Reliability Analysis Update

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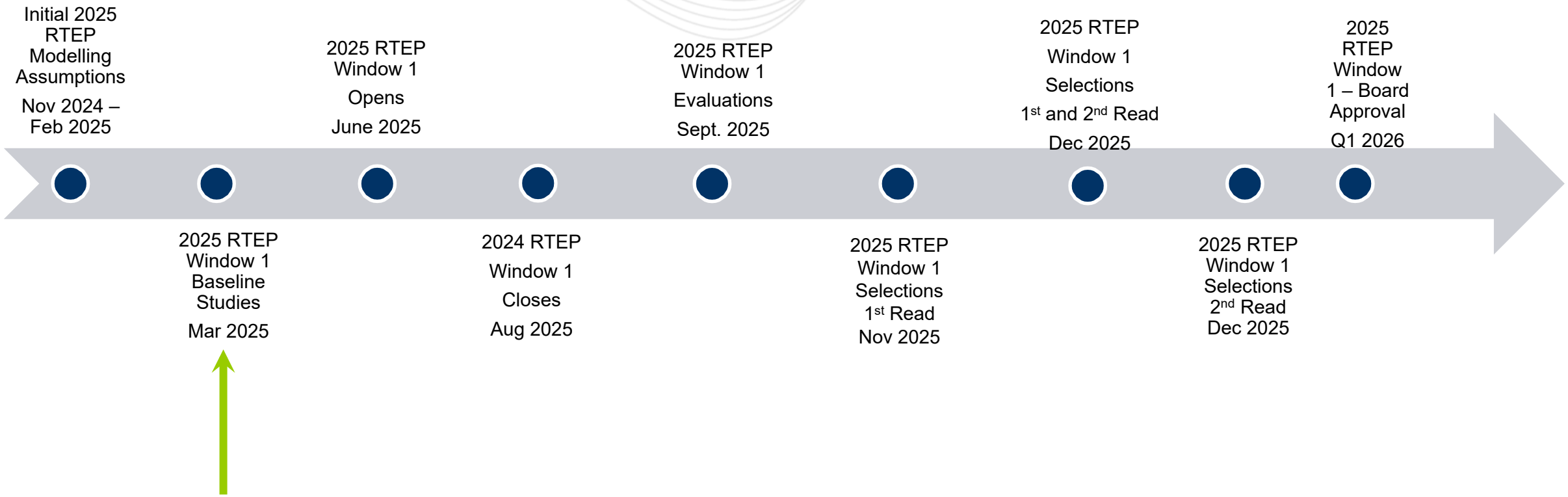
PJM Transmission Planning

Transmission Expansion Advisory Committee
April 1, 2025

2025 RTEP Window 1 Update

2025 RTEP Window 1 – Timeline



Scope Change & Cost Updates
Baseline Reliability Projects

Dominion Transmission Zone: Baseline New Mars – Lockridge – Golden 230kV Lines New Mars – Golden 500kV Line

Scope change for B3800.210 – B3800.212 (230kV Line Mars – Lockridge – Golden & 500kV Line Mars – Golden)

Part of the recommended solution for 2022 Window 3 (2022-W3-692) is to construct a new 230kV line from Mars – Lockridge – Golden and a new 500kV line from Mars – Golden.

Original Solution:

