

Dominion Supplemental Projects

Transmission Expansion Advisory
Committee
November 30, 2021

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-2021-0009 Update

Process Stage: Solutions Meeting 11/30/2021

Previously Presented: Solutions Meeting 04/06/2021

Project Driver: Customer Service

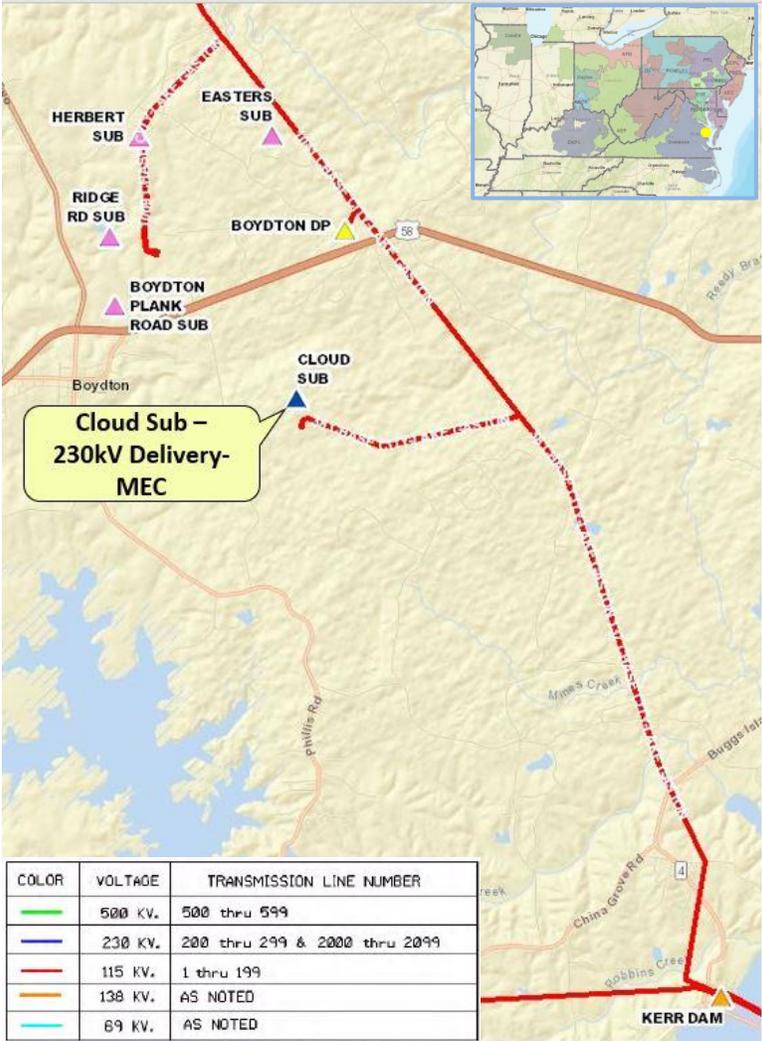
Specific Assumption References:

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

Problem Statement:

ODEC has submitted a request with an updated load projection on behalf of Mecklenburg Electric Coop (MEC) for a delivery point (Cloud Sub - Coleman Creek DP) at Boydton, VA, to support a datacenter campus of total load in excess of 100 MW. The customer requests service by June 1, 2024.

Initial In-Service Load	Projected 2026 Load
Summer: 91.0 MW	Summer: 156.0 MW



Dominion Transmission Zone: Supplemental Cloud 230kV Delivery - MEC

Need Number: DOM-2021-0009 Update

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution:

- Split 230kV Line #235 (Clover - Farmville) near Chase City substation and extend two single circuit 230kV lines for approx. 15 miles to the proposed Cloud Substation.
- Terminate the two 230kV lines into 4 breaker ring bus to create a Cloud - Clover line and a Cloud - Farmville line.
- Add two 224 MVA 115/230kV transformers with breakers on both sides.
- Expand 115kV bus to 4 breaker ring bus.
- 4 additional 230kV breakers will be paid for by Customer (cost not included here).

Estimated Project Cost: ~~\$45.0M~~ **\$81M** (Total)

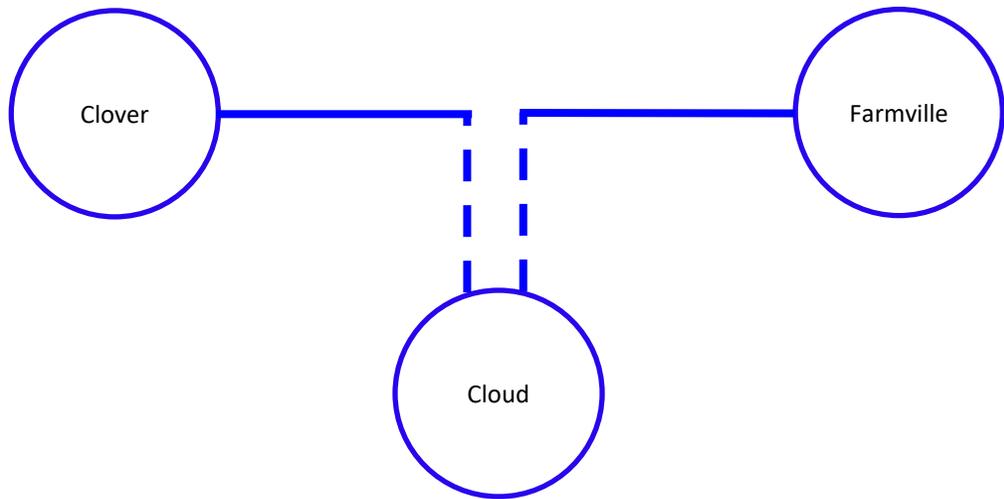
Transmission Line	\$30M (\$66M)
Substation	\$15M

Alternatives Considered:

No feasible alternatives

Projected In-service Date: 06/01/2024

Project Status: Engineering



Dominion Transmission Zone: Supplemental Customer Load Request

Need Number: DOM-2021-0010

Process Stage: Solutions Meeting 11/30/2021

Previously Presented: Solutions Meeting 04/06/2021

Project Driver: Customer Service

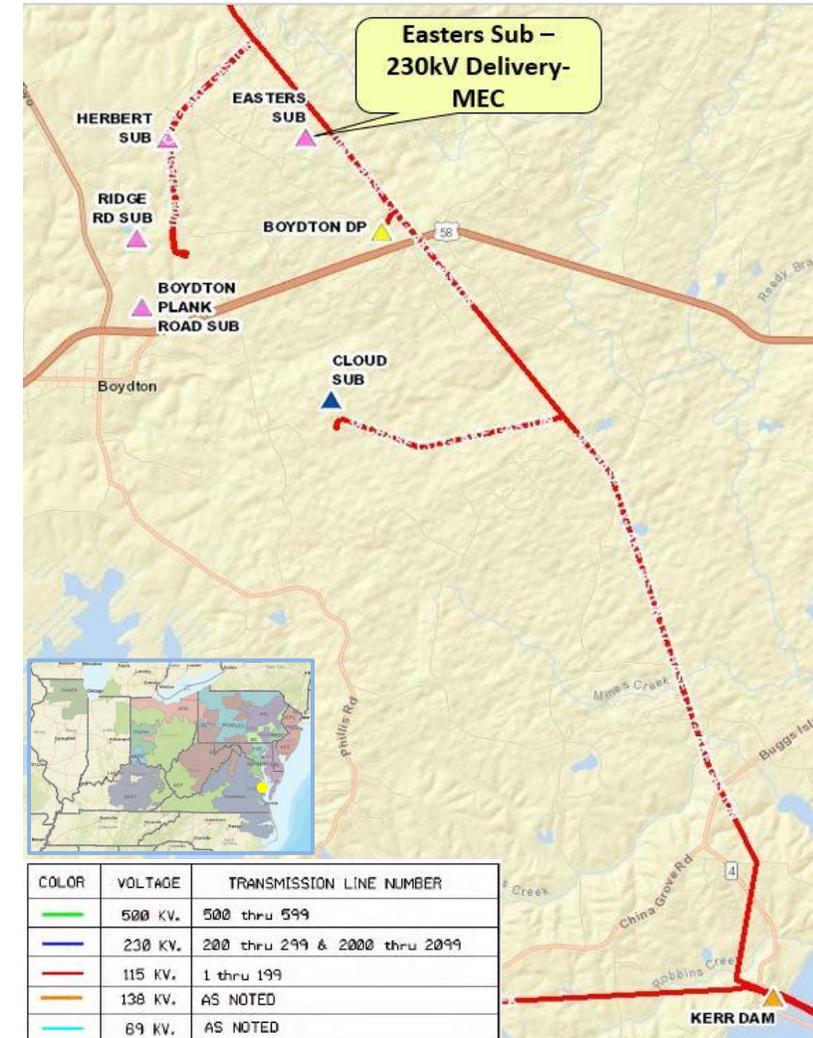
Specific Assumption References:

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

Problem Statement:

ODEC has submitted a request on behalf of Mecklenburg Electric Coop (MEC) for a new delivery point (Easters Sub – Timber DP) at Boydton, VA, to support a new datacenter campus with a total load in excess of 100 MW. The customer requests service by November 1, 2021.

Initial In-Service Load	Projected 2026 Load
Winter: 12.0 MW	Summer: 123.0 MW



Dominion Transmission Zone: Supplemental Easters 230kV Delivery - MEC

Need Number: DOM-2021-0010

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution:

The project will need to be built in 2 stages due to the timeframe associated with obtaining a CPCN and extend 230kV into the area. The 115kV Station will help meet the initial load target date.

Stage 1: Interconnect the new substation by cutting and extending 115kV Line #137 (Kerr Dam – Ridge Road) to the proposed Easters 115kV Substation. The conductor, substation and line equipment used to interconnect Easters 115 kV with the transmission system will be same as 230kV substation. The projected in-service date for Stage 1 is November 1, 2021.

Stage 2: Cut and extend 230kV Line #2226 (Clover – Cloud 230kV) to the proposed Easters 230kV Substation. Add one 84 MVAR 230kV cap bank for voltage support. Once conversion from 115kV to 230kV substation is complete, remove Easters 115kV tap and reconnect Line #137 Kerr Dam – Ridge Road. 8 additional 230kV breakers will be paid for by Customer (cost not included here). The projected in-service date for Stage 2 is June 1, 2024.

Estimated Project Cost: \$20.0 M (Total)

Transmission Line	\$5 M
115kV Substation	\$10 M
230kV Substation	\$5 M

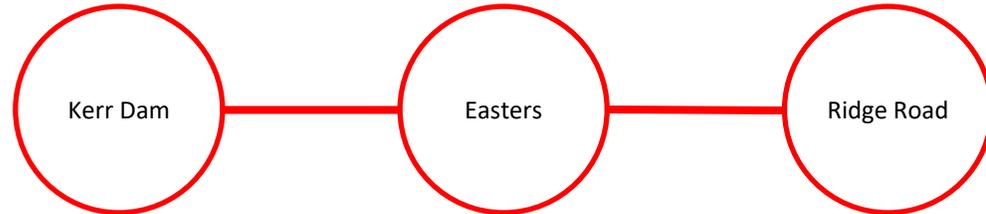
Alternatives Considered:

No feasible alternatives

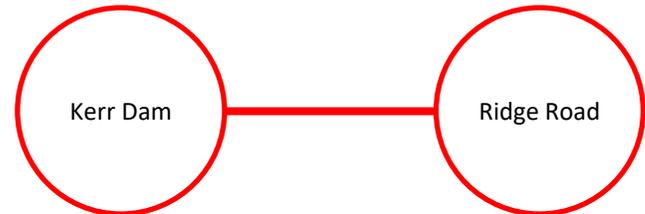
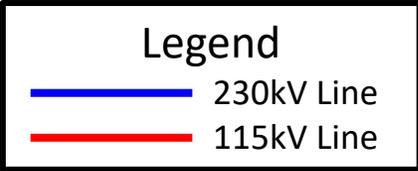
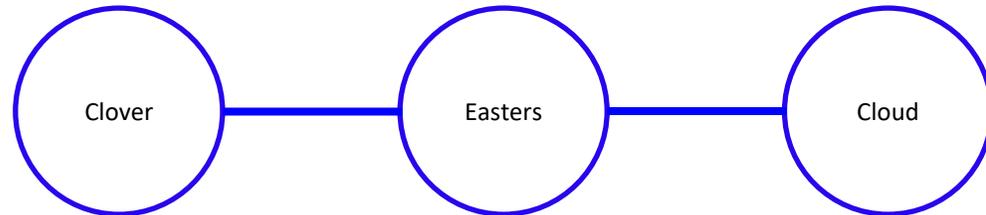
Projected In-service Date: 06/01/2024 (Stage 2)

Project Status: Engineering

Stage 1: Easters 115kV Sub



Stage 2: Easters 230kV Sub



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0009-DNH & DOM-2021-0010-DNH

Meeting Date: 11/30/2021

Process Stage: Solutions Meeting 11/30/2021

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.

