Dominion Supplemental Projects

Transmission Expansion Advisory Committee
October 6, 2020

Needs

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

Dominion Transmission Zone: Supplemental Customer Load Request

Need Number: DOM-2020-0035

Process Stage: Need Meeting 10/06/2020

Project Driver: Customer Service

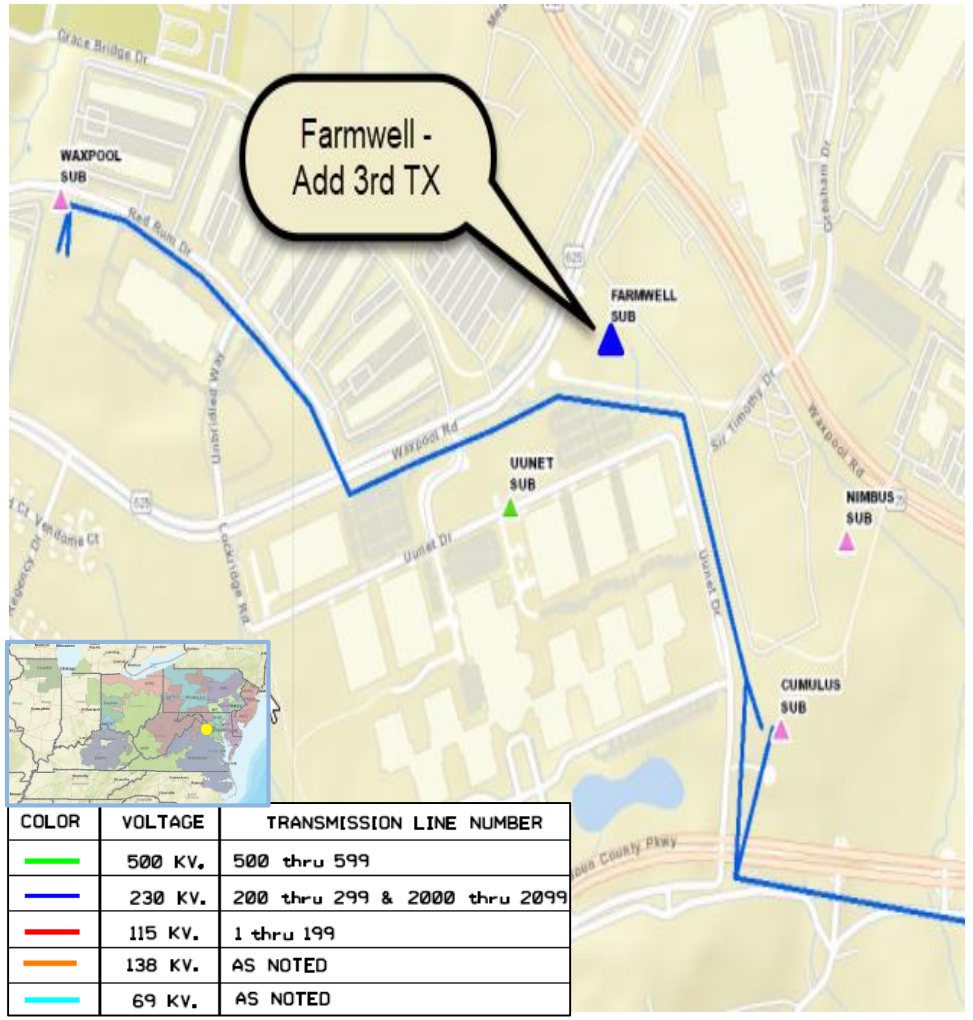
Specific Assumption References:

Customer load request will be evaluated per Dominion's Facility Interconnection Requirements Document and Dominion's Transmission Planning Criteria.

Problem Statement:

DEV Distribution has submitted a DP Request to add a 3rd distribution transformer at Farmwell Substation in Loudoun County. The new transformer is being driven by continued load growth in the area and contingency loading for loss of one of the existing transformers. Requested in-service date is 01/01/2023.

Initial In-Service Load	Projected 2025 Load
Summer: 136.3 MW	Summer: 228.2 MW



Dominion Transmission Zone: Supplemental Equipment Material Condition, Performance and Risk

Need Number: DOM-2020-0036

Process Stage: Need Meeting 10/06/2020

Project Driver: Equipment Material Condition, Performance and Risk

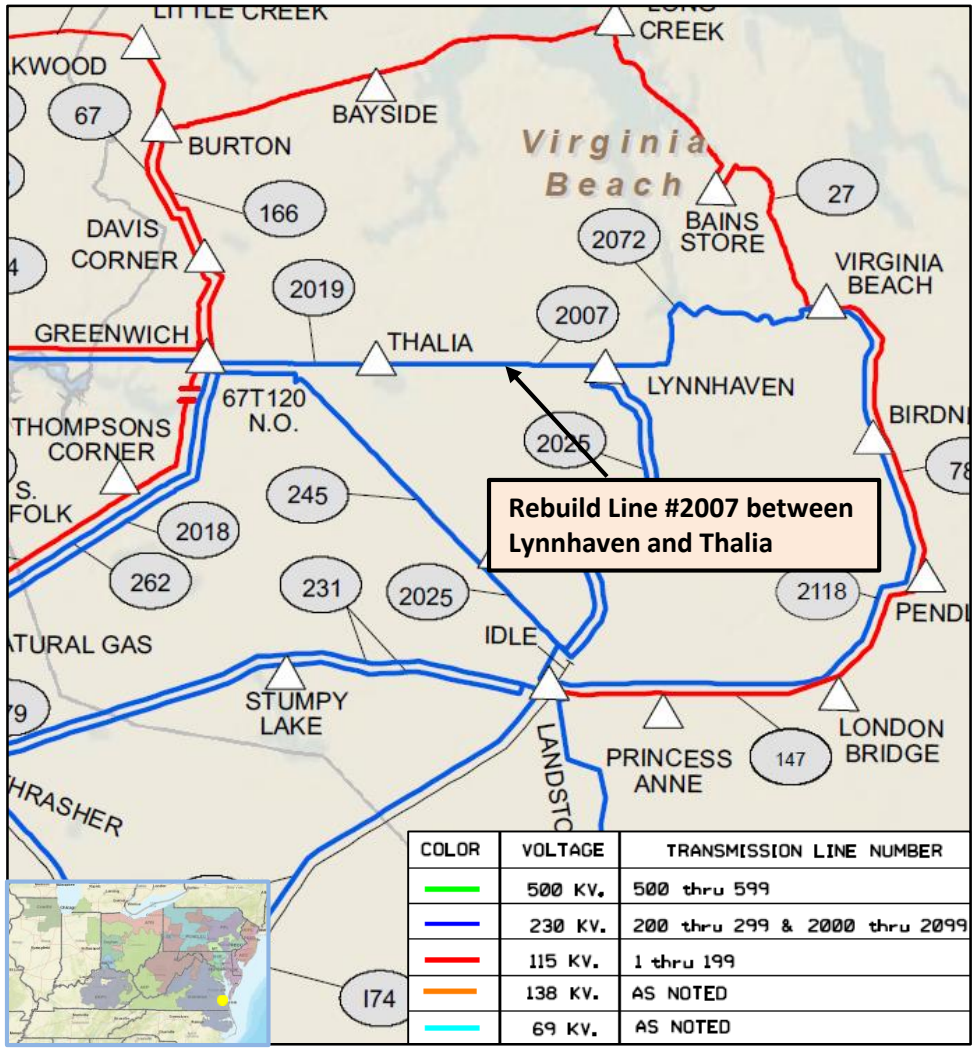
Specific Assumption References:

See details on Equipment Material Condition, Performance and Risk in Dominion's Planning Assumptions presented in December 2019 and updated in June 2020.