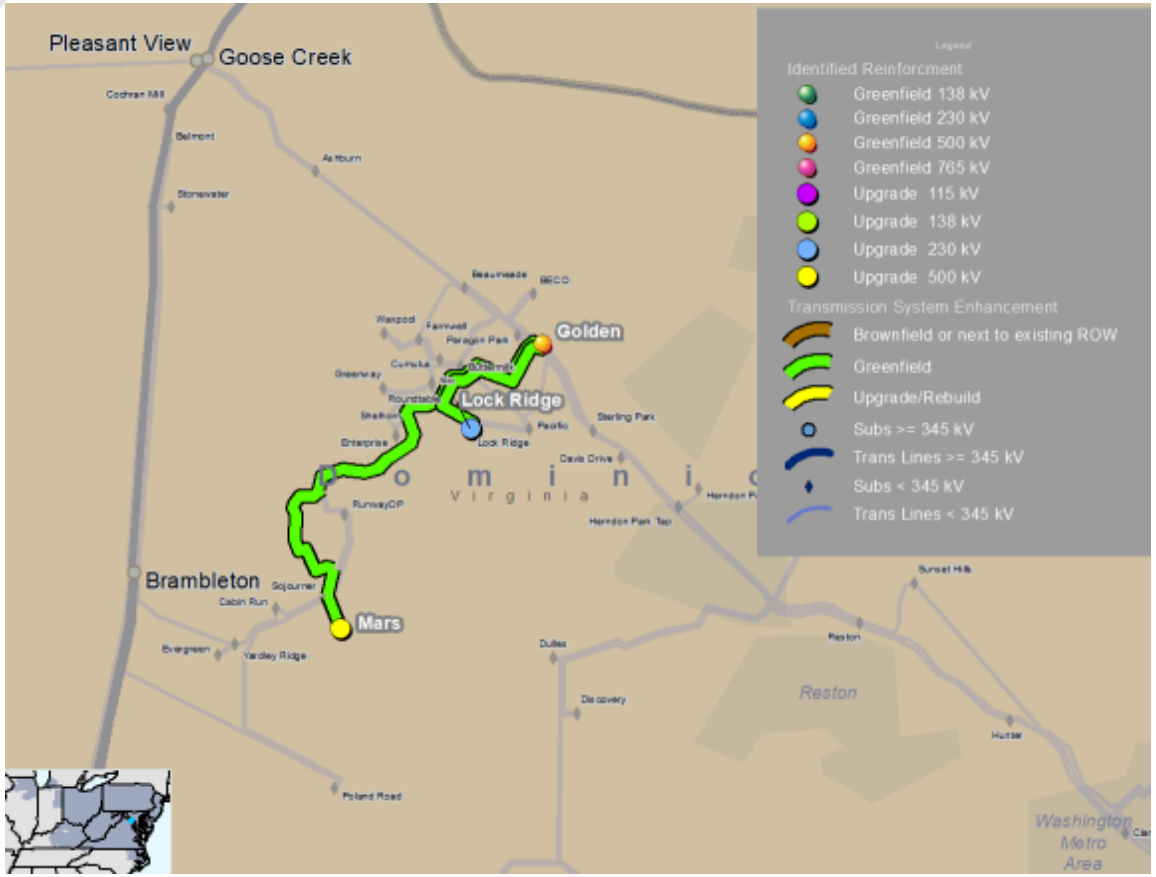
- Build a new 230kV line approximately 5.2 miles from Mars - Lockridge on 500/230kV double circuit structures to achieve a summer rating of 1573 MVA. Install 230kV equipment at Mars and Lockridge substations. **(B3800.210) $57.95M**
- Build a new 230kV line approximately 2.9 miles from Lockridge - Golden on 500/230kV double circuit structures to achieve a summer rating of 1573 MVA. Install 230kV equipment at Golden and Lockridge substations. **(B3800.211) $56.93M**
- Build a new 500kV line approximately 8.3 miles from Mars substation to Golden substation on 500/230kV double circuit structures to achieve a summer normal rating of 4357 MVA. Install 500kV equipment at Golden and Mars substations. **(B3800.212) $228.04M**

