



# Reliability Analysis Update

Wenzheng Qiu

Stan Sliwa

Transmission Expansion Advisory Committee

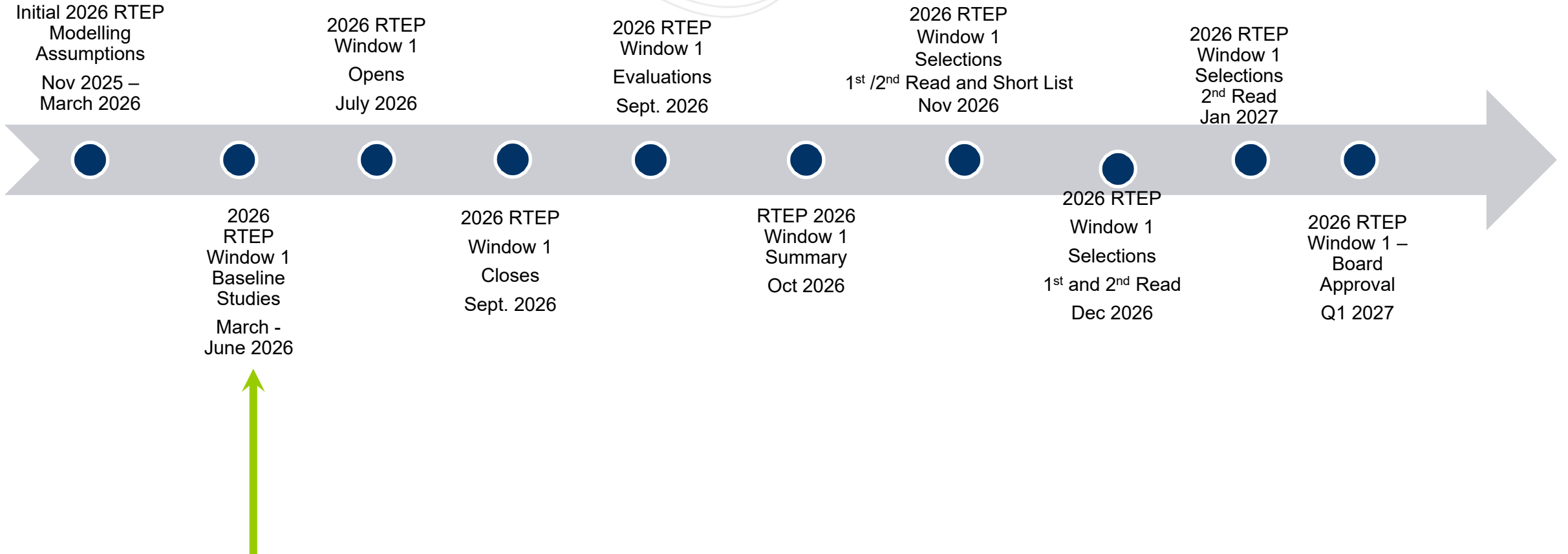
April 7, 2026

- 2026 RTEP - Window 1
  - Schedule Update
- 2025 RTEP - Window 1
  - P5 Updates
- Scope / Cost Changes



# 2026 RTEP Window 1 Schedule Update

# 2026 RTEP Window 1 – Timeline





# 2025 RTEP Window 1 P5 Updates

# 2<sup>nd</sup> Read

**Process Stage:** Second Read

**Criteria:** Baseline Analysis

**Assumption Reference:** 2030 RTEP assumption

**Model Used for Analysis:** 2025 Series RTEP 2030 Summer, Winter & LL cases

**Proposal Window Exclusion:** Substation Exclusion

**Problem Statement:** In 2025 Series RTEP 2030 Summer, Winter & LL cases, multiple thermal and voltage violations are observed due to multiple P5 contingencies.

**Proposed Solution:**

- TOs have submitted P5 mitigation projects that include upgrades listed below designed to eliminate the P5 contingency:
  - Battery Monitoring
  - Relay Upgrades