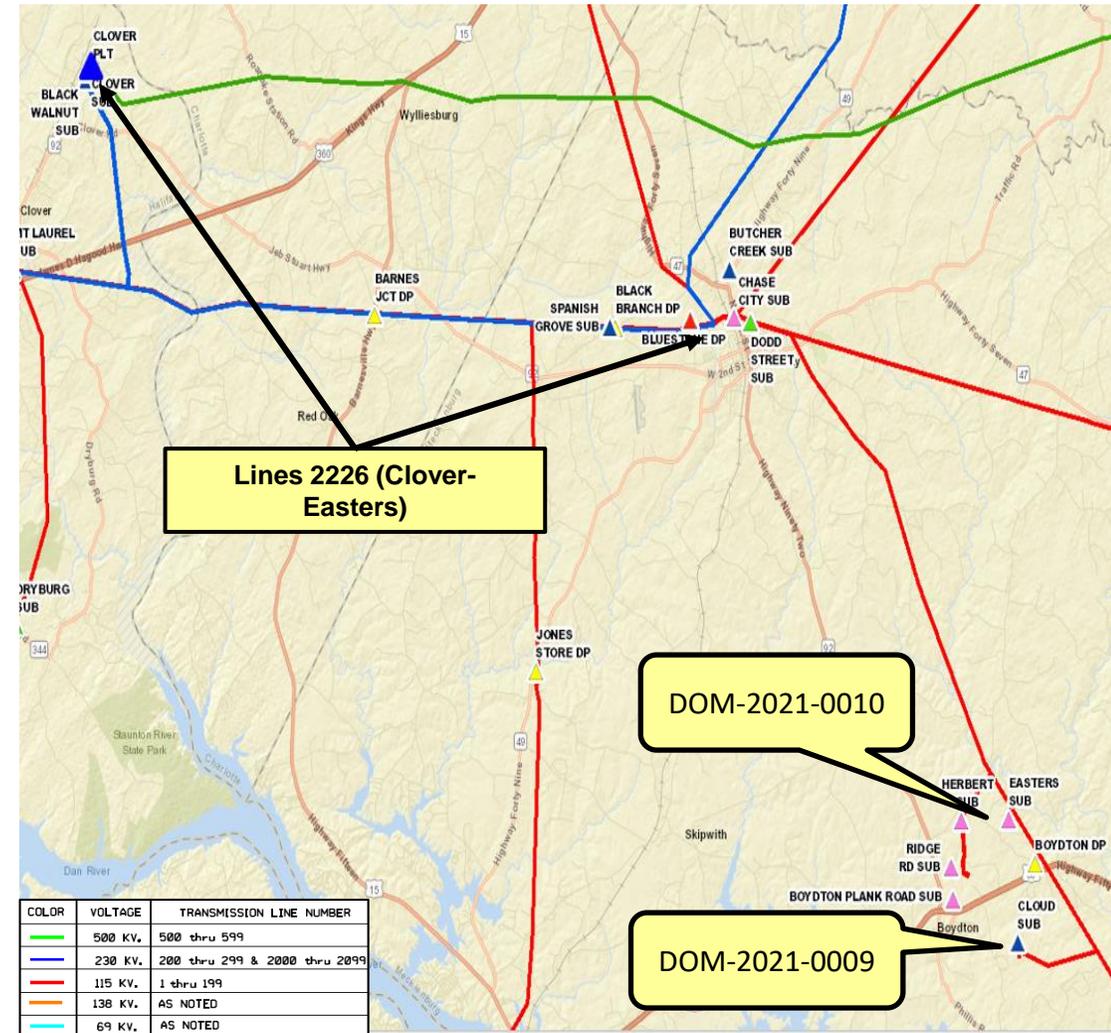
Problem Statement:

PJM has identified a N-1 Generator Deliverability contingency scenario that results in overload of Line 2226 (Clover to Easters) in the 2021 Do-No-Harm analysis.

The loss of Line 556 (Clover – Rawlings) under contingency DVP-P1-2: Line 566 creates overload on:

- Line 2226 (Clover to Easters)

The violations are caused by previously presented Supplemental Projects DOM-2021-0009 and DOM-2021-0010 in the Dominion Zone.



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0009-DNH & DOM-2021-0010-DNH

Meeting Date: 11/30/2021

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution :

Rebuild approximately 16 miles between Clover Sub and structure #235/310 of 230kV Line 2226 using a higher capacity conductor and associated substation equipment to achieve an expected rating of 1572 MVA.

TO Alternatives Considered :

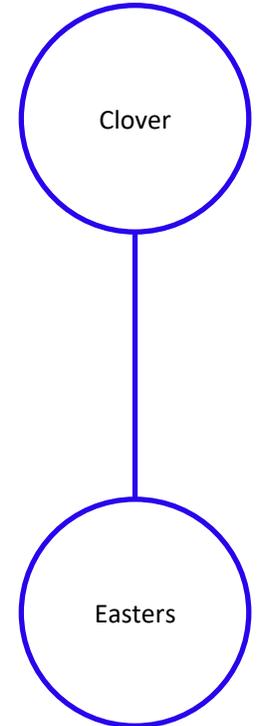
No feasible alternatives

Estimated cost: \$ 34.0 M

Projected In-service Date: 06/30/2026

Project Status: Conceptual

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Customer Load Request

Need Number: DOM-2021-0016

Process Stage: Solutions Meeting 11/30/2021

Previously Presented: Solutions Meeting 04/06/2021

Project Driver: Customer Service

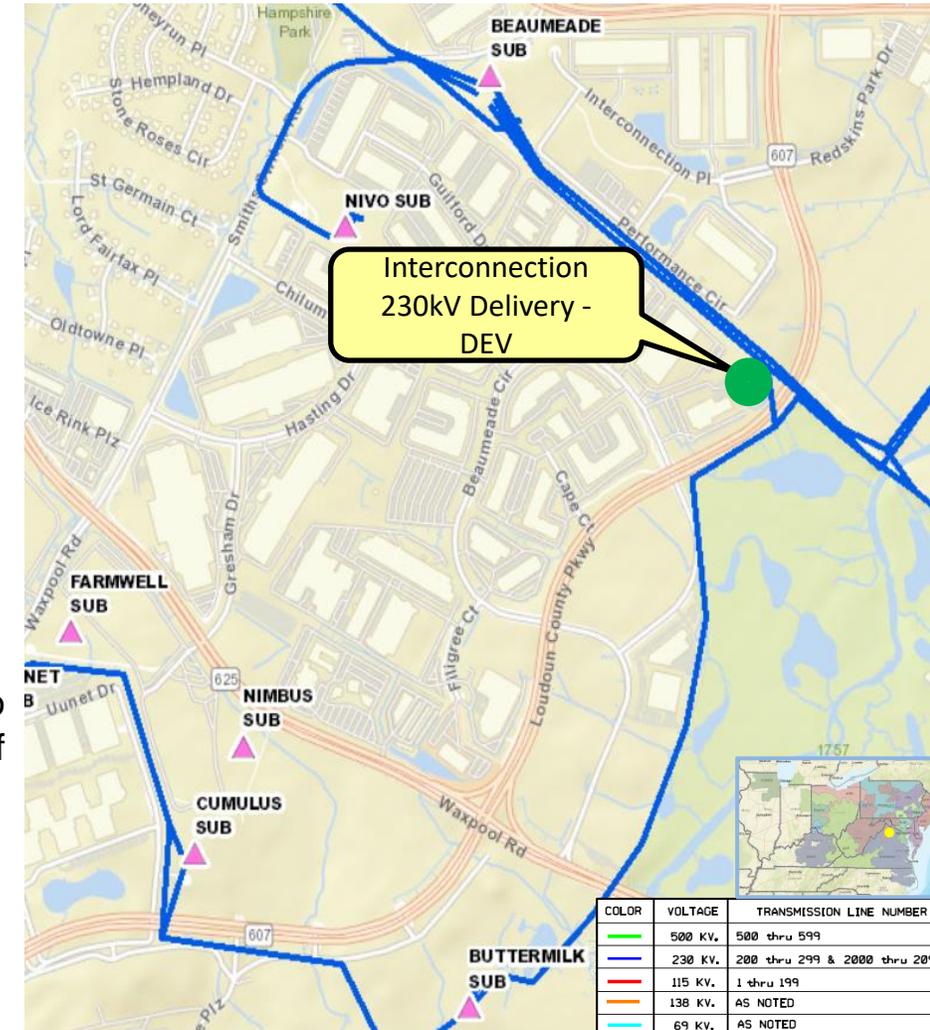
Specific Assumption References:

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 (Interconnection) to accommodate a new datacenter campus in Loudoun County with a total load in excess of 100MW. Requested in-service date is 12/15/2024.

Initial In-Service Load	Projected 2026 Load
Summer: 180.3 MW	Summer: 208.3 MW



Dominion Transmission Zone: Supplemental Interconnection 230kV Delivery - DEV

Need Number: DOM-2021-0016

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution:

Interconnect the new substation by cutting and extending 230kV Line #2152 (Buttermilk - Beaumeade) to the proposed Interconnection Substation. Terminate both ends into a four-breaker ring arrangement to create an Interconnection - Beaumeade line and an Interconnection - Buttermilk line.