Transmission Estimated Cost: $342.92M

Required in-service date: 6/1/2027

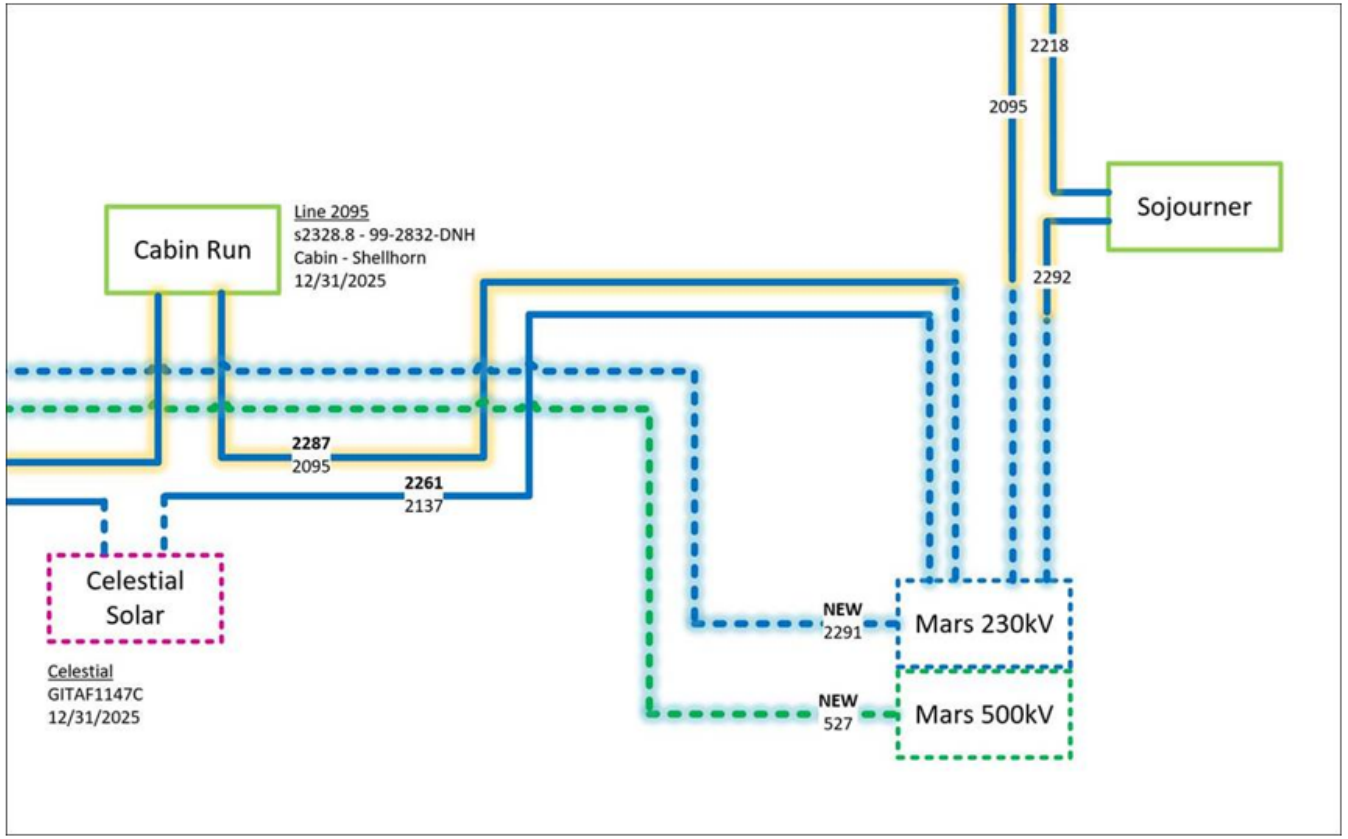
Projected in-service date: 6/1/2027

Previously Presented: 12/5/2023



B3800.210 – B3800.212 part of solution 2022-W3-692

Dominion Transmission Zone: Baseline
New Mars – Lockridge – Golden 230kV Lines
New Mars – Golden 500kV Line



Transmission Arrangement for area surrounding Mars before addition of Golden-Mars 5-2 project (after completion of Wishing Star – Mars project)