Problem Statement:

Dominion Energy has identified a need to replace 60 concrete structures of 230kV Line #2007 (Lynnhaven – Thalia) based on the Company's End of Life criteria.

- The 3.37 miles long line was constructed on concrete structures in 1970. These structures have developed significant structural concerns as they age.
- Every pole is experiencing hairline cracking at a minimum, and many of the poles have more advanced cracking that has exposed some of the interior reinforcing bars and cables.
- The cracks allow for significant water infiltration which can accelerate the deterioration of the concrete and cause rusting of the steel reinforcing components.
- The 230kV Line #2007 provides service to Thalia substation with approximately 134 MW of tapped load.



Dominion Transmission Zone: Supplemental Equipment Material Condition, Performance and Risk

Need Number: DOM-2020-0037

Process Stage: Need Meeting 10/06/2020

Project Driver: Equipment Material Condition, Performance and Risk

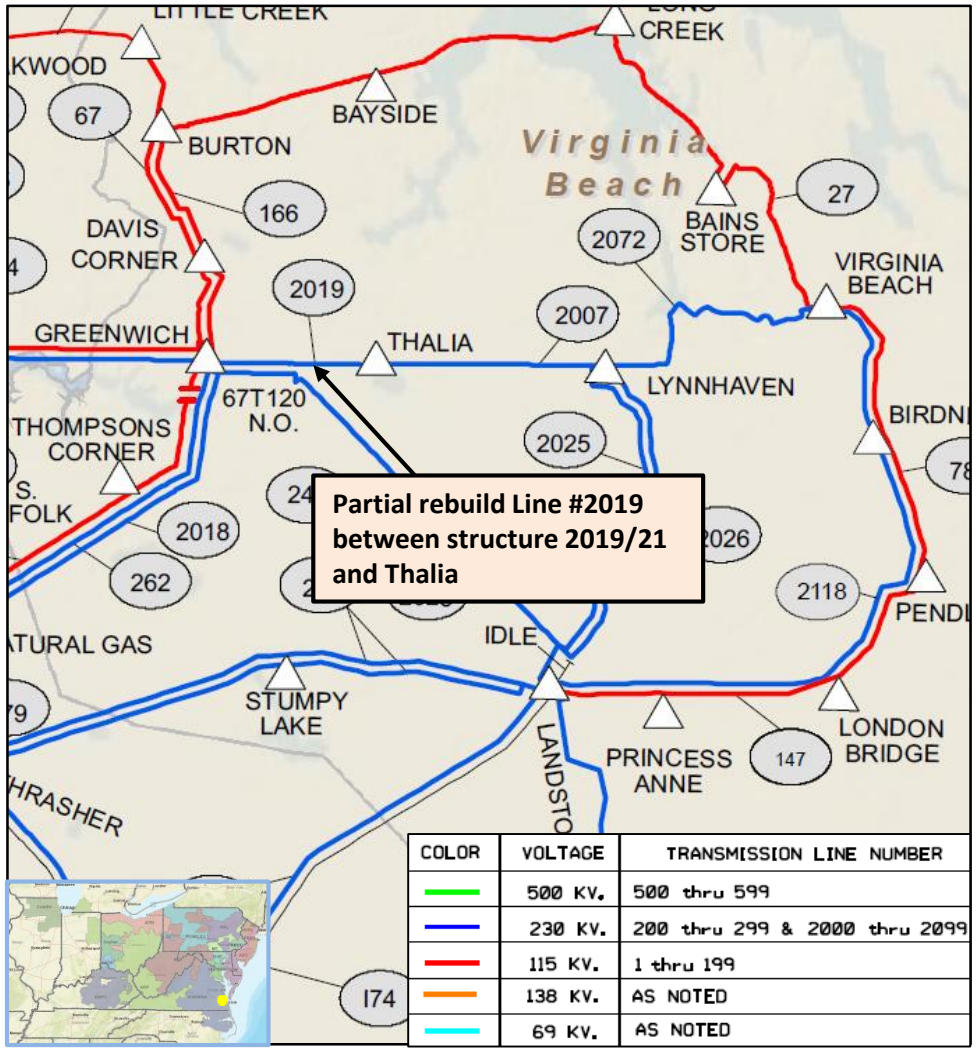
Specific Assumption References:

See details on Equipment Material Condition, Performance and Risk in Dominion's Planning Assumptions presented in December 2019 and updated in June 2020.

Problem Statement:

Dominion Energy has identified a need to replace 20 concrete structures (Structure 2019/21 – Thalia segment) of 230kV Line #2019 (Greenwich – Thalia) based on the Company's End of Life criteria.

- The 1.17 miles segment of 230kV Line #2019 was constructed on concrete structures in 1970. These structures have developed significant structural concerns as they age.
- Every pole is experiencing hairline cracking at a minimum, and many of the poles have more advanced cracking that has exposed some of the interior reinforcing bars and cables.
- The cracks allow for significant water infiltration which can accelerate the deterioration of the concrete and cause rusting of the steel reinforcing components.
- The 230kV Line #2019 provides service to Thalia substation with approximately 134 MW of tapped load.



