



Reliability Analysis Update

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Transmission Expansion Advisory Committee

Tuesday, August 31, 2021

Changes to Existing Projects

Baseline Reliability Projects



AEP Transmission Zone B3139 – B3141, B3220 Replacement

B3139 - B3141 (Originally Presented 10/17/2019, 11/14/2019 TEAC)

B3220 (Originally Presented 7/7/2020 and 11/4/2020 TEAC)

Driver: : AEP Buchanan units 1 and 2 Deactivation

Original Scope:

- **B3139:** Rebuild the Garden Creek - Whetstone 69 kV line (approx. 4 mile)
- **B3140:** Rebuild the Whetstone - Knox Creek 69 kV line (3.1 mile)
- **B3141:** Rebuild the Knox Creek - Coal Creek 69 kV line (2.9 mile)
- **B3220:** Install 14.4 MVAR Capacitor Bank at Whitewood 138 KV

Original Presented Estimated Total Cost: \$33.2 M

Updated Functional Estimated Total Cost: \$28.66M

Required IS Date: 6/1/2023

Presented Projected IS Date: 6/1/2023

Updated Projected IS Date: 12/15/2023

Reason for the delay:

- The schedule does not allow adequate time to complete the bat portal netting during September/October of 2021. This cannot be shifted to the next survey window due to the start of construction in July of 2022 to meet the current in-service date.
- The schedule does not allow for time of year restrictions for tree clearing due to endangered bat species.





AEP Transmission Zone B3139 – B3141, B3220 Replacement

Supplemental Needs identified in the area

1. Salmon substation (AEP-2021-AP003, Needs Meeting 1/15/2021)
2. Skeggs Branch Substation (AEP-2021-AP013, Needs Meeting 3/19/2021)
3. Garden Creek – Richlands – Skeggs Branch 69kV line (AEP-2021-AP014, Needs Meeting 3/19/2021)
4. Dismal River – Grundy – Looney Creek 69kV (AEP-2021-AP002, Needs Meeting 1/15/2021)