Estimated Project Cost: \$16.0 M

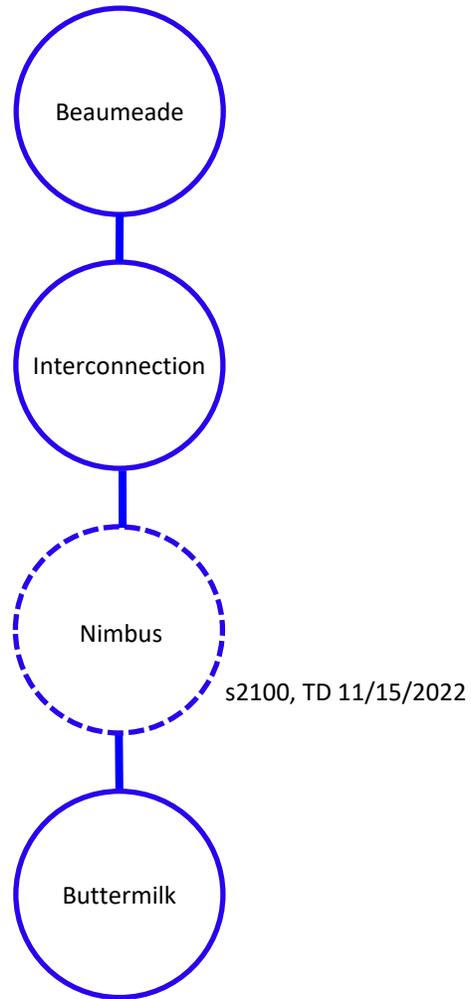
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 12/15/2024

Project Status: Engineering

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0016-DNH

Process Stage: Solutions Meeting 11/30/2021

Project Driver: Do No Harm Analysis

Specific Assumption References:

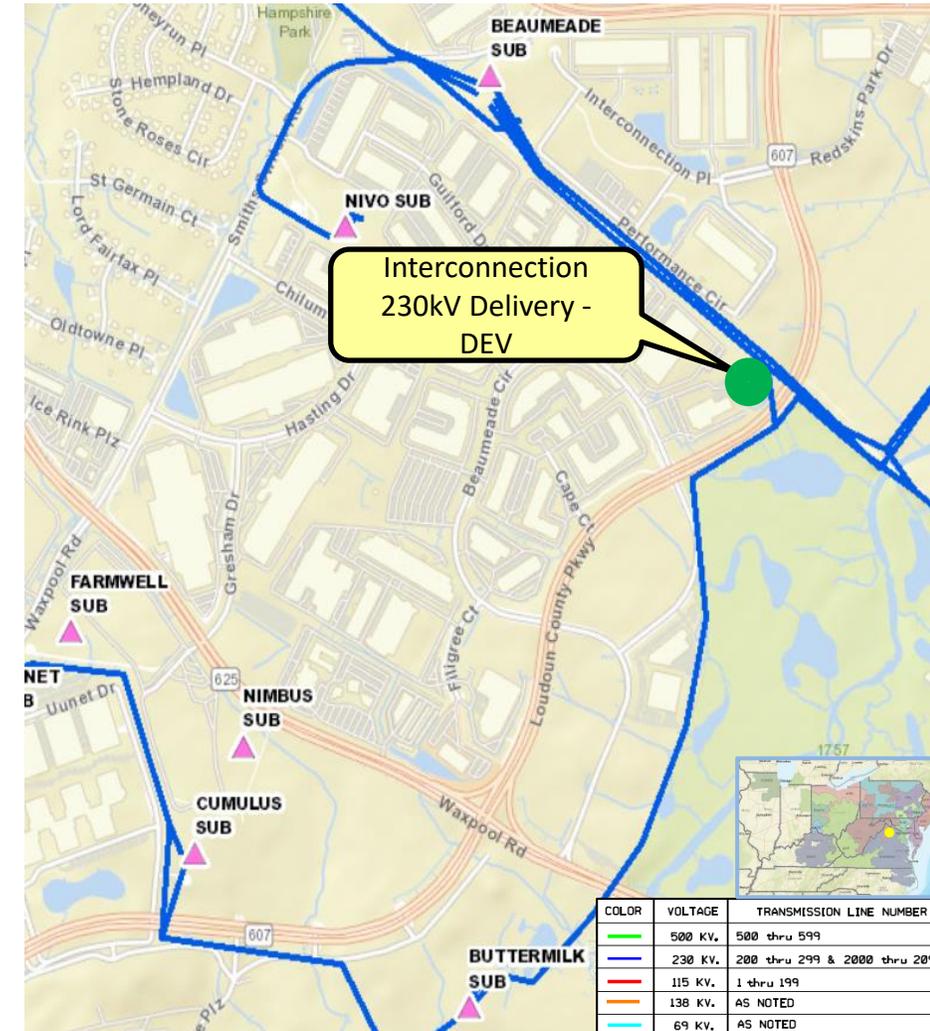
Customer load request will be evaluated per Dominion's Facility Interconnection Requirements Document and Dominion's Transmission Planning Criteria.

Problem Statement:

PJM has identified violations on four facilities.

- 1) Pleasant View 500-230kV TX – **(Generator Deliverability Analysis)**
 - Contingency scenario: DVP_P1-3: 8BRAMBLETON-TX#1
- 2) Line #202 (Clark to Idylwood) – **(N-1 Contingency Analysis)**
 - Contingency scenario: DVP_P7-1: LN 227-274
- 3) Ox 500-230kV Transformers (1 & 2) – **(N-1-1 Contingency Analysis)**
 - Contingency scenarios: DVP_P1-2: LN 561 and DVP_P1-3: 8OX-TX#1
DVP_P1-2: LN 561 and DVP_P1-3: 8OX TX#2
- 4) Line #205 (Locks – Harrowgate – Tyler) – **(Generator Deliverability Analysis)**
 - Contingency scenario: DVP_P4-2: 562T563

These violations were caused by Supplemental Project DOM-2021-0016 in the Dominion Zone.



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0016-DNH

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution (Part 1 of 4):

Pleasant View 500-230kV Transformer

- Install (1) 1440 MVA 500-230 kV transformer at Goose Creek Substation.
 - Extend the existing 500kV ring bus at Goose Creek Substation to be set up for a future six-breaker ring arrangement. One breaker to be installed initially creating a five-breaker ring bus.
 - Install a new 230kV ring bus at Goose Creek Substation to be set up for a future four-breaker ring arrangement. Three 230kV breakers to be installed initially.
- Cut and extend line #227 (Belmont to Beaumeade) into Goose Creek Substation.
- Upgrade 230kV Pleasant View breakers L3T203 and L3T2180 from 50kA to 63kA.