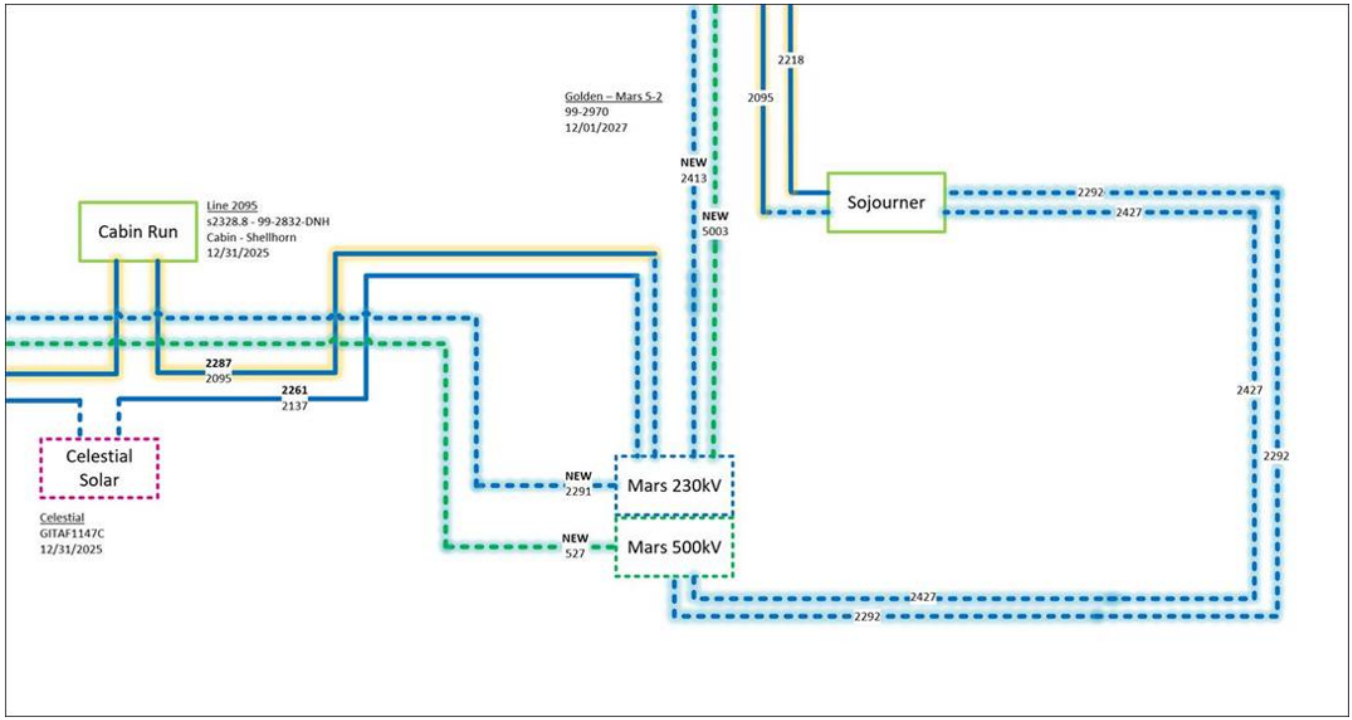
Dominion Transmission Zone: Baseline New Mars – Lockridge – Golden 230kV Lines New Mars – Golden 500kV Line

Revised Solution:

- Remove 230kV line #2095 Mars - Shellhorn and 230kV line #2292 Mars – Sojourner in the existing transmission corridor between Sojourner and Mars substations so that they can be re-routed to the south side of Mars substation, adding approximately 2 miles of new conductor. This is to allow for termination of the 5-2 Golden – Mars circuits into Mars substation.
- Cut 230kV line #2095 Mars – Shellhorn into Sojourner substation, creating 230kV line #2427 (Mars - Sojourner) and 230kV line #2095 (Sojourner - Shellhorn).
- Upgrade 4 230kV breakers at Sojourner substation from 63kA to 80kA

Reason for Scope Change & Cost Update:

- The new Golden – Mars 230kV & 500kV lines will intersect with the existing transmission corridor containing the 230kV lines Mars-Shellhorn Line #2095, Mars-Sojourner Line #2292, Celestial-Mars Line #2161, and Cabin Run-Mars Line #2287 just east of the Old Ox/Carters School Road Intersection. Spatial and FAA constraints along these existing lines would prevent installation of the Golden – Mars lines along any of the alternative routes.
- Cost increase due to additional 2 miles of transmission line and real estate required to reroute line #2095 Mars – Shellhorn & line #2292 Mars – Sojourner.



Transmission Arrangement for area surrounding Mars with proposed changes

Additional Cost Estimate: $97M (B3800.210 $49M + B3800.212 $48M)

Total Proposed Cost Estimate: $439.92M

APS Transmission Zone: Baseline Doubs 500kV Breaker Replacement

Process Stage: Cost Update

Criteria: Short Circuit

Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Short Circuit base case + PJM selected solution

Proposal Window Exclusion: None

Problem Statement:

In the 2029 RTEP Short Circuit base case that includes the 2024W1 selected solution, 1-500kV breaker at Doubs substation was identified as being over duty.

Recommended Solution:

Replace 50kA breaker DL-59 #2CAP with a 63kA breaker. **(b4000.110)**

Estimated Cost: ~~**$11.5 M**~~ **$10.06 M**

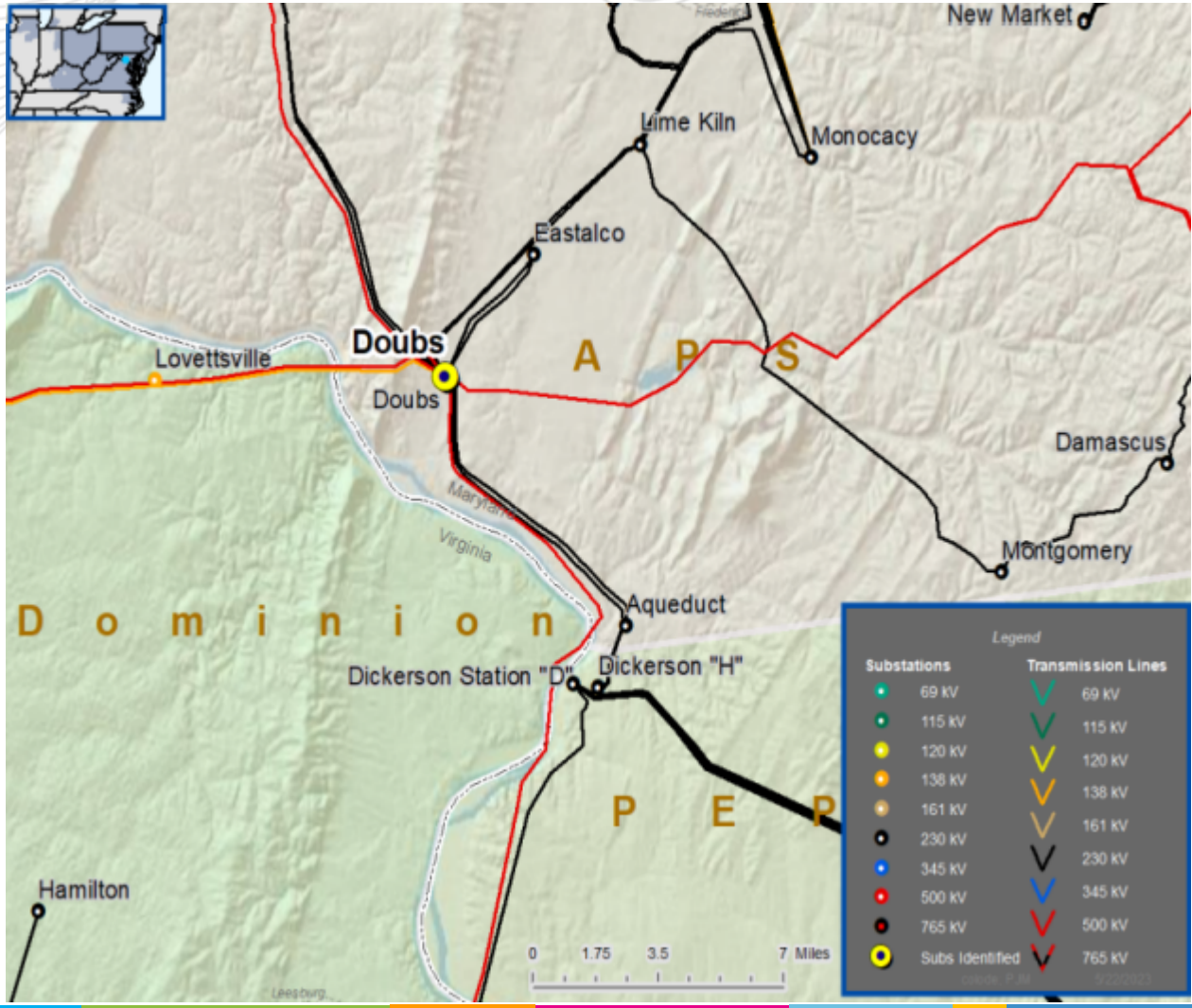
Reason for Cost Change:

Original estimated cost incorrectly reflected the future “in-service year” installed cost rather than the current year cost.

Required IS Date: 6/1/2029

Projected IS Date: 6/1/2029

Previously Presented: 1/10/2025



Cancellations

DOM Transmission Zone: Baseline Loudoun – Morrisville 500kV

Process Stage: Cancellation

Criteria: End of Life

Assumption Reference: FERC 715

B3211: Rebuild the 1.3 mile section of Line #569 Loudoun to Morrisville with single-circuit 500 kV structures at the current 500 kV standard. This will increase the rating of Line #569 to 3424 MVA.

The upgrade was identified through reliability studies that indicated that retiring Line #569 would result in thermal overloads in accordance with P6 NERC criteria violations.