Solutions

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

Dominion Transmission Zone: Supplemental Customer Load Request

Need Number: DOM-2019-0005 (s2108) **- Update**

Process Stage: Solutions Meeting 10/06/2020

Previously Presented: Solution Meeting 08/08/2019

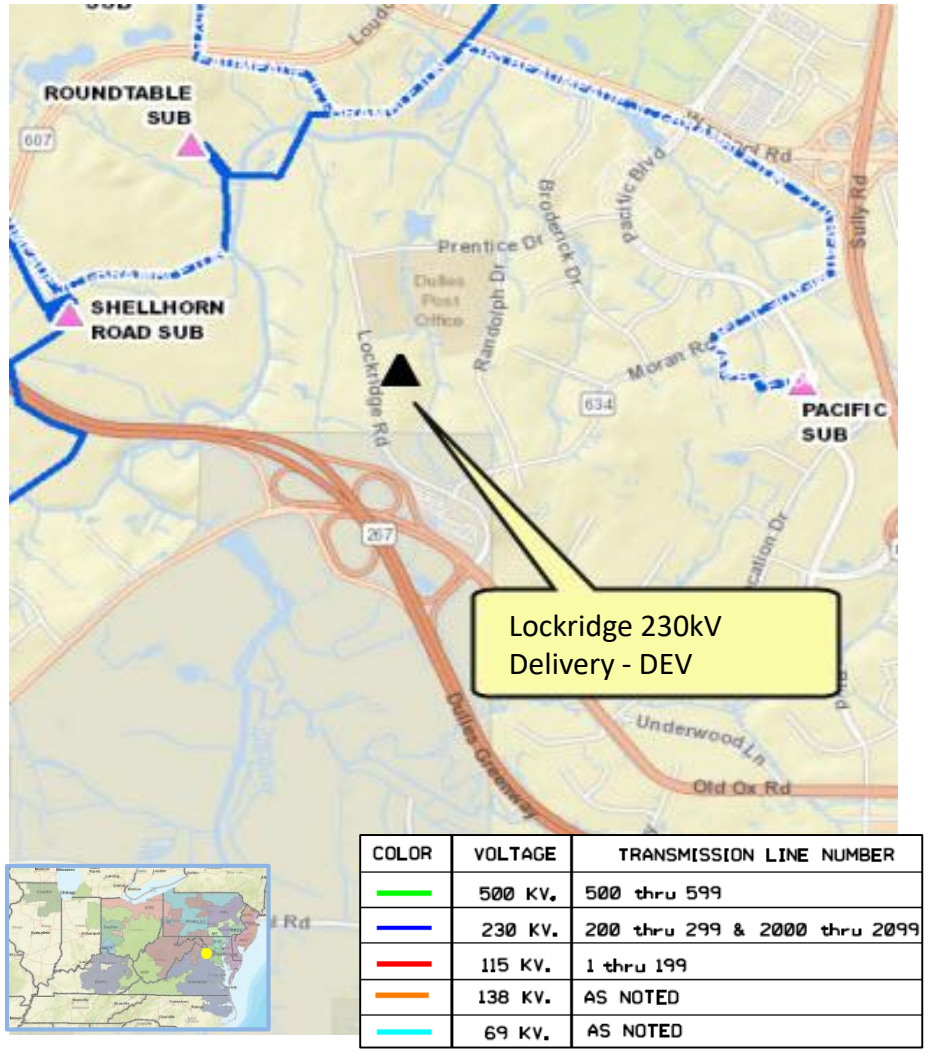
Project Driver: Customer Service

Specific Assumption References:

Customer load request will be evaluated per Dominion's Facility Interconnection Requirements Document and Dominion's Transmission Planning Criteria.

Problem Statement:

DEV Distribution has submitted a DP Request for a new substation (Lockridge) to support a new datacenter campus in Loudoun County with a total load in excess of 100 MW. The new station will also support existing data center load in the immediate area. Requested in-service date is 7/31/2022. Date changed from 09/30/2021 as previously presented.

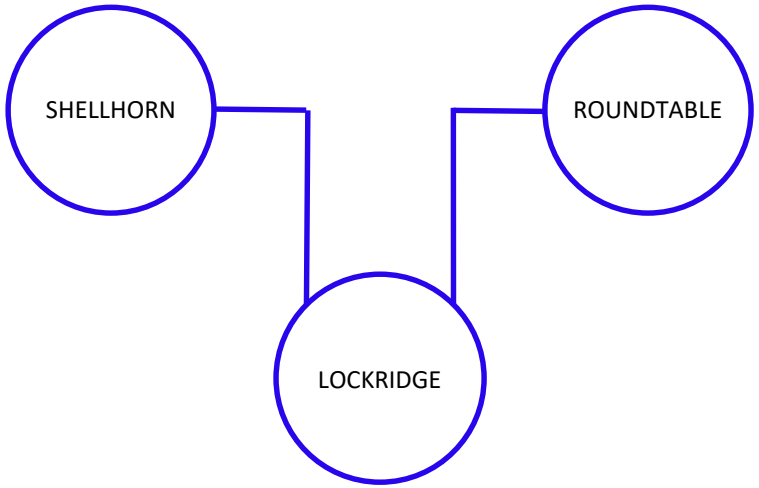


Dominion Transmission Zone: Supplemental Lockridge 230 kV Delivery - DEV

Need Number: DOM-2019-0005 (s2108) **- Update**
Process Stage: Solutions Meeting 10/06/2020
Updated Solution:
Currently in the 2025 RTEP Lockridge substation is being tapped off 230kV Line #2214 (Roundtable-Buttermilk). During the Virginia State Corporation Commission regulatory process the proposed solution was altered to tap 230kV Line #2188 (Shellhorn-Roundtable) due to routing. (Previously solution was to cut 230kV Line #2214 (Buttermilk-Roundtable) and extend a 1.8 mile 230kV Loop to Lockridge substation.

Cut an existing 230kV line between Shellhorn and Roundtable substations. Construct a 1.0 mile 230kV loop to Lockridge substation.

At Lockridge, install four 230kV breakers (station arranged as six breaker ring) to terminate the two lines. Install two 230kV circuit switchers and any necessary high side switches and bus work for two initial transformers (five ultimate). No changes to the scope at Lockridge substation.
Estimated Project Cost: $14.5 M (Previously $35.0M)
Alternatives Considered :
No feasible alternatives



Projected In-service Date: 7/31/2022
Project Status: Engineering
Model: 2025 RTEP

Dominion Transmission Zone: Supplemental Equipment Material Condition, Performance and Risk

Need Number: DOM-2020-0030
Process Stage: Solutions Meeting 10/06/2020
Previously Presented: Need Meeting 09/01/2020