**Transmission Estimated Cost:** AEP \$1.7 M, DOM \$0.02 M

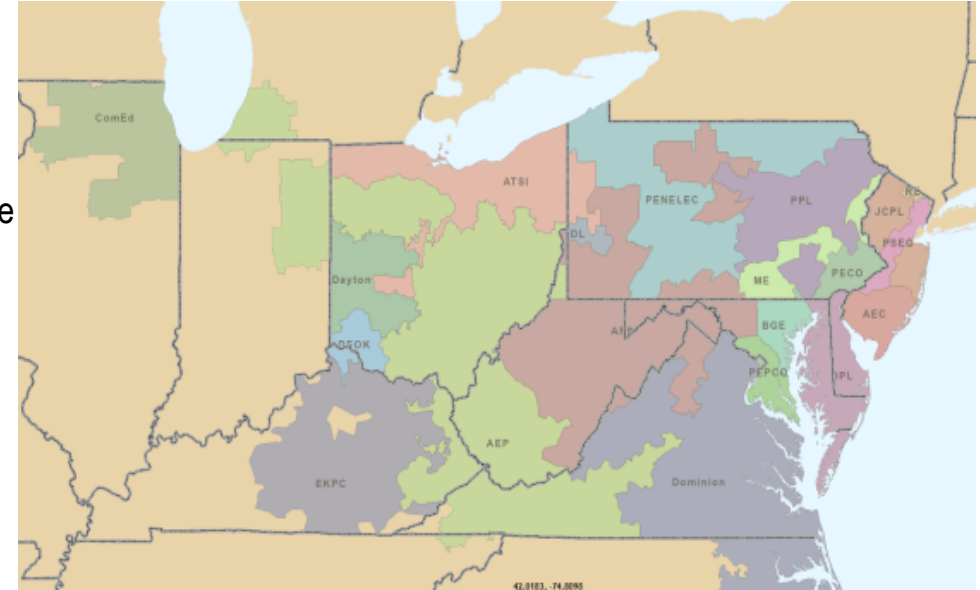
**Ancillary Benefits:** Installation of redundant equipment will prevent outage scenarios and improve reliability of the transmission system.

**Required in-service date:**

04/15/2030 (4 AEP and 1 DOM), 06/01/2030(5 AEP), 12/01/2030(3 AEP)

**Projected in-service date:** 4/15/2030

**Upgrade IDs:** b4077 (AEP); b4078 (DOM).



TO	Total Cost (\$)	# of Substations By kV Level				
		115	138	230	345	500
AEP	\$ 1,700,000.00		5		7	
DOM	\$ 20,000					1

# 1<sup>st</sup> Read

**Process Stage:** First Read

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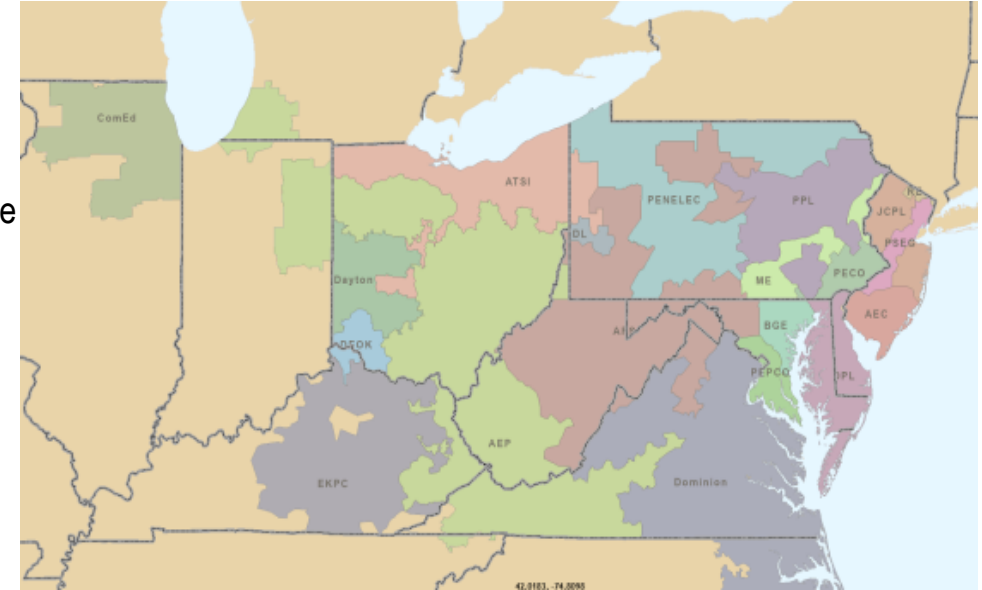
**Transmission Estimated Cost:** JCPL \$0.8 M, ATSI \$7.2M, ComEd \$0.2M, ACE \$0.16M

**Ancillary Benefits:** Installation of redundant equipment will prevent outage scenarios and improve reliability of the transmission system.

**Required in-service date:**

04/15/2030(1 JCPL & 1 ATSI, 1 ACE), 06/01/2030(6 ATSI, 1 ComEd), 12/01/2030(1 ATSI)

**Projected in-service date:** 4/15/2030



TO	Total Cost (\$)	# of Substations By kV Level				
		115	138	230	345	500
JCPL	\$ 800,000.00			1		
ATSI	\$ 7,020,000.00		5		3	
ComEd	\$ 200,000.00		2		1	
ACE	\$ 160,000.00			1		

# Scope / Cost Changes

**Process Stage:** Additional Scope

**Criteria:** Winter Generator Deliverability

**Assumption Reference:** 2027 RTEP assumption

**Model Used for Analysis:** 2027 RTEP Winter cases

**Proposal Window Exclusion:** Substation Equipment

**Problem Statement:**

The Brunner Island – Yorkanna 230 kV circuit is overloaded for single contingency.