Estimated Project Cost: \$41.0 M

Transmission Line Cost: \$5.0 M

Substation Cost: \$36 M

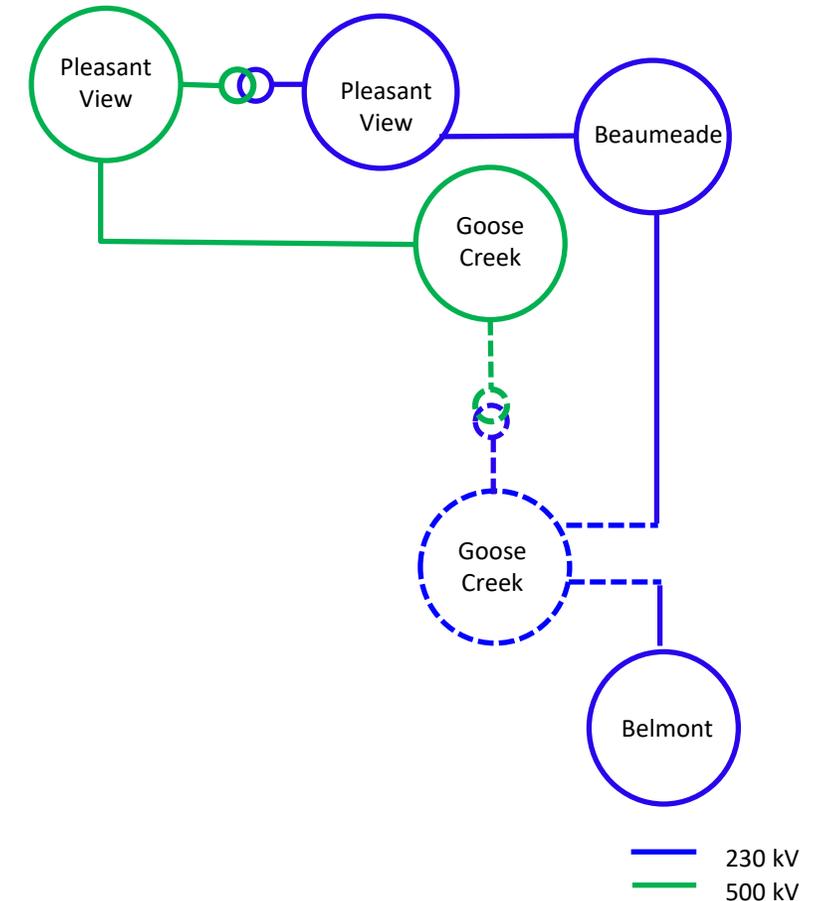
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 12/15/2026

Project Status: Engineering

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0016-DNH

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution (Part 2 of 4):

Line #202 (Clark to Idylwood) – Reconductor Line #202 (Clark – Idylwood), approximately 4 miles, using a higher capacity conductor and upgrade terminal equipment to achieve an expected rating of 1572 MVA.

Estimated Project Cost: \$8.0 M

Transmission Line Cost: \$4.0 M

Substation Cost: \$4.0 M

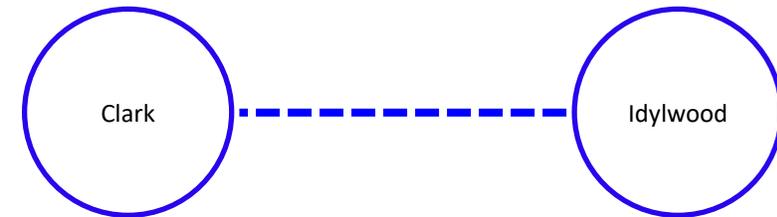
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 12/15/2026

Project Status: Engineering

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0016-DNH
Process Stage: Solutions Meeting 11/30/2021

Proposed Solution (Part 3 of 4):

Ox 500-230kV Transformers –

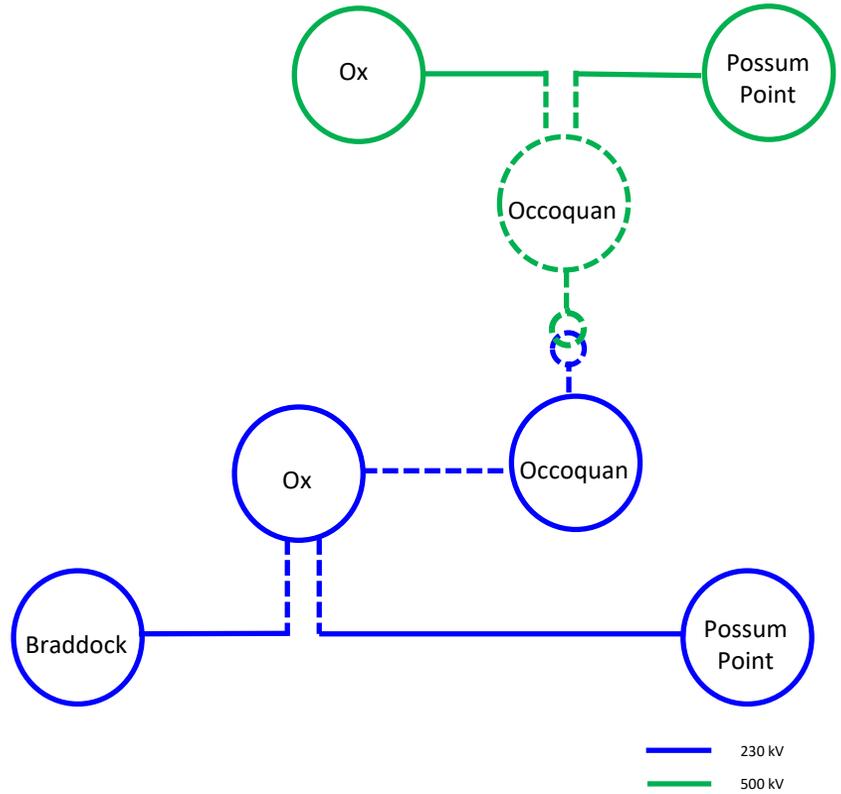
- Install (1) 1440 MVA 500-230 kV transformer and associated 500 kV and 230 kV equipment (breakers, switches, leads) at Occoquan Substation to supply the area with a 500 kV source
- Cut and loop 500 kV line #571 (Ox – Possum Point) as the 500 kV source into the proposed 500 kV ring bus
- Existing terminations for 230 kV line #2001 (Occoquan – Possum Point), line #2013 (Occoquan – Ox), and line #2042 (Odgen Martin – Ox) will be rearranged to terminate into the Occoquan station
- Line #215 (Hayfield – Possum Point) will be rearranged to route over the expanded Occoquan station
- Rebuild 230 kV line #2013 (Occoquan – Ox) using a higher capacity conductor, as well as terminal equipment upgrades, to achieve an expecting rating of 1572 MVA.
- Upgrade (2) 230 kV breakers 201342 & L142 from 50kA to 63kA at Ox Substation due to an insufficient breaker duty rating with the expansion in place.
- Cut and loop line #237 (Braddock – Possum Point) into Ox Substation
- Install a new backbone and associated 230 kV equipment to the south of the existing 230 kV yard in Ox substation

Estimated Project Cost: \$84.5 M (Total)
Transmission Line Cost: \$14.0 M
Substation Cost: \$70.5 M

Alternatives Considered:
No feasible alternatives

Projected In-service Date: 12/15/2026

Project Status: Engineering
Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0016-DNH

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution (Part 4 of 4):

Line #205 (Locks – Harrowgate – Tyler) – Rebuild approximately 10 miles segment of Line #205 from Locks to Tyler and upgrade the terminal equipment. The minimum summer normal rating of the line segments will be 1572MVA.