Project Driver: Equipment Material Condition, Performance and Risk

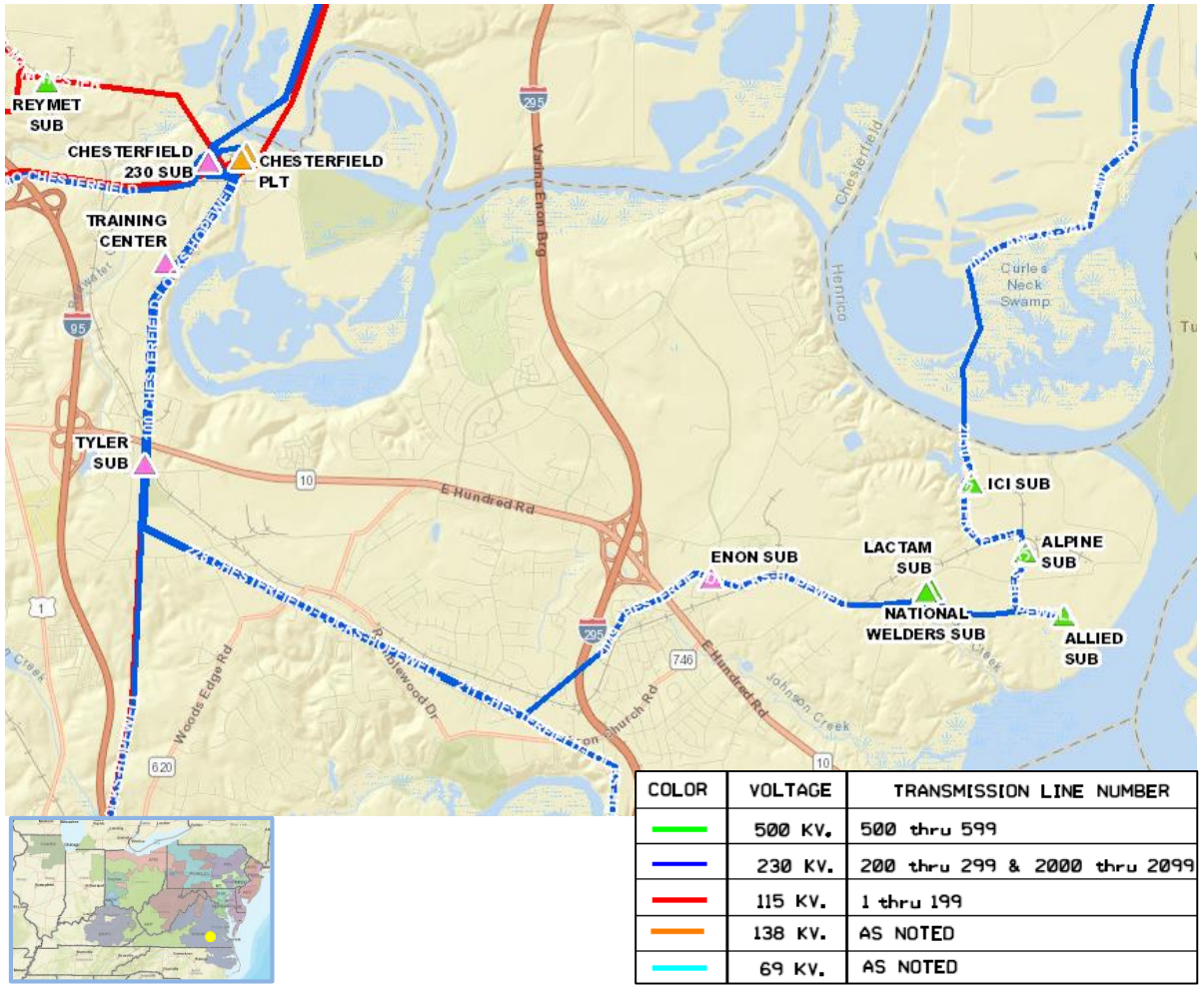
Specific Assumption References:

See details on Equipment Material Condition, Performance and Risk in Dominion's Planning Assumptions presented in December 2019 and updated in June 2020

Problem Statement:

Dominion Energy has identified a need to replace 16 existing transmission towers (Chesterfield – Enon segment) of 230kV Line #2049 (Chesterfield – Allied).

- Approximately 2.9 miles of 9.9 miles of this line was constructed on CORTEN structures and these structures are at the end of their useful life.
- The 230kV Line #2049 provides service to Enon and National Welders substations with approximately 33 MW and 15 MW tapped load.
- Removal of the Chesterfield – Enon segment will create a radial line exceeding Dominion's 700 MW/miles criteria.



Dominion Transmission Zone: Supplemental Line #2049 End-of-Life Rebuild

Need Number: DOM-2020-0030

Process Stage: Solutions Meeting 10/06/2020

Proposed Solution:
The 16 existing transmission CORTEN towers will be replaced with a single circuit weathering steel monopoles.

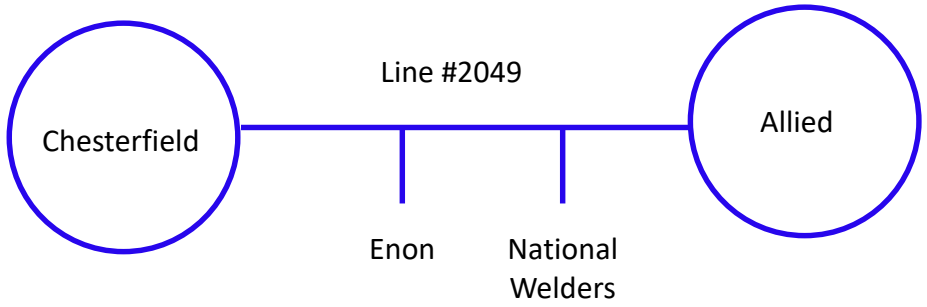
Estimated Project Cost: $4.8 M

Alternatives Considered:
No feasible alternatives

Projected In-service Date: 04/15/2022

Project Status: Engineering

Model:



Dominion Transmission Zone: Supplemental Customer Load Request

Need Number: DOM-2020-0031

Process Stage: Solutions Meeting 10/06/2020

Previously Presented: Need Meeting 09/01/2020

Project Driver: Customer Service

Specific Assumption References:

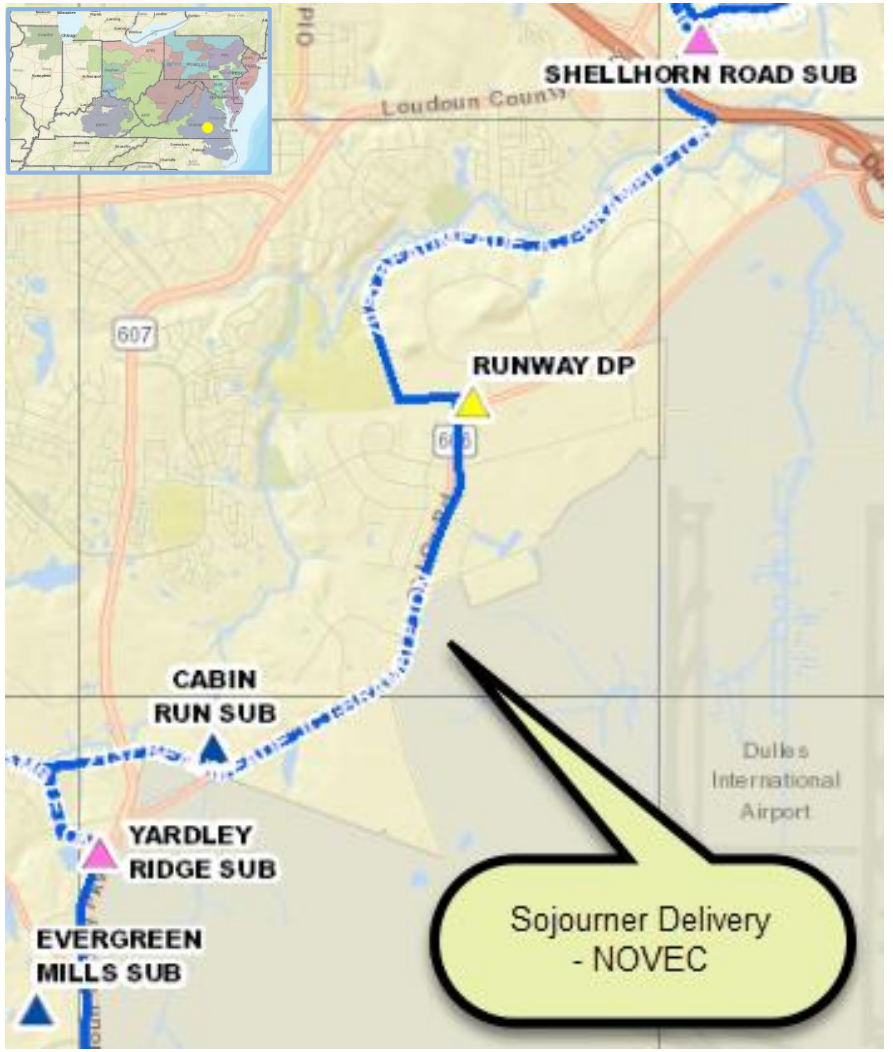
Customer load request will be evaluated per Dominion's Facility Interconnection Requirements Document and Dominion's Transmission Planning Criteria.

Problem Statement:

NOVEC has submitted a DP Request for a new substation (Sojourner) in Loudoun County with a total load in excess of 100MW by 2026. Requested in-service date is 03/15/2022.

Initial In-Service Load	Projected 2025 Load
Summer: 10.0 MW	Summer: 80.0 MW

COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED



Dominion Transmission Zone: Supplemental Sojourner 230kV Delivery - DEV

Need Number: DOM-2020-0031

Process Stage: Solutions Meeting 10/06/2020

Proposed Solution:

Interconnect the new substation by cutting and extending 230kV Line #2137 (Aviator-Shellhorn) to the proposed Sojourner Substation. Lines to terminate in a 230kV four-breaker ring arrangement with a provision to add two additional 230kV breakers for an ultimate of a six-breaker ring arrangement.

Estimated Project Cost: $8.0 M

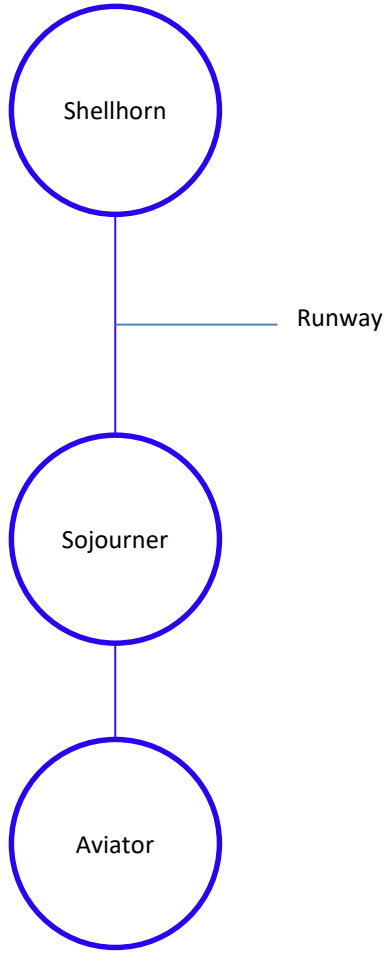
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 03/15/2022

Project Status: Engineering

Model: N/A



Dominion Transmission Zone: Supplemental Do No Harm (DNH) Analysis

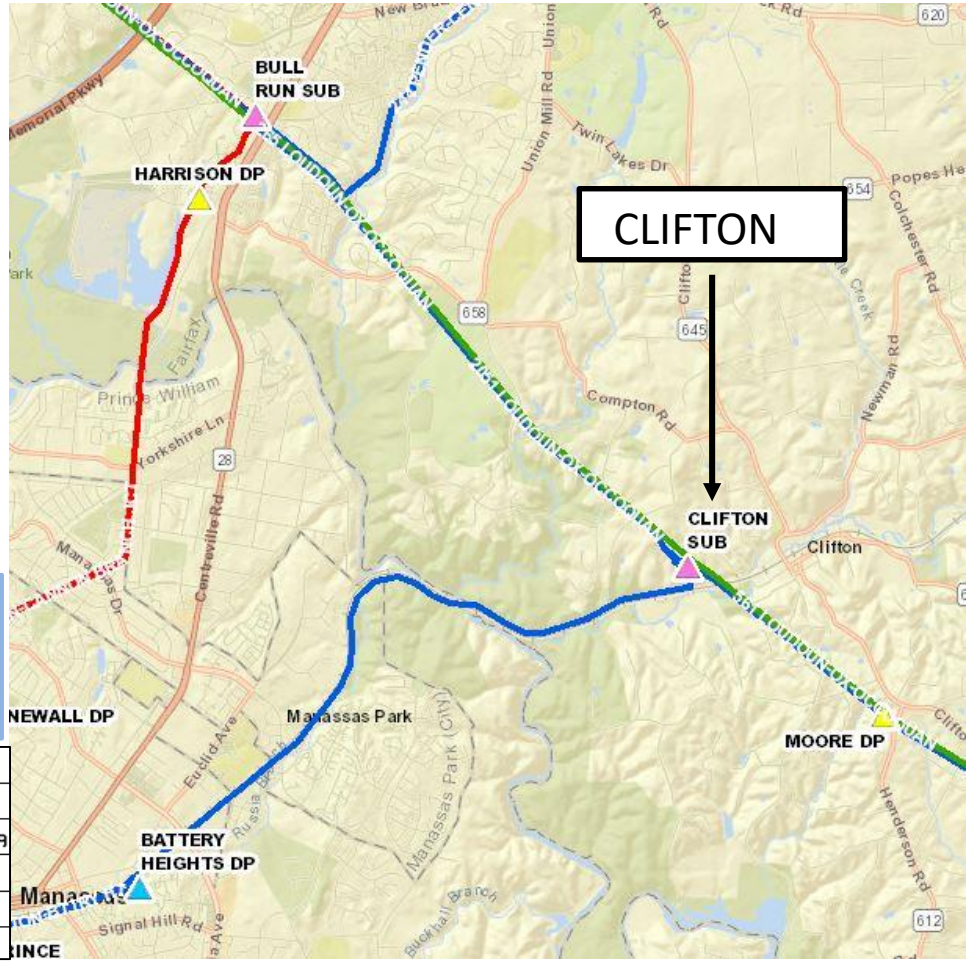
Need Number: DOM-2020-0013

Process Stage: Solutions Meeting 10/06/2020

Project Driver: Customer Service (Do No Harm Analysis)

Specific Assumption References:
None.