**Existing Facility Rating:** 647SN/8041E, 746WN/903WE MVA

**Proposed Facility Rating:** 709SN/869SE, 805WN/1031WE MVA

**Recommended Solution:**

Reconductor/rebuild 0.64 miles of the PPL side of the Brunner Island - Yorkanna 230 kV circuit. (b3774)

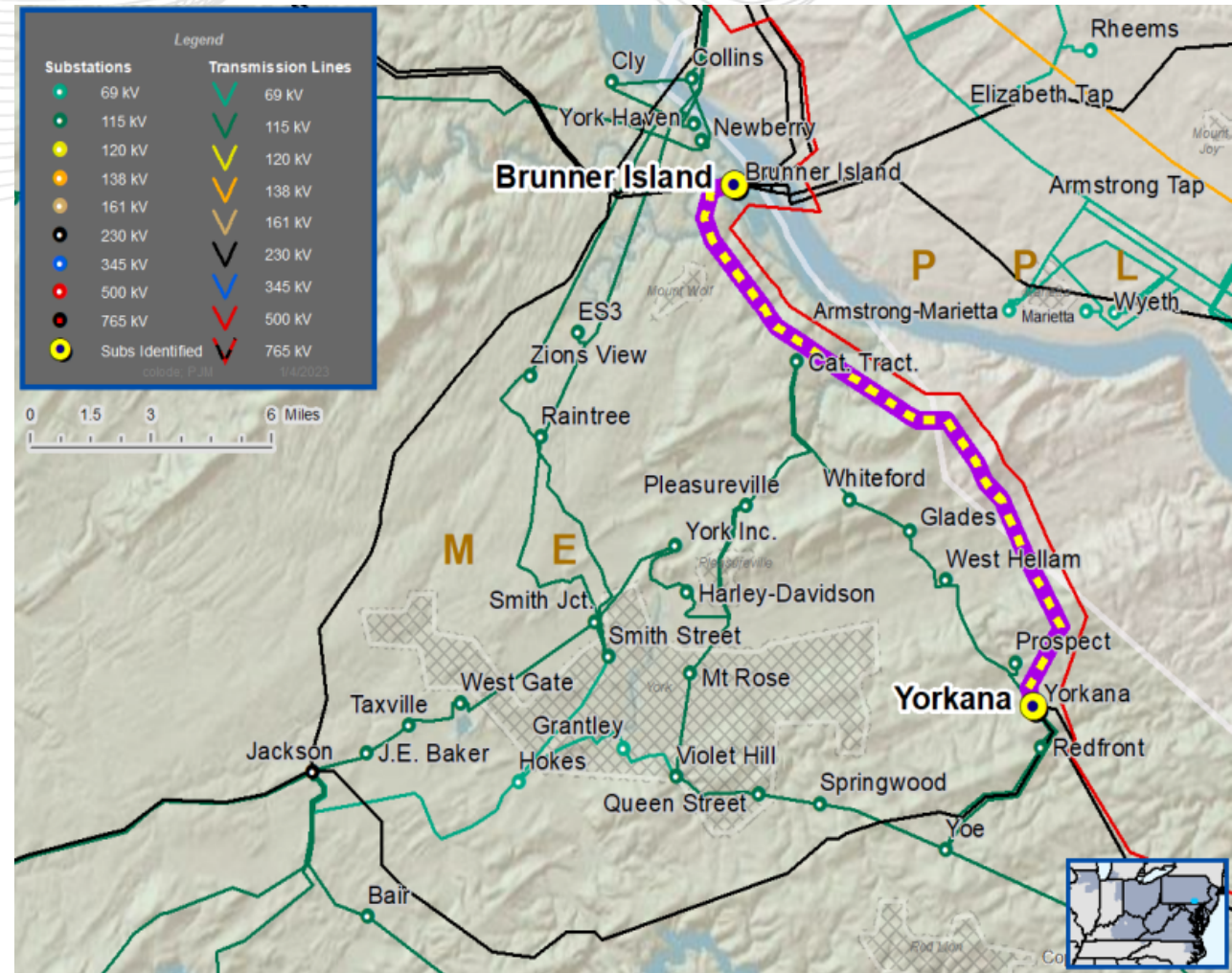
Replace structure 1055-1 with new steel pole dead-end structure at the MAIT/PPL demarcation point on Brunner Island – Yorkanna 230kV line. (b3774.2)