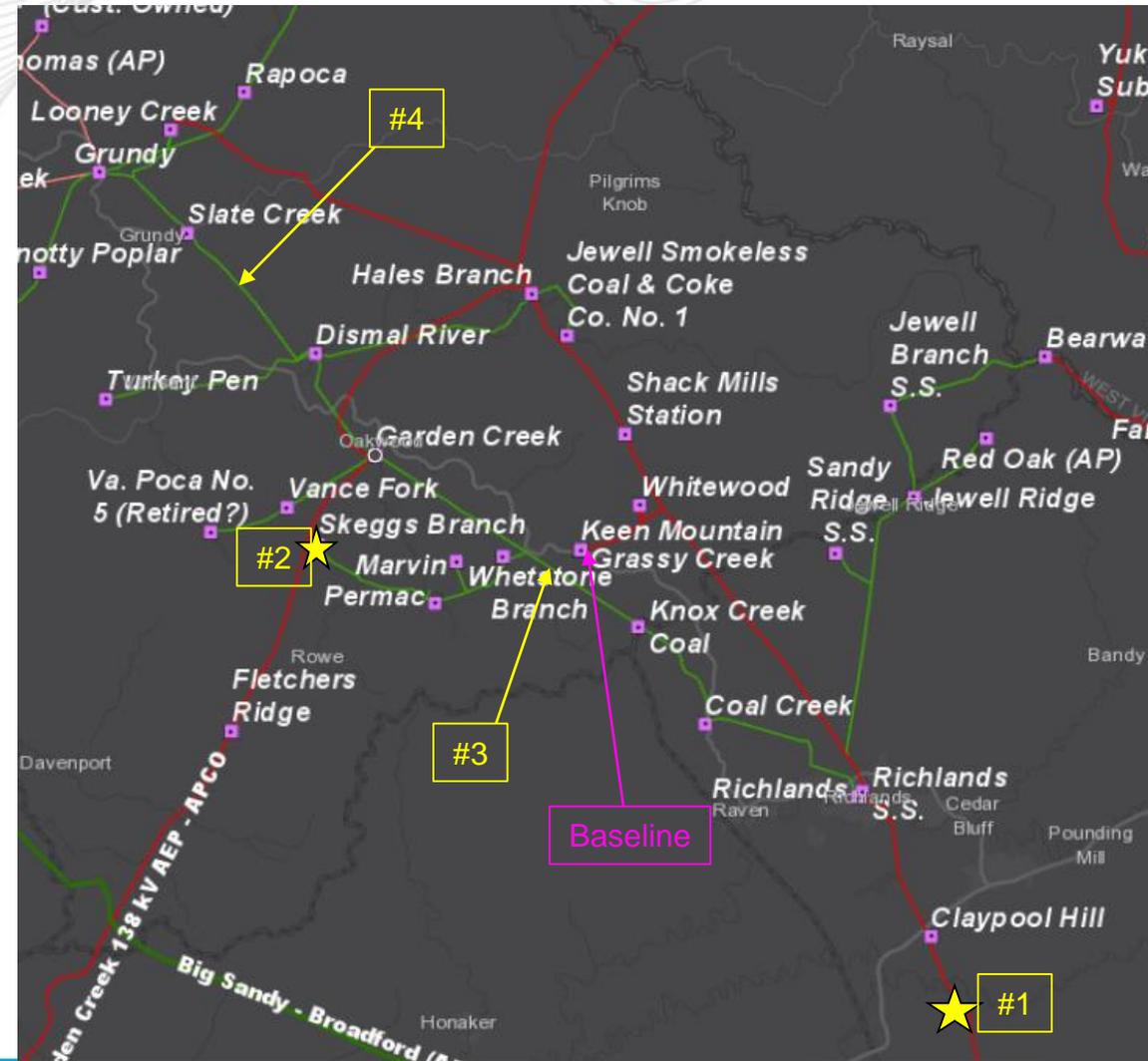


AEP Transmission Zone B3139 – B3141, B3220 Replacement

Current B3139 –B3141 and B3220

Supplemental needs Addressed:

- Part of AEP-2021-AP014
 - Garden Creek – Coal Creek 69kV line section



Holistic Alternative (Previously presented on 8/10/2021 TEAC):

- **Rebuild Skeggs Branch** substation in the clear as Coronado substation. Establish New 138kV and 69kV Buses. Install 138/69kV 130 MVA transformer, 138kV Circuit Switcher, 69kV breaker. Retire Existing Skeggs Branch substation. **(B3333.1) \$ 6.315 M**
- **New ~1.2 mi 138kV extension** to new Skeggs Branch substation location. **(B3333.2) \$ 4.62 M**
- **Install 46.1 MVAR Cap bank** at Whitewood substation along with a 138kV breaker. **(B3333.3) \$ 1.05 M**
- **Rebuild ~9 mi 69kV line** from new Skeggs branch station to Coal Creek 69kV line. **6-wire the short double circuit section** between Whetstone Branch and Str. 340-28 to convert the line to single circuit. **Retire** Garden Creek to Whetstone Branch 69kV line section. **(B3333.4) \$ 26.25 M**
- **Retire** Knox Creek SS. **(B3333.5) \$ 0.06 M**
- **Retire** Horn Mountain SS. This will be served directly from 69kV bus at New Skeggs branch Substation. **(B3333.6) \$ 0.05 M**
- **At Clell SS**, Replace (2) 600A POP Switches and Poles with single 2 Way 1200A POP Switch and Pole. **(B3333.7) \$ 0.34 M**
- **At Permac**, Replace 600A Switch and structure with 2 Way 1200A POP Pole Switch and pole. **(B3333.8) \$ 0.31 M**
- **At Marvin SS**, Replace 600A Switch and structure with 2 Way 1200A POP Pole Switch and pole. **(B3333.9) \$ 0.31 M**
- **At Whetstone Branch substation**, Replace 69kV 600A 2 Way POP Switch with 69kV 1200A 2 Way POP Switch. Remove 69kV to Skeggs Branch (Switch "22" POP). **(B3333.10) \$ 0.568 M**
- **At Garden Creek substation**, Remove 69kV Richlands (via Coal Creek) line (Circuit Breaker F and disconnect switches) and update relay settings. **(B3333.11) \$ 0.138 M**
- **Remote End work** at Clinch River substation. **(B3333.12) \$0.08 M**
- **Remote End work** at Clinchfield substation. **(B3333.13) \$0.08 M**