Problem Statement:
A Lincoln Park do-no-harm short circuit analysis identified Clifton L282 breaker as being overdutied.



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

Dominion Transmission Zone: Supplemental Do No Harm (DNH) Analysis

Need Number: DOM-2020-0013

Process Stage: Solutions Meeting 10/06/2020

Proposed Solution:
Replace 50KAIC Clifton L282 breaker with 63KAIC model.

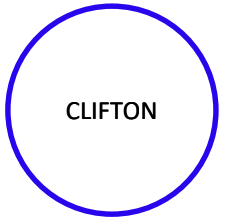
Estimated Project Cost: $0.467M

Alternatives Considered:
No feasible alternatives

Projected In-service Date: 06/01/2025

Project Status: Engineering

Model: PJM 2025 Short Circuit case



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2020-0001, DOM-2020-0004, DOM-2020-0005
Meeting Date: 10/06/2020

Process Stage: SOLUTIONS
Supplemental Project Driver: Do No Harm Analysis

Specific Assumption Reference:

Customer load request will be evaluated per Dominion's Facility Interconnections Requirements Document & Dominion's Transmission Planning Criteria.

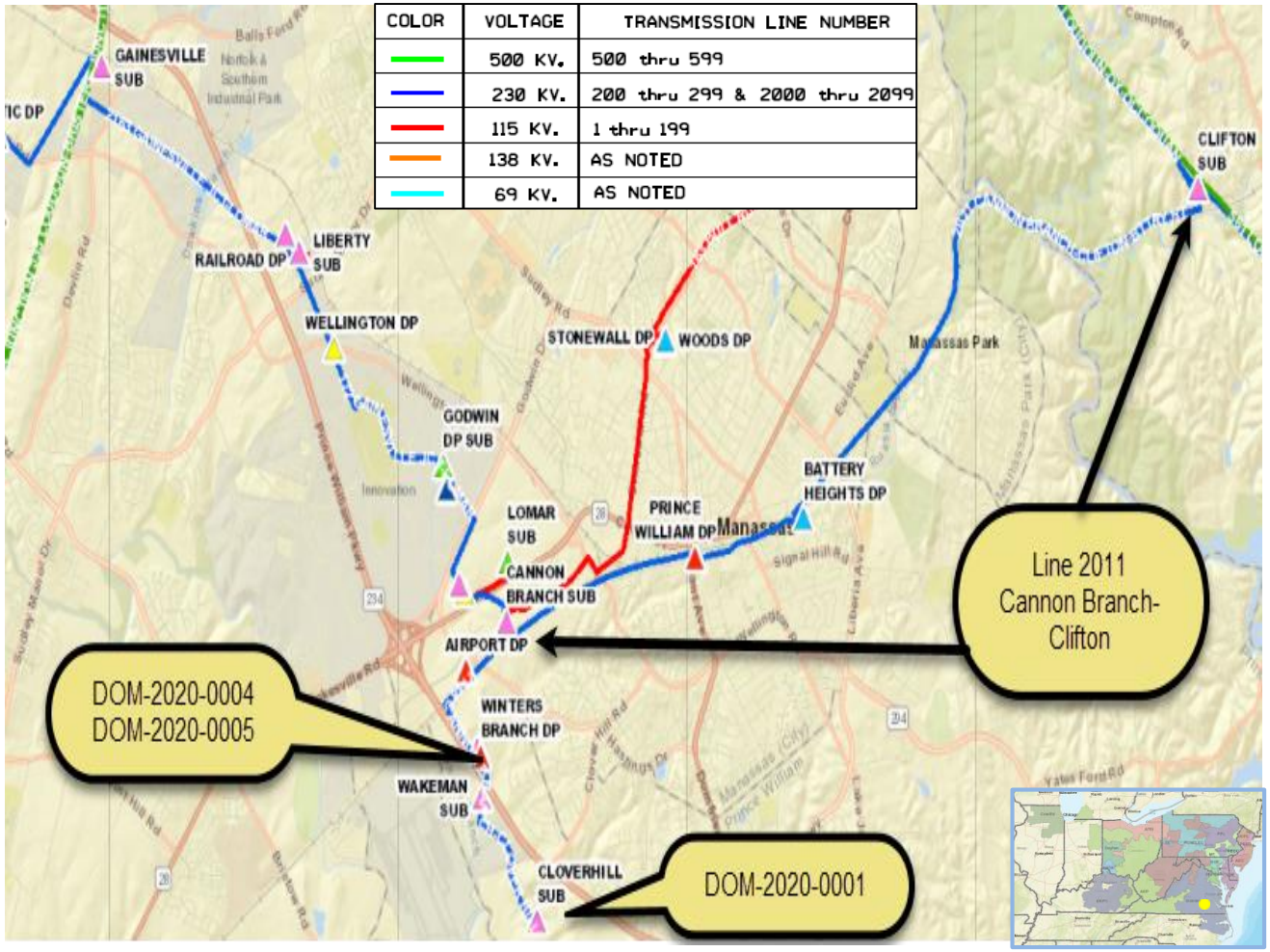
Problem Statement:

PJM has identified several N-1-1 contingencies that result in overloads associated with 230kV Line 2011 during the 2020 Do-No-Harm analysis.

For example the loss of 230kV Line 2151 (Gainesville-Railroad) and 230kV Line 2163 (Liberty-Vint Hill) creates overloads for Line 2011 segments:

- Segment 1 - Battery Heights-Clifton – (Existing rating of 797 MVA)
- Segment 2 - Battery Heights-Prince William (Existing rating of 876 MVA)
- Segment 3 -Prince William-Cannon Branch (Existing rating of 939 MVA)

The violations are caused by previously presented Supplemental Projects in the Dominion Zone in the area.



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Proposed Solution :

Re-conductor the 230kV Line 2011 from Clifton to Cannon Branch (7.54 miles) using a higher capacity conductor as well as terminal equipment upgrades to achieve an expected rating of 1574 MVA.