**Estimated Cost:** ~~\$2.5 M~~ **\$4.3M** (Increase of 1.8 from b3774.2)

**Alternatives:** N/A

**Required In-Service:** 6/1/2027

**Projected In-Service:** 6/1/2027

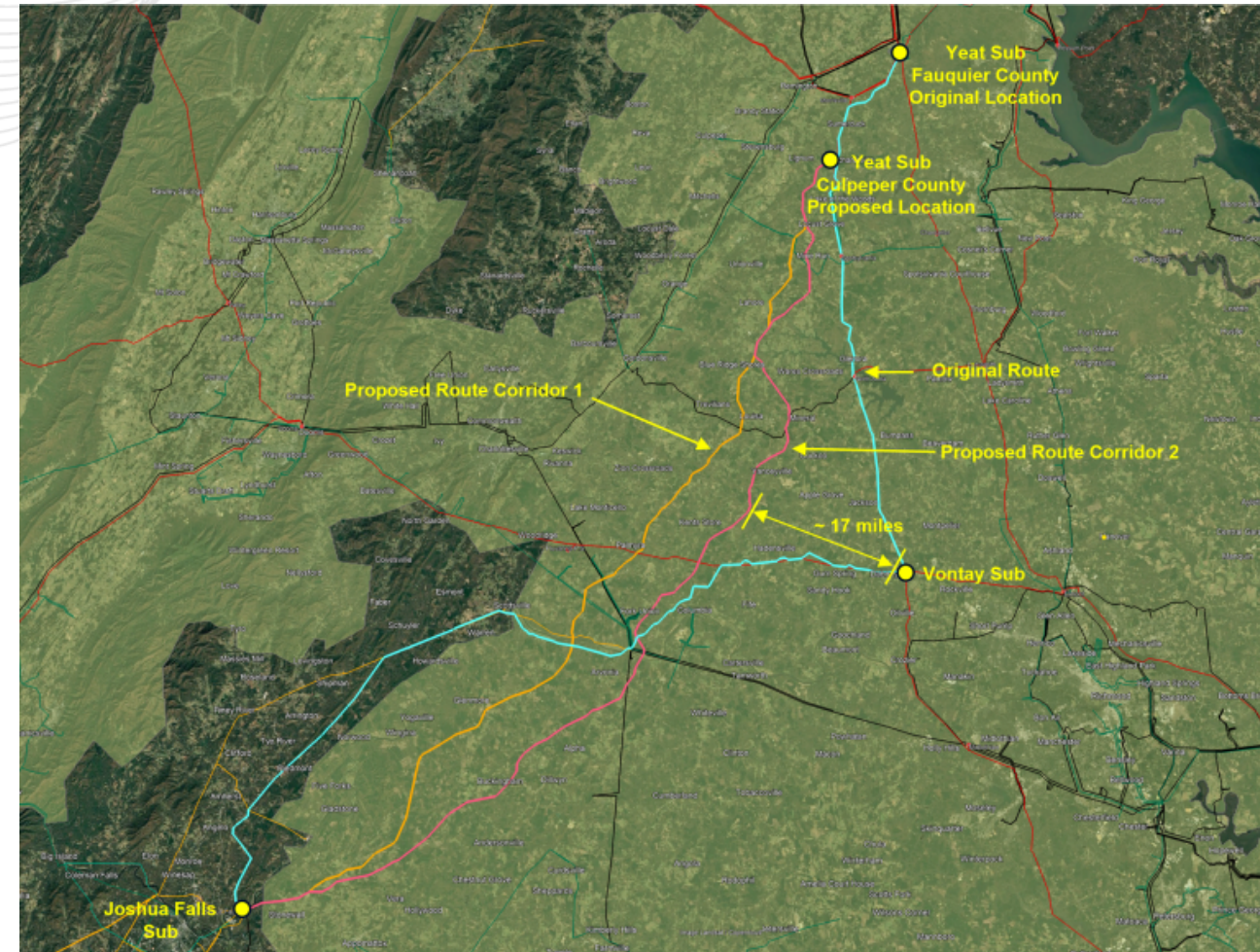


## Scope Change Drivers / Considerations:

- Enhancement to schedule certainty to meet project's in-service date
- Reduce potential residential, environmental, cultural and historical impacts
- Consider options to reduce new greenfield 765kV line mileage and associated cost/value benefits
- Offers comparable Transfer limits to the originally approved/selected proposal from 2025-W1
- Requires minor adjustments to earlier approved developments in the area (as will be explained in following slides)

## First Read:

- PJM Board approval – Target July 2026
- PJM will model the scope change presented herein part of the 2026 RTEP Competitive Window



\*Potential route variations are not shown on the map.

## Scope change for B4000.355 – B4000.359 (New Yeat – Joshua Falls 765kV line, Yeat 765/500/230kV Substation)

Part of the recommended solution for 2024 Window 1 (2024-W1-820) is to construct a new 765/500/230kV substation called Yeat & construct a new 765kV line from Joshua Falls to Yeat.