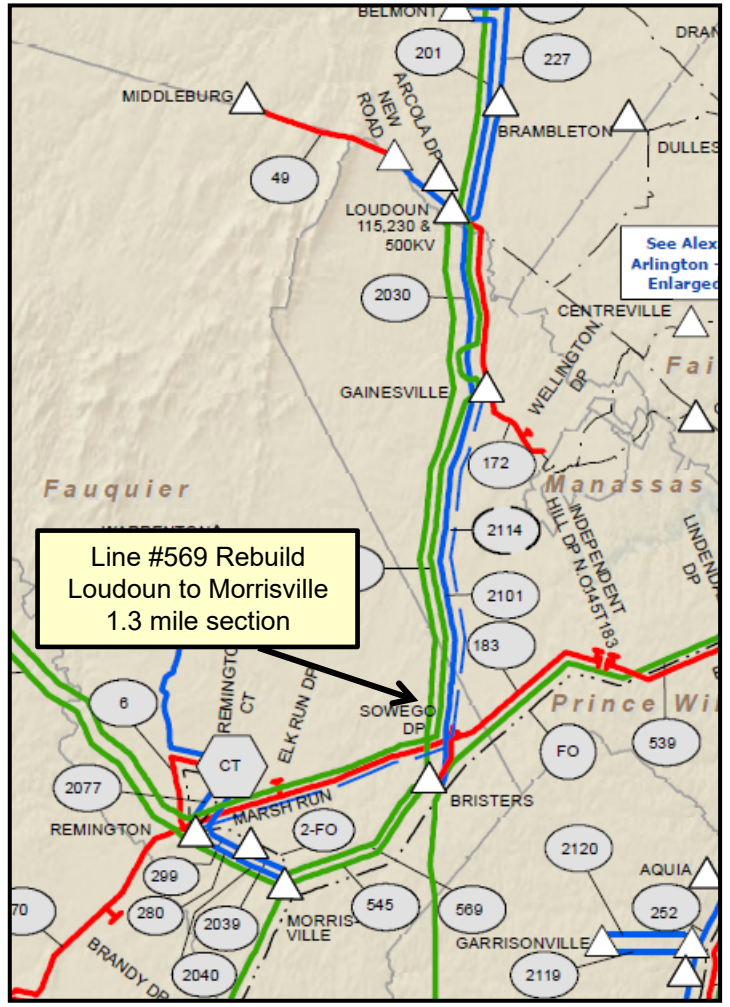
Cancellation Reason: Baseline project b3800.312 from 2022 Window 3 will rebuil entire portion of line #569 Loudoun – Morrisville, therefore eliminating the need project.