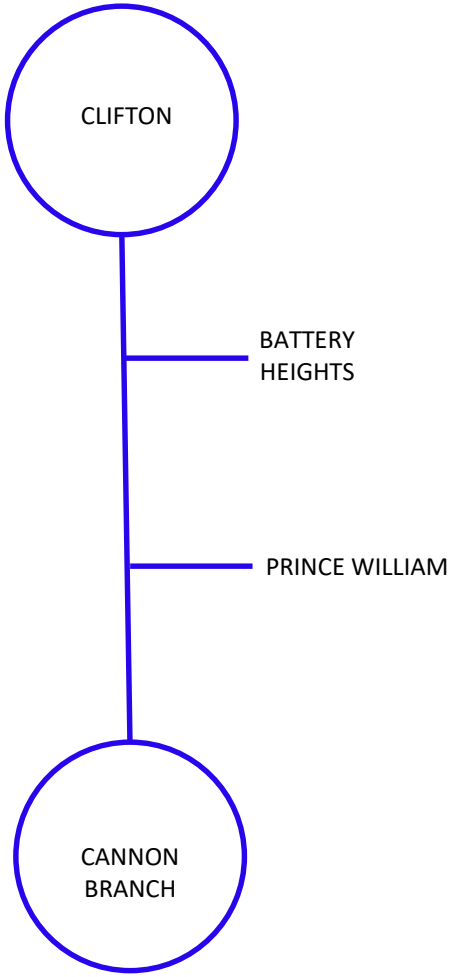
TO Alternatives Considered :

No feasible alternatives

Estimated cost: $ 17.0M

Projected In-service Date: 12/31/2025

Project Status: Conceptual



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2020-0012, DOM-2020-0021, DOM-2020-0022
Meeting Date: 10/06/2020

COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

Process Stage: SOLUTIONS
Supplemental Project Driver: Do No Harm Analysis

Specific Assumption Reference:

Customer load request will be evaluated per Dominion's Facility Interconnections Requirements Document & Dominion's Transmission Planning Criteria.

Problem Statement:

PJM has identified several N-1 and N-1-1 contingencies that result in overloads of 230kV Line 2152, 230kV Line 9173 and 230kV Line 9185 during the 2020 Do-No-Harm analysis.

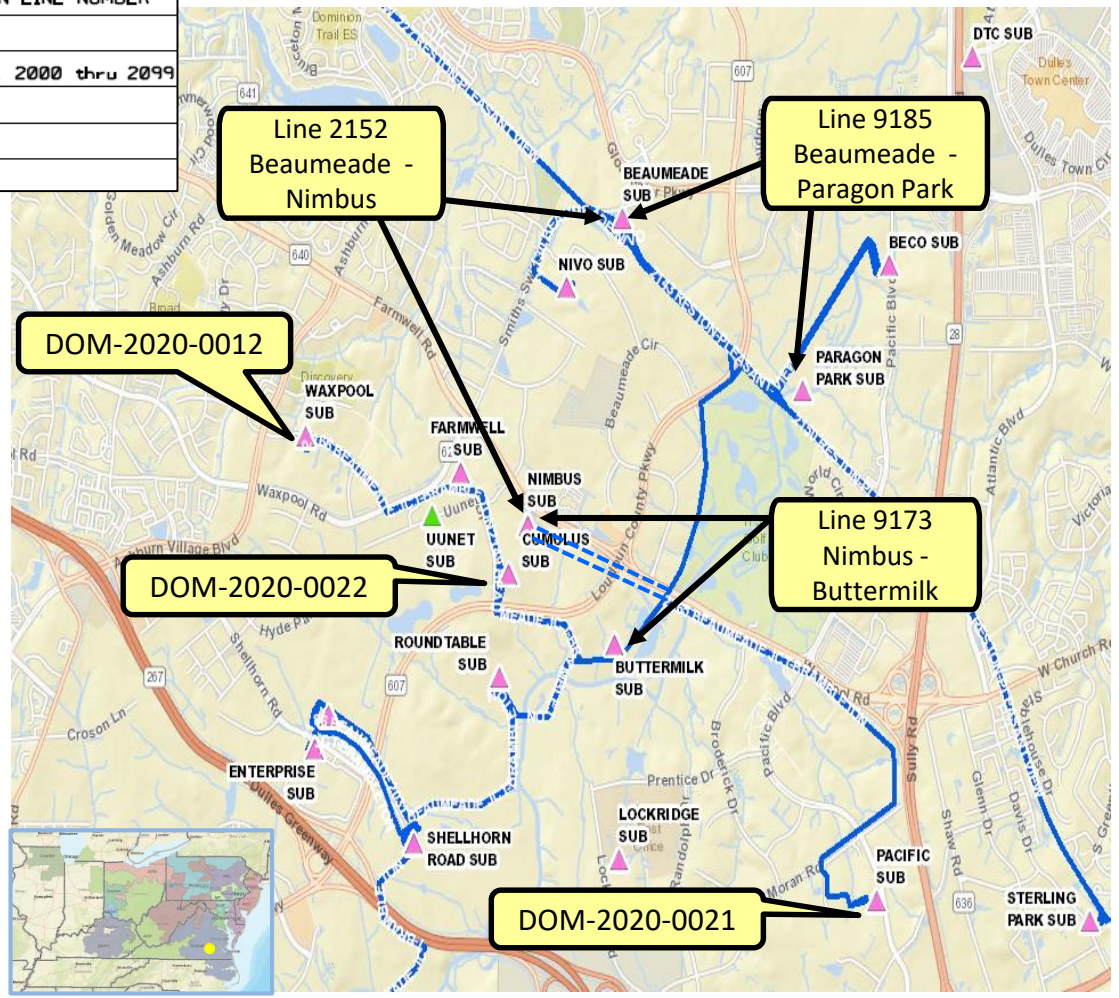
For example, the loss of Line 2172 (Brambleton – Evergreen Mills Line 1) and 2210 (Brambleton – Evergreen Mills Line 2) creates overloads of:

- 230kV Line 2152 (Beaumeade to Nimbus) – Current rating 876 MVA
- 230kV Line 9173 (Nimbus to Buttermilk) – Current rating 876 MVA

Another example is the loss of Line 2143 (Beaumeade – DTC) and 2152 (Beaumeade – Nimbus) creates overloads of:

- 230kV Line 9185 (Beaumeade to Paragon Park) – Current rating 765 MVA

The violations are caused by previously presented Supplemental Projects in the Dominion Zone in the area.



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Proposed Solution :

Re-conductor the 230kV Line 2152 from Beaumeade to Nimbus (2.16 miles), 230kV Line 9173 from Nimbus to Buttermilk (0.94 miles) and 230kV Line 9185 from Beaumeade to Paragon Park (1.0 miles) using a higher capacity conductor as well as terminal equipment upgrades to achieve an expected rating of 1574 MVA.