Estimated Project Cost: \$27.0 M

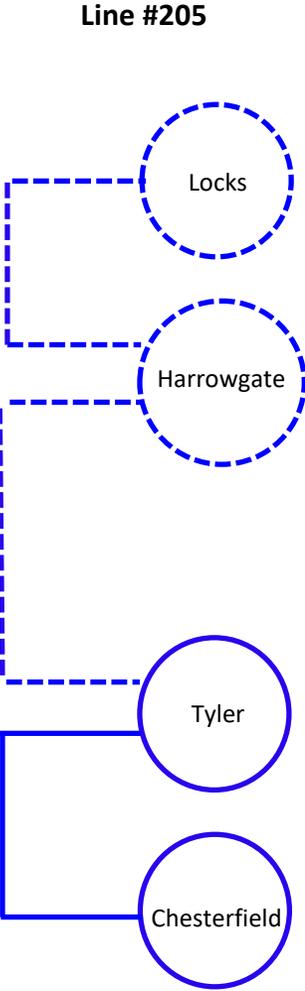
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 12/15/2026

Project Status: Conceptual

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Customer Load Request

Need Number: DOM-2021-0020

Process Stage: Solutions Meeting 11/30/2021

Previously Presented: Solutions Meeting 05/11/2021

Project Driver: Customer Service

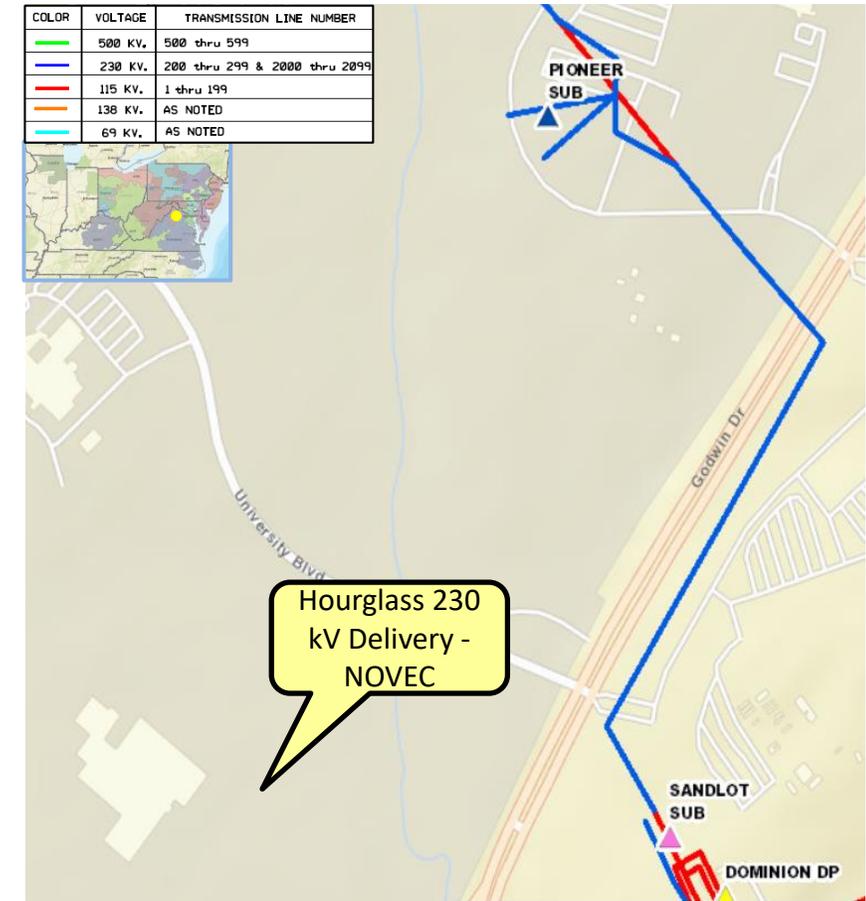
Specific Assumption References:

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 (Hourglass) to serve a data center complex in Prince William County with a total load in excess of 100 MW by 2025. Requested in-service date is 06/15/2023.

Initial In-Service Load	Projected 2026 Load
Summer: 10.0 MW	Summer: 114.7 MW



Dominion Transmission Zone: Supplemental Hourglass 230kV Delivery – NOVEC

Need Number: DOM-2021-0020

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution:

Interconnect the new substation by cutting and extending Line #2196 (Pioneer - Sandlot) to the proposed Hourglass Substation. Terminate both ends into a 230 kV four-breaker ring arrangement with a provision to add two additional 230 kV breakers for an ultimate configuration of a six-breaker arrangement.

Estimated Project Cost: \$11.0 M

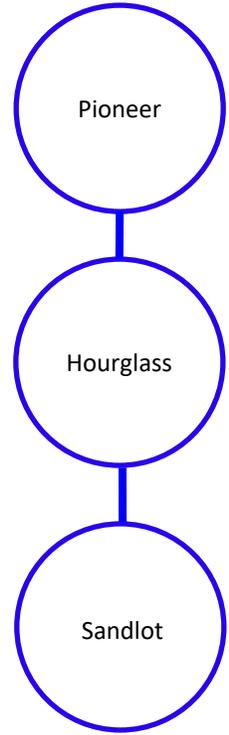
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 06/15/2023

Project Status: Engineering

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0020-DNH

Process Stage: Solutions Meeting 11/30/2021

Project Driver: Do No Harm Analysis

Specific Assumption References:

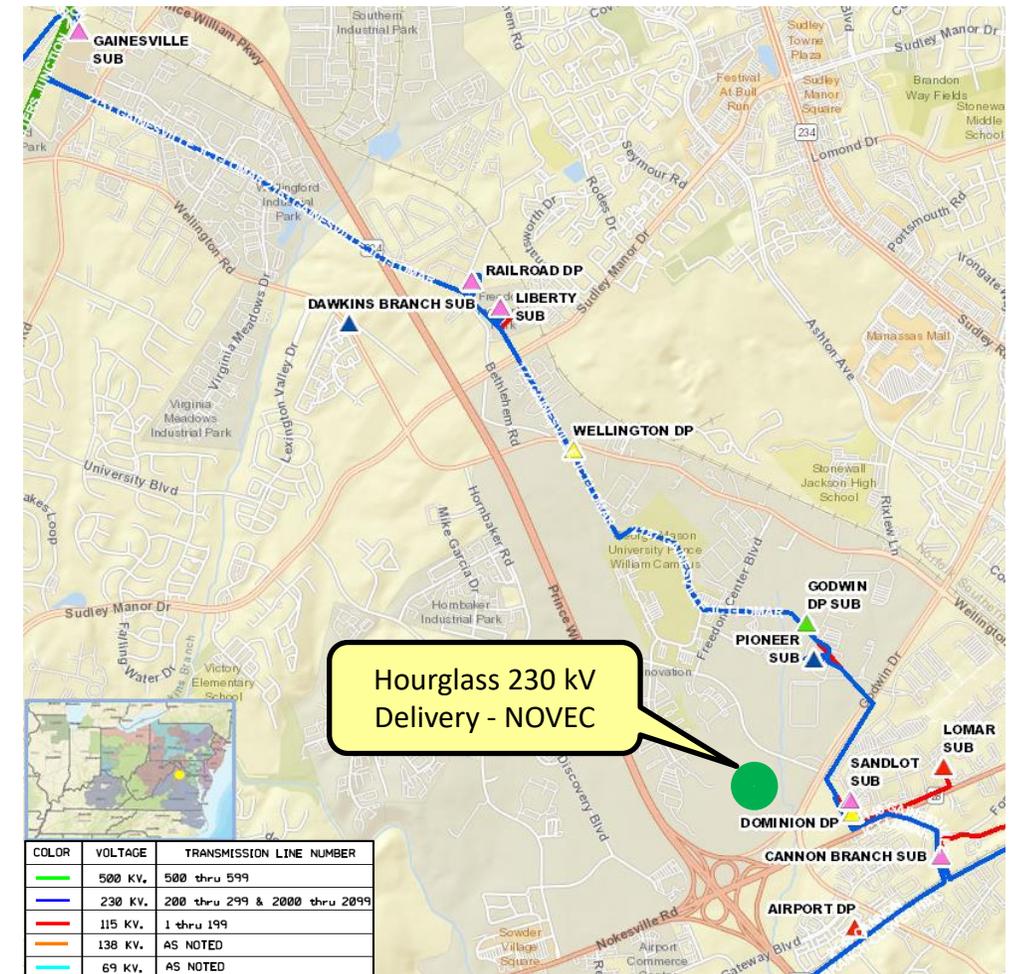
Customer load request will be evaluated per Dominion's Facility Interconnection Requirements Document and Dominion's Transmission Planning Criteria.