Total Estimated Cost: \$40.171 M

Projected IS Date: 12/15/2023

Supplemental needs Addressed:

- AEP-2021-AP013: Skeggs Branch substation needs.
- Part of AEP-2021-AP014
 - N.O. at Permac station.
 - Improved sectionalizing capability for multiple substations (Twin Valley SS, Marvin, Clell) being hard tapped to 69kV Line or operated radially.
 - Three – terminals at Whetstone Branch.
 - Garden Creek-Coal Creek line condition
- Part of AEP-2021-AP003: Accommodates New Salmon substation load addition.





Cost Comparison: Solve the same baseline needs and additional supplemental needs

B3139 –B3140, B3220 estimated cost: \$28.6 M
Additional Supplemental estimated cost: \$17.42 M
Total estimated cost: \$46.02 M

Baseline Alternative estimated cost: \$40.13 M
Additional Supplemental estimated cost: \$1 M
Total estimated cost: \$41.13 M

Projected IS Date: 12/15/2023

Projected IS Date: 12/15/2023

Besides ~\$5 M cost saving, the proposed alternative allows for less future work and mitigates duplicity of the Transmission line and substation work in a rugged and mountainous terrain. By rebuilding the line and adding sectionalizing to the Skeggs Branch-Whetstone line as proposed in the alternate, the line between Garden Creek and Whetstone can be retired completely. All additional supplemental work not addressed by the scope change will be presented through the M-3 process as those solutions are developed.



Dominion Transmission Zone: Baseline b3246 Scope / Cost Change

Process Stage: Scope / Cost Change b3246.1-5

Criteria: N-1-1 Load Drop (Summer and Winter), 300 MW Load Loss

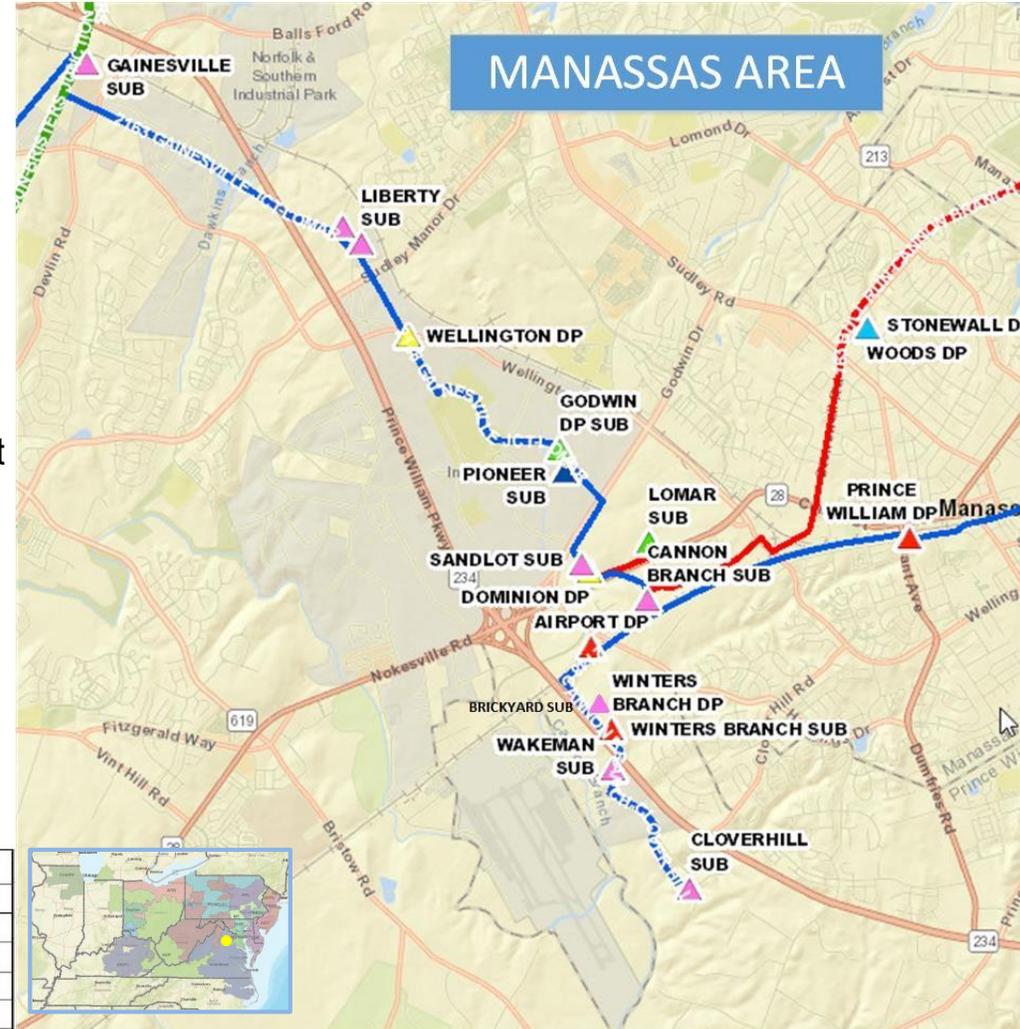
Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP Summer & Winter cases