TO Alternatives Considered :

No feasible alternatives

Estimated cost:

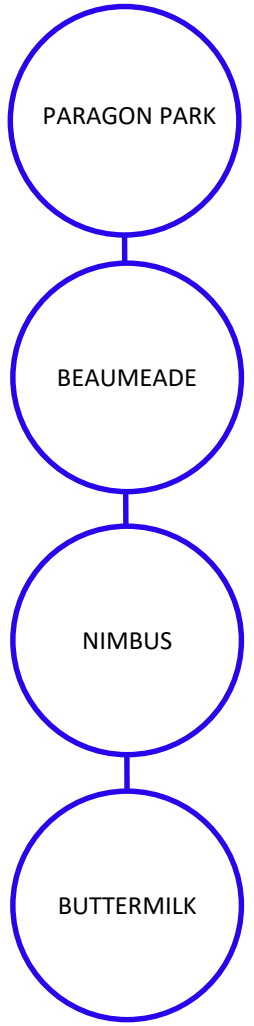
230kV Line 2152 Beaumeade to Nimbus - $ 6.0M

230kV Line 9173 Nimbus to Buttermilk - $ 5.0M

230kV Line 9185 Beaumeade to Paragon Park - $ 4.0M

Projected In-service Date: 12/31/2025

Project Status: Conceptual



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2020-0003, DOM-2020-00012, DOM-2020-0022
Meeting Date: 10/06/2020

Process Stage: SOLUTIONS
Supplemental Project Driver: Do No Harm Analysis

Specific Assumption Reference:

Customer load request will be evaluated per Dominion's Facility Interconnections Requirements Document & Dominion's Transmission Planning Criteria.

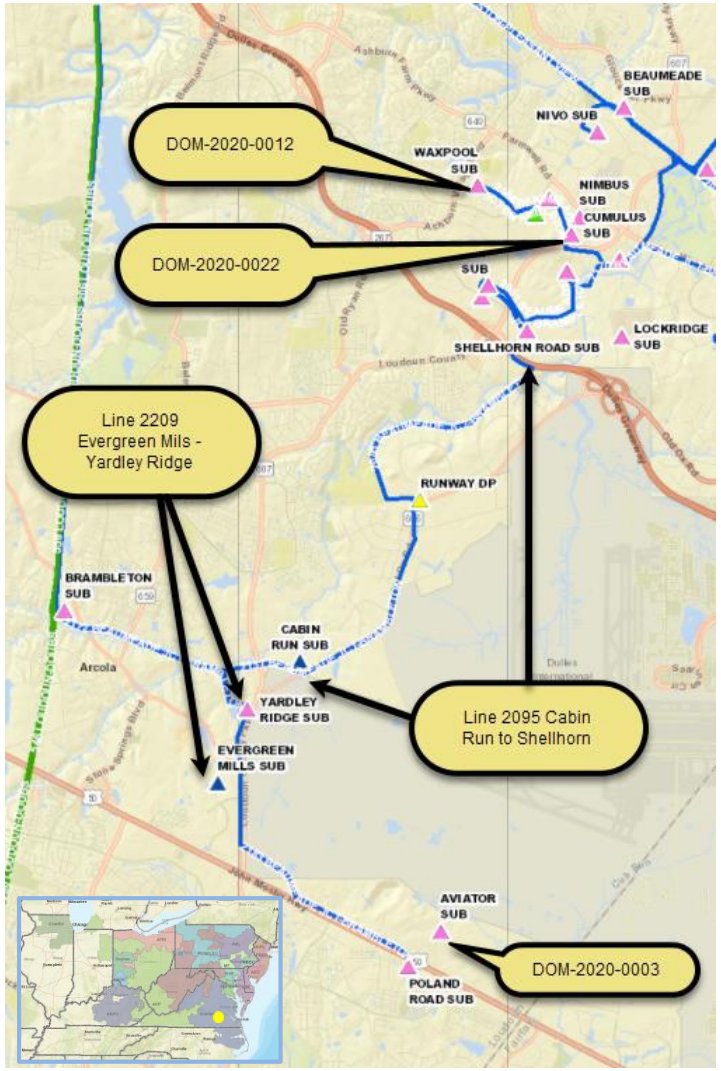
Problem Statement:

PJM has identified several N-1-1 contingencies that result in overloads associated with 230kV Line 2209 and 230kV Line 2095 during the 2020 Do-No-Harm analysis.

For example the loss of Line 227 (Beaumeade – Belmont) and 274 (Beaumeade-Pleasant View) creates overloads of:

- 230kV Line 2209 (Evergreen Mills to Yardley) – Current rating 1047 MVA
- 230kV Line 2095 (Cabin Run to Shellhorn) – Current rating 1047 MVA

The violations are caused by previously presented Supplemental Projects in the Dominion Zone in the area.



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

Dominion Transmission Zone: Supplemental Do No Harm Analysis

Proposed Solution :

Re-conductor the 230kV Line 2209 from Evergreen Mills to Yardley Ridge (0.16 miles) and 230kV Line 2095 from Cabin Run to Shellhorn (4.73 miles) using a higher capacity conductor as well as terminal equipment upgrades to achieve an expected rating of 1574 MVA.

TO Alternatives Considered :

No feasible alternatives

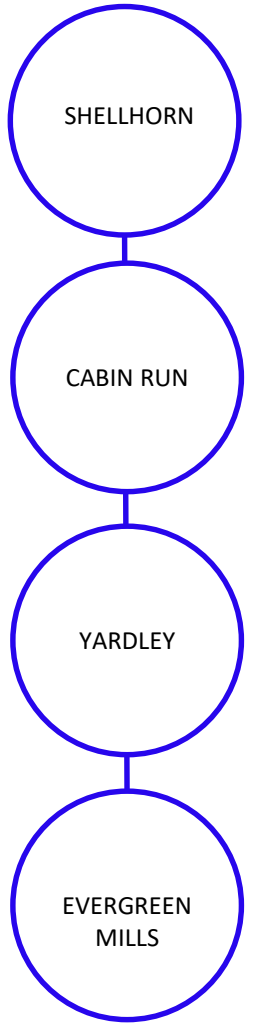
Estimated cost:

230kV Line 2209 Evergreen Mills to Yardley Ridge - $ 5.0M

230kV Line 2095 Cabin Run to Shellhorn - $ 8.0M

Projected In-service Date: 12/31/2025

Project Status: Conceptual



Appendix

High level M-3 Meeting Schedule

Assumptions

Activity	Timing
Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
Stakeholder comments	10 days after Assumptions Meeting

Needs

Activity	Timing
TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
Stakeholder comments	10 days after Needs Meeting

Solutions

Activity	Timing
TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
Stakeholder comments	10 days after Solutions Meeting

Submission of Supplemental Projects & Local Plan

Activity	Timing
Do No Harm (DNH) analysis for selected solution	Prior to posting selected solution
Post selected solution(s)	Following completion of DNH analysis
Stakeholder comments	10 days prior to Local Plan Submission for integration into RTEP
Local Plan submitted to PJM for integration into RTEP	Following review and consideration of comments received after posting of selected solutions

Revision History

09/25/2020 – V1 – Original version posted to pjm.com.

10/01/2020 – V2 – Removed slides 11 & 12 and adjusted ordering of slides. Corrected a spelling error on slide 11 and updated substation name on slide 12.