### Original Solution:

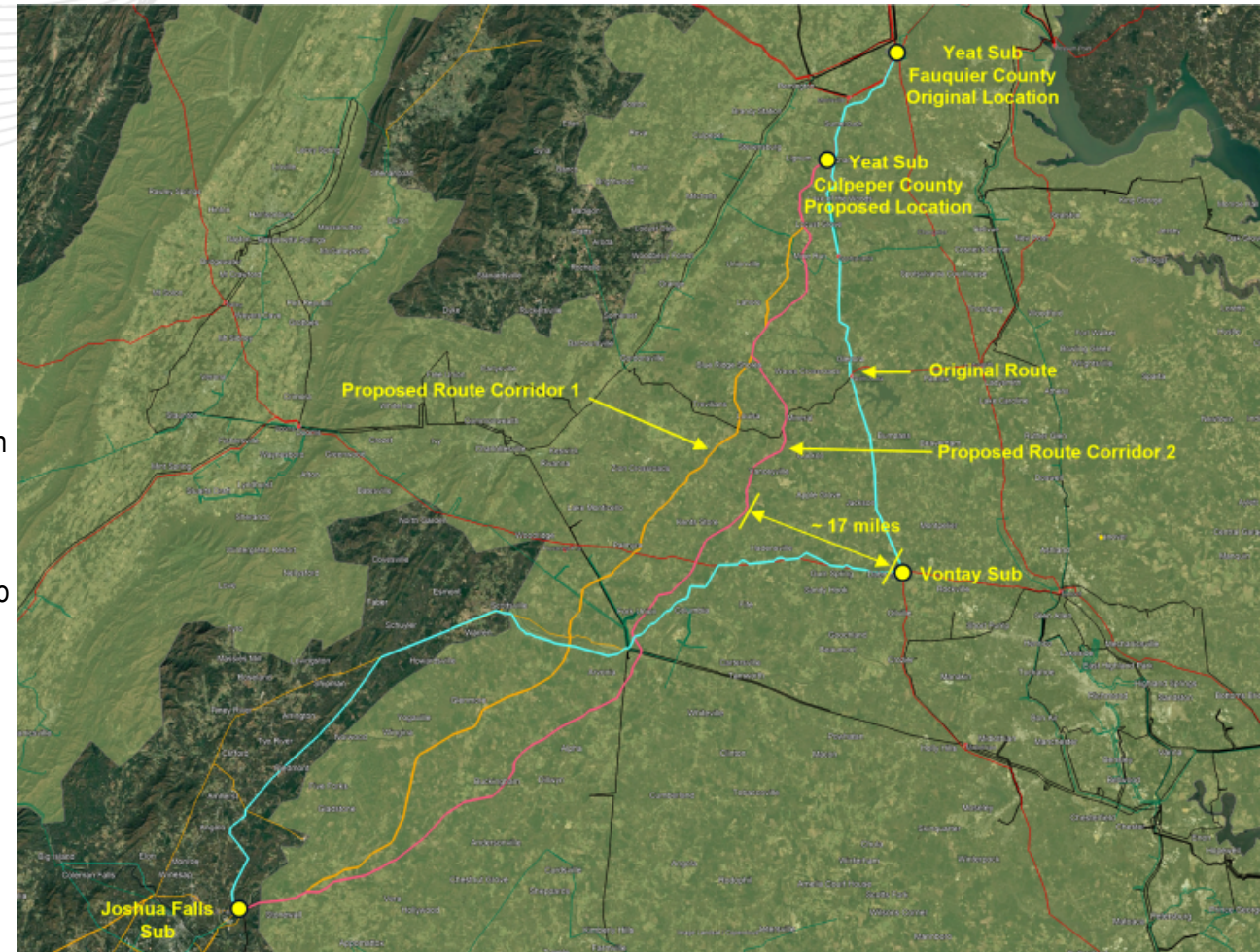
- Build a new 156 mile 765kV line from Joshua Falls – Yeat. (Roughly 69.3 miles in AEP section). **(b4000.355) \$341.17M**
- Build a new 156 mile 765kV line from Joshua Falls – Yeat. (Roughly 86.7 miles in Dominion section). **(b4000.356) \$426.83M**
- Build a new 765/500/230kV substation called Yeat. Install (2) 765/500 kV transformers. Cut in 500kV line Bristers – Ox and 500kV line Meadowbrook – Vint Hill into Yeat. **(b4000.357) \$197.1M**
- At Yeat substation, install (1) 500/230kV transformer. Cut in 230kV line Vint Hill – Elk Run into Yeat substation **(b4000.358) \$45.6M**
- Add (2) 765kV breakers at Joshua Falls substation. Substation expansion is required to add the additional breakers. **(b4000.359) \$99.19M**

**Transmission Estimated Cost: \$1,109.89M**

**Required IS Date: 6/1/2029**

**Projected IS Date: 6/1/2029**

**Previously Presented: 01/07/2025**



\*Potential route variations are not shown on the map.

