements
Solutions Considered:					
1. Establish a new 230 kV breaker station in the vicinity of Arnolds and build a radial 230 kV line to Dahlgren site. Estimated Project Cost \$ 31.2 M	\$ 31.2 M	\$ 4.9 M *	\$ 26.2 M	Yes	Yes
2. Split existing 230 kV line in the vicinity of Arnolds Corner and loop the 230 kV line in and out of the Dahlgren site.	\$ 30.9 M	\$2.7 M	\$ 28.2 M	Yes	Yes
3. Install 230-115 (or 69) kV Transformer and build 115 (or 69 kV) line to Dahlgren site	\$ 31.9 M	\$ 9.6 M	\$ 22.3 M	Yes	Yes
3. Build a radial 230 kV line from Morgantown PS to Dahlgren.	\$ 70.0 M	\$3.0 M	\$ 67.0 M	Yes	Yes

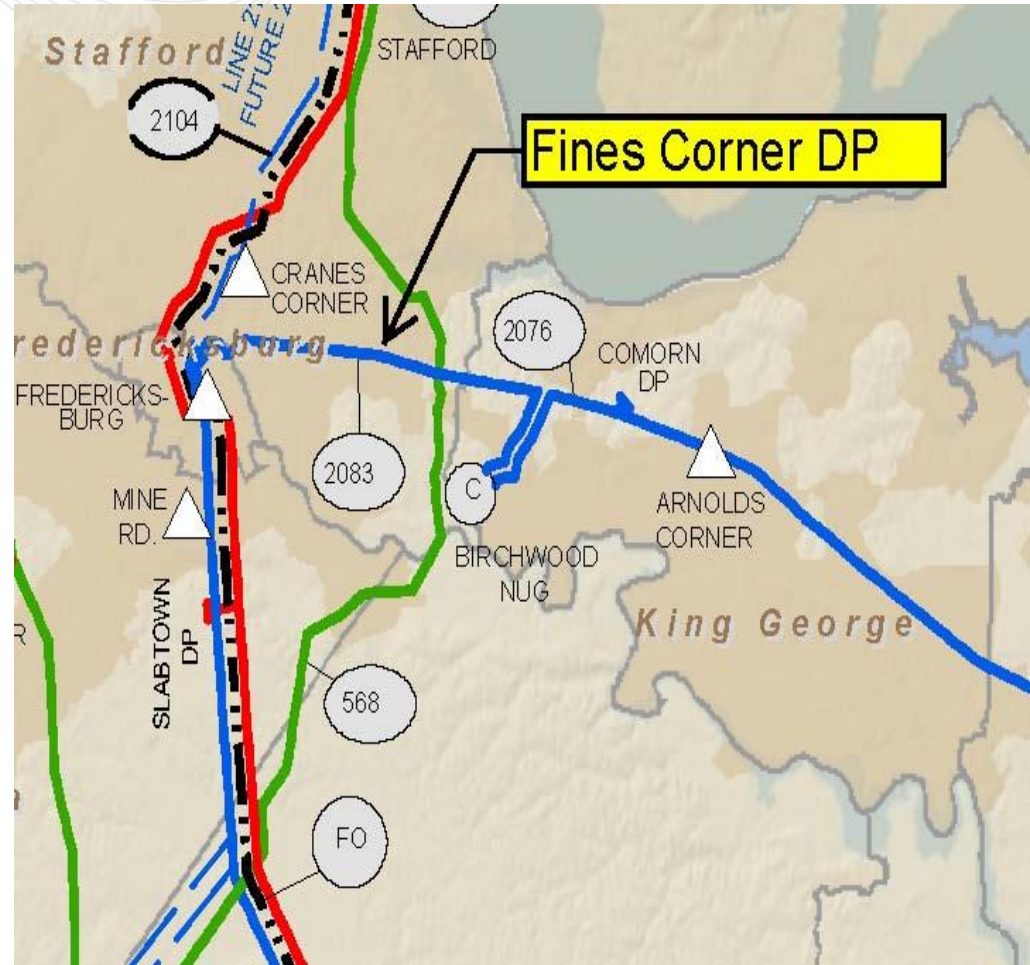
Recommended Solution:

Solution 2

Expected IS Date: 5/2014

***Note:** Tap line greater than 1-mile and circuit voltage greater than 138 kV therefore breaker station required per Facility Connection Requirements

- New Fines Corner 230kV delivery point.
- Estimated load is 18 MW.
- Tap line #2083 (Fredericksburg to Birchwood) and install line switches and associated equipment.
- Estimated Project Cost: \$ 0.75 M
- Potential IS Date: 5/2014



- New Elm Farm 115 kV delivery point in Woodbridge, VA.
- Estimated initial load is 30 MW.
- Tap line #183 (Bristers to Ox) and install line switches and associated equipment.
- Estimated Project Cost: \$0.75 M
- Potential IS Date: 5/2015