Proposal Window Exclusion: Immediate Need

Problem Statement:

- Various load drop violations in the Manassas area greater than 300 MW:
 - The loss of 230kV Line #2195 Cannon Branch-Winters Branch and 230kV Line #2196 Pioneer-Sandlot (N2-SLD5, N2-WLD2).
 - The loss of 230kV Line # 2195 Cannon Branch-Winters Branch and 230kV Line #2148 Cloverhill-Sandlot (N2-SLD6, N2-WLD3).
 - The loss of 230kV Line #2195 Cannon Branch-Winters Branch and 230kV Line #2187 Liberty-Pioneer (N2-SLD7 , N2-WLD1).
 - The loss of 230kV Line#2011 Cannon Branch-Liberty and 230kV Line #2187 Liberty-Pioneer (N2-SLD10, N2-WLD6).



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Dominion Transmission Zone: Baseline b3246 Scope / Cost Change

Updated Project Scope:

Based on conversations with NOVEC and the City of Manassas Electric Department during the engineering of the original scope it was determined that four Delivery Points required a scope change.

- 1.) NOVEC Wellington and Godwin Delivery Points will be converted vs. retired.
- 2.) NOVEC is no longer planning a New Wellington Delivery Point.
- 3.) The City of Manassas Lomar Delivery Point will be retired with a new DP established at Cannon Branch.
- 4.) The City of Manassas Dominion Delivery Point will be retired and sourced from an expanded Sandlot DP.

The conversion of 115kV Line #172 Liberty-Lomar and 115kV Line #197 Cannon Branch-Lomar to 230kV to provide a new 230kV source between Cannon Branch and Liberty will **not include** the conversion of 0.36 mile segment of line between Lomar and Cannon Branch junction that will be wrecked and not rebuilt (**b3246.1**). Substation work will be required at Liberty, Wellington, Godwin, Pioneer, Sandlot and Cannon Branch. (**b3246.2**).

Extend Line #2011 Cannon Branch – Clifton to Winters Branch by removing the existing Line #2011 termination at Cannon Branch and extending the line to Brickyard creating Line #2011 Brickyard-Clifton and extending a new line between Brickyard and Winters Branch (**b3246.3**). Substation work will be required at Cannon Branch, Brickyard, and Winters Branch (**b3246.4**).

Replace the Gainesville 230kV 40kA breaker “216192” with a 50kA breaker (**b3246.5**).