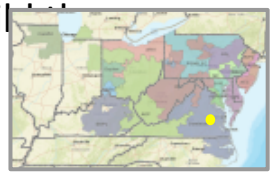
Previously Presented: 8/8/2019 TEAC

Estimated Project Cost: $4.5 M

Required In-Service Date: As Soon As Possible

Projected In-Service Date: 12/31/2024





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

DOM Transmission Zone: Baseline Ox 500kV Breaker Replacements

Process Stage: Cancellation

Criteria: Short Circuit

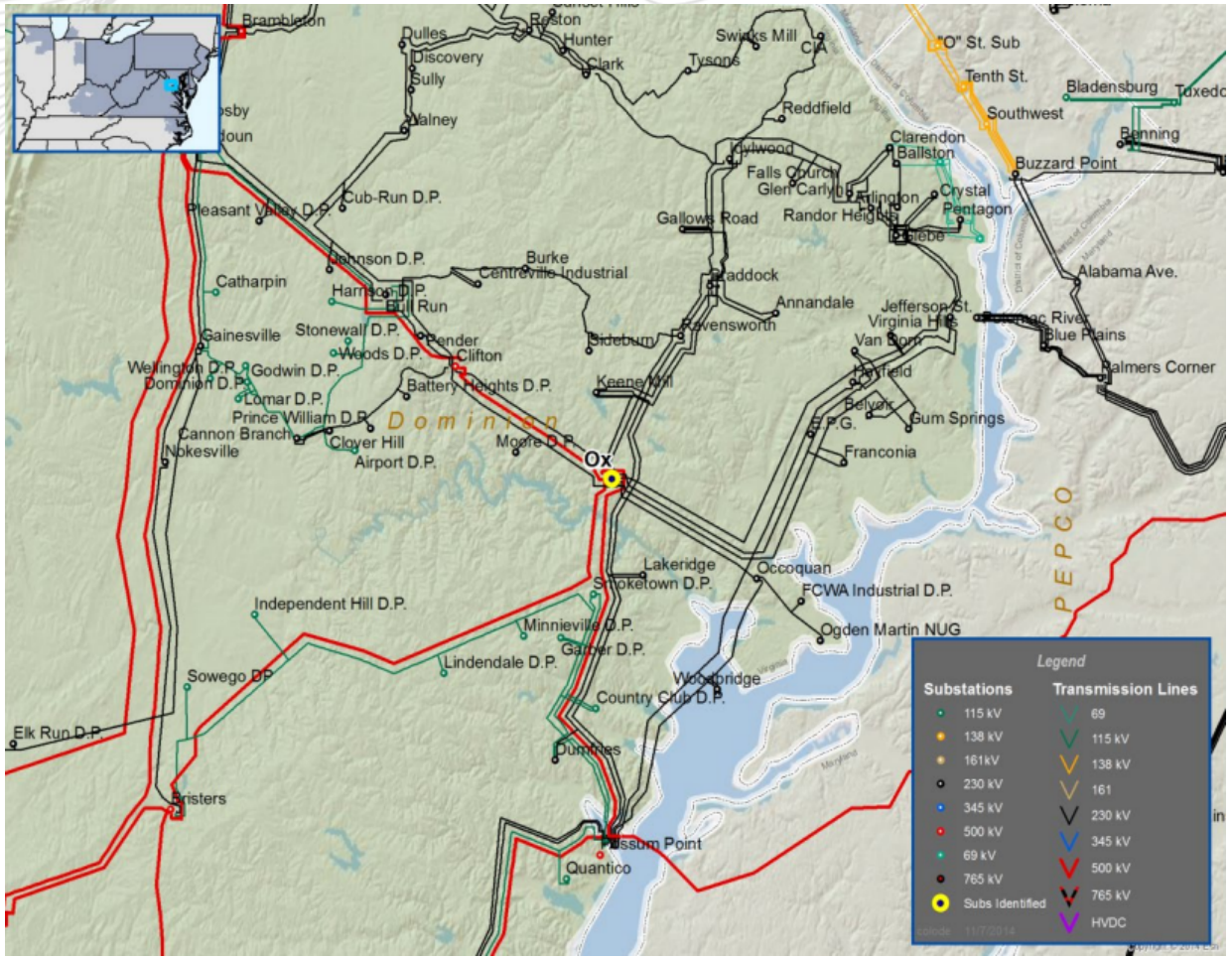
Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Short Circuit base case + PJM selected solution

Proposal Window Exclusion: None

B4000.130: Replace 40kA breakers 56142, H1T539, H2T539 with 63kA breakers.

Estimated Cost: $3.045 M



Reason for Cancellation:

Baseline projects b3800.236 (H1T539, H2T539) & b3800.335 (56142) from 2022 Window 3 replace the same 3 breakers therefore eliminating the need for this project.

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Required IS Date: 6/1/2029

Projected IS Date: 6/1/2029

Previously Presented: 1/10/2025

Contact

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Reliability Analysis Update

Member Hotline

(610) 666-8980

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Revision History

Version No.	Date	Description
1	Mar. 27th, 2025	• Initial slides posted

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Resources Available to PJM Stakeholders

(Transmission Planning)

Reference Resources

- PJM Learning Center – Overviews on PJM's priorities and responsibilities, including Planning responsibilities

- Process to build a new facility – Overview of the steps and parties involved in the process to build a new facility from the need to completion.

- PJM Manual 14B – Details on how PJM conducts analysis (web or pdf)

- PJM Manual 14F – Overview of the competitive process (web or pdf)

Reference Resources

- Generation interconnection queue – List of all projects for proposed generation. PJM does not solicit these requests, but PJM will ensure each project can operate reliably.
  - Serial process – Historic view of all projects submitted prior to 2022
  - Cluster process – Progress of all projects processed with the reformed interconnection process

- PJM Manual 14H – Overview of the generation interconnection process (web or pdf)

Reference Resources

- General PJM training – A variety of training resources on various aspects of PJM, including overviews such as PJM Introduction and PJM 101: The Basics.

- 2022 RTEP Window 3 FAQ – A lot of great background that applies to the current body of work.

- PJM's Client Management team – Single point of contact for any questions about PJM.
  - Phone: (610) 666-8980 or (866) 400-8980
  - E-mail: custsvc@pjm.com