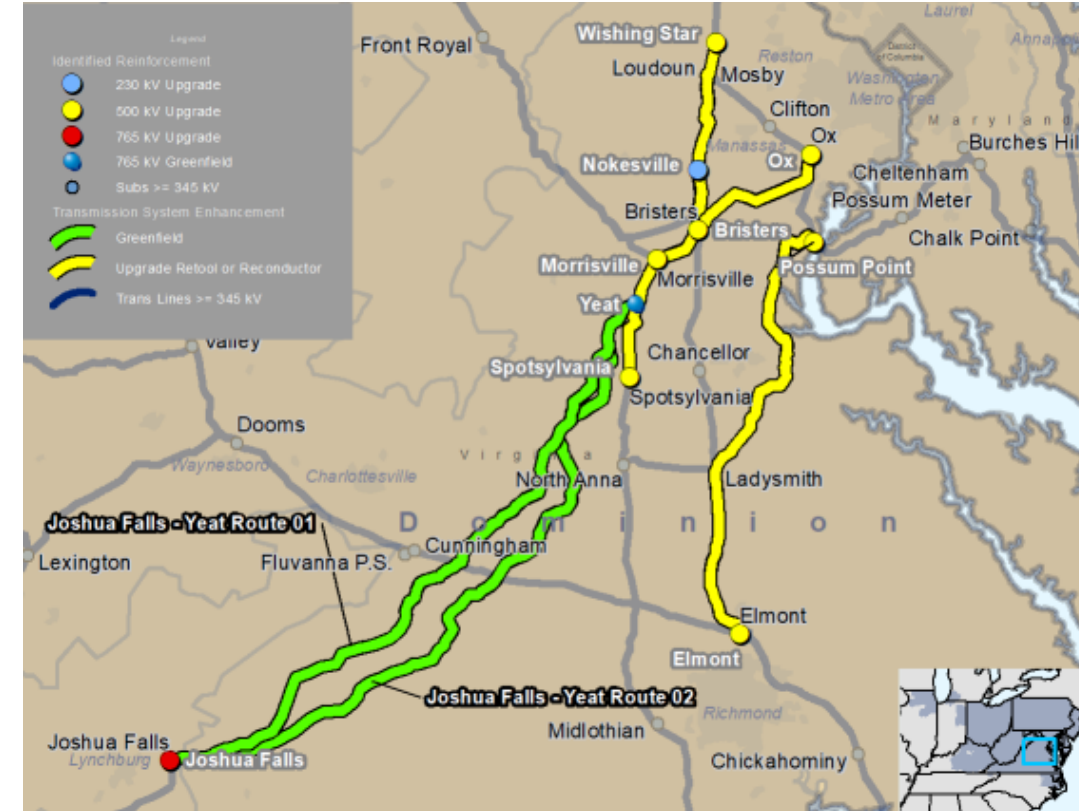
## High-Level Overview

### • Yeat Substation Relocation

- Relocate Yeat 765kV substation further south by ~15 mi
- Reduce (shorten) Joshua Falls – Yeat 765kV greenfield line to 115 miles
  - 765kV line will head directly towards Yeat (N-E direction from Joshua as shown in map and will no longer pass by Vontay)
- Remove 230kV yard at Yeat
- Cut-in Culpeper Yeat into 500kV Line #594 Spotsylvania - Morrisville
- Extend Morrisville - Wishing Star 500kV line by 7.5 mi from Morrisville to Culpeper-Yeat (using existing ROW)
- Move Kraken loop 500 kV line termination to Bristers (Previously Yeat), reducing length by 1.5 mi

### • Additional Reinforcements Required:

- Rebuild ~8 miles of existing 500kV Line #594 from Yeat to Morrisville
- Tie the Morrisville – Bristers and Bristers – Nokesville 230kV lines by removing line terminations at Bristers (bypassing the Bristers substation)
- Upgrade Bristers 230/115kV transformer
- Revise the Yeat – Ox 500kV line (~21 mi) rebuild scope from 2025W1 (b4053.23) to rebuild Bristers – Ox 500kV line (~23 mi) (~2 mi extra)
- Tie the Elmont – Kraken and Kraken – Possum Pt 500kV lines by removing line terminations at Kraken (bypassing the Kraken substation)
- Rebuild 500kV Line #594 Spotsylvania to Yeat 500kV line (~11 mi)



**Preliminary Transmission Arrangement for Yeat substation relocation in Culpeper County & supporting reinforcements**

## Scope Change Details to Existing Baseline Projects:

### 2022 Window 3:

- Build a new 500kV line from ~~Morrisville Culpeper Yeat~~ to Vint Hill. New conductor to have a summer rating of 4357 MVA. Line length is approximately ~~49.74~~ 27.21 miles. (b3800.356) ~~\$101.89M~~ \$150.64M
- ~~Upgrade and install equipment at Morrisville substation to support the new 500kV conductor termination.~~ Terminal equipment at Morrisville substation to be rated for 5000 A for 500kV Line #545 & #569. Upgrade 500 kV bus 2 to 5000 A. (b3800.346) ~~\$17.54~~ \$12.54

### 2024 Window 1:

- Build a 500kV line from a new substation called Kraken to ~~a new substation called Yeat~~ Bristers. New conductor to have a minimum summer normal rating of 4357MVA. (b4000.345) ~~\$394.71M~~ \$384.96M
- Cut-in 500 kV line from Kraken substation into ~~Yeat~~ Bristers substation (b4000.346) \$5M (No cost change)
- Build a new ~~156~~ 115 mile 765kV line from Joshua Falls – ~~Culpeper~~ Yeat. (Roughly ~~69.3~~ 5 miles in AEP section). (b4000.355) ~~\$341.17M~~ \$24.62M
- Build a new ~~156~~ 115 mile 765kV line from Joshua Falls – ~~Culpeper~~ Yeat. (Roughly ~~86.7~~ 110 miles in Dominion section). (b4000.356) ~~\$426.83M~~ \$541.54M
- Build a new ~~765/500/230kV~~ 765/500kV substation called ~~Culpeper~~ Yeat. Install (2) 765/500 kV transformers. Cut in 500kV line ~~Bristers—Ox and 500kV line Meadowbrook—Vint Hill Spotsylvania – Morrisville~~ into Yeat. (b4000.357) ~~\$197.10M~~ \$187.10M



# Dominion Transmission Zone: Baseline New 765/500/230kV Yeat Substation

## Scope Change Details to Existing Baseline Projects:

### 2025 Window 1:

- Rebuild approximately ~~22~~ 23 miles of 500 kV line No. 539 ~~Yeat Bristers~~ – Ox using 6000A conductor on double-circuit structures with the option of adding a 230 kV line at a later time. **(b4053.23) \$122.66M (No cost change)**
- Construct a new ~~765/500 kV~~ Vontay switching station at the crossing of 500 kV line No. 553 Cunningham-Elmont and ~~765 kV line Joshua Falls Yeat~~ 500 kV line No. 576 Midlothian – North Anna. Develop ~~two 765 kV line terminal positions and~~ three 500 kV line terminal positions. ~~Install one 765/500 kV transformer, with provisions for a future second transformer.~~ **(b4053.13) ~~\$217.76 M~~ \$80.0M**
- Cut and loop Line #5008 into Mosby substation, which will result in two (2) 500 kV lines: Line #5008 ~~Morrisville Culpeper Yeat~~ – Mosby and Line #9573 Mosby – Wishing Star Sub. The proposed structures to be installed are two (2) single circuit engineered steel double dead-end 3-pole structures and one (1) single circuit steel A-frame backbone structure. **(b4053.11) \$6.686M (No cost change)**

### Cancellations:

- At Yeat substation, install (1) 500/230kV transformer. Cut in 230kV line Vint Hill – Elk Run into Yeat substation **(b4000.358) \$45.6M**
- Scope change to b3800.313 from 2025W1 no longer required to reconductor existing 500kV line from Yeat – Vint Hill to 6000A. B3800.313 will remain as originally spec'd.
- Loop 765 kV Joshua Falls – Yeat into the new Vontay substation, which will result in two 765 kV lines: from Joshua Falls – Vontay and Vontay – Yeat. **(b4053.16) \$8.36M**

## New Baseline Projects:

- Rebuild approximately 8 miles of the existing 500kV line from Culpeper Yeat to Morrisville. **\$48.75M (b4000.361)**
- Tie the Morrisville – Bristers and Bristers – Nokesville 230kV lines by removing line terminations at Bristers (bypassing the Bristers substation). **\$0.5M (b4000.362)**
- Upgrade Bristers 230/115kV transformer. **\$2M (b4000.363)**
- Tie the Elmont – Kraken and Kraken – Possum Pt 500kV lines by removing line terminations at Kraken (bypassing the Kraken substation). **\$1M (b4053.34)**
- Rebuild approximately 11 miles of 500kV Line #594 Spotsylvania to Culpeper Yeat 500kV line. **\$67.03M (b4053.35)**

**Total Cost Savings: \$250.28M**



# Dominion Transmission Zone: Baseline Second Chickahominy 500/230kV Transformer

Previously Presented: 6/2/2020 TEAC & 6/8/2021 TEAC

Baseline Reliability: Generation Deactivation

Problem Statement: Generation Deliverability - Chesterfield 5 and 6

- Chickahominy 500/230 kV transformer is overloaded for loss of Chickahominy – Surry 500 kV line

Recommend Solution: (b3213)

- ~~Install a 2nd Chickahominy 500/230 kV transformer~~
- Reconfigure 500kV portion of substation into a ring bus
- Relocate the Chickahominy – Elmont 500kV line #557 to terminate in a new bay at Chickahominy substation and relocate the Chesterfield – Lanexa 115kV line #92 to allow for the expansion of the Chickahominy substation
- Add three new 500 kV breakers with 50kA interrupting rating and associated equipment

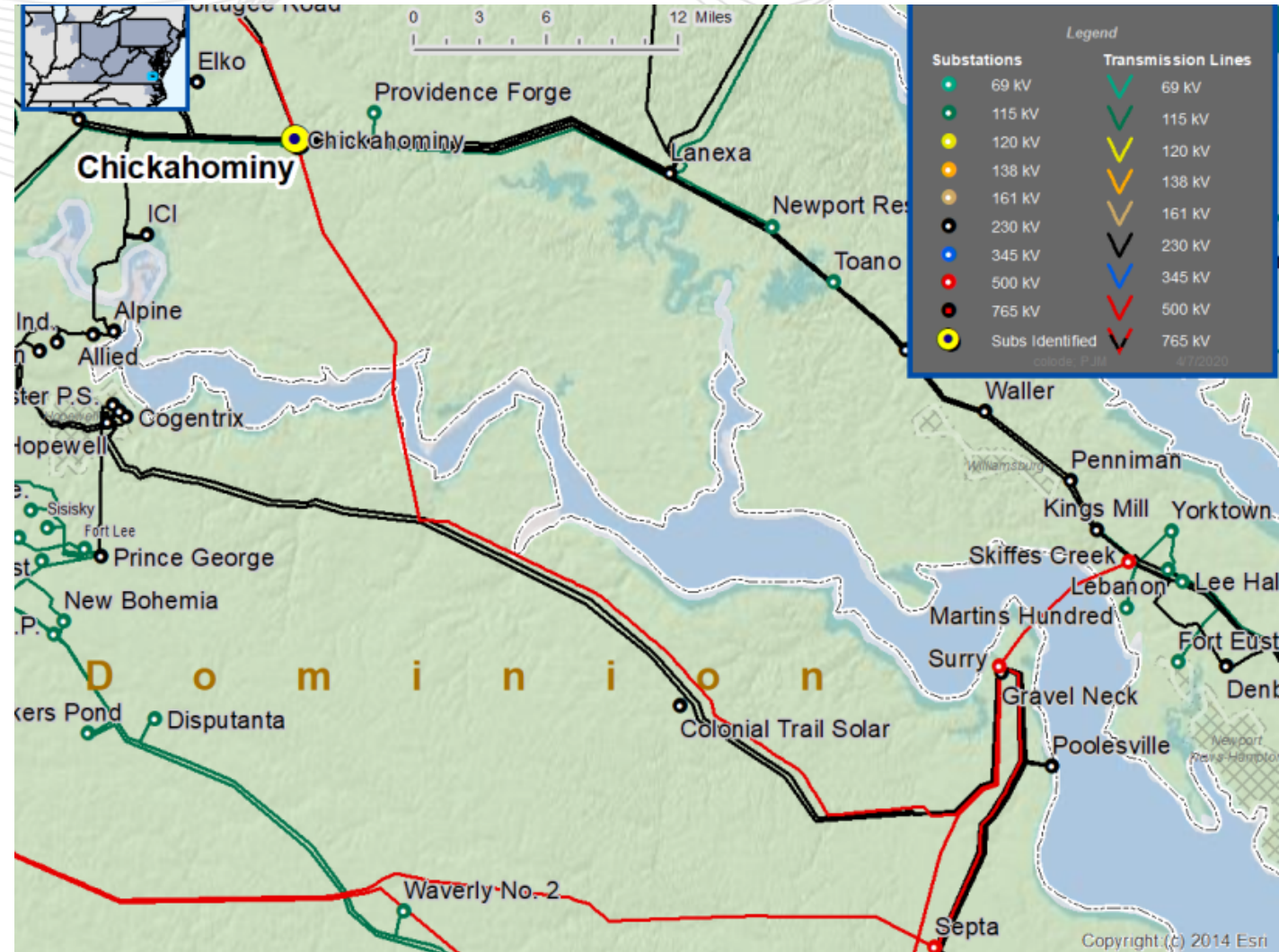
Reason for Change

- 2024 RTEP W1 & 2025 RTEP W1 analysis indicates that the 2<sup>nd</sup> transformer is not required at this time.

Required In-Service Date: 6/1/2023

Actual In-Service Date: 4/24/2024

Estimated Project Cost: ~~\$31.05M~~ \$34.03M



Facilitator:

Eric Hsia, [Eric.Hsia@pjm.com](mailto:Eric.Hsia@pjm.com)

Secretary:

Joshua Stephenson, [Joshua.Stephenson@pjm.com](mailto:Joshua.Stephenson@pjm.com)

SME:

Wenzheng Qiu, [Wenzheng.Qiu@pjm.com](mailto:Wenzheng.Qiu@pjm.com)

Stanley Sliwa, [Stanley.Sliwa@pjm.com](mailto:Stanley.Sliwa@pjm.com)

## Reliability Analysis Update



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

[custsvc@pjm.com](mailto:custsvc@pjm.com)

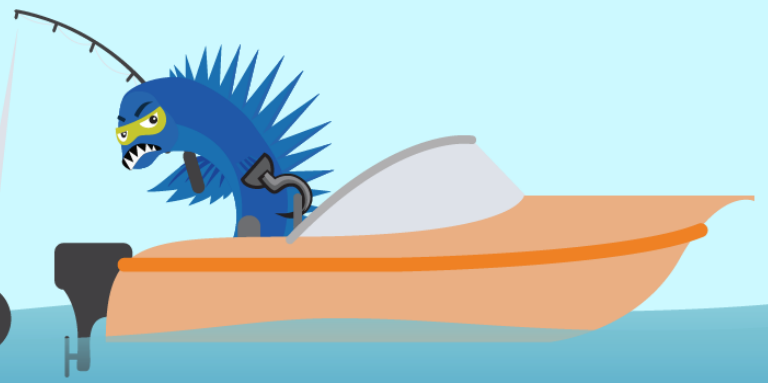
Version No.	Date	Description
1	April 3, 2026	<ul style="list-style-type: none"><li>Initial slides posted</li></ul>
2	April 3, 2026	<ul style="list-style-type: none"><li>Added schedule update for 2026 RTEP - Window 1 – slides 2-4</li></ul>

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