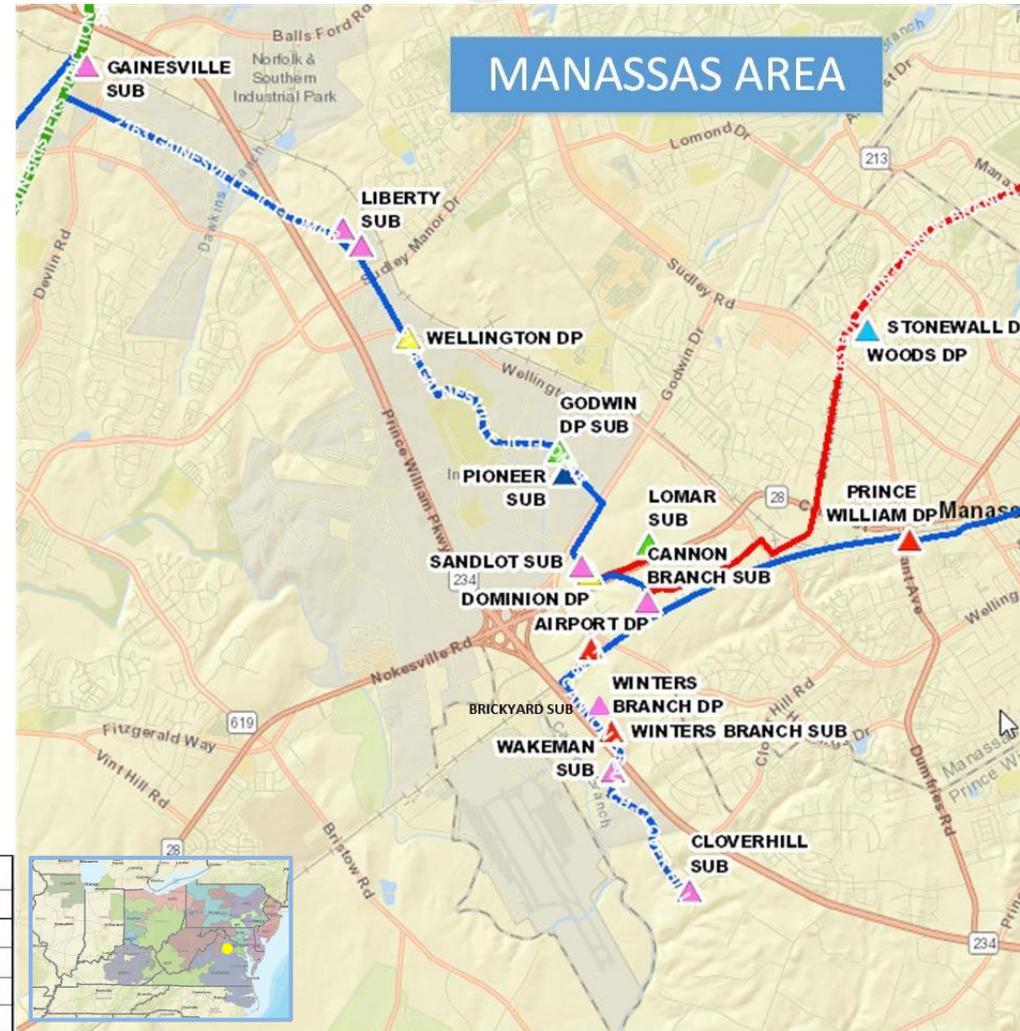
Estimated Cost: ~~\$45.5~~ 38.5 M

- 115kV to 230kV Line Conversion: \$ ~~10.8~~ 8 M (**b3246.1**)
- Substation Work for 115kV to 230kV Line Conversion: \$ ~~24.16~~ 16 M (**b3246.2**)
- 230kV Line #2011 Extension: \$ 10 M (**b3246.3**)
- 230kV Line #2011 Substation Work for Extension: \$ 4 M (**b3246.4**)
- Gainesville 230kV “216192” breaker replacement: \$ 0.5M (**b3246.5**)

Alternatives: N/A

Required In-Service: 6/1/2023

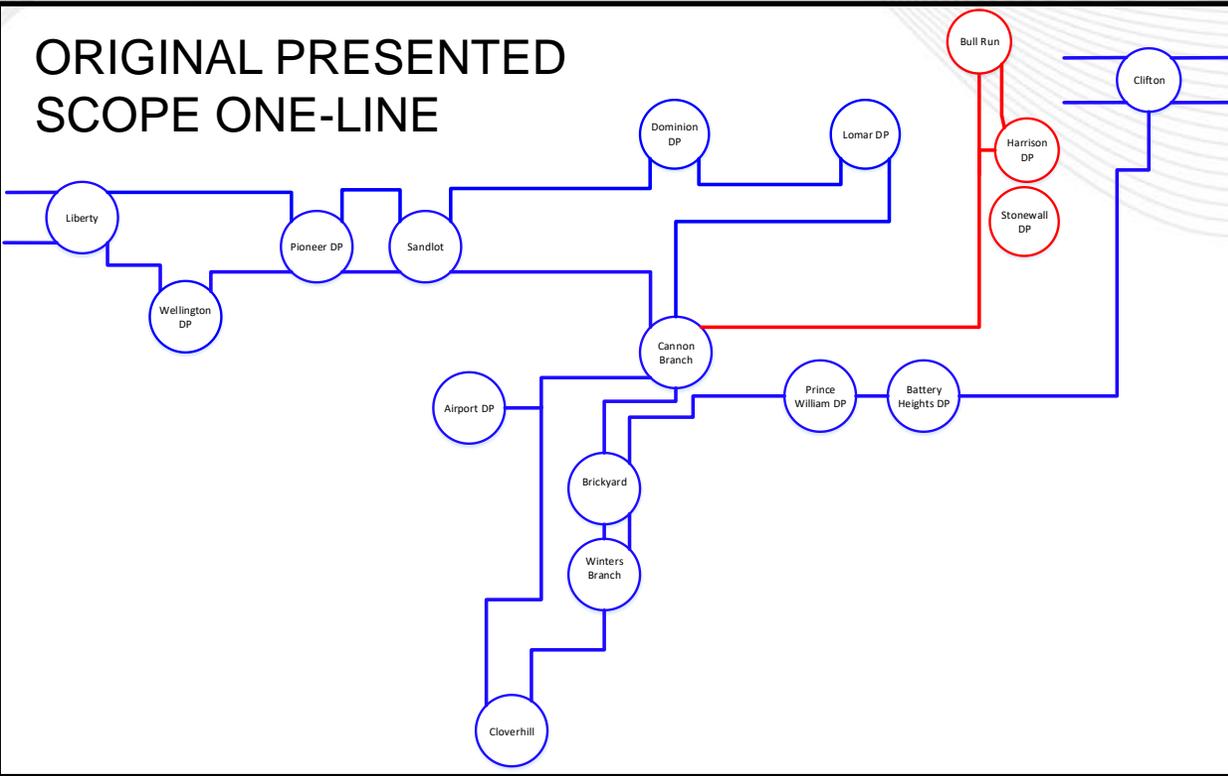
COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
Green	500 KV.	500 thru 599
Blue	230 KV.	200 thru 299 & 2000 thru 2099
Red	115 KV.	1 thru 199
Orange	138 KV.	AS NOTED
Cyan	69 KV.	AS NOTED