Problem Statement:

PJM has identified violations on the following separate facilities:

- Bristers 500-230 kV TX – **(N-1-1 Contingency Analysis)**
Contingency scenario: DVP_P1-2: LN 539 and DVP_P1-2: LN 569
- Line #2187 (Pioneer DP to Liberty) – **(N-1-1 Contingency Analysis)**
Contingency scenario: DVP_P1-2: LN 2228 and DVP_P1-2: LN 2011
- Line #2228 (Pioneer DP to Liberty) – **(N-1-1 Contingency Analysis)**
Contingency scenarios: DVP_P1-2: LN 2187 and DVP_P1-2: LN 2011
- Line #2080 (Liberty to Railroad DP) – **(N-1-1 Contingency Analysis)**
Contingency scenarios: DVP_P1-2: LN 2163 and DVP_P1-2: LN 2011
- Line #2151 (Railroad DP to Gainesville) – **(N-1-1 Contingency Analysis)**
Contingency scenarios: DVP_P1-2: LN 2163 and DVP_P1-2: LN 2011
- Line #2163 (Vint Hill to Liberty) – **(N-1-1 Contingency Analysis)**
Contingency scenarios: DVP_P1-2: LN 2151 and DVP_P1-2: LN 2011

These violations were caused by Supplemental Project DOM-2021-0020 in the Dominion Zone.



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0020-DNH

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution (Part 1 of 2):

Re-conductor the following segments of 230kV line using a higher capacity conductor as well as terminal equipment upgrades to achieve an expected rating of 1572 MVA:

- Line #2187: Pioneer DP – Liberty 230 kV (approx. 2.1 miles)
- Line #2228: Pioneer DP – Liberty 230 kV (approx. 2.1 miles)
- Line #2163: Vint Hill – Liberty (approx. 6.2 miles)
- Line #2080: Liberty – Railroad DP 230 kV (approx. 0.3 miles)
- Line #2151: Railroad DP – Gainesville 230 kV (approx. 2.2 miles)

Estimated Project Cost: \$32.0 M (Total)

Transmission Line Cost: \$20.0 M

Substation Cost: \$12.0 M

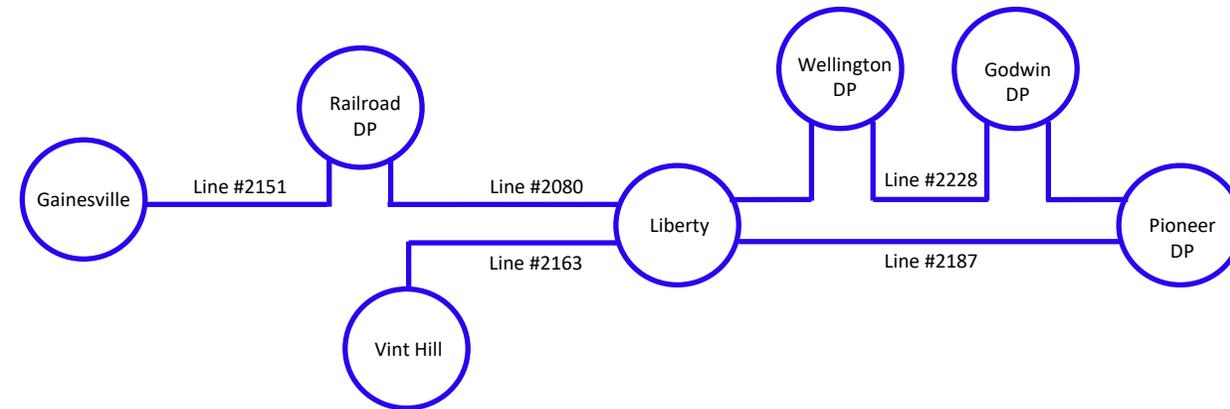
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 12/15/2026

Project Status: Engineering

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2021-0020-DNH

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution (Part 2 of 2):

Bristers Substation

- Install (1) 840 MVA 500-230 kV transformer at Bristers Substation and associated 500 kV and 230 kV equipment
- Expand Bristers Substation to the north of the existing site to accommodate the 230 kV breaker ring required for the addition of the new transformer
- Line terminations for Line #183 (Bristers – Ox 115 kV), Line #2101 (Bristers – Vint Hill 230 kV), and Line #539 (Ox – Bristers 500 kV) will be re-arranged to accommodate the expansion

Estimated Project Cost: \$65.0 M

Transmission Line Cost: \$5.0M

Substation Cost: \$60.0M

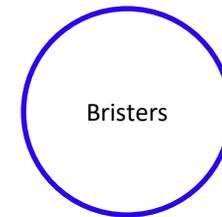
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 12/15/2026

Project Status: Engineering

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Customer Load Request

Need Number: DOM-2020-0043

Process Stage: Solutions Meeting 11/30/2021

Previously Presented: Solutions Meeting 05/11/2021

Project Driver: Customer Service

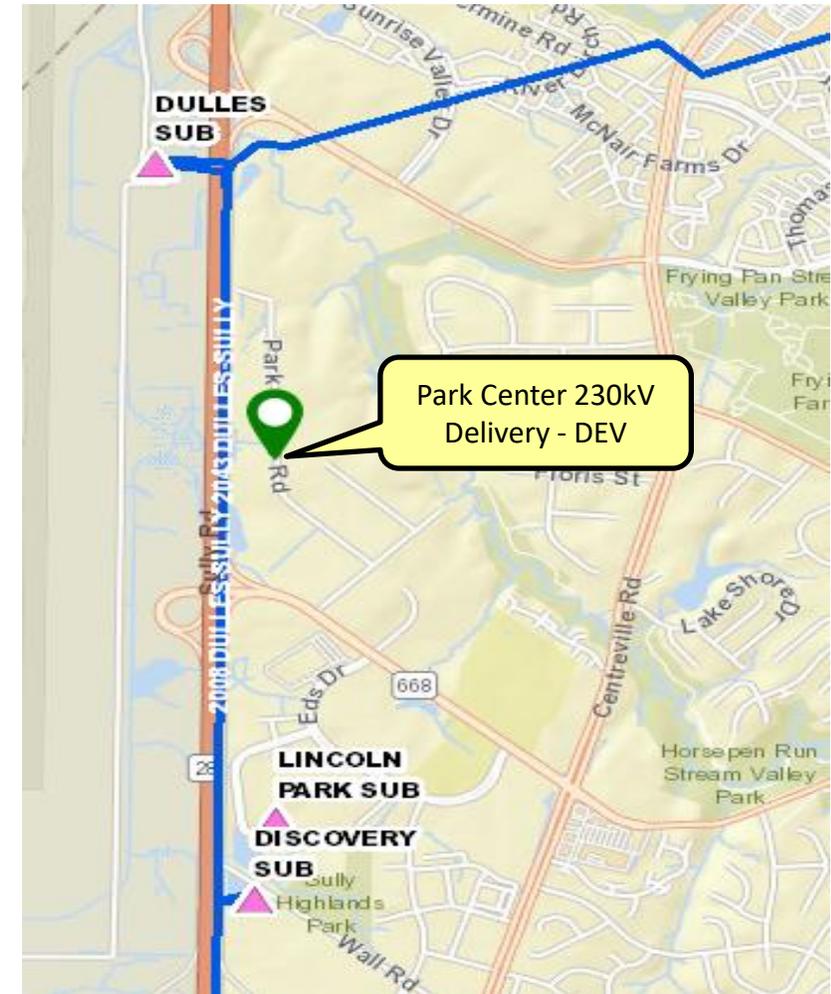
Specific Assumption References:

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 (Park Center) to accommodate a new datacenter campus in Fairfax County with a total load in excess of 100MW. Requested in-service date is 8/01/2024.