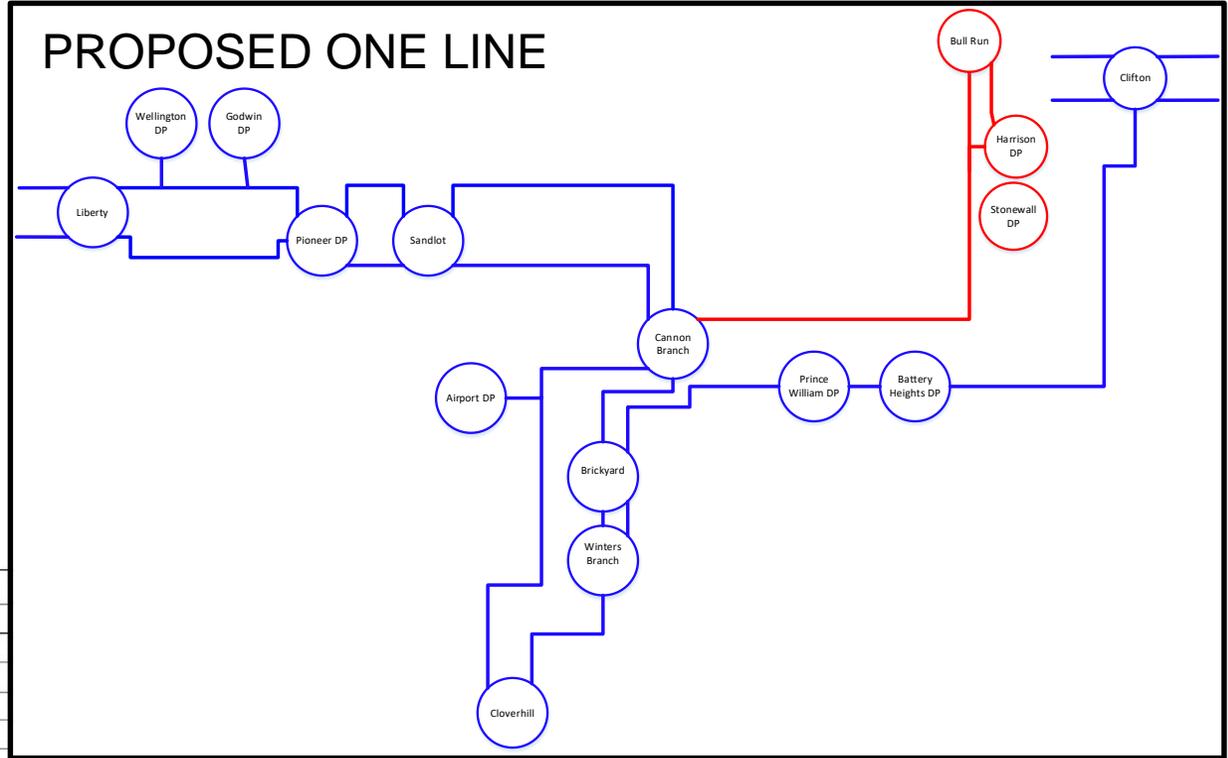


Dominion Transmission Zone: Baseline b3246 Scope / Cost Change

ORIGINAL PRESENTED SCOPE ONE-LINE



PROPOSED ONE LINE



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



2021 RTEP

2021 RTEP 15 Year Analysis									
Season	Contingency	From Bus	From Name	To Bus	To Name	CKT	KVs	Areas	100% Year
Summer	Single	231001	EDGEMR 5	214236	LINWOOD85	1	230/230	235/230	2033
Summer	Single	231001	EDGEMR 5	231000	CLAY_230	1	230/230	235/235	2032
Summer	Single	231000	CLAY_230	214235	LINWOOD84	1	230/230	235/230	2031
Summer	Single	200924	26CANYON	200706	26N.MESHPN	1	230/230	226/226	2027
Winter	Single	200675	26E.TWANDA	200924	26CANYON	1	230/230	226/226	2030
Winter	Single	200924	26CANYON	200706	26N.MESHPN	1	230/230	226/226	2031
Summer	Single	213438	BRADFRD1	213436	BRADFR12	Z	230/230	230/230	2030
Summer	Tower	216950	ROSELAND	217808	CDRGV_Y	1	230/230	231/231	2035
Summer	Tower	270855	POWERTON ; R	349662	7TAZEWELL	1	345/345	222/357	2036

- PJM Manual 14B section C.4.4, the outcome of the long-term deliverability analysis will identify the need to include in the RTEP any:
 - New 230 kV or 345 kV circuits to support load growth in years 6 through 8
 - Right-of way acquisition for any new 230 kV or 345 kV circuits to support load growth in years 9 and 10
 - New 500 kV or greater circuits to support load growth in years 6 through 12
- PJM identified six 230 kV and one 345 kV overload in year 9 ~ 15, but there are no requirements to address the overload at this point
- PJM identified one 230 kV overload in year 6, and will monitor next year

- Current schedule (currently targeting the schedule below)
 - Window 1
 - Opened July 2, 2021
 - Anticipated Close: August 31, 2021
 - Post updates to models and violations as required



2021 SAA Proposal Window to Support NJ OSW

- PJM is soliciting project proposals to build the necessary transmission to meet New Jersey's goal of facilitating the delivery of a total of 7,500 MW of offshore wind through 2035
 - Anticipated Schedule
 - Open Window April 15
 - Pre-bid meeting May 5
 - Close Window September 17 (updated)

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Reliability Analysis Update



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Version No.	Date	Description
1	8/25/2021	<ul style="list-style-type: none">• Original slides posted