Initial In-Service Load	Projected 2025 Load
Summer: 29.0 MW	Summer: 41.0 MW



Dominion Transmission Zone: Supplemental Park Center 230kV Delivery - DEV

Need Number: DOM-2020-0043

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution:

Interconnect the new substation by cutting and extending Line #2043 (Reston-Lincoln Park) to the proposed Park Center Substation. Terminate both ends into a four-breaker ring arrangement to create a Park Center-Reston line and a Park Center-Lincoln Park line.

Estimated Project Cost: \$10.0 M

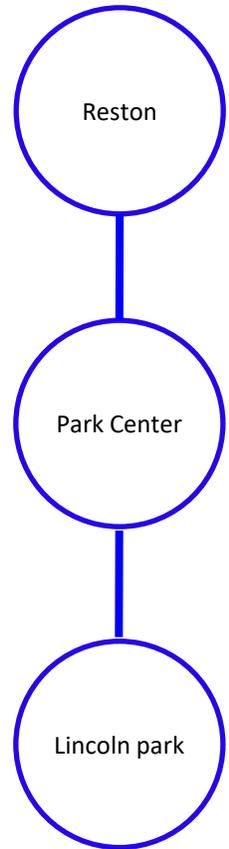
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 08/01/2024

Project Status: Engineering

Model: 2025 RTEP



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2020-0043-DNH

Process Stage: Solutions Meeting 11/30/2021

Project Driver: Do No Harm Analysis

Specific Assumption References:

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

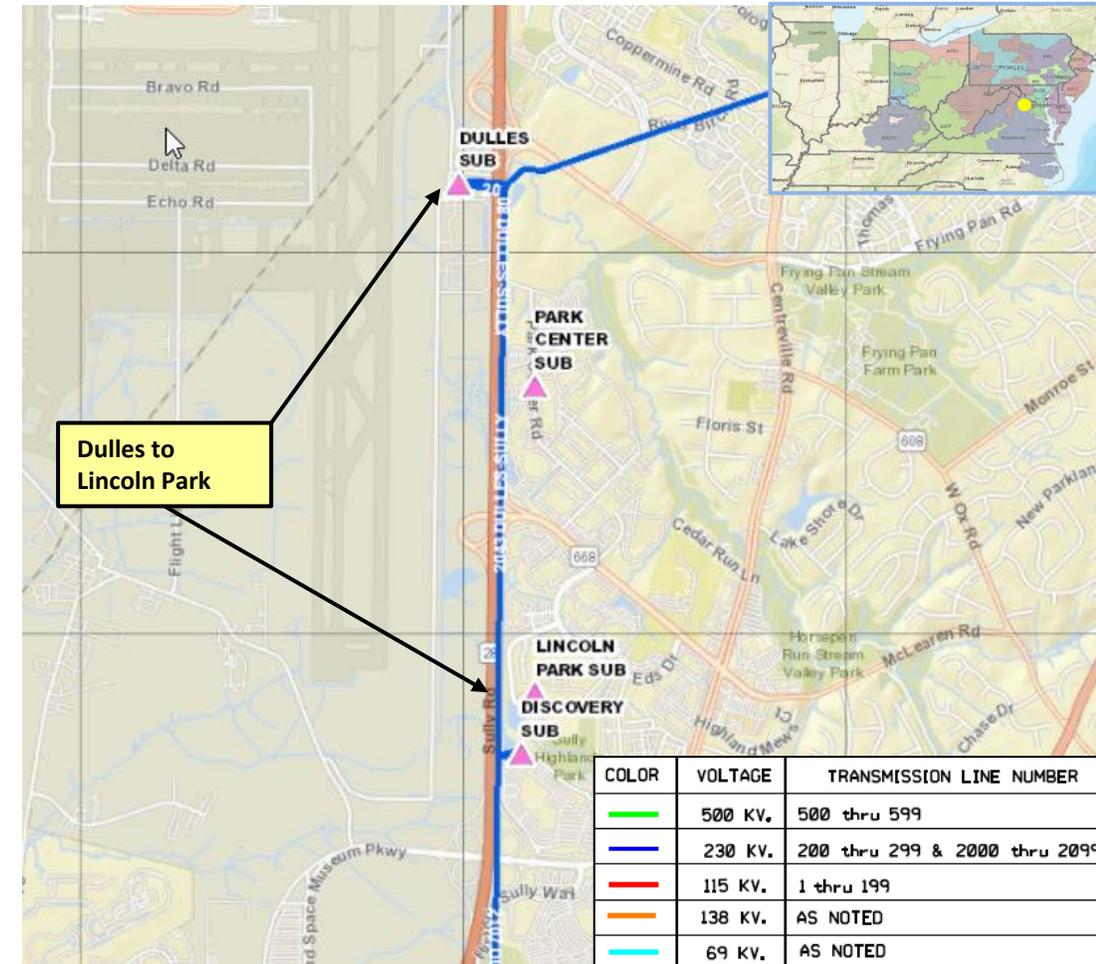
Problem Statement:

PJM has identified an N-1-1 contingency that results in an overload of the Dulles to Lincoln Park segment of Line #2008.

Contingency causing overload:

- Primary contingency: Loss of Line #227 (Beaumeade to Belmont)
- Secondary contingency: Loss of Line #274 (Beaumeade to Pleasant View)

These violations were caused by Supplemental Project DOM-2020-0043 in the Dominion Zone.



Dominion Transmission Zone: Supplemental Do No Harm Analysis

Need Number: DOM-2020-0043-DNH

Process Stage: Solutions Meeting 11/30/2021

Proposed Solution:

Reconductor approximately 3 miles of Line #2008 from Dulles to Lincoln Park upgrade the terminal equipment. The minimum summer rating of the line segment will be 1572MVA.

Estimated Project Cost: \$5 M

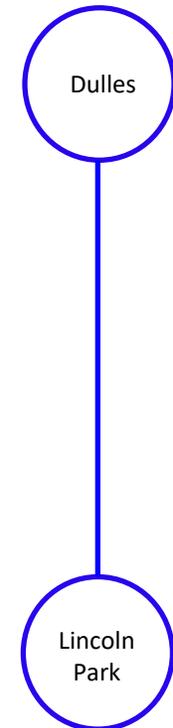
Alternatives Considered:

No feasible alternatives

Projected In-service Date: 12/15/2026

Project Status: Engineering

Model: 2025 RTEP



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

11/19/2021 – V1 – Original version posted to pjm.com

11/22/2021 – V2 – Administrative updates to slides 8, 11-15.

11/30/2021 – V3 – Corrected rating on slides 13 